Aircraft Recovery Manual

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CHALLENGER

Publication No. CH 600 ARM
BOMBARDIER CHALLENGER*

AIRCRAFT RECOVERY MANUAL

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**EFFECTIVITY: ALL**

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SECTION 06 – Ground Safety

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1. **Scope of the Manual**


   A. Bombardier Business Aircraft Customer Support (BBACS) prepared the Aircraft
      Recovery Manual to help an Airport Authority, an FBO, and/or an aircraft recovery crew if
      an accident occurs with the above Bombardier Challenger model business jet. Because
      there are many Completion Centres that do different passenger compartment layout, it is
      not possible to give all the different layouts in this manual.

   B. No aircraft recovery will be the same as other recovery operations because of:
      - The accident or the incident itself
      - The location of the aircraft
      - The amount of aid that is available locally
      - The weather conditions when the accident/incident occurred. Also, the effects of the
        weather before and after the recovery operation
      - The number of persons that are available to help with the recovery.

   C. Send your questions and suggestions to:
      Bombardier Business Aircraft, Customer Support
      P.O. Box 6087, Station Centre–ville
      Montreal, Quebec, Canada H3C 3G9
      Attention: Senior Accident Investigator, Department 686–CA

2. **Statement of Liability**


   A. This manual is intended to be used by Aircraft Crash Recovery crews involved in the
      recovery of any of the above Bombardier Challenger model business jet which becomes
      involved in an accident. It is also intended to help those persons planning for the unlikely
      event that will require recovery actions. The actions described in this manual are
      intended as recommendations only, as to how aircraft recovery tasks should be carried
      out. Any omission of a task or an action, or omission to a task or action, shall not be
      interpreted as an admission of liability by Bombardier Inc., or any of its sub–groups of
      affiliates or related entities.
3. Manual Organization

A. General

There are six sections in this manual:
- Section 1 – INTRODUCTION
- Section 2 – AIRCRAFT RECOVERY
- Section 3 – AIRCRAFT – GENERAL
- Section 4 – EMERGENCY INFORMATION
- Section 5 – FIRE FIGHTING
- Section 6 – GROUND SAFETY

4. Technical Glossary

A. Refer to Table 1 for a Technical Glossary of aircraft terminology and their abbreviations.

<p>| A/C   | Aircraft                        |
| ac    | Alternating Current             |
| ADG   | Air Driven Generator            |
| APU   | Auxiliary Power Unit            |
| AUX   | Auxiliary                       |
| CBR   | California Bearing Ratio        |
| CFR   | Crash Fire Rescue               |
| dc    | Direct Current                  |
| DISCH | Discharge                       |
| ELECT PWR | Electrical Power              |
| ENG   | Engine                          |
| EQP   | Equipment Bay                   |
| FS    | Fuselage Station                |
| FT/SEC| Feet per second                 |</p>
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5. Dimensions

A. Linear dimensions given in this manual are in inches. The metric equivalents are given in parentheses ( ).
1. Quick Reference Guide

A. The leader of the recovery operation can use the Quick Reference Guide that follows as a check list for the recovery team to refer to.

(1) Do the weight and balance

   (a) Find the weight and balance of the aircraft to make an estimate of the limits to jack and tow the aircraft.

   (b) Record the quantity and location of cargo and fuel to calculate the weight and balance.

   NOTE: You may have to calculate the weight and balance more than one time during the recovery operations.

(2) Get initial data about the incident

   (a) Set up interface with the investigator-in-Charge (IIC), local authorities, the aircraft manufacturer (Bombardier) representative and the owner agent or representative.

   (b) Tell the recovery crew surveyor to make a full estimate of the site as quickly as possible. The type of accident site can have an effect on the aircraft removal.

   (c) Make a note of the slope of the terrain, the ground cover (e.g. trees, grass, rock) and the distance from the runway, taxiway and apron.

   (d) Make an analysis of the ground condition to calculate the bearing area necessary to lift and move the aircraft.

   (e) Choose suitable personnel (as well as recovery crew members) and make an estimate of the necessary equipment and related manuals.

   (f) Get accommodations, transportation, work visa (when necessary) and money for the recovery team.

   NOTE: The IIC must be at the site before this occurs.

   (g) At the site, speak to local airport authorities, regulatory authorities and national investigation authorities.

      Get data on the items that follow:
      - Local environment
      - Climate
      - Terrain structure
− Communications.
− Local regulations for the defueling of the aircraft.

(3) Set up Interface

(a) Make a detailed aircraft recovery plan (use a general recovery plan).

(b) Get permission from local and national authorities to continue with the recovery operation. It is necessary for the different authorities to find the cause(s) of an aircraft accident. You must know and follow the regulatory authority regulations, and the laws of the country in which the accident occurs.

(c) Move personnel and equipment to the recovery site.

(d) Prepare hangar and/or parking space for the aircraft. Refer to section 3 figure 1 for aircraft dimensions.

(e) Make sure that cranes are locally available. Also, make sure that other heavy equipment, building materials and access roads are available. Some of the operators are members of an organization that share their technical facilities, service and recovery equipment (recovery kits). The International Air Technical Pool (IATP) is the organization that manages the recovery pool arrangement.

(f) If components are remove from the aircraft for recovery purposes, the center of gravity weight and balance location must be re-calculated before the aircraft is moved.

(g) If possible, remove all health risk payload (fuel, dangerous materials, catering, oxygen, squibs, galley and lavatory disposal and water) from the aircraft.

NOTE: Follow the applicable local regulations concerning defueling.

(h) If possible, remove the baggage, cargo and flyaway kit.

(i) If required, remove primary components as necessary.

(j) Refer to section 6 – GROUND SAFETY for data on the installation of the ground lockpins. these lockpins are used, where possible, to safety the landing gear for operations on the ground.

(k) Prepare to tether, lift and move the aircraft.

(l) Complete the aircraft damage report when the aircraft recovery is completed. The damage report is made by the Bombardier investigating team, or a Technical Support/Engineering team that is specially assembled for the task.
2. Planning for Aircraft Recovery

A. General

**CAUTION:** THE SPECIAL PROBLEMS THAT ARE RELATED TO AN AIRCRAFT RECOVERY OPERATION MAKE IT NECESSARY FOR ONE APPROVED PERSON TO DIRECT ALL OF THE OPERATION.

(1) Refer to the International Civil Aviation Organization (ICAO) document #9137–AN/898, Airport Services Manual, Part 5, "Removal Of Disabled Aircraft" as an aid for aircraft recovery.

(2) The document gives the procedures to use for the recovery and/or the removal of a disabled aircraft. Some advanced procedures that are necessary are as follows:

(a) When you have to move an aircraft that cannot taxi or be towed with an approved tow bar or tow bridle, use other recovery procedures. The aircraft may be lifted with pneumatic bags or cranes and moved on a trailer or dollies.

(b) Advance planning is important to make sure that the equipment and persons with the skills to do a recovery operation are available when necessary.

(c) Prepare a full “Aircraft Recovery Plan” which may be started as soon as an accident occurs and at the request of the IIC.

(d) Make sure to have the necessary emergency procedures. Give to the applicable personnel, the tasks they are responsible for.

(e) Tell all major users of the airport about the airport management policies that apply to the removal of disable aircraft. Include applicable parts of this document in the airport procedure.

**NOTE:** We recommend that a copy of this document be in the airport’s “Aircraft Recovery Plan”.

B. Aircraft Recovery Plan

(1) The Aircraft Recovery Plan includes:

(a) Guidelines for the fast removal of a disabled aircraft from the airport operational areas as well as the time necessary to prevent secondary damage to the aircraft.

(b) Detailed grid maps for use during recovery operations. The maps must show the topography of the airport site, approaches and adjacent areas. They must also show roads, ditches, gates, ground conditions and other factors that could have an effect on the aircraft recovery operations.

(c) Details about access roads to all parts of the airport that are near overhead power lines or bridges, specially those roads necessary for heavy equipment such as cranes.
(d) Bombardier’s data on the Challenger 60X model aircraft uses the airport. For aircraft recovery, the important data is weight and balance, lifting and moving, and weight reduction figures.

(e) The type and location of heavy or specialized equipment and the time necessary for the equipment to get it to the airport. Equipment to defuel the aircraft must be available to move to all areas or location. Because of the dimensions of the Challenger 60X model aircraft, cranes and slings can be used to lift the aircraft. The availability of cranes should be included in the recovery plan.

NOTE: If not available, try to get aircraft recovery kits from other airports as quickly as possible.

The ICAO “Airport Services Manual”, Part 5, gives a worldwide list of aircraft kits.

(f) Sources of personnel with different skills, ranging from laborers to aircraft mechanics.

(g) The requirements for food, clothes and shelter for the recovery crew.

(h) Flexible procedures for communications, security and safety for the recovery operation, that are correct for the site.

(i) An active inventory of local salvage equipment that is available to the airport. The operator can get aircraft removal equipment and crews through contracts with airport owners, military airfields or aeronautical industries near the airport.

(j) Airport rules must make sure of the items that follow:
1. The airport owner’s right to close all or part of the airport as necessary.
2. The limits of liabilities and penalties for violations.

NOTE: An agreement must be received from the IIC or the senior official of the investigation team, before the airport owner can move a disabled aircraft.
(k) Contracts/agreements between aircraft operators and fixed base operators must give each of them the capability to move the types of aircraft they use or those which they service. The movement must include minimum risk of damage to the aircraft and to the airport. The contracts/agreements can be with a single operator, a cooperative procedure with the airport authorities or a joint procedure by more than one operator at the applicable airport. We recommend that the operators put their removal equipment together because of:

1. The logistics and time saving advantages of recovery kits that they own together.
2. The economic advantages to single operator (they can buy fewer kits).
3. The improvements that come with more equipment because a larger number or operators are together.

(l) The contracts/agreements must record the fixed base operator’s procedures and capacity to do non-routine aircraft repairs on runways.

(m) Procedures and agreements for airports used jointly by civil and military aviation.

(n) Analysis of data on recovery equipment, shows that the type of recovery equipment used does not affect the actual removal time.

(o) In the procedures for recovery equipment, look carefully at the items that follow:

1. The full system to lift and move the aircraft.
2. The mixture of recovery system components and the support equipment necessary to move dangerous materials. Also other equipment such as cranes, dollies and flatbed trucks.
3. The availability of winch equipped heavy equipment (bulldozer, tractor etc.).

NOTE: To move the Bombardier Challenger 60X model aircraft, we recommend a tractor/trailer with a bed of equally low height. This will decrease the height the recovery team must lift a damaged aircraft.

3. Moving the Aircraft

A. General

(1) The primary reason to move the aircraft is for recovery as quickly as possible without further primary or secondary damage. An up-to-date recovery plan is the best procedure to decrease recovery time. Procedures for the recovery, as well as a group of trained personnel must be included in the plan.

(2) A correct estimate of the damage to the aircraft is very important. This will help to find, in the shortest time, the procedure to do the recovery operation.
B. Steps and Recommendations for an Efficient Aircraft Recovery

(1) Before you start a recovery operation, make sure of the correct safety precautions:

(a) Remove the aircraft batteries as quickly as possible. If it is not possible to remove the batteries, disconnect and insulate the battery connectors. Refer to Figure 1.

NOTE: These may not be accessible – any point will do.

(b) Close oxygen bottle valve.

(c) If necessary, defuel the damaged aircraft to increase the speed of the recovery operation.

NOTE: Follow the applicable local regulations concerning defueling.

(2) Examination how the accident occurred. This will help to make an estimate of the damage that occurred to the aircraft.

(3) After a check of the obvious damage, examine the structural condition of the aircraft.

(4) Look for possible damage to other areas of the aircraft. The following are indications of damage:

(a) Bulges in the wing or fuselage skin panels, at structural joints, or heavy fittings, are indications of internal damage.

(b) Rivets, bolts or fasteners of all types that tilt, are cut or loose, are also indications of damage.

(c) Torn, cracked or buckled fairings and other non-structural parts are causes for close inspection of the structure below them. Think that damage to the structure below these parts is possible until a close inspection shows differently.

NOTE: A close inspection may not be possible if the aircraft is wheels–up.

(5) Make a list of missing or unserviceable items as you make an estimate of the damage.
(6) **WARNING:** FIND OUT IF THE STRUCTURE OF A DAMAGED AIRCRAFT CAN HOLD ITS WEIGHT BEFORE YOU LOWER IT ON THE LANDING GEAR FROM TRESTLES OR JACKS. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURY TO PERSONS OR MORE DAMAGE TO THE STRUCTURE.

Do an inspection of the aircraft structure before it comes off the trestles or jacks to see if it is sufficiently strong to tow the aircraft on its landing gear. Lower the landing gear only if:

(a) The IIC agrees.

(b) It is safe.

(c) No more damage will occur.

(7) **CAUTION:** DO NOT REMOVE FUEL, CARGO, OR THE ENGINES IF THEY KEEP THE AIRCRAFT'S CENTER OF GRAVITY. THIS WILL PREVENT AN OVERLOAD AT THE JACKING POINT.

The maximum weight of the aircraft on jacks are as follows:

**NOTE:** These weights are for an undamaged aircraft. The damage caused by an accident may cause lower maximum permitted loads at the jacking points. Refer to Figure 2 for jacking point locations. It can be better to put the aircraft on trestles (assembled on-site) if there is structural damage.

(a) The maximum permitted weight of the aircraft is 36 000 lb (16 329.3 kg).

(b) The maximum vertical jacking loads for each jack location are as follow: Refer to Figure 2.
   - 5 620 lb (2 549.2 kg) at the nose jacking point.
   - 16 370 lb (7 425.3 kg) at each wing jacking point.

(8) If required, remove baggage and cargo from the aircraft. The baggage compartment door opens in and up.

(9) Examine the damage to the fuel system to find the best procedure to defuel the aircraft. The single-point refuel/defuel adaptor, fuel lines and tanks can have damage. Refer to Figure 3.

(10) Alternative procedures to defuel the aircraft are as follows:

**NOTE:** Follow the applicable local regulations concerning defueling.

(a) Suction defuel procedure.
   1. The suction will break when one of the inlet points becomes open. This procedure is slow and can mean that the fuel tank is not fully drained.

(b) Gravity defuel procedure.
WARNING: MAKE SURE THAT THE FUEL LEVEL IN THE TANK IS BELOW THE OPENING OF THE GRAVITY FUELING ADAPTER. IF IT IS NOT, FUEL WILL SPILL OUT OF THE TANK. THIS CAN CAUSE INJURY TO PERSONS.

1. Fuel will come out from the tank(s) if the tank is higher than the gravity fuel adaptor. To prevent this, make sure the fuel level in the tank is below the gravity fueling adaptor before opening.

2. If available, use a gravity defuel adaptor to drain fuel from the underwing fuel drains into approved containers. Use the suction procedure at the single point refuel/defuel position. Use a suction hose in the overwing and center tank gravity fuel adaptor to remove fuel if it is not possible to remove it through the pressure refuel/defuel adaptor.

3. The quantity of fuel in the tank and the attitude of the aircraft will control the amount of fuel you can remove.

(c) If accessible, the fuel drain valves at the bottom of the tanks may be used for defueling. This method of defueling is very slow and dangerous due to fuel vapor.

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

(11) WARNING: BEFORE YOU REMOVE THE ENGINE, MAKE SURE THAT THE AIRCRAFT IS STABLE. IF IT IS NOT STABLE, THE AIRCRAFT CAN FALL AND CAUSE INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT.

If the engines have to be removed to keep the weight and balance, make sure the aircraft is level before the release of the load on the yokes. The aircraft must also be stable to prevent movement because of an imbalance when an engine is removed.

(12) In recovery operations, there are two basic situations that will occur:
- You can tow the aircraft on its landing gear.
- You must lift the aircraft on to a transport..

(a) If the landing gear is still serviceable after the aircraft has run off the runway or taxiway, it may be possible to tow by the main gear (refer to section 6 figure 3).

(b) If the landing gear has flat tire(s), there are some tow limits. Refer to Figure 7 for towing restrictions with flat tire.

(c) Make an estimate of the ground load−bearing capacity and the slope of the terrain in the recovery area. Make the path to tow the aircraft as smooth as possible if it does not have concrete or asphalt. Refer to Figure 4 for landing gear measurements and tire pressures.
(d) If the landing gear is unserviceable, use pneumatic lifting bags or cranes and slings to lift the aircraft. Then put it on dollies or on a flatbed trailer.

(13) **CAUTION:** INFLATE THE FORWARD AND AFT LIFTING BAGS SUFFICIENTLY TO KEEP THE AIRCRAFT STABLE. PUT THE BAGS IN AREAS OF SUFFICIENT STRENGTH TO PREVENT MORE DAMAGE TO THE AIRCRAFT.

Lift an aircraft that is on its fuselage with lifting bags put below each wing, the forward fuselage and the aft fuselage. Refer to Figure 5 for the recommended position of the pneumatic bags. Keep the aircraft stable with cables while you lift it, or while it is on the pneumatic bags. Inflate the pneumatics bags sufficiently to allow the installation of trestles or jack, at the noses, wings and the rear fuselage support. Put the cables at the nose jack point and the rear mooring points.

(14) Use a nose jack and normal jacking procedures to lift a nose-down aircraft around the MLG axis.

(15) When you use cranes and slings to lift the aircraft, you must make an estimate of the damage to the structure. This will help to find how much damage has occurred and the location of strong frames to transmit the sling loads. Because each aircraft recovery operation is different, Bombardier cannot recommend special sling locations. Generally, use the nose jack point, the passenger door aft frame and the forward engine mounts to lift the aircraft. Refer to Figure 6 for the strongest frame locations.

(16) Lift the aircraft only in periods of very light or no winds. Because of the large wing area, empennage, and fuselage, small gusts of wind can cause large pendulum movements.

(17) Make the aircraft stable during the lift. To help control its movement during the lift, attach ropes to available strong points, such as the landing gear. If the engines are removed, attach ropes to the forward engine mounts. During the lift, level the aircraft then lift it sufficiently high to put it on jacks or flatbed trailer.

(18) If the aircraft cannot be moved on its landing gear, it may be moved on a flatbed trailer. Refer to Figure 6.

(19) Cranes and slings may be faster and easier to use to recover the Bombardier Challenger 60X model aircraft.
AIRCRAFT RECOVERY MANUAL (PSP 620)
CL−600/601/601−3A/601−3R/604/605/650

AIRCRAFT BATTERIES AND STATIC GROUND CONNECTIONS
Figure 1 (Sheet 1 of 4)

EFFECTIVITY: ALL
Aircraft Batteries and Static Ground Connections
Figure 1 (Sheet 2 of 4)
Aircraft Batteries and Static Ground Connections
Figure 1 (Sheet 3 of 4)
Aircraft Batteries and Static Ground Connections
Figure 1 (Sheet 4 of 4)
Structural Jacking Points / Jacking Adaptors

Figure 2
LEGEND
A – AUXILIARY TANK
L – LEFT MAIN TANK
R – RIGHT MAIN TANK
FA – FORWARD AUXILIARY TANK
AA – AFT AUXILIARY TANK
T – TAIL TANK (IF INSTALLED)
S – SADDLE TANK (CL604)

OVERWING GRAVITY FUEL FILLER

PRESSURE REFUEL / DEFUEL ADAPTOR

AIRCRAFT DEFUELLING
Figure 3

EFFECTIVITY: ALL
Landing Gear Information

Figure 4
Lifting With Pneumatic Bags
Figure 5
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.

Aircraft Recovery With Cranes And Slings
Figure 6

EFFECTIVITY: ALL

SECTION 02 Page 18  Nov 06/2015
1. Avoid sharp turns, abrupt starts and stops.
2. Maximum taxiing or towing speed = 5 mph (8kmh).
3. Maximum taxiing or towing speed = 2 mph (3kmh).
4. After clearing runway, or if additional tire fails, the airplane should be stopped and serviceable wheel/tire assembly(ies) installed to obtain item number 2 or 6.
5. After any tire failure or excessive heat condition the affected wheel assembly must be inspected per applicable Goodyear Overhaul Manual prior to further use.
6. Under a multiple failed tire condition, the affected landing gear assemblies and linkages must be inspected for possible structural damage.
7. Observe the CAUTION below:
   CAUTION: TAXIING OR TOWING WITH TWO FLAT TIRES ON SAME GEAR CAN RESULT IN WHEEL DAMAGE

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>MAIN GEAR CONDITION</th>
<th>TIRE FOOTPRINT EXAMPLES</th>
<th>IS TAXING ALLOWED?</th>
<th>IS TOWING ALLOWED?</th>
<th>DISTANCE ALLOWED (TAXIING &amp; TOWING)</th>
<th>NOSE WHEEL ANGLE OF TURN</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>ONLY ONE FLAT TIRE (ANY TIRE)</td>
<td></td>
<td>YES</td>
<td>YES</td>
<td>UNLIMITED</td>
<td>NORMAL</td>
<td>SEE NOTES 1., 2., 5.</td>
</tr>
<tr>
<td>2</td>
<td>TWO FLAT TIRES (ONE ON EACH AXLE)</td>
<td></td>
<td>YES</td>
<td>YES</td>
<td>UNLIMITED</td>
<td>NORMAL</td>
<td>SEE NOTES 1., 3., 4., 5., 6., 7.</td>
</tr>
<tr>
<td>3</td>
<td>TWO FLAT TIRES (ON ONE AXLE)</td>
<td></td>
<td>YES</td>
<td>BOTH MAIN GEAR ONLY</td>
<td>MINIMUM TO CLEAR RUNWAY</td>
<td>10 DEGREES MAXIMUM</td>
<td>SEE NOTES 1., 3., 4., 5., 6., 7.</td>
</tr>
<tr>
<td>4</td>
<td>THREE FLAT TIRES (ANY COMBINATION)</td>
<td></td>
<td>YES</td>
<td>BOTH MAIN GEAR ONLY</td>
<td>MINIMUM TO CLEAR RUNWAY</td>
<td>10 DEGREES MAXIMUM</td>
<td>SEE NOTES 1., 3., 4., 5., 6., 7.</td>
</tr>
<tr>
<td>5</td>
<td>FOUR FLAT TIRES</td>
<td></td>
<td>YES</td>
<td>BOTH MAIN GEAR ONLY</td>
<td>MINIMUM TO CLEAR RUNWAY</td>
<td>10 DEGREES MAXIMUM</td>
<td>SEE NOTES 1., 3., 4., 5., 6., 7.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOSE GEAR CONDITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
</tr>
<tr>
<td>7</td>
</tr>
</tbody>
</table>

### NOTES

- Avoid sharp turns, abrupt starts and stops.
- Maximum taxiing or towing speed = 5 mph (8kmh).
- Maximum taxiing or towing speed = 2 mph (3kmh).
- After clearing runway, or if additional tire fails, the airplane should be stopped and serviceable wheel/tire assembly(ies) installed to obtain item number 2 or 6.
- After any tire failure or excessive heat condition the affected wheel assembly must be inspected per applicable Goodyear Overhaul Manual prior to further use.
- Under a multiple failed tire condition, the affected landing gear assemblies and linkages must be inspected for possible structural damage.
- Observe the CAUTION below:
  CAUTION: TAXIING OR TOWING WITH TWO FLAT TIRES ON SAME GEAR CAN RESULT IN WHEEL DAMAGE

---

**Towing or Taxiing with Flat Tires**

*Figure 7*
4. Terrain Consideration

A. General

(1) The type of terrain, weather conditions and the structural damage to the aircraft are all factors to find the bearing area necessary to lift and move the aircraft. Get an experienced civil engineer or earthworks contractor to make an assessment of the terrain surface conditions, bearing loads and areas.

B. Factors to Determine the Most Practical Recovery Plan

(1) Make an estimate of the general terrain to find the best route to tow the aircraft. Structural damage to the aircraft can occur if it is moved over rough terrain that is not smooth. If necessary, grade the proposed tow route to give a smooth surface for the aircraft and tow vehicle(s).

(2) Make an estimate of how hard and smooth the surface is. Also, the possible effect of rainfall and drainage on the load-bearing capacity of the terrain. Find the safe bearing load and surface area of the terrain. The ground must have the same condition for a depth of 8 in (20.3 cm) because the force necessary to tow an aircraft changes as a function of the strength of the terrain.

(3) The type of terrain shows the applicable procedure to lift the aircraft:
   (a) Refer to Figure 2 for the use of jacks.
   (b) Refer to Figure 5 for the use of pneumatic bags.
   (c) Refer to Figure 6 Mobile cranes and slings.

C. Ground Conditions

(1) Ground conditions are one of the primary factors in aircraft recovery operations. Ground conditions have an effect on decisions to tow the aircraft, put tethers in the ground, or set shoring (cribbing). From the results of ground test, the recovery team makes decisions about reinforcement of the terrain and the shoring (cribbing) base.

(2) The California Bearing Ratio (CBR) is known as the standard for different ground conditions.
   (a) For ground conditions that are related to shoring the aircraft refer to Table 1.
   (b) For the related bearing strength of different ground conditions refer to Table 2.
<table>
<thead>
<tr>
<th>Surface Type</th>
<th>Shoring (Cribbing) Required For Rolling Loads</th>
<th>Shoring (Cribbing) Required For Jacking Loads</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum Allowable Contact Pressure</td>
<td>Minimum Contact Area Needed</td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td>kPa</td>
</tr>
<tr>
<td>Soft Wet Clay or Wet Organic Terrain</td>
<td>18.0</td>
<td>124.0</td>
</tr>
<tr>
<td>Loose Sand or Sandy Terrain</td>
<td>65.0</td>
<td>448.0</td>
</tr>
<tr>
<td>Sand With Clay</td>
<td>100.0</td>
<td>690.0</td>
</tr>
<tr>
<td>Well Graded Sand and Medium Clay</td>
<td>180.0</td>
<td>1241.0</td>
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<tr>
<td>Sandy Gravel, Clay–Gravel or Dry Clay</td>
<td>300.0</td>
<td>2068.0</td>
</tr>
<tr>
<td>Compacted Sandy Clay–Gravel</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Surface Type</td>
<td>Safe Bearing Load</td>
<td>Approximate Bearing Area Necessary</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>-------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td></td>
<td>psi</td>
<td>kPa</td>
</tr>
<tr>
<td></td>
<td>in²</td>
<td>ft²</td>
</tr>
<tr>
<td>Slate or Rock</td>
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<td>1586.0</td>
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<tr>
<td>Concrete</td>
<td>156.0</td>
<td>1076.0</td>
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<tr>
<td>Hard Pan and Gravel</td>
<td>138.0</td>
<td>951.0</td>
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<tr>
<td>Small Sand and Gravel</td>
<td>100.0</td>
<td>689.0</td>
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<tr>
<td>Gravel, Course Sand or Medium Clay</td>
<td>62.0</td>
<td>427.0</td>
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<tr>
<td>Loose Sand and Gravel Mixture</td>
<td>42.0</td>
<td>290.0</td>
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<tr>
<td>Medium Stiff Clay</td>
<td>35.0</td>
<td>241.0</td>
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<tr>
<td>Loose Sand</td>
<td>30.0</td>
<td>207.0</td>
</tr>
<tr>
<td>Soft Clay or Earth</td>
<td>15.5</td>
<td>107.0</td>
</tr>
</tbody>
</table>
1. **Model Designation and Type**

   The Bombardier Challenger 60X model business jet is made by Bombardier Aerospace. The aircraft is a swept-wing monoplane with pressurized cabin, operated by two crew.

   **CL−600**

   The above Challenger model has two Avco Lycoming ALG 502L−2 turbofan engines.

   **CL−601**

   The above Challenger model has two General Electric CF 34−1A or −3A or −3A2 turbofan engines.

   **CL−601−3A and CL−601−3R**

   The above Challenger models have two General Electric CF34−3A or −3A1 or −3A2 turbofan engines.

   **CL−604, CL−605, CL−650**

   The above Challenger models have two General Electric CF34−3B turbofan engines.

2. **Aircraft Dimensions**

   **CL−600**

   Refer to Figure 1 for all basic dimensions, including ground clearances.

   **CL−601**

   Refer to Figure 2 for all basic dimensions, including ground clearances.

   **CL−604**

   Refer to Figure 3 for all basic dimensions, including ground clearances.

   **CL−605 and CL−650**

   Refer to Figure 4 for all basic dimensions, including ground clearances.
### CABIN INTERIOR DIMENSIONS

<table>
<thead>
<tr>
<th>Feature</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>28 ft 3 in (8.61 m)</td>
</tr>
<tr>
<td>Width (max dia)</td>
<td>8 ft 2 in (2.49 m)</td>
</tr>
<tr>
<td>Headroom (floor to max height)</td>
<td>6 ft 1 in (1.85 m)</td>
</tr>
<tr>
<td>Volume</td>
<td>1150 cu ft (32.56 m³)</td>
</tr>
<tr>
<td>Floor Area</td>
<td>202.5 sq ft (18.81 m²)</td>
</tr>
<tr>
<td>Floor Width</td>
<td>7 ft 2 in (2.18 m)</td>
</tr>
</tbody>
</table>

### NOTES
- Measurement at manufacturers empty weight.
- 21 ft (6.40 m) elevator up.
- Open passenger door ground clearance 4 in (10.16 cm).
AIRCRAFT RECOVERY MANUAL (PSP 620)
CL-600/601/601−3A/601−3R/604/605/650

CABIN INTERIOR DIMENSIONS

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NOTES

- Measurement at manufacturers empty weight.
- 21 ft (6.40 m) elevator up.
- Open passenger door ground clearance 4 in (10.16 cm).
- Aircraft with tail tank.

EFFECTIVITY: ALL

A/C POST SB601−0006

AIRCRAFT RECOVERY MANUAL (PSP 620)
CL-600/601/601−3A/601−3R/604/605/650

EFFECTIVITY: ALL

A/C POST SB601−0006

AIRCRAFT RECOVERY MANUAL (PSP 620)
CL-600/601/601−3A/601−3R/604/605/650

EFFECTIVITY: ALL

A/C POST SB601−0006
CABIN INTERIOR DIMENSIONS

<p>| | | | | | | |</p>
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<th></th>
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</tr>
</tbody>
</table>

NOTES

⚠️ Measurement at manufacturers empty weight.

⚠️ 21 ft (6.40 m) elevator up.

⚠️ Open passenger door ground clearance 4 in (10.16 cm).

EFFECTIVITY

☑️ A/C 5301 to 5303, 5306 and A/C 5304, 5307 to 5608 POST SB604–56–001
NOTES

Measurement at manufacturers empty weight.

21 ft (6.40 m) elevator up.

Open passenger door ground clearance 4 in (10.16 cm).

CABIN INTERIOR DIMENSIONS

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</tr>
<tr>
<td>Floor Width</td>
<td>7 ft 2 in (2.18 m)</td>
</tr>
</tbody>
</table>

Aircraft Basic Dimensions – CL–605 and CL–650

Figure 4
3. Dangerous Areas

Persons who do aircraft recovery operations must know of the danger areas around the engines and the APU. Refer to Figure 5, Figure 6, Figure 7, and Figure 8.
Intake / Exhaust Danger Areas and Exhaust Velocities at Idle Thrust

Figure 5

EFFECTIVITY: ALL
Intake / Exhaust Danger Areas and Exhaust Velocities at Maximum Thrust
Figure 6
APU Exhaust Danger Area
Figure 7
DANGEROUS AREAS AROUND THE AIRCRAFT

Figure 8

EFFECTIVITY: ALL
4. Doors

The aircraft has the doors that follow:

- Passenger/crew entrance door,
- Baggage compartment door on the left side of the aircraft,
- Aft equipment compartment door at the bottom of the rear fuselage,
- Different small service access doors,
- Overwing emergency exit door located on the right side of the passenger compartment.

NOTE: The entrance stairs attach to the passenger/crew door.

5. Composite Materials

A. Composite materials such as Kevlar, Graphite, Fiberglass and Fiberlam are used in many components of the Bombardier Challenger 605/650 Aircraft. Refer to Figure 9 and Figure 10 for the location of the composite materials.
Composite Materials

Figure 9
Composite Materials

Figure 10
6. Interior Configurations

A. Internal configurations will change according to customer options installed at the completion centers. Refer to Figure 11.
Interior Configurations
Figure 11

EFFECTIVITY: ALL
1. Emergency Access

A. Passenger Door

CL−600, CL−601, CL−601−3A, CL−601−3R, CL−604

(1) The Passenger Entrance Door is on the left side of the aircraft, just after the flight compartment. The door serves as a type 1 Emergency Exit. Refer to Figure 1, Figure 2, and Figure 4.

(2) Dimensions:

- Height 6 ft 2 in (1.88 m)
- Width 2 ft 6 in (0.76 m)
- Height to the sill (one step below the floor line) 4 ft 3 in (1.30 m)

(3) To Open the Passenger Door from the external side do the following:

**WARNING:** BE VERY CAREFUL WHEN YOU OPEN THE PASSENGER DOOR. IF THE CABIN IS PRESSURIZED AND THE DOOR IS OPEN, THE DOOR WILL OPEN SUDDENLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(a) Push the external door handle trigger marked PUSH. The handle ejects 1.5 in (38.1 mm) out from the recess.

(b) Turn the handle 45 degrees counterclockwise to operate the latch mechanism. For aircraft equipped with a Pull Out handle, upon its release, the handle is used to help to pull the door down.

(c) Let the passenger door drop by gravity to the full open position.

**NOTE:** The passenger door gas spring actuator will control the decent of the door.

- The passenger door will open in less than 9 seconds.
- The passenger door telescopic struts will stop the door at the correct position.

B. Passenger Door

CL−605 and CL−650

(1) The Passenger Entrance Door is on the left side of the aircraft, just after the flight compartment. The door serves as a type 1 Emergency Exit. Refer to Figure 3, and Figure 4.
(2) Dimensions:
  – Height 6 ft 2 in (1.88 m)
  – Width 2 ft 6 in (0.76 m)
  – Height to the sill (one step below the floor line) 4 ft 3 in (1.30 m)

(3) Pressure Valve:

  (a) The pressure valve is a small vent flap in the lower half of the passenger door. It equalizes the internal and external pressure before the door opens.

(4) To open the passenger door from the external side do the following:

**WARNING:** BE VERY CAREFUL WHEN YOU OPEN THE PASSENGER DOOR. IF THE CABIN IS PRESSURIZED AND THE DOOR IS OPEN, THE DOOR WILL OPEN SUDDENLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

  (a) Push the external door handle trigger marked PUSH. The handle ejects 1.5 in (38.1 mm) out from the recess.

  **NOTE:** The external door handle will not release if the cabin pressure has not lowered to the correct pressure.

  (b) Turn the handle 45 degrees counterclockwise to operate the latch mechanism. The latch mechanism opens the pressure valve.

  **NOTE:** Let the passenger door drop by gravity to the full open position.

  The passenger door gas spring actuator will control the descent of the door.

  The passenger door will open in less than 9 seconds.

  The passenger door telescopic struts will stop the door at the correct position.

C. Overwing Emergency Exit Door

(1) The overwing emergency−exit door is on the right side of the passenger compartment. The emergency exit door can be operated from the internal or external side of the aircraft. The door serves as a type III Emergency Exit. Refer to Figure 5, Figure 6, Figure 7, and Figure 8.

(2) Dimensions:
  – Height 3 ft (0.91 m)
  – Width 1 ft 8 in (0.52 m)

(3) To open the overwing emergency−exit door from the external side do as follows:
WARNING: THE OVERWING EMERGENCY EXIT DOOR WEIGHS APPROXIMATELY 50.5 POUNDS (22.9 KG). BE CAREFUL WHEN YOU OPEN THE DOOR. THE DOOR IS NOT ATTACHED TO THE AIRCRAFT. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS.

(a) Apply hand pressure on the outside push plate and push the overwing–exit door into the aircraft

(4) To open the overwing emergency–exit door from the inside do as follows:

(a) Pull the upper latch handle marked EXIT PULL.

(b) Hold the overwing emergency–exit door at the lower hand grip and the upper latch handle.

(c) Tilt the overwing emergency–exit door inboard and lift the door out of the bottom hooks and pin fittings.

D. Baggage Compartment Door

(1) The baggage compartment door is a plug–type access door on the left side of the aft fuselage section, forward of the aft pressure bulkhead. Refer to Figure 9.

(2) Dimensions
- Height 2 ft 6 in (0.76 m)
- Width 2 ft (0.61 m)
- Height to sill floor line 5 ft 4 in (1.62 m)

(3) To open the baggage compartment door with the external handle do as follows:

(a) Push the external door handle trigger marked PUSH. The door handle will move out.

(b) Turn the external handle counterclockwise to the UNLOCKED position.

(c) Push the door in and up until the rollers contact the top stops and the opening is clear.

(4) To open the baggage compartment door with the internal handle do as follows:

(a) Pull the knob and turn the handle clockwise to unlock the door.

(b) Pull the door in and up until the rollers contact the top stops and the opening is clear.
E. Aft Equipment Compartment Door

CL−600, CL−601, CL−601−3A, CL−601−3R, CL−604

(1) The aft equipment compartment of the above Bombardier Challenger 60X model series business jet is a non−pressurized area. Access to the aft equipment compartment is through a door on the lower aft fuselage. The door is hinged at the forward end and opens down and forward. Refer to Figure 10.

NOTE: The letter X represents the number of the aircraft model.

(2) To open the aft equipment compartment door do as follows:

WARNING: THE AFT EQUIPMENT BAY DOOR MOVE DOWN WHEN YOU ROTATE THE HANDLE. MAKE SURE THAT YOU HOLD THE DOOR OR INJURY MAY OCCUR.

(a) Push the external door handle trigger marked PUSH. The door handle will move out.

(b) Hold the door, and rotate the handle clockwise to OPEN.

F. Aft Equipment Compartment Door

CL−605

(1) The aft equipment compartment of the above Bombardier Challenger 605 model series business jet is a non−pressurized area. Access to the aft equipment compartment is through a door on the lower aft fuselage. The door is hinged at the forward end and opens down and forward. Refer to Figure 11.

(2) To open the aft equipment compartment door do as follows:

WARNING: THE AFT EQUIPMENT BAY DOOR MOVE DOWN WHEN YOU ROTATE THE HANDLE. MAKE SURE THAT YOU HOLD THE DOOR OR INJURY MAY OCCUR.

(a) Push the external door handle trigger marked PUSH. The door handle will move out.

(b) Hold the door, and rotate the handle clockwise to OPEN.

G. Service Doors and Panels

The service doors and panels give access to the equipment and systems all through the fuselage. The doors and panels are made from alloy or graphite with Nomex honeycomb material. Refer to Figure 12, Figure 13, Figure 14 and Figure 15.
H. Windshields and Windows

CL−600, CL−601, CL−601−3A, CL−601−3R

(1) The flight compartment has two windshields and two side windows. The passenger compartment has seven windows on each side. There is one additional window in the overwing emergency exit door on the right side of the fuselage. The windows are permanently attached to the aircraft structure.

(2) The windshield are made with layers of acrylic and polyvinyl butyl (PVB) and glass.

(3) The side windows are made with layers of acrylic and (PVB).

WARNING: DO NOT TRY TO CHOP THROUGH THE WINDOWS. GO THROUGH THE EMERGENCY BREAK-IN ZONE. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS.

I. Windshields and Windows

CL−604

(1) The windows system includes flight compartment windows and passenger compartment windows. The flight compartment has two windshields and two side windows. There is a left windshield and a right windshield at the front of the flight compartment. There is one side window on the left and right sides of the flight compartment, immediately aft of each windshield.

On aircraft 5305 and pre SB 604−56−001, there are 12 windows in the passenger compartment. There are six passenger compartment windows on the left side of the fuselage and six on the right side. One of the windows on the right side of the fuselage is installed in the overwing emergency exit.

On aircraft 5301 to 5303, 5306, 5609 and subs and post SB 604−56−001, there are 15 windows in the passenger compartment. There are seven passenger compartment windows on the left side of the fuselage and eight on the right side. One of the windows on the right side of the fuselage is installed in the overwing emergency exit.

(2) The windshield assembly is made from acrylic material.

(3) The side windows are made with layers of acrylic and (PVB).

WARNING: DO NOT TRY TO CHOP THROUGH THE WINDOWS. GO THROUGH THE EMERGENCY BREAK-IN ZONE. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS.
J. Windshields and Windows

CL–605 and CL–650

(1) The windows system includes flight compartment windows and passenger compartment windows. The flight compartment has two windshields and two side windows. There is a left windshield and a right windshield at the front of the flight compartment. There is one side window on the left and right sides of the flight compartment, immediately aft of each windshield. There are seven passenger compartment windows on the left side of the fuselage and eight on the right side. One of the windows on the right side of the fuselage is installed in the overwing emergency exit.

(2) The windshield assembly is made from acrylic material.

(3) The side windows are made with layers of acrylic and (PVB).

WARNING: DO NOT TRY TO CHOP THROUGH THE WINDOWS. GO THROUGH THE EMERGENCY BREAK-IN ZONE. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS.
CL-600/CL-601 – Passenger / Crew Entrance Door and Baggage Compartment Door – Handle Operation

Figure 1
EFFECTIVITY
1 A/C 5301 TO 5303, 5306, 5609 TO 5665

CL−604 – Passenger / Crew Entrance Door and Baggage Compartment Door – Handle Operation
Figure 2
CL-605/CL-650 – Passenger / Crew Entrance Door and Baggage Compartment Door – Handle Operation
Figure 3
WARNING
Cabin may be pressurized.

Downward Opening Passenger / Crew Entrance Door – Operation
Figure 4

EFFECTIVITY: ALL

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CL–600 – Overwing Emergency Exit Door
Figure 5

EFFECTIVITY: ALL

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A/C POST SB601−0006

CL−601 − Overwing Emergency Exit Door
Figure 6

HOOK FITTINGS

QUICK−RELEASE LATCH MECHANISM

PUSH PLATE

HAND HOLD

EFFECTIVITY: ALL

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EFFECTIVITY

A/C 5301 to 5303, 5306 and A/C 5304, 5307 to 5608 POST SB604−56−001

CL−604 − Overwing Emergency Exit Door

Figure 7
CL–605/CL–650 – Overwing Emergency Exit Door
Figure 8 (Sheet 1 of 2)
CL–605/CL–650 – Overwing Emergency Exit Door
Figure 8 (Sheet 2 of 2)
Baggage Compartement Door
Figure 9

GUIDE TRACKS
INTERNAL HANDLE

HANDLE KEY LOCK
EXTERNAL HANDLE
EXTERNAL HANDLE TRIGGER

AFFECTIVITY: ALL

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Figure 10

EFFECTIVITY: ALL
CL–605 – Aft Equipment – Compartment Door

Figure 11

EFFECTIVITY: ALL
EFFECTIVITY: ALL

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CL–601 – Service Doors and Panels
Figure 13
EFFECTIVITY:  ALL

SECTION 04

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EFFECTIVITY: ALL

SECTION 04

CL–605/CL–650 – Service Doors and Panels
Figure 15
1. General

**WARNING:** MAKE SURE THAT YOU DISCONNECT THE ELECTRICAL POWER TO THE ENGINE FIRE-EXTINGUISHER BOTTLES. THE EXTINGUISHER BOTTLES HAVE PYROTECHNIC SQUIBS. IF YOU DO NOT DISCONNECT THE ELECTRICAL POWER, THERE CAN BE AN EXPLOSION. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

A. The sentences below give the classes used for fire-fighting.
   - For brake and wheel fires, use only dry powder or class D fire extinguishers.
   - For all other parts of the aircraft, use class B or C fire extinguishers.

<table>
<thead>
<tr>
<th>Aerodrome Category For Rescue And Fire Fighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

B. Typical fire-fighting is done with small equipment. Refer to Figure 1 and Figure 2.
INTERNAL ENGINE FIRE

EXHAUST NOZZLE FIRE

REAR FUSELAGE EQUIPMENT BAY FIRE

BRAKE FIRE

 Figure 1
CL−604/CL−605/CL−650 – Fire−Fighting

Figure 2

EFFECTIVITY: ALL

SECTION 05

Page 3

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2. On–Board Fire–Fighting Equipment

A. General

The fire extinguishing system supplies fire extinguishant to the engines and auxiliary power unit (APU) through a distribution system controlled from the flight compartment. The fire extinguishing system also has a portable fire extinguisher for manual operation on the aircraft.

B. APU and Engine Fire Extinguishing Systems

The Challenger models have two identical crew–operated fire–fighting systems. Each system has a spherical fire bottle of Halon 1301 located in the aircraft aft section. The bottles are pressurized with dry nitrogen at a pressure of 600 psi (4 137 kPa) to push the Halon. There are three pyrotechnic squibs to discharge and direct the Halon. One or both bottles can be directed at No. 1 or No. 2 engine. Refer to Figure 3.

C. Portable Fire Extinguishers

There is a fire extinguisher on the flight compartment bulkhead behind the copilot's seat. The fire extinguisher contains 3.5 lb (1.59 kg) of Halon 1211.

D. Optional Challenger Total–Flood Fire–Management System


The above Challenger models have an optional total–flood fire–management system. Refer to Figure 4. This system is controlled manually or automatically and operates in emergency landing or crash conditions. This system releases and distributes the Halon 1301 extinguishant from the 7 containers located in the aft equipment compartment. This system is for fire protection of the areas that follow:

– Flight compartment
– Passenger compartment
– Lavatory
– Cargo compartment
– Lower fuselage
– Aft equipment compartment.

The crew can control the total flood fire management system manually if there are indications that a crash impact will occur, or in an emergency landing condition. The crew control the system from the flight compartment with the TOTAL SYSTEM/FLOOD ARMED switch/light found on the FUSELAGE FIRE EXT control panel.
The crew must push the TOTAL SYSTEM/FLOOD ARMED switch/light two times to operate the total–flood fire–management system, in these conditions. This sends commands to the computer. When the computer senses the first command, it opens all valves, and arms all detonating circuits. When the computer senses the second command, it makes all bottles release the extinguishant into all areas at the same time.

The system is also controlled automatically through a computer circuit if a crash impact is sensed. When a crash occur, the aircraft internal impact switches send a command to the computer. The computer then sends commands to open all valves, and arm all detonating circuits. Once armed, the detonating circuit makes all bottles release the extinguishant into all areas at the same time.

If the crew have pushed the TOTAL SYSTEM/FLOOD ARMED switch/light one time before the crash impact is sensed, the aircraft internal impact switches send a different command to the computer. In these conditions, the computer automatically makes all bottles release the extinguishant into all areas at the same time.
On-Board Fire-Fighting Equipment
Figure 3 (Sheet 2 of 2)
TOTAL SYSTEM FLOOD
SWITCH/LIGHT
Used in the event of anticipated crash or emergency landing. When used before crash, commands computer:
FIRST PUSH: Opens all valves and arms all detonating circuits; illuminates ARMED amber lights in all switch/lights.
SECOND PUSH: Discharges all bottles simultaneously into all zones.
Internal impact switches command computer to perform both operations automatically on sensing crash impact, or, if system has been manually armed (FIRST PUSH), will discharge bottles automatically.

BOTTLE CONDITION
LIGHTS
Green: Good detonator circuits
Amber: Empty or low pressure

BELL
Rings in conjunction with red FIRE lights to warn of fire. Switch silences bell. If light is amber, indicates bell is OFF.

1. PUSH TO ARM
2. PUSH TO DISCH. OFF

TOTAL SYSTEM FLOOD ARMED
FLOOD ARMED

CL-600/CL-601/CL-604 − Optional Challenger Total-Flood Fire-Management System
Figure 4 (Sheet 2 of 2)
3. **Engine/APU Fire Controls**

   A. **General**

   The control and monitor panels are in the flight compartment. The APU FAULT panel is on the external surface of the aft fuselage on the pilot's side.

   B. **Engine Fire Control**


   (1) For the above Challenger models, in the flight–compartment, on the glareshield, push the L.H. ENG FIRE PUSH and R.H. ENG FIRE PUSH switch/lights. Refer to Figure 5.

   **NOTE:** This procedure stops the engine fuel, the hydraulics systems, electrical, and bleed air systems.

   (2) In the flight–compartment, on the IGNITION/ELECT PWR panel, set the BATTERY MASTER switch to the OFF position. Refer to Figure 7.

   C. **Engine Fire Control**

   CL–604, CL–605, CL–650

   (1) For the above Challenger models, in the flight–compartment, on the glareshield panel, push the LH ENG FIRE PUSH, and RH ENG FIRE PUSH switch/lights. Refer to Figure 6.

   **NOTE:** This procedure stops the engine fuel, the hydraulics systems, electrical, and bleed air systems.

   (2) In the flight–compartment, on the ELECTRICAL POWER panel, set the BATT MASTER switch to the OFF position. Refer to Figure 8 and Figure 9.

   D. **APU Fire Control**

   On the ground, the APU should stop automatically if a fire occurs. If it does not stop or if it is necessary to control the APU manually, do one of the two steps as follow:

   (1) In the flight–compartment, on the glareshield panel, push the APU FIRE PUSH switch/light. Refer to Figure 5 and Figure 6

   (2) On the external APU FAULT panel, push the APU STOP pushbutton. After the APU has shutdown, you must push the IND RESET pushbutton.
ENGINE SHUT DOWN

L.H. ENG FIRE PUSH
BOTTLE ARMED PUSH TO DISCH

BOTTLE ARMED PUSH TO DISCH

R.H. ENG FIRE PUSH

ENGINE SHUT DOWN

L.H. ENG FIRE PUSH

BOTTLE ARMED PUSH TO DISCH

R.H. ENG FIRE PUSH

APU FIRE PUSH

BOTTLE ARMED PUSH TO DISCH

EFFECTIVITY: A/C CL600 AND CL601−1A

EFFECTIVITY: A/C CL601−3A AND CL601−3R

CL−600/CL−601−1A/−3A/−3R − Engine/APU Fire Controls
Figure 5 (Sheet 1 of 2)
CL–600/CL–601–1A/–3A/–3R – Engine/APU Fire Controls

Figure 5 (Sheet 2 of 2)
ENGINE SHUT DOWN

LH ENG FIRE PUSH

APU FIRE PUSH

RH ENG FIRE PUSH

APU SHUT DOWN

BOTTLE 1 ARMED PUSH TO DISCH

BOTTLE ARMED PUSH TO DISCH

BOTTLE 2 ARMED PUSH TO DISCH

CL-604/CL-605/CL-650 – Engine/APU Fire Controls
Figure 6

EFFECTIVITY: ALL
CL−600/CL−601−1A/−3A/−3R – Electrical System Control Panels

Figure 7
ELECTRICAL POWER CONTROL PANEL

CL–604 – Electrical System Control Panel
Figure 8

EFFECTIVITY: ALL
CL–605/CL–650 – Electrical System Control Panel

Figure 9

ELECTRICAL POWER CONTROL PANEL

EFFECTIVITY: ALL
4. Electrical Control Panels and Battery Locations

This section shows the electrical system control panels. The section also shows the battery locations on the aircraft.

A. To isolate the electrical power:

CL−600, CL−601, CL−601−3A, CL−601−3R

(1) For the above Challenger models, do as follows, Refer to Figure 7:

(a) On the power management panel, set the AC POWER GEN 1, GEN 2 and APU switches to the OFF/RESET position.

(b) On the IGNITION/ELECT PWR panel, set the BATTERY MASTER switch to the OFF position.

B. To isolate the electrical power:

CL−604, CL−605, CL−650

(1) For the above Challenger models, do as follows, Refer to Figure 8 and Figure 9:

(a) On the ELECTRICAL POWER control panel, set the AC POWER GEN1, GEN2 and APU GEN switches and the BATT MASTER switch to the OFF position.

C. To disconnect main battery:

CL−600, CL−601, CL−601−3A, CL−601−3R

(1) For the above Challenger models, do as follows, Refer to Figure 10:

(a) On the IGNITION/ELECT PWR panel, set the BATTERY MASTER switch to the OFF position.

(b) Open the rear–fuselage equipment–bay door.

(c) Turn the battery connector handle counterclockwise to disconnect the battery electrical wires from the battery.

(d) Install protective covers on the electrical receptacles.
D. To disconnect main battery:

   CL–604

   (1) For the above Challenger models, do as follows, Refer to Figure 11:

      (a) On the ELECTRICAL POWER control panel, set the BATT MASTER switch to the OFF position.

      (b) Open the aft equipment compartment door.

      (c) Disconnect the electrical connectors from the battery.

      (d) Install protective covers on the electrical receptacles.

E. To disconnect main battery:

   CL–605 and CL–650

   (1) For the above Challenger models, do as follows, Refer to Figure 12:

      (a) On the ELECTRICAL POWER control panel, set the BATT MASTER switch to the OFF position.

      (b) Open the forward equipment compartment door.

      (c) Disconnect the electrical connectors from the battery.

      (d) Install protective covers on the electrical receptacles.
CL-600/CL-601–1A/–3A/–3R – Battery Locations
Figure 10 (Sheet 1 of 2)
CL–600/CL–601−1A/−3A/−3R – Battery Locations

Figure 10 (Sheet 2 of 2)
CL–604 – Main and Auxiliary Batteries
Figure 11

EFFECTIVITY: ALL
CL–605/CL–650 – Main and Auxiliary Batteries
Figure 12 (Sheet 1 of 2)
CL-605/CL-650 – Main and Auxiliary Batteries
Figure 12 (Sheet 2 of 2)
5. **Flammable Fluids and Gases**

Table 1 contains a list of all flammable fluids and gases carried on the aircraft. The table also gives the specifications or commercial grades and capacities. The locations of the reservoirs and tanks are shown. Refer to Figure 13 and Figure 14.

<table>
<thead>
<tr>
<th>CAPACITY</th>
<th>SPECIFICATION OR COMMERCIAL GRADES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CUBIC FEET</td>
<td>U.S. GALLONS</td>
</tr>
<tr>
<td><strong>FUEL SYSTEM WITHOUT FORWARD AND AFT FUEL TANKS</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>FUEL SYSTEM WITH FORWARD AND AFT FUEL TANKS</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>FUEL SYSTEM WITH FORWARD, AFT, AND TAIL FUEL TANKS</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>ENGINE OIL TANK (CL−600)</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>ENGINE OIL TANK (CL−601−1A, CL−601−3A, CL−601−3R, CL−604 and CL−604DX)</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>HYDRAULIC RESERVOIR</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>APU AND GENERATOR ADAPTOR OIL TANKS</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>IDG OIL SUMP</strong></td>
<td>—</td>
</tr>
<tr>
<td><strong>OXYGEN BOTTLE SYSTEM PRESSURE − 1800 psi</strong></td>
<td>49.8</td>
</tr>
</tbody>
</table>
CL–605/CL–650 – Flammable Fluids and Gases

Figure 14
6. Fuel System General Layout

The Challenger has a wet wing structure, sealed to make three isolated tanks. The two main fuel tanks are in the outboard wing sections and an auxiliary fuel tank is in the wing center section. Refer to Figure 15, Figure 16 and Figure 17. There can be one more tank installed in the fuselage tail cone.

The fuel system indication in the flight compartment is given.
CL–600/CL–601–1A/–3A/–3R – Fuel System Layout and Controls

Figure 15

AIRCRAFT RECOVERY MANUAL (PSP 620)
CL–600/601/601–3A/3R/604/605/650

EFFECTIVITY: ALL

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CL-604 – Fuel System Controls
Figure 16

EFFECTIVITY: ALL
CL–605/CL–650 – Fuel Systems Controls

Figure 17
7. Emergency Break-In Zone

**WARNING:** DO NOT TRY TO CHOP THROUGH THE WINDOWS. GO THROUGH THE EMERGENCY BREAK-IN ZONE. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS.

There are no break-in marks painted on the aircraft. It is very improbable that the passenger/crew entrance door, overwing emergency exit and the baggage compartment door will all be jammed or blocked. If it becomes necessary to make a force entry, the area shown will offer the least resistance. **Refer to Figure 18.**
WARNING
Do not attempt to chop through windows

Emergency Break-In–Zone
Figure 18
8. Tires

**WARNING:** DO NOT APPROACH HOT TIRES FROM THE SIDES. HOT TIRES CAN EXPLODE AND CAUSE INJURIES TO PERSONS. APPROACH HOT TIRES FROM THE FRONT OR REAR ONLY. IF YOU DO NOT DO THIS, YOU CAN SUFFER INJURIES.

If the wheels on the aircraft become hot (for example, because of hard braking or under-inflation), there is a possibility that the fusible plugs can melt. This will release the tire pressure quickly. It is important for persons not to approach the wheels from the sides. Approach suspected hot wheel assemblies from the front or rear to prevent injury if a tire explosion occurs. **Refer to Figure 1.**

9. Composite Material Fire Precautions

A. General

(1) With the new generation aircraft, composite materials are widely used. These materials are made of layers of fibres bonded together in a "criss–cross" pattern. Resins, epoxies and phenols are used as the bond agent.

B. Dangerous Effects of Free Fibers

(1) If an aircraft fire occurs, the bonding agents (resins, epoxies and phenols) can become not stable and break down. This releases dangerous gases into the air. Fire fighters and other personnel must avoid the downwind area of the fire, specially when they do not use self–contained breathing equipment. Not only dangerous gases are hazardous, but the fire also releases small particles of free fibers.

(2) When the fire is extinguished and the structure becomes cool, the bonding agents stop the release of these free fibers. However, the released free fibers continue to be dangerous and can become a long term problem. This is because of the conditions that follow:

- When the free fibers come in contact with fire, the fibers tend to break into shorter lengths and smaller diameters. This makes the free fibers light and easily airborne. The free fibers also absorb pyrolytic acid. This poisonous material is picked up from the burned materials. The smoke from the fire can carry the free fibers and send the contamination over a large area.

- Without correct protection, personnel can breathe in the free fibers and the free fibers can bond to a person’s respiratory system. The free fibers can also move to other internal organs and cause damage. The free fibers are very stable and there is no deterioration of the fibers in the body.

- The free fibers will burn the eyes.

- The ends of the fibers are very sharp. This will let them pass through clothing and skin. If you rub the affected area, you can cause dermatitis and medical treatment will be necessary.
C. Control of Free Fibers

(1) As soon as the fire fighting and medical work is complete, take steps to limit the spread of free fibers. This is important when you move the damaged aircraft.

(2) Treat the components that can release free fibers as follows:
   - Keep the materials wet with Aqueous Fire Fighting Foam (AFFF) or water. With the AFFF, wet the materials every six hours.

   **NOTE:** Light oil, clear liquid furniture wax, polyacrylic acid or strippable paint, are all good materials to contain free fibers. These liquids are not considered to be a problem to future investigations.

   - Move the damaged aircraft the minimum distance possible and keep it on paved surface when possible. This will make the removal of the contamination more efficient.

(3) All personnel that work in the free fiber contaminated area must wear disposable paper coveralls, heavy boots, thick leather gloves, goggles, and a dust mask. Paper coveralls and dust masks must be discarded when they leave the contaminated area.
1. Towing the Aircraft

CAUTION: THE NOSE WHEEL STEERING ARMING SWITCH MUST BE IN THE OFF POSITION WHEN PUSHING OR TOWING THE AIRCRAFT.

IF THE PASSENGER/CREW DOWNWARD OPENING DOOR IS OPEN WHILE THE AIRCRAFT IS BEING MOVED, DOOR SUPPORT CABLE MUST BE IN PLACE TO PREVENT DAMAGE TO THE DOOR.

THE AIR DRIVEN GENERATOR IS OPERATED MANUALLY OR BY A PYROTECHNIC SQUIB. PERSONNEL SHOULD STAY CLEAR OF AIR DRIVEN GENERATOR UNTIL SAFETY PIN IS INSTALLED.

A. General

When it is not possible to use the engines to move the aircraft, the aircraft must be pushed or towed. Attach a towbar to the lugs on the steering cuff of the nose landing gear main fitting. Refer to Figure 1. Rearward motion is controlled and stopped by the towing vehicle since the use of wheel brakes could lift the nose gear off the ground.

B. Towing Procedure

Refer to Figure 2 for the general arrangement for towing and aircraft turn radii.

C. Towing Procedure (With Towing Bridle)

− Equipment and Material

− Towing Bridle, Bombardier GSE Ref. No. 09–10–03 or GSE Ref. No. 09–10–08 (CL600 and CL601) (refer to ILLUSTRATED TOOL AND EQUIPMENT MANUAL)


− Door support cables (if required) – GSE Ref. No. 10–10–27
− Headset with microphone and lead (two required) – GSE Ref. No. 23–00–01
− Cord, headset extension – GSE Ref. No. 23–00–02

(1) Installation of Towing Bridle

CAUTION: DO NOT INSTALL THE WIRE ROPE ASSEMBLIES ON TOP OF THE BRAKE LINES OR WIRING HARNESS. MAKE SURE THAT ONLY THE LEATHER BINDING OF THE WIRE ROPE ASSEMBLIES TOUCHES THE MAIN LANDING GEAR. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO EQUIPMENT.

(a) Secure the wire rope assemblies around each main landing gear as follows:

1. When the aircraft is towed forward, put the wire rope assembly around the lower part of the main beam; Refer to Figure 3.

2. When the aircraft is towed rearward, put the wire rope assembly above the trailing arm link and below the axle of the main landing gear.

   NOTE: Loosen or remove the retaining clips sufficiently to insert the wire rope assembly between the landing gear and the brake lines and wiring harnesses.

(b) Secure both ends of each wire rope assembly to the appropriate anchor shackle.

   WARNING: PRIOR TO TOWING THE AIRCRAFT, CHECK THAT ALL BOLTS AND PINS ARE SECURE AND THAT THE WIRE ROPE ASSEMBLIES ARE NOT KINKED.

(c) Observe all safety precautions when the aircraft is towed (refer to paragraph E.).

(2) Removal of the Tow Bridle.

(a) Disconnect the wire rope assemblies from the applicable anchor shackles.

(b) Remove the wire rope assemblies from the main landing gear.

(c) Clean, lubricate, and store the tow bridle.

D. Ground Lock Pins

Refer to Figure 4 and Figure 6, for data on ground lock pins that are installed for safety during ground operations.

E. Towing Safety Precautions
WARNING: BE VERY CAREFUL WHEN YOU OPEN THE PASSENGER DOOR. IF THE CABIN IS PRESSURIZED AND THE DOOR IS OPEN, THE DOOR WILL OPEN SUDDENLY AND CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: ENSURE THAT NOSE WHEEL STEERING ARMING SWITCH ON PILOT’S FACIA PANEL IS OFF AND REMAINS OFF DURING TOWING OPERATION. TORQUE LINKS MUST NOT BE DISCONNECTED.

BEFORE TOWING AIRCRAFT, ALLOW AIRCRAFT GYROS TO STABILIZE. ENSURE THAT EITHER AC POWER IS OFF AND HAS BEEN OFF FOR 5 MINUTES OR THAT AC POWER IS ON AND HAS BEEN ON FOR 5 MINUTES.

A MINIMUM LOAD IS REQUIRED ON NOSE WHEEL BEFORE TOWING AIRCRAFT (REFER TO WEIGHT AND BALANCE MANUAL).

IF DOWNWARD OPENING PASSENGER/CREW ENTRANCE DOOR IS OPEN WHILE AIRCRAFT IS BEING TOWED, DOOR SUPPORT CABLES MUST BE IN PLACE TO PREVENT DAMAGE TO DOOR.

(1) Make sure that the main landing gear and nose landing gear ground lock pins are installed (refer to MAINTENANCE MANUAL, Chapter 10).

(2) Make sure that all the tires and the shock struts are correctly inflated (refer to MAINTENANCE MANUAL, Chapter 12).

CAUTION: TURNING THE NOSE WHEELS BEYOND 90 DEGREES FROM CENTRE WITH A TOWING BRIDLE OR TOW BAR COULD RESULT IN DAMAGE TO THE NOSE GEAR MECHANISM.

(3) Install the tow bridle (refer to paragraph C.(1)).

(4) Make sure that all ground equipment and other obstacles are removed from vicinity of aircraft.

CAUTION: UNEVEN DISTRIBUTION OF WEIGHT ON THE TWO CABLES COULD RESULT IN DAMAGE TO THE ENTRANCE DOOR.

(5) If the aircraft is towed with the entrance door open, safety the door off the ground with two support cables. Attach the eye ends to the top tension button in door frame. Connect the other end to the lower handrail post fitting on the door. Adjust cables for equal tension.

(6) Make sure that a person is in the flight compartment to apply the brakes.

(7) Switch BATTERY MASTER switch ON.
(8) Check the brake pressure gauge in the flight compartment to make sure there is sufficient brake pressure (1000 psi minimum). If the pressure is not sufficient, operate No. 2 hydraulic system electric motor-driven pump and No. 3 hydraulic system motor-driven pump 3A (refer to MAINTENANCE MANUAL, Chapter 12).

**NOTE:** A person must be in the flight compartment to monitor the brake pressure gauge throughout duration of the tow.

**CAUTION:** DURING TOWING, ONLY APPLY BRAKES IN AN EMERGENCY.

(9) Connect intercom system between driver of towing vehicle and operator of aircraft brakes (refer to MAINTENANCE MANUAL, Chapter 23).

(10) If in a congested area, position a person at each wing tip to ensure adequate distance from any obstruction in the vicinity of the aircraft.

(11) If the aircraft is moved in reverse, position a person at the tail to ensure adequate distance from obstruction.

(12) Remove chocks and release park brake.

(13) Commence to tow and limit speed to 5 MPH (8 KM/H).

**CAUTION:** IF AIRCRAFT IS PARKED WITH NOSE WHEELS NOT CENTERED THEY WILL RETURN TO CENTRE WHEN POWER IS APPLIED. THIS MAY CAUSE INADVERTENT MOVEMENT OF AIRCRAFT.

(14) On completion of the tow operation, make sure that the nose wheel is in the centered position. Apply the park brake, chock the wheels, disconnect the tow vehicle, remove the tow bar or tow bridle from the nose gear and park aircraft (refer to MAINTENANCE MANUAL, Chapter 10).

**NOTE:** In some case after towing, a difference in main landing gear shock strut extension may exist. Check that the shock struts are correctly serviced (refer to MAINTENANCE MANUAL, Chapter 12).
Towing Aircraft
Figure 1

EFFECTIVITY: ALL

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NOTE
Lesser steering angles require wider taxi strip for 180° turn.

Aircraft Turning Radii
Figure 2

EFFECTIVITY: ALL

SECTION 06
Page 6
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BEFORE THE AIRCRAFT IS TOWED, MAKE SURE THAT ALL THE BOLTS AND PINS ARE ATTACHED SAFELY. ALSO MAKE SURE THAT THERE ARE NO KINKS IN THE WIRE ROPE ASSEMBLIES. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING
BEFORE THE AIRCRAFT IS TOWED, MAKE SURE THAT ALL THE BOLTS AND PINS ARE ATTACHED SAFELY. ALSO MAKE SURE THAT THERE ARE NO KINKS IN THE WIRE ROPE ASSEMBLIES. IF YOU DO NOT DO THIS, YOU CAN CAUSE INJURIES TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION
MAKE SURE THAT THE WIRE ROPE ASSEMBLIES DO NOT TOUCH THE BRAKE LINES OR THE WIRING HARNESS. ALSO MAKE SURE THAT ONLY THE LEATHER BINDINGS OF THE WIRE ROPE ASSEMBLIES TOUCH THE LANDING GEAR. IF YOU DO NOT DO THIS YOU CAN CAUSE DAMAGE TO THE BRAKE LINES, THE WIRING HARNESS, OR THE LANDING GEAR.

Main Gear Towing
Figure 3
Main Landing Gear Ground Locking Pin

Figure 4

INTEGRATOR PLUGGER MUST BE FLUSH WITH OR BELOW HOUSING TO INDICATE RETRACTION ACTUATOR IS LOCKED INTERNALLY

LOCKING PIN HOLE EXPOSED

SPRING CLIP COVERING LOCKING PIN HOLE
Nose Landing Gear Ground Locking Pin
Figure 5

EFFECTIVITY: ALL
Air-Driven Generator Ground Safety Pin
Figure 6
Nose Wheel Steering Switch Location
Figure 7 (Sheet 1 of 2)
Nose Wheel Steering Switch Location

LANDING GEAR CONTROL PANEL

Nose Wheel Steering Switch Location
Figure 7 (Sheet 2 of 2)

EFFECTIVITY: ALL