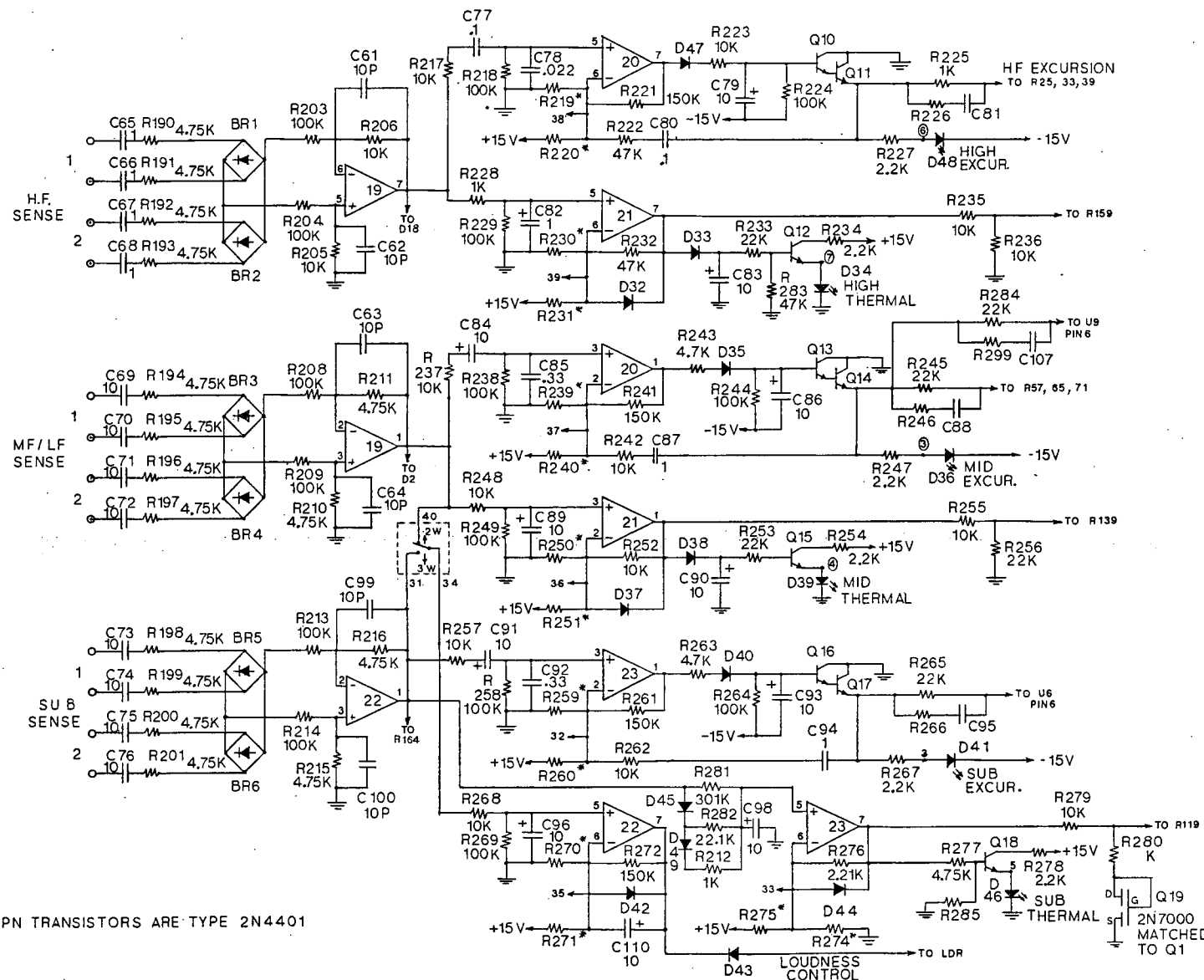


REVISIONS			
LTN	DESCRIPTION	DATE	APPROVED
A	PRODUCTION RELEASE	5/9/88	A.V.
B	SEE SHEET 4		
C	D29, 30, 31 WERE SPECIFIED TYPE D2, 10, 18 WERE IN THE ECO 204	8/13/88	A.V.
D	ADDED 116, 111, 1 DED SUB CIRCUIT, ECO 201	8/17/88	R.V.
E	REVISED SENSE FAIL CRT. ECO 210	2/10/89	R.V.
F	SUB LIMITING CHANGE ECO 249	3/14/90	A.V.
G	SEE 74-4 ECO 291	11-24-90	E.S.
H	SEE SHT. 4, 5 ECO 314, 315 DELETE C36, V16, 54 ADD U401, 402 AND ASSOC. CRYST	5-25-91	F.O.

TOLERANCES UNLESS OTHERWISE SPECIFIED			
R	%	R	%
C	±	C	±
D	±	D	±
Q	±	Q	±
U	±	U	±
APPROVALS	DATE	SCALE	DRAWING NO.
DESIGNED		SCALE	D
CHECKED		SCALE	
APPROVED		SCALE	
DO NOT SCALE DRAWING			
SHEET 2			



REVISIONS			
LTN	DESCRIPTION	DATE	APPROVED
1	PRODUCTION RELEASE	5/1/68	
2	SEE SMT 4		
3	SEE PG 2	11/15/71	
4	SEE PG 2 ECD 201	10/21/78	
5	SEE PG 2 + PG 4	2/11/79	
6	SUB LIMITER CHANGE ECD 247	3/11/80	
7	SEE PG 4 ECD 191	4-16-70	
8	SEE SMT. 2, 4, 5 ECD 314, 325	6-1-72	F.O.

ON THIS PAGE
R190 → 285, 299
C65 → 100, 107, 110
D30 → 49
Q10 → 19
U19 → 23

NOT USED
C108, 109, 97
R202, 207

SENSE, CONTROL

PRELIMINARY UNLESS OTHERWISE SPECIFIED		REVISIONS	
REVISIONS		REVISIONS	
APPROVALS	DATE	APPROVALS	DATE
DESIGN		DESIGN	
PREPARED		PREPARED	
SCHEMATIC, X31 PROCESSOR		SCHEMATIC, X31 PROCESSOR	
SCALE		SCALE	
D		D	
DO NOT SCALE DRAWING		DO NOT SCALE DRAWING	
SHEET 3		SHEET 3	

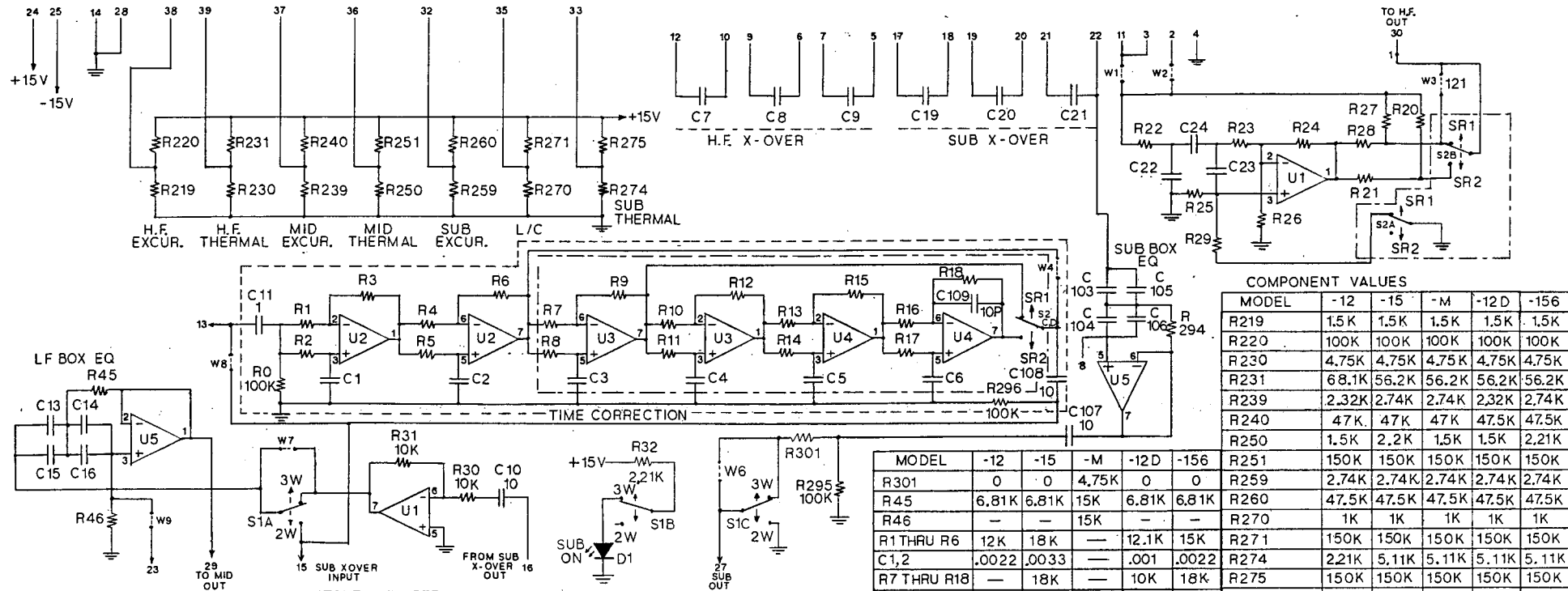
$$F_2 = \frac{1}{2\pi \times C7 \times 47.5K}$$

1.5KHz (-12)
1KHz (-15)
2.2KHz (-M)

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

106 Hz (-12, -15)
338Hz (-M)

REVISIONS			
LTN	DESCRIPTION	DATE	APPROVED
	PRODUCTION RELEASE ADDED P, F, MTE	5/1/88	R.H.
A	ADDED W6, RECALCULATED R301 SEE ECO 173	7/1/89	
B	SEE PG 2	8/3/89	R.H.
D	SEE PG 2 ECO 201	10/27/89	
E	ADDED -12D -156 MODULES SEE ECO 218 - 221	11/1/89	R.H.
F	REPLACED CHANGE ECO 249	3-14-90	
G	THREE PARTITION SW PAGE SW. ECO 291	11-24-90	R.U.
H	SEE INT 2, F - ELO 314, 325 USE REV.C PROGRAM INADUE	5-24-92	F.O.



COMPONENT VALUES

MODEL	-12	-15	-M	-12D	-156
R219	15K	1.5K	1.5K	1.5K	1.5K
R220	100K	100K	100K	100K	100K
R230	4.75K	4.75K	4.75K	4.75K	4.75K
R231	68.1K	56.2K	56.2K	56.2K	56.2K
R239	2.32K	2.74K	2.74K	2.32K	2.74K
R240	47K	47K	47K	47K	47.5K
R250	1.5K	2.2K	1.5K	1.5K	2.21K
R251	150K	150K	150K	150K	150K
R259	2.74K	2.74K	2.74K	2.74K	2.74K
R260	47.5K	47.5K	47.5K	47.5K	47.5K
R270	1K	1K	1K	1K	1K
R271	150K	150K	150K	150K	150K
R274	2.21K	5.11K	5.11K	5.11K	5.11K
R275	150K	150K	150K	150K	150K
C7, 8, 9	.0022	.0033	.0015	.0033	.0033
C19, 20, 21	.015	.015	.0047	.015	.015
C13, 14	.1	.1	.1	.1	.1
C15, 16	—	.022	—	—	.022
R294	6.81K	6.81K	6.81K	6.81K	6.81K
C103, 104	.1	.1	.1	.1	.1
C105, 106	.047	.047	.047	.047	.047

MODEL	-12	-15	-M	-12D	-156
R301	0	0	4.75K	0	0
R45	6.81K	6.81K	15K	6.81K	6.81K
R46	—	—	15K	—	—
R1 THRU R6	12K	18K	—	12.1K	15K
C1, 2	.0022	.0033	—	.001	.0022
C3 THRU C6	—	.0033	—	.0022	.0022
R22	6.81K	4.75K	4.75K	4.75K	4.75K
R23	6.81K	10K	10K	10K	10K
R24	6.81K	6.81K	6.81K	6.81K	12.1K
R25	15K	47.5K	47.5K	10K	18.2K
R26	2.21K	22.1K	22.1K	22.1K	22.1K
R29	—	—	—	—	—
C24	.0022	.0033	.0033	.0022	.0022
C22	.0033	—	—	.001	.001
C23	.001	470 P	470 P	.001	.001
R20, 21	—	6.81K	—	—	—
R27, 28	10K	10K	6.81K	10K	10K

NOTE:
SHEET 5 IS
SIZE A.

REVISIONS			
LTN	DESCRIPTION	DATE	APPROVED
	PRODUCTION RELEASE ADDED P, F, MTE	5/1/88	R.H.
A	ADDED W6, RECALCULATED R301 SEE ECO 173	7/1/89	
B	SEE PG 2	8/3/89	R.H.
D	SEE PG 2 ECO 201	10/27/89	
E	ADDED -12D -156 MODULES SEE ECO 218 - 221	11/1/89	R.H.
F	REPLACED CHANGE ECO 249	3-14-90	
G	THREE PARTITION SW PAGE SW. ECO 291	11-24-90	R.U.
H	SEE INT 2, F - ELO 314, 325 USE REV.C PROGRAM INADUE	5-24-92	F.O.

COMPONENTS INSIDE
BOX ARE DELETED IN -12 MODULE
AND -M MODULE.

ALL IC'S ARE TYPE 4560
ON REV. B PCB R301 IS LABELED W6

SWITCHES, JUMPERS

MODEL	X31-12	X31-15	X31-M1	-12D	-156
S1	X	X	X	X	X
S2	X	X	X	X	X
W1	X	X	X	X	X
W2	X	X	X	X	X
W3	X	X	X	X	X
W4	X	X	X	X	X
W5	X	X	X	X	X
W6	X	X	X	X	X
W7	X	X	X	X	X
W8	X	X	X	X	X
W9	X	X	X	X	X

*SPECIAL JUMPER IN PLACE OF S2.

