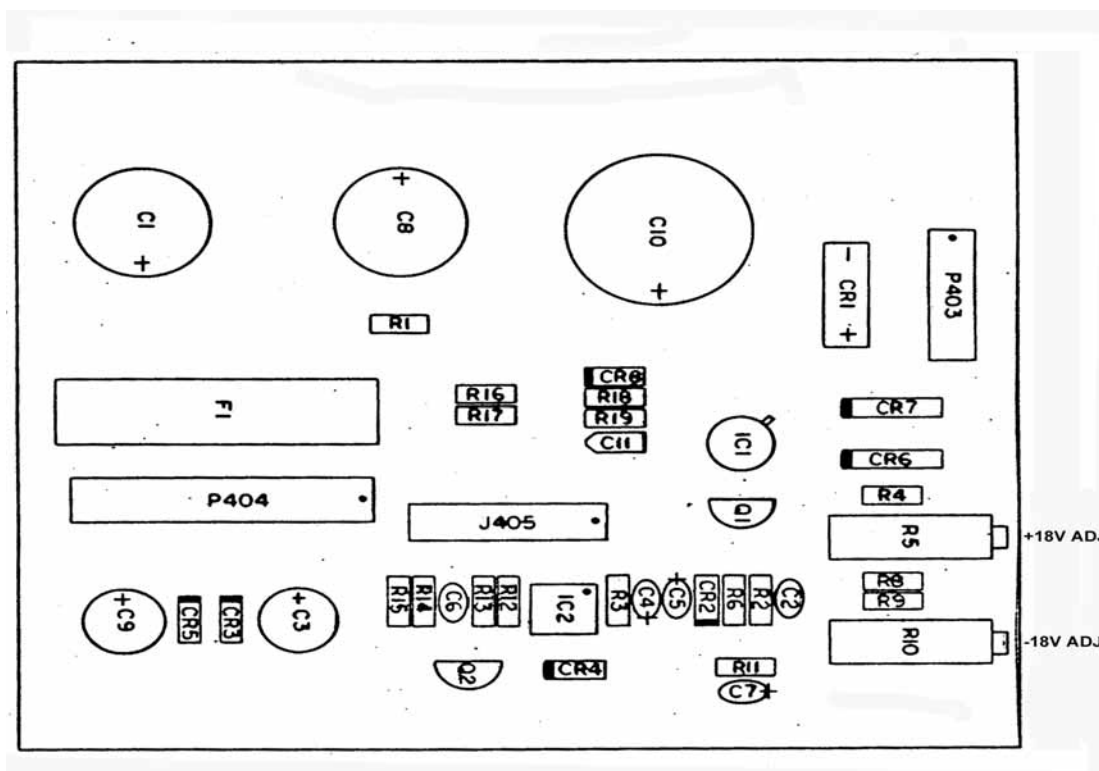


1.1 CALIBRATION PROCEDURE

Remove the instrument top and bottom cover and the card cage cover. Allow a two-hour warm-up period before calibration. In general, calibration should be performed in the sequence given.

1.1.1 Power Supply

DPS14 ADJUSTMENT



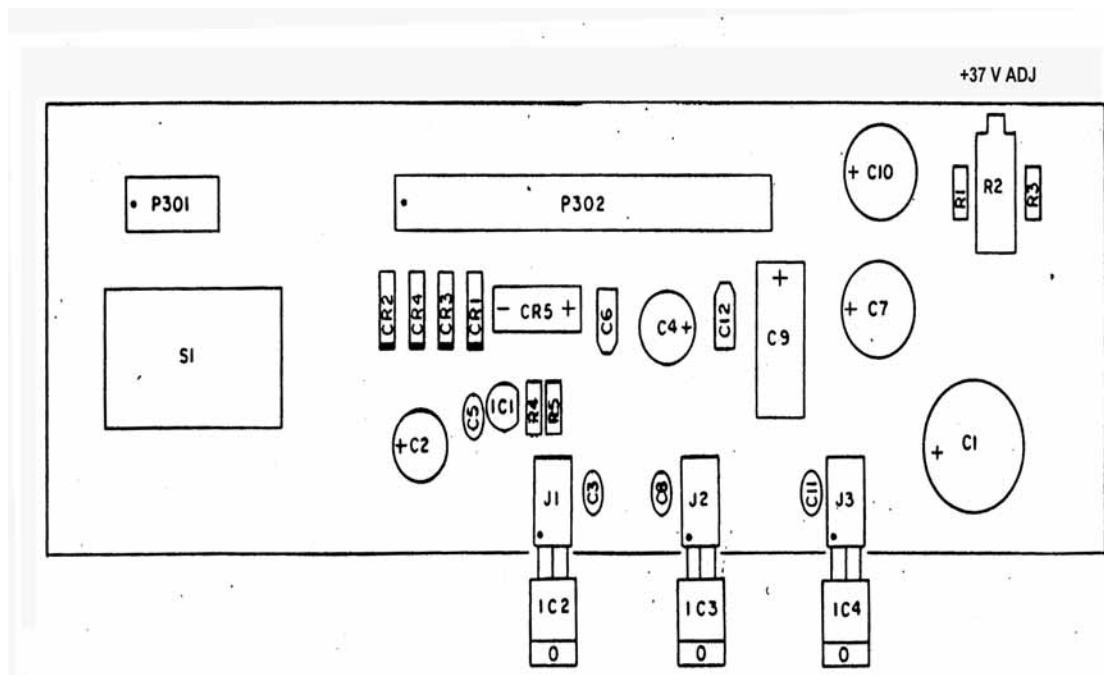
Note: All measurements are made with reference to chassis ground.

+18V VOLT ADJUSTMENT – Connect the digital voltmeter to the **orange** +18 volt line on pin 3 of module M30-5. Set the +18V ADJ to read **+18.00 V +/- .005**.

-18V VOLT ADJUSTMENT – Connect the digital voltmeter to the **yellow** -18V volt line on pin 4 of module M30-5. Set the -18V ADJ to read **-18.00V +/- .005**.

+7.3V VOLT ADJUSTMENT - Connect the digital voltmeter to the **green** +7.3V volt line on pin 2 of module M30-5. It should read **+7.3V +/-0.15**. If not, add R17 or R19 to adjust the reading.

DIGITAL POWER SUPPLY ADJUSTMENT



Note: On the readings, use a digital ground as reference, not chassis ground.

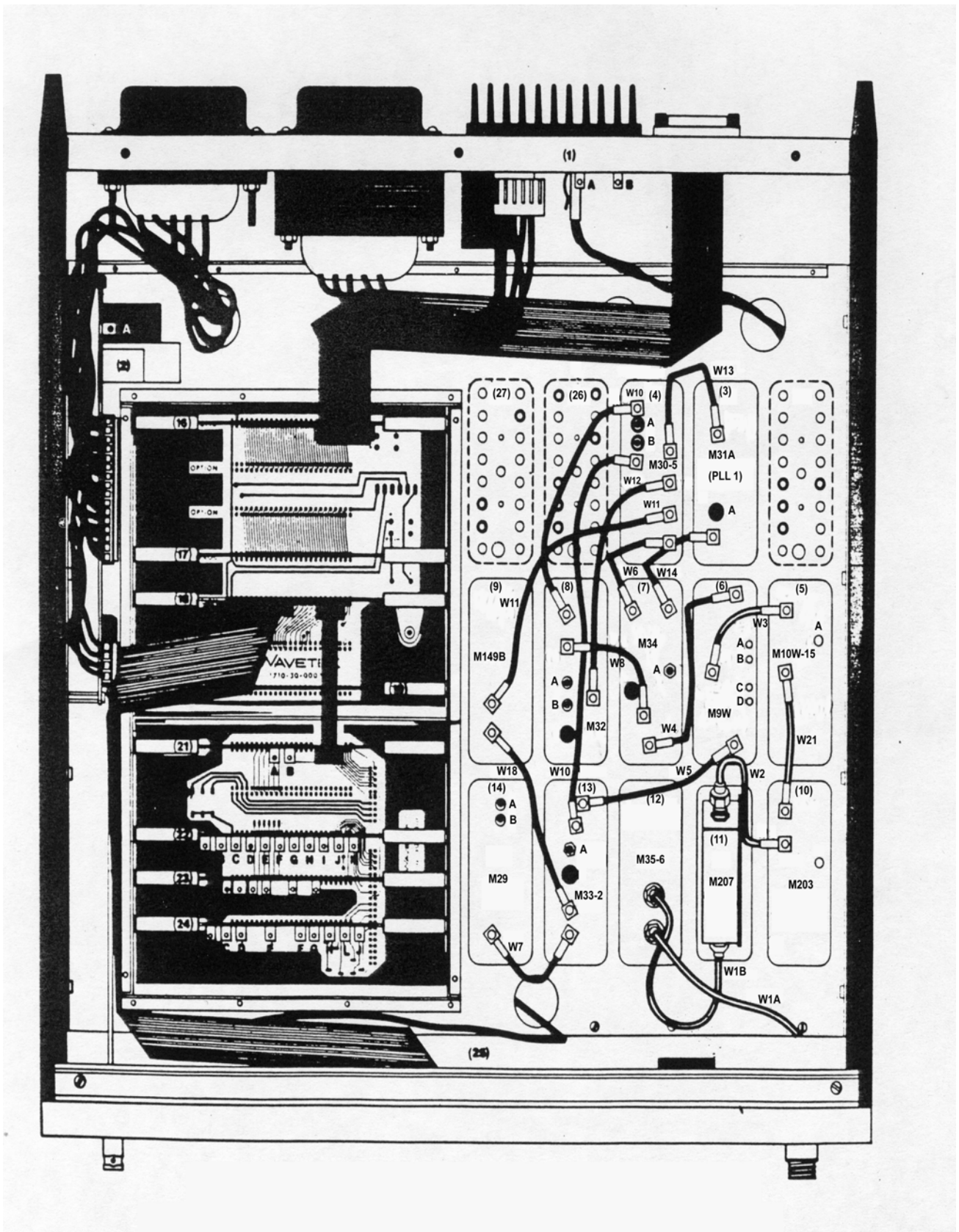
+5V VOLT ADJUSTMENT - Connect the digital voltmeter to the **green** +5V volt line on pin 12 or 13 of the digital power supply. The reading should be **+5V +/-0.2**. If not, adjust R5.

+37V VOLT ADJUSTMENT - Connect the digital voltmeter to the **brown** +37V volt line on pin 16 of the digital power supply. Set the +37V ADJ on the digital power supply to read **+37V +/- 0.5**.

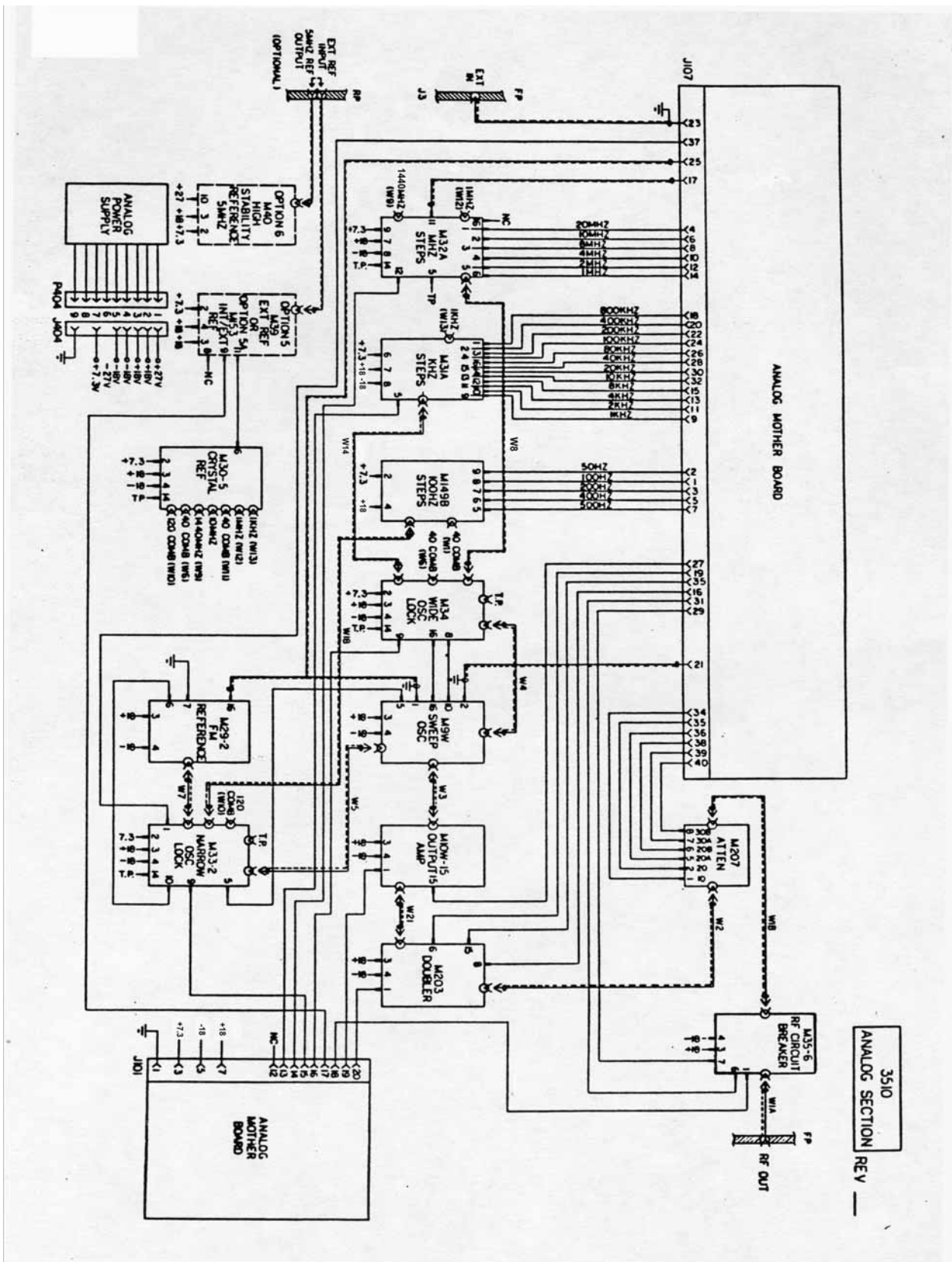
- 5V VOLT ADJUSTMENT - Connect the digital voltmeter to the **red** -5V volt line on pin 10 of the digital power supply. The reading should be **-5V +/-0.2**.

+12V VOLT ADJUSTMENT - Connect the digital voltmeter to the +12V volt line on pin 14 or 15 of the digital power supply. The reading should be **+12V +/-0.2**.

1.1.2 Test Points and Adjustment Locations

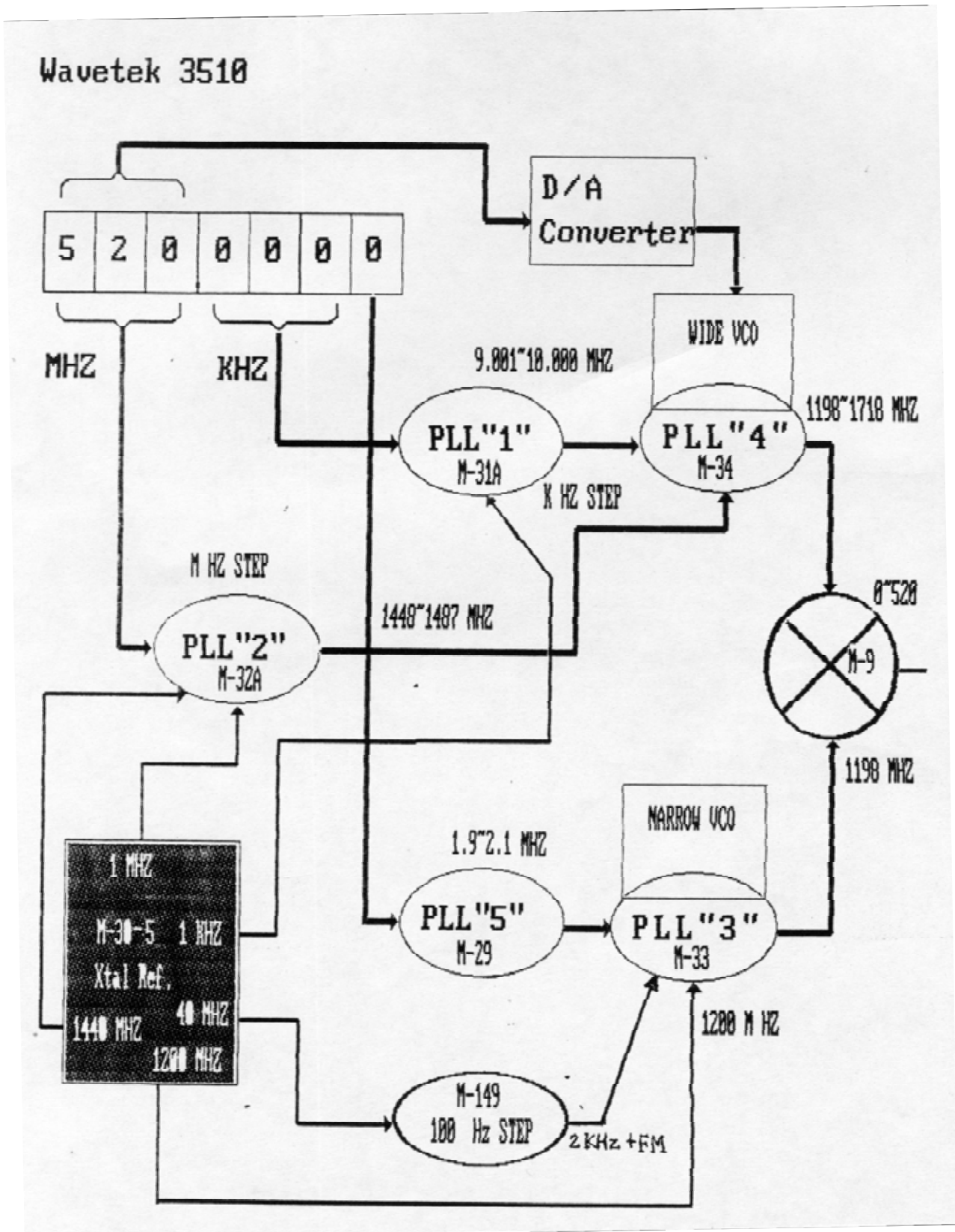


1.1.3 Block Diagram of Phase Locked Loop (PLL) Sections



1.1.4 PHASE LOCKED LOOP 2 ADJUSTMENT

The simplified functions of the Phase Locked Loop (PLL) are as follow:



FREQUENCY CARD ADJUSTMENT – Connect the digital voltmeter to the analog program input on pin 11 of the M32A. Recall stored setting 509. Set the M32A ADJ R39 at the Frequency Card to **0 V +/- 0.1**.

PHASE LOCK VOLTAGE ADJUSTMENT – Connect the digital voltmeter to the PLL test point on pin 15 of the M32A. Using stored setting 509, adjust A on the M32A for 0V +/- 0.1. Recall stored setting 510. Adjust B on the M32A for 0V +/- 0.1. Change the frequency in 1 MHz step from 239 MHz to 200 MHz, noting the voltage on pin 15 is **0V +/- 1.0**.

LEVELER CHECK – Connect the digital voltmeter to the leveler test point on pin 14 of the M32A. Change the frequency in 1 MHz step from 200 MHz to 239 MHz, noting the voltage is **0.55V to 2.5V**.

1.1.5 PHASE LOCKED LOOP 3 ADJUSTMENT

PLL3 consists of the two modules; the M33-2 and the M9W. The test point is on the module M33-2 while the adjustment controls are on the M9W module.

2 MHz NULL – Connect the oscilloscope to the phase lock output on pin 5 of the M33-2. Recall stored setting 524. Adjust C on the M9W for a null on the oscilloscope of less than 20 mv.

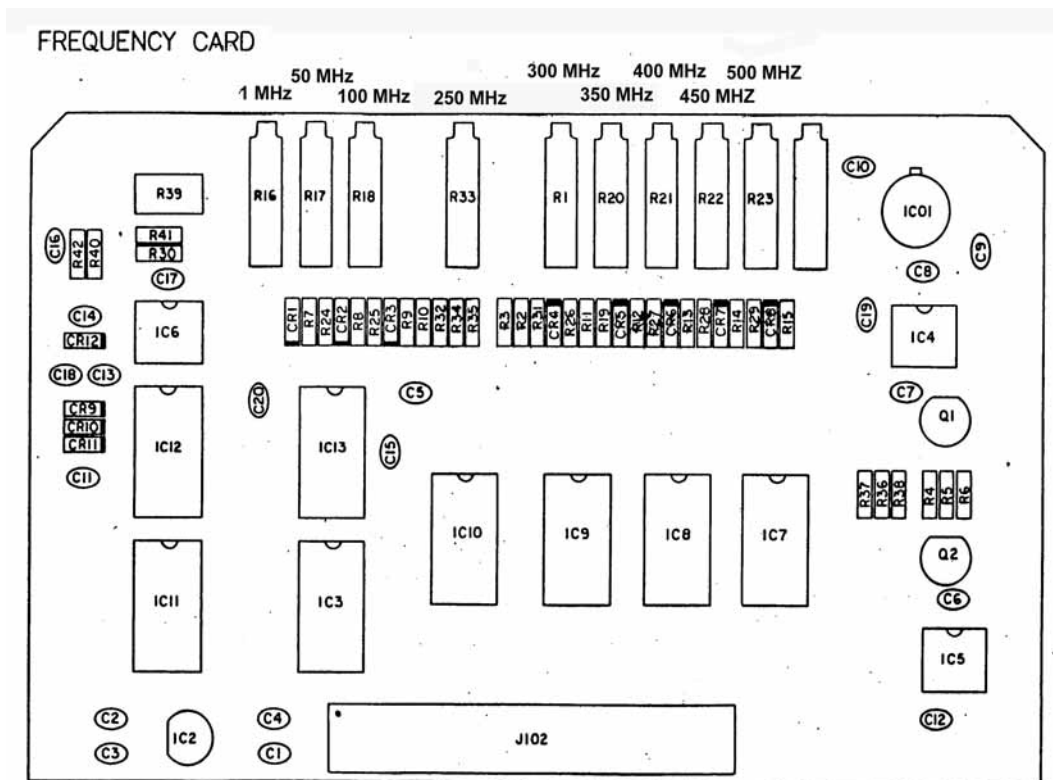
PHASE LOCK VOLTAGE ADJUSTMENT – Connect the digital voltmeter to the phase lock output on pin 5 of the M33-2. Adjust D on the M9W for **-1.5V +/-0.1**.

LEVELER CHECK – Connect the digital voltmeter to the leveler test point on pin 14 of the M33-2. The reading should be between **0.55 V to 2.5 V**.

1.1.6 PHASE LOCKED LOOP 4 ADJUSTMENT

Calibration of PLL 4 involves modules M9W and M34, and the Sweep Drive/DAC board. Test points are located on module M34 and the Sweep Drive/DAC board, while adjustment controls are located on module M9W and the Sweep Drive/DAC board.

PHASE LOCK VOLTAGE ADJUSTMENT – Connect the digital voltmeter to the analog tuning input on pin 2 of the M9W. Recall stored setting 501. Set the frequency step size to 50 MHz. Adjust 250 MHz on the Frequency Card for **0V +/- 0.005**.



Connect the digital voltmeter to the phase lock output on pin 8 of the M34. Adjust A on the M9W for **0V +/- 1.0** .

Set the output frequency to 300 MHz and adjust 300 MHz on the Frequency Card for 0V +/- 3.0 . Repeat this step, using the applicable Frequency Card adjustment for 350, 400, and 450 MHz.

Set the output frequency to 500 MHz. Adjust 500 MHz on the Frequency Card close to 0V. Set the output frequency to 520 MHz. Readjust 500 MHz on the Frequency Card to give a symmetrical reading around 0V at 520 MHz and 500 MHz.

Recall stored setting 503. Adjust 100 MHz on the Frequency Card for **0V +/- 3.0**.

Recall stored setting 504. Adjust 50 MHz on the Frequency Card for **0V +/- 3.0**.

Recall stored setting 505. Adjust 1 MHz on the Frequency Card for **0V +/- 3.0**.

LEVELER ADJUSTMENT – Connect the digital voltmeter to the leveler test point on pin 14 of the M34. Recall stored setting 508. Step the output frequency up in 10 MHz increments, noting the frequency of the maximum reading. Adjust B on the

M9W for **1V +/- 0.005** at that frequency.

Recall stored setting 508. Step the output frequency up in 10 MHz increment, noting the minimum voltage is greater than 0.7 V.

1.1.7 CRYSTAL REFERENCE CHECK.

LEVELER CHECK – Connect the digital voltmeter to the leveler test point on pin 14 of the M30-5. The reading should be between 0.55 V to 1.5 V.

FREQUENCY CHECK – Connect the frequency counter to the RF OUTPUT connector on the front panel. Recall stored setting 513. The reading should be 520 MHz +/- 0.0001.

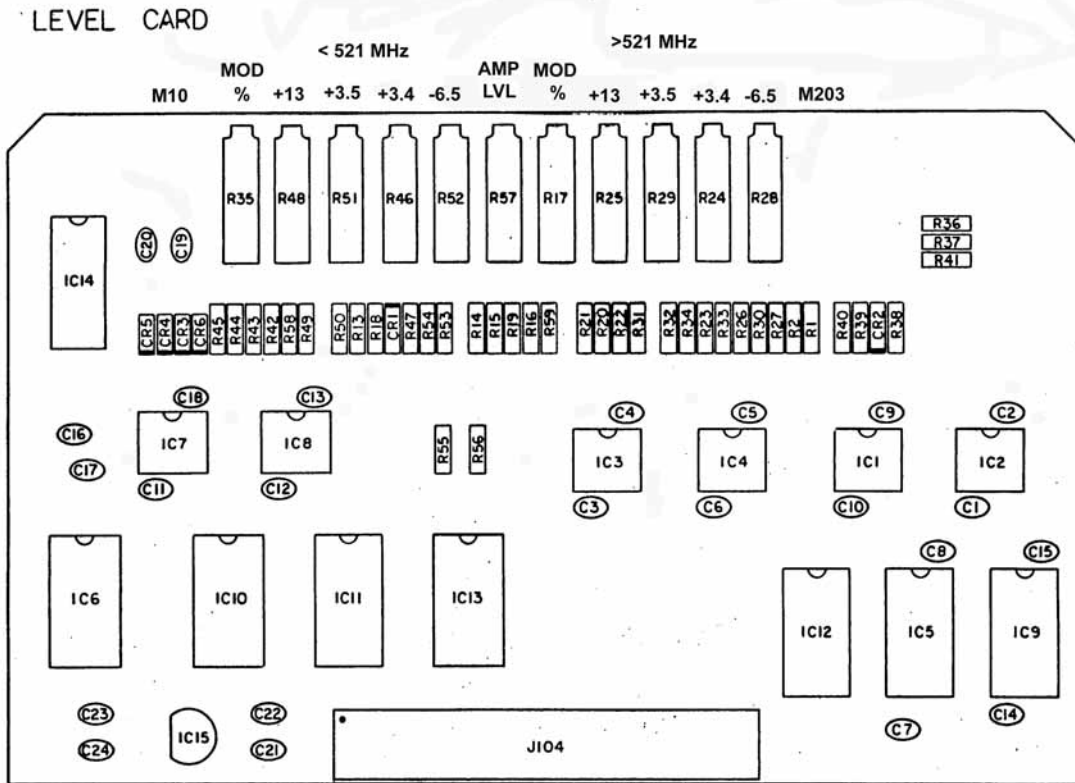
1.1.8 PHASE LOCKE LOOP 5 ADJUSTMENT.

FREQUENCY ADJUSTMENT – Connect the frequency counter to the RF OUTPUT connector on the front panel. Recall stored setting 513. Turn the ALC off. Adjust B on the M29-2 for 520 MHz +/- 0.001. After adjustment, turn ALC on.

2 KHz NULL ADJUSTMENT – Connect the oscilloscope to pin 10 of the M33-2. Adjust A on the bottom of the M33-2 to null the 2 KHz signal there.

1.1.9 OUTPUT POWER ADJUSTMENT

Non-doubled power adjustments are located on the left side of the card. Looking at the component side with the card ejectors at the top. Doubled power adjustments are located on the right side of the card.



NON-DOUBLED POWER ADJUSTMENT – Connect the power meter to the RF OUTPUT connector on the front panel. Recall stored setting 515. Adjust +13 on the level card for +13 dBm +/- 0.1. Change the output level to +3.5 dBm. Adjust +3.5 on the level card for +3.5 dBm +/- 0.1. Change the output level to +13 dBm and repeat both adjustments as necessary.

Recall stored setting 526. Adjust +3.4 on the level card for +3.4 dBm +/- 0.1. Change the output level to -6.5 dBm. Adjust -6.5 on the level card for -6.5 dBm +/-0.1. Change the output level to +3.4 dBm and repeat both adjustments as necessary.

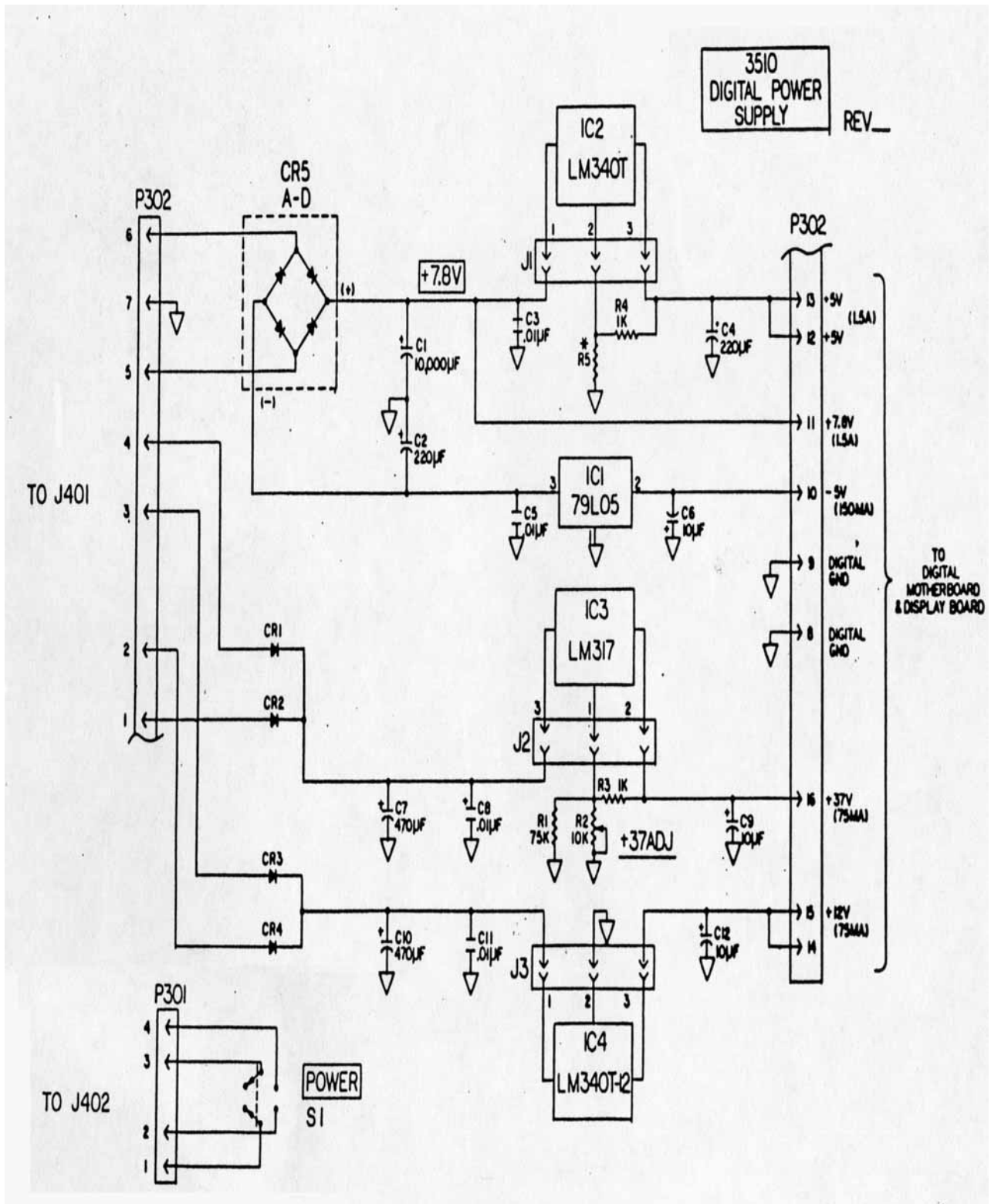
DOUBLE POWERADJUSTMENT – Repeat the procedure for non-doubled power adjustments using the doubled power adjustments on the Level Card and stored setting 517 in the first paragraph and 518 in the second.

1.1.10 Stored Settings

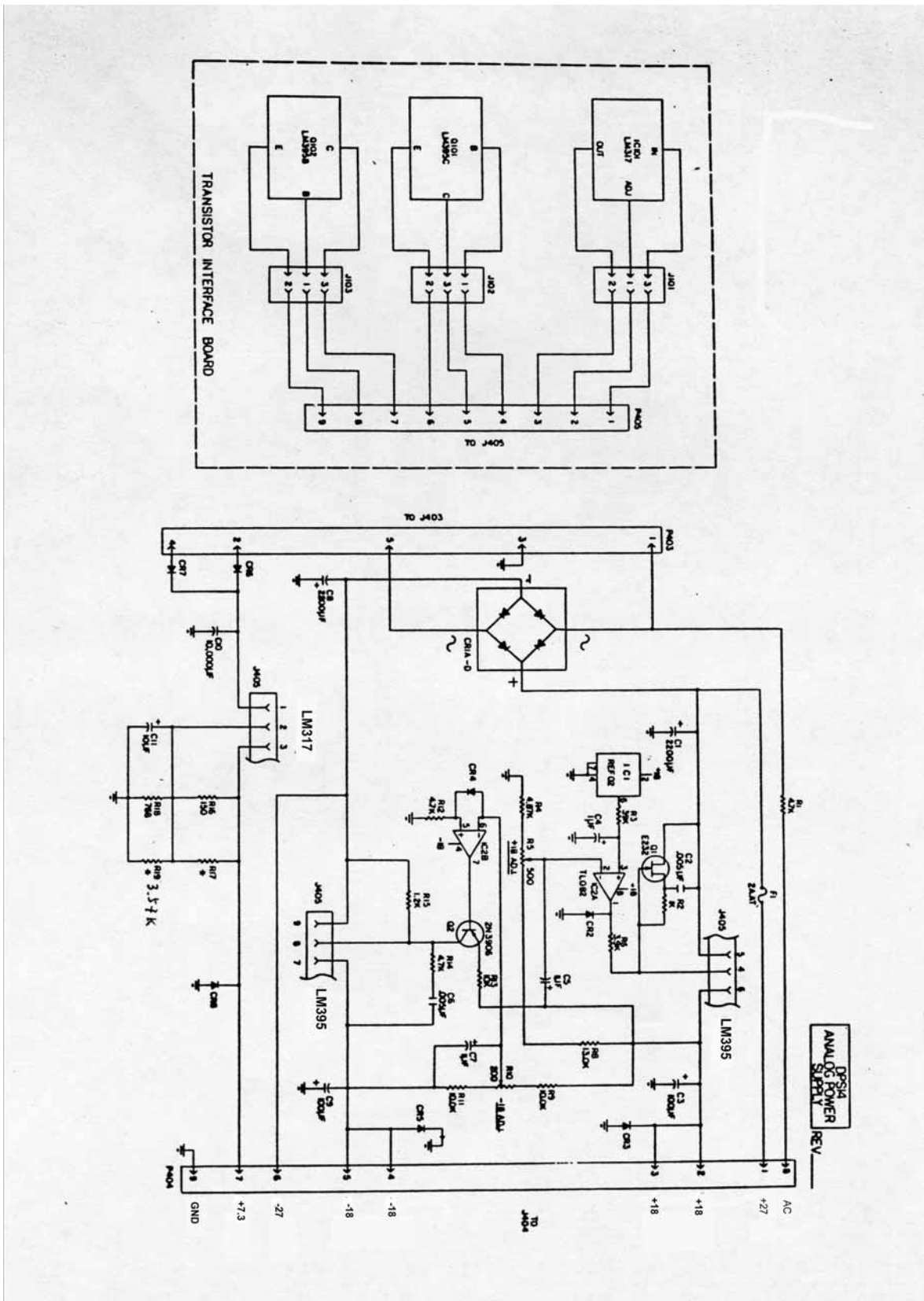
Setting	Freq (MHz)	Level (dBm)	Setting	Freq (MHz)	Level (dBm)
501	250	0	520	260	2
502	510	0	521	761	2
503	100	0	522	520	-6.9
504	50	0	523	1000	-6.9
505	1	0	524	1000	-6.9
506	520.9999	0	525	520	-6.9
507	1.999	0	526	1000	13
508	1	0	527	1000	13
509	200	0	528	1000	2
510	239	0	529	1000	3
511	520	0	530	520	2
512	520	0	531	1000	2
513	520	0	532	100.003	13
514	520	0	533	239.003	13
515	100	13	534	519.003	13
516	100	2	535	100.003	13
517	761	13	536	1	13
518	761	2	537	1000	3
519	1	12	538	1000	13

2.1761 DIAGRAMS AND CIRCUIT BOARD ILLUSTRATIONS

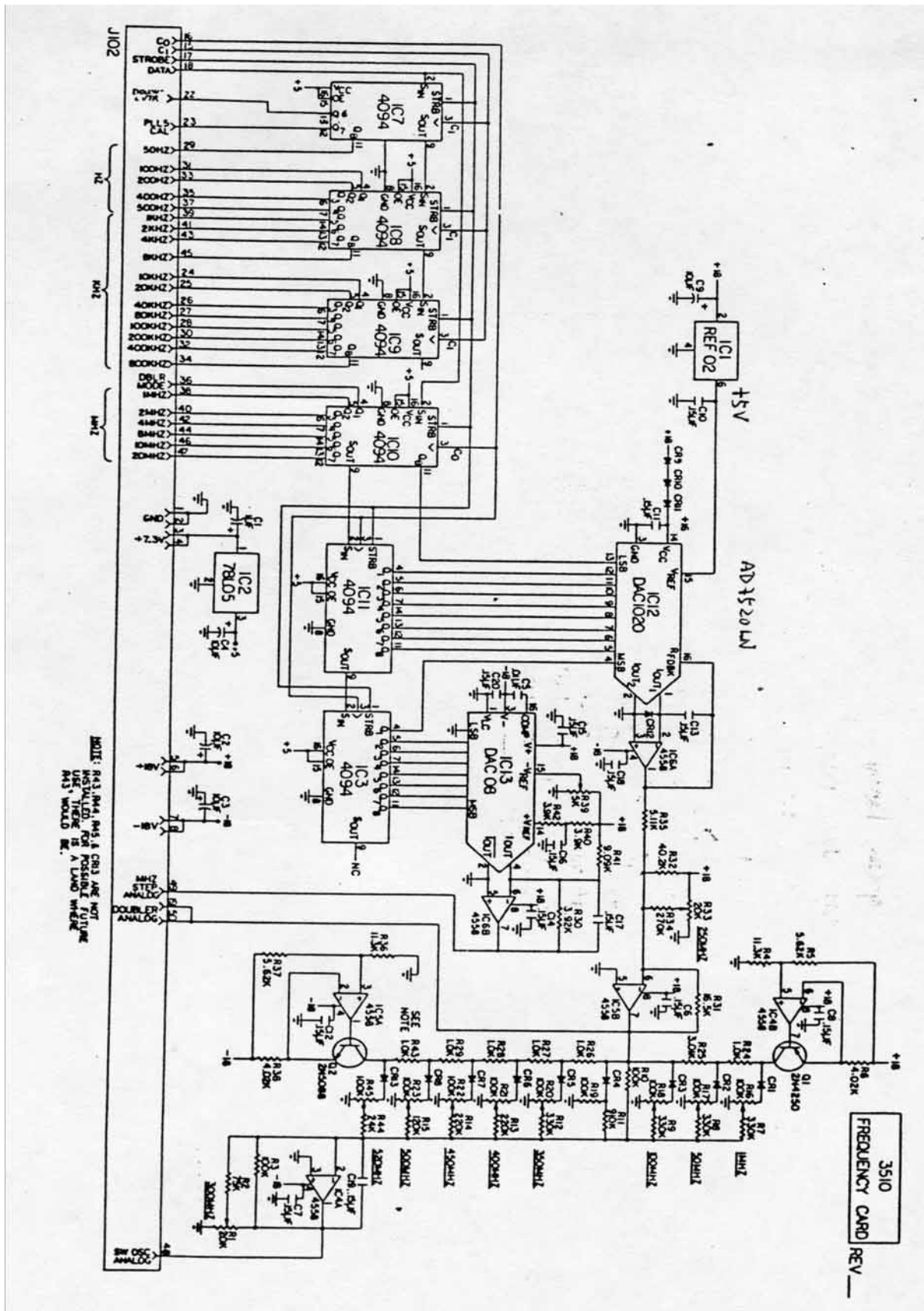
2.1.1 Digital Power Supply



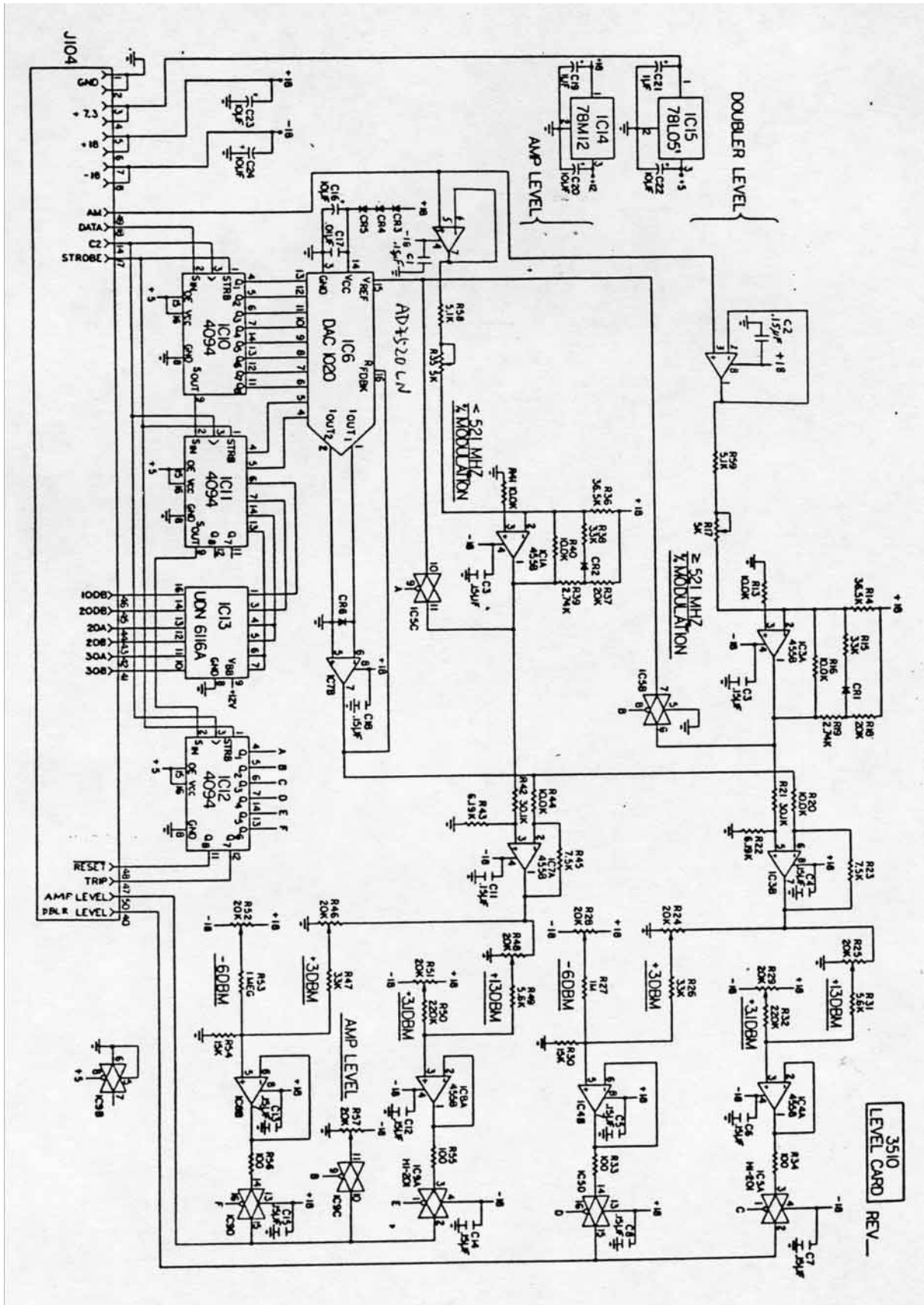
2.1.2 Analog Power Supply



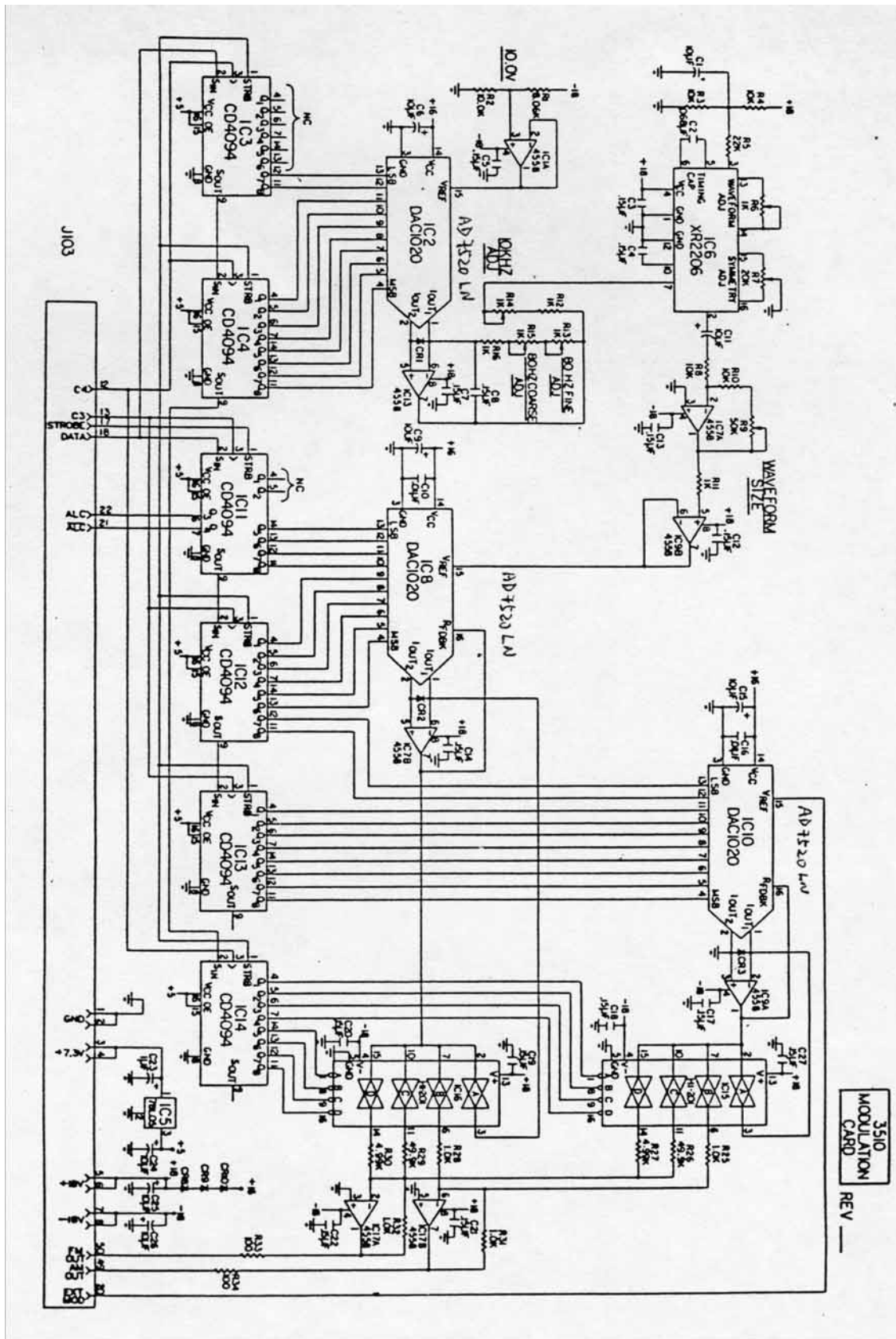
2.1.4 Frequency Card



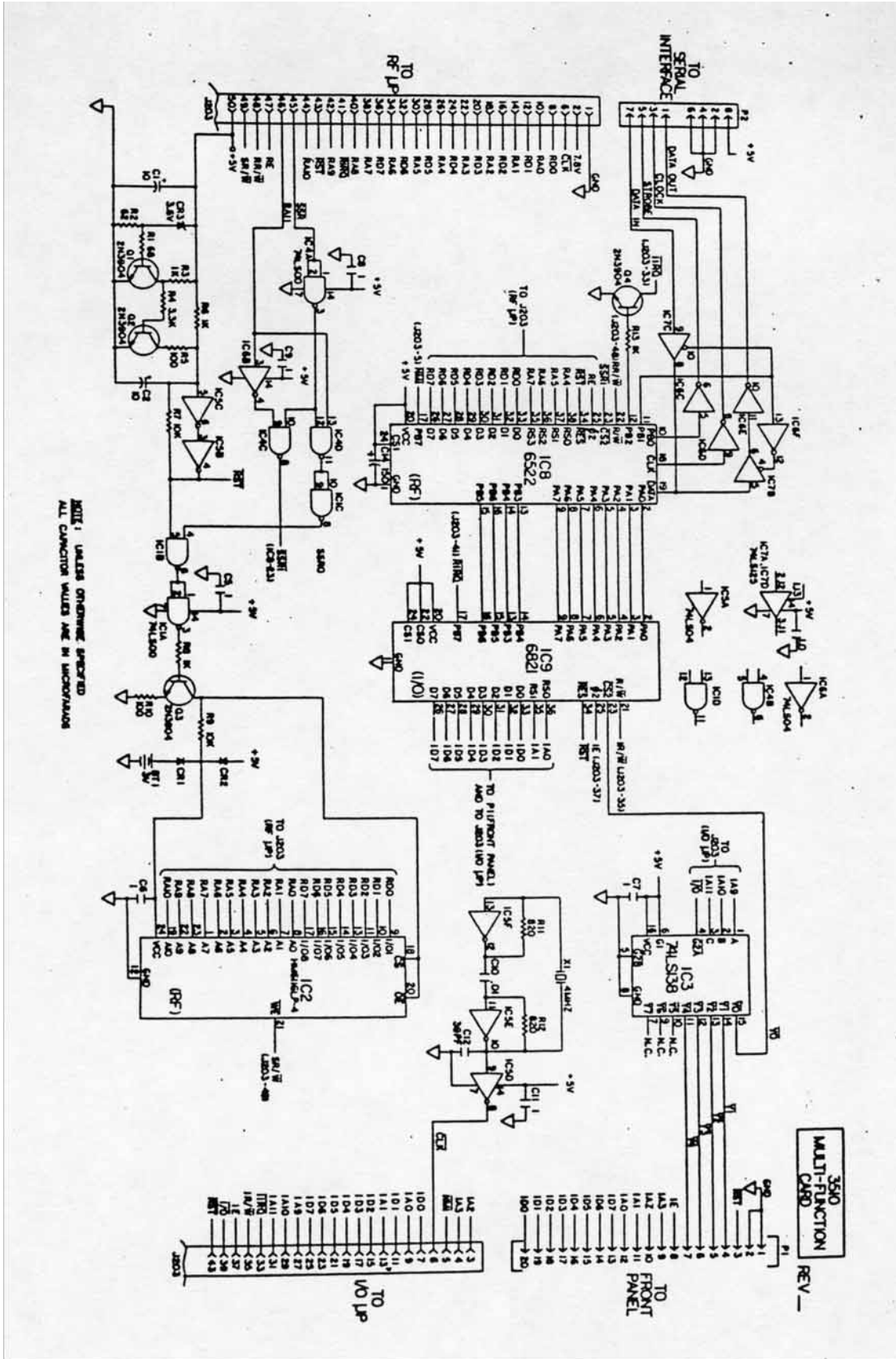
2.1.5 Level Card



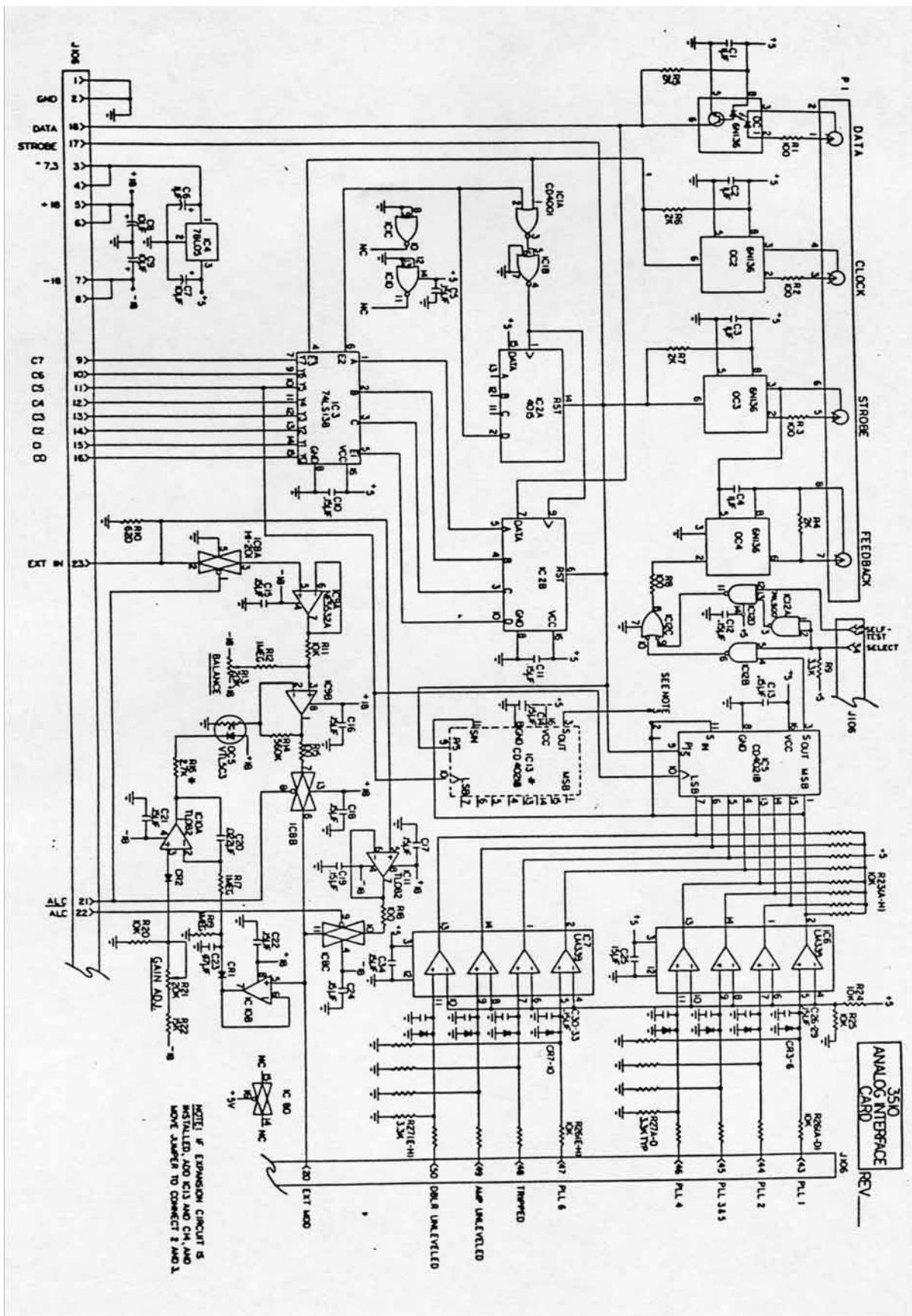
2.1.6 Modulation Card



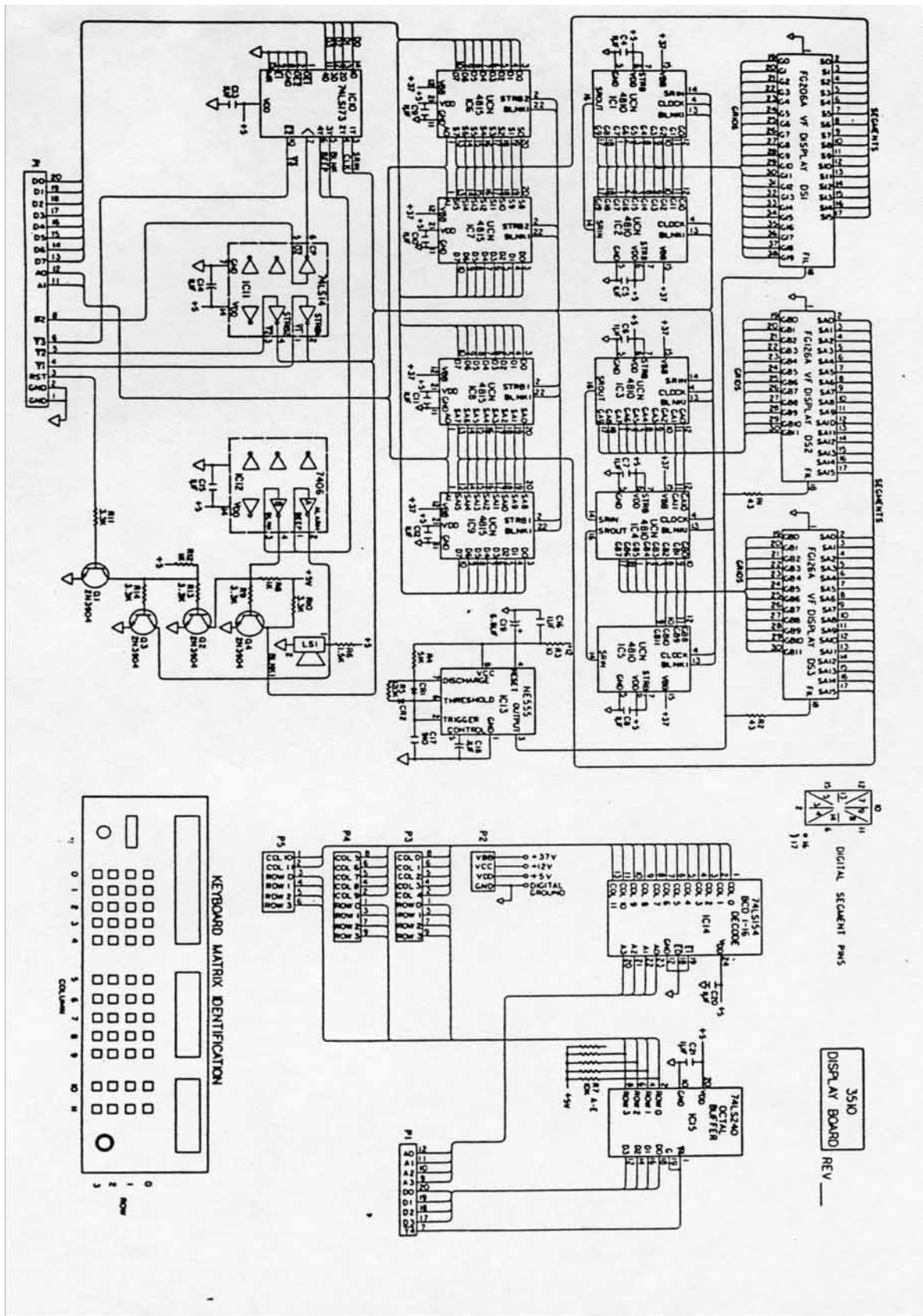
2.1.7 Multifunction Card



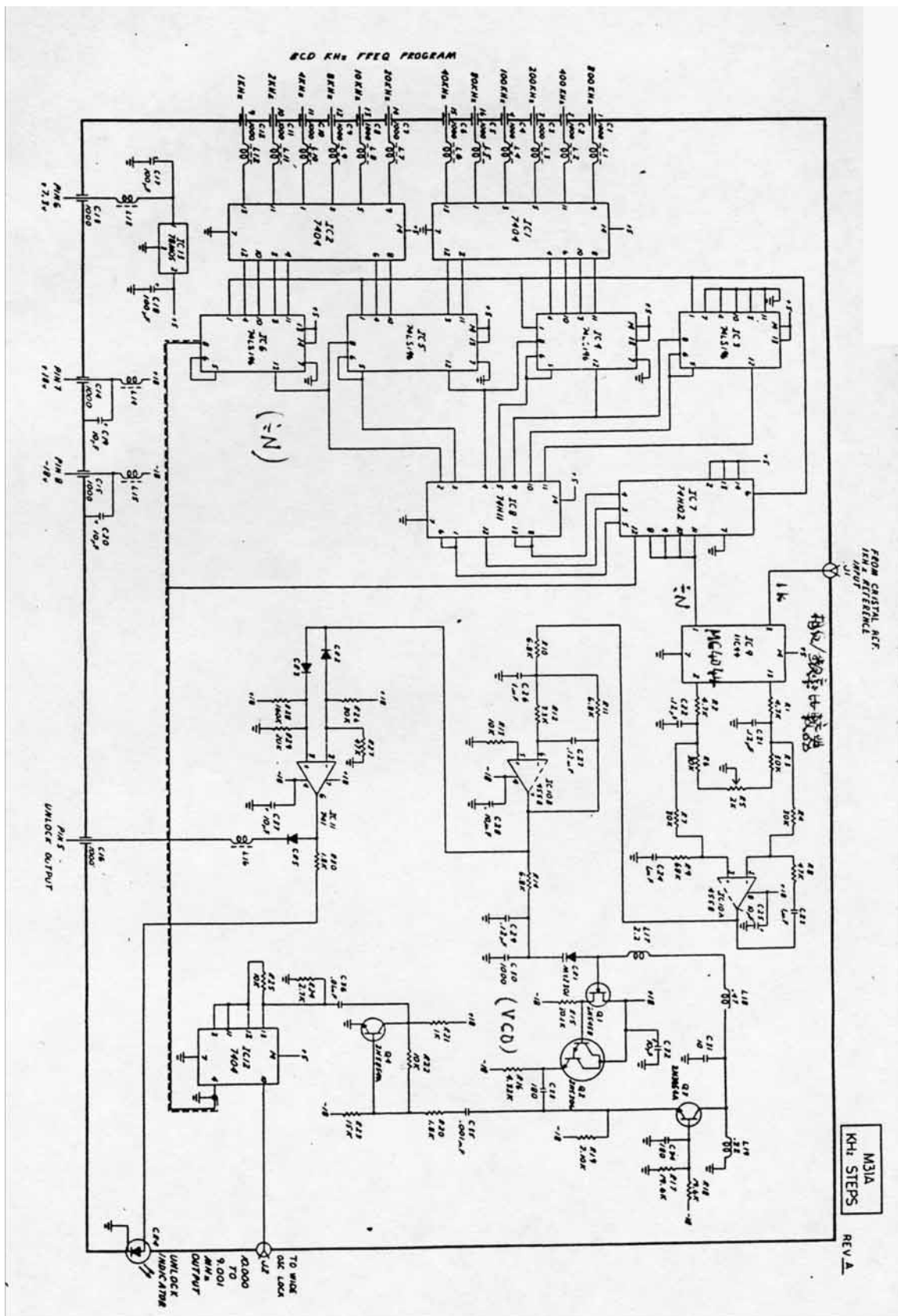
2.1.8 Analog Interface Card



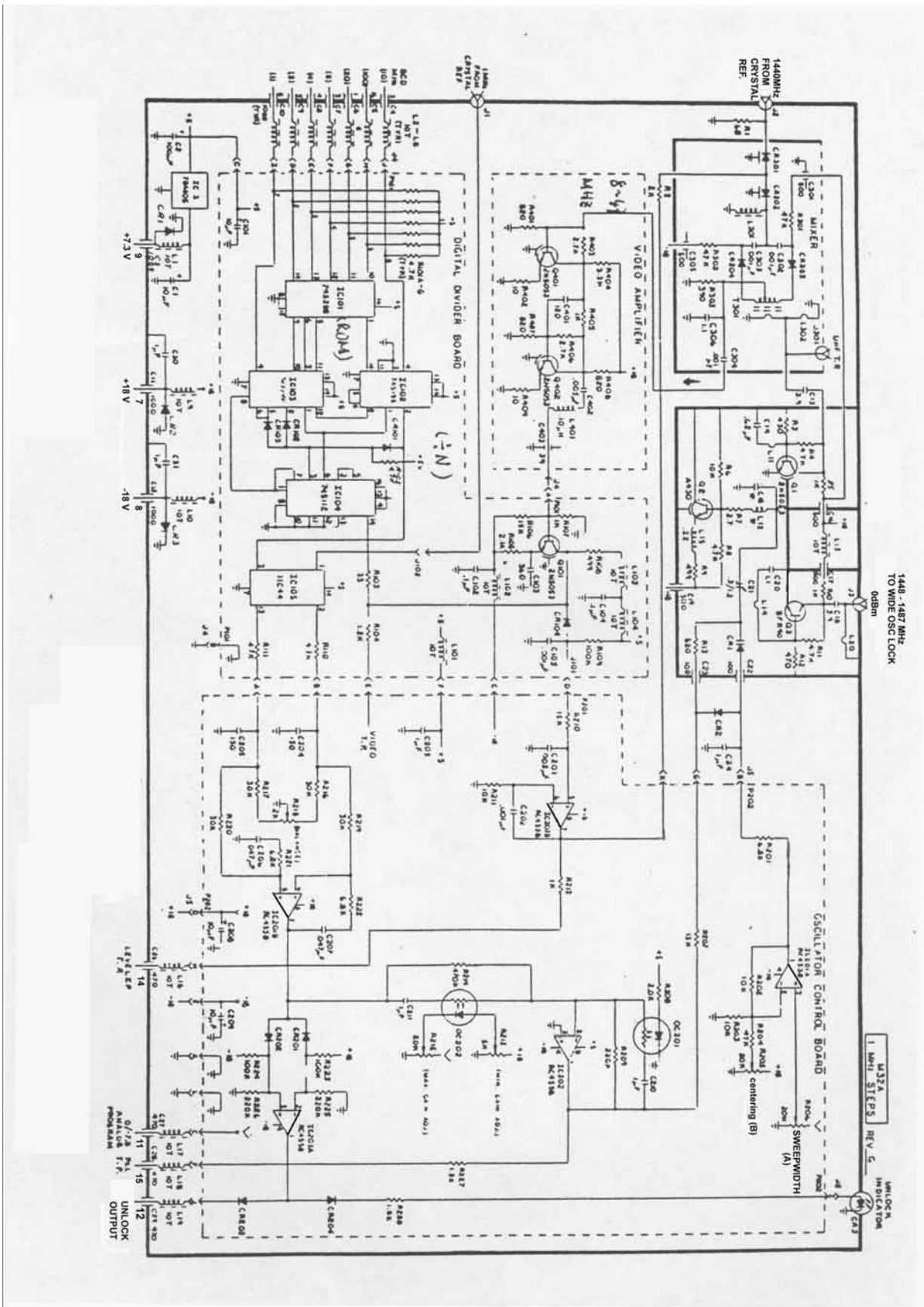
2.1.9 Display Board



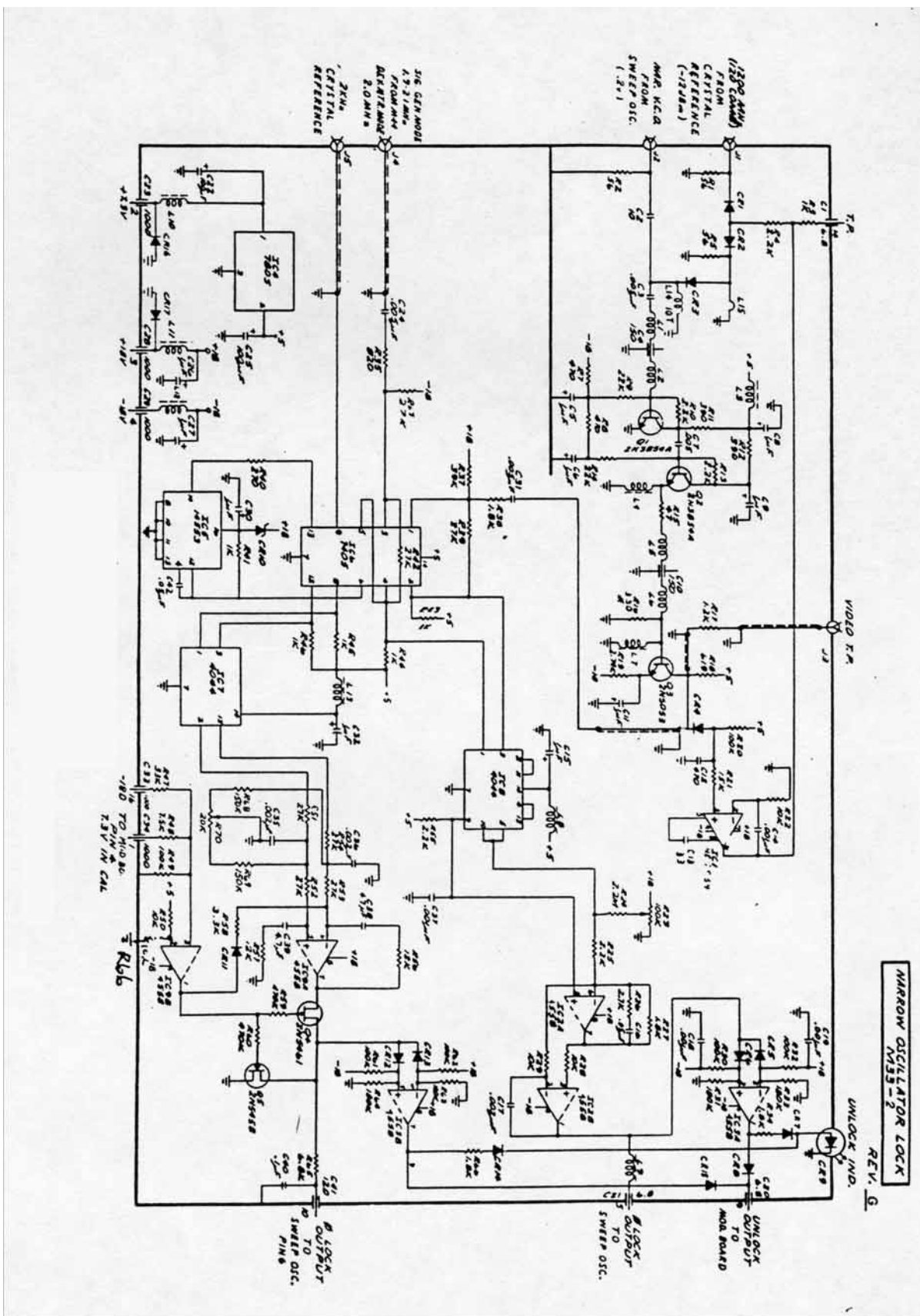
2.1.10 M31A-KHz Steps "PLL1"



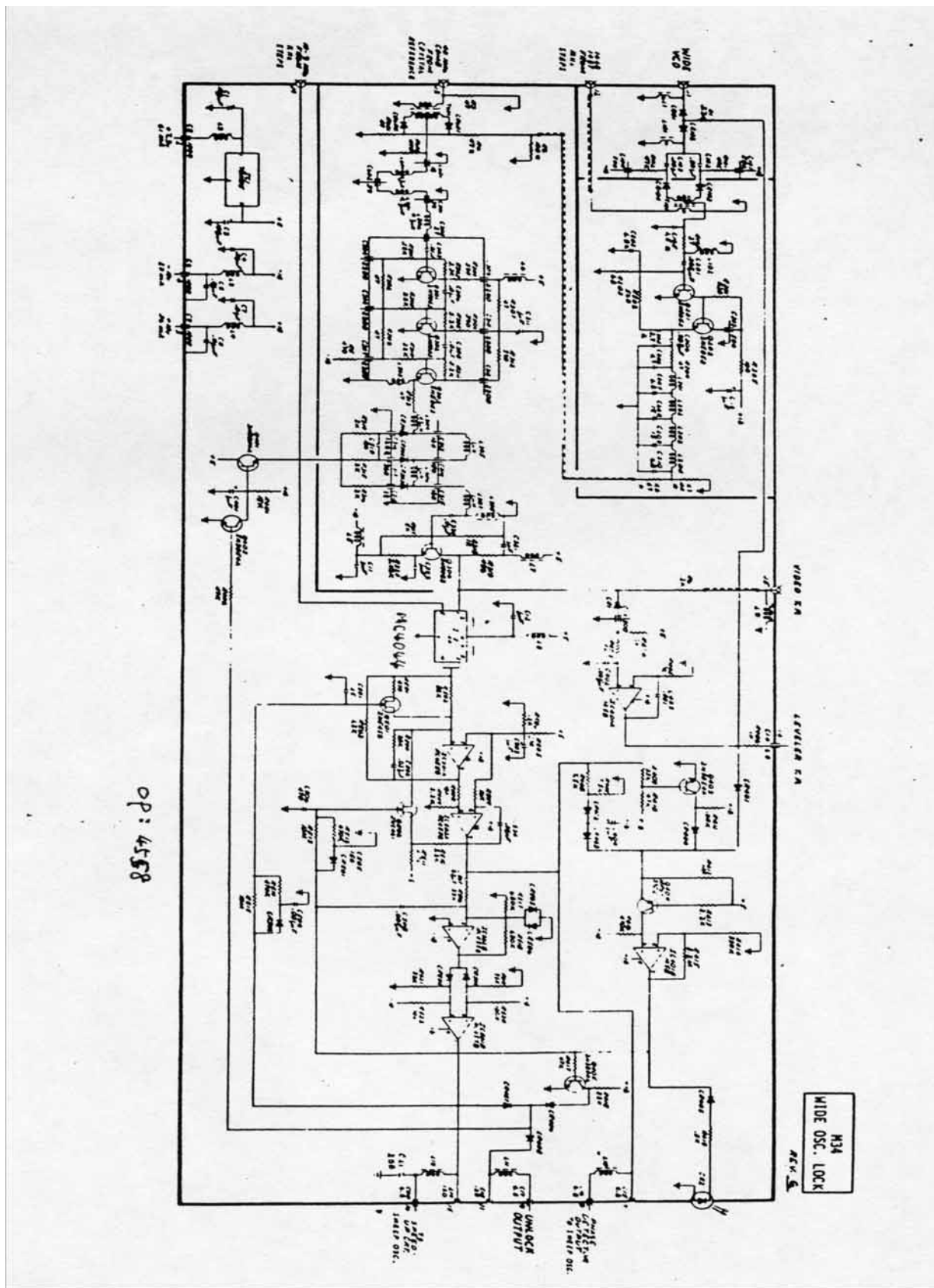
2.1.11 M32A-MHz Steps "PLL2"



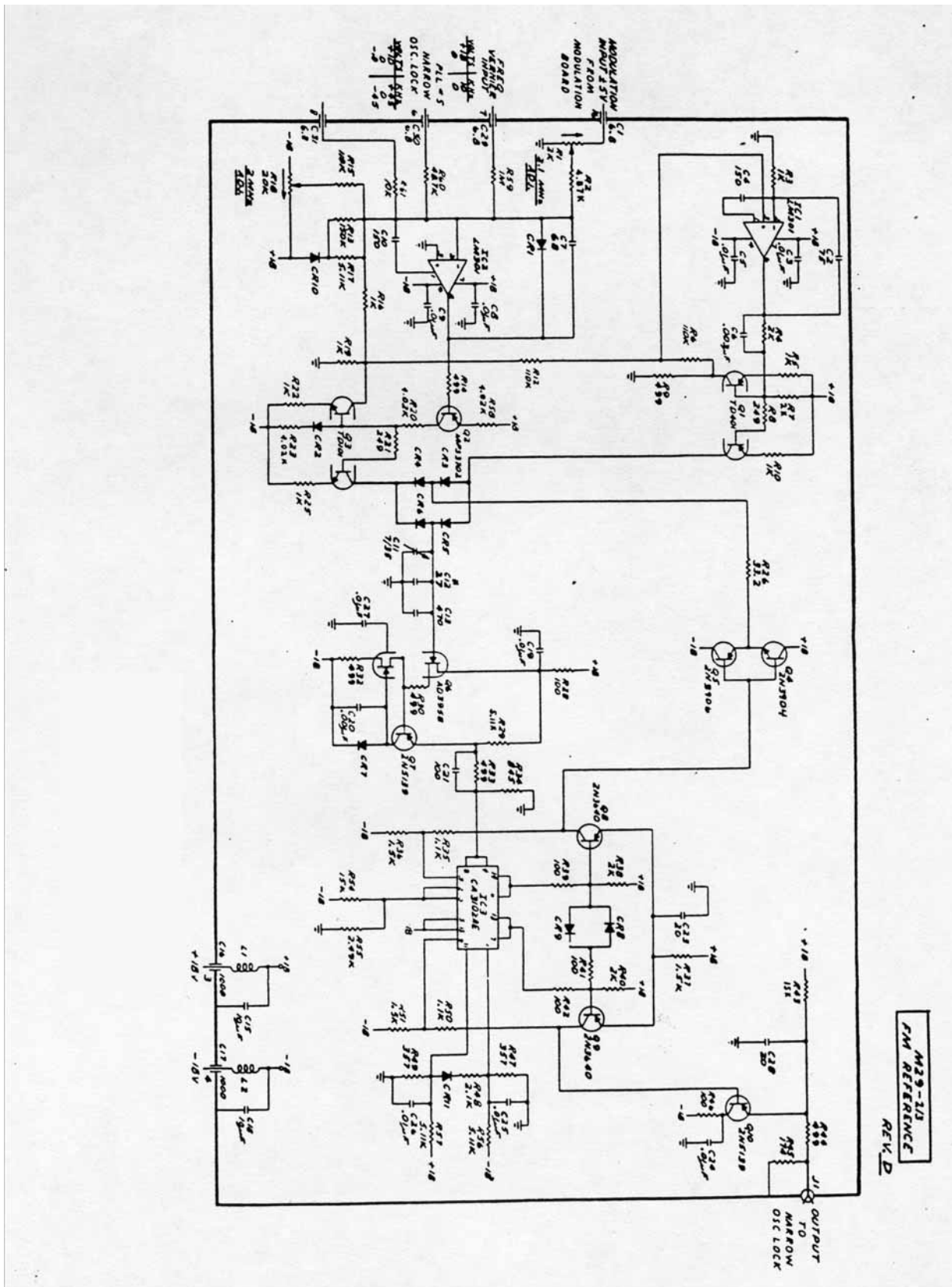
2.1.12 M33-2 Narrow OSC "PLL3"



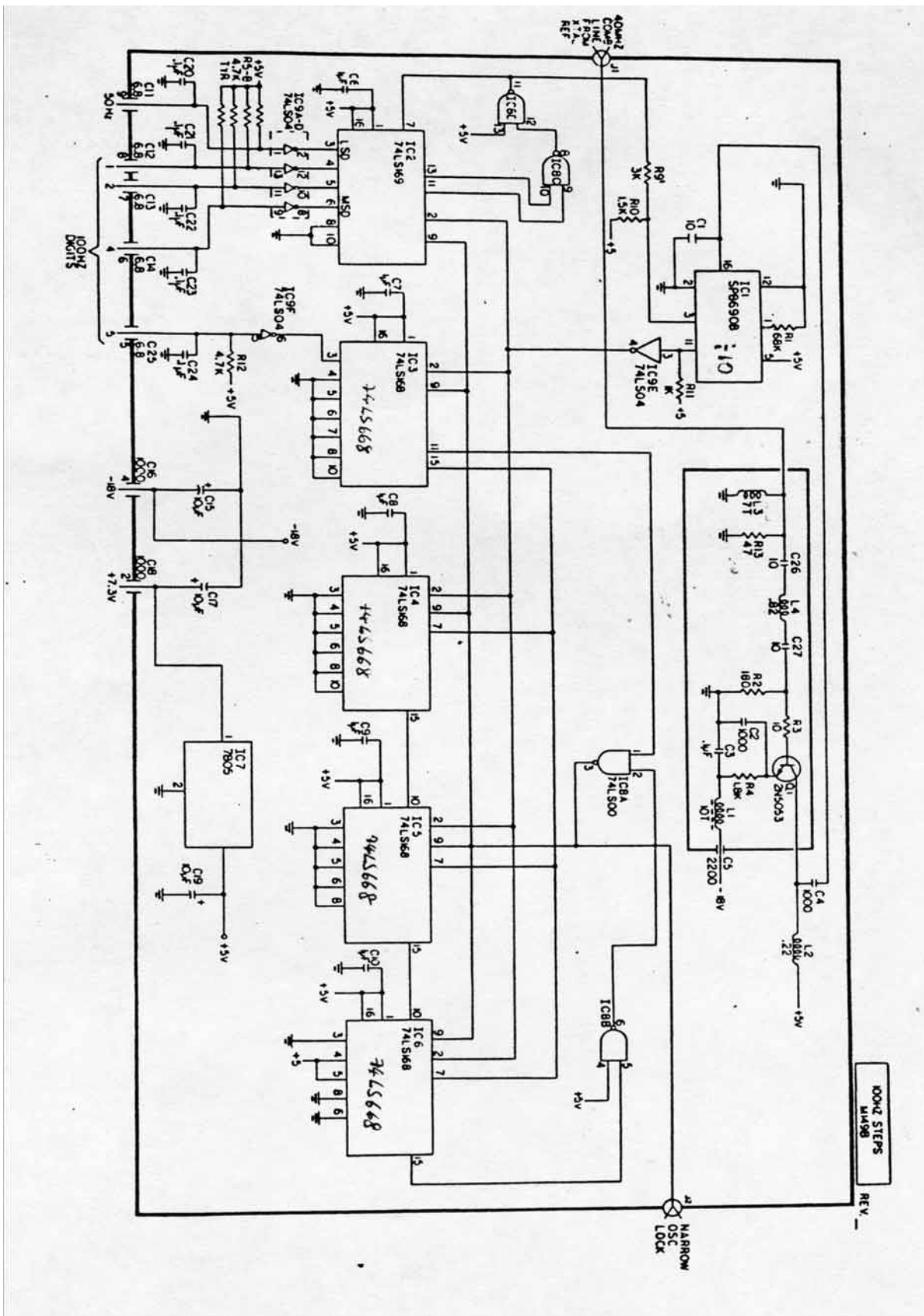
2.1.13 M34 Wide OSC "PLL 4"



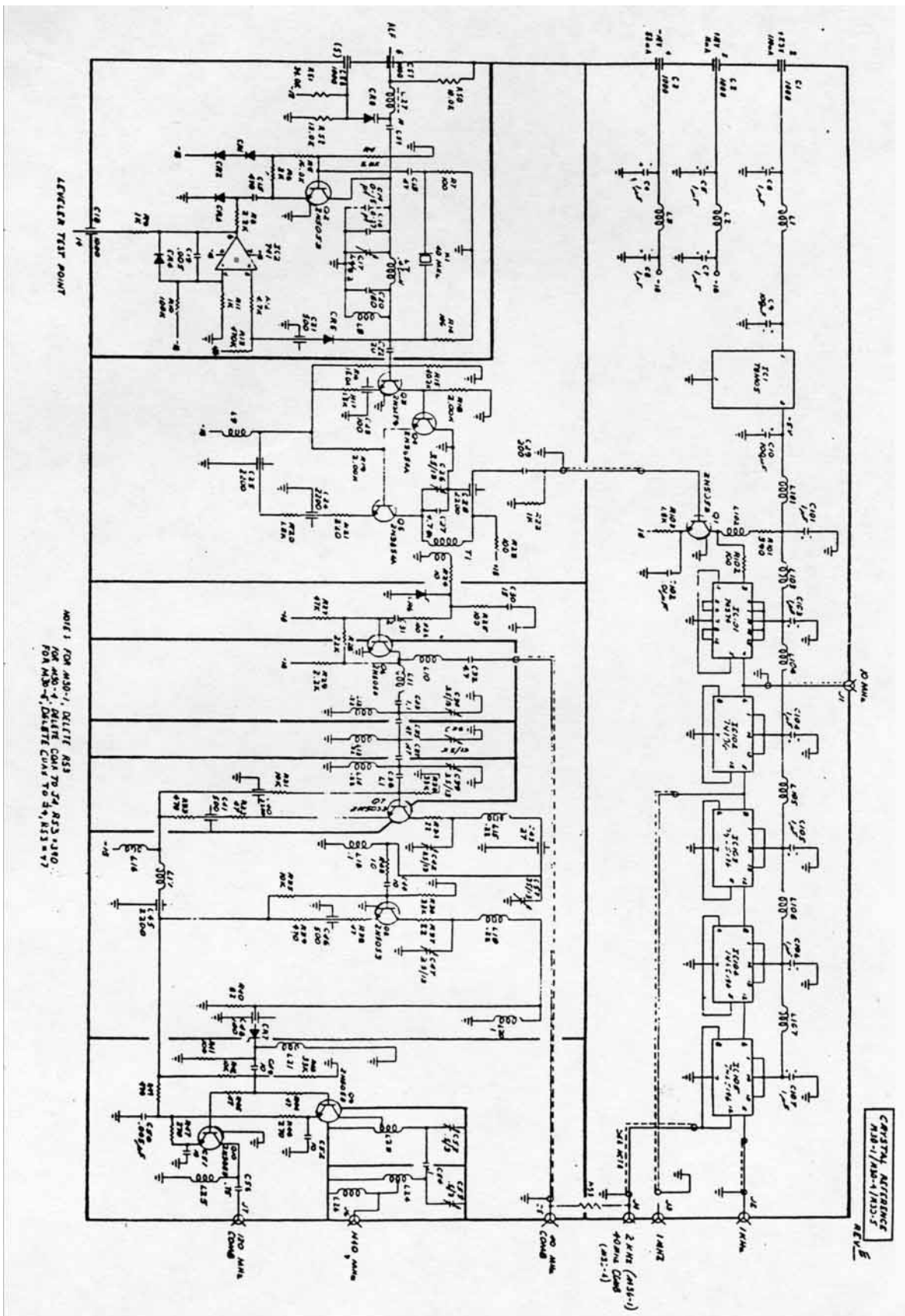
2.1.14 M29-2 FM Reference "PLL5"



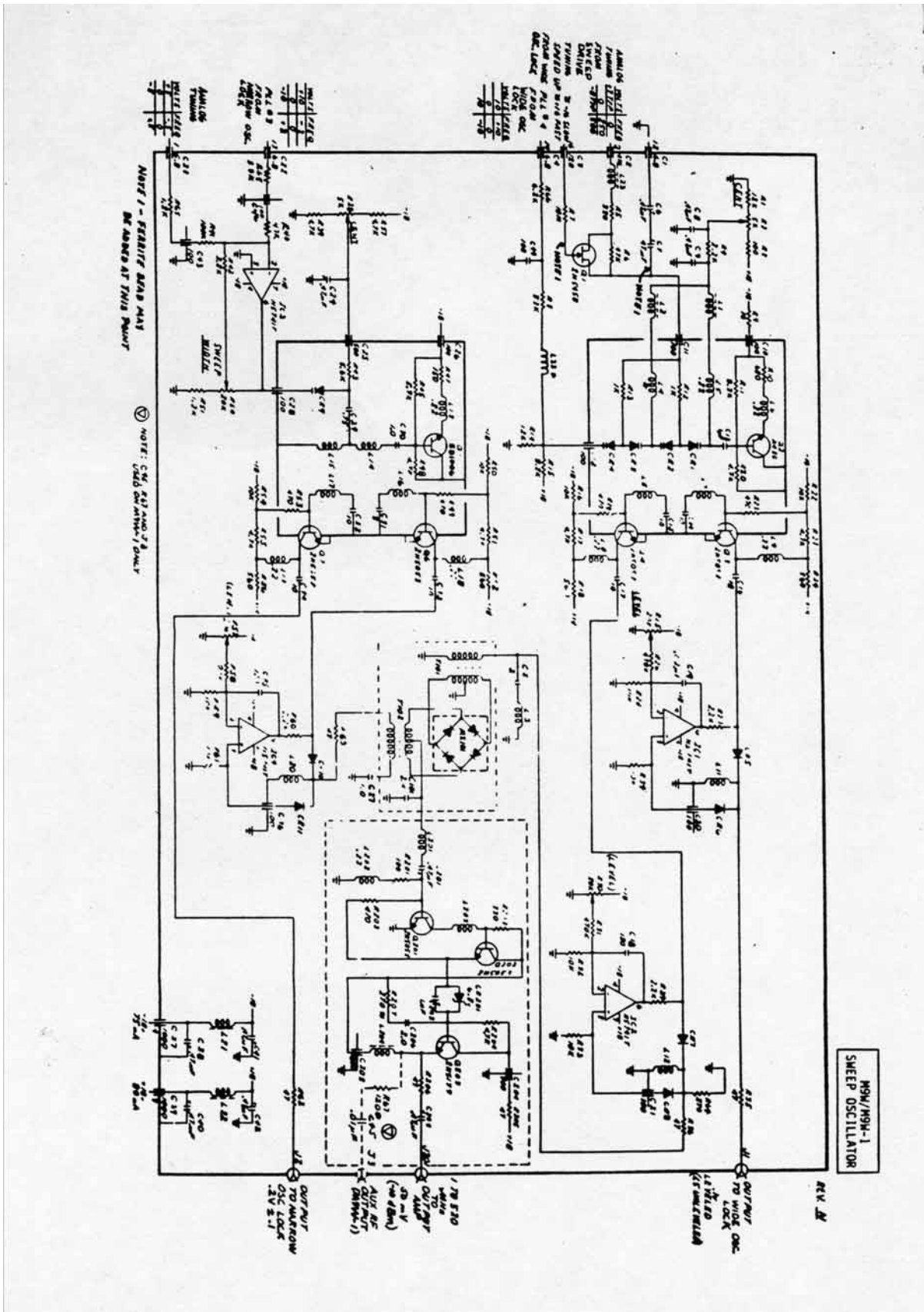
2.1.15 M149B 100Hz Steps



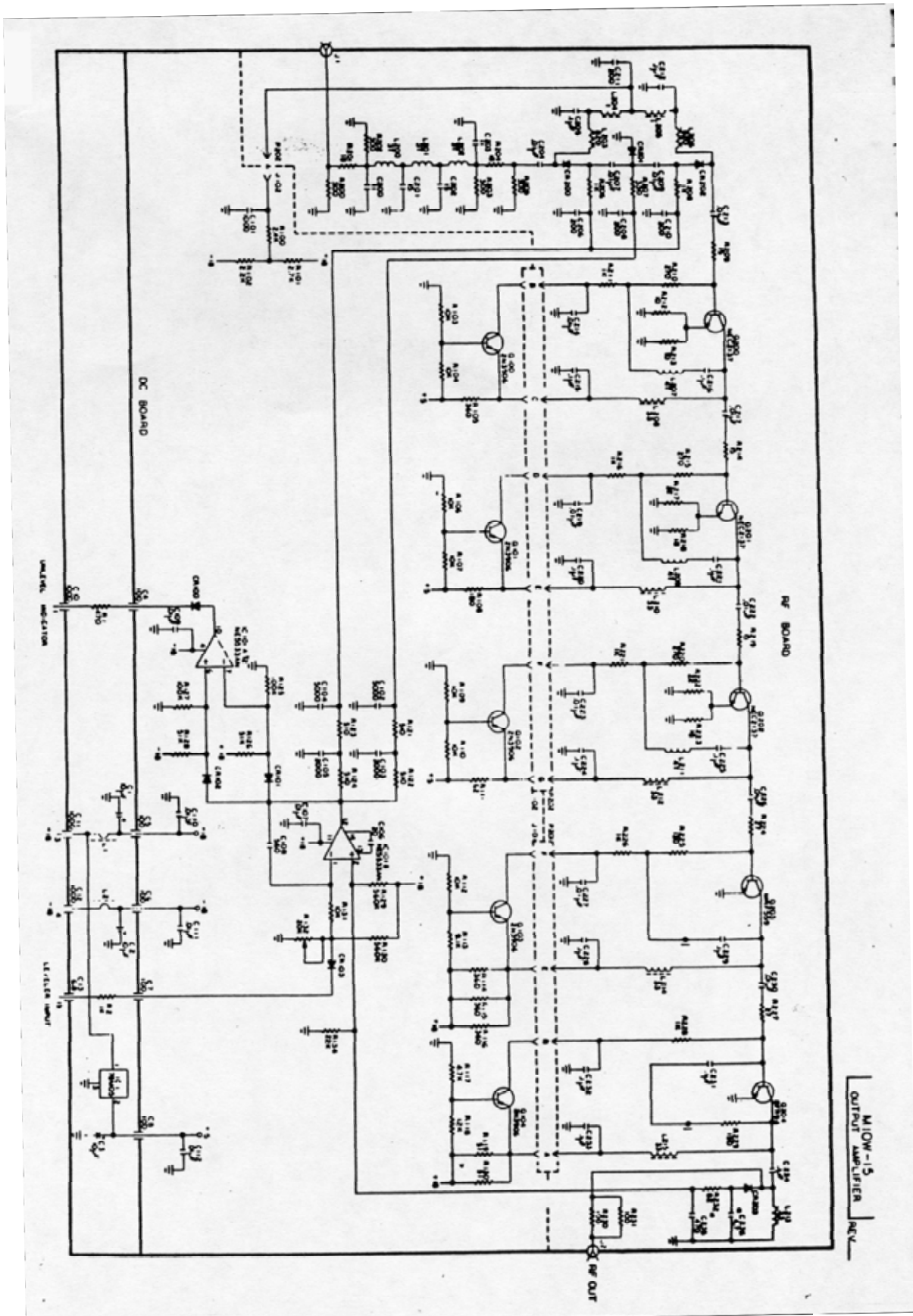
2.1.16 M30-5 Crystal Reference



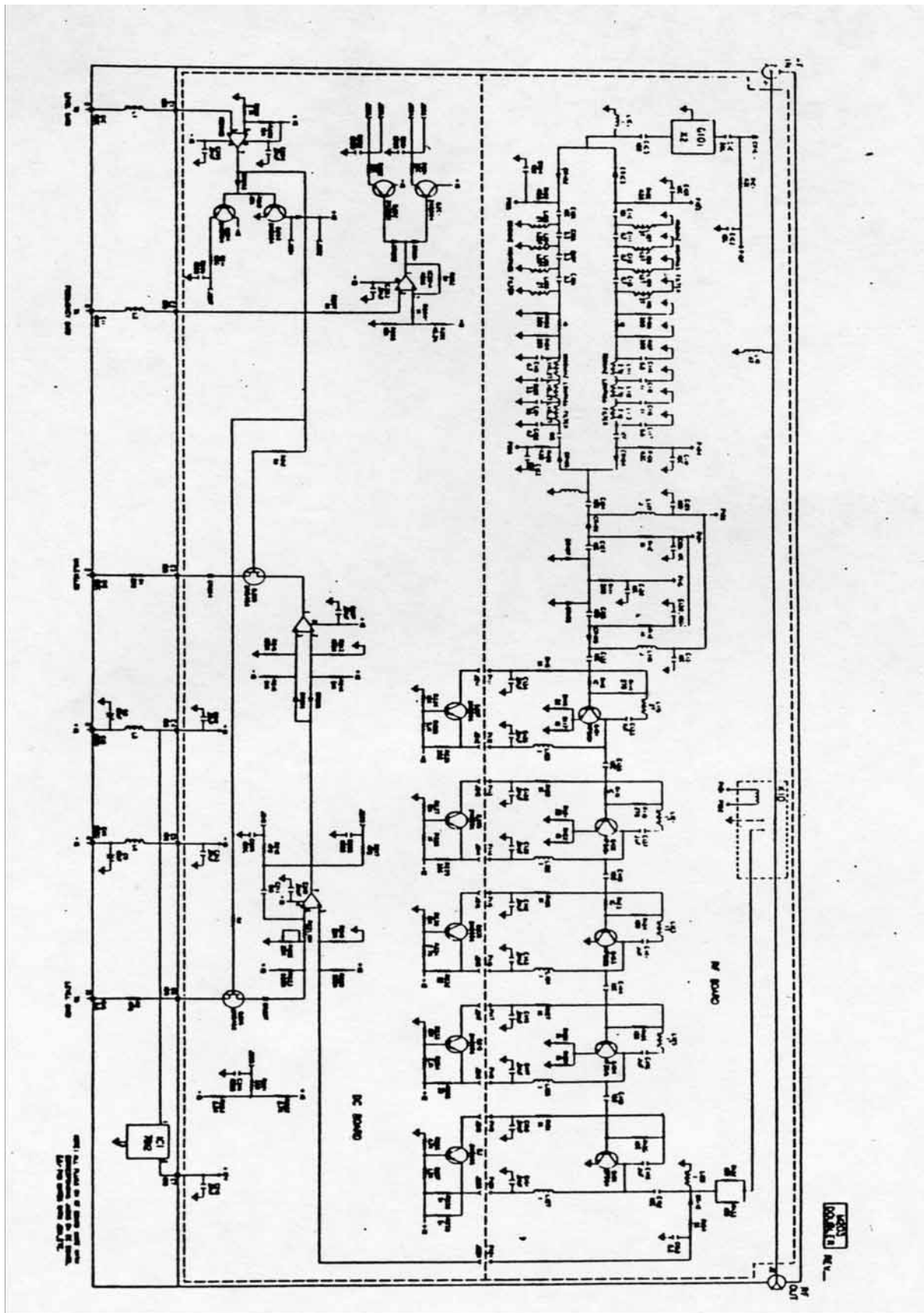
2.1.17 M9W Sweep OSC



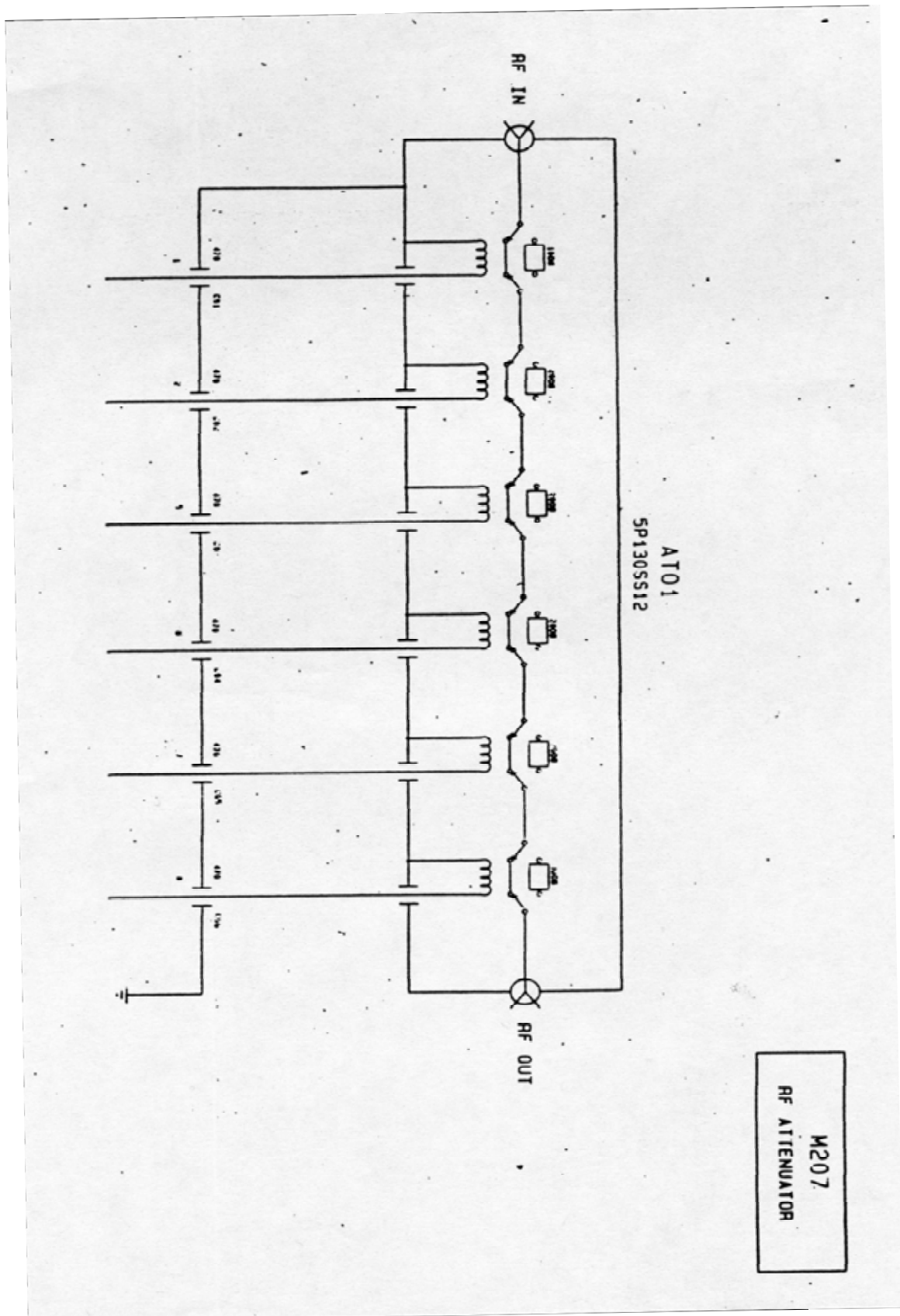
2.1.18 M10W-5 Output AMP



2.1.19 M203 Double



2.1.20 M207 Attenuator



2.1.21 M35-6 RF Circuit Breaker

