

52-7085VE5

VHF

DATA TRANSCEIVERS

PLL SYNTHESIZED (EEPROM)

Service Manual

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1. SPECIFICATION

GENERAL SPECIFICATIONS

PERFORMANCE SPECIFICATIONS	FCC PART 90
POWER SOURCE	+13.6V D.C. nominal(+10.8 to +15.6V)
TEMPERATURE RANGE	
STORAGE	80°C maximum -40°C min. 25°C nominal
OPERATING	60°C maximum -20°C min.
ANTENNA IMPEDANCE	50 Ω
FREQUENCY CONTROL	PLL SYNTHESISER
FREQUENCIES OF OPERATION	136~165 , 146~174MHZ
FREQUENCY TOLERANCE AND STABILITY	±1.5PPM
MODULATION TYPE	FM
INTERMEDIATE FREQUENCIES	21.4 MHZ 455 KHZ
CHANNEL SPACING	12.5 /25KHZ
TRANSMIT ATTACK TIME	< 25 mS
HIGH HUMIDITY	90%
CHANNEL CAPABILITY	16 by software control
NOMINAL DIMENSIONS	134 mm(L)X60 mm(W)X33 mm(H)
WEIGHT	145g

RADIO DATA TRANSCEIVER NOMINAL PERFORMANCE

TEST FREQUENCY-----142.0125MHZ

RECEIVER TEST AT 12.5KHZ CHANNEL SPACING

1. Audio Level (0.3~0.5V) -----245mV
2. Distortion (< 5%)-----2.3%
3. SINAD (> 12dB at -119dBm)-----15dB
4. Current -----90mA
5. Carrier Detect Level-----OFF: -114dBm ON:-116dBm

TRANSMITTER TEST AT 12.5KHZ CHANNEL SPACING

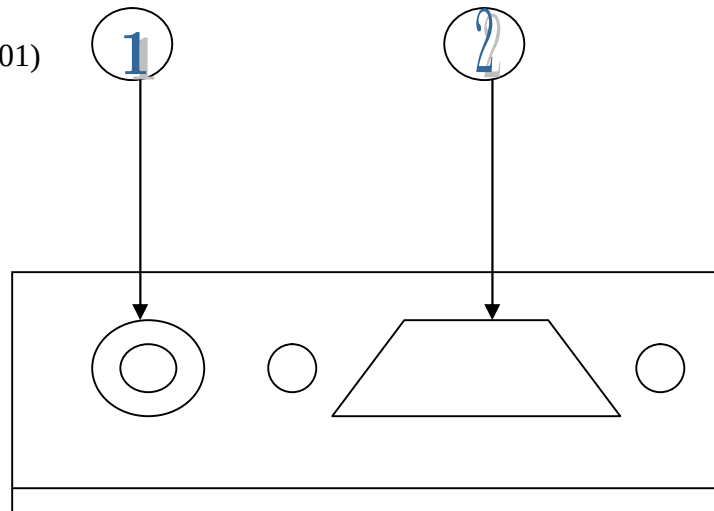
1. RF Output Power(5.0~6.5W)-----5.5W
2. Current (< 1300mA)-----1180mA
3. Deviation (1.7~2.1 khz at 106mV)-----1.9khz
4. Distortion (< 5%)-----0.9%

2. CONNECTIONS AND OPERATION

EXTERNAL CONNECTIONS

1- 50 Ω BNC SOCKET

2- 9 WAY " D " TYPE PLUG(J501)



D-TYPE INTERCONNECTIONS

PIN	FUNCTION	TYPE	RANGE	DESCRIPTION
J501-1	DATA_IN	ANALOGUE	106mV	EXTERNAL MODULATION INPUT
J501-2	DATA_OUT	ANALOGUE	250~350mV	RECEIVER AF OUTPUT
J501-3	PTT	INPUT	0V/+5V	TRANSMIT ENABLE
J501-4	GND	GND	0V	GND
J501-5	B+	V+	+13.8V	POWER SUPPLY
J501-6	CDS	OUTPUT	OPEN/SHORT	RF CARRIER DETECT
J501-7	RSSI	OUTPUT	1.2V~2.3V	RSSI OUTPUT
J501-8	PGM_DATA	INPUT	0V/NC	PROGRAMMER DATA INPUT
J501-9	PGM_ENB	INPUT	0V/5V	PROGRAMMING ENABLE

3. CIRCUIT DESCRIPTION

TRANSMITTER

The transmitter is comprised of:

- Audio amplifier connections from J501 pin 1
- Frequency Synthesizer
- Transmitter
- Automatic Power Control

Audio frequency connections

Processed data from the U602 is applied to the VCO via R621 and applied to the TCXO VC

Frequency synthesizer circuit

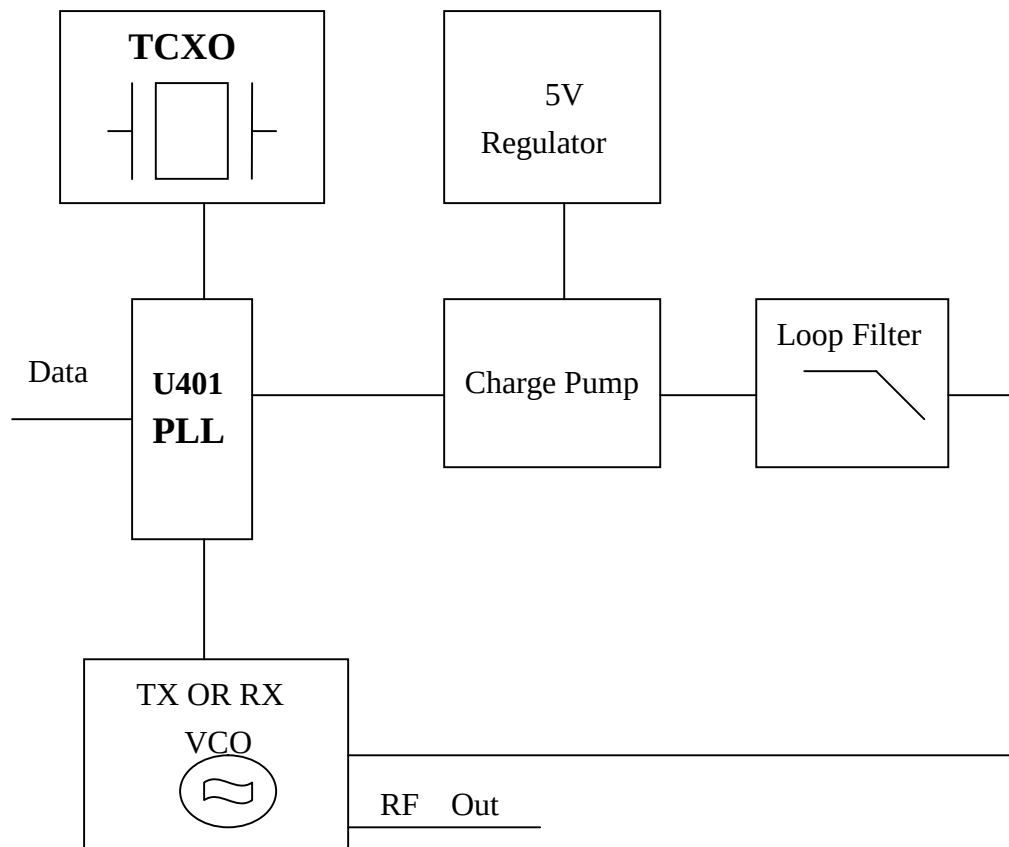
With data received from the EEPROM (U503) the frequency synthesizer circuit controls and Produces the RF carrier frequency for the transmitter during transmit and the local oscillator frequency for the receiver. The frequency synthesizer circuit is comprised of:

- 12.8 MHZ Tcxo
- Voltage Controlled Oscillator (VCO) module
- Charge Pump and Loop Filter
- PLL Frequency Synthesizer
- Dual Modulus Prescaler

PLL Synthesizer

The PLL synthesizer circuit is common to both the transmitter and receiver,

The synthesizer comprises:



12.8 MHZ TCXO

X401 is VCTCXO , which provide stable oscillator of 12.8 MHZ to PLL IC.

Frequency adjustment is provided by VR401

.Voltage controlled oscillator module(VCO)

The module produces carrier frequencies during transmit and local oscillator frequencies during receive.

The module contains RX VCO and TX VCO . TX VCO for producing carrier frequencies during

Transmit and RX VCO for producing the local oscillator frequency during receive .

The module also has Rx and TX powerline filters.

RX and TX power line filters

Transistor Q306 is configured as a 5v power supply ripple filter. The filter reduces the noise on the carrier and local oscillator signals.

RX VCO

The RX VCO comprises JFET Q301, coil L302 , and varactor D301 and is configured as a Colpitts Oscillator . D301 produces a change in frequency with a change in DC voltage and is controlled by the tuning voltage signal present at the cathode. The local oscillator signal at the source of Q301 is applied to the buffer/amplifier formed by Q305 and Q201. The Local signal is applied to the mixer when diode D203 is reverse biased and D202 is forward biased.

TX VCO

The TX VCO comprises JFET Q302, coil L305 , and varactor D302 and D303 and is configured as a Colpitts oscillator . D302 produces a change in frequency with a change in DC voltage and is controlled by the tuning voltage signal present at the cathode. The AF signal at J901 pin 1 is applied to the cathode of D303 to produce FM modulation. When diode D203 is forward biased and D202 is reverse biased the modulated RF signal at the collector of Q201 is passed to the power Amplifier and harmonic filter via the cascode buffer/amplifier Q205.

PLL IC

The reference frequency from the TCXO, at 12.8 MHz , is connected to pin 1 of U401(MB1504) the appropriate VCO is connected to pin 11.

REFDIV divides the 12.8 MHz to produce a reference frequency (F_r) of 5 or 6.25 kHz dependent upon channel spacing selected. VARDIV divides the prescaled VCO frequency to produce a variable frequency (F_v). F_v and F_r are fed to the phase detector.

Phase detector

When $F_v = F_r$, the phase detector output (pins 15 and 16, U401) produces narrow negative pulses and F_v and F_r pulse widths are identical. When $F_v > F_r$ pin 15 (V) pulses negative with pin 16 (R) remaining high.

When $F_v < F_r$ pin 16 (R) pulses negative with pin 15 (V) remaining high.

The signal at pin 15 and 16 is smoothed the loop filter and applied to the VCO.

Out-of-lock detector

The out-of-lock detector produces a series of logic level pulses when the loop is out of lock at pin 7 of U401. The pulses at pin 7 of U401 are buffered by Q401 and then integrated by R407 and C406. The product of the integrating circuit is fed to Q202 to turn off transmitter power.

Charge Pump and Loop Filter

Transistors Q402~Q404 , and associated resistors and capacitors form the charge pump and loop filter .

The phase detector output from U401 pins 15 and 16 are combined by the charge pump to produce a 0 to 8V tuning voltage signal.

The signal is filtered by the loop filter (R414, C414 and C413) to remove any residual reference frequency harmonics from the signal. After filtering the signal is applied to the voltage controlled oscillator module.

DC REGULATOR

The DC Regulator U402, converts the +13.6 V to a 5V supply .

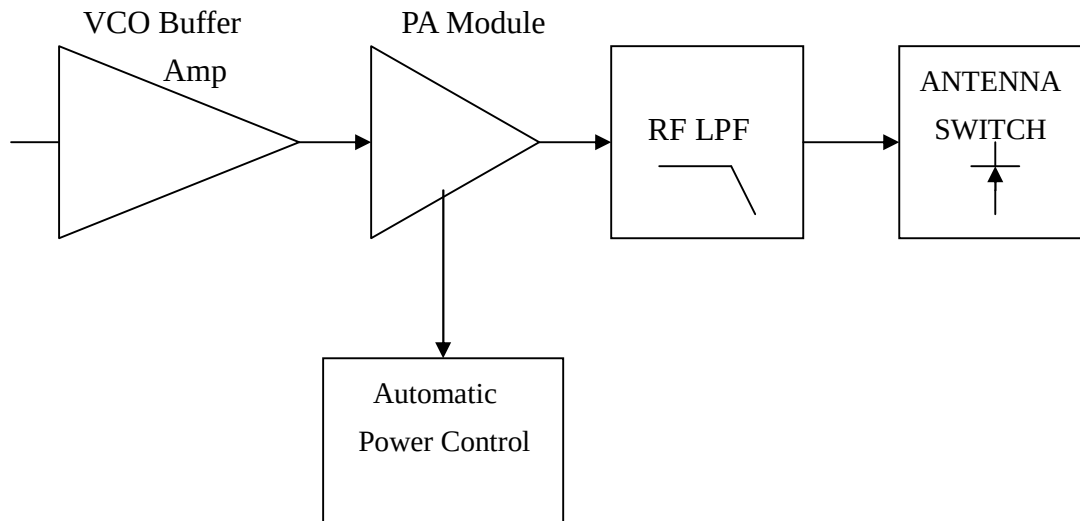
This is used to provide the tuning voltage for the VCO .

Dual modulus prescaler

The prescaler divides the VCO frequency by 64 or 65.

Transmitter

The transmitter comprises:



Buffer

When the radio is in transmit mode the diode D203 is forward biases enabling the modulated RF signal from the VCO to pass to the buffer/pre-amplifier Q205 and associated components.

The output signal is passed from Q205 to Q206 via a matching network consisting of inductor L203 and C217.

PA module

The signal is then amplified for transmission by 207, which is a power amplifier module.

Low pass filter

The amplified RF signal is passed through the stripline coupler and is fed to the harmonic low pass filter, comprising L211 to L212 and C228-C240 and then to the antenna connector (ANT).

Antenna Switch

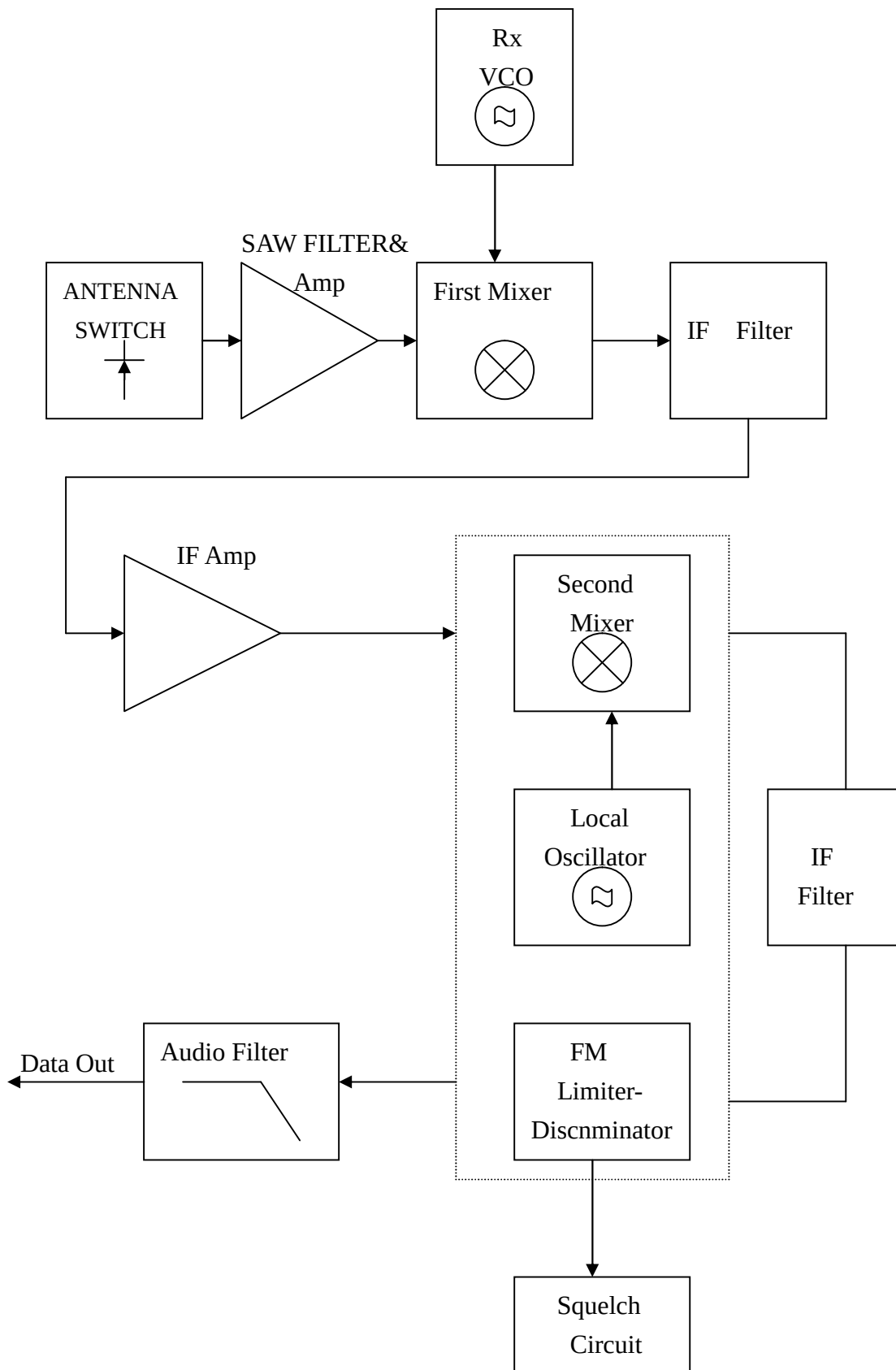
When transmitting, the diodes D205 are forward biased, allowing the RF to pass to the antenna. D206 is shorted to ground which makes L210 look open circuit (1/4 wave tuned stub). This prevents the TX signal from passing to the receiver stage.

Power output control .

The RF power tuning by VC201, which make sure the current less than 1300mA when output power is 5 W.

Receiver

The receiver comprises:



Antenna Switch

In receive, the diode D205 are reverse biased. L210 is now in circuit, passing the signal from the antenna to the front-end amplifier Q101.

Front End

The receiver signal is passes through the band pass filter consisting of C101 to C109/L101 to L104.

Diode D101 serves as protection from RF overload from nearby transmitters.

The input signal is coupled to the base of Q101 which serves as an RF amplifier.

The output of Q101 is then coupled to a second bandpass filter consisting of C114 to C119 / L105 to L107.

The output of the front end signal then coupled to the dual-gate FET mixer Q102.

First Mixer

Q102, 2-pole crystal filters XF101 and coils T101 and C123 form the First Mixer and First IF Filter.

The RF signal, from the front-end filter and amplifier Q101 is applied to the VCO local oscillator signal to make mixer.

The difference frequency of 21.4 MHz is taken from Q102 and is filtered by the crystal filters XF101.

The tuned circuits T101 and associated components provide matching of the crystal filters to ensure a good pass-band response and selectivity.

The IF signal is amplified by Q103 and passed to the FM Detector IC.

Second mixer, Second IF, FM detector

The output of the IF amplifier is fed into the narrowband FM IF Integrated Circuit U101 (MC3361).

This is a single conversion FM receiver which contains the second mixer, second IF amplifier, and FM detector.

Crystal X101,connected to pin 1 of U101, determines the second local oscillator frequency.

In this case the crystal has a frequency of 20.945MHz. The first IF signal is applied to the mixer and resultant frequency of 455KHz, is the difference between the IF signal and second local oscillator.

The 455KHz IF signal is output from pin 3 and is applied to a 455KHz band-pass filter CF1.

The output of CF1is passed via pin 5 to a high gain IF amplifier coupled to the adjustable quadrature detector CD1.Any detected signal is produced at pin 9 of U101 and applied to the Receiver Audio Circuit and the Mute (Squelch) Circuit.

Squelch (MUTE) Circuit

Any noise signal is amplified by U101 internal noise amplifier .signal is applied to pin10 of U101. The squelch trigger output (pin 13,U101) is applied to the pin 6 of J903.

When noise is present, the voltage at pin 12 of U101 is exceeds than 0.7V. The squelch trigger output is open, It's make pin 6 of J903 open state.

When no noise is present, the voltage at pin 12 of U101 less 0.7v and pin 13 of U101 is HI voltage.

This make pin 6 of J903 short state.

VR101 is set to tuning squelch when 25khz channel space is present.

Carrier Detect

A Carrier Detect (MUTE DETECT) output is available on pin 6 of J903 .

AF Output Low Pass Filter

A low pass filter formed by R115 and C132 removes any extraneous 455kHz energy from the AF output of the FM receiver chip (pin 9 of U101).

The filtered signal is passed to pin 2 of J903.

Microcontroller

The PIC16C57C04 microcontroller IC controls the programmable features and frequency synthesizer data.

Programming Mode

The programming mode allows the user to retrieve or program TX/RX frequencies, when pin 2 of J903 is set to ground. Programming mode will Inhibit , serial communications can then be made in order to read/program the on- board EEPROM (U503)which contains radio- specific data.

EEPROM

Relevant channel information, such as Rx/ Tx frequencies, is stored in the EEPROM(U503) which is a 93C46. This information may be programmed and erased via the D- type socket.

The EEPROM has 1024 (8x128) capacity and is written serially.

Power supply circuit

The data radio is supplied with a nominal + 13.8V dc power supply input from external equipment which is filtered using C512. This supply is converted into 5V voltage levels on the board using the regulator U402 and associated components . This +5V line is fed to the CPU circuit .

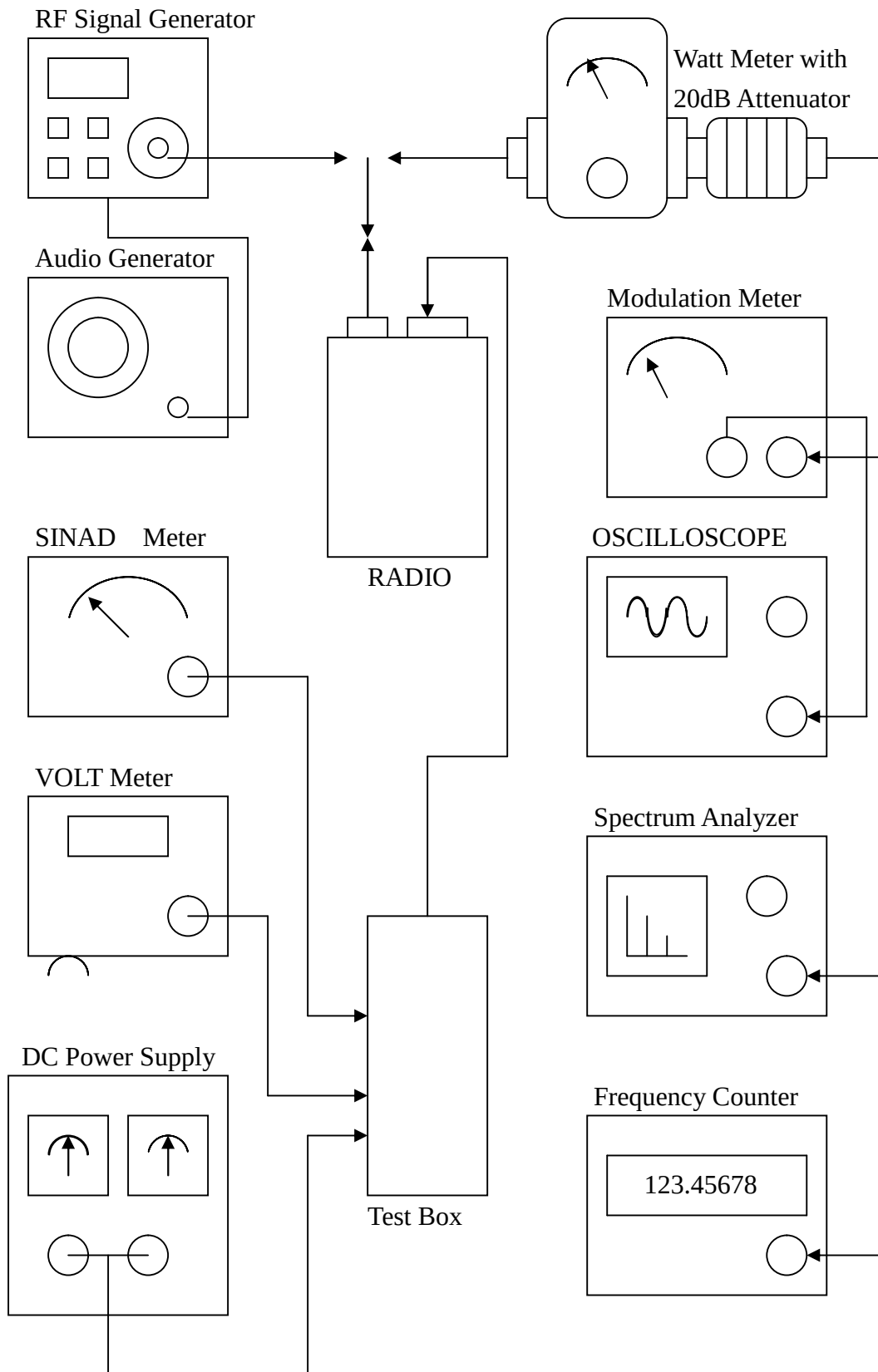
4. PERFORMANCE TEST AND ALIGNMENT

The alignment and performance test procedures assume the use of the following equipment.

Discrete test equipment

Volt Meter	Spectrum Analyser and notch filter(option)
RF Power Meter.	Coupler (20dB isolation)
DC Power Supply, 0-15V 2A min	Distortion Meter
Oscilloscope, 20 MHz dual beam	
RF Frequency Counter,	
100 kHz - 600 MHz	
AF Signal Generator 0 – 20 kHz	
RF Signal Generator	
SINAD Meter	
Modulation Meter	
Audio Power Meter	

5. TEST EQUIPMENT CONFIGURATION.



Test Equipment Configuration

6. TRANSMITTER PERFORMANCE TESTS

Power Output

Transmit periods longer than 3 minutes are to be avoided.

1. Set the power supply voltage to 13.8V dc. and monitor the voltage during transmit.
2. Switch data radio TX and check and record the output power. The nominal output power is adjustable about 5W and make sure the current less than 1300 mA..
3. Set the PTT switch to OFF .

Frequency accuracy

1. Whilst transmitting, measure the transmit frequency using the RF frequency counter.
2. Adjust VR401 so that frequency is as close as possible to the exact required transmit frequency. Ideally it should be within 100 Hz at room temperature.

Peak Deviation

1. Connect the oscilloscope to the output of the modulation meter.
2. Set the AF signal generator to 1000 Hz at 106mV and connect to DATA _IN line (pin 1 of J501)
3. Switch data radio to TX and observe the oscilloscope display to check that the 1000Hz tone is a sine wave and adjust VR601 to make deviation is about 3.5KHZ.
4. Using the AF signal generator, sweep from 100 Hz to 3 kHz and record the peak deviation.
5. Check the peak deviation for appropriate channel spacing as follows :
For 12.5 kHz channel spacing, Peak deviation is not greater than 2.5 kHz.
For 20 kHz channel spacing, Peak deviation is not greater than 4 kHz.
For 25 kHz channel spacing, Peak deviation is not greater than 5 kHz.

Spectrum Test

It may be necessary to notch the fundamental signal during this test.

1. Connect a spectrum analyser and RF power meter to the antenna socket.
2. Switch data radio to TX. Observe the output spectrum on the spectrum analyser.
3. Adjust notch filter to minimise the carrier. All spurious and harmonics signals should be below- 36 dBm up to 1 GHz and below –30 dBm between 1 and 4 GHz.
4. Switch off the data radio transmit control.

Receiver Performance Tests

Sensitivity

The SINAD performance test may be used to test the sensitivity of the receiver.

1. Connect the RF signal generator to the data radio BNC antenna connector.
2. Set the RF signal generator to the receive frequency .
3. Connect the leads of the SINAD meter between 0 V and pin 2 on J501.
4. Set the deviation to 60% of the peak system deviation.
5. Set the AF generator to 1 kHz.
6. Adjust the RF signal generator level until the SINAD Meter reads 12 dB.
7. Check that the signal generator RF level is less than 0.25uV pd (-119dBm).

Squelch/Carrier Detect Adjustment

1. Set the RF signal generator to the receiver frequency with 60% deviation. Set the AF signal to 1 kHz
2. Set RF input level to give -113dBm.
3. Adjust VR101 until CDS J501 pin 6 changes state from “HIGH” to “LOW”.
4. Reduce RF input level to –115dBm and check that CDS line goes HIGH .

Switch off the RF generator and disconnect the test equipment.

6. PARTS LIST

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Revised: February 27, 2014

136~165MHZ/12.5KHZ

Revision:

Bill Of Materials

February 27, 2014

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Item	Quantity	Reference	Part
1	1	C101	560P
2	6	C102,C108,C111,C112,C119, C230	39P
3	9	C103,C109,C110,C117,C135, C418,C419,C420,C617	100P
4	9	C104,C136,C217,C231,C233, C302,C308,C506,C608	47P
5	9	C105,C107,C226,C236,C244, C246,C303,C310,D402	NU
6	2	C106,C336	9P
7	1	C114	150P
8	44	C115,C120,C121,C122,C126, C139,C202,C203,C206,C209, C210,C212,C214,C216,C218, C220,C222,C223,C225,C227, C228,C229,C234,C235,C237, C301,C307,C313,C314,C316, C317,C318,C319,C325,C326, C328,C401,C404,C415,C422, C423,C424,C426,C511	102P
9	2	C116,C140	56P
10	1	C118	270P

Item	Quantity	Reference	Part
11	5	C123,C311,C312,C403,C408	5P
12	17	C124,C134,C137,C142,C143, C205,C324,C329,C402,C406, C411,C421,C427,C429,C502, C606,C618	104P
13	1	C125	474P
14	4	C127,C129,C130,C133	220P
15	5	C128,C215,C221,C407,C412	103P
16	2	C131,C601	1U/X7R 0805
17	2	C132,C607	223P/X7R 0603
18	2	C138,C428	33U/6.3V/EC/SMT
19	3	C141,C224,C239	33P
20	1	C144	27P
21	2	C201,C416	2P
22	9	C204,C501,C505,C507,C508, C509,C510,C602,C605	470P
23	6	C207,C208,C409,C410,C431, C603	10U/16V T
24	8	C211,C405,C609,C611,C612, C613,C614,C615	1U/Y5V 0805

Item	Quantity	Reference	Part
25	1	C213	18P
26	1	C219	3P
27	4	C232,C238,C240,C417	15P
28	2	C243,C245	12P
29	2	C304,C305	6P
30	3	C306,C309,C315	1P
31	2	C327,C425	2.2U/10V T
32	1	C335	8P
33	2	C413,C604	104P/X7R
34	1	C414	1U/16V T
35	1	C430	47U/16V/EC/SMT
36	1	C432	33U/6.3V EC
37	2	C503,C504	22P
38	1	C512	100U/16V/EC/SMT
39	1	CD1	CDS455C24
40	1	CF1	CFU455HT/3PIN
41	1	D101	1SS362

Item	Quantity	Reference	Part
42	1	D102	1SS355
43	3	D201 ,D207 ,D501	RLS4148
44	2	D202 ,D203	1SS314
45	1	D204	PTZ5.6B
46	2	D205 ,D206	HVU131
47	3	D301 ,D302 ,D303	1SV215
48	2	D401 ,D601	RLZ3.0B
49	1	D502	RLZ4.3B
50	1	D503	1N4004 SMT
51	1	J201	BNC
52	1	J501	CONNECTOR DB9
53	7	L101 ,L102 ,L103 ,L104 ,L105 , L106 ,L107	27NH
54	2	L201 ,L308	150NH
55	1	L202	56NH
56	1	L203	22NH
57	2	L204 ,L401	1UH
58	1	L205	33NH

Item	Quantity	Reference	Part
59	2	L206,L212	0.45*2.3*7T
60	1	L207	0.45*1.5*5T
61	1	L208	0.45*1.5*6T
62	1	L209	2.2UH/1008
63	1	L210	0.45*2.3*8T
64	1	L211	0.45*2.3*6T
65	4	L301,L303,L304,L307	2.2UH
66	1	L302	68NH
67	1	L305	39NH
68	1	L306	0.82UH
69	1	L601	125MH
70	1	Q101	2SC5086
71	1	Q102	3SK318
72	1	Q103	2SC4215
73	1	Q104	DTC144EE
74	1	Q105	DTA144EE
75	4	Q201,Q205,Q305,Q405	2SC4083

Item	Quantity	Reference	Part
76	7	Q202,Q203,Q306,Q402,Q404, Q408,Q409	2SC4116
77	1	Q204	DTA123YE
78	1	Q206	BFG35
79	1	Q207	2SK3476
80	2	Q301,Q302	MMBFJ 310LT1
81	1	Q303	UMG2N
82	3	Q401,Q403,Q501	2SA1586
83	2	Q406,Q407	BCW68G
84	1	Q502	UMH6N
85	1	R101	8.2K
86	3	R102,R112,R204	3K3
87	1	R104	180R
88	6	R105,R106,R107,R213,R304, R307	330R
89	2	R108,R227	470K
90	9	R109,R114,R202,R310,R420, R422,R424,R425,R501	4.7K
91	1	R110	5.6K

Item	Quantity	Reference	Part
92	14	R111,R201,R209,R210,R225, 10K R302,R305,R407,R410,R411, R508,R610,R612,R621	
93	1	R113	15K
94	4	R115,R220,R415,R608	2.7K
95	1	R116	510K
96	5	R117,R226,R412,R413,R602	100R
97	1	R118	180K
98	1	R119	150K
99	9	R120,R121,R404,R405,R503, 100K R607,R611,R613,R617	
100	1	R203	220R
101	11	R205,R207,R208,R419,R421, 1K R423,R502,R506,R507,R604, R609	
102	2	R206,R601	27K
103	1	R211	560R
104	2	R212,R603	2.2K
105	1	R214	10R
106	3	R215,R217,R605	820R

0803VRI2.SCH
136~165MHZ/12.5KHZ

Bill Of Materials

February 27, 2014

Revised: February 27, 2014

Revision:

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Item	Quantity	Reference	Part
107	1	R216	5.6R
108	4	R218,R308,R504,R505	470R
109	2	R219,R223	56R
110	1	R222	22R/0805
111	3	R224,R408,R409	22K
112	2	R301,R303	47R
113	1	R309	120K
114	1	R401	150R
115	9	R402,R403,R606,R614,R615, R616,R618,R619,R620	47K
116	1	R406	33K
117	2	R414,R417	1.2K
118	1	R416	7.5K
119	1	R418	91K
120	1	R509	1M
121	1	R622	680R
122	1	RP501	10K*4 SMT
123	1	S501	DIGITAL SW 16CH SMT

Item	Quantity	Reference	Part
124	1	T101	P1007X
125	1	U101	AA32416A
126	1	U401	MB1504 SMT
127	1	U402	UTC7805 SMT
128	1	U501	ELM7S32
129	1	U502	PIC16C57/XT SMT
130	1	U503	93C46 SMT
131	1	U601	LM386D
132	1	U602	TL064CD SMT
133	1	VC201	30PVC
134	1	VR101	10KB/SMT
135	1	VR401	100KB SMT
136	2	VR601 ,VR602	10KB SMT
137	1	X101	20.945MHZ UM1
138	1	X401	12.8MHZ TCXO/SMT
139	1	X501	3.58MHZ 3X9
140	1	XF101	21M08B

8 . PROGRAMMER INSTRUCTION

Welcome to PC Programmer.

Please Read this file, before you first use the software.

TABLE OF CONTENTS

1. Brief introduction
2. Before Installing
3. Install PC Programmer
4. INSTRUCTIONS
5. UnInstall PC Programmer

1. Brief introduction

Welcome to PC Programmer. This program is designed to be used with the Interface Adapter.

The following equipment will be needed to program the Device:

- A. A computer to install this program with at least 2 MB available space in hard disk and a 9-pin male RS-232 serial port.
- B. Win XP Operation System.
- C. Part of the Programming Kit
 - 1) An interface Adapter.
 - 2) A CD disk with the program, PC Programmer files

2. Before Installing

Before You Run Setup, make sure that your computer meets the minimum requirements mentioned above, and read the Readme file(this file).

NOTE: If you firstly install PC Programmer in you system, the setup may update some system files on your computer , so you may run the setup again after your system be updated. Please follow the installation instruction on the screen.

3. Install

TO install PC Programmer on your computer

- 1)Insert the CD.
- 2)Run Setup.exe
- 3)Follow the installation instruction on the screen.

Important: You cannot simply copy files from the CD to your hard disk and run PC Programmer . You must use the Setup program, which decompresses and installs the files in the appropriate directories.

4. INSTRUCTIONS

4.1 Connection

4.2 Start up PC Programmer

4.3 Edit Configuration

4.3.1 Open/Recall/Upload Configuration file

4.3.2 Edit Channel data

4.3.3 Set Option item

4.3.4 (Block)Cut/Copy/Delete/Paste

4.3.5 Auto-Frequency edit

4.3.6 Save a Configuration to disk

4.3.7 Download Configuration to device

4.3.8 Print a Configuration

4.4 Exit PC Programmer

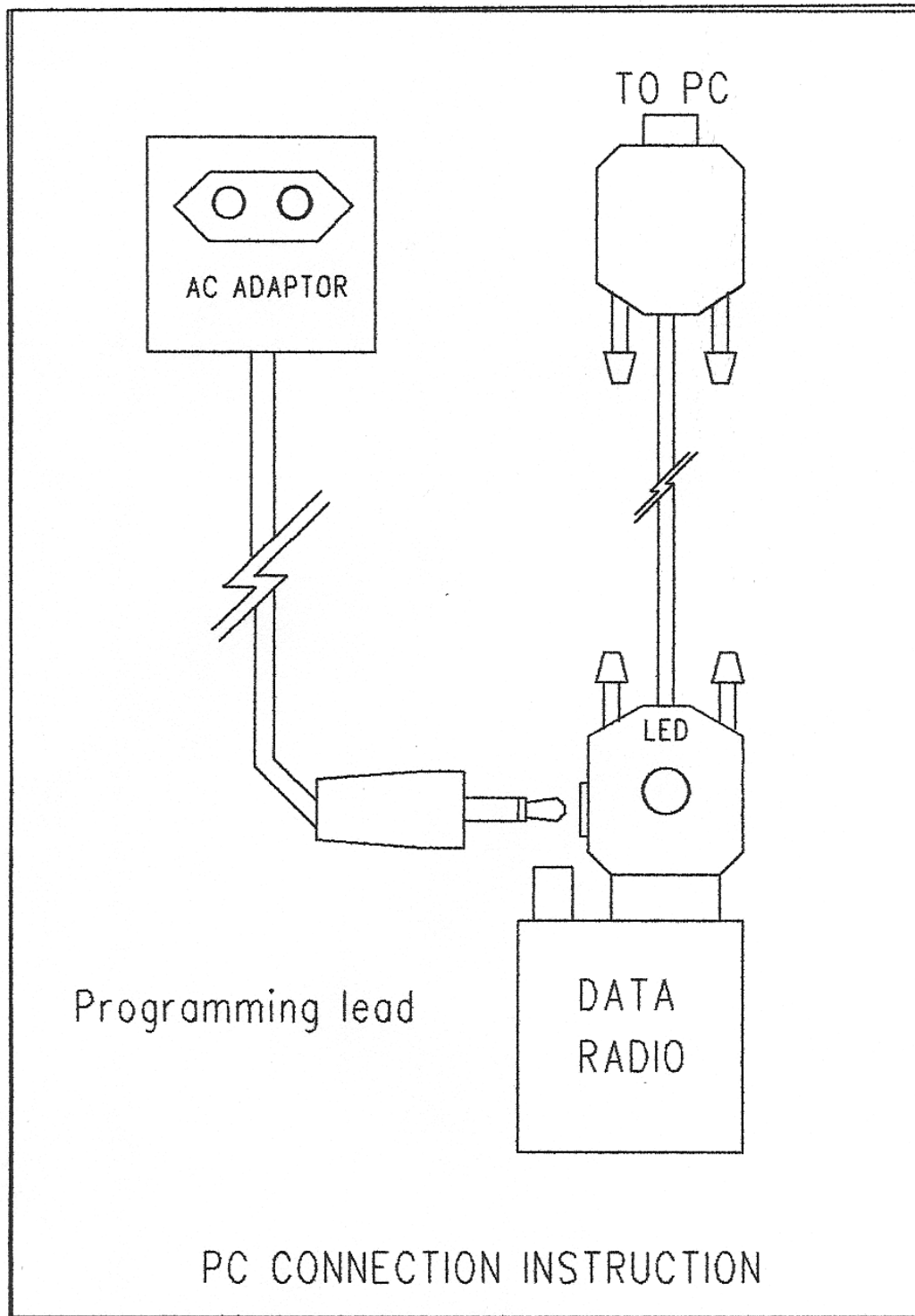
4.1 Connection

1.Connect one side of Interface Adapter to the computer's serial port.

Never care the port number, the PC Programmer will locate it automatically.

2.Connect the other side of Interface Adapter to the Device's 26-pin female port.

3.Connect power supply to device and LED will be light. The device will into PC_programming mode automatically, please see the picture of below.



4.2 Start up PC Programmer

1. Select 'Start', choose 'Programs',
click on the '*** AES-7350 Series' program.
2. When HD Serial PC Programmer is started, a main form will be shown
after a greeting form.
3. There has a menu bar at the top of the main form, and a message box
at the bottom.

NOTE: The program is menu driven for all pertinent commands. All the commands can be accessed by either key board or the left mouse button.

Access keys mainly used are:

'Tab' or 'Arrow' to move focus(or cursor)

'Enter' to active a focused command

4.3 Edit Configuration

4.3.1 Open/Upload Configuration file

To edit the configuration, please either

1) Recall an Existing Configuration by click on the 'Open' item in the File Menu, select the configuration file by click on or input its name then press 'Enter' key.

OR 2) Upload configuration data from a device by click on 'Upload' item in the Device menu. to a Configuration window .

Different Model's device Configuration can be opened and edited.

There are two fields in each Configuration window: system data and Channel data.

OR 3) Open an existing Configuration by click on the 'OPEN' item in the File Menu. A pop up window will be shown, select a file by arrow key or mouse then click 'OK'.

4.3.2 Edit Channel data

1) Set focus to the Channel data field by move the mouse pointer.

2) Select a particular channel number to be edited by either the arrow key or click on it.

3) Pop up input window by either press 'Enter' key or double click on the selected channel number.

4) Use computer's cursor keys, Tab key, Enter key, arrow key or mouse to renew the channel data.

5) Click 'OK' button on the input window to accept the change or 'Cancel' to not change, and return back to Configuration Window.

4.3.3 Edit Option item

1) To Edit Channel Option, Select a particular channel number in the Option View Window by either the arrow key or click on it, then Pop up the input window for Channel Option, 'Enter' key or double click on the selected channel number.

- 2) To Edit System Option, Pop up input window for System Option, click "SYSTEM" in the 'OPTION' menu.
- 3) To Edit Advanced Option, Pop up input window for Advanced Option, click "ADVANCED OPTION" in the 'OPTION' menu.
- 4) Use computer's cursor keys, Tab key, Enter key, arrow key or mouse to renew the Option Item.
- 5) Click 'OK' button on the input window to accept the change or 'CANCEL' to not change, and return back to Configuration Window.

4.3.4 (Block)Cut/Copy/Delete/Paste

To select a block of channel data as source by either

- 1) Select start channel by arrow key, then while press 'Shift' key select end channel number by arrow key.
 - 2) Click on start channel, then while press 'Shift' key click on end channel number
 - 3) Press the left mouse button on start channel then move the mouse until reach the end channel number, release left mouse button.
 - A) To Cut selected (block) Channel(s) either press 'Ctrl'+ 'X' or click 'CUT' item in Edit menu.
 - B) To Copy selected (block) Channel(s) either press 'Ctrl'+ 'C' or click 'COPY' item in Edit menu.
 - C) To Delete selected (block) Channel(s) either press 'Del(Delete)' key or click on 'DELETE' item in Edit menu.
- After Cut or Copy, the data can be pasted to where you want.
- D) To Paste , select a channel as the start number of target , then either press 'Ctrl'+ 'V' or click on 'PASTE' item in Edit menu.

NOTE: Paste operation allows you to export data to any Configuration window opened.

4.3.5 Auto-Frequency edit

This feature provide you with a quick Frequency set function.

To use this command after either

- 1) Click 'EDIT' Menu
- 2) Click on 'AUTOFREQ' item in 'EDIT' menu to pop up a input window.
- 3) Use computer's cursor keys, Tab key, Enter key, arrow key or mouse to set data.
- 4) Click 'OK' button on the input window to accept the change or 'CANCEL' to not change, and return back to Configuration Window.

4.3.6 Save a Configuration to disk

- 1) Different configuration can be saved to disk.
- 2) Click on 'SAVE' item in 'FILE' Menu will overwrite an existing configuration file on your disk by current configuration.
- 3) Select 'SAVE AS' from 'FILE' Menu will save the current configuration by a name as you prefer.

4.3.7 Download to device

To Download current Configuration to device, select 'DOWNLOAD' from sub menu under 'DEVICE' menu.

4.3.8 Print a Configuration

Click on 'PRINT' item in 'FILE' Menu will send current Configuration to printer.

4.4 Exit PC Programmer

To Exit PC Programmer, click on 'EXIT' item in 'FILE' Menu.

5. UnInstall PC Programmer

To uninstall PC Programmer from your hard disk, select 'Start', choose 'Settings', click on the 'Control Panel', then find 'Add/Remove Programs' icon from the pop up window then double click on it, then find '*** Serial PC Programmer' from application list and click on it, then click on 'Add/Remove' button under application list, then follow the instructions on your screen.

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 90 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- . Reorient or relocate the receiving antenna.
- . Increase the separation between the equipment and receiver.
- . Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- . Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. (Example - use only shielded interface cables when connecting to computer or peripheral devices).

FCC Radiation Exposure Statement

This equipment complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 0.9 m between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

The antennas used for this transmitter must be installed to provide a separation distance of at least 0.9 m from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 90 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.