Theory of Operation (FCC ID: ADV0609)

This scanner receives the frequencies indicated in the following table.

Receive frequency band, range, step and mode

Band	Range	Step	Mode (Default)
VHF Low	25.000 to 27.405 MHz	10 kHz	AM
	27.410 to 29.505 MHz	5 kHz	AM
	29.510 to 29.700 MHz	5 kHz	FM
	29.710 to 49.830 MHz	10 kHz	FM
	49.835 to 54.000 MHz	5 kHz	FM
VHF Aircraft	108.000 to 136.99166 MHz	8.33 kHz	AM
VHF High	137.000 to 137.9950 MHz	5 kHz	FM
	138.000 to 143.9875 MHz	12.5 kHz	FM
	144.000 to 147.9950 MHz	5kHz	FM
	148.000 to 150.7875 MHz	12.5 kHz	FM
	150.800 to 150.8450 MHz	5 kHz	FM
	150.8525 to 154.4975 MHz	7.5 kHz	FM
	154.515 to 154.6400 MHz	5 kHz	FM
	154.650 to 156.255 MHz	7.5 kHz	FM
	156.275 to 157.450 MHz	25 kHz	FM
	157.470 to 161.5725 MHz	7.5 kHz	FM
	161.6 00 to 161.975 MHz	5 kHz	FM
	162.000 to 174.000 MHz	12.5 kHz	FM
	216.0025 to 224.995 MHz	5 kHz	FM
UHF Low	225.000 to 379.975 MHz	25.0 kHz	AM
	380.000 to 419.9875 MHz	12.5 kHz	FM
	420 .000 to 450.000 MHz	5 kHz	FM
	450.00625 to 469.99375 MHz	6.25 kHz	FM
	470.000 to 512.000 MHz	12.5 kHz	FM
UHF High	764.000 to 766.996875 MHz	3.125 kHz	FM
	773.000 to 775.996875 MHz	3.125 kHz	FM
	794.000 to 796.996875 MHz	3.125 kHz	FM
	803.000 to 805.996875 MHz	3.125 kHz	FM
	806.000 to 823.9875 MHz	12.5 kHz	FM
	849.000 to 868.9875 MHz	12.5 kHz	FM
	894.000 to 901.9875 MHz	12.5 kHz	FM
	902.000 to 927.995 MHz	5 kHz	FM
	928.000 to 939.9875 MHz	12.5 kHz	FM
	940.000 to 960.000 MHz	6.25 kHz	FM
	1240.000 to 1300.000 MHz	6.25 kHz	FM

A signal of any frequency indicated in the above table passes through Attenuator Circuit D1, 2

and enters a Bandpass Filter selected by Band Select Control IC1 from five Bandpass filers (25 to 54 MHz, 108 to 225 MHz, 225 to 406MHz, 406 to 512 MHz, 764 MHz to 1,300 MHz). The filtered signal is amplified by RF Amp Circuit divided into two groups, Q7 (25MHz to 512MHz) and Q3, 4 (764MHz to 1300MHz).

The signal is then sent to the 1st Mixer to be mixed with the 1st Local Frequency, which is generated by PLL consisting of two VCOs (VCO1, Q20 383.175 MHz to 579.150 MHz and VCO2, Q22 596.775 to 919.200) with the fundamental frequency of 12.75 MHz, depending on the received frequency (refer to LOCAL OSC FREQUENCY CALCULATION), and generates the 1st IF frequency. The generated 1st IF frequency, filtered through Filter (XF1) enters the 2nd Mixer.

At the 2nd Mixer, the signal is mixed with the 2nd Local Frequency, which is generated by PLL consisting of VCO Q29 (358.250 to 359.46875) with the fundamental frequency of 12.75 MHz, depending on the received frequency (refer to LOCAL OSC FREQUENCY CALCULATION).

The signal is sent to IC8. It is mixed with the 3rd local oscillator 20.945 MHz controlled by CPU to generate 455 kHz signal, which passed 455 kHz Filter. The filtered signal is detected by IC8 in the FM Mode and in the AM Mode to generate audio signal. The audio signal passes through Pre Amp IC9 and Audio Amp IC13 to output audio through the Speaker.

The other signal generated by IC8, as SQ control signal passes through SQVR and Noise Amp IC7 and returns to IC8. The signal is then sent to CPU to performs SQ operation.

On the other hand, the signal, which is passed through Buffer Amp IC9, using several Data Filters consisting IC301, 303, and 305 sends data for operating WX Same, CTCSS, DCS, LTR trunking, EDCAS trunking, and Motorola trunking functions to CPU

This Model has the Spectrum Sweeper Feature (High-Speed Receiving System).
By activating this feature, the signal controlled by Q13, 14, 17, 18 and 19, passes through Q15, 16 and is detected by D27, 28, compared by IC3, and then sent to CPU IC306.

Memory IC302 is used to maintain channel data.

The rubber antenna is operate for frequency from 25 to 1300 MHz.
This antenna has BNC connector with 50 Ohm impedance.

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FUNCTION OF EACH SEMICONDUCTOR OR OTHER ACTIVE CIRCUIT DEVICE [2.983(6)]

1. Transistor, FET

Q1	DTA114EUA	SWITCHING
Q2	UMD2N	SWITCHING
Q3	2SC4094(R37) or 2SC4094(R38)	RF AMP
Q4	2SC4226(R25)	RF AMP
Q5	DTC114YUA or UN5214	SWITCHING
Q6	UMD2N	SWITCHING
Q7	2SC4094(R37) or 2SC4094(R38)	RF AMP
Q8	2SC4116(Y)	AGC AMP
Q9	2SC4250	2nd MIXER
Q10	2SC4215(O)	2nd IF AMP
Q11	2SC4116(GR)	AGC AMP
Q12	DTC114YUA or UN5214	SWITCHING
Q13	DTC114YUA or UN5214	SWITCHING
Q14	DTC114YUA or UN5214	SWITCHING
Q15	2SC4226(R25)	2nd IF AMP
Q16	2SC4226(R25)	2nd IF AMP
Q17	DTA114EUA	SWITCHING
Q18	DTC114YUA or UN5214	SWITCHING
Q19	2SC4226(R25)	SWITCHING
Q20	2SC4226(R25)	VCO 1
Q21	DTC114YUA or UN5214	SWITCHING
Q22	2SC4226(R25)	VCO 2
Q23	DTC114YUA or UN5214	SWITCHING
Q24	2SC4226(R25)	BUFFER VCO 1&2
Q25	2SC4116(GR)	LOW PASS FILTER
Q26	2SK880(Y)	LOW PASS FILTER
Q27	2SK880(Y)	LOW PASS FILTER
Q28	2SC4116(GR)	LOW PASS FILTER
Q29	2SC4251 or MT3S16U	VCO 3
Q30	2SC4250 or 2SC4251 or MT3S16U	BUFFER VCO 3
Q31	DTA114EUA	FILTER SWITCHING
Q32	DTC114YUA or UN5214	Muting
Q33	DTC114YUA or UN5214	SWITCHING
Q34	2SD2118	CHARGE CIRCUIT
Q35	2SC4117(GR)	CHARGE CIRCUIT
Q301	DTC114YUA or UN5214	SWITCHING
Q302	2SA1577(Q)	LCD DRIVER
Q303	2SA1577(Q)	LCD DRIVER
Q304	2SC4116(GR)	RESET CIRCUIT

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FUNCTION OF EACH SEMICONDUCTOR OR OTHER ACTIVE CIRCUIT DEVICE [2.983(6)]

2. IC

IC1	HD74AC164 or TC74VHC164	BAND SELECT/ATT.CONT.
IC2	uPC2757TB	1st MIXER
IC3	NJM2406	DETECTOR COMPARATOR
IC4	TC7S04F	OSCILLATOR
IC5	MB15F07SL	PLL
IC6	TK11819M	DC TO DC CONVERTOR
IC7	NJM2904M	COMPARATOR / NOISE AMP
IC8	TK10931V	3rd IF AMP / 3rd LO / 3rd MIX / NOISE AMP / QUADRATURE DETECTOR
IC9	NJM13404V	BUFFER/PRE AMP
IC10	TC4S66F	SWITCHING
IC11	TC74HC4066AFT or TC74HC4066AFS	SWITCHING
IC12	BA05FP or BA05CC0FP	VOLTAGE REGULATOR
IC13	NJM2070M	AUDIO AMP
IC14	AN77033SP	VOLTAGE REGULATOR
IC15	TK11233CUCB	VOLTAGE REGULATOR

IC301	NJM13403V	LOW SPEED DATA FILTER
IC302	HN58X24512FPI or M24512WMW6T or M24512WMW6TG	MEMORY
IC303	NJM2903M	HI SPEED DATA FILTER / LOW SPEED DATA FILTER
IC304	S-80820CNNB or S-80820ANNP	VOLTAGE DETECTOR
IC305	NJM13403V	SAME DATA FILTER / WX ALERT DATA FILTER
IC306	M30620FCPGP#U5C (GRE-0609)	CPU