

REV	DESCRIPTION	DATE	APPROVED
A	Initial design (10% and 20% Plan Approval)	7-6-77	AL
B	SPR 100-1, 101, 102, 103	8-10-77	
C	SEE INT. 4 & 5	7-27-78	F.O.

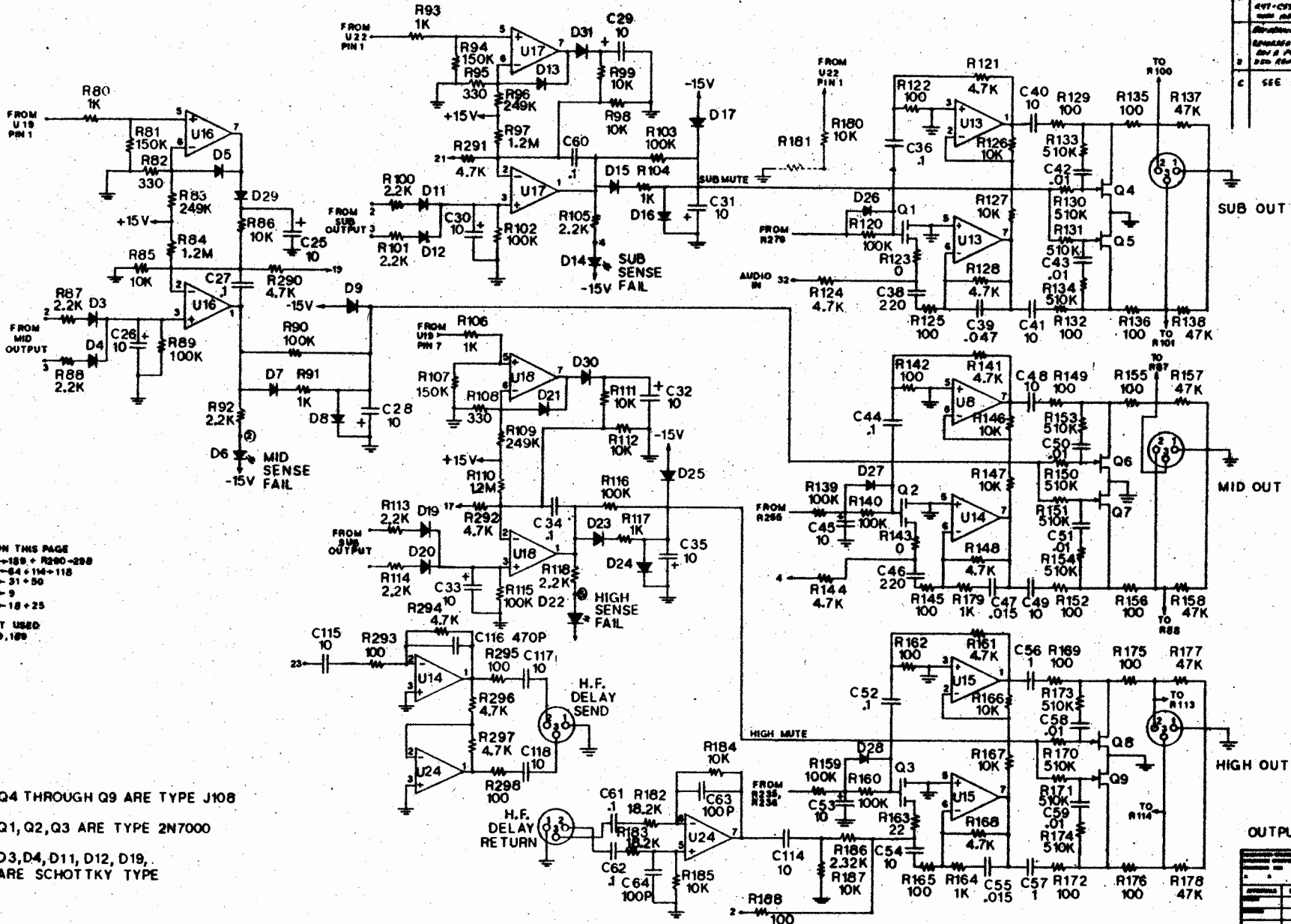
ON THIS PAGE NOT USED  
 R1-79 \*299  
 C1-24 10,24  
 U1-12  
 D1,18

PARTS MARKED \* ARE ON PROGRAM PCB,  
 SEE PAGE 4 FOR VALUE.

INPUT, X-OVERS

RENKUS-HEINZ	
SCHEMATIC, X-310 PROCESSOR	
DATE	REV. NUMBER
7-27-78	D
DO NOT SCALE DRAWING	

NO.	DESCRIPTION	DATE	APPROVED
A	REVISED TO ADD 100 OHM RESISTOR TO U17-C29	2-7-81	A.S.
B	REPLACES AN UNLABLED COMPONENT IN SCHEMATIC OF FIG. 1	8-13-81	
B	REVISED TO ADD 100 OHM RESISTOR TO U17-C29	1-15-90	
C	SEE SATC 4 + 5	5-27-11	P.O.



ON THIS PAGE  
 R80 → 188 + R290-298  
 C25 → 84 + 116 + 118  
 D3 → 31 + 50  
 Q1 → 9  
 U13 → 18 + 25  
 NOT USED  
 R119, 120  
 C37

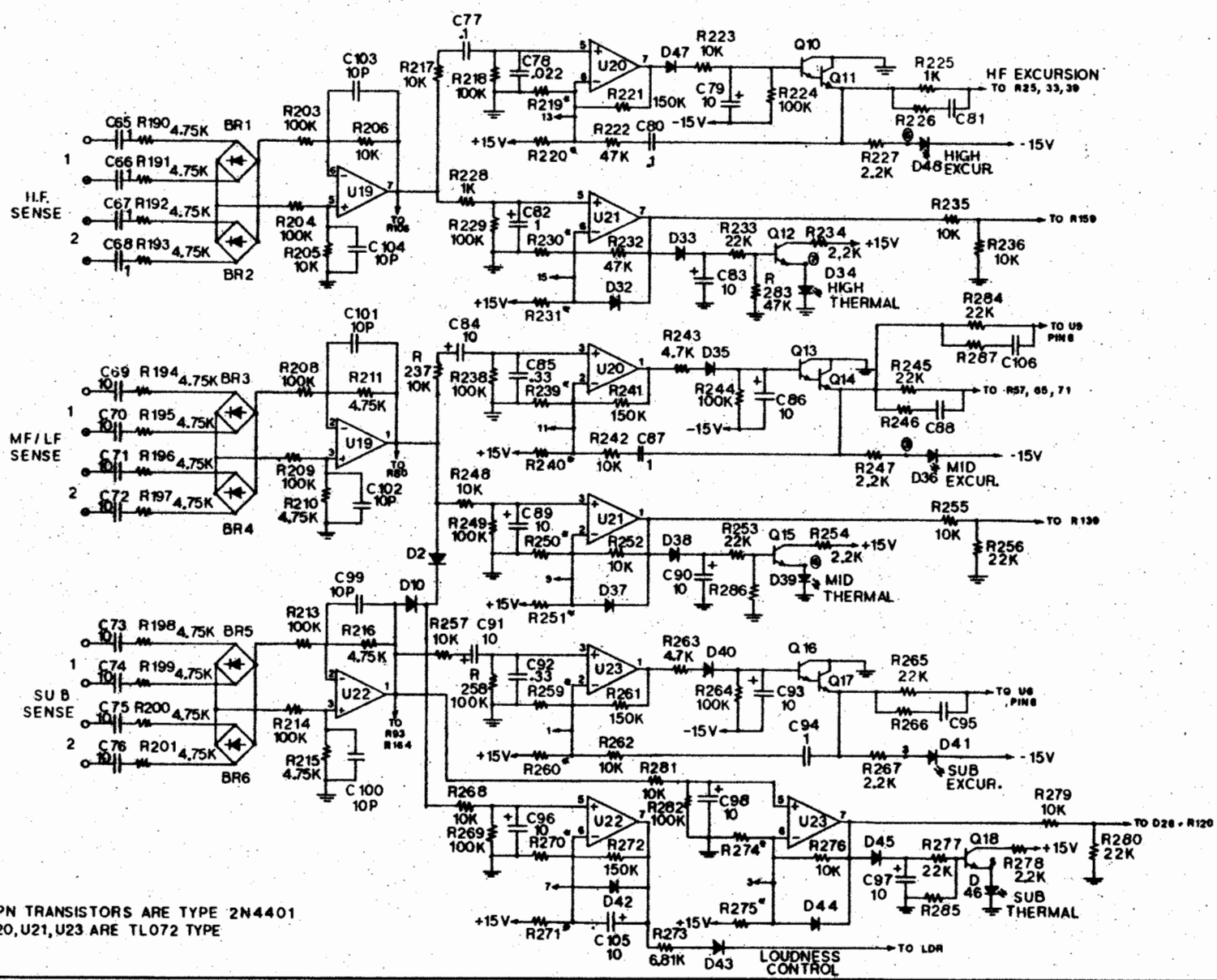
Q4 THROUGH Q9 ARE TYPE J108  
 Q1, Q2, Q3 ARE TYPE 2N7000  
 D3, D4, D11, D12, D19,  
 ARE SCHOTTKY TYPE

REVISIONS		DATE	APPROVED
A	REVISIONS		
B	REVISIONS		
C	REVISIONS		

RENKUS-HEINZ	
SCHEMATIC, X310	
PROCESSOR	
DATE	REV. NO.
	D
DO NOT SCALE DIMENSIONS	
PAGE 2	

REV	DESCRIPTION	DATE	APPROVED
A	REVISED TO ADD BR 1, BR 2	7-7-63	FD
B	REV. 5-7-7		
C	SEE SHTS 4+5	5-17-62	FO



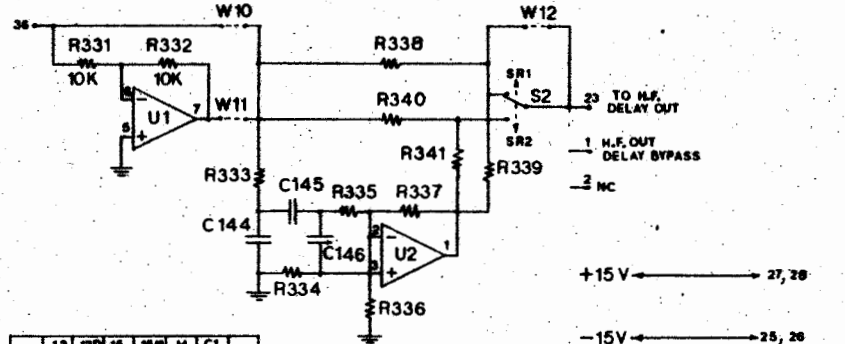
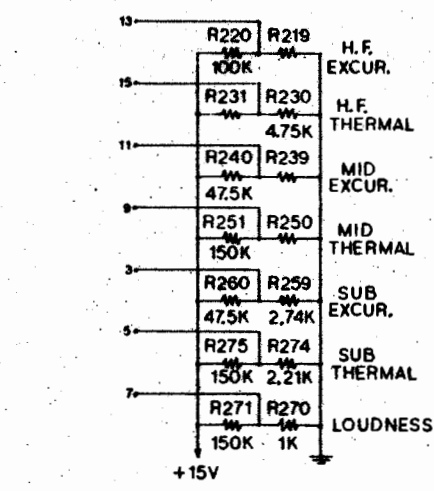
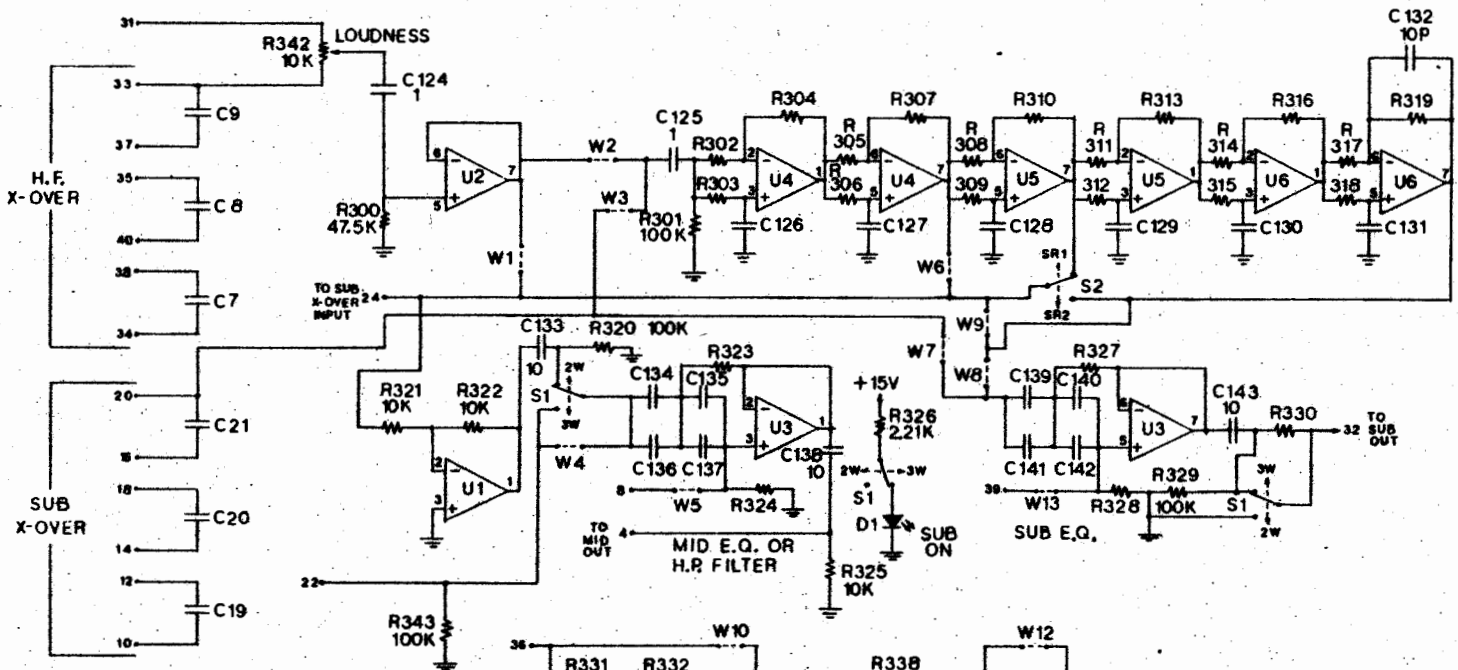
NPN TRANSISTORS ARE TYPE 2N4401  
 U20, U21, U23 ARE TL072 TYPE

ON THIS PAGE  
 R190-289  
 C85-106  
 D32-46, 2, 10  
 Q10-18  
 U18-23

NOT USED  
 R202, 207, 212, 288, 289

SENSE, CONTROL	
REVISION	RENKUS-HEINZ
DATE	SCHEMATIC, X310
DESCRIPTION	PROCESSOR
DESIGNED BY	
CHECKED BY	
APPROVED BY	D
DATE	
NO. OF COPIES	3

REV.	DESCRIPTION	DATE	APPROVED
A	ADD R342 TO R344, 150V OUT MID E.Q. FILTER TO PWR 22	7-4-67	R.D.
B	ADD R345 TO R347 REMOVE R348, R349, R350, R351	8-8-67	
C	CHANGE C7-C1, R24, R25 FOR PWR 22 - C1 ONLY SEE ALSO SHEET 5	5-2-68	F.O.



	12	12D	15	15/6	M	C1
S1	X	X	X	X		
S2			X			
W1	X	X	X	X	X	X
W2	X	X	X	X		
W3					X	X
W4					X	X
W5	X	X	X	X	X	X
W6	X					
W7	X	X	X	X	X	X
W8					X	X
W9	X		X			
W10					X	X
W11	X	X	X	X	X	X
W12	X	X	X	X	X	X
W13	X	X	X	X	X	X

$$F_1 = \frac{1}{2\pi \times C19 \times 100K}$$

$$F_2 = \frac{1}{2\pi \times C7 \times 47.5K}$$

$F_1 = 106\text{HZ EXCEPT -M} = 338\text{HZ}$   
 $F_2 = 1\text{KHZ (-15, -15/6, -12D)}$   
 $2.2\text{KHZ (-M)}$

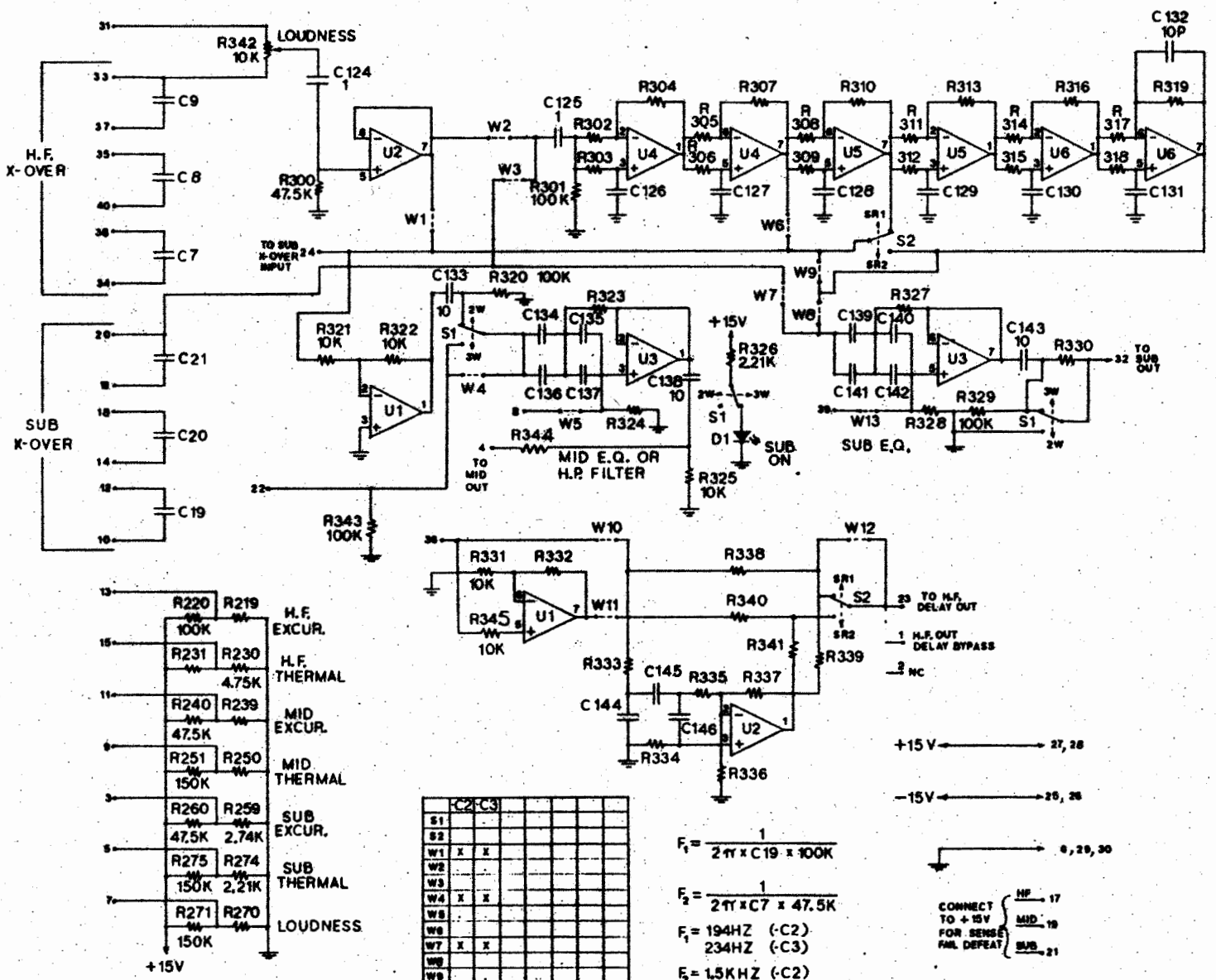
CONNECT TO +15V FOR SENSE FOR DEFECT

HF - 17  
 MID - 19  
 SUB - 21

R219	1.5K	1.5K	1.5K	1.5K	1.5K	4.02K
R339	18.2K	18.2K	18.2K	18.2K	12.1K	22.1K
R327	6.81K	6.81K	6.81K	6.81K	6.81K	6.81K
C141, 142	.047	.047	.047	.047	.047	-
C139, 140	.1	.1	.1	.1	.1	.1
C128-C131	-	.0022	.0033	.0022	-	.01
R308-R319	-	10K	18K	18K	-	12.1K
R338	18.2K	18.2K	18.2K	18.2K	12.1K	10K
R340, 341	-	-	6.81K	-	-	-
C146	.001	.001	470P	.001	470P	470P
C144	.0033	.001	-	.001	-	-
C145	.0022	.0022	.0033	.0022	.0033	.0033
R336	2.21K	22.1K	22.1K	22.1K	22.1K	22.1K
R334	15K	10K	47.5K	18.2K	47.5K	47.5K
R337	6.81K	6.81K	6.81K	12.1K	6.81K	6.81K
R335	6.81K	10K	10K	10K	10K	10K
R333	6.81K	4.75K	4.75K	4.75K	4.75K	4.75K
C126, 127	.0022	.001	.0033	.0022	-	.01
R302-R307	12.1K	12.1K	18.2K	15K	-	12.1K
R324	-	-	-	-	15K	15K
R323	6.81K	6.81K	6.81K	6.81K	15K	15K
R330	-	-	-	-	4.75K	0
R250	1.5K	1.5K	2.21K	2.21K	1.5K	1.5K
R239	2.32K	2.32K	2.74K	2.74K	2.74K	2.74K
R231	68.1K	56.2K	56.2K	56.2K	56.2K	56.2K
C136, 137	-	-	.022	.022	-	-
C134, 135	.1	.1	.1	.1	.1	.1
C19, 20, 21	.015	.015	.015	.015	.0047	.0047
C7, 8, 9	.0022	.0033	.0033	.0033	.0015	.0022
MODEL	-12	-12D	-15	-15/6	-M	-C1

NO.	REVISION	DATE	BY
1	REVISED TO ADD PINS 27, 28, 29 AND PINS 17, 18, 19	7-4-67	R.H.
2	REVISED TO ADD PINS 27, 28, 29 AND PINS 17, 18, 19	8-8-67	
3	REVISED TO ADD PINS 27, 28, 29 AND PINS 17, 18, 19	11-8-67	
4	ADD THIS PAGE (PINS 5) AND PINS 17, 18, 19	1-24-72	GO.

SEE ALSO PAGE 4



R344	1.21K	1.21K		
R219	4.02K	4.02K		
R270	15K	15K		
R332	2.0K	2.0K		
R339	8.25K	8.25K		
R327	6.81K	6.81K		
C141, 142	-	-		
C139, 140	.1	.1		
C128-R313	-	-		
R308-R319	-	-		
R338	10K	10K		
R340, 341	-	-		
C146	470P	470P		
C144	-	-		
C145	.0033	.0033		
R336	2.21K	2.21K		
R334	47.5K	47.5K		
R337	6.81K	6.81K		
R335	10K	10K		
R333	4.75K	4.75K		
C126, 127	-	-		
R302-R307	-	-		
R324	15K	15K		
R323	15K	15K		
R330	0	0		
R250	1.5K	1.5K		
R239	2.74K	2.74K		
R231	56.2K	56.2K		
C136, 137	-	-		
C19, 20, 21	.0082	.0088		
C7, 8, 9	.0022	.0015		
MODEL	-C2	-C3		

	C2	C3
S1		
S2		
W1	X	X
W2		
W3		
W4	X	X
W5		
W6		
W7	X	X
W8		
W9		
W10		
W11	X	X
W12	X	X
W13	X	X

$$F_1 = \frac{1}{2\pi \times C19 \times 100K}$$

$$F_2 = \frac{1}{2\pi \times C7 \times 47.5K}$$

$F_1 = 194HZ (-C2)$   
 $234HZ (-C3)$   
 $F_2 = 1.5KHZ (-C2)$   
 $2.2KHZ (-C3)$

CONNECT TO +15V FOR SENSE AND DEFAT

HF 17  
 MID 18  
 SUB 21

REVISION	DATE	BY
1	7-4-67	R.H.
RENKUS-HEINZ		
SCHEMATIC, X310		
PROGRAM MODULE		
NO.	DATE	BY
1	7-4-67	R.H.
D		
DO NOT SCALE DIMENSIONS TO FIT		