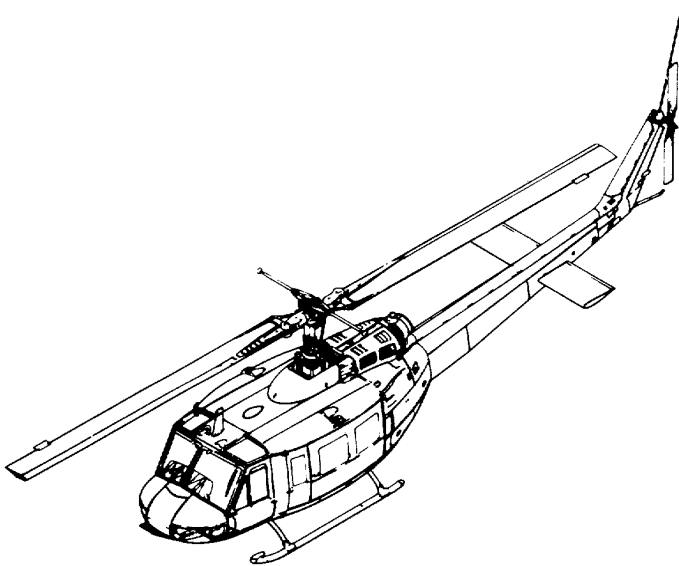


**TECHNICAL MANUAL
OPERATOR'S MANUAL
FOR
ARMY EH-1H/X
HELICOPTER**



**HEADQUARTERS DEPARTMENT
OF THE ARMY
5 NOVEMBER 1983**

WARNING DATA

TABLE OF CONTENTS

INTRODUCTION

DESCRIPTION AND OPERATION

AVIONICS

MISSION EQUIPMENT

**OPERATING LIMITS AND
RESTRICTIONS**

WEIGHT/BALANCE AND LOADING

PERFORMANCE DATA

NORMAL PROCEDURES

EMERGENCY PROCEDURES

REFERENCES

ABBREVIATIONS AND TERMS

ALPHABETICAL INDEX

TECHNICAL MANUAL

OPERATOR'S MANUAL EH-1H/X HELICOPTERS

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publication and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Troop Support & Aviation Material Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished directly to you.

TABLE OF CONTENTS

		Page
CHAPTER 1	INTRODUCTION	1-1
CHAPTER 2	HELICOPTER AND SYSTEMS DESCRIPTION AND OPERATION	2-1
Section I	Helicopter	2-1
II	Emergency Equipment	2-12
III	Engine and Related Systems	2-19
IV	Helicopter Fuel System	2-23
V	Flight Control System	2-25
VI	Hydraulic System	2-26
VII	Power Train System	2-27
VIII	Rotors	2-28
IX	Utility Systems	2-29
X	Heating and Ventilation	2-30
XI	Electrical Power Supply and Distribution System	2-32
XII	Lighting	2-44
XIII	Flight Instruments	2-46
XIV	Servicing, Parking and Mooring	2-51
XV	Helicopter Security System	2-64
CHAPTER 3	AVIONICS	3-1
Section I	General	3-1
II	Communications	3-3
III	Navigation	3-20
IV	Transponder and Radar	3-49
CHAPTER 4	MISSION EQUIPMENT	4-1
Section I	Mission Avionics	4-1
CHAPTER 5	OPERATING LIMITS AND RESTRICTIONS	5-1
Section I	General	5-1
II	System Limits	5-1
III	Power Limits	5-5

IV	Loading Limits	5-6
V	Airspeed Limits	5-6
VI	Maneuvering Limits	5-8
VII	Environmental Restrictions	5-8
VIII	Height Velocity	5-8
IX	Other Limitations	5-8
CHAPTER 6	WEIGHT/BALANCE AND LOADING	
Section I	General	6-1
II	Weight and Balance	6-1
III	Fuel/Oil	6-6
IV	Personnel.....	6-6
V	Mission Equipment	6-6
VI	Center of Gravity Limits.....	6-6
CHAPTER 7	PERFORMANCE DATA	
Section I	Introduction	7-1
II	Performance Planning	7-5
III	Torque Available.....	7-10
IV	Hover.....	7-14
V	Takeoff.....	7-20
VI	Cruise.....	7-24
VII	Drag	7-52
VIII	Climb - Descent	7-56
IX	Idle Fuel Flow	7-60
CHAPTER 8	NORMAL PROCEDURES	
Section I	Mission Planning	8-1
II	Operating Procedures and Maneuvers	8-3
III	Instrument Flight	8-13
IV	Flight Characteristics	8-14
V	Adverse Environmental Conditions	8-20
VI	Crew Duties	8-24
CHAPTER 9	EMERGENCY PROCEDURES	
Section I	Helicopter Systems	9-1
APPENDIX A	REFERENCES	A-1
APPENDIX B	ABBREVIATIONS AND TERMS	B-1
INDEX		Index 1

LIST OF ILLUSTRATION

FIGURE	TITLE	PAGE
2-1	General Arrangement	2-2
2-2	Principal Dimensions Diagram - Typical	2-5
2-3	Turning Radius - Typical	2-6
2-4	Cabin Door Lock - Typical	2-7
2-5	Crew Seats - Typical	2-9
2-6	Instrument Panel	2-13
2-7	Crew Compartment - Typical	2-15
2-8	Engine - Typical	2-20
2-9	Engine/Miscellaneous Control Panel	2-24
2-10	Heating and Defrosting System	2-31
2-11	E Electrical System Schematic Diagram - Typical	2-33
2-12	DC Circuit Breaker Panel - Typical	2-39
2-13	AC Circuit Breaker Panel - Typical	2-43
2-14	E Caution Panel -Typical.....	2-48
2-15	EB X Caution Panel	2-49
2-16	Servicing Diagram -Typical	2-52
2-17	Ground Handling Equipment, Covers, Rotor Tiedowns, and Mooring Diagram	2-63
2-18	Helicopter Security System - Typical	2-65
3-1	Avionics Equipment Configuration - Typical	3-2
3-2	Signal Distribution Panel C-1611D/AIC	3-6
3-3	E EB UHF Control Panel C-6287/ARC-51BX	3-7
3-4	X UHF Command Set AN/ARC-164	3-8
3-5	X Control Panel AN/ARC-115	3-9
3-6	E EB VHF Control Panel C-7197/ARC-134	3-10
3-7	X Control Panel AN/ARC-114A	3-12
3-8	E EB FM Radio Set Control Panel AN/ARC-131	3-13
3-9	E EB Voice Security Equipment TSEC/KY 28	3-15
3-10	EB X Voice Security Equipment TSEC/KY-58	3-16
3-11	Direction Finder Control Panel ARN-83	3-21
3-12	E EB Navigation Control Panel ARN-82	3-21
3-13	Course Deviation Indicator 1D-1347() /ARN	3-22
3-14	X Radio Receiving Set AN/ARN-123(V)	3-23
3-15	E EB Gyromagnetic Compass Indicator (RMI) 1D-998	3-30
3-16	X TACAN Control Panel AN/ARN-103	3-38
3-17	X INS Control Indicator AN/ASN-86	3-39
3-18	X Bearing Distance Headline Indicator (BDHI) 1D-663/ASN	3-42
3-19	X Copilots Radio Magnetic Indicator (RMI) ID-998/ASN	3-43
3-20	X INS/TAC Switch	3-44
3-21	X VOR/ADF: INS/TAC Switches	3-45
3-22	X Mode Select Switch	3-46
3-23	X Magnetic Heading Select Switch	3-47
3-24	X Altitude Indicator Switch	3-48
3-25	Transponder Set AN/APX-72	3-50

LIST OF ILLUSTRATION (CON'T)

FIGURE	TITLE	PAGE
3-26	AAU-32/A Altitude Encoder/Pneumatic Altimeter.....	3-52
3-27	E EB Height Indicator ID- 1345/ APN-171(V)1	3-55
3-28	X EB Copilots Radar Altimeter Indicator RT-1115/AN/APN-209	3-56
4-1	Mission Antenna Installation	4-4
4-2	E Intercommunication Control Set (C-1611D/AIC)	4-5
4-3	EB Intercommunication Control Set (C-1611D/AIC)	4-8
4-4	X Intercommunication Control Set (C-1611D/AIC)	4-10
4-5	E Mission AC Power Control Panel SA-1843/ARQ-33	4-12
4-6	E EB Mission Power Control Panel, C-8983/ARQ-33	4-13
4-7	X Mission Power Control Panel.....	4-14
4-8	E EB Mission Antenna Control Panel, SA-1823/ARQ-33	4-16
4-9	X Mission Antenna Control Switch	4-17
4-10	E EB Mission Antenna Position Indicator	4-19
4-11	E EB Communications Secure - Nonsecure Indicator	4-20
4-12	Radar Warning System AN/APR-39	4-21
4-13	Radar Warning System AN/APR-39	4-22
4-14	EB X Radar Warning System AN/APR-44	4-23
4-15	EB X Radar Warning Receiver Control Panel (AN/APR-44(V)3)	4-24
4-16	EB X Countermeasures System AN/ALQ-144	4-25
4-17	EB X Countermeasures Control Panel (AN/ALQ-144)	4-26
4-18	X Mission Bearing Distance Heading Indicator (ID-2091)	4-27
4-19	EB M130 Flare/Chaff Dispensing System	4-30
4-20	X M130 Flare/Chaff Dispensing System	4-31
4-21	EB X Flare/Chaff Dispenser Installation	4-32
4-22	EB X Flare/Chaff Dispenser Control Panel	4-33
5-1	Instrument Marking	5-2
5-2	Airspeed Operating Limits Chart	5-7
6-1	Helicopter Station Diagram	6-2
6-2	DD Form 365C	6-3
6-3	DD Form 365F	6-4
6-4	Fuel Data	6-7
6-5	Personnel Moment.....	6-8
6-6	EB X System Weight and Balance Data	6-9
6-7	E EB Cargo Compartment	6-10
6-8	E EB Cargo Tiedown Fitting Data	6-12
6-9	Center of Gravity Limits.....	6-14
7-1	Performance Planning Card	7-7
7-2	Temperature Conversion Chart	7-9
7-3	Maximum Torque Available (30 Minute Operation) Chart	7-11
7-4	Hover (Ceiling) Chart	7-15
7-5	Control Margin	7-18
7-6	Takeoff Chart	7-21

LIST OF ILLUSTRATION (CON'T)

FIGURE	TITLE	PAGE
7-7	Cruise Chart	7-25
7-8	Drag Chart	7-53
7-9	Climb - Descent Chart	7-57
7-10	Climb Performance Chart	7-59
7-11	Idle Fuel Flow Chart	7-61
7-12	Fuel Flow VS Torque Chart	7-63
8-1	Danger Area.....	8-2
8-2	Exterior Check Diagram	8-5
8-3	Forces Acting Upon a Helicopter	8-19
9-1	Emergency Exits and Equipment	9-2
9-2	Autorotational Glide Characteristics Chart	9-7
9-3	Height Velocity Diagram	9-8

CHAPTER 1

INTRODUCTION

1-1. GENERAL.

These instructions are for use by the operator(s). They apply to EH-1H and EH-1X helicopters.

1-2. WARNINGS, CAUTIONS, AND NOTES.

Warnings, Cautions, and Notes are used to emphasize important and critical instructions and are used for the following conditions.

WARNING

An operating procedure, practice, etc., which, if not correctly followed, could result in personal injury or loss of life.

CAUTION

An operating procedure, practice, etc., which, if not strictly observed, could result in damage to or destruction of equipment

NOTE

An operating procedure, condition, etc., which it is essential to highlight.

1-3. DESCRIPTION.

This manual contains the best operating instructions and procedures for the EH-1H/X helicopter under most circumstances. The observance of limitations, performance and weight balance data provided is mandatory. The observance of procedure is mandatory except when modification is required because of multiple emergencies, adverse weather, terrain, etc. Your flying experience is recognized, and therefore, basic flight

principles are not included. **THIS MANUAL SHALL BE CARRIED IN THE HELICOPTER AT ALL TIMES.**

1-4. APPENDIX A, REFERENCES.

Appendix A is a listing of official publications cited within the manual applicable to and available for flight crews.

1-5. APPENDIX B, ABBREVIATIONS AND TERMS.

Definitions of all abbreviations and terms used throughout the manual are included in appendix B.

1-6. INDEX.

The index lists, in alphabetical order, every titled paragraph, figure, and table contained in this manual. Chapter 7 performance data has an additional index within the chapter.

1-7. ARMY AVIATION SAFETY PROGRAM.

Reports necessary to comply with the safety program are prescribed in AR 385-40.

1-8. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.

For information concerning destruction of Army materiel to prevent enemy use, refer to TM 750-244-1-5.

1-9. FORMS AND RECORDS.

Army aviators flight records and helicopter maintenance records which are to be used by the operators and crewmembers are prescribed in TM 38-750 and TM 55-405-9.

1-10. EXPLANATION OF CHANGE SYMBOLS.

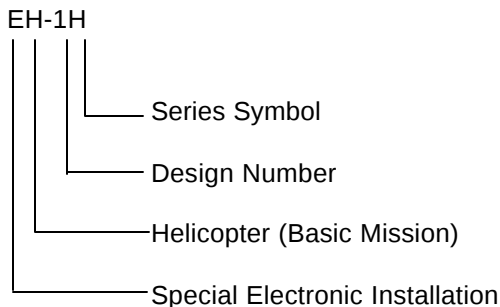
Changes, except as noted below, to the text and tables, including new material on added pages, are indicated by a vertical line in the outer margin extending close to the entire area of the material affected; exception: pages

with emergency markings, which consist of black diagonal lines around three edges, may have the vertical line or change symbol placed along the inner margins. Symbols show current changes only. A miniature pointing hand symbol is used to denote a change to an illustration. However, a vertical line in the outer margin, rather than miniature pointing hands, is utilized when there have been extensive changes made to an illustration. Change symbols are not utilized to indicate changes in the following:

- a. Introductory material.
- b. Indexes and tabular data where the change cannot be identified.
- c. Blank space resulting from the deletion of text, an illustration, or a table.
- d. Correction of minor inaccuracies, such as spelling, punctuation, relocation of material, etc., unless such correction changes the meaning of instructive information and procedures.

1-11. HELICOPTER DESIGNATION SYSTEM.

The designation system prescribed by AR 70-50 is used in helicopter designations as follows:



1-12. DESIGNATOR SYMBOLS.

Designator symbols **E** (EH-1H Phase 1A), **EB** (EH-1H Phase 1B) and **X** (EH-1X) are used in conjunction with text contents, text headings and illustration titles to show limited effectivity of the material. One or more designator symbols may follow a text heading or illustration title to indicate proper effectivity, unless the material applies to all models and configurations within the manual. If the material applies to all series and configurations, no designator symbols will be used. Where practical, descriptive information shall be condensed and combined for all models to avoid duplication.

1-13. USE OF WORDS SHALL, WILL, SHOULD AND MAY.

Within this technical manual the word "shall" is used to indicate a mandatory requirement. The word "will" is used to express a declaration of purpose. The word "should" is used to indicate a non-mandatory but preferred method of accomplishment. The word "may" is used to indicate an acceptable method of accomplishment.

CHAPTER 2

HELICOPTER AND SYSTEMS DESCRIPTION AND OPERATION

SECTION I. HELICOPTER

2-1. GENERAL DESCRIPTION.

The EH-1H and EH-1X helicopters are essentially all metal helicopters with one main rotor and one tail rotor. Power is provided by a turbine engine. Features include the two-bladed main rotor, low silhouette, wide cabin and skid type landing gear. The EH-1H Phase 1A has both intercept and countermeasure (AN/TLQ-27A) functions. The EH-1H Phase 1B has intercept and countermeasure functions provided by the AN/TLQ-17A system. The EH-1X has intercept, countermeasure (AN/TLQ-17A) and Airborne Direction Finding functions. The EH-1H/X maximum gross weight is 9500 pounds.

2-2. GENERAL ARRANGEMENT.

Figure 2-1 depicts the general arrangement. Indexed items include access openings and most of the items referred to in the exterior check paragraph in Section II of Chapter 8.

2-3. PRINCIPAL DIMENSIONS.

Figure 2-2 depicts the principal dimensions.

2-4. TURNING RADIUS.

Figure 2-3 depicts the minimum turning radius.

2-5. FUSELAGE.

The fuselage is the forward section of the airframe extending from the nose to the forward end of the tailboom. The fuselage consists primarily of two longitudinal beams with transverse bulkheads and metal covering. The main beams are the supporting structure for the cabin, landing gear, fuel tanks, transmission, engine, and tailboom. The external cargo suspension unit is attached to the main beams near the center of gravity of the helicopter.

2-6. TAILBOOM.

The tailboom section is bolted to the aft end of the

fuselage and extends to the aft end of the helicopter. It is a tapered, semi-monocoque structure comprised of skins, longerons, and stringers. The tailboom supports the tail rotor, vertical fin, and synchronized elevator. It houses the tail rotor driveshaft and some electronic equipment.

2-7. LANDING GEAR SYSTEM.

a. Main Landing Gear. The main landing gear consists of two aluminum arched crosstubes mounted laterally on the fuselage with two longitudinal skid tubes attached to the crosstubes. The skid tubes are made of aluminum and have steel skid shoes attached to the bottom to minimize skid wear.

b. Tail Skid. A tubular steel tail skid is installed on the aft end of the tailboom. It acts as a warning to the pilot upon an inadvertent tail-low landing and aids in protecting the tail rotor from damage.

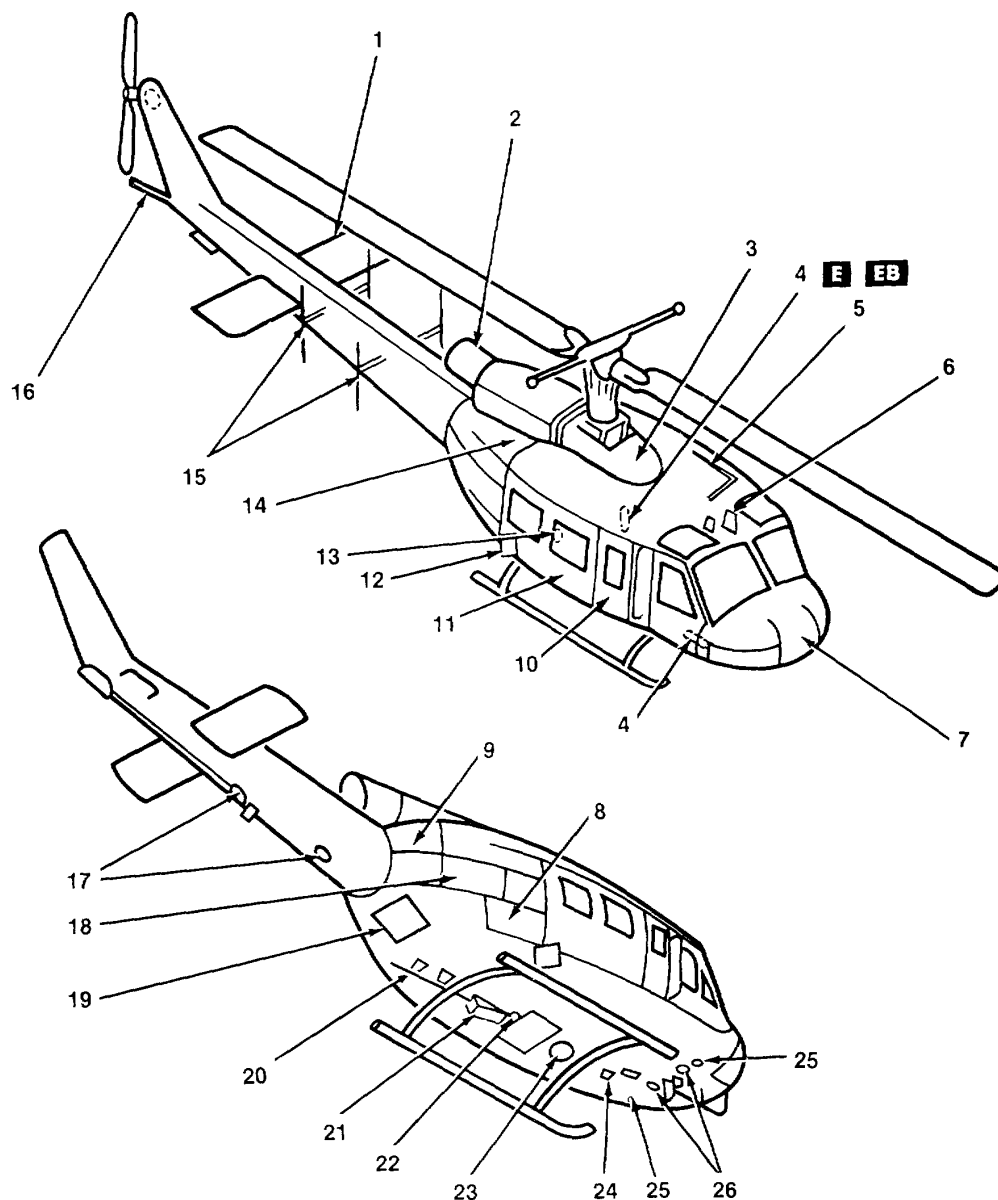
2-8. CREW COMPARTMENT DIAGRAM.

The crew compartment is depicted in figure 2-7.

2-9. COCKPIT AND CABIN DOORS.

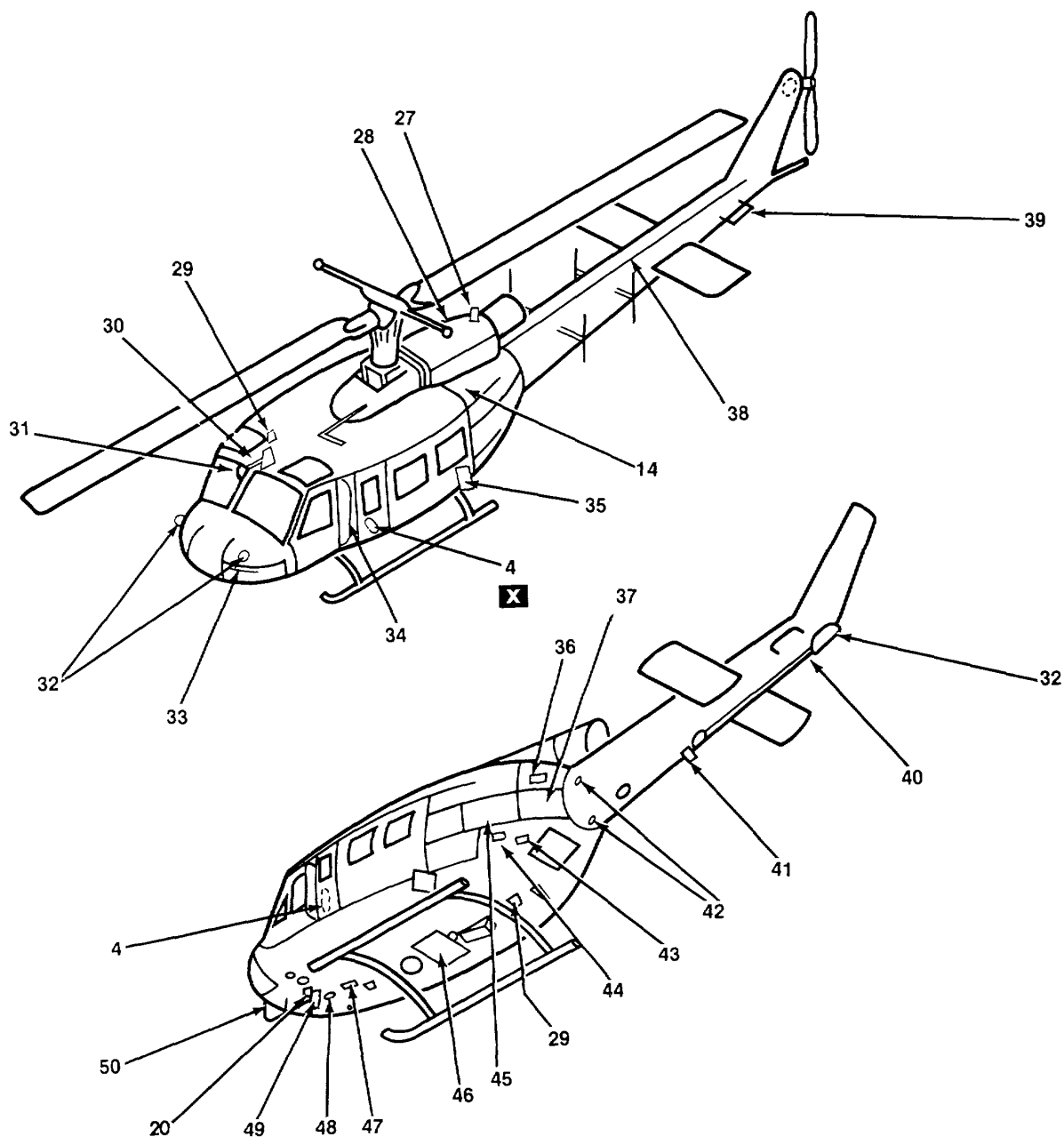
a. Cockpit Doors. The cockpit doors are formed aluminum frames with transparent plastic windows in the upper section (figure 2-1). Ventilation is supplied by the sliding panels in the windows. Cam-type door latches are used and doors are equipped with jettisonable door releases.

b. Cabin Doors. The two cabin doors are formed aluminum frames with transparent plastic windows in the upper section (figure 2-1). These doors are on rollers and slide aft to the open position allowing full access to the cargo area. Hinged doorpost panels are forward of the cabin door. They provide a larger entrance to the cargo area. An open door lock is provided to hold the door in the aft position to prevent door separation in flight (figure 2-4).



- | | |
|--|--|
| 1. Synchronized elevator | 14. Engine deck access door |
| 2. Engine exhaust IR suppressor | 15. DF antennas X |
| 3. Transmission cowling | 16. Tail skid |
| 4. Fire extinguisher | 17. Radar altimeter antennas No. 2 E EB |
| 5. VHF-FM communication antenna | 18. Oil cooler fan access door |
| 6. VHF-UHF antenna | 19. IR oil cooler shield EB X |
| 7. Radio compartment and fwd battery access door | 20. TACO communication antenna X |
| 8. Heater compartment access door | 21. Intercept antenna E EB |
| 9. Tail rotor driveshaft coupling access door | 22. Position light (white) |
| 10. Cabin panel door | 23. Landing light |
| 11. Cabin cargo door | 24. Radar warning blade antenna |
| 12. Chaff & flare dispenser EB X | 25. Radar warning SAM antenna EB X |
| 13. Transm. fluid sight gage | 26. Radar altimeter antennas No. 1 X |

Figure 2-1. General Arrangement (Sheet 1 of 3)



- | | |
|--|--|
| 27. Anti-collision light | 39. VHF navigation omni antenna |
| 28. Engine cowling | 40. ECM antenna |
| 29. TACAN navigation antenna X | 41. BITE antenna X |
| 30. Pitot Tube | 42. Tailboom attachment bolts |
| 31. FAT probe | 43. DC external power receptacle |
| 32. Radar warning spiral antennas | 44. AC external power receptacle EB X |
| 33. Glideslope antenna X | 45. Aft radio compartment access doors |
| 34. FM homing antenna | 46. ADF sense antenna |
| 35. Chaff dispenser EB X | 47. Marker beacon antenna |
| 36. Tail rotor driveshaft access door | 48. Searchlight |
| 37. Electrical compartment access door | 49. IFF antenna |
| 38. Driveshaft cover | 50. FM communication antenna E EB |

Figure 2-1. General Arrangement (Sheet 2 of 3)