Zener diodes in the SH3 process were unreliable without hermetically sealed packages and were banned from production.

All unmarked resistors are 100 ohm/sq nichrome with a typical TC of +80ppm/deg C. AB resistors are made with the active base layer.
Most nichrome resistors are made from multiple instances of 100 ohm resistors.
Some nichrome resistors are larger to allow for laser trimming at the wafer stage.

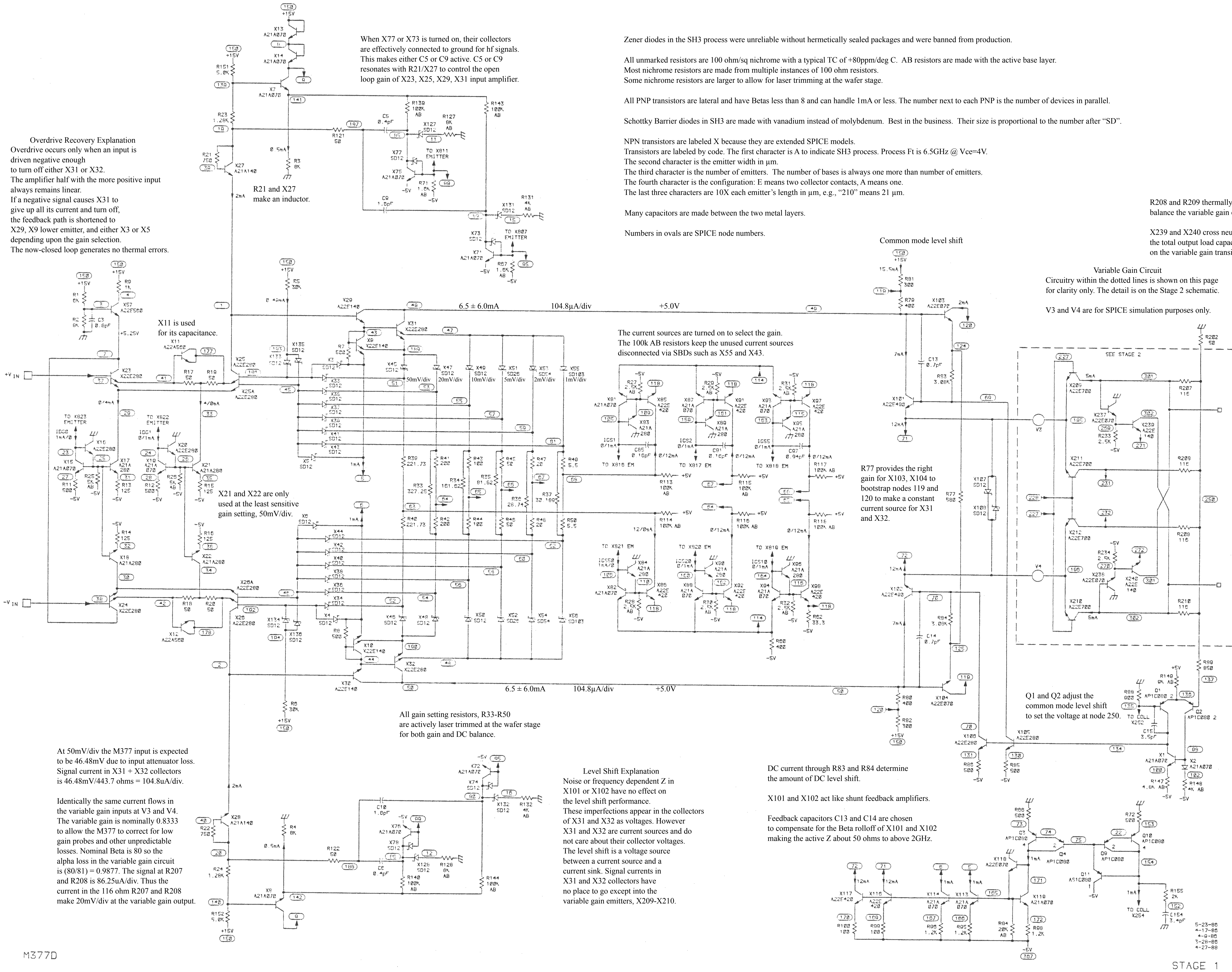
All PNP transistors are lateral and have Betas less than 8 and can handle 1mA or less. The number next to each PNP is the number of devices in parallel.

Schottky Barrier diodes in SH3 are made with vanadium instead of molybdenum. Best in the business. Their size is proportional to the number after "SD".

NPN transistors are labeled X because they are extended SPICE models.
Transistors are labeled by code. The first character is A to indicate SH3 process. Process Ft is 6.5GHz @ Vce=4V.
The second character is the emitter width in µm.
The third character is the number of emitters. The number of bases is always one more than number of emitters.
The fourth character is the configuration: E means two collector contacts, A means one.
The last three characters are 10X each emitter's length in µm, e.g., "210" means 21 µm.

Many capacitors are made between the two metal layers.

Numbers in ovals are SPICE node numbers.



Overdrive Recovery Explanation
Overdrive occurs only when an input is driven negative enough to turn off either X31 or X32.
The amplifier half with the more positive input always remains linear.
If a negative signal causes X31 to give up all its current and turn off, the feedback path is shortened to X29, X9 lower emitter, and either X3 or X5 depending upon the gain selection.
The now-closed loop generates no thermal errors.

At 50mV/div the M377 input is expected to be 46.48mV due to input attenuator loss.
Signal current in X31 + X32 collectors is 46.48mV/443.7 ohms = 104.8uA/div.

Identically the same current flows in the variable gain inputs at V3 and V4. The variable gain is nominally 0.8333 to allow the M377 to correct for low gain probes and other unpredictable losses. Nominal Beta is 80 so the alpha loss in the variable gain circuit is (80/81) = 0.9877. The signal at R207 and R208 is 86.25uA/div. Thus the current in the 116 ohm R207 and R208 make 20mV/div at the variable gain output.

Level Shift Explanation
Noise or frequency dependent Z in X101 or X102 have no effect on the level shift performance.
These imperfections appear in the collectors of X31 and X32 as voltages. However X31 and X32 are current sources and do not care about their collector voltages.
The level shift is a voltage source between a current source and a current sink. Signal currents in X31 and X32 collectors have no place to go except into the variable gain emitters, X209-X210.

DC current through R83 and R84 determine the amount of DC level shift.

X101 and X102 act like shunt feedback amplifiers.

Feedback capacitors C13 and C14 are chosen to compensate for the Beta rolloff of X101 and X102 making the active Z about 50 ohms to above 2GHz.

5-23-86
4-17-85
4-8-85
3-26-85
4-27-88

M377D

STAGE 1