TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test Of: Crowcon Detection Instruments Ltd.
Gasman 2

To: F.C.C. Part 15 Subpart C: 1998
(Intentional Radiators)
Section 15.231

Additional Requirements Only

Test Report Serial No:
RFI/EMCB1/RP40407C

This Test Report Is Issued Under The Authority Of Brian Watson Technical Director: 	**Checked By:** 
Tested By: 	**Release Version No:** **PDF01** .....
Issue Date: 25 May 2000	**Test Date: 12 May 2000**

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Test Of: **Crowcon Detection Instruments Ltd.**
Gasman 2
To: **F.C.C. Part 15: 1998 Subpart C (Intentional Radiators) Section 15.231**

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1. Client Information

Company Name:	Crowcon Detection Instruments Ltd
Address:	2 Blacklands Way Abingdon Business Park Abingdon Oxfordshire OX14 1DY
Contact Name:	Mr P Basham

2. Equipment Under Test (EUT)

The client has supplied the following information (with the exception of the Date of Receipt):

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	Crowcon Detection Instrument Ltd
Model Name or Number:	Gasman 2 (Toxic Gas Detector)
Unique Type Identification:	None stated by client
Serial Number:	None stated by client
Country of Manufacture:	UK
FCC ID Number:	Not applicable
Date of Receipt:	12 January 2000

2.2. Description Of EUT

The equipment under test is a hand held / body worn gas detector with a low power 418 MHz transmitter.

2.3. Modifications Incorporated In EUT

The client has declared that the EUT has not been modified from what is described by the Model Name and Unique Type Identification stated above.

2.4. Additional Information Related To Testing

Power Supply Requirement:	Internal battery supply of 4.5 V
Intended Operating Environment:	Light Industry and Heavy Industry
Weight:	200 grams
Dimensions:	130 mm x 56 mm x 27 mm
Interface Ports:	None

2.5. Support Equipment

No support equipment was used to exercise the EUT during testing.

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 15 Subpart C:1998 (Intentional Radiators). Section 15.231. (Periodic Operation within the Band 40.66 to 40.70 MHz and above 70 MHz). Additional requirements Only.
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices: Digital Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (1992)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.3. Definition Of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During the test the EUT was operated by an internal battery supply of 4.5 V.

5.2. Operating Modes

The EUT was tested in the following operating mode:

- Alarm Mode.

The reason for choosing this operating mode was that it was defined by the client as being likely to be the worst case with regards EMC.

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

Standalone.

The reason for choosing this configuration was that it was defined by the client as being likely to be the worst case with regards EMC.

6. Summary Of Test Results

Range Of Measurements	Specification Reference	Compliancy Status
Electric Radiated Field Strength Fundamental frequency (Alarmed Mode)	C.F.R. 47 Part 15.231(b): 1998.	Complied
Measurement of Duty Cycle to Establish Average Field Strength	C.F.R. 47 Part 15.231(b): 1998.	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire. RG26 5RQ. England.

7. Measurements, Examinations And Derived Results

7.1. General Comments

7.1.1. This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

7.1.2. The measurement uncertainties stated were calculated in accordance with the requirements of NAMAS Document NIS 81 with a confidence level of 95%. Please refer to Section 8 for details of measurement uncertainties.

7.2. Test Results For Radiated Emissions

7.2.1. Electric Field Strength Measurements: Fundamental Emission: Alarmed Mode

7.2.1.1. The client has stated that the transmitter frequency for the EUT was 418 MHz.

7.2.1.2. The following table lists the measurement of the fundamental emission in the worse case antenna polarisation, using a Peak detector function (results incorporate antenna factors and cable losses):

Frequency (MHz)	Ant. Pol.	Peak. Level (dBmV/m)	Av. Limit (dBmV/m)	Margin (dB)	Result
418.069	Vert.	81.4	80.3	N/A	Complied

7.2.2. Duty Cycle to Establish True Average Field Strenght

7.2.2.1. A measurement of the transmitted signal was measured to determine the average radiated field strength level from the measured Peak field strength level stated above. The EUT was operated as intended, in a continuous transmit mode of operation. The test receiver was set to measure the timing characteristics of the measured signal, and this enabled the duty cycle to be determined.

7.2.2.2. The following table lists the time for the transmitters on and off state.

Time On (mS)	Time Off (mS)	Duty Cycle (%)
52.8	53.3	0.498

7.2.2.3. Graphical plots of the timing characteristics of the transmitter can be seen in Appendix 2 of this test report.

7.2.2.4. The calculated duty cycle was applied to the measured Peak value to obtain the true Average field strength level.

7.2.2.5. The true Average level was calculated as follows.

Duty Cycle: 50%.
Measured Peak Level: 81.4dBuV/m (11749uV/m).
50% of 11749: 5875uV/m (75.3dBuV/m).

Therefore the calculated true Average field strength level is 75.3 dBuV/m.

8. Measurement Uncertainty

8.1. Company Policy, as based on the NAMAS Accreditation Standard, M10, paragraph 12.11 (o), states that Test Reports shall include estimated uncertainty of the calibration or test result (this information need only appear in test reports and test certificates where it is relevant to the validity or application of the test result, where a client's instructions so require or where uncertainty affects compliance to a specification or limit).

8.2. The global uncertainties have been calculated in accordance with NAMAS NIS 81 (Edition 1, May 1994) as follows:

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Radiated Electric Field Strength Emissions	30 MHz to 1000 MHz	95%	+/- 4.9 dB
Duty Cycle Measurement	418 MHz	95%	+/- 0.12 %

8.3. Measurement uncertainties have been applied in accordance with NAMAS document NIS 81 (edition 1, May 1994), and in the absence of any specification criteria, guidance, or code of practice, compliance has been judged on the basis of shared risk.

8.4. In the case of emissions tests, the measured value of the disturbance from the product sample shall be compared directly with the limits. If the measured value is equal to or less than the limit the product is deemed to pass the test.

8.5. In the case of immunity tests, the equipment is deemed to pass the test if it fulfils the stated performance criteria at the required or a higher severity level. The measurement uncertainty has been taken into account in the calibration procedures stated in the relevant basic standard.

8.6. The methods used to calculate the above uncertainties are in line with those used for calibration laboratories contained in NAMAS document NIS 3003 Edition 8 “The Expression of Uncertainty and Confidence in Measurement” May 1995, which align with international recommendations “Guide to the Expression of Uncertainty in Measurement” ISO/IEC/OIML/BIPM (Prepared by ISO/TAG 4: January 1993).

Appendix 1. Test Equipment Used

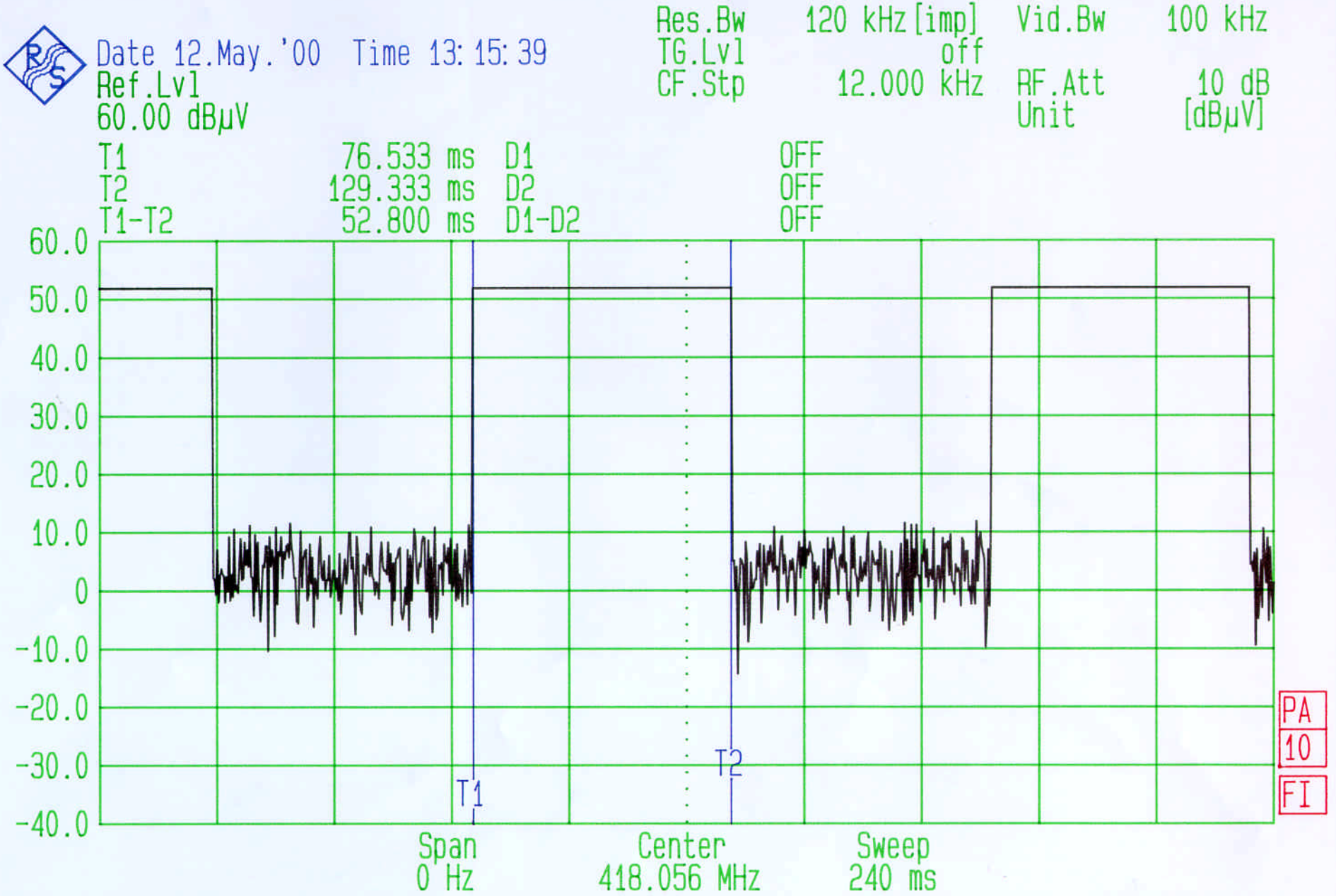
Instrument	Manufacturer	Model	RFI No.
OATS Positioning Controller	R & S	HCC	A276
Antenna	Chase	CBL6111B	A1039
Cable	Rosenberger	UFA 210A-1-0788-50x50	C322
Test Receiver	R & S	ESBI	M088
Receiver	R & S	ESVP	M002
Spectrum Monitor	R & S	EZM	M003
Turntable Controller	R.H.Electrical Services	RH351	M173
Receiver	R & S	ESBI	M090

NB In accordance with NAMAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Graphical Test Results

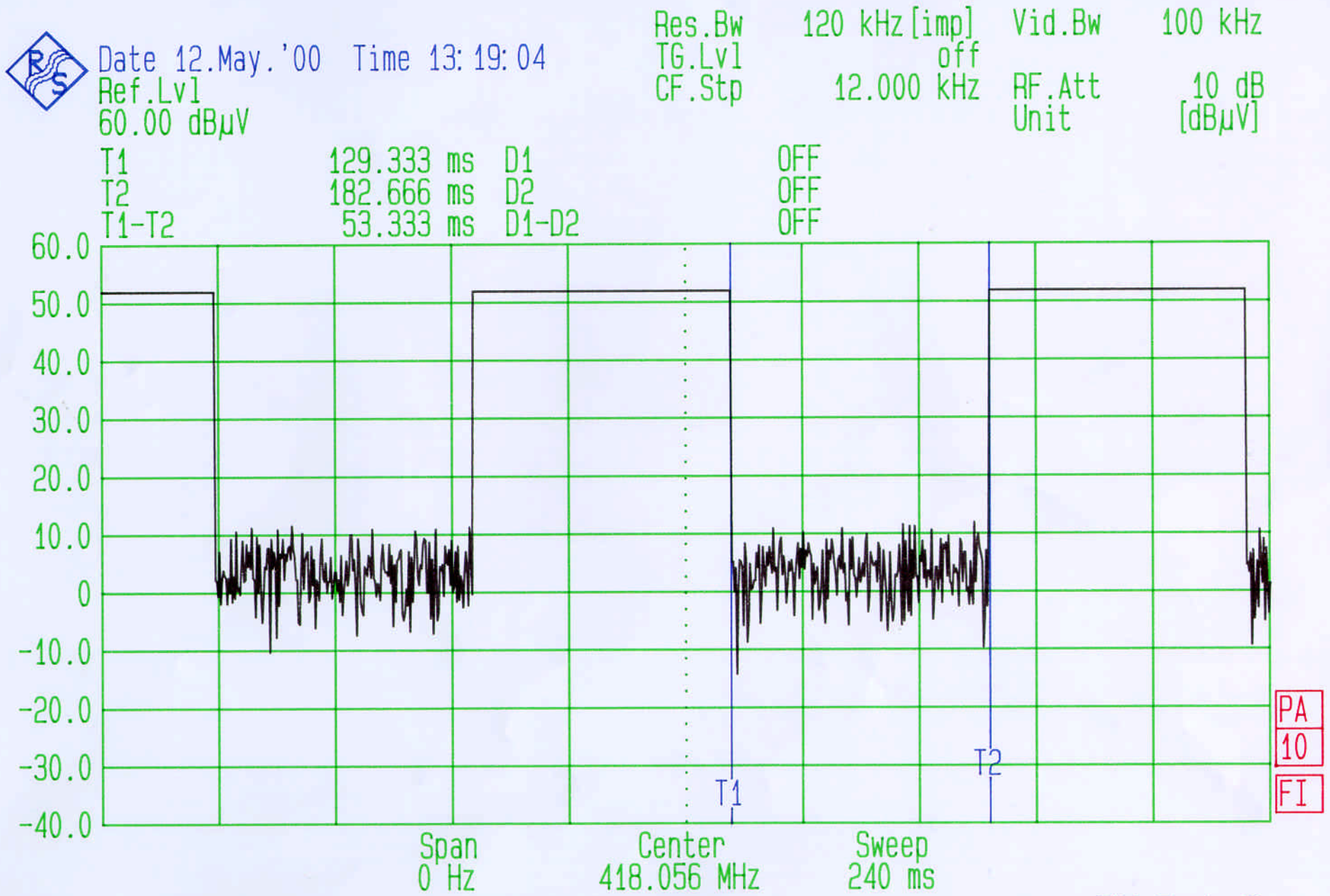
This appendix contains the following graphs:

Graph Reference Number	Title
GPH\40407\200	Duty Cycle Calculation. Transmitter On
GPH\40407\201	Duty Cycle Calculation. Transmitter Off



Duty Cycle Measurement. Tested by RFI for Crowcon.
T1/T2: Transmitter On Cycle

FCC Part 15
GPH/40407/200



Duty Cycle Measurement. Tested by RFI for Crowcon.
T1/T2: Transmitter Off Cycle

FCC Part 15
GPH/40407/201