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LFG-1310

FUNCTION GENERATOR

SERVICE MANUAL

****

NOTE

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

****

1st edition May, 1986

CONTENTS

1. SPECIFICATIONS

Frequency Range:	0.01Hz to 10MHz, 9 ranges
Accuracy:	x0.01 to x100k ranges . . . ±5% of full scale x1M range . . . ±10% of full scale
Waveforms:	Sine wave, triangle wave, square wave, ramp wave, and pulse wave
Sine wave:	
Flatness:	0.01Hz to 100kHz . . . ±0.3 dB 100kHz to 10MHz . . . ±1 dB
Distortion:	10Hz to 50kHz . . . 0.5% or less
Triangle wave:	
Linearity error:	1% at 100Hz
Square wave:	
Rise/fall time:	25ns or less (with max. output)
Symmetry Variation:	20:80 to 80:20 (0.01Hz to 1MHz)
Operation Mode:	
CW:	Continuous generation
TRIG/GATE:	TRIG . . . one cycle oscillation triggered by input signal GATE . . . oscillation only when input is HI
Frequency range:	0.1Hz to 1MHz
Input voltage:	TTL
Input frequency:	DC to 100kHz
Start/stop phase:	Variable
BURST:	Burst wave oscillation for gate time of 1ms to 10s by built-in oscillator. ON/OFF time is symmetrical and variable.
SWEEP:	
Sweep mode:	Selection of linear and logarithmic sweep
Sweep time:	1ms to 10s, 2 ranges, continuously variable. Fly-back line interval is symmetrical and variable.
Sweep width:	Max. 1:100, continuously variable (sweep start freqeuncy can be specified.)
Output Characteristics:	
Output level:	20Vp-p (output terminal open)
Attenuator:	0, 20, 40, and 60dB, continuously variable
Output impedance:	50ohms ±10%
DC offset:	Max. ±10V (output opened)
SYNC output:	TTL level (duty cycle are symmetrical and variable.)
GCV output:	Voltage output in proportion to frequency, 0 to 5V (max. frequency in each range)
SWEEP output:	Sweep output in sweep mode, 0 to −5V
SWEEP/BURST gate out:	TTL level
Amplitude Modulation (AM):	Modulation level . . . 0 to 100%, continuously variable Input signal level . . . max. 5Vp-p Suppressed-carrier mode
External Control of Frequency (VCG):	
Frequency range:	Max. 1000:1, with frequency dial set to "10"
Input level:	0 to −5V (±20%) (frequency is decreased by negative voltage)
Power Supply:	100 VAC ±10% 50/60Hz 30VA 120, 200, 220, and 240V available by adjusting the power transformer tap
Size and Weight:	300(W) x 100(H) x 300(D)mm, approx. 3.5kg
Accessories:	Connection cable: LC-204B (50-ohm BNC-clip cable) x 1 Instruction manual x 1 Option: 50-ohm terminator LT-2049

Remarks:
1. The specifications described above are applicable at a temperature of 23°C ±5°C and a relative humidity of 40 to 85%.
2. Unless otherwise stated, the frequency dial is set to 1 to 10, and SYMMETRY is set OFF for the specification data.

2. TEST EQUIPMENT REQUIRED

The following test equipment is required for calibration and servicing of the Model LFM-1310. The suggested specifications are the minimum necessary for proper calibration of this instrument.

Test Equipment	Minimum Spec
- Multimeter	0 - 20V Accuracy < 0.1% 3-1/2 digit
- Oscilloscope	10mV sensitivity 100MHz bandwidth Delayed sweep Low capacitance probe
- Frequency Counter	0.01Hz - 10MHz
- Distortion Meter	1kHz 1% full scale
- Audio Generator	1kHz sine wave
- Function Generator	100kHz TTL signal
- 50 ohm Terminator	Feedthrough

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.

- 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.

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

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.

FREQ Dial	10
FREQ RANGE	x100
MODE	CW
FUNCTION	Sine wave
OUTPUT	
DC OFFSET	OFF
ATTENUATION	0dB
VARIABLE	Fully clockwise
SWEEP/BURST/AM MOD	
SYMMETRY	OFF
VARIABLE	Center
AM CARRIER LEVEL	0
TIME	1-100mS
START/MOD LEVEL	Center
SET	START
LIN-LOG	LIN
AM	OFF
TRIG START LEVEL	Center
SYMMETRY	OFF

3.3 Power Supply

- Connect the DC voltmeter between TP3(+17V line) and/or TP4(-17V line), on the pc board(T-3571), and chassis.

- Adjust VR8(T-3571) so that the voltages at the TP3 and TP4 are exactly same absolute value.

- Check all supplies according to Table 3-1.

Voltage	Test point
+14V	D43(T-3570) anode
-14V	D44(T-3570) cathode
+6V	Junction of R53 and R54
+5V	IC13(T-3570) pin3
+5V1	D42(T-3570) cathode

Table 3-1

3.4 Offset Adjustment-1 (Current source)

- Set: FREQ Dial — Fully counterclockwise
  FREQ RANGE — x100

- Connect the DC voltmeter between TP4 and TP5(T-3570). Note the voltage reading to three places of decimal. Remove the voltmeter.

- Connect the DC voltmeter between TP2 and TP3(T-3570).

- Adjust VR3(T-3570) for exactly same voltage as above noted.

3.5 Buffer Amplifier

- Set: FREQ Dial — Fully counterclockwise
  FREQ RANGE — x100
  FUNCTION — Square wave
  SYMMETRY — On

- Connect the oscilloscope to OUTPUT connector and set the TIME/DIV control to 0.1mS, SLOPE button to +. Adjust TIME VARIABLE control for 1 cycle display.

(1) Bias Adjustment

- Adjust VR6(T-3570) to the center of the stable oscillation range when rotate the SYMMETRY control at both extreme positions.

(2) Symmetry Checking

- Expand the negative going edge, located at the center area of the graticule, 100 times using the delayed sweep mode of the oscilloscope as shown in Figure 3-1.

Figure 3-1

Observe this point

- The displacement of the positive and negative going edge should be less than 0.4%(4 divisions) when switch the SLOPE button between + and -.

3.6 Offset Adjustment-2 (Tuning Amplifier)

- Connect the junction of R1 and VR1(T-3570) to chassis by short clip lead.
- Connect the DC voltmeter to TP2(T-3570).
- Adjust VR2(T-3570) for a voltmeter reading of 0.000V.

3.7 Frequency Adjustment-1(1kHz)

- Set: FREQ Dial 10
  FREQ RANGE x100
  FUNCTION Square wave
- Connect the frequency counter to OUTPUT connector.
- Adjust VR1(T-3570) for a frequency reading of 1.005kHz.

3.8 Symmetry Adjustment-1(Dial "1")

- Set: Same as 3.7
- Connect the frequency counter to OUTPUT connector.

  Connect the oscilloscope to SYNC OUT connector and set the TIME/DIV control to 0.1mS/DIV for 1 cycle display.
- Connect the DC voltmeter to TP1(T-3570) and note the voltage. Call the voltage -V.
- Rotate the FREQ Dial clockwise until the voltage reading becomes -V/10.

- Adjust VR4 and VR5(T-3570) alternately to obtain an 100Hz, symmetrical square wave.

3.9 Dial Settings

- Set: FREQ Dial 1
  FREQUENCY RANGE x100

- Connect the frequency counter to OUTPUT connector.

- The frequency reading should be between 97Hz and 103Hz.

- If not, reset the FREQ Dial by two set screws on the dial knob for frequency reading of 100Hz then repeat step 3.7 and 3.8 to re-adjust the frequency.

3.10 Frequency Adjustment-2(10Hz)

- Set: FREQ Dial 10
  FREQ RANGE x1
  FUNCTION Square wave

- Connect the frequency counter to OUTPUT connector.

- Adjust VR8(T-3570) for a frequency reading of 10.00Hz.

3.11 Symmetry Adjustment-2(x1 RANGE)

- Set: FREQ Dial 1
  FREQ RANGE x1
  FUNCTION Square wave

- Connect the oscilloscope to OUTPUT connector and set the TIME/DIV control to 0.1S/DIV then expand the sweep width 10 times using horizontal magnifier mode.

- Adjust VR7(T-3570) precisely so that the displacement of the positive and negative going edge of the square wave should be less than 0.5%(0.25 division) when switch the SLOPE button between + and -. Refer to Figure 3-1.

3.12 Frequency Adjustment-3

(1) 1MHz

- Set: FREQ Dial 10
  FREQ RANGE x100k
  FUNCTION Square wave

Connect the frequency counter to OUTPUT connector.

- Adjust VC1(T-3570) for a frequency reading of 1.000MHz.

(2) 10MHz

- Set: FREQ Dial 10
  FREQ RANGE x1M

- Adjust VC4(T-3570) for a frequency reading of 10MHz.

(3) 5MHz

- Set: FREQ Dial 5
  FREQ RANGE x1M

- Check that the accuracy is between 4.8MNHz and 5.2MHz.

- If not, adjust VC3(T-3570) so that the frequency reading is 10000 times of the x100 RANGE.

- Repeat the step (1) and (2) if necessary.

(4) 100kHz

- Set: FREQ Dial 10
  FREQ RANGE x10k

- Adjust VC2(T-3570) for a frequency reading of 100.0kHz.

3.13 Sweep Generator

(1) Symmetry Adjustment

Set: SWEEP/BURST/AM MOD
  TIME 1-100mS
  TIME VARIABLE Fully counterclockwise
  SYMMETRY OFF
  SET SWEEP

- Connect the oscilloscope to SWEEP/BURST GATE OUT connector.

- Adjust VR4(T-3569) for a symmetrical square wave.

(2) Anti-log Circuit Adjustment

- Adjust following adjustments on the pc board(T-3570) to obtain a waveform as shown in Figure 3-2.

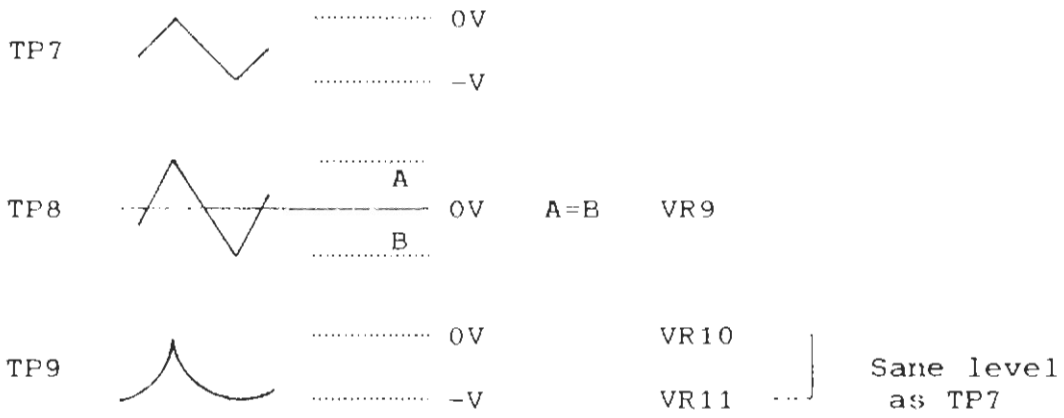


Figure 3-2

3.14 High Frequency Compensation

(1) Gate

- Set: FREQ Dial 10
  FREQ RANGE x100k
  MODE GATE
  FUNCTION Sine wave

- Connect the oscilloscope to OUTPUT connector via 50 ohm terminator.

- Apply 100kHz TTL signal from the reference function generator to TRIG IN connector.

- Set the TRIG START LEVEL control to obtain a waveform as shown in Figure 3-3.

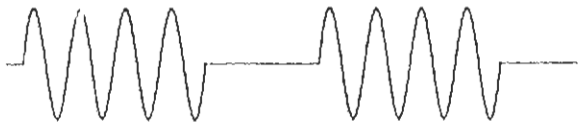


Figure 3-3

- Adjust VC5(T-3570) so that the base line becomes as flat as possible with less ringing and overshoot.

(2) Output Amplifier

- Set: FREQ Dial 1
  FREQ RANGE x1M
  MODE CW
  FUNCTION Square wave
  ATTENUATION 0dB
  VARIABLE Fully clockwise

- Connect the oscilloscope to OUTPUT connector via 50 ohm terminator.

  Adjust VR1-4 and VC1(T-3571) for a flat top square wave.

- Set: FUNCTION Sine wave

- Adjust vertical sensitivity of the oscilloscope for 6 divisions display.

- Set: FREQ Dial 10

- The sine wave amplitude should be between 5.5 division and 6.5 division.

- Repeat above adjustment if necessary.

3.15 Distortion Adjustment

- Set: FREQ Dial 10
  FREQ RANGE x1k
  FUNCTION Sine wave

- Connect the distortion meter to OUTPUT connector via 50 ohm terminator.

- Adjust VR6 and VR7(T-3571) alternately for minimum sine wave distortion.

3.16 AM Modulation

- Set: FREQ Dial 10
  FREQ RANGE x10k
  FUNCTION Sine wave
  SWEEP/BURST/AM MOD
  AM ON
  AM CARRIER LEVEL Fully clockwise
  MOD LEVEL Fully clockwise

- Connect the oscilloscope to OUTPUT connector.

- Connect the sine wave generator to MOD IN connector and set the frequency to 1kHz, output level for 100% AM.

- Adjust CARRIER LEVEL control and VR5(T-3571) alternately for correct DSB(Double Side Band) waveform as shown in Figure 3-4.

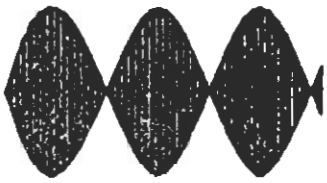


Figure 3-4

4. TROUBLESHOOTING PROCEDURE

4.1 Troubleshooting Aid-1

- Confirm that the any equipment used with the LFG-1310 is operating correctly.

- Check all control settings, because an incorrect setting can make a good unit appear defective. If there is any question about the function, see the INSTRUCTION MANUAL for a correct operation.

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

- Some troubles can be solved with proper adjustment.

- Check voltage, waveform and state of logic circuit as shown in the "7 BLOCK DIAGRAM/SCHEMATIC DIAGRAM" to trace the defective circuit. Then, troubleshoot the associated circuit and/or the control circuit. Start with the power supply.

4.2 Troubleshooting Aid-2

(1) Overall operation is not satisfactory or unit is "dead".

a. Check the power supplies. Refer to "3.3 Power supply".

Secondary voltage of the power transformer

+17V: Check IC4 and associated circuit (Adjust VR8)
-17V: Check IC5 and associated circuit (Adjust VR8)
+14V: Check D43 and associated circuit
-14V: Check D44 and associated circuit
+6V: Check D9 and associated circuit
+5V: Check IC13 and associated circuit
+5V1: Check D42 and associated circuit

(2) FUNCTION

a. No triangle wave comes out with CW MODE.
   Check that triangle wave is present at TP6.
   Yes: Check waveform at pin 1 of P2(T-3571) for triangle wave.
      Yes- Check output amplifier(Q1-9, IC1 T-3571) Attenuator(S1, R11-16).
      No- Check FUNCTION switch(S2 T-3568), AM ON/OFF switch(S3 T-3569), VARIABLE control(VR4, 5).
   No: Check the triangle generator by following procedure.
   Apply 1kHz sine wave from audio generator to the gate of Q7(T-3570) and set the amplitude about 10Vp-p.
   Check that the clipped sine wave is present at the OUTPUT connector.
      Yes- Connect the DC voltmeter to TP1(T 3570). The voltage reading should be between about -60mV and -5.5V when rotate the FREQ dial from fully clockwise to fully counterclockwise. And also, the voltage at the TP3 and 4 are proportioned to the voltage at TP1.
      If the voltage changes correct, check current sources(IC4, 5, Q3-6), diode bridge(D3-10 T-3570).
      If the no voltage is present, check tuning amplifier(IC1 T-3570) and SYMMETRY control.
      No- Check comparator(IC7, Q13-20 T-3570), buffer amplifier(Q7-10 T-3570).

b. No sine wave comes out
   Confirm that the triangle function works correctly.
   Yes: Check waveform and DC voltage at the sine wave converter(Q15-20 T-3571), FUNCTION switch and associated circuit.
   No: Check the triangle generator.

c. Distorted sine wave comes out
   Adjust VR6, 7(T-3571). Refer 3.16.

d. No square wave comes out
   Confirm that the triangle function works correctly.
   Yes: Check FUNCTION switch and associated circuit.
   No: Check the triangle generator.

e. No frequency change or intermitttent by rotating FREQ dial.
   Check VR1, FREQ RANGE switch and range capacitors(C17-22).
   If x1 and lower ranges do not work, check capacitance multiplier(IC6, Q11, 12 T-3570).

f. No SYMMETRY control works
Check S1, VR1(T-3569) and associated circuit.

g. No DC OFFSET works
Check IC1(T-3570) and associated circuit.

(3) Burst

a. No burst signal comes out
Check waveform at TP7(T-3570) for triangle wave which frequency is changed by rotate the TIME VARIABLE control.
Yes: Check input signal at following points of burst gate (T-3570).
Pin 4 of IC9 for triangle wave
Pin 5 of IC8 for square wave
Pin 1 of IC8 for square wave
DC voltage at pin 9 of IC9 from -6.7V to -12V when rotate TRIG START LEVEL control.
Yes- Check burst gate(IC8, Q21, 22, 32 T-3570) and associated circuit.
No Check the signal sources

No: Integrator(IC10 T-3570), comparator(IC11, 12, Q26-30 T-3570) and associated circuit.

b. TRIG MODE
Check one-shot multivibrator(IC1 T-3568) and signal source of TRIG IN connector.

c. GATE MODE
Check burst control(IC12 T-3570) and signal source of TRIG IN connector.

d. No SYMMETRY control works
Check integrator and comparator(IC10-12, Q26-28 T-3570).

e. No TRIG START LEVEL control works
VR2(T-3569) and associated circuit. See (2) a.

(4) Sweep

a. Confirm that the CW came out from the OUTPUT connector, also the frequency to be changed by rotating the FREQ dial

b. No sweep mode works
Check waveform at TP7(T-3570) for triangle wave which frequency is changed by rotate the TIME VARIABLE control.
Yes: Check waveform at pin 2 of P3(T-3570).
Yes- Tuning amplifier(IC1 T-3570) and associated circuit.
No Integrator and comparator(IC10-12, Q26-28 T-3570).
No: Check MODE switch and associated circuit.

c. Log sweep does not work
Check antilogarithmic converter(IC14-16 T-3570) and associated circuit

d. No sweep time changes
Check C1, 2(T-3569) and associated circuit.

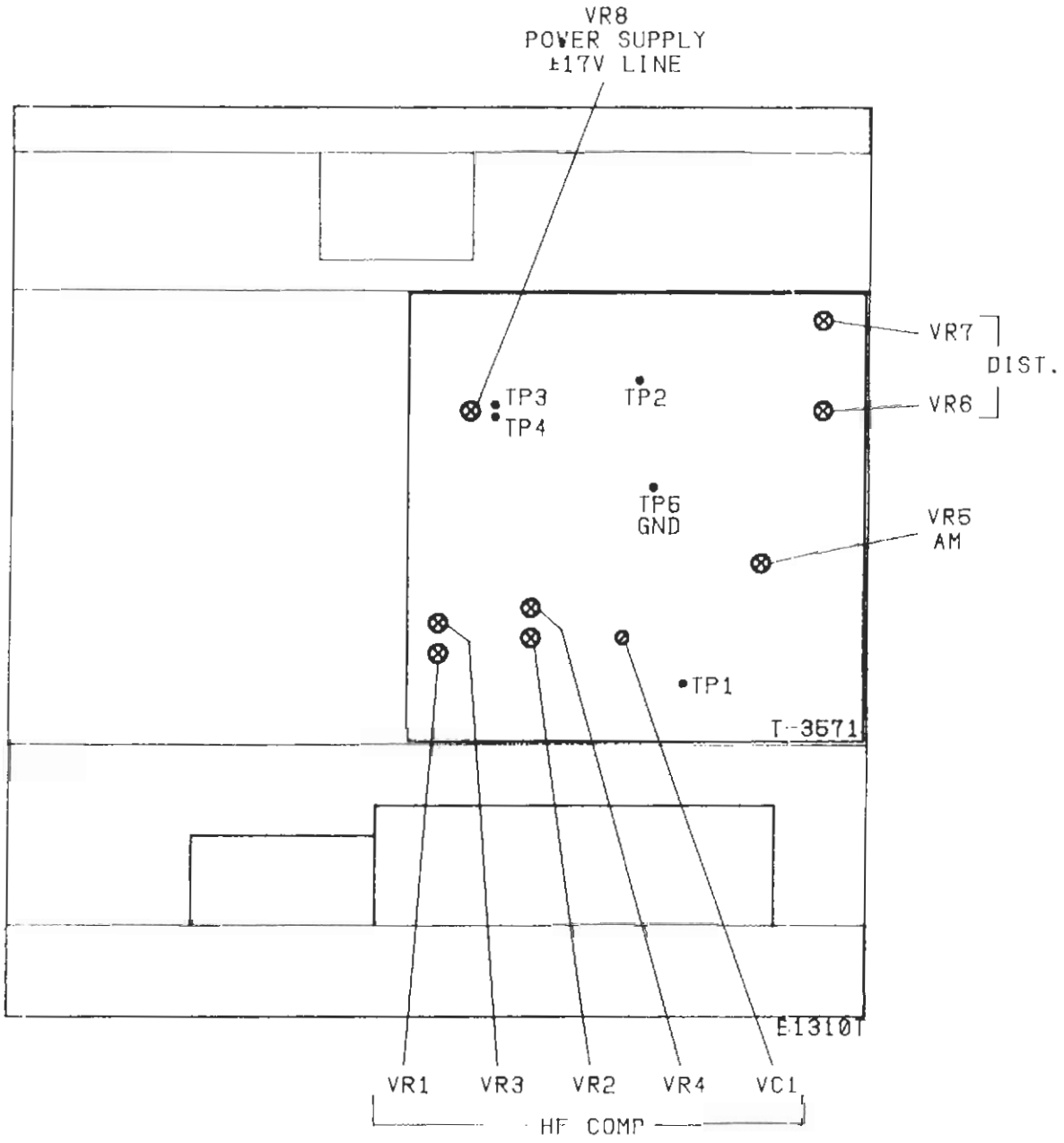
(5) AM modulation
a. No modulated signal comes out
Check waveform at pin 2 of P3(T-3571) for CW and pin 1 of P5(T-3571) for associated signal from MOD IN connector.
Yes: Check waveform at base of Q12(T-3571) for modulated signal.
Yes- Check output amplifier(Q12-14 T-3571) and associated circuit.
No- Check IC3(T-3571) and associated circuit.
No: Check that the signal sources, MOD LEVEL control(VR5 T-3569) and associated circuit.

(6) Others
a. No SYNC output
Check sync output amplifier(Q23-25 T-3570).

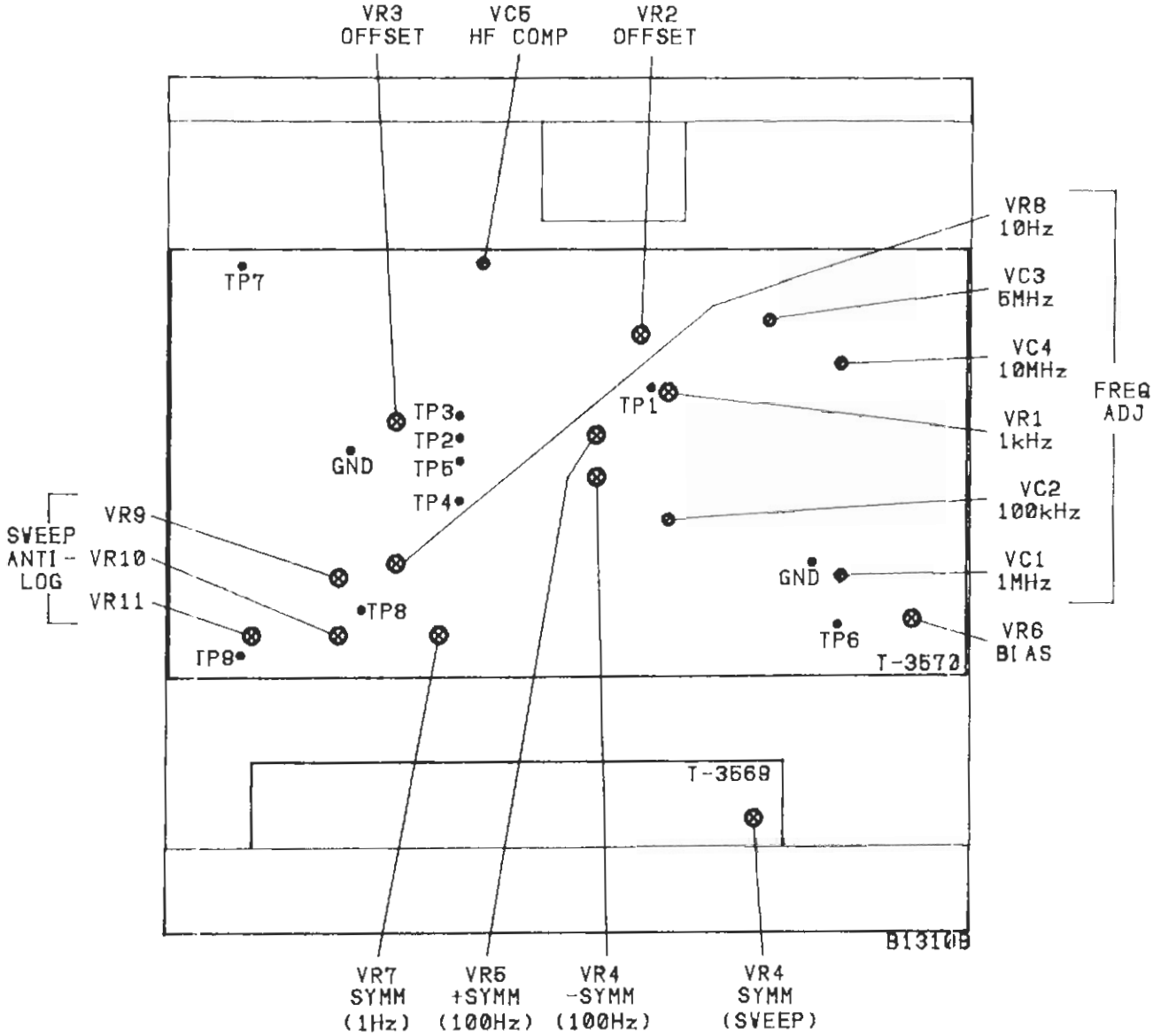
b. No SWEEP/BURST GATE OUT signal comes out
Check Q31(T-3570) and associated circuit.

5. ADJUSTMENT LOCATIONS

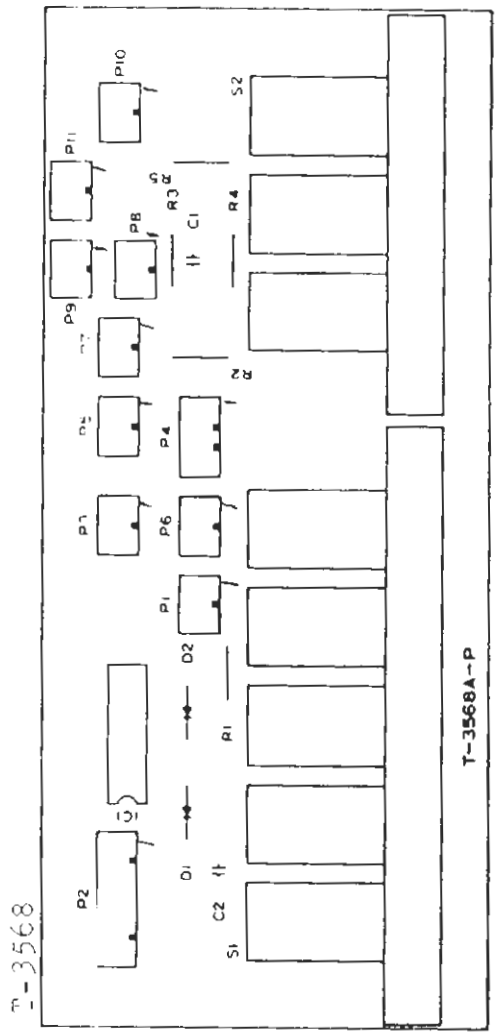
<TOP VIEW>

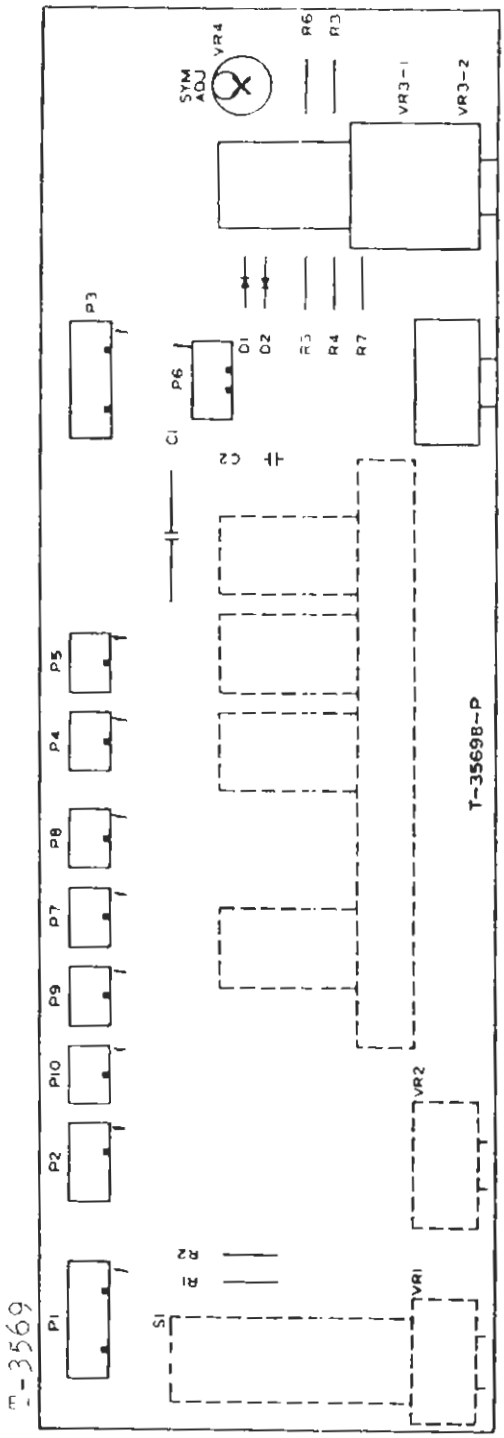


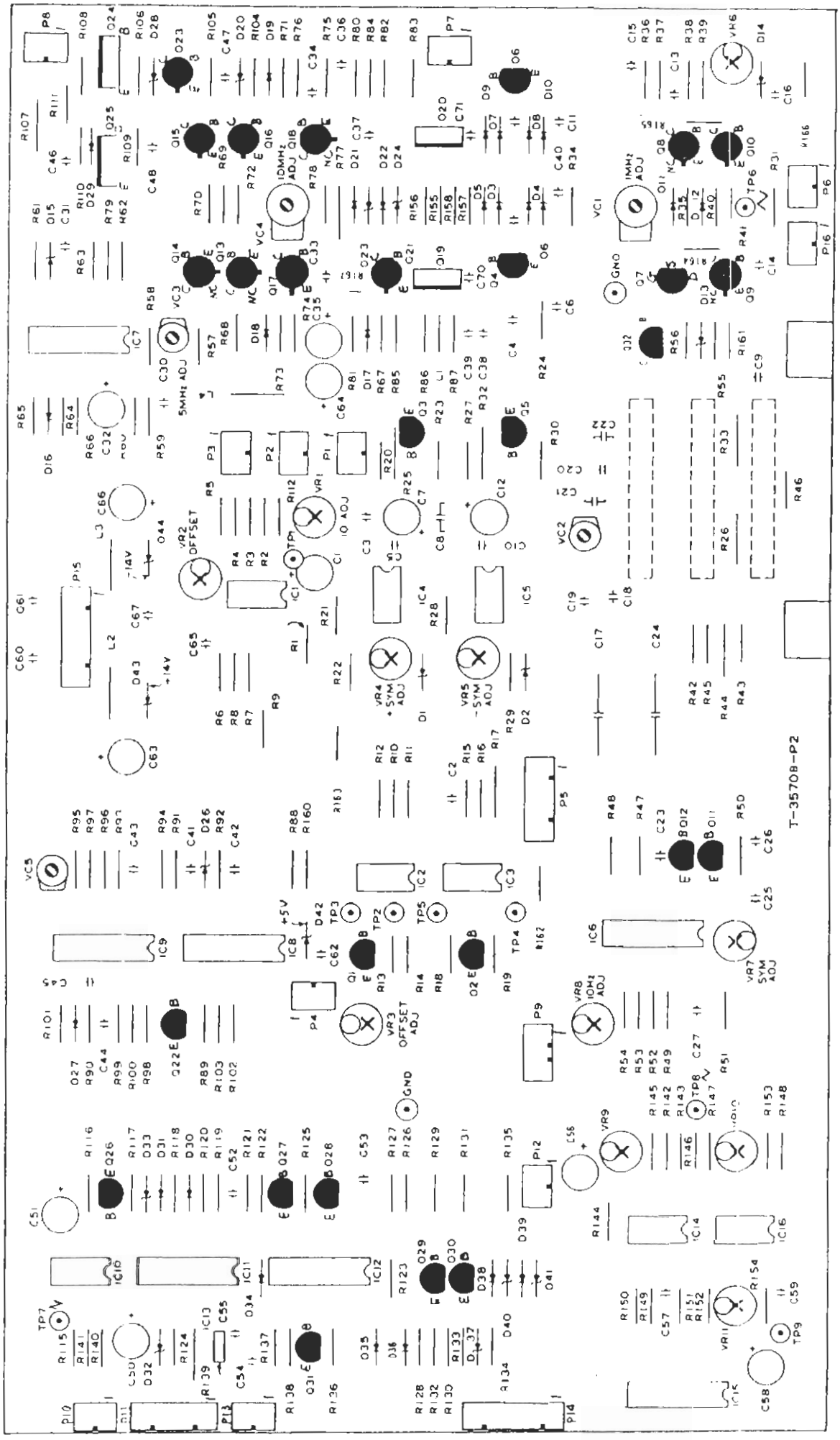
<BOTTOM VIEW>


VR3
OFFSET
VC5
HF COMP
VR2
OFFSET
VR8
10Hz
TP7
VC3
5MHz
VC4
10MHz
TP1
FREQ
ADJ
TP3
TP2
TP5
TP4
GND
VR1
1kHz
VC2
100kHz
SWEEP
ANTI-
LOG
VR9
VR10
VR11
GND
VC1
1MHz
TP8
TP8
TP6
VR6
BIAS
T-3570
T-3569
B1310B
VR7
SYMM
(1Hz)
VR5
+SYMM
(100Hz)
VR4
-SYMM
(100Hz)
VR4
SYMM
(SWEEP)

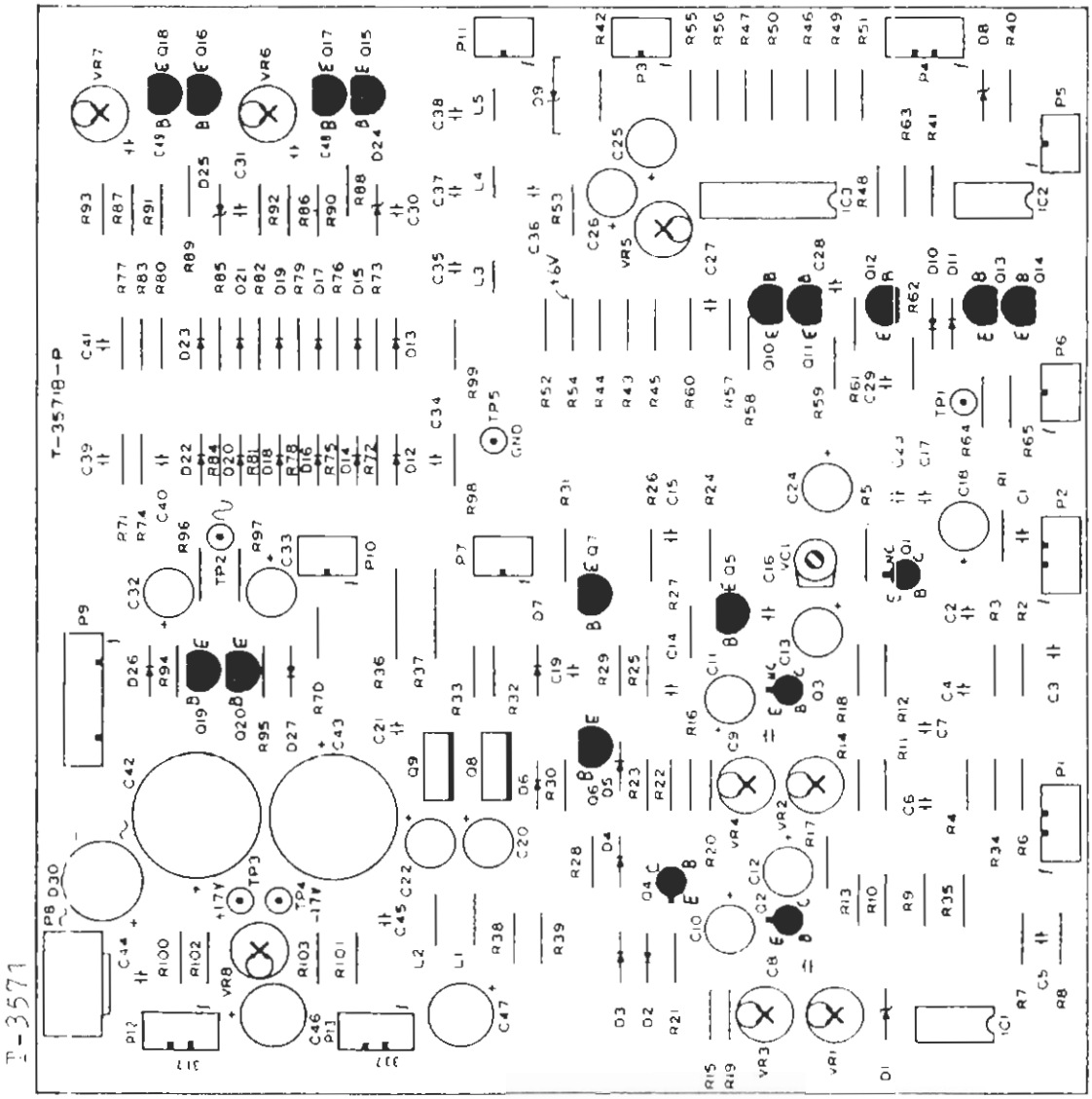
6. PRINTED CIRCUIT BOARD

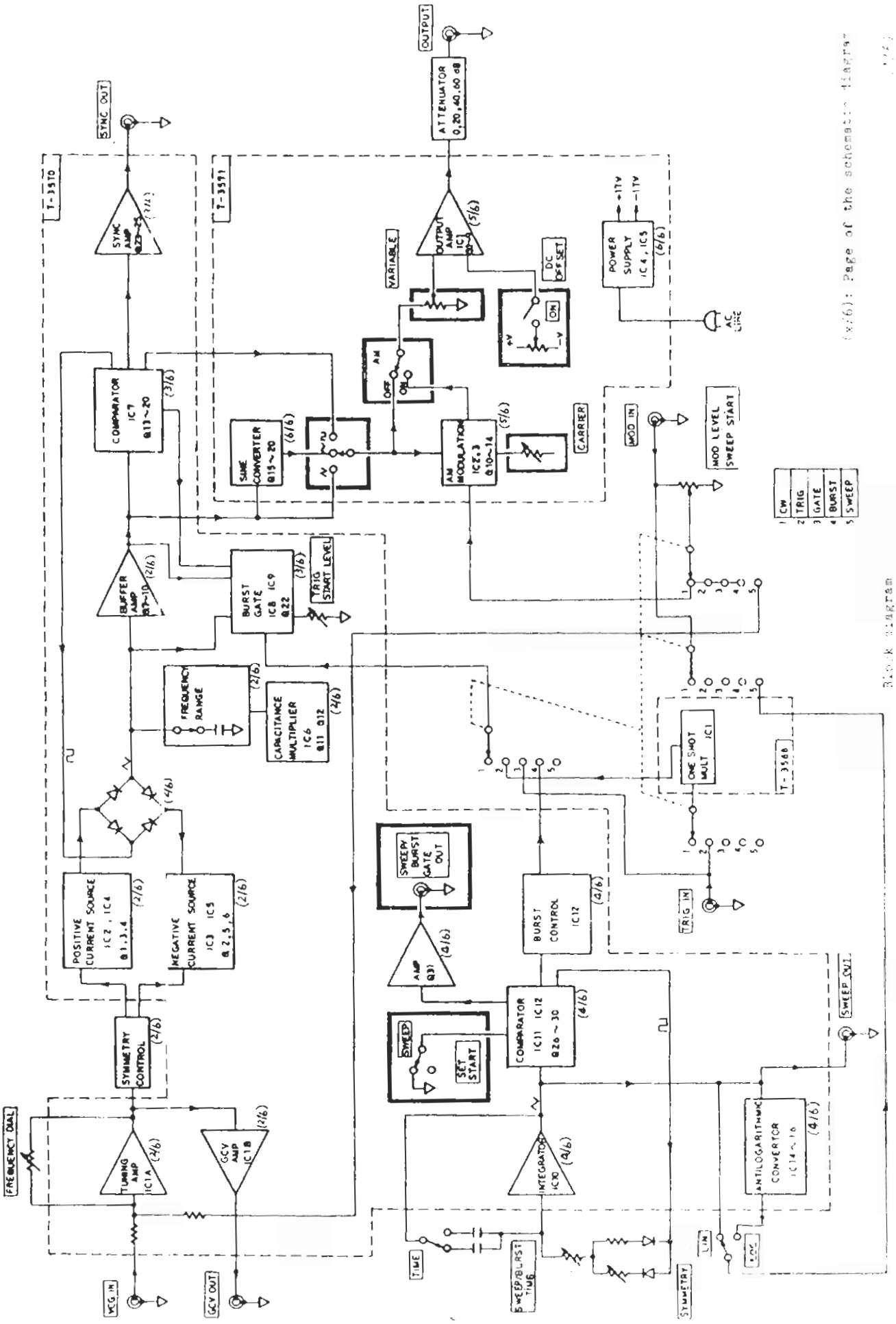






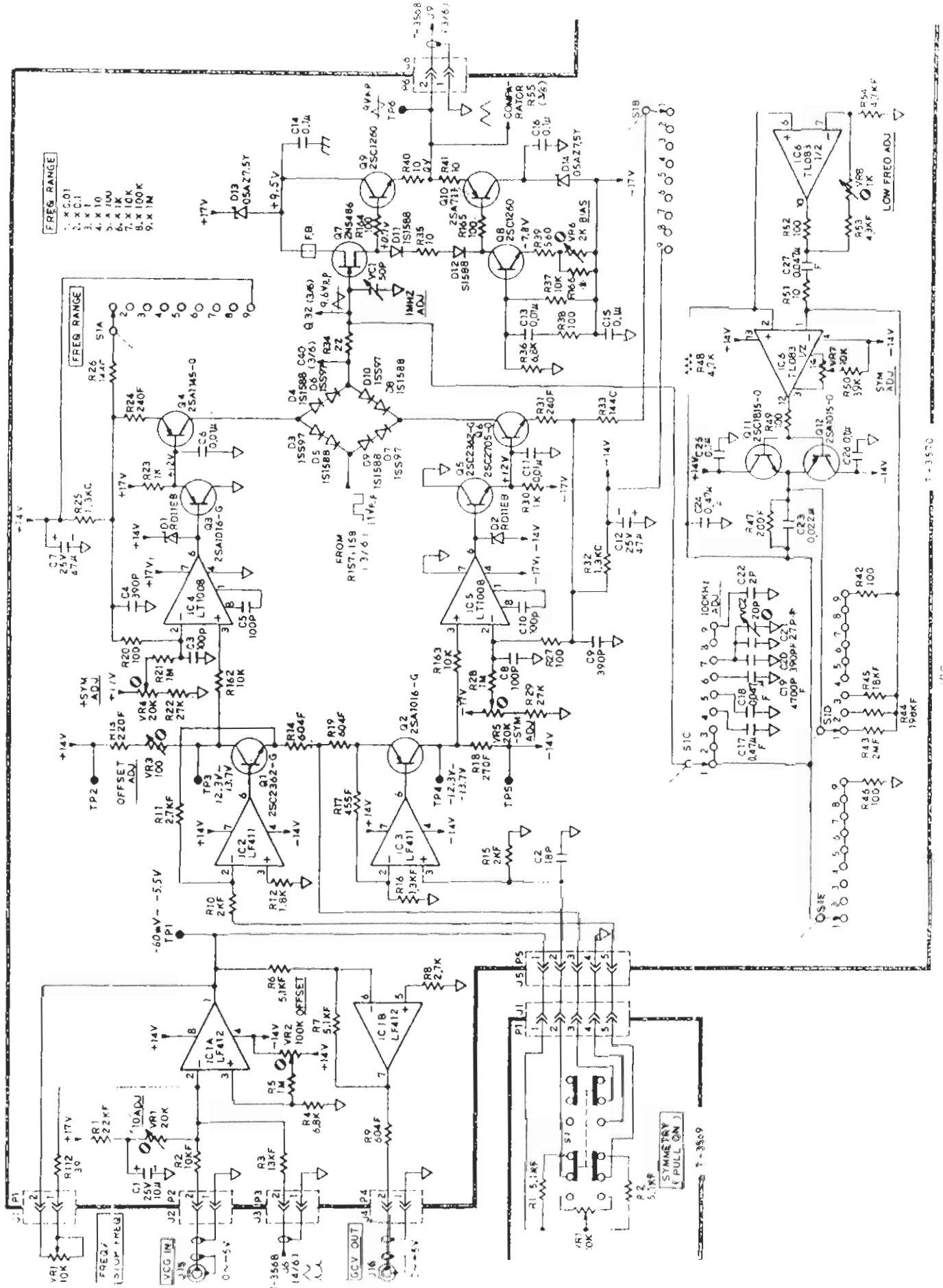
T-3570

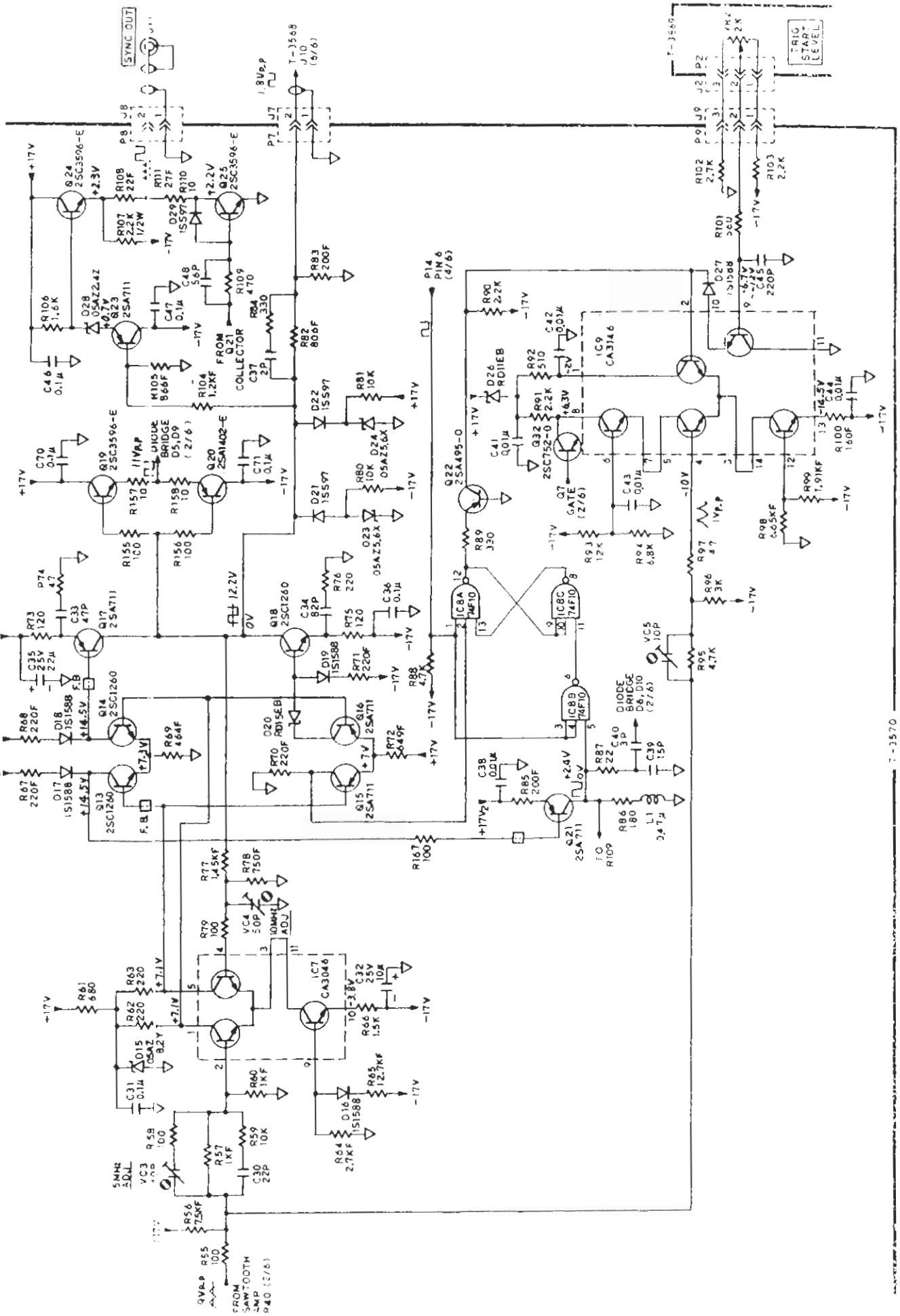

T-3571
T-3571B-P

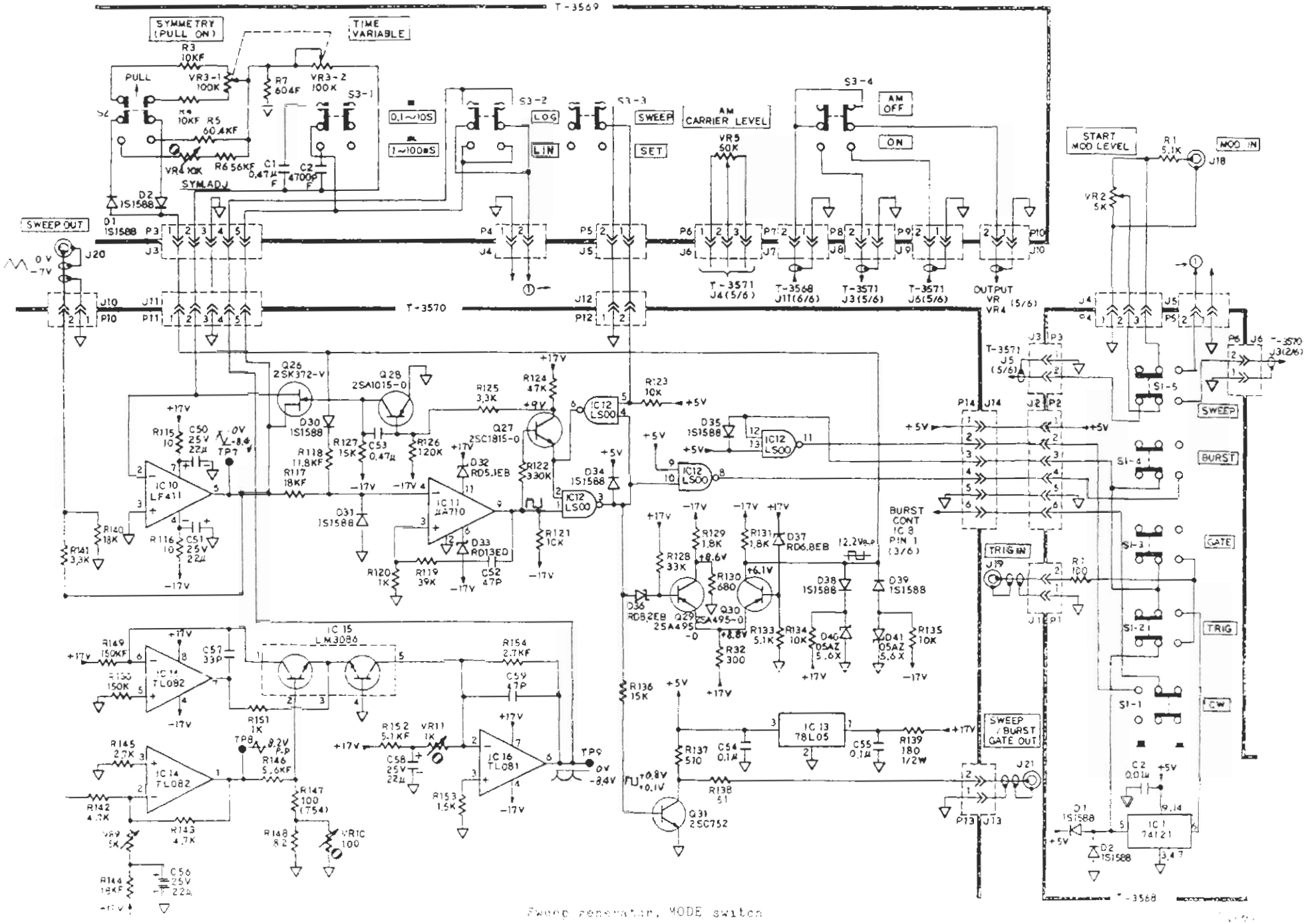


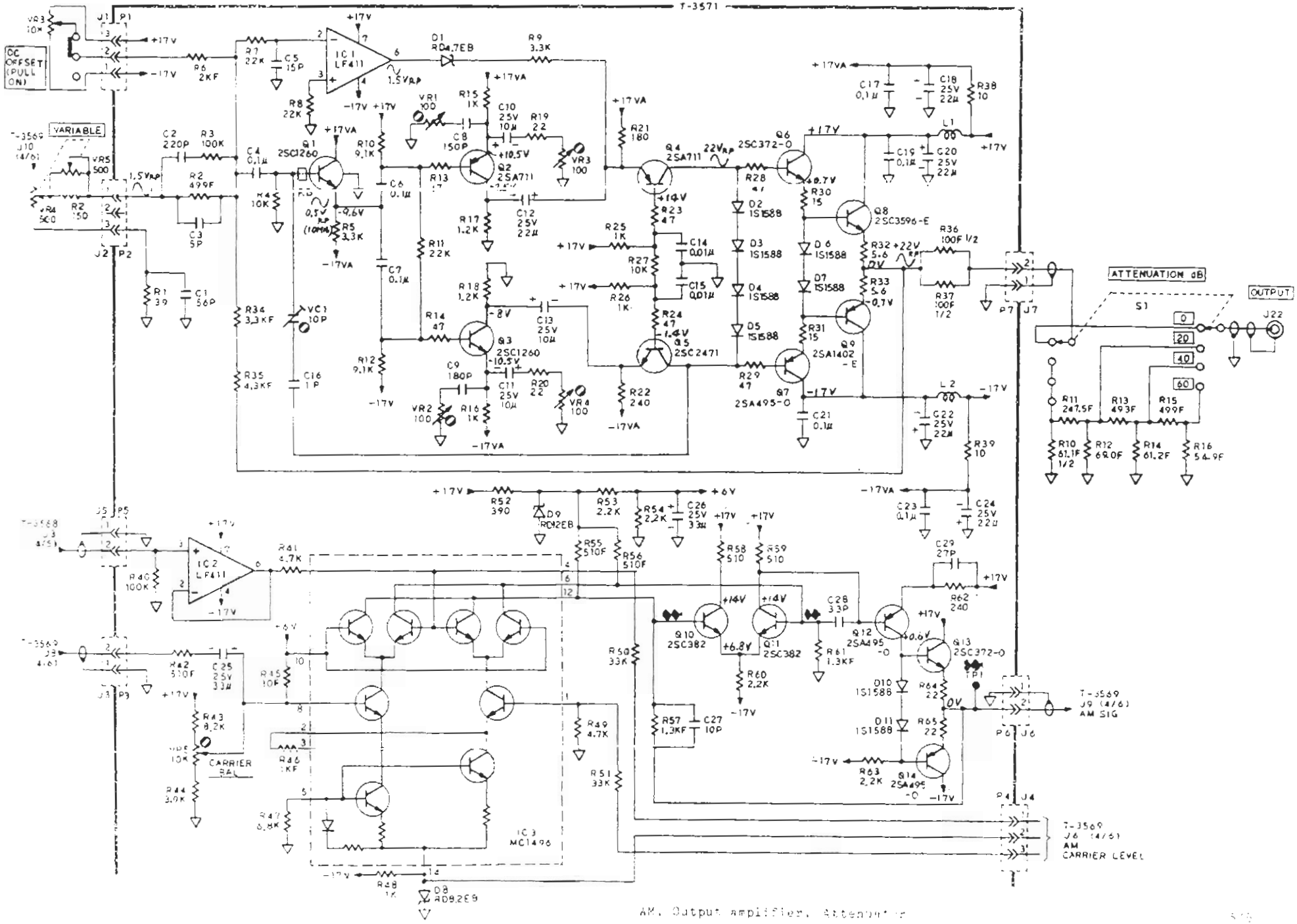
(x/6): Page of the schematic diagram

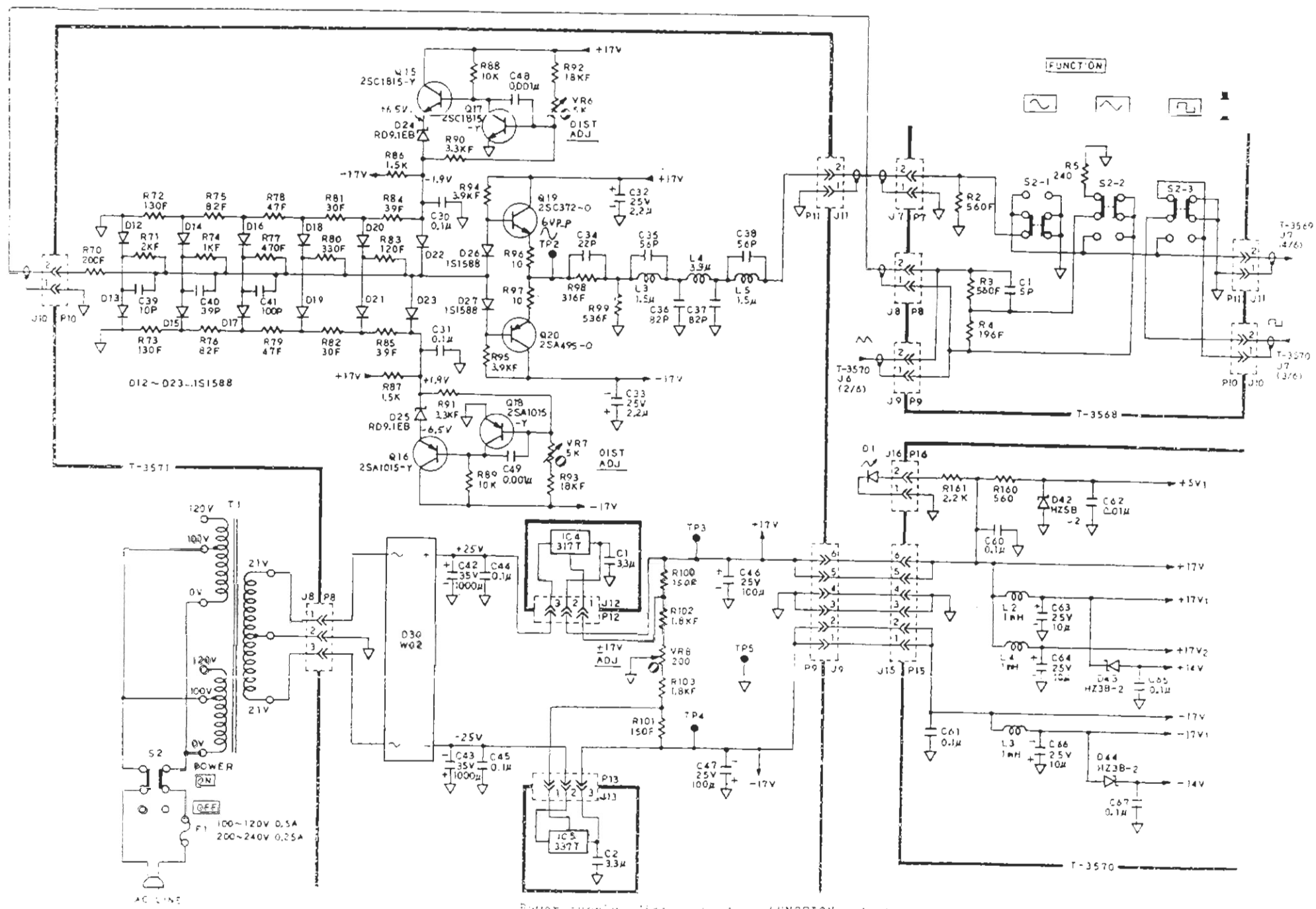
Block diagram




SYNC OUT
TRIG START LEVEL
Comparator, Burst, Sync
T-3570


T-3569
T-3570
T-3568
SYMMETRY (PULL ON)
TIME VARIABLE
PULL
SYM ADJ
0.1~10S
1~100mS
LOG
LIN
SWEEP
SET
AM CARRIER LEVEL
AM OFF
ON
SWEEP OUT
START MOD LEVEL
MOD IN
OUTPUT VR
TRIG IN
BURST CONT IC 8 PIN 1 (3/6)
SWEEP / BURST GATE OUT
SWEEP
BURST
GATE
TRIG
CW
IC 10 LF411
IC 11 μA710
IC 12 LS00
IC 13 78L05
IC 14 TL082
IC 15 LM3086
IC 16 TL081
IC 1 74121
Sweep generator, MODE switch


T-3571
OC OFFSET (PULL ON)
VARIABLE
IC1 LF411
IC2 LF411
IC3 MC1496
Q1 2SC1260
Q2 2SA711
Q3 2SC1260
Q4 2SA711
Q5 2SC2471
Q6 2SC372-O
Q7 2SA495-O
Q8 2SC3596-E
Q9 2SA1402-E
Q10 2SC382
Q11 2SC382
Q12 2SA495-O
Q13 2SC372-O
Q14 2SA495-O
ATTENUATION dB
OUTPUT
J22
S1
0
20
40
60
CARRIER BAL
T-3569 J9 (4/6) AM SIG
T-3569 J6 (4/6) AM CARRIER LEVEL
AM, Output amplifier, Attenuator



Power assembly, line converter, FUNCTION switch

No.	LOR PT No.	DESCRIPTION			
*** MAIN FRAME ***					
-RESISTORS-					
R1	1010512003	CARBON FILM	5.1K OHM	5%	1/4W
R2	1010151007	CARBON FILM	150 OHM	5%	1/4W
R10	1346119002	METAL FILM	61.1 OHM	1%	1/2W
R11	1362475004	METAL FILM	247.5 OHM	0.5%	1/4W
R12	1326909007	METAL FILM	69.0 OHM	1%	1/4W
R13	1324930006	METAL FILM	493 OHM	1%	1/4W
R14	1326129001	METAL FILM	61.2 OHM	1%	1/4W
R15	1314990007	METAL FILM	499 OHM	1%	1/6W
R16	1315499001	METAL FILM	54.9 OHM	1%	1/6W
-VARIABLE RESISTORS-					
VR1	1940046003	PLASTIC	10K OHM 1.5% LIN.	1W	"FREQ"
VR2	1815008501	CARBON FILM	5K OHM 20%	1/8W	"MOD LEVEL"
VR3	1815011115	CARBON FILM	10K OHM 20%	1/8W	"DC OFFSET"
-CAPACITORS-					
C1	2470339008	ELECTROLYTIC	3.3uF	20%	35V
C2	2470339008	ELECTROLYTIC	3.3uF	20%	35V
-DIODE-					
D1	3130063000	LED	TLG164	"POWER"	
-INTEGRATED CIRCUITS-					
IC4	3210317009	REGULATOR	LM317T		
IC5	3210337005	REGULATOR	LM337T		
-TRANSFORMER-					
T1	5800537004	TRANSFORMER	U-537		
-SWITCHES-					
S1	4000546019	ROTARY	G-546A	"ATTENUATION"	
S2	4020138009	PUSH	E3B-70702V	"POWER"	
-FUSE-					
F1	4363735007	TIME LAG	ST4 250mA	"180V-264V"	
F1	4363750003	TIME LAG	ST4 500mA	"90V-132V"	
-MISCELLANOUS-					
	4310214006	CONNECTOR	BNC 186		
	4371009003	FUSE HOLDER	FH-032(6.35X31.8)		

No	LOR PT No.	DESCRIPTION			
(T-3568 CONT'D)					
-CAPACITORS-					
C1	2120050003	MICA	5pF		500V
C2	2010103005	CERAMIC	0.01uF		50V
-DIODES-					
D1	3110006004	DETECTOR	1S1588		
D2	3110006004	DETECTOR	1S1588		
-INTEGRATED CIRCUIT-					
IC1	3250121000	TTL	SN74121		
-SWITCHES-					
S1	4000548004	PUSH	G-548	"MODE"	
S2	4000549006	PUSH	G-549	"FUNCTION"	
-PC BOARD-					
	5903568018		T-3568A		

*** CONTROL BOARD-1		T3568 ***			
-RESISTORS-					
R1	1010101002	CARBON FILM	100 OHM	5%	1/4W
R2	1315600004	METAL FILM	560 OHM	1%	1/4W
R3	1315600004	METAL FILM	560 OHM	1%	1/4W
R4	1311960000	METAL FILM	196 OHM	1%	1/6W
R5	1010241008	CARBON FILM	240 OHM	5%	1/4W

*** CONTROL BOARD-2		T-3569 ***			
-RESISTORS-					
R1	1315101006	METAL FILM	5.1K OHM	1%	1/4W
R2	1315101006	METAL FILM	5.1K OHM	1%	1/4W
R3	1311002000	METAL FILM	10.0K OHM	1%	1/4W
R4	1311002000	METAL FILM	10.0K OHM	1%	1/4W
R5	1316042002	METAL FILM	60.4K OHM	1%	1/4W
R6	1315602008	METAL FILM	6K OHM	1%	1/4W
R7	1316040008	METAL FILM	604 OHM	1%	1/6W
-VARIABLE RESISTORS-					
VR1	1815019001	CARBON FILM	10K OHM 20%	1/8W	"SYMMETRY"
VR2	1815013201	CARBON FILM	2K OHM 20%	1/8W	"TRIG LEVEL"
VR3	1815020006	CARBON FILM	100K/100K OHM 20%	1/8W	"SYMM/TIME"
VR4	1711004079	CERMET	10K OHM 20%	1/3W	
VR5	1815008510	CARBON FILM	50K OHM 20%	1/8W	"AM CARR LEVEL"
-CAPACITORS-					
C1	2194022003	PLASTIC FILM	0.47uF	1%	100V
C2	2192025007	PLASTIC FILM	4700pF	1%	100V
-DIODES-					
D1	3110006004	DETECTOR	1S1588		
D2	3110006004	DETECTOR	1S1588		
-SWITCH-					
S3	4000547002	PUSH	G-547	"SWEEP/BURST/AM MOD"	
-PC BOARD-					
	5903569029		T-3569B		

No.	LDR PT No.	DESCRIPTION			
*** MAIN BOARD		T-3570 ***			
-RESISTORS-					
R1	1312202004	METAL FILM	22K OHM	1%	1/4W
R2	1311002000	METAL FILM	10.0K OHM	1%	1/4W
R3	1311302002	METAL FILM	13K OHM	1%	1/4W
R4	1010682003	CARBON FILM	6.8K OHM	5%	1/4W
R5	1010105000	CARBON FILM	1M OHM	5%	1/4W
R6	1315101006	METAL FILM	5.1K OHM	1%	1/4W
R7	1315101006	METAL FILM	5.1K OHM	1%	1/4W
R8	1010272009	CARBON FILM	2.7K OHM	5%	1/4W
R9	1316040008	METAL FILM	604 OHM	1%	1/6W
R10	1312001004	METAL FILM	2K OHM	1%	1/4W
R11	1312701002	METAL FILM	2.7K OHM	1%	1/4W
R12	1010182008	CARBON FILM	1.8K OHM	5%	1/4W
R13	1312200000	METAL FILM	220 OHM	1%	1/4W
R14	1316040008	METAL FILM	604 OHM	1%	1/6W
R15	1312001004	METAL FILM	2K OHM	1%	1/4W
R16	1311301000	METAL FILM	1.3K OHM	1%	1/4W
R17	1324550006	METAL FILM	455 OHM	1%	1/4W
R18	1312700000	METAL FILM	270 OHM	1%	1/4W
R19	1316040008	METAL FILM	604 OHM	1%	1/6W
R20	1010101002	CARBON FILM	100 OHM	5%	1/4W
R21	1010105000	CARBON FILM	1M OHM	5%	1/4W
R22	1010273001	CARBON FILM	27K OHM	5%	1/4W
R23	1010102004	CARBON FILM	1K OHM	5%	1/4W
R24	1312400008	METAL FILM	240 OHM	1%	1/4W
R25	1381005005	METAL FILM	1.3K OHM	0.25%	1/4W
R26	1384500021	METAL FILM	144 OHM	0.25%	1/4W
R27	1010101002	CARBON FILM	100 OHM	5%	1/4W
R28	1010105000	CARBON FILM	1M OHM	5%	1/4W
R29	1010273001	CARBON FILM	27K OHM	5%	1/4W
R30	1010102004	CARBON FILM	1K OHM	5%	1/4W
R31	1312400008	METAL FILM	240 OHM	1%	1/4W
R32	1381005005	METAL FILM	1.3K OHM	0.25%	1/4W
R33	1384500021	METAL FILM	144 OHM	0.25%	1/4W
R34	1010220000	CARBON FILM	22 OHM	5%	1/4W
R35	1010100000	CARBON FILM	10 OHM	5%	1/4W
R36	1010682008	CARBON FILM	6.8K OHM	5%	1/4W
R37	1010103006	CARBON FILM	10K OHM	5%	1/4W
R38	1010101002	CARBON FILM	100 OHM	5%	1/4W
R39	1010561006	CARBON FILM	560 OHM	5%	1/4W
R40	1010100000	CARBON FILM	10 OHM	5%	1/4W
R41	1010100000	CARBON FILM	10 OHM	5%	1/4W
R42	1010101002	CARBON FILM	100 OHM	5%	1/4W
R43	1312004000	METAL FILM	2M OHM	1%	1/4W
R44	1321983009	METAL FILM	198K OHM	1%	1/4W
R45	1311802002	METAL FILM	18K OHM	1%	1/4W
R46	1010101002	CARBON FILM	100 OHM	5%	1/4W
R47	1312000002	METAL FILM	200 OHM	1%	1/4W
R48	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R49	1010101002	CARBON FILM	100 OHM	5%	1/4W
R50	1010393001	CARBON FILM	39K OHM	5%	1/4W
R51	1010100000	CARBON FILM	10 OHM	5%	1/4W
R52	1010101002	CARBON FILM	100 OHM	5%	1/4W
R53	1314301008	METAL FILM	4.3K OHM	1%	1/4W
R54	1314701004	METAL FILM	4.70K OHM	1%	1/4W
R55	1010101002	CARBON FILM	100 OHM	5%	1/4W

No.	LDR PT No.	DESCRIPTION			
(T-3570	CONT'D)				
R56	1317501004	METAL FILM	7.5K OHM	1%	1/4W
R57	1311001008	METAL FILM	1K OHM	1%	1/4W
R58	1010101002	CARBON FILM	100 OHM	5%	1/4W
R59	1010103006	CARBON FILM	10K OHM	5%	1/4W
R60	1311001008	METAL FILM	1K OHM	1%	1/4W
R61	1010681006	CARBON FILM	680 OHM	5%	1/4W
R62	1010221002	CARBON FILM	220 OHM	5%	1/4W
R63	1010221002	CARBON FILM	220 OHM	5%	1/4W
R64	1312701002	METAL FILM	2.7K OHM	1%	1/4W
R65	1311272009	METAL FILM	12.7K OHM	1%	1/6W
R66	1010152009	CARBON FILM	1.5K OHM	5%	1/4W
R67	1312200000	METAL FILM	220 OHM	1%	1/4W
R68	1312200000	METAL FILM	220 OHM	1%	1/4W
R69	1314640000	METAL FILM	464 OHM	1%	1/4W
R70	1312200000	METAL FILM	220 OHM	1%	1/4W
R71	1312200000	METAL FILM	220 OHM	1%	1/4W
R72	1316490009	METAL FILM	649 OHM	1%	1/6W
R73	1010121008	CARBON FILM	120 OHM	5%	1/4W
R74	1010470003	CARBON FILM	47 OHM	5%	1/4W
R75	1010121008	CARBON FILM	120 OHM	5%	1/4W
R76	1010221002	CARBON FILM	220 OHM	5%	1/4W
R77	1321451006	METAL FILM	1.45K OHM	1%	1/4W
R78	1317500002	METAL FILM	750 OHM	1%	1/4W
R79	1010101002	CARBON FILM	100 OHM	5%	1/4W
R80	1010103006	CARBON FILM	10K OHM	5%	1/4W
R81	1010103006	CARBON FILM	10K OHM	5%	1/4W
R82	1318060006	METAL FILM	806 OHM	1%	1/6W
R83	1312000002	METAL FILM	200 OHM	1%	1/4W
R84	1010331009	CARBON FILM	330 OHM	5%	1/4W
R85	1312000002	METAL FILM	200 OHM	1%	1/4W
R86	1010181006	CARBON FILM	180 OHM	5%	1/4W
R87	1010220000	CARBON FILM	22 OHM	5%	1/4W
R88	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R89	1010331009	CARBON FILM	330 OHM	5%	1/4W
R90	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R91	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R92	1010511001	CARBON FILM	510 OHM	5%	1/4W
R93	1010123002	CARBON FILM	12K OHM	5%	1/4W
R94	1010682008	CARBON FILM	6.8K OHM	5%	1/4W
R95	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R96	1010302002	CARBON FILM	3K OHM	5%	1/4W
R97	1010470003	CARBON FILM	47 OHM	5%	1/4W
R98	1316851007	METAL FILM	5.65K OHM	1%	1/6W
R99	1311911007	METAL FILM	1.91K OHM	1%	1/6W
R100	1311600000	METAL FILM	160 OHM	1%	1/4W
R101	1010561006	CARBON FILM	560 OHM	5%	1/4W
R102	1010272009	CARBON FILM	2.7K OHM	5%	1/4W
R103	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R104	1311201006	METAL FILM	1.2K OHM	1%	1/4W
R105	1318660000	METAL FILM	866 OHM	1%	1/6W
R106	1010162002	CARBON FILM	1.6K OHM	5%	1/4W
R107	1020222001	CARBON FILM	2.2K OHM	5%	1/2W
R108	1312209008	METAL FILM	22 OHM	1%	1/4W
R109	1010471005	CARBON FILM	470 OHM	5%	1/4W
R110	1010100000	CARBON FILM	10 OHM	5%	1/4W
R111	1312709008	METAL FILM	27 OHM	1%	1/4W
R112	1010390005	CARBON FILM	39 OHM	5%	1/4W

No.	LDR PT No.	DESCRIPTION			
(T-3570	CONT'D)				
R115	1010100000	CARBON FILM	10 OHM	5%	1/4W
R116	1010100000	CARBON FILM	10 OHM	5%	1/4W
R117	1311802002	METAL FILM	18K OHM	1%	1/4W
R118	1311182008	METAL FILM	11.8K OHM	1%	1/6W
R119	1010393001	CARBON FILM	39K OHM	5%	1/4W
R120	1010102004	CARBON FILM	1K OHM	5%	1/4W
R121	1010103004	CARBON FILM	10K OHM	5%	1/4W
R122	1010334005	CARBON FILM	330K OHM	5%	1/4W
R123	1010103006	CARBON FILM	10K OHM	5%	1/4W
R124	1010473009	CARBON FILM	47K OHM	5%	1/4W
R125	1010333003	CARBON FILM	33K OHM	5%	1/4W
R126	1010124004	CARBON FILM	120K OHM	5%	1/4W
R127	1010153001	CARBON FILM	15K OHM	5%	1/4W
R128	1010333003	CARBON FILM	33K OHM	5%	1/4W
R129	1010182008	CARBON FILM	1.8K OHM	5%	1/4W
R130	1010681006	CARBON FILM	680 OHM	5%	1/4W
R131	1010182008	CARBON FILM	1.8K OHM	5%	1/4W
R132	1010301000	CARBON FILM	300 OHM	5%	1/4W
R133	1010512003	CARBON FILM	5.1K OHM	5%	1/4W
R134	1010103006	CARBON FILM	10K OHM	5%	1/4W
R135	1010103006	CARBON FILM	10K OHM	5%	1/4W
R136	1010153001	CARBON FILM	15K OHM	5%	1/4W
R137	1010511001	CARBON FILM	510 OHM	5%	1/4W
R138	1010510009	CARBON FILM	51 OHM	5%	1/4W
R139	1020181003	CARBON FILM	180 OHM	5%	1/2W
R140	1010183000	CARBON FILM	18K OHM	5%	1/4W
R141	1010332001	CARBON FILM	3.3K OHM	5%	1/4W
R142	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R143	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R144	1311802002	METAL FILM	18K OHM	1%	1/4W
R145	1010272009	CARBON FILM	2.7K OHM	5%	1/4W
R146	1315601006	METAL FILM	5.6K OHM	1%	1/4W
R147	1392900297	METAL FILM	100 OHM	5%	1/8W
R148	1010820004	CARBON FILM	82 OHM	5%	1/4W
R149	1311503002	METAL FILM	150K OHM	1%	1/4W
R150	1010154003	CARBON FILM	150K OHM	5%	1/4W
R151	1010102004	CARBON FILM	1K OHM	5%	1/4W
R152	1315101006	METAL FILM	5.1K OHM	1%	1/4W
R153	1010152009	CARBON FILM	1.5K OHM	5%	1/4W
R154	1312701002	METAL FILM	2.7K OHM	1%	1/4W
R155	1010101002	CARBON FILM	100 OHM	5%	1/4W
R156	1010101002	CARBON FILM	100 OHM	5%	1/4W
R157	1010100000	CARBON FILM	10 OHM	5%	1/4W
R158	1010100000	CARBON FILM	10 OHM	5%	1/4W
R160	1010561006	CARBON FILM	560 OHM	5%	1/4W
R161	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R162	1010103006	CARBON FILM	10K OHM	5%	1/4W
R163	1010103006	CARBON FILM	10K OHM	5%	1/4W
R164	1010101002	CARBON FILM	100 OHM	5%	1/4W
R165	1010101002	CARBON FILM	100 OHM	5%	1/4W
R167	1000101005	CARBON FILM	100 OHM	5%	1/6W
-VARIABLE RESISTORS-					
VR1	1711004088	CERMET	20K OHM	20%	1/3W
VR2	1711004107	CERMET	100K OHM	20%	1/3W
VR3	1940044009	METAL FILM	100 OHM	20%	1/2W
VR4	1940045001	METAL FILM	20K OHM	20%	1/2W

No.	LDR PT No.	DESCRIPTION			
(T-3570	CONT'D)				
VR5	1940045001	METAL FILM	20K OHM	20%	1/2W
VR6	1711004051	CERMET	2K OHM	20%	1/3W
VR7	1711004079	CERMET	10K OHM	20%	1/3W
VR8	1711004042	CERMET	1K OHM	20%	1/3W
VR9	1711004125	CERMET	5K OHM	20%	1/3W
VR10	1711004006	CERMET	100 OHM	20%	1/3W
VR11	1711004042	CERMET	1K OHM	20%	1/3W
-CAPACITORS-					
C1	2240100006	ELECTROLYTIC	10uF	20%	25V
C2	2120180008	MICA	18pF	10%	500V
C3	2110101009	MICA	100pF	10%	50V
C4	2130391008	PLASTIC FILM	390pF	10%	50V
C5	2110101009	MICA	100pF	10%	50V
C6	2010103005	CERAMIC	0.01uF		50V
C7	2240470009	ELECTROLYTIC	47uF	20%	25V
C8	2110101009	MICA	100pF	10%	50V
C9	2130391008	PLASTIC FILM	390pF	10%	50V
C10	2110101009	MICA	100pF	10%	50V
C11	2010103005	CERAMIC	0.01uF		50V
C12	2240470009	ELECTROLYTIC	47uF	20%	25V
C13	2010103005	CERAMIC	0.01uF		50V
C14	2090016006	CERAMIC	0.1uF		50V
C15	2090016006	CERAMIC	0.1uF		50V
C16	2090016006	CERAMIC	0.1uF		50V
C17	2194022003	PLASTIC FILM	0.47uF	1%	100V
C18	2192031002	PLASTIC FILM	0.047uF	1%	100V
C19	2192025007	PLASTIC FILM	4700pF	1%	100V
C20	2192030000	PLASTIC FILM	390pF	1%	100V
C21	2120270009	MICA	27pF	10%	500V
C22	2120020006	MICA	2pF		500V
C23	2610223003	PLASTIC FILM	0.022uF	10%	63V
C24	2194022003	PLASTIC FILM	0.47uF	1%	100V
C25	2090016006	CERAMIC	0.1uF		50V
C26	2090016006	CERAMIC	0.1uF		50V
C27	2192031002	PLASTIC FILM	0.047uF	1%	100V
C30	2120220004	MICA	22pF	10%	500V
C31	2090016006	CERAMIC	0.1uF		50V
C32	2240100006	ELECTROLYTIC	10uF	20%	25V
C33	2120470016	MICA	47pF	10%	500V
C34	2120820008	MICA	82pF	10%	500V
C35	2240220006	ELECTROLYTIC	22uF	20%	25V
C36	2090016006	CERAMIC	0.1uF		50V
C37	2120020006	MICA	2pF		500V
C38	2010103005	CERAMIC	0.01uF		50V
C39	2120150009	MICA	15pF	10%	500V
C40	2120030009	MICA	3pF		500V
C41	2010103005	CERAMIC	0.01uF		50V
C42	2010103005	CERAMIC	0.01uF		50V
C43	2010103005	CERAMIC	0.01uF		50V
C44	2010103005	CERAMIC	0.01uF		50V
C45	2110221009	MICA	220pF	10%	50V
C46	2090016006	CERAMIC	0.1uF		50V
C47	2090016006	CERAMIC	0.1uF		50V
C48	2120560008	MICA	56pF	10%	500V
C50	2240220006	ELECTROLYTIC	22uF	20%	25V
C51	2240220006	ELECTROLYTIC	22uF	20%	25V

No.	LDR PT No.	DESCRIPTION			
(T-3570	CONT'D)				
C52	2120470016	MICA	47pF	10%	500V
C53	2610474008	PLASTIC FILM	0.47uF	10%	63V
C54	2090016006	CERAMIC	0.1uF		50V
C55	2090016006	CERAMIC	0.1uF		50V
C56	2240220006	ELECTROLYTIC	22uF	20%	25V
C57	2120330001	MICA	33pF	10%	500V
C58	2240220006	ELECTROLYTIC	22uF	20%	25V
C59	2120470016	MICA	47pF	10%	500V
C60	2090016006	CERAMIC	0.1uF		50V
C61	2090016006	CERAMIC	0.1uF		50V
C62	2010103005	CERAMIC	0.01uF		50V
C63	2240100006	ELECTROLYTIC	10uF	20%	25V
C64	2240100006	ELECTROLYTIC	10uF	20%	25V
C65	2090016006	CERAMIC	0.1uF		50V
C66	2240100006	ELECTROLYTIC	10uF	20%	25V
C67	2090016006	CERAMIC	0.1uF		50V
C70	2090016006	CERAMIC	0.1uF		50V
C71	2090016006	CERAMIC	0.1uF		50V
-VARIABLE CAPACITORS-					
VC1	2910023009	CERAMIC	5-50pF	250V	
VC2	2910020003	CERAMIC	3.3-18pF	250V	
VC3	2910022007	CERAMIC	4-40pF	250V	
VC4	2910023009	CERAMIC	5-50pF	250V	
VC5	2910018006	CERAMIC	2.8-10pF	250V	
-TRANSISTORS-					
Q1	3032362004	NPN	2SC2362-G		
Q1	3090036001	FET	2N5486		
Q2	3011016005	PNP	2SA1016-G		
Q3	3011016005	PNP	2SA1016-G		
Q4	3011145006	PNP	2SA1145-G		
Q5	3032362004	NPN	2SC2362-G		
Q6	3032705008	NPN	2SC2705-G		
Q8	3031260000	NPN	2SC1260		
Q9	3031260000	NPN	2SC1260		
Q10	3010711007	PNP	2SA711		
Q11	3031815009	NPN	2SC1815-O or Y		
Q12	3011015003	PNP	2SA1015-O or Y		
Q13	3031260000	NPN	2SC1260		
Q14	3031260000	NPN	2SC1260		
Q15	3010711007	PNP	2SA711		
Q16	3010711007	PNP	2SA711		
Q17	3010711007	PNP	2SA711		
Q18	3031260000	NPN	2SC1260		
Q19	3033596005	NPN	2SC3596-E		
Q20	3011402000	PNP	2SA1402-E		
Q21	3010711007	PNP	2SA711		
Q22	3010495007	PNP	2SA495(G)TM-G		
Q23	3010711007	PNP	2SA711		
Q24	3033596005	NPN	2SC3596-E		
Q25	3033596005	NPN	2SC3596-E		
Q26	3050372009	FET	2SK372-V		
Q27	3031815003	NPN	2SC1815-O or Y		
Q28	3011015003	PNP	2SA1015-O or Y		
Q29	3010495007	PNP	2SA495(G)TM-O		
Q30	3010495007	PNP	2SA495(G)TM-O		

No.	LDR PT No.	DESCRIPTION		
(T-3570	CONT'D)			
Q31	3030752005	NPN	2SC752(G)TM-O	
Q32	3030752005	NPN	2SC752(G)TM-O	
DIODES-				
D1	3120055004	ZENER	RD11EB	11V
D2	3120055004	ZENER	RD11EB	11V
D3	3110071005	SCHOTTKY	1SS97	
D4	3110006004	DETECTOR	1S1588	
D5	3110006004	DETECTOR	1S1588	
D6	3110071005	SCHOTTKY	1SS97	
D7	3110071005	SCHOTTKY	1SS97	
D8	3110006004	DETECTOR	1S1588	
D9	3110006004	DETECTOR	1S1588	
D10	3110071005	SCHOTTKY	1SS97	
D11	3110006004	DETECTOR	1S1588	
D12	3110006004	DETECTOR	1S1588	
D13	3120027018	ZENER	05AZ7.5Y	7.5V
D14	3120027018	ZENER	05AZ7.5Y	7.5V
D15	3120028010	ZENER	05AZ8.2Y	8.2V
D16	3110006004	DETECTOR	1S1588	
D17	3110006004	DETECTOR	1S1588	
D18	3110006004	DETECTOR	1S1588	
D19	3110006004	DETECTOR	1S1588	
D20	3120030008	ZENER	RD15EB	15V
D21	3110071005	SCHOTTKY	1SS97	
D22	3110071005	SCHOTTKY	1SS97	
D23	3120057017	ZENER	05AZ5.6X	5.6V
D24	3120057017	ZENER	05AZ5.6X	5.6V
D26	3120055004	ZENER	RD11EB	11V
D27	3110006004	DETECTOR	1S1588	
D28	3120079008	ZENER	05AZ2.4Z	2.4V
D29	3110071005	SCHOTTKY	1SS97	
D30	3110006004	DETECTOR	1S1588	
D31	3110006004	DETECTOR	1S1588	
D32	3120024003	ZENER	RD5.1EB	5.1V
D33	3120054002	ZENER	RD13EB	13V
D34	3110006004	DETECTOR	1S1588	
D35	3110006004	DETECTOR	1S1588	
D36	3120028001	ZENER	RD8.2ES	8.2V
D37	3120026007	ZENER	RD6.8EB	6.8V
D38	3110006004	DETECTOR	1S1588	
D39	3110006004	DETECTOR	1S1588	
D40	3120057017	ZENER	05AZ5.6X	5.6V
D41	3120057017	ZENER	05AZ5.6X	5.6V
D42	3120080003	ZENER	HZ5B-2	4.7V
D43	3120081005	ZENER	HZ3B-2	2.9V
D44	3120081005	ZENER	HZ3B-2	2.9V
-INTEGRATED CIRCUITS-				
IC1	3220076000	OP AMP	LF412	
IC2	3220075008	OP AMP	LF411	
IC3	3220075008	OP AMP	LF411	
IC4	3220147007	OP AMP	LT1008CN8	
IC5	3220147007	OP AMP	LT1008CN8	
IC6	3220146005	OP AMP	TL083CN	
IC7	3090034007	TRANSISTOR ARRAY	CA3046	
IC8	3290010009	TTL	74F10 PC	

No.	LDR PT No	DESCRIPTION			
(T-3570	CONT'D)				
IC9	3090035009	TRANSISTOR ARRAY	CA3146 E		
IC10	3220075008	OP AMP	LF411		
IC11	3210710001	LINEAR	SN72710N		
IC12	3260000995	TTL	74LS00		
IC13	3220049007	REGULATOR	UPC78L05	+5V	
IC14	3220038002	OP AMP	TL082		
IC15	3213000001	TRANSISTOR ARRAY	LM3086		
IC16	3220048005	OP AMP	TL081CP		
-COILS-					
L1	3960478004	COIL	0.47UH	10%	
L2	3960109104	COIL	1mH	10%	
L3	3960109104	COIL	1mH	10%	
L4	3960109003	COIL	10H	10%	
-SWITCH-					
S1	4000545008	ROTARY	Q-545	'FREQ RANGE'	
-PC BOARD-					
	590357002A		T-3570B		
-MISCELLANOUS-					
	4323019021	SOCKET	310-99-120		

*** POWER SUPPLY, AMPLIFIER BOARD T-3571 ***

-RESISTORS-					
R1	1010390005	CARBON FILM	39 OHM	5%	1/4W
R2	1314990007	METAL FILM	499 OHM	1%	1/8W
R3	1010104008	CARBON FILM	100K OHM	5%	1/4W
R4	1010103006	CARBON FILM	10K OHM	5%	1/4W
R5	1010332001	CARBON FILM	3.3K OHM	5%	1/4W
R6	1311202003	METAL FILM	12K OHM	1%	1/4W
R7	1010223006	CARBON FILM	22K OHM	5%	1/4W
R8	1010223006	CARBON FILM	22K OHM	5%	1/4W
R9	1010332001	CARBON FILM	3.3K OHM	5%	1/4W
R10	1010912009	CARBON FILM	9.1K OHM	5%	1/4W
R11	1010223006	CARBON FILM	22K OHM	5%	1/4W
R12	1010912009	CARBON FILM	9.1K OHM	5%	1/4W
R13	1010470003	CARBON FILM	47 OHM	5%	1/4W
R14	1010470003	CARBON FILM	47 OHM	5%	1/4W
R15	1010102004	CARBON FILM	1K OHM	5%	1/4W
R16	1010102004	CARBON FILM	1K OHM	5%	1/4W
R17	1010122000	CARBON FILM	1.2K OHM	5%	1/4W
R18	1010122000	CARBON FILM	1.2K OHM	5%	1/4W
R19	1010220000	CARBON FILM	22 OHM	5%	1/4W
R20	1010220000	CARBON FILM	22 OHM	5%	1/4W
R21	1010181006	CARBON FILM	180 OHM	5%	1/4W
R22	1010241008	CARBON FILM	240 OHM	5%	1/4W
R23	1010470003	CARBON FILM	47 OHM	5%	1/4W
R24	1010470003	CARBON FILM	47 OHM	5%	1/4W
R25	1010102004	CARBON FILM	1K OHM	5%	1/4W
R26	1010102004	CARBON FILM	1K OHM	5%	1/4W
R27	1010103006	CARBON FILM	10K OHM	5%	1/4W
R28	1010470003	CARBON FILM	47 OHM	5%	1/4W

No.	LDR PT No.	DESCRIPTION			
(T-3571	CONT'D)				
R29	1010470003	CARBON FILM	47 OHM	5%	1/4W
R30	1010150005	CARBON FILM	15 OHM	5%	1/4W
R31	1010150005	CARBON FILM	15 OHM	5%	1/4W
R32	1010569002	CARBON FILM	5.6 OHM	5%	1/4W
R33	1010569002	CARBON FILM	5.6 OHM	5%	1/4W
R34	1312701002	METAL FILM	5.6K OHM	1%	1/4W
R35	1314301008	METAL FILM	4.3K OHM	1%	1/4W
R36	1331000000	METAL FILM	100 OHM	1%	1/2W
R37	1331000000	METAL FILM	100 OHM	1%	1/2W
R38	1010100000	CARBON FILM	10 OHM	5%	1/4W
R39	1010100000	CARBON FILM	10 OHM	5%	1/4W
R40	1010104008	CARBON FILM	100K OHM	5%	1/4W
R41	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R42	1315100004	METAL FILM	510 OHM	1%	1/4W
R43	1010822008	CARBON FILM	8.2K OHM	5%	1/4W
R44	1010392009	CARBON FILM	3.9K OHM	5%	1/4W
R45	1311009004	METAL FILM	10 OHM	1%	1/4W
R46	1311001008	METAL FILM	1K OHM	1%	1/4W
R47	1010682008	CARBON FILM	6.8K OHM	5%	1/4W
R48	1010102004	CARBON FILM	1K OHM	5%	1/4W
R49	1010472007	CARBON FILM	4.7K OHM	5%	1/4W
R50	1010333003	CARBON FILM	33K OHM	5%	1/4W
R51	1010333003	CARBON FILM	33K OHM	5%	1/4W
R52	1010391007	CARBON FILM	390 OHM	5%	1/4W
R53	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R54	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R55	1315100004	METAL FILM	510 OHM	1%	1/4W
R56	1315100004	METAL FILM	510 OHM	1%	1/4W
R57	1311301000	METAL FILM	1.3K OHM	1%	1/4W
R58	1010511001	CARBON FILM	510 OHM	5%	1/4W
R59	1010511001	CARBON FILM	510 OHM	5%	1/4W
R60	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R61	1311301000	METAL FILM	1.3K OHM	1%	1/4W
R62	1010241008	CARBON FILM	240 OHM	5%	1/4W
R63	1010222004	CARBON FILM	2.2K OHM	5%	1/4W
R64	1010220000	CARBON FILM	22 OHM	5%	1/4W
R65	1010220000	CARBON FILM	22 OHM	5%	1/4W
R70	1312000002	METAL FILM	200 OHM	1%	1/4W
R71	1312001004	METAL FILM	2K OHM	1%	1/4W
R72	1311300008	METAL FILM	130 OHM	1%	1/4W
R73	1311300008	METAL FILM	130 OHM	1%	1/4W
R74	1311001008	METAL FILM	1K OHM	1%	1/4W
R75	1318209004	METAL FILM	82 OHM	1%	1/4W
R76	1318209004	METAL FILM	82 OHM	1%	1/4W
R77	1314700002	METAL FILM	470 OHM	1%	1/4W
R78	1314709000	METAL FILM	47 OHM	1%	1/4W
R79	1314709000	METAL FILM	47 OHM	1%	1/4W
R80	1313300000	METAL FILM	330 OHM	1%	1/4W
R81	1313009006	METAL FILM	30 OHM	1%	1/4W
R82	1313009006	METAL FILM	30 OHM	1%	1/4W
R83	1311200004	METAL FILM	120 OHM	1%	1/4W
R84	1313909002	METAL FILM	39 OHM	1%	1/4W
R85	1313909002	METAL FILM	39 OHM	1%	1/4W
R86	1010152009	CARBON FILM	1.5K OHM	5%	1/4W
R87	1010152009	CARBON FILM	1.5K OHM	5%	1/4W
R88	1010103006	CARBON FILM	10K OHM	5%	1/4W
R89	1010103006	CARBON FILM	10K OHM	5%	1/4W

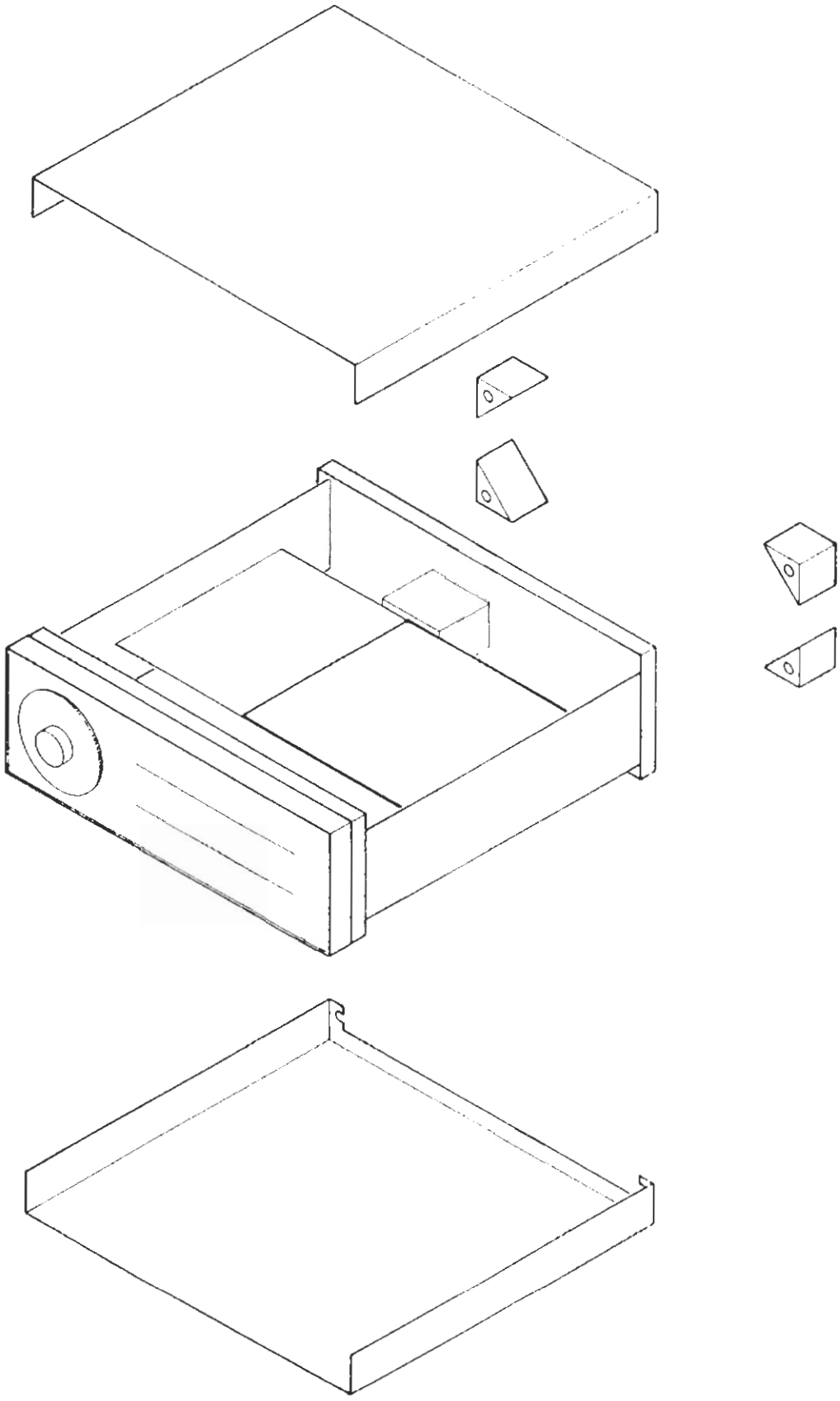
No.	LDR PT No.	DESCRIPTION			
(T-3571	CONT'D)				
R90	1313301002	METAL FILM	3.3K OHM	1%	1/4W
R91	1313301002	METAL FILM	3.3K OHM	1%	1/4W
R92	1311802002	METAL FILM	18K OHM	1%	1/4W
R93	1311802002	METAL FILM	18K OHM	1%	1/4W
R94	1313901006	METAL FILM	3.9K OHM	1%	1/4W
R95	1313901006	METAL FILM	3.9K OHM	1%	1/4W
R96	1010100000	CARBON FILM	10 OHM	5%	1/4W
R97	1010100000	CARBON FILM	10 OHM	5%	1/4W
R98	1313160000	METAL FILM	316 OHM	1%	1/4W
R99	1315360000	METAL FILM	536 OHM	1%	1/6W
R100	1311500006	METAL FILM	150 OHM	1%	1/4W
R101	1311500006	METAL FILM	150 OHM	1%	1/4W
R102	1311801000	METAL FILM	1.8K OHM	1%	1/4W
R103	1311801000	METAL FILM	1.8K OHM	1%	1/4W
-VARIABLE RESISTORS-					
VR1	1711004006	CERMET	100 OHM	20%	1/3W
VR2	1711004006	CERMET	100 OHM	20%	1/3W
VR3	1711004006	CERMET	100 OHM	20%	1/3W
VR4	1711004006	CERMET	100 OHM	20%	1/3W
VR5	1711004079	CERMET	10K OHM	20%	1/3W
VR6	1711004125	CERMET	5K OHM	20%	1/3W
VR7	1711004125	CERMET	5K OHM	20%	1/3W
VR8	1711004015	CERMET	200 OHM	20%	1/3W
-CAPACITORS-					
C1	2120560008	MICA	56pF	10%	500V
C2	2110221009	MICA	220pF	10%	50V
C3	2120050005	MICA	5pF		500V
C4	2610104005	PLASTIC FILM	0.1uF	10%	63V
C5	2120150009	MICA	15pF	10%	500V
C6	2610104005	PLASTIC FILM	0.1uF	10%	63V
C7	2610104005	PLASTIC FILM	0.1uF	10%	63V
C8	2110151004	MICA	150pF	10%	50V
C9	2110181003	MICA	180pF	10%	50V
C10	2240100006	ELECTROLYTIC	10uF	20%	25V
C11	2240100006	ELECTROLYTIC	10uF	20%	25V
C12	2240220006	ELECTROLYTIC	22uF	20%	25V
C13	2240220006	ELECTROLYTIC	22uF	20%	25V
C14	2010103005	CERAMIC	0.01uF		50V
C15	2010103005	CERAMIC	0.01uF		50V
C16	2120010003	MICA	1pF		500V
C17	2090016006	CERAMIC	0.1uF		50V
C18	2240220006	ELECTROLYTIC	22uF	20%	25V
C19	2090016006	CERAMIC	0.1uF		50V
C20	2240220006	ELECTROLYTIC	22uF	20%	25V
C21	2090016006	CERAMIC	0.1uF		50V
C22	2240220006	ELECTROLYTIC	22uF	20%	25V
C23	2090016006	CERAMIC	0.1uF		50V
C24	2240220006	ELECTROLYTIC	22uF	20%	25V
C25	2240330003	ELECTROLYTIC	33uF	20%	25V
C26	2240330003	ELECTROLYTIC	33uF	20%	25V
C27	2120100004	MICA	10pF	10%	500V
C28	2120330001	MICA	33pF	10%	500V
C29	2120270009	MICA	27pF	10%	500V
C30	2090016006	CERAMIC	0.1uF		50V
C31	2090016006	CERAMIC	0.1uF		50V

No.	LDR PT No.	DESCRIPTION			
(T-3571	CONT'D)				
C32	2240229004	ELECTROLYTIC	2.2uF	20%	25V
C33	2240229004	ELECTROLYTIC	2.2uF	20%	25V
C34	2120220004	MICA	22pF	10%	500V
C35	2120560008	MICA	56pF	10%	500V
C36	2120820008	MICA	82pF	10%	500V
C37	2120820008	MICA	82pF	10%	500V
C38	2120560008	MICA	56pF	10%	500V
C39	2120100004	MICA	10pF	10%	500V
C40	2120390009	MICA	39pF	10%	500V
C41	2110101009	MICA	100pF	10%	50V
C42	2320048004	ELECTROLYTIC	1000uF	20%	35V
C43	2320048004	ELECTROLYTIC	1000uF	20%	35V
C44	2090016006	CERAMIC	0.1uF		50V
C45	2090016006	CERAMIC	0.1uF		50V
C46	2240101008	ELECTROLYTIC	100uF	20%	25V
C47	2240101008	ELECTROLYTIC	100uF	20%	25V
C48	2010102003	CERAMIC	1000pF		50V
C49	2010102003	CERAMIC	1000pF		50V
-VARIABLE CAPACITOR-					
VC1	2910018006	CERAMIC	2.8-10pF	250V	
-TRANSISTORS-					
Q1	3031260000	NPN	2SC1260		
Q2	3010711007	PNP	2SA711		
Q3	3031260000	NPN	2SC1260		
Q4	3010711007	PNP	2SA711		
Q5	3032471009	NPN	2SC2471		
Q6	3030372005	NPN	2SC372(G)TM-O		
Q7	3010495007	PNP	2SA495(G)TM-O		
Q8	3033596005	NPN	2SC3596-E		
Q9	3011402000	PNP	2SA1402-E		
Q10	3030382008	NPN	2SC382		
Q11	3030382008	NPN	2SC382		
Q12	3010495007	PNP	2SA495(G)TM-O		
Q13	3030372005	NPN	2SC372(G)TM-O		
Q14	3010495007	PNP	2SA495(G)TM-O		
Q15	3031815018	NPN	2SC1815-Y		
Q16	3011015012	PNP	2SA1015-Y		
Q17	3031815018	NPN	2SC1815-Y		
Q18	3011015012	PNP	2SA1015-Y		
Q19	3030372005	NPN	2SC372(G)TM-O		
Q20	3010495007	PNP	2SA495(G)TM-O		
-DIODES-					
D1	3120058000	ZENER	RD4.7EB	4.7V	
D2	3110006004	DETECTOR	1S1588		
D3	3110006004	DETECTOR	1S1588		
D4	3110006004	DETECTOR	1S1588		
D5	3110006004	DETECTOR	1S1588		
D6	3110006004	DETECTOR	1S1588		
D7	3110006004	DETECTOR	1S1588		
D8	3120028001	ZENER	RD8.2EB	8.2V	
D9	3120059002	ZENER	RD12EB	12V	
D10	3110006004	DETECTOR	1S1588		
D11	3110006004	DETECTOR	1S1588		
D12	3110006004	DETECTOR	1S1588		

No.	LDR PT No.	DESCRIPTION		
(T-3571	CONT'D)			
D13	3110006004	DETECTOR	1S1588	
D14	3110006004	DETECTOR	1S1588	
D15	3110006004	DETECTOR	1S1588	
D16	3110006004	DETECTOR	1S1588	
D17	3110006004	DETECTOR	1S1588	
D18	3110006004	DETECTOR	1S1588	
D19	3110006004	DETECTOR	1S1588	
D20	3110006004	DETECTOR	1S1588	
D21	3110006004	DETECTOR	1S1588	
D22	3110006004	DETECTOR	1S1588	
D23	3110006004	DETECTOR	1S1588	
D24	3120029003	ZENER	RD9.1EB	9.1V
D25	3120029003	ZENER	RD9.1EB	9.1V
D26	3110006004	DETECTOR	1S1588	
D27	3110006004	DETECTOR	1S1588	
D30	3110042008	BRIDGE RECTIFIER	W-02	
-INTEGRATED CIRCUITS-				
IC1	3220075008	OP AMP	LF411	
IC2	3220075008	OP AMP	LF411	
IC3	3211496010	BAL MOD	MC1496L	
-COILS-				
L3	3970159005	COIL	1.5uH	10%
L4	3970399005	COIL	3.9uH	10%
L5	3970159005	COIL	1.5uH	10%
-PC BOARD-				
	5903571026		T-3571B	

9. CABINET REMOVAL

- Take four screws, holding cord wrappers, to remove the Top and Bottom cover.



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