INTRODUCTION

This manual is in the interest of ensuring that in the event of an aircraft accident or incident emergency personnel are able to access an aircraft safely and efficiently. This manual will provide emergency personnel with the basic information required to safely access all areas of company aircraft.

A copy of this manual should be kept in the station with the station manuals and a copy should be in the possession of the Airport Crash Fire Rescue (Fire) department for training and reference.

Beechcraft 1900D Chapter 1
EMB-120 Chapter 2
DHC 8 Chapter 3
CRJ-200 Chapter 4
CRJ-700 Chapter 5
CRJ-900 Chapter 6
ERJ-145 Chapter 7

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For FAA Use Only

FAA ACCEPTED: [Signature]
Principal Operations Inspector, MASA
DATE: [Signature]

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CHAPTER 1
BEECHCRAFT 1900D
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1. Push to discharge left engine fire extinguisher.

2. Pull to close firewall fuel valve and arm engine fire extinguisher.

3. Pull to close firewall fuel valve fire ext arm.

4. Then push to discharge fire extinguisher.

5. Pull to close firewall fuel valve fire ext arm.

6. Battery and generator switches off.

7. Pull condition levers full aft to shut off fuel at the engine.

8. Oxygen push off.


10. Auto feather arm off.

11. Pilots air pull on.

12. Cabin oxygen pull on.

13. Ignition and engine start left off.

LANDING GEAR ACCUMULATOR
LANDING GEAR HYDRAULIC RESERVOIR MIL-H-5605 OIL
BRAKE RESERVOIR MIL-H-5605 OIL
ENGINE OIL
FUEL
ENGINE OIL
FUEL
BATTERY COMPARTMENT
MAXIMUM PASSENGERS 19
CREW (2)
TWO OXYGEN BOTTLES
ELT SWITCH
ENGINE FIRE BOTTLE
ENGINE FIRE BOTTLE
NOTES:
1900D FUEL SYSTEM (WET WING) - 678 GALLONS (TOTAL)
SERIAL NUMBER IS ON ID. PLAQUE LOCATED ON THE LEFT AFT FUSELAGE BELOW STABILON.

EMERGENCY EXITS FROM THE OUTSIDE, THE DOORS ARE RELEASED WITH A FLUSH MOUNTED PULL OUT HANDLE. THE NON-HINGED, PLUG-TYPE DOORS REMOVE COMPLETELY FROM THE FRAME INTO THE CABIN WHEN THE LATCHES ARE RELEASED.

THE FUSELAGE CAN BE CUT OUT ABOVE THE WINDOW LEVEL ANYWHERE BETWEEN THE DASHED LINES PROVIDED THE BATTERY IS OFF. SOME WIRING FOR THE CABIN AISLE LIGHTING WILL BE ENCOUNTERED.

NOTE: IN UNUSUAL SITUATIONS THE PASSENGER COMPARTMENT CAN BE ACCESSED THROUGH THE CARGO COMPARTMENT FORWARD PARTITION. AFTER REMOVING BAGGAGE AS NECESSARY, PULL DOWN PARTITION LOCK PIN AT 12 O’CLOCK POSITION, OR IF PIN WILL NOT RELEASE, CUT AROUND LOCK MECHANISM BY ANY MEANS AVAILABLE.

CABIN DOOR TO OPEN THE DOOR, DEPRESS THE RELEASE BUTTON ADJACENT TO THE DOOR HANDLE AND ROTATE THE HANDLE CLOCKWISE. PULL OUT AT THE TOP OF THE DOOR UNTIL THE GAS SPRING TAKES OVER AND LET THE DOOR DROP DOWN TO THE FULLY OPEN POSITION.

CARGO DOOR TO OPEN THE DOOR DEPRESS THE RELEASE BUTTON ADJACENT TO THE DOOR HANDLE AND ROTATE THE HANDLE CLOCKWISE, PULL OUT AT THE BOTTOM OF THE DOOR UNTIL THE GAS SPRINGS TAKE OVER TO LIFT THE DOOR TO THE FULLY OPEN POSITION.
CHAPTER 2
EMB-120 BRASILIA
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1. INTRODUCTION

A. This publication was prepared for the purpose of supplying crash, rescue, and fire-fighting teams with guidance, that is, helping to save the occupants and prevent further damage to the airplane. The information herein allows adequate handling of damaged airplane on the site of accident to prevent or minimize additional damage.

B. This publication consists of two sections: Section 1 provides general information and procedures, such as: airplane dimensions and minimum ground turning radius, towing, defueling, and jacking. Section II contains the airplane typical interior arrangements, location of flammable and explosive components, location and operating instructions for all access provisions, fire-fighting instructions and hoisting procedures. For further details on each system, refer to the corresponding maintenance manual.
SECTION I
GENERAL INFORMATION
2. AIRPLANE GENERAL DESCRIPTION

A. The EMB-120 Brasilia airplane is manufactured by Embraer- Empresa Brasileira de Aeronautica S.A. in Sao Jose dos Campos-S.P., Brazil. It was designed for the transportation of passengers and cargo in the airlines.

B. The EMB-120 Brasilia is an all-metal, pressurized, low-wing, t-tail, monoplane. Fully retractable tricycle-type landing gear with dual wheels, anti-skid braking system, and steerable nose gear are utilized. Power is provided by two turbo-prop, axial-flow, PW100 series engines. The ailerons and elevators are mechanically controlled by means of conventional cables, bellcranks, pulleys, and push-pull rods. The flaps and rudder are hydraulically actuated. An independent fuel supply is provided for each engine. Fuel is stored in two integral wing tanks. The airplane air conditioning and pressurization systems provide for passenger and crew comfort. As an option, the airplane may be provided with an Auxiliary Power Unit (APU).
Figure 1-1. Aircraft Dimensions and Minimum Turning Radius
3. LANDING GEAR BALL-LOCK PINS REMOVAL/INSTALLATION

A. The landing gear ball-lock pins must be installed whenever the airplane is parked, being serviced and/or being towed.

(1) Install ball-lock pins

(a) Make sure landing gear control handle is at down position.

(b) Insert ball-lock pin into hole located in secondary drag and locking strut of each landing gear.

(c) Make sure REMOVE BEFORE FLIGHT red streamer is properly in sight.

(2) Remove ball-lock pins

(a) Make sure landing gear control handle is at down position.

(b) Remove ball-lock pins.

(c) Stow ball-lock pins in special tool bag.

Figure 1-2. Landing Gear Ball-Lock Pins Removal/Installation
4. AIRPLANE JACKING

4.1. GENERAL
A. The three jacking points for raising the entire airplane consist of jacking pads which are integral with the airplane body and seat perfectly on the jacks.
B. The jacks used in this task (ground support equipment No. 011) are 900 mm high in the down position. Their travel is 600 mm and their capacity is 7 tons.

4.2. PREPARE FOR JACKING
A. Apply airplane parking brake
B. Make sure landing gear ball-lock pins are installed.
C. Clear area under airplane of all unnecessary equipment.
D. The complete airplane jacking requires three technicians for the simultaneous actuation of jacks, plus one technician to control the task.

4.3. JACK AIRPLANE
A. Suitably place jacks under jacking points.
B. Actuate the three simultaneously, so that jacking is symmetrical, always ensuring airplane remains leveled while it is raised up to desired height.
C. Lock jacks.

4.4. UNJACK AIRPLANE
A. Clear area under airplane of all unnecessary equipment.
B. Unlock jacks.
C. Gradually and simultaneously open hydraulic jack valves, slowly and symmetrically, to ensure airplane remains leveled while it is lowered.
D. Install wheel chocks and remove jacks from under airplane.
E.
5. AIRPLANE TOWING

5.1. GENERAL

A. Towing operations can be accomplished either manually or by means of a towing vehicle.

B. The tow bar (ground support equipment No. .016), used in conjunction with a towing vehicle, incorporates a break-off section, which breaks before any excessive stress above 1989 kgf, causes any damage to the nose landing gear or to the airplane structure.

C. Manual towing is accomplished by means of the tow bar (ground support equipment No. .017) and manual ground handling. When pushing the airplane, use, as support, points or areas which are less prone to damage.

5.2. SAFETY PRECAUTIONS

A. Towing operations shall be accomplished with the airplane hydraulic system depressurized.

B. A technician is required to stay in the cockpit when the airplane is being towed to operate the emergency/ parking brake.

C. Do not turn the nose gear beyond its turning radius, as marked in the nose gear.

D. Make sure the landing gear ball-lock pins are installed.

E. In case it is necessary to tow the aircraft with the electrical system energized, make sure the electronic motor-driven hydraulic pumps are OFF during the towing operation.

F. Make sure that the emergency/ parking brake is released.

G. After towing operation, make sure that the nose landing gear towing overtravel indicator is not disassembled.

5.3. INSTALL TOW BAR (TRACTOR TOWING)

A. Position tow bar in nose gear axle.

B. Align tow bar pins with nose gear axle, by turning wheel actuation crank on tow bar.

C. Fit tow bar pins to nose gear axle, by turning them counterclockwise, until by spring action, they are inserted in axle.

D. Lock pins by turning them clockwise.

5.4. REMOVE TOW BAR (TRACTOR TOWING)

A. Unlock towbar pins by turning them counterclockwise.
B. Release tow bar by pulling and turning them clockwise.

C. Remove tow bar.

5.5. INSTALL TOW BAR (MANUAL TOWING)

A. Position tow bar on nose gear axle.

B. Attach tow bar by inserting and locking pins in nose gear axle, by means of pin handles.

5.6. REMOVE TOW BAR (MANUAL TOWING)

A. Unlock and remove tow bar pins from nose gear axle, by means of pin handles.

B. Remove tow bar.
Figure 1-4. Airplane Towing
6. GRAVITY DEFUELING

6.1. GENERAL

A. The gravity defueling valves are located in the inboard tanks between ribs 4 and 5 of each half-wing and are actuated by means of an adapter with a manual shutoff valve (G.S.E. No. 065).

B. The airplane and the defueling cart must be grounded before the defueling procedure is carried out.

6.2. DEFUEL

A. Position defueling cart near selected defueling port.

B. Remove cap from defueling port.

C. Install quick-defueling device to defueling port.

D. Position the other hose end in defueling cart.

E. Open quick-defueling device shutoff valve and carry out defueling.

F. After defueling, close quick-defueling device shutoff valve.

G. Remove defueling device from defueling port.

H. Install cap to defueling port.

I. Remove defueling cart.
Figure 1-5. Gravity Defueling
7.  EMERGENCY FREE-FALL LANDING GEAR EXTEND SYSTEM

7.1.  GENERAL

A.  The emergency free-fall landing gear extend system comprises actuating assembly, control cables, pulleys, springs, and uplock hooks actuating devices.

7.2.  OPERATION

A.  Gain access to Emergency Free-Fall Landing Gear Extend System panel.

B.  Cut lockwire of Emergency Selector Valve receptacle.

C.  Fit lever into receptacle and set Emergency Selector Valve to “EMERG”.

D.  Position lever in receptacle associated with nose landing gear and pull it. The nose gear will then extend and lock down.

E.  Repeat step 4 for receptacles associated with the left and right main landing gear.

F.  Install landing gear ball-lock pins.

Figure 1-6. Emergency Free-Fall Landing Gear Extended System
8. OXYGEN CYLINDERS REMOVAL

8.1. SAFETY PRECAUTIONS

A. Oil, grease, flammable solvents, dust, metal filing, and other combustible materials are potential fire and explosion hazards and may be a source of spontaneous combustion, when in contact with pure oxygen.

B. Make sure that all the electrical equipment is disconnected and that the airplane is properly grounded.

C. Keep hands, gloves, clothing, equipment, and tools always clean and free of residues of grease, oil and other hydrocarbons.

8.2. REMOVE OXYGEN CYLINDERS

A. Gain access to cylinders.

B. Cut lockwire and manually rotate oxygen cylinder pressure regulator to OFF.

C. Disconnect charging relief, pressure gauge, and distribution tubing from cylinder.

D. Remove attachment clamp bolts and remove cylinder.

E. Protect open fittings with plastic caps.
Figure 1-7. Oxygen Cylinder Removal

1. AIRPLANES WITH 40 cu.ft OXYGEN CYLINDER (FOR CREW SUPPLY ONLY)
2. AIRPLANES WITH 115 cu.ft OXYGEN CYLINDER (PASSENGER AND CREW SUPPLY)
9. MAIN BATTERY REMOVAL

9.1. GENERAL

A. For main battery removal procedure, the PWR SELECT, switch, on the overhead panel, should be set at the OFF position.

9.2. REMOVE MAIN BATTERY

A. Gain access to main battery by opening its access door on the airplane nose left side.

B. Cut connector and wing nut lockwires.

C. Disconnect the two electrical connectors.

D. Disconnect the two wing nuts attaching battery to its support.

E. Loosen clamps attaching battery vent tubes.

F. Remove vent tubes.

G. Remove battery.
Figure 1-8. Main Battery Removal
10. EMERGENCY BATTERY REMOVAL

10.1. GENERAL

A. For emergency battery removal procedure, the PWR SELECT switch, on the overhead panel, should be set at the OFF position, and the BACK UP/EMERG BATT switch located on the instrument panel should be set at the OFF position.

10.2. REMOVE EMERGENCY BATTERY

A. Gain access to the emergency battery by opening main battery compartment door on the airplane nose left side.

B. Cut lockwire of knurled nut.

C. Loosen knurled nut attaching emergency battery to support.

D. Remove emergency battery.
Figure 1-9. Emergency Battery Removal
SECTION II

EMERGENCY INFORMATION
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Figure 2-1A. Interior Arrangement - Passenger Configuration 2
Figure 2-1B. Interior Arrangement - Passenger Configuration 3
Figure 2-1C. Interior Arrangement - Passenger/Full Cargo Configuration 4
Figure 2-2. Location of Composite Materials on Airplane skin
Figure 2-3. Danger Areas
11. FLAMMABLE AND/OR EXPLOSIVE COMPONENTS, FLUIDS, AND EMERGENCY EQUIPMENT

11.1. GENERAL

A. Figure 2-4 highlights the location of flammable or explosive components, equipment and fluids, as well as the location of emergency equipment of the several airplane interior arrangement configurations. The following paragraphs provide a brief description of these items.

11.2. FUEL

A. Fuel is stored in two integral wing tanks. Fuel supply lines extend through the nacelles to the engines. In the airplanes provided with APU, the lines extend from the wing roots as far as the tail cone. Fuel used: jet fuel, specification ASTM D1655.

11.3. ENGINE OIL

A. The oil used for engine lubrication is stored in an integral tank in each engine. The capacity of each tank is approximately 9 liters (2.5 US Gal). The oil specification is MIL-L0 23699A, Type II.

11.4. WHEELS

A. The airplane landing gear wheels are made of forged aluminum alloy. Each main landing wheel is provided with three fusible plugs, which deflate the tire if overtemperature occurs.

11.5. HYDRAULIC ACCUMULATORS

A. The parking/ emergency brake accumulator is pressurized to 1100 psi at 21°C and is located in the hydraulic compartment, in the aircraft nose. The specification of the nitrogen is BB-411, Type I, Class I, Grade B.

11.6. OXYGEN CYLINDERS (FIXED)

A. The oxygen supply (1850 psi) is stored in a cylinder whose volume capacity is 115 cu. ft. for crew and passengers supply. For aircraft equipped with chemical oxygen generation system for passengers, the cylinder for crew supply has a capacity of 40 cu. ft. The specification of the oxygen used is MIL-O- 27210.
B.

11.7. BATTERY

A. The airplane main battery is located on the left side of the nose section. It is a nickel-cadmium battery and its capacity is 24 VDC-36 AMP/hour.

11.8. HYDRAULIC RESERVOIRS

A. The hydraulic reservoirs are located aft of the engine nacelles. Each has a volume capacity of 4.2 liters (1.1 US Gal) of hydraulic fluid, specification MIL-H-5606. They are pressurized to 30+1 psi with engine bleed air.

11.9. PORTABLE OXYGEN CYLINDERS

A. The oxygen cylinders, specification DOT-3AA-1800, are equipped with free-flow masks and have a capacity of 11 cu. ft. when charged to 1800 psi at 21°C.

11.10. PORTABLE FIRE EXTINGUISHERS

A. The portable fire extinguishers are charged with 2.5 lb. of HALON 1211 (CBrC1F2) gaseous agent or 2.2 lb. of HALONITE. Only the HALONITE (HALON 1211 and HALON 1301) fire extinguishers are disposable. Both fire extinguishers are applicable to all types of fire (classes A, B, and C).

11.11. OTHER EQUIPMENT

A. As emergency equipment, the following are applied: a hatchet for cutting operations, ropes, flashlight, first-aid kit, full face mask, smoke goggles and medicinal kit (optional).
Figure 2-4. Location of Flammable and Explosive Components and Fluids (Sheet 1)
Figure 2-4. Location of Flammable and Explosive Components and Fluids (Sheet 2)
Figure 2-4A. Emergency Equipment Location - Configuration 1 (Sheet 1)
Figure 2-4A. Emergency Equipment Location - Configuration 1 (Sheet 2)
Figure 2-4B. Emergency Equipment Location - Configuration 2 (Sheet 1)
Figure 2-4B. Emergency Equipment Location - Configuration 2 (Sheet 2)
Figure 2-4B. Emergency Equipment Location - Configuration 2 (Sheet 3)
Figure 2-4B. Emergency Equipment Location - Configuration 2 (Sheet 4)
Figure 2-4C. Emergency Equipment Location - Configuration 3 (Sheet 1)
Figure 2-4C. Emergency Equipment Location - Configuration 3 (Sheet 2)
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Figure 2-6. Emergency Exit-Right Side
Figure 2-7. Chop Area
Figure 2-8. Emergency Exit for Pilots
Figure 2-9. Passenger Rescue
Figure 2-10. Passenger Door
Figure 2-11. Cargo Door
12. FIRE EXTINGUISHING

12.1. FIRE IN LANDING GEAR WHEELWELL

A. Carefully approach landing gear wheelwell(s), as shown in figure 2-12, and start extinguishing the fire using HALON 1211 (CBrCIF2- bromochlorodifluoromethane) extinguishing agent.

12.2. FIRE IN THE WHEEL BRAKES

**WARNING** ANYONE WHO APPROACHES THE WHEEL LATERALLY WILL BE EXPOSED TO DANGER, IN CASE OF EXPLOSION.

A. Approach the wheel from the rear or from the front only.

B. Extinguish the fire with a jet of HALON 1211(CBrCIF2) applying the agent with brief intermittent jets, limiting the quantity to a minimum.

C. After extinguishing the fire, cool the brake by spraying it with HALON 1211(CBrCIF2). Apply successive jets during 3 to 5 seconds, then 15 to 30 seconds, so as to dissipate vapor concentrations.

D. After cooling the brake, allow a minimum of 15 minutes to elapse before moving the airplane.

12.3. FIRE IN THE ENGINES

A. If the fire cannot be extinguished from the cockpit by the pilots or a skilled technician, make sure that the propeller(s) is (are) motionless and start extinguishing the fire, as shown in figure 2-12 using HALON 1211 (CBrCIF2) extinguishing agent.
Figure 2-12. Fire Extinguishing
13. EMERGENCY HOISTING AND LIFTING

13.1. GENERAL

A. A crashed airplane with retracted landing gear may be lifted by putting a pile of air bags or by means of a hoisting or device GSE NO 039 under each wing and inflating them until the aircraft is lifted high enough for dolly to go under it or for jacks to be installed.

B. Taking into consideration the various situations and possibilities associated with airplane accidents, this procedure is not meant to establish standards, but to provide guidance on applicable courses of action. The procedure to be chosen is a function of location, accident characteristics, and equipment available at the airport. Therefore, specific planning is required for each case.

13.2. PREPARE FOR HOISTING AND LIFTING

A. Check that generators, battery, fuel pump, and valve switches are OFF.

B. Remove main emergency batteries.

C. Remove oxygen cylinders.

D. Defuel airplane.

13.3. LIFT AIRPLANE

A. Position and attach air bags centered under each half-wing box abeam, on the outboard side of the nacelles.

B. Inflate air bags in a progressive and simultaneous manner until the airplane is high enough for a dolly to go under it or for jacks to be installed.

C. Remove airplane from place according to the procedures described.
Figure 2-13. Aircraft Lifting by Means of Air Bags
13.4. HOISTING BY MEANS OF DEVICE FOR ONE HOIST (SEE FIGURE 2-A)
A. REMOVE ENGINE COWING INTERNAL DOORS.

CAUTION
HOISTING DEVICE MAXIMUM CAPACITY IS 7,500 Kgf.

B. Position hoisting device on aircraft, centering in the direction of its longitudinal axis.

C. Rest hoisting device supports on frames 19 and 36.

D. Pass nylon straps under the airplane, at frames 16, 19, 36 and 38A regions. Fasten them as indicated in detail A, figure 2-14.

E. Attach hoisting device in position, be means of the support adjusting fittings.

F. Fasten stabilization cables to engines as indicated in detail B, figure 2-14.

G. Hoist airplane until reaching the desired height.

H. Remove airplane from place, according to the procedures described in the section titled AIRPLANE TRANSPORTATION.

13.5. HOISTING BY MEANS OF DEVICE FOR TWO HOISTS (SEE FIGURE 2-15)

NOTE
The airplane hoisting device, with the aid of two hoists, comprises two slings, one for the front fuselage and the other for the rear fuselage.

CAUTION
FRONT SLING MAXIMUM CAPACITY IS 4,600 Kgf AND REAR SLING IS 2,900 Kgf.

A. Install front sling as described below:

(1) Position front sling on airplane, on frames 16 and 19.

(2) Pass nylon straps under the airplane, on frames 16 and 19. Fasten them as indicated in detail A, figure 2-15.

(3) Attach front sling by means of the support adjusting fittings.
Figure 2-14. Airplane Hoisting by Means of One Hoist
Figure 2-15. Airplane Hoisting by Means of Two Hoists
B. Install rear sling as described below:

1. Position rear sling on airplane, on frames 36 and 38A.
2. Pass nylon straps under airplane, on frames 36 and 38A. Fasten them as indicated in detail A, figure 2-15.
3. Attach rear sling by means of the support adjusting fittings.
4. Hoist airplane by means of two slings, maintaining it leveled up to the desired height.
5. Remove airplane from place according to the procedures described in paragraph 11.13.

13.6. AIRPLANE TRANSPORTATION

A. By means of operational landing gear (see figure 2-16):

1. After the airplane had been hoisted or lifted to a sufficient height, install jacks (see Section I).
2. Control landing gear extension in free fall (see Section I).
3. Ensure landing gear is correctly down and locked.
4. Install landing gear ball-lock pins (see Section I).
5. Deflate and remove air bags or remove hoisting devices.
6. Lower and remove jacks (see Section I).
7. Tow the airplane (see Section I).

B. By means of inoperative landing gear:

1. After the airplane had been hoisted or lifted to a sufficient height, rest and attach it to the dolly.
2. Deflate and remove air bags or remove hoisting devices.
3. Tow the airplane.
Figure 2-16. Airplane Supporting on Jacks and Landing Gear Extension
CHAPTER 3
DE HAVILLAND DASH-200
# Mesa Airlines, Inc.
## Crash Fire Rescue Manual

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   1.2. **AIRSTAIR DOOR OPERATION** ........................................ 11
   1.3. **SERVICE DOORS** ........................................ 11
2. **FLIGHT COMPARTMENT EMERGENCY ESCAPE HATCH** ........................................ 17
WHEELS EXTENDED  
A=125.00 IN (3.18m) 
B=43.00IN (1.09m) 
C=63.00IN (1.6m)  
APPROX 2 FT (.61m) 
LOWER IN WHEELS 
RETRACTED SITUATION.

WHEELS RETRACTED  
24 FT 7 IN.*  
(7.49m)  
26 FT 1 IN.  
(7.99m)  
4 FT 3 IN.  
(1.3m)  
4 FT 11 IN.  
(1.48m) 
6 FT 8 IN.  
(2.03m)  
8 ft 4 in.  
(2.54m)

BASIC WEIGHT = 21,400 lb. (9,707 kg)  
MAX. TAKE-OFF WEIGHT = 36,000 lb. (16,366 kg)  
SEATING CAPACITY = UP TO 37 PAX  
AND 4 CREW

NOTE:  
DIMENSIONS TO GROUND LINE INDICATED  
* ARE APPROXIMATE ONLY AND VARY  
DEPENDING ON LOADING CONDITIONS  
AND AIRCRAFT CONFIGURATION.

* BASIC WEIGHT WILL VARY DUE TO  
CONFIGURATION AND MODIFICATION  
NO FUEL, NO PAX OR CREW.

GENERAL ARRANGEMENT
FAMILIARIZATION AND LOCATION GUIDE

* FLIGHT COMPARTMENT
  A. FIRE EXTINGUISHER
  B. FIRE AXE LOCATION
  C. PORTABLE OXYGEN BOTTLE

* FORWARD CABIN
  A. OXYGEN BOTTLES
  B. GALLEY LOCATION
  C. EMERGENCY DOOR—TYPE II
  D. FIRST AID KIT

* AFT CABIN
  A. EMERGENCY DOORS—TYPE III
  B. FIRE EXTINGUISHER BOTTLES

* BAGGAGE COMPARTMENT
EXTERIOR WALK-AROUND

1. AIRSTAIR DOOR & DEMO OF EXTERNAL OPENING SEQUENCE.
2. NOSE BAY ACCESS DOORS—BATTERY LOCATION & MAIN ELECTRICAL CONTACCTOR BOX.
3. OXYGEN BOTTLE.
4. NOSE GEAR WHEEL WELL, NOSE GEAR HYDRAULIC & RESERVOIR.
5. TYPE II EMERGENCY DOOR — EXTERNAL OPENING SEQUENCE.
6. TYPE III EMERGENCY DOOR — EXTERNAL OPENING SEQUENCE.
7. REAR COMPARTMENT ACCESS DOOR — OPENING SEQUENCE & FLIGHT DATA RECORDER & COCKPIT RECORDER LOCATION.
8. BAGGAGE COMPARTMENT DOOR — OPENING SEQUENCE.
9. TYPE III EMERGENCY DOOR — EXTERNAL OPENING SEQUENCE.
10. N°1. NACELLE, MAIN LANDING GEAR & HYDRAULIC RESERVOIR.
Mesa Airlines, Inc.
Crash Fire Rescue Manual

INTERIOR ARRANGEMENT

- Lavatory
- Galley
- Baggage Compartment 300 cu ft (8.49 m³)
- Observer's Seat
- Wardrobe
- Flight Attendant's Seat
- Passenger Door & Crew Entry 30 in. W x 65 in. H (0.762 m x 1.65 m)
- Moveable Bulkhead
- Overhead Bins
- Baggage Door 50 in. W x 60 in. H (1.27 m x 1.52 m)
- Passenger Cabin Length 30 ft. 1 in. (9.16 m)
NOTE:

* DIMENSIONS ARE APPROXIMATE AND MAY VARY DEPENDING ON AIRCRAFT CONFIGURATION AND LOADING CONDITIONS.
FLIGHT COMPARTMENT (VIEW FORWARD)
Mesa Airlines, Inc.

Crash Fire Rescue Manual

FLIGHT COMPARTMENT (VIEW AFT)
1. EXITS

A. There are five emergency exits located on the aircraft. A Flight Compartment Emergency Escape Hatch, available to the flight crew, is located in the Flight Compartment roof and is operated by an internal handle. An airstair door, located on the forward left side of the fuselage, is operated by internal or external handles. The airstair door incorporates an inflatable seal fed from the 18 psi deicing system. A Type II emergency exit door is located on the right side of the fuselage, opposite the airstair door. Two Type III emergency exit doors are located one on each side of the fuselage, just forward of the wing. The Type II and Type III emergency exit doors each incorporate a window and may be opened by either internal or external handles located below the window. The Type II and Type III emergency doors incorporate a compression seal around the outside of the door to contain aircraft pressurization when the doors are closed.

1.1 TYPE II AND TYPE III EMERGENCY EXIT DOOR OPERATION

A. The external handle, located below the window, is flush with the door skin and incorporates a push-button for quick-release, enabling the handle to be rotated. Rotating the handle actuates the locking pin and vent dish by a system of pulleys, a cable and shaft quadrant. A cable guard is installed over the shaft quadrant. To remove either the Type II or Type III emergency exit door using the external handle, push the quick-release button to release the handle. Turn the handle counterclockwise to open the vent and retract the locking pin. Push the door inward.

1.2 AIRSTAIR DOOR OPERATION

A. The Airstair door is opened externally by operation of the door handle lever located on the left side of the fuselage just forward of the door. Initial movement of the handle trips the door seal pressurizing valve to release the seal pressure allowing cabin pressure to deplete. Continued movement of the handle moves the door upward and inward to clear the ten pressure pads from their mating stops so that the door may be manually pulled open. Door lowering is assisted by a door counterbalance system.

1.3 SERVICE DOORS

A. Baggage Door Operation

The baggage door is located on the left side of the rear fuselage. The door is opened and closed manually using an external handle which normally is flush with the door skin. A quick-release button is located in the center of the handle.
To open the baggage door, release the handle from the stowed position by pushing the quick-release button. Rotate the handle 180 degrees counterclockwise to unlock the door and initiate an inward and upward movement. Stow the handle by pressing it back into its recess in the door and, while supporting the door, manually raise to the fully open position. Secure the door in the open position by engaging the door support strut.

**NOTE**  Cabin compartment emergency entry from the baggage compartment is not normally possible.
Mesa Airlines, Inc.
Crash Fire Rescue Manual

TYPE III MID CABIN EMERGENCY EXIT DOORS.
(20.2 x 35.8 IN.) (513 x 904 mm)

TYPE II FORWARD CABIN EMERGENCY EXIT DOOR.
(20.2 x 55.3 IN.)
(513 x 1403 mm)

FLIGHT COMPARTMENT EMERGENCY HATCH
(18.5 x 20.8 IN.)
(470 x 523 mm)

REAR FUSELAGE ACCESS DOOR (TO AIR CONDITIONING UNIT AND A.P.U. ONLY).

BAGGAGE COMPARTMENT DOOR
(50.0 x 60.0 IN.) (1270 x 1524 mm)

AIRSTAIR DOOR
(30.0 x 66 IN.)
(762 x 1676 mm)

NOSE COMPARTMENT DOORS
(DC CONTACOR BOX, BATTERY & CREW OXYGEN)

AIRCRAFT DOORS AND GROUND SERVICE PANELS
Mesa Airlines, Inc.
Crash Fire Rescue Manual

TYPE II FORWARD CABIN EMERGENCY EXIT

FLIGHT COMPARTMENT EMERGENCY HATCH

AIRSTAIR DOOR

TYPE III MID CABIN EMERGENCY EXIT

TYPE III MID CABIN EMERGENCY EXIT

EVACUATION ROUTES
WARNING
KEEP CLEAR
OF DOOR
PULL HANDLE
OUT AND DOWN
TO OPEN
SUPPORT DOOR
WHILE LOWERING

PUSH

OPEN
POSITION

TURN HANDLE DOWN
AND PUSH HATCH IN

ROOF ESCAPE HATCH
(SEE PAGE 13
FOR DETAILS)

CREW EMERGENCY
DESCENT DEVICE
TYPICAL BOTH SIDES.

PASSENGER AND CREW ESCAPE SYSTEMS
Mesa Airlines, Inc.
Crash Fire Rescue Manual

1

HANDLES SPRING OUT WHEN BUTTON IS PRESSED

DOOR PLUGGED

2

DOOR UNPLUGS (MOVES IN) AS HANDLES ARE TURNED 180°

DOOR UNPLUGGED

3

HANDLES ARE PRESSED INTO LATCH FLUSH WITH DOOR BEFORE RAISING DOOR TO OPEN POSITION

NOTE:
REVERSE ABOVE PROCEDURE TO CLOSE DOOR

WARNING
LIFT DOOR TO OPEN HANDLE TO BE FLUSH BEFORE LIFTING WHEN RAISING OR LOWERING KEEP CLEAR OF DOOR PATH

NOTE:
UNSTOW SUPPORT STRUT AS REQUIRED FOR HOLDING DOOR IN THE OPEN POSITION. BEFORE CLOSING DOOR, RESTOW SUPPORT STRUT.

BAGGAGE DOOR

SUPPORT STRUT

DOOR RAISED

BAGGAGE DOOR OPERATION
2. FLIGHT COMPARTMENT EMERGENCY ESCAPE HATCH

A. The Flight Compartment Escape Hatch, located in the Flight Compartment roof, is completely detachable for emergency exit or can be partially opened for ventilation when the aircraft is on the ground. The hatch is mounted at the rear on two support fittings and at the front by two locking and release fittings. An operating handle, located in the center of the hatch, is retained in an open or closed position by an over center spring. The handle operates a transversely-mounted torque shaft assembly with arms attached at each end. Rollers at the end of each arm engage detented locking release fittings installed in the Flight Compartment roof structure. A seal is installed around the edge of the hatch to contain the aircraft pressurization when the hatch is closed.

B. To open the Flight Compartment Escape Hatch, rotate the handle 72 degrees counterclockwise. A mechanical linkage connected to the handle rotates the torque tube and the rollers move forward in the fittings where they are supported by the spring-loaded detents. Controlled by the geometry of the torque tube and the rollers, the hatch pivots about the rear support fittings and opens approximately one inch at the front. Opening the hatch permits depressurization and provides a modest amount of ventilation to the Flight Compartment. A downward pull on the handle of approximately 40 pounds releases the rollers against the action of the forward locking and release detent springs. The hatch may then be completely removed.
NOTE:
In an emergency it may be possible by cutting through the outer skin to gain access to reposition the operating handle from outside and then force the hatch downwards.

FLIGHT COMPARTMENT EMERGENCY HATCH
18.5" x 20.6" (470 x 523 mm)

10 x 8 in. (254 x 203 mm)

SEAL

REAR SUPPORT FITTINGS

OPERATING HANDLE

72°

DETENT

TORQUE SHAFT ASSEMBLY

ARM

ROLLER

SPRING

OVERCENTER SPRING

FLIGHT COMPARTMENT EMERGENCY ESCAPE HATCH
ENGINE DANGER AREAS

*NOT ALL AIRCRAFT
NOTE:

"CUT-THROUGH" AREAS REQUIRE PORTABLE METAL-CUTTING EQUIPMENT. IT IS RECOMMENDED THAT MAJOR EFFORT TO GAIN ACCESS BE DIRECTED TO HATCHES AND DOORS DUE TO THE TYPE OF STRUCTURE AND POSSIBLE INJURY TO PERSONNEL WITHIN.

INTERIOR CONSTRUCTION

- STRINGERS RUN ABOVE & BELOW WINDOWS
- SKIN THICKNESS .060 IN. (1.50mm).

CUT-THROUGH AREAS TYPICAL BOTH SIDES

SIDE WINDOW (NON-OPENING)

WINDSHIELD

PASSENGER COMPARTMENT WINDOWS.

TYPICAL CUT-THROUGH AREA DIMENSIONS
(42.0 x 20.0 IN.) (1067 x 508 mm)

THE THIRD WINDOW AFT OF AIRSTAIR DOOR IS RECOMMENDED FOR FIRST CHOICE CUT-THROUGH (ALTHOUGH ANY WINDOW IS SUITABLE).
Mesa Airlines, Inc.
Crash Fire Rescue Manual

_FLIGHT ATTENDANT’S SEAT_  
_LIFE JACKET AND FLASHLIGHT_  
_EMERGENCY EQUIPMENT AND SUPPLIES STOWAGE COMPARTMENT_  

**VIEW LOOKING FORWARD**

_BAGGAGE DOOR_  
_FIRE EXTINGUISHER_  
_SEAT BELT EXTENDERS DETAIL ‘A’_  

**VIEW LOOKING OUTBOARD LEFT SIDE**

_OXYGEN MASK BAG_  
_OXYGEN CYLINDER_  
_HOLDERS TAPE_  
_CYLINDER STRAP_  
_FIRE EXTINGUISHER DETAIL ‘B’_

*NOTE: MAY VARY WITH AIRLINE & CONFIGURATION*

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FUSELAGE SAFETY EQUIPMENT LOCATIONS
Mesa Airlines, Inc.
Crash Fire Rescue Manual

OXYGEN INDICATOR

CO-PILOT'S OXYGEN MASK
OBSERVER'S HEADSET
OBSERVER'S HEADSET CONN'N AND MICROPHONE SWITCH
OBSERVER'S OXYGEN MASK
PILOT'S OXYGEN MASK
FULL FACE SMOKE MASK
PILOT'S OXYGEN SUPPLY OUTLET
CREW PORTABLE OXYGEN CYLINDER

OVERBOARD DISCHARGE INDICATOR
COPILOT'S OXYGEN SUPPLY OUTLET
PRESSURE INDICATOR
FORWARD PRESSURE BULKHEAD
CREW - OXYGEN CYLINDER (39.4 CU FT/ 1.1 m³)

RANGE MARKS
RED: 0 - 250 psi (DANGER LEVEL)
GREEN: 250 - 1800 psi (USEABLE RANGE)
YELLOW: 1800 - 2500 psi (OVERPRESSURE)
BLUE RADIAL: 1300 psi (MINIMUM DISPATCH)

CREW OXYGEN LOCATIONS
Mesa Airlines, Inc.
Crash Fire Rescue Manual

BAGGAGE COMPARTMENT

PASSenger oxygen cylinder (optional)
Mesa Airlines, Inc.
Crash Fire Rescue Manual

PASSERGNER OXYGEN AUTOMATIC PRESENTATION SYSTEM (OPTIONAL)
### Mesa Airlines, Inc.
**Crash Fire Rescue Manual**

**EXTINGUISHER TYPE**

<table>
<thead>
<tr>
<th>FIRE AREA</th>
<th>PREFERRED</th>
<th>ALTERNATIVE</th>
<th>AVOID</th>
<th>NOTES</th>
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<tbody>
<tr>
<td>ENGINE FIRES</td>
<td>HALON 1211</td>
<td>FOAM</td>
<td>CO₂ CAN DAMAGE ENGINE. DRY CHEMICAL CORRO-SIVE</td>
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<tr>
<td>FUEL FIRE</td>
<td>1. DRY CHEMICAL POWDER LEAKING FUEL. 2. WATER FOG OR FOAM ON GROUND SPILL AREA</td>
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<td></td>
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<tr>
<td>WHEEL FIRE</td>
<td>DRY CHEMICAL POWDER</td>
<td>HALON 1211</td>
<td>CO₂ WHEEL BREAKAGE IS POSSIBLE</td>
<td>3. WHEELS ARE EQUIPPED WITH FUSIBLE PLUGS WHICH WILL BLOW AT 288°F (142°C)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4. APPROACH LANDING GEAR FROM FORWARD OR AFT. STAND UPWIND OF FIRM TO AVOID SKY-DRCLI FUMES. ALL WHEELS ARE FORGED ALUMINUM.</td>
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TOTAL OIL CAPACITY FOR BOTH ENGINES

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HYDRAULIC FLUID

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<td>NOSE</td>
<td>1.05</td>
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</table>

ALL SYSTEMS USE PHOSPHATE ESTER-BASED TYPE N FLUID (e.g. SKYDROL)

TOTAL FUEL CAPACITY

BASED ON JET A-1 S.G. OF 0.816 (SINGLE TANK DIVIDE BY 2)

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<td>1532</td>
<td>5600</td>
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</table>

FLAMMABLE MATERIAL LOCATIONS
NOTE:

* APPROX. 2 FT. LOWER IN WHEELS-UP SITUATION.

* THERE ARE NO EXTERNALLY ACCESSIBLE ENGINE FIRE ACCESS PANELS.

INTAKE TO GROUND LEVEL (7.53 FT) (2.30m)

EXHAUST TO GROUND LEVEL (9.58 FT) (2.92m)

ENGINE FIRE ACCESS LOCATIONS
ENGINE FIRE EXTINGUISHER OPERATION

A. ELECTRICAL POWER MUST BE PRESENT
B. PULL "PULL FUEL OFF" HANDLE.
C. SELECT "EXTG" TOGGLE SWITCH TO EITHER "AFT BTL" OR "FWD BTL".

REMOVING ELECTRICAL POWER

A. SELECT "BATTERY MASTER" SWITCH TO "OFF".
B. SELECT "AUX BATT" AND "MAIN BATT" SWITCHES TO "OFF".
C. SELECT "EXT PWR" TO "OFF".

ENGINE FIRE EXTINGUISHER AND BATTERY POWER SWITCH LOCATIONS
CHAPTER 4
CRJ-200
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3. QUICK REFERENCE GUIDE TO AIRCRAFT RECOVERY .............................................. 6
4. PLANNING FOR AIRCRAFT RECOVERY ...................................................................... 7
5. MOVING THE AIRCRAFT ............................................................................................. 10
6. TERRAIN CONSIDERATIONS ..................................................................................... 18
1. CRASH CREW CHART (FIGURE 1.1 CRASH CREW CHART)
2. QUICK REFERENCE GUIDE TO AIRCRAFT RECOVERY

A. The following guide/checklist is intended to assist the person in charge of the recovery operation and set a quick reference agenda for the recovery team.

   (1) Obtain initial information about the incident.

   (2) Establish communications with the local airline, the aircraft manufacturer representative, and the owner's agent or representative.

   (3) Expedite the recovery designated surveyor to make a detailed assessment of the site. The nature of the site has a major influence on the recovery methods. The slope of the terrain and the distance from the runways, taxiways, and aprons should be noted. Determination of the soil condition is important in order to calculate the bearing area required to lift and move the aircraft.

   (4) Prepare and select personnel (in addition to the designated recovery crew members) and assess the requirements for equipment and supporting manuals.

   (5) Arrange accommodations, transportation (including visas when necessary), and funds for the recovery personnel.

   (6) On site, establish communications with local airport authorities, regulatory authorities, and national investigating authorities.

   (7) Gather local information on the following:

      (a) Local environment

      (b) Climate

      (c) Ground structure

      (d) Communications

   (8) Formulate a detailed aircraft recovery plan (based on a prearranged general recovery plan).
(9) Obtain clearance from local and national authorities to proceed with the recovery operation. If an aircraft is substantially damaged in an accident, an investigation by the government authorities will be required. It is obligatory to be familiar with, and to follow the requirements and laws of the country in which the accident occurred.

(10) Have personnel and equipment sent over.

(11) Ensure local availability of cranes and other heavy machinery, access roads and building materials. Some airlines are members of pooling arrangement for technical facilities and services, and recovery equipment (recovery kits). The International Air Technical Pool (IATP) is the organization that manages the recovery pool arrangements.

(12) Establish procedures for local health risks and emergencies (first aid, doctors, hospitals, and ambulances).

(13) Performance weight and balance calculations in accordance with the recovery plan's components removal.

(14) Remove all health risk payload (fuel, oils, hazardous material, catering, galley, lavatory waste and water, etc.).

3. QUICK REFERENCE GUIDE TO AIRCRAFT RECOVERY

A. When it is necessary to move an aircraft that cannot taxi under its own power, or be towed with the standard towbar and tug, other moving and recovery methods have to be used. The aircraft may need to be towed by its main landing gear, or raised with pneumatic lifting bags or cranes and slings and carried on dollies or a trailer.

The recovery of an aircraft has three basic steps:

(1) Planning for an aircraft recovery.

(2) Notification of the accident investigation authorities.

(3) Moving the aircraft.
4. PLANNING FOR AIRCRAFT RECOVERY

A. The responsibility for the removal of a disabled aircraft is discussed in the U.S. Federal Aviation Administration (FAA) Advisory Circular 150/5200-13 “Removal of Disabled Aircraft” and also in the International Civil Aviation Organization (ICAO) document 9137-AN/898, Part 5 “Airport Services Manual, Part 5, Removal of Disabled Aircraft”. The two documents illustrate some of the methods that can be used for the recovery and/or removal of disabled aircraft, including the advance planning requirements that follow.

More often than not, the actual removal of a disabled aircraft is beyond the technical capability of the average airport owner. Some thoughtful advance planning is called for to ensure that the necessary equipment and skills will be furnished and can put to use quickly when they are needed. Consider the following:

(1) Prepare a detailed “Aircraft Recovery Plan” for each airport, ready to be put in motion as soon as an accident occurs or as soon as any required investigation permits. Contemplate the necessary emergency actions and assign specific responsibilities for carrying them out. THE COMPLEXITIES INVOLVED IN REMOVING A DISABLED AIRCRAFT MAKE IT IMPERATIVE THAT A SPECIFIC PERSON BE DESIGNATED TO TAKE CHARGE OF THE OVERALL OPERATIONS. Inform all major users of the airport, of the airport management’s preparations and capabilities, as well as its policies regarding disabled aircraft removal. Applicable portions of this document should be included in the airport plan. It is suggested that a copy of this document be used as part of the airport’s “Aircraft Recovery Plan”.

(2) Local airline representatives should have a clear definition of their responsibility and authority to enter into contracts for removal services. Airport authorities should be made aware of these arrangements.

(3) Among other things, include in the plan:

(a) Guidelines to plan for the quick removal of disabled aircraft from airport operational areas versus taking the time necessary to prevent secondary damage to the aircraft. Safety, security, interference with ground operations, and public involvement are all factors to examine.
(b) Detailed grid maps of the type referred to in the FAA Advisory Circular 150/1500-10, for use during aircraft recovery operations. These maps should show the topography of the airport site, approaches, and surroundings. Roads, ditches, gates, soil conditions, and any other factors that could have an effect on the aircraft recovery operations should be indicated on these maps. Re-evaluation and inspection of all sites should be done periodically to keep all maps current.

(c) Access routes to all parts of the airport, especially any routes needed for heavy equipment such as cranes, in the vicinity of overhead power lines or bridges.

(d) Aircraft manufacturers’ data on the types of aircraft that normally use the airport. For aircraft recovery, the important data is the data on weight and balance, weight reduction, lifting, and moving. Section 1 of this manual includes the basic data for all series of the Canadair Regional Jet model CL600-2819.

(e) The type and location of heavy or specialized equipment that might be needed and the time required to get it to the airport. It is important to have aircraft defueling equipment that can move to any area or location. Due to the smaller size of the Regional Jet, cranes and slings can easily be used to lift the aircraft. The availability of cranes should be included.

(f) Arrangements for quickly obtaining aircraft recovery kits from other airports. The ICAO document, in Appendix 2, lists world-wide locations of lifting kits containing pneumatic bags and jacks.

(g) Sources of manpower with various skills, ranging from laborers to aircraft mechanics.

(h) Requirements for food, clothing, and shelter for the recovery crew.

(i) Communications, security and safety plans for the recovery operation, flexible enough to suit any site.
(4) Make advance plans to obtain the services of aircraft removal equipment and crews, through agreements with other airport sponsors, with military airfields, or with aeronautical industries in the vicinity of civil airports. An inventory of locally available salvage equipment should be kept current. This should include, in addition to equipment located at the airport, equipment that construction contractors and other operators of heavy machinery have nearby and will agree to make available. The heavy demand for cranes, tractor-trailers etc., in regular service may require payment of a retainer fee to ensure their availability on short notice. When arranging for equipment, anticipate that a primary source of equipment or operators may not be available, and that a second or even a third source for these services must be considered in the plans. Mere plans to call for heavy equipment are not enough. An airport must have commitments from companies to provide the equipment and services when they are needed.

(5) Airport regulations should establish the owner’s right to close all or part of the airport as necessary, his limits of liability and penalties for violations. Particular attention should be given to the airport owner’s authority to move disabled aircraft.

(6) Contractual arrangements between air carriers and fixed base operators should provide for a capability to move the types of aircraft normally used or serviced with minimum risk of secondary damage to either the aircraft or the airport. These arrangements may include those of an individual airline plan, a cooperative plan with the airport authorities, or a joint plan by several air carriers at a particular airport. The pooling of removal equipment by the airlines appears to have considerable merit because of the following factors:

(a) Logistic and time-saving advantages of having kits more widely distributed.

(b) Economic advantages of individual airlines needing fewer kits.

(c) Overall improvements that should result by gaining additional equipment from participation of a large number of airlines.

(7) Arrangements and agreements should take into account the air carrier and fixed base operators’ plans and ability to quickly perform non-routine aircraft repairs on runways.
(8) Mutually supporting plans and agreements are needed at airports that are used jointly by civil and military aviation.

(9) In planning for recovery equipment, pay particular attention to:

(a) Availability of a complete system for lifting or hoisting and for transporting the aircraft.

(b) Compatibility of recovery system components and the requirement for support equipment such as materials handling equipment, cranes, dollies, flat bed trucks, etc. For moving the Regional Jet, a tractor-trailer with a uniformly low bed to minimize the amount of lifting is especially useful.

(c) Availability of heavy winching equipment, due to the frequent use of this method of recovery.

Analysis of data on current recovery equipment indicates that the type of recovery equipment used does make a big difference in the actual removal time. This is because of the time consuming complex job of maintaining aircraft stability while lifting, jacking, or raising the aircraft by various means. The time consuming aspect of this job is also related to the problems involved in arranging and using recovery equipment so as to prevent damage to the aircraft skin or structure. In view of these factors, the most significant time advantages can be gained by having agreements for recovery, having someone take charge of the overall operations, and having adequate recovery equipment on hand, or available for fly in on short notice. It is advisable for airports with only one runway to have a recovery equipment either at the airport, or in the vicinity of the airport.

5. MOVING THE AIRCRAFT

A. Each aircraft recovery is unique, although the general procedures are the same. The primary objective of any aircraft recovery operation is the recovery of the aircraft in the minimum amount of time while at the same time avoiding further or secondary damage. An up-to-date recovery plan which provides the procedures and methods, and trained people who can carry out such a plan is the best way to achieve these objectives.

B. A quick reference guide to the aircraft recovery is given in the first pages of this section.
C. Information on the Canadair Regional Jet Model CL600-2B19 that can be useful for an aircraft recovery is provided in Section 1 of this manual. Of particular importance are the fuselage reference planes given in Section 1-06, page 2 which permits any location on the aircraft to be directly related to any other.

D. A correct estimate of the damage to the aircraft to be recovered is very important. This will help to determine at the earliest opportunity the approach to be taken in the recovery. This is in order to recover the aircraft safely while avoiding secondary damage. The list that follows suggests steps and recommendations for a good aircraft recovery:

(1) As soon as possible, remove the aircraft and the APU batteries. If the removal of the batteries is not possible, disconnect and insulate the battery connectors (Section 1-24, page 6). Ground the aircraft through the static ground connections (Section 1-12, page 6).

(2) Removing the fuel from a damaged aircraft may take a long time and should be started as soon as it is certain that it is necessary.

(3) Ventilate the interior of the aircraft if a fire has been extinguished.

E. A study of the manner in which the accident occurred will help to assess what structural damage may have been done to the aircraft. After the obvious damage has been observed, the structural condition of the aircraft should be examined. An assessment of possible consequential damage from the impact to other members such as buckles, joggles, bulges in the wing or fuselage skin panels at structural joints or heavy fittings are indications of internal damage. Rivets, bolts, or fasteners of any kind that are tipped, or sheared, or loosed may serve as clues. Fairings and other non-structural parts that are torn, cracked, or buckled are reasons for close inspection of the structure they cover. Damage to this underlying structure should be presumed until a close inspection proves otherwise.

F. A list of missing or unserviceable items that are noticed during the assessment of the damage should be recorded.
G. The aircraft needs to be inspected for hard landing (as per the Aircraft Maintenance Manual CSP A-001, Chapter 05) when and if the aircraft has traveled over rough ground or absorbed heavy shocks during the incident. In incidents that involve collapsed landing gear, or landing with landing gear retracted, it may be possible to extend the gear after the aircraft has been lifted. It should be determined that the structure is capable of supporting the weight before the aircraft is lowered onto the gear and towed back to the runway by the main gear.

H. The weight and balance of the aircraft should be determined to know the weight to be moved and the load at the specific jacking points. A record of the quantity and the location of the cargo and fuel will be used for the weight and balance calculations. The Weight and Balance Manual (CSP A-041) should be referred to for the proper procedures and calculation methods required to determine the center of gravity of the aircraft. The weight and balance calculation may need to be re-done or re-evaluated several times during the recovery operation.

I. Although it is generally easier to recover an aircraft when it is at a low weight, with fuel, cargo, and sometimes engines removed, this weight may sometimes be desirable. It can act as a counter balance to help keep the aircraft’s center of gravity at the desired point and therefore reduce the load on a specific jacking point.

J. The maximum jacking loads for the Regional Jet series 100 and series 100ER are given in Section 1-0, page 5. It should be noted that these numbers are for a new, undamaged aircraft and that damage to the structure of the aircraft caused by an accident may result in a reduction of these allowable maximum jacking loads.

K. Baggage and cargo should be removed from the aircraft. The cargo compartment door opens inwards and upwards.

L. Defueling a damaged aircraft may take a long time. Therefore it should be started as soon as it is certain that it is necessary. A fuel system schematic and fuel tank capacities and defueling rates are given in Section 1-28, pages 3 and 11.

M. In a recovery situation, electric power from the aircraft may not be available to operate the aircraft fuel pumps. The single point refuel/defuel adapter may be damaged or unreachable and ruptures can have occurred in the fuel lines or tanks. The best defueling procedure can only be decided after an evaluation of the extent of the damage to the system.
(1) If electrical power is not available the aircraft can be defueled by the suction method. It should be remembered that the suction will break when one of the inlet points is uncovered. This method is slow and may result in only partial defueling.

(2) A hose inserted in the overwing and center tank gravity fueling adapter can be used to suck out the fuel if it cannot be removed through the pressure refuel/defuel adapter. To prevent spills when a filler cap is removed, the fuel level inside the tank must be below the gravity fueling adapter opening. This will depend on the quantity of fuel in the tank and the attitude of the aircraft. The location of the gravity fueling adapters is shown in Section 1-28, page 6.

(3) If they can be reached, the fuel drain valves at the bottom of the tanks can be used for defueling. The location of the fuel drain valves is shown in Section 128, page 4. This method of defueling is very slow and dangerous due to the fumes.

(4) Remember that the method used to remove the fuel and the attitude of the aircraft will influence the quantity of fuel that can be drained from each tank and the time required for the operation.

(5) Each General Electric CF34-3A1 engine on the aircraft weighs approximately 2500 pounds (1134 kilograms) and is held on the aircraft by a forward yoke and an aft thrust fitting as shown in Section 1-71, pages 5 and 6. The engine is usually removed from the aircraft with use of an overhead crane and sling combination as shown in Section 1-71, page 11. A portable hoist that attaches to the engine pylons can also be used for removal of the engine as shown in Section 1-74. During engine removal, when the aircraft is leveled, the crane or hoist will carry most of the engine weight and relieve the yoke and thrust fitting of most of the load. If the aircraft is not in a normal attitude, it may be necessary to first make it level in order to relieve the loads on the yoke and thrust fitting before any attempt to remove the engine is made. The aircraft should also be stable enough to prevent any movement due to an imbalance when an engine is removed.

(6) In recovery operations, there are two basic situations that will occur:

(a) The aircraft can be towed on its landing gear (nose or main).
(b) The aircraft must be carried.

1. If the landing gear is still serviceable after the aircraft has run off the runway or taxiways, it may be possible to tow it back, preferably by the main gear as shown in Section 1-09.

2. The soil bearing capacity and the slope of the terrain in and around the recovery area should be considered. The footprint and tire pressure are given in Section 1-32. The aircraft will not roll as easily on sand and gravel as it would on concrete or asphalt, therefore the surface should be smoothed out as much as possible.

(3) If the landing gear is unserviceable, pneumatic lifting bags or cranes and slings can be used to lift the aircraft so that it can be carried dollies or on a flat bed trailer.

(a) An aircraft at rest on its fuselage can be lifted with the use of pneumatic lifting bags positioned under each wing, the forward fuselage, and the aft fuselage. The recommended location for the positioning of the air bags is shown in Figure 1. Stabilizing cables should be used at both the nose jacking point and the rear fuselage mooring points to stabilize the aircraft being lifted or at rest on the pneumatic bags. The pneumatic bags should be inflated sufficiently to permit the installation of the nose jack, the wing jacks, and the rear fuselage support.

(b) A nose down aircraft can be lifted about the main landing gear axis with the use of a pneumatic lifting bag for initial lift followed by the use of the nose jack and normal jacking procedures.

(c) When cranes and slings are used to lift the aircraft, an evaluation of the damage to the structure should be carried out. This evaluation will help to determine the extent of the damage and the location of strong frames to carry the slings. Because every aircraft recovery operation is unique, Canadair cannot recommend specific locations for the slings, the jack points, the pressure bulkheads, and the door edges are usually the locations where the strongest frames will be found.
AIRCRAFT RECOVERY - LIFTING WITH PNEUMATIC BAGS

CAUTION
Forward and aft fuselage lifting bags should be inflated sufficiently to stabilize aircraft and must be placed in areas of sufficient structural strength to avoid aircraft damage.
(d) The aircraft should be lifted in periods of calm winds only. Given the large area of the wings, the empennage, and the fuselage, even a small breeze can cause large swinging forces. To help control any movement of the aircraft being lifted, it must be stabilized with the use of ropes attached to the nose jacking point and rear fuselage mooring points. If the engines are removed from the aircraft, ropes to stabilize the aircraft can be attached to the forward engine mounts. During lifting, the aircraft should first be leveled and then raised only high enough so it can be put on jacks or on a slat bed trailer.

(8) If the aircraft cannot be moved on its landing gear, it can be carried on a flat bed trailer as shown in figure 2. A steel beam, with vertical columns to the wing jacking points, installed across the aft end of the trailer will support the aircraft through its wing jacking points. A rear fuselage support, installed at forward end of the trailer, will support the rear of the aircraft through its rear fuselage support location. To prevent any movement of the aircraft, the beam and the rear fuselage support should be welded to the frame of the trailer.

(9) Due to the small size of the Regional Jet, it may be easier and faster to recover and move the aircraft with the use of cranes and slings.
NOTE
12 in. (0.30 m) wide strap preferred, 10 in. (0.25 m) wide strap minimum, check sling load rating and use multiple slings to carry load safely.
6. TERRAIN CONSIDERATIONS

A. The terrain considerations under and around the aircraft, the prevailing weather conditions, and the structural damage to the aircraft are important because they determine the bearing area required to lift and move the aircraft. An experienced Civil Engineer or earthworks contractor should be consulted to help in assessing the soil surface conditions, bearing loads, and bearing areas. The following is a list of terrain considerations involved in deciding on the most practical method of lifting and moving the aircraft.

1. Observe the general area to determine the best route to tow the aircraft. If the ground is flat, the recovery is straightforward. Rolling terrain may create difficulty and may result in additional structural damage. Prior to towing the aircraft, rough terrain may require grading to provide a smooth path for the aircraft and the towing vehicle(s).

2. Observe surface hardness, surface smoothness, and surface drainage or possible effect of rainfall on the load-carrying capability of the ground. Determine the safe bearing load and surface area of the ground. Soil strength should have the same consistency for a depth of 8 inches (.20 meters) and the force required to tow an aircraft increases as a function of the softness of the ground.

3. In the event that the jacking points of the aircraft are buried, it will be necessary to dig to hard ground to expose enough hard surface area for shoring (cribbing). Refer to Figure 1 for minimum soil surface conditions.

4. Determine the method for lifting the aircraft which best suits the conditions;
   (a) Jacking
   (b) Pneumatic bags
   (c) Mobile cranes and slings

5. Weather conditions can further complicate the recovery operation. Drainage ditches and irrigation pumps will be required to divert standing water. If high winds are forecast, preparation for tethering must be planned. Do not attempt to move the aircraft in winds above 30 knots.
<table>
<thead>
<tr>
<th>SURFACE</th>
<th>SHORING (CRIBBING) REQUIRED FOR ROLLING LOADS</th>
<th>SHORING (CRIBBING) REQUIRED FOR JACKING LOADS</th>
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<tbody>
<tr>
<td></td>
<td>Maximum allowable contact pressure</td>
<td>Minimum contact area required</td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td>kPa</td>
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<td>Soft wet clay or wet organic soil</td>
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<td>1241.0</td>
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<tr>
<td>Sandy gravel or clayey gravel or dry clay</td>
<td>300.0</td>
<td>2068.0</td>
</tr>
<tr>
<td>Compacted sandy clayey gravel</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Soil Surface Conditions for Shoring (Cribbing) Conditions
B. The soil surface conditions are prime factors in the aircraft recovery operation. The decisions regarding towing the aircraft, anchoring tethers in the ground, or setting shoring (cribbing) are based on the knowledge of soil conditions. From that knowledge, decisions will be made as to the necessity of ground cover or arrangements for the area of the shoring (cribbing) base.

The California Bearing Ratio (CBR) is recognized as the standard for providing a basis of comparison for different soil conditions. It is a measure of the shear strength of the soil expressed as a percent value for crushed stone which is equal to 100. Refer to Figure 1 for the corresponding bearing strength of various soil conditions.
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