MODEL FS700
LORAN-C
FREQUENCY STANDARD

MODEL FS710
Distribution Amplifier

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Revision 2.5 (10/2001)

INTRODUCTION

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

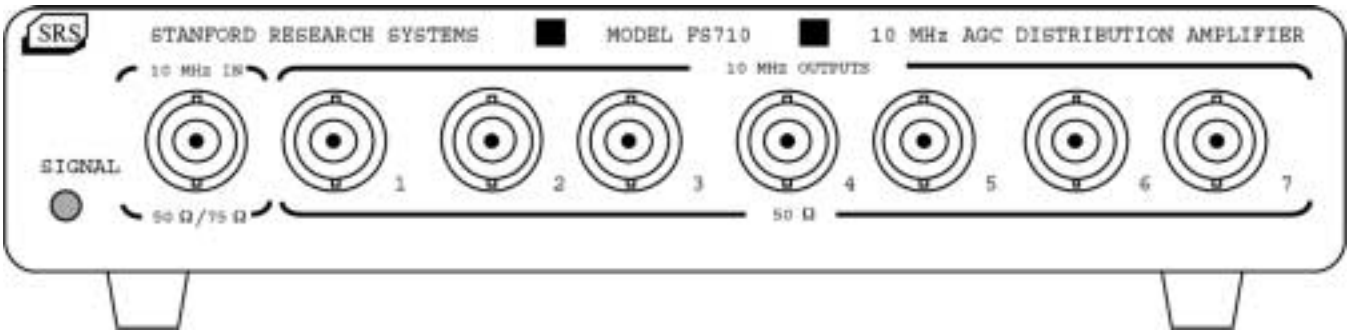

Figure 1 – FS710 Front Panel

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 a green light in 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 opens and shorts 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.

FS710 PARTS LIST

REF.	SRS PART	VALUE	DESCRIPTION
C 11	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 12	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 13	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 21	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 22	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 23	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 31	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 32	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 33	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 41	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 42	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 43	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 51	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 52	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 53	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 61	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 62	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 63	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 71	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 72	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 73	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 101	5-00132-501	56P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 102	5-00002-501	100P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 103	5-00002-501	100P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 104	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 105	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 106	5-00027-503	.01U	Capacitor, Ceramic Disc, 50V, 20%, Z5U
C 107	5-00015-501	39P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 108	5-00003-501	10P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 109	5-00015-501	39P	Capacitor, Ceramic Disc, 50V, 10%, SL
C 110	5-00027-503	.01U	Capacitor, Ceramic Disc, 50V, 20%, Z5U
C 111	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 112	5-00027-503	.01U	Capacitor, Ceramic Disc, 50V, 20%, Z5U
C 113	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 114	5-00027-503	.01U	Capacitor, Ceramic Disc, 50V, 20%, Z5U
C 115	5-00023-529	.1U	Cap, Monolythic Ceramic, 50V, 20%, Z5U
C 116	5-00100-517	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 117	5-00100-517	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 118	5-00100-517	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 119	5-00100-517	2.2U	Capacitor, Tantalum, 35V, 20%, Rad
C 120	5-00030-520	2200U	Capacitor, Electrolytic, 16V, 20%, Rad
C 121	5-00030-520	2200U	Capacitor, Electrolytic, 16V, 20%, Rad
C 122	5-00083-516	200P	Capacitor, Silver Mica, 500V, 5%,
D 1	3-00377-305	GLPED2	LED, Rectangular, Bicolor
D 2	3-00203-301	1N5711	Diode
D 3	3-00203-301	1N5711	Diode
D 4	3-00062-340	KBP201G/BR-81D	Integrated Circuit (Thru-hole Pkg)
J 1	1-00003-120	BNC	Connector, BNC

REF.	SRS PART	VALUE	DESCRIPTION
J 2	1-00003-120	BNC	Connector, BNC
J 3	1-00003-120	BNC	Connector, BNC
J 4	1-00003-120	BNC	Connector, BNC
J 5	1-00003-120	BNC	Connector, BNC
J 6	1-00003-120	BNC	Connector, BNC
J 7	1-00003-120	BNC	Connector, BNC
J 8	1-00073-120	INSL	Connector, BNC
J 9	1-00065-114	7 PIN; WHITE	Header, Amp, MTA-100
J 50	0-00001-000	WIRE	Hardware, Misc.
L 11	6-00048-603	4.7UH	Inductor, Axial
L 21	6-00048-603	4.7UH	Inductor, Axial
L 31	6-00048-603	4.7UH	Inductor, Axial
L 41	6-00048-603	4.7UH	Inductor, Axial
L 51	6-00048-603	4.7UH	Inductor, Axial
L 61	6-00048-603	4.7UH	Inductor, Axial
L 71	6-00048-603	4.7UH	Inductor, Axial
L 101	6-00081-603	4.7UH	Inductor, Axial
L 102	6-00081-603	4.7UH	Inductor, Axial
L 103	6-00081-603	4.7UH	Inductor, Axial
P 1	4-00370-441	500	Pot, Multi-Turn Trim, 3/8" Square Top Ad
PC1	7-00332-701	FS710	Printed Circuit Board
Q 1	3-00021-325	2N3904	Transistor, TO-92 Package
Q 2	3-00021-325	2N3904	Transistor, TO-92 Package
Q 3	3-00021-325	2N3904	Transistor, TO-92 Package
Q 4	3-00021-325	2N3904	Transistor, TO-92 Package
Q 5	3-00021-325	2N3904	Transistor, TO-92 Package
Q 6	3-00021-325	2N3904	Transistor, TO-92 Package
Q 7	3-00021-325	2N3904	Transistor, TO-92 Package
Q 8	3-00197-321	2N2907	Transistor, TO-18 Package
Q 9	3-00022-325	2N3906	Transistor, TO-92 Package
Q 10	3-00022-325	2N3906	Transistor, TO-92 Package
R 11	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 12	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 13	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 14	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 21	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 22	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 23	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 24	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 31	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 32	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 33	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 34	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 41	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 42	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 43	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 44	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 51	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 52	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 53	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%

REF.	SRS PART	VALUE	DESCRIPTION
R 54	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 61	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 62	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 63	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 64	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 71	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 72	4-00062-401	270	Resistor, Carbon Film, 1/4W, 5%
R 73	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 74	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 101	4-00242-407	73.2	Resistor, Metal Film, 1/8W, 1%, 50PPM
R 102	4-00086-401	51	Resistor, Carbon Film, 1/4W, 5%
R 103	4-00074-401	33K	Resistor, Carbon Film, 1/4W, 5%
R 104	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 105	4-00045-401	2.0K	Resistor, Carbon Film, 1/4W, 5%
R 106	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 107	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 108	4-00080-401	47	Resistor, Carbon Film, 1/4W, 5%
R 109	4-00057-401	220	Resistor, Carbon Film, 1/4W, 5%
R 110	4-00032-401	100K	Resistor, Carbon Film, 1/4W, 5%
R 111	4-00032-401	100K	Resistor, Carbon Film, 1/4W, 5%
R 112	4-00051-401	2.7K	Resistor, Carbon Film, 1/4W, 5%
R 113	4-00060-401	240	Resistor, Carbon Film, 1/4W, 5%
R 114	4-00071-401	33	Resistor, Carbon Film, 1/4W, 5%
R 115	4-00079-401	4.7K	Resistor, Carbon Film, 1/4W, 5%
R 116	4-00079-401	4.7K	Resistor, Carbon Film, 1/4W, 5%
R 117	4-00350-407	3.74K	Resistor, Metal Film, 1/8W, 1%, 50PPM
R 118	4-00204-407	750	Resistor, Metal Film, 1/8W, 1%, 50PPM
R 119	4-00057-401	220	Resistor, Carbon Film, 1/4W, 5%
R 120	4-00090-401	560	Resistor, Carbon Film, 1/4W, 5%
T 1	6-00009-610	T1-1-X65	Transformer
T 2	6-00077-610	SR445/FS710	Transformer
U 1	3-00386-340	MC1590	Integrated Circuit (Thru-hole Pkg)
U 2	3-00090-340	LF411	Integrated Circuit (Thru-hole Pkg)
U 3	3-00119-329	7905	Voltage Reg., TO-220 (TAB) Package
U 4	3-00112-329	7805	Voltage Reg., TO-220 (TAB) Package
Z 0	0-00043-011	4-40 KEP	Nut, Kep
Z 0	0-00108-054	1" #26	Wire #26 UL1061
Z 0	0-00165-003	TO-18	Insulators
Z 0	0-00187-021	4-40X1/4PP	Screw, Panhead Phillips
Z 0	0-00208-020	4-40X3/8PF	Screw, Flathead Phillips
Z 0	0-00209-021	4-40X3/8PP	Screw, Panhead Phillips
Z 0	0-00220-002	5EFM4S	Power_Entry Hardware
Z 0	0-00221-000	SR440FOOT	Hardware, Misc.
Z 0	0-00231-043	#4 SHOULDER	Washer, nylon
Z 0	0-00243-003	TO-220	Insulators
Z 0	0-00522-053	3-1/2" #24	Wire #24 UL1007 Strip 1/4x1/4 Tin
Z 0	0-00532-053	3-1/2 YEL NOTIN	Wire #24 UL1007 Strip 1/4x1/4 Tin
Z 0	1-00066-112	7 PIN; 24AWG/WH	Connector, Amp, MTA-100
Z 0	6-00002-611	.25A 3AG	Fuse
Z 0	7-00119-720	SR440-1	Fabricated Part

Z 0	7-00120-720	SR440-2	Fabricated Part
Z 0	7-00331-709	FS710-1	Lexan Overlay
Z 0	9-00267-917	GENERIC	Product Labels

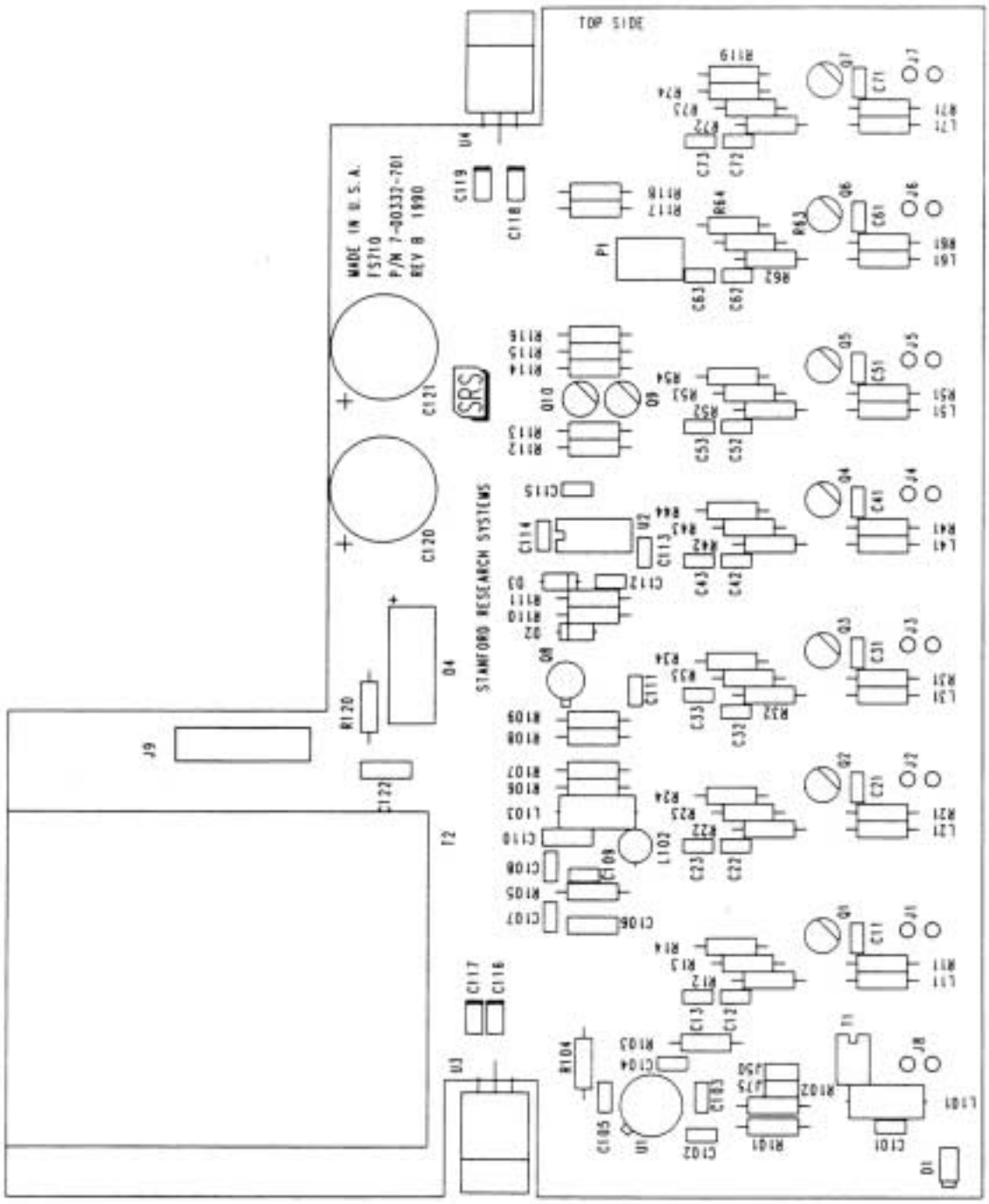

Figure 2 – FS710 PC Layout

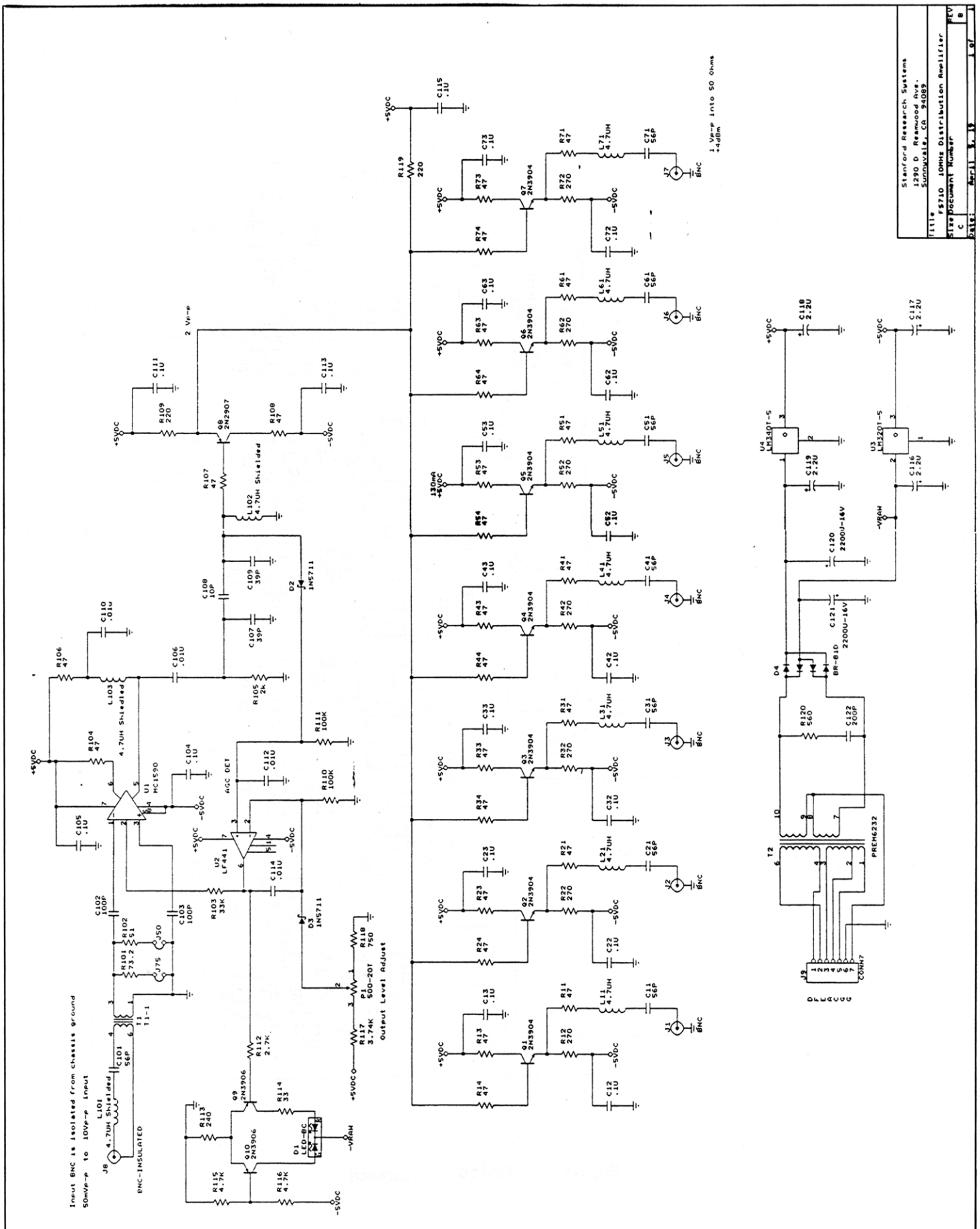

Figure 3 - FS710 Schematic