FS710 - 10 MHz AGC DISTRIBUTION AMPLIFIER

Introduction

The FS710 10 MHz AGC Distribution Amplifier provides seven sine wave outputs from a single 10 MHz source. Designed as an accessory for the FS700 LORAN Receiver, the FS710 AGC circuitry can compensate up to 30 dB of cable loss. This makes the FS710 ideal for distributing a 10 MHz timebase as far as a mile from the FS700 Receiver.

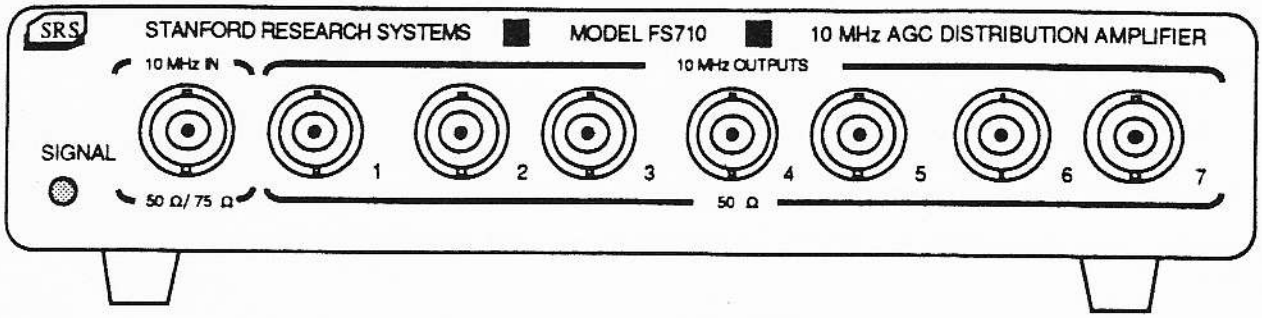

Figure 1 - FS710 Front Panel

Typical Specifications

Input	Frequency:	10 MHz ±100 kHz
	Type:	Insulated BNC, transformer coupled
	Impedance:	50 Ω or 75 Ω (jumper selectable)
	Level:	35 mV to 5 VAC peak-to-peak
	VSWR:	< 1.2 at 10 MHz
Output	Type:	7 local grounded BNC's
	Level:	1 V peak-to-peak into 50 Ω, ±10% or 2 V peak-to-peak into 10 kΩ, ±10%
	VSWR:	< 1.2 at 10 MHz (50 Ω)
	Distortion:	< -30 dBc
Mechanical	7.75" x 7.5" x 2" (w x l x h)	
Weight	3 lbs	
Power	100/120/220/240 VAC, 10 Watts, 50/60 Hz	
Warranty	One year parts and labor on materials and workmanship.	

Operation

Normal operation is indicated by the green light on the lower left corner of the front panel. A red light indicates that the input signal is too low to maintain the set amplitude output.

Troubleshooting

WARNING: Dangerous voltages are present on the printed circuit board. Always turn the power off and disconnect the line cord before removing the cover or changing components.

If front panel indicator is not lit, check the rear panel power switch, the power cord, and the fuse. If the Signal indicator is red, check for proper input signal frequency (10 MHz ± 1%) and sufficient amplitude. Also, check for open or short circuits on the input and output connections.

Calibration

Either J50 or J75 (not both) should be installed to match the input signal impedance (50 or 75 ohms, respectively). The output level can be set to any level from .75 to 1.25 volts peak to peak by adjusting P1. Of the 8 round holes in the top of the box, P1 is accessible through the right-rear position.

Circuit Description

T1, L101, C101, R101, and R102 comprise the input network and provide ground isolation, bandpass filtering, and impedance matching. The signal is amplified by U1 and further filtered by a "stagger tuned" network consisting of L103, C107, R105, C108, C109, and L102. U2 controls the gain of U1 by comparing the peak voltage at L102 with the reference voltage from P1, R117 and R118. D1 indicates loss of signal (red) if the control voltage from U2 becomes less than -2.5 volts. Q8 buffers the signal for distribution to the output transistors Q1 through Q7. Final bandpass filtering and impedance matching is provided by L11-L71, C11-C71, and R11-R71.

Line Voltage Selection

The FS710 operates from a 100, 120, 220 or 240 Volt AC nominal, 50 or 60 Hz power source. Before applying power, verify that the line selector card (located in the power entry module) is in the correct position. The selected voltage is indicated by the white dot on the voltage list.

To change the line voltage selection, disconnect the line cord and remove the fuse module with a small screwdriver. Pull out the voltage selection card (located at the right of the power entry module) with a pair of needle nose pliers. Rotate the plastic indicator until it lines up with the correct voltage indicated on the fuse holder and reinsert the card. Install the correct fuse, reinsert the fuse holder and replace the line cord.

Line Fuse

Verify that the correct line fuse is installed before connecting the line cord. The rear panel indicates the correct fuse size, 1/4 Amp @ 100/120 Volts or 1/8 Amp @ 220/240 Volts. If necessary the fuse can be changed as indicated in the line voltage selection section.

Parts List

C 11	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 12	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 13	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 21	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 22	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 23	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 31	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 32	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 33	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 41	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 42	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 43	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 51	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 52	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 53	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 61	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 62	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 63	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 71	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 72	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 73	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 101	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 102	100P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 103	100P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 104	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 105	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 106	.01U	Capacitor, Ceramic Disc, 100V, 20%, Z5
C 107	39P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 108	10P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 109	39P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 110	.01U	Capacitor, Ceramic Disc, 100V, 20%, Z5
C 111	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 112	.01U	Capacitor, Ceramic Disc, 100V, 20%, Z5
C 113	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 114	.01U	Capacitor, Ceramic Disc, 100V, 20%, Z5
C 115	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 116	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 117	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 118	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 119	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 120	2200U	Capacitor, Electrolytic, 16V, 20%, Rad
C 121	2200U	Capacitor, Electrolytic, 16V, 20%, Rad
C 122	200P	Capacitor, Silver Mica, 250V, 5%, DM15
D 1	GLPED2	LED, Rectangular, Bi-color
D 2	5082-2800	Diode, Schottky
D 3	5082-2800	Diode, Schottky
D 4	BR-81D	Full Wave Rectifier
J 1	BNC	Connector, BNC, Panel Mount
J 2	BNC	Connector, BNC, Panel Mount
J 3	BNC	Connector, BNC, Panel Mount
J 4	BNC	Connector, BNC, Panel Mount
J 5	BNC	Connector, BNC, Panel Mount
J 6	BNC	Connector, BNC, Panel Mount
J 7	BNC	Connector, BNC, Panel Mount
J 8	INSL	Connector, BNC, Panel Mount
J 9	MINI 7 DI	Connector, Male
L 11	4.7UH	Inductor
L 21	4.7UH	Inductor
L 31	4.7UH	Inductor
L 41	4.7UH	Inductor
L 51	4.7UH	Inductor
L 61	4.7UH	Inductor
L 71	4.7UH	Inductor
L 101	4.7UH	Inductor, Axial, Shielded
L 102	4.7UH	Inductor, Axial, Shielded
L 103	4.7UH	Inductor, Axial, Shielded
P 1	500	Pot, Multi-Turn Trim
PC1	FS710	Printed Circuit Board
Q 1	2N3904	Transistor, TO-92 Package
Q 2	2N3904	Transistor, TO-92 Package
Q 3	2N3904	Transistor, TO-92 Package
Q 4	2N3904	Transistor, TO-92 Package
Q 5	2N3904	Transistor, TO-92 Package
Q 6	2N3904	Transistor, TO-92 Package
Q 7	2N3904	Transistor, TO-92 Package
Q 8	2N2907	Transistor, TO-92 Package
Q 9	2N3906	Transistor, TO-92 Package
Q 10	2N3906	Transistor, TO-92 Package
R 11	47	Resistor, Carbon Film, 1/4W, 5%
R 12	270	Resistor, Carbon Film, 1/4W, 5%
R 13	47	Resistor, Carbon Film, 1/4W, 5%
R 14	47	Resistor, Carbon Film, 1/4W, 5%
R 21	47	Resistor, Carbon Film, 1/4W, 5%
R 22	270	Resistor, Carbon Film, 1/4W, 5%
R 23	47	Resistor, Carbon Film, 1/4W, 5%
R 24	47	Resistor, Carbon Film, 1/4W, 5%
R 31	47	Resistor, Carbon Film, 1/4W, 5%
R 32	270	Resistor, Carbon Film, 1/4W, 5%
R 33	47	Resistor, Carbon Film, 1/4W, 5%
R 34	47	Resistor, Carbon Film, 1/4W, 5%
R 41	47	Resistor, Carbon Film, 1/4W, 5%
R 42	270	Resistor, Carbon Film, 1/4W, 5%
R 43	47	Resistor, Carbon Film, 1/4W, 5%
R 44	47	Resistor, Carbon Film, 1/4W, 5%
R 51	47	Resistor, Carbon Film, 1/4W, 5%
R 52	270	Resistor, Carbon Film, 1/4W, 5%
R 53	47	Resistor, Carbon Film, 1/4W, 5%
R 54	47	Resistor, Carbon Film, 1/4W, 5%
R 61	47	Resistor, Carbon Film, 1/4W, 5%
R 62	270	Resistor, Carbon Film, 1/4W, 5%
R 63	47	Resistor, Carbon Film, 1/4W, 5%
R 64	47	Resistor, Carbon Film, 1/4W, 5%
R 71	47	Resistor, Carbon Film, 1/4W, 5%
R 72	270	Resistor, Carbon Film, 1/4W, 5%
R 73	47	Resistor, Carbon Film, 1/4W, 5%
R 74	47	Resistor, Carbon Film, 1/4W, 5%
R 101	73.2	Resistor, Metal Film, 1/8W, 1%, 50PPM
R 102	51	Resistor, Carbon Film, 1/4W, 5%
R 103	33K	Resistor, Carbon Film, 1/4W, 5%
R 104	47	Resistor, Carbon Film, 1/4W, 5%
R 105	2.0K	Resistor, Carbon Film, 1/4W, 5%
R 106	47	Resistor, Carbon Film, 1/4W, 5%
R 107	47	Resistor, Carbon Film, 1/4W, 5%
R 108	47	Resistor, Carbon Film, 1/4W, 5%
R 109	220	Resistor, Carbon Film, 1/4W, 5%
R 110	100K	Resistor, Carbon Film, 1/4W, 5%
R 111	100K	Resistor, Carbon Film, 1/4W, 5%

R 112	2.7K	Resistor, Carbon Film, 1/4W, 5%
R 113	240	Resistor, Carbon Film, 1/4W, 5%
R 114	33	Resistor, Carbon Film, 1/4W, 5%
R 115	4.7K	Resistor, Carbon Film, 1/4W, 5%
R 116	4.7K	Resistor, Carbon Film, 1/4W, 5%
R 117	3.74K	Resistor, Metal Film, 1/8W, 1%, 50PPM
R 118	750	Resistor, Metal Film, 1/8W, 1%, 50PPM
R 119	220	Resistor, Carbon Film, 1/4W, 5%
R 120	560	Resistor, Carbon Film, 1/4W, 5%
T1	T1-1	Transformer, signal
T2	FS710	Transformer, 12VA
U1	MC1590	Integrated Circuit
U2	LF411	Integrated Circuit
U3	MC7905	Regulator, Voltage
U4	LM340T-5	Regulator, Voltage
Z0	4-40X3/8PP	Screw, Panhead Phillips
Z0	POWERBLK	Power Entry Hardware
Z0	FOOT	Hardware, Misc.
Z0	SR440-1	Fabricated Part
Z0	SR440-2	Fabricated Part
Z0	FS710-1	Lexan Overlay

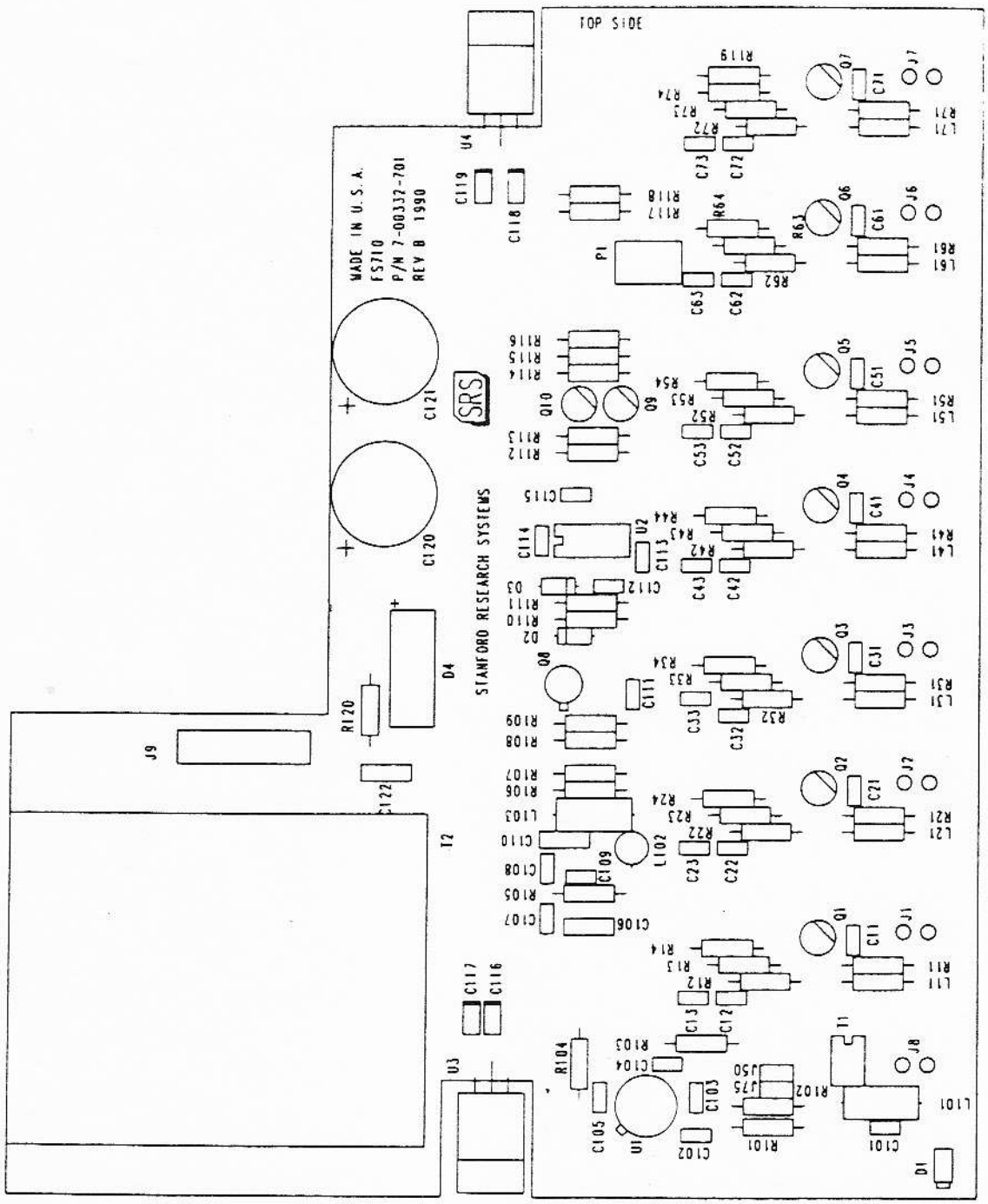

Figure 2 - FS710 PC Layout

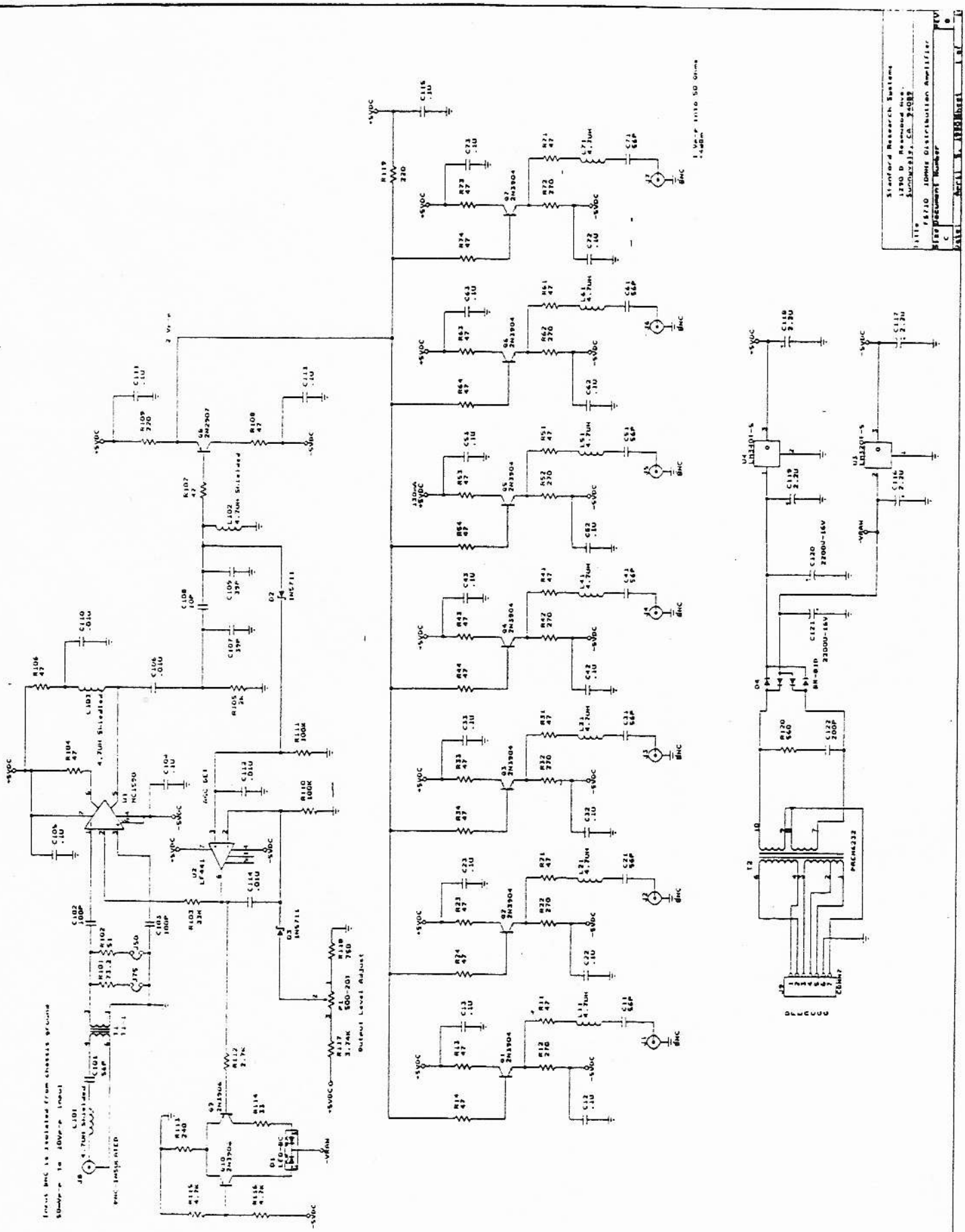

Figure 3 - FS710 Schematic