

TYPE OF EXHIBIT: OPERATIONAL DESCRIPTION

FCC PART: 2.983 (d) (1,2,3,4,5,6,10,11)

MANUFACTURER: RITRON, INC.
505 West Carmel Drive
Carmel, IN 46032

MODEL: DTX-154

TYPE OF UNIT: VHF-FM Transceiver

FCC ID: AIERIT12-150

DATE: September 15, 1999

This exhibit includes a description of the DTX-154 along with some of the items required by FCC part 2.983 (d). The items of part 2.983 (d) not included here exist as separate exhibits which are a part of this type acceptance application.

The DTX-154 is a VHF two-way radio designed for either voice or data transmission in the frequency range of 136 to 174 MHz. The deviation can be adjusted so that operation on either 12.5 kHz or 25 kHz channels is possible. The maximum power output is 6 watts. The device is designed for an external power supply, whose voltage can be either 7.5 VDC or range from 11 to 15 VDC depending upon model. A more detailed description of the device, including specifications, theory of operation, and input/output definition can be found in the user/maintenance manual, which is a separate exhibit.

TYPE OF EXHIBIT: TYPES OF EMISSION
FREQUENCY RANGE
OPERATING POWER VALUES
MAXIMUM POWER RATING

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EMISSION TYPES:

12.5 kHz Channel Spacing

11K0F3E

11K0F1D

25 kHz Channel Spacing

16K0F3E

FREQUENCY RANGE

136 to 174 MHz

OPERATING POWER VALUES

1 to 6 watts

Power is controlled by adjusting the bias voltage on the PA stage of the RF power module. This voltage typically varies between 1.5 and 3 volts. Typical values are shown in the DC voltage chart which follows.

MAXIMUM POWER RATING

6 watts

TYPE OF TEST: DC VOLTAGE CHART

FCC PART: 2.983 (d) (5)

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TEST RESULTS:

Nominal Supply Voltage = 7.5 VDC

Frequency (MHz)	Output Power (W)	Final Stage Voltage (VDC)	Final Stage Current (IDC)	Control Voltage (VDC)
148.025	1.0	7.17	0.66	1.42
	2.0	7.08	1.00	1.68
	3.0	6.99	1.32	1.90
	4.0	6.93	1.56	2.13
	5.0	6.85	1.86	2.67
	6.0	6.78	2.11	3.50
161.000	1.0	7.14	0.76	1.62
	2.0	7.04	1.12	1.87
	3.0	6.97	1.40	2.09
	4.0	6.91	1.61	2.29
	5.0	6.85	1.84	2.59
	6.0	6.78	2.07	3.09
173.975	1.0	7.15	0.75	1.72
	2.0	7.04	1.00	1.93
	3.0	6.99	1.24	2.18
	4.0	6.95	1.47	2.48
	5.0	6.88	1.69	3.05
	6.0	6.80	1.97	4.00

TYPE OF EXHIBIT: CIRCUIT DESCRIPTION:
SPURIOUS RADIATION SUPPRESSION
MODULATION LIMITING
POWER LIMITING

FCC PART: 2.983 (d) (11)

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SPURIOUS RADIATION SUPPRESSION CIRCUITRY

Occupied Bandwidth

The occupied bandwidth of the transmitted signal is controlled by a combination of modulation limiter (described below) and clipper filter. The limiter is followed by a five pole active filter formed around IC310B and IC310C. This filter is of quasi-raised cosine design and removes high frequency audio components either from the input signal or from the limiting process itself.

Transmitter Spurious

The voltage controlled oscillator in the unit operates at the carrier frequency, thus no sub-harmonics of the carrier exist. The type of synthesizer used (fractional-N) along with a well designed synthesizer loop filter ensure that synthesizer reference spurs are well suppressed.

The harmonics of the transmitter carrier are attenuated by an Elliptic RF lowpass filter formed around a L115 and L116 and capacitors C169 through C173.

MODULATION LIMITING CIRCUITRY

The transmitter modulation is limited by passing the audio signal to be transmitted through an amplitude limiter based around operational amplifier, IC310A, on the loader board. This device is allowed to be driven to its output voltage limits which provides a very stable and repeatable clamp on its output signal amplitude.

POWER LIMITING CIRCUITRY

The output power is limited and controlled by setting the voltage on the Vgg pin of the RF PA module. This pin sets the bias voltage of the driver stage internal to the module. The upper voltage limit of this pin is limited to 3.6 volts by the 5 volt limit of the power control logic IC and the voltage divider which follows. When operated at the specified supply voltage, the unit is not capable of exceeding the rated output power limit.

TYPE OF EXHIBIT: CIRCUIT DESCRIPTION:
FREQUENCY DETERMINING AND STABILIZING

FCC PART: 2.983 (d) (10)

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The frequency stability of the unit is solely determined by the frequency stability of the master reference oscillator, Y101, located on the RF board. Y101 is a voltage controlled temperature compensated crystal oscillator. Temperature compensating circuitry internal to this device ensures that with constant frequency control voltage, the frequency will remain within guaranteed tolerances over the required temperature range. Since the frequency can also be controlled by the voltage on the frequency control pin, the voltage to this pin is from a precision voltage regulator, IC314 on the loader board.