

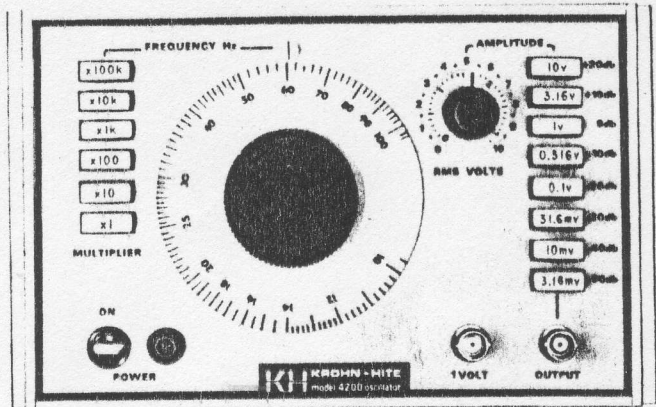
10Hz to 10MHz
TEST OSCILLATOR
Model 4200

- **Frequency range:** 10Hz to 10MHz
- **Power output:** ½ watt
- **Maximum output:** 10 volts rms
- **Frequency response:** 0.025 db
- **Harmonic distortion:** 0.1%
- **Amplitude stability:** 0.02%
- **Frequency accuracy:** 2%
- **Internal impedance:** 50 ohms
- **Auxiliary output**
- **External synchronization**

The Model 4200 Oscillator is a low priced solid state laboratory or production signal source with performance available only in units selling at twice the price. It provides a sine wave over the range from 10Hz to 10MHz with ½ watt of power at less than 0.1% distortion. An infinite resolution dial and push-button multiplier provides rapid and continuous frequency tuning.

The half watt of power over the entire range is outstanding for a general purpose test oscillator, and this coupled with an excellent frequency response of 0.025 db, makes the Model 4200 ideal for meter calibration, response measurements and amplifier testing.

Amplitude calibration of 0.2db accuracy is obtained by an 8 position push-button attenuator calibrated in 10db steps. A continuous output control combined with the attenuator provides 90db of attenuation.

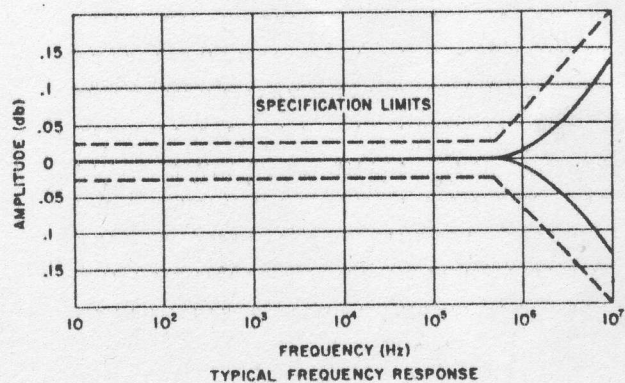
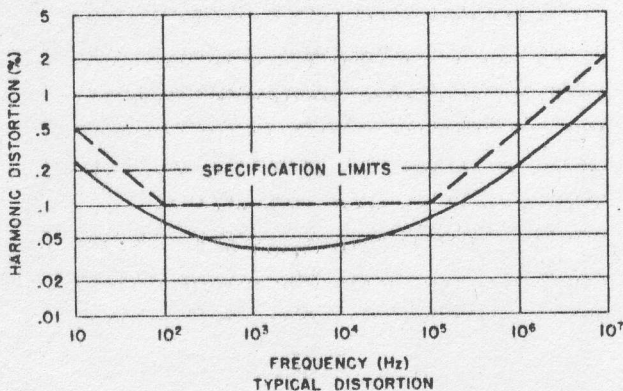


The 50 ohm impedance minimizes signal losses due to resistive and capacitive loading and the half watt of power is essential for driving loads without overloading.

Unavoidable capacitive loading limits the usefulness of any oscillator without low internal impedance and high power output capabilities.

A fixed 1 volt output independent of the main output can be used for synchronizing a scope or as an auxiliary output. For increased frequency accuracy, a synchronizing input is available to lock the Model 4200 to a precise external frequency source.

Careful attention to packaging design, rugged construction and use of all silicon transistors makes this unit insensitive to vibration and shock. The Model 4200 with its broad frequency range, flat response, clean signal and low price, is ideally suited for laboratory and production applications.



model 4200 OSCILLATOR

SPECIFICATIONS

Frequency range:

10 Hz to 10 MHz continuously variable.

| MULTIPLIER | FREQUENCY (Hz) |
|------------|----------------------|
| 1 | 10-100 |
| 10 | 100-1000 |
| 100 | 1000-10,000 |
| 1,000 | 10,000-100,000 |
| 10,000 | 100,000-1,000,000 |
| 100,000 | 1,000,000-10,000,000 |

Frequency control:

A single turn dial calibrated from 9.8 to 104 to read directly in Hertz and a six position pushbutton multiplier. A frequency vernier drive coupled to the dial facilitates close adjustment of frequency.

Frequency calibration accuracy:

±2% from 100Hz to 1 MHz, rising to ±3% at 10Hz and 10MHz.

Frequency stability:

vs. TIME: Short term, within ±0.002%. In any period of one hour or less, within ±0.01%.

vs. TEMPERATURE: Within ±0.05% per degree C from 10Hz to 10MHz.

External synchronization:

A 1.5 volt peak to peak external signal will lock Oscillator over a range of approximately ±0.5% with a slight change in distortion and amplitude for a sine wave synchronizing signal.

Main output:

POWER: ½ watt (10Hz to 10MHz).

VOLTAGE: 10 volts rms open circuit, 5 volts across 50 ohms.

CURRENT: 100 milliamperes rms.

IMPEDANCE: Constant 50 ohms ±1%.

OUTPUT CIRCUITRY: Direct Coupled.

DC COMPONENT: Nominal zero volts. At maximum output, drift is less than 2 millivolts per degree C, less than 1 millivolt for a 10% line voltage change. Drift reduced in proportion to pushbutton attenuator setting.

DISTORTION: Less than 0.1% from 100Hz to 100kHz, rising to 0.5% at 10Hz and 2% at 10MHz.

AMPLITUDE STABILITY:

vs. TIME: In any period of one hour or less, within ±0.02%. In any period of 20 hours or less, within ±0.1%.

vs. LINE: For a 10% change in line voltage, less than ±0.01% from 10Hz to 10MHz.

vs. TEMPERATURE: Within ±0.1% per degree C.

HUM AND NOISE: Less than 0.05% of attenuator setting.

CYCLE TO CYCLE AMPLITUDE STABILITY: Less than 0.1%.

FREQUENCY RESPONSE: Within ±0.025db from 10Hz to 500kHz, rising to ±0.2db at 10MHz.

AMPLITUDE CONTROL: Eight position pushbutton attenuator calibrated in voltage and 10db steps from +20 to -50db and a infinite resolution vernier calibrated in RMS volts from 0 to and 0 to 10. Attenuator accuracy: ±0.2db of pushbutton setting from 10Hz to 10MHz.

Auxiliary output:

VOLTAGE: Fixed 1 volt RMS.

IMPEDANCE: 600 ohms.

DC COMPONENT: Zero.

Ambient temperature range:

0°C to 50°C.

Terminals:

MAIN AND AUXILIARY OUTPUT: Front only on Bench Model, Rear only on Rack Model.

EXTERNAL SYNCHRONIZATION: Rear only on Bench and Rack Models.

Power requirements:

105-125 or 210-250 volts, single phase, 50-400Hz, 30 watts.

Dimensions and Weights:

Bench Model 4200, 8½" wide, 5¼" high, 13½" deep, 11 lbs. 5kgs net, 18 lbs/8kgs shipping. Rack-mounting Model 4200R 19" wide, 5¼" high, 13½" deep, 15 lbs/6,8kgs net, 21 lbs/9,5kg shipping.

Price: \$350.00.

Specifications and price are subject to change without notice.

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MODEL 4200

SECTION 1

GENERAL DESCRIPTION

1.1 Introduction

This manual provides operation and maintenance instructions with detailed specifications, schematic diagram and parts list for the Model 4200 Test Oscillator, illustrated in Figure 1. When the suffix "R" is added to the model number the Oscillator is provided with a front panel suitable for standard rack mounting, and is identical to the bench model in operation and performance.

Reference to Operating Instructions, Section 2, is recommended before this Oscillator is put into operation. In the event the Oscillator is not functioning or fails to meet performance specifications, reference should be made to the Maintenance procedure, Section 4. However, before doing any troubleshooting, it should be determined if the normal adjustments mentioned in the Calibration and Adjustment procedure, Section 5, will correct the trouble.

1.2 Description

The Model 4200 is an all silicon, solid state, general purpose Test Oscillator that provides a main sine wave and an auxiliary sine wave from 10Hz to 10MHz. It operates from an ac source of 115 or 230V, 50-400Hz.

The main sine wave output is variable from 0 to 10 volts rms open-circuit or 5 volts rms across 50 ohms. Maximum power output is 1/2 watt with less than 0.1% harmonic distortion. The Auxiliary output is a sine wave fixed at 1 volt rms open circuit.

1.3 Technical Summary

Frequency Range

10Hz to 10MHz continuously variable

| <u>MULTIPLIER</u> | <u>FREQUENCY (Hz)</u> |
|-------------------|-----------------------|
| 1 | 10-100 |
| 10 | 100-1,000 |
| 100 | 1,000-10,000 |
| 1000 | 10,000-100,000 |
| 10,000 | 100,000-1,000,000 |
| 100,000 | 1,000,000-10,000,000 |

Frequency Control

A single turn dial calibrated from 9.8 to 102 to read directly in Hertz and a six position pushbutton multiplier. A concentric control provides a vernier drive for fine adjustment of frequency.

Frequency Calibration Accuracy

$\pm 2\%$ from 100Hz to 1MHz, rising to $\pm 3\%$ at 10Hz and 10MHz.

Frequency Stability

VS. time: Short term within $\pm 0.002\%$. In any period of one hour or less within $\pm 0.01\%$.

VS. temperature: Within $\pm 0.05\%$ per degree C from 10Hz to 10MHz.

VS. line: For a 10% change in line voltage, $\pm 0.002\%$.

VS. load: No load to full load, $\pm 0.005\%$.

External Synchronization

A 1.5 volt peak to peak external signal will lock Oscillation over a range of approximately $\pm 1.5\%$ with no change in distortion and amplitude for a sine wave synchronizing signal.

See Section 2. _____

Sine Wave Output

Power: 1/2 watt (10Hz to 10MHz)

Voltage: 10 volts rms open circuit

Current: 100 milliamperes rms

Impedance: Constant 50 ohms $\pm 1\%$

Output circuitry: Direct coupled

DC Component: Nominal zero volts. At maximum output drift is less than 2 millivolts per degree C, less than 1 millivolt for a 10% line voltage change. Drift reduced in proportion to pushbutton attenuator setting.

Distortion: Less than 0.1% from ~~100Hz~~^{100Hz} to 100kHz rising to ~~2% at 10MHz~~ .5% at 10Hz and 2% at 10MHz.

Amplitude Stability

VS Time: In any period of one hour or less within $\pm 0.02\%$.
In any period of 20 hours or less, within $\pm 0.1\%$.

VS Line: For a 10% change in line voltage ~~within~~^{less than} $\pm 0.01\%$ from 10Hz to 10MHz.

VS Temperature: Within $\pm 0.1\%$ per degree C.

Hum and Noise: Less than 0.05% of Pushbutton Attenuator setting.

Cycle to Cycle Amplitude Stability: Less than 0.1%

Frequency Response: Within $\pm 0.025\text{db}$ from 10Hz to 500kHz, rising to $\pm 0.05\text{db}$ at 2MHz and $\pm 0.2\text{db}$ at 10MHz.

Amplitude Control:

Eight position pushbutton attenuator calibrated in open circuit voltage and 10db steps from +20 to -50db plus an infinite resolution potentiometer calibrated in RMS volts from 0 to 3.16 and 0 to 10. Attenuator accuracy: $\pm 0.2\text{db}$ of pushbutton setting from 10Hz to 10MHz.

Auxiliary Output

Voltage: Fixed at 1 volt RMS open circuit.

Impedance: 600 ohms

DC Component: Zero

Power Requirements

105-125 or 210-250 volts single phase, 50-400Hz, 30 watts.

Ambient Temperature Range

0°C to 50°C

Terminals

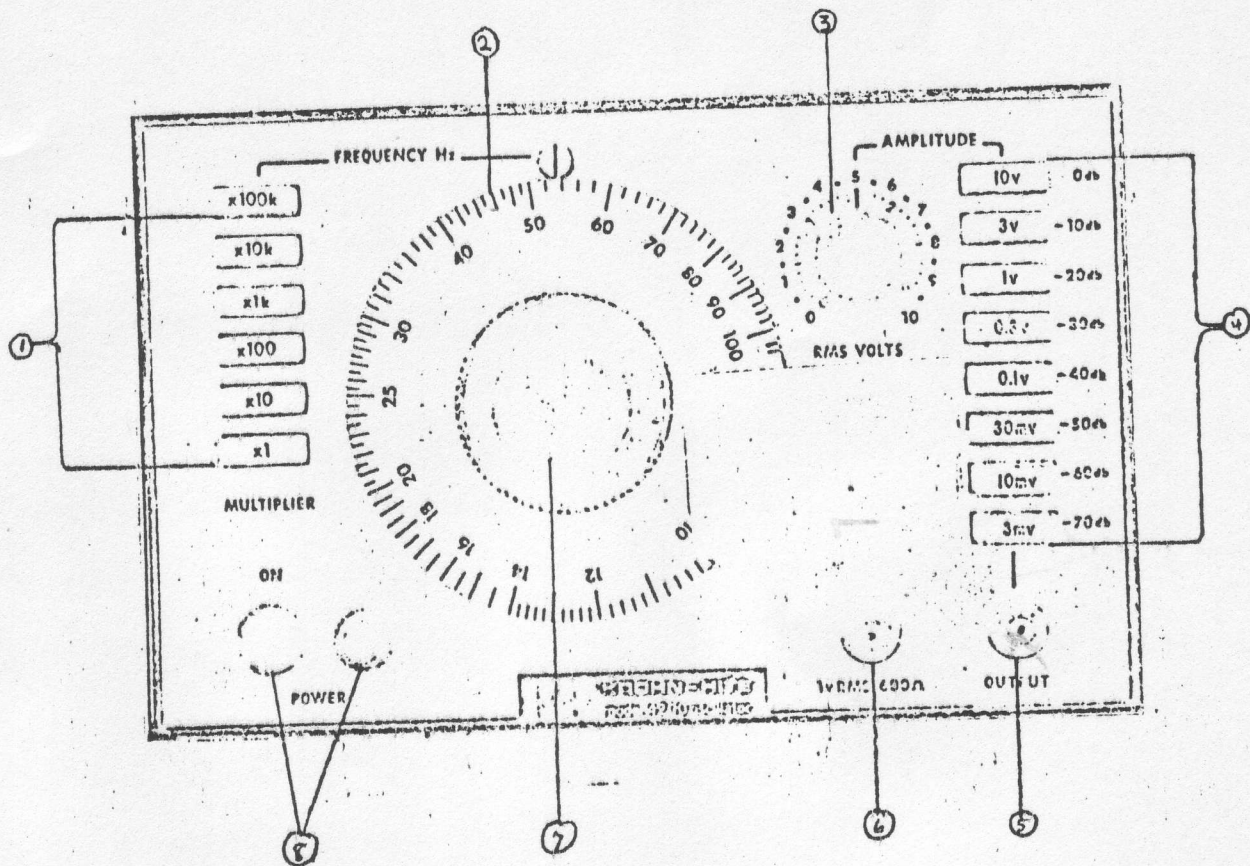
Main and Auxilliary Output: BNC connectors on front only for Bench Model 4200 and rear of chassis for Rack Model 4200R.

External Synchronization: BNC connector on rear chassis, only.

Dimensions and Weights

Bench Model 4200, 8 1/2" wide, 5 1/4" high, 13 1/2" deep, 11 lbs/5kgs net, 18 lbs/8kgs shipping. Rack-mounting Model 4200R, 19" wide, 5 1/2" high, 13 1/2" deep, 15 lbs/6.8kgs net, 21 lbs/9.5kgs shipping.

LOCATION OF CONTROLS AND INDICATORS



- (1) Frequency Multiplier: Selects one of six frequency ranges, from 10Hz to 10MHz.
- (2) Frequency Dial: Varies output frequency within each frequency range. Dial reading multiplied by Frequency Multiplier is the output frequency.
- (3) Variable Amplitude Control: Adjusts the amplitude of signal applied to the Output Attenuator, (~~controls output level~~).
- (4) Output Attenuator: Attenuates the output of the Test Oscillator in 7 steps of 10db each.
- (5) Main Output Connector: Provides the main output signal at an impedance level of 50 ohms, (on rear only for Rack unit).
- (6) Auxiliary Output: Provides 1V RMS auxiliary output signal at an impedance level of 600 ohms.
- (7) Frequency Vernier: Provides a fine adjustment of frequency.
- (8) Power On and Pilot Light: Switch applies power to the Oscillator and lamp glows to indicate application of power.

SECTION 2
OPERATING INSTRUCTIONS

2.1 General

On receipt of the Test Oscillator, carefully examine it for any damage that may have occurred in transit. If signs of damage are observed, file a claim with the transporting agency immediately and notify your Krohn-Hite Representative or Krohn-Hite Corporation directly. Do not attempt to use the Oscillator if extensive damage has occurred and do not ship the unit back until the carrier has inspected it. The instrument may be opened for inspection without nullifying the Warranty.

Rack-Mounting models (designated by a suffix "R" after the model number) mount with four machine screws in the standard 19" rack space. No special brackets or attachments are needed.

2.2 Operation

Figure identifies and describes the function of all the front panel controls, connectors and indicators for the Model 4200.

To operate the Model 4200 proceed as follows:

- a) Make appropriate power connection as described in Section 2.4.
- b) Turn Power Switch to ON position. Pilot Light will glow indicating application of primary power.
- c) Select the desired frequency with the pushbutton Frequency Multiplier and Frequency Dial. For precise frequency setting, connect a frequency counter to the Auxiliary Output and use the Frequency Vernier for fine adjustment.
- d) Set the pushbutton Output Attenuator switch to the minimum voltage range that would include the desired output voltage.

e) Connect load to output connector.

f) Adjust Amplitude control for desired output voltage.

2.3 External Synchronization

An External Sync connector on the rear of the chassis is provided to synchronize the frequency of the Oscillator to an external signal. Connect the external signal to the External Sync. input connector and set the Oscillator dial to the frequency desired.

With an external sine or square wave synchronizing signal of 1.5 volts peak-to-peak, the Oscillator output will be locked in frequency to the external signal over a locking range of approximately $\pm 1.5\%$. The Oscillator distortion will not increase with an external sine wave synchronizing signal ~~and to~~ ^{but will increase to} $.5\%$ for a square wave external signal. When the Oscillator frequency is the same as the external signal frequency, the Oscillator output will be 180° out of phase with the external synchronizing signal. A $\pm 1.5\%$ variation in the Oscillator frequency will vary their relative phase by approximately ± 90 degrees.

With a 10 volt peak-to-peak sine wave external synchronizing signal, the maximum recommended, the locking range will increase to 2% and the distortion will remain the same. With a square wave external signal the same locking range of 2% will be obtained but the distortion will rise to approximately 1% .

2.4 Line Voltage and Fuses

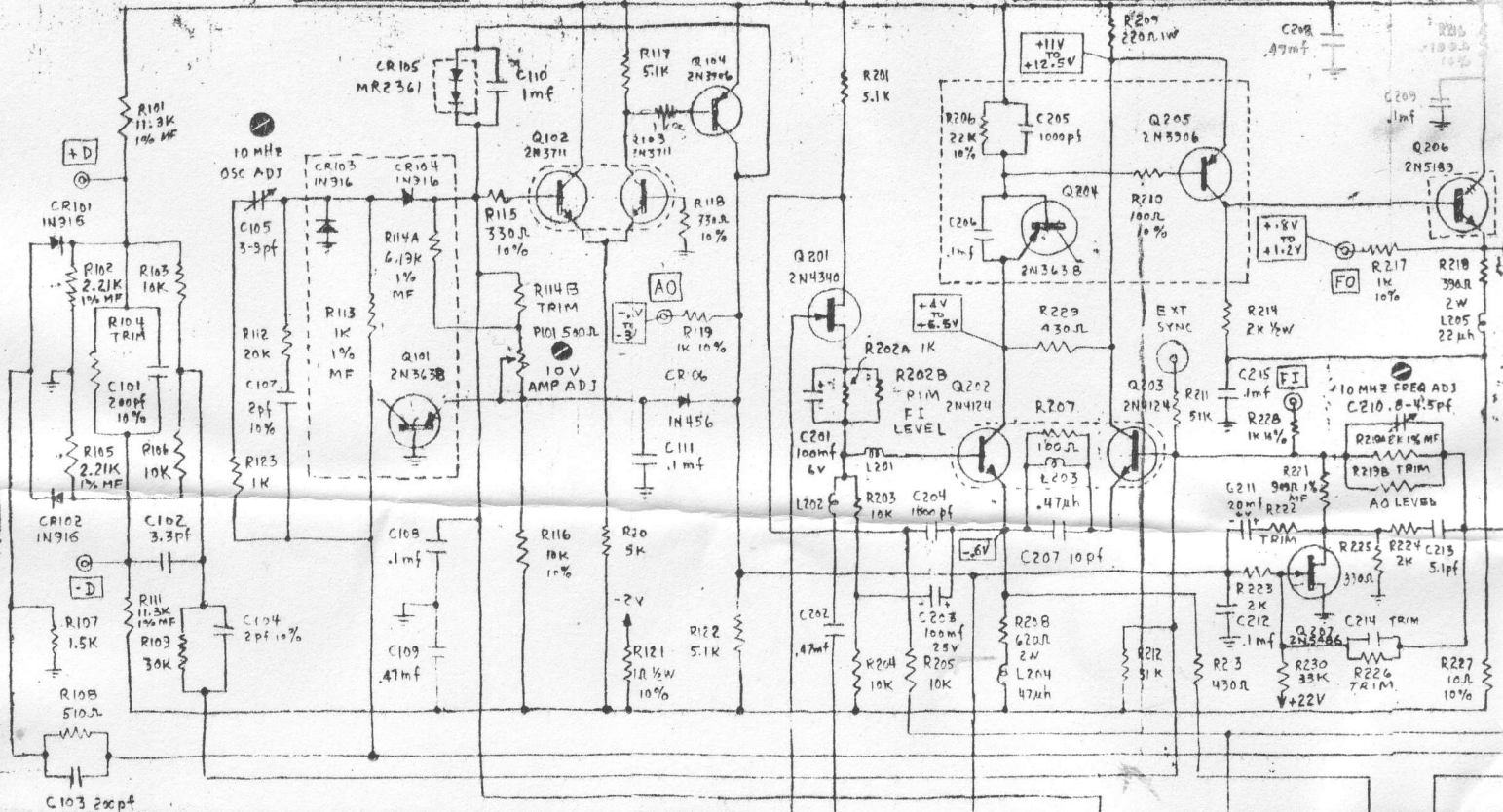
The Oscillator is normally wired for operation from an A-C power source of 105-125 volts, 50 to 400Hz and uses a 0.5 ampere slow-blow fuse that is mounted on the rear of the chassis. It may be modified to operate from an A-C source of 210 to 250 volts by removing the two jumpers between terminals 1 and 3, and terminals 2 and 4 of the power transformer and connecting a jumper across

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terminals 2 and 3. A 0.25 ampere slow-blow fuse should be used for 210-250 volt operation. An identifying tag attached to the line cord will indicate when the Oscillator is wired for 230 volt line operation.

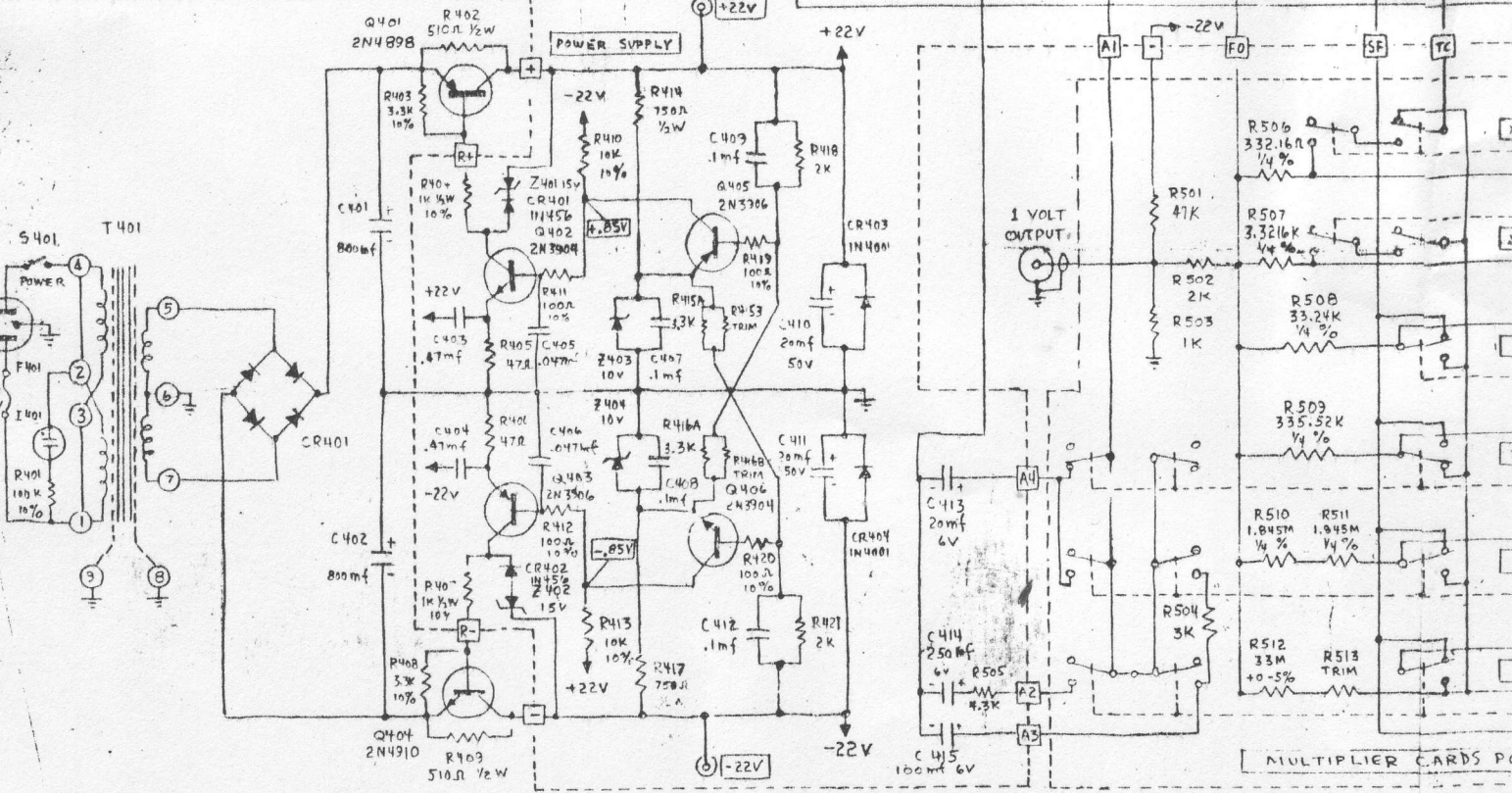
Access to the interior of the Oscillator is accomplished easily by loosening (not removing) the two black thumb screws centered on each side at the rear of the chassis and then pulling out the two side covers. Remove the two sheet metal screws holding the top and bottom covers and remove the covers.

AVC AMPLIFIER

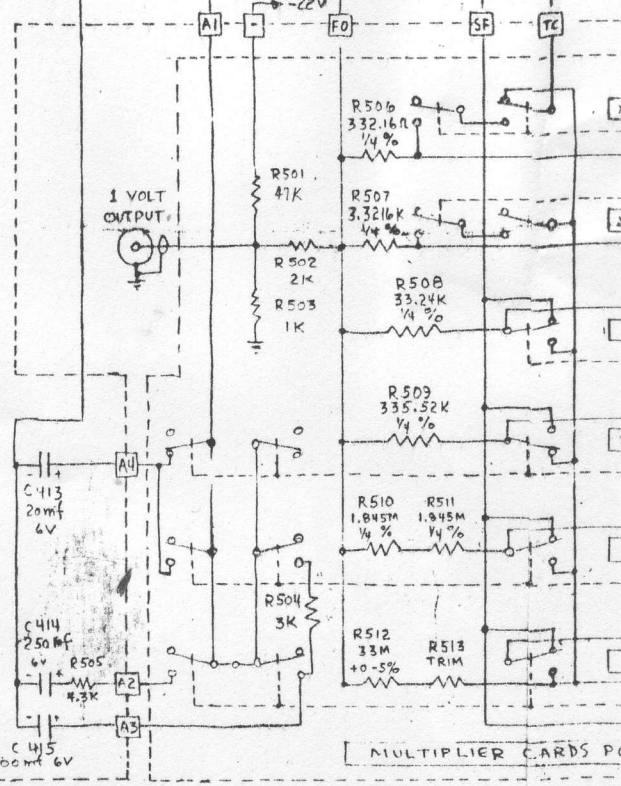
OSCILLATOR AMPLIFIER

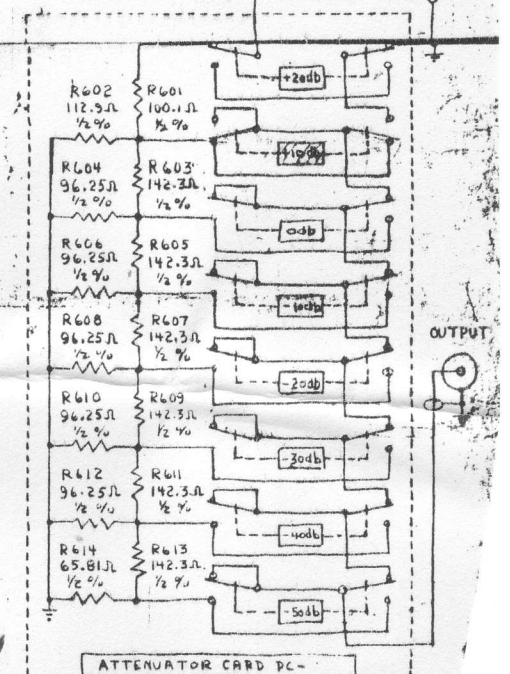
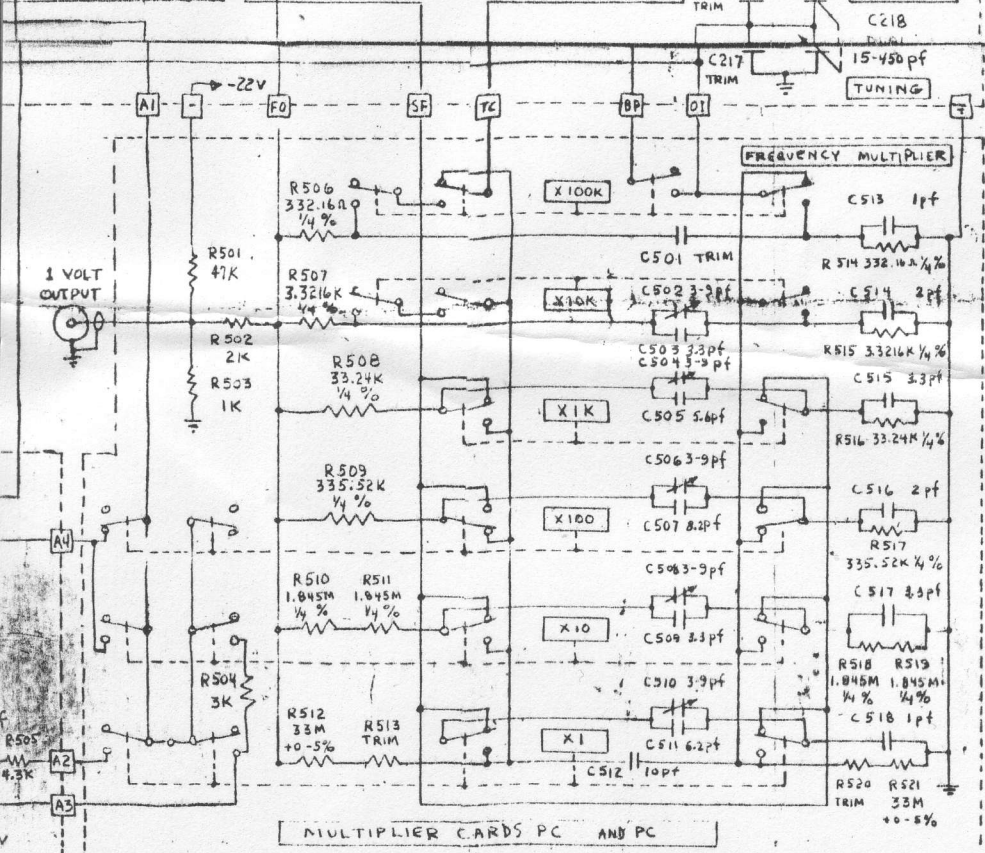
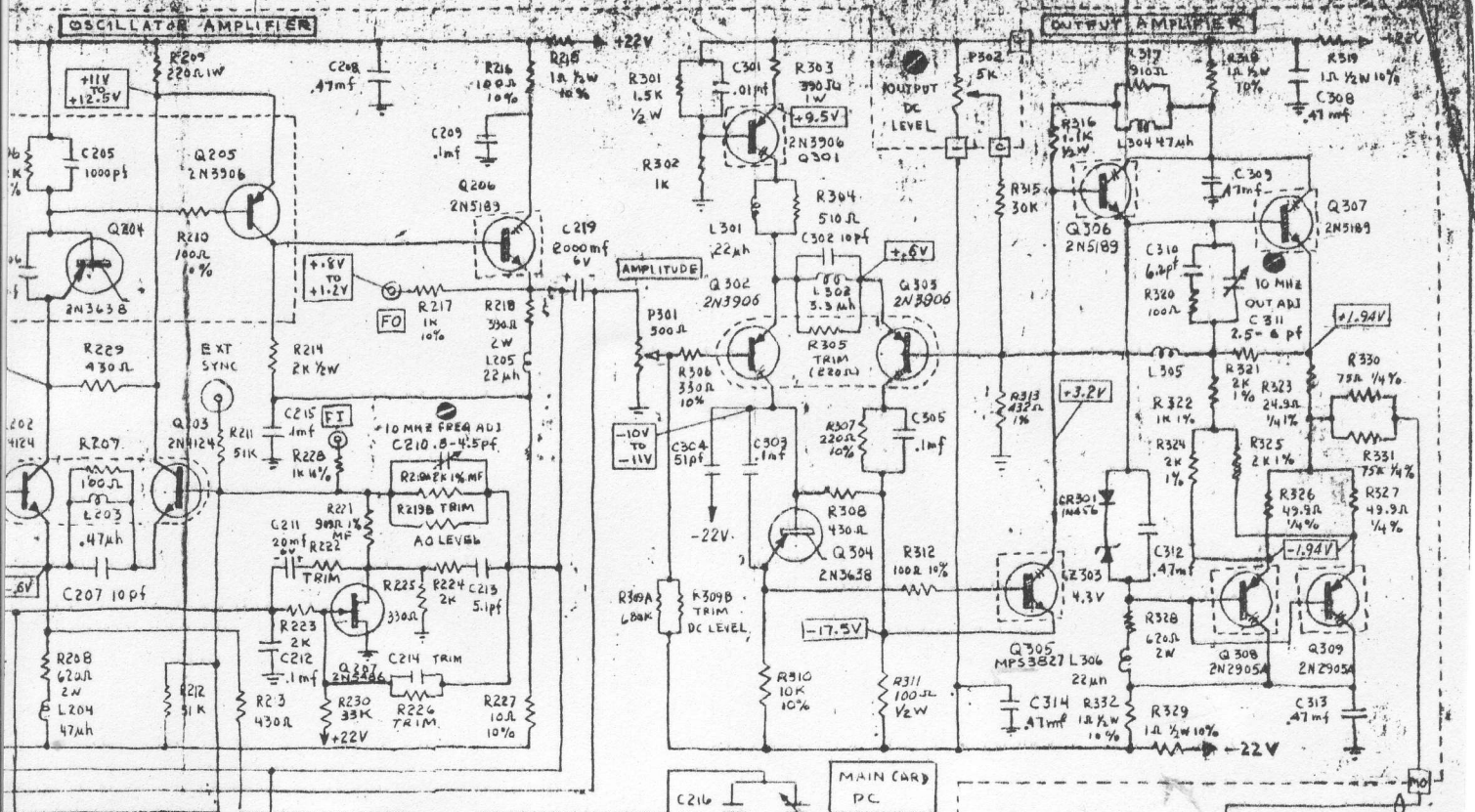


POWER SUPPLY



MULTIPLIER CARDS PC





NOTE FREQUENCY MULTIPLIER SHOWN IN X100 POSITION
ATTENUATOR SHOWN IN +10DB POSITION

| MODEL | TITLE | DATE | REV |
|--------|-----------|---------|---------|
| 4200 | SCHEMATIC | 12/6/66 | |
| Den By | 2/6 | Den Rev | 12/6/66 |
| Apr By | 4/3 | Apr Rev | 4/3 |

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