



# 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.

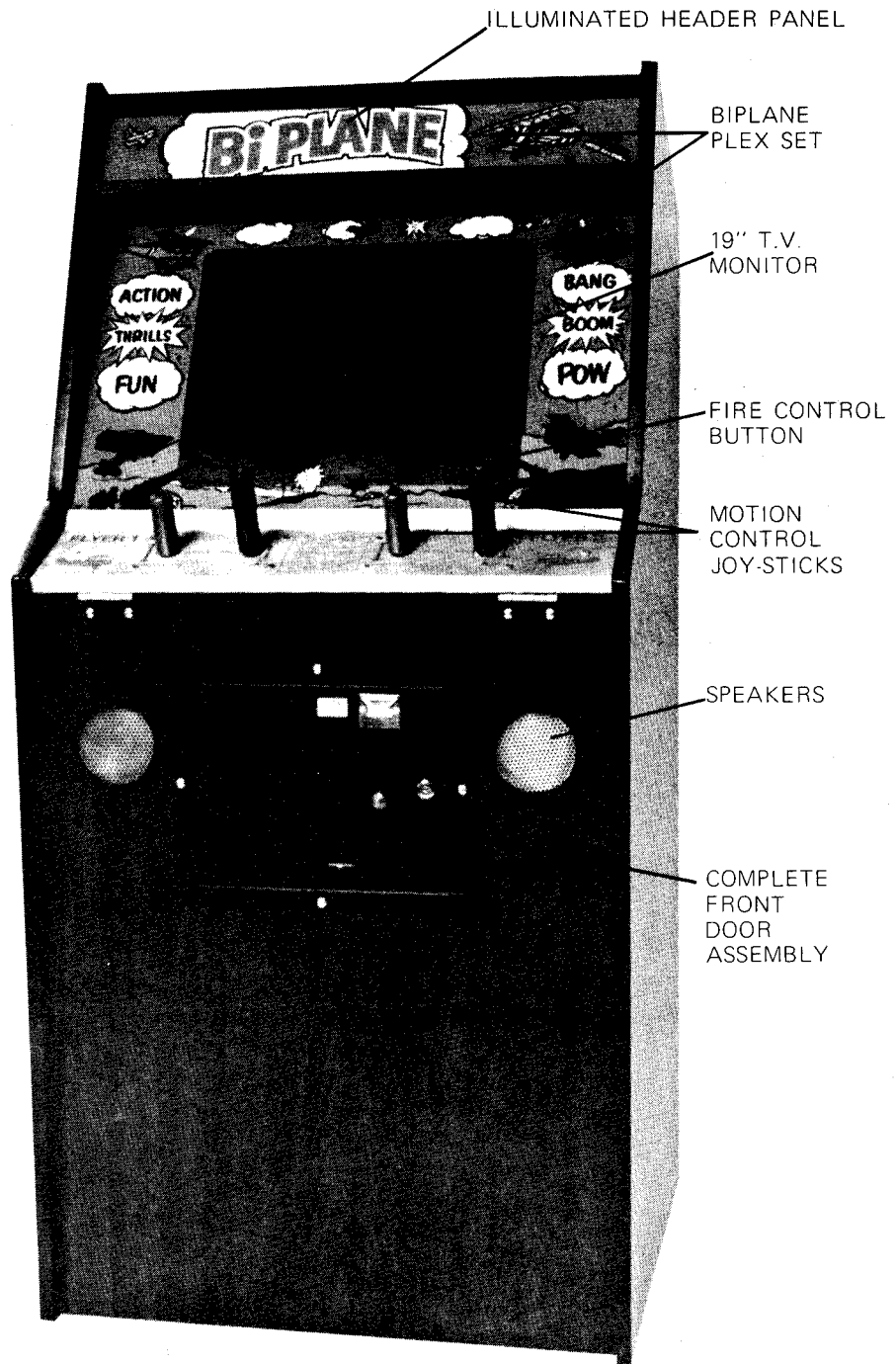
**PITCH 1:**

Same as pitch 2 for white plane.

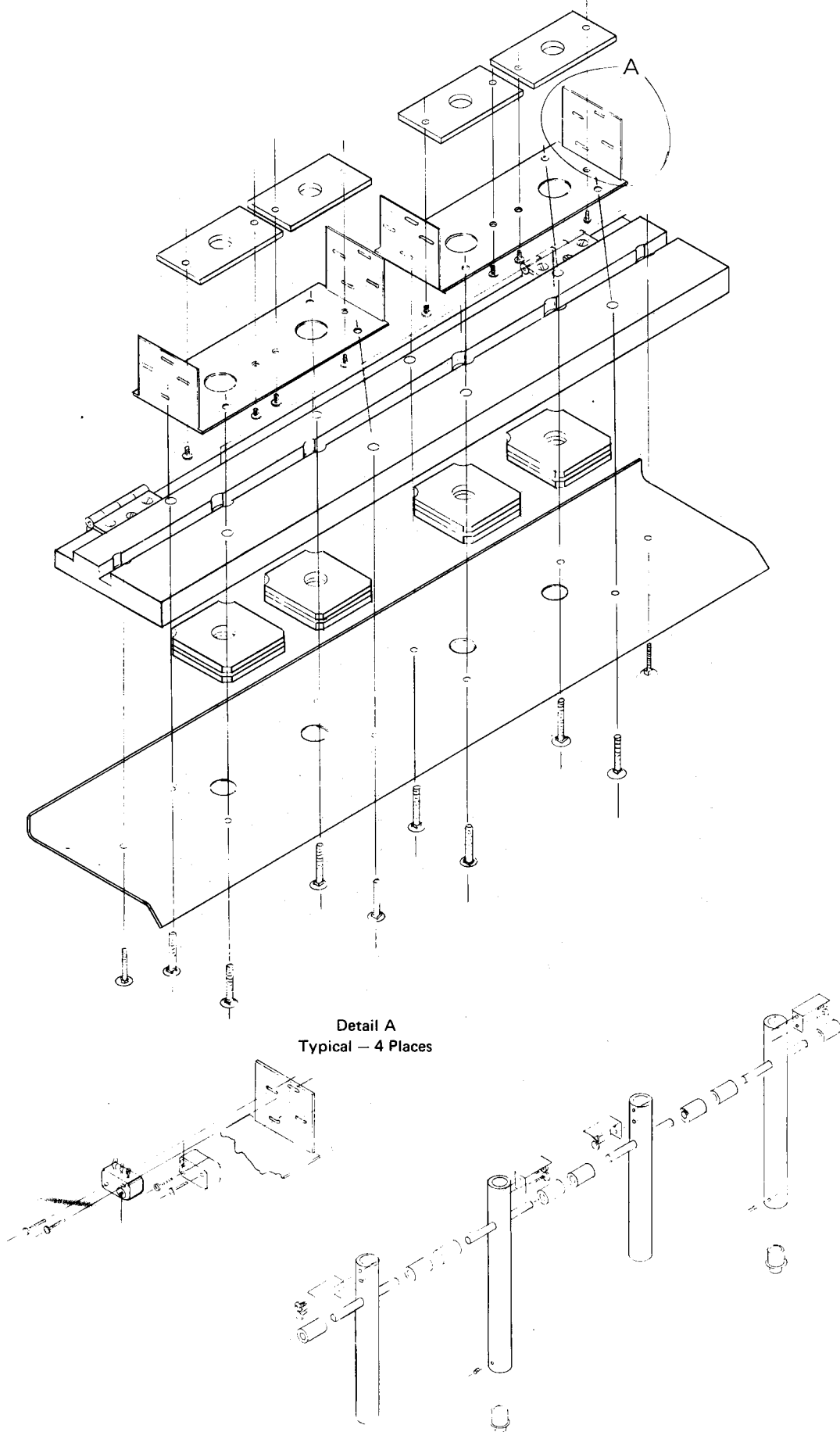
**tone 1:**

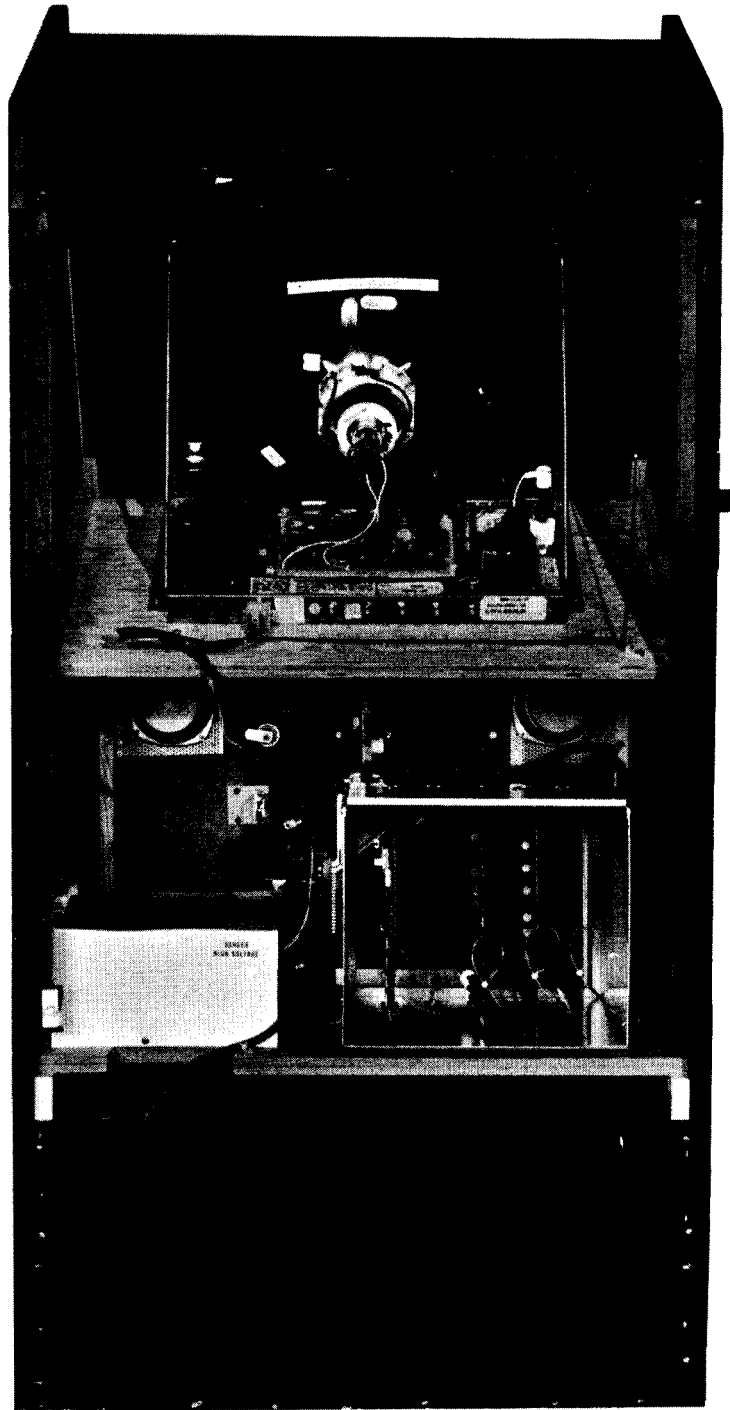
Same as tone 2 for white plane.

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

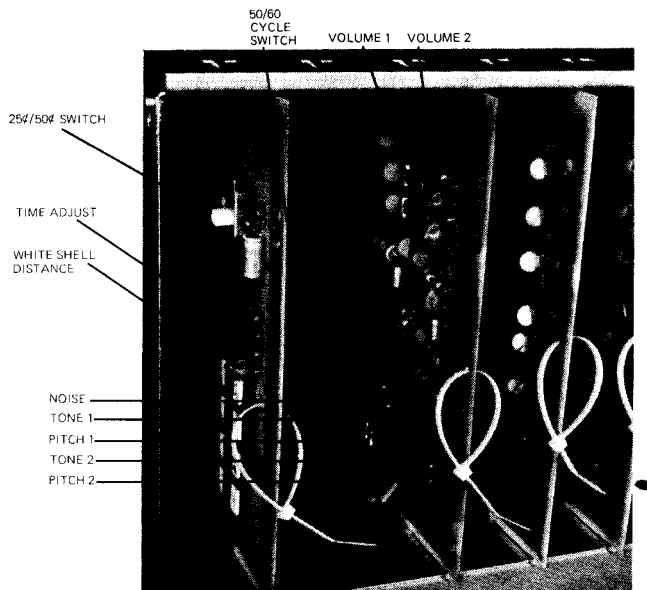
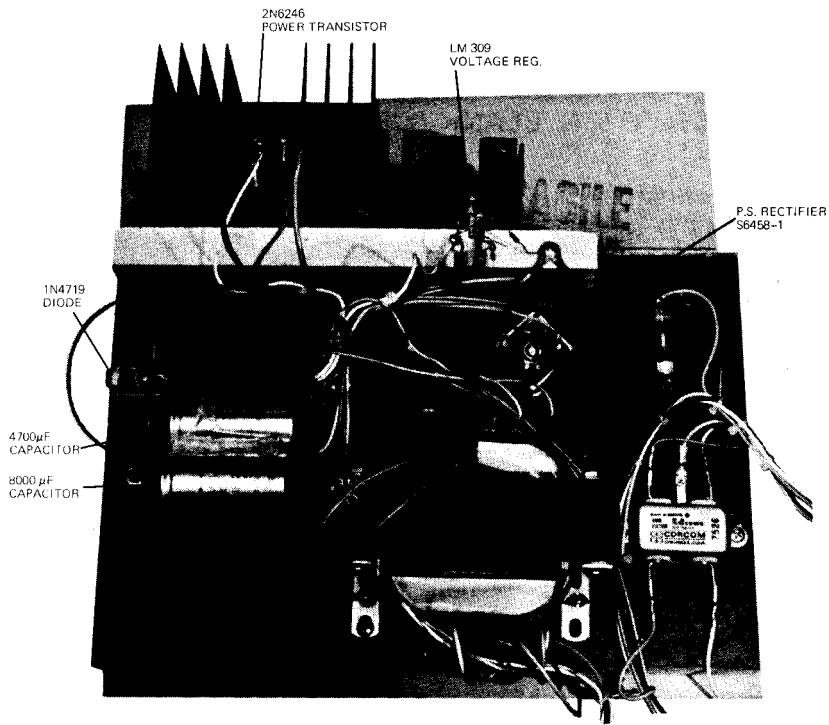


# COMPONENTS AND DESCRIPTION





# COMPONENTS AND DESCRIPTION



# TROUBLE SHOOTING

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## 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



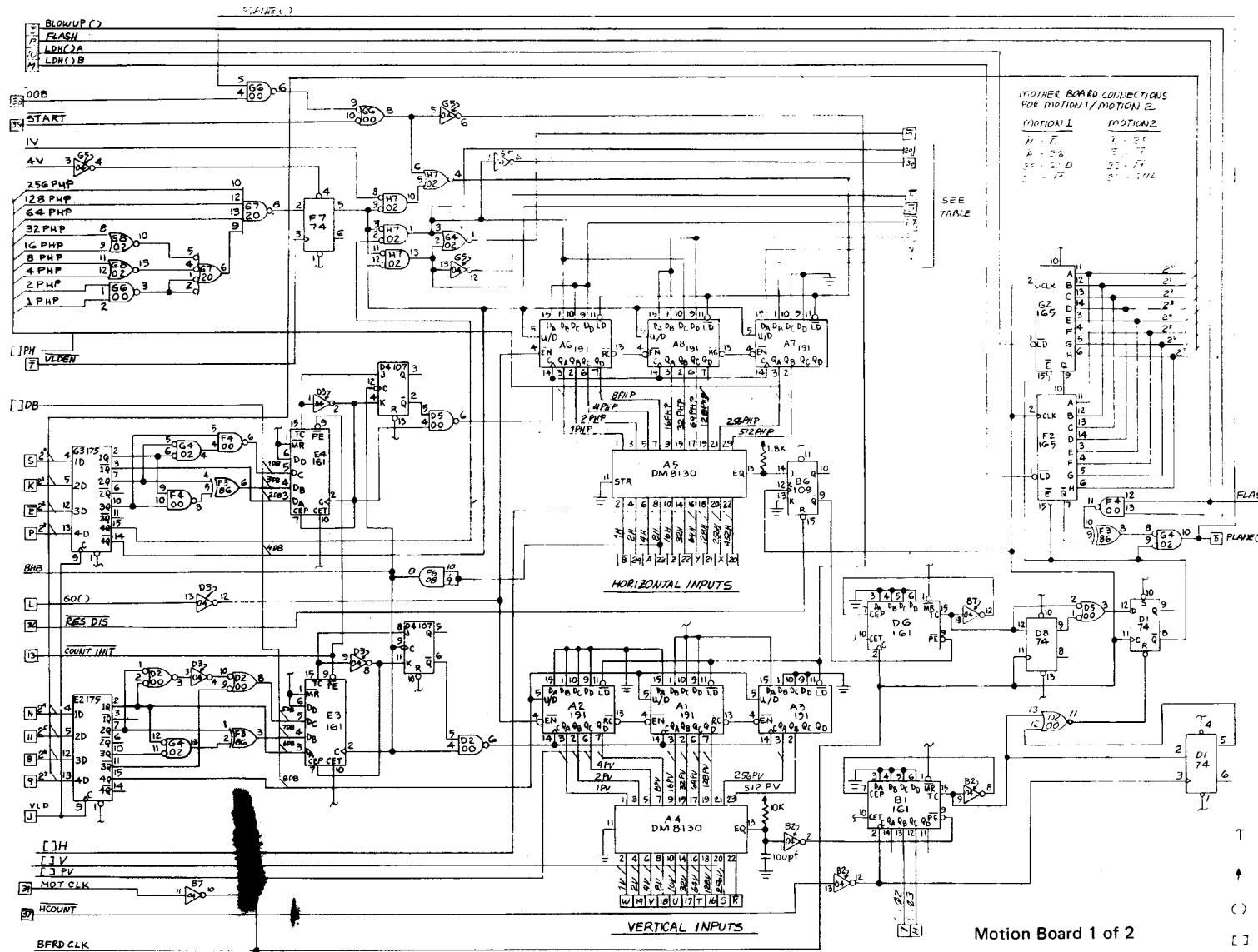
# PRICE LIST

## PARTS LIST

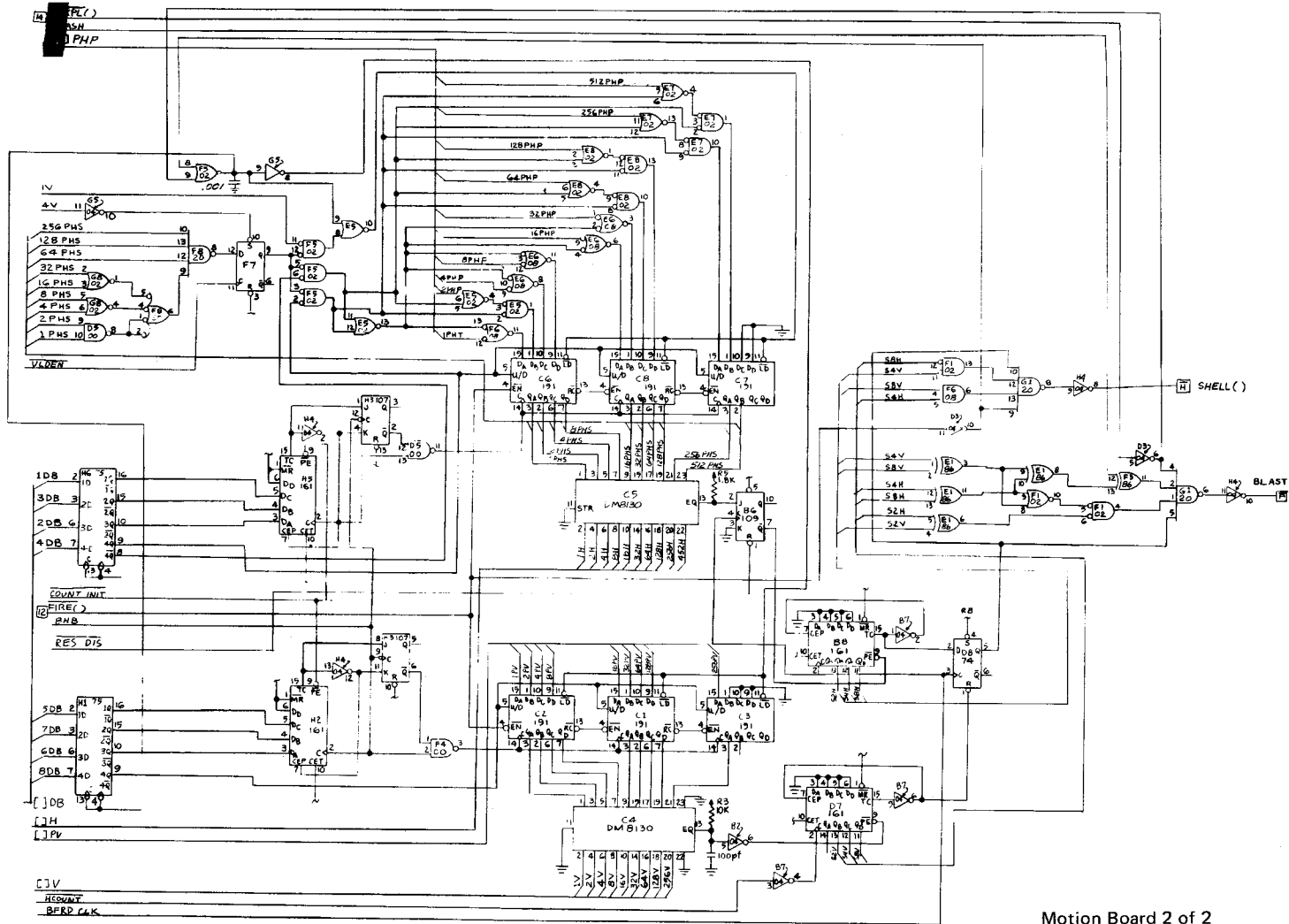
<b>PART #</b>	<b>DESCRIPTION</b>	<b>UNIT PRICE</b>
300-200	Power Supply	75.00
500-206	Mother Board	75.00
500-201	Motion Board	250.00
500-202	Synch Board	250.00
500-204	Memory Board	250.00
500-200	Set of PC Boards w/Cage	750.00
600-200	Control Panel	75.00
400-100	Coin Door Assembly	55.00
34-64581	P.S. 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



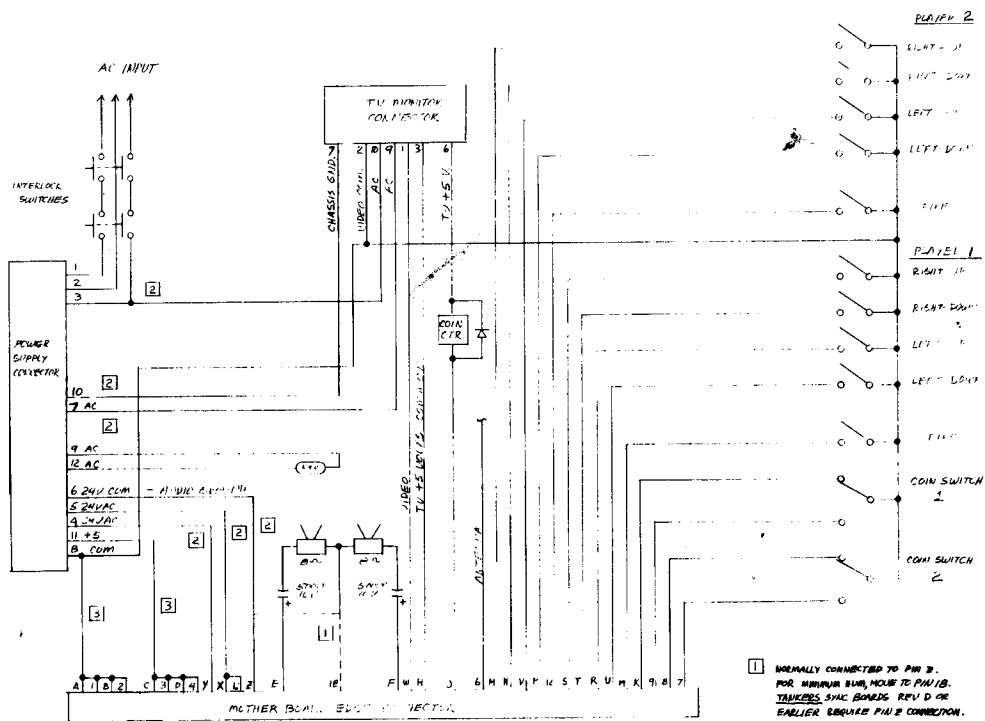
Motion Board 1 of 2



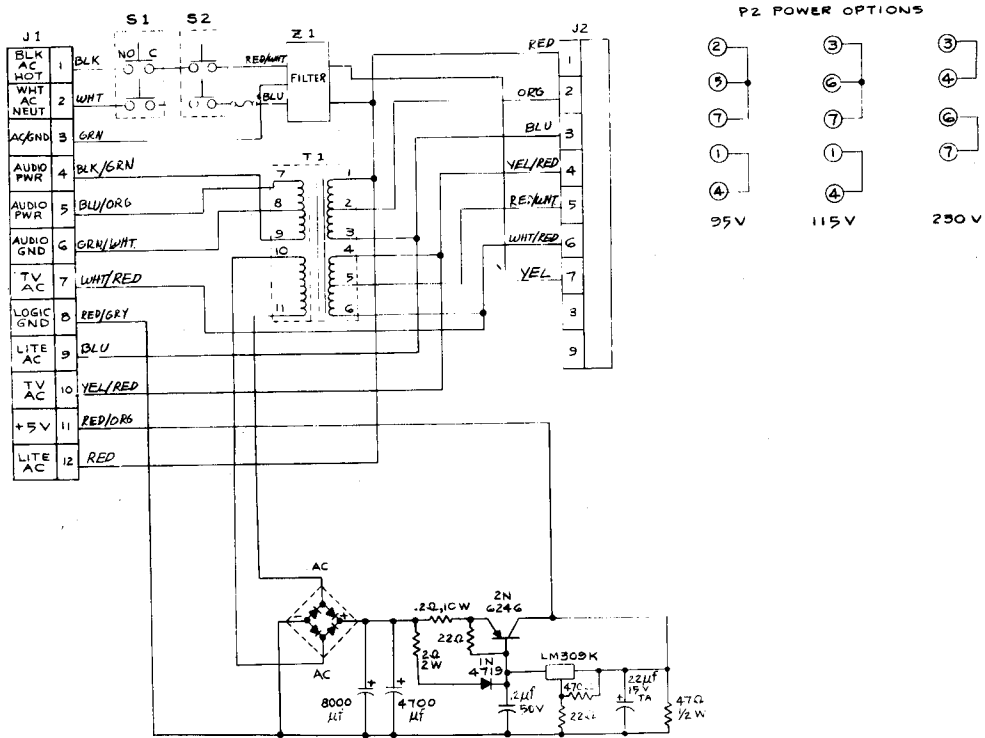
Motion Board 2 of 2

# SCHEMATICS

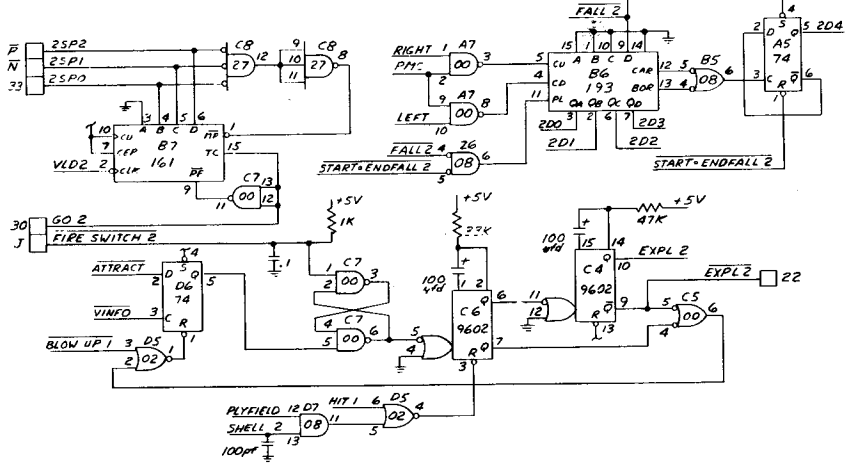
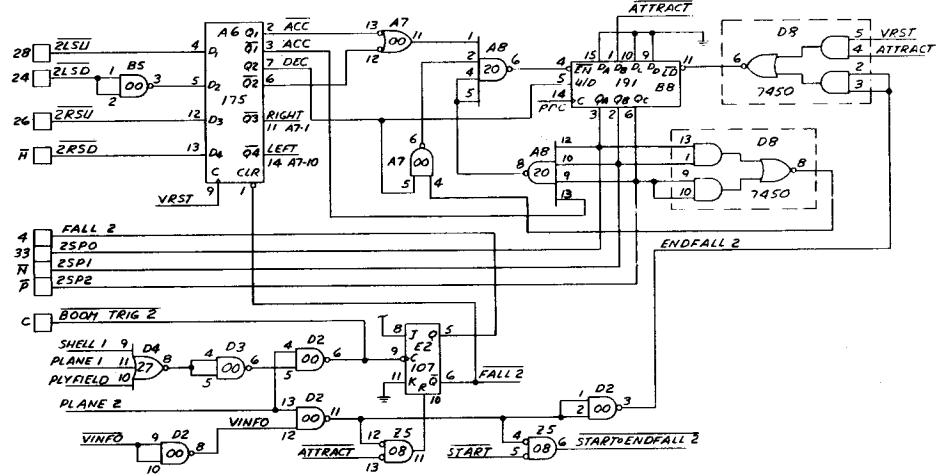
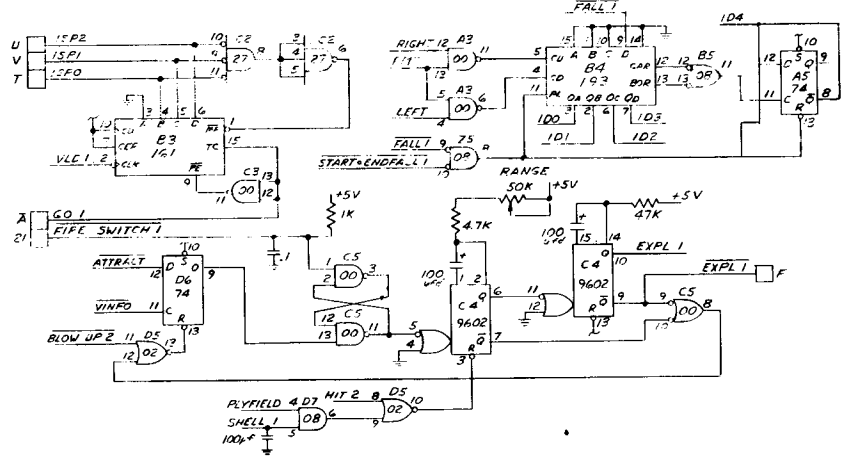
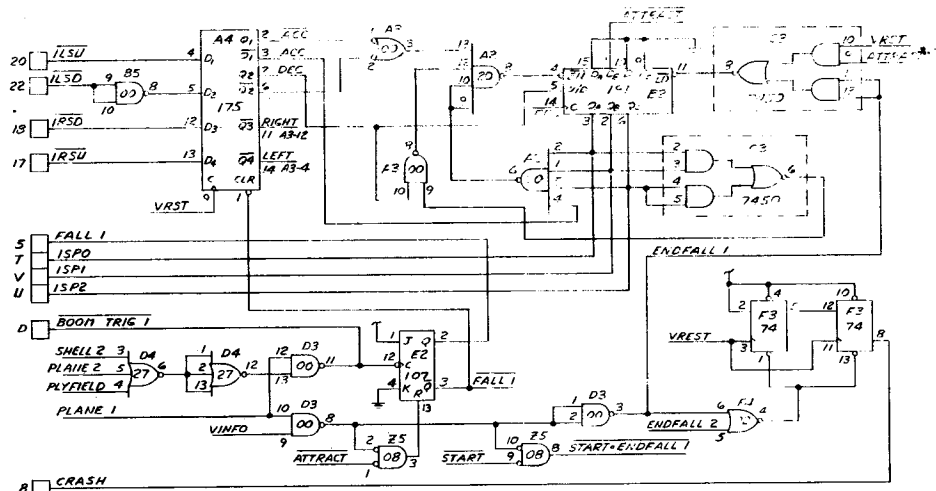
# SCHEMATICS



Cabinet Interconnections



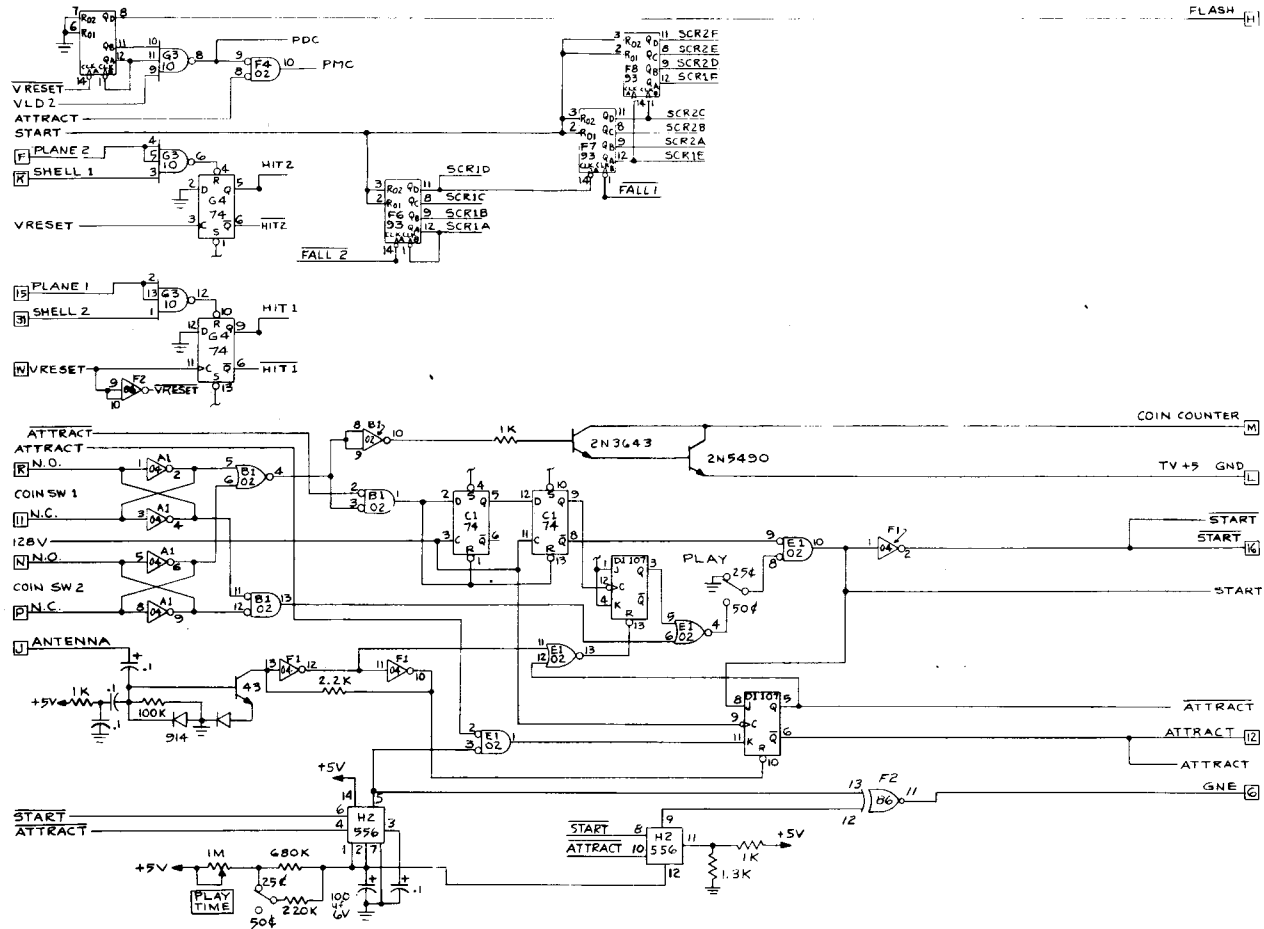
Power Supply



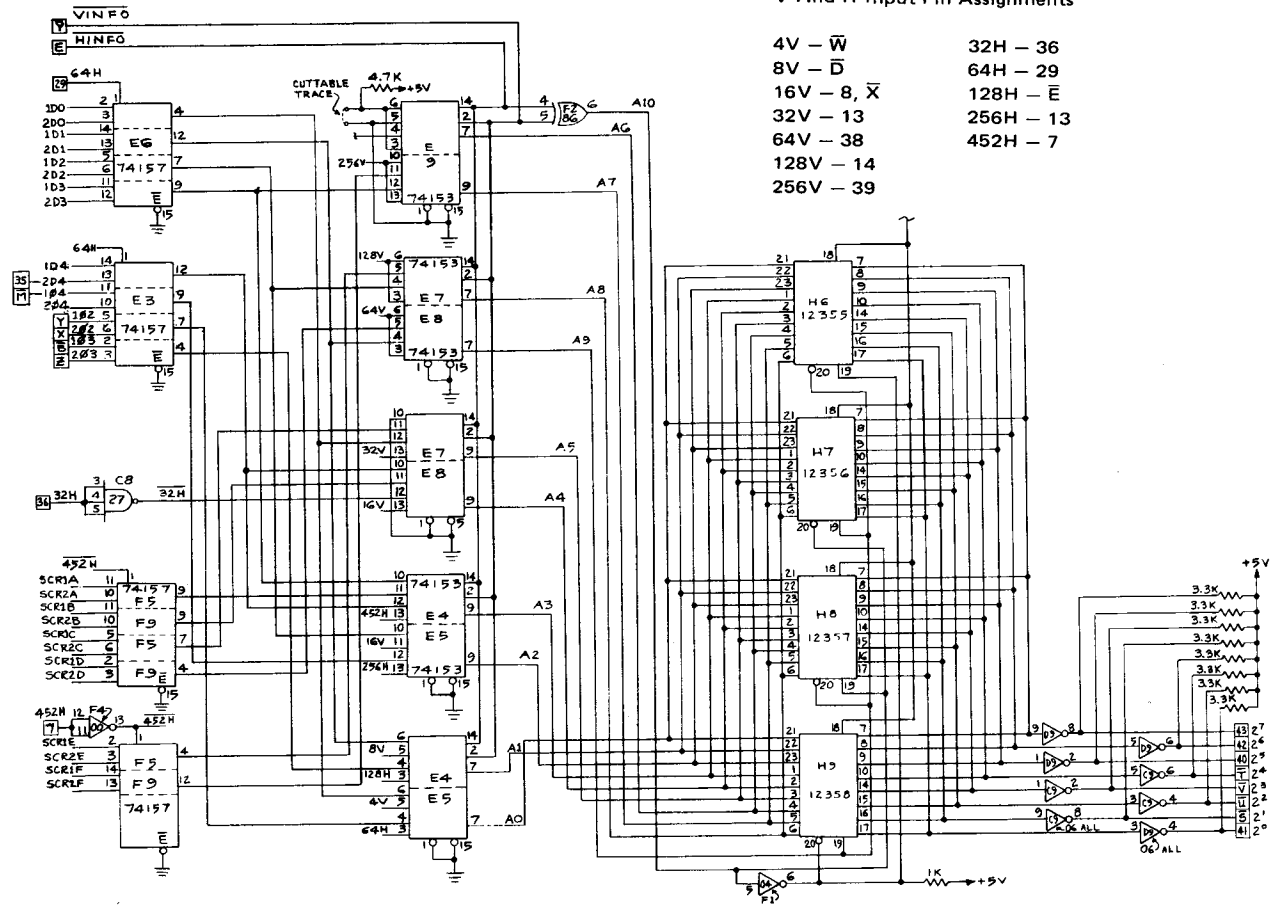
Memory Board 1 of 3

# SCHEMATICS

# SCHEMATICS



Memory Board 2 of 3



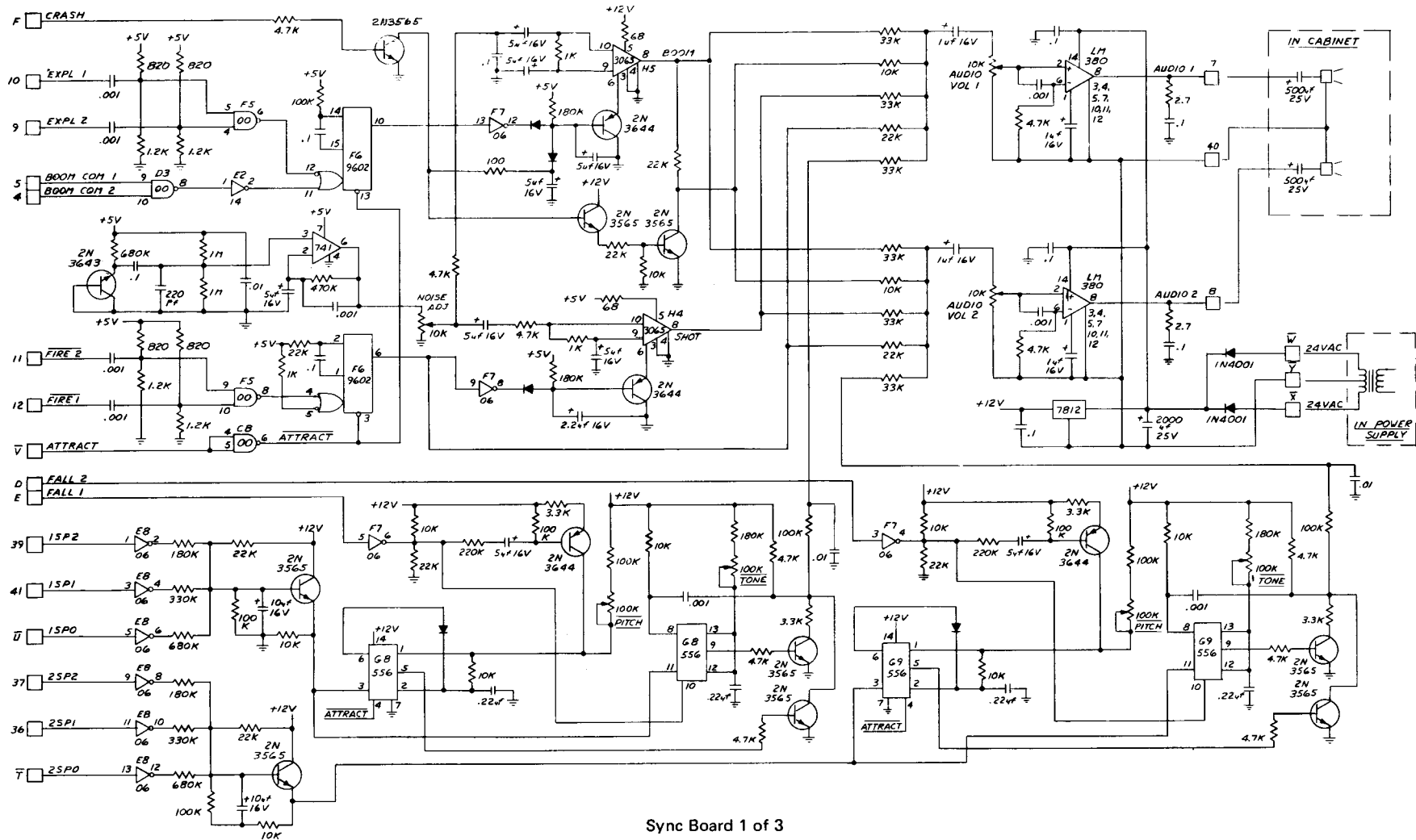
V And H Input Pin Assignments

- 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

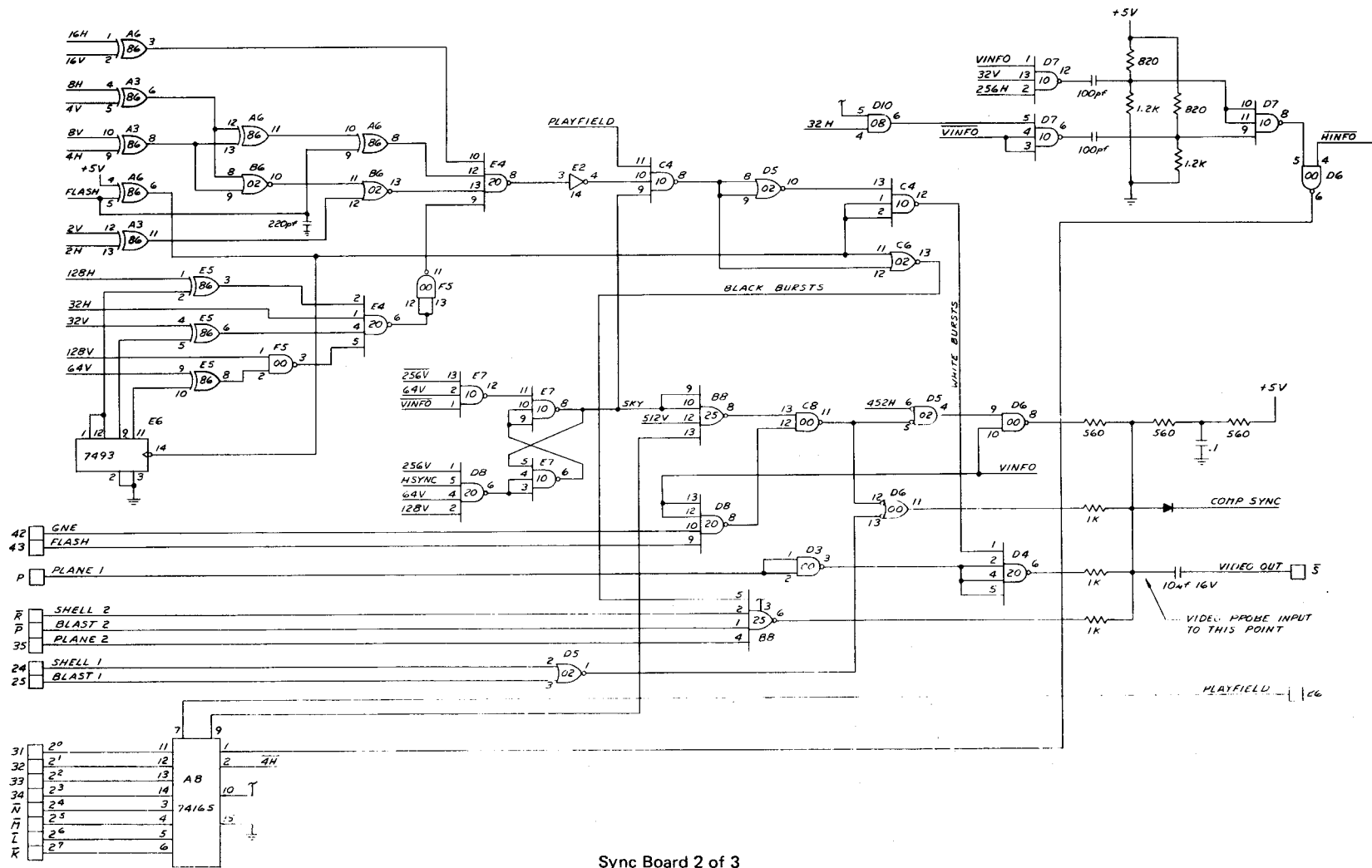
# SCHEMATICS

# SCHEMATICS



Sync Board 1 of 3



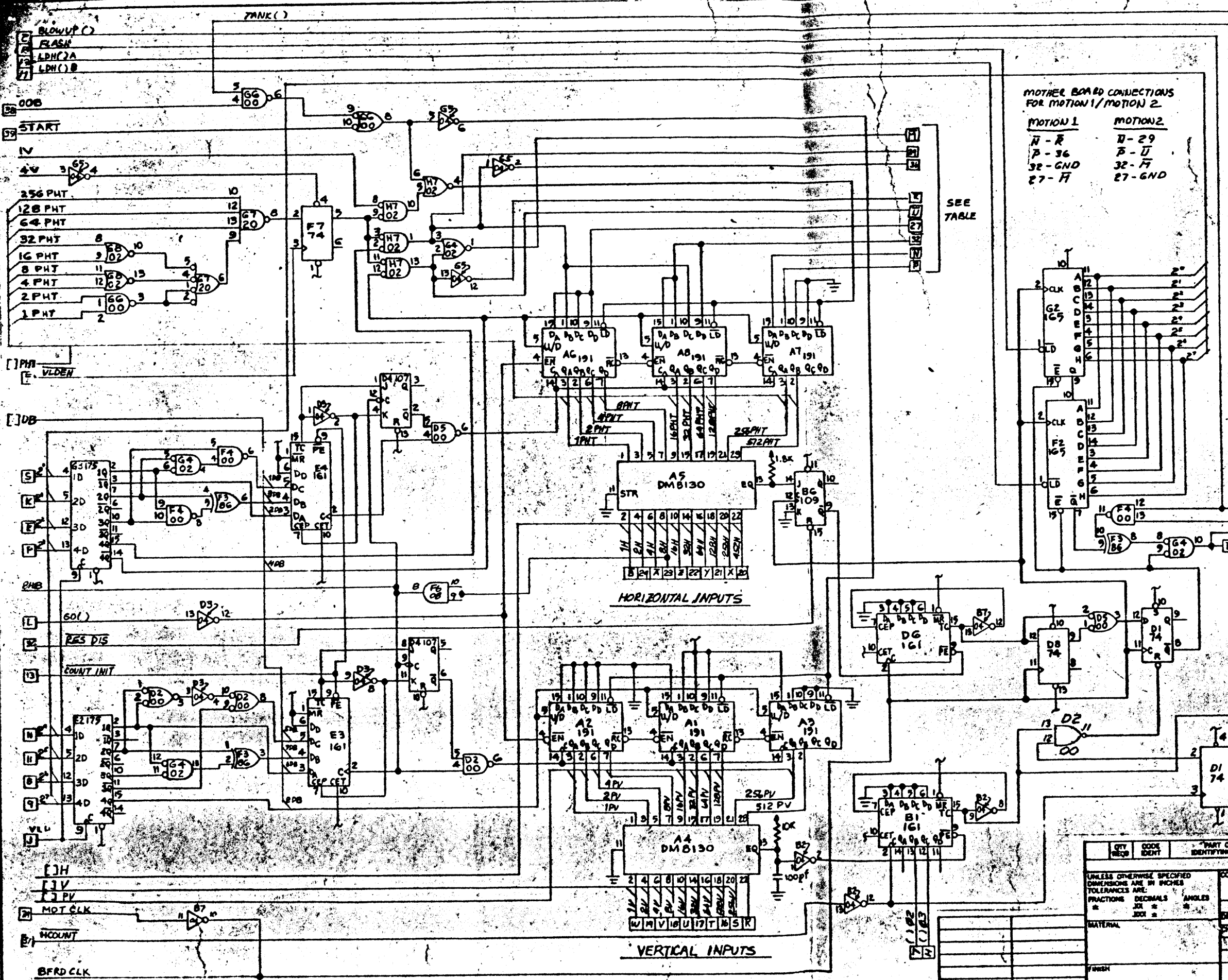


# SCHEMATICS



**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

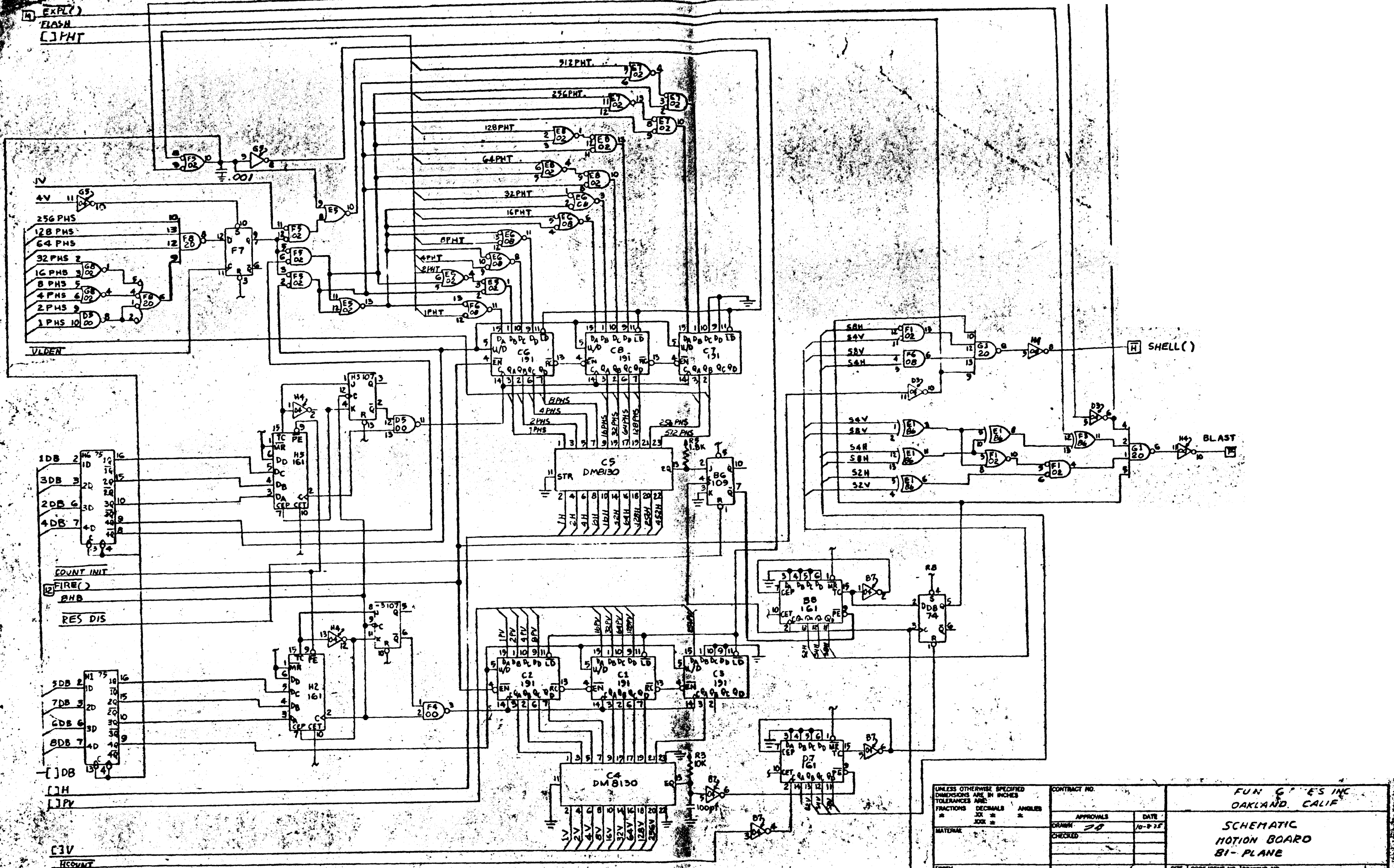
[ ] " ALL SIGNALS OF SIMILAR NAME

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION
PARTS LIST			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:		CONTRACT NO.	
FRACTIONS	DECIMALS	ANGLES	APPROVALS
±	±	±	
MATERIAL		DATE	
FINISH		DRAWN	
NEXT ASSY		CHECKED	
USED ON		DATE	
APPLICATION		SCALE	
DO NOT SCALE DRAWING		DRAWING NO.	
		201	
		SHEET 1 OF 2	

FUN GAMES INC  
OAKLAND CALIF

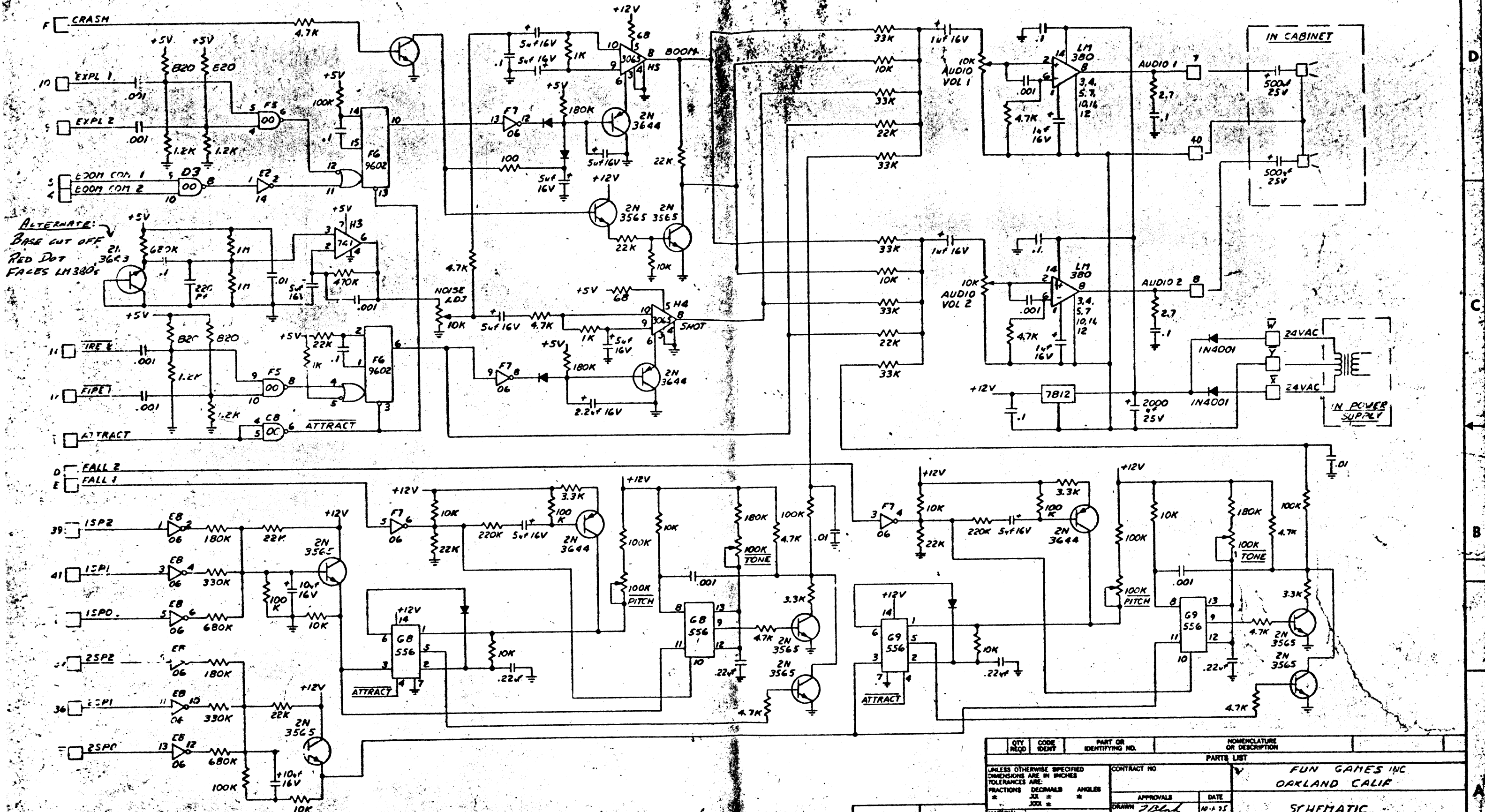
SCHMATIC  
MOTION BOARD  
BI-PLANE

DATE: 11-1-75  
DRAWN: [Signature]  
CHECKED: [Signature]



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.			
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DO NOT SCALE DRAWING		SHEET 2 OF 2			

ZONE	LTR	REVISIONS		DATE	APPROVED
		DESCRIPTION			



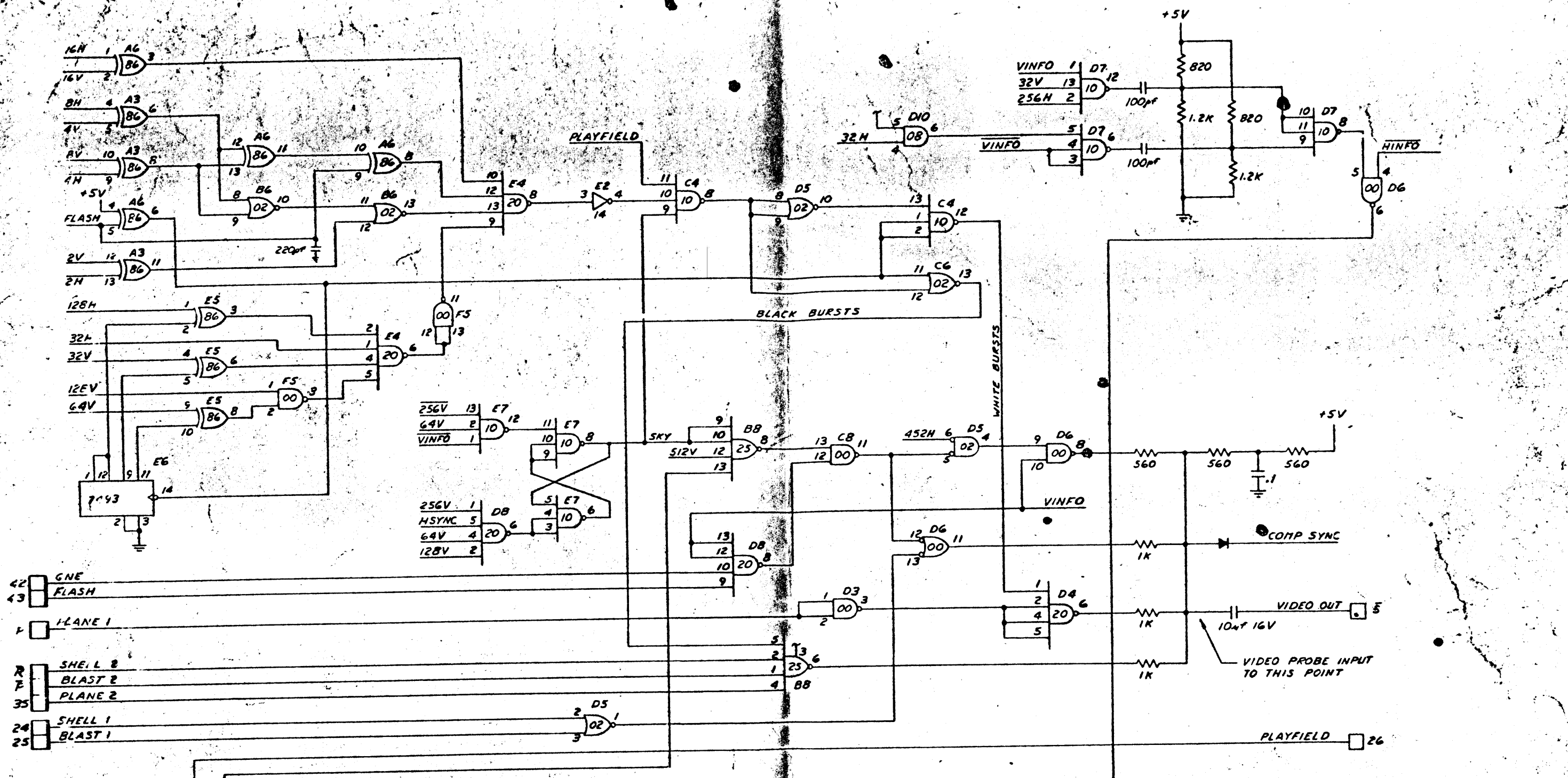
ALTERNATE:  
BASE CUT OFF  
RED DOT  
FALES LM380s

2. ALL RESISTORS ARE IN OHMS  
1/4 W, 5%, CC  
1. ALL DIODES ARE 1N914  
NOTE: UNLESS OTHERWISE NOTED

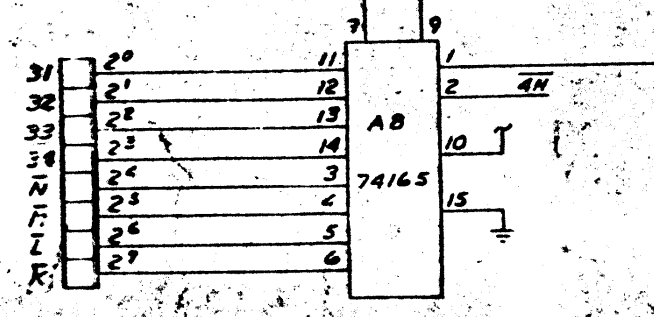
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PARTS LIST			
FUN GAMES INC ORKLAND CALIF			CONTRACT NO.
SCHEMATIC SYNC BOARD BI-PLANE			APPROVALS DATE
DRAWN <i>JR</i> 10-1-75			CHECKED <i>JK</i> 10-22-75
SIZE	CODE	IDDC NO.	DRAWING NO.
D			202
SCALE			SHEET 1 OF 3

NEXT ASSY	USED ON
APPLICATION	DO NOT SCALE DRAWING

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

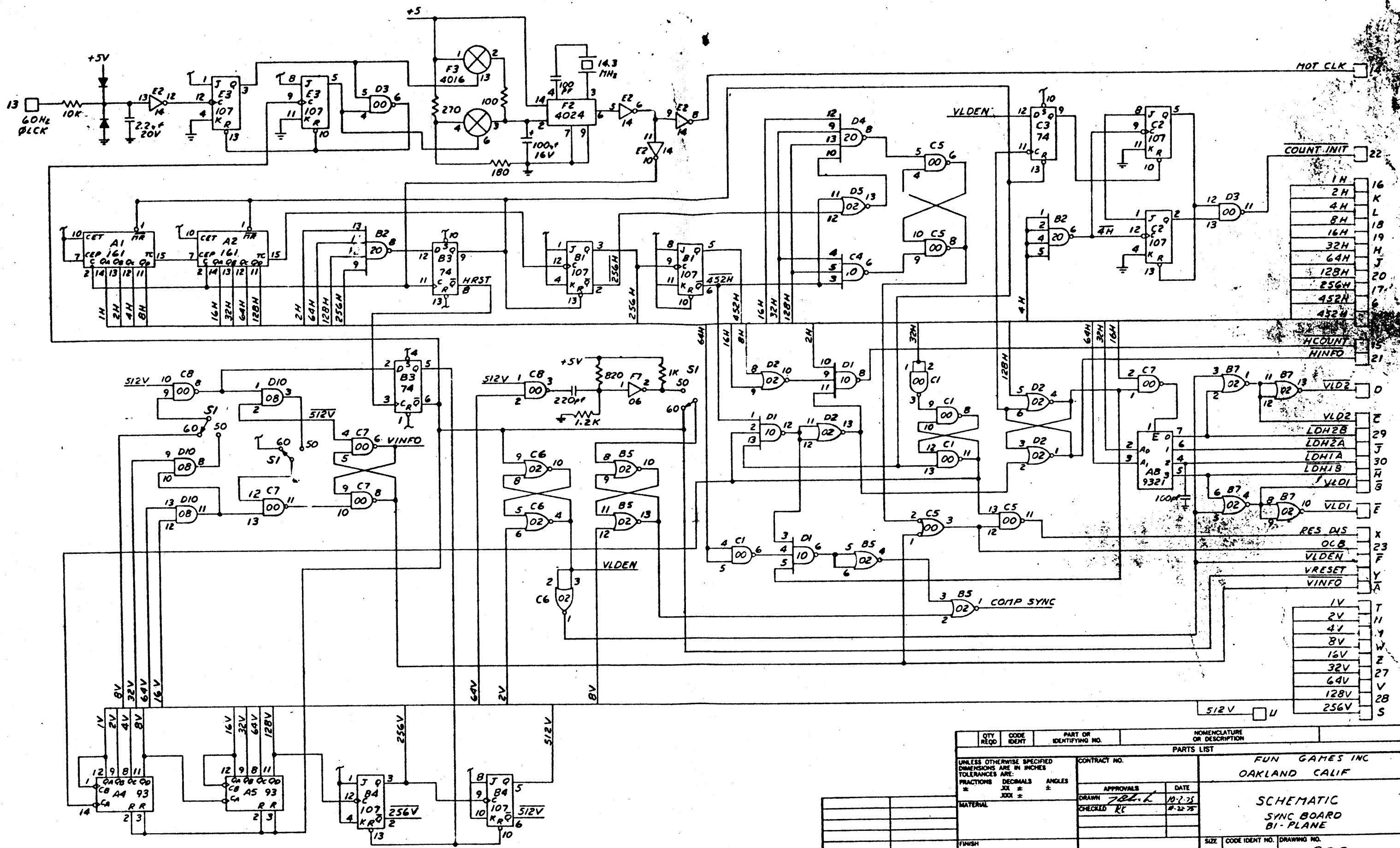


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PARTY ORDER		DRAWN	
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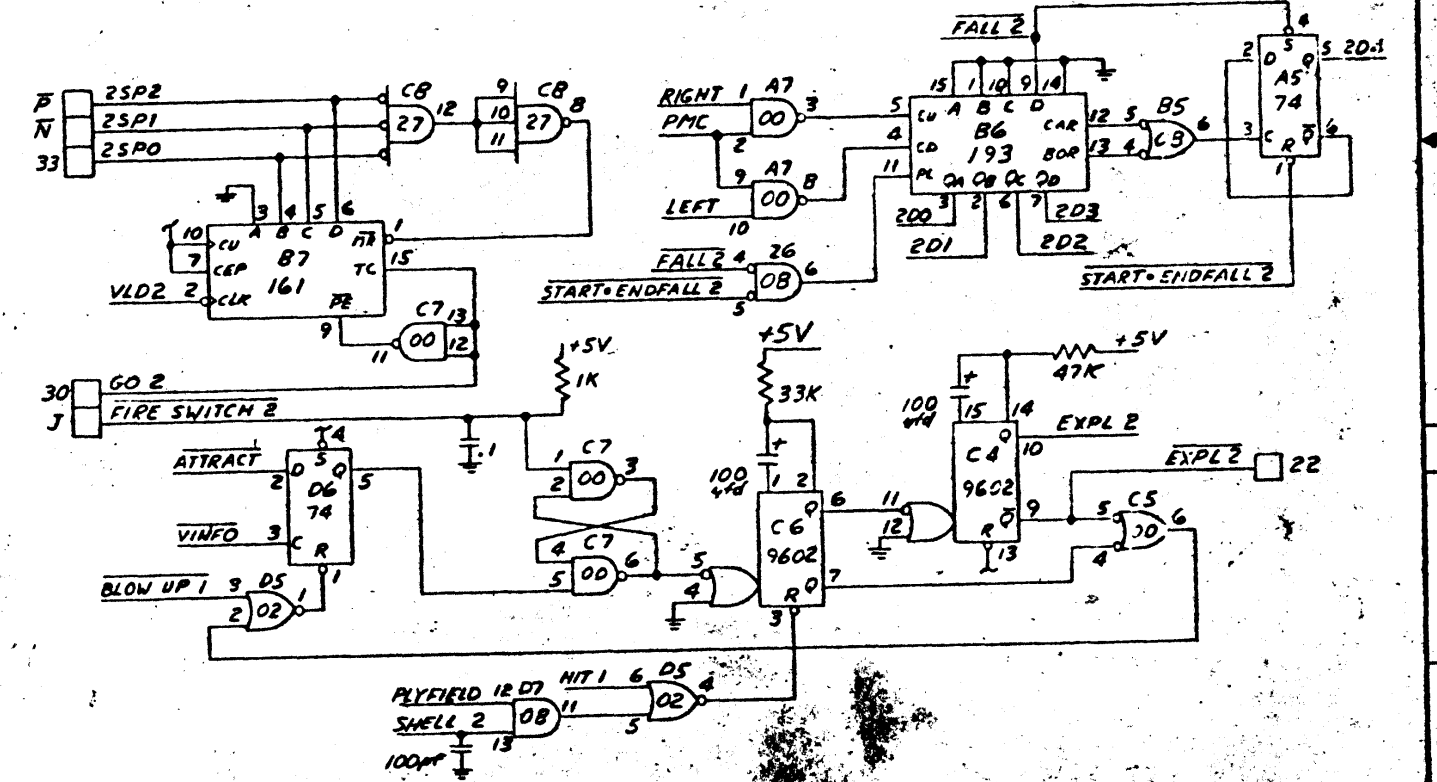
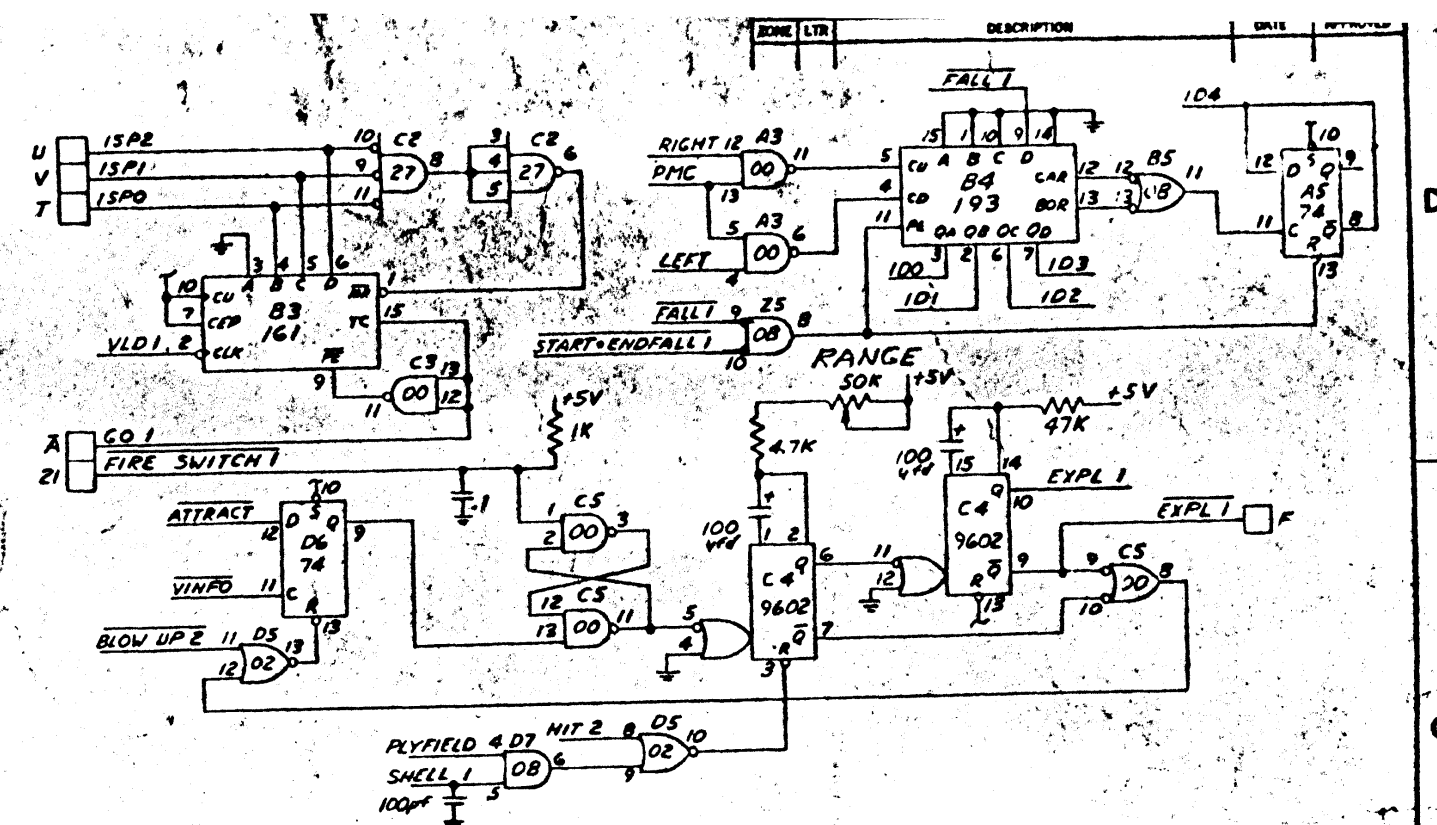
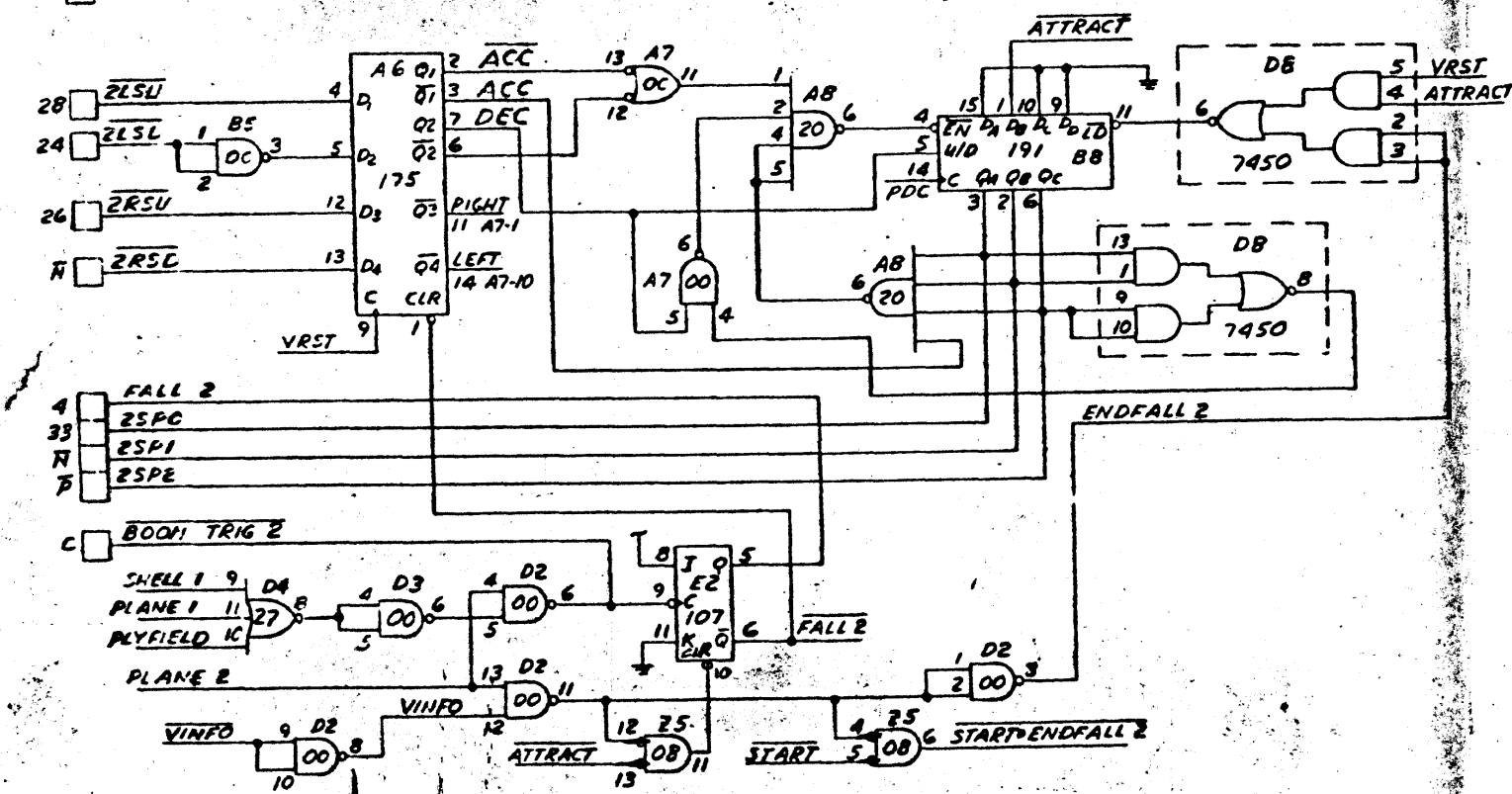
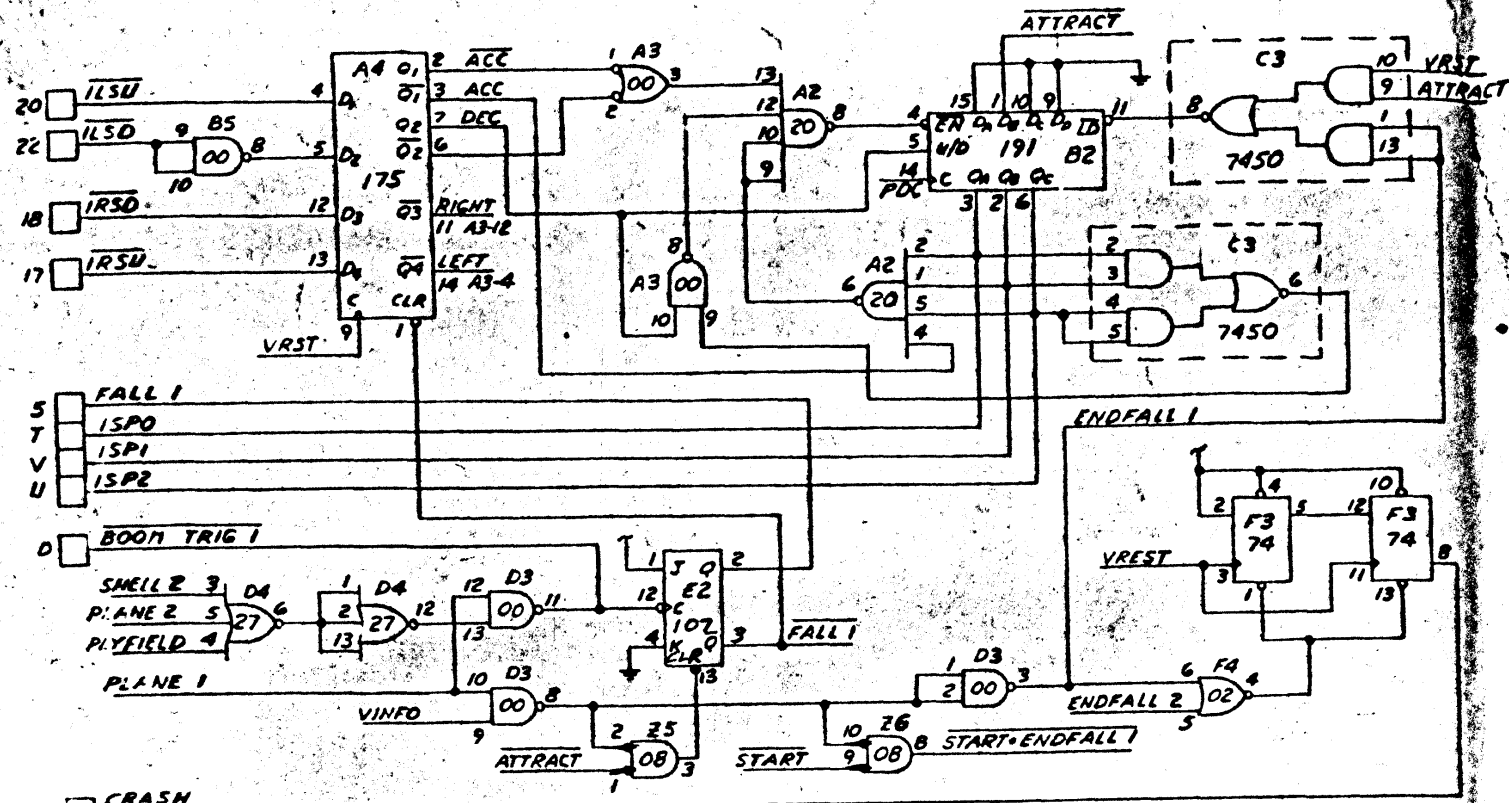
FUN GAMES INC OAKLAND CALIF	
SCHEMATIC SYNC BOARD BI-PLANE	
SIZE	CODE IDENT
D	202
SCALE	SHEET 2 OF 3

ZONE		REVISIONS		DATE	APPROVED
LTR	DESCRIPTION				



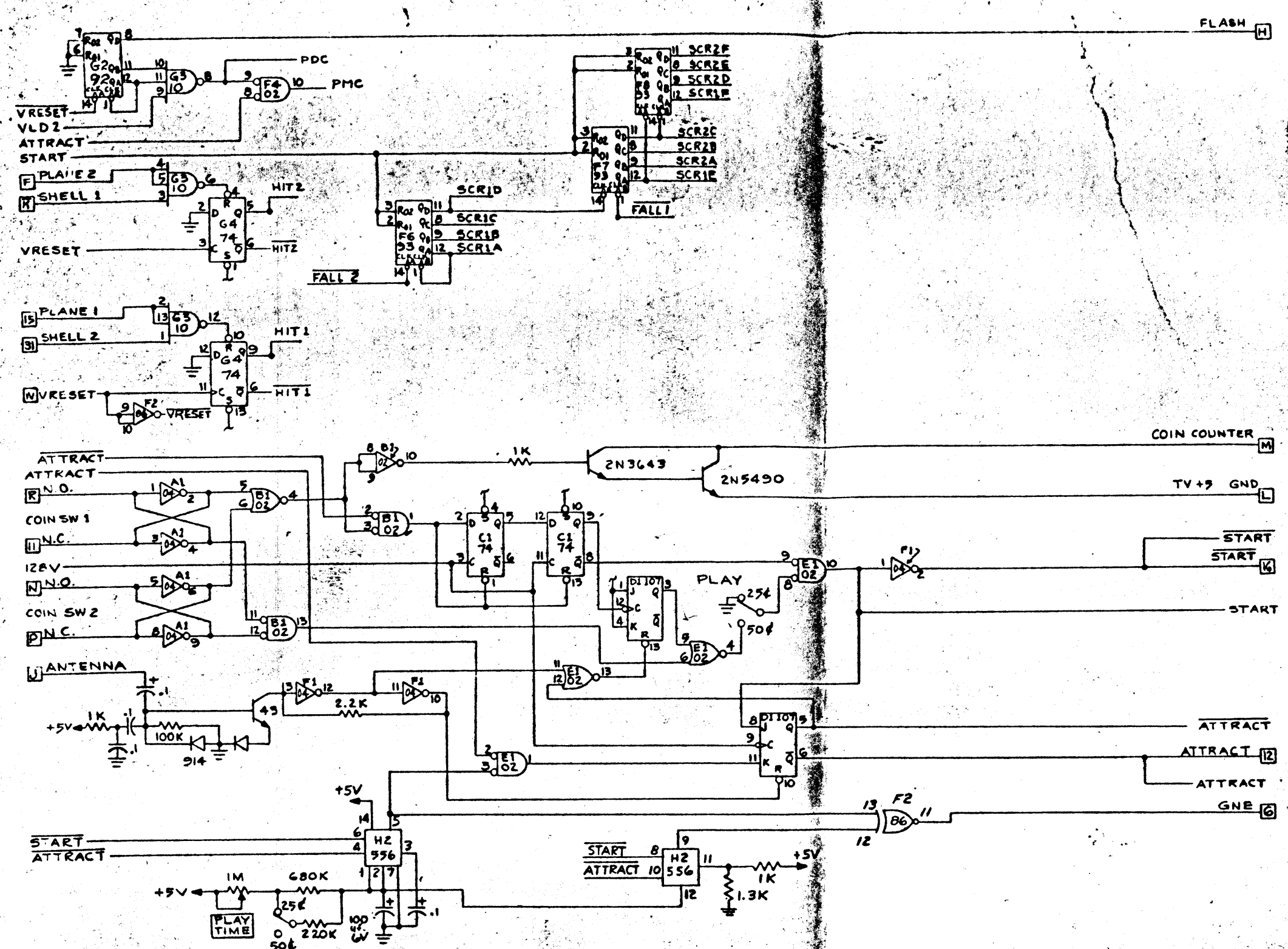
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CONTRACT NO.		FUN GAMES INC OAKLAND CALIF	
APPROVALS		DATE	
DRAWN <i>JBL</i>		10-2-75	
CHECKED <i>RE</i>		8-22-75	
SCHEMATIC SYNC BOARD BI-PLANE			
SIZE	CODE IDENT NO.	DRAWING NO.	
D		202	
SCALE		SHEET 3 OF 3	





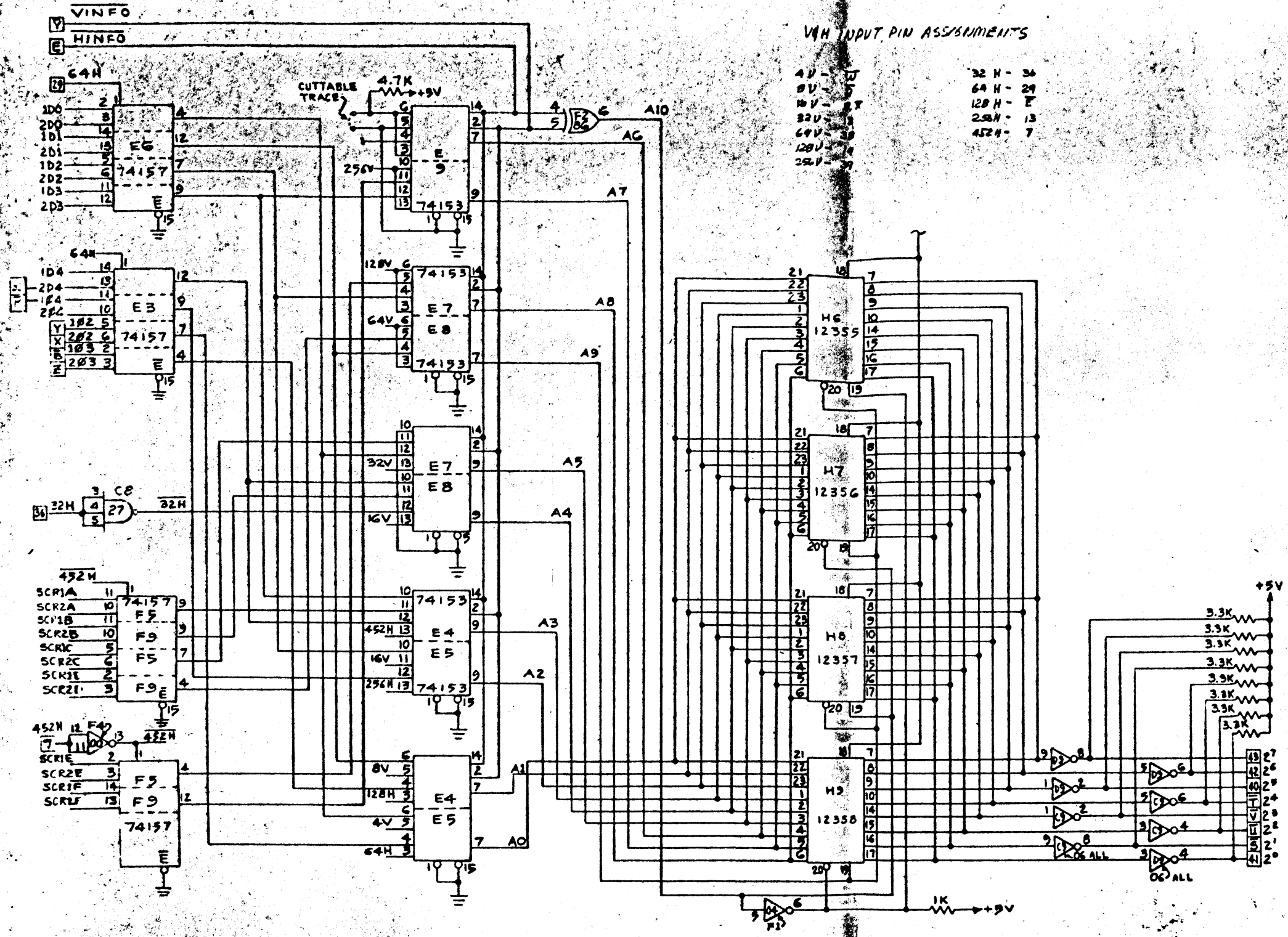
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MATERIAL		APPROVALS	DATE
FINISH		DRAWN 78	10-8-75
NEXT ASSY		CHECKED [initials]	10-22-75
USED ON		SCALE	D
APPLICATION		DO NOT SCALE DRAWING	DRAWING NO. 204
			SHEET 1 OF 2

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



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FRACTIONS	DECIMALS	ANGLES	
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		DRAWN <i>JJK</i>	10-2-75
		CHECKED <i>RE</i>	10-2-75
FINISH		FUN GAMES INC. OAKLAND CALIF.	
		SCHEMATIC MEMORY BOARD BI-PLANE	
SIZE	CODE IDENT NO.	DRAWING NO.	
D		204	A
DO NOT SCALE DRAWING		SHEET 2 OF 3	

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED



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PARTS LIST			
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= XX ±      °      ° = XXX ±      °      °		<b>FUN GAMES INC</b> <b>OAKLAND CALIF</b>	
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	204	
SCALE	SHEET 3 OF 3		A