



TRANSPORTATION SAFETY SERVICES

Commercial Vehicle Enforcement Branch



THERMAL IMAGING

Thermal Imaging Unit

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PREFACE

In 2004 Alberta Transportation, Commercial Vehicle Enforcement Branch undertook a pilot project of conducting thermal imaging observations on commercial vehicles capable of 4500 kilograms or more at various locations throughout Alberta.

This pilot project was undertaken following the McDermid Report (2004) Recommendations which stated “Take advantage of advances in technology provided the objectives are directly related to improving road safety.”

Assigned Transport Officers were deployed with a demonstration unit in 2004/2005 (March 2004 to January 2005) and utilized the equipment provided by Intelligent Imaging Systems from Edmonton, AB

From the results of the pilot project Alberta Infrastructure & Transportation, Commercial Vehicle Enforcement Branch has purchased thermal imaging equipment in 2007 and it is currently being deployed by 9 Transport Officers throughout the Province of Alberta.

This document will outline various aspects of the thermal imaging system.

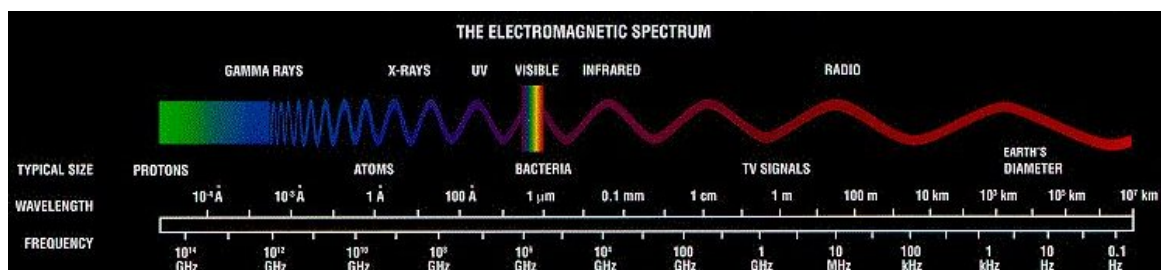
What is Thermal Imaging?

Thermography is the use of an infrared imaging and measurement camera to "see" and "measure" thermal energy emitted from an object.

Thermal, or infrared energy, is light that is not visible because its wavelength is too long to be detected by the human eye; it's the part of the electromagnetic spectrum that we perceive as heat. Unlike visible light, in the infrared world, everything with a temperature above absolute zero emits heat. Even very cold objects, like ice cubes, emit infrared. The higher the object's temperature, the greater the IR radiation emitted.

Infrared allows us to see what our eyes cannot. Infrared thermography cameras produce images of invisible infrared or "heat" radiation and provide precise non-contact temperature measurement capabilities. Nearly everything gets hot before it fails, making infrared cameras extremely cost-effective, valuable diagnostic tools in commercial vehicle enforcement applications.

High definition (or high resolution) thermal imaging refers to the fine detail and clarity of a thermal image. This means it contains a large number of pixels per unit of area. In this case, a thermal imaging camera taking a high definition photo means you will find smaller problems at greater distances. You can find significant problems that could be missed with a lower resolution thermal imaging camera. More pixels mean greater temperature measurement accuracy, particularly for small objects.



Mobile Thermal Imaging Overview

Commercial Vehicle Enforcement's Thermal Imaging Units are custom designed to perform inspections on commercial vehicles while providing the operator with a comfortable, climate controlled environment. These units are capable of performing brake inspections on moving commercial vehicles.

The Thermal Imaging Units can be moved to multiple locations and have multiple uses. Weather **does not** affect the operational ability of the Thermal Imaging Units. The following list is a sample of the potential uses for these units:

1. Commercial Vehicle Inspection

- Malfunctioning brakes
- Overheated brakes
- Overheated bearings
- Under-inflated tires
- Retread separation
- Overloaded units
- False compartment identification

2. Dangerous Goods Inspection and Disaster Response

- Emergency response
- Fire source detection
- Cargo tank profiling (fluid levels & voids that contain fluid)
- Spill zone detection

3. Law Enforcement Inspection

- Search and Rescue
- Cargo Profiling

Samples of Thermal Imaging

Below you will find several examples of brake defects.



Cold center – no brake heat



Axle #1 – Service Rig – no brake heat

Samples of Thermal Imaging



Notice the white hot from the far tire



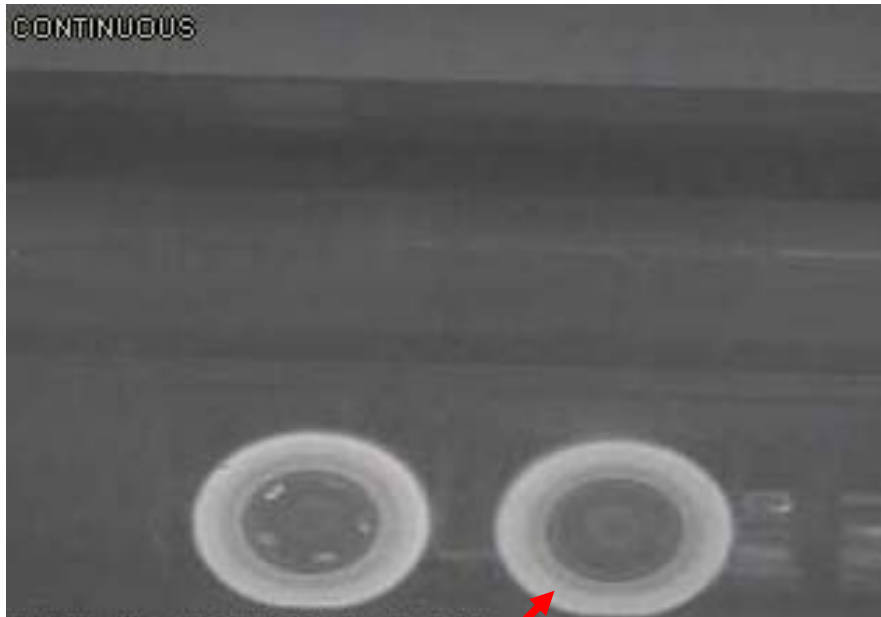
This is the color image from the above example.

While preparing for inspection this tire was so hot that it failed.

The wheel bearings were identified as the cause.

If this had happened on the highway the results could have been catastrophic!

Samples of Thermal Imaging



No brake heat



C.V.E.B. Thermal Imaging Equipment

C.V.E.B. mobile thermal imaging unit consists of:

- 3 Custom designed vans
- Color & Thermal Camera (3 mounting options)
- Thermal Imaging System and Software
- Inspection Documentation System
- Workstation
- Monitors
- Power Supply and Management System
- UHF Radio System (including portable radio)



L to R: Chief Transport Officer Steve Callahan; Rob Sapinsky, Thermal Imaging Coordinator; Fred Ko, Intelligent Imaging Systems.

Thermal Imaging Unit Deployment

Commercial Vehicle Enforcement Branch deploys the 3 Thermal Imaging Units at selected locations throughout Alberta. The use of this technology allows for pre-screening of commercial vehicles and identifies serious safety defects ahead of an actual inspection therefore, selecting vehicles that may be a hazard on the highways.

Commercial Vehicles are screened as they enter a site location. Thermal Imaging Operators then notify an interceptor of vehicles that appear to have problems.

Once a vehicle is identified the interceptor will direct it to an area where team/s of officers are assigned to conduct the appropriate level of Commercial Vehicle Safety Alliance inspection (Level I, II or III).

How are we doing?

- Our Thermal Imaging Units were placed into service on May 15, 2007. The results have confirmed that strategic deployment of Thermal Imaging to assist Transport Officers and police agencies in identifying commercial vehicles with mechanical defects is assisting to make our highways safe.
- In 2008 Alberta's Thermal Imaging Program was the recipient of the Transportation Minister Award for technical innovation.
- In 2010 Alberta's Thermal Imaging Program was the recipient of the national award for program operation from the Intelligent Transportation Systems Society of Canada.

Thermal Imaging Team

Alberta's Thermal Imaging Team currently consists of 3 equipped Thermal Imaging Units and trained operators which are from strategic locations throughout Alberta. Thermal Imaging Operators are required to successfully complete an extensive training program which includes theory and practical evaluations.