



BI PLANE
TM

FUN GAMES INC.

**INSTRUCTION
MANUAL**

JANUARY 1976

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GENERAL INSTRUCTIONS

INSTALLATION:

Open back of cabinet and MAKE SURE ALL BOARDS ARE PROPERLY SEATED INTO CARD CAGE. Plug into AC Power.

PRICE PER GAME SWITCH:

Located at the top of the memory board is the price per game switch. Up is one coin per game and down is two coins per game.

GAME TIME POT:

Directly below the price per game switch is the game time pot.

WHITE PLANE SHOT RANGE POT:

Directly below the game time pot is the white plane shot range pot. Turning clockwise increases shot range. Range should be adjusted to be equal to black plane range.

VOLUME 2 POT (Location "2"):

Volume for white plane is controlled by the top pot on the *sync* board. Clockwise increases volume.

VOLUME 1 POT (Location "1"):

Directly below the volume 2 pot is the black plane volume. Operates same as volume 2 pot.

NOTE: FOLLOWING CONTROLS ARE FACTORY SET. QUALIFIED TECHNICAL PERSONNEL ONLY SHOULD ADJUST.

NOISE VOLUME:

Location #4 controls shot and boom plane relative volume.

PITCH 2:

Controls pitch of black plane motor.

tone 2:

Controls tone of black plane motor.

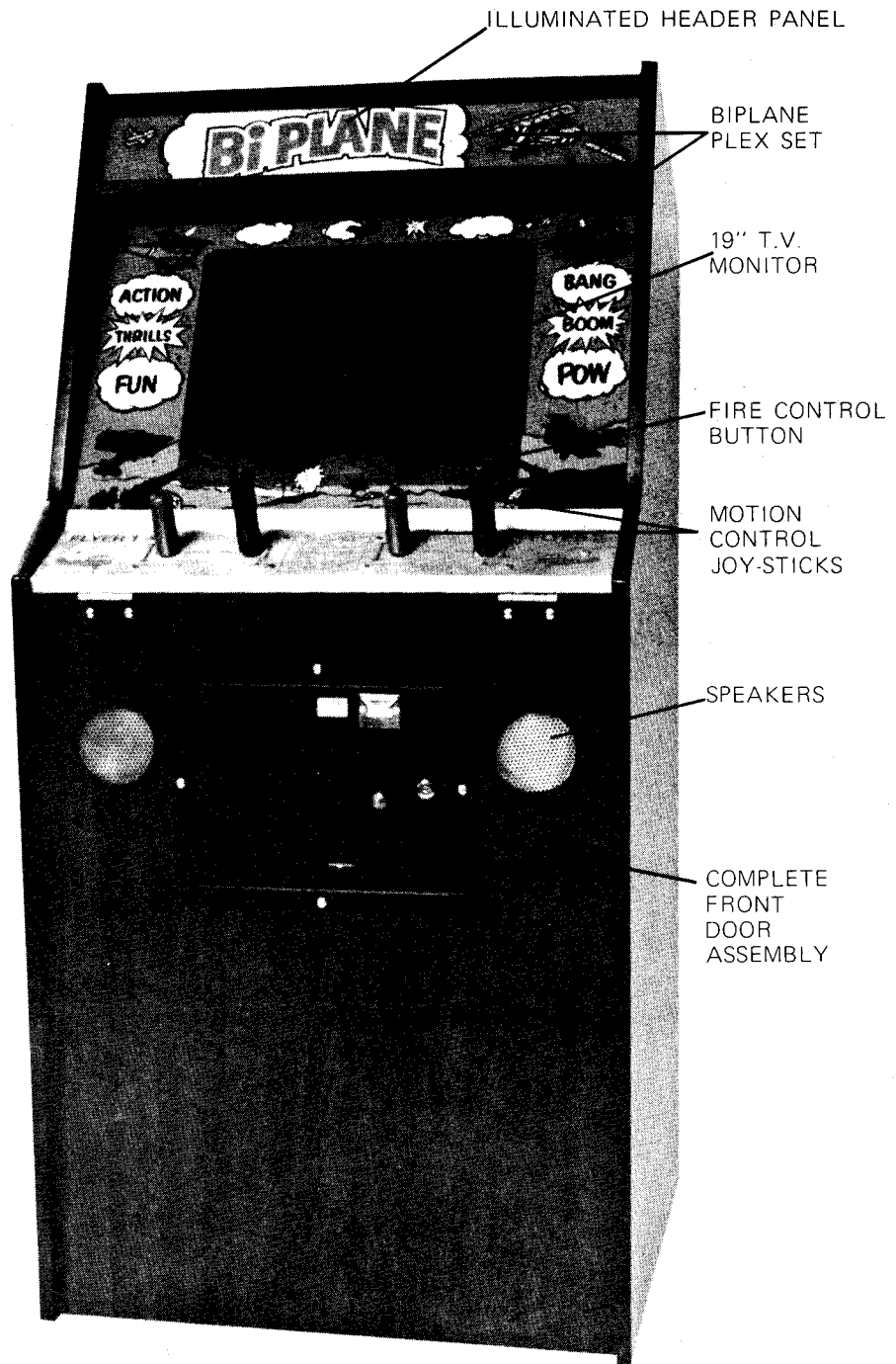
PITCH 1:

Same as pitch 2 for white plane.

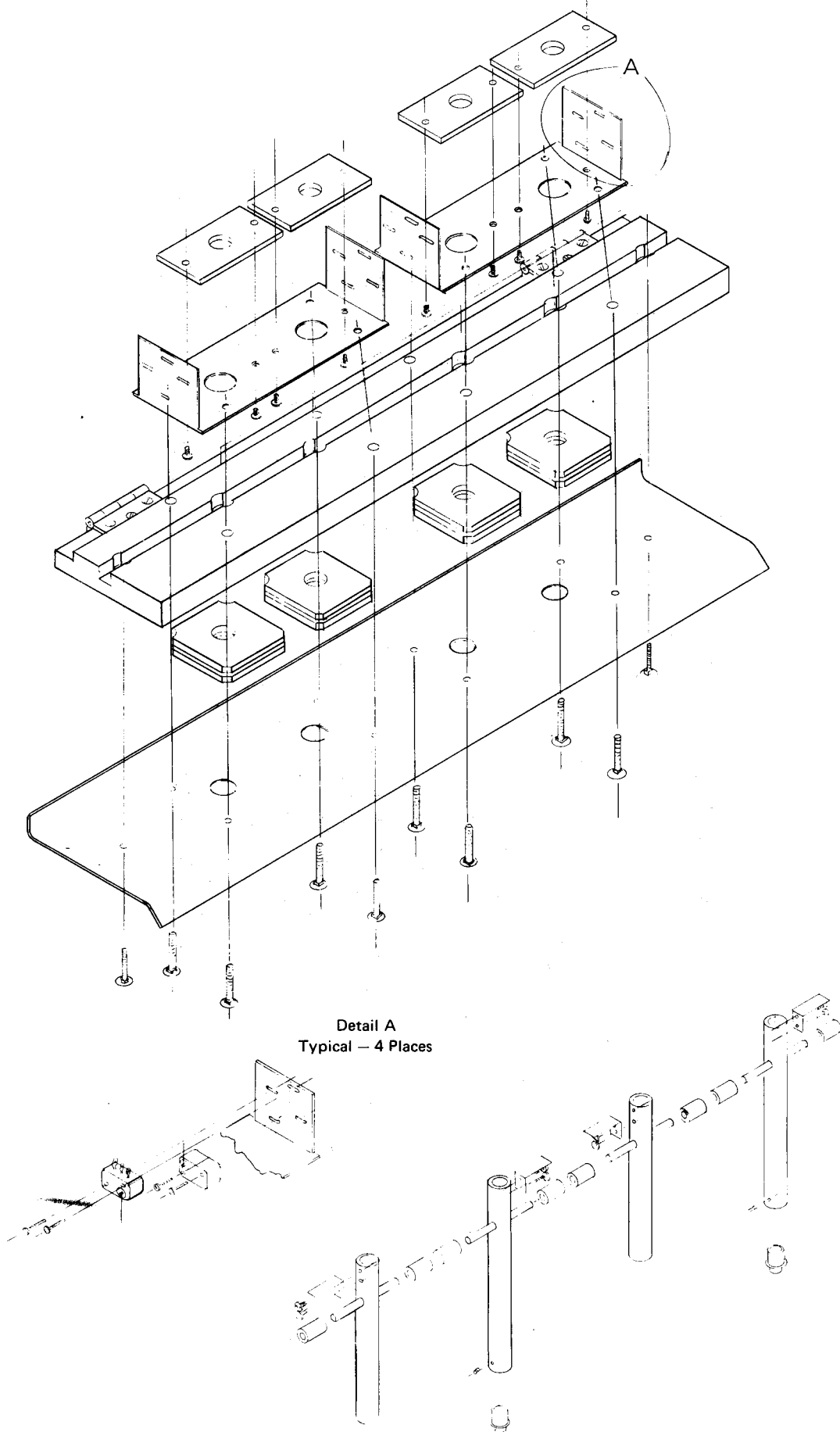
tone 1:

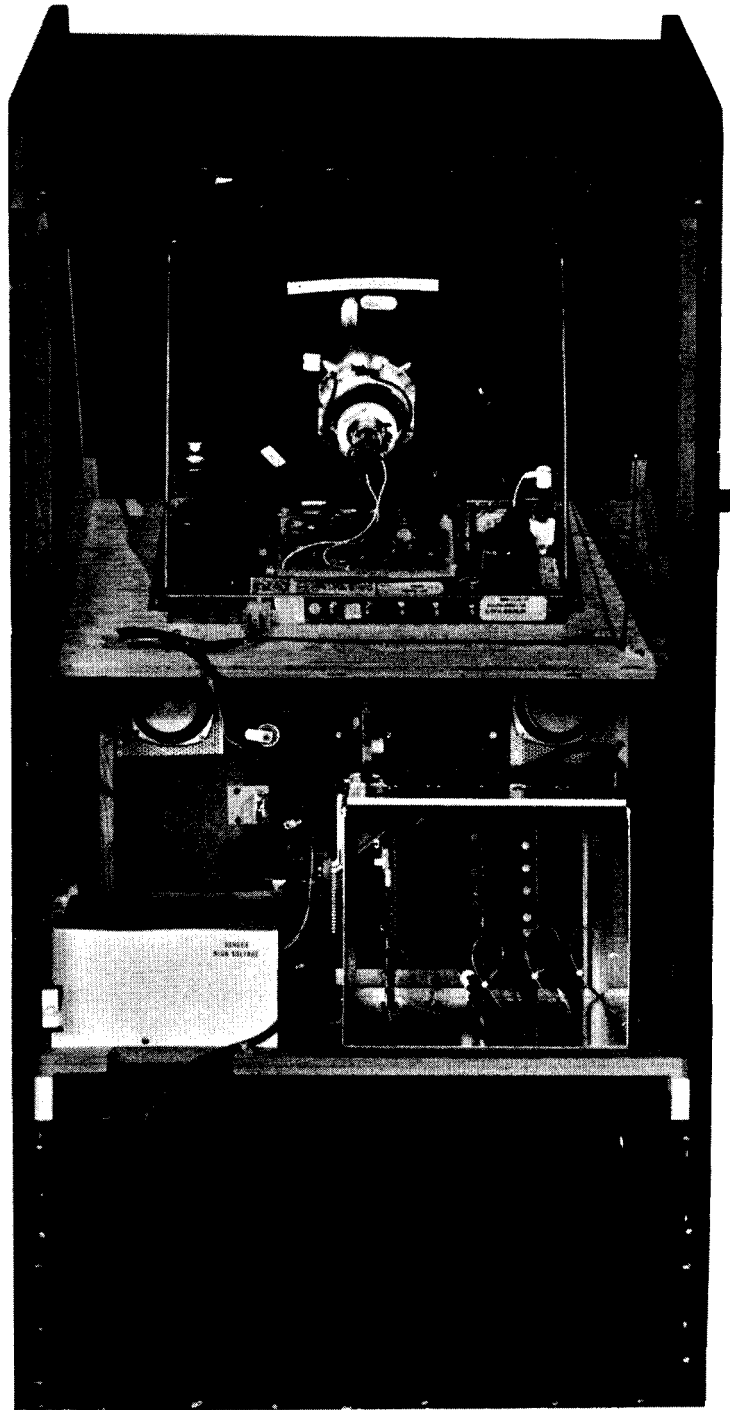
Same as tone 2 for white plane.

NOTE: BE SURE ALL BOARDS ARE PROPERLY SEATED, INCLUDING INTERCONNECT BOARDS IN HARNESS CONNECTOR.

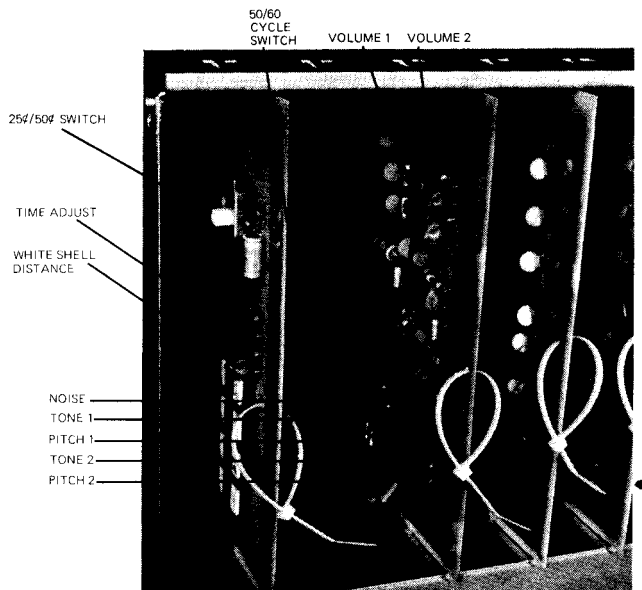
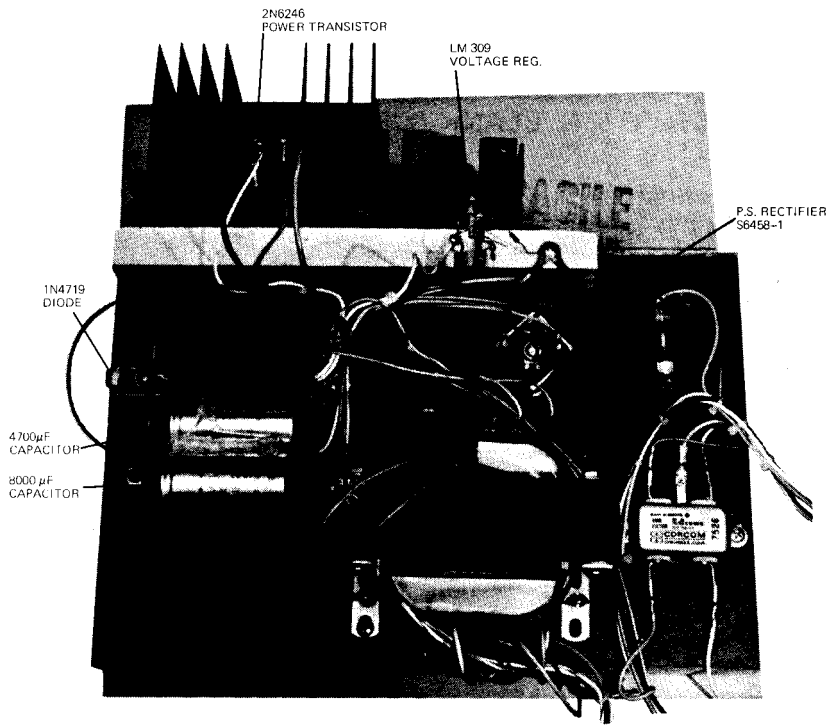


COMPONENTS AND DESCRIPTION





COMPONENTS AND DESCRIPTION



TROUBLE SHOOTING

TROUBLESHOOTING GUIDE

AUDIO

1. Check speakers and connections
2. Adjust audio controls on synch board
3. Change synch board

VIDEO (RIPPLE, DISTORTION, BLANK SCREEN)

1. Measure +5V
2. Check interlock switches
3. Shorted diode in P.S. rectifier
4. Change synch board

VIDEO (SHAKE)

1. Adjust T.V. controls
2. Change crystal/4024 I.C. on synch board

MOTION

1. Check control panel switches
2. Switch motion boards — if problem persists on same side (ie. black or white plane) change memory board

SCORING

1. Change memory board

Important: Severe damage will occur if any board but the synch board is inserted in synch board socket.

1. Check control panel switches
2. Switch motion boards — if problem persists on same side (i.e., black or white plane) change memory board

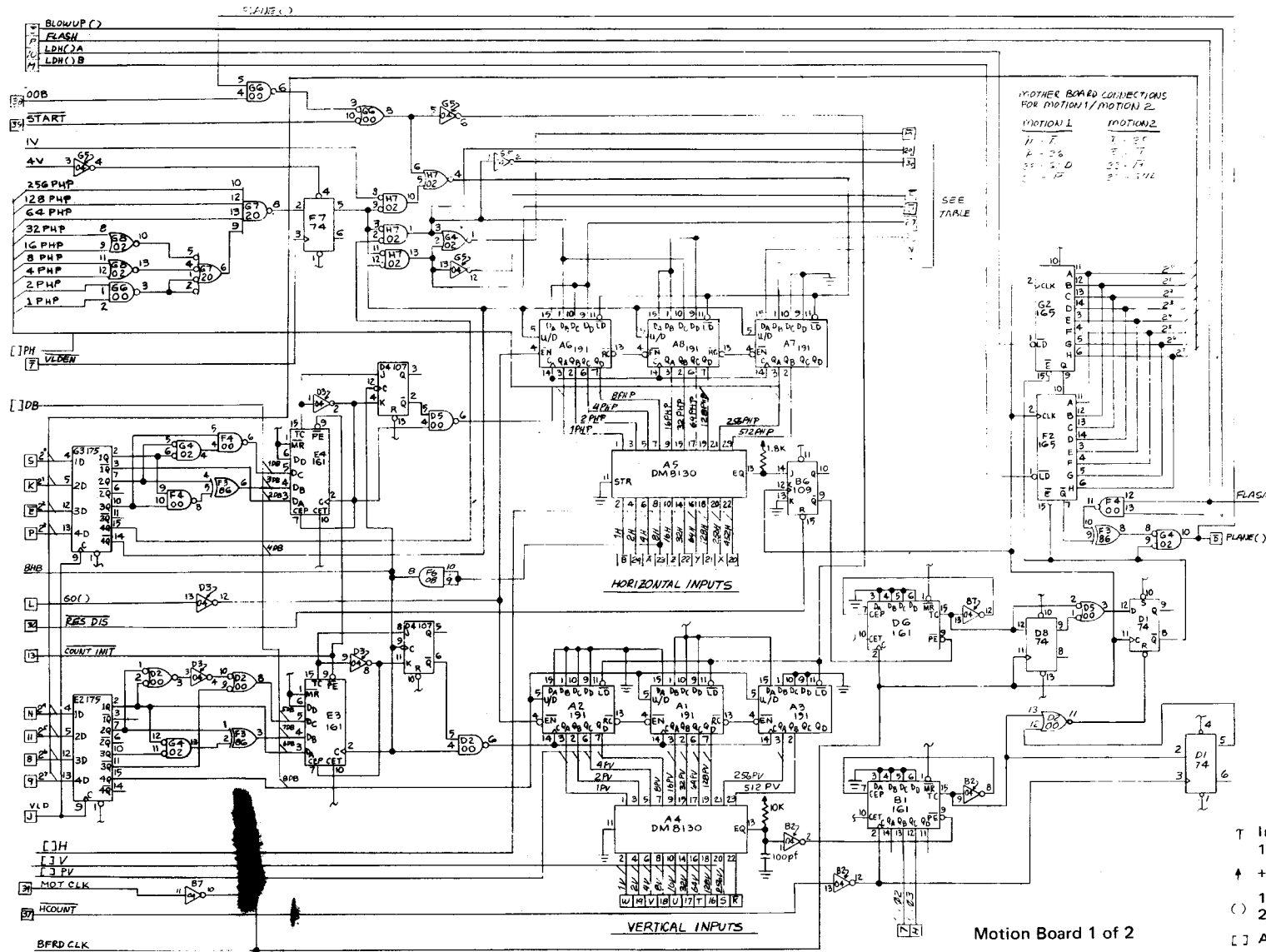
PRICE LIST

PARTS LIST

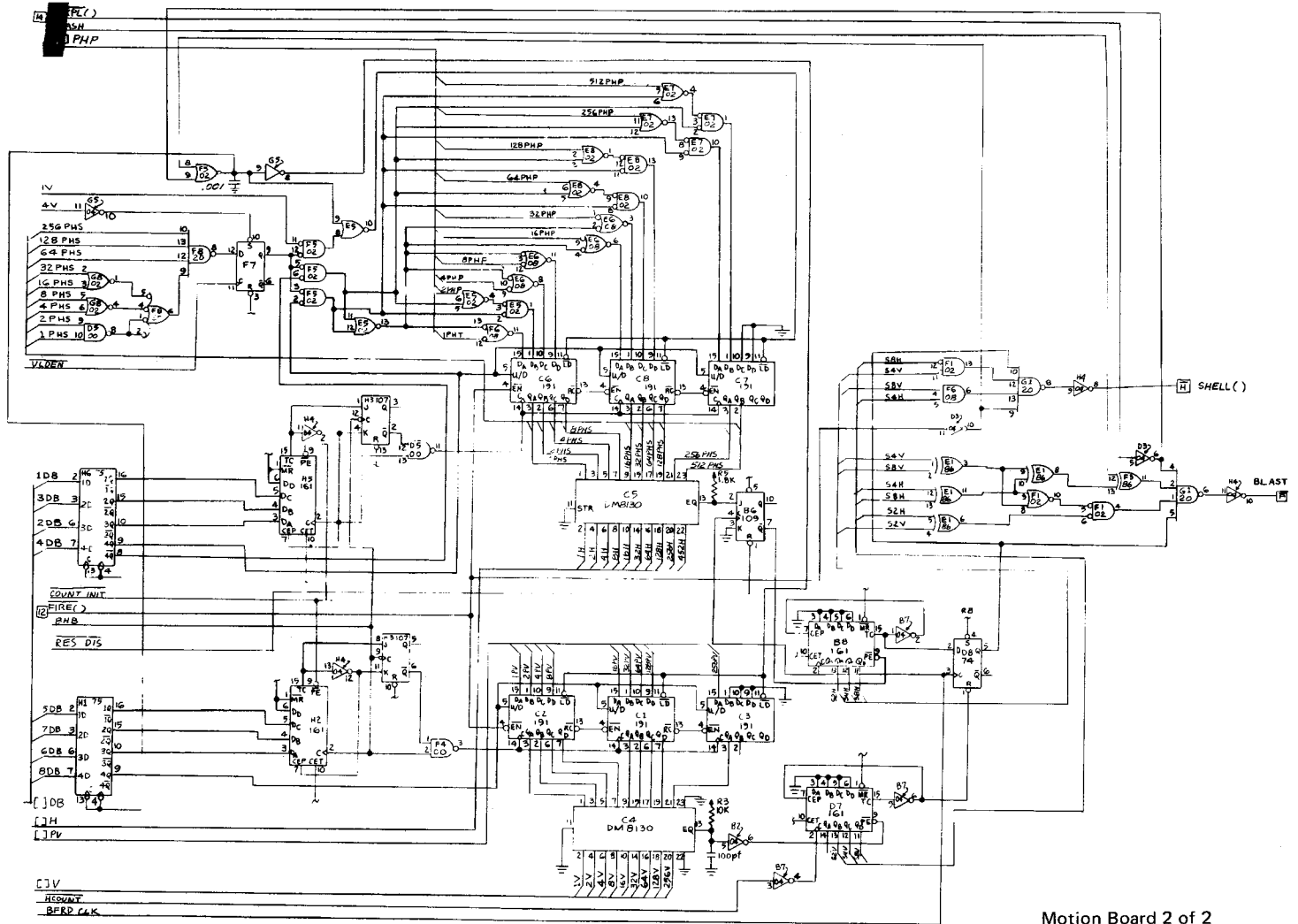
PART #	DESCRIPTION	UNIT PRICE
300-200	Power Supply	75.00
500-206	Mother Board	75.00
500-201	Motion Board	250.00
500-202	Synch Board	250.00
500-204	Memory Board	250.00
500-200	Set of PC Boards w/Cage	750.00
600-200	Control Panel	75.00
400-100	Coin Door Assembly	55.00
34-64581	P.S. Rectifier	10.29
36-LM309	P.S. Voltage Regulator	3.54
42-0019	19" Monitor, Motorola	295.00
41-5006	Speakers	5.70
46-0051	Switch, Cherry, E51	2.82
46-0903	Fire Button, Switch	1.59
47-0001	Coin Counter	9.72
82-0001	P.S. Transformer	42.75
35-14318	Crystal 14.318 MHZ	5.04
37-4024	4024 I.C.	6.69
32-2N6246	2N6246 Power Transistor	3.69

Minimum Order - \$25.00

SCHEMATICS



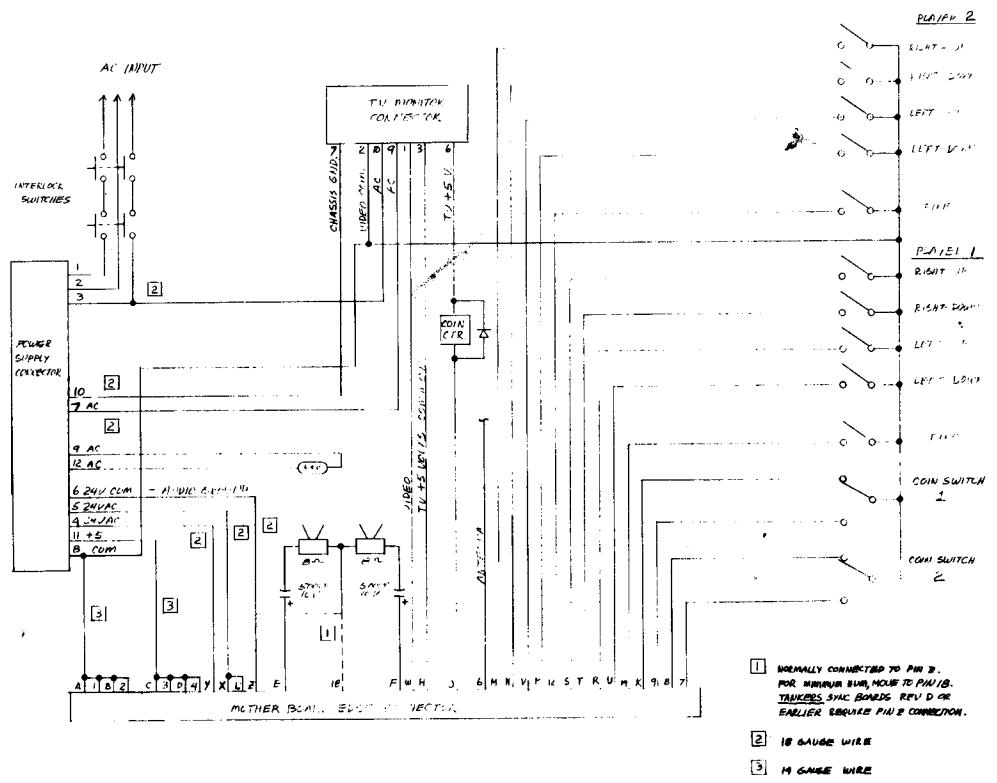
Motion Board 1 of 2



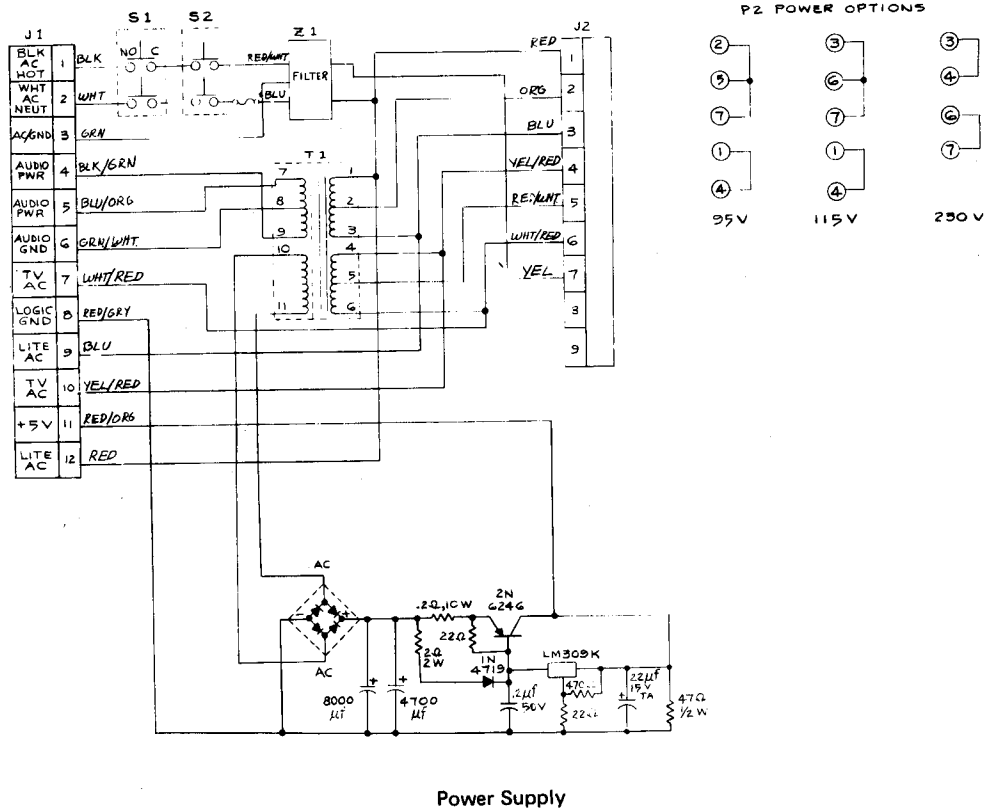
Motion Board 2 of 2

SCHEMATICS

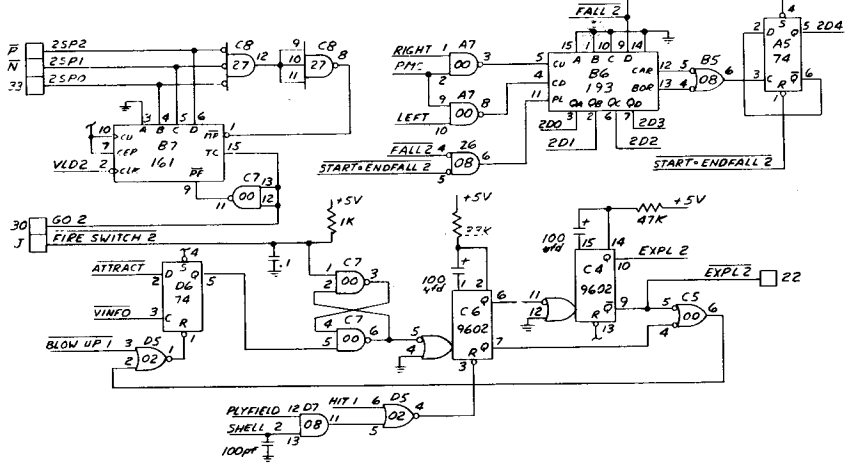
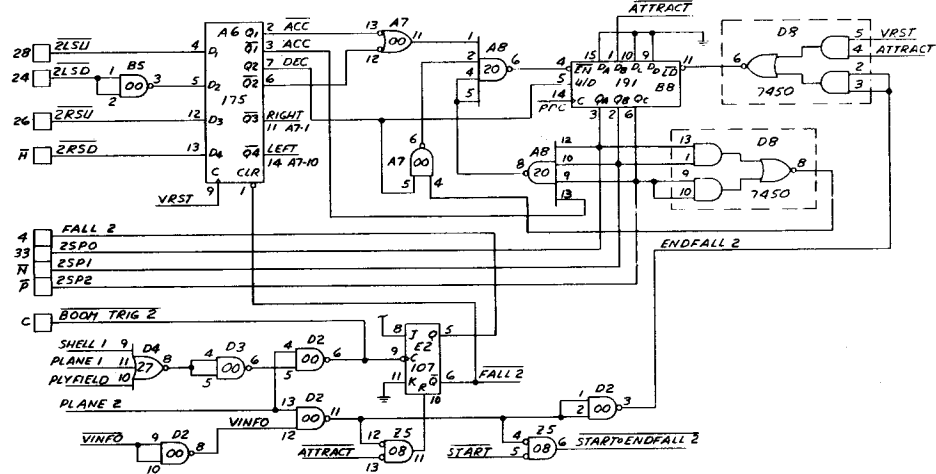
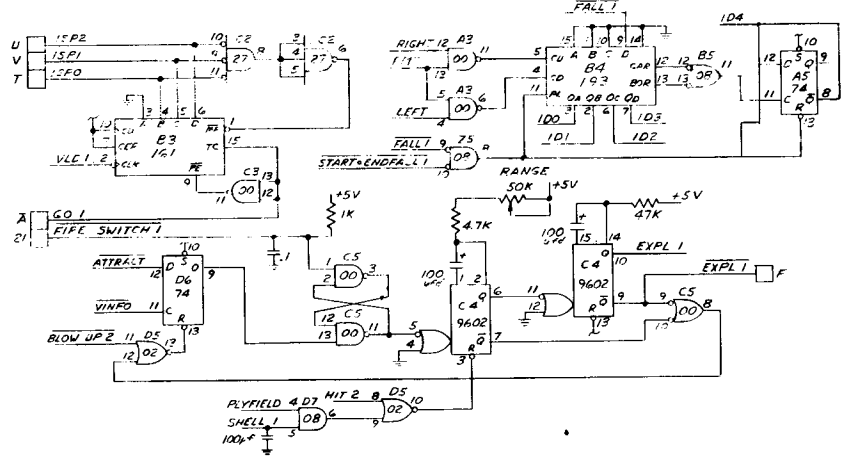
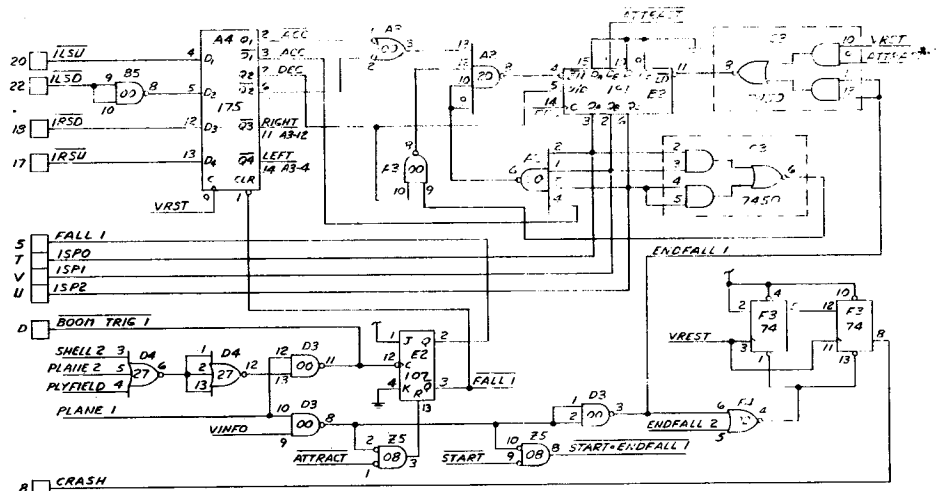
SCHEMATICS



Cabinet Interconnections



Power Supply

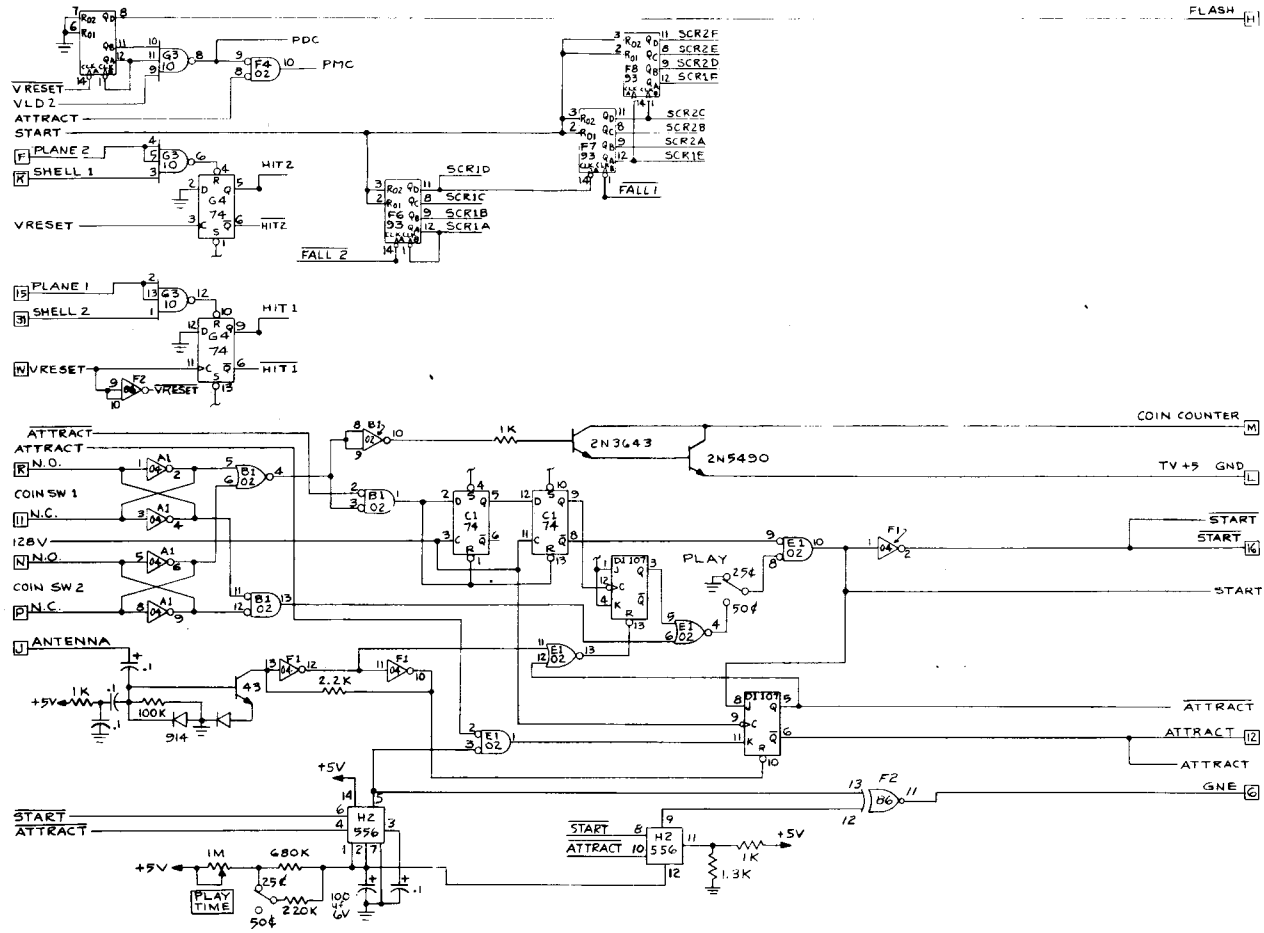


Memory Board 1 of 3

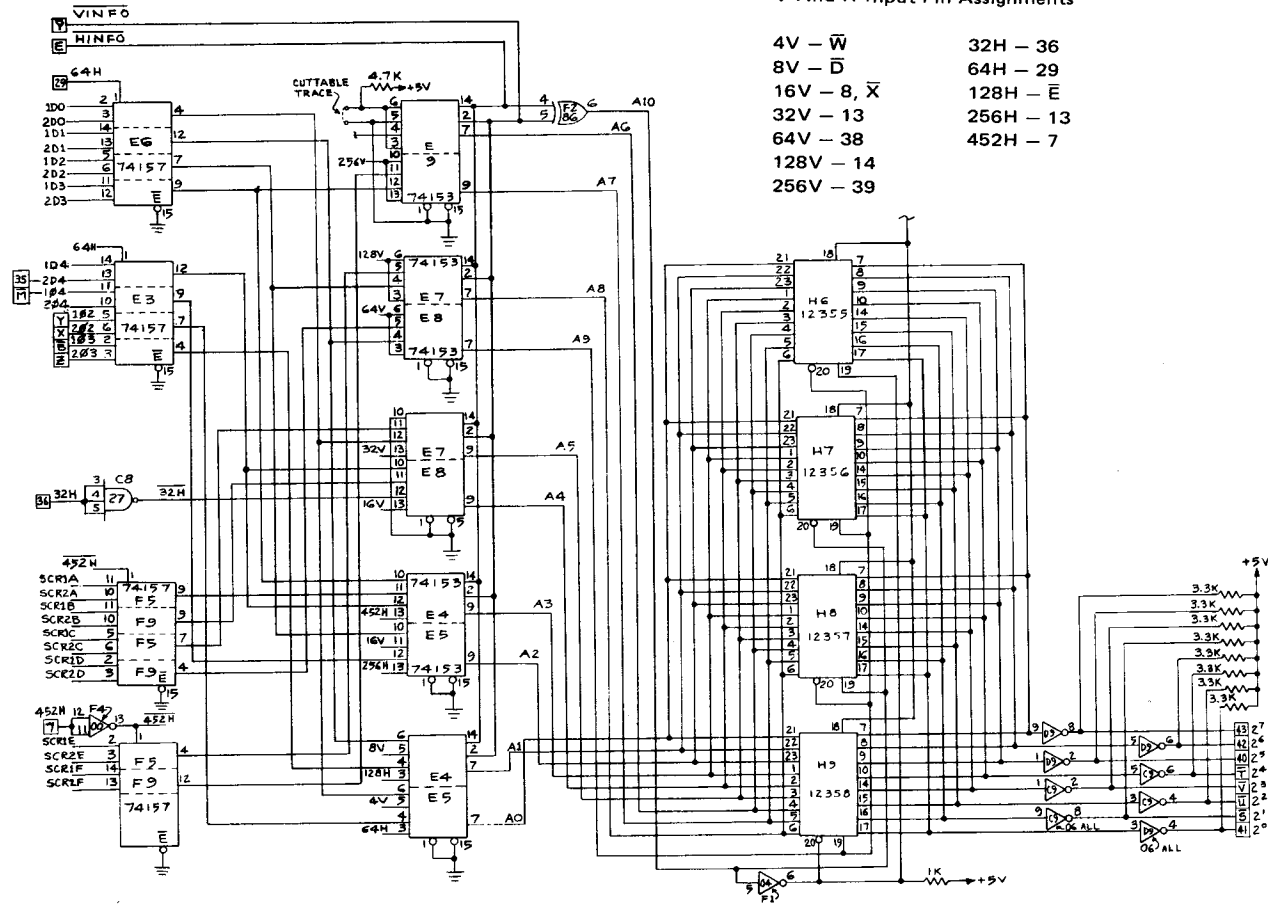
SCHEMATICS

SCHEMATICS

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Memory Board 2 of 3

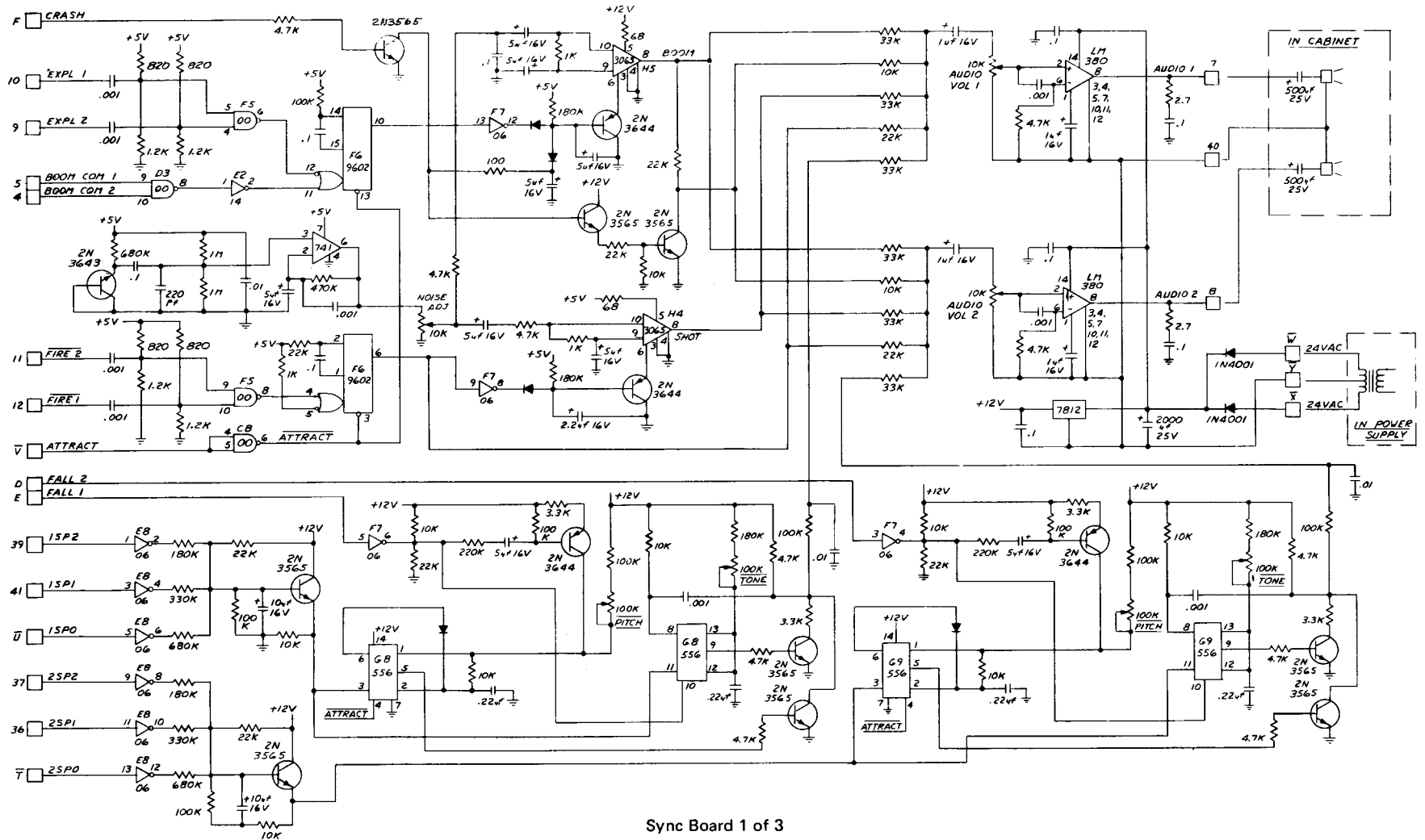


V And H Input Pin Assignments

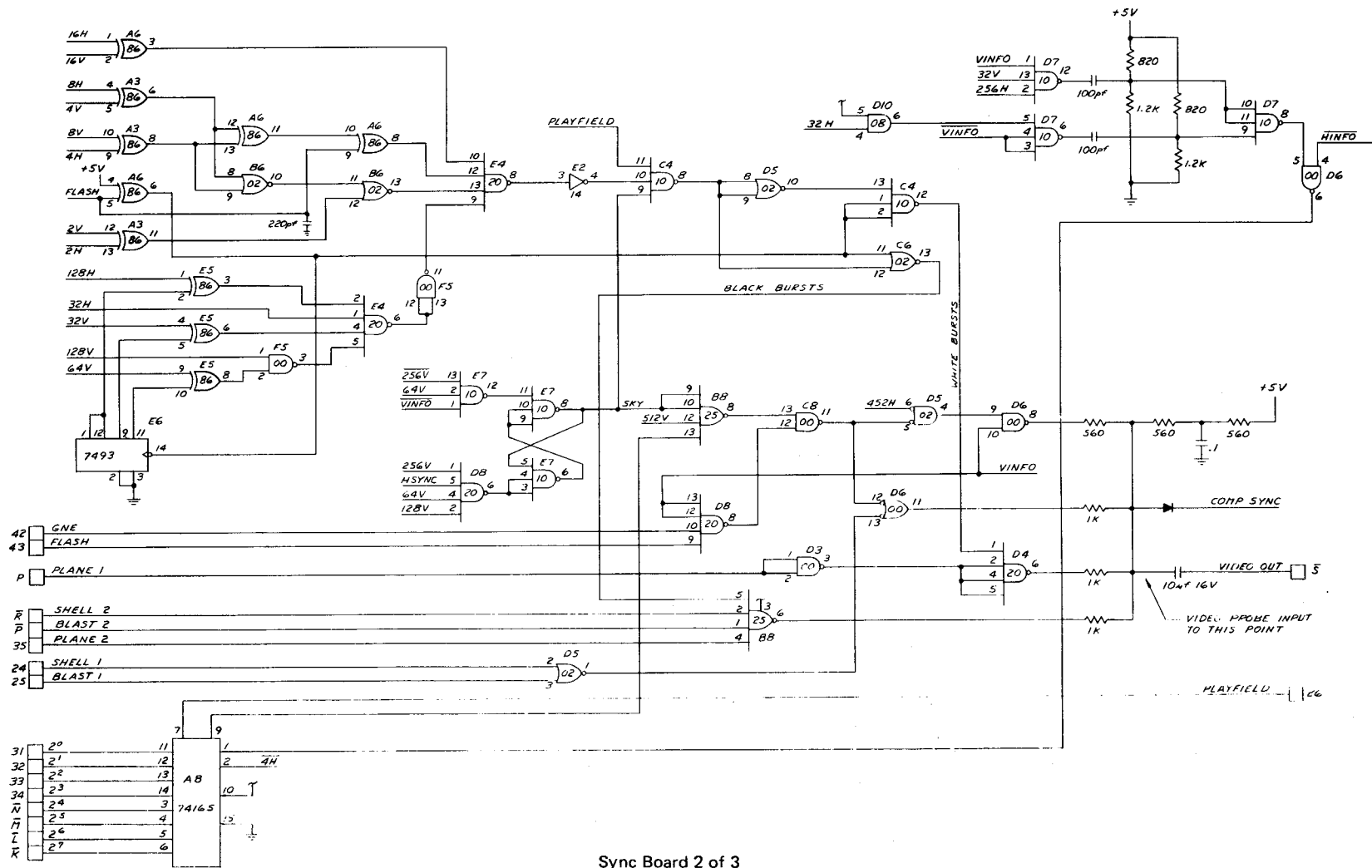
- 4V - \bar{W}
- 8V - \bar{D}
- 16V - 8, \bar{X}
- 32V - 13
- 64V - 38
- 128V - 14
- 256V - 39
- 32H - 36
- 64H - 29
- 128H - E
- 256H - 13
- 452H - 7

Memory Board 3 of 3

SCHEMATICS



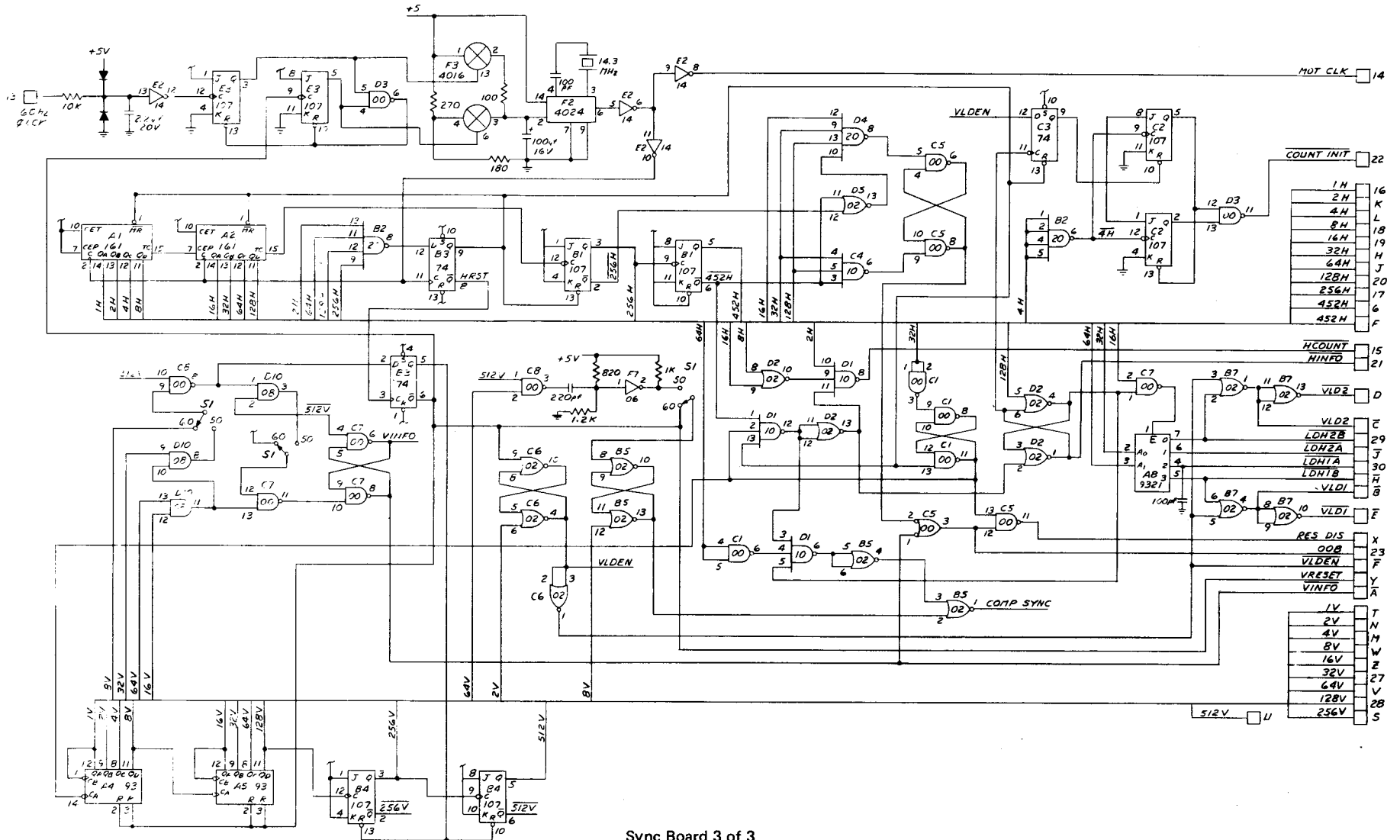
Sync Board 1 of 3



SCHEMATICS

SCHEMATICS

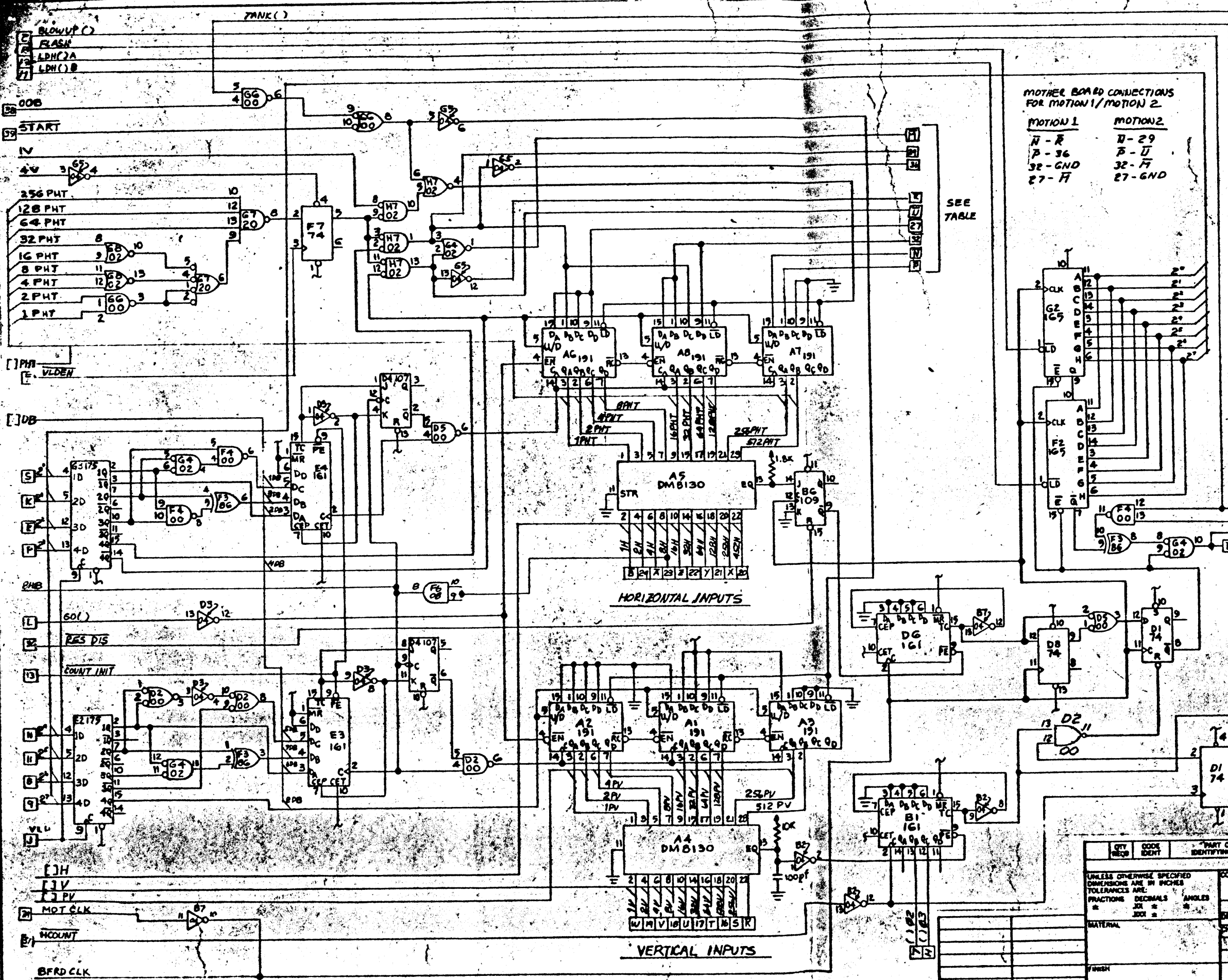
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Sync Board 3 of 3

FUN GAMES INC.
8410 AMELIA ST., OAKLAND, CA 94621 (415) 568-5225

REVISIONS			
ZONE	LTR	DESCRIPTION	APPROVED



MOTHER BOARD CONNECTIONS FOR MOTION 1/MOTION 2

MOTION 1	MOTION 2
N - R	U - 29
P - 36	V - U
32 - GND	32 - F
27 - F	27 - GND

SEE TABLE

SYMBOLS

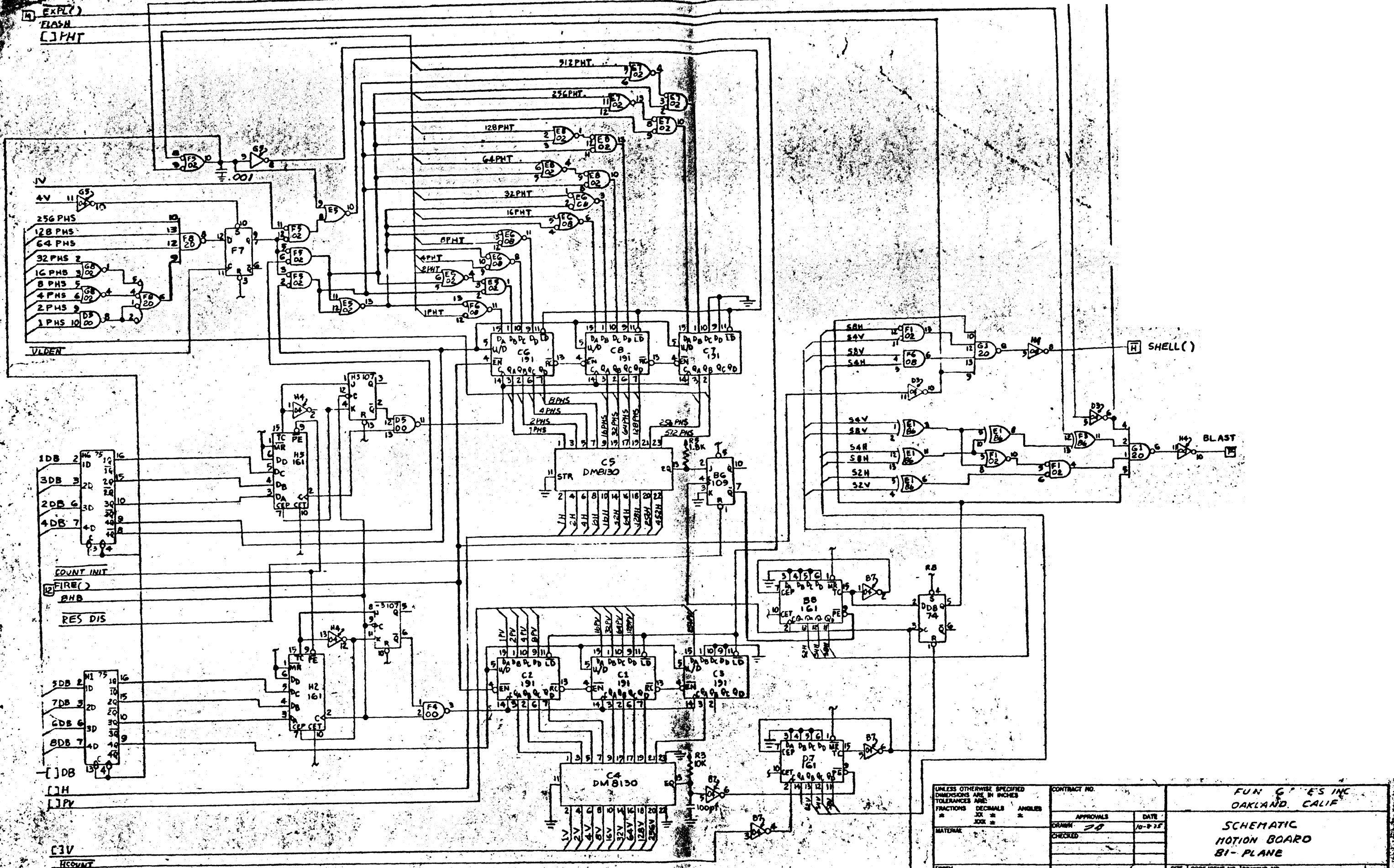
[INDICATES PULLUP TO +5 THRU 1K RES

↑ " +5

() " 1 FOR BOARD ONE
2 FOR BOARD TWO

[] " ALL SIGNALS OF SIMILAR NAME

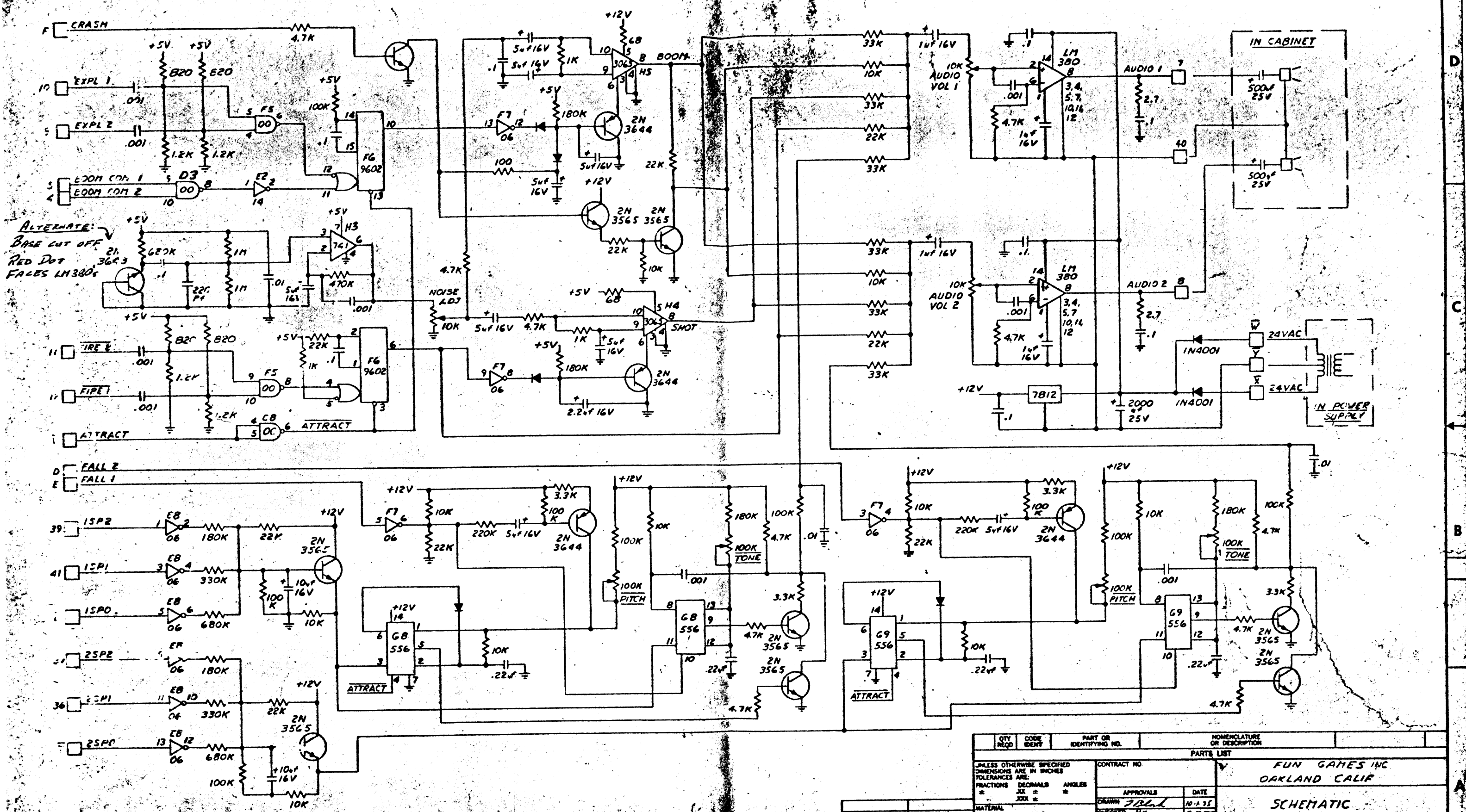
QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES		CONTRACT NO.	
MATERIAL		APPROVALS	DATE
FINISH		CHECKED	DATE
NEXT ASSY USED ON		FUN GAMES INC OAKLAND CALIF	
APPLICATION		SCHEMATIC MOTION BOARD BI-PLANE	
DO NOT SCALE DRAWING		SIZE	CODE IDENT NO. DRAWING NO.
		D	201
		SCALE	SHEET 1 OF 2



EXPL()
 FLASH
 [] PHT
 4V
 256 PHS
 128 PHS
 64 PHS
 32 PHS 2
 16 PHS 3
 8 PHS 5
 4 PHS 6
 2 PHS 9
 1 PHS 10
 VLDEN
 COUNT INT
 FIRE()
 RND
 RES DIS
 [] DB
 [] H
 [] PY
 [] V
 RECOUNT
 BRD CLK

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.		FUN G'S INC OAKLAND, CALIF	
FRACTIONS	DECIMALS	ANGLES	APPROVALS	DATE	
1/16	.005	30	20	10-1-75	
MATERIAL	CHECKED				
FRESH					
SIZE	CODE IDENT NO.	DRAWING NO.			
D		201	A		
DO NOT SCALE DRAWING		SHEET 2 OF 2			

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED

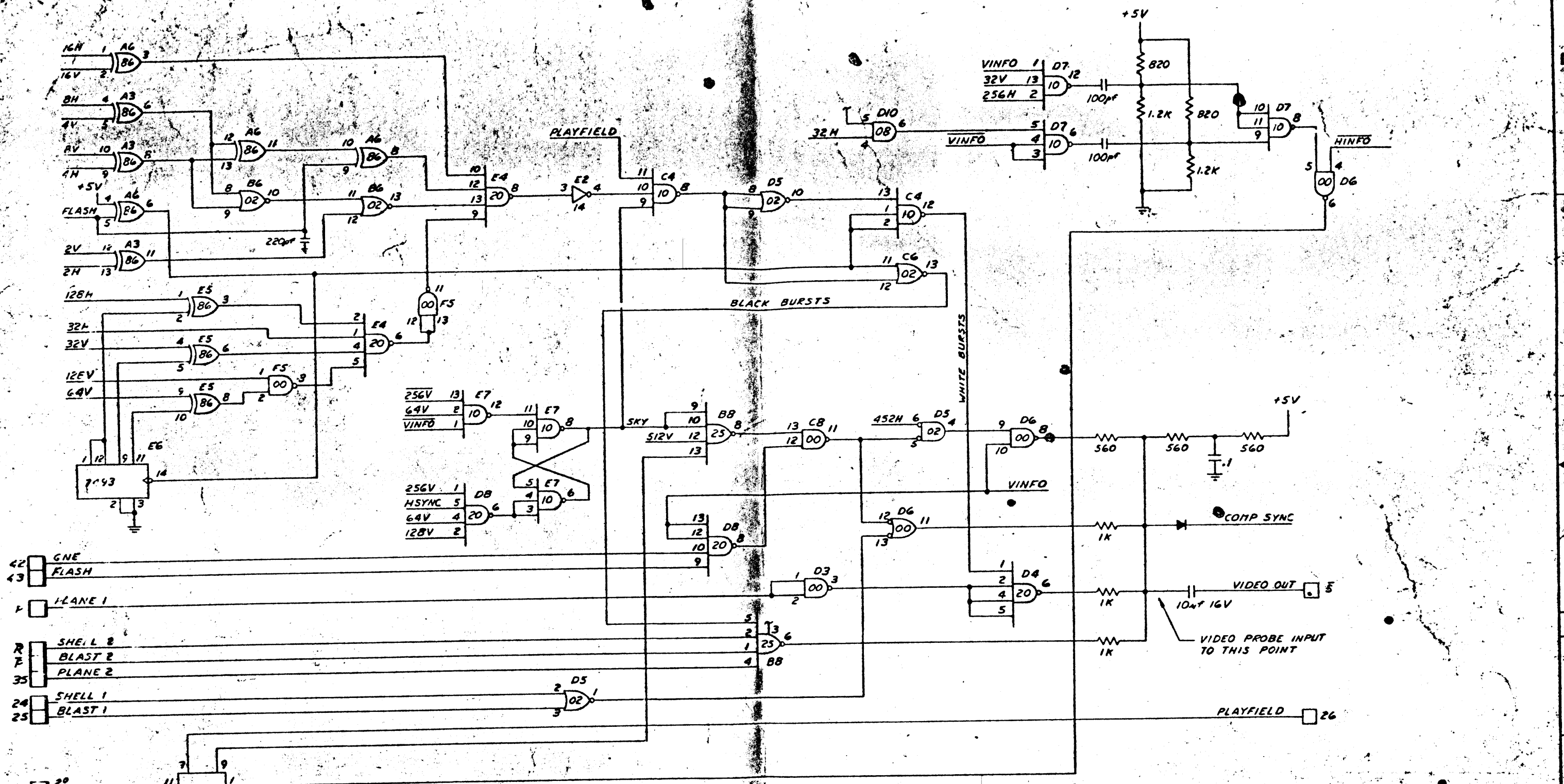


ALTERNATE:
BASE CUT OFF
RED DOT
FALES LM380s

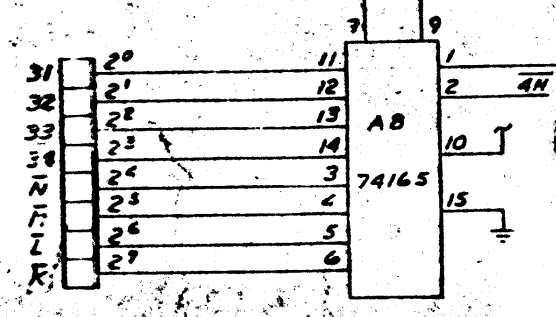
2. ALL RESISTORS ARE IN OHMS
1/4 W, 5%, CC
1. ALL DIODES ARE IN914
NOTE: UNLESS OTHERWISE NOTED

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	FUN GAMES INC OAKLAND CALIF
FRACTIONS	DECIMALS	ANGLES	
MATERIAL		APPROVALS	DATE
		DRAWN <i>JBL</i>	10-1-75
		CHECKED <i>KE</i>	10-28-75
SCHEMATIC SYNC BOARD BI-PLANE			
SIZE	CODE	IDDC NO.	DRAWING NO.
D			202
SCALE			SHEET 1 OF 3

ZONE		LTR		REVISIONS	DATE	APPROVED
DESCRIPTION						

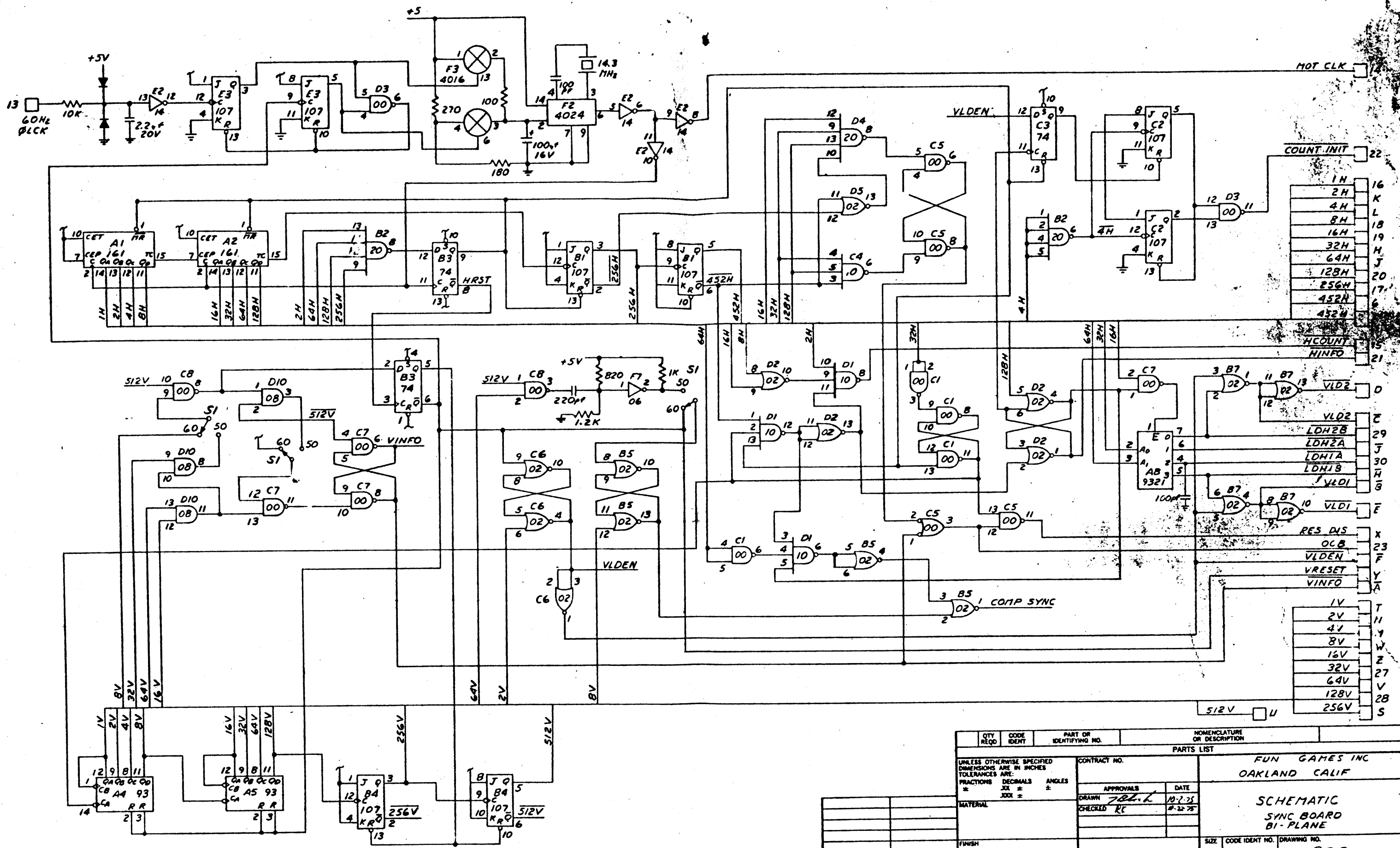


- 42 GNE
- 43 FLASH
- 1 PLANE 1
- R SHELL 2
- F BLAST 2
- 35 PLANE 2
- 24 SHELL 1
- 25 BLAST 1

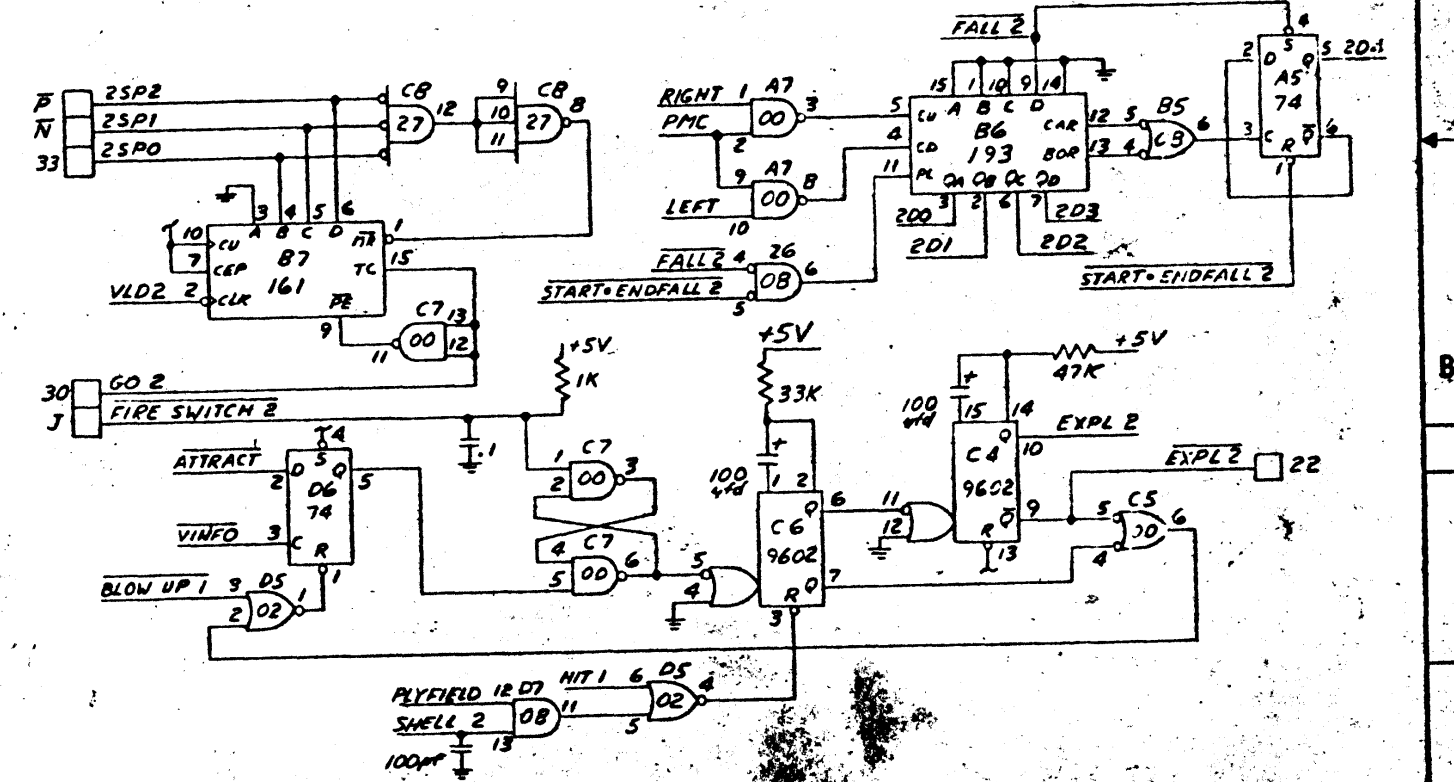
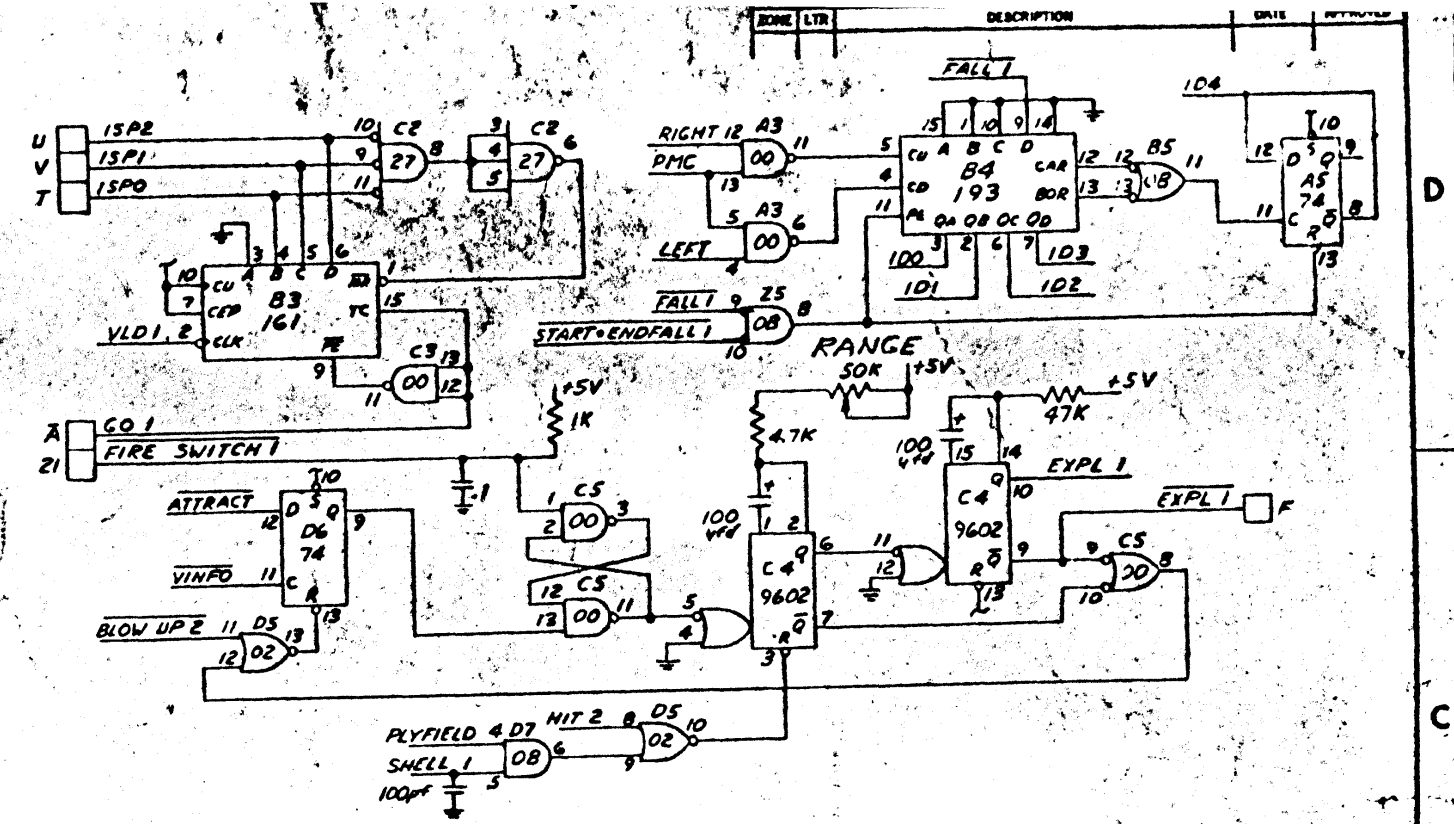
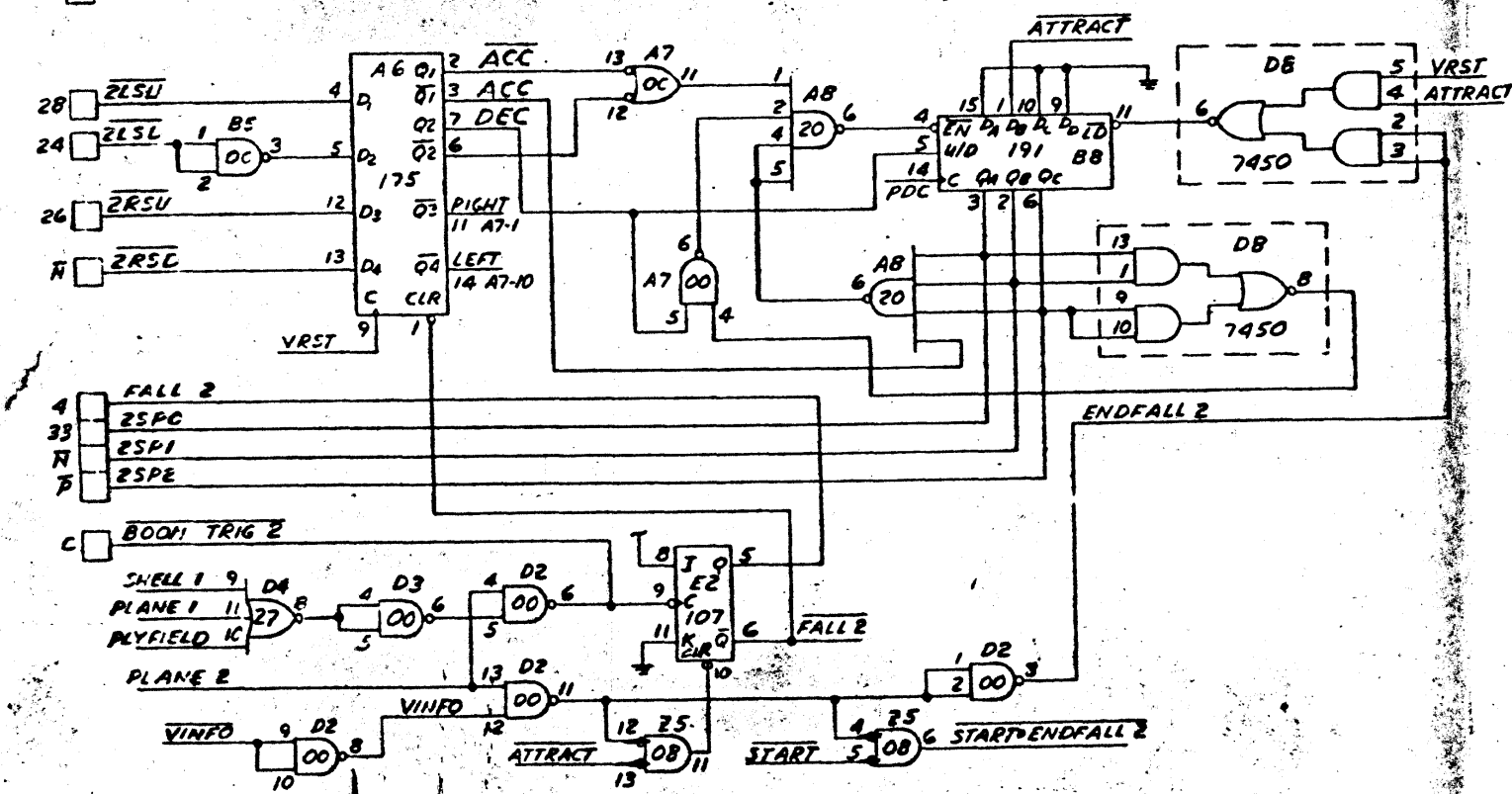
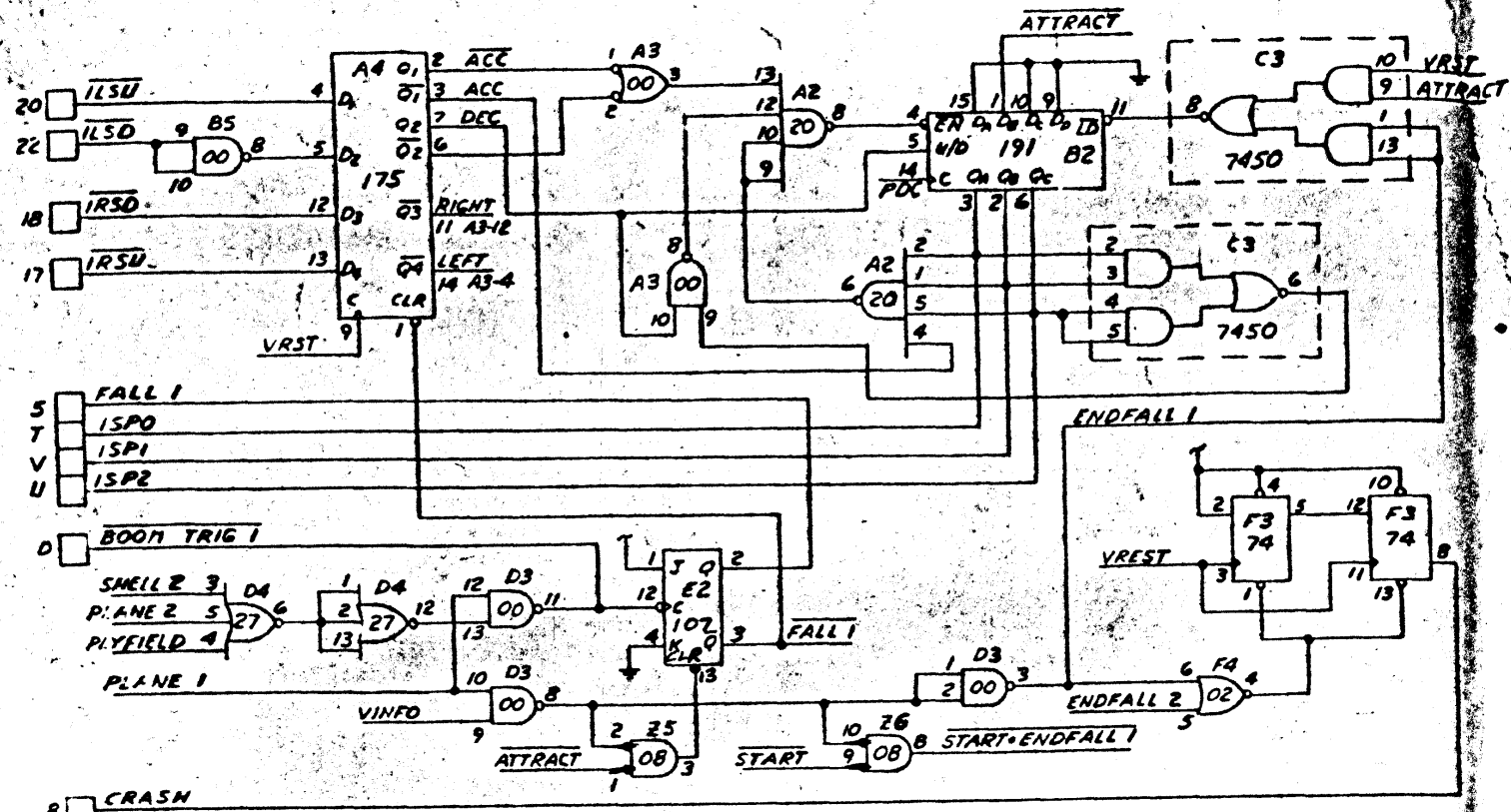


QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			PARTS LIST
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES		CONTRACT NO.	FUN GAMES INC OAKLAND CALIF
MATERIAL		APPROVALS	DATE
FINISH		DRAWN	9-29-55
PARTS USED		CHECKED	10-22-55
APPLICATION		DO NOT SCALE DRAWING	SCALE
			202
			SHEET 2 OF 3

REVISIONS			
ZONE	LTR	DESCRIPTION	DATE

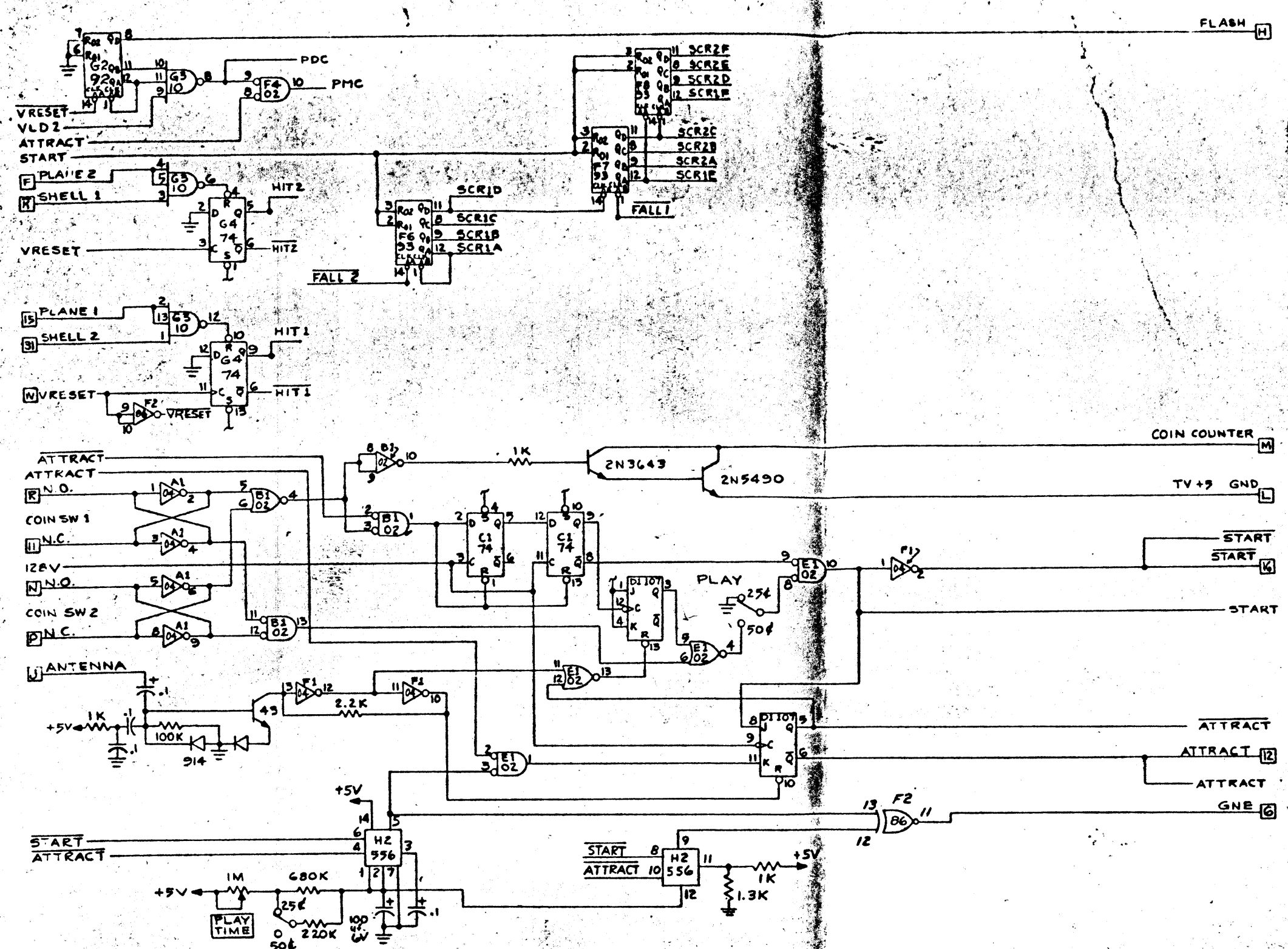


QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
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MATERIAL		APPROVALS DATE	
FINISH		DRAWN <i>RL</i> 10-2-75	
NEXT ASSY USED ON APPLICATION		CHECKED <i>RE</i> 10-22-75	
DO NOT SCALE DRAWING		FUN GAMES INC OAKLAND CALIF	
SCALE		SCHEMATIC SYNC BOARD BI-PLANE	
SIZE CODE IDENT NO. DRAWING NO.		202	
SHEET 3 OF 3			



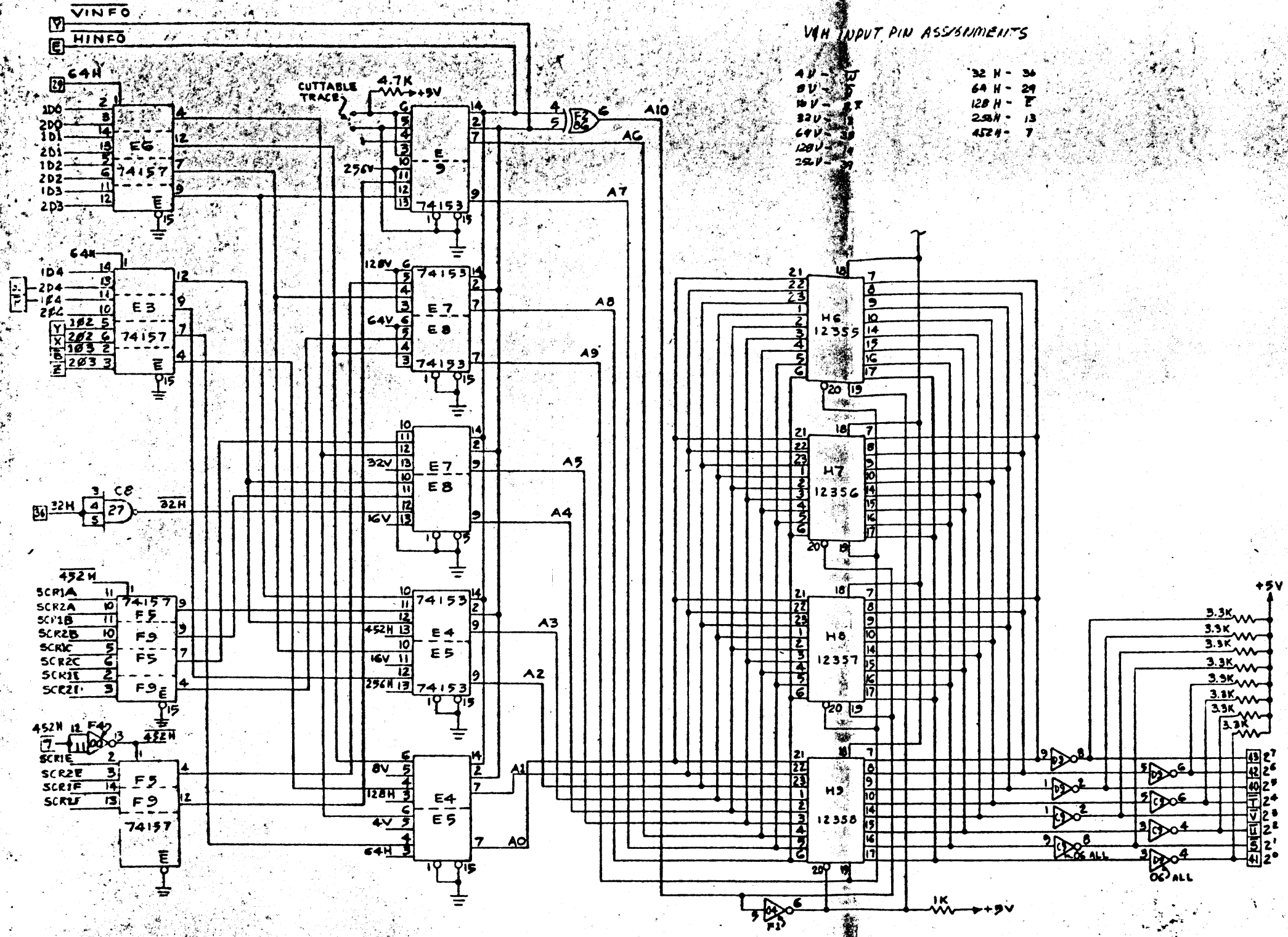
CITY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
			FUN GAMES, INC OAKLAND, CALIF
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES; TOLERANCES ARE: FRACTIONS DECIMALS ANGLES		CONTRACT NO.	APPROVALS DATE
			DRAWN 78 10-8-75
			CHECKED 22 11-22-75
MATERIAL	FINISH	SCALE	DRAWING NO.
			204
NEXT ASSY	USED ON	APPLICATION	DO NOT SCALE DRAWING
			SHEET 1 OF 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	FUN GAMES INC OAKLAND CALIF
* XXX	* XXX	* XXX	
MATERIAL	APPROVALS	DATE	SCHEMATIC MEMORY BOARD BI-PLANE
	CHECKED		
FINISH	SIZE	CODE IDENT NO.	DRAWING NO.
	D		204
NEXT ASSY	USED ON	SCALE	SHEET 2 OF 3
APPLICATION	DO NOT SCALE DRAWING		

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE FRACTIONS DECIMALS ANGLES		CONTRACT NO.	
= XX ± = XXX ±		FUN GAMES INC OAKLAND CALIF	
MATERIAL		APPROVALS	DATE
FINISH		CHECKED <i>RE</i>	02-75
NEXT ASSY		USED ON	
APPLICATION		DO NOT SCALE DRAWING	
SIZE	CODE IDENT NO.	DRAWING NO.	
D		204	A
SCALE			SHEET 3 OF 3