

Film-Tech

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4.0 KT-24 Surround-Sound Processor

4.1 Introduction

The KT-24 Surround-Sound Processor is designed to create a surround channel from any monaural sound track. It distinguishes among voices, music, and effects, so dialogue only comes from the screen speakers. The circuitry also works with the KT-22 to automatically boost the center channel by 6 dB for dialogue to insure clarity and presence.

The KT-24 also contains a sub-harmonic synthesizer to develop the low frequencies that are usually missing from film sound. For example, when music plays, a space ship takes off, or a bomb explodes, the KT-24 broadens the bass information for a more convincing presentation.

4.2 Front and Rear Panels

Refer to Figure 4.1. Front Panel of the KT-24.

1. Surround Level. This control provides a fine-tuning adjustment for the level of the surround speakers.
2. LEDs. The LEDs indicate the level of the input signal.
3. Unit Bypass. This button provides a hard-wire bypass of the processing circuitry.
4. Surround with LF. For Kintek processing of a sound track, use this button.
5. Low Freq. Only. Use this button for low-frequency enhancement of SVA (Dolby) films used with SVA processors or 4-track magnetic prints.
6. Low-Frequency Level and LED. This control adjusts the level of the sub-harmonic bass loudspeaker, while the brightness of the LED indicates the amount of the sub-harmonic synthesis.

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Refer to Figure 4.2. Rear Panel of the KT-24.

1. Input from the KT-22 or Other Source.
2. Output to Surround Amplifier.
3. Optional Input. For systems with Dolby but not the KT-26, use this input for the surround channel. In the "bypass" mode, the original Dolby signal is played.
4. Output to Low-Frequency Power Amplifier.
5. Level Set. This control adjusts the input level.
6. Auxiliary Connector. In conjunction with the KT-22, this patch point is used for the special processing of center-channel dialogue.
7. Delay. Raise the delay level by 1 ms for each foot between the screen and the farthest surround speaker and add 10 ms.

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4.3 Specifications

Input Impedance	18 kilohms actual impedance, bridges 600-ohm sources. Input transformer for ground isolation.
Input Level	-3 dBm (548 mV) to +17 dBm (5.48 mV) nominal (surrounds with low-frequency output).
Output Level	20 dBm (7.75 V) maximum for 10-kilohm load. 14 dBm (3.88 V) maximum for 500-ohm load.
Frequency Response	20 Hz to 8 kHz (specially filtered for Kintek processing).
Low-Frequency Synthesis	27 Hz to 55 Hz (derived from 55 Hz to 110 Hz input signal). Output impedance and level same as surround channel.
Connectors	Barrier Strips.
AC Power	120 VAC, 50 or 60 Hz, 16 watts maximum. Consult factory for operation with other line voltages.
Dimensions	3 1/2" H X 19" W X 10 1/4" D. (88.9 mm H X 483 mm W X 260 mm D.) Rack-mount front panel.

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Weight

11 pounds.

(5 kilograms.)

Kintek products are manufactured under one or more of the following U.S. patents: 3,681,618; 3,714,462; 3,789,143; 4,101,849; 4,097,767. Other patents pending.

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4.4 Installation

4.4.1 Unpacking and Mounting

Remove the unit from its shipping carton. The KT-24 was carefully inspected and tested at the factory. Contact your dealer in the event of any problems. We suggest saving the shipping carton and packing materials for safely transporting the unit in the future.

4.4.2 Precautions

When locating any electronic equipment near heat sources, provide adequate clearance for ventilation. Excessive heat shortens the life of any electronic component. Avoid high humidity and water.

Mounting electronic equipment and connecting cables as far as possible from motors and large power transformers lessens the possibility of 60-Hz hum being heard in the system.

4.4.3 Connections

Refer to Figure 4.3 for the connections on the rear panel of the KT-24. Use 2-conductor shielded cable for all wiring. For the input cable, attach the shield wire to ground at the source component. At the KT-24's output terminal, connect the shield to the "GND" terminals (the KT-24 becomes the source for the following component, usually an amplifier). Under certain circumstances, the shield wire may need to be attached to both ends to eliminate a hum in the system.

If an unbalanced (high-impedance) input is used, wire the ground and low terminals together at the source component. Attach the shield to the "LOW" and "GND" terminals for an unbalanced output.

With SVA (three- or four-channel stereo) sound systems, use the KT-26 SVA (Dolby) Interface Unit (refer to Section 11.0).

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Typically, the input for the KT-24 comes from the output of the KT-21. The low-frequency output terminals are connected to the KT-90 Low-Frequency Subwoofer System, which contains a built-in power amplifier. If another low-frequency speaker system is used, at least 300 watts of amplifier power is recommended to cover a medium-size theatre, and a low-pass filter at 100 Hz is required to limit the frequency spectrum of the signal driving the amplifier.

AC Power. The unit draws approximately 16 watts. No AC power switch is provided, but the KT-24 can be connected to the switched AC outlet in an equipment rack or accessory outlet on adjacent sound equipment. Replace fuse with same size only: 1/4 amp Slow Blow (120 V).

4.5 Operation

4.5.1 System Alignment

Refer to Section 1.5.1 for the full alignment procedure. Check speakers for the proper operation of all drivers. Follow the wiring information in Figure 4.3. Adjust projector optics, guide roller, and azimuth.

Kintek B Chain Adjustment

1. On the rear panel of the KT-21, place the input and output range switches in the "low" position. Set the output level control to maximum cw.

2. Place the selector in the "film" position on the KT-33. With the

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pink-noise loop running, adjust the master fader control to "normal."

3. On the KT-21, make sure the "enhance" button is pushed in and the expansion control is at the minimum (left) position. Observe the LED display and adjust the input level control on the rear panel until only one red LED is lit in the high-frequency band.

4. Turn down the master fader. Push the "operate" button on the KT-22.

5. Turn all KT-100 Power Amplifier input level controls to the full ccw (minimum) position. Turn on the KT-100s. Leave the KT-90 off.

6. Raise the center-channel (power amplifier "C") input level to the full cw position. Turn up the master fader until a moderate level of pink noise is heard from the center speaker.

7. Check the speaker for the proper operation of all drivers. Turn down the level control on the power amplifier.

8. Repeat Steps 6 and 7 for the left, right, and surround channels. To check the surround speakers, temporarily raise the surround level (front panel) and surround limit control (rear panel) on the KT-24. Repair speakers as necessary. Proper calibration of the Kintek System requires that all speakers be in proper working order and in phase with each other.

9. Turn down (full ccw) the master fader, surround level, surround limit, and surround power-amplifier level.

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10. Raise (full cw) the left, center, and right amplifier levels.

11. With a pink-noise loop running and the operate button on the KT-22 pushed in, advance the master fader until there is a moderate level heard in the theatre.

12. Set the SPL meter on the fast C-weighted scale and place it 2 to 4 feet in front of the left speaker. Note the reading and repeat for the center and right speakers. All the speakers should be producing the same level. If it is necessary to match the center speaker's level with the left and right speakers, adjust the center-channel output control on the KT-22. Stop the pink-noise loop.

13. Measure the distance from the screen to the rear surround speaker. Add 10 feet. On the rear panel of the KT-24, set the delay to that number.

14. On the rear panel of the KT-21, make sure the high-frequency control is at the 12 o'clock position (on units without an "A" after the serial number, leave the control at the maximum ccw position). Turn down (full ccw) the output level control.

15. Set the master fader to "normal."

16. The level controls of the left, center, and right amplifiers channel should be at the full cw position.

17. Making sure one red LED is lit in the high-frequency bank of the KT-21, run the pink-noise loop and place the SPL meter in the

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theatre--4 feet off the floor in the center of the seating area. Adjust the output control on the back of the KT-21 for a level of 75 dBc.

18. Turn off all power amplifiers.

19. With the pink-noise loop still running, adjust the input level on the rear panel of the KT-24 so only the last two yellows LEDs are on.

20. Make sure the master fader is on the "normal" position.

21. Turn on all power amplifiers. Leave the KT-90 off.

22. Raise the level on the surround amplifier channel to the full cw position. All other power amplifier levels should be at the full cw position and left there.

23. With the pink-noise loop running, a measurement of 75 dBc should be read on the meter in the center of the seating area. Repeat steps 17 to 22 if another level is measured.

24. On the rear panel of the KT-24, make sure the surround limit is turned down (full ccw). On the front panel, turn up the surround level to "5." Raise the surround limit on the rear panel until the level in center of the seating area increases from 75 dBc to 77 dBc.

On early kt-24's without a surround limit control on the rear panel: Simply adjust the front surround level control until the level in the center of the seating area increases from 75 dBc to 77 dBc. Place a red arrow on the KT-24 front panel to indicate the position of the

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surround level.

25. Turn off all power amplifiers. Reinstall the caps in the proper access holes.

26. With the pink-noise loop running, raise the low-frequency level control on the front panel of the KT-24 to 3 o'clock. The master fader should still be in the "normal" position.

27. On the KT-90 behind the screen, turn down (full ccw) the sensitivity control.

28. Set the high-frequency control to "100" and the low-frequency control to "out."

29. Be sure the SPL meter will not be "hearing" ambient noise from projectors, air conditioners, or traffic sounds, which should register less than 55 dBc in the center of the seating area. Turn on the KT-90. Adjust the sensitivity control for an SPL level of 75 dBc in the center of the seating area.

30. Return to the booth. Turn on all power amplifiers. Push in the bypass button on the KT-24. Advance the master fader until a level of 85 dBc is measured in the center of the seating area.

31. Set the selector on the front panel of the KT-31 to "all." Observe the VU meter on the KT-31 while setting the meter adjust control

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on the rear panel of the KT-33. Adjust for a reading of -6 dB on the meter.

32. Push in the "surround with low frequency" button on the front of the KT-24.

33. Turn down the master fader. Stop the projector and remove the pink-noise loop.

34. Run a reel of an Academy mono print of known good quality. Do not use trailers, as they are usually overmodulated and distorted.

35. Set the fader for a normal listening level in theatre. The master fader setting should be in the 10 to 1 o'clock range. Film levels vary depending on the recording level. It is not unusual, for instance, to run trailers at a lower master-fader setting than features.

36. It is useful to listen to several films when an audience is in the theatre. If necessary, readjust the high-frequency control on the KT-21 for a better treble sound after listening to music and effects.

AFTER ALL ADJUSTMENTS HAVE BEEN MADE, USE THE RED ARROWS TO SHOW THE CORRECT SETTINGS OF EVERY CONTROL.

Please Note: Do not increase the surround level more than two marks beyond the red arrow; otherwise, the system will be out of balance.

When all set up procedures have been completed, the sound in the

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auditorium should be of a high-fidelity stereo quality. The surround channel should blend with the screen channels during loud music and effects passages not containing dialogue. The surround channel should not be raised to the point where obvious and constant level changes are heard. An unnatural and distracting effect will result, especially when the surrounds are off; in addition, the screen sound may seem inadequate.

The same is true for the low-frequency transducer. The low frequencies should enhance the overall sound but not be so overpowering that the bass becomes boomy and unnatural.

Because every film sound track is equalized and mixed differently, fine-tuning adjustments have been provided for the and low-frequency transducer on the front panel of the KT-24. A few minutes during the opening credits of a feature will allow enough time for the adjustment of this level to give the optimum balance in the theatre.

4.6 Theory of Operation

4.6.1 Flow Chart *SEE FIG 4.4*

4.6.2 Schematic and Board Layouts

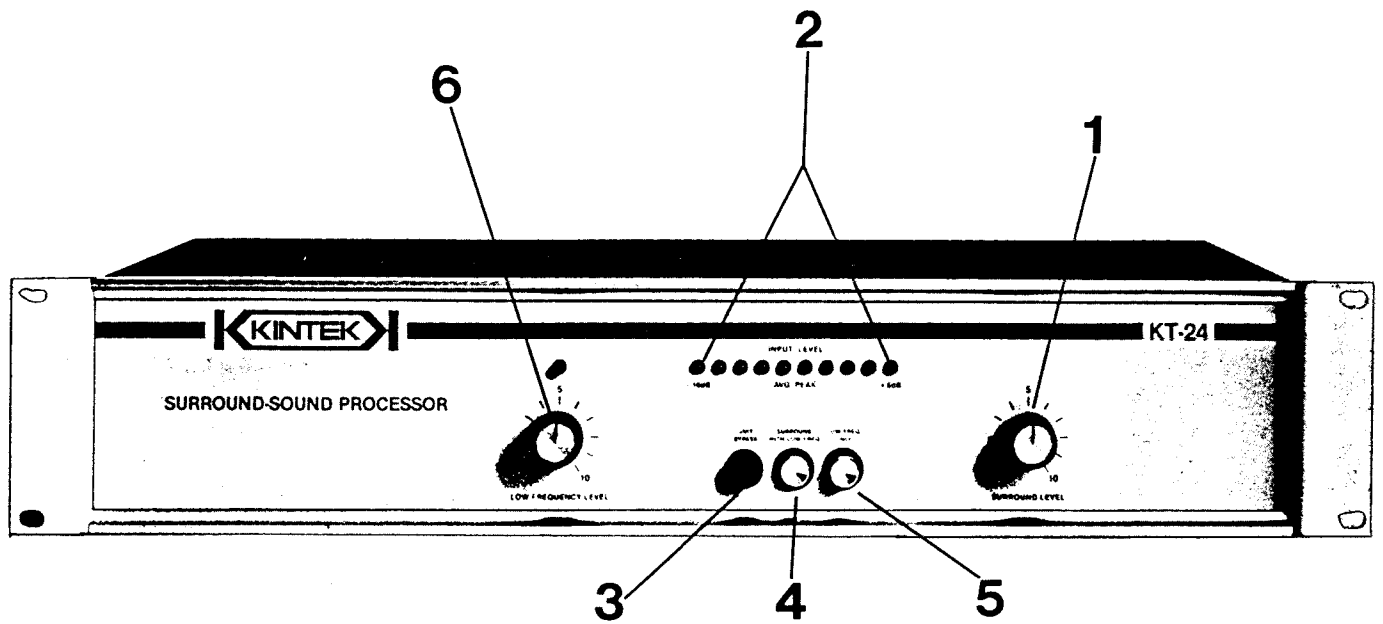


Figure 4.1. Front Panel of the KT-24.

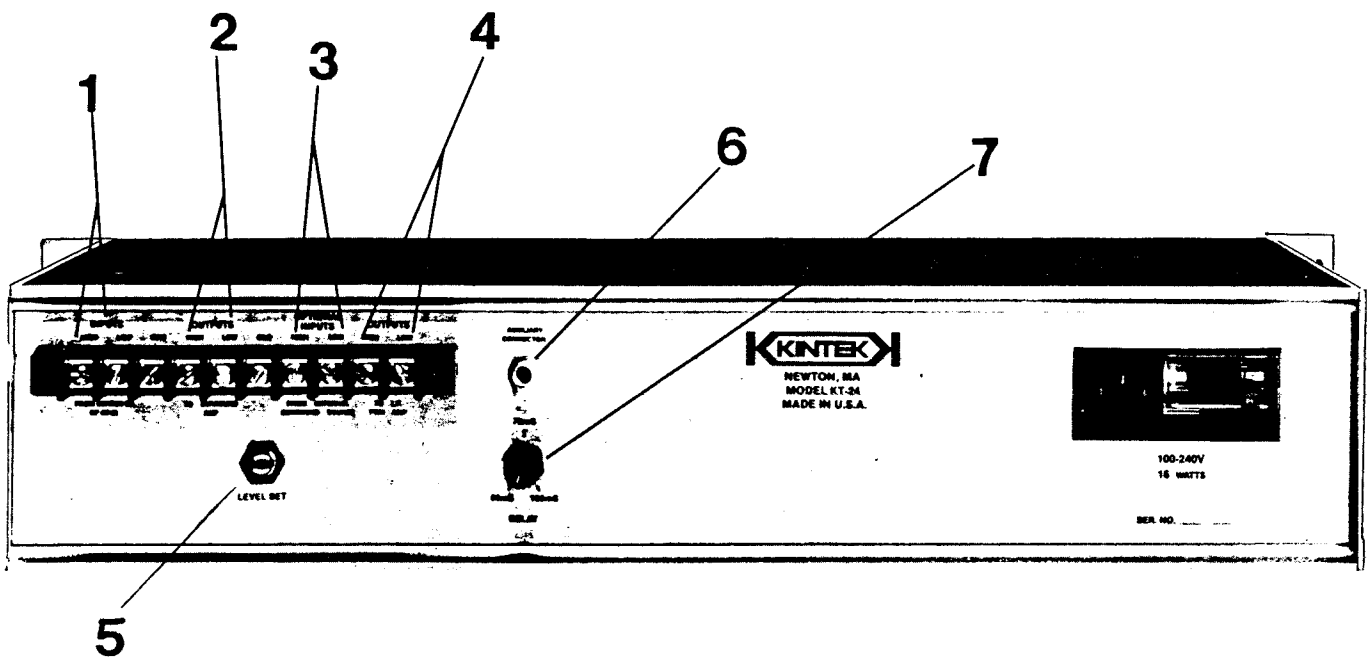


Figure 4.2. Rear Panel of the KT-24.

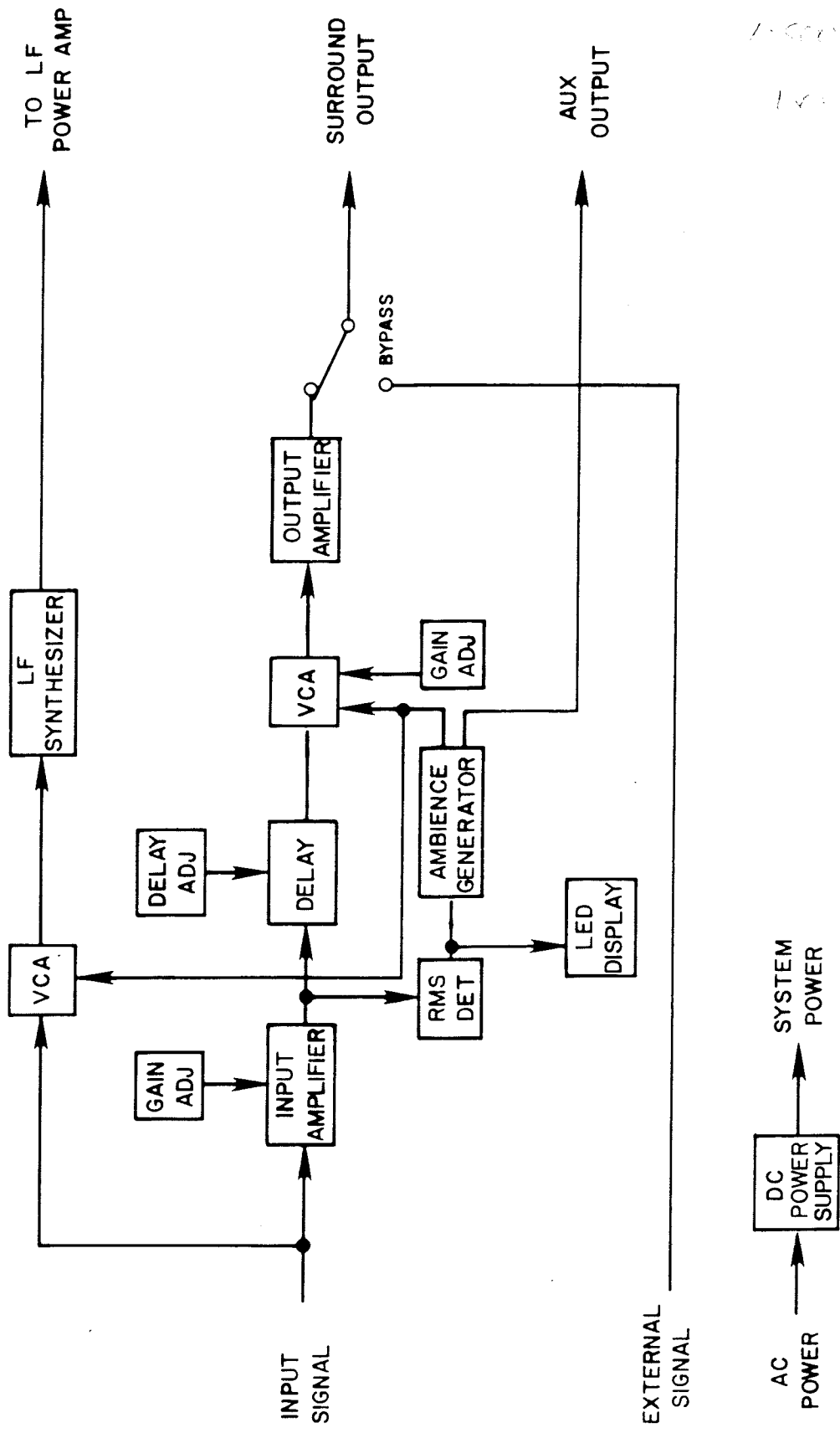
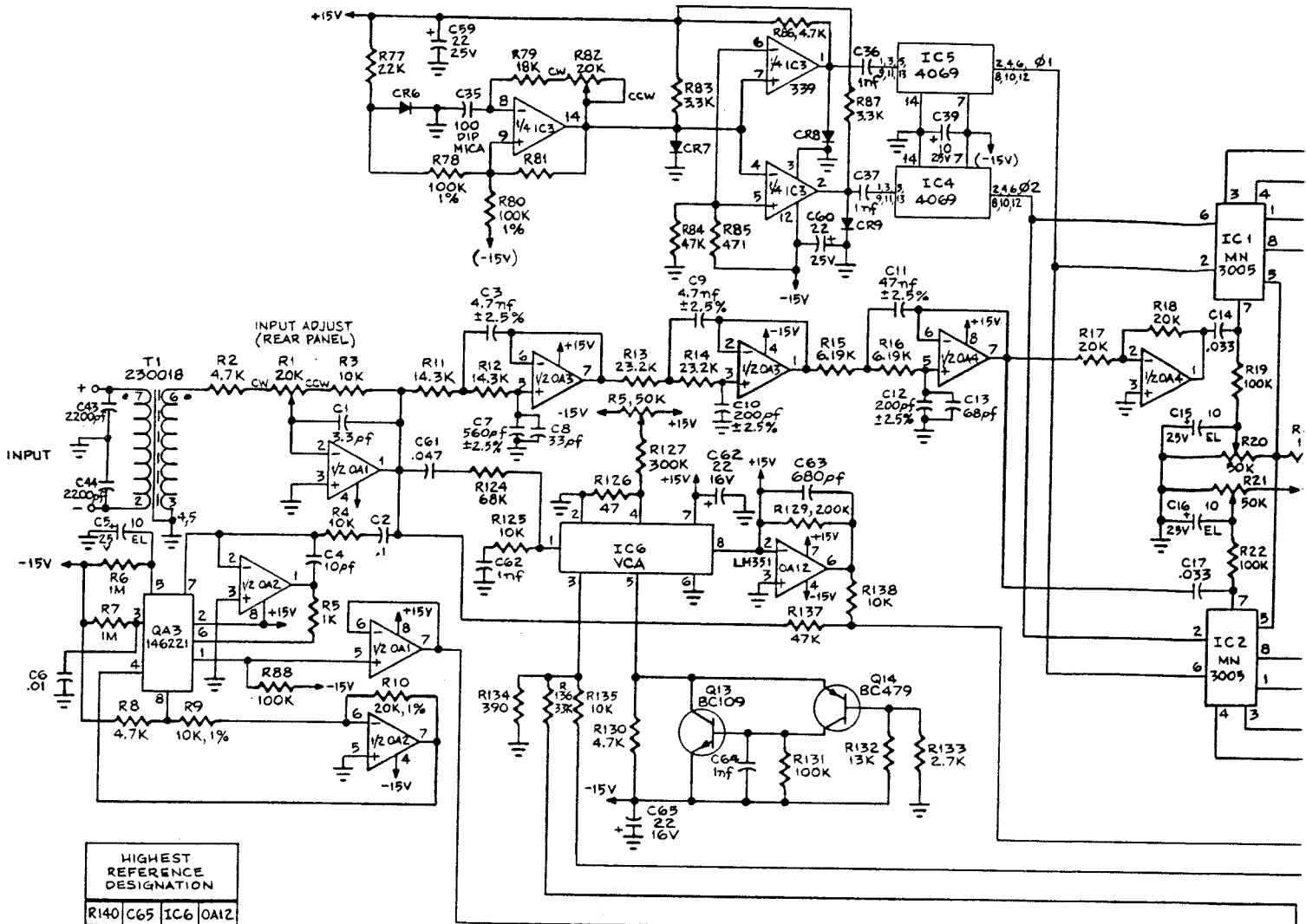
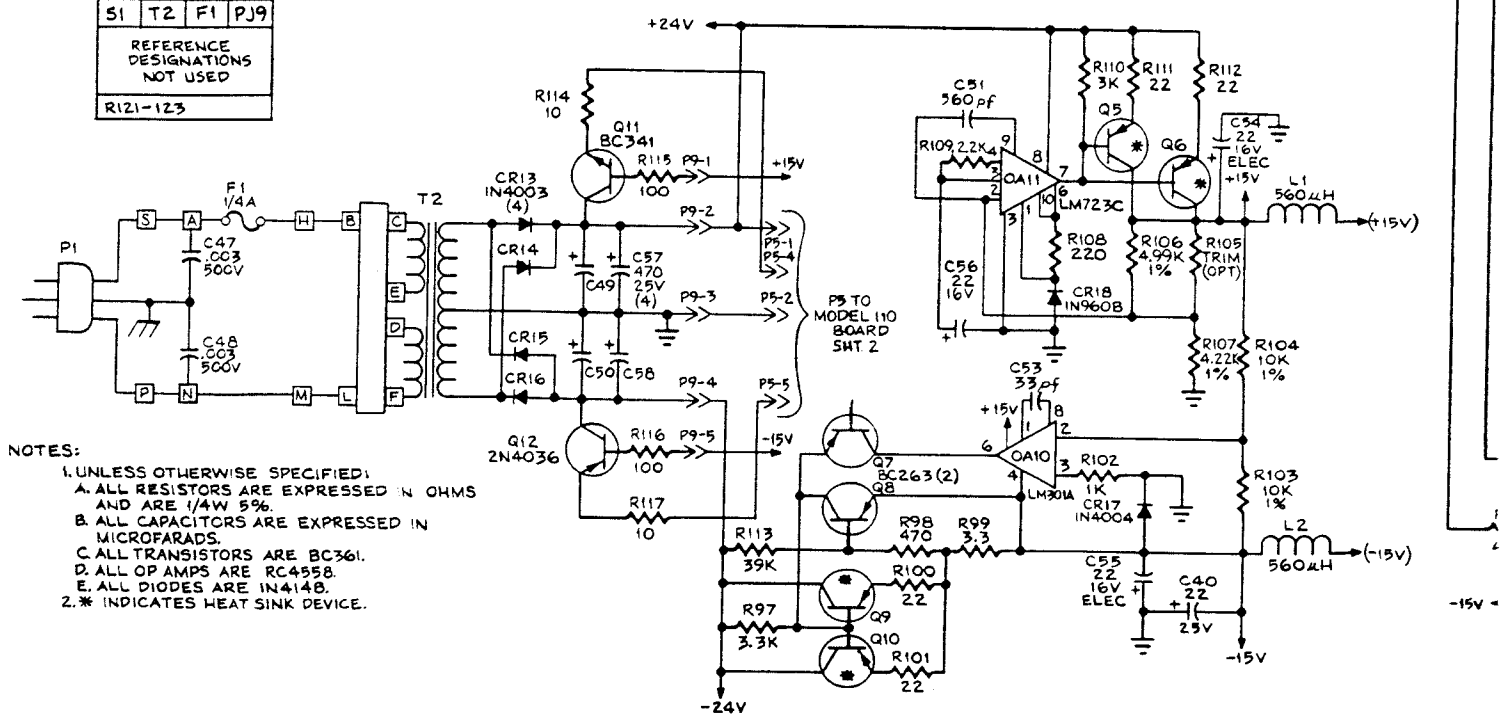


FIGURE 4.4. FLOW CHART OF THE KT-24.

1-500-227-1-74
18-300

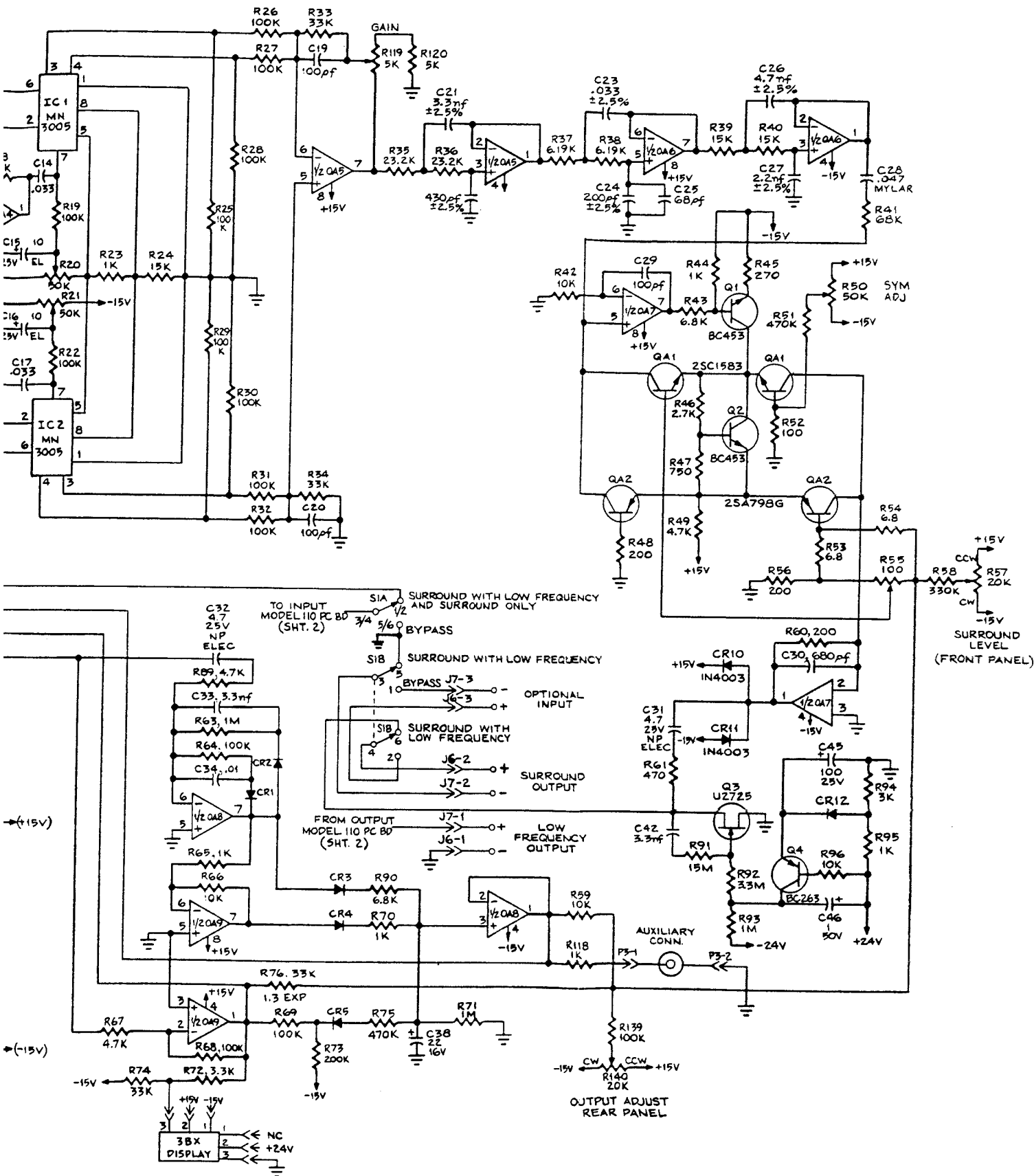


HIGHEST REFERENCE DESIGNATION			
R140	C65	IC6	OA12
Q14	CR18	L2	QA3
S1	T2	F1	PJ9
REFERENCE DESIGNATIONS NOT USED			
R121-123			



- NOTES:
- UNLESS OTHERWISE SPECIFIED:
 - A. ALL RESISTORS ARE EXPRESSED IN OHMS AND ARE 1/4W 5%.
 - B. ALL CAPACITORS ARE EXPRESSED IN MICROFARADS.
 - C. ALL TRANSISTORS ARE BC361.
 - D. ALL OP AMPS ARE RC4558.
 - E. ALL DIODES ARE IN4148.
 - * INDICATES HEAT SINK DEVICE.

FIGURE 4.5A SCHEMATIC



SCHEMATIC OF THE KT-24

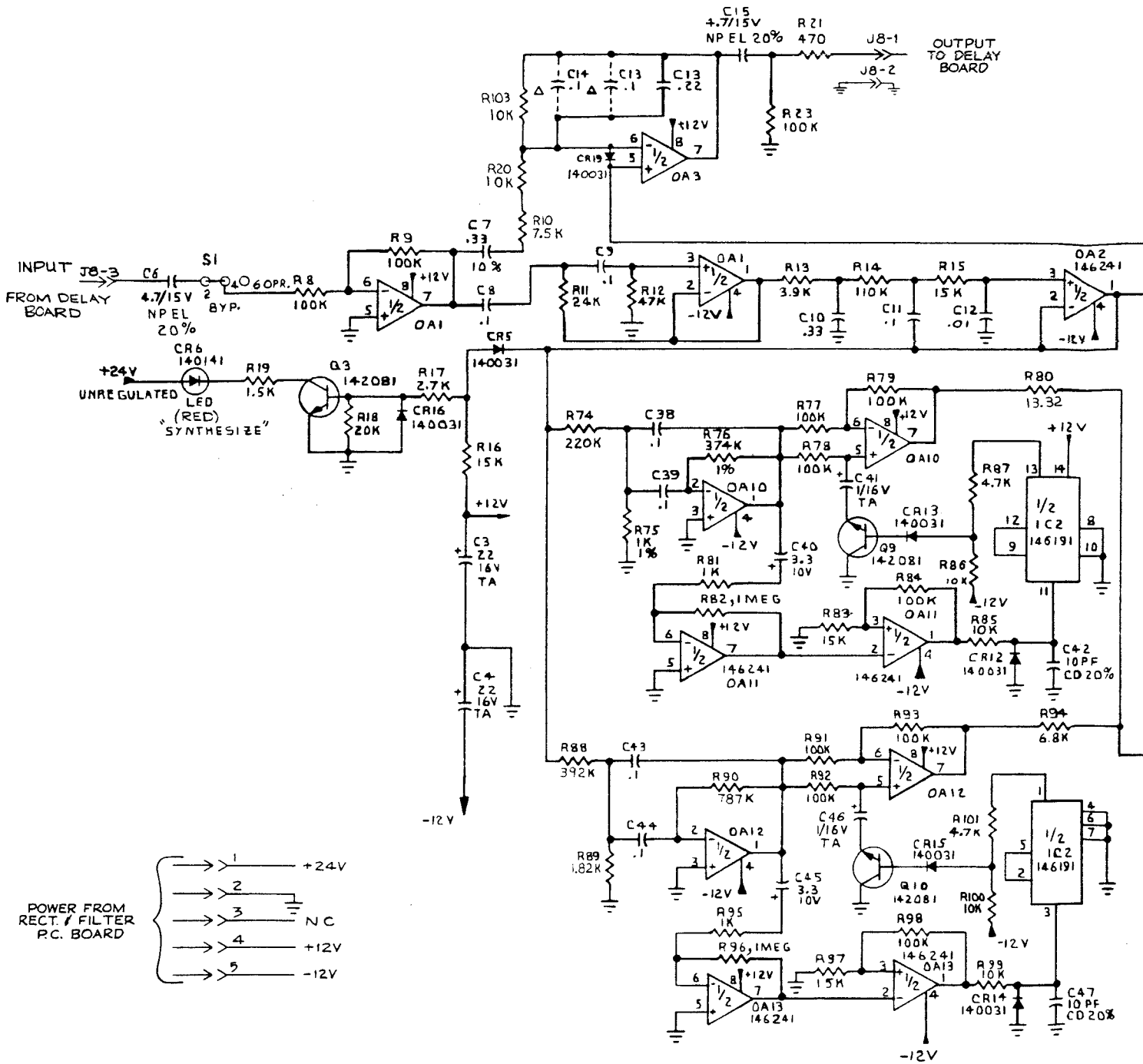
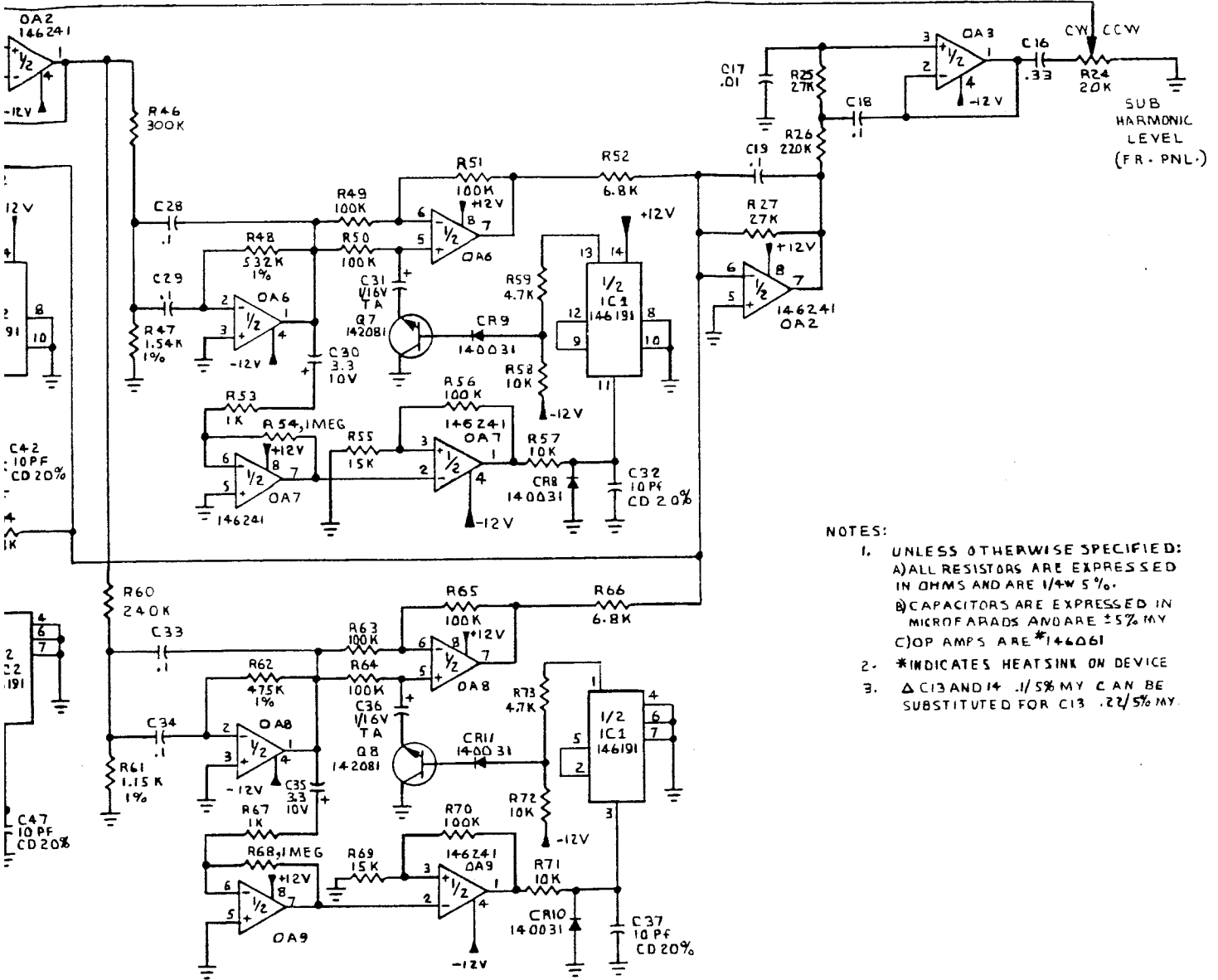


FIGURE 4.5B SCHEMA



SUB
 HARMONIC
 LEVEL
 (FR. PNL.)

NOTES:

1. UNLESS OTHERWISE SPECIFIED:
 - A) ALL RESISTORS ARE EXPRESSED IN OHMS AND ARE 1/4W 5%.
 - B) CAPACITORS ARE EXPRESSED IN MICROFARADS AND ARE ±5% MFR.
 - C) OP AMPS ARE *146061
2. *INDICATES HEATSINK ON DEVICE
3. Δ C13 AND 14 .1/5% MFR CAN BE SUBSTITUTED FOR C13 .22/5% MFR.

SCHEMATIC OF THE KT-24

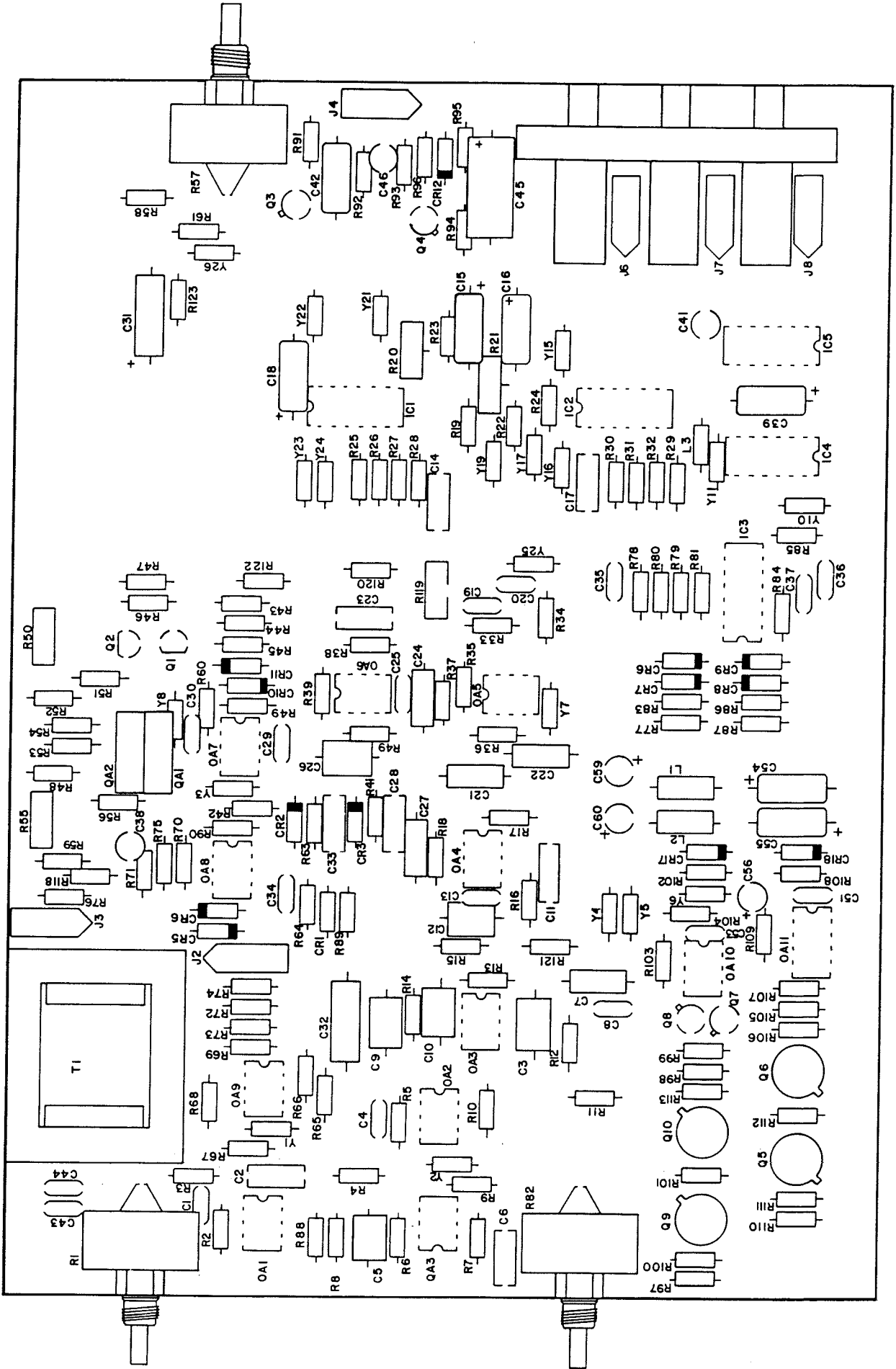


FIGURE 4.6A BOARD LAYOUT OF THE KT-24

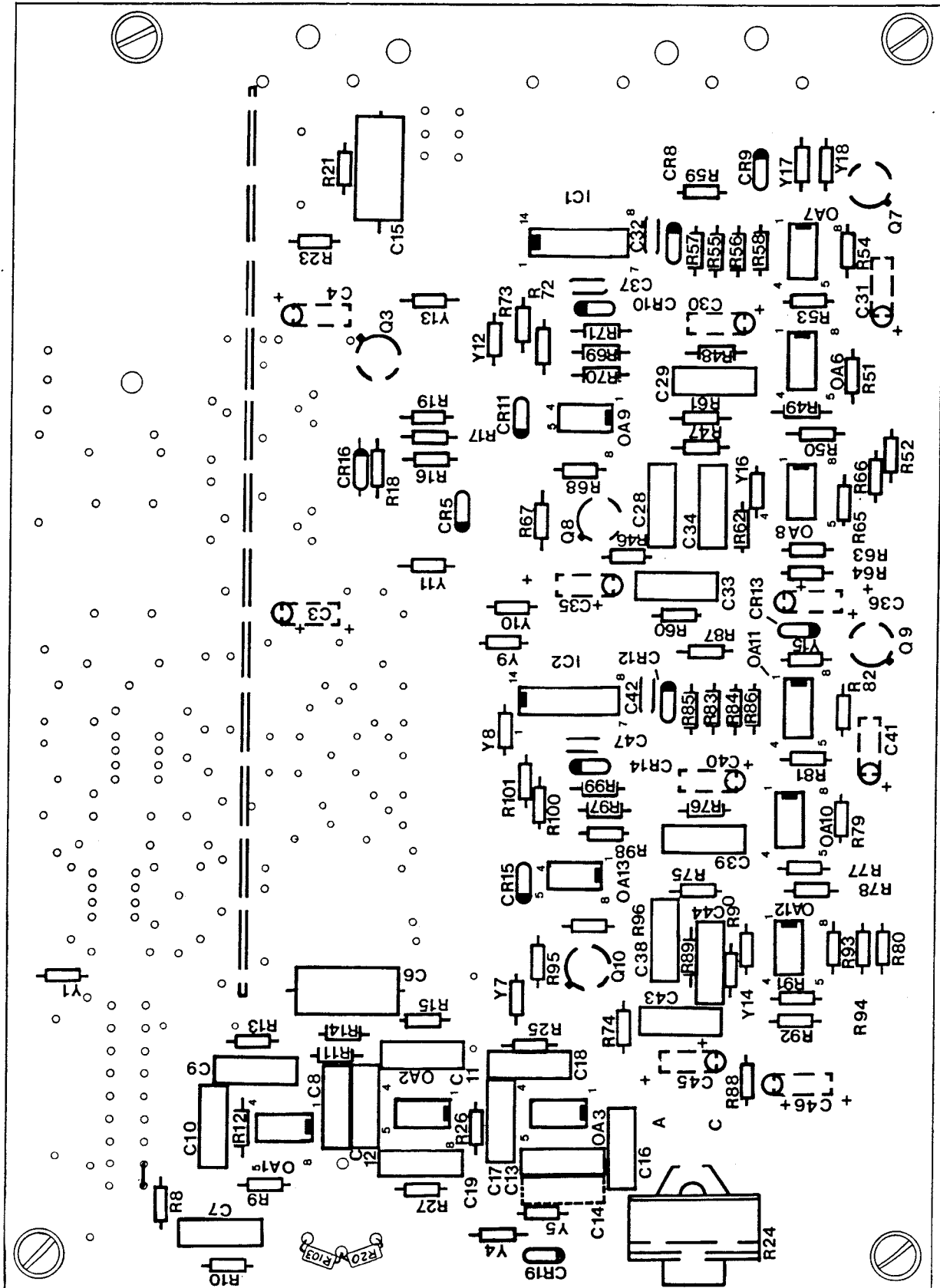


FIGURE 4.6B BOARD LAYOUT OF THE KT-24

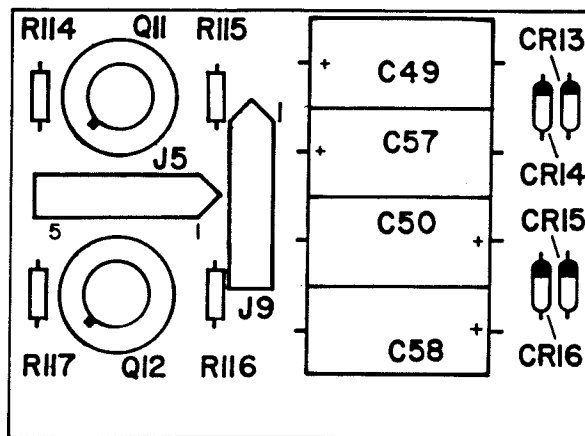


FIGURE 4.6C
BOARD LAYOUT OF THE KT-24

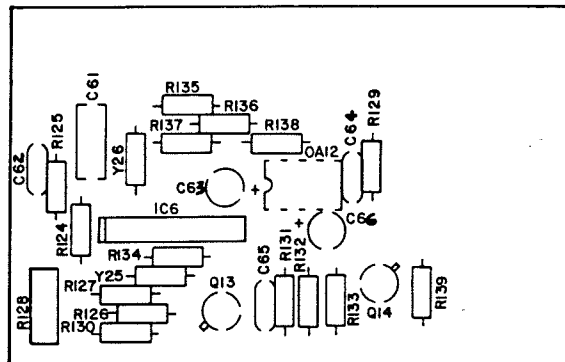


FIGURE 4.6D
BOARD LAYOUT OF THE KT-24