Assembly Instructions for ABC Add/Subtract Modules

12/12/95

1. Connect 22ga green wire from P1-1{s} to T7-8 {bh-s}

2. Connect 22ga yellow wires as follows:
   P1-2 {s} to T6-2 {bh}
   T7-2 {bhs} to T6-2 {bh}
   T6-2 {bhs} to T4-2 {bh}
   T4-2 {bhs} to T5-2 {bh}
   T5-2 {bhs} to T3-2 {bh}
   T3-2 {bhs} to T2-2 {bh}
   T2-2 {bhs} to T1-2 {bhs}

3. Make 7 grid cap leads from 9" lengths of 22ga black wire.

4. Connect grid cap leads to pin 1 of all tubes. {bhs}

5. Make 3 RC Combos consisting of R=100meg, C=220pF, 8" 22ga wire from RC junction
   One combo (RC2) has 51.1k (R90) resistor from RC junction. Heatshrink tubing over junction.

6. Connect RC combos as follows:

   RC1
   C1 to T5-4 {bhs}
   R11 to T5-5 {bhs}
   white wire to P1-4 {s}

   RC2
   C2 to T3-4 {bhs}
   R21 to T3-5 {bhs}
   white wire to P1-6 {s}
   R90 to T4-8 {bhs}

   RC3
   C3 to T3-8 {bhs}
   R31 to T3-1 {ths}
   white wire to P1-7 {s}

7. Connect bus wire from T7-6 {ths} to T7-3 {bh}.

8. Connect white 22ga wires as follows:
   P1-3 {s} to T1-3 {bhs}
   P1-5 {s} to T7-3 {bhs}

9. Solder 4" 22ga white wire to one end of 5.11 meg resistor and heatshrink the joint. Make 60.

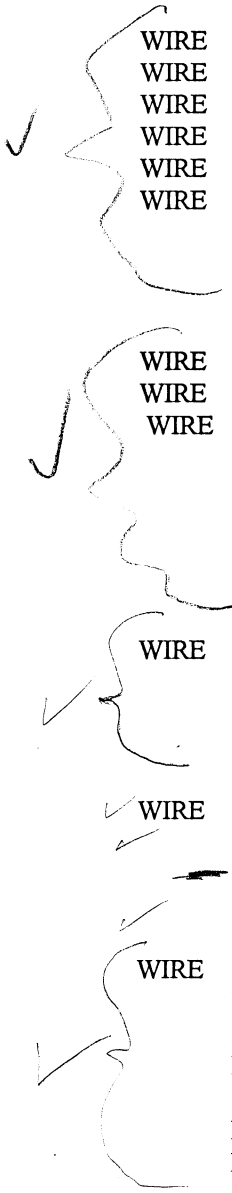
10. Connect above assemblies as follows: R124, wire to P1-8, resistor to T7-1 {th}
    R134, wire to P1-9, resistor to T7-5 {th}

11. Solder 5" 22ga. brown wire to P1-10 {s}.

12. Solder 3" 22ga red wire to P1-11 {s}.

13. Solder 6" 22ga. black wire to one end of 5.11 meg resistor and heatshrink the joint. Make 360.

14. Install the following resistors. Heatshrink exposed resistor leads 'WIRE' indicates a wired resistor constructed in step 13.



WIRE	R84	5.11 meg	T1-6 {bh} to T6-1 {th}
WIRE	R133	5.11 meg	T1-6 {bh} to T7-1 {th}
WIRE	R122	5.11 meg	T1-6 {bh} to T7-5 {bh}
WIRE	R102	5.11 meg	T1-6 {bhs} to T6-5 {bh}
WIRE	R143	5.11 meg	T1-1 {th} to T4-3 {bhs}
WIRE	R142	5.11 meg	T1-1 {th} to T6-6 {bh}
	R141	5.11 meg	T1-1 {ths} facing center
	R72	5.11 meg	T1-5 {bhs} to T2-3 {bhs}
	R71	7.5 meg	T1-5 {ths} facing center
WIRE	R83	5.11 meg	T2-6 {bh} to T6-1 {th}
WIRE	R104	5.11 meg	T2-6 {bh} to T6-5 {th}
WIRE	R63	5.11 meg	T2-1 {ths} to T3-6 {bh}
	R62	5.11 meg	T2-1 {th} to T3-3 {bh}
	R61	3.01 meg	T2-1 {th} facing center
	R53	5.11 meg	T2-5 {bh} to T3-3 {bhs}
	R52	5.11 meg	T2-5 {bhs} to T3-6 {bhs}
	R51	5.11 meg	T2-5 {ths} facing center
WIRE	R113	5.11 meg	T4-1 {th} to T5-3 {bh}
	R112	5.11 meg	T4-1 {th} to T6-3 {bh}
	R111	5.11 meg	T4-1 {ths} facing center
	R200	2.7 meg	T4-5 facing up
WIRE	R82	5.11 meg	T5-3 {bhs} to T6-1 {th}
	R42	5.11 meg	T5-1 {th} to T5-6 {bh}
	R41	7.5 meg	T5-1 {ths} facing center
	R103	5.11 meg	T5-6 {bhs} to T6-5 {bh}
WIRE	R132	5.11 meg	T6-3 {bhs} to T7-1 {th}
	R81	4.12 meg	T6-1 {ths} facing center
	R101	4.12 meg	T6-5 {ths} facing center
	R123	5.11 meg	T6-6 {bhs} to T7-5 {bhs}
	R131	2.74 meg	T7-1 {ths} facing center
	R121	2.74 meg	T7-5 {ths} facing center

15. Cut 10" #22 bus wire. Route bus wire to center of all tube sockets except T3. Connect all center facing resistors to bus wire. Heatshrink all exposed bus wire and resistor leads.

16. Solder brown wire from P1-10 to the above bus.

17. Attach heatshrink to both ends of the following resistors, leaving 1/4" exposed lead. Connect one lead of each as follows:

R140	51k	T1-3
R70	100k	T1-6
R60	100k	T2-3
R50	100k	T2-6
R20	100k	T3-3
R30	100k	T3-6
R110	100k	T4-3
R40	100k	T5-3
R10	100k	T5-6
R80	100k	T6-3
R100	100k	T6-6
R130	51k	T7-6

18. Cut 5" #22 bus wire. Route wire top to bottom at center of module. Connect all remaining resistors to bus wire. Heatshrink all exposed bus wire.

19. Connect red wire from P1-11 to the above bus .

14. Install the following resistors. Heatshrink exposed resistor leads 'WIRE' indicates a wired resistor constructed in step 13.

WIRE	R84	5.11 meg	T1-6 {bh} to T6-1 {th}
WIRE	R133	5.11 meg	T1-6 {bh} to T7-1 {th}
WIRE	R122	5.11 meg	T1-6 {bh} to T7-5 {bh}
WIRE	R102	5.11 meg	T1-6 {bhs} to T6-5 {bh}
WIRE	R143	5.11 meg	T1-1 {th} to T4-3 {bhs}
WIRE	R142	5.11 meg	T1-1 {th} to T6-6 {bh}
	R141	5.11 meg	T1-1 {ths} facing center
	R72	5.11 meg	T1-5 {bhs} to T2-3 {bhs}
	R71	7.5 meg	T1-5 {ths} facing center
WIRE	R83	5.11 meg	T2-6 {bh} to T6-1 {th}
WIRE	R104	5.11 meg	T2-6 {bh} to T6-5 {th}
WIRE	R63	5.11 meg	T2-1 {ths} to T3-6 {bh}
	R62	5.11 meg	T2-1 {th} to T3-3 {bh}
	R61	3.01 meg	T2-1 {th} facing center
	R53	5.11 meg	T2-5 {bh} to T3-3 {bhs}
	R52	5.11 meg	T2-5 {bhs} to T3-6 {bhs}
	R51	5.11 meg	T2-5 {ths} facing center
WIRE	R113	5.11 meg	T4-1 {th} to T5-3 {bh}
	R112	5.11 meg	T4-1 {th} to T6-3 {bh}
	R111	5.11 meg	T4-1 {ths} facing center
	R200	~~2.7 meg~~ 7.5	T4-5 facing up
WIRE	R82	5.11 meg	T5-3 {bhs} to T6-1 {th}
	R42	5.11 meg	T5-1 {th} to T5-6 {bh}
	R41	7.5 meg	T5-1 {ths} facing center
	R103	5.11 meg	T5-6 {bhs} to T6-5 {bh}
WIRE	R132	5.11 meg	T6-3 {bhs} to T7-1 {th}
	R81	4.12 meg	T6-1 {ths} facing center
	R101	4.12 meg	T6-5 {ths} facing center
	R123	5.11 meg	T6-6 {bhs} to T7-5 {bhs}
	R131	2.74 meg	T7-1 {ths} facing center
	R121	2.74 meg	T7-5 {ths} facing center

15. Cut 10" #22 bus wire. Route bus wire to center of all tube sockets except T3. Connect all center facing resistors to bus wire. Heatshrink all exposed bus wire and resistor leads.

16. Solder brown wire from P1-10 to the above bus.

17. Attach heatshrink to both ends of the following resistors, leaving 1/4" exposed lead. Connect one lead of each as follows:

2-51K, 10 100K

R140	51k	T1-3
R70	100k	T1-6
R60	100k	T2-3
R50	100k	T2-6
R20	100k	T3-3
R30	100k	T3-6
R110	100k	T4-3
R40	100k	T5-3
R10	100k	T5-6
R80	100k	T6-3
R100	100k	T6-6
R130	51k 100K	T7-6 T4-6

18. Cut 5" #22 bus wire. Route wire top to bottom at center of module. Connect all remaining resistors to bus wire. Heatshrink all exposed bus wire.

19. Connect red wire from P1-11 to the above bus .

Assembly Instructions for ABC Add/Subtract Modules 12/20/95

1. Connect 22ga green wire from P1-1{s} to T7-8 {bh-s}

2. Connect 22ga yellow wires as follows:
   P1-2 {s} to T6-2 {bh}
   T7-2 {bhs} to T6-2 {bh}
   T6-2 {bhs} to T4-2 {bh}
   T4-2 {bhs} to T5-2 {bh}
   T5-2 {bhs} to T3-2 {bh}
   T3-2 {bhs} to T2-2 {bh}
   T2-2 {bhs} to T1-2 {bhs}

3. Make 7 grid cap leads from 9" lengths of 22ga black wire.

4. Connect grid cap leads to pin 1 of all tubes. {bhs}

5. Make 3 RC Combos consisting of R=100meg, C=220pF, 8" 22ga wire from RC junction
   One combo (RC2) has 51.1k (R90) resistor from RC junction. Heatshrink tubing over junction.

6. Connect RC combos as follows:
   RC1 C1 to T5-4 {bhs}
   R11 to T5-5 {bhs}
   white wire to P1-4 {s}

   RC2 C2 to T3-4 {bhs}
   R21 to T3-5 {bhs}
   white wire to P1-6 {s}
   R90 to T4-8 {bhs}

   RC3 C3 to T3-8 {bhs}
   R31 to T3-1 {ths}
   white wire to P1-7 {s}

7. Connect bus wire from T7-6 {ths} to T7-3 {bh}.

8. Connect white 22ga wires as follows:
   P1-3 {s} to T1-3 {bhs}
   P1-5 {s} to T7-3 {bhs}

9. Solder 4" 22ga white wire to one end of 5.11 meg resistor and heatshrink the joint. Make 60.

10. Connect above assemblies as follows: R124, wire to P1-8, resistor to T7-1 {th}
    R134, wire to P1-9, resistor to T7-5 {th}

11. Solder 5" 22ga. brown wire to P1-10 {s}.

12. Solder 3" 22ga red wire to P1-11 {s}.

13. Solder 6" 22ga. black wire to one end of 5.11 meg resistor and heatshrink the joint. Make 360.

Changes to T4

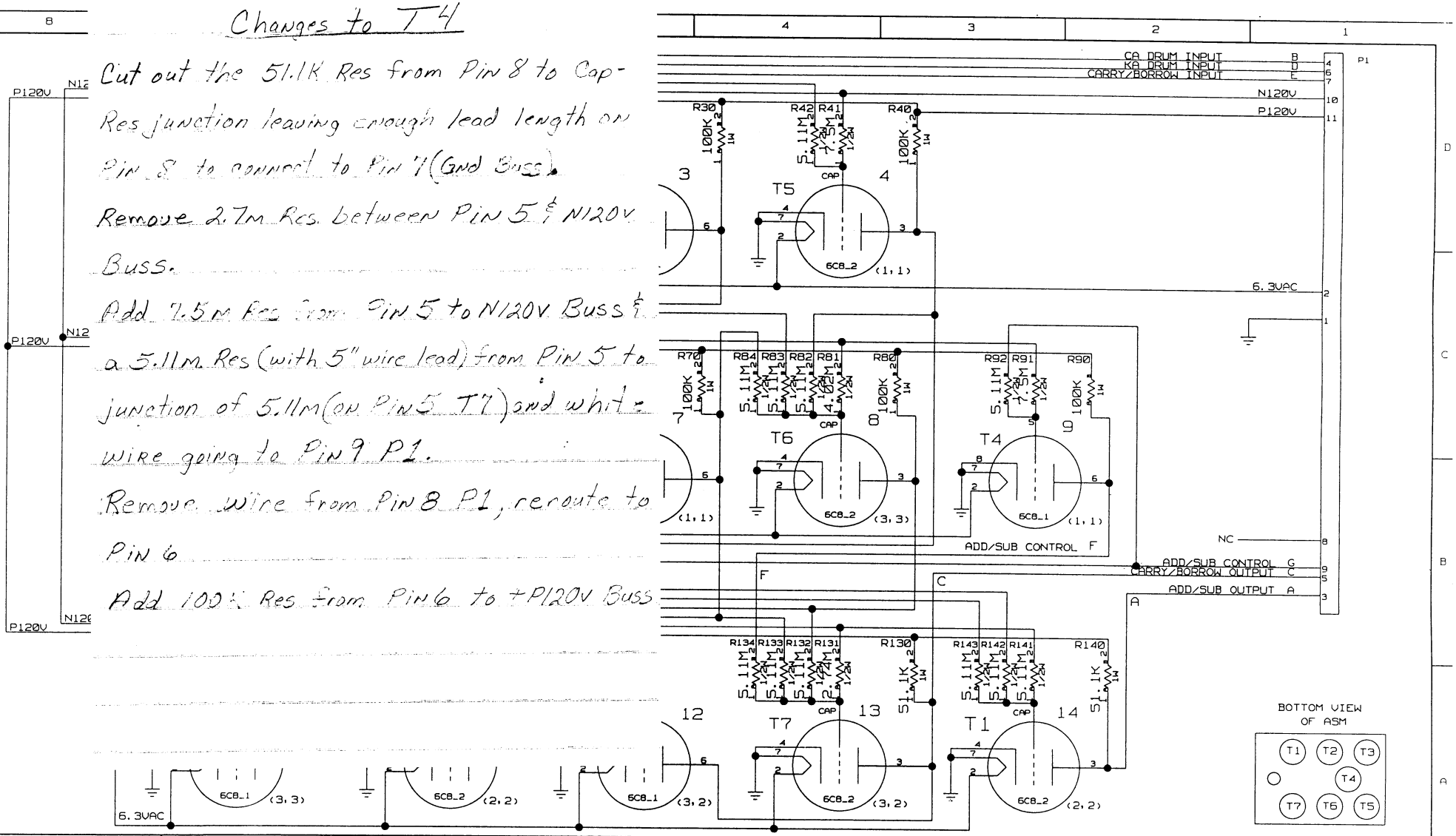
Cut out the 51.1K Res from Pin 8 to Cap-Res junction leaving enough lead length on Pin 8 to connect to Pin 7 (Gnd Buss).

Remove 2.7M Res. between Pin 5 & N120V Buss.

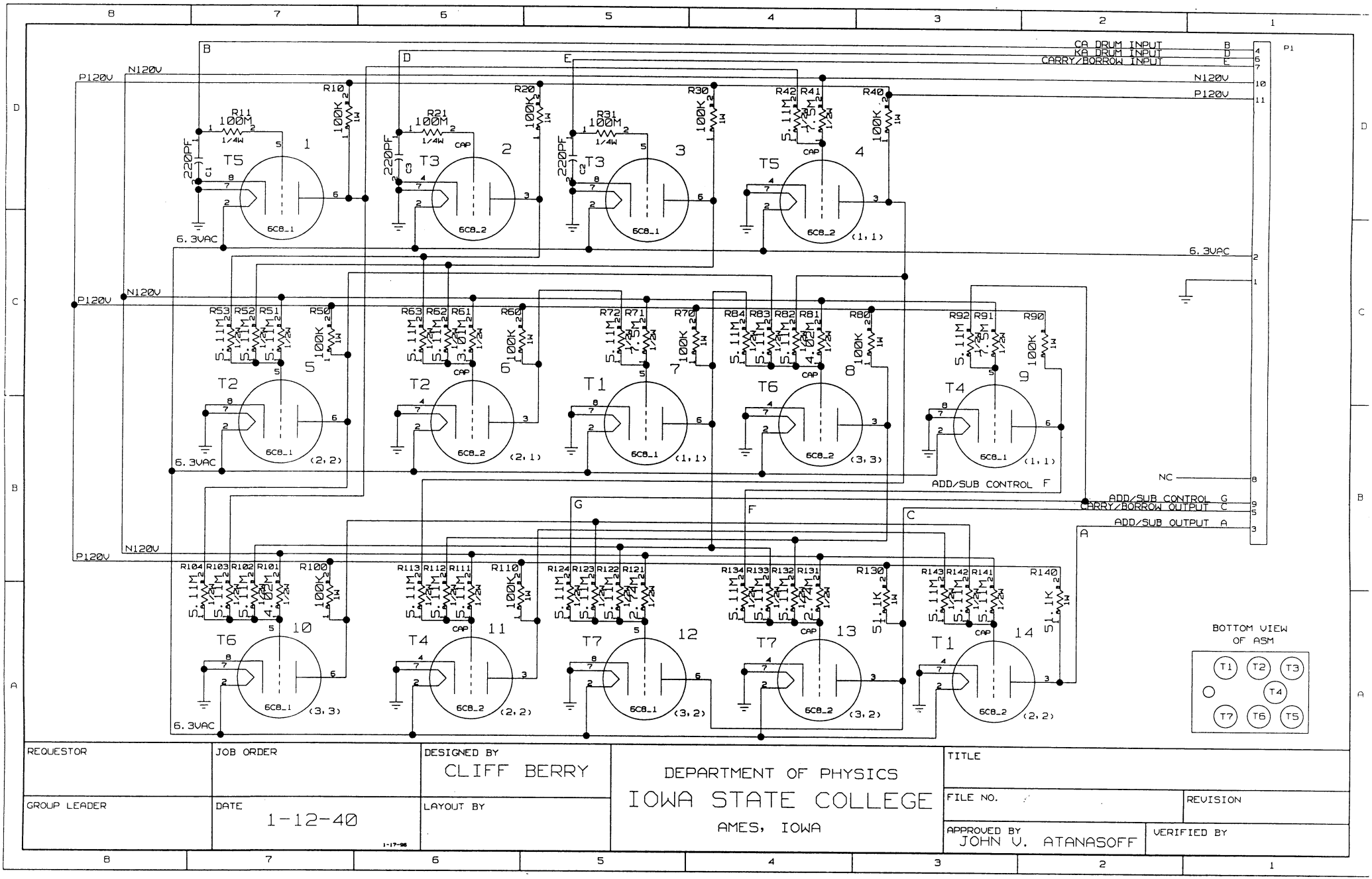
Add 7.5M Res from Pin 5 to N120V Buss & a 5.11M Res (with 5" wire lead) from Pin 5 to junction of 5.11M (on Pin 5 T7) and white wire going to Pin 9 P1.

Remove wire from Pin 8 P1, reroute to Pin 6

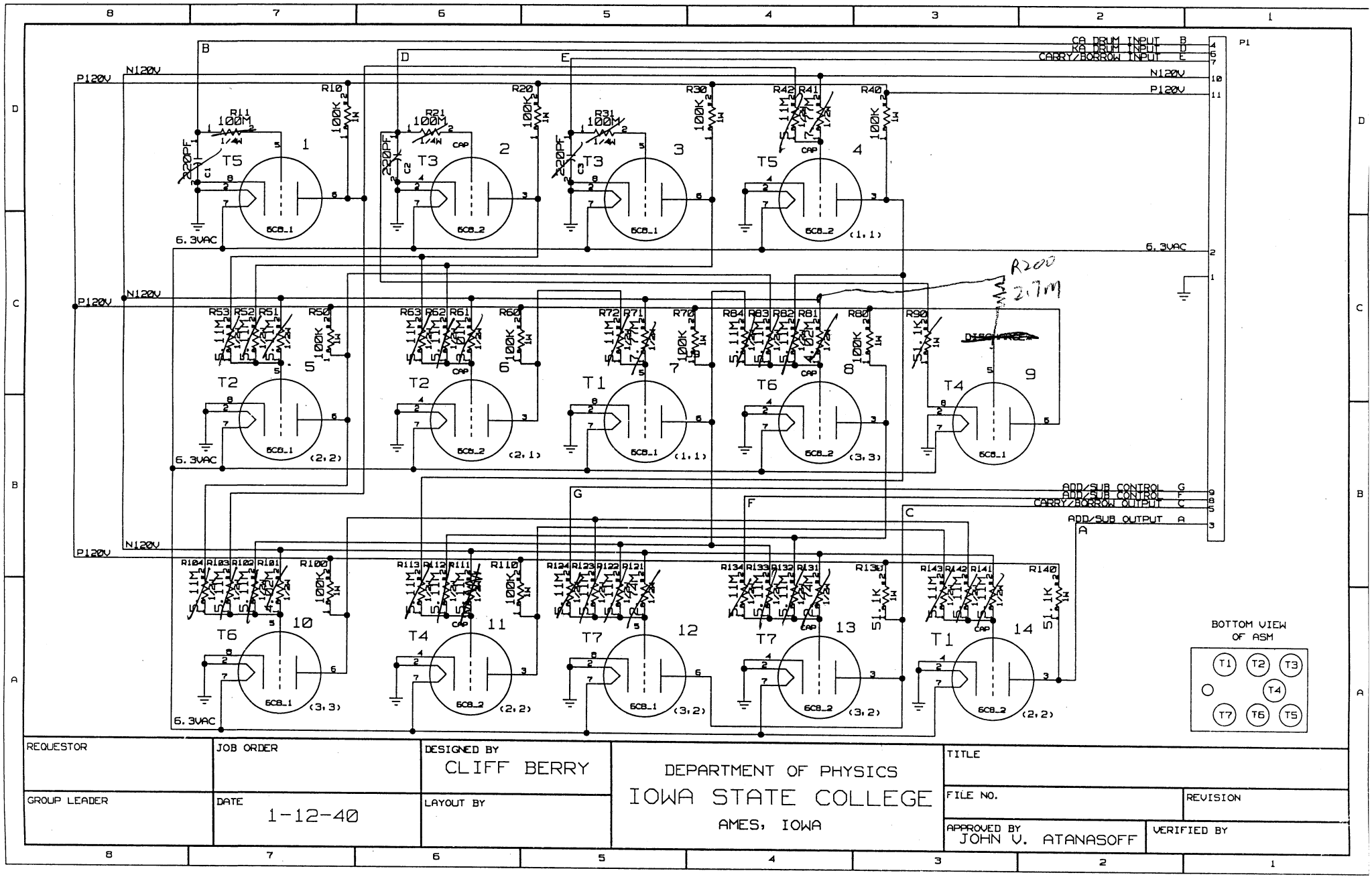
Add 100K Res from Pin 6 to +P120V Buss



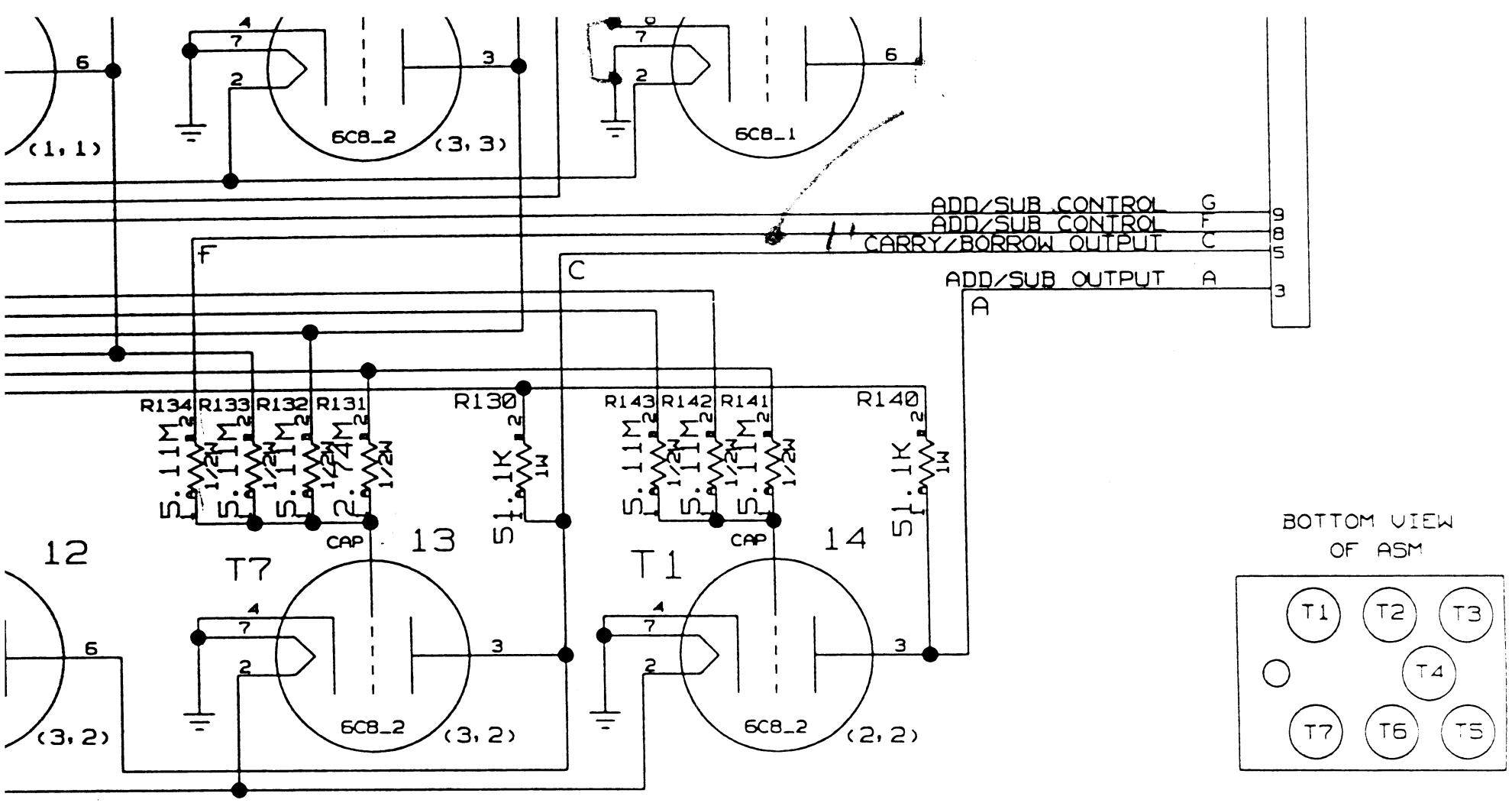
REQUESTOR	JOB ORDER	DESIGNED BY CLIFF BERRY	DEPARTMENT OF PHYSICS IOWA STATE COLLEGE AMES, IOWA	TITLE	
GROUP LEADER	DATE 1-12-40	LAYOUT BY		FILE NO.	REVISION
				APPROVED BY JOHN V. ATANASOFF	VERIFIED BY



REQUESTOR	JOB ORDER	DESIGNED BY CLIFF BERRY	DEPARTMENT OF PHYSICS IOWA STATE COLLEGE AMES, IOWA	TITLE	
GROUP LEADER	DATE 1-12-40	LAYOUT BY		FILE NO.	REVISION
				APPROVED BY JOHN V. ATANASOFF	VERIFIED BY



REQUESTOR	JOB ORDER	DESIGNED BY CLIFF BERRY	DEPARTMENT OF PHYSICS IOWA STATE COLLEGE AMES, IOWA	TITLE	
GROUP LEADER	DATE 1-12-40	LAYOUT BY		FILE NO.	REVISION
				APPROVED BY JOHN V. ATANASOFF	VERIFIED BY



DEPARTMENT OF PHYSICS

WA STATE COLLEGE

AMES, IOWA

TITLE

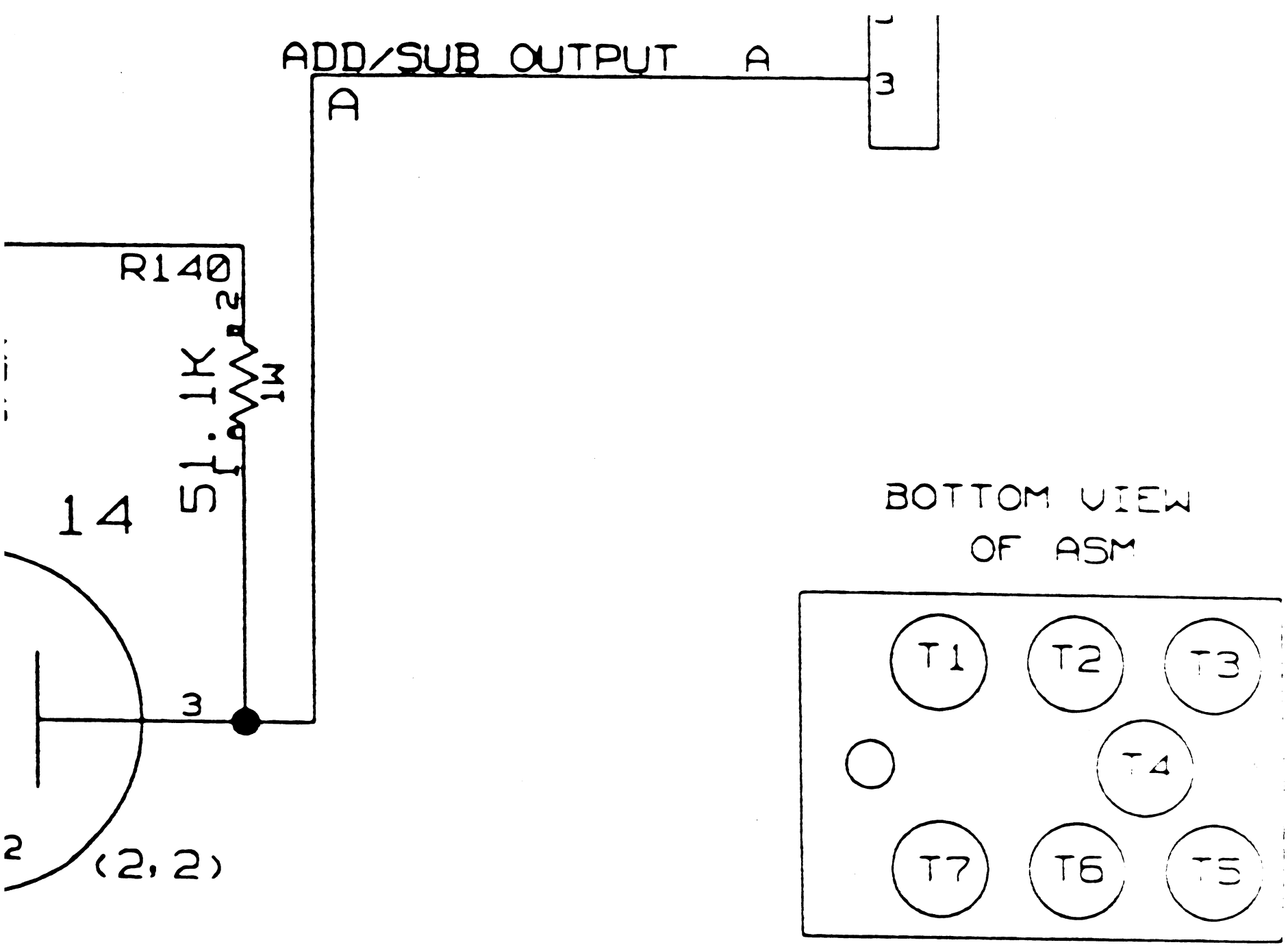
FILE NO.

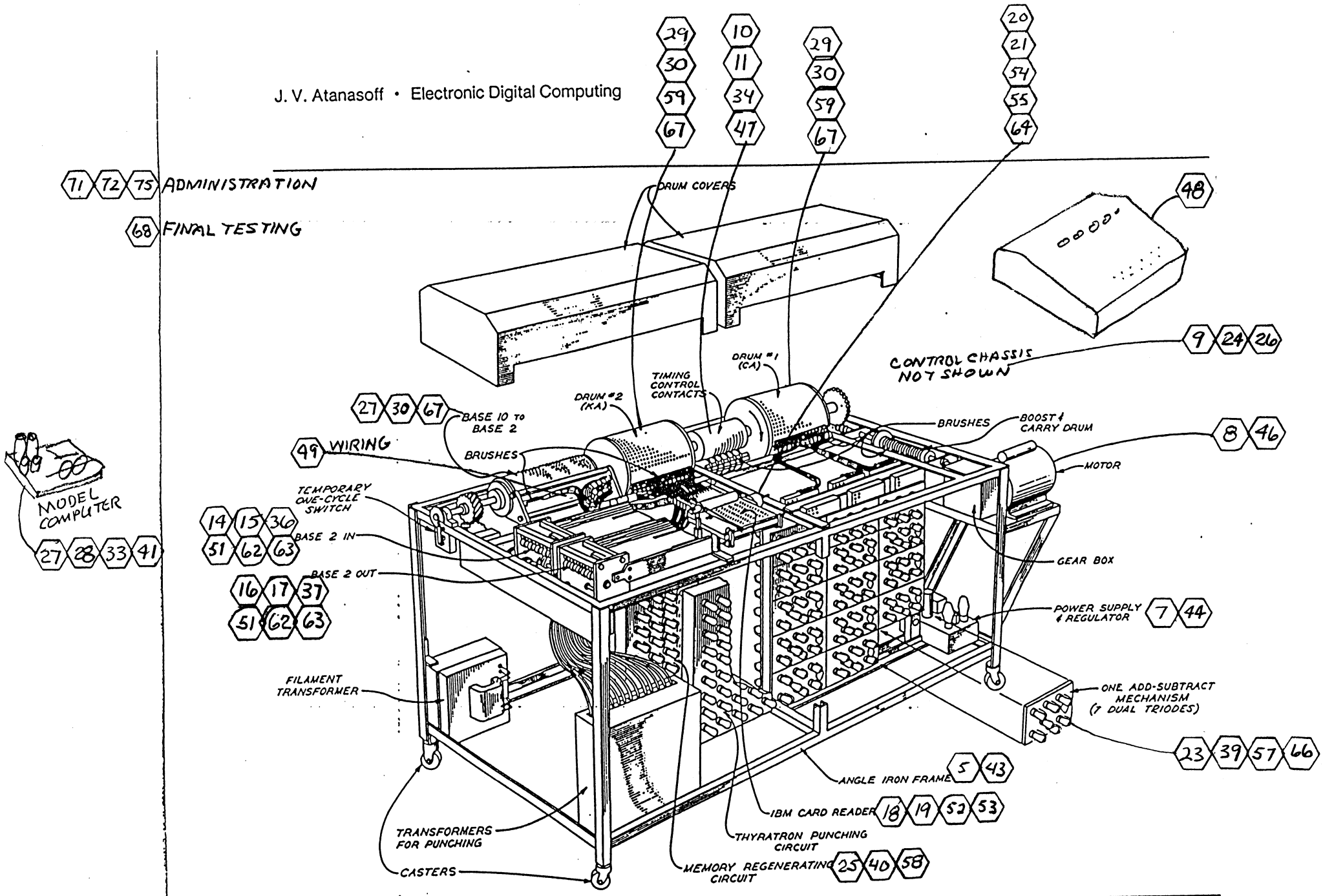
REVISION

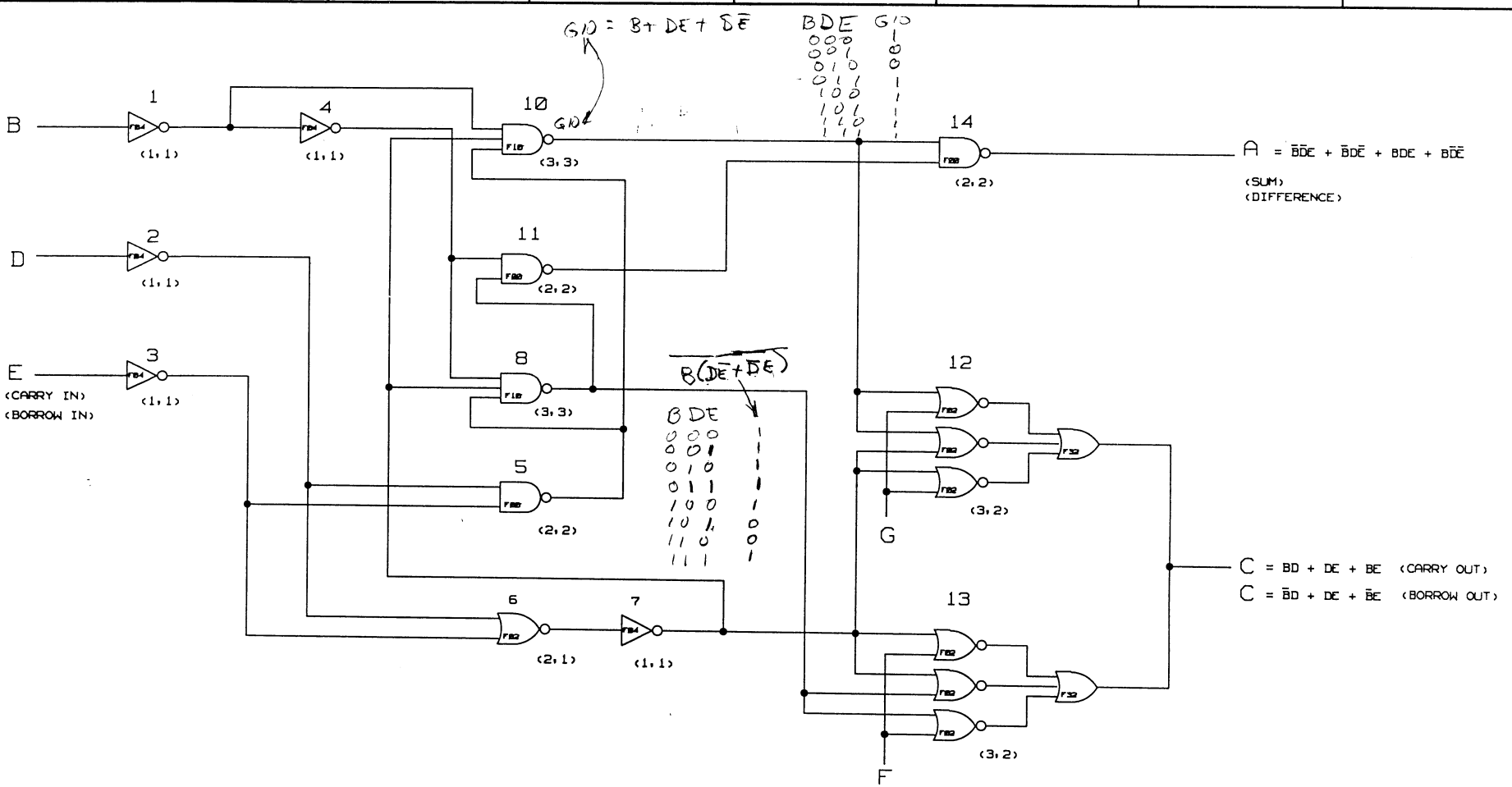
APPROVED BY
JOHN V. ATANASOFF

VERIFIED BY

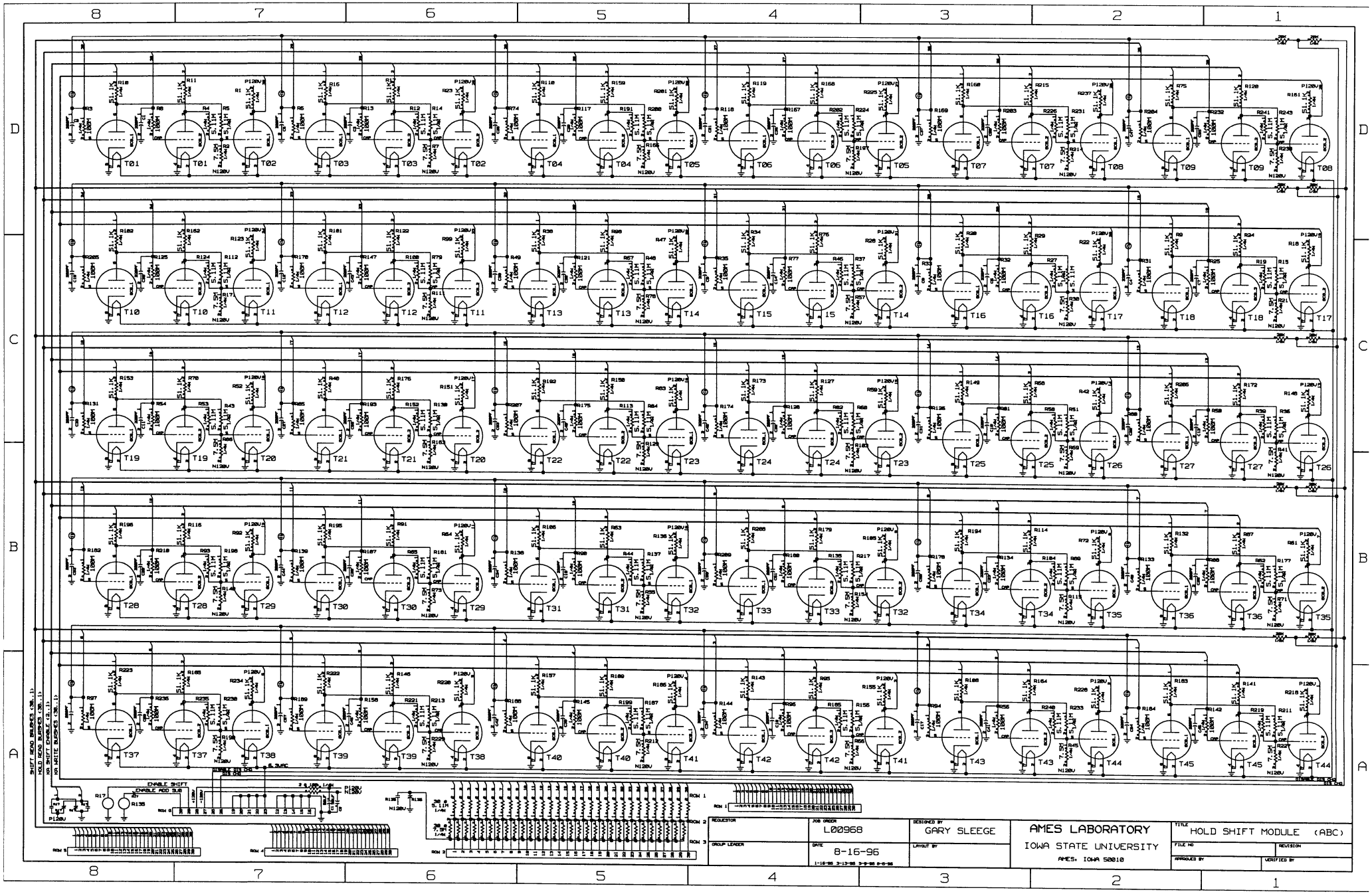
	4	3	2	1

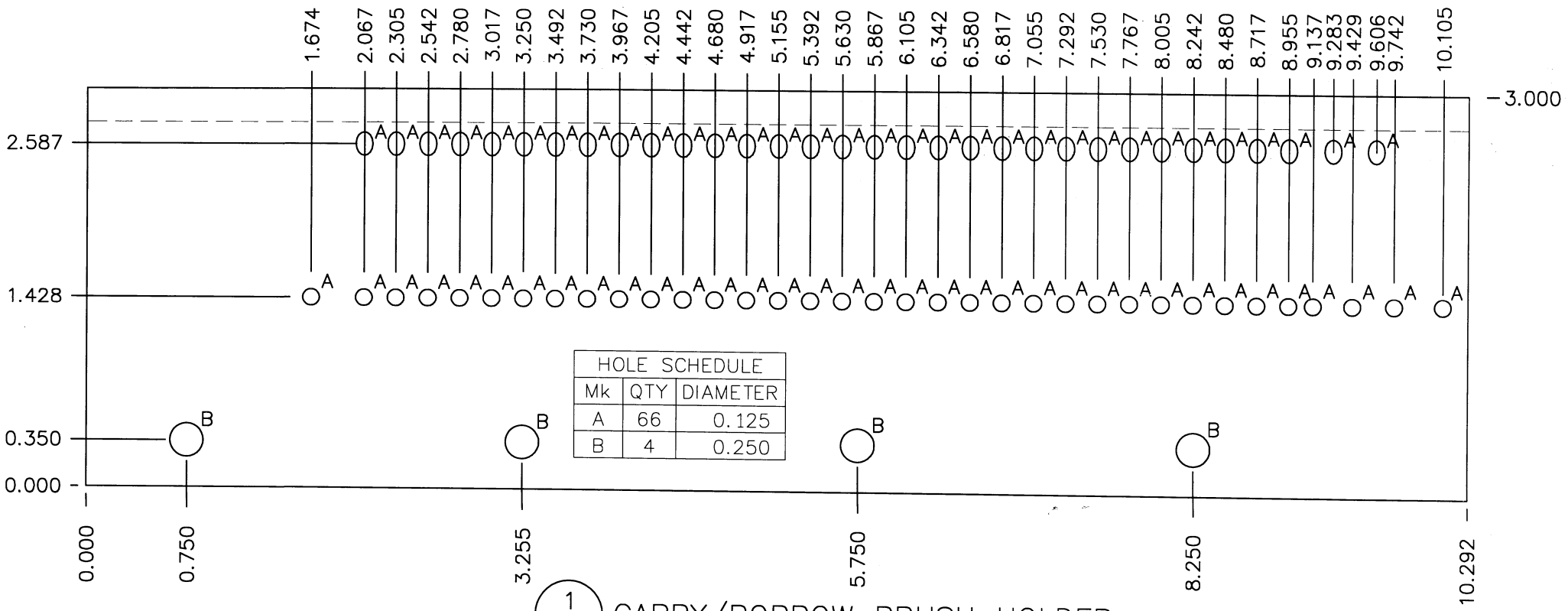

ADD/SUB OUTPUT A
A
3
R140
2
51.1K
1W
14
3
2
(2,2)
BOTTOM VIEW
OF ASM
T1
T2
T3
T4
T7
T6
T5


29 30 59 67
10 11 34 47
29 30 59 67
20 21 54 55 64
71 72 75 ADMINISTRATION
68 FINAL TESTING
DRUM COVERS
48
9 24 26
CONTROL CHASSIS NOT SHOWN
DRUM #1 (CA)
TIMING CONTROL CONTACTS
DRUM #2 (KA)
27 30 67
BASE 10 to BASE 2
99 WIRING
BRUSHES
BRUSHES
BOOST & CARRY DRUM
8 46
MOTOR
TEMPORARY ONE-CYCLE SWITCH
14 15 36
51 62 63
BASE 2 IN
BASE 2 OUT
16 17 37
51 62 63
MODEL COMPUTER
27 28 33 41
GEAR BOX
POWER SUPPLY & REGULATOR
7 44
FILAMENT TRANSFORMER
ONE ADD-SUBTRACT MECHANISM (7 DUAL TRIODES)
23 39 57 66
ANGLE IRON FRAME
5 43
IBM CARD READER
18 19 52 53
TRANSFORMERS FOR PUNCHING
THYRATRON PUNCHING CIRCUIT
CASTERS
MEMORY REGENERATING CIRCUIT
25 40 58



REQUESTOR	JOB ORDER	DESIGNED BY	AMES LABORATORY IOWA STATE UNIVERSITY AMES, IOWA 50011	TITLE	
GROUP LEADER	DATE	LAYOUT BY		FILE NO.	REVISION
				APPROVED BY	VERIFIED BY


8
7
6
5
4
3
2
1
D
C
B
A
SHIFT READ BRUSHES (36:1)
HOLD READ BRUSHES (36:1)
90 SHIFT BRUSHES (36:1)
ENABLE SHIFT
ENABLE ADD SUB
REQUESTOR
GROUP LEADER
JOB ORDER
L00968
DATE
8-16-96
1-16-96 3-13-96 3-9-96 8-6-96
DESIGNED BY
GARY SLEEGE
LAYOUT BY
AMES LABORATORY
IOWA STATE UNIVERSITY
AMES, IOWA 50010
TITLE
HOLD SHIFT MODULE (ABC)
FILE NO
REVISION
APPROVED BY
VERIFIED BY



HOLE SCHEDULE		
Mk	QTY	DIAMETER
A	66	0.125
B	4	0.250

1/39 CARRY/BORROW BRUSH HOLDER

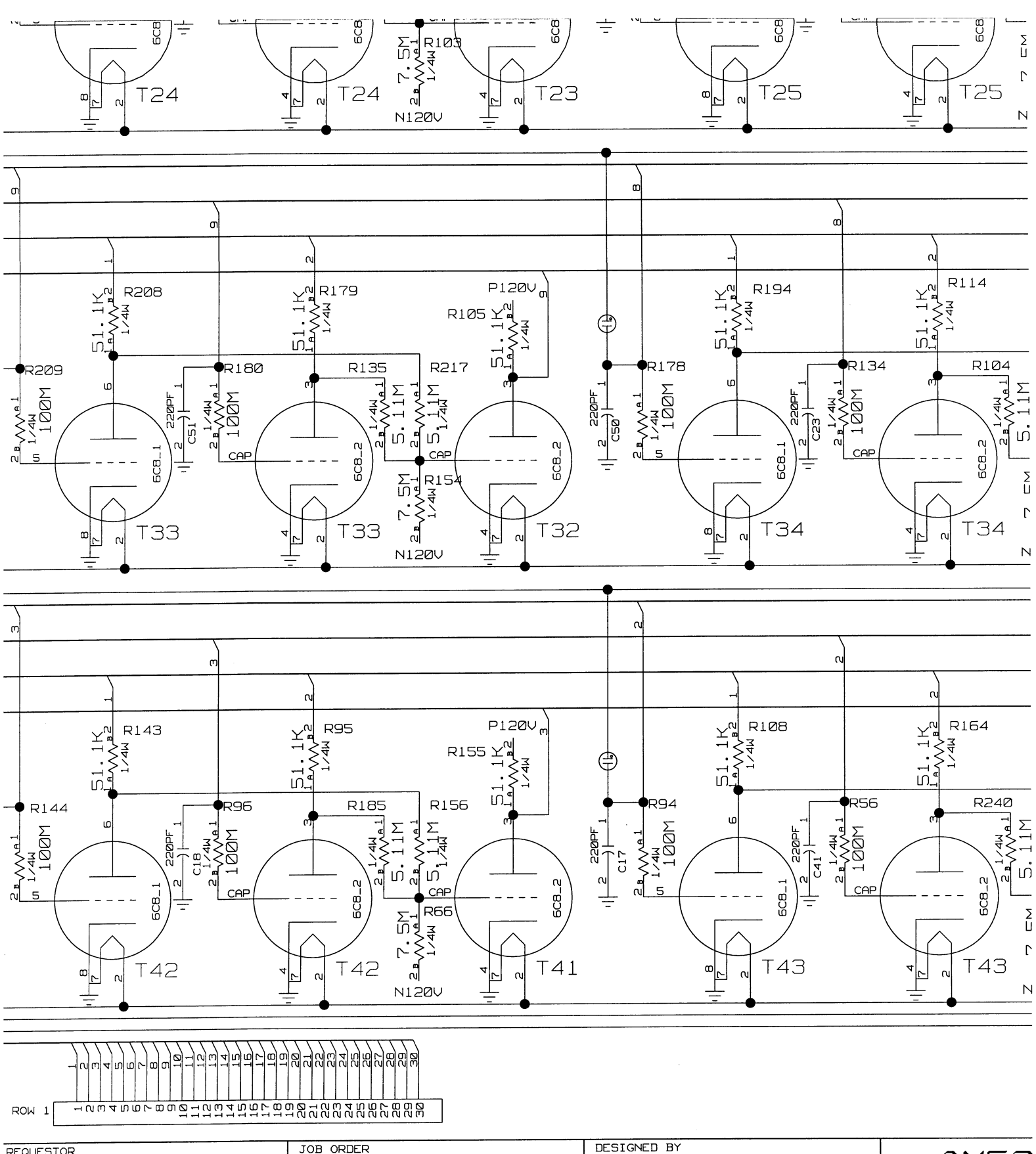
MATERIAL: PHENOLIC

REQD: ONE

SCALE: FULL SIZE

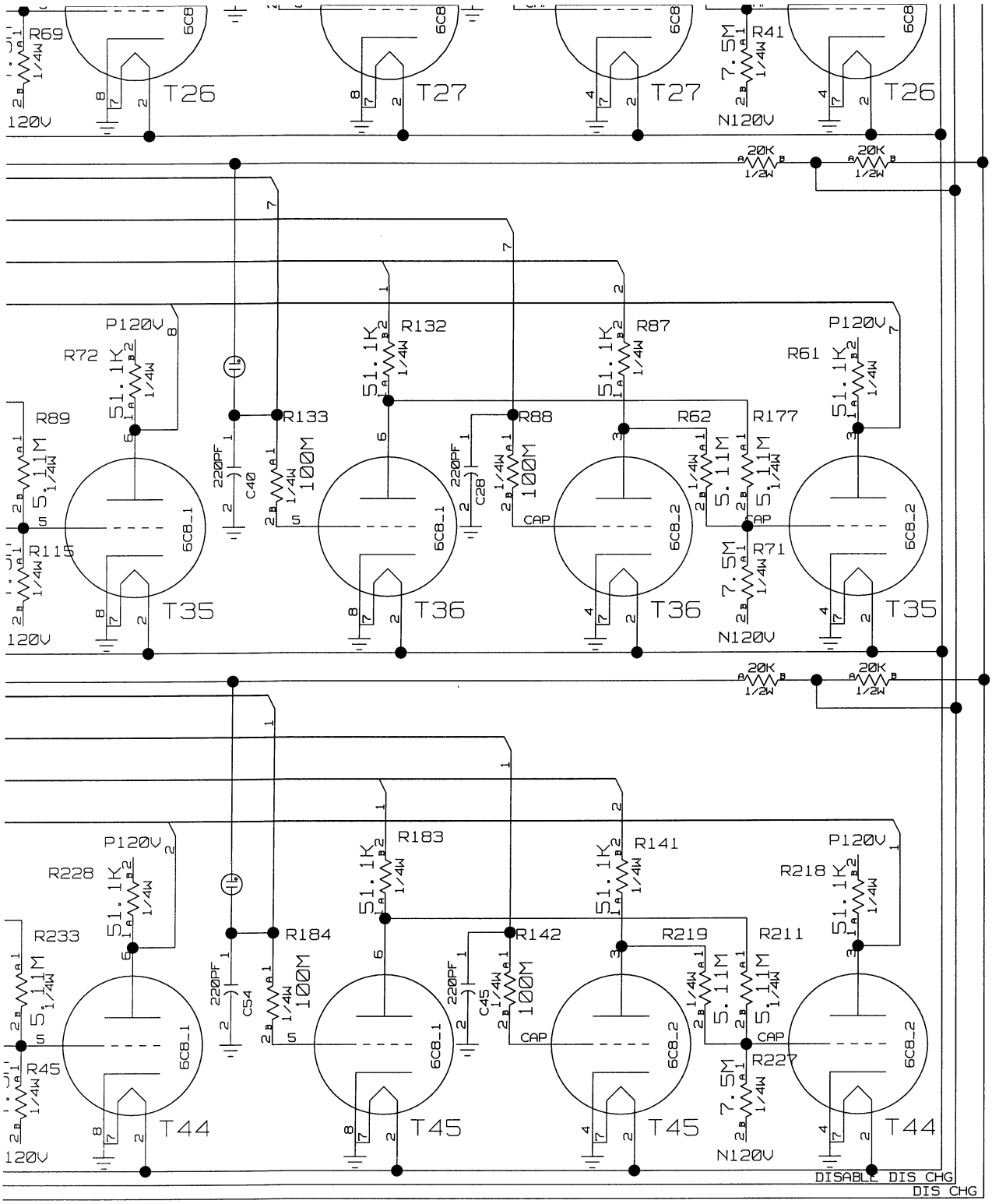
8
7
D
C
R10
R11
R1
R16
R3
R8
R4
R5
R6
R2
T01
T01
T02
T03
P120V
N120V
51.1K
5.11M
7.5M
100M
220PF
6C8_1
6C8_2
CAP
R102
R162
R123
R101
R205
R125
R124
R112
R170
R171
T10
T10
T11
T12
R153
R70
R52
R40
R131
R54
R53
R43
R85

6
5
R13
R12
R14
R23
R74
R110
R117
R159
R191
R200
R201
R166
R7
T03
T02
T04
T04
T05
P120V
N120V
R147
R100
R79
R122
R99
R49
R38
R121
R98
R67
R48
R47
R111
R78
T12
T11
T13
T13
T14
R193
R152
R130
R176
R151
R207
R192
R175
R150
R113
R84
R83



REQUESTOR	JOB ORDER L00968	DESIGNED BY GARY SLEEGE	AMES IOWA
GROUP LEADER	DATE 8-16-96 1-16-96 3-13-96 5-9-96 8-6-96	LAYOUT BY	

4 3



LABORATORY	TITLE: HOLD SHIFT MODULE (ABC)
TATE UNIVERSITY	FILE NO / REVISION
IMES, IOWA 50010	APPROVED BY / VERIFIED BY

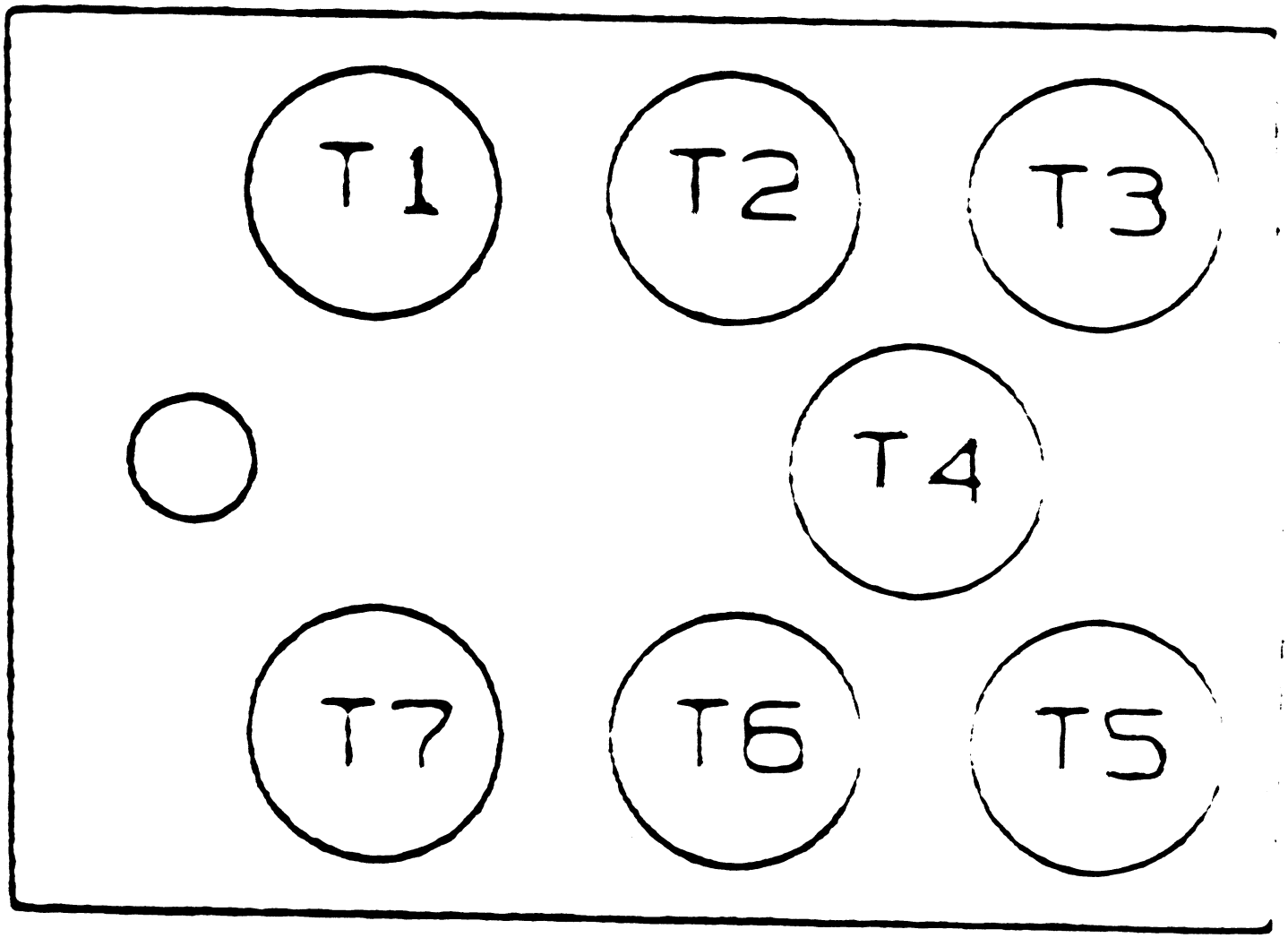
2 1

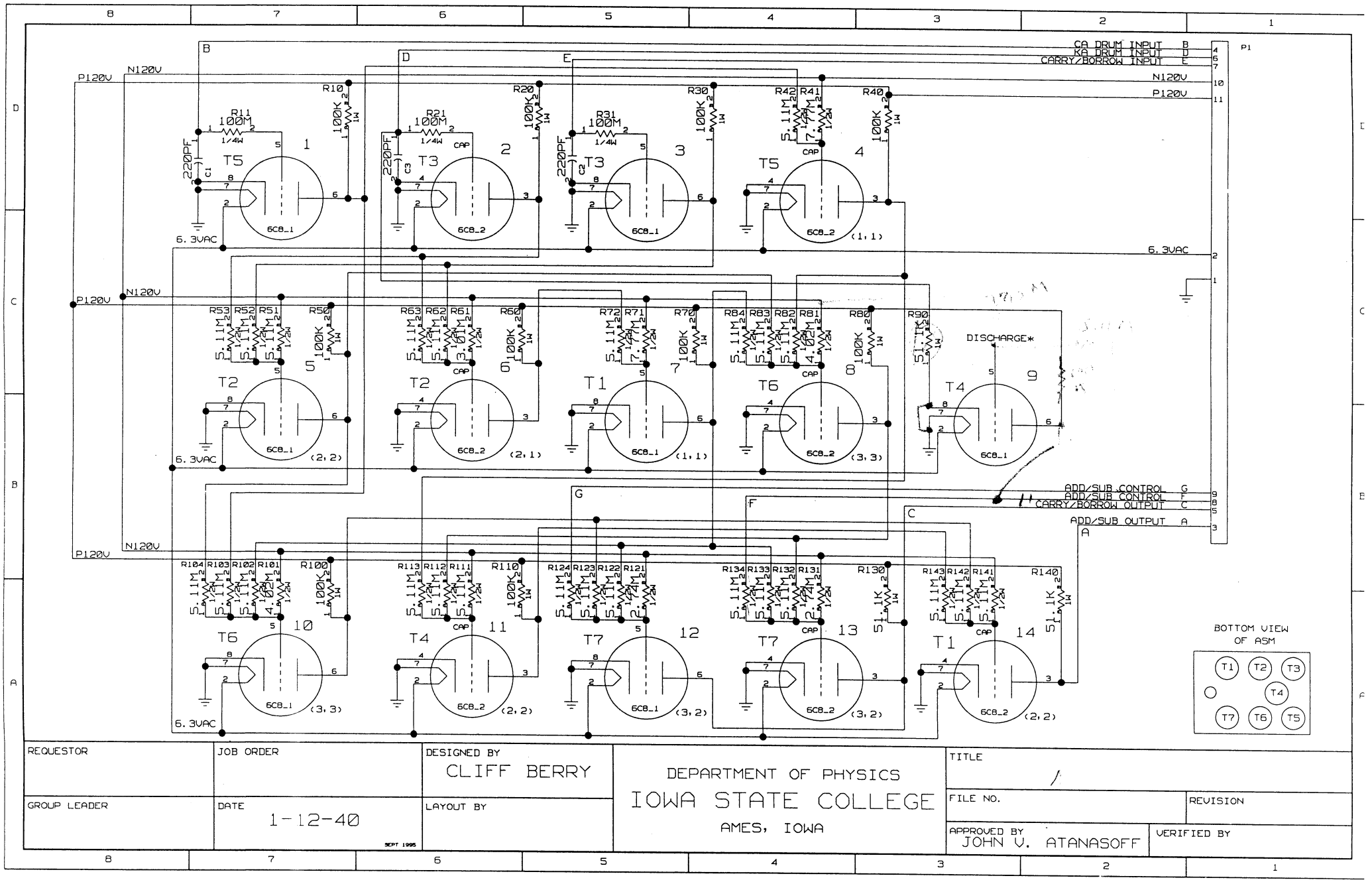
B A

2
1
D
C
20K
1/2W
P120V
R237
R231
R204
R75
R232
R120
R241
R243
R161
R238
R214
51.1K
5.11M
100M
7.5M
220PF
C47
C55
6C8_1
6C8_2
T08
T09
120V
N120V
R22
R31
R9
R25
R24
R19
R15
R18
R30
R21
C4
C7
T17
T18
R42
R80
R206
R50
R172
R39
R36
R148
R51
C22
C13

4
3
R118
R119
R167
R168
R202
R224
R225
R169
R160
R203
R215
R226
T06
T05
T07
N120V
P120V
R35
R34
R77
R76
R46
R37
R28
R57
R33
R20
R32
R29
R27
T15
T14
T16
R174
R173
R128
R127
R82
R60
R59
R126
R149
R81
R68
R58
220PF
100M
5.11M
7.5M
51.1K
1/4W
6C8_1
6C8_2
CAP

BOTTOM VIEW OF ASM



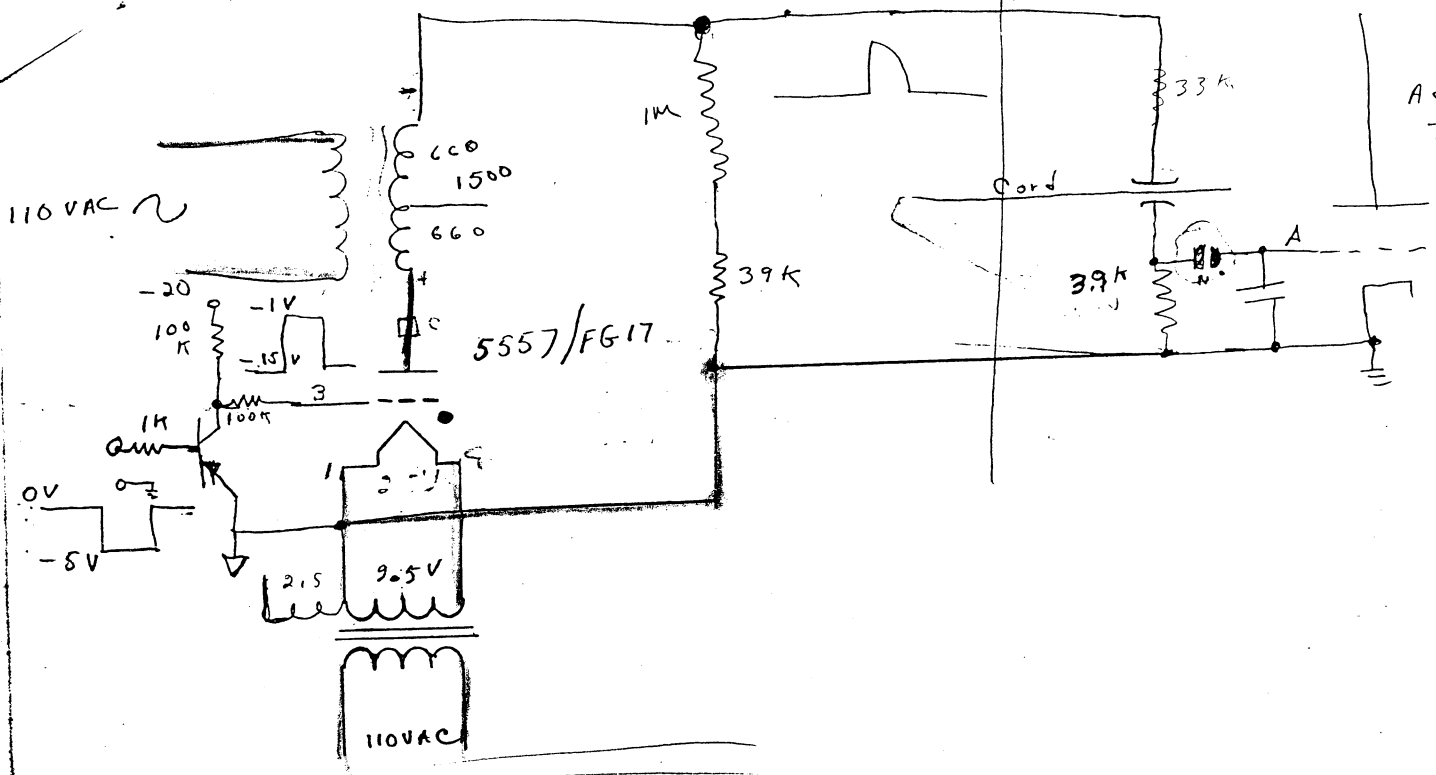


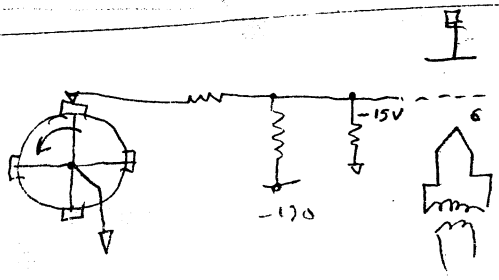
REQUESTOR	JOB ORDER	DESIGNED BY CLIFF BERRY	DEPARTMENT OF PHYSICS IOWA STATE COLLEGE AMES, IOWA	TITLE	
GROUP LEADER	DATE 1-12-40	LAYOUT BY		FILE NO.	REVISION
				APPROVED BY JOHN V. ATANASOFF	VERIFIED BY

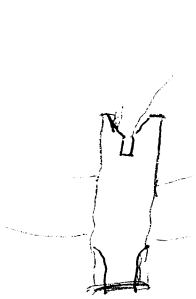
SEPT 1995

Berry

Standard 4-553C Reader







3°

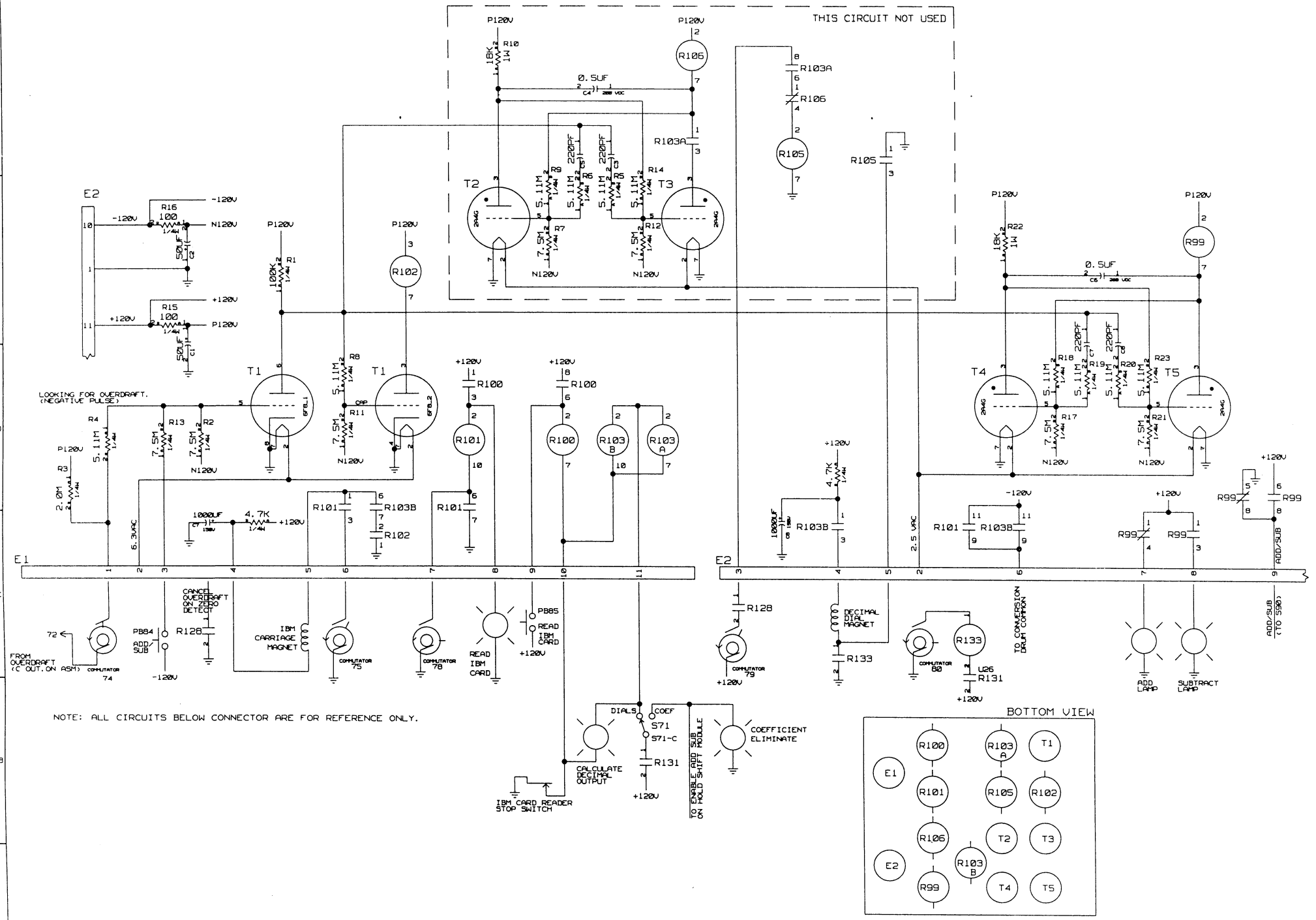
+5

5
6
ROW 1
ROW 3
30 @ 5.11M 1/4W
30 @ 7.5M 1/4W
R135
N120V
6C8_1
6C8_2
7.5M
5.11M
100M
51.1K
220PF
P120V
T41
T40
T39
T38
T32
T31
T30
T29
T22
T21
T20

REQUESTOR	JOB ORDER	DESIGNED BY	LAYOUT BY
GROUP LEADER	DATE 3-13-96	GARY SLEEGE	AMES IOWA

LABORATORY
TATE UNIVERSITY
MES, IOWA 50010
TITLE
HOLD SHIFT MODULE (ABC)
FILE NO
REVISION
APPROVED BY
VERIFIED BY
2
1
D
C
B
T44
T45
T35
T36
T26
T27
6C8_1
6C8_2
120V
N120V
P120V
7.5M
5.11M
51.1K
100M
220PF
R233
R228
R184
R183
R142
R141
R219
R211
R218
R89
R72
R133
R132
R88
R87
R62
R61
R71
R69
R41
C54
C40
C28
C45

8
7
ROW 5
ROW 4
ROW 6
SHIFT READ BRUSHES <30..1>
HOLD READ BURSHES <30..1>
KA SHIFT ENABLE <2..1>
KA WRITE BURSHES <30..1>
ENABLE SHIFT
ENABLE ADD SUB
+120V
-120V
6.3VAC
P1200
P1201
P1202
2 @ 100, 1/4W
C1 50UF
C2 50UF
R135
R17
T37
T38
T39
T28
T29
T30
T19
T20
T21
6C8_1
6C8_2
N1200
7.5M
5.11M
100M
51.1K
220PF
R97
R223
R165
R236
R235
R230
R234
R190
R189
R222
C60
C46
C57
R182
R196
R116
R210
R93
R198
R92
R195
C25
C52
C44
C29
R86
R40
R139



REQUESTOR	JOB ORDER L00968	DESIGNED BY GARY SLEEGE	AMES LABORATORY IOWA STATE UNIVERSITY AMES, IOWA 50010	TITLE ADD SUBTRACT CONTROL (ABC)
GROUP LEADER	DATE SEPTEMBER 6, 1996 4-2-96	LAYOUT BY		FILE NO / REVISION
				APPROVED BY / VERIFIED BY

T21
T20
T22
T22
T23
R163
R129
7.5M
1/4W
N120V
6C8
R91
R64
R107
R65
R181
R73
R138
R106
R63
R136
R90
R44
R137
R55
P120V
51.1K
5.11M
100M
CAP
220PF
C24
C16
6C8_2
6C8_1
T30
T29
T31
T31
T32
R146
R220
R158
R221
R213
R229
R157
R109
R186
R188
R145
R199
R187
R212
C42
C35
T39
T38
T40
T40
T41
R135
30 @ 5.11M 1/4W
30 @ 7.5M 1/4W
ROW 1
ROW 2
ROW 3

5
6
ROW 1
ROW 2
ROW 3
ROW 4
GND
N1200V
R135
T38
T39
T40
T41
T28
T29
T30
T31
T32
T18
T19
T20
T21
T22
T23
6C8_1
6C8_2
7.5M
5.11M
51.1K
100M
220PF
P1200V

SHIFT READ BRUSHES <30..1>
HOLD READ BURSHES <30..1>
KA SHIFT ENABLE <2..1>
KA WRITE BURSHES <30..1>
ENABLE SHIFT
ENABLE ADD SUB
DISABLE DIS CHG
DIS CHG
6.3VAC
-120V
+120V
ROW 4
ROW 5
ROW 6
P120V
N120V
R135
R17
T39
T38
T37
T30
T29
T28
T21
T20
T19
6C8_1
6C8_2
7.5M
5.11M
100M
51.1K
220PF
50UF
1/4W
1/2W
1W