

LFG-1300S  
FUNCTION GENERATOR  
SERVICE MANUAL

\*\*\*\*\*  
<<WARNING>>  
This service manual is for use by qualified  
personnel only. To avoid electrical shock,  
do not perform any service in this manual  
unless qualified to do so.

\*\*\*\*\*

1st edition Nov., 1989

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## 1. SPECIFICATIONS

|                                                                                                               |                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Range                                                                                               | 0.002Hz to 2MHz in 8 decade ranges.                                                                                                                                                                                                  |
| Dial Accuracy                                                                                                 | $\pm$ (3% set value + 3% full scale) for 0.02Hz to 200kHz.<br>$\pm$ (5% set value + 5% full scale) for 200kHz to 2MHz.                                                                                                               |
| Output Signals                                                                                                | Sine, Triangle, Square, Pulse, Sawtooth, DC, TTL output                                                                                                                                                                              |
| Sine Wave<br>Output voltage<br>Distortion<br><br>Output flatness                                              | 20V <sub>p-p</sub> (approx. 7Vrms) into open circuit<br>Less than 0.5% for 10Hz to 20kHz.<br>Less than 1% for 20kHz to 100kHz.<br>Less than 3% for 100kHz to 2MHz.<br>With $\pm$ 0.3dB for 0.02Hz to 2MHz.                           |
| Triangle Wave<br>Output voltage<br>Symmetry                                                                   | 20V <sub>p-p</sub> into open circuit<br>Less than 1% for 0.02Hz to 100kHz.                                                                                                                                                           |
| Sawtooth Wave<br>Output voltage<br>Symmetry                                                                   | 20V <sub>p-p</sub> into open circuit<br>15:85 or 85:15, Fixed                                                                                                                                                                        |
| Square Wave<br>Output voltage<br>Symmetry<br>Rise time                                                        | 20V <sub>p-p</sub> into open circuit<br>Less than 1% for 0.02Hz to 100kHz.<br>Less than 100ns.                                                                                                                                       |
| Pulse Wave<br>Output voltage<br>Symmetry                                                                      | 20V <sub>p-p</sub> into open circuit<br>Continuously variable, 9:1 to 1:9                                                                                                                                                            |
| TTL Output<br>Fan out<br>Output level                                                                         | 20TTL<br>2.4V to 5V for H.<br>0V to 0.4V for L.                                                                                                                                                                                      |
| DC                                                                                                            | Any level within $\pm$ 10V by DC OFFSET.                                                                                                                                                                                             |
| DC OFFSET                                                                                                     | -10V to +10V<br>Clipping level for superposed waveform: $\pm$ 10V.                                                                                                                                                                   |
| Sweep<br>Sweep mode<br>Sweep rate<br>Sweep width<br><br>External sweep control (VCG)<br>Sweep output (H. OUT) | LOG. or LINEAR is selectable.<br>Continuously variable, 20ms (50Hz) to 5s (0.2Hz).<br>Continuously variable, 10:1 to 1000:1 of frequency ratio.<br>0V to +10V (max. sweep width).<br>This is connected to X-axis of an oscilloscope. |

|                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Amplitude Modulation<br>Depth<br>Modulation signal                                       | Continuously variable, 0% to 95% or more.<br>External input.<br>Carrier suppress function is available.                                                                                                                                                                                                                                                                                                                                                                                          |
| Output Connector<br>Output impedance<br>Attenuators<br>Accuracy                          | 500 $\Omega$ $\pm$ 5%.<br>10dB, 20dB, and 40dB.<br>$\pm$ 1% of set value for less than 200kHz.<br>$\pm$ 2% of set value for 200kHz and above.                                                                                                                                                                                                                                                                                                                                                    |
| Rear Panel Connector<br>VCG IN<br><br>GCV OUT<br><br>MOD IN<br><br>H. OUT<br><br>TTL OUT | External frequency control input, maximum control at 0V to +10V, approx. 10k $\Omega$ of input impedance.<br>Frequency control voltage output, approx. 0V to + 5V for a dial tuning, approx. 1.5k $\Omega$ of output impedance.<br>AM modulation input, optimum input voltage 0.3Vrms, approx. 10k $\Omega$ of input impedance.<br>X-axis signal for oscilloscope in sweep operation, 0V to + 1V sawtooth wave, approx. 1k $\Omega$ of output impedance.<br>TTL level output.<br>Fan out: 20TTL. |
| Size and Weight                                                                          | 250mm (W) X 125mm (H) X 250mm (D),<br>4kg. approx.                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Power Supply                                                                             | 100V, 120V, 220V, 240VAC<br>50/60Hz, 20VA                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Accessories                                                                              | A connection cable LC-2048 (BNC 50 $\Omega$ ). 1 ea.<br>Spare fuse ..... 1 ea.<br>Circuit protection fuse ..... 1 ea.                                                                                                                                                                                                                                                                                                                                                                            |
| Optional accessory                                                                       | Instruction manual ..... 1 ea.<br>Terminator LT-2049 50 $\Omega$ (Separately available).                                                                                                                                                                                                                                                                                                                                                                                                         |

## 2. TEST EQUIPMENT REQUIRED

The following test equipment is required for calibration and servicing of the Model LFG-1300S. The suggested specifications are the minimum necessary for proper calibration of this instrument.

| Test Equipment      | Minimum Specifications                                                                                           |
|---------------------|------------------------------------------------------------------------------------------------------------------|
| - Multimeter        | Accuracy: <1%<br>*LEADER Model LDM-853A                                                                          |
| - Oscilloscope      | Sensitivity: 10mV/div<br>Bandwidth: 20MHz<br>*LEADER Model 1021<br>Low capacitance probe<br>*LEADER Model LF-180 |
| - Frequency Counter | Frequency range: 0.2Hz to 2MHz<br>*LEADER Model LDC-823A                                                         |
| - Audio Generator   | Frequency: 1kHz<br>*LEADER Model LAG-120B                                                                        |
| - Distortion Meter  | Full scale: 0.1%<br>Frequency: 400Hz, 1kHz<br>*LEADER Model 171                                                  |
| - AC Millivoltmeter | Sensitivity: 0.1Vrms<br>Frequency Range: 2MHz                                                                    |

### 3. CALIBRATION PROCEDURE

#### 3.1 General

Calibration should be performed after a 30 minute warm-up period. It should also be confirmed that the unit is connected to the rated power line voltage.

All adjustments should be completed in the given order, because some adjustments interact with others.

During the adjustment procedure, remove the case only when necessary and replace immediately after making an adjustment. This will maintain all circuits at constant operating temperature.

When connecting the oscilloscope to the test point, use a low capacitance probe.

#### \*\*\* WARNING \*\*\*

Electrical shock hazards exist inside this instrument when covers are removed.

#### 3.2 Initial Control Settings

The initial control settings to be used for each check and adjustment are listed below. Any variations from these settings are stated in the applicable procedure.

|                  |                        |
|------------------|------------------------|
| FREQUENCY Dial   | 1.0                    |
| FREQUENCY Switch | x1k                    |
| SWEEP            |                        |
| ON-OFF           | OFF                    |
| LIN-LOG          | LIN                    |
| RATE             | Fully clockwise        |
| WIDTH            | Fully clockwise        |
| AMPLITUDE MOD    |                        |
| ON-OFF           | OFF                    |
| MOD              | Fully counterclockwise |
| CARRIER LEVEL    | 0                      |
| DC OFFSET        | OFF                    |
| FUNCTION         | Sine                   |
| OUTPUT           |                        |
| AMPLITUDE        | Fully clockwise        |
| ATTENUATION      | 0dB                    |

### 3.3 Power Supply

- Connect the DC voltmeter between test point(T-2107, main board) and chassis.
- Check the voltages according to Table 3-1.

| Test point   | Voltage | Tolerance          | Adjustment  |
|--------------|---------|--------------------|-------------|
| IC304, pin 2 | +5V     | +4.75V to +5.25V   | -           |
| IC305, pin 2 | -5V     | -4.75V to -5.25V   | -           |
| IC302, pin 2 | +15V    | +14.25V to +15.75V | -           |
| IC303, pin 2 | -15V    | -14.25V to -15.75V | -           |
| TP4          | +10.0V  | -                  | VR302, +10V |
| TP3          | -10V    | +1% of +10V supply | -           |

Table 3-1

### 3.4 Voltage Controlled Generator(VCG)

#### (1) Offset

- Set: FREQUENCY Dial Fully clockwise  
OUTPUT  
AMPLITUDE Fully clockwise
- Connect the DC voltmeter to emitter of Q104(T-2107, main board).
- Adjust VR101, OFFSET(T-2107, main board) for a voltage reading of 0.0Vdc.

#### (2) Frequency

- Connect the frequency counter to OUTPUT connector.
- Set: FREQUENCY Switch x1k  
FREQUENCY Dial .2
- Adjust VR106, x1k 200Hz ADJ(T-2107, main board) for a frequency reading of 200Hz.
- Set: FREQUENCY Dial 2.0
- Adjust VR112, x1k 2kHz ADJ(T-2107, main board) for a frequency reading of 2kHz.
- Repeat above adjustment for best calibration accuracy.



- Set: FREQUENCY Dial 2.0
- Adjust all remaining ranges by using the adjustments according to Table 3-2.
- \*NOTE\* It may be compromise to obtain a best calibration accuracy on all ranges.

| Frequency(Range) | Adjustment       |
|------------------|------------------|
| 0.2Hz(x0.1)      | VR103(x10)       |
| 2Hz(x1)          | VR103(x10)       |
| 20Hz(x10)        | VR103(x10)       |
| 200Hz(x100)      | VR105(x100)      |
| 20kHz(x10k)      | VR107(x10k)      |
| 200kHz(x100k)    | VR108(x100k)     |
| 2MHz(x1M)        | VR109/VC101(x1M) |

Table 3-2

### 3.5 Functions

#### (1) Sine Wave

##### a. Distortion

- Set: FREQUENCY Dial 2.0
- FREQUENCY Switch x1k
- FUNCTION Sine
- OUTPUT
- AMPLITUDE Fully clockwise
- Connect the distortion meter to OUTPUT connector.
- \*NOTE\* Monitor the harmonic output of the distortion meter with the oscilloscope while an adjustment.
- Adjust VR110, +DIST and VR111, -DIST(T-2107, main board) alternately for minimum distortion.
- Set: FREQUENCY Switch x10
- Adjust VR113, LOW FREQ DIST(T-2107, main board) for minimum distortion.
- Set: FREQUENCY Dial .2
- Adjust VR114, SINE OFFSET(T-2107, main board) for minimum distortion.
- Repeat above adjustment for minimum distortion.

b. Output Level

- Set: OUTPUT  
          AMPLITUDE                      Fully clockwise
- Connect the oscilloscope to OUTPUT connector.
- Adjust VR210, SINE OUTPUT(T-2107, main board) for an amplitude of 20Vp-p.

(2) Triangular Wave

- Set: FREQUENCY Dial                      2.0  
      FREQUENCY Switch                    x1k  
      FUNCTION                             Triangle  
      OUTPUT  
      AMPLITUDE                           Fully clockwise
- Connect the oscilloscope to OUTPUT connector.
- Adjust VR203, TRIANGULAR OUTPUT(T-2107, main board) for an amplitude of 20Vp-p.

(3) Square Wave

- Set: FREQUENCY Dial                      2.0  
      FREQUENCY Switch                    x1k  
      FUNCTION                             Square  
      OUTPUT  
      AMPLITUDE                           Fully clockwise
- Connect the oscilloscope to OUTPUT connector.

a. Output Level

- Adjust VR202, SQUARE WAVE OUTPUT(T-2107, main board) for an amplitude of 20Vp-p.

b. Offset

- Adjust VR201, SQUARE OFFSET(T-2107, main board) for a center of the square wave to 0Vdc.

### 3.6 AM Modulation

- Set: FREQUENCY Dial 2.0
- FREQUENCY Switch x100k
- AMPLITUDE MOD
- ON-OFF ON
- MOD Midrange
- FUNCTION Sine
- OUTPUT
- AMPLITUDE Midrange

- Connect the oscilloscope to OUTPUT connector.
- Connect the audio generator to MOD IN connector and set the frequency to 1kHz, output level for 1Vp-p.
- Adjust CARRIER LEVEL control to obtain an AM signal. Refer to Figure 3-1.

#### (1) Balance

- Adjust VR207, AM BAL(T-2107, main board) to equalize the "A" and "B" of the waveform as shown in Figure 3-1.

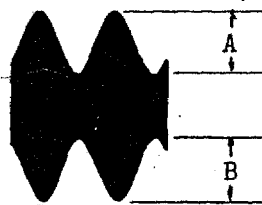


Figure 3-1

- Confirm that the DSB(Double Side Band) signal is obtained by adjusting the CARRIER LEVEL control. Refer to Figure 3-2.

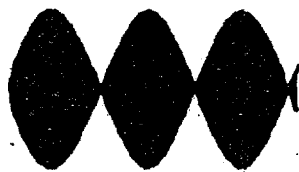


Figure 3-2

(2) Amplifier

- Set: AMPLITUDE MOD  
MOD Fully clockwise
- Adjust CARRIER LEVEL control for 100% modulation.
- Set: AMPLITUDE MOD  
ON-OFF OFF  
MOD Fully counterclockwise
- Adjust the oscilloscope sensitivity for 4 divisions display.

a. Gain

- Set: AMPLITUDE MOD  
ON-OFF ON
- Adjust VR208, AM GAIN(T-2107, main board) for a display of 2 divisions.

b. Offset

- Adjust VR209, AM OFFSET(T-2107, main board) for the same DC levels when the AM MOD switch is pushed on and off.

3.7 Rear Panel Outputs

(1) H OUT

- Set: SWEEP  
LIN-LOG LIN  
RATE Fully clockwise
- Connect the oscilloscope to H OUT connector on the rear panel.
- Set VR301, SAWTOOTH RETURN(T-2107, main board) to fully clockwise.
- Confirm that the fall time of the sawtooth should be 5ms or less.
- Confirm that the rise-up time of the sawtooth should be 20ms or less.

- Set: SWEEP RATE Fully counterclockwise
- The rise-up time of the sawtooth should be 5sec or longer.

(2) GCV OUT

- Connect the oscilloscope to GCV OUT connector on the rear panel. Use DC input mode.

a. DC Output

- Set: FREQUENCY Dial Fully clockwise
- SWEEP OFF
- ON-OFF OFF

- The output voltage should be 0Vdc.

- Set: FREQUENCY Dial Fully counterclockwise

- The output voltage should be between +2Vdc and +8Vdc.

b. Sawtooth Output

- Set: FREQUENCY Dial Fully clockwise
- SWEEP ON
- ON-OFF Fully clockwise
- WIDTH Midrange
- RATE

- Confirm that the waveform as shown in Figure 3-3.

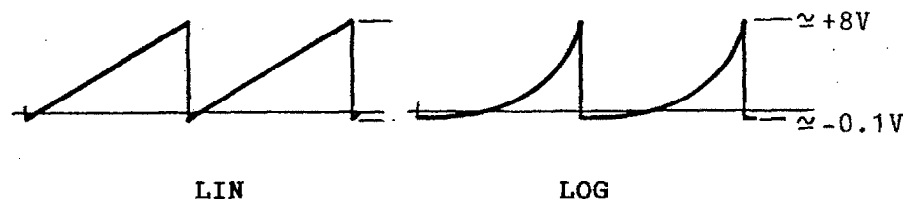


Figure 3-3

## 4. TROUBLESHOOTING PROCEDURE

### 4.1 General

Confirm that the any equipment used with the Model LFG-1300S is operating correctly.

Check all control settings, an incorrect setting can make a good unit appear defective. If there is any question about the function, refer to the Instruction Manual for correct operation.

Check all circuit for visual defects such as broken component, loose connection, open wire, poor soldering etc.

Some troubles can be solved with proper adjustment.

Check the voltage and waveform as shown in the Schematic Diagram to locate the defective circuit. Start with the power supply.

#### \*\*\* WARNING \*\*\*

Electrical shock hazards exist inside this instrument when covers removed.

### 4.2 Theory of Operation

The Model LFG-1300S is divided into five major sections; a Basic Function Generator including a Voltage Controlled Generator (VCG) and Sine Shaper, an AM Modulator, a Sweep Generator and an Output Amplifier/Attenuator with DC offset circuitry. Refer to "7. Block Diagram".

#### - Basic Function Generator

The basic function generator has a non-linear feedback loop consisting of a flip-flop and an integrator that produces the square and triangular waveforms.

In the VCG, the frequency is determined by the frequency dial VR601 and range switch S101. Frequency can also be controlled by an external VCG input J2 on the rear panel.

The sine shaper receives the triangular wave from the basic generator and converts it through a diode-resistance network to a sine wave. The sine, square and triangular wave are routed through a function switch S201 to the AM modulator.

- AM

When a AM modulator is selected, the amplitude of the output waveform can be modulated by an external input. Percentage of modulation can be controlled by VR603 and carrier suppression is controlled by VR604.

FM modulation can be obtained by applying voltage to the VCG input.

- Sweep Generator

Sweep generator is two generators. The master generator is a VCG and the secondary generator produces a sawtooth waveform that sweeps the frequency of the master generator. All outputs; sine, triangular or square can be swept linear or logarithmic on each range.

The sawtooth is applied to the H OUT connector on the rear panel.

- Output Amplifier and Attenuator

The output amplifier produces a high amplitude output directly coupled through the 50 ohm attenuator. Signal offset is controlled at this point. A 125mA fuse is installed on the attenuator pc board T-2004 to protect the output from any externally applied voltage.

The attenuator is a passive 10, 20, 40dB resistor network. Attenuation is 0dB with buttons out and 70dB with all buttons depressed.

- Symmetry

Symmetry of the square wave is controlled by comparator Q203, Q204 and IC204. Adjusting VR602, symmetry control, changes the voltage applied to IC204 changing the symmetry of the applied square wave.

- Power Supply

The power supply is a linear supply with outputs of +5, +10 and +15 volts. These supplies are controlled by IC302-IC306 with +10 volts adjustable by VR302.

### 4.3 Troubleshooting Aid

#### \*\*\* WARNING \*\*\*

Electrical shock hazards exist inside this instrument when covers are removed.

- (1) Overall operation is not satisfactory, or no signal output.

Check the following points.

- Line fuse

0.315A time-lag fuse for 100V to 120V operation.

0.125A time-lag fuse for 200V to 240V operation.

\*CAUTION\* Use specified fuse only. Refer to section "10. Parts list".

- Secondary voltage of the power transformer.

- Regulated DC power supplies on the main board, T-2107. Refer to Table 4-1.

| Test point   | Voltage | Tolerance          | Adjustment  |
|--------------|---------|--------------------|-------------|
| IC304, pin 2 | +5V     | +4.75V to +5.25V   | -           |
| IC305, pin 2 | -5V     | -4.75V to -5.25V   | -           |
| IC302, pin 2 | +15V    | +14.25V to +15.75V | -           |
| IC303, pin 2 | -15V    | -14.25V to -15.75V | -           |
| TP4          | +10.0V  | -                  | VR302, +10V |
| TP3          | -10V    | +1% of +10V supply | -           |

Table 4-1

Yes: Proceed to step "(2)".

No: Troubleshoot regulated power supplies.

+5V: D307-310, IC304(T-2107, main board) and associated circuit.

-5V: D307-310, IC305(T-2107, main board) and associated circuit.

+15V: D303-306, IC302(T-2107, main board) and associated circuit.

-15V: D303-306, IC303(T-2107, main board) and associated circuit.

+10V: +15V and -15V supplies, Q303-304, IC306 (T-2107, main board) and associated circuit.

-10V: +15V, -15V and +10V supplies, Q305-306, IC306 (T-2107, main board) and associated circuit.

- Fuse, F401(soldered on the attenuator board, T-2004) for open. Refer to page 9-2 for replacement.

\*CAUTION\* Use specified fuse only. Refer to section "10. Parts list".



(2) Master Generator

a. No triangular wave comes out.

Check waveform at TP2(T-2107, main board) for triangular wave.

Yes: Troubleshoot output amplifier, attenuator, Function switch and associated circuit.

No: Troubleshoot voltage to current converter, Frequency switch and associated circuit.

b. No sine wave comes out

Confirm that the triangle function works correctly.

Check waveform at junction of R161(T-2107, main board) and Function switch.

Yes: Troubleshoot Function switch and associated circuit.

No: Troubleshoot sine converter and associated circuit.

c. No square wave comes out

Confirm that the triangle function works correctly.

Check waveform at junction of VR202(T-2107, main board) and Function switch for triangular wave.

Yes: Troubleshoot Function switch and associated circuit.

No: Troubleshoot square wave shaper and associated circuit.

d. No frequency change or intermittent by rotating Frequency dial.

Troubleshoot VR601, Frequency switch and associated circuit.

Troubleshoot low frequency feedback amplifier and associated circuit for x1 and lower ranges.

(3) AM Modulator

No modulated signal comes out

Confirm that the continuous wave came out from the OUTPUT connector.

Check waveform at emitter of Q207(T-2107, main board) for modulated signal.

Yes: Troubleshoot modulator and associated circuit.

No: Troubleshoot output stage and associated circuit.

(4) Sweep Mode

No sweep mode works

Confirm that the continuous wave came out from the OUTPUT connector, also the frequency to be changed by rotating the Frequency dial

Check waveform at TP5(T-2107, main board) for sawtooth wave which frequency is changed by rotate the RATE control.

Yes: Troubleshoot Sweep switch and associated circuit.

No: Troubleshoot sawtooth generator, log sweep shaper and associated circuit.

(5) Others

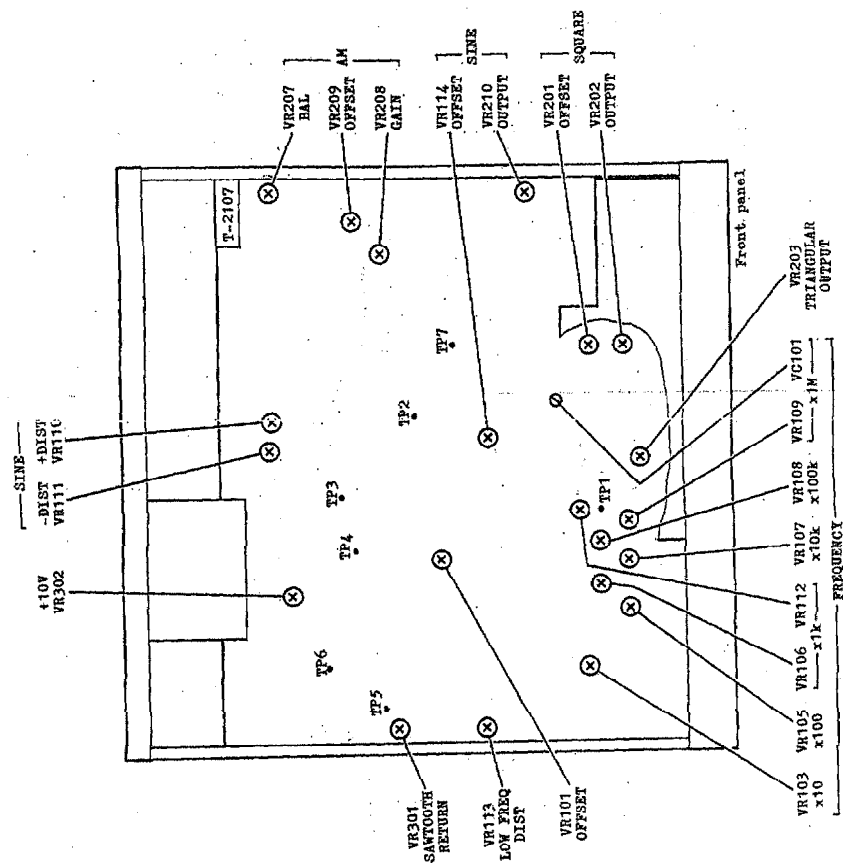
a. No SYMMETRY control works

Check VR602 and associated circuit.

b. No DC OFFSET works

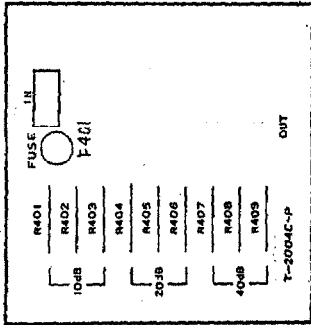
Check VR502 and associated circuit.

# 5. ADJUSTMENT LOCATIONS

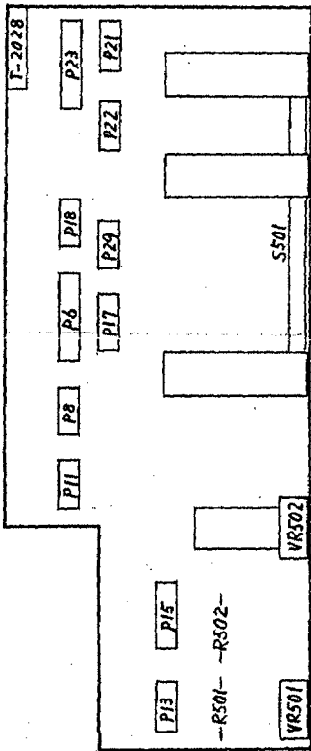


Top View

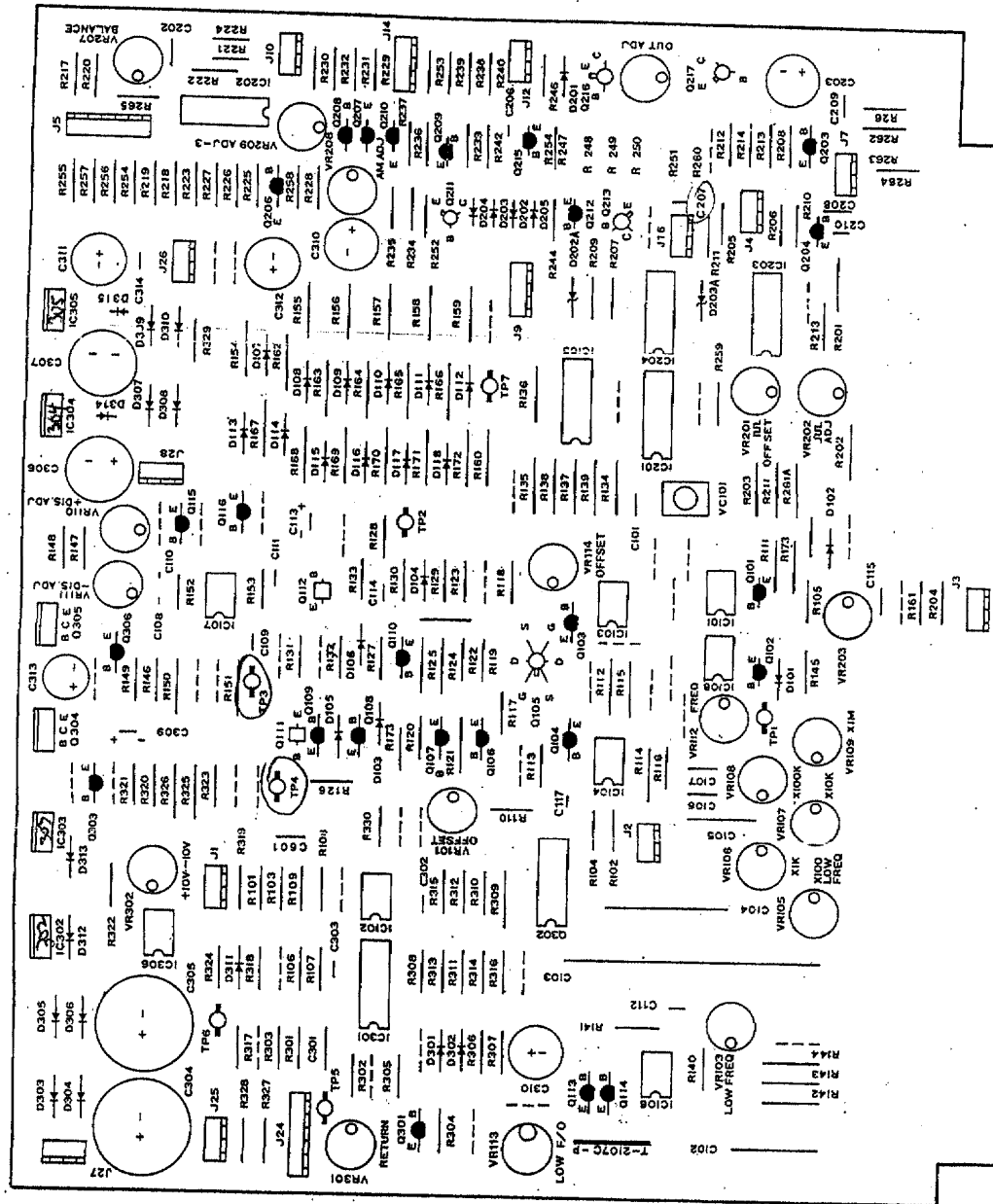
6. PRINTED CIRCUIT BOARD



Attenuator Board  
T-2004

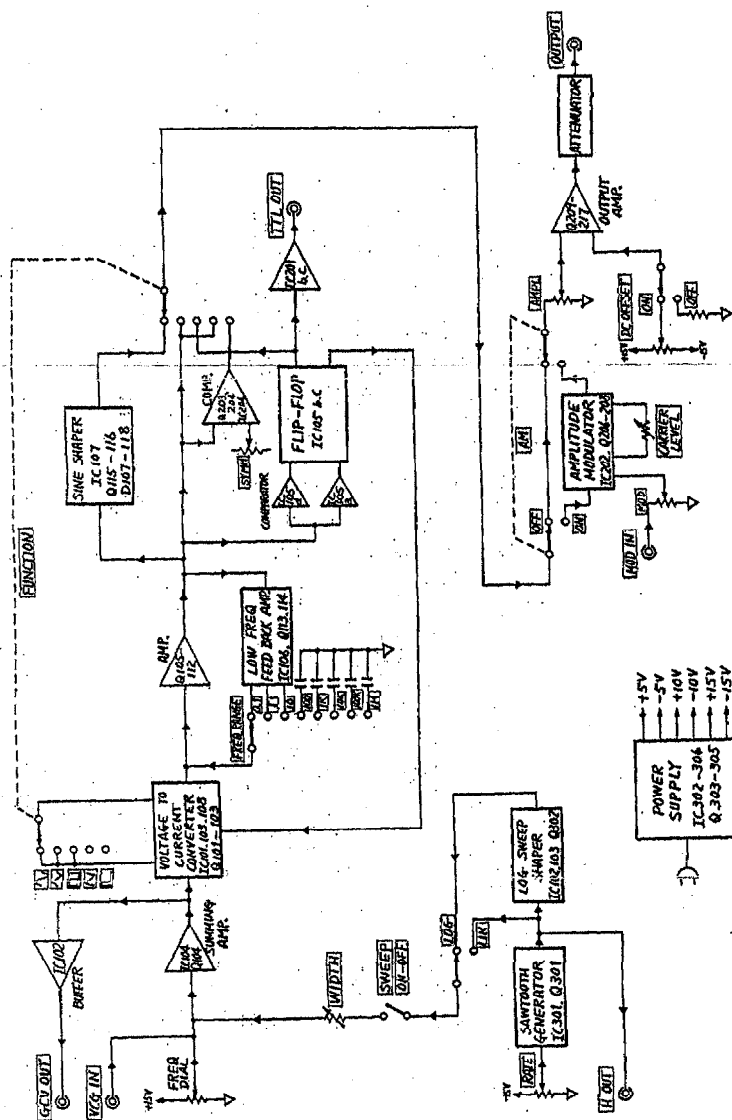


Control Board  
T-2028

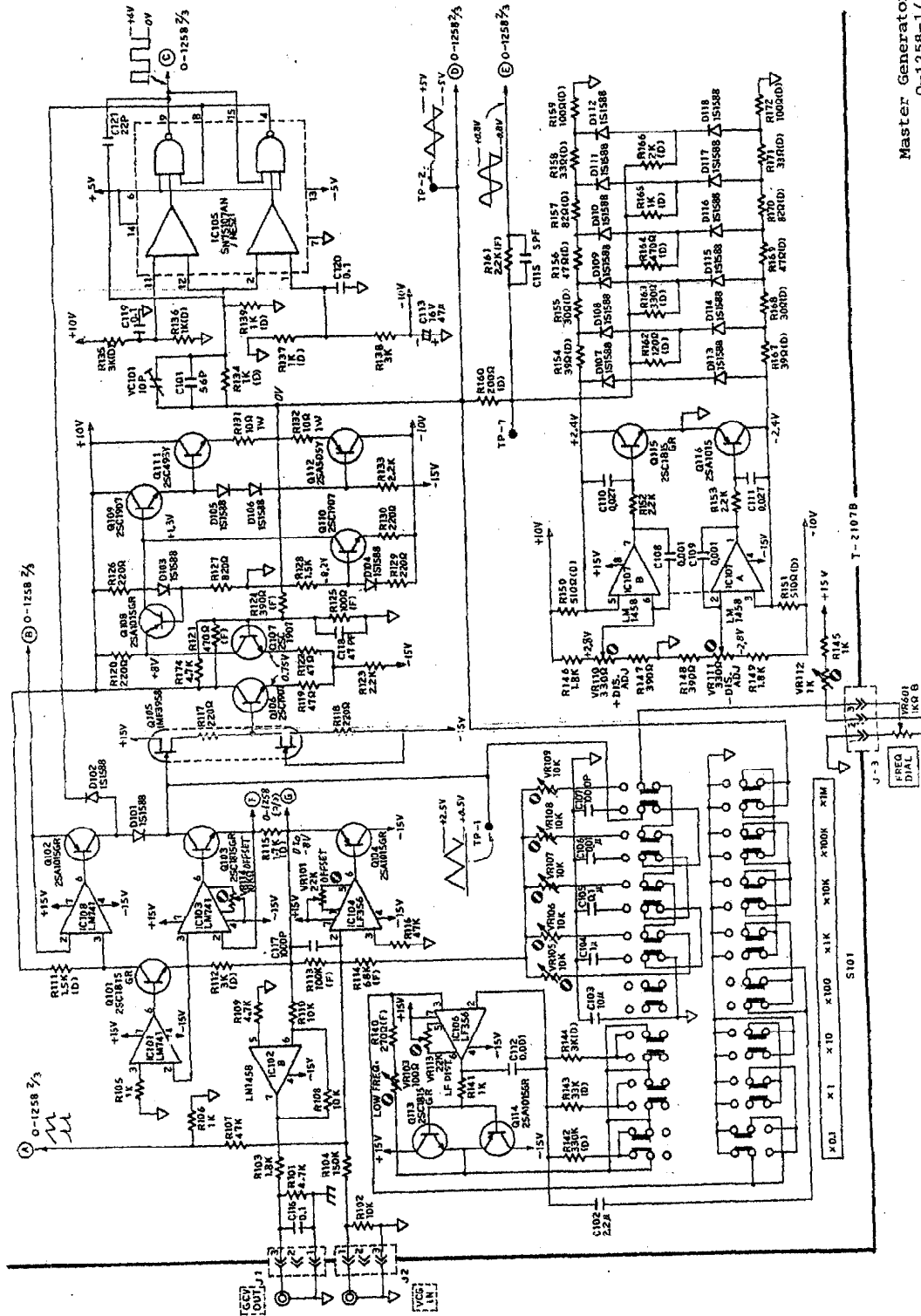


Main Board  
T-2107

# 7. BLOCK DIAGRAM

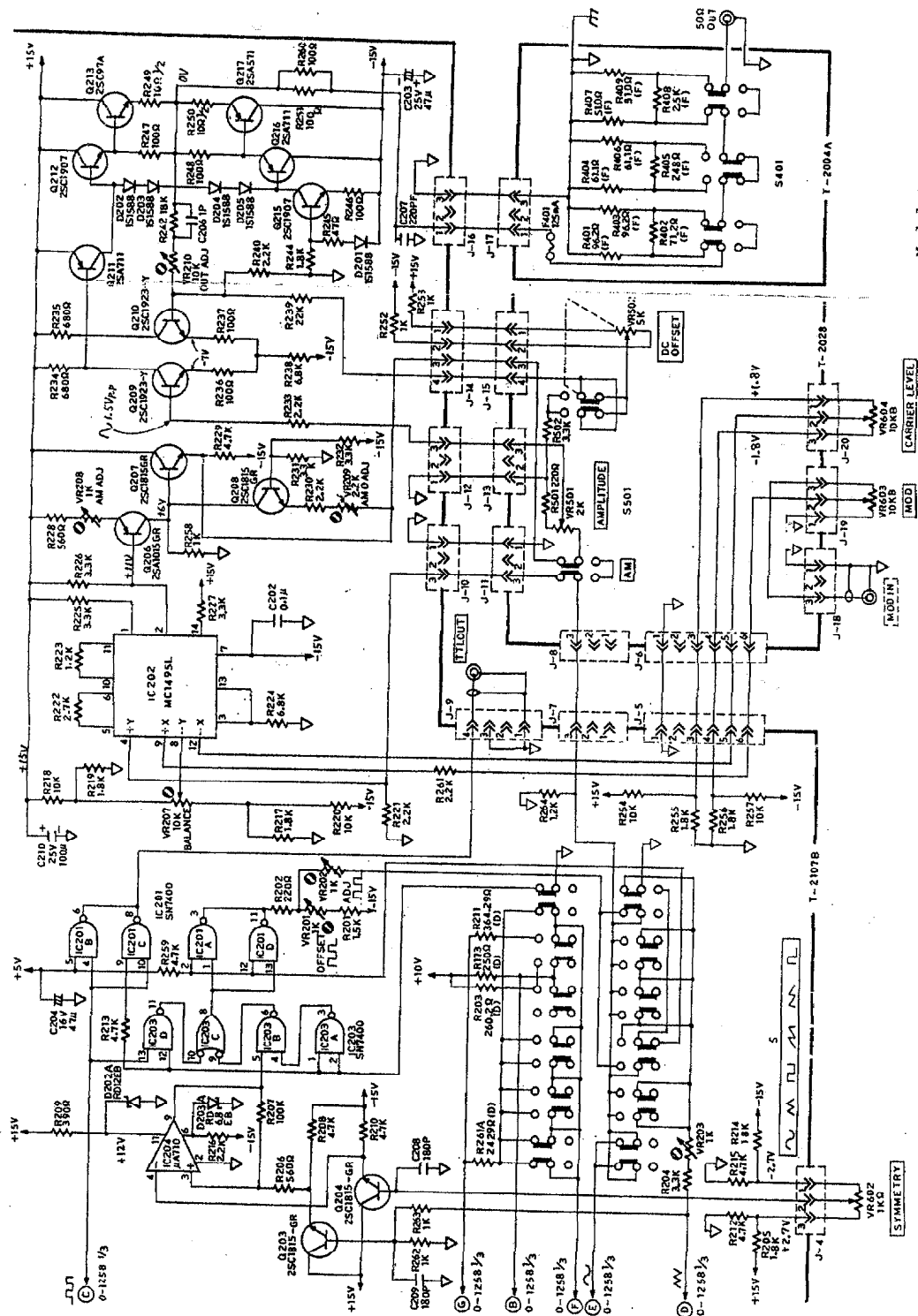


# 8. SCHEMATIC DIAGRAM



Master Generator  
O-1258-1/3

8-1  
13005



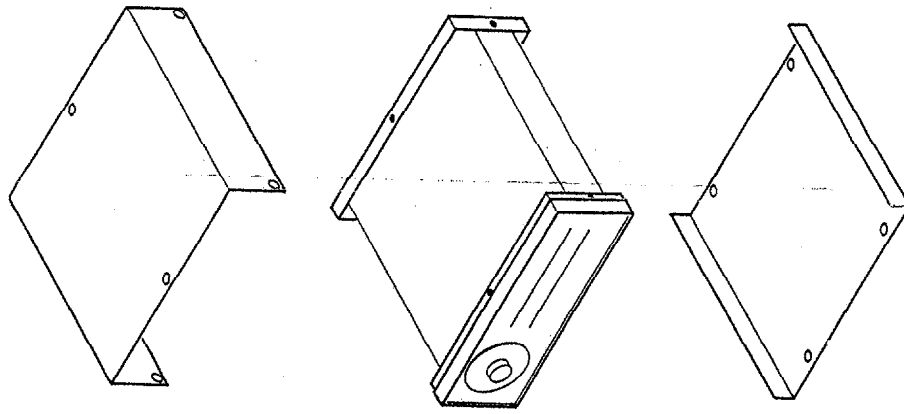
Modulator, Output Stage  
O-1258-2/3

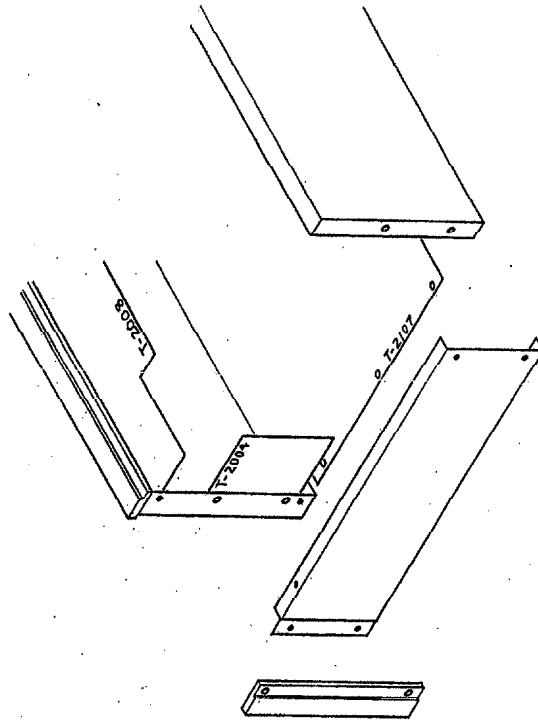




## 9. CABINET REMOVAL

- Take six screws off to remove the Top cover.
- Take four screws off to remove the Bottom cover.





# 10. PARTS LIST

No. LDR PT No. DESCRIPTION

## \*\*\* ATTENUATOR BOARD

T-2004 \*\*\*

### -RESISTORS-

|      |            |            |          |    |      |
|------|------------|------------|----------|----|------|
| R401 | 1349629003 | METAL FILM | 96.2 OHM | 1% | 1/2W |
| R402 | 1347129001 | METAL FILM | 71.2 OHM | 1% | 1/2W |
| R403 | 1349629003 | METAL FILM | 96.2 OHM | 1% | 1/2W |
| R404 | 1346119002 | METAL FILM | 61.1 OHM | 1% | 1/2W |
| R405 | 1342480003 | METAL FILM | 248 OHM  | 1% | 1/2W |
| R406 | 1346119002 | METAL FILM | 61.1 OHM | 1% | 1/2W |
| R407 | 1345109003 | METAL FILM | 51 OHM   | 1% | 1/2W |
| R408 | 1342501005 | METAL FILM | 2.5K OHM | 1% | 1/2W |
| R409 | 1345109003 | METAL FILM | 51 OHM   | 1% | 1/2W |

### -SWITCH-

|      |            |      |        |               |
|------|------------|------|--------|---------------|
| S401 | 4020108000 | PUSH | S-3-26 | "ATTENUATION" |
|------|------------|------|--------|---------------|

## \*\*\* CONTROL BOARD

T-2028 \*\*\*

### -RESISTORS-

|      |            |             |          |    |      |
|------|------------|-------------|----------|----|------|
| R501 | 1010221002 | CARBON FILM | 220 OHM  | 5% | 1/4W |
| R502 | 1010332001 | CARBON FILM | 3.3K OHM | 5% | 1/4W |

### -VARIABLE RESISTORS-

|       |            |             |        |     |       |             |
|-------|------------|-------------|--------|-----|-------|-------------|
| VR501 | 1813041002 | CARBON FILM | 2K OHM | 20% | 1/10W | "AMPLITUDE" |
| VR502 | 1910045000 | CARBON FILM | 5K OHM | 20% | 1/10W | "DC OFFSET" |

### -SWITCH-

|      |            |      |        |      |
|------|------------|------|--------|------|
| S501 | 4020109002 | PUSH | S-7-26 | "AM" |
|------|------------|------|--------|------|

### -PC BOARD-

|            |         |
|------------|---------|
| 5902028001 | T-2028A |
|------------|---------|

## \*\*\* MAIN FRAME \*\*\*

### -VARIABLE RESISTORS-

|       |            |             |          |      |      |                 |
|-------|------------|-------------|----------|------|------|-----------------|
| VR601 | 1940027009 | PLASTIC     | 1K OHM   | 1.5% | 1W   |                 |
| VR602 | 1811106002 | CARBON FILM | 1K OHM   | 20%  | 1/8W | "SYMMETRY"      |
| VR603 | 1811110003 | CARBON FILM | 10K OHM  | 20%  | 1/8W | "MOD"           |
| VR604 | 1811110003 | CARBON FILM | 10K OHM  | 20%  | 1/8W | "CARRIER LEVEL" |
| VR605 | 1811114001 | CARBON FILM | 100K OHM | 20%  | 1/8W | "WIDTH"         |
| VR606 | 1811152009 | CARBON FILM | 10K OHM  | 20%  | 1/8W | "RATE"          |

### -DIODE-

|    |            |     |         |
|----|------------|-----|---------|
| D1 | 3130005006 | LED | SLP-751 |
|----|------------|-----|---------|

### -TRANSFORMER-

|    |            |                   |        |
|----|------------|-------------------|--------|
| T1 | 3800407001 | POWER TRANSFORMER | J-407A |
|----|------------|-------------------|--------|

### -SWITCH-

|    |            |      |        |         |
|----|------------|------|--------|---------|
| S1 | 4020130003 | PUSH | S-1-33 | "POWER" |
|----|------------|------|--------|---------|

| No.     | LDR PT No. | DESCRIPTION |            |      |      |
|---------|------------|-------------|------------|------|------|
| (T-2107 | CONT'D)    |             |            |      |      |
| R169    | 1364700007 | METAL FILM  | 47 OHM     | 0.5% | 1/4W |
| R170    | 1368200010 | METAL FILM  | 82 OHM     | 0.5% | 1/4W |
| R171    | 1363300041 | METAL FILM  | 33 OHM     | 0.5% | 1/4W |
| R172    | 1361000065 | METAL FILM  | 100 OHM    | 0.5% | 1/4W |
| R173    | 1362500016 | METAL FILM  | 250 OHM    | 0.5% | 1/4W |
| R174    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R201    | 1311501008 | METAL FILM  | 1.5K OHM   | 1%   | 1/4W |
| R202    | 1312200000 | METAL FILM  | 220 OHM    | 1%   | 1/4W |
| R203    | 1362602005 | METAL FILM  | 260.2 OHM  | 0.5% | 1/4W |
| R204    | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |
| R205    | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |
| R206    | 1010561006 | CARBON FILM | 560 OHM    | 5%   | 1/4W |
| R207    | 1010104008 | CARBON FILM | 100K OHM   | 5%   | 1/4W |
| R208    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R209    | 1010391007 | CARBON FILM | 390 OHM    | 5%   | 1/4W |
| R210    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R211    | 1382001003 | METAL FILM  | 364.29 OHM | 0.5% | 1/4W |
| R212    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R213    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R214    | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |
| R215    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R216    | 1010222004 | CARBON FILM | 2.2K OHM   | 5%   | 1/4W |
| R217    | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |
| R218    | 1010103006 | CARBON FILM | 10K OHM    | 5%   | 1/4W |
| R219    | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |
| R220    | 1010103006 | CARBON FILM | 10K OHM    | 5%   | 1/4W |
| R221    | 1010222004 | CARBON FILM | 2.2K OHM   | 5%   | 1/4W |
| R222    | 1010272009 | CARBON FILM | 2.7K OHM   | 5%   | 1/4W |
| R223    | 1010122000 | CARBON FILM | 1.2K OHM   | 5%   | 1/4W |
| R224    | 1010682008 | CARBON FILM | 6.8K OHM   | 5%   | 1/4W |
| R225    | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |
| R226    | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |
| R227    | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |
| R228    | 1010561006 | CARBON FILM | 560 OHM    | 5%   | 1/4W |
| R229    | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |
| R230    | 1010222004 | CARBON FILM | 2.2K OHM   | 5%   | 1/4W |
| R231    | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |
| R232    | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |
| R233    | 1010222004 | CARBON FILM | 2.2K OHM   | 5%   | 1/4W |
| R234    | 1010681006 | CARBON FILM | 680 OHM    | 5%   | 1/4W |
| R235    | 1010681006 | CARBON FILM | 680 OHM    | 5%   | 1/4W |
| R236    | 1010101002 | CARBON FILM | 100 OHM    | 5%   | 1/4W |
| R237    | 1010101002 | CARBON FILM | 100 OHM    | 5%   | 1/4W |
| R238    | 1010682008 | CARBON FILM | 6.8K OHM   | 5%   | 1/4W |
| R239    | 1010223006 | CARBON FILM | 22K OHM    | 5%   | 1/4W |
| R240    | 1010222004 | CARBON FILM | 2.2K OHM   | 5%   | 1/4W |
| R242    | 1010183000 | CARBON FILM | 18K OHM    | 5%   | 1/4W |
| R244    | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |
| R245    | 1010470003 | CARBON FILM | 47 OHM     | 5%   | 1/4W |
| R246    | 1010101002 | CARBON FILM | 100 OHM    | 5%   | 1/4W |
| R247    | 1210101008 | METAL OXIDE | 100 OHM    | 5%   | 1W   |
| R248    | 1210101008 | METAL OXIDE | 100 OHM    | 5%   | 1W   |
| R249    | 1210479007 | METAL OXIDE | 4.7 OHM    | 5%   | 1W   |
| R250    | 1210479007 | METAL OXIDE | 4.7 OHM    | 5%   | 1W   |
| R251    | 1341000007 | METAL FILM  | 100 OHM    | 1%   | 1/2W |
| R252    | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |
| R253    | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |

| No.                  | LDR PT No. | DESCRIPTION |            |      |      |  |
|----------------------|------------|-------------|------------|------|------|--|
| (T-2107              | CONT'D)    |             |            |      |      |  |
| R254                 | 1010103006 | CARBON FILM | 10K OHM    | 5%   | 1/4W |  |
| R255                 | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |  |
| R256                 | 1010182008 | CARBON FILM | 1.8K OHM   | 5%   | 1/4W |  |
| R257                 | 1010103006 | CARBON FILM | 10K OHM    | 5%   | 1/4W |  |
| R258                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R259                 | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |  |
| R260                 | 1341000007 | METAL FILM  | 100 OHM    | 1%   | 1/2W |  |
| R261                 | 1010222004 | CARBON FILM | 2.2K OHM   | 5%   | 1/4W |  |
| R262                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R263                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R264                 | 1010122000 | CARBON FILM | 1.2K OHM   | 5%   | 1/4W |  |
| R301                 | 1010104008 | CARBON FILM | 100K OHM   | 5%   | 1/4W |  |
| R302                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R303                 | 1010473009 | CARBON FILM | 47K OHM    | 5%   | 1/4W |  |
| R304                 | 1010471005 | CARBON FILM | 470 OHM    | 5%   | 1/4W |  |
| R305                 | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |  |
| R306                 | 1010152009 | CARBON FILM | 1.5K OHM   | 5%   | 1/4W |  |
| R307                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R308                 | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |  |
| R309                 | 1311503002 | METAL FILM  | 150K OHM   | 1%   | 1/4W |  |
| R310                 | 1010154003 | CARBON FILM | 150K OHM   | 5%   | 1/4W |  |
| R311                 | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |  |
| R312                 | 1010273001 | CARBON FILM | 27K OHM    | 5%   | 1/4W |  |
| R313                 | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |  |
| R314                 | 1010103006 | CARBON FILM | 10K OHM    | 5%   | 1/4W |  |
| R315                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R316                 | 10391007   | CARBON FILM | 390 OHM    | 5%   | 1/4W |  |
| R317                 | 1010272009 | CARBON FILM | 2.7K OHM   | 5%   | 1/4W |  |
| R318                 | 1010272009 | CARBON FILM | 2.7K OHM   | 5%   | 1/4W |  |
| R319                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R320                 | 1010392009 | CARBON FILM | 3.9K OHM   | 5%   | 1/4W |  |
| R321                 | 1010332001 | CARBON FILM | 3.3K OHM   | 5%   | 1/4W |  |
| R322                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R323                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R324                 | 1010471005 | CARBON FILM | 470 OHM    | 5%   | 1/4W |  |
| R325                 | 1361000001 | METAL FILM  | 1K OHM     | 0.5% | 1/4W |  |
| R326                 | 1361000001 | METAL FILM  | 1K OHM     | 0.5% | 1/4W |  |
| R327                 | 1010472007 | CARBON FILM | 4.7K OHM   | 5%   | 1/4W |  |
| R328                 | 1010102004 | CARBON FILM | 1K OHM     | 5%   | 1/4W |  |
| R329                 | 1010221002 | CARBON FILM | 220 OHM    | 5%   | 1/4W |  |
| R330                 | 1010474001 | CARBON FILM | 470K OHM   | 5%   | 1/4W |  |
| R261A                | 1362429007 | METAL FILM  | 2.429K OHM | 0.5% | 1/4W |  |
| -VARIABLE RESISTORS- |            |             |            |      |      |  |
| VR101                | 1712011009 | METAL GLAZE | 22K OHM    | 25%  | 1/2W |  |
| VR103                | 1712002008 | METAL GLAZE | 100 OHM    | 25%  | 1/2W |  |
| VR105                | 1712010007 | METAL GLAZE | 10K OHM    | 25%  | 1/2W |  |
| VR106                | 1712010007 | METAL GLAZE | 10K OHM    | 25%  | 1/2W |  |
| VR107                | 1712010007 | METAL GLAZE | 10K OHM    | 25%  | 1/2W |  |
| VR108                | 1712010007 | METAL GLAZE | 10K OHM    | 25%  | 1/2W |  |
| VR109                | 1712010007 | METAL GLAZE | 10K OHM    | 25%  | 1/2W |  |
| VR110                | 1712004002 | METAL GLAZE | 330 OHM    | 25%  | 1/2W |  |
| VR111                | 1712004002 | METAL GLAZE | 330 OHM    | 25%  | 1/2W |  |
| VR112                | 1712006006 | METAL GLAZE | 1K OHM     | 25%  | 1/2W |  |
| VR113                | 1712011009 | METAL GLAZE | 22K OHM    | 25%  | 1/2W |  |
| VR114                | 1712010007 | METAL GLAZE | 10K OHM    | 25%  | 1/2W |  |
| VR201                | 1712006006 | METAL GLAZE | 1K OHM     | 25%  | 1/2W |  |

| No.          | LDR PT No. | DESCRIPTION  |          |     |      |
|--------------|------------|--------------|----------|-----|------|
| (T-2107      | CONT'D)    |              |          |     |      |
| VR202        | 1712006006 | METAL GLAZE  | 1K OHM   | 25% | 1/2W |
| VR203        | 1712006006 | METAL GLAZE  | 1K OHM   | 25% | 1/2W |
| VR207        | 1712010007 | METAL GLAZE  | 10K OHM  | 25% | 1/2W |
| VR208        | 1712006006 | METAL GLAZE  | 1K OHM   | 25% | 1/2W |
| VR209        | 1712007008 | METAL GLAZE  | 2.2K OHM | 25% | 1/2W |
| VR210        | 1712010007 | METAL GLAZE  | 10K OHM  | 25% | 1/2W |
| VR301        | 1712014005 | METAL GLAZE  | 100K OHM | 25% | 1/2W |
| VR302        | 1712006006 | METAL GLAZE  | 1K OHM   | 25% | 1/2W |
| -CAPACITORS- |            |              |          |     |      |
| C101         | 2110560001 | MICA         | 56pF     | 10% | 50V  |
| C102         | 2150225005 | PLASTIC FILM | 2.2uF    | 5%  | 100V |
| C103         | 2150106007 | PLASTIC FILM | 10uF     | 5%  | 100V |
| C104         | 2150105014 | PLASTIC FILM | 1uF      | 5%  | 100V |
| C105         | 2160104000 | PLASTIC FILM | 0.1uF    | 5%  | 200V |
| C106         | 2200103004 | PLASTIC FILM | 0.01uF   | 5%  | 100V |
| C107         | 2190002003 | PLASTIC FILM | 1000pF   | 2%  | 125V |
| C108         | 2010102012 | CERAMIC      | 1000pF   | 10% | 50V  |
| C109         | 2010102012 | CERAMIC      | 1000pF   | 10% | 50V  |
| C110         | 2140273018 | PLASTIC FILM | 0.027uF  | 10% | 50V  |
| C111         | 2140273018 | PLASTIC FILM | 0.027uF  | 10% | 50V  |
| C112         | 2010102012 | CERAMIC      | 1000pF   | 10% | 50V  |
| C113         | 2230470048 | ELECTROLYTIC | 47uF     | 20% | 16V  |
| C115         | 2120050005 | MICA         | 5pF      |     | 500V |
| C116         | 2010104007 | CERAMIC      | 0.1uF    |     | 50V  |
| C117         | 2010102012 | CERAMIC      | 1000pF   | 10% | 50V  |
| C118         | 2110470000 | MICA         | 47pF     | 10% | 50V  |
| C119         | 2090016006 | CERAMIC      | 0.1uF    |     | 50V  |
| C120         | 2090016006 | CERAMIC      | 0.1uF    |     | 50V  |
| C121         | 2120220004 | MICA         | 22pF     | 10% | 500V |
| C202         | 2140104015 | PLASTIC FILM | 0.1uF    | 10% | 50V  |
| C203         | 2240470045 | ELECTROLYTIC | 47uF     | 20% | 25V  |
| C204         | 2230470048 | ELECTROLYTIC | 47uF     | 20% | 16V  |
| C206         | 2120010003 | MICA         | 1pF      |     | 500V |
| C207         | 2130221030 | PLASTIC FILM | 220pF    | 10% | 50V  |
| C208         | 2110181003 | MICA         | 180pF    | 10% | 50V  |
| C209         | 2110181003 | MICA         | 180pF    | 10% | 50V  |
| C210         | 2240101044 | ELECTROLYTIC | 100uF    | 20% | 25V  |
| C301         | 2140334003 | PLASTIC FILM | 0.33uF   | 10% | 50V  |
| C302         | 2110101009 | MICA         | 100pF    | 10% | 50V  |
| C303         | 2110470000 | MICA         | 47pF     | 10% | 50V  |
| C304         | 2350222041 | ELECTROLYTIC | 2200uF   | 20% | 35V  |
| C305         | 2350222041 | ELECTROLYTIC | 2200uF   | 20% | 35V  |
| C306         | 2240221044 | ELECTROLYTIC | 220uF    | 20% | 25V  |
| C307         | 2240101044 | ELECTROLYTIC | 100uF    | 20% | 25V  |
| C310         | 2240101044 | ELECTROLYTIC | 100uF    | 20% | 25V  |
| C311         | 2220470041 | ELECTROLYTIC | 47uF     | 20% | 10V  |
| C312         | 2220470041 | ELECTROLYTIC | 47uF     | 20% | 10V  |
| C313         | 2230470048 | ELECTROLYTIC | 47uF     | 20% | 16V  |
| C314         | 2010104007 | CERAMIC      | 0.1uF    |     | 50V  |
| C602         | 2010104007 | CERAMIC      | 0.1uF    |     | 50V  |

| No.                  | LDR PT No. | DESCRIPTION |            |      |
|----------------------|------------|-------------|------------|------|
| (T-2107 CONT'D)      |            |             |            |      |
| -VARIABLE CAPACITOR- |            |             |            |      |
| VC101                | 2910030006 | CERAMIC     | 2-10pF     | 250V |
| -TRANSISTORS-        |            |             |            |      |
| Q101                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q102                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q103                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q104                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q105                 | 3090009008 | FET         | 2N3958     |      |
| Q106                 | 3031907004 | NPN         | 2SC1907    |      |
| Q107                 | 3031907004 | NPN         | 2SC1907    |      |
| Q108                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q109                 | 3031907004 | NPN         | 2SC1907    |      |
| Q110                 | 3031907004 | NPN         | 2SC1907    |      |
| Q111                 | 3033419012 | NPN         | 2SC3419-Y  |      |
| Q112                 | 3011356018 | PNP         | 2SA1356-Y  |      |
| Q113                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q114                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q115                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q116                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q203                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q204                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q206                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q207                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q208                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q209                 | 3031923002 | NPN         | 2SC1923-Y  |      |
| Q210                 | 3031923002 | NPN         | 2SC1923-Y  |      |
| Q211                 | 3010711007 | PNP         | 2SA711     |      |
| Q212                 | 3031907004 | NPN         | 2SC1907    |      |
| Q213                 | 3030097009 | NPN         | 2SC97A     |      |
| Q215                 | 3031907004 | NPN         | 2SC1907    |      |
| Q216                 | 3010711007 | PNP         | 2SA711     |      |
| Q217                 | 3010571007 | PNP         | 2SA571     |      |
| Q218                 | 3031815018 | NPN         | 2SC1815-Y  |      |
| Q219                 | 3011015012 | PNP         | 2SA1015-Y  |      |
| Q301                 | 3011015021 | PNP         | 2SA1015-GR |      |
| Q303                 | 3031815027 | NPN         | 2SC1815-GR |      |
| Q304                 | 3040880001 | NPN         | 2SD880-O   |      |
| Q305                 | 3040880001 | NPN         | 2SD880-O   |      |
| Q306                 | 3011015021 | PNP         | 2SA1015-GR |      |
| -DIODES-             |            |             |            |      |
| D101                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D102                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D103                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D104                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D105                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D106                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D107                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D108                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D109                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D110                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D111                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D112                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D113                 | 3110006004 | DETECTOR    | 1S1588     |      |
| D114                 | 3110006004 | DETECTOR    | 1S1588     |      |



| No.             | LDR PT No. | DESCRIPTION |              |
|-----------------|------------|-------------|--------------|
| (T-2107 CONT'D) |            |             |              |
| D115            | 3110006004 | DETECTOR    | 1S1588       |
| D116            | 3110006004 | DETECTOR    | 1S1588       |
| D117            | 3110006004 | DETECTOR    | 1S1588       |
| D118            | 3110006004 | DETECTOR    | 1S1588       |
| D201            | 3110006004 | DETECTOR    | 1S1588       |
| D202            | 3110006004 | DETECTOR    | 1S1588       |
| D203            | 3110006004 | DETECTOR    | 1S1588       |
| D204            | 3110006004 | DETECTOR    | 1S1588       |
| D205            | 3110006004 | DETECTOR    | 1S1588       |
| D301            | 3110006004 | DETECTOR    | 1S1588       |
| D302            | 3110006004 | DETECTOR    | 1S1588       |
| D303            | 3110019003 | RECTIFIER   | 1DZ61        |
| D304            | 3110019003 | RECTIFIER   | 1DZ61        |
| D305            | 3110019003 | RECTIFIER   | 1DZ61        |
| D306            | 3110019003 | RECTIFIER   | 1DZ61        |
| D307            | 3110019003 | RECTIFIER   | 1DZ61        |
| D308            | 3110019003 | RECTIFIER   | 1DZ61        |
| D309            | 3110019003 | RECTIFIER   | 1DZ61        |
| D310            | 3110019003 | RECTIFIER   | 1DZ61        |
| D311            | 3120058000 | ZENER       | RD4.7EB 4.7V |
| D312            | 3110019003 | RECTIFIER   | 1DZ61        |
| D313            | 3110019003 | RECTIFIER   | 1DZ61        |
| D314            | 3110019003 | RECTIFIER   | 1DZ61        |
| D315            | 3110019003 | RECTIFIER   | 1DZ61        |
| D202A           | 3120059002 | ZENER       | RD12EB 12V   |
| D203A           | 3120026007 | ZENER       | RD6.8EB 6.2V |

-INTEGRATED CIRCUITS-

|       |            |                  |           |      |
|-------|------------|------------------|-----------|------|
| IC101 | 3210741075 | OP AMP           | MC1741CP1 |      |
| IC102 | 3211458021 | OP AMP           | MC1458CP1 |      |
| IC103 | 3210741075 | OP AMP           | MC1741CP1 |      |
| IC105 | 3220002001 | COMPARATOR       | NE521     |      |
| IC107 | 3211458021 | OP AMP           | MC1458CP1 |      |
| IC108 | 3210741075 | OP AMP           | MC1741CP1 |      |
| IC201 | 3250000026 | TTL              | SN7400N   |      |
| IC202 | 3211495009 | LINEAR           | MC1495L   |      |
| IC203 | 3250000026 | TTL              | SN7400N   |      |
| IC204 | 3210710001 | LINEAR           | SN72710N  |      |
| IC301 | 3220037000 | OP AMP           | TL084CN   |      |
| IC302 | 3213086004 | TRANSISTOR ARRAY | LM3086    |      |
| IC302 | 3217815007 | REGULATOR        | HA17815P  | +15V |
| IC303 | 3217915010 | REGULATOR        | MC7915CT  | -15V |
| IC304 | 3217805004 | REGULATOR        | HA17805P  | +5V  |
| IC305 | 3217905017 | REGULATOR        | MC7905CT  | -5V  |
| IC306 | 3211458021 | OP AMP           | MC1458CP1 |      |

-SWITCHES-

|      |            |       |            |
|------|------------|-------|------------|
| S101 | 4000409000 | Q-409 | "POWER"    |
| S201 | 4000423004 | Q-423 | "FUNCTION" |

-PC BOARD-

5902107016

T-2107C