



AIRBORNE OPERATIONS

VOLUME 5

THE PARACHUTIST'S MANUAL

(ENGLISH)

(This publication supersedes B-GL-322-005/FP-001, dated 2004-10-18.)

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Issued on the Authority of the Chief of the Land Staff

OPI: DAD 4-2

2005-05-01

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FOREWORD

1. B-GL-322-005/FP-001 *Airborne, Volume 5, The Parachutist's Manual*, is issued on authority of the Chief of the Defence Staff.
2. B-GL-322-005/FP-001 is effective upon receipt and supersedes CFP 310(4)(Interim), dated April 1980, which shall be destroyed.
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PREFACE

1. Airborne Forces must be trained and equipped to conduct static line parachute and Military Freefall Parachute (MFP) operations.
2. In Chapters 1 to 6 of this publication, the equipment and techniques employed in static line parachuting are described.
3. Chapters 7 to 11 deal with the equipment and techniques used in MFP training and operations at altitudes below 13,000 feet (ft) above mean sea level (MSL).
4. Chapters 12 to 16 deal with the equipment and techniques used in Static Line Square training and operations at altitudes below 13,000 feet above Mean Sea Level (MSL).
5. Chapter 17 (to be issued) will deal with the equipment and techniques used in MFP training and operations above 13,000 feet MSL¹.
6. NDHQ is the authority governing the operations of the Canadian Forces Parachute Team which, by virtue of its commitments, employs equipment and techniques at variance to those described in this manual.

¹ The necessary oxygen equipment for parachuting above 13,000 ft MSL is not yet available to the Canadian Forces.

TABLE OF CONTENTS

FOREWORD	i
PREFACE	iii
CHAPTER 1 PARACHUTE EQUIPMENT	
SECTION 1 THE CT-1 PARACHUTE ASSEMBLY	1
General	1
Component Parts of the CT-1 Main Parachute	1
Canopy Assembly	1
Harness Assembly	2
Three-Point Release Harness Assembly	2
Quick Release Box (QRB) Harness Assembly	5
Riser Groups	7
Canopy Quick Release Assemblies	8
Pack Assembly and Flyer's Kit Bag	9
Deployment Bag Assembly	11
Component Parts of the CR-1 Reserve Parachute	12
Canopy Assembly	12
Pack Assembly	13
Ripcord Assembly	14
Pilot Parachute Assembly	14
SECTION 2 CARE OF THE CT-1 ASSEMBLY	15
General Precautions	15
SECTION 3 DONNING AND FITTING THE CT-1 ASSEMBLY	16

General	16
Inspection of Parachutes	16
Preparing the CT-1 Main for Donning.....	16
Donning the CT-1 Main.....	17
Fitting the CT-1 Main	19
Inspection.....	19
Donning the CR-1 Reserve	19
SECTION 4 THE PARACHUTIST HELMET	22
General	22
Component Parts.....	22
Assembling the Helmet.....	24
Donning the Helmet.....	24
SECTION 5 DEPOLOYMENT AND DEVELOPMENT	25
General	25
Deployment and Development of the CT-1 Main.....	25
Malfunctions	31
Preparing the CT-1 Assembly for Carrying and Transport.....	32
SECTION 6 THE CT-2 PARACHUTE ASSEMBLY	33
General	33
Component Parts of the CT-2 Main Parachute	33
Canopy Assembly	33
Harness Assembly.....	33

Pack Assembly	33
Deployment Bag Assembly	33
Donning and Fitting the CT-2 Parachute Assembly	34
SECTION 7 CT-2 CANOPY CONTROL	34
General	34
Characteristics of the CT-2 Canopy	34
Canopy Control	34
Turns	34
Holding	34
Driving	35
Crabbing	35
Braking	35
SECTION 8 PERSONNEL PARACHUTE BACK DISPATCH PARACHUTE	35
General	35
Component Parts	35
Harness Assembly	37
Pack Assembly	38
Canopy Assembly	38
Pilot Parachute Assembly	39
Deployment and Development of the CR-1 and Personnel Parachute Back (PPB) Dispatch Parachute	39
CHAPTER 2 PARACHUTIST EQUIPMENT LOADS	
SECTION 1 GENERAL	41

Introduction.....	41
General Rules.....	41
Rules for Packing.....	41
Parachutist Equipment Lowering System	42
The Lowering Strap Assembly	44
SECTION 2 THE C-2 RUCKSACK	50
General.....	50
Preparing the Rucksack and Attaching the PELS	50
Radio Sets	55
SECTION 3 CREW SERVED WEAPONS VALISE	56
General.....	56
Components of the CSW.....	56
Preparing the CSWV for a Parachute Descent.....	58
Lowering and Jettisoning the CSWV.....	62
SECTION 4 THE MEDICAL FIELD KIT	63
General.....	63
Preparing and Attaching the Kit to the Parachute Harness	63
SECTION 5 PERSONAL WEAPONS (C7 OR C8)	63
General.....	63
The Rifle C7 or C8.....	63
The Rifle and Snowshoes.....	63
SECTION 6 MISCELLANEOUS LOADS	70

The Browning Automatic Pistol	70
Snowshoes	70
Life Preserver Underarm.....	70
CHAPTER 3 PARACHUTIST TECHNIQUES	
SECTION 1 GENERAL	75
Introduction.....	75
SECTION 2 AIRCRAFT DRILL	75
General.....	75
The Jumpmaster	75
Seat Belts Off.....	76
Get Ready	77
Stand Up	81
Hook Up.....	87
Check Static Lines	90
Check Your Equipment.....	92
Sound Off for Equipment Check	94
Stand By.....	96
GO!	100
Exit.....	101
Stop Drop.....	101
Unhook, Restow and Sit Down.....	102
Aft End Jumping	102

Jumping Following Loads Dispatched from the Wedge Delivery System	104
Stand By	105
GO!	105
Interrupted Aircraft Drill.....	105
Emergencies	107
Forced Landing	107
Ditching.....	108
Abandonment in Flight	109
Immediate Abandonment in Flight	109
Hang-Ups	110
SECTION 3 FLIGHT.....	110
General	110
Points of Flight Procedure.....	110
Check Canopy	110
Keep a Sharp Look-Out during Descent	113
Release the Waistband	114
Lower Equipment.....	115
Prepare to Land	116
Operation of the CR-1 Reserve Parachute upon Complete Malfunction of the Main Parachute.....	117
Operation of the CR-1 Reserve Parachute upon Partial Malfunction of the Main Parachute	117
Tangles	118
Slipping	118

Obstacles in the Air.....	120
Obstacles on the Ground.....	120
SECTION 4 LANDING	121
General.....	121
Five Points of Contact.....	121
Executing the Landing.....	123
Tree Landing.....	123
Wire Landing	125
Water Landing	126
Landing against an Obstacle	128
Landing on an Obstacle	128
SECTION 5 CANOPY COLLAPSING	129
General.....	129
Activating the Canopy Release.....	129
Pulling in Suspension Lines.....	129
Assisted Collapse	130
CHAPTER 4 JUMPMaster DUTIES	
SECTION 1 GENERAL	131
Introduction.....	131
The Jumpmaster	131
Jumpmaster Equipment.....	131
Aircraft Inspection	131

Initial Inspection of Parachutists	134
Rigger Check	134
Jumpmaster Check	135
Briefing	137
Emplaning	138
In-Flight Duties	138
Dispatch of Parachutists	139
SECTION 2 DOOR LOADS	141
General	141
SECTION 3 AFT END JUMPING	142
General	142
Aircraft Inspection	142
Jumpmaster Check	143
Emplaning	143
Dispatch of Parachutists following CCC-1 or A-21 Containers (Ramp)	143
Dispatch of Parachutists Following Load Platforms	144
Emergencies	145
SECTION 4 THE STICK COMMANDER	145
General	145
Stick Commander's Equipment	145
Dressing	145
Paratrooper Door Dispatching	146

Aft End Dispatching	146
SECTION 5 HANG-UPS	147
General	147
Equipment Hang-Ups.....	147
Misrouted Static Line.....	148
CHAPTER 5 CC-130 HERCULES AIRCRAFT	
General	149
Seating Arrangements.....	149
Parachutist Delivery Equipment	151
Emergency Exits	151
CHAPTER 6 CH-146 GRIFFON HELICOPTER	
SECTION 1 GENERAL	153
Description.....	153
Technical Data	153
Seating Arrangements.....	154
Parachutist Safety Equipment.....	155
SECTION 2 AIRCRAFT DRILL	155
General	155
Emplaning	156
Jump Commands.....	156
Interrupted Aircraft Drill.....	158
Forced Landings	159
SECTION 3 JUMPMaster DUTIES	161

General	161
Communications	161
Jumpmaster Equipment.....	161
Aircraft Inspection and Preparation	162
Jumpmaster Checks	165
Jumpmaster Position	165
Night Procedures.....	167
Hang-Up Procedures	167
Safety	168
 CHAPTER 7 MILITARY FREEFALL EQUIPMENT	
SECTION 1 THE MILITARY FREEFALL PARACHUTE ASSEMBLY.....	171
General	171
Component Parts of the CT-6 Parachute Assembly.....	171
Canopy Assembly	172
Pilot Chute Main Assembly	174
Main Pilot Chute Bridle	174
Main Deployment Bag	174
Reserve Deployment System	174
Pack and Harness Assembly	174
Risers.....	178
Ripcords	178
SECTION 2 OPERATION	178

Main Canopy.....	178
Reserve Canopy	179
Automatic Parachute Release	179
SECTION 3 MISCELLANEOUS FREEFALL EQUIPMENT.....	180
Altimeter	180
Setting the Altimeter	182
Preparation and Mounting the APR.....	182
Helmet, Goggles and Gloves	183
Illuminating Devices.....	183
SECTION 4 DONNING AND FITTING	183
Don and Fit the CT-6 Assembly	184
Donning the MFP Instruments.....	185
SECTION 5 THEORY OF FLIGHT FOR RAM-AIR CANOPIES.....	185
General.....	185
Flight Characteristics	186
Turbulence and Ram-Air Parachutes	187
CHAPTER 8 FREEFALL PARACHUTIST EQUIPMENT LOADS	
SECTION 1 GENERAL	191
Introduction.....	191
General Rules.....	191
Rules for Packing.....	191
Single Action Release Parachutist's Equipment Lowering System Components and Equipment Attaching Strap	191

Placing the Rucksack into the Sarpels	194
Attaching the Lowering Strap, Jettison Strap, Jettison Buckle and Equipment Snap Hooks	195
Preparing the Rifle and Snowshoes	197
Attaching the Rifle and Snowshoes to the Rucksack.....	198
Getting Dressed with Full Equipment.....	200
Preparing the Rifle Only	200
Getting Dressed with Rifle Only	200
SECTION 2 MILITARY FREEFALL CYLINDER	201
Packing the MFP Cylinder.....	201
Rigging the MFP Cylinder with the Sling Assembly.....	201
Attaching the 10.7 m (35 ft) Cargo Freefall Parachute System	203
Attaching the Transfer Link to the FTD	203
Installing the APR.....	204
Illuminating the MFP Cylinder	204
 CHAPTER 9 MILITARY FREEFALL PARACHUTIST TECHNIQUES	
SECTION 1 GENERAL	205
Introduction.....	205
SECTION 2 AIRCRAFT DRILL	205
General.....	205
The Freefall Jumpmaster (JM).....	205
Jump Commands.....	206
Seat Belts Off.....	206

Get Ready Get Dressed	206
Arm	206
2 Minutes	207
Sound Off for Equipment Check	207
1 Minute	207
Stand By	208
GO!	208
Exit Techniques	208
Interrupted Aircraft Drill	208
Emergency Aircraft Drill	209
Forced Landing	209
Abandonment in Flight	210
Immediate Abandonment in Flight	211
SECTION 3 FREEFALL FLIGHT	211
General	211
Stabilization	211
Falling Positions	211
Terminal Velocity and Buffeting	212
Five Points of Freefall Procedure	212
Reading the Altimeter	213
Activating the Main Canopy	213
Turns	214

Delta.....	215
Regaining Stability.....	215
Another Parachutist Directly Below	215
SECTION 4 PARACHUTE MALFUNCTIONS.....	215
General.....	215
Emergency Procedure	216
High Speed Malfunctions.....	216
Floating Ripcord Handle.....	217
Hard Pull	217
Pack Closure	217
Bag Lock.....	217
Snivler.....	217
Low Speed Malfunctions	217
Slider Hang-Up	218
Broken Right or Left Brake Line	218
Line Twist	218
Left or Right Brake Line Hang-Up.....	219
End Cell Closure	219
Broken Suspension Lines.....	219
Accidental Reserve Deployment.....	219
Pilot Chute in Front of Cells	220
Tension Knots	220

SECTION 5 RAM-AIR CANOPY MANOEUVRING AND PRECISION LANDING	220
Flight Modes	220
Full Glide	221
Half Brakes	221
Full Brakes	221
Stall Steady State (Induced)	221
Stall Dynamic	222
Turns	222
Turns Full Glide	222
Spiral Turns	222
Turns with Brakes	223
Landings	223
Precision Approaches	223
SECTION 6 OBSTACLES ON THE GROUND	224
General	224
SECTION 7 NIGHT PARACHUTING PROCEDURES	225
General	225
DZ Marking and Preparation for a Night Freefall	225
Night In-Flight Procedures	226
Night Landing with CT-6	226
SECTION 8 SAFETY	227
General	227

Safety in Freefall.....	227
Safety Once Under Canopy.....	227
Safety on the Drop Zone	228
CHAPTER 10 FREEFALL JUMPMaster DUTIES	
SECTION 1 GENERAL	229
Introduction.....	229
The Freefall Jumpmaster.....	229
Freefall Jumpmaster Kit.....	229
SECTION 2 PRE-FLIGHT PROCEDURE	230
Aircraft Inspection	230
Organization and Control of Parachutists on the Ground	230
Roll Call and Falling-In	230
Physical Inspection	231
Drawing of Parachutes and Automatic Parachute Release (APR).....	231
Supervising the Preparation and Donning of the CT-6.....	231
FJM Inspection—Ground	232
Freefall Jumpmaster Briefing.....	234
MFP Aircrew Briefing	235
Emplaning.....	236
SECTION 3 IN-FLIGHT DUTIES.....	237
General.....	237
Jump Commands and Dispatching of Parachutists (Ramp).....	237

Jump Commands and Dispatching of Parachutists (Door)	239
Freefall Jumpmaster Ground Check with Equipment.....	239
In-Flight Dressing and Freefall Jumpmaster Inspection with Equipment	240
SECTION 4 FREEFALL CYLINDERS.....	241
Rigging the Cylinder on Board the CC-130.....	241
Dispatching a Single Cylinder	242
Dispatching Numbers 1 and 2 Tandem Cylinders	244
Dual Dispatching and Dual Tandem Dispatching of Cylinders.....	244
SECTION 5 MISCELLANEOUS DUTIES	245
Calculation of the High Altitude Release Point (HARP).....	245
Plotting HARP Results on Map	245
CHAPTER 11 MILITARY FREEFALL PARACHUTING FROM AIRCRAFT OTHER THAN CC-130	
SECTION 1 INTRODUCTION	247
General.....	247
Aircraft Suitability	247
Personnel Equipment Loads	247
SECTION 2 AIRCRAFT DRILL	248
General.....	248
Loadmaster Duties	248
Freefall Jumpmaster Duties	248
SECTION 3 SPOTTING	248
General.....	248

Determining a Release Point.....	249
Aircraft Procedure for Spotting.....	250
Freefall Jumpmaster Kit.....	250
Communications	251

CHAPTER 12 MILITARY STATIC LINE SQUARE EQUIPMENT

SECTION 1 THE CT-6 STATIC LINE PARACHUTE ASSEMBLY	253
General.....	253
Component Parts of the CT-6 Parachute Assembly.....	253
Canopy Assembly	254
Static Line	255
Outer Deployment Bag	255
Drogue Parachute.....	255
Inner Deployment Bag.....	255
Drogue/Slider Control Line	255
Reserve Deployment System	255
Pack and Harness Assembly	256
Risers.....	259
Ripcord.....	259
SECTION 2 OPERATION	259
Main Canopy.....	259
Reserve Canopy	260
SECTION 3 MISCELLANEOUS CT-6 STATIC LINE SQUARE EQUIPMENT	260

Altimeter	260
Setting the Altimeter	261
Helmet, Goggles and Gloves	261
Illuminating Devices	261
SECTION 4 DONNING AND FITTING	262
Don and Fit the CT-6 Static Line Assembly	263
Donning the Instruments	263
SECTION 5 THEORY OF FLIGHT FOR RAM-AIR CANOPIES	263
General	263
Flight Characteristics	265
Turbulence and Ram-Air Parachutes	266
CHAPTER 13 CT-6 STATIC LINE SQUARE PARACHUTIST EQUIPMENT LOADS	
SECTION 1 GENERAL	269
Introduction	269
General Rules	269
Rules for Packing	269
Static Line Square Parachutist's Equipment Lowering System Components and Equipment Attaching Strap	269
Attaching the Lowering Strap, Jettison Strap, Jettison Buckle and Equipment Snap Hooks	270
Getting Dressed with Full Equipment	273
Preparing the Rifle Only	274
Getting Dressed with Rifle Only	274
CHAPTER 14 MILITARY CT-6 STATIC LINE SQUARE PARACHUTIST TECHNIQUES	

SECTION 1 GENERAL	275
Introduction.....	275
SECTION 2 AIRCRAFT DRILL	275
General.....	275
The Jumpmaster (JM)	275
Jump Commands.....	276
1 Minute	276
Stand By	276
GO!	277
Exit Techniques	277
Interrupted Aircraft Drill.....	277
Emergency Aircraft Drill	277
Forced Landing	277
Abandonment in Flight	278
Immediate Abandonment in Flight	278
SECTION 3 PARACHUTE MALFUNCTIONS.....	279
General.....	279
Emergency Procedure	279
High Speed Malfunctions.....	280
Static Line Failure.....	280
Bag Lock.....	280
Snivler	280

Low Speed Malfunctions	281
Slider Hang-Up	281
Broken Right or Left Brake Line	281
Line Twists	282
Brake Line Hang-Up	282
End Cell Closure	282
Broken Suspension Lines	282
Accidental Reserve Deployment	283
Pilot Chute in Front of Cells	283
Tension Knots	283
SECTION 4 RAM-AIR CANOPY MANOEUVRING AND PRECISION LANDING	283
Flight Modes	283
Full Glide	284
Half Brakes	284
Full Brakes	284
Stall Steady State (Induced)	284
Stall Dynamic	285
Turns	285
Turns Full Glide	285
Spiral Turns	285
Turns with Brakes	286
Landings	286

Precision Approaches.....	286
SECTION 5 OBSTACLES ON THE GROUND	287
General	287
SECTION 6 NIGHT PARACHUTING PROCEDURES	288
General	288
Drop Zone Marking and Preparation for Night Parachuting.....	288
Night In-Flight Procedures.....	289
Night Landing with CT-6.....	289
SECTION 7 SAFETY	290
General	290
Safety Once Under Canopy.....	290
Safety on the Drop Zone	291
CHAPTER 15 CT-6 STATIC LINE SQUARE JUMPMaster DUTIES	
SECTION 1 GENERAL	293
Introduction.....	293
The Jumpmaster	293
Jumpmaster Equipment.....	293
SECTION 2 PRE-FLIGHT PROCEDURE	294
Aircraft Inspection	294
Organization and Control of Parachutists on the Ground	294
Roll Call and Falling-In	294
Physical Inspection	295

Drawing of Parachutes	295
Supervising the Preparation and Donning of the CT-6	295
JM Inspection—Ground	296
If Equipment is Worn	298
Jumpmaster Briefing	299
Static Line Square Aircrew Briefing	300
Emplaning	301
SECTION 3 IN-FLIGHT DUTIES	301
General	301
Jump Commands and Dispatching of Parachutists (Ramp)	302
Jump Commands and Dispatching of Parachutists (Door)	303
Jumpmaster Check with Equipment	304
In-Flight Dressing and Jumpmaster Inspection with Equipment	304
SECTION 4 MISCELLANEOUS DUTIES	305
Calculation of the High Altitude Release Point (HARP)	305
Plotting HARP Results on Map	306
CHAPTER 16 CT-6 STATIC LINE SQUARE PARACHUTING FROM AIRCRAFT OTHER THAN CC-130	
SECTION 1 INTRODUCTION	307
General	307
Aircraft Suitability	307
Personnel Equipment Loads	307
SECTION 2 AIRCRAFT DRILL	308

General	308
Loadmaster Duties	308
Jumpmaster Duties	308
SECTION 3 SPOTTING	308
General	308
Determining a Release Point.....	309
Aircraft Procedure for Spotting.....	310
Jumpmaster Kit	310
Communications	311
CHAPTER 17 CT-6 STATIC LINE SQUARE PARACHUTING FROM CH-146 GRIFFON HELICOPTER	
SECTION 1 GENERAL	313
Description.....	313
Technical Data	313
Seating Arrangements	314
Parachutist Safety Equipment	316
SECTION 2 AIRCRAFT DRILL	316
General	316
Emplaning	317
Jump Commands.....	317
Interrupted Aircraft Drill.....	319
Forced Landings.....	319
SECTION 3 JUMPMASTER DUTIES	322

General	322
Communications	322
Jumpmaster Equipment.....	322
Aircraft Inspection and Preparation	323
Jumpmaster Checks	326
Jumpmaster Position	326
Night Procedures.....	328
Hang-Up Procedures	328
Safety	329

TABLE OF FIGURES

Figure 1-1: Canopy Assembly	2
Figure 1-2: Three-Point Release Harness Assembly	4
Figure 1-3: Quick Release Box Harness Assembly	6
Figure 1-4: Quick Release Box	7
Figure 1-5: Riser Set	8
Figure 1-6: Canopy Quick Release Assembly	9
Figure 1-7: Pack Assembly and Flyer's Kit Bag	10
Figure 1-8: Deployment Bag Assembly	11
Figure 1-9: CR-1 Reserve Parachute	12
Figure 1-10: CR-1 Reserve Parachute	14
Figure 1-11: Pilot Parachute Assembly	15
Figure 1-12: Parachutist with CT-1 (Front View)	20
Figure 1-13: Parachutist with CT-1 (Side View)	21
Figure 1-14: The Parachutist Helmet	23
Figure 1-15: Deployment Phase 1	26
Figure 1-16: Deployment Phase 2	27
Figure 1-17: Deployment Phase 3	28
Figure 1-18: Deployment Phase 4	29
Figure 1-19: Deployment Phase 5	30
Figure 1-20: Personnel Parachute Back Dispatch Parachute Main Lift Web	36
Figure 1-21: Personnel Parachute Back Dispatch Parachute	37
Figure 2-1: Parachutist's Equipment Lowering System (PELS) with Lowering Strap Assembly	43

Figure 2-2: Lowering Strap Assembly	45
Figure 2-3: Pass Running End through Suspension Point	46
Figure 2-4: Pass Bight through Fixed Loop.....	47
Figure 2-5: Pull Bight Tightly through Fixed Loop.....	48
Figure 2-6: Thread Running End down through the Bight	49
Figure 2-7: Jettison Strap Attached to Snap Hook.....	50
Figure 2-8: Running Ends of the PELS under the Top Portion of the Rucksack Frame.....	51
Figure 2-9: Routing PELS over Bottom Portion of Rucksack	52
Figure 2-10: Adjuster Buckles Centred and Secured	53
Figure 2-11: Attaching Lowering Strap	54
Figure 2-12: Rucksack Ready for a Parachute Descent	55
Figure 2-13a: Components of the CSWV	57
Figure 2-13b: Components of the CSWV	57
Figure 2-14: Position Handles towards Opening for Quick Access.....	59
Figure 2-15: CSWV with Long Weapon	60
Figure 2-16: CSWV with Short Weapon	61
Figure 2-17: Snowshoes Secured by Nylon Straps	62
Figure 2-18: Lowering Strap Secured around the Rifle	64
Figure 2-19: Rifle and Snowshoes Ready for Rigging	66
Figure 2-20: Preparing top Snowshoe.....	67
Figure 2-21: Put Snowshoes Together	67
Figure 2-22: Place the Rifle on the Snowshoes	68

Figure 2-23: Secure the Butt of the Rifle	69
Figure 2-24: Life Preserver Underarm	71
Figure 2-25: Wearing the LPU	72
Figure 2-26: Wearing the LPU	73
Figure 3-1: Visual Signal for GET READY	78
Figure 3-2: Position of Parachutists (Port) for GET READY	80
Figure 3-3: Visual Signal for Outboard Jumpers	81
Figure 3-4: Visual Signal for STAND UP	82
Figure 3-5: Inboard Jumpers	83
Figure 3-6: Visual Signal for STAND UP	84
Figure 3-7: Position of Parachutist for STAND UP	86
Figure 3-8: Visual Signal for HOOK UP	87
Figure 3-9: Position of Parachutist (Port) for HOOK UP	89
Figure 3-10: Visual Signal for CHECK STATIC LINES	91
Figure 3-11: Visual Signal for CHECK YOUR EQUIPMENT	93
Figure 3-12: Visual Signal for SOUND OFF FOR EQUIPMENT CHECK	95
Figure 3-13a: Visual Signal for STAND BY	97
Figure 3-13b: Visual Signal for STAND BY	97
Figure 3-14: Position of Number 1 Parachutist (Port) for STAND BY	98
Figure 3-15: Position of JM (Starboard Side) for STAND BY	100
Figure 3-16: Check Canopy	111
Figure 3-17: Corrective Action for Twists in Suspension Lines	112

Figure 3-18: Keep A Sharp Look Out.....	113
Figure 3-19: Release the Waistband	114
Figure 3-20: Lower Equipment.....	115
Figure 3-21: Prepare to Land	116
Figure 3-22: Left Slip.....	119
Figure 3-23: Executing A Parachute Landing.....	122
Figure 3-24: Tree Landing	124
Figure 3-25: Wire Landing	126
Figure 4-1: Anchor Line Cables Rigged for Door Exits	132
Figure 4-2: Retrieval Gear for a Door Exit	133
Figure 4-3: Aft End Support Arm in Horizontal Position.....	140
Figure 4-4: Anchor Line Cables Rigged for Aft End Exits.....	142
Figure 5-1: The CC-130 Hercules Aircraft	149
Figure 5-2: Seating Arrangement for 62 Parachutists.....	150
Figure 5-3: Seating Arrangement for 40 Parachutists.....	150
Figure 5-4: Emergency Exits	152
Figure 6-1: CH-146 Griffon Helicopter	153
Figure 6-2: Starboard Stick without Equipment	154
Figure 6-3: Starboard Stick with Summer Equipment.....	155
Figure 6-4: Cutting the Anchor Line Strap	160
Figure 6-5: Retrieval System	162
Figure 6-6: Anchor Line Assembly	163

Figure 6-7: Anchor Line Assembly Installation	164
Figure 6-8: JM Position in the Aircraft.....	166
Figure 6-9: Ring Fitting	169
Figure 6-10: Stud Fitting with Slotted Groove	170
Figure 7-1: CT-6 Parachute	173
Figure 7-2: Pack and Harness Assembly	176
Figure 7-3: Pack and Harness Assembly	177
Figure 7-4: Automatic Parachute Release.....	180
Figure 7-5: Altimeter	181
Figure 8-1: MFP SARPELS.....	192
Figure 8-2: Attaching Strap	193
Figure 8-3: Attaching Strap Buckle Rigging	194
Figure 8-4: Rucksack inside SARPELS.....	195
Figure 8-5: Equipment Lowering Rope	196
Figure 8-6: Jettison Strap Attachment	197
Figure 8-7: Rigging Snowshoes.....	198
Figure 8-8: Attachment of Rifle and Snowshoes	199
Figure 12-1: Pack and Harness Assembly	257
Figure 12-2: Pack and Harness Assembly	258
Figure 13-1: PELS for Static Line Square	270
Figure 13-2: Lowering Strap Attachment	271
Figure 13-3: Jettison Buckle Routing	272

Figure 13-4: Equipment Snap Hooks.....273

Figure 17-1: CH-146 Griffon Helicopter313

Figure 17-2: Starboard Stick without Equipment315

Figure 17-3: Starboard Stick with Summer Equipment.....316

Figure 17-4: Cutting the Anchor Line Strap321

Figure 17-5: Retrieval System323

Figure 17-6: Anchor Line Assembly.....324

Figure 17-7: Anchor Line Assembly Installation.....325

Figure 17-8: Jumpmaster Position in the Aircraft.....327

Figure 17-9: Ring Fitting330

Figure 17-10: Stud Fitting with Slotted Groove331

CHAPTER 1 PARACHUTE EQUIPMENT

SECTION 1 THE CT-1 PARACHUTE ASSEMBLY

GENERAL

1. The CT-1 main parachute is a static line operated, bag deployed, troop-type parachute. It is worn on the back and is fitted to the parachutist by means of a harness that fits over the shoulders and around the legs, and is fastened at the chest with a quick release box or three-point release assembly. The CR-1 reserve parachute is secured to the front of the harness to complete the CT-1 assembly. The complete assembly weighs approximately 21 kg (46 lb).

COMPONENT PARTS OF THE CT-1 MAIN PARACHUTE

2. The CT-1 main parachute is composed of the following assemblies:
- a. canopy assembly;
 - b. harness assembly;
 - c. pack assembly and flyer's kit bag; and
 - d. deployment bag assembly.

CANOPY ASSEMBLY

3. The CT-1 canopy assembly (see Figure 1-1) consists of the canopy, which is made of twill nylon cloth, 30 suspension lines made of nylon cord with a minimum breaking strength (MBS) of 181 kg (400 lb), and four connector links which attach the canopy assembly to the harness.

4. The canopy is parabolic in shape and has a nominal diameter of 10.7 m (35 ft) and a skirt diameter of 7.5 m (24 ft 6 in) at the lower lateral band. It is divided from the apex to the lower lateral band into 30 wedge-shaped gores, each of which has three diagonally stitched sections. The framework of the canopy is constructed of 30 lengths of nylon cord which are located in the channels between two consecutive gores and extend from the upper to the lower lateral bands. The upper lateral band is made of nylon webbing, sewn over the folded-over canopy material, which completely encircles the canopy at the apex. The lower lateral band likewise encircles the canopy at the periphery. Pocket bands of the same material are sewn to the lower lateral band at every other suspension line.

5. An anti-inversion net skirt made of nylon mesh with 9.5 cm (3.75 in) squares, 46 cm (18 in) in width, is sewn to the lower lateral band and to each suspension line of the canopy.

6. The suspension lines are 7.8 m (25 ft 6 in) long and extend from the lower lateral band, at the channels between the gores, to the connector links. There are 15 apex lines across the 51 cm (20 in) apex vent.

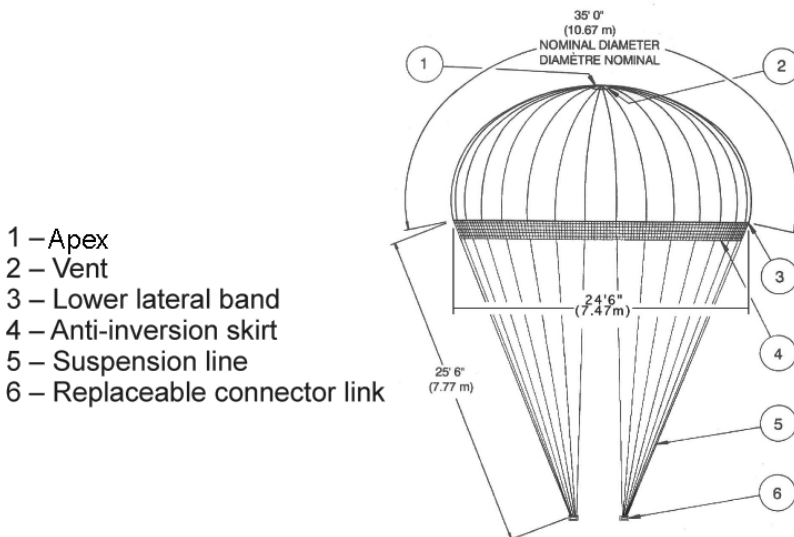


Figure 1-1: Canopy Assembly

HARNESS ASSEMBLY

7. The CT-1 harness assembly is constructed of nylon webbing and metal fittings. There are two configurations for the CT-1 harness assembly:

- a. three-Point Release harness assembly; and
- b. quick Release Box (QRB) harness assembly.

8. Although the Three-Point Release harness assembly is more common, both types of harness assemblies will be described. Both harness assemblies consist of:

- a. the main lift web;
- b. one horizontal and two diagonal back straps; and
- c. two canopy quick release assemblies.

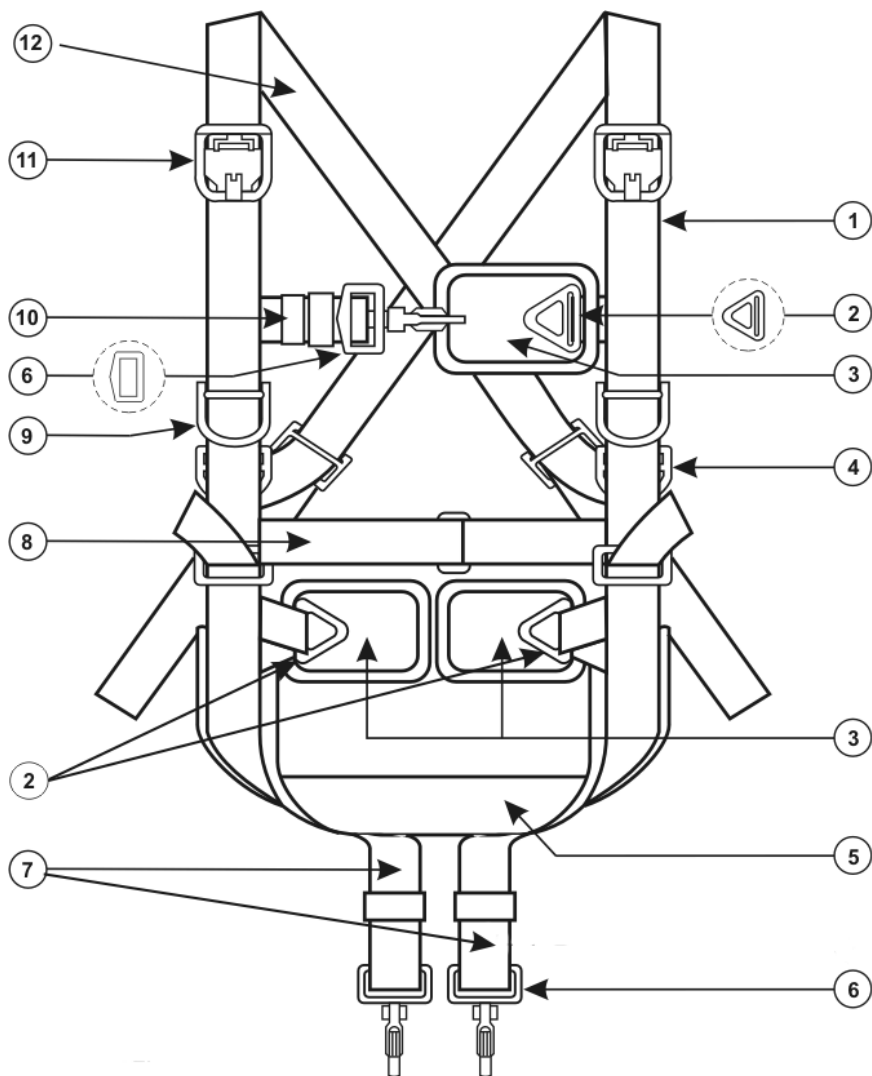
THREE-POINT RELEASE HARNESS ASSEMBLY

9. The main lift web (see Figure 1-2) consists of a two ply length of webbing, extending from canopy release to canopy release, forming a saddle at the bottom, and having an MBS of 2,900 kg (6,500 lb). There is an adjustable chest strap and two adjustable leg straps, all fitted

with quick fit ejector snap hooks that attach to V-rings with comfort pads sewn to the main lift web. There are two metal D-rings for attaching the reserve, and below these are two V-rings for attaching the parachutist's equipment.

10. The diagonal back straps are attached to the canopy release assemblies, and cross in the centre of the back. The running ends are fitted with adjuster buckles. The horizontal back strap is fitted with an adjuster buckle, and passes through the back strap loops with the ends threaded through the adjuster buckles of the diagonal back straps.

11. One group of two risers extends from each canopy release assembly to the connector links. Each group consists of a continuous length of webbing divided equally at the canopy release assembly and held in position by a keeper. At the end of each of the four risers is a connector link loop.



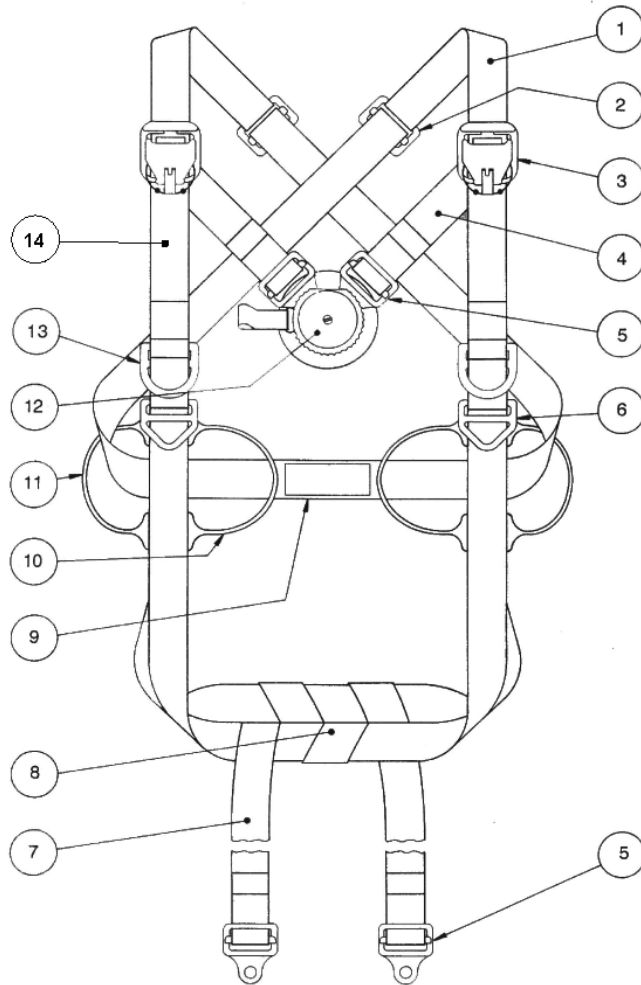
- 1—Main lift web
- 2—V-ring
- 3—Comfort pad
- 4—Equipment V-ring attachment
- 5—Saddle
- 6—Quick fit ejection snap hooks
- 7—Leg strap
- 8—Horizontal back strap
- 9—Reserve parachute D-ring attachment
- 10—Chest strap
- 11—Canopy quick release assembly
(female fitting)
- 12—Back diagonals

Figure 1-2: Three-Point Release Harness Assembly

QUICK RELEASE BOX (QRB) Harness Assembly

12. The main lift web (see Figure 1-3) consists of a two-ply length of webbing that extends from canopy release assembly to canopy release assembly. A continuation of one ply of the main lift web forms the chest straps. The lower portion of the main lift web forms the saddle through which a continuous length of webbing is interwoven. The extended portions of this interwoven webbing form the leg straps. The leg and chest straps are fitted with adjustable locking lugs. Secured to the main lift web are two V-rings for attaching parachutist equipment loads. Above these are two D-rings to which the reserve parachute is attached. Below each V-ring is a leg strap loop and a back strap loop. The MBS of the harness webbing is 2,900 kg (6,500 lb).

13. The diagonal back straps are attached to the canopy release assemblies, and cross in the centre of the back. The running ends are fitted with adjuster buckles. The horizontal back strap passes through the back strap loops with the ends threaded through the adjuster buckles of the diagonal back straps.



- 1 – Diagonal back strap
- 2 – Back strap adjuster
- 3 – Canopy quick release assembly
(female fitting)
- 4 – Chest strap
- 5 – Adjustable connector lug
- 6 – Equipment V-ring attachment
- 7 – Leg strap
- 8 – Saddle
- 9 – Horizontal back strap
- 10 – Leg strap loop
- 11 – Back strap loop
- 12 – Quick release box
- 13 – Reserve parachute D-ring
- 14 – Main lift web

Figure 1-3: Quick Release Box Harness Assembly

14. The harness quick release assembly consists of a QRB (see Figure 1-4) which is permanently affixed to the locking lug of the left chest strap. The locking lugs of the right chest

strap and both leg straps fit into appropriate slots in the QRB. It thus forms an instantly breakable connection between the chest and leg straps.

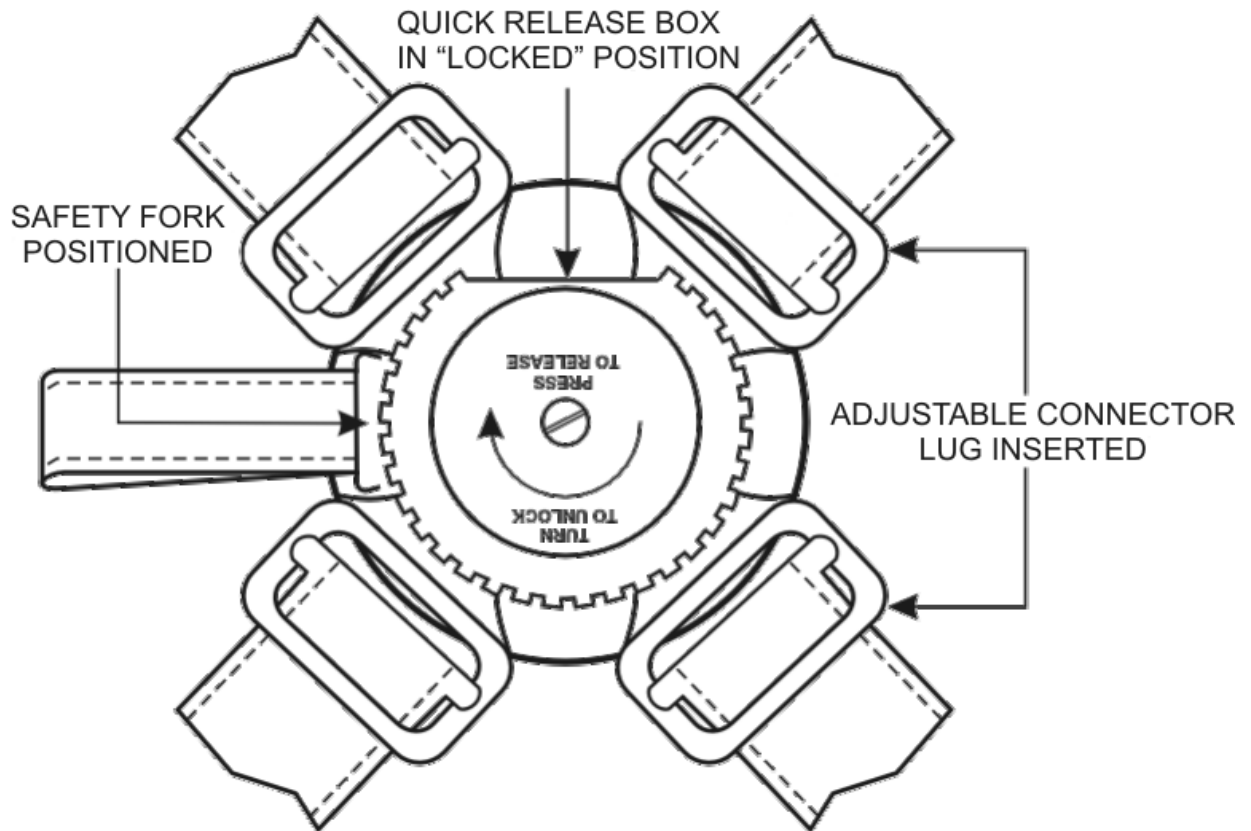
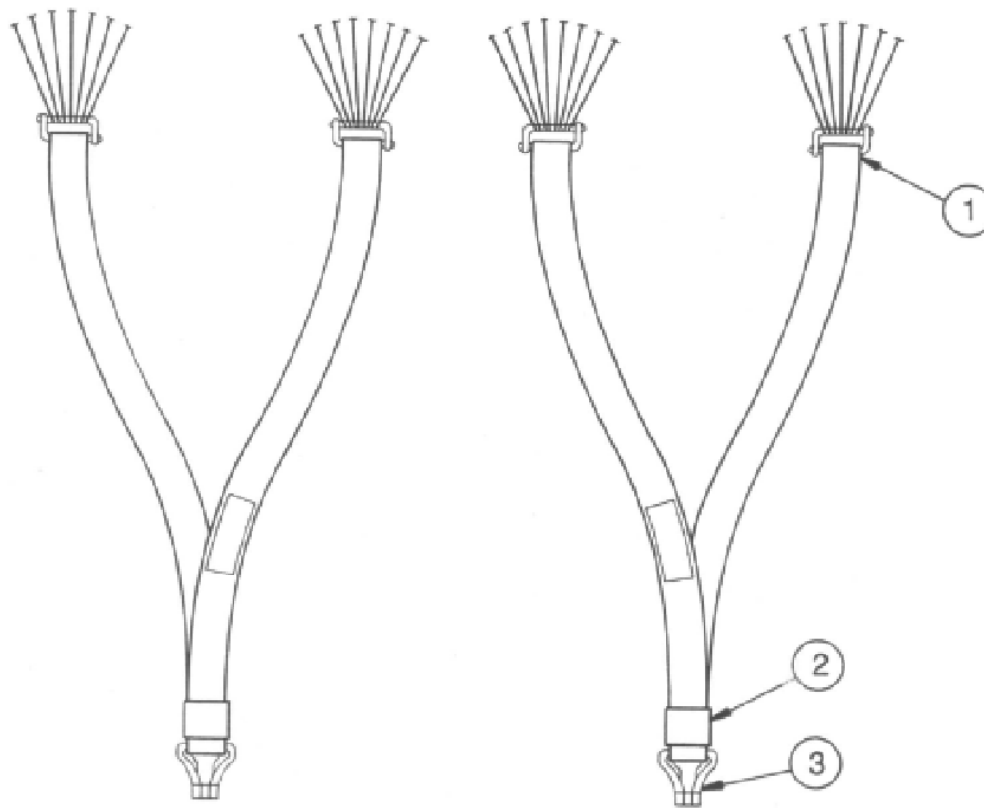


Figure 1-4: Quick Release Box

15. The quick release assembly incorporates three safety features:
 - a. the safety fork must be removed before the operating dial can be rotated;
 - b. the operating button must be rotated a quarter turn before it can be activated; and
 - c. the operating button must be depressed before it will release.

RISER GROUPS

16. One group of two risers (see Figure 1-5) extends from each canopy release assembly to the connector links. Each group consists of a continuous length of webbing divided equally at the canopy release assembly and held in position by a keeper. At the end of each of the four risers is a connector link loop.



- 1 – Riser loops – connector link attachment
- 2 – Keeper / Confluence wrap
- 3 – Canopy quick release male fitting

Figure 1-5: Riser Set

CANOPY QUICK RELEASE ASSEMBLIES

17. The canopy quick release assemblies are mechanisms that secure the riser groups to the main lift web (see Figure 1-6).

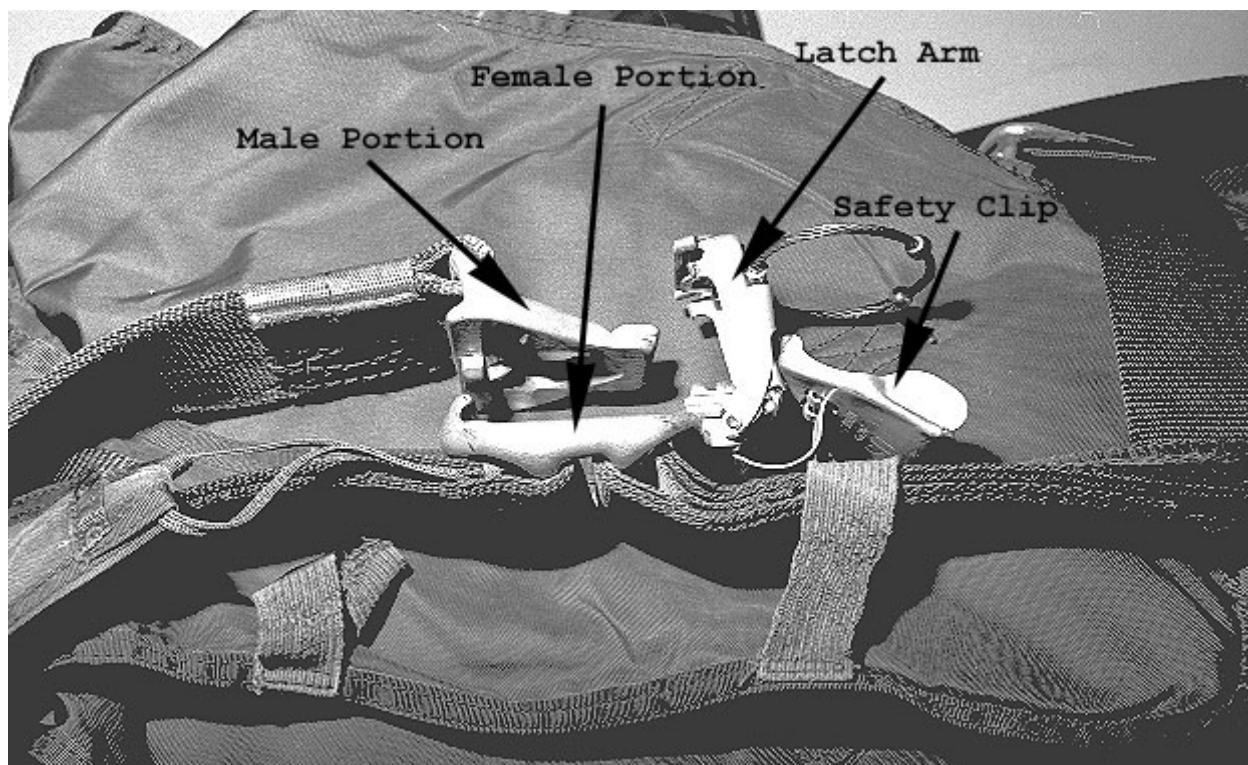


Figure 1-6: Canopy Quick Release Assembly

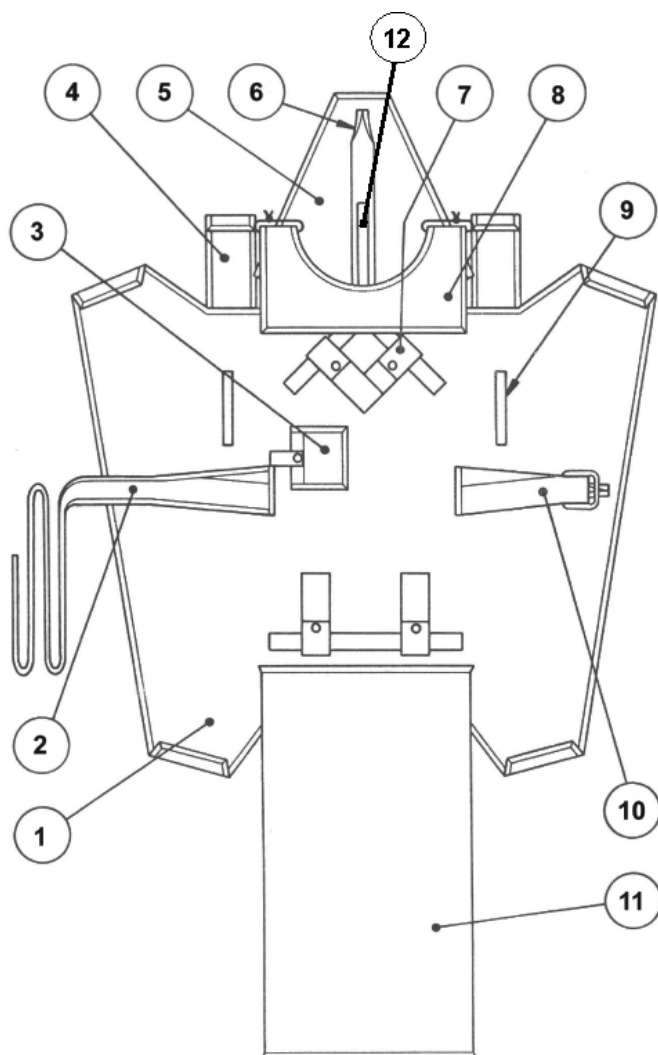
18. By disconnecting one or both canopy releases after landing, the parachutist can avoid being dragged by high winds. Each canopy release assembly has four main parts:

- a. a male fitting, which is permanently attached to a group of risers;
- b. a female fitting, which is permanently attached to the main lift web;
- c. a lanyard-activated latch arm which locks the male and female portions together; and
- d. a safety clip that locks the latch arm closed.

PACK ASSEMBLY AND FLYER'S KIT BAG

19. When the parachute is packed, the deployment bag is secured within the pack assembly and the static line is stowed on the outside of the pack. The pack (see Figure 1-7) is made of nylon material and is of non-rigid construction. It consists of a pack tray, two end flaps, and two side flaps. On the top end flap is a short length of webbing to which are attached two small loops of elastic webbing known as slack control loops. On each side flap is a similar length of webbing called a retainer band keeper, to which the retainer bands which hold the stowed static line are attached. Sewn onto each end and side flap is a length of webbing that forms four pack closing loops. A waistband is attached on the right side of the pack tray and a metal waistband adjuster buckle on the left side. Four pieces of webbing with dome fasteners, known as harness keepers, secure the pack to the harness at the horizontal and diagonal back straps.

20. Permanently attached to the bottom end flap is a flyer's kit bag and two elastic bands for stowing the bag. This bag is made of nylon, and has two carrying handles and a two-way zipper. The bag is used to contain the main parachute prior to issue and after it has been jumped.



- 1 – Side flap
- 2 – Waist band
- 3 – Log book pocket
- 4 – Connector link protector flap
- 5 – End flap
- 6 – Pack closing loop
- 7 – Harness keeper
- 8 – Yoke
- 9 – Retainer band keeper
- 10 – Waist band adjuster
- 11 – Flyer's kit bag
- 12 – Slack control loop keeper

Figure 1-7: Pack Assembly and Flyer's Kit Bag

DEPLOYMENT BAG ASSEMBLY

21. The deployment bag (see Figure 1-8) contains the stowed canopy and suspension lines. The bag is made of nylon reinforced with webbing, and is of non-rigid construction. Attached inside the closed end of the bag is a strap of nylon webbing with a loop on the running end known as the break cord attaching strap and loop. On the outside of the bag are two parallel rows of suspension line stowing loops and a suspension line protector flap. At the open end of the bag are two locking stow loops and two connector link tie loops which are a continuation of the reinforcement webbing.

22. Permanently attached to the closed end of the bag is a 4.6 m (15 ft) static line made of 1,814 kg (4,000 lb) MBS nylon web. The static line is rolled to reduce abrasion. A snap fastener is attached to the running end of the static line. Sewn onto the static line from the fixed end to the pack opening loop is a cotton protector sleeve that protects the static line from friction damage.

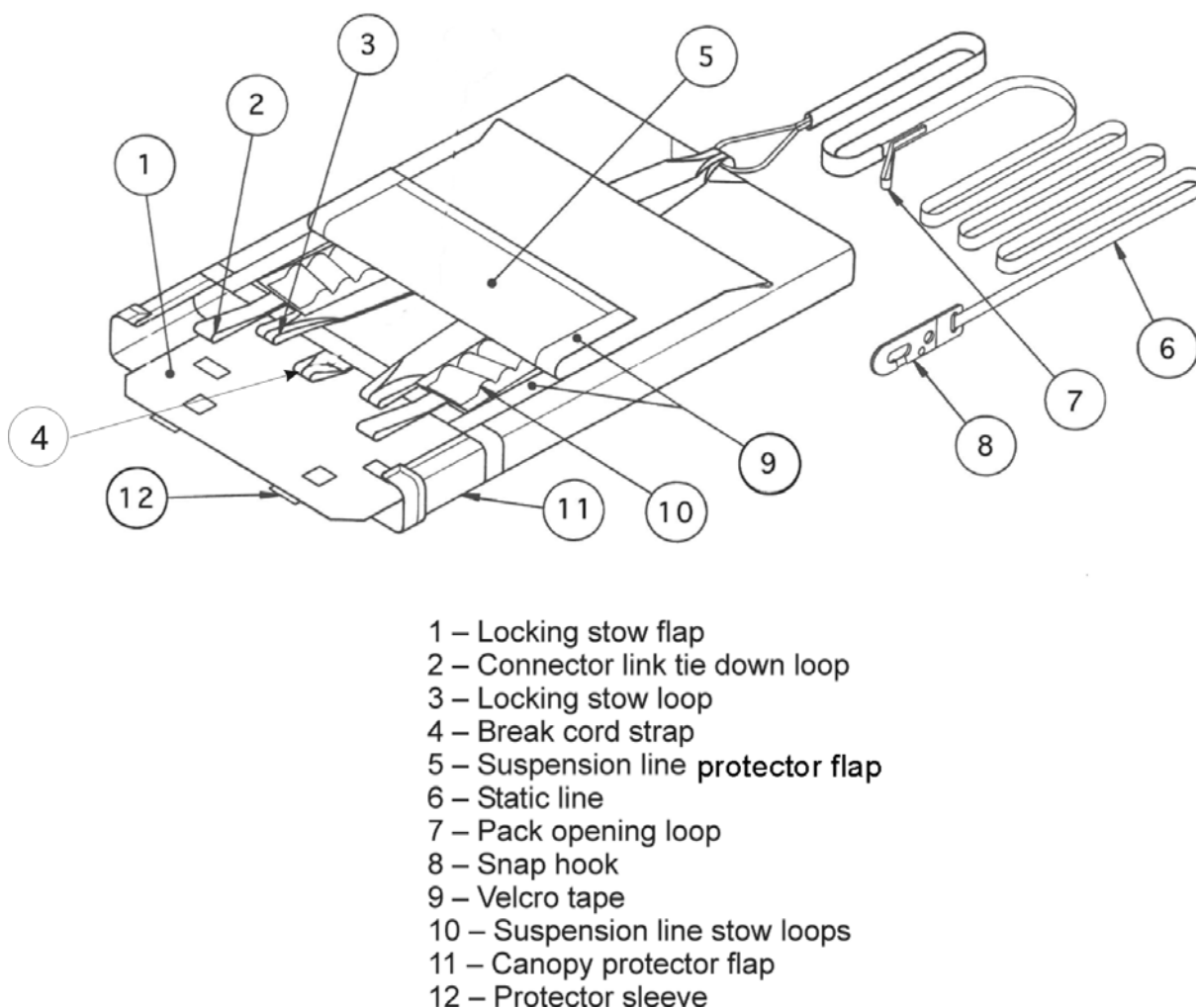


Figure 1-8: Deployment Bag Assembly

COMPONENT PARTS OF THE CR-1 RESERVE PARACHUTE

23. The CR-1 reserve parachute (see Figure 1-9) consists of the following:

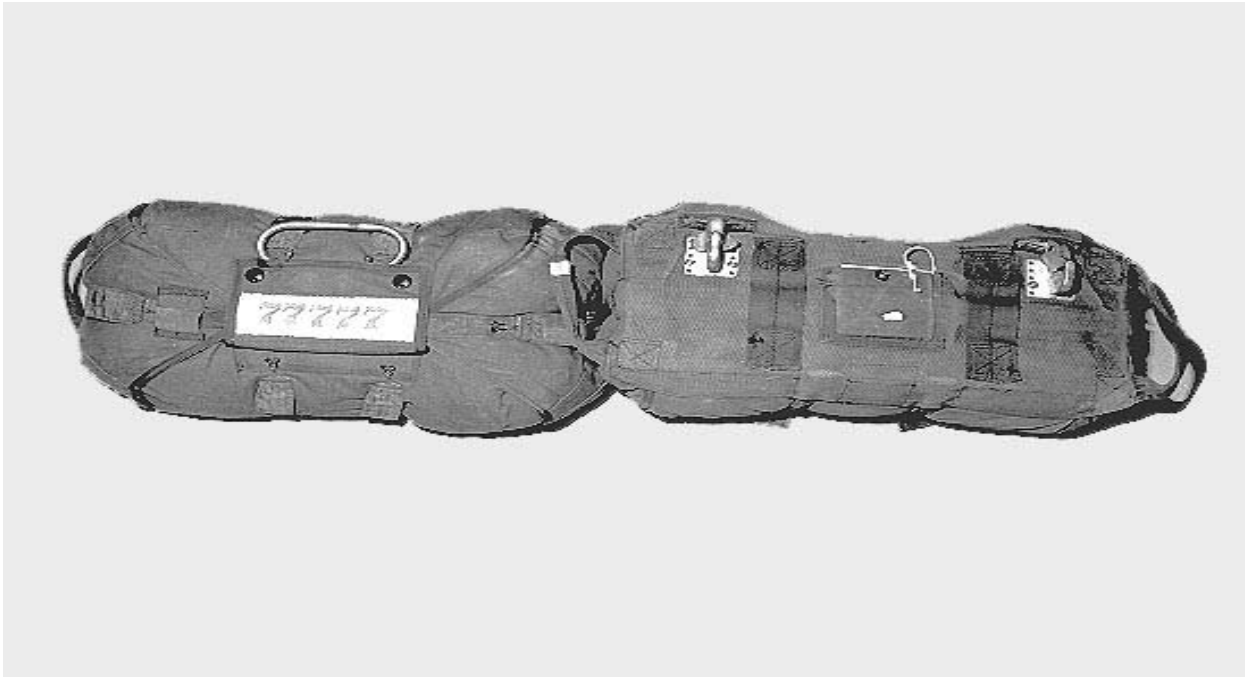


Figure 1-9: CR-1 Reserve Parachute:

- a. canopy assembly;
- b. pack assembly;
- c. ripcord assembly; and
- d. pilot parachute assembly.

CANOPY ASSEMBLY

24. The CR-1 reserve canopy assembly consists of the canopy, 12 continuous suspension lines, two metal snap hooks, and a nylon spreader bar.

25. The canopy is a flat circular type with a 7.3 m (24 ft) diameter. It has 24 gores, each gore having two sections. There are radial seam channels between the gores through which the suspension lines pass. Pocket bands are sewn to the lower lateral band at each suspension line.

26. The suspension lines are continuous type III nylon cord. They are attached at either end to the snap hooks, and run up through the radial seam channels and across the 46 cm (18 in) apex vent.

27. The snap hooks are permanently fixed to the pack assembly. They are used to attach the reserve parachute to the D-rings of the main lift web and are attached to each other by the nylon spreader bar.

PACK ASSEMBLY

28. The pack assembly (see Figure 1-10) consists of a pack tray composed of a semi-rigid steel wire frame covered with nylon, a top and bottom flap, and two end flaps. Sewn inside the pack tray at each end is a retainer band keeper. The retainer bands are used to stow the suspension lines. Sewn onto the inside of the top and bottom flaps are two pilot parachute protector flaps. On the outside of the top flap is a ripcord protector flap that covers the ripcord pocket. The ripcord protector flap is fitted with two "lift-the dome" or Velcro fasteners. The pack is held closed by two locking cones, attached to the bottom flap and protruding through the two metal grommets on the top flap, and two metal end fasteners attached to the end flaps. There are three pack opening bands that fit around the pack, with six attaching points (two on both the top and bottom flaps, and one on each side flap), which pull the flaps open when the parachute is activated. A carrying handle is attached to each end of the pack. At the rear of the pack are two waistband keepers.

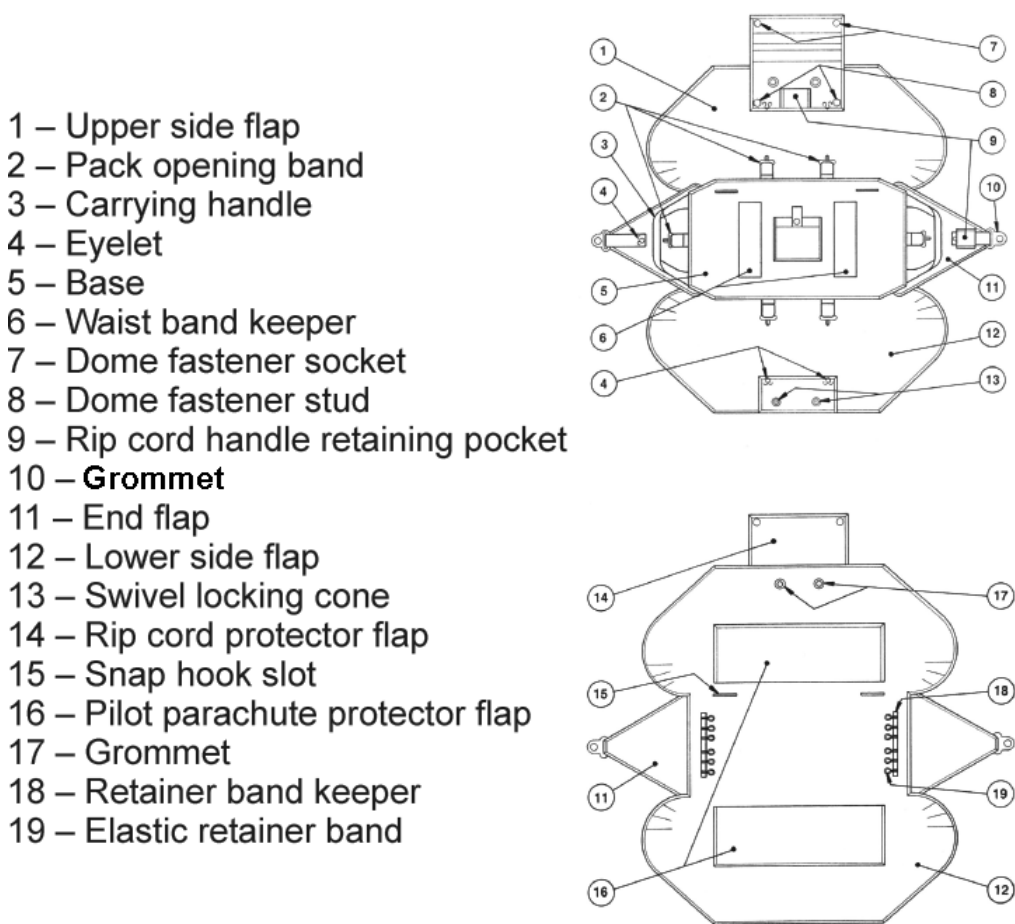


Figure 1-10: CR-1 Reserve Parachute

RIPCORD ASSEMBLY

29. The ripcord assembly consists of a ripcord handle and two lengths of flexible steel cable with a metal ball swaged on one end and a locking pin on the other. On the packed parachute the bottom of the ripcord handle is in the ripcord pocket and the locking pins are inserted through the locking cones. A length of red thread, known as the rigger's seal, is attached to the seal cable and passes around the locking pin beneath the cone. If unbroken, this seal indicates that the parachute is serviceable.

PILOT PARACHUTE ASSEMBLY

30. The MA-1 pilot parachute (see Figure 1-11) assists canopy deployment. The pilot parachute is a spiral vane type with a 946 mm (37 1/4 in) diameter and is made of ripstop nylon.

A pilot parachute opening spring is located inside the vane of the pilot parachute for launching the pilot parachute. When the reserve is packed, a kicker plate is placed on top of the packed reserve parachute canopy at the base of the pilot parachute to assist launching the pilot parachute. A 806 mm (31 $\frac{3}{4}$ in) nylon bridle line attaches the pilot parachute to apex lines of the canopy.

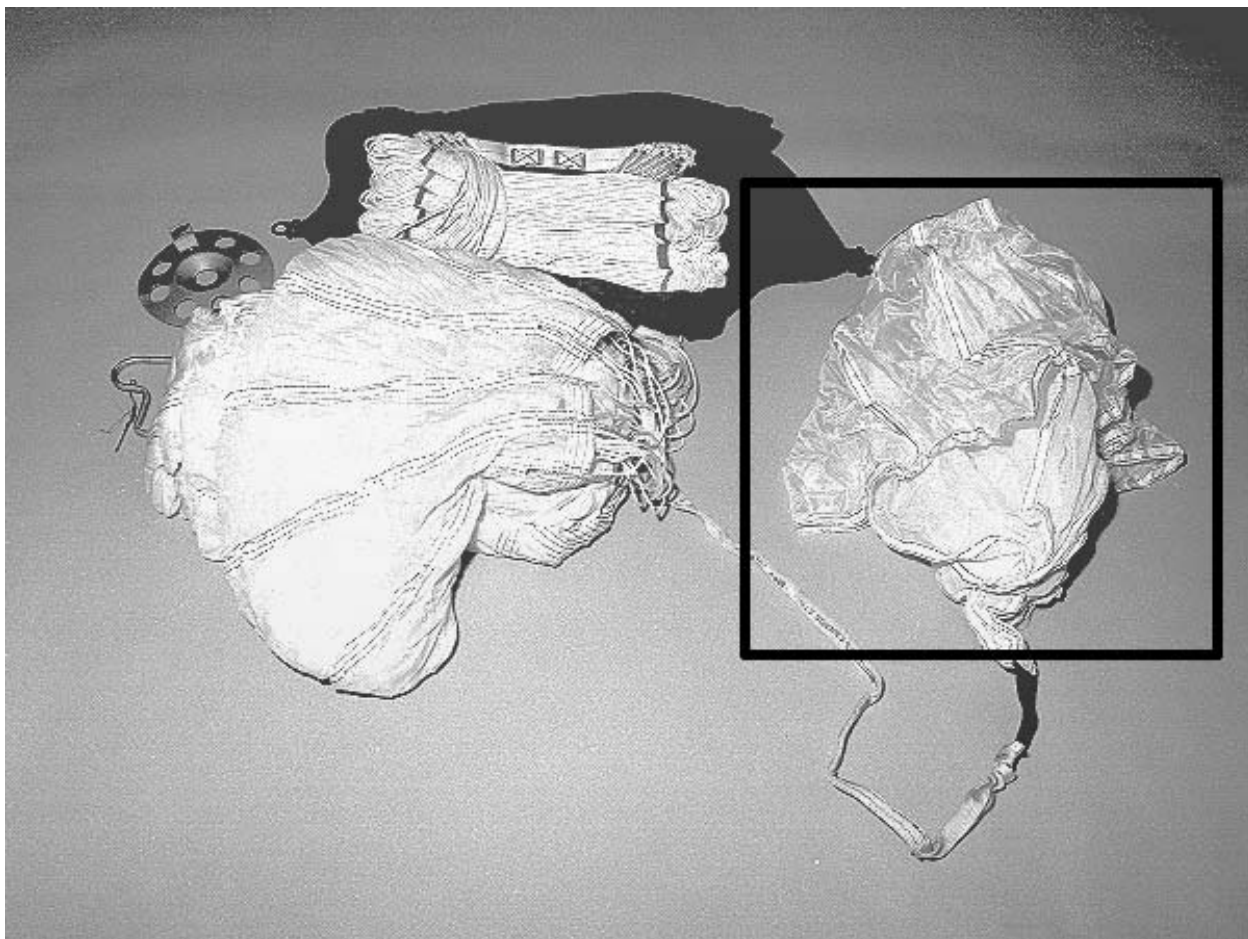


Figure 1-11: Pilot Parachute Assembly

SECTION 2

CARE OF THE CT-1 ASSEMBLY

GENERAL PRECAUTIONS

31. Utmost care should be taken with parachute assemblies to eliminate any possibility of damage or faulty operation due to improper handling or storage. The following precautions will be observed when handling parachutes:

- a. parachutes will not be placed where they will be exposed to dampness or excessive heat;
- b. parachutes will not be stored in direct sunlight;

- c. parachutes will not be handled roughly or carelessly; and
- d. parachutes should be prepared for transport and stowed properly in the flyer's kit bag as soon as possible after use.

SECTION 3

DONNING AND FITTING THE CT-1 ASSEMBLY

GENERAL

32. Responsibility for the correct donning and fitting of the parachute lies with the individual parachutist. The jumpmaster's check is only a confirmation.

INSPECTION OF PARACHUTES

33. After a parachute has been received at a unit and before it is jumped it must be inspected by a qualified Parachute Rigger (Para Rigger), TSQ 911.06, to ensure that it is serviceable. This inspection must be done before the parachute is issued to the parachutist or, if necessary, after the parachutist has donned the parachute.

34. In either case, after being issued the CT-1 assembly, the parachutist will:

- a. inspect the reserve parachute and ensure that:
 - (1) the snap hooks are serviceable;
 - (2) there is no canopy material protruding from the pack; and
 - (3) the riggers' seals are intact; and
- b. remove the main parachute from the flyer's kit bag and inspect it to ensure that:
 - (1) no canopy material is protruding from the pack;
 - (2) the Three-Point Release harness is serviceable (in the case of a QRB harness assembly, this is done by striking the operating button when it is in the locked position);
 - (3) all straps are not cut or excessively worn; and
 - (4) the waist band and adjuster buckle are not excessively worn or frayed.

PREPARING THE CT-1 MAIN FOR DONNING

35. While the parachutist is inspecting the harness, the parachute is prepared for donning as follows:

- a. in the case of a Three-Point Release harness assembly:
 - (1) release ejector snaps on the chest and leg straps and lay out all the straps;
 - (2) adjust the chest and leg straps to their fullest extent; and
 - (3) adjust the diagonal back straps so they have approximately 15 cm (6 in) of strap extending from the adjuster buckle, and extend the horizontal back strap so that there is approximately 10 cm (4 in) of strap extending from the buckle; and
- b. in the case of a QRB harness assembly:
 - (1) remove the safety fork;
 - (2) test the operating button, then rotate it to “RELEASE”;
 - (3) depress the operating button and ensure that it locks into the depressed position;
 - (4) rotate the operating button against the direction of the arrow to “DON”, and ensure that the button springs outwards; and
 - (5) slide the locking lugs to the ends of the chest and leg straps;
- c. pull the risers from the pack approximately 5 cm (2 in) past the double stitched labels (manufacturer’s labels);
- d. adjust the diagonal back strap until approximately 15 cm (6 in) of the running ends protrude from the adjuster buckles;
- e. re-zip the flyer's kit bag and accordion-fold it so that it is the same width as the parachute pack; and
- f. roll the bag up and stow it at the bottom of the pack with the two stowing elastics.

DONNING THE CT-1 MAIN

- 36. The CT-1 main is donned using the buddy system as follows:
 - a. The parachutist picks up the parachute with the canopy releases at the top and the harness towards him.
 - b. The Number 2 holds the pack between his hands with the canopy release assemblies behind his knuckles.
 - c. In the case of the Three-Point Release harness assembly:

- (1) The parachutist then turns about and inserts his arms between the main lift web and the back pad, donning the assembly as he would a coat, immediately bending forward at the waist approximately 90°. The Number 2 pushes the pack high on the parachutist's back and pulls the saddle down under his buttocks.
 - (2) Ensuring there is no twist in the chest strap, the parachutist hooks the ejector snap to the chest V-ring, adjusts the comfort pad behind the V-ring, and tightens the chest strap.
 - (3) The Number 2 then passes the leg straps to the parachutist, who ensures that the leg straps are free of twists and attaches them to the V-rings for the leg straps, with the comfort pads under the ejector snaps.
 - (4) The parachutist then tightens the leg straps ensuring that they are snug, sitting up at the top of the thigh, and are equal in length, with the saddle under the buttocks
 - (5) The running ends of the leg straps are **not** secured in the retainer bands.
- d. In the case of a QRB harness assembly:
- (1) The parachutist then turns about and inserts his arms between the main lift web and the diagonal back straps, and bends 90° forward at the waist. The Number 2 pushes the pack high on his back and pulls the saddle under his buttocks.
 - (2) The parachutist inserts the locking lug of the right chest strap into the QRB until it locks.
 - (3) The parachutist ensures that the leg straps are free from twists and threads them from inside to outside, depending on the build of the parachutist, either:
 - (a) through the leg straps loops; or
 - (b) through the back strap loops.
 - (4) The leg straps are then inserted into the QRB.
 - (5) The operating button is then turned in the direction of the arrow to "LOCKED".
 - (6) The safety fork is inserted into the slot of the QRB marked "RELEASE" so that it clamps onto the operating button rod.

FITTING THE CT-1 MAIN

37. The parachutist bends forward at the waist and pulls the running ends of the leg straps, ensuring they are snug and the saddle is under the buttocks, with both straps of equal length.
38. Remaining bent forward, the Number 2 adjusts the diagonal back straps so that the canopy releases are positioned in the hollows of the shoulders just below the collar bones and both diagonal back straps ends are of equal length.
39. The parachutist then stands up straight to confirm fitting.
40. The parachutist then assists while the Number 2 dons his CT-1 main in the same manner.

INSPECTION

41. Unless the main parachute has been previously inspected by a Para Rigger, after it has been fitted it shall be inspected by a Para Rigger to ensure that it is serviceable and properly fitted.

DONNING THE CR-1 RESERVE

42. After the CT-1 main has been inspected, the parachutist will don the CR-1 reserve, using the buddy system as follows:
 - a. the parachutist's Number 2 will hold the reserve in front of the parachutist with the ripcord handle up;
 - b. the parachutist will ensure that there are no twists in the waistband and will thread it through the waist band keepers of the reserve;
 - c. the parachutist will snap the reserve snap hooks to the D-rings on the main lift web;
 - d. the parachutist's Number 2 will secure the waist band to the waist band adjuster buckle with a quick release bight; and
 - e. after opening his ripcord protector flap and donning his helmet, the parachutist will be ready for the jumpmaster's check (see Figures 1-12 and 1-13).



Figure 1-12: Parachutist with CT-1 (Front View)



Figure 1-13: Parachutist with CT-1 (Side View)

NOTE

The procedure for dressing with equipment is detailed in Chapter 2.

**SECTION 4
THE PARACHUTIST HELMET**

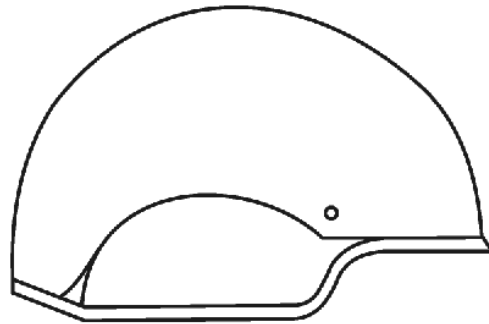
GENERAL

43. The helmet used when parachuting is the Canadian Forces Combat Helmet, model CG634, or the older style steel combat helmet. This section describes the new CG634 model.

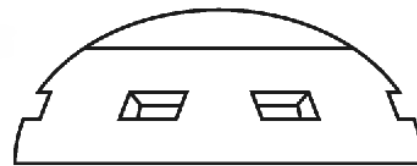
COMPONENT PARTS

44. The parachutist helmet (see Figure 1-14) consists of the following:

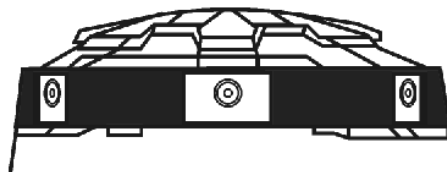
SHELL



TRAUMA LINER DESIGN VARIES WITH SIZE LARGE SIZE SHOWN



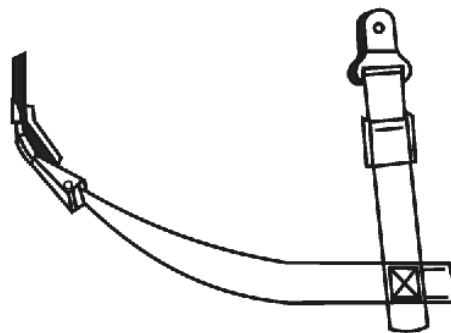
SUSPENSION SYSTEM



HEAD BAND



CHIN STRAP ASSEMBLY



SCREW AND BARREL NUTS



Figure 1-14: The Parachutist Helmet

- a. shell;
- b. trauma liner;

- c. suspension system;
- d. head band;
- e. chin strap assembly; and
- f. screw and barrel nuts.

ASSEMBLING THE HELMET

45. The helmet is assembled as follows:

- a. turn the helmet up so that the interior of the shell is facing you and the rear screw hole is in the 12 o'clock position;
- b. note the alignment marks in the helmet;
- c. insert the trauma liner into the suspension system;
- d. insert the suspension system containing the trauma liner into the shell, making sure the back goes in first;
- e. adjust the trauma liner in the suspension system ensuring that it and the suspension system are aligned with the alignment mark on the edging material of the shell;
- f. insert three barrel nuts through the shell from the outside and pass them through the plastic support of the suspension system;
- g. attach the chin strap assembly to the interior of the helmet using the three screws;
- h. insert the headband into the suspension, leather inside and the hem down;
- i. cover the nape pad screw head with a locally purchased high density closed cell neoprene foam approximately 3 mm (1/8 in) thick and measuring 1 cm (1/2 in) by 1 cm (1/2 in); and
- j. adjust the helmet for proper fit.

DONNING THE HELMET

46. When donning the helmet, ensure that:

- a. the helmet is tilted slightly at an angle of approximately 8 to 10 degrees, by setting the brim of the helmet one finger width above your eyebrows;
- b. confirm that there is no contact between the head and the trauma liner; and

- c. tighten the front two adjustment buckles on the chin strap until the chin cup is positioned snugly around the chin.

SECTION 5

DEPLOYMENT AND DEVELOPMENT

GENERAL

47. Deployment is the action of the canopy and suspension lines being withdrawn from the stowed position. Deployment is completed when the canopy and lines are fully extended.

48. Development is the action of the canopy filling with air. Development is complete when the canopy has assumed its normal shape and is giving full support to the parachutist or load.

DEPLOYMENT AND DEVELOPMENT OF THE CT-1 MAIN

49. Before exit, the parachutist hooks the static line snap fastener to the anchor line cable in the aircraft. On exit the parachutist falls downward due to gravity and forward, in the direction the aircraft is moving, due to inertia. While falling the parachute deploys as follows (see Figures 1-15 to 1-19):

- a. **Phase 1.** The static line is pulled from the stowed position.



Figure 1-15: Deployment Phase 1

- b. **Phase 2.** The pack opening loop breaks the pack closing tie.



Figure 1-16: Deployment Phase 2

- c. **Phase 3.** The static line pulls the deployment bag and risers from the pack.



Figure 1-17: Deployment Phase 3

- d. **Phase 4.** The two connector link ties break. The suspension lines are pulled from the stowing loops and finally from the locking stow loops.

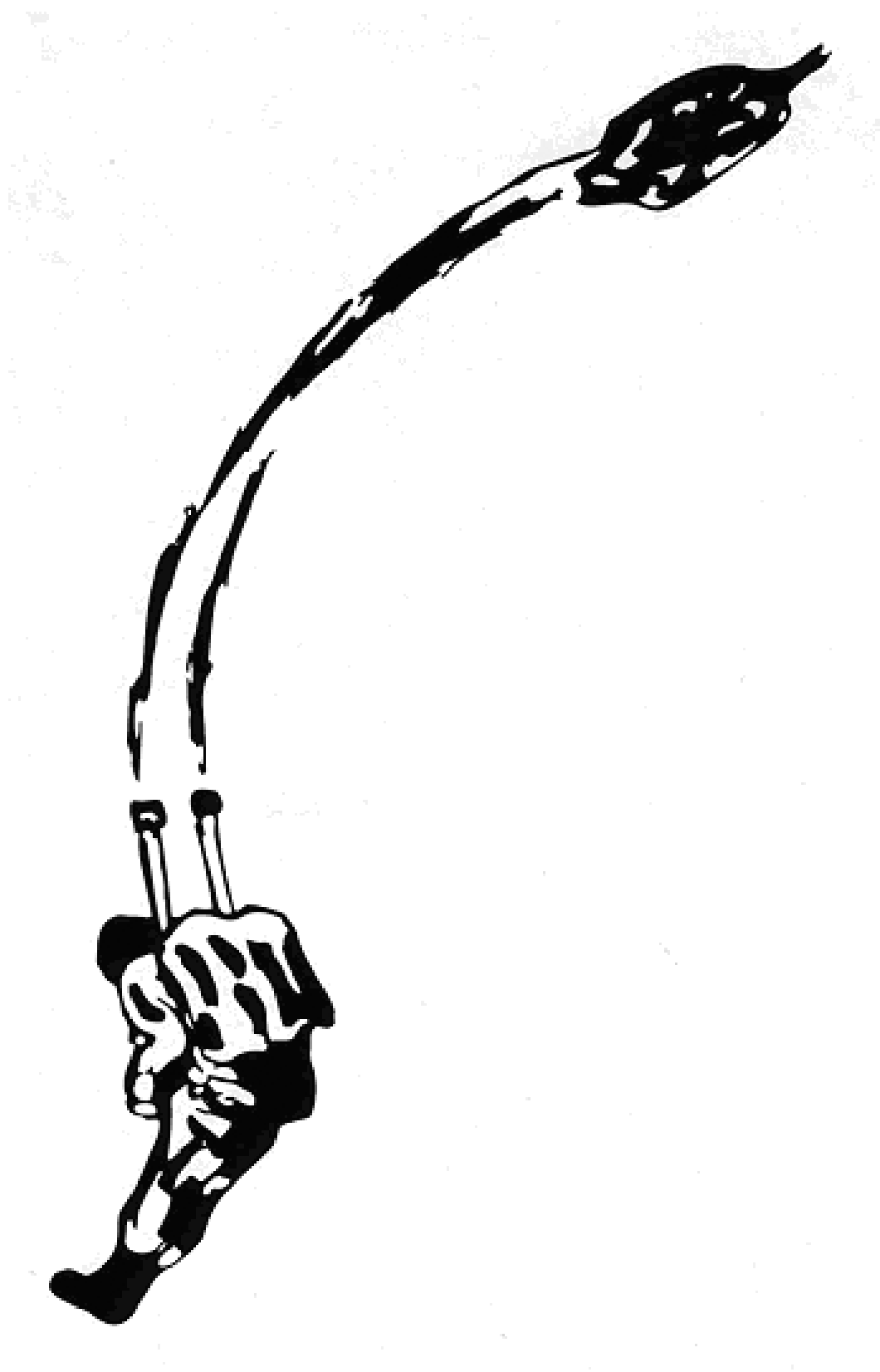


Figure 1-18: Deployment Phase 4

- e. **Phase 5.** The deployment bag opens and the canopy is withdrawn until deployment is complete. The apex tie then breaks and the canopy develops.



Figure 1-19: Deployment Phase 5

NOTE

These phases must occur in sequence to produce maximum safety and reliability. Phases must not start before the previous phase is completed.

50. As the canopy develops, the forward movement of the parachutist is arrested. The parachutist then swings under the canopy and begins to descend.

51. The time from exit to full development of the CT-1 main is approximately 3.5 seconds. Variation may occur with air speed and other factors. In general, as the air speed decreases, development time increases.

52. As the canopy and suspension lines are deploying, the lines and risers may turn around each other. These turns may result from:

- a. rotation of the deployment bag during deployment;
- b. turning of the canopy during deployment;
- c. rotation of the parachutist's body during deployment; or
- d. a combination of any of the above.

53. These turns may remain after development is complete. Turns are not classed as a malfunction. Corrective action for turns is detailed in Chapter 3, paragraphs 82 and 83.

MALFUNCTIONS

54. A parachute malfunction is improper functioning of the parachute system causing the parachute to deploy, develop or descend in an abnormal manner.

55. Malfunctions are classed as either:

- a. a **complete malfunction**, when the canopy gives no support to the parachutist; or
- b. a **partial malfunction**, when the canopy gives some but not full support.

56. Complete and partial malfunctions of the CT-1 main are very rare and are normally caused by unusual accidents.

57. Partial malfunctions may be of the three following types:

- a. **Inversion.** The canopy is blown completely through two adjacent suspension lines, thus turning itself inside out. An inversion may cause friction damage to the canopy material. Inversions are very rare due to the preventive action of the anti-inversion skirt on the canopy.

- b. **Semi-inversion.** The canopy is blown partially through two adjacent suspension lines, forming two or more lobes. A semi-inversion may remain stable, become a complete inversion, or revert to normal development during descent. Again, this type of malfunction is very rare.
- c. **Blown Section.** During development, the strain on one section is sometimes sufficient to cause it to blow out. The canopy is so constructed that rarely more than one section is blown.

58. Corrective action for parachute malfunctions is detailed in Chapter 3, Paragraphs 90 through 94. Malfunctions must be reported to the Para Rigger on the drop zone as soon as possible.

PREPARING THE CT-1 ASSEMBLY FOR CARRYING AND TRANSPORT

59. The parachute will normally be spread out on the ground after landing. It is prepared for transport as follows:

- a. Retrieve male fitting of the canopy release and reconnect.
- b. Move to the apex, removing any debris from the suspension lines and canopy on the way.
- c. Grasp the apex and rotate the canopy 5 to 10 times.
- d. Still grasping the apex, return to the harness and flyer's kit bag.
- e. Release the elastic on the flyer's kit bag, open the zipper and turn the bag right side out.
- f. Place the pack and harness in the flyer's kit bag.
- g. Beginning with the risers, S-fold the suspension lines and canopy into the bag, ensuring that the apex is on top. Move the flyer's kit bag towards the parachute as opposed to dragging the canopy.
- h. Close the zipper on the bag, ensuring that the zipper does not snag the canopy material.

60. If the parachute assembly is to be manpacked, pass one handle through the other, snap one of the reserve snap hooks through a carrying handle on the flyer's kit bag, and sling the assembly over a shoulder, with the reserve in front and the bag in the back.

SECTION 6

THE CT-2 PARACHUTE ASSEMBLY

GENERAL

61. The CT-2 main parachute is a steerable static line operated, bag deployed, troop-type parachute similar to the CT-1 parachute assembly. It is worn on the back and is fitted to the parachutist by means of a three-point release harness assembly. The complete assembly less reserve parachute weighs approximately 21.3 kg (47 lb).

COMPONENT PARTS OF THE CT-2 MAIN PARACHUTE

62. The CT-2 main parachute is composed of the following assemblies:

- a. canopy assembly;
- b. harness assembly;
- c. pack assembly; and
- d. deployment bag assembly.

CANOPY ASSEMBLY

63. The standard 9.7 m diameter flat circular canopy embodies a cut out configuration. A net skirt has been added to reduce the possibility of inversions. Two steering lines with toggles are provided for manoeuvring the parachute. The canopy is fabricated from olive drab 4.7 gram low porosity, plain weave nylon.

HARNESS ASSEMBLY

64. The harness assembly of the CT-2 main parachute is the three-point release assembly detailed in paragraphs 9 to 11.

PACK ASSEMBLY

65. The pack assembly of the CT-2 main parachute is similar to the CT-1 detailed in paragraphs 19 and 20.

DEPLOYMENT BAG ASSEMBLY

66. The deployment bag assembly is similar to the CT-1 detailed in paragraphs 21 and 22, except that elastic bands are used to secure the suspension lines instead of the suspension line loop.

DONNING AND FITTING THE CT-2 PARACHUTE ASSEMBLY

67. Donning and fitting the CT-2 parachute is the same as for the CT-1 fitted with a three-point release assembly detailed in Section 3.

SECTION 7 CT-2 CANOPY CONTROL

GENERAL

68. The cut out configuration provides the canopy with forward thrust. This forward thrust coupled with the capability to turn the canopy allows the parachutist to steer in the air to a limited degree and to reduce drift on landing.

CHARACTERISTICS OF THE CT-2 CANOPY

69. The characteristics of the CT-2 steerable canopy are as follows:
- a. the rate of turn is 8 seconds for a 360 degree turn;
 - b. the rate of descent is approximately 4.7 m/sec for a jumper of average weight; and
 - c. the canopy has a forward speed of 6.4 km/h to 11.3 km/h in still air, depending on the weight of the parachutist.

CANOPY CONTROL

70. The canopy is controlled by pulling on the toggles located on the rear risers. When one or both toggles are pulled, it changes the configuration of the cut out portion of the parachute, causing the canopy to turn or brake.

TURNS

71. The parachutist turns by pulling down the toggle in the direction he wants to turn. (i.e. pull on the left toggle to turn left). When he has achieved the degree of turn desired, he releases tension on the toggle. If adjustments are needed, the parachutist pulls the other toggle to correct any overturning.

HOLDING

72. Holding is used to decrease the horizontal movement of the parachutist.

73. The parachutist holds by turning the canopy so that the modifications at the rear of the canopy are downwind (i.e. the parachutist is facing into the wind).

DRIVING

74. Driving is used to increase the horizontal movement of the parachutist.
75. The parachutist drives by turning the canopy so that the modifications at the rear of the canopy are upwind (i.e. the parachutist has the wind at his back).

CRABBING

76. Crabbing is moving at an angle to the line of drift. It is achieved by turning the canopy at an angle to the line of drift and maintaining the angle.
77. Crabbing is normally used to enable parachutists to manoeuvre to the wind line in order to land close to the desired Point of Impact (PI).

BRAKING

78. Braking (decreasing forward momentum) is achieved by pulling down on both toggles. The parachutist may have the brakes on when there is no surface wind, in order to decrease the forward movement of the canopy. However the parachutist must still execute a proper landing. When braking, the toggles must not be so far extended that the modifications to the canopy are completely closed.

**SECTION 8
PERSONNEL PARACHUTE BACK DISPATCH PARACHUTE****GENERAL**

79. The 7.3 m (24 ft) personnel parachute back (PPB) dispatch parachute is a ripcord operated, freefall type parachute. It is worn by jumpmasters and assistant jumpmasters, and is used only in an emergency.

COMPONENT PARTS

80. The 7.3 m (24 ft) PPB is composed of the following assemblies (see Figures 1-20 and 1-21):
- a. harness assembly;
 - b. pack assembly;
 - c. canopy assembly; and
 - d. pilot parachute assembly.



Figure 1-20: Personnel Parachute Back Dispatch Parachute Main Lift Web



Figure 1-21: Personnel Parachute Back Dispatch Parachute

HARNESS ASSEMBLY

81. The harness assembly consists of nylon webbing with metal fittings and two canopy release assemblies.
82. Attached to the main lift web by means of a length of webbing are two V-rings that engage ejector snaps on the leg straps when the parachute is donned.
83. The chest straps are secured to the main lift web. The right chest strap is equipped with a quick fit V-ring that is engaged with an ejector snap secured to the left chest strap.

84. Two diagonal back straps cross at the centre of the back; each end is attached to a canopy release assembly and the opposite ends are fitted with quick fit adjuster buckles. The horizontal back strap passes through the main lift web loops and each end is threaded through the corresponding quick fit fastener of the diagonal back strap. By grasping the running ends of the horizontal back straps and pulling in a downward direction, the width of the harness is narrowed and the main lift web is shortened to the configuration desired by the wearer.

85. A group of two risers extends from each canopy release assembly to the connector links. Each group consists of a continuous length of webbing divided equally at the canopy release and held in position by a keeper. At each running end of the four risers a connector link loop is formed.

86. The canopy release assemblies are devices that connect the canopy and the risers to the harness. They enable the wearer to separate the canopy quickly from the harness in the event of being dragged by high winds.

87. The ripcord housing is attached at one end to the top end flap and the opposite end is secured to the ripcord pocket.

88. The ripcord consists of a flexible steel cable with a handle at one end. Attached to the cable, at intervals, are three locking pins that lock the pack closed.

PACK ASSEMBLY

89. The pack assembly, used to contain the suspension lines, canopy and pilot parachute when the parachute is completely packed, is made of nylon material reinforced with nylon tapes and webbing. It is of semi-rigid construction and consists of a bottom, two end flaps, two side flaps, and two pilot parachute positioning flaps.

CANOPY ASSEMBLY

90. The canopy assembly, consisting of replaceable connector links, suspension lines and canopy, constitutes the lifting surface of the parachute.

91. The multicoloured canopy, 24 ft (7.3 m) in diameter, is of circular bias construction and is made of nylon material reinforced at the upper and lower lateral bands. It consists of 24 gores, which are sewn together to provide a channel between each gore. Passing through each channel is a suspension line. Each gore is divided into four sections.

92. The apex vent is a circular opening 46 cm (18 in) in diameter supported by the suspension lines.

93. Joining the canopy to the connector links are 12 continuous suspension lines. From the connector links, the lines extend to the lower lateral band, through the channels, and across the apex vent to the diametrically opposite connector links.

PILOT PARACHUTE ASSEMBLY

- 94. The pilot parachute is of spiral spring, vane type construction.
- 95. A bridle line connects the pilot parachute to the apex lines of the canopy.

DEPLOYMENT AND DEVELOPMENT OF THE CR-1 AND PERSONNEL PARACHUTE BACK DISPATCH PARACHUTE

- 96. The CR-1 and PPB dispatch parachutes are activated by pulling the ripcord handle. The parachute then deploys as follows:
 - a. the locking pins are withdrawn from the locking cones, allowing the pack to open;
 - b. the pack opening bands pull back the flaps exposing the pilot parachute;
 - c. the spring on the pilot parachute throws the pilot canopy and bridle cord clear of the pack; and
 - d. the pilot canopy catches the air, acting as an air anchor while it withdraws the main canopy and suspension lines.
- 97. On both of these parachutes, the canopy begins to develop before deployment is complete.

CHAPTER 2

PARACHUTIST EQUIPMENT LOADS

SECTION 1

GENERAL

INTRODUCTION

1. Parachutists carry a variety of loads and load combinations on operations and during training.
2. Equipment other than that detailed in this chapter is normally delivered as door loads or by heavy drop.

GENERAL RULES

3. The general rules for jumping with equipment are as follows:
 - a. a parachutist will jump with the weapons and equipment immediately required;
 - b. the load should be as light and compact as possible;
 - c. the load should be free from sharp projections;
 - d. all equipment not lowered before landing should be attached to the front of the parachutist; and
 - e. all loose strap ends must be tucked away or secured with masking tape.

RULES FOR PACKING

4. The rules for packing are as follows:
 - a. whenever possible, weapons and equipment should be packed as complete units, e.g. pack a radio and its battery in the same load;
 - b. sufficient padding must be used to prevent direct contact between hard objects;
 - c. ensure that hard objects are packed so that they will not damage the container;
 - d. whenever possible, soft equipment such as clothing should be used as padding for other items;
 - e. items should be packed so that they will be removed from the container in the order in which they are required;

- f. insulate items which can be damaged by freezing; and
- g. pack the heaviest items in the bottom of the load.

PARACHUTIST'S EQUIPMENT LOWERING SYSTEM

5. The operational requirement for the Canadian military parachutist is to exit from an aircraft with sufficient weapons and equipment to be able to fight effectively before recovering any heavy equipment which may be delivered separately.

6. The Parachutist's Equipment Lowering System (PELS) (see Figure 2-1) is a simple device which:

- a. securely attaches equipment to the parachutist while in and exiting from the aircraft;
- b. provides for quick release of the equipment from the parachutist regardless of the light conditions or the type of hand protection worn;
- c. is lightweight; and
- d. is capable of being speedily attached to and released from the parachutist's equipment.

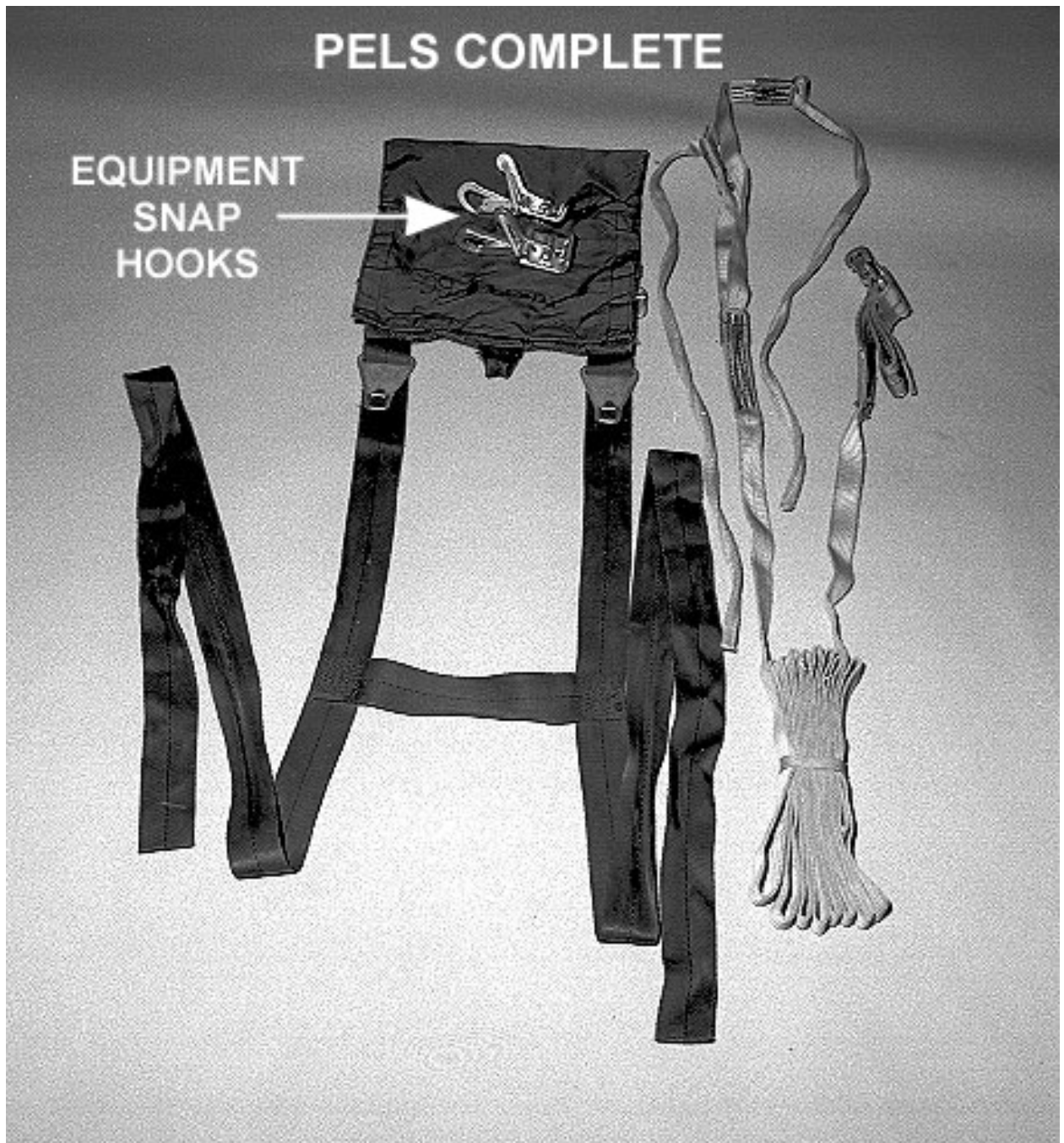


Figure 2-1: Parachutist's Equipment Lowering System (PELS) with Lowering Strap Assembly

7. The PELS consists of two 1.67 m (66 inch) nylon straps connected by a 26.7 cm (10.5 in) nylon strap positioned 35.6 cm (14 in) from a valise in which the lowering strap is stowed. The valise is 29.8 (11.75 in) long and 24.8 cm (9.75 in) wide, and there is a 10.2 cm (4 in) opening at the top which can be closed with Velcro material. There are two adjuster buckles attached to the valise end of the straps. There are two strap fastener hasps attached to the straps to allow the attachment of the two equipment snap hooks.

8. The PELS is attached by passing the long straps around the equipment to be carried and securing them to the adjuster buckles. The method of securing the PELS to specific equipment is described in subsequent sections.
9. The PELS is disengaged from the equipment by lifting the edge of the adjuster buckle, and pulling the running end back through the fastener.
10. The equipment snap hooks, which are secured to the strap fasteners hasps, are attached to the V-rings on the main lift webs, with the release levers facing away from the parachutist. The equipment snap hook of the lowering strap must be secured between the equipment snap hooks of the PELS.

THE LOWERING STRAP ASSEMBLY

11. The lowering strap is used to secure the equipment below the parachutist prior to landing.
12. The lowering strap is a 4.4 m (14.5 ft) length of 2.5 cm (1 in), 1,814 kg (4,000 lb) MBS tubular nylon webbing (see Figure 2-2). Located at one end are two equipment carrying end straps of the same material. The short carrying end strap is 78.7 cm (31 in) and the long carrying end strap is 106.7 cm (42 in). On each equipment carrying end strap is a fixed loop and a running end. Sewn onto the opposite end of the lowering strap is a jettison strap 58.4 cm (23 in) in length, made of 4.4 cm (1.75 in) Type VIII nylon. A snap hook adjuster buckle completes the assembly.

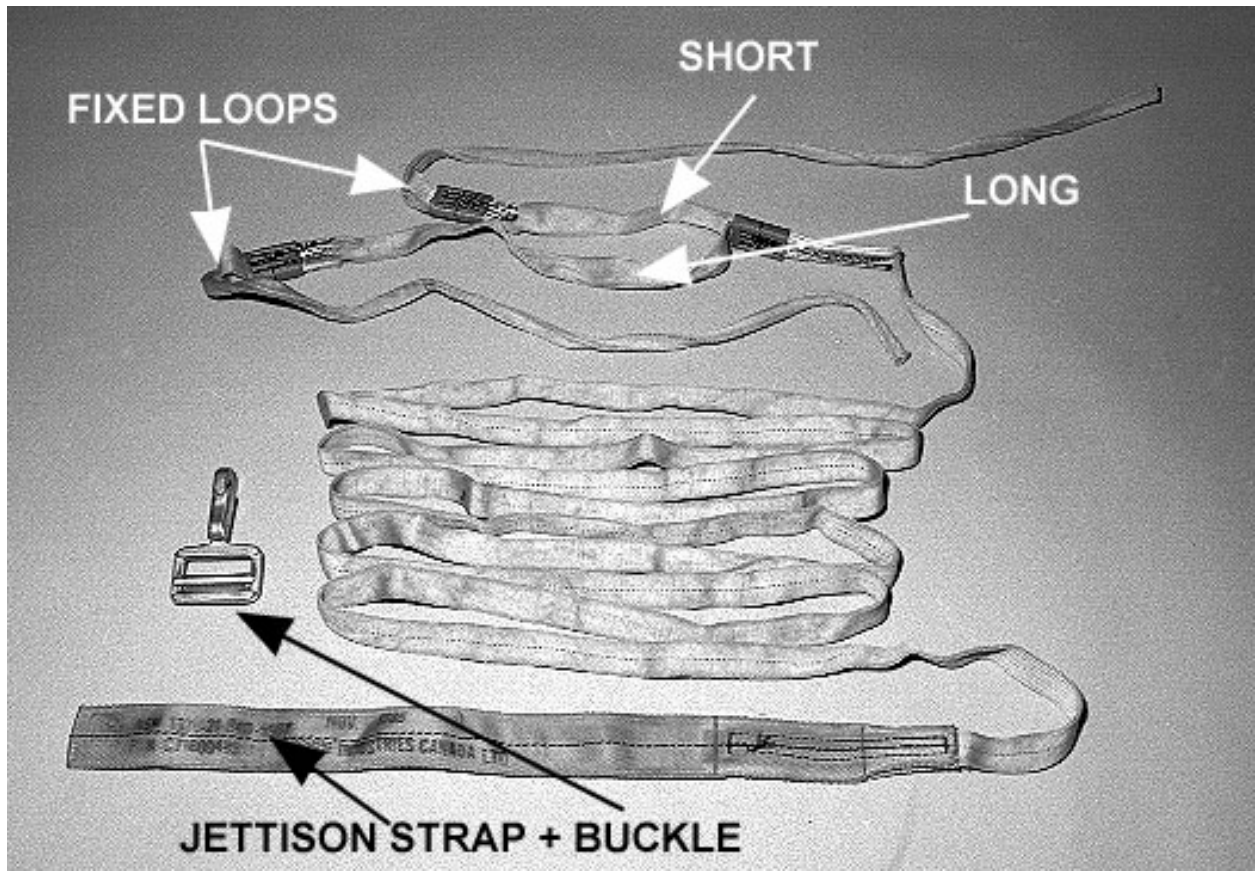


Figure 2-2: Lowering Strap Assembly

13. The equipment carrying end straps are attached to the equipment as follows:
 - a. pass the running end through and or around the point of suspension of the equipment to be carried (see Figure 2-3);



Figure 2-3: Pass Running End through Suspension Point

- b. make a bight in the running end and pass the bight through the fixed loop of the equipment carrying end strap (see Figure 2-4);



Figure 2-4: Pass Bight through Fixed Loop

- c. pull the bight through the fixed loop until it is tight around the point of suspension (see Figure 2-5); and



Figure 2-5: Pull Bight Tightly through Fixed Loop

- d. thread the running end down through the bight and pull the bight tight, leaving a two-finger width loop in the running end (see Figure 2-6).



Figure 2-6: Thread Running End down through the Bight

14. The equipment carrying end straps are detached by pulling the running end back through the bight.
15. When used with the PELS, the long equipment carrying end of the lowering strap is attached to the loop which is located at the top centre of the PELS valise.
16. The jettison strap is attached to the snap hook as shown in Figure 2-7. Parachutists must ensure that the bight in the jettison strap is four fingers in width. A retainer band is placed over the four layers of the strap, just below the snap hook buckle, to prevent accidental jettisoning of the equipment.

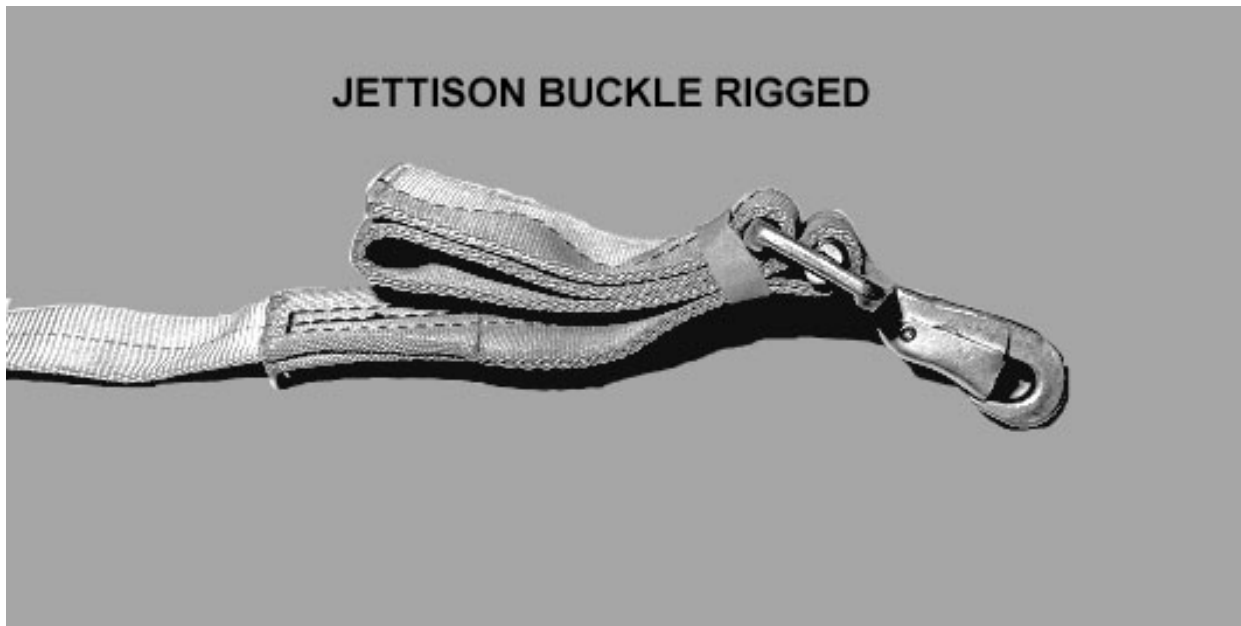


Figure 2-7: Jettison Strap Attached to Snap Hook

17. The snap hook is attached to the right V-ring on the parachute harness except when only a shoulder load is carried, in which case it is attached to the V-ring on the same side as the load. The opening of the snap faces away from the parachutist.

SECTION 2 THE C-2 RUCKSACK

GENERAL

18. The C-2 rucksack consists of a metal frame, two shoulder straps, a waistband, a cargo carrier with three external pockets, and two straps for securing the sleeping bag container above the cargo carrier. The frame of the rucksack can be used as a pack board. It is designed to carry a portion of a soldier's field equipment.

19. Parachutists can jump with the C-2 rucksack alone or in combination with other equipment.

PREPARING THE RUCKSACK AND ATTACHING THE PELS

20. The PELS will be attached to the rucksack as follows:

- a. Pack the cargo carrier in accordance with the rules of packing, and secure the sleeping bag container.
- b. Secure all loose strap ends.
- c. Place PELS on a level surface with the adjuster buckles facing up.

- d. Place the rucksack on the laid out PELS with the shoulder straps up and the bottom of the rucksack toward the adjuster buckles.
- e. Thread the running ends of the PELS under the top portion of the rucksack frame, ensuring they are outermost from the valise retaining straps and under the shoulder straps. Secure the running ends through the adjuster buckles (see Figure 2-8).



Figure 2-8: Running Ends of the PELS under the Top Portion of the Rucksack Frame

- f. Ensure PELS at the hasp end is over the frame (see Figure 2-9).



Figure 2-9: Routing PELS over Bottom Portion of Rucksack

- g. Adjust the PELS ensuring the adjuster buckles are in line with the centre bar of the frame.
- h. To prevent the PELS from coming loose, make a quick release knot around the PELS strap located below the adjuster buckles and tuck excess away (see Figure 2-10).



Figure 2-10: Adjuster Buckles Centred and Secured

- i. Attach lowering strap's long equipment carrying end to the rucksack, S-fold and place neatly in PELS valise (see Figure 2-11).



Figure 2-11: Attaching Lowering Strap

- j. Attach equipment snap hooks, secure the short equipment carrying end to the cured portion of the rucksack frame, and have only the securing knot, strap to jettison buckle, and short equipment carrying end outside PELS valise (see Figure 2-12).

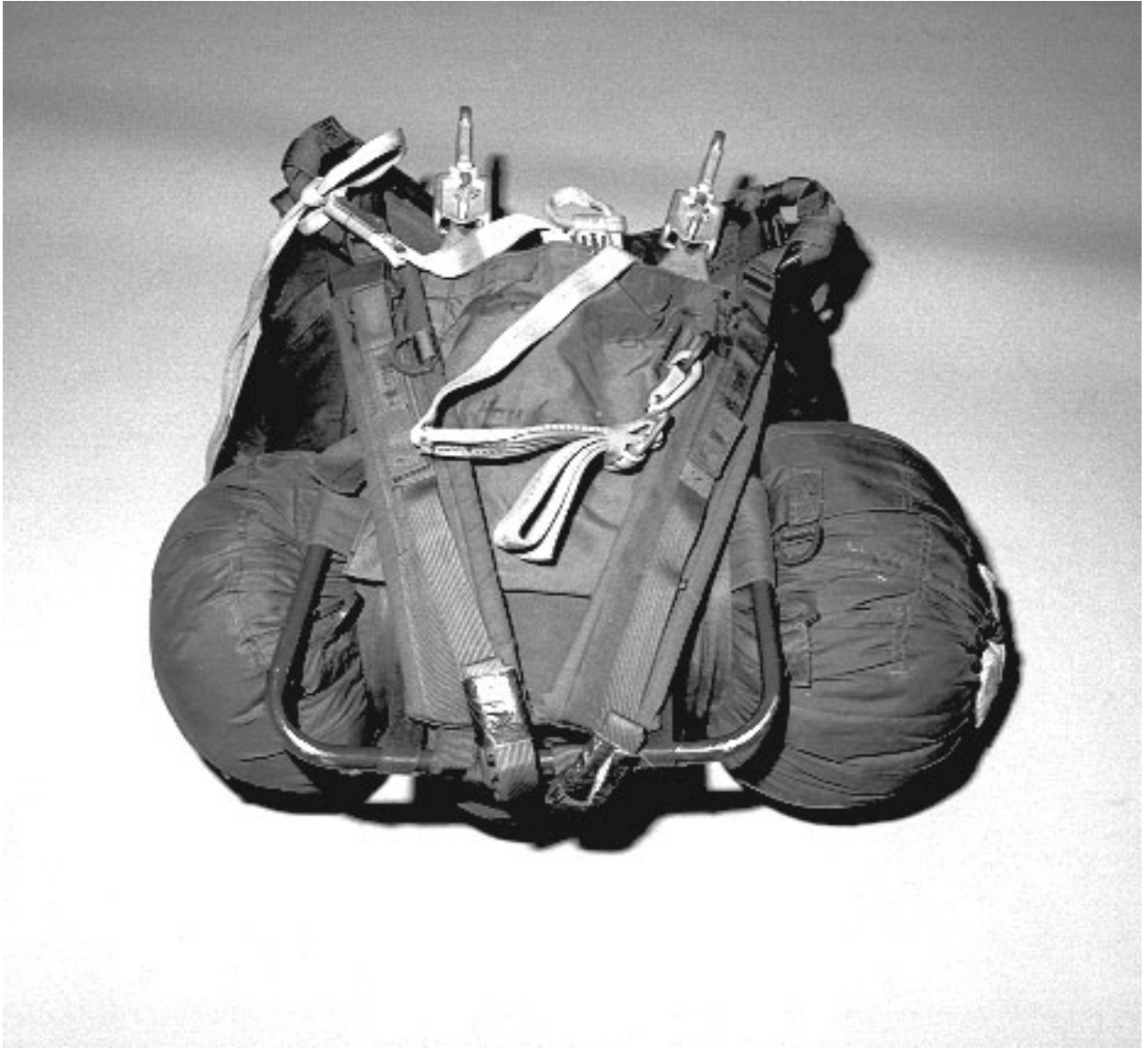


Figure 2-12: Rucksack Ready for a Parachute Descent

RADIO SETS

21. The rigging procedure for in service radio sets is as follows:
 - a. The AN/PRC 522 is placed with the LED horizontal, and is secured between the rucksack and the sleeping bag container. For additional security, an A7A strap is used to secure the radio to the rucksack frame. The PELS is attached to the load in the reverse order to that described in paragraphs 20d to 20j, so that the equipment snap hooks are on top of the valise. When rigging the PELS, the rucksack shoulder straps must be released, then secured after rigging.
 - b. The AN/PRC 138 is placed LED up and is secured between the rucksack and sleeping bag container. For additional security, the protecting bars of the radio

are secured to the rucksack frame with a length of fibrous nylon or polyester cord, 77.1 kg (170 lb) MBS. The PELS is attached to the load in the reverse order to that described in paragraphs 20d to 20j, so that the equipment snap hooks are on top of the valise. When rigging the PELS, the rucksack shoulder straps must be released, then secured after rigging.

- c. The AN/PRC 113 is placed LED up and is secured between the rucksack and sleeping bag container. For additional security, the protecting bars of the radio are secured to the rucksack frame with a length of fibrous nylon or polyester cord, 77.1 kg (170 lb) MBS. The PELS is attached to the load in the reverse order to that described in paragraphs 20d to 20j, so that the equipment snap hooks are on top of the valise. When rigging the PELS, the rucksack shoulder straps must be released, then secured after rigging.

SECTION 3

CREW SERVED WEAPONS VALISE

GENERAL

22. The Crew Served Weapons Valise (CSWV) is used to carry weapons or equipment too large to be carried in the rucksack or secured to the jumper in the normal manner. It is designed for use as a shoulder load.

23. The CSWV is an olive drab nylon bag with padding that has one opening flap with Velcro closures. It measures 132 cm (52 in) long, 58 cm (21 in) wide when fully open, and 30 cm (12 in) wide when closed. It weighs 2.5 kg (5.5 lb). The valise can be folded at the upper portion to carry shorter support weapons. It is also adaptable for both summer and winter configurations. This valise may have to be locally modified to meet specific requirements.

COMPONENTS OF THE CSWV

24. The weapons valise has the following components (see Figures 2-13a and b):

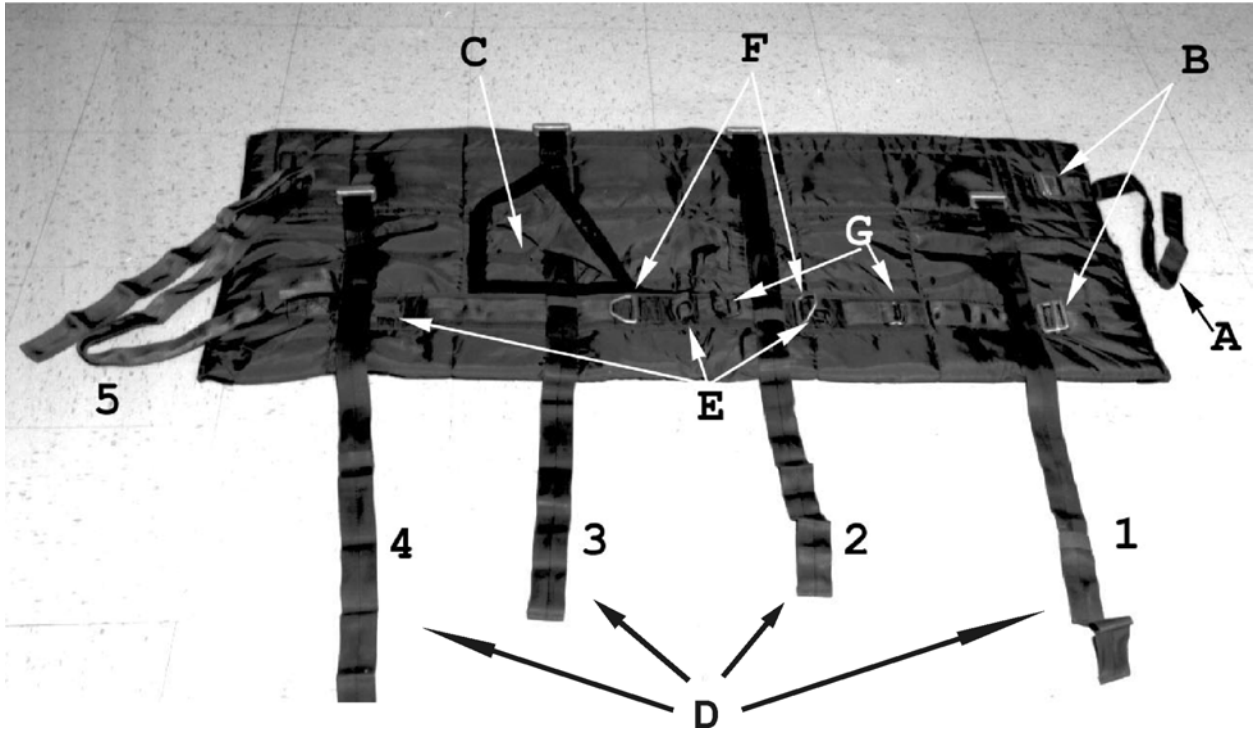


Figure 2-13a: Components of the CSWV

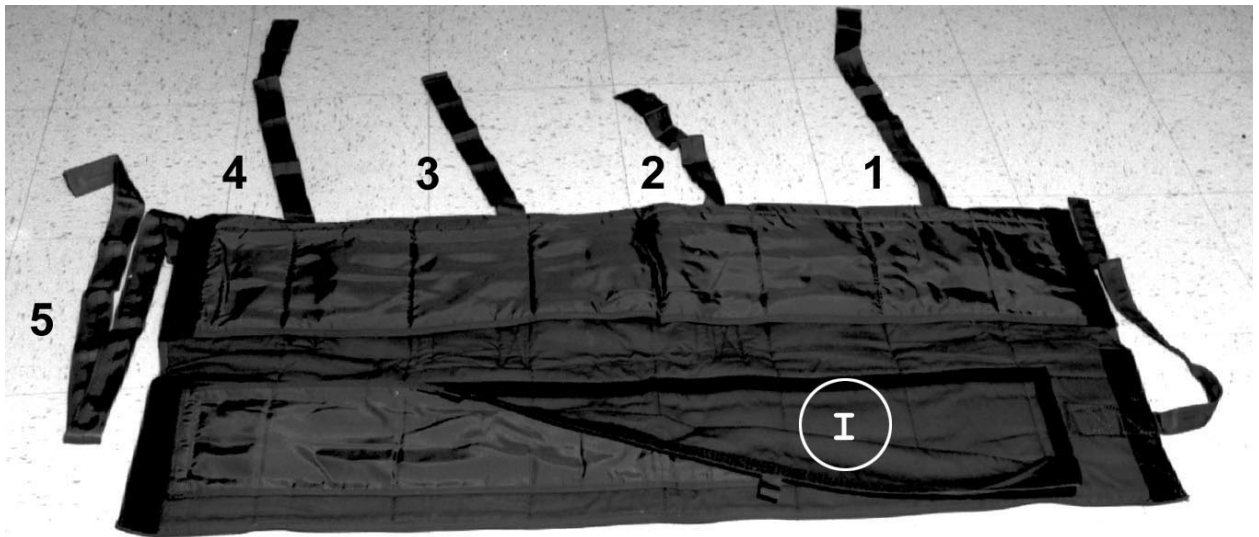


Figure 2-13b: Components of the CSWV

- a. A: 1 in (2.5 cm) reinforcing tape used to shorten the valise if necessary.
- b. B: two quick fit adjuster buckles located on each side of the upper part of the valise, used for securing the number 5 strap to create the shoulder strap (local modification).

- c. C: an exterior pocket used for stowing the lowering strap during specific parachute operations.
- d. D: four Type VIII nylon straps fitted with quick fit adjuster buckles that run horizontally from the top portion of the valise (for ease of rigging they are numbered 1 through 4).
- e. E: three fixed attaching loops that the lowering strap is attached to, ensuring the weapon valise lands in a proper manner.
- f. F: two fixed D rings.
- g. G: two twin type adjuster buckles used for securing the nylon reinforcing tape if needed.
- h. H: one Type VIII nylon strap (modified part) sewn to the bottom portion of the valise to act as the shoulder strap. It can be fitted with a comfort pad. For ease of rigging this is referred to as the number 5 strap.
- i. I: an interior pocket used for the storage of ammunition and spare parts if necessary.

PREPARING THE CSWV FOR A PARACHUTE DESCENT

25. The following procedure will be used to prepare the CSWV for a parachute descent:
- a. Lay the valise out on a level surface with the nylon straps on the bottom. Extend all the straps to their maximum length, and open the Velcro enclosure.
 - b. The support weapon will be placed within the valise so that the barrel end is pointed towards the bottom of the valise where the single Type VIII nylon strap is located. If applicable, the weapon-carrying handle is positioned towards the opening for quick access (see Figure 2-14). All weapons will be inserted in such a manner that any delicate parts will be placed next to the body of the jumper when worn. This will ensure the valise lands uppermost and reduces the landing shock on the weapon.

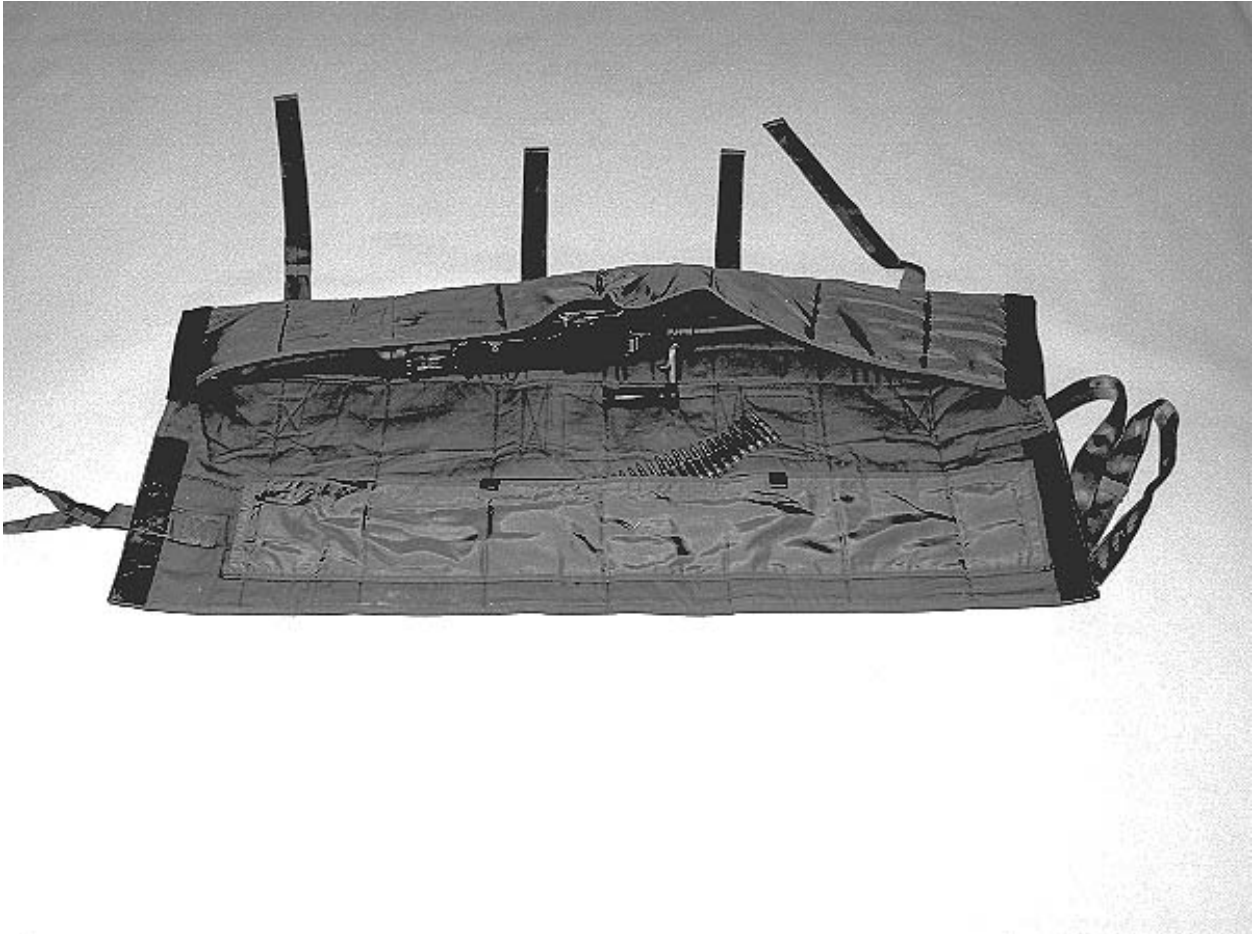


Figure 2-14: Position Handle towards Opening for Quick Access

- c. The length of the weapon will determine the straps used to adjust the length of the valise (see Figures 2-15 and 2-16).

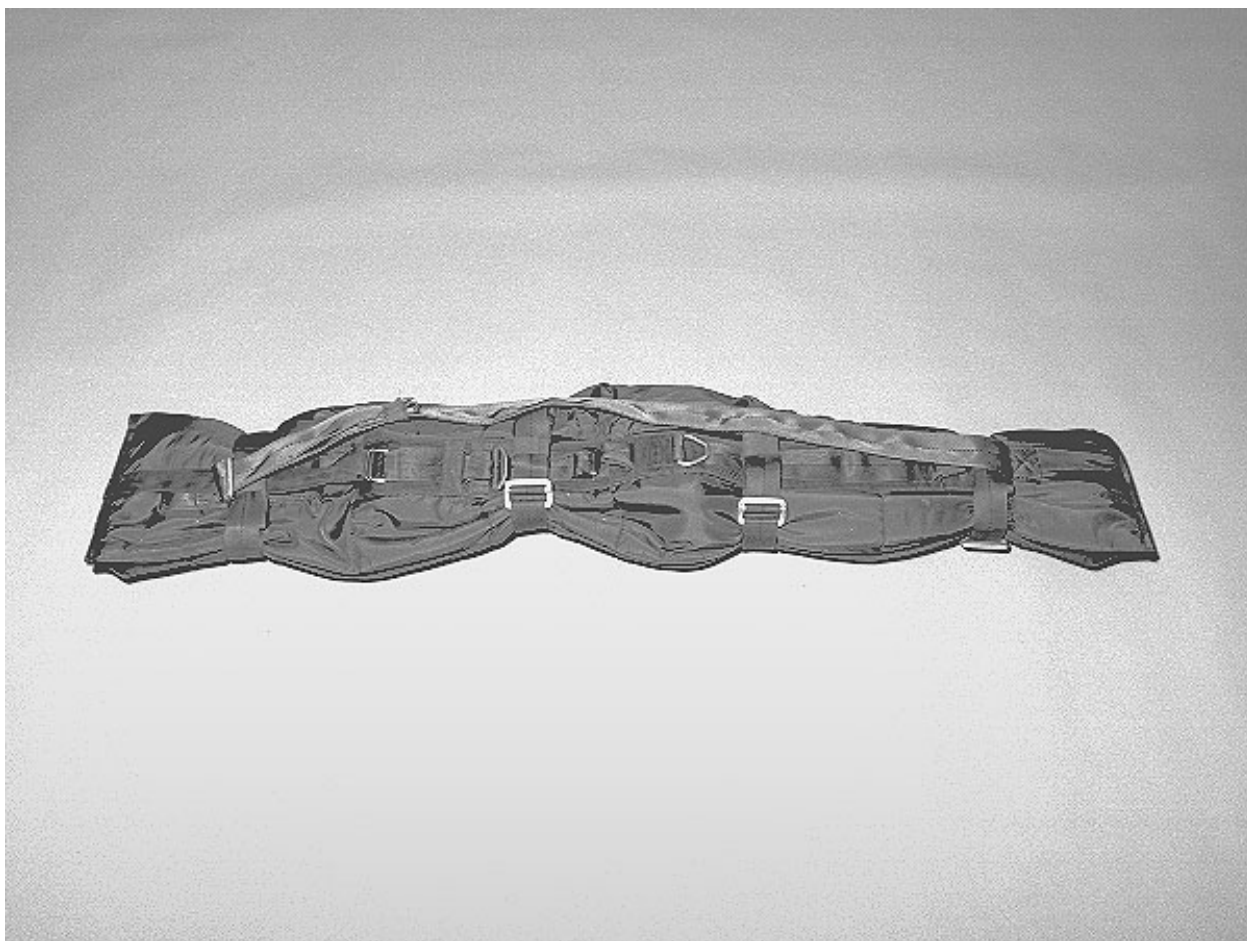


Figure 2-15: CSWV with Long Weapon



Figure 2-16: CSWV with Short Weapon

- d. Pack the valise observing the rules of packing.
- e. Secure the four horizontal nylon straps, then roll and tuck the excess away within the retaining bands.
- f. For winter operations the snowshoes will be secured to the outer portion of the valise using the Type VIII nylon straps (see Figure 2-17).

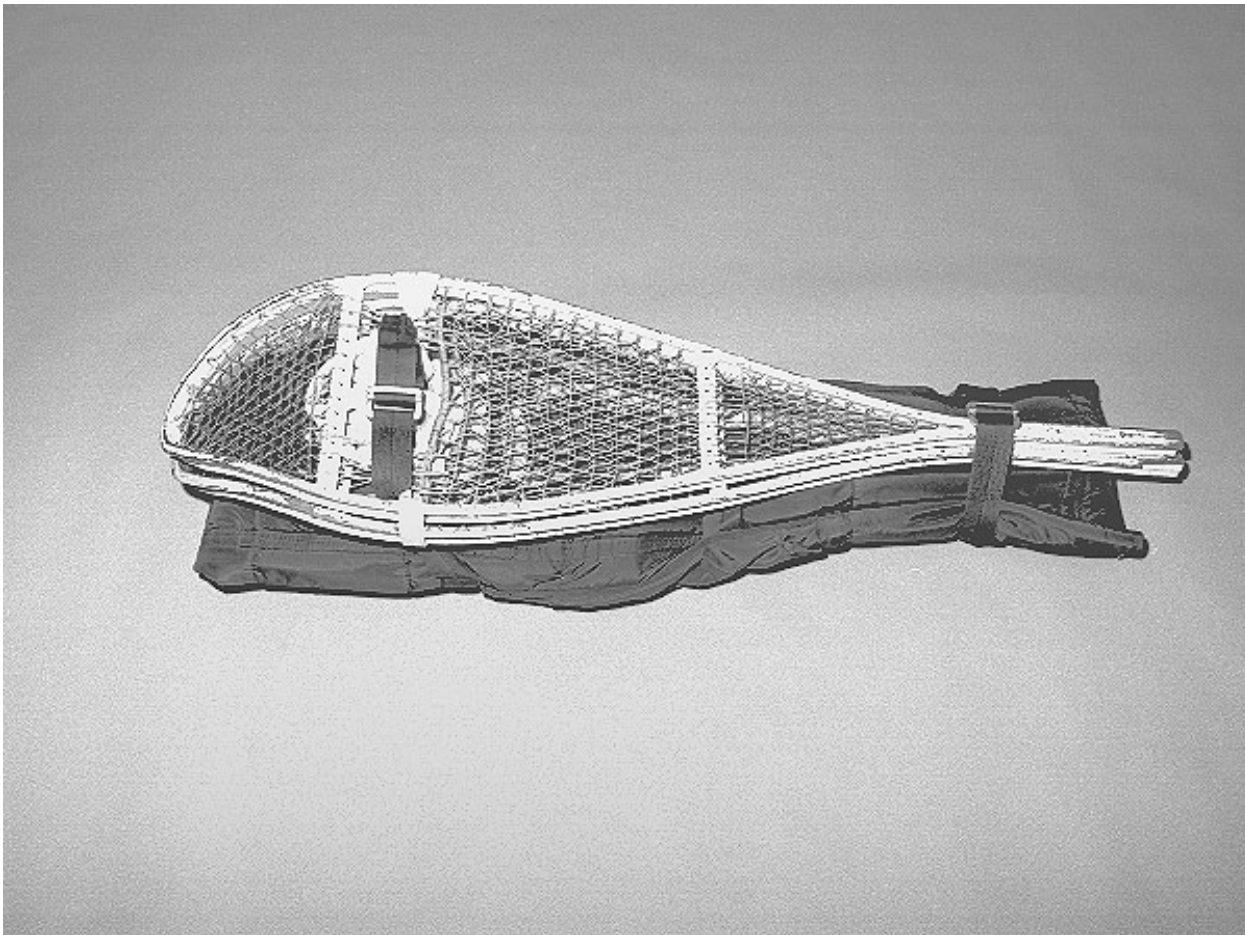


Figure 2-17: Snowshoes Secured by Nylon Straps

- g. Secure the single vertical strap to the top adjuster buckle, roll and secure the excess away.
- h. The nylon reinforcing tape from the top portion of the valise will also be secured to the twin adjuster buckle.

NOTE

The lowering strap will be secured to the CSWV by tying a double locking loop system.

LOWERING AND JETTISONING THE CSWV

- 26. To lower the CSWV after completing the third point of flight procedure:
 - a. check to ensure the area below you is clear;
 - b. remove the valise from the shoulder; and

- c. lower the rucksack and shoulder load in the normal manner.
27. To jettison the CSWV:
- a. lower the shoulder load and rucksack as detailed above; and
 - b. activate the jettison buckle and release it.

SECTION 4 THE MEDICAL FIELD KIT

GENERAL

28. The medical field kit is a canvas pack 40.5 by 30.5 by 17.8 cm (16 by 12 by 7 in). It has two shoulder straps and two quick-adjustable straps on the ends. The pack is closed with a two-way zipper and has three exterior pockets.
29. Parachutists may jump with the kit:
- a. alone, in which case it is landed attached to the parachutist; or
 - b. in combination with other equipment, in which case it is lowered prior to landing.

PREPARING AND ATTACHING THE KIT TO THE PARACHUTE HARNESS

30. Pre-fit the shoulder straps, S-fold them and secure them with heavy tape.
31. Adjust the quick-adjustable straps as short as possible, roll fold the running ends, and secure them with heavy tape.
32. Don the main and reserve parachutes.
33. Secure the snaps of the quick-adjustable straps to the V-rings of the parachute harness.

SECTION 5 PERSONAL WEAPONS (C7 OR C8)

GENERAL

34. Parachutists can jump with the rifle C7 or C8 alone or in combination with other equipment. They can also jump with the Browning Automatic Pistol.

THE RIFLE C7 OR C8

35. To prepare the rifle:

- a. inspect the rifle to ensure that it is serviceable;
- b. ensure the magazine is secured to the weapon;
- c. adjust the sling, so when the rifle is slung the butt plate is level with the shoulder; and
- d. ensure that the plastic adjuster buckles on the sling are not cracked or broken and are tied with $\frac{1}{4}$ inch cotton webbing to secure the sling to the front foresight.

36. If the rifle is to be dropped in combination with a PELS load, after attaching the PELS load to the V-rings on the main lift web:

- a. sling the rifle, muzzle down, over the shoulder opposite the hand which will hold the static line snap fastener;
- b. secure the short equipment carrying end of the lowering strap around the rifle at the slip ring of the hand guard (see Figure 2-18); and



Figure 2-18: Lowering Strap Secured around the Rifle

- c. when donning the reserve parachute, pass the waistband over the rifle and sling.

37. If the rifle is not to be dropped with a PELS load:

- a. attach the long equipment carrying end of the lowering strap to the small of the rifle butt;

- b. attach the short equipment carrying end through the loop in the sling, around the hand guard and through the foresight stand;
- c. using a buddy to help hold the stows, stow the lowering strap into accordion-folds the length of the hand guard, ensuring that:
 - (1) all the slack from the equipment carrying ends are taken up on the first fold;
 - (2) all the folds are equal in length and dressed-off;
 - (3) the running end of the last stow has approximately 20 cm (8 in) left before the jettison buckle; if not, the last stow will be folded back on itself to make a half-stow that will leave the required amount of slack;
 - (4) the jettison buckle will come off the stows pointing towards the butt of the weapon;
 - (5) the stows will be secured to the hand guard of the rifle in two places approximately 2.5 cm (1 in) from the end of the stows with two turns of 5 cm (2 in) masking tape; and
 - (6) the running ends of the equipment carrying ends will be secured either to the butt with heavy tape or alongside the stows with masking tape.
- d. the jettison buckle and strap will be rigged as per usual with approximately 20 cm (8 in) of slack on the lowering strap. The jettison buckle can be hooked to the equipment V-ring without disrupting the stows or breaking the heavy tape securing the stows.

THE RIFLE AND SNOWSHOES

38. Prepare the rifle as detailed in paragraph 36 (see Figure 2-19).

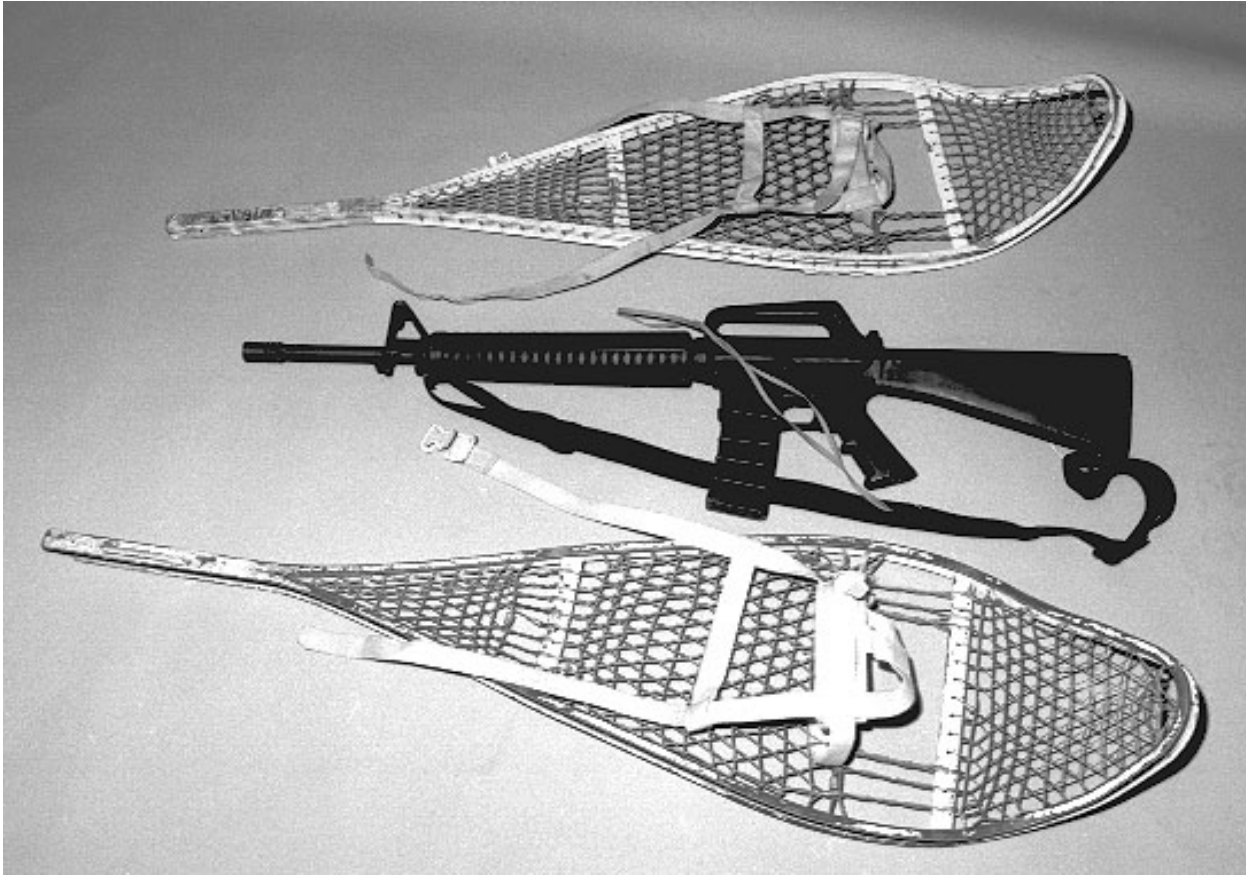


Figure 2-19: Rifle and Snowshoes Ready for Rigging

39. Prepare the snowshoes:
 - a. Inspect the snowshoes to ensure they are serviceable.
 - b. Attach the snowshoe bindings and fit to the footwear the parachutist will be wearing for the jump.
 - c. Select one of the snowshoes and thread the running end of the heel strap down through the mesh near the trail. Thread the running end back up through the mesh and secure it to the buckle (see Figure 2-20).

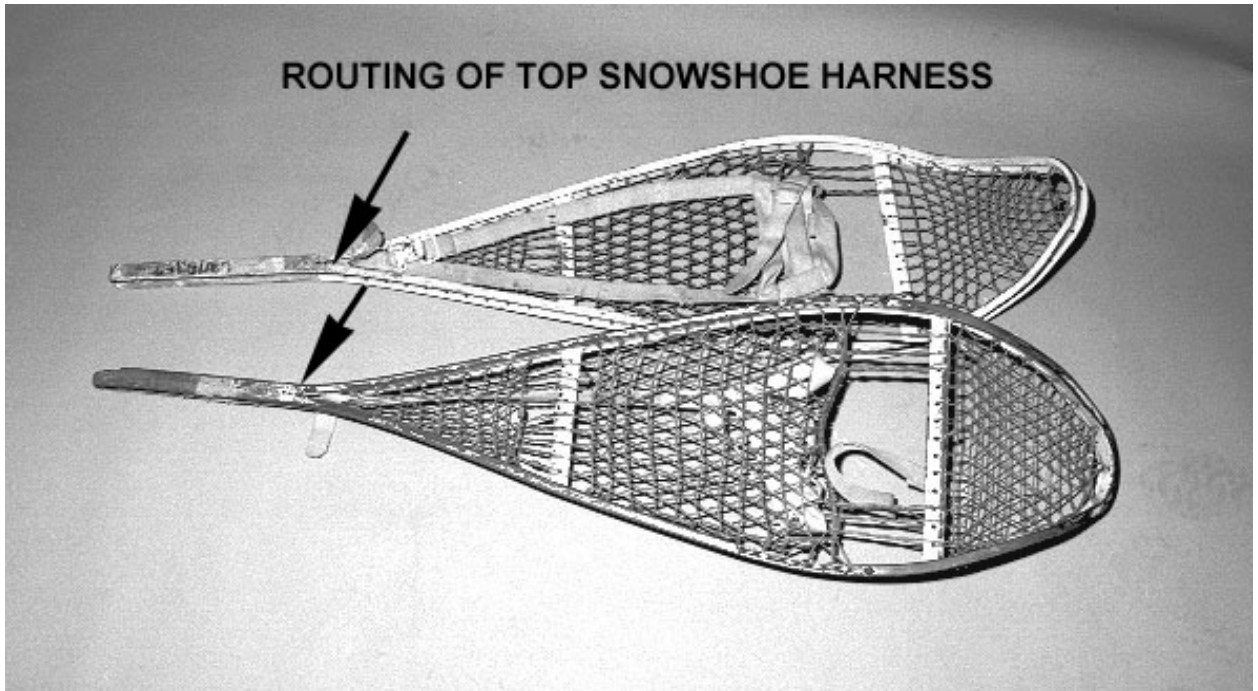


Figure 2-20: Preparing top Snowshoe

- d. Place this snowshoe on top of the other. Pull the harness of the bottom snowshoe up through the toe hole of the top snowshoe and pull it tight (it helps to tape the trails together for neatness in rigging) (see Figure 2-21).

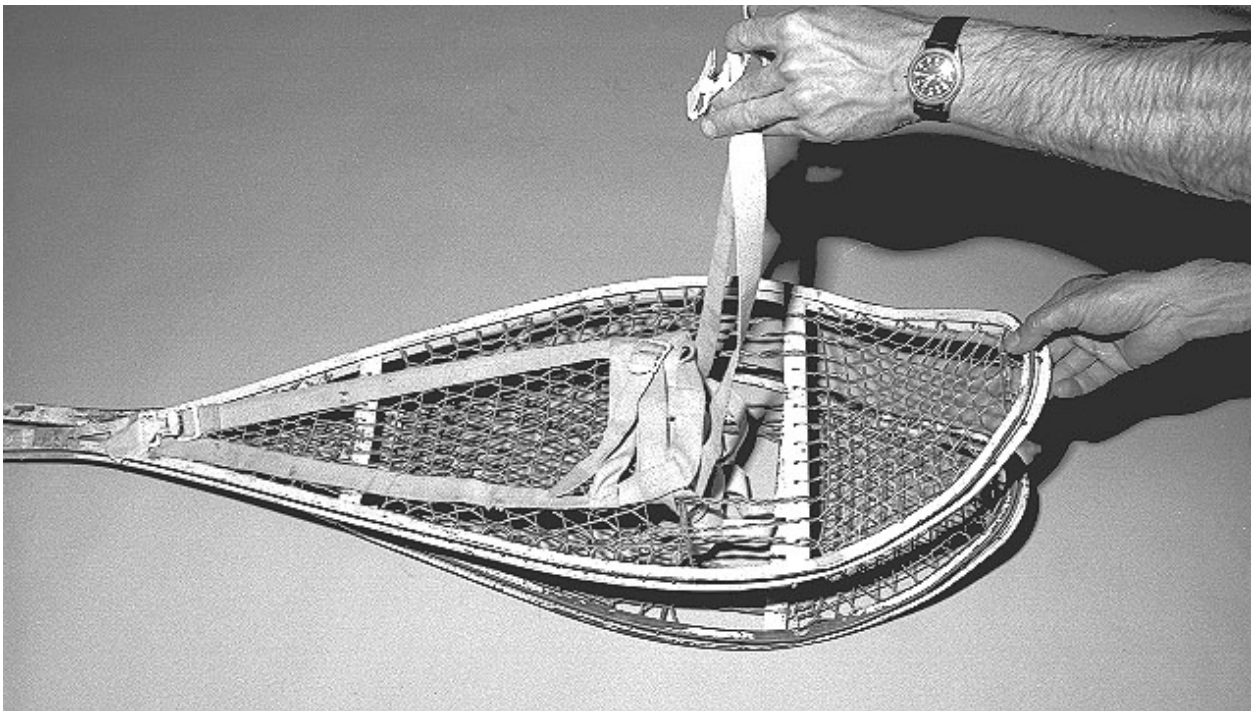


Figure 2-21: Put Snowshoes Together

- e. Wrap the buckle end of the heel strap twice around the snowshoe frame, even with the toe hole, by taking the buckle outside the frame and coming up between the frame and the mesh toward the toe.
- f. Wrap the running end of the heel strap around the other side of the frame once, in the same manner.

40. Attach the rifle to the snowshoes:

- a. place the rifle on top of the snowshoes with the muzzle towards the trail end and the small of the butt over the toe hole (see Figure 2-22);

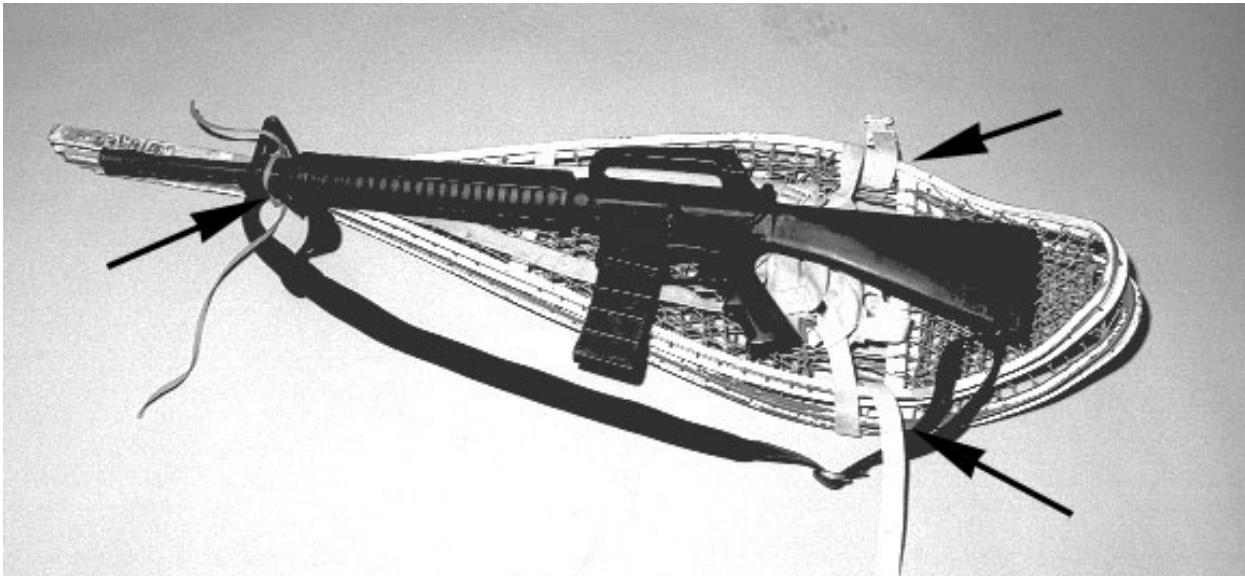


Figure 2-22: Place the Rifle on the Snowshoes

- b. place the ejection opening down against the snowshoe when the rifle is to be worn on the left shoulder, and vice versa when worn on right shoulder;
- c. secure the muzzle of the rifle to the snowshoe by threading a length of 6.6 mm (1/4 in) cotton webbing through the loop of the sling, around both trails, through the foresight stand, twice, then secure with a surgeon's locking knot; and
- d. secure the butt of the rifle to the snowshoes by winding one turn of the running end of the heel strap over and around the small of the butt, then secure it to the heel strap buckle (see Figure 2-23).

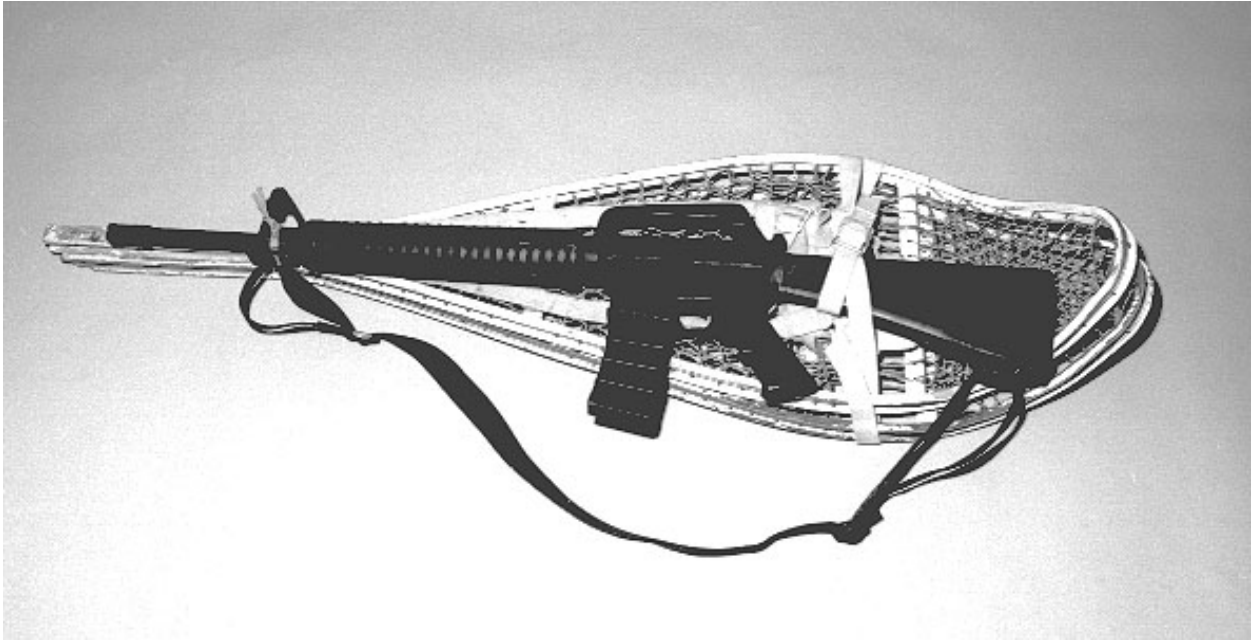


Figure 2-23: Secure the Butt of the Rifle

41. If the rifle and snowshoes are to be dropped in combination with a PELS load, after attaching the PELS load to the V-rings on the main lift web:
 - a. sling the rifle and snowshoes, muzzle and trails down, over the appropriate shoulder;
 - b. secure the short equipment carrying end of the lowering strap around the frames of both snowshoes three holes up from the cross support bar on the snowshoes; and
 - c. when donning the reserve parachute, pass the waistband over the rifle, snowshoes, and rifle-sling.
42. If the rifle and snowshoes are to be dropped alone, i.e. without the PELS load, the procedure will be as detailed in paragraph 41 except that the short equipment-carrying end of the lowering strap will go completely around both snowshoe trails and the rifle.
43. If the parachute waist-band is too short to go around the snowshoes, use one of the following methods:
 - a. A waistband extension, which is a length of waistband material with a waistband adjuster permanently attached to one end, may be used. The running end of the waistband will be secured to the adjuster of the waistband extension. The running end of the extension will then form the quick release at the waistband adjuster of the parachute.
 - b. If a waistband extension is not available, a length of A7A strap will be used as follows:

- (1) thread the waistband through its adjuster on the harness side of the pack-tray, roll fold the running end, and secure it with heavy tape;
- (2) thread the A7A strap through the horizontal backstrap keepers of the pack so that the buckle will be on the left; and
- (3) use the A7A strap in lieu of the waistband.

SECTION 6

MISCELLANEOUS LOADS

THE BROWNING AUTOMATIC PISTOL

44. The service pistol will be worn on the web belt under the parachute harness or carried in the CSWV or rucksack.

SNOWSHOES

45. Prepare the snowshoes by sandwiching both bindings between the snowshoes, then by taping the trails together, as well as both sides of the frames, level with the toe holes. Attach the equipment carrying ends of the lowering strap around:

- a. both trails at the point where the trails divide; and
- b. both forward cross bars, adjacent to the centre of the toe holes.

46. Accordion-fold the running end of the lowering strap with 30.4 cm (12 in) bights and secure with heavy tape or retainer bands.

47. Using a C7 sling, or any such adjustable strap with a fixed loop on one end and a snap on the other, make a sling as follows:

- a. pass the looped end of the strap through the mesh of the snowshoes just behind the rear cross bars;
- b. attach the snap to the snowshoe mesh of the appropriate shoe, just forward of the forward cross bars, and tape the snap closed; and
- c. adjust the sling in length until the top of the bows is approximately 5 cm (2 in) above the shoulder.

LIFE PRESERVER UNDERARM

48. The Life Preserver Underarm (LPU) will be worn by parachutists when the planned drop zone is within 1.6 km (1 mile) of a water hazard, or when otherwise ordered. It is designed to keep the parachutist's face out of water, regardless of what equipment load is being carried.

49. The LPU consists of two cells, each equipped with a semi-automatic CO₂ inflation device and an emergency oral inflation device (see Figure 2-24). The LPU is worn under the parachute harness and is held in place under the armpits by an adjustable harness and waistband (see Figures 2-25 and 2-26).



Figure 2-24: Life Preserver Underarm



Figure 2-25: Wearing the LPU



Figures 2-26: Wearing the LPU

50. The LPU is prepared for use and donning by being checked by a Parachute Rigger TSQ 911.06, as follows:

- a. each cell is orally inflated and checked for punctures;
- b. the firing mechanism and harness is visually checked for damage; and
- c. the CO₂ bottle is checked for secure placement.

51. Fit and don the LPU so that the packs are positioned under the armpits and the harness is snug. The parachutist's harness is then fitted over the LPU and adjusted to the individual, ensuring that the preserver pouches are exposed and positioned behind the main lift web.

CHAPTER 3 PARACHUTIST TECHNIQUES

SECTION 1 GENERAL

INTRODUCTION

1. The standard drills and techniques used in parachuting include the following:
 - a. aircraft drill;
 - b. flight;
 - c. landing; and
 - d. canopy collapsing.

SECTION 2 AIRCRAFT DRILL

GENERAL

2. The aim of aircraft drill is to ensure:
 - a. orderly movement within the aircraft;
 - b. a systematic safety check of all parachutists;
 - c. that all parachutists are ready to jump at the appointed time; and
 - d. correct exit technique.
3. The drills detailed in this section are for the CC-130 Hercules aircraft. Drills for jumping from the CH-146 Griffon helicopter are detailed in Chapter 6.

THE JUMPMASTER

4. The duties of the jumpmaster (JM) are detailed in Chapter 4.
5. A qualified JM shall be appointed for each aircraft load of parachutists. The JM has technical control of all parachutists detailed to jump from that aircraft. All orders from the Aircraft Captain are passed through the loadmaster to the JM, who then shall relay them to the parachutists.
6. The JM shall give all jump commands.

7. One or more assistant JMs may assist the JM.
8. The JM will indicate when the parachutists are to unfasten their seat belts.
9. The JM prepares the parachutists to jump by giving the following commands:
 - a. **SEAT BELTS OFF;**
 - b. **GET READY;**
 - c. **STAND UP;**
 - d. **HOOK UP;**
 - e. **CHECK STATIC LINES;**
 - f. **CHECK YOUR EQUIPMENT;**
 - g. **SOUND OFF FOR EQUIPMENT CHECK;**
 - h. **STAND BY;** and
 - i. **GO!**
10. The JM gives each command verbally and visually.
11. On receipt of each command, except **SEAT BELTS OFF**, the parachutists repeat the command in unison and then react to the command.
12. All jump commands will be given and repeated in the English language.
13. All commands are described for a jump from a CC-130 double-door.

SEAT BELTS OFF

14. The **SEAT BELTS OFF** command will be given only if seat belts have not been removed by parachutists during the flight. It will be given at a pre-arranged time, which will never be less than 20 minutes before P-hour (the time that the first parachutist exits from the aircraft).
15. The hand signal for this command will be to place both hands at belt height in the centre of the body, and then simultaneously move them from the centre of the body, out to both sides, at full arm extent.
16. This command is not repeated. Parachutists will remove their seat belts and ensure they place them completely behind the body on the jump seat.

GET READY**NOTE**

During extended flights, in-flight dressing will be conducted prior to the **GET READY**.

17. The **GET READY** command is given at a pre-arranged time, the time depending upon the number of parachutists in the sticks, normally 10 minutes before P-hour for a CC-130 and 4 minutes before P-hour for a CH-146.
18. The JM will extend his arms toward the parachutists as shown in Figure 3-1 and order **GET READY**.



Figure 3-1: Visual Signal for GET READY

19. After repeating the command, each parachutist will:

- a. move to the edge of the seat;
- b. grasp the seat rail with the hand closest to the aft end of the aircraft;
- c. place the other hand on the knee;
- d. tuck the leg closest to the aft end of the aircraft under the seat and place the other leg forward in the aisle; and
- e. watch the JM (see Figure 3-2).



Figure 3-2: Position of Parachutists (Port) for GET READY

STAND UP

20. When both outboard and inboard seats are used, the **STAND UP** command will be given in two parts:

- a. the JM will extend his arms to the sides at shoulder height, raise his hands and forearms as shown in Figures 3-3 and 3-4, and order **OUTBOARD JUMPERS STAND UP**; and



Figure 3-3: Visual Signal for Outboard Jumpers



Figure 3-4: Visual Signal for STAND UP

- b. when the outboard parachutists have reacted, the JM will extend his arms forward, raise his hands and forearms as shown in Figures 3-5 and 3-6, and order **INBOARD JUMPERS STAND UP**.



Figure 3-5: Inboard Jumpers



Figure 3-6: Visual Signal for STAND UP

21. After repeating the command, each parachutist will:
 - a. stand up;
 - b. raise and secure the seats unless ordered not to;
 - c. face aft, remove the snap fastener with the inboard hand, and position it so that the opening is 2.5 cm (1 in) from the anchor line cable, facing outboard between the helmet and the hand;

- d. with the inboard foot leading, move aft and place the outboard hand 2.5 cm (1) in from the anchor line cable with palm open; and
- e. watch the JM (see Figure 3-7).



Figure 3-7: Position of Parachutist for STAND UP

HOOK UP

22. The JM will make an inward hooking motion with his index fingers as shown in Figure 3-8 and order **HOOK UP**.



Figure 3-8: Visual Signal for HOOK UP

23. After repeating the command, each parachutist will:

- a. hook their snap fastener to the anchor line cable, the gate facing outboard;
- b. pull down on the static line to lock the snap fastener;
- c. hold the static line by a correct bight just below the snap fastener;
- d. insert the safety pin halfway into the snap fastener towards the aft end of the aircraft and bend it; and
- e. watch the JM (see Figure 3-9).



Figure 3-9: Position of Parachutist (Port) for HOOK UP

NOTE

After a parachutist has hooked up, he will NOT release his static line until he has thrown it fully aft on exit.

CHECK STATIC LINES

24. The JM will form a circle with the thumb and index finger of each hand and with his arms at full extent make a pull-push motion as shown in Figure 3-10, and order **CHECK STATIC LINES**.



Figure 3-10: Visual Signal for CHECK STATIC LINES

25. After repeating the command, each parachutist will force his snap fastener to the rear and check the parachutist in front of him to ensure that:

- a. the snap fastener is secure on the anchor line cable, gate is closed and facing the proper direction, and the locking button is flush with the locking plate;
- b. the static line safety pin is inserted and bent;

- c. the parachutist has a proper bight;
- d. using the OK sign, trace the static line down to the slack control loop ensuring that it is not misrouted;
- e. tap the jumper OK; and
- f. return free hand to the anchor line cable.

26. The last parachutist in a stick will be inspected by the parachutist in front of him. They will turn toward their free hands, away from the static line, and the inspection will be carried out as detailed in paragraph 25.

27. After completing the inspection, each parachutist will tap the parachutist he inspected and, if the static line is correct, tell him that he is OK. The inspecting parachutist then returns the free hand to the anchor line cable. If an item of equipment is not correct, the inspecting parachutist will take action as detailed in paragraph 30.

CHECK YOUR EQUIPMENT

28. The JM will tap his chest with both hands with arms at full extent in an opening and closing motion as shown in Figure 3-11 and order **CHECK YOUR EQUIPMENT**.



Figure 3-11: Visual Signal for CHECK YOUR EQUIPMENT

29. After repeating the command, each parachutist will check his equipment to ensure that:
- a. the snap fastener is secured to the anchor line cable, locking button is closed and facing the proper direction, locking button is flush with the locking plate;
 - b. the static line safety pin is inserted and bent;
 - c. he has a proper bight;
 - d. the static line is not misrouted (as far back as the shoulder);

- e. the helmet is secured;
- f. the canopy release assemblies are closed (visual check);
- g. with a quick release box (QRB), trace the chest straps and verify that the QRB is locked (the word "LOCKED" showing on the operating button) and the safety fork is properly inserted;
- h. with a three-point harness, trace the main lift web straps down and then across the chest strap, checking that the quick fit ejector snap hook is secured and comfort pad is properly positioned;
- i. both snap hooks of the reserve parachute are secured to the D-rings on the main lift web;
- j. there is a three finger quick release bight in the waistband;
- k. with a three-point release, verify that the leg quick fit ejector snap hooks are securely fastened to the V-rings and the comfort pads are in position;
- l. the routing of the leg straps in the groin area is comfortable; and
- m. return the hand to the anchor line cable.

30. The JM will also inspect each parachutist at this time. If any parachutist finds something wrong with his equipment or the equipment of another parachutist, he will bring it to the attention of the JM during this inspection.

SOUND OFF FOR EQUIPMENT CHECK

31. The JM will cup his hands behind his ears as shown in Figure 3-12 and order **SOUND OFF FOR EQUIPMENT CHECK.**



Figure 3-12: Visual Signal for SOUND OFF FOR EQUIPMENT CHECK

32. After repeating the command, each parachutist will cut down his free hand and, starting with the last man in each stick, will tap the man in front of him and sound off **OK**. Parachutists who do not have another parachutist immediately in front of them will turn and point to the next parachutist to sound off rather than tapping him. The Number 1 parachutist will point to the JM and sound off **NUMBER 1 OK**.

33. After sounding off:

- a. when carrying a shoulder load, parachutists will grasp the carrying strap of the shoulder load and the main lift web just below the canopy release; or
- b. when not carrying a shoulder load, parachutists will place their hands, palm out, to steady themselves.

34. When all parachutists have sounded off, and after the slow-down of the aircraft, the paratrooper doors will be opened by the loadmaster(s) as the aircrew continues with their procedures.
35. The JM will inform parachutists of the **1 MINUTE** warning and surface wind speed.
36. On night drops the following procedures should be applied to permit parachutist's eyes to become accustomed to the darkness:
- a. red lights can be turned on at the discretion of the JM anytime after the aircrew completes the post take-off check;
 - b. for in-flight dressing, red lights can be turned on only after the initial JM check is complete; and
 - c. if there is any doubt as to when red lights can be turned on or off, the JM will clarify the procedure during the aircrew briefing.

STAND BY

37. This command will be given approximately 15 seconds before P-hour. The JM will cross his wrists in front of his face, and with a sweeping motion point at both doors as shown in Figures 3-13a and 3-13b, and order **STAND BY**. This is often referred to as the "15 Second Warning".



Figure 3-13a: Visual Signal for STAND BY



Figure 3-13b: Visual Signal for STAND BY

38. After repeating the command:

- a. The Number 1 parachutist will:
 - (1) pivot into the centre of the door with the toe of the inboard foot at the hinge of the jump platform and the toe of the outboard foot even and touching the instep of the inboard foot (see Figure 3-14);



Figure 3-14: Position of Number 1 Parachutist (Port) for STAND BY

- (2) at the same time, with the inboard hand throw the snap fastener fully aft to the anchor line support bracket, release it, and place hands, palms out, by the edge of the door but not touching it;
 - (3) if a shoulder load is carried, with the outboard hand, maintain a grasp on the carrying strap of the shoulder load and the main lift web;
 - (4) keep the body erect and knees slightly bent; and
 - (5) watch the jump lights; and
- b. The remainder of the parachutists will repeat the word of command and:
- (1) close up to the preceding parachutist;
 - (2) bring the toe of the outboard foot in to the instep of the inboard foot;
 - (3) keep the body erect and the knees bent;
 - (4) grasp the main lift web and carrying strap of the shoulder load, or, if a shoulder load is not carried, extend arm along the side of the reserve with the palm facing out; and
 - (5) watch the jump lights or the JM.

39. After giving the command **STAND BY**, the JM will control Number 1 Port's static line and raise his free arm as shown in Figure 3 15. The assistant JM will do likewise at the starboard door, controlling Number 1 Starboard's static line.



Figure 3-15: Position of JM (Starboard Side) for STAND BY

GO!

40. The green jump light will come on, and the JM and assistant JM will drop their upraised arms and order **GO!**

41. Upon seeing the green light or hearing the command **GO!**:

- a. the Number 1 parachutist will exit immediately; and
- b. subsequent parachutists will repeat **GO!**, move down to the Number 1's position in stick order, and exit at one second intervals.

42. Movement to the door will be by the “mambo step”. The leading (inboard) foot is moved forward 23 cm (9 in) and the rear foot is brought up to it, toe to instep, at a rate of 100 paces per minute.

EXIT

43. The exiting parachutist will exit from the Number 1's position as follows:

- a. step onto the jump platform and spring up and out vigorously off the ball of the leading foot;
- b. bring the feet together and straighten the legs;
- c. put the head down and the chin on the chest;
- d. put the hands on the ends of the reserve parachute;
- e. lock the elbows into the body; and
- f. bend forward at the waist.

44. The parachutist will remain in this “jab” position for four seconds to allow the parachute to develop. To ensure that he maintains the position for the correct length of time, he will do a deployment count, i.e. as he springs he will count: **ONE THOUSAND - TWO THOUSAND - THREE THOUSAND - FOUR THOUSAND**. On completion of the deployment count, the parachutist begins flight procedure.

STOP DROP

45. If a stop drop is called the JM will make a slashing movement across the throat and order **STOP DROP**.

46. On receipt of the command, the parachutists will stop, remain in position and watch the JM.

47. If the **STOP DROP** is ordered:

- a. prior to the green light, the jumpers will remain in the 1 minute position and await further instructions; or
- b. during the green light, the JM will physically stop the jumpers by placing an arm in front of the jumpers. The jumpers will stop, return to the 1 minute position, and await further instructions.

UNHOOK, RESTOW AND SIT DOWN

48. To give this command, the JM will make an unhooking movement with his hands, opposite to the HOOK UP signal shown in Figure 3-6, and order **UNHOOK, RESTOW AND SIT DOWN**.

49. On receipt of this command, each parachutist will:

- a. unhook their snap fastener;
- b. restow their static line on their reserve;
- c. lower their seats;
- d. sit down; and
- e. on instructions from the JM, secure their seat belt.

50. When both outboard and inboard seats are used, the command **SIT DOWN** will be given in two parts as for **STAND UP**.

AFT END JUMPING

51. When jumping with loads that are being dispatched off the ramp, parachutists may be required to follow the loads.

52. When jumping from the aft end, the following differences in aircraft drill will be observed:

- a. On the command **STAND UP**:
 - (1) seats will not be raised; and
 - (2) parachutists will move aft under control of the JM and stand on the inboard side of the anchor line cable.
- b. On the command **HOOK UP**, parachutists will hook up so that the opening of the snap fastener faces inboard, insert the static line safety pin halfway towards the aft and bend it, then move sideways to the centre of the aircraft, allowing the long bight in the static line to slide through the hand controlled by the thumb until a normal bight is obtained and the arm is fully extended toward the anchor line cable.
- c. On the command **CHECK STATIC LINES**:
 - (1) Each parachutist will slide the snap fastener to the rear and at the same time take a pace toward the anchor line cable with the inboard foot, and check the static line and the back of the preceding parachutist as explained in paragraph 25. After

completing the check, parachutists will return to their position in the centre of the aircraft.

- (2) When the last parachutist has completed the check on the preceding parachutist, the last two parachutists will turn inboard so that their main parachutes turn toward their free hands. They will raise their static lines above their heads, and the second last parachutist will check the static line of the last parachutist. After completing the check, both parachutists will return back to their original position in the centre of the aircraft.
- d. On the command **CHECK YOUR EQUIPMENT**, each parachutist will tug on the static line, then take a pace toward the anchor line cable with his inboard foot and proceed with the check detailed in paragraph 29.
 - e. On the command **SOUND OFF FOR EQUIPMENT CHECK**, each parachutist will execute the drills detailed in paragraphs 32 and 33.
 - f. On the command **STAND BY**:
 - (1) **Following a Ramp Dispatched Load:**
 - (a) The Number 1 parachutist will move to a position so that his frontal equipment is 15 cm (6 in) from the load;
 - (b) The JM will hold one arm in front of the Number 1 parachutist; and
 - (c) The remaining parachutists will close up, at a walk, maintaining control of the static line by keeping the arm straight and maintaining a bight in the static line; and
 - (2) **Aft End Jumping without a Ramp Equipment Load:**
 - (a) The Number 1 parachutist will walk aft to a point within 46 cm (18 in) of the trailing edge of the ramp;
 - (b) The JM will hold one arm in front of the Number 1 parachutist; and
 - (c) The remaining parachutists will close up, at the walk, maintaining control of the static line as they move aft.
 - g. On the command **GO!**:
 - (1) **Following a Ramp Dispatched Load:**

- (a) The green light is the signal to dispatch the load. When the load (including the breakaway static lines) is clear, the JM will drop his arm and order GO! to the parachutists. All parachutists will follow the load as quickly as possible; and
 - (b) On exit, the parachutist will release the static line when he takes the last pace before springing out. The exit must be made off the centre of the ramp; and
- (2) **Aft End Jumping without a Ramp Equipment Load:**
- (a) The Number 1 parachutist will take one pace, throw his snap fastener releasing his static line at the same time, and exit adopting the jab position; and
 - (b) Each subsequent parachutist will exit in the same manner, ensuring the static line is not released until the last pace is taken.

JUMPING FOLLOWING LOADS DISPATCHED FROM THE WEDGE DELIVERY SYSTEM

53. When jumping following loads dispatched from the Wedge Delivery System (WDS), the parachutist will execute commands as follows:

- a. **SEAT BELTS OFF** as detailed in paragraphs 14 to 16;
- b. **GET READY** as detailed in paragraphs 17 to 19;
- c. **STAND UP** as detailed in paragraphs 20 and 21;
- d. **HOOK UP** as detailed in paragraphs 22 and 23;
- e. **CHECK STATIC LINES** as detailed in paragraphs 24 to 27;
- f. **CHECK YOUR EQUIPMENT** as detailed in paragraphs 28 to 30; and
- g. **SOUND OFF FOR EQUIPMENT CHECK** as detailed in paragraphs 31 to 33.

54. The doors will be opened as described in paragraph 34.

NOTE

After hooking-up, parachutists must ensure that they are not exerting any tension on the anchor line cable while the loadmaster is adjusting it.

STAND BY

55. This command will be given approximately 15 seconds before P-hour. There will be no reaction on the part of the parachutists to this order and both Number 1 parachutists will remain in the 1 minute position.

56. The remaining procedures will be as detailed in paragraph 39.

57. At P-hour the green lights will be illuminated, the loadmaster will cut the final restraint strap and the bundles will be dispatched from the WDS. Again, there will be no reaction on the part of the parachutists.

GO!

58. Approximately 3 seconds after the dispatch of the WDS, the loadmaster will ascertain that the bundles are clear. Having done so, he will drop his right arm, tap the JM on the shoulder and order **GO!**. Both the JM and assistant JM will ensure his load is clear then drop his upraised arm and order **GO!**.

59. Upon hearing the command **GO!** from the JM:

- a. Number 1 parachutists will repeat **GO!**, move to their respective doors and then exit immediately; and
- b. subsequent parachutists will perform as stated in paragraph 42b.

INTERRUPTED AIRCRAFT DRILL

60. Incidents may occur which will interrupt the normal sequence of aircraft drill. While all causes of interruption cannot be foreseen, some of the more likely ones are:

- a. parachutist not in physical condition to jump;
- b. parachutist with faulty equipment;
- c. obstruction on exit; or
- d. **STOP DROP.**

61. If a parachutist is not in physical condition to jump due to serious illness or for any other reason, the JM will:

- a. remove him from the stick;
 - b. seat belt him in at the forward end of the aircraft;
 - c. order him not to jump; and
 - d. notify the Drop Zone controller, through the Aircraft Captain, that a parachutist will not be jumping.
62. If a parachutist is found to have faulty equipment, the JM will:
- a. if the fault is discovered before the red light has come on, correct it by replacement or adjustment; or
 - b. if the fault is discovered after the red light has come on, remove the parachutist from the stick as in paragraph 61.
63. If, prior to the doors being opened, the stick is obstructed by a parachutist falling in the aircraft, refusing to jump, or for any other reason, the JM will:
- a. clear the obstruction;
 - b. remove the parachutist from the stick and sit him down in the forward part of the cargo compartment, ensure that his seat-belt is secured, and order him not to jump;
 - c. notify the Drop Zone controller, through the Aircraft Captain, that a parachutist will not be jumping; and
 - d. continue with JM/stick-leader duties.
64. If after the doors have been opened, the stick is obstructed for any of the reasons described in paragraph 60, the JM/stick leader will:
- a. stop the stick and push it back as far as possible;
 - b. request the loadmaster check for hang-ups, if part of the stick has exited;
 - c. wait until the other stick has been dispatched, deployment bags have been retrieved, and doors closed;
 - d. unhook the parachutist and sit him down in the forward part of the cargo compartment, ensure that his seat-belt is secured, and order him not to jump; and
 - e. confer with the aircrew as to the possibility of another pass.
65. If, while the stick is exiting, the red light comes on, the JM will order **STOP DROP** and, if necessary, physically restrain the parachutists. The loadmaster will

then immediately check for hang-ups, and then confer with the pilot as to the action to be taken.

66. In all cases the JM must use his discretion and, if the safety of any parachutist is in doubt, parachutists must not be allowed to jump.

EMERGENCIES

67. There are various ways to caution parachutists to prepare for an emergency. These include verbal and visual signs through the public address (PA) system or the loadmaster aboard the aircraft. Lights and bells in the aircraft also aid in passing on crucial information. Emergencies aboard an aircraft include:

- a. forced landing;
- b. ditching;
- c. abandonment in flight;
- d. immediate abandonment in flight; and
- e. hang-ups.

FORCED LANDING

68. If it is necessary to make a forced landing, the procedure is:

- a. There will be one short ring on the alarm bell or verbally through the PA system or loadmaster and, if the aircraft has one, the passenger warning sign will come on. If time permits, instructions will be given over the PA system.
- b. The JM will order the parachutists to sit down and secure their seat belts and put on their helmets. Then the JM does the same.
- c. Just before touch-down, there will be one continuous ring on the alarm bell.
- d. The JM will order the parachutists to clasp their hands behind their necks, place their feet and knees together towards the centre of the aircraft, and lean toward the forward bulkhead of the aircraft. They will remain in this position until the aircraft comes to a stop.
- e. When the aircraft has stopped, the JM will order parachutists to unfasten their seat belts and evacuate the aircraft through the paratrooper doors as quickly as possible. Under the control of the JM, parachutists will move at least 200 m (218 yd) from the rear of the aircraft.

69. If an emergency occurs immediately after take-off, there will only be time for a continuous ring of the bell as a final warning. Parachutists will still have their seat belts secured and will carry out the actions detailed in sub-paragraphs 68 d and e.

DITCHING

70. If it is necessary to ditch the aircraft, the procedure is:

- a. The initial warning is identical to a forced landing warning as detailed in paragraph 68 except it is followed by a verbal “ditching” repeated three times. It should be obvious from the flight plan and by looking out of the window whether it is to be a forced landing or ditching, nevertheless parachutists shall be informed if the emergency is a ditching.
- b. Parachutists and JM will:
 - (1) release their waist-band and pull it through, unhook the left snap of the reserve parachute and, as applicable, maintain physical control over the rifle and snowshoes, release the PELS snap fasteners and activate the lowering strap jettison device;
 - (2) with a three point release harness assembly, undo quick fit ejector snap hooks;
 - (3) with a QRB harness assembly, sit down and remove the safety fork, rotate the operating button, unlock the quick release box and clear the leg straps;
 - (4) secure seat belts; and
 - (5) await instructions from the Aircraft Captain.
- c. Just before touch-down there will be one continuous ring on the alarm bell.
- d. Parachutists and JM will clasp their hands behind their necks, place their feet and knees together toward the centre of the aircraft, and lean toward the forward bulkhead of the aircraft. They will remain in this position until the aircraft comes to a stop.
- e. On instructions from the loadmaster, the JM will order parachutists to unfasten seat belts and remove parachutes and equipment.
- f. The loadmaster will indicate which ditching hatch the parachutists shall use and inform them of the action to be taken after clearing the aircraft.

ABANDONMENT IN FLIGHT

71. If it is necessary to abandon the aircraft in flight, the procedure is:
- a. There will be one short ring on the alarm bell or verbally through the PA system or loadmaster. The red jump light will come on.
 - b. The JM will give all the jump commands in the normal manner and will order **STAND BY** immediately after **SOUND OFF FOR EQUIPMENT CHECK** is complete.
 - c. While parachutists are preparing to jump the Aircraft Captain will look for a suitable Drop Zone. When parachutists are ready and/or when the Aircraft Captain has found a Drop Zone:
 - (1) the green jump light will come on;
 - (2) the JM will drop his upraised arm and order **GO!**;
 - (3) parachutists will exit in the normal manner, followed by the JM; and
 - (4) at any time an Abandonment in Flight can become an Immediate Abandonment in Flight.

IMMEDIATE ABANDONMENT IN FLIGHT

72. In an emergency when control of the aircraft cannot be maintained, the parachutists must clear the aircraft as quickly as possible. The procedure is:
- a. There will be a continuous ring on the alarm bell, the loadmaster will open the doors, and the green jump lights will come on.
 - b. The JM will order **STAND UP, HOOK UP, GO!**.
 - c. Parachutists will stand up, hook up, and exit in stick order. If inboard and outboard seats are used, outboard parachutists forward of the wheel wells will stand up on their seats until the inboard parachutists have passed them by.
 - d. If a jumper misses the hook up, he will stand on the seat until all jumpers have passed him.
 - e. The JM and assistant JM will exit last.

HANG-UPS

73. A parachutist may be hung up or towed behind the aircraft by either an equipment hang-up or a static line hang-up.
74. If a parachutist is hung up by his equipment, he will be cut free as soon as possible.
75. If a parachutist is hung up by a static line, he will be retrieved into the aircraft. The parachutist must, however, remain alert during the retrieval and should he break free at any time during the operation, he must carry out his first point of flight procedure and then, if necessary, activate his reserve.

SECTION 3 FLIGHT

GENERAL

76. Flight, as applied to parachuting, is the period of time from completion of the deployment count until the parachutist first makes contact with the ground.
77. During flight, there are set drills, known as the "points of flight procedure", which shall be carried out on every static line parachute jump.
78. In addition to the points of flight procedure, there are other actions that a parachutist may be required to carry out in reaction to circumstances that may arise during flight.

POINTS OF FLIGHT PROCEDURE

79. There are five points of flight procedure:
- a. check canopy;
 - b. keep a sharp look-out during descent;
 - c. release the waist-band;
 - d. lower equipment; and
 - e. prepare to land.

CHECK CANOPY

80. Immediately after the parachutist finishes the deployment count, he will check to see if his canopy is properly developed by:

- a. reaching up on the insides of the front risers and pushing forward; and
- b. looking up into the canopy (see Figure 3-16).



Figure 3-16: Check Canopy

- 81. If the canopy is not properly developed, the parachutist will activate his reserve parachute as detailed in paragraphs 91 to 94.
- 82. If the parachutist cannot lift his head due to turns in the suspension lines, he will:

- a. reach behind the neck and grasp the riser groups with the thumbs down (see Figure 3-17);



Figure 3-17: Corrective Action for Twists in Suspension Lines

- b. pull outward;
 - c. kick in an unwind direction; and
 - d. when the turns have unwound, check canopy.
83. If the number of turns is such that the canopy is not fully developed, the parachutist will activate the reserve parachute.

KEEP A SHARP LOOK-OUT DURING DESCENT

84. Immediately after checking canopy and throughout flight, the parachutist will maintain all around observation (see Figure 3-18) to:



Figure 3-18: Keep a Sharp Look Out

- a. avoid collision with other parachutists; and
- b. check the landing area for obstacles.

RELEASE THE WAISTBAND

85. To enable the parachutist to lower his equipment and to facilitate removal of the harness on the ground, he will release the waistband during flight (see Figure 3-19) by:



Figure 3-19: Release the Waistband

- a. pulling the running end of the waistband to free it from the waistband adjuster;
- b. lifting the bottom of the reserve parachute with the left hand; and
- c. pulling the waistband free from the waistband keepers with the right hand.

LOWER EQUIPMENT

86. When the parachutist is approximately 60 m (200 ft) above ground (see Figure 3-20), he will:



Figure 3-20: Lower Equipment

- a. check to ensure that the area below is clear of other parachutists;
- b. remove the shoulder load from the shoulder and drop it; and
- c. lower equipment by releasing the snap hooks on the PELS.

87. If the parachutist is carrying a shoulder load only, after checking the area below, he will remove the load from the shoulder and throw it to his front. If the load

is light, he will check below to ensure that it has fallen the complete length of the lowering strap.

88. Under zero-wind conditions, the parachutist will oscillate the load by kicking the lowering strap. This will permit the parachutist to land clear of the load.

PREPARE TO LAND

89. After lowering his equipment, the parachutist (see Figure 3-21) will:



Figure 3-21: Prepare to Land

- a. force the feet and knees tightly together, knees slightly bent, with legs and feet hanging naturally under the body;
- b. force the head down and the chin on the chest;

- c. reach as high as possible, grasping all four risers with the elbows to the front, or, if required, maintain a proper slip as detailed in paragraph 98.
- d. watch the ground and assess the line of drift; and
- e. turn the feet off at an angle of 90° to the line of drift.

OPERATION OF THE CR-1 RESERVE PARACHUTE UPON COMPLETE MALFUNCTION OF THE MAIN PARACHUTE

90. If, on check canopy, the parachutist sees that he has a complete malfunction, he will:

- a. force the feet and knees together;
- b. look down and identify the ripcord handle;
- c. force one arm to the side and grasp the ripcord handle with the opposite hand;
- d. pull the ripcord handle vigorously at an angle of 45° and discard;
- e. punch the side of the reserve then force the hand to the side of the body; and
- f. turn the head off to the side and streamline the body.

91. Due to the point of suspension of the reserve parachute, the parachutist will be at an awkward backward-leaning angle. To remedy this the parachutist will reach between the two groups of suspension lines, grasp as many lines as possible, bring hands behind the neck, and force the body up in a proper landing attitude.

OPERATION OF CR-1 RESERVE PARACHUTE UPON PARTIAL MALFUNCTION OF THE MAIN PARACHUTE

92. If, on check canopy, the parachutist sees that he has a partial malfunction, he will:

- a. look down and identify where the ripcord handle is;
- b. place one hand over the ripcord protector flap and, with the other hand, grasp the ripcord handle;
- c. pull the ripcord handle and drop it, holding the pilot parachute and reserve canopy in the pack with the opposite hand;
- d. insert the free hand between the canopy and the suspension lines;
- e. kick the legs for momentum;

- f. force legs together while throwing the canopy as far as possible to either side;
- g. free any suspension lines remaining in the pack; and
- h. assist development of the canopy, if necessary, by shaking out suspension lines.

93. If both canopies remain inflated, the parachutist will land in the normal landing attitude.

94. If the reserve canopy collapses, if time permits the parachutist will pull the canopy in and hold it between his legs so that:

- a. the reserve canopy cannot foul the main canopy; and
- b. the parachutist will have an unobstructed view of the ground.

TANGLES

95. If, due to tumbling during deployment of the canopy, the parachutist becomes entangled in the suspension lines, he will first check his canopy and then untangle the suspension lines and free one limb at a time.

SLIPPING

96. The CT-1 parachute can be steered to a limited extent by slipping. Slipping will cause the parachute to move, in relation to the normal drift, in the direction of the risers which are pulled down, e.g. pulling down the left risers will move the parachute to the left (see Figure 3-22).



Figure 3-22: Left Slip

97. Slipping is done to:
 - a. avoid collisions with other parachutists;
 - b. increase or decrease your line of drift;
 - c. avoid landing on or against obstacles;
 - d. reduce drift on landing; and
 - e. dampen oscillation.
98. To apply a slip the parachutist will:

- a. reach up as high as possible and grasp, with the thumbs down, two adjacent risers;
 - b. pull the risers down until the elbows are locked to the sides or behind the reserve; and
 - c. maintain the proper landing attitude with the rest of the body.
99. A slip must be let out slowly or it will cause the parachutist to oscillate.
100. A slip performed by pulling down substantially on one riser is permitted. However, this method should be avoided when the parachutist is within 30 m (100 ft) of the ground as the canopy has a tendency to rotate.

OBSTACLES IN THE AIR

101. If the parachutist is in danger of colliding with another parachutist, he will slip in the opposite direction.
102. If a collision cannot be avoided, the parachutist will:
- a. spread his arms and legs to prevent passing through the suspension lines;
 - b. turn his head away from the suspension lines to prevent friction burns to the face; and
 - c. apply an opposite slip when free from the suspension lines.
103. If two parachutists become entangled and cannot separate, the higher parachutist will work his way down until he is level with and face to face with the lower. The parachutists will grasp each other's harness and prepare to land. Upon landing the parachutists will release their grips and roll in opposite directions.
104. Parachutists should avoid passing directly over or under another parachutist because this creates a partial vacuum above the lower canopy that might cause the upper canopy to collapse.

OBSTACLES ON THE GROUND

105. Obstacles on the ground are classified, in relation to the parachutist's line of drift, as:
- a. long obstacles;
 - b. pin-point obstacles; and
 - c. area obstacles.

106. A long obstacle is one which is wide yet has little depth in relation to the line of drift. If the parachutist is in danger of landing on a long obstacle, he will slip over it, i.e. slip in the direction he is drifting. Once he has passed the obstacle, he must slip in the opposite direction to reduce the amount of drift.

107. A pin-point obstacle is a stationary object that has little depth or width in relation to the line of drift, e.g. a small building. If the parachutist is in danger of landing on a pin-point obstacle, he will slip to one side of it.

108. An area obstacle is one that covers a large area of ground, e.g. a town or wooded area. If the parachutist is in danger of landing in an area obstacle, he will slip away from the nearest edge of the obstacle.

SECTION 4 LANDING

GENERAL

109. Most injuries to parachutists result from incorrect landing. The parachute landing technique enables the parachutist to distribute the shock of landing over the entire body and reduce the chance of injury. As the muscles, when moderately tensed, are better able to absorb the shock of landing than the bone structure, the parachute landing technique uses five muscled portions of the body which are called the points of contact.

FIVE POINTS OF CONTACT

110. A parachute landing is executed by touching down in sequence the five points of contact (see Figure 3-23), which are:

- a. balls of the feet;
- b. calf;
- c. thigh;
- d. buttocks; and
- e. diagonally across the back.

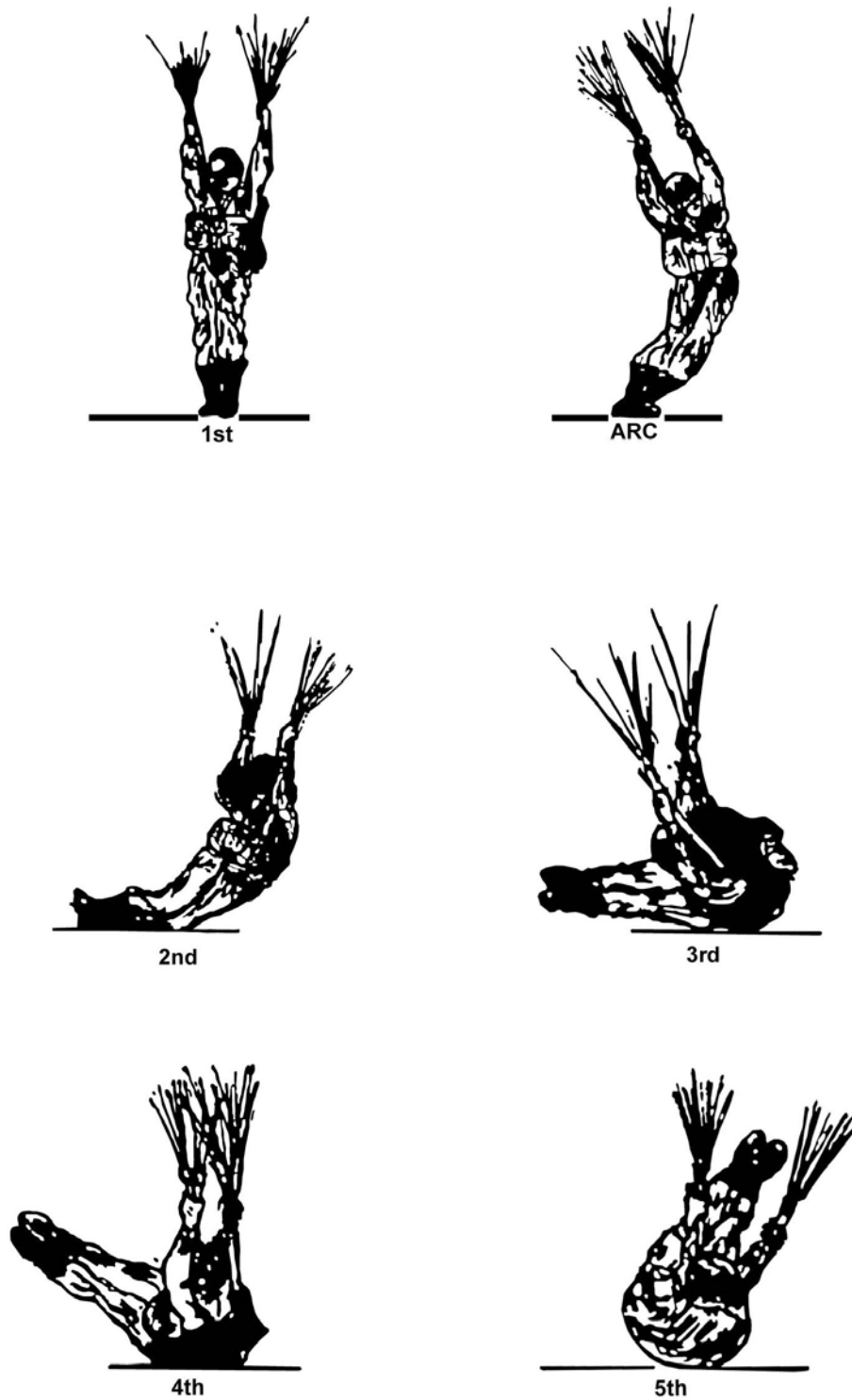


Figure 3-23: Executing a Parachute Landing

EXECUTING THE LANDING

111. As he approaches the ground the parachutist will be in the prepare-to land position as detailed in paragraph 89. His feet will be turned 90° to his line of drift, presenting his second and third points of contact. As the balls of the feet touch the ground, the parachutist will arc his body by bending the upper part of the body away from the line of drift, and forcing calves and thighs toward the line of drift. Except for the arcing of the body, he will remain in the prepare-to-land attitude. He will then fall along the line of drift, touching down the calf, thigh and buttocks. The momentum of the roll will then carry his legs up and over, and he will roll diagonally across his back.

112. The parachutist may, if he wishes, slip against the wind to cut down his drift on landing. Such a slip should be applied when the parachutist is high enough above ground to allow time for the slip to take effect.

113. Throughout the landing, the parachutist will:

- a. force the feet and knees tightly together, knees slightly bent, with legs and feet hanging naturally under the body;
- b. force the head down with the chin on the chest; and
- c. keep the elbows well up and forced around to the front, or, if landing with a slip, keep the elbows forced inwards.

TREE LANDING

114. A parachutist about to land in trees will:

- a. not lower his equipment;
- b. force the feet and knees tightly together;
- c. place the elbows on top of the reserve;
- d. cross the arms and grasp the main lift web under the canopy releases; and
- e. force the head down between the arms, thus protecting his face.

115. The parachutist will maintain this position (see Figure 3-24) until he comes to a full stop. As he might break through the trees and land on the ground, the parachutist will remain prepared for a normal landing.



Figure 3-24: Tree Landing

116. If the parachutist is suspended in the trees, he will:
- a. lower and jettison his equipment;
 - b. unhook one side of his reserve;
 - c. activate his reserve;
 - d. get out of the harness; and

- e. making sure that he remains on the outside of the canopy, climb down the lines and canopy of the reserve parachute to the ground.

WIRE LANDING

117. A parachutist about to land in high tension or telephone wires (see Figure 3-25) will:

- a. lower and jettison equipment;
- b. force the feet and knees tightly together and streamline the body;
- c. reach high on the inside of the front risers with the fingers together;
- d. watch the wires and attempt to avoid contact with them; and
- e. turn the head off to one side if going through the wires.



Figure 3-25: Wire Landing

WATER LANDING

118. Canadian Forces policy is that parachutists will never be dropped in water intentionally except with water landing training. Furthermore, when it is intended to drop parachutists within 1.6 km (1 mile) of water, they must be equipped with Life Preservers Underarm (LPU).

119. A parachutist may find himself about to land in water on any one of the following occasions:

- a. **Planned Descent into Water without Equipment (LPU Worn).** A parachutist about to land in water during water landing training will:

- (1) release his waistband;
- (2) inflate his LPU by pulling the firing toggle straight forward to the limit of travel and releasing it immediately (or, if the CO₂ cartridge fails to function, inflate the LPU by blowing into one or both oral inflation tubes);
- (3) secure the LPU lobes together by means of the Velcro tapes at the front of each lobe;
- (4) prepare to land, and at approximately 8 m (25 ft) open the safety clips of the canopy releases, insert the thumbs into the latch arm lanyards, and as the feet touch the water, activate the canopy release;
- (5) grab hold of canopy for recovery, and
- (6) gather together with other parachutists for mutual support and to facilitate the retrieval operation.

b. **Unintentional Water Landing with Equipment (LPU Worn).** A parachutist wearing an LPU who believes that he is about to land in water on other than planned water landing training, will:

- (1) release his waistband;
- (2) lower and jettison his equipment;
- (3) inflate his LPU, as described in sub paragraph 119a(2);
- (4) secure the LPU lobes together by means of the Velcro tapes in front of each lobe;
- (5) prepare to land, and at approximately 8 m (25 ft) open the safety clips of the canopy releases, insert the thumbs into the latch arm lanyards, and as the feet touch the water, activate the canopy release; and
- (6) gather together for mutual support with other parachutists to facilitate the search and rescue operation.

c. **Unintentional Water Landing with Equipment (No LPU Worn).** A parachutist, not wearing an LPU, who believes that he is about to land in water will:

- (1) Release his waistband.
- (2) Lower and jettison his equipment.
- (3) Remove and discard his reserve.

- (4) Remove and discard his helmet.
- (5) Undo the chest strap (three-point harness). With a QRB harness, remove the safety fork rotate to release position, placing one hand across body to grasp the main lift web. With the free hand strike the QRB and free leg straps from leg loops, ensure that the right chest strap is clear, and with the free hand grasp the other side of the main lift web.
- (6) At 8 m (25 ft) above the water, open the safety clip of the canopy releases, insert thumbs in the latch arm lanyard.
- (7) As the feet touch the water the parachutist will pull down on the latch arm lanyard, cutting the canopy away.
- (8) Once in the water with a three point harness, release the leg strap quick fit ejector snap hooks from your leg V-rings.
- (9) Remove the harness and gather together for mutual support with other parachutists to facilitate the search and rescue operation.

120. The conditions described in sub-paragraphs 119 a, b and c, constitute the only occasions when the static-line parachutist will touch the canopy releases before landing.

LANDING AGAINST AN OBSTACLE

121. A parachutist who is about to land against an obstacle will turn his body so that he does not strike it with his back. If he is facing the obstacle, he will raise his feet to fend it off. If he is drifting backwards towards the obstacle, he will turn his body through a quarter turn in order to hit the obstacle with the side of his body. The rest of his body maintains the proper landing attitude.

122. To turn the body through a quarter turn, the parachutist will grasp the rear riser on the side to which he wishes to turn and pull it down as for a slip.

LANDING ON AN OBSTACLE

123. Landing on an obstacle, such as a roof, does not alter the normal landing technique. Immediately after landing, the parachutist will activate his canopy releases to prevent being dragged off the obstacle.

SECTION 5 CANOPY COLLAPSING

GENERAL

124. Parachutists will collapse their canopies as soon as possible after landing:
- a. to prevent injury from dragging; and
 - b. to prevent unnecessary delay.
125. The canopy will normally be collapsed by activating the canopy release assembly, but it may also be collapsed by:
- a. pulling in suspension lines; or
 - b. the assisted collapse.

ACTIVATING THE CANOPY RELEASE

126. If the parachutist's canopy remains inflated after landing, he will:
- a. roll onto his back;
 - b. with one hand, pull out and down on the safety clip;
 - c. turn his head away from the canopy release assembly to be activated; and
 - d. grasp the lanyard of the canopy release assembly and pull out and down.
127. The parachutist will re-connect the canopy release assembly prior to preparing the parachute for carrying and transportation.

PULLING IN SUSPENSION LINES

128. If the parachutist cannot activate the canopy release assembly, he will:
- a. roll onto his stomach;
 - b. reach out and, with thumbs down, grasp as many of the lower suspension lines as possible; and
 - c. pull the suspension lines in, hand over hand, until the canopy collapses.

ASSISTED COLLAPSE

129. To assist a parachutist who cannot collapse his own canopy, the assisting parachutist will:

- a. grasp the canopy by the apex and pull it into the wind; and
- b. if the assisted parachutist is injured and requires medical aid, whirl a portion of the canopy over the head to alert the Drop Zone Controller.

CHAPTER 4 JUMPMASTER DUTIES

SECTION 1 GENERAL

INTRODUCTION

1. Duties of the jumpmaster (JM) for the CC-130 Hercules are detailed in this chapter. JM duties for the CH-146 Griffon are detailed in Chapter 6.

THE JUMPMASTER

2. A JM shall be a parachutist of NCM or officer rank who has passed a JM course and is currently certified as qualified under existing Canadian Forces regulations.
3. The JM is responsible to the Aircraft Captain for the safe and efficient dispatch of the parachutists. Normally, communications between the aircraft captain and the JM are through the loadmaster.
4. A qualified JM will be employed at each paratrooper door used. The JM controlling the port door will be the senior JM. The senior JM will give all jump commands from a position near the ramp of the aircraft where he may best see and be seen by all parachutists. The assistant JM will control the starboard door.
5. JM procedures and duties when parachutists are jumping from the aft end of the aircraft are detailed in Section 3 of this chapter.

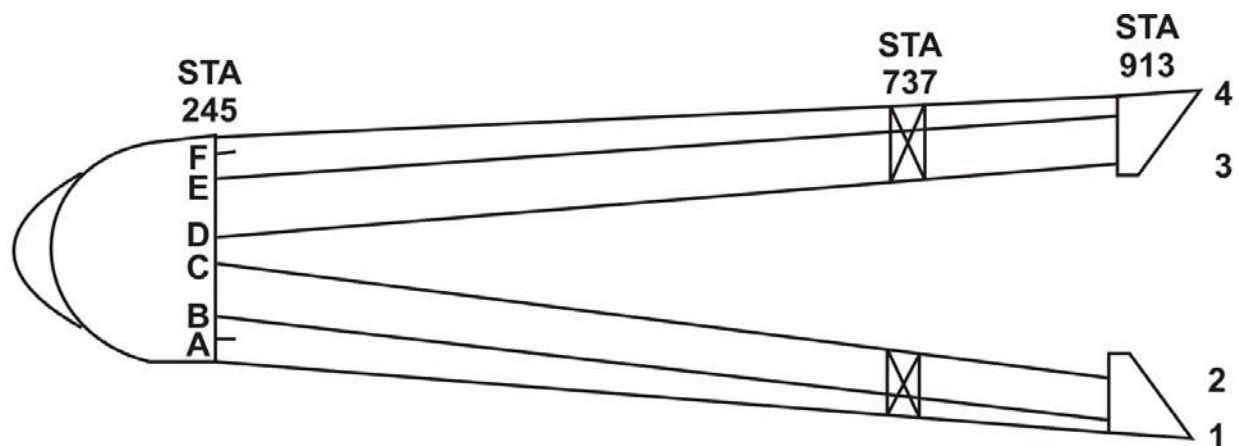
JUMPMASTER EQUIPMENT

6. Prior to any jump, the JM will draw and have aboard the aircraft:
 - a. two 7.3 m (24 ft) PPB dispatch parachutes;
 - b. two sheath knives;
 - c. masking tape and gun tape;
 - d. a minimum of one spare reserve parachute (not time expired);
 - e. a minimum of one spare parachutist's helmet (either type);
 - f. spare helmet parts, e.g. chin straps;
 - g. spare retainer bands;

- h. 6.6 mm (1/4 in) cotton webbing; and
 - i. a carrying bag for the equipment described above.
7. On arrival at the aircraft, the JM will usually find the necessary retrieval system on board installed and ready for inspection.
8. The JM will wear environmental clothing suitable to the climatic conditions on the Drop Zone (DZ).

AIRCRAFT INSPECTION

9. Prior to any parachute jump, whether ramp or door, the JM, accompanied by the loadmaster, will inspect the aircraft to ensure that:
- a. paratrooper doors and pip pins are serviceable and the doors, together with the fuselage aft of the doors, are free of projections;
 - b. jump platforms are serviceable and safety wired;
 - c. air deflectors open approximately 38 cm (15 in);
 - d. the floor and jump platforms are not slippery;
 - e. all anchor line cable connections are secured and rigged (see Figure 4-1);



- 1. NUMBER 1 CABLE FROM B TO 1
- 2. NUMBER 2 CABLE FROM C TO 2
- 3. NUMBER 3 CABLE FROM D TO 3
- 4. NUMBER 4 CABLE FROM E TO 4

- 5. NUMBER 1 CABLE FROM B TO 2 FOR PERS / WEDGE
- 6. NUMBER 2 CABLE FROM E TO 3 FOR PERS / WEDGE

Figure 4-1: Anchor Line Cables rigged for Door Exits

- f. anchor line support brackets are locked in position and anchor line cables are secured into them;

- g. jump signal lights, cargo compartment lights, warning bell and intercommunications system are serviceable;
- h. the retrieval gear is serviceable and rigged with the Hung-up Parachutist Retrieval Assist System (HUPRAS), as detailed in Canadian Forces Air Command Manual (CFACM) 60-2601(2) Air Transport Group *Airlift Operations: Tactical*, for either door or aft end dispatch (see Figure 4-2);



Figure 4-2: Retrieval Gear for a Door Exit.

- i. anchor line cables are not frayed or worn;
- j. anchor line cables are secured by placing full weight on the centre of each cable;

- k. anchor line cables are approximately 195 cm (77 in) from the floor at Station 570;
- l. any projections in the cargo compartment which may snag a static line, parachute or parachutist, are masked;
- m. seats are down, seat belts are crossed, and there are sufficient seats for the parachutists;
- n. any aerial delivery rails and rollers do not impede the parachutists' passage to the paratrooper doors;
- o. emergency equipment and exits are secured; and
- p. airsickness bags are available.

INITIAL INSPECTION OF PARACHUTISTS

10. At reporting time, the JM will assert control over the parachutists. The JM will:
- a. call the manifest and line up the parachutists in stick order; and
 - b. inspect the parachutists to ensure that each parachutist:
 - (1) is in physical condition to jump;
 - (2) is wearing identification discs, or has an identification card;
 - (3) if wearing a ring, masks or removes it, or wears gloves;
 - (4) if wearing eye glasses, secures them; and
 - (5) is wearing proper environmental clothing.

RIGGER CHECK

11. When the initial inspection is completed, the JM will order parachutists to dress for rigger check.
12. Only a currently qualified parachute rigger will carry out the rigger check.
13. If a qualified parachute rigger has inspected the parachutes after receipt by the unit, parachutists will be ordered to dress for a JM check, as described in paragraph 15.
14. The procedure for the rigger check is detailed in Canadian Forces Parachute Maintenance Depot Technical Bulletin No 7.

JUMPMaster CHECK

15. When the rigger check is completed, the JM will order parachutists to dress for a JM check. When parachutists are fully dressed, the JM will conduct an initial four point check (no equipment) or a five point check (full equipment) on each parachutist. This ensures that:

- a. each parachutist has been rigger checked;
- b. the pack tray is even with the shoulders;
- c. the shoulder load is positioned properly;
- d. canopy releases are in the hollow of the shoulders; and
- e. the ripcord protector flap is open.

16. After this, the JM will carry on with the ground check, consisting of the following:

- a. helmet and chin-strap are secured;
- b. canopy release assemblies are properly assembled, level, and are positioned in the hollows of the shoulders;
- c. if using a Quick Release Box (QRB) harness, chest straps are even and without twists, the QRB is locked, the safety fork is inserted and all locking lugs are secured;
- d. if using a three point harness, the main lift web is without any twists and the chest strap is without any twists and the quick fit ejector snap hook is secured to the V-ring, with no fabric from the comfort pad caught in the snap hook;
- e. the waist-band is without twists, passes through the waist-band keepers on the reserve parachute, with the running end secured in the waist-band adjuster by a quick release bight;
- f. the reserve parachute has:
 - (1) the butterfly snap hookspring loaded and attached to the D-rings of the harness;
 - (2) pack opening bands are secured and have elasticity;
 - (3) ripcord locking pins are inserted through the locking cones over the grommets, and the pins have the swag balls in place and are not bent, rusted or damaged in any way and the handle is seated in the pocket;

- (4) the ripcord protective flap is closed after verification; and
 - (5) the reserve pack tray is generally in good condition and there is no canopy showing.
- g. if equipment and weapons are being carried the JM will:
 - (1) have the parachutist hold the reserve;
 - (2) inspect to ensure the equipment snap hooks are properly secured to the equipment V-rings;
 - (3) ensure the jettison buckle is secured to the proper V-ring and that the opening of the buckle is facing out;
 - (4) ensure leg straps for both types of harnesses are inspected for their length, routing and security;
 - (5) carry out the concurrent inspection of the rucksack and the shoulder load to ensure they are properly positioned and serviceable; and
 - (6) the JM will perform the actions detailed in paragraph 16 subparagraph i sub-subparagraphs (3) to (18) of this section (see below).
- h. if the parachutist is not dressed with equipment or weapons the JM will:
 - (1) have the parachutist hold the reserve;
 - (2) ensure leg straps for both types of harnesses are inspected for their length, routing and security;
 - (3) tell the parachutist to turn around;
 - (4) inspect the rear of the parachutist, and ensure the helmet pad is in place and fasteners are secured;
 - (5) trace the risers from the canopy releases to the pack tray ensuring they are not misrouted;
 - (6) remove the snap fastener and static line taking out one stow, and inspect the static line from the pack tray to the snap fastener both physically and visually to ensure it is serviceable;
 - (7) check the double stitching of the fixed bight on the static line;
 - (8) check the snap fastener for serviceability, pass the snap fastener to the parachutist and tell the parachutist to stow it;

- (9) start on the opposite side where the static line is over the parachutist's shoulder and trace the back diagonal straps physically and visually, checking for length, routing and security;
- (10) inspect the flyer's kit bag for width and security;
- (11) trace the saddle from side to side to ensure there are no twists or that it is not misrouted;
- (12) check the overall condition of the pack tray and ensure that there is no parachute showing;
- (13) take the static line, form a bight and pass it through the slack control loop under the horizontal stows;
- (14) check from the front of the parachutist to the slack control loop ensuring the static line is properly stowed and not misrouted;
- (15) check the elasticity of the retainer bands;
- (16) trace the static line from the slack control loop to the pack closing tie ensuring the static line is serviceable;
- (17) visually and physically check that the pack closing tie is through the four pack closing loops and pack opening loop, and that the knot is secured; and
- (18) tap the parachutist "OK".

BRIEFING

17. After confirming the details with the Aircraft Captain, the JM will brief parachutists on:

- a. the type of drop;
- b. drop altitude;
- c. duration of the red light and other jump signals;
- d. duration of the green light, if critical;
- e. to **GO!** on either the green light or verbally;
- f. emergency signals;
- g. action to be taken in case of a hang-up; and

- h. any other information pertinent to the drop, e.g. that parachutists have been manifested in accordance with the appropriate operation order and that they shall parachute in accordance with the JM's orders.

EMPLANING

18. At the appointed time, and after obtaining permission from the Aircraft Captain, the JM will:

- a. guide the parachutists to the aircraft and emplane them in reverse stick order if entering from the rear of the aircraft (note that if the Wedge Delivery System is being employed, the JM will ascertain how parachutists are to emplane, brief them, and guide them accordingly);
- b. report to the Aircraft Captain, who will sign the load manifest;
- c. give the aircraft loadmaster one copy of the manifest and turn the remaining copies over to the unit emplaning officer;
- d. ensure that each parachutist's seat belt is fastened over top of the reserve parachute and static line to facilitate checking by the JM, and that the helmet is secured;
- e. tie down spare JM equipment;
- f. don the dispatcher parachute (if not done prior to emplaning);
- g. inform the loadmaster that parachutists are ready for take-off; and
- h. sit down and fasten his seat belt.

IN-FLIGHT DUTIES

19. Communications between the Aircraft Captain and the JM will be:

- a. by jump signal lights;
- b. by alarm bell; and
- c. verbally and by hand signal, through the loadmaster.

20. During the time the parachutists are in the aircraft, the JM will:

- a. maintain strict discipline in the cargo compartment;
- b. prohibit unnecessary movement of the parachutists; and
- c. keep the senior parachutist informed of any pertinent information received from the loadmaster.

DISPATCH OF PARACHUTISTS

21. If equipment has been removed during flight, the loadmaster will alert the JM at a pre-arranged time. The JM will then order **GET DRESSED** and, when dressing is complete, carry out a JM check of the equipment which was removed.
22. When so notified by the loadmaster, the JM will order **SEAT BELTS OFF**.
23. The JM will give jump commands as detailed in Chapter 3.
24. After giving the command **CHECK YOUR EQUIPMENT**, the JM will check the port stick and the assistant JM will check the starboard stick, beginning with the last parachutist. Each parachutist will be inspected to ensure that:
 - a. the snap fastener is secured to the anchor line cable;
 - b. the static line is not misrouted and is under the horizontal stows, and the slack is secured in the slack control loop;
 - c. the pack closing tie is secured;
 - d. the helmet is secured;
 - e. canopy release assemblies are closed, chest strap is not misrouted, ejector snap hook is closed;
 - f. the overall condition of the reserve is suitable for jumping;
 - g. the QRB assembly is locked and the safety fork is inserted, or the ejector snaps are attached to the appropriate V-rings on the main lift web and are positively closed, whichever is applicable;
 - h. equipment snap hooks are closed, the jettison buckle is secured, and the shoulder load is secured; and
 - i. the waistband still has the proper bight.
25. When **SOUND OFF FOR EQUIPMENT CHECK** is completed, the JM will inform the loadmaster that parachutists are ready to jump.
26. After the aircraft slowdown, the loadmaster will open the paratrooper doors and set the jump platforms. The loadmaster may also inform the JM of the ground wind speed. The JM will pass this information to the parachutists.
27. The loadmaster will give the JM the **1 MINUTE** warning, which will be passed to the parachutists.
28. Subsequently, the JM and assistant JM will check their respective doors to ensure that:

- a. the door is locked open and the pip pin properly inserted;
- b. the jump platform is locked in position by both locking plates;
- c. the air deflector is opened;
- d. the aft end support arm is in the horizontal position (see Figure 4-3);



Figure 4-3: Aft End Support Arm in Horizontal Position.

29. Fifteen seconds before P-hour, the loadmaster will inform the JM. The JM will order **STAND BY**, and the JM and assistant JM will:

- a. move to the anchor line support brackets of their respective sticks and face outboard;

- b. control the Number 1 parachutist's snap fastener with the outboard hand, and with the free hand remove any slack in the Number 1 parachutist's static line, ensuring the static line runs through the slack-control loop and underneath all horizontal stows;
 - c. raise the inboard arm; and
 - d. watch the jump signal lights.
30. On display of the green jump signal light and/or hearing **GO!** from the loadmaster, the JM and assistant JM will:
- a. drop their raised arms;
 - b. order **GO!** and
 - c. control the snap fasteners of successive parachutists.
31. Immediately after the last parachutist exits, the JM and assistant JM will check for hung up parachutists by lying on the aircraft floor and looking out at the deployment bags. If there is no hang-up, they will give a thumbs up signal to the loadmaster and report **CLEAR**. Action to be taken in the event of a hang-up is detailed in Section 5 to this chapter.
32. The JM and assistant JM will assist the loadmaster in retrieving the deployment bags.

SECTION 2 DOOR LOADS

GENERAL

33. If parachutists are to be dropped in conjunction with door loads, the loadmaster may dispatch the door loads as detailed in CFACM 60-2601(1) and (2) Air Transport Group *Airlift Operations: Tactical*.
34. Parachutists may only jump behind bundles rigged with breakaway static lines.
35. The loadmaster may position the door load and hook up the cargo parachute static line prior to the red light warning for the parachutists.
36. The loadmaster may be assisted in dispatching the load by the JM.
37. The JM will check to ensure that the door load is completely clear of the aircraft and that the static line has broken away before dispatching the parachutists.

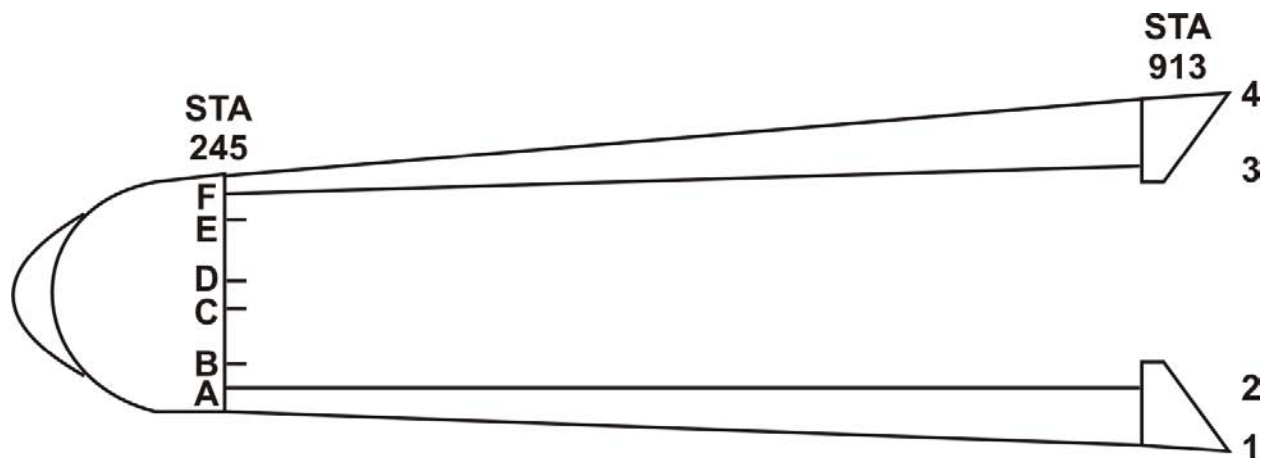
SECTION 3 AFT END JUMPING

GENERAL

38. Parachutists will jump from the aft end when jumping with loads which cannot be dropped as door bundles, or as part of their continuation parachute training.
39. This section details the difference in procedures from paratrooper door jumping.
40. There will only be a maximum of 20 parachutists per anchor-line cable, for a maximum of 40 parachutists on the aircraft.
41. When following loads, parachutists will use the starboard anchor-line cable.

AIRCRAFT INSPECTION

42. The aircraft will be inspected as detailed in paragraph 9, except that:
- if the load to be followed is a platform, the jump platform will not be installed;
 - anchor line cables are rigged as shown in Figure 4-4;



1. NUMBER 1 CABLE FROM A TO 2, AND
2. NUMBER 2 CABLE FROM F TO 3

Figure 4-4: Anchor Line Cables Rigged for Aft End Exits.

- a bulldog clamp is installed and masked on each anchor line cable, 50 cm (20 in) forward of the aft supports at Station 893;
- anchor line support brackets are folded up and secured to the ceiling;

- e. the retrieval gear is rigged and secured with two turns of 6 mm (1/4 in) cotton webbing, as follows:
 - (1) with the retrieval spool against and tied to the bulldog clamp;
 - (2) 5 cm (2 in) above the clip on the emergency hand grip at Station 862;
 - (3) on the vertical support tube at Station 813;
 - (4) on the litter support at Station 627; and
 - (5) with the retrieval assist strap installed at Station 850.

JUMPMaster CHECK

- 43. The JM check is as detailed in paragraph 15 except that:
 - a. the JM will check the snap fastener for serviceability, pass the snap fastener to the parachutist and tell the parachutist to stow it with a long bight;
 - b. the static line will pass over the opposite shoulder; e.g. the left shoulder for a starboard side parachutist; and
 - c. when stowing the static line on the reserve parachute, the parachutist will pull the bight out so that it extends to the horizontal pack-opening band of the reserve parachute.
- 44. Due to the length of the bight in the static line, it will be necessary for the JM to pull out one extra horizontal stow when inspecting the overall condition of the pack during the ground check.

EMPLANING

- 45. Aft end jumping emplaning is either through the ramp door or through the crew door on the port side if there is a load being followed, as detailed in paragraph 18.

DISPATCH OF PARACHUTISTS FOLLOWING CCC-1 OR A-21 CONTAINERS (RAMP)

- 46. Parachutists will be dispatched as detailed in paragraphs 21 to 32, except that aircraft drill will be as detailed in paragraph 53, Chapter 3, and:
 - a. on the command **HOOK UP** the JM will position the Number 1 parachutist near but not aft of the tie-down points used to secure the load;

- b. at the **1 MINUTE** warning the JM will ensure that the loadmaster has removed all in-flight restraints from the load except the quick release straps;
- c. after the command **STAND BY** the JM will stand forward of the load, in front of the Number 1 parachutist; and
- d. on display of the green jump signal light the JM will:
 - (1) step to the port side of the ramp, check the centre of the floor for obstructions to parachutists, and watch the breakaway action of the static lines; and
 - (2) when the static line(s) have broken away, order the parachutists to **GO!**.

DISPATCH OF PARACHUTISTS FOLLOWING LOAD PLATFORMS

- 47. Parachutists will be emplaned as detailed in paragraph 45.
- 48. Parachutists will be dispatched as detailed in paragraph 46, except that:
 - a. on the command **HOOK UP** the JM will position the Number 1 parachutist not closer than 15 cm (6 in) forward of the load;
 - b. at the **1 MINUTE** warning the JM will ensure the centre aisle is clear of obstructions to parachutists;
 - c. after the command **STAND BY** the JM will stand to the right of and place his right arm in front of the Number 1 parachutist, raise his left arm, and watch the jump signal light;
 - d. the JM must ensure that he does not block the loadmaster's view of the extraction parachute;
 - e. on display of the green jump signal light the JM will:
 - (1) observe the extraction of the load;
 - (2) when the load begins to move, move the parachutists aft under control of his right arm;
 - (3) as the load leaves the ramp, ensure that the static lines break away and that the centre aisle is clear of obstructions to the parachutists;
 - (4) if the conditions in sub-subparagraph (3) are met, drop his left arm, remove his right arm from in front of the Number 1 parachutist, and order **GO!**; or

- (5) if the static lines fail to break away, order **STOP DROP**.

EMERGENCIES

49. If it is necessary to abandon the aircraft in flight when it is rigged for aft end jumping, the procedures detailed in paragraph 72, Chapter 3 will be followed, except that:

- a. if the aircraft is carrying a load platform, the ramp will open, the load will be extracted and parachutists will follow the load; or
- b. in all other cases the JM will;
 - (1) order the parachutists to place their static lines over the opposite shoulder; and
 - (2) carry out the procedures for a normal paratrooper door jump, whether or not the centre anchor line supports and jump platforms are installed; or
 - (3) in the event that the load blocks access to the paratrooper doors, ensure that parachutists remain secured in the aircraft.

SECTION 4 THE STICK COMMANDER

GENERAL

50. During airborne training or operations a stick commander may replace the JM. A stick commander shall be a parachutist who is a current and qualified jumpmaster. The duties, authority, and responsibility of a stick commander are identical to those of a JM except as otherwise detailed in this section.

STICK COMMANDER'S EQUIPMENT

51. The stick commander's equipment is the same as the JM's except that the stick commander will wear a CT-1 or CT-2 assembly and personal weapon and equipment, if required.

DRESSING

52. The stick commander will dress, and is rigger and JM checked, at the same time as the parachutists.

PARATROOPER DOOR DISPATCHING

53. The stick commander will dispatch parachutists as detailed in paragraphs 21 to 32, except that after inspecting the stick and before **SOUND OFF FOR EQUIPMENT CHECK**, the stick commander will hook up as Number 1 on the inboard anchor line cable (if four cables are used). The stick commander will then have the Number 1 parachutist check his static line and check his equipment.

54. On display of the green jump light the stick commander will dispatch the parachutists and exit last.

55. If the stick commander must deploy with rucksack he will use one of the following methods to dispatch the stick:

- a. if the rucksack is attached to himself, on display of the green jump light the stick commander will dispatch the parachutists and exit last; or
- b. if the stick commander has prepared his rucksack as a door bundle he will either:
 - (1) on the green light, throw his rucksack out first as a door bundle, dispatch the parachutists, and exit last; or
 - (2) on the green light, dispatch the parachutists, throw out his rucksack as a door bundle, and exit last.

56. After the parachutists exit the loadmaster will be responsible for ensuring no parachutist is hung up and for retrieving the deployment bags.

AFT END DISPATCHING

57. When jumping from the aft end, two qualified JMs will be used as stick commanders. The stick commander will hook up and exit as the Number 1.

58. Parachutists will be dispatched as detailed in paragraphs 46 or 47 and 48, except that:

- a. On the command **HOOK UP**, the stick commander will ensure that the Number 2 parachutist leaves sufficient space for the stick commander to hook up as Number 1.
- b. After checking the stick and before **SOUND OFF FOR EQUIPMENT CHECK**, the stick commander will hook up as Number 1 parachutist, and have the Number 2 parachutist check his static line and check his equipment.
- c. After the command **STAND BY** the stick commander will raise his arm.

- d. On display of the green jump signal light the stick commander will follow the load aft.
- e. When the load has cleared the ramp, the stick commander will ensure that the static lines have broken away, check the centre aisle for obstructions, drop his upraised arm, and order **GO!**. The stick commander will exit followed by the parachutists.

59. After the parachutists exit the loadmaster will be responsible for ensuring no parachutist is hung up and for retrieving the deployment bags.

SECTION 5 HANG-UPS

GENERAL

60. Hang-ups, their causes, and the action to be taken by the parachutist are described in paragraphs 73 to 75, Chapter 3.

61. The decision and action required to cut a hung up parachutist free will be the responsibility of one of the following, in the precedence shown:

- a. the JM if one is used; or
- b. the stick commander if he is still in the aircraft when the hang-up occurs; or
- c. the assistant stick commander on aft end jumps; or
- d. the loadmaster if the stick commander and assistant stick commander have left the aircraft.

62. When the decision is made to retrieve, the loadmaster will take charge of the retrieval operation.

63. During training and practicing the stick commander technique, an additional non-jumping JM may be carried in the aircraft. The JM's primary duty is to assist in the retrieval of a hung-up stick commander or parachutist.

EQUIPMENT HANG-UPS

64. If a parachutist is hung up by fouled equipment or a fouled lowering strap, the responsible person will:

- a. stop the stick;
- b. shout **PORT/STARBOARD HANG-UP**;
- c. cut the fouled equipment free as soon as possible; and

NOTE

On hearing **RETRIEVE**, the loadmaster will position the retrieval assist strap around the static lines, rotate the jump platform in and activate the retrieval winch.

- d. report **HANG-UP RELEASED**.

65. If the cause of the hang-up is clear and unlikely to recur, permission may be requested from the Aircraft Captain for another pass over the Drop Zone.

MISROUTED STATIC LINE

66. If, during a door drop, a parachutist is hung up by his static line, the responsible person will:

- a. stop the stick (if any parachutists remain in the aircraft);
- b. shout **PORT/STARBOARD HANG-UP — RETRIEVE**;
- c. order the stick (if any parachutists remain) to the forward end of the cargo compartment on the opposite side from the hang-up; and
- d. when the parachutist is retrieved to the door, pull him into the aircraft by hand.

67. If, during a ramp drop, a parachutist is hung up by his static line, the responsible person will:

- a. stop the stick (if any parachutists remain in the aircraft);
- b. shout **HANG-UP—RETRIEVE**; and
- c. when the parachutist is retrieved to the edge of the ramp pull him onto the ramp by hand.

NOTE

On hearing **RETRIEVE**, the loadmaster will raise the ramp 10 to 15 degrees until the parachutist stabilizes in the slipstream, position the retrieval assist strap under the static lines and secure it to the fuselage on the side opposite the hang-up, and activate the retrieval winch.

CHAPTER 5

CC-130 HERCULES AIRCRAFT

GENERAL

1. The CC-130 Hercules (see Figure 5-1) is the primary Canadian Forces operational aircraft for delivering parachutists. It is a four engine, turbo-prop, medium range transport. Parachutists may jump from two paratrooper doors near the aft end or off the aft end over the ramp. The CC-130 is equipped with an aerial dual rail unloading kit and can drop heavy drop load platforms or smaller aerial delivery containers. It has a short take-off and landing capability, and can operate from fields without a prepared surface.



Figure 5-1: The CC-130 Hercules Aircraft

SEATING ARRANGEMENTS

2. The CC-130 aircraft can carry 62 parachutists with limited equipment or 40 parachutists with rucksacks. The seating arrangements for 62 and 40 parachutists are shown in Figures 5-2 and 5-3 respectively.

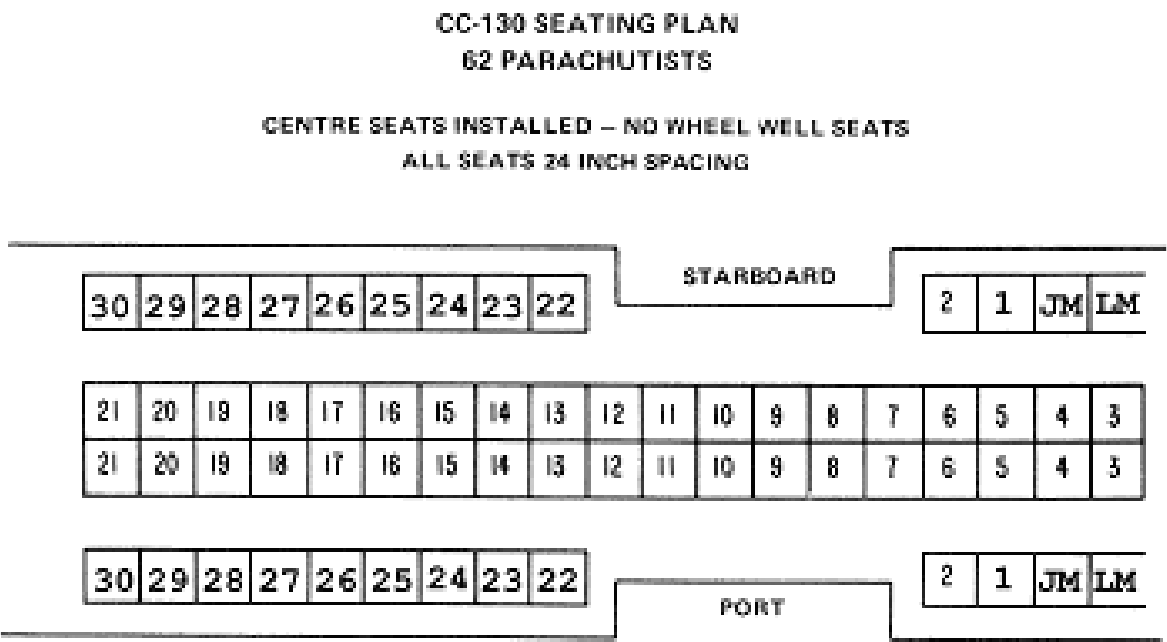


Figure 5-2: Seating Arrangement for 62 Parachutists

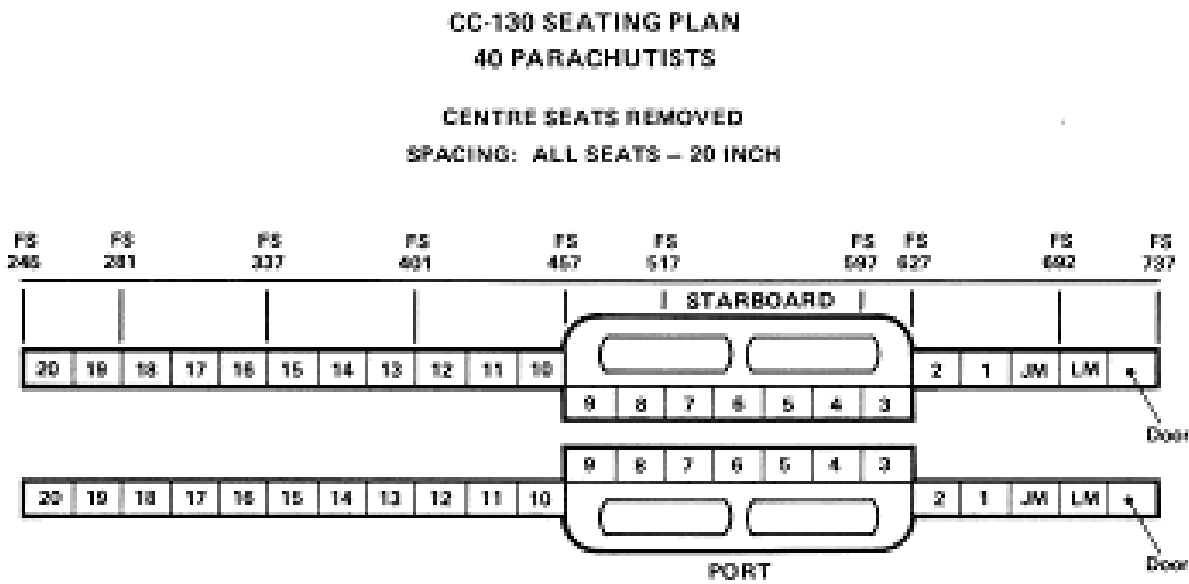


Figure 5-3: Seating Arrangement for 40 Parachutists

3. When more than 40 parachutists are to jump, four anchor line cables are required.

PARACHUTIST DELIVERY EQUIPMENT

4. The following equipment is installed in the CC-130 for use by parachutists:
 - a. Seven sets of jump signal lights - one on each anchor line aft support, one on the aft edge of each paratrooper door, one above and forward of each paratrooper door, and one on the port side near the door to the flight deck;
 - b. Anchor line cables with fittings which allow the installation of two or four cables;
 - c. Static line retrieval gear which consists, on both sides, of:
 - (1) electric winch;
 - (2) retrieval cable;
 - (3) yoke connection for use when four anchor line cables are used;
 - (4) retrieval cable extension for use when jumping from the aft end;
 - (5) spool with attaching rod on each anchor line cable used;
 - (6) two sets of electrical switches for activating the winch, one on the forward bulkhead and one aft of the paratrooper door; and
 - (7) the Hung Up Parachutist Retrieval Assist System (HUPRAS), described in CFACM 60-2601(2) Tactical Airlift Operations.
 - d. An anchor line support bracket by each paratrooper door, each of which can secure two anchor line cables;
 - e. A jump platform for each paratrooper door which can be rotated out for use and in for flight;
 - f. An air deflector forward of each paratrooper door to reduce air turbulence during exit;
 - g. Removable troop seats with seat belts which will accommodate up to 40 parachutists using outboard seats only, and up to 62 parachutists using outboard and centre seats; and
 - h. An alarm bell and loudspeaker (public address) system.

EMERGENCY EXITS

5. In addition to the loading ramp and door, the paratrooper doors and the crew door, the CC-130 aircraft has the following emergency exits:

- a. three ditching hatches on the top of the fuselage;
- b. a side emergency exit on the starboard side forward of the wheel well; and
- c. two hinged windows in the pilot's compartment (see Figure 5-4)

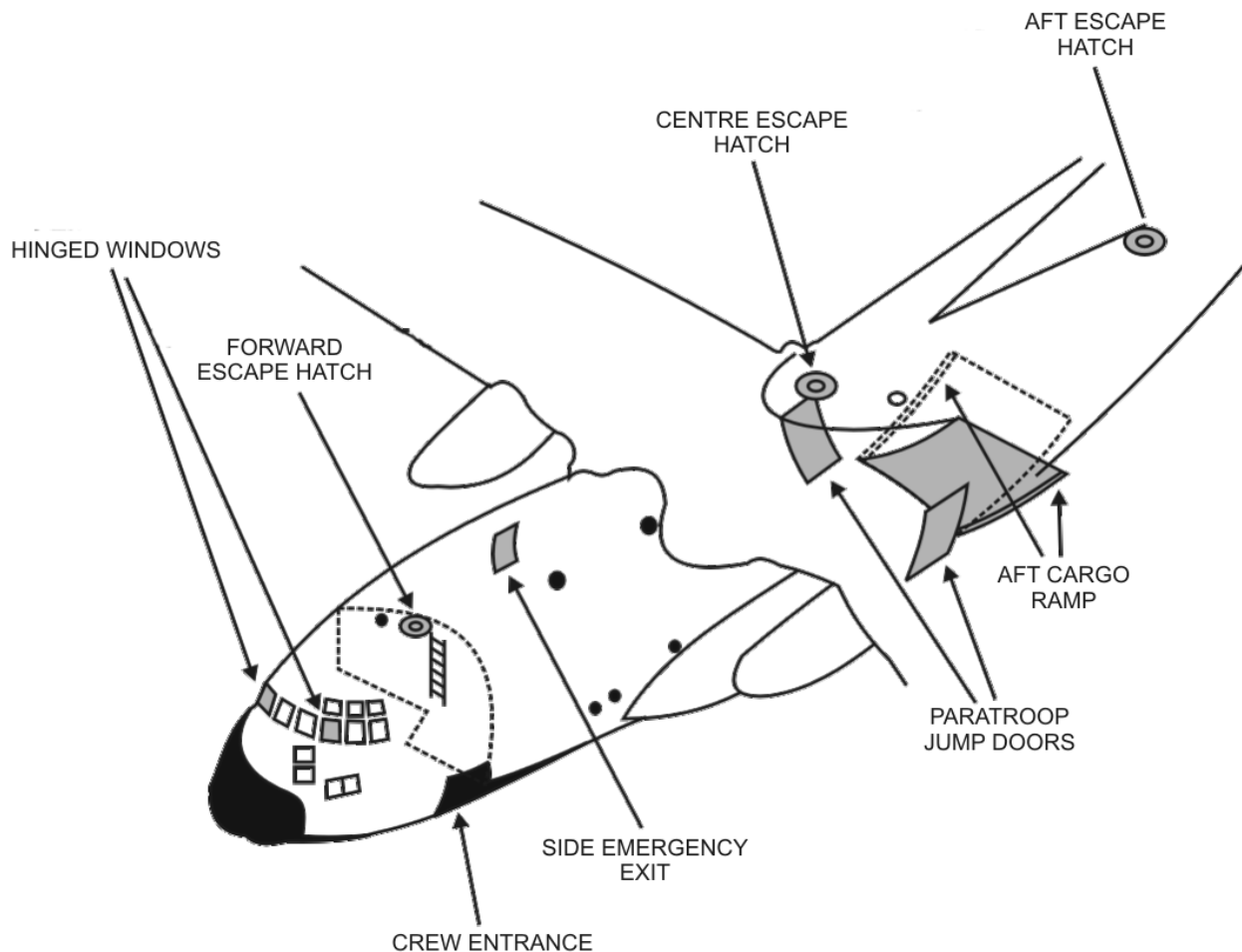


Figure 5-4: Emergency Exits

6. All emergency hatches and the side emergency exit can be opened from the inside or the outside by a release handle. All emergency exits open inwards.

CHAPTER 6 CH-146 GRIFFON HELICOPTER

SECTION 1 GENERAL

DESCRIPTION

1. The CH-146 Griffon is a tactical helicopter capable of operating from prepared or unprepared landing zones under visual or instrument flight rules by day or night (see Figure 6-1).



Figure 6-1: CH-146 Griffon Helicopter

TECHNICAL DATA

2. CH-146 helicopter technical data is as follows:
 - a. **Design Gross Weight.** 5,397 kg (11,900 lb).
 - b. **Maximum Combat Load.** 1,247 kg (2,750 lb).
 - c. **Aircrew.** Aircraft Captain, co-pilot and flight engineer.

- d. **Cargo Area.** 7.3 cu m (220 cu ft).
- e. **Maximum Airspeed.** 140 knots Indicated Air Speed (250 km/h).
- f. **Maximum Altitude.** 6,096 m (20,000 ft) (DND limitation to 10,000 ft) above Mean Sea Level.
- g. **Personnel Capacity.** Crew (3) plus 12 passengers or 8 parachutists.
- h. **Static Line Jump Altitude.** 381 m (1,250 ft) minimum.
- i. **Optimum Jump Airspeed.** 65 knots Indicated Air Speed.

SEATING ARRANGEMENTS

3. The CH-146 helicopter can carry up to eight parachutists without winter equipment, seated, when the cargo doors are removed, in two sticks each of four parachutists (see Figure 6-2). As well:



Figure 6-2: Starboard Stick without Equipment

- a. six winter-equipped parachutists with full equipment, three per stick, can be seated when the cargo doors are removed; and

- b. six summer-equipped parachutists with full equipment, three per stick, can be seated when the cargo doors are removed (see Figure 6-3).



Figure 6-3: Starboard Stick with Summer Equipment

NOTE

Doors must be removed for all static line parachuting operations.

PARACHUTIST SAFETY EQUIPMENT

4. Crew safety harnesses and removable safety belts are provided in the CH-146 for use by parachutists and crew.

SECTION 2 AIRCRAFT DRILL

GENERAL

5. Aircraft drill for the CH-146 is as detailed in Chapter 3 except as otherwise noted in this section.

EMPLANING

6. Parachutists will have their static lines stowed on the top loop on the RIGHT side of the parachute pack by the jumpmaster (JM) during his ground check.
7. Upon receiving the authority to board from one of the pilots or the flight engineer (visual signal if the aircraft is running by a thumb up to the JM), the port stick followed by the starboard stick will follow the JM in reverse stick order from the 12 o'clock position and proceed to board the aircraft.
8. The JM will ensure all parachutists place one hand on the ripcord protector flap of the reserve.
9. Parachutists will take up their seated positions in the aircraft in stick order from the aft end. They will fasten their seat belts under the reserve parachute and static line to facilitate checking by the JM. Meanwhile the JM will hook up the static lines to the anchor line strap in stick order.
10. Each parachutist will observe the JM hooking up his static line to the D-ring of the anchor line assembly.
11. The JM will ensure that the seat belt of each parachutist is securely fastened.
12. Each parachutist will give a visual "OK" (thumb up) when he has seen his static line hooked up and his seat belt has been checked.
13. When all parachutists have been hooked up and have had their seat belts checked, the JM will ensure every parachutist has indicated a thumb up.
14. The JM will adopt a seated position facing aft in the centre of the aircraft.
15. The JM will ensure that parachutists retain one hand over the ripcord protector flap of the reserve parachute at all times, until **STAND BY** is ordered.
16. The JM will give a thumb up to the flight engineer when the troops are ready for take-off and verbally report **JUMPMaster SECURE** after his safety harness and seat belt is fastened.

JUMP COMMANDS

17. The **4 MINUTE**, **1 MINUTE**, **15 SECOND**, and **5-4-3-2-1 — GO!** warnings are given by the Aircraft Captain over the intercommunication radio to the JM.
18. Jump commands and procedures are as follows:
 - a. **GET READY** is given by the JM on receipt of the **4 MINUTE** warning from the Aircraft Captain, and from that time parachutists will maintain eye contact with the JM.

- b. **CHECK YOUR EQUIPMENT.** On hearing this order:
 - (1) each parachutist checks his equipment in the normal manner;
 - (2) the JM carries out his normal checks on each parachutist, paying particular attention to static line routing and anchor line hook-up.
- c. **SOUND OFF FOR EQUIPMENT CHECK.** On hearing this order:
 - (1) the last man in each stick will tap the man beside him and sound off his own stick number as **OK**;
 - (2) the Number 1 parachutist, port and starboard, will look at the JM and give the thumb up signal when Number 2 taps him and sound off **NUMBER 1 OK**; and
 - (3) when all parachutists have sounded off, the JM may inform them of the surface wind speed.
- d. **SEAT BELTS OFF** is given by the JM on receipt of the **1 MINUTE** warning from the Aircraft Captain. The following actions are then taken:
 - (1) each parachutist will remove his seat belt and clear it from his equipment, ensuring one hand is kept over the ripcord protector flap at all times; and
 - (2) the JM will make a final safety check of static lines and ensure seat belts are clear of parachutists.
- e. **STAND BY** is given by the JM on receipt of the **15 SECOND** warning. The following actions are taken:
 - (1) all parachutists will look at the JM;
 - (2) the JM will raise both hands while facing aft in the aircraft;
 - (3) if **STOP DROP** is received after the **15 SECONDS** warning, the JM will grasp his raised right hand with his left hand and jumpers will re-fasten their seat belts under command of the JM.
- f. **GO!** On receipt of the **GO!** signal from the Aircraft Captain, the following sequence of actions will be followed:
 - (1) the JM will give an individual command **GO!** to each parachutist;

- (2) the JM will dispatch the port and then the starboard sticks, in stick order, by pointing to each parachutist in turn and ordering,
1 GO!, 2 GO!, etc.;
- (3) on receipt of his individual command **GO!**, each parachutist will push himself up and out vigorously with his hands, and adopt the “jab” position;
- (4) after the last parachutist has been dispatched from each stick, the JM will check for hang-ups and, if there are none, inform the Aircraft Captain **CLEAR**;
- (5) the JM will retrieve static lines and secure them for landing; and
- (6) upon landing the JM will ask permission to clear static lines.

INTERRUPTED AIRCRAFT DRILL

19. Incidents may occur which will interrupt the normal sequence of aircraft drill. Some of these may be:

- a. a parachutist who is not in satisfactory physical condition to jump;
- b. a parachutist with faulty equipment; or
- c. giving of the order **STOP DROP** by the JM.

20. If the normal sequence of aircraft drill is interrupted, the following actions will occur:

- a. the JM will immediately inform the Aircraft Captain of the cause of the interruption;
- b. the JM will order seat belts fastened if the interruption occurs after the **1 MINUTE** warning;
- c. if a jumper in a stick cannot be safely dispatched, the JM will not allow the remainder of the stick to jump because of the static line configuration;
- d. the JM will NOT attempt to remove a jumper from his seated position in the door in the event of an interruption;
- e. on permission from the Aircraft Captain, the opposite side stick may be dispatched by the JM if the interrupted stick has refastened their seat belts and the cause of interruption will not interfere with the safety of the opposite side stick; and

- f. the JM will immediately retrieve static lines from any deployed parachutes and secure them.

FORCED LANDINGS

21. If the CH-146 is required to make a forced landing, the Aircraft Captain will employ auto-rotation procedure, which will normally result in the following:

- a. noticeable loss of altitude;
- b. rapid slowdown of descent about 30 m (100 ft) above ground, with the nose raised as the aircraft flares out on a cushion of air; and
- c. slow descent to ground touchdown.

22. If it is necessary to make a forced landing, aircraft procedure will be as follows:

- a. The JM will be informed by the Aircraft Captain of the nature of the emergency.
- b. The flight engineer and the JM will ensure that seat belts are fastened.
- c. Under no circumstances will parachutists attempt to jump from the aircraft.
- d. The JM will remain in the JM's position until the aircraft lands.
- e. On landing, the JM, will immediately clear the parachutists' static line snap fasteners by cutting the type X cotton anchor line strap in two spots (see Figure 6-4).

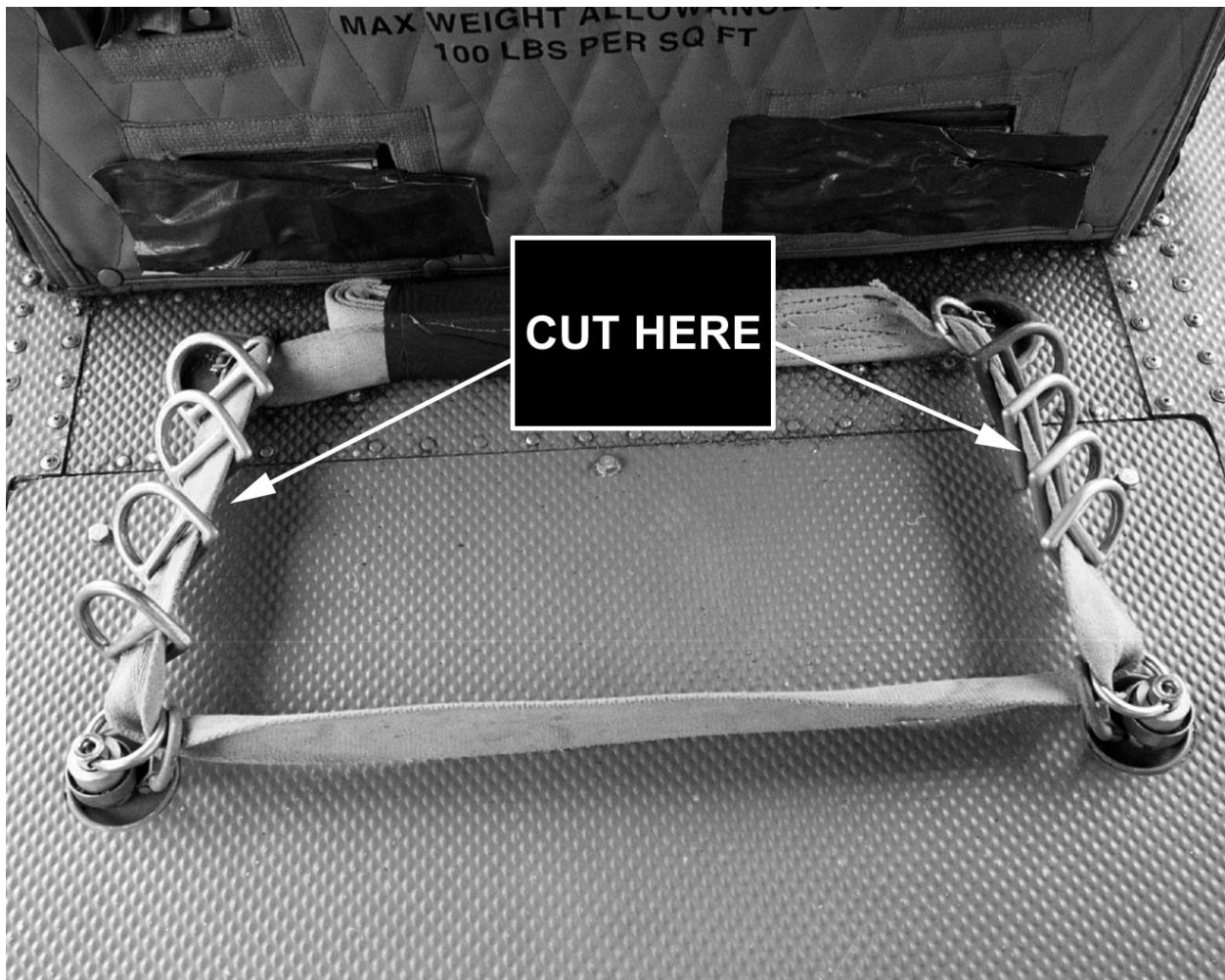


Figure 6-4: Cutting the Anchor Line Strap

- f. No personnel will exit the aircraft until the Aircraft Captain has given the authority to do so, or when all aircraft moving parts have stopped moving.
- g. As each parachutist deplanes he will move to a point at least 100 m (300 ft) to the side of the aircraft.
- h. The JM will not leave the aircraft until all parachutists' snap fasteners are cleared from the anchor line strap and are clear of the aircraft. The JM will not hesitate to use his knife to free the parachutists' static lines if he feels it is necessary.
- i. If the forced landing involved ditching, the parachutists will inflate their LPU's when clear of the aircraft.

SECTION 3

JUMPMASTER DUTIES

GENERAL

23. JM duties in the CH-146 are as detailed in Chapter 4 except as otherwise noted in this section.

COMMUNICATIONS

24. Communications in the CH-146 will consist of verbal conversations between the Aircraft Captain, the flight engineer and the JM, using the intercommunications system.

25. If the **STOP DROP** signal has to be given after the **15 SECOND** warning, it will be given by the Aircraft Captain directly to the JM.

JUMPMASTER EQUIPMENT

26. Prior to any jump, the JM will draw and have aboard the aircraft:

- a. crewman safety harness;
- b. safety harness tether strap;
- c. sheath knife;
- d. hook knife (NSN 5110-00-524-6924);
- e. masking and gun tape;
- f. one 2.6 m (8½ ft) Type X cotton anchor line strap;
- g. hang-up strap with 5,000 lb (2,275 kg) carabineer;
- h. eight D-rings;
- i. two ring fittings;
- j. spare retainer bands;
- k. nine Wind Drift Indicators;
- l. map of Drop Zone; and
- m. stopwatch.

AIRCRAFT INSPECTION AND PREPARATION

27. Aircraft fitted with HF SSB antennae, skis or both will NOT be used for static line parachuting.
28. The JM and the flight engineer will prepare the helicopter as follows:
 - a. main and small cabin cargo doors will be removed;
 - b. all passenger seats will be removed;
 - c. the retrieval system assembly will be installed in the aircraft, consisting of a tether strap off the restraint harness and a local manufacture retrieval strap and carabineer (see Figure 6-5);

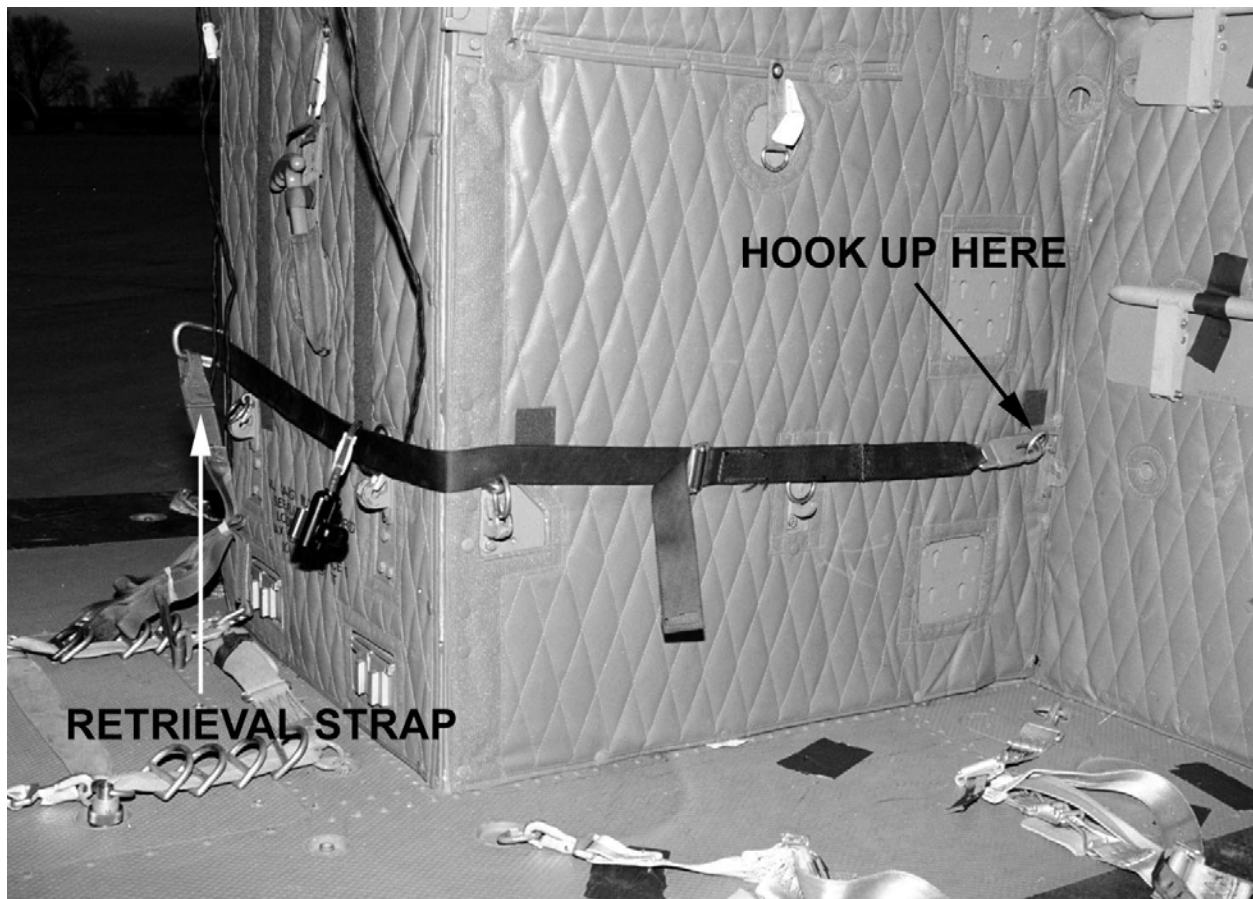


Figure 6-5: Retrieval System

- d. safety belts will be installed for each parachutist; and
- e. one anchor line assembly will be installed in the aircraft, consisting of Type X cotton webbing anchor line strap and eight D-rings (see Figure 6-6).

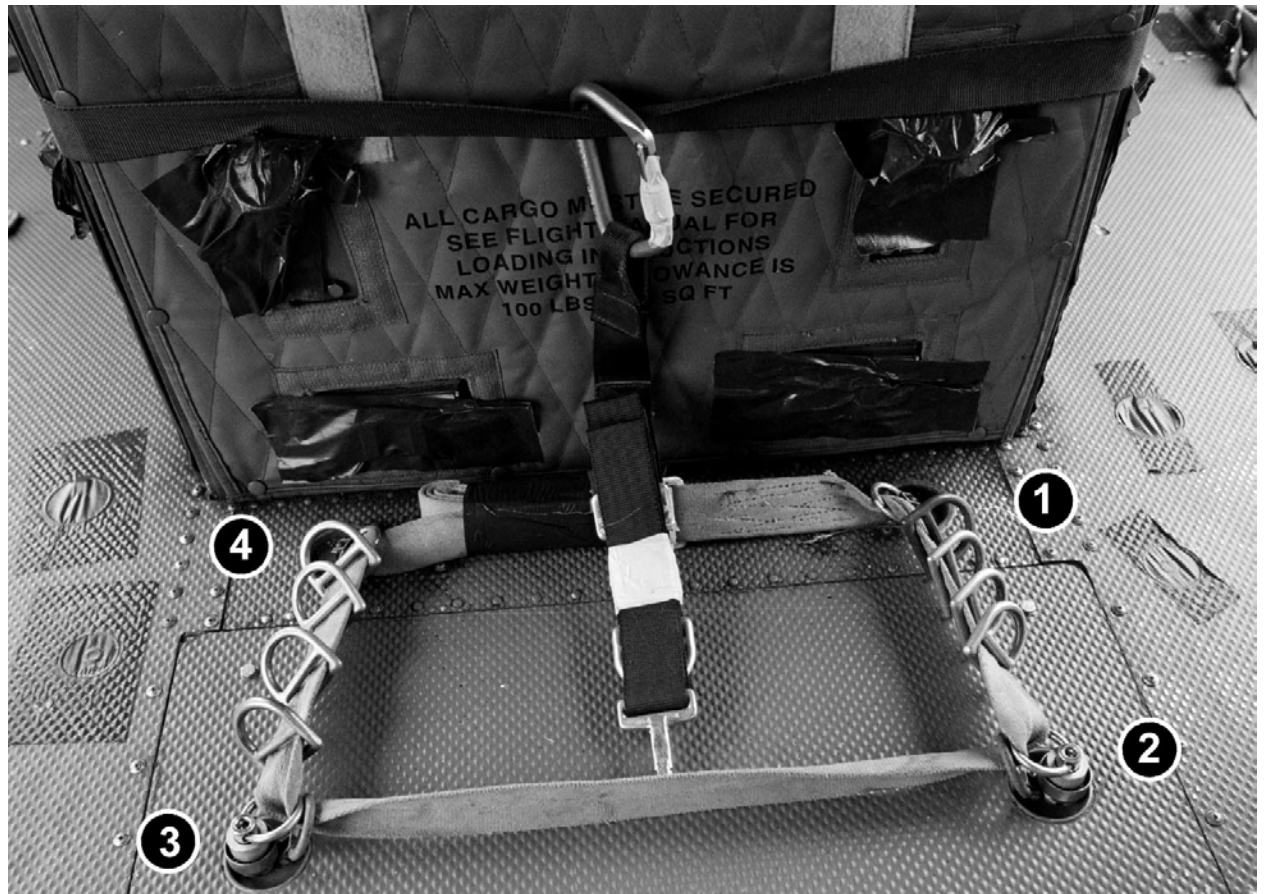


Figure 6-6: Anchor Line Assembly

29. The anchor line assembly is installed in the centre of the aircraft as follows (see Figure 6-7):

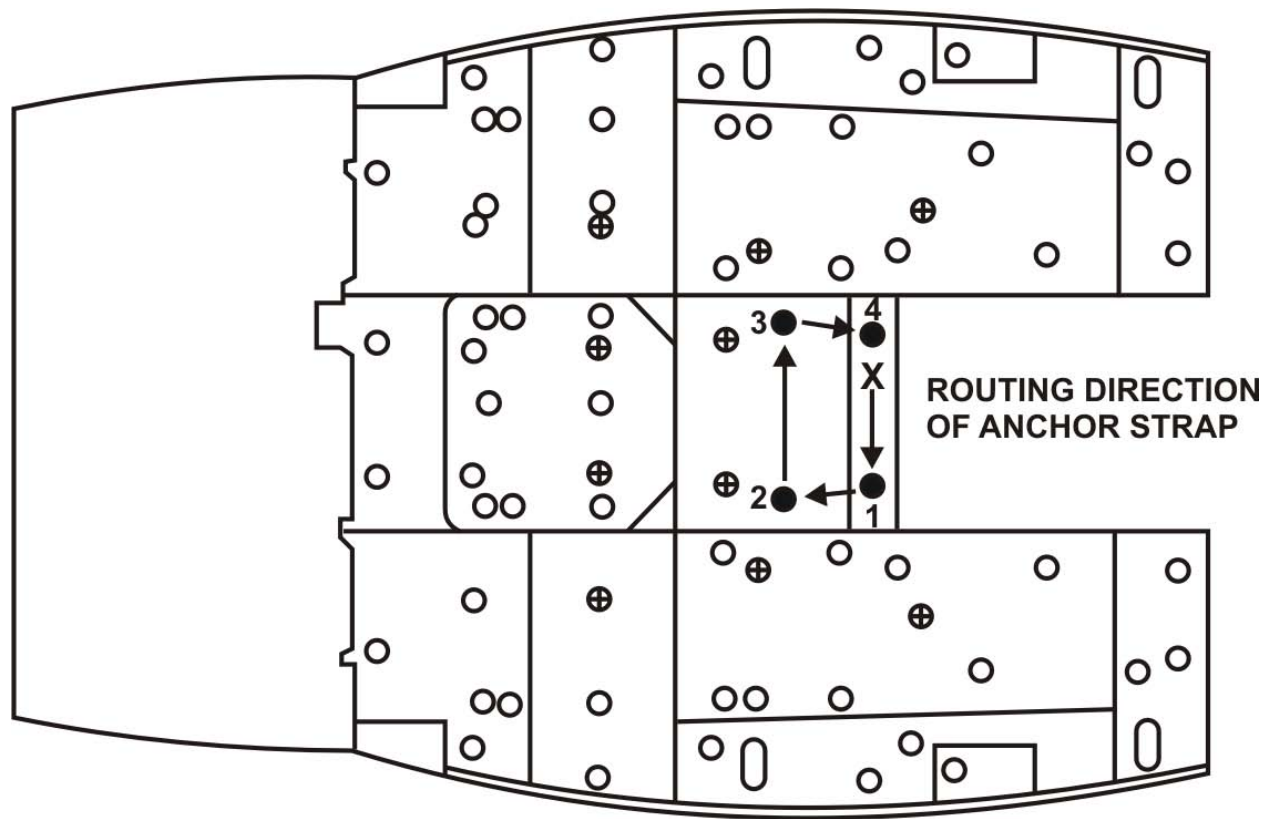


Figure 6-7: Anchor Line Assembly Installation

- a. Install two ring fittings at the stud fittings shown at point 2 and 3.
 - b. The running end of the strap is threaded through tie-down 1 from inboard to outboard and four d-rings are placed on the strap, with the round part of the d-ring facing outboard.
 - c. The strap is threaded through tie-down 2 and the ring fitting, and then is threaded through tie-down 3 and the ring fitting. Four d-rings are then placed on the strap with the round part of the ring facing outboard.
 - d. The strap is now threaded through tie-down 4.
 - e. The running end of the strap is secured to the “quick-fit” adapter between tie-downs 1 and 4. And the rolled excess strap is secured with gun tape.
30. All sharp edges and protrusions will be gun taped throughout the cabin.
 31. The JM will inspect the prepared aircraft to ensure no unsafe conditions exist.
 32. The JM will ensure the starboard cargo compartment door on the tail boom is locked.

JUMPMASTER CHECKS

33. The JM pre-flight checks are detailed in paragraph 9, Chapter 4. The following additional points must also be included in the checks:

- a. the snap fastener must be placed by the JM on the top loop on the RIGHT side of the parachute pack and not over the parachutist's shoulder on the reserve; and
- b. rifle and snowshoes must be rigged over the same shoulder as appropriate for the CC-130 port or starboard door, depending upon whether the parachutist is on the port or starboard stick.

JUMPMASTER POSITION

34. During take-off, the JM takes a seated position in the aircraft with safety harness fastened, facing aft in the centre of the aircraft.

35. Once airborne, the JM may move about to check parachutists by adjusting the length of the safety harness restraining strap.

36. During the jump run, the JM will adopt a standing, crouched position, enabling him to see both sticks. The JM will return to this position each time he completes his in-flight checks (see Figure 6-8).



Figure 6-8: JM Position in the Aircraft

NIGHT PROCEDURES

37. For a night drop, standard procedures for the CH-146 are used. The cabin area has both a white and night vision goggle (NVG) green light capability. Normally, all night operations will be conducted under NVG conditions and the NVG green light will be used. However, white light may be used to illuminate the cargo compartment during emplaning. The RED cargo compartment light will be turned on to aid vision adaptation on take-off.

HANG-UP PROCEDURES

38. If a parachutist is hung up by a fouled lowering strap, the JM will:

- a. stop the stick;
- b. inform the Aircraft Captain;
- c. cut the fouled equipment strap free; and
- d. report **HANG-UP RELEASED**.

39. If the cause of the hang-up is clear and no unsafe conditions exist, the JM may dispatch the remaining parachutists with the permission of the Aircraft Captain.

40. If a parachutist is hung up by his static line, the JM will verify the condition of the parachutist:

- a. If the parachutist is hung up by his static line and is conscious, the JM will:
 - (1) stop the stick;
 - (2) inform the Aircraft Captain;
 - (3) ensure the parachutist has indicated to him that he is conscious by placing one or both hands on the helmet;
 - (4) cut the parachutist free with his sheath knife; and
 - (5) upon being cut free, the parachutist will immediately activate his reserve.
- b. If the parachutist is hung up by the static line and is unconscious, the JM will:
 - (1) stop the stick;
 - (2) inform the Aircraft Captain;

- (3) use the hang-up strap to secure the parachutist if possible; and
 - (4) prepare for a soft landing.
- c. If the parachutist is hung up by his equipment or parachute saddle on the skid, the JM will:
 - (1) stop the stick;
 - (2) inform the Aircraft Captain;
 - (3) use the hang-up strap to secure the parachutist; and
 - (4) prepare for a soft landing.

SAFETY

- 41. Eight parachutists, four per stick, is the maximum number of parachutists that may be safely hooked up and dispatched on one lift.
- 42. Seat belts remain fastened until the command **SEAT BELTS OFF (1 MINUTE)** warning) is ordered.
- 43. The ripcord protector flap on the reserve parachute will be covered by at least one hand at all times from boarding, during flight, and until **STAND BY** is ordered. The JM will emphasize this drill to the jumpers prior to emplaning and will maintain a constant check to ensure that it is being carried out during flight.
- 44. An airspeed of 65 knots Indicated Air Speed during the jump run is recommended. Airspeeds lower than 50 knots or higher than 70 knots are not recommended.
- 45. A twenty-degree bank turn is the maximum safe bank turn during flight with parachutists seated in the door with seat belts fastened.
- 46. Ring fittings are inspected before and after use, disposing of unserviceable rings.
- 47. Ring fittings are only placed on the stud fittings which have the slotted groove (PN 120-064-3HN) (see Figures 6-9 and 6-10).



Figure 6-9: Ring Fitting



Figure 6-10: Stud Fitting with Slotted Grove

48. The anchor line strap must be made of Type X cotton webbing. Nylon webbing is not safe.
49. Static lines must be retrieved, stowed and secured inside the aircraft prior to landing. They must be left hooked to the anchor line strap until after the aircraft has landed and permission to unhook them has been received from the Aircraft Captain.
50. If a static line hang-up occurs the Aircraft Captain must be informed, and he will determine whether a soft landing is necessary.
51. Personnel will not approach or exit the aircraft from other than the 12-o'clock position, under authority of the Aircraft Captain, while the helicopter blades are rotating.

CHAPTER 7 MILITARY FREEFALL EQUIPMENT

SECTION 1 THE MILITARY FREEFALL PARACHUTE ASSEMBLY

GENERAL

1. The CT-6 parachute assembly is the standard Military Freefall Parachuting (MFP) equipment used within the Canadian Forces.
2. The CT-6 parachute assembly is a back type assembly, with canopies mounted in a reserve over main configuration. The pack assembly is held to the body by a fully adjustable three point connection, ejector snap hook and V-ring harness, complete with D-ring load attachment points. The main and reserve canopies are identical, i.e. Ram Air seven cell configuration, with individual trim setting and full steering capabilities. They are deployed from their individual pack compartments by a pilot chute and deployment bag system. The main canopy can be activated either manually by a ripcord or automatically by an Automatic Parachute Release (APR). The reserve canopy can be activated automatically during the main cutaway sequence, if the reserve static line is connected. When the reserve static line is not connected, the reserve canopy must be activated manually by the reserve ripcord.

COMPONENT PARTS OF THE CT-6 PARACHUTE ASSEMBLY

3. The main component parts of the CT-6 parachute assembly are:
 - a. canopy assembly;
 - b. pilot chute, main assembly;
 - c. main pilot chute bridle;
 - d. freefall deployment bag assembly;
 - e. reserve deployment system:
 - (1) pilot chute;
 - (2) bridle and deployment bag; and
 - (3) reserve static line.
 - f. pack and harness assembly;
 - g. main riser assembly, left and right hand;

- h. main cutaway ripcord assembly;
- i. reserve ripcord assembly;
- j. safety stow loop assembly;
- k. main closing loop assembly;
- l. reserve closing loop assembly;
- m. reserve bridle locking loop assembly; and
- n. flyers kit bag.

CANOPY ASSEMBLY

4. The main and the reserve canopies are identical Ram Air designs, with a seven cell configuration (see Figure 7-1). The flying surface is 34.37 m^2 (370 ft^2). The canopy is constructed of Exacta silver grey nylon cloth, with an air permeability of 0.5 to 5 ft^3 per minute per square foot ($\text{ft}^3/\text{min}/\text{ft}^2$). The Ram Air canopy is similar to an aircraft wing, with upper and lower control surfaces connected by a series of ribs. This construction forms a rectangular shaped canopy with seven dual openings at the leading edge, known as cells. The cells create air pressure between the upper and lower control surfaces, giving the canopy its shape and glide characteristics.

5. All but one of the canopy inner ribs have three elliptical apertures cut into them to allow span-wise airflow. Rib number eight has only two apertures. The two outer ribs and six alternative ribs through the canopy have load distribution tapes and attachment loops for suspension line attachment. A stabilizer panel is attached to each outside rib of the canopy, and is also attached to the outboard sets of suspension lines.

6. The canopy suspension lines are made of white Dacron cord, 272 kg (600 lb) minimum breaking strength (MBS). They are attached to the outside ribs and every alternate rib, at four chord-wise (front to back) attachment points on each rib.

7. Two steering lines, attached at the risers by guide rings, are used to manoeuvre the canopy. Steering lines are formed when five separate lines are cascaded into one main steering line. The steering lines are attached to the trailing edge of the canopy and run to the back-side of the respective rear riser.

8. A slider is used, on deployment of the parachute, for reefing. It is rectangular in shape, made of silver grey Exacta material reinforced with Mil-W-4088 Type VIII black nylon webbing, with a #8 grommet in each corner and a #2 grommet installed in the centre.

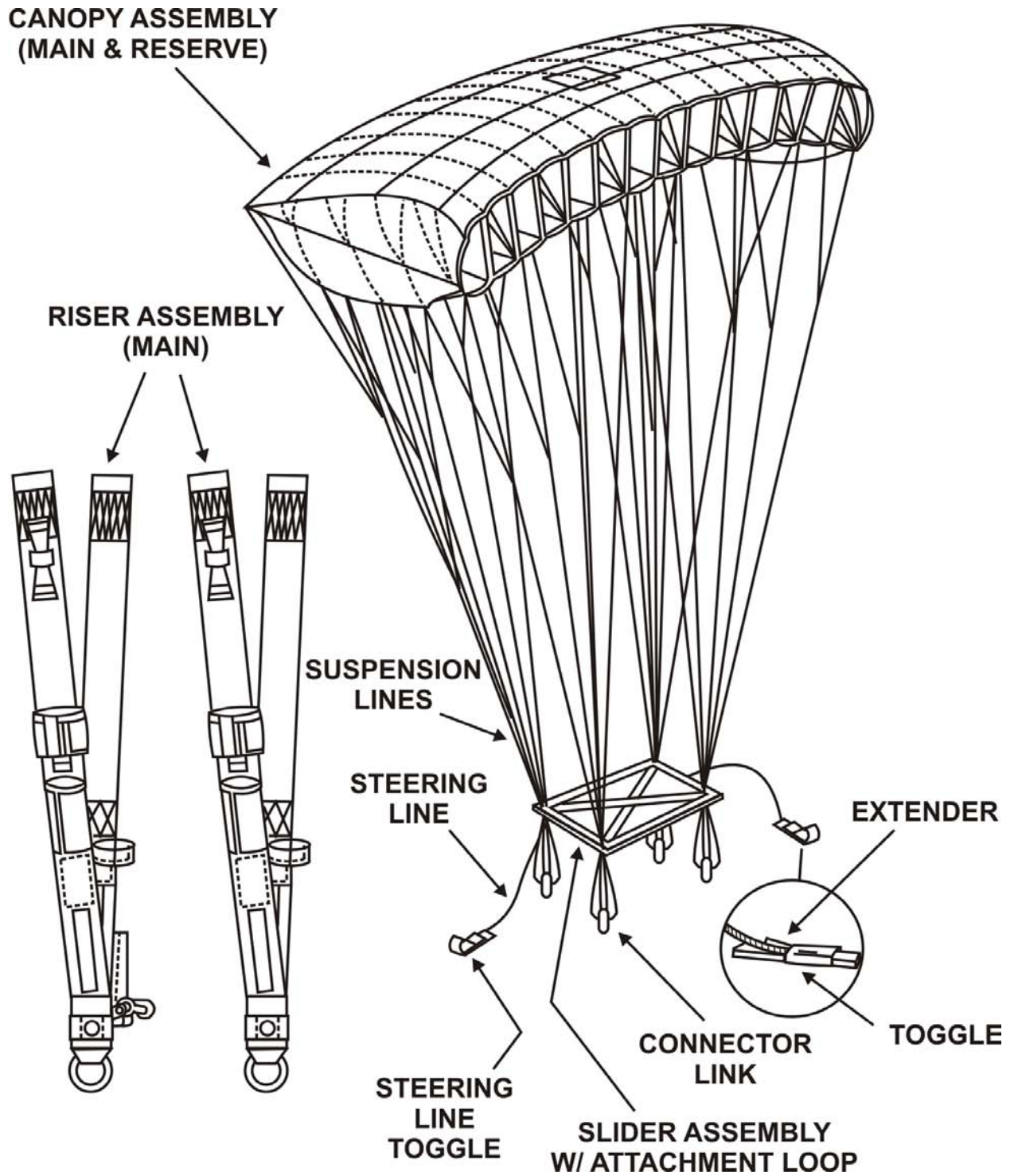


Figure 7-1: CT-6 Parachute

PILOT CHUTE MAIN ASSEMBLY

9. The main pilot chute has a 17 cm (6.75 in) diameter crown covered with a combination of Exacta silver grey nylon fabric and nylon mesh fabric. A 2.5 cm (1 in) loop at the bottom of the main pilot chute is used to connect the 160 cm (64 in) main bridle to the main canopy assembly.

MAIN PILOT CHUTE BRIDLE

10. The main pilot chute bridle is made of 2.5 cm (1 in) wide black nylon webbing, 160 cm (64 in) long. At one end is a 28 cm (11 in) loop and at the other end is a 28 cm (11 in) loop complete with a steel ring.

MAIN DEPLOYMENT BAG

11. The freefall deployment bag measures 43 cm by 23 cm (17 in by 9 in) and is made from MIL-C-7219 olive drab nylon cloth. A grommet in the top of the freefall deployment bag allows the bridle to pass through the bag and attach to the canopy. The freefall deployment bag has attachment points for elastic stowage bands, which are used to lock the bag closed and for stowing the suspension lines.

RESERVE DEPLOYMENT SYSTEM

12. The reserve pilot chute consists of a 14.6 cm (5.75 in) diameter crown and 48 cm (19 in) spiral spring, and is covered with a combination of Exacta silver grey nylon fabric and large hole nylon mesh fabric. The reserve pilot chute is a permanent component of the deployment bag and bridle.

13. The bridle consists of 5 cm wide by 5.5 m long polyester webbing (2 in by 18 ft) attached to the reserve pilot chute with a larkshead knot, with the opposite end sewn to the reserve deployment bag. Bridle assistor pockets are sewn on the bridle to assist deployment. The reserve deployment bag, constructed of MIL-C-7219 black nylon fabric, measures 30.5 by 40.6 cm (12 by 16 in).

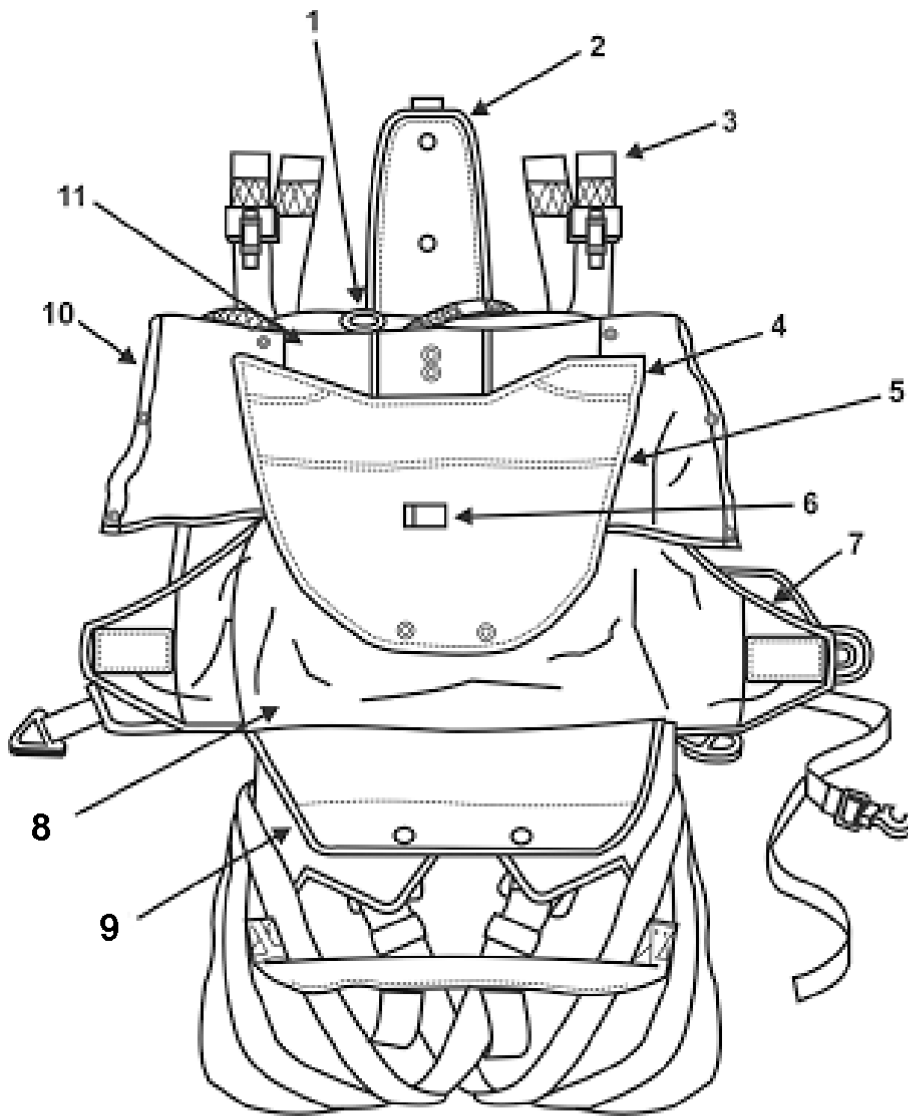
14. The reserve static line pulls the reserve ripcord during cutaway of the main canopy. It is 37.5 cm (14.75 in) long and is made from MIL-T-5038 Type IV yellow nylon tape and hook and pile fasteners, complete with a steering ring at each end.

PACK AND HARNESS ASSEMBLY

15. The pack and harness assembly is a reserve over main canopy type, made of olive drab Cordura nylon cloth, 284 g/m² (12 oz/yd²) (see Figures 7-2 and 7-3). The reserve canopy compartment is a two pin closure type, with four closure flaps, and a reinforced pin flap and securing tab to protect the pin closure area. The main canopy compartment is a two pin closure type, with four closure flaps, and a reinforced pin flap and securing tab to protect the pin closure

area. On the right side flap is a steel plate and cover flap for the attachment of the APR power housing. On the right wing flap is a pocket for stowing the APR. The centre flap comprises a main flap, closure flap, protector cover and static line cover flap. The back pad is part of the pack, and gives comfort and protection for the back and shoulders. The harness is made of 4.4 cm (1.75 in) wide Type VII olive drab nylon webbing, 2,721 kg (6,000 lb) MBS, and is an integral part of the pack and back pad. Fitted as part of the harness are:

- a. hardware for the three point ejector snap hooks and V-ring style connection;
- b. hardware for the three ring canopy release;
- c. D-rings for equipment carrying;
- d. adjusters for harness adjustment;
- e. comfort pads for the seat section;
- f. comfort pads for each ejector snap hook and V-ring connection;
- g. pockets and housings for the main, reserve and cut-away ripcords; and
- h. an adjustable waist band.

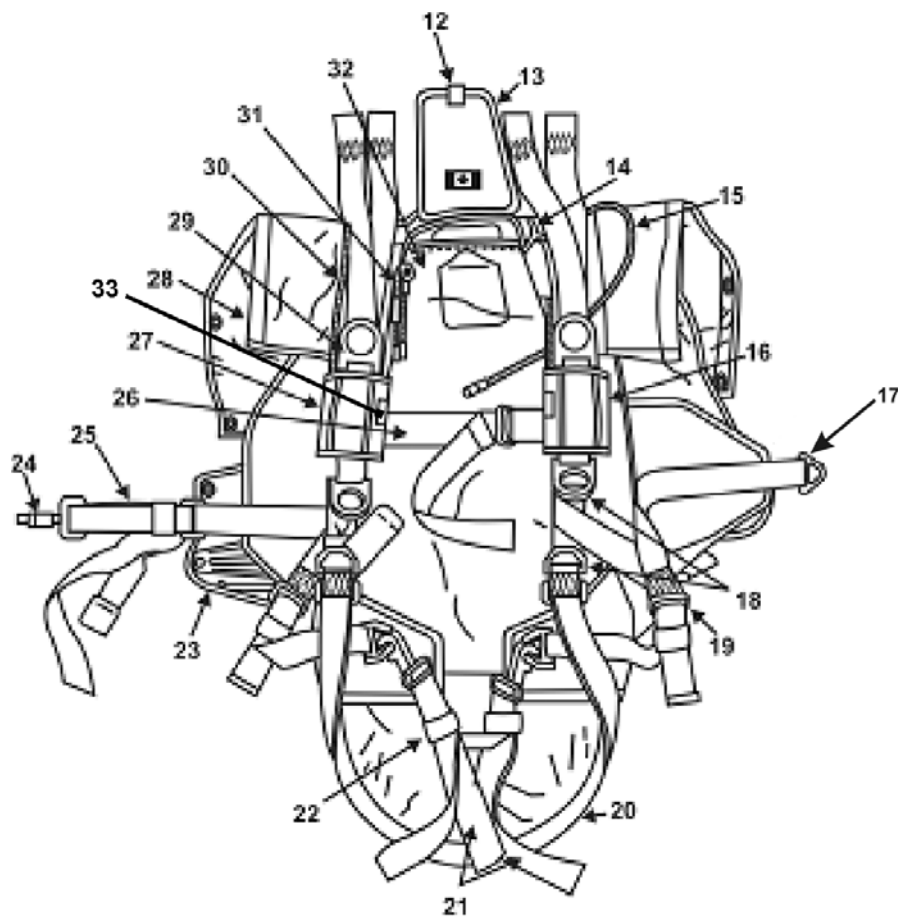


BACK VIEW

Legend:

1. Reserve Static Line Guide Ring
2. Reserve Pin Flap
3. Reserve Risers.
4. Reserve Parachute Compartment Bottom Flap
5. Centre Flap Assembly
6. Static Line Snap Hook Stow Loop
7. Main Side Flap
8. Main Parachute Compartment
9. Main Parachute Compartment Bottom Flap
10. Reserve Side Flap
11. Reserve Parachute Compartment

Figure 7-2: Pack and Harness Assembly



FRONT VIEW

Legend:

- 12. Securing Tab
- 13. Reserve Top Flap
- 14. Reserve Ripcord Housing
- 15. Main Cutaway Ripcord Housing
- 16. Reserve Ripcord Handle Pocket
- 17. V-Ring
- 18. Equipment Rings
- 19. Adjuster
- 20. Saddle
- 21. Leg Straps
- 22. Keeper
- 23. AOD Flap
- 24. Ejector Snap
- 25. Waist band
- 26. Chest strap
- 27. Main Ripcord Handle Pocket
- 28. Main Riser Cover Flap
- 29. Ring No 1
- 30. Main Ripcord Housing
- 31. Main Cutaway Ripcord Housing
- 32. Back Pad
- 33. Main cutaway handle pocket

Figure 7-3: Pack and Harness Assembly

RISERS

16. The main riser assembly is made from MIL-W-27265 Type VII olive drab nylon webbing. Each riser strap is 91.4 cm (36 in) long. The bottom end of each riser incorporates two rings of the three ring release system, a grommet, and a locking loop. A fluted channel is sewn to the back of the rear riser strap for stowing the main cutaway ripcord cable. The back of the rear riser also incorporates steering line keepers for stowing excess steering line, and steering line toggle keepers for stowing steering line toggles. The reserve static line connector quick release is attached to the left hand riser. Trim tabs sewn to the back of the front riser strap are provided for canopy trim adjustment.

RIPCORDS

17. The main cutaway ripcord consist of a red Cordura nylon cloth covered cushion grip, and two plastic coated cables, 34 cm (13.5 in) and 124 cm (49 in) long. A 10 cm (4 in) length of hook and pile fastener is sewn to the cushion grip to secure the grip to the main ripcord handle pocket.

18. The main ripcord assembly consists of a 116.8 cm (46 in) long stainless steel braided cable with two locking pins. The cable is secured to a curved ripcord handle with two swaged balls.

19. The reserve ripcord assembly consists of a 76 cm (30 in) long stainless steel braided cable with two locking pins. The cable is secured to a curved ripcord handle with two swaged balls.

SECTION 2 OPERATION

MAIN CANOPY

20. The parachutist exits the aircraft and freefalls to the required height above the Drop Zone. To deploy the main canopy, the parachutist manually pulls the ripcord. This action extracts the two pins from the soft cone closure loops, which lock the flaps of the main canopy pack compartment closed. With the main canopy compartment open, the pilot chute springs out into the airstream, extracting with it the bridle and deployment bag, containing the main canopy.

21. The increasing distance between the parachutist and the pilot chute causes the suspension lines to be pulled from their stowage on the deployment bag. At full line stretch, the last suspension line stowage releases the deployment bag flap, allowing the canopy to be extracted from the deployment bag. The deployment bag and pilot chute remain attached to the centre of the canopy.

22. The slider on the canopy is employed to reduce the initial opening shock, by temporarily reefing the canopy. As inflation continues, the slider travels down the suspension lines to the top

of the canopy risers. When the canopy is fully inflated, the glide angle can be adjusted by use of the trim loops, situated on the inside of the two front risers.

23. Steering is accomplished by releasing the toggles from their stowage pockets on the outside of the two rear risers and manipulating them. This also releases the brakes.

RESERVE CANOPY

24. Should the main canopy malfunction, the parachutist can activate the reserve canopy by either of the following methods:

- a. Pulling the main cut-away ripcord jettisons the main canopy and risers at the three ring release system junction on the main harness. If the reserve static line is connected, it automatically pulls the reserve ripcord, thus removing the pins, from the soft cone closure loops, which lock the flaps of the reserve canopy pack compartment closed. If the reserve static line is not connected, the reserve ripcord must be pulled to activate the reserve canopy.
- b. Pulling the reserve ripcord extracts the pins which lock the flaps of the reserve canopy pack compartment closed from the soft cone closure loops.

25. The deployment sequence of the reserve canopy is the same as that of the main canopy. The 5.5 m (18 ft) long bridle is fixed to the deployment bag, allowing separation in case the parachutist becomes entangled with the main canopy. The reserve deployment bag falls away from the reserve parachute assembly, allowing parachute deployment.

26. The reserve and main canopies are identical; therefore the function of the slider, and the use of trim loops and steering toggles, are also identical.

AUTOMATIC PARACHUTE RELEASE

27. Should the parachutist for any reason fail to activate the main ripcord, the Automatic Parachute Release (APR) Type CFF-2, at its pre-set altitude, will automatically open the main canopy pack compartment by extracting the pins from the soft cone closure loops, thus deploying the main parachute system (see Figure 7-4).

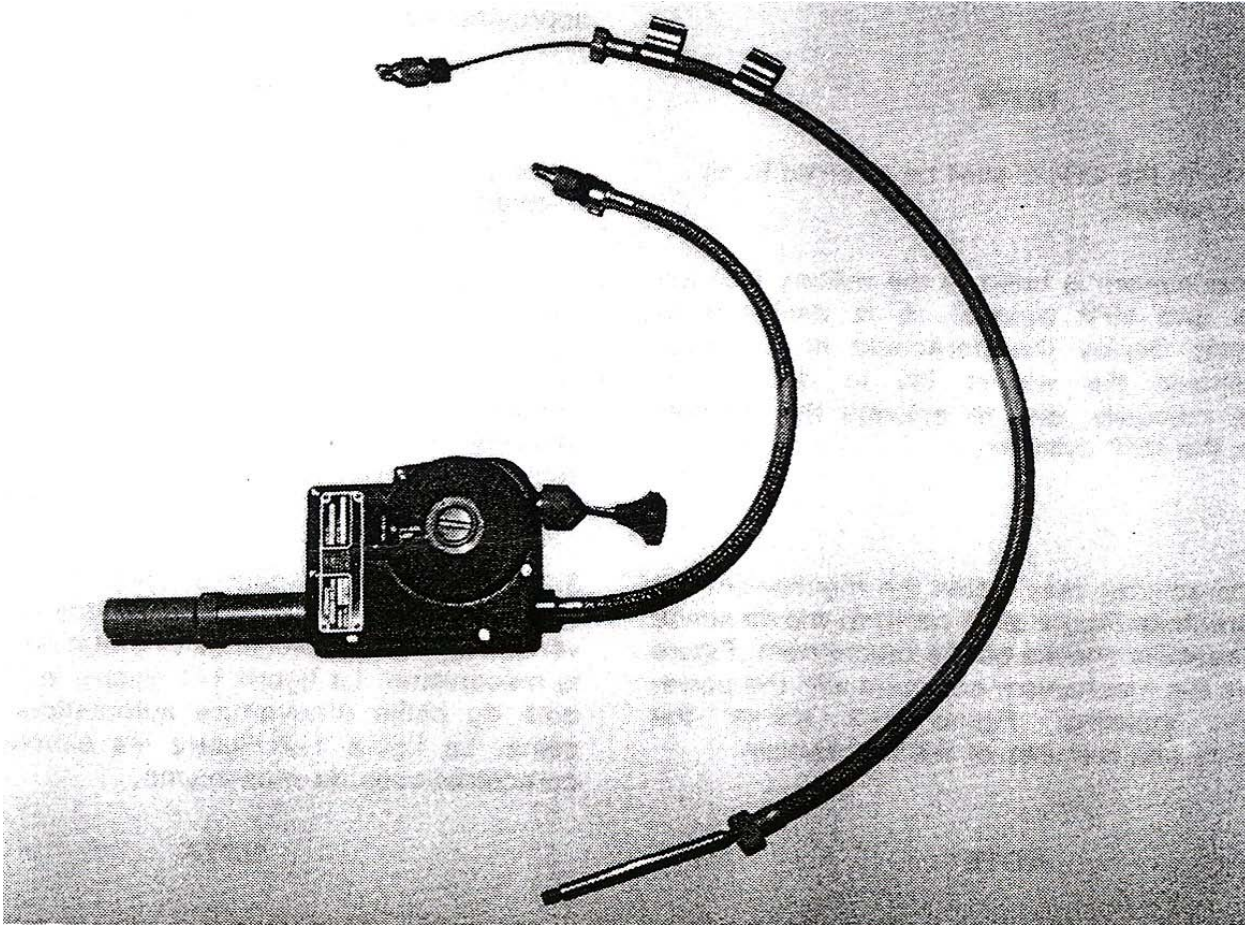


Figure 7-4: Automatic Parachute Release

SECTION 3 MISCELLANEOUS FREEFALL EQUIPMENT

ALTIMETER

28. The altimeter is the primary instrument used by freefallers to determine altitude above ground level (AGL). Each model works on the same basic principle. As the altimeter passes through different altitudes, the altimeter's aneroid barometer measures the difference in ambient air pressures. The pressure changes are indicated on the altimeter dial by the altitude indicator needle (see Figure 7-5).

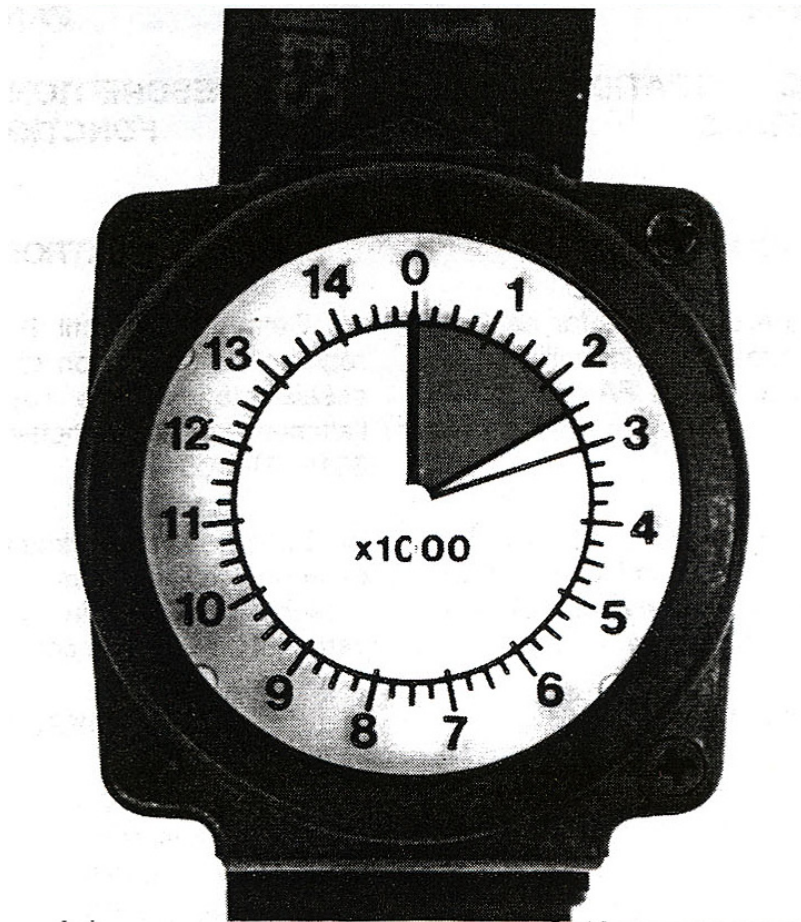


Figure 7-5: Altimeter

29. The altimeter measures altitude from a pre-set zero altitude, and has the following characteristics:

- a. dial graduated from 0 to 15,000 ft AGL;
- b. sub-graduations every 250 ft;
- c. a red portion, meaning danger, and a yellow portion, warning, are displayed so that:
 - (1) the red portion is between 2,500 and 0 ft; and
 - (2) the yellow portion is between 3,000 and 2,500 ft.
- d. an adjustment knob located on the side of the altimeter;
- e. a light for use at night; and
- f. Velcro wristband.

SETTING THE ALTIMETER

30. Prior to emplaning, the altimeter must be adjusted so that it will register zero on the Drop Zone. The setting on the altimeter prior to take-off is determined as follows:

- a. if the Drop Zone is at the same altitude as the point of departure the needle will be set at zero;
- b. if the Drop Zone is lower in elevation than the point of departure the needle will be advanced clockwise by the amount of the difference in elevation; and
- c. if the Drop Zone is higher than the point of departure the needle will be reset counter-clockwise by the amount of the difference in elevation.

PREPARATION AND MOUNTING THE APR

31. Upon receiving the APR from the rigger, the parachutist will ensure that:

- a. the APR is armed;
- b. the arming pin is inserted;
- c. the APR has the proper millibar setting, by comparing the reading in the millibar window to the reading obtained from the rigger;
- d. the knurled knob of the power cable is secure;
- e. the withdrawal hook and locking nut are secure;
- f. the spring cylinder is not loose; and
- g. the reset indicator is lined up.

32. In order to mount the APR the parachutist must:

- a. engage the power cable key into the key plate;
- b. attach the power cable withdrawal hook to the pin of the main ripcord assembly, ensuring the swagged ball is above;
- c. ensure that the knurled knob is tightened onto the withdrawal hook;
- d. check to ensure the pins have not been withdrawn or bent;
- e. slide the APR body into the APR pocket, secure the strap and ensure the snap is secure; and
- f. do up the snaps on the power cable housing to secure the power cable.

HELMET, GOGGLES AND GLOVES

33. The Protec helmet and civilian pattern freefall goggles are the standard MFP helmet and goggles. Gloves must be worn when engaging in MFP operations or training.

ILLUMINATING DEVICES

34. During night MFP operations, illuminating devices are required:

- a. to enable the parachutist to read the altimeter; and
- b. to enable parachutists to see each other during free-fall and parachute descent.

35. A chemical light stick is used as an illuminating device. Light sticks are secured on the wrist altimeter with elastic bands, one on each foot with 6.6 mm (¼ in) cotton web, and one to the top of the helmet with gun tape.

SECTION 4 DONNING AND FITTING

36. Prior to getting dressed the parachutist will inspect the CT-6 MFP parachute assembly to ensure the following:

- a. remove the assembly from the flyers kit bag, and fold and store the bag behind the comfort pad;
- b. check the left side three ring release system to ensure that the cutaway cable runs through the riser release loop and the excess is stored in the cable tunnel;
- c. in succession, rotate the top then the middle ring ¼ turn to ensure the ring is circular and undamaged;
- d. ensure the split ring is taped;
- e. check the main ripcord handle to ensure that it is not stitched, by running a finger around the ripcord handle inside the pocket;
- f. check the right side three ring release system as for the left three ring release, ensure the cutaway lanyard snap is attached, and that the reserve static line shackle is attached to the reserve static line ring;
- g. check the main cutaway pillow to ensure the cables are in the pillow and not twisted, remove the pillow from the pocket, ensuring the serviceability of the Velcro, and reinstall;
- h. check the chest strap and buckle for serviceability;

- i. check the reserve ripcord handle as for the main ripcord handle;
- j. check the waistband and quick ejector snap hook for serviceability;
- k. check the leg straps and quick ejector snaps hooks for serviceability;
- l. turn the parachute around and check the general condition of the main and reserve container;
- m. open the reserve ripcord protector flap, and check to ensure that the ripcord pins are fully home and the cable moves freely within the cable housing.
- n. check to see that the reserve cable runs through the reserve static line guide ring and the reserve ripcord guide ring, and ensure the rigger's seal is installed;
- o. open the main ripcord protector flap and check to ensure the ripcord pins are fully home and the cable moves freely in the cable housing, and ensure the rigger's seal is installed; and
- p. if satisfied with the parachute, install the APR.

DON AND FIT THE CT-6 ASSEMBLY

37. The parachutist will not have to use the buddy system to get dressed. He will:
- a. adjust his harness using the adjustable buckles on the main lift web and diagonal back straps;
 - b. sitting down, place his arms through the main lift web like he would put on a jacket;
 - c. attach the chest strap and secure the excess strap using the retaining band;
 - d. stand up and attach both leg straps, making sure that there are no twists, and push on the quick ejector snap once again, securing the excess straps with the retaining bands;
 - e. bend over and make sure that he has the parachute as high as possible before attaching the waistband; and
 - f. secure the excess strap with the retaining band.
38. At this point the jumper is ready for the rigger's check. Once he has been checked, the jumper will put his altimeter on and have his helmet, gloves and goggle by the side, ready for the freefall jumpmaster (FJM) check.

DONNING THE MFP INSTRUMENTS

39. Before boarding the aircraft the jumper will wear his freefall instruments as follows:
- a. gloves on with altimeter on the left wrist; and
 - b. helmet on with goggles raised on the helmet.

SECTION 5 THEORY OF FLIGHT FOR RAM-AIR CANOPIES

GENERAL

40. Ram-Air canopies are aerodynamically stiffened fabric airfoils, which generate lift by forward flight through the air. The relative lengths of the suspension lines maintain the airfoil angle of attack, such that the leading edge of the wing is slightly lower than the trailing edge portion. Thus, the airfoil shaped surface of the canopy is forced to slide or plane through the air, similar to a glider in descending flight. Ram-Air wings generate lift in the same manner, relying on the reduced pressure of the airflow over the curved upper surface.
41. Although the early work and basic principles of Ram-Air inflated airfoil parachutes must be credited to Domina Jalbert, Para-Flight Incorporated was responsible for advancing the technology of high performance gliding parachutes to the point where practical personnel parachuting usage became feasible.
42. Three extremely important proprietary developments were responsible for the overwhelming success of Ram-Air parachutes:
- a. First, the unique configuration was based on the concept of direct suspension line attachment to the canopy lower surface, eliminating the bulk and extra drag produced by the then-accepted method of external load distribution members or "V" tabs. This direct approach system of carrying the payload produces an extremely efficient and aerodynamically clean high glide configuration.
 - b. Secondly, the successful application of the very effective pilot chute/slider controlled inflation retardation system, which provides a unique solution to the otherwise intolerable high opening shock load inherent in Ram-Air type parachutes. Simply stated, the drag forces exerted by the pilot chute and the slider during deployment are transferred through the mechanics of the system in such a way as to progressively retard the otherwise explosive inflation rate of the canopy.
 - c. Thirdly, the deployment brake system plays a very important part in the deployment process by reducing forward surging of the canopy.
43. The leading edge of any Ram-Air canopy (wing) is open or physically missing, forming intakes, which allow the cells to be Ram-Air inflated. Internal air pressure causes a small

amount of stagnant air to be pushed ahead of the airfoil, forming an artificial leading edge. The focal point of this stagnant air acts as a true leading edge, deflecting the relative wind above and below.

44. Drag, which acts in a direction parallel to the relative wind, is the only force tending to retard the forward motion of the wing through the air. Gravity, plus the resultant sum of these aerodynamic forces on the upper surface, acts to pull the canopy through the air, thus the flat glide angle.

45. Application of brakes on the canopy causes the trailing edge to be deflected downward, creating additional drag and a loss of gliding speed. This also produces a proportionate loss in generated lift, resulting in a steeper glide-angle. As full brakes are reached, the wing ceases to generate dynamic lift, the result being an increased rate of descent, which is associated with a nearly vertical descent angle. Depressing the brakes beyond full brakes will cause the parachute to enter a stall.

46. Differential application of brakes produces an unbalanced drag force at the trailing edge, resulting in a yaw turn toward the side with the highest drag. Since the slow side generates less lift, it tends to drop slightly in a shallow banking motion, much like an airplane. This bank angle will increase as the toggle displacement is differentially increased.

FLIGHT CHARACTERISTICS

47. Although Ram-Air parachutes are fairly docile and forgiving, it still must be emphasized that they are high performance gliding wings. In the hands of an inexperienced jumper, or one ignorant of proper handling techniques, they are, by virtue of their high performance, potentially dangerous. **It is therefore absolutely imperative that the parachutist possess a working knowledge of Ram-Air flight capabilities and limitations, and that he fully understands handling techniques, before jumping this parachute.**

48. Handling techniques are not overly complicated, but since a Ram-Air canopy is basically a fabric wing section, a very basic knowledge of aerodynamics is necessary in order to better understand flight and handling characteristics.

49. As mentioned previously, Ram-Air canopies glide or plane through the air, at about 30 to 50 km/h (20 to 30 mph). They always fly at this speed regardless of wind conditions, except when brakes are applied.

50. This flying speed is called AIR SPEED, and remains constant regardless of whether the parachute is headed upwind, downwind or crosswind. The only variation in flying upwind or downwind is a change in ground speed, which is often mistaken for a change in air speed. Wind only affects ground speed and has no effect on air speed.

51. The air speed on all Ram-Air canopies is controlled with brakes using conventional control lines and toggles. The toggle travel on Ram-Air canopies will cause a speed reduction of approximately 19 km/h (12 mph).

52. Unlike conventional steerable canopies, there is almost no surge on deployment, and there is no wind noise at all until after the deployment brakes are released. For those not previously exposed to flight characteristics of Ram-Air canopies, the wind noise created by forward speed can be used as a rough “air speed indicator”. The lack of wind noise can be used as a stall warning.
53. Once you have grown accustomed to the canopy you will no longer even notice the wind noise, you will have learned to fly the canopy by feel, and you will have ample stall warning. Most Ram-Air canopies are docile and will signal their intention in advance. There is sufficient feel on the toggles to sense canopy reaction such as the “shudder” that precedes a stall.
54. It is important to remember, when controlling the canopy's flight, that the rate of control motion from one position to another is as critical as the relative position of the toggles.
55. Due to the high penetrating ability of Ram-Air canopies, it is often difficult to determine wind direction without the aid of a wind sock or smoke on the ground. All landings must be made upwind to minimize ground speed.
56. Ram-Air canopies have the same control (toggle) travel as conventional parachutes but control two to three times the air speed, making any control motion two to three times as effective and sensitive.
57. A Ram-Air canopy moving with and through a mass of air is much the same as a boat moving with and through a mass of water (river). If a speed boat has a constant speed of 30 km/h (20 mph), this is comparable to the air speed of an average RamAir canopy. If the boat is in a river flowing at 30 km/h (20 mph), the same conditions exist as if you were flying a Ram-Air canopy in 30 km/h (20 mph) winds. If you point the boat downstream, you will be moving through the water at 30 km/h (20 mph)—but your speed relative to the river bank would be 60 km/h (40 mph). If you turned the boat upstream, you would still be moving at 30 km/h (20 mph) but your speed relative to the river bank would now be zero. Facing the Ram-Air canopy into a 30 km/h (20 mph) wind would also yield zero ground speed.

TURBULENCE AND RAM-AIR PARACHUTES

58. Ram-Airs are radically different from conventional or round parachutes in all respects, not just appearance. The “square” parachute in reality is closer to a aircraft wing than a conventional parachute. The difference is that a conventional parachute produces drag and almost no lift, while Ram-Air parachutes in full flight generate much more lift than drag.
59. As the trailing edge is deflected with the control lines, lift is gradually reduced and drag is increased. If this reduction of lift is gradual the canopy can be slowed to zero airspeed or vertical descent, at which point it will be generating a lot more drag than lift. If the airflow is allowed to reverse itself, the canopy will stall.
60. For each airflow design there is a range of airflow angles that the canopy can tolerate, without either stalling or the airfoil shape being severely distorted due to reduction or elimination of the Ram-Air that pressurizes the canopy.

61. Without Ram-Air pressurization, there is no airfoil to generate lift. As long as the relative wind or airflow over the canopy is within the -10° to about -90° segment, the canopy remains semi-rigid and retains the airfoil shape. If the airflow over the canopy changes more than -90° or less than -10° , the canopy will not fly and will not maintain the airfoil shape.

62. Turbulence will affect Ram-Air parachutes and the way they perform. Turbulence is also known as “eddies” or “rotors”. Turbulence may be produced in various dimensions. It may have a minimal effect on a parachute or may be large enough to cause the canopy to collapse. The amount of turbulence may affect a Ram-Air parachute for a few meters to several hundred meters. Turbulence of the magnitude that can affect a Ram-Air parachute is caused by:

- a. solid objects like trees, hills, buildings, etc. obstructing the airflow (wind);
- b. the static instability of the air (due to thermal activity); or
- c. wind shear (due to differences in velocity between two layers of air).

63. The type of turbulence described in sub-paragraph 62c is the least likely to be encountered by jumpers and, except in extreme cases like cold or warm fronts moving through the area, would pose little danger to the Ram-Air jumper.

64. The type of turbulence described in subparagraph 62b is associated with thermal activity. It is caused because a rising mass of warm air has momentum. This type of turbulence is very common on sunny days all year round. Most commonly, this type of turbulence is only dangerous to the Ram-Air jumper if it is associated with relatively high winds. Turbulence that the jumper should be most concerned with is caused by solid objects obstructing the path of the wind (subparagraph 62a). This type of turbulence is often compounded by turbulence generated by thermal activity.

65. The factors that affect the intensity of turbulence are wind velocity, density of the air, and the shape and size of the obstruction in the path of the wind.

66. Wind velocity is the most influential and also the most measurable factor. In winds from 0 to 16 km/h (0 to 10 mph), the turbulence generated will not be intense enough to pose serious danger to the jumper. If the winds are 16 to 32 km/h (10 to 20 mph), severe enough turbulence can be generated to cause canopy collapse, especially close to the obstruction responsible for the turbulent eddy. If the winds are in excess of 32 km/h (20 mph), severe turbulence should be expected well downwind of any obstruction.

67. The shape and size of the objects obstructing wind flow are also very influential in determining the size and intensity of turbulence. A rectangular building with sharp corners will generate turbulence at slower wind speeds and generate much more forceful turbulence than an rounded building.

68. One can expect more severe turbulence in the late morning and early afternoons because both thermal activity and wind velocity tend to reach their maximum then. The size, the terrain (obstructions) and wind direction determine at what wind speed your Drop Zone will start generating turbulent eddies of sufficient energy to cause danger to Ram-Air flyers.

69. When flying with turbulence present, the lighter the jumper, the more susceptible to problems associated with turbulence. Lighter jumpers have a lower tolerance to turbulence and should be extra careful when encountering turbulent eddies. The forces acting upon the canopy are proportional to the rate of change of the wind velocity on the canopy. Therefore, it is more dangerous to fly fast through turbulence than to fly slowly. Flying through turbulence should be done at about 30% to 50% brake setting. Too slow may also be dangerous because the canopy may stall without warning due to a sudden gust.

CHAPTER 8

FREEFALL PARACHUTIST EQUIPMENT LOADS

SECTION 1

GENERAL

INTRODUCTION

1. The Military Freefall Parachutist (MFP) carries a variety of loads on operational and training jumps.

GENERAL RULES

2. A parachutist will normally jump with the weapons and equipment required immediately on landing. All other equipment will be rigged in freefall cylinders and dispatched with the parachutists.

RULES FOR PACKING

3. The Parachutist Equipment Load is packed as described in Chapter 2.

SINGLE ACTION RELEASE PARACHUTIST'S EQUIPMENT LOWERING SYSTEM COMPONENTS AND EQUIPMENT ATTACHING STRAP



Figure 8-1: MFP SARPELS

4. The different components of the MFP Single Action Release Parachutist's Equipment Lowering System (SARPELS) (see Figure 8-1) are:

- a. 1. Jettison Buckle;
- b. 2. Equipment Snap Hook with the attaching buckle adapter;
- c. 3. Equipment Snap Hook with the attaching buckle adapter;
- d. 4. Jettison Strap;
- e. 5. 2.4 m (8 ft) Lowering Rope;
- f. 6. 1.67 m (66 in) Attaching Strap;
- g. 7. "Y" strap;
- h. 8. Horizontal Strap; and
- i. 9. SARPELS Equipment bag with fix strap and cotter pin.

5. The routing of the attaching strap and the attaching buckles are as follows:
 - a. the attaching strap goes under the main frame at the bottom of the rucksack between the bag and the kidney pad (see Figure 8-2);



Figure 8-2: Attaching Strap

- b. the attaching strap will be between the main frame and the small bar of the D portion of the rucksack; and
 - c. the attaching buckles are then secured to the attaching strap with the words “THIS SIDE UP” to the outside (see Figure 8-3).



Figure 8-3: Attaching Strap Buckle Rigging

PLACING THE RUCKSACK INTO THE SARPELS

6. To place the rucksack into the SARPELS the following procedure will be used:
 - a. Lay out the SARPELS with all the flaps open.
 - b. Prepare the rucksack shoulder straps (separate the quick releases).
 - c. Place the rucksack into the bag aligning all the appropriate openings of the SARPELS to the rucksack frame. Feed the shoulder straps and equipment attaching straps out through the holes. Close the SARPELS, ensuring there is Velcro on Velcro, side flaps first, then the bottom flaps (see Figure 8-4).



Figure 8-4: Rucksack inside SARPELS

- d. Secure the fixed straps of the SARPELS, going in a counter clockwise direction (the two fixed straps, the vertical strap, and the single horizontal strap), then insert the cotter pin.
- e. Feed the two vertical straps through the fixed keepers and secure them to the quick fit adjuster buckles, rigger roll the excess and secure under the retainer band provided, and secure the horizontal strap in the same manner, ensuring it goes over everything. (When rigging for full winter equipment, this will be done after attaching the snowshoes and rifle to the rucksack).
- f. Re-attach the shoulder straps and tape over the Velcro portion of the quick releases with two turns of 2.5 cm (1 in) masking tape.

ATTACHING THE LOWERING STRAP, JETTISON STRAP, JETTISON BUCKLE AND EQUIPMENT SNAP HOOKS

7. To attach the lowering strap, jettison strap and buckle:
 - a. Attach the lowering end of the lowering strap to the fixed loop of the valise, ensuring the running end passes through the bight one extra time and is snug.

- b. Loosely stow the strap into the valise with the large loop coming out of the centre, and close the valise with Velcro on Velcro (see Figure 8-5).



Figure 8-5: Equipment Lowering Rope

- c. Attach the jettison buckle to the jettison strap in the same manner as for static line, ensuring the opening of both buckles faces in towards the centre of the jettison strap.
- d. Feed the jettison strap through the large loop of the lowering strap, ensuring the jettison buckle end is to the right side of the rucksack as you look at it. Take the large loop, place it under one of the yellow tapes, and Velcro it to the rucksack (see Figure 8-6).



Figure 8-6: Jettison Strap Attachment

- e. Attach the equipment snap hooks to the attaching buckles so that the openings face towards each other.
- f. Secure the buckles to the metal fittings on the SARPELS bag for transport.

PREPARING THE RIFLE AND SNOWSHOES

- 8. The rifle and snowshoes will be prepared as for a starboard door exit for static line, ensuring the sling is tight against the mesh of the snowshoes (see Figure 8-7).

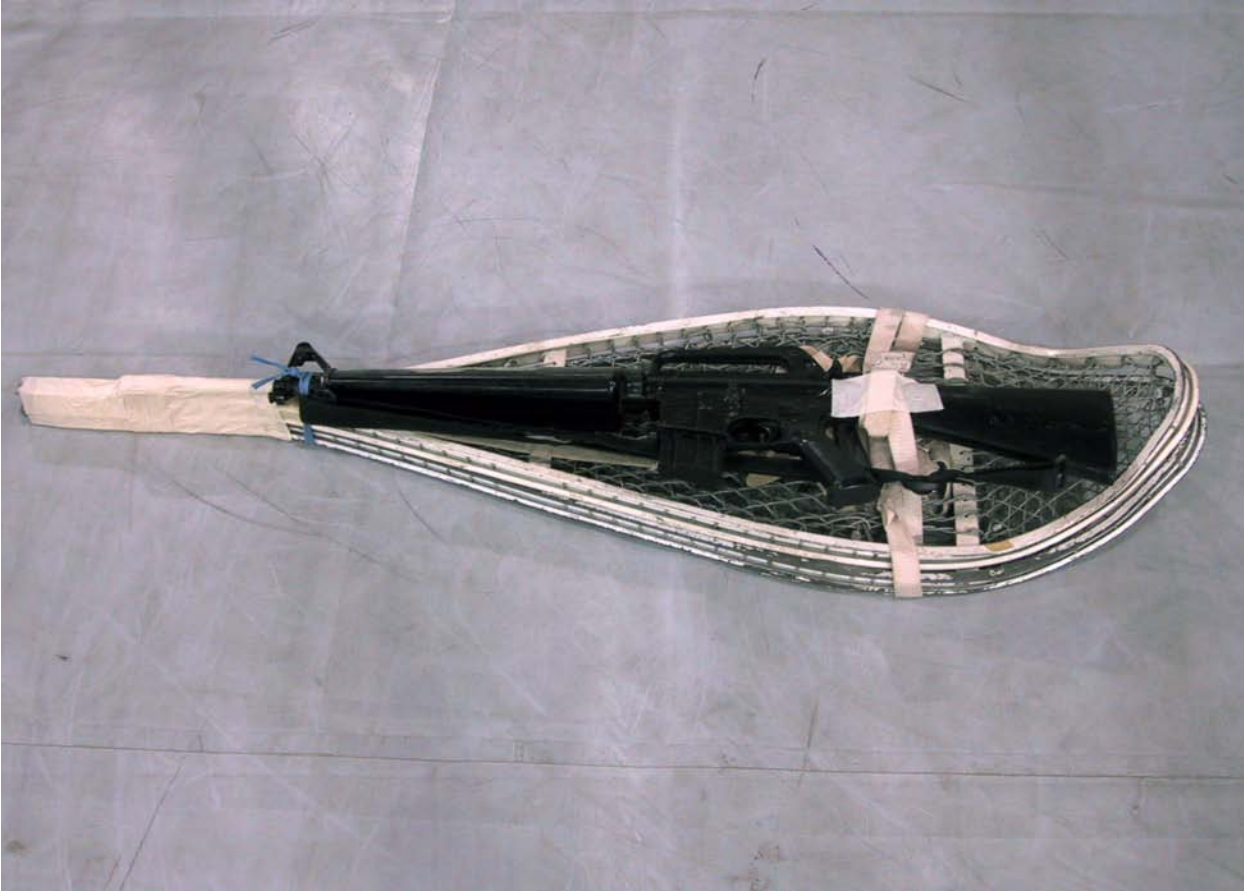


Figure 8-7: Rigging Snowshoes

ATTACHING THE RIFLE AND SNOWSHOES TO THE RUCKSACK

9. The following procedure will be used to attach the rifle and snowshoes to the rucksack (see Figure 8-8):
 - a. Prepare the rucksack up to the point where the vertical straps are tight and the horizontal straps are loose.
 - b. Tuck the left side flap away.
 - c. Place the rifle and snowshoes to the left side with the tail ends up and the toe end by the sleeping bag valise.
 - d. Thread the horizontal strap over the frame under the mesh and then back over the frame. Secure the running end to the buckle, tighten and rigger roll the excess away.
 - e. Thread the small equipment attaching strap that is towards the tail end of the snowshoes around the frame, secure it and tuck it away.

- f. Tape over the tail ends of the snowshoes and the rifle muzzle with masking tape to ensure they will not snag on anything or impede movement.



Figure 8-8: Attachment of Rifle and Snowshoes

GETTING DRESSED WITH FULL EQUIPMENT

10. When in-flight dressing is done using the CT-6, all parachutes will be pre-rigger checked and the freefall jumpmaster (FJM) will do a complete check in the aircraft after parachutists are dressed. Once on the aircraft, when the FJM orders **GET DRESSED** jumpers will:
- a. Working in pairs, place their rucksacks on the seat, place their legs through the shoulder straps of the rucksack and tighten down the shoulder straps, and tuck the excess away.
 - b. Undo their waist band, then attach the jettison buckle to the equipment V-rings on the leg pads of the CT-6, ensuring the jettison side is on the right side with the free side of the strap facing out. The jumper must ensure the jettison strap is fed through the large loop of the lowering strap.
 - c. Connect the equipment snap hooks to the D-rings, and tighten down and half hitch the running ends of the equipment attaching straps, ensuring any excess is tucked away.
 - d. Ensure the tail end of the snowshoes run under the arm towards the front of the jumper so as not to interfere with the activation of the reserve ripcord handle if necessary.
 - e. Ensure the waist band goes over everything, secured to the appropriate V-ring and any excess is stowed properly.
 - f. Put on helmet, goggles, gloves and altimeter and wait for the FJM's inspection.

NOTE

When the shoulder straps and equipment attaching straps are tightened, they must be half hitched off and the excess tucked away.

PREPARING THE RIFLE ONLY

11. The rifle is prepared by loosening the sling off so that it will have enough material to go under the main lift web and be secured by the chest strap.

GETTING DRESSED WITH RIFLE ONLY

12. On the order to **GET DRESSED** with rifle only parachutists will:
- a. put a doubled piece of 80 lb test through the tie off loop on the left side of the CT-6;

- b. get dressed as described in Chapter 7, except they will leave the waistband and chest strap undone;
- c. sling the rifle over the left shoulder, muzzle down, sight to the rear;
- d. place the sling between the harness and body, ensuring it goes over the chest strap when it is done up;
- e. do up the waist band; and
- f. tie off the sling with the 80 lb test with a regular bow tie knot.

SECTION 2

MILITARY FREEFALL CYLINDER

PACKING THE MFP CYLINDER

13. Packing the MFP cylinder, in accordance with C-22-011-200/CL-023, is as follows:
- a. Weigh the payload, cushioning material, rigging and parachute assemblies (and ballast if required) to bring the rigged weight to 204 kg (450 lb) plus or minus 2.2 kg (5 lb). To achieve this the payload including padding and ballast should weigh approximately 143 kg (315 lb).
 - b. Place the cylinder horizontally on a pallet and block it to prevent rolling.
 - c. If the load consists of loose items of equipment, pack the equipment, cushioning material and ballast, if required, into the cylinder. Make sure to observe the rules of packing and ensure even weight distribution. Also check to see that the load does not shift when moving.
 - d. Cut two discs of honeycomb so they fit snugly into the rim of the caps.
 - e. Insert the end caps onto the cylinder, ensuring that the strap guides are aligned and the roller guides are at the bottom.

RIGGING THE MFP CYLINDER WITH THE SLING ASSEMBLY

14. Determine from which side of the aircraft the cylinder will be dispatched, bearing in mind that the cargo parachute is attached to the upper portion of the front end cap and the Automatic Parachute Release (APR) is always facing inboard of the aircraft. A team of three is required to rig the cylinder as follows:
- a. One team member holds the Force Transfer Device (FTD) with one hand centred on the front end cap, with the mounting plate facing inboard (right for starboard, left for port).

- b. With the other hand, hold the buckle end of the horizontal strap on the outboard side of the cylinder 60 cm (2 ft) from the front end cap.
- c. Run the strap horizontally around the cylinder, ensuring that there are no twists, pass the strap through the strap guide of the FTD, and secure the running end hand tight in the buckle so that the buckle is 30 cm (1 ft) from the front end cap.
- d. Roll the cylinder to one side to allow the vertical strap to pass underneath the cylinder, and place the buckle of the vertical strap on top of the cylinder 30 cm (1 ft) from the front end cap.
- e. Pass the running end of the vertical strap under the bar of two D-rings and then around the cylinder ensuring there are no twists. Before placing the strap through the strap guide on the FTD place the third D-ring on the strap.
- f. Leaving the D-ring immediately below the FTD pass the strap through the strap guide on the FTD and secure the running end in the buckle, so that the buckle is on the top and 30 cm (1 ft) from the front end cap. Position the first and second D-rings on the top, 60 cm (2 ft) from either end cap.
- g. Pass the running end of a 3 m (10 ft) strap under the bar of the front end D-ring from outboard to inboard, and pull it through to the double stitched portion.
- h. Run the running end over and around the horizontal strap on the inboard side with the running end passing over the horizontal strap, for the second time, forward of the first loop.
- i. Repeat as in subparagraph h above with the outboard horizontal strap and secure in the buckle.
- j. Repeat the procedure with the other 3 m (10 ft) strap on the back end.
- k. Adjust both 3 m (10 ft) straps so that they are 60 cm (2 ft) in from and parallel to the ends of the cylinder.
- l. Using a pick handle and an A7A strap, tighten the vertical strap, the horizontal strap and both 3 m (10 ft) straps as tight as possible. Be careful not to damage the cylinder when tightening the 3 m (10 ft) straps.
- m. Rigger roll the end of all straps and secure with one turn 6.6 mm (1/4 in) cotton webbing, and also tie off where the vertical and horizontal straps meet on the end cap with a surgeon's and locking knot.
- n. Ensure that the roller guides on both end caps are flush with the cylinder and trim if necessary.

ATTACHING THE 10.7 M (35 FT) CARGO FREEFALL PARACHUTE SYSTEM

15. With the cylinder lying horizontally, install the cargo parachute as follows:
 - a. With the transfer link downward, and the snap fastener and riser uppermost, place the cargo parachute above the FTD.
 - b. Secure the cargo parachute pack with lengths of 454.5 kg (1,000 lb) minimum breaking strength (MBS) tubular nylon webbing from the pack tie down loops to the horizontal strap, left and right of the FTD, and diagonally around the horizontal strap and the 3 m (10 ft) strap closest to the front end cap.
 - c. Attach the risers to the D-rings, the outboard riser to the far D-ring, snap hook facing outwards, and secure the snap hooks with two turns of masking tape.
 - d. Draw the risers together, “S” fold the excess, and secure the risers to the vertical strap at four places with one turn of 6.6 mm (1/4 in) cotton webbing, using a surgeon's and locking knot (three of the ties will be between the parachute and the first D-ring, and one between the D-rings). There will be a half turn in one of the risers.
 - e. Apply four turns of 2.5 cm (1 in) or 2 turns of 5 cm (2 in) masking tape around the pack and over the risers, taking care not to tape over the transfer link.

ATTACHING THE TRANSFER LINK TO THE FTD

16. The procedure for attaching the transfer link to the FTD is as follows:
 - a. ensure that the transfer link is free from twists;
 - b. rotate the release lever fully toward the APR key plate and open the release gate latch;
 - c. insert the transfer link into the release gate, rotate the release gate latch to the closed position, and rotate the release lever up toward the release gate, thus locking the device;
 - d. pass the shear wire (ensuring that it is a brass wire .032 in diameter) through the holes in the body and the release lever (between the gate and release lever), twist the wire ends together on the release gate side of the release lever tightly enough so that there is no play in the release lever, and cut off the excess wire, ensuring that the wire was not broken while being tightened; and
 - e. secure any slack in the transfer link with two turns of a retainer band to the retainer band strap on the pack.

INSTALLING THE APR

17. The procedure for installing the APR is as follows:
- a. insert the key of the power cable into the key plate and rotate it one quarter turn to lock it;
 - b. attach the APR to the inboard horizontal strap by means of the dome fastener;
 - c. double a 2.4 m (8 ft) length of 550 cord around the power cable sleeve close to the body;
 - d. pass the running ends under the horizontal strap from the opposite side and pull;
 - e. open the APR flap, pass both running ends over the APR body, form a half hitch around the horizontal strap and the barrel, secure to the 3 m (10 ft) strap with a surgeon's and locking knot, and close the flap;
 - f. secure the power cable sleeve to the horizontal strap at the end cap with one turn of 550 cord using a surgeon's and locking knot;
 - g. secure the power cable sleeve to the mounting plate and the horizontal strap with a 60 cm (2 ft) length of 550 cord by passing the cord under the horizontal strap, and pass the running end through holes in the mounting plate;
 - h. pass the ends of the cord over and around the power cable sleeve from opposite sides, and secure with a surgeon's and locking knot;
 - i. attach the withdrawal hook to the eye of the release lever and secure it by screwing the knurled nut over the end of the hook to the full extent of the screw threads; and
 - j. secure the knurled nut to prevent loosening by vibration with masking tape, ensuring that the tape will not impede movement of the power cable (do not cover the threads of the screw).

ILLUMINATING THE MFP CYLINDER

18. For night operations or training the cylinder will be illuminated by 9 light sticks:
- a. 1 under the FTD; and
 - b. 1 on each strap, approximately 30 cm (12 in) from the front/end caps.

CHAPTER 9

MILITARY FREEFALL PARACHUTIST TECHNIQUES

SECTION 1

GENERAL

INTRODUCTION

1. Standard drills and techniques used in Military Freefall Parachuting (MFP) include the following:
 - a. aircraft drill;
 - b. freefall flight
 - c. flight and canopy control; and
 - d. landing.
2. The CC-130 Hercules is the primary aircraft used for operational or training insertion of MFP personnel and equipment. The procedures detailed in this chapter apply to the CC-130 aircraft. Chapter 11 details the deviations from these drills when using other types of aircraft.

SECTION 2

AIRCRAFT DRILL

GENERAL

3. The aim of aircraft drill is to ensure:
 - a. a systematic check of all parachutists;
 - b. that all parachutists are ready to jump at the appointed time; and
 - c. correct exit technique.

THE FREEFALL JUMPMaster (FJM)

4. The freefall jumpmaster (FJM) may be assisted by one or more assistant jumpmasters. The FJM is responsible for giving all jump commands.
5. The duties of the FJM are detailed in Chapter 10.

JUMP COMMANDS

6. Jump commands are as follows:
 - a. **SEAT BELTS OFF;**
 - b. **GET READY/GET DRESSED;**
 - c. **ARM/PUT IT AWAY;**
 - d. **2 MINUTES — ALTIMETRE PIN CHECK;**
 - e. **SOUND OFF FOR EQUIPMENT CHECK;**
 - f. **1 MINUTE;**
 - g. **STAND BY;** and
 - h. **GO!.**
7. Parachutists do not repeat the word of command but simply acknowledge by reacting.

SEAT BELTS OFF

8. On the command **SEAT BELTS OFF**, all parachutists will remove their seat belts and make sure that they are clear from their equipment.

GET READY/GET DRESSED

9. On the command **GET READY/GET DRESSED**:
 - a. parachutists will get dressed if they have equipment; and
 - b. parachutists will be checked individually by the FJM.

ARM

10. This command is given after requesting permission from the Aircraft Captain through the loadmaster. This is done at a predetermined altitude.
11. The FJM will check his altimeter to ensure that the reading shows that the aircraft is at least 1000 ft above the Automatic Parachute Release (APR) activating altitude. The FJM will then arm the APR of a selected parachutist and check to see if the APR has fired. If the APR has not fired then the FJM will stand up and give the command **ARM**, while at the same time holding the arming pin above his head.

12. Parachutists will remain seated and arm their APR by pressing and rotating the arming pin counter-clockwise. They will then show the arming pin to the FJM by holding it above the head.
13. The FJM will count the arming pins to ensure that all APRs have been armed. He will then place his arming pin in his pocket, and give the command to the parachutists to **PUT IT AWAY**, which will signify to the parachutists to do likewise.
14. After parachutists have secured the arming pins they will lean forward, and the FJM will check all main parachutes to ensure that no APR has fired.

2 MINUTES

15. The Aircraft Captain will inform the FJM, through the loadmaster, that the aircraft is 2 minutes away from the Drop Zone.
16. At that time, the loadmaster will open the door or the ramp.
17. On the command **2 MINUTES**:
 - a. Parachutists will stand up and move to the centre of the aircraft.
 - b. The number 1 will move to the hinge of the ramp, and the remainder will close up. The FJM and parachutists will then compare their altimeters. There should be no more than 200 ft difference below 10,000 ft AGL and 500 ft difference above 10,000 ft AGL among fellow parachutists. If there is a greater difference, parachutists must bring it to the attention of the FJM.
 - c. Each parachutist will undo the main parachute pin protector flap of the person in front of them.
 - d. The parachutists will do a reserve and main pin check and notify the FJM of any problems.
 - e. If a night drop, night chemical lights will be activated.

SOUND OFF FOR EQUIPMENT CHECK

18. The last jumper taps the man in front of him OK. This is repeated until it reaches number 1 parachutist who sounds off **NUMBER 1 OK**.

1 MINUTE

19. On the command **1 MINUTE**:
 - a. ground winds are passed to the parachutists;

- b. goggles are lowered; and
- c. FJM confirms run in and spot.

STAND BY

20. On the command **STAND BY**, the Number 1 followed by the remaining parachutists will move to a position 45 cm (18 in) from the edge of the ramp.

GO!

21. On the command **GO!**, which is given verbally and visually by the FJM, and by displaying the green light, parachutists will exit as briefed.

EXIT TECHNIQUES

22. Parachutists must exit as rapidly as possible in order to land as a small group. The two types of exits are as follows:

- a. poised exits; and
- b. dive exit.

INTERRUPTED AIRCRAFT DRILL

23. During MFP, the actions to be taken during interrupted aircraft drill are the same as for static line:

- a. **Parachutist not in physical condition to jump.** Any time a parachutist is found to be unable to jump due to drugs, alcohol, sickness or injury, he will be removed from the stick and ordered not to jump.
- b. **Faulty equipment prior to the red light.** If any equipment is found faulty prior to the red light, the fault will be corrected by adjustment or replacement. If the fault cannot be fixed, the parachutist will be removed from the stick and ordered not to jump.
- c. **Faulty equipment after red light.** If any faulty equipment is found after the red light, the parachutist will be removed from the stick and ordered not to jump. When there are additional passes the faulty equipment may be replaced prior to a later pass.
- d. **Obstruction in the door.** If for some reason the ramp or door becomes obstructed (i.e. parachutist falls), the FJM will stop any remaining parachutists,

remove the fallen parachutist, seat belt him in, and order him not to jump. The FJM can ask for another pass for the remaining parachutists.

- e. **Display of the red light after the GO!.** After the command **GO!**, if the red light should come on, the following actions will take place:
 - (1) the FJM will order **STOP**; and
 - (2) parachutists will move back to the “1 Minute” position.
- f. **Stop Drop.** A **STOP DROP** may be given at any time. If the drop is cancelled, the following actions will take place:
 - (1) the FJM will give the command **DISARM**;
 - (2) all parachutists will put their arming pins back into their APR using the buddy system; and
 - (3) all parachutists will put their seat belts and helmets on, and prepare for landing.

EMERGENCY AIRCRAFT DRILL

24. As a general rule, if the aircraft is:
 - a. between 0 and 800 ft AGL, the aircraft will land with parachutists on board;
 - b. between 800 and 1,500 ft AGL, parachutists will execute a poised exit and activate their reserve parachute; and
 - c. above 1,500 ft AGL, parachutists will execute a poised exit and activate their main parachute they will form groups in the air and fly their parachutes to a suitable Drop Zone.
25. In all emergency situations the APR does not need to be armed prior to jumping.
26. For some emergencies, depending on the altitude, the parachutist will be required to do a pivot poised exit so that they face the prop blast. This will aid in the deployment of the parachute.

FORCED LANDING

27. The following signals and procedures are used on a forced landing:
 - a. an initial warning will be given by a short ring of the bell, through the public address system, or verbally from the FJM;

- b. the FJM will ensure that all parachutists are seated, with seat belts secured and helmets on;
- c. the final warning will be one continuous ring of the bell;
- d. parachutists will grasp their hands behind the neck, force their feet and knees together, and lean toward the forward bulkhead of the aircraft, making sure their legs are not under the seats;
- e. when the aircraft stops, the doors will be opened and all parachutists will clear the aircraft at least 200 m (600 ft) to the rear under control of the FJM;
- f. if there are parachutists inboard and outboard, outboard parachutists forward of the wheel wells will stand on the seats until inboard parachutists are clear, and will then follow the inboard parachutists; and
- g. if the aircraft is still on the runway and the bell is rung continuously, parachutists will carry out the drills detailed in subparagraphs a—f.

ABANDONMENT IN FLIGHT

28. It may be necessary for parachutists to exit the aircraft prior to reaching their planned Drop Zone. There will normally be sufficient time between the initial warning and the abandonment of the aircraft for parachutists to be briefed on the emergency and the Aircraft Captain's intentions. The procedure for an abandonment in flight is as follows:

- a. An initial warning will be given by a short ring of the bell and red light on, through the public address system, or verbally from the FJM.
- b. The FJM will give the jump commands as per normal except the **ARM** will not be given and the **STAND BY** will be given after the FJM check is completed. If the situation permits the FJM will confirm the altitude prior to the **GO!**, allowing parachutists to exit immediately once the Aircraft Captain has found a suitable Drop Zone.
- c. The final warning will be a display of the green light, through the public address system, or verbally from the FJM.
- d. Parachutists will exit normally, followed by the FJM.

NOTE

Unless the ramp is already open, the parachutists will exit through the doors.

IMMEDIATE ABANDONMENT IN FLIGHT

29. If there is no time for complete aircraft drills, parachutists will exit as quickly as possible. The procedure for immediate abandonment in flight is as follows:

- a. an initial warning will be given by a continuous ring of the bell and displaying the green light, through the public address system, or verbally from the FJM;
- b. the FJM will check instruments and verify altimeter setting;
- c. the FJM will then give one of the following commands, whichever is applicable:
 - (1) if between 800 and 1,500 ft AGL—**ALTITUDE _____ AGL, STAND UP, ON YOUR RESERVE, GO!;** or
 - (2) above 1,500 ft AGL—**ALTITUDE _____ AGL, STAND UP, ON YOUR MAIN, GO!.**
- d. speed is essential in clearing the aircraft.

SECTION 3 FREEFALL FLIGHT

GENERAL

30. The period between the exit from the aircraft and the activation of the main parachute is known as "freefall flight".

31. During freefall flight, stability and manoeuvres are essential in order to avoid collisions, to enable parachutists to manoeuvre to the parachute opening point (POP), and /or to follow freefall loads.

STABILIZATION

32. The parachutist will adopt a stable falling position as soon as he leaves the aircraft. Stability is achieved when a parachutist falls horizontally facing the earth and keeps a heading on a fixed point on the ground. All freefall flight manoeuvres will be carried out from this stable falling position.

FALLING POSITIONS

33. The two falling positions are:
- a. gull wing position; and

- b. basic stable position or “box” position.

34. It is unlikely that a parachutist will be stable on exiting an aircraft. In order to have a stable exit the parachutist must slowly transition from a gull wing position to a basic stable position.

35. The parachutist will adopt the gull wing position as follows:

- a. force the head back, force the stomach forward and arch the body;
- b. bend the knees slightly, toes pushing in the insoles of the boots;
- c. arms extended along the body, palms facing forward with the hands a minimum of 15 cm (6 in) from your side, a slight bend in the elbows, fingers extended; and
- d. from the gull wing position the parachutist will count off **ARCH—TWO THOUSAND—THREE THOUSAND—FOUR THOUSAND**, and will smoothly transition from gull wing to basic stable position (see paragraph 35).

36. The parachutist will adopt the basic stable (or “box”) position as follows:

- a. force the head back, force the stomach forward, and arch the body;
- b. bend the knees 90 degrees, legs shoulder width apart, toes pushing on the insoles of the boots; and
- c. simultaneously bend the elbows at 90 degrees, palms down and fingers extended.

TERMINAL VELOCITY AND BUFFETING

37. The parachutist will reach terminal velocity approximately 12 seconds after exiting from the aircraft.

38. Prior to reaching terminal velocity, and in some cases after reaching terminal velocity, the parachutist may experience a rocking sensation, known as buffeting. This is usually caused by the parachutist having too rigid a position. Buffeting is remedied by the parachutist adopting a slightly more relaxed position and adjusting the position of hands and feet.

FIVE POINTS OF FREEFALL PROCEDURE

39. Much like static line parachuting, the parachutist must follow a set pattern of action when in freefall. The five points of freefall procedure are as follows:

- a. “ADOPT A BASIC STABLE POSITION”. As soon as the parachutist leaves the aircraft adopt a basic stable position as explained in paragraphs 33 to 35.

- b. “ORIENT YOURSELF”. This is done so the parachutist knows at all times his exact position reference the intended point of landing.
- c. “KEEP A SHARP LOOKOUT DURING DESCENT”. This is done to ensure you do not get directly over another parachutist and to avoid other parachutists in the air.
- d. “CHECK YOUR ALTIMETER”. The parachutist must know his altitude at all times. Altitude awareness is not a faculty one is born with, but the parachutist must develop it.
- e. “ACTIVATE YOUR MAIN PARACHUTE”. It is imperative, unless the parachutist is out of control, that all freefall manoeuvres are stopped just prior to opening altitude, the parachutist then relaxing the body and initiating the pull at the proper altitude.

40. The second, third and fourth points of freefall do not necessarily occur in order, and as the parachutist’s experience increases, he will find they are conducted almost simultaneously.

READING THE ALTIMETER

41. During freefall it is necessary for the parachutist to monitor his altimeter to determine his altitude, especially as he approaches opening altitude. The parachutist will read his altimeter using the following sequence:

- a. with slow movement, bring the arms slightly forward;
- b. look to the left and glance at the altimeter;
- c. after a momentary glance, bring the head and arms back to the original position; and
- d. check the altimeter every 10-12 seconds and more frequently near opening altitude.

ACTIVATION OF MAIN CANOPY

42. The minimum opening altitude for freefall parachutists in training is 3,500 ft AGL, and all parachutists on any one pass will open their parachutes at the designated altitude.

43. When the parachutist is approximately 1,000 ft above opening altitude he will prepare to open by adopting the basic stable position. The parachutist will wave off and activate his main canopy by using the “LOOK AND REACH, PULL AND CHECK” sequence, as follows:

- a. On the “LOOK” phase the following takes place:
 - (1) the arch is emphasized;

- (2) the eyes glance at the ripcord handle; and
 - (3) the head is rotated forward slightly, allowing the parachutist to see the ripcord handle.
- b. On the "REACH" phase the following takes place:
 - (1) the arms are bent at the elbows;
 - (2) the left hand is brought to the top of the head, palm down and fingers spread; and
 - (3) the right hand grasps the ripcord handle by looping the thumb through it.
- c. On the "PULL" phase the following takes place:
 - (1) the head is quickly forced back; and
 - (2) simultaneously, the arms are extended fully above the head, maintaining a grip on the ripcord handle.
- d. On the "CHECK" phase the head is rotated to the right to observe the deployment of the parachute.

44. If the parachutist is in perfect stable position on opening, a vacuum may be created above the parachutist's back, known as a "burble". This may cause the pilot chute to flutter. By looking sharply over the right shoulder the vacuum will break allowing the pilot chute to deploy.

45. Once the parachutist is under a fully developed canopy, the ripcord handle is slid over the wrist to prevent losing it, and the parachutist performs a canopy serviceability check as explained in Section 4 of this chapter.

URNS

46. In order to maintain a heading or change direction in freefall, the parachutist must be able to turn. All turns are initiated from the basic stable position or "box" position. To turn left or right in freefall the parachutist will:

- a. turn his head in the direction of the turn;
- b. bend the body at the waist toward the direction of the turn;
- c. drop the shoulder which is pointing in the direction of the turn; and
- d. when the parachutist reaches the desired heading, adopt the box position.

DELTA

47. The parachutist will adopt the delta position as follows:
- a. straighten the legs, toes pointed, legs approximately 15-20 cm (6-8 in) apart; and
 - b. simultaneously, the arms are brought back to the sides and straightened approximately 15-20 cm (6-8 in) from the sides of the body.

REGAINING STABILITY

48. There are times in freefall when a parachutist may become unstable. To regain stability during freefall, the parachutist will perform the following sequence of manoeuvres:
- a. exaggerate the arch in the stable position;
 - b. should this manoeuvre fail to work, the parachutist will go through a rapid transition from the basic stable position to the delta position; and
 - c. should this manoeuvre fail to work, the parachutist will automatically activate his main canopy.

ANOTHER PARACHUTIST DIRECTLY BELOW

49. On most occasions parachutists will not jump alone. Due to body weight, parachutists will fall at different rates, and the possibility of two parachutists being one above the other exists. It is very important, especially when parachutists are approaching opening altitude, to ensure the parachutists have horizontal separation. When a parachutist realizes that there is another parachutist below him the parachutist may have to turn, and will thus:
- a. immediately adopt the delta position, sound off **DELTA — TWO THOUSAND—THREE THOUSAND—FOUR THOUSAND—FIVE THOUSAND**, then gradually readopt the box position; and
 - b. read the altimeter and orient himself.

SECTION 4 PARACHUTE MALFUNCTIONS

GENERAL

50. The CT-6 is one of the safest parachutes designed for military freefall parachuting. The materials and technology have been tested extensively. However, we must also accept the fact that parachute malfunctions are possible.

WARNING

The parachutist must pull the cutaway handle first, then activate the ripcord handle. If the reserve is pulled first the main may become entangled in the reserve as it is deploying and result in a reserve malfunction.

51. A malfunction is any abnormal operation of the parachute where full support or control is denied to the parachutist.
52. Malfunctions are grouped into two categories:
 - a. high speed malfunctions; and
 - b. low speed malfunctions.

EMERGENCY PROCEDURE

53. If the main parachute is not deployed by 1,500 ft AGL the parachutist must:
 - a. visually and physically locate the cutaway handle and the reserve ripcord handle, and grasp both;
 - b. pull the cutaway handle to the full extension of the right arm; and
 - c. activate the reserve handle with the left hand;
54. These actions will cut away the main canopy. The reserve will begin deploying as the Reserve Static Line (RSL) activates.

HIGH SPEED MALFUNCTIONS

55. High speed malfunctions occur when there is no support from the main canopy, there is a rapid descent, and no object bigger than the pilot chute is visible.
56. High speed malfunctions include:
 - a. floating ripcord handle;
 - b. hard pull;
 - c. pack closure;
 - d. bag lock; and
 - e. snivler.

57. Immediate corrective action must be instinctive because of the high fall rate. After the corrective action has been taken, the emergency procedure will be initiated if the problem persists.

FLOATING RIPCORDER HANDLE

58. A floating ripcord handle occurs when the ripcord handle is out of its housing and is floating. The corrective action consists in locating the cable housing, following the cable out to the handle, and pulling at the opening altitude. Should this fail, carry out the emergency procedure.

HARD PULL

59. A hard pull occurs when abnormal resistance prevents the parachutist from pulling the ripcord with one hand. The corrective action is to reach across with the left hand, grasp the right wrist, and give a good pull. Should this fail, carry out the emergency procedure.

PACK CLOSURE

60. A pack closure occurs when the parachute pack remains closed after the parachutist pulls the ripcord. The corrective action is to hit the parachute pack with the elbows. Should this fail, carry out the emergency procedure.

BAG LOCK

61. A bag lock occurs when the pilot chute and deployment bag have withdrawn from the pack assembly but the main parachute remains stowed in the deployed bag. The corrective action is to carry out the emergency procedure.

SNIVLER

62. A snivler occurs when the parachute deploys from the deployment bag yet the slider remains up and the parachute fails to inflate. The corrective action is to un-stow the canopy brakes, "pump" brakes, and observe if anything happens. The canopy should inflate, and the slider will move down. Should this fail carry out the emergency procedure.

LOW SPEED MALFUNCTIONS

63. Low speed malfunctions may be observed after the deployment of the main parachute. If the parachutist is unable to gain control or full support of the main canopy he will make the decision to cut away and activate the reserve.

64. If at 1,500 ft AGL the problem has not been rectified, the emergency procedure must be carried out.
65. There are nine types of low speed malfunctions:
- a. slider hang-up;
 - b. broken right/left brake line;
 - c. line twist;
 - d. right/left brake line hang-up;
 - e. end cell closure;
 - f. broken suspension line;
 - g. accidental reserve deployment;
 - h. pilot chute in front of cells; and
 - i. tension knots.

SLIDER HANG-UP

66. On activation of the main parachute, the parachutist may observe that the slider is hung up. This is due to incorrect stowing of the slider, restricted movement on the suspension lines or poor line stowage. The corrective action is to release the brakes and apply a steady downward pressure on them. Once rectified release the brakes slowly. Should this fail, carry out the emergency procedure.

BROKEN RIGHT OR LEFT BRAKE LINE

67. On activation of the main parachute, the parachutist may have a broken brake line. This is caused by excessive opening load. The parachutist will rotate in the same direction as the good brake line, due to one side of the canopy flying with no brakes applied while the other side will be flying at 50% brakes. If this happens, the parachutist will release the good brake line, then fly the canopy with the rear risers and flare the canopy by pulling down on the rear risers. Should the parachutist be unable to control the canopy carry out the emergency procedure.

LINE TWIST

68. If the parachutist is unstable or turning on opening this may cause line twists. In this case the action taken by the parachutist is the same as for static line. On activation of the main canopy grasp both sets of risers in a thumbs down attitude and pull the risers apart while kicking

the legs to create momentum in the opposite direction of the turns. Should this fail by 1,500 ft AGL carry out the emergency procedure.

NOTE

Do not release the brakes until the twists are out.

LEFT OR RIGHT BRAKE LINE HANG-UP

69. After activation, the parachutist may find it impossible to release one or both brake lines. This may be caused by improper stowing during packing. The parachutist will release the good brake line and attempt to undo the hung-up brake line with both hands. If the parachutist cannot release it, fly the canopy straight with the good toggle at 50% brakes and hold onto the opposite rear riser. When the parachutist wishes to turn raise or pull down the good toggle. On landing, the parachutist will wrap the good toggle around the hand until the canopy flies at 50% brakes and flare with the rear risers. The stall point will be higher and the parachutist will thus execute a Parachute Landing Fall (PLF). If the parachutist cannot gain control of the canopy by 1,500 ft AGL carry out the emergency procedure.

END CELL CLOSURE

70. If the slider does not go fully down there will be insufficient pressure to inflate the cells of the parachute. The parachutist will notice the outer cells of the canopy flapping in the air flow. Releasing and depressing the brakes between 50% and 80% should rectify the problem. If the cells do not stay inflated the parachutist may have to maintain slight pressure on the brakes to keep them inflated. If this fails to rectify the problem carry out the emergency procedure.

BROKEN SUSPENSION LINES

71. On activation, the parachutist might see broken suspension lines due to the opening load. Check the manoeuvrability of the parachute by executing a 360 degree right turn and 360 degree left turn, and checking the stall point. If the parachutist judges that the parachute is not responding properly, assess the situation and carry out the emergency procedure.

ACCIDENTAL RESERVE DEPLOYMENT

72. There is a remote possibility that the reserve may accidentally deploy. Should this happen the parachutist will attempt to catch the reserve between his legs before it inflates. If the reserve inflates the parachutist will carry out a canopy transfer by cutting away his main parachute. This manoeuvre will not be attempted below 500 ft AGL. If below 500 ft AGL, the parachutist will land with both canopies.

PILOT CHUTE IN FRONT OF CELLS

73. If the pilot chute goes in front of the cells, the parachutist will closely watch how the canopy responds. The parachutist will try to surge the canopy so the pilot chute flips over to where it should be (at the rear of the canopy). This is done by pulling all the way down on the brakes, holding for a few seconds, then releasing quickly. If this does not solve the problem, monitor your canopy all the way down. If the response of the canopy is good, the parachutist can land with the pilot chute in front of the canopy.

TENSION KNOTS

74. This may happen if one line forms a loop around another line. If this happens the parachutist must do a manoeuvrability check by making a 360 degree left turn and a 360 degree right turn, and checking the stall point. If the canopy performs properly the parachutist can land with it. If it does not perform properly carry out the emergency procedure.

NOTE

Most low speed malfunctions will be rectified by applying the correct drill. In extreme cases or when the parachutist has serious doubt, carry out the emergency procedure.

SECTION 5 RAM-AIR CANOPY MANOEUVRING AND PRECISION LANDING

FLIGHT MODES

75. Although there are many flight modes the canopy may be configured to during descent, the five major configurations are:

- a. full glide;
- b. half brakes;
- c. full brakes;
- d. stall—steady state; and
- e. stall—dynamic.

FULL GLIDE

76. With toggles up most Ram-Air canopies will glide at about 30 to 50 km/h (20 to 30 mph) with a ratio of descent of approximately 3 to 5 m/sec (8 to 14 feet per second) (fps), and will

track straight and stable. Bias turns can usually be traced to air turbulence or uneven harness adjustment.

77. Under certain rough air conditions, the canopy may bounce mildly or severely in full flight, in much the same manner as an airplane in turbulence. In turbulent conditions, it is best (highly recommended) to fly with 50% brakes to avoid gust induced stall or momentary deflation of the canopy.

78. Increased penetration into wind may be gained by pulling down the trim tabs located on the inside of the front risers. When trim tabs are utilized return to normal use of the steering lines for subsequent control. Remember, in the event of a broken steering line or when manoeuvring immediately after opening, while the deployment brakes are still secured, the rear risers can be used for full directional control, to include landing.

HALF BRAKES

79. Braking is affected by altering the airflow along the lower surface of the wing. This is accomplished by distorting the trailing edge in much the same manner as with flaps on an airplane.

80. From full glide, depress both toggles slowly to about chest level or slightly below. At this point, forward speed will be 16 to 24 km/h (10 to 15 mph) and the corresponding rate of descent 3 to 4 m/sec (8 to 10 fps).

FULL BRAKES

81. Under normal flight conditions, the fully braked attitude will be reached by depressing both toggles slowly until nearly all the forward speed is reduced. In this mode, the direction of travel will be almost vertical. The forward speed will be around 5 km/h (3 mph) or less, and the rate of descent about 2 to 3 m/sec (6 to 8 fps).

82. Further braking will result in a sink or mush, which is on the verge of a stall. This must be avoided at all costs close to the ground.

STALL STEADY STATE (INDUCED)

83. A stall (steady state) can be induced by depressing the toggles slowly to the full brake position and allowing 7 to 10 cm (3 to 4 in) extra toggle to travel past the full brake position. In this attitude, the airfoil loses its efficiency as a lifting device. The forward speed goes to zero as the canopy sinks and then gently rocks backwards.

84. At this time the canopy may attempt to fly backwards or turn off to one side. Recovery from this type of stall is accomplished by simply raising the toggles smoothly 15 to 20 cm (6 to 8 in) to the 75% to 80% brake condition. The canopy will accelerate gently out of the stall. Never

release the toggles completely or let them up abruptly. If the toggles are released in such a manner, the canopy will surge forward violently.

STALL DYNAMIC

85. Dynamic stalls will occur due to sudden loss of airspeed in gusty wind conditions or the inadvertent depression of the steering toggles past the 100% brake range.

86. The canopy will decelerate rapidly and stall, and recovery action must be initiated immediately by allowing the steering toggles to retract until the canopy regains forward flight.

URNS

87. There are various methods that may be applied to turn a Ram-Air canopy:

- a. turns, full glide;
- b. spiral turns;
- c. turns with brakes; and
- d. stall turns.

URNS FULL GLIDE

88. Turns from full glide are responsive, but due to the high forward speed the turns will encompass a wide arc. These turns are made by depressing either toggle, leaving the other one at the full glide position. In this type of turn, the canopy will bank and actually dive, causing the parachute to lose altitude quickly. The further the toggle is depressed, the steeper the bank angle. The increase in rate of descent is partially due to the loss of lift resulting from the bank angle.

SPIRAL TURNS

89. Spiral turns are basically turns from full glide but maintained for more than 360 degrees of rotation. The first turn will be fairly slow with shallow bank angles, but both the turn speed and the bank angle will increase rapidly if the spiral is maintained. Increasing the turn rate will cause excessively fast diving speed, with a rapid loss of altitude, and therefore should be avoided below 500 ft AGL.

URNS WITH BRAKES

90. **Turns—50% Brakes.** Turns from the 50% braked condition are made by further depressing either toggle. Canopy response in this mode is much faster, with minimal braking, resulting in almost flat turns.
91. **Turns—75% to 80% Brakes.** This is the canopy's optimum control range with extremely quick response. When flying in this mode, the parachutist should be keenly aware that he is operating very near the stall range. Turns are best made with directional cross control (by slightly raising the opposite toggle). This is done to prevent the canopy from stalling. There is little or no banking, and the resulting heading changes are quick and flat.
92. **Stall Turns.** When the canopy is flying in the 90% to 100% brake range and either of the toggles is further depressed a stall turn will result. Stall turns produce a very quick, pivoting action, with the stalled side of the canopy flying backwards. Since the stalled side generates very little lift, the rate of descent will increase. Stall turns should only be used with extreme caution.

LANDINGS

93. While there are many ways of landing with a Ram-Air canopy, a smooth, soft stand up or walk away landing is most desired. The flared landing technique is most commonly used.
94. The flared landing is in essence a carefully controlled dynamic stall, timed so that touchdown occurs during the exact moment of high lift yield, during the artificial change in angle of attack. Flared landings, like all Ram-Air parachute landings, are made by easing the toggles up, allowing the air speed to build up (a flared landing cannot be accomplished without sufficient speed). At about 3 m (10 ft) above the ground, slowly depress both toggles downwards, timing the movement to coincide with the 100% brake position at touchdown. If on a misjudged flare attempt the parachute enters a dynamic stall, stall recovery must be initiated. Flared landings are always made into the wind.
95. Ram-Air canopies can be safely landed without flaring. On final approach, simply fly the canopy at 50% to 75% brakes with the final braking increase occurring immediately prior to landing. This is similar to the landing of conventional parachutes, and ground speed will depend on wind velocity.

PRECISION APPROACHES

96. The recommended Ram-Air canopy landing approach is similar to standard aircraft practice, consisting of a downwind leg, a base leg and a final approach upwind towards the target. It is usually difficult to visually gauge variations in altitude accurately, so a reliable altimeter is mandatory while under the canopy.
97. The downwind leg is flown along the wind line, passing the target area at an altitude of between 1,000 to 1,500 ft AGL, while tracking approximately 100 m (400 ft) to the side of the target. Continue the downwind leg approximately 100 to 125 m (300 to 400 ft) downwind to the

target. Under zero wind conditions, the downwind leg may be extended past the 125 m (400 ft) distance to permit a longer and flatter final approach. Under high wind conditions, 16 to 32 km/h (10 to 20 mph), the downwind leg must be shortened to allow for decreased penetration. A basic rule is to increase rotation height by 30 m (100 ft) for every 1.6 km/h (1 mph) increased wind velocity, starting at 125 m (400 ft) for 0 to 13 km/h (0 to 8 mph) winds. For winds in excess of 21 km/h (13 mph), rotate no further downwind than 60 m (200 ft) from the target and at a minimum of 1,000 ft AGL. In gusty and/or turbulent conditions, all Ram-Air canopies are best flown with approximately 50% brakes. More than 80% or less than 20% brakes must be avoided. Gust induced stall or momentary deflation of the canopy is possible due to turbulence and gusts.

98. At this point, begin a gentle 90 degree turn to fly the base leg across the wind line. This leg is usually flown at 30% to 60% brakes, depending upon the wind condition, and the base leg may be either shortened or extended to reach a proper rotation altitude. Under low wind conditions, 0 to 14 km/h (0 to 9 mph), the base leg is flown to a "rotation point" approximately 100 m (400 ft) directly downwind of the target, at an altitude of 500 to 600 feet AGL.

99. The final approach must begin at no lower than 500 feet AGL. On final approach, the angle must be assessed and any major control corrections performed immediately, while there is sufficient altitude and distance to the target.

SECTION 6 OBSTACLES ON THE GROUND

GENERAL

100. Normally the Drop Zone is a carefully selected and surveyed piece of ground with minimum obstructions and dangerous features. However, due to human error, navigational miscalculation or sudden changes in meteorological conditions you may find yourself over a less than desirable area for landing.

101. The following precautionary measures may be taken when encountering typical types of obstacles:

- a. **Wires.** This type of obstacle is the easiest to avoid although it may be the deadliest should they be high-tension electrical wires. Wires may be over flown, under flown or best of all, flown parallel to, if wind conditions allow. Remember the parachutist is not merely descending as with a round parachute, but is flying at higher velocities horizontally, so it is best to manoeuvre around the wires.
- b. **Buildings.** Due to the high degree of accuracy and manoeuvrability of Ram-Air parachutes, the parachutist may fly around, over, under or land on top of buildings with relative ease. Should it be necessary to land against a tall building just prior to impact, the parachutist should flare the canopy to reduce forward velocity and contact the obstacle with feet first, or turn the body sideways, to minimize impact.

- c. **Water.** Careful appreciation of altitude, wind speed and direction should allow the parachutist to avoid most types of water obstacles. When water is unavoidable the parachutist must:
 - (1) Lower all heavy and non-essential equipment such as rucksack, weapons and other attached equipment at an altitude 200 ft AGL, and release the waistband and chest strap.
 - (2) Face into the wind and enter the water in the flare landing mode. Immediately upon immersion activate the cut-away handle and remove the two leg straps.
 - (3) Extricate from the harness and proceed with lifesaving manoeuvres as required.
- d. **Tree Landings.** Landing in trees with Ram-Air parachutes is much less likely to cause injuries if executed in the proper manner. When a tree landing is unavoidable, the parachutist must:
 - (1) keep his equipment and NOT lower the rucksack;
 - (2) face into the wind, flare upon landing into the trees; and
 - (3) hold on to the branches and climb down if possible.

SECTION 7 NIGHT PARACHUTING PROCEDURES

GENERAL

102. For tactical or training reasons parachute operations may be done during periods of darkness or last light. Since control is more difficult during darkness, discipline during freefall and descent under canopy must be established. Special procedures are used to ensure safe parachuting at night.

DZ MARKING AND PREPARATION FOR A NIGHT FREEFALL

103. Drop Zone markings will consist of:
- a. code identifiers illuminated by flares and facing into the wind so the parachutist can read the letter when landing into the wind; and
 - b. alternatively, vehicle headlights facing into the wind so the parachutist can see the tail lights and the headlights are facing away.

104. The preparations for a night drop are the same as a day drop except that each parachutist will be issued 4 chemical light sticks as follows:

- a. 1 green chemical light stick taped to the altimeter to illuminate the dial during freefall;
- b. 1 green chemical light stick taped to the back of the parachutist's helmet;
- c. 1 red chemical light stick taped to the left heel and 1 blue chemical light stick, to the right heel.; and
- d. each parachutist will be issued a safety light, inserted in the back pack assembly where the flyers kit bag is stored.

NIGHT IN-FLIGHT PROCEDURES

105. In-flight procedures are the same as for day except:

- a. after all checks are completed in the aircraft, the cargo compartment red lights will be turned on to allow parachutists to gain their night vision;
- b. at the **2 MINUTES** warning, chemical light sticks will be illuminated; and
- c. cargo lights will be dimmed.

NIGHT LANDING WITH CT-6

106. Due to the flight characteristics of the CT-6, parachute night landings could be hazardous. Depth perception at night will cause parachutists to flare either too high or late in many cases. For this reason all parachutists will turn their canopy into the wind at a minimum of 300 ft AGL, lower their equipment, and land with 50% brakes, executing a proper roll, with the feet turned off.

107. On landing the parachutist will complete the following Drop Zone and rendezvous drills:

- a. collapse main canopy;
- b. get out of harness;
- c. gather rifle and equipment;
- d. remove APR from the harness and replace the arming pin;
- e. pack the main parachute in the flyer's kit bag; and
- f. pick up all equipment and move to the rendezvous.

108. While moving off the Drop Zone the parachutists must stay alert and look for injured parachutists. Should one find an injured parachutist, alert the Drop Zone controller by lighting a flare or strobe, and assist the parachutist by making him comfortable until medical aid arrives.

SECTION 8

SAFETY

GENERAL

109. Once a parachutist exits the aircraft there will be many things on his mind. The parachutist must be aware of everything that is happening around him to avoid an accident.

SAFETY IN FREEFALL

110. When in freefall the parachutist must:

- a. keep a sharp look out for other parachutists;
- b. follow the assigned task;
- c. maintain constant altitude awareness;
- d. wave-off before activation of the main parachute, and activate the main parachute at the proper altitude; and
- e. be in control when activating the main parachute

SAFETY ONCE UNDER CANOPY

111. Once under canopy the parachutist must:

- a. always check canopy on opening, and carry out the post-deployment drill;
- b. apply brakes slightly in heavy turbulence;
- c. turn to the right if a head-on canopy collision is imminent (if toggles are not released, the rear risers can be used);
- d. always be aware of other parachutists;
- e. give the low parachutist the right of way;
- f. give a parachutist experiencing control problems the right of way;
- g. not focus blindly on the landing point;

- h. avoid turbulence from other canopies and objects on the ground;
- i. exercise caution when near the target;
- j. never induce a stall and hold it unless there is sufficient altitude to recover and the air is clear below;
- k. never induce violent spirals below 1,000 ft AGL or near other parachutists;
- l. if a malfunction from another parachutist is observed, follow that parachutist to the ground and observe where the main canopy lands;
- m. always face into the wind on landing;
- n. do not get within 8 m (25 ft) of another canopy; and
- o. do not execute turns below 100 ft AGL.

SAFETY ON THE DROP ZONE

112. Once on the Drop Zone the parachutist must:
- a. keep helmet on until clear of the Drop Zone;
 - b. watch for other parachutists landing;
 - c. perform correct pack-up drills;
 - d. clear the Drop Zone as quickly as possible; and
 - e. look out for any injured parachutists.

CHAPTER 10 FREEFALL JUMPMaster DUTIES

SECTION 1 GENERAL

INTRODUCTION

1. Duties of the Freefall Jumpmaster (FJM) are detailed in this chapter for the CC-130 aircraft. FJM duties for other aircrafts are detailed in Chapter 11.

THE FREEFALL JUMPMaster

2. A FJM shall be a Military Freefall Parachutist (MFP) of NCM, NCO or officer rank who has passed an FJM course and is currently certified as qualified under existing Canadian Forces regulations.
3. The FJM is responsible to the Aircraft Captain for the safe and efficient dispatch of freefall parachutists. Normally, communications between the aircraft captain and the FJM are through the loadmaster.
4. The FJM may be assisted by assistant FJM(s). The FJM is responsible for giving all jump commands.
5. The FJM will not jump until the last parachutist has exited.

FREEFALL JUMPMaster KIT

6. Prior to any jump, the FJM shall draw and have on board the aircraft the FJM kit containing:
 - a. sheath knife;
 - b. if feasible and desirable, a spare CT-6 and APR;
 - c. altimeter;
 - d. spare helmet and goggles;
 - e. flat tip screwdriver;
 - f. roll of gun tape;
 - g. roll of 6 mm (1/4 in) cotton webbing;
 - h. retainer bands

- i. map of Drop Zone;
- j. 9 wind drift indicators (WDI) if required; and
- k. any other articles that the FJM may require for a specific purpose.

SECTION 2 PRE-FLIGHT PROCEDURE

AIRCRAFT INSPECTION

7. Prior to any freefall parachute jump, the FJM, accompanied by the loadmaster, will inspect the aircraft to ensure that:
- a. paratrooper doors and pip pins are serviceable and free of projections;
 - b. jump platforms are serviceable and safety wired;
 - c. air deflectors open approximately 38 cm (15 in);
 - d. the floor and jump platforms are not slippery;
 - e. there are no projections in the cargo compartment which may snag a parachutist;
 - f. emergency equipment and exits are secured;
 - g. if jumping from the ramp, that it works properly; and
 - h. airsickness bags are available.

ORGANIZATION AND CONTROL OF PARACHUTISTS ON THE GROUND

8. To ensure orderly progression and adequate control of parachutists on the ground the following will take place under the control of the FJM:
- a. roll call and falling-in of parachutists;
 - b. physical inspection of parachutists; and
 - c. drawing of parachutes.

ROLL CALL AND FALLING-IN

9. For roll call and falling-in the procedure will be:

- a. the senior FJM will call roll and place the parachutists in proper chalk order according to the manifest (the assistant FJM will ensure parachutists move to their proper locations); and
- b. parachutists will then place their helmets on top of the bench and stand properly at ease in front of their helmets.

PHYSICAL INSPECTION

10. The FJM will make a physical inspection of each parachutist. This is done for every jumper of each chalk by both the senior FJM and assistant FJM to ensure:

- a. individuals have not been drinking, are in good health, and show no signs of using illegal drugs;
- b. parachutists have their identity discs or an identification card;
- c. rings and watches are removed;
- d. if wearing eye glasses, they are attached with an elastic strap or tied securely;
- e. proper footwear is being worn; and
- f. parachutists have gloves, hook knives, goggles and helmets.

DRAWING OF PARACHUTES AND AUTOMATIC PARACHUTE RELEASE (APR)

11. The FJM will meet with the rigger and ascertain the location for drawing parachutes and APRs. The FJM at the same time will obtain the millibar setting for the APRs.

12. The FJM will then move the parachutists in chalk order and have them draw parachutes and APRs, ensuring the gear is correctly lined up and neatly organized.

SUPERVISING THE PREPARATION AND DONNING OF THE CT-6

13. **Responsibility for the correct donning and fitting of the parachute lies with the individual parachutist**, however, the FJM must ensure parachutes are properly prepared prior to donning. The FJM should look for the following:

- a. a proper inspection of the parachute assembly is carried out;
- b. the APR and withdrawal hook are properly attached;
- c. the altimeter is zeroed, or set for the applicable Drop Zone;
- d. all straps are properly adjusted, and excess stowed; and

- e. flyers kit bag is stowed neatly.

14. Parachutists are then ordered to get dressed for a rigger's check. When the rigger's check is completed, the jumper will undergo a FJM check.

FJM INSPECTION—GROUND

15. The FJM inspection is a systematic, thorough check conducted to ensure, prior to boarding the aircraft, that all parachutists are properly dressed and safe to parachute. Once parachutists have been ordered to dress for an FJM check, the FJM can commence ground inspections. The FJM will:

- a. Ensure the parachutist has a serviceable helmet, goggles and gloves.
- b. Visually check that the altimeter is zeroed or set for the applicable drop zone.
- c. Visually and physically check the left riser group to ensure it is not twisted and is running unobstructed from the pack to the three ring release system, under the securing flap.
- d. Visually check and ensure that the riser release loop is through the metal grommet and the cutaway cable is running through the riser release loop, with the excess cable in the tunnel.
- e. Visually check the three ring connectors to ensure they are not bent, cracked, or damaged. Rotate the smallest ring one quarter turn to ensure it is not elongated. Ensure the split ring on the fixed loop of the riser release loop is completely inside the fixed loop and the fixed loop is taped.
- f. Repeat subparagraphs c, d and e on the right riser group.
- g. Visually and physically ensure the cutaway handle is fastened to the harness with Velcro and is not obstructed in any way.
- h. Visually and physically check the chest strap to ensure it is not misrouted around the main lift web or through either the main or reserve ripcord handles. Also ensure that it is secure and the excess is tucked away.
- i. Visually and physically trace the main lift web down to the waist band, ensuring it is not twisted or misrouted.
- j. Visually check the waist band to ensure it is not twisted and is running over top of everything.
- k. Visually and physically check the waist band quick fit ejector snap by pushing in on the locking lever, ensuring no material is caught in the tooth and the comfort pad is under the quick fit ejector snap.

- l. Visually check the leg straps to ensure they are not twisted or misrouted, also ensuring the quick fit ejector snaps are attached to the correct V-rings and checked as described in subparagraph k.
- m. Have the parachutist turn around.
- n. Open the main ripcord protector flap. Insert the thumb into the main ripcord pocket and trace the handle to ensure there are no obstructions inside the pocket and that the handle is not sewn inside. With the thumb check the elasticity of the pocket, then ensure the handle is fully inside the pocket.
- o. Grasp the swaged ball of the main ripcord, and the ripcord between the pack closing loop and the ripcord housing, and ensure the ripcord runs freely inside the housing by pulling back and forth 2 to 3 times.
- p. Visually check that the main ripcord pin is running through the pack closing loop, that it is not bent, rusted, corroded or damaged in any way, and the rigger's seal is intact.
- q. Ensure the withdrawal hook is attached to the pin (not the ripcord) between the pack closing loop and the base of the pin.
- r. Ensure the knurled nut is screwed down fully (3 to 4 threads showing).
- s. Ensure the power cable is running freely.
- t. Ensure the power cable housing key is secured to the key plate.
- u. Check to see that the power cable nut and arming pin are secure.
- v. Visually check the APR to ensure:
 - (1) it has the proper millibar setting;
 - (2) inform the jumper of the millibar setting and then check that the reset indicator is lined up; and
 - (3) the APR protector flap, power cable protector flap and main ripcord protector flap are closed.
- w. Move to the left side of the parachutist and open the reserve ripcord protector flap and lay it over the parachutist's right shoulder.
- x. Physically check the reserve ripcord and pocket the same way as for the main, and ensure that the ripcord runs freely inside the housing.
- y. Visually and physically check:
 - (1) the reserve static line lanyard is snapped to the left riser,

- (2) the ring is attached to the reserve static line release shackle and the shackle is fully closed, and
 - (3) the reserve static line ring is between the ripcord housing and the reserve ripcord ring.
- z. Visually check the reserve pins and ensure they are both through the pack closing loops, and they are not bent, rusted, corroded or damaged in any way. Ensure the rigger's seal is intact and the cable is running to the left of the pins. Close the reserve ripcord protector flap.
- aa. Visually check the general condition of the pack.
- bb. Tap the jumper OK.

FREEFALL JUMPMaster BRIEFING

16. After confirming the details of the drop with the aircrew, the FJM will brief the parachutists on the freefall operation. Using visual aids such as maps, air photos, sketches or a sand model, the FJM will brief the parachutists on the following:

- a. Flight:
 - (1) flight altitude and duration, and type of aircraft;
 - (2) jump altitude and duration of flight; and
 - (3) emergency signals and procedures.
- b. Jump:
 - (1) altimeter setting for primary and alternate Drop Zones;
 - (2) APR setting for primary and alternate Drop Zones;
 - (3) duration of red light;
 - (4) duration of green light;
 - (5) designated parachutist to dispatch the freefall cylinder;
 - (6) freefall flight manoeuvres;
 - (7) canopy manoeuvres;
 - (8) opening altitude and Parachute Opening Point (POP); and
 - (9) predicted weather conditions.

- c. Drop Zone(s):
 - (1) name and location;
 - (2) markings;
 - (3) size and obstacles;
 - (4) landmarks;
 - (5) point of impact; and
 - (6) location of rendezvous point.
- d. Any other instructions relevant to the drop such as casualties and parachute recovery.
- e. The FJM will issue the final statement: **YOU ARE NOW MANIFESTED, AND YOU WILL PARACHUTE IN ACCORDANCE WITH MY INSTRUCTIONS AND ALL ORDERS APPLICABLE TO THIS CHALK.**

MFP AIRCREW BRIEFING

17. Once all parachutists have been seated, and seat belts have been fastened and checked by the FJM, the FJM and aircrew will conduct a briefing near the aft end of the cargo compartment to confirm that all are operating on the same information. This briefing is known as the “Aircrew Briefing” and will include the pilot, navigator, loadmaster and FJM.

18. The Aircraft Captain will normally start the briefing and will cover the following items, most of which are taken from the parachute operation order:

- a. type of drop;
- b. maximum surface winds permissible;
- c. number of passes;
- d. number of parachutists (determined by load manifest);
- e. cabin lighting and heating;
- f. communications within the aircraft to include:
 - (1) intercom;
 - (2) lights; and
 - (3) bells.

- g. emergency procedures, including informing the FJM of altitude above ground level (AGL) before exit commands are given;
 - h. hang-up procedures;
 - i. alternate plan (e.g. alternate Drop Zone or air land); and
 - j. APRs are armed 1,000 ft above opening altitude and will have to be disarmed if the aircraft has to go below arming altitude.
19. The navigator will then cover the following items:
- a. confirm High Altitude Release Point (HARP);
 - b. duration of the red light;
 - c. duration of the green light;
 - d. run in and escape routes (detailed on map); and
 - e. drop altitude AGL.
20. After the pilot and navigator have finished their briefing, the FJM will confer with the loadmaster to confirm the following:
- a. jump signals;
 - b. signal for **STOP DROP** before and after the **15 SECONDS** warning; and
 - c. for cylinder drops, confirm who will remove the two cargo straps and who will cut the restraining strap.
21. If there are any last minute changes regarding the drop, the changes must be covered during the aircrew briefing and the senior passenger informed.
22. At this time, the senior FJM must ensure that two copies of the passenger load manifest are passed to the loadmaster.

EMPLANING

23. At the appointed time, and after obtaining permission from the Aircraft Captain, the FJM will:
- a. guide parachutists to the aircraft and emplane them in reverse stick order;
 - b. report to the Aircraft Captain and have him sign the load manifest;

- c. distribute copies of the load manifest in accordance with unit SOP;
- d. ensure each parachutist's seat belt and helmet are secured;
- e. ensure parachutists' equipment loads are placed in the centre of the aircraft and are secured by means of tie down straps;
- f. ensure that the FJM kit is secured;
- g. ensure that any freefall cylinders are secured by tie down straps;
- h. inform the loadmaster that parachutists are ready for take-off; and
- i. sit down and fasten his seat belt.

SECTION 3 IN-FLIGHT DUTIES

GENERAL

24. After take-off the FJM will:
- a. when so informed, order seat belts off;
 - b. maintain strict discipline; and
 - c. keep the senior passenger informed.

JUMP COMMANDS AND DISPATCHING OF PARACHUTISTS (RAMP)

25. After giving the command **GET READY** the FJM will inspect each parachutist using the following procedure:
- a. order parachutists to stand up;
 - b. check to ensure each parachutist has helmet, goggles and gloves;
 - c. carry out a comparison check of the parachutist's altimeter with his (if more than 200 ft off below 10,000 ft, or more than 500 ft off above 10,000 ft, the FJM will exchange the altimeter);
 - d. visual check of the eyes to ensure the parachutist is coherent;
 - e. visual check of both ripcord handles to ensure they are still in the ripcord pockets;
 - f. visual check of the chest strap to ensure it is still secure and not misrouted, and the excess is stowed;

- g. visually and physically inspect the waistband to ensure it is still secure, not misrouted, and the ejector snap is closed;
- h. visually and physically check both leg straps to ensure routing is correct, excess is stowed, and the ejector snap is closed;
- i. check the APR setting (verbally state setting to the jumper);
- j. check reset indicator (ensure both lines are even);
- k. visually check main ripcord pins to ensure they have not come out of the pack closing loop;
- l. open the reserve ripcord protector flap and visually and physically ensure the reserve static line lanyard is snapped to the left riser, the ring is attached to the reserve static line release shackle and the shackle is fully closed, and the reserve static line ring is between the ripcord housing and the reserve ripcord guide ring;
- m. visually and physically ensure that both reserve pins are fully inserted into both reserve pack closing loops and close the reserve ripcord protector flap, 100% Velcro on Velcro; and
- n. tap the parachutist OK.

26. After giving the command **ARM**, the FJM will position himself where all parachutists can observe him. The FJM will then:

- a. check that everyone has removed the arming pin from the APR;
- b. signal parachutists to place the arming pins in their pockets by putting his arming pin in his pocket; and
- c. check each parachutist's APR to ensure it has not fired.

27. After receiving the command **2 MINUTES**, the parachutists will carry out the following checks on each other:

- a. altimeter comparison check;
- b. visually check main ripcord pins for proper position;
- c. visually check reserve ripcord pins for proper position; and
- d. visually check that the reserve static line lanyard is snapped to the left riser, the ring is attached to the reserve static line release shackle, and the shackle is fully closed.

28. After giving the command **1 MINUTE, GOGGLES DOWN**, the FJM will confirm run in and spot and tell parachutists the winds on the Drop Zone.

29. After giving the command **STAND BY**, the FJM will move to a point approximately 45 cm (18 in) from the trailing edge of the ramp, face towards the aft end of the aircraft, and observe the jump lights and the loadmaster.
30. After giving the command **GO!**, the FJM will constantly observe the jump lights and the parachutists as they exit the aircraft.

JUMP COMMANDS AND DISPATCHING OF PARACHUTISTS (DOOR)

31. Jump commands for door jumps will be the same as for ramp jumps except as noted below:
- a. parachutists will position themselves so that the first parachutist is in line with the leading edge of the door; and
 - b. after the command **1 MINUTE**, the FJM will check that:
 - (1) the door is open and the pip pin inserted;
 - (2) the jump platform is locked;
 - (3) air deflectors are open; and
 - (4) pass the winds on the Drop Zone to the parachutists.

FREEFALL JUMPMaster GROUND CHECK WITH EQUIPMENT

32. Inspection of rucksacks rigged with the Single Action Release Parachutist's Equipment Lowing System (SARPELS) should be conducted in the following sequence:
- a. Check shoulder straps to ensure there are two turns of 2.5 cm (1 in) masking tape to secure the quick releases.
 - b. Check the cotter pin to ensure that it goes through the cone, over the top of the grommets, pointing diagonally toward the valise.
 - c. Trace the vertical straps to ensure they are not twisted, and that they are tight, routed properly under the shoulder straps and through the keepers, and the excess is stowed under the retainer band.
 - d. Inspect the horizontal strap to ensure it is not twisted, and it is tight, routed correctly over the top of the side flaps, and the excess is stowed under the retainer band.
 - e. Inspect the attaching strap to ensure it is properly routed between the two bars and behind the kidney strap.

- f. Ensure that the strap passes through the buckles correctly, there are two equipment snap hooks attached, and the openings are facing inwards.
- g. Ensure the knot of the lowering rope is properly secured to the fixed loop on the SARPELS.
- h. Ensure the jettison strap passes through the loop on the lowering strap, that the fixed buckle is operational, and that a quick release is attached to the jettison buckle on the right side.
- i. If jumping rifle only or with rucksack, the rifle is prepared with the sling longer than normal to accommodate for the twist when dressing (no other special rigging is necessary).
- j. If jumpers have to check rucksacks with rifle and snowshoes, carry out paragraph 32, subparagraphs a-g, and in addition ensure:
 - (1) rifle and snowshoes are rigged as for static line starboard door, except the sling will be tight and the muzzle will be taped to the tails of the snowshoes;
 - (2) rifle and snowshoes are on the left side of the rucksack, as the jumper wears it, with the tails to the bottom and the curved portion toward the rucksack and over the valise;
 - (3) the horizontal strap of the SARPELS is over the top of the snowshoe frame at the toe hole, between the mesh of the two snowshoes, over the top of the frame again, and tightened off using the adjuster buckle, with the excess stowed under the retainer band; and
 - (4) the securing strap, nearest the tails of the snowshoes, is around the frame, through the mesh, on the side of the frame closest to the sling, secured and tucked away.
- k. All parachutists will be rigger checked and FJM checked prior to boarding to ensure parachutists are capable of exiting the aircraft in case of an in-flight emergency. Parachutists may in the case of a long flight have their chutes pre-rigger checked and board the aircraft without wearing the CT-6 parachute.

IN-FLIGHT DRESSING AND FREEFALL JUMPMaster INSPECTION WITH EQUIPMENT

- 33. In most cases parachutists will board the aircraft with their parachutes on. Once the aircraft takes off and P-hour approaches parachutists, when ordered to **GET DRESSED**, will don their equipment.
- 34. The FJM will ensure donning is being done correctly and assist parachutists as they dress.

NOTE

If parachutes are donned on the ground the rifle will be attached prior to the riggers inspection.

35. The FJM can begin inspecting whenever parachutists are dressed.
36. The FJM will carry out a normal aircraft check on the parachute first, then inspect the equipment load per the following sequence:
 - a. inspect the rifle, ensuring it is secured to the fixed loop on the left shoulder with 80 lb test, the sling goes through the chest strap under the main lift web, and the waistband is over top of the rifle;
 - b. ensure that the equipment snap hooks on the attaching strap are attached to the equipment D-rings, the attaching strap is tight, half hitched off, and the excess tucked away;
 - c. ensure both shoulder straps of the rucksack are secure on the parachutist legs, left and right side, checking security, tightness, half hitched off, excess tucked away, and the two turns of 2.5 cm (1 in) tape is still secure;
 - d. ensure the jettison strap is secure to the V-rings on the leg straps and is under the securing strap, the jettison release is on the right side and the jettison strap passes through the lowering rope, and the loop of the lowering rope is attached to the yellow keeper;
 - e. visually check the general condition of the rucksack; and
 - f. once the inspection is completed, tap the jumper and tell him **OK**.
37. When jumping rifle and snowshoes with rucksack, the FJM check on the rucksack remains the same except that the FJM must ensure that:
 - a. rifle and snowshoes are on the left side of the parachutist, in front of his arm, and do not interfere with the activation of the reserve ripcord handle; and
 - b. the waistband is over the top of everything.

SECTION 4

FREEFALL CYLINDERS

RIGGING THE CYLINDER ON BOARD THE CC-130

38. If the FJM is tasked to put the cylinders on board the aircraft, the following procedures must be applied:

- a. the FJM must install the roller assembly as follows:
 - (1) ensure that the rollers are not interfering with the ramp mechanism;
 - (2) take one cargo strap and thread the standing end from the centre of the rollers, through the rollers, up to the end , then back down toward the centre, and attach to the floor using the rings towards the centre of the rollers;
 - (3) ensure the adjustable end is attached to the floor, outboard, on the opposite side, using the rings towards the centre of the rollers;
 - (4) repeat with the other cargo strap;
 - (5) tighten both cargo straps at the same time, making sure they do not interfere with the ramp mechanism; and
 - (6) secure the excess using gun tape.
- b. To install the cylinder on the roller assembly the FJM must:
 - (1) ensure that the cylinder is seated on the rollers right side up, and the cargo chute is facing the forward end of the aircraft;
 - (2) attach the tubular nylon on the D-ring to the floor ring;
 - (3) secure the cylinder with two cargo straps attached at both ends, making sure that the standing (non-adjusting) ends are outboard of the rollers; and
 - (4) secure the excess with gun tape, making sure that nothing will interfere with parachutist exits.

DISPATCHING A SINGLE CYLINDER

39. Prior to boarding the aircraft, the Number 1 and Number 2 parachutists will be briefed on the procedure.

40. Prior to the red light the FJM will:

- a. verify the setting on the cylinder APRs after the aircraft has been depressurised;
- b. take sufficient cylinder static line to hook up the snap fastener to the anchor line cable gate facing inboard;
- c. form a bight in the static line, and secure it in the retainer band on top of the parachute container with two turns around the static line bight;
- d. check the cylinder as follows:

- (1) ensure that the snap fastener is closed and the opening facing inboard, with the locking button flush with the locking plate;
- (2) there is an actual break away static line;
- (3) using the OK sign, trace the static line from the snap fastener to the first stow on the container;
- (4) ensure that the stows of the drogue chute static line are secure;
- (5) visually check the Load Transfer Device (LTD), making sure that it is locked;
- (6) check the APR making sure that the withdraw hook is secure, the attaching points are secure, and the arming pin is in place;
- (7) check the riser group making sure that they are hooked on the D-rings; and
- (8) overall condition of the cylinder.

41. Sometime after dressing commences the loadmaster will remove one of the cylinder's cargo straps. However, the FJM must confirm this happens. The FJM will carry on with normal duties up to the **ARM**, then:

- a. after giving the **ARM**, the FJM will check all parachutists;
- b. the FJM then arms the cylinder, checking to ensure that the APR did not fire, and gives the arming pin to the Number 1 jumper;
- c. at the **2 MINUTES** warning, the loadmaster will remove the other cargo strap (FJM must confirm this happens);
- d. at the **1 MINUTE** warning, Number 1 and Number 2 will hold back the cylinder while the loadmaster or FJM cuts the tubular nylon cord as close to the D-ring as possible (FJM will confirm this happens);
- e. on the **STAND BY**, the Number 1 and Number 2 will push the cylinder aft so that one quarter of the cylinder is over the edge of the ramp and will hold it there; and
- f. on the **GO!**, Number 1 and Number 2 will push the cylinder out of the aircraft and await the FJM signal to exit.

NOTE

No exits will be made until the FJM sees that the cylinder static line has broken free.

DISPATCHING NUMBERS 1 AND 2 TANDEM CYLINDERS

42. Two cylinders in tandem are dispatched as follows:
- a. all procedures are the same as those described in paragraph 41 up to the **15 SECOND** warning (**STAND BY**);
 - b. on the **15 SECOND** warning, the Number 1, being the closest to the ramp edge, will push his cylinder so that it is approximately one quarter of the way out of the aircraft and will hold it there;
 - c. Number 2 will push his cylinder to the point where it makes gentle contact with the drogue parachute of the first cylinder;
 - d. on the command **GO!** from the FJM, Number 1 will push his cylinder out and Number 2 will push his cylinder aft, passing it to Number 1, who will push it out of the aircraft; and
 - e. on seeing the cylinder's static lines break away, the FJM will dispatch the MFP group.

DUAL DISPATCHING AND DUAL TANDEM DISPATCHING OF CYLINDERS

43. Procedures for dispatching dual tandem cylinders are as follows:
- a. all procedures are the same as those described in paragraph 41 up to the **15 SECOND** warning (**STAND BY**);
 - b. on the **15 SECOND** warning, the port side only will push their cylinders over the edge of the ramp and await the command **GO!**;
 - c. the starboard side will push their cylinders sufficiently aft so that the first cylinder is no further aft than the edge of the ramp, the Number 2 starboard ensuring that his cylinder is making gentle contact with the drogue parachute of the first cylinder;
 - d. on the command **GO!**, the port side will dispatch their cylinders, followed by the starboard side; and
 - e. the remaining procedure is the same as for the dispatch of tandem cylinders.

SECTION 5 MISCELLANEOUS DUTIES

CALCULATION OF THE HIGH ALTITUDE RELEASE POINT (HARP)

44. Procedures for calculating the HARP are outlined in *1 CAD Orders 2601 Volume Two*. A synopsis of these procedures is outlined below.

45. There are two kinds of values used while doing the HARP, described as “Known Values” and “Unknown Values”.

46. “Known Values” can usually be obtained from the Deputy Airborne Force Commander and they include:

- a. opening and jump altitude;
- b. type of aircraft; and
- c. location of the target on the Drop Zone (IP).

47. The weather section will provide wind speed and wind direction from ground level up to jump altitude in thousand foot intervals.

48. “Unknown Values” will be calculated using the information obtained from the weather section, as follows:

- a. canopy drift (CD);
- b. direction of canopy drift (DCD);
- c. freefall drift (FFD);
- d. direction of freefall drift (DFFD); and
- e. forward throw (found using the type of aircraft).

49. After obtaining all wind and direction data from the weather section from ground level to exit altitude, the FJM may begin calculating HARP.

PLOTTING HARP RESULTS ON MAP

50. The following symbols are used when plotting results:

- a. $+$ is the symbol used to mark the IP on the map;
- b. $\triangle$ is the symbol used to mark the opening point;

- c.  is the symbol used to mark the end of the projection; and
- d.  is the symbol used to mark the exit point.

51. Plotting results is as follows:

- a. using the information obtained from the HARP, plot canopy drift from the IP in the appropriate direction to the opening point;
- b. plot freefall drift from the opening point to the end of the projection;
- c. draw a line from the end of the projection to the IP; and
- d. on that line, at the appropriate distance from the end of the projection, plot the exit point.

52. The release point should be at the grid where the projection on the map was plotted

CHAPTER 11

MILITARY FREEFALL PARACHUTING FROM AIRCRAFT OTHER THAN CC-130

SECTION 1

INTRODUCTION

GENERAL

1. Although the CC-130 is the primary aircraft for the operational delivery of the Military Freefall Parachutist (MFP) at present, various other aircraft may be used for operational or training jumps. Such aircraft can be broken down into two types:
 - a. **Type A.** Aircraft which are so equipped and crewed that the aircrew can compute the High Altitude Release Point (HARP) from data obtained from onboard equipment; and
 - b. **Type B.** Aircraft which are not so equipped or crewed.
2. When Type B aircraft are used, the location of the Parachute Opening Point (POP) and HARP will be determined through the use of Wind Drift Indicators (WDI) dropped from POP altitude.
3. A rate one turn is defined as a two minute, 360 degree turn used to estimate drift.

AIRCRAFT SUITABILITY

4. Any aircraft which incorporates the following characteristics is considered suitable for MFP delivery:
 - a. an exit through which a parachutist may leave the aircraft, in flight, and not be imperilled by collision with any part of the aircraft or by propeller, rotor or jet wash;
 - b. sufficient space to carry out aircraft drill safety checks; and
 - c. a means of communication between the Aircraft Captain and jumpmaster.

PERSONNEL EQUIPMENT LOADS

5. Parachutists will jump with equipment loads only from aircraft in which the exit can be made from an erect standing position.

SECTION 2 AIRCRAFT DRILL

GENERAL

6. Although the movement of parachutists may be hindered due to the restricted cargo compartment of some of these aircraft, the aircraft drill detailed in Chapter 14 will be adhered to when jumping from training aircraft.

LOADMASTER DUTIES

7. The loadmaster is responsible for:
- a. relaying all jump commands and other instructions given by the Aircraft Captain to the jumpmaster; and
 - b. opening the door or ramp prior to the **2 MINUTES** warning.

FREEFALL JUMPMaster DUTIES

8. The Freefall Jumpmaster (FJM) is responsible for the duties detailed in Chapter 10. In addition, the FJM is responsible for dropping WDIs as detailed in section 3.
9. On the **2 MINUTES** warning, the FJM will position himself close to the door/ramp, facing the parachutists.
10. On receiving permission to drop, the FJM will ascertain when the aircraft is over the release point and order the parachutists to **GO!**. He will dispatch the parachutists and exit after the last parachutist.

SECTION 3 SPOTTING

GENERAL

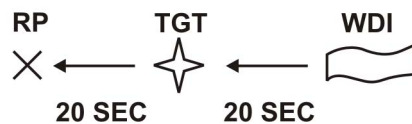
11. With the increased use of aircraft other than the CC-130, FJMs must be familiar with spotting and the procedures for guiding aircraft to a release point. When using smaller aircraft which are not equipped with complex navigation aids, the FJM may be tasked to select the release point and dispatch parachutists safely over the right area.
12. "Spotting" is the art of guiding an aircraft to a predetermined release point so parachutists may land within the Drop Zone. Wind normally moves in layers at varying speeds and in different directions. To assess how far the parachutist is going to drift under canopy, it is necessary to measure the mean effect of the wind from opening altitude down to ground level.

13. The most practical and widely practised means of determining drift is the WDI method. The WDI is constructed of crepe paper and is 6 m (21 ft) long and 25.4 cm (10 in) wide, and is weighted at one end with approximately 55-70 gm (2-2.5 oz). When dropped, WDIs should descend at approximately 300 m (1000 ft)/min. This is an accurate representation of the speed at which the average parachutist will descend under canopy.

DETERMINING A RELEASE POINT

14. When dispatching MFPs, the Aircraft Captain has the option of either:
 - a. determining his own Release Point (RP), in which case all the FJM will do is dispatch the WDIs on command; or
 - b. task the FJM to determine an RP, in which case the FJM must be thoroughly familiar with the procedure for determining an RP and guiding the aircraft to it.
15. To determine the RP it is necessary to guide the aircraft into the wind over the target (T) at opening altitude, and carry out the following steps:
 - a. release WDIs over target;
 - b. start a stopwatch;
 - c. orbit aircraft so WDIs can be observed;
 - d. stop stopwatch as WDIs hit the ground;
 - e. ensure proper flight time 300 m (1000 ft)/min +/-20 sec;
 - f. guide aircraft over WDIs over target and time the distance;
 - g. keeping the aircraft on same bearing fly same distance to the other side of the target;

EXAMPLE



- h. release confirmatory WDIs, which should land close to the target;
- i. start stopwatch;
- j. stop stopwatch as WDIs hit ground;
- k. ensure proper flight time; and

- l. adjust tentative RP if necessary.

NOTE

If confirmatory WDIs are off target more than 200 m (650 ft) repeat steps g-l.

16. WDIs will be dispatched:
 - a. prior to the first personnel drop of each day;
 - b. whenever there is a major wind change of 4 kts or 30 degrees;
 - c. after a break in jumping of 90 min or more; and
 - d. whenever there is a change in drop altitude of 300 m (1000 ft) or more.

NOTE

If the aircraft is unable to fly into the wind for whatever reason (e.g. air traffic, winds too high), WDIs can still be thrown, ensuring that they are released over the target.

AIRCRAFT PROCEDURE FOR SPOTTING

17. A normal aircrew briefing will be given at the beginning of each day. At this time the FJM must review the spotting procedure with the aircrew.

FREEFALL JUMPMaster KIT

18. Prior to any jump, the FJM shall draw and have on board the aircraft the FJM kit containing:
 - a. sheath knife;
 - b. if feasible and desirable, a spare CT-6 and APR;
 - c. altimeter;
 - d. spare helmet and goggles;
 - e. flat tip screwdriver;
 - f. roll of gun tape;

- g. roll of 6 mm (1/4 in) cotton webbing;
- h. retainer bands
- i. map of Drop Zone;
- j. 9 wind drift indicators (WDI) if required; and
- k. any other articles that the FJM may require for a specific purpose.

COMMUNICATIONS

19. Whenever dispatching from a non-standard aircraft the FJM should be in direct communication with the Aircraft Captain through the intercom system at all times.

20. Once the post take-off check is complete, the FJM will prepare WDIs, if not already done. Once the "OK" is received from the Aircraft Captain, the FJM can open the door and locate the target area if possible. At this time the Aircraft Captain should be making his approach and only minor corrections, if any, should have to be made.

21. The sequence of communications between the Aircraft Captain and the FJM should as follows:

- a. FJM to Aircraft Captain. **1 MINUTE FOR WDI RUN;**
- b. Aircraft Captain to FJM. **1 MINUTE, WINDS xx KTS, CLEAR TO DROP or STOP DROP;**
- c. FJM to Aircraft Captain. **15 SECONDS;**
- d. Aircraft Captain to FJM. **ACKNOWLEDGE;**
- e. FJM to Aircraft Captain. **GO, WDIs AWAY;**
- f. Dispatch WDIs.
- g. Inform Aircraft Captain of impact point;
- h. Aircraft Captain to FJM. **ON RUN IN FOR CONFIRMATION WDIs;**
- i. FJM to Aircraft Captain. **1 MINUTE FOR CONFIRMATION WDIs;**
- j. Aircraft Captain to FJM. **1 MINUTE, WINDS xx KTS, CLEAR TO DROP or STOP DROP;**
- k. FJM to Aircraft Captain. **15 SECONDS;**
- l. Aircraft Captain to FJM. **ACKNOWLEDGE;** and

- m. FJM to Aircraft Captain. **GO, WDIs AWAY.**
22. If confirmation WDIs are good, the FJM will close the door and ask permission to carry on with FJM duties.
23. As P-Hour approaches communication between the Aircraft Captain and the FJM should be as follows:
- a. Aircraft Captain to FJM. **2 MINUTES;**
 - b. FJM to Aircraft Captain. **1 MINUTE FOR LIVE DROP;**
 - c. Aircraft Captain to FJM. **1 MINUTE, WINDS xx KTS, CLEAR TO DROP or STOP DROP;**
 - d. FJM to Aircraft Captain. **15 SECONDS;**
 - e. Aircraft Captain to FJM. **ACKNOWLEDGE;**
 - f. FJM to Aircraft Captain. **GO!;** and
 - g. FJM to Aircraft Captain. Number of jumpers dispatched followed by **CLEAR** or **HUNG-UP.**
24. The FJM must remember the following points:
- a. If the FJM jumps, the loadmaster will call **CLEAR.**
 - b. All communications between FJM and Aircraft Captain will be acknowledged.
 - c. The Aircraft Captain is responsible for the safety of the aircraft and everyone in it at all times. The FJM is responsible for the safe and orderly dispatch of the parachutists.
 - d. Any member of the flight crew or the FJM can call a **STOP DROP** at any time during these procedures.

CHAPTER 12

MILITARY STATIC LINE SQUARE EQUIPMENT

SECTION 1

THE CT-6 STATIC LINE PARACHUTE ASSEMBLY

GENERAL

1. The CT-6 static line parachute assembly is the standard Military Static Line Square Parachuting Equipment used within the Canadian Forces.
2. The CT-6 static line parachute assembly is a back type assembly, with canopies mounted in a reserve over main configuration. The pack assembly is held to the body by a fully adjustable three point connection, ejector snap hook and V-ring harness, complete with D-ring load attachment points. The main and reserve canopies are identical, i.e. Ram-Air seven cell configuration, with individual trim setting and full steering capabilities. They are deployed from their individual pack compartments by a pilot chute and deployment bag system. The main canopy is activated by a static line. The reserve canopy can be activated automatically during the main cutaway sequence, if the reserve static line is connected. When the reserve static line is not connected, the reserve canopy must be activated manually by the reserve ripcord.

COMPONENT PARTS OF THE CT-6 PARACHUTE ASSEMBLY

3. The main component parts of the CT-6 static line parachute assembly are:
 - a. canopy assembly;
 - b. drogue parachute;
 - c. static line;
 - d. outer deployment bag;
 - e. inner deployment bag;
 - f. drogue/slider control line;
 - g. reserve deployment system:
 - (1) pilot chute;
 - (2) bridle and deployment bag; and
 - (3) reserve static line;
 - h. pack and harness assembly;

- i. main riser assembly, left and right hand;
- j. main cutaway ripcord assembly;
- k. reserve ripcord assembly;
- l. safety stow loop assembly;
- m. main closing loop assembly;
- n. reserve closing loop assembly;
- o. reserve bridle locking loop assembly; and
- p. parachute travel bag.

CANOPY ASSEMBLY

4. The main and the reserve canopies are identical Ram-Air designs, with a seven cell configuration. The flying surface is 34.37 m² (370 ft²). The canopy is constructed of Exacta silver grey nylon cloth, with an air permeability of 0.5 to 5.0 feet³ per minute per square foot (ft³/min/ft²). The Ram-Air canopy is similar to an aircraft wing, with upper and lower control surfaces connected by a series of ribs. This construction forms a rectangular shaped canopy with seven dual openings at the leading edge, known as cells. The cells create air pressure between the upper and lower control surfaces, giving the canopy its shape and glide characteristics.

5. All but one of the canopy inner ribs have three elliptical apertures cut into them to allow span-wise air flow. Rib number eight has only two apertures. The two outer ribs and six alternative ribs through the canopy have load distribution tapes and attachment loops for suspension line attachment. A stabilizer panel is attached to each outside rib of the canopy, and is also attached to the outboard sets of suspension lines.

6. The canopy suspension lines are made of white Dacron cord, 272 kg (600 lb) minimum breaking strength (MBS). They are attached to the outside ribs and every alternate rib, at four chord-wise (front to back) attachment points on each rib.

7. Two steering lines, attached at the risers by guide rings, are used to manoeuvre the canopy. Steering lines are formed when five separate lines are cascaded into one main steering line. The steering lines are attached to the trailing edge of the canopy and run to the back-side of the respective rear riser.

8. A slider is used, on deployment of the parachute, for reefing. It is rectangular in shape, made of silver grey Exacta material reinforced with Mil-W-4088 Type VIII black nylon webbing, with a #8 grommet in each corner and a #2 grommet installed in the centre.

STATIC LINE

9. In the static line configuration, the main parachute assembly is deployed by a static line anchored to the aircraft by a snap hook complete with safety pin. The static line is 447 cm (14 ft 8 in.) long and is made from Type VIII nylon webbing that is folded and sewn finished. Two static line pins are used to close the main canopy compartment of the pack and harness.

OUTER DEPLOYMENT BAG

10. The outer deployment bag is made from black nylon cloth. The loop of the drogue parachute is passed through a grommet on top of the outer deployment bag, then securing it to the static line attachment loop. The outer deployment bag has attachment points for elastic stowage bands, which are used to lock the bag closed, and for stowing the suspension lines.

DROGUE PARACHUTE

11. The drogue parachute assists in the deployment of the main canopy. It is 89 cm (35 in) in diameter and is made from silver grey nylon cloth and nylon mesh. A centreline passes through the centre of the drogue from the bottom loop, then through the grommet at the top of the drogue. The centreline connects a tie strap, which is used to connect the drogue to the attachment loop on the outer deployment bag. A loop at the bottom of the drogue connects to the drogue/slider control line.

INNER DEPLOYMENT BAG

12. The inner deployment bag is made from olive drab cotton cloth. A grommet on top of the inner deployment bag allows the drogue/slider control line to pass through the inner deployment bag. The inner deployment bag has attachment points for the safety stow loop and the elastic stowage bands, which are used to lock the inner deployment bag closed and for stowing the drogue/slider control line.

DROGUE/SLIDER CONTROL LINE

13. The drogue/slider control line connects the canopy slider to the drogue parachute. A loop at the opposite end attaches to the outer deployment bag. Two cotton fabric buffer sleeves provide protection from friction burns during deployment. A bag stop from the drogue ends prevents the deployment bag from fouling the canopy during deployment.

RESERVE DEPLOYMENT SYSTEM

14. The reserve pilot chute consists of a 14.6 cm (5.75 in) diameter crown, and 48 cm (19 in) spiral spring, and is covered with a combination of Exacta silver grey nylon fabric and large hole

nylon mesh fabric. The reserve pilot chute is a permanent component of the deployment bag and bridle.

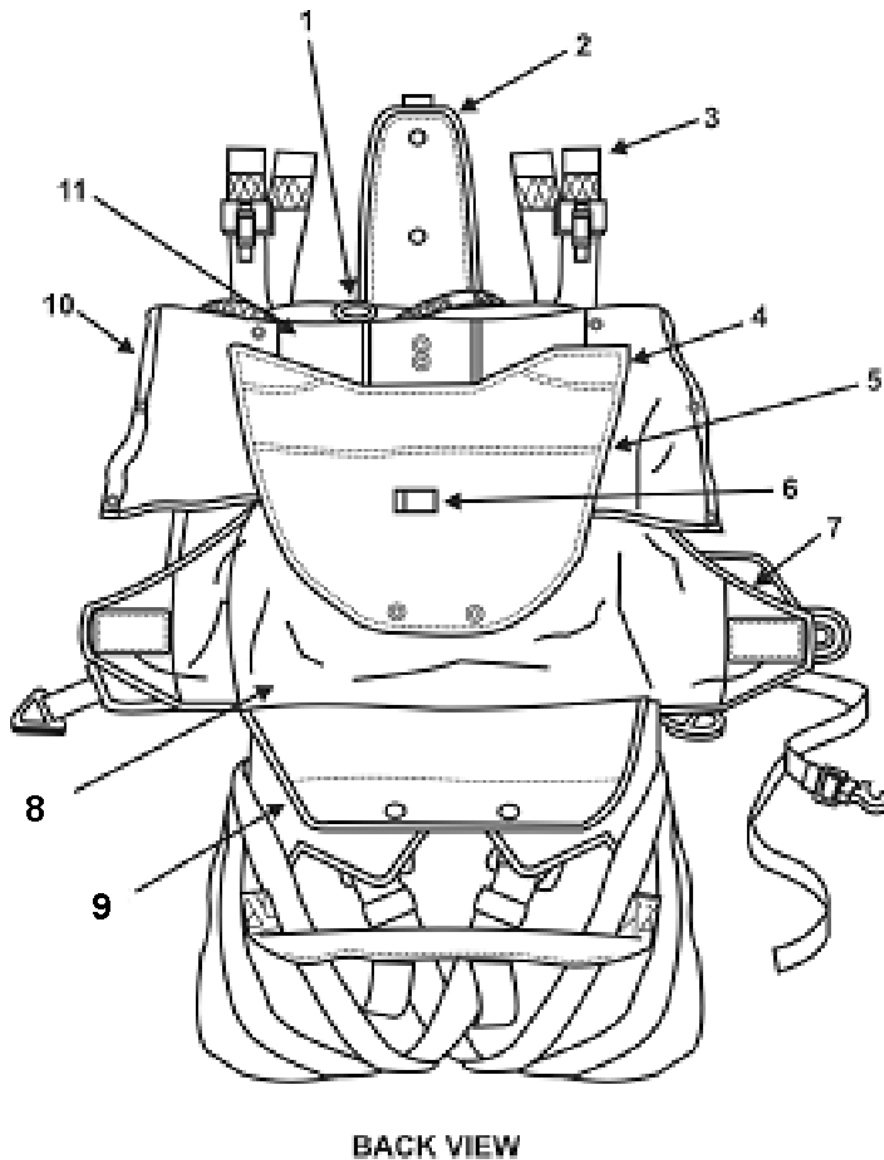
15. The bridle and deployment bag consists of a 5 cm wide by 5.5 m long polyester webbing (2 in by 18 ft) attached to the reserve pilot chute with a larkshead knot, with the opposite end sewn to the reserve deployment bag. Bridle assistor pockets are sewn on the bridle to assist deployment. The reserve deployment bag, constructed of MIL-C-7219 black nylon fabric, measures 30.5 by 40.6 cm (12 by 16 in).

16. The reserve static line pulls the reserve ripcord during cutaway of the main canopy. It is 37.5 cm (14.75 in) long and is made from MIL-T-5038 Type IV yellow nylon tape and hook and pile fasteners, complete with a steering ring at each end.

PACK AND HARNESS ASSEMBLY

17. The pack and harness assembly is a reserve over main canopy type, made of olive drab Cordura nylon cloth, 284 g/m² (12 oz/yd²) (see Figures 12-1 and 12-2). The reserve canopy compartment is a two pin closure type, with four closure flaps, and a reinforced pin flap and securing tab to protect the pin closure area. The main canopy compartment is a two pin closure type, with four closure flaps, and a reinforced pin flap and securing tab to protect the pin closure area. On the right side flap is a steel plate and cover flap for the attachment of the APR power housing. On the right wing flap is a pocket for stowing the APR. The centre flap comprises a main flap, closure flap, protector cover and static line cover flap. The back pad is part of the pack, and gives comfort and protection for the back and shoulders. The harness is made of 4.4 cm (1.75 in) wide Type VII olive drab nylon webbing, 2,721 kg (6,000 lb) MBS, and is an integral part of the pack and back pad. Fitted as part of the harness are:

- a. hardware for the three point ejector snap hooks and V-ring style connection;
- b. hardware for the three ring canopy release;
- c. D-rings for equipment carrying;
- d. adjusters for harness adjustment;
- e. comfort pads for the seat section;
- f. comfort pads for each ejector snap hook and V-ring connection;
- g. pockets and housings for the main, reserve and cut-away ripcords; and
- h. an adjustable waist band.

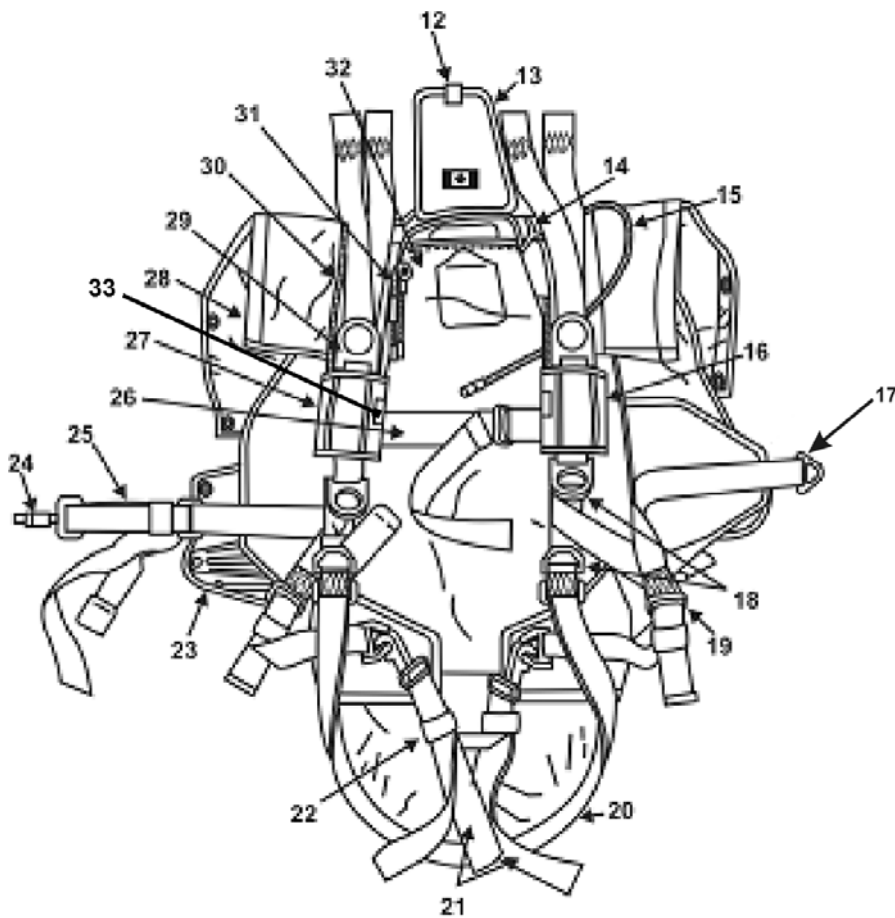


BACK VIEW

Legend:

1. Reserve Static Line Guide Ring
2. Reserve Pin Flap
3. Reserve Risers.
4. Reserve Parachute Compartment Bottom Flap
5. Centre Flap Assembly
6. Static Line Snap Hook Stow Loop
7. Main Side Flap
8. Main Parachute Compartment
9. Main Parachute Compartment Bottom Flap
10. Reserve Side Flap
11. Reserve Parachute Compartment

Figure 12-1: Pack and Harness Assembly



FRONT VIEW

- Legend:
- 12. Securing Tab
 - 13. Reserve Top Flap
 - 14. Reserve Ripcord Housing
 - 15. Main Cutaway Ripcord Housing
 - 16. Reserve Ripcord Handle Pocket
 - 17. V-Ring
 - 18. Equipment Rings
 - 19. Adjuster
 - 20. Saddle
 - 21. Leg Straps
 - 22. Keeper
 - 23. AOD Flap
 - 24. Ejector Snap
 - 25. Waist band
 - 26. Chest strap
 - 27. Main Ripcord Handle Pocket
 - 28. Main Riser Cover Flap
 - 29. Ring No 1
 - 30. Main Ripcord Housing
 - 31. Main Cutaway Ripcord Housing
 - 32. Back Pad
 - 33. Main cutaway handle pocket

Figure 12-2: Pack and Harness Assembly

RISERS

18. The main riser assembly is made from MIL-W-27265 Type VII olive drab nylon webbing. Each riser strap is 91.4 cm (36 in) long. The bottom end of each riser incorporates two rings of the three ring release system, a grommet, and a locking loop. A fluted channel is sewn to the back of the rear riser strap for stowing the main cutaway ripcord cable. The back of the rear riser also incorporates steering line keepers for stowing excess steering line, and steering line toggle keepers for stowing steering line toggles. The reserve static line connector quick release is attached to the left hand riser. Trim tabs sewn to the back of the front riser strap are provided for canopy trim adjustment.

RIPCORD

19. The reserve ripcord assembly consists of a 76 cm (30 in) long stainless steel braided cable with two locking pins. The cable is secured to a curved ripcord handle with two swaged balls.

SECTION 2 OPERATION

MAIN CANOPY

20. The parachutist ensures that the snap hook is anchored to the aircraft and the safety pin is inserted. As the parachutist falls away from the aircraft the static line is pulled from the stows on the outside of the pack. The pins are pulled from the main closing loop. The side, top and bottom separate allowing the outer deployment bag to be pulled from the main parachute compartment.

21. The suspension lines are extracted from the outer deployment bag elastic stowage bands as the outer deployment bag is pulled away from the pack.

22. When the suspension lines are at full stretch, removal of the last four suspension line stows unlocks the outer deployment bag.

23. The inner deployment bag is extracted from the outer deployment bag. The drogue/slider control line upon full extension releases the main canopy from the inner deployment bag.

24. The drogue parachute is pulled from the elastic stow loop on the outer deployment bag. The parachutist is now free from the static line and the aircraft. This allows the drogue parachute to fill with air.

25. The drag load from the drogue parachute now permits deployment/inflation of the canopy similar to freefall configuration, except that the slider is now assisted by the drag force of the drogue parachute.

26. By pulling down on the steering line toggles, the parachutist unlocks the deployment brakes and becomes fully capable of controlling the canopy during descent by using the steering lines.

RESERVE CANOPY

27. Should the main canopy malfunction, the parachutist can activate the reserve canopy by either of the following methods:

- a. Pulling the main cut-away ripcord jettisons the main canopy and risers at the three ring release system junction on the main harness. If the reserve static line is connected, it automatically pulls the reserve ripcord, thus removing the pins which lock the flaps of the reserve canopy pack compartment closed from the soft cone closure loops. If the reserve static line is not connected, the reserve ripcord must be pulled to activate the reserve canopy.
- b. Pulling the reserve ripcord extracts the pins, which lock the flaps of the reserve canopy pack compartment closed, from the soft cone closure loops.

28. The deployment sequence of the reserve canopy is the same as that of the main canopy. The 5.5 m (18 ft) long bridle is fixed to the deployment bag, allowing separation in case the parachutist becomes entangled with the main canopy. The reserve deployment bag falls away from the reserve parachute assembly, allowing parachute deployment.

29. The reserve and main canopies are identical; therefore the function of the slider, and the use of trim loops and steering toggles, are also identical.

SECTION 3 MISCELLANEOUS CT-6 STATIC LINE SQUARE EQUIPMENT

ALTIMETER

30. The altimeter is the primary instrument used by parachutists to determine altitude above ground level (AGL). Each model works on the same basic principle. As the altimeter passes through different altitudes, the altimeter's aneroid barometer measures the difference in ambient air pressures. The pressure changes are indicated on the altimeter dial by the altitude indicator needle.

31. The altimeter measures altitude from a pre-set zero altitude, and has the following characteristics:

- a. dial graduated from 0 to 15,000 ft AGL;
- b. sub-graduations every 250 ft;

- c. a red portion, meaning danger, and a yellow portion, warning, are displayed so that;
 - (1) the red portion is between 2,500 and 0 ft; and
 - (2) the yellow portion is between 3,000 and 2,500 ft.
- d. an adjustment knob located on the side of the altimeter;
- e. a light for use at night; and
- f. Velcro wristband.

SETTING THE ALTIMETER

32. Prior to emplaning, the altimeter must be adjusted so that it will register zero on the Drop Zone. The following three circumstances will determine the setting of the altimeter prior to take-off:

- a. if the Drop Zone is at the same altitude as the point of departure the needle will be set at zero;
- b. if the Drop Zone is lower in elevation than the point of departure the needle will be advanced clockwise by the amount of the difference in elevation; and
- c. if the Drop Zone is higher than the point of departure the needle will be reset counter-clockwise by the amount of the difference in elevation.

HELMET, GOGGLES AND GLOVES

33. The Protec helmet and civilian pattern freefall goggles are the standard static line square helmet and goggles. Gloves must be worn when engaging in static line square operations or training.

ILLUMINATING DEVICES

34. During night operations, illuminating devices are required:

- a. to enable the parachutist to read the altimeter; and
- b. to enable parachutists to see each other during parachute descent.

35. A chemical light stick is used as an illuminating device. Light sticks are secured on the wrist altimeter with elastic bands, one to each foot with 6.6 mm ($\frac{1}{4}$ in) cotton web, and one on top of the helmet with gun tape.

SECTION 4

DONNING AND FITTING

36. Prior to getting dressed the parachutist will inspect the CT-6 static line parachute assembly to ensure the following:

- a. Remove the assembly from the flyers kit bag. Fold and store the bag behind the comfort pad.
- b. Check the right side three ring release system to ensure that the cutaway cable runs through the riser release loop and the excess is stored in the cable tunnel.
- c. Rotate the small ring one quarter turn to ensure the ring is circular and undamaged.
- d. Ensure the split ring is taped (if applicable).
- e. Check the main cutaway pillow (pillow) to ensure the cables are in the pillow and not twisted, remove the pillow from the pocket ensuring the serviceability of the Velcro, and reinstall.
- f. Check the left side three ring release system as for the right three ring release, ensure the cutaway lanyard snap is attached, and that the reserve static line shackle is attached to the reserve static line ring.
- g. Check the chest strap and buckle for serviceability.
- h. Check the reserve ripcord handle to ensure that it is not stitched. This is done by running a finger around the ripcord handle inside the pocket.
- i. Check the waistband and quick ejector snap hook for serviceability.
- j. Check the leg straps and quick ejector snap hooks for serviceability.
- k. Turn the parachute around and check the general condition of the main and reserve container.
- l. Open the reserve ripcord protector flap and check to ensure that the ripcord pins are fully home and the cable moves freely within the cable housing.
- m. Check to see that the reserve cable runs through the reserve static line guide ring and the reserve ripcord guide ring, the cable is over the top of the cutaway housing, and ensure the rigger's seal is installed.
- n. Check the stowage of the static line alternating from side to side. Lift the corners of the main flap and check to ensure the static line pins are fully home. Ensure the rigger's seal is installed.

DON AND FIT THE CT-6 STATIC LINE ASSEMBLY

37. The parachutist will not have to use the buddy system to get dressed. He will:
- a. adjust his harness using the adjustable buckles on the main lift web and diagonal back straps;
 - b. sitting down, place his arms through the main lift web like he would put on a jacket;
 - c. attach his chest strap and secure the excess strap using the retaining band;
 - d. stand up and attach both leg straps, making sure that there are no twists, and push on the quick ejector snap once again, securing the excess straps with the retaining bands;
 - e. bend over and make sure that he has the parachute as high as possible before attaching the waistband; and
 - f. secure the excess strap with the retaining band.
38. At this point the jumper is ready for the rigger's check. Once he has been checked, the jumper will put his altimeter on and have his helmet, gloves and goggles by the side ready for the jumpmaster (JM) check.

DONNING THE INSTRUMENTS

39. Before boarding the aircraft the jumper will wear his instruments as follows:
- a. gloves on with altimeter on the left wrist; and
 - b. helmet on with goggles (optional) raised on the helmet.

SECTION 5 THEORY OF FLIGHT FOR RAM-AIR CANOPIES

GENERAL

40. Ram-Air canopies are aerodynamically stiffened fabric airfoils, which generate lift by forward flight through the air. The relative lengths of the suspension lines maintain the airfoil angle of attack, such that the leading edge of the wing is slightly lower than the trailing edge portion. Thus, the airfoil shaped surface of the canopy is forced to slide or plane through the air, similar to a glider in descending flight. Ram-Air wings generate lift in the same manner, relying on the reduced pressure of the airflow over the curved upper surface.

41. Although the early work and basic principles of Ram-Air inflated airfoil parachutes must be credited to Domina Jalbert, Para-Flight Incorporated alone was responsible for advancing the technology of high performance gliding parachutes to the point where practical personnel parachuting usage became feasible.

42. Three extremely important proprietary developments were responsible for the overwhelming success of Ram-Air parachutes:

- a. First, the unique configuration was based on the concept of direct suspension line attachment to the canopy lower surface, eliminating the bulk and extra drag produced by the then-accepted method of external load distribution members or "V" tabs. This direct approach system of carrying the payload produces an extremely efficient and aerodynamically clean high glide configuration.
- b. Secondly, the successful application of the very effective pilot chute/slider controlled inflation retardation system, which provides a unique solution to the otherwise intolerable high opening shock load inherent in Ram-Air type parachutes. Simply stated, the drag forces exerted by the pilot chute and the slider during deployment are transferred through the mechanics of the system in such a way as to progressively retard the otherwise explosive inflation rate of the canopy.
- c. Thirdly, the deployment brake system plays a very important part in the deployment process by reducing forward surging of the canopy.

43. The leading edge of any Ram-Air canopy (wing) is open or physically missing, forming intakes, which allow the cells to be Ram-Air inflated. Internal air pressure causes a small amount of stagnant air to be pushed ahead of the airfoil, forming an artificial leading edge. The focal point of this stagnant air acts as a true leading edge, deflecting the relative wind above and below.

44. Drag, which acts in a direction parallel to the relative wind, is the only force tending to retard the forward motion of the wing through the air. Gravity, plus the resultant sum of these aerodynamic forces on the upper surface, acts to pull the canopy through the air, thus the flat glide angle.

45. Application of brakes on the canopy causes the trailing edge to be deflected downward, creating additional drag and a loss of gliding speed. This also produces a proportionate loss in generated lift, resulting in a steeper glide-angle. As full brakes are reached, the wing ceases to generate dynamic lift, the result being an increased rate of descent, which is associated with a nearly vertical descent angle. Depressing the brakes beyond full brakes will cause the parachute to enter a stall.

46. Differential application of brakes produces an unbalanced drag force at the trailing edge, resulting in a yaw turn toward the side with the highest drag. Since the slow side generates less lift, it tends to drop slightly in a shallow banking motion, much like an airplane. This bank angle will increase as the toggle displacement is differentially increased.

FLIGHT CHARACTERISTICS

47. Although Ram-Air parachutes are fairly docile and forgiving, it still must be emphasized that they are high performance gliding wings. In the hands of an inexperienced jumper, or one ignorant of proper handling techniques, they are, by virtue of their high performance, potentially dangerous. **It is therefore absolutely imperative that the parachutist possess a working knowledge of Ram-Air flight capabilities and limitations, and that he fully understands handling techniques, before jumping this parachute.**

48. Handling techniques are not overly complicated, but since a Ram-Air canopy is basically a fabric wing section, a very basic knowledge of aerodynamics is necessary in order to better understand flight and handling characteristics.

49. As mentioned previously, Ram-Air canopies glide or plane through the air at about 30 to 50 km/h (20 to 30 mph). They always fly at this speed regardless of wind conditions, except when brakes are applied.

50. This flying speed is called AIR SPEED, and remains constant regardless of whether the parachute is headed upwind, downwind or crosswind. The only variation in flying upwind or downwind is a change in ground speed, which is often mistaken for a change in air speed. Wind only affects ground speed and has no effect on air speed.

51. The air speed on all Ram-Air canopies is controlled with brakes using conventional control lines and toggles. The same toggle travel on Ram-Air canopies will cause a speed reduction of approximately 19 km/h (12 mph).

52. Unlike conventional steerable canopies, there is almost no surge on deployment, and there is no wind noise at all until after the deployment brakes are released. For those not previously exposed to flight characteristics of Ram-Air canopies, the wind noise created by forward speed can be used as a rough "air speed indicator". The lack of wind noise can be used as a stall warning.

53. Once you have grown accustomed to the canopy you will no longer even notice the wind noise, you will have learned to fly the canopy by feel, and you will have ample stall warning. Most Ram-Air canopies are docile and will signal their intention in advance. There is sufficient feel on the toggles to sense canopy reaction such as the "shudder" that precedes a stall.

54. It is important to remember, when controlling the canopy's flight, that the rate of control motion from one position to another is as critical as the relative position of the toggles.

55. Due to the high penetrating ability of Ram-Air canopies, it is often difficult to determine wind direction without the aid of a wind sock or smoke on the ground. All landings must be made upwind to minimize ground speed.

56. Ram-Air canopies have the same control (toggle) travel as conventional parachutes but control two to three times the air speed, making any control motion two to three times as effective and sensitive.

57. A Ram-Air canopy moving with and through a mass of air is much the same as a boat moving with and through a mass of water (river). If a speed boat has a constant speed of 30 km/h (20 mph), this is comparable to the air speed of an average Ram Air canopy. If the boat is in a river flowing at 30 km/h (20 mph), the same conditions exist as if you were flying a Ram-Air canopy in 30 km/h (20 mph) winds. If you point the boat downstream, you will be moving through the water at 30 km/h (20 mph)—but your speed relative to the river bank would be 60 km/h (40 mph). If you turned the boat upstream, you would still be moving at 30 km/h (20 mph) but your speed relative to the river bank would now be zero. Facing the Ram-Air canopy into a 30 km/h (20 mph) wind would also yield zero ground speed.

TURBULENCE AND RAM-AIR PARACHUTES

58. Ram-Airs are radically different from conventional or round parachutes in all respects, not just appearance. The square parachute in reality is closer to a hang glider than a conventional parachute. The difference is that a conventional parachute produces drag and almost no lift, while Ram-Air parachutes in full flight generate much more lift than drag.

59. As the trailing edge is deflected with the control lines, lift is gradually reduced and drag is increased. If this reduction of lift is gradual the canopy can be slowed to zero airspeed or vertical descent, at which point it will be generating a lot more drag than lift. If the airflow is allowed to reverse itself, the canopy will stall.

60. For each airflow design there is a range of airflow angles that the canopy can tolerate, without either stalling or the airfoil shape being severely distorted due to reduction or elimination of the Ram-Air that pressurizes the canopy.

61. Without Ram-Air pressurization, there is no airfoil to generate lift. As long as the relative wind or airflow over the canopy is within the -10° to about -90° segment, the canopy remains semi-rigid and retains the airfoil shape. If the airflow over the canopy changes more than -90° or less than -10° , the canopy will not fly and will not maintain the airfoil shape.

62. Turbulence will affect Ram-Air parachutes and the way they perform. Turbulence is also known as “eddies” or “rotors”. Turbulence may be produced in various dimensions. It may have a minimal effect on a parachute or may be large enough to cause the canopy to collapse. The amount of turbulence may affect a Ram-Air parachute for a few metres to several hundred metres. Turbulence of the magnitude that can affect a Ram-Air parachute is caused by:

- a. solid objects like trees, hills, buildings, etc. obstructing the airflow (wind);
- b. static instability of the air, (due to thermal activity); or
- c. wind shear (due to differences in velocity between two layers of air).

63. The type of turbulence described in subparagraph 62c is the least likely to be encountered by jumpers and, except in extreme cases like cold or warm fronts moving through the area, would pose little danger to the Ram-Air jumper.

64. The type of turbulence described in sub-paragraph 62b is associated with thermal activity. It is caused because a rising mass of warm air has momentum. This type of turbulence is very common on sunny days all year round. Most commonly, this type of turbulence is only dangerous to the Ram-Air jumper if it is associated with relatively high winds. Turbulence that the jumper should be most concerned with is caused by solid objects obstructing the path of the wind (sub paragraph 62a). This type of turbulence is often compounded by turbulence generated by thermal activity.

65. The factors that affect the intensity of turbulent eddies are wind velocity, density of the air, and the shape and size of the obstruction in the path of the wind.

66. Wind velocity is the most influential and also the most measurable factor. In winds from 0 to 16 km/h (0 to 10 mph), the turbulence generated will not be intense enough to pose serious danger to the jumper. If the winds are 16 to 32 km/h (10 to 20 mph), severe enough turbulence can be generated to cause canopy collapse, especially close to the obstruction responsible for the turbulent eddy. If the winds are in excess of 32 km/h (20 mph), severe turbulence should be expected well downwind of any obstruction.

67. The shape and size of the objects obstructing wind flow are also very influential in determining the size and intensity of turbulence. A rectangular building with sharp corners will generate turbulence at slower wind speeds and generate much more forceful eddies than an rounded building.

68. One can expect more turbulence in the late morning and early afternoons because both thermal activity and wind velocity tend to reach their maximum then. The size, the terrain (obstructions) and wind direction determine at what wind speed your Drop Zone will start generating turbulent eddies of sufficient energy to cause danger to Ram-Air flyers.

69. When flying with turbulence present, the lighter the jumper, the more susceptible to problems associated with turbulence. Lighter jumpers have a lower tolerance to turbulence and should be extra careful when encountering turbulent eddies. The forces acting upon the canopy are proportional to the rate of change of the wind velocity on the canopy. Therefore, it is more dangerous to fly fast through turbulence than to fly slowly. Flying through turbulence should be done at about 30% to 50% brake setting. Too slow may also be dangerous because the canopy may stall without warning due to a sudden gust.

CHAPTER 13

CT-6 STATIC LINE SQUARE PARACHUTIST EQUIPMENT LOADS

SECTION 1

GENERAL

INTRODUCTION

1. The static line square parachutist carries a variety of loads on operational and training jumps.

GENERAL RULES

2. A parachutist will normally jump with the weapons and equipment required immediately on landing. All other equipment will be rigged as aircraft loads and dispatched with the parachutists.

RULES FOR PACKING

3. The Parachutist Equipment Load is packed as described in Chapter 2.

STATIC LINE SQUARE PARACHUTIST'S EQUIPMENT LOWERING SYSTEM COMPONENTS AND EQUIPMENT ATTACHING STRAP

4. The different components of the Parachutist's Equipment Lowering System (PELS) (see Figure 13-1) are:

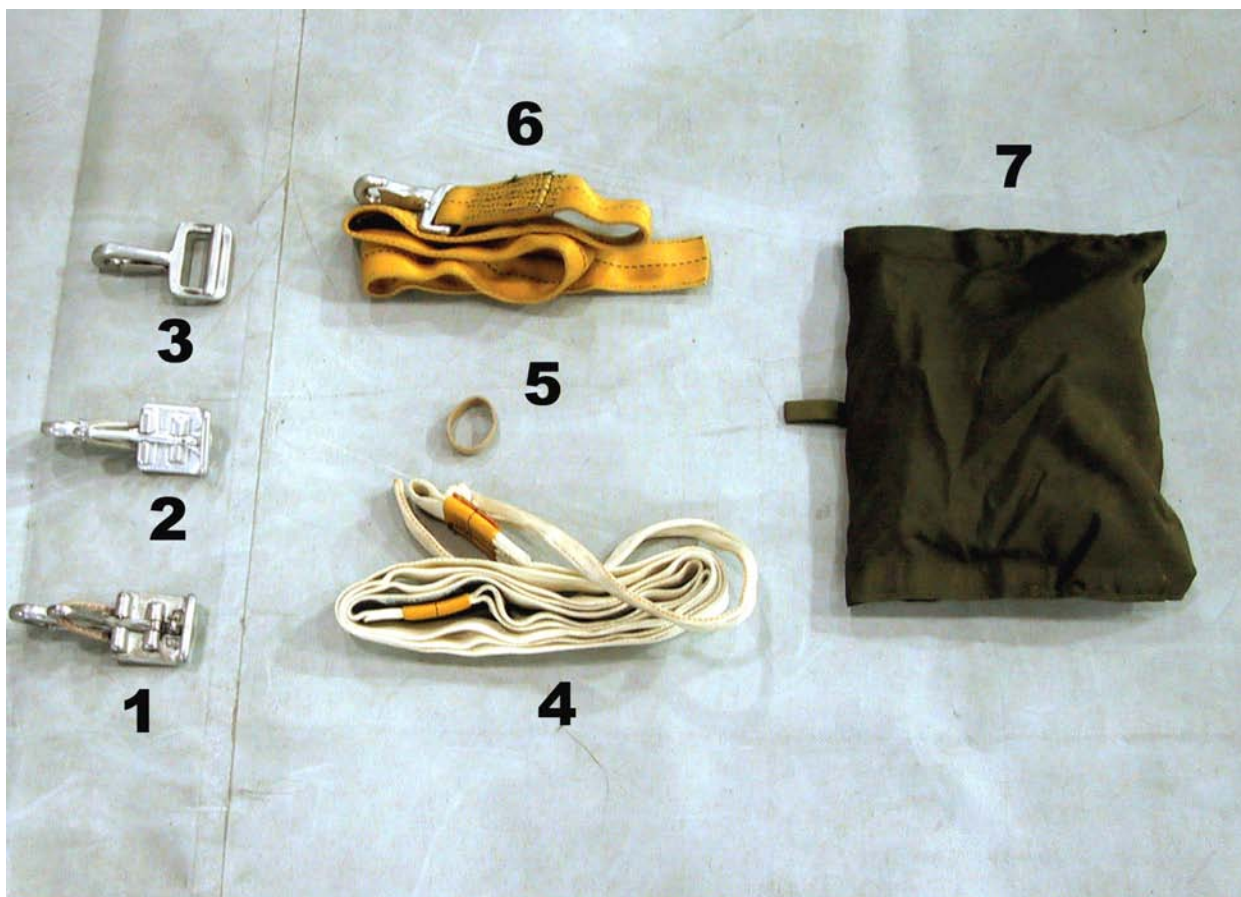


Figure 13-1: PELS for Static Line Square

- a. 2 Equipment Snap Hooks (1 & 2);
 - b. Jettison Buckle (3);
 - c. 2.4 m (8 ft) Lowering Strap (4);
 - d. Elastic retaining band (5);
 - e. Jettison Strap (6); and
 - f. PELS Harness (7).
5. The PELS is placed on the rucksack in the same manner as described in Chapter 2.

ATTACHING THE LOWERING STRAP, JETTISON STRAP, JETTISON BUCKLE AND EQUIPMENT SNAP HOOKS

6. To attach the lowering strap, jettison strap and buckle:

- a. Attach the lowering end of the lowering strap to the fixed loop of the PELS valise, ensuring the running end passes through the bight one extra time and is snug (see Figure 13-2).



Figure 13-2: Lowering Strap Attachment

- b. Loosely stow the strap into the valise with the large loop coming out of the centre, and close the valise with Velcro on Velcro.
- c. Attach the jettison buckle to the jettison strap in the same manner as for static line round, ensuring the opening of both buckles face in towards the centre of the jettison strap.
- d. Feed the jettison strap through the large loop of the lowering strap, ensuring the jettison buckle end is to the right side of the rucksack as you look at it. Take the large loop, place it under one of the yellow tapes, and Velcro it to the rucksack (see Figure 13-3).



Figure 13-3: Jettison Buckle Routing

- e. Attach the equipment snap hooks to the attaching strap buckles so that the openings face up (see Figure 13-4).



Figure 13-4: Equipment Snap Hooks

GETTING DRESSED WITH FULL EQUIPMENT

7. When in-flight dressing is done using the CT-6 static line square, all parachutes will be pre-rigger checked and the jumpmaster (JM) will do a complete check in the aircraft after parachutists are dressed. Once on the aircraft, when the JM orders **GET DRESSED** parachutists will:

- a. working in pairs, place their rucksacks on the seat;
- b. attach the jettison buckle to the equipment V-rings on the leg pads of the CT-6 static line assembly, ensuring the jettison side is on the right side with the free side of the strap facing out, and that the jettison strap is fed through the large loop of the lowering strap;
- c. connect the equipment snap hooks to the D-rings;
- d. ensure the waist band is underneath everything, secured to the appropriate V-ring, and any excess is stowed properly; and
- e. put on helmet, goggles, gloves, and altimeter, and wait for the JM's inspection.

PREPARING THE RIFLE ONLY

8. The rifle shall be prepared by loosening the sling off so that it will have enough material to go under the main lift web and be secured by the chest strap.

GETTING DRESSED WITH RIFLE ONLY

9. On the order to **GET READY/GET DRESSED** with rifle only the parachutist will:
- a. put a doubled piece of 80 lb test through the tie off loop on the left side of the CT-6 static line assembly;
 - b. get dressed as described in Chapter 12, except leave the waistband and chest strap undone;
 - c. sling the rifle over the left shoulder, muzzle down, sight to the rear;
 - d. place the sling between the harness and body, ensuring it goes over the chest strap when it is done up;
 - e. do up the waist band; and
 - f. tie off the sling with the 80 lb test with a regular bow tie knot.

CHAPTER 14

MILITARY CT-6 STATIC LINE SQUARE PARACHUTIST TECHNIQUES

SECTION 1

GENERAL

INTRODUCTION

1. Standard drills and techniques used in military freefall parachuting using the CT-6 static line square include the following:
 - a. aircraft drill;
 - b. freefall flight
 - c. flight and canopy control; and
 - d. landing.
2. The CC-130 Hercules is the primary aircraft used for the operational or training insertion of personnel and equipment using the CT-6 static line square. The procedures detailed in this chapter apply to the CC-130 aircraft. Chapter 16 details the deviations from these drills when using other types of aircraft, and Chapter 17 details the drills used with the CH-146 Griffon helicopter.

SECTION 2

AIRCRAFT DRILL

GENERAL

3. The aim of aircraft drill is to ensure:
 - a. a systematic check of all parachutists;
 - b. that all parachutists are ready to jump at the appointed time; and
 - c. correct exit technique.

THE JUMPMaster (JM)

4. The jumpmaster (JM) may be assisted by one or more assistant JMs. The JM is responsible for giving all jump commands.
5. The duties of the JM are detailed in Chapter 4.

JUMP COMMANDS

6. Jump commands are as follows:

- a. **SEAT BELTS OFF;**
- b. **GET READY;**
- c. **STAND UP;**
- d. **HOOK UP;**
- e. **CHECK STATIC LINES;**
- f. **CHECK YOUR EQUIPMENT;**
- g. **SOUND OFF FOR EQUIPMENT CHECK;**
- h. **1 MINUTE;**
- i. **STAND BY;** and
- j. **GO!.**

7. Reaction to all jump commands are the same as detailed in Chapter 3, except as described in the following paragraphs (8 to 10).

1 MINUTE

8. On the command **1 MINUTE**:

- a. ground winds are passed to the parachutist;
- b. parachutists move to the centre of the aircraft; and
- c. goggles are lowered (if worn).

STAND BY

9. On the command **STAND BY**, the Number 1 followed by the remaining parachutists moves to a position 45 cm (18 in) from the edge of the ramp, with Number 2 remaining at a half ramp spacing.

GO!

10. On the command **GO!**, which is given verbally and visually by the JM, and by displaying the green light, parachutists will exit, staying in the centre of the aircraft and maintaining at least 1.5 m (5 ft) distance from the parachutist in front of them.

EXIT TECHNIQUES

11. Parachutists must exit with the appropriate distance detailed in Paragraph 10 in order to avoid collisions outside the aircraft upon exit. The type of exit to be utilized is the relaxed jab position.

INTERRUPTED AIRCRAFT DRILL

12. The procedures for interrupted aircraft drill are as outlined in Chapter 3.

EMERGENCY AIRCRAFT DRILL

13. As a general rule, if the aircraft is:

- a. between 0 and 800 ft above ground level (AGL), the aircraft will land with parachutists on board;
- b. between 800 and 2,500 ft AGL, if hooked up to the aircraft, parachutists will exit as directed by the JM;
- c. between 800 and 2,500 ft AGL, if not hooked up to the aircraft, parachutists will execute a poised exit and activate reserve; and
- d. above 2,500 ft AGL, parachutists will exit as per normal.

FORCED LANDING

14. The following signals and procedures are used on a forced landing:

- a. an initial warning will be given by a short ring of the bell, through the public address system, or verbally from the JM;
- b. the JM will ensure that all parachutists are seated, with seat belts secured and helmets on;
- c. the final warning will be one continuous ring of the bell;

- d. parachutists will grasp their hands behind the neck, force their feet and knees together, and lean toward the forward bulkhead of the aircraft, making sure their legs are not under the seats;
- e. when the aircraft stops, the doors will be opened and all parachutists will clear the aircraft at least 200 m (600 ft) to the rear under control of the JM;
- f. if there are parachutists inboard and outboard, outboard parachutists forward of the wheel wells will stand on the seats until inboard parachutists are clear, and will then follow the inboard parachutists; and
- g. if the aircraft is still on the runway and the bell is rung continuously, parachutists will carry out the drills detailed in subparagraphs a—f.

ABANDONMENT IN FLIGHT

15. It may be necessary for parachutists to exit the aircraft prior to reaching their planned Drop Zone. There will normally be sufficient time between the initial warning and the abandonment of the aircraft for parachutists to be briefed on the emergency and the Aircraft Captain's intentions. The procedure for an abandonment in flight is as follows:

- a. An initial warning will be given by a short ring of the bell and red light on, through the public address system, or verbally from the JM.
- b. The JM will give all jump commands as per normal and the **STAND BY** will be given after the JM check is completed. If the situation permits the JM will confirm the altitude prior to the **GO!**, allowing parachutists to exit immediately once the Aircraft Captain has found a suitable Drop Zone.
- c. The final warning will be a display of the green light, through the public address system, or verbally from the JM.
- d. Parachutists will exit normally, followed by the JM.

NOTE

Unless the ramp is already open, parachutists will exit through the doors.

IMMEDIATE ABANDONMENT IN FLIGHT

16. If there is no time for complete aircraft drills, parachutists will exit as quickly as possible. The procedure for immediate abandonment in flight is as follows:

- a. An initial warning will be given by a continuous ring of the bell and display of the green light, through the public address system, or verbally from the JM.

- b. If the parachutist is not hooked up, the JM orders **IMMEDIATE ABANDONMENT IN FLIGHT, STAND UP, POISE EXIT, ON RESERVE—GO!**
- c. If the parachutist is already hooked up, the JM will order parachutists to pass their static line behind their head and transfer it to the inboard hand (as per door exit), then will give the **GO!**.
- d. Speed is essential in clearing the aircraft.

SECTION 3 PARACHUTE MALFUNCTIONS

GENERAL

17. The CT-6 static line assembly is one of the safest parachutes designed for military parachuting. The materials and technology have been tested extensively. However, we must also accept the fact that parachute malfunctions are possible.

18. A malfunction is any abnormal operation of the parachute where full support or control is denied to the jumper.

19. Malfunctions are grouped into two categories:

- a. high speed malfunctions; and
- b. low speed malfunctions.

EMERGENCY PROCEDURE

20. If the main parachute is not deployed by 1,500 ft AGL the jumper must:

- a. visually and physically locate the cut away handle and the reserve ripcord handle, and grasp both;
- b. pull the cut away handle to the full extension of the right arm; and
- c. activate the reserve handle with the left hand.

21. These actions will cut away the main canopy. The reserve will begin deploying as the Reserve Static Line activates.

WARNING

The parachutist must pull the cut away handle first, then activate the ripcord handle. If the reserve is pulled first the main may become entangled in the reserve as it is deploying and result in a reserve malfunction.

HIGH SPEED MALFUNCTIONS

22. High speed malfunctions occur when there is no support from the main canopy, there is a rapid descent, and no object bigger than the pilot chute is visible.

23. High speed malfunctions include:

- a. static line failure;
- b. bag lock; and
- c. snivler

24. Immediate corrective action must be instinctive because of the high fall rate. After the corrective action has been taken, the emergency procedure will be initiated if the problem persists.

STATIC LINE FAILURE

25. Static line failure is when either the static line breaks or comes undone from the anchor line cable. The corrective action is to carry out the emergency procedure immediately.

BAG LOCK

26. A bag lock occurs when the pilot chute and deployment bag have withdrawn from the pack assembly but the main parachute remains stowed in the deployed bag. The corrective action is to carry out the emergency procedure immediately.

SNIVLER

27. A snivler occurs when the chute deploys from the deployment bag yet fails to inflate and the slider remains up. The corrective action is to un-stow the canopy brakes, "pump" brakes, and observe if anything happens. The canopy should inflate, and the slider will move down. Should this fail carry out the emergency procedure.

LOW SPEED MALFUNCTIONS

28. Low speed malfunctions may be observed after the deployment of the main parachute. If the jumper is unable to gain control or full support of the main canopy he will make the decision to cut away and activate the reserve.
29. If at 1,500 ft AGL the problem has not been rectified, the emergency procedure must be carried out.
30. There are nine types of low speed malfunctions:
- a. slider hang-up;
 - b. broken right or left brake line;
 - c. line twist;
 - d. right or left brake line hang-up;
 - e. end cell closure;
 - f. broken suspension line;
 - g. accidental reserve deployment;
 - h. pilot chute in front of cells; and
 - i. tension knots.

SLIDER HANG-UP

31. On activation of the main parachute, the parachutist may observe that the slider is hung up. This is due to incorrect stowing of the slider, restricted movement on the suspension lines, or poor line stowage. The corrective action is to release the brakes and apply a steady downward pressure on them. Once rectified release the brakes slowly. Should this fail, carry out the emergency procedure.

BROKEN RIGHT OR LEFT BRAKE LINE

32. On activation of the main parachute, the parachutist may have a broken brake line, caused by an excessive opening load. The parachutist will rotate in the same direction as the good brake line, due to one side of the canopy flying with no brakes applied while the other side will be flying at 50% brakes. If this happens, the parachutist will release the good brake line, then fly the canopy with the rear risers and flare the canopy by pulling down on the rear risers. Should the parachutist be unable to control the canopy carry out the emergency procedure.

LINE TWISTS

33. If the jumper is unstable or turning on opening this may cause line twists. In this case the action taken by the parachutist is the same as for static line. On activation of the main canopy grasp both sets of risers in a thumbs down attitude and pull the risers apart while kicking the legs to create momentum in the opposite direction of the turns. Should this fail by 1,500 ft AGL carry out the emergency procedure.

NOTE

Do not release the brakes until the twists are out.

BRAKE LINE HANG-UP

34. After activation, the parachutist may find it impossible to release one or both brake lines. This may be caused by improper stowing during packing. The parachutist will release the good brake line and attempt to undo the hung-up brake line with both hands. If the jumper cannot release it, fly the canopy straight with the good toggle at 50% brakes and hold on to the opposite rear riser. When the parachutist wishes to turn raise or pull down the good toggle. On landing, the parachutist will wrap the good toggle around the hand until the canopy flies at 50% brakes, and flare with the rear risers. The stall point will be higher and the parachutist will thus execute a Parachute Landing Fall (PLF). If the parachutist cannot gain control of the canopy by 1,500 ft AGL carry out the emergency procedure.

END CELL CLOSURE

35. If the slider does not go fully down there will be insufficient pressure to inflate the cells of the parachute. The parachutist will notice the outer cells of the canopy flapping in the air flow. Releasing and depressing the brakes between 50% and 80% should rectify the problem. If the cells do not stay inflated the parachutist may have to maintain slight pressure on the brakes to keep them inflated. If this fails to rectify the problem carry out the emergency procedure.

BROKEN SUSPENSION LINES

36. On activation, the parachutist might see broken suspension lines due to the opening load. Check the manoeuvrability of the parachute by executing a 360 degree right turn and 360 degree left turn, and checking the stall point. If the parachutist judges that the parachute is not responding properly, assess the situation and carry out the emergency procedure.

ACCIDENTAL RESERVE DEPLOYMENT

37. There is a remote possibility that the reserve may accidentally deploy. Should this happen the parachutist will attempt to catch the reserve between his legs before it inflates. If the reserve inflates the parachutist will carry out a canopy transfer by cutting away his main parachute. This manoeuvre will not be attempted below 500 ft AGL. If below 500 ft AGL, the parachutist will land with both canopies.

PILOT CHUTE IN FRONT OF CELLS

38. If the pilot chute goes in front of the cells, the parachutist will closely watch how the canopy responds. The parachutist will try to surge the canopy so the pilot chute flips over to where it should be (at the rear of the canopy). This is done by pulling all the way down on the brakes, holding for a few seconds, then releasing quickly. If this does not solve the problem, the parachutist must monitor the canopy all the way down. If the response of the canopy is good, the parachutist can land with the pilot chute in front of the canopy.

TENSION KNOTS

39. This may happen if one line forms a loop around another line. If this happens the parachutist must do a manoeuvrability check by making a 360 degree left turn and a 360 degree right turn, and then a stall point check. If the canopy performs properly the parachutist can land with it. If it does not perform properly carry out the emergency procedure.

NOTE

Most low speed malfunctions will be rectified by applying the correct drill. In extreme cases or when the parachutist has serious doubt, carry out the emergency procedure.

SECTION 4 RAM-AIR CANOPY MANOEUVRING AND PRECISION LANDING

FLIGHT MODES

40. Although there are many flight modes the canopy may be configured to during descent, the five major configurations are:

- a. full glide;
- b. half brakes;
- c. full brakes;

- d. stall—steady state; and
- e. stall—dynamic.

FULL GLIDE

41. With toggles up most Ram-Air canopies will glide at about 30 to 50 km/h (20 to 30 mph) with a ratio of descent of approximately 3 to 5 m/sec (8 to 14 fps), and will track straight and stable. Bias turns can usually be traced to air turbulence or uneven harness adjustment.
42. Under certain rough air conditions, the canopy may bounce mildly or severely in full flight, in much the same manner as an airplane in turbulence. In turbulent conditions, it is best (highly recommended) to fly with 50% brakes to avoid gust induced stall or momentary deflation of the canopy.
43. Increased penetration into wind may be gained by pulling down the trim tabs located on the inside of the front risers. When trim tabs are utilized return to normal use of the steering lines for subsequent control. Remember, in the event of a broken steering line or when manoeuvring immediately after opening, while the deployment brakes are still secured, the rear risers can be used for full directional control, to include landing.

HALF BRAKES

44. Braking is affected by altering the airflow along the lower surface of the wing. This is accomplished by distorting the trailing edge in much the same manner as with flaps on an airplane.
45. From full glide, depress both toggles slowly to about chest level or slightly below. At this point, forward speed will be 16 to 24 km/h (10 to 15 mph) and the corresponding rate of descent 3 to 4 m/sec (8 to 10 fps).

FULL BRAKES

46. Under normal flight conditions, the fully braked attitude will be reached by depressing both toggles slowly until nearly all the forward speed is reduced. In this mode, the direction of travel will be almost vertical. The forward speed will be around 5 km/h (3 mph) or less, and the rate of descent about 2 to 3 m/sec (6 to 8 fps).
47. Further braking will result in a sink or mush, which is on the verge of a stall. This must be avoided at all costs close to the ground.

STALL STEADY STATE (INDUCED)

48. A stall (steady state) can be induced by depressing the toggles slowly to the full brake position and allowing 7 to 10 cm (3 to 4 in) extra toggle to travel past the full brake position. In

this attitude, the airfoil loses its efficiency as a lifting device. The forward speed goes to zero as the canopy sinks and then gently rocks backwards.

49. At this time the canopy may attempt to fly backwards or turn off to one side. Recovery from this type of stall is accomplished by simply raising the toggles smoothly 15 to 20 cm (6 to 8 in) to the 75% to 80% brake condition. The canopy will accelerate gently out of the stall. Never release the toggles completely or let them up abruptly. If the toggles are released in such a manner, the canopy will surge forward violently.

STALL DYNAMIC

50. Dynamic stalls will occur due to sudden loss of airspeed in gusty wind conditions or the inadvertent depression of the steering toggles past the 100% brake range.

51. The canopy will decelerate rapidly and stall, and recovery action must be initiated immediately by allowing the steering toggles to retract until the canopy regains forward flight.

URNS

52. There are various methods that may be applied to turn a Ram-Air canopy:

- a. turns, full glide;
- b. spiral turns;
- c. turns with brakes; and
- d. stall turns.

URNS FULL GLIDE

53. Turns from full glide are responsive, but due to the high forward speed, the turns will encompass a wide arc. These turns are made by depressing either toggle, leaving the other one at the full glide position. In this type of turn, the canopy will bank and actually dive, causing the parachute to lose altitude quickly. The further the toggle is depressed, the steeper the bank angle. The increase in rate of descent is partially due to the loss of lift resulting from the bank angle.

SPIRAL TURNS

54. Spiral turns are basically turns from full glide but maintained for more than 360 degrees of rotation. The first turn will be fairly slow with shallow bank angles, but both the turn speed and the bank angle will increase rapidly if the spiral is maintained. Increasing the turn rate will cause excessively fast diving speed, with a rapid loss of altitude, and therefore should be avoided below 500 ft AGL.

TURNS WITH BRAKES

55. **Turns— 50% Brakes.** Turns from the 50% braked condition are made by further depressing either toggle. Canopy response in this mode is much faster, with minimal braking, resulting in almost flat turns.

56. **Turns— 75% to 80% Brakes.** This is the canopy's optimum control range with extremely quick response. When flying in this mode, the jumper should be keenly aware that he is operating very near the stall range. Turns are best made with directional cross control (by slightly raising the opposite toggle). This is done to prevent the canopy from stalling. There is little or no banking, and the resulting heading changes are quick and flat.

57. **Stall Turns.** When the canopy is flying in the 90% to 100% brake range and either of the toggles is further depressed, a stall turn will result. Stall turns produce a very quick, pivoting action, with the stalled side of the canopy flying backwards. Since the stalled side generates very little lift, the rate of descent will increase. Stall turns should only be used with extreme caution.

LANDINGS

58. While there are many ways of landing with a Ram-Air canopy, a smooth, soft stand up or walk away landing is most desired. The flared landing technique is most commonly used.

59. The flared landing is in essence a carefully controlled dynamic stall, timed so that touchdown occurs during the exact moment of high lift yield, during the artificial change in angle of attack. Flared landings, like all Ram-Air parachute landings, are made by easing the toggles up, allowing the air speed to build up (a flared landing cannot be accomplished without sufficient speed). At about 3 m (10 ft) above the ground, slowly depress both toggles downwards, timing the movement to coincide with the 100% brake position at touchdown. If on a misjudged flare attempt the parachute enters a dynamic stall, stall recovery must be initiated. Flared landings are always made into the wind.

60. Ram-Air canopies can be safely landed without flaring. On final approach, simply fly the canopy at 50% to 75% brakes with the final braking increase occurring immediately prior to landing. This is similar to the landing of conventional parachutes, and ground speed will depend on wind velocity.

PRECISION APPROACHES

61. The recommended Ram-Air canopy landing approach is similar to standard aircraft practice, consisting of a downwind leg, a base leg and a final approach upwind towards the target. It is usually difficult to visually gauge variations in altitude accurately, so a reliable altimeter is mandatory while under the canopy.

62. The downwind leg is flown along the wind line, passing the target area at an altitude of between 1,000 to 1,500 feet AGL, while tracking approximately 100 m (400 ft) to the side of the target. Continue the downwind leg approximately 100 to 125 m (300 to 400 ft) downwind to the

target. Under zero wind conditions, the downwind leg may be extended past the 125 m (400 ft) distance to permit a longer and flatter final approach. Under high wind conditions, 16 to 32 km/h (10 to 20 mph), the downwind leg must be shortened to allow for decreased penetration. A basic rule is to increase rotation height by 30 m (100 ft) for every 1.6 km/h (1mph) increased wind velocity, starting at 125 m (400 ft) for 0 to 13 km/h (0 to 8) mph winds. For winds in excess of 21 km/h (13 mph), rotate no further downwind than 60 m (200 ft) from the target and at a minimum of 1,000 ft AGL. In gusty and/or turbulent conditions, all Ram-Air canopies are best flown with approximately 50% brakes. More than 80% or less than 20% brakes must be avoided. Gust induced stall or momentary deflation of the canopy is possible due to turbulence and gusts.

63. At this point, begin a gentle 90 degree turn to fly the base leg across the wind line. This leg is usually flown at 30% to 60% brakes, depending upon the wind condition, and the base leg may be either shortened or extended to reach a proper rotation altitude. Under low wind conditions, 0 to 14 km/h (0 to 9 mph), the base leg is flown to a "rotation point" approximately 100 m (400 ft) directly downwind of the target, at an altitude of 500 to 600 ft AGL.

64. The final approach must begin at no lower than 500 ft AGL. On final approach, the angle must be assessed and any major control corrections performed immediately, while there is sufficient altitude and distance to the target.

SECTION 5 OBSTACLES ON THE GROUND

GENERAL

65. Normally the Drop Zone is a carefully selected and surveyed piece of ground with minimum obstructions and dangerous features. However, due to human error, navigational miscalculation or sudden changes in meteorological conditions you may find yourself over a less than desirable area for landing.

66. The following precautionary measures may be taken when encountering typical types of obstacles:

- a. **Wires.** This type of obstacle is the easiest to avoid although it may be the deadliest should they be high tension electrical wires. Wires may be over flown, under flown or best of all, flown parallel to if wind conditions allow. Remember the parachutist is not merely descending as with a round parachute, but is flying at higher velocities horizontally, so it is best to manoeuvre around the wires.
- b. **Buildings.** Due to the high degree of accuracy and manoeuvrability of Ram-Air parachutes, the parachutist may fly around, over, under or land on top of buildings with relative ease. Should it be necessary to land against a tall building just prior to impact, the parachutist should flare the canopy to reduce forward velocity and contact the obstacle with feet first, or turn the body sideways, to minimize impact.

- c. **Water.** Careful appreciation of altitude, wind speed and direction should allow the parachutist to avoid most types of water obstacles. When water is unavoidable the parachutist must:
 - (1) Jettison all heavy and non-essential equipment such as rucksack, weapons and other attached equipment at an altitude 200 ft AGL, and release the RSL, chest strap and waist band.
 - (2) Face into the wind, on final approach jettison equipment and then enter the water in the flare landing mode. Immediately upon immersion activate the cut-away handle and remove the two leg straps.
 - (3) Extricate from the harness and proceed with lifesaving manoeuvres as required.
- d. **Tree Landings.** Landing in trees with Ram-Air parachutes is much less likely to cause injuries if executed in the proper manner. When a tree landing is unavoidable, the parachutist must:
 - (1) keep his equipment and NOT lower the rucksack;
 - (2) face into the wind, flaring upon landing into the trees; and
 - (3) hold on to the branches and climb down if possible.

SECTION 6 NIGHT PARACHUTING PROCEDURES

GENERAL

67. For tactical or training reasons parachute operations may be done during periods of darkness or last light. Since control is more difficult during darkness, discipline during descent under canopy must be established. Special procedures are used to ensure safe parachuting at night.

DROP Z ONE MARKING AND PREPARATION FOR NIGHT PARACHUTING

68. Drop Zone markings will consist of:
- a. code identifiers illuminated by flares and facing into the wind so parachutists can read the letter when landing into the wind; and
 - b. alternatively, vehicle headlights facing into the wind so parachutists can see the tail lights and the headlights are facing away.

69. The preparations for a night drop are the same as a day drop except that each parachutist will be issued 4 chemical light sticks as follows:

- a. 1 green chemical light stick taped to the altimeter to illuminate the dial during freefall;
- b. 1 green chemical light stick attached to the back of the parachutist's helmet;
- c. 1 red chemical light stick taped to the left heel, and 1 blue chemical light stick, to the right heel; and
- d. each parachutist will be issued a safety light, inserted in the back pack assembly where the flyers kit bag is stored.

NIGHT IN-FLIGHT PROCEDURES

70. In-flight procedures are the same as for day except:

- a. after all checks are completed in the aircraft, the cargo compartment red lights will be turned on to allow parachutists to gain their night vision;
- b. at the **SOUND OFF FOR EQUIPMENT CHECK**, chemical light sticks will be illuminated; and
- c. cargo lights will be dimmed.

NIGHT LANDING WITH CT-6

71. Due to the flight characteristics of the CT-6, parachute night landings could be hazardous. Depth perception at night will cause the parachutist to flare either too high or late in many cases. For this reason all parachutists will turn their canopy into the wind at a minimum of 300 ft AGL, lower their equipment, and land with 50% brakes, executing a proper roll.

72. On landing the parachutist will complete the following Drop Zone and rendezvous drills:

- a. collapse main canopy;
- b. get out of the harness;
- c. gather rifle and equipment;
- d. pack the main parachute in the flyer's kit bag; and
- e. pick up all equipment and move to the rendezvous.

73. While moving off the Drop Zone the parachutist must stay alert and look for injured parachutists. Should you find an injured jumper alert the Drop Zone controller by lighting a flare or strobe, and assist the jumper by making him comfortable until medical aid arrives.

SECTION 7

SAFETY

GENERAL

74. Once a parachutist exits the aircraft there will be many things on his mind. The parachutist must be aware of everything that is happening around him to avoid an accident.

SAFETY ONCE UNDER CANOPY

75. Once under canopy the parachutist must:
- a. always check the canopy on opening, and carry out the post-deployment drill;
 - b. apply brakes slightly in heavy turbulence;
 - c. turn to the right if a head-on canopy collision is imminent (if toggles are not released, the rear risers can be used);
 - d. always be aware of other parachutists;
 - e. give the low parachutist the right of way;
 - f. give a parachutist experiencing control problems the right of way;
 - g. do not focus blindly on the landing point;
 - h. avoid turbulence from other canopies and objects on the ground;
 - i. exercise caution when near the target;
 - j. never induce a stall and hold it unless there is sufficient altitude to recover and the air is clear below;
 - k. never induce violent spirals below 1,000 ft AGL or near other parachutists;
 - l. if a malfunction by another parachutist is observed follow that parachutist to the ground and observe where the main canopy lands;
 - m. always face into the wind on landing;
 - n. do not get within 10 m (25 ft) of another canopy; and

- o. do not execute turns below 500 ft.

SAFETY ON THE DROP Z ONE

76. Once on the Drop Zone the parachutist must:
- a. keep helmet on until clear of the Drop Zone;
 - b. watch for other parachutists landing;
 - c. perform correct pack up drills;
 - d. clear the Drop Zone as quickly as possible; and
 - e. look out for any injured parachutists.

CHAPTER 15

CT-6 STATIC LINE SQUARE JUMPMASTER DUTIES

SECTION 1

GENERAL

INTRODUCTION

1. Duties of the CT-6 static line square jumpmaster (JM) for the CC-130 Hercules are detailed in this chapter. JM duties for other aircrafts are detailed in Chapters 16 and 17.

THE JUMPMASTER

2. A JM shall be a military parachutist of NCO or officer rank who has passed a JM course and is currently certified as qualified under existing Canadian Forces regulations.

3. The JM is responsible to the Aircraft Captain for the safe and efficient dispatch of all parachutists. Normally, communications between the Aircraft Captain and the JM are through the loadmaster.

4. The JM may be assisted by assistant JMs. The JM is responsible for giving all jump commands.

5. The JM will not exit until the last parachutist has exited the aircraft.

JUMPMASTER EQUIPMENT

6. Prior to any jump, the JM will draw and have aboard the aircraft:

- a. sheath knife;
- b. if feasible and desirable, a spare CT-6;
- c. altimeter;
- d. spare helmet and goggles;
- e. roll of gun tape;
- f. roll of 6.6 mm (1/4 in) cotton webbing;
- g. retainer bands
- h. map of Drop Zone (DZ);

- i. 9 Wind Drift Indicators if required; and
- j. any other articles that the JM may require for a specific purpose.

SECTION 2

PRE-FLIGHT PROCEDURE

AIRCRAFT INSPECTION

7. Prior to any parachute jump, the JM, accompanied by the loadmaster, will inspect the aircraft to ensure that:
- a. paratrooper doors and pip pins are serviceable and free of projections;
 - b. jump platforms are serviceable and safety wired;
 - c. air deflectors open approximately 38 cm (15 in);
 - d. the floor and jump platforms are not slippery;
 - e. there are no projections in the cargo compartment which may snag a parachutist;
 - f. emergency equipment and exits are secured;
 - g. if jumping from the ramp, that it works properly; and
 - h. airsickness bags are available.

ORGANIZATION AND CONTROL OF PARACHUTISTS ON THE GROUND

8. To ensure orderly progression and adequate control of parachutists on the ground the JM will control the following:
- a. roll call and falling-in of the parachutists;
 - b. physical inspection of the parachutists; and
 - c. drawing of parachutes.

ROLL CALL AND FALLING-IN

9. For Roll Call and Falling In:
- a. the senior JM will call roll and place parachutists in proper chalk order according to the manifest (the assistant JM will ensure that they move to their proper locations); and

- b. parachutists will then place their helmets on top of the bench and stand properly at ease in front of their helmets.

PHYSICAL INSPECTION

10. The JM will conduct a physical inspection of the parachutists. This is done by both the senior JM and assistant to every parachutist of each chalk to ensure:

- a. individuals have not been drinking, that they are in good health, and show no signs of using illegal drugs;
- b. parachutists have their identity discs or cards;
- c. parachutists remove rings and watches;
- d. if wearing eye glasses, that they are attached with an elastic strap or tied securely;
- e. proper footwear is being worn; and
- f. parachutists have gloves, goggles (optional) and helmets.

DRAWING OF PARACHUTES

11. The JM will meet with the rigger and ascertain the location for drawing parachutes.

12. The JM will then move the parachutists in chalk order and have them draw parachutes, ensuring the gear is correctly lined up and neatly organized.

SUPERVISING THE PREPARATION AND DONNING OF THE CT-6

13. **The responsibility for correct donning and fitting of the parachute lies with the individual parachutist**, however, the JM must ensure the parachutes are properly prepared prior to donning. The JM should look for the following:

- a. that a proper inspection of the parachute assembly is carried out;
- b. the altimeter is zeroed, or set for the applicable Drop Zone;
- c. all straps are properly adjusted, and excess stowed; and
- d. flyer's kit bag is stowed neatly.

14. Parachutists are then ordered to get dressed for rigger's check. Once the rigger's check is completed parachutists will undergo a JM check.

JM INSPECTION— GROUND

15. The JM inspection is a systematic, thorough check conducted to ensure that all parachutists are properly dressed and safe to parachute prior to boarding the aircraft. Once the parachutist has been ordered to dress for a JM check, the JM can commence this inspection. The JM will:

- a. Ensure that the jumper has been rigger checked, and that the snap fastener hook on the waistband V-ring is on the left side of the jumper.
- b. Ensure the jumper is coherent and has a serviceable helmet, hook knife and gloves.
- c. Visually check that the altimeter is zeroed or set for the applicable Drop Zone.
- d. Visually and physically check left riser group to ensure it is not twisted and is running unobstructed from the pack to the three ring release system, under the securing flap.
- e. Visually check and ensure riser release loop is through the metal grommet, cut away cable is running through the riser release loop, and the excess cable is in the tunnel.
- f. Visually check the three ring connector to ensure they are not bent, cracked or damaged. Rotate the top ring and the middle ring one quarter turn to ensure they are not elongated. If there is a split ring ensure it is on the fixed loop of the riser release loop, completely inside the fixed loop, and that it is taped.
- g. Repeat subparagraphs d. to f. on the right riser group.
- h. Visually inspect the cut-away handle and ensure it is not obstructed, and ask the jumper if he physically broke the Velcro of the cut-away handle.
- i. Visually and physically check the chest strap to ensure it is not misrouted around the main lift web or through the reserve ripcord handle, that it is secure, and the excess is tucked away underneath the retainer provided.
- j. Visually and physically trace the main lift web from the equipment O-ring down to the equipment V-ring, ensuring it is not twisted or misrouted, and the running end of the adjuster strap is rigger rolled and stowed in the retainer provided.
- k. Visually and physically check the waistband to ensure it is not twisted and is not running over top of the equipment. Visually and physically check the quick fit ejector snap hook by pressing onto the locking

lever to ensure it is closed properly, and the excess is rigger rolled and stowed in the retainer provided.

- l. Visually check both leg straps to ensure they are not twisted or misrouted. Visually and physically check that both quick fit ejector snap hooks are connected to their appropriate V-ring, press on both locking levers to ensure they are closed properly, and the excess is rigger rolled and stowed in the retainer provided. Have the jumper turn around.
- m. Remove the snap fastener from the left side waistband V-ring, open the static line cover flap, and remove three horizontal stows from the retainer band.
- n. Visually and physically inspect both sides of the static line, starting from the end closest to the pack all the way to the double stitched portion, for cuts, burns, frays or excessive wear.
- o. Check the double stitched portion, by twisting it, to ensure no stitches are broken.
- p. Visually check the fixed loop on the static line for excessive wear both on the inside and out. At the same time, check the snap fastener covered by the fixed loop of the static line for cracks, abrasions and excessive wear.
- q. Close the snap fastener, try to open it without depressing the locking button (should not open), then open the snap fastener to ensure that the slide works smoothly.
- r. Ensure that the static line safety pin is attached to the static line by a lanyard running through the fixed loop, and that it is serviceable.
- s. Pass the snap fastener underneath the arm closest to the anchor line cable and attach it on the opposite equipment O-ring.
- t. Check the horizontal stows for security by sharply pulling on the folds inserted in the retainer bands and trace the static line all the way to the protector sleeve.
- u. Lift the pin cover flap to visually inspect the pack closing pins to ensure they are secure in the two pack closing loops (facing up and out) and that there is an unbroken rigger's seal.
- v. Close the static line retainer flap, ensuring that the static line is passed down and centred between the dome fasteners.
- w. Form a big bit in the static line and pass it down through the slack control loop.

- x. Trace the static line from the snap fastener to the slack control loop to ensure that it is not misrouted.
- y. Move to the left side of the jumper and open the reserve ripcord protector flap and lay it over the jumper's right shoulder.
- z. Grasp on the swaged balls of the reserve ripcord and the ripcord above the reserve pins, and ensure the ripcord is running freely in the ripcord housing and the reserve static line ring and the reserve ripcord guiding ring
- aa. Visually and physically ensure the reserve ripcord handle is not sewn in and is fully seated in its pocket.
- bb. Visually and physically check the Reserve Static Line is snapped to the left riser, the ring is attached to the Reserve Static Line release shackle and the shackle is fully closed and the reserve static line ring is between the ripcord housing and the reserve ripcord ring.
- cc. Visually check the reserve pins and ensure they are both through the pack closing loops, and they are not bent, rusted, corroded or damaged in any way. Ensure the rigger's seal is intact and the cable is running to the left of the pins. Close the reserve ripcord protector flap.
- dd. Visually check the general condition of the pack.
- ee. Tap the jumper OK!

IF EQUIPMENT IS WORN

16. If equipment is worn the JM will conduct the ground inspection described in paragraph 15 subparagraphs a. to cc., and then will carry out the equipment check in the following sequence:

- a. visually and physically inspect the rifle ensuring it is secured to the fixed loop on the left shoulder with a piece of 6.6 mm (¼ in) cotton webbing (80 lbs test), the sling goes under the main lift web through the chest strap and is properly positioned, and the waistband is over top of the rifle;
- b. visually and physically ensure that the equipment snap hooks are attached to the equipment O-rings;
- c. visually and physically ensure that the jettison strap is secured to the V-rings on the leg straps, with the jettison release on the right side and the opening facing towards the jumper;

- d. visually and physically ensure the jettison strap passes through the lowering rope loop and the lowering rope is secured to the PELS bag with a proper securing knot;
- e. visually check the general condition of the rucksack; and
- f. tap the jumper OK!

JUMPMaster BRIEFING

17. After confirming the details of the drop with the aircrew, the JM will brief parachutists on the operation using visual aids such as maps, air photos, sketches or a sand model, as follows:

- a. **Flight:**
 - (1) flight altitude and duration, and type of aircraft;
 - (2) jump altitude and duration of flight;
 - (3) emergency signals and procedures;
- b. **Jump:**
 - (1) altimeter setting for primary and alternate Drop Zones;
 - (2) duration of red light;
 - (3) duration of green light;
 - (4) canopy manoeuvres;
 - (5) predicted weather conditions;
- c. **Drop Zones:**
 - (1) name and location;
 - (2) markings;
 - (3) size and obstacles;
 - (4) landmarks;
 - (5) point of impact (PI); and
 - (6) location of rendezvous point.
- d. Any other instructions relevant to the drop such as casualties and parachute recovery.

- e. The JM will issue the final statement: **YOU ARE NOW MANIFESTED, AND YOU WILL PARACHUTE IN ACCORDANCE WITH MY INSTRUCTIONS AND ALL ORDERS APPLICABLE TO THIS CHALK.**

STATIC LINE SQUARE AIRCREW BRIEFING

18. Once all parachutists have been seated, and seat belts have been fastened and checked by the JMs, the JMs and aircrew will conduct a briefing near the aft end of the cargo compartment to confirm that all are operating on the same information. This briefing is known as the “Aircrew Briefing” and will include the Aircraft Captain, navigator, loadmaster and JMs.

19. The Aircraft Captain will normally start the briefing and will cover the following items, most of which are taken from the parachute operation order:

- a. type of drop;
- b. maximum surface winds permissible;
- c. number of passes;
- d. number of parachutists (determined by load manifest);
- e. cabin lighting and heating;
- f. communications within the aircraft to include:
 - (1) intercom;
 - (2) lights; and
 - (3) bells.
- g. emergency procedures, including informing the FJM of altitude above ground level (AGL) before exit commands are given;
- h. hang-up procedures; and
- i. alternate plan (alternate Drop Zone or air land, etc).

20. The navigator will then cover the following items:

- a. confirm High Altitude Release Point (HARP) and release point;
- b. duration of the red light;
- c. duration of the green light;
- d. run in and escape routes (detailed on map); and

- e. drop altitude AGL.
21. After the Aircraft Captain and navigator have finished their briefing, the JMs will confer with the loadmaster to confirm the following:
- a. jump signals; and
 - b. signal for **STOP DROP** before and after the **15 SECONDS** warning.
22. If there are any last minute changes regarding the drop, the changes must be covered during the aircrew briefing and the senior passenger informed.
23. At this time, the senior JM must ensure that two copies of the passenger load manifest are passed to the loadmaster.

EMPLANING

24. At the appointed time, and after obtaining permission from the Aircraft Captain, the JM will:
- a. guide the parachutists to the aircraft and emplane them in reverse stick order;
 - b. report to the Aircraft Captain and have him sign the load manifest;
 - c. distribute copies of the load manifest in accordance with unit SOP;
 - d. ensure that each parachutist's seat belt and helmet are secured;
 - e. ensure that parachutists' equipment loads are placed in the centre of the aircraft and secured by means of tie down straps;
 - f. ensure that the jumpmaster's kit is secured;
 - g. inform the loadmaster that the troops are ready for take-off; and
 - h. sit down and fasten his seat belt.

SECTION 3 IN-FLIGHT DUTIES

GENERAL

25. After take-off the JM will assume the following duties:
- a. when so informed, order seat belts off;
 - b. maintain strict discipline; and

- c. keep the senior passenger informed.

JUMP COMMANDS AND DISPATCHING OF PARACHUTISTS (RAMP)

26. After giving the command **CHECK YOUR EQUIPMENT**, the JM begin his checks with the last parachutist of the stick. Each parachutist will be inspected using the following sequence:

- a. move to the rear of the jumper and with the static line form a bight in the slack control loop;
- b. place a thumb in the bight of the static line, which has been passed through the slack control loop, and take up the slack, while at the same time placing the other hand on top of the snap fastener;
- c. visually and physically ensure the snap fastener is hooked to the anchor line cable with the opening facing inboard;
- d. ensure the locking button is flush with the locking plate;
- e. ensure the static line safety pin is inserted in the snap fastener and bent;
- f. ensure the jumper has a proper long bight (all the way to his elbow);
- g. trace the static line from the bight all the way to the slack control loop to ensure it is not misrouted and there is enough of a bight in the slack control loop;
- h. starting from inboard to outboard, lift the corner of the static line cover flap to visually ensure that the jumper has a minimum of one stow per side;
- i. starting from inboard to outboard, lift the corner of the pin cover flap to ensure the pack closing pins are secure in the two pack closing loops (facing up and out), and that there is a rigger's seal (on both pins);
- j. open the reserve ripcord protector flap, and physically and visually ensure the reserve static line lanyard is snapped to the left riser, the ring is attached to the reserve static line release shackle, the shackle is fully closed, and the reserve static line ring is in between the ripcord housing and the reserve ripcord guiding ring;
- k. visually and physically ensure that both reserve pins are fully inserted into both reserve pack closing loops, and close the reserve ripcord protector flap 100% Velcro on Velcro;

- l. visually inspect the altimeter to ensure it works properly (200 ft difference with the JM altimeter below 10,000 ft);
- m. talk to the jumper to ensure he is coherent and has his helmet attached;
- n. visually inspect the cut away handle and the reserve ripcord handle to ensure they are still placed properly;
- o. quickly ensure the chest strap is not misrouted, is secure and the excess is tucked away underneath the retainer provided;
- p. visually and physically check the waistband quick fit ejector snap hook by pressing onto the locking lever to ensure it is closed properly, and the excess is rigger rolled and stowed in the retainer provided;
- q. visually and physically check both leg straps quick fit ejector snap hooks by pressing on the locking lever to ensure they are properly closed, and the excess is rigger rolled and stowed in the retainer provided; and
- r. Tap the jumper OK.

27. If equipment is worn the JM will carry out the same check in paragraph 26 subparagraphs a. to p., then carry out the following sequence:

- a. visually and physically inspect the rifle ensuring it is secured to the fixed loop on the left shoulder with a piece of 6.6 mm (¼ in) cotton webbing (80 lb test), the sling passing under the main lift web and around the chest strap;
- b. visually and physically check both equipment snap hooks to ensure they are properly secured to the equipment O-ring;
- c. visually and physically check the jettison buckle on the right side to ensure it is attached and dressed properly, tracing the jettison strap to ensure it passes through the lowering strap loop and the left buckle is attached properly; and
- d. tap the jumper OK.

JUMP COMMANDS AND DISPATCHING OF PARACHUTISTS (DOOR)

28. Jump commands for door jumps will be the same as for ramp jumps except as noted below:

- a. parachutists will position themselves so that the first jumper is in line with the leading edge of the door; and
- b. After the command **1 MINUTE**, the JM will:

- (1) check that the door is open and the pip pin inserted;
- (2) check that the jump platform is locked;
- (3) check that air deflectors are open; and
- (4) pass the winds on the Drop Zone to the parachutists.

JUMPMaster CHECK WITH EQUIPMENT

29. Inspection of the rucksack rigged with the PELS system should be conducted in the same sequence as outlined in Chapter 3, except for the following:

- a. ensure the strap passes through the buckles correctly, there are two equipment snap hooks attached, and the openings are facing inwards;
- b. ensure the knot of the lowering rope is properly secured to the fixed loop on the PELS;
- c. ensure the jettison strap passes through the loop on the lowering strap, the fixed buckle is operational, and a quick release is attached to the jettison buckle on the right side;
- d. if jumping rifle only or with rucksack, the rifle is prepared with the sling longer than normal to accommodate for the twist when dressing (no other special rigging will be necessary); and
- e. all parachutists will be rigger checked and JM checked prior to boarding to ensure parachutist are capable of exiting the aircraft in case of an in-flight emergency (parachutists may in the case of a long flight have their chutes pre-rigger checked and board the aircraft without wearing the CT-6 parachute).

IN-FLIGHT DRESSING AND JUMPMaster INSPECTION WITH EQUIPMENT

30. In most cases parachutists will board the aircraft with their parachutes on. Once the aircraft takes off and P-hour approaches the parachutists will don their equipment when ordered to **GET DRESSED**.

NOTE

If parachutes are donned on the ground the rifle will be attached prior to the rigger's inspection.

31. The JM will ensure the donning is being done correctly and assist parachutists as they dress.

32. The JM can begin his inspection whenever parachutists are dressed.
33. The JM will carry out a normal aircraft check on the parachute first, then inspect the equipment load, per the following sequence:
 - a. inspect the rifle, ensuring it is secured to the fixed loop on the left shoulder with 80 lb test, it is turned so that the sling is on the outside over the butt, it is properly positioned, and the waistband is over top of the rifle;
 - b. ensure the equipment snap hooks on the attaching strap are attached to the equipment D-rings;
 - c. ensure the jettison strap is secure to the V-rings on the leg straps and is under the securing strap, the jettison release is on the right side, the jettison strap passes through the lowering rope, and the loop of the lowering rope is attached to the yellow keeper;
 - d. visually check the general condition of the rucksack; and
 - e. once the inspection is completed, tap the jumper OK.

SECTION 4 MISCELLANEOUS DUTIES

CALCULATION OF THE HIGH ALTITUDE RELEASE POINT (HARP)

34. The procedures for calculating the HARP are outlined in 1 CAD Orders 2601 Volume Two. A synopsis of these procedures is outlined below.
35. There are two kinds of values used while doing the HARP, described as “Known Values” and “Unknown Values”.
36. The “Known Values” can usually be obtained from the Deputy Airborne Force Commander and they include:
 - a. opening and jump altitude;
 - b. type of aircraft; and
 - c. location of the target on the Drop Zone (IP).
37. The weather section will provide wind speed and wind direction from ground level up to jump altitude in thousand foot intervals.
38. “Unknown Values” will be calculated using the information obtained from the weather section, as follows:
 - a. canopy drift (CD);

- b. direction of canopy drift (DCD); and
 - c. forward throw (found using the type of aircraft).
39. After obtaining all wind and direction data from the weather section from ground level to exit altitude, the JM may begin calculating HARP.

PLOTTING HARP RESULTS ON MAP

40. The following symbols are used when plotting results:
- a.  is the symbol used to mark the IP on the map;
 - b.  is the symbol used to mark the opening point;
 - c.  is the symbol used to mark the end of the projection; and
 - d.  is the symbol used to mark the exit point.
41. Plotting results is as follows:
- a. using the information obtained from the HARP, plot canopy drift from the IP in the appropriate direction to the opening point;
 - b. plot freefall drift from the opening point to the end of the projection;
 - c. draw a line from the end of the projection to the IP; and
 - d. on that line, at the appropriate distance from the end of the projection, plot the exit point.
42. The release point should be at the grid where the projection on the map was plotted.

CHAPTER 16

CT-6 STATIC LINE SQUARE PARACHUTING FROM AIRCRAFT OTHER THAN CC-130

SECTION 1

INTRODUCTION

GENERAL

1. Although the CC-130 Hercules is the primary aircraft for the operational delivery of troops at present, a variety of other aircraft may be used for operational or training jumps. Such aircraft can be broken down into two types, as follows:
 - a. **Type A.** Aircraft which are so equipped and crewed that the aircrew can compute the High Altitude Release Point (HARP) from data obtained from onboard equipment; and
 - b. **Type B.** Aircraft that are not so equipped or crewed.
2. When Type B aircraft are used, the location of the parachute opening point (POP) and HARP will be determined through the use of wind drift indicators (WDI) dropped from POP altitude.

AIRCRAFT SUITABILITY

3. Any aircraft which incorporates the following characteristics is considered suitable for parachute delivery:
 - a. an exit through which a parachutist may leave the aircraft, in flight, and not be imperilled by collision with any part of the aircraft or by propeller, rotor or jet wash;
 - b. sufficient space to carry out the aircraft drill safety checks;
 - c. means of communication between the Aircraft Captain and jumpmaster; and
 - d. a means of static line retrieval

PERSONNEL EQUIPMENT LOADS

4. Parachutists will jump with equipment loads only from aircraft from which a safe exit can be made.

SECTION 2 AIRCRAFT DRILL

GENERAL

5. Although the movement of parachutists may be hindered due to the restricted cargo compartment of some of these aircraft, the aircraft drill detailed in Chapter 14 will be adhered to when jumping from training aircraft.

LOADMASTER DUTIES

6. The loadmaster is responsible for the following:
 - a. Relaying all jump commands and other instructions given by the Aircraft Captain to the jumpmaster (JM); and
 - b. opening the door or ramp after the **SOUND OFF FOR EQUIPMENT CHECK** has been given.

JUMPMASTER DUTIES

7. The JM is responsible for performing the duties detailed in Chapter 15. In addition, the JM is responsible for dropping WDIs as detailed in section 3.
8. On the **1 MINUTE** warning, the JM will position himself close to the door or ramp, facing the parachutists.
9. On receiving permission to drop, the JM will ascertain when the aircraft is over the release point, order the parachutists to **GO!**, and dispatch the parachutists.

SECTION 3 SPOTTING

GENERAL

10. With the increased use of aircraft other than the CC-130, JMs must be familiar with spotting and the procedures for guiding aircraft to a release point. When using smaller aircraft, which are not equipped with complex navigation aids, the JM may be tasked to select the release point and dispatch parachutists safely over the right area.

11. “Spotting” is the art of guiding an aircraft to a predetermined release point so parachutists may land within the target area in the Drop Zone (DZ). Wind normally moves in layers at varying speeds and in different directions. To assess how far the parachutist is going to drift under canopy, it is necessary to measure the mean effect of the wind from opening altitude down to ground level.

12. The most practical and widely practiced means of determining drift is the Wind Drift Indicator (WDI) method. The WDI is constructed of crepe paper, 6 m (21 ft) long and 25.4 cm (10 in) wide, and is weighted at one end with approximately 55-70 gm (2-2 1/2 oz). When dropped, WDIs should descend at approximately 300 m (1,000 ft)/min. This is an accurate representation of the speed at which the average parachutist will descend under canopy.

DETERMINING A RELEASE POINT

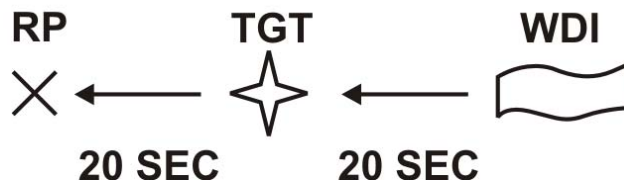
13. When dispatching from non-standard aircraft the Aircraft Captain has the option of either:

- a. determining his own release point (RP), in which case all the JM will do is dispatch the WDIs on command; or
- b. task the JM to determine a RP, in which case the JM must be thoroughly familiar with the procedure for determining a RP and guide the aircraft to it.

14. To determine the RP it is necessary to guide the aircraft into the wind over the target at opening altitude and carry out the following steps:

- a. release WDIs over target;
- b. start a stopwatch;
- c. orbit aircraft so WDIs can be observed;
- d. stop stopwatch as WDIs hit the ground;
- e. ensure proper flight time 1000 ft/min +/-20 sec;
- f. guide aircraft over WDIs over target and time the distance;

EXAMPLE



- g. keeping the aircraft on the same bearing, fly the same distance to the other side of the target;
- h. release confirmatory WDIs, which should land close to the target;
- i. start stopwatch;

- j. stop stopwatch as WDIs hit ground;
- k. ensure proper flight time; and
- l. adjust tentative RP if necessary.

NOTE

If confirmatory WDIs are off target more than 200 m repeat steps g-l.

15. WDIs will be dispatched:
- a. prior to the first personnel drop of each day;
 - b. whenever there is a major wind change of 4 kts or 30 degrees;
 - c. after a break in jumping of 90 min or more; and
 - d. whenever there is a change in drop altitude of 300 m (1,000 ft) or more.

NOTE

If the aircraft is unable to fly into the wind for whatever reason (e.g. air traffic, winds too high), WDIs can still be thrown, ensuring that they are released over the target.

AIRCRAFT PROCEDURE FOR SPOTTING

16. A normal aircrew briefing will be given at the beginning of each day. At this time the JM must ensure that he reviews the spotting procedure with the aircrew.

JUMPMaster KIT

17. The JM must ensure he has:
- a. 9 WDIs;
 - b. stopwatch; and
 - c. map of Drop Zone.

COMMUNICATIONS

18. Whenever dispatching from a non-standard aircraft the JM will be in direct communication with the Aircraft Captain through the intercommunications system at all times.

19. Once the post take-off check is complete, the JM will prepare WDIs, if not already done. Once the JM has received the "OK" from the Aircraft Captain he can open the door and locate the target area if possible. At this time the Aircraft Captain should be making his approach and only minor corrections, if any, should have to be made.

20. The sequence of communications between the Aircraft Captain and the JM should as follows:

- a. JM to Pilot. **1 MINUTE FOR WDI RUN;**
- b. Aircraft Captain to JM. **1 MINUTE, WINDS xx, CLEAR TO DROP or STOP DROP;**
- c. JM to Aircraft Captain. **15 SECONDS;**
- d. Aircraft Captain to JM. **ACKNOWLEDGE;**
- e. JM to Aircraft Captain. **GO!, WDIs AWAY;**
- f. Dispatch WDIs.
- g. Inform Aircraft Captain of impact point;
- h. Aircraft Captain to JM. **ON RUN IN FOR CONFIRMATION WDIs;**
- i. JM to Aircraft Captain. **1 MINUTE FOR CONFIRMATION WDIs;**
- j. Aircraft Captain to JM. **1 MINUTE, WINDS xx, CLEAR TO DROP or STOP DROP;**
- k. JM to Aircraft Captain. **15 SECONDS;**
- l. Aircraft Captain to JM. **ACKNOWLEDGE;** and
- m. JM to Aircraft Captain. **GO!, WDIs AWAY.**

21. If confirmation WDIs are good, the JM will close the door and ask permission to carry on with JM duties.

22. As P-Hour approaches communication between the Aircraft Captain and the JM should be as follows:

- a. Aircraft Captain to JM. **2 MINUTES**;
 - b. JM to Aircraft Captain. **1 MINUTE FOR LIVE DROP**;
 - c. Aircraft Captain to JM. **1 MINUTE, WINDS xx, CLEAR TO DROP** or **STOP DROP**;
 - d. JM to Aircraft Captain. **15 SECONDS**;
 - e. Aircraft Captain to JM. **ACKNOWLEDGE**;
 - f. JM to Aircraft Captain. **GO!**; and
 - g. JM to Aircraft Captain. Number of Parachutists dispatched followed by **CLEAR** or **HUNG-UP**.
23. The JM must remember the following points:
- a. If the JM jumps, the loadmaster will call the **CLEAR**.
 - b. All communications between JM and Aircraft Captain will be acknowledged.
 - c. The Aircraft Captain is responsible for the safety of his aircraft and everyone in it at all times. The JM is responsible for the safe and orderly dispatch of the parachutists.
 - d. Any member of the flight crew or the JM can call a **STOP DROP** at any time during these procedures.

CHAPTER 17

CT-6 STATIC LINE SQUARE PARACHUTING FROM CH-146 GRIFFON HELICOPTER

SECTION 1

GENERAL

DESCRIPTION

1. The CH-146 Griffon is a tactical helicopter capable of operating from prepared or unprepared landing zones under visual or instrument flight rules by day or night (see Figure 17-1).



Figure 17-1: CH-146 Griffon Helicopter

TECHNICAL DATA

2. CH-146 helicopter technical data is as follows:
 - a. **Design gross weight.** 5,397 kg (11,900 lb);
 - b. **Maximum combat load.** 1,247 kg (2,750 lb);

- c. **Aircrew.** Aircraft Captain, co-pilot and flight engineer;
- d. **Cargo area.** 7.3 cu m (220 cu ft);
- e. **Maximum airspeed.** 140 knots Indicated Air Speed (250 km/h);
- f. **Maximum altitude.** 6,096 m (20,000 ft) (DND limitation to 10,000 ft) above Mean Sea Level (MSL);
- g. **Personnel capacity.** Crew (3) plus 12 passengers or 8 parachutists;
- h. **Static line jump altitude.** 381 m (2500 ft) minimum; and
- i. **Optimum jump airspeed.** 65 knots Indicated Air Speed.

SEATING ARRANGEMENTS

3. The CH-146 helicopter can carry up to eight parachutists without winter equipment, seated, when the cargo doors are removed, in two sticks each of four parachutists (see Figure 17-2). As well:



Figure 17-2: Starboard Stick without Equipment

- a. six winter-equipped parachutists with full equipment, three per stick, can be seated when the cargo doors are removed; and
- b. six summer-equipped parachutists with full equipment, three per stick, can be seated when the cargo doors are removed (see Figure 17-3).



Figure 17-3: Starboard Stick with Summer Equipment

NOTE

Doors must be removed for all static line parachuting operations.

PARACHUTIST SAFETY EQUIPMENT

4. Crew safety harnesses and removable safety belts are provided in the CH-146 for use by parachutists and crew.

SECTION 2 AIRCRAFT DRILL

GENERAL

5. Aircraft drill for the CH-146 is as detailed in Chapter 3 except as otherwise noted in this section.

EMPLANING

6. Parachutists will have their static lines stowed on the RIGHT side of the parachute pack by the jumpmaster (JM) during the ground check.
7. Upon receiving authority to board from one of the pilots or the flight engineer (visual signal if the aircraft is running by a thumb up to the JM), the port stick followed by the starboard stick will follow the JM in reverse stick order from the 12 o'clock position and proceed to board the aircraft.
8. Parachutists will take up their seated positions in the aircraft in stick order from the aft end. They will fasten their seat belts, which will be checked by the JM. Meanwhile the JM will hook up static lines to the anchor line cable in stick order.
9. Each parachutist will observe the JM hooking up his static line to the D-ring of the anchor line assembly.
10. The JM will ensure that the safety belt of each parachutist is securely fastened.
11. Each parachutist will give a visual "OK" (thumb up) when he has seen his static line hooked up and his seat belt has been checked.
12. When all parachutists have been hooked up and have had their seat belts checked, the JM will ensure every parachutist has indicated a thumb up.
13. The JM will adopt a seated position facing aft in the centre of the aircraft.
14. The JM will give a thumb up to the flight engineer when parachutists are ready for take-off and verbally report **JUMPMaster SECURE** after his safety harness and seat belt is fastened.

JUMP COMMANDS

15. The 4 minute, 1 minute, 15 seconds, and **5-4-3-2-1 — GO!** warnings are given by the Aircraft Captain over the intercommunication radio to the JM.
16. Jump commands and procedures are as follows:
 - a. **GET READY.** This command is given by the JM on receipt of the **4 MINUTE** warning from the Aircraft Captain, and from that time the parachutists will maintain eye contact with the JM;
 - b. **CHECK YOUR EQUIPMENT.** On hearing this order:
 - (1) Each parachutist checks his equipment in the normal manner;
 - (2) The JM carries out his normal checks on each parachutist, paying particular attention to static line routing and anchor line hook-up.

- c. **SOUND OFF FOR EQUIPMENT CHECK.** On hearing this order:
 - (1) The last man in each stick will tap the man beside him and sound off his own stick number as **OK**;
 - (2) The Number 1 parachutists, port and starboard, will look at the JM, give the thumb up signal when Number 2 taps him and sound off **NUMBER 1 OK**; and
 - (3) When all parachutists have sounded off, the JM may inform them of the surface wind speed.
- d. **SEAT BELTS OFF.** This command is given by the JM on receipt of the **1 MINUTE** warning from the Aircraft Captain. The following actions are then taken:
 - (1) each parachutist will remove his seat belt and clear it from his equipment; and
 - (2) the JM will make a final safety check of static lines and ensure seat belts are clear of parachutists.
- e. **STAND BY.** This command is given by the JM on receipt of the **15 SECONDS** warning. The following actions are taken:
 - (1) all parachutists will look at the JM;
 - (2) the JM will raise both hands while facing aft in the aircraft;
 - (3) if **STOP DROP** is received after the **15 SECONDS** warning, the JM will grasp his raised right hand with his left hand and the jumpers will re-fasten their seat belts under command of the JM.
- f. **GO!** On receipt of the **GO!** signal from the Aircraft Captain, the following sequence of actions will be followed:
 - (1) The JM will give an individual command **GO!** to each parachutist
 - (2) The JM will dispatch the port and then the starboard sticks, in stick order, by pointing to each parachutist in turn and ordering,
1 GO!, 2 GO!, etc.
 - (3) On receipt of his individual command **GO!**, each parachutist will push himself up and out vigorously with his hands, and adopt the “jab” position;

- (4) After the last parachutist has been dispatched from each stick, the JM will check for hang-ups and, if there are none, inform the Aircraft Captain **CLEAR**;
- (5) The JM will retrieve static lines and secure them for landing; and
- (6) Upon landing the JM will ask permission to clear static lines.

INTERRUPTED AIRCRAFT DRILL

17. Incidents may occur which will interrupt the normal sequence of aircraft drill, e.g.:

- a. a parachutist who is not in satisfactory physical condition to jump;
- b. a parachutist with faulty equipment; or
- c. giving of the order **STOP DROP** by the JM.

18. If the normal sequence of aircraft drill is interrupted, the following actions will occur:

- a. the JM will immediately inform the Aircraft Captain of the cause of the interruption;
- b. the JM will order seat belts fastened if the interruption occurs after the **1 MINUTE** warning;
- c. if a jumper in a stick cannot be safely dispatched, due to the static line configuration the JM will not allow the remainder of the stick to jump;
- d. the JM will NOT attempt to remove a jumper from his seated position in the door in the event of an interruption;
- e. on permission from the Aircraft Captain, the opposite side stick may be dispatched by the JM if the interrupted stick has refastened their seat belts and the cause of interruption will not interfere with the safety of the opposite side stick; and
- f. the JM will immediately retrieve static lines from any deployed parachutes and secure them.

FORCED LANDINGS

19. If the CH-146 is required to make a forced landing, the Aircraft Captain will employ auto rotation procedure, which will normally result in the following:

- a. noticeable loss of altitude;

- b. rapid slowdown of descent about 30 m (100 ft) above ground, with the nose raised as the aircraft flares out on a cushion of air; and
- c. slow descent to ground touchdown.

20. If it is necessary to make a forced landing, aircraft procedure will be as follows:

- a. The JM will be informed by the Aircraft Captain of the nature of the emergency.
- b. The flight engineer and the JM will ensure that seat belts are fastened.
- c. Under no circumstances will parachutists attempt to jump from the aircraft.
- d. The JM will remain in the JM's position until the aircraft lands.
- e. On landing, the JM will immediately clear the parachutists' static line snap fasteners by cutting the type X cotton anchor line strap in two spots (see Figure 17-4).

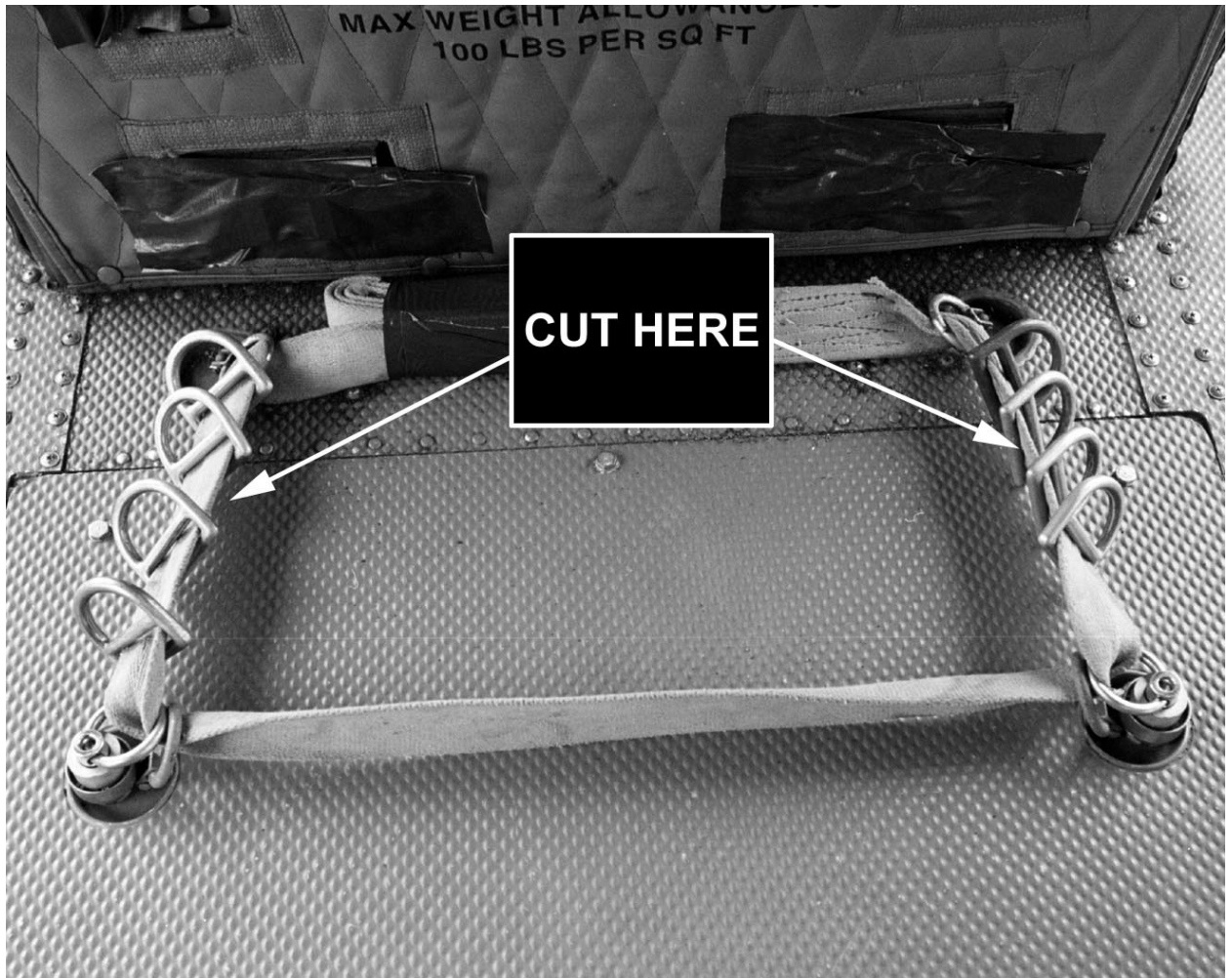


Figure 17-4: Cutting the Anchor Line Strap

- f. No personnel will exit the aircraft until the Aircraft Captain has given the authority to do so, or when all aircraft moving parts have stopped moving.
- g. As each parachutist deplanes he will move to a point at least 100 m (300 ft) to the side of the aircraft.
- h. The JM will not leave the aircraft until all parachutists' snap fasteners are cleared from the anchor line cable and are clear of the aircraft. The JM will not hesitate to use his knife to free the parachutists' static lines if he feels it is necessary.
- i. If the forced landing involved ditching, the parachutists will inflate their LPUs when clear of the aircraft.

SECTION 3 JUMPMaster DUTIES

GENERAL

21. JM duties in the CH-146 are detailed in Chapter 4 except as otherwise noted in this section.

COMMUNICATIONS

22. Communications in the CH-146 will consist of verbal conversations between the Aircraft Captain, the flight engineer and the JM using the intercommunications system.

23. If the **STOP DROP** signal has to be given after the **15 SECONDS** warning it will be given by the Aircraft Captain directly to the JM.

JUMPMaster EQUIPMENT

24. Prior to any jump, the jumpmaster will draw and have aboard the aircraft:

- a. crewman safety harness;
- b. safety harness tether strap;
- c. sheath knife;
- d. hook knife (NSN 5110-00-524-6924);
- e. masking and gun tape;
- f. one 2.6 m (8 ½ ft) Type X cotton anchor line strap;
- g. hang-up strap with 5,000 lb carabineer;
- h. eight D-rings;
- i. two ring fittings;
- j. spare retainer bands;
- k. nine Wind Drift Indicators;
- l. map of Drop Zone; and
- m. stopwatch.

AIRCRAFT INSPECTION AND PREPARATION

25. Aircraft fitted with HF SSB antennae, skis or both will NOT be used for static line parachuting.
26. The JM and the flight engineer will prepare the helicopter as follows:
 - a. main and small cabin cargo doors will be removed;
 - b. all passenger seats will be removed;
 - c. the retrieval system assembly will be installed in the aircraft, consisting of a tether strap off the restraint harness and a local manufacture retrieval strap and carabineer (see Figure 17-5);

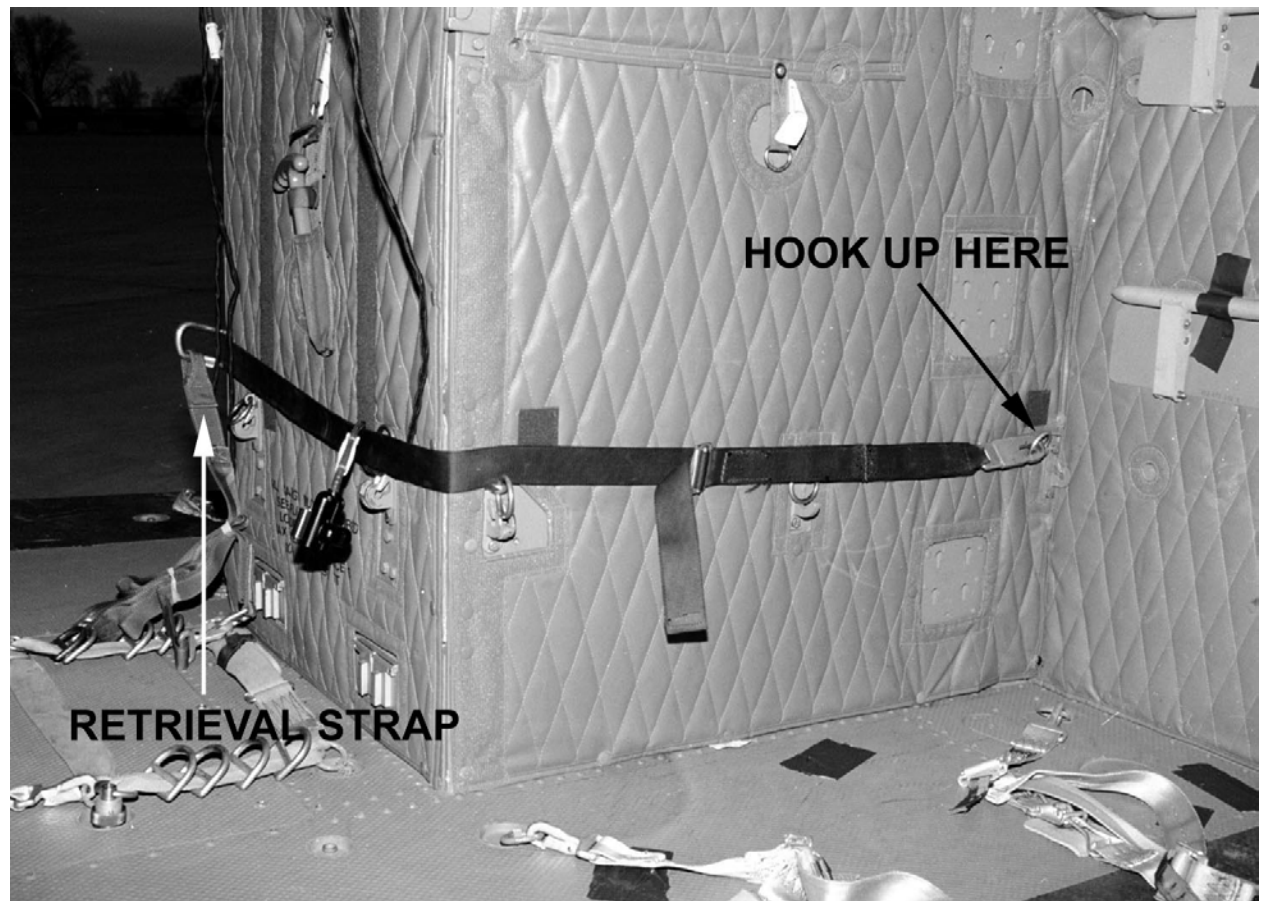


Figure 17-5: Retrieval System

- d. safety belts will be installed for each parachutist; and
- e. one anchor line assembly is installed in the aircraft, consisting of Type X cotton webbing anchor line strap and eight D-rings (see Figure 17-6).

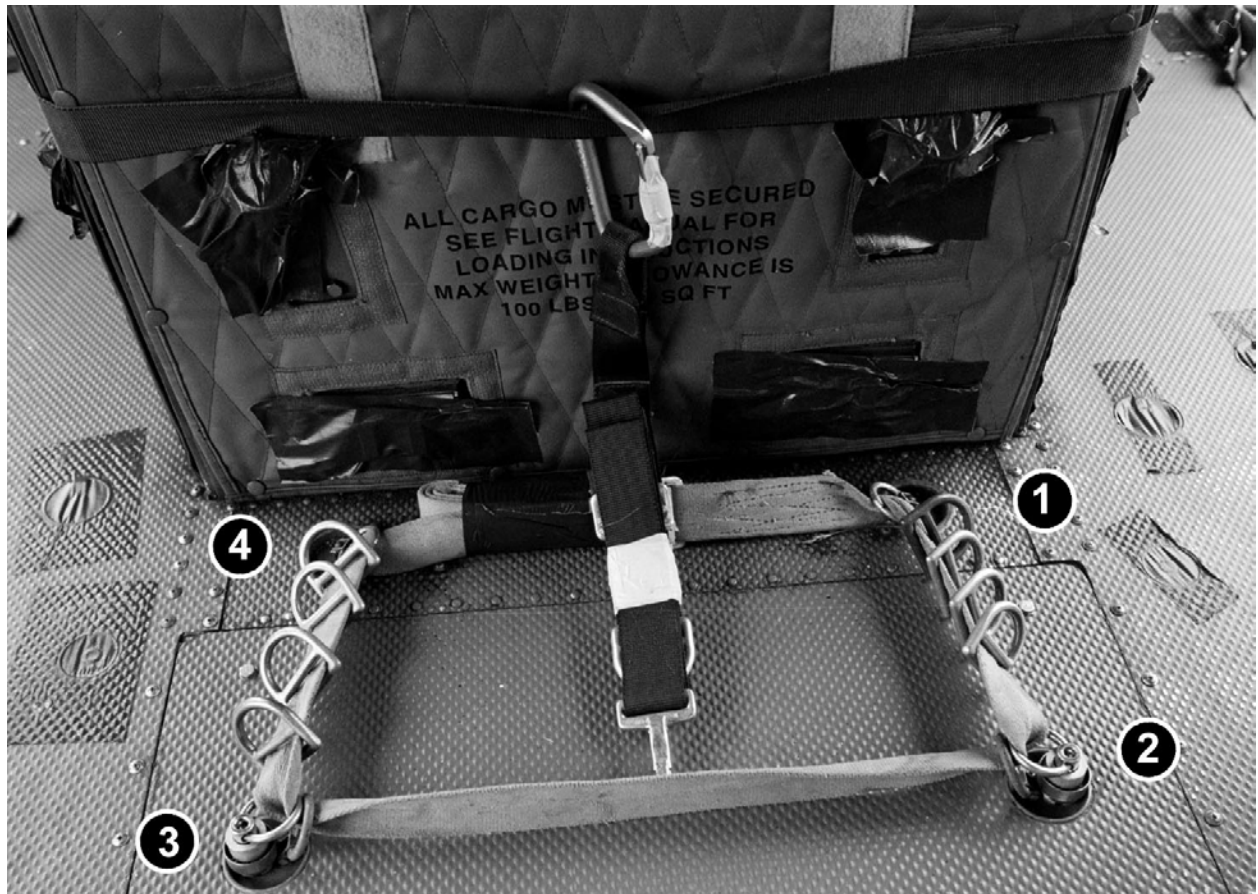


Figure 17-6: Anchor Line Assembly

27. The anchor line assembly is installed in the centre of the aircraft as follows (see Figure 17-7):

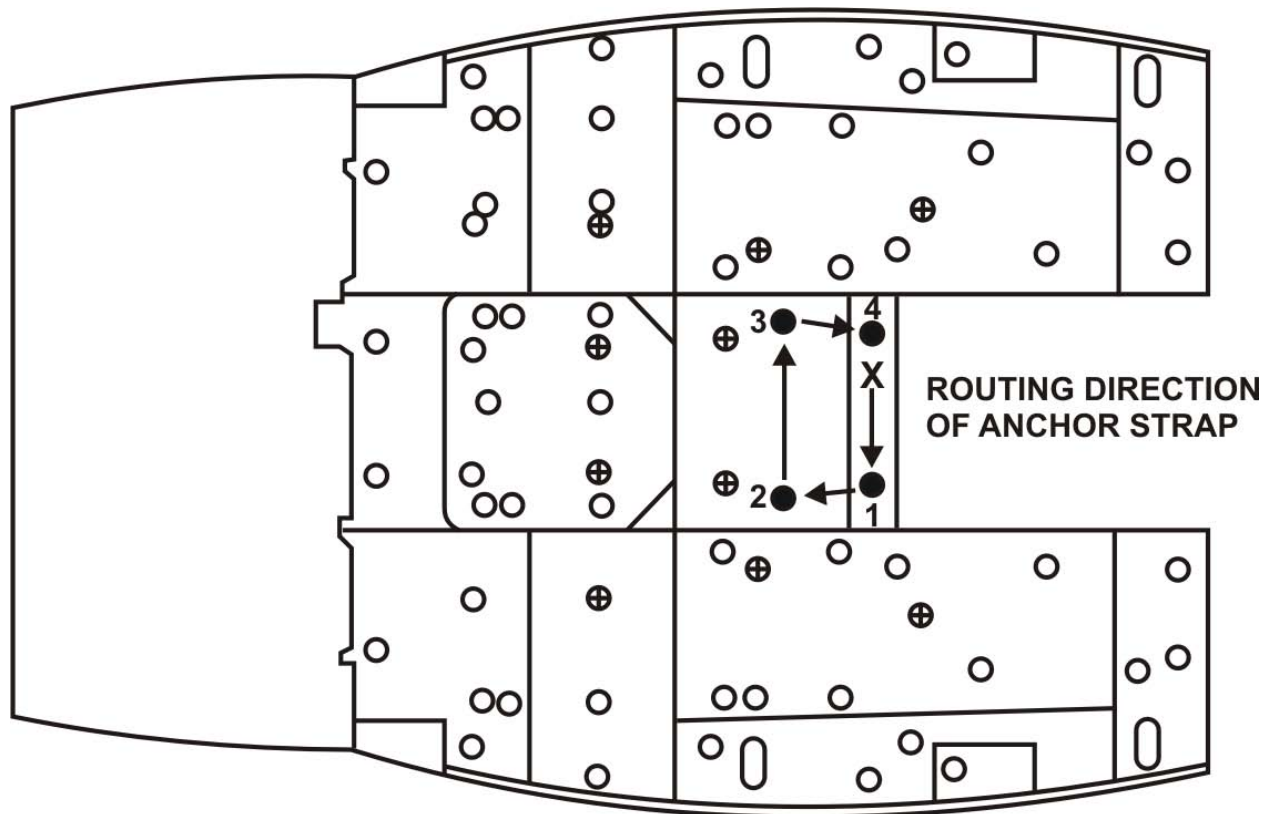


Figure 17-7: Anchor Line Assembly Installation

- a. Install two ring fittings at the stud fittings shown at point 2 and 3.
 - b. The running end of the strap is threaded through tie-down 1 from inboard to outboard and four d-rings are placed on the strap, with the round part of the D-ring facing outboard.
 - c. The strap is threaded through tie-down 2 and the ring fitting, and then is threaded through tie-down 3 and the ring fitting. Four d-rings are then placed on the strap with the round part of the ring facing outboard.
 - d. The strap is now threaded through tie-down 4.
 - e. The running end of the strap is secured to the “quick-fit” adapter between tie-downs 1 and 4, and the rolled excess strap is secured with gun tape.
28. All sharp edges and protrusions will be gun taped throughout the cabin.
 29. The JM will inspect the prepared aircraft to ensure no unsafe conditions exist.
 30. The JM will ensure the starboard cargo compartment door on the tail boom is locked.

JUMPMaster CHECKS

31. The JM pre-flight checks are detailed in paragraph 9, Chapter 4. The following additional points must also be included in the checks:

- a. The snap fastener must be placed by the JM on the RIGHT side of the parachute pack and not over the parachutist's shoulder.
- b. The C8 rifle must be rigged over the same shoulder as appropriate for the CC-130 port or starboard door, depending upon whether the parachutist is in the port or starboard stick. Only C8 weapons are authorized for static line parachuting from the CH 146. In addition, snowshoes are not authorized for parachute operations or training from the CH 146 Griffon Helicopter.

JUMPMaster POSITION

32. During take-off, the JM takes a seated position in the aircraft with safety harness fastened, facing aft in the centre of the aircraft.

33. Once airborne, the JM may move about to check parachutists by adjusting the length of the safety harness restraining strap.

34. During the jump run, the JM will adopt a standing, crouched position, enabling him to see both sticks. The JM will return to this position each time he completes his in-flight checks (see Figure 17-8).



Figure 17-8: Jumpmaster Position in the Aircraft

NIGHT PROCEDURES

35. For a night drop, standard procedures for the CH-146 are used. The cabin area has both a white and night vision goggle (NVG) green light capability. Normally, all night training and operations will be conducted under NVG conditions, and the NVG green light will be used. However, white light may be used to illuminate the cargo compartment during emplaning. The RED cargo compartment light will be turned on to aid night vision adaptation on take-off.

HANG-UP PROCEDURES

36. If a parachutist is hung up by a fouled lowering strap, the JM will:
- stop the stick;
 - inform the Aircraft Captain;
 - cut the fouled equipment strap free; and
 - report **HANG-UP RELEASED**.
37. If the cause of the hang-up is clear and no unsafe conditions exist, the JM may dispatch the remaining parachutists with the permission of the Aircraft Captain.
38. If a parachutist is hung up by his static line, the JM will:
- stop the stick;
 - inform the Aircraft Captain;
 - ensure the parachutist has indicated to him that he is conscious by placing one or both hands on the helmet;
 - cut the parachutist free with his sheath knife; and
 - upon being cut free, the parachutist will immediately activate his reserve.
39. If the parachutist is hung up by the static line and is unconscious, the JM will:
- stop the stick;
 - inform the aircraft Captain;
 - use the hang-up strap to secure the parachutist if possible; and
 - prepare for a soft landing.
40. If the parachutist is hung up by his equipment or parachute saddle on the skid, the JM will:

- a. stop the stick;
- b. inform the aircraft Captain;
- c. use the hang-up strap to secure the parachutist; and
- d. prepare for a soft landing.

SAFETY

- 41. Eight parachutists, four per stick, is the maximum number of parachutists that may be safely hooked up and dispatched on one lift.
- 42. Seat belts remain fastened until the command **SEAT BELTS OFF (1 MINUTE** warning) is ordered.
- 43. Parachutists will not move to the edge of the aircraft until the **STAND BY** is given;
- 44. An airspeed of 65 knots Indicated Air Speed during the jump run is recommended. Airspeeds lower than 50 knots or higher than 70 knots are not recommended.
- 45. A twenty-degree bank turn is the maximum safe bank turn during flight with parachutists seated in the door with seat belts fastened.
- 46. Ring fittings are inspected before and after use, disposing of unserviceable rings.
- 47. Ring fittings are only placed on the stud fittings which have the slotted grove (PN 120-064-3HN) (see Figures 17-9 and 17-10).



Figure 17-9: Ring Fitting



Figure 17-10: Stud Fitting with Slotted Groove

48. The anchor line strap must be made of Type X cotton webbing. Nylon webbing is not safe.

49. Static lines must be retrieved, stowed and secured inside the aircraft prior to landing. They must be left hooked to the anchor line strap until after the aircraft has landed and permission to unhook them has been received from the Aircraft Captain.

50. If a static line hang-up occurs, the Aircraft Captain must be informed and he will determine whether a soft landing is necessary.

51. Personnel will not approach or exit the aircraft from other than the 12 o'clock position, under authority of the Aircraft Captain, while the helicopter blades are rotating.