



# Canadian Association of Rocketry

## Certified Rocket Inspector Program

### Overview

CAR has identified that the current understanding of RSO functions at an HPR launch consists of 2 separate and distinct roles. One is to inspect each and every rocket prior to flight, and the second is to supervise the active range. These two functions have very different mind and skill sets. To reflect these differences, CAR has separated the former RSO role into the Range Safety Officer and the Rocket Inspector roles.

The Rocket Inspector (RI) shall be appropriately qualified and certified to approve each and every rocket for flight. This will occur by proof of experience and knowledge of high power rocketry systems and regulations governing the launching of rockets. The **Certified Rocket Inspector Program** defines the safety program and the technical safety requirements for individuals acting as Rocket Inspectors in order to comply with Transport Canada's "Requirements for Launching High Power Rockets In Canada". It is needed to protect new members certifying to fly high power rockets, launch proponents, the general public and private property from hazards associated with failure of rocketry components and inexperience.

There are three Levels of Rocket Inspector, with each of the Levels allowing the Rocket Inspector to inspect rockets of increasing complexity. To progress through the 3 levels requires a flier to acquire the ability to inspect rockets prior to flight (Rocket Inspection) through an apprenticeship program. There are no multiple choice test formats that can prepare someone for the Rocket Inspector role. Hence, this program is, by design, the documentation of his or her experience.

Using the appropriate form, the apprentice RI will log the inspection of each rocket while being supervised by a qualified Rocket Inspector for the impulse or complexity of each rocket being inspected. Once the form has been completed, the apprentice RI then submits the form to CAR Headquarters along with the processing fee. The Chief RSO will sign-off the application form, and with that, the apprentice RI will receive a new membership card indicating their new Rocket Inspector Level.

It is in the design of this program that a certified Rocket Inspector, at a given level, should seldom inspect a rocket at his current impulse level (or lower). Rather he should seize the opportunity to observe and instruct an apprentice Rocket Inspector (or lower level RI) inspecting a rocket and sign-off that inspection on that inspector's Application Form. In this way, currently certified Rocket Inspectors can encourage others to also become certified and share the event load.

The official list of certified Rocket Inspectors is available from CAR Headquarters and can also be viewed online at CARweb, the Canadian Association of Rocketry's website – [www.canadianrocketry.org](http://www.canadianrocketry.org).

Use the **Rocket Inspector Application Forms**, available for download from CARweb, at [www.canadianrocketry.org](http://www.canadianrocketry.org), or from your local club's CAR Liaison, or write to CAR HQ to have one mailed to you.

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The relevant forms are:

- Rocket Inspector Level 1 Application Form
- Rocket Inspector Level 2 Application Form
- Rocket Inspector Level 3 Application Form
- Rocket Inspection Checklist

## Rocket Inspector Level 1

The RI Level 1 is certified to inspect simple, motor ejection rockets of H through L impulse inclusive, and is qualified to supervise RI Level 1 apprentices.

### Requirements

The applicant for Rocket Inspector Level 1:

1. must be CAR HPR Level 1 certified.
2. must have knowledge of the documents listed below in under **Knowledge**.
3. must have inspected, under the supervision of a Certified Rocket Inspector, a minimum of twenty (20) High Power Rockets, at least three (3) of which are of J, K, or L impulse.
4. must have performed two (2) Launch Control Officer (LCO) tours of duty at an active CAR-sanctioned HPR launch.
5. must be familiar with the CAR Launch Details form and the Rocket Inspector Checklist.
6. must submit a completed Rocket Inspector Level 1 Application Form to CAR HQ.

### Knowledge

The Rocket Inspector (RI) Level 1 shall have knowledge of the following documents:

- Aeronautics Act – Definitions; Transport Canada
- Canadian Aviation Regulations, Sections 602.43 / 602.44 / 602.45 ; Transport Canada

- "Requirements for Launching High Power Rockets in Canada"; Jan 4, 2000; Transport Canada
- "Authorization Requirements for the Use of Hybrid High Power Rocket Motors"; Transport Canada
- CAR High Power Rocketry Safety Code; Canadian Association of Rocketry
- The Explosives Act; Natural Resources-Explosives Division
- TRA High Power Rocketry Safety Code; Tripoli Rocketry Association, USA
- NAR High Power Rocketry Safety Code; National Association of Rocketry, USA

**Experience**

The Rocket Inspector (RI) Certification Levels attest to the individual's experience, as such the RI:

- will understand how to calculate center of pressure (CP) and center of gravity (CG) to determine whether a given rocket is stable in flight;
- can determine that the recovery system being inspected is appropriate for the size and type of rocket being flown;
- shall have used computer software programs to determine a rockets expected altitude, location of CP and CG;
- shall be able to recognize the best rocket motor for optimum performance and thrust computations.

## Rocket Inspector Level 2

The RI Level 2 is certified to inspect any L1, L2, or L3 Certification rocket, complex or otherwise, as well as any other rockets of H through L impulse, simple or complex.

### Requirements

The applicant for Rocket Inspector Level 2:

1. must have completed all the requirements for and be certified as a Rocket Inspector Level 1.
2. must be CAR HPR Level 2 certified.
3. must have a CAR Electronics Endorsement (or equivalent as determined by CRSO)
4. must have inspected a further minimum twenty (20) High Power Rockets, at least ten (10) of which Must be CAR HPR Level 3 impulse.
5. must have two (2) inspections of a complex design, (staged or clustered, any impulse).
6. must have five (5) inspections of rockets with electronic deployment.
7. must submit a completed Rocket Inspector Level 2 Application Form to CAR HQ.

### Knowledge

The Rocket Inspector (RI) Level 2 shall have knowledge of the following documents:

- All documents listed for Rocket Inspector Level 1, plus
- CAR HPR Level 1 – 3 Certification Program; Canadian Association of Rocketry
- CAR High Power Rocketry Level 4 Certification Program; Canadian Association of Rocketry
- TRA High Power Certification Program; Tripoli Rocketry Association, USA
- NAR High Power Certification Program; National Association of Rocketry, USA

### Experience

The Rocket Inspector (RI) Certification Levels attest to the individual's experience, as such the RI:

- will understand how to calculate center of pressure (CP) and center of gravity (CG) to determine whether a given rocket is stable in flight;
- can determine that the recovery system being inspected is appropriate for the size and type of rocket being flown;

- shall have the experience to recognize, if electronics are used for recovery systems, that the electronics are connected appropriately for the expected "G" loads and altitudes;
- shall have used computer software programs to determine a rockets expected altitude, location of CP and CG;
- shall be able to recognize the best rocket motor for optimum performance and thrust computations.

### Rocket Inspector Level 3

The RI Level 3 is certified to inspect any High Power Rocket, including CAR HPR Level 4 Certification rockets, and also including rockets, simple or complex, with installed impulse from H to O.

#### Requirements

The applicant for Rocket Inspector Level 3:

1. must have completed all the requirements for and be certified as a Rocket Inspector Level 2.
2. must be CAR HPR Level 3 certified.
3. must have inspected a minimum of three (3) CAR HPR Level 4 (M – O impulse) rockets.
4. must submit a completed Rocket Inspector Level 3 Application Form to CAR HQ.

#### Knowledge

The Rocket Inspector (RI) Level 3 shall have knowledge of the following documents:

- All documents listed for Rocket Inspector Level 1 and Level 2

#### Experience

The Rocket Inspector (RI) Certification Levels attest to the individual's experience, as such the RI:

- shall have the experience as described for RI Level 1 and RI Level 2, plus:
- shall be able to use calculate a calculation system using on-site weather data to determine appropriate launcher angle and direction to ensure that a ballistic descent will impact within the range's "sterile" recovery zone.

Current Revision: v1.1

Revision History:

Feb 13, 2005 - Ian Stephens, revision from original 2002 document

Apr 08, 2005 – Ian Stephens, continued editing for format and readability

Mar 01, 2006 – Shane Weatherill, revisions

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