

# ON-SCENE TRAFFIC ACCIDENT INVESTIGATORS' MANUAL

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Inspector, Traffic Branch  
Royal Canadian Mounted Police  
Province of British Columbia  
Canada

*With a Foreword by*

**R. J. Boyle**

*Director  
"Drinking Driver Counter Attack"  
Ministry of the Attorney General  
Province of British Columbia  
Canada*

This manual clearly outlines the steps to be taken in conducting an orderly, professional on-scene traffic accident investigation. Its practicality and specificity will be appreciated by all those charged with responsibility for investigating traffic accidents, interpreting the data, and presenting evidence based on scientific analysis.

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*Springfield • Illinois • U.S.A.*

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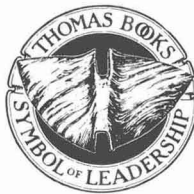
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*to Gertrude and Leo Sprenkle*

## FOREWORD

**H**AD Conan Doyle been creating his Sherlock Holmes in today's world, he might well have portrayed the great detective as a traffic accident investigator. The deductive talents, wide technical and scientific knowledge, combined with an acute understanding of human behavior are Holmesian skills applied by effective traffic accident investigators.

Nowhere are such skills more essential than at the scene of an accident. Many of the clues and much of the evidence has a short life span and if not quickly captured make an accurate reconstruction of the event almost impossible.

This manual will fill a gap in the published literature by addressing specifically and in depth "on scene" accident investigation. The author, Royal Canadian Mounted Police Inspector Robert Rivers, brings over twenty-five years of extensive police experience to this task. He has the practical knowledge gained from highway patrol duties, skills derived from operating in the "Training and Development" and the "Research and Planning" sections of the R.C.M.P. He is currently the officer in charge, Traffic Section, "E" Division, R.C.M.P., which covers the province of British Columbia. His professional training includes graduation from the Northwestern University Traffic Institute, studying "On Scene Traffic Investigation," "Technical Accident Investigation," and "Police Management."

Bob Rivers' professional qualifications are happily joined with a dedication to high standards and a demonstrated ability in effective highway safety programs.

I am confident that this manual will be of great worth to front line accident investigators — those "On Scene."

Ron J. Boyle

## PREFACE

**O**N-SCENE traffic accident investigation is perhaps the most important part of the entire traffic accident investigation process. Because of its importance, this traffic accident investigation manual has been prepared to meet the needs of the investigator who is responsible for carrying out an investigation at the scene. Notwithstanding, the manual's value is not with this investigator alone. It will be of similar value to others who must have a good knowledge of on-scene traffic accident investigation procedures and the evidence that should normally be available. These persons include not only the police, but also lawyers, judges, private investigators, insurance adjusters, accident reconstructionists and instructors and students involved in traffic accident investigation training programs.

The on-scene investigator must be aware of his responsibilities and how to properly fulfill them from the time he is advised of the occurrence of an accident to the time he completes his report based upon his investigation. Unless he knows what type of evidence to look for and how to recognize, interpret, gather and record evidence such as skid marks, tire marks, yaw marks, roadway and vehicle marks and damages; and environmental, human and mechanical factors, etc., he will be unable to carry out a complete and thorough investigation. If a complete and thorough investigation is not carried out; if a piece of evidence is not noted, gathered or recorded or is misinterpreted, improper conclusions may be arrived at regarding the accident cause. This text is intended to meet these requirements.

Mathematical equations and examples are completed in both United States (Imperial) and metric measurement systems (SI). In this way, it will also meet the needs of those countries that have been using the metric system for a considerable period of time as well as those which have recently converted to the metric system.

Many published books and papers have been studied in the research and preparation of this manual. A bibliography lists several of these works.

The contents of this *On-Scene Traffic Accident Investigators' Manual* are not intended to supercede policies or legislation that are or may be in effect in any jurisdiction. The views expressed herein are not necessarily those of the Royal Canadian Mounted Police.

I wish to acknowledge my gratitude to J.R.E. D'Aoust, Traffic Accident Analyst, for reviewing and providing helpful and detailed suggestions regarding the preparation of those chapters pertaining to field sketches, maps and diagrams and speed estimates.

R.W.R.

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**ON-SCENE  
TRAFFIC ACCIDENT  
INVESTIGATORS'  
MANUAL**



## *Chapter 1*

# **INTRODUCTION TO ON-SCENE TRAFFIC ACCIDENT INVESTIGATION**

**1.001** On-scene investigation is perhaps the most important part of the whole traffic accident investigation process. The success or failure of all other segments, e.g., follow-up investigation and accident reconstruction, depends almost entirely upon the evidence gathered during the on-scene investigation.

### **PERSONNEL SELECTION AND TRAINING**

**1.002** An on-scene investigator should:

- a. Have a particular aptitude for this type of investigation.
- b. Have a good basic knowledge of accident causes and investigational methods and techniques, and have at least a general knowledge of accident reconstruction principles.
- c. Further his expertise and competency by taking training in advanced accident investigation techniques and undertaking self-study through various literature available to him.

### **INVESTIGATORS' RESPONSIBILITIES**

**1.003** The responsibilities of an on-scene traffic accident investigator include:

- a. Caring for the injured.
- b. Protecting persons and property from further injury, damage or loss.
- c. Gathering evidence at the scene, including:
  - (i) interviewing drivers, victims and other witnesses;
  - (ii) examining for physical evidence, e.g., highway marks and damage and environmental factors, and
  - (iii) conducting mechanical inspections of vehicles involved.
- d. Recording facts including the taking of notes, statements, scene measurements and photographs.

### **COLLECTING FACTS AND INFORMATION**

**1.004** An investigator should gather facts and information that will:

- a. Determine the cause of the accident.
- b. Provide information that will assist in accident prevention including *Engineering*, *Enforcement* and *Education* programs.
- c. Provide evidence for the prosecution in the event there has been a violation of law.
- d. Meet the requirements of accident report completion.
- e. Provide sufficient information to meet the requirements of follow-up investigation and accident reconstruction.

### **OBJECTIVES OF AN ON-SCENE INVESTIGATION**

- 1.005** An investigation should satisfy the requirements of determining:
- a. WHAT happened, i.e., the type of accident.
  - b. WHERE the accident occurred.
  - c. WHEN the accident occurred.
  - d. WHY the accident occurred, e.g., violation of law, engineering defects, etc.
  - e. WHO was involved.

### **INVESTIGATORS' INVENTORY**

**1.006** A vehicle used for on-scene traffic accident investigation must be equipped in all respects to meet the various types of emergency situations and investigational requirements that might arise. An investigator should be trained and totally familiar with the proper use of this equipment. Equipment should be examined frequently and be well maintained. (See Fig. 1-1).

<i>Axe</i>	Single blade, head type
<i>Blankets</i>	Minimum of two, disposable type
<i>Broom</i>	Push type with heavy fiber bristles
<i>Camera</i>	Complete with necessary equipment, e.g., tripod, extra film, flash equipment, etc.
<i>Carrying Cases</i>	For camera and camera supplies, measuring tapes, traffic cuffs and vests, flares, fuses, etc.
<i>Clinometer</i>	For measuring grades
<i>Clipboard</i>	Portable type complete with light and plastic cover for rain
<i>Coveralls</i>	Suitable for conducting mechanical inspections on-scene
<i>Crayons</i>	Yellow color, lumberman's type, for marking positions of vehicles and other evidence
<i>Dash Pad</i>	For dash of vehicle, complete with light
<i>Communications Systems</i>	Radio communications system for vehicle and a public address system
<i>Envelopes</i>	For protecting evidence, e.g., paint chips.
<i>Fire-extinguisher</i>	Multi-purpose, dry chemical type
<i>First-Aid Kit</i>	Type and supplies dependent upon availability of other emergency services, e.g., ambulance
<i>Flashlights</i>	At least two, equipped with traffic wands
<i>Forms</i>	As required by departmental policies and legislation, e.g., statements and note-taking, field investigations, accident reports, inventory, etc.
<i>Jack</i>	Axle type for lifting vehicles in emergencies when bumper jack is not adequate
<i>Knife</i>	Sharp knife for cutting seat belts, clothing, etc.
<i>Lights, vehicle</i>	Emergency flashing lights; roof and side-mounted flood lights
<i>Light, spot</i>	Permanent mounted or portable pistol-grip spot light
<i>Measuring Devices</i>	a. Tapes b. Wheel c. Clinometer — for measuring grades and superelevations
<i>Paper</i>	Plain bond and graphic for preparing field sketches
<i>Pencils</i>	
<i>Pry Bar</i>	
<i>Safety Vests</i>	
<i>Shovel</i>	
<i>Signs</i>	Warning type signs
<i>Tow Cable</i>	
<i>Tire Pressure Gauge</i>	
<i>Tire Tread-depth Gauge</i>	
<i>Traffic Cones</i>	
<i>Traffic (Arm) Cuffs</i>	
<i>Traffic Template</i>	

Figure 1-1. Investigators' inventory.

## Chapter 2

# THE ACCIDENT

### ACCIDENT DEFINED

2.001 An accident is defined as “That occurrence in a *sequence of events* which usually produces unintended injury, death or property damage.”<sup>1</sup>

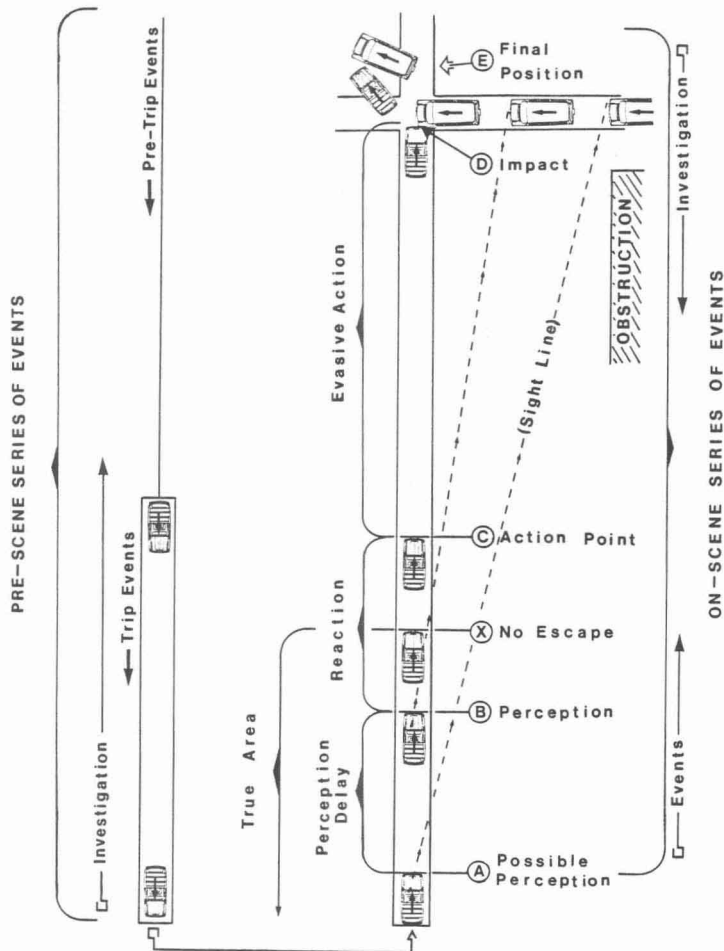


Figure 2-1. Series of events. Source: *Traffic Accident Investigators' Handbook* by Rivers. Courtesy Charles C Thomas, Publisher, Springfield, Illinois.

## SERIES OF EVENTS

2.002 Each traffic accident consists of two sets of events.<sup>2</sup>

1. *Pre-scene series of events.* The events that lead up to the driver's point of possible perception of a hazard.
2. *On-scene series of events.* The events that occur within the *On-scene Area* including the point of possible perception.

2.003 The pre-scene series of events can be further divided.

1. *Pre-trip events.* The events that occur, including situations relative to the driver and vehicle that exist, before the trip is started, e.g., driver inexperience, impairment by alcohol or drugs, vehicle defect, overload, etc.
2. *Trip events.* The events that occur or situations that arise after the trip starts and lead up to the point of possible perception, e.g., driver stopping for a meal or coffee, fatigue, illness, consumption of alcohol or drugs, erratic driving; vehicle mechanical failure, view obstructions, load falling from vehicle, etc.

2.004 On-scene series of events include:

- a. *Point of possible perception.* The place and time at which a *normal* person could perceive a hazard.
- b. *Perception Delay.* The time involved from the point of *possible perception to the point of actual* perception. When perception is not immediate, a perception delay of 0.75 seconds may be used for investigation purposes.
- c. *Perception Distance.* The distance travelled during perception delay.
- d. *Point of Perception or Actual Perception.* The point where a situation such as a hazard is comprehended or perceived as a hazard.
- e. *Reaction.* The voluntary or involuntary response to a hazard or other situation that has been perceived.<sup>3</sup> (See also paragraph 4.001.)
- f. *Reaction Time.* The length of time from when a person perceives a given situation as being a hazard to when he reacts to his perception. When a person's reaction time is unknown, use 0.75 seconds for investigation purposes. (See also paragraph 4.001)
- g. *Reaction Distance.* The distance travelled during reaction time. (See also paragraph 4.001.)
- h. *Action Point.* The action point follows reaction and is the place where a person puts into action his decision based on his perception of a hazard, such as braking or steering.
- i. *Evasive Action.* Action or combination of actions taken, e.g., steering, braking, etc., to avoid a collision or other hazardous situation.
- j. *Evasive Action Distance.* The distance travelled after the action



point to where the traffic unit stops by itself or otherwise to avoid a collision, or to the point of impact.<sup>4</sup>

- k. *True (Safe) Area*. That area leading up to the point of no escape during which evasive action could be initiated in order to avoid a collision.<sup>5</sup>
- l. *Point of No Escape*. The place and time after or beyond which the accident cannot be prevented by a particular traffic unit.<sup>6</sup>
- m. *Encroachment*. Entering or intruding into the rightful path or area of another traffic unit.
- n. *Point of Impact*. The place where a traffic unit strikes another traffic unit or some other object, or overturns.
- o. *Primary Contact*. The first contact between two traffic units or a traffic unit and another object, or a vehicle's first contact with a highway surface during an overturn.
- p. *Engagement*. The penetration of one traffic unit into another traffic unit or object during collision.
- q. *Maximum Engagement*. The point of a traffic unit's maximum penetration into another traffic unit or object during collision.
- r. *Disengagement*. The separation of traffic units or a traffic unit and other object after maximum engagement.
- s. *Secondary Contacts*. A *secondary contact* occurs when a vehicle disengages, rotates and strikes an opposing vehicle a second time. A *post-secondary contact* is where a vehicle disengages in a secondary contact and strikes a third vehicle.
- t. *Final Position*. The location where a traffic unit comes to rest after collision. In determining the final position, it is important to learn whether the vehicle stopped at the position at which it is found or whether it had been driven or moved to that position after the collision.

**2.005** Each traffic unit (road vehicle or a pedestrian<sup>7</sup>) involved in an accident has its own *series of events*. Each unit's series of events must be investigated separately. Drivers and witnesses generally describe events forward leading up to the result. The investigator, however, must start with the result and investigate back through the events as far as necessary to determine where, when, how and why the accident occurred.