

DAMAGE CONTROL BOOKLET
[*SGML VERSION; SEE CHANGE
RECORD*]

INSPECTION, MAINTENANCE, AND
REPAIR

WATERTIGHT CLOSURES

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FOREWORD

The Damage Control Booklet for Watertight Closures, Inspection, Maintenance, and Repair, was prepared by the Naval Sea Systems Command in response to an action item of the Chief of Naval Operation's Damage Control/Fire Fighting Working Group (DC/FF WG). This booklet describes the types of Navy watertight closures and functions, and provides instructions for inspection, maintenance, and repair. In addition, this document enables cross-referencing of vendor part numbers to National Stock Numbers to simplify repair part acquisition. This manual consists of the following:

1. [Chapter 1](#) - Watertight Closures, Functions and Descriptions
2. [Chapter 2](#) - Watertight Closures, Inspection, Maintenance, and Repair
3. [Chapter 3](#) - Door Repair and Replacement
4. [Chapter 4](#) - Hatch Repair
5. [Chapter 5](#) - Scuttle Repair
6. [Chapter 6](#) - Door Latch Devices
7. [Chapter 7](#) - Armored Ballistic Closures
8. [Chapter 8](#) - Special Closures
9. [Appendix A](#) through [Appendix K](#)

The technical point of contact for watertight closure inspection, maintenance, and repair is Department of the Navy, Naval Surface Warfare Center, Carderock Division (NSWCCD-SSES), Hull Outfitting Section, Code 9782, Philadelphia, PA 19112-5083, commercial telephone (215) 897-7344, DSN 443-7344, FAX (215) 897-8027.

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TABLE OF CONTENTS

Chapter/Paragraph	Page
1 WATERTIGHT CLOSURES, FUNCTIONS AND DESCRIPTIONS	1-1
1-1. FUNCTIONS.	1-1
1-2. DESCRIPTIONS.	1-1
1-3. DESCRIPTIONS OF MACHALTS.	1-9
2 WATERTIGHT CLOSURES, INSPECTION, AND MAINTENANCE	2-1
2-1. STEEL CLOSURES.	2-1
2-1.1 SAFETY.	2-1
2-1.2 GENERAL GUIDANCE FOR INSPECTIONS.	2-1
2-1.3 KNIFE-EDGE AND DOOR FRAME INSPECTION.	2-2
2-1.4 GASKET INSPECTION.	2-4
2-1.5 CHALK TEST.	2-4
2-1.5.1 Chalk Test for Doors, Hatches, and Scuttles.	2-5
2-1.5.2 Chalk Test for Navy Standard Raised Watertight Hatches Equipped With "Drop Bolt" Type Dogs.	2-5
2-1.6 INSPECTION OF WATERTIGHT DOORS.	2-5
2-1.6.1 Inspection of Handles.	2-9
2-1.6.2 Inspection of Dog Wedges.	2-9
2-1.6.3 Inspection of Quick-Acting Watertight Door Linkage.	2-10
2-1.6.4 Inspection of Quick-Acting Watertight Door Linkage.	2-10
2-1.7 INSPECTION OF WATERTIGHT HATCHES.	2-10
2-1.8 INSPECTION OF WATERTIGHT SCUTTLES.	2-12
2-1.9 WATERTIGHT/AIRTIGHT DOOR DOG AND HINGE ADJUSTMENT.	2-14
2-1.9.1 Adjustment Method 1 (Gasket Removed).	2-14
2-1.9.2 Adjustment Method 2 (Gasket Installed).	2-15
2-1.9.3 Other Door Maintenance.	2-16
2-1.10 DOG MAINTENANCE.	2-16
2-1.11 DOG SPINDLE LUBRICATION.	2-16
2-1.12 REPLACEMENT OF STICK PACKING AND PACKING PLUNGERS.	2-17
2-1.13 SELF-LUBRICATED BUSHINGS.	2-18
2-1.14 SINTERED BRONZE BUSHINGS WITH ELISHA TECHNOLOGIES EDC 1270 EPL GREASE AND CRES PAINT SHIELD (STEEL DOORS ONLY).	2-18
2-1.15 GASKET MAINTENANCE AND REPLACEMENT.	2-20
2-1.15.1 Removal.	2-20
2-1.15.2 Installation of MIL-R-900 Gasket Rubber.	2-21
2-1.15.3 Installation of ZZ-R-765 Silicone Gasket (MACHALT 167-31004 (ECP-444)).	2-23
2-1.16 DAMAGE CONTROL CLOSURES INSPECTION FORM.	2-23
2-1.17 MAINTENANCE RECORDS.	2-23
2-2. ALUMINUM CLOSURES.	2-25

TABLE OF CONTENTS - Continued

Chapter/Paragraph		Page
	3-1.7.2 Lever Disassembly.	3-12
	3-1.7.3 Conrod Repair.	3-13
	3-1.7.4 Lever Repair.	3-14
	3-1.7.5 Lever Installation.	3-15
	3-1.7.6 Conrod Installation.	3-15
3-1.8	INDIVIDUAL DOG REPAIR.	3-16
	3-1.8.1 Individual Dog Disassembly and Repair.	3-16
	3-1.8.2 Individual Dog Installation.	3-17
	3-1.8.3 Individual Dog Installation - Sintered Bronze Bushings with Elisha Technologies EDC 1270 EPL Grease and CRES Paint Shield.	3-18
3-1.9	WATERTIGHT AND AIRTIGHT DOOR HINGE REPAIR.	3-20
	3-1.9.1 Disassembly and Repair of Hinge Assemblies (On Doors Without MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed).	3-20
	3-1.9.2 Disassembly and Repair of Hinge Assemblies (On Doors With MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed).	3-21
3-1.10	DOG WEDGE REPLACEMENT.	3-23
	3-1.10.1 Replacement of Welded Dog Wedge.	3-23
	3-1.10.2 Replacement of Riveted Dog Wedge.	3-24
	3-1.10.3 Replacement of Machine Screwed Dog Wedge.	3-24
3-1.11	DOOR HANDLE SPRING CLIPS.	3-24
3-1.12	WATERTIGHT DOOR AND FRAME INSTALLATION.	3-24
	3-1.12.1 Preparation of the Bulkhead.	3-25
	3-1.12.2 Installation of the Door Frame.	3-26
	3-1.12.2.1 Steel-to-Steel Installation.	3-26
	3-1.12.2.2 Steel-to-Aluminum Installation.	3-26
	3-1.12.3 Door Installation.	3-27
3-1.13	DOOR FRAME/FLANGE ASSEMBLY REPLACEMENT.	3-27
	3-1.13.1 Flange Type Door Frame Removal and Installation.	3-27
	3-1.13.2 Installation of the Door Frame/Flange Assembly.	3-28
	3-1.13.3 Door Installation.	3-29
3-2.	ALUMINUM DOORS.	3-29
	3-2.1 DOOR REPAIR.	3-29
	3-2.2 DOOR DISASSEMBLY.	3-30
	3-2.3 SPINDLE SLEEVE PREPARATION AND BUSHING INSTALLATION.	3-31
	3-2.4 SELF-LUBRICATED BUSHING INSTALLATION.	3-31
	3-2.5 OPERATING HANDLE REPLACEMENT.	3-33
	3-2.5.1 Operating Handle Disassembly.	3-33
	3-2.5.2 Operating Handle Repair and Replacement.	3-34
3-2.6	CONROD AND LEVER DISASSEMBLY AND REPAIR.	3-36
	3-2.6.1 Conrod Disassembly.	3-36
	3-2.6.2 Lever Disassembly.	3-36
	3-2.6.3 Conrod Repair.	3-36
	3-2.6.4 Lever Repair.	3-36

TABLE OF CONTENTS - Continued

Chapter/Paragraph		Page
	3-2.6.5 Lever Installation.	3-36
	3-2.6.6 Conrod Installation.	3-36
3-2.7	INDIVIDUAL DOG REPAIR.	3-36
	3-2.7.1 Individual Dog Disassembly and Repair.	3-36
	3-2.7.2 Individual Dog Installation.	3-37
3-2.8	WATERTIGHT AND AIRTIGHT DOOR HINGE REPAIR.	3-37
3-2.9	DOG WEDGE REPLACEMENT.	3-39
	3-2.9.1 Replacement of Welded Dog Wedge.	3-39
	3-2.9.2 Replacement of Riveted Dog Wedge.	3-39
	3-2.9.3 Replacement of Machine Screwed Dog Wedge.	3-39
3-2.10	DOOR HANDLE SPRING CLIPS.	3-39
3-2.11	WATERTIGHT DOOR AND FRAME INSTALLATION.	3-39
	3-2.11.1 Preparation of the Bulkhead.	3-39
	3-2.11.2 Installation of the Door Frame.	3-40
	3-2.11.2.1 Aluminum-to-Aluminum Installation.	3-40
	3-2.11.2.2 Steel-to-Aluminum Installation.	3-41
	3-2.11.3 Door Installation.	3-42
3-2.12	DOOR FRAME/FLANGE ASSEMBLY REPLACEMENT.	3-42
	3-2.12.1 Flange Type Door Frame Removal and Installation.	3-42
	3-2.12.2 Installation of the Door Frame/Flange Assembly.	3-43
	3-2.12.3 Door Installation.	3-43
4	HATCH REPAIR	4-1
4-1.	HATCH REPAIR.	4-1
4-2.	HINGE PIN REPLACEMENT.	4-1
4-3.	DOG BOLT REPAIR.	4-1
	4-3.1 DOG BOLT NUT REPLACEMENT.	4-1
	4-3.2 DOG BOLT REPLACEMENT.	4-2
4-4.	QUICK-ACTING HATCH REPAIR.	4-3
5	SCUTTLE REPAIR	5-1
5-1.	SCUTTLE REMOVAL.	5-1
5-2.	DISASSEMBLY AND REPAIR.	5-1
	5-2.1 STEEL SCUTTLES.	5-1
	5-2.2 ALUMINUM SCUTTLES.	5-5
5-3.	SCUTTLE ASSEMBLY.	5-6
	5-3.1 HANDLE INSTALLATION FOR RAISED SCUTTLES.	5-6
	5-3.2 HANDLE INSTALLATION FOR FLUSH SCUTTLES.	5-7
	5-3.3 FINAL ASSEMBLY OF RAISED AND FLUSH SCUTTLES.	5-7

TABLE OF CONTENTS - Continued

Chapter/Paragraph	Page
5-4. INSTALLATION OF SCUTTLE ONTO FRAME.	5-8
6 DOOR LATCH DEVICES	6-1
6-1. FUNCTION.	6-1
6-2. DESCRIPTION.	6-1
6-2.1 COLLECTIVE PROTECTIVE SYSTEM LATCH (MACHALT 167-53008 (ECP-523)).	6-1
6-2.2 DOG ASSIST LATCH (MACHALT 167-53009 (ECP-514)).	6-1
6-3. REPLACEMENT PARTS.	6-2
6-4. INSPECT, CLEAN, AND LUBRICATE LATCH DEVICES (MACHALT 167-53009 (ECP-514) AND MACHALT 167-53008 (ECP-523)).	6-2
6-4.1 SAFETY.	6-2
6-4.2 GENERAL GUIDANCE FOR INSPECTIONS.	6-2
6-4.3 INSPECT, CLEAN, AND LUBRICATE.	6-3
6-4.3.1 Visual Inspection.	6-3
6-4.3.2 Clean and Lubricate.	6-5
7 ARMORED BALLISTIC CLOSURES	7-1
7-1. BALLISTIC DOORS.	7-1
7-2. REPLACEMENT PARTS FOR BALLISTIC CLOSURES.	7-2
7-2.1 QUICK-ACTING (GANG-OPERATED) BALLISTIC CLOSURES.	7-3
7-2.2 SPINDLES FOR BALLISTIC CLOSURES.	7-3
7-2.3 DOG WEDGES.	7-3
7-2.4 DOGS FOR BALLISTIC CLOSURES.	7-4
7-3. BALLISTIC HATCHES.	7-5
7-3.1 BALANCED BALLISTIC HATCHES.	7-5
7-3.2 SHEAVES.	7-6
7-3.3 WIRE ROPE ASSEMBLIES.	7-7
7-3.4 AUTOMATIC CATCH ASSEMBLY.	7-7
7-3.5 SPINDLES.	7-8
7-3.6 BUSHINGS.	7-9
7-3.7 HATCH BEARING PLATE.	7-9
7-3.8 PACKING PLUNGER.	7-10
7-3.9 TURNBUCKLE ASSEMBLIES.	7-10
7-3.10 BALLISTIC HATCH REPLACEMENT PARTS.	7-11
7-4. BALLISTIC SCUTTLES.	7-11
7-4.1 SAFETY CATCH, CATCH BRACKETS, AND CATCH PINS.	7-14
7-4.2 TOOLS.	7-14

TABLE OF CONTENTS - Continued

Chapter/Paragraph	Page
7-5. BALLISTIC (ARMOR) CLOSURE REPLACEMENT PARTS.	7-15
7-5.1 BALLISTIC (ARMOR) DOOR.	7-15
7-5.2 BALLISTIC (ARMOR) HATCH.	7-15
7-5.3 BALLISTIC (ARMOR) SCUTTLE.	7-15
7-5.4 AUTOMATIC CATCH ASSEMBLY.	7-15
8 SPECIAL CLOSURES	8-1
8-1. GENERAL.	8-1
8-2. MANHOLES.	8-1
8-3. HATCHES WITHIN HATCHES.	8-1
8-4. DOORS WITHIN DOORS.	8-1
8-5. OTHER.	8-2
A STANDARD ACRONYMS/ABBREVIATIONS AND GLOSSARY FOR NAVY WATERTIGHT CLOSURES	A-1
GLOSSARY.	A-2
B CHARACTERISTICS OF DOORS, HATCHES, AND SCUTTLES	B-1
B-1. DOOR, METAL, MARINE STRUCTURAL (WITHOUT FIXED LIGHT AND HASP ASSEMBLY)	B-1
B-2. GLASS REINFORCED PLASTIC (GRP) CLOSURES, MARINE (SEE)	B-1
B-3. DOOR, ALUMINUM, MARINE STRUCTURAL	B-1
B-4. HATCH, MARINE	B-1
B-5. SCUTTLE, MARINE	B-2
B-6. HOW TO USE THE INFORMATION IN FIGURES.	B-2
C WATERTIGHT CLOSURE REPLACEMENT PARTS AND WEARING PARTS FOR STANDARD DOORS, HATCHES, AND SCUTTLES	C-1
SECTION I REPLACEMENT PART KITS FOR STANDARD WATERTIGHT DOORS, HATCHES, AND SCUTTLES	C-1
C-1. Self-Lubricated Bushing Kits for Standard Individually Dogged Watertight Doors	C-1
C-2. Self-Lubricated Bushing Kits for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-2

TABLE OF CONTENTS - Continued

Chapter/Paragraph	Page
C-3. Self-Lubricated Bushing Kits for Standard Quick-Acting Watertight Door Operating Handle Assembly	C-3
C-4. Self-Lubricated Bushing Kits for Standard Quick-Acting Watertight Door Linkage Mechanism	C-4
C-5. Self-Lubricated Bushing Kits for Standard Quick-Acting Flush Watertight Scuttles	C-4
C-6. Self-Lubricated Bushing Kits for Standard Quick-Acting Raised Watertight Scuttles	C-5
C-7. Wear Part Replacement Kits for Standard Individually Dogged Watertight Doors	C-5
C-8. Complete Dog Assembly Replacement Parts for Standard Individually Dogged Watertight Doors	C-7
C-9. Wear Part Replacement Kits for Standard Quick-Acting Watertight Doors	C-7
C-10. Complete Operating Handle Assemblies for Standard Quick-Acting Watertight/Airtight Doors	C-8
C-10.1 Lever Side/Handle Side Designation.	C-9
C-11. Spindle and Linkage Wearing Parts for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-9
C-12. Replacement Lever Assemblies for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-11
C-13. Replacement Connecting Rods for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-12
C-14. Replacement Wearing Parts for Hinge Assemblies for Individually Dogged and Quick-Acting Watertight Doors	C-12
C-15. Replacement Wearing Parts for Hinge Assemblies for Standard Quick-Acting Airtight Doors	C-13
C-16. Replacement Wearing Parts for Raised Dog Bolt-Type Watertight Hatches	C-14
C-17. Replacement Parts for 24" x 30", 4-Dog, Raised Quick-Acting Watertight Hatches, Spring Balanced (Rectangular or Oval)	C-16
C-18. Replacement Wearing Parts for Standard Raised and Flush Watertight Scuttles	C-16
C-19. Replacement Wearing Parts for Standard Flush Quick-Acting Watertight Scuttles	C-17
C-20. Replacement Wearing Parts for Standard Raised Quick-Acting Watertight Scuttles	C-18

TABLE OF CONTENTS - Continued

Chapter/Paragraph	Page
SECTION II Complete Parts Lists for Standard Watertight Doors, Hatches, and Scuttles . . .	C-19
C-21. DOORS	C-20
C-22. HATCHES	C-24
C-23. SCUTTLES	C-26
C-24. OTHER	C-27
C-24.1 Ballistic (Armor) Closures	C-33
SECTION III Commercial Sources	C-37
D SPECIAL TOOLS AND MATERIALS	D-1
E MACHALT 167-31004 (ECP-444) DESCRIPTION AND PARTS INFORMATION	E-1
F MACHALT 167-31006 (ECP-486) DESCRIPTION AND PARTS INFORMATION	F-1
G MACHALT 167-53009 (ECP-514) DESCRIPTION AND PARTS INFORMATION	G-1
H MACHALT 167-31006 (ECP-518) DESCRIPTION AND PARTS INFORMATION	H-1
I MACHALT 167-53008 (ECP-523) DESCRIPTION AND PARTS INFORMATION	I-1
J MACHALT 167-31010 (ECP-526) DESCRIPTION AND PARTS INFORMATION	J-1
K MACHALT 167-31011 (ECP-538) DESCRIPTION AND PARTS INFORMATION	K-1

LIST OF TABLES

Table	Title	Page
A-1.	List of Acronyms/Abbreviations	A-1
B-1.	Information Listed for Each Figure	B-2
C-1.	Self-Lubricated Bushing Kits for Standard Individually Dogged Watertight Doors . .	C-1
C-2.	Self-Lubricated Bushing Kits for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-2
C-3.	Self-Lubricated Bushing Kits for Standard Quick-Acting Watertight Door Operating Handle Assembly	C-3
C-4.	Self-Lubricated Bushing Kits for Standard Quick-Acting Watertight Door Linkage Mechanism	C-4
C-5.	Self-Lubricated Bushing Kits for Standard Quick-Acting Flush Watertight Scuttles .	C-5
C-6.	Self-Lubricated Bushing Kits for Standard Quick-Acting Raised Watertight Scuttles	C-5
C-7.	Wear Part Replacement Kits for Standard Individually Dogged, 6-Dog, Watertight Seal Door With 1-1/8" Spindles	C-5
C-8.	Wear Part Replacement Kits for Standard Individually Dogged, 6-Dog, Watertight Aluminum Door With 1-1/8" Spindles	C-6
C-9.	Wear Part Replacement Kits for Standard Individually Dogged, 6-Dog, Watertight Door With 1" Spindles	C-6
C-10.	Complete Dog Assembly Replacement Parts for Standard Individually Dogged, 6-Dog, 1-1/8" Spindle Size Watertight Door	C-7
C-11.	Complete Dog Assembly Replacement Parts for Standard Individually Dogged, 6-Dog, 1" Spindle Size Watertight Doors	C-7
C-12.	Wear Part Replacement Kits for 6-Dog, Steel, QAWT Door	C-7
C-13.	Wear Part Replacement Kits for 6-Dog, Aluminum, QAWT Door	C-8
C-14.	Operating Handle Assemblies for Lever Side/Handle Side Designation Doors	C-9
C-15.	WTC Kit for Spindle and Linkage Wearing Parts for Standard 8- and 10-Dog QAWT Door	C-10
C-16.	WTC Kit Mod for Spindle and Linkage Wearing Parts for Standard 8- and 10-Dog QAWT Door	C-10
C-17.	Linkage and Spindle Wear Parts for Standard 8- and 10-Dog QAWT Aluminum Door	C-11
C-18.	Replacement Lever Assemblies for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-11

LIST OF TABLES - Continued

Table	Title	Page
C-19.	Replacement Connecting Rods for Standard 8- and 10-Dog Quick-Acting Watertight Doors	C-12
C-20.	Replacement Wearing Parts for Hinge Assemblies for Individually Dogged and Quick-Acting Watertight Doors	C-13
C-21.	Replacement Wearing Parts for Hinge Assemblies for Standard Quick-Acting Airtight Doors	C-13
C-22.	Replacement Wearing Parts for Raised Dog Bolt-Type Watertight Hatches	C-14
C-23.	Repair Parts List	C-15
C-24.	Replacement Parts for 24" x 30", 4-Dog, Raised Quick-Acting Watertight Hatches, Spring Balanced (Rectangular or Oval)	C-16
C-25.	Replacement Wearing Parts for Standard Raised and Flush Watertight Scuttles . . .	C-17
C-26.	Replacement Wearing Parts for Standard Flush Quick-Acting Watertight Scuttles . .	C-17
C-27.	Replacement Wearing Parts for Standard Raised Quick-Acting Watertight Scuttles .	C-19
C-28.	Individually Dogged Watertight Doors	C-20
C-29.	26" x 66", 8-Dog, Quick-Acting Watertight Doors	C-21
C-30.	26" x 66", 10-Dog, Quick-Acting Watertight Doors	C-21
C-31.	26" x 66", 3-Dog, Quick-Acting Watertight Doors	C-22
C-32.	Raised Drop Bolt-Type Watertight Hatches	C-24
C-33.	24" X 30", 4-Dog, Raised Quick-Acting Watertight Hatch, Spring Balanced	C-25
C-34.	Flush Individually Dogged Watertight Hatches, Light Dog	C-25
C-35.	Flush Individually Dogged Watertight Hatches, Heavy Dog	C-25
C-36.	18", 21", and 25" Flush and Raised Quick-Acting Watertight Scuttles	C-26
C-37.	Raised Quick-Acting Watertight Scuttles	C-26
C-38.	Flush Quick-Acting Watertight Scuttles	C-26
C-39.	Watertight Aluminum Closures	C-27
C-40.	Sliding Dog Quick-Acting Watertight Doors	C-28
C-41.	Individually Dogged, Watertight Mild Steel Doors with Self-Lubricated Stainless Steel (CRES) Bushings	C-29
C-42.	Quick-Acting, Watertight Mild Steel Doors with Self-Lubricated Stainless Steel (CRES) Bushings	C-31

LIST OF TABLES - Continued

Table	Title	Page
C-43.	Individually Dogged Doors	C-33
C-44.	Quick-Acting Doors	C-34
C-45.	Individually Dogged and Quick-Acting Hatches	C-34
C-46.	Variations by Drawing for Individually Dogged and Quick-Acting Hatches	C-35
C-47.	Individually Dogged and Quick-Acting Scuttles (18", 21", or 25")	C-36
C-48.	Varfiations for Individually Dogged and Quick-Acting Scuttles (18", 21", or 25") . .	C-36
C-49.	Commercial Sources for Watertight Closures	C-37
D-1.	Special Tools And Materials	D-1
E-1.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31004 (ECP-444)	E-1
E-2.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31004 (ECP-444)	E-1
F-1.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-486)	F-1
F-2.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-486)	F-1
F-3.	STEEL INDIVIDUALLY DOGGED WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-486)	F-1
F-4.	STEEL INDIVIDUALLY DOGGED WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-486)	F-1
G-1.	STEEL QUICK-ACTING AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-53009 (ECP-514)	G-1
H-1.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-6, 7, AND 8 ONLY)	H-1
H-2.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-6, 7, AND 8 ONLY) . . .	H-1
H-3.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-10 ONLY)	H-2
H-4.	STEEL INDIVIDUALLY DOGGED WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-10 ONLY)	H-2
I-1.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-53008 (ECP-523)	I-1

LIST OF TABLES - Continued

Table	Title	Page
I-2.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-53008 (ECP-523)	I-1
J-1.	STEEL QUICK-ACTING WATERTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31010 (ECP-526)	J-1
J-2.	STEEL QUICK-ACTING WATERTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31010 (ECP-526)	J-1
J-3.	STEEL INDIVIDUALLY DOGGED WATERTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31010 (ECP-526)	J-2
J-4.	STEEL INDIVIDUALLY DOGGED WATERTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31010 (ECP-526)	J-2
K-1.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31011 (ECP-538) (APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH BUSHIPS DWG. 805-1400054)	K-1
K-2.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS INSTALLED AS A RESULT OF MACHALT 167-31011 (ECP-538) (APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH BUSHIPS DWG. 805-1400054)	K-1
K-3.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31011 (ECP-538) (APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH NAVSEA DWG. 803-6397269)	K-2
K-4.	STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS INSTALLED AS A RESULT OF MACHALT 167-31011 (ECP-538) (APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH NAVSEA DWG. 803-6397269)	K-2

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1.	Individually Dogged Watertight Door	1-1
1-2.	Quick-Acting Watertight Door	1-2
1-3.	Quick-Acting Airtight Door	1-2
1-4.	Raised Watertight Hatch	1-3
1-5.	Raised Watertight Hatch with Scuttle	1-3
1-6.	Raised Watertight Scuttle	1-4
1-7.	Flush Watertight Scuttle	1-4
1-8.	Flush Watertight Hatch	1-4
1-9.	Ramped Low Profile Hatch (6,000 Lb Wheel Load)	1-5
1-10.	Flush Watertight Scuttle (6,000 Lb Wheel Load)	1-6
1-11.	Ramped Low Profile Scuttle (6,000 Lb Wheel Load)	1-6
1-12.	Watertight Manhole Cover	1-7
1-13.	Watertight Quick-Acting Ballistic Door	1-7
1-14.	Watertight Individually Dogged Ballistic Door	1-8
1-15.	Glass-Reinforced Plastic Quick-Acting Watertight Door	1-8
1-16.	Glass-Reinforced Plastic Individually Dogged Watertight Door	1-8
1-17.	Fixed Light	1-9
1-18.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31004 (ECP-444)	1-10
1-19.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31006 (ECP-486)	1-11
1-20.	Dogging Assist Latch Installed by MACHALT 167-53009 (ECP-514)	1-12
1-21.	Quick-Acting Watertight Door Hinge Assembly Modified by MACHALT 167-31006 (ECP-518)	1-13
1-22.	Collective Protective System (CPS) Door Latch Installed by MACHALT 167-53008 (ECP-523)	1-14
1-23.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)	1-15
1-24.	Quick-Acting Watertight/Airtight Door Hinge Assembly Modified by MACHALT 167-31011 (ECP-538)	1-16

LIST OF ILLUSTRATIONS - Continued

Figure	Title	Page
2-1.	Knife-Edge Inspection Using Straightedge Method	2-2
2-2.	Knife-Edge Inspection Using String Method	2-3
2-3.	Knife-Edge Inspection for Warpage	2-3
2-4.	Gauge for Measuring Knife-edge Height	2-4
2-5.	Gasket Inspection	2-4
2-6.	Hinge Pin Assemblies	2-6
2-7.	Quick-Acting Door Dog Assembly (Cross Sectional View)	2-7
2-7A.	Quick-Acting Door Dog Lever Assembly (Cross Sectional View) Modified by MACHALT 167-31004 (ECP-444)	2-8
2-7B.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)	2-8
2-8.	Watertight Door Wedges	2-10
2-9.	Quick-Acting Watertight Door Lever and Connecting Rod Studs	2-10
2-10.	Dog Bolt Assembly	2-11
2-11.	Hatch Cover Brace and Toggle Bolt	2-12
2-12.	Quick-Acting Watertight Scuttle Spindles	2-12
2-13.	Quick-Acting Watertight Scuttle Handwheels	2-13
2-14.	Dogging Arm Assembly	2-13
2-15.	Locking Arm/Brace Link	2-14
2-16.	Locking Arm/Brace Link	2-15
2-17.	Packing Plunger Locations	2-17
2-17A.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31004 (ECP-444)	2-19
2-17B.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)	2-19
2-18.	Gasket Removal	2-21
2-19.	Damage Control Closures Inspection Form	2-24
2-20.	Knife-Edge Inspection Using Straightedge Method	2-25
2-21.	Knife-Edge Inspection Using String Method	2-25

LIST OF ILLUSTRATIONS - Continued

Figure	Title	Page
2-22.	Knife-Edge Inspection for Warpage	2-26
2-23.	Gauge for Measuring	2-26
2-24.	Hinge Pin Assemblies	2-28
2-25.	Quick-Acting Door Dog Assembly (Cross Sectional View)	2-29
2-25A.	Quick-Acting Door Dog Lever Assembly (Cross Sectional View) Modified by MACHALT 167-31004 (ECP-444)	2-29
2-26.	Dog Bolt Assembly	2-31
2-27.	Hatch Cover Brace and Toggle Bolt	2-31
2-28.	Quick-Acting Watertight Scuttle Spindles	2-32
2-29.	Quick-Acting Watertight Scuttle Handwheels	2-33
2-30.	Dogging Arm Assembly	2-33
2-31.	Locking Arm/Brace Link	2-34
3-1.	Quick Acting Door Levers	3-2
3-1A.	Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)	3-6
3-2.	Quick-Acting Operating Handle Assembly (Left-Hand Shown)	3-8
3-3.	Quick-Acting Operating Handle Temporary Repair	3-9
3-4.	Quick-Acting Door Lever Assembly	3-12
3-4A.	Quick-Acting Door Lever Assembly Modified by MACHALT 167-31010 (ECP-526)	3-13
3-5.	Conrod Removal and Installation Tool	3-14
3-6.	Conrod Location Guide	3-16
3-7.	Individual Dog Assembly	3-17
3-7A.	Individual Dog Assembly Modified by MACHALT 167-31010 (ECO-526)	3-17
3-8.	Watertight Door Hinge Components (For Doors Without MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed)	3-21
3-8A.	Watertight Door Hinge Components (For Doors With MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed)	3-22
3-9.	Dog Wedges	3-23

LIST OF ILLUSTRATIONS - Continued

Figure	Title	Page
3-10.	Spring Clip Assemblies	3-25
3-11.	Methods of Securing Welded Structure	3-25
3-12.	Dielectric Tape Installation	3-27
3-13.	Quick Acting Door Levers	3-30
3-14.	Quick-Acting Operating Handle Temporary Repair	3-34
3-15.	Individual Dog Assembly	3-37
3-15A.	Individual Dog Assembly with Self-Lubricating Bushings	3-37
3-16.	Watertight Door Hinge Components	3-38
3-17.	Methods of Securing Welded Structure	3-40
3-18.	Dielectric Tape Installation	3-41
4-1.	Watertight Hatch Hinge Assembly	4-1
4-2.	Watertight Hatch Dog Bolt Mechanism	4-2
4-3.	Removing Dog Pad Pin	4-3
5-1.	Raised Scuttle Components	5-2
5-2.	Scuttle Components	5-3
5-3.	Flush Scuttle Components	5-3
5-4.	Scuttle Spindles	5-4
5-5.	Dog Cam	5-5
6-1.	Door Latch Device	6-1
6-2.	Latch Device Assembly Replacement Parts	6-3
6-3.	Latch Device	6-4
7-1.	Armored Ballistic Closures, Individually Dogged	7-1
7-2.	Gasket Retainer (Corner and Straight)	7-1
7-3.	Gasket	7-2
7-4.	Straight Handle Bushing, Dog Setscrew, and Corner Dogs	7-2
7-5.	Armored Ballistic Closures, Tri-Hinged	7-2

LIST OF ILLUSTRATIONS - Continued

Figure	Title	Page
7-6.	Quick-Acting (Gang Operated_ Ballistic Closure (Open and Closed Position)	7-3
7-7.	Linkage Assembly (Typical)	7-4
7-8.	Spiders for Ballistic Closures	7-4
7-9.	Dog Wedges (Right-Hand/Left-Hand)	7-4
7-10.	Quick-Acting (Gang Operated) Ballistic Closure Wear Parts	7-5
7-11.	Typical Hatch	7-6
7-12.	Spring Casing Assembly	7-7
7-13.	Cable Assembly Wire Rope	7-7
7-14.	Automatic Catch Assembly	7-8
7-15.	Spindle, Split Bushing, Dog and Dog Setscrew, Packing Plunger, Bearing Plate, Wedge (Right-Hand/Left-Hand), and Bearing Washer	7-9
7-16.	Turnbuckle Assembly	7-10
7-17.	Turnbuckle Assembly Parts	7-10
7-18.	Typical Scuttle	7-11
7-19.	Straight Handle Dog, Corner Dogs, and Dog Setscrew	7-12
7-20.	Ballistic Scuttle	7-12
7-21.	Scuttle Gears	7-13
7-22.	Handwheels and Wrenches	7-13
7-23.	Safety Catch	7-14
8-1.	Manholes	8-2
8-2.	Doors Within Doors	8-2
B-1.	DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 1 of 4)	B-3
B-1.	DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 2 of 4)	B-4
B-1.	DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 3 of 4)	B-5
B-1.	DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 4 of 4)	B-6

LIST OF ILLUSTRATIONS - Continued

Figure	Title	Page
B-2.	DOOR, METAL, MARINE STRUCTURAL (Standard Nontight Doors)	B-7
B-3.	DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Airtight Doors)	B-8
B-4.	DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 1 of 4)	B-9
B-4.	DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 2 of 4)	B-10
B-4.	DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 3 of 4)	B-11
B-4.	DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 4 of 4)	B-12
B-5.	DOOR, ALUMINUM, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 1 of 2)	B-13
B-5.	DOOR, ALUMINUM, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 2 of 2)	B-14
B-6.	DOOR, ALUMINUM, MARINE STRUCTURAL (Individually Dogged Watertight Doors) (Sheet 1 of 2)	B-15
B-6.	DOOR, ALUMINUM, MARINE STRUCTURAL (Individually Dogged Watertight Doors) (Sheet 2 of 2)	B-16
B-7.	HATCHES, MARINE (Standard Companion Raised Watertight Hatches (With Scuttle, Without Catch Assembly))	B-17
B-8.	HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 1 of 5)	B-18
B-8.	HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 2 of 5)	B-19
B-8.	HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 3 of 5)	B-20
B-8.	HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 4 of 5)	B-21
B-8.	HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 5 of 5)	B-22
B-9.	HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 1 of 5)	B-23
B-9.	HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 2 of 5)	B-24

LIST OF ILLUSTRATIONS - Continued

Figure	Title	Page
B-9.	HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 3 of 5)	B-25
B-9.	HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 4 of 5)	B-26
B-9.	HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly)) (Sheet 5 of 5)	B-27
B-10.	HATCHES, MARINE (Standard Quick-Acting Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))	B-28
B-11.	HATCHES, MARINE (Standard Quick-Acting Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))	B-29
B-12.	HATCHES, MARINE (Standard Quick-Acting Spring Balanced Flush Watertight Hatches (Without Scuttle))	B-30
B-13.	HATCHES, MARINE (Standard Quick-Acting Spring Balanced Raised Watertight Hatches (Without Scuttle and Hasp Assembly))	B-31
B-14.	SCUTTLE, MARINE (Standard Quick-Acting Flush Watertight Scuttles (Operation: Wrench Above, Handwheel Below))	B-32
B-15.	SCUTTLE, MARINE (Standard Quick-Acting Raised Watertight Scuttles (Handwheel Above and Below))	B-33
B-16.	SCUTTLE, MARINE (Standard Quick-Acting Flush Watertight Scuttles (Handwheel Above and Below))	B-34

SAFETY SUMMARY

GENERAL SAFETY NOTICES The following general safety notices supplement the specific warnings and cautions appearing in this manual. General and specific precautions must be understood and applied during operation and maintenance of the equipment covered herein. The Commanding Officer or other authority will issue orders necessary for any situation not covered in these general and specific safety precautions.

DO NOT REPAIR OR ADJUST ALONE Under no circumstances should repair or adjustment of energized equipment be attempted alone. The immediate presence of someone capable of rendering aid is required. Before making adjustments, be sure to protect against grounding. If possible, adjustments should be made with one hand, with the other hand free and clear of equipment. Even when power has been removed from equipment circuits, dangerous potentials may still exist due to retention of charges by capacitors. Circuits must be grounded and all capacitors discharged prior to attempting repairs.

TEST EQUIPMENT Make certain test equipment is in good condition. If a test meter must be held, ground the case of the meter before starting measurement. Do not touch live equipment or personnel working on live equipment while holding a test meter. Some types of measuring devices should not be grounded; such devices should not be held when taking measurements.

FIRST AID An injury, no matter how slight, should never go unattended. Always obtain first aid or medical attention immediately.

RESUSCITATION Personnel working with or near high voltage shall be familiar with approved resuscitation methods. If someone is injured and stops breathing, initiate resuscitation immediately. A delay could cost the victim's life. Refer to Naval Ships Technical Manual, Chapter 300.

GENERAL PRECAUTIONS The following general precautions are to be observed at all times:

1. All electrical components associated with equipment shall be installed and grounded in accordance with applicable Navy regulations and approved shipboard practices.
2. All maintenance operations shall comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 series.
3. Special precautionary measures are essential to prevent applying power to equipment at any time maintenance work is in progress.
4. Do not make any unauthorized alterations to equipment.
5. Before working on electrical equipment, use voltmeter to ensure that system is not energized.
6. All circuits not known to be dead must be considered live and dangerous at all times.
7. Do not wear loose clothing while working around rotating parts of machinery.
8. When working near electricity, do not use metal rules, flashlights, metallic pencils, or any other objects having exposed conducting material.
9. Be sure to deenergize all equipment before connecting or disconnecting meters or test leads.
10. When connecting a meter to terminals for measurement, use range higher than expected voltage.
11. Before operating equipment or performing any tests or measurements, ensure that frames of all motors and starter panels are securely grounded.

SAFETY SUMMARY - Continued

12. Ensure that area is well ventilated when using cleaning solvent. Avoid prolonged breathing of fumes and solvent contact with skin or eyes.

WARNING

Ensure the hatch escape route is free of personnel before securing the hatch. (Page 2-1)

WARNING

Prior to lubricating this type of dog assembly, ensure all dogs are adjusted for 1/8-inch gasket compression. If dogs are adjusted after lubrication, the grease will be forced out of the sleeve and onto the deck and other parts of the door. Protect deck area below with rags or drop cloth prior to lubrication. (Page 2-19)

WARNING

Gasket channels on doors that have radio frequency shielded gaskets (wire impregnated) must be free of paint to ensure proper grounding. (Page 2-20)

WARNING

Be careful not to pull on the gasket in a direct line with your face. The pliers could slip and cause injury. (Page 2-21)

WARNING

All tag-out procedures must be in accordance with current shipboard instructions. (Page 2-23, page 6-3)

WARNING

Ensure the space below is unmanned before closing and dogging the hatch when checking hinge pins for wear. (Page 2-32)

WARNING

Ensure hands are out of the clear opening when conducting this test. (Page 2-34)

WARNING

Exercise caution when using flammable solvent. (Page 3-2, page 3-3, page 3-8, page 3-32, page 3-34)

WARNING

The adhesive/sealant is hazardous material. (Page 3-4)

WARNING

Use caution when working with flammable solvent. (Page 3-16, page 3-31, page 3-36)

WARNING

Ensure a minimum 2-inch hand clearance exists between the door dogging handle and any latch device component. (Page 6-5)

WARNING

Respiratory protective equipment must be worn if exhaust ventilation (fixed or portable) is not in operation or is inadequate. If unsure whether ventilation is adequate, consult work center supervisor. (Page 6-6)

WARNING

Wear safety goggles when wire brushing with power drill. (Page 6-6)

CAUTION

A knife-edge that is too high will damage the gasket; a knife-edge that is too low will damage the hinges as a result of overadjusting the door in attempting to maintain a watertight seal. (Page 2-3, page 2-26)

CAUTION

During installation of new gasket, no splices are allowed. Gasket should be one continuous length. (Page 2-4)

CAUTION

When inspecting hinge pins for wear, ensure the space below is unmanned before closing and dogging the hatch. (Page 2-11)

CAUTION

Ensure hands are out of the clear opening when conducting this test. (Page 2-13)

CAUTION

Under no circumstances should a wire brush or metal scraper be used. Any metal tool can cut or score the rubber. (Page 2-20)

CAUTION

Prevent petroleum products from coming into contact with rubber gaskets. These products destroy the gasket material. (Page 2-20)

CAUTION

Do not locate the joint in a radius portion of the closure. (Page 2-21)

CAUTION

Do not use any lubricant other than silicone compound. (Page 2-22)

CAUTION

Do not use petroleum-based products on the gasket. (Page 2-23)

CAUTION

Use extreme care when driving the plug with a soft-faced hammer. Lay the spindle on wood or other soft material. Avoid metal-to-metal contact. It may be necessary to use a 1/4-inch or slightly smaller diameter drift punch to drive the plug. Avoid striking the spindle. (Page 3-4, page 3-32)

CAUTION

Do not force the bushing or attempt to drive it with a mallet or hammer. The self-lubricated bushing has a Teflon ring that can be easily damaged. (Page 3-4, page 3-32)

CAUTION

Do not force the bushing or attempt to drive it with a mallet or hammer. (Page 3-4)

CAUTION

Do not tighten the setscrew. (Page 3-4, page 3-33)

CAUTION

When trial fitting or installing the new flanged bushing, do not force or attempt to drive it onto the spindle or into the spindle sleeve with a mallet or hammer, as flanged bushing O-rings can easily be damaged. The flanged bushing should slide on with normal hand pressure. (Page 3-5, page 3-19)

CAUTION

Do not allow the threads of the spindle shaft to come in contact with the interior of the flanged bushing or the spindle sleeve. (Page 3-6, page 3-7, page 3-19)

CAUTION

Do not sand or paint bearing surfaces. (Page 3-9, page 3-14, page 3-15, page 3-34)

CAUTION

Do not sand and paint parts that are made of CRES. An easy way to differentiate between plated steel and CRES is with a magnet. Plated steel will attract the magnet; stainless steel will not. (Page 3-9, page 3-14, page 3-15, page 3-34)

CAUTION

Use extreme care when driving the plug with a hammer. Lay the shaft on wood or other soft material. Avoid metal-to-metal contact. It may be necessary to use a 1/4-inch or slightly smaller diameter drift pin to drive the plug. Avoid striking the shaft, and do not remove the packing plunger. (Page 3-9, page 3-35)

CAUTION

If replacing the bushings with self-lubricated ones, trial fit the new bushings to the hand lever shaft. Do not attempt to force the bushings or drive the bushings with a mallet or hammer. The self-lubricated bushing has a Teflon seal ring that can easily be damaged. The bushing should slide onto the shaft with normal hand pressure. (Page 3-9)

CAUTION

Do not allow the threads of the shaft to come into contact with the interior of the bushing. (Page 3-10, page 3-35)

CAUTION

When trial fitting or installing the new flanged bushing, do not force or attempt to drive bushing onto the spindle or into the spindle sleeve with a mallet or hammer, as flanged bushing O-rings can easily be damaged. The flanged bushing should slide on with normal hand pressure. (Page 3-11)

CAUTION

To prevent damage to O-rings, do not allow the threads of the spindle to come in contact with the interior of the flanged bushings. (Page 3-11)

CAUTION

Do not allow the threads of the dog and spindle shaft to come in contact with the interior of the flanged bushing or spindle sleeve or straight bushing. (Page 3-19)

CAUTION

Keep the heat even so as not to draw and warp the assembly. (Page 3-28, page 3-43)

CAUTION

Do not force or attempt to drive the bushing with a mallet or hammer. (Page 3-32)

CAUTION

The adhesive/sealant is hazardous material. (Page 3-33)

CAUTION

If replacing the bushings with self-lubricated bushings, trial fit the new bushings to the hand lever shaft. Do not attempt to force or drive the bushings with a mallet or hammer. The self-lubricated bushing has a Teflon seal ring that can easily be damaged. The bushing should slide onto the shaft with normal hand pressure. (Page 3-35)

CAUTION

Use only a flat file to smooth the metal; never grind aluminum. (Page 3-42)

CAUTION

Do not grind the weld flush. (Page 4-3)

CAUTION

The gasket must be removed from the scuttle before working with an oxy-acetylene torch; otherwise, the heat will destroy the gasket. (Page 5-3)

CAUTION

Do not apply heat to remove dog adjusting bolt. (Page 5-5)

CAUTION

Ensure that thrust washers are installed between the contact surface of the flanged bushings and the inside and outside handles. Missing thrust washers will result in damage to the self-lubricating lining on the flanged face of the bushing. (Page 6-5)

CAUTION

Do not allow latch bar to hang freely, supported only by the extension spring, as damage to extension spring may occur. Support latch bar with extension spring by taping it to the door panel with duct tape. (Page 6-6)

CAUTION

Under no circumstances should abrasive cloth, wire brush, or metal scraper be used to clean latch spindles, inside surface of spindle sleeves, or thrust washers, as this will damage machined surfaces of these components. (Page 6-6)

CHAPTER 1

WATERTIGHT CLOSURES, FUNCTIONS AND DESCRIPTIONS

1-1. FUNCTIONS.

The primary function of watertight closures, including doors, hatches, and scuttles, is to provide access and to prevent progressive flooding. The secondary function is to control the spread of fire, toxic vapors, and smoke. Doors, hatches, and scuttles allow movement of personnel throughout the ship. Dogged manhole covers and bolted manhole plates allow access to those compartments, tanks, and voids that are not frequently accessed, but must sometimes be entered to perform material inspections, surveys, and maintenance. The function of manhole covers and plates is to contain or prevent liquids from entering or leaving the space of a void, tank, or cofferdam.

1-2. DESCRIPTIONS.

The watertight closures are described as follows:

- a. Individually Dogged Watertight Doors. (See [figure 1-1](#).) These doors are either 4-, 6-, 8-, 10-, or 12-dogged and watertight. These doors provide access/egress to compartments that are not high usage spaces and which do not require rapid access such as paint lockers, deck gear lockers, or storerooms. The 10-dog doors are usually found below the V-lines in order to maintain a higher degree of watertight integrity.

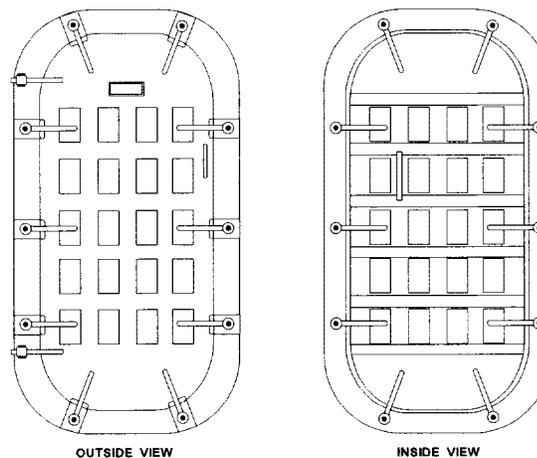


Figure 1-1. Individually Dogged Watertight Door

- b. Quick-Acting Watertight Doors. (See [figure 1-2](#).) These doors are used for routine passage and access/egress into the superstructure from the weather decks, main passageways, or manned spaces such as the Combat Information Center (CIC), Radio Central, Machinery Control Central, or Damage Control Central. These doors are usually placed in high traffic areas.

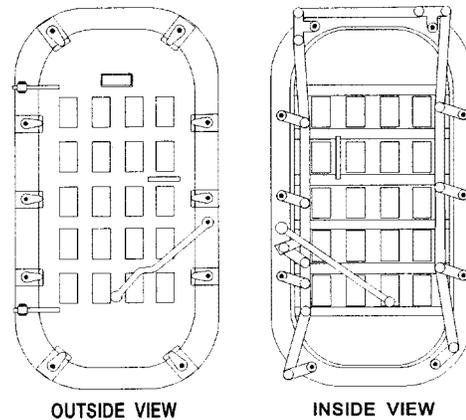


Figure 1-2. Quick-Acting Watertight Door

- c. Quick-Acting Airtight Doors. (See [figure 1-3](#).) These doors are usually located above the V-lines and are used to access fan rooms, storerooms, and spaces where interior bulkheads are required to be airtight. These doors have three dogs on the handle side and no dogs on the hinge side, and are designed to prevent the spread of fire, toxic vapors, and smoke in the event of shipboard casualties.

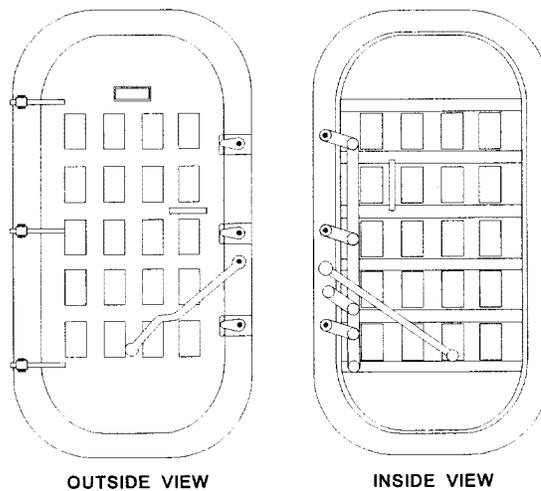


Figure 1-3. Quick-Acting Airtight Door

- d. Raised Watertight Hatches. (See [figure 1-4](#).) These hatches are installed in interior and exterior areas where rapid access/egress is not required. These hatches are usually located in low traffic areas and offset in a corner of a passageway or compartment. These hatches are usually installed in compartments which provide egress by other means. These hatches do not have escape scuttles, and are usually used for stores on/offload and access for heavy equipment.
- e. Raised Watertight Hatches with Scuttles. (See [figure 1-5](#).) These hatches are installed in interior and exterior areas where rapid access/egress is required. These hatches are usually provided in higher traffic areas than the raised watertight hatch, and are offset in a corner of a passageway or compartment. These hatches have escape scuttles to provide rapid access/egress, and are usually located above berthing compartments, manned and unmanned machinery spaces, and all deck levels requiring rapid access/egress.

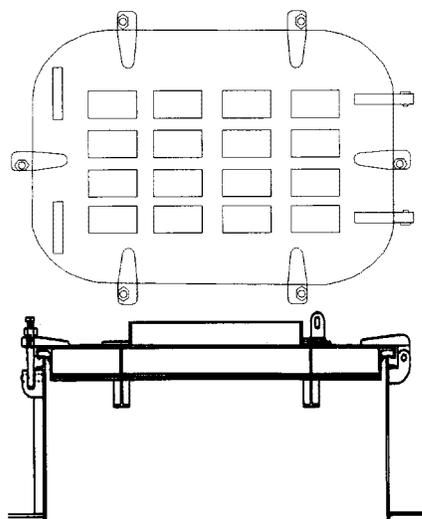


Figure 1-4. Raised Watertight Hatch

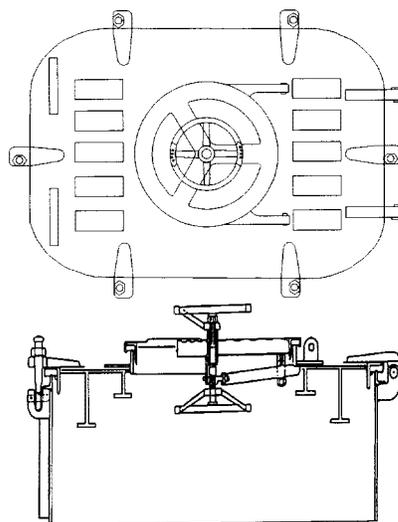


Figure 1-5. Raised Watertight Hatch with Scuttle

- f. Raised Watertight Scuttles. (See [figure 1-6](#).) These scuttles are installed in interior and exterior areas, and are offset in a corner out of high traffic zones where rapid access/egress is required. These scuttles may be used as an alternate access to manned or unmanned spaces, machinery spaces, or storerooms.
- g. Flush Watertight Scuttles. (See [figure 1-7](#).) These scuttles are installed in areas such as flight decks, cargo decks, hangar decks, passageways, or areas of relatively high traffic where a flush deck condition is required to eliminate tripping hazards or to maintain a smooth trucking surface. Trough drains are required for flush scuttles in weather decks.
- h. Flush Watertight Hatches. (See [figure 1-8](#).) These hatches are installed in areas such as flight decks, hangar decks, cargo decks, passageways, or areas of relatively high traffic where a flush deck condition is required to eliminate tripping hazards or to maintain a smooth trucking surface. Trough drains are required for flush hatches in weather decks.

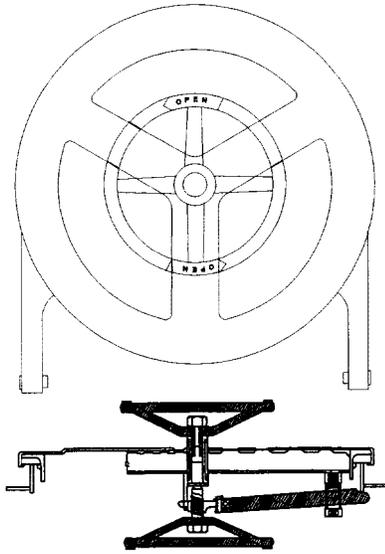


Figure 1-6. Raised Watertight Scuttle

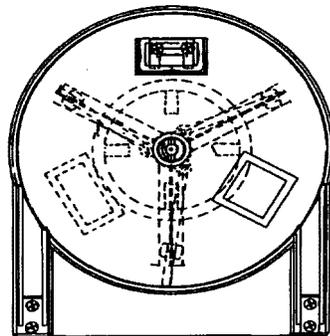


Figure 1-7. Flush Watertight Scuttle

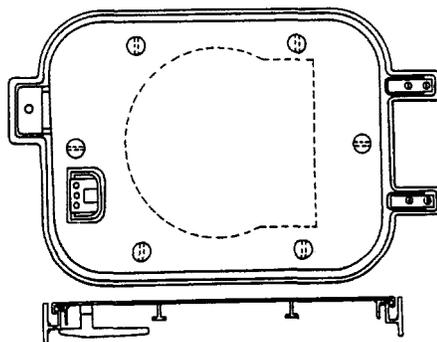


Figure 1-8. Flush Watertight Hatch

- i. Flush Watertight Hatches (6,000 Lb Wheel Load) and Ramped Low Profile Hatches (6,000 Lb Wheel Load). (See [figure 1-9](#)). The 6,000 lb wheel load flush watertight hatch is not illustrated.) These types of hatches are spring-balanced and are installed in areas such as flight decks, hangar decks, cargo decks, passageways, or areas of high traffic that may be subject to wheel loads of up to 6,000 lbs (maximum). For exterior installa-

tions, flush hatches are to be provided with trough drains. Ramped low profile hatches are installed in areas where a minimum height ramped hatch would not be detrimental to shipboard vehicular traffic or pose a tripping hazard.

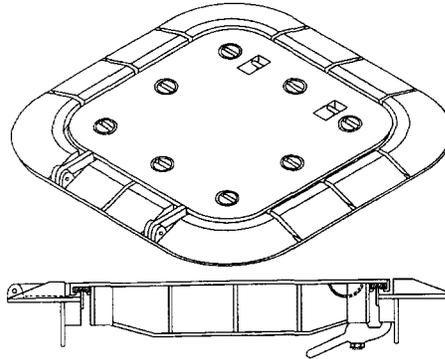


Figure 1-9. Ramped Low Profile Hatch (6,000 Lb Wheel Load)

- j. Flush Watertight Scuttles (6,000 Lb Wheel Load) and Ramped Low Profile Scuttles (6,000 Lb Wheel Load). (See [figure 1-10](#) and [figure 1-11](#).) These types of scuttles are installed in areas such as flight decks, hangar decks, cargo decks, passageways, or areas of high traffic that may be subject to wheel loads of up to 6,000 lbs (maximum). For exterior installations, flush scuttles are to be provided with trough drains. Ramped low profile scuttles are installed in areas where a minimum height ramped scuttle would not be detrimental to shipboard vehicular traffic or pose a tripping hazard.
- k. Manhole Covers. (See [figure 1-12](#).) Manhole covers provide access to tanks, voids, and cofferdams. These covers provide watertight and oiltight integrity. These spaces need to be accessed periodically for inspection or repair.
- l. Watertight Quick-Acting Ballistic Doors. (See [figure 1-13](#) and [figure 7-6](#).) These 3-dog doors are installed in ballistic armored bulkheads, and are the same thickness and material as the plating in which they are fitted. These doors are provided where rapid access is required.
- m. Watertight Individually Dogged Ballistic Doors. (See [figure 1-14](#) and [figure 7-5](#).) These 3-dog doors are installed in ballistic armored bulkheads, and are the same thickness and material as the plating in which they are fitted. These doors are provided where rapid access/egress is not required.
- n. Watertight, Spring-Balanced, Individually Dogged Ballistic Hatches. (See [figure 7-11](#).) These hatches are installed in a ballistic armored deck, and are spring-balanced counterweight or hydraulically operated. The hatch is held open by an automatic catch assembly. The hatch and deck are the same material and thickness.
- o. Balanced Armor Ballistic Scuttles. (See [figure 7-18](#).) These scuttles are 18-, 21-, and 25-inch diameter clear openings. Balanced armor scuttles are used as secondary or emergency access/ egress through a deck, bulkhead, or hatch cover. Scuttles are spring-balanced and are held open by an automatic catch assembly.
- p. Glass-Reinforced Plastic Quick-Acting Watertight Doors. (See [figure 1-15](#).) These glass-reinforced plastic (GRP) doors must meet all the requirements of a standard quick-acting watertight door. These doors are used primarily for minesweeping class ships to reduce magnetic signature.
- q. Glass-Reinforced Plastic Individually Dogged Watertight Doors. (See [figure 1-16](#).) These GRP doors must meet all the requirements of a standard dogged watertight door. These doors are used primarily for mine-sweeping class ships to reduce magnetic signature.
- r. Fixed Lights. (See [figure 1-17](#).) These lights are 4 inches in diameter and are provided in doors to pilothouses, airlocks, supply department offices (disbursing), flammable liquids storerooms, and flammable liquids issue

rooms. These lights are installed in quick-acting doors that provide routine passage on and above the damage control deck and in spaces where additional visibility is necessary because of traffic considerations. Fixed lights are not installed in watertight doors below the damage control deck (except where required in doors to magazines in which air-launched guided missile components containing liquid propellants are stowed) or in doors leading to the weather. Fixed lights in watertight doors are of sufficient strength to maintain the damage control strength requirements and resistance to damage of the watertight door. Fixed lights, 6 inches in diameter, are installed in air locks, decontamination stations, and pressure lock doors. Doors to weather decks with fixed lights have a dead light cover for darken ship capability.

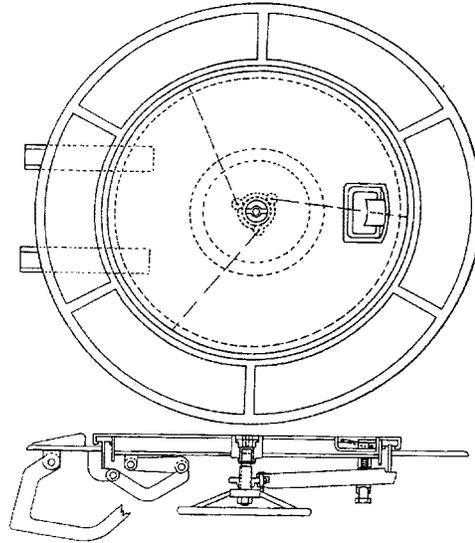


Figure 1-10. Flush Watertight Scuttle (6,000 Lb Wheel Load)

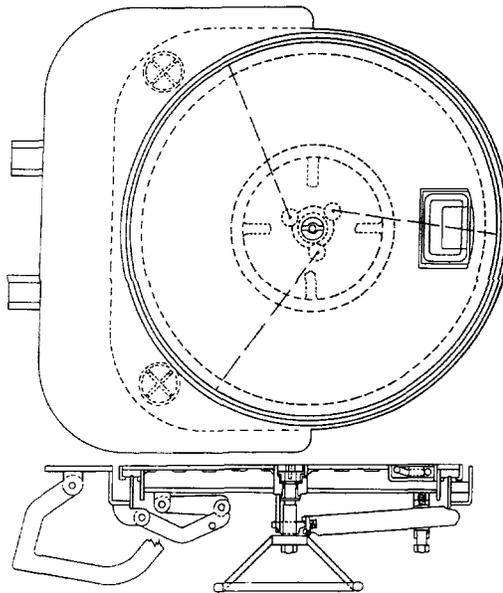


Figure 1-11. Ramped Low Profile Scuttle (6,000 Lb Wheel Load)

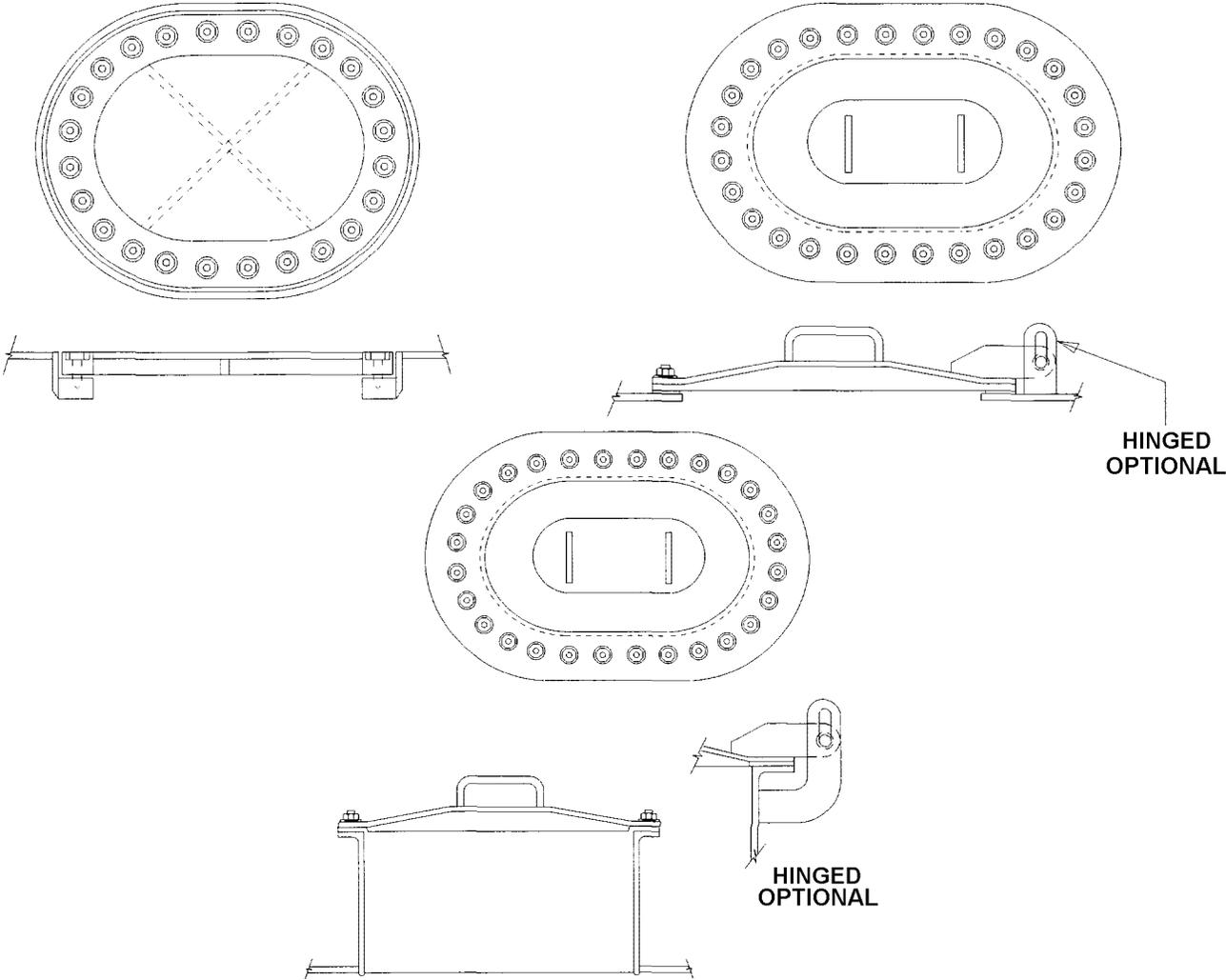


Figure 1-12. Watertight Manhole Cover

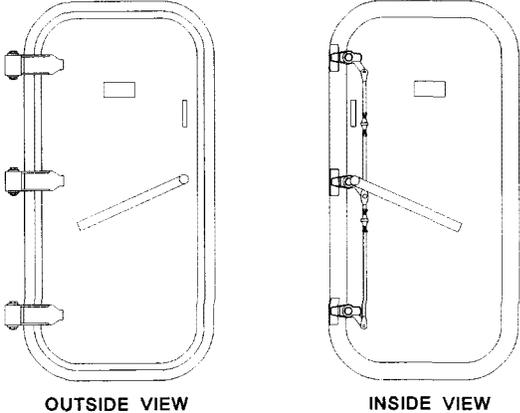


Figure 1-13. Watertight Quick-Acting Ballistic Door

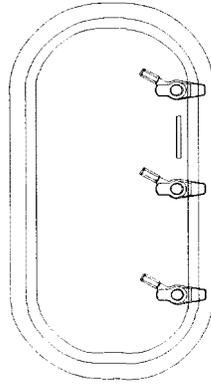


Figure 1-14. Watertight Individually Dogged Ballistic Door

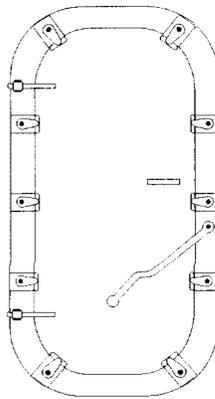


Figure 1-15. Glass-Reinforced Plastic Quick-Acting Watertight Door

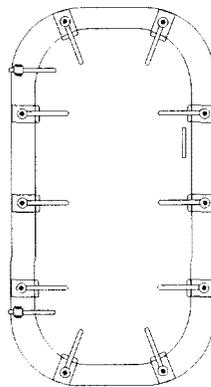


Figure 1-16. Glass-Reinforced Plastic Individually Dogged Watertight Door

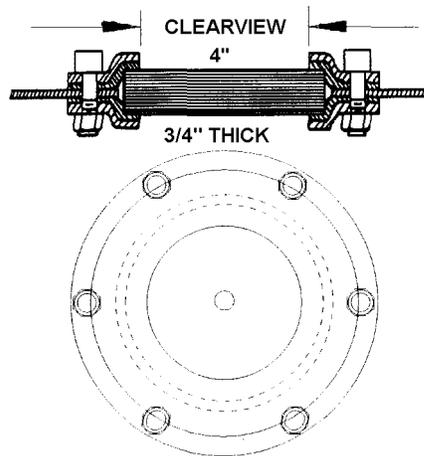


Figure 1-17. Fixed Light

1-3. DESCRIPTIONS OF MACHALTS.

- a. MACHALT 167-31004 (ECP-444) removes the Oilite bronze or CRES flanged and straight bushings, jamnuts, helical spring, and MIL-R-900 gaskets, and installs self-locking nuts, thrust washers, self-lubricated flanged and straight bushings, and silicone rubber gaskets in weatherdeck quick-acting watertight/airtight doors. (See [figure 1-18.](#))
- b. MACHALT 167-31006 (ECP-486) removes the Oilite bronze or CRES flanged and straight bushings, jamnuts, helical spring, and MIL-R-900 gaskets, and installs self-locking nuts, thrust washers, self-lubricated flanged and straight bushings, and silicone rubber gaskets in LHA-1 Class steel interior quick-acting and individually dogged watertight/airtight doors. (See [figure 1-19.](#))
- c. MACHALT 167-53009 (ECP-514) installs a dogging assist latch on high traffic, quick-acting, 3-dog, airtight, nonballistic doors and fragmentation doors. (See [figure 1-20.](#))
- d. MACHALT 167-31006 (ECP-518) removes all replaceable components in the hinge assemblies and replaces with upgraded pins, thrust washers, and self-lubricated bushings on quick-acting watertight doors in high traffic areas. (See [figure 1-21.](#))
- e. MACHALT 167-53008 (ECP-523) removes the existing collective protective system (CPS) door latch and installs a Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSSES), style door latch (gate latch) on the CPS zone boundary quick-acting watertight/airtight doors. (See [figure 1-22.](#))
- f. MACHALT 167-31010 (ECP-526) is installed on exterior doors, well deck doors, and doors in high moisture/humidity areas. This MACHALT removes the Oilite bronze flanged and straight bushings, jamnuts, packing plungers, string, string packing, and helical springs, and installs sintered bronze flanged and straight bushings, O-rings, T-seals, helical springs, self-locking hex nuts, setscrews, and CRES paint shields. The sintered bronze bushings are impregnated with Elisha Technologies EDC 1270 EPL, and the void space within the sleeve is filled with EDC 1270 EPL grease. MACHALT (ECP-526) also replaces the self-lubricated bushings previously installed by MACHALT 167-31004 (ECP-444) on quick-acting weather doors. MACHALT (ECP-526) is not applicable to the newer style doors equipped with grade 316 CRES spindle sleeves. (See [figure 1-23.](#))
- g. MACHALT 167-31011 (ECP-538) replaces all existing replaceable components in the hinge assemblies of quick-acting watertight/quick-acting airtight (QAWT/QAAT) doors in high traffic locations with upgraded pins and thrust washers. Self-lubricated bushings are installed to correct recurring wear and maintain the integrity of the QAWT/QAAT doors. (See [figure 1-24.](#))

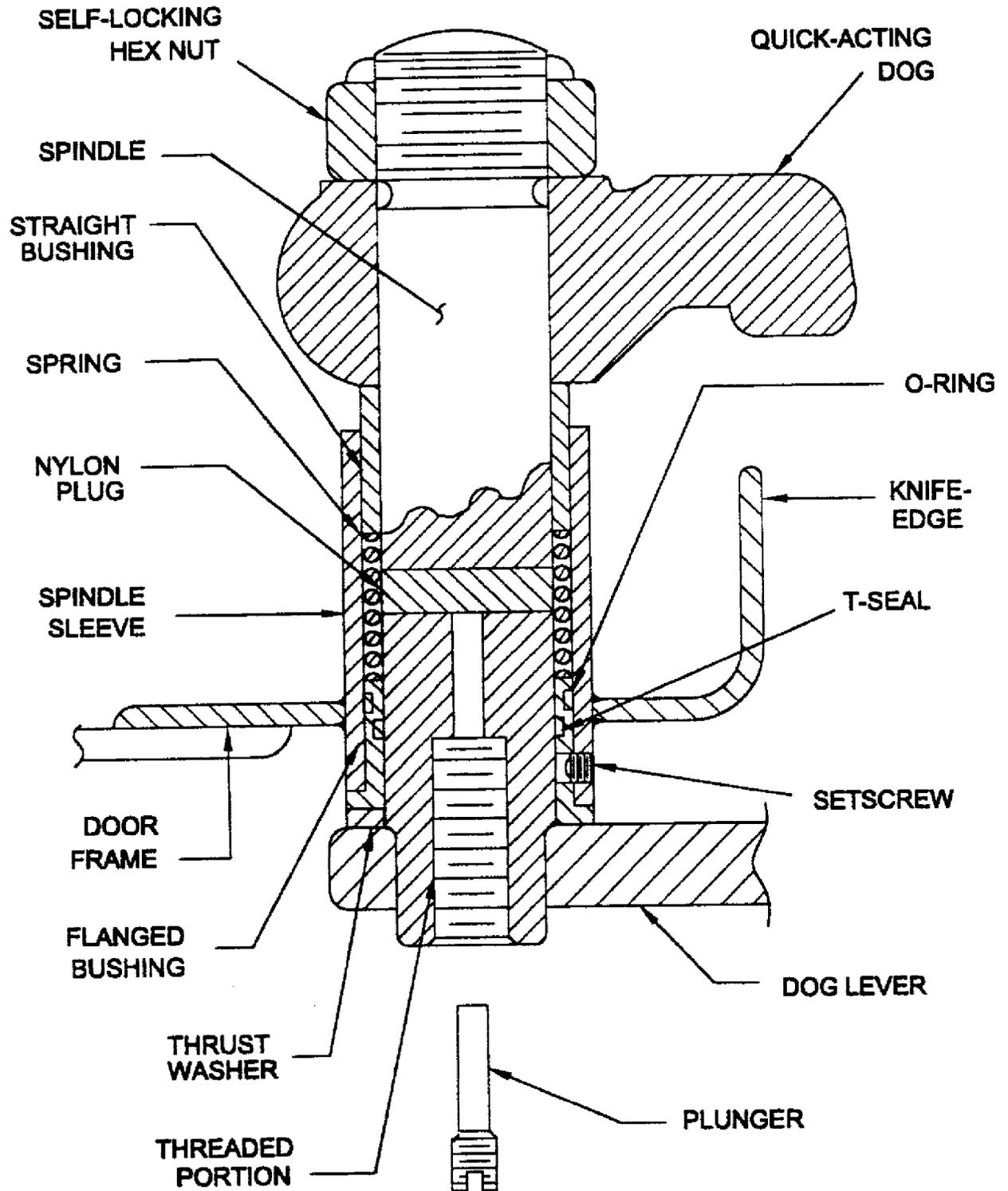


Figure 1-19. Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31006 (ECP-486)

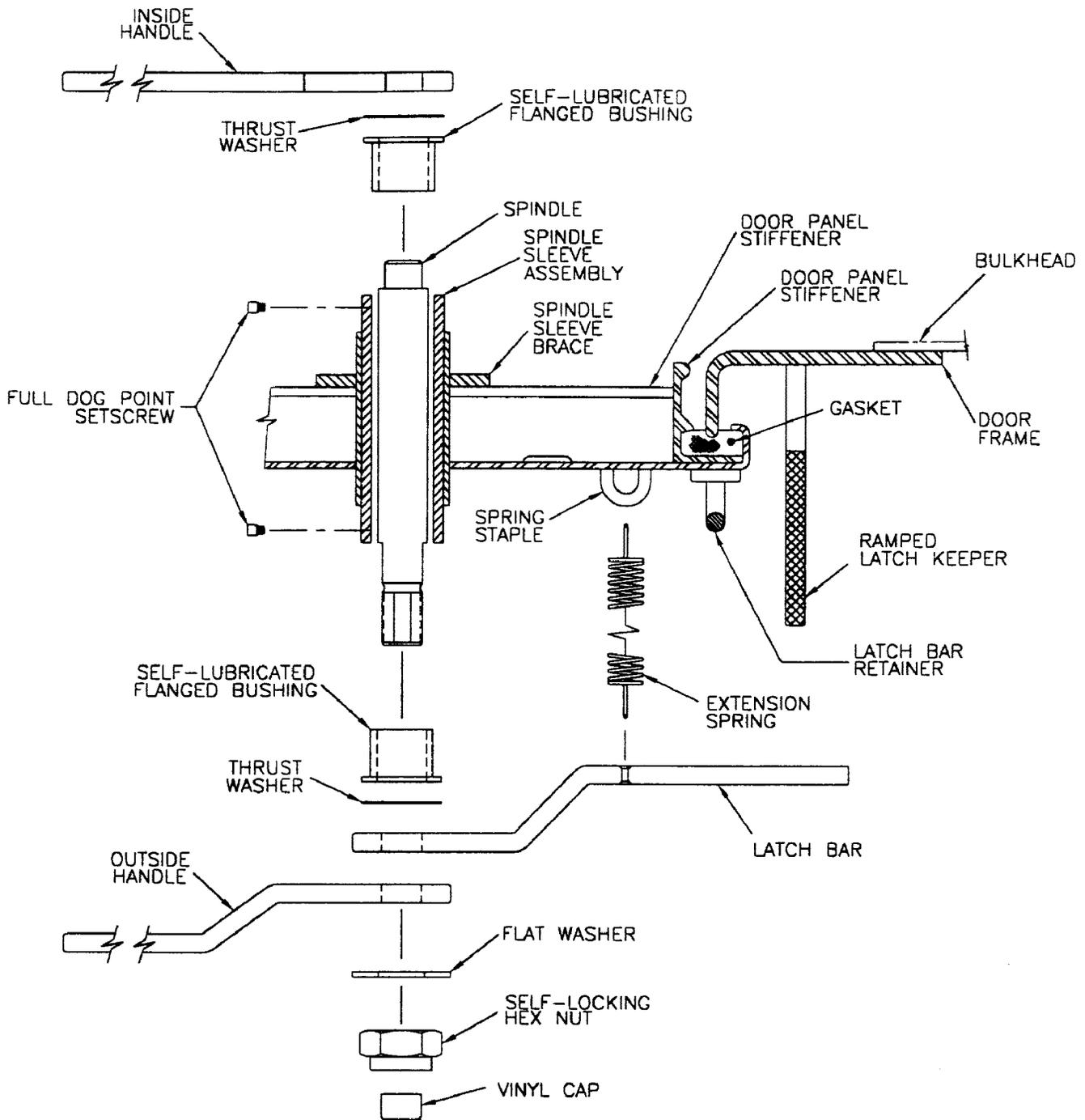


Figure 1-20. Dogging Assist Latch Installed by MACHALT 167-53009 (ECP-514)

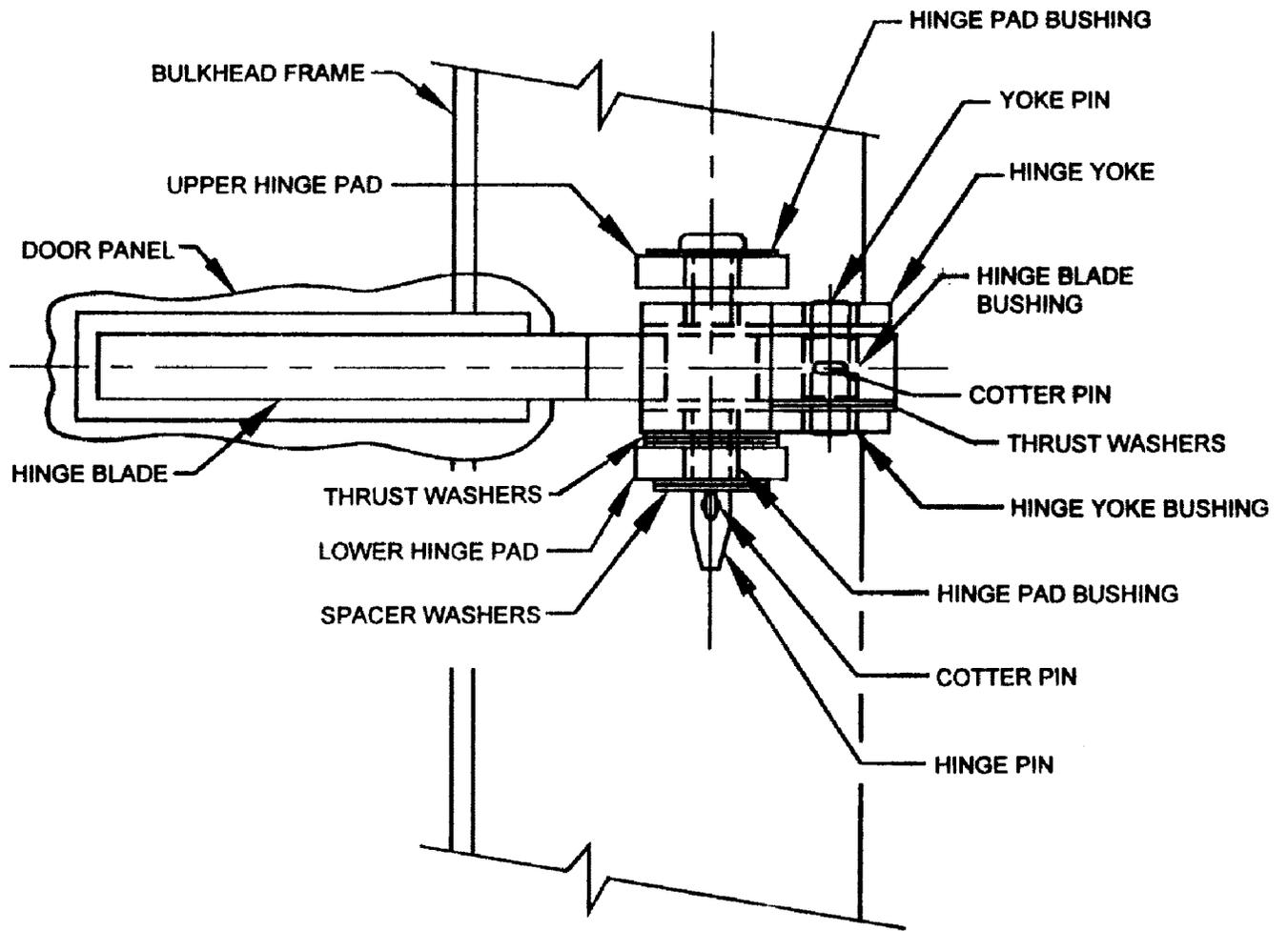


Figure 1-21. Quick-Acting Watertight Door Hinge Assembly Modified by MACHALT 167-31006 (ECP-518)

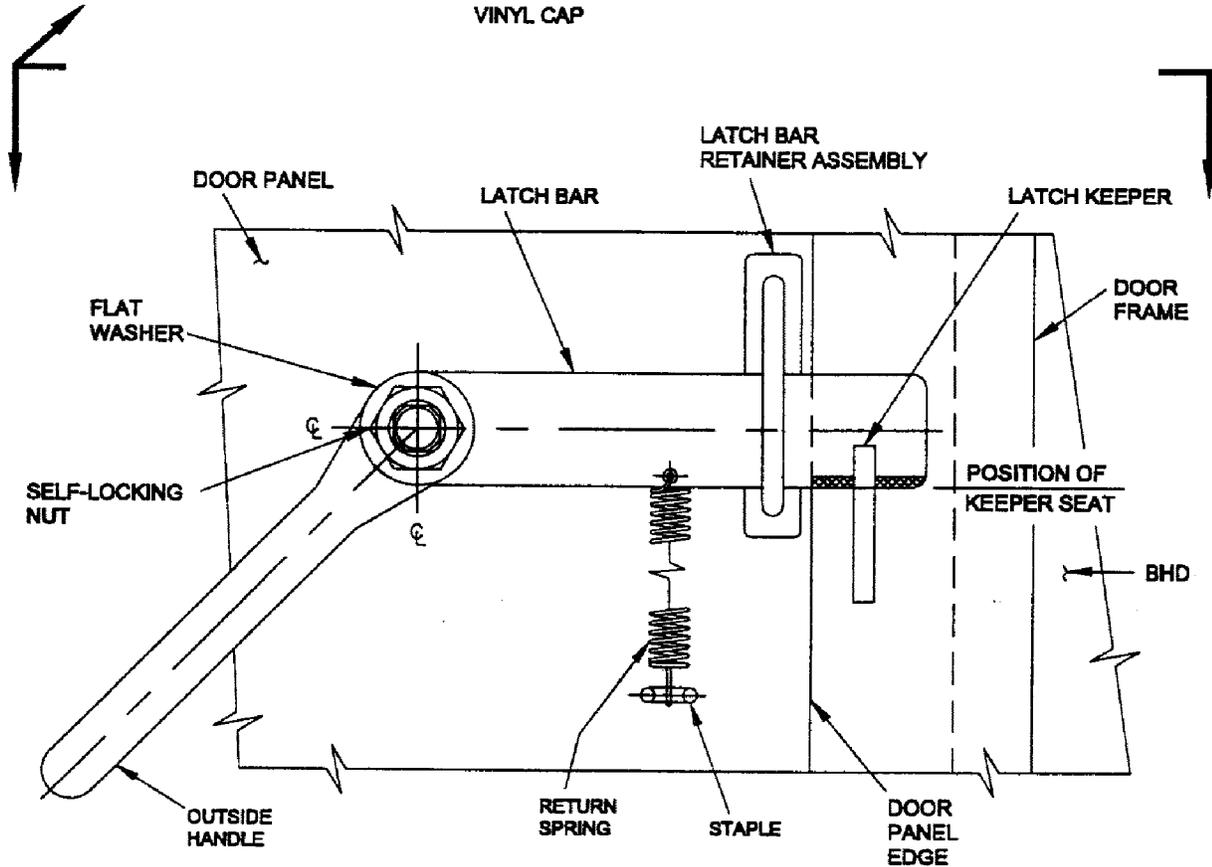
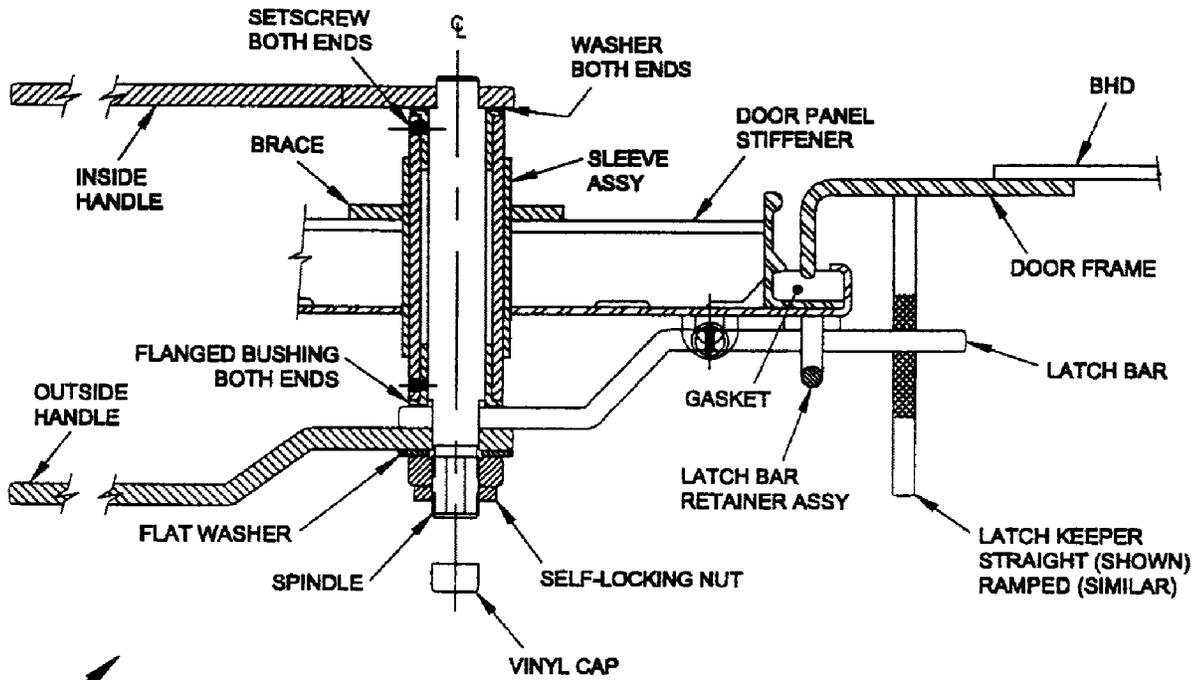


Figure 1-22. Collective Protective System (CPS) Door Latch Installed by MACHALT 167-53008 (ECP-523)

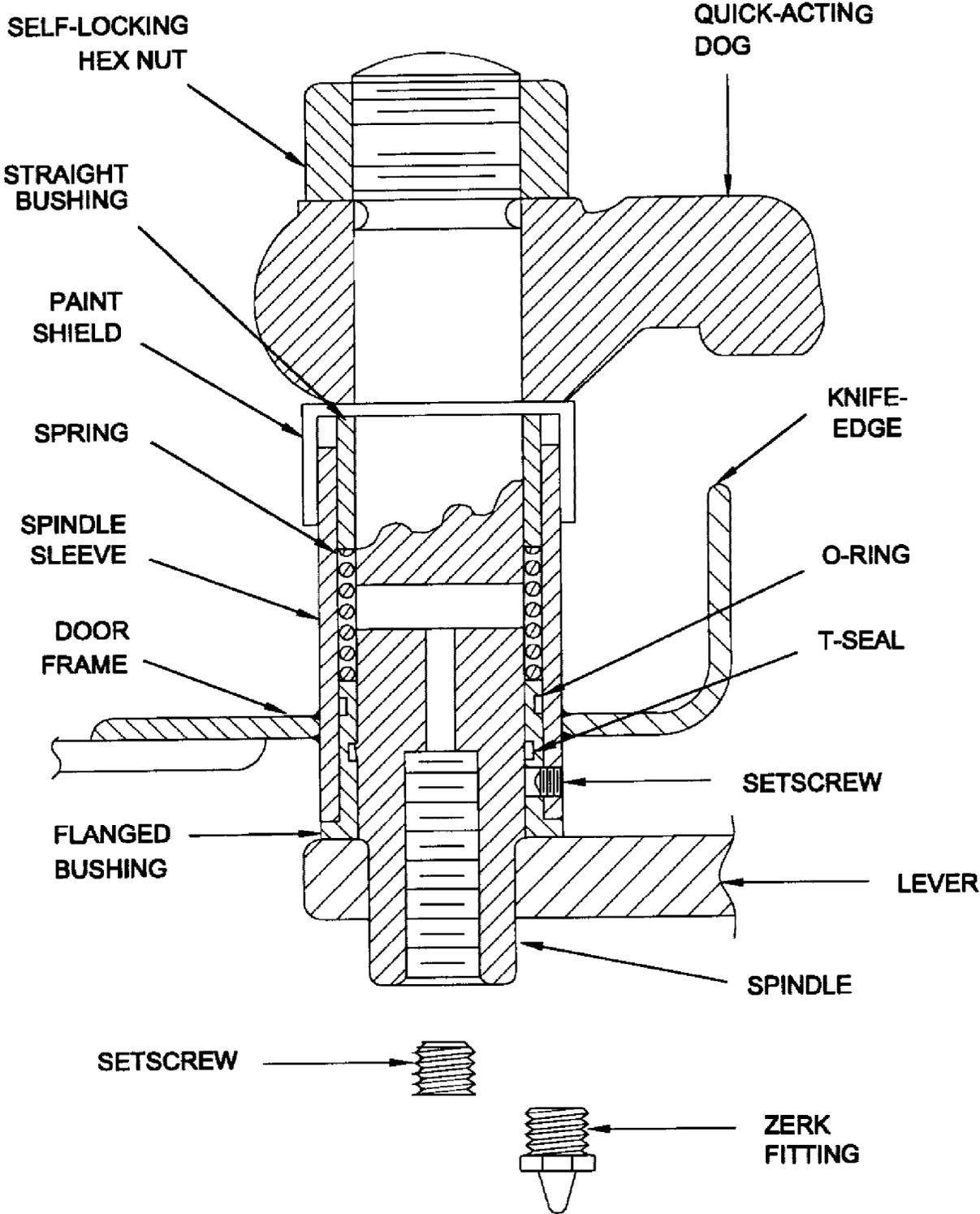


Figure 1-23. Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)

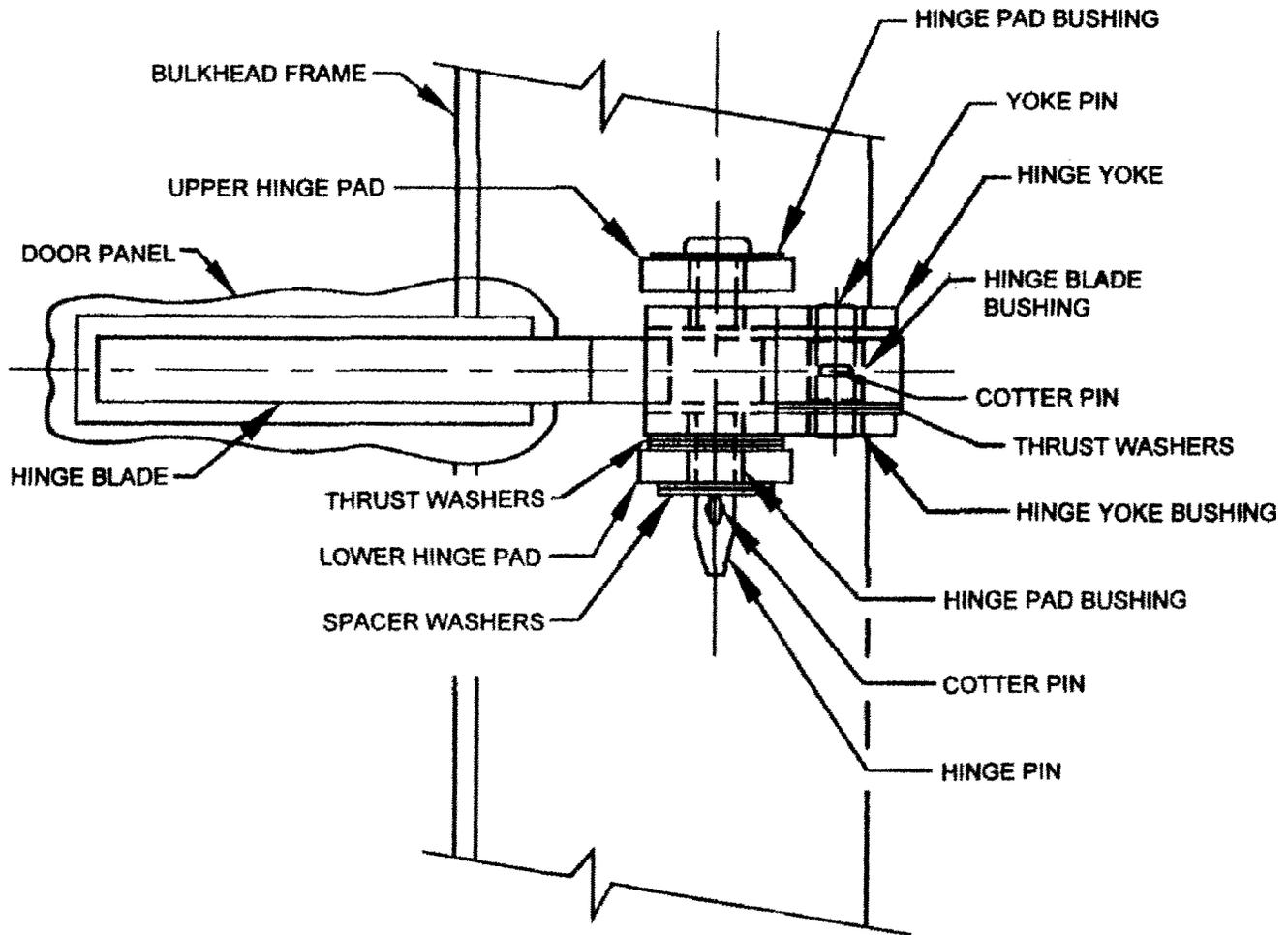


Figure 1-24. Quick-Acting Watertight/Airtight Door Hinge Assembly Modified by MACHALT 167-31011 (ECP-538)

CHAPTER 2

WATERTIGHT CLOSURES, INSPECTION, AND MAINTENANCE

2-1. STEEL CLOSURES.

2-1.1 SAFETY. Before starting repairs to any watertight fitting, obtain permission from the chain of command to disable a watertight fitting. Make an entry in the ship's closure log and safety tag-out log as appropriate. Check with the supervisor before starting work. Do not disassemble any watertight fitting while the vessel is underway, and accomplish only those emergency repairs required to keep that particular fitting operational. Do not sacrifice the ship's watertight integrity by totally disassembling a hatch or door below the waterline because of worn bushings, especially when the ship is in a busy sea lane. Exercise common sense.

If a hatch or scuttle cover is removed for repairs, rope off and cover the area to prevent personnel from falling into the opening. Fasten or lash back any closure that must remain open while work is being accomplished to prevent the closure from swinging as the ship rolls.

If possible, try to start and finish the work on the closure in the same work day. This will prevent having an additional open closure after working hours when a minimum of the crew is on board. Have on hand all parts needed for repair of the closure before starting the work. Report to your supervisor when you have completed repairs. Remove red safety tags, and clear the entry in the ship's closure log.

WARNING

Ensure the hatch escape route is free of personnel before securing the hatch.

2-1.2 GENERAL GUIDANCE FOR INSPECTIONS. The following principles apply to inspections for all watertight closures:

- a. Comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 Series, which is found in each work center.
- b. All tag-out procedures shall be in accordance with current shipboard instructions.
- c. Exercise extreme caution when working around open trunk areas.
- d. Accomplish inspection and maintenance semiannually, or more frequently if adverse conditions have been encountered. Adverse conditions include:
 1. Weather Decks - Constant exposure to elements and heavy usage.
 2. Interior Spaces - Heavy passage of personnel or equipment through openings.
- e. Loose, missing, or damaged parts and parts showing excessive wear must all be replaced.
- f. Doors, hatches, and scuttles should routinely be inspected by Damage Control Petty Officers, Work Center Supervisors, and Zone Inspectors for:
 1. Loose, missing, and damaged parts.
 2. Paint, rust, and other foreign matter on gaskets, knife-edges, and working parts such as bushings, linkages, and brackets.

3. Binding and difficult operations.
4. Distortion and deterioration of metal surfaces.
5. Hinge pin wear and pins that are not properly secured.
6. Gasket joints must be minimized. No more than one joint on closures with all radius corners. Splices are not permitted.
7. Gasket cracks, deterioration, hardness, permanent set over 1/8-inch deep, and gaps due to shrinkage where gasket ends meet.
8. Obstructed access to escape scuttles.
9. Packing plungers intact and stick packing adequate (except on closures with self-lubricated bushings).
10. Broken or missing spring clips.
11. Missing special purpose wrenches (dogging wrenches, T-wrenches, and engineer's wrenches).

If any parts are missing or beyond repair, replacement parts can be obtained through the Navy Supply System. Refer to the Afloat Shopping Guide and appendix C for listings of the most commonly needed repair parts. Other parts for which the Navy Supply System does not maintain stock can sometimes be obtained on a special order basis by forwarding a description of the part needed and nameplate data from the closure to the Navy Ship's Parts Control Center (SPCC), Mechanicsburg, PA. Additional assistance can be provided by Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), Attn: Code 9780, Hull Outfitting, Philadelphia, PA, DSN 443-7344, Commercial 215-897-7344. If parts are not in stock (NIS) or not carried (NC) by the supply system, open purchases can be made. Refer to [appendix C](#).

2-1.3 KNIFE-EDGE AND DOOR FRAME INSPECTION.

- a. Open the fitting. Inspect the knife-edge for straightness and/or warpage using a straightedge and two lengths of string. See [figure 2-1](#), [figure 2-2](#), and [figure 2-3](#). The maximum acceptable variation for knife-edge straightness is plus or minus 1/16 inch. The maximum acceptable warpage of the door frame is 1/8 inch. If frame/coaming warpage is excessive, or if the knife-edge straightness is not within tolerances, initiate action to replace the closure.

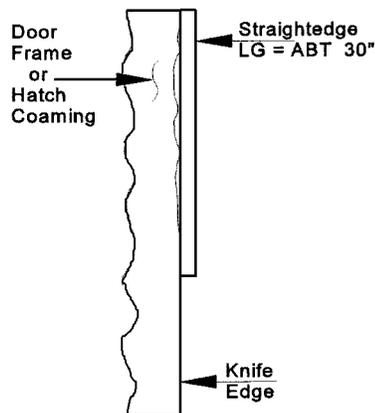


Figure 2-1. Knife-Edge Inspection Using Straightedge Method

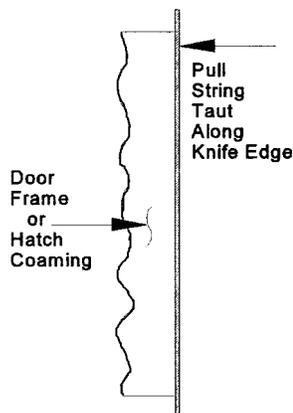


Figure 2-2. Knife-Edge Inspection Using String Method

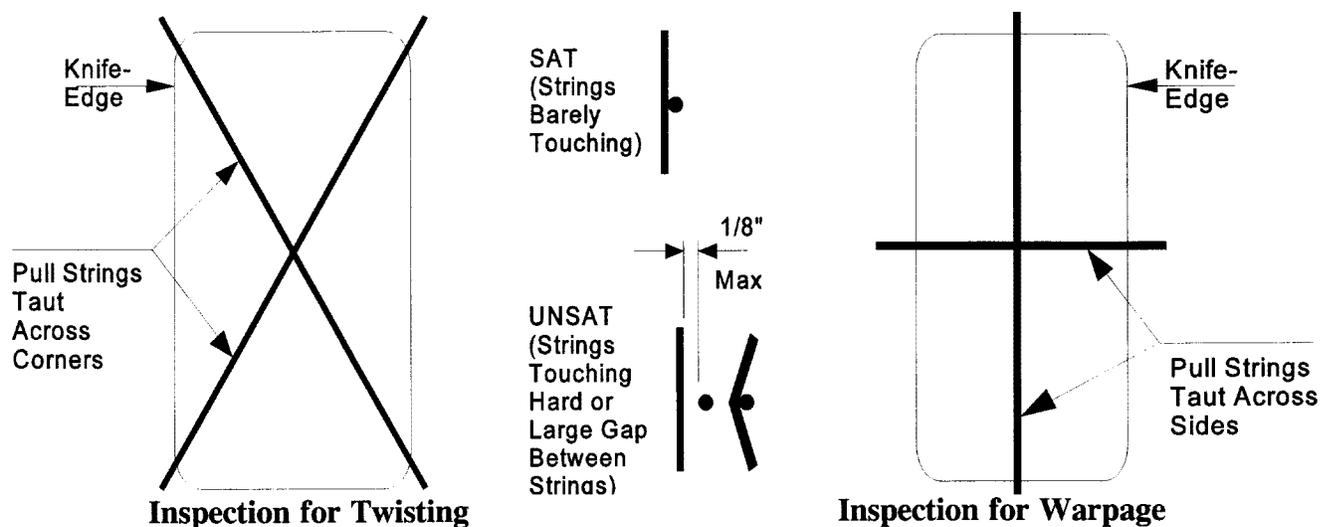


Figure 2-3. Knife-Edge Inspection for Warpage

- b. Inspect the knife-edge for paint, dirt, rust, or nicks. Remove paint and rust with #320 grit aluminum oxide abrasive cloth. Be sure to remove the abrasive grit with a clean rag to prevent the grit from getting embedded in the gasket.

CAUTION

A knife-edge that is too high will damage the gasket; a knife-edge that is too low will damage the hinges as a result of overadjusting the door in attempting to maintain a watertight seal.

- c. Inspect the entire knife-edge for proper height. A block of aluminum cut to the specifications shown in [figure 2-4](#) is an effective gauge. If the knife-edge is more than 1/8 inch too high or too short, it must be repaired in accordance with [step d](#).
- d. Repair a nicked or short knife-edge by building up the area with CRES stainless steel electrode and filing with a flat file. Grind a high steel knife-edge to shorten to the required height. (The use of power grinders on knife-edges is not recommended.) Straighten bent knife-edges by reshaping with a hammer or by bending.

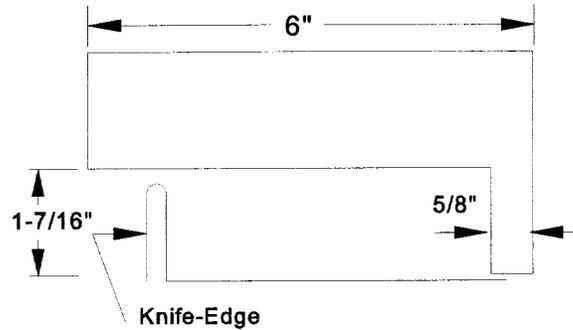


Figure 2-4. Gauge for Measuring Knife-edge Height

2-1.4 GASKET INSPECTION. Rubber gaskets are installed in watertight closures to provide a watertight fit all around by bearing against the knife-edge. Inspect the gasket for the following:

- The rubber must be soft and pliable, and have no cracks.
- There should be no paint, rust, or other foreign matter.
- The gasket joint should be located at the top of the door.
- There must be no gaps in the gasket joint. Replace the gasket if shrinkage has caused separation where the two ends join.
- A permanent set or groove in the rubber may not be greater than 1/8-inch deep.

CAUTION

During installation of new gasket, no splices are allowed. Gasket should be one continuous length.

Replace the gasket if any of these problems exist. If the gasket is otherwise satisfactory, remove any paint from the gasket surface with a small block of hard wood. Remove dirt from the gasket with a clean rag. Damaged gaskets must be completely replaced. See [figure 2-5](#).

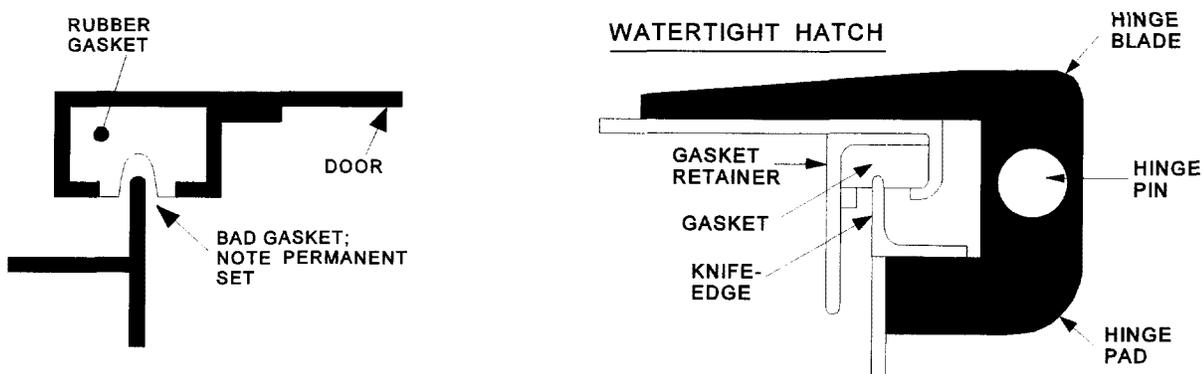


Figure 2-5. Gasket Inspection

2-1.5 CHALK TEST. The chalk test is a simple means of determining if the gasket is in continuous contact with the knife-edge when a closure is dogged. A successful chalk test does not guarantee that a closure is watertight, but, if the gasket is in good condition and dogs are properly adjusted, this test does provide a reasonable

assurance of watertight integrity. To chalk test doors, hatches, and scuttles, accomplish [paragraph 2-1.5.1](#). To chalk test navy standard raised watertight hatches equipped with "drop bolt" type dogs, accomplish [paragraph 2-1.5.2](#).

2-1.5.1 Chalk Test for Doors, Hatches, and Scuttles.

- a. Wipe the knife-edge clean with a dry rag.
- b. Wipe the gasket clean with a dry rag.
- c. Rub chalk on the knife-edge.
- d. Close and dog the closure tightly.
- e. While the closure is dogged down, inspect for any loose dogs. If any dog is loose, adjust the dog and repeat the chalk test.
- f. Open the closure and observe the imprint of chalk on the gasket. The chalk imprint should be in the center three-fifths of the width of the gasket. If the chalk line is not continuous, the closure is not watertight and requires further adjustment or repair. If the chalk imprint has a gap near a dog, the dog may be loose or out of adjustment. However, this also may indicate that the opposite dog is too tight, causing a "bind" in the door. Refer to [paragraph 2-1.9](#) for adjusting the dogs to get a consistent seal around the closure.

2-1.5.2 Chalk Test for Navy Standard Raised Watertight Hatches Equipped With "Drop Bolt" Type Dogs.

- a. Wipe the knife-edge clean with a dry rag.
- b. Wipe the gasket clean with a dry rag.
- c. Rub chalk on the knife-edge.
- d. Carefully lower the hatch using the hand grabs provided on the top of the hatch cover. Do not allow the hatch cover to free-fall. Swing the drop bolts up and through the slot on the dog lugs. Handtighten each dog nut until seated firmly against the dog lug. After all dog nuts have been handtightened, tighten each dog nut down one full turn with the dog wrench to compress the gasket 1/8 inch. (The drop bolt threads are 3/4-8 acme.)
- e. Open the hatch and observe the imprint of chalk on the gasket. If the chalk line is not continuous, the hatch is not watertight and requires further adjustment or repair.

2-1.6 INSPECTION OF WATERTIGHT DOORS. The following inspection procedure applies to both quick-acting and individually dogged doors.

- a. Examine the knife-edge and gasket as described in [paragraph 2-1.3](#) and [paragraph 2-1.4](#).
- b. Accomplish the chalk test as described in [paragraph 2-1.5](#).
- c. Visually inspect the door for missing, damaged, or nonstandard components.
- d. Visually inspect the hinge sleeves and hinge pins (on doors without Machinery Alteration (MACHALT) 167-31006 Engineering Change Proposal (ECP) 518 installed) for wear. Visually inspect the hinge pad bushings, hinge yoke bushings, spacer bushing, and hinge pin (on doors with MACHALT 167-31006 (ECP-518) installed) for wear. With the door opened, grasp the door from the hand lever side and push it toward the hinged side. The door should not give more than approximately 3/16 inch. If it does, either the hinge pins and/or washers are worn, or the holes for the hinge pins have become enlarged. Do not confuse hinge pin

wear with normal play in the hinge blades. Another indication of hinge pin wear is if the metal channel surrounding the gasket on the door side is rubbing against the knife-edge, or if the door panel rubs one or more side dogs when opening or closing. (See figure 2-6, "A.") A good hinge and alignment are illustrated in figure 2-6, "B." Replace the hinge pin washers and/or pins (on doors without MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) installed), or replace the hinge pad bushings, hinge yoke assembly, thrust washers, yoke pin spacer, and hinge pin (on doors with MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) installed), if any of the following conditions exist:

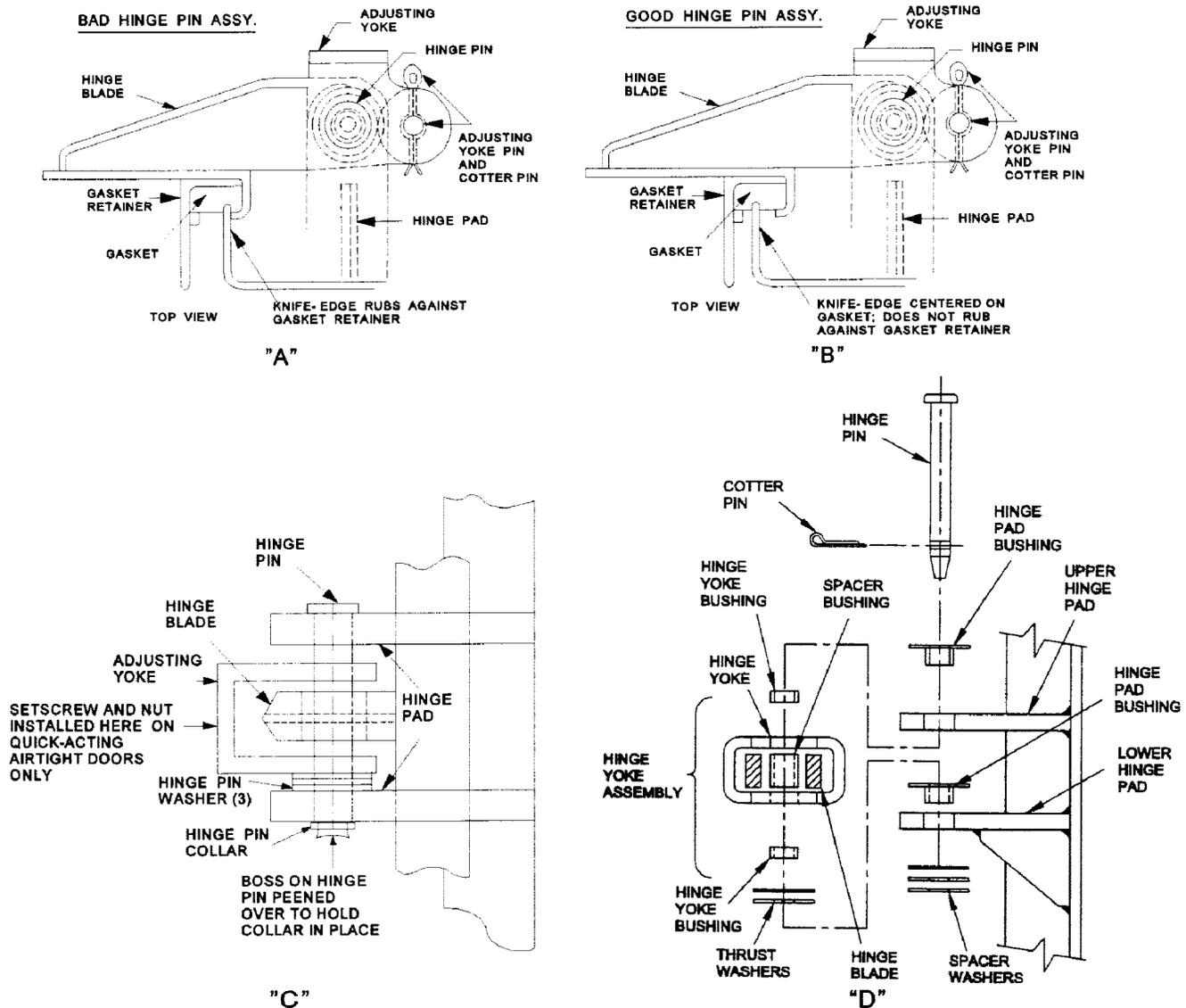


Figure 2-6. Hinge Pin Assemblies

1. The metal surrounding the top and bottom of the door gasket rubs against the knife-edge.
2. The door panel rubs one or more dogs, particularly at the bottom of the door.
3. The door chafes the knife-edge when opened and closed.
4. The hinge pin washers (on doors without MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) installed) are worn thin to approximately 1/32 inch. New washers are 1/16 inch in thickness. See figure 2-6, "C." The thrust washers or the flange on the hinge pad bushings (on doors without

MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) installed) are worn thin to approximately 1/32 inch. New thrust washers and the flange on new hinge pad bushings are 1/16 inch in thickness. See [figure 2-6](#), "D."

5. The hinge pin is bent or damaged. Refer to [chapter 3, paragraph 3-1.9](#), for procedures to repair hinge pin assemblies.
- e. Ensure the device for holding the door open is intact and workable.
- f. Inspect the bottom of the door for rust, which would indicate poor cleaning and priming of the coaming.
- g. Inspect each dog assembly. Ensure that the straight bushing is firmly seated against the back of the dog and is free of dirt, rust, and paint. Ensure the flanged bushing is firmly seated against the end of the dog sleeve and is secured in place by its dog point setscrew. See [figure 2-7](#). Setscrews are often painted over and may be difficult to locate. Remove paint as necessary to inspect for loose, missing, or broken setscrews. For self-lubricated bushings, a CRES thrust washer should be installed between the dog lever and the face of the flanged bushing. See [figure 2-7A](#).

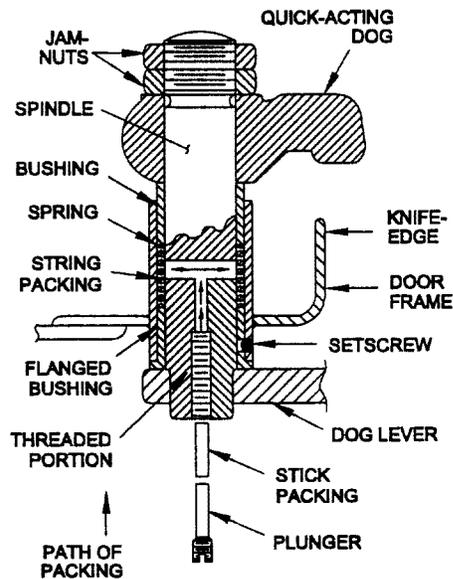


Figure 2-7. Quick-Acting Door Dog Assembly (Cross Sectional View)

- h. With the door opened, the dogs properly adjusted, and the jamnuts tightened, grasp each dog spindle and attempt to shake it up and down and side to side. If it moves, the bushings must be replaced. If the bushings are replaced and there is still visible play between the spindle sleeve in the door frame and the outside of the bushings, the spindle sleeve is corroded to oversized dimensions. In this situation, the entire door should be replaced. This is a common occurrence if the door has not been lubricated and packed in accordance with proper Planned Maintenance System (PMS) instructions, and on weatherdeck doors that are severely corroded.

NOTE

Stick packing is not required for doors with self-lubricated bushings installed.

- i. Ensure both jamnuts or self-locking hex nuts are in place on each dog assembly. Jamnuts should be locked tightly together. Remove any paint or dirt from the bushings with a wire brush and a clean rag. The straight bushing should not be stuck in the spindle sleeve and should rest against the back of the dog. If the bushing

is jammed or stuck in the sleeve, it will have to be removed, and the interior of the sleeve cleaned out and lubricated, to ensure a free sliding fit of the bushing in the spindle sleeve. See [figure 2-7](#), [figure 2-7A](#), and [figure 2-7B](#).

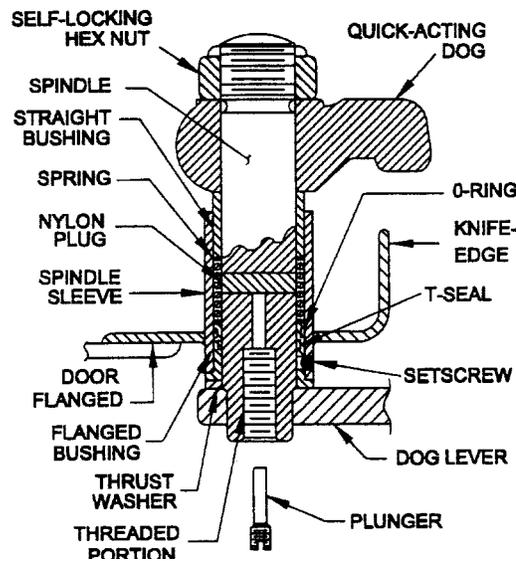


Figure 2-7A. Quick-Acting Door Dog Lever Assembly (Cross Sectional View) Modified by MACHALT 167-31004 (ECP-444)

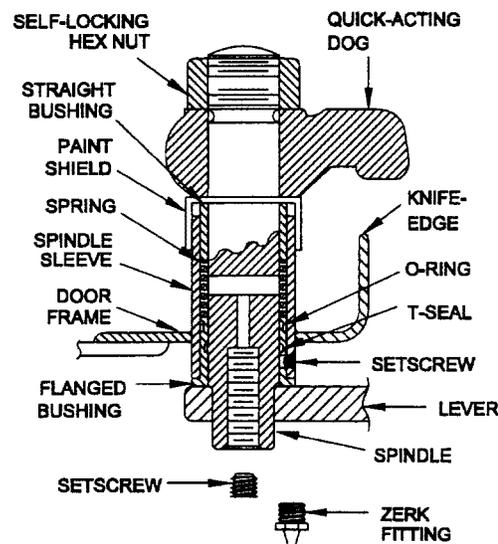


Figure 2-7B. Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)

- j. Ensure there are no missing, broken, or worn spring clips for operating handle. Spring clip shall positively engage operating handle in the undogged position.
- k. Ensure there is no cracked glass in fixed light.
- l. Ensure proper operation of dead light cover over fixed light.

- m. Ensure proper operation and condition of door hook and bumper assembly. Verify there are no parts missing and no structural damage.
- n. Ensure proper material for proper hardware on weather deck doors. Dogs, dog spindle nuts, and operating handles should be CRES (nonmagnetic). Verify with magnet.
- o. Ensure there are no obstructions in way of access to closure. Door should be able to swing open a minimum of 90 degrees. Dogs should not chafe panel edges when opening or closing.
- p. On all weather and well deck doors, remove gasket and inspect gasket channel for loose paint, rust, or corrosion, particularly along the bottom of door.
- q. Accomplish a random inspection of at least two dog sleeves, including at least one from a lower corner dog. Remove double jamnuts or self-locking hex nut, the dog, and the straight bushing. Inspect for the presence of string and stick packing (oilite bushings only), moisture, or rust. If found, inspect all remaining dogs. Replenish string and stick packing, if necessary.
- r. If binding is present, remove paint from wedge pad contact surfaces, dogs, spindle threads, spindle nuts, bushings, packing plungers, setscrews, connecting rod studs and nuts, and contact surfaces of connecting rod linkages using wire brush, scraper, or abrasive cloth. DO NOT REPAINT.
- s. On all weather and well deck doors, ensure gasket is firmly seated in the gasket channel with no bulges, particularly along the bottom of the door.

2-1.6.1 Inspection of Handles.

- a. Quick-Acting Doors. Work the operating handle back and forth to inspect for excessive tightness or binding. A handle which cannot be opened and closed with one hand may have dogs which are out of adjustment or handle nuts which are too tight. If the door handle must be raised in order to close the door, either the hinge pins are worn or the hinge pin bracket holes have become enlarged. If a door will not operate from the inside, either the handle has fallen on the opposite side or the handle is slipping on its spindle. Slipping of the handle indicates excessive wear on the flats of the spindle where they fit into the hole on the end of the handle. Inspect the lineup of the outer and inner handles. If obstructing the free operation of the door, the handles must be disassembled and repaired.
- b. Individually Dogged Doors. Work each individual handle back and forth. The handles should work smoothly. If the handles do not work smoothly, disassemble, clean, and lubricate, then reassemble and adjust in accordance with [paragraph 2-1.9](#). String and stick packing are not required for doors with self-lubricated bushings installed. Refer to [chapter 3, paragraph 3-1.6](#) through [paragraph 3-1.8](#), for procedures on disassembling and repairing handles.

2-1.6.2 Inspection of Dog Wedges. Inspect each dog wedge for wear. If a wedge is worn more than halfway down, or if deep grooves are carved into it, the wedge must be replaced. When setting the door handle on an individually dogged door, the dog should come to a stop approximately one-half of the distance across the surface of the wedge. The dog should never exceed the stop formed into the trailing end of the wedge. If it does, either the dog is out of adjustment or the wedge is worn away and must be replaced. If the raised land (sometimes called the "telltale") on one side of the wedge is worn, this could be an indication that the hinge pins are worn. This condition results from the fact that as the hinge pins wear, the door tends to shift or tilt away from the hinge side toward the lever side. The dog lugs then tend to contact the raised land, wearing it away as the door is opened and closed. Refer to [chapter 3, paragraph 3-1.10](#), to replace dog wedges. Inspect each dog wedge for tight mounting to the door. Grasp each wedge and try to rattle it back and forth. For riveted wedges, tighten loose rivets with a ball peen hammer and back up bar or hammer. For bolted and riveted wedges, the gasket must be removed to access the machine screws or rivets for tightening or replacement. See [figure 2-8](#).

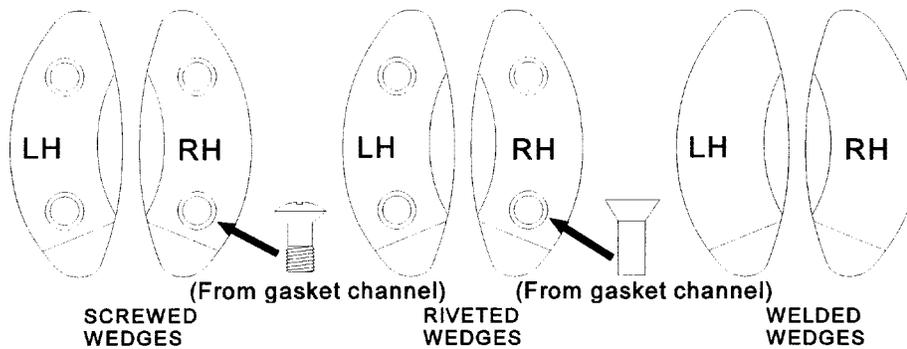


Figure 2-8. Watertight Door Wedges

2-1.6.3 Inspection of Quick-Acting Watertight Door Linkage. Visually ensure all brass conrod collars (round nuts) and cotter pins are in place. With the door open, grasp each connecting rod (conrod) in turn with one hand. Shake the linkage from side to side and note the amount of play. If the linkage is loose or moves more than 1/8 inch, the linkage bushings are worn and must be replaced.

2-1.6.4 Inspection of Quick-Acting Watertight Door Linkage. Inspection of Conrod and Lever Studs. Studs from the factory are swaged in place. Over a period of time, these studs may loosen or break completely away. To inspect for loose studs, open the door and work the hand lever back and forth. Inspect each stud, one at a time. Any studs which move must be repaired by swaging. Refer to [chapter 3, paragraph 3-1.7.3](#), for procedures on repairing studs. Failure of even one stud will cause complete failure of the entire door linkage. See [figure 2-9](#).

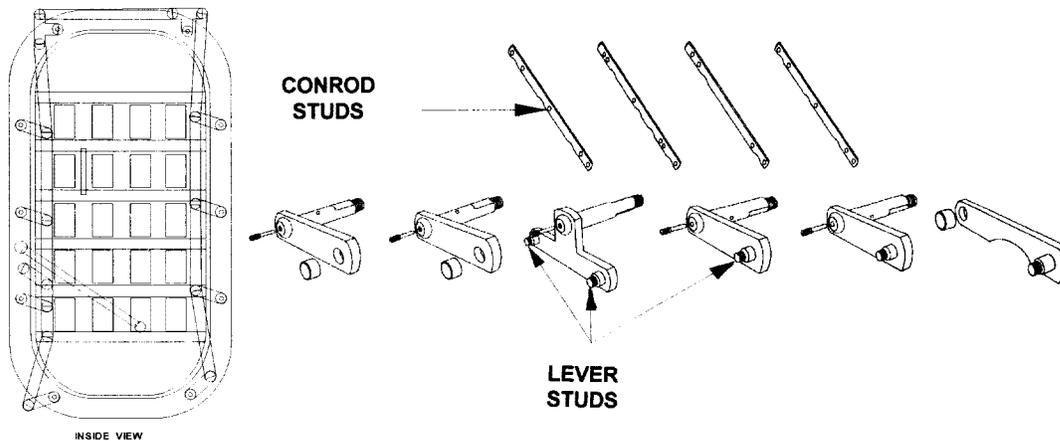


Figure 2-9. Quick-Acting Watertight Door Lever and Connecting Rod Studs

2-1.7 INSPECTION OF WATERTIGHT HATCHES.

- a. When inspecting a closed and dogged navy standard raised watertight hatch equipped with "drop bolt" type dogs, which has an orange silicone gasket, standing on the hatch and kicking the dog bolts to ascertain tightness may not be an accurate or consistent method to confirm whether or not the dogs are properly secured. To quickly determine if the dog bolts are secure, start with a visual inspection to ensure all dog bolts are properly engaged on the dog lugs. Grasp each dog nut and attempt to turn the nut by hand. The nuts should not rotate.
- b. Examine the knife-edge and gasket as described in [paragraphs 2-1.3](#) and [2-1.4](#).

- c. Accomplish the chalk test in accordance with [paragraph 2-1.5](#).
- d. With the hatch open, examine the dog bolt threads and nut for wear. Wear is indicated by excessive wobble between the nut and dog bolt. Replace the dog bolt assembly if it is excessively worn. Inspect to ensure that the flats on the dog bolt nut are in good condition and that the dogging wrench fits properly. Replace the nut if the flats are rounded off. Ensure the collar is not missing from the top of the dog bolt. The purpose of the collar is to prevent the loss of the nut when the hatch is opened. If satisfactory, coat the dog bolt threads with a light coating of silicone compound. See [figure 2-10](#).

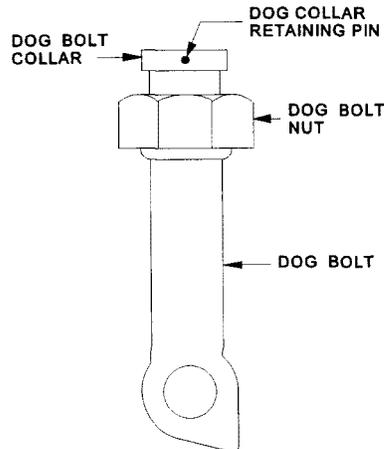


Figure 2-10. Dog Bolt Assembly

- e. All hatches should have a means of holding the hatch cover upright when the compartment below is entered or exited. This consists of a pipe/swivel assembly permanently attached to the hatch cover at one end while the other end is connected by means of a toggle bolt to a clip welded to the hatch combing. The toggle bolt is fastened to the brace pipe by means of stainless steel aircraft cable to prevent loss. (Do not substitute chain for the cable.) To stow the brace when the hatch cover is closed, the brace pipe is unfastened from the hatch coaming by pulling the toggle bolt from the clip. The brace pipe is then swung up under the hatch cover and fastened with the same toggle bolt to clips that are welded to the hatch underside specifically for this purpose.
 1. Ensure the brace pipe, toggle, and cable assembly are not missing or damaged.
 2. Ensure the pipe assembly supports the hatch cover when in the upright position.
 3. Ensure the toggle bolt is the right size to attach to the clips and that it has not been replaced by nuts and bolts. See [figure 2-11](#).
- f. Hinge pin wear on watertight hatches is often difficult to detect since there is normally a large amount of play in hinges, even when the fitting is new. Thus, it is good practice to periodically remove hinge pins (with hatch closed and dogged) and examine the pins for wear. Ensure washers, lock collars, and cotter pins on hinge pins are in place.

CAUTION

When inspecting hinge pins for wear, ensure the space below is unmanned before closing and dogging the hatch.

- g. The toggle pin on a watertight hatch must be the same size as the hole provided.
- h. For individually dogged hatches, ensure the engineer's wrench is in place. For flush hatches, if the hatch is operated with a T-wrench, ensure the T-wrench is in place.

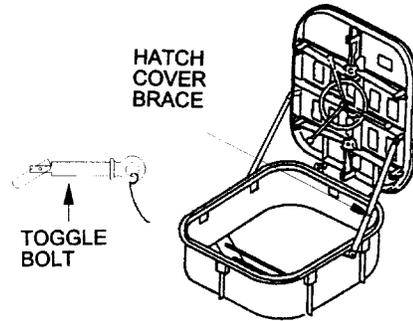


Figure 2-11. Hatch Cover Brace and Toggle Bolt

2-1.8 INSPECTION OF WATERTIGHT SCUTTLES.

- a. Examine the knife-edge and gasket as described in [paragraph 2-1.3](#) and [paragraph 2-1.4](#).
- b. Accomplish the chalk test as described in [paragraph 2-1.5](#).
- c. For flush scuttles, ensure the T-wrench is in place.
- d. With the scuttle completely dogged down tight, grasp the handwheel. Play in the handwheel indicates that the wheel nut is loose or the square spindle hole in the handwheel is rounded out. Tighten the nut or replace the handwheel if the square hole is rounded out. If the handwheel nuts are tight and the handwheel can be pulled up and down, the flange formed into the spindle has broken free and the spindle must be replaced. This problem is caused by over tightening (dogging down) the scuttle. See [figure 2-12](#).

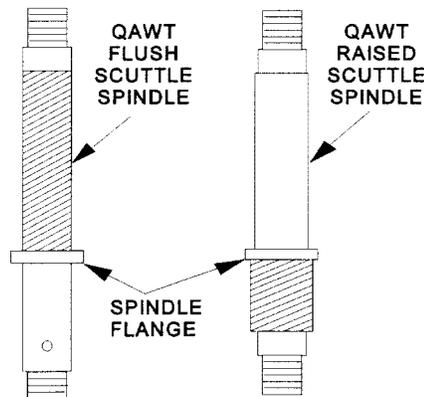


Figure 2-12. Quick-Acting Watertight Scuttle Spindles

Examine the notches formed into the handwheel(s). Turn the wheel to the opened position and feel for the notches. This is a safety requirement which allows opening or closing the fitting by touch in darkness or smoke. Raised watertight scuttles have different handwheels for the upper and lower sides (each with different National Stock Numbers (NSNs)). When replacing the handwheel, be sure to choose the proper replacement part. See [figure 2-13](#).

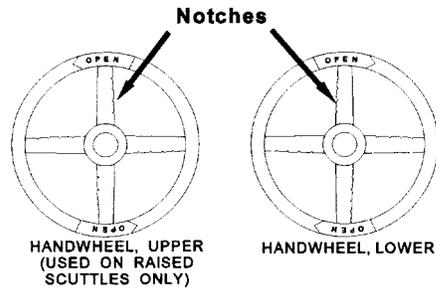


Figure 2-13. Quick-Acting Watertight Scuttle Handwheels

- e. Standing below the scuttle, lower the cover and dog it down. Grasp and attempt to wiggle each dogging arm. If one or more of the dogging arms move, tighten the dog adjustment bolt on the loose arm. Dog adjustment bolts have a locking device that consists of a small nylon plug pressed into a hole in the body of the bolt. The locking device prevents the adjustment bolt from backing out after adjustment of the dogging arm. Inspect each adjustment bolt for wear by trying to tighten it by hand. If the bolt screws in all the way by hand, it is worn and must be replaced. Push each dogging arm in toward the scuttle. If it does not return to position, the spring inside the housing which holds the dog must be replaced. Dogging arm assemblies are the same for raised and flushed scuttles. See [figure 2-14](#).

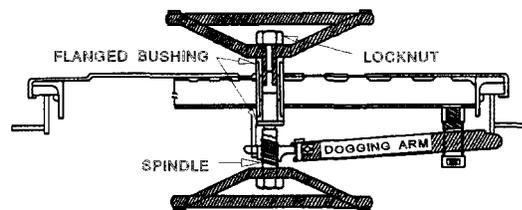


Figure 2-14. Dogging Arm Assembly

- f. Open the scuttle, grasp the handwheel with both hands, and attempt to shake the handwheel from side to side. Any play or movement in the spindle indicates either that the spindle bushings are worn and should be replaced, or that there is not enough silicone compound lubricating the bushings. The handwheel should spin easily when turned. If it does not, the spindle is bound up or seized to the bushings. This is caused by a lack of lubrication between the spindle shaft and bushings. To correct this problem, remove, clean, and reassemble the spindle assembly. If the handwheel wobbles when the nuts are tightened, look down at the spindle while turning the handwheel to determine if the spindle is bent. If the spindle is bent, it must be replaced.
- g. Grasp the spider with both hands, one on each side, and attempt to move it (wobble it) from side to side. A slight movement is normal. However, movement of more than 1/16 inch indicates that the spider and/or the spindle threads are worn and one or both of those parts should be replaced. Also inspect the guide cam for the presence of a correct weld.
- h. Hinge pin wear on quick-acting scuttles is often difficult to detect since there is normally a large amount of play in hinges, even when the fitting is new. Thus, it is good practice to periodically remove and examine the pins to inspect for wear. Ensure that lock collars on hinge pins are in place. For quick-acting flush scuttles, inspect spacer washers for wear.

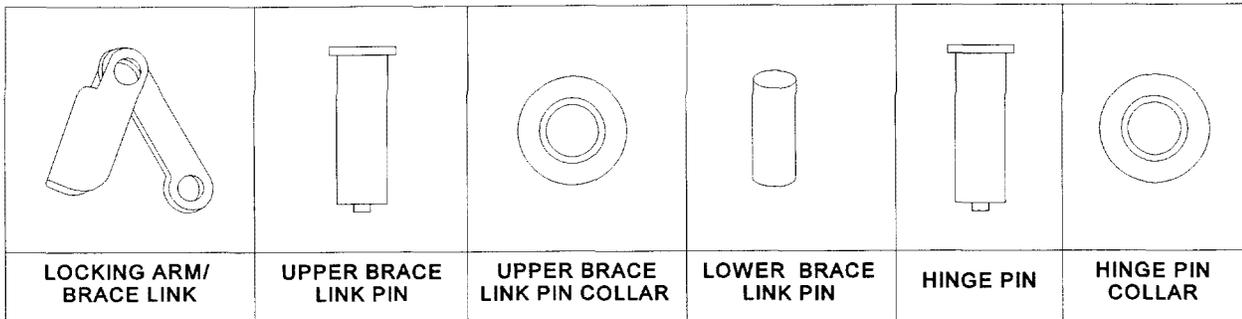
CAUTION

Ensure hands are out of the clear opening when conducting this test.

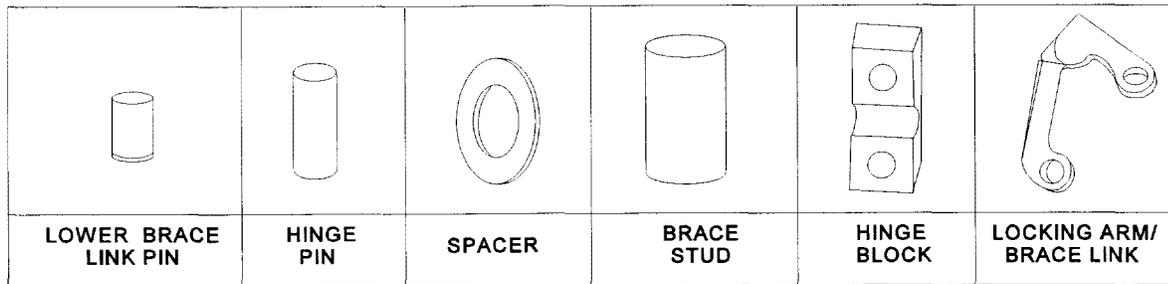
- i. With the scuttle open, push down on the scuttle top. The brace link assembly should not collapse. If the brace

link assembly does collapse, the brace link assembly is worn or bound up from corrosion, and either the brace link assembly or brace link pins should be cleaned and replaced. See [figure 2-15](#).

- j. Clean dirt, debris, and corrosion from around the spindle collar and recessed area around the knife-edge. Ensure the scuttle is easily operated with a T-wrench. If the wrench slips, either the collar slot or T-wrench is worn and should be replaced. Also ensure that drain channels are clear.



**BRACE LINK ASSEMBLY FOR
QUICK-ACTING WATERTIGHT RAISED SCUTTLE**



**LOCKING ARM/BRACE LINK ASSEMBLY FOR
QUICK-ACTING WATERTIGHT FLUSH SCUTTLE**

Figure 2-15. Locking Arm/Brace Link

2-1.9 WATERTIGHT/AIRTIGHT DOOR DOG AND HINGE ADJUSTMENT. The door knife-edge must contact the gasket at every point continuously around the door to guarantee a watertight seal. If there are areas where the knife-edge does not contact the gasket, adjust the dogs to apply greater pressure to the door and force the gasket to contact the knife-edge. All inspections, repairs, and other adjustments should be completed before adjusting the dogs. There are two methods of adjusting the dogs to provide a 1/8-inch compression of the gasket. Method 1 (refer to [paragraph 2-1.9.1](#)) has proven to be the most accurate. However, this procedure must be accomplished with the gasket removed. Method 2 (refer to [paragraph 2-1.9.2](#)) is accomplished with the gasket in place. However, this procedure is less accurate, especially if there is warpage between the door panel and the knife-edge. Either method can be used for quick-acting or individually dogged doors.

2-1.9.1 Adjustment Method 1 (Gasket Removed). To accomplish this procedure, obtain a gauge block, 3/8-inch thick by 1/2-inch wide, fabricated from 3/8-inch flat bar stock. The gauge block should be approximately 6 inches long.

- a. Loosen all jamnuts or self-locking nuts and hinge adjusting screws (airtight doors only).
- b. Remove the existing gasket. If in satisfactory condition, save gasket for reinstallation.
- c. Place the 3/8-inch thick gauge block in the gasket channel directly behind the dog wedge. Using two 1/2-inch long pieces of gasket material, secure the gauge block in the gasket channel.

- d. Close the door and dog door down.
- e. Tighten the first jamnut or self-locking nut down until the knife-edge hits hard against the 3/8-inch thick gauge block. See [figure 2-16](#).
- f. Where jamnuts are used, tighten the second jamnut securely against the first jamnut.

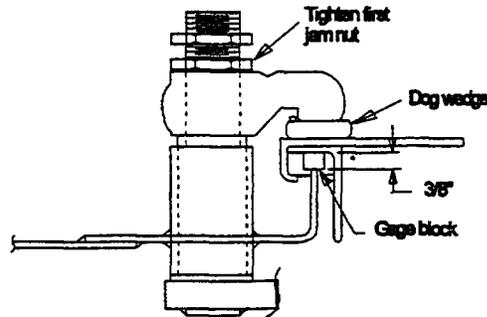


Figure 2-16. Locking Arm/Brace Link

- g. Repeat [step b](#) through [step f](#) for each dog.
- h. For airtight doors, adjust each hinge by inserting the gauge block in the gasket channel directly behind the hinge blade. Close the door, and, using the proper size Allen wrench, tighten the hinge adjusting screw until the knife-edge hits hard against the gauge block. Tighten the hinge adjusting screw locknut firmly against the yoke while holding the adjusting screw with the Allen wrench.

2-1.9.2 Adjustment Method 2 (Gasket Installed).

- a. Loosen all jamnuts or self-locking nuts and hinge adjusting screws (airtight doors only).
- b. Close the door, but do not dog door down.
- c. If there is warpage between the door panel and the frame, the gasket will not contact the knife-edge evenly. Start the dog alignment in the area where the gasket first contacts the knife-edge.
- d. Insert a strip of paper between the gasket and the knife-edge, and dog the door.
- e. Tighten the first jamnut or self-locking nut down until the paper cannot be pulled out from between the knife-edge and the gasket. Ensure the dog is contacting the dog wedge. (For individually dogged doors, two persons are required, one on either side of the door.)
- f. Tighten the first jamnut or self-locking nut an additional 1-1/8 turns to achieve a 1/8-inch gasket compression.
- g. Where jamnuts are used, tighten the second jamnut securely against the first as previously discussed in [paragraph 2-1.9.1, step f](#).
- h. Repeat [step b](#) through [step g](#) for the remaining dogs.
- i. For airtight doors, adjust each hinge by inserting a strip of paper between the gasket and knife-edge behind each hinge and dog the door. Tighten each hinge adjusting screw until the paper can not be slid out from between the knife-edge and the gasket.
- j. For airtight doors, tighten each hinge adjusting screw an additional 1-3/8 turns to achieve a 1/8-inch gasket compression. When finished, tighten the hinge adjusting screw locknut firmly against the yoke while holding the adjusting screw with the Allen wrench.

2-1.9.3 Other Door Maintenance.

- a. After adjusting the dogs and/or hinges, accomplish a chalk test inspection. (Refer to [paragraph 2-1.5.](#)) If the door is properly adjusted, the gasket will show a continuous line of chalk.
- b. Once maintenance actions are complete, open and close the door several times to distribute the silicone compound on wearing parts evenly and to confirm that the door is operating satisfactorily. These preventive maintenance procedures, accomplished on a regular basis, should keep watertight/ airtight closure problems to a minimum. Discrepancies which cannot be corrected by the cognizant work group must be reported to the appropriate damage control work center for repair. If the discrepancy cannot be repaired by ship's force, or if the repair parts are not available, submit a deferred action/work request for OPNAV 4790.2K. If discrepancies render the door nonfunctional, indicate as such in the ship's closure log.

2-1.10 DOG MAINTENANCE.

- a. Grit and other foreign matter may, over a period of time, become embedded in the lubricated moving parts of dogging mechanisms, resulting in damage to working surfaces. Clean old grease and other foreign matter from threaded and exposed working parts. Avoid getting any oil or cleaning solvents on the gasket when cleaning. The standard rubber gasket materials used in watertight closures are excellent for use as a watertight seal, but do not have high resistance to petroleum based products. Oil or petroleum based solvents in continuous contact with closure gaskets will eventually cause gaskets to deteriorate, resulting in loss of watertightness and requiring replacement of gaskets.
- b. Lubricate dog and hand lever spindles. (Refer to [paragraph 2-1.11.](#))
- c. If the closure is equipped with stick packing plungers, screw in the packing plunger several turns to force packing out and around the spindle. If the packing plunger cannot be screwed in, renew the stick packing. (Refer to [paragraph 2-1.12.](#)) Use no more than three sticks of packing in standard length spindle shaft openings.

NOTE

Closures equipped with self-lubricated bushings do not need stick packing or string packing.

2-1.11 DOG SPINDLE LUBRICATION.

NOTE

On exterior or well deck doors equipped with steel sleeves, MACHALT 167-31010 (ECP-526) removes existing Oilite bronze bushings, string and stick packing, packing plungers, and jamnuts. This MACHALT installs sintered bronze bushings impregnated with Elisha Technologies EDC 1270 EPL O-rings, T-seals, helical springs, self-locking hex nuts, and paint shields and fills the void space inside the spindle sleeve with Elisha Technologies EDC 1270 EPL grease. This MACHALT also replaces the self-lubricated bushing components installed by MACHALT 167-31004 (ECP-444).

Occasionally, due to lack of usage or because of paint and extreme environmental conditions, a dogging mechanism or hand lever will freeze in its spindle and refuse to turn. When this occurs, the dog assembly should

be completely disassembled and cleaned. Refer to [chapter 3](#), [chapter 4](#), and [chapter 5](#) for disassembly instructions for doors, hatches, and scuttles, respectively. For doors equipped with Oilite bronze bushings, string, and string packing, after cleaning the dog assembly:

- a. Replace the string packing which is used to fill space between the coils of the compression spring on the dog spindle. String packing is the same type of material used in stick packing, but is enclosed in a cotton thread jacket.

NOTE

Do not use string packing or stick packing on a closure that has self-lubricated bushings installed.

- b. Lubricate the shafts by applying a light coat of silicone compound. Inspect threads for damage. If found, chase thread with 7/8-9 UNC2A die nut. Afterwards, remove all metal particles from spindle threads and shaft. Lubricate dog lever conrod bushings (Oilite only) with a few drops of oil (symbol 2190 TEP), as applicable.
- c. Reassemble the dog assembly.

2-1.12 REPLACEMENT OF STICK PACKING AND PACKING PLUNGERS. A hollow shaft which runs down the center and out the sides of dog and hand-lever spindles on watertight doors permits the repacking of these fittings without disassembly. On most doors, the lengthwise opening is threaded and equipped with a packing plunger. (See [figure 2-17](#).) As the plunger is screwed in, it forces 1/4-inch by 1-1/4-inch stick packing (which was specifically developed for watertight doors) out and around the spindle, filling the voids between the spindle, its associated fittings, the string packing, and the spindle sleeve. Stick packing is used in conjunction with string packing to provide an air, gas, and watertight seal around the spindle of the dogging mechanism. Each time maintenance is required, the plunger is screwed in until stick packing is squeezed out around the spindle. If the packing has been completely used up, the packing plunger will not screw in any farther. When this occurs, the stick packing must be replenished.

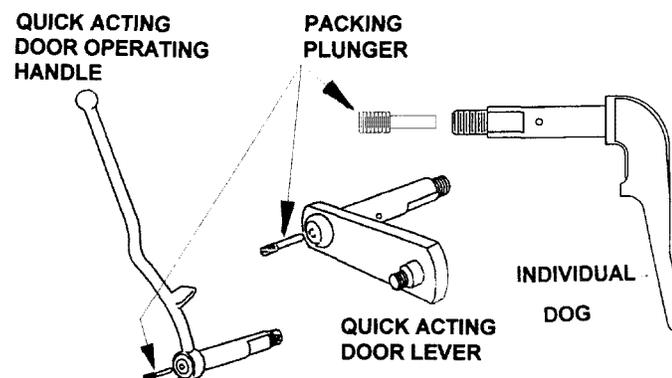


Figure 2-17. Packing Plunger Locations

NOTE

Closures equipped with self-lubricated bushings do not need stick packing or string packing. Refer to [paragraph 2-1.13](#) for more information.

- a. To replace stick packing on a closure equipped with packing plungers, accomplish the following:
 1. Stick packing is supplied packed between corrugated cardboard strips. Dip the strip in cold, fresh water

before removing the sticks to prevent the stick packing from adhering to fingers. This precaution ensures that the packing will remain intact when grasp is released.

2. After the packing plunger is removed from the spindle, insert the stick packing into the packing shaft opening.
 3. A 1/4-inch diameter rod is useful for pushing the stick packing deeper into the shaft opening before reinserting the plunger. Push the packing far enough into the shaft so that the plunger does not contact the packing while it is being reinserted. If the plunger comes in contact with the packing before its threads are engaged, some of the stick packing may be wasted.
 4. Reinsert the packing plunger into the packing shaft opening.
 5. Tighten the plunger with a screwdriver until excess packing appears around the spindle. This indicates that all voids inside the spindle sleeve are filled and that the fitting assembly is watertight.
- b. To apply string and stick packing on a closure not equipped with a packing plunger, accomplish the following:
1. On closures that have a spring, slide the dog spindle with the flanged bushing into the frame sleeve and follow it with the compression spring. Wrap approximately 6 inches of string packing around the spindle shaft, between the coils of the spring. Force the string into the frame sleeve by applying pressure to the spring with the straight bushing and final assembly. Finally, use the packing plunger to insert just enough stick packing to form an airtight, gastight, and watertight seal. Avoid putting too much packing in the sleeve. (A maximum of three sticks is usually sufficient.)
 2. On closures without a spring, such as earlier types with 1-inch spindles, wrap 12 inches of string packing around the spindle and slowly force the packing into the frame with the straight bushing and final assembly. Then, add stick packing as described in [step b.1](#).

2-1.13 SELF-LUBRICATED BUSHINGS. Oilite phosphor bronze bushings on dog assemblies can be replaced with self-lubricated stainless steel bushings that are Teflon coated. These bushings have an internal T-seal with an external O-ring to provide a watertight seal. These bushings were authorized for new construction; modified dog-in-frame, quick-acting, and individually dogged watertight doors; and for flush and raised scuttles. Self-lubricated bushings may also be found on other ships as a result of modernization, replacement, authorized ship alteration (SHIPALT), or authorized MACHALT. Ordering information for these bushings is provided in [appendix C, section I](#), of this booklet.

With the installation of self-lubricated bushings, string packing, and stick packing are no longer required for dog assemblies. The packing plunger is still left in place inside the spindle to fill the void that would otherwise result. Grease is not used for installation of self-lubricated bushings; silicone compound is used to make the assembly easier. Refer to [chapter 3, paragraph 3-1.4](#), for installation instructions for these bushings.

2-1.14 SINTERED BRONZE BUSHINGS WITH ELISHA TECHNOLOGIES EDC 1270 EPL GREASE AND CRES PAINT SHIELD (STEEL DOORS ONLY). MACHALT 167-31010 (ECP-526), applicable to exterior and well deck doors, and other doors located in high humidity areas, replaces the existing Oilite bushings or self-lubricated bushings with sintered bronze bushings impregnated with Elisha Technologies EDC 1270 grease, CRES helical springs, and self-locking hex nuts. This MACHALT also removes the nylon plug from the spindle (where self-lubricated bushings are installed) and replaces the packing plunger with a setscrew plug. A CRES paint shield is also installed over the external end of the sleeve between the dog and straight bushing. See [figure 2-17A](#) and [figure 2-17B](#). In the absence of a MACHALT installation label plate, the presence of a paint shield on the exterior end of the sleeve indicates that MACHALT 167-31010 (ECP-526) has been installed. The void space inside the sleeve is filled with Elisha Technologies EDC 1270 EPL grease, which is injected through a lubrication fitting temporarily installed in the packing plunger hole. Once lubricated, the lubrication fitting is

removed, and a setscrew plug is inserted in the hole. If left in place, the lubrication fitting will interfere with the movement of the operating linkage on quick-acting doors.

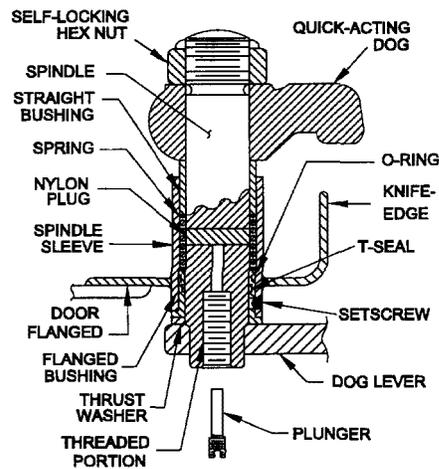


Figure 2-17A. Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31004 (ECP-444)

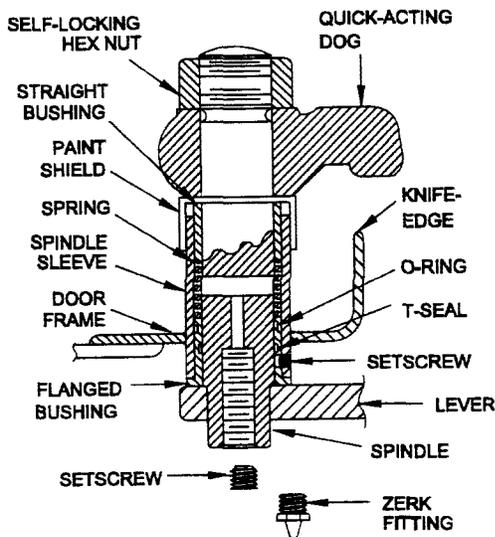


Figure 2-17B. Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)

WARNING

Prior to lubricating this type of dog assembly, ensure all dogs are adjusted for 1/8-inch gasket compression. If dogs are adjusted after lubrication, the grease will be forced out of the sleeve and onto the deck and other parts of the door. Protect deck area below with rags or drop cloth prior to lubrication.

- a. To lubricate this type of dog assembly, remove the setscrew plug from the packing plunger hole. Install the lubrication fitting. Using a grease gun, inject Elisha Technologies EDC 1270 EPL grease into the sleeve until the grease just starts to flow from the paint shield. Wipe off any excess grease from around the spindle sleeve and paint shield. When complete, remove the lubrication fitting and install the setscrew plug.

2-1.15 GASKET MAINTENANCE AND REPLACEMENT. Clean gaskets by scraping with a hardwood block approximately 5/8-inch wide. You can also use an eraser to clean the gasket. The wooden handle of a wire brush makes an adequate gasket cleaning tool if nothing else is available, provided only the wooden handle is used to clean the gasket.

WARNING

Gasket channels on doors that have radio frequency shielded gaskets (wire impregnated) must be free of paint to ensure proper grounding.

CAUTION

Under no circumstances should a wire brush or metal scraper be used. Any metal tool can cut or score the rubber.

CAUTION

Prevent petroleum products from coming into contact with rubber gaskets. These products destroy the gasket material.

Inspection procedures for watertight closure gaskets are provided in [paragraph 2-1.4](#). If a gasket fails the inspection, accomplish the procedures in [paragraph 2-1.15.1](#) through [paragraph 2-1.15.3](#). Accomplish any dog adjustments before installing a new gasket.

2-1.15.1 Removal.

- a. Locate the gasket joint.
- b. Make a V-shaped cut with a razor knife completely through the gasket on one side of the joint, and remove the wedge of gasket material.
- c. Pull the two ends of the gasket from beneath the channel with a screwdriver, and clamp the ends together with vise grip pliers.
- d. Using the vice grips as a handle, stretch the gasket and pull from the channel around the entire door. See [figure 2-18](#).

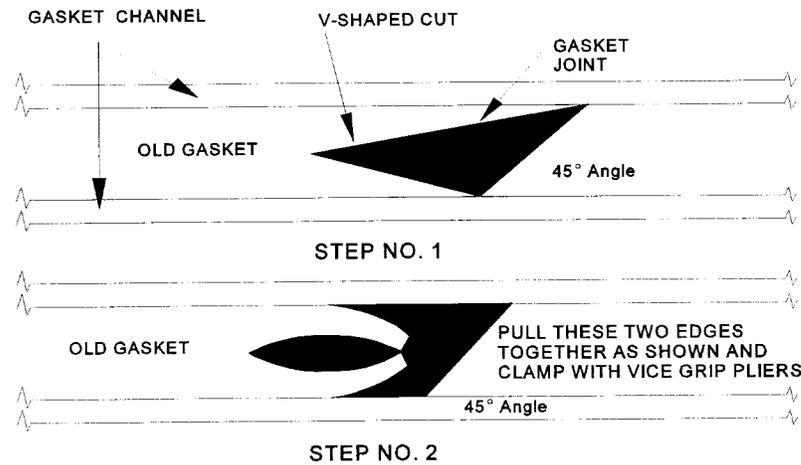


Figure 2-18. Gasket Removal

WARNING

Be careful not to pull on the gasket in a direct line with your face. The pliers could slip and cause injury.

- e. Clean all debris and corrosion from the inside of the gasket channel. A small rotary wire brush, chucked in an electric drill, is effective for removing this corrosion.
- f. Prime the inside of the gasket channel with Formula 150 epoxy polyamide primer.
- g. When the first coat is dry, apply a topcoat of Formula 151.

2-1.15.2 Installation of MIL-R-900 Gasket Rubber.

NOTE

The MIL-R-900 gasket is gradually being phased out for use in nonballistic doors, hatches, and scuttles. This gasket is being replaced by a softer, more resilient, tear resistant, fire retardant, silicone rubber (MACHALT 167-31004 (ECP-444)) in accordance with FEDSPEC ZZ-R-765, Class 3B, Grade 30.

Since a rubber gasket will shrink with age and as a result of the installation procedure, the gasket should be cut several inches longer than the size of the channel. Cut approximately 1 inch extra for every 3 feet of length of channel. Use only a single length of gasket. An overlapping 45-degree angle should be used for the joint.

CAUTION

Do not locate the joint in a radius portion of the closure.

- a. Installation of Closures Equipped with a C-Type Gasket Channel.

CAUTION

Do not use any lubricant other than silicone compound.

1. Use gasket material that has a beveled edge.
 2. Cut a single length of rubber gasket material to go around the door plus 6 inches
 3. Apply silicone compound to the entire gasket and to the inside of the metal gasket channel. Petroleum-based products will deteriorate the rubber gasket. The silicone compound will not only lubricate the rubber but will reduce corrosion by stopping water entrapment in the bottom part of the door.
 4. Begin to install the gasket, with the bevel facing to the inside of the channel. On a door, start at the top center of the closure. With the exception of scuttles, do not place the joint on a curved section of the door or hatch. Gasket joints on scuttles are usually placed at the top of the scuttle when it is open. Clamp one end of the gasket in place with welder's vice grip pliers to keep it from sliding.
 5. To insert the gasket into the channel, use a blunt instrument such as an old, large, flat tipped screwdriver with its tip rounded and smooth. Blunting the tool helps prevent tearing the gasket. A small block of hardwood can also be used. The gasket may be stretched slightly to permit easier insertion of the gasket. After installing approximately 1 foot of gasket, stop and use the blunt tool to apply back pressure to return the gasket to its original shape. (Remove the stretch.) Use additional welder's vice grip pliers, if needed, to hold the gasket in place as the installation proceeds. Repeat this procedure around the door until arrival back at the top. Remove all stretch from the entire gasket.
 6. Let the gasket set for approximately 24 hours to allow for shrinkage.
 7. Trim the excess gasket material to make an overlapping 45-degree joint. Allow a 1-inch overlap to be force fitted into the gasket channel to allow for any further possible shrinkage of the gasket. More than one joint is not permitted on watertight fittings with all radius corners. Joints must be minimized, and splices are not permitted.
 8. Clean any silicone residue from the two mating surfaces of the joint. Apply sealing compound to the gasket joint to prevent leakage. Ensure the joint is tight.
- b. Installation of Closures Equipped with a U-Type Gasket Channel.
1. Cut a single length of rubber gasket material to go around the door plus 6 inches.
 2. Apply sealing compound to the back of the gasket.
 3. Begin to install the gasket. On a door, start at the top center of the closure. With the exception of scuttles, do not place the joint on a curved section of the door or hatch. Gasket joints on scuttles are usually placed at the top of the scuttle when it is open. Clamp one end of the gasket in place with welder's vice grip pliers to keep it from sliding.
 4. To insert the gasket into the channel, use a blunt instrument such as an old, large, flat tipped screwdriver with its tip rounded and smooth. Blunting the tool helps prevent tearing the gasket. A small block of hardwood can also be used. Use additional welder's vice grip pliers, if needed, to hold the gasket in place as the installation proceeds. Repeat this procedure around the door until arrival back at the top. Remove all stretch from the entire gasket.
 5. Trim the excess gasket material to make an overlapping 45-degree joint. Allow approximately 1 inch overlap to be force fitted into the gasket channel to allow for any further possible shrinkage of the gasket. More than one joint is not permitted on watertight fittings with all radius corners. Joints must be minimized, and splices are not permitted.
 6. Ensure the two mating surfaces of the joint are clean. Apply sealing compound to the gasket joint to prevent leakage. Ensure the joint is tight.

WARNING

All tag-out procedures must be in accordance with current shipboard instructions.

7. Tag closure "Out of Service." Dog the closure to clamp the gasket in place until the sealing compound sets.

2-1.15.3 Installation of ZZ-R-765 Silicone Gasket (MACHALT 167-31004 (ECP-444)). The ZZ-R-765 Silicone, Class 3B, 30 Durometer, is authorized for all watertight closures except ballistic closures.

CAUTION

Do not use petroleum-based products on the gasket.

- a. Cut a single length of silicone gasket material to go around the door plus 1 inch. Ensure both gasket ends are cut square. Apply silicone compound to the gasket.
- b. Begin to install the gasket with the beveled side toward the inside of the channel. On a door, start at the top center of the closure. With the exception of scuttles, do not place the joint on a curved section of the door or hatch. Gasket joints on scuttles are usually placed at the top of the scuttle when open. No tools are required to install a silicone gasket. Simply squeeze the gasket and push into the channel. While installing, apply back pressure to the gasket. Be careful not to stretch the gasket.
- c. When you arrive back at the gasket joint, force fit the extra 1 inch into the channel. More than one joint is not permitted on watertight fittings with all radius corners.
- d. Remove excess silicone compound with a clean rag.

2-1.16 DAMAGE CONTROL CLOSURES INSPECTION FORM. A generic inspection form for use by ship's force to aid in inspecting damage control watertight, airtight, and fumetight closures is provided as [figure 2-19](#). This form is in no way an official inspection guide and is included only as a suggested guide for inspections such as zone inspections. This form serves as a check-off and as documentation of the condition of shipboard closures, and is authorized to be reproduced locally.

2-1.17 MAINTENANCE RECORDS. For any deficiencies that cannot be corrected by ship's force:

- a. Use the Navy's Maintenance and Material Management (3M) System Deferred Action/Work Request Form OPNAV 4790/2K to document the problem.
- b. Provide a Job Sequence Number (JSN) for ordering parts, scheduling future repair, and/or requesting repair by an outside activity.

DAMAGE CONTROL CLOSURES INSPECTION (Ship's Force Personnel Only) U.S.S. _____					
Interior		Location:	Dk:	Name:	
Exterior		Compartment #:	Fr:	Date:	
ITEM	DOOR	HATCH	HATCH WITH SCUTTLE	SCUTTLE	BALLISTIC FITTING
TYPE	WATERTIGHT	AIRTIGHT/FUMETIGHT	QUICK-ACTING	INDIVIDUALLY DOGGED	FLUSH
MATERIAL	STEEL	ALUMINUM	FIBERGLASS/GRP	CRES	HY/HTS
DETAILS	ITEM	FOUND	TYPE OF MOUNTING	CLASSIFICATION	
SIZE	NO. OF DOGS		RAISED	STRUCTURAL (NON-BALLAST)	FIREZONE STRUCTURAL
	TYPE /NO. OF WEDGES		LOW PROFILE	FIREZONE	STRUCTURAL (BALLISTIC)
	LOCATION/NO. OF HINGES		RAMPED LOW PROFILE	COMPANION/ACCESS	SPECIAL
	TEST PRESSURE		FLUSH	STRIKEDOWN	ACCESS
	COAMING		DESIGNATION	PASSING SCUTTLE	
	BEARING/BUSHING				
	DESIGNATION				
INSPECTION	ITEM	CONDITION FOUND		GUIDANCE	
	GENERAL CONDITION				
	OPERATION			Ease of operation, binding	
	STRAIGHTNESS			Bulkhead/deck, closure	
	GASKET			Location of seam, type and condition of gasket	
	FIXED LIGHTS			Size: Condition:	
	KNIFE-EDGE			Cracks, kinks, bent, min/max height	
	BUSHINGS/BEARINGS			Freedom of movement	
	FASTENERS			Locknuts/jamnuts, bushings, conrod collars, cotter pins	
	LUBRICANT/ANTISEIZE			Linkage, fasteners	
	COMPONENTS			Spindle, yokes, etc.	
	COAMINGS			Size: Condition:	
	ACTUATING MECHANISM			Smoothly operable	
	LINKAGE			Washers between moving parts, lubricated	
	WRENCH/HANDLE/ETC.			Secured and accessible	
	METAL SPRAYED			Weather deck	
	DOG SLEEVES			Deterioration, cracked weld	
	CLOSURE CLEARANCE			Adequate for passage	
	STRUCTURE			Holes, dents, dielectric tape/coating	
	KEEP OPEN LATCH			Scuttle - hatch - door	
	LABEL PLATES			Legible and secure	
	FASTENER MATERIAL			CRES on exterior closures	
	CHANNEL DRAINS			Scuttles/hatches - clogged/unclogged	
REMARKS:					

Figure 2-19. Damage Control Closures Inspection Form

2-2. ALUMINUM CLOSURES.

2-2.1 SAFETY. Refer to [paragraph 2-1.1](#).

2-2.2 GENERAL GUIDANCE FOR INSPECTIONS. Refer to [paragraph 2-1.2](#).

2-2.3 KNIFE-EDGE AND DOOR FRAME INSPECTION.

- a. Open the fitting. Inspect the knife-edge for straightness and/or warpage using a straightedge and two lengths of string. See [figure 2-20](#), [figure 2-21](#), and [figure 2-22](#). The maximum acceptable variation for knife-edge straightness is plus or minus 1/16 inch. The maximum acceptable warpage of the door frame is 1/8 inch. If frame/coaming warpage is excessive, or if the knife-edge straightness is not within tolerances, initiate action to replace the closure.
- b. Inspect the knife-edge for paint, dirt, rust, or nicks. For aluminum knife-edges, remove paint with a nylon scrubbing pad, paint remover and a rag only.

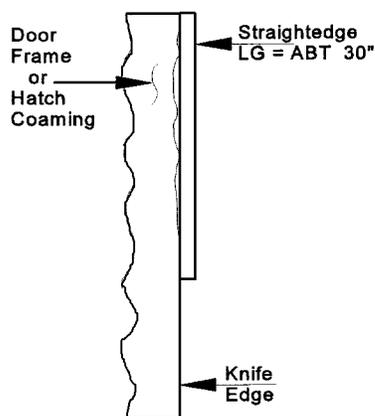


Figure 2-20. Knife-Edge Inspection Using Straightedge Method

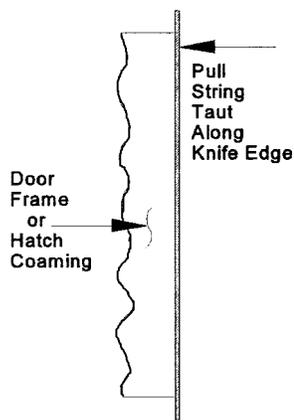


Figure 2-21. Knife-Edge Inspection Using String Method

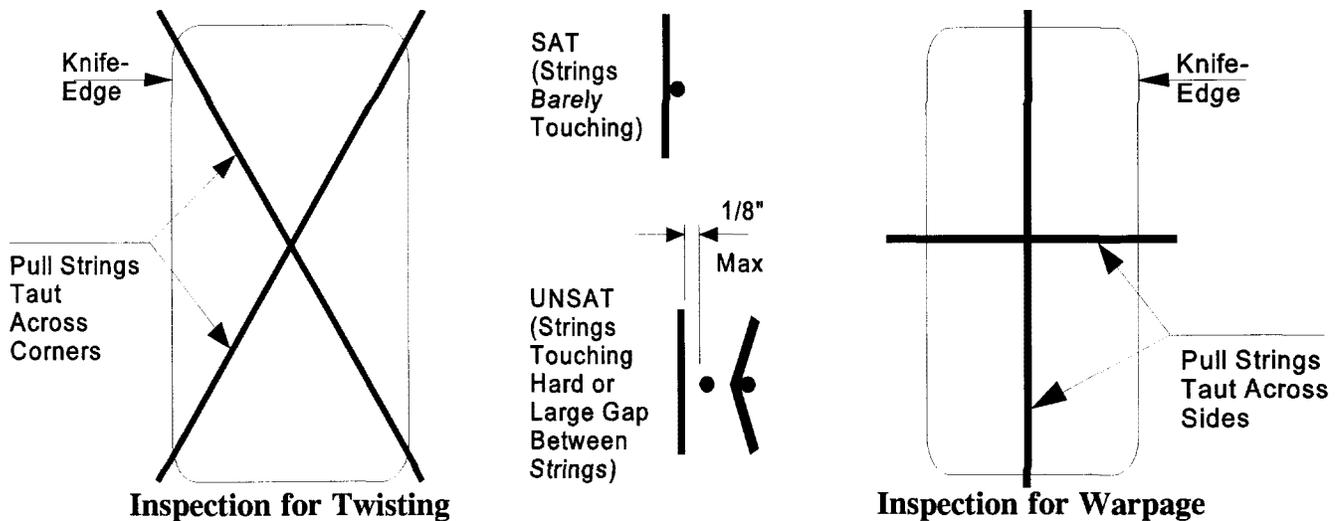


Figure 2-22. Knife-Edge Inspection for Warpage

CAUTION

A knife-edge that is too high will damage the gasket; a knife-edge that is too low will damage the hinges as a result of overadjusting the door in attempting to maintain a watertight seal.

- c. Inspect the entire knife-edge for proper height. A block of aluminum cut to the specifications shown in [figure 2-23](#) is an effective gauge. If the knife-edge is more than 1/8 inch too high or too short, it must be repaired in accordance with [step d](#).
- d. For aluminum knife-edges, do not attempt to build up a short knife-edge. Report the closure to the appropriate damage control work center for the repair. Use only a fine file to file down a high knife-edge, and avoid leaving grooves in the edge. Use a steel striker plate when hammering a bent aluminum knife-edge to avoid denting the aluminum.

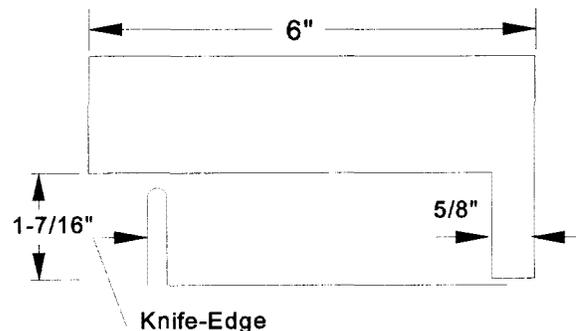


Figure 2-23. Gauge for Measuring

2-2.4 GASKET INSPECTION. Refer to [paragraph 2-1.4](#).

2-2.5 CHALK TEST. Refer to [paragraph 2-1.5](#).

2-2.6 INSPECTION OF WATERTIGHT DOORS. The following inspection steps apply to both quick-acting and individually dogged doors:

- a. Examine the knife-edge and gasket as described in [paragraph 2-2.3](#) and [paragraph 2-1.4](#).
- b. Accomplish the chalk test in accordance with [paragraph 2-1.5](#).
- c. Visually inspect the door for missing, damaged, or nonstandard components.
- d. Visually inspect the hinge sleeves and hinge pins for wear. With the door opened, grasp the door from the hand lever side, and push toward the hinged side. The door should not give more than approximately 3/16 inch. If it does, either the hinge pins and/or washers are worn, or the holes for the hinge pins have become enlarged. Do not confuse hinge pin wear with normal play in the hinge blades. Another indication of hinge pin wear is if the metal channel surrounding the gasket on the door side is rubbing against the knife-edge, or if the door panel rubs one or more side dogs when opening or closing. See [figure 2-24, "A."](#) A good hinge and alignment are illustrated in [figure 2-24, "B."](#) Replace the hinge pin washers and/or pins if any of the following conditions exist:
 1. The metal surrounding the top and bottom of the door gasket rubs against the knife-edge.
 2. The door panel rubs one or more dogs, particularly at the bottom of the door.
 3. The door chafes the knife-edge when opened and closed.
 4. The hinge pin washers are worn thin to approximately 1/32 inch. New washers are 1/16 inch in thickness. See [figure 2-24, "C."](#)
 5. The hinge pin is bent or damaged. Refer to [chapter 3, paragraph 3-1.9](#), for procedures on repairing hinge pin assemblies.
- e. Ensure the device for holding the door open is intact and workable.
- f. Inspect the bottom of the door for corrosion. Corrosion in this location indicates poor cleaning and priming of the coaming.
- g. Inspect each dog assembly. Ensure the straight bushing is firmly seated against the back of the dog and is free of dirt, corrosion, and paint. Ensure the flanged bushing is firmly seated against the end of the dog sleeve and is secured in place by its dog point setscrew. See [figure 2-25](#). Setscrews are often painted over and may be difficult to locate. Remove paint as necessary to inspect for loose, missing, or broken setscrews. For self-lubricated bushings, there should be a CRES thrust washer between the dog lever and the face of the flanged bushing. See [figure 2-25A](#).
- h. With the door open, the dogs properly adjusted, and the jamnuts tightened, grasp each dog spindle and attempt to shake it up and down and side to side. If it moves, the bushings must be replaced. If the bushings are replaced and there is still visible play between the spindle sleeve in the door frame and the outside of the bushings, the spindle sleeve is corroded to oversized dimensions. The entire door should be replaced in this situation. This is a common occurrence if the door has not been lubricated and packed in accordance with proper PMS procedures, and on weatherdeck doors that are severely corroded.

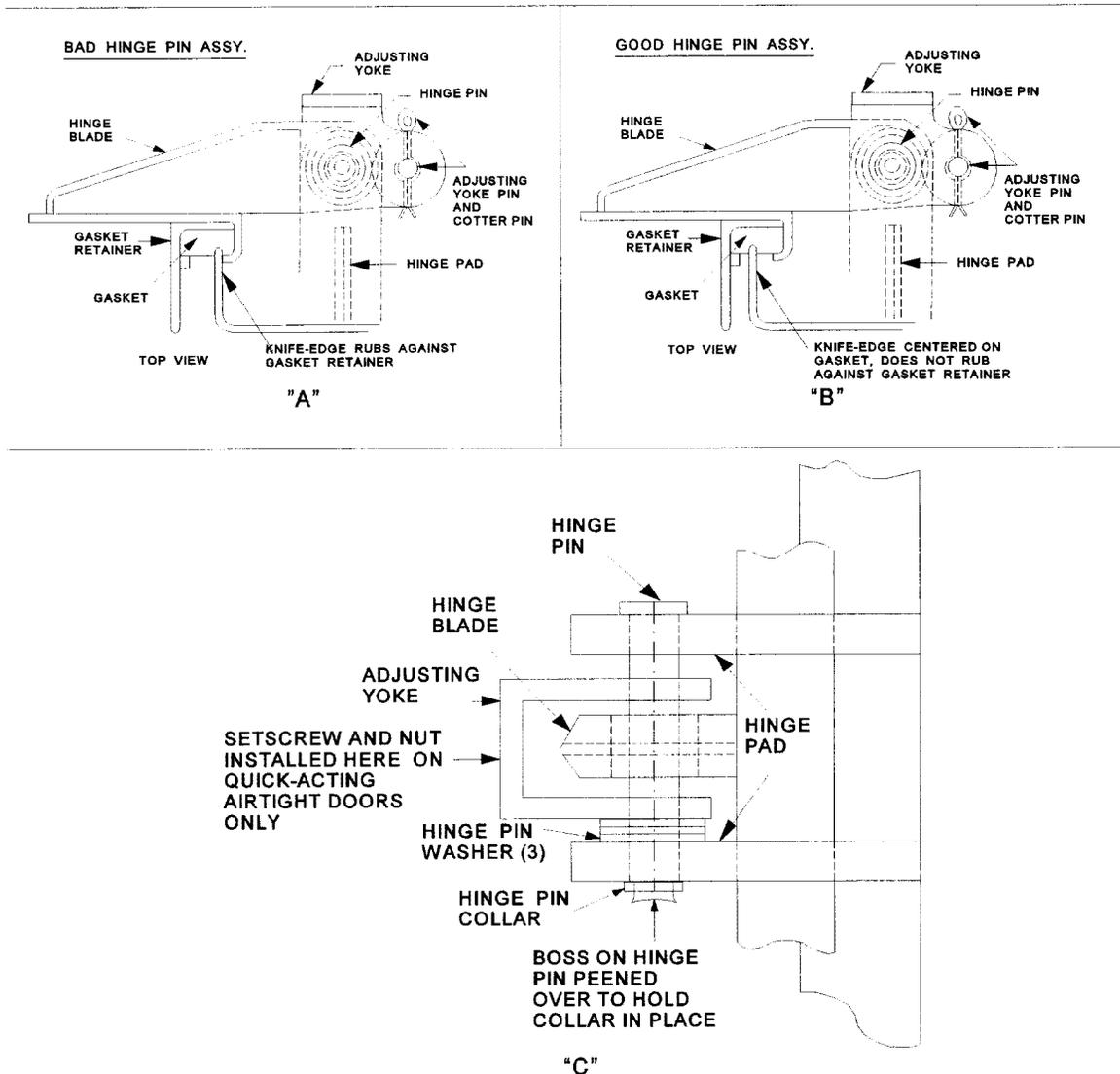


Figure 2-24. Hinge Pin Assemblies

NOTE

Stick packing is not required for doors with self-lubricated bushings installed.

- i. Ensure both jamnuts or self-locking hex nuts are in place on each dog assembly. Jamnuts should be locked tightly together. Remove any paint or dirt from the bushings with a wire brush and a clean rag. The straight bushing should not be stuck in the spindle sleeve and should rest against the back of the dog. If the bushing is jammed or stuck in the sleeve, bushing must be removed and the interior of the sleeve cleaned out and lubricated to ensure a free sliding fit. See [figure 2-25A](#).
- j. Ensure there are no missing, broken, or worn spring clips for operating handle. Spring clip shall positively engage operating handle in the undogged position.
- k. Ensure there is no cracked glass in fixed light.

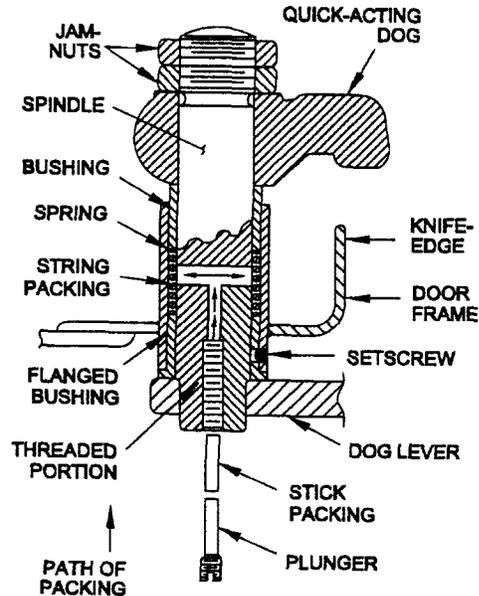


Figure 2-25. Quick-Acting Door Dog Assembly (Cross Sectional View)

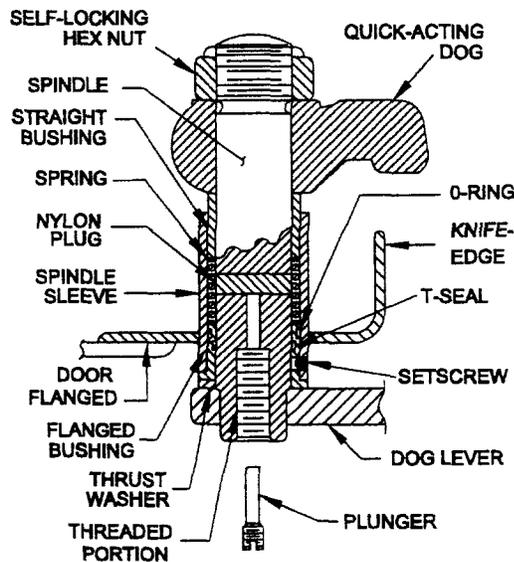


Figure 2-25A. Quick-Acting Door Dog Lever Assembly (Cross Sectional View) Modified by MACHALT 167-31004 (ECP-444)

- l. Ensure proper operation of dead light cover over fixed light.
- m. Ensure proper operation and condition of door hook and bumper assembly. Verify there are no parts missing and no structural damage.
- n. Ensure proper material for proper hardware on weather deck doors. Dogs, dog spindle nuts, and operating handles should be CRES (nonmagnetic). Verify with magnet.
- o. Ensure there are no obstructions in way of access to closure. Door should be able to swing open a minimum of 90 degrees. Dogs should not chafe panel edges when opening or closing.

- p. On all weather and well deck doors, remove gasket and inspect gasket channel for loose paint, rust, or corrosion, particularly along the bottom of door.
- q. Perform a random inspection of at least two dog sleeves, including at least one from a lower corner dog. Remove double jamnuts or self-locking hex nut, the dog, and the straight bushing. Inspect for the presence of string and stick packing (Oilite bushings only), moisture, or rust. If found, inspect all remaining dogs. Replenish string and stick packing, if necessary.
- r. If binding is present, remove paint from wedge pad contact surfaces, dogs, spindle threads, spindle nuts, bushings, packing plungers, setscrews, connecting rod studs and nuts, and contact surfaces of connecting rod linkages using wire brush, scraper, or abrasive cloth. DO NOT REPAINT.
- s. On all weather and well deck doors, ensure gasket is firmly seated in the gasket channel with no bulges, particularly along the bottom of the door.

2-2.6.1 Inspection of Handles.

- a. Quick-Acting Doors. Work the operating handle back and forth to inspect for excessive tightness or binding. A handle which cannot be opened and closed with one hand may have dogs which are out of adjustment or handle nuts which are too tight. If the door handle must be raised in order to close the door, either the hinge pins are worn or the hinge pin bracket holes have become enlarged. If a door will not operate from the inside, either the handle has fallen on the opposite side or the handle is slipping on its spindle. Slipping of the handle indicates excessive wear on the flats of the spindle where they fit into the hole on the end of the handle. Inspect the lineup of the outer and inner handles. If obstructing the free operation of the door, the handles must be disassembled and repaired.
- b. Individually Dogged Doors. Work each individual handle back and forth. The handles should work smoothly. If the handles do not work smoothly, disassemble, clean, and lubricate, then reassemble and adjust in accordance with [paragraph 2-1.9](#). String and stick packing are not required for doors with self-lubricated bushings installed. Refer to [chapter 3, paragraph 3-2.5](#) and [paragraph 3-2.7](#), for procedures on disassembling and repairing handles.

2-2.6.2 Inspection of Dog Wedges. Refer to [paragraph 2-1.6.2](#).

2-2.6.3 Inspection of Quick-Acting Watertight Door Linkage. Refer to [paragraph 2-1.6.3](#).

2-2.6.4 Inspection of Conrod and Lever Studs. Refer to [paragraph 2-1.6.4](#).

2-2.7 INSPECTION OF WATERTIGHT HATCHES.

- a. Examine the knife-edge and gasket as described in [paragraph 2-2.3](#) and [paragraph 2-2.4](#).
- b. Accomplish the chalk test in accordance with [paragraph 2-1.5](#).
- c. With the hatch open, examine the dog bolt threads and nut for wear. Wear is indicated by excessive wobble between the nut and dog bolt. Replace the dog bolt assembly if it is excessively worn. Ensure that the flats on the dog bolt nut are in good condition and that the dogging wrench fits it properly. Replace the nut if the flats are rounded off. Ensure that the collar is not missing from the top of the dog bolt. The purpose of the collar is to prevent the loss of the nut when the hatch is opened. If all is satisfactory, coat the dog bolt threads with a light coating of silicone compound. See [figure 2-26](#).

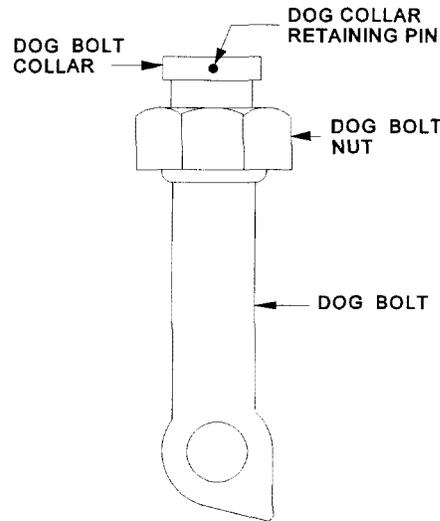


Figure 2-26. Dog Bolt Assembly

- d. All hatches should have a means of holding the hatch cover upright when the compartment below is entered or exited. This consists of a pipe/swivel assembly permanently attached to the hatch cover at one end while the other end is connected by means of a toggle bolt to a clip welded to the hatch coaming. The toggle bolt is fastened to the brace pipe by means of stainless steel aircraft cable to prevent loss. (Do not substitute chain for the cable.) To stow the brace when the hatch cover is closed, the brace pipe is unfastened from the hatch coaming by pulling the toggle bolt from the clip. The brace pipe is then swung up under the hatch cover and fastened with the same toggle bolt to clips that are welded to the hatch underside specifically for this purpose.
1. Ensure the brace pipe, toggle, and cable assembly are not missing or damaged.
 2. Ensure the pipe assembly supports the hatch cover when in the upright position.
 3. Ensure the toggle bolt is the right size to attach to the clips and that it has not been replaced by nuts and bolts. See [figure 2-27](#).

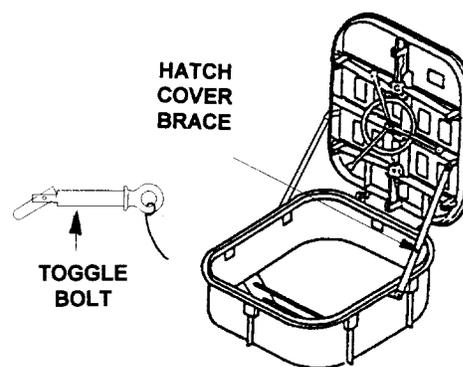


Figure 2-27. Hatch Cover Brace and Toggle Bolt

- e. Hinge pin wear on watertight hatches is often difficult to detect since there is normally a large amount of play in hinges, even when the fitting is new. Thus, it is good practice to periodically remove hinge pins (with hatch closed and dogged) and examine the pins for wear. Ensure washers, lock collars, and cotter pins on hinge pins are in place.

WARNING

Ensure the space below is unmanned before closing and dogging the hatch when checking hinge pins for wear.

- f. The toggle pin on a watertight hatch must be the same size as the hole provided.
- g. For individually dogged hatches, ensure that the engineer's wrench is in place. For flush hatches, if the hatch is operated with a T-wrench, ensure that the T-wrench is in place.

2-2.8 INSPECTION OF WATERTIGHT SCUTTLES.

- a. Examine the knife-edge and gasket as described in [paragraph 2-1.4](#) and [paragraph 2-2.3](#).
- b. Accomplish the chalk test in accordance with [paragraph 2-1.5](#).
- c. For flush scuttles, ensure the T-wrench is in place.
- d. With the scuttle completely dogged down tight, grasp the handwheel. Play in the handwheel indicates that the wheel nut is loose or the square spindle hole in the handwheel itself is rounded out. Tighten the nut or replace the handwheel if the square hole is rounded out. If the handwheel nuts are tight and the handwheel can be pulled up and down, the flange formed into the spindle has broken free and the spindle must be replaced. This problem is caused by overtightening (dogging down) the scuttle. See [figure 2-28](#).

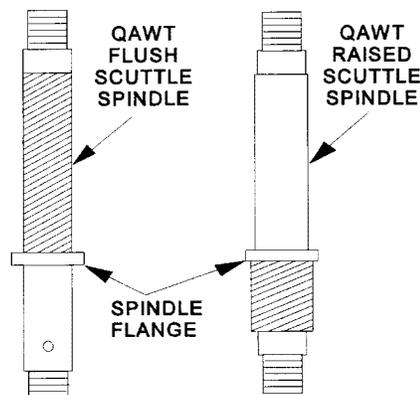


Figure 2-28. Quick-Acting Watertight Scuttle Spindles

Examine the notches formed into the handwheel(s). Turn the wheel to the opened position and feel for the notches. This is a safety requirement which allows opening or closing the fitting by touch in darkness or smoke. Raised watertight scuttles have different handwheels for the upper and lower sides (each with different NSNs). When replacing the handwheel, be sure to choose the proper replacement part. See [figure 2-29](#).

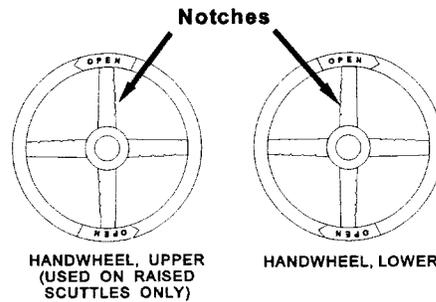


Figure 2-29. Quick-Acting Watertight Scuttle Handwheels

- e. Standing below the scuttle, lower the cover and dog it down. Grasp and attempt to wiggle each dogging arm. If one or more of the dogging arms move, tighten the dog adjustment bolt on the loose arm(s). Dog adjustment bolts have a locking device that consists of a small nylon plug pressed into a hole in the body of the bolt. The locking device prevents the adjustment bolt from backing out after adjustment of the dogging arm. Inspect each adjustment bolt for wear by trying to tighten it by hand. If the bolt screws in all the way by hand, it is worn and must be replaced. Push each dogging arm in toward the scuttle. If it does not return to position, the spring inside the housing which holds the dog must be replaced. Dogging arm assemblies are the same for raised and flushed scuttles. See [figure 2-30](#).

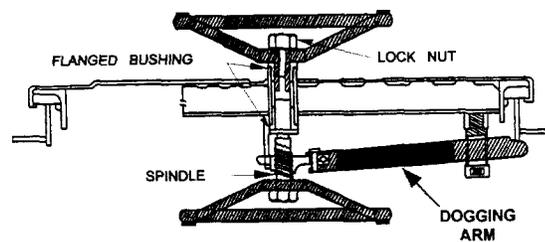


Figure 2-30. Dogging Arm Assembly

- f. Open the scuttle, grasp the handwheel with both hands, and attempt to shake the handwheel from side to side. Any play or movement in the spindle indicates either that the spindle bushings are worn and should be replaced, or that there is not enough silicone compound lubricating the bushings.

The handwheel should spin easily when turned. If it does not, the spindle is bound up or seized to the bushings. This is caused by a lack of lubrication between the spindle shaft and bushings. To correct this problem, remove, clean, and reassemble the spindle assembly.

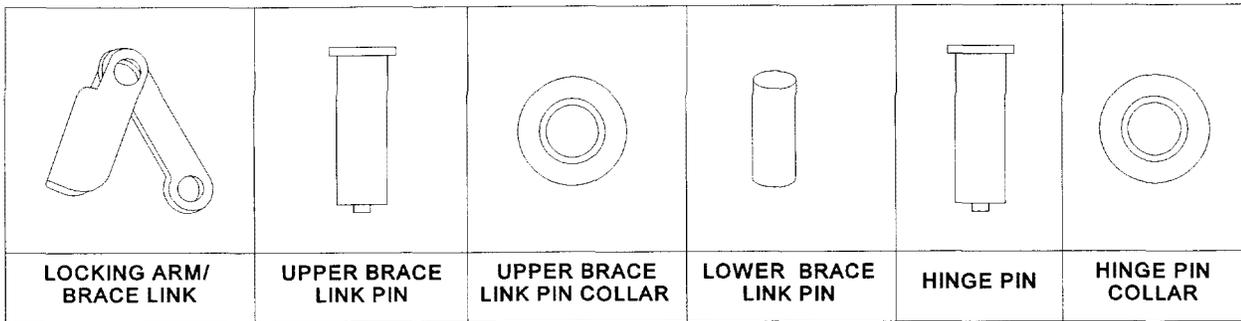
If the handwheel wobbles when the nuts are tightened, inspect the spindle while turning the handwheel to determine if the spindle is bent. If the spindle is bent, it must be replaced.

- g. Grasp the spider with both hands, one on each side, and attempt to move it (wobble it) from side to side. A slight movement is normal. However, movement of more than 1/16 inch indicates that the spider and/or the spindle threads are worn and one or both of those parts should be replaced. Also inspect the guide cam for the presence of a correct weld.
- h. Hinge pin wear on quick-acting scuttles is often difficult to inspect since there is normally a large amount of play in hinges, even when the fitting is new. Thus, it is good practice to periodically remove and examine the pins to inspect for wear. Ensure that lock collars on hinge pins are in place. For quick-acting flush scuttles, inspect spacer washers for wear.

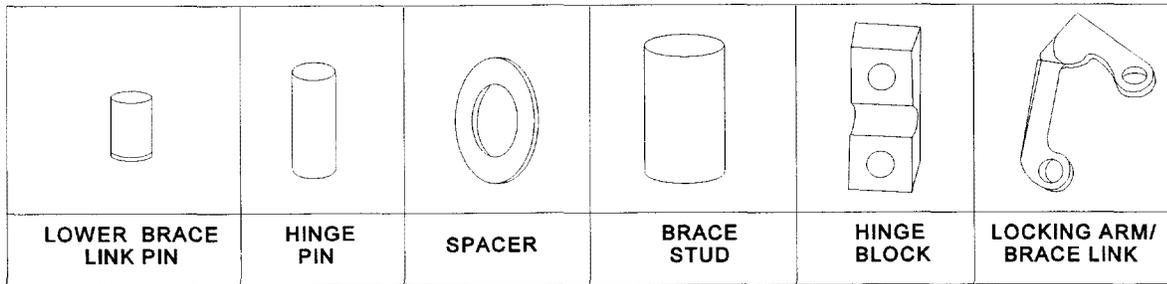
WARNING

Ensure hands are out of the clear opening when conducting this test.

- i. With the scuttle open, push down on the scuttle top. The brace link assembly should not collapse. If it does, this indicates that the brace link assembly is worn or bound up from corrosion. Either the brace link assembly or brace link pins should be cleaned and replaced. See [figure 2-31](#).



**BRACE LINK ASSEMBLY FOR
QUICK-ACTING WATERTIGHT RAISED SCUTTLE**



**LOCKING ARM/BRACE LINK ASSEMBLY FOR
QUICK-ACTING WATERTIGHT FLUSH SCUTTLE**

Figure 2-31. Locking Arm/Brace Link

- j. Clean dirt, debris, and corrosion from around the spindle collar and recessed area around the knife-edge. Ensure the scuttle is easily operated with a T-wrench. If the wrench slips, either the collar slot or T-wrench is worn and should be replaced. Also ensure that drain channels are clear.

2-2.9 WATERTIGHT/AIRTIGHT DOOR DOG AND HINGE ADJUSTMENT. Refer to [paragraph 2-1.9](#).

2-2.9.1 Adjustment Method 1 (Gasket Removed). Refer to [paragraph 2-1.9.1](#).

2-2.9.2 Adjustment Method 2 (Gasket Installed). Refer to [paragraph 2-1.9.2](#).

2-2.9.3 Other Door Maintenance. Refer to [paragraph 2-1.9.3](#).

2-2.10 DOG MAINTENANCE. Refer to [paragraph 2-1.10](#).

2-2.11 DOG SPINDLE LUBRICATION. Refer to [paragraph 2-1.11](#).

2-2.12 REPLACEMENT OF STICK PACKING AND PACKING PLUNGERS. Refer to [paragraph 2-1.12](#).

2-2.13 SELF-LUBRICATED BUSHINGS. Refer to [paragraph 2-1.13](#).

2-2.14 GASKET MAINTENANCE AND REPLACEMENT. Refer to [paragraph 2-1.15](#).

2-2.14.1 Removal. Refer to [paragraph 2-1.15.1](#).

2-2.14.2 Installation of MIL-R-900 Gasket Rubber. Refer to [paragraph 2-1.15.2](#).

2-2.14.3 Installation of ZZ-R-765 Silicone (MACHALT 167-31004 (ECP-444)). Refer to [paragraph 2-1.15.3](#).

2-2.15 DAMAGE CONTROL CLOSURES INSPECTION FORM. Refer to [paragraph 2-1.16](#).

2-2.16 MAINTENANCE RECORDS. Refer to [paragraph 2-1.17](#).

CHAPTER 3

DOOR REPAIR AND REPLACEMENT

3-1. STEEL DOORS.

3-1.1 DOOR REPAIR. If routine maintenance is not sufficient to restore a watertight door to watertight or operating condition, defective parts must be repaired or replaced. (Refer to [chapter 2](#) for inspection and maintenance procedures.) If the answer to the problem is not covered in [chapter 3](#) or in the [appendices](#), consult the appropriate technical point of contact at Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), or a commercial point of contact. When accomplishing maintenance or repairs on a door, avoid the following:

- a. Never bend, twist, or beat the door.
- b. Never use a pneumatic grinder to grind the knife-edge. If the knife-edge requires dressing, use a file to remove the nicks. Never use a Wheeze bar or large crescent wrench to bend or twist the knife-edge.
- c. Never use excess force to close a door.
- d. Never let doors in major egress areas go without repair.
- e. Never paint a gasket, dog, dog wedge, spindle threads, spindle nut, knife-edge, straight bushing, or label plate.
- f. For gasket replacement, never use more than one continuous length of gasket material.
- g. Use only a blunt instrument to install gaskets. Never use a screwdriver, scraper, or knife.
- h. Never apply paint to moving components on the hinge assembly, as components must remain free to move.

3-1.2 DOOR DISASSEMBLY. Damage to the structure or operability of a watertight door can result from warpage to the bulkhead in which it is installed. Another factor that contributes to wear on a watertight door is the weight of the whole door assembly as it swings on its hinges, particularly in high traffic areas. In order to repair problems such as a warped door frame or an inoperable quick-acting dogging assembly, the door must be completely disassembled. In some cases, removal of the door from its hinge assembly is necessary to accomplish the repair.

When disassembling a watertight closure to accomplish repairs, inspect all wear parts, such as bushings, and replace as required. If repairing a door to correct for warpage, expect to replace all wear parts (and possibly non-wear parts) because of the excessive strain warpage causes to the door assembly. To disassemble a watertight door, accomplish the following:

- a. For quick-acting doors, completely disassemble the entire operating handle, spindle, lever, and conrod assemblies. See [figure 3-1](#), and refer to [paragraph 3-1.6](#) and [paragraph 3-1.7](#), for procedures on disassembling operating handles and lever/conrod assemblies. To make reassembly easier, mark each linkage part and its location with a metal etcher. For individually dogged doors, completely disassemble each dog. Refer to [paragraph 3-1.8](#) for instructions.

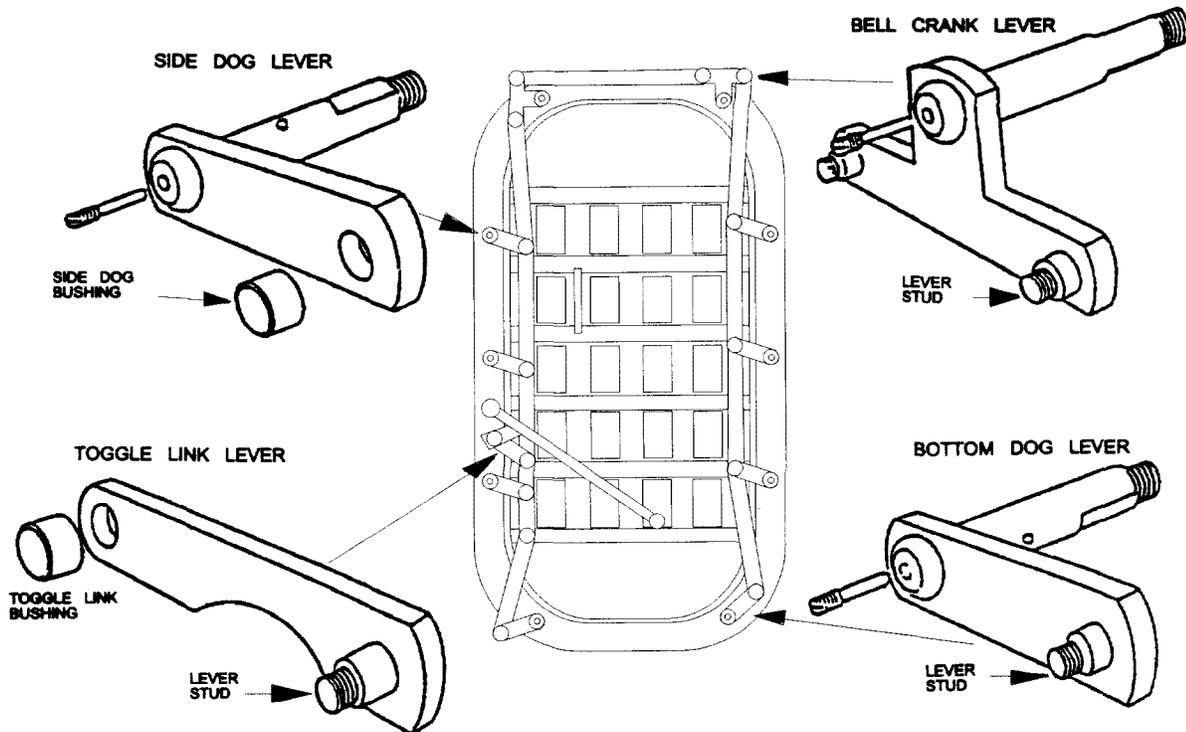


Figure 3-1. Quick Acting Door Levers

- b. Flanged bushings on dog assemblies are held in place with Allen head setscrews. Use an Allen wrench to loosen the setscrews. Gently tap out the flanged and straight bushings from all spindle sleeves with a brass rod or pipe approximately 5/8 inch in diameter.
- c. To inspect bushings for wear, insert on a clean spindle of the proper diameter and move back and forth. Bushings should have a firm, uniform fit on the spindle, with no play or wobbling. Replace any bushing that wobbles on the spindle.
- d. To inspect springs for wear, compare with a new spring. Replace any spring that is collapsed or broken, or that has individual coils which are worn thin. New springs are machined with the end coils thinner than those in the center. This is not a sign of wear.

3-1.3 SPINDLE SLEEVE PREPARATION AND BUSHING INSTALLATION. Clean and prepare all spindle sleeves of a watertight closure before installing bushings. For ordering replacement bushings, note that spindle bushings and springs for quick-acting doors are 1-inch in diameter. Spindle bushings and springs on individually dogged doors are 1-1/8 inch in diameter. On some older ships, individually dogged doors have 1-inch diameter spindle bushings, and both the inner and outer bushings are flanged. These older bushings, though obsolete, are still available through watertight door part companies (refer to [appendix C](#)), but are not available through the Navy Supply System. For installation of self-lubricated bushings, refer to [paragraph 3-1.4](#) or [paragraph 3-1.5](#). To prepare spindle sleeves and install bushings, accomplish the following:

WARNING

Exercise caution when using flammable solvent.

- a. For steel doors, scrape rust, paint, and old grease from the spindle sleeves using a flat tipped punch and a 1-inch diameter rotary wire brush chucked in an electric drill. A no. 320 grit aluminum oxide cloth can also be used. Remove all rust and corrosion; otherwise, the straight bushing in a dog assembly will not be free to move in the spindle sleeve under spring tension. For all doors, remove all traces of packing with a rag and dry cleaning solvent.
- b. Clean out the setscrew hole in each spindle sleeve with a 12-28UNF tap. Thinly coat the inside of each spindle sleeve with a silicone compound.
- c. Scribe a line on the face of each flanged bushing to indicate the location of the setscrew hole (except for flanged bushings of quick-acting handles). This will make it much easier later to align the hole in the bushing with the setscrew hole in the door sleeve. Thinly coat flanged bushings with a silicone compound, and insert one bushing into each spindle sleeve from the linkage side of the door. Align the hole in each bushing with the setscrew hole in the door sleeve.
- d. Coat the setscrews with antiseize compound. Insert each setscrew into a setscrew hole, and lock the bushing to the sleeve (except for flanged bushings for quick-acting handles). If the setscrew hole is worn out and will not hold a 12-28UNF dog point setscrew, complete the repair in one of the following two ways:
 1. Drill and tap an oversize hole in the sleeve with a no. 7 drill and 1/4-20UNC tap. (Setscrews of this size are available commercially.)
 2. Remove the flanged bushing, and drill and tap a completely new hole somewhere else on the sleeve. Use a no. 14 drill and 12-28UNF tap. Install and rotate the bushing to line up with the new hole.

3-1.4 SELF-LUBRICATED BUSHING INSTALLATION. Oilite phosphor bronze bushings on dog assemblies of steel doors can be replaced with self-lubricated stainless steel bushings that are Teflon coated and have an O-ring mounting. These bushings were recently authorized for new construction; for dog-in-frame, quick-acting, and individually dogged watertight doors; and for flush and raised scuttles. Self-lubricated bushings may also be found on other ships as a result of modernization, replacement, or authorized machinery alteration (MACHALT).

With the installation of self-lubricated bushings, string packing and stick packing are no longer required for dog assemblies. The packing plunger is still left in place inside the spindle to fill the void that would otherwise result. Accomplish the following installation procedure to replace dog assembly bushings with a self-lubricated bushing replacement parts kit. (Ordering information for the bushing kits is provided in [appendix C, section I](#).)

- a. Remove the existing dog assembly and dog point setscrew. (Refer to [paragraph 3-1.7](#) for quick-acting dog disassembly or [paragraph 3-1.8](#) for individual dog disassembly.) If unable to remove the existing setscrew, drill and tap at the location for the 1/4-20UNC dog point setscrew furnished in the repair parts kit.

WARNING

Exercise caution when using flammable solvent.

- b. Remove all traces of packing residue from the dog sleeve with a rag and dry cleaning solvent.
- c. Remove corrosion from the interior of the sleeve and ends of sleeve with no. 320 grit aluminum oxide cloth (for steel sleeves). Clean with a rag and solvent.
- d. Clean the spindle of the dog assembly lever or individual dog with a rag and solvent.
- e. Use a soft-faced hammer to install the plastic plug in the transverse hole in the spindle. Do not remove the packing plunger.

CAUTION

Use extreme care when driving the plug with a soft-faced hammer. Lay the spindle on wood or other soft material. Avoid metal-to-metal contact. It may be necessary to use a 1/4-inch or slightly smaller diameter drift punch to drive the plug. Avoid striking the spindle.

CAUTION

Do not force the bushing or attempt to drive it with a mallet or hammer. The self-lubricated bushing has a Teflon ring that can be easily damaged.

- f. Apply a thin coat of silicone compound to the interior of the new flanged bushing. Trial fit the bushing to the spindle. The bushing should slide onto the spindle with normal hand pressure.

CAUTION

Do not force the bushing or attempt to drive it with a mallet or hammer.

- g. Apply a thin coat of silicone compound to the exterior of the flanged bushing. Trial fit the bushing to the dog sleeve. Applying hand pressure, carefully work the flanged bushing into the sleeve.
- h. Apply a thin coat of silicone compound to the inner surface of the dog sleeve on the exterior side (panel side) of the door. Trial fit the straight bushing to the sleeve.
- i. Use the black mark on the edge of the flanged bushing to assist in aligning the hole in the bushing. (It may be necessary to remove the tape that joins the thrust washer to the bushing in order to locate the black mark.) Temporarily tape the washer to the plug. To assist in aligning the bushing mark to the setscrew hole in the sleeve, mark the position of the hole on the outer circumference of the sleeve.

NOTE

Align the bushing mark with the sleeve hole carefully. Since the adhesive/ sealant sets up quickly, the hole in the flanged bushing must be in exact alignment with the hole in the dog sleeve

- j. Apply a thin coat of adhesive/sealant to the outer edge of the dog sleeve. Immediately work the O-ring into the dog sleeve, and press the flanged bushing to a snug fit with the sleeve.

WARNING

The adhesive/sealant is hazardous material.

CAUTION

Do not tighten the setscrew.

- k. Install the CRES dog point setscrew, and rotate the set key one turn.

- l. Apply a thin coat of silicone compound to the lever or dog spindle and to the exterior of the straight bushing. Carefully insert the spindle into the sleeve. Remove the tape holding the thrust washer and the flanged bushing together.
- m. Install the remainder of the dog assembly, except for the second jamnut (if not using self-locking nuts), according to normal procedures. (Refer to [paragraph 3-1.7](#) for quick-acting dog installation or [paragraph 3-1.8](#) for individual dog installation.)
- n. Apply antiseize compound to the setscrew. Tighten the setscrew to near flush with the surface of the dog sleeve, or until full tightness is achieved. At this point, back off the set key one-half turn.
- o. Repeat [step a](#) through [step n](#) for each dog assembly.
- p. When all dog assemblies are completed, adjust the dogs and accomplish a chalk test. Refer to [chapter 2, paragraph 2-1.9](#), for watertight door dog adjustments and to [chapter 2, paragraph 2-1.5](#), for procedures on accomplishing a chalk test.
- q. After adjustments and a chalk test are completed, install the second jamnut (if not using self-locking nuts). Hold the nut that is already installed with a 1-5/16-inch flat engineer's wrench. Thread the second nut onto the spindle, and tighten it against the first nut with another 1-5/16-inch wrench.

3-1.5 SINTERED BRONZE BUSHINGS WITH ELISHA TECHNOLOGIES EDC 1270 EPL GREASE AND CRES PAINT SHIELD.

NOTE

On exterior or well deck doors equipped with steel sleeves, MACHALT 167-31010 (ECP-526) removes existing Oilite bronze bushings, string and stick packing, packing plungers, and jamnuts. This MACHALT installs sintered bronze bushings impregnated with Elisha Technologies EDC 1270 EPL O-rings, T-seals, helical springs, self-locking hex nuts, and paint shields and fills the void space inside the spindle sleeve with Elisha Technologies EDC 1270 EPL grease. This MACHALT also replaces the self-lubricated bushing components installed by MACHALT 167-31004 (ECP-444).

3-1.5.1 Quick-Acting Watertight Door Modified Dog and Lever Assembly Installation.

- a. Remove setscrew. Clean internal grease passages of spindle using EDC cleaning fluid and cotton tip applicators. Clean internal threads of spindle with a 5/16-24UNF tap, using LPS Tapmatic no. 1 gold as a lubricant. Reinstall setscrew. See [figure 3-1A](#).

CAUTION

When trial fitting or installing the new flanged bushing, do not force or attempt to drive it onto the spindle or into the spindle sleeve with a mallet or hammer, as flanged bushing O-rings can easily be damaged. The flanged bushing should slide on with normal hand pressure.

CAUTION

Do not allow the threads of the spindle shaft to come in contact with the interior of the flanged bushing or the spindle sleeve.

- b. Trial fit flanged bushing by applying a thin coat of EDC 1270 EPL grease to the interior of flanged bushing and sliding onto the spindle with normal hand pressure. Then, remove flanged bushing.

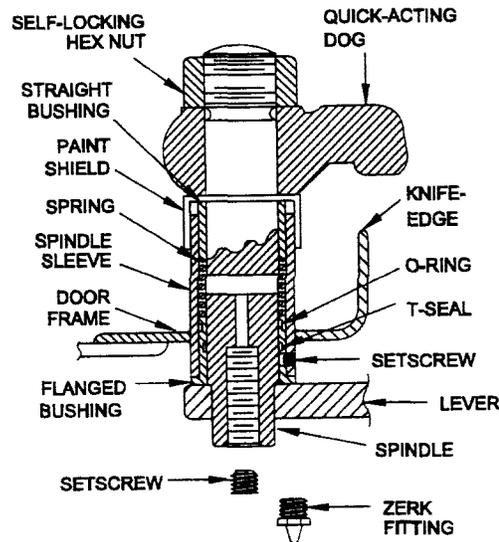


Figure 3-1A. Quick-Acting Door Dog Assembly (Cross Section View) Modified by MACHALT 167-31010 (ECP-526)

- c. Trial fit flanged bushing by applying a thin coat of EDC 1270 EPL grease to the exterior of flanged bushing and sliding into one of the top spindle sleeves with normal hand pressure. Then, remove flanged bushing.
- d. Trial fit straight bushing by applying a thin coat of EDC 1270 EPL grease to the inner surface of spindle sleeve on the outside (panel side) of the door and sliding the straight bushing into the spindle sleeve with normal hand pressure. Then, remove straight bushing.
- e. Align the flanged bushing with the setscrew hole on the spindle sleeve. Work flanged bushing into the spindle sleeve until the flanged bushing is pressed snugly against the spindle sleeve.
- f. Install the setscrew, one turn only, into the hole of spindle sleeve.
- g. Apply EDC 2400 caulk to the setscrew installed in [step f](#). Tighten the setscrew to near flush with the surface of the spindle sleeve, or until tightness is achieved, then back off one-half turn.
- h. Apply a thin coat of EDC 1270 EPL grease to the bell crank lever and spindle. Then, carefully install bell crank lever into the spindle sleeve.

NOTE

If levers were removed as left- and right-hand assemblies, the levers can be reinstalled as units at this time.

- i. Install compression spring onto spindle shaft.

CAUTION

Do not allow the threads of the spindle shaft to come in contact with the interior of the flanged bushing or the spindle sleeve.

- j. Apply a thin coat of EDC 1270 EPL grease to the exterior of straight bushing, and install bushing onto spindle shaft.
- k. Install paint shield, dog, and self-locking hex nut onto spindle. Tighten the self-locking hex nut just enough to eliminate play
- l. Repeat [step a](#) through [step k](#) for remaining bell crank lever, bottom dog lever, and side dog lever.
- m. When all dog assemblies are completed, install handle assembly in accordance with [paragraph 3-1.6](#). Adjust dogs in accordance with [chapter 2, paragraph 2-1.9](#), and chalk test in accordance with [chapter 2, paragraph 2-1.5](#).
- n. After adjustments and a chalk test are completed, lubricate dog and handle bushings in accordance with [chapter 2, paragraph 2-1.14](#).

3-1.6 OPERATING HANDLE REPLACEMENT. The operating handles of a quick-acting door should work smoothly, without excessive tightness or binding. If handles do not work smoothly, disassemble, clean, and lubricate, then reassemble and adjust. The handles on quick-acting doors wear faster than on other doors because of the strain of operating the entire closing mechanism. Worn, wobbling bushings are another reason to disassemble and repair operating handles. Expect to replace bushings and other wear parts whenever door handles are disassembled for maintenance or repair. Door handles can be disassembled without taking apart other components of the closing mechanism, except for the linkage that connects directly to the handles.

3-1.6.1 Operating Handle Disassembly.

- a. Place the operating handles in an undogged position.
- b. With the inside handle engaged in the spring clip assembly, remove the cotter pin and conrod collar from the toggle link lever and inside handle.

NOTE

Quick-acting doors with MACHALT 167-31010 (ECP-526) installed will have dog point setscrews securing both flanged bushings in the sleeve. The setscrews must be removed prior to removing the bushings.

- c. Remove the jamnuts or self-locking nut from the operating handle shaft.
- d. Withdraw the outside and inside handles from the sleeve. Remove both of the flanged bushings from the sleeve. See [figure 3-2](#).

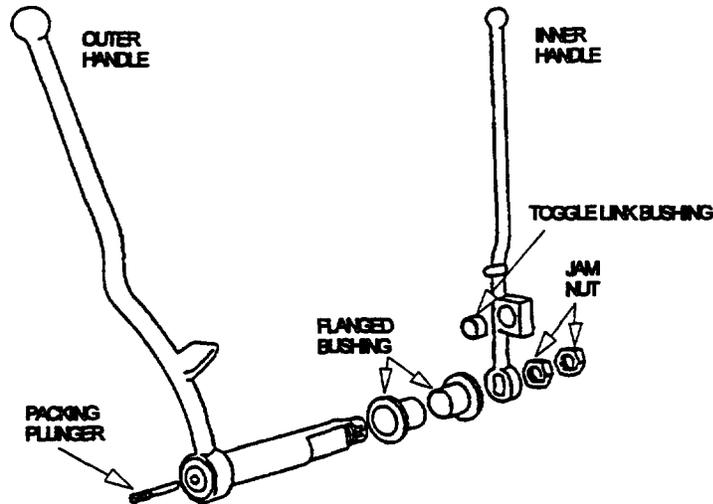


Figure 3-2. Quick-Acting Operating Handle Assembly (Left-Hand Shown)

3-1.6.2 Operating Handle Repair and Replacement. To repair or replace the operating handles of a quick-acting steel watertight door, accomplish the following:

- a. Remove the packing plunger from the outer handle spindle. Discard the packing plunger if it has a damaged screwdriver slot or threads. If the internal thread on the spindle is damaged, it can be retapped with a 5/16-24UNF tap. Remove the chips from the hole with a scribe and cotton swab. (This step is not necessary where self-lubricated bushings are either existing or being installed new.)
- b. Examine the spindle bearing surfaces of each handle. If the bearing surfaces have deep scratches or grooves, the handle must be replaced. If the spindle threads are damaged, repair them with a 7/8-9UNC die.

The fit between the spindle and the hole in the inner operating handle is sometimes so loose that the hole becomes enlarged and excessive movement develops. The result of this problem is that the interior and exterior handles become misaligned by as much as 30 degrees, preventing rapid operation of the door. To correct this problem, accomplish a temporary repair in accordance with [figure 3-3](#). This consists of installing a grooved 1/8-inch roll pin in a hole drilled through the operating handle and the handle shaft. The handle and shaft must be drilled as an assembly to ensure correct alignment of the holes. The pin will hold the handle and shaft rigidly together, but can be removed if necessary for maintenance purposes.

WARNING

Exercise caution when using flammable solvent.

- c. For steel doors, remove corrosion from the interior and ends of the sleeve with no. 320 grit aluminum oxide cloth. Clean with a rag and dry cleaning solvent.

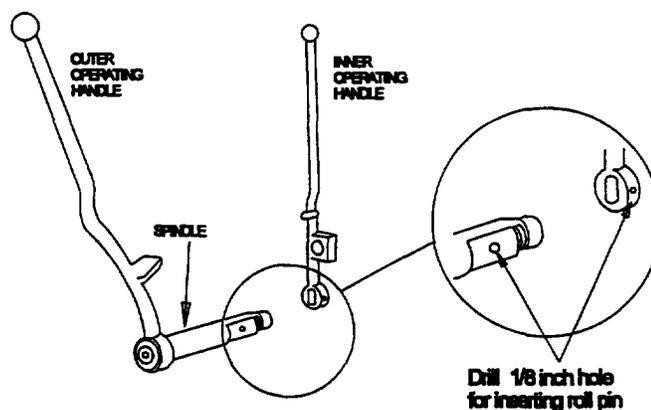


Figure 3-3. Quick-Acting Operating Handle Temporary Repair

NOTE

For exterior or well deck doors having MACHALT 167-31010 (ECP-526) installed, proceed to [paragraph 3-1.6.3](#).

CAUTION

Do not sand or paint bearing surfaces.

CAUTION

Do not sand and paint parts that are made of CRES. An easy way to differentiate between plated steel and CRES is with a magnet. Plated steel will attract the magnet; stainless steel will not.

- d. Scrape, sand, and paint individual linkage parts if required. Use Formula 150 primer. Clean parts with a rag and solvent.
- e. When using a self-lubricated bushing replacement parts kit, install the plastic plug that is supplied with the kit into the transverse hole in the hand lever shaft.

CAUTION

Use extreme care when driving the plug with a hammer. Lay the shaft on wood or other soft material. Avoid metal-to-metal contact. It may be necessary to use a 1/4-inch or slightly smaller diameter drift pin to drive the plug. Avoid striking the shaft, and do not remove the packing plunger.

- f. Apply a thin coat of silicone compound to the interior of the flanged bushings.

CAUTION

If replacing the bushings with self-lubricated ones, trial fit the new bushings to the hand lever shaft. Do not attempt to force the bushings or drive the

Caution - precedes

bushings with a mallet or hammer. The self-lubricated bushing has a Teflon seal ring that can easily be damaged. The bushing should slide onto the shaft with normal hand pressure.

- g. Apply a thin coat of silicone compound to the inner surface of the operating handle sleeve and both ends of the sleeve. Install the flanged bushings into the sleeve.

CAUTION

Do not allow the threads of the shaft to come into contact with the interior of the bushing.

- h. Apply silicone compound to the spindle of the outer operating handle. Insert the outside operating handle in the flanged bushing. NOTE Omit this step if installing self-lubricated bushings.
- i. From the inside of the door, wrap 12 inches of string packing around the outer handle spindle and push the string packing into the spindle sleeve with a screwdriver.
- j. Apply hand pressure to the other flanged bushing, and carefully guide the operating handle shaft through the bushing. Avoid thread contact with the inner surface of the bushing.
- k. Install the inside handle and connect the toggle link.
- l. Thread the conrod collar onto the toggle link lever stud. Do not tighten.
- m. Install one jamnut or self-locking nut. Tighten the nut just enough to engage three threads. Do not install a second jamnut at this time. If using jamnuts, install the second jamnut only after all assembly/adjustments and a chalk test are completed. Refer to [chapter 2, paragraph 2-1.9](#), for watertight door dog adjustments and to [chapter 2, paragraph 2-1.5](#), for procedures on accomplishing a chalk test.
- n. Tighten the conrod collar to the proper position, and install the cotter pin. Spread and bend the ends of the cotter pin.
- o. Insert a packing plunger into the handle spindle. (Do not use stick packing when installing self-lubricated bushings.)

3-1.6.3 Operating Handle Bushing Replacement - Sintered Bronze Bushings with Elisha Technologies EDC 1270 EPL Grease (MACHALT 167-31010 (ECP-526)).

NOTE

On exterior or well deck doors equipped with steel sleeves, MACHALT 167-31010 (ECP-526) removes existing Oilite bronze bushings, string and stick packing, packing plungers, and jamnuts. This MACHALT installs sintered bronze bushings impregnated with Elisha Technologies EDC 1270 EPL O-rings, T-seals, helical springs, self-locking hex nuts, and paint shields and fills the void space inside the spindle sleeve with Elisha Technologies EDC 1270 EPL grease. This MACHALT also replaces the self-lubricated bushing components installed by MACHALT 167-31004 (ECP-444).

- a. Remove packing plunger. Clean internal grease passages of spindle using EDC cleaning fluid and cotton tip applicators. Clean outer handle internal threads for packing plunger with a 5/16-24UNF tap, using LPS Tap-matic no. 1 gold as a lubricant. Install zerk fitting.
- b. Remove and discard the external O-ring from flanged bushing to be installed on the inner handle side of spindle sleeve.

CAUTION

When trial fitting or installing the new flanged bushing, do not force or attempt to drive bushing onto the spindle or into the spindle sleeve with a mallet or hammer, as flanged bushing O-rings can easily be damaged. The flanged bushing should slide on with normal hand pressure.

- c. Trial fit both flanged bushings by applying a thin coat of EDC 1270 EPL grease to the interior of flanged bushings and slide them onto the spindle with normal hand pressure. Then, remove flanged bushings.
- d. Apply a thin coat of EDC 1270 EPL grease to the exterior and face surface of both flanged bushings, and slide one into each of the spindle sleeves with normal hand pressure. Align the flanged bushings with the setscrew holes on the spindle sleeves. Leave flanged bushings in spindle sleeves. Install the setscrews, one turn only, into the spindle sleeve holes.
- e. Apply EDC 2400 caulk to setscrews installed in [step d](#). Tighten setscrews to near flush with the surface of the spindle sleeve or until tightness is achieved, then back off one-half turn.
- f. Apply a thin coat of EDC 1270 EPL grease to the spindle of the outer handle.

CAUTION

To prevent damage to O-rings, do not allow the threads of the spindle to come in contact with the interior of the flanged bushings.

- g. Apply hand pressure to flanged bushings on the inside of door, and carefully guide the outer handle spindle into spindle sleeve and through flanged bushings.
- h. Install the inner handle, and engage in the spring clip assembly.
- i. Install toggle link lever to inner handle.
- j. Install the conrod collar over toggle link lever stud. Do not tighten.
- k. Install self-locking hex nut, and tighten just enough to eliminate play.
- l. Use grease gun to apply EDC 1270 EPL grease to zerk fitting until a small amount of EDC 1270 EPL grease comes out of the flanged bushings. Remove grease gun and zerk fitting, and install setscrew with EDC 2400 caulk.
- m. Install washers, conrod bushings, and the conrods.
- n. Install conrod collar and cotter pins.
- o. Adjust dogs, as required, to provide 1/8-inch gasket compression in accordance with [chapter 2, paragraph 2-1.9](#).
- p. Accomplish chalk test procedure in accordance with [chapter 2, paragraph 2-1.5](#).

3-1.7 CONROD AND LEVER DISASSEMBLY AND REPAIR. This section provides the procedures for disassembling and repairing the components of a quick-acting watertight door closure assembly. A complete disassembly is necessary if the connecting rod (conrod) and lever assembly is frozen or does not operate properly. To disassemble the linkages:

3-1.7.1 Conrod Disassembly.

- a. Remove the cotter pin, conrod collar (round nut), conrod, and washer from each conrod linkage. See [figure 3-1](#), [figure 3-4](#), and [figure 3-4A](#).
- b. Remove the conrods from the lever assemblies. For easier reassembly, mark each conrod and its location with a metal etcher.

3-1.7.2 Lever Disassembly.

- a. For each dog and lever assembly, remove the self-locking hex nut (or two jamnuts) and the rotating dog from the outside of the door.
- b. Remove the paint shield (if applicable), straight bushings, and compression springs from the spindle sleeves.
- c. Remove the levers from the spindle sleeves. Mark each lever and its location for easier reassembly.
- d. Use an Allen wrench to loosen the setscrew on the flanged bushings. Remove the flanged bushings from the spindle sleeves.

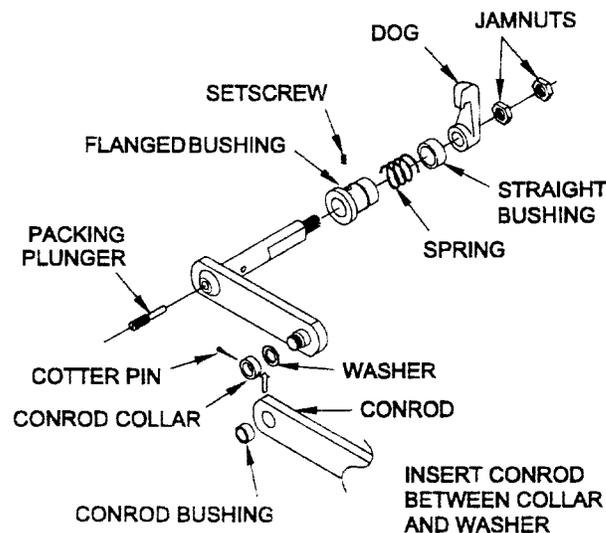


Figure 3-4. Quick-Acting Door Lever Assembly

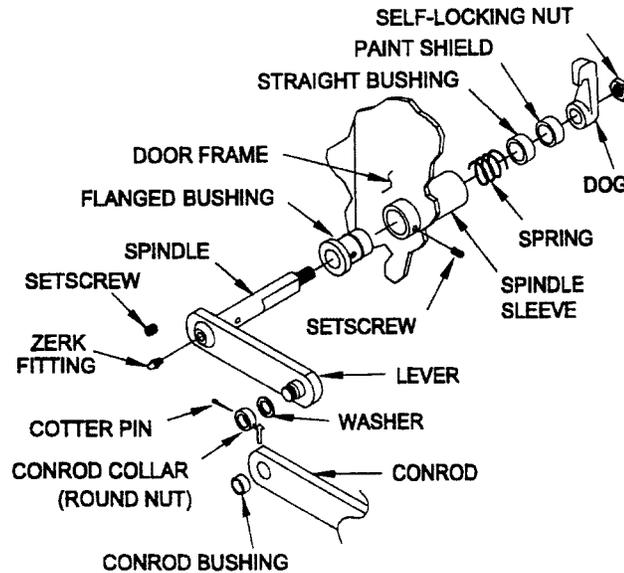


Figure 3-4A. Quick-Acting Door Lever Assembly Modified by MACHALT 167-31010 (ECP-526)

3-1.7.3 Conrod Repair.

- a. Examine each conrod for wear. Replace any conrod that shows excessive wear or deformation of holes. Conrods and levers are available commercially in either mild steel or CRES, which eases the maintenance required on weather deck doors.
- b. Examine all conrod bushings for wear. Remove any bushing that has excessive wear with a large flat tipped punch or the special removal tool illustrated in [figure 3-5](#). This tool can be easily fabricated on a metal lathe. Use a vice to hold the conrod while the bushing is forced out of the hole.
- c. Examine all studs, which are the threaded posts on each conrod and lever. A stud that is loose or has worn bearing surfaces must be replaced. For ships with access to a hydraulic press, the preferred method for replacing studs is by swaging the stud to the conrod or lever. Welding is only permitted as a temporary repair for loose studs. Be sure to use a replacement stud of the exact same length as the old one. To replace a stud:
 1. Swaging Method:
 - (a). Drill the stud 3/16-inch deep from the back side with a 1/2-inch cobalt drill bit.
 - (b). Drive the pin through the hole with a 3/8-inch drive pin punch.
 - (c). Use a swaging tool with a hydraulic press to insert the stud into the hole.
 2. Welding Method: (Not permitted; use only for temporary repair.)
 - (a) Drill the stud 3/16-inch deep from the back side with a 1/2-inch cobalt drill bit.
 - (b) Drive the pin through the hole with a 3/8-inch drive pin punch.
 - (c) Insert the new stud in the hole, and clamp it tightly in place using a pair of welder's vice grip style clamps. Ensure the stud is straight and not cocked in any way.
 - (d) Ring weld the stud to the conrod or lever using a 3/32-inch alloy 300 series stainless steel electrode. Gas tungsten arc welding (GTAW) with 1/16 wire is also acceptable.
 - (e) Grind the weld to dime thickness.
- d. Chase stud threads with a 5/8-18UNF thread chaser, if necessary. The threads on the brass conrod collars can be chased with a 5/8-18UNF tap while holding the shank of the tap in a vice. Handthread the conrod collar

onto the tap. A 1/8-inch diameter welding rod stub inserted into one of the cotter pin holes in the nut makes it easier to turn the conrod collar. Do not use pliers or a pipe wrench, which will mar the polished surface of the nut.

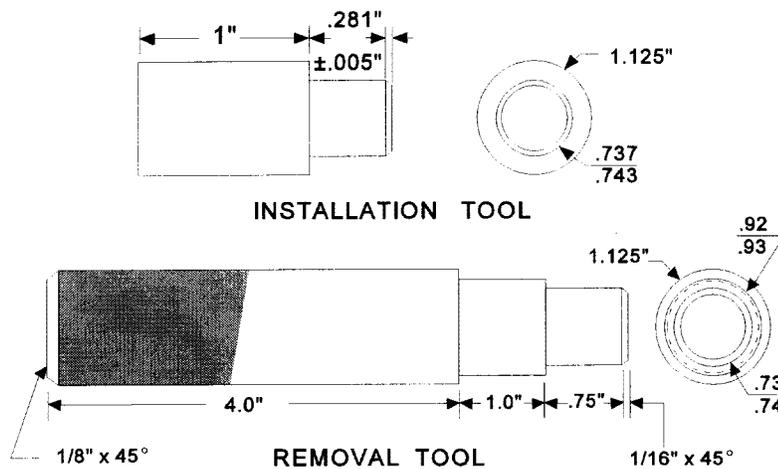


Figure 3-5. Conrod Removal and Installation Tool

CAUTION

Do not sand or paint bearing surfaces.

CAUTION

Do not sand and paint parts that are made of CRES. An easy way to differentiate between plated steel and CRES is with a magnet. Plated steel will attract the magnet; stainless steel will not.

- e. Scrape, sand, and paint all of the individual linkage parts, if required. Use Formula 150 primer and Formula 151 top coat.
- f. Replace conrod bushings if wear is apparent or if the closure linkages allow a play of more than 1/8-inch when inspected. (Refer to [chapter 2, paragraph 2-1.6.3.](#)) The following three different size bushings are generally used on quick-acting doors:
 1. 5/8-inch thick operating handle and toggle link bushings.
 2. 1/2-inch thick lever bushings.
 3. 3/8-inch thick conrod bushings.
- g. Install the conrod bushings by pressing into place with a vise or with the use of the special installation tool illustrated in [figure 3-5](#). Using this tool along with the vise helps hold the bushing in proper alignment with the conrod while the bushing is pressed into place.

3-1.7.4 Lever Repair.

- a. Examine each lever for wear. Replace any lever that has deep scratches or grooves worn into the bearing surfaces.

- b. Examine all studs, which are the threaded posts on each conrod and lever. A stud that is loose or has worn bearing surfaces must be replaced. Refer to [paragraph 3-1.7.3](#) for procedures on repairing and replacing studs.
- c. Chase the threads of lever spindles with a 7/8-9UNC die, if necessary.

NOTE

Step d is not required where self-lubricated bushings are installed.

- d. Remove the packing plungers from all lever spindles. Discard packing plungers that have damaged screw-driver slots or threads. If the internal thread on a spindle is damaged, it can be retapped with a 5/16-24UNF tap. Remove the chips from the hole with a scribe and cotton swab. Replace the packing plungers.

CAUTION

Do not sand or paint bearing surfaces.

CAUTION

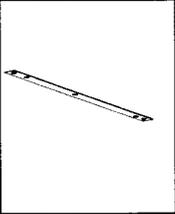
Do not sand and paint parts that are made of CRES. An easy way to differentiate between plated steel and CRES is with a magnet. Plated steel will attract the magnet; stainless steel will not.

- e. Scrape, sand, and paint all of the individual linkage parts, if required. Use Formula 150 primer and Formula 151 top coat.

3-1.7.5 Lever Installation. Prepare spindle sleeves and assemble bushing in each sleeve, as described in [paragraph 3-1.3](#) through [paragraph 3-1.5](#).

3-1.7.6 Conrod Installation. When replacing conrods with new parts, be aware that all top conrods for quick-acting watertight doors (26 inches wide) are identical. However, the distance between centers of opposing bellcrank connecting studs may vary as much as 1/2 inch. Conrods obtained commercially have one bushing inserted. The other conrod bushing is attached. To install conrods, accomplish the following

- a. Apply a light coat of silicone compound to the conrod bushings and the bearing surfaces of all studs. Coat the stud threads with antiseize compound.
- b. Use the identifying marks previously made on conrods in [paragraph 3-1.7.1](#) to locate the correct position for each conrod. Also see [figure 3-6](#). Insert one washer on each stud between the conrod and lever components at each linkage connection.
- c. Attach a brass conrod collar (round nut) to each linkage connection. Handtighten only.
- d. At each stud, align the hole in the conrod collar with the hole drilled into the stud. Insert a cotter pin and bend over both legs of the cotter pin with needle nose pliers.

						
	CONROD LEVER SIDE	CONROD LEVER SIDE	CONROD HINGE SIDE	CONROD HINGE SIDE	CONROD TOP	CONROD CORNER
RH 8-DOG	R	-	Z	-	D	E
LH 8-DOG	X	-	H	-	D	E
RH 10-DOG	-	W	-	Q	D	C
LH 10-DOG	-	K	-	B	C	-

NOTE: Matched letters indicate that these parts are interchangeable.

Figure 3-6. Conrod Location Guide

3-1.8 INDIVIDUAL DOG REPAIR. This section describes procedures for disassembling and repairing an individual dog mechanism. A complete disassembly is necessary if inspection of the dog reveals that the dog does not operate smoothly or that the bushings or compression spring require replacement.

3-1.8.1 Individual Dog Disassembly and Repair.

- a. Remove the self-locking hex nut (or two jamnuts) and the dog handle from the inside of the door. Remove the dog and paint shield from the outside of the door. See [figure 3-7](#) and [figure 3-7A](#).
- b. Remove the straight bushing and compression spring from the spindle sleeve.
- c. Use an Allen wrench to loosen the setscrew on the flanged bushing. Remove the flanged bushing from the spindle sleeve.

WARNING

Use caution when working with flammable solvent.

- d. For steel doors, scrape rust, paint, and old grease from the spindle sleeve using a flat tipped punch and a 1-inch diameter rotary wire brush chucked in an electric drill. A no. 320 grit aluminum oxide cloth can also be used. Remove all rust and corrosion; otherwise, the straight bushing in a dog assembly will not be free to move in the spindle sleeve under spring tension. Remove all traces of packing with a rag and dry cleaning solvent.
- e. Clean out the setscrew hole in the spindle sleeve with a 12-28UNF tap, if necessary. Coat the inside of the spindle sleeve with a thin coat of silicone compound.

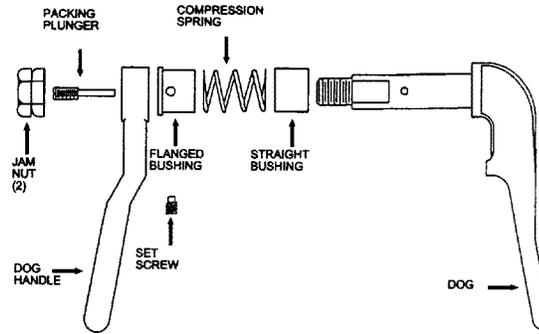


Figure 3-7. Individual Dog Assembly

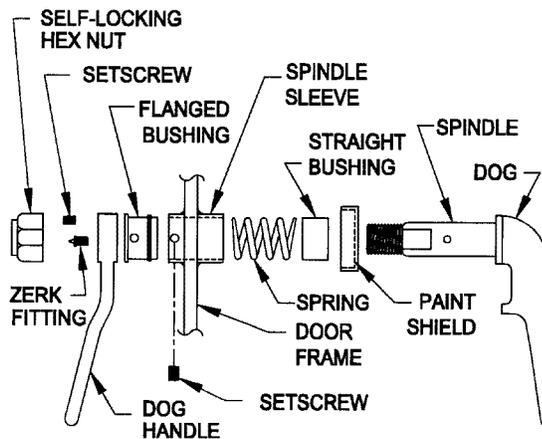


Figure 3-7A. Individual Dog Assembly Modified by MACHALT 167-31010 (ECO-526)

- f. Inspect all wear parts for excessive wear, and obtain replacement parts as required. Refer to [paragraph 3-1.3](#) and [paragraph 3-1.4](#) for additional information.
- g. Clean the dog shaft with solvent to remove all traces of grease. Use a no. 320 grit aluminum oxide cloth to remove burrs from the dog shaft.

NOTE

Step h is not required where self-lubricated bushings are installed.

- h. Remove the packing plunger from the dog shaft. Discard the packing plunger if it has a damaged screwdriver slot or threads. If the internal thread on the spindle is damaged, it can be retapped with a 5/16-24UNF tap. Remove the chips from the hole with a scribe and cotton swab. Replace the packing plunger.

3-1.8.2 Individual Dog Installation.

NOTE

For repair/installation of individual dogs having MACHALT 167-31010 (ECP-526) installed, proceed to [paragraph 3-1.8.3](#). MACHALT 167-31010 (ECP-526) is applicable to exterior and well deck doors, and to other doors in high moisture/humidity areas that have carbon steel spindle sleeves. MACHALT 167-

31010 (ECP-526) is not applicable to interior doors or doors with CRES spindle sleeves. MACHALT 167-31010 (ECP-526) has been installed if a CRES paint shield is installed on the exterior end of the spindle sleeve.

- a. When installing new self-lubricated bushings with a replacement parts kit, install the plastic plug that comes in the kit into the hole in the dog shaft. Do not remove the packing plunger.
- b. Scribe a line on the face of the flanged bushing to indicate the location of the setscrew hole. This will make it easier later to align the hole in the bushing with the setscrew hole in the door sleeve. Coat the flanged bushing with a thin coat of silicone compound, and insert the bushing into the spindle sleeve from the linkage side of the door. Align the hole in the bushing with the setscrew hole in the door sleeve.
- c. Coat the setscrew with antiseize compound. Insert the setscrew into the setscrew hole, and lock the bushing to the sleeve.
- d. Coat the dog shaft with silicone compound, and insert the shaft into the spindle sleeve.
- e. Insert a compression spring (new or cleaned) onto the dog spindle from the front side of the door. With Oilite bronze bushings, use only phosphor bronze springs. With stainless steel bushings, use only stainless steel springs. Wrap a 6-inch length of string packing between the spring coils over the spindle.

NOTE

Watertight doors that have self-lubricated bushings do not require string packing or stick packing.

- f. Coat the straight bushing with silicone compound, and install the bushing onto the spindle from the front side of the door. The bushing should slide freely back and forth under spring tension in the spindle sleeve.
- g. Install the dog handle, and attach one jamnut or self-locking nut. Tighten the nut just enough to engage three threads.
- h. If using jamnuts, do not install the second jamnut at this time. Install the second jamnut only after all assembly/adjustments and a chalk test are completed. Refer to [chapter 2, paragraph 2-1.9](#), for watertight door dog adjustments and to [chapter 2, paragraph 2-1.5](#), for procedures on accomplishing a chalk test.
- i. After adjustments and a chalk test are completed, install the second jamnut (if jamnuts are being used). Hold the nut that is already installed with a 1-5/16-inch flat engineer's wrench. Thread the second nut onto the spindle, and tighten it against the first nut with another 1-5/16-inch wrench. A few taps on the second wrench with a rawhide hammer should lock the two nuts together to prevent loosening.

3-1.8.3 Individual Dog Installation - Sintered Bronze Bushings with Elisha Technologies EDC 1270 EPL Grease and CRES Paint Shield. (See [figure 3-7A](#).)

NOTE

On exterior or well deck doors equipped with steel sleeves, MACHALT 167-31010 (ECP-526) removes existing Oilite bronze bushings, string and stick packing, packing plungers, and jamnuts. This MACHALT installs sintered bronze bushings impregnated with Elisha Technologies EDC 1270 EPL O-rings, T-seals, helical springs, self-locking hex nuts, and paint shields and fills the void space inside the spindle sleeve with Elisha Technologies EDC 1270 EPL grease. This MACHALT also replaces the self-lubricated bushing components.

- a. Clean internal grease passages of spindle using EDC cleaning fluid and cotton tip applicators. Clean internal threads of spindle for packing plunger with a 5/16-24UNF tap, using LPS Tapmatic no. 1 gold as a lubricant. Remove any metal particles from grease passage. Install zerk fitting.

CAUTION

When trial fitting or installing the new flanged bushing, do not force or attempt to drive it onto the spindle or into the spindle sleeve with a mallet or hammer, as flanged bushing O-rings can easily be damaged. The flanged bushing should slide on with normal hand pressure.

CAUTION

Do not allow the threads of the spindle shaft to come in contact with the interior of the flanged bushing or the spindle sleeve.

- b. Trial fit flanged bushing by applying a thin coat of EDC 1270 EPL grease to the interior of flanged bushing and slide them onto the spindle with normal hand pressure. Then, remove flanged bushing.
- c. Trial fit flanged bushing by applying a thin coat of EDC 1270 EPL grease to the exterior of flanged bushing and sliding into the spindle sleeve with normal hand pressure. Then, remove flanged bushing.
- d. Trial fit straight bushing by applying a thin coat of EDC 1270 EPL grease to the inner surface of spindle sleeve on the outside (panel side) of the door and sliding the straight bushing into the spindle sleeve with normal hand pressure. Then, remove straight bushing.
- e. Align the flanged bushing with the setscrew hole on the spindle sleeve. Work flanged bushing into the spindle sleeve until the flanged bushing is pressed snugly against the spindle sleeve.
- f. Install the setscrew, one turn only, into the hole of spindle sleeve.
- g. Apply EDC 2400 caulk to the setscrew installed in step (6). Tighten the setscrew to near flush with the surface of the spindle sleeve, or until tightness is achieved, then back off one-half turn.
- h. Install compression spring onto spindle shaft.

CAUTION

Do not allow the threads of the dog and spindle shaft to come in contact with the interior of the flanged bushing or spindle sleeve or straight bushing.

- i. Install paint shield onto dog and spindle. Apply a thin coat of EDC 1270 EPL grease to the dog and spindle. Apply a thin coat of EDC 1270 EPL grease to the exterior of straight bushing and install onto spindle shaft. Then, carefully install dog and spindle, paint shield, and straight bushing into the spindle sleeve.
- j. Install dog handle and self-locking hex nut onto spindle. Tighten the self-locking hex nut just enough to remove play.
- k. Repeat [step a](#) through [step j](#) for remaining dog assemblies.
- l. When all dog assemblies are completed, install handle assembly in accordance with [paragraph 3-1.6](#). Adjust dogs in accordance with [chapter 2, paragraph 2-1.9](#), and chalk test in accordance with [chapter 2, paragraph 2-1.5](#).

- m. After adjustments and a chalk test are completed, lubricate dog and handle bushings in accordance with [chapter 2, paragraph 2-1.14](#).

3-1.9 WATERTIGHT AND AIRTIGHT DOOR HINGE REPAIR. Due to more frequent use, quick-acting watertight doors are more likely to experience wear to hinge assemblies than individually dogged doors. Refer to [chapter 2, paragraph 2-1.6](#), for conditions that require repair or replacement of hinge pins and hinge assemblies.

Repairs to a watertight door hinge assembly can be accomplished without disassembling any of the closure mechanism. Review the safety procedures described in [chapter 2, paragraph 2-1.1](#), before starting repair work to door hinges.

3-1.9.1 Disassembly and Repair of Hinge Assemblies (On Doors Without MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed). To disassemble and repair hinge assemblies, accomplish the following:

- a. With a hammer and chisel, knock the hinge pin collars off the bottom of the hinge pins. See [figure 3-8](#).
- b. Use a flat tipped drift punch to drive out the hinge pins. If the hinge pins are badly worn, have another person pick up the door from the bottom and rock it back and forth while the pins are driven out. The rocking action tends to pull the grooves that are worn into the shank away from the other steel hinge parts, allowing easier removal. Set the door panel aside, with the hinge side up.
- c. Disassemble the adjusting pin and yoke of each hinge assembly. On quick-acting airtight doors, the adjusting yoke has a setscrew and hex nut fitted to the front side. This yoke is used to push the hinge side of the door and gasket up against the knife-edge, since there are no dogs on the hinge side of the airtight door for this purpose.
- d. Examine the hinge parts for excessive wear, and clean the parts or procure replacement parts as required. Brass hinge pins are recommended over stainless steel, and if stainless steel hinge pins are found they should be replaced with brass hinge pins to avoid undue wear to hinge yokes.
- e. Reassemble the adjusting yokes and pins onto the door hinge blades. Be sure to insert a 1/8-inch thick brass flat washer on top of the bottom adjusting yoke blade before inserting the adjusting pin and cotter pin.
- f. Set the door in the frame.
- g. Place three 1/16-inch thick brass flat washers between the top of the hinge blade and the lower adjusting yoke leaf. Insert the hinge pins.
- h. Close and dog the door. Ensure the knife-edge sits in the center three-fifths of the width of the door gasket at the top and bottom. There should be no contact between the metal on the door gasket channel and the knife-edge. If there is metal-to-metal contact, shim the door up or down by adding or removing one 1/16-inch washer from each hinge. See [figure 3-8](#).

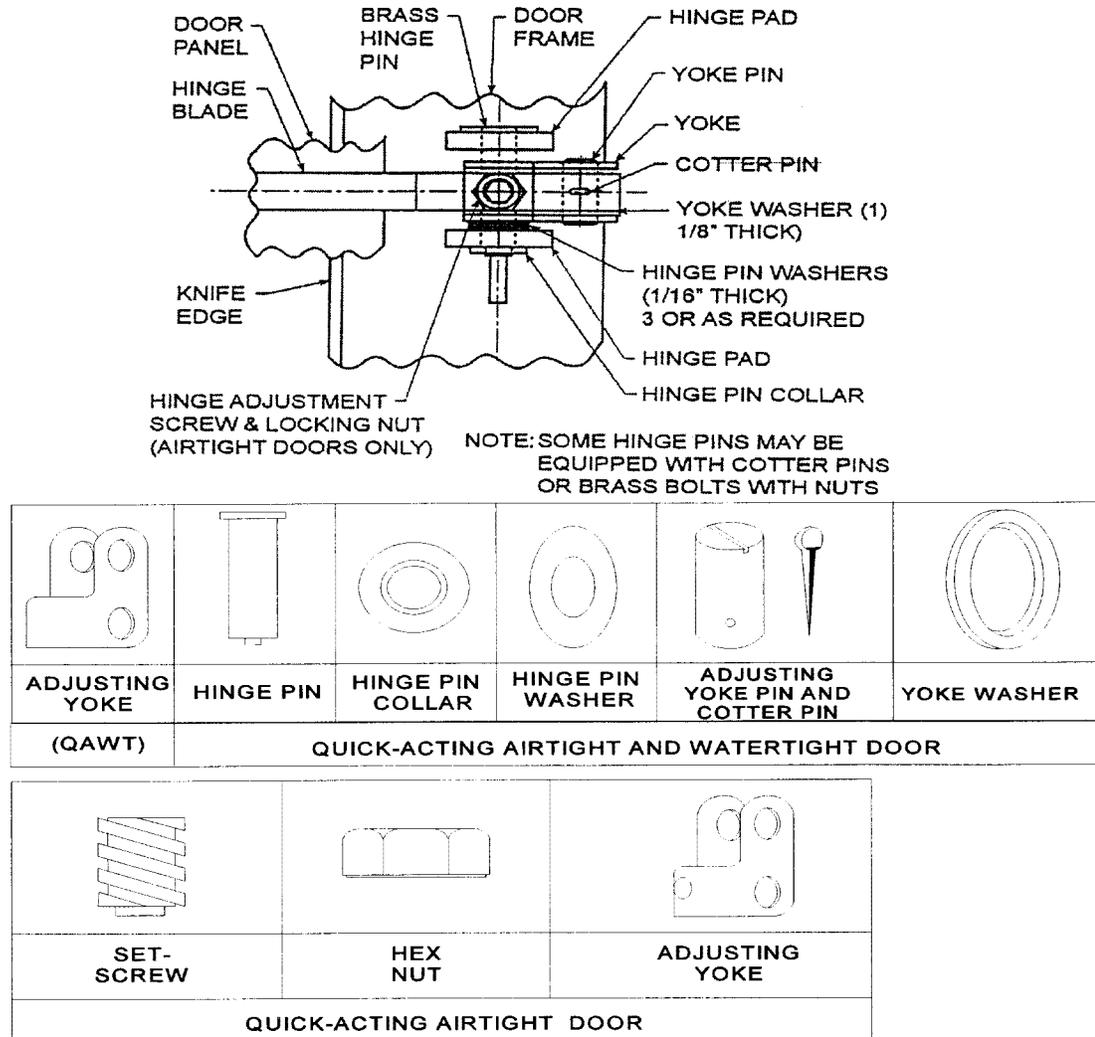
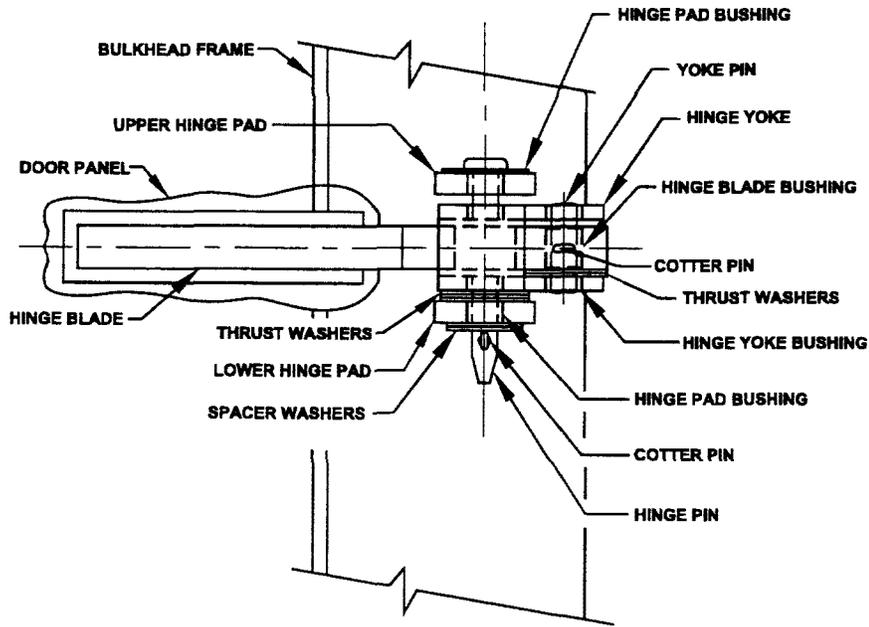


Figure 3-8. Watertight Door Hinge Components (For Doors Without MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed)

- i. To lock the hinge pin to the collar, have someone hold a sledge hammer over the top of each hinge pin while the collar is inserted, bevel side down, over the boss on the bottom of the hinge pin. Peen over the boss with the rounded end of a ball peen hammer to lock the collar to the hinge pin. The weight of the sledge hammer resting on top of the hinge pin keeps the pin from backing out as the boss is peened over.

3-1.9.2 Disassembly and Repair of Hinge Assemblies (On Doors With MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed).

- a. Remove cotter pins, spacer washers, hinge pins, and thrust washers. See [figure 3-8A](#). Set the door panel aside with the hinge side up.
- b. Remove cotter pins, yoke pins, hinge yoke, thrust washers, and hinge pin spacer from each hinge assembly.
- c. Clean the hinge parts and examine for excessive wear. Procure replacement parts as required.
- d. Apply a thin film of quick forming adhesive to the outside diameter surface of the hinge pad bushings, ensuring no adhesive comes in contact with the inside diameter.



HINGE PIN & COTTER PIN	YOKE PIN & COTTER PIN	HINGE YOKE	HINGE PAD BUSHING
HINGE BLADE BUSHING	HINGE YOKE BUSHING	SPACER BUSHING	THRUST WASHER
QUICK-ACTING AIRTIGHT AND WATERTIGHT DOORS			

Figure 3-8A. Watertight Door Hinge Components (For Doors With MACHALT 167-31006 (ECP-518) or MACHALT 167-31011 (ECP-538) Installed)

- e. Install hinge pad bushings into the upper and lower hinge pads and, if necessary, gently tap into upper and lower hinge pads.
- f. Temporarily install hinge pins while adhesive is forming in order to align hinge pad bushings. Remove hinge pins after adhesive is formed.
- g. Insert yoke pin spacer into the yoke pin hole in the hinge blade. Align cotter pin holes of the yoke pin spacer with the cotter pin holes of the hinge blades. Position hinge yoke assembly on hinge blade, and partially insert yoke pin with slotted end up.
- h. Install two thrust washers between the bottom of hinge blades and the hinge yoke assemblies. Align thrust washers and fully insert yoke pins. Align cotter pin holes in hinge blades, hinge yoke assemblies, and yoke pins, and install cotter pins. Ensure hinge yoke assemblies rotate freely around the yoke pins.
- i. Position door upright and resting on deck close to hinge pads. Partially rotate hinge yokes away from hinge

pin holes in hinge blades. Insert hinge pin spacers in holes of hinge blades. Then, rotate hinge yoke assemblies back into position over the hinge pin holes in the hinge blades, ensuring hinge pin spacers remain in place and upright.

- j. Lift door into position on the hinge pads, and insert hinge pins through the hinge pads, hinge yokes, and spacer bushings. With one person supporting the door on the handle side, pry upward on the underside of the hinge blades and lower hinge pads with a long flat tipped screwdriver. Lift the hinge pins enough to insert two thrust washers between the hinge yokes and the lower hinge pad bushings. Center thrust washers, and fully insert hinge pins.
- k. Install spacer washers and cotter pins into hinge pins.
- l. Close and dog the door. Ensure the knife-edge sits in the center three-fifths of the width of the door gasket at the top and bottom. There should be no contact between the metal on the door gasket channel and the knife-edge. If there is metal-to-metal contact, shim the door up or down by adding or removing one 1/16-inch thrust washer from each hinge. See [figure 3-8A](#).

3-1.10 DOG WEDGE REPLACEMENT. A dog wedge must be replaced if it is worn more than halfway down, or if it has deep grooves carved into it or other signs of excessive wear or damage. The wedge may be either welded, riveted, or bolted in place with machine screws. See [figure 3-9](#), and accomplish the procedure in [paragraph 3-1.10.1](#), [paragraph 3-1.10.2](#), or [paragraph 3-1.10.3](#) as applicable.

3-1.10.1 Replacement of Welded Dog Wedge.

- a. Remove the door hinge pins, washers, and gasket. Place the door in a flat position.

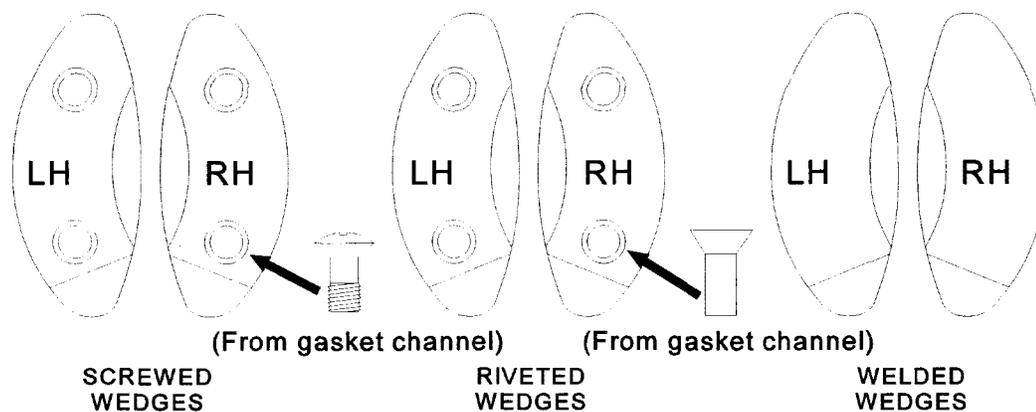


Figure 3-9. Dog Wedges

- b. Remove the damaged wedge with a portable grinder.
- c. Position the new wedge exactly over the position of the old wedge.
- d. Weld the new wedge in place using the GTAW (tungsten inert gas (TIG)) or shielded metal arc welding (SMAW, metal inert gas (MIG)) welding process. Welding electrodes must conform to MIL-E-278, aluminum bronze, MIL-E-CU/AL-A, for SMAW welding or MIL-E-23765/3, aluminum bronze, CUAL-A2, for GTAW (TIG) welding.
- e. Reinstall the door, washers, hinge pins, and gasket.
- f. Adjust the door as required. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making adjustments.

3-1.10.2 Replacement of Riveted Dog Wedge.

- a. Remove the door hinge pins, washers, and gasket. Place the door in a flat position.
- b. Remove the damaged wedge by drilling out the center of the rivet using a hammer and center punch.
- c. Use a nylon scrubbing pad to clean the area under the wedge.
- d. Use Formula 150 primer on the area under the wedge.
- e. Install dielectric barrier on the area under the wedge.
- f. Position the new wedge exactly over the position of the old wedge. Rivet the wedge into place.
- g. Reinstall the door, washers, hinge pins, and gasket.
- h. Adjust the door as required. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making adjustments.

3-1.10.3 Replacement of Machine Screwed Dog Wedge.

- a. Remove the door hinge pins, washers, and gasket. Place the door in a flat position.
- b. Remove the damaged wedge by removing the 5/16-24UNC machine screws.
- c. Use a nylon scrubbing pad to clean the area under the wedge.
- d. Use Formula 150 primer on the area under the wedge.
- e. Install a dielectric barrier on the area under the wedge.
- f. Position the new wedge exactly over the position of the old wedge. Use 5/16-24UNC machine screws to bolt the wedge into place.
- g. Reinstall the door, washers, hinge pins, and gasket.
- h. Adjust the door as required. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making adjustments.

3-1.11 DOOR HANDLE SPRING CLIPS. Quick-acting watertight doors have a bronze spring clip fastened to the inside of the door frame to hold the handle upright when the door is open. Individually dogged doors have a spring clip assembly for each dogging handle. Over time, the spring clip may snap off due to metal fatigue. To replace a spring clip assembly, accomplish the following:

- a. Remove the two screws holding the clip to the tab that is welded to the door frame. Use an offset screwdriver to gain access to the screw heads. If the screws are frozen and impossible to remove, chisel the screw heads off flush with the surface. Redrill the holes with a no. 21 drill, and tap the holes with a 10-32UNF tap.
- b. Spring clip assemblies come in two different styles. See [figure 3-10](#). The center-to-center distance between screw holes on newer doors is 1/2-inch. On older doors, the distance between screw holes is 11/16-inch. If the holes on the new spring clip do not match the holes on the door, it will be necessary to drill a new hole in the mounting tab welded to the door. Mark the new hole location with a small center punch. Drill the new hole with a no. 21 drill, and tap with a 10-32UNF tap. Screw on the new spring clip.

3-1.12 WATERTIGHT DOOR AND FRAME INSTALLATION. This section describes procedures for cutting an opening in a bulkhead to install a watertight door, and for installing the door frame and door. Instructions for replacing an existing flange type watertight door frame with a new flange and frame are provided in [paragraph 3-1.13](#).

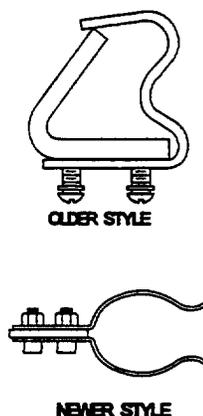


Figure 3-10. Spring Clip Assemblies

3-1.12.1 Preparation of the Bulkhead.

- a. Inspect the bulkhead for straightness. If the bulkhead is warped or twisted, straighten with a strongback. Use an angle or flat bar. If the bulkhead is bowed, make a cut in the plate. Use a strongback to flatten the bowed area, and reweld the cut. See [figure 3-11](#).

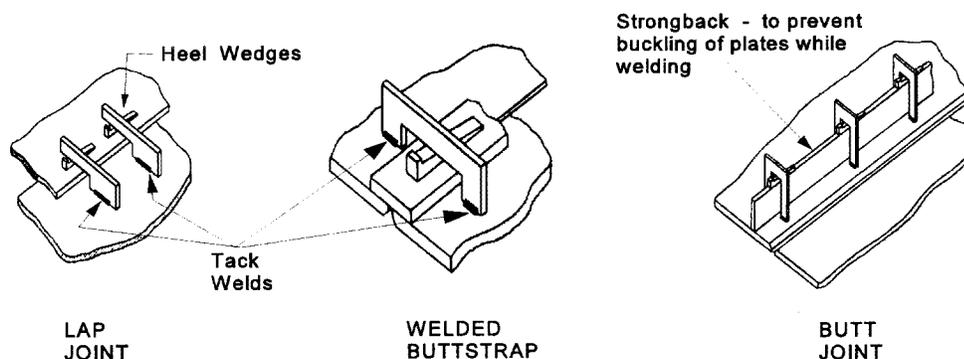


Figure 3-11. Methods of Securing Welded Structure

- b. If the bulkhead has no header or longitudinal T-bar at approximately 6 feet above the deck, install a new one. Locate the header 6 inches above the upper edge of the location for the clear opening of the watertight closure. Weld the entire length of the header. See BUSHIPS Drawing 805-1362325, Revision C, Reinforcement for Watertight and Airtight Door Openings.
- c. If the vertical stiffeners in the bulkhead are more than 12 inches from the location for the door frame, install chocks around the frame, one chock above and one below the intended location for each dog. Chocks must be constructed of the same material as the door frame. See BUSHIPS Drawing 805-1362325, Revision C.
- d. The area of the bulkhead that contacts the closure frame must be smooth. No welds or tacks are permitted in the lap area. For a steel bulkhead, grind the surface to remove all roughness.
- e. Prior to installing the door in the bulkhead, rework the door for fitness to be installed. Ensure all parts are operable and have no defects. Refer to [chapter 2, paragraph 2-1.2](#) through [paragraph 2-1.6.4](#), for door inspection procedures.
- f. Remove the door from the door frame.
- g. To mark the cutting line, have another person hold the door frame against the bulkhead in the exact location

where the clear opening is to be cut. Lay out the vertical and horizontal centers of the clear opening on the bulkhead. Mark the cutting line for the clear opening. For a steel door, center punch the line every 1/2 inch. Remove the door frame from the bulkhead.

- h. Using an exothermic torch or plasma cutter, cut the opening for the door in the bulkhead and remove the cut panel.

3-1.12.2 Installation of the Door Frame.

3-1.12.2.1 Steel-to-Steel Installation. The fit-up of the door frame to the bulkhead is to be metal-to-metal. The fit-up should be uniformly tight, with no space between the frame and the bulkhead.

- a. Align the door frame over the clear opening, and use C-clamps to hold the frame in place. If this is a one-person operation, tack two 2- x 2- x 1/4-inch thick plates approximately 12 inches apart to use as a ledge for the frame while clamping in place.
- b. Tack weld (skip weld) the door frame to the bulkhead every 6 inches on both sides. Keep the heat even so as not to draw and warp the assembly. Tacks on opposing sides of the fit-up should be staggered. Tacks should be approximately 1-inch in length.
- c. Fill in between the tack welds, working from one end to the other and staggering welds to prevent warping. Move from one side of the installation to the other often to keep the heat even.
- d. After the structure has been completely welded, chip away all slag.

3-1.12.2.2 Steel-to-Aluminum Installation.

- a. Align the door frame over the clear opening, and use C-clamps to hold the frame in place. If this is a one-person operation, tack two 2- x 2- x 1/4-inch thick plates approximately 12 inches apart to use as a ledge for the frame while clamping in place.
- b. Drill holes for huck rivets through the frame and bulkhead. For a standard 8- or 10-dog door, drill approximately 60 holes. Drill the holes close enough to the outer edge of the door frame to avoid having huck rivets interfere with the operation of the quick-acting linkage assembly. See [figure 3-12](#).
- c. Before installing the door frame, apply two layers (8-1/2 millimeters each, 17 millimeters total) of dielectric barrier tape to the area of the bulkhead that will be in contact with the door frame.

The bulkhead must be smooth. (Refer to [paragraph 3-1.12.1](#).) Install strips of dielectric tape along the entire edge of the clear opening. Cut curved pieces for the corners. See [figure 3-12](#).

- d. Use C-clamps to temporarily secure the door frame to the rim of the clear opening. Install hex head bolts and nuts in enough of the rivet holes to secure the frame. Remove the C-clamps.

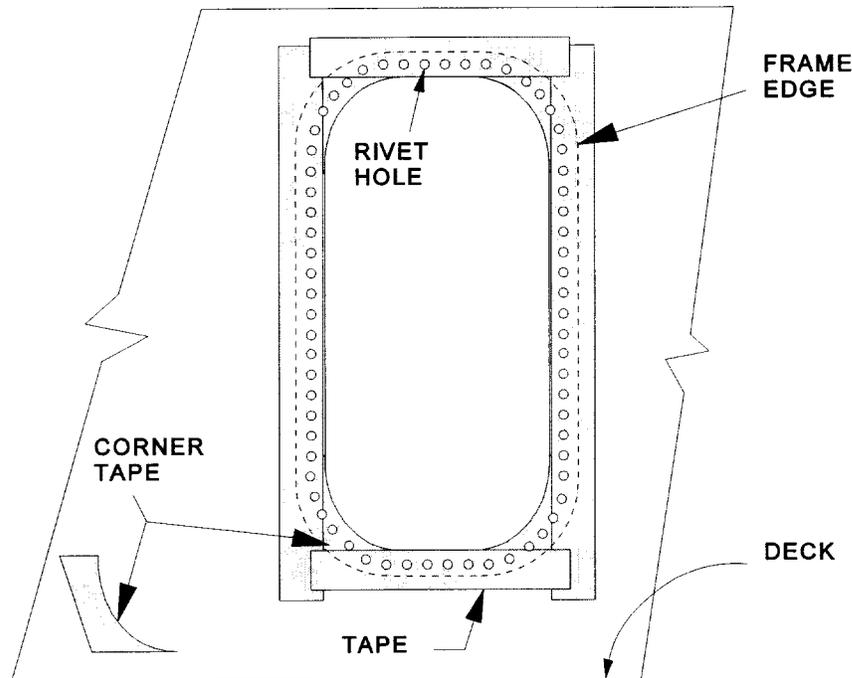


Figure 3-12. Dielectric Tape Installation

- e. Huck rivet the frame to the bulkhead.
- f. After the frame is completely huck riveted, use a utility knife to remove excess dielectric tape.

NOTE

In a steel-to-aluminum installation, a bimetallic strip may be used in lieu of dielectric tape. However, the bimetallic strip will greatly increase the weight and moment of the installation.

3-1.12.3 Door Installation.

- a. Install the door to the frame and make adjustments. Refer to [paragraph 3-1.4](#) through [paragraph 3-1.8](#) for installation procedures. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making door dog adjustments.
- b. Conduct a chalk test. (Refer to [chapter 2, paragraph 2-1.5](#).)
- c. Install a door stop and keeper.
- d. Install a door hasp and keeper, if applicable.
- e. If this is an individually dogged door, install a wrench stowage bracket to the bulkhead outside and inside the door.

3-1.13 DOOR FRAME/FLANGE ASSEMBLY REPLACEMENT. Use the following procedures for replacing a flange type watertight door frame with a new flange and frame.

3-1.13.1 Flange Type Door Frame Removal and Installation.

- a. Cut out the door frame to be replaced. The use of a plasma cutter is recommended due to its speed and clean cutting capabilities, which reduce the grinding time required to prepare the surface for the installation. An exothermic torch can also be used for the removal.
- b. Measure approximately 10 inches from the cut and mark a zone around the edge of the cut. Ensure there are no electrical cables or other mounted parts that will prevent or hamper the installation.
- c. For a steel bulkhead, grind the area inside the 10-inch markings down to bare metal and remove any slag left by the removal cut. Also grind the deck area below the cutout approximately 3 inches from the bulkhead.
- d. Measure the distance from the deck to the bottom cut to allow extra clearance on the bottom edge of the flange.
- e. Remove the door from the door frame. Remove the dog shafts and linkage assemblies. Remove all bushings. Save all parts removed. Renew parts as required.
- f. Lay the door frame on a sheet of 3/16-inch or 1/4-inch plate. Measure the distance from the edge of the plate to the bottom edge of the door frame, allowing for the measurement taken in [step d](#). Add 1-1/2 to 2 inches to allow the door frame and flange to overlap. Make adjustments as necessary and mark.
- g. Measure approximately 6 inches from the outside edge of the door frame on the three remaining sides of the frame and mark.
- h. Mark the door drape on all four sides in accordance with [step f](#) and [step g](#). Also trace around the outside edge of the door frame for reference later.
- i. Remove the door frame, and measure the distance on the back side of the door frame from the edge to the closest sleeve tube. Allow clearance for the weld bead. Add this measurement to the inside of the traced door frame mark. This will produce the area of the flange-to-frame overlap. Mark this measurement all the way around the inside of the traced door frame mark.
- j. Cut the outermost mark and innermost mark.
- k. Lay the door frame on a table or deck. Place the flange on top of the door using welding vise grip type C-clamps to hold the flange. Frame the flange and the door together while making alignments to the center flange and frame assembly. Ensure the top of the door frame and the top of the flange are at the same end before continuing.

CAUTION

Keep the heat even so as not to draw and warp the assembly.

- l. Tack weld the frame to the flange at approximately eight places evenly spaced on each side of the frame/flange assembly.
- m. Fill in between the tack welds, working from one end to the other and staggering welds to prevent warping. Turn the assembly over often and weld both sides to keep the heat even.
- n. After the assembly is welded on both sides completely and has cooled, take the assembly and the door to the installation area.

3-1.13.2 Installation of the Door Frame/Flange Assembly.

- a. Prior to installing the frame/flange assembly in the bulkhead, rework the door to be installed for fitness. Ensure all parts are operable and have no defects. Refer to [chapter 2, paragraph 2-1.2](#) through [paragraph 2-1.6.4](#), for inspection procedures.
- b. Weld L-brackets in place at the most warped locations. Insert steel wedges on the flange area only and not on the door frame. Hit the wedges with a hammer to either bend the flange or pull the bulkhead out to meet the flange.
- c. When the door flange and bulkhead meet closely enough that the gap can be filled by a weld bead, weld the door in place. Spread the heat evenly to prevent drawing and warping as the welds bond the assembly to the bulkhead.
- d. After the assembly has been completely welded and all slag has been chipped, install bushings, dog shafts, and linkage assemblies. Inspect for freedom of movement. Additional grinding may be required for clearance of assembly action. Remove dog shafts, linkage assemblies, and bushings for preservation.
- e. After all welding and grinding is completed, preserve the affected area by priming and painting.

3-1.13.3 Door Installation.

- a. When the paint is dry, reinstall the dogging shafts and linkage assemblies as applicable.
- b. Install the door to the frame and make adjustments. Refer to [paragraph 3-1.4](#) through [paragraph 3-1.8](#) for installation procedures. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making door dog adjustments.
- c. Conduct a chalk test. (Refer to [chapter 2, paragraph 2-1.5](#).)
- d. Install a door stop and keeper.
- e. Install a door hasp and keeper, if required.
- f. For an individually dogged door, install a wrench stowage bracket to the bulkhead outside and inside the door.

3-2. ALUMINUM DOORS.

3-2.1 DOOR REPAIR. If routine maintenance is not sufficient to restore a watertight door to watertight or operating condition, defective parts must be repaired or replaced. (Refer to [chapter 2](#) for routine maintenance procedures.) If the answer to the problem is not covered in [chapter 3](#) or in the appendices, consult the appropriate technical point of contact at NSWCCD-SSES or a commercial point of contact. When accomplishing maintenance or repairs on a door, avoid the following:

- a. Never bend, twist, or beat the door.
- b. Never use a pneumatic grinder to grind the knife-edge. If the knife-edge requires dressing, use a file to remove the nicks. Never use a Wheeze bar or large crescent wrench to bend or twist the knife-edge.
- c. Never use excess force to close a door.
- d. Never let doors in major egress areas go without repair.
- e. Never paint a gasket, dog, dog wedge, spindle threads, spindle nut, knife-edge, straight bushing, or label plate.
- f. For gasket replacement, never use more than one continuous length of gasket material.
- g. Use only a blunt instrument to install gaskets. Never use a screwdriver, scraper, or knife.
- h. Never apply paint to moving components on the hinge assembly, as components must remain free to move.

3-2.2 DOOR DISASSEMBLY. Damage to the structure or operability of a watertight door can result from warpage to the bulkhead in which it is installed. Another factor that contributes to wear on a watertight door is the weight of the whole door assembly as it swings on its hinges, particularly in high traffic areas. In order to repair problems such as a warped door frame or an inoperable quick-acting dogging assembly, the door must be completely disassembled. In some cases, removal of the door from its hinge assembly is necessary to accomplish the repair.

When disassembling a watertight closure to accomplish repairs, inspect all wear parts, such as bushings, and replace as required. If repairing a door to correct for warpage, expect to replace all wear parts (and possibly non-wear parts) because of the excessive strain warpage causes to the door assembly. To disassemble a watertight door, accomplish the following:

- a. For quick-acting doors, completely disassemble the entire operating handle, spindle, lever, and conrod assemblies. See [figure 3-13](#), and refer to [paragraph 3-2.6](#) and [paragraph 3-2.7](#) for procedures on disassembling operating handles and lever/conrod assemblies. To make reassembly easier, mark each linkage part and its location with a metal etcher. For individually dogged doors, completely disassemble each dog. Refer to [paragraph 3-2.8](#) for instructions.

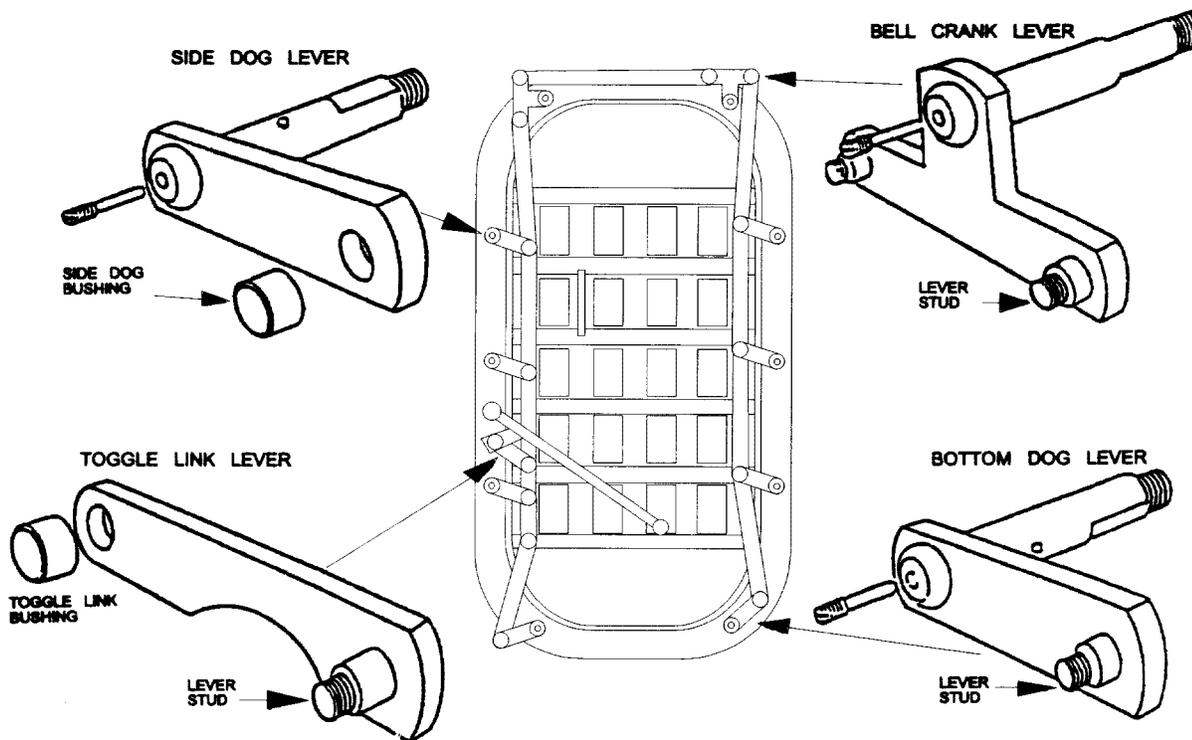


Figure 3-13. Quick Acting Door Levers

- b. Flanged bushings on dog assemblies are held in place with Allen head setscrews. Use an Allen wrench to loosen the setscrews. Gently tap out the flanged and straight bushings from all spindle sleeves with a brass rod or pipe approximately 5/8 inch in diameter.
- c. To inspect bushings for wear, insert on a clean spindle of the proper diameter and move back and forth. Bushings should have a firm, uniform fit on the spindle, with no play or wobbling. Replace any bushing that wobbles on the spindle.

- d. To inspect springs for wear, compare with a new spring. Replace any spring that is collapsed or broken, or that has individual coils which are worn thin. New springs are machined with the coils at the ends thinner than those in the center. This is not a sign of wear.

3-2.3 SPINDLE SLEEVE PREPARATION AND BUSHING INSTALLATION. Clean and prepare all spindle sleeves of a watertight closure before installing bushings. For ordering replacement bushings, note that spindle bushings and springs for quick-acting doors are 1 inch in diameter. Spindle bushings and springs on individually dogged doors are 1-1/8 inch in diameter. On some older ships, individually dogged doors have 1-inch diameter spindle bushings, and both the inner and outer bushings are flanged. These older bushings, though obsolete, are still available through watertight door part companies (refer to [appendix C](#)), but are not available through the Navy Supply System. Springs and setscrews for aluminum doors are made of stainless steel. The dog spindle and operating handle bushings on most aluminum doors are also made of stainless steel. Some aluminum doors may have stainless steel bushings with self-lubricating liners installed. However, stainless steel bushings installed in exterior aluminum doors cause galvanic corrosion inside the spindle sleeves. MACHALT 167-31004 (ECP 444) replaces the stainless steel bushings in aluminum quick-acting exterior doors with hard, anodized aluminum bushings with self-lubricating liners to reduce the effects of the galvanic corrosion caused by the use of dissimilar metals. For installation of self-lubricated bushings, refer to [paragraph 3-2.4](#). To prepare spindle sleeves and install bushings:

WARNING

Use caution when working with flammable solvent.

- a. For aluminum doors, clean with a Scotch Brite pad. Remove corrosion; otherwise, the straight bushing in a dog assembly will not be free to move in the spindle sleeve under spring tension. For all doors, remove all traces of packing with a rag and dry cleaning solvent.
- b. Clean out the setscrew hole in each spindle sleeve with a 12-28UNF tap. Thinly coat the inside of each spindle sleeve with a silicone compound.
- c. Scribe a line on the face of each flanged bushing to indicate the location of the setscrew hole (except for flanged bushings for quick-acting handles). This will make it much easier later to align the hole in the bushing with the setscrew hole in the door sleeve. Thinly coat flanged bushings with a silicone compound, and insert one into each spindle sleeve from the linkage side of the door. Align the hole in each bushing with the setscrew hole in the door sleeve.
- d. Coat the setscrews with antiseize compound. Insert each setscrew into a setscrew hole, and lock the bushing to the sleeve (except for flanged bushings for quick-acting handles). If the setscrew hole is worn out and will not hold a 12-28UNF dog point setscrew, complete the repair in one of the following two ways:
 - 1. Drill and tap an oversize hole in the sleeve with a no. 7 drill and 1/4-20UNC tap. (Setscrews of this size are available commercially.)
 - 2. Remove the flanged bushing, and drill and tap a completely new hole somewhere else on the sleeve. Use a no. 14 drill and 12-28UNF tap. Install and rotate the bushing to line up with the new hole.

3-2.4 SELF-LUBRICATED BUSHING INSTALLATION. With the installation of self-lubricated bushings, string packing and stick packing are no longer required for dog assemblies. The packing plunger is still left in

place inside the spindle to fill the void that would otherwise result. Accomplish the following procedure to replace dog assembly bushings with a self-lubricated bushing replacement parts kit. (Ordering information for the bushing kits is provided in [appendix C, section I](#).)

- a. Remove the existing dog assembly and dog point setscrew. (Refer to [paragraph 3-2.6](#) for quick-acting dog disassembly or [paragraph 3-2.7](#) for individual dog disassembly.) If unable to remove the existing setscrew, drill and tap at that location for the 1/4-20UNC dog point setscrew furnished in the repair parts kit.

WARNING

Exercise caution when using flammable solvent.

- b. Remove all traces of packing residue from the dog sleeve with a rag and dry cleaning solvent.
- c. Remove corrosion from the interior of the sleeve and ends of sleeve with a Scotch Brite pad (for aluminum sleeves). Clean with a rag and solvent.
- d. Clean the spindle of the dog assembly lever or individual dog with a rag and solvent.
- e. Use a soft-faced hammer to install the plastic plug in the transverse hole in the spindle. Do not remove the packing plunger.

CAUTION

Use extreme care when driving the plug with a soft-faced hammer. Lay the spindle on wood or other soft material. Avoid metal-to-metal contact. It may be necessary to use a 1/4-inch or slightly smaller diameter drift punch to drive the plug. Avoid striking the spindle.

CAUTION

Do not force the bushing or attempt to drive it with a mallet or hammer. The self-lubricated bushing has a Teflon ring that can be easily damaged.

- f. Apply a thin coat of silicone compound to the interior of the new flanged bushing. Trial fit the bushing to the spindle. The bushing should slide onto the spindle with normal hand pressure.

CAUTION

Do not force or attempt to drive the bushing with a mallet or hammer.

- g. Apply a thin coat of silicone compound to the exterior of the flanged bushing. Trial fit the bushing to the dog sleeve. Applying hand pressure, carefully work the flanged bushing into the sleeve.
- h. Apply a thin coat of silicone compound to the inner surface of the dog sleeve on the exterior side (panel side) of the door. Trial fit the straight bushing to the sleeve.
- i. Use the black mark on the edge of the flanged bushing to assist in aligning the hole in the bushing. (It may be necessary to remove the tape that joins the thrust washer to the bushing in order to locate the black mark.)

Temporarily tape the washer to the plug. To assist in aligning the bushing mark to the setscrew hole in the sleeve, mark the position of the hole on the outer circumference of the sleeve.

NOTE

Align the bushing mark with the sleeve hole carefully. Since the adhesive/ sealant sets up quickly, the hole in the flanged bushing must be in exact alignment with the hole in the dog sleeve.

- j. Apply a thin coat of adhesive/sealant to the outer edge of the dog sleeve. Immediately work the O-ring into the dog sleeve, and press the flanged bushing to a snug fit with the sleeve.

CAUTION

The adhesive/sealant is hazardous material.

CAUTION

Do not tighten the setscrew.

- k. Install the CRES dog point setscrew, and rotate the set key one turn.
- l. Apply a thin coat of silicone compound to the lever or dog spindle and to the exterior of the straight bushing. Carefully insert the spindle into the sleeve. Remove the tape holding the thrust washer and the flanged bushing together.
- m. Install the remainder of the dog assembly, except for the second jamnut (if not using self-locking nuts). Refer to [paragraph 3-2.6](#) for quick-acting dog installation or [paragraph 3-2.7](#) for individual dog installation.
- n. Apply antiseize compound to the setscrew. Tighten the setscrew to near flush with the surface of the dog sleeve, or until full tightness is achieved. At this point, back off the set key one-half turn.
- o. Repeat [step a](#) through [step n](#) for each dog assembly.
- p. When all dog assemblies are completed, adjust the dogs and accomplish a chalk test. Refer to [chapter 2, paragraph 2-1.9](#), for watertight door dog adjustments and to [chapter 2, paragraph 2-1.5](#), for procedures on accomplishing a chalk test.
- q. After adjustments and a chalk test are completed, install the second jamnut (if not using self-locking nuts). Hold the nut already installed with a 1-5/16-inch flat engineer's wrench. Thread the second nut onto the spindle, and tighten against the first nut with another 1-5/16-inch wrench.

3-2.5 OPERATING HANDLE REPLACEMENT. The operating handles of a quick-acting door should work smoothly, without excessive tightness or binding. If the handles do not work smoothly, disassemble, clean, and lubricate, then reassemble and adjust. The handles on quick-acting doors wear faster than on other doors because of the strain of operating the entire closing mechanism. Worn, wobbling bushings are another reason to disassemble and repair operating handles. Expect to replace bushings and other wear parts when door handles are disassembled for maintenance or repair. Door handles can be disassembled without taking apart other components of the closing mechanism, except for the linkage that connects directly to the handles.

3-2.5.1 Operating Handle Disassembly. Refer to [paragraph 3-1.6.1](#).

3-2.5.2 Operating Handle Repair and Replacement. To repair or replace the operating handles of a quick-acting, steel, or aluminum watertight door, accomplish the following:

- a. Remove the packing plunger from the outer handle spindle. Discard the packing plunger if it has a damaged screwdriver slot or threads. If the internal thread on the spindle is damaged, it can be retapped with a 5/16-24UNF tap. Remove the chips from the hole with a scribe and cotton swab. (This step is not necessary where self-lubricated bushings are either existing or being installed new.)
- b. Examine the spindle bearing surfaces of each handle. If the bearing surfaces have deep scratches or grooves, the handle must be replaced. If the spindle threads are damaged, repair with a 7/8-9UNC die.

The fit between the spindle and the hole in the inner operating handle is sometimes so loose that the hole becomes enlarged and excessive movement develops. The result of this problem is that the interior and exterior handles become misaligned by as much as 30 degrees, preventing rapid operation of the door. To correct this problem, accomplish the temporary repair in accordance with figure 3-14. This consists of installing a grooved 1/8-inch roll pin in a hole drilled through the operating handle and the handle shaft. The handle and shaft must be drilled as an assembly to ensure correct alignment of the holes. The pin will hold the handle and shaft rigidly together, but can be removed if necessary for maintenance purposes.

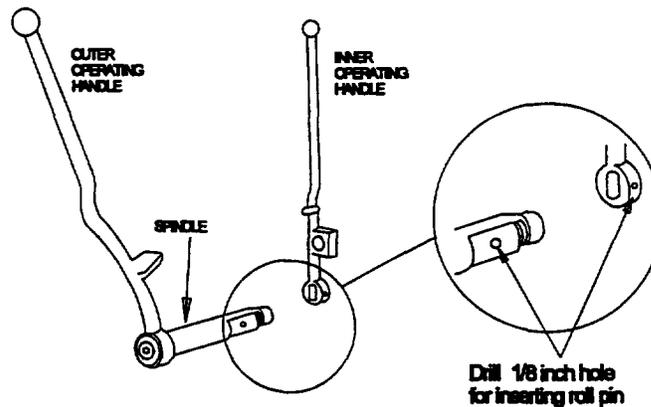


Figure 3-14. Quick-Acting Operating Handle Temporary Repair

WARNING

Exercise caution when using flammable solvent.

- c. For aluminum doors, use a nylon scrubbing pad. For all doors, clean with a rag and dry cleaning solvent.

CAUTION

Do not sand or paint bearing surfaces.

CAUTION

Do not sand and paint parts that are made of CRES. An easy way to differentiate between plated steel and CRES is with a magnet. Plated steel will attract the magnet; stainless steel will not.

- d. Scrape, sand, and paint individual linkage parts if required. Use Formula 150 primer. Clean parts with a rag and solvent.
- e. When using a self-lubricated bushing replacement parts kit, install the plastic plug supplied with the kit into the transverse hole in the hand lever shaft.

CAUTION

Use extreme care when driving the plug with a hammer. Lay the shaft on wood or other soft material. Avoid metal-to-metal contact. It may be necessary to use a 1/4-inch or slightly smaller diameter drift pin to drive the plug. Avoid striking the shaft, and do not remove the packing plunger.

- f. Apply a thin coat of silicone compound to the interior of the flanged bushings.

CAUTION

If replacing the bushings with self-lubricated bushings, trial fit the new bushings to the hand lever shaft. Do not attempt to force or drive the bushings with a mallet or hammer. The self-lubricated bushing has a Teflon seal ring that can easily be damaged. The bushing should slide onto the shaft with normal hand pressure.

- g. Apply a thin coat of silicone compound to the inner surface of the operating handle sleeve and both ends of the sleeve. Install the flanged bushings into the sleeve.

CAUTION

Do not allow the threads of the shaft to come into contact with the interior of the bushing.

- h. Apply silicone compound to the spindle of the outer operating handle. Insert the outside operating handle in the flanged bushing.

NOTE

Omit [step i](#) if installing self-lubricated bushings.

- i. From the inside of the door, wrap 12 inches of string packing around the outer handle spindle and push the string packing into the spindle sleeve with a screwdriver.
- j. Apply hand pressure to the other flanged bushing, and carefully guide the operating handle shaft through the bushing. Avoid thread contact with the inner surface of the bushing.
- k. Install the inside handle and connect the toggle link.
- l. Thread the conrod collar onto the toggle link lever stud. Do not tighten.
- m. Install one jamnut or self-locking nut. Tighten the nut just enough to engage three threads. Do not install a second jamnut (if applicable) at this time. If using jamnuts, install the second jamnut only after all assembly/adjustments and a chalk test are completed. Refer to [chapter 2, paragraph 2-1.9](#), for watertight door dog adjustments and to [chapter 2, paragraph 2-1.5](#), for procedures on accomplishing a chalk test.

- n. Tighten the conrod collar to the proper position, and install the cotter pin. Spread and bend the ends of the cotter pin.
- o. Insert a packing plunger into the handle spindle. (Do not use stick packing when installing self-lubricated bushings.)

3-2.6 CONROD AND LEVER DISASSEMBLY AND REPAIR. Refer to [paragraph 3-1.7](#).

3-2.6.1 Conrod Disassembly. Refer to [paragraph 3-1.7.1](#).

3-2.6.2 Lever Disassembly. Refer to [paragraph 3-1.7.2](#).

3-2.6.3 Conrod Repair. Refer to [paragraph 3-1.7.3](#).

3-2.6.4 Lever Repair. Refer to [paragraph 3-1.7.4](#).

3-2.6.5 Lever Installation. Prepare spindle sleeves and install a flanged bushing in each sleeve as described in [paragraph 3-2.3](#) and [paragraph 3-2.4](#).

3-2.6.6 Conrod Installation. Refer to [paragraph 3-1.7.6](#).

3-2.7 INDIVIDUAL DOG REPAIR. This section describes procedures for disassembling and repairing an individual dog mechanism. A complete disassembly is necessary if inspection of the dog reveals that the dog does not operate smoothly or that the bushings or compression spring require replacement.

3-2.7.1 Individual Dog Disassembly and Repair.

- a. Remove the self-locking hex nut (or two jamnuts) and the dog handle from the outside of the door. Remove the dog from the inside of the door. See [figure 3-15](#) and [figure 3-15A](#).
- b. Remove the straight bushing and compression spring from the spindle sleeve.
- c. Use an Allen wrench to loosen the setscrew on the flanged bushing. Remove the flanged bushing from the spindle sleeve.

WARNING

Use caution when working with flammable solvent.

- d. For aluminum doors, clean with a Scotch Brite pad. Remove all corrosion; otherwise, the straight bushing in a dog assembly will not be free to move in the spindle sleeve under spring tension. Remove all traces of packing with a rag and dry cleaning solvent.
- e. Clean out the setscrew hole in the spindle sleeve with a 12-28UNF tap, if necessary. Thinly coat the inside of the spindle sleeve with a silicone compound.

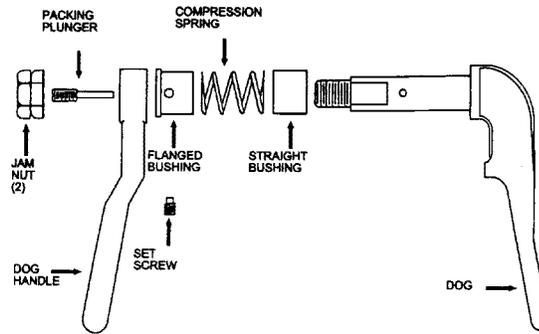


Figure 3-15. Individual Dog Assembly

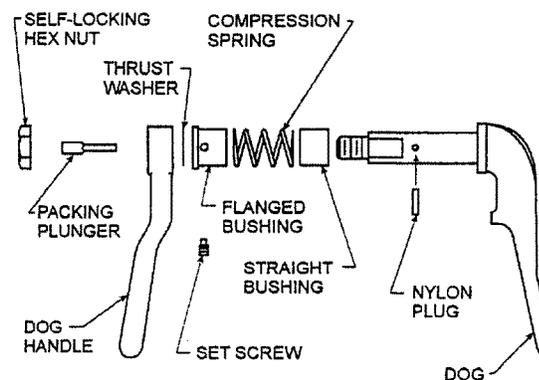


Figure 3-15A. Individual Dog Assembly with Self-Lubricating Bushings

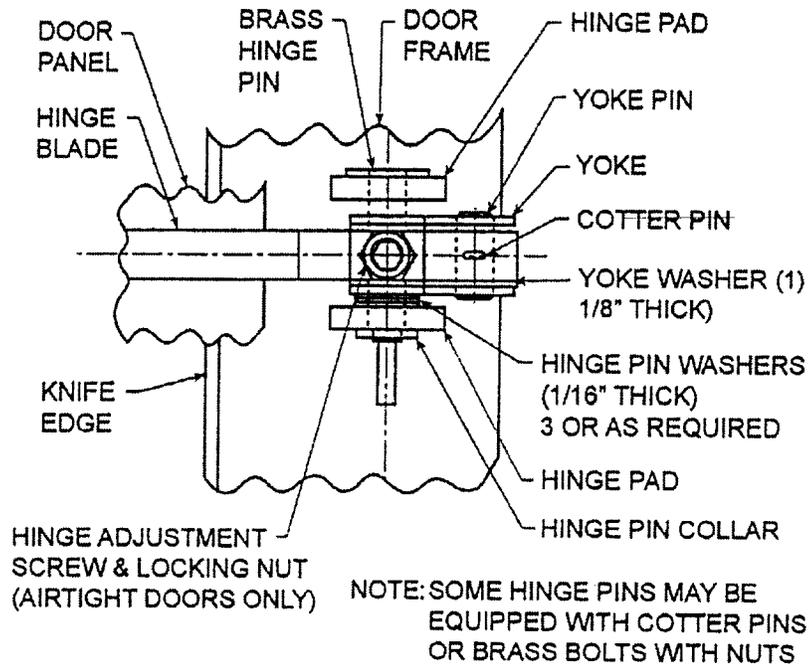
- f. Inspect all wear parts for excessive wear and obtain replacement parts as required. Refer to [paragraph 3-2.3](#) and [paragraph 3-2.4](#) for more information.
- g. Clean the dog shaft with solvent to remove all traces of grease. Use a no. 320 grit aluminum oxide cloth to remove burrs from the dog shaft.
- h. Remove the packing plunger from the dog shaft. Discard the packing plunger if it has a damaged screwdriver slot or threads. If the internal thread on the spindle is damaged, it can be retapped with a 5/16-24UNF tap. Remove the chips from the hole with a scribe and cotton swab. Replace the packing plunger. (This step is not required where self-lubricated bushings are installed.)

3-2.7.2 Individual Dog Installation. Refer to [paragraph 3-1.8.2](#).

3-2.8 WATERTIGHT AND AIRTIGHT DOOR HINGE REPAIR. Quick-acting watertight doors are more likely to experience wear to hinge assemblies than individually dogged doors due to more frequent use. Refer to [chapter 2, paragraph 2-2.6](#), for conditions that require repair or replacement of hinge pins and hinge assemblies.

Repairs to a watertight door hinge assembly can be accomplished without disassembling the closure mechanism. Review the safety procedures described in [chapter 2, paragraph 2-1.1](#), before starting repair work on door hinges. To disassemble and repair hinge assemblies, accomplish the following:

- a. With a hammer and chisel, knock the hinge pin collars off the bottom of the hinge pins. See [figure 3-16](#).



ADJUSTING YOE	HINGE PIN	HINGE PIN COLLAR	HINGE PIN WASHER	ADJUSTING YOE PIN AND COTTER PIN	YOKE WASHER
(QAWT)	QUICK-ACTING AIRTIGHT AND WATERTIGHT DOOR				

SET-SCREW	HEX NUT	ADJUSTING YOE
QUICK-ACTING AIRTIGHT DOOR		

Figure 3-16. Watertight Door Hinge Components

- b. Use a flat tipped drift punch to drive out the hinge pins. If the hinge pins are badly worn, have another person pick up the door from the bottom and rock it back and forth while the pins are driven out. The rocking action tends to pull the grooves that are worn into the shank away from the other steel hinge parts, allowing easier removal. Set the door panel aside, with the hinge side up.
- c. Disassemble the adjusting pin and yoke of each hinge assembly. Note that on quick-acting airtight doors, the adjusting yoke has a setscrew and hex nut fitted to the front side. This yoke is used to push the hinge side of the door and gasket up against the knife-edge, since there are no dogs on the hinge side of the airtight door for this purpose.
- d. Examine the hinge parts for excessive wear, and clean the parts or procure replacement parts as required. Brass hinge pins are recommended over stainless steel to avoid undue wear to hinge yokes. If stainless steel hinge pins are found, replace with brass hinge pins as soon as possible.
- e. Reassemble the adjusting yokes and pins onto the door hinge blades. Be sure to insert a 1/8-inch thick brass flat washer on top of the bottom adjusting yoke blade before inserting the adjusting pin and cotter pin.
- f. Set the door in the frame.
- g. Place three 1/16-inch thick brass flat washers between the top of the hinge blade and the lower adjusting yoke leaf. Insert the hinge pins.
- h. Close and dog the door. Ensure the knife-edge sits in the center three-fifths of the width of the door gasket at the top and bottom. There should be no contact between the metal on the door gasket channel and the knife-edge. If there is metal-to-metal contact, the door must be shimmed up or down by adding or removing one 1/16-inch washer from each hinge. See [figure 3-16](#).
- i. To lock the hinge pin to the collar, have someone hold a sledge hammer over the top of each hinge pin while the collar is inserted, bevel side down, over the boss on the bottom of the hinge pin. Peen over the boss with the rounded end of a ball peen hammer to lock the collar to the hinge pin. The weight of the sledge hammer resting on top of the hinge pin keeps the pin from backing out as the boss is peened over.

3-2.9 DOG WEDGE REPLACEMENT. Refer to [paragraph 3-1.10](#).

3-2.9.1 Replacement of Welded Dog Wedge. Refer to [paragraph 3-1.10.1](#).

3-2.9.2 Replacement of Riveted Dog Wedge. Refer to [paragraph 3-1.10.2](#).

3-2.9.3 Replacement of Machine Screwed Dog Wedge. Refer to [paragraph 3-1.10.3](#).

3-2.10 DOOR HANDLE SPRING CLIPS. Refer to [paragraph 3-1.11](#).

3-2.11 WATERTIGHT DOOR AND FRAME INSTALLATION. This section describes procedures for cutting an opening in a bulkhead to install a watertight door, and for installing the door frame and door. Instructions for replacing an existing flange type watertight door frame with a new flange and frame are provided in [paragraph 3-2.12](#).

3-2.11.1 Preparation of the Bulkhead.

- a. Inspect the bulkhead for straightness. If the bulkhead is warped or twisted, straighten with a strongback. Use an angle or flat bar. If the bulkhead is bowed, make a cut in the plate. Use a strongback to flatten the bowed area and reweld the cut. See [figure 3-17](#).

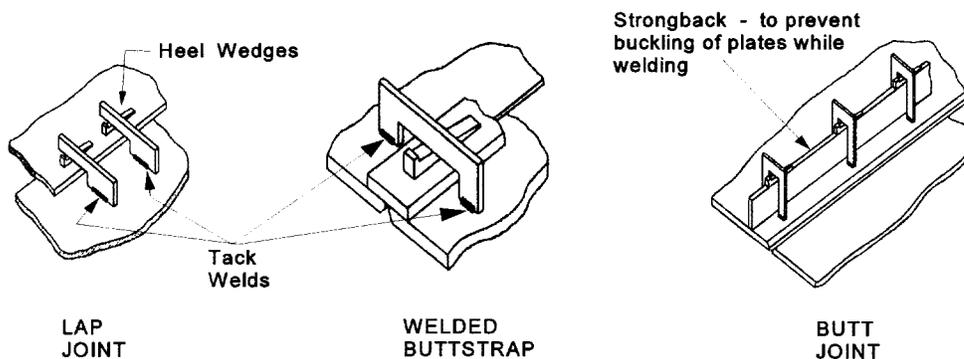


Figure 3-17. Methods of Securing Welded Structure

- b. If the bulkhead has no header or longitudinal T-bar at approximately 6 feet above the deck, install a new one. Locate the header 6 inches above the upper edge of the location for the clear opening of the watertight closure. Weld the entire length of the header. See BUSHIPS Drawing 805-1362325, Revision C, Reinforcement for Watertight and Airtight Door Openings.
- c. If the vertical stiffeners in the bulkhead are more than 12 inches from the location for the door frame, install chocks around the frame, one chock above and one below the intended location for each dog. Chocks must be constructed of the same material as the door frame. See BUSHIPS Drawing 805-1362325, Revision C.
- d. The area of the bulkhead that contacts the closure frame must be smooth. No welds or tacks are permitted in the lap area. For an aluminum bulkhead, use a fine flat file to remove all roughness; never grind aluminum.
- e. Prior to installing the door in the bulkhead, rework the door for fitness to be installed. Ensure all parts are operable and have no defects. Refer to [chapter 2, paragraph 2-1.2](#) through [paragraph 2-1.6.4](#), for door inspection procedures.
- f. Remove the door from the door frame.
- g. To mark the cutting line, have another person hold the door frame against the bulkhead in the exact location where the clear opening is to be cut. Lay out the vertical and horizontal centers of the clear opening on the bulkhead. Mark the cutting line for the clear opening. For an aluminum door, scribe the line in the plate. Remove the door frame from the bulkhead.
- h. Using an exothermic torch or plasma cutter, cut the opening for the door in the bulkhead and remove the cut panel.

3-2.11.2 Installation of the Door Frame.

3-2.11.2.1 Aluminum-to-Aluminum Installation. The fit-up of the door frame to the bulkhead is to be metal-to-metal. The fit-up should be uniformly tight, with no space between the frame and the bulkhead.

- a. Align the door frame over the clear opening, and use C-clamps to hold the frame in place. If this is a one-person operation, tack two 2- x 2- x 1/4-inch thick plates approximately 12 inches apart to use as a ledge for the frame while clamping in place.

- b. Tack weld (skip weld) the door frame to the bulkhead every 6 inches on both sides. Keep the heat even so as not to draw and warp the assembly. Tacks on opposing sides of the fit-up should be staggered. Tacks should be approximately 1 inch in length.
- c. Fill in between the tack welds, working from one end to the other and staggering welds to prevent warping. Move from one side of the installation to the other often to keep the heat even.
- d. After the structure has been completely welded, chip away all slag.

3-2.11.2.2 Steel-to-Aluminum Installation.

- a. Align the door frame over the clear opening, and use C-clamps to hold the frame in place. If this is a one-person operation, tack two 2- x 2- x 1/4-inch thick plates approximately 12 inches apart to use as a ledge for the frame while clamping in place.
- b. Drill holes for huck rivets through the frame and bulkhead. For a standard 8- or 10-dog door, drill approximately 60 holes. Drill the holes close enough to the outer edge of the door frame to avoid having huck rivets interfere with the operation of the quick-acting linkage assembly. See [figure 3-18](#).
- c. Before installing the door frame, apply two layers (8-1/2 millimeters each, 17 millimeters total) of dielectric barrier tape to the area of the bulkhead that will be in contact with the door frame. The bulkhead must be smooth. (Refer to [paragraph 3-2.11.1.](#)) Install strips of dielectric tape along the entire edge of the clear opening. Cut curved pieces for the corners. See [figure 3-18](#).
- d. Use C-clamps to temporarily secure the door frame to the rim of the clear opening. Install hex head bolts and nuts in enough of the rivet holes to secure the frame. Remove the C-clamps.
- e. Huck rivet the frame to the bulkhead.
- f. After the frame is completely huck riveted, use a utility knife to remove excess dielectric tape.

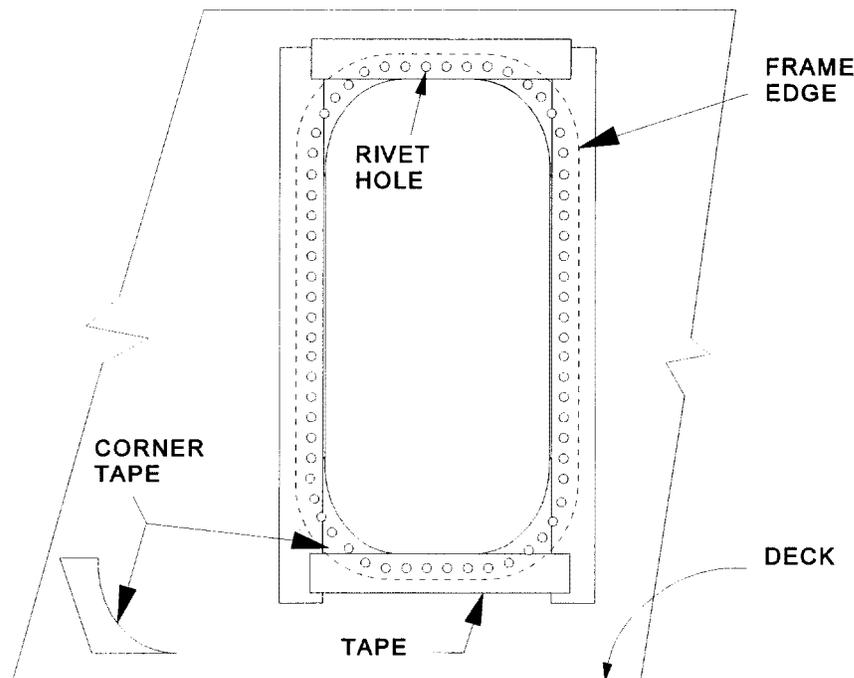


Figure 3-18. Dielectric Tape Installation

NOTE

In a steel-to-aluminum installation, a bimetallic strip may be used in lieu of dielectric tape. However, the bimetallic strip will greatly increase the weight and moment of the installation.

3-2.11.3 Door Installation.

- a. Install the door to the frame and make adjustments. Refer to [paragraph 3-2.4](#) through [paragraph 3-2.7](#) for installation procedures. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making door dog adjustments.
- b. Conduct a chalk test. (Refer to [chapter 2, paragraph 2-1.5](#).)
- c. Install a door stop and keeper.
- d. Install a door hasp and keeper, if applicable.
- e. If this is an individually dogged door, install a wrench stowage bracket to the bulkhead outside and inside the door.

3-2.12 DOOR FRAME/FLANGE ASSEMBLY REPLACEMENT. Accomplish the following procedures for replacing a flange type watertight door frame with a new flange and frame.

3-2.12.1 Flange Type Door Frame Removal and Installation.

- a. Cut out the door frame to be replaced. The use of a plasma cutter is recommended due to its speed and clean cutting capabilities, which reduce the amount of grinding time required to prepare the surface for the installation. An exothermic torch can also be used for the removal.
- b. Measure approximately 10 inches from the cut and mark a zone around the edge of the cut. Ensure there are no electrical cables or other mounted parts that will prevent or hamper the installation.

CAUTION

Use only a flat file to smooth the metal; never grind aluminum.

- c. For an aluminum bulkhead, file the area inside the 10-inch markings down to bare metal and remove any slag left by the removal cut. Also file the deck area below the cutout approximately 3 inches from the bulkhead.
- d. Measure the distance from the deck to the bottom cut to allow extra clearance on the bottom edge of the flange.
- e. Remove the door from the door frame. Remove the dog shafts and linkage assemblies. Remove all bushings. Save all parts removed. Renew parts as required.
- f. Lay the door frame on a sheet of 3/16-inch or 1/4-inch plate. Measure the distance from the edge of the plate to the bottom edge of the door frame. Allow enough for the measurement taken in [step d](#). Add 1-1/2 to 2 inches to allow the door frame and flange to overlap. Make adjustments as necessary and mark.
- g. Measure approximately 6 inches from the outside edge of the door frame on the three remaining sides of the frame and mark.

- h. Mark the door drape on all four sides in accordance with [step f](#) and [step g](#). Also trace around the outside edge of the door frame for reference later.
- i. Remove the door frame, and measure the distance on the back side of the door frame from the edge to the closest sleeve tube. Allow clearance for the weld bead. Add this measurement to the inside of the traced door frame mark. This will produce the area of the flange-to-frame overlap. Mark this measurement all the way around the inside of the traced door frame mark.
- j. Cut the outermost mark and innermost mark.
- k. Lay the door frame on a table or deck. Place the flange on top of the door using welding vise grip type C-clamps to hold the flange. Frame the flange and the door together while making alignments to the center flange and frame assembly. Ensure the top of the door frame and the top of the flange are at the same end before continuing.

CAUTION

Keep the heat even so as not to draw and warp the assembly.

- l. Tack weld the frame to the flange at approximately eight places evenly spaced on each side of the frame/flange assembly.
- m. Fill in between the tack welds, working from one end to the other and staggering welds to prevent warping. Turn the assembly over often and weld both sides to keep the heat even.
- n. After the assembly is welded on both sides completely and has cooled, take the assembly and the door to the installation area.

3-2.12.2 Installation of the Door Frame/Flange Assembly.

- a. Prior to installing the frame/flange assembly in the bulkhead, rework the door to be installed for fitness. Ensure that all parts are operable and have no defects. Refer to [chapter 2, paragraph 2-1.2](#) through [paragraph 2-1.6.4](#), for inspection procedures.
- b. Weld L-brackets in place at the most warped locations. Insert steel wedges on the flange area only and not on the door frame. Hit the wedges with a hammer to either bend the flange or pull the bulkhead out to meet the flange.
- c. When the door flange and bulkhead meet closely enough that the gap can be filled by a weld bead, weld the door in place. Spread the heat evenly to prevent drawing and warping as the welds bond the assembly to the bulkhead.
- d. After the assembly has been completely welded and all slag has been chipped, install bushings, dog shafts, and linkage assemblies. Inspect for freedom of movement. Additional filing may be required for clearance of assembly action. Remove dog shafts, linkage assemblies, and bushings for preservation.
- e. After all welding and grinding is completed, preserve the affected area by priming and painting.

3-2.12.3 Door Installation.

- a. When the paint is dry, reinstall the dogging shafts and linkage assemblies as applicable.

- b. Install the door to the frame and make adjustments. Refer to [paragraph 3-2.4](#) through [paragraph 3-2.7](#) for installation procedures. Refer to [chapter 2, paragraph 2-1.9](#), for procedures on making door dog adjustments.
- c. Conduct a chalk test. (Refer to [paragraph 2-1.5](#).)
- d. Install a door stop and keeper.
- e. Install a door hasp and keeper, if required.
- f. For an individually dogged door, install a wrench stowage bracket to the bulkhead outside and inside the door.

CHAPTER 4

HATCH REPAIR

4-1. HATCH REPAIR.

If routine maintenance is not sufficient to restore a watertight hatch to watertight or operating condition, repair or replace defective parts. (Refer to [chapter 2](#) for inspection and maintenance procedures.) Refer to the Afloat Shopping Guide and to [appendix B](#) and [appendix C](#) for information to help identify and procure replacement parts. If the answer to the problem is not covered in the [appendices](#), consult the appropriate technical point of contact at Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), or a commercial point of contact.

4-2. HINGE PIN REPLACEMENT.

Hinge assemblies for hatches tend to be more wobbly than door hinges, even in new construction. For this reason, inspecting the hinge assembly by operating the hatch does not necessarily reveal hinge pin wear. It is good practice to periodically remove the hinge pins and visually inspect for damage. To remove a hinge pin, first remove the cotter pin that holds it in place. Remove the hinge washer and slide the hinge pin out of the hinge pad. See [figure 4-1](#). Replace all worn hinge pins and hinge washers.

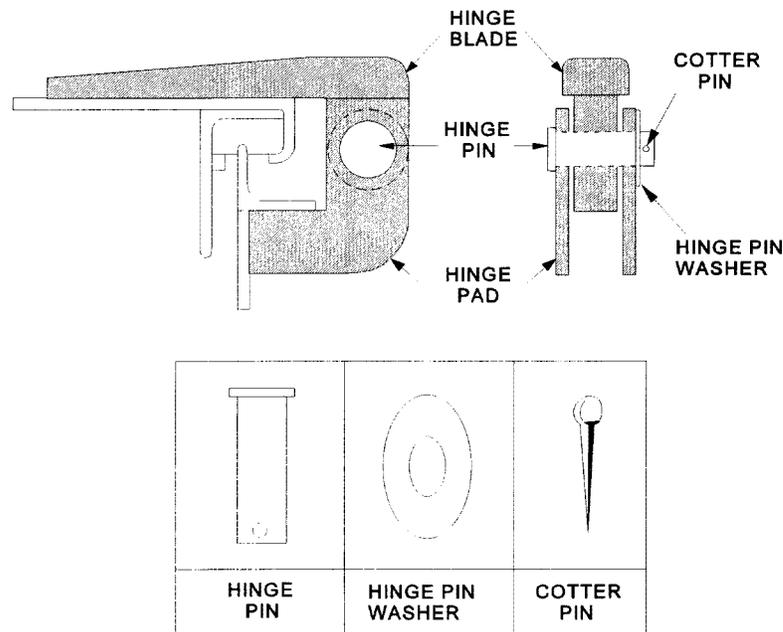


Figure 4-1. Watertight Hatch Hinge Assembly

4-3. DOG BOLT REPAIR.

4-3.1 DOG BOLT NUT REPLACEMENT. The dog bolt (drop bolt) nut must be replaced if it is damaged or missing. The nut may be out-of-round from being hit by heavy equipment, or the threads may be bad.

- a. Using a 1/8-inch drive pin punch, drive out the collar retaining pin from the top of the dog bolt.
- b. Remove the collar and nut by backing off the nut all the way. The nut will push the collar off the dog bolt.

c. Attach a new nut, boss side down. Reinstall the collar and retaining pin. See [figure 4-2](#).

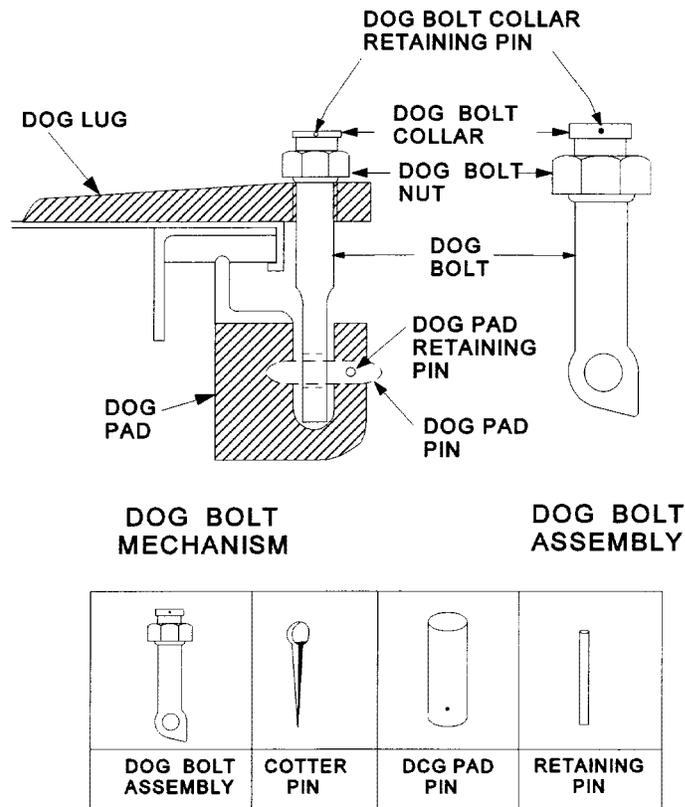


Figure 4-2. Watertight Hatch Dog Bolt Mechanism

NOTE

A retaining pin can be fabricated by using 1/8-inch diameter brazing rod. Cut the rod approximately 1/8-inch longer than required length. Insert the rod andpeen over the ends with a hammer to hold in place.

4-3.2 DOG BOLT REPLACEMENT. Dog bolts can become bent if all are not loosened sufficiently when the hatch is raised. Replace dog bolts which are bent or which have an elongated hole or stripped threads.

Hatch dog bolts are either shipped from the factory or ordered as replacements through the Federal Stock System, are made of mild steel. Mild steel dog bolts are sufficient for use on hatches located within the weather envelope. However, these bolts rust and corrode. For hatches located on weather decks, use replacement dog bolts made of stainless steel. Stainless steel dog bolts are available from commercial watertight fitting parts suppliers. (Refer to [appendix C](#).) To replace a dog bolt:

- Using a 3/32- or 1/8-inch drive pin punch, remove the retaining pin from the dog pad pin.
- With a combination square or rule, locate and center punch the inside of the hatch coaming at a point over the approximate center of the end of the dog pad pin.
- Drill a 1/8-inch diameter hole through the coaming. Insert a 1/8-inch diameter punch, and drive out the dog pad pin. See [figure 4-3](#).

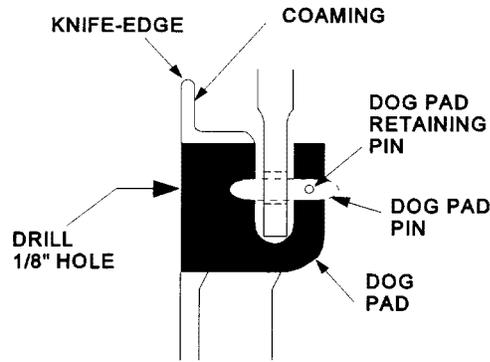


Figure 4-3. Removing Dog Pad Pin

- d. Remove the damaged dog bolt.
- e. Install the new dog bolt into the slot in the dog pad. Ensure the protrusion or bulge that is cast into one side of the bottom of the bolt faces towards the back of the slot in the hatch cover. If the bolt is installed backward, the dog bolt will not swing fully away from the dog pad when the hatch is lifted.
- f. Replace the dog pad pin. Align the holes for the retaining pin with the holes in the dog pad pin. Install the retaining pin.

CAUTION

Do not grind the weld flush.

- g. Weld up the 1/8-inch hole previously drilled in the hatch coaming with a 1/8-inch diameter E6010 or E6011 electrode.
- h. Coat the dog bolt threads with a thin coat of grease.

4-4. QUICK-ACTING HATCH REPAIR.

Quick-acting hatches have a handwheel assembly similar to those on scuttles. For instructions on handwheel disassembly and repair, refer to [chapter 5, paragraph 5-2](#). For information on hatch brace assemblies, refer to [chapter 2, paragraph 2-1.7](#), for steel assemblies or to [chapter 2, paragraph 2-2.7](#), for aluminum assemblies.

CHAPTER 5

SCUTTLE REPAIR

5-1. SCUTTLE REMOVAL.

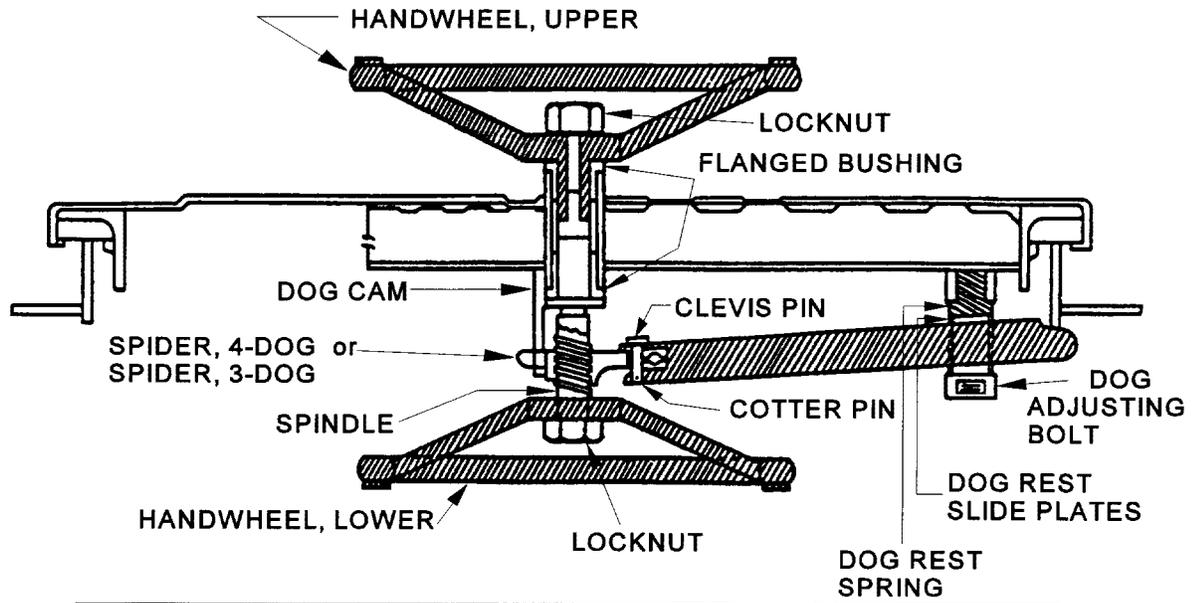
If routine maintenance is not sufficient to restore a watertight scuttle to watertight or operating condition, repair or replace defective parts. (Refer to [chapter 2](#) for inspection and maintenance procedures.) Refer to the Afloat Shopping Guide and to [appendix B](#) and [appendix C](#) for information to help identify and procure replacement parts. If the answer to the problem is not covered in the appendices, consult the appropriate technical point of contact at Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), or a commercial point of contact. To accomplish repairs on the handwheel assembly, the dog arms, or the hinges, remove the scuttle from its frame as follows:

- a. Use a chisel to knock off the upper brace link collar and hinge pin collars. Remove the hinge pins and brace link pin.
- b. For flush scuttles, remove the flathead screws from the hinge blocks.
- c. Lift the scuttle from its frame. Rope off the opening or cover with plywood as a safety precaution. Carry the scuttle to the shop for disassembly.

5-2. DISASSEMBLY AND REPAIR.

5-2.1 STEEL SCUTTLES.

- a. To remove the handwheel(s), remove the handwheel locknut(s) from the ends of the spindle. (Jamnuts or a jamnut and acorn nut must be installed in place of a locknut.)
- b. Remove the cotter pin and clevis pin attaching each dog arm to the spider. Remove the dog arms from the assembly. See [figure 5-1](#) and [figure 5-2](#).
- c. For flush scuttles, remove the spindle collar setscrew and unscrew the collar. See [figure 5-3](#).
- d. Unthread the spider from the spindle. Remove the spindle from the spindle sleeve.
- e. Using a 5/8-inch diameter (approximate) brass pipe or round stock, drive out the two flanged spindle bushings from the sleeve.
- f. Scrape rust, paint, and old grease from the spindle sleeve using a flat tipped punch and a 1-inch diameter rotary wire brush chucked in an electric drill. A no. 320 grit aluminum oxide cloth can also be used. Remove all traces of packing with a rag and dry cleaning solvent. Use caution when working with the flammable solvent.



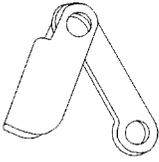
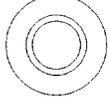
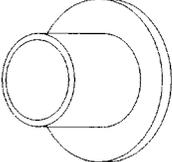
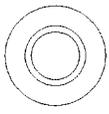
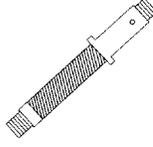
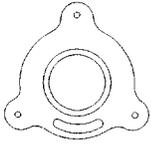
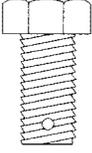
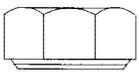
					
BRACE LINK ASSEMBLY	UPPER BRACE LINK PIN	UPPER BRACE LINK PIN COLLAR	LOWER BRACE LINK PIN	FLANGED BUSHING	
					
HINGE PIN	HINGE PIN COLLAR	PACKING PLUNGER	SPINDLE		
					
3-DOG SPIDER	DOG ADJUSTING BOLT	DOG REST SPRING	DOG REST SLIDE PLATE	CLEVIS PIN AND COTTER PIN	LOCKNUT

Figure 5-1. Raised Scuttle Components

- g. Dog adjustment bolts have a locking device that consists of a small nylon plug pressed into a hole in the body of the bolt. The locking device prevents the adjustment bolt from backing out after adjustment of the dogging arm. Inspect each adjustment bolt for wear by trying to tighten by hand. If the bolt screws in all the way by hand, it is worn and must be replaced.

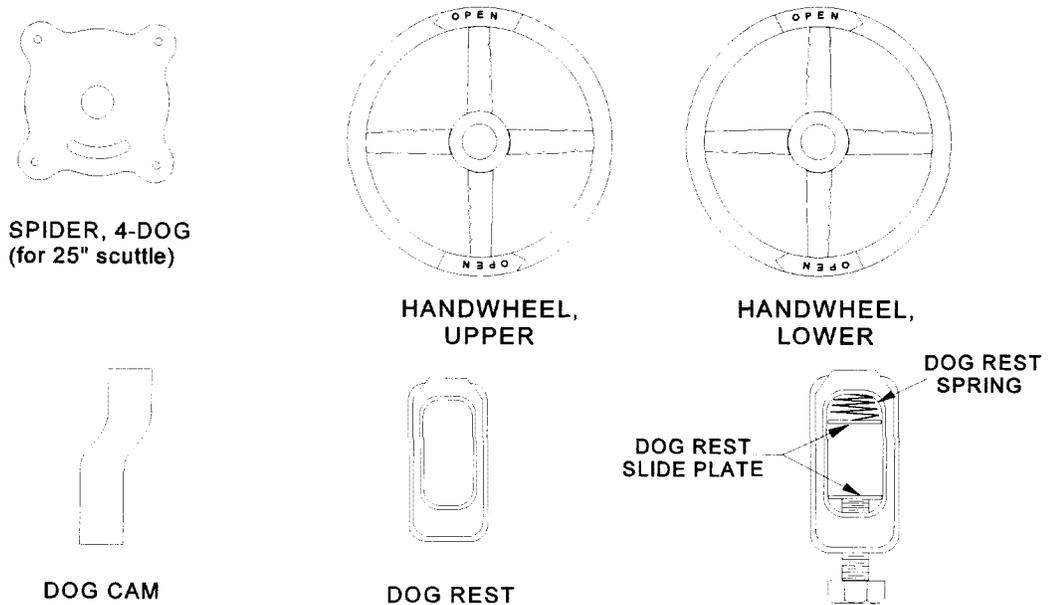


Figure 5-2. Scuttle Components

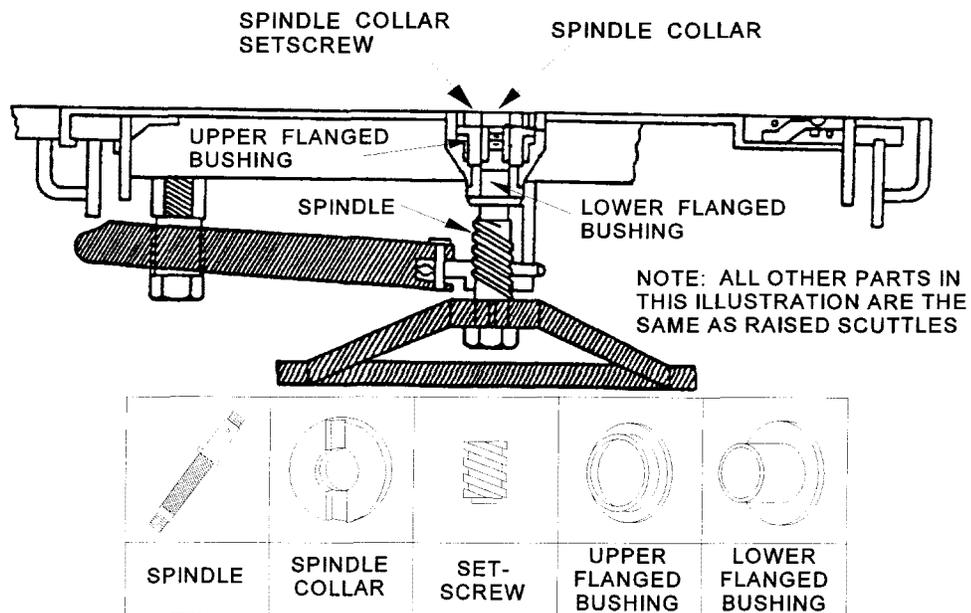


Figure 5-3. Flush Scuttle Components

CAUTION

The gasket must be removed from the scuttle before working with an oxy-acetylene torch; otherwise, the heat will destroy the gasket.

- h. Remove the dog adjusting bolt from each dog rest. If a bolt is frozen to the dog rest, heat the dog rest with an oxyacetylene torch. Secure the torch, and remove the bolt with a wrench.
- i. If the threads in a dog rest are damaged beyond repair, replace the dog rest as follows:
 - 1. Burn the dog rest off with an oxyacetylene torch.
 - 1. Weld on a new dog rest in exactly the same position and alignment as the dog rest removed.
- j. Chase the threads in each dog rest with a 5/8-18UNF tap.
- k. Coat the dog adjustment bolt threads with antiseize compound.
- l. Examine all other parts for wear or damage, and procure replacement parts as required. (Refer to the Afloat Shopping Guide and [appendix C](#).) Chase spindle threads with a 3/4-16UNF tap and die. Replace the spindle if any of the following conditions are found:
 - 1. Spindle is bent or has deep scratches.
 - 2. The threads are so badly worn that a new spider, when screwed on to the spindle, wobbles excessively.
 - 3. The machined flange is cracked or completely broken away. Often, the flange will crack around the entire periphery of the inner diameter, breaking free and forming what looks like a washer. See [figure 5-4](#).

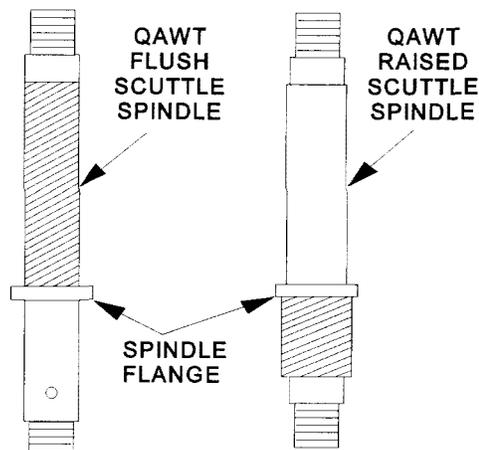
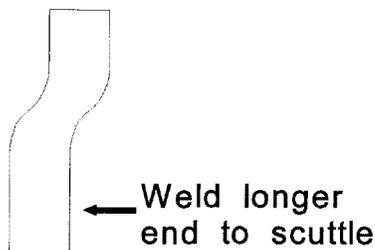


Figure 5-4. Scuttle Spindles

If either the spindle or the spider is damaged, replace both parts; otherwise, the spindle and spider will not fit properly. If the spider must be replaced, be aware that spiders for 18- and 21-inch scuttles have three dog arm holes and are interchangeable. Spiders for 25-inch scuttles have four dog arm holes and can only be used on 25-inch scuttles

- m. Examine the dog cam welded to the scuttle underside. See [figure 5-1](#) and [figure 5-2](#). Dog cams can become bent or break away completely over time from operation of the handwheels. If a cam requires replacing, it is important to position the new cam exactly in the same position as the old cam. Carefully mark the position of the old cam to indicate the proper fit-up of the new dog cam to the slot in the spider. If the old cam is missing, the old weld left on the scuttle will give a good idea of the proper position for the cam. Ensure the correct end of the cam is welded to the spider. The longer of the two sections of the cam is the end that should be welded. See [figure 5-5](#) and .
- n. Clean parts with a rag and dry cleaning solvent. Prime and paint the dog arms. Use Formula 150 primer and Formula 151 top coat.



DOG CAM

Figure 5-5. Dog Cam

5-2.2 ALUMINUM SCUTTLES.

- a. To remove the handwheel(s), remove the handwheel locknut(s) from the ends of the spindle. (Jamnuts or a jamnut and acorn nut must be installed in place of a locknut.)
- b. Remove the cotter pin and clevis pin that attach each dog arm to the spider. Remove the dog arms from the assembly. See [figure 5-1](#) and [figure 5-2](#).
- c. For flush scuttles, remove the spindle collar setscrew and unscrew the collar. See [figure 5-3](#).
- d. Unthread the spider from the spindle. Remove the spindle from the spindle sleeve.
- e. Using a 5/8-inch diameter (approximate) brass pipe or round stock, drive out the two flanged spindle bushings from the sleeve.
- f. Use a Scotch Brite pad to scrape corrosion, paint, and old grease from the spindle sleeve. Remove all traces of packing with a rag and dry cleaning solvent. Use caution when working with the flammable solvent.
- g. Dog adjustment bolts have a locking device that consists of a small nylon plug pressed into a hole in the body of the bolt. The locking device prevents the adjustment bolt from backing out after adjustment of the dogging arm. Inspect each adjustment bolt for wear by trying to tighten by hand. If the bolt screws in all the way by hand, it is worn and must be replaced.

CAUTION

Do not apply heat to remove dog adjusting bolt.

- h. Remove the dog adjusting bolt from each dog rest. If a bolt is frozen to the dog rest, use solvent to loosen the dog bolt.
- i. If the threads in a dog rest are damaged beyond repair, replace the dog rest as follows:
 1. Grind down the dog rest.
 2. Weld on a new dog rest in exactly the same position and alignment as the old one.
- j. Chase the threads in each dog rest with a 5/8-18UNF tap.
- k. Coat the dog adjustment bolt threads with antiseize compound.
- l. Examine all other parts for wear or damage, and procure replacement parts as required. (Refer to the Afloat Shopping Guide and [appendix C](#).) Chase spindle threads with a 3/4-16UNF tap and die. Replace the spindle if any of the following conditions are found:

1. Spindle is bent or has deep scratches.
2. The threads are so badly worn that a new spider, when screwed onto the spindle, wobbles excessively.
3. The machined flange is cracked or completely broken away. Often, the flange will crack around the entire periphery of the inner diameter, breaking free and forming what looks like a washer. See [figure 5-4](#).

If either the spindle or the spider is damaged, replace both parts; otherwise, the spindle and spider will not fit properly. If the spider must be replaced, be aware that spiders for 18- and 21-inch scuttles have three dog arm holes and are interchangeable. Spiders for 25-inch scuttles have four dog arm holes and can only be used on 25-inch scuttles.

- m. Examine the dog cam welded to the scuttle underside. See [figure 5-1](#) and [figure 5-2](#). Dog cams can become bent or break away completely over time from operation of the handwheels. If a cam requires replacing, it is important to position the new cam in exactly the same position as the old cam. Carefully mark the position of the old cam to indicate the proper fit-up of the new dog cam to the slot in the spider. If the old cam is missing, the old weld left on the scuttle will give a good idea of the proper position for the cam. Ensure the correct end of the cam is welded to the spider. The longer of the two sections of the cam is the end that should be welded. See [figure 5-5](#).
- n. Clean parts with a rag and dry cleaning solvent. Prime and paint the dog arms. Use Formula 150 primer and Formula 151 top coat.

5-3. SCUTTLE ASSEMBLY.

5-3.1 HANDLE INSTALLATION FOR RAISED SCUTTLES.

- a. Thinly coat the inside of the spindle sleeve with a silicone compound.
- b. Coat the lower flanged bushing with a silicone compound, and tap into place in the sleeve with a rawhide hammer.

NOTE

For flush scuttles, the lower flanged bushing is shaped differently than the upper bushing. See [figure 5-3](#).

- c. Coat the spindle bearing surface and thread with silicone compound, and thread the spider onto the spindle approximately halfway. The spider boss should face down, away from the spindle flange.
- d. Insert the spindle into the scuttle spindle sleeve. Pass the crescent shaped slot in the spider over the dog cam. There should be a loose fit between the cam and slot. If the fit is too tight, grind or file the slot to fit. The dog cam may need to be tapped to one side or the other with a hammer to help fit the slot in the spider over the dog cam. This is invariably true if the cam has been replaced.
- e. From the scuttle top, cut and wrap the spindle with approximately 12 inches of string packing. Push the packing into the spindle sleeve with a screwdriver. Coat the upper flanged bushing with silicone compound, and install the bushing.

NOTE

Do not apply string packing or stick packing if self-lubricated bushings are being installed in the assembly.

- f. Coat the spindle handwheel nut threads with antiseize compound, and install the upper handwheel.

NOTE

Be sure to install the upper handwheel. Ensure the arrow cast into the handwheel points in the direction the handwheel is turned to open the scuttle. On the lower handwheel, the arrow points in the opposite direction. Do not mix the directions up. See [figure 5-2](#). Handwheels for 18- and 21-inch scuttles are 10 inches in diameter; handwheels for 25-inch scuttles are 13 inches in diameter.

- g. Install a 5/8-11UNC stainless steel locknut and tighten. If the nuts on the scuttle are plated steel, replace with CRES nuts. If in doubt, test with a magnet. The CRES nuts attract the magnet very little, if at all.
- h. If desired, add a stainless steel 5/8-11UNC acorn style cap nut atop the locknut to protect the packing plunger. Besides protecting the packing plunger, this method also eliminates any possibility of the handwheel nut loosening over time. The CRES acorn nuts are available through the Navy Stock System. If there are not enough threads left on the spindle to use the acorn nut, replace the previously installed CRES locknut with a CRES jamnut, which is thinner than the regular nut.

5-3.2 HANDLE INSTALLATION FOR FLUSH SCUTTLES.

- a. Thinly coat the inside of the spindle sleeve with a silicone compound.
- b. Coat the lower flanged bushing with a silicone compound, and tap into place in the sleeve with a rawhide hammer.

NOTE

For flush scuttles, the lower flanged bushing is shaped differently than the upper bushing. See [figure 5-3](#).

- c. Coat the spindle bearing surface and thread with silicone compound, and thread the spider onto the spindle approximately halfway. The spider boss should face down, away from the spindle flange.
- d. Insert the spindle into the scuttle spindle sleeve.
- e. Coat the spindle collar threads with antiseize compound, and thread the collar onto the spindle until its top surface is flush with the top of the spindle.
- f. If either the spindle or spindle collar must be replaced, a new setscrew hole will have to be drilled and tapped. This is because new spindles and collars do not come drilled and tapped for a setscrew. Do not attempt to reuse the old hole in a reused part. Drill and tap a completely new hole. Use a no. 3 drill and 1/4-28UNF tap.
- g. Align the two halves of the setscrew hole in the collar and the spindle. Coat the setscrew with antiseize compound and install.

5-3.3 FINAL ASSEMBLY OF RAISED AND FLUSH SCUTTLES.

- a. For each dog arm, insert the dog rest spring and two dog rest slide plates into the dog rest. One slide plate sits on top of the spring and rides against the upper surface of the dog arm. The other slide plate rides against the lower side of the dog arm and rests on top of the end of the dog adjusting bolt.
- b. Insert the dog arm between the two slide plates, sliding the arm up and into the spider. Ensure the beveled side of the dog arm faces toward the scuttle underside or coaming.

- c. Pass the headed clevis pin from the scuttle underside through the hole in the dog arm and spider. Align the hole in the clevis pin with the small hole in the dog collar, and insert a 3/32-inch by 1-inch CRES or brass cotter pin. Bend over the long leg of the cotter pin.
- d. Repeat [step a](#) through [step c](#) for the other two or three dog arm assemblies.
- e. Coat the dog arm adjusting bolt threads with antiseize compound and install the bolts. Do not tighten the bolts at this time. Tighten the bolts only after assembly/adjustments and a chalk test are completed.
- f. For raised scuttles, install the lower handwheel, washer, and locknut. Use antiseize compound on the spindle threads.

5-4. INSTALLATION OF SCUTTLE ONTO FRAME.

- a. For raised scuttles:
 - 1. Place the scuttle in the frame.
 - 2. Insert the hinge pins and lock collars. The beveled side of lock collars must face out.
 - 3. Install the brace link pin and collar. Bend the end of the pin with a ball peen hammer to lock the pin to the collar.
- b. For flush scuttles:
 - 1. Clean the recessed areas around the scuttle opening of any debris and corrosion. Prime and paint as required. Use Formula 150 primer and Formula 151 top coat.
 - 2. Replace the hinge pins, and peen over the boss with a backup hammer and ball peen hammer.
 - 3. Attach the brace link to the brace pad hinge block with a new pin. Peen over the boss to lock in place.
 - 4. Lay the hinge blocks over the screw holes in the scuttle recess. Place the scuttle in the frame over the hinge blocks, and replace the upper hinge plates and flathead screws. Coat the hinge blocks and brace link with wire rope grease.

NOTE

The CRES brace links are available commercially for flush scuttles located on the weather decks.

- c. Stand on the underside of the scuttle. Close and dog down the scuttle approximately halfway. Set up on the dog adjusting bolts until the dog arms just begin to pull down on the scuttle.
- d. Open the scuttle and accomplish the chalk test. (Refer to [chapter 2, paragraph 2-1.5.](#)) Readjust dog bolts and accomplish another chalk test as required.
- e. Insert the packing plunger and stick packing. (Refer to [chapter 2, paragraph 2-1.12.](#))

NOTE

Scuttles equipped with self-lubricated bushings do not require stick packing or string packing. The packing plunger is left in place to fill the void that would remain in the spindle.

- f. Operate the scuttle to inspect for smoothness with a minimum of effort and no binding. The dog arms should fully engage the coaming. If the handwheel is difficult to turn, open the scuttle and tap the sides of the handwheels with a rawhide hammer from all four compass points. This procedure helps seat the bushings in proper alignment with the spindle. The handwheel should then be much easier to turn.

CHAPTER 6

DOOR LATCH DEVICES

6-1. FUNCTION.

The purpose of door latch devices is to either provide for a controlled opening of a door where air pressure differential would normally cause the door to slam open or closed (Collective Protective System (CPS) latch) or to allow personnel to properly close a 3-dog, quick-acting airtight door with one hand (dog assist latch).

6-2. DESCRIPTION.

6-2.1 COLLECTIVE PROTECTIVE SYSTEM LATCH (MACHALT 167-53008 (ECP-523)). The Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), style CPS latch is similar to a common gate latch. This latch is installed on doors of airlocks/pressure locks which are generally located in boundaries of CPS zones. This latch provides positive engagement by use of a latch bar and either a straight or ramped keeper. Both the latch bar and the keeper have a stellite coating applied to the contact surfaces to reduce wear. When the door is undogged, the door opens several inches before the latch bar hits the stop on the keeper and allows pressure on both sides of the door to equalize.

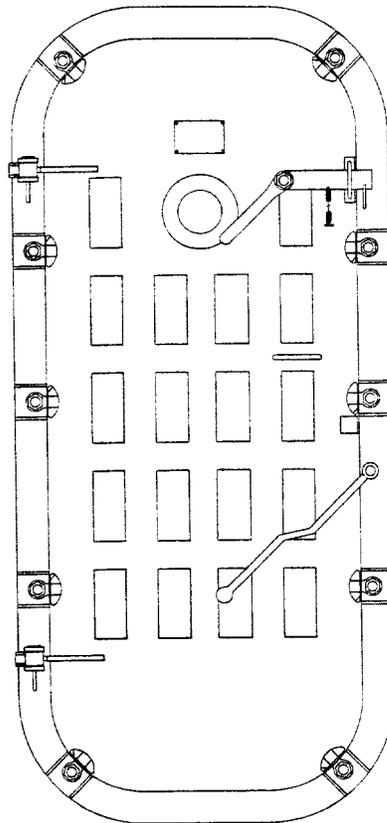


Figure 6-1. Door Latch Device

6-2.2 DOG ASSIST LATCH (MACHALT 167-53009 (ECP-514)). The dog assist latch, which is similar to the CPS latch, is installed on 3-dog, bound hinge airtight doors. As the description indicates, this latch is designed to assist personnel in properly closing and dogging airtight doors. These doors, when properly adjusted, start to

compress the gasket on the hinge side as the door swings to close. Typically, this generates a significant amount of resistance when the handle side of the panel is held closed against the knife-edge. Usually, the use of both hands is required to properly dog the door. In most cases, the door panel is not held tightly against the knife-edge prior to dogging the door. This results in the dogs striking the side of the door panel, causing structural damage to the panel and accelerated wear on the wedges. The dog assist latch provides a means of holding the door panel in the properly closed position (against the knife-edge) while dogging the door, thereby eliminating the need to use both hands. The only difference between the CPS latch and the dog assist latch is the length of the keeper. The CPS latch, when engaged, allows free movement of the door panel in order to facilitate pressure relief, whereas the dog assist latch is set to engage the keeper when the handle side gasket first contacts the knife-edge.

6-3. REPLACEMENT PARTS.

With the exception of the keeper, parts for the CPS latch and the dog assist latch are identical, and are illustrated in [figure 6-2](#). The latch is designed to require little maintenance. The two flanged bushings used are self-lubricating and are the exact same bushings used in the quick-acting door operating handle sleeve. The bushings are equipped with an external O-ring and an internal T-seal to provide a watertight seal for the spindle sleeve. The commercial off-the-shelf type extension spring is externally mounted and easily repaired or replaced. All components of the latch assembly are CRES 316 and do not require preservation. Replacement parts are available in the Navy Stock System and can be identified on the applicable Allowance Parts List (APL).

6-4. INSPECT, CLEAN, AND LUBRICATE LATCH DEVICES (MACHALT 167-53009 (ECP-514) AND MACHALT 167-53008 (ECP-523)).

6-4.1 SAFETY. Before repairing any door latch device, obtain permission from the Engineering Officer to disable the door. Make an appropriate entry in the ship's closure log. Check with supervisor before starting work. Do not disassemble any door latch device while the ship is underway; perform only those emergency repairs required to keep that particular door operational.

Fasten or lash back any door which must remain open while work is being accomplished to prevent the door from swinging as the ship rolls. If possible, try to start and finish repair on the door in the same workday. This will prevent having an additional open closure after working hours when fewer crewmen are on board. Have on hand all parts required to repair the latch device before starting work. Notify a supervisor when the repairs are completed. Clear the entry in the ship's closure log.

6-4.2 GENERAL GUIDANCE FOR INSPECTIONS. The following principles apply to inspections for all watertight and airtight closures:

- a. Comply with Navy Safety Precautions for Forces Afloat, OPNAVINST 5100 Series, which is found in each work center.
- b. All tag-out procedures shall be in accordance with current shipboard instructions.
- c. Accomplish inspection and maintenance in accordance with applicable Planned Maintenance System (PMS) documentation.
- d. Replace loose, missing, or damaged parts, and parts showing excessive wear.

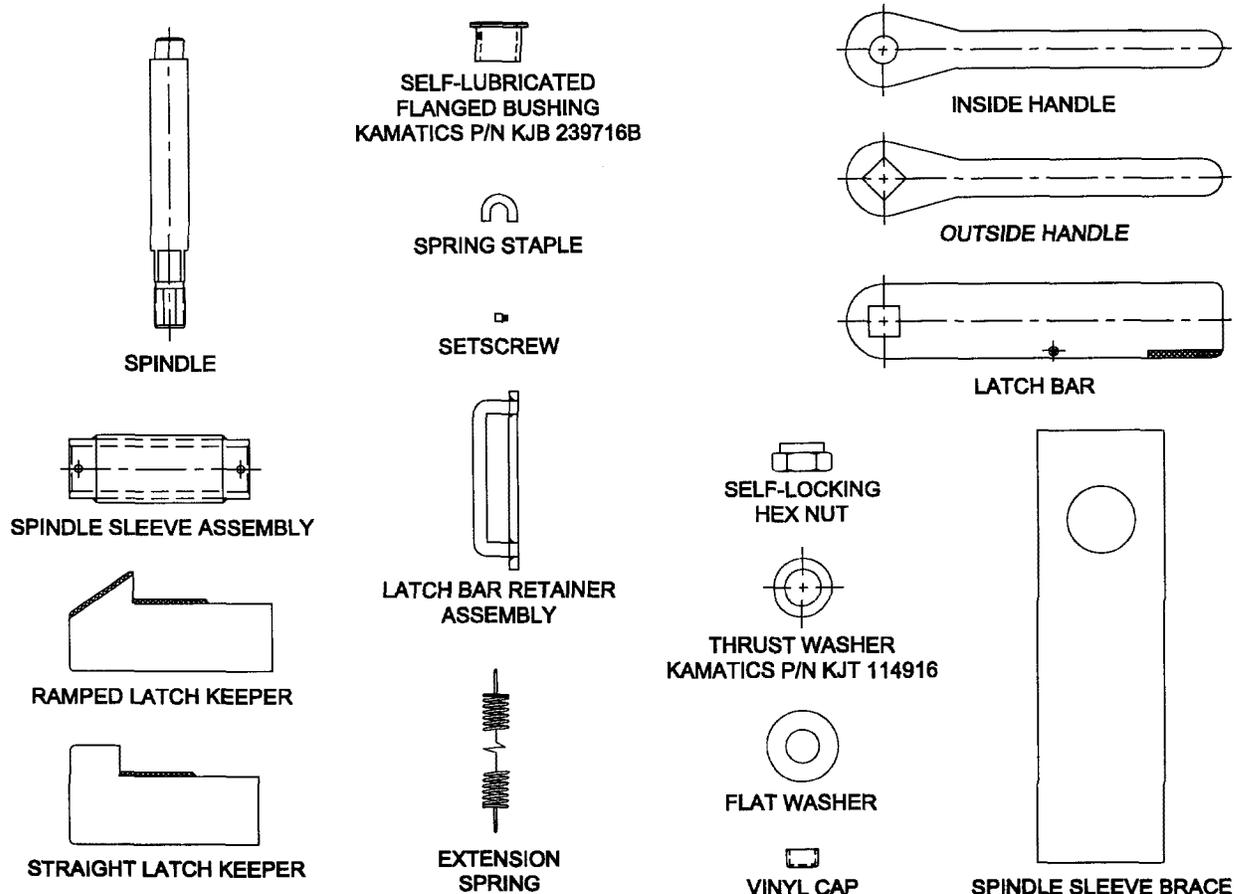


Figure 6-2. Latch Device Assembly Replacement Parts

e. Latches should be routinely inspected by Damage Control Petty Officers and Zone Inspectors for:

1. Loose, missing, and damaged parts.
2. Paint, rust, and other foreign matter on working parts such as flanged bushings.
3. Binding and difficult operation.
4. Distortion and deterioration of metal surfaces.
5. Broken and missing springs.

If any parts are missing or beyond repair, replacement parts can be obtained through the Navy Stock System. Additional assistance can be provided by NSWCCD-SSES, Attn: Code 9782, Philadelphia, PA, Hull Outfitting, DSN 443-7344, Commercial (215) 897-7344.

6-4.3 INSPECT, CLEAN, AND LUBRICATE.

6-4.3.1 Visual Inspection.

WARNING

All tag-out procedures must be in accordance with current shipboard instructions.

a. Deenergize applicable CPS supply and exhaust fans, and tag "Danger: Out of Service." Shut door to be inspected.

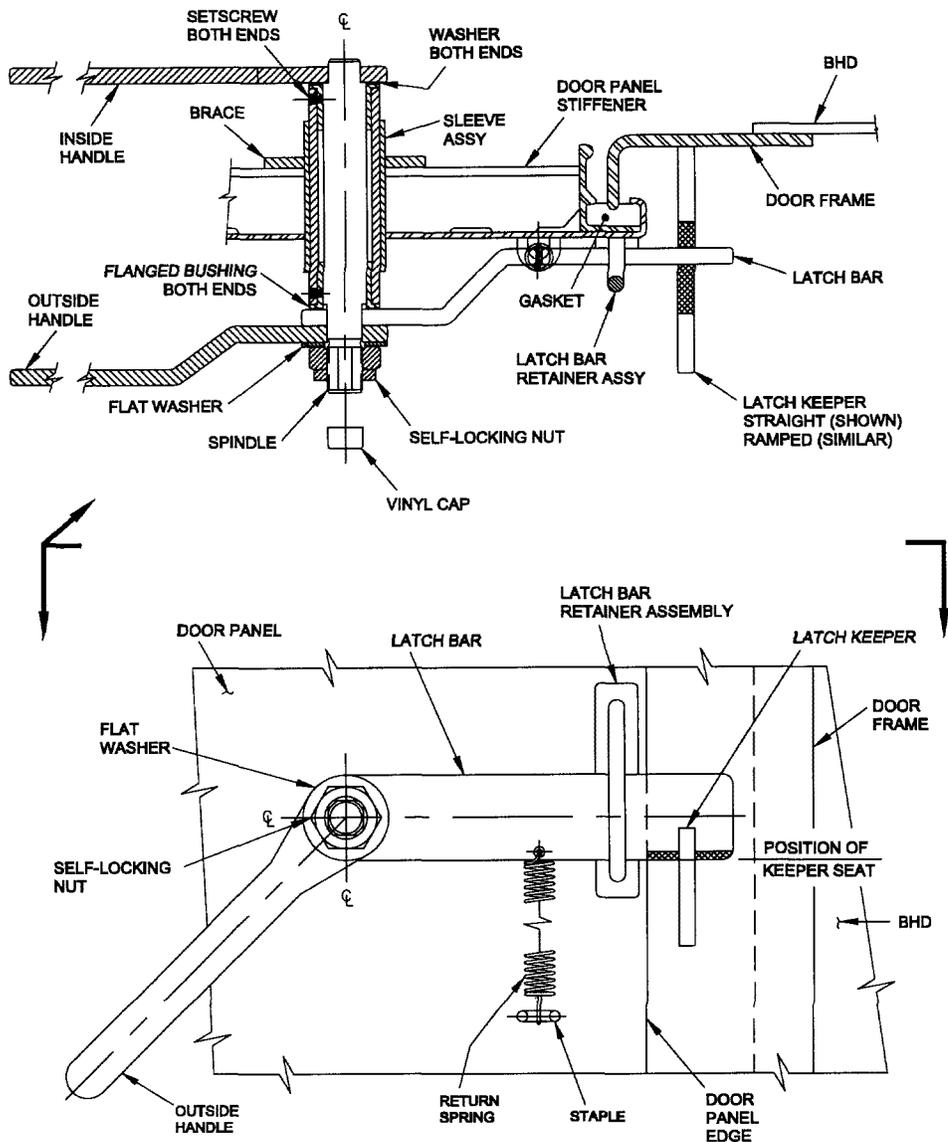


Figure 6-3. Latch Device

- b. See [figure 6-1](#) and [figure 6-2](#) for identification of components, and inspect latch for the following:
1. Paint, rust, or other foreign matter on spindle, flanged bushings, setscrews, thrust washers, spindle sleeve, flat washer, self-locking hex nut, extension spring, and contact areas of working parts.
 2. Distortion, damage, or deterioration of any components.
 3. Obstructions in way of access to latch device and obstructions which interfere with operation of latch device.

CAUTION

Ensure that thrust washers are installed between the contact surface of the flanged bushings and the inside and outside handles. Missing thrust washers will result in damage to the self-lubricating lining on the flanged face of the bushing.

4. Loose or missing self-locking nut, flat washer, and thrust washers on latch spindle.
5. Loose or missing setscrews for flanged bushings. Setscrews should be flush or slightly recessed in spindle sleeves and tight.
6. Missing or stretched extension spring, and missing or damaged spring staple. Ensure that spring loop ends are crimped closed around latch bar and spring staple.
7. Missing or damaged inside handle, outside handle, latch bar, latch bar retainer, latch keeper, and slide bar.
8. Worn stellite coating on latch bar and latch keeper. The coating shall be considered worn out when 3/32-inch of material has been lost from the original 1/8-inch thick coating.
9. Cracked or broken welds on spindle sleeve, sleeve brace, inside handle, latch keeper, spring staple, latch bar retainer, and slide bar.
10. Loose or flaking paint and rust on door panel at spindle sleeve penetration and in the immediate vicinity of latch bar retainer, slide bar, and spring staple.
11. Latch handles interfering with the proper operation of the darken ship covers over fixed lights.

WARNING

Ensure a minimum 2-inch hand clearance exists between the door dogging handle and any latch device component.

12. Latch device assembly does not interfere with operating door dogging handle.
13. Operate latch device through latch/unlatch cycle, and inspect for binding or excessive play between spindle, spindle sleeve, and flanged bushings. When the handle is released, the latch bar should return to latched position. Binding can be caused by overtightening self-locking nut, friction between contact surfaces of latch bar and retainer/slide bar, or no lubrication on O-rings in flanged bushings. Excessive play indicates worn flanged bushings or improperly tightened self-locking nut.
14. Inspect for worn flanged bushings. Grasp inside handle (handle welded to spindle), and attempt to shake it up and down, and side to side. If movement occurs, bushings are worn. In and out movement is not an indication of worn bushings, but an indication of an overtightened self-locking nut.
15. For doors installed with square latch keepers, close door from open position. Ensure that latch bar contacts vertical face of latch keeper and prevents door from fully closing until latch bar is raised to unlatch position.
16. For doors with ramped latch keepers, close door from open position. Ensure that latch bar contacts ramped (sloped) section of latch keeper and travels up and over keeper, allowing door to close fully. If latch bar contacts the vertical portion of keeper, either the door panel has dropped because of worn hinge washers and hinge pins or the latch assembly was not properly aligned when installed.

6-4.3.2 Clean and Lubricate.

- a. Remove vinyl cap, self-locking hex nut, and flat washer from spindle.

CAUTION

Do not allow latch bar to hang freely, supported only by the extension spring, as damage to extension spring may occur. Support latch bar with extension spring by taping it to the door panel with duct tape.

- b. Remove outside handle, latch bar, and thrust washer.

WARNING

Respiratory protective equipment must be worn if exhaust ventilation (fixed or portable) is not in operation or is inadequate. If unsure whether ventilation is adequate, consult work center supervisor.

- c. Remove spindle from spindle sleeve assembly. Retain spindle CRES thrust washers for reinstallation.
- d. Remove setscrew from self-lubricated flanged bushings.
- e. Remove self-lubricated flanged bushings.

WARNING

Wear safety goggles when wire brushing with power drill.

- f. Clean contact surfaces of latch bar, latch keeper, slide bar, and latch bar retainer with aluminum oxide abrasive cloth, no. 320 grit, or wire wheel only if paint or rust exists. Use clean rag to remove abrasive grit remaining on components.
- g. Clean self-lubricated flanged bushings with clean, dry rag. Inspect external O-ring, internal T-seal, and bearing liner for wear or damage.
- h. Clean inside surface of spindle sleeve assembly and surface of spindle using a rag.

CAUTION

Under no circumstances should abrasive cloth, wire brush, or metal scraper be used to clean latch spindles, inside surface of spindle sleeves, or thrust washers, as this will damage machined surfaces of these components.

- i. Clean surfaces of latch spindle, inside surface of spindle sleeve assembly, and thrust washers with crocus cloth only if paint or surface rust exists. Use clean rag to remove grit or debris.
- j. Inspect for nicks or burrs on spindle and in spindle sleeve assembly in flanged bushing contact area. If found, file smooth. Use clean rag to remove grit or debris.
- k. Inspect for damaged or stripped threads on spindle. If found, chase threads with rethreading die.
- l. Reinstall self-lubricated flanged bushings.

- m. Reinstall setscrews into self-lubricated flanged bushings.
- n. Reinstall spindle into spindle sleeve assembly.
- o. Reinstall thrust washer, latch bar, and outside handle.
- p. Reinstall flat washer and self-locking hex nut on spindle.
- q. Reinstall vinyl cap onto threads of spindle.

CHAPTER 7

ARMORED BALLISTIC CLOSURES

7-1. BALLISTIC DOORS.

To maintain ballistic qualities and tightness of a structure, ballistic armored closures are made of the same material and the same thickness as the plating in which they are fitted. In plating 5/8-inch and thicker, door edges and the clear opening have matching 45-degree bevels to prevent closures from being driven through the openings under ballistic impact and to ensure that, when closed, closures will be near flush with the plating. See [figure 7-1](#).

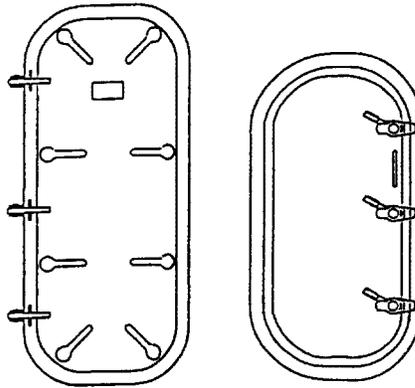


Figure 7-1. Armored Ballistic Closures, Individually Dogged

In plating 5/8-inch or thicker, ballistic closures have gaskets made of either two-line rubber (MIL-G-20078, Type "B") or two-line silicone rubber (FED-SPEC ZZ-R-765). The gaskets are fitted into an ordinary strength steel gasket strip welded to the closure plate. The gasket is secured to the strip with adhesive (Type MMM-A-A121) and 1/8-inch by 5/8-inch flat bar, and retained by flat headed machine screws spaced approximately 5 inches center-to-center. See [figure 7-2](#).

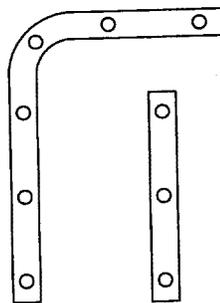


Figure 7-2. Gasket Retainer (Corner and Straight)

Ballistic closures located in plating less than 5/8-inch thick have gaskets (MIL-R-900) similar to those for nonballistic closures. Gasket material for closures installed in fueling areas must conform to MIL-R-15624, Class 3. See [figure 7-3](#).

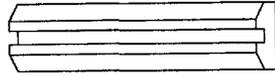


Figure 7-3. Gasket

Individually dogged closures in ballistic plating 5/8-inch or thicker have penetrating type dogs. Dogs and spindles are manufactured from either HY 80 steel bar (MIL-S-21952) or HTS 80 castings (MIL-S-23008). See [figure 7-4](#). Dogs in ballistic plating less than 5/8-inch thick are similar in design and materials to those used on standard structural nonballistic closures.

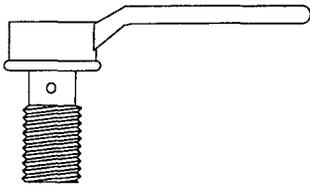
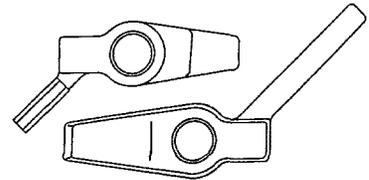
**STRAIGHT HANDLE DOG****DOG SETSCREW****CORNER DOGS**

Figure 7-4. Straight Handle Bushing, Dog Setscrew, and Corner Dogs

The outer end of dog spindles are either flush and slotted, or protruding and hexagonal. All ballistic closures have handles on both sides. Hinges for ballistic closures are located on the outer (exposed) side and are so designed that hinge pins (no. 2 type) will be in double shear. The weight of the closure is carried on the lower hinge. Closures weighing more than 1,000 pounds have three hinges. See [figure 7-5](#).

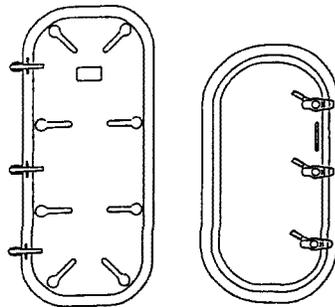


Figure 7-5. Armored Ballistic Closures, Tri-Hinged

7-2. REPLACEMENT PARTS FOR BALLISTIC CLOSURES.

Parts for ballistic armored watertight closures may appear similar, but will be found to vary from ship to ship (that is, different threads or overall measurements). Inquiries to commercial sources or planning yards should include as much information as possible to aid in locating proper replacement parts. The following data should be included:

- Ship's hull number.
- NAVSEA/BUSHIPS Drawing number.
- Sample or photograph of parts.
- Closure size (with the panel open, measure height and width between inner edge of frame).

- e. Quick-acting (gang-operated) or individually dogged.
- f. Number of dogs, location, and type (for example, side top corner, bottom corner, straight dog, or angle dog).
- g. Approximate thickness of the bulkhead.

7-2.1 QUICK-ACTING (GANG-OPERATED) BALLISTIC CLOSURES. Multidog mechanisms of quick-acting ballistic closures may be grouped with connecting rods and locknuts to a turnbuckle which provides a means for adjusting the dogs to the proper position. Right-hand and left-hand threads are machined at opposing ends of connecting rods. Likewise, stainless steel or brass turnbuckle fittings have threads machined to receive the right- and left-hand threaded portion of the connecting rods. The connecting rod locknuts are machined and internally right- and left-hand threaded. The connecting rod shoulder bolts are retained by hexagonal-shaped nuts drilled to receive retaining cotter pins. A connecting rod washer is installed on each connecting rod stud and connecting rod shoulder bolt. The length of connecting rods varies with closure size. See [figure 7-6](#) and [figure 7-7](#).

7-2.2 SPINDLES FOR BALLISTIC CLOSURES. The top and bottom dog assemblies on a quick-acting three-dog closure may use slot head spindles. The slot head provides a means of turning the spindle into the threaded door panel and additional support plate. The support plate is added to give additional thread strength to the door panel. On the same doors, the center dog may have a round head spindle or a slot head spindle. The round and slot head spindles for these closures have been modified to hex head spindles. See [figure 7-8](#).

7-2.3 DOG WEDGES. Quick-acting ballistic closures and individually dogged ballistic closures use 6-3/4-inch long aluminum bronze wedges. Shim stock is used between wedges and wedge mounting pads. Flat head brass machine screws are used to retain the wedges to mounting plates. Wedges are available in right-hand and left-hand styles. See [figure 7-9](#).

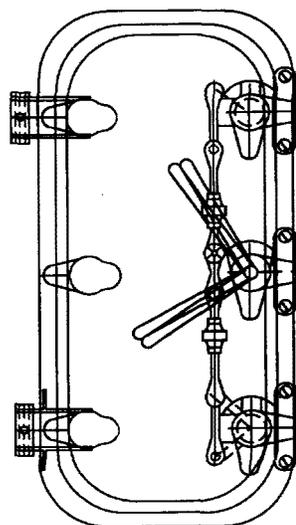


Figure 7-6. Quick-Acting (Gang Operated_ Ballistic Closure (Open and Closed Position)

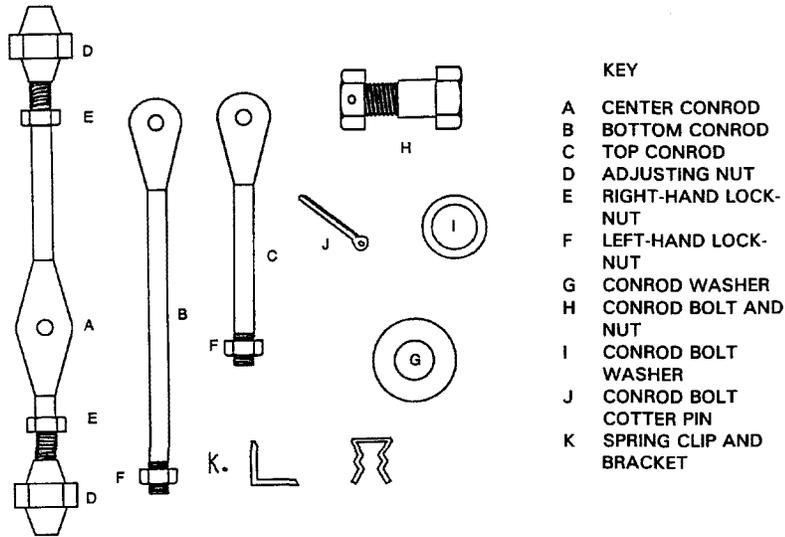


Figure 7-7. Linkage Assembly (Typical)

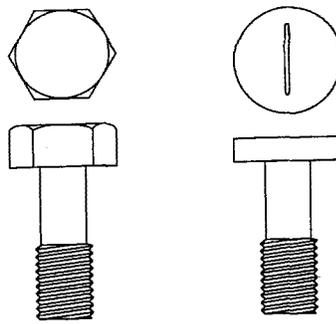


Figure 7-8. Spiders for Ballistic Closures

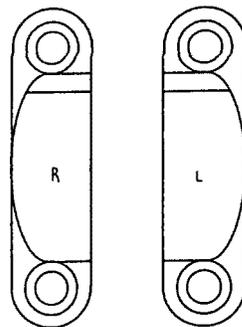


Figure 7-9. Dog Wedges (Right-Hand/Left-Hand)

7-2.4 DOGS FOR BALLISTIC CLOSURES. The top and bottom dogs on quick-acting three-dog ballistic closures may be supported by a slot head spindle in the closure panel. In this configuration, the dog assemblies are "bushed" to the spindle. The center dog is joined to the spindle by a buttress thread. The thread joint of the dog assemblies is locked with a 1/2-13NC CRES setscrew.

In a new assembly, the spindle bearing washer is mated to the spindle shaft. The spindle and bearing washer are inserted into the opening in the closure. Dogs are mated to the spindle shaft and properly adjusted for fit.

Once fitted, the mated buttress thread and dog joint is center punched and then drilled to a depth of 1 inch using a drill bit equivalent for a 1/2-13NC tap. Tap the hole using a starting tapper, bottom 1/2-13NC tap. Insert the 1/2-13NC setscrew, and tighten until the setscrew face is flush with the spindle and dog face. This arrangement locks the assembly together. This procedure can be accomplished on and off the closure. All fit-ups are made at the closure. Center punching is made at the closure, and adjacent matchmarks are punched at a distance from the drill and tap punch mark for easy assembly later. See [figure 7-10](#).

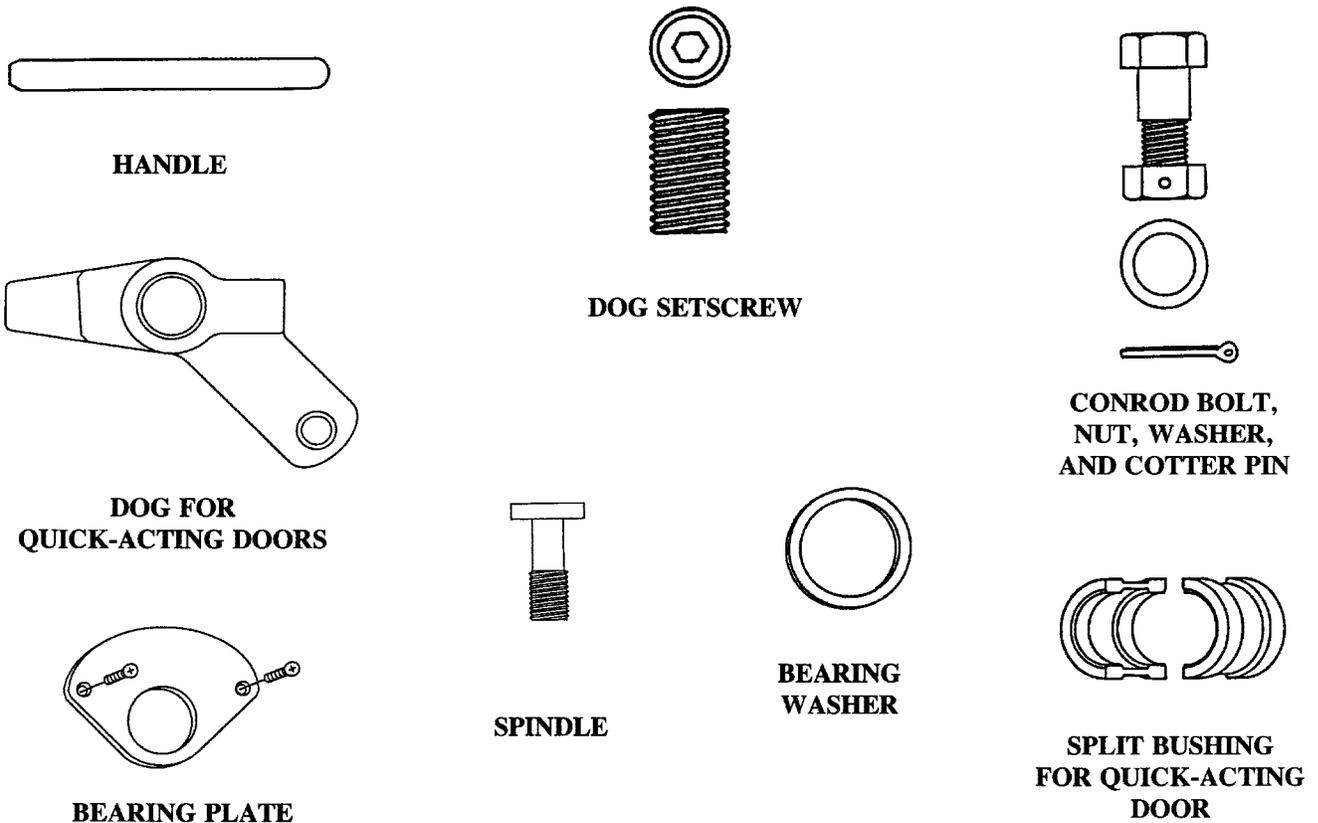


Figure 7-10. Quick-Acting (Gang Operated) Ballistic Closure Wear Parts

7-3. BALLISTIC HATCHES.

Flush ballistic hatches are of the same material and thickness as the deck in which they are installed. In the case of multiple course decks, hatches are constructed of the same material as the upper course and are the same thickness as the total deck thickness. Flush hatches in ballistic decks are usually dog type and spring balanced.

Hatches that are not spring balanced are operable from the upper side of the deck only. These hatches are opened and closed with hand-operated chain hoists, unless a power hoist is installed near the hatch for moving stores or other material through the hatchway. See [figure 7-11](#).

7-3.1 BALANCED BALLISTIC HATCHES. The edges of flush ballistic hatches and the deck plating in which they are installed have matching 45-degree bevels. The top of the hatch is fit practically flush with the top of the deck plating (or with the top of the landing strip, if installed). In order to allow for compression of the gasket, the clearance between the closed hatch cover and deck plating in way of the bevel is approximately 1/8 inch measured vertically. The hatch is not rabbeted or otherwise recessed to facilitate securing the gasket.

Springs and other parts for balanced hatches are designed so the hatch is as balanced as possible in all positions. The force of the spring is sufficient to allow one person to open or close the hatch easily from above or below.

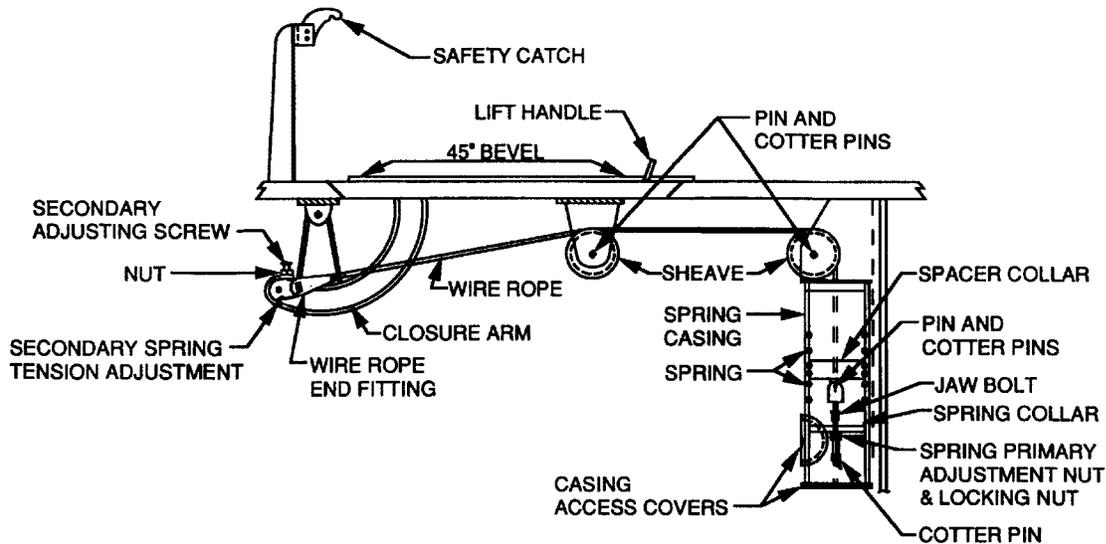


Figure 7-11. Typical Hatch

Hatches without lift handles are slightly overbalanced. These hatches should raise toward open slightly when undogged and require a moderate amount of downward pressure to dog down. Hatches with lift handles should be balanced to allow free fall slowly toward closed, but not slam. The hatch should slow and stop just before gasket and seating surface contact (2 to 6 inches). See [figure 7-11](#).

Ballistic hatch springs are the compression type (spring steel, Grade II, Type B, Material 7) and have three-quarters of a coil on each end squared and ground smooth. The springs, spring plate, filler plate, and jaw bolt assembly are fitted within a metal enclosure (spring casing) having a casing head assembly, end cover, and hand-hole cover. Ballistic hatch spring plates and spring filler plates are part of the spring assembly of most ballistic armor hatches which use two coil springs. Two springs are used instead of one to avoid buckling which is likely to occur during the compression of a single spring. The filler plate is located between the two coil springs to provide a smooth surface for the squared ends of the springs. The spring plate is located at the base of the spring assembly. This plate is secured in place on the threaded end of the jaw bolt by an adjusting nut, locknut, and cotter pin. The adjusting nut provides the primary means for bringing the hatch into balance, and the purpose of the locknut is to lock the adjusting nut in place. The cotter pin installed near the end of the threaded portion of the jaw bolt is to prevent inadvertent loss of the adjusting nut or locknut. Access to the primary adjustment nut, locknut, and cotter pin is made by removing the handhole cover and casing end cover which are affixed to the spring casing by 10-24NC x 1/4-inch long machine screws. See [figure 7-12](#).

The secondary means of bringing the hatch into balance is with the secondary spring tension adjustment bolt located on the hinge arm. To decrease spring tension, loosen the adjustment bolt locknut and rotate the adjustment bolt clockwise until desired tension is achieved. Counterclockwise rotation of the adjustment bolt will increase spring tension. The adjustment bolt locknut prevents inadvertent movement of the adjustment bolt when locked in place. See [figure 7-11](#).

7-3.2 SHEAVES. Sheave assemblies are used to reduce wire rope friction to a minimum. Graphite bronze bushed sheaves with cold rolled steel pins, steel washers, and steel cotter pins are fitted to sheave brackets welded

to casing head plates and to chocks at other suitable locations along the wire rope path of travel. The number of sheave assemblies installed will depend on the overall length of the wire rope and/or the number of bends along the wire rope path of travel. See [figure 7-12](#).

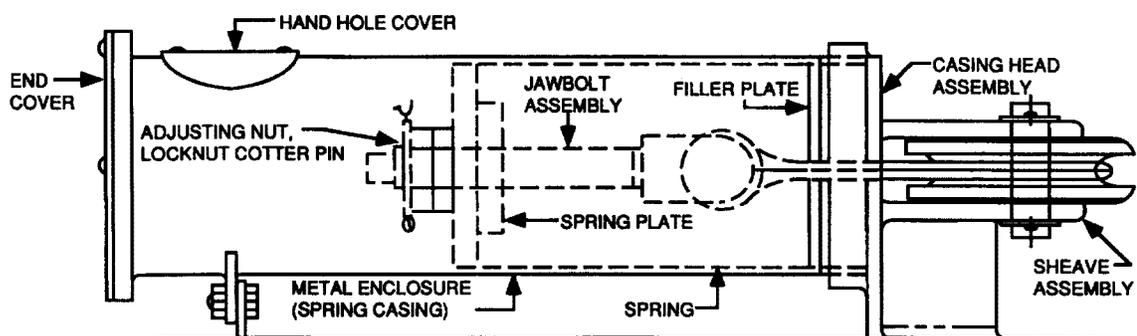


Figure 7-12. Spring Casing Assembly

7-3.3 WIRE ROPE ASSEMBLIES. Jaw bolt and clevis end wire rope socket electroline fiege fittings are used in wire rope assemblies on ballistic armor hatches. Navy drawings of wire rope assemblies show the fittings and are listed in the bill of material as "clevis end w.r. socket" and "stud end w.r. socket." The diameter of the fiege fittings depends on the hatch size and the cover thickness. The diameter and type of wire rope used in wire rope assemblies also depends on hatch size and the cover thickness. The material specifications are listed in the drawing bill of material for each type hatch and class ship. The 3/8-inch diameter wire rope (6 x 37) is preformed, fiber core, improved plow steel, galvanized, in accordance with material specification RR-W-410, Type 1, Class 3. The 1/2-inch diameter wire rope is the same type and specification. The 5/8-inch diameter wire rope (6 x 37) is preformed, internal wire rope core, extra improved plow steel, galvanized, in accordance with material specification RR-W-410, Type 1, Class 3. Complete wire rope assemblies (wire rope, jaw bolt, and clevis end wire rope socket) are to be tested in accordance with the current Naval Sea Systems Command Technical Manual (NSTM), Chapter 613, by a certified weight testing facility. A certificate must be issued, and an approved type test label must be attached to the wire rope at the location specified on the drawing. The entire wire rope must be lubricated with hatch in the open and closed positions to ensure all surfaces of the wire rope are properly lubricated as specified in current Planned Maintenance System Maintenance Requirement Card. See [figure 7-12](#) and [figure 7-13](#).

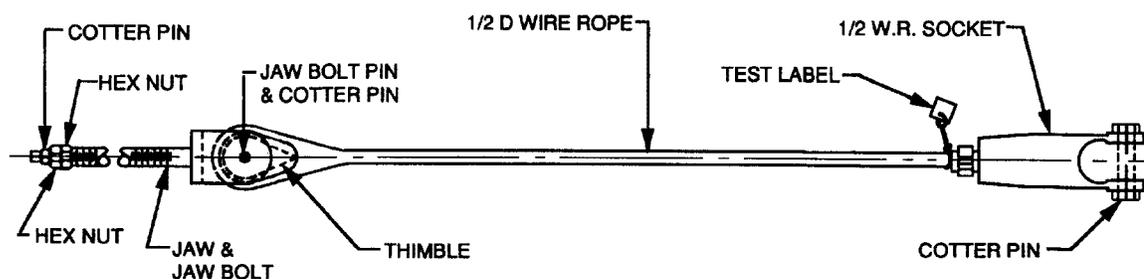


Figure 7-13. Cable Assembly Wire Rope

7-3.4 AUTOMATIC CATCH ASSEMBLY. The automatic catch assembly is a safety device installed on all ballistic hatches. Various materials are used in the manufacture of automatic catch assemblies dependant upon the location of installation and end use. Catch bodies, catch pins, and guide pins of automatic catch assemblies located in weather area (except the barricade webbing hatch on CVs/CVNs) trunks leading to shaft alleys or JP-5 pump rooms are made of CRES material (Class 316 COD.A) in accordance with military specification (MIL-SPEC) QQ-S-763. The catch pin and guide pin for closures used in nonsparking areas shall be made of brass in

accordance with MIL-SPEC QQ-B-637. The catch spring shall be made of phosphor bronze alloy 510, in accordance with MIL-SPEC QQ-W-321. Open ends of the coil spring are ground flush on both ends. See [figure 7-14](#).

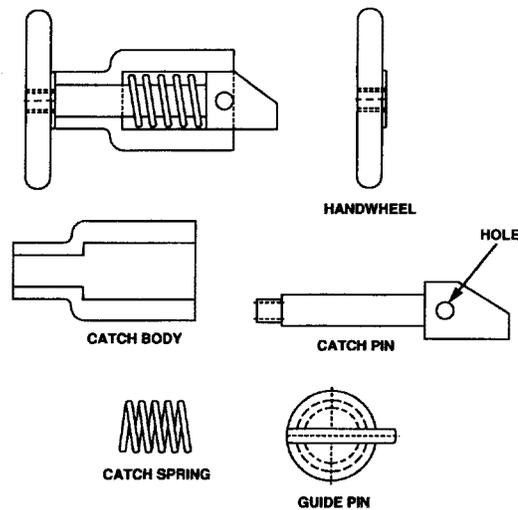


Figure 7-14. Automatic Catch Assembly

7-3.5 SPINDLES. Dogging devices for a ballistic hatch may have either a cone spindle or a straight spindle. Cone spindles are supported by a cone bushing and a split bushing. Spindles are manufactured of steel alloy in accordance with MIL-N-3182 and machine threaded to receive the internal threaded portion of the dog selected for the type and style hatch installed. Spindles are drilled and tapped during final assembly to receive a setscrew which retains the dog in proper position selected. The hexagon end of the straight spindle is drilled and tapped to receive a phosphor bronze packing plunger. Spindles for flush deck hatches are drilled and tapped at the threaded end to receive a phosphor bronze packing plunger and a 1/2-13NC dog retaining setscrew. See [figure 7-15](#).

- a. Requests for information on replacement of cone spindles should include the following:
 1. Width across the flats or parallel sides of hex head.
 2. Thickness of hex head.
 3. Spindle length (measured from under the hex head to the spindle).
 4. Outer diameter of the spindle bearing surface.
 5. Length of the spindle bearing surface.
 6. Whether the thread end of the spindle is drilled and tapped for a packing plunger.
- b. Requests for information on replacement of straight spindles should include the following:
 1. Width across the flats or parallel sides of hex head.
 2. If round headed, the outer diameter.
 3. Thickness of the head.
 4. Spindle length (measured from under the spindle head to the end of the spindle).
 5. Outer diameter of the spindle bearing surface.
 6. Whether the thread end of the spindle is drilled and tapped for a packing plunger.

7-3.6 BUSHINGS. Ballistic hatches may require the use of a cone shaped bushing insert. The cone bushing is used in connection with a split bushing. The dimensions of the split bushing vary with the design of the hatch. It may be necessary to remove a dogging device in order to properly measure and identify the part. Due to the distinct difference and application of cone bushings, specific installation instructions should be followed. Instructions not available should be requested.

Nimitz class carriers use solid bushings 2-1/32-inch inside diameter instead of a split bushing. The lengths of solid bushings vary from 2-11/16 inch to 4 inches. In all correspondence concerning this type bushing, specify length and inside diameter, and indicate tapered or flush ends. Bushings are made of bronze material in accordance with applicable list of material (MIL-B-16443). See [figure 7-15](#).

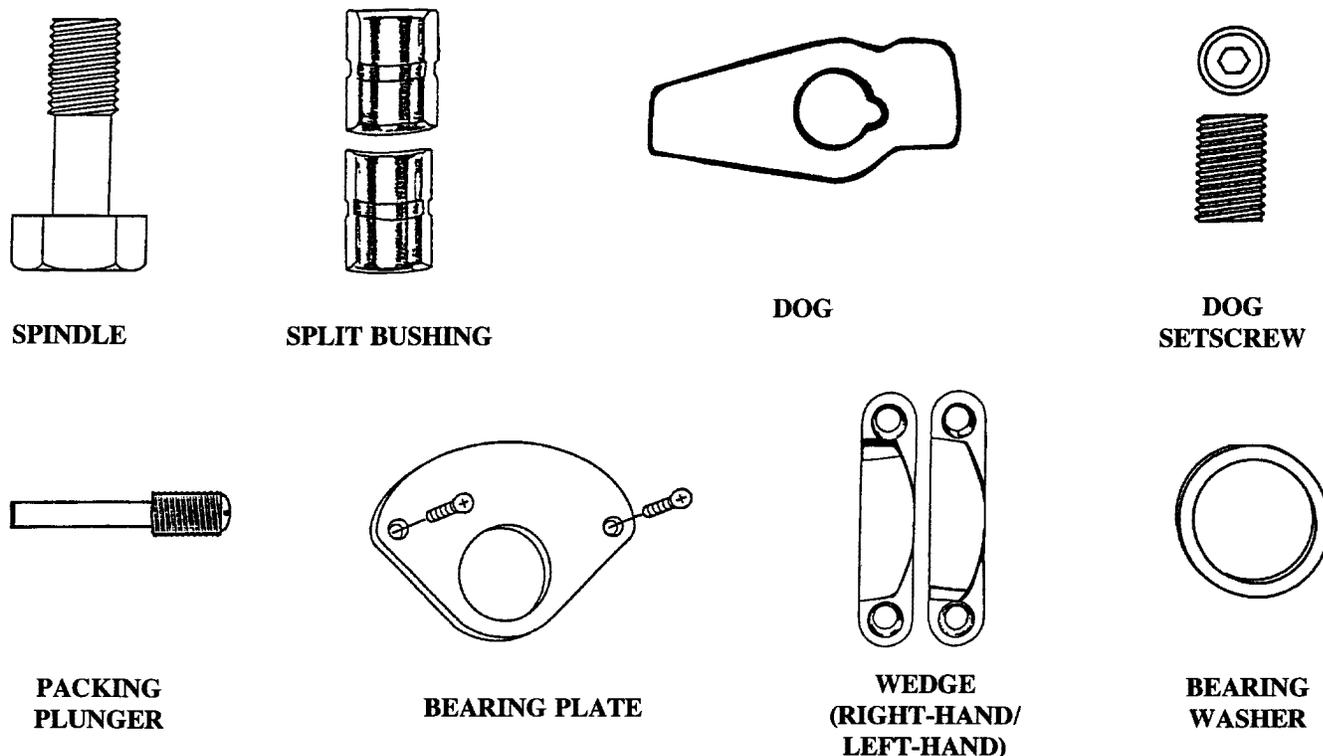


Figure 7-15. Spindle, Split Bushing, Dog and Dog Setscrew, Packing Plunger, Bearing Plate, Wedge (Right-Hand/Left-Hand), and Bearing Washer

7-3.7 HATCH BEARING PLATE. Hatch bearing plates and the associated bearing washers differ in dimensions due to the design and size of the hatch. The use of spacers under the bearing plate may be required on some older ships. Bearing washers and bearing plates are made of brass material in accordance with applicable list of material (MIL-N-994). Bearing plates are held in place by 1/4-inch x 5/8-20NC(A) flat head brass machine screws in accordance with applicable list of material (MIL-S-933).

In all correspondence concerning hatch bearing plates, include as much of the following information as possible to assist in obtaining replacement parts:

- a. Size of the clear opening.
- b. Quick-acting or individually dogged.
- c. Hatch location (deck, frame number, and port or starboard).
- d. Thickness of spacers (if applicable).

7-3.8 PACKING PLUNGER. Some ballistic hatches use a distinctly different packing plunger which is located in the hatch cover adjacent to the hex head spindle. This style packing plunger is inserted at an angle to the spindle. The outer end of the packing plunger is round headed with a screwdriver slot, and the shaft portion is partially threaded to allow insertion into the drilled and tapped hole in the hatch cover.

If alemite zerk fittings are found installed in a hatch, the fittings are to be replaced with proper packing plungers if dog spindles penetrate through the hatch. A through spindle packed with general purpose grease will not maintain watertightness; therefore, alemite zerk fittings are permitted for use only in nonpenetrating dog spindles. Packing plungers are normally made of phosphor bronze in accordance with the applicable list of material (MIL-SPEC QQ-P-330-COMP.A). See [figure 7-15](#).

7-3.9 TURNBUCKLE ASSEMBLIES. Turnbuckle assemblies with connecting links are available for quick-acting ballistic armored hatches. The size of the hatch determines the length of the connecting rods and links. The installed turnbuckle assembly provides a means for adjusting the dogs to the proper positions. Right-hand and left-hand threads are machined at opposing ends of connecting rods. Likewise, turnbuckle fittings are machined to receive the right and left threaded portion of the connecting rod. Connecting rod locknuts are drilled and tapped with right-hand and left-hand threads. Connecting rod shoulder bolts are retained by hexagon shaped nuts drilled to receive retaining cotter pins. A connecting rod washer is installed on each connecting rod stud and shoulder bolt. See [figure 7-16](#) and [figure 7-17](#).

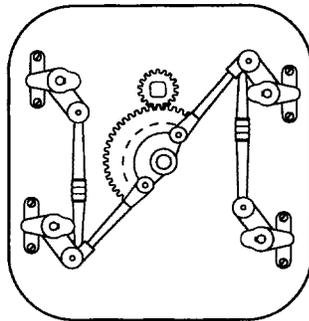


Figure 7-16. Turnbuckle Assembly

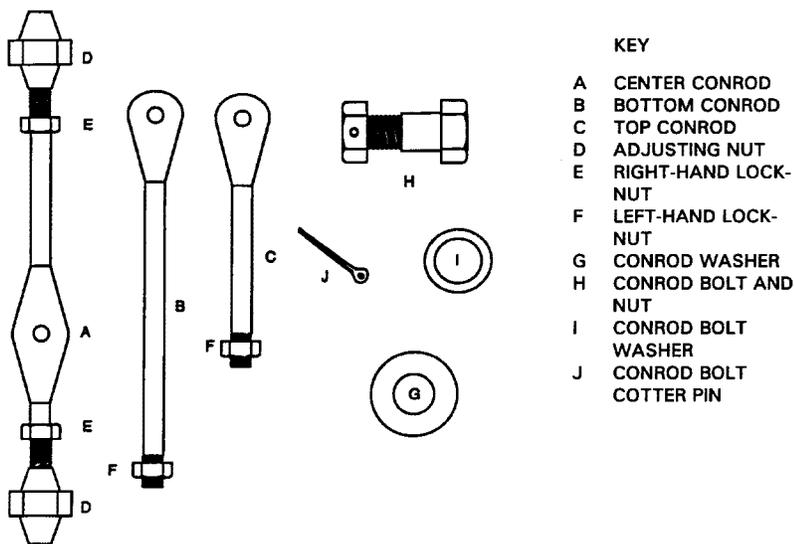


Figure 7-17. Turnbuckle Assembly Parts

7-3.10 BALLISTIC HATCH REPLACEMENT PARTS. The variation in arrangement and design of quick-acting hatches makes it essential to provide specific information when requesting information or when attempting to procure parts. The following information should be provided in any correspondence concerning quick-acting ballistic hatches:

- a. Ship's hull number.
- b. NAVSEA/BUSHIPS Drawing number.
- c. Sample or photograph of parts.
- d. Hatch size (with the hatch open, measure the length and width between the inner edges of the deck plate).
- e. Quick-acting or individually dogged.
- f. If quick-acting, method of operation.
- g. Power operated, spring balanced, counterweighted, or hydraulic.
- h. Number of straight dogs and angle dogs.
- i. Hinged on short or long side of hatch.
- j. Approximate thickness of the deck.

7-4. BALLISTIC SCUTTLES.

Quick-acting balanced armor scuttles are of the same thickness and material as the plating in which they are installed. The edges of the scuttle and the plating have matching 45-degree bevels.

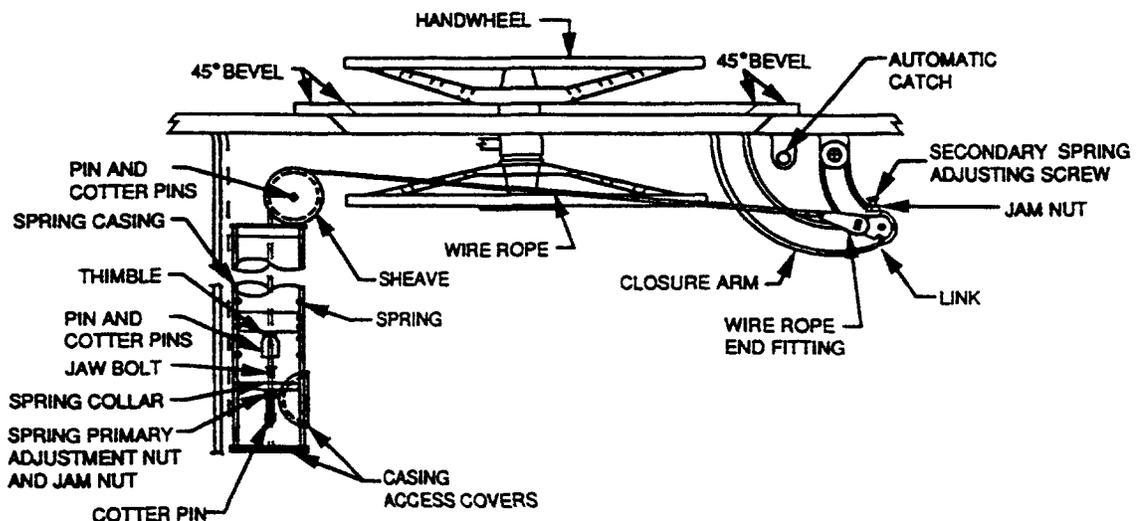


Figure 7-18. Typical Scuttle

In multiple course decks, the scuttles are of the same material as the upper course and in one thickness equal to the total thickness of the deck.

Scuttles 18 inches in diameter have three dogs. Scuttles 25 inches in diameter have four dogs. The 18-inch balanced armor scuttle is used for normal quick access or egress through a closed (dogged position) balanced armor hatch, or for emergency use in a deck. The 25-inch balanced armor scuttle is used for an emergency access or egress from designated areas such as machinery spaces or rooms. In escape trunks passing through more than one deck, escape scuttles are usually stacked.

Scuttles installed in hatches are designed to withstand the same design pressure as the hatch in which they are installed. Some scuttles may have insert plates which are reinforced by brackets or headers to maintain structural continuity with the deck and to minimize stress concentrations.

Flush deck exterior scuttles have interior hinges, troughs, and 2-inch trough drains. Some ballistic scuttle designs use an individual dog mechanism with straight or angle dogs. This design is found on the flight deck scuttles of aircraft carriers. See [figure 7-19](#).

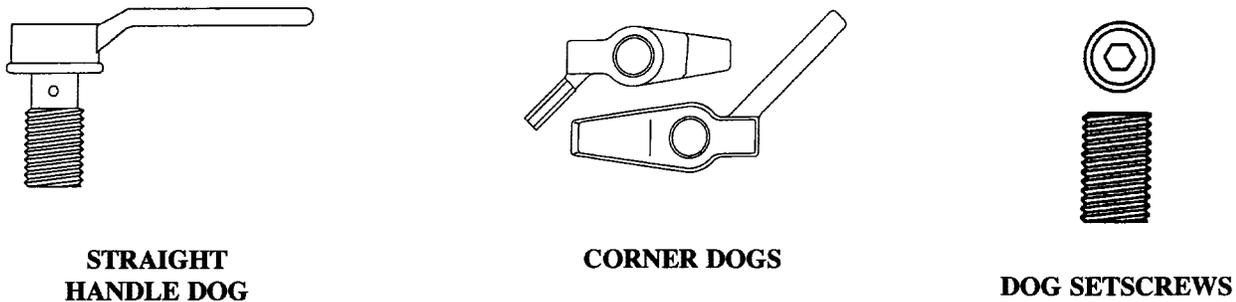


Figure 7-19. Straight Handle Dog, Corner Dogs, and Dog Setscrew

Other ballistic armor scuttles are balanced quick-acting. This type scuttle has either an 18-inch or 25-inch diameter clear opening and is operated by a quadrant gear dogging device. The 18-inch ballistic armor scuttle has a manganese bronze pinion gear that mates with three quadrant gears/dogs. See [figure 7-20](#).

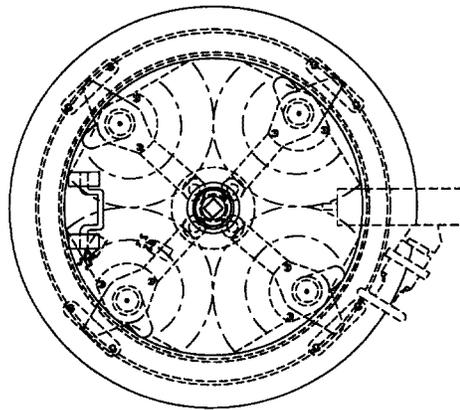


Figure 7-20. Ballistic Scuttle

The 25-inch ballistic armor scuttle is designed with a manganese bronze pinion gear which mates with four manganese bronze idler gears that in turn mate with four quadrant gears/dogs. See [figure 7-21](#). The idler gear used on 25-inch ballistic armor scuttles is designed to mesh with the pinion gear. The pinion gear is designed to mesh with either the idler gear or with the quadrant gears/dogs, depending on the scuttle design.

The pinion gear attached to the spindle shaft is actuated from above by use of T-slot wrench or a handwheel wrench. These special wrenches are normally stowed in brackets located near the closure. The closure is operated from below by a handwheel attached to the spindle shaft.

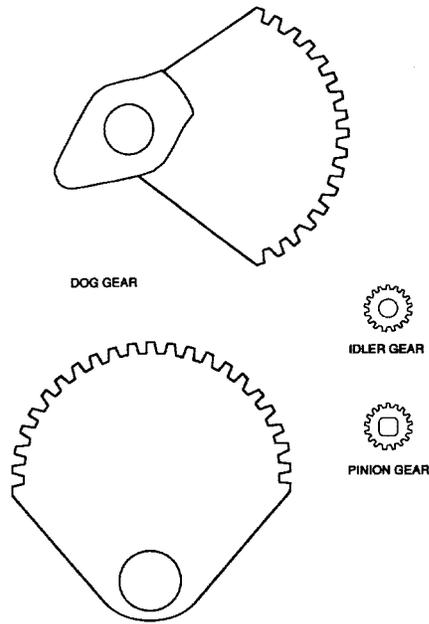


Figure 7-21. Scuttle Gears

Handwheel and handwheel wrenches are available in mild steel, cast steel, and bronze. Bronze handwheels are designated as nonsparking. This type handwheel is used in weapons areas, in pump room accesses, or in any location where a potentially explosive atmosphere exists. See [figure 7-22](#).

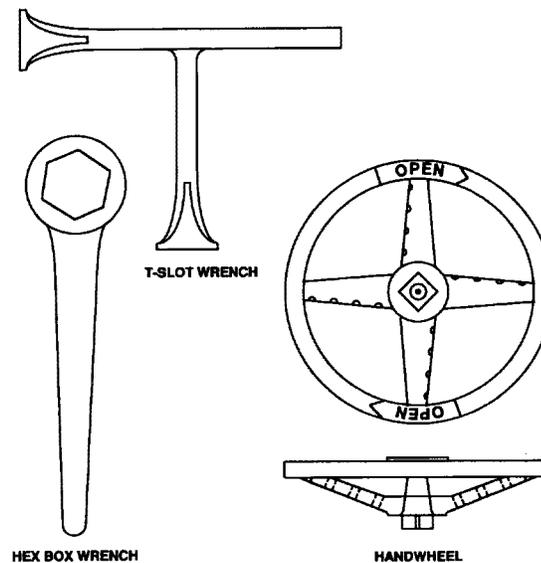


Figure 7-22. Handwheels and Wrenches

Ballistic armor balanced scuttle balancing assemblies use basically the same components as ballistic armor balanced hatches (for example, spring assemblies, spring casing and components, sheave assemblies, jaw bolt assemblies, secondary adjustment components, automatic catch assemblies, wire rope and associated parts). In any correspondence concerning ballistic armor scuttles, the following information should be provided. See [figure 7-18](#).

- a. Ship's hull number.
- b. NAVSEA/BUSHIPS Drawing number.
- c. Sample or photograph of parts.
- d. Location of the scuttle (deck, frame number, and port or starboard).
- e. Scuttle size (with the scuttle open, measure the diameter from the inner edge of the hatch cover deck plate).
- f. Number of dogs.
- g. Approximate thickness of hatch cover deck plate.
- h. Type of dog (quadrant or individual).
- i. Rating (psi) of the hatch cover or deck, if available.
- j. Length of spindle (measure from under the spindle head to the end of the spindle).
- k. Length of the bearing surface.
- l. Outer diameter of bearing surface.
- m. Bushing length.
- n. Thickness of scuttle cover.
- o. Rating (psi) of scuttle, if available.
- p. Outer diameter of the scuttle.

7-4.1 SAFETY CATCH, CATCH BRACKETS, AND CATCH PINS. Safety catch assemblies are vitally important for the safe operation of ballistic closures. The safety catch provides a secondary means of holding the closure in the open position.

Catch assemblies are available in galvanized steel and brass. Brass catch assemblies are intended for use in locations such as weapons area, pump rooms, or any potentially explosive atmosphere. The associated catch rods are available in galvanized steel (Grade M, MIL-S-20166). See [figure 7-23](#).

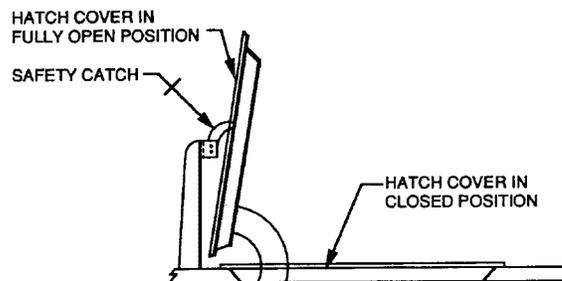


Figure 7-23. Safety Catch

7-4.2 TOOLS. Due to the importance of special tools, relevant information is also included in this paragraph as follows:

- a. Hex box wrenches are available in mild steel and bronze. Bronze wrenches are designated as nonsparking and are manufactured in accordance with MIL-B-16443. These wrenches are used in weapons areas, pump room accesses, or any potentially explosive atmosphere. Mild steel galvanized wrenches are made in accordance with MIL-S-16974, Grade 1023-W.

- b. Handwheel wrenches are available in galvanized mild steel (MIL-SPEC ASTI-A-53 GR.B MIL-S-20166); bronze, Class "B" (MIL-B-16443); and cast steel (MIL-S-21066). The T-slot wrench (MIL-S-21066) is galvanized.

7-5. BALLISTIC (ARMOR) CLOSURE REPLACEMENT PARTS.

Various vendors can quote the prices and availability of complete quick-acting 3-dog and individually dogged 8-dog ballistic doors, individually dogged ballistic hatches (with or without scuttle), and ballistic scuttles, as well as all associated parts. Inquiries and/or requests for quotes should be accompanied by NAVSEA or BUSHIPS drawing number(s), the ship's hull number, or a sample of the component or part, if possible, to assist in identification.

7-5.1 BALLISTIC (ARMOR) DOOR.

- a. Door size (measured as height x width between inner edges of the frame with panel open).
- b. Quick-acting or individually dogged.
- c. Number of dogs, location, and type of dog (for example, side top corner, bottom corner, straight, or angle dog).
- d. Right-hand or left-hand door (determined by hinge location side).
- e. Approximate thickness of bulkhead.

7-5.2 BALLISTIC (ARMOR) HATCH.

- a. Hatch size (measured as length x width between inner edges of deck plate with hatch open).
- b. Quick-acting or individually dogged (if not quick-acting), method of operation, power operated, spring balanced, counterweighted, or hydraulic.
- c. Number of dogs, and number of straight or angle dogs.
- d. Short or long sided hinged, approximate thickness of deck.

7-5.3 BALLISTIC (ARMOR) SCUTTLE.

- a. Scuttle size (measured as diameter between inner edge of deck plate or hatch cover with scuttle open).
- b. Number of dogs.
- c. Approximate thickness of deck plate or hatch cover.
- d. Type of dog quadrant gear or individual dog.
- e. Measurement of the scuttle spindle socket (normally 7/8-inch square) should be furnished. (Refer to [paragraph 7-4.2.](#))
- f. Measurement of the hex head (across the flats) of the spindle should be furnished. (Refer to [paragraph 7-4.2.](#))

7-5.4 AUTOMATIC CATCH ASSEMBLY. The automatic catch assembly is a safety device installed on all ballistic hatches and scuttles. Complete assemblies include the catch body, plunger, spring, and handwheel. Plungers are available in mild steel, corrosion resistant steel, or bronze. Corrosion resistant steel is to be used in

weather deck, flight deck areas, or saltwater environments. Bronze plungers are designated nonsparking and are used in locations such as weapons areas, pump room accesses, or a normally potential explosive atmosphere.

Handwheels shall be drilled and tapped for an Allen head setscrew to be used as a wheel-to-shaft locking device. This feature is designed to prevent the inadvertent rotation of the handwheel. Left-hand rotation of the handwheel will cause the loss of proper spring tension and the eventual failure of the catch assembly guide pin.

NOTE

When requesting automatic catch assemblies, the location of the guide pin (left- or right-handed) must be specified, unless the installing activity intends to complete the assembly by properly installing the guide pin as required.

CHAPTER 8

SPECIAL CLOSURES

8-1. GENERAL.

In addition to the more common closures described in [chapter 1](#), several ships are fitted with special closures which qualify as watertight. This chapter includes these special closures, along with the associated inspection, repair, and maintenance procedures required. The maintenance procedures are essentially the same as those for other watertight closures. The only unique procedures apply to manholes which are secured by bolts rather than dogs.

8-2. MANHOLES.

Manholes are openings into unmanned spaces, usually tanks and voids, for the purposes of inspection and maintenance (painting or coating). Manholes are fitted with covers that are designed to maintain watertight integrity and security from hazardous fluid encroachment. Manholes range in size and shape of the clear opening from 18-inch diameter circular to 15-inch by 23-inch oval (most common size). Most manholes are raised to prevent inadvertent shipping of water into the space. Flush-deck manholes are used in ammunition storage areas and in working, walking, and operating areas where a raised manhole would be a hazard to personnel. Gaskets are of the same material as for other closures, except in locations where potential contact with fuel or other petroleum products exists. In those locations, gaskets shall be in accordance with MIL-R-15624, Class 3. A manhole that is installed in other than a horizontal structure, and with a cover that weighs over 20 pounds, must have a hinge at the top. See [figure 8-1](#).

8-3. HATCHES WITHIN HATCHES.

Trunks and routes for shipping large items of equipment, machinery, or load items require hatches larger than normal size to be provided in certain situations. These hatches can be found on CG-47 Class cruisers. In locations such as weather and damage control decks where these routes penetrate watertight boundaries, the oversized hatches must be watertight. Personnel access through such a hatchway can be difficult due to the size and weight of the hatch cover and the number of dogs required to loosen and tighten. To allow easier access, the panel of the large hatch cover has a smaller size hatch which may be individually dogged or quick-acting, depending on the traffic needs. The larger hatch is always individually dogged. Inspection and maintenance for these specialized hatches are the same as for single hatches.

8-4. DOORS WITHIN DOORS.

Trunks and routes for shipping large items also require doors larger than normal size to be provided in certain situations. Wherever an oversize door is located in a watertight boundary bulkhead, the door must be watertight. As in the case with hatches, the panel of the door is fitted with a standard personnel door if frequent access through the door is required. Inspection and maintenance for these specialized doors are the same as for normal watertight doors. See [figure 8-2](#).

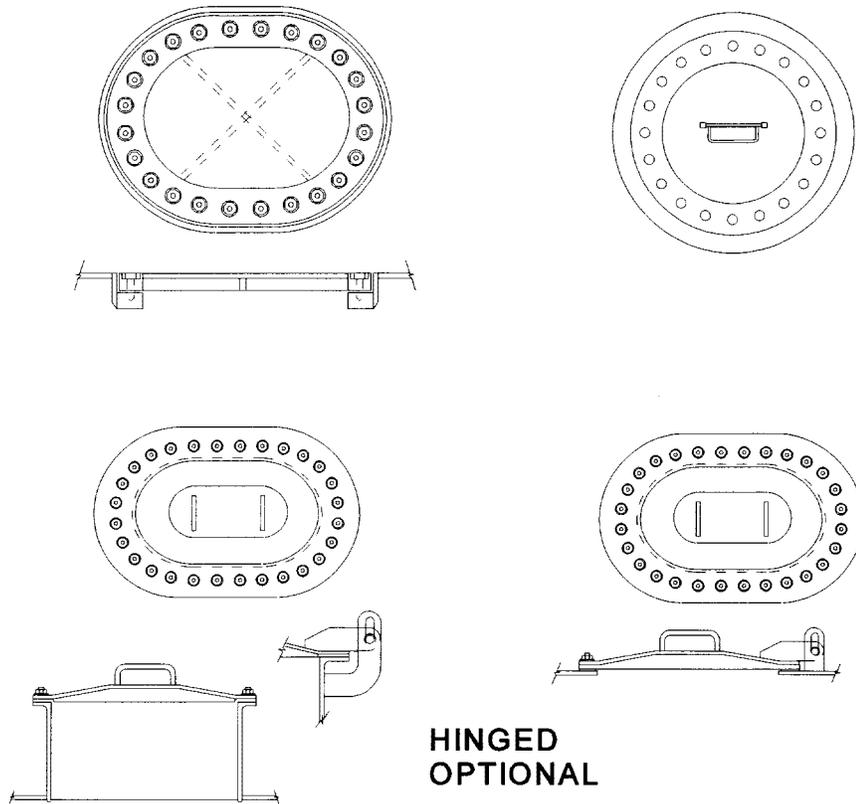


Figure 8-1. Manholes

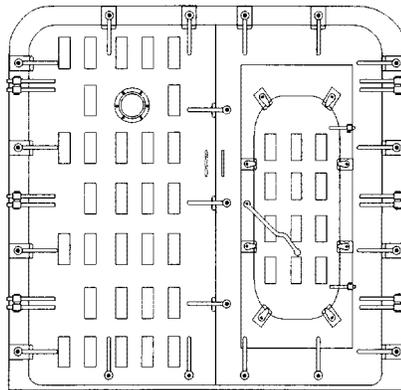


Figure 8-2. Doors Within Doors

8-5. OTHER.

There are several other types of closures that require watertightness. Due to their specialized nature and the fact that personnel traffic is not a primary consideration, these closures are considered beyond the scope of this booklet. Examples of such closures are sideport doors, roller curtain doors for aircraft elevator openings, doors or hatches at terminals of cargo handling equipment (conveyors, transporters, and dumbwaiters), and ammunition elevator sliding doors.

APPENDIX A

STANDARD ACRONYMS/ABBREVIATIONS AND GLOSSARY FOR NAVY WATERTIGHT CLOSURES

Table A-1. List of Acronyms/Abbreviations

Acronym/Abbreviation	Definition
AD	Armored Door (Nonmagazine Related)
AH	Armored Hatch
AHC	Ammunition Hoist Cover
AHD	Ammunition Hoist Door
AP	Air Port
AQAES	Armored Quick-Acting Escape Scuttle
AS	Armored Scuttle
ATC	Air Test Cap
ATD	Airtight Door
AT/FZ	Airtight/Firezone (Door)
ATS	Airtight Scuttle
AWTD	Armored Watertight Door
AWTH	Armored Watertight Hatch
BA	Ballistic Armor
BERP	Bolted Equipment Removal Plate
BP	Baffle Ports
CRES	Corrosion Resistant Steel
FTD	Firetight Door
FT/FZ	Fumetight Firezone (Door)
GPR	Glass-Reinforced Plastic
GTAW	Gas Tungsten Arc Welding
HMHC	Hinged Manhole Cover
LP	Low Profile
MHC	Manhole Cover
MIG	Metal Inert Gas
NTD	Nontight Door
PS	Passing Scuttle
QA	Quick-Acting
QAAD	Quick-Acting Armored Door
QAAH	Quick-Acting Armored Hatch
QAAS	Quick-Acting Armored Scuttle
QAATD	Quick-Acting Airtight Door
QAES	Quick-Acting Escape Scuttle
QAWTD	Quick-Acting Watertight Door
QAWTH	Quick-Acting Watertight Hatch
QAWTS	Quick-Acting Watertight Scuttle
RLP	Ramped Low Profile
SMAW	Shielded Metal Arc Welding
TIG	Tungsten Inert Gas
WTC	Watertight Closure
WTD	Watertight Door
WTH	Watertight Hatch

Table A-1. List of Acronyms/Abbreviations - Continued

Acronym/Abbreviation	Definition
WTS	Watertight Scuttle

GLOSSARY.

- a. Access Hatchway. Used primarily for the passage of personnel.
- b. Airtight Firezone (AT/FZ) Door. Located in a firezone boundary. Designed to retard the passage of flame and smoke and meet the requirements of airtightness.
- c. Ammunition Passing Scuttle. Fitted in bulkheads, doors, decks, or platforms to permit the passage of ammunition.
- d. Antiseize Compound. A special lubricant designed to prevent galling or seizing between mating parts.
- e. Ballistic Closure. Fitted in special treatment steel structure and intended to resist splinters, fragments, and machine gun fire. This group includes raised hatches and scuttles of standard design, but constructed of ballistic material. Where conditions warrant, these closures may be power operated.
- f. Bolted Equipment Removal Plate (BERP). Removable bolted access plate in bulkhead or deck for the removal of equipment and machinery.
- g. Companion Hatchway. Used primarily for the passage of personnel.
- h. Conrod. Connecting rod (component of a quick-acting closure assembly) which connects levers.
- i. CRES. Corrosion resistant steel (stainless steel).
- j. Decanning Scuttle. Fitted in decks or flats to facilitate decanning and the disposal of empty powder or cartridge tanks.
- k. Degrees of Tightness.
 1. Oiltight (Symbol OT). Tightness which that permits no visible leakage of test fluid as specified in U.S. Navy General Specifications (GENSPECS).
 2. Watertight (Symbol WT). Tightness which permits no visible leakage of water or no more than the allowable drop in air pressure as specified in U.S. Navy GENSPECS.
 3. Airtight (Symbol AT). Tightness which permits no more than the allowable drop in air pressure as specified in U.S. Navy GENSPECS.
 4. Fumetight (Symbol FT). Tightness such that there is no visible or discernible opening in the structure.
 5. Nontight (Symbol NT). Condition for which structure, closure, or fitting is not required to prevent or retard the passage of any fluid or propagation of flame.
- l. Flush Hatch or Scuttle. Flush with the deck when in the closed position.
- m. Fumetight Firezone (FT/FZ) Door. Located in a firezone boundary to retard the passage of flame and smoke. Designed to meet the requirements of fumetightness.
- n. Jamnut. A nut which is shorter in height than normal. Designed to be locked or jammed against another nut to prevent both from loosening in service.
- o. Joiner Door. Used in applications where structural strength, ballistic qualities, and tightness are not

required. Applications include offices and living quarters, expanded metal, water closet stalls, and screen doors. These doors, when solid, are used to provide passage between air conditioned and non-air conditioned areas.

- p. Left-Hand and Right-Hand. Identification/differentiation applicable to doors. If the hinges are on the left when facing the side of the door which opens inward, it is a left-hand door. If the hinges are on the right, it is a right-hand door.
- q. Low Profile (LP) Hatch or Scuttle. The minimum height necessary to eliminate deck recesses and provide a smooth, protrusion-free cover when raised above the deck.
- r. Mild Steel. Low carbon structural steel which rusts easily.
- s. Monel. A nickel-copper alloy having high corrosion resistance. Often used aboard ships in threaded fasteners and fittings which are subject to exposure to seawater.
- t. Proof Test Pressure for Watertight and Oiltight Closures. Tightness pressure times 150 percent.
- u. Quick-Acting Door, Hatch, or Scuttle. Designed to operate all dogs simultaneously with a single lever or handwheel.
- v. Raised Hatch, Manhole, or Scuttle. Designed with the minimum coaming height specified for the deck location to limit the flow of water below deck when the hatch is open.
- w. Ramped Low Profile (RLP) Hatch or Scuttle. Low profile hatches and scuttles which are faired to the deck.
- x. Roller Curtain Door. Closures composed of a series of interlocking metal slats which wind into compact rolls at the tops of the openings. These doors may be either manually operated or power operated, depending on the size and conditions of service.
- y. Self-Lubricated Bushing. Teflon coated, stainless steel bushing designed with an O-ring for watertight fittings. This type of bushing requires less maintenance than phosphor bronze.
- z. Striking Down Hatchway. Used for striking down ammunition stores and miscellaneous supply areas.
 - aa. Weather Deck. Area of the vessel exposed to the weather.
 - ab. Weather Envelope. Structure (decks and bulkheads) which encloses the interior of a ship.
 - ac. Zerk Fitting. A type of grease fitting often used in vehicular and machinery applications.

APPENDIX B

CHARACTERISTICS OF DOORS, HATCHES, AND SCUTTLES

This appendix contains descriptive and graphic characteristics of structural metal watertight doors, hatches, and scuttles. The information listed for each type of closure includes the data found on the nameplate of the particular closure. Each listing includes the National Stock Number (NSN) to use when ordering complete assemblies, and also provides the Allowance Parts List (APL) number and drawing number to use for identifying component parts or referencing on work requests or other maintenance documentation. For price information, consult the current edition of the Ships Parts Control Center (SPCC) Stock and Price List. The following access closure types are included in this appendix:

B-1. DOOR, METAL, MARINE STRUCTURAL (WITHOUT FIXED LIGHT AND HASP ASSEMBLY)

Standard Individually Dogged Watertight Doors (see [figure B-1](#))

Standard Nontight Doors (see [figure B-2](#)).

Standard Quick-Acting Airtight Doors (see [figure B-3](#))

Standard Quick-Acting Watertight Doors (see [figure B-4](#)).

B-2. GLASS REINFORCED PLASTIC (GRP) CLOSURES, MARINE (SEE [FIGURE B-4](#))

B-3. DOOR, ALUMINUM, MARINE STRUCTURAL

Standard Quick-Acting Watertight Doors (see [figure B-5](#)).

Individually Dogged Watertight Doors (see [figure B-6](#)).

B-4. HATCH, MARINE

Standard Companion Raised Watertight Hatches (With Scuttle, Without Catch Assembly) (see [figure B-7](#)).

Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly) (see [figure B-8](#)).

Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly) (see [figure B-9](#)).

Standard Quick-Acting Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly) (see [figure B-10](#)).

Standard Quick-Acting Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly) (see [figure B-11](#)).

Standard Quick-Acting Spring Balanced Flush Watertight Hatches (Without Scuttle) (see [figure B-12](#)).

Standard Quick-Acting Spring Balanced Raised Watertight Hatches (Without Scuttle and Hasp Assembly) (see [figure B-13](#)).

B-5. SCUTTLE, MARINE

Standard Quick-Acting Flush Watertight Scuttles (Operation: Wrench Above, Handwheel Below) (see [figure B-14](#)).

Standard Quick-Acting Raised Watertight Scuttles (Handwheel Above and Below) (see [figure B-15](#)).

Standard Quick-Acting Flush Watertight Scuttles (Handwheel Above and Below) (see [figure B-16](#)).

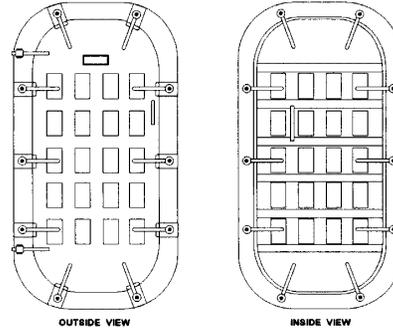
B-6. HOW TO USE THE INFORMATION IN FIGURES.

Watertight closures are listed in alphabetical order by type of closure, then sorted by clear opening size and number of dogs or drop bolts. The following information listed is for each closure:

Table B-1. Information Listed for Each Figure

COLUMN	DESCRIPTION/DEFINITION
NSN	National Stock Number for ordering complete assemblies. The Federal Supply Class (FSC) for all closures is H2040. (The unit of issue for all closures is each (EA).)
Material/Panel Thickness	Type of material and thickness of the metal used in fabricating the door. Thicker metal is used in watertight closures for doors lower in the ship or for topside blast design criteria.
Test Press (PSI)	The pressure the door is designed to withstand. Generally, the higher pressure doors are used below the ship's "V" line.
Hand	Identifies the door as "L" (left-hand) or "R" (right-hand) opening. Hatches are designated "LS" (long side) or "SS" (short side) opening.
APL/Compnt ID No.	The Allowance Parts List number or unique component identification number.
NAVSEA Std Plan Dwg	The Naval Sea Systems Command Standard Plan drawing number.
Rev	The current plan revision level.
Assy	The assembly number used by ship designers and shipyard personnel to identify (on plans and documents) the type of closure to be installed in a specific location on a ship.
Int or Ext	The door location specified as "I" (interior) or "E" (exterior).
Gasket Length	Length of gasket required for replacement.
Date of Last Issue	The date the drawing was last updated.
Verified	The date when the plan was last verified to be on file at Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), and not deleted. This does not determine the accuracy of the plan or specify whether correction or update is required.

DOOR, METAL, MARINE STRUCTURAL
Standard Individually Dogged Watertight Doors



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
18" X 36" - 4-DOG											
H2040-00-912-5758	med stl/0.075	6	L	312090108	805-1400073	G	414	I	9 ft	01-31-67	04-02-99
H2040-00-912-5755	med stl/0.075	6	R	312090109	805-1400073	G	413	I	9 ft	01-31-67	04-02-99
18" X 36" - 6-DOG											
H2040-00-912-5756	med stl/0.075	19	L	312090110	805-1400073	G	422	I	9 ft	01-31-67	04-02-99
H2040-00-912-5757	med stl/0.075	19	R	312090111	805-1400073	G	421	I	9 ft	01-31-67	04-02-99
H2040-00-912-5754	med stl/0.075	26	L	312090112	805-1400073	G	430	I	9 ft	01-31-67	04-02-99
H2040-00-912-5752	med stl/0.075	26	R	312090113	805-1400073	G	429	I	9 ft	01-31-67	04-02-99
26" X 45" - 6-DOG											
H2040-00-912-6175	med stl/0.075	10	L	312090114	805-1400071	E	382	I	12 ft	3-14-68	04-02-99
H2040-00-912-6178	med stl/0.075	10	R	312090115	805-1400071	E	381	I	12 ft	3-14-68	04-02-99
H2040-00-880-6448	med stl/0.075	10	R	312090048	805-1400072	-	429	I	12 ft	3-14-68	04-02-99

Figure B-1. DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 1 of 4)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Individually Dogged Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 45" - 8-DOG											
H2040-01-291-2082	med std/0.075	21	L	312090102	805-1400071	E	396mod	E	12 ft	03-14-68	04-02-99
H2040-01-291-2081	med std/0.075	21	R	312090101	805-1400071	E	389mod	E	12 ft	03-14-68	04-02-99
26" X 45" - 10-DOG											
H2040-00-912-6181	med std/0.120	32	L	312090118	805-1400072	E	398	I	12 ft	06-02-67	04-02-99
H2040-00-912-6182	med std/0.120	32	R	312090119	805-1400072	E	397	I	12 ft	06-02-67	04-02-99
26" X 45" - 12-DOG											
2040-00-554-6193	med std/0.120	37	L	312090053	803-6397261		11	I	12 ft	06-02-67	04-02-99
2040-01-450-6150	med std/0.120	37	R	312090052	803-6397261		12	I	12 ft	06-02-67	04-02-99
26" X 54" - 6-DOG											
H2040-00-912-6184	med std/0.075	7	L	312090122	805-1400070	G	350	I	14 ft	06-08-67	04-02-99
H2040-00-912-6183	med std/0.075	7	R	312090123	805-1400070	G	349	I	14 ft	06-08-67	04-02-99
H2040-00-554-6207	med std/0.075	7	L	312090054	803-6397261		11	I	14 ft	06-08-67	04-02-99
H2040-00-554-0194	med std/0.075	7	R	312090011	803-6397261		12	I	14 ft	06-08-67	04-02-99
26" X 54" - 8-DOG											
H2040-00-554-6205	med std/0.075	16	L	312090056	805-1400070	G	358	E	14 ft	06-08-67	04-02-99
H2040-00-554-6209	med std/0.075	16	R	312090055	805-1400070	G	357	E	14 ft	06-08-67	04-02-99

Figure B-1. DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 2 of 4)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Individually Dogged Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 54" - 10-DOG											
H2040-00-554-6931	med stl/0.75	22	L	312090058	805-1623053	G	366	E	14 ft	03-14-62	04-02-99
H2040-00-554-6932	med stl/0.75	22	R	312090057	805-1623053	G	365	E	14 ft	03-14-62	04-02-99
H2040-00-554-3537	med stl/0.120	28	L	312090060	805-1623053	G	374	I	14 ft	03-14-62	04-02-99
H2040-00-554-3536	med stl/0.120	28	R	312090059	805-1623053	G	373	I	14 ft	03-14-62	04-02-99
H2040-00-554-0203	med stl/0.120	13	L		805-1400072	G	310	I	14 ft	06-02-67	04-02-99
26" X 57" - 6-DOG											
H2040-00-542-0196	med stl/0.075	6	L	312090062	805-1400069	G	326	E	14.5 ft	06-03-67	04-02-99
H2040-00-554-3522	med stl/0.075	6	R	312090061	805-1400069	G	325	E	14.5 ft	06-03-67	04-02-99
26" X 57" - 8-DOG											
H2040-00-554-6213	med stl/0.75	9.5	L	312090064	805-1400069	G	334	I	14.5 ft	06-03-67	04-02-99
H2040-00-554-6212	med stl/0.75	9.5	R	312090063	805-1400069	G	333	I	14.5 ft	06-03-67	04-02-99
26" X 57" - 10-DOG											
H2040-00-554-3538	med stl/0.75	12.5	L	312090066	805-1623052	E	342	E	14 ft	08-12-64	04-02-99
H2040-00-554-3540	med stl/0.75	12.5	R	312090065	805-1623052	E	341	E	14 ft	08-12-64	04-02-99
26" X 66" - 8-DOG											
H2040-00-912-6752	med stl/0.075	10	L	312090136	805-1400066	G	318	I	16 ft	06-28-65	04-02-99
H2040-00-912-6751	med stl/0.075	10	R	312090137	805-1400066	G	317	I	16 ft	06-28-65	04-02-99

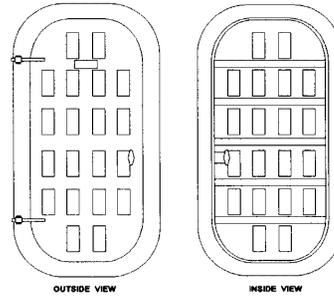
Figure B-1. DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 3 of 4)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Individually Dogged Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 66" - 10-DOG											
H2040-00-912-6748	med stl/0.075	15	L	312090138	805-1400066	G	302	I	16 ft	06-28-65	04-02-99
H2040-00-912-6747	med stl/0.075	15	R	312090139	805-1400066	G	301	I	16 ft	06-28-65	04-02-99
H2040-00-912-6750	med stl/0.120	13	L	312090140	805-1400066	G	310	I	16 ft	06-28-65	04-02-99
H2040-00-912-6749	med stl/0.120	13	R	312090141	805-1400066	G	309	I	16 ft	06-28-65	04-02-99
H2040-00-554-6215	med stl/0.120	13	R	312090032	805-1400058	G	117	I	16 ft	06-02-67	04-02-99
30" X 66" - 8-DOG											
H2040-00-912-6758	med stl/0.075	5	L	312090142	805-1626357	E	478	I	16.6 ft	06-08-67	04-02-99
H2040-00-912-6757	med stl/0.075	5	R	312090143	805-1626357	E	477	I	16.6 ft	06-08-67	04-02-99
30" X 66" - 10-DOG											
H2040-00-912-6754	med stl/0.075	15	L	312090144	805-1626357	E	462	I	16.6 ft	06-08-67	04-02-99
H2040-00-912-6753	med stl/0.075	15	R	312090145	805-1626357	E	461	I	16.6 ft	06-08-67	04-02-99
H2040-00-912-6756	med stl/0.120	13	L	312090146	805-1626357	E	470	I	16.6 ft	06-08-67	04-02-99
H2040-00-912-6755	med stl/0.120	13	R	312090147	805-1626357	E	469	I	16.6 ft	06-08-67	04-02-99

Figure B-1. DOOR, METAL, MARINE STRUCTURAL (Standard Individually Dogged Watertight Doors) (Sheet 4 of 4)

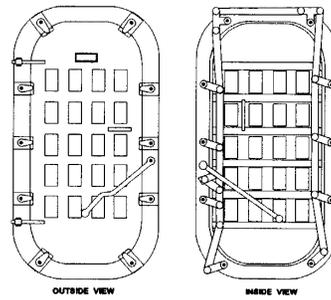
DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Nontight Doors



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 66"											
H2040-00-542-0219	mild stl/0.075	-	L	312090076	805-1400075	-	438	I	16.6 ft	06-02-67	04-02-99
H2040-00-542-0191	mild stl/0.075	-	R	312090015	805-1400075	-	437	I	16.6 ft	06-02-67	04-02-99

Figure B-2. DOOR, METAL, MARINE STRUCTURAL (Standard Nontight Doors)

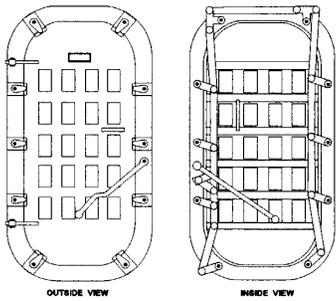
DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Quick-Acting Airtight Doors



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 66" - 3-DOG											
H2040-00-542-0193	mild stl/0.075	2	L	312090001	805-1400074	-	446	I	16 ft	06-09-67	04-02-99
H2040-00-542-0192	mild stl/0.075	2	R	312090075	805-1400074	-	445	I	16 ft	06-09-67	04-02-99

Figure B-3. DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Airtight Doors)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Quick-Acting Watertight Doors



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
18" X 36" - 6-DOG											
H2040-00-912-5762	med stl/0.075	15	L	312090150	805-1400064	G	254	I	9 ft	05-28-76	04-02-99
H2040-00-912-5761	med stl/0.075	15	R	312090151	805-1400064	G	253	I	9 ft	05-28-76	04-02-99
H2040-00-912-5760	med stl/0.120	30	L	312090152	805-1400064	G	262	I	9 ft	05-28-76	04-02-99
H2040-00-912-5759	med stl/0.120	30	R	312090153	805-1400064	G	261	I	9 ft	05-28-76	04-02-99
26" X 45" - 6-DOG											
H2040-00-912-5764	med stl/0.075	10	L	312090154	805-1400061	H	230	I	12 ft	06-10-65	04-02-99
H2040-00-912-5763	med stl/0.075	10	R	312090155	805-1400061	H	229	I	12 ft	06-10-67	04-02-99

Figure B-4. DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 1 of 4)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Quick-Acting Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 45" - 8-DOG											
H2040-00-912-5766	med stl/0.090	20	L	312090156	805-1400062	G	238	I	12 ft	04-02-67	04-02-99
H2040-00-912-5765	med stl/0.090	20	R	312090157	805-1400062	G	237	I	12 ft	04-02-67	04-02-99
26" X 45" - 10-DOG											
H2040-00-912-5768	med stl/0.120	30	L	312090158	805-1400063	H	246	I	12 ft	06-09-67	04-02-99
H2040-00-912-5767	med stl/0.120	30	R	312090159	805-1400063	H	245	I	12 ft	06-09-67	04-02-99
26" X 54" - 8-DOG											
H2040-00-912-5770	med stl/0.090	15	L	312090160	805-1400059	G	198	I	14 ft	06-02-67	04-02-99
H2040-00-912-5769	med stl/0.090	15	R	312090161	805-1400059	G	197	I	14 ft	06-02-67	04-02-99
H2040-00-912-6186	med stl/0.075	16	L	312090124	805-1400070	E	358	I	14 ft	09-15-90	04-02-99
H2040-00-912-6185	med stl/0.075	16	R	312090125	805-1400070	E	357	I	14 ft	09-15-90	04-02-99
26" X 54" - 10-DOG											
H2040-00-912-5771	med stl/0.120	30	L	312090162	805-1400060	G	214	I	14 ft	06-02-67	04-02-99
H2040-00-912-5772	med stl/0.120	30	R	312090163	805-1400060	G	213	I	14 ft	06-02-67	04-02-99
H2040-00-554-3537	med stl/0.120	28	L	312090060	805-1623053	-	374	I	14 ft		04-02-99
H2040-00-554-3536	med stl/0.120	28	R	312090059	805-1623053	-	375	I	14 ft		04-02-99
H2040-00-554-6931	med stl/0.075	22	L	312090058	805-1400070	-	366	I	14 ft		04-02-99
H2040-00-554-6932	med stl/0.075	22	R	312090057	805-1400070	-	365	I	14 ft		04-02-99

Figure B-4. DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 2 of 4)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Quick-Acting Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
26" X 57" - 8-DOG											
H2040-00-912-5773	med stl/0.075	5	L	312090164	805-1400057	G	150	I	14 ft	06-01-67	04-02-99
H2040-00-912-5774	med stl/0.075	5	R	312090165	805-1400057	G	149	I	14 ft	06-01-67	04-02-99
26" X 57" - 10-DOG											
H2040-00-912-5776	med stl/0.075	12.5	L	312090166	805-1400058	G	166	I	14 ft	06-02-67	04-02-99
H2040-00-912-5775	med stl/0.075	12.5	R	312090167	805-1400058	G	165	I	14 ft	06-02-67	04-02-99
26" X 66" - 8-DOG											
H2040-01-293-2586	med stl/0.075	10	L	312090104	805-1400056	H	140mod	E	16 ft	08-15-69	07-22-92
H2040-01-293-2587	med stl/0.075	10	R	312090105	805-1400056	H	139mod	E	16 ft	08-15-69	07-22-92
H2040-00-912-5778	med stl/0.075	10	L	312090168	805-1400056	F	134	I	16 ft	07-18-69	07-22-92
H2040-00-912-5777	med stl/0.075	10	R	312090169	805-1400056	F	133	I	16 ft	07-18-69	07-22-92
26" X 66" - 10-DOG											
H2040-00-912-5779	med stl/0.075	15	L	312090172	805-1400050	G	102	I	16 ft	06-07-67	04-02-99
H2040-00-912-5780	med stl/0.175	15	R	312090173	805-1400050	G	101	I	16 ft	06-07-67	04-02-99
H2040-00-912-5781	med stl/0.120	13	L	312090174	805-1400050	G	118	I	16 ft	06-07-67	04-02-99
H2040-00-912-6167	med stl/0.120	13	R	312090175	805-1400050	G	117	I	16 ft		04-02-99

Figure B-4. DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 3 of 4)

DOOR, METAL, MARINE STRUCTURAL (Cont'd)
Standard Quick-Acting Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 66" - 8-DOG											
	med stl/0.120	13	R	312090002	805-1400050	G	117	I	16.6 ft	06-07-67	04-02-99
H2040-00-912-6168	med stl/0.075	5	L	312090176	805-1626510	G	518	I	16.6 ft	03-14-68	04-02-99
H2040-00-912-6169	med stl/0.075	5	R	312090177	805-1626510	G	517	I	16.6 ft	03-14-68	04-02-99
30" X 66" - 10-DOG											
H2040-00-912-6170	med stl/0.075	15	L	312090178	805-1626433	E	486	I	16.6 ft	06-10-65	04-02-99
H2040-00-912-6171	med stl/0.075	15	R	312090179	805-1626433	E	485	I	16.6 ft	06-10-65	04-02-99
H2040-00-912-6172	med stl/0.120	13	L	312090180	805-1626433	E	502	I	16.6 ft	06-10-65	04-02-99
H2040-00-912-6173	med stl/0.120	13	R	312090181	805-1626433	E	501	I	16.6 ft	06-10-65	04-02-99

GLASS REINFORCED PLASTIC (GRP) CLOSURES, MARINE

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
					804-5000905					10-29-82	
					805-5000906					10-29-82	
					805-5000907					10-29-82	
					805-5000937					10-29-82	

Figure B-4. DOOR, METAL, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 4 of 4)

DOOR, ALUMINUM, MARINE STRUCTURAL
Standard Quick-Acting Watertight Doors

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
18" X 36" - 6-DOG											
H2040-01-441-7767	Alum/0.125	5	L	312090307	167-7044215		1			9-25-95	04-02-99
H2040-01-437-8433	Alum/0.125	5	R	312090324	167-7044215		2			9-25-95	04-02-99
26" X 45" - 6-DOG											
H2040-01-438-2747	Alum/0.125	5	L	312090323	167-7044215		3			9-25-95	04-02-99
H2040-01-440-2731	Alum/0.125	5	R	312090322	167-7044215		4			9-25-95	04-02-99
26" X 54" - 8-DOG											
H2040-01-440-6912	Alum/0.125	5	L	312090321	167-7044215		5			9-25-95	04-02-99
H2040-01-444-0132	Alum/0.125	5	R	312090320	167-7044215		6			9-25-95	04-02-99
26" X 57" - 8-DOG											
H2040-01-444-0584	Alum/0.125	5	L	312090319	167-7044215		7			9-25-95	04-02-99
H2040-01-440-7338	Alum/0.125	5	R	312090318	167-7044215		8			9-25-95	04-02-99
26" X 66" - 8-DOG											
H2040-01-448-5165	Alum/0.125	5	L	312090317	167-7044215		9			9-25-95	04-02-99
H2040-01-440-4579	Alum/0.125	5	R	312090316	167-7044215		10			9-25-95	04-02-99
26" X 66" - 10-DOG											
H2040-01-440-1903	Alum/0.125	5/13	L	312090315	167-7044215		11			9-25-95	04-02-99
H2040-01-440-5971	Alum/0.125	5/13	R	312090314	167-7044215		12			9-25-95	04-02-99
30" X 66" - 8-DOG											
H2040-01-441-4412	Alum/0.125	5	L	312090313	167-7044215		13			9-25-95	04-02-99
H2040-01-441-3149	Alum/0.125	5	R	312090312	167-7044215		14			9-25-95	04-02-99

Figure B-5. DOOR, ALUMINUM, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 1 of 2)

DOOR, ALUMINUM, MARINE STRUCTURAL (Cont'd)
Standard Quick-Acting Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 66" - 10-DOG											
H2040-01-441-3154	Alum/0.125	5/13	L	312090311	167-7044215		15			9-25-95	04-02-99
H2040-01-441-3152	Alum/0.125	5/13	R	312090310	167-7044215		16			9-25-95	04-02-99
36" X 66" - 10-DOG											
H2040-01-441-3151	Alum/0.125	5/13	L	312090309	167-7044215		17			9-25-95	04-02-99
H2040-01-441-7772	Alum/0.125	5/13	R	312090308	167-7044215		18			9-25-95	04-02-99

Figure B-5. DOOR, ALUMINUM, MARINE STRUCTURAL (Standard Quick-Acting Watertight Doors) (Sheet 2 of 2)

DOOR, ALUMINUM, MARINE STRUCTURAL (Cont'd)
 Individually Dogged Watertight Doors

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
18" X 36" - 4-DOG											
H2040-01-441-7771	Alum/0.125	5	L	312090326	167-7044217		1			9-25-95	04-02-99
H2040-01-441-7770	Alum/0.125	5	R	312090327	167-7044217		2			9-25-95	04-02-99
26" X 45" - 6-DOG											
H2040-01-448-0481	Alum/0.125	5	L	312090328	167-7044217		3			9-25-95	04-02-99
H2040-01-440-7190	Alum/0.125	5	R	312090329	167-7044217		4			9-25-95	04-02-99
26" X 54" - 6-DOG											
H2040-01-440-7181	Alum/0.125	5	L	312090330	167-7044217		5			9-25-95	04-02-99
H2040-01-440-7182	Alum/0.125	5	R	312090331	167-7044217		6			9-25-95	04-02-99
26" X 57" - 6-DOG											
H2040-01-440-7156	Alum/0.125	5	L	312090332	167-7044217		7			9-25-95	04-02-99
H2040-01-440-7192	Alum/0.125	5	R	312090333	167-7044217		8			9-25-95	04-02-99
26" X 57" - 8-DOG											
H2040-01-440-7183	Alum/0.125	5	L	312090334	167-7044217		9			9-25-95	04-02-99
H2040-01-440-7158	Alum/0.125	5	R	312090335	167-7044217		10			9-25-95	04-02-99
26" X 66" - 8-DOG											
H2040-01-440-7194	Alum/0.125	5	L	312090336	167-7044217		11			9-25-95	04-02-99
H2040-01-440-7184	Alum/0.125	5	R	312090337	167-7044217		12			9-25-95	04-02-99
26" X 66" - 10-DOG											
H2040-01-441-7604	Alum/0.125	5/13	L	312090338	167-7044217		13			9-25-95	04-02-99
H2040-01-441-7768	Alum/0.125	5/13	R	312090339	167-7044217		14			9-25-95	04-02-99

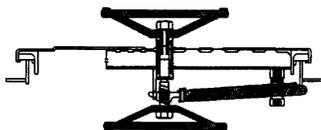
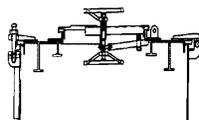
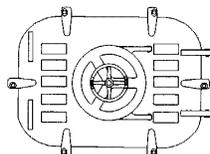
Figure B-6. DOOR, ALUMINUM, MARINE STRUCTURAL (Individually Dogged Watertight Doors) (Sheet 1 of 2)

DOOR, ALUMINUM, MARINE STRUCTURAL (Cont'd)
Individually Dogged Watertight Doors (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 66" - 8-DOG											
H2040-01-442-2577	Alum/0.125	5	L	312090340	167-7044217		15			9-25-95	04-02-99
H2040-01-441-7769	Alum/0.125	5	R	312090341	167-7044217		16			9-25-95	04-02-99
30" X 66" - 10-DOG											
H2040-01-438-1467	Alum/0.125	5/13	L	312090342	167-7044217		17			9-25-95	04-02-99
H2040-01-441-7687	Alum/0.125	5/13	R	312090325	167-7044217		18			9-25-95	04-02-99

Figure B-6. DOOR, ALUMINUM, MARINE STRUCTURAL (Individually Dogged Watertight Doors) (Sheet 2 of 2)

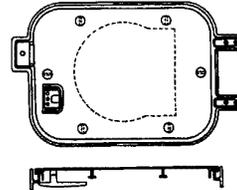
HATCH, MARINE
Standard Companion Raised Watertight Hatches
(With Scuttle, Without Catch Assembly)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
36" X 72" - 14-DOG											
H2040-00-554-6920	med st/0.075	15	LS	313050062	805-1624139	D	101		17 ft	09-18-61	04-02-99
H2040-00-554-6922	med st/0.075	15	SS	313050061	805-1624139	D	102		17 ft	09-20-61	04-02-99
30" X 36" - 10-DROP BOLT											
H2040-00-554-4059	med st/0.125	30	SS	313050055	805-1624087	-	-	E	11 ft	11-01-84	04-02-99
36" X 72" - 16-DROP BOLT											
-	med st/0.125	15		313050063	805-1624138	E	101		17 ft	10-19-67	04-02-99

Figure B-7. HATCHES, MARINE (Standard Companion Raised Watertight Hatches (With Scuttle, Without Catch Assembly))

HATCH, MARINE (Cont'd)
Standard Individually Dogged Flush Watertight Hatches
(Without Escape Scuttle and Catch Assembly)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
24" X 30" - 6-DOG											
-	med stl/0.125	5	LS	313050077	805-1624141		3		9.6 ft		04-02-99
H2040-00-554-6889	med stl/0.125	5	SS	313050076	805-1624141		1		9.6 ft		04-02-99
H2040-00-554-6866	med stl/0.125	15	LS	313050079	805-1624142		3		9.6 ft		04-02-99
24" X 30" - 8-DOG											
-	med stl/0.125	30	LS	313050081	805-1624143		3		9.6 ft		04-02-99
30" X 30" - 6-DOG											
H2040-00-542-0211	med stl/0.125	5		313050082	803-1624094	F	1		10.6 ft	03-08-83	04-02-99
30" X 36" - 6-DOG											
-	med stl/0.125	5	LS	313050085	803-1624095	F	3		11.6 ft	03-08-83	04-02-99
-	med stl/0.125	5	SS	313050084	803-1624095	F	1		11.6 ft	03-08-83	04-02-99

Figure B-8. HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))
 (Sheet 1 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Flush Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 36" - 8-DOG											
H2040-00-554-6900	med stl/0.125	15	LS	313050087	803-1624108	F	3		11 ft	05-03-82	04-02-99
H2040-00-554-6899	med stl/0.125	15	SS	313050086	803-1624108	F	1		11 ft	05-03-82	04-02-99
30" X 48" - 8-DOG											
	med stl/0.125	5	LS	313050089	803-1624096	F	3		13 ft	03-30-84	04-02-99
H2040-00-554-6898	med stl/0.125	5	SS	313050088	803-1624096	F	1		13 ft	03-30-84	04-02-99
30" X 48" - 10-DOG											
H2040-00-554-6894	med stl/0.125	15	LS	313050091	803-1624109	F	3		13 ft	05-03-82	04-02-99
H2040-00-554-6895	med stl/0.125	15	SS	313050090	803-1624109	F	1		13 ft	05-03-82	04-02-99
30" X 60" - 10-DOG											
	med stl/0.125	5	LS	313050093	803-1624097	G	3		15 ft	03-30-84	04-02-99
	med stl/0.125	5	SS	313050092	803-1624097	G	1		15 ft	03-30-84	04-02-99
30" X 60" - 12-DOG											
	med stl/0.125	15	LS	313050095	803-1624110	F	3		15 ft	05-03-82	04-02-99
H2040-00-554-6916	med stl/0.125	15	SS	313050094	803-1624110	F	1		15 ft	05-03-82	04-02-99
36" X 42" - 8-DOG											
H2040-00-554-6933	med stl/0.125	5	LS	313050097	803-1624098	F	3		13 ft	03-30-84	04-02-99
H2040-00-554-6886	med stl/0.125	5	SS	313050096	803-1624098	F	1		13 ft	03-30-84	04-02-99
H2040-00-554-4058	med stl/0.125	5	SS	313050057	803-1624088		2		13 ft	03-30-84	04-02-99

Figure B-8. HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 2 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Flush Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
36" X 42" - 10-DOG											
	med st/0.125	15	LS	313050099	803-1624111	F	3		13 ft	05-03-82	04-02-99
	med st/0.125	15	SS	313050098	803-1624111	F	1		13 ft	05-03-82	04-02-99
36" X 60" - 12-DOG											
	med st/0.125	5	LS	313050101	803-1624099	F	3		15 ft	03-30-84	04-02-99
	med st/0.125	5	SS	313050100	803-1624099	F	1		15 ft	03-30-84	04-02-99
36" X 60" - 12-DOG											
	med st/0.125	15	LS	313050103	803-1624112	F	3		15 ft	05-03-82	04-02-99
	med st/0.125	15	SS	313050102	803-1624112	F	1		15 ft	05-03-82	04-02-99
36" X 72" - 12-DOG											
2040-00-554-6883	med st/0.125	5	LS	313050105	803-1624100	F	3		17 ft	05-03-82	04-02-99
	med st/0.125	5	SS	313050104	803-1624100	F	1		17 ft	05-03-82	04-02-99
36" X 72" - 14-DOG											
	med st/0.125	15	LS	313050107	803-1624113	F	3		17 ft	05-03-82	04-02-99
	med st/0.125	15	SS	313050106	803-1624113	F	1		17 ft	05-03-82	04-02-99
48" X 48" - 8-DOG											
	med st/0.125	5	LS	313050109	803-1624101	F	3		16 ft	03-30-84	04-02-99
	med st/0.125	5	SS	313050108	803-1624101	F	1		16 ft	03-30-84	04-02-99

Figure B-8. HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 3 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Flush Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
42" X 48" - 12-DOG											
	med stl/0.125	15	LS	313050111	803-1624114	F	3		16 ft	05-03-82	04-02-99
	med stl/0.125	15	SS	313050110	803-1624114	F	1		16 ft	05-03-82	04-02-99
48" X 48" - 10-DOG											
H2040-00-540-5000	med stl/0.125	5		313050112	803-1624102	F	1		16 ft	05-03-82	04-02-99
48" X 48" - 16-DOG											
H2040-00-540-5001	med stl/0.125	15		313050113	803-1624115	E	1		16 ft	03-07-68	04-02-99
60" X 60" - 12-DOG											
	med stl/0.125	5		313050114	803-1624103	F	1		20 ft	05-03-82	04-02-99
60" X 60" - 14-DOG											
H2040-00-554-6914	med stl/0.125	15		313050115	803-1624116	E	1		20 ft	04-09-68	04-02-99
72" X 72" - 12-DOG											
H2040-00-554-6936	med stl/0.125	5		313050116	803-1624104	F	1		24 ft	05-03-82	04-02-99
72" X 72" - 18-DOG											
	med stl/0.125	15		313050117	805-1624117	E	1		24 ft	04-09-68	04-02-99
30" X 30" - 10-DROP BOLT											
H2040-00-554-6923	med stl/0.125	30		313050054	805-1624092	E	1		10 ft	03-12-68	04-02-99

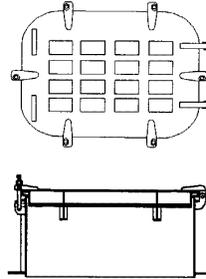
Figure B-8. HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 4 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Flush Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 36" - 10-DROP BOLT											
H2040-00-554-4049	med st/0.125	30	LS	313050056	805-1624087	E	1		11 ft	03-12-68	04-02-99
H2040-00-554-4059	med st/0.125	30	SS	313050055	805-1624087	E	2		11 ft	03-12-68	04-02-99
36" X 42" - 12-DROP BOLT											
	med st/0.125	30	LS	313050058	805-1624188	E	1		13 ft	03-12-68	07-24-92
H2040-00-554-4058	med st/0.125	30	SS	313050057	805-1624188	E	2		13 ft	03-12-68	07-24-92
36" X 60" - 12-DROP BOLT											
	med st/0.075	15	LS	313050060	805-1624089	E	1		15 ft	03-12-68	04-02-99
H2040-00-554-6939	med st/0.075	15	SS	313050059	805-1624089	E	2		15 ft	03-12-68	04-02-99

Figure B-8. HATCHES, MARINE (Standard Individually Dogged Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 5 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Raised Watertight Hatches
(Without Escape Scuttle and Catch Assembly)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
24" X 24" - 6-DROP BOLT											
H2040-00-554-6194	med stl/0.075	15		313050004	805-1624090	E	1		8 ft	03-12-68	04-02-99
24" X 30" - 6-DROP BOLT											
H2040-00-540-5003	med stl/0.075	5	LS	313050006	805-1624144	E	9		9 ft	04-09-68	04-02-99
H2040-00-540-5002	med stl/0.075	5	SS	313050005	805-1624144	E	10		9 ft	04-09-68	04-02-99
24" X 30" - 8-DROP BOLT											
H2040-00-540-5005	med stl/0.075	15	LS	313050008	805-1624144	E	5		9 ft	04-09-68	04-02-99
H2040-00-540-5004	med stl/0.075	15	SS	313050007	805-1624144	E	6		9 ft	04-09-68	04-02-99

Figure B-9. HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 1 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Raised Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
24" X 30" - 10-DROP BOLT											
H2040-00-540-5007	med stl/0.125	30	LS	313050010	805-1624144	E	1		9 ft	04-09-68	04-02-99
H2040-00-540-5006	med stl/0.125	30	SS	313050009	805-1624144	E	2		9 ft	04-09-68	04-02-99
30" X 30" - 6-DROP BOLT											
H2040-00-554-6941	med stl/0.075	5		313050011	805-1624093	E	1		10 ft	03-12-68	04-02-99
30" X 30" - 8-DROP BOLT											
H2040-00-554-6942	med stl/0.075	15		313050012	805-1624093	E	3		10 ft	03-12-68	04-02-99
30" X 30" - 10-DROP BOLT											
H2040-00-554-6940	med stl/0.125	30		313050013	805-1624091	F	1		10 ft	03-12-68	04-02-99
30" X 36" - 6-DROP BOLT											
H2040-00-542-0212	med stl/0.075	5	LS	313050015	805-1624070	H	9		11 ft	04-09-68	04-02-99
H2040-00-554-6938	med stl/0.075	5	SS	313050014	805-1624070	H	10		11 ft	04-09-68	04-02-99
30" X 36" - 8-DROP BOLT											
H2040-00-554-6874	med stl/0.075	15	LS	313050017	805-1624070	H	5		11 ft	04-09-68	04-02-99
H2040-00-554-6875	med stl/0.075	15	SS	313050016	805-1624070	H	6		11 ft	04-09-68	04-02-99
30" X 36" - 10-DROP BOLT											
H2040-00-554-6903	med stl/0.125	30	LS	313050019	805-1624070	H	1		11 ft	04-09-68	04-02-99
H2040-00-554-6876	med stl/0.125	30	SS	313050018	805-1624070	H	2		11 ft	04-09-68	04-02-99

Figure B-9. HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 2 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Raised Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 48" - 8-DROP BOLT											
	med stl/0.075	5	LS	313050021	805-1624073	E	1		13 ft	09-09-68	04-02-99
H2040-00-554-4060	med stl/0.075	5	SS	313050020	805-1624073	E	2		13 ft	09-09-68	04-02-99
30" X 48" - 10-DROP BOLT											
H2040-00-554-4061	med stl/0.075	15	LS	313050023	805-1624073	E	5		13 ft	09-09-68	04-02-99
H2040-00-542-0213	med stl/0.075	15	SS	313050022	805-1624073	E	6		13 ft	09-09-68	04-02-99
30" X 48" - 12-DROP BOLT											
H2040-00-273-9065	med stl/0.125	30	LS	313050025	805-1624074	F	1		13 ft	04-09-68	04-02-99
H2040-00-554-4064	med stl/0.125	30	SS	313050024	805-1624074	F	2		13 ft	04-09-68	04-02-99
30" X 60" - 10-DROP BOLT											
H2040-00-273-9098	med stl/0.075	5	LS	313050027	805-1624075	F	1		15 ft	04-09-68	04-02-99
H2040-00-542-0214	med stl/0.075	5	SS	313050026	805-1624075	F	2		15 ft	04-09-68	04-02-99
30" X 60" - 12-DROP BOLT											
H2040-00-554-4057	med stl/0.075	15	LS	313050029	805-1624075	F	5		15 ft	04-09-68	04-02-99
H2040-00-554-4067	med stl/0.075	15	SS	313050028	805-1624075	F	6		15 ft	04-09-68	04-02-99
30" X 60" - 12-DROP BOLT											
	med stl/0.125	30	LS	313050031	805-1624076	F	1		15 ft	04-09-68	04-02-99
H2040-00-554-4056	med stl/0.125	30	SS	313050030	805-1624076	F	2		15 ft	04-09-68	04-02-99

Figure B-9. HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 3 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Raised Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
36" X 42" - 8-DROP BOLT											
H2040-00-554-4048	med stl/0.075	5	LS	313050033	805-1624077	E	1		13 ft	04-09-68	04-02-99
	med stl/0.075	5	SS	313050032	805-1624077	E	2		13 ft	04-09-68	04-02-99
36" X 42" - 10-DROP BOLT											
H2040-00-554-4042	med stl/0.075	15	LS	313050035	805-1624077	E	5		13 ft	04-09-68	04-02-99
H2040-00-554-4039	med stl/0.075	15	SS	313050034	805-1624077	E	6		13 ft	04-09-68	04-02-99
36" X 42" - 12-DROP BOLT											
	med stl/0.125	30	LS	313050037	805-1624078	F	1		13 ft	04-09-68	04-02-99
H2040-00-273-9063	med stl/0.125	30	SS	313050036	805-1624078	F	2		13 ft	04-09-68	04-02-99
36" X 60" - 12-DROP BOLT											
	med stl/0.075	15	LS	313050039	805-1624079	F	1		15 ft	04-09-68	04-02-99
	med stl/0.075	15	SS	313050038	805-1624079	F	2		15 ft	04-09-68	04-02-99
36" X 72" - 12-DROP BOLT											
	med stl/0.075	5	LS	313050041	805-1624080	E	1		17 ft	04-09-68	04-02-99
H2040-00-554-4062	med stl/0.075	5	SS	313050040	805-1624080	E	2		17 ft	04-09-68	04-02-99
36" X 72" - 14-DROP BOLT											
H2040-00-273-9067	med stl/0.075	15	LS	313050043	805-1624080	E	5		17 ft	04-09-68	04-02-99
H2040-00-273-9071	med stl/0.075	15	SS	313050042	805-1624080	E	6		17 ft	04-09-68	04-02-99

Figure B-9. HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 4 of 5)

HATCH, MARINE (Cont'd)
Standard Individually Dogged Raised Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
42" X 48" - 8-DROP BOLT											
H2040-00-554-4053	med stl/0.075	5	LS	313050045	805-1624081	E	1		15 ft	04-09-68	04-02-99
H2040-00-554-4052	med stl/0.075	5	SS	313050044	805-1624081	E	2		15 ft	04-09-68	04-02-99
42" X 48" - 10-DROP BOLT											
	med stl/0.090	15	LS	313050047	805-1624081	E	5		15 ft	09-09-68	04-02-99
H2040-00-554-6196	med stl/0.090	15	SS	313050046	805-1624081	E	6		15 ft	09-09-68	04-02-99
48" X 48" - 10-DROP BOLT											
H2040-00-554-6197	med stl/0.075	5		313050048	805-1624082	E	1		16 ft	04-09-68	04-02-99
48" X 48" - 12-DROP BOLT											
H2040-00-554-6198	med stl/0.090	15		313050049	805-1624082	E	3		16 ft	04-09-68	04-02-99
60" X 60" - 12-DROP BOLT											
H2040-00-294-2228	med stl/0.075	5		313050050	805-1624083	E	1		20 ft	04-09-68	04-02-99
60" X 60" - 14-DROP BOLT											
	med stl/0.075	15		313050051	805-1624084	F	1		20 ft	03-08-68	04-02-99
72" X 72" - 14-DROP BOLT											
H2040-00-554-6201	med stl/0.090	5		313050052	805-1624085	E	1		24.6 ft	03-12-68	04-02-99
72" X 72" - 16-DROP BOLT											
H2040-00-554-4050	med stl/0.125	15		313050053	805-1624086	F	1		24.6 ft	03-12-68	04-02-99

Figure B-9. HATCHES, MARINE (Standard Individually Dogged Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))
(Sheet 5 of 5)

HATCH, MARINE (Cont'd)
Standard Quick-Acting Flush Watertight Hatches
(Without Escape Scuttle and Catch Assembly)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 36" - 4-DOG FLUSH WT HATCH											
H2040-00-554-6878	med stl/0.125	5	LS	313050119	805-1624135	E	3		11 ft	07-23-87	04-02-99
H2040-00-554-6879	med stl/0.125	5	SS	313050118	805-1624135	E	1		11 ft	07-23-87	04-02-99
30" X 36" - 6-DOG FLUSH WT HATCH											
H2040-00-554-6887	med stl/0.125	15	LS	313050121	805-1624136		3		11 ft		04-02-99
H2040-00-554-6877	med stl/0.125	15	SS	313050120	805-1624136		1		11 ft		04-02-99
36" X 42" - 6-DOG FLUSH WT HATCH											
H2040-00-554-6890	med stl/0.125	5	LS	313050123	805-1624137	B	3		13 ft	12-05-67	04-02-99
H2040-00-554-6891	med stl/0.125	5	SS	313050122	805-1624137	B	1		13 ft	12-05-67	04-02-99

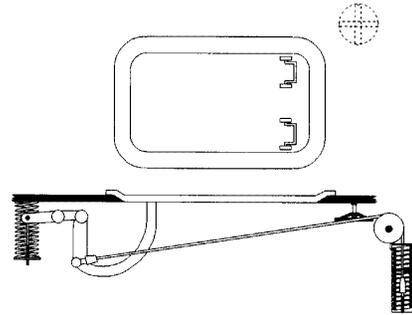
Figure B-10. HATCHES, MARINE (Standard Quick-Acting Flush Watertight Hatches (Without Escape Scuttle and Catch Assembly))

HATCH, MARINE (Cont'd)
Standard Quick-Acting Raised Watertight Hatches
(Without Escape Scuttle and Catch Assembly) (Cont'd)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 36" - 4-DOG RAISED WT HATCH											
H2040-00-554-6925	med stl/0.125	5	LS	313050065	805-1624120	F	3		11 ft	07-23-87	04-02-99
H2040-00-554-6924	med stl/0.125	5	SS	313050064	805-1624120	F	1		11 ft	07-23-87	04-02-99
30" X 36" - 6-DOG RAISED WT HATCH											
H2040-00-554-6871	med stl/0.125	15	LS	313050067	805-1624121	E	3		11 ft	05-14-63	04-02-99
H2040-00-554-6904	med stl/0.125	15	SS	313050066	805-1624121	E	1		11 ft	05-14-63	04-02-99
36" X 42" - 6-DOG RAISED WT HATCH											
H2040-00-554-6972	med stl/0.125	5	LS	313050069	805-1624122	E	3		13 ft	05-14-63	04-02-99
H2040-00-554-6905	med stl/0.125	5	SS	313050068	805-1624122	E	1		13 ft	05-14-63	04-02-99
36" X 42" - 10-DOG RAISED WT HATCH											
	med stl/0.125	15	LS	313050071	805-1624123	E	3		13 ft	05-14-63	04-02-99
H2040-00-554-6873	med stl/0.125	15	SS	313050070	805-1624123	E	1		13 ft	05-14-63	04-02-99

Figure B-11. HATCHES, MARINE (Standard Quick-Acting Raised Watertight Hatches (Without Escape Scuttle and Catch Assembly))

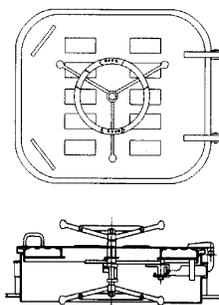
HATCH, MARINE (Cont'd)
Standard Quick-Acting Spring Balanced Flush Watertight Hatches
(Without Scuttle)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
30" X 36" - 8-DOG											
	med stl/0.125		LS		805-1626008	B			11 ft	01-02-59	04-02-99
42" X 48" - 8-DOG											
	med stl/0.125	5	SS	313050126	805-1627176	B	1		15 ft	05-14-63	07-24-92
42" X 48" - 12-DOG											
	med stl/0.125	15	SS	313050127	805-5959264	B	2		16 ft	05-14-63	07-24-92
36" X 42" - 10-DOG											
	med stl/0.125	15	LS	313050125	805-1624672				.	11-01-84	97-23-92

Figure B-12. HATCHES, MARINE (Standard Quick-Acting Spring Balanced Flush Watertight Hatches (Without Scuttle))

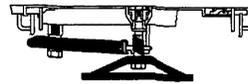
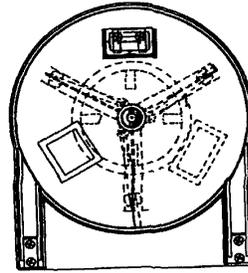
HATCH, MARINE (Cont'd)
Standard Quick-Acting Spring Balanced Raised Watertight Hatches
(Without Scuttle and Hasp Assembly)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
42" X 48" - 7-DOG											
	med stl/0.125	5	LS	313050073	805-1624124		3		15 ft	05-14-63	04-02-99
H2040-00-540-5010	med stl/0.125	5	SS	313050072	805-1624124		1		15 ft	05-14-63	04-02-99
42" X 48" - 9-DOG											
H2040-00-554-6878	med stl/0.125	15	LS	313050119	805-1624125		3		15 ft	05-14-63	04-02-99
H2040-00-540-5006	med stl/0.125	15	SS	313050009	805-1624125		1		15 ft	05-14-63	04-02-99
24" X 30" - 4-DOG, COAMING HGH: 12"											
H2040-00-542-0248	med stl/0.125	5		313050003	805-1626021				9 ft	05-14-63	04-02-99

Figure B-13. HATCHES, MARINE (Standard Quick-Acting Spring Balanced Raised Watertight Hatches (Without Scuttle and Hasp Assembly))

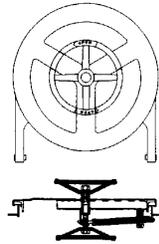
SCUTTLE, MARINE
 Standard Quick-Acting Flush Watertight Scuttles
 (Operation: Wrench Above, Handwheel Below)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
18" - 3-DOG											
	med std/0.187	30		313170004	803-1623054	G			56.5 in.	10-06-87	04-02-99
H2040-00-725-4515	med std/0.187	30		314050026	803-1623054	G			56.5 in.	10-06-87	04-02-99
21" - 3-DOG											
H2040-00-554-6911	med std/0.187	17		314010007	803-1623056	H			70 in.	10-06-87	04-02-99
25" - 4-DOG											
H2040-00-554-6910	med std/0.187	25		314010006	803-1623057	G			78.5 in.	10-06-87	04-02-99
H2040-01-393-1805	med std/0.187	25		313170002	803-5773913	A			78.5 in.	08-31-87	07-27-92

Figure B-14. SCUTTLE, MARINE (Standard Quick-Acting Flush Watertight Scuttles (Operation: Wrench Above, Handwheel Below))

SCUTTLE, MARINE (Cont'd)
Standard Quick-Acting Raised Watertight Scuttles
(Handwheel Above and Below)



NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
18" - 3-DOG, COAMING HGH: 1-1/2" TO 2"											
	med stl/0.075	35		314050008	803-1401890	G	A		56.5 in.	10-06-87	04-02-99
H2040-00-727-5458	med stl/0.075	35		314050019	803-1401890	G	A		56.5 in.	10-06-87	04-02-99
18" - 3-DOG, COAMING HGH: 6"											
	med stl/0.075	35		314050009	803-1401890	G	B		56.5 in.	10-06-87	04-02-99
H2040-00-725-4514	med stl/0.075	35		313050020	803-1401890	G	B		56.5 in.	10-06-87	04-02-99
21" - 3-DOG, COAMING HGH: 1-1/2" TO 2"											
	med stl/0.075	30		313170008	803-1401892	H	A		70 in.	10-06-87	04-02-99
H2040-00-725-4513	med stl/0.075	30		314050021	803-1401892	H	A		70 in.	10-06-87	04-02-99
21" - 3-DOG, COAMING HGH: 6"											
H2040-00-554-6909	med stl/0.075	16		313170009	803-1401892	H	B		70 in.	10-06-87	04-02-99
21" - 4-DOG, COAMING HGH: 1-1/2" TO 2"											
	med stl/0.075	30		314050012	803-1401891	G	A		70 in.	10-06-87	04-02-99
H2040-00-801-1048	med stl/0.075	30		314050022	803-1401891	G	A		70 in.	10-06-87	04-02-99

Figure B-15. SCUTTLE, MARINE (Standard Quick-Acting Raised Watertight Scuttles (Handwheel Above and Below))

SCUTTLE, MARINE (Cont'd)
Standard Quick-Acting Flush Watertight Scuttles
(Handwheel Above and Below)

NSN	MATERIAL/ PANEL THICKNESS	TEST PRESS (PSI)	HAND	APL COMPNT ID NO.	NAVSEA STD PLAN DWG	REV	ASSY	INT OR EXT	GASKET LENGTH	DATE OF LAST ISSUE	VERIFIED
21" - 4-DOG, COAMING HGH: 6"											
	med st/0.075	18		314050013	803-1401891	G	B		70 in.	10-06-87	04-02-99
H2040-00-753-3751	med st/0.075	18		314050023	803-1401891	G	B		70 in.	10-06-87	04-02-99
25" - 4-DOG, COAMING HGH: 1-1/2 " TO 2"											
	med st/0.075	27		314050014	803-1623058	G	A		78.5 in.	10-06-87	04-02-99
H2040-00-725-4519	med st/0.075	27		314000012	803-1623058	G	A		78.5 in.	10-06-87	04-02-99
25" - 4-DOG, COAMING HGH: 6"											
	med st/0.075	18		314050015	803-1623058	G	B		78.5 in.	10-06-87	04-02-99
H2040-00-725-4517	med st/0.075	18		313050025	803-1623058	G	B		78.5 in.	10-06-87	04-02-99

Figure B-16. SCUTTLE, MARINE (Standard Quick-Acting Flush Watertight Scuttles (Handwheel Above and Below))

APPENDIX C

WATERTIGHT CLOSURE REPLACEMENT PARTS AND WEARING PARTS FOR STANDARD DOORS, HATCHES, AND SCUTTLES

This appendix is provided as a reference source for identifying proper parts and kits which are either not available through the Navy Supply System or not identified with a National Stock Number (NSN). Dogs, wedges, clips, linkages, springs, lever arms, self-lubricated bushings, gasket material and other hardware items associated with preventive and corrective maintenance for watertight closures are included. This appendix is divided into three parts (replacement parts kits, complete parts lists, and commercial sources).

The information in this appendix was obtained from commercial vendors of watertight closure replacement parts. Completeness and accuracy of the information are limited to the input supplied by vendors. Abbreviated vendor names represent the following: J.D.A. Company (JDA), Railway Specialties Corp. (RSC), Southwest Products Company (SPC), and Worldwide Marine, Inc. (WWM). Commercial prices are not included herein. It is suggested that vendor catalogs are retained for general reference and current prices. This appendix is to be used in conjunction with other portions of this booklet, particularly appendix B, which lists NSNs of watertight closure parts.

SECTION I

REPLACEMENT PART KITS FOR STANDARD WATERTIGHT DOORS, HATCHES, AND SCUTTLES

C-1. Self-Lubricated Bushing Kits for Standard Individually Dogged Watertight Doors

NSN 3120-01-263-0393
 New NAVSEA Dwg. 803-6397261
 Old BUSHIPS Dwg. 805-1400067

These watertight closure (WTC) kits consist of Naval Sea Systems Command (NAVSEA) approved self-lubricated corrosion-resistant steel (CRES) bushings along with CRES springs, dog point setscrews, thrust washers, and nylon plugs. The kits are for use on steel or aluminum doors. Self-lubricated bushings eliminate the need for string packing and stick packing in the dog assembly. The flanged bushing contains an outer O-ring seal and inner T-seal to ensure that the dog assembly is watertight. Order one kit for each dog assembly.

Table C-1. Self-Lubricated Bushing Kits for Standard Individually Dogged Watertight Doors

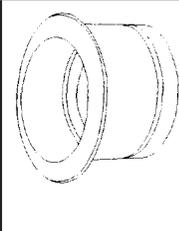
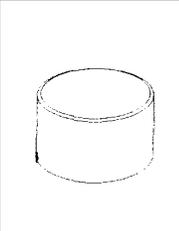
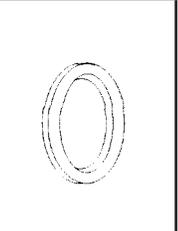
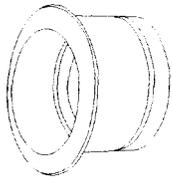
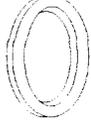
						
DESCRIP- TION	FLANGED BUSHING	STRAIGHT BUSHING	SPRING	NYLON PLUG	THRUST WASHER	SETSCREW 12-28
JDA KIT A						
1-1/8" SPINDLE DIAMETER	0556A	0562A	0560A	0102	0103	0576

Table C-1. Self-Lubricated Bushing Kits for Standard Individually Dogged
Watertight Doors - Continued

						
DESCRIP- TION	FLANGED BUSHING	STRAIGHT BUSHING	SPRING	NYLON PLUG	THRUST WASHER	SETSCREW 12-28
QUANTITY	2	2	2	2	2	2
KAMATICS KIT KPD364						
1-1/8" SPINDLE DIAMETER	KJB239918B	KJB240018B	KPD575	KJS115804	KJT114218	KPD622
QUANTITY	1	1	1	1	1	1
SPC BUSHING KIT SWBK-18-393						
1-1/8" SPINDLE DIAMETER	DBSF-18-268	DBS-18-269	SWP-262-11	SWP-NP	SWP-262-10	SWP-269-102
QUANTITY	1	1	1	1	1	1
NSN	3120-01-436-0830	3120-01-435-7963	5360-01-434-1831	9390-01-097-3768	5310-01-434-2297	5305-01-369-0768

C-2. Self-Lubricated Bushing Kits for Standard 8- and 10-Dog Quick-Acting Watertight Doors

NSN 3120-01-263-0392
New NAVSEA Dwg. 803-6397268
Old BUSHIPS Dwg. 805-1400051

These WTC kits consist of NAVSEA approved self-lubricated CRES bushings along with CRES springs, dog point setscrews, thrust washers, and nylon plugs. The kits are for use on steel or aluminum doors. Self-lubricated bushings eliminate the need for string packing and stick packing in the dog assembly. The flanged bushing contains an outer O-ring seal and inner T-seal to ensure that the dog assembly is watertight. Order one kit for each dog assembly.

Table C-2. Self-Lubricated Bushing Kits for Standard 8- and 10-Dog
Quick-Acting Watertight Doors

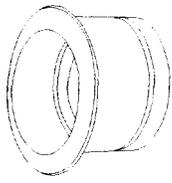
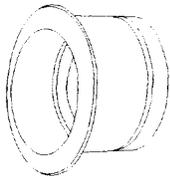
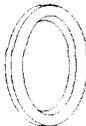
						
DESCRIP- TION	FLANGED BUSHING	STRAIGHT BUSHING	SPRING	NYLON PLUG	THRUST WASHER	SETSCREW 12-28
JDA KIT E						

Table C-2. Self-Lubricated Bushing Kits for Standard 8- and 10-Dog
Quick-Acting Watertight Doors - Continued

						
DESCRIP- TION 1-1/8" SPINDLE DIAMETER QUANTITY	FLANGED BUSHING 0106A 2	STRAIGHT BUSHING 0557A 2	SPRING 0558A 2	NYLON PLUG 0102 2	THRUST WASHER 0104 2	SETSCREW 12-28 0576 2
KAMATICS KIT KPD365						
1-1/8" SPINDLE DIAMETER QUANTITY	KJB239716B 1	KJB239816B 1	KPD576 1	KJS115804 1	KJT114916 1	KPD622 1
SPC BUSHING KIT SWBK-18-392						
1-1/8" SPINDLE DIAMETER QUANTITY	DBSF-16-268 1	DBS-16-269 1	SWP-269-106 1	SWP-NP 1	SWP-269-105 1	SWP-269-102 1
NSN	3120-01-444- 2987	3120-01-444- 3003	5360-01-438- 4750	9390-01-097- 3768	5310-01-437- 3270	5305-01-369- 0768

C-3. Self-Lubricated Bushing Kits for Standard Quick-Acting Watertight Door Operating Handle Assembly

These WTC kits consist of NAVSEA approved self-lubricated CRES bushings. The kits are for use on steel or aluminum doors. Self-lubricated bushings eliminate the need for string packing and stick packing in the dog assembly. The flanged bushing contains an outer O-ring seal and inner T-seal to ensure that the handle assembly is watertight.

Table C-3. Self-Lubricated Bushing Kits for Standard Quick-Acting
Watertight Door Operating Handle Assembly

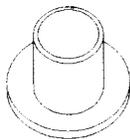
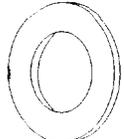
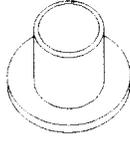
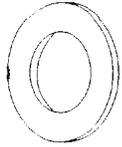
			
DESCRIPTION	FLANGED BUSHING	NYLON PLUG	THRUST WASHER
KAMATICS KIT KPD558-1 (REPAIR ONLY)*			
PART NUMBER	KJB239716B	KJS115804	KJT114916
QUANTITY	2	1	1

Table C-3. Self-Lubricated Bushing Kits for Standard Quick-Acting
Watertight Door Operating Handle Assembly - Continued

			
DESCRIPTION	FLANGED BUSHING	NYLON PLUG	THRUST WASHER
SPC BUSHING KIT SWBK-16-392-1			
PART NUMBER	DBSF-16-267	SWP-NP	SWP-269-105
QUANTITY	2	1	2
NSN	3120-01-444-3007	9390-01-097-3768	5310-01-437-3270

*Kamatics Kit KPD558-3 is for new construction only. All parts and quantities are the same except flanged bushing (part number KJB286916B).

C-4. Self-Lubricated Bushing Kits for Standard Quick-Acting Watertight Door Linkage Mechanism

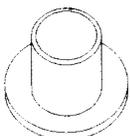
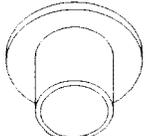
Table C-4. Self-Lubricated Bushing Kits for Standard Quick-Acting
Watertight Door Linkage Mechanism

DESCRIPTION	TOGGLE LINK BUSHING, 5/8"	TOGGLE LINK BUSHING, 1/2"	CONROD BUSHING, 3/8"
KAMATICS PART NOS			
PART NUMBER	KJB2396312	KJB296412B	KJB296812B
QUANTITY	1	1	1
SPC BUSHING PART NOS			
PART NUMBER	DBS-15-13	DBS-15-12	DBS-15-11
QUANTITY	1	1	1
NSN			

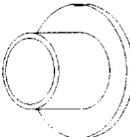
C-5. Self-Lubricated Bushing Kits for Standard Quick-Acting Flush Watertight Scuttles

These WTC kits consist of NAVSEA approved self-lubricated CRES bushings. The kits are for use on steel or aluminum scuttles. Self-lubricated bushings eliminate the need for string packing and stick packing in the dog assembly. The flanged bushing contains an outer O-ring seal and inner T-seal to ensure that the handle assembly is watertight.

Table C-5. Self-Lubricated Bushing Kits for Standard Quick-Acting Flush Watertight Scuttles

			
DESCRIPTION	FLANGED BUSHING, UPPER	FLANGED BUSHING, UPPER	NYLON PLUG
KAMATICS KIT KPD543			
PART NUMBER	KJB286512B	KJB286420B	KJS115804
QUANTITY	2	1	1
NSN	3120-01-346-3859	3120-01-346-0373	9390-01-097-3768

C-6. Self-Lubricated Bushing Kits for Standard Quick-Acting Raised Watertight Scuttles**Table C-6.** Self-Lubricated Bushing Kits for Standard Quick-Acting Raised Watertight Scuttles

		
DESCRIPTION	FLANGED BUSHING	NYLON PLUG
KAMATICS KIT KPD550		
PART NUMBER	KJB286512B	KJS115804
QUANTITY	2	1
NSN	3120-01-346-3859	939-01-097-3768

C-7. Wear Part Replacement Kits for Standard Individually Dogged Watertight Doors

CRES or mild steel wear parts for individually dogged, 6-dog, watertight steel door with 1-1/8" spindles. Order by kit number, and specify CRES or mild steel.

Table C-7. Wear Part Replacement Kits for Standard Individually Dogged, 6-Dog, Watertight Seal Door With 1-1/8" Spindles

NAME	WWM P/N	NSN	QUANTITY
FLANGED BUSHING, 1-1/8" ID, OILITE, PHOS. BRZ	1213	3120-01-104-1108	6
STRAIGHT BUSHING, 1-1/8" ID, OILITE, PHOS. BRZ	4902	3120-00-999-3106	6
SPRING, 1-1/8" ID, PHOS. BRZ	3902	5360-00-690-5395	6
PACKING PLUNGER, 2-5/8" L, PHOS. BRZ	5902	5305-01-104-1052	6
JAMNUT, 7/8"-9NC, CRES	0821	5310-01-097-7966	12
HINGE PIN AND COLLAR	4602 x 5602	5315-00-841-1390 3040-00-152-8830	2
HINGE WASHER, 1/8"	7602	-	4
HINGE WASHER, 1/16"	7602-1	5310-01-128-5347	4

Table C-7. Wear Part Replacement Kits for Standard Individually Dogged,
6-Dog, Watertight Seal Door With 1-1/8" Spindles - Continued

NAME	WWM P/N	NSN	QUANTITY
ADJUSTING YOKE PIN AND WASHER	8602 x 9602	5315-01-260-5538	2
SETSCREW, DOG POINT, 12-28 NF, BRASS	0816	5305-01-369-0768	6
SETSCREW, DOG POINT, 1/4-20, BRASS	0816-1	-	2
SPRING CLIP ASSY, USE REV. K, 1/2"	0403	5845-00-999-3093	4
STICK PACKING	1001-1	5330-00-262-9439	12
STRING PACKING	1002	5330-00-262-9437	5 ft

CRES wear parts for individually dogged, 6-dog, watertight aluminum door with 1-1/8" spindles. Order by kit number.

Table C-8. Wear Part Replacement Kits for Standard Individually Dogged,
6-Dog, Watertight Aluminum Door With 1-1/8" Spindles

NAME	WWM P/N	NSN	QUANTITY
FLANGED BUSHING, 1-1/8" ID, CRES	1213	-	6
STRAIGHT BUSHING, 1-1/8" ID, CRES	4902	-	6
SPRING, 1-1/8" ID, CRES	3902	5360-01-434-1831	6
HINGE PIN AND COLLAR, CRES	4602 x 5602	-	2
HINGE WASHER, 1/8", CRES	7602	-	4
HINGE WASHER, 1/16", CRES	7602-1	-	4
ADJUSTING YOKE PIN AND WASHER CRES	8602 x 9602	5315-01-260-5538	2
SETSCREW, DOG POINT, 12-28 NF, CRES	0816	5305-01-369-0768	6
SETSCREW, DOG POINT, 1/4-20, CRES	0816-1	-	2
SPRING CLIP ASSY, CRES, USE REV. K, 1/2"	0403	-	4

CRES or mild steel wear parts for individually dogged, 6-dog, watertight door with 1" spindles. Order by kit number, and specify CRES or mild steel.

Table C-9. Wear Part Replacement Kits for Standard Individually Dogged,
6-Dog, Watertight Door With 1" Spindles

NAME	WWM P/N	NSN	QUANTITY
FLANGED BUSHING, 1" ID x 3/4" L, OILITE, PHOS. BRZ	0808	-	12
PACKING PLUNGER, 2" L, PHOS. BRZ	0950	-	6
JAMNUT, 3/4"-10NC, CRES	0858	-	12
HINGE PIN AND COLLAR	4602 x 5602	5315-00-841-1390 3040-00-152-8830	2
HINGE WASHER, 1/8"	7602	-	4
HINGE WASHER, 1/16"	7602-1	5310-01-128-5347	4
ADJUSTING YOKE PIN AND WASHER	8602 x 9602	5315-01-260-5538	2
SPACER, BRZ, 1/16", FOR 1" SPINDLE	0872	-	6
SPACER, BRZ, 1/8", FOR 1" SPINDLE	0961	-	6
STICK PACKING	1001-1	5330-00-262-9439	12
STRING PACKING	1002	5330-00-262-9437	6 ft

C-8. Complete Dog Assembly Replacement Parts for Standard Individually Dogged Watertight Doors

CRES or mild steel dog assembly sets for individually dogged, 6-dog, 1-1/8" spindle size watertight door.

Table C-10. Complete Dog Assembly Replacement Parts for Standard Individually Dogged, 6-Dog, 1-1/8" Spindle Size Watertight Door

NAME	NSN	QUANTITY
DOG, CRES, 1-1/8"	2040-00-770-8387	6
DOG HANDLE, CRES, 1-1/8"	5340-00-735-4565	6
FLANGED BUSHING, 1-1/8" ID, OILITE, PHOS. BRZ	3120-01-104-1108	6
STRAIGHT BUSHING, 1-1/8" ID, OILITE, PHOS. BRZ	3120-00-999-3106	6
SPRING, 1-1/8" ID, PHOS. BRZ	5360-00-690-5395	6
PACKING PLUNGER, 2-5/8" L, PHOS. BRZ	5305-01-104-1052	6
JAMNUT, 7/8"-9NC, CRES	5310-01-097-7966	12
SETSCREW DOG POINT, 12-28 NF	5305-01-393-4916	6
SETSCREW DOG POINT, 1/4-20	-	3
SPRING CLIP ASSY	5845-00-999-3093	4
STICK PACKING	5330-00-262-9439	12
STRING PACKING	5330-00-262-9437	5 ft

CRES or mild steel dog assembly sets for individually dogged, 6-dog, 1" spindle size watertight door. Order by kit number, and specify CRES or mild steel.

Table C-11. Complete Dog Assembly Replacement Parts for Standard Individually Dogged, 6-Dog, 1" Spindle Size Watertight Doors

NAME	NSN	QUANTITY
DOG, CRES, 1"		6
DOG HANDLE, CRES, 1"		6
FLANGED BUSHING, 1" ID, 3/4" L, PHOS. BRZ		12
PACKING PLUNGER, 2" L, PHOS. BRZ		6
JAMNUT, 3/4"-10NC, CRES		12
STICK PACKING	5330-00-262-9439	12
STRING PACKING	5330-00-262-9437	6 ft

C-9. Wear Part Replacement Kits for Standard Quick-Acting Watertight Doors

CRES or mild steel wear parts for 6-dog, steel, quick-acting watertight (QAWT) door. Order by kit number, and specify CRES or mild steel.

Table C-12. Wear Part Replacement Kits for 6-Dog, Steel, QAWT Door

NAME	WWM P/N	NSN	QUANTITY
FLANGED BUSHING, 1" ID, OILITE, PHOS. BRZ	0702	3120-01-134-8784	6
STRAIGHT BUSHING, 1" ID, OILITE, PHOS. BRZ	1702	3120-01-109-5518	6
SPRING, 1" ID, PHOS. BRZ	3702	5360-00-802-1859	6
PACKING PLUNGER, 1-1/2" L, PHOS. BRZ	6102	5315-01-045-9724	6
JAMNUT, 7/8"-9NC, CRES	0821	5310-01-097-7966	12
HINGE PIN AND COLLAR	4602 x 5602	5315-00-841-1390 3040-00-152-8830	2

Table C-12. Wear Part Replacement Kits for 6-Dog, Steel, QAWT Door -

Continued

NAME	WWM P/N	NSN	QUANTITY
HINGE WASHER, 1/8"	7602	-	4
HINGE WASHER, 1/16"	7602-1	5310-01-128-5347	4
LINKAGE WASHER	0803	5310-01-244-4517	6
ADJUSTING YOKE PIN AND WASHER	8602 x 9602	5315-01-260-5538	2
SETSCREW, DOG POINT, 12-28 NF	0816	5305-01-103-8804	6
SETSCREW DOG POINT, 1/4-20	0816-1	-	2
CONROD COLLAR AND COTTER	6702	5310-00-735-4548	6
SPRING CLIP ASSEMBLY, USE REV. K, 1/2", FOR ALUMINUM USE REV. J, 11/16"	0817	5340-01-382-4563	1
STICK PACKING	1001-1	5330-00-262-9439	12
STRING PACKING	1002	5330-00-262-9437	5 ft

CRES wear parts for 6-dog, aluminum, QAWT door.

Table C-13. Wear Part Replacement Kits for 6-Dog, Aluminum, QAWT Door

NAME	NSN	QUANTITY
FLANGED BUSHING, 1" ID, CRES	-	6
STRAIGHT BUSHING, 1" ID, CRES	-	6
SPRING, 1" ID, CRES	5360-01-438-4750	6
PACKING PLUNGER, 1-1/2" L, PHOS. BRZ	5315-01-045-9724	6
JAMNUT, 7/8"-9NC, CRES	5310-01-097-7966	12
HINGE PIN AND COLLAR, CRES	-	2
HINGE WASHER, 1/8", CRES	-	4
HINGE WASHER, 1/16", CRES	-	4
LINKAGE WASHER	5310-01-244-4517	6
ADJUSTING YOKE PIN AND COTTER	-	2
SETSCREW, DOG POINT, 12-28 NF, CRES	-	6
SETSCREW, DOG POINT, 1/4-20, CRES	-	2
CONROD COLLAR AND COTTER	5310-00-735-4548	6
SPRING CLIP ASSEMBLY, USE REV. K, 1/2", FOR ALUMINUM USE REV. J, 11/16"	-	1
STICK PACKING	5330-00-262-9439	12
STRING PACKING	5330-00-262-9437	5 ft

C-10. Complete Operating Handle Assemblies for Standard Quick-Acting Watertight/Airtight Doors

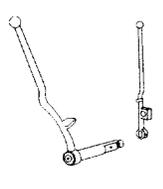
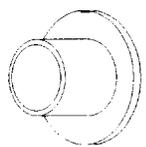
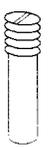
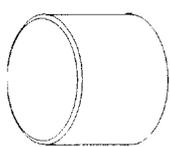
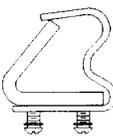
These WTC kits provide one set of operating handles complete with bushings, jamnuts, packing plunger, and spring clip assembly needed to repair one quick-acting watertight/airtight operating handle assembly. The handle extension bushing is inserted at the factory. Proper assembly of the outer handle and inner handle must be exact to prevent unnecessary wear of the linkage mechanism. To ensure proper fit, assembly of the outer handle and spindle is accomplished at the factory. This eliminates the chance of error in positioning and welding. The inner and outer handle sets are sold separately if desired. Assemblies are available in CRES or mild steel. The QAWT doors, 36" wide, have an additional set of operating handles on the hinge side of the door.

To order this kit with self-lubricated bushings vice the Oilite bushings, order "WTC Kit Mod." In "WTC Kit Mod," the flanged bushings are replaced by CRES flanged self-lubricated bushings with thrust washers, and the handle extension bushing is replaced by a self-lubricated bushing. Refer to the following page for ordering information.

CRES or mild steel handle assemblies for these QAWT doors, sizes 26" x 66", 8-dog; 26" x 66", 10-dog; and 36" x 66", 10-dog (lever side only). The 36" QAWT doors have an additional set of operating handles on the hinge side of the door. Order by kit number, and specify left-hand (LH) or right-hand (RH).

C-10.1 Lever Side/Handle Side Designation. The side opposite the hinges is designated as the lever side for all quick-acting doors except the 36" x 66", 10-dog, QAWT door. For that door, the side opposite the hinges is designated as the handle side. The 36" x 66", 10-dog door has two operating handles. The designation of the handle assembly for the hinge side of 36" x 66", 10-dog, left-hand door is RH assembly for LH door (hinge side).

Table C-14. Operating Handle Assemblies for Lever Side/Handle Side Designation Doors

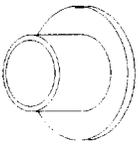
						
DESCRIPTION	OPERATING HANDLE, INNER AND OUTER	FLANGED BUSHING	PACKING PLUNGER	JAMNUT	HANDLE EXTENSION BUSHING	SPRING CLIP ASSEMBLY
JDA KIT D						
HANDLE ASSEMBLY CRES	0587	0571	0559	0147	0110	0143
HANDLE ASSEMBLY MSTL	0587A	0571	0559	0185	0110	0143
QUANTITY	1-SET	2	1	2	1	1
WWM PEKPAK C						
HANDLE ASSEMBLY CRES	1-SET	7803	3802	0821	0802	0817
HANDLE ASSEMBLY MSTL	1-SET	7803	3802	0879	0802	0817
QUANTITY	1-SET	2	1	2	1	1
NSN	2040-01-398-2446	2040-01-398-2450	3120-01-125-1292	2040-01-033-6240	5310-01-097-7966	5340-01-382-4563

C-11. Spindle and Linkage Wearing Parts for Standard 8- and 10-Dog Quick-Acting Watertight Doors

These WTC kits provide replacement parts repair linkage and spindle wear on 8- and 10-dog QAWT doors. Provided are bushings, springs, jamnuts, and setscrews for lever assembly spindle wear and conrod collars, cot-

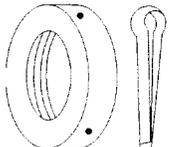
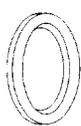
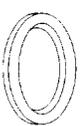
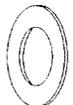
ter pins, bushings, and washers for linkage wear. Specify CRES or mild steel jamnuts. The "WTC Kit Mod" replaces bushings in the standard WTC kit with self-lubricated bushings.

Table C-15. WTC Kit for Spindle and Linkage Wearing Parts for Standard 8- and 10-Dog QAWT Door

					
DESCRIPTION	FLANGED BUSHING OILITE	STRAIGHT BUSHING OILITE	COMPRESSION SPRING	JAMNUT	SETSCREW
JDA KIT F*					
PART NUMBER	0106	0557	0558	CRES 0147 MSTL 0185	0142
QUANTITY	4	4	4	8	4
WWM PEKPAK D*					
PART NUMBER	0702	1702	3702	CRES 0821 MSTL 0879	0816
QUANTITY	4	4	4	8	4
NSN	3120-01-134-8784	3120-01-109-5518	5360-00-802-1859		5305-01-103-8804

*JDA Kit F and WWM PEKPAK D: Order two kits for 8-dog QAWT door. Order three kits for 10-dog QAWT door.

Table C-16. WTC Kit Mod for Spindle and Linkage Wearing Parts for Standard 8- and 10-Dog QAWT Door

						
DESCRIP-TION	PACKING PLUNGER	CONROD COLLAR AND COT-TER PIN	CONROD BUSHING	CONROD SIDE DOG BUSHING	HANDLE EXTENSION BUSHING	CONROD WASHER
JDA KIT F*						
PART NUMBER	0566	0568	0107	0109	0110	0111
QUANTITY	4	8	4	2	2	8
WWM PEKPAK D*						
PART NUMBER	6102	6702	0800	0801	0802	0803
QUANTITY	4	8	4	2	2	8
NSN	-	5310-00-735-4548	3120-01-106-6754	3120-01-104-4965	3120-01-104-4966	5310-01-244-4517

*JDA Kit F and WWM PEKPAK D: Order two kits for 8-dog QAWT door. Order three kits for 10-dog QAWT door.

Linkage and spindle wear parts for 8- and 10-dog QAWT aluminum doors. Order by kit number.

Table C-17. Linkage and Spindle Wear Parts for Standard 8- and 10-Dog QAWT Aluminum Door

NAME	WWM/PN	NSN
FLANGED BUSHING, 1" ID, CRES	0702-11	-
STRAIGHT BUSHING, 1" ID, CRES	1702-11	-
SPRING, 1" ID, CRES	3702-11	5360-01-438-4750
SETSCREW, DOG POINT, 12-28NF, CRES	0816-11	-
SETSCREW, DOG POINT, 1/4-20, CRES	0816-1-11	-
SPRING CLIP ASSY, CRES, USE REV. J, 11/16"	0817-11	-
STICK PACKING	1001-1	5330-00-262-9439
STRING PACKING	1002	5330-00-262-9437

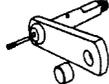
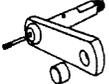
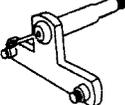
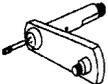
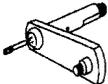
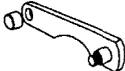
C-12. Replacement Lever Assemblies for Standard 8- and 10-Dog Quick-Acting Watertight Doors

These kits provide one each of the lever assemblies required to repair dog linkage mechanisms on 8- and 10-dog QAWT doors. When ordering, specify LH or RH door. Lever assemblies are the same for 8- and 10-dog doors, and consist of the following pieces from the factory:

Side Dog Lever	Spindle welded to lever; bushing and packing plunger inserted.
Bottom Dog Lever	Spindle welded to lever with stud attached; packing plunger inserted.
Bell Crank Lever	Spindle welded to lever with two studs attached; packing plunger inserted.
Toggle Link Lever	Lever with stud attached; bushing inserted.

The "WTC Kit Mod" is identical to the standard WTC kit except that self-lubricated bushings are provided instead of Oilite bushings. Refer to the following page for ordering information.

Table C-18. Replacement Lever Assemblies for Standard 8- and 10-Dog Quick-Acting Watertight Doors

						
DESCRIP- TION	SIDE DOG LEVER LEVER SIDE	SIDE DOG LEVER HINGE SIDE	BELL CRANK LEVER	BOTTOM DOG LEVER LEVER SIDE	BOTTOM DOG LEVER HINGE SIDE	TOGGLE LINK LEVER
JDA KIT G						
RH DOOR	0158	0159	0164	0156	0157	0165
LH DOOR	0158A	0159A	0164A	0156A	0157A	0165A
QUANTITY	1	1	1	1	1	1
WWM PEKPAK E						
RH DOOR	0832	0833	0841	0830	0831	0843
LH DOOR	0832-1	0833-1	0841-1	0830-1	0831-1	0843-1
QUANTITY	1	1	1	1	1	1
NSN						

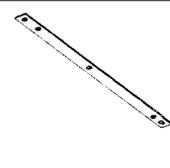
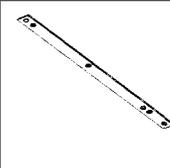
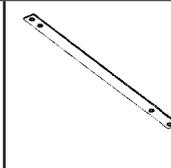
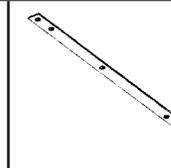
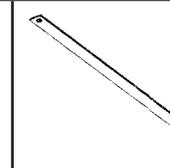
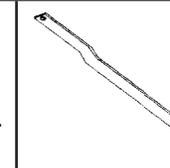
C-13. Replacement Connecting Rods for Standard 8- and 10-Dog Quick-Acting Watertight Doors

These kits provide replacement connecting rods (conrods) required to repair 8- and 10-dog QAWT doors. Specify 8- or 10-dog door and LH or RH. For 8-dog doors, conrods are supplied as follows:

Conrod, Lever Side	Five studs attached to conrod at factory.
Conrod, Hinge Side	Four studs attached to conrod at factory.
Conrod, Corner	Two bushings inserted in conrod at factory. (All corners are the same for 8-dog doors.)
Conrod, Top	One bushing inserted in conrod at factory, and second bushing attached for insertion at time of repair. (This part is the same for 8- and 10-dog doors.)

The "WTC Kit Mod" is identical to the standard WTC kit except that self-lubricated bushings are provided instead of Oilite bushings. Refer to the following page for ordering information.

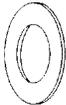
Table C-19. Replacement Connecting Rods for Standard 8- and 10-Dog Quick-Acting Watertight Doors

						
DESCRIP- TION	CONROD LEVER SIDE	CONROD LEVER SIDE	CONROD HINGE SIDE	CONROD HINGE SIDE	CONROD TOP	CONROD CORNER
JDA KIT H						
RH 8-DOG	0160	-	0161	-	0163	0162
LH 8-DOG	0160A	-	0161A	-	0163	0162
RH 10-DOG	-	0166	-	0167	0163	0168
LH 10-DOG	-	0166A	-	0167A	0163	0168
QUANTITY	1	1	1	1	1	2
WWM PEKPAK KIT F						
RH 8-DOG	0834	-	0835	-	0840	0836
LH 8-DOG	0834-1	-	0835-1	-	0840	0836
RH 10-DOG	-	0848	-	0849	0840	0850
LH 10-DOG	-	0848-1	-	0849-1	0840	0850
QUANTITY	1	1	1	1	1	2

C-14. Replacement Wearing Parts for Hinge Assemblies for Individually Dogged and Quick-Acting Watertight Doors

These WTC kits provide wearing parts required to repair four hinge assemblies. Included are hinge pins, hinge pin collars, hinge pin washers, adjusting yokes, adjusting yoke pins, and cotter pins. Kits are for use on standard individually dogged and QAWT door hinge assemblies. The applicable NAVSEA drawing is 805-1400054, Doors, W.T.Q.A., W.T., A.T., M.T., Hinge Arrangement.

Table C-20. Replacement Wearing Parts for Hinge Assemblies for Individually Dogged and Quick-Acting Watertight Doors

						
DESCRIPTION	ADJUSTING YOKE	HINGE PIN	HINGE PIN COLLAR	HINGE PIN WASHER - 1/16"	HINGE PIN WASHER - 1/8"	ADJUSTING YOKE PIN AND WASHER
JDA KIT J						
QUICK-ACTING AND INDIVIDUALLY DOGGED	0197	0561	0563	0570	0570A	0572
QUANTITY	4	4	4	8	8	4
WWM PEKPAK KIT H						
QUICK-ACTING AND INDIVIDUALLY DOGGED	0939	4602	5602	7602-1	7602	8602
QUANTITY	4	4	4	8	8	4
NSN	2040-01-452-6372	5315-00-841-1390	3040-00-152-8830	5310-01-128-5347	-	5315-01-260-5538

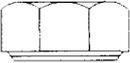
C-15. Replacement Wearing Parts for Hinge Assemblies for Standard Quick-Acting Airtight Doors

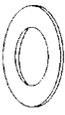
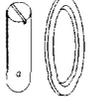
These WTC kit supplements provide the additional parts required to repair the bound hinge assemblies peculiar to standard quick-acting airtight doors. The parts supplied in the supplement are provided along with the set screws and hex nuts required to repair three hinge assemblies on one quick-acting airtight 3-dog door.

Table C-21. Replacement Wearing Parts for Hinge Assemblies for Standard Quick-Acting Airtight Doors

				
DESCRIPTION	SETSCREW	HEX NUT	ADJUSTING HINGE YOKE	HINGE PIN
JDA KIT J SUPP				
PART NUMBER	0144	0153	0197A	0561
QUANTITY	3	3	3	3
WWM PEKPAK H SUPP				
PART NUMBER	0818	0827	0939-1	4602
QUANTITY	3	3	3	3

Table C-21. Replacement Wearing Parts for Hinge Assemblies for Standard
Quick-Acting Airtight Doors - Continued

				
DESCRIPTION	SETSCREW	HEX NUT	ADJUSTING HINGE YOKE	HINGE PIN
NSN	5305-01-103-8804	-	2040-01-452-6372	5315-00-841-1390

				
DESCRIPTION	HINGE PIN COLLAR	HINGE PIN WASHER - 1/16"	HINGE PIN WASHER - 1/8"	ADJUSTING YOKE PIN AND WASHER
JDA KIT J SUPP				
PART NUMBER	0563	0570a	0570	0572
QUANTITY	3	4	4	3
WWM PEKPAK KIT H SUPP				
PART NUMBER	5602	7602-1	7602	8602
QUANTITY	3	4	4	3
NSN	-	5310-01-128-5347	-	5315-01-260-5538

C-16. Replacement Wearing Parts for Raised Dog Bolt-Type Watertight Hatches

These WTC kits provide four replacement dog bolt assemblies required to repair individually dogged raised watertight hatches, and four sets of dog pad pins and retaining pins to secure the dog bolt assemblies. Each dog bolt assembly consists of dog bolt, brass ACME nut, dog bolt collar, and collar pin. The assembly comes ready for installation. Also included in the WTC kits are two hinge pins, hinge pin washers, and brass cotter pins for hinge repair.

Table C-22. Replacement Wearing Parts for Raised Dog Bolt-Type Watertight
Hatches

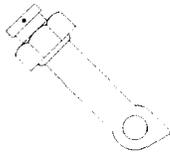
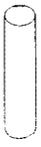
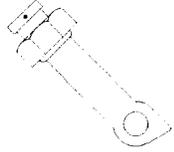
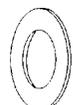
						
DESCRIP- TION	DOG BOLT ASSEMBLY	HINGE PIN	HINGE PIN WASHER	COTTER PIN	DOG PAD PIN	RETAINING PIN
JDA KIT I						

Table C-22. Replacement Wearing Parts for Raised Dog Bolt-Type Watertight

Hatches - Continued

						
DESCRIPTION	DOG BOLT ASSEMBLY	HINGE PIN	HINGE PIN WASHER	COTTER PIN	DOG PAD PIN	RETAINING PIN
PART NUMBER	0565	0314	0315	0316	0317	0317A
QUANTITY	4	2	2	2	4	4
WWM PEKPAK KIT G						
PART NUMBER	6002	0970	0971	0972	0973	0973-1
QUANTITY	4	2	2	2	4	4
NSN	5306-00-770-8390	5315-00-753-3875	-	-	5315-00-802-2938	-

C-16.1 Repair Parts List Include the following information with inquiries for drop bolts that are other than standard:

1. Application - hatch, portlight, ammunition locker, pyrotechnics locker.
2. Diameter of bolt and material, either mild steel, stainless (CRES) steel, brass or phosphor bronze.
3. Type thread - standard or ACME (ACME thread has flat edge on thread surface) and number of threads per inch.
4. Thread length desired (a "full thread" is the maximum amount possible).
5. O.A.L. from center of bolt eye to end of bolt.
6. Type of nut desired - hex head, ring, or wing
7. Furnish sample, if possible.

Table C-23. Repair Parts List

NAME	WWM/PM	NSN
DOG LUG, LH (WELDED TO HATCH COVER, CATCHES DROP BOLT)*	0982-1	
DOG LUG, RH*	0982	
DOG PAD	0975	
DOG PAD PIN, CRES, AND RETAINING PIN, BRASS	0973 x 0973-1	5315-00-802-2938 (DOG PAD PIN ONLY)
DOG BOLT ASSY, CRES (INCLUDES PC 51-53)**	6002	5306-00-770-8390
DOG BOLT ASSY, MSTL (FOR INTERIOR HATCHES)	6002-1	
DOG BOLT COLLAR, CRES	0820-11	3040-00-802-1840
DOG BOLT COLLAR PIN, CRES	0825-11	

Table C-23. Repair Parts List - Continued

NAME	WWM/PM	NSN
DOG BOLT NUT, 3/4-D8 ACME, BRASS	0818	5310-00-772-9259
HINGE BLADE	0981	
HINGE PAD (WELDED TO HATCH COAMING)	0977	
HINGE PIN, BRASS (INCLUDES 071-63X64)	0970	5315-00-753-3875
HINGE PIN COTTER, 1/8" x 1" L, CRES	0972-11	
HINGE PIN WASHER, BRASS	0971	
WRENCH, ENGINEER'S, 1-5/16"	1004	

*Dog lug, LH and RH also available in aluminum or CRES. **Dog bolt assy, CRES, with brass hex nut, is 303-304 grade stainless steel.

**Dog bolt assy, CRES, with brass hex nut, is 303-304 grade stainless steel.

C-17. Replacement Parts for 24" x 30", 4-Dog, Raised Quick-Acting Watertight Hatches, Spring Balanced (Rectangular or Oval)

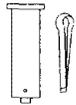
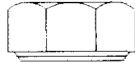
Table C-24. Replacement Parts for 24" x 30", 4-Dog, Raised Quick-Acting Watertight Hatches, Spring Balanced (Rectangular or Oval)

NAME	NSN
ADJUSTING SHOE AND SCREW	
BRACE LINK ASSEMBLY	
DOG BOLT	5306-00-753-4217
GLAND X PIN	
PACKING PLUNGER	
SPIDER AND PIN	
SPINDLE	
UPPER AND LOWER BRACE PIN AND COTTER	

C-18. Replacement Wearing Parts for Standard Raised and Flush Watertight Scuttles

These WTC kits provide wear parts to repair either raised or flush 18" or 21" QAWT scuttles. Clevis pins with cotter pins, dog rest springs, and dog adjusting bolts are supplied, along with dog rest side plates, self-locking hex nuts, and one 3-dog spider. These parts are sufficient to repair one 18" or 21" scuttle. A similar package for 4-dog, 25" scuttles is available upon request.

Table C-25. Replacement Wearing Parts for Standard Raised and Flush Watertight Scuttles

						
DESCRIP- TION	3-DOG SPIDER	DOG ADJUSTING BOLT	DOG REST SPRING	DOG REST SLIDE PLATE	CLEVIS PIN AND COT- TER PIN	LOCKNUT
JDA KIT K						
PART NUMBER	0567	0187	0188	0189	0194	0195
QUANTITY	1	3	3	6	3	2
WWM PEKPAK I						
PART NUMBER	6202	0881	0882	0883	0888	0889
QUANTITY	1	3	3	6	3	2
NSN	2040-00-770- 8393	5306-01-131- 6720	5360-00-690- 5373			

C-19. Replacement Wearing Parts for Standard Flush Quick-Acting Watertight Scuttles

These WTC kits provide replacement wear parts required to repair the spindle mechanism, brace link, and hinges on QAWT flush scuttles. For spindle assembly repair, kits supply the spindle, spindle collar, collar set-screw, packing plunger, and upper and lower flanged bushings. For brace link assembly maintenance, hinge blocks (one with brace pad welded on and one without), flat head machine screws, brace washers, lower brace link pin, brace stud, and one complete brace link assembly are provided. Brace link assembly available in CRES or mild steel. Kits also include hinge pins.

Table C-26. Replacement Wearing Parts for Standard Flush Quick-Acting Watertight Scuttles

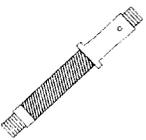
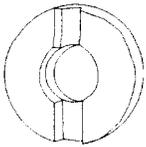
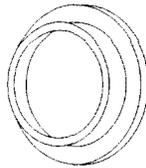
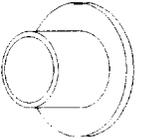
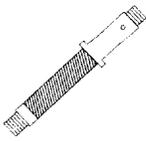
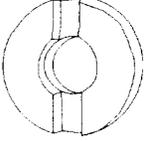
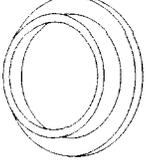
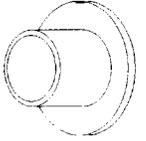
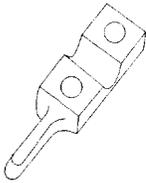
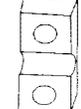
							
DESCRIP- TION	SPINDLE	SPINDLE COLLAR	SETSCREW	PACKING PLUNGER	UPPER FLANGED BUSHING	LOWER FLANGED BUSHING	BRACE LINK ASSY
JDA KIT L							
PART NUMBER	0171A	0172	0173	0174	0175	0176	CRES 0890 MSTL 0815
QUANTITY	1	1	1	1	1	1	1
WWM PEKPAK J							
PART NUMBER	0860-1	0861	0862	0863	0864	0865	CRES 0890 MSTL 0815
QUANTITY	1	1	1	1	1	1	1

Table C-26. Replacement Wearing Parts for Standard Flush Quick-Acting
Watertight Scuttles - Continued

							
DESCRIPTION	SPINDLE	SPINDLE COLLAR	SETSCREW	PACKING PLUNGER	UPPER FLANGED BUSHING	LOWER FLANGED BUSHING	BRACE LINK ASSY
NSN	2040-00-770-8392	5310-00-753-4330	5305-00-980-6819	2040-01-094-2568	3120-00-122-7037	3120-01-106-6753	2530-01-431-2288

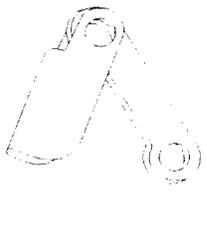
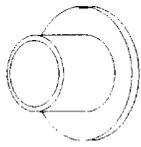
							
DESCRIPTION	BRACE PAD HINGE BLOCK	FLAT HEAD MACHINE SCREW	LOWER BRACE LINK PIN	HINGE PIN	BRACE WASHER	BRACE STUD	HINGE BLOCK
JDA KIT L							
PART NUMBER	300	0302	0303	0304	0305	0306	0307
QUANTITY	1	4	1	2	2	1	1
WWM PEKPAK J							
PART NUMBER	0945	0951	0952	0954	0955	0956	0957
QUANTITY	1	4	1	2	2	1	1
NSN	5340-01-241-1033		5315-01-242-6133	5315-01-155-8895		5365-01-243-3805	

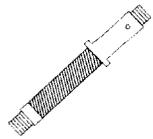
C-20. Replacement Wearing Parts for Standard Raised Quick-Acting Watertight Scuttles

These WTC kits provide replacement wear parts required to repair the spindle mechanism, brace link, and hinges on QAWT raised scuttles. Parts include one spindle, two flanged bushings, and one packing plunger for spindle assembly. Two hinge pins and collars are provided for hinge repair. For brace link repair, kits include one complete brace link assembly, as well as one upper brace link pin, one upper brace link pin collar, and one lower brace link pin.

To order these kits with self-lubricated bushings vice the Oilite bushings, order "WTC Kit Mod." In "WTC Kit Mod," the flanged bushings are replaced by CRES flanged self-lubricated bushings. A nylon plug is also supplied to plug the hole in the spindle.

Table C-27. Replacement Wearing Parts for Standard Raised Quick-Acting Watertight Scuttles

					
DESCRIPTION	BRACE LINK ASSEMBLY	UPPER BRACE LINK PIN	UPPER BRACE LINK PIN COLLAR	LOWER BRACE LINK PIN	FLANGED BUSHING
JDA KIT M					
PART NUMBER	0114	0148	0149	0150	0152
QUANTITY	1	1	1	1	2
WWM PEKPAK K					
PART NUMBER	0807	0822	0823	0824	0826
QUANTITY	1	1	1	1	2
NSN					
CRES					
BRASS		2040-01-093-1079		5315-01-142-3595	3120-01-097-8113

				
DESCRIPTION	HINGE PIN	HINGE PIN COLLAR	PACKING PLUNGER	SPINDLE
JDA KIT M				
PART NUMBER	0154	0155	0301	0574
QUANTITY	2	2	1	1
WWM PEKPAK K				
PART NUMBER	0828	0829	0950	9302
QUANTITY	2	2	1	1
NSN				
CRES				
BRASS	5315-01-372-8425	5320-01-082-2171		

SECTION II**COMPLETE PARTS LISTS FOR STANDARD WATERTIGHT DOORS, HATCHES, AND SCUTTLES**

[Appendix C, Part II](#), contains comprehensive lists of replacement parts for standard watertight doors, hatches, and scuttles. These parts have been manufactured to military specifications and are to be used in accordance with Planned Maintenance System (PMS) Maintenance Requirement Cards (MRCs).

C-21. DOORS

Table C-28. Individually Dogged Watertight Doors

NAME	JDA P/N	WWM P/N	NSN
ADJUSTING YOKE PIN AND WASHER	0197	8602 x 9602	5315-01-260-5538
COTTER PIN	054-11	9602	-
DOG AND HANDLE, 1-1/8", CRES	0117 x 0117A	0810	-
DOG HANDLE, 1-1/8", CRES	0117A	0810-1	5340-00-735-4565
DOG AND HANDLE, 1-1/8", MSTL	0116 x 0116A	0809	-
DOG HANDLE, 1-1/8", MSTL	0116A	0809-1	-
DOG AND HANDLE, 1", CRES	0112 x 0112A	0804	-
DOG HANDLE, 1", CRES	0112A	0804-1	-
DOG AND HANDLE, 1", MSTL	0118 x 0118A	0811	-
DOG HANDLE, 1", MSTL	0118A	0811-1	-
FLANGED BUSHING, 1-1/8" ID, OILITE	0556	1213	3120-01-104-1108
FLANGED BUSHING, 1" ID x 3/4" L, OILITE	0115	0702	-
GASKET, MIL-R-900, 1-1/4" x 1/2" (UNIT-FT)	0553	0808	-
GASKET, SILICONE RUBBER, ZZ-R-765, FOR MISSILE BLAST AREA DOORS	262-59	1003 BY NAME	-
GASKET, GLASS-METALLIC, SILICONE CORE, MIL-G-17927C, FOR FIRE ZONE BOUNDARY DOORS	074-41	BY NAME	-
HINGE BLADE, LOW	0323A	0985	-
HINGE BLADE, HIGH	054-1	098	-
HINGE PAD, LOW	0324A	0984	-
HINGE PAD, HIGH	054-3		-
HINGE PIN AND COLLAR	0561 x 0563	4602 x 5602	5315-00-841-1390 (hinge pin only)
HINGE PIN COLLAR	0563	5602	3040-00-152-8830
HINGE PIN WASHER, 1/16", BRASS	0570A	7602-1	5310-01-128-5347
HINGE PIN WASHER, 1/8", BRASS	0570	7602	-
HINGE YOKE	0197	0939	5342-01-259-4615
JAMNUT, 7/8"-9NC, CAD. PLTD, INTERIOR DOORS	0185	0879	-
JAMNUT, 7/8"-9NC, CRES, EXTERIOR DOORS, 1-1/8" SPINDLE	0147	0821	5310-01-097-7966
JAMNUT, 3/4"-10NC, ZINC PLTD, INTERIOR DOORS, 1" SPINDLE	0169	0806	-
JAMNUT, 3/4"-10NC, CRES, EXTERIOR DOORS, 1" SPINDLE	0113	0858	-
PACKING PLUNGER, 2" L, FOR 1" SPINDLE SIZE	0301	0950	-
PACKING PLUNGER, 2-5/8" L, FOR 1-1/8" SPINDLE SIZE	0564	5902	-
PORT SIGHT GLASS, HEAT TREATED, 4-3/4" D x 3/4" THICK	0184	0878	-
PORT SIGHT GLASS FRAME ASSY, WITH GLASS, MSTL	055-1-6	0878-1	-
PORT SIGHT GLASS FRAME ASSY, WITH GLASS, CRES	055-1-6C	0878-11	-
SETSCREW, DOG POINT, 12-28NF, BRASS	0142	0816	5305-01-393-4916
SETSCREW, DOG POINT, 1/4"-20, BRASS	0142A	0816-1	-

Table C-28. Individually Dogged Watertight Doors - Continued

NAME	JDA P/N	WWM P/N	NSN
SPRING CLIP ASSY (DOG RETAINER), USE REV. K, 1/2"	0105	0403	-
SPRING, 1-1/8" ID, PHOS. BRZ, FOR 1-1/8" SPINDLE	0105	3902	5360-00-690-5395
STICK PACKING, 325 PER BOX (ORDER BY BOX OR EACH)	0551	1001-1	5330-00-262-9439
STRAIGHT BUSHING, 1-1/8" ID, OILITE	0562	4902	3120-00-999-3106
STRING PACKING, 225 FT SPOOL (ORDER BY SPOOL OR LENGTH)	0552	1002	5330-00-262-9437
WEDGE, LEFT-HAND, DRILLED AND CSK FOR RIVET	0183	0874	-
WEDGE, RIGHT-HAND, DRILLED AND CSK FOR RIVET	0181	0873	-
WEDGE, LEFT-HAND, UNDRILLED FOR WELDING	0183A	0874-1	2040-00-770-8389
WEDGE, RIGHT-HAND, UNDRILLED FOR WELD- ING	0182	0873-1	2040-00-770-8388
WEDGE, RIVET, BRASS, 5/16" D x 9/16" L	0573	8702	-

Table C-29. 26" x 66", 8-Dog, Quick-Acting Watertight Doors

NAME	JDA P/N	WWM P/N
BELL CRANK LEVER, HINGE AND LEVER SIDE, LH	0164A	0841-1
BELL CRANK LEVER, HINGE AND LEVER SIDE, RH	0164	0841
BOTTOM DOG LEVER, HINGE SIDE, LH	0157A	0831-1
BOTTOM DOG LEVER, HINGE SIDE, RH	0157	0831
BOTTOM DOG LEVER, LEVER SIDE, LH	0156A	0830-1
BOTTOM DOG LEVER, LEVER SIDE, RH	0156	0830
CONROD, CORNER (ALL ALIKE)	0162	0836
CONROD, HINGE SIDE, LH	0161A	0835-1
CONROD, HINGE SIDE, RH	0161	0835
CONROD, LEVER SIDE, LH	0160A	0834-1
CONROD, LEVER SIDE, RH	0160	0834
CONROD, TOP, LH OR RH	0163	0840
OPERATING HANDLE ASSY, CRES, REPL., LH OR RH	DC KIT D-CRES	"C" CRES
OPERATING HANDLE ASSY, MSTL, REPL., LH OR RH	DC KIT D-MS	"C" MSTL
SIDE DOG LEVER, HINGE SIDE, LH	0159A	0833-1
SIDE DOG LEVER, HINGE SIDE, RH	0159	0833
SIDE DOG LEVER, LEVER SIDE, LH	0158A	0832-1
SIDE DOG LEVER, LEVER SIDE, RH	0158	0832
TOGGLE LINK ASSY, LH	0165A	0843-1
TOGGLE LINK ASSY, RH	0165	0843

Table C-30. 26" x 66", 10-Dog, Quick-Acting Watertight Doors

NAME	JDA P/N	WWM P/N
BELL CRANK LEVER, HINGE AND LEVER SIDE, LH	0164A	0841-1
BELL CRANK LEVER, HINGE AND LEVER SIDE, RH	0164	0841
BOTTOM DOG LEVER, HINGE SIDE, LH	0157A	0831-1

Table C-30. 26" x 66", 10-Dog, Quick-Acting Watertight Doors - Continued

NAME	JDA P/N	WWM P/N
BOTTOM DOG LEVER, HINGE SIDE, RH	0157	0831
BOTTOM DOG LEVER, LEVER SIDE, LH	0156A	0830-1
BOTTOM DOG LEVER, LEVER SIDE, RH	0156	0830
CONROD, CORNER (ALL ALIKE)	0168	0850
CONROD, HINGE SIDE, LH	0167A	0849-1
CONROD, HINGE SIDE, RH	0167	0849
CONROD, LEVER SIDE, LH	0166A	0848-1
CONROD, LEVER SIDE, RH	0166	0848
CONROD, TOP, LH OR RH	0163	0840
OPERATING HANDLE ASSY, CRES, REPL., LH OR RH	DC KIT D-CRES	"C" CRES
OPERATING HANDLE ASSY, MSTL, REPL., LH OR RH	DC KIT D-MS	"C" MSTL
SIDE DOG LEVER, HINGE SIDE, LH	0159A	0833-1
SIDE DOG LEVER, HINGE SIDE, RH	0159	0833
SIDE DOG LEVER, LEVER SIDE, LH	0158A	0832-1
SIDE DOG LEVER, LEVER SIDE, RH	0158	0832
TOGGLE LINK ASSY, LH	0165A	0843-1
TOGGLE LINK ASSY, RH	0165	0843

Table C-31. 26" x 66", 3-Dog, Quick-Acting Watertight Doors

NAME	JDA P/N	WWM P/N	NSN
ADJUSTING YOKE PIN AND WASHER	0572	8602	5315-01-260-5538
COTTER PIN	054-11	9602	-
CONROD, LH			-
CONROD, RH			-
CONROD BUSHING, 3/8" L, OILITE	0107	0800	3120-01-106-6754
CONROD COLLAR AND COTTER	0568	6702	5310-00-735-4548
CONROD COLLAR COTTER PIN	0520-20	6702-1	-
CONROD SIDE AND BOTTOM DOG BUSHING, 1/2", OILITE	0109	0801	3120-01-104-4965
FLANGED BUSHING, 1" ID, OILITE	0106	0702	3120-01-125-1292
GASKET, MIL-R-900, 1-1/4" x 1/2" (UNIT-FT)	0553	1003	-
GASKET, SILICONE RUBBER, ZZ-R-765, FOR MISSILE BLAST AREA DOORS	262-59		
GASKET, GLASS-METALLIC, SILICONE CORE, MIL-G-17927C, FOR FIRE ZONE BOUNDARY DOORS	074-41		
HINGE BLADE, LOW	* 0324A/** 0324	* 0985-1/** 0985	
HINGE BLADE, HIGH	054-1		
HINGE PAD, LOW	* 0323A/** 0323	* 0984-1/** 0984	
HINGE PAD, HIGH	054-3		
HINGE PIN AND COLLAR	0561 x 0563	4602	5315-00-841-1390 (hinge pin only)
HINGE PIN COLLAR FOR 054-6	0563	5602	3040-00-152-8830
HINGE PIN WASHER, 1/16", BRASS	0570A	7602-1	5310-01-128-5347
HINGE PIN WASHER, 1/8", BRASS	0570	7602	
HINGE YOKE	0197	0939	2040-01-452-6372

Table C-31. 26" x 66", 3-Dog, Quick-Acting Watertight Doors - Continued

NAME	JDA P/N	WWM P/N	NSN
HOOK, MSTL OR CRES	050-54 or 050-54S		
JAMNUT, 7/8-9NC, CAD. PLTD, INTERIOR DOORS	0185	0879	
JAMNUT, 7/8-9NC, CRES FOR EXTERIOR DOORS	0147	0821	5310-01-097-7966
LEVER REST CLIP BRACKET, LH FOR MTG OPER HANDLE CLIP ASSY, QAAT AND WT DOORS	053-13LH	0404	
LEVER REST CLIP BRACKET, LH FOR MTG OPER HANDLE CLIP ASSY, QAAT AND WT DOORS	053-13RH		
LINKAGE WASHER, BRASS	0111	0803	5310-01-244-4517
LOCKING SETSCREW, 1/44-18 x 7/16 L, CRES FOR SPLIT SPINDLE (OBSOLETE)	051-86	0890	
OPERATING HANDLE ASSY, CRES LH OR RH	0587	PEKPAK "C"	
OPERATING HANDLE ASSY, HINGE SIDE, 36" QAWT DOOR, CRES	0588		
OPERATING HANDLE ASSY, MSTL LH OR RH	0587A	PEKPAK "C"	
OPERATING HANDLE ASSY, HINGE SIDE, 36" QAWT DOOR, MSTL	0588A		
PACKING PLUNGER, 1-1/2" L PHOS. BRZ, FOR DOG SPINDLE	0566	6102	
PACKING PLUNGER, 2-1/4" L PHOS. BRZ, FOR OUTSIDE OPERATING HANDLE	0559	3802	2040-01-033-6240
PORT SIGHT GLASS, HEAT TREATED, 4-3/4" x 3/4"	0184	0878	
PORT SIGHT GLASS FRAME ASSY, WITH GLASS, MSTL	055-1-6		
PORT SIGHT GLASS FRAME ASSY, WITH GLASS, CRES	055-1-6-C		
ROTATING DOG, CRES	0119	0812	2040-00-770-8374
ROTATING DOG, MSTL	0119A	0812-1	
SCUFF PLATE, CRES	0199	0941	
SETSCREW, DOG POINT, 12-28NF, BRASS	0142	0816	5305-01-103-8804
SETSCREW, DOG POINT, 12-28NF, CRES	0576	0816-11	
SETSCREW, DOG POINT, 1/4-20, BRASS	0142A	0816-1	
SETSCREW, DOG POINT, 1/4-20, CRES	0142AS	0816-1-11	
SPRING, 1" ID, PHOS. BRZ	0558	8702	5360-00-802-1859
SPRING CLIP ASSY, RETAINS OPER HANDLE, REV. K, 1/2"	143	0817	5340-01-382-4563
STAPLE, MSTL OR CRES	050-55 or 050-55A		
STICK PACKING, 325 PER BOX (ORDER BY BOX OR EA)	0551	1001-1	5330-00-262-9439
STRAIGHT BUSHING, 1" ID, OILITE	0557	1702	
STRING PACKING, 225 FT SPOOL (ORDER BY SPOOL OR LENGTH)	0552	1002	
TOGGLE LINK BUSHING, 5/8" L, OILITE	0110	0802	3120-01-104-4966
TOGGLE LINK AND HANDLE EXTENSION SELF- LUBRICATED BUSHING	0110A		
TOGGLE LINK ASSY, LH			

Table C-31. 26" x 66", 3-Dog, Quick-Acting Watertight Doors - Continued

NAME	JDA P/N	WWM P/N	NSN
TOGGLE LINK ASSY, RH			
TOGGLE LINK ASSY, LH OFFSET	058-23		
TOGGLE LINK ASSY, RH OFFSET	058-22		
WEDGE, LH, DRILLED AND CSK FOR RIVET	0183	0874	
WEDGE, RH, DRILLED AND CSK FOR RIVET	0181	0873	
WEDGE, LH, UNDRILLED FOR WELDING	0183A	0874-1	2040-00-770-8389
WEDGE, RH, UNDRILLED FOR WELDING	0182	0873-1	2040-00-770-8388
WEDGE, RIVET	0573	8702	

*STEEL

**CRES

C-22. HATCHES**Table C-32.** Raised Drop Bolt-Type Watertight Hatches

NAME	JDA P/N	WWM P/N	NSN
DOG LUG, LH (WELDED TO HATCH COVER, CATCHES DROP BOLT)*	0321A	0982-1	
DOG LUG, RH*	0321	0982	
DOG PAD	0318	0975	
DOG PAD PIN, CRES, AND RETAINING PIN, BRASS	0317 x 0317A	0973	5315-00-802-2938 (dog pad pin only)
DROP BOLT ASSY, CRES (INCLUDES PC 51-53)**	0565	6002-11	5306-00-770-8390 (Pc 50 only)
DROP BOLT ASSY, MSTL (FOR INTERIOR HATCHES)	0565 STL	6002	
DROP BOLT COLLAR, CRES OR STEEL	0146	0820	3040-00-802-1840 (steel)
DROP BOLT COLLAR PIN, CRES OR BRASS	0151	0825	
DROP BOLT NUT, 3/4-D8 ACME, BRASS	0145	0819	5310-00-772-9259
HINGE BLADE, STEEL	0320	0981	
HINGE PAD (WELDED OR BOLTED TO HATCH COAMING)	0319	0977	
HINGE PIN, BRASS	0314	0970	5315-00-753-3875
HINGE PIN COTTER, 1/8" x 1", CRES OR BRASS	0316	0972	
HINGE PIN WASHER, BRASS	0315	0971	
WRENCH, ENGINEER'S, 1-5/16"	0554	1004	
WRENCH, CLIPS, TWO PER SET	0555	1005	

*Dog lug, LH and RH also available in aluminum or CRES.

**Dog bolt assy, CRES, with brass hex nut, is 303-304 grade stainless.

Table C-33. 24" X 30", 4-Dog, Raised Quick-Acting Watertight Hatch,
Spring Balanced

NAME	JDA P/N	WWM P/N	NSN
ADJUSTING SHOE AND SCREW	021-14 x 15	0900	
BRACE LINK ASSEMBLY	021-50/52		
DOG BOLT AND NUT	021-10/12		5306-00-753-4217 (dog bolt only)
GLAND x PIN	021-22 x 23		
PACKING PLUNGER	021-21		
SPIDER AND PIN	021-28 x 29		
SPINDLE	021-19		
UPPER AND LOWER BRACE PIN AND COTTER	021-48 x 49		

Table C-34. Flush Individually Dogged Watertight Hatches, Light Dog

NAME	JDA P/N	WWM P/N	NSN
ANGLE DOG, CRES	0177RH or 0177LH	0867	5342-01-093-1551
ANGLE DOG, MSTL	0177ARH or 0177ALH	0867-1	
BEARING (ONE PER SPINDLE), OILITE, 1/8" THICK	0309	0961	
BUSHING, STRAIGHT (TWO PER SPINDLE), 1" ID x 5/8" L	0310	0962	3120-01-108-4531
CATCH SPRING, PHOS. BRZ (ONE PER DOG ASSY)	105-63	0966	
HINGE U-PAD (TWO PER HATCH)	106-68		
HINGE PIN, CRES (TWO PER HATCH)	0312	0967	
HINGE PIN KEEPER, MSTL (TWO PER HATCH)	0313A	0969	
LOCKNUT, CRES	0179	0871	
MACH. SCREW, FH, CRES (TWO PER KEEPER)	0313	0968	
SPACER (TWO PER SPINDLE), OILITE, 1/16" THICK	0180	0872	
SPINDLE, CRES, 1" OD, 7/8"-9NC-2	0178	0870	3040-00-735-4558
STRAIGHT DOG, CRES	0177	0866	2040-00-735-4559
STRAIGHT DOG, MSTL	0177A	0866-1	
STRAIGHT WEDGE, BRASS	0311B	0964	5340-00-770-8386
WEDGE RIVET, BRASS (OBSOLETE-BUT AVAIL- ABLE)	105-62		
STRAIGHT WEDGE, ALUM BRZ	0311		

Table C-35. Flush Individually Dogged Watertight Hatches, Heavy Dog

NAME	JDA P/N	WWM P/N	NSN
BEARING (ONE PER SPINDLE)	119-59	0961	
BUSHING, STRAIGHT (TWO PER SPINDLE), 1-1/8" ID	119-54	4902	
SPACER (TWO PER SPINDLE)	119-60	0872	
SPINDLE, CRES, 1-1/8" OD	119-55	0870	

C-23. SCUTTLES**Table C-36.** 18", 21", and 25" Flush and Raised Quick-Acting Watertight Scuttles

NAME	JDA P/N	WWM P/N	NSN
DOG ADJUSTING BOLT, WITH NYLOC PIN, CRES	0187	0881	5306-01-131-6720
DOG ARM, 18", GALV.	0190	0884	
DOG ARM, 21", GALV.	0191	0885	
DOG ARM, 25", GALV.	0192	0886	2040-00-770-8379
DOG CAM	0140	0814	2040-00-735-4564
DOG PIN AND COTTER, CRES	0194	0888	
DOG REST SLIDE PLATE, BRASS	0189	0883	
DOG REST SPRING, PHOS. BRZ	0188	0882	5360-00-690-5373
SPIDER, 3-DOG	0567	6202	2040-00-770-8393
SPIDER, 4-DOG (FOR 25" SCUTTLES)	0193	0887	2040-01-368-7043

Table C-37. Raised Quick-Acting Watertight Scuttles

NAME	JDA P/N	WWM P/N	NSN
BRACE LINK ASSY, CRES	0114	0807	
BUSHING, UPPER AND LOWER	0152	0826	3120-01-097-8113
HANDWHEEL, LOWER, 10" (18" x 21" SCUTTLES)	0569	7202	
HANDWHEEL, UPPER, 10" (18" x 21" SCUTTLES)	0569A	7202-1	
HANDWHEEL, LOWER, 13" (25" SCUTTLES)	0186	0880	5340-00-802-1833
HANDWHEEL, UPPER, 13" (25" SCUTTLES)	0186A	0880-1	5340-00-802-1834
HINGE PIN	0154	0828	5315-00-802-1837
HINGE PIN COLLAR	0155	0829	5320-01-082-2171
LOCKNUT, MSTL, PLATED, HANDWHEEL	0195 MSTL	0889	
LOCKNUT, CRES	0195 CRES	0889-1	
LOWER BRACE LINK PIN	0150	0824	5315-01-142-3595
PACKING PLUNGER, 2" L, PHOS. BRZ	0301	0950	
SPINDLE, CRES	0574	9302	
UPPER BRACE LINK PIN	0148	0822	5315-01-140-9950
UPPER BRACE LINK PIN COLLAR	0149	0823	2040-01-093-1079

Table C-38. Flush Quick-Acting Watertight Scuttles

NAME	JDA P/N	WWM P/N	NSN
BRACE LINK ASSY, MSTL	0815	0815	
BRACE LINK ASSY, CRES	0890	0890	
BRACE LINK PIN, LOWER, BRASS	0303	0952	5315-01-242-6133
BRACE STUD, PHOS. BRZ (UPPER PIN)	0306	0956	5365-01-243-3805
BRASS WASHER, BRASS (TWO PER BRACE STUD)	0305	0955	
FLANGED BUSHING, LOWER, OILITE	0176	0865	3120-01-106-6753
FLANGED BUSHING, UPPER, OILITE	0175	0864	3120-00-122-7037
HANDWHEEL, LOWER, 10" DIA.	0569	7202	
HANDWHEEL, LOWER, 13" DIA.	0186	0880	5340-00-802-1833

Table C-38. Flush Quick-Acting Watertight Scuttles - Continued

NAME	JDA P/N	WWM P/N	NSN
HINGE BLOCK, MSTL, GALV. (RIGHT SIDE)	0307	0957	
HINGE BLOCK AND BRACE PAD, MSTL, GALV. (LEFT SIDE)	0300	0945	
HINGE BLOCK, CRES (RIGHT SIDE)		0957-11	
HINGE BLOCK AND BRACE PAD, CRES (LEFT SIDE)		0945-11	
HINGE PAD, GALV.	0308	0960	
HINGE PAD, CRES	0960-11		
HINGE PIN	0304	0954	5315-01-155-8895
LOCKNUT, MSTL, PLATED, HANDWHEEL	0195 MSTL	0889	
LOCKNUT, CRES, HANDWHEEL	0195 CRES	0889-11	
MACHINE SCREW, FH, 3/8" x 2", CRES	0302	0951	
PACKING PLUNGER, 3/4" L, PHOS. BRZ	0174	0863	2040-01-094-2568
SETSCREW, 1/4-28UNF, 5/16" L, CRES	0173	0816-1-11	5305-00-980-6819
SPINDLE	0171A	0860-1	2040-00-770-8392
SPINDLE ASSY, COMPLETE CRES	0171	0860	
SPINDLE COLLAR, CRES	0172	0861	5310-00-753-4330
T-WRENCH	0170	0859	
HINGE TAPPING BLOCK			

C-24. OTHER

For aluminum closures, CRES, grade 316 flanged and straight bushings, dog point setscrews, and compression springs are suggested as replacement parts for nylon bushings, brass dog point setscrews, and phosphor bronze springs.

Table C-39. Watertight Aluminum Closures

NAME	JDA P/N	WWM P/N	NSN
ADJUSTING YOKE PIN AND COTTER, CRES	0901	8602-11	
ADJUSTING YOKE PIN COTTER, CRES		9602-11	
FLANGED BUSHING, QA DOOR, 1" ID, CRES	0575	0702-11	
FLANGED BUSHING, ID DOOR, 1-1/8" ID, CRES	0578	1213-11	
HINGE BLADE, LOW, ALUMINUM	0902	885-11	
HINGE PIN AND COLLAR, CRES	0580 x 0582	4602-11 x 5602-11	
HINGE PIN COLLAR, CRES	0582	5602-11	
HINGE YOKE, ALUMINUM	0577 CRES	0939-11	
MACHINE SCREW, FH, CRES, 5/16-24NF (FOR WEDGES)	0586	8702-11	
SETSCREW, DOG POINT, ALLEN HEAD, 12-28NF, CRES	0576	0816-11	
SETSCREW, DOG POINT, ALLEN HEAD, 1/4-20NF, CRES		0816-1-11	
SPRING, QA DOOR, 1" ID, CRES	0558A	3702-11	
SPRING, ID DOOR, 1-1/8" ID, CRES	0560A	3902-11	
STRAIGHT BUSHING, QA DOOR, 1" ID, CRES	0579	1702-11	

Table C-39. Watertight Aluminum Closures - Continued

NAME	JDA P/N	WWM P/N	NSN
STRAIGHT BUSHING, ID DOOR, 1-1/8" ID, CRES	0581	4902-11	
WEDGE, LH, CRES DRILLED AND TAPPED FOR 5/16-24	0595	0874-11	
WEDGE, RH, CRES DRILLED AND TAPPED FOR 5/16-24	0594	0873-11	

Table C-40. Sliding Dog Quick-Acting Watertight Doors

NAME	JDA P/N	WWM P/N	NSN
DOG, SLIDER BAR, SIDE			
DOG, SLIDER BAR, END			
PIVOT PIN		1013	
OPERATING CRANK, RH		1014	
OPERATING CRANK, LH		1015	
OPERATING CRANK CAP, RH		1016	
OPERATING CRANK CAP, LH		1017	
SPINDLE		1018	
SPINDLE BUSHING		1019	
SPINDLE NUT		1020	
SPINDLE NUT PIN		1021	
SLIDE PLATE		0883	
SPRING		0882	
SETSCREW (FOR ADJUSTING SPRING TENSION ON DOG)		1026	
LOCKING SETSCREW		1027	
CONROD BUSHING		1028	
CONROD WASHER		0803	
CONROD COTTER PIN		1030	
CONNECTING RODS			
TOGGLE ARM BOLT		1046	
TOGGLE ARM, RH		1047	
TOGGLE ARM, LH		1048	
TOGGLE ARM BUSHING		1049	
TOGGLE ARM PIN		1050	
TOGGLE ARM LOCK PIN		1051	
TOGGLE ARM SPRING MAIN LEAF		1052	
TOGGLE ARM SPRING 2ND LEAF		1053	
TOGGLE ARM SPRING 3RD LEAF		1054	
TOGGLE ARM BACKPLATE		1055	
TOGGLE ARM SPRING BOLT		1056	
TOGGLE ARM SPRING LOCKWASHER		1057	
TOGGLE ARM COLLAR			
TOGGLE ARM COTTER PIN			
HAND LEVER, 26 x 66, 8-DOG DOOR			
HAND LEVER SHAFT x LINKS, RH		1079	
HAND LEVER SHAFT x LINKS, LH		1080	
HAND LEVER SHAFT BUSHING			

Table C-40. Sliding Dog Quick-Acting Watertight Doors - Continued

NAME	JDA P/N	WWM P/N	NSN
PACKING PLUNGER		0950	
HAND LEVER SHAFT NUTS		0858	
INTERLOCK BRACKET		1085	
INTERLOCK LATCH ASSEMBLY		1086	
INTERLOCK LATCH HUB		1087	
INTERLOCK LATCH PIN		1088	
INTERLOCK LATCH COTTER			
INTERLOCK LATCH SPRING		1090	
INTERLOCK LATCH SPRING PIN		1093	
INTERLOCK ROD SLIDE BUTTON		1094	
INTERLOCK ROD COTTER			
INTERLOCK ROD STUD			
INTERLOCK ROD			
HINGE PIN		4602	5315-00-841-1390
HINGE WASHER, 1/16"		7602-1	5310-01-128-5347
HINGE WASHER, 1/8"		7602	
HINGE ADJUSTING YOKE		0939	5342-01-259-4615
HINGE ADJUSTING YOKE PIN		8602	5315-01-260-5538
HINGE ADJUSTING YOKE PIN COTTER		9602	
HINGE PIN (DOUBLE)		4602-1	
HINGE PIN COLLAR		5602	3040-00-152-8830

Table C-41. Individually Dogged, Watertight Mild Steel Doors with Self-Lubricated Stainless Steel (CRES) Bushings

NAME	JDA P/N	WWM P/N	NSN
ADHESIVE SEALANT, TYPE III, FOR FLANGED BUSHING INSTALLATION, HAZ. MAT.			
ADJUSTING YOKE PIN, BRASS, AND COTTER COTTER PIN, CRES, 5/32" x 2"		8602 x 9602	
ANTISEIZE COMPOUND, MIL-T-22361		9602	
BUSHING, FLANGED, 316 GR SST, 1-1/8" ID, USED ON ALL ID DOORS		11-1213	3120-01-436-0830
BUSHING STRAIGHT, 316 GR SST, 1-1/8" ID, USED ON ALL ID DOORS		11-4902	3120-01-435-7963
DOG, 316 GR SST, 1-1/8", USED ON ALL ID DOORS EXCEPT 26" x 45", 10- x 12-DOG		11-0810	2040-01-434-4754
DOG HANDLE, 316 GR SST, 1-1/8", USED ON ALL ID DOORS		11-0810-1	2040-01-434-6865
DOG, 316 GR SST, 1-1/8", USED ONLY ON ID 26" x 45", 10- x 12-DOG DOORS			
GASKET, SYNTHETIC RUBBER, MIL-R-900, 1-1/4" x 1/2", FOR ALL STANDARD CLOSURES WITH TWO OPPOSITE CHAMFERED CORNERS		1003	
GASKET, SILICONE RUBBER, ZZ-R-765, FOR MISSILE BLAST AREAS			

Table C-41. Individually Dogged, Watertight Mild Steel Doors with
Self-Lubricated Stainless Steel (CRES) Bushings - Continued

NAME	JDA P/N	WWM P/N	NSN
GASKET, GLASS-METALLIC COVER, SILICONE CORE, MIL-G-17927C, FOR FIRE ZONE BOUNDARY DOORS		0985	
HINGE BLADE, LOW, MSTL, FOR ALL ID DOORS			
HINGE BLADE, HIGH, MSTL, FOR ALL ID DOORS			
HINGE PAD, LOW, MSTL, FOR ALL ID DOORS			
HINGE PAD, HIGH, MSTL, FOR ALL ID DOORS			
HINGE PAD GUSSET, HIGH, MSTL, FOR ALL ID DOORS			
HINGE PIN			5306-01-434-2298
HEX NUT, BRASS, 1/2-13NC			5310-01-434-1852
COTTER PIN, CRES, 3/32" x 1"			
HINGE PIN WASHER, BRASS, 1/16"		7602-1	5310-01-128-5347
HINGE PIN WASHER, BRASS, 1/8"		7602	5310-01-312-3369
HINGE YOKE, MSTL		0939	
HEX NUT, SELF-LOCKING, MSTL, PLATED, 7/8-9NC		0879	
HEX NUT, SELF-LOCKING, CRES, 7/8-9NC		0821	
LOCKNUT, MSTL, PLATED, 7/8-9NC			
LOCKNUT, CRES, 7/8-9NC			
O-RING, NITRILE, 1-3/16" ID x 1-3/8" OD x 3/32"			
PORTSIGHT GLASS FRAME ASSY, MSTL			
PORT SIGHT GLASS (LENS), HEAT TREATED, 4-3/4" D x 3/4" TRUNK			
PORT SIGHT GLASS GASKET, MIL-R-900			
PORT SIGHT FRAME STUD, 316 GR SST, 3/8-16NC, WELD TYPE			
HEX NUT, CRES, 3/8-16NC			
SETSCREW, SOCKET, HEADLESS, CRES, 12-28NF x 9/32" L, FULL DOG (0.110" DOG POINT OR EQUIVALENT 7/64" L)			5305-01-369-0768
SETSCREW, SOCKET, HEADLESS, CRES, 1/4-20NC x 9/32" L, FULL DOG			
SILICONE COMPOUND FOR BEARINGS AND DOG ASSY INSTALLATION HAZ. MAT.			
SPRING, 1-1/8" ID, 302 GR SST, FOR ID DOG ASSY			5360-01-434-1831
SPRING CLIP ASSY FOR IND. DOG, CONSISTING OF PHOS. BRZ SPRING CLIP STL STOP, TWO RH MACHINE SCREWS, BRASS, 10-32 x 3/8"			
SPRING CLIP BRACKET, STL WASHER, THRUST, 316 GR SST, FOR IND. DOG ASSY			5310-01-437-9259
WEDGE, ALUMINUM BRONZE ALLOY, LH			2040-01-435-8933
WEDGE, ALUMINUM BRONZE ALLOY, RH			5342-01-435-1754

Table C-42. Quick-Acting, Watertight Mild Steel Doors with Self-Lubricated Stainless Steel (CRES) Bushings

NAME	JDA P/N	WWM P/N	NSN
ADHESIVE SEALANT, TYPE III, FOR FLANGED BUSHING INSTALLATION HAZ. MAT.			
ADJUSTING YOKE PIN, BRASS, AND COTTER COTTER PIN, CRES, 5/32" x 2"			
ANTISEIZE COMPOUND, MIL-T-22361			
BUSHING, FLANGED, 316 GR SST, 1" ID, USED ON ALL QA DOORS			3120-01-444-2987
BUSHING, FLANGED, 316 GR SST, 1" ID, USED ON ALL QA DOOR OPERATING HANDLE ASSEMBLIES			3120-01-444-3007
BUSHING, STRAIGHT, 316 GR SST, 1" ID, 1.125 L USED ON QA DOORS WITH STD LENGTH DOG SPINDLES			3120-01-444-3003
BUSHING, STRAIGHT, 316 GR SST, 1" ID, 1.183 L USED ON QA DOORS WITH LONG SPINDLE ON DOG ASSY BELOW OPERATING HANDLE BUSHING, CONROD, 316 GR SST, 3/8" L			
BUSHING DOG LEVER, 316 GR SST, 1/2" L			
BUSHING, TOGGLE LINK AND OPERATING HANDLE, 316 GR SST, 5/8" L			
BELL CRANK LEVER, HINGE SIDE AND LEVER SIDE, LH			
BELL CRANK LEVER, HINGE SIDE AND LEVER SIDE, RH			
BOTTOM DOG LEVER, HINGE SIDE, LH FOR ALL QA, MSTL DOORS EXCEPT 36" x 66" 10-DOG			
BOTTOM DOG LEVER, HINGE SIDE, RH FOR ALL QA, MSTL DOORS EXCEPT 36" x 66" 10-DOG			
BOTTOM DOG LEVER, HINGE SIDE, LH FOR ALL QA, MSTL 36" x 66" 10-DOG DOORS			
BOTTOM DOG LEVER, HINGE SIDE, RH FOR ALL QA, MSTL 36" x 66" 10-DOG DOORS			
BOTTOM DOG LEVER, LEVER SIDE, LH FOR ALL QA, MSTL DOORS			
BOTTOM DOG LEVER, LEVER SIDE, RH FOR ALL QA, MSTL DOORS			
CONNECTING LINKS, CONNECTING RODS, CORNER RODS AND TOP CONRODS (LINKAGE MECHANISM) ^{NOTE:}			
CONROD COLLAR, BRASS, AND COTTER PIN, CRES COTTER PIN, CRES			
CONROD WASHER, BRASS			
GASKET, SYNTHETIC RUBBER, MIL-R-900, 1-1/4" x 1/2" FOR ALL STANDARD CLOSURES WITH TWO OPPOSITE CHAMFERED CORNERS			

Table C-42. Quick-Acting, Watertight Mild Steel Doors with Self-Lubricated
Stainless Steel (CRES) Bushings - Continued

NAME	JDA P/N	WWM P/N	NSN
GASKET, SILICONE RUBBER, ZZ-R-765, FOR MISSILE BLAST AREAS			
GASKET, GLASS-METALIC COVER, SILICONE CORE, MIL-G-17927C, FOR FIRE ZONE BOUNDARY DOORS			
HINGE BLADE, LOW, MSTL, FOR ALL MSTL QA DOORS EXCEPT 30" x 36" AND 36" x 66", 10-DOG			
HINGE BLADE, LOW, MODIFIED, MSTL, FOR QA DOORS, 30" x 36" AND 36" x 66", 10-DOG			
HINGE BLADE, HIGH, MSTL, FOR ALL MSTL, QA DOORS			
HINGE PAD, LOW, MSTL, FOR ALL MSTL QA DOORS EXCEPT 30" x 36" AND 36" x 66", 10-DOG			
HINGE PAD, LOW, MODIFIED, FOR ALL QA DOORS, 30" x 36" AND 36" x 66", 10-DOG			
HINGE PAD, HIGH, MSTL, FOR ALL MSTL QA DOORS			
HINGE PAD GUSSET, LOW, MSTL, FOR ALL MSTL QA DOORS			
HINGE PAD GUSSET, HIGH, MSTL, FOR ALL MSTL QA DOORS			
HINGE PIN			5315-01-437-3832
HEX NUT, BRASS, 1/2-13NC			
COTTER PIN, CRES, 3/32" x 1"			
HINGE PIN WASHER, BRASS, 1/16"			
HINGE PIN WASHER, BRASS, 1/8"			
HINGE YOKE, MSTL			
HEX NUT, SELF-LOCKING, MSTL, PLATED, 7/8-9NC			
HEX NUT, SELF-LOCKING, CRES, 7/8-9NC			5310-01-369-8655
LINKAGE MECHANISM			
LOCKNUT, MSTL, PLATED, 7/8-9NC			
LOCKNUT, CRES, 7/8-9NC			
O-RING, NITRILE, 1-3/16" ID x 1-3/8" OD x 3/32"			
OPERATING HANDLE ASSY FOR 36" x 66", 10-DOG			
OPERATING HANDLE ASSY FOR OTHER THAN 36" x 66", 10-DOG			
PORT SIGHT GLASS (LENS), HEAT TREATED, 4-3/4" D x 3/4" TRUNK			
PORT SIGHT GLASS FRAME ASSY, MSTL			
PORT SIGHT GLASS GASKET, MIL-R-900			
PORT SIGHT FRAME STUD, 316 GR SST, 3/8-16NC, WELD TYPE			
HEX NUT, CRES, 3/8-16NC			
ROTATING DOG, 316 GR SST			

Table C-42. Quick-Acting, Watertight Mild Steel Doors with Self-Lubricated
Stainless Steel (CRES) Bushings - Continued

NAME	JDA P/N	WWM P/N	NSN
SCUFF PLATE FOR DOOR PANEL, 316 GR SST, 2" x 2" x 14" WITH 3/16" RADIUS ON ONE EDGE			
SETSCREW, SOCKET, HEADLESS, CRES, 12-28NF x 9/32" L, FULL DOG (0.110" DOG POINT OR EQUIVALENT 7/64" L)			5305-01-369-0768
SETSCREW, SOCKET, HEADLESS, CRES, 1/4-20NC x 9/32" L, FULL DOG			
SILICONE COMPOUND FOR BEARINGS AND DOG ASSY INSTALLATION HAZ. MAT.			
SPRING, 1" ID, 302 GR SST, FOR QA DOG ASSY			5360-01-438-4750
SPRING CLIP ASSY, FOR OPERATING HANDLES FOR ALL QA DOORS			
SPRING CLIP BRACKET FOR QA, LH DOORS*			
SPRING CLIP BRACKET FOR QA, RH DOORS*			
SPRING CLIP BRACKET FOR QA, LH DOORS*			
SPRING CLIP BRACKET FOR QA, RH DOORS*			
TOGGLE LINK, LH, FOR QA, LH DOORS*			
TOGGLE LINK, RH, FOR QA, RH DOORS*			
TOGGLE LINK, LH, FOR QA, LH DOORS*			
TOGGLE LINK, RH, FOR QA, RH DOORS*			2040-01-443-7734
TOGGLE LINK, OFFSET, LH, FOR QA, LH DOORS*			
TOGGLE LINK, OFFSET, RH, FOR QA, RH DOORS*			
WASHER, THRUST, 316 GR SST, FOR QA DOG ASSY AND OPERATING HANDLE ASSY			5310-01-437-3270
WEDGE, ALUMINUM BRONZE ALLOY, LH			2040-01-435-8933
WEDGE, ALUMINUM BRONZE ALLOY, RH			5342-01-435-7757

NOTE: When ordering connecting links, connecting rods, corner rods, and top conrods (linkage mechanism), provide part noun name, door size, number of dogs, and LH or RH.

*Consult the vendor for details regarding which P/N is designed for specific door sizes.

C-24.1 Ballistic (Armor) Closures

Table C-43. Individually Dogged Doors

NAME	R.S.C.	NAVSEA DWG NO.	NSN
BEARING PLATE FOR 2" OD BUSHING	163-8		
BEARING WASHER	163-7		
BUSHING, SPECIFY LENGTH AND OD	1102	4322609/2	
DOG, ANGLE, RH	163-2		
DOG, ANGLE, LH	163-3		

Table C-43. Individually Dogged Doors - Continued

NAME	R.S.C.	NAVSEA DWG NO.	NSN
DOG, STRAIGHT	163-1		
DOG SPINDLE, SPECIFY OD AND L OF BEARING SURFACE	163-5, 006-1, 0-69-1	4322609/2	
HINGE BOLT, NUT AND WASHER, BRASS, 3" L, WITH COTTER PIN	162-4-6/9		
MACHINE SCREW, FH, BRASS, 1/4-20NC	163-10		
MACHINE SCREW, FH, BRASS, 1/2-13NC	163-14		
PACKING PLUNGER, 2" L, PHOS. BRZ	163-17		5305-01-104-1052
SETSCREW, BRASS, 1/2"-13NC	163-11		
WEDGE, LH, 6-3/4" L	163-12		2540-01-352-6174
WEDGE, RH, 6-3/4" L	163-13		2540-01-352-6173

Table C-44. Quick-Acting Doors

NAME	R.S.C.	NAVSEA DWG NO.	NSN
BEARING PLATE FOR 2" OD BUSHING	163-8		
BEARING WASHER	163-7		
BUSHING, SPLIT, SPECIFY LENGTH AND OD	163-6	4322609/2	
DOG, QQ, FOR LH DOOR	161-5		
DOG, QA, FOR RH DOOR	161-4		
HANDLE, INSIDE	161-20		
HANDLE, OUTSIDE WITH CATCH ROD	161-21		
HINGE BOLT, NUT AND WASHER, BRASS, 4" L, WITH COTTER PIN	164-6/9		
MACHINE SCREW, FH, BRASS, 1/4-20NC	163-10		
MACHINE SCREW, FH, BRASS, 1/2-13NC	163-14		
PACKING PLUNGER, 2" L, PHOS. BRZ	163-17		5305-01-104-1052
SETSCREW, BRASS, 1/2"-13NC	163-11		
SPINDLE, SLOT HEAD, TOP AND BOTTOM DOG	068-13	4322609/2	
SPINDLE, ROUND HEAD, CENTER DOG ONLY	068-11		
SPINDLE, HEX HEAD, TOP, CENTER, BOTTOM DOGS	161-9		
SPRING CLIP ASSY	161-32/34		
TURNBUCKLE ASSY FOR LH AND RH DOORS	-		
WEDGE, LH, 6-3/4" L	163-12		2540-01-352-6174
WEDGE, RH, 6-3/4" L	163-13		2540-01-352-6173

Table C-45. Individually Dogged and Quick-Acting Hatches

NAME	R.S.C.	NSN
AUTOMATIC CATCH ASSEMBLY BODY	914-25	
AUTOMATIC CATCH PLUNGER ASSY STEEL	914-25SP	
AUTOMATIC CATCH PLUNGER ASSY BRASS	914-25BP	
AUTOMATIC CATCH STEEL PLUNGER, COMPLETE	914-26	
AUTOMATIC CATCH BRASS PLUNGER, COMPLETE	914-27	

Table C-45. Individually Dogged and Quick-Acting Hatches - Continued

NAME	R.S.C.	NSN
BEARING PLATE	913-16	
BEARING WASHER	913-16	
BOX WRENCH, 2-3/8" HEX STEEL	656-27	
BOX WRENCH, 2-3/8" HEX BRASS	656-73	
BOX WRENCH, 2-5/8" HEX STEEL	913-34	
BOX WRENCH, 2-5/8" HEX BRONZE	913-35	
BUSHING	SEE NOTE	
BUSHING	SEE NOTE	
DOG, HEX HANDLE, LH	656-3	
DOG, HEX HANDLE, RH	656-2	
DOG, HEX HANDLE, STRAIGHT	656-1	
DOG WITHOUT HANDLE	656-4	
DOG, QA		
HANDWHEEL WRENCH FOR QA HATCH FOR 7/8" SQUARE SPINDLE SOCKET	629-26	
MACHINE SCREW, FH, 10-24 x 5/8", FOR GASKET RET. STRIPS	656-34	
MACHINE SCREW, FH, 10-24 x 1", FOR GASKET RET. STRIPS	656-43A	
PACKING PLUNGER, WITH HEAD, 1-1/4" L 618-14 SETSCREW, BRASS, 1/2-13NC	163-11	
SPINDLE	SEE NOTE	
SPINDLE	SEE NOTE	
TURNBUCKLE ASSY	SEE NOTE	
WEDGE, LH, 6-3/4" L	163-12	2540-01-352-6174
WEDGE, RH, 6-3/4" L	163-13	2540-01-352-6173
WEDGE, LH, 7-5/8" L	656-20	
WEDGE, RH, 7-5/8" L	656-21	

NOTE

Components vary in dimension depending on the size of the door and drawings.
Refer to table below.

Table C-46. Variations by Drawing for Individually Dogged and Quick-Acting Hatches

DWG. NO.	PART NO.	COMPONENT/DIMENSION
4322618/2	3	SPINDLE, 4" OD, 2" ID, 6-7/8" LENGTH
	4	BUSHING, SPLIT, 2-1/4" OD, 2" ID, 2" LENGTH
4322618/1	20	SPINDLE, 1-13/16" DIA, 3-1/4" LENGTH TO BOTTOM OF HEAD
	21	SPINDLE, 1-13/16" DIA, 3-1/2" LENGTH TO BOTTOM OF HEAD
	22	BUSHING, SPLIT, 2-1/4" OD, 1-3/4" ID, 1-7/16" LENGTH
	23	BUSHING, SPLIT, 2-1/4" OD, 1-13/16" ID, 1-11/16" LENGTH

Table C-47. Individually Dogged and Quick-Acting Scuttles (18", 21", or 25")

NAME	R.S.C.	NSN
AUTOMATIC CATCH ASSEMBLY BODY	914-25	
AUTOMATIC CATCH PLUNGER ASSY STEEL	914-25SP	
AUTOMATIC CATCH PLUNGER ASSY BRASS	914-25BP	
AUTOMATIC CATCH STEEL PLUNGER, COMPLETE	914-26	
AUTOMATIC CATCH BRASS PLUNGER, COMPLETE	914-27	
BEARING PLATE	931-033	
DOG INDIVIDUAL, STRAIGHT	SEE NOTE 1	
DOG, QUADRANT GEAR FOR 18" BA SCUTTLE	720-14, 15, 16	
DOG, QUADRANT GEAR FOR 25" BA SCUTTLE	469-37, 38, 40	
HANDWHEEL WRENCH FOR 7/8" SQUARE SPINDLE SOCKET	720-31	
IDLER GEAR	649-30	
PINION GEAR	574-20	
QUADRANT GEAR DOG SPINDLE	931-32	
QUADRANT GEAR DOG SPINDLE NUT	931-34	
SPINDLE ASSY, COMPLETE, 18" SCUTTLE	SEE NOTE 2	
SPINDLE ASSY, COMPLETE, 25" SCUTTLE	SEE NOTE 2	
SPRING CLIP ASSY	720-41 x 42	
WEDGE, LH, 7-5/8" L	656-20	
WEDGE, RH, 7-5/8" L	656-21	
BUSHING	SEE NOTE 2	

NOTE

- Ballistic scuttle design may use a straight or angle individual dog mechanism. Specify length of dog spindle, length of bearing surface, and OD of bearing surface.
- Specify the cover thickness and spindle length, bearing surface, and OD. Refer to table below.

Table C-48. Variations for Individually Dogged and Quick-Acting Scuttles (18", 21", or 25")

DWG. NO.	PART NO.	COMPONENT/DIMENSION
4322618/3	25	BUSHING, 1-3/4" OD, 1-1/2" ID, 1/2" CUT 1-15/16" LENGTH (50# SCUTTLE)
	26	BUSHING, 1-3/4" OD, 1-1/2" ID, 3/4" CUT 1-15/16" LENGTH (91.8# SCUTTLE)
	22	SPINDLE, 1-1/2" OD, 5-7/8" LENGTH
	23	SPINDLE, 1-1/2" OD, 6-17/32" LENGTH
	62	SPINDLE, 1-1/2" OD, 6-3/4" LENGTH
	66	SPINDLE, 1-1/2" OD, 5-7/8" LENGTH
	68	SPINDLE, 1-1/2" OD, 7-13/32" LENGTH

NOTE

Part nos. 25 and 26 turn fit on part nos. 22, 23, 62, 66, and 68.

SECTION III
COMMERCIAL SOURCES

The following is a list of commercial sources for watertight closures, indicating company names, addresses, and telephone and FAX numbers.

Table C-49. Commercial Sources for Watertight Closures

Advanced Structures Corp. 235 West Industry Court Deer Park, NY 11729 (516) 667-5000 (516) 667-5015 (FAX)	Kamatics Corp. P.O. Box 3 1330 Blue Hills Avenue Bloomfield, CT 06002 (860) 243-9704, (860) 243-7993 (FAX)
Aero Rubber Co., Inc. P.O. Box 1409-T 7501 West 99th Place Bridgeview, IL 60455 (312) 430-4900	Network Electronic Corp. (U.S. Bearing Division) 9750 Desota Avenue Chatsworth, CA 91311 (818) 341-3595
Baier Hatch Co. 16901 Wood-Red Road Woodinville, WA 98072 (425) 481-5019, (425) 488-2424 (FAX)	Railway Specialties Corp. P.O. Box 29 Bristol, PA 19007 (215) 788-9242, (215) 788-9244 (FAX)
Galaxy Die & Engineering Co. 26477 Golden Valley Road Santa Clarita, CA 91350 (805) 250-9090	Southwest Products Co. P.O. Box 1028 Monrovia, CA 91017-1028 (800) 826-0729
Greer Stopnut Co. 481 McNally Drive Nashville, TN 37211 (615) 832-8375, (615) 331-0065 (FAX)	Seico, Inc. 100 Bombay Drive Columbia, SC 29209 (800) 742-8869
Groendyk Manufacturing Co., Inc. (Gasket Material) P.O. Box 278 Buchanan, VA 24066-0278 (540) 254-1010	Siloxane Technologies, Inc. 18975-B Mermack Avenue Lake Elsinore, CA 92531 (909) 674-0681
J.D.A. Co. 518 H Avenue Coronado, CA 92118 (619) 435-6545, (619) 435-0780 (FAX)	W.L. Gore Associates Elkton, MD (410) 392-3200
Juniper Industries, Inc. 72-15 Metropolitan Avenue Middle Village, NY 11379 (718) 326-2546, (800) 221-4664 (718) 326-3786 (FAX)	Worldwide Marine 1400 London Boulevard Portsmouth, VA 23704 (757) 399-2002, (757) 399-7619 (FAX)

APPENDIX D

SPECIAL TOOLS AND MATERIALS

This appendix contains convenient lists of the special tools, hardware, and materials required to accomplish the maintenance procedures discussed in this booklet. These items are required in addition to the standard items ordinarily stocked in the work centers and other maintenance spaces on surface ships. All items should be on hand prior to accomplishing maintenance procedures.

Each item listing includes the item name, a brief description, the National Stock Number (NSN), and unit of issue. Use this appendix as a checklist for procuring any missing or low inventory items, and as a handy reminder when preparing to do the work.

Table D-1. Special Tools And Materials

TOOLS		
Name	NSN	Unit of Issue
Blades, Utility Cutter	5110-01-452-7562	EA
Brush, Acid	7920-00-514-2417	GR
Brush, Adhesive (for cleaning parts)	7920-00-252-4084	EA
Brush, Wire, Rotary (for cleaning out spindle sleeves)	5130-00-263-0235	EA
Brush, Wire, Rotary (1" brush for cleaning gasket retainer)	5130-00-263-0235	EA
Connecting Rod Removal/Installation Tool	To Be Fabricated by Ship's Force	---
Crimping Tool, Terminal (for swaging sleeves to aircraft cable)	5120-00-596-9311	EA
Cutter, Utility (for cutting gasket material)	5110-01-446-7112	EA
Drill Set, Twist (1/16" to 1/2")	5110-00-293-0983	SE
Drill Set (1-60 American wire gauge)	5133-00-529-5687	SE
Die, 5/8-18UNF (for conrod and lever studs)	5136-00-197-9567	EA
Die, Rethreading, 7/8-9UNC (for dressing threads on levers)	5136-00-197-9558	EA
File, Hand, Half Round, Double Cut, Smooth	5110-00-241-9149	EA
Hammer, Inserted Face, Soft	5120-00-293-3007	EA
Nippers, End Cutting (for cutting aircraft cable)	5110-00-221-1499	EA
Oiler, Hand	4930-00-275-7900	EA
Pliers, Chain Nose	5120-00-268-3579	EA
Pliers, Linesman	5120-00-239-8251	EA
Punch, Drive Pin, 1/16"	5120-00-240-6082	EA
Punch, Drive Pin, 3/32"	5120-00-242-3435	EA
Punch Set, Drive Pin, 1/8"	5120-00-242-5966	SE
Punch Set, Drive Pin	5120-00-883-3003	EA
Punch Set, Drift (for driving hinge pins)	5120-00-240-8898	EA
Screwdriver, Cross Tip, 10-Inch		EA
Screwdriver, Offset, Flat Tipped (for door spring clips)	5120-00-256-9014	EA
Screwdriver, Offset, Flat Tipped (for door spring clips)	5120-00-180-0798	EA
Scribe	5120-00-596-1543	EA
Tap, 10-32UNF (for door spring clips)	5136-00-228-1008	EA
Tap, 12-28UNF (for dog point set)	5136-00-228-1009	EA
Tap, 1/4-20UNC (for retapping worn out dog point setscrew holes for larger size setscrews)	5136-00-739-5693	EA
Tap, 5/16-24UNF (for packing plunger holes)	5136-00-580-7359	EA
Tap, 5/8-18UNF (for dog rest adjusting bolthole in scuttle)	5136-00-229-9275	EA

Table D-1. Special Tools And Materials - Continued

TOOLS		
Name	NSN	Unit of Issue
Vice Grip Pliers, Welder's Clamp (for removing and installing gasket material)	5120-00-494-1895	EA
Wrench, Engineer's, 1-5/16" Flat (for adjusting jamnuts on door)	5120-00-203-4807	EA
Wrench, Allen Set (11 pieces)	5120-00-595-9244	SE

COMMON HARDWARE		
Name	NSN	Unit of Issue
Locknut, 5/8"-11UNC (castle nut for lower handwheel on flush scuttles)	5310-00-853-4090	EA
Nut, Cap, 5/8"-11UNC, Monel, Acorn Style Nut (for raised scuttle)	5310-00-638-9865	EA
Nut, Steel, 5/8"-11UNC, CRES, Jamnut (for use below the above acorn nut)	5310-00-934-9724	EA
Locknut, 5/8"-11UNC, Monel (for use on upper or lower raised scuttle handwheels)	5310-00-616-1586	EA
Pin, Cotter, 3/32" x 1-1/8" (for headed pin on scuttle dog area)	5315-00-234-1623	EA
Pin, Cotter, 1/8" x 1-1/2", CRES (for brass round nuts on door)	5315-00-241-7332	EA
Pin, grooved (for dog bolt collar on watertight hatches)	5315-00-725-3994	EA
Screw, 10-32 x 3/8" (for door spring clips)	5305-00-059-3657	EA
Swaging sleeve, 1/16" (for swaging aircraft cable to toggle bolt)	4030-00-431-5536	EA
Wire rope, 1/16", Aircraft (for attaching toggle bolt to hatch braze)	4010-00-224-9432	RL (1000 ft)

CLEANING MATERIAL, PACKING, AND LUBRICANTS		
Name	NSN	Unit of Issue
Antiseize Compound	8030-00-251-3980	LB
Chalk, Carpenter's (box of 72)	7510-00-272-9254	BX
Cloth, Abrasive (320 grit, 50 yd bolt)	5350-00-229-3092	RO
Grease, General Purpose (1-3/4 lb can)	9150-00-985-7316	CN
Grease, Wire Rope (smallest - 35 lb can)	9150-00-530-6814	CN
Oil, Turbine (1 gal. can)	9150-00-942-9343	GL
Packing, Stick (325 sticks per box)	5330-00-262-9439	EA
Packing, String (75 yds per roll)	5330-00-262-9437	YD
Solvent, Cleaning (pint can)	6850-00-110-4498	PT
Silicone Compound (10 lb can)	6850-00-295-7685	CN
EDC Cleaning Fluid	*	CN
EDC 2400 Caulk	*	TU
EDC 1270 EPL Grease	*	TU

*NSNs will be provided when available.

APPENDIX E

MACHALT 167-31004 (ECP-444) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-31004 (ECP-444) removes the Oilite bronze or CRES flanged and straight bushings, jam-nuts, helical spring, and MIL-R-900 gaskets, and installs self-locking nuts, thrust washers, self-lubricated flanged and straight bushings, and silicone rubber gaskets in weatherdeck quick-acting watertight/airtight doors.

**Table E-1. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR
PARTS REMOVED AS A RESULT OF MACHALT 167-31004 (ECP-444)**

NAME	NSN	QUANTITY	PART NO.
Bushing, Flanged	9Z3120-01-134-8784	AR	805-1400051 PC4
Bushing, Straight	9Z3120-01-109-5518	AR	805-1400051 PC5
Spring, Helical, Comp.	9Z5360-00-802-1859	AR	805-1400051 PC14
Rubber Strip, SD1-2	9Z5330-00-171-9368	AR	MIL-R-900
Nut, Plain Hex	9Z5310-00-764-6610	AR	805-1400053 PC11 805-1400051 PC22
Setscrew, Dog Point	9Z5305-01-103-8804	AR	805-1400051 PC11

**Table E-2. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR
PARTS ADDED AS A RESULT OF MACHALT 167-31004 (ECP-444)**

NAME	NSN	QUANTITY	PART NO.	CAGE
Repair Kit, Bushing	9Z3120-01-263-0392	AR	KPD365	50632
Repair Kit, Bushing (For Operating Handle)	9Z3120-01-412-8087	AR	KPD558-1	50632
Nut, Self-Locking	9Z5310-01-413-0481	AR	89NTU-1409	84460
Seal, Nonmetallic SP	9Z5330-01-371-7183	AR	6894503	53711
Barrier, Dielectric	9Z5330-01-415-4945	AR	0050202.00	60622

APPENDIX F

MACHALT 167-31006 (ECP-486) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-31006 (ECP-486) removes the Oilite bronze or CRES flanged and straight bushings, jam-nuts, helical spring, and MIL-R-900 gaskets, and installs self-locking nuts, thrust washers, self-lubricated flanged and straight bushings, and silicone rubber gaskets in LHA-1 Class steel interior quick-acting and individually dogged watertight/airtight doors.

Table F-1. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-486)

NAME	NSN	QUANTITY	PART NO.
Bushing, Flanged	9Z3120-01-134-8784	AR	805-1400051 PC4
Bushing, Straight	9Z3120-01-109-5518	AR	805-1400051 PC5
Spring, Helical, Comp.	9Z5360-00-802-1859	AR	805-1400051 PC14
Rubber Strip, SD1-2	9Z5330-00-171-9368	AR	MIL-R-900
Nut, Plain Hex	9Z5310-00-764-6610	AR	805-1400053 PC11 805-1400051 PC22
Setscrew, Dog Point	9Z5305-01-103-8804	AR	805-1400051 PC11

Table F-2. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-486)

NAME	NSN	QUANTITY	PART NO.	CAGE
Repair Kit, Bushing	9Z3120-01-263-0392	AR	KPD365	50632
Repair Kit, Bushing	9Z5310-01-412-8087	AR	KPD558-1	50632
Nut, Self-Locking	9Z5310-01-413-0481	AR	89NTU-1409	84460
Seal, Nonmetallic SP	9Z5330-01-371-7183	AR	6894503	53711

Table F-3. STEEL INDIVIDUALLY DOGGED WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-486)

NAME	NSN	QUANTITY	PART NO.
Bushing, Flanged	9Z3120-01-104-1108	AR	805-1400067 PC4
Bushing, Straight	9Z3120-00-999-3106	AR	805-1400067 PC3
Spring, Helical, Comp.	9Z5360-00-690-5395	AR	805-1400067 PC13
Rubber Strip, SD1-2	9Z5330-00-171-9368	AR	MIL-R-900
Nut, Plain Hex	9Z5310-00-891-3461	AR	805-1400067 PC9
Setscrew, Dog Point	9Z5305-01-103-8804	AR	805-1400067 PC8

Table F-4. STEEL INDIVIDUALLY DOGGED WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-486)

NAME	NSN	QUANTITY	PART NO.	CAGE
Repair Kit, Bushing	9Z3120-01-263-0393	AR	KPD364	50632
Nut, Self-Locking	9Z5310-01-413-0481	AR	89NTU-1409	84460
Seal, Nonmetallic SP	9Z5330-01-371-7183	AR	6894503	53711

APPENDIX G

MACHALT 167-53009 (ECP-514) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-53009 (ECP-514) installs a dogging assist latch on high traffic, quick-acting, 3-dog, bound hinge airtight, nonballistic doors and fragmentation doors.

**Table G-1. STEEL QUICK-ACTING AIRTIGHT DOOR PARTS ADDED
AS A RESULT OF MACHALT 167-53009 (ECP-514)**

NAME	NSN	QUANTITY	PART NO.	CAGE
Spring, Extension	*	AR	E0650-063-3000S	77535
Setscrew, Full Dog	9Z5305-01-369-0768	AR	FF-S-200TY1-STY5	81348
Spindle	*	AR	7378791 PC1	89256
Sleeve, Spindle	*	AR	7378791 PC2	89256
Sleeve, Outer	*	AR	7378791 PC3	89256
Offset Handle, Outside	*	AR	7378791 PC4	89256
Straight Handle, Outside	*	AR	7378791 PC5	89256
Straight Handle, Inside	*	AR	7378791 PC6	89256
Handle, Inside, Offset	*	AR	7378791 PC7	89256
Latch Bar, Offset, RH	*	AR	7378791 PC8	89256
Latch Bar, Offset, LH	*	AR	7378791 PC9	89256
Latch Bar, Straight, RH	*	AR	7378791 PC10	89256
Latch Bar, Straight, LH	*	AR	7378791 PC11	89256
Latch Keeper, Ramped	*	AR	7378791 PC13	89256
Retainer Assembly, Latch Bar	*	AR	7378791 PC14	89256
Retainer Assembly, Latch Bar	*	AR	7378791 PC15	89256
Brace, Spindle Sleeve	*	AR	7378791 PC16	89256
Brace, Spindle Sleeve	*	AR	7378791 PC17	89256
Staple, Spring	*	AR	7378791 PC18	89256
Washer Flat	*	AR	7378791 PC24	89256
Bushing, Flanged, Self-Lubricated	*	AR	KJB239716B	50632
Washer	9Z5310-01-437-3270	AR	KJT114916	50632
Nut, Hex, Self-Locking	9Z5310-01-413-0481	AR	89NTU-1409	27687
Cap, Vinyl	*	AR	9753K52	39428

*NSNs will be provided when available.

APPENDIX H

MACHALT 167-31006 (ECP-518) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-31006 (ECP-518) removes all replaceable components in the hinge assemblies and replaces with upgraded pins, thrust washers, and self-lubricated bushings on quick-acting watertight and airtight doors in high traffic areas.

Table H-1. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-6, 7, AND 8 ONLY)

NAME	NSN	QUANTITY	PART NO.
Pin, Hinge	5135-00-841-1390	2	805-1400054 PC6
Collar	3040-00-152-8830	2	805-1400054 PC7
Yoke, Hinge	5342-01-259-4615	2	805-1400054 PC5
Pin, Yoke	5315-01-260-5538	2	805-1400054 PC8
Washer, Yoke	5310-01-127-5040	2	805-1400054 PC10
Washer, Hinge Pad	5310-01-128-5347	6	805-1400054 PC9
Pin, Cotter	5315-01-187-9460 5315-00-849-5578	2	805-1400054 PC11

Table H-2. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-6, 7, AND 8 ONLY)

NAME	NSN	QUANTITY	PART NO.	CAGE
Bushing, Hinge Pad	*	4	KJB586007B	50632
Pin, Hinge	*	2	JE 689-21E	97537
Washer, Thrust	*	6	KJT818207V	50632
Washer, Flat	*	6	90107A032	39428
Hinge Yoke Assembly	*	2	JE-HTD-YB	97537
Bushing, Spacer	*	2	SS-1420-12	16286
Pin, Cotter, 1/8 Inch Dia. x 1 Inch Long	*	2	98450A475	39428
Pin, Yoke	*	2	JE-689-23D	97537
Bushing, Hinge Blade	*	2	JE-689-18E	97537
Pin, Cotter, 5/32 Inch Dia. x 2 Inches Long	*	2	98355A210	39428

*NSNs will be provided when available.

NOTE

MACHALT 518 has been superceded by MACHALT 538. When replacement parts are required, refer to [Appendix K](#).

Table H-3. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-10 ONLY)

NAME	NSN	QUANTITY	PART NO.
Pin, Hinge	5315-01-437-3832	2	803-6397269 PC164
Nut, Hex	5310-01-350-2904	2	803-6397269 PC165
Yoke, Hinge	2040-01-437-8396	2	803-6397269 PC163
Pin, Yoke	5315-01-459-0398	2	803-6397269 PC167
Washer, Yoke	*	2	803-6397269 PC170
Washer, Hinge Pad	5310-01-128-5347	4	803-6397269 PC169
Pin, Cotter	5315-00-234-1864	2	803-6397269 PC166
Pin, Cotter	5315-00-849-5578	2	803-6397269 PC168

*NSNs will be provided when available.

Table H-4. STEEL INDIVIDUALLY DOGGED WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31006 (ECP-518) (AOE-10 ONLY)

NAME	NSN	QUANTITY	PART NO.	CAGE
Bushing, Hinge Pad	*	4	KJB586007B	50632
Pin, Hinge	*	2	JE-689-21E	97537
Washer, Thrust	*	6	KJT818207V	50632
Washer, Spacer	*	6	90107A032	39428
Hinge Yoke Assembly	*	2	JE-HTD-YB	97537
Spacer, Hinge Pin	*	2	SS-1420-12	16286
Pin, Cotter, 1/8 Inch Dia. x 1 Inch Long	*	2	98450A475	39428
Pin, Yoke	*	2	JE-689-23D	97537
Spacer, Yoke Pin	*	2	JE-689-18E	97537
Pin, Cotter, 5/32 Inch Dia. x 2 Inches Long	*	2	98355A210	39428

*NSNs will be provided when available.

APPENDIX I

MACHALT 167-53008 (ECP-523) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-53008 (ECP-523) removes the existing collective protective system (CPS) door latch and installs a Naval Surface Warfare Center, Carderock Division - Ship Systems Engineering Station (NSWCCD-SSES), style door latch (gate latch) on the CPS zone boundary quick-acting watertight/airtight doors.

Table I-1. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-53008 (ECP-523)

NAME	NSN	QUANTITY	PART NO.
Latch Assembly	N/A	AR	6573626-1
Latch Assembly	N/A	AR	6573626-2
Capscrew, Hex Head	9Z5305-00-051-4076	AR	MS90727-34
Lockwasher	9Z5310-00-959-4679	AR	MS35340-45
Capscrew, Hex Head	9Z5305-00-267-8954	AR	MS90727-10
Washer, Flat	9Z5310-00-582-5677	AR	MS15795-810
Hex Nut, Self-Locking	9Z5310-00-061-7327	AR	MS21045-4
Washer, Flat	9Z5310-00-680-6745	AR	MS15795-811

Table I-2. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-53008 (ECP-523)

NAME	NSN	QUANTITY	PART NO.	CAGE
Spring, Extension	*	AR	E0650-063-3000S	77535
Setscrew, Full Dog	9Z5305-01-369-0768	AR	FF-S-200TY1-STY5	81348
Spindle	*	AR	7325922 PC1	89256
Sleeve, Spindle	*	AR	7325922 PC2	89256
Sleeve, Outer	*	AR	7325922 PC3	89256
Offset Handle, Outside	*	AR	7325922 PC4	89256
Straight Handle, Outside	*	AR	7325922 PC5	89256
Straight Handle, Inside	*	AR	7325922 PC6	89256
Handle, Inside, Offset	*	AR	7325922 PC7	89256
Latch Bar, Offset, RH	*	AR	7325922 PC8	89256
Latch Bar, Offset, LH	*	AR	7325922 PC9	89256
Latch Bar, Straight, RH	*	AR	7325922 PC10	89256
Latch Bar, Straight, LH	*	AR	7325922 PC11	89256
Latch Keeper, Straight	*	AR	7325922 PC12	89256
Latch Keeper, Ramped	*	AR	7325922 PC13	89256
Retainer Plate, Latch Bar	*	AR	7325922 PC14	89256
Retainer, Latch Bar	*	AR	7325922 PC15	89256
Brace, Spindle Sleeve	*	AR	7325922 PC16	89256
Brace, Spindle Sleeve	*	AR	7325922 PC17	89256
Staple, Spring	*	AR	7325922 PC18	89256
Washer, Flat	*	AR	7325922 PC24	89256
Retainer Plate, Latch Bar	*	AR	7325922 PC26	89256
Retainer, Latch Bar	*	AR	7325922 PC27	89256

Table I-2. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR
PARTS ADDED AS A RESULT OF MACHALT 167-53008 (ECP-523) -

Continued

NAME	NSN	QUANTITY	PART NO.	CAGE
Latch Keeper, Straight	*	AR	7325922 PC28	89256
Latch Keeper, Ramped	*	AR	7325922 PC29	89256
Brace, Sleeve Assembly	*	AR	7325922 PC30	89256
Staple	*	AR	7325922 PC31	89256
Bushing, Flanged, Self- Lubricated	*	AR	KJB239716B	50632
Washer	9Z5310-01-437-3270	AR	KJT114916	50632
Nut, Hex, Self-Locking	9Z5310-01-413-0431	AR	89NTU-1409	27687
Jamnut, Temporary	*	AR	94846A037	39428
Cap, Vinyl	*	AR	9753K52	39428

*NSNs will be provided when available.

APPENDIX J

MACHALT 167-31010 (ECP-526) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-31010 (ECP-526) is installed on exterior doors, well deck doors, and doors in high moisture/humidity areas. This MACHALT removes the Oilite bronze flanged and straight bushings, jamnuts, packing plungers, string, string packing, and helical springs, and installs sintered bronze flanged and straight bushings, O-rings, T-seals, helical springs, self-locking hex nuts, setscrews, and CRES paint shields. The sintered bronze bushings are impregnated with Elisha Technologies EDC 1270 EPL, and the void space within the sleeve is filled with EDC 1270 EPL grease. MACHALT (ECP-526) also replaces the self-lubricated bushings previously installed by MACHALT 167-31004 (ECP-444) on quick-acting weather doors. MACHALT (ECP-526) is not applicable to the newer style doors equipped with grade 316 CRES spindle sleeves.

**Table J-1. STEEL QUICK-ACTING WATERTIGHT DOOR PARTS
REMOVED AS A RESULT OF MACHALT 167-31010 (ECP-526)**

NAME	NSN	QUANTITY	PART NO.
Bushing, Flanged	2040-01-134-8784	AR	805-1400053 PC4
Spring, Helical, Compression	2040-00-802-1859	AR	805-1400053 PC8
Plunger, Packing	2040-01-045-9724	AR	805-1400053 PC6
Nut, Steel	2040-00-764-6610	AR	805-1400053 PC5
Bushing, Straight	2040-01-109-5518	AR	805-1400053 PC2
Repair Kit, Bushing*	3120-01-236-0392	AR	KPD365
Repair Kit, Bushing*	**	AR	KPD558-1

*Previously installed by MACHALT 167-31004 (ECP-444) on weather deck quick-acting doors.

**NSNs will be provided when available.

**Table J-2. STEEL QUICK-ACTING WATERTIGHT DOOR PARTS ADDED
AS A RESULT OF MACHALT 167-31010 (ECP-526)**

NAME	NSN	QUANTITY	PART NO.	CAGE
Spring, Compression	*	AR	86001400	*
Setscrew, 12-28UNF, Stainless Steel	*	AR	86001550	*
Bushing, Flanged	*	AR	86002400	*
Setscrew, 5/16-24UNF, Stainless Steel	*	AR	86001600	*
Zerk Fitting, 5/16-24UNF	*	AR	86001100	*
Paint Shield	*	AR	86001350	*
Bushing, Straight	*	AR	86001200	*
Nut, Hex, Self-Locking	9Z5310-01-413-0481	AR	89NTU-1409	27687

*NSNs and CAGEs will be provided when available.

Table J-3. STEEL INDIVIDUALLY DOGGED WATERTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31010 (ECP-526)

NAME	NSN	QUANTITY	PART NO.
Bushing, Flg Dog	2040-01-104-1108	AR	805-1400067 PC4
Bushing, Pln Dog	2040-00-999-3106	AR	805-1400067 PC3
Spring, Helical, Compression	2040-00-690-5395	AR	805-1400067 PC13
Nut, Steel	2040-00-891-3461	AR	805-1400067 PC9
Plunger, Packing	2040-01-104-1052	AR	805-1400067 PC8
Repair Kit, Bushing*	3120-01-236-0392	AR	KPD365
Repair Kit, Bushing*	**	AR	KPD558-1

*Previously installed by MACHALT 167-31004 (ECP-444) on weather deck quick-acting doors.

**NSNs will be provided when available.

Table J-4. STEEL INDIVIDUALLY DOGGED WATERTIGHT DOOR PARTS ADDED AS A RESULT OF MACHALT 167-31010 (ECP-526)

NAME	NSN	QUANTITY	PART NO.	CAGE
Spring, Compression	*	AR	86002100	*
Bushing, Straight	*	AR	86001900	*
Paint Shield, Stainless Steel	*	AR	86002050	*
Setscrew, No. 12-28UNF, Stainless Steel	*	AR	86001550	*
Zerk Fitting, 5/16-24UNF	*	AR	86001100	*
Setscrew, 5/16-24UNF, Stainless Steel	*	AR	86001600	*
Bushing, Flanged	*	AR	86002450	*
Nut, Hex, Self-Locking	9Z5310-01-413-0481	AR	89NTU-1409	27687

*NSNs and CAGEs will be provided when available.

APPENDIX K

MACHALT 167-31011 (ECP-538) DESCRIPTION AND PARTS INFORMATION

MACHALT 167-31011 (ECP-538) replaces all existing replaceable components in the hinge assemblies of quick-acting watertight/quick-acting airtight (QAWT/QAAT) doors in high traffic locations with upgraded pins and thrust washers. Self-lubricated bushings are installed to correct recurring wear and maintain the integrity of the QAWT/QAAT doors.

Table K-1. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31011 (ECP-538) (APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH BUSHIPS DWG. 805-1400054)

NAME	NSN	QUANTITY		PART NO.
		WT	AT	
Pin, Shoulder	5135-00-841-1390	2	3	805-1400054 PC6
Collar, Shaft	3040-00-152-8830	2	3	805-1400054 PC7
Yoke, Hinge	5342-01-259-4615	2		805-1400054 PC5
Pin, Yoke Hinge (with Washer)	5315-01-260-5538	2	3	805-1400054 PC8 & PC10
Washer, Hinge Pad	5310-01-128-5347	6	9	805-1400054 PC9
Pin, Cotter	5315-00-187-9460 5315-00-849-5578	2	3	805-1400054 PC11
Yoke, Hinge	2040-01-452-6372	2	3	805-1400054 PC14

Table K-2. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS INSTALLED AS A RESULT OF MACHALT 167-31011 (ECP-538) (APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH BUSHIPS DWG. 805-1400054)

NAME	NSN	QUANTITY		PART NO.	CAGE
		WT	AT		
Bushing, Hinge Pad	*	4	6	7379216 PC12	*
Pin, Hinge	*	2	3	7379216 PC5	*
Washer, Thrust	*	12	18	7379216 PC14	*
Washer, Spacer	*	10	15	7379216 PC11	*
Hinge Yoke Assembly (Std Hinge)	*	2	3	7379216 PC1	*
Hinge Yoke Assembly (High Hinge)	*	2	3	7379216 PC2	*
Spacer, Hinge Pin	*	2	3	7379216 PC8	*
Pin, Cotter, 1/8" Dia. x 1" Long	*	2	3	7379216 PC10	*
Pin, Yoke	*	2	3	7379216 PC6	*
Spacer Kit, Yoke Pin**	*	2	3	7379216 PC NOs. 7, 18, 19, 20, 21, 22 and 23	*
Pin, Cotter, 5/32" Dia. x 2" Long	*	2	3	7379216 PC9	*
Setscrew	5305-01-398-2632	-	3	7379216 PC24	*
Nut, Hex	*	-	3	7379216 PC25	*

*NSNs and CAGEs will be provided when available.

**Spacer kit provides a selection of oversize bushings to compensate for oversize yoke pin holes in existing door hinge blades. Spacer bushing selected for use should provide a light press fit in yoke pin hole.

Table K-3. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS REMOVED AS A RESULT OF MACHALT 167-31011 (ECP-538)
(APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH NAVSEA DWG. 803-6397269)

NAME	NSN	QUANTITY		PART NO.
		WT	AT	
Pin, Hinge	5315-01-437-3832 5306-01-434-2298	2		803-6397269 PC164
Nut, Hex	5310-01-350-2904 5310-01-380-3383	2		803-6397269 PC165
Yoke, Hinge	2040-01-437-8396	2		803-6397269 PC163
Pin, Yoke Hinge (with Washer)	5315-01-560-5538	2		803-6397269 PC167
Washer, Hinge Pad	5310-01-128-5347	6		803-6397269 PC169
Pin, Cotter	5315-00-234-1864	3		803-6397269 PC166
Pin, Cotter	5315-00-849-5578	3		803-6397269 PC168

Table K-4. STEEL QUICK-ACTING WATERTIGHT/AIRTIGHT DOOR PARTS INSTALLED AS A RESULT OF MACHALT 167-31011 (ECP-538)
(APPLIES TO QAWT/QAAT DOORS WITH HINGE ASSEMBLY ORIGINALLY MANUFACTURED IN ACCORDANCE WITH NAVSEA DWG. 803-6397269)

NAME	NSN	QUANTITY		PART NO.	CAGE
		WT	AT		
Bushing, Hinge Pad	*	4	6	7379216 PC12	*
Pin, Hinge	*	2	3	7379216 PC5	*
Washer, Thrust	*	12	18	7379216 PC14	*
Washer, Hinge Pin	*	10	15	7379216 PC11	*
Hinge Yoke Assembly (Std Hinge)	*	2	3	7379216 PC1	*
Hinge Yoke Assembly (High Hinge)	*	2	3	7379216 PC2	*
Spacer, Hinge Pin	*	2	3	7379216 PC8	*
Pin, Cotter, 1/8" Dia. x 1" Long	*	2	3	7379216 PC10	*
Pin, Yoke	*	2	3	7379216 PC6	*
Spacer, Kit, Yoke Pin**	*	2	3	7379216 PC7, 18, 19, 20, 21, 22 and 23	*
Pin, Cotter, 5/32" Dia. x 2" Long	*	2	3	7379216 PC9	*
Set, Screw	5305-01-398-2632	-	3	7379216 PC24	53711
Nut, Hex	*	-	3	7379216 PC25	*

*NSNs and CAGEs will be provided when available.

**Spacer kit provides a selection of oversize bushings to compensate for oversize yoke pin holes in existing door hinge blades. Spacer bushing selected for use should provide a light press fit in yoke pin hole.