

# **operation & service manual**



**DATA EAST USA, INC.**  
470 Needles Drive  
San Jose, CA 95112

780-0054-00  
January, 1987

**KARNOV**  
**OPERATION AND SERVICE MANUAL**  
UPRIGHT CABINET MODEL 1US28U

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## 2. SPECIFIC INFORMATION

### A. Game Adjustments.

SOUND VOLUME: The sound volume level is adjustable by turning the potentiometer VR1 on the main logic pcb until the desired volume level is attained. Turn the potentiometer clockwise to increase the sound volume.

POWER SUPPLY: The switching regulator's +5 volt output is adjustable by turning the potentiometer VR1. This adjustment should only be performed while measuring the +5 volts with a DIGITAL MULTIMETER at the LOGIC PCB, not at the switching regulator!

**CAUTION: THIS PROCEDURE SHOULD ONLY BE ATTEMPTED BY QUALIFIED SERVICE PERSONNEL DUE TO THE EXTREME RISK OF PERSONAL INJURY AND/OR DAMAGE TO THE GAME ELECTRONICS.**

POWER SWITCH AND FUSE INFORMATION: The Power Supply assembly features an ON/OFF mounted on the switch bracket and accessible from the lower rear of the cabinet. This switch must be in the OFF position before servicing the game electronics to prevent unwanted electrical shock. There are also two fuses mounted next to the ON/OFF switch. They are labeled as to their required ratings. In the event replacement is required, replace only with fast blow devices.

- \* The 3 AMP FAST BLOW fuse is on the 117 VAC line. In the event that this fuse should blow, all power to the game will be removed. Check all harnessing for proper connections and look for obvious damage to monitor, power supply, and logic pcb set before replacing the fuse and applying power.
- \* The 1 AMP FAST BLOW fuse is on the +12 VDC line between the switching regulator and the coin door lamps. In the event that this fuse should blow, the lamps will not be illuminated. Check for damaged coin door wiring and/or defective coin door lamps.

B. Operator selectable options.

The Karnov game allows for operator adjustable pricing, bonus lives, difficulty, etc. These are accessed by the two 8 position dipswitches located on the main logic pcb. Tables 1 and 2 outline the available options.

TABLE 1 - DIPSWITCH 1

		1	2	3	4	5	6	7	8
GAME CHARGE	1 COIN=1 CREDIT:	OFF	OFF						
COIN 1	1 COIN=2 CREDIT:	ON	OFF						
	1 COIN=3 CREDIT:	OFF	ON						
	2 COIN=1 CREDIT:	ON	ON						
GAME CHARGE	1 COIN=1 CREDIT:		OFF	OFF					
COIN 2	1 COIN=2 CREDIT:		ON	OFF					
	1 COIN=3 CREDIT:		OFF	ON					
	2 COIN=1 CREDIT:		ON	ON					
NOT USED - MUST BE OFF					OFF				
FLIP SCREEN	NO:					OFF			
	YES:					ON			
CABINET STYLE	TABLE:					OFF			
	UPRIGHT:					ON			
NO DIE MODE	NO:						OFF		
	YES:						ON		

TABLE 2 - DIPSWITCH 2

		1	2	3	4	5	6	7	8
NUMBER OF LIVES	THREE:	OFF	OFF						
	FIVE:	ON	OFF						
	ONE:	OFF	ON						
	INFINITE:	ON	ON						
NUMBER OF K FOR	50:		OFF	OFF					
BONUS LIFE	70:		ON	OFF					
	90:		OFF	ON					
	100:		ON	ON					
LEVEL OF	NORMAL:			OFF	OFF				
DIFFICULTY	EASY:			ON	OFF				
	HARD:			OFF	ON				
	VERY HARD:			ON	ON				
ATTRACT MODE	YES:					OFF			
SOUND	NO:					ON			
TIMER REDUCTION	NORMAL:						OFF		
SPEED	FAST:						ON		

#### 4. REPLACEMENT PARTS BREAKDOWN

##### FINAL ASSEMBLY, KARNOV U/R, 500-0020-00

ITEM	PART NUMBER	DESCRIPTION
1	365-0010-00	CABINET, GREY
2	510-0104-00	CONTROL PANEL ASSY., KARNOV
3	510-0065-00	MONITOR, UNIVERSAL, H/V.
4	510-0004-00	COIN DOOR ASSY.
5	510-0002-01	POWER SUPPLY ASSY., 11 AMP
6	510-0102-00	PCB SET, KARNOV
7	520-0083-00	PCB, EMI FILTER, DE-0239
8	170-0002-00	DUAL LAMPHOLDER ASSY.
9	165-0004-01	LAMP, INCANDESCENT, 40 W.
10	031-0004-00	SPEAKER, 8 OHM, 8 WATT, 4" DIA.
11	535-0009-00	RETAINER, PLEX
12	830-0030-00	PLEX, MARQUEE, KARNOV
13	660-0001-01	PLEX, MONITOR, CLEAR, 23.75 X 23.75
14	810-0021-00	UNDERLAY, MONITOR, KARNOV
15	380-0002-00	BEZEL, MONITOR, BLACK
16	036-0116-00	HARNESS, MAIN, STD 1P.
17	780-0054-00	MANUAL, SERVICE & OPERATION
18	820-0036-00	DECAL, SIDE, GEN.
19	406-0047-00	LABEL, INSTRUCTION

##### CONTROL PANEL ASSEMBLY, KARNOV, 510-0104-00

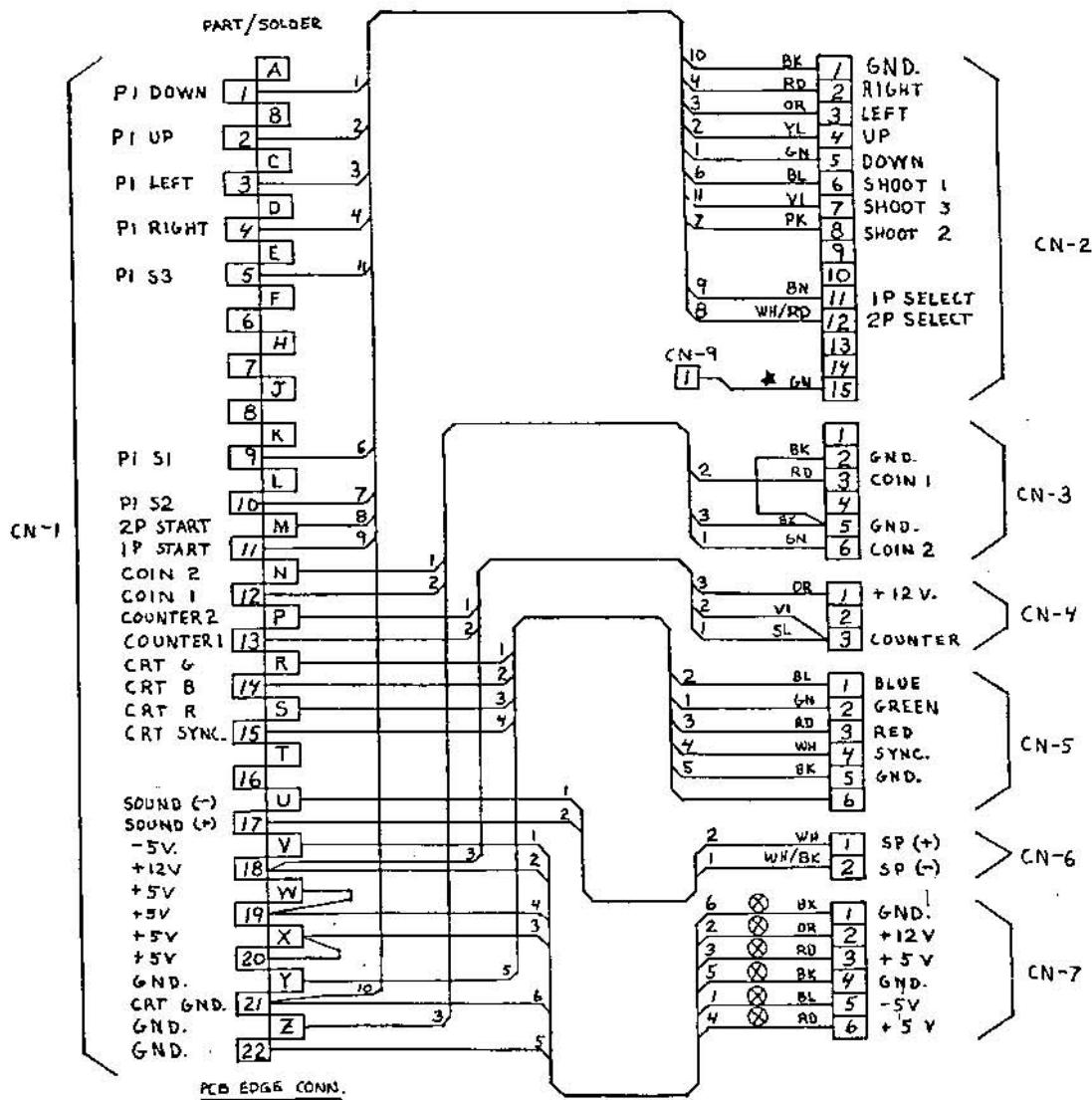
ITEM	PART NUMBER	DESCRIPTION
1	535-0063-02	CONTROL PANEL, BARE
2	800-0026-00	CONTROL PANEL OVERLAY, KARNOV
3	350-0016-04	PUSHBUTTON ASSY, YELLOW
4	350-0016-02	PUSHBUTTON ASSY, RED
5	350-0016-06	PUSHBUTTON ASSY, BLUE
6	350-0016-09	PUSHBUTTON ASSY, WHITE
7	450-0003-00	JOYSTICK ASSY., 8 WAY, CC.
8	036-0115-03	HARNESS, CONTROL PANEL, 1P/2P 3 SHOOT

##### POWER SUPPLY ASSEMBLY, STANDARD, 510-0002-01

ITEM	PART NUMBER	DESCRIPTION
1	515-0003-00	CHASSIS, WOOD
2	515-0002-00	POWER CORD
3	010-0001-00	TRANSFORMER, ISOLATION
4	001-0012-00	SWITCHING REGULATOR, 11A
5	515-0004-00	SWITCH BRACKET ASSY.
6	150-0004-00	NOISE FILTER

## 4. WIRING INFORMATION

### A. Main Harness wiring diagram.



B. Edge connector pin-out.

The Karnov pcb has a 56 pin JAMMA standard edge connector. Data East adds a suitable EMI filter pcb to make the game comply with FCC regulations and adapt to the Data East harness pin-out configuration.

The edge connector pin-out diagram below represents the JAMMA standard used on the actual game pcb, the one on page 9 is the Data East style harness pin-out used on the EMI filter pcb.

**JAMMA EDGE CONNECTOR PIN-OUT**

KARNOV PCB EDGE CONNECTOR, CN-3

SOLDER SIDE	PIN NUMBER	COMPONENT SIDE
GROUND	A 1	GROUND
GROUND	B 2	GROUND
+ 5 VOLTS	C 3	+ 5 VOLTS
+ 5 VOLTS	D 4	+ 5 VOLTS
- 5 VOLTS N/A	E 5	- 5 VOLTS N/A
+12 VOLTS	F 6	+12 VOLTS
BLOCKING KEY	H 7	BLOCKING KEY
COIN COUNTER 2	J 8	COIN COUNTER 1
	K 9	
SPEAKER (-)	L 10	SPEAKER (+)
	M 11	
VIDEO GREEN	N 12	VIDEO RED
VIDEO SYNC	P 13	VIDEO BLUE
SERVICE SWITCH	R 14	VIDEO GROUND
	S 15	
COIN SWITCH 2	T 16	COIN SWITCH 1
START SWITCH 2	U 17	START SWITCH 1
2P CONTROL 1 UP	V 18	1P CONTROL 1 UP
2P CONTROL 2 DOWN	W 19	1P CONTROL 2 DOWN
2P CONTROL 3 LEFT	X 20	1P CONTROL 3 LEFT
2P CONTROL 4 RIGHT	Y 21	1P CONTROL 4 RIGHT
2P CONTROL 5 PUSH 1	Z 22	1P CONTROL 5 PUSH 1
2P CONTROL 6 PUSH 2	a 23	1P CONTROL 6 PUSH 2
2P CONTROL 7 PUSH 3	b 24	1P CONTROL 7 PUSH 3
	c 25	
	d 26	
GROUND	e 27	GROUND
GROUND	f 28	GROUND

**DATA EAST EDGE CONNECTOR PIN-OUT**

EDGE CONNECTOR, EMI FILTER PCB: DE-0239-0

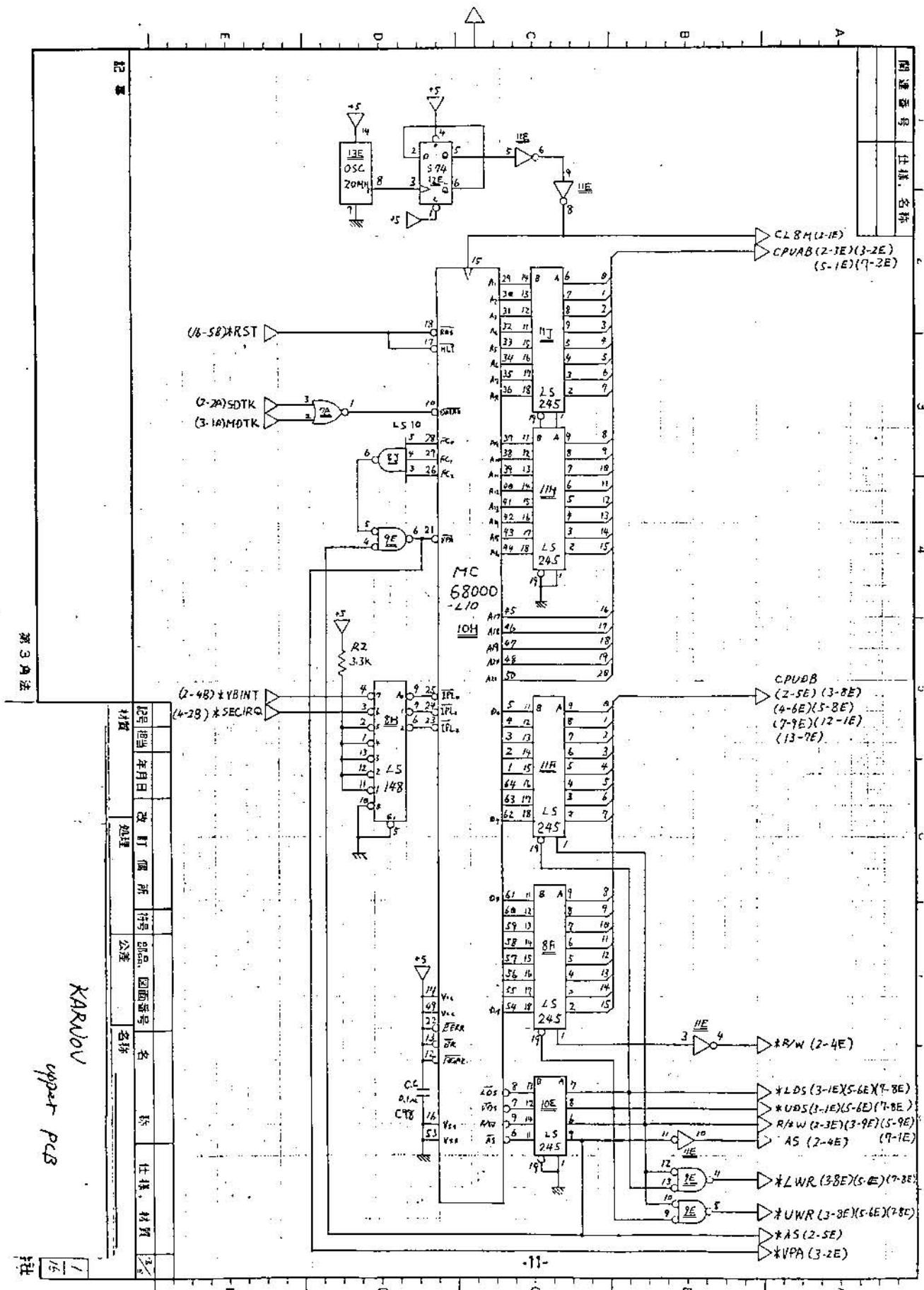
SOLDER SIDE	PIN NUMBERS	COMPONENT SIDE
2P CONTROL 2 DOWN	A 1	1P CONTROL 2 DOWN
2P CONTROL 1 UP	B 2	1P CONTROL 1 UP
2P CONTROL 3 LEFT	C 3	1P CONTROL 3 LEFT
2P CONTROL 4 RIGHT	D 4	1P CONTROL 4 RIGHT
2P CONTROL 7 PUSH 3	E 5	1P CONTROL 7 PUSH 3
	F 6	
	H 7	
TEST SWITCH	J 8	SERVICE SWITCH
2P CONTROL 5 PUSH 1	K 9	1P CONTROL 5 PUSH 1
2P CONTROL 6 PUSH 2	L 10	1P CONTROL 6 PUSH 2
2P START SWITCH	M 11	1P START SWITCH
COIN SWITCH 2	N 12	COIN SWITCH 1
COIN COUNTER 2	P 13	COIN COUNTER 1
VIDEO BLUE	R 14	VIDEO GREEN
VIDEO SYNC	S 15	VIDEO RED
	T 16	
SPEAKER (-)	U 17	SPEAKER (+)
- 5 VOLTS	V 18	+ 12 VOLTS
+ 5 VOLTS	W 19	+ 5 VOLTS
+ 5 VOLTS	X 20	+ 5 VOLTS
GROUND	Y 21	GROUND
GROUND	Z 22	GROUND

## 5. PCB SCHEMATICS

### WARNING:

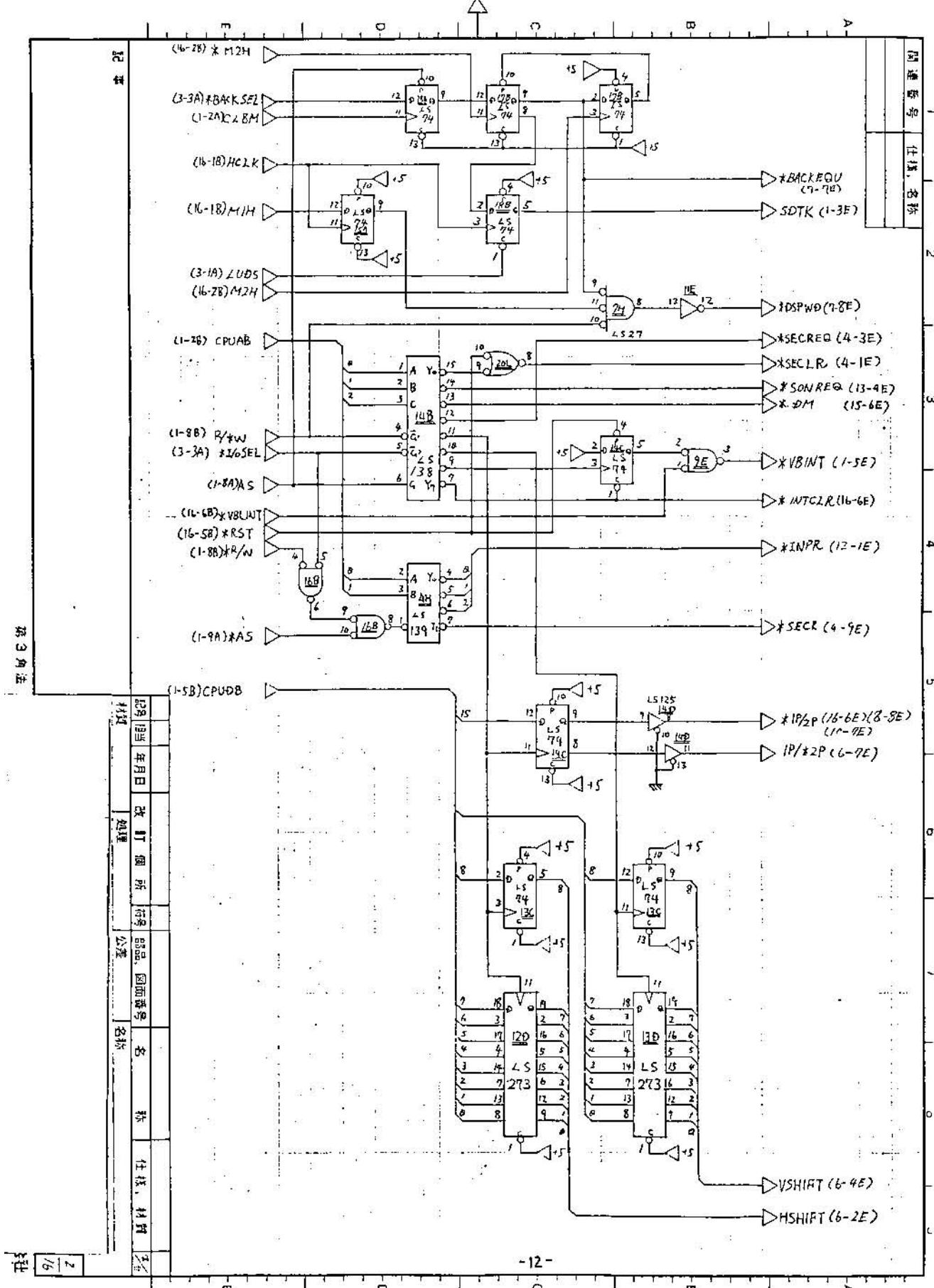
DUE TO THE MULTI-LAYER PRINTED CIRCUIT BOARDS USED ON THIS GAME, DATA EAST RECOMMENDS SERVICE BE PERFORMED ONLY BY QUALIFIED TECHNICIANS WITH THE EQUIPMENT REQUIRED FOR THE SERVICING OF MULTI-LAYER PRINTED CIRCUIT BOARDS.

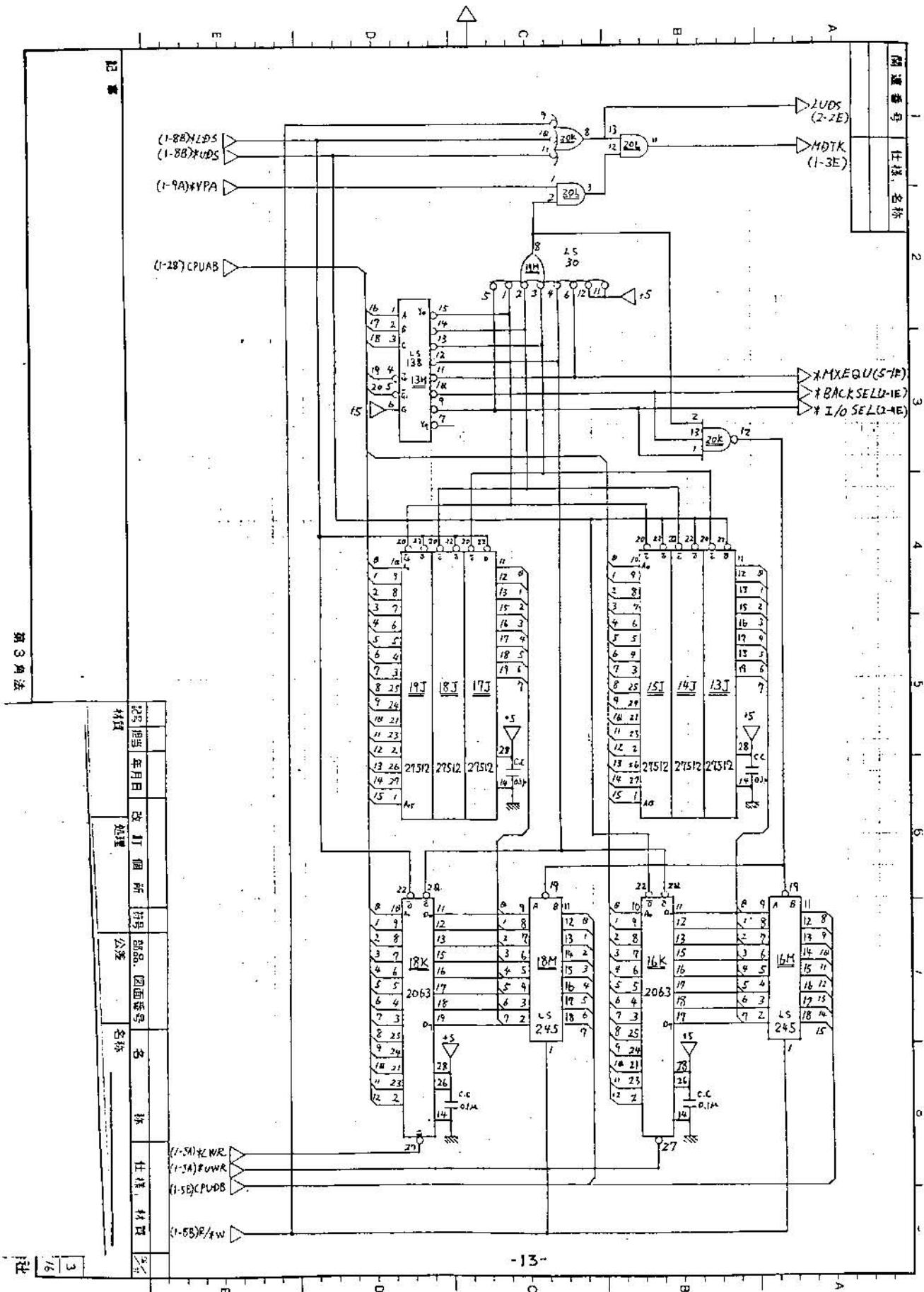
ATTEMPTS TO SERVICE MULTI-LAYER PRINTED CIRCUIT BOARDS USING CONVENTIONAL DE-SOLDERING EQUIPMENT MAY RESULT IN PERMANENT DAMAGE TO THE PRINTED TRACES AND VOID YOUR WARRANTY.

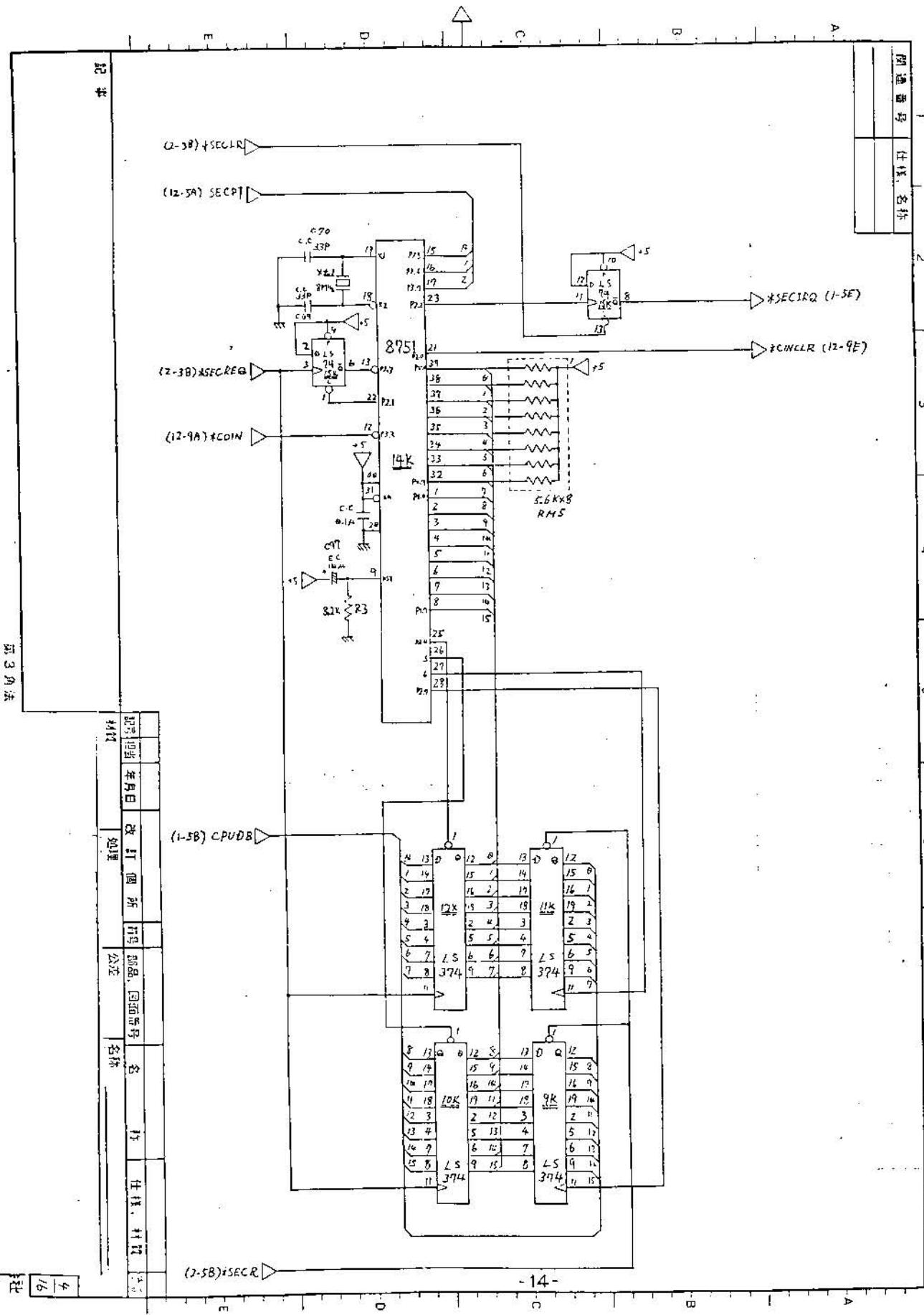


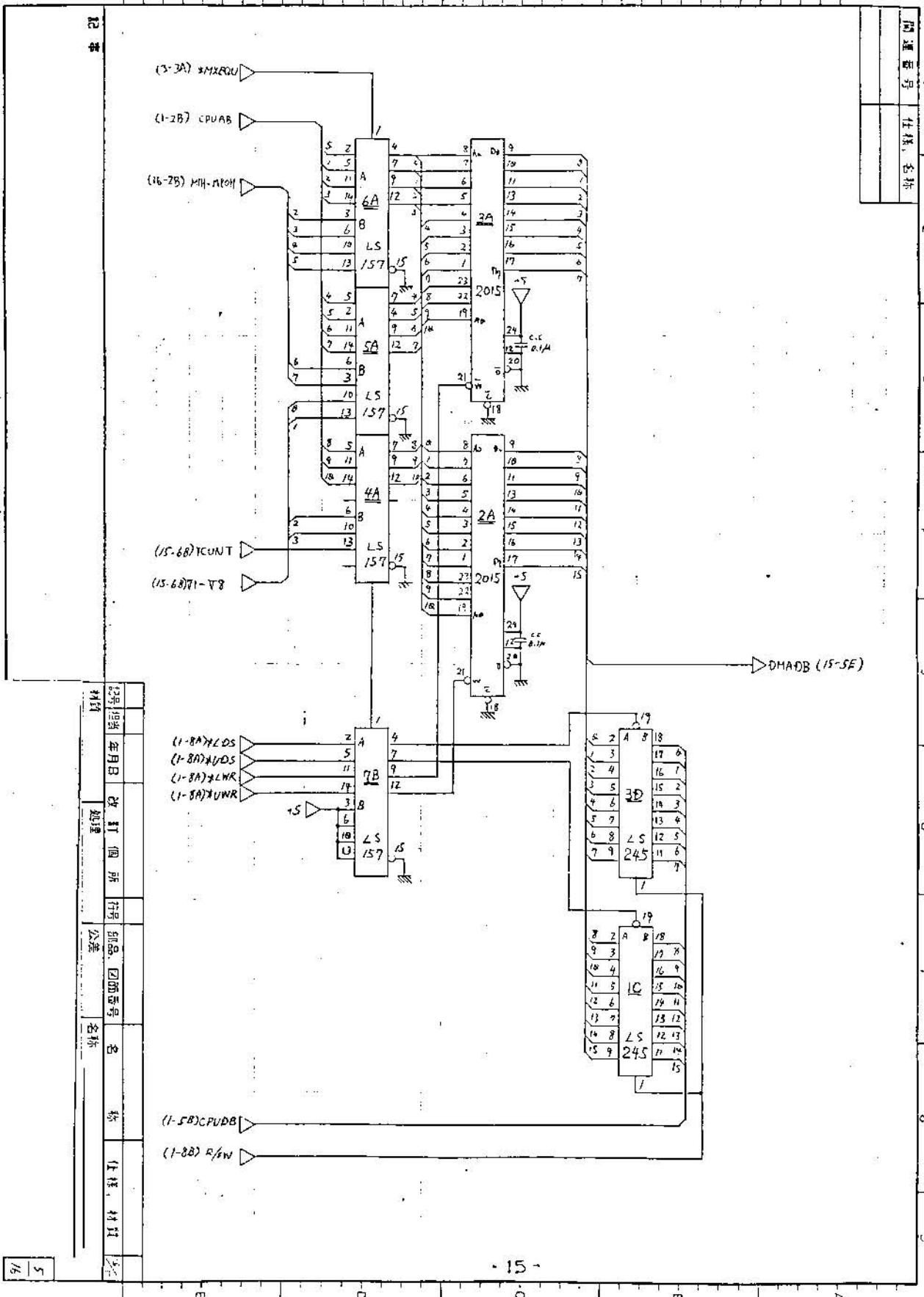
upper PCB

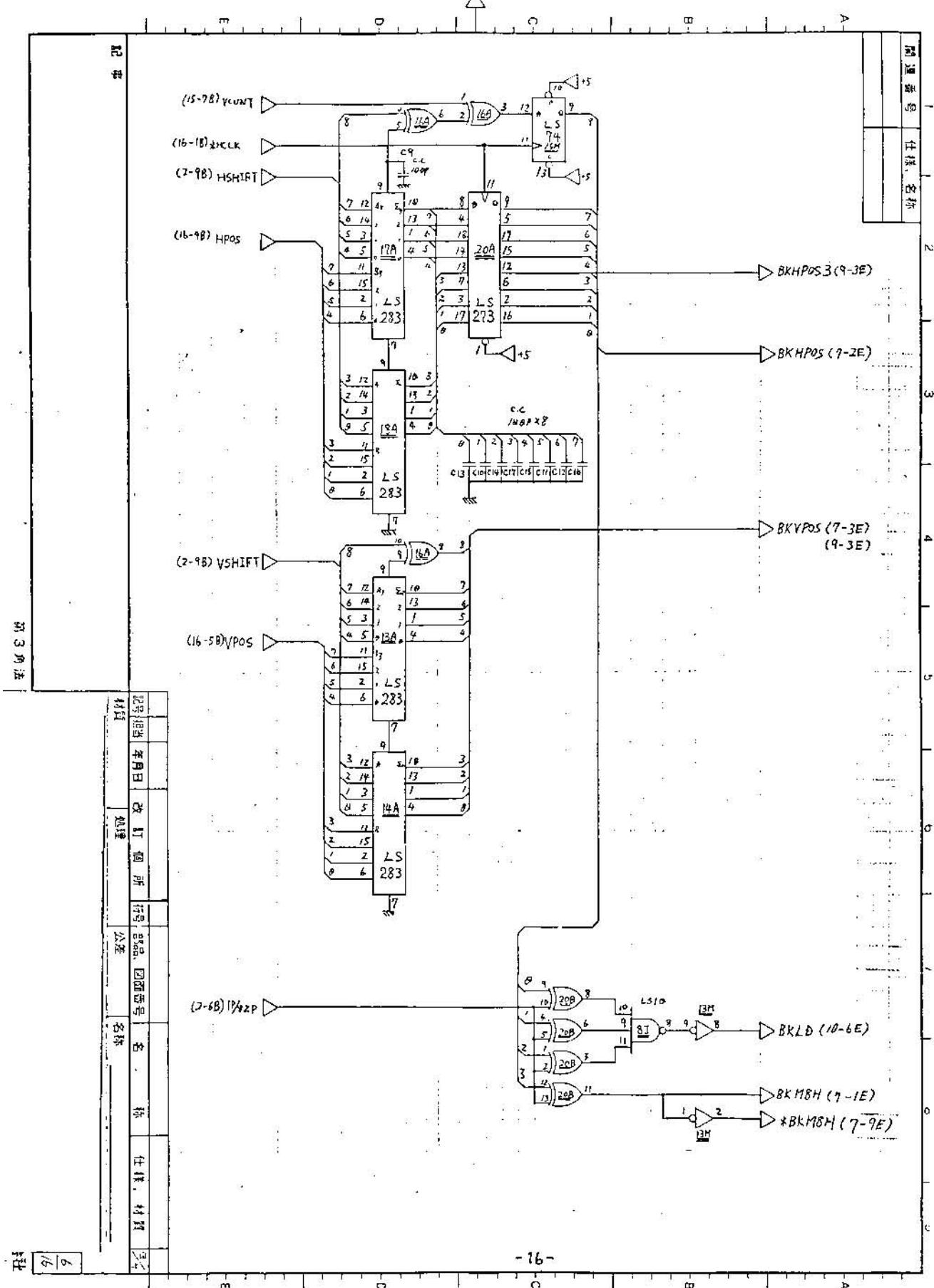
KARNOV

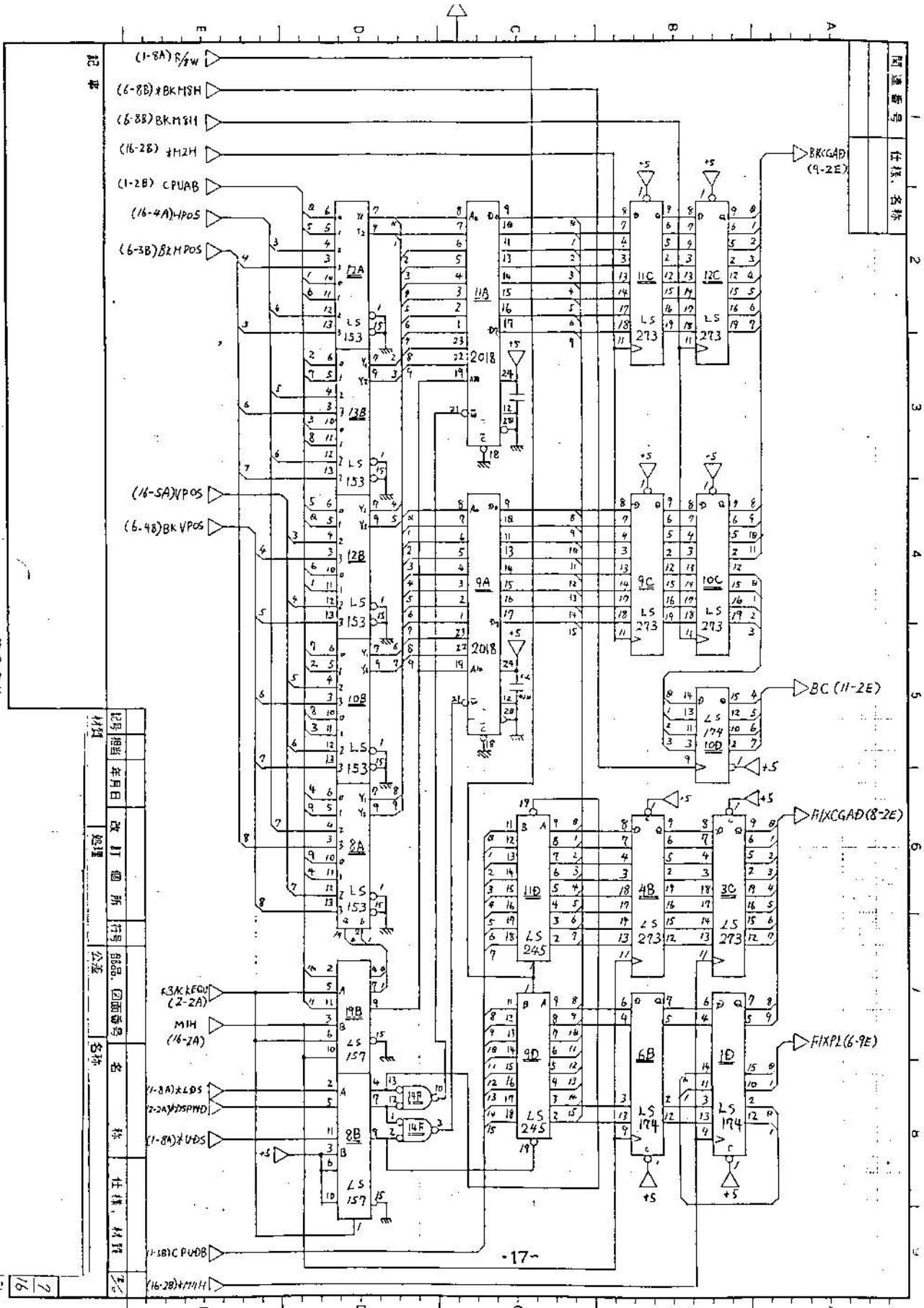


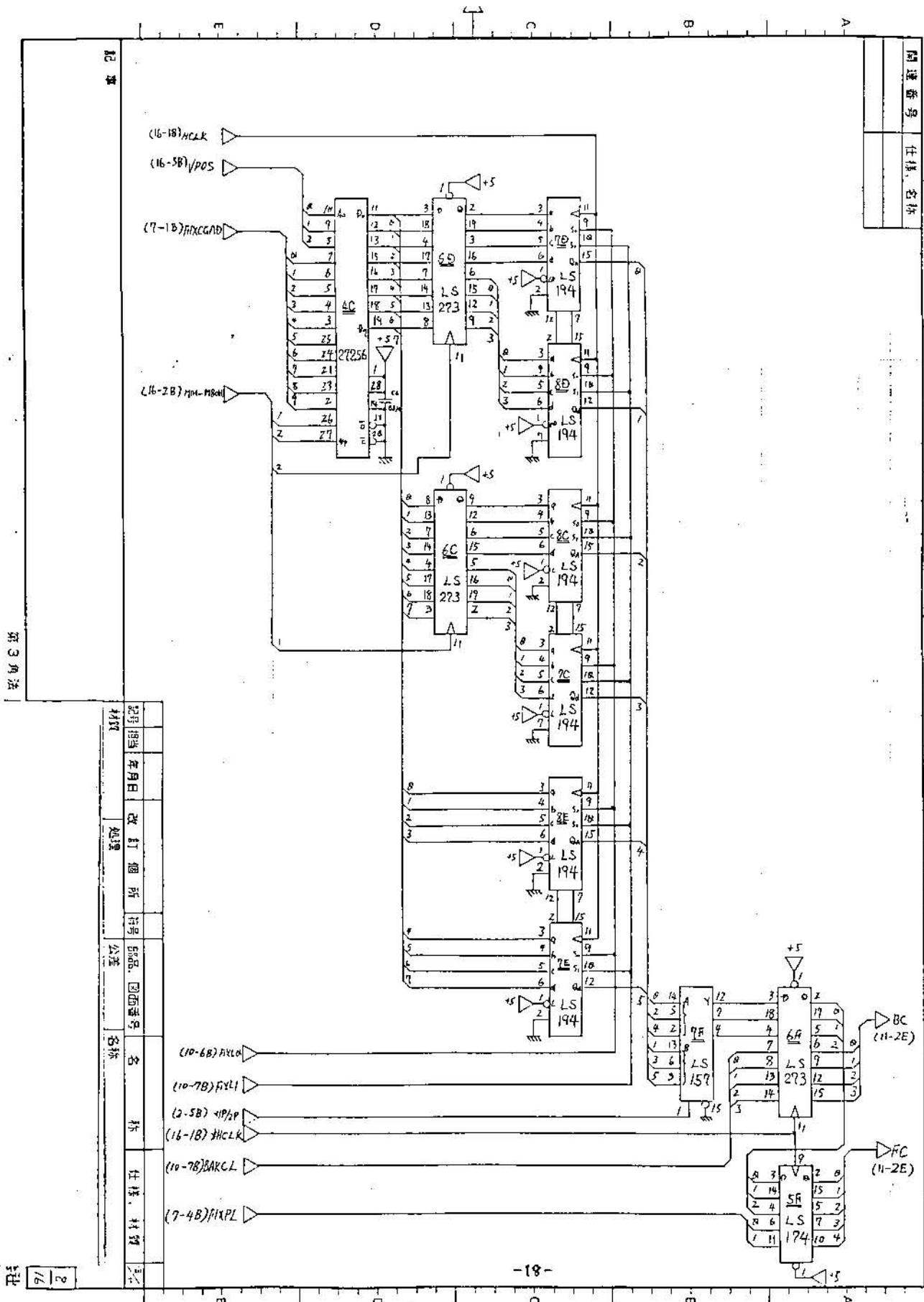


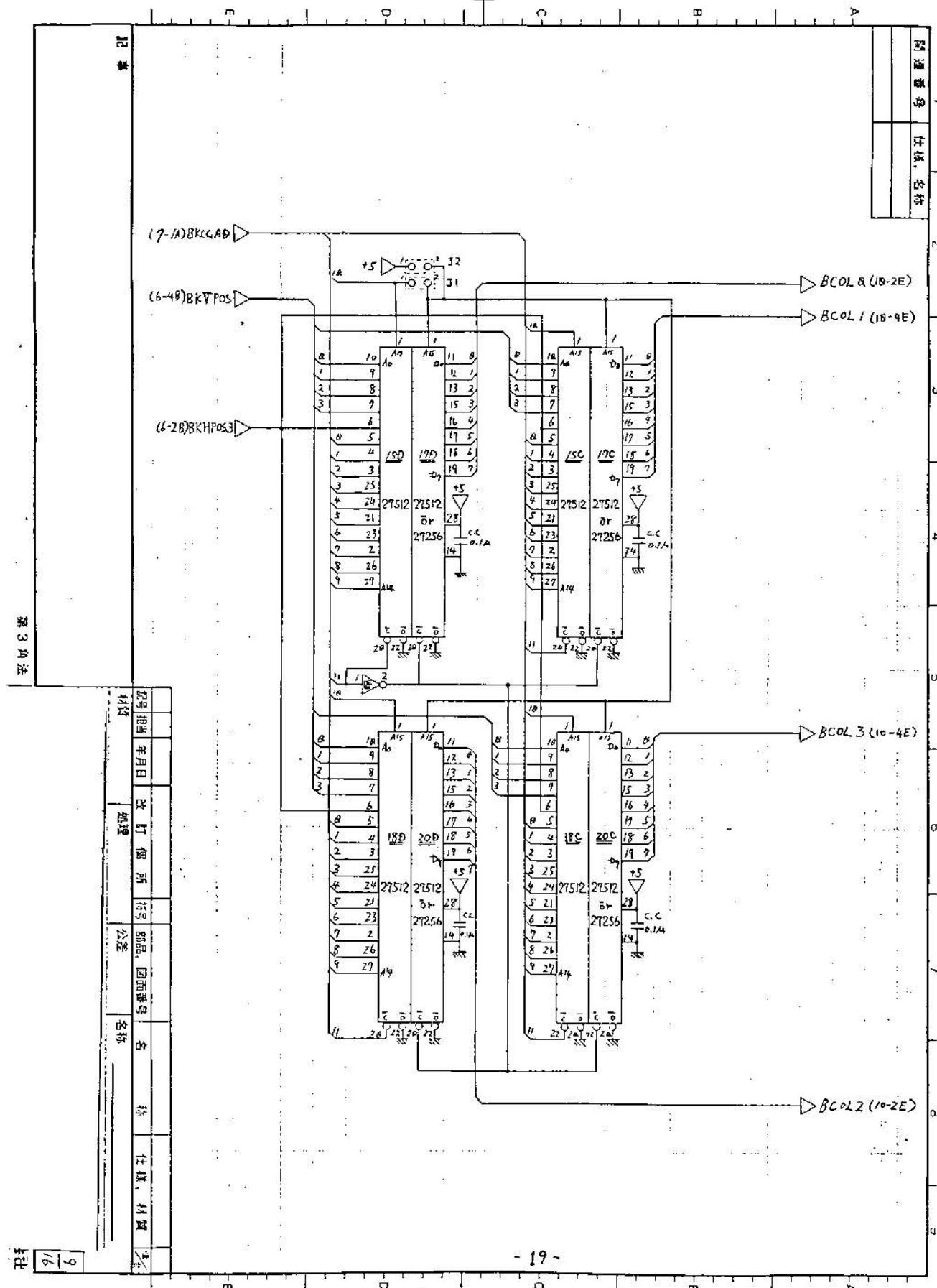


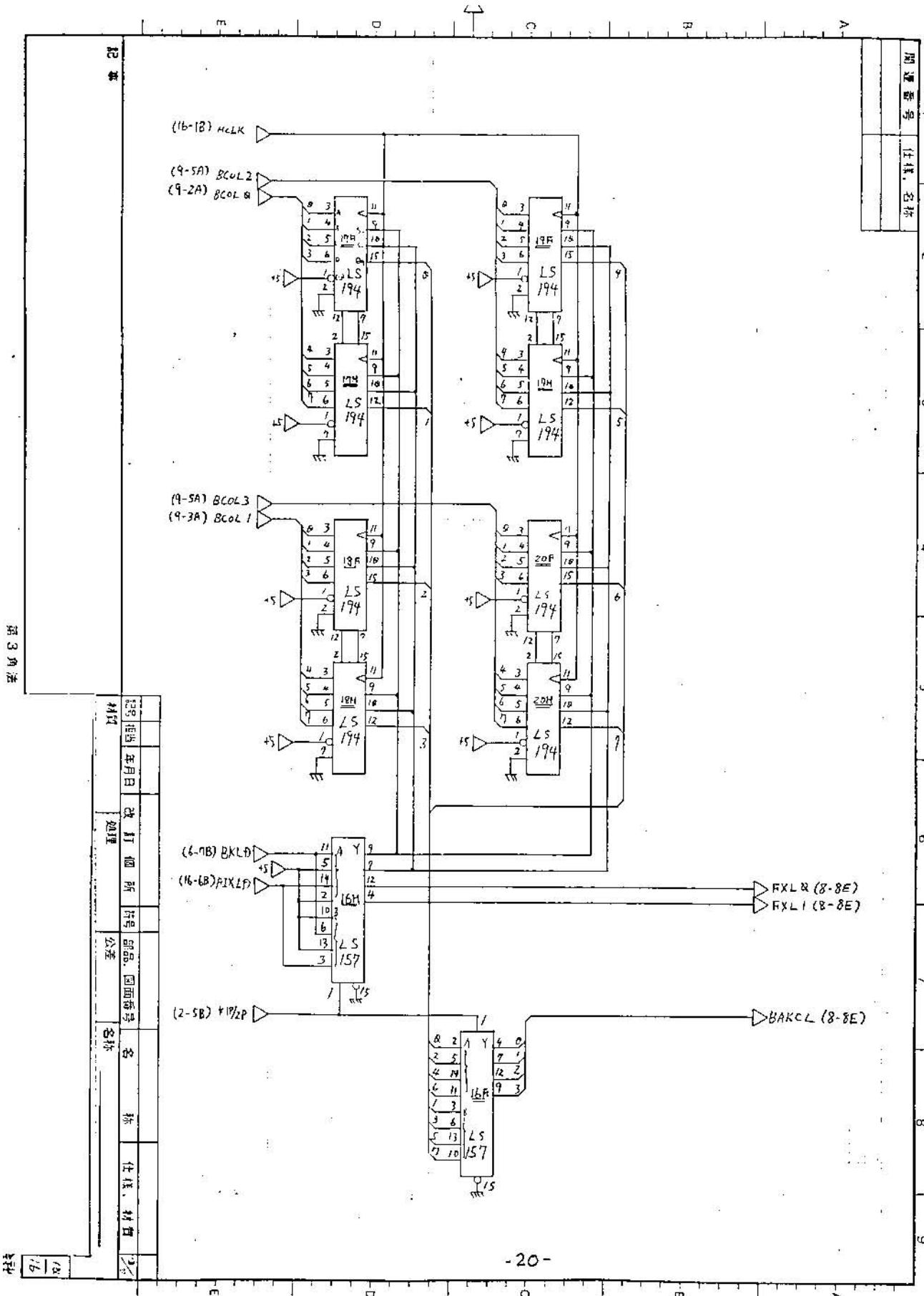


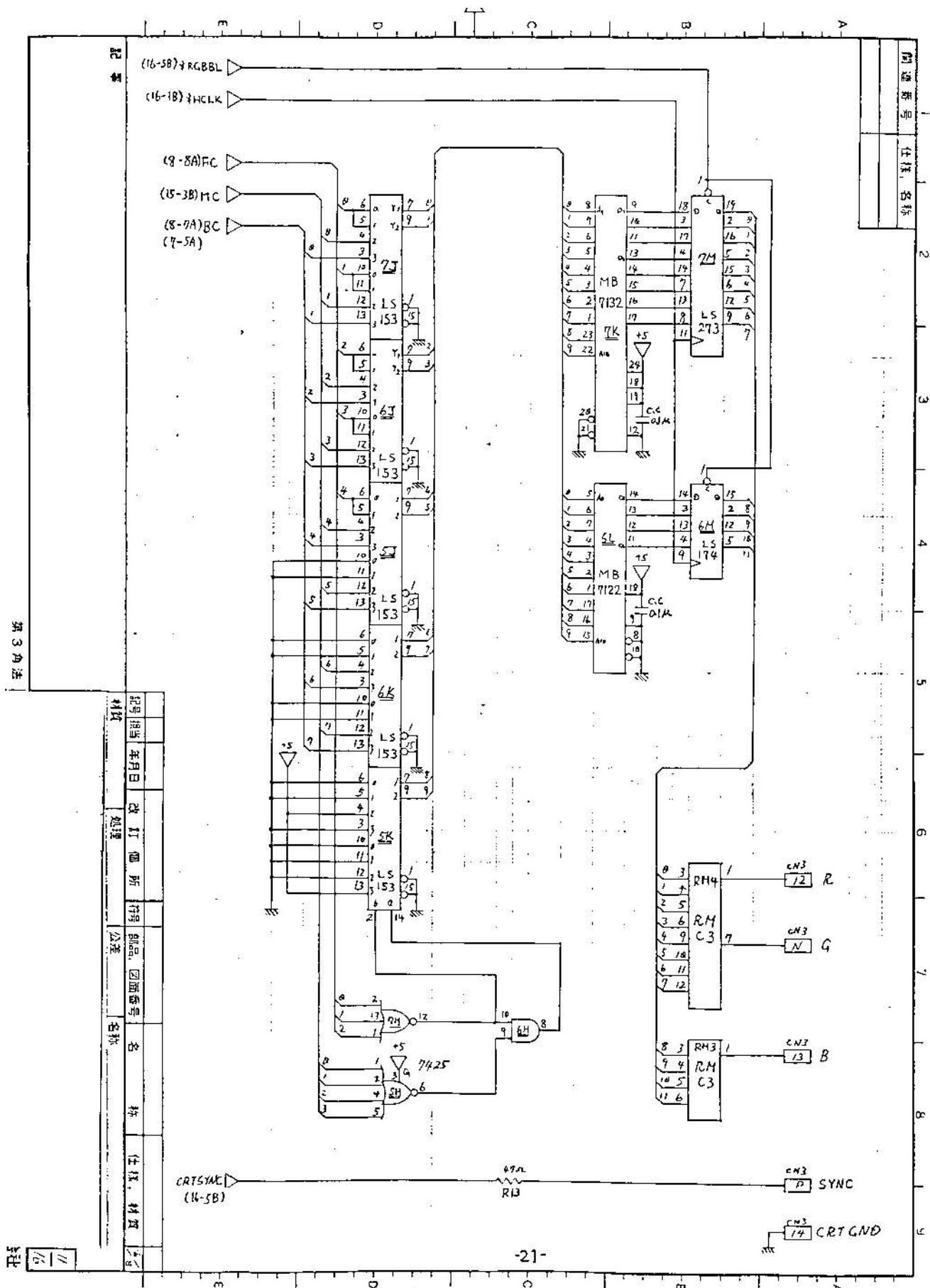


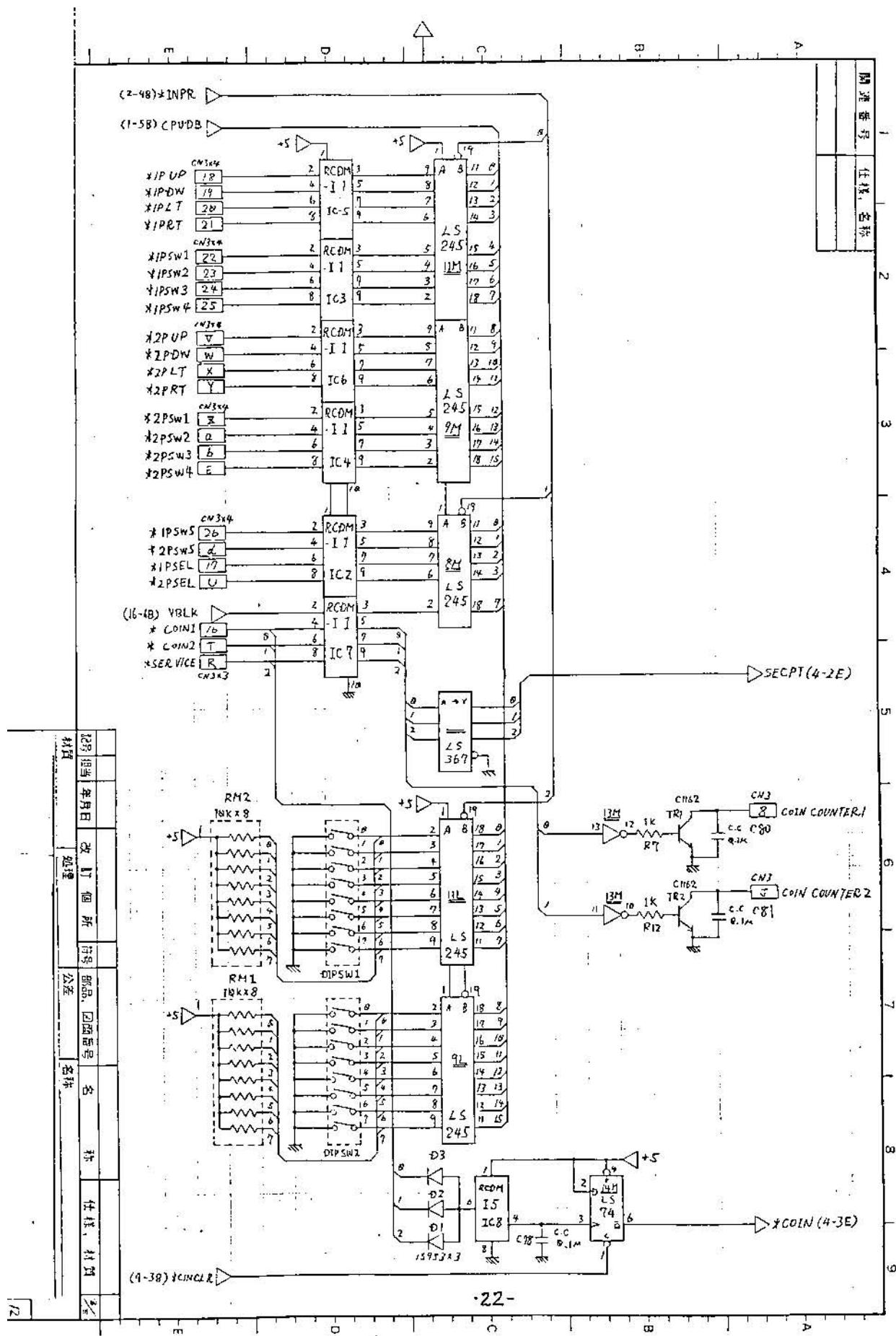


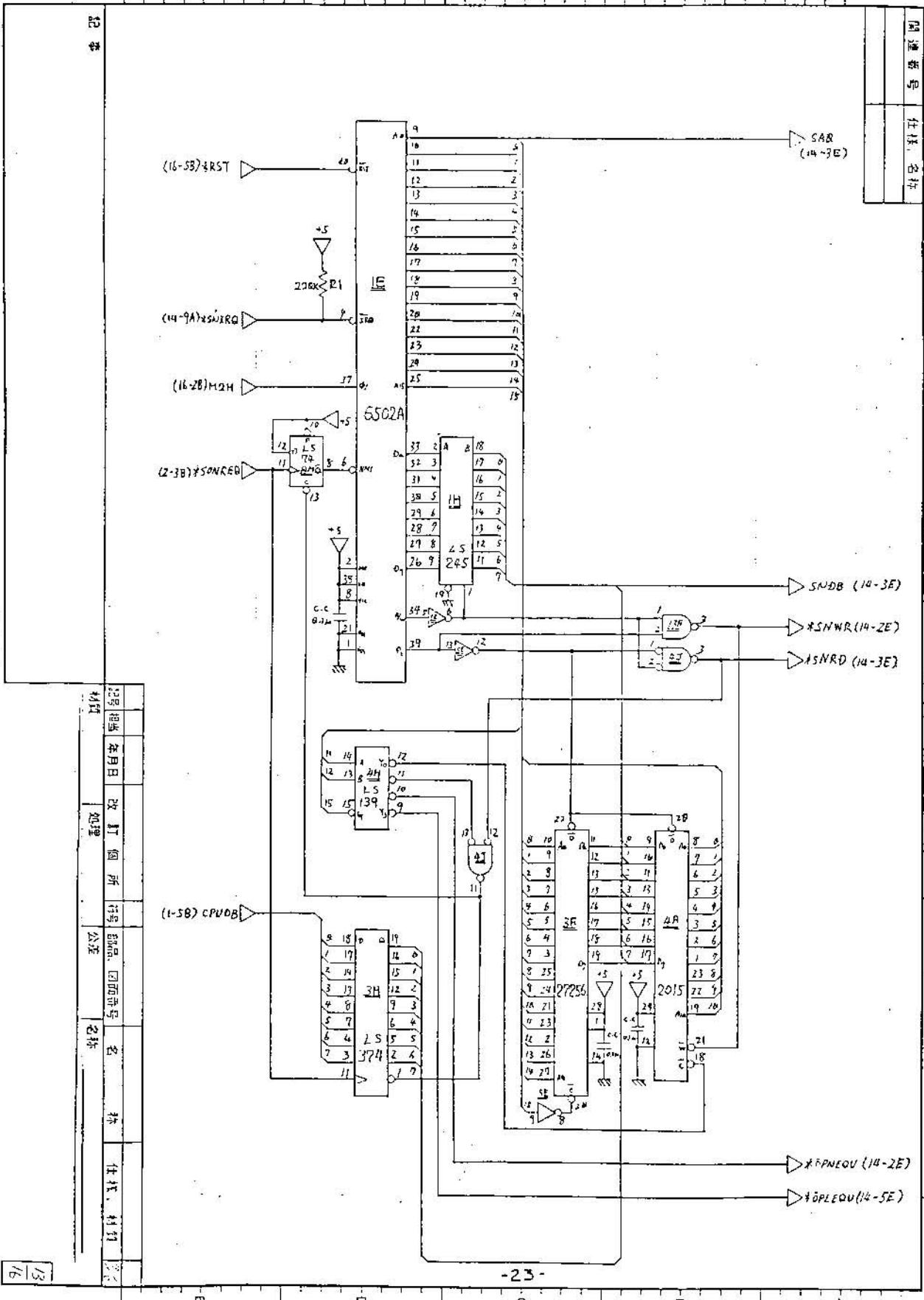






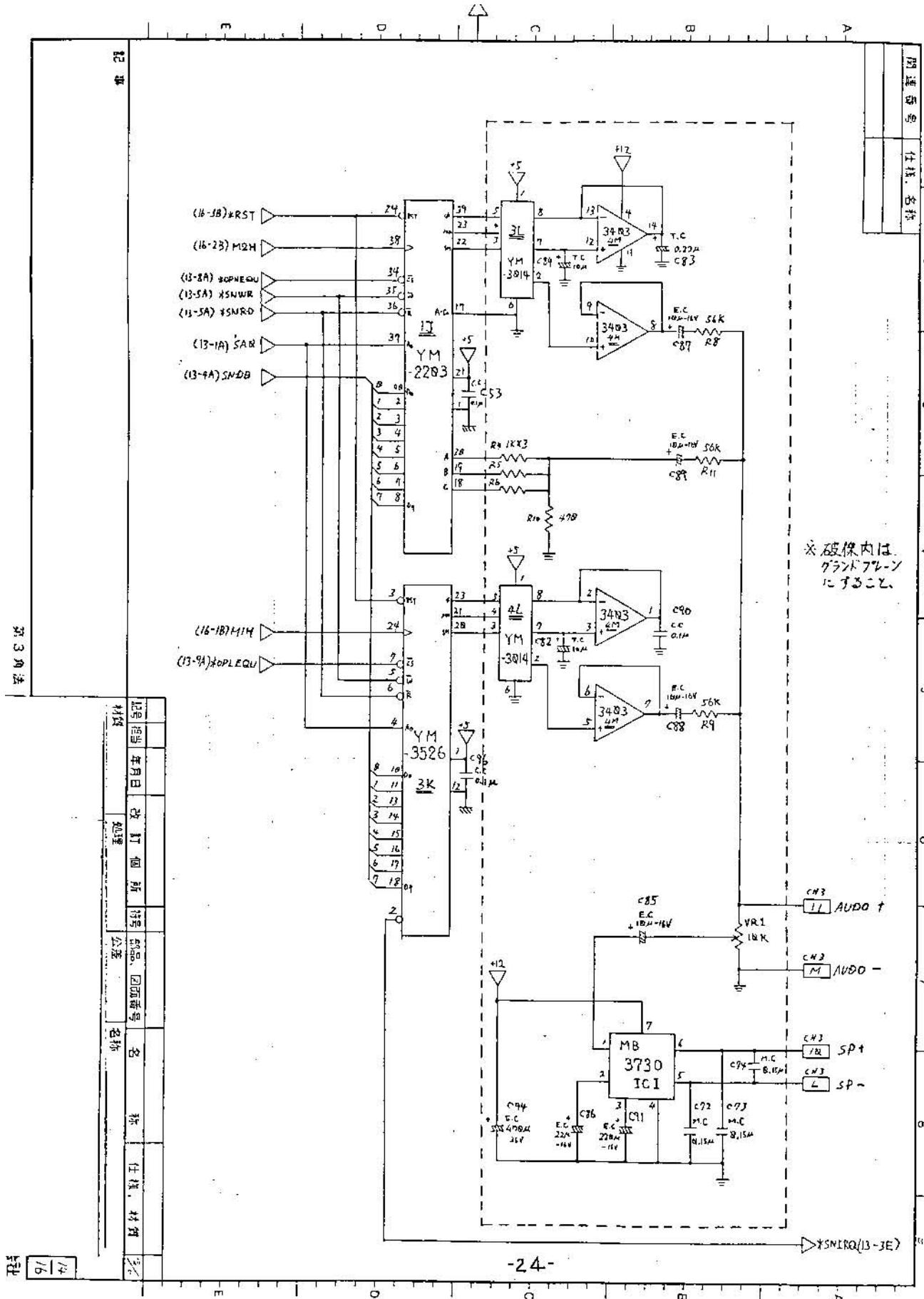


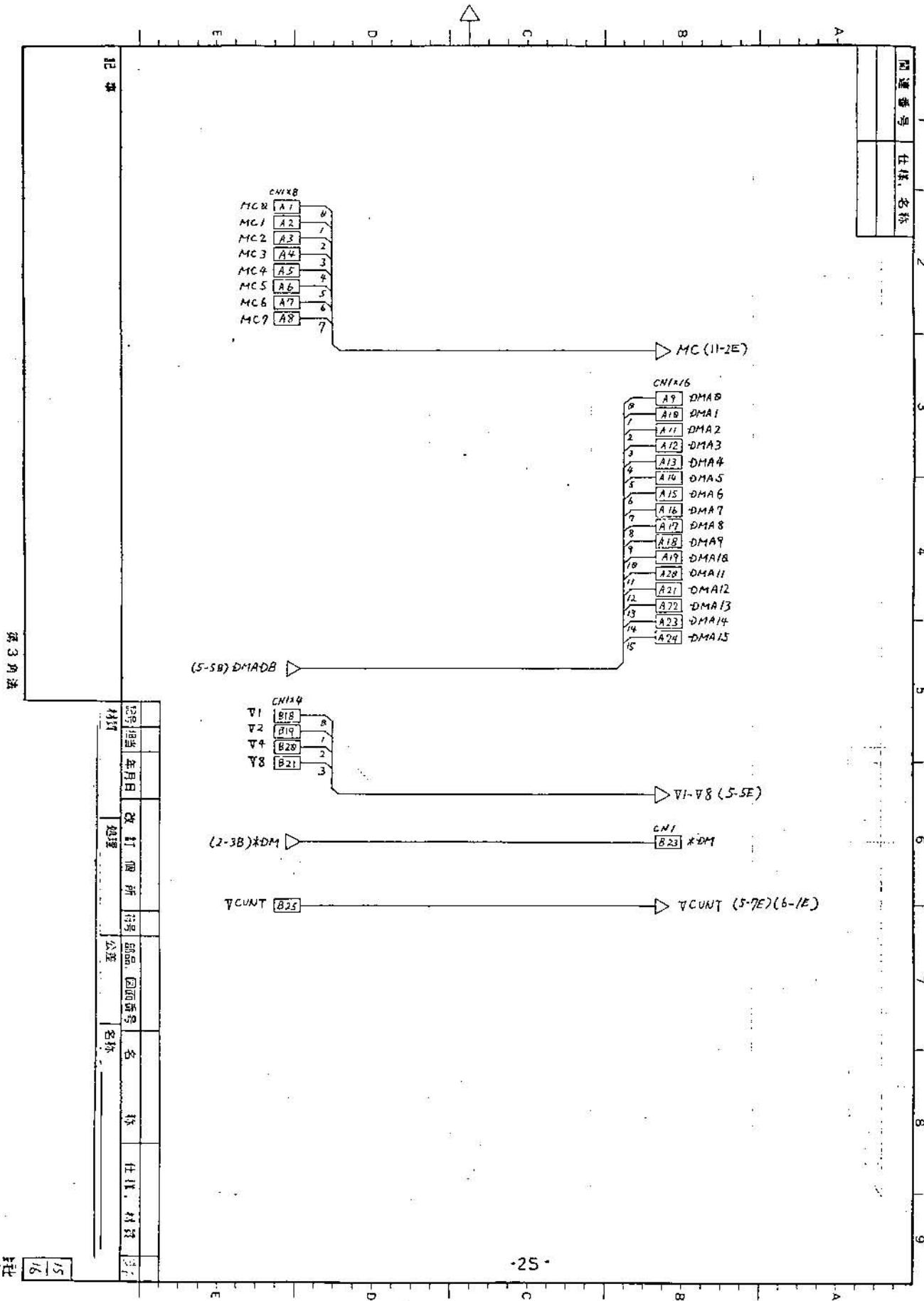




第3方法

記号	機器	年月日	改訂	圖面所	符号	部品、回路番号	名	格	仕様、付属



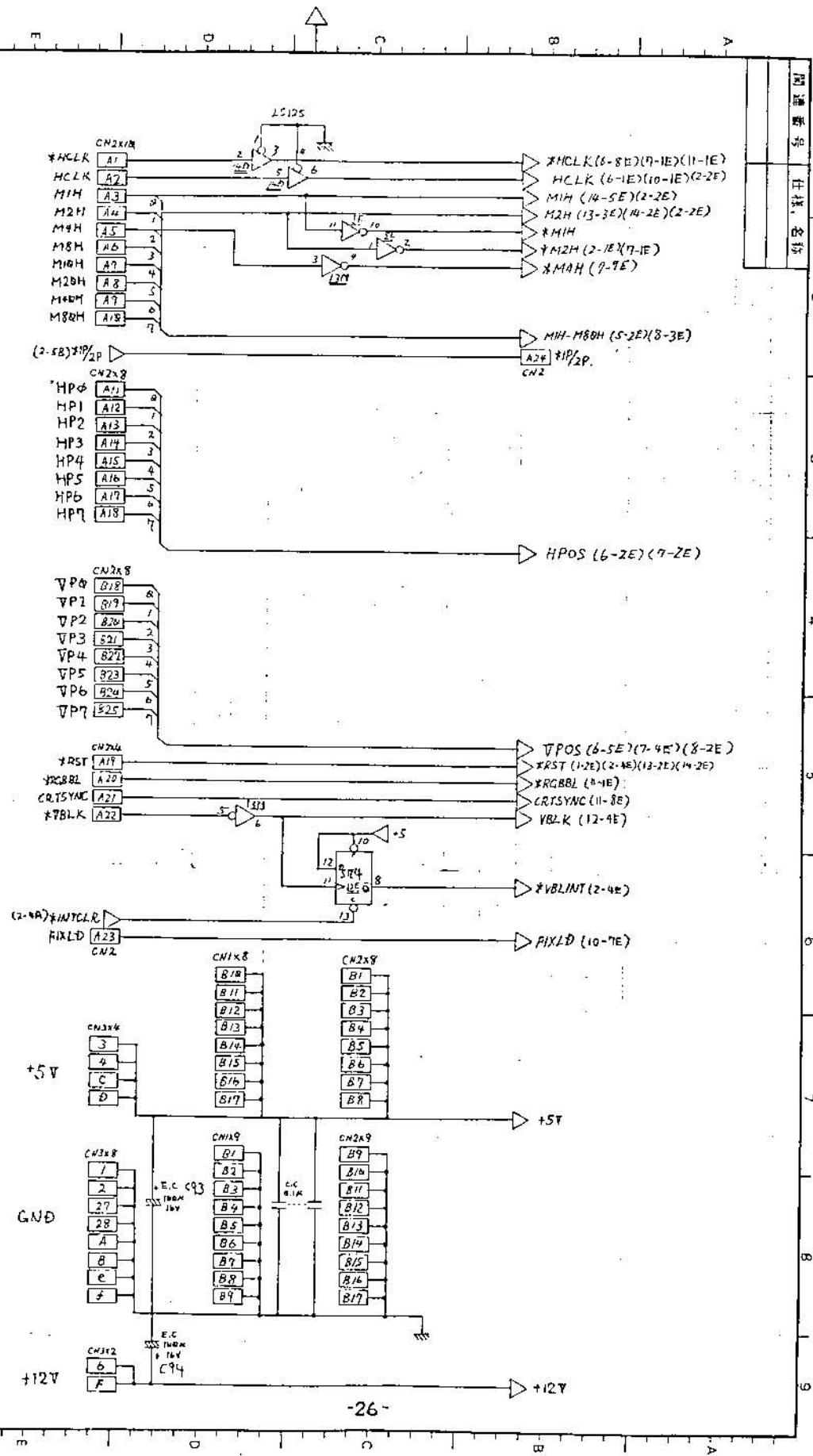


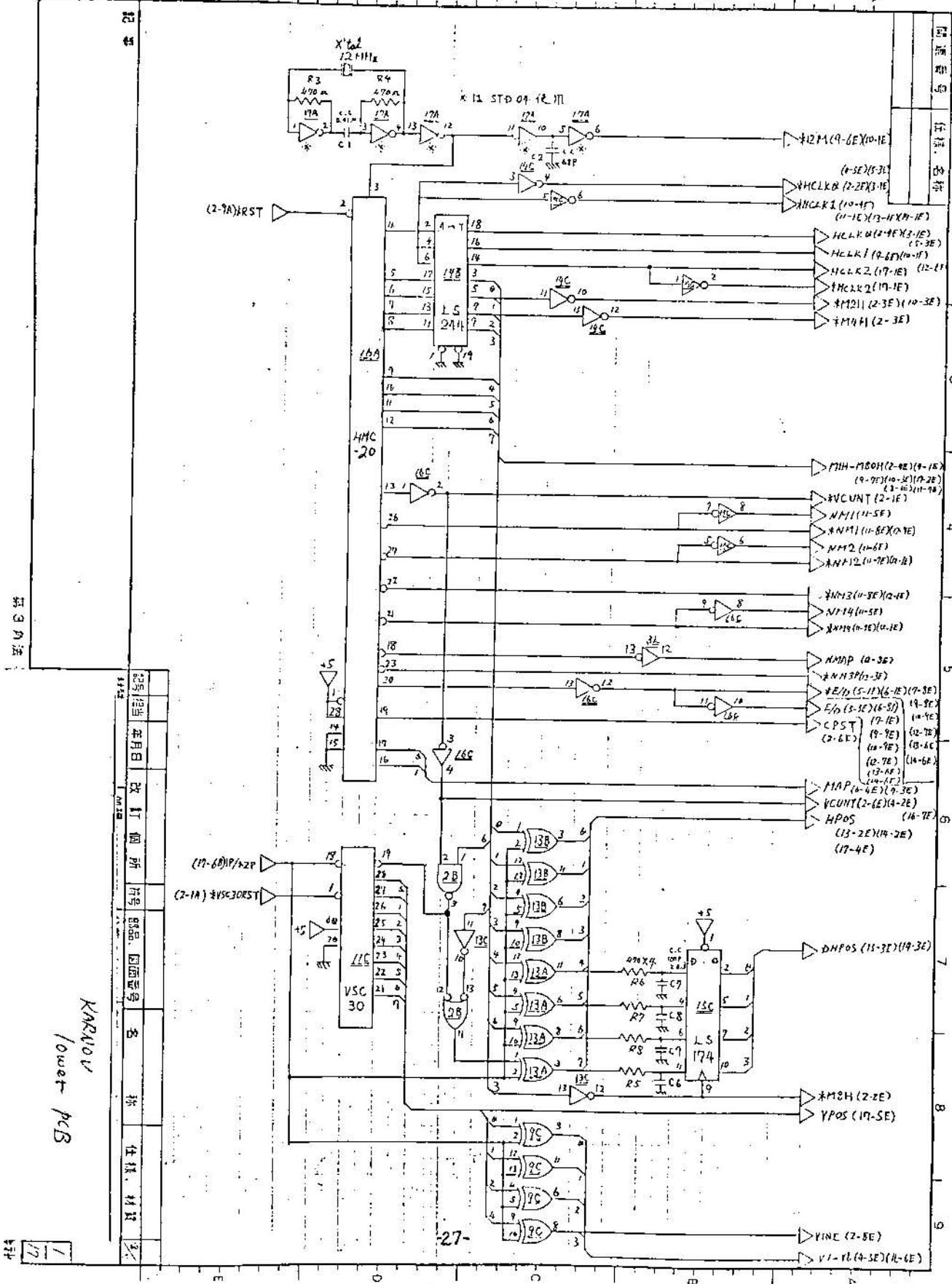
回路番号 仕様、名稱

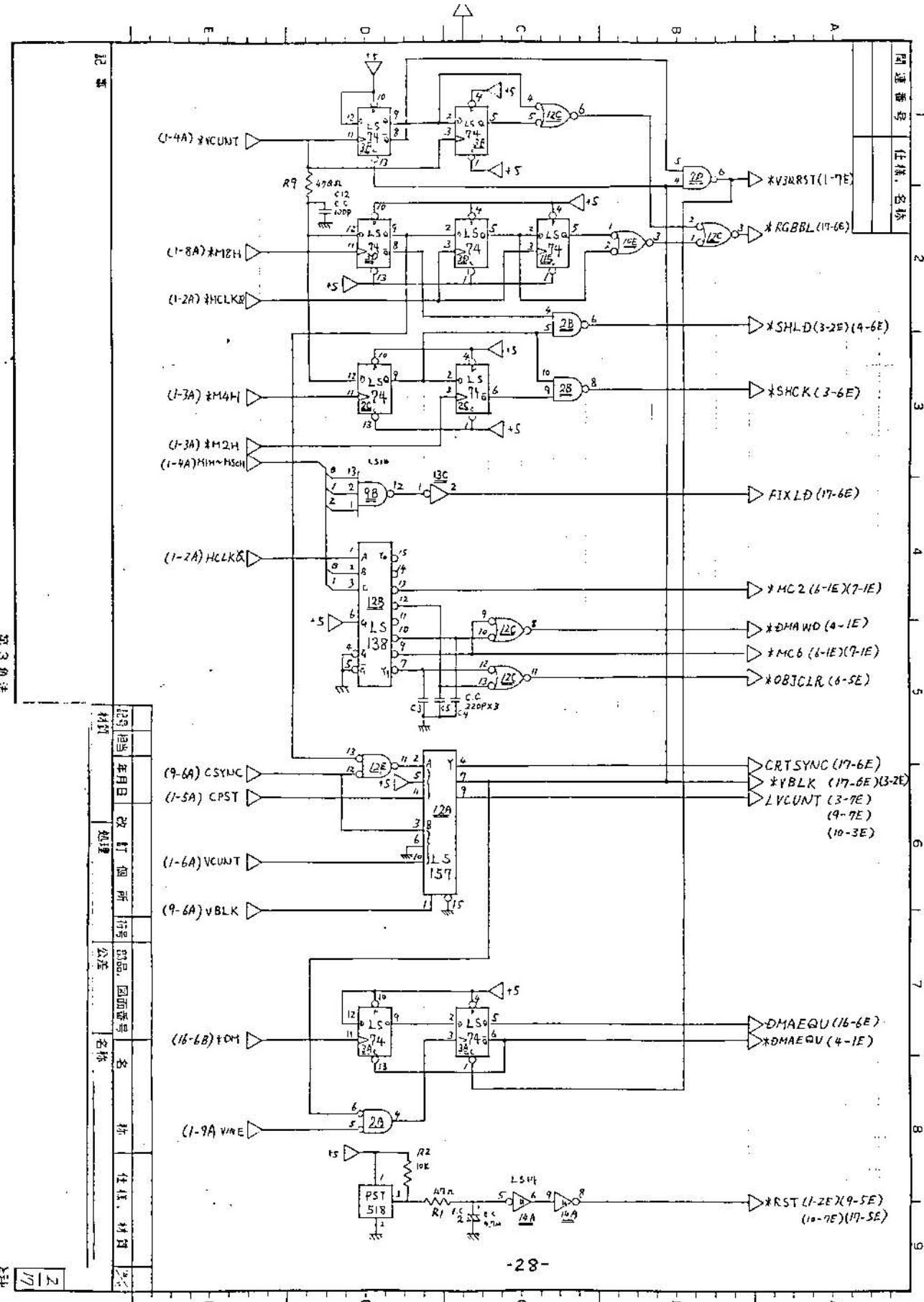
第3角法

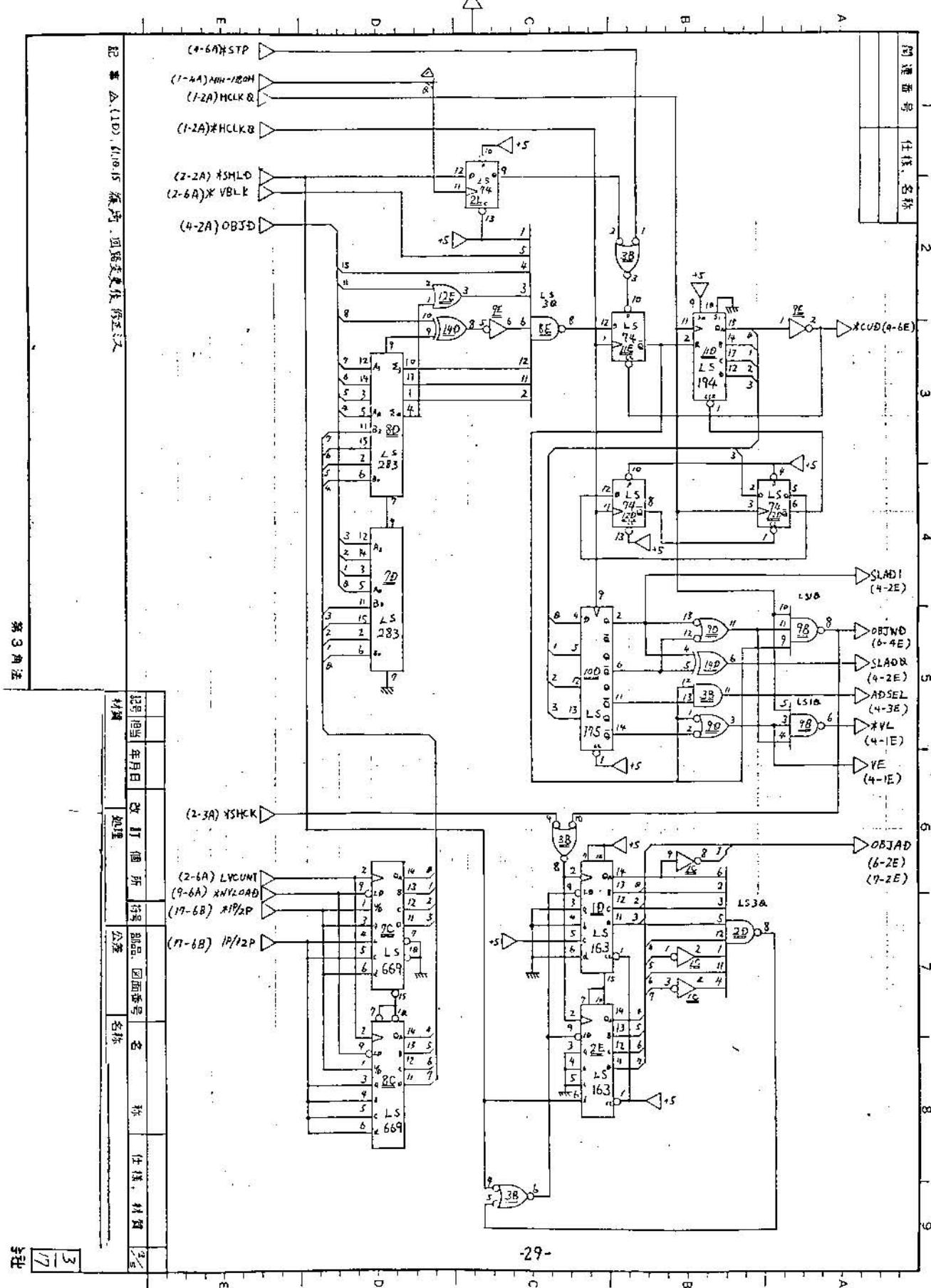
機器	部品	回路番号	仕様、名稱
材質	處理		

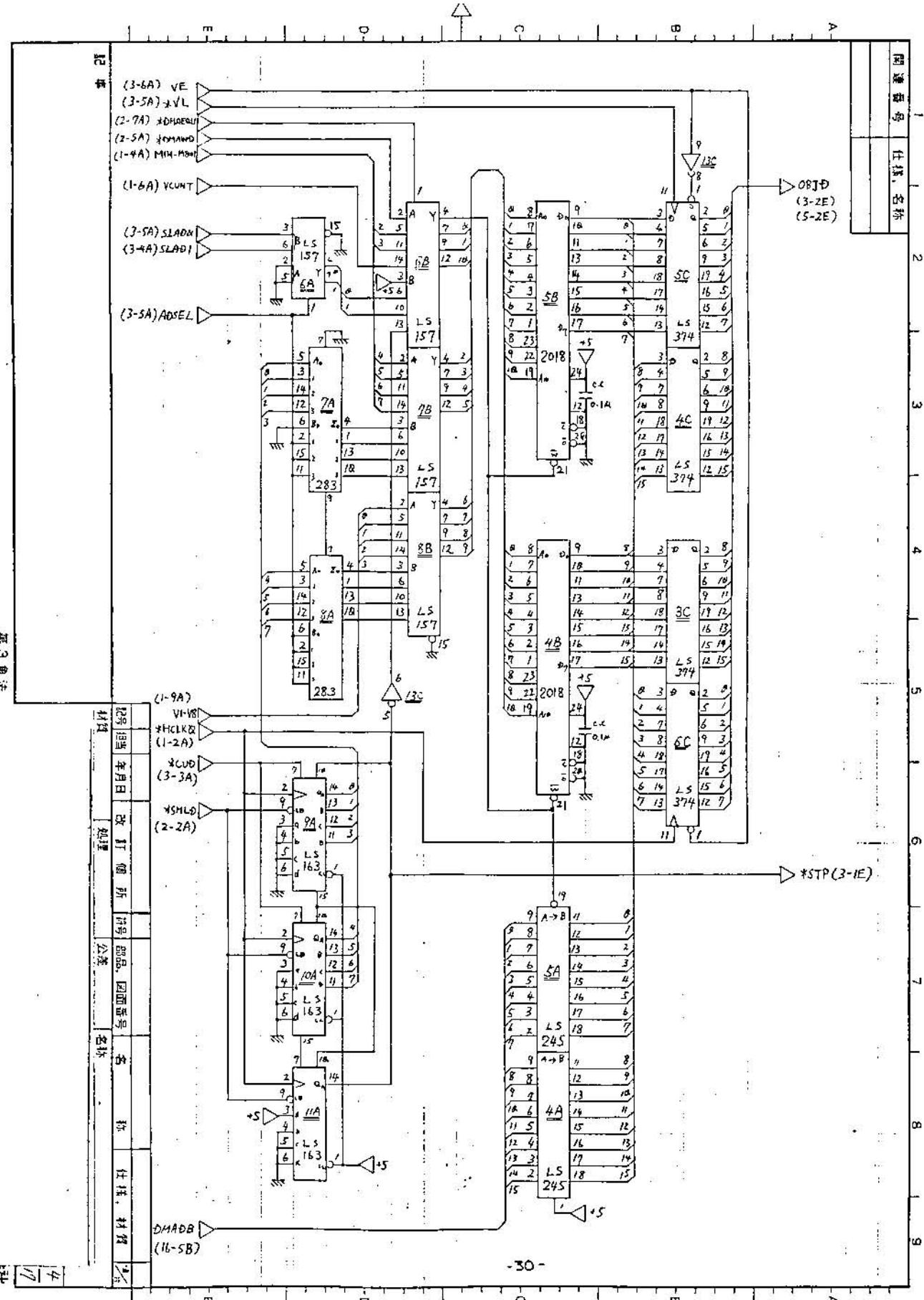
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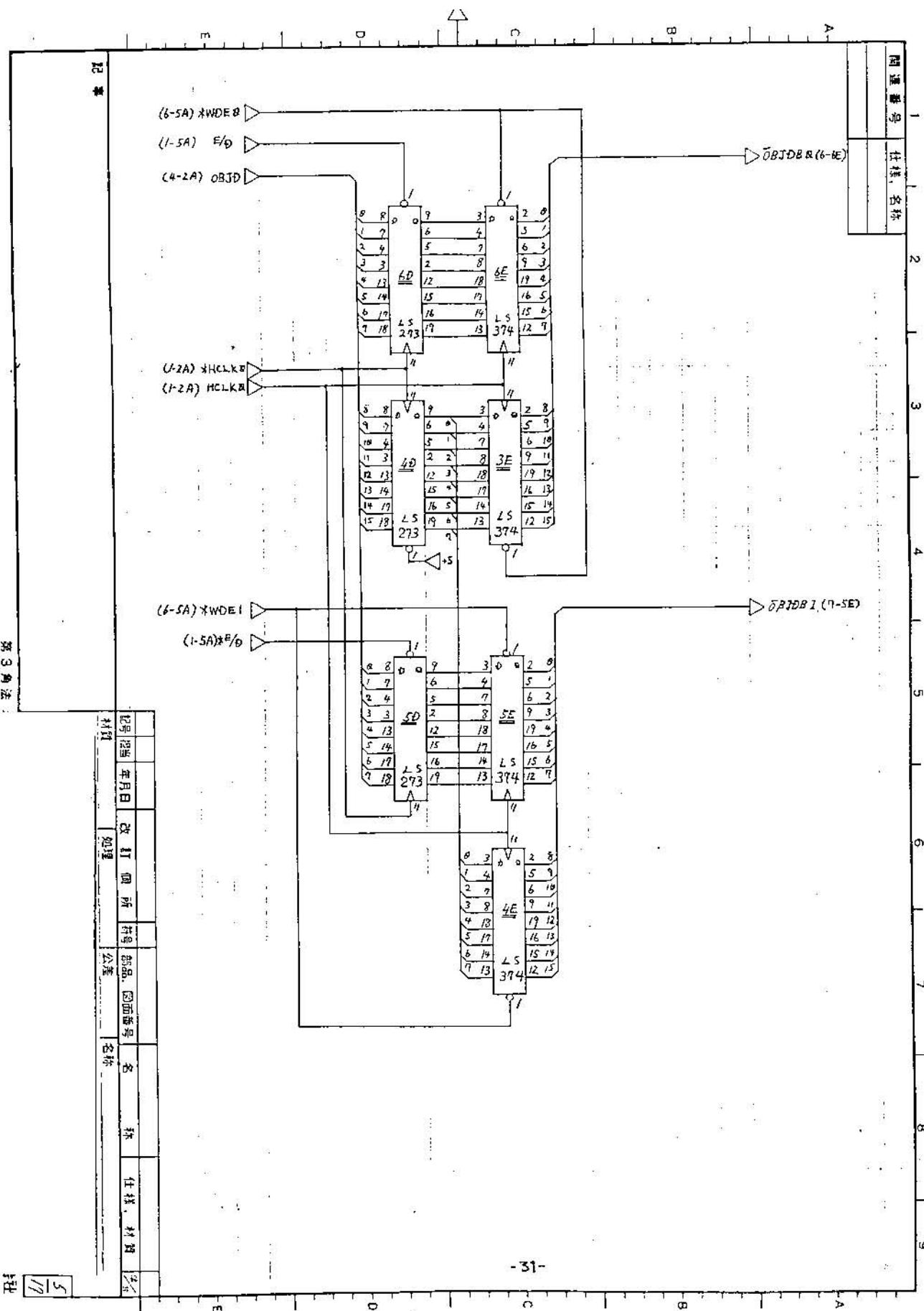


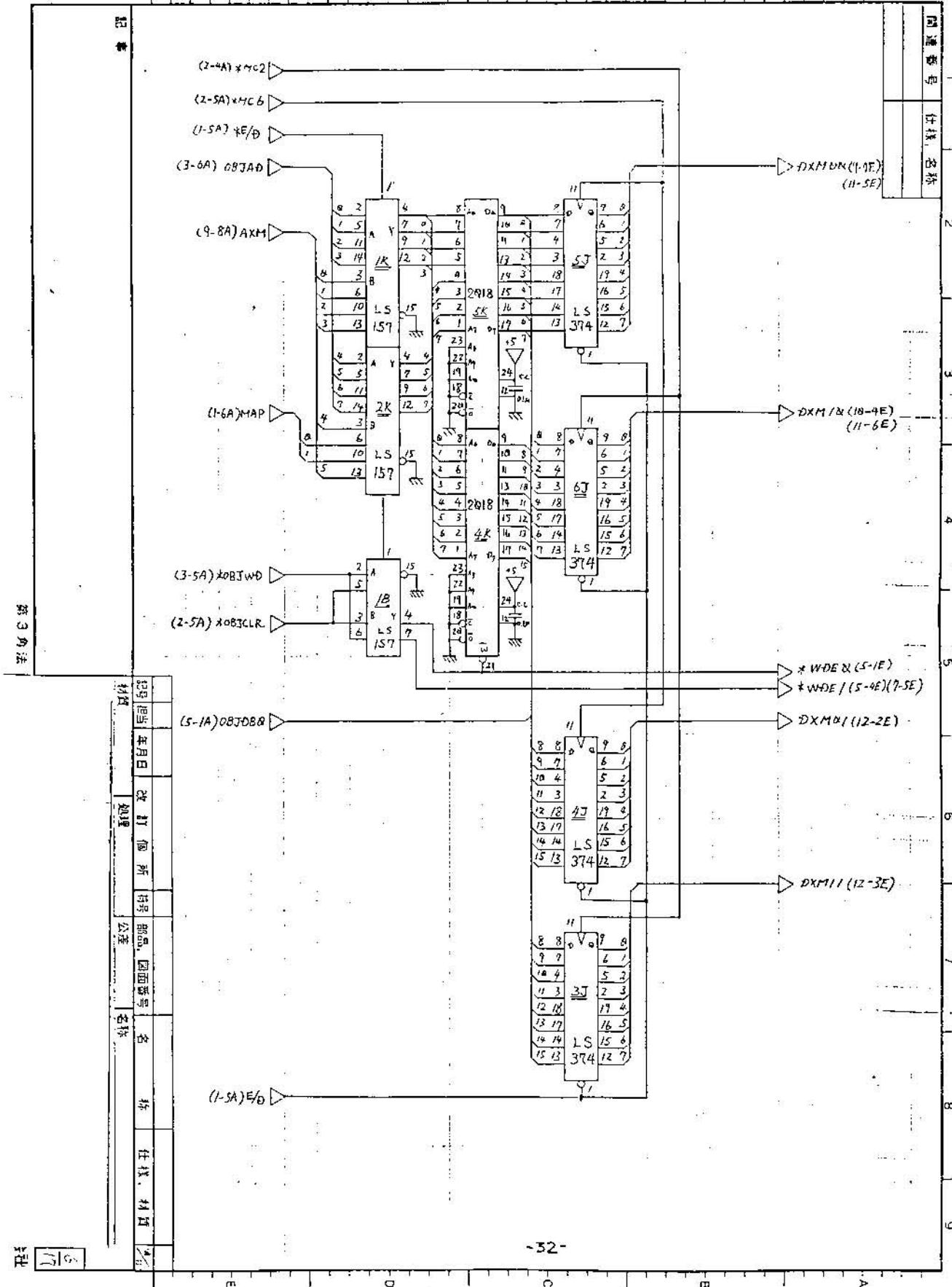


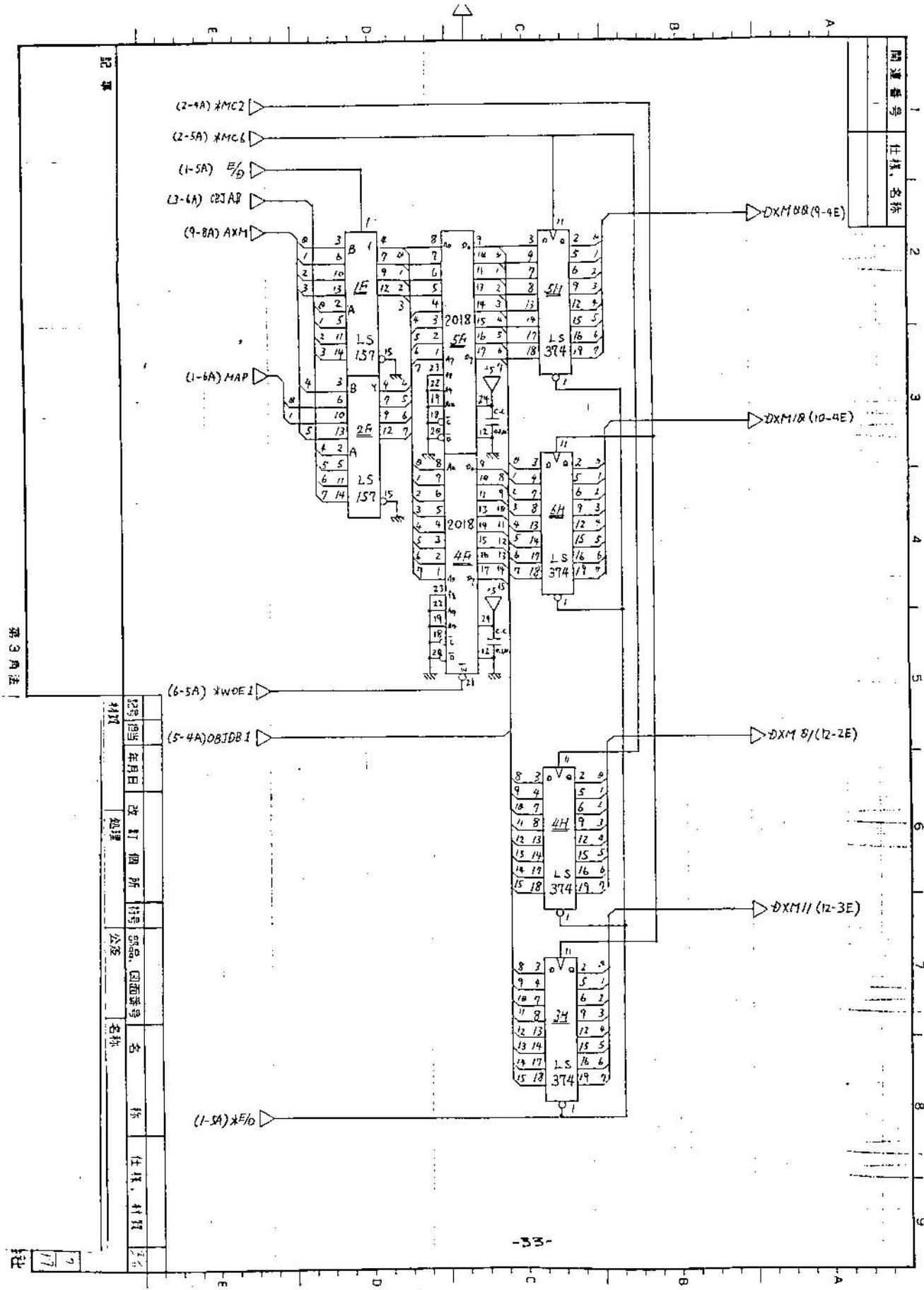


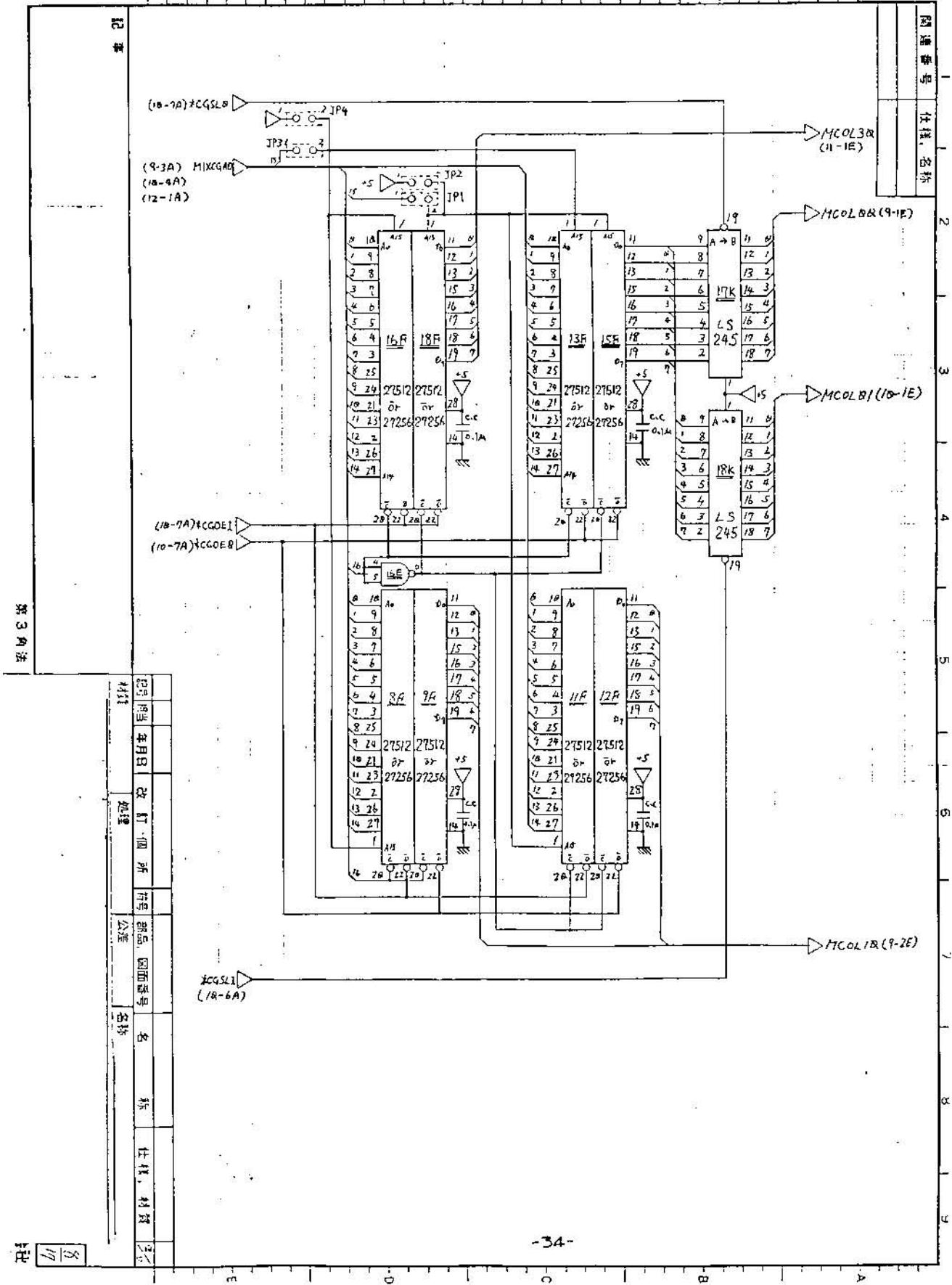


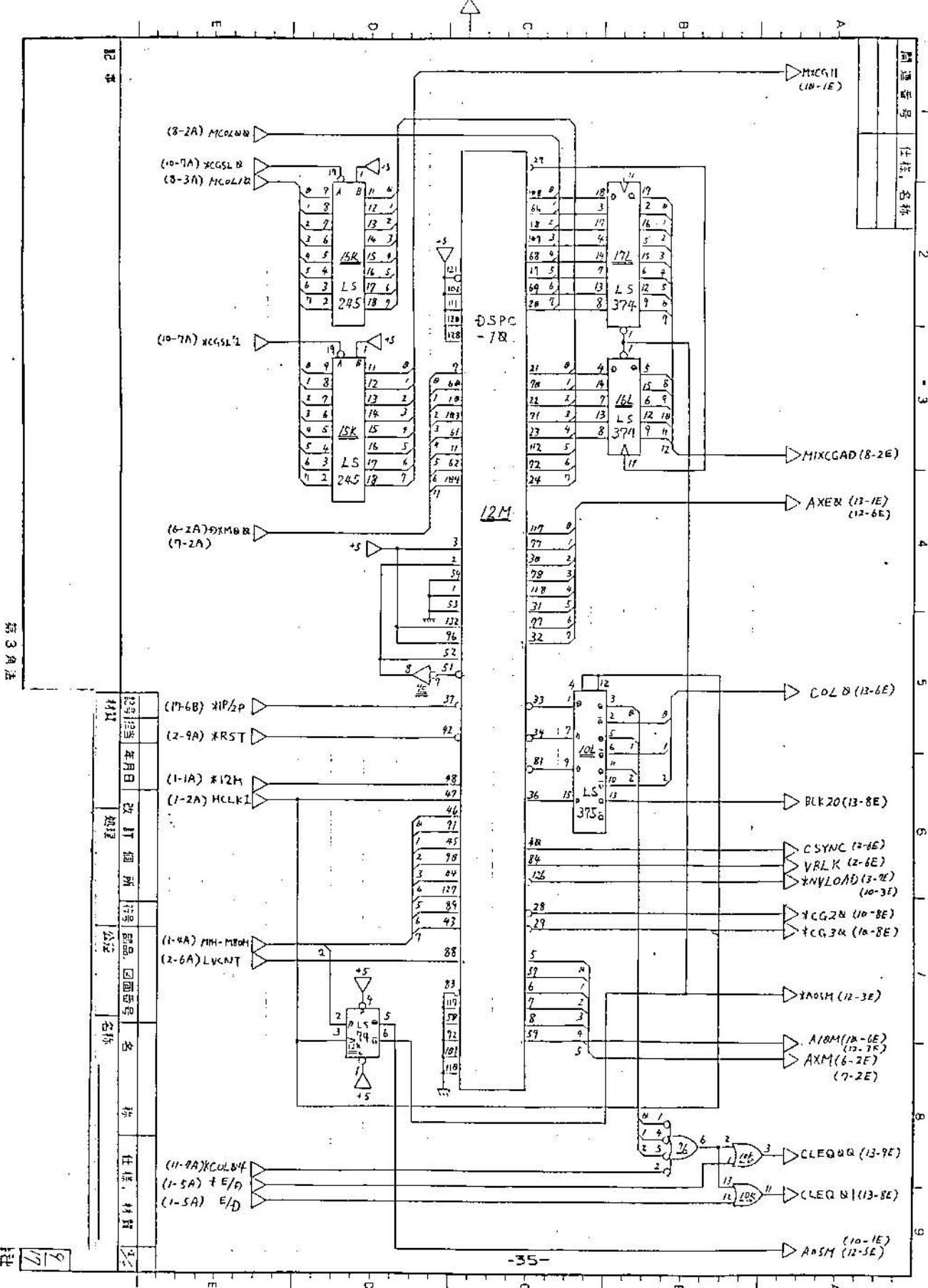


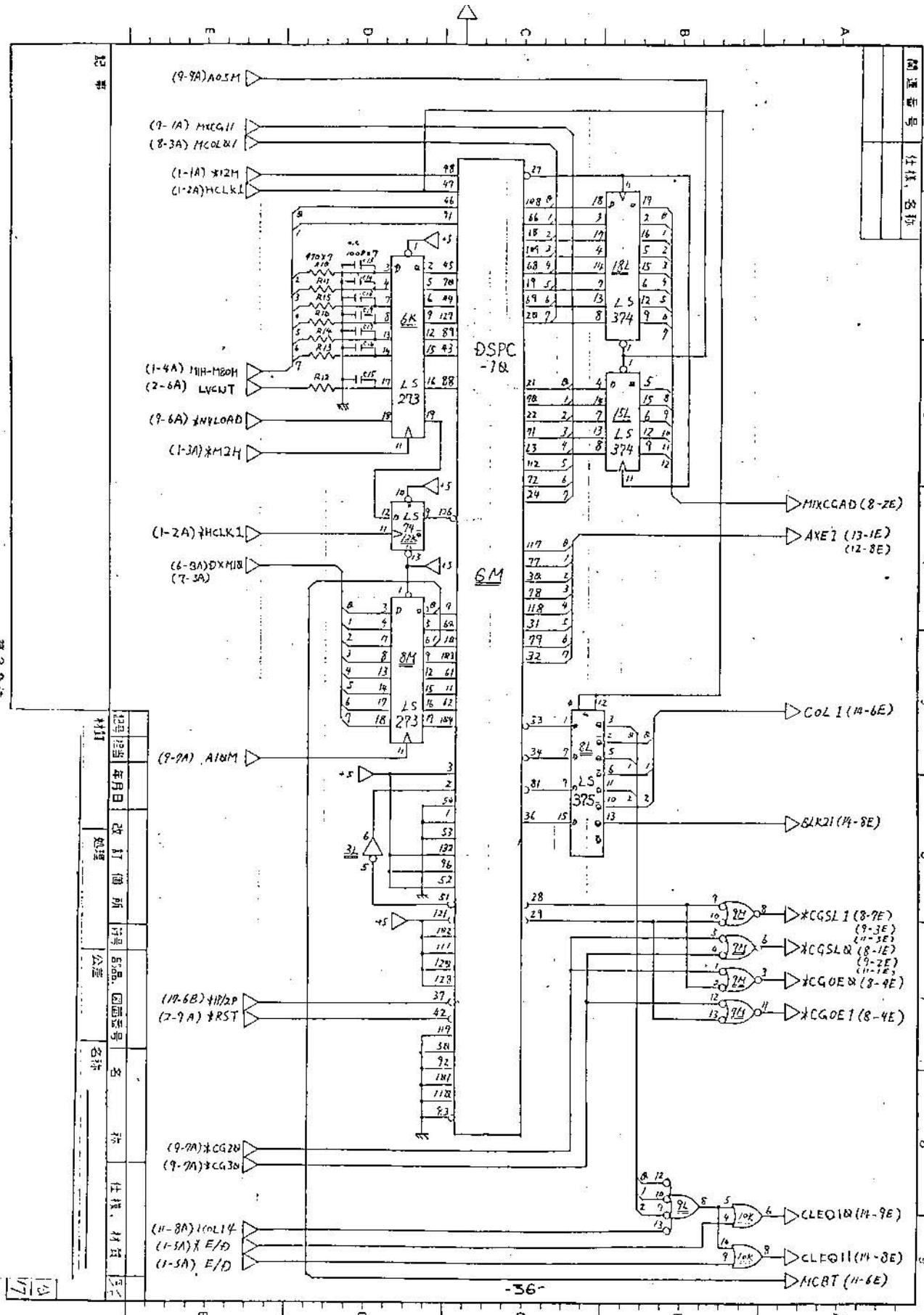


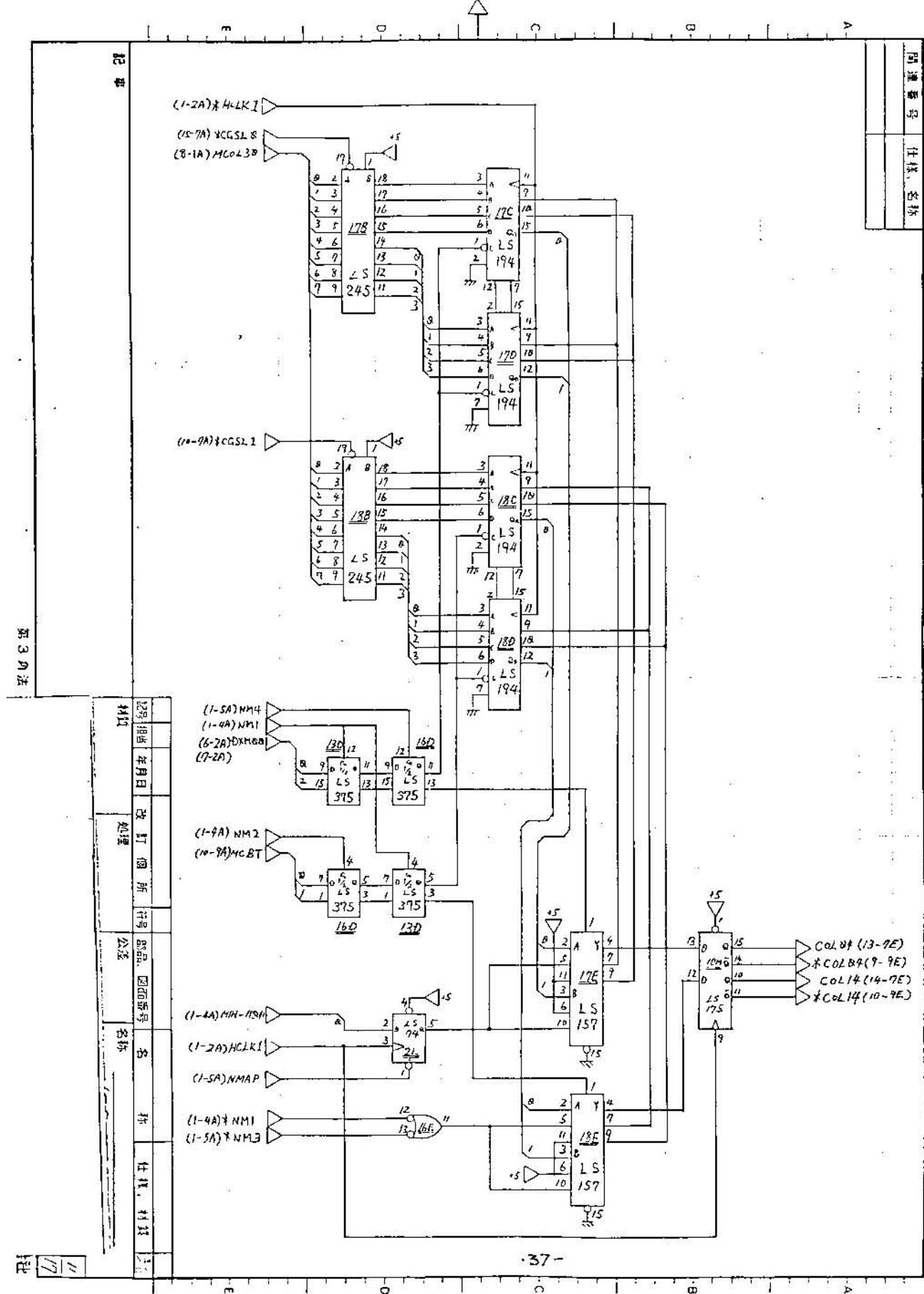




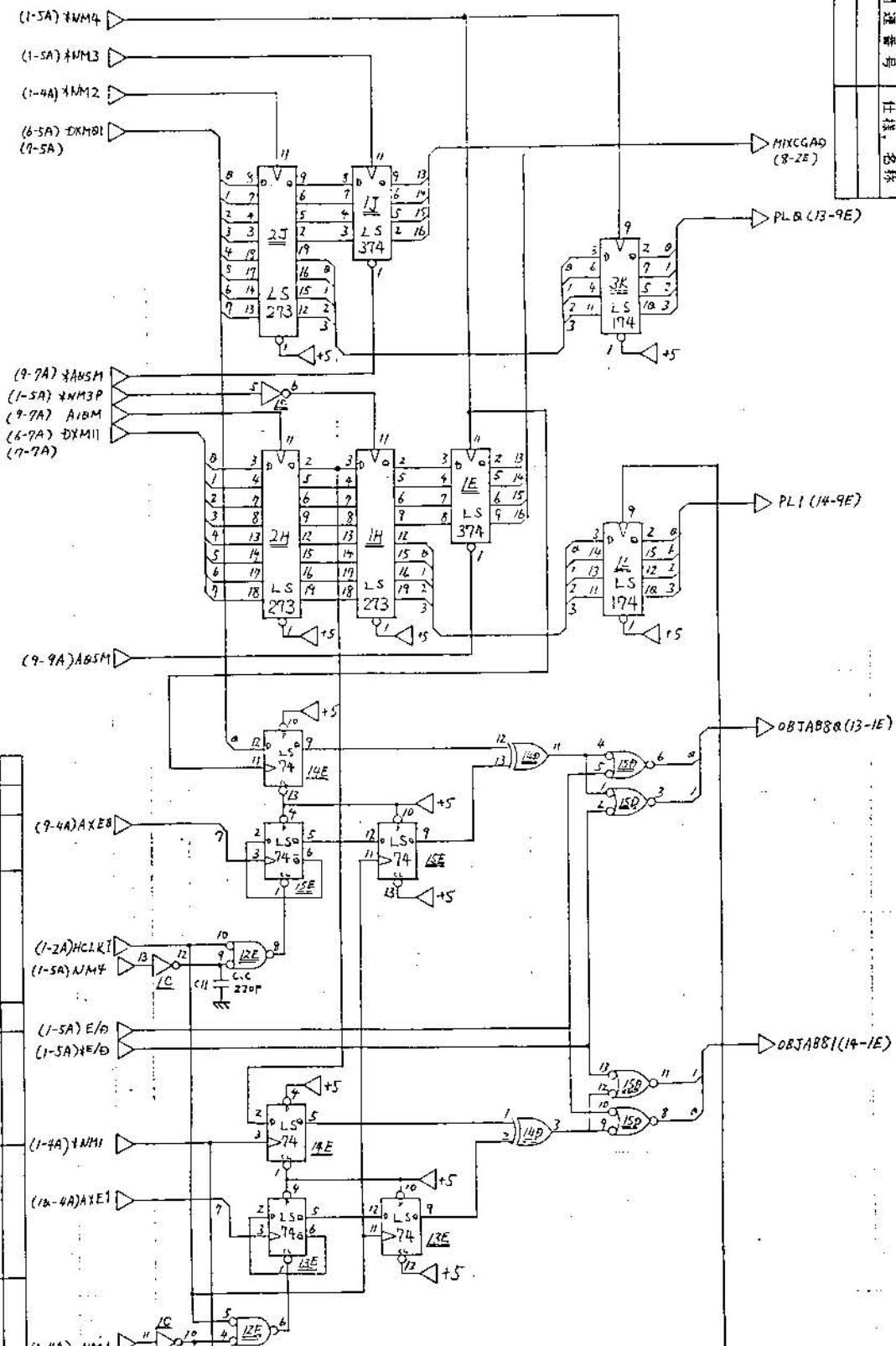


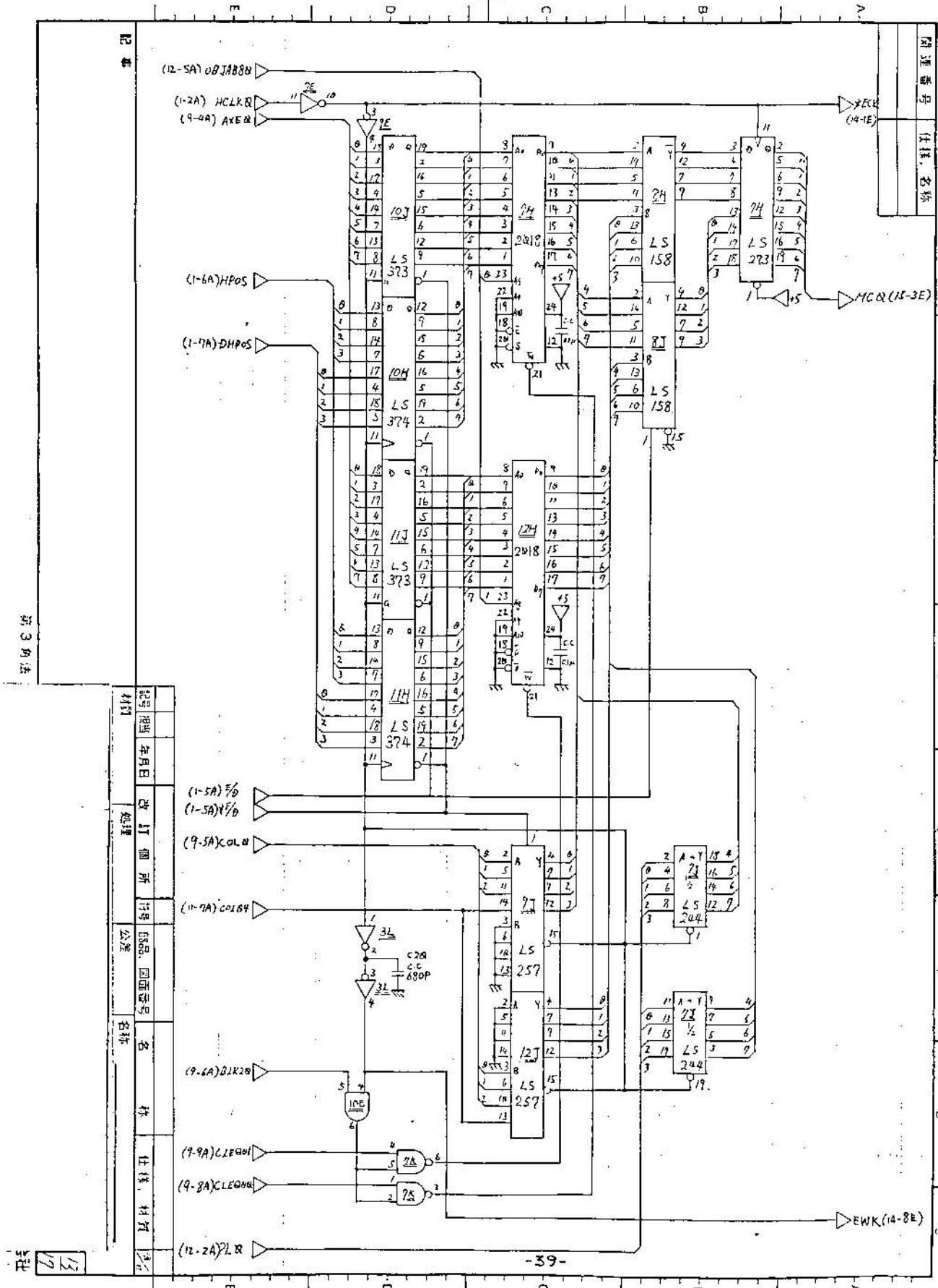


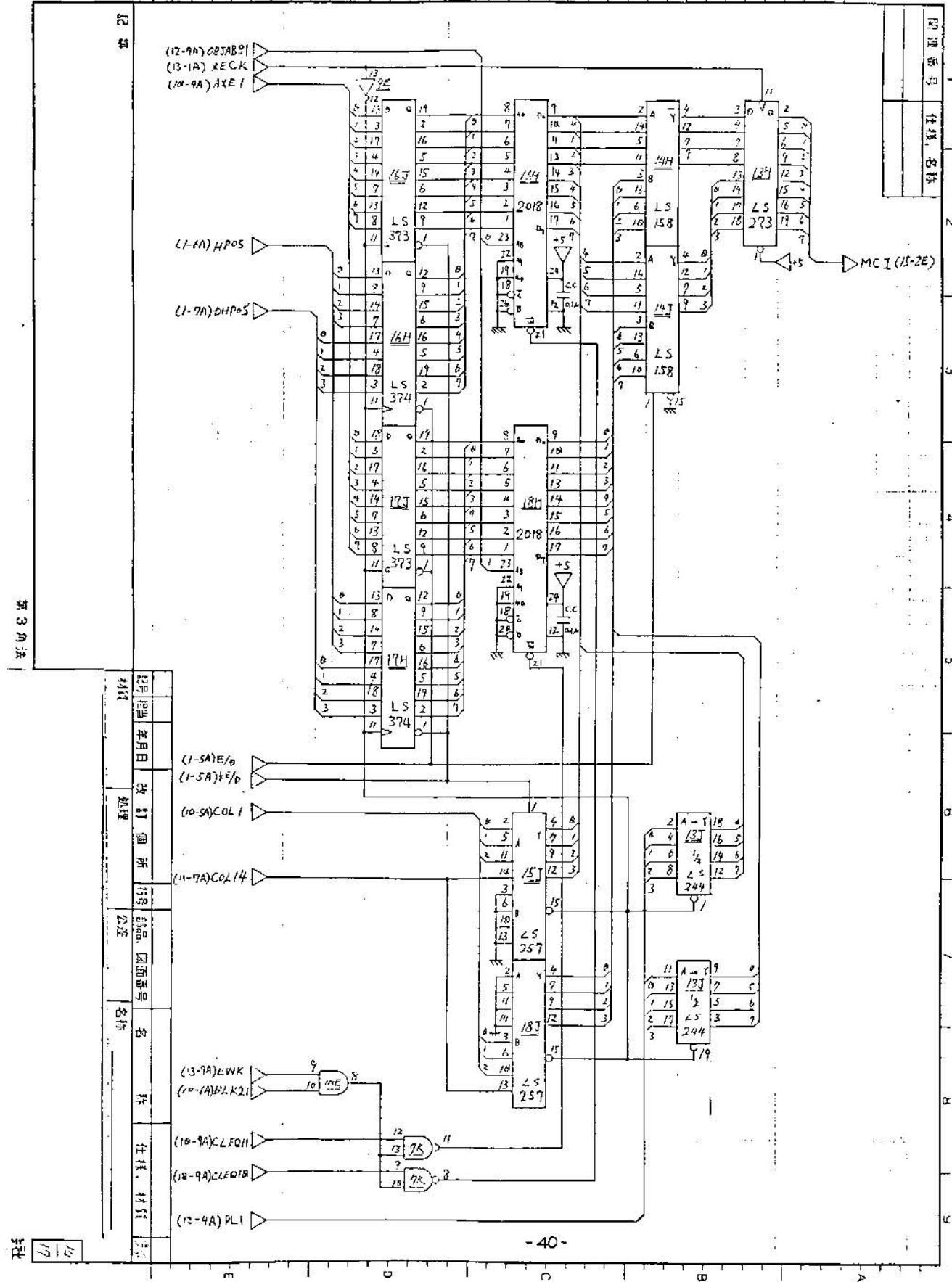


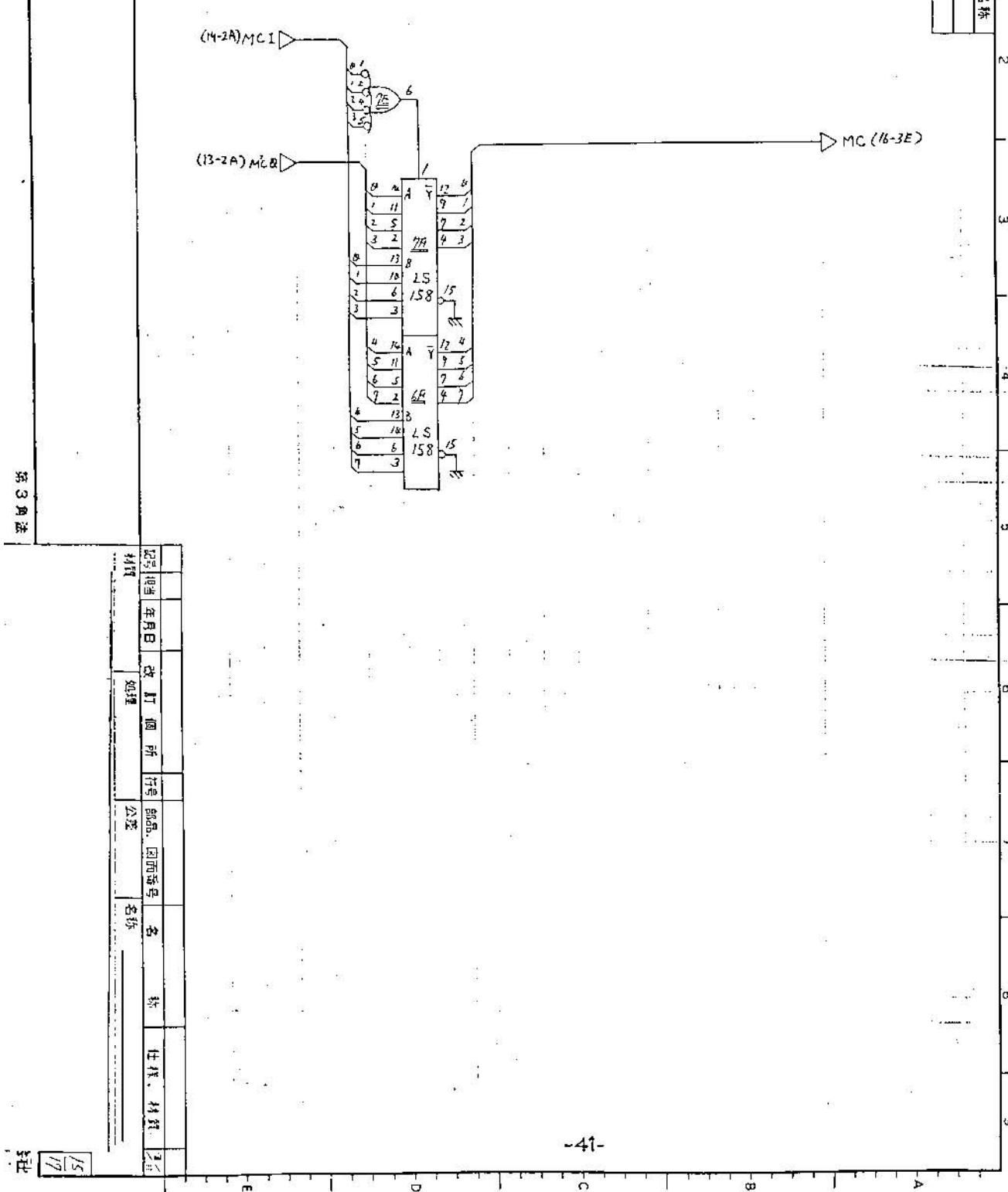


機種	年月日	改訂箇所	部品、回路番号	名稱
機種	年月日	改訂箇所	部品、回路番号	名稱
12				



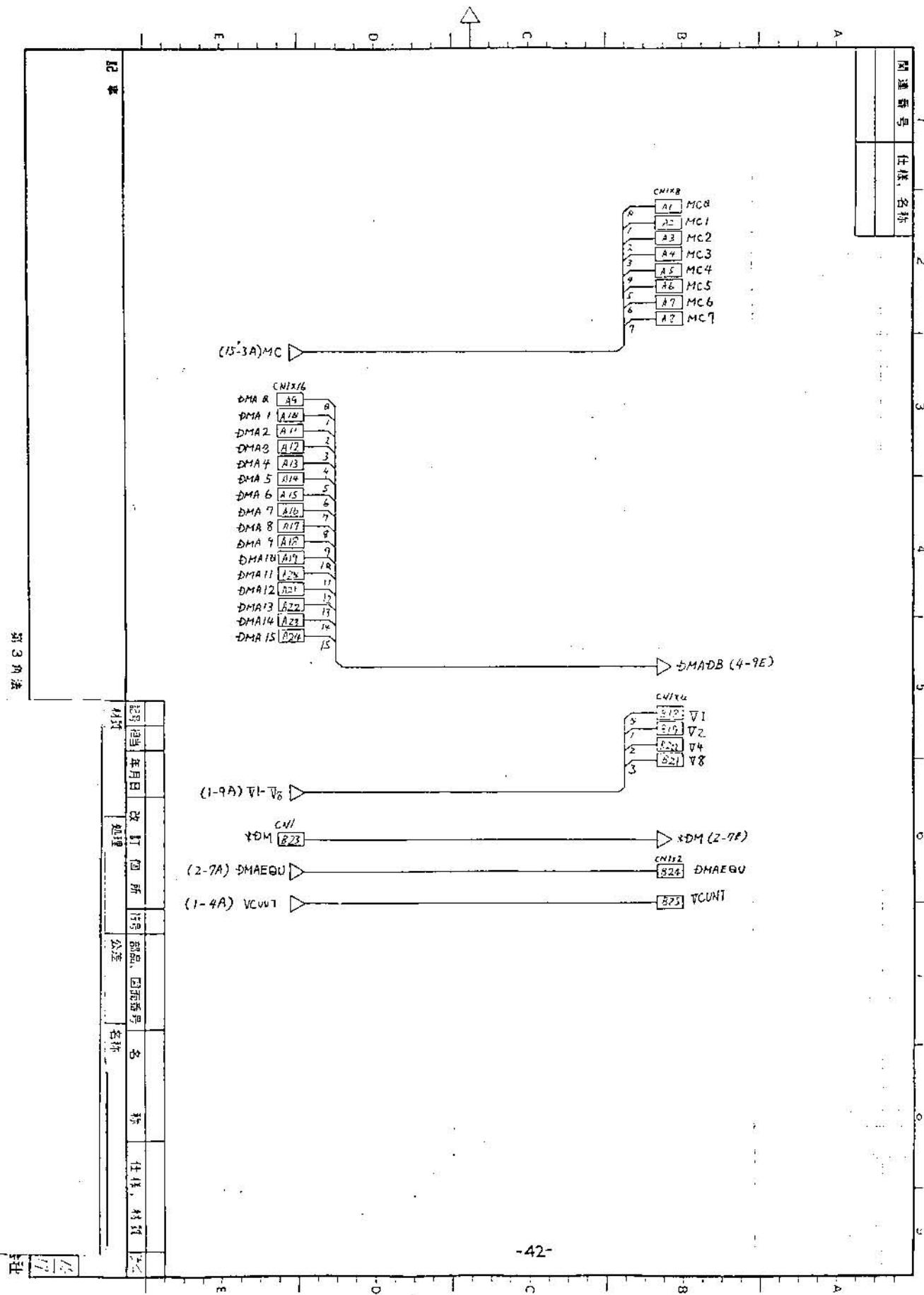






記述

第3角法



関連番号 仕様、名前

