

## Instruction Manual

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Model 2005B RF SIGNAL GENERATOR

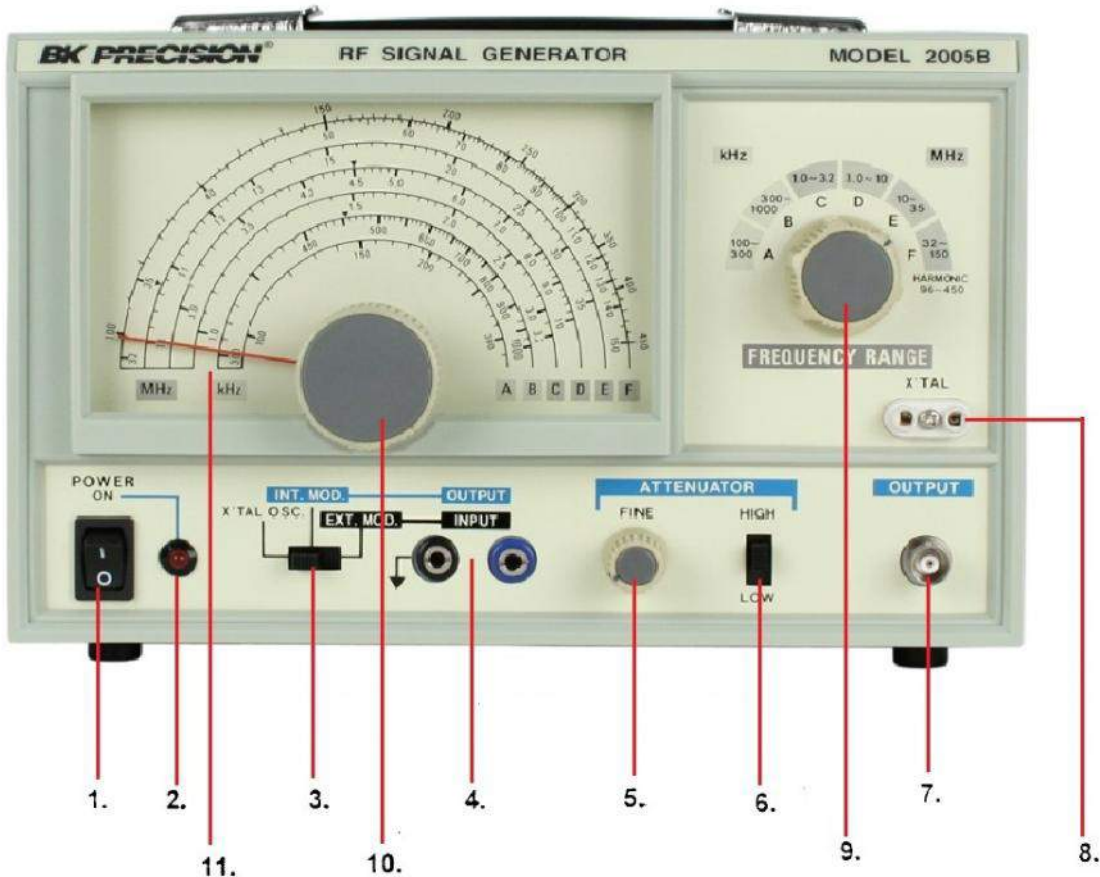
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## SPECIFICATIONS

Frequency Range	: A 100KHz – 300KHz : B 300KHz – 1000KHz : C 1.0MHz – 3.2MHz : D 3.0MHz – 10MHz : E 10MHz – 35MHz : F 32MHz – 150MHz : (up to 450MHz on third-harmonics)
Frequency Accuracy	: ± 3%
RF Output	: 100mVrms. Approximately up to 35MHz.
Output Control	: HIGH – LOW switch and fine adjuster.
Modulation	: Internal 1KHz : External 50Hz – 20KHz, at less than 1Vrms.
Audio Output	: 1KHz, Min. 1Vrms. (fixed)
Crystal Oscillator HC6/u holder	: For 1 – 15MHz use crystal in type HC-6u Holder (not included)
Power Requirement	: 110V or 220V AC @ 50/60Hz.
Dimensions	: 5.91" x 9.84" x 5.12" (H x W x D) (150 x 250 x 130mm)
Weight	: 5.51lbs. (2.5Kg.)

## CONTROLS AND INDICATORS

1. **POWER Switch.** Turns power **ON** and **OFF**.
2. **PILOT LIGHT.** Lights when power is on.
3. **MODE Switch.** **EXT MOD:** For modulation of carrier with an external source.  
**INT MOD:** Use of internal 1KHz for modulation of external circuit testing.  
**XTAL:** Crystal oscillator output from internal 1KHz oscillator.
4. **INPUT/OUTPUT Jack.** Input jack for external modulation signal when external modulation is selected. 1KHz output when internal modulation is selected.
5. **FINE RF ATTENUATOR Knob.** Continuous RF output voltage fine adjusting knob.
6. **HIGH-LOW RF ATTENUATOR Knob.** Sets the RF output level (at **LOW** the output is lowered by 10%).
7. **RF OUTPUT Jack.** Output for RF signal.
8. **XTAL Socket.** For insertion of quartz crystal 1-15MHz in type HC-6/U holder.
9. **FREQUENCY RANGE Switch.** Has six positions for RF output frequency ranges.
10. **FREQUENCY CONTROL DIAL.** Used to adjust dial frequency.
11. **FREQUENCY DIAL.** Indicates the frequency of the output signal. Use the scale which corresponds to the **FREQUENCY RANGE** switch position. For convenience, approximate location of standard IF signals are also marked on the dial.



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high DC voltage present. Otherwise, connect a blocking capacitor (0.05uF to 100pF), depending on the frequency.

### 3. Modulated Carrier, Internal Source

Set the mode switch at INT. MOD.

By tuning the receiver to the generator frequency or vice versa, an audio tone will be heard in the loudspeaker. An audio voltmeter should be connected across the speaker terminals when aligning the internal circuit. A dummy resistor with suitable power rating can be used in place of the moving coil.

It is advisable to keep the RF signal level as low as possible in order to prevent overloading the transistors or electron tubes in the circuit. Excessive input voltage will cause AGC action and/or two resonance points to appear and proper alignment or adjustment would be impossible.

### 4. Modulated Carrier, External Source

Set the mode switch to EXT. MOD.

Connect leads from an external audio generator to the INPUT.

Frequencies up to 15KHz can be used for modulation at RF above 3MHz. The audio input voltage should not exceed 2V; this is to prevent modulation distortion.

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## 5. Unmodulated Carrier

Set the mode switch to EXT. MOD. There should be no connection to the input.

The RF signal can be used in testing and receiver with a beat oscillator, or circuits that do not require a modulated signal.

The RF signal can be applied to a sweep generator for the marker signal.

## 6. Crystal Oscillator Output

Control settings:

Set mode switch to XTAL. Insert a crystal in FT-243 holder in the XTAL socket.

Set RF output switch to LOW.

Set FREQ. RANGE switch to "F" and frequency dial to 100KHz.

Set FINE control to minimum.

The output signal is treated in the same manner for the unmodulated carrier with the exception that the output level cannot be adjusted.

**NOTE:** If a RF signal is required at the same time, set the output frequency with the FREQ. RANGE switch and frequency dial as required. Adjust the RF FINE control knob.

## 7. AF Output 1KHz

Control Settings:

Mode Switch at 1NT. MOD.

FREQ RANGE switch at "F" and frequency dial to 100MHz.

Connect leads from OUTPUT to the test circuit. Use an external potentiometer, 100K – 1M $\Omega$ , to lower the voltage.

## 8. Oscillator Frequency Calibration

The RF oscillator frequency can be calibrated to a high degree of precision using the harmonics of the internal crystal oscillator and an external all-wave receiver. The latter is utilized as a frequency transfer unit.

- (1) Set the mode switch to XTAL.
- (2) Insert the "standard frequency" crystal, preferably at a multiple of 1MHz. For spot frequency checking to be 10.7MHz use a 10.7MHz crystal.
- (3) Set the RF slide switch to LOW.
- (4) Connect the RF output to the receiver input direct or through a small coupling capacitor to the rod antenna.
- (5) In the following example use a 15MHz crystal will be given.
- (6) Tune the receiver to 5MHz or 5<sup>th</sup> harmonic of 1MHz. Then by carefully tuning both the oscillator and is adjusted to zero beat and the dial reading is noted. At other frequencies spaced 1MHz apart, the same procedure is repeated oscillator setting – tuning the receiver – returning oscillator and noting the reading on the dial.

Practical use of harmonics up to the tenth or higher is possible. However, care must be exercised in selecting the proper harmonic, especially at high RF when a relatively low frequency crystal is used.

**NOTE:** When a receiver equipped with a beat frequency oscillator is used the measurements can be simplified. The "zero-beat" condition is at the point where the steady beat is heard most clearly.

## MAINTENANCE

### WARNING

*The following instructions are for use by qualified service personnel only. To avoid electrical shock, do not perform any servicing other than contained in the operating instructions unless you are qualified to do so.*

*Line voltage is present when covers are removed and the unit is plugged in, even if turned off. Unplug the generator before performing servicing procedures.*

### CASE REMOVAL

To remove the case from the RF generator, perform the following steps:

1. Unplug the unit.
2. Remove the four screws located around the front panel and the two screws by the line cord jack and at the line selection voltage switch.
3. Slide the case straight back.
4. To reinstall the case, reverse the procedure.

### FUSE REPLACEMENT

If the fuse blows, the pilot light will go out and the Generator will not operate. The fuse should not normally open unless a problem has developed in the unit. Try to determine and correct the cause of the blown fuse, then replace only with a 0.3A, 250V, 5 x 20mm fuse (for 120VAC) and 0.15A, 250V, 5 x 20mm (for 240VAC). The fuse is located inside the unit on a printed circuit board on the left hand side (**POWER** switch side) of the unit. For access to the fuse, remove the case from the Generator by following the instructions in the **CASE REMOVAL** paragraph located previously in this section of the manual.



**ACCESSORIES SUPPLIED WITH UNIT**

- Output Cable, BNC to Insulated Clips
- Power Cord, Detachable
- Instruction Manual
- Schematic Diagram & Parts List

**U.S.A. PARTS ORDERING INFORMATION**

There is a minimum charge for each invoice. Orders will be shipped C.O.D. unless previous open account arrangements have been made or remittance accompanies order. Advance remittance must cover handling, postage, or express charges. Specify model and serial number when ordering replacement parts.

**ORDER REPLACEMENT PARTS FROM:**

**B & K-Precision, Factory Service Operations**  
 Maxtec International Corporation  
 6470 West Cortland Street  
 Chicago, Illinois 60635  
 Tel (312) 889-1448



**SERVICING  
 INFORMATION**

**BK PRECISION®  
 MODEL 2005A**

**R F GENERATOR**

**Parts List**

<b>SCHEMATIC SYMBOL</b>	<b>DESCRIPTION</b>	<b>B&amp;K PRECISION PART NUMBER</b>
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**RESISTORS**  
 Unlisted resistors are 5%, 1/4 W  
 See Schematic for value.

VR501	100 kΩ, Potentiometer .....	.008-887-9-001
VR502	1 kΩ Potentiometer W/Switch .....	.008-145-9-002

**CAPACITORS**

C101	220 μF, +80/-20%, 50 V, Electrolytic .....	.022-328-9-006
C201	0.01 μF, +80/-20%, 25 V Ceramic .....	.020-433-9-001
C202, 204	33 pF, 5%, 25 V NPO Ceramic .....	.031-074-9-003
C203	68 pF, 5%, 25 V NPO Ceramic .....	.031-074-9-004
C205	1000 pF, +80/-20%, 50 V Ceramic .....	.020-433-9-002
C206	0.01 μF, +80/-20%, 25 V Ceramic .....	.020-433-9-001
C207	1000 pF, +80/-20%, 25 V Ceramic .....	.020-432-9-001
C208	0.1 μF, +80/-20%, 25 V Ceramic .....	.020-386-9-004
C209	2 pF, ±0.5 pF, 25 V NPO Ceramic .....	.031-074-9-001
C304	1500 pF, 5%, 50 V Polyester .....	.025-283-9-001
C401	10 μF, +80/-20%, 16 V Electrolytic .....	.022-393-9-001
C402	4.7 μF, +80/-20%, 50 V Electrolytic .....	.022-336-9-002
C403	220 μF, +80/-20%, 25 V Electrolytic .....	.022-336-9-001
C404	220 μF, +80/-20%, 16 V Electrolytic .....	.022-393-9-002
C405	22 μF, +80/-20%, 25 V Electrolytic .....	.022-393-9-004
C406	10 μF, +80/-20%, 50 V Electrolytic .....	.022-390-9-001
C407	47 μF, +80/-20%, 16 V Electrolytic .....	.022-393-9-003
C408	1000 pF, +80/-20%, 25 V Ceramic .....	.020-432-9-001
C409-411	0.047 μF, 5%, 50 V Polyester .....	.025-283-9-002

## PARTS LIST (continued)

C502, 504	0.047 $\mu$ F, +80/-20%, 25 V Ceramic	020-385-9-003
C503	33 pF, 5%, 25 V NPO Ceramic	031-074-9-003
C505	100 pF, 5%, 25 V NPO Ceramic	031-074-9-002
C506	0.01 $\mu$ F, +80/-20%, 25 V Ceramic	020-433-9-001
C507	100 $\mu$ F, +80/-20%, 25 V Electrolytic	022-328-9-001
VC401	Variable Tuning Capacitor	029-021-9-001

## TRANSISTORS & DIODES

Q201, 202	2N5485, FET	182-067-9-001
Q203	2SC1730K, NPN Transistor	176-222-9-001
Q301, 302	2SC1815-GN, NPN Transistor	176-095-9-001
Q501	2N5485, FET	182-067-9-001
Q502	2SC1730K, NPN Transistor	176-222-9-001
D101, 102	1 Amp, 600 PIV Diode	151-050-9-001
D103	LED, Red	158-067-9-001
D301	10 V, +1.7/-2.7%, 500 mW Zener Diode	152-189-9-001

## TRANSFORMERS, COILS & SWITCHES

T101	Power Transformer (120, 220, 240 V PRI)	065-253-9-001
L601	7.5 mHy, 3% Coil	044-071-9-001
L602	820 $\mu$ Hy, 3% Coil	044-071-9-002
L603	80 $\mu$ Hy, 3% Coil	044-071-9-003
L604	6.0 $\mu$ Hy, 3% Coil	044-071-9-004
L605	0.55 $\mu$ Hy, 10% Coil	044-071-9-005
L606	Flat Copper Wire	044-070-9-006
S101	Pushbutton Switch, POWER	088-178-9-001
S401	Lever Switch, INT/EXT	080-032-9-001
S601	Rotary Switch, 6 Position, FREQUENCY RANGE	083-326-9-001

## MISCELLANEOUS

F101	300 mA, 250 V 5 x 20 mm Fast Acting Fuse	196-300-0-300
	Fuse Clip (2 required)	741-209-9-001
	AC Receptacle (Line Cord)	770-022-9-001
	Line Cord Set, CSA/UL	420-039-9-001
	BNC Connector	772-024-9-002
	Front Plate (Sub-Panel)	254-146-9-001
	Front Bezel, Black	380-656-9-001
	Front Inlay (Nameplate)	260-541-9-001

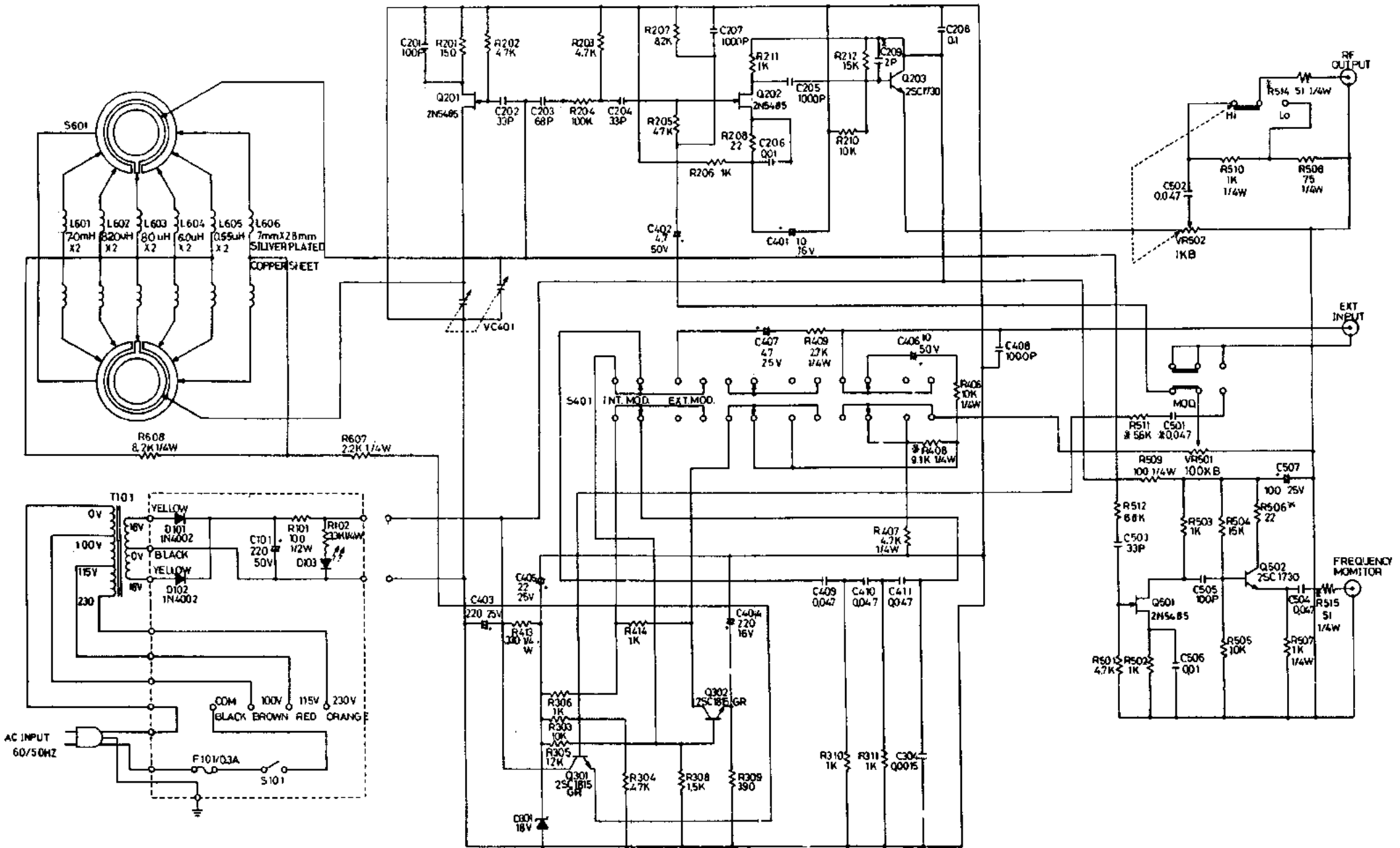
## PARTS LIST (continued)

Sub-Chassis	258-074-9-001
Metal Case, Black	272-203-9-001
Foot	381-152-9-001
Scale Pointer (Frequency)	265-051-9-001
Shaft Bearing	849-019-9-001
Scale Pointer Bushing	849-019-9-002
Power Switch Bezel, Brown	380-601-9-001
Knob, Black, FREQUENCY Dial	751-343-9-001
Knob, Black, MODE LEVEL & RF LEVEL	751-343-9-002
Knob, Silver, INT/EXT MODULATION	751-381-9-001
Knob, Black, FREQUENCY RANGE	751-343-9-004
Switch Button, Red	384-079-9-001
Cable Assembly, BNC-Alligator Clips	534-241-0-000
Instruction Manual	480-673-9-001

**CALIBRATION PROCEDURE**

**MODEL 2005A**

1. Set up the Model 2005A RF Generator as follows:
  - a. Power ON.
  - b. INT-EXT switch to EXT.
  - c. No connection to INPUT-OUTPUT jack (no external modulation).
  - d. Connect RF OUTPUT jack to oscilloscope (at least 40 MHz bandwidth). Do not use terminating resistor.
  - e. Connect FREQ MONITOR jack to frequency counter (at least 500 MHz). Do not use terminating resistor.
  - f. Select Range F and set dial to 35 MHz.
  - g. Set RF LEVEL control for 300 mV p-p on oscilloscope.
2. For each range (starting at F and progressing to A), check the frequency at four points on the dial as listed in the following tables. If adjustment is required, remove the case and adjust to the tighter adjustment limits. Range F must be adjusted before proceeding to other bands.



**RANGE F:**

DIAL	COUNTER (case on)	ADJ. LIMITS (case off)
150 MHz	145.5-154.5 MHz	147-153 MHz
70 MHz	67.9-72.1 MHz	68.6-71.4 MHz
50 MHz	48.5-51.5 MHz	49-51 MHz
32 MHz	31.04-32.96 MHz	31.36-32.46 MHz

Adjust distance between long metal pieces extending from BAND switch.

**RANGE E:**

DIAL	COUNTER (case on)	ADJ. LIMITS (case off)
35 MHz	33.95-36.05 MHz	34.3-35.7 MHz
20 MHz	19.4-20.6 MHz	19.6-20.4 MHz
15 MHz	14.55-15.45 MHz	14.7-15.3 MHz
10 MHz	9.7-10.3 MHz	9.8-10.2 MHz

Adjust by shaping slightly the most exterior coil of L605.

**RANGE D:**

DIAL	COUNTER (case on)	ADJ. LIMITS (case off)
11 MHz	10.67-11.33 MHz	10.78-11.22 MHz
7 MHz	6.79-7.21 MHz	6.86-7.14 MHz
4.5 MHz	4.365-4.635 MHz	4.41-4.59 MHz
3 MHz	2.91-3.09 MHz	2.94-3.06 MHz

Adjust by shaping slightly the most exterior coil of L604.

**RANGE C:**

DIAL	COUNTER (case on)	ADJ. LIMITS (case off)
3.0 MHz	2.91-3.09 MHz	2.94-3.06 MHz
2.0 MHz	1.94-2.06 MHz	1.96-2.04 MHz
1.5 MHz	1.455-1.545 MHz	1.47-1.53 MHz
0.9 MHz	0.873-0.927 MHz	0.882-0.918 MHz

Adjust distance between two coils of L603.

**RANGE B:**

DIAL	COUNTER (case on)	ADJ. LIMITS (case off)
900 kHz	873-927 kHz	882-918 kHz
600 kHz	582-618 kHz	588-612 kHz
400 kHz	388-412 kHz	392-408 kHz
290 kHz	281.3-298.7 kHz	284.2-295.8 kHz

Adjust distance between two coils of L602.

**RANGE A:**

DIAL	COUNTER (case on)	ADJ. LIMITS (case off)
290 kHz	281.3-298.7 kHz	284.2-295.8 kHz
200 kHz	194-206 kHz	196-204 kHz
150 kHz	145.5-154.5 kHz	147-153 kHz
100 kHz	97-103 kHz	98-102 kHz

Adjust distance between two coils of L601.