BSM-8301A MU-831RA
BSM-8301J MU-831RJ
BSM-8301K MU-831RK
BSM-8302A MU-832RA
BSM-8302J MU-832RJ
BSM-8302K MU-832RK
AC-800PA
AC-800PJ
AP-800PA
AW-800PA
AH-800PA
AE-800PA
AR-800PA
AL-800PA
AG-800PA
AG-820PA

Life Scope 9
BEDSIDE MONITOR
BSM-8301/8302

0634-000059F

0634-000059F

MANUAL CHANGE INFORMATION

DATE: January 22, 1999

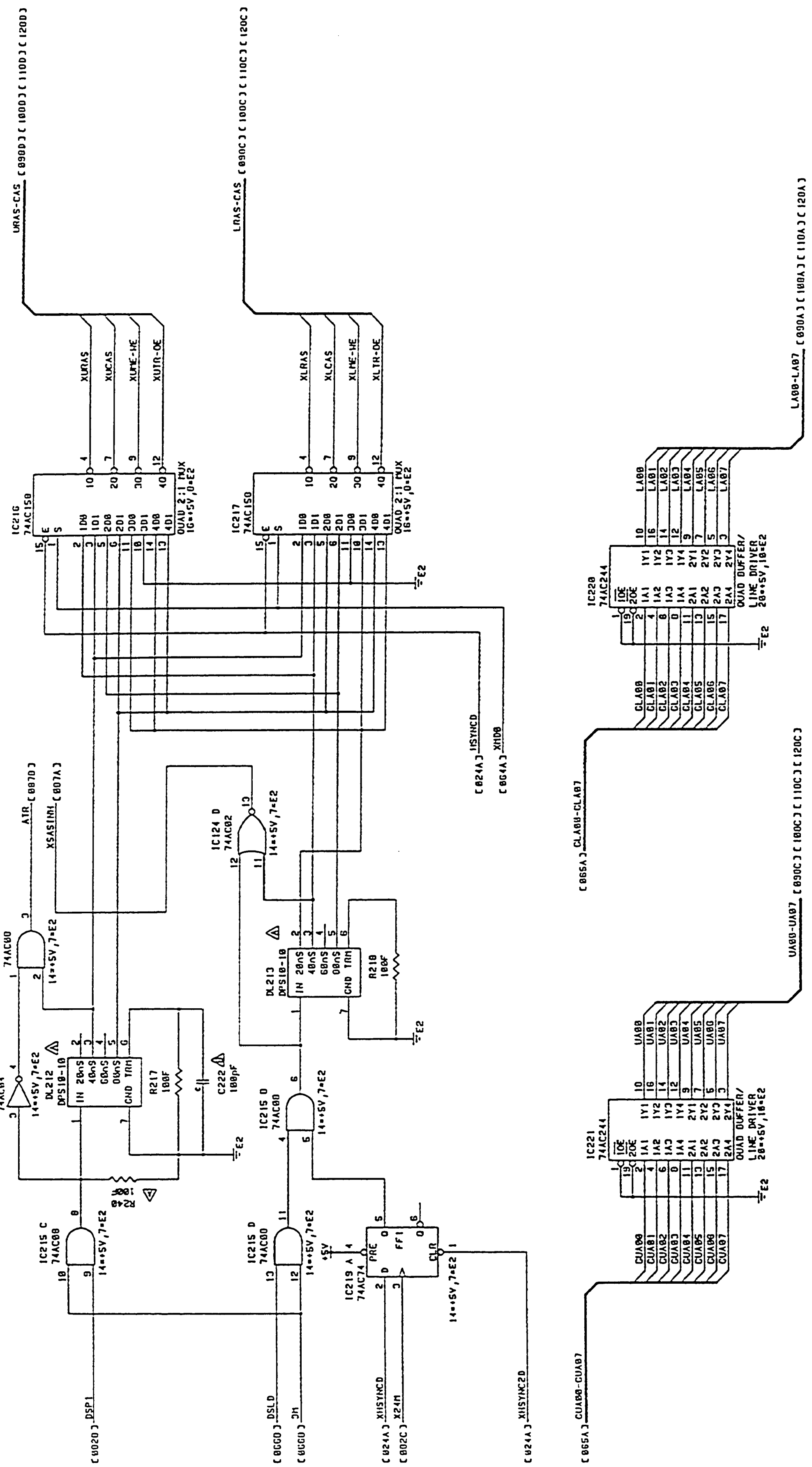
Circuit Diagram Change

The circuit diagram of the UP-3981 CRTC board is changed as follows due to the addition of the C222 100 pF capacitor (NK code No. 071307):

From page	To page
39/46 in manual change information (0634-000059B)	2/2

The affected models are as follows:

Model	Main unit	Starting serial No.	Hardware revision
BSM-8301A/J/K	MU-831RA	02112	E2
	MU-831RJ	00369	D8
	MU-831RK	03395	G6
BSM-8302A/J/K	MU-832RA	00135	D4
	MU-832RJ	00441	D5
	MU-832RK	00651	E0



0634-000059E

Nov 9, 1995

MANUAL CHANGE INFORMATION

Unit	Main Unit	Revision
VM-004P CRT Unit	MU-831RA	A1
	MU-831RJ	
	MU-831RK	
	MU-832RA	
	MU-832RJ	
	MU-832RK	

CRT Unit: The model of the CRT unit is changed. This change is reflected in the following changes in the Service Manual:

Section 4.2.5 CRT Unit VM-004P

From	To
Pages 4-49 to 4-52	Pages 2/12 to 5/12

Section 6.3 CRT Unit VM-004P

From	To
Pages 6-6 to 6-9	Pages 6/12 to 9/12

Section 10 Circuit Diagrams

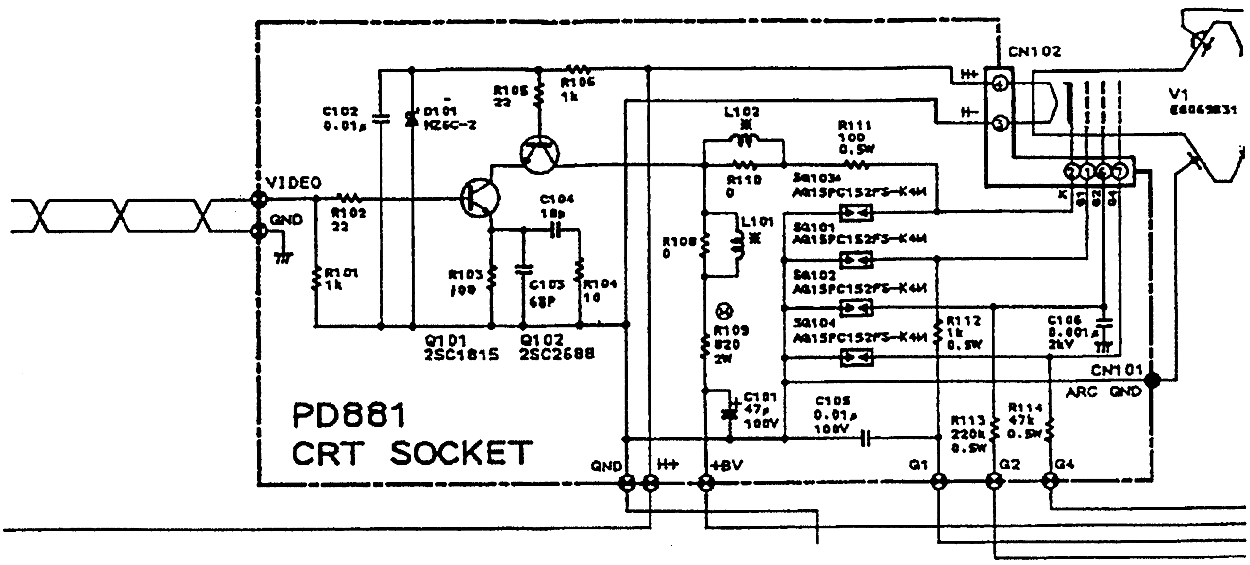
From	To
Page 10-45	Pages 10/12 to 12/12

4.2.5 CRT Unit VM-004P

CRT unit VM-004P receives synchronization signal and video signal from the CRTC board and displays on the screen. Screen brightness control is done by the volume on the front of the bedside monitor and the SUB-BRIGHT volume on the CRTC board.

1) Video signal circuit

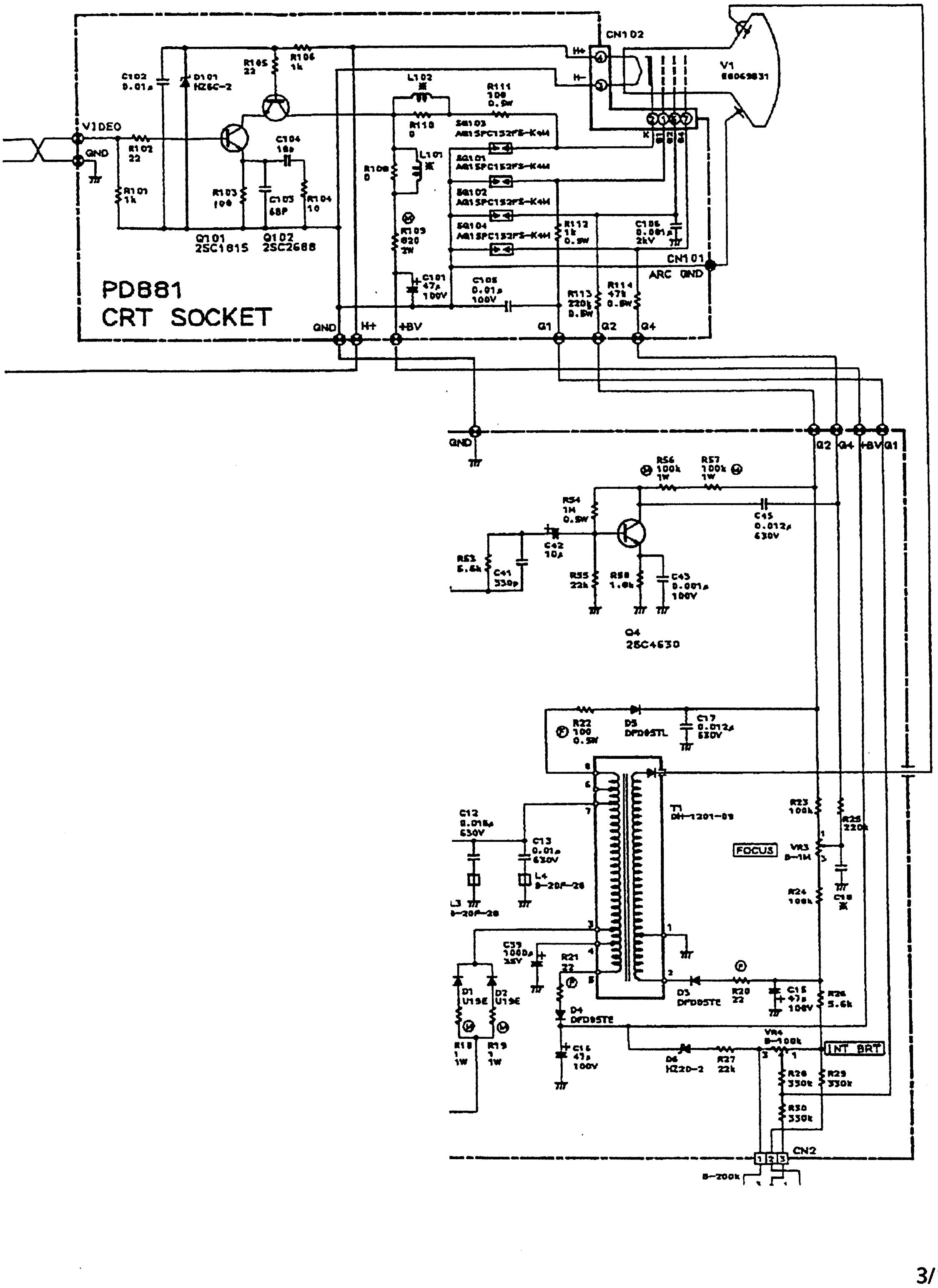
Video signal from the CRTC board is input to the video signal amplifier on the board mounted on the neck of the CRT through the input connector. Video signal is approximately 8 times invertedly amplified and drives CRT cathode. R109 is metal oxide film resistor for heat tolerance due to large power exhaust in the resistor.



2) CRT and peripherals

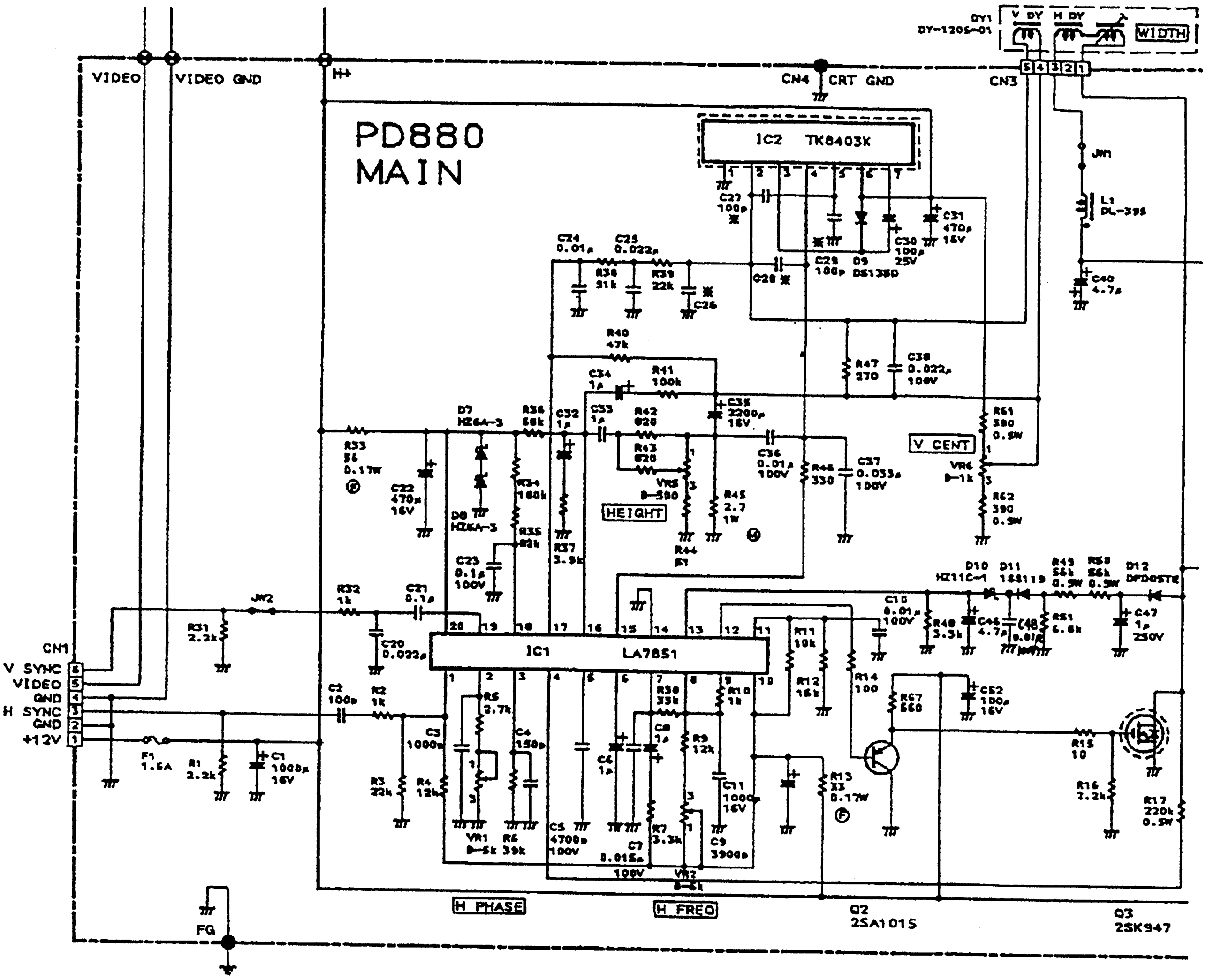
Electron beam controlled by this bias voltage between the first grid voltage and video signal voltage illuminates fluorescent screen of the CRT. By shifting first grid voltage, overall screen brightness can be controlled. Charge circuit composed of C15, R28, R29 and R30 is a spot killer which prevents electron beam focusing at the center of the screen at power off which will burn fluorescent material.

The fourth grid controls the focusing of the screen.



3) Vertical deflection circuit

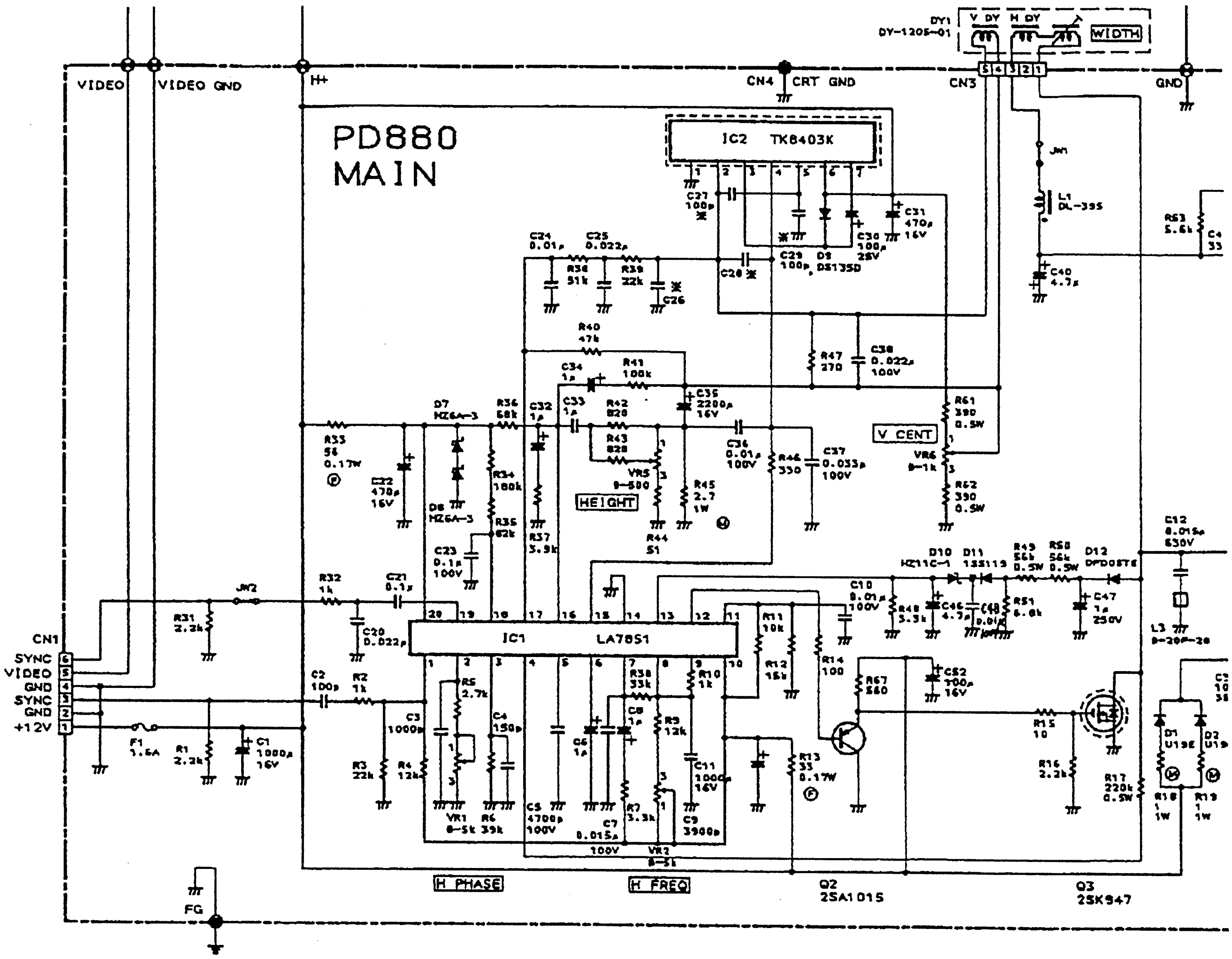
Vertical synchronization signal is input to IC1 pin-19 and controls ON/OFF of the charge/discharge circuit composed of C23, R34 and R35 to generate approximately 62 kHz sawtooth voltage. This sawtooth voltage output from IC1 through pin-15 to input to IC2 pin 4 for amplification. After amplification, the signal is output from IC2 through pin-5 to drive the vertical deflection yoke. VR5 is used to adjust the vertical amplitude.



4) Horizontal deflection circuit

Sawtooth voltage is generated by charge/discharge circuit composed of C11, R9 and VR2. The frequency is automatically controlled with AFC (Automatic Frequency Control) circuit to 24.6 kHz is synchronized with horizontal synchronization signal. Driver Q2 output the horizontal synchronization signal to MOS-FET Q3 to drive the horizontal deflection circuit and high voltage circuit.

WIDTH Coil inserted in series to deflection yoke is for horizontal width adjustment and L1 is for fine linearity adjustment.



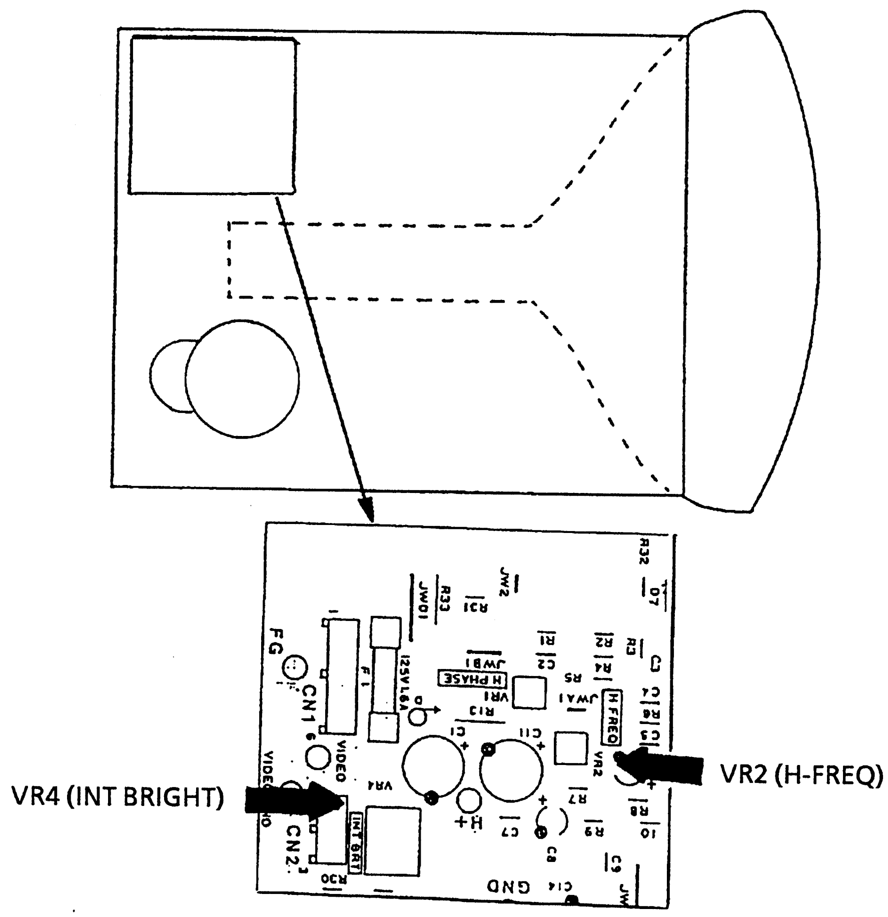
6.3 CRT Unit VM-004P

CRT unit has adjustment points of screen synchronization, brightness, screen size, position and focusing. Call up the Self Test Screen No.2 to assist in the adjustment.

1) Horizontal synchronization
i. Find out volume position points by rotating the VR2 (H-FREQ) clockwise and counterclockwise where the screen becomes out of horizontal synchronization.
ii. Set the volume position at the center of these two points. This point is assumed to be the center position points if the screen does not become out of synchronization even when the volume is fully rotated clockwise or counterclockwise.

2) Screen brightness
If screen is dark and not bright enough even if screen is cleaned and CRTC board SUB-BRIGHT is adjusted, adjust the CRT unit brightness. When this adjustment is required, the CRT unit is near the end of its use life. Prepare a new CRT unit for the bedside monitor.

Adjust VR4 (INT BRIGHT) to bright up the screen. If you have an illumination meter, adjust this VR4 (INT BRIGHT) until the Self Test All Raster mode screen reads 240 cd/m² ±20 cd/m² on the illumination meter.



3) Screen size

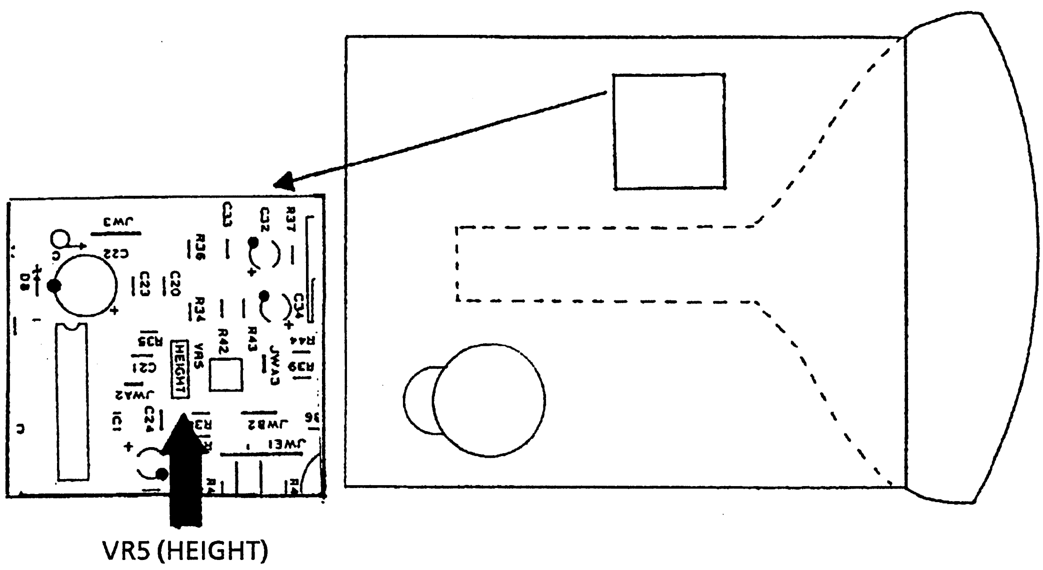
Adjustment of vertical and horizontal size of the screen. Use the Self Test Grid screen for this adjustment.

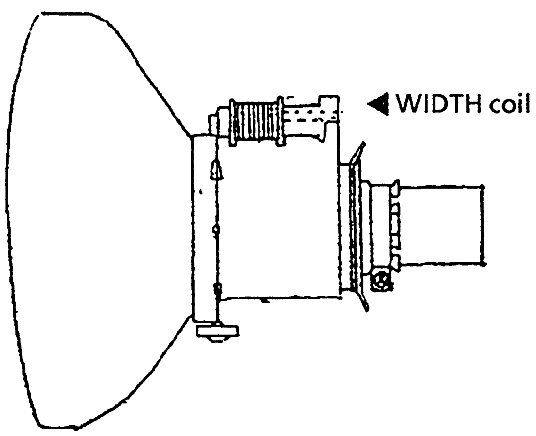
i. Adjust VR5 (HEIGHT) until the screen height becomes 120 ±4 mm.

ii. Use a ferrite core screwdriver to adjust WIDTH coil of the CRT unit until the screen width becomes 160 ±4 mm.

NOTE

Use a ferrite core screwdriver or a plastic made screwdriver to adjust the WIDTH coil because other screwdrivers may damage the core of the WIDTH coil.

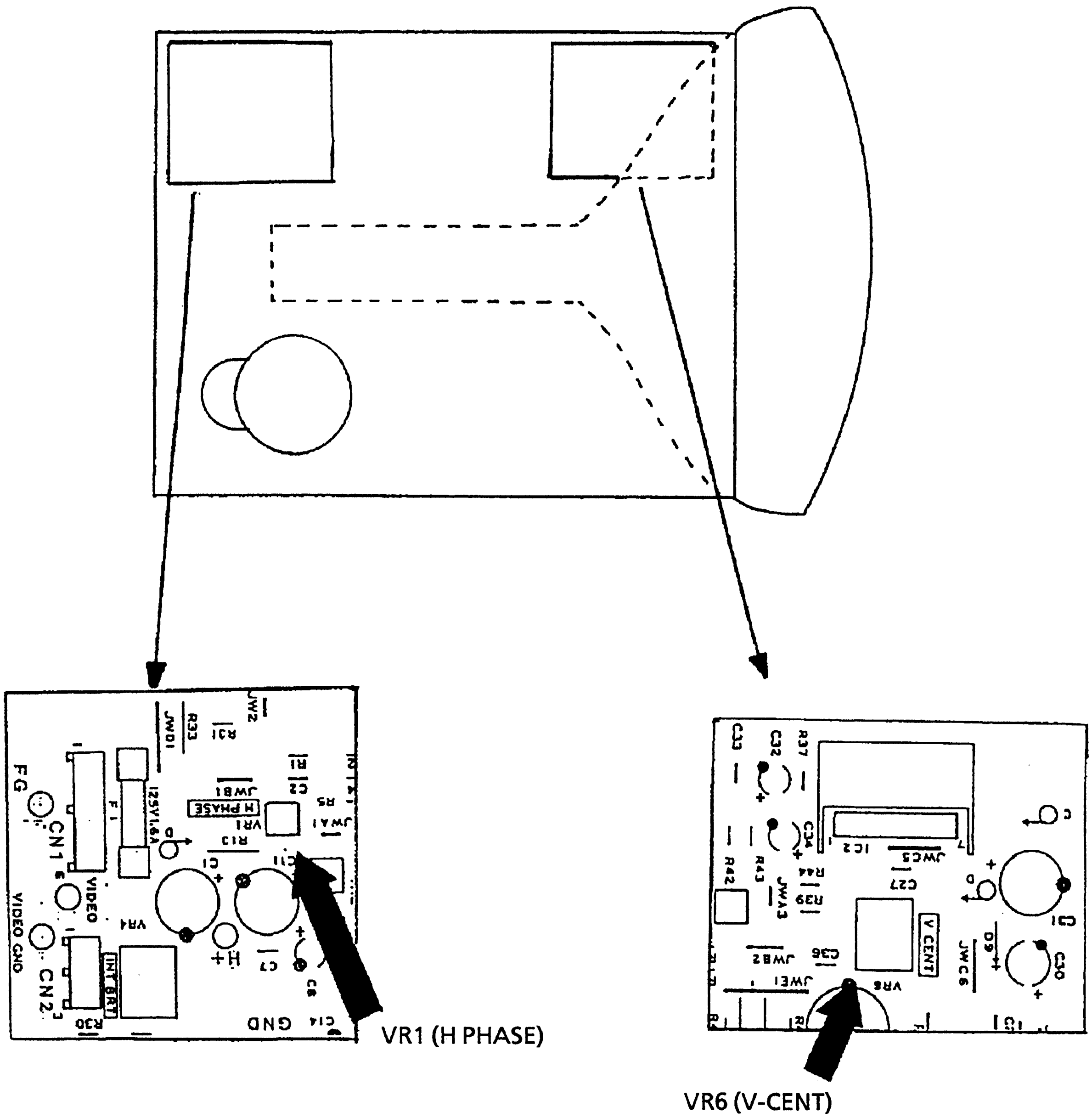




4) Screen position

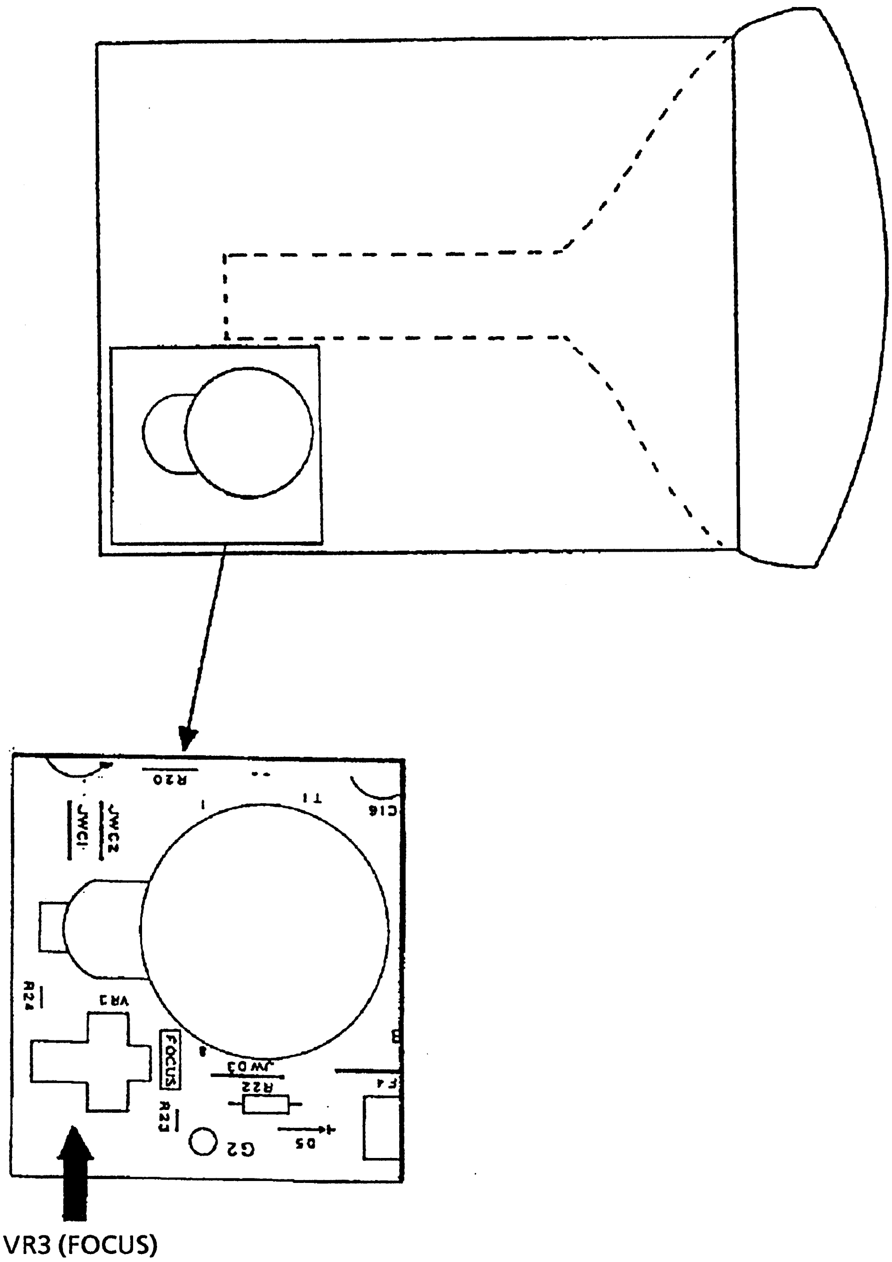
Adjustment of the raster position.

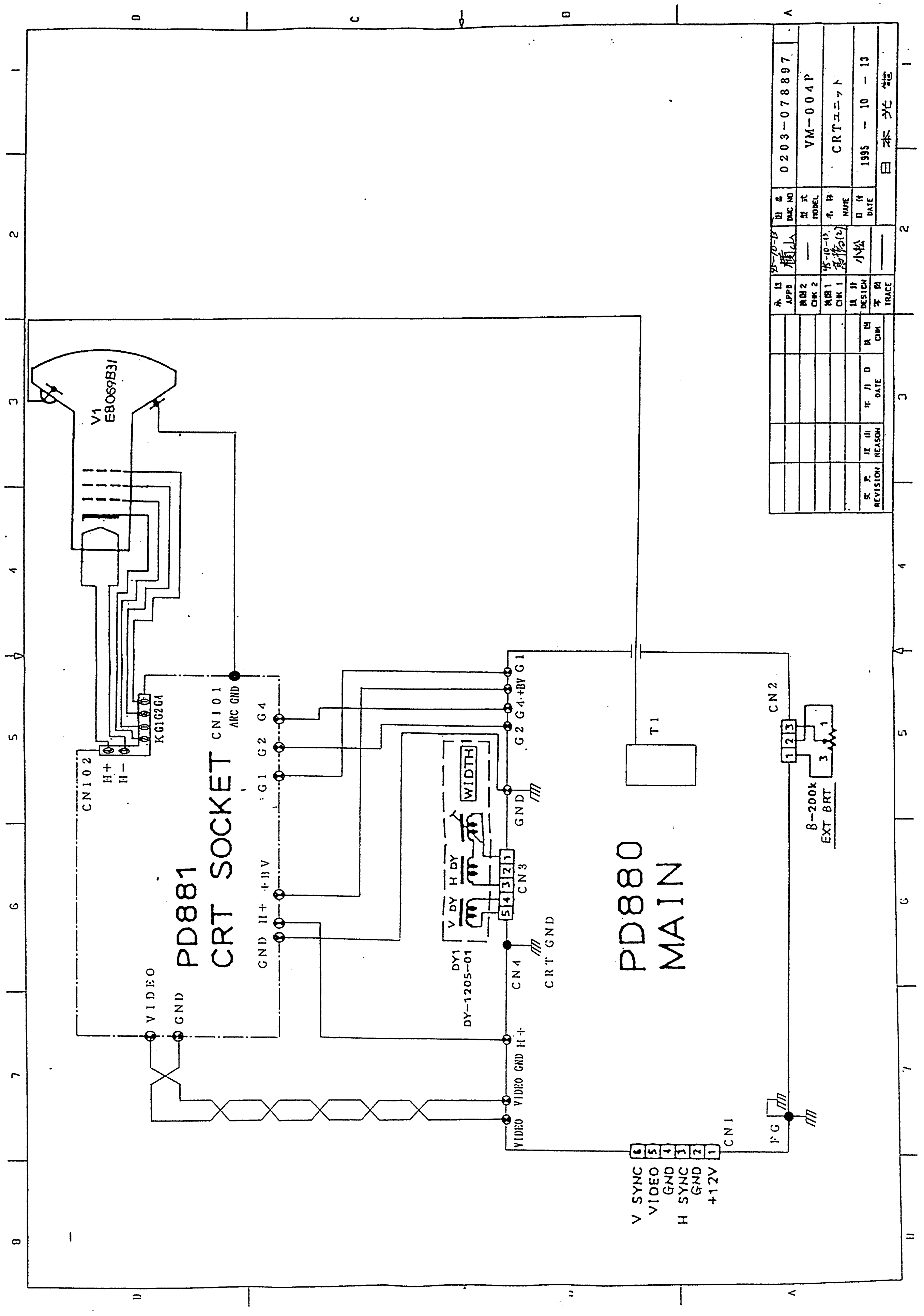
Adjust the VR6 (V-CENT) and VR1 (H PHASE) until the display area is at the center of the screen.



5) Focusing

Adjust VR3 (FOCUS) until the entire screen is in focus.

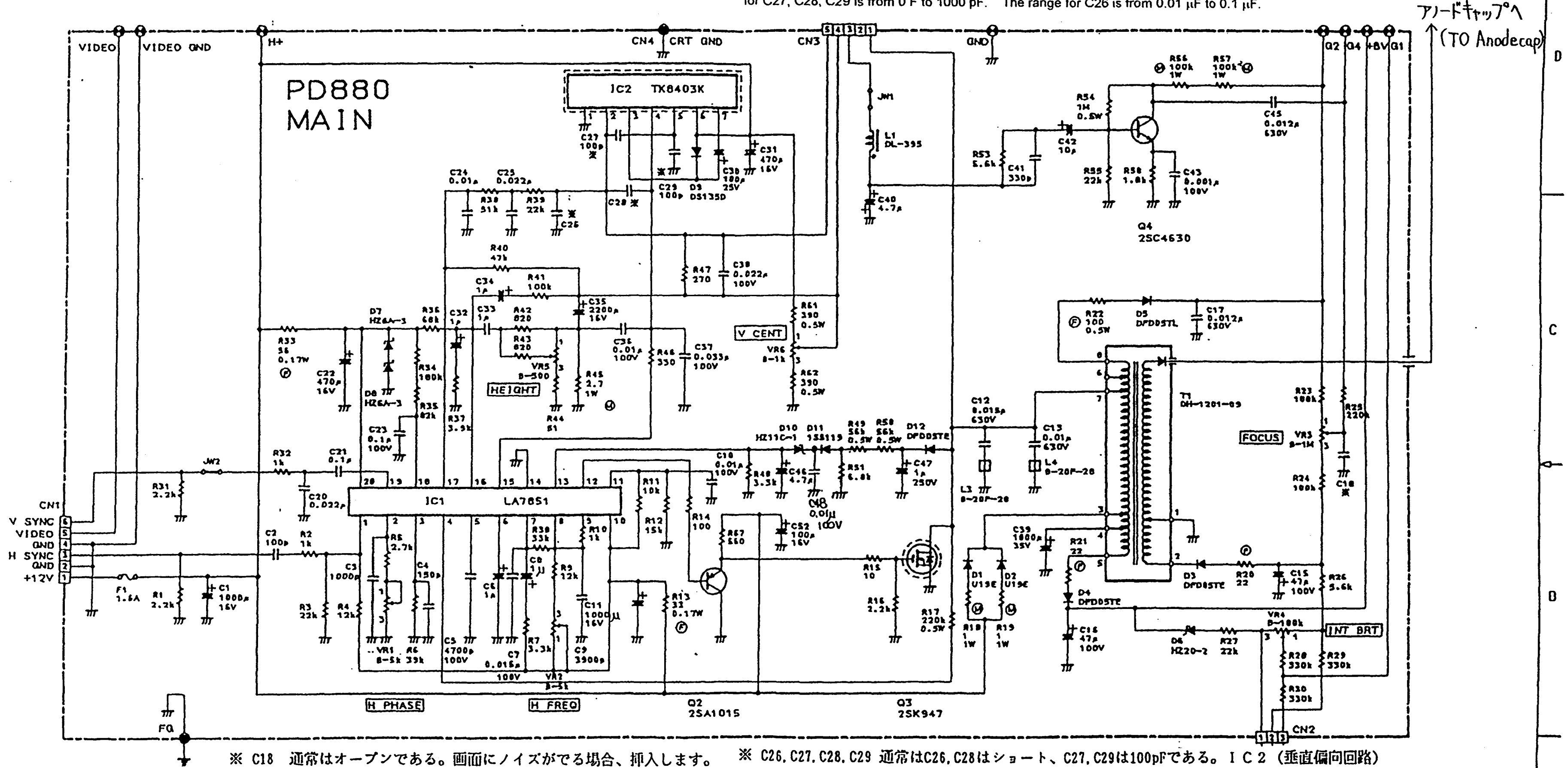




PD881
CRT SOCKET
PD880
MAIN
V1
E8069B31
CN101
ARC GND
CN102
H+
H−
K G1 G2 G4
G4
G2
G1
+BV
H+
GND
VIDEO
GND
G1
G4·+BV
G4·+BV
G2
GND
WIDTH
H DY
V DY
CN3
5 4 3 2 1
DY1
DY−1205−01
CN4
CRT GND
H+
VIDEO GND
VIDEO
T1
CN2
1 2 3
B−200k
EXT BRT
FG
CN1
6 5 4 3 2 1
V SYNC
VIDEO
GND
H SYNC
GND
+12V
0203−078897
VM−004P
CRTユニット
1995 − 10 − 13
日本光電
APPD
CHK 2
CHK 1
DESIGN
TRACE
DWG NO
MODEL
NAME
DATE
REVISION
REASON
DATE
CHK

※ C18: This capacitor is not mounted when shipped. Mount capacitor when noise appeared on the screen. The range for C18 is from 0.01 μF to 0.1 μF.

※ C26, C27, C28, C29: Capacitors C26 and C28 are not mounted when shipped. The printed patterns for C26 and C28 are short. C27 and C29 are mounted with 100 pF capacitors when shipped. Replace, mount or change these capacitors when the IC2 (vertical deflection circuit) becomes unstable. The range for C27, C28, C29 is from 0 F to 1000 pF. The range for C26 is from 0.01 μF to 0.1 μF.



※ C18 通常はオープンである。画面にノイズがでる場合、挿入します。

C：0.01μF ～ 0.1μF

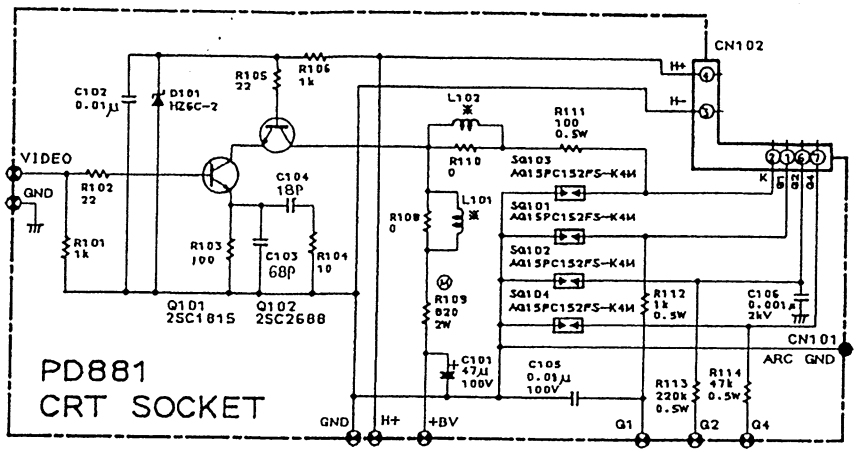
※ C26, C27, C28, C29 通常はC26, C28はショート、C27, C29は100pFである。ＩＣ２（垂直偏向回路）が不安定な場合、挿入及び値の変更を行います。

C27, C28, C29：0 F ～ 1000pF C26：0 F, 0.01μF ～ 0.1μF

1. All capacitors are 50WV unless otherwise noted. Unit is in FARAD(F).
2. All resistors are 0.25W unless otherwise noted. Unit is in OHM(Ω).
3. Components marked with ※ are subject to change without notice.
4. Semiconductors may be changed for equivalent ones.
5. Ⓜ : Fixed Metal Film Resistor
6. Ⓕ : Fuse Resistor

承認 APPD	95-10-13 横山
検図2 CHK 2	—
検図1 CHK 1	95-10-13 高橋(2)
設計 DESIGN	小松
写図 TRACE	—
図番 DWG NO	0203-078879
型式 MODEL	VM-004P
名称 NAME	CRTユニット MAIN
日付 DATE	1995 - 10 - 13
	日本光電

変更 REVISION	理由 REASON	年月日 DATE	検印 CHK



※ L101,L102　通常はオープンである。VIDEO信号のｆ特が悪い場合挿入します（その場合、R108・R110はＬの値に応じて変える必要あり）。Ｌ：1μH 〜 10μH

※　L101, L102: These inductors are not mounted when shipped. Mount inductor to change the R108 or R110 when frequency response characteristic of the VIDEO signal is off. The range for L101 or L102 is from 1μH to 10 μH.

1. All capacitors are 50WV unless otherwise noted. Unit is in FARAD(F).
2. All resistors are 0.25W unless otherwise noted. Unit is in OHM(Ω).
3. Components marked with ※ are subject to change without notice.
4. Semiconductors may be changed for equivalent ones.
5. Ⓜ : Fixed Metal Film Resistor
6. Ⓕ : Fuse Resistor

承認 APPD	95-10-13 横山	図番 DWG NO	0203-078888		
検図2 CHK 2	—	型式 MODEL	VM-004P		
検図1 CHK 1	95-10-13 高橋(2)	名称 NAME	CRTユニット　CRTソケット		
設計 DESIGN	小松	日付 DATE	1995 - 10 - 13		
写図 TRACE	—		日本光電		

変更 REVISION	理由 REASON	年月日 DATE	検図 CHK

0634-000059D

MANUAL CHANGE INFORMATION

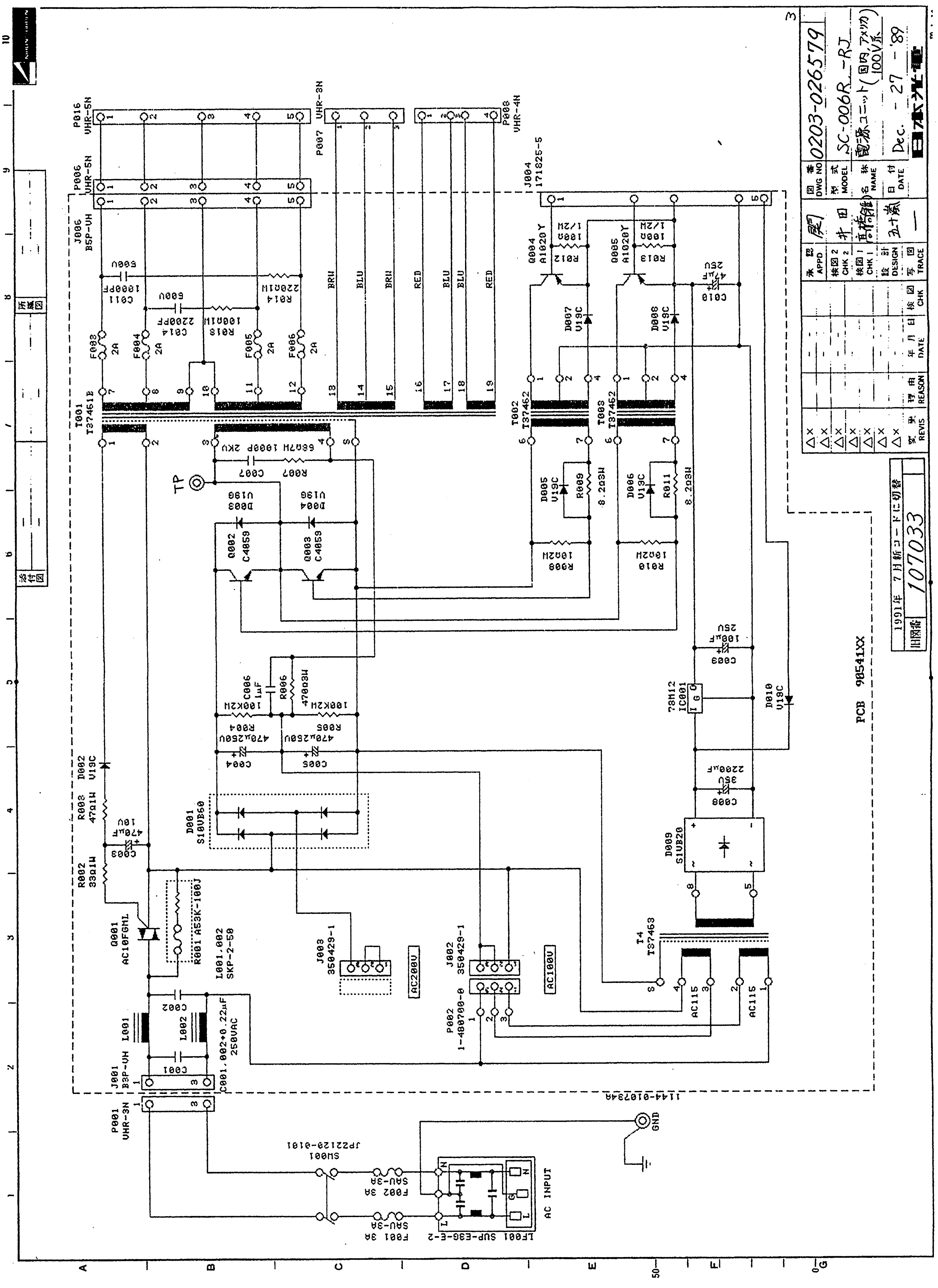
Model	Power Unit
BSM-8301A/J/K	SC-006R
	SC-006RJ
	SC-006RK
BSM-8302A/J/K	SC-006R
	SC-006RJ
	SC-006RK

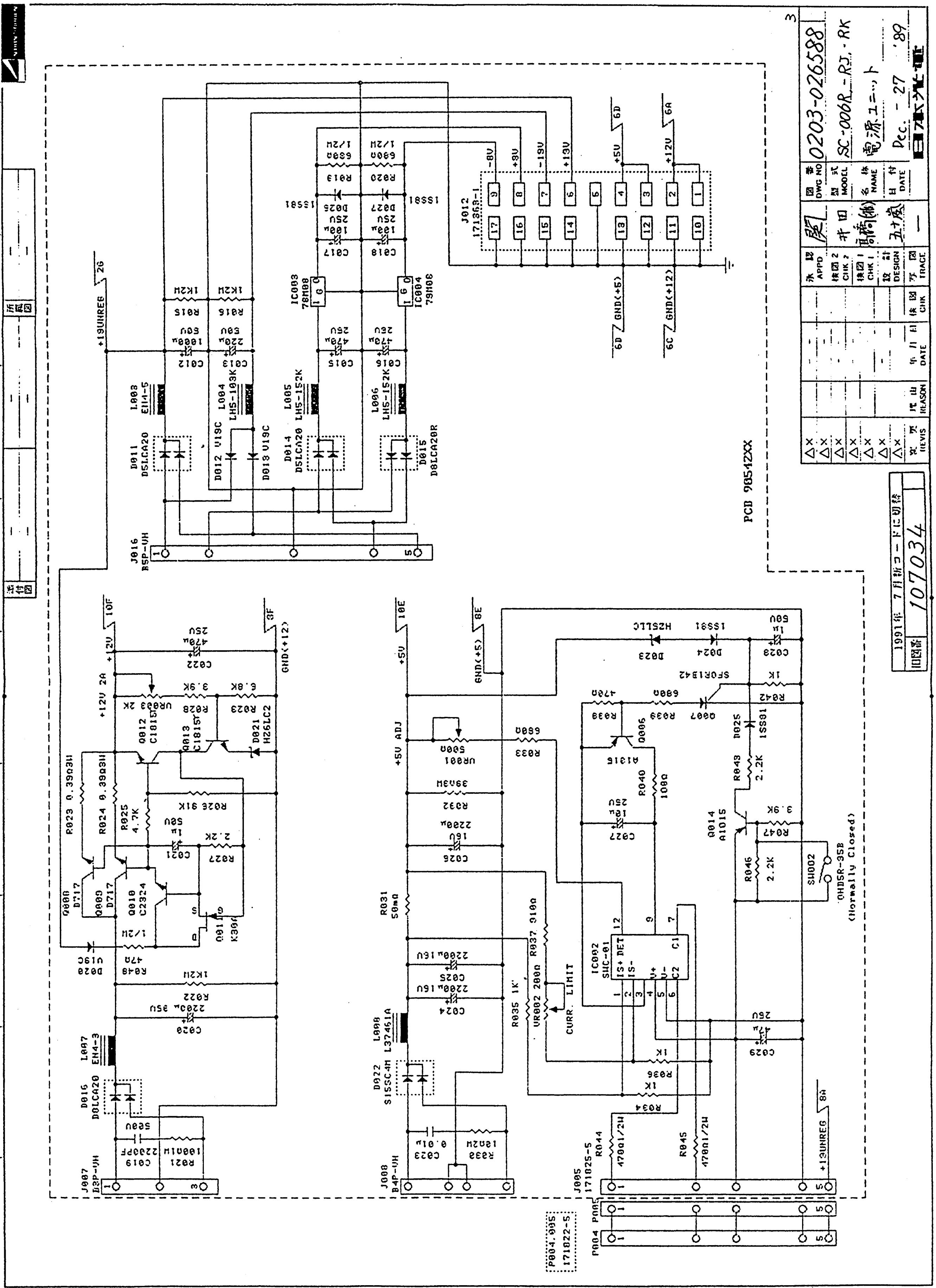
Circuit Diagram

The circuit diagrams in section 10 of the service manual are changed as follows.

From Page	To Page
10-42 to 10-43	2/3 to 3/3

MANUAL CHANGE INFORMATION





PCB 9854ZXX
0203-026588
SC-006R-RJ, RK
107034

0634-000059C

MANUAL CHANGE INFORMATION

Model	Main Unit	Revision	Software Revision	Starting SerialNo.
BSM-8301A/J/K	MU-831RA	D1	A3 - 04	01406
	MU-831RJ	D1	A3 - 04	00196
	MU-831RK	E1	A3 - 04	01311
BSM-8302A/J/K	MU-832RA	D1	A3 - 04	00128
	MU-832RJ	D1	A3 - 04	00241
	MU-832RK	D1	A3 - 04	00411

Change: The fixed ECG Head Amp (AC-800PA/PJ) on the main unit is made removable, and therefore, became an option. This change causes a minor change in the system composition shown on the following pages.

Section 1: 1) System Composition-1 (Page 1-2)

FROM

- MU-831RA / MU-831RJ / MU-831RK — Bedside monitor main unit (with NIBP)
  - CD-055P — Chassis parts
  - CD-056P — Chassis parts (speaker, touch panel)
  - VM-004P — CRT Unit
  - SC-006R — Power Supply Unit (MU-831RA/RJ)
  - SC-006RK — Power Supply Unit (MU-831RK)
  - US-0520 — ROM pack with ROM chips
    - UP-05201 — ROM pack without ROM chips
  - UP-03971 — Main Board
  - UP-03981 — CRTC Board
  - UP-0399 — HA (Head Amp) mother Board
  - UP-0519 — Respiration Board
  - UP-0400 — Operation Board - 1
    - UP-0509 — Operation Board - 2
    - UP-0584 — Operation Board - 3
  - **AC-800PA (A)** — **ECG head amplifier (MU-831RA)**
  - **AC-800PJ (J/K)** — **ECG head amplifier (MU-831RK/RJ)**
  - AP-712P — NIBP Unit
- QI-812P — Interface (for thermal array recorder, optional)
  - UP-0402 — WSIF Board
  - YS-015P9 — WS connection cable (45cm)
- QI-814P — Interface (for central monitor, optional)
  - UP-0401 — PIO Board

TO

- MU-831RA / MU-831RJ / MU-831RK — Bedside monitor main unit (with NIBP)
  - CD-055P — Chassis parts
  - CD-056P — Chassis parts (speaker, touch panel)
  - VM-004P — CRT Unit
  - SC-006R — Power Supply Unit (MU-831RA/RJ)
  - SC-006RK — Power Supply Unit (MU-831RK)
  - US-0520 — ROM pack with ROM chips
    - UP-05201 — ROM pack without ROM chips
  - UP-03971 — Main Board
  - UP-03981 — CRTC Board
  - UP-0399 — HA (Head Amp) mother Board
  - UP-0519 — Respiration Board
  - UP-0400 — Operation Board - 1
    - UP-0509 — Operation Board - 2
    - UP-0584 — Operation Board - 3
  - AP-712P — NIBP Unit
  - - - - - AC-800PA (A) — **ECG head amplifier (MU-831RA)**
  - - - - - AC-800PJ (J/K) — **ECG head amplifier (MU-831RK/RJ)**
  - - - - - QI-812P — Interface (for thermal array recorder)
    - UP-0402 — WSIF Board
    - YS-015P9 — WS connection cable (45cm)
  - - - - - QI-814P — Interface (for central monitor)
    - UP-0401 — PIO Board

----- Optional Unit

2) System Composition-2 (Page 1-3)

FROM

- MU-832RA / MU-832RJ / MU-832RK — Bedside monitor main unit (without NIBP)
  - CD-055P — Chassis parts
  - CD-056P — Chassis parts (speaker, touch panel)
  - VM-004P — CRT Unit
  - SC-006R / SC-006RK — Power Supply Unit (MU-832RA/RJ) / Power Supply Unit (MU-832RK)
  - US-0520 — ROM pack with ROM chips
    - UP-05201 — ROM pack without ROM chips
  - UP-03971 — Main Board
  - UP-03981 — CRTC Board
  - UP-0399 — HA (Head Amp) mother Board
  - UP-0519 — Respiration Board
  - UP-0400 — Operation Board - 1
    - UP-0509 — Operation Board - 2
    - UP-0584 — Operation Board - 3
  - **AC-800PA (A) / AC-800PJ (J/K)** — **ECG head amplifier (MU-832RA) / ECG head amplifier (MU-832RK/RJ)**
  - QI-812P — Interface (for thermal array recorder, optional)
    - UP-0402 — WSIF Board
    - YS-015P9 — WS connection cable (45cm)
  - QI-814P — Interface (for central monitor, optional)
    - UP-0401 — PIO Board

TO

- **MU-832RA / MU-832RJ / MU-832RK** — Bedside monitor main unit (without NIBP)
  - CD-055P — Chassis parts
  - CD-056P — Chassis parts (speaker, touch panel)
  - VM-004P — CRT Unit
  - SC-006R — Power Supply Unit (MU-832RA/RJ)
  - SC-006RK — Power Supply Unit (MU-832RK)
  - US-0520 — ROM pack with ROM chips
    - UP-05201 — ROM pack without ROM chips
  - UP-03971 — Main Board
  - UP-03981 — CRTC Board
  - UP-0399 — HA (Head Amp) mother Board
  - UP-0519 — Respiration Board
  - UP-0400 — Operation Board - 1
    - UP-0509 — Operation Board - 2
    - UP-0584 — Operation Board - 3
  - - - - - AC-800PA (A) — **ECG head amplifier (MU-832RA)**
  - - - - - AC-800PJ (J/K) — **ECG head amplifier (MU-832RK/RJ)**
  - - - - - QI-812P — Interface (for thermal array recorder)
    - UP-0402 — WSIF Board
    - YS-015P9 — WS connection cable (45cm)
  - - - - - QI-814P — Interface (for central monitor)
    - UP-0401 — PIO Board

----- Optional Unit

0634-000059B

MANUAL CHANGE INFORMATION

Model	Main Unit	Starting Serial No.	Software Revision	Hardware Revision
BSM-8301A/J/K	MU-831RA	01046	A3-01	C0
	MU-831RJ	00111	A3-01	C0
	MU-831RK	00831	A3-01	D0
BSM-8302A/J/K	MU-832RA	00103	A3-01	C0
	MU-832RJ	00181	A3-01	C0
	MU-832RK	00231	A3-01	C0

The following boards are changed:

Board	From	To
MAIN	UP-0397	UP-03971
CRTC	UP-0398	UP-03981
ROM PACK	UP-0520	UP-05201

The above boards are upgraded when modifications are made to the following boards.

1 CRTC Board UP-03981

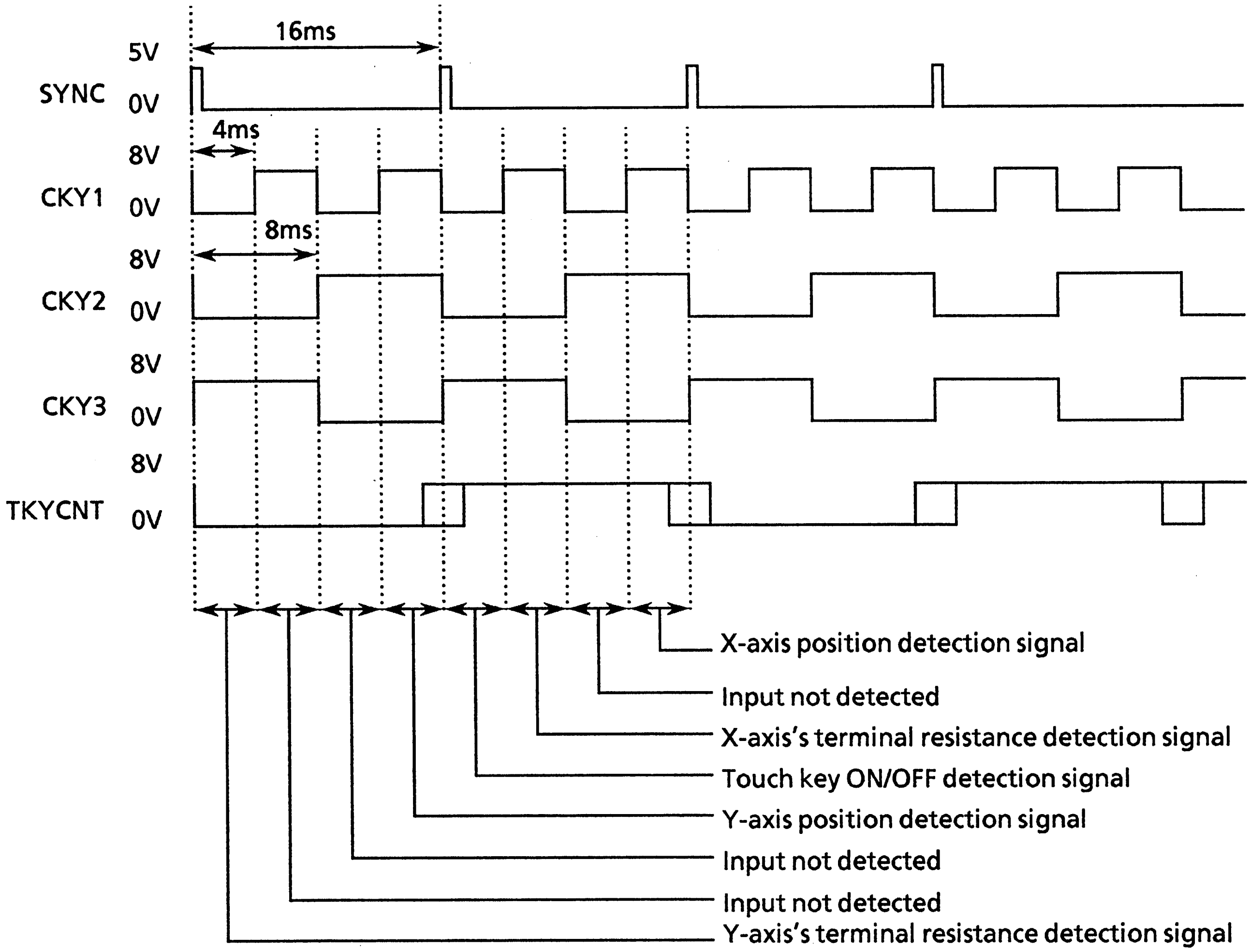
The circuit that accept external video signals and the related synchronized signals is deleted in this modified CRTC board. This function was not used.

2 MAIN Board UP-03971

2.1 Touch-key interface unit

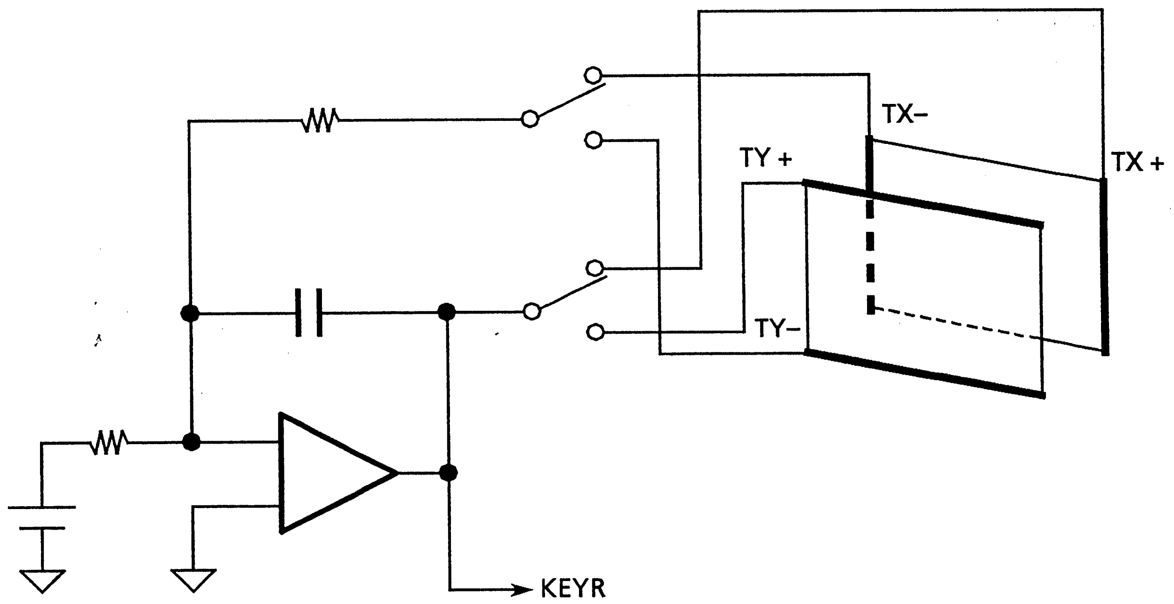
The touch-key operation is not changed. The touch position detection timing is changed from software control to hardware control. This is to incorporate the change in resistance between the terminals of the touch screen transparent electrodes due to aging.

Now the touch-key detected position and the touch screen transparent electrodes's terminal detected resistance value are time-shared as shown in the following time-chart:



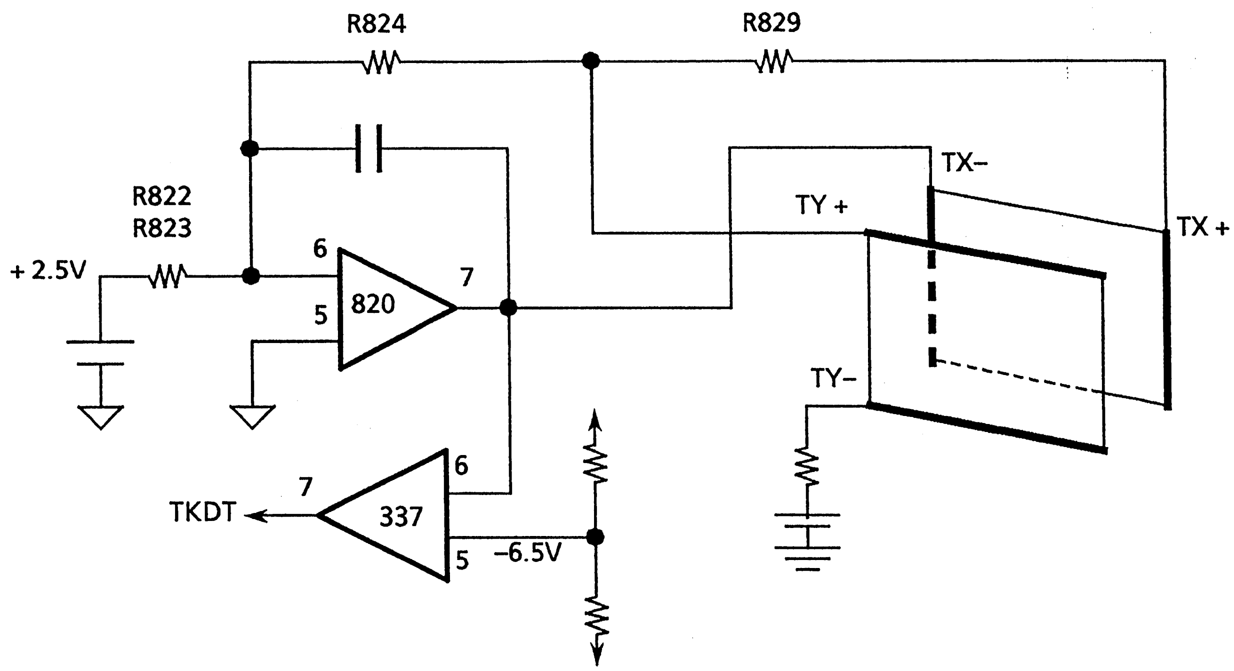
Signal CKY2 and CKY3 contain the time-shared information for touch position and its corresponding voltage between the terminals of the touch screen transparent electrodes. Signal TKYCONT is the same as the previous X/XY signal. The value of the X-axis and the value of the Y-axis are time-shared in this signal. Signal CKY1 determine whether the touch screen is being used or not.

Resistance between the terminals of the touch screen transparent electrodes.



The resistance of the touch screen transparent electrodes changes with time. This causes the calculation of the position of the touched screen to be inaccurate. To offset this effect the fabove circuit is used. This circuit periodically measure the resistance of the touch screen transparent electodes. The CPU then used the value of this resistance to calculate the actual position where contact has been made on the screen. The signal carrying the value of this resistance is called KEYR.

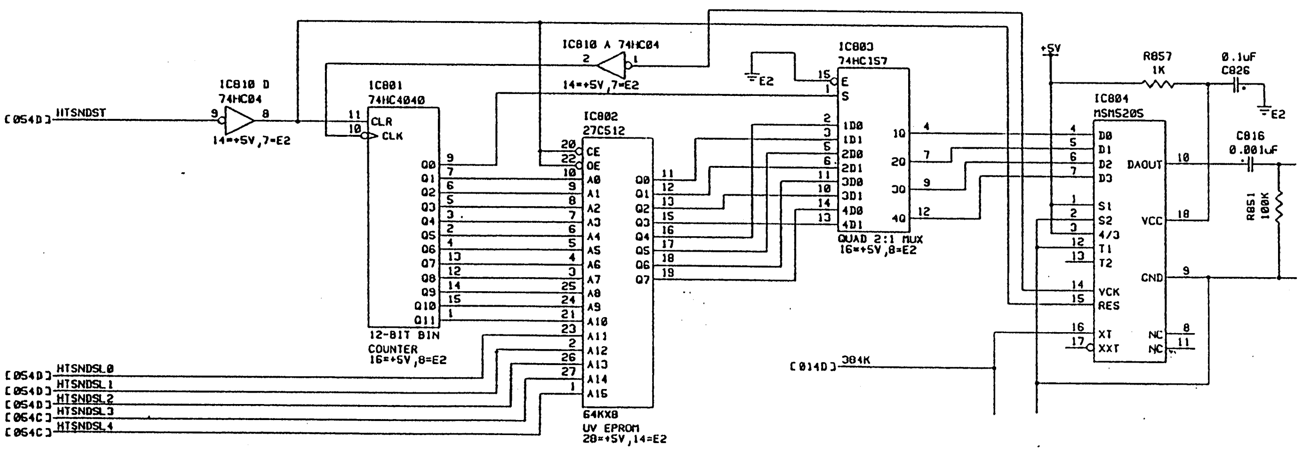
Touch Screen Key Touch Detector



The resistance of the touch screen transparent electrodes changes when the screen is touched and released. The change in resistance causes the output voltage of the operational amplifier IC820 to change. This output voltage in turn causes the IC337 to release a signal with different voltage. This signal is known as touch screen key touch detection signal (TKDT).

2.2 Sound Unit

Modification is made on this unit to accommodate the change in tone caused by differrent SaO2 values. The previous unit had only one tone represented by the 3 bit HTSNDST signals. The modified unit has a maximum of 32 different tones represented by the 5 bit HTSNDST signals. Pin No.1 and 27 of IC802 are used for the additional 2 bit HTSNDST signals.



2.3 EMC Filter

This filter is added to decrease the EMC noise. The following filters, capacitors and resistors are changed as follow.

Board	Changed
Main	L004 ~ L006, L101, L102, L705, L706
CRTC	L102, L107, L108, C211 ~ C221, R223, R224, R229 ~ R237

3 ROM PACK Board UP-05201

This board is only upgraded. There are no change in functions and parts on this board.

4 Electrical Part List

The electrtical part list of the changed boards in the service manual (from page 9-3 to 9-13) are changed as follow.

UP-03971 MAIN BD

ASSY	CKT NO.	PART NO.	QTY	DESCRIPTION
UP-03971		105842	1	BATT CR17335SE-T-C7 Lithium 3V
UP-03971		356598	2	CN AXS202811(u-IC SOCKET 28pin)
UP-03971	C001	046861	1	EECF5R5U105 1F/5.5V
UP-03971	C010-C012	159632	3	TAC 267M2002 106MR533 10uF20V
UP-03971	C013-C014	159695	2	TAC 267M3502 106MR720 10uF35V
UP-03971	C015-C016	159703	2	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C020-C074	159703	55	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C101	159641	1	TAC 267M2002 226MR533 22uF20V
UP-03971	C102	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C103	159632	1	TAC 267M2002 106MR533 10uF20V
UP-03971	C104	159721	1	CEC GRM39SL 220K50PT 50V 22pF
UP-03971	C105	159632	1	TAC 267M2002 106MR533 10uF20V
UP-03971	C106-C108	159703	3	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C110	159748	1	CEC GRM39SL 470K50PT 50V 47pF
UP-03971	C121	159748	1	CEC GRM39SL 470K50PT 50V 47pF
UP-03971	C122	159766	1	CEC GRM39SL 101K50PT 100pF50V
UP-03971	C301	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C302-C303	159632	2	TAC 267M2002 106MR533 10uF20V
UP-03971	C304	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C305	159632	1	TAC 267M2002 106MR533 10uF20V
UP-03971	C306-C308	159703	3	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C309	043543	1	FLC ECQP1H102JZ 1000pF
UP-03971	C310	159748	1	CEC GRM39SL 470K50PT 50V 47pF
UP-03971	C311-C316	159703	6	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C317	341471	1	FLC ECW-U1H473JA5 50V 0.047uF
UP-03971	C318	341462	1	FLC ECW-U1H333JA5 50V 0.033uF
UP-03971	C319	159784	1	CEC GRM39SL 331K50PT 330pF50V
UP-03971	C320	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C330-C331	159695	2	TAC 267M3502 106MR720 10uF35V
UP-03971	C332-C333	159703	2	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C334-C335	159784	2	CEC GRM39SL 331K50PT 330pF50V
UP-03971	C401-C404	331134	4	FLC ECW-U1H103JA5 50V 0.01uF
UP-03971	C405	341471	1	FLC ECW-U1H473JA5 50V 0.047uF
UP-03971	C406-C407	331072	2	FLC ECW-U1H102JA5 50V 0.001uF
UP-03971	C408	331054	1	FLC ECW-U1H682JA5 50V 0.0068uF
UP-03971	C409	339607	1	FLC ECW-U1H222JA5 50V 0.0022uF
UP-03971	C410	331054	1	FLC ECW-U1H682JA5 50V 0.0068uF
UP-03971	C411	339607	1	FLC ECW-U1H222JA5 50V 0.0022uF
UP-03971	C412	341471	1	FLC ECW-U1H473JA5 50V 0.047uF
UP-03971	C451	339607	1	FLC ECW-U1H222JA5 50V 0.0022uF
UP-03971	C452-C455	159632	4	TAC 267M2002 106MR533 10uF20V
UP-03971	C456	331072	1	FLC ECW-U1H102JA5 50V 0.001uF
UP-03971	C457-C459	341471	3	FLC ECW-U1H473JA5 50V 0.047uF
UP-03971	C460-C461	159659	2	TAC 267M3502 105MR 1uF35V
UP-03971	C501	339607	1	FLC ECW-U1H222JA5 50V 0.0022uF
UP-03971	C502-C505	159632	4	TAC 267M2002 106MR533 10uF20V
UP-03971	C506	331072	1	FLC ECW-U1H102JA5 50V 0.001uF
UP-03971	C507-C509	341471	3	FLC ECW-U1H473JA5 50V 0.047uF
UP-03971	C510-C511	159659	2	TAC 267M3502 105MR 1uF35V
UP-03971	C701-C702	341471	2	FLC ECW-U1H473JA5 50V 0.047uF
UP-03971	C704	159632	1	TAC 267M2002 106MR533 10uF20V
UP-03971	C705-C706	159703	2	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C707	159632	1	TAC 267M2002 106MR533 10uF20V
UP-03971	C709	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C710-C711	159632	2	TAC 267M2002 106MR533 10uF20V
UP-03971	C712	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	C713-C714	159632	2	TAC 267M2002 106MR533 10uF20V
UP-03971	C715	159784	1	CEC GRM39SL 331K50PT 330pF50V
UP-03971	C716-C718	159748	3	CEC GRM39SL 470K50PT 50V 47pF
UP-03971	C719-C720	159632	2	TAC 267M2002 106MR533 10uF20V
UP-03971	C721	159695	1	TAC 267M3502 106MR720 10uF35V
UP-03971	C722-C724	159748	3	CEC GRM39SL 470K50PT 50V 47pF
UP-03971	C725-C726	159721	2	CEC GRM39SL 220K50PT 50V 22pF
UP-03971	C727	159766	1	CEC GRM39SL 101K50PT 100pF50V
UP-03971	C801-C804	339607	4	FLC ECW-U1H222JA5 50V 0.0022uF
UP-03971	C805-C806	331134	2	FLC ECW-U1H103JA5 50V 0.01uF
UP-03971	C816-C817	331072	2	FLC ECW-U1H102JA5 50V 0.001uF
UP-03971	C822-C824	331134	3	FLC ECW-U1H103JA5 50V 0.01uF
UP-03971	C826-C827	159703	2	CEC ECUY1H 104ZFG 0.1uF50V
UP-03971	D101	160087	1	D 1SS307 TE85R
UP-03971	D102	003667	1	D HP5082-2835
UP-03971	D103	160104	1	D HSM123 TR
UP-03971	D301	160104	1	D HSM123 TR
UP-03971	D303-D305	160078	3	D HSK120TR
UP-03971	D401-D404	160087	4	D 1SS307 TE85R
UP-03971	D451-D452	071495	2	D 1SS106TE
UP-03971	D453-D454	160078	2	D HSK120TR
UP-03971	D501-D502	071495	2	D 1SS106TE
UP-03971	D503-D504	160078	2	D HSK120TR
UP-03971	D701-D703	160104	3	D HSM123 TR
UP-03971	D801	160078	1	D HSK120TR
UP-03971	IC101	365258	1	CMOS 74AC161SJ
UP-03971	IC102	161692	1	ADIC TL7705ACPS
UP-03971	IC103	160817	1	CMOS MC14538BF
UP-03971	IC104	161273	1	CMOS HD74HC148FP
UP-03971	IC105	365294	1	CPU HD68HC000CP12 PLCC
UP-03971	IC106	333694	1	TTL SN74LS07
UP-03971	IC107	365222	1	CMOS 74AC10SJ
UP-03971	IC108	323054	1	CMOS HD74HC393FP

ASSY	CKT NO.	PART NO.	QTY	DESCRIPTION
UP-03971	IC109	333836	1	CMOS 74AC04SJ
UP-03971	IC111	365204	1	CMOS 74AC00SJ
UP-03971	IC112	333845	1	CMOS 74AC139SJ
UP-03971	IC113	161709	1	CMOS 74AC138SJ
UP-03971	IC115	161709	1	CMOS 74AC138SJ
UP-03971	IC117	161709	1	CMOS 74AC138SJ
UP-03971	IC118	357418	1	CMOS HD74AC164FP
UP-03971	IC119	333845	1	CMOS 74AC139SJ
UP-03971	IC121	333827	1	CMOS 74AC32SJ
UP-03971	IC128-IC129	348205	2	RAM HM628128LFP-8
UP-03971	IC136	333854	1	CMOS 74AC244SJ
UP-03971	IC137	365302	1	CPU TMP82C51AM-10(CELZ
UP-03971	IC138	333854	1	CMOS 74AC244SJ
UP-03971	IC139	333702	1	CMOS HD74HC273FP
UP-03971	IC140	323179	1	CPU MSM6242GS-VK
UP-03971	IC141	323188	1	CPU HM58C65FP-25
UP-03971	IC142	365204	1	CMOS 74AC00SJ
UP-03971	IC143	161237	1	CMOS HD74HC390FP
UP-03971	IC144	334042	1	CMOS HD74AC125FP
UP-03971	IC145	161112	1	CMOS HD74HC174FP
UP-03971	IC151-IC153	149937A	3	CMOS 74AC373SJ(CD74AC373M) SOP
UP-03971	IC154-IC155	357454	2	CMOS TC74AC245F
UP-03971	IC156	333836	1	CMOS 74AC04SJ
UP-03971	IC157-IC159	149901A	3	CMOS 74AC74SJ(CD74AC74M) (SOP)
UP-03971	IC161-IC166	357454	6	CMOS TC74AC245F
UP-03971	IC167	365249	1	CMOS 74AC86SJ
UP-03971	IC301	160568	1	CMOS MC14051BF
UP-03971	IC302	160265	1	OPIC uPC812G2
UP-03971	IC303	160568	1	CMOS MC14051BF
UP-03971	IC304	015886	1	IC UPC-649C
UP-03971	IC305	160265	1	OPIC uPC812G2
UP-03971	IC306	016653	1	ADIC ADC574AJH 12BITADC
UP-03971	IC307	333702	1	CMOS HD74HC273FP
UP-03971	IC308	161282	1	CMOS MC14504BF
UP-03971	IC309	333854	1	CMOS 74AC244SJ
UP-03971	IC310	160871	1	CMOS HD74HC04FP
UP-03971	IC311	333854	1	CMOS 74AC244SJ
UP-03971	IC313	160978	1	CMOS HD74HC74FP
UP-03971	IC315-IC316	333702	2	CMOS HD74HC273FP
UP-03971	IC317	016092	1	ADIC HA-17012PB 12BIT DA
UP-03971	IC318	160265	1	OPIC uPC812G2
UP-03971	IC324	160407	1	REG LT1009S8
UP-03971	IC328	333702	1	CMOS HD74HC273FP
UP-03971	IC331-IC332	161282	2	CMOS MC14504BF
UP-03971	IC335	323099	1	OPIC uPC458G2
UP-03971	IC337	160309	1	ADIC HA17903FP

ASSY	CKT NO.	PART NO.	QTY	DESCRIPTION
UP-03971	IC338	161095	1	CMOS HD74HC164FP
UP-03971	IC340	160853	1	CMOS HD74HC00FP
UP-03971	IC341	015814	1	REG uPC7812H Regulator
UP-03971	IC342	015841	1	REG UPC7912H
UP-03971	IC401-IC405	160265	5	OPIC uPC812G2
UP-03971	IC406-IC407	160586	2	CMOS MC14053BF
UP-03971	IC408-IC409	160265	2	OPIC uPC812G2
UP-03971	IC411	160586	1	CMOS MC14053BF
UP-03971	IC451-IC452	160265	2	OPIC uPC812G2
UP-03971	IC453	160586	1	CMOS MC14053BF
UP-03971	IC454	160256	1	OPIC uPC811G2
UP-03971	IC502	160265	1	OPIC uPC812G2
UP-03971	IC503	160586	1	CMOS MC14053BF
UP-03971	IC504	160256	1	OPIC uPC811G2
UP-03971	IC701	160265	1	OPIC uPC812G2
UP-03971	IC702	161282	1	CMOS MC14504BF
UP-03971	IC703-IC704	333694	2	TTL SN74LS07
UP-03971	IC705	160871	1	CMOS HD74HC04FP
UP-03971	IC706	160586	1	CMOS MC14053BF
UP-03971	IC707	160265	1	OPIC uPC812G2
UP-03971	IC708	160568	1	CMOS MC14051BF
UP-03971	IC709	015823	1	REG uPC7815H Regulator
UP-03971	IC710	160265	1	OPIC uPC812G2
UP-03971	IC711	160586	1	CMOS MC14053BF
UP-03971	IC712	160309	1	ADIC HA17903FP
UP-03971	IC713	160586	1	CMOS MC14053BF
UP-03971	IC714	160871	1	CMOS HD74HC04FP
UP-03971	IC716-IC719	161291	4	CMOS uPD74HC4094GS
UP-03971	IC720-IC723	161754	4	CMOS HD74HC597FP
UP-03971	IC724	161086	1	CMOS HD74HC161FP
UP-03971	IC725	161264	1	CMOS HD74HC4040FP
UP-03971	IC726	160978	1	CMOS HD74HC74FP
UP-03971	IC727	160862	1	CMOS HD74HC02FP
UP-03971	IC729	333702	1	CMOS HD74HC273FP
UP-03971	IC730-IC731	160978	2	CMOS HD74HC74FP
UP-03971	IC732	161237	1	CMOS HD74HC390FP
UP-03971	IC733	161068	1	CMOS HD74HC157FP
UP-03971	IC801	161264	1	CMOS HD74HC4040FP
UP-03971	IC803	161068	1	CMOS HD74HC157FP
UP-03971	IC804	016475	1	ADIC MSM5205RS
UP-03971	IC805	161264	1	CMOS HD74HC4040FP
UP-03971	IC807	161068	1	CMOS HD74HC157FP
UP-03971	IC808	016475	1	ADIC MSM5205RS
UP-03971	IC809	333854	1	CMOS 74AC244SJ
UP-03971	IC810	160871	1	CMOS HD74HC04FP
UP-03971	IC811-IC812	161086	2	CMOS HD74HC161FP

ASSY	CKT NO.	PART NO.	QTY	DESCRIPTION
UP-03971	IC814	160265	1	OPIC uPC812G2
UP-03971	IC815	160853	1	CMOS HD74HC00FP
UP-03971	IC816	160265	1	OPIC uPC812G2
UP-03971	IC817	333827	1	CMOS 74AC32SJ
UP-03971	IC820-IC821	160265	2	OPIC uPC812G2
UP-03971	IC822-IC824	160586	3	CMOS MC14053BF
UP-03971	J001	091437	1	PCN FFC-34BSM1#2
UP-03971	J005	091152	1	PCN PS-22PLB-D4LT1-FL
UP-03971	J006	083339	1	PCN 171363-1 17pin male
UP-03971	J007-J009	089966	3	PCN PCN10EA-90S-2.54DSA(05)
UP-03971	J010	365178	1	PCN PCN10EA-64S-2.54DS(05)
UP-03971	J011	092864	1	PCN IL-2P-S3FP2-1
UP-03971	L001-L003	024243	3	NFLT BNX002-01 DC Line Filter
UP-03971	L004-L006	367381	3	NFLT NFM61R30T472T1
UP-03971	L101	341489	1	NFLT BLM21A05PT
UP-03971	L102	367381	1	NFLT NFM61R30T472T1
UP-03971	L704-L705	367381	2	NFLT NFM61R30T472T1
UP-03971	Q101	160122	1	TR 2SA1122 CORD TR
UP-03971	Q102	160149	1	TR 2SC2618 D TR
UP-03971	Q701	160122	1	TR 2SA1122 CORD TR
UP-03971	Q702	160149	1	TR 2SC2618 D TR
UP-03971	R101	159561	1	MR RK73K1JTD0 47KohmJ 1/16W
UP-03971	R105	159561	1	MR RK73K1JTD0 47KohmJ 1/16W
UP-03971	R106	351834	1	MR RK73K1JTD0 100ohmJ 1/16W
UP-03971	R125-R126	351834	2	MR RK73K1JTD0 100ohmJ 1/16W
UP-03971	R304-R305	365187	2	MR RN73C2BTD 1.000Kohm B 1/8W
UP-03971	R331	159561	1	MR RK73K1JTD0 47KohmJ 1/16W
UP-03971	VC101	047637	1	VC TZ03R 300ER 5.2-30pF
UP-03971	VR301	159846	1	POT G4AT 1Kohm
UP-03971	VR302-VR303	159819	2	POT G4AT 100ohm
UP-03971	VR304	159828	1	POT G4AT 200ohm
UP-03971	VR305	159873	1	POT G4AT 10Kohm
UP-03971	VR451	159882	1	POT G4AT 20Kohm
UP-03971	VR452	159873	1	POT G4AT 10Kohm
UP-03971	VR501	159882	1	POT G4AT 20Kohm
UP-03971	VR502	159873	1	POT G4AT 10Kohm
UP-03971	VR701	159837	1	POT G4AT 500ohm
UP-03971	X101	022931	1	XTAL KF-38G

UP-03981 CRTC BD

ASSY	CKT NO.	PART NO.	QTY	DESCRIPTION
UP-03981		086185	1	CN IC SOCKET DL-2-20A (01)
UP-03981	CNJ101	089957	1	PCN PCN10EA-90P-2.54DS(05)
UP-03981	CNJ102	081109	1	CN RDBD-25SE-LNA FEMALE
UP-03981	CNJ103	089699	1	PCN M60-12-30-114P (12P Straight)
UP-03981	CNJ105	089912	1	PCN PCN10EA-32P-2.54DS(05)
UP-03981	CNJ107	090705	1	PCN PS-20PLB-D4T1-FL1
UP-03981	CNJ108	089663	1	PCN M60-03-30-114P (3P Straight)
UP-03981	C010-C014	159784	5	CEC GRM39SL 331K50PT 330pF50V
UP-03981	C101-C102	159632	2	TAC 267M2002 106MR533 10uF20V
UP-03981	C103-C111	159659	9	TAC 267M3502 105MR 1uF35V
UP-03981	C112-C202	159703	91	CEC ECUY1H 104ZFG 0.1uF50V
UP-03981	C203-C204	159766	2	CEC GRM39SL 101K50PT 100pF50V
UP-03981	C211-C214	159721	4	CEC GRM39SL 220K50PT 50V 22pF
UP-03981	C215-C216	159748	2	CEC GRM39SL 470K50PT 50V 47pF
UP-03981	C217	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03981	C301-C303	159632	3	TAC 267M2002 106MR533 10uF20V
UP-03981	C304	159721	1	CEC GRM39SL 220K50PT 50V 22pF
UP-03981	C305	070317	1	EC ECEA1VU 101B (100uF/35V)
UP-03981	C306	331107	1	FLC ECW-U1H223JA5 50V 0.022uF
UP-03981	C307	070317	1	EC ECEA1VU 101B (100uF/35V)
UP-03981	C308	159632	1	TAC 267M2002 106MR533 10uF20V
UP-03981	C309	159721	1	CEC GRM39SL 220K50PT 50V 22pF
UP-03981	C310	070317	1	EC ECEA1VU 101B (100uF/35V)
UP-03981	C311	331107	1	FLC ECW-U1H223JA5 50V 0.022uF
UP-03981	C312	159766	1	CEC GRM39SL 101K50PT 100pF50V
UP-03981	C313	159703	1	CEC ECUY1H 104ZFG 0.1uF50V
UP-03981	C401-C403	040377	3	EC ECES1EU682Q
UP-03981	DL201-DL202	037229	2	COIL JD3010C
UP-03981	DL212-DL213	037265	2	COIL DCS10-10 Delay Line
UP-03981	D101-D129	160104	29	D HSM123 TR
UP-03981	D131	160078	1	D HSK120TR
UP-03981	D201-D216	160104	16	D HSM123 TR
UP-03981	GA101	013754A	1	CPU Gate Array ACW
UP-03981	GA102-GA103	013745A	2	CPU Gate Array DCW
UP-03981	IC101-IC104	333854	4	CMOS 74AC244SJ
UP-03981	IC105	161709	1	CMOS 74AC138SJ
UP-03981	IC106	333863	1	CMOS 74AC08SJ
UP-03981	IC107	333836	1	CMOS 74AC04SJ
UP-03981	IC108	334042	1	CMOS HD74AC125FP
UP-03981	IC109	333774	1	CPU HD63484CP-8
UP-03981	IC110	365285	1	CPU HD63486CP32
UP-03981	IC111	365276	1	CPU HD63485CP32
UP-03981	IC112-IC119	333907	8	RAM HM53461JP-12

ASSY	CKT NO.	PART NO.	QTY	DESCRIPTION
UP-03981	IC120	365213	1	CMOS 74AC02SJ
UP-03981	IC121	365267	1	CMOS TC74AC05F
UP-03981	IC122	333854	1	CMOS 74AC244SJ
UP-03981	IC124	365213	1	CMOS 74AC02SJ
UP-03981	IC201-IC206	357454	6	CMOS TC74AC245F
UP-03981	IC207-IC210	323116	4	CPU HM62256LFP-8T
UP-03981	IC215	333863	1	CMOS 74AC08SJ
UP-03981	IC216-IC217	365231	2	CMOS 74AC158SJ
UP-03981	IC218-IC219	149901A	2	CMOS 74AC74SJ(CD74AC74M) (SOP)
UP-03981	IC220-IC221	333854	2	CMOS 74AC244SJ
UP-03981	IC227	149901A	1	CMOS 74AC74SJ(CD74AC74M) (SOP)
UP-03981	IC228	333854	1	CMOS 74AC244SJ
UP-03981	IC230-IC237	333907	8	RAM HM53461JP-12
UP-03981	IC238-IC239	334069	2	CMOS TC74AC299F
UP-03981	IC240-IC247	333907	8	RAM HM53461JP-12
UP-03981	IC248-IC249	334069	2	CMOS TC74AC299F
UP-03981	IC250-IC257	333907	8	RAM HM53461JP-12
UP-03981	IC258-IC259	334069	2	CMOS TC74AC299F
UP-03981	IC260-IC267	333907	8	RAM HM53461JP-12
UP-03981	IC268-IC269	334069	2	CMOS TC74AC299F
UP-03981	IC270	334033	1	CMOS HD74AC374FP
UP-03981	IC271	333827	1	CMOS 74AC32SJ
UP-03981	IC272	334033	1	CMOS HD74AC374FP
UP-03981	IC301	010801	1	ADIC uPC1316C AUDIO AMP
UP-03981	L101	024243	1	NFLT BNX002-01 DC Line Filter
UP-03981	L102	334149	1	NFLT NFM52R20P506
UP-03981	L107-L108	341489	2	NFLT BLM21A05PT
UP-03981	Q101-Q103	334122A	3	TR 2SC3735-T2B
UP-03981	Q105-Q107	334122A	3	TR 2SC3735-T2B
UP-03981	R223-R224	351834	2	MR RK73K1JTD0 100ohmJ 1/16W
UP-03981	R229-R230	367399	2	MR RK73K1JTD0 10ohmJ 1/16W
UP-03981	R231-R232	351834	2	MR RK73K1JTD0 100ohmJ 1/16W
UP-03981	R236-R237	367399	2	MR RK73K1JTD0 10ohmJ 1/16W
UP-03981	VR101	365196	1	POT G4ST 200Kohm
UP-03981	X101	026259	1	XTAL TD308C 49.152MHZ

5 Circuit Diagram

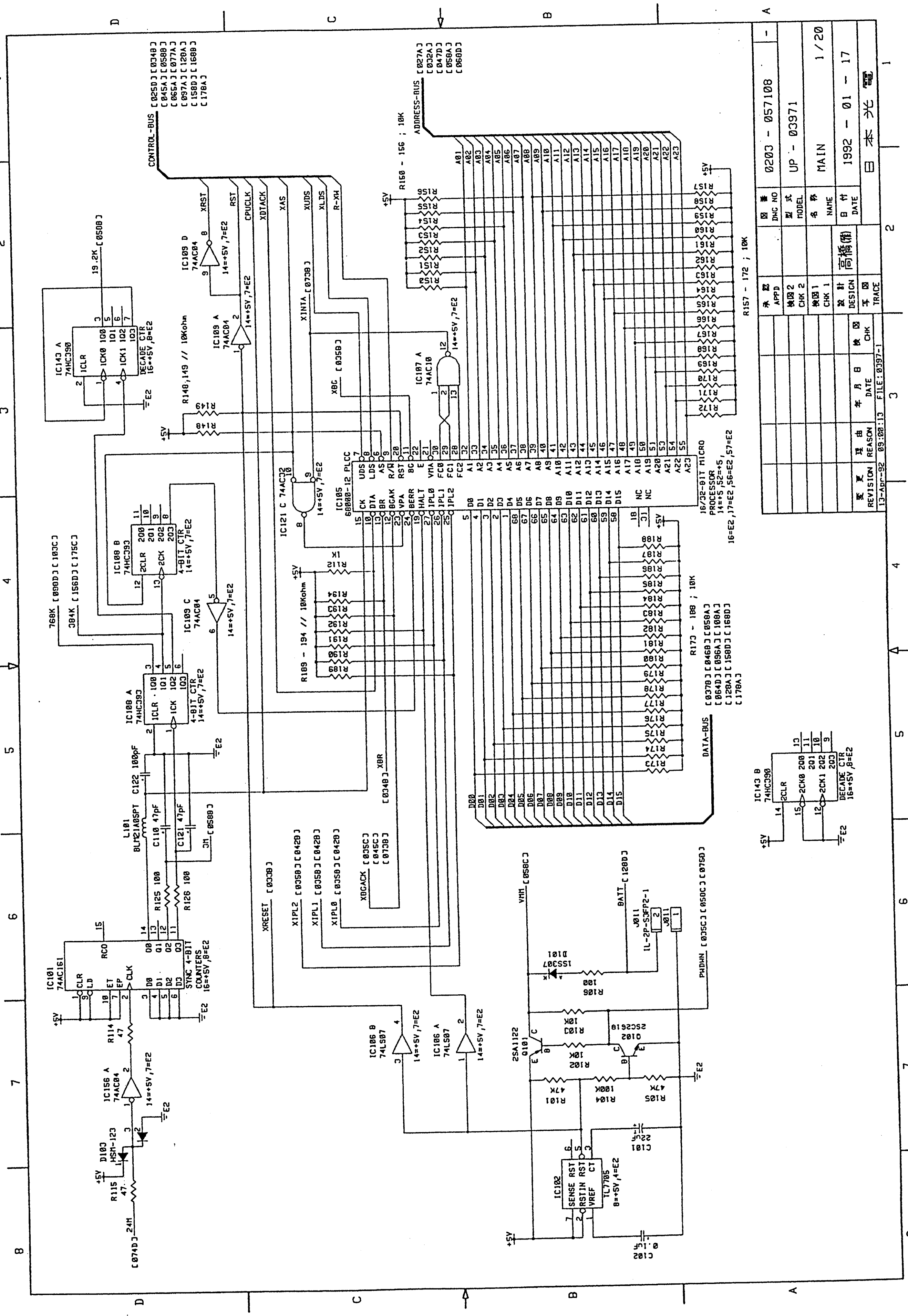
The circuit diagrams in section 10 of the service manual are changed as follow.

Circuit Diagram	From Page	To Page
MAIN	10-4 to 10-22	11/46 to 30/46
ROM PACK	10-23 to 10-24	31/46 to 32/46
CRTC	10-25 to 10-38	33/46 to 46/46

6 Compatibility

Compatibility between the board and the software revision is shown below.

Board	Software Revision	
	Previous	A3-01
UP-0397	Yes	Yes
UP-03971	No	Yes
UP-0398	Yes	Yes
UP-03981	Yes	Yes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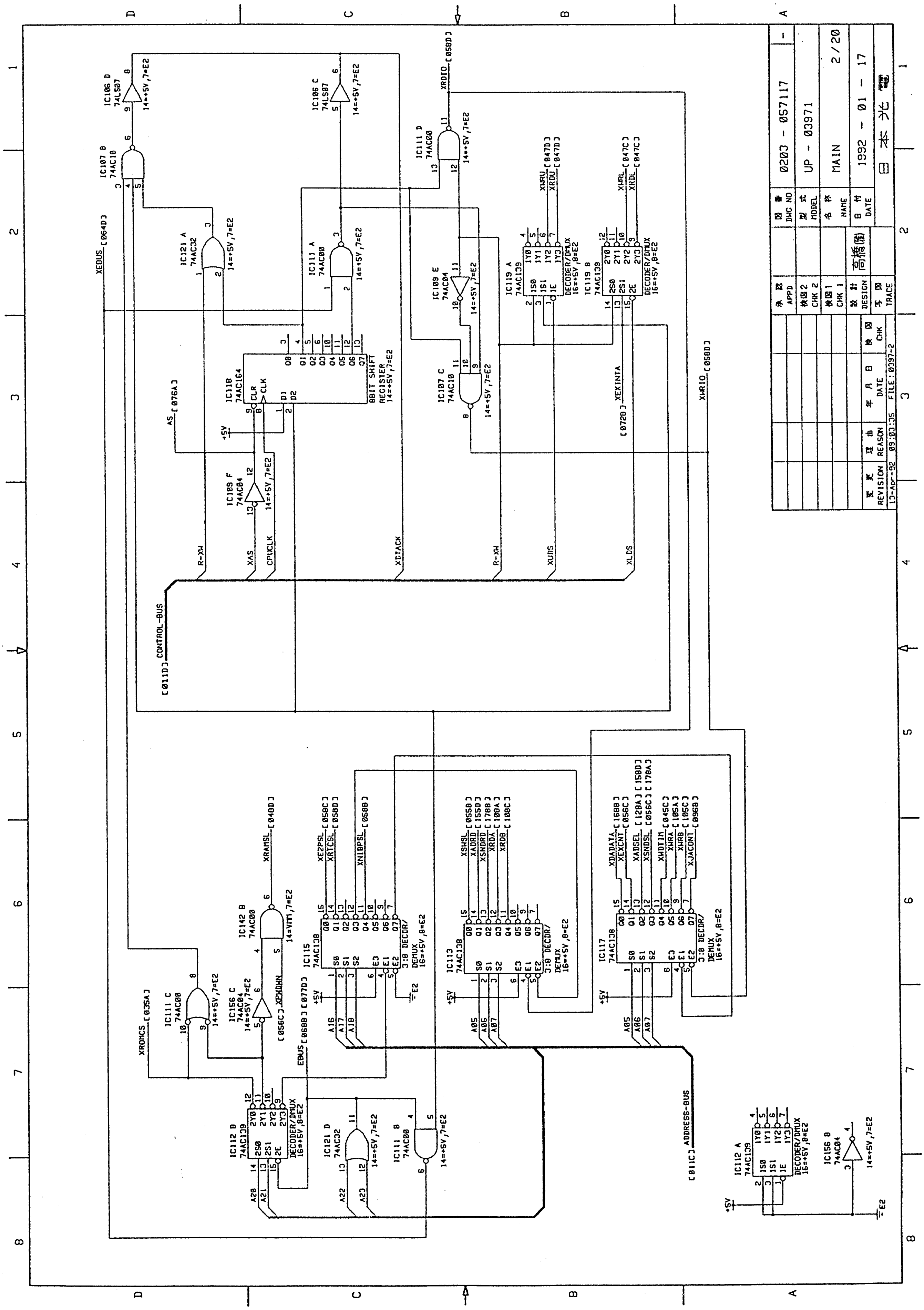
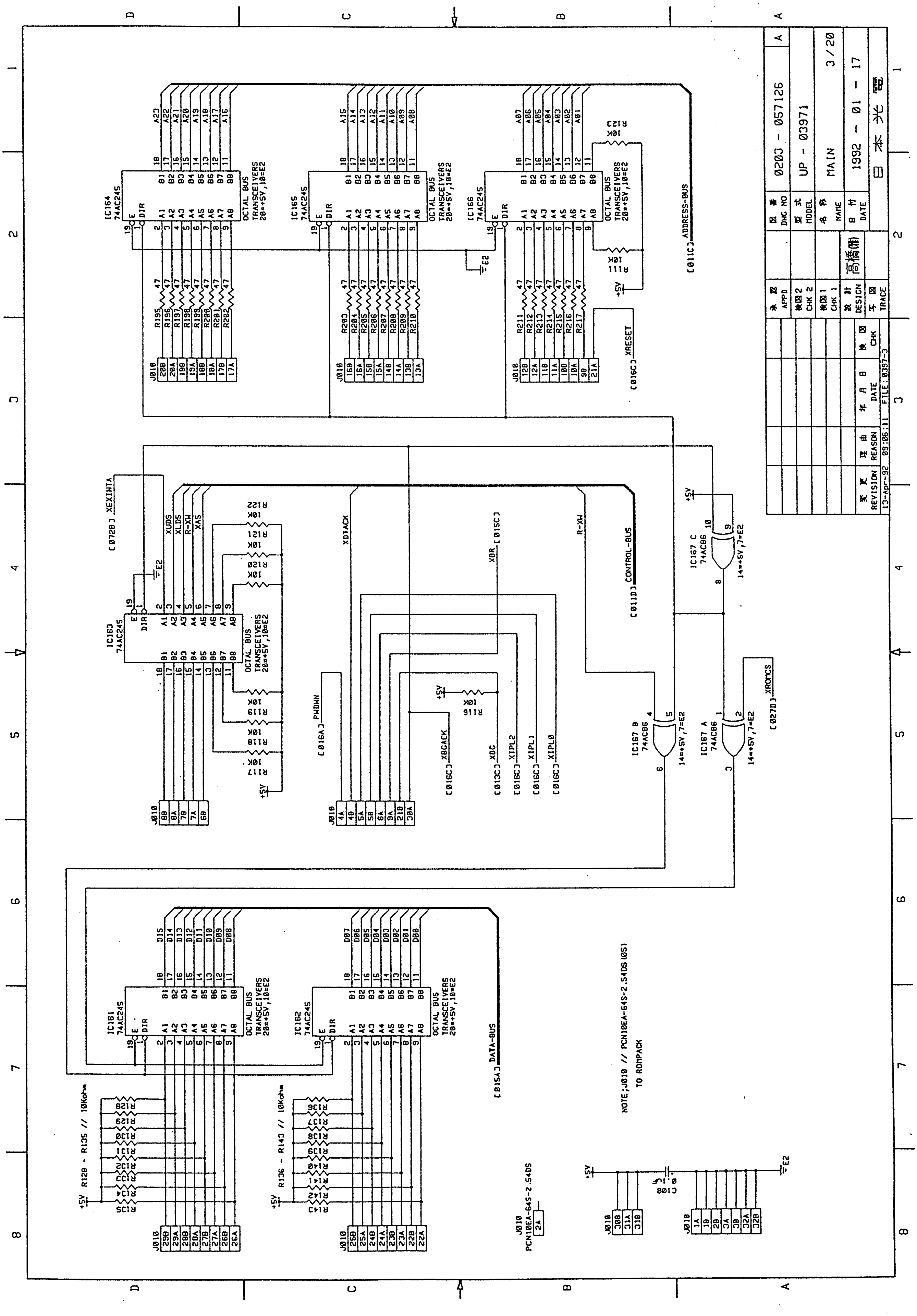
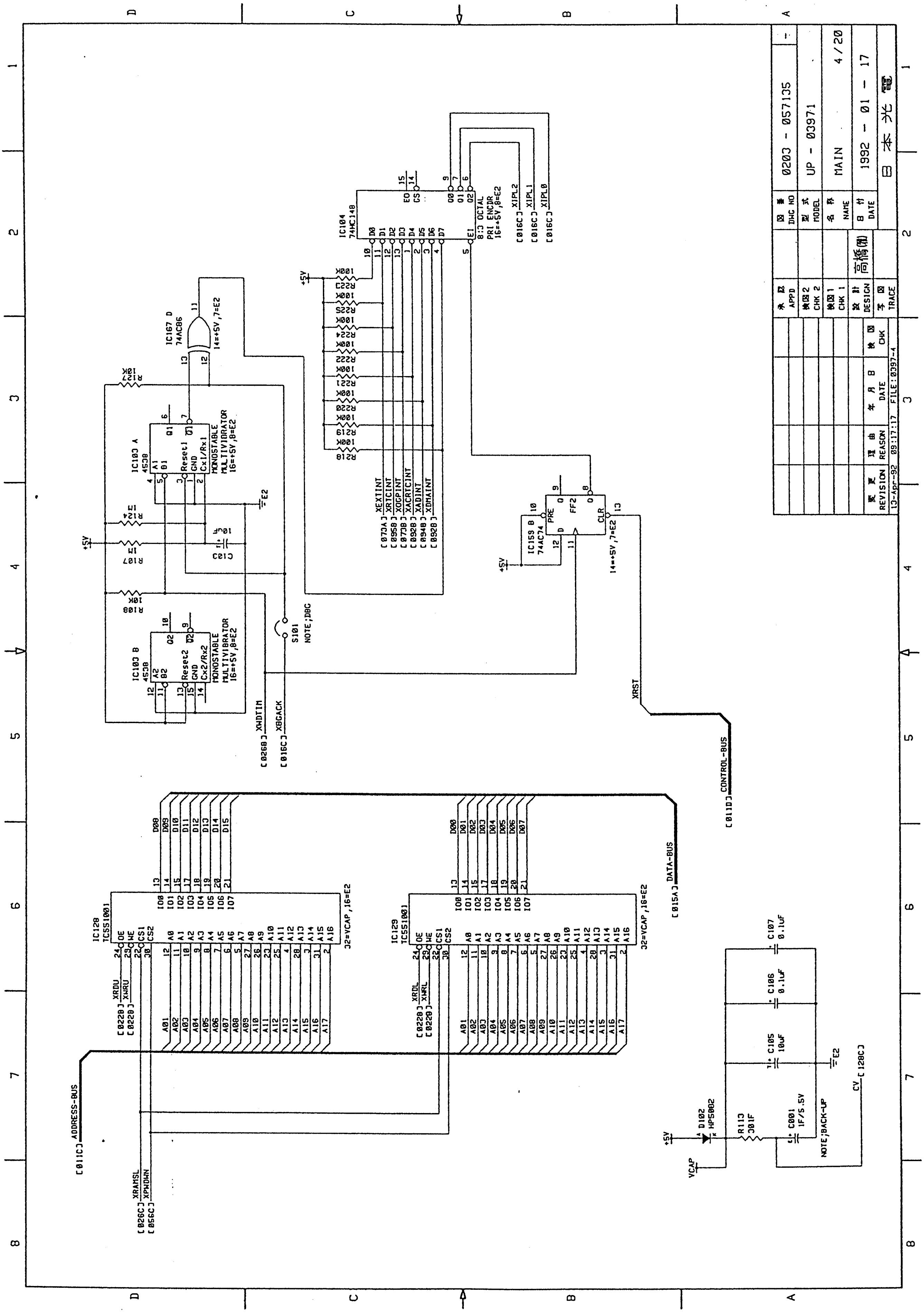
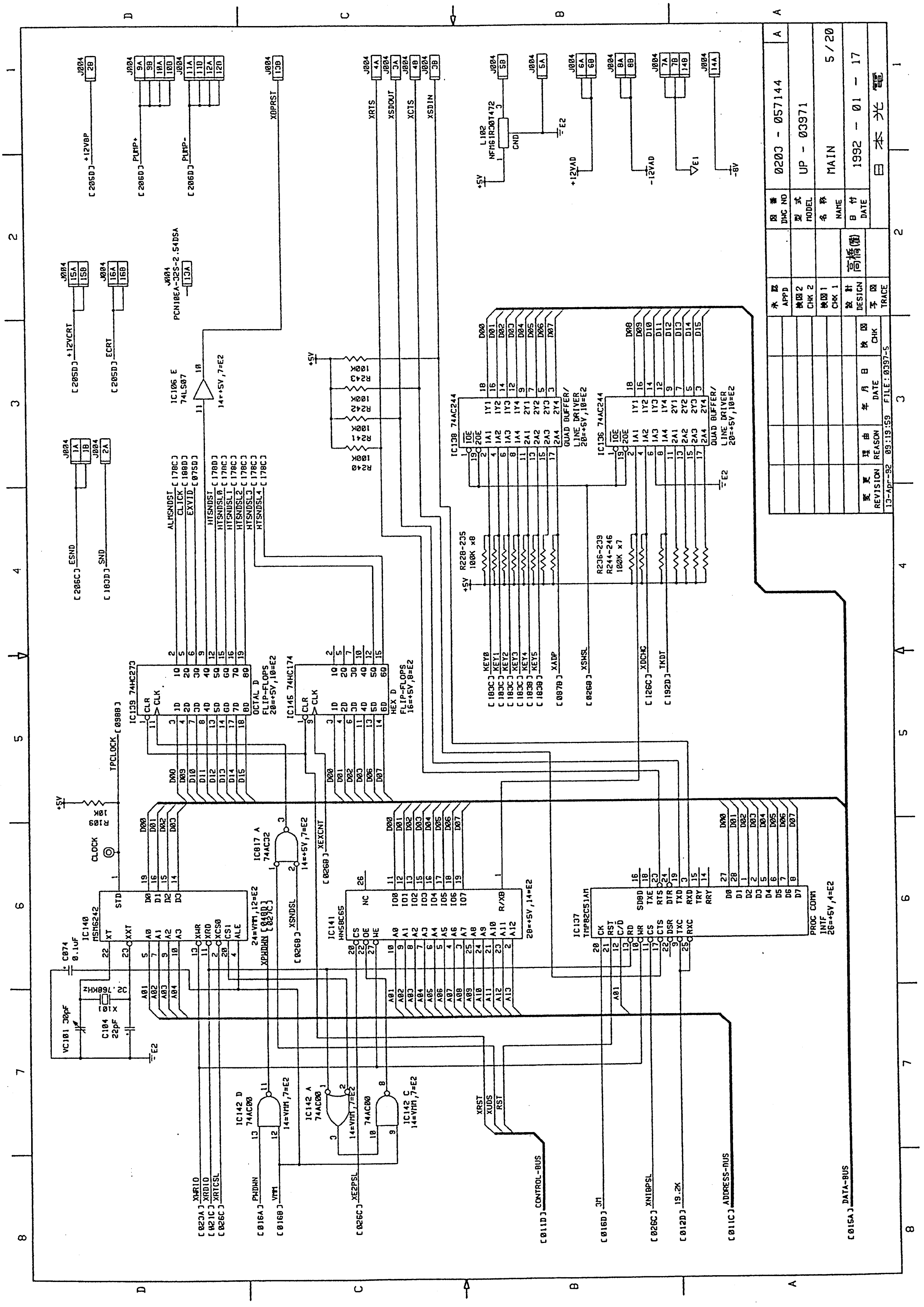
UP - 03971
MAIN
1/20
1992 - 01 - 17

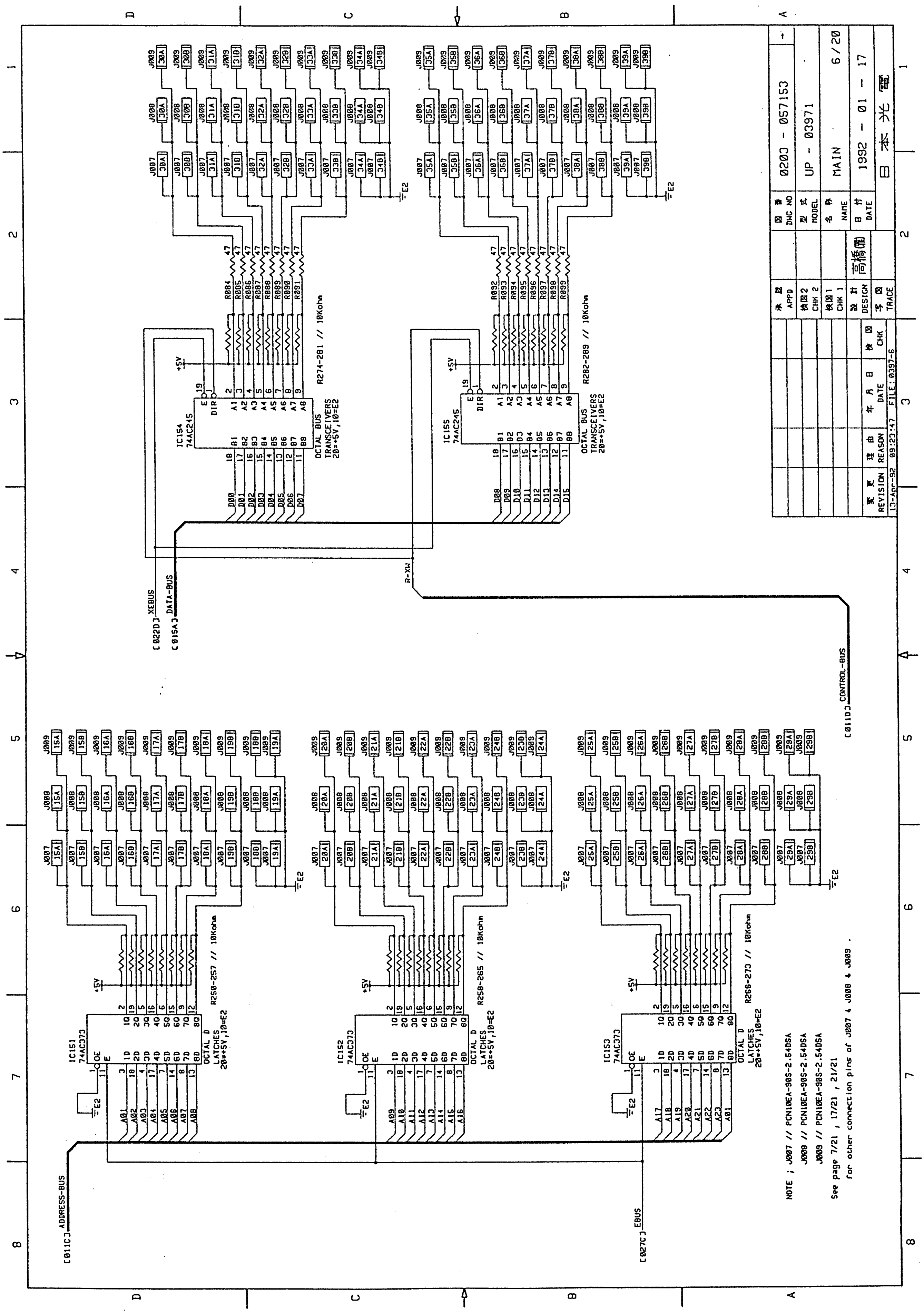

0203 - 057117
UP - 03971
MAIN
2/20
1992 - 01 - 17
日本光電
CONTROL-BUS
ADDRESS-BUS

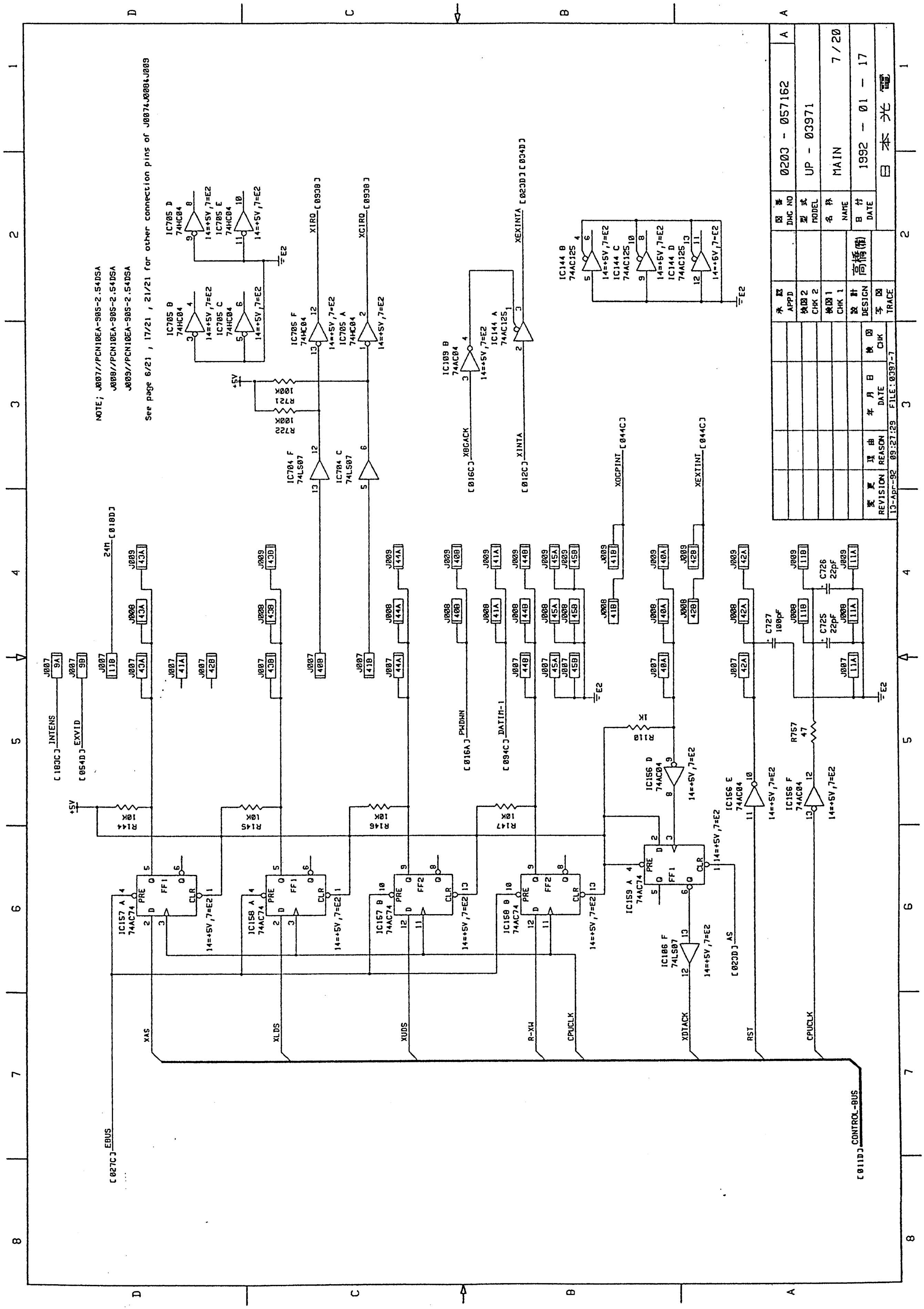

0203 - 057126
UP - 03971
MAIN
3 / 20
1992 - 01 - 17
ADDRESS-BUS
CONTROL-BUS
DATA-BUS
IC164 74AC245
IC165 74AC245
IC166 74AC245
IC163 74AC245
IC161 74AC245
IC162 74AC245
IC167 A 74AC86
IC167 B 74AC86
IC167 C 74AC86
OCTAL BUS TRANSCEIVERS 20=+5V,10=E2
NOTE;J010 // PCN10EA-64S-2.54DS(05) TO ROMPACK
J010 PCN10EA-64S-2.54DS
R128 - R135 // 10Kohm
R136 - R143 // 10Kohm
XRESET
XRDMCS
XEXINTA
XDTACK
XBR
XBGACK
XBG
XIPL2
XIPL1
XIPL0
PWDHN
R-XW
XUDS
XLDS
XAS
13-Apr-92 09:06:11 FILE:0397-3

MANUAL CHANGE INFORMATION

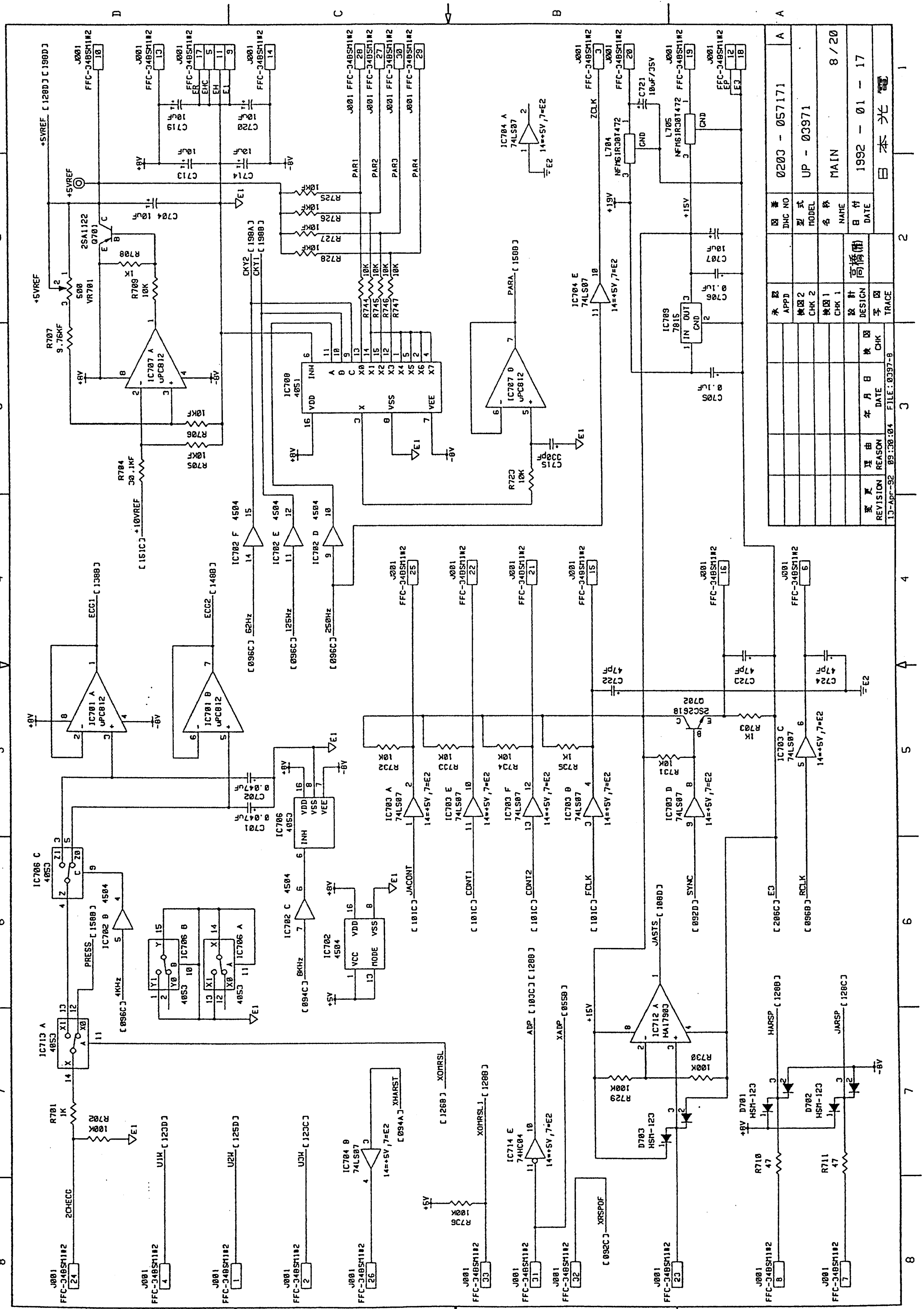


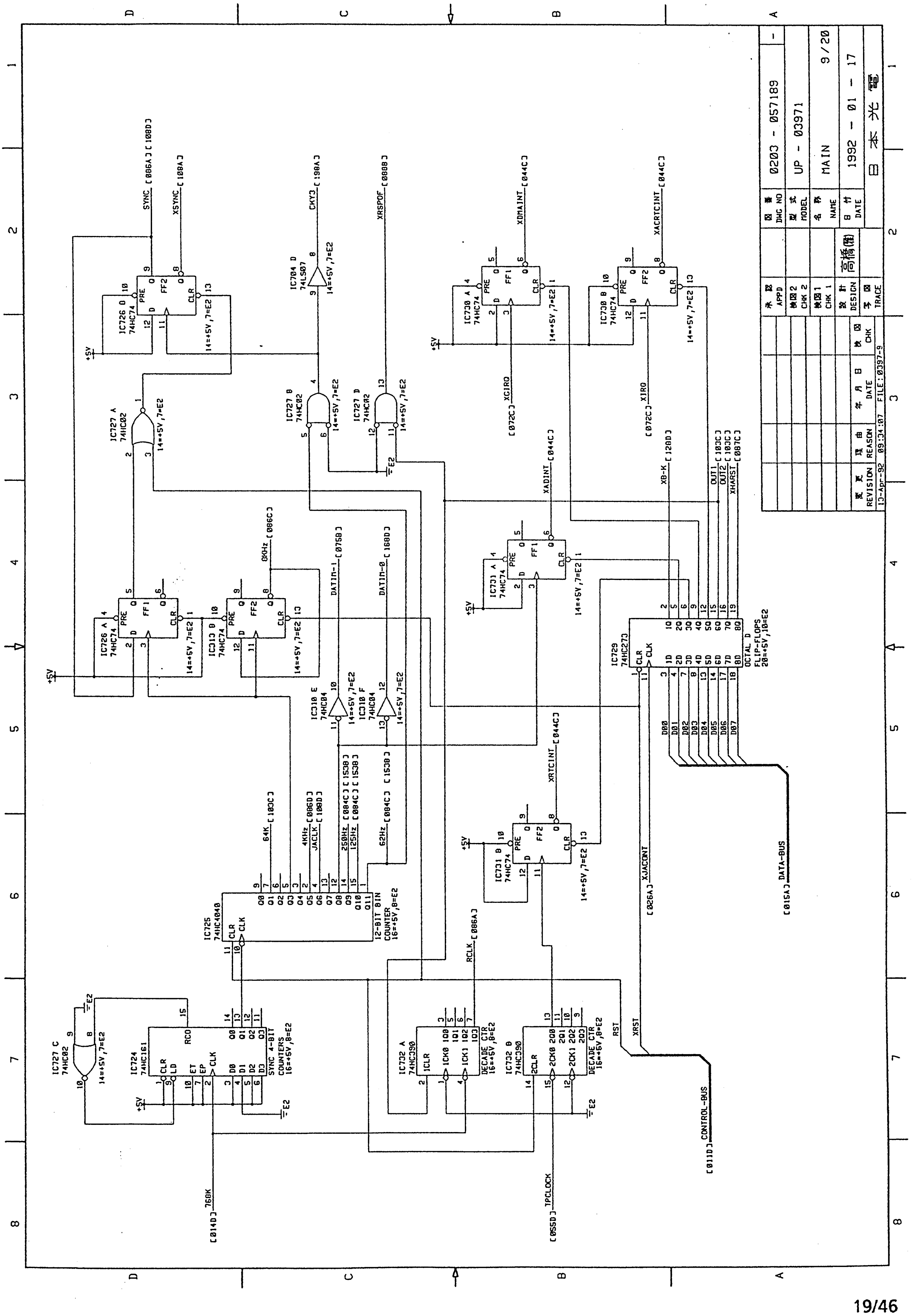

0203 - 057144
UP - 03971
MAIN
5 / 20
1992 - 01 - 17
PROC COMM INTF
QUAD BUFFER/ LINE DRIVER
OCTAL D FLIP-FLOPS
HEX D FLIP-FLOPS
CONTROL-BUS
ADDRESS-BUS
DATA-BUS

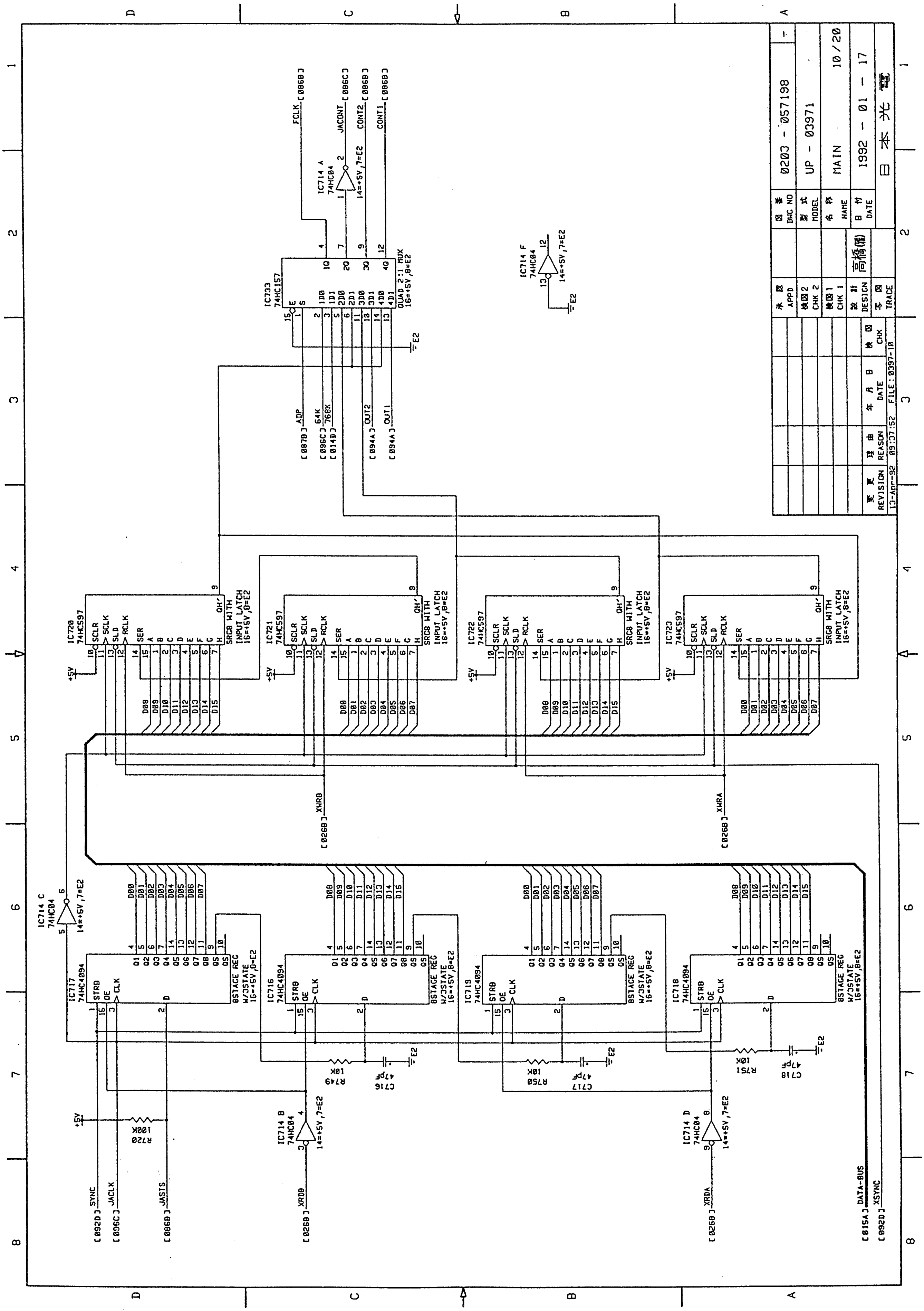

0203 - 057153
UP - 03971
MAIN
6/20
1992 - 01 - 17
IC154
74AC245
IC155
74AC245
IC151
74AC373
IC152
74AC373
IC153
74AC373
OCTAL BUS TRANSCEIVERS
OCTAL D LATCHES
DATA-BUS
XEBUS
R-XW
CONTROL-BUS
ADDRESS-BUS
EBUS
NOTE ; J007 // PCN10EA-90S-2.54DSA
J008 // PCN10EA-90S-2.54DSA
J009 // PCN10EA-90S-2.54DSA
See page 7/21 , 17/21 , 21/21
for other connection pins of J007 & J008 & J009 .

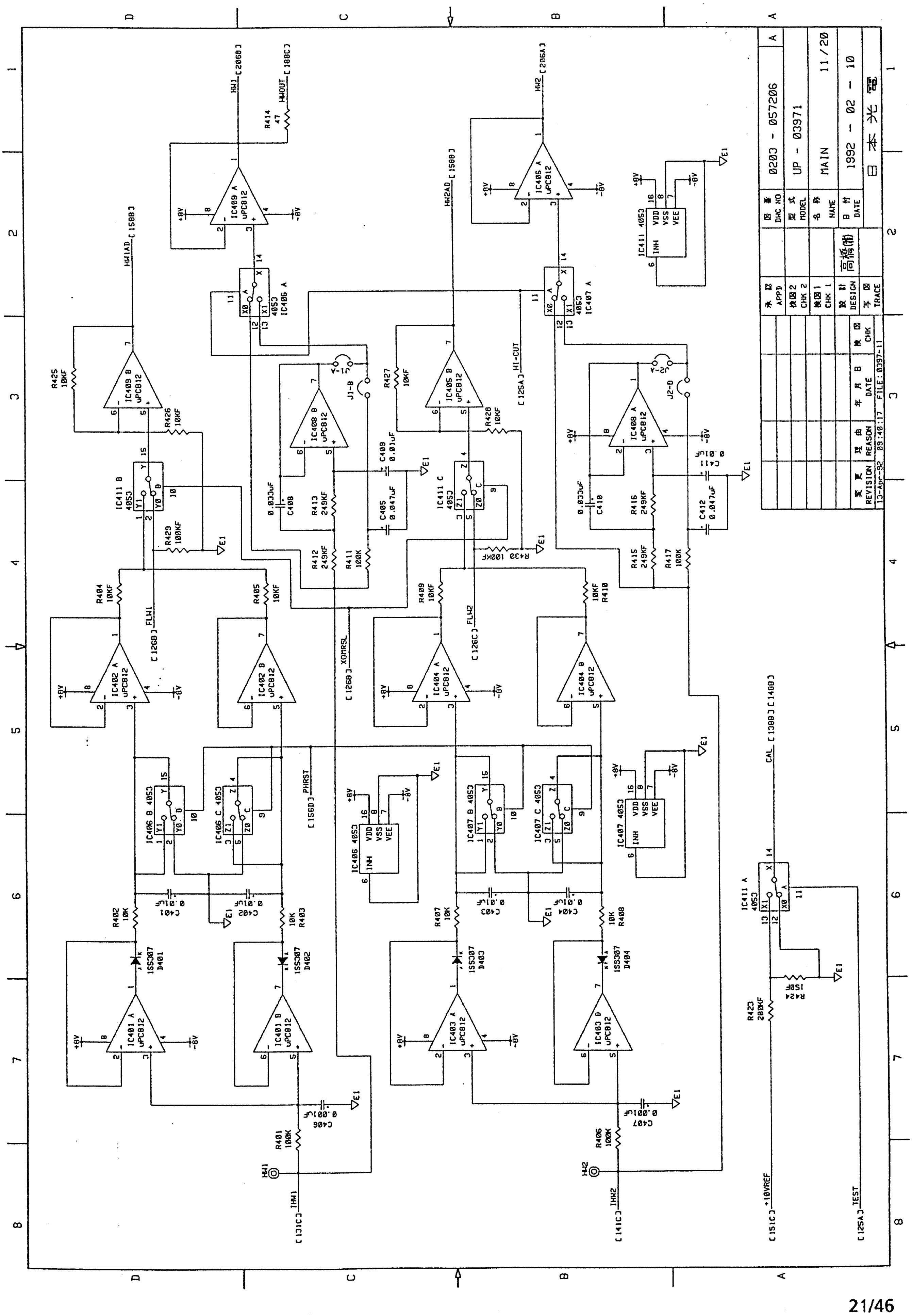

0203 - 057162
UP - 03971
MAIN
7/20
1992 - 01 - 17
CONTROL-BUS

MANUAL CHANGE INFORMATION

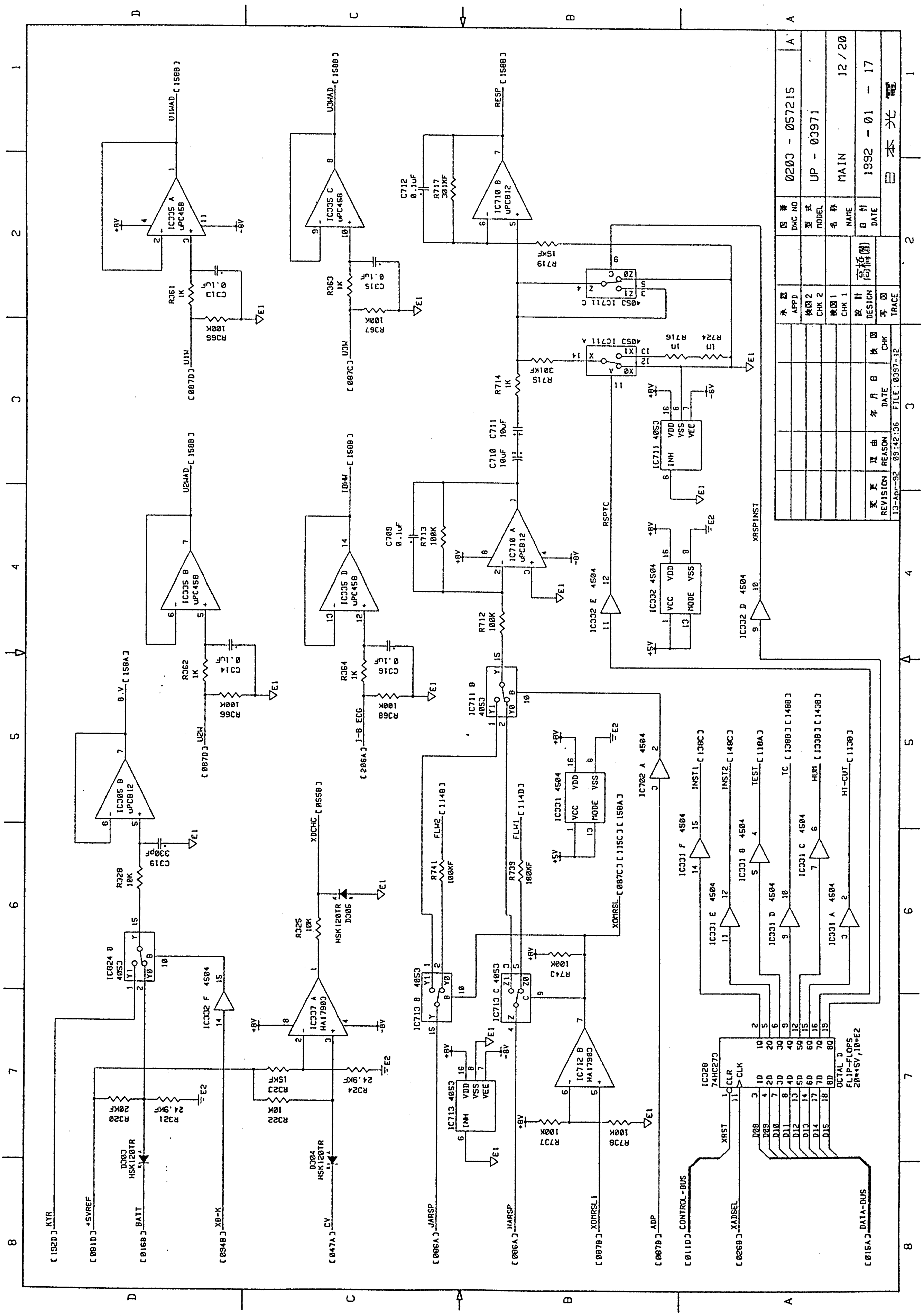


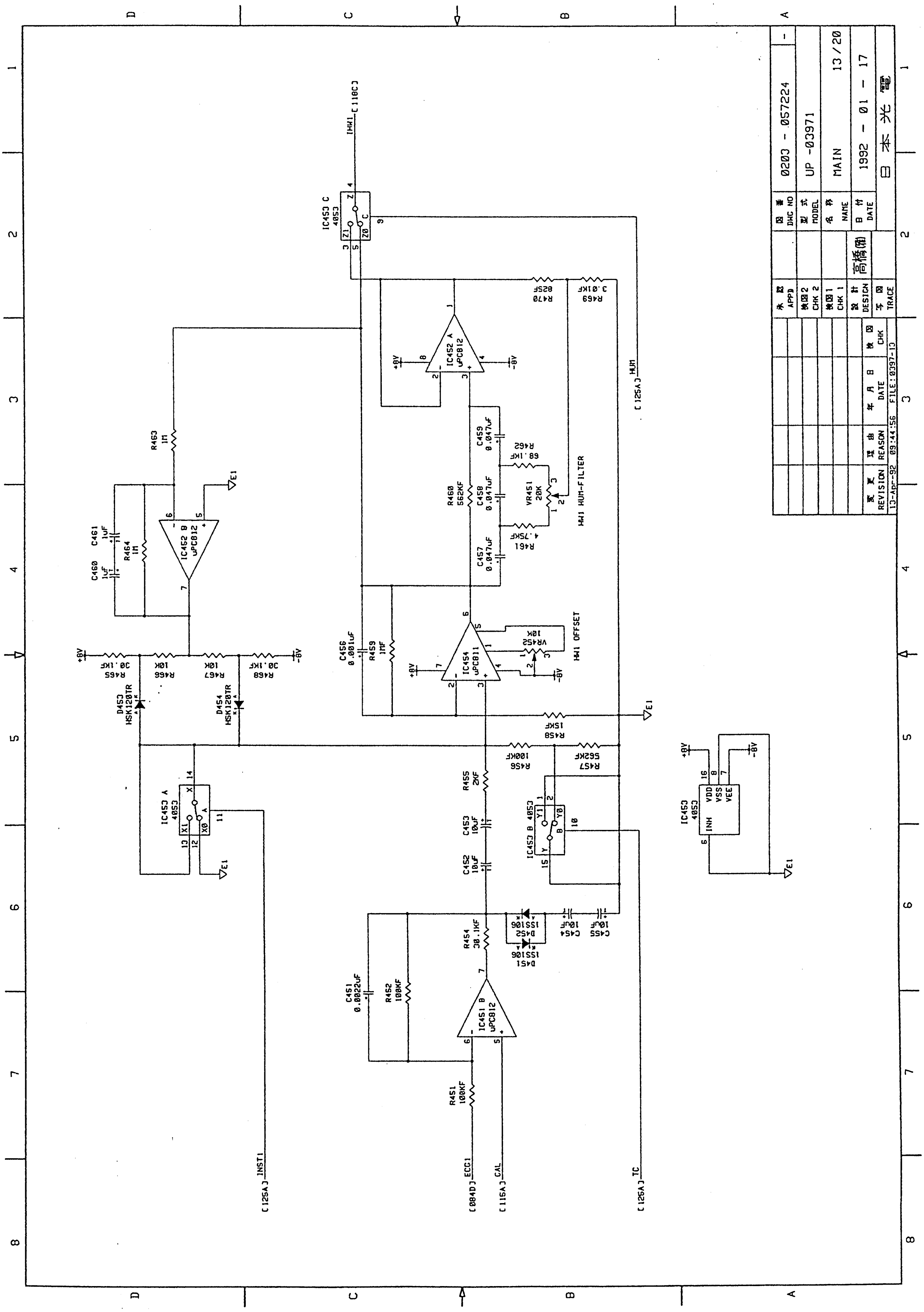

0203 - 057189
UP - 03971
MAIN
9 / 20
1992 - 01 - 17
DATA-BUS
CONTROL-BUS

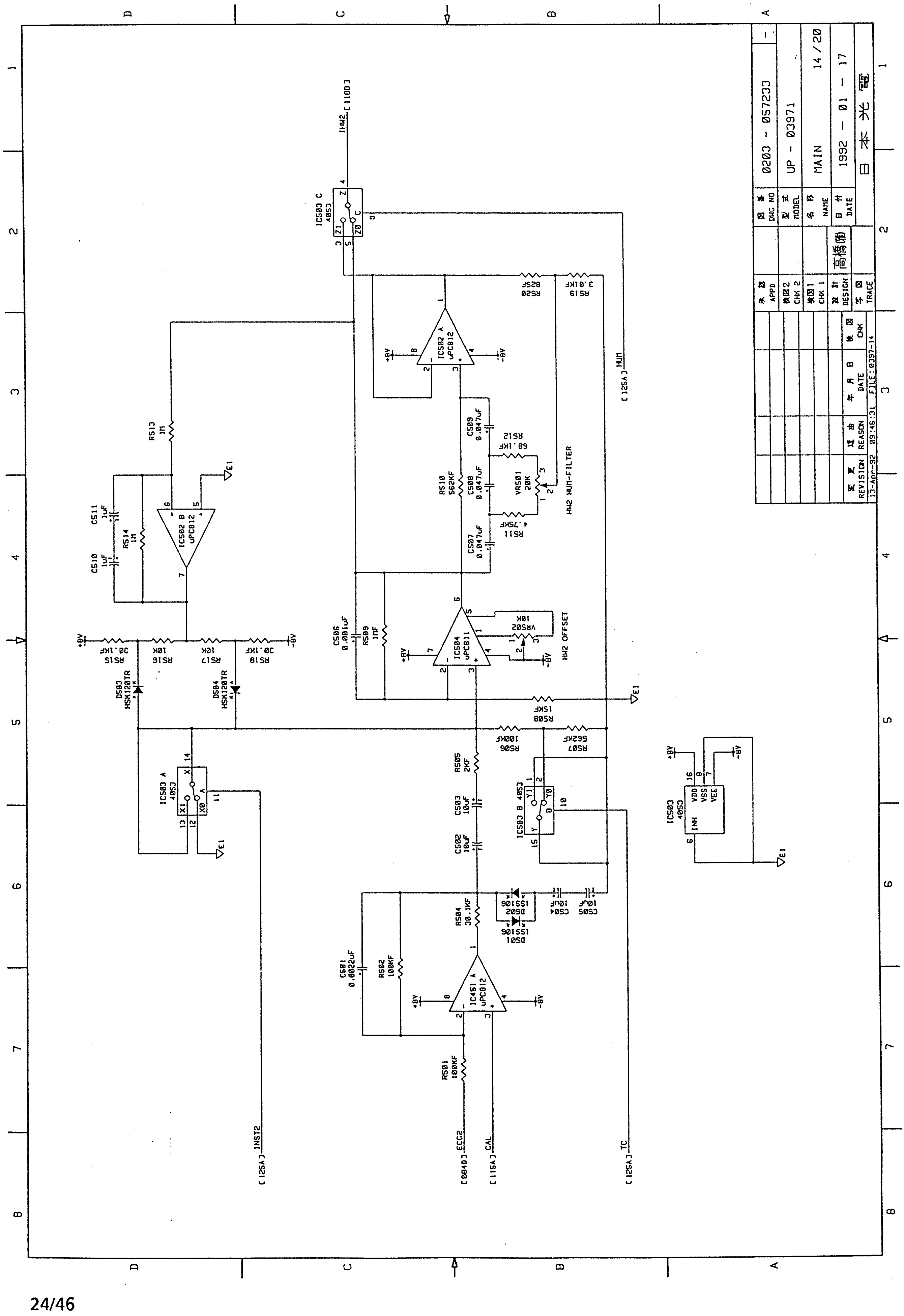

0203 - 057198
UP - 03971
MAIN 10/20
1992 - 01 - 17
日本光電

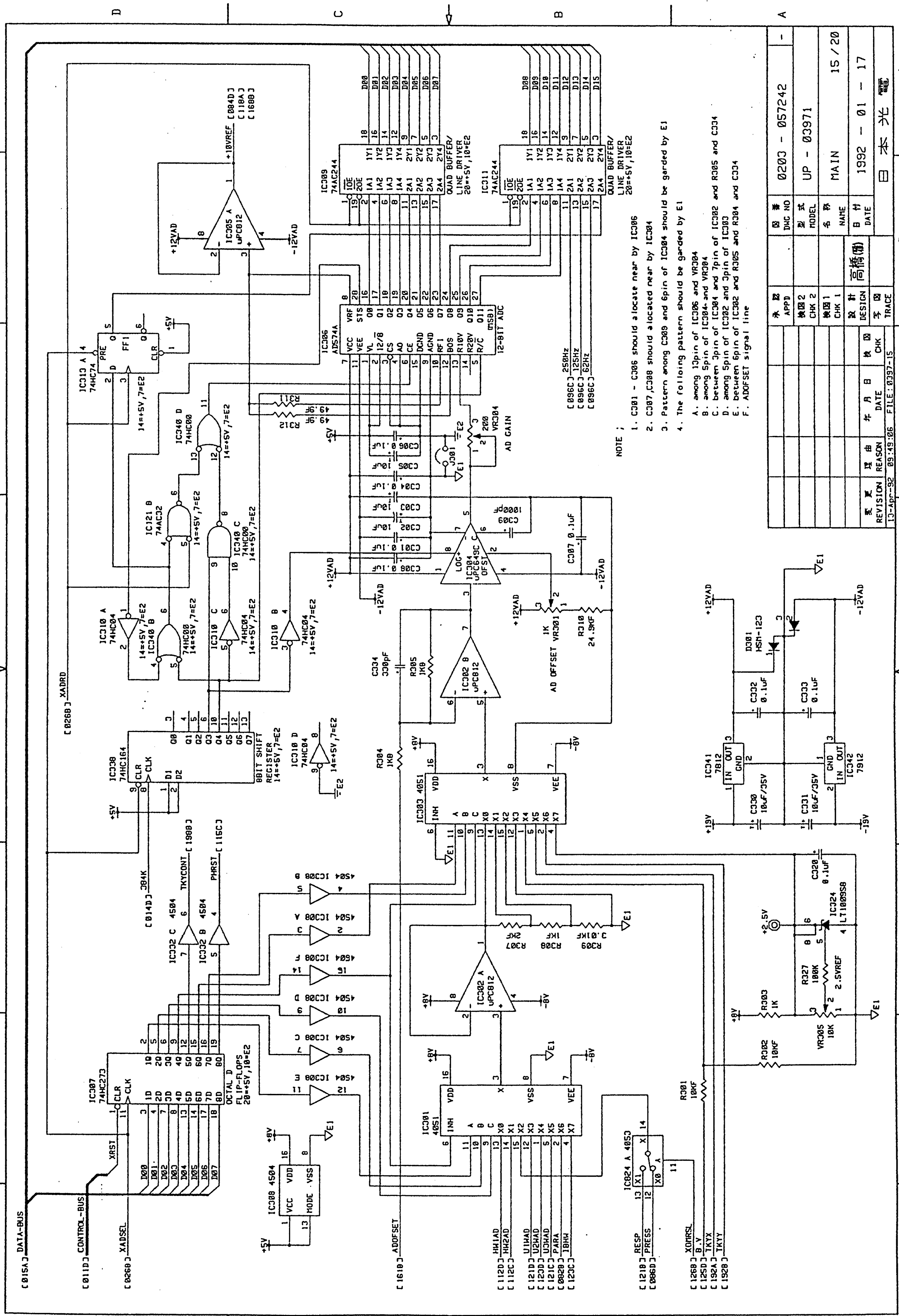

020J - 057206
UP - 03971
MAIN
11/20
1992 - 02 - 10

MANUAL CHANGE INFORMATION

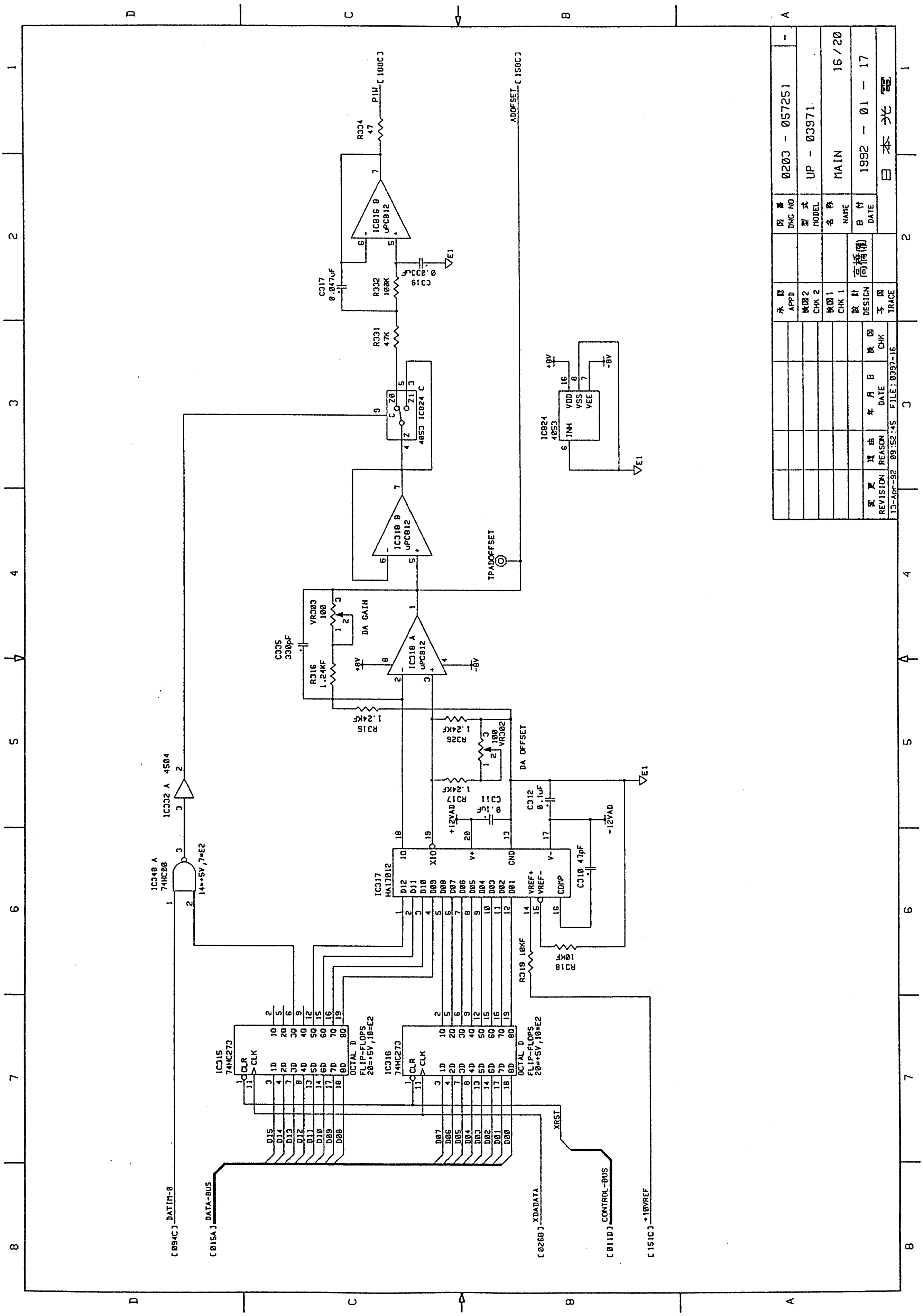


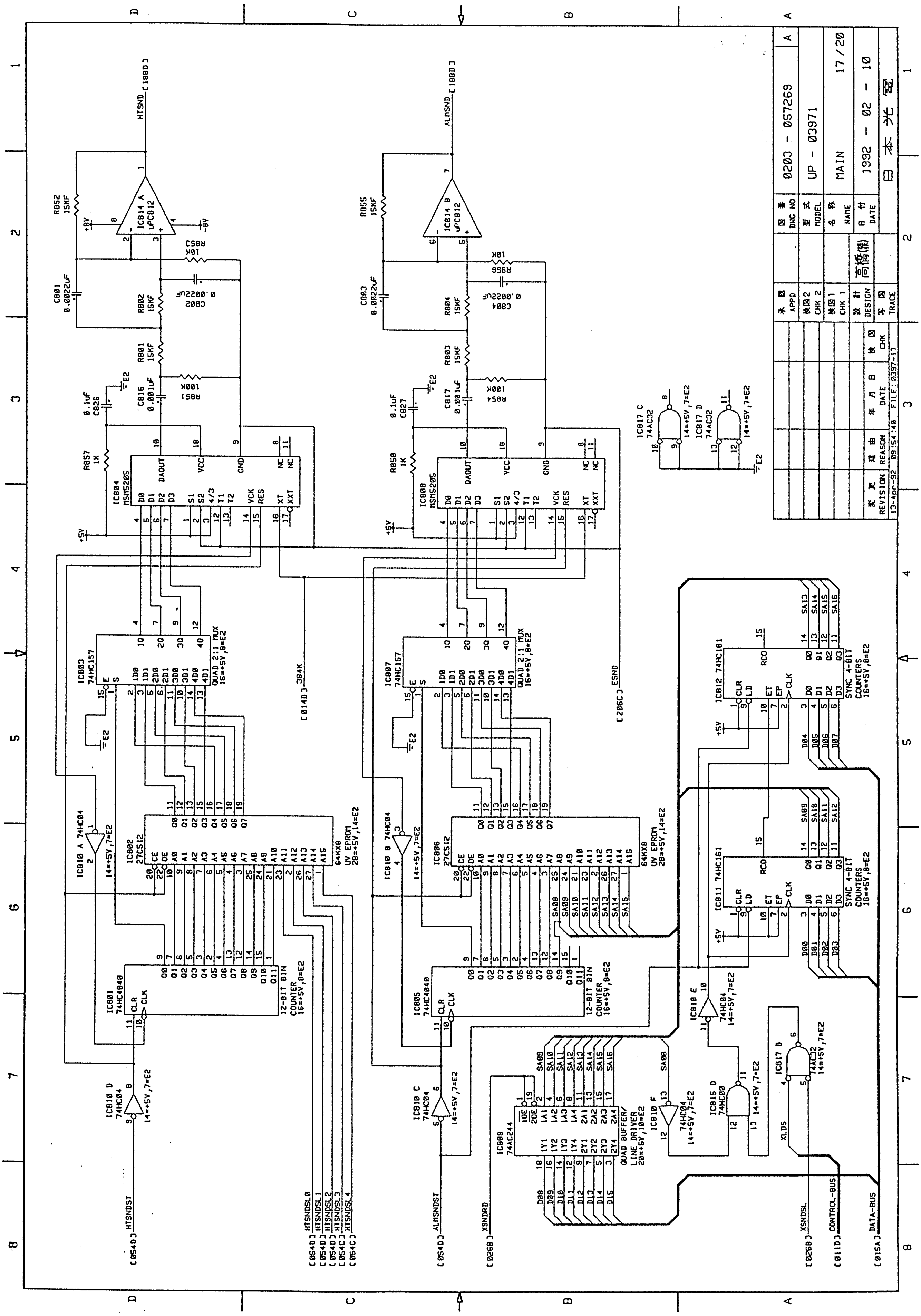

0203 - 057224
UP -03971
MAIN
13 / 20
1992 - 01 - 17
日本光電
REVISION
REASON
DATE
CHK
DESIGN
TRACE
APPD
DWG NO
MODEL
NAME
FILE:0397-13
HM1 HUM-FILTER
HM1 OFFSET
IC452 A
uPC812
IC452 B
uPC812
IC451 B
uPC812
IC454
uPC811
IC453 A
IC453 B
IC453 C
4053
INST1
ECG1
CAL
TC
HUM
HM1

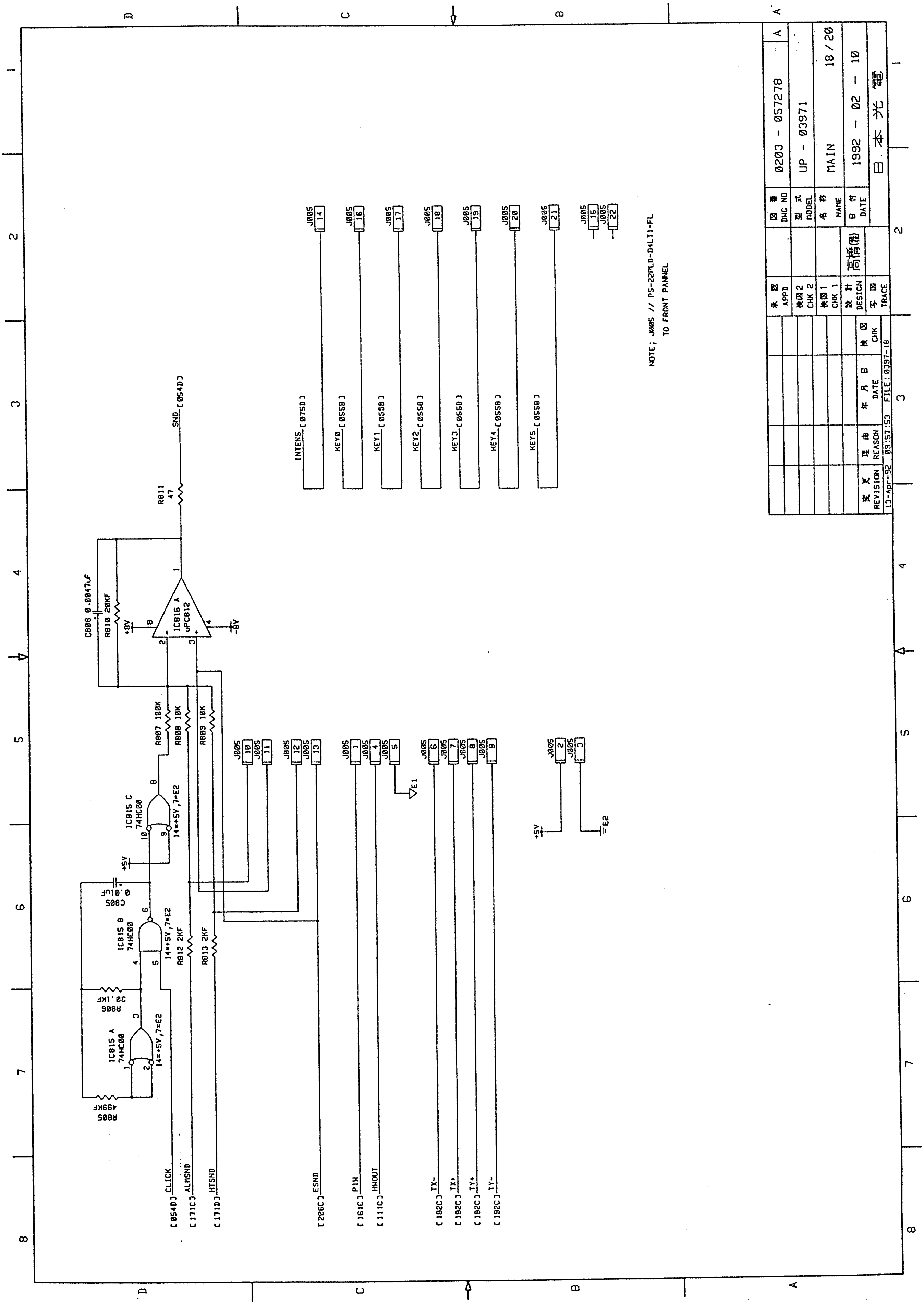

0203 - 057233
UP - 03971
MAIN
14 / 20
1992 - 01 - 17

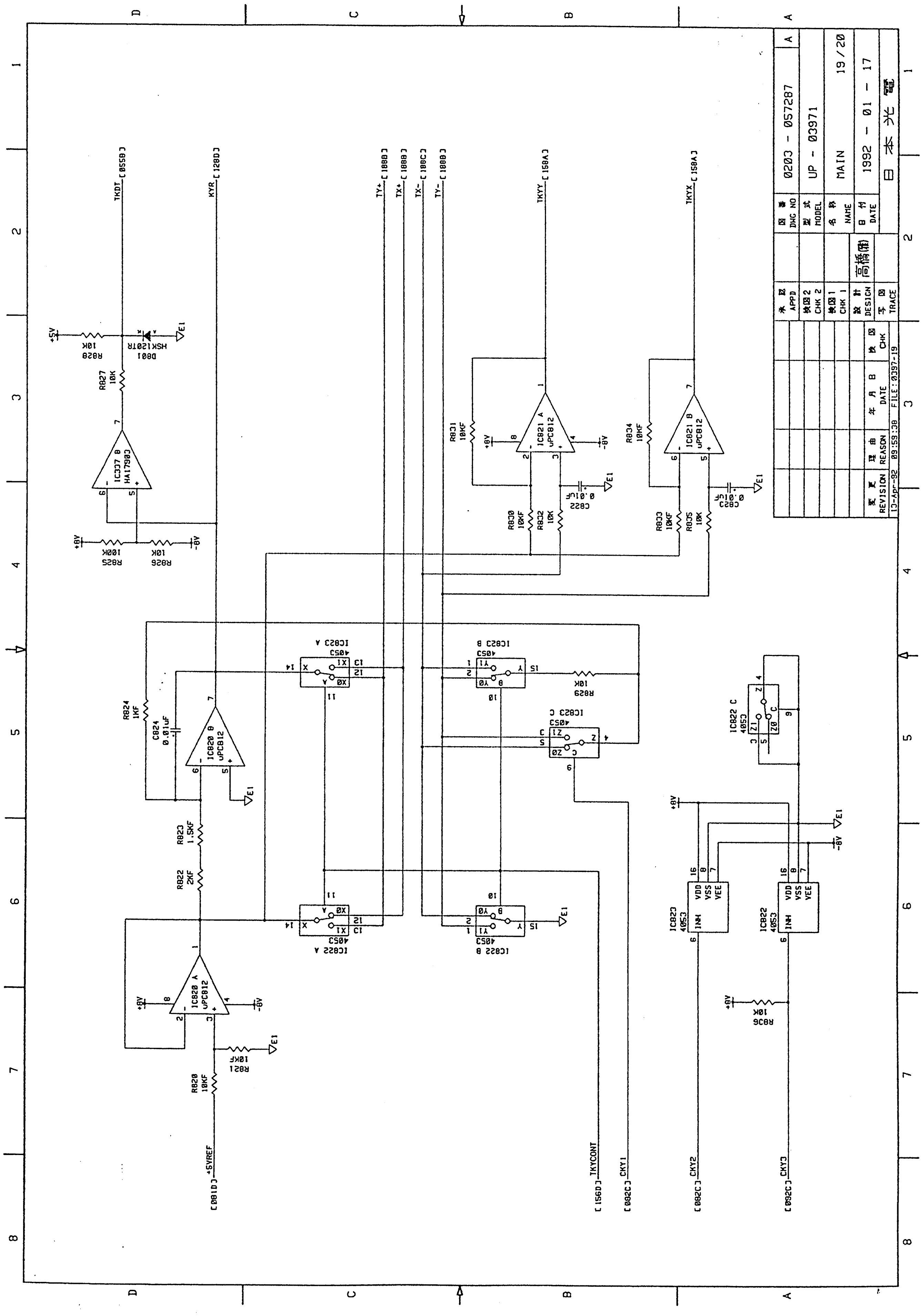

0203 - 057242
UP - 03971
MAIN
15/20
1992 - 01 - 17

MANUAL CHANGE INFORMATION

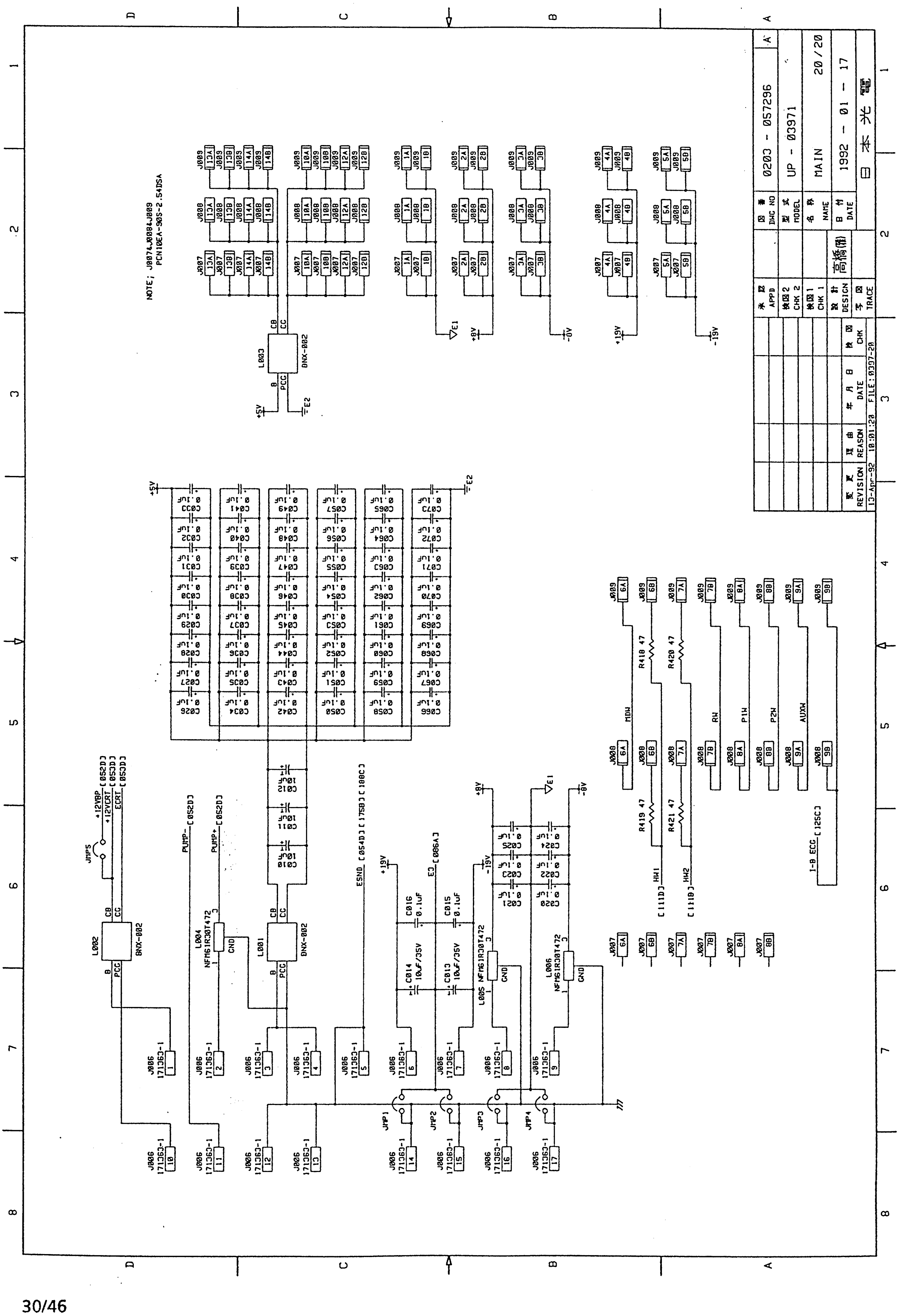


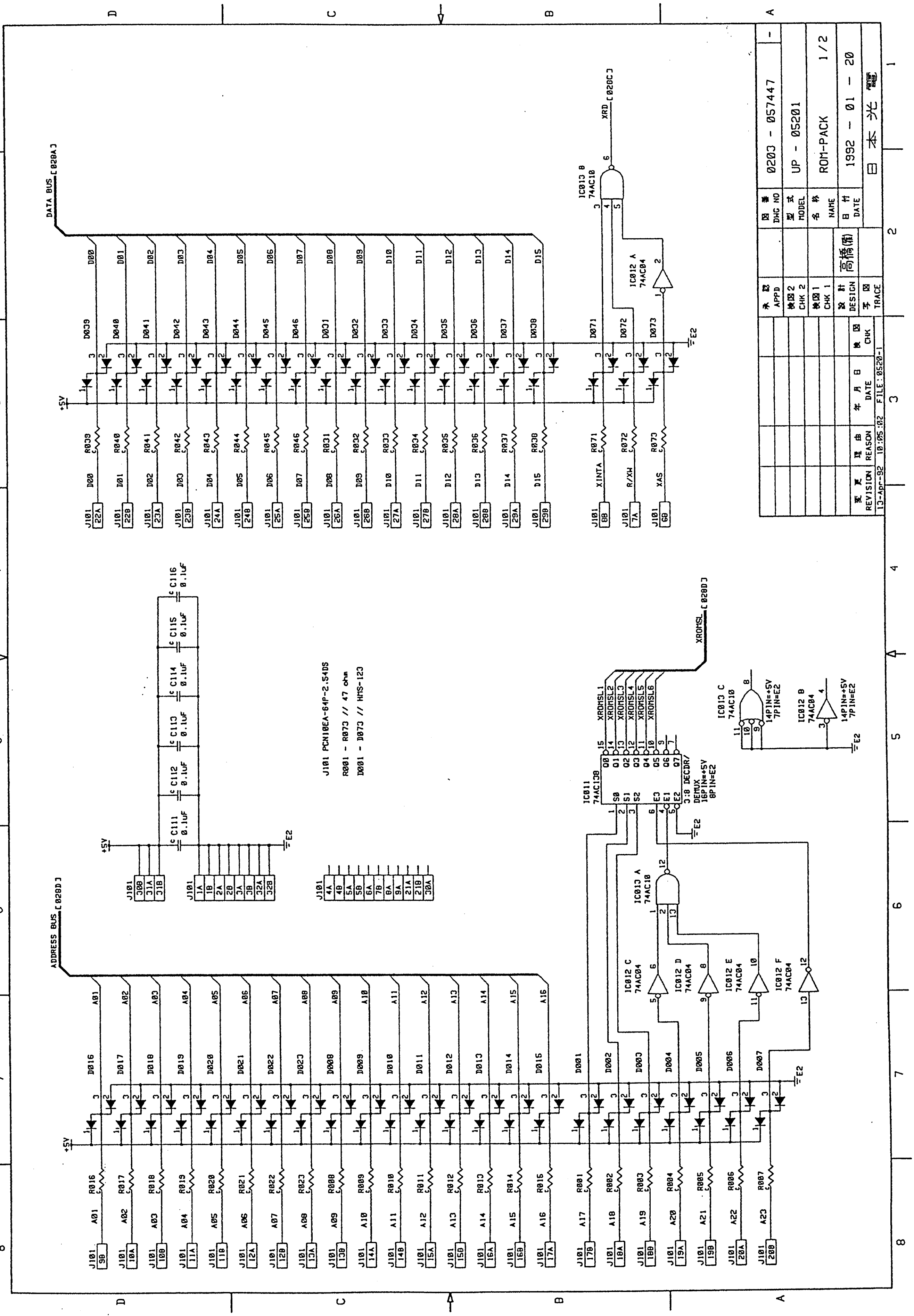

0203 - 057269
UP - 03971
MAIN
17/20
1992 - 02 - 10
日本光電
DWG NO
MODEL
NAME
DATE
APP'D
CHK 2
CHK 1
DESIGN
TRACE
REVISION
REASON
DATE
CHK
13-Apr-92
09:54:40
FILE:0397-17
IC804 MSM5205
IC808 MSM5205
IC803 74HC157
IC807 74HC157
IC802 27C512
IC806 27C512
IC801 74HC4040
IC805 74HC4040
IC814 A uPC812
IC814 B uPC812
IC812 74HC161
IC811 74HC161
IC809 74AC244
IC815 D 74HC00
IC817 B 74AC32
HTSND
ALMSND
HTSNDST
ALMSNDST
XSNDRD
XSNDSL
CONTROL-BUS
DATA-BUS
ESND
384K


0203 - 057278
UP - 03971
MAIN
18 / 20
1992 - 02 - 10
NOTE; JA05 // PS-22PLD-D4LT1-FL
TO FRONT PANNEL

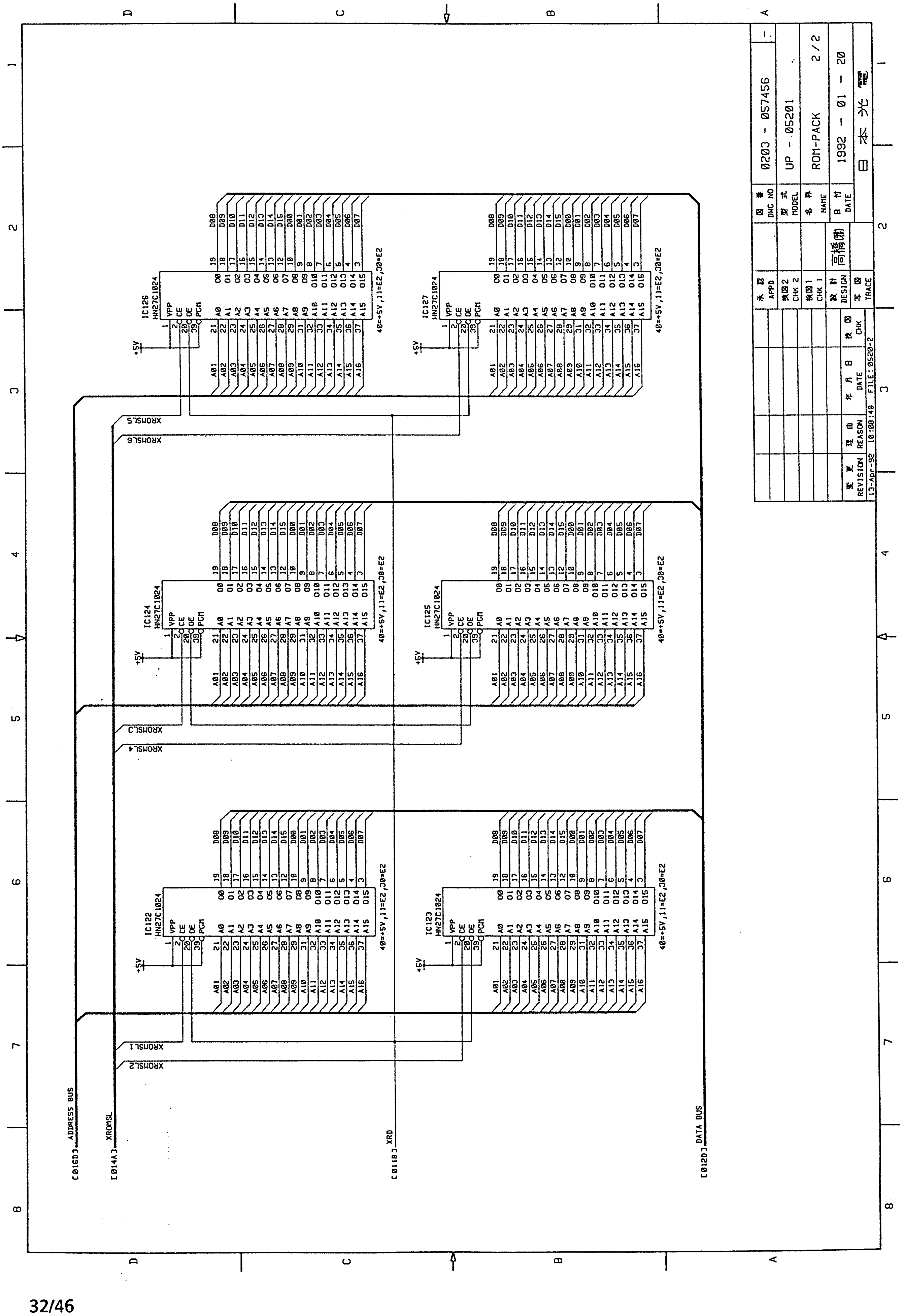

0203 - 057287
UP - 03971
MAIN
19 / 20
1992 - 01 - 17
DWG NO
MODEL
NAME
DATE
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVISION
REASON
DATE
CHK
FILE:0397-19

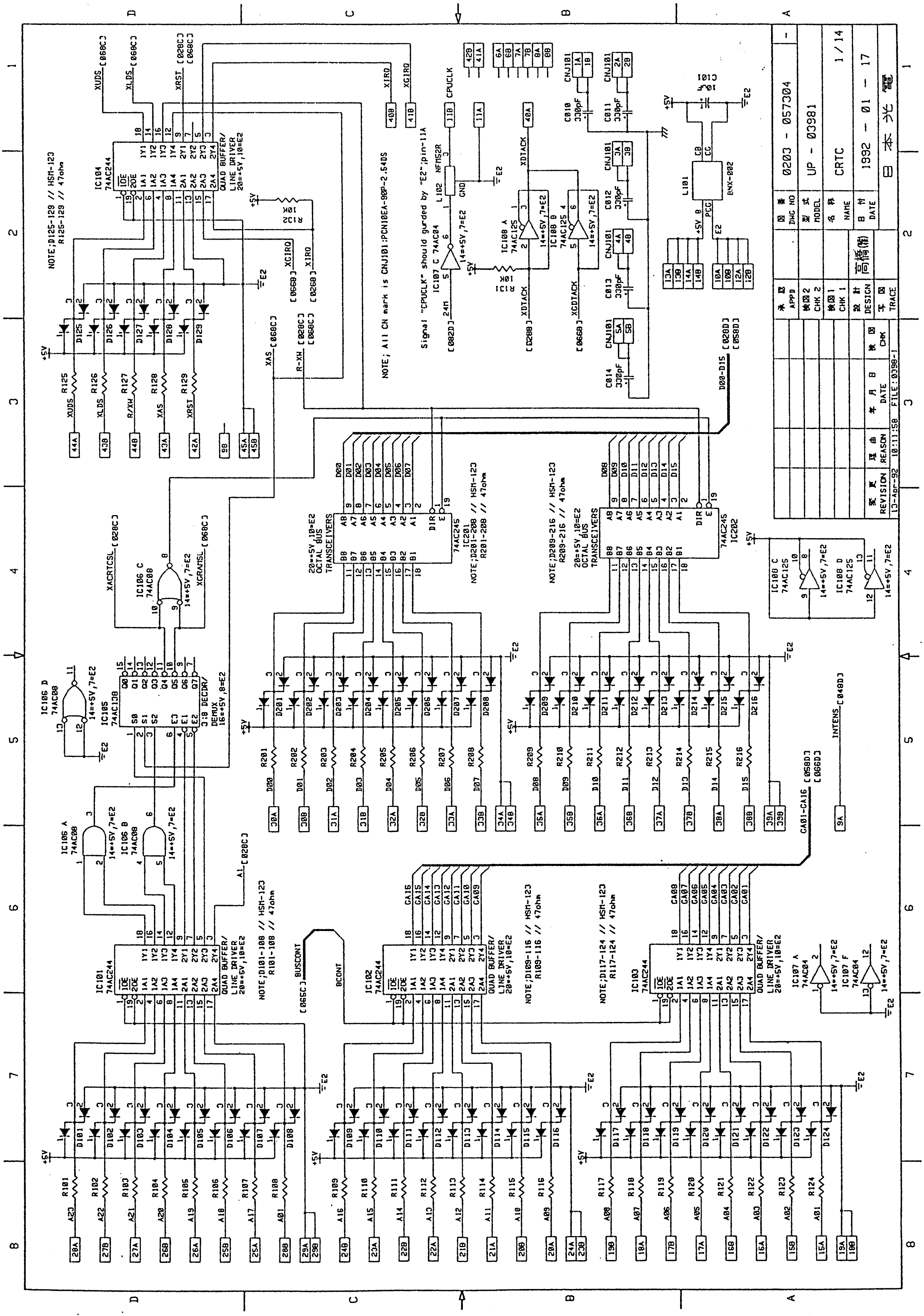
MANUAL CHANGE INFORMATION

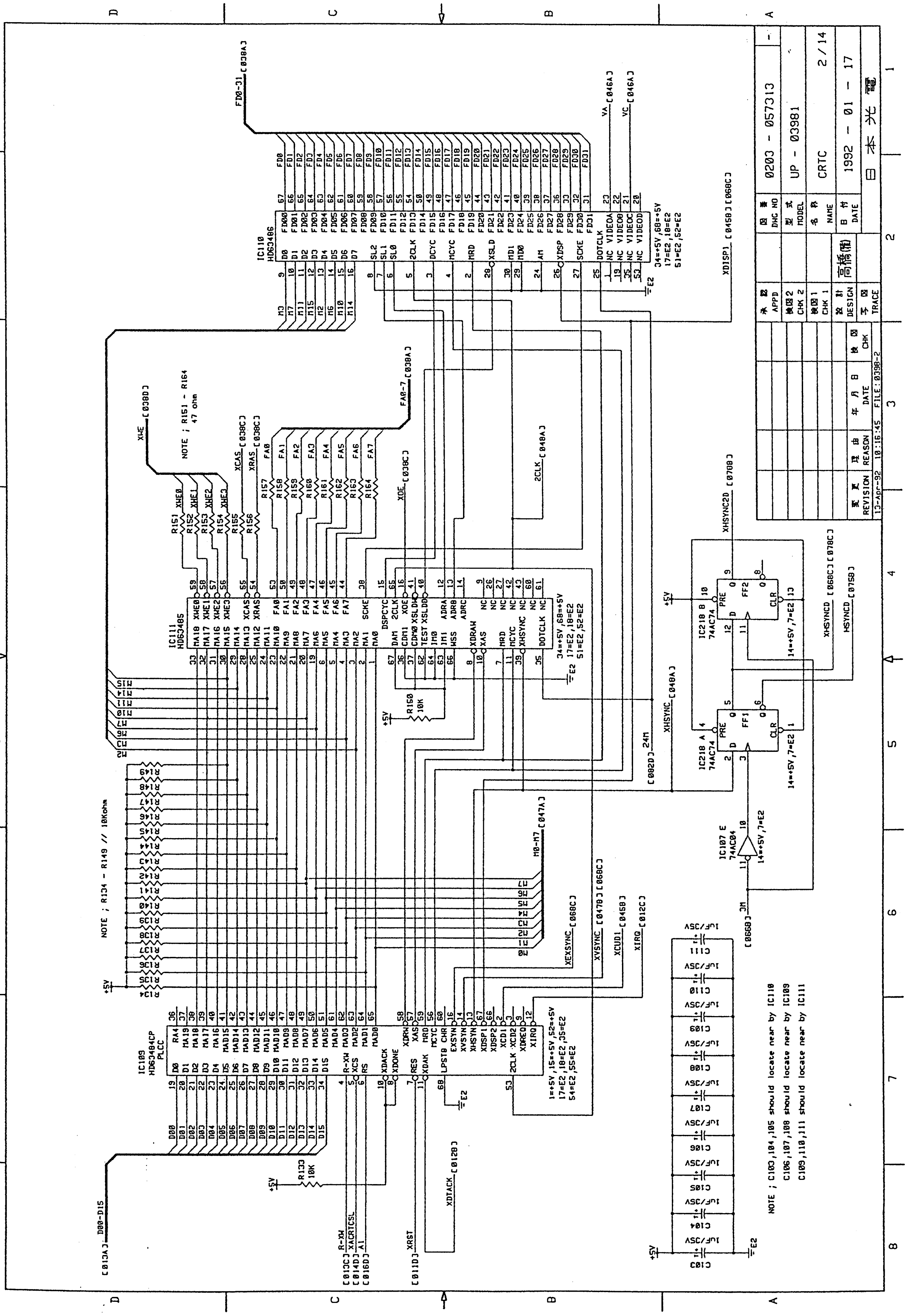


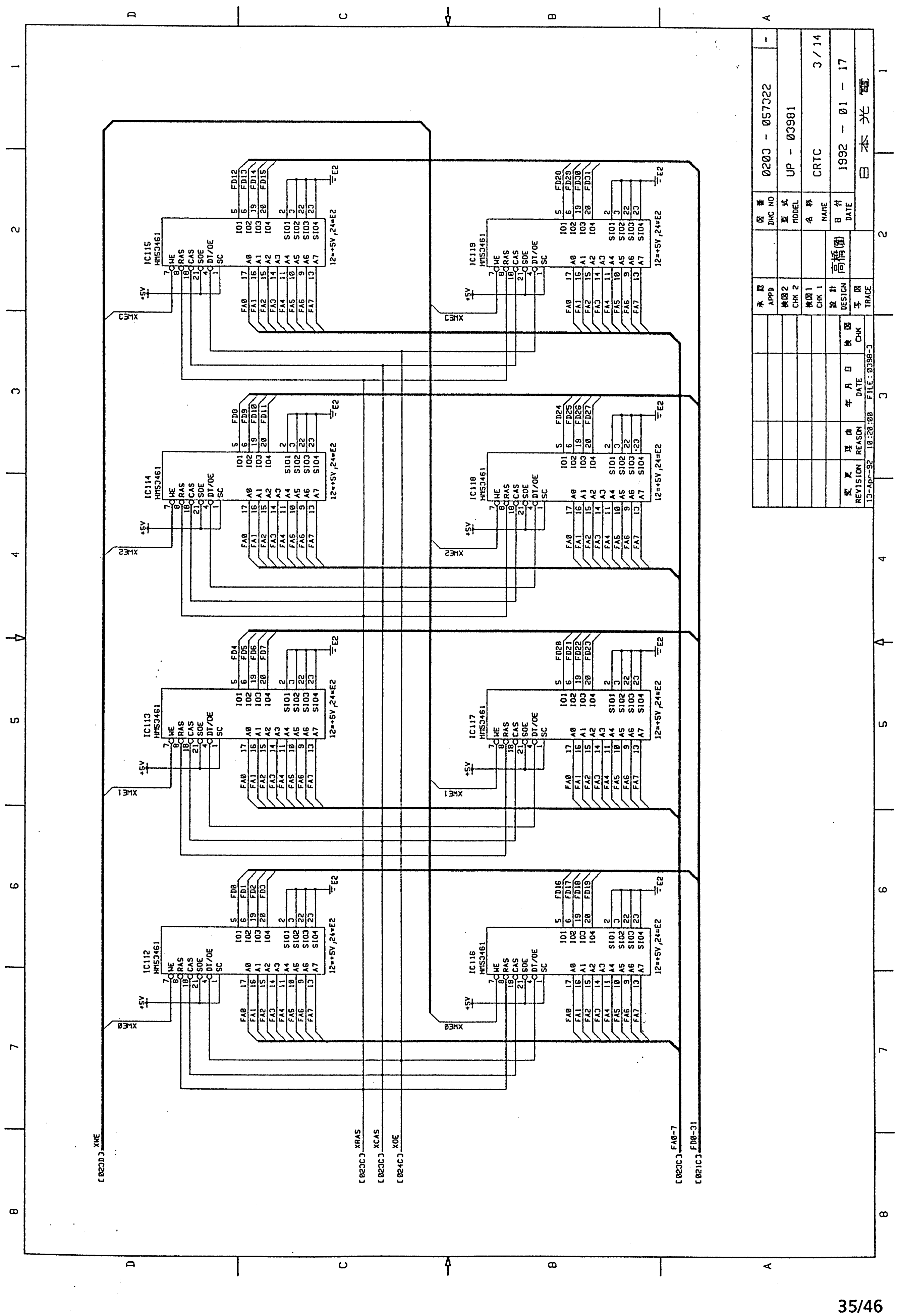


DATA BUS [020A]
ADDRESS BUS [020D]
J101 PCN10EA-64P-2.54DS
R001 - R073 // 47 ohm
D001 - D073 // HMS-123
0203 - 057447
UP - 05201
ROM-PACK
1/2
1992 - 01 - 20

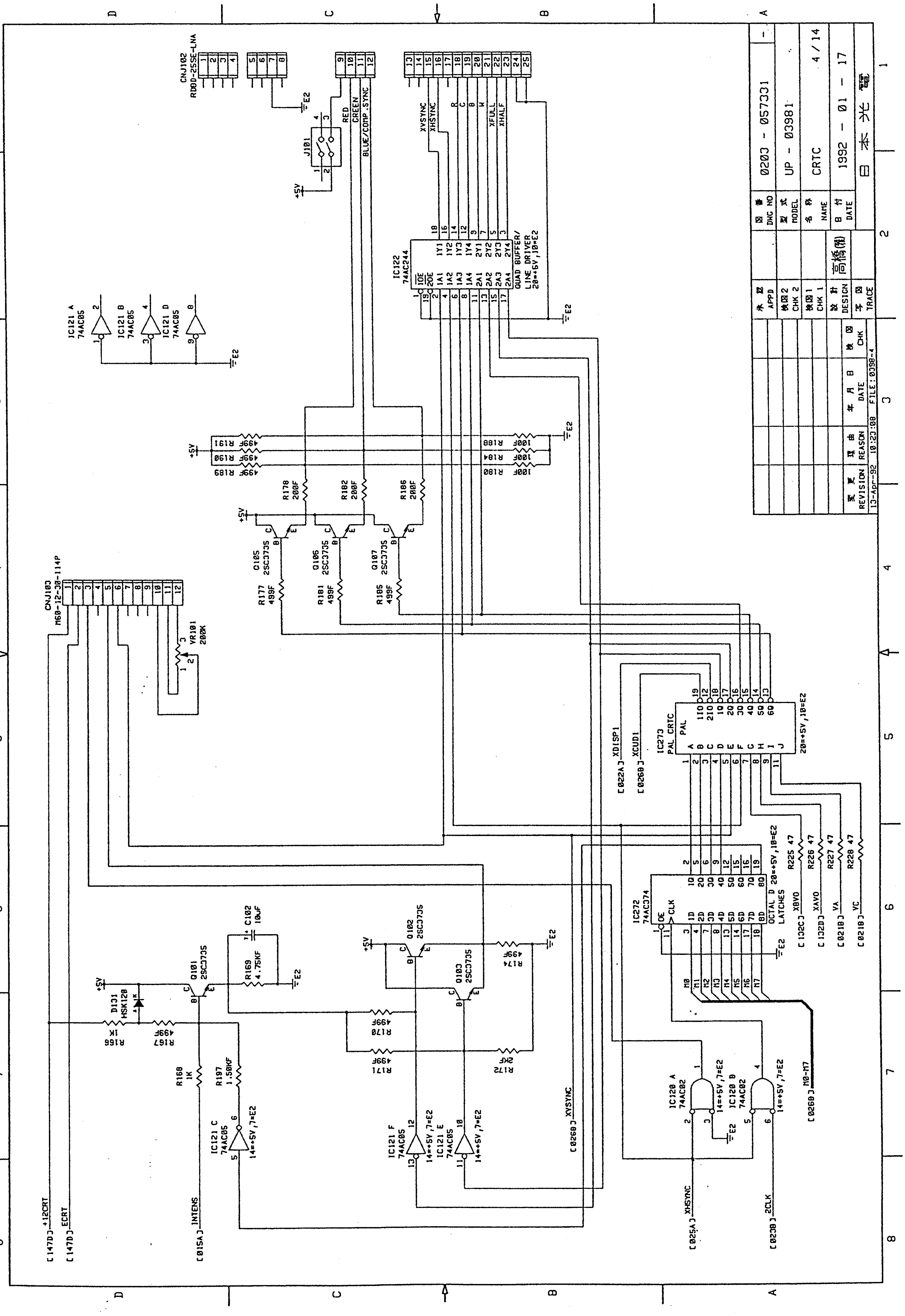

0203 - 057456
UP - 05201
ROM-PACK 2/2
1992 - 01 - 20
DWG NO
MODEL
NAME
DATE
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVISION
REASON
DATE
CHK
13-Apr-92
10:00:40
FILE:0520-2
ADDRESS BUS
XROMSL
XRD
DATA BUS

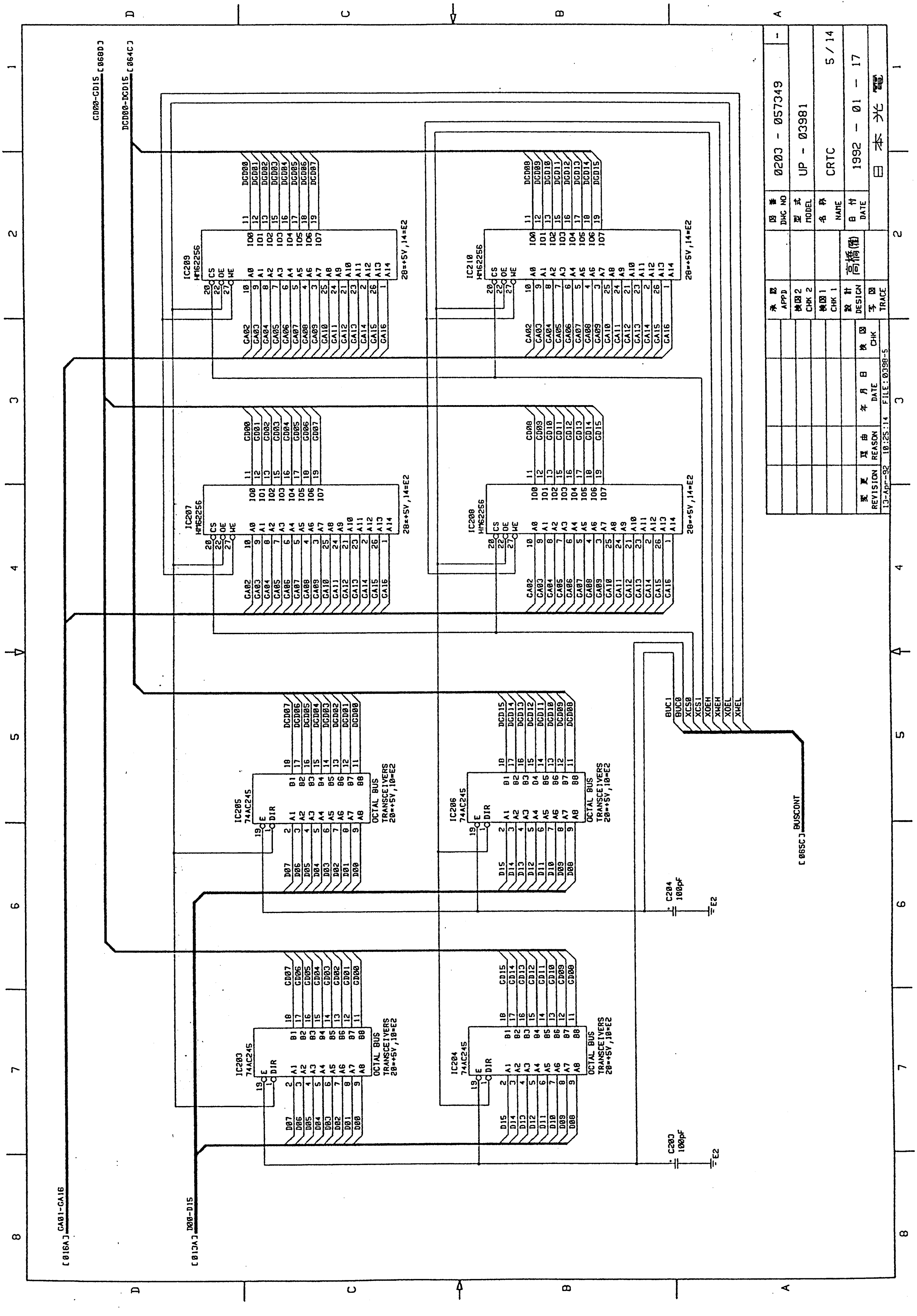

0203 - 057304
UP - 03981
CRTC
1 / 14
1992 - 01 - 17
日本光電


0203 - 057313
UP - 03981
CRTC
2/14
1992 - 01 - 17
IC110 HD63486
IC111 HD63485
IC109 HD63484CP PLCC
IC218 A 74AC74
IC218 B 74AC74
IC107 E 74AC04

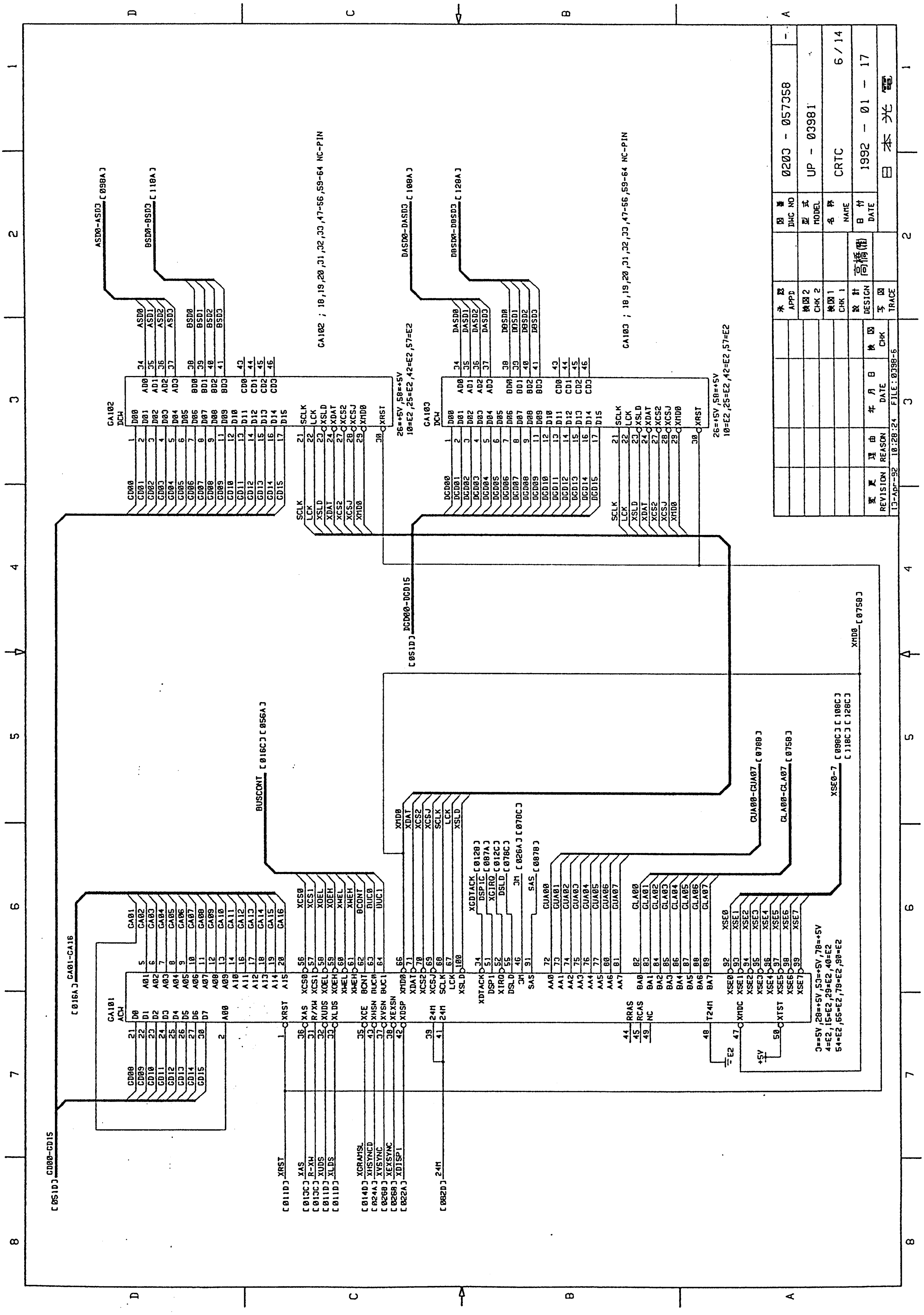

0203 - 057322
UP - 03981
CRTC
3 / 14
1992 - 01 - 17
日本光電

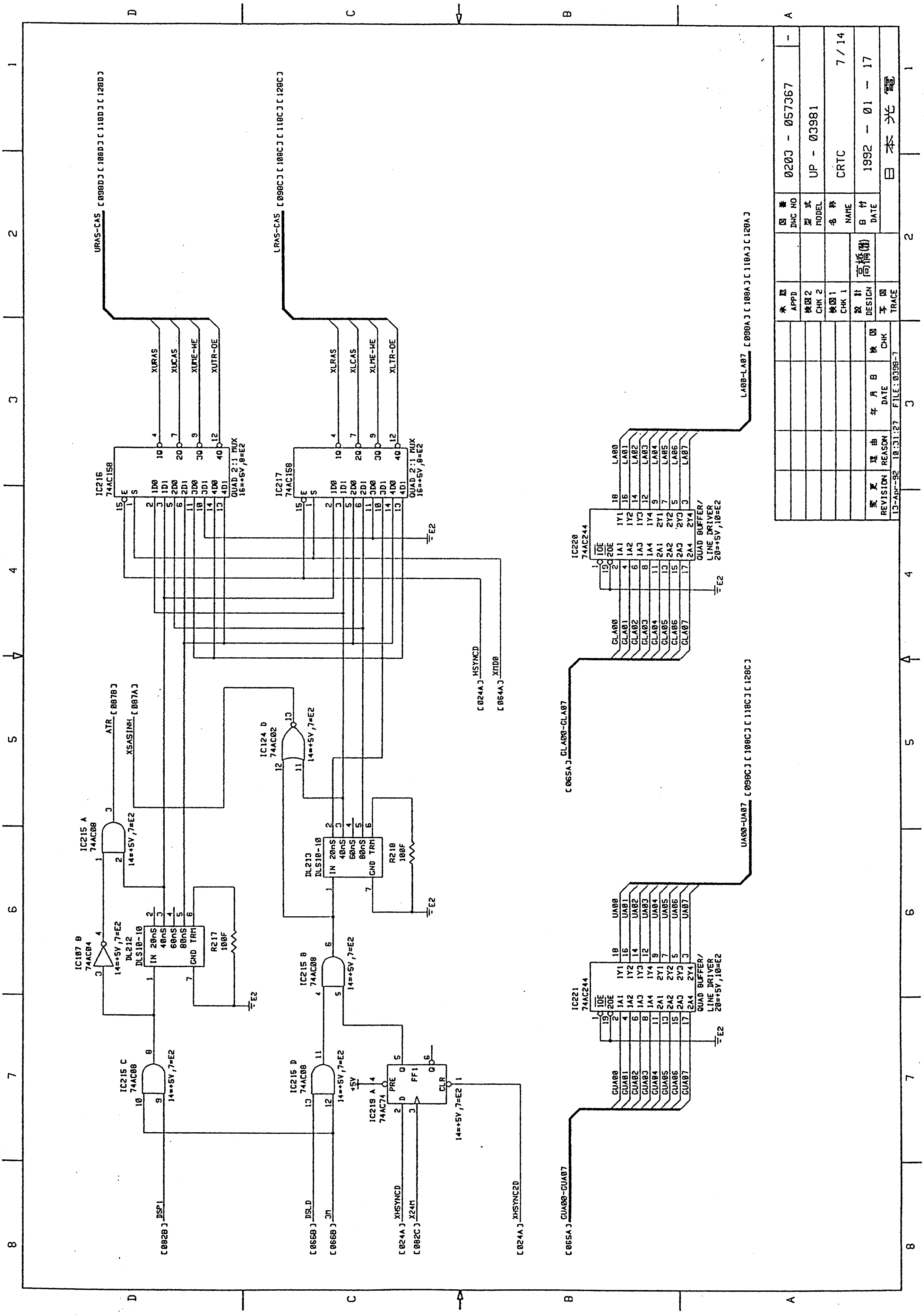
MANUAL CHANGE INFORMATION

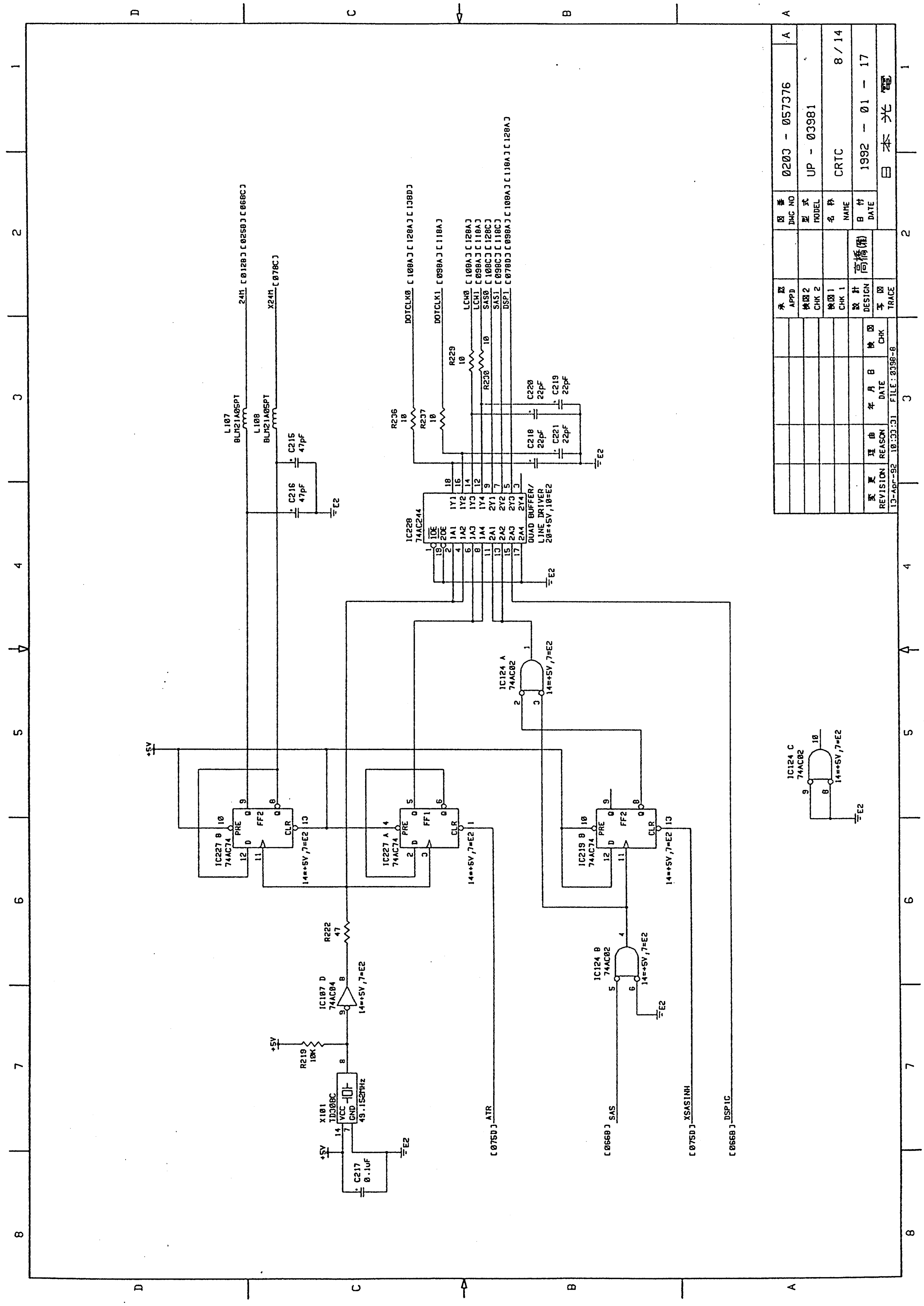


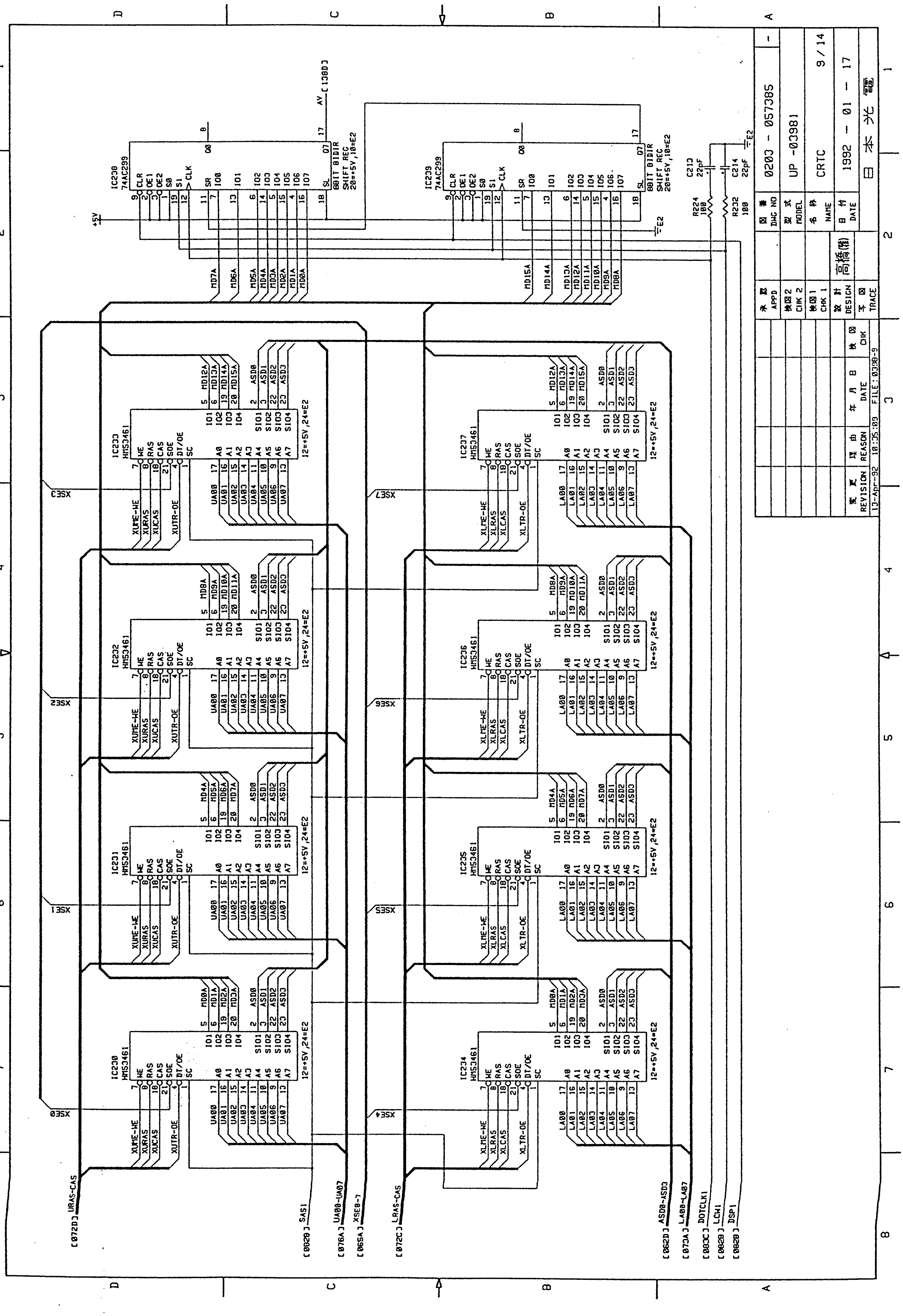

0203 - 057349
UP - 03981
CRTC
5 / 14
1992 - 01 - 17
日本光電
IC209 HM62256
IC210 HM62256
IC207 HM62256
IC208 HM62256
IC205 74AC245
IC206 74AC245
IC203 74AC245
IC204 74AC245
OCTAL BUS TRANSCEIVERS
C204 100pF
C203 100pF
BUSCONT
CD00-CD15
DCD00-DCD15
GA01-GA16
D00-D15

MANUAL CHANGE INFORMATION

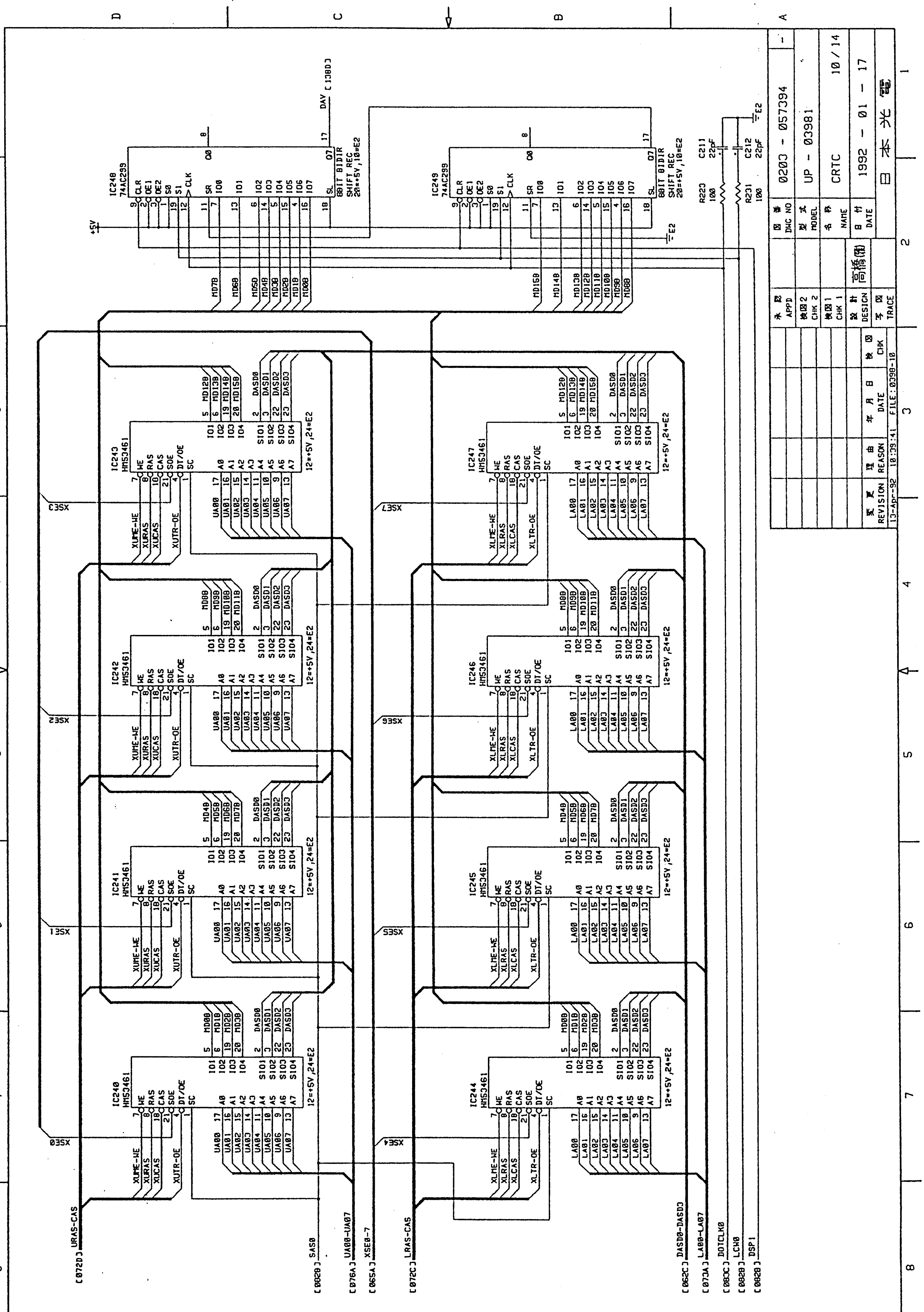


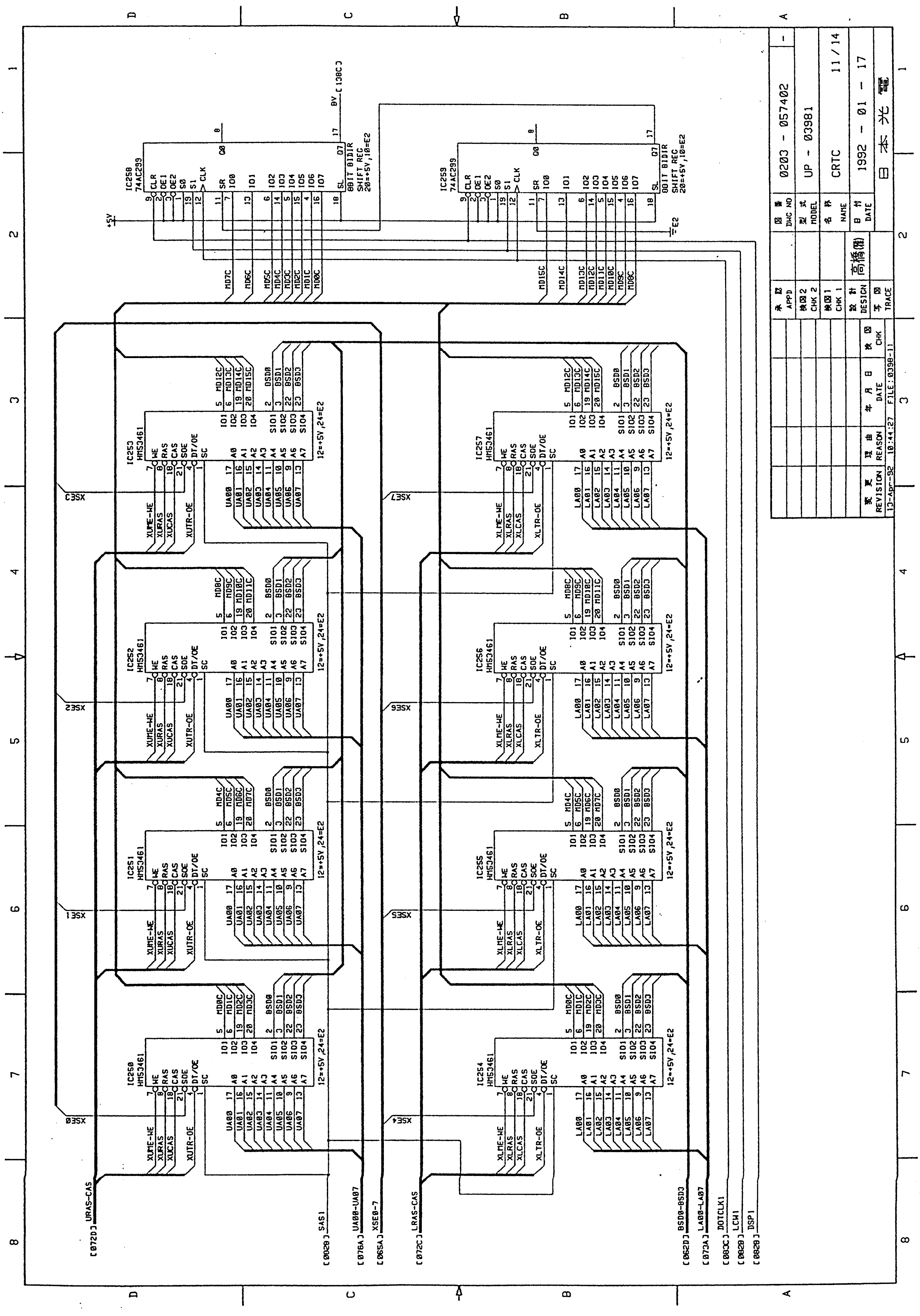

0203 - 057367
UP - 03981
CRTC
7/14
1992 - 01 - 17
日本光電
IC216 74AC158
IC217 74AC158
IC220 74AC244
IC221 74AC244
DL212 DLS10-10
DL213 DLS10-10
IC219 A 74AC74


0203 - 057376
UP - 03981
CRTC
8 / 14
1992 - 01 - 17
IC228
74AC244
QUAD BUFFER/
LINE DRIVER
20=+5V,10=E2
IC227 B
74AC74
IC227 A
74AC74
IC219 B
74AC74
IC124 A
74AC02
IC124 B
74AC02
IC124 C
74AC02
IC107 D
74AC04
X101
TD308C
49.152MHz
L107
BLM21A05PT
L108
BLM21A05PT
24M
X24M
DOTCLK0
DOTCLK1
LCH0
LCH1
SAS0
SAS1
DSP1
ATR
SAS
XSASINH
DSPIC
+5V
E2

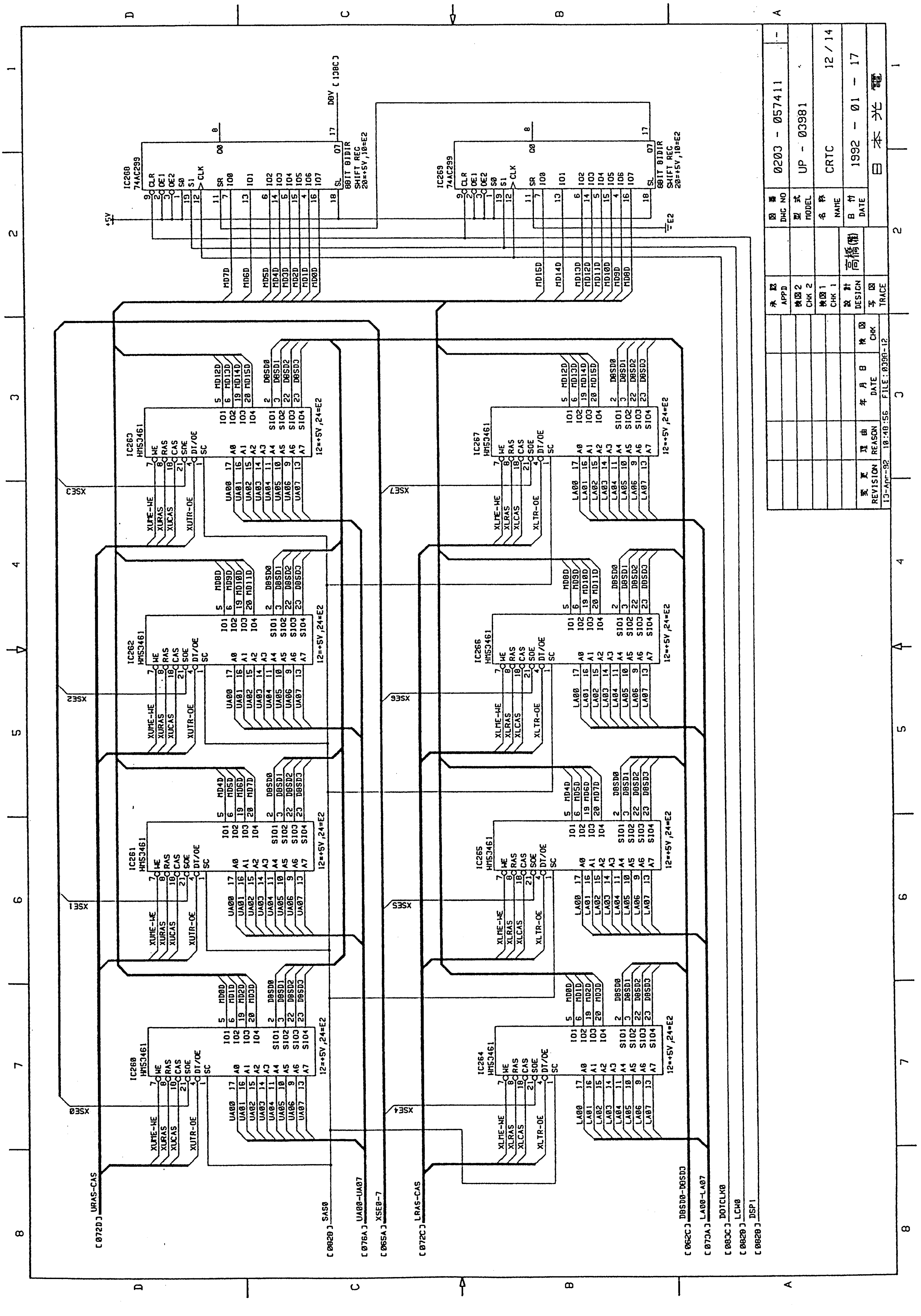

0203 - 057385
UP -03981
CRTC
9 / 14
1992 - 01 - 17
日本光電
IC230 74AC299
IC239 74AC299
8BIT BIDIR SHIFT REG
IC230 HM53461
IC231 HM53461
IC232 HM53461
IC233 HM53461
IC234 HM53461
IC235 HM53461
IC236 HM53461
IC237 HM53461
URAS-CAS
LRAS-CAS
UA00-UA07
LA00-LA07
ASD0-ASD3
SAS1
XSE0-7
DOTCLK1
LCH1
DSP1

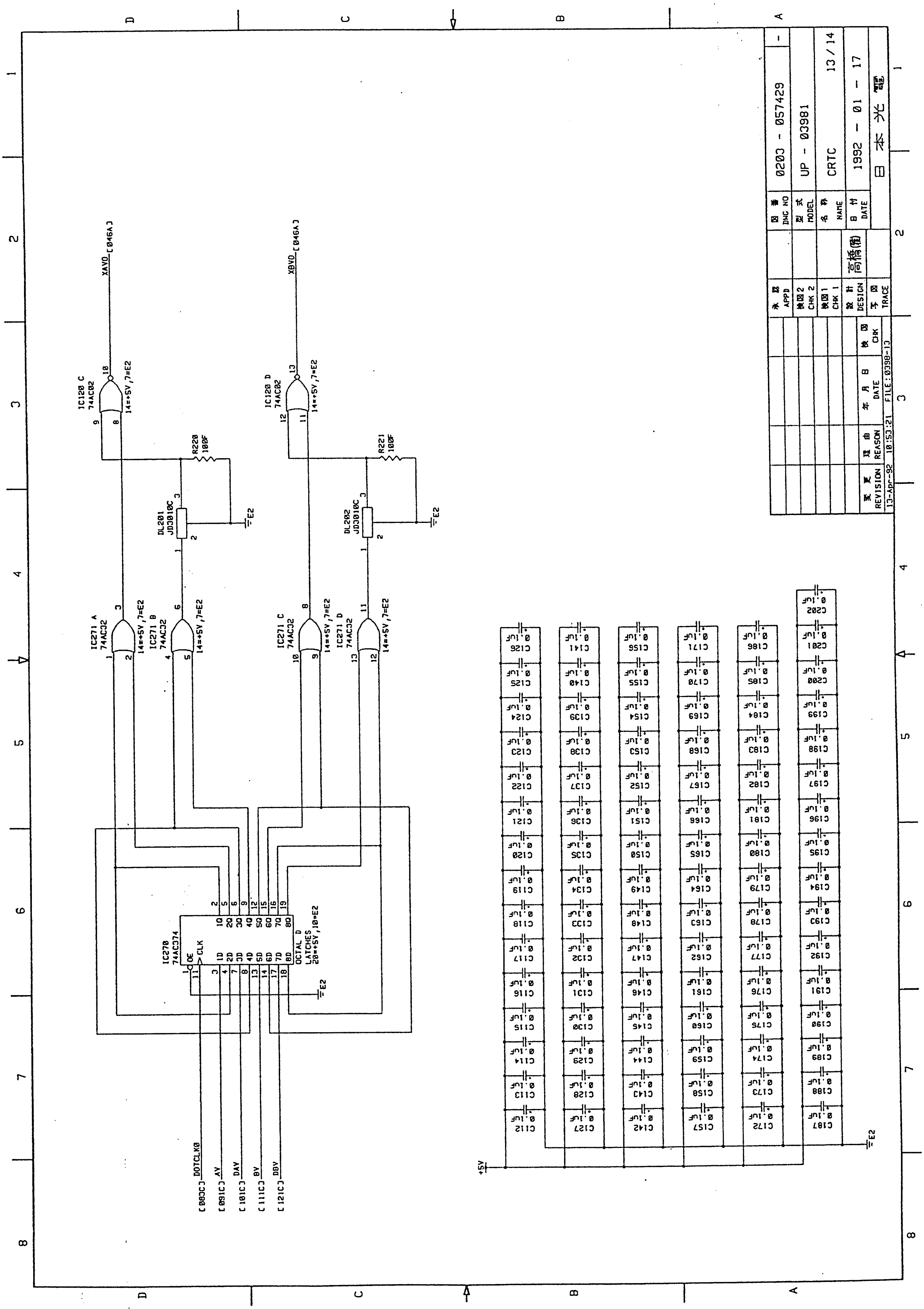
MANUAL CHANGE INFORMATION



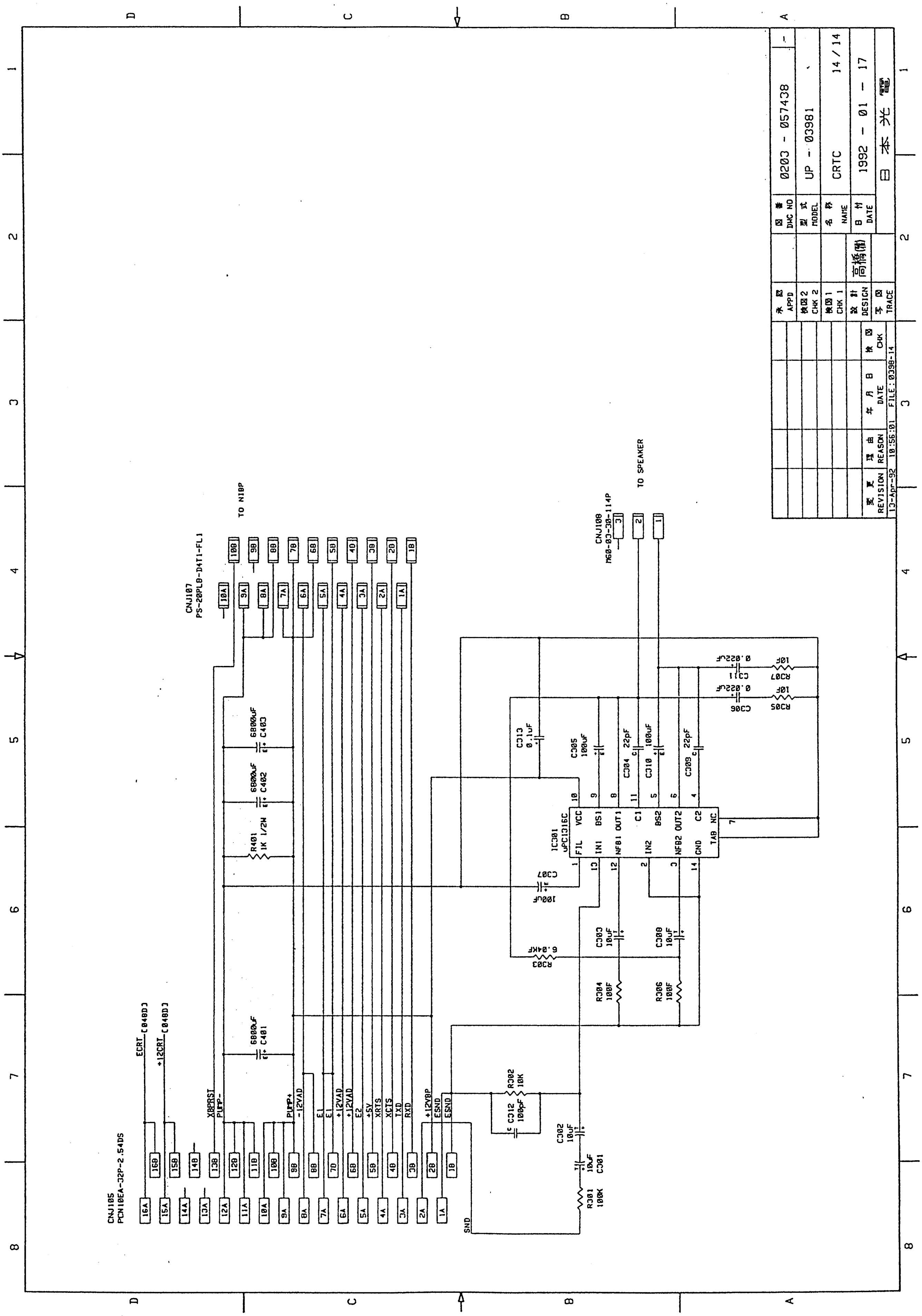

0203 - 057402
UP - 03981
CRTC
11 / 14
1992 - 01 - 17
IC258 74AC299
IC259 74AC299
IC250 HM53461
IC251 HM53461
IC252 HM53461
IC253 HM53461
IC254 HM53461
IC255 HM53461
IC256 HM53461
IC257 HM53461
8BIT BIDIR SHIFT REG
URAS-CAS
UA00-UA07
XSE0-7
LRAS-CAS
BSD0-BSD3
LA00-LA07
DOTCLK1
LCH1
DSP1

MANUAL CHANGE INFORMATION




0203 - 057429
UP - 03981
CRTC
13 / 14
1992 - 01 - 17
IC120 C
74AC02
IC120 D
74AC02
R220
100F
R221
100F
DL201
JD3010C
DL202
JD3010C
IC271 A
74AC32
IC271 B
74AC32
IC271 C
74AC32
IC271 D
74AC32
IC270
74AC374
OCTAL D
LATCHES
20=+5V,10=E2
XAVO
XBVO
DOTCLK0
AV
DAY
BY
DBY

MANUAL CHANGE INFORMATION



0634-000059A

MANUAL CHANGE INFORMATION

Model	Main Unit	Starting Serial No.	Software Revision
BSM-8301A/J/K	MU-831RA	00986	A3-01
	MU-831RJ	00111	A3-01
	MU-831RK	00801	A3-01
BSM-8302A/J/K	MU-832RA	00098	A3-01
	MU-832RJ	00181	A3-01
	MU-832RK	00216	A3-01

The optional interface unit QI-813P can be installed into the BSM-8300 Series of the above software revision.

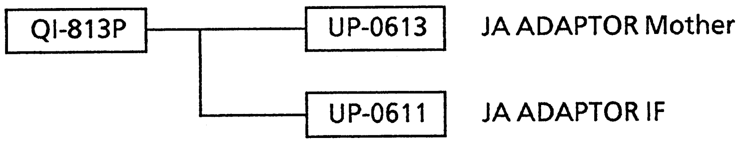
1 General

The optional interface unit QI-813P enables the BSM-8300 Series bedside monitors to be linked directly to an external input box JA-800PA/PJ, -810PA/PJ, -860PA.

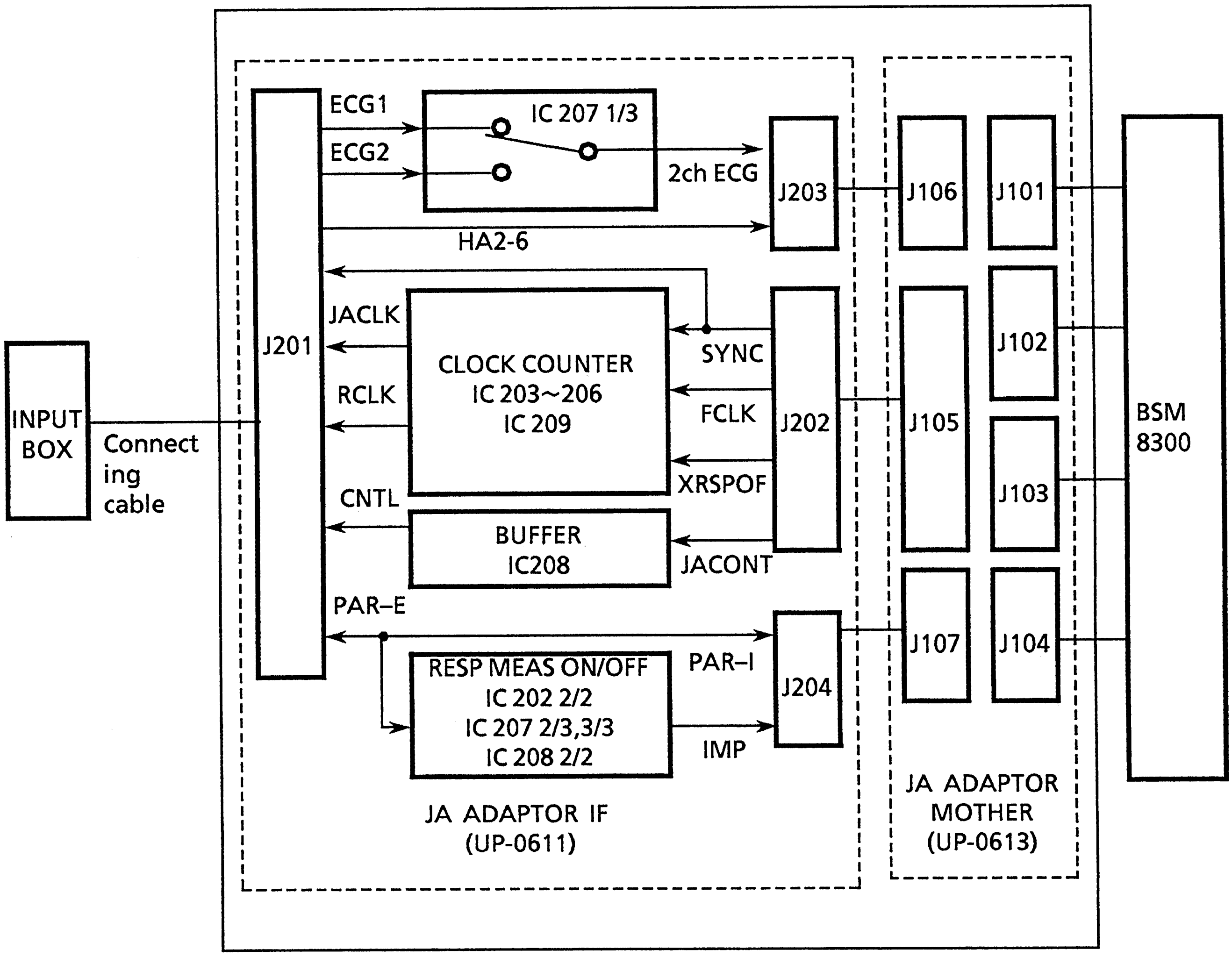
This unit QI-813P has the following function:

- the two ECG signals from the input box are time-shared into one ECG signal before being sent to the BSM-8300 bedside monitor.
- it generates the input box control signal from the clock signal of the BSM-8300 bedside monitor.
- it generates the respiration measurement ON/OFF status signal from the PARA signal and sends it to the BSM-8300 bedside monitor.
- it stops sending the respiration detection clock signal to the input box when the the respiration measurement status is OFF.
- it supplies the power and control signal to the input box and receives the status signal and the amplifier output signals from the input box.

2 COMPOSITION



3 QI-813P Block Diagram



4 Signal List

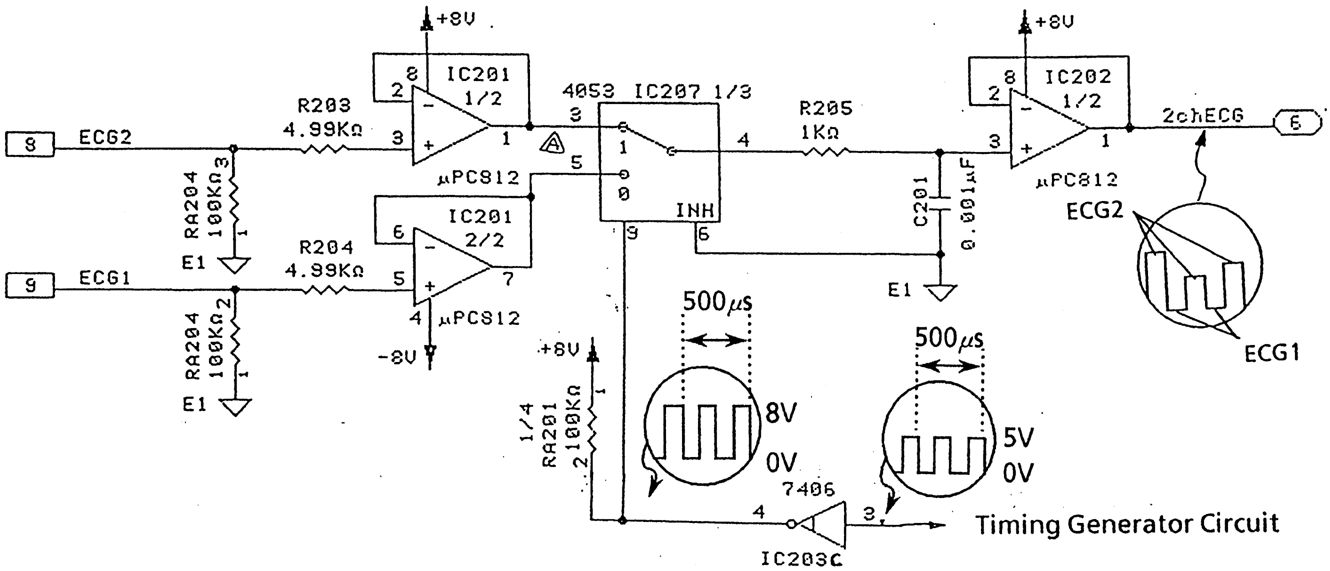
Prefix "X" means negative logic.
For example: A/XM
High level (5V): Address recognition signal (active-high)
Low level (0V) : Message recognition signal (active-low)
If a signal is not found, search the symbol from "X + signal name" lists.
If a signal "X + symbol" is not found, search the symbol from "signal name-X".

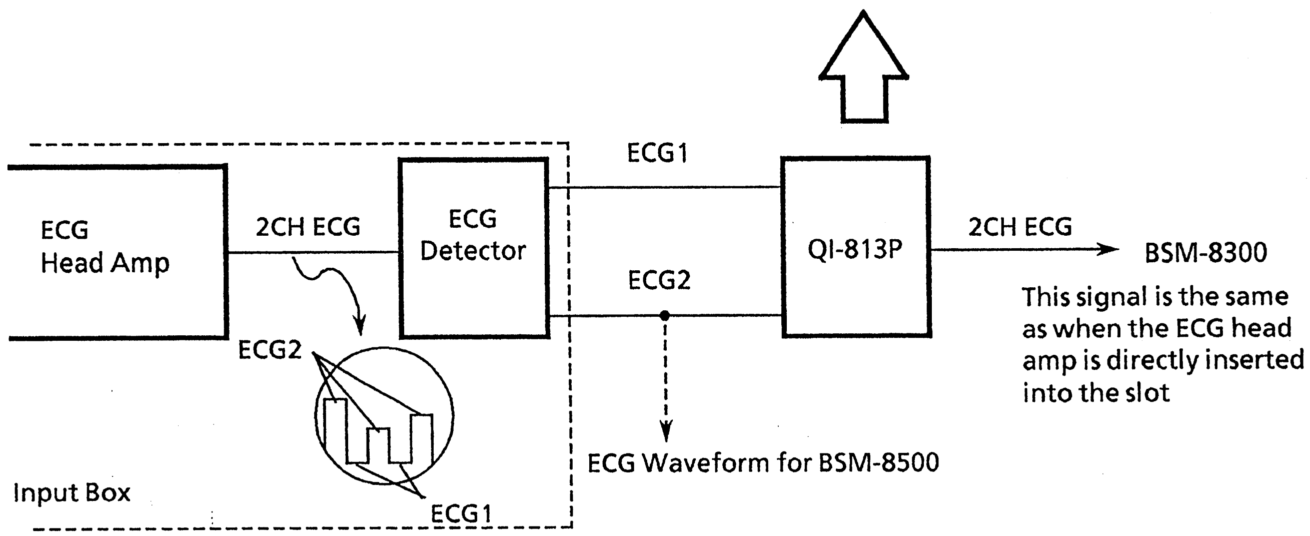
Symbol	Function	Direction
2 ch ECG	Time–shared ECG signals	to BSM main unit
CNTL	Input box control	to Input box
ECG1	ECG 1 waveform (15 mV/V)	from Input box
ECG2	ECG 2 waveform (15 mV/V)	from Input box
E1	Ground for analog circuits	
E3	Ground for digital circuits	
EH	Ground for head amplifier	
EP	Ground for NIBP head amplifier	
ER	Ground for respiration measurement	
FCLK	Source clock (768 kHz)	from BSM main unit
IMP	Respiration impedance signal from the patient	to BSM main unit
JACONT	Control for input	from BSM main unit
PAR-E	External PARA signal	from Input box
PAR-I	Internal PARA signal	to BSM main unit
RCLK	Clock for respiration measurement exciter	to Input box
RW	Respiration waveform	QI transmits the signal only
STS	Input box status signal	from Input box
SYNC	Synchronization signal for input box	from BSM main unit
U1W	Slot 1 head amplifier signal	QI transmits the signal only
U2W	Slot 2 head amplifier signal	QI transmits the signal only
U3W	Slot 3 head amplifier signal	QI transmits the signal only
XADP	QI acknowledgement signal (0V;QI, 5V;head amplifier)	to BSM main unit
XHARST	Head amplifier reset signal (0V; Reset)	from BSM main unit
XRSPOF	Respiration measurement by impedance method is set to OFF when thermistor method is used (0V;Off)	from BSM main unit

5 Circuit Description

5.1 2ch ECG Time–shared Signal Generator

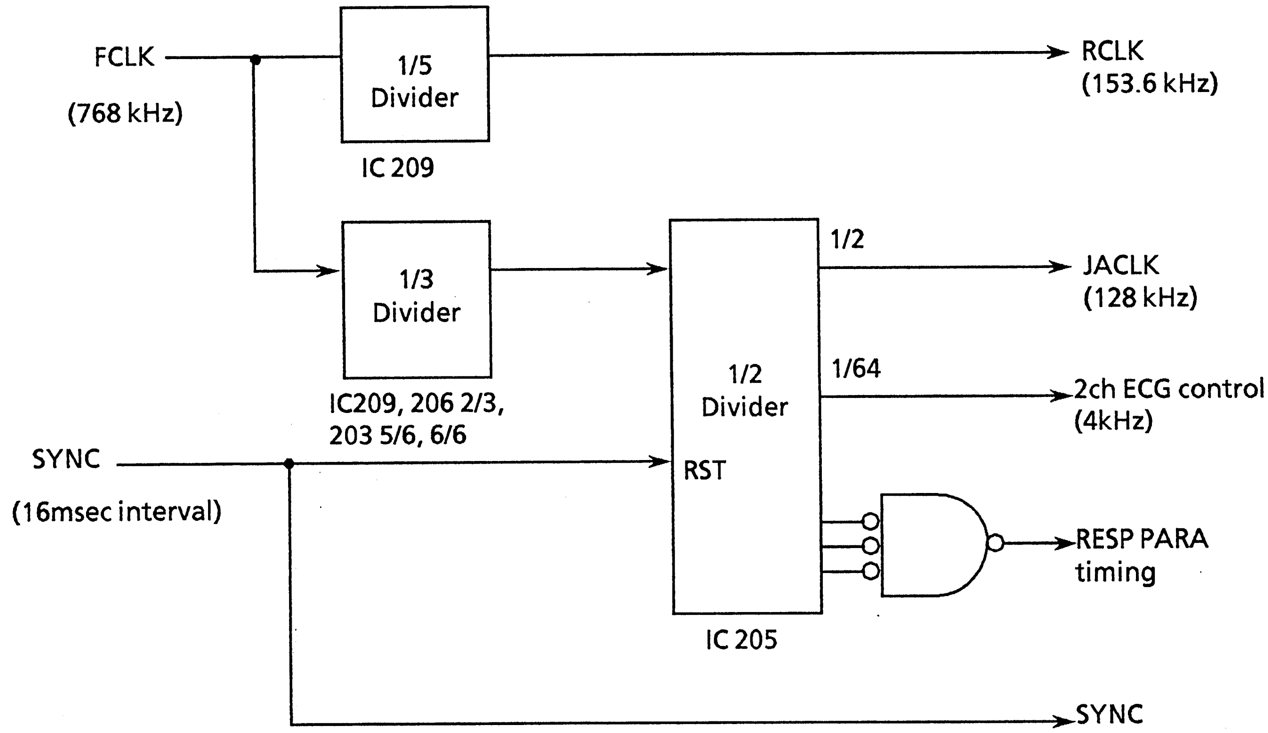
ECG1 and ECG2 signals are first buffered by IC201 before they are time–shared into 2ch ECG signal by the switch IC207 1/3. The timing control signal enters this switch IC207 1/3 via terminal No.9. IC203 C converts the timing control signal level range from 0V to +5V, to 0V to +8V. The resistor R205 and capacitor C201 filter the switching noise.





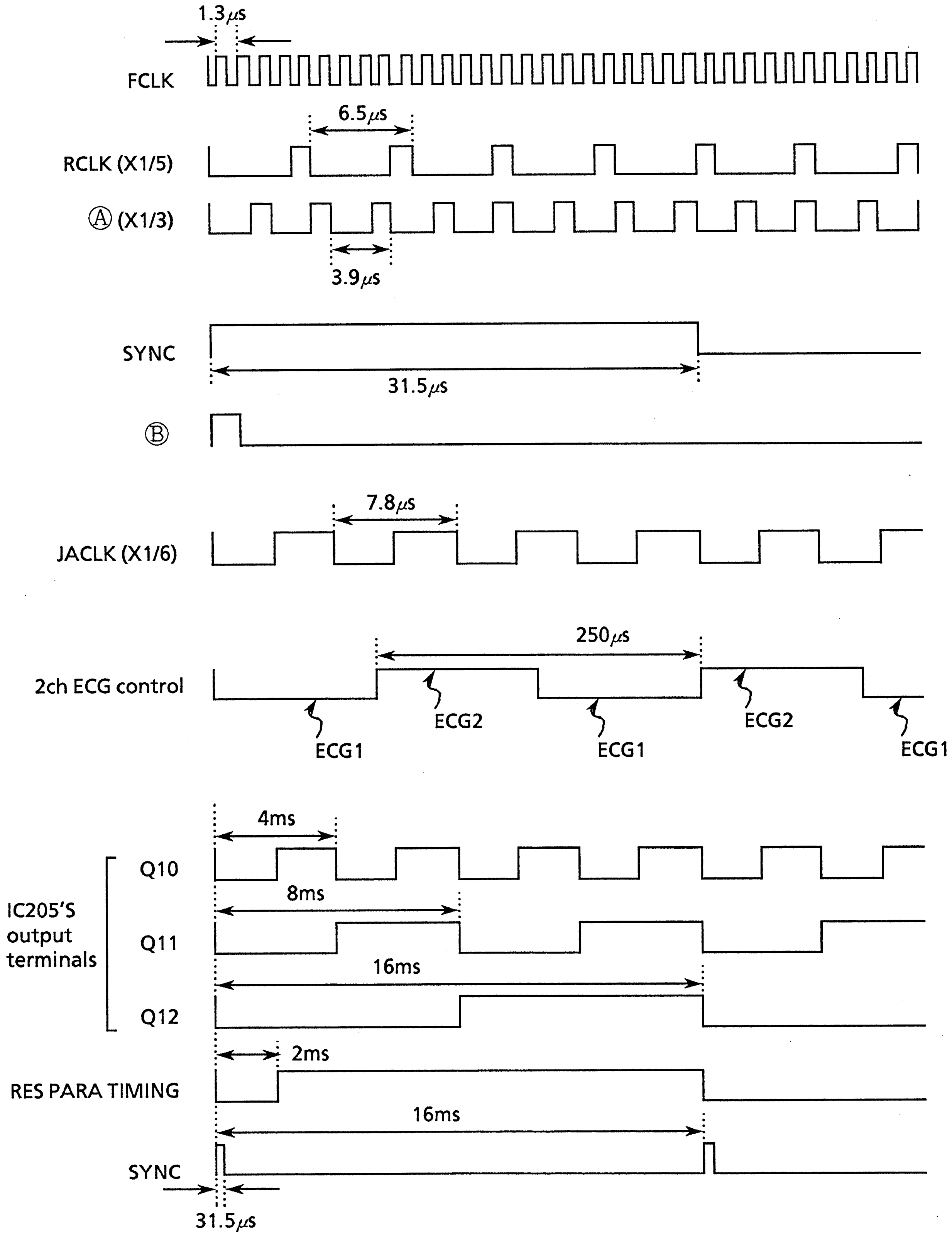
5.2 Timing Generator

FCLK is the source timing clock (768 kHz) signal for this unit. This source timing signal level is shifted by resistor R240, RA 203 4/6, and IC204 1/2. From this clock the following timings are generated:

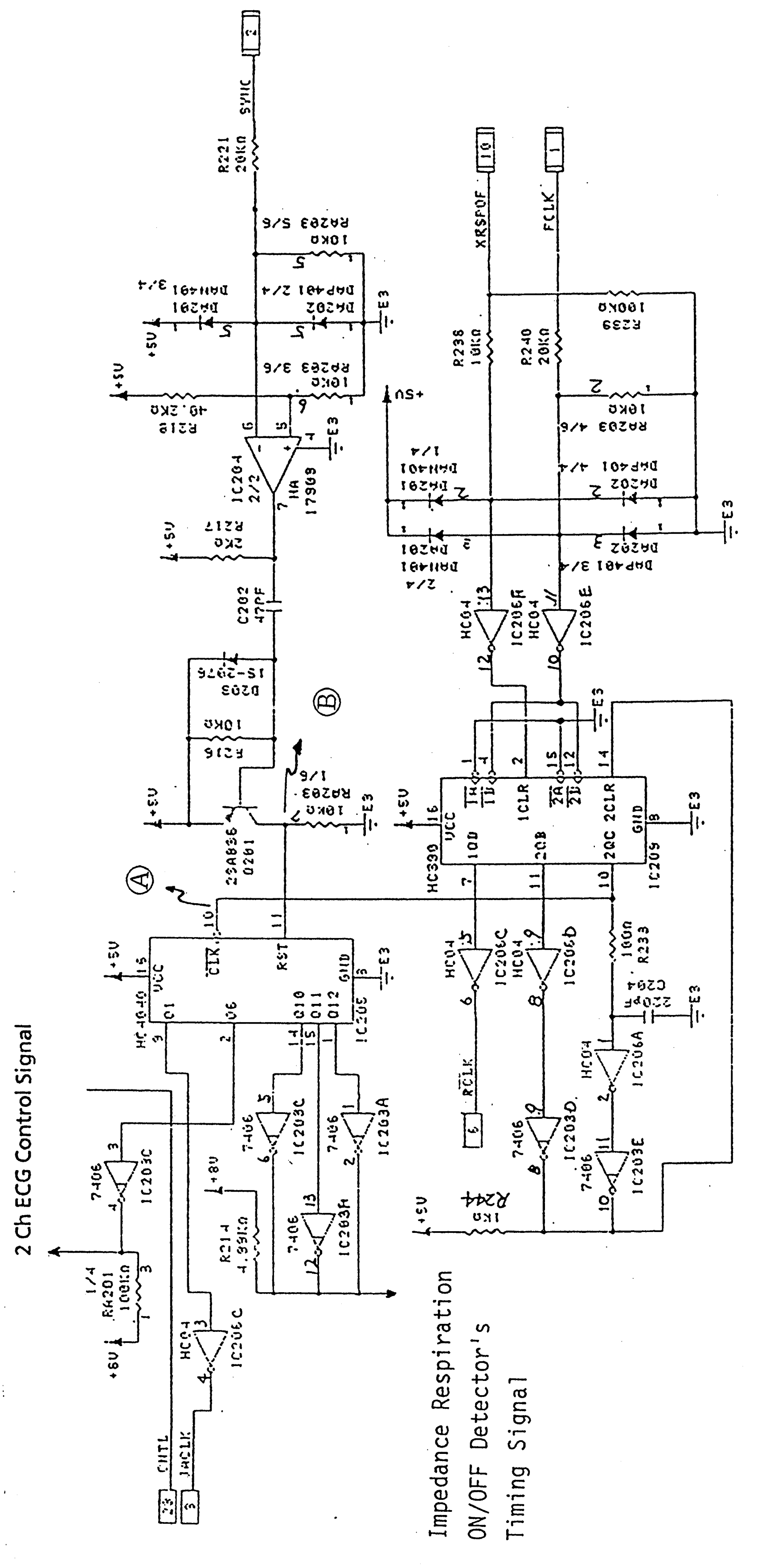


This circuit relays the SYNC signal from the bedside monitor to the input box. IC203A, C, and F provide the timing signals to the impedance respiration on/off detection circuit.

Timing Chart



Timing Generator Circuit



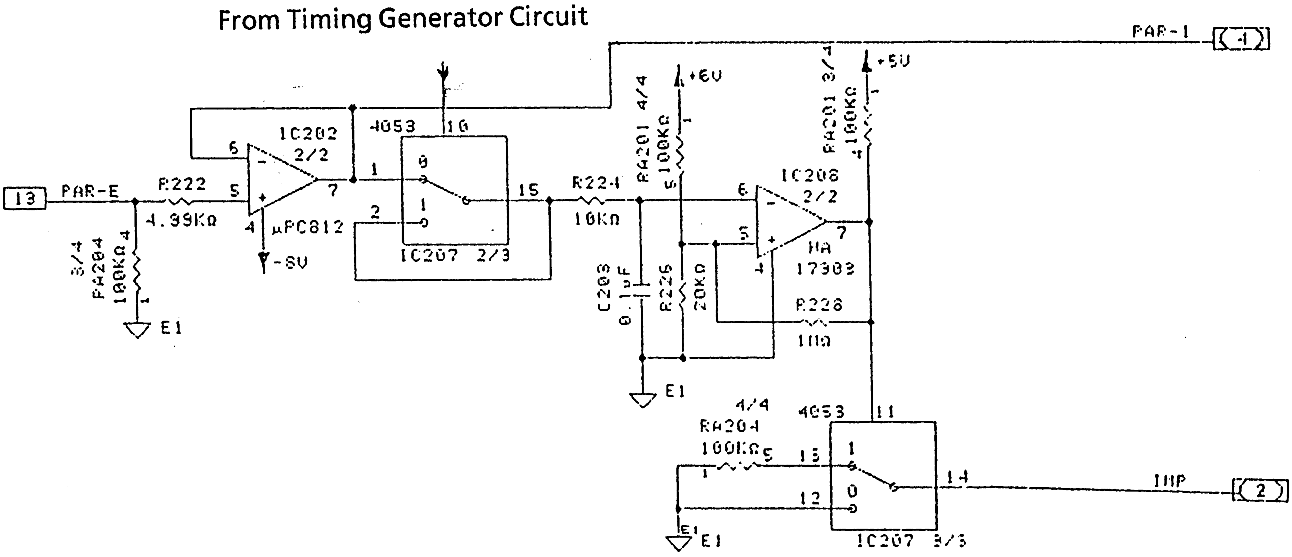
5.3 Impedance Respiration ON/OFF Detector

For impedance respiration detector in the input box to function, the impedance between the leads R(RA) and F(LL) has to be less than 2 kΩ. When the impedance is less than 2 kΩ, the para 1 signal from the input box will indicate impedance respiration measurement status on by having a voltage of 0V. When the para 1 signal has a +5V, the impedance respiration measurement is off. This could mean that the impedance in the leads is more than 2 kΩ or the leads are off.

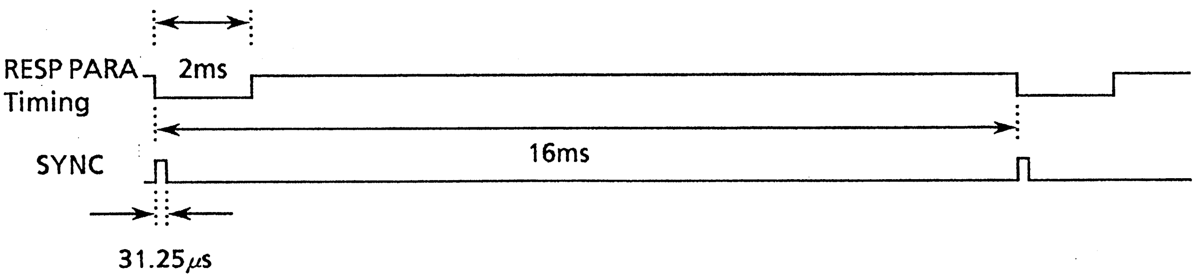
The para 1 signal with 0V will set the switch IC207 3/3 to "1" causing the impedance respiration detector to measure the respiration. A para 1 signal having value +5V sets the switch IC207 3/3 to "0" and thereby shortcircuiting the impedance respiration detector.

The para 1 signal is received by the interface unit as PAR-E. The signal is buffered by IC202 2/2 and transfered to the bedside monitor as signal PAR-I. This unit also pick out the para 1 signal from the PAR-E signal by IC207 2/3 with the timing control signal provided by IC203A, C, and F of the timing generator circuit.

From Timing Generator Circuit

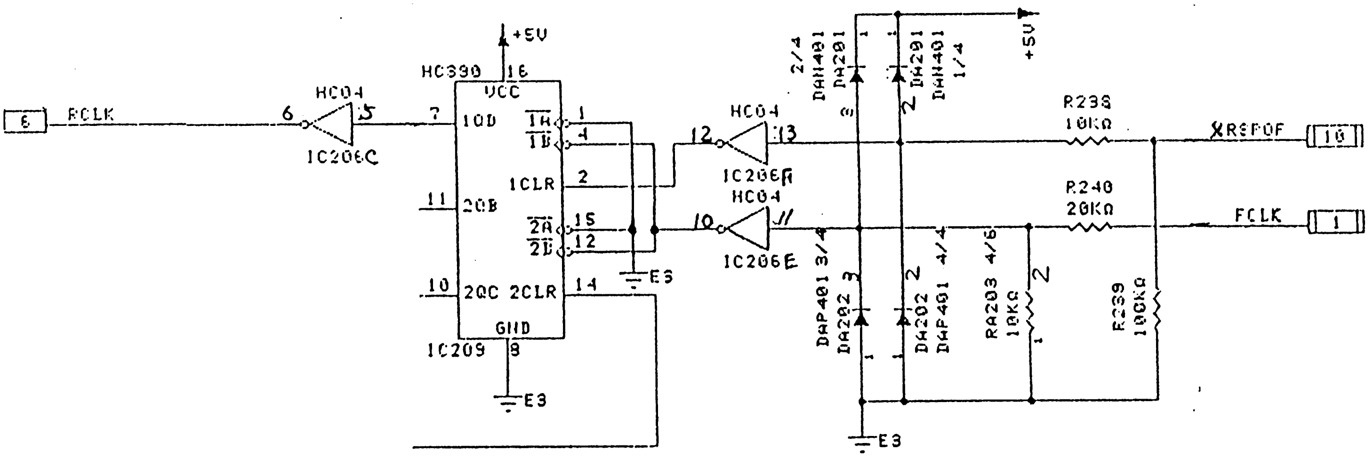


Timing Chart



5.4 Respiration Off

When the respiration is measured using the thermistor method, the bedside monitor sends a signal to the input box instructing it to disable RCLK output to stop measuring the respiration by the impedance method. This signal is known as the XRESPOF.



5.5 Others

The signal XADP of pin 1B of jumper J101 of UP-0613 board is the interface QI-813P acknowledgement signal. This signal informs the BSM-8300 bedside monitor whether the interface QI-813P is connected to it or not.

6 Pin connector Assignment

J201, RDCD-37SE-LNA (To Input Box)

Pin No.	Signal name
1	Not used
2	Not used
3	JACLK
4	Not used
5	Not used
6	RCLK
7	E1
8	ECG2
9	ECG1
10	U2W
11	Not used
12	Not used
13	PAR–E
14	Not used
15	Not used
16	+8V
17	-8V
18	E3
19	+19V
20	Not used
21	SYNC
22	Not used
23	CNTL
24	Not used
25	STS
26	ER
27	RW
28	U1W
29	U3W
30	Not used
31	Not used
32	Not used
33	Not used
34	EH
35	E1
36	E3
37	+19V

UP-0611 ⟷ UP-0613

J202 FFC-14BSM#02 / J105 FFC-14BSM#02

Pin No.	Signal name	Pin No.
1	FCLK	1
2	SYNC	2
3	E3	3
4	E3	4
5	EP	5
6	JACONT	6
7	Not used	7
8	STS	8
9	Not used	9
10	XRESPOF	10
11	+19V	11
12	+19V	12
13	Not used	13

J203 FFC-10BSM#02 / J106 FFC-10BSM#02

Pin No.	Signal name	Pin No.
1	RW	1
2	U1W	2
3	E1	3
4	U2W	4
5	+8V	5
6	2 chECG	6
7	–8V	7
8	U3W	8
9	Not used	9

J204 FFC-6BSM#02 / J107 FFC-6BSM#02

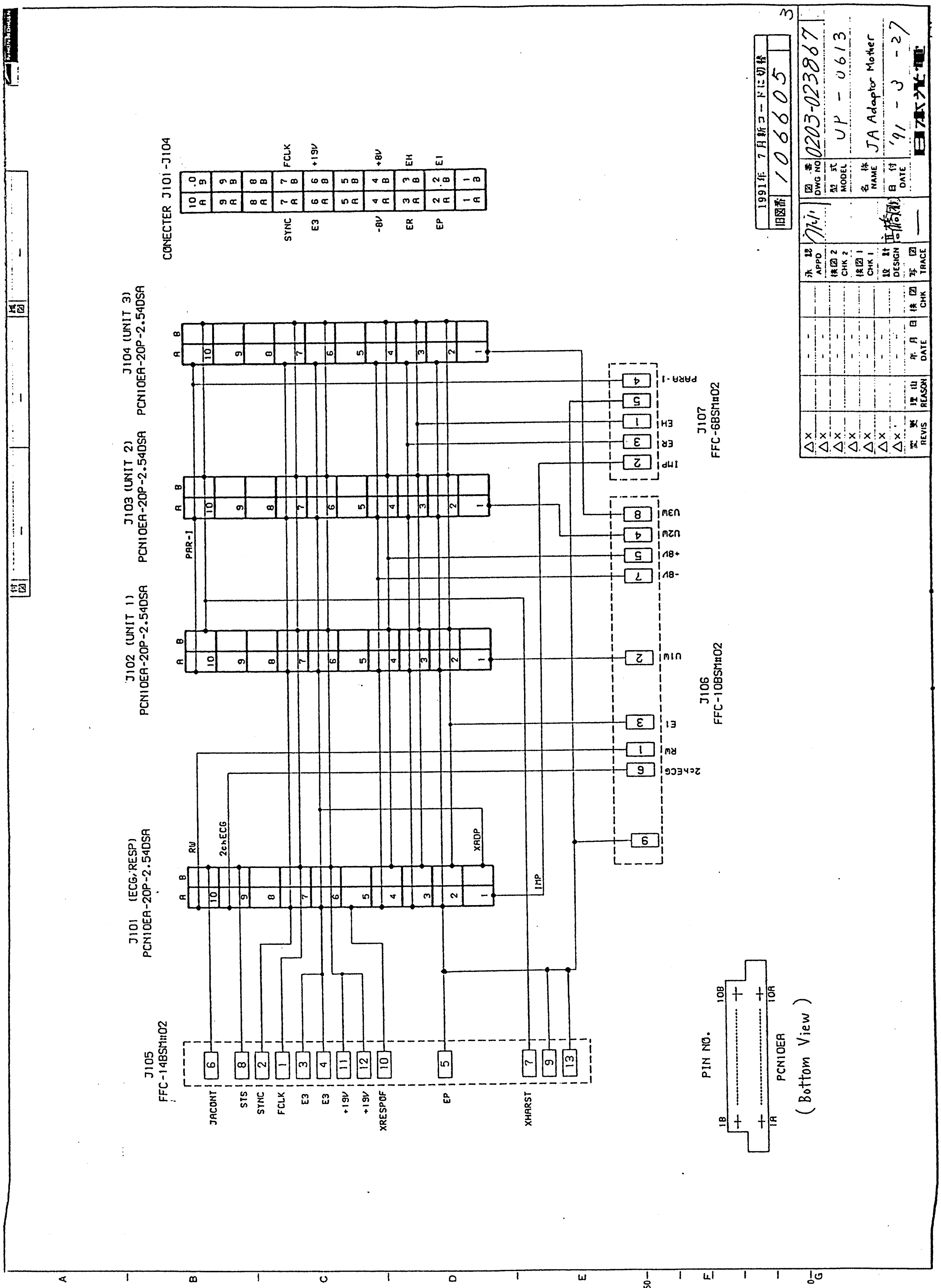
Pin No.	Signal name	Pin No.
1	EH	1
2	IMP	2
3	ER	3
4	PAR–I	4
5	Not used	5

7 Electrical Part List

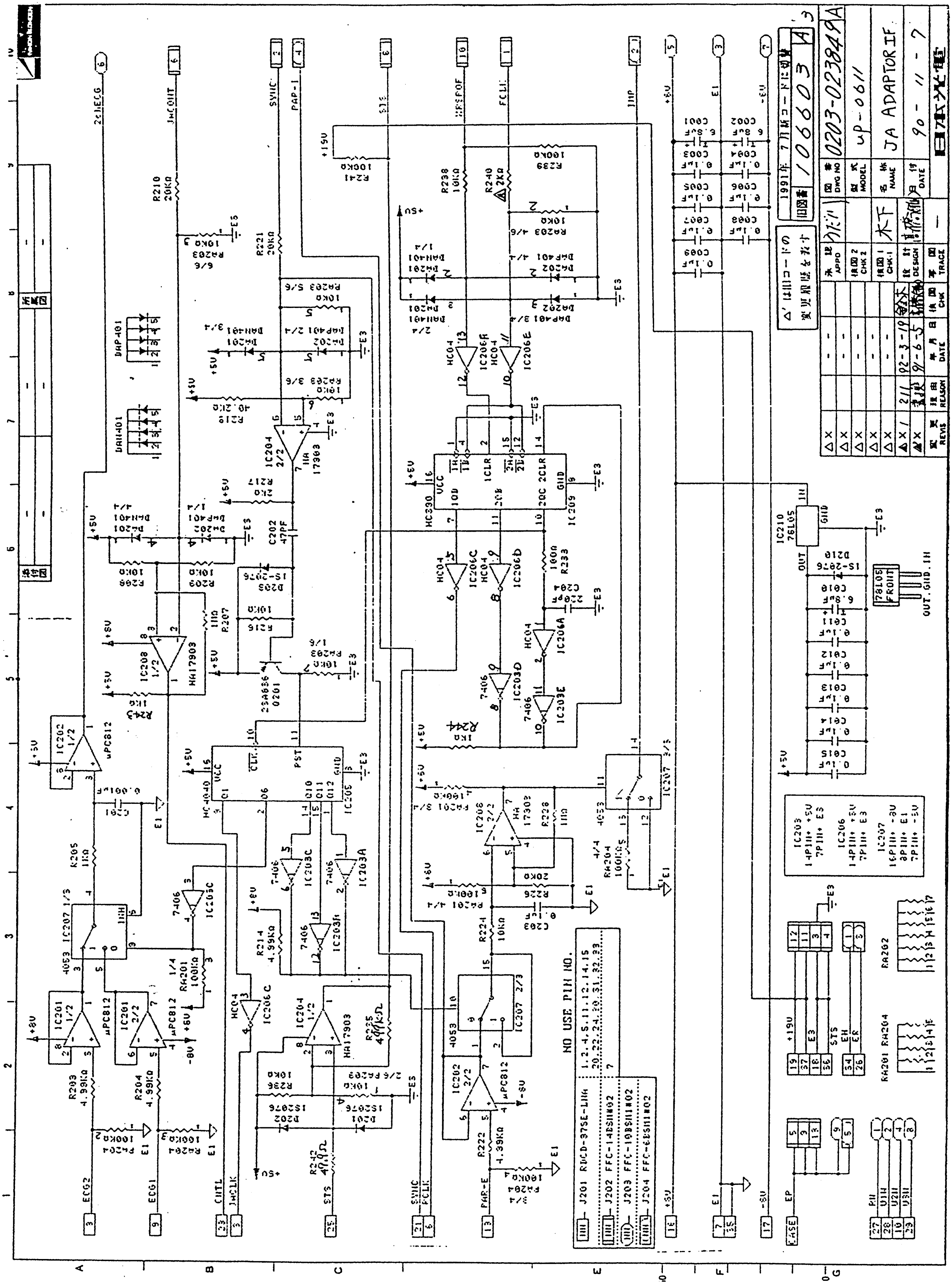
ASSY	CKT NO.	PART NO.	QTY		DESCRIPTION
UP-0613 JA ADAPTOR MOTHER					
UP-0613	J101-J104	319291	4	PCN	PCN10EA-20P-2.54DSA(0.5u)
UP-0613	J105	091205A	1	PCN	FFC-14BSM1#02ST
UP-0613	J106	091188A	1	PCN	FFC-10BSM1#02ST
UP-0613	J107	091161A	1	PCN	FFC-6BSM1#02ST
UP-0611 JA ADAPTOR IF					
UP-0611	C001-C002	070487	2	TAC	ECSZ35HS6R8B 35V 6.8uF
UP-0611	C003-C009	071236	7	CEC	TPD55Y5V1H104Z5-W 50V 0.1uF
UP-0611	C010	070487	1	TAC	ECSZ35HS6R8B 35V 6.8uF
UP-0611	C011-C015	071236	5	CEC	TPD55Y5V1H104Z5-W 50V 0.1uF
UP-0611	C201	070834	1	FLC	ECQ-B 1H 102JZ3 0.001uF
UP-0611	C202	071281	1	CEC	DD05-989SL470K500 500V 47pF
UP-0611	C203	071094	1	FLC	ECQ-V 1H 104JZ3 (0.1uF)
UP-0611	C204	071325	1	CEC	DD05-989B221K500 500V 220pF
UP-0611	DA201	003613	1	D	DAN401
UP-0611	DA202	003604	1	D	DAP401
UP-0611	D201-D203	071503	3	D	1S2076ATE
UP-0611	D210	071503	1	D	1S2076ATE
UP-0611	IC201	016181	1	OPIC	UPC812C
UP-0611	*IC201	162521	0	OPIC	LF412CN
UP-0611	IC202	016181	1	OPIC	UPC812C
UP-0611	*IC202	162521	0	OPIC	LF412CN
UP-0611	IC203	007832	1	TTL	SN7406N
UP-0611	IC204	010739	1	OPIC	HA17903PS
UP-0611	IC205	018865	1	CMOS	UPD74HC4040C
UP-0611	*IC205	162887	0	CMOS	HD74HC4040P
UP-0611	IC206	018722	1	CMOS	HD74HC04P
UP-0611	*IC206	163574	0	CMOS	UPD74HC04C
UP-0611	IC207	017224	1	CMOS	HD14053BP(MC14053BCP)
UP-0611	*IC207	163289	0	CMOS	MC14053BCP
UP-0611	IC208	010739	1	OPIC	HA17903PS
UP-0611	IC209	019267	1	CMOS	HD74HC390P
UP-0611	*IC209	163868	0	CMOS	UPD74HC390C
UP-0611	IC210	014673	1	REG	uPC78L05J (NJM78L05A)
UP-0611	*IC210	162423	0	REG	NJM78L05A
UP-0611	J201	081092	1	CN	RDCD-37SE-LNA Receptacle female
UP-0611	J202	091205A	1	PCN	FFC-14BSM1#02ST
UP-0611	J203	091188A	1	PCN	FFC-10BSM1#02ST
UP-0611	J204	091161A	1	PCN	FFC-6BSM1#02ST
UP-0611	Q201	071904	1	TR	2SA836 C or D TZ
UP-0611	RA201	072431	1	RM	EXB-F5 E 104JYV
UP-0611	RA202	318113	1	RM	EXB-F7 E 102J
UP-0611	RA204	072431	1	RM	EXB-F5 E 104JYV

8 Circuit Diagram

8.1 JA ADAPTOR MOTHER (UP-0613)

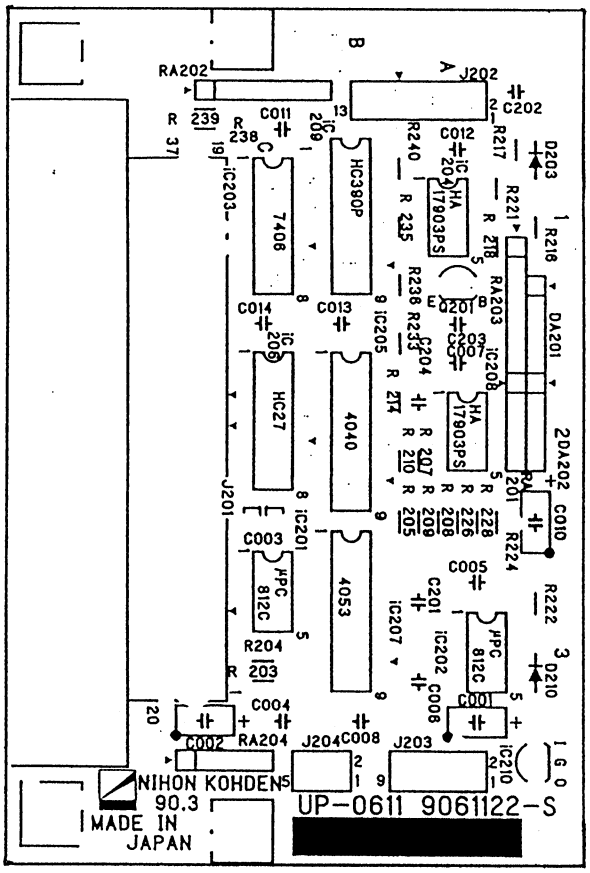


8.2 JA ADAPTOR IF (UP-0611)

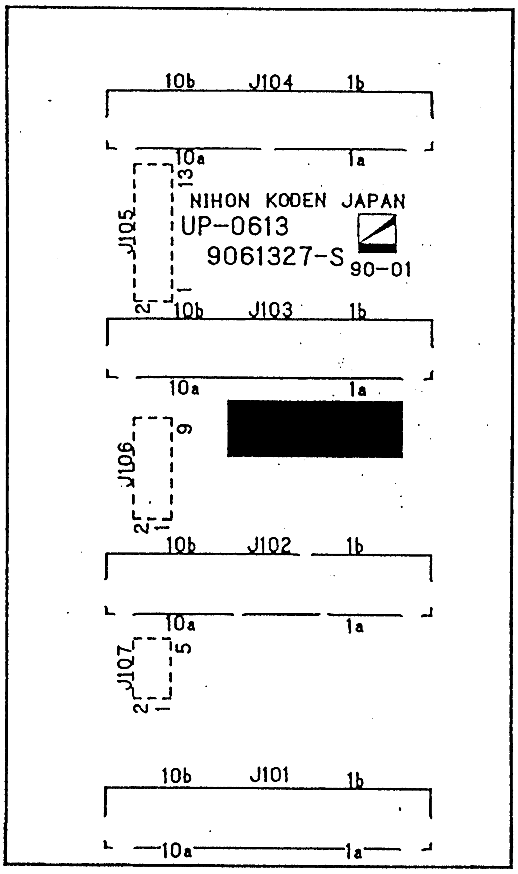


9 Part Location Guide

JA ADAPTOR IF (UP-0611)



JA ADAPTOR MOTHER (UP-0613)



BSM-8301A	MU-831RA
BSM-8301J	MU-831RJ
BSM-8301K	MU-831RK
BSM-8302A	MU-832RA
BSM-8302J	MU-832RJ
BSM-8302K	MU-832RK
	AC-800PA
	AC-800PJ
	AP-800PA
	AW-800PA
	AH-800PA
	AE-800PA
	AR-800PA
	AL-800PA
	AG-800PA
	AG-820PA

Life Scope 9

BEDSIDE MONITOR

BSM-8301/8302

0634-000059

CAUTION

Risk of Fire, Replace Battery as Marked.

Refer to page 9-3 for marked battery.

CONTENTS
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Page

Section 1

1. Introduction

1.1 General

Life Scope 9 BSM-8300 series bedside monitors are Nihon Kohden second BSM series monitor following the BSM-8500 series bedside monitors providing 4 head amplifier slots and employing touch-key screen operation panel.

The MU-831RA/J/K main units of each BSM-8301A/J/K provide an ECG/Resp. head amplifier and an NIBP unit while the MU-832RA/J/K main units of each BSM-8302A/J/K have not the NIBP unit.

Head amplifiers for the BSM-8500 series are compatible with the BSM-8300 series except for the AP-851PA NIBP unit.

Difference between the sufixes as as follows:

MU-831/832RA: AC117V line voltage with 6-pin AAMI input of ECG (AC-800PA)
MU-831/832RJ: AC110-125V line with 8-pin input of ECG (AC-800PJ)
MU-831/832RK: AC220-240V line voltage with 8-pin inp of ECG (AC-800PJ)

1.2 System composition and major functions

1) The BSM-8301/8302 compose of each MU-831R/832R main unit and optional head ampifiers.

2) Two optional interfaces QI-812P and QI-814P can be independently installed in the MU main unit.

3) The QI-812P interface is for connecting the WS-841RJ/K or WS-821RJ/K thermal array recorder. This interface is also mounting an interface for RS-232C communiation with an external instrument such as a personal computer.

4) The QI-814P interface is for connectiong the bedside monitor main unit to the central montoring system (OGP-7101/7102 or CNS-8200). This intreface is also mounting an interface for externally inputting OIR-7100 CO2 monitor signal.

5) By using the QI-814P interface, VY-800RA/K display controller can be used for a display monitor.

System composition-1

MU-831RA
MU-831RJ
MU-831RK
Bedside monior
main unit
(with NIBP)

- CD-055P — Chassis parts
- CD-056P — Chassis parts (speaker, touch panel)
- VM-004P — CRT unit
- SC-006R — Power supply unit (MU-831RA/J)
  SC-006RK — Power supply unit (MU-831RK)
- US-0520A — ROM pack with ROM chips
  - UP-0520 ROM pack without ROM chips
- UP-0397 — Main board
- UP-0398 — CRTC board
- UP-0399 — HA (Head Amp) mother board
- UP-0519 — Respiration board
- UP-0400 — Operation board-1
  - UP-0509 Operation board-2
  - UP-0584 Operation board-3
- AC-800PA (A) — ECG head amplifier (MU-831RA)
  AC-800PJ (J/K) — ECG head amplifier (MU-831RJ/K)
- AP-712P — NIBP unit
- QI-812P — Interface (for thermal array recorder, optional)
  - UP-0402 WSIF board
  - YS-015P9 WS connection cable (45cm)
- QI-814P — Intreface (for central montor, optional)
  - UP-0401 PIO board

System composition-2

MU-832RA
MU-832RJ
MU-832RK
Bedside monior
main unit
(without NIBP)

- CD-055P — Chassis parts
- CD-056P — Chassis parts (speaker, touch panel)
- VM-004P — CRT unit
- SC-006R — Power supply unit (MU-832RA/J)
  SC-006RK — Power supply unit (Mu-832RK)
- US-0520A — ROM pack with ROM chips
  - UP-0520 — ROM pack without ROM chips
- UP-0397 — Main board
- UP-0398 — CRTC board
- UP-0399 — HA (Head Amp) mother board
- UP-0519 — Respiration board
- UP-0400 — Operation board-1
  - UP-0509 — Operation board-2
  - UP-0584 — Operation board-3
- AC-800PA — ECG head amplifier (MU-832RA)
  AC-800PJ — ECG head amplifier (MU-832RJ/K)
- QI-812P — Interface (for thermal array recorder, optional)
  - UP-0402 — WSIF board
  - YS-015P9 — WS connection cable (45cm)
- QI-814P — Interface (for central monitor, optional)
  - UP-0401 — PIO board

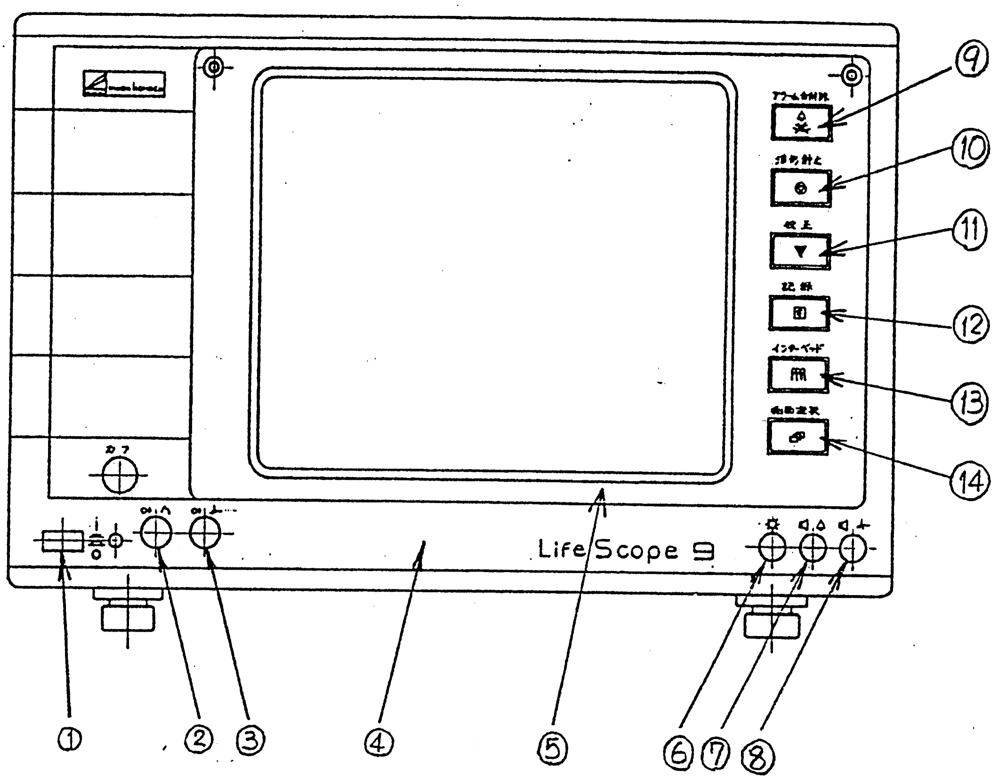
1.3 Panel descriptions

1.3.1 Front

1. Power switch
2. BP1 output connector
3. ECG1 output connector
4. Front frame
5. Touch-key panel assembly

6. Brightness control volume
7. Alarm tone control volume
8. QRS sync. tone control volume
9. Alarm tone SUSPEND key
10. Waveform FREEZE key

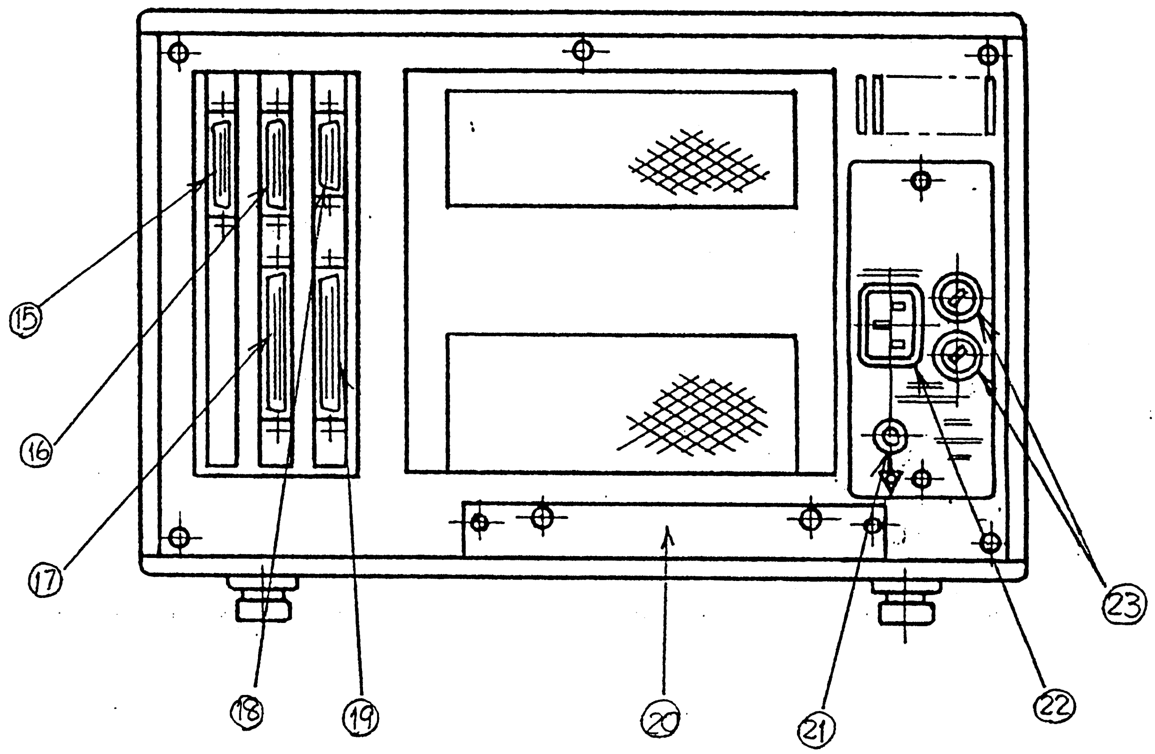
11. TEST key
12. RECORD key
13. INTERBED key
14. DISPLAY selection key



1.3.2 Rear

15. VIDEO output connector
16. RS-232C connector (optional)
17. WS connector (optional)
18. AUX input connector
19. CNS connector (optional)
20. ROM pack

21. Equipotential terminal
22. AC SOURCE socket
23. Fuse holder

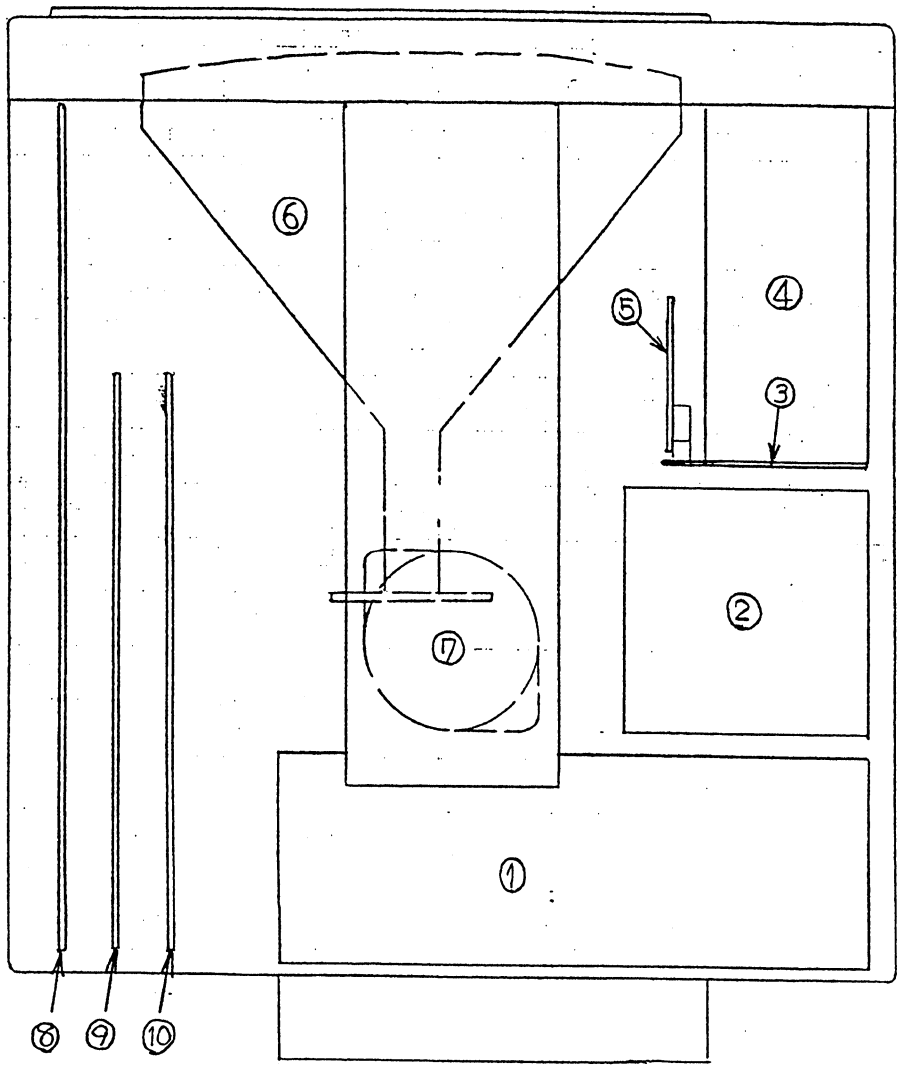


1.4 Location of components

1.4.1 Top view

1. SC-006R, SC-006RK power unit
2. AP-712P NIBP unit
3. UP-0399 Head amplifier mother board
4. Head amplifier compartment
5. UP-0519 Respiration board

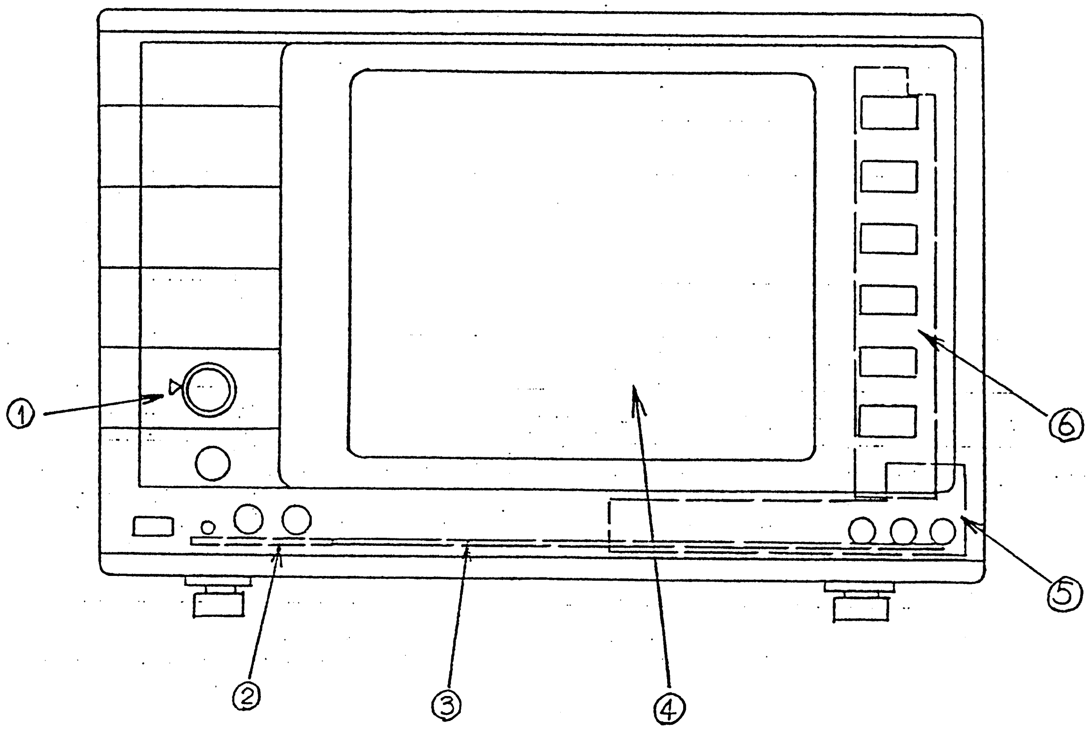
6. VM-004P CRT unit
7. Speaker
8. UP-0398 CRTC board
9. UP-0402 WSIF board (QI-812P)
10. UP-0401 PIO board (QI-814P)



1.4.2 Front view

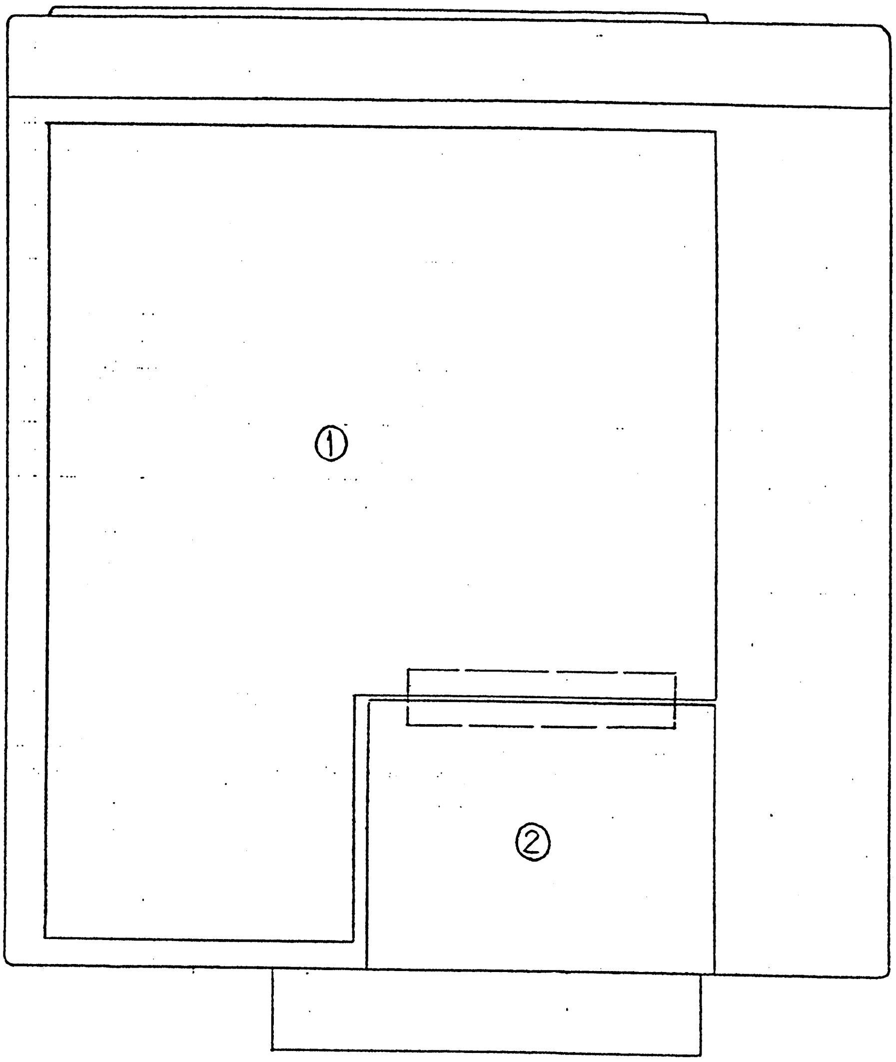
1. AC-800PA, 800PJ ECG/RESP head amplifier
2. UP-0584 Operation board-3
3. UP-0397 Main board
4. Touck-key panel
5. UP-0400 Operation board-1

6. UP-0509 Operation board-2



1.4.3 Bottom view

1. UP-0397 Main board
2. US-0520A ROM pack



1.5 Servicing policy

Maintenance of the unit by users is cleaning the touch-key panel touch-key panel sensing part assignment. Replacing components must be done by qualified thechnical personnel only.

As repair of the four layer printed pattern boards of the high part counting density and surface bonding parts are requires special toos and high skill, do not try to reair then in field. Repair should be done in service house.

All NIBP units must be returned to Nihon Kohden for repair as it requires special adjustment for accuracy and safety.

Be sure the following point before servicing.

1) Ask users for details of trouble before and after toruble occurence.

2) Check trouble from various view points before opening the unit.

3) Use the self test program of the main unit to focus the trouble source.

1.6 Precautions when servicing

1) High voltage hazard exists around the CRT unit. Be careful not to touch inside the unit.

2) When transfering printed circuit boards, put them in conductive bag to protect against damage due to high static electricity. Never use styloleform or polyethilen bag.

3) Electrical parts on the MAIN board and CRTC board are of surface bonding and require special tools to remove and resolder. Be sure poor handling of such parts will break the printed patterns on or inside the boards.

Section 2

2. Troubleshooting and self test mode program

2.1 Troubleshooting

1) Screen trouble

Phenomenon	Check point and trouble source	Action
Blank screen (entire black)	Power lamp lighting? .Power source down. .Faulty power unit. .Shortened +5V (check +5V by pulling out each board one by one.	Check AC line voltage, fuses. Check power unit without load and replace power unit if still faulty. Replace power unit. Replace faulty board.
	Loose ROM pack on the rear.	Secure ROM pack.
	Loose connetors (external, internal)	Secure connectors.
	CRT heater OK? .Faulty power unit.	Check power unit without load and replace power unit if still faulty.
	.Shortened +12V 1) Disconnect CRT unit cable.	1) Check +12V and replace CRT unit if +12V is OK.
	2) Disconnect NIBP unit.	2) Check +12V and replace NIBP unit if +12V is OK.
	3) Disconnect CRTC board.	3) Check +12V and replace CRTC board if +12V is OK.
	Check QRS sync. tone, central communication, etc.	Replace CRTC board.
	Entire malfunction?	Replace main board.

Phenomenon	Check point and trouble source	Action
Faulty display (including entire white screen)	Faulty horizontal and/or vertical synchronization. .Poor adjustment of CRT unit.	Adjust H-HOLD and/or V-HOLD volume on CRT unit.
	.Faulty CRTC board.	Replace CRTC board.
	Poor characters and/or waveforms. .Faulty ROM pack (check by Self Test for ROM test).	Replace ROM pack.
	.Poor characters and/or waveform on screen.	Replace CRTC baord.
Dimmed screen.	Dirty back of touch-key panel or CRT surface.	Remove touch-key panel and clean touch-key panel and CRT surface.
	Poor CRTC board adjustment.	Adjust SUB-BRIGHT volume on CRTC board.
	Poor CRT unit adjustment.	Adjust SUB-BRIGHT volume on CRT unit. Replace CRTC board and/or CRT unit if not adjustable.

2) Waveform trouble

Phenomenon	Check point and trouble source	Action
No waveform (including no trace for waveform)	All traces are faulty (no trace or waveform) .CRTC board faulty.	Replace CRTC board.
	No waveform except for ECG? .Head amplifier faulty.	Replace head amplifier.
	.Resp. board faulty (if only respiration trace is faulty).	Replace Resp. board.
	.CRTC board faulty (no trace at Self Test).	Replace CRTC board.

Phenomenon	Check point and trouble source	Action
No waveform (flat trace)	All traces are flat including calibration waveform. .Power unit faulty.	Replace power unit if power unit is faulty without load.
	1) Disconnect interface board.	1) Replace interface board if power is OK without interface board.
	2) Disconnect NIBP unit.	2) Replace NIBP unit if power is OK without NIBP unit.
	3) Remove head amplifiers one by one.	3) Replace faulty head amplifier(s).
	4) Main board faulty.	4) Replace main board.
	All traces are flat but calibration waveform is OK. 1) Head amplifier faulty.	1) Replace faluty head ampl.
	2) Main board faulty.	2) Replace main board.

3) Sound trouble

Phenomenon	Check point and trouble source	Action
No sound generation.	No key click tone? .Speaker faulty. .CRTC board faulty. .Main board faulty.	.Replace speaker. .Replace CRTC board. .Replace main board.
	No alarm tone or QRS sync. tone? .Main board faulty.	.Replace main board.
Incorrect tone.	All tones incorrect? .CRTC board faulty. .Main board faulty.	.Replace CRTC board. .Replace main board.
	Alarm tone or QRS sync. tone incorrect? .Main board faulty.	.Replace main board.
	Continuous tone generation. .Main board faulty.	.Replace main board.

4) Touch key trouble

Phenomenon	Check point and trouble source	Action
No operation of touch key.	Indication of touch key position at self test key OK? .Poor adjustment of touch key positioning. .Touch key faulty (cracking) 1) Material also broken? 2) Smooth moving at position setting? TOUCH KEY A/D value at self test A/D, D/A test OK? (000 when not pushed) (800 ± 600 when pushed)	.Readjust the touch key positioning. .Replace the touch key panel if material is broken. .Readjust touch key positioning if crack is small. .Replace the touch key panel if 000 is not displayed when it is removed, or replace the main board if 000 is displayed. .If trouble is found when touch key is pressed, replace the main board.

5) NIBP trouble

Phenomenon	Check point and trouble source	Action
NIBP operation (No NIBP indication on the screen).	Check connection cable connecting the NIBP unit.	Secure connection cable. Replace NIBP unit.
No cuff inflation. No cuff pressure indication. No measurement.	NIBP unit faulty.	Replace NIBP unit.
Error is indicated. Measurement results seem to be faulty.	Cuff bending, clamping. Air leakage from cuff hose. Measure blood pressure with the monitor and stesoscope simultaneously and compare the results.	Check cuff hose or replace. Check cuff wrapping. Replace NIBP unit.

2.2 Self Test

Self test is to inspect normal functions of the instrument and to find trouble source when servicing. Self test contains a lot of of information but is not perfect.

There are two self test modes.

1) Power on self test
2) Off line (manual) self test

2.2.1 Power on self test

Power-on self test is done when power is turned on. If trouble is found and system cannot operate any more, screen changes to the off-line self test mode and error is displayed on the screen. If trouble small for normal operation (ex. backed up data are broken or backup battery has discharged), screen proceeds to the normal operation mode. Contents of such error can be reviewed on the off-line self test mode screen.

Power-on self test covers memory and I/O devices on the main board and CRTC board. If optional interface board(s) are mounted, devices on the board(s) are covered.

1) Main board test (UP-0397)

. **RAM test (IC128-IC135)**

Data "55H" is written into eight pieces of 256k S-RAM chips and read out to be compared with the original data. RAM data are not broken with this test.

. **ROM test (IC122-IC127)**

Sum value of each five pieces of ROM chips is compared with previously stored sum value in ROM to be compared with.

. **Clock test (IC140)**

Clock IC data are read and legality of time and date is inspected.

. Serial IO test (IC137)

Data of status register are read out and TxRDY and TxE signals are inspected.

. **Interrupt test (IC104)**

Intervals of 2mS interrupt and real-time clock interrupt are inspected.

- EEPROM test (IC141)

  Sum value is compared with previously stored sum value in EEPROM.

- A/D, D/A test

  D/A converter output is A/D converted to inspect whether the A/D output in the specified normal range.

- Battery test

  Battery voltage for clock IC is A/D converted and inspected whether it is in the specified normal range.

Error code at power-on test

Error code is indicated with one hexadecimal code for each four bits. Therefore, eight digits can display 32 kinds of error.

M A J O R   E R R O R   0 0 0 0 0 0 0 0

Bit	31- 28	27- 24	23- 20	19- 16	15- 12	11- 8	7- 4	3- 0

Bit	Description
31	Undefined '0"
30	Undefined '0"
29	Undefined '0"
28	Undefined '0"
27	Interrupt error (BUS ERROR)
26	Interrupt error (COMM. ERROR)
25	Interrupt error (DMA ERROR)
24	Interrupt error (CLOCK ERROR)
23	Interrupt error (2mS ERROR)
22	Clock error
21	Undefiend "0"
20	Undefiend "0"
19	Undefiend "0"
18	Baud rate clock error (QI-812P)
17	Undifiend "0"
16	EEPROM error (IC141)

15 ROM error (IC127)
14 ROM error (IC127)
13 ROM error (IC127)
12 ROM error (IC126)

11 ROM error (IC125)
10 ROM error (IC124)
9 ROM error (IC123)
8 ROM error (IC122)

7 RAM error (IC135)
6 RAM error (IC134)
5 RAM error (IC133)
4 RAM error (IC132)

3 RAM error (IC131)
2 RAM error (IC130)
1 RAM error (IC129)
0 RAM error (IC128)

Example of major error indication

MAJOR ERROR 0 4 C 1 3 0 3 0

RAM ERROR (IC132, 133)
ROM ERROR (IC126, 127)
EEPROM ERROR
INTERRUPT ERROR (2ms)
CLOCK ERROR
INTRERRUPT ERROR (COMM)

MINOR ERROR 0 0 0 0 0 0 0 0

Bit	31- 28	27- 24	23- 20	19- 16	15- 12	11- 8	7- 4	3- 0

Bit Description

31 Undifined "0"
30 Undifined "0"
29 Undifined "0"
28 Undifined "0"

27 Undifined "0"
26 Undifined "0"
25 Undifined "0"
24 Undifined "0"

23 Undifined "0"
22 Undifined "0"
21 Undifined "0"
20 Undifined "0"

19	Undifined "0"
18	Undifined "0"
17	Undifined "0"
16	Undifined "0"
15	Undifined "0"
14	Undifined "0"
13	Serial I/O error (QI-812P)
12	A/D converter error (QI-814P)
11	Communication controller error (QI-814P)
10	Wave RAM error (IC210)
9	Wave RAM error (IC209)
8	Wave RAM error (IC208)
7	Wave RAM error (IC207)
6	Graphic RAM error
5	Undifined "0"
4	ACRTC error (CRTC)
3	A/D converter error (MAIN)
2	Battery discharged
1	A/D converter error
0	A/D, D/A loop error

2) CRTC board test (UP-0398)

. CRT controller test (IC109)

Data of control register are read out to be compared with preset values. Also status register is inspected as the same manner.

. Graphic RAM test (IC112-IC119)

Test pattern "5555H" is written into RAM for chatacter/graphic display (frame buffer memory) and read out to be compared with the original data. Then "0000H" is read out to inspect whether all addresses are "0000H".

. Wave RAM test (IC207-IC210)

Test pattern "5555H" and "0000H" are written and read out for Write/Read test.

3) QI-812P (UP-0402 WSIF baord) test

. Serial I/O test (IC201)

Data of status register are read out and TxRDY and TxE signals are inspected.

. Baud rate clock test (IC203)

Software timer counts baud rate clock and inspects whether frequency is in specified normal range.

4) QI-814P (UP-0401 CNS PIO board) test

. Communication controller test (IC111)

Data of status register are read out and TxE signal is inspected.

. A/D converter test

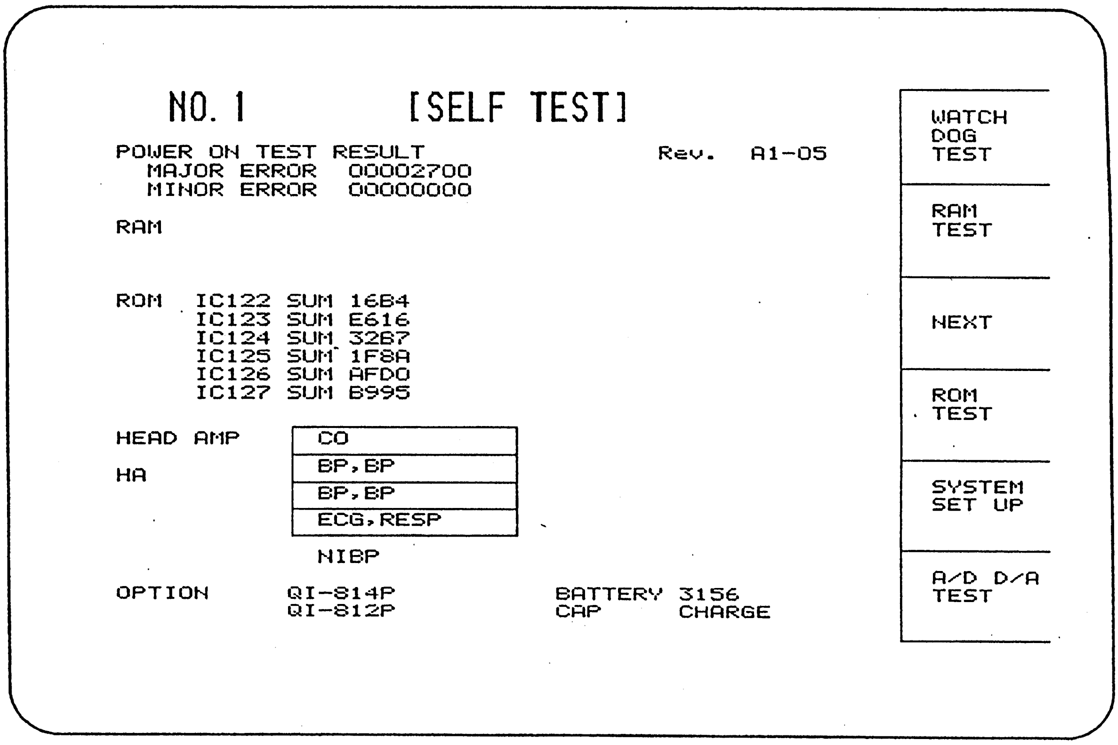
A/D converter starts and end of conversion (EOC) signal is inspected whether it is outputted within specified normal time.

2.2.2 Off-line (manual) self test

Off-line (manual) self test mode is called up by turning power on while pressing the TEST key. System setup is done in the off-line self test. Test mode screens consists of No.1 screen through No.8 screen. Each time the TEST key is pressed, screen proceeds up. DISPLAY key calls up sub screen if exists.

1) Self test title screen (No.1)

Following items are displayed when the self test No.1 screen is called up.



. Power-on test result display

Major and minor errors are separately displayed. Error code is eight digits of hexadecimal number and each digit is hexadecimal number of four bits. If there is no error, all digits read "0".

. Program revision number display

Displayes mounted program revision number. Revision number determines specifications and functions of the bedside monitor. Be careful of the number.

. Head amplifier insertion detection display

When the head amplifiers are inserted into the main unit, parameter names of the units with "HA" (Head Amplifier) are displayed. If the extension input box is used, "JA" is displayed instead of "HA". For ECG/Respiration head amplifier, "ECG, RESP" is displayed when the amplifier is in measuring condition. "NIBP" is is displayed when the NIBP unit in mounted correctly.

. Optional board insertion detection display

When the optional interface boards (QI-812P and QI-814P) are inserted, interface models are displayed.

. Battery voltage, backup capacitor voltage display

Battery voltage for clock IC is tested. If higher than 2.6 volts (indication is "2600" for 2.6 volts) it is normal.

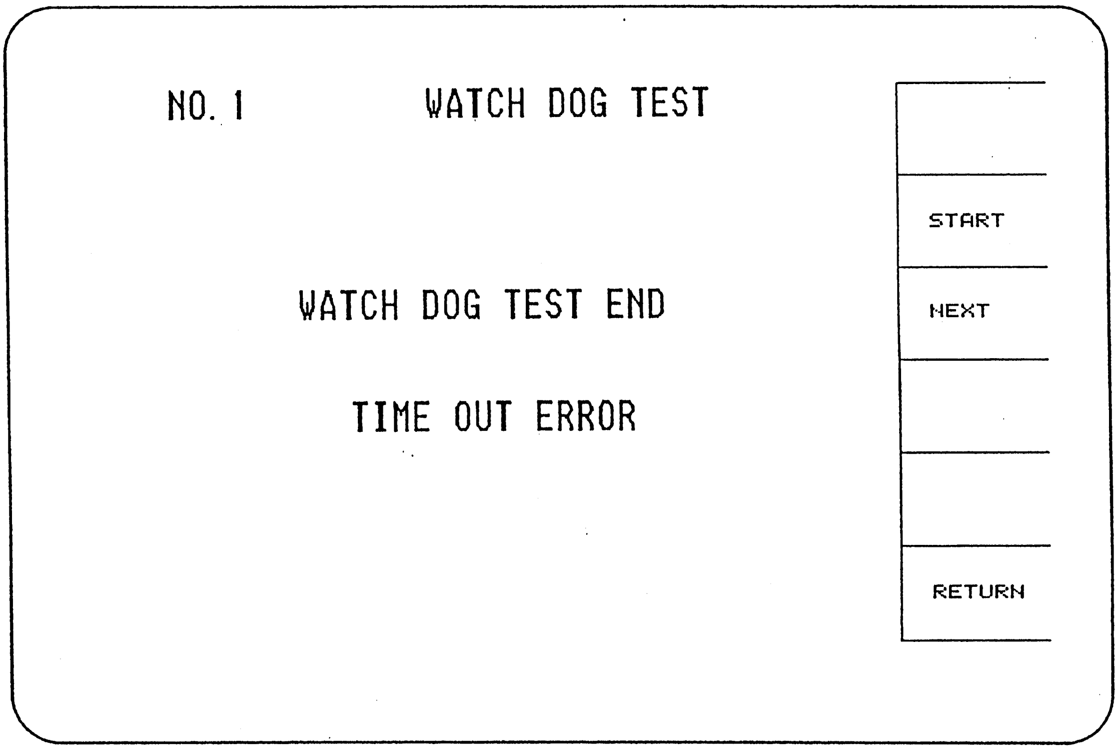
Backup capacitor is for data backup against short power failure. Voltage is measured only once at power on as it is immediately charged after power on. Therefore, when self test No.1 screen is called up from No.8 screen using the TEST key, there is no backup capacitor test information. CHARGE or DISCHARGED is displayed according to capacitor voltage at power on.

Following tests are performed by key operation

. Watch dog timer test

By pressing the SUSPEND key watch dog timer test screen is called up and test starts. Message "WATCH DOG TEST RUNNING" is displayed while testing. Test results indication is "NO ERROR" or "TIME OUT ERROR".

Pressing the DISPLAY key returns the screen to No.1 screen.
Pressing the FREEZE key restarts the watch dog timer test.
Pressing the TEST key advance the screen to No.2 screen.

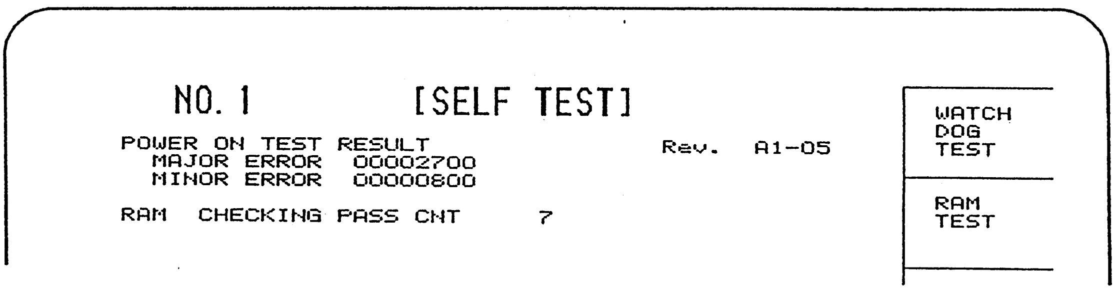


. RAM test

RAM test starts by pressing the FREEZE key at the No.1 screen. Test is made by Write/Read method. Message :CHECKING PASS CNT XX (XX is numerics) while checking.

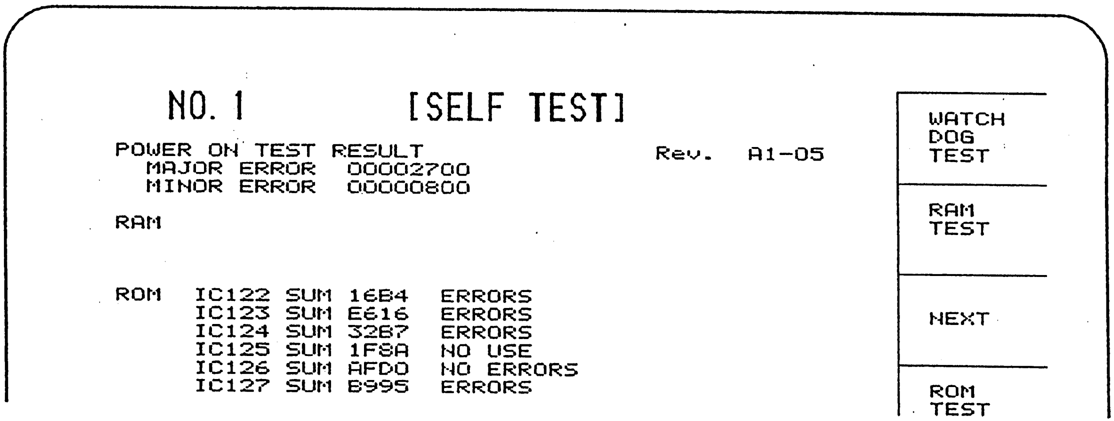
If an error is found, the IC number, address and read data/write data are dispalyed.

TEST key must be used to escape from this RAM test to the No.2 screen.



. ROM test

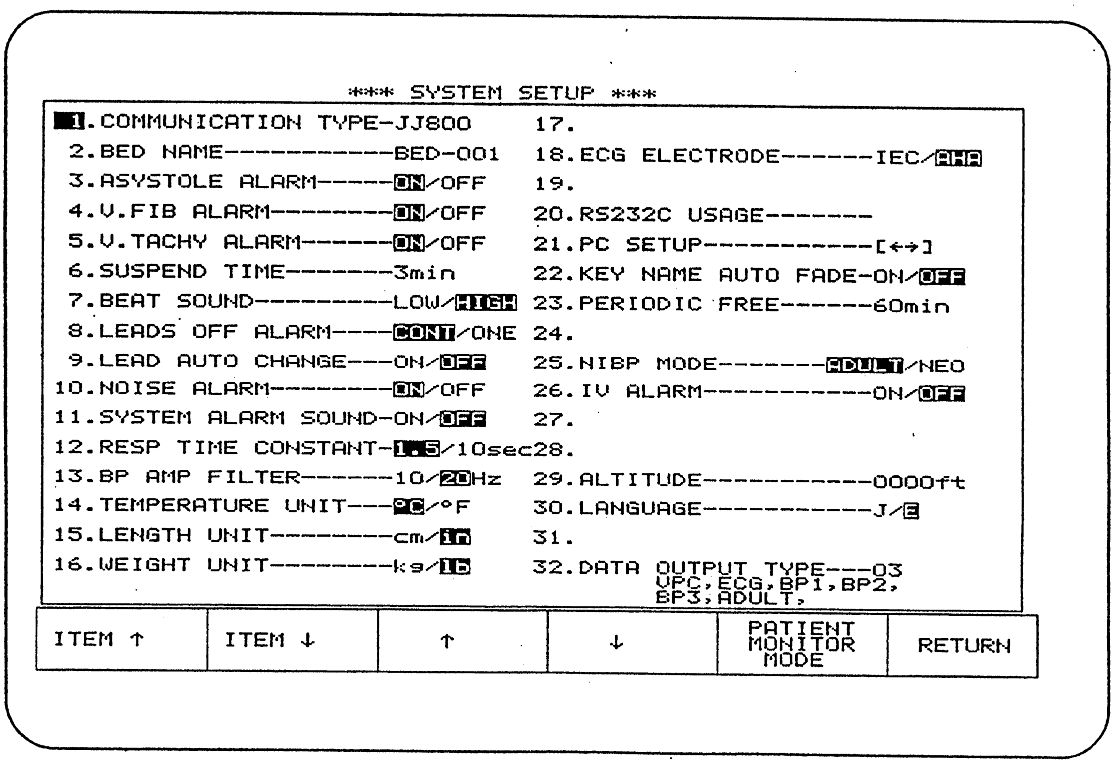
ROM test starts by pressing the RECORD key. Message "CHECKING" is displayed while checking.



. System setup

System setup screen is called up by pressing the INTERBED key. System setup menu includes various items such as physical units, language, etc. ITEM , ITEM and keys of the touch-key panel are used to select items. After setting LANGUAGE "E" (ENGLISH), press the SUSPEND key for three scocnds to initialize the system.

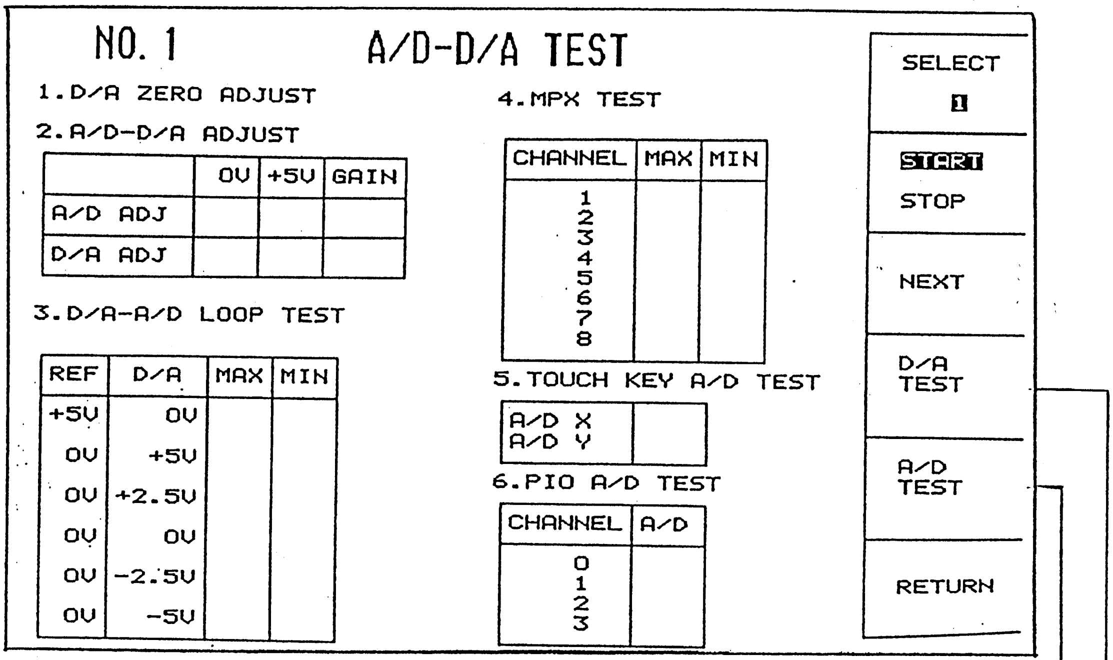
Initialization means the factory set including trend data except for clock set and touch-key positioning. Press the "PATIENT MONITOR MODE" key or RETURN key to return the screen to No.1 screen.



. A/D, D/A test

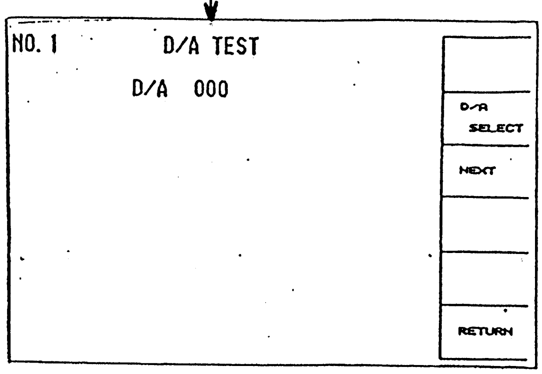
A/D, D/A test start by pressing the DISPLAY key. The screen has two sub screens for A/D test and D/A test for adjustment. Refer to pages for adjustment in details.

Select one of six items by pressing the SUSPEND key to check A/D conversion of reference voltages whether the A/D data are in specified normal ranges or A/D conversion when screen is touched is correct.



AD TEST	TS1	TS2	TS3	TS4	TS5	TS6	TS7	TS8
ECG 1	801 80A	801 809	801 809	7FD 805	7F9 802	7FB 803	7FB 803	801 809
ECG 2	7EC 7F2	7EC 7F2	7ED 7F3	7ED 7F3	7EE 7F5	7EF 7F4	7ED 7F3	7ED 7F3
RESP	838 83C	839 83D	839 83D	839 83D	839 83D	839 83C	839 83C	838 83C
UNIT1 ( )	802 808	803 808	802 808	803 808	803 808	804 808	802 808	802 808
UNIT2 ( )	802 808	803 808	802 808	803 809	803 808	804 808	802 808	802 809
UNIT3 ( )	803 809	803 809	803 808	803 809	804 809	804 809	802 808	803 809
PARA	82C 832	FC4 FCA	FC7 FCD	FC7 FCD	FC7 FCD	FC7 FCD	FC6 FCD	FC7 FCD
AMP								

RETURN



Sub screen for D/A test is called up by pressing the RECORD key and sub screen for D/A screen is called up by pressing the INTERBED key. DISPLAY key returns the screen to the No.1 screen.

NO. 1 D/A TEST

D/A 000

D/A SELECT

NEXT

RETURN

AD TEST	TS1	TS2	TS3	TS4	TS5	TS6	TS7	TS8
ECG 1	7FD 802	7FE 801	7FD 801	7FF 801	7FC 801	7FC 800	7FB 800	7FD 800
ECG 2	7FE 803	802 809	805 80C	803 809	7FC 801	7F5 7FA	7EF 7F5	7F4 7FB
RESP	65A 6D0	65A 6CF	65A 6CF	65A 6CF	659 6CF	659 6CE	659 6CE	659 6CE
UNIT1 (BP BP)	95E AEA	95C AE9	8BC ABA	8BE ABC	95D AEC	95E AEC	8BF ABB	8C1 AB9
UNIT2 (BP BP)	7FF 900	7FF 900	D28 D2B	D28 D2C	7FE 8FC	7FF 8FD	D28 D2B	D28 D2C
UNIT3 (CO)	7F6 7FA	7F6 7FB	367 36F	367 36E	FFF FFF	FFF FFF	000 000	000 000
PARA	FD0 FD5	A5F A64	A1D A21	940 944	A5B A5F	A5B A61	A59 A5E	A5A A5E
AMP	IMP	BP	BP	CO	BP	BP	BP	BP

RETURN

2) Character test screen (No.2)

On this screen, CRT controller LSI device and graphic RAM on the CRTC board are tested. Display mode changes by pressing the key on the front panel.

Function of each key is as follows:

SUSPEND ..... Screen brightness changes at each time the SUSPEND key is pressed to Off → half brightness → full brightness-1 → full brightness-2.
Note: There is no difference on the screen between full brightness-1 and -2.

FREEZE ...... Scrolls the screen up.

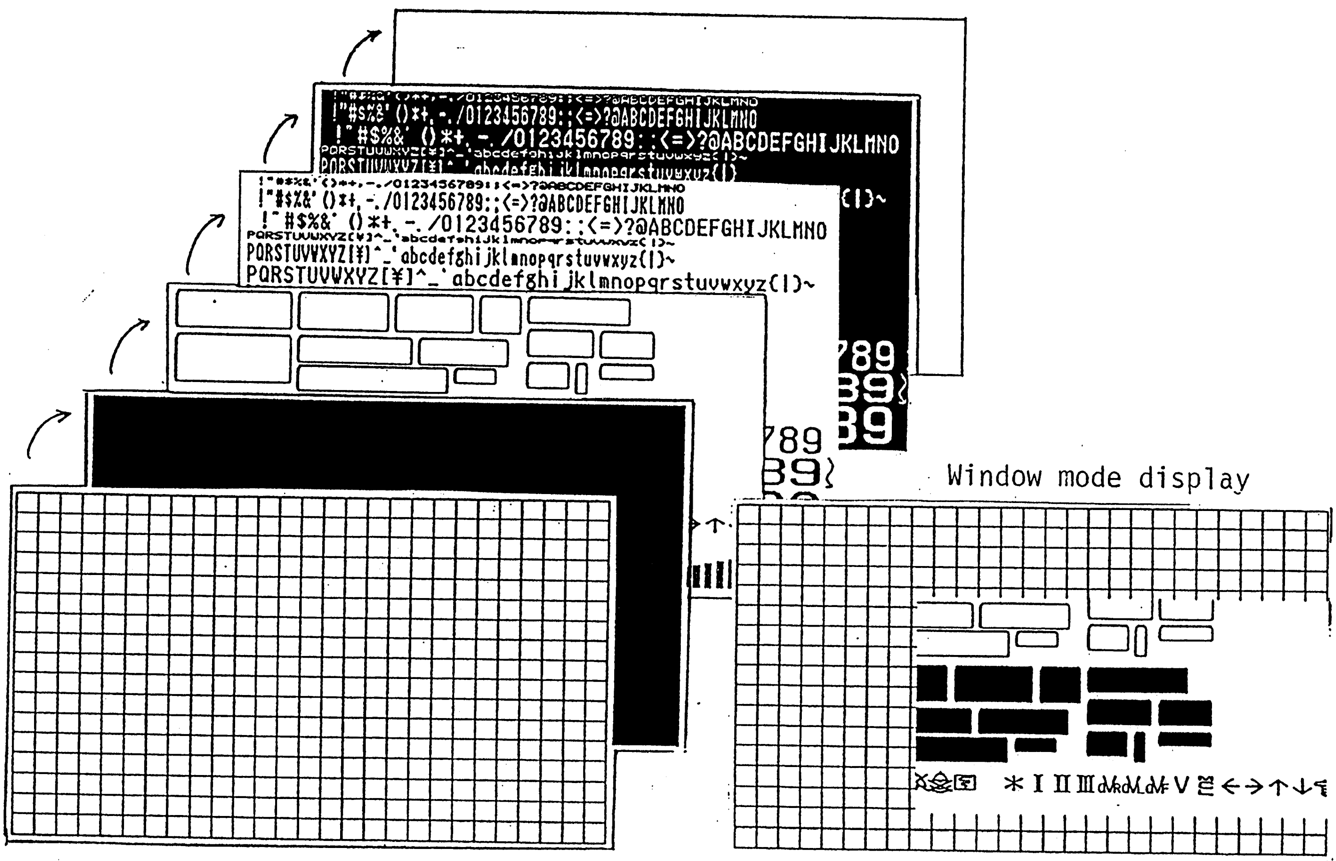
TEST .... Proceeds the screen to No.3 screen.

RECORD ...... Scrolls the screen down.

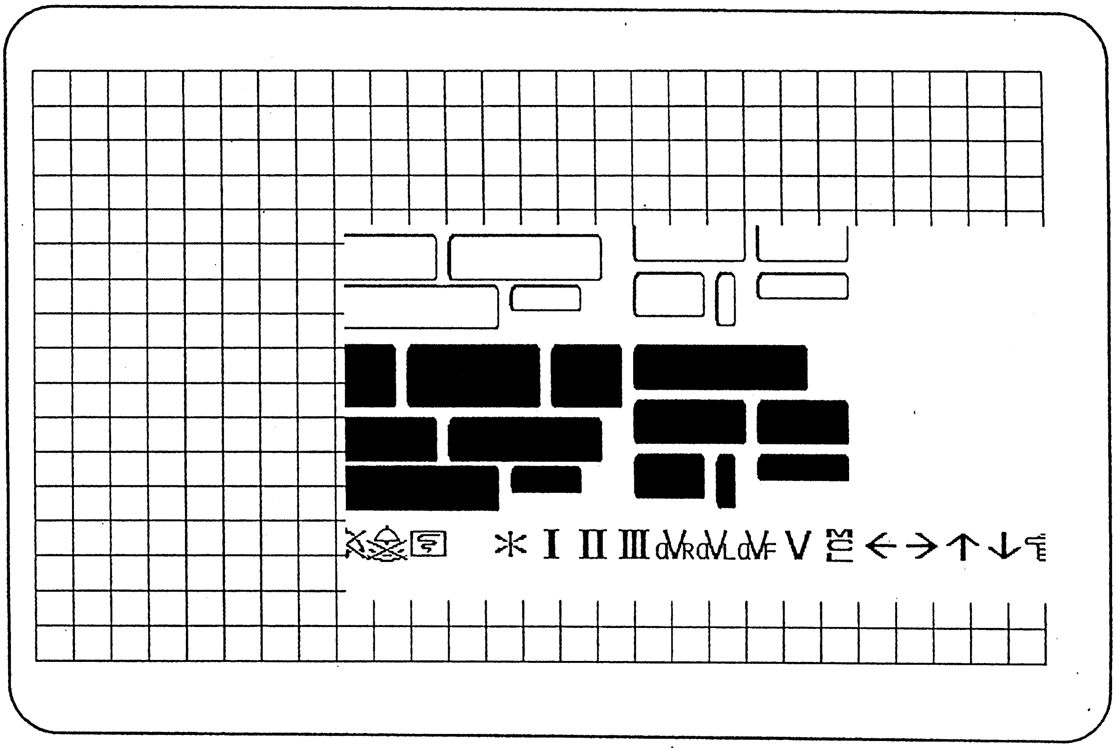
INTERBED .... Screen changes at each time the INTERBED key is pressed to Sleep mode → Window mode → Normal mode.

DISPLAY ..... Screen changes at each time the DISPLAY key is pressed to Grid → Full raster → Character-1 and -2 → reverse shaded character-2 → External input.

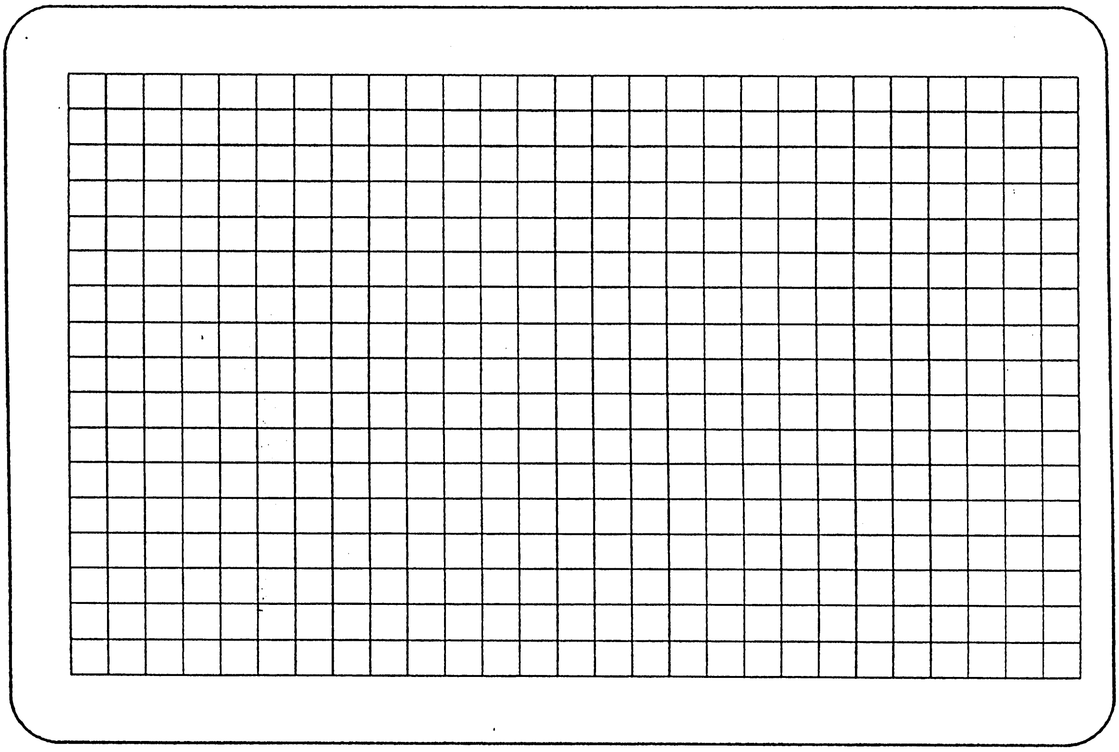
This test is done by eye inspection for screen size, grid distortion, character missing, screen brightness, and display mode changing.



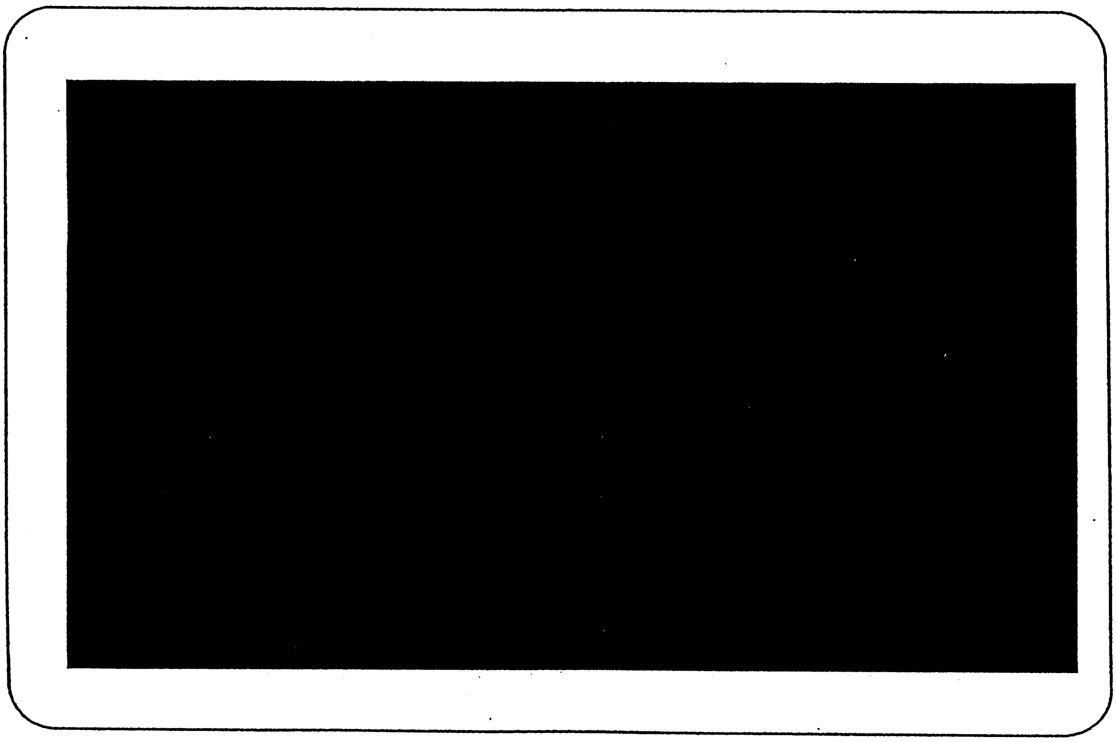
Window mode screen



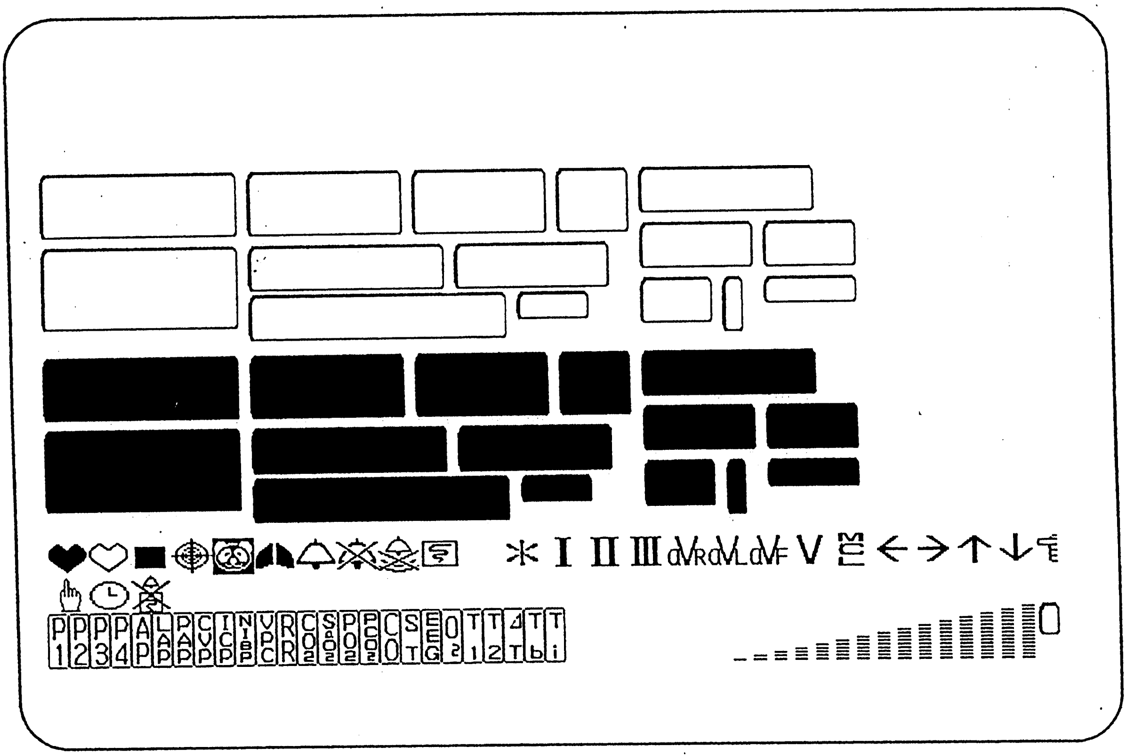
Grid mode screen



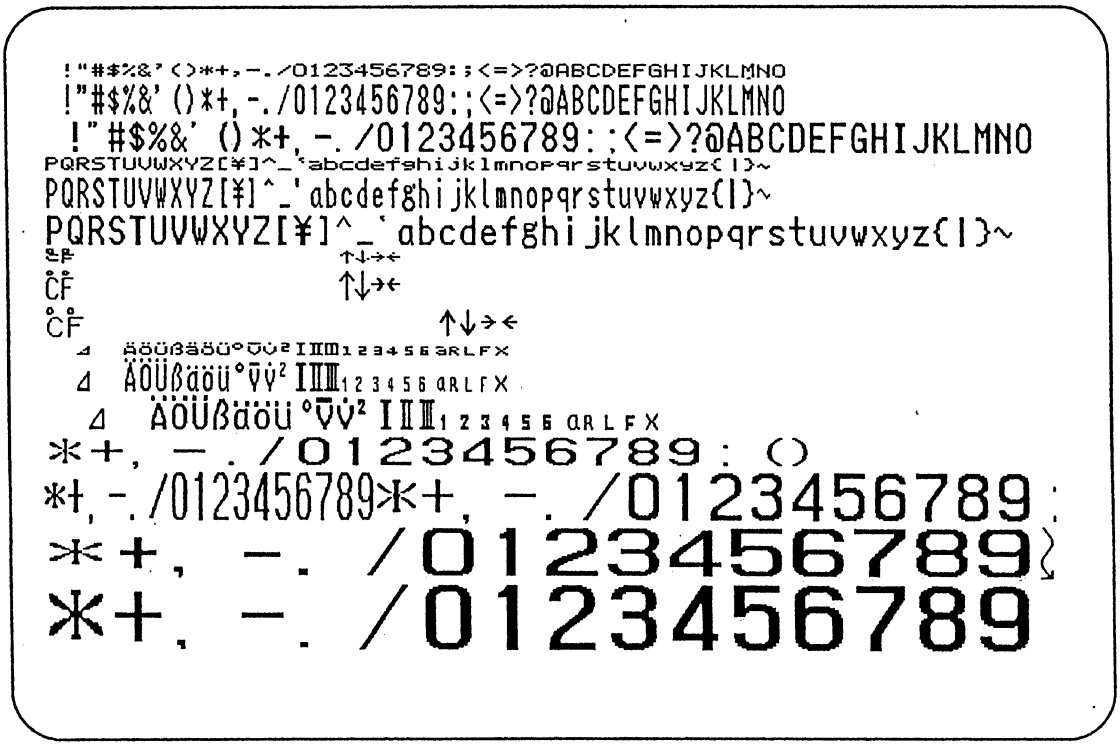
Full raster mode screen



Character-1 mode screen



Character-2 mode screen



Reverse shaded character-2 mode screen

3) Wave test screen (No.3)

On this test screen, waveform generator circuit, wave RAM and frame buffer RAM are tested. Function of each key is as follows:

SUSPEND ..... Brightness of each waveform trace changes one by one at each time the SUSPEND key is pressed to Off → Half brightness → Full brightness-1 → Full brightness-2.

FREEZE ...... Waveform scrolling stops.

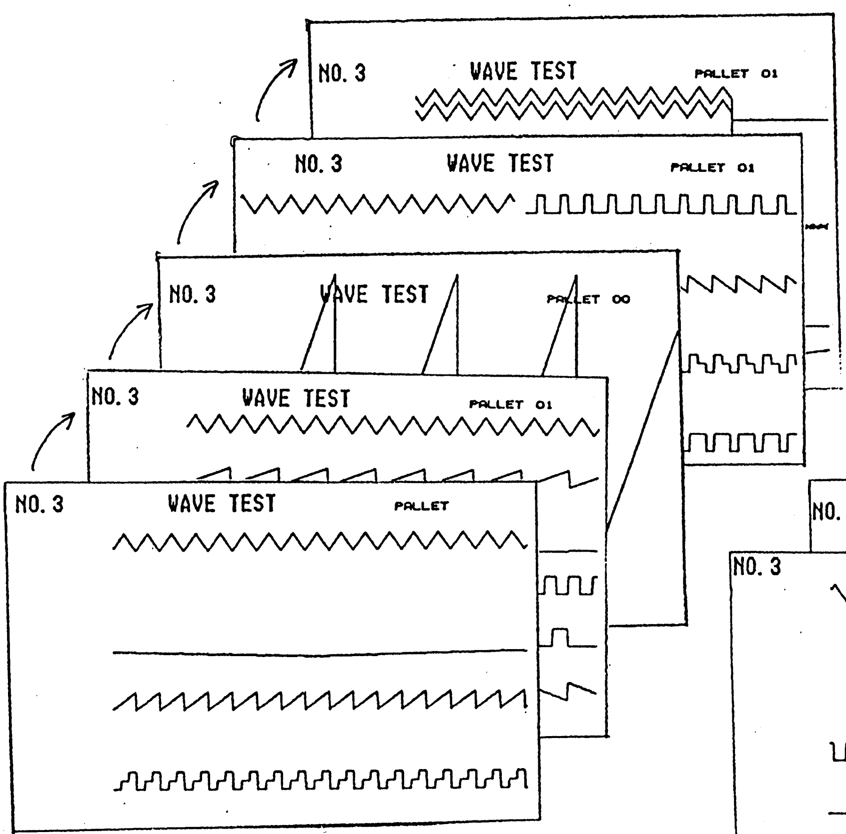
TEST .... Proceeds the screen to No.4 screen.

RECORD ...... Trace brightness on and off of each trace.

INTERBED .... At 4 trace mode; selection of 20 dots/mm or 10 dots/mm.
At 6 trace mode; trace brightness on/off of 2nd/3rd traces, and 5th/6th traces.

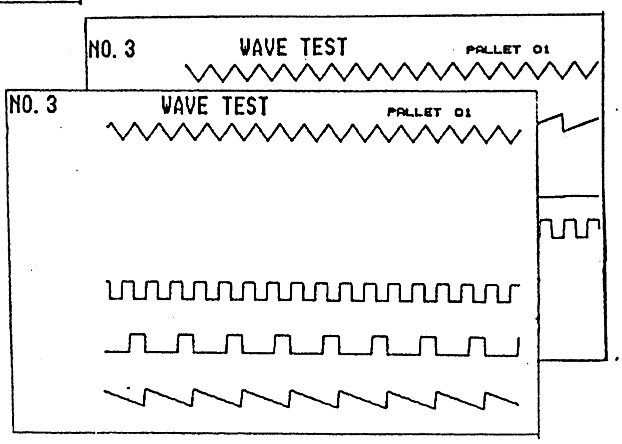
DISPLAY ..... Selection of 4 trace mode → 6 trace mode → full amplitude → 8 trace mode → A/D mode.

At 4 trace mode of wave test screen, display is done by switching palette.



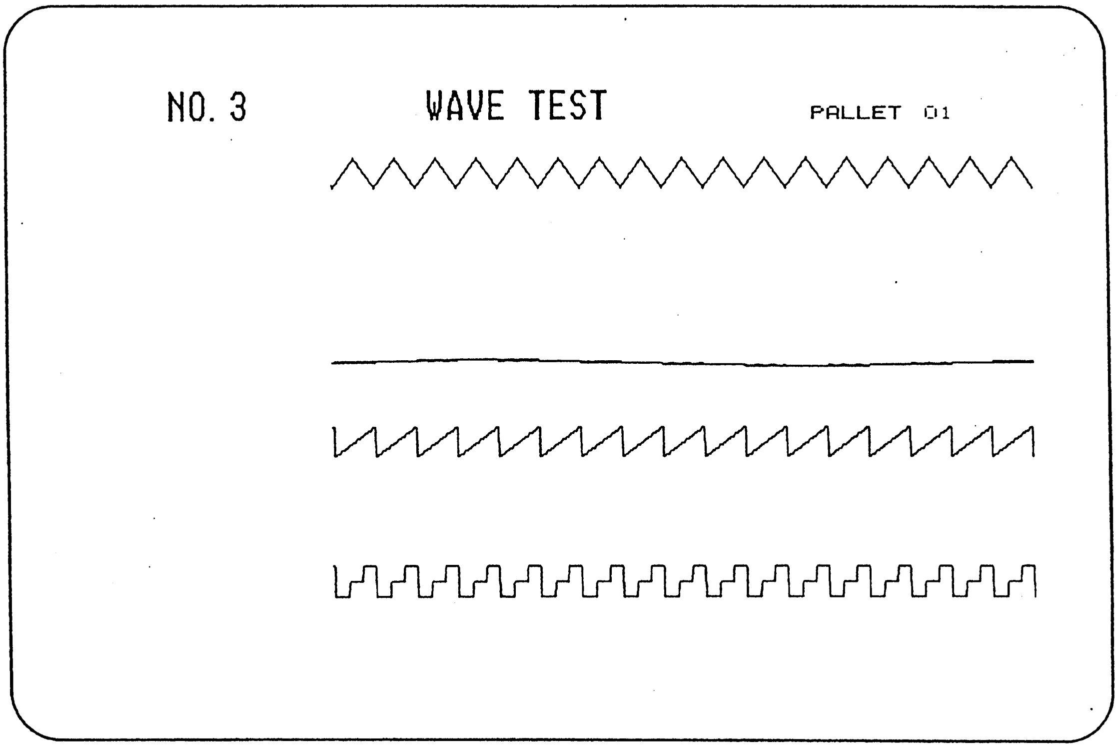
4 trace mode → 6 trace mode →
full amplitude → 8 trace mode → A/D mode

At 6 trace mode

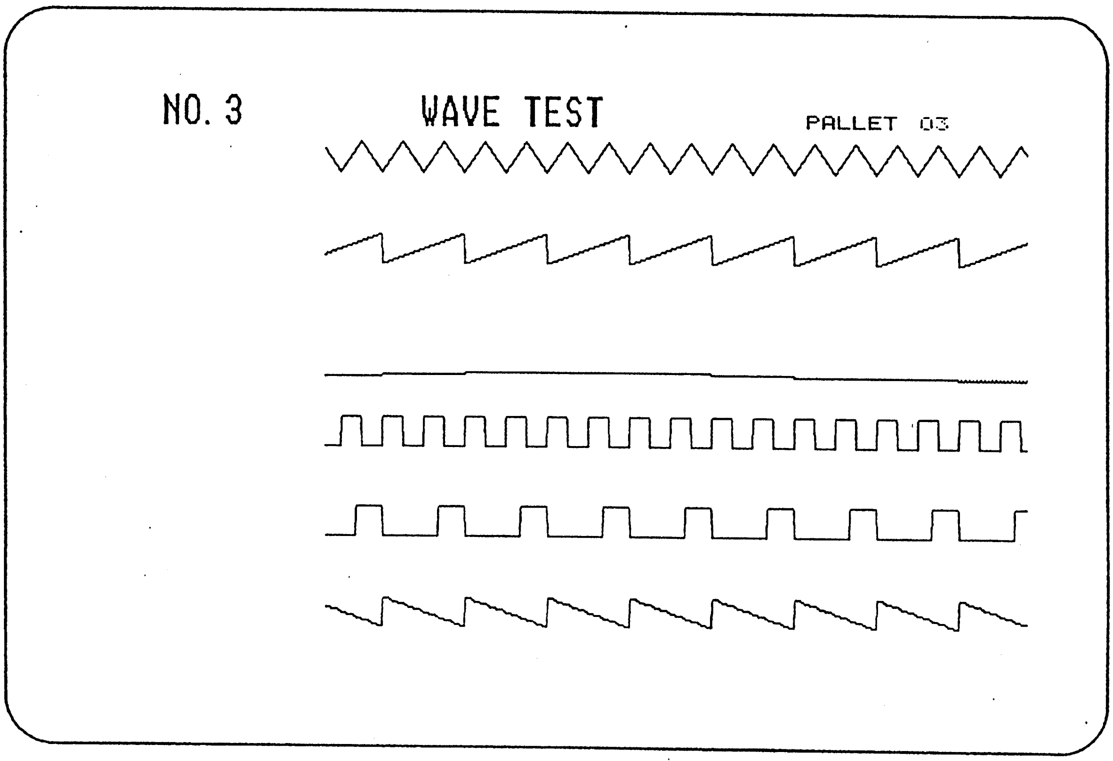


trace brightness on/off of
2nd/3rd traces, and 5th/6th traces

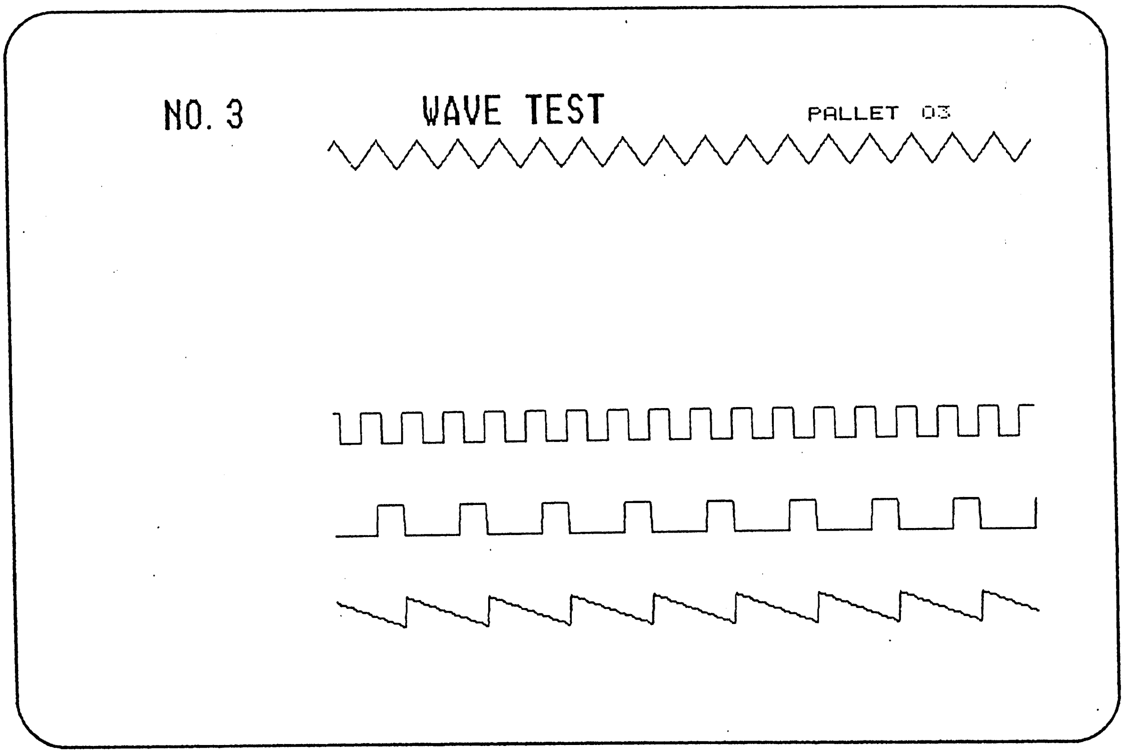
4 trace mode screen



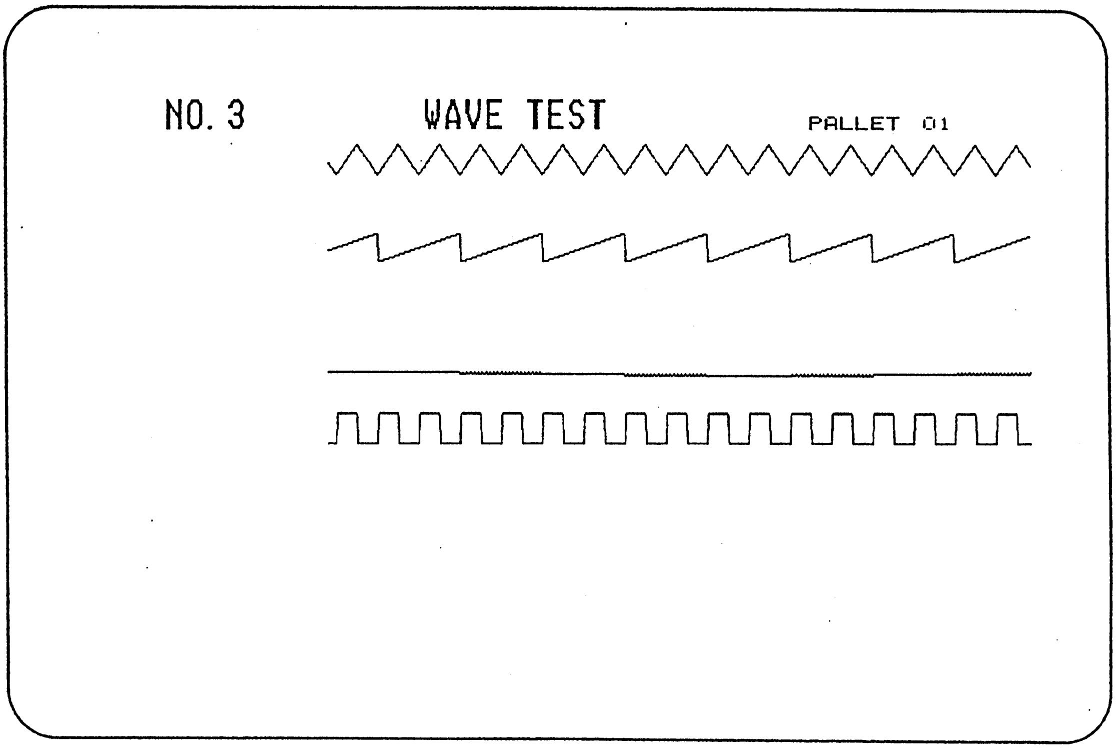
6 trace mode screen (base)



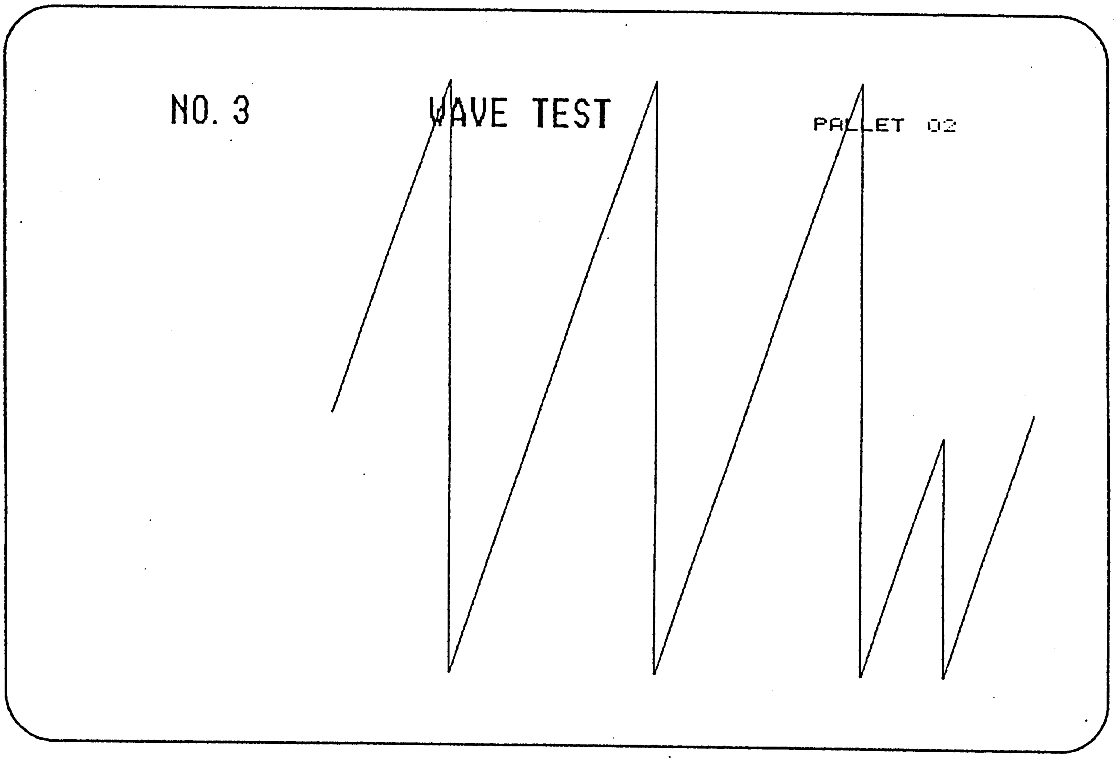
6 trace mode screen-1



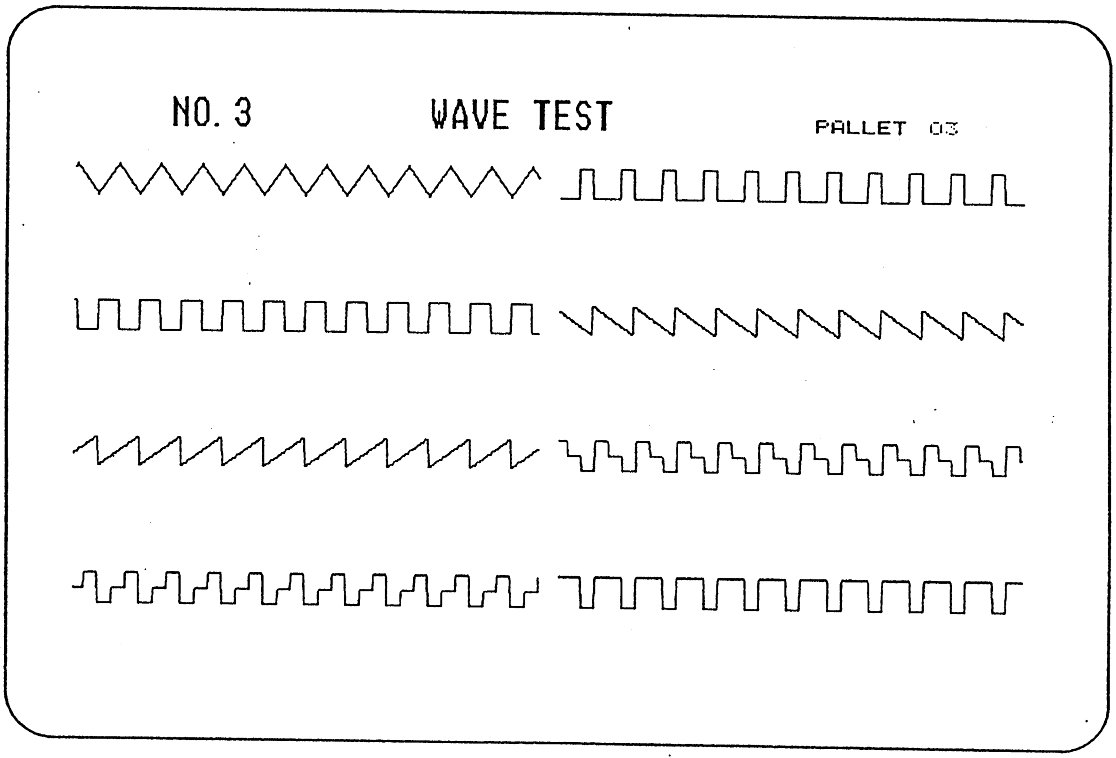
6 trace mode screen-2



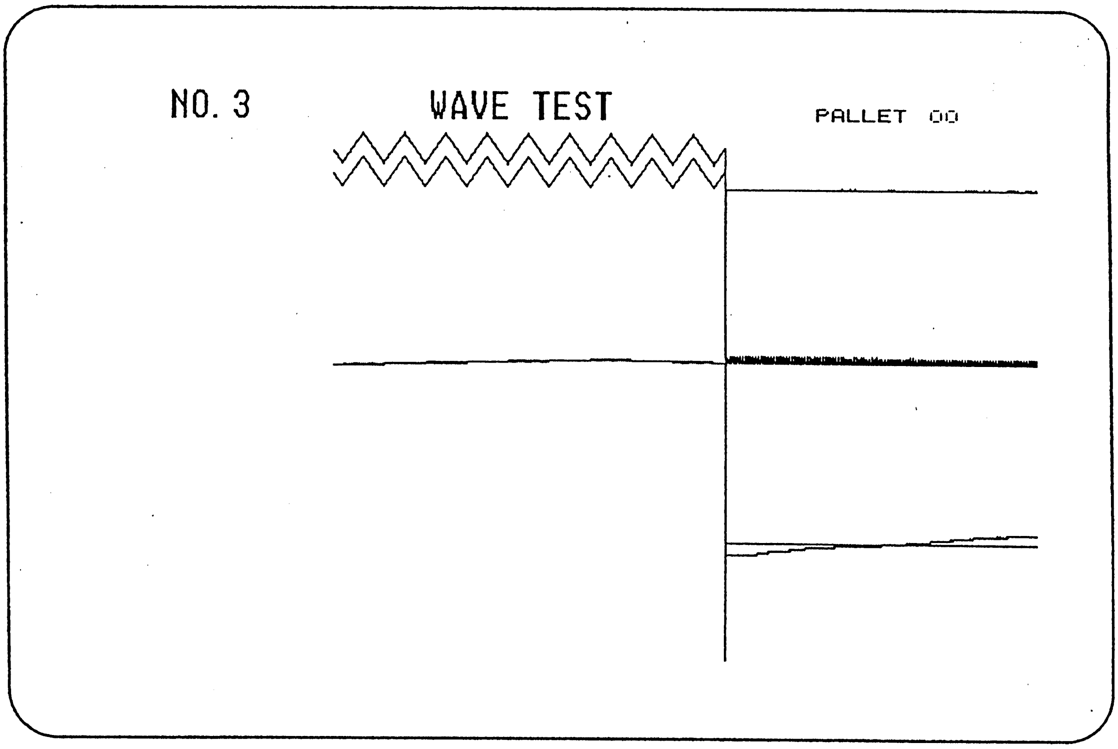
Full amplitude mode screen



8 trace mode screen

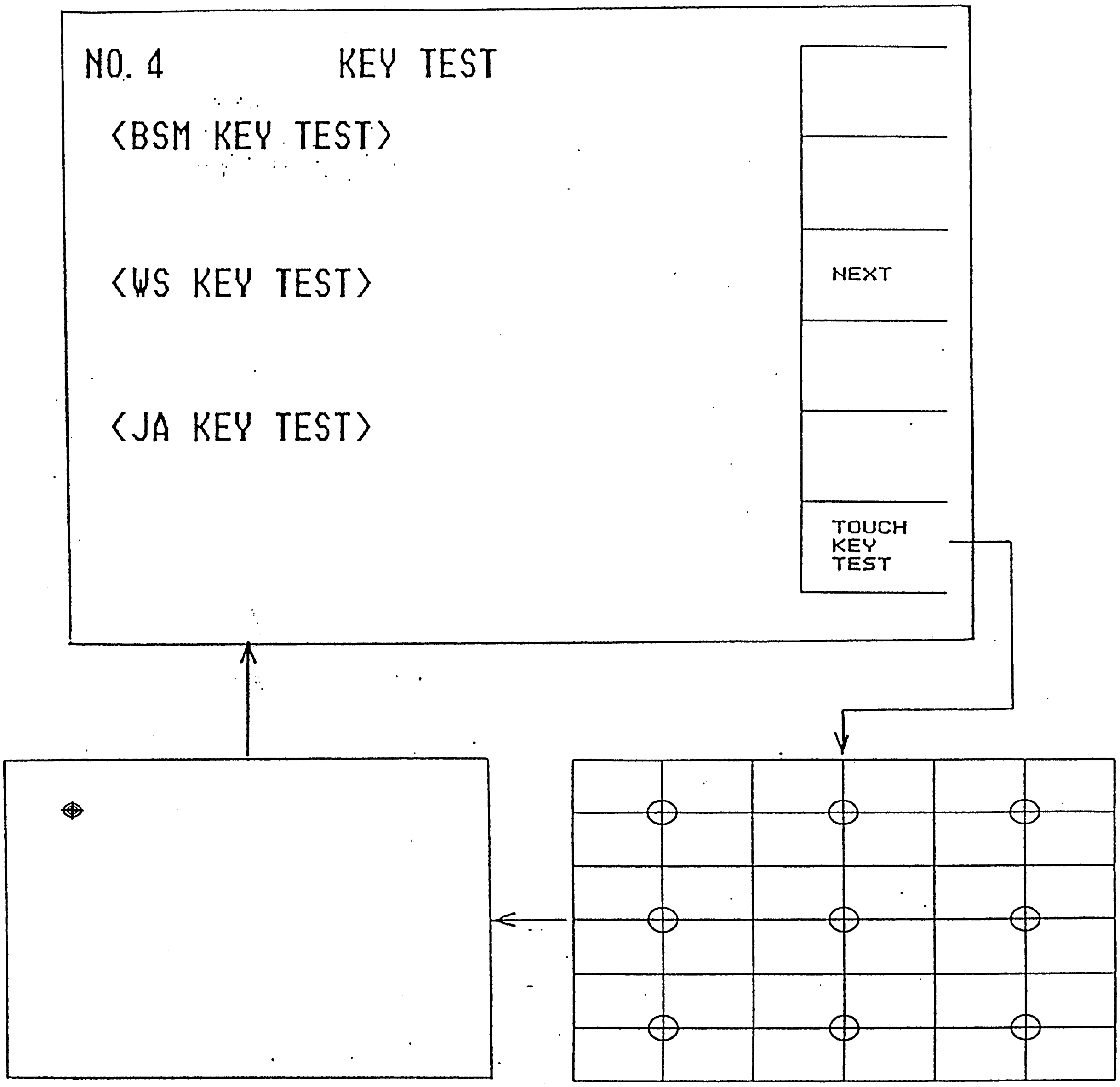


A/D mode screen



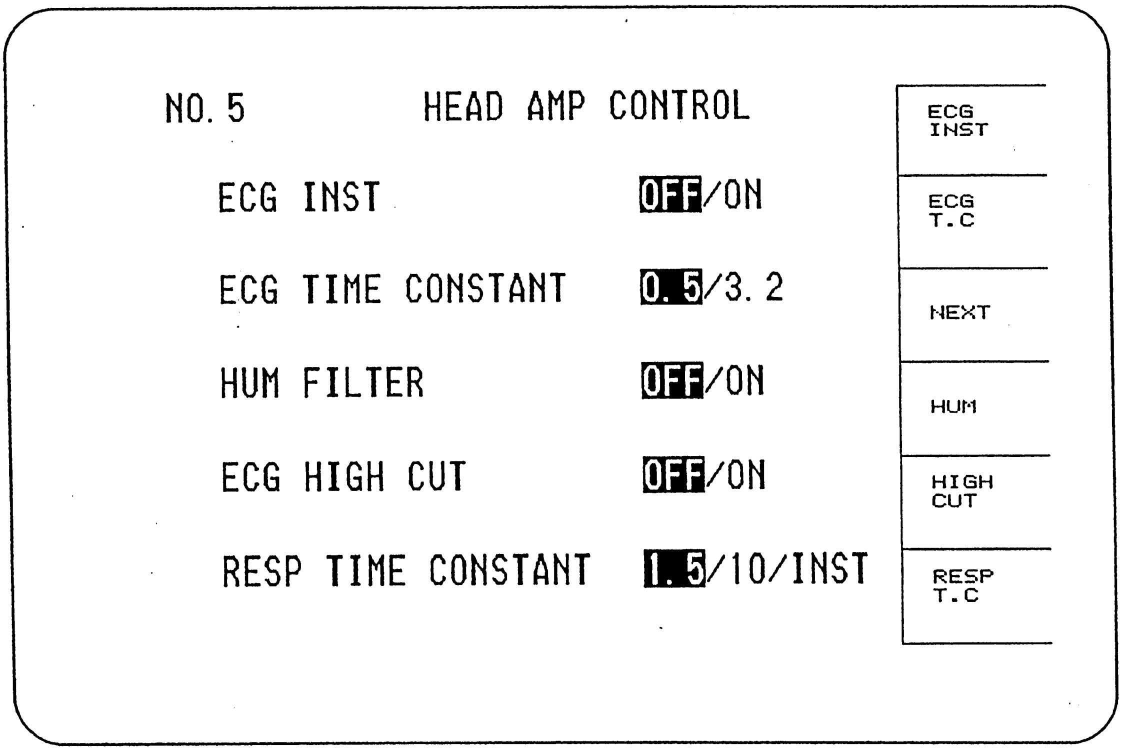
4) Key test screen (No.4)

This screen is to inspect key operation of the bedside monitor main unit, external recorder, extension input box. Screen displays the key name being pressed. Pressing the DISPLAY key calls up TOUCH-KEY TEST mode. Confirm that mark "⊕" is displayed behind the surface of the touch-key panel being pressed. If the mark does not coincide to the surface being pressed, press the DISPLAY key again to set the screen to TOUCH-KEY DATA SETUP mode. Press the surface of the touch-key panel where the mark "⊕" is displayd. After setting all points press the DISPLAY key again to return to the No.4 screen.



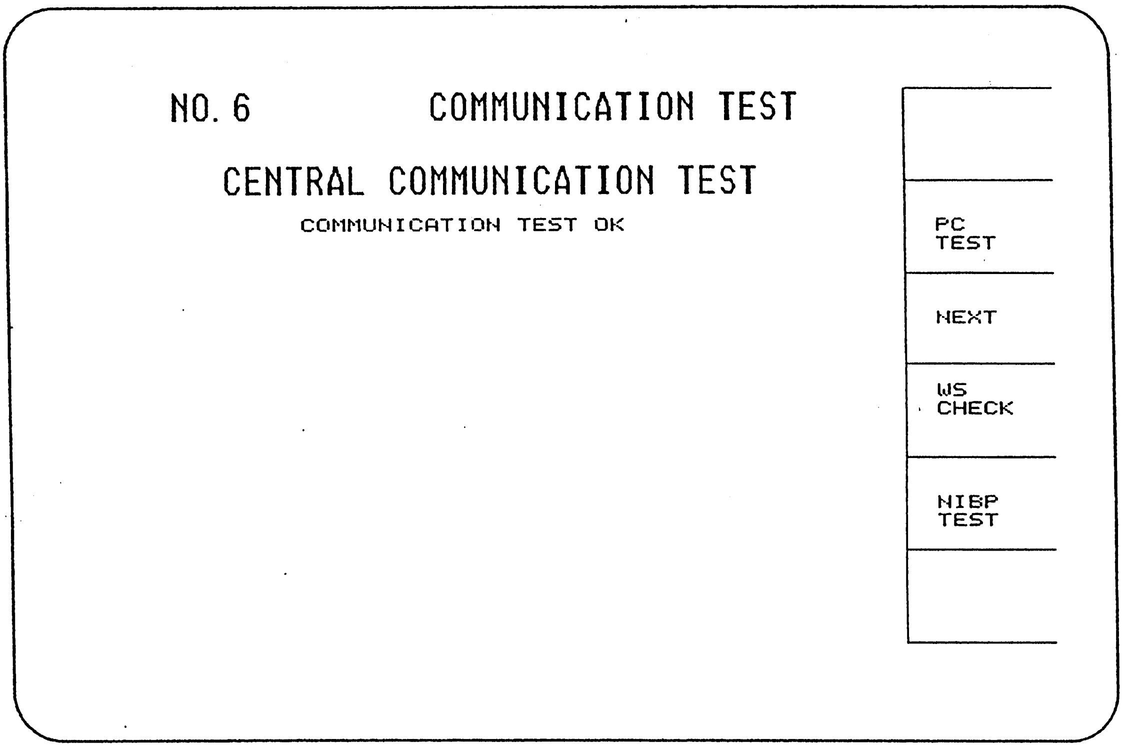
5) Head amplifier control screen (No.5)

By changing time constant and setting filter on or off, ECG/Respiration circuits are tested. Refer to pages for adjustment in details.



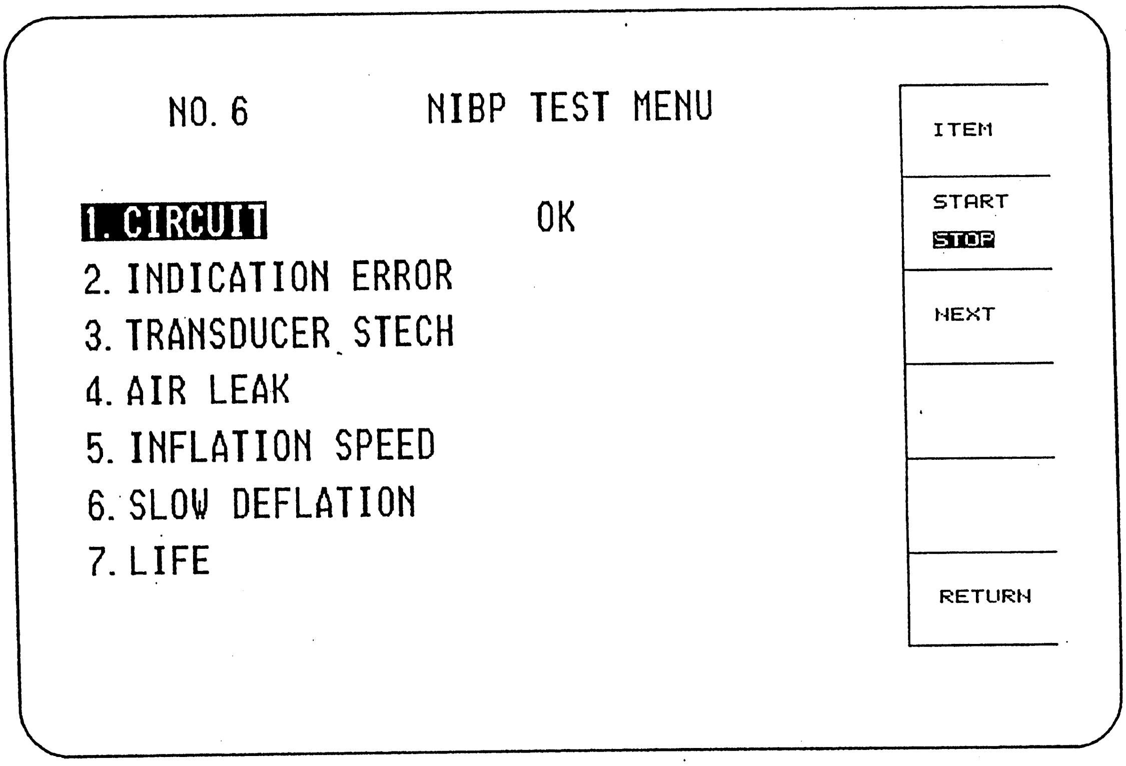
6) Communication test screen (No.6)

Communication between an external instrument is tested via the optional interface board. If there is no central monitor interface, "NO BAORD" is displayed. When central monitor including MU-820R central monitor main unit and JJ-810/820R signal exchanger) is connected, "COMMUNICATION TEST OK" appears in 3 to 5 seconds.



NIBP test

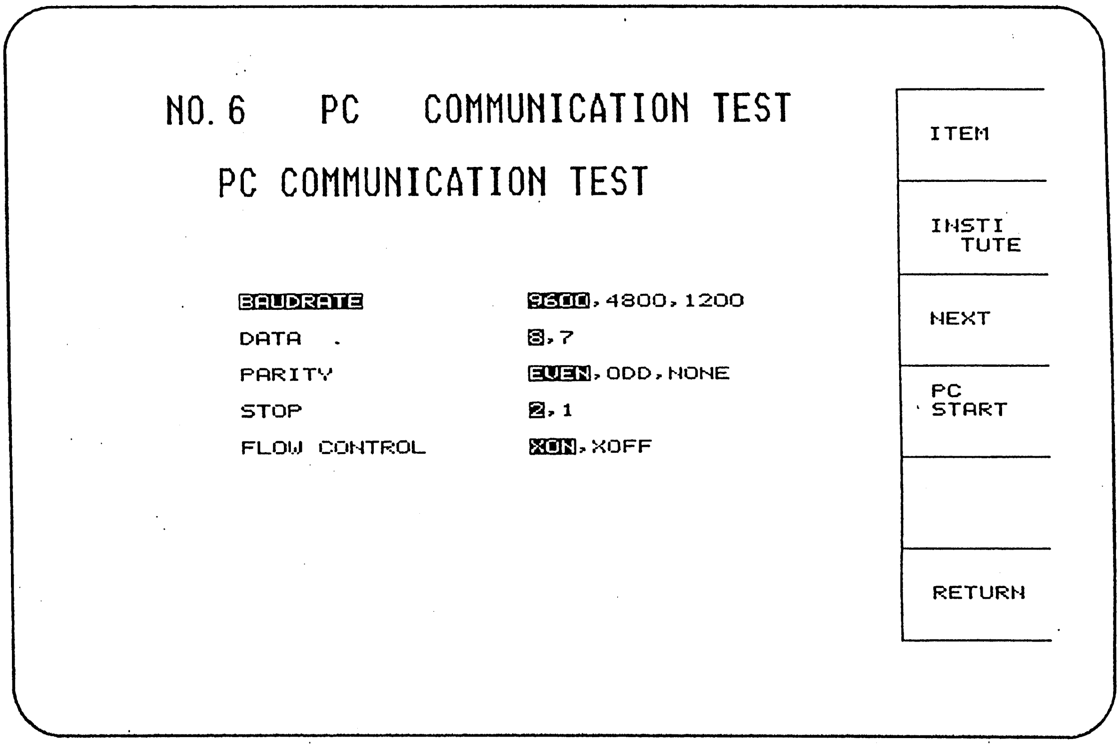
NIBP test screen is called up by pressing the INTERBED key. NIBP test is made between the built-in NIBP unit. NIBP test command is sent to the NIBP test for self test. If communiation is incorrect or the unit is not mounted (MU-832R), "NO MODULE" is displayed. If communication is correct, "OK" appears. Other test items require special jigs. Refer to pages for adjustment in details.



If the WSIF board (QI-812P) is mounted, the following tests are provided.

. PC communication test

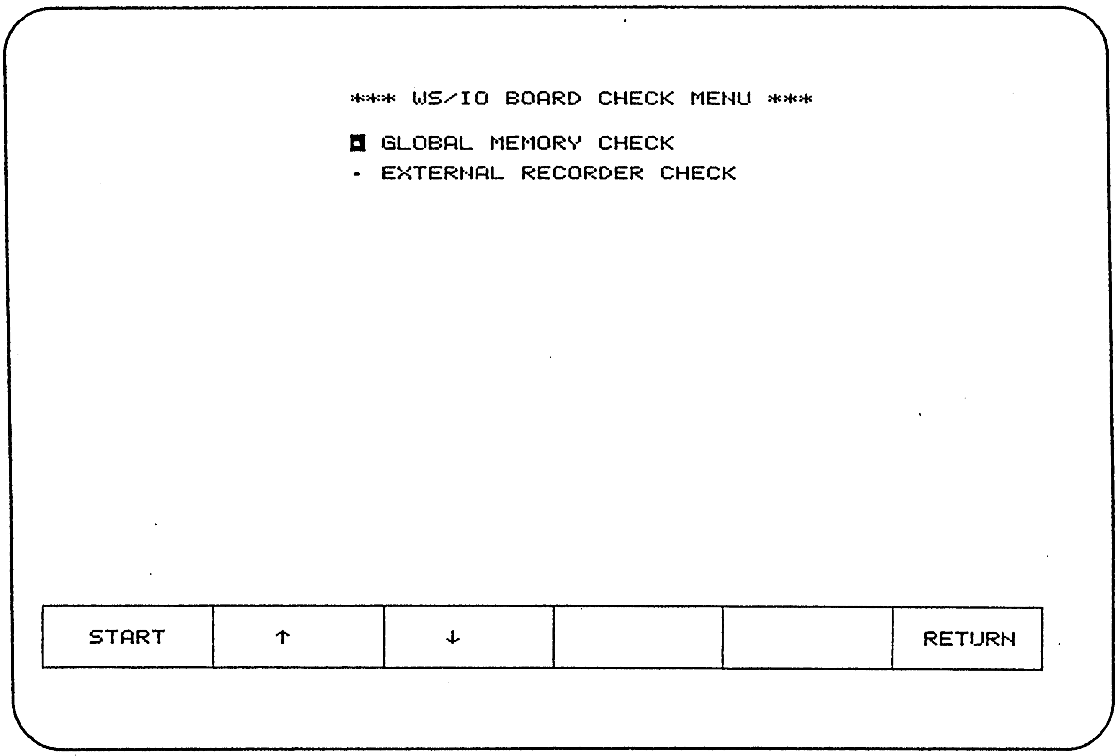
The FREEZE key is indicated with PC TEST and pressing it called up PC communication sub screen. This PC test is for RS-232C port. Special jigs are required for this PC test. Refer to pages for adjustment in details.

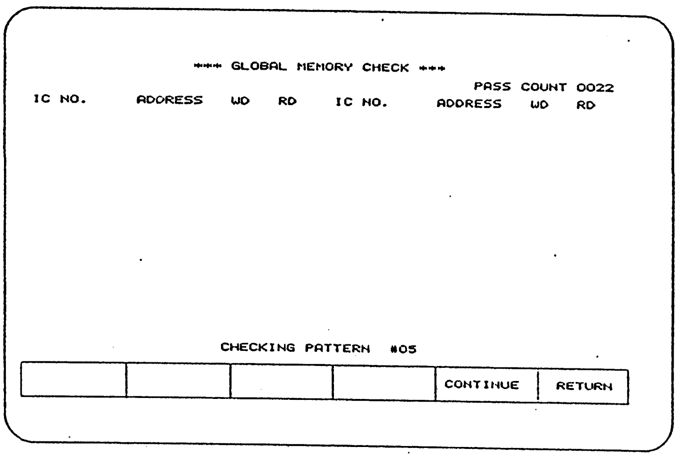


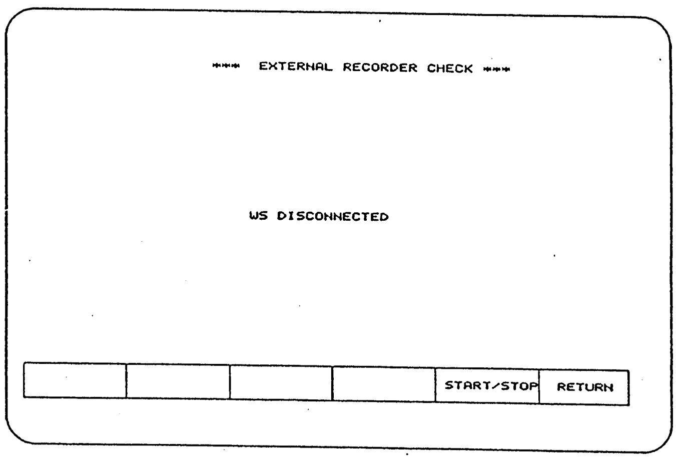
. WS test

The RECORD key is indicated with WS CHECK and pressing it calls up WS test sub screen. There are two test items. One is dual port memory (global memory) which for inpu/output between the recorder, and the other is actual communication with the recorder. Dual port memory check is done by Write/Read method. Actual communication between the recorder is done by sending record activation commands to the recorder. If the recorder is not connected, "WS CISCONNECTED" appears on the screen.

Press the RETURN key to return the screen mode to the No.6 screen.







7) Sound test screen (No.7)

This screen is for sound related tests.

Function of each key is as follows:

SUSPEND ..... Generates key touch click tone.

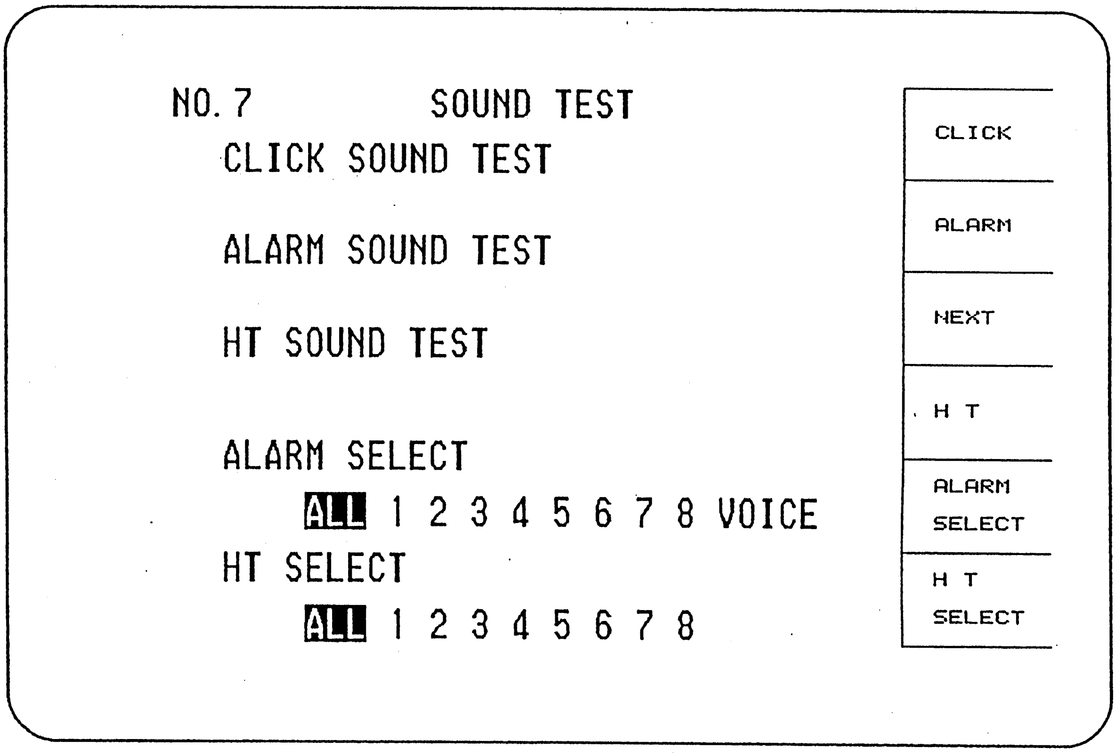
FREEZE ...... Generates alarm tone.

TEST .... Proceeds the screen to No.8 screen.

RECORD ...... Generates QRS sync. tone.

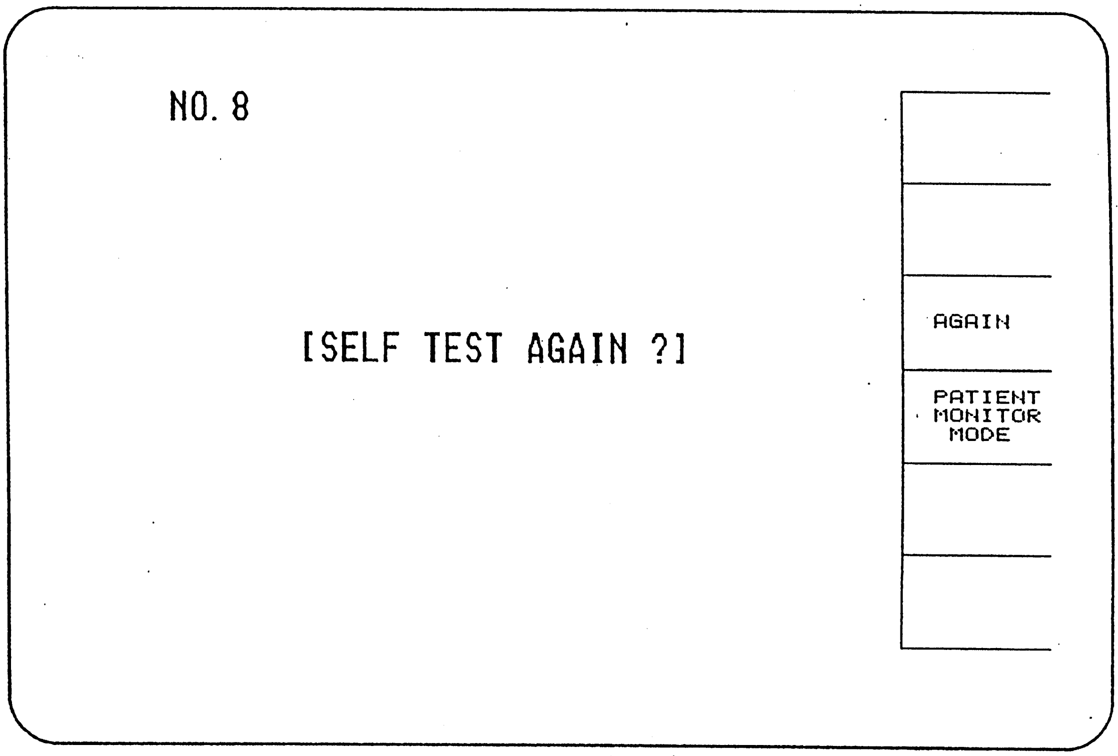
INTERBED .... Selects alarm tone (when ALL, all alarm tones are genereated successively).

DISPLAY ..... Selects QRS sync. tone (when ALL, all QRS sync. tones are generated successively).



8) Self test again? screen (No.8)

The last screen of the off-line self test. If the TEST key is pressed, screen returns to the No.1 screen and the self test can be repeated. On the No.1 screen returned from the No.8 screen, power-on test results are of the previously tested ones. If the TEST key is not pressed for several seconds or by pressing the RECORD key, the No.8 screen returns to the normal patient monitoring screen.



Section 3

3. Signal name

NOTE: Top of the component name is the supplier of the signal or power if two or more components are listed for one signal or power.

If two or more same signal names are listed, functions in each PC board are different.

Signals beginning with X mean that the signals function in "active low".

Signal	PC board	Model	Page	Description
+10VREF	MAIN	UP-0397	7/19	Reference voltage for AD/DA converter
+12CRT	CRTC	UP-0398	4/14	Power for CRT unit
	MAIN	UP-0397	19/19	- ditto -
+12SND	CRTC	UP-0398	14/14	Power for audio amplifier
+12VAD	MAIN	UP-0397	14/19	Power for AD/DA converter
+15	MAIN	UP-0397	7/19	Power for head amplifiers
+19	MAIN	UP-0397	7/19	Power for input box extension
+5V	MAIN	UP-0397	2/19	Power for digital devices
	CRTC	UP-0398	1/14	- ditto -
	PIO	UP-0401	1/4	- ditto -
	WSIF	UP-0402	1/3	- ditto -
+5VREF	MAIN	UP-0397	7/19	Reference voltage for head ampl. detection
+8V	MAIN	UP-0397	7/19	Power for analog devices
	PIO	UP-0401	1/4	- ditto -
-12VAD	CRTC	UP-0398	14/14	Power for NIBP data AD conversion
-12VAD	MAIN	UP-0397	14/19	Power for AD/DA conversion
-8V	MAIN	UP-0397	7/19	Power for analog devices
	PIO	UP-0401	1/4	- ditto -
125Hz	MAIN	UP-0397	7/19	Head ampl. detection control signal
12VPUMP	MAIN	UP-0397	19/19	Power for NIBP pump
19.2K	MAIN	UP-0397	1/19	NIBP unit communication sync. clock singal

Signal	PC board	Model	Page	Description
24M	CRTC	UP-0398	1/14	24.576MHz system clock
	MAIN	UP-0397	1/19	- ditto -
250Hz	MAIN	UP-0397	7/19	Head ampl. detection control signal
2CHECG	MAIN	UP-0397	7/19	2 channel ECGs mixed signal
2CLK	CRTC	UP-0398	2/14	ACRTC clock signal
384K	NAIM	UP-0397	1/19	AD control, audio circuit basic clock signal
3M	CRTC	UP-0398	7/14	ACW sync. clock signal
3M	MAIN	UP-0397	1/19	NIBP unit communication basic clock
3M	PIO	UP-0401	1/4	Clock for AD conversion
49M	CRTC	UP-0398	7/14	49.152Mz original system clock sigal
4KHz	MAIN	UP-0397	7/19	ECG signal separation control clock signal
64K	MAIN	UP-0397	7/19	Clock signal for head amplifiers
6M	PIO	UP-0401	1/4	Central communication basic clock signal
768K	MAIN	UP-0397	1/19	Input block control clock signal
8KHz	MAIN	UP-0397	7/19	ECG signal separation control clock signal
96K	MAIN	UP-0397	1/19	DA data output switch clock signal
A/XM	PIO	UP-0401	3/4	Central com. address/message switch control
A/XMR	PIO	UP-0401	3/4	Return line of A/XM signal
A0-A23	MAIN	UP-0397	1/19	Address bus
A00L-A10L	WSIF	UP-0402	3/3	WS address
A01-A18	ROM-P	UP-0520	2/2	Address bus (lower 18 bits)
A01-A23	MAIN	UP-0397	1/19	Address bus
AA0-AA7	CRTC	UP-0398	7/14	A group frame memory address
ADOFSET	MAIN	UP-0397	14/19	AD input offset
ALMSND	MAIN	UP-0397	16/19	Alarm sound
ALPL	PIO	UP-0401	2/4	Alarm pole control output
ALSNDST	MAIN	UP-0397	5/19	Alarm sound generation control signal
ALVOL	MAIN	UP-0397	17/19	Alarm sound signal
ASD0-ASD-3	CRTC	UP-0398	6/14	A group serial data
ATR	CRTC	UP-0398	7/14	Shift register latch timing signal
AUX1IN	PIO	UP-0401	3/4	Aux. input 1
AUX2IN	PIO	UP-0401	3/4	Aux. input 2
AUXW	WSIF	UP-0402	1/3	Aux. waveform output
AV	CRTC	UP-0398	9/14	A group video signal
AVO	CRTC	UP-0398	4/14	A group signal output
B	CRTC	UP-0398	4/14	Slave monitor "BLUE" output (digital)
B-BECG	WSIF	UP-0402	1/3	Interbed ECG waveform
B.V.	MAIN	UP-0397	11/19	Battery voltage monitor signal
BATT	MAIN	UP-0397	1/19	Battery voltage
BCONT	CRTC	UP-0398	1/14	CPU bus control signal
BLUE	CRTC	UP-0398	4/14	Slave monitor "BLUE" output (analog)
BSD0-BSD3	CRTC	UP-0398	6/14	B group serial data
BUC0	CRTC	UP-0398	5/14	Even word bus control
BUC1	CRTC	UP-0398	5/14	Odd word bus control
BV	CRTC	UP-0398	11/14	B group video signal

Signal	PC board	Model	Page	Description
BVO	CRTC	UP-0398	4/14	B group signal output
CAL	MAIN	UP-0397	10/19	ECG calibration voltage (15mV)
CAS	CRTC	UP-0398	7/14	Colomun address strobe signal (frame memory)
CLICK	MAIN	UP-0397	5/19	Key clock tone control signal
CLOCK	MAIN	UP-0397	5/19	Clock adjustment terminal
CONT1, 2	MAIN	UP-0397	7/19	Head amplifier control singals (spare)
CPUCLK	PIO	UP-0401	1/4	CPU clock signal
CPUCLK	CRTC	UP-0398	1/14	- ditto -
CPUCLK	MAIN	UP-0397	1/19	- ditto -
CPUCLK	WSIF	UP-0402	1/3	- ditto -
CV	MAIN	UP-0397	4/19	Capacitor voltage for RAM data backup
D00-D15	MAIN	UP-0397	1/19	Data bus
	ROM-P	UP-0520	2/2	- ditto -
DAS0-3	CRTC	UP-0398	6/14	Delayed A group serial data
DATIN	MAIN	UP-0397	8/19	DA conversion timing signal
DAV	CRTC	UP-0398	10/14	Delayed A group video signal
DAVO	CRTC	UP-0398	4/14	Delayed A group signal output
DBSD0-3	CRTC	UP-0398	4/14	Delayed B group serial data
DBV	CRTC	UP-0398	12/14	Delayed B group video signal
DBVO	CRTC	UP-0398	4/14	Delayed B group signal output
DGD0-DGD15	CRTC	UP-0398	6/14	Delayed waveform data
DOTCLK	CRTC	UP-0398	8/14	Dot clock
DOTCLK0	CRTC	UP-0398	8/14	Dot clock
DOTCLK1	CRTC	UP-0398	8/14	Dot clock
DSLD	CRTC	UP-0398	6/14	Waveform data conversion start signal (delay)
DSP1	CRTC	UP-0398	8/14	Drawing timing signal
DSP1G	CRTC	UP-0398	6/14	Drawing timing signal output
DT/OE	CRTC	UP-0398	7/14	Data/Output enable signal (frame memory)
E1	MAIN	UP-0397	7/19	Analog ground
	PIO	UP-0401	2/4	- ditto -
E2	PIO	UP-0401	2/4	Digital ground
E3	MAIN	UP-0397	7/19	+19V ground
ECG1	MAIN	UP-0397	7/19	ECG1 waveform (15mV/mV)
ECG2	MAIN	UP-0397	7/19	ECG2 waveform (15mV/mV)
ECRT	MAIN	UP-0397	19/19	CRT unit ground
ECRT	CRTC	UP-0398	4/14	- ditto -
EH	MAIN	UP-0397	7/19	Head amplifier ground
EHC	MAIN	UP-0397	7/19	ECG head amplifier analog ground
EP	MAIN	UP-0397	7/19	Head amplifier digital ground
ER	MAIN	UP-0397	7/19	Respiration signal analog ground
ER	RESP	UP-0519	1/1	- ditto -
ESND	MAIN	UP-0397	16/19	Sound signal ground
	CRTC	UP-0398	14/14	- ditto -
EXTVIDEO	CRTC	UP-0398	4/14	External video output
EXTIN	PIO	UP-0401	3/4	External input signal

Signal	PC board	Model	Page	Description
EXVID	MAIN	UP-0397	5/19	External video switch signal
	CRTC	UP-0398	1/14	- ditto -
FA0-FA7	CRTC	UP-0398	7/14	Graphic frame memory address
FCLK	MAIN	UP-0397	7/19	Clock signal for floating input
FD0-FD31	CRTC	UP-0398	2/14	Graphic frame memory data
G	CRTC	UP-0398	4/14	Slave monitor "GREEN" output (analog)
GA01-GA16	CRTC	UP-0398	1/14	Waveform memory address bus
GUA0-GUA7	CRTC	UP-0398	6/14	Upper screen address
GLA0-GLA7	CRTC	UP-0398	6/14	Lower screen address
GD0-GD15	CRTC	UP-0398	6/14	Wavefrom memory data bus
GND	CRTC	UP-0398	4/14	External input/output ground
GREEN	CRTC	UP-0398	4/14	Slave monitor "GREEN" output (digital)
HA/XJA	MAIN	UP-0397	8/19	Head amplifier-Input box select control
HARST	MAIN	UP-0397	7/19	Reset output for head amlifiers
HI-CUT	MAIN	UP-0397	10/19	High cut filter control signal
HTSND	MAIN	UP-0397	16/19	Heart beat sync. tone source
HTSNDSL0	MAIN	UP-0397	5/19	Heart beat sync. tone selection singal-0
HTSNDSL1	MAIN	UP-0397	5/19	Heart beat sync. tone selection singal-1
HTSNDSL2	MAIN	UP-0397	5/19	Heart beat sync. tone selection singal-2
HTSNDST	MAIN	UP-0397	5/19	Heart beat sync. tone generation control
HTVOL	MAIN	UP-0397	17/19	Heart beat sync. tone singal
HUM	MAIN	UP-0397	11/19	Hum (AC) filter control signal
HW(AD)1	MAIN	UP-0397	10/19	CH1 ECG waveform for AD input (peak-hold)
HW(AD)2	MAIN	UP-0397	10/19	CH2 ECG waveform for AD input (peak-hold)
HW	PIO	UP-0401	3/4	Real time ECG waveform
HW1	MAIN	UP-0397	9/19	ECG2 waveform (1V/mV)
HW1	WSIF	UP-0402	1/3	Real tiem ECG1 output (1V/mV)
HW2	MAIN	UP-0397	9/19	ECG2 waveform (1V/mV)
HW2	WSIF	UP-0402	1/3	Real tiem ECG2 output (1V/mV)
HWOUT	MAIN	UP-0397	10/19	ECG output
W	CRTC	UP-0398	4/14	Slave monitor "WHITE" output (digital)
IBECG	PIO	UP-0401	2/4	Interbed ECG waveform
IBHW	MAIN	UP-0397	11/19	Interbed ECG waveform AD input
IMP	RESP	UP-0519	1/1	Impedance method respiration pickup signal
INST1	MAIN	UP-0397	11/19	ECG1 INST (instantaneous stop) control signal
INST2	MAIN	UP-0397	11/19	ECG2 INST (instantaneous stop) control signal
INT	WSIF	UP-0402	3/3	WS communication interrupt request signal
INTENS	MAIN	UP-0397	19/19	Screen intensity (brightness) control signal
	CRTC	UP-0398	1/14	- ditto -
IO0-IO7	WSIF	UP-0402	2/3	WS communication data 0-7
JACLK	MAIN	UP-0397	7/19	Head ampl. input/output signal reference clock
JACONT	MAIN	UP-0397	7/19	Head ampl. control signal
JASTS	MAIN	UP-0397	7/19	Head ampl. status input

Signal	PC board	Model	Page	Description
KEYO-KEY6	MAIN	UP-0397	5/19	Key input 0-6
LCK	CRTC	UP-0398	6/14	Inter gate array control signal
LCW.0, 1	CRTC	UP-0398	8/14	Shift register load signal 0 and 1
MO-M7	CRTC	UP-0398	2/14	ACRTC local bus
MDW	PIO	UP-0401	3/4	Delayed ECG waveform
	WSIF	UP-0402	1/3	- ditto -
OUT1, OUT2	MAIN	UP-0397	8/19	Head ampl. control signal (spare)
P1W	PIO	UP-0401	3/4	BP1 waveform output
	WSIF	UP-0402	1/3	- ditto -
P2W	PIO	UP-0401	3/4	BP2 waveform output
	WSIF	UP-0402	1/3	- ditto -
PAR1	MAIN	UP-0397	7/19	Resp. head ampl. detection signal
PAR2	MAIN	UP-0397	7/19	2nd slot head ampl. detection signal
PAR3	MAIN	UP-0397	7/19	3rd slot head ampl. detection signal
PAR4	MAIN	UP-0397	7/19	4th slot head ampl. detection signal
PARA	MAIN	UP-0397	7/19	Head ampl. detection signal mixed output
PARA	RESP	UP-0519	1/1	Resp. head ampl. detection signal
PHRST	MAIN	UP-0397	10/19	Peak-hold reset control signal
PUMP+	CRTC	UP-0398	14/14	NIBP pump power (+)
PUMP-	CRTC	UP-0398	14/14	NIBP pump power (-)
PWDWN	MAIN	UP-0397	1/19	Power down signal
R	CRTC	UP-0398	4/14	Slave monitor "RED" output (analog)
R/XB	MAIN	UP-0397	5/19	EEPROM write ready/busy signal
R/XW	MAIN	UP-0397	1/19	Read/Write control signal
	CRTC	UP-0398	1/14	- ditto -
	PIO	UP-0401	1/4	- ditto -
	WSIF	UP-0402	1/3	- ditto -
	ROM-P	UP-0520	1/2	- ditto -
RAS	CRTC	UP-0398	7/14	Row address strobe signal (frame memory)
RCLK	MAIN	UP-0397	7/19	Respiration signal control reference clock
RCLK	RESP	UP-0519	1/1	Respiration signal detection clock
RDA, RDB	MAIN	UP-0397	9/19	Head ampl. status read signal A and B
RED	CRTC	UP-0398	4/14	Slave monitor "RED" output (digital)
RESP	RESP	UP-0519	1/1	Respiration waveform signal
	MAIN	UP-0397	7/19	Respiration waveform output
RSP(HA)	MAIN	UP-0397	7/19	Respiration waveform input when input box is not used
RSP(JA)	MAIN	UP-0397	7/19	Respiration waveform input from input box
RSPINST	MAIN	UP-0397	7/19	Respiration signal INST control signal
RSPTC	MAIN	UP-0397	11/19	Respiration waveform time constant control
RST	MAIN	UP-0397	1/19	Reset signal
RW	PIO	UP-0401	3/4	Respiration waveform output

Signal	PC board	Model	Page	Description
RW	WSIF	UP-0402	1/3	Respiration waveform output
RXD	CRTC	UP-0398	14/14	NIBP data read signal (NIBP to MAIN board)
SAS	CRTC	UP-0398	6/14	Frame memory serial shift signal
SAS0, SAS1	CRTC	UP-0398	8/14	- ditto -
SCLK	CRTC	UP-0398	6/14	Waveform serial conversion clock signal (wave to dot format)
SIGNAL	PIO	UP-0401	3/4	Central communication data
SIGNALR	PIO	UP-0401	3/4	Return line of SIGNAL
SLEEP	CRTC	UP-0398	1/14	Sleep mode screen control signal
SND	MAIN	UP-0397	5/19	Sound signal output
	CRTC	UP-0398	14/14	- ditto -
SPKR+	CRTC	UP-0398	14/14	Speaker output signal (+)
SPKR-	CRTC	UP-0398	14/14	Speaker output signal (-)
SYNC	MAIN	UP-0397	7/19	Head ampl. control sync. signal
TC	MAIN	UP-0397	11/19	ECG time constant control signal
TEST	MAIN	UP-0397	10/19	Calibration voltage
TKDT	MAIN	UP-0397	5/19	Touch key on detection signal
TKYX	MAIN	UP-0397	14/19	Touch key X-axis output voltage
TKYY	MAIN	UP-0397	14/19	Touch key Y-axis output voltage
TPCLOCK	MAIN	UP-0397	5/19	Clock IC adjustment Test Point
TX+	MAIN	UP-0397	18/19	Touch key exciter voltage, X-axis (+)
TX-	MAIN	UP-0397	18/19	touch key exciter voltage, X-axis (-)
TXD	CRTC	UP-0398	14/14	NIBP data read signal (MAIN board to NIBP)
TY+	MAIN	UP-0397	18/19	Touch key exciter voltage, Y-axis (+)
TY-	MAIN	UP-0397	18/19	Touch key exciter voltage, Y-axis (-)
U1W	MAIN	UP-0397	5/19	2nd slot head ampl. input signal
U1WAD	MAIN	UP-0397	11/19	2nd slot head ampl. waveform AD input
U2W	MAIN	UP-0397	5/19	3rd slot head ampl. input signal
U2WAD	MAIN	UP-0397	11/19	3rd slot head ampl. waveform AD input
U3W	MAIN	UP-0397	5/19	4th slot head ampl. input signal
U3WAD	MAIN	UP-0397	11/19	4th slot head ampl. waveform AD input
VA	CRTC	UP-0398	2/14	Graphic "A" video output
VC	CRTC	UP-0398	2/14	Graphic "C" video output
VCAP	MAIN	UP-0397	2/19	Backup capacitor voltage
VIDEO	CRTC	UP-0398	4/14	Video signal output
VMM	MAIN	UP-0397	1/19	Backup battery voltage
X/XY	MAIN	UP-0397	14/19	Touch key X-axis/Y-axis select control signal
X24M	CRTC	UP-0398	7/14	24MHz clock inverted signal
XRTCINT	MAIN	UP-0397	1/19	Periodic interrupt sigal
XACRTCINT	MAIN	UP-0397	1/19	Graphic drawing data transfer sync. interrupt
XACRTSL	CRTC	UP-0398	1/14	ACRTC select signal
XADINT	MAIN	UP-0397	1/19	AD conversion interrupt
XADP	MAIN	UP-0397	5/19	Input box adaptor detection signal
XADRD	MAIN	UP-0397	2/19	AD conversion data read select signal

Signal	PC board	Model	Page	Description
XADSEL	MAIN	UP-0397	2/19	AD conversion control select/IO select signal
XAE	PIO	UP-0401	3/4	System (machine) alarm signal
XAL	PIO	UP-0401	3/4	Alarm signal output
XAS	MAIN	UP-0397	1/19	Address strobe signal
	CRTC	UP-0398	1/14	- ditto -
	PIO	UP-0401	1/4	- ditto -
	WSIF	UP-0402	1/3	- ditto -
XBG	MAIN	UP-0397	1/19	Bus master switch acknowledge singal
XBGACK	MAIN	UP-0397	1/19	Bus master switch acknoledge confirmation signal
XBPRST	MAIN	UP-0397	5/19	NIBP reset ooutput
	CRTC	UP-0398	14/14	- ditto -
XBR	MAIN	UP-0397	1/19	Bus master request signal
XBUSY	WSIF	UP-0402	1/3	Dual port RAM accessing indication signal
XCAS	CRTC	UP-0398	2/14	Graphic memory column address strobe signal
XCLGSL	WSIF	UP-0402	1/3	Select signal for baud rate generator
XCOMW	WSIF	UP-0402	3/3	WS memory write control input
XCS0	CRTC	UP-0398	5/14	Wavefrom memory chip select signal
XCS1	CRTC	UP-0398	5/14	Waveform memory chip select signal (delayed)
XCS2	CRTC	UP-0398	5/14	Inter gate array control signal
XCSAD	PIO	UP-0401	1/4	AD converter chip select signal
XCSCOM	PIO	UP-0401	1/4	Central communication control chip select signal
XCSIOA	PIO	UP-0401	1/4	Spare input/output A chip select signal
XCSIOB	PIO	UP-0401	1/4	Spare input/output B chip select signal
XCSJ	CRTC	UP-0398	6/14	Inter gate array control signal
XCTS	CRTC	UP-0398	14/14	NIBP reception end signal (NIBP to MAIN board)
	MAIN	UP-0397	5/19	- ditto -
XDADATA	MAIN	UP-0397	2/19	DA converted data output select signal
XDAT	CRTC	UP-0398	6/14	Inter gate array control signal
XDCHG	MAIN	UP-0397	11/19	RAM backup capacitor voltage drop signal
XDISP	CRTC	UP-0398	2/14	Graphic display timing signal
XDMAINT	MAIN	UP-0397	1/19	Waveform display data transfer sync. interrupt
XDTACK	MAIN	UP-0397	1/19	Data transfer acknowledge signal
	PIO	UP-0401	1/4	- ditto -
XDTACK	CRTC	UP-0398	1/14	ACRTC data transfer acknowledge signal
XE2PSL	MAIN	UP-0397	2/19	EEPROM chip select signal
XEBUS	MAIN	UP-0397	2/19	External PC board access sigal
XEINTA	MAIN	UP-0397	2/19	External interrupt acknowledge signal
XEXSYNC	CRTC	UP-0398	2/14	Frame sync. signal
XEXTINT	MAIN	UP-0397	1/19	Optional interrupt (WS com., PC com.)
XXFLSYNC	CRTC	UP-0398	4/14	Frame sync. signal
XFULL	CRTC	UP-0398	4/14	Full intensity (brightness) signal (digital)

Signal	PC board	Model	Page	Description
XGDTACK	CRTC	UP-0398	1/14	Waveform data transfer acknowledge signal
XGIRQ	CRTC	UP-0398	1/14	Graphic display data transfer interrupt request signal
	MAIN	UP-0397	7/19	- ditto -
XGRAMSL	CRTC	UP-0398	1/14	Waveform memory select signal
XHALF	CRTC	UP-0398	4/14	Half intensity signal (digital)
XHARST	MAIN	UP-0397	5/19	Head ampl. reset signal
XHO	PIO	UP-0401	3/4	ECG measure signal
XHS	PIO	UP-0401	3/4	Hand shake signal
XHSR	PIO	UP-0401	3/4	Return line of XHS
XHSYNC	CRTC	UP-0398	4/14	Horizontal sync. signal
XHSYNC2D	CRTC	UP-0398	2/14	Horizontal sync. signal (deleyed)
XHSYNCD	CRTC	UP-0398	2/14	Horizontal sync. signal (deleyed)
XHT	PIO	UP-0401	2/4	Heart beat sync. output signal
XIBSEL	PIO	UP-0401	2/4	Interbed ECG select signal
XIN	WSIF	UP-0402	1/3	Input port select signal
XINTA	MAIN	UP-0397	1/19	Inrerrupt acknowledge signal
XINTA	ROM-P	UP-0520	1/2	- ditto -
XINTR	PIO	UP-0401	3/4	Interrupt request (to central monitor)
XINTRR	PIO	UP-0401	3/4	Return line of XINTR
XIORST	PIO	UP-0401	1/4	System reset for optional PC board
XIPL0,1,2	MAIN	UP-0387	1/19	Interrupt priority level signals
XIRQ	CRTC	UP-0398	1/14	Interrupt request for waveform data transfer
	MAIN	UP-0397	7/19	- ditto -
XJACONT	MAIN	UP-0397	2/19	Head ampl./Input box selct switch control
XLRAS	CRTC	UP-0398	7/14	Lower screen lower address strobe signal (frame memory)
XLDS	MAIN	UP-0397	1/19	Lower byte data strobe signal
	CRTC	UP-0398	1/14	- ditto -
	WSIF	UP-0402	1/3	- ditto -
	ROM-P	UP-0520	1/2	- ditto -
XLME/WE	CRTC	UP-0398	7/14	Lower screen mode set/Write enable signal (frame memory)
XLTR/OE	CRTC	UP-0398	7/14	Lower screen transfer/Output enable signal (frame memory)
XMDO	CRTC	UP-0398	6/14	Inter gate array control signal
XMDC	CRTC	UP-0398	6/14	Inter gate array control signal
XMEMR	WSIF	UP-0402	3/3	WS memory read control input
XNIBPSL	MAIN	UP-0397	2/19	NIBP communication control select signal
XOE	CRTC	UP-0398	2/14	Graphic memory output enable signal
XOEH	CRTC	UP-0398	5/14	Upper byte bus output enable signal
XOEL	CRTC	UP-0398	5/14	Lower byte bus output enable signal
XOGPINT	MAIN	UP-0397	1/19	Interrupt for central communciation

Signal	PC board	Model	Page	Description
XOUT	WSIF	UP-0402	1/3	Output port select signal
XPCINT	WSIF	UP-0402	1/3	Interrupt for PC (Personal Computer) com.
XPCSL	WSIF	UP-0402	1/3	PC communication control select signal
XPDWN	MAIN	UP-0397	1/19	Power down detection signal
XRAMOSL	MAIN	UP-0397	2/19	RAM 0 select signal
XRAM1SL	MAIN	UP-0397	2/19	RAM 1 select signal
XRAM2SL	MAIN	UP-0397	2/19	RAM 2 select signal
XRAM3SL	MAIN	UP-0397	2/19	RAM 3 select signal
XRAMC	WSIF	UP-0402	3/3	WS memory slect signal
XRAS	CRTC	UP-0398	2/14	Graphic memory lower address strobe signal
XRD	PIO	UP-0401	1/4	Read control signal
XRD	WSIF	UP-0402	1/3	- ditto -
XRD	ROM-P	UP-0520	2/2	- ditto -
XRDA	MAIN	UP-0397	2/19	Head ampl. status write port A select singal (leads off, etc)
XRDB	MAIN	UP-0397	2/19	Head ampl. status write port B select singal
XRDIO	MAIN	UP-0397	2/19	Low speed memory (IO) read control signal
XRDL	MAIN	UP-0397	2/19	Lower byte read control signal
	ROM-P	UP-0520	1/2	- ditto -
XRDU	MAIN	UP-0397	2/19	Upper byte read control signal
	ROM-P	UP-0520	1/2	- ditto -
XROMOSL	ROM-P	UP-0520	2/2	ROM 0 select signal
XROM1SL	ROM-P	UP-0520	2/2	ROM 1 select signal
XROM2SL	ROM-P	UP-0520	2/2	ROM 2 select signal
XROMCS	MAIN	UP-0397	2/19	ROM select signal
XRSPOF	MAIN	UP-0397	7/19	Resp. exciter clock off control singal (RESP. OFF opertion)
XRST	MAIN	UP-0397	1/19	System reset signal
	CRTC	UP-0398	1/14	- ditto -
	PIO	UP-0401	1/4	- ditto -
	WSIF	UP-0402	1/3	- ditto -
XRT	PIO	UP-0401	2/4	Resp. sync. output
XRTCINT	MAIN	UP-0397	1/19	1/64 seconds periodic interrupt
XRTCSL	MAIN	UP-0397	2/19	Clock IC select signal
XRTS	CRTC	UP-0398	14/14	NIBP communication resuest output signal (MAIN board to NIBP)
XRTS	MAIN	UP-0397	5/19	- ditto -
XSASINH	CRTC	UP-0398	7/14	Frame memory shift clock inhibit signal
XSDIN	MAIN	UP-0397	5/19	NIBP data receive input (RXD)
XSDOUT	MAIN	UP-0397	5/19	NIBP data transfer output (TXD)
XSEO-XSE7	CRTC	UP-0398	6/14	Frame memory serial select signal
XSLD	CRTC	UP-0398	6/14	Waveform data conversion start signal

Signal	PC board	Model	Page	Description
XSNDRD	MAIN	UP-0397	2/19	Alarm sound address write select signal
XSNDSL	MAIN	UP-0397	2/19	Sound generation control IO select signal
XSWSL	MAIN	UP-0397	2/19	Key signal input port select signal
XTEST	PIO	UP-0401	3/4	Calibration control output
XUCAS	CRTC	UP-0398	7/14	Upper screen column address strobe signal (frame memory)
XUDS	MAIN	UP-0397	1/19	Upper byte data strobe signal
XUDS	CRTC	UP-0398	1/14	- ditto -
XUDS	ROM-P	UP-0520	1/2	- ditto -
XUME/WE	CRTC	UP-0398	7/14	Upper screen mode set/Write enable signal
XURAS	CRTC	UP-0398	7/14	Upper screen lower address strobe signal (frame memory)
XUTR/OE	CRTC	UP-0398	7/14	Upper screen transfer/Output enable signal (frame memory)
XVSYNC	CRTC	UP-0398	2/14	Vertical sync. signal
XWDTIM	MAIN	UP-0397	1/19	Watch dog timer control signal
XWE0-XWE3	CRTC	UP-0398	2/14	Graphic frame memory write signal (1)
XWEH	CRTC	UP-0398	6/14	Wavefrom frame memory write singal (upper byte)
XWEL	CRTC	UP-0398	6/14	Wavefrom frame memory write singal (lower byte)
XWR	PIO	UP-0401	1/4	Write control signal
XWR	WSIF	UP-0402	1/3	- ditto -
XWRA	MAIN	UP-0397	2/19	Head ampl. control output A select signal (1st 16 bits)
XWRB	MAIN	UP-0397	2/19	Head ampl. control output B select singal (2nd 16 bits)
XWRIO	MAIN	UP-0397	2/19	Low speed memory (IO) write control signal
XWRL	MAIN	UP-0397	2/19	Write control signal (lower byte)
XWRU	MAIN	UP-0397	2/19	High speed memory write control signal (upper byte)
XWSINT	WSIF	UP-0402	1/3	Interrupt for WS communication
XWSRET	WSIF	UP-0402	1/3	WS reset output
XWSSL	WSIF	UP-0402	1/3	Select signal for dual port RAM
Z-CLK	RESP	UP-0519	1/1	Resp. zero balance clock (250Hz)

Section 4

4. Circuit description

4.1 General

Physiological signals picked up by the head amplifiers are transfered to the head amplifier interface circuit of the main PC board through the head amplifier mother board inside the head amplifier console. Impedance signal for respiration detection is transferred to the respiration board through the ECG/RESP board isolation transformer and head amplifier mother board. In the respiration board, impedance signal is detected and amplified to obtain respiration waveform.

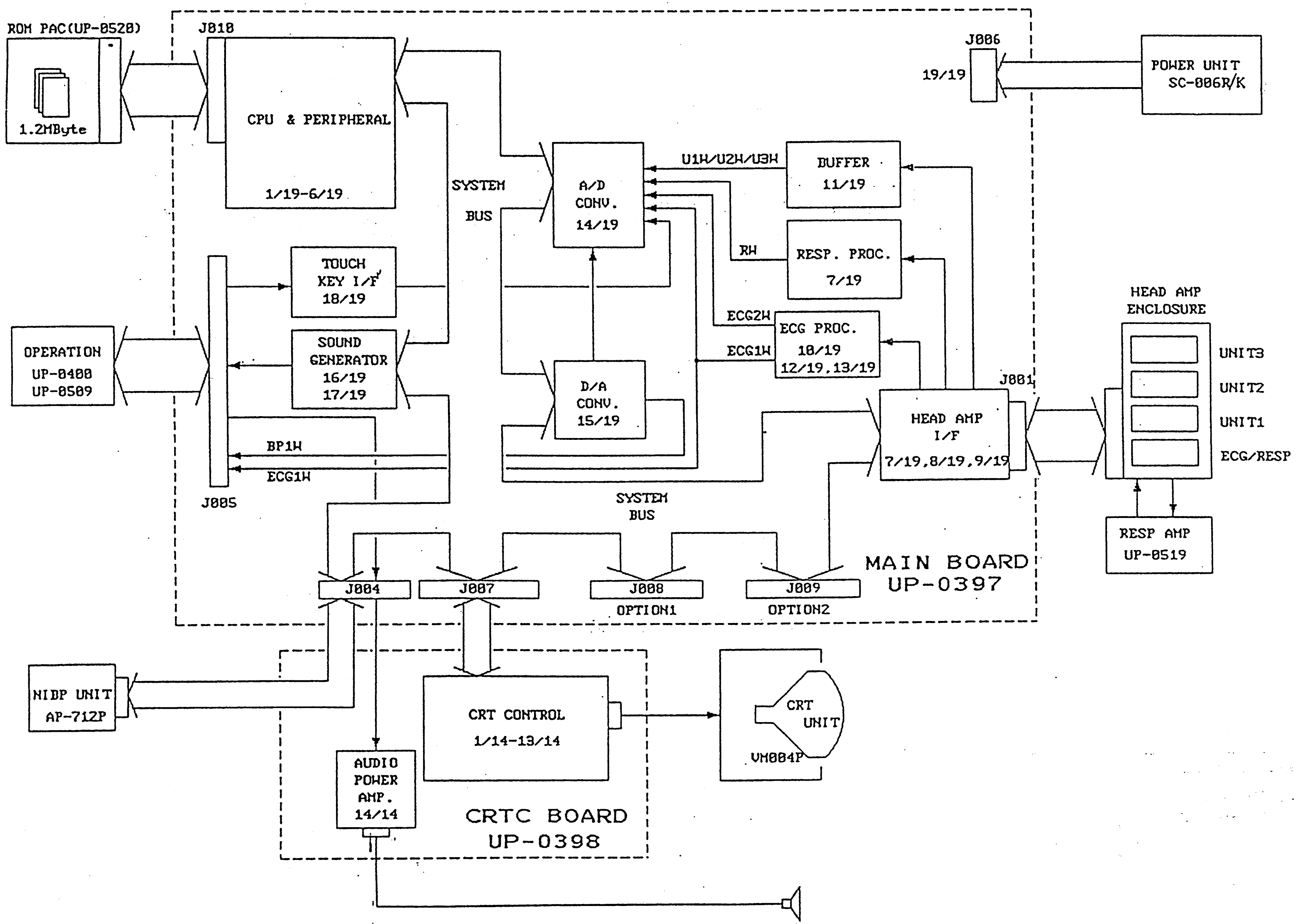
ECG signal is processed in the main board such as pacing pulse rejection, hum filtering etc., and inputted to the A/D conversion circuit. Other signals and touch key signals are buffed or processed with position detection circuit and then A/D converted. At the A/D converter input; offset component from the D/A converter is added to signal to shift zero level of signal for wide dynamic range of A/D convesion. D/A converter outputs BP1 waveform signal to the output terminal on the front of the main unit.

The main PC circuit mounts CPU and its peripheral family devices (ROM, RAM, and I/O devices) and controls all functions of the bedside monitor. The control program (software) is stored in the ROM pack. Therefore, software upgrade is easily made only by replacing the ROM pack.

The sound board generates QRS synchronized tone, alarm tone, and key touch click tone. Audio power amplifier on the CRTC board amplifies tone signal to drive a speaker.

The CRTC board receives graphic data (characters and trendgraph), waveform data from the main board and generates video signal to the CRT unit and external display monitor. NIBP unit is connected to the main unit via the CRTC board.

NIBP unit has all the functions for NIBP measurement and outputs NIBP data to the CPU by communication.


ROM PAC(UP-0520)
1.2MByte
J010
CPU & PERIPHERAL
1/19-6/19
SYSTEM
BUS
A/D
CONV.
14/19
U1W/U2W/U3W
BUFFER
11/19
J006
19/19
POWER UNIT
SC-006R/K
RW
RESP. PROC.
7/19
TOUCH
KEY I/F
18/19
OPERATION
UP-0400
UP-0509
SOUND
GENERATOR
16/19
17/19
ECG2W
ECG1W
ECG PROC.
10/19
12/19,13/19
HEAD AMP
ENCLOSURE
UNIT3
UNIT2
UNIT1
ECG/RESP
J001
D/A
CONV.
15/19
HEAD AMP
I/F
7/19,8/19,9/19
BP1W
ECG1W
J005
SYSTEM
BUS
RESP AMP
UP-0519
MAIN BOARD
UP-0397
J004
J007
J008
OPTION1
J009
OPTION2
NIBP UNIT
AP-712P
CRT CONTROL
1/14-13/14
CRT
UNIT
VM004P
AUDIO
POWER
AMP.
14/14
CRTC BOARD
UP-0398

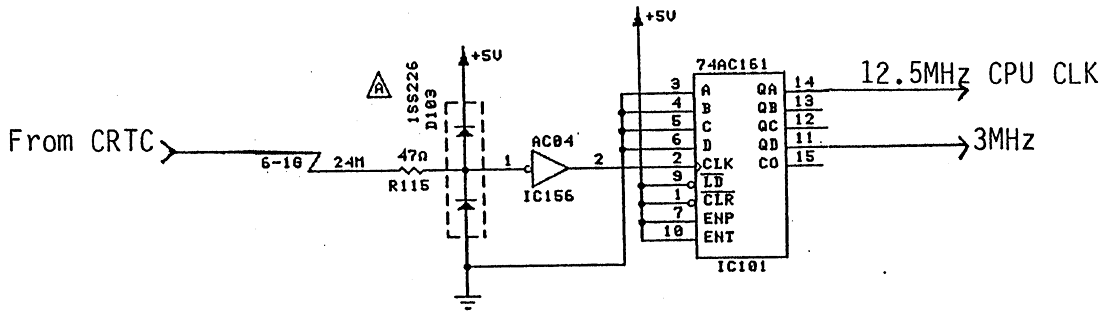
4.2 Functions of each component

4.2.1 Main board UP-0397

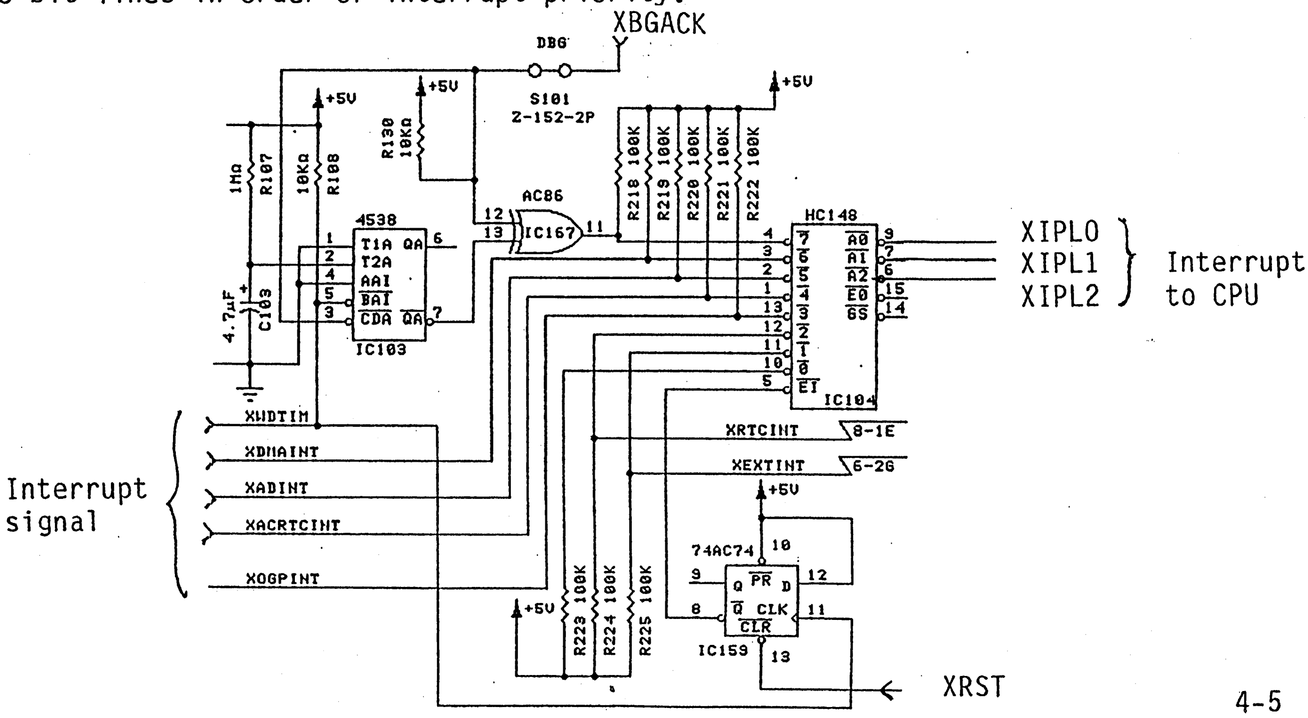
The main board is the central unit of the system and functions except for CRT display related items are made by this unit.

1) CPU and peripherals

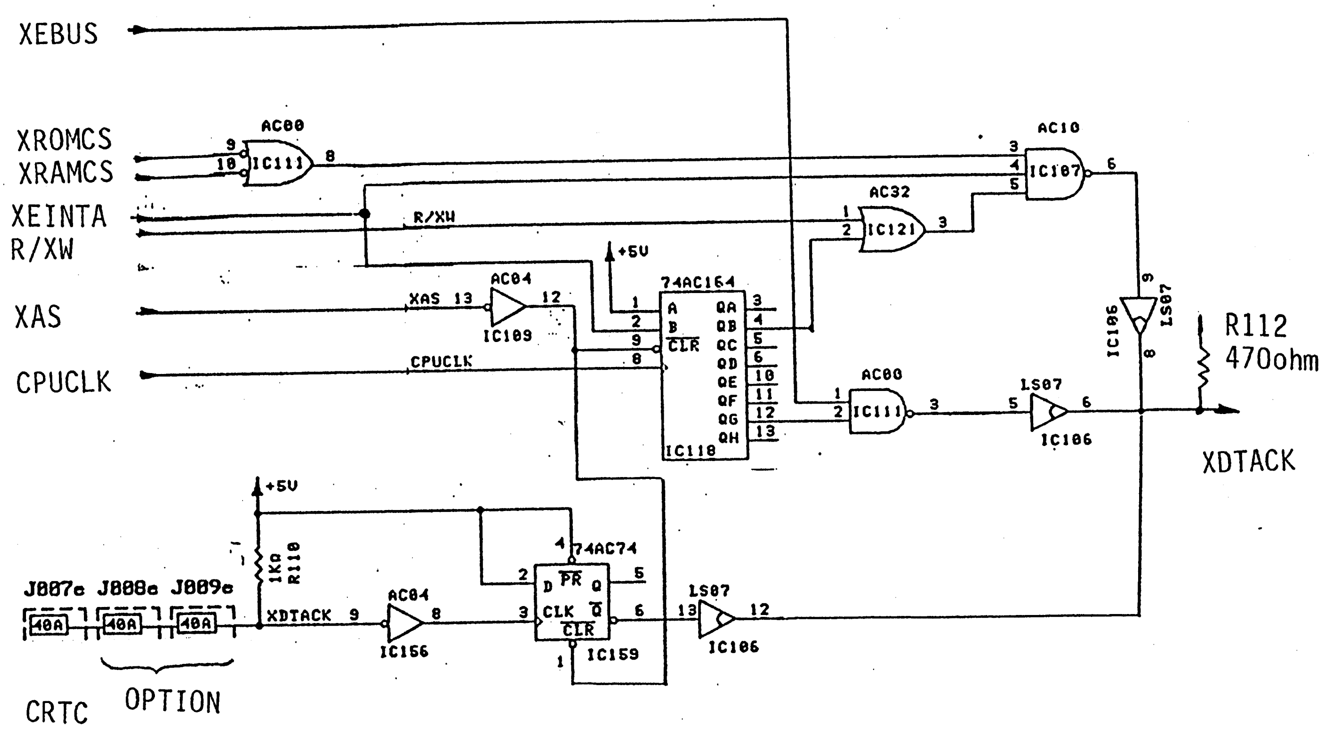
CPU device employed in the system is the MC68000 (HD68HC000) of version 12.5MHz. CPU clock is 12.288MHz which is half division of system clock supplied from the CRTC board. From this system clock signal, other clock signals 3M, 768K, 384K, 19.2K, etc., to be used in the main board are generated.



IC103 is an one-shot multi-vibrator for watch dog timer circuit. Time constant of this one-shot circuit is set to approximately 5 seconds by R107 and C103. If there is no reset in 5 seconds, highest priority interrupt is sent to the CPU to inform software runaway. IC159 inhibits all interrupts to the CPU at power on or power restoration after short time power down to prevent operation error of the system. IC104 determines priority of interrupt and order of priority is form 7, 6, 5, and 1. In normal operating condition, all interrupts except for watch dog timer interrupt are used. Interrupt signal is sent to the CPU via the IPLO- IPL2 3 bit lines in order of interrupt priority.

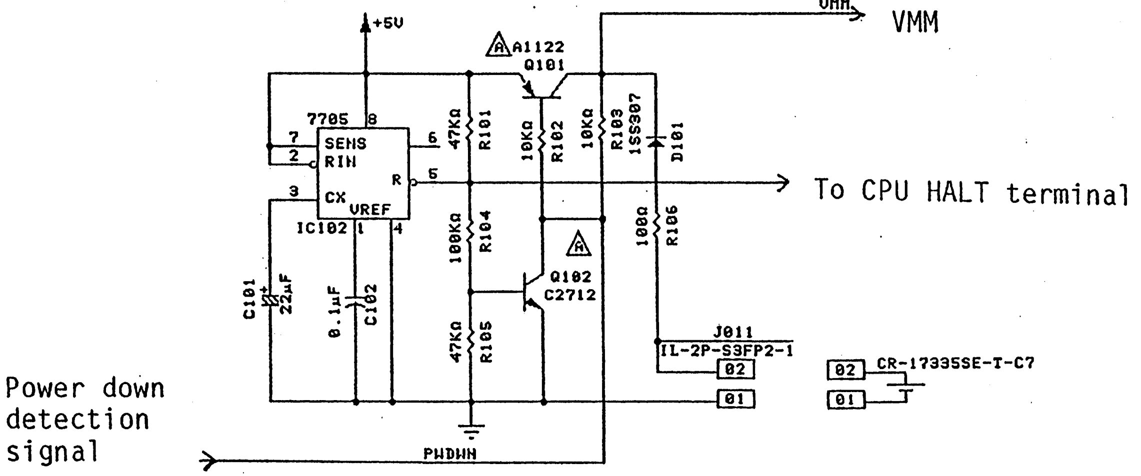


XDTACK signal is returned to the CPU by the peripheral devices in response to chip select signal. As access time of each device is different, system ROM an RAM respond without delay time at read cycle, and 1 clock (approx. 80ns) delayed at write cycle, and other IC chips on the main board respond 6 clocks delayed. Response signals from the CRTC board, central interface or WS interface is synchronized with XAS signal by the IC159.

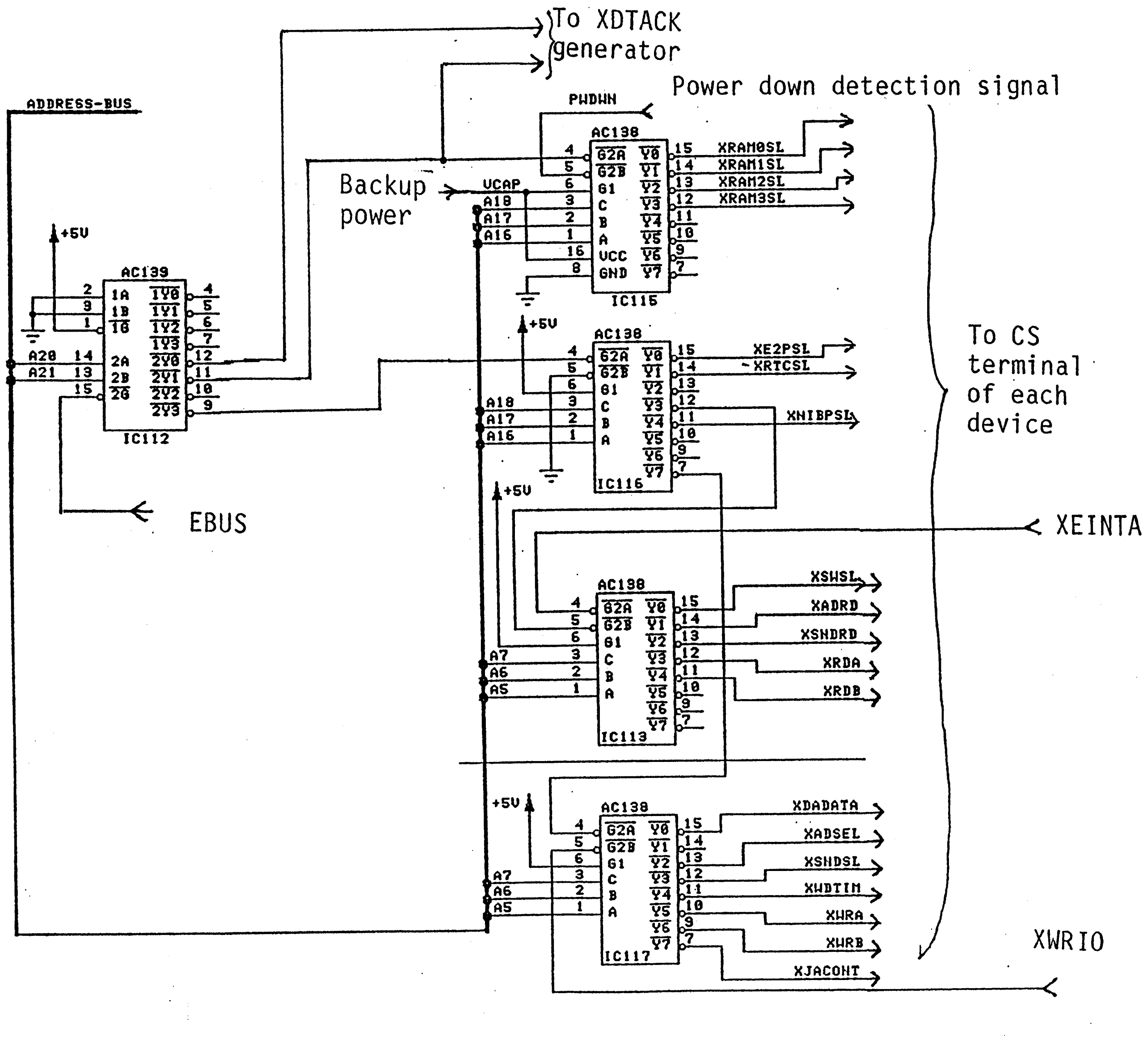


CPU waits the response signal and stops operation if there is no response. Bus error detection is informed to the CPU if there is not response within a specified time which means malfunction of peripheral devices. In this system bus error detection time is 20us from start of XAS signal.

At power on, power on reset signal is generated by the IC102. Reset signal is released approximately 200ms after +5V power voltage exceeds a specified threshold voltage. 200ms delay time is determined by capacitance of the C102.
When +5V power voltage drops, reset signal is generated to prevent operation malfunction of the CPU and other devices.



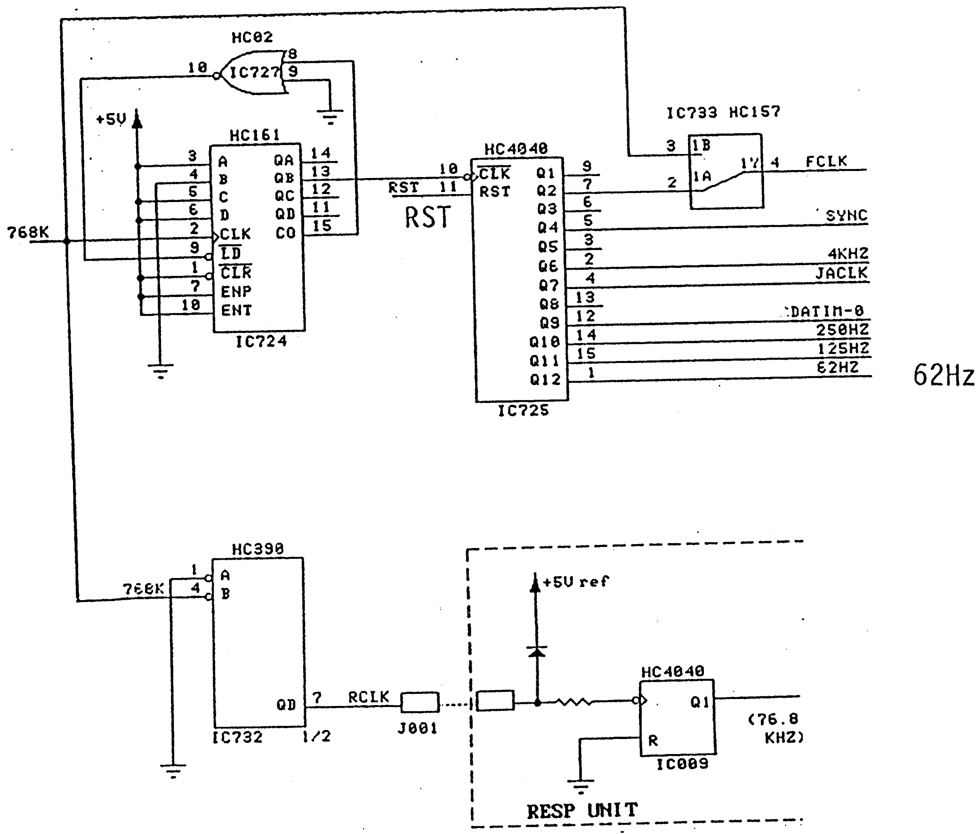
Chip select circuit selects a device for read/write access by the CPU and IC112, IC113, IC115- IC117 are assigned according to memory map and I/O map. In the IC devices, IC115 only is power backed up by power backup capacitor for trend data and other data storage in the RAM while power is off.



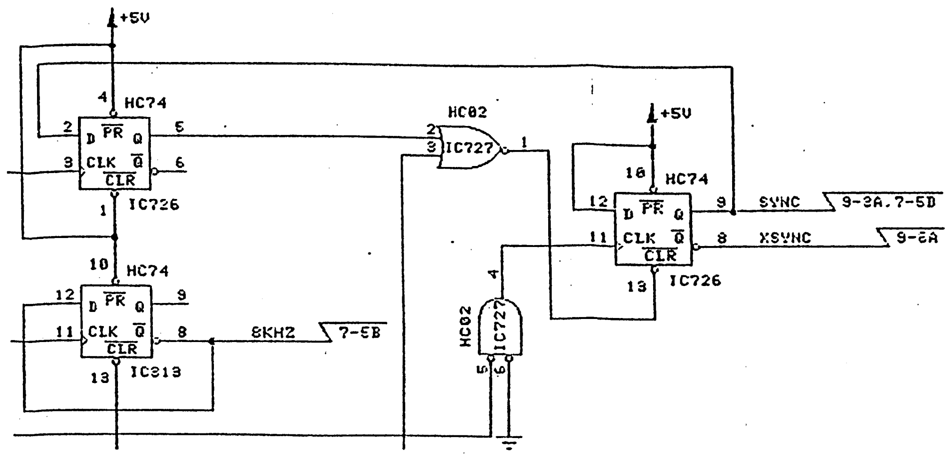
2) Input interface circuit

Waveform signals (analog signals) such as ECG waveform, head amplifier status signals from the mother board and control signals for head amplifiers pass through this input interface circuit.

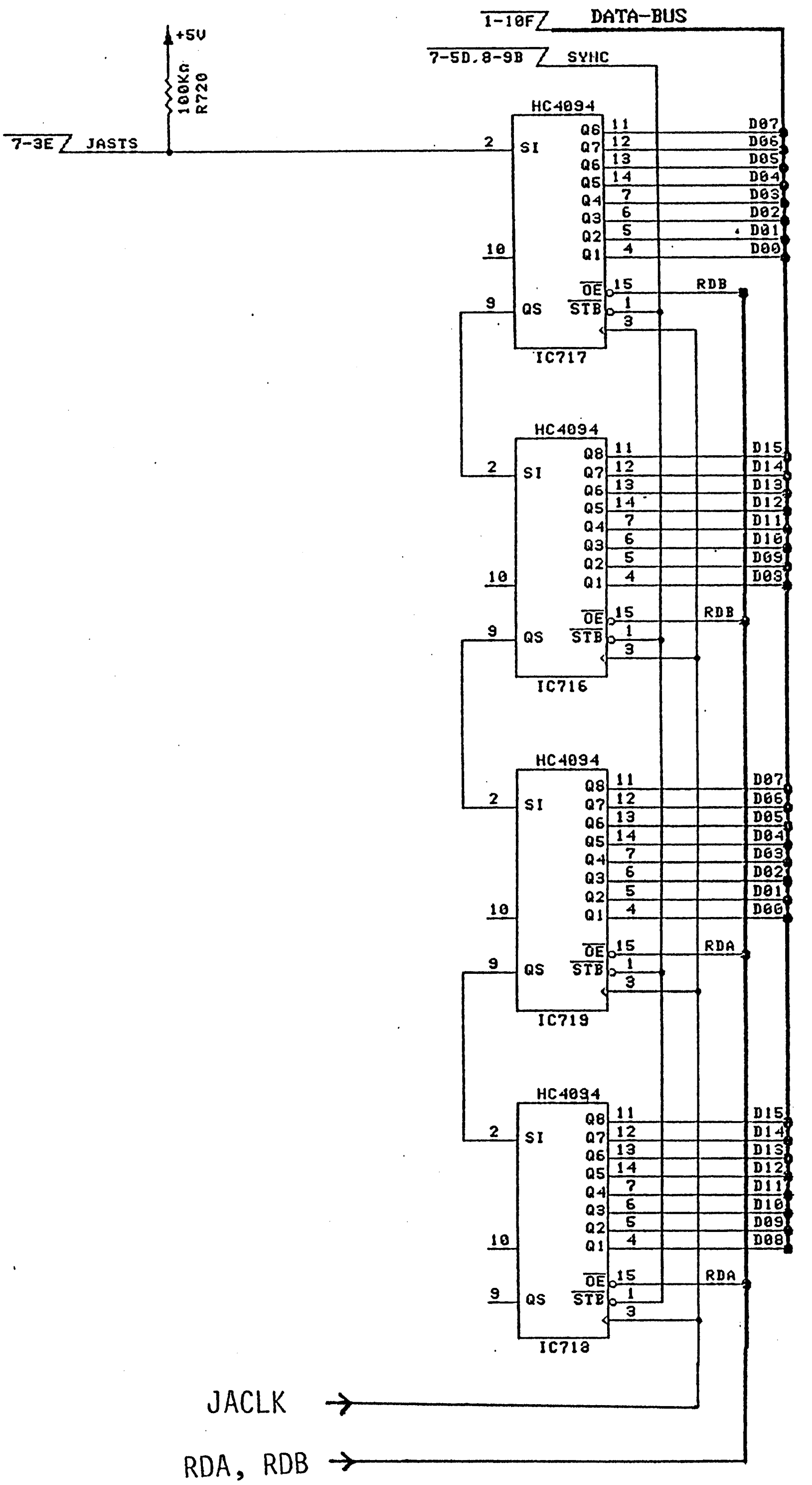
768K clock signal from the CPU is divided to generate clock signals for this circuit block. IC724 divides the clock signal to 1/3 and IC725 divides the clock again to finally obtain 62.5Hz signal for switching PARA signals. IC733 changes frequency of clock signal when head amplifiers are inserted in the main unit console or in an extension input box (under development).



Head amplifiers synchronize timing for communication with the main unit with SYNC signal. SYNC signal is a pulse signal generated every 16ms and between SYNC signal and next SYNC signal, JACONT 32 bit control signal is sent from the main unit and JASTS 32 bit status signal is sent from the head amplifiers repeatedly.

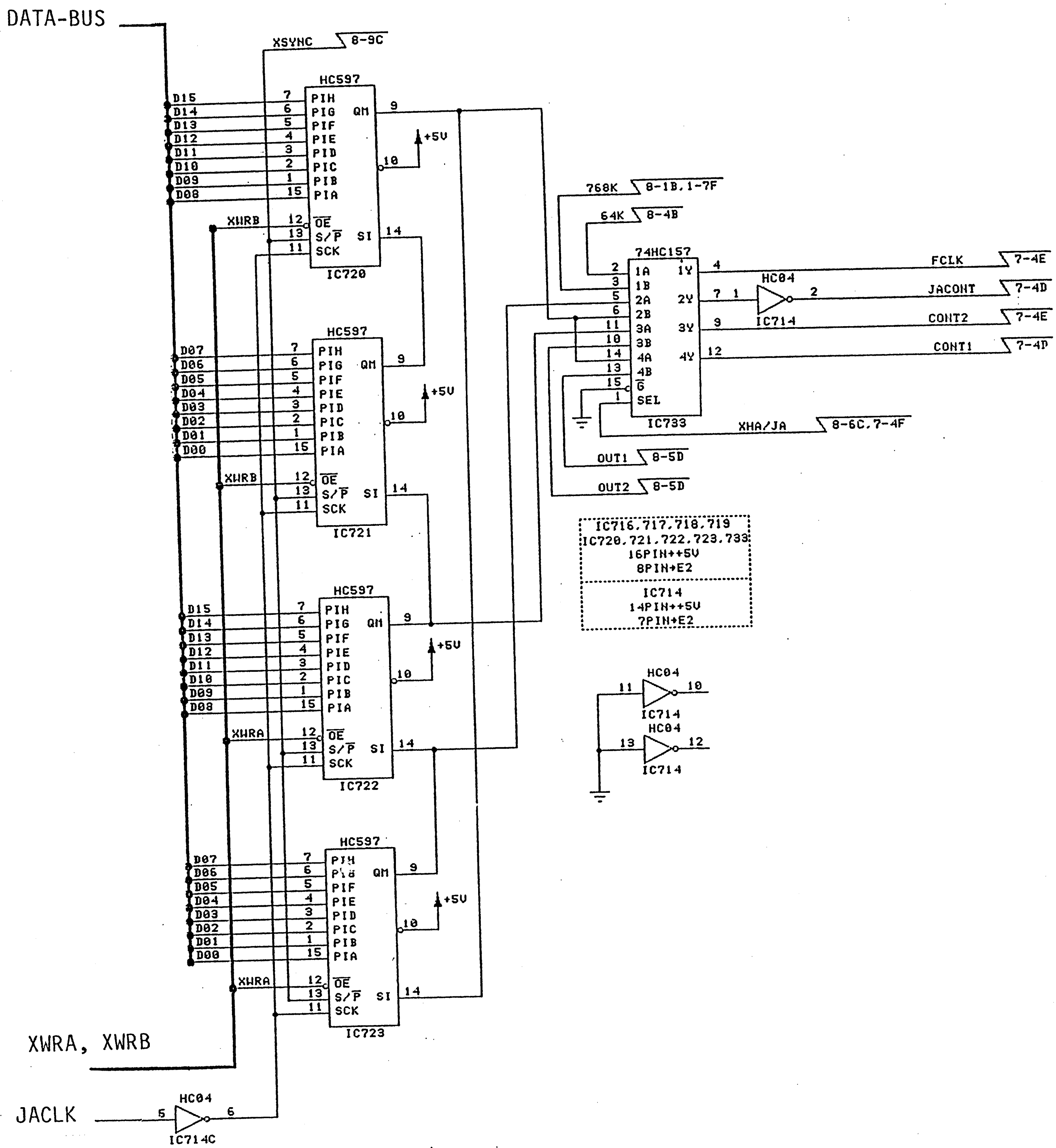


JASTS status signal is inputted to a shift register which is strobed with each SYNC pulse and read out by the access from the CPU.



IC720- IC723 send control signals to the head amplifiers and IC716-IC719 receive status signal. Data written by the CPU is parallel-serial converted and sent to the head amplifiers via IC733, IC714 and IC703.

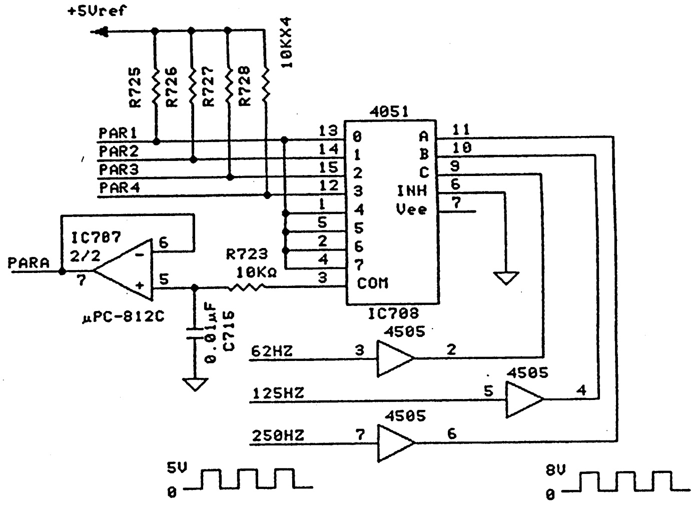
As timing of control signal of each head amplifier is different, CONT1 and CONT2 signals are also sent on the way of shift register to the head amplifiers.

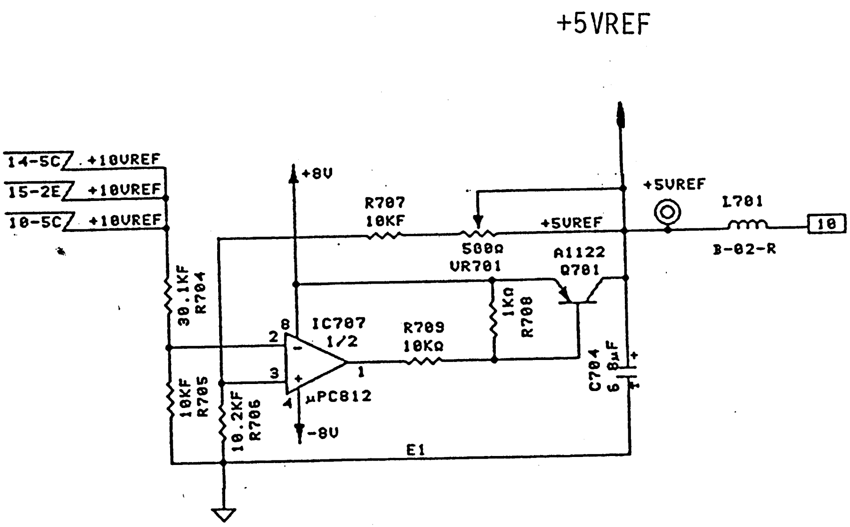


There are PAR1 to PAR4 signals in addition to the status signal from the head amplifiers that indicate which head amplifiers are inserted into the head amplifier slots.

Resistor of different resistance value is connected across this PARA signal line and ground in each head amplifier. Attenuated voltage of +5Vref by this resistor indicates each head amplifier. IC708 switches PAR1 to PAR4 signals one by one and sends them to the next block as PARA signal. IC707 and Q701 generate +5Vref reference voltage.

PAR1 is measure signal of the ECG/RESP head amplifier and PAR1 is 0V during respiration measurement.

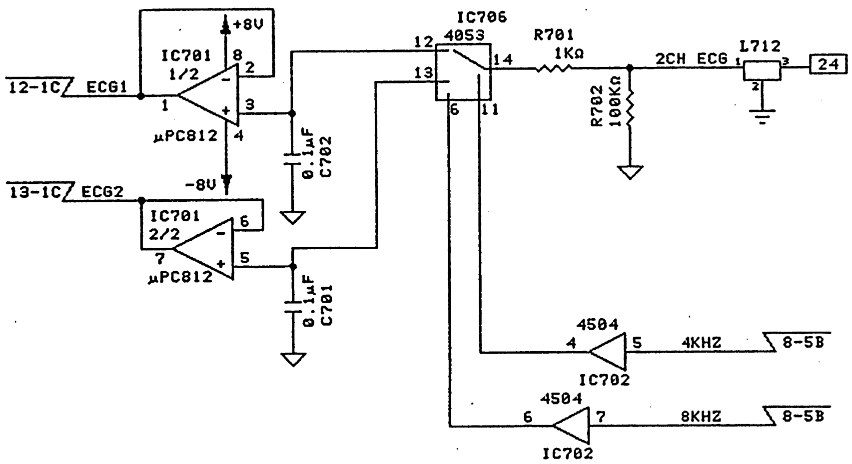


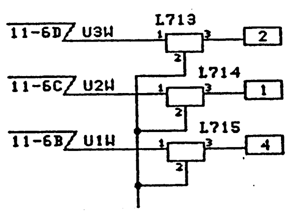


Waveform data is sent from each head amplifier on analog lines U1W- U3W (Unit 1; above the ECG/RESP head amplifier, Unit 3; top slot).

Slot	Slot name	Signal name	PARA name (parameter name)
	Unit 3	U3W	PAR4
	Unit 2	U2W	PAR3
	Unit 1	U1W	PAR2
	ECG/RESP	2ch ECG/Resp	PAR1

Multiplexed waveform data of some head amplifiers are demodulated with software after A/D conversion. As high speed ECG waveform data demodulation processing is overload for software, IC706 is used to demodulate ECG1 and ECG2 waveforms from 2CHECG signal.

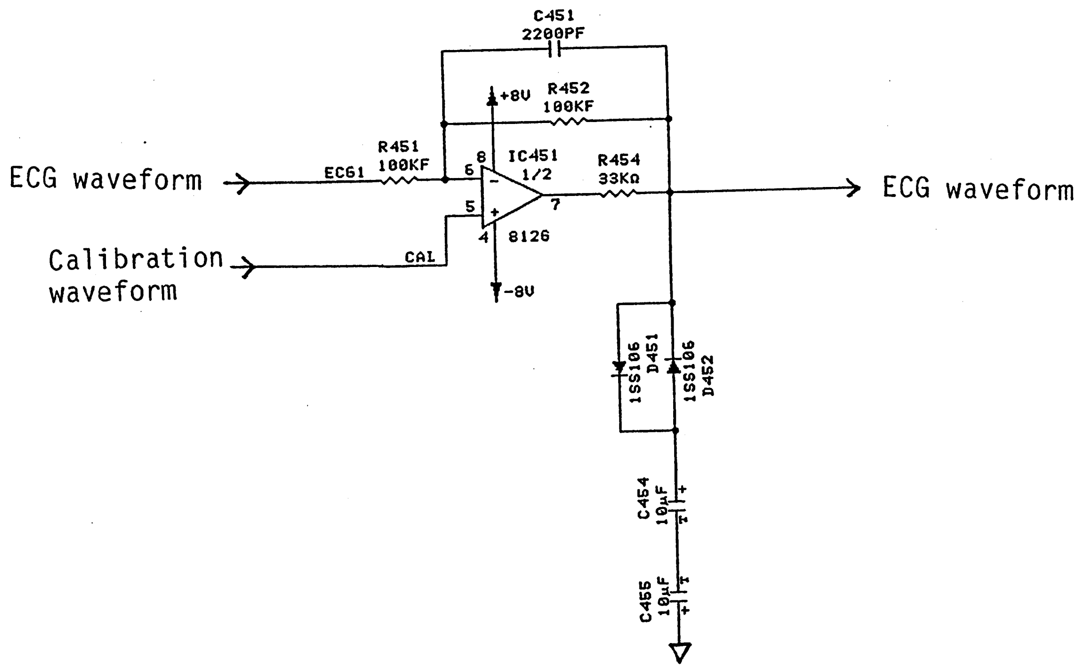




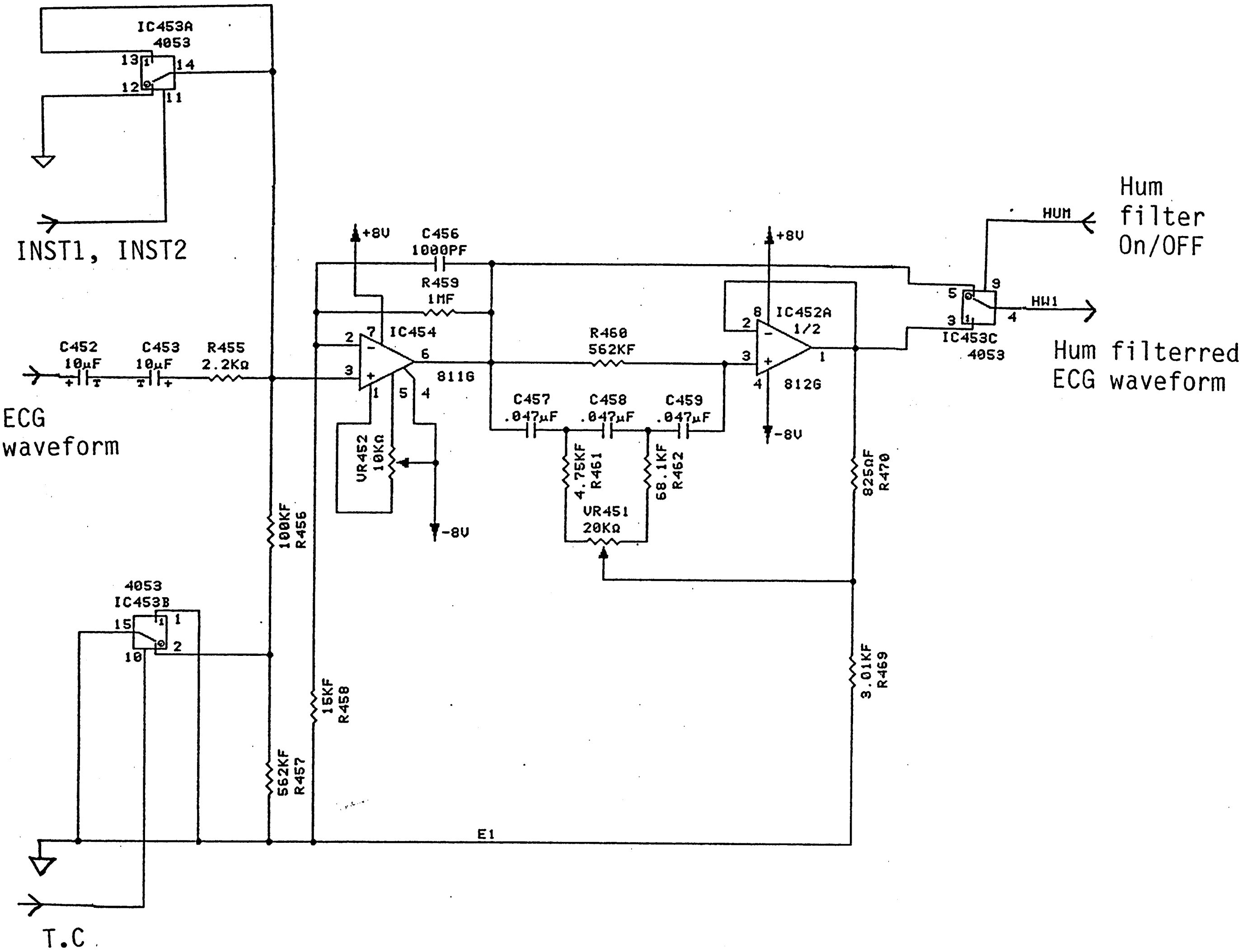
3) ECG processing circuit block

ECG1 and ECG2 signals are independently processed. Descriptions are for ECG1 in this manual and part symbol numbers in parentheses ( ) indicate for ECG2.

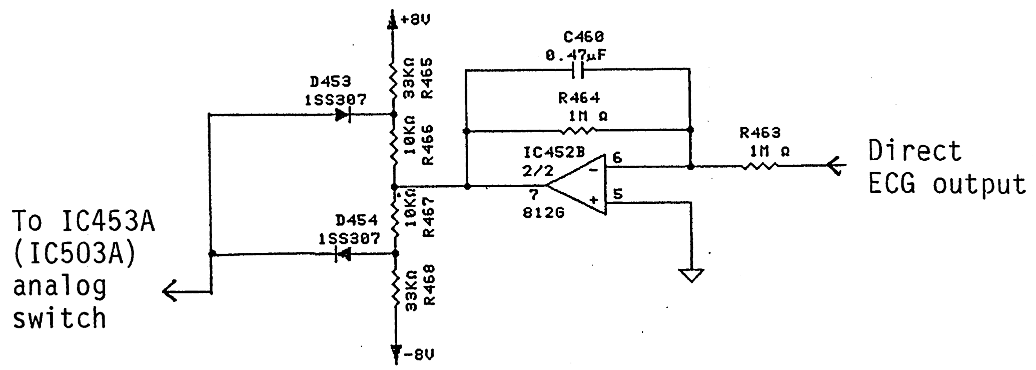
ECG signal from the head amplifier is inputted to the IC451 1/2 (IC451 2/2) in 15mV/1mV signal level. Calibration signal is superimposed to ECG signal and the IC451 functions as a buffer amplifier and pacing pulse limitter. D451 and D542 (D501 and D502) are clamp diodes against over input. C454, C455 (C504, C505) and R454 (R504) are composing of large time constant circuit. With this time constant, slow change (Ex. base line drift) or small signal which does not exceeds forward direction voltage of the clamp diodes directly passes through the circuit but high speed large amplitude pacing pulses are clamped with the diodes to limit output level so as to prevent saturation in the next circuit.



ECG amplifier time constant is determined by C452, C453 (C502, C503), R456 and R457 (R506 and R507). Analog switch IC453B (IC503B) selects 0.5 seconds or 3.2 seconds . ECG signal is 67 times amplified to be 1V/1mV level signal. Analog switch IC453C (IC503C) selects direct ECG output or AC interference filtered ECG output by IC452A (IC502A). This AC interference filter is a notch filter of 54Hz null point. Reduction ratio is -20dB for both 50Hz and 60Hz line frequencies with high cut filter in later circuit.

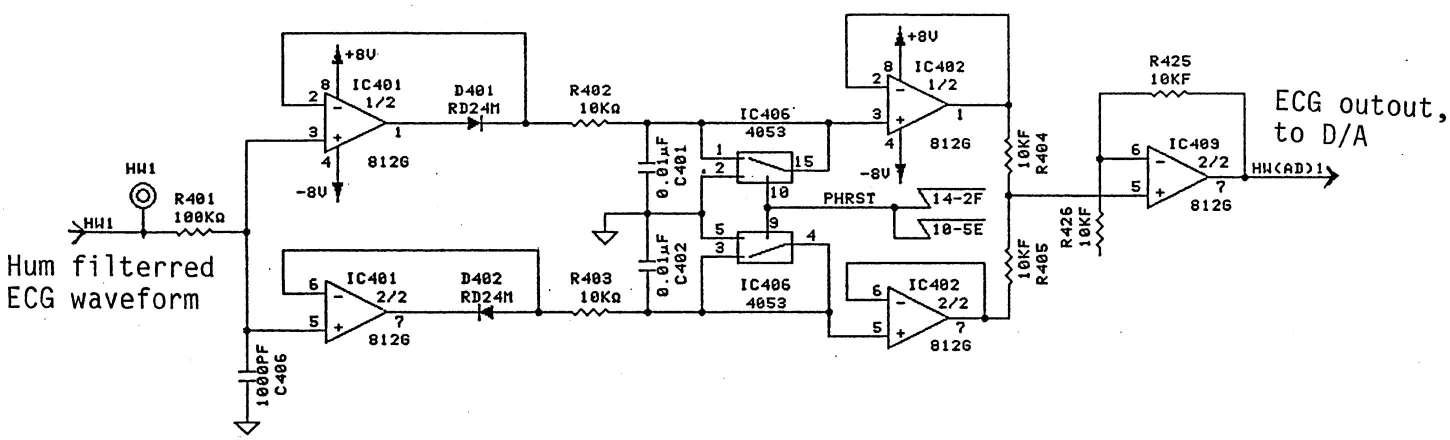


Next stage of circuit is auto INST (instantaneous stop) circuit composed of IC452B (IC502B). When ECG baseline drifts, lower frequency component in ECG signal is amplified and applied to resistor network composed of R465- R468 (R515-R518). Output of IC452B (IC502B) is normally near 0V and D453 and D454 (D503 and D504) are off condition. When ECG baseline drifts, voltage is generated here and when one of the diodes is turned to on due to large drift, C452 and C453 (C504 and C505) are rapidly charged through the diode. As IC452B (IC502B) is an inverting amplifier, output works against baseline drift. Therefore, IC452B (IC502B) output returns to near 0V. IC453A (IC503A) is an analog switch for manual INST (instantaneous stop) of ECG signal.

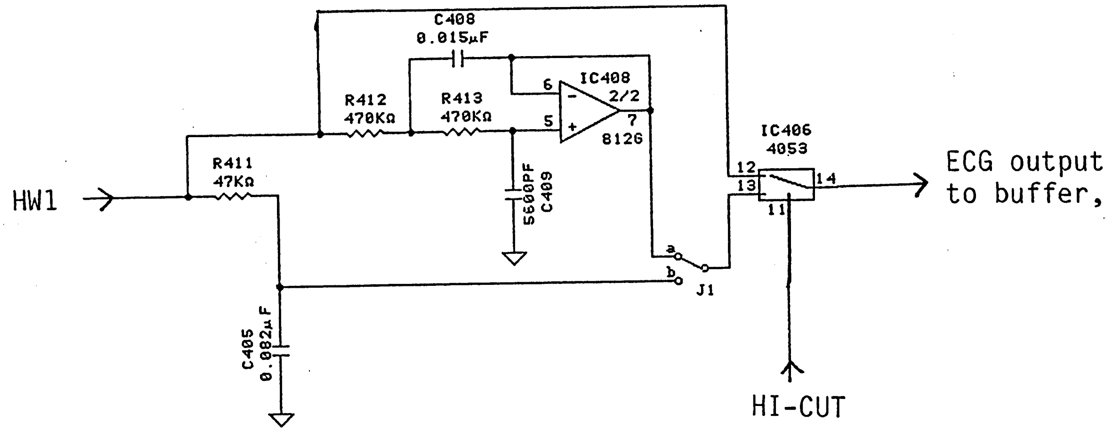


Next stage of circuit is peak hold circuit of ECG signal after R401 and C406 (R406 and C407). To sample sharp pulse such as cardiac pacing pulse by the A/D converter, peak hold circuit is used to hold peak until next sampling time. With this processing, pacing pulse can be displayed on the screen. IC401 1/2, D401, IC402 1/2 (IC403 1/2, IC403, IC404 1/2) are for positive peak from E1 ground and IC401 2/2, D402, IC402 2/2 (IC403 2/2, D404, IC404 2/2) are for negative peak from E1.

C401 and C402 (C403 and C404) are for holding voltage of peak and IC406 1/3 and 2/3 are for discharging peak voltage to reset. R404 and R405 (R409 and R410) add the both polarity peaks and IC409 2/2 (IC405 2/2) bufs and amplifies the peak-held ECG signal to be used for ECG display on the screen.

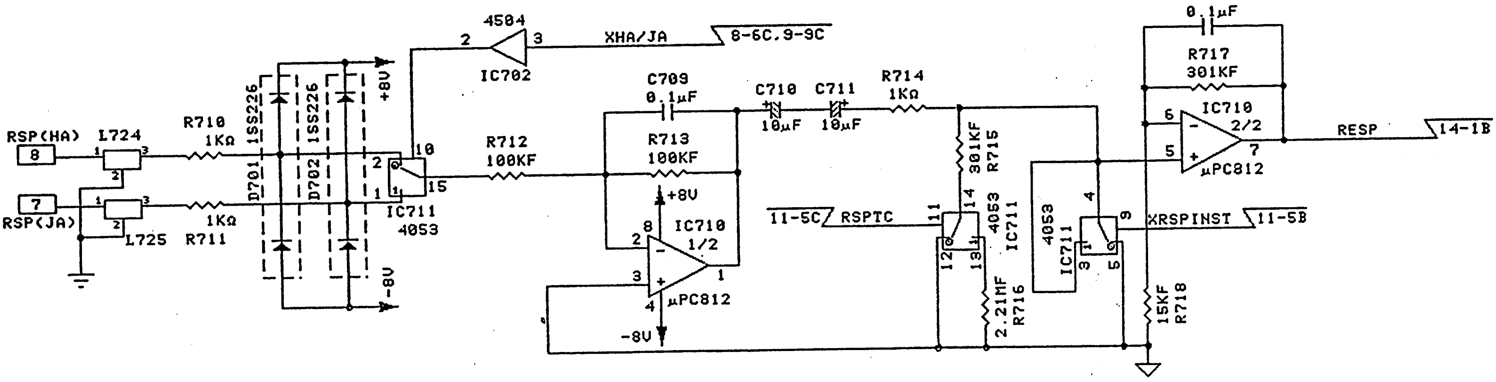


Branched ECG signal before peak hold circuit is directly passes through IC406 3/3 (IC407 3/3) analog switch to central monitor and ECG output on the front panel. The analog switch selects 40Hz high cut filter on or off. Jumper line J1 (J2) is to change ECG high cut filter characteristics. In factory set, point "a" is closed and point "b" is open.



4) Respiration waveform processing circuit block

Respiration waveform head amplifier output RSP(HA) is inputted to buffer amplifier through IC711 analog switch. This switch is used to select signal line to RSP(JA) when extension input box is used with the bedside monitor main unit. C710, C711, R715 and R714 determine respiration amplifier time constant. IC711 2/3 selects 1.5 seconds or 12.5 seconds time constant. IC711 2/3 is for INST (instantaneous stop) of respiration waveform. Output of the time constant circuit, respiration waveform is 21 times amplified by IC710 2/2 to be 1V/1ohm (BSM-8300J/K) signal level. This output level is 0.8V/1ohm in case of BSM-8300A used with AAMI type ECG connection cable in which 1kohm resistors are connected.

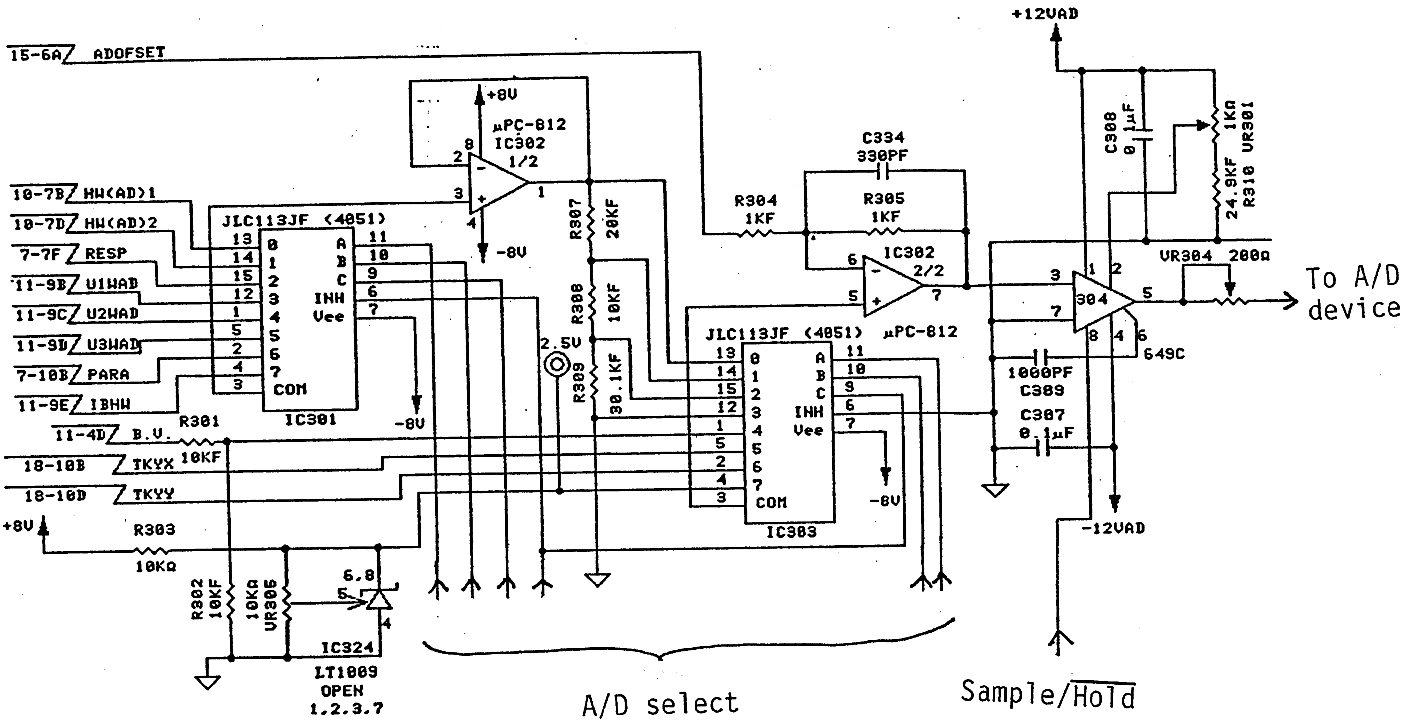


5) A/D converter

Waveform signals from head amplifiers and PARA (parameter) signal are multiplexed by IC301 and inputted to IC302 1/2. Gain of IC302 1/2 is changed according to signal and its output signal is inputted to IC303. In addition to above data, IC303 multiplexes system status (touch key voltages, battery voltage, etc.) and outputs them to the next circuit block.

IC302 adds offset voltages from the D/A converter to parameters whose signal is not symmetric on 0V such as blood pressure waveforms. With offset voltages, A/D conversion can be made in wide dynamic range.

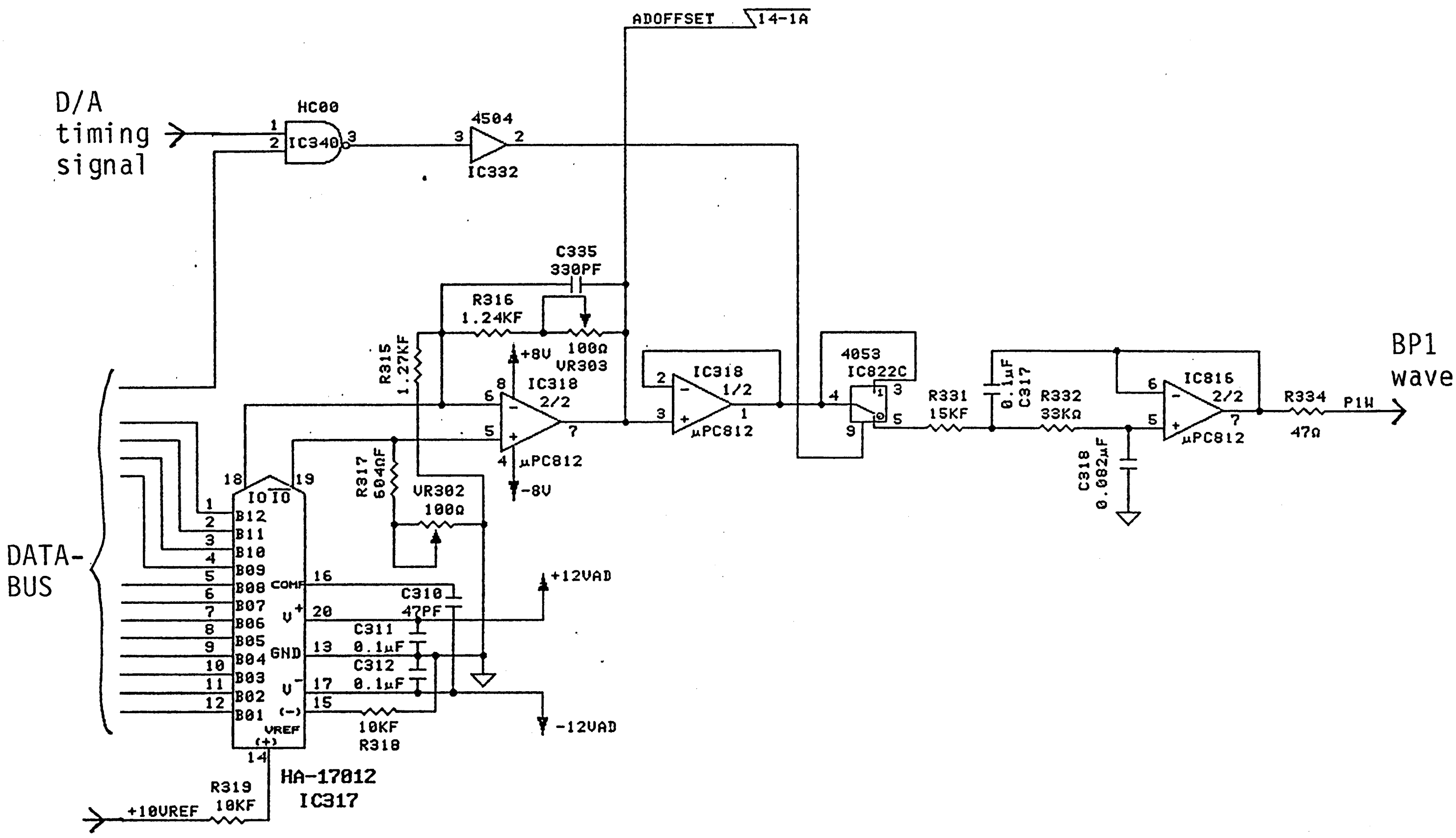
IC304 is a sample hold circuit to hold input voltage during A/D conversion to avoid variation of input.



6) D/A conversion circuit block

This circuit block outputs blood pressure waveforms after zero balancing and offset voltages for A/D conversion. Before A/D conversion, offset voltage is added according to each parameter.

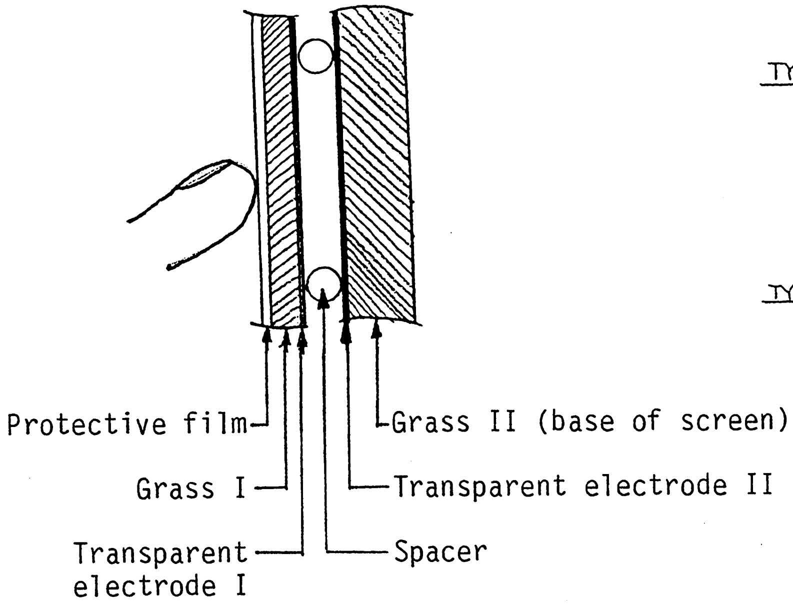
While offset voltage is not outputted, IC822 analog switch is closed in timing of P1W signal selection and P1W signal is smoothed with IC816 high-cut filter and outputted from the connector on the front panel of the bedside monitor. P1W to the central monitor is generated inside the central monitor interface board.

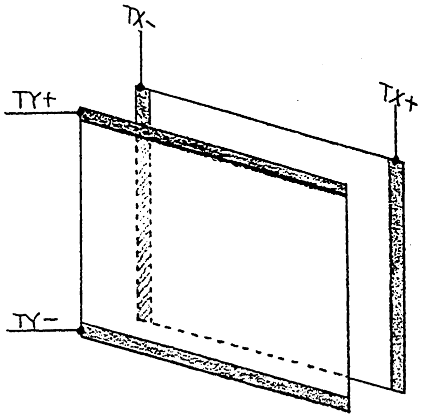


7) Touch key intreface circuit block

Theory of touch key operation

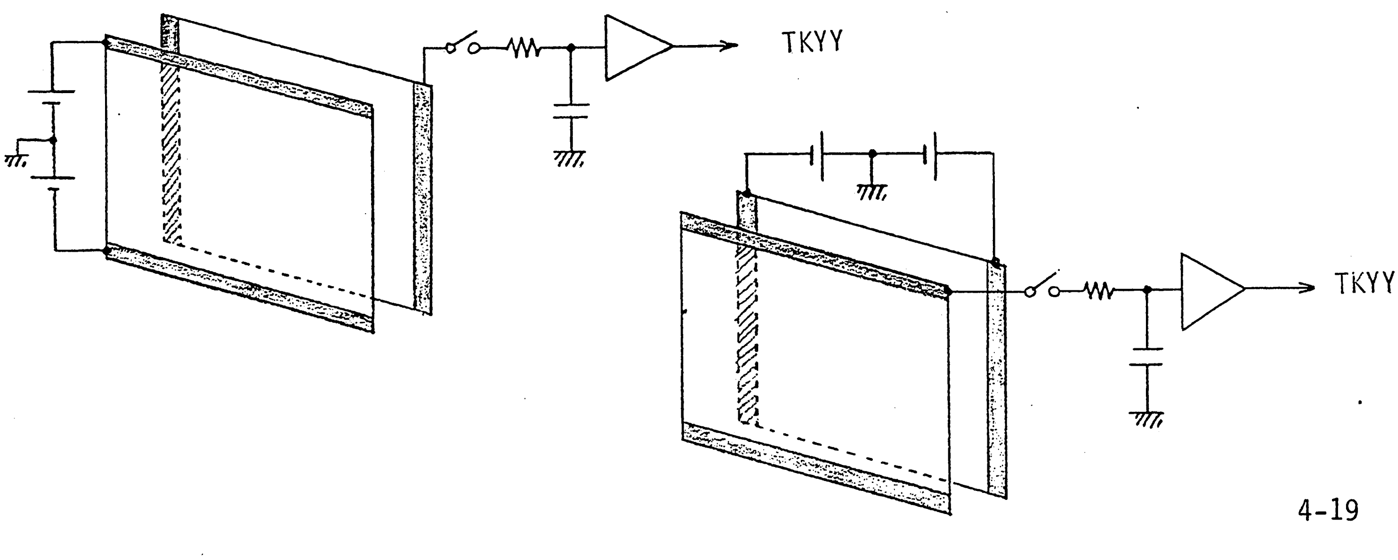
Touch key panel is composed of a plastic film for protection and two transparent grass electrodes on both sides of spacers. Voltage is applied to the electrodes to each X-axis direction and Y-axis direction. When finger touches to the surface of the panel, two electrodes touch and atttenuated voltages with touch are proportional to the touch position of finger. Touch position can be known by measuring voltages.





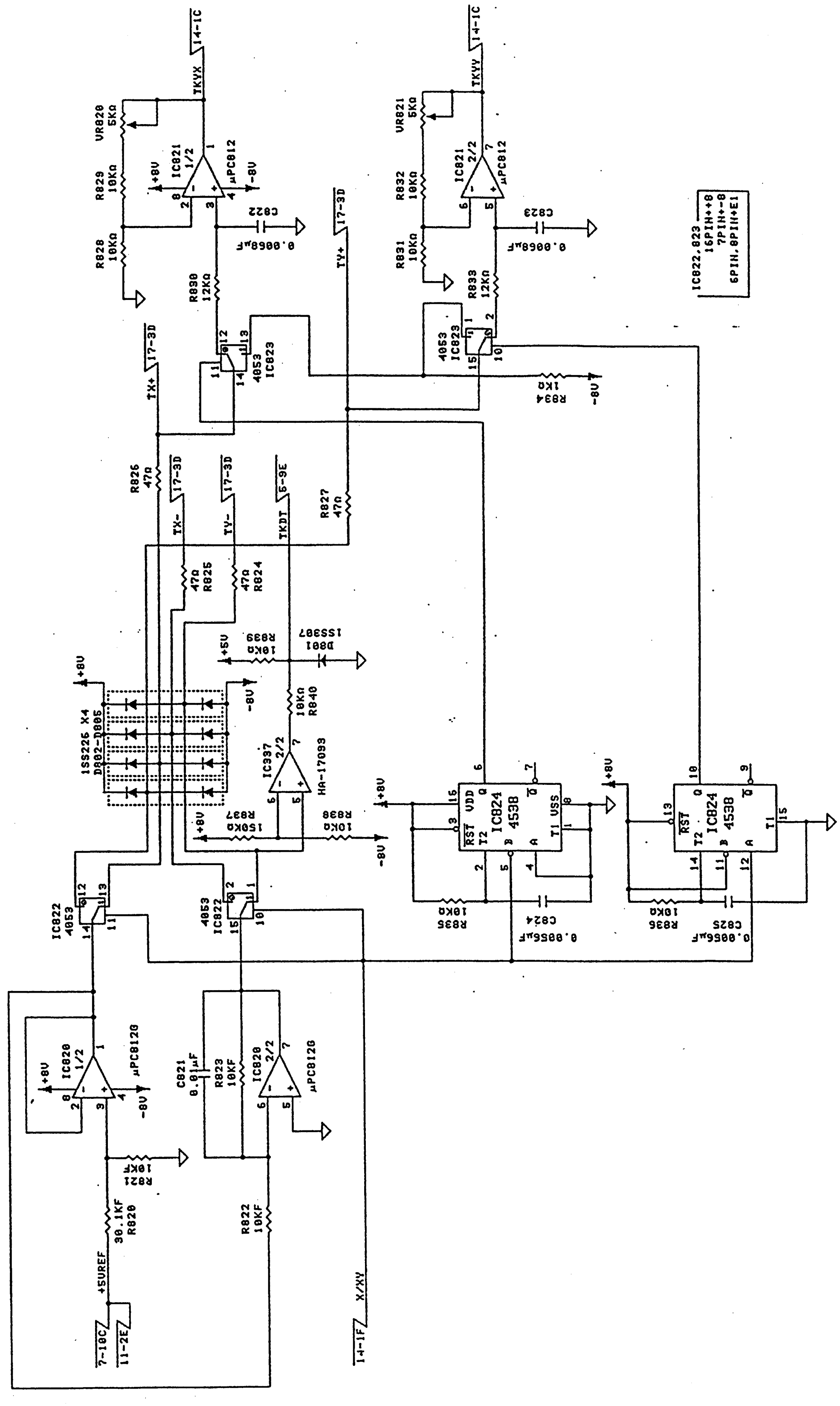
In actual design, voltage is applied to the two electrode alternately and attenuated voltages are picked up from the electrode to which voltage is not applied. Picked up voltages are held until the next cycle.

X/XY = L (Y-axis position detection)   X/XY = H (X-axis position detection)



+5Vref voltage is regulated by IC820 and +1.25V and -1.25V voltages are generated. IC822 analog switch select voltage to be applied to each electrode alternately. Switching is controlled by X/XY signal.

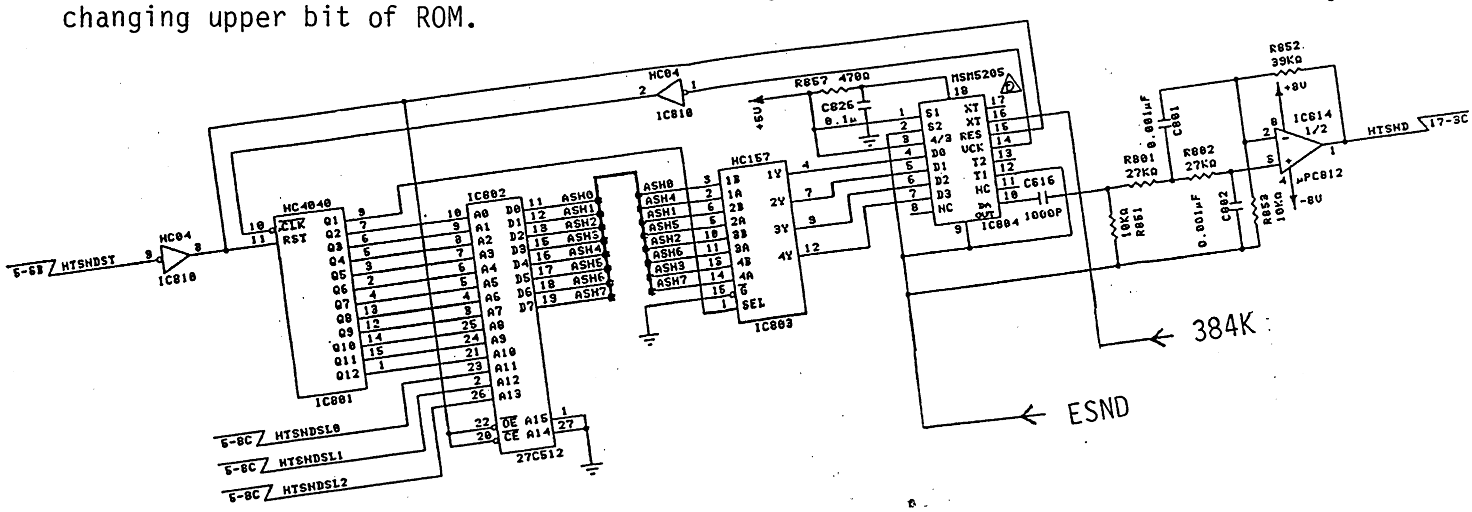
IC824 is a one-shot circuit to close the switch for voltage-hold in timing of X/XY signal. R830, C822 and IC821 1/2 are for X-axis detection and R833, C823 and IC821 2/2 are for Y-axis detection.



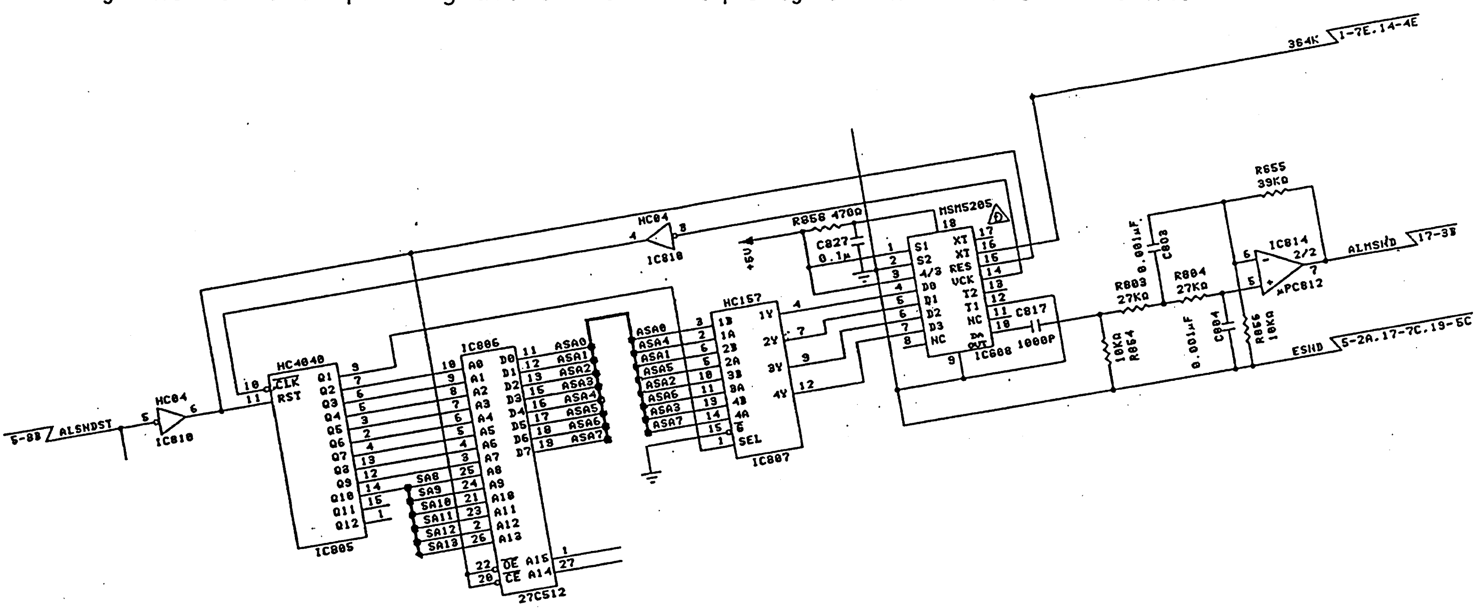
8) Sound circuit

Sound circuit generates alarm tone, QRS synchronized tone and key click tone. Each tone generation circuit is independent. A sound synthetic IC that can generate various tones is used for alarm tone and QRS tone generation but conventional tones only are used for the bedside monitor.

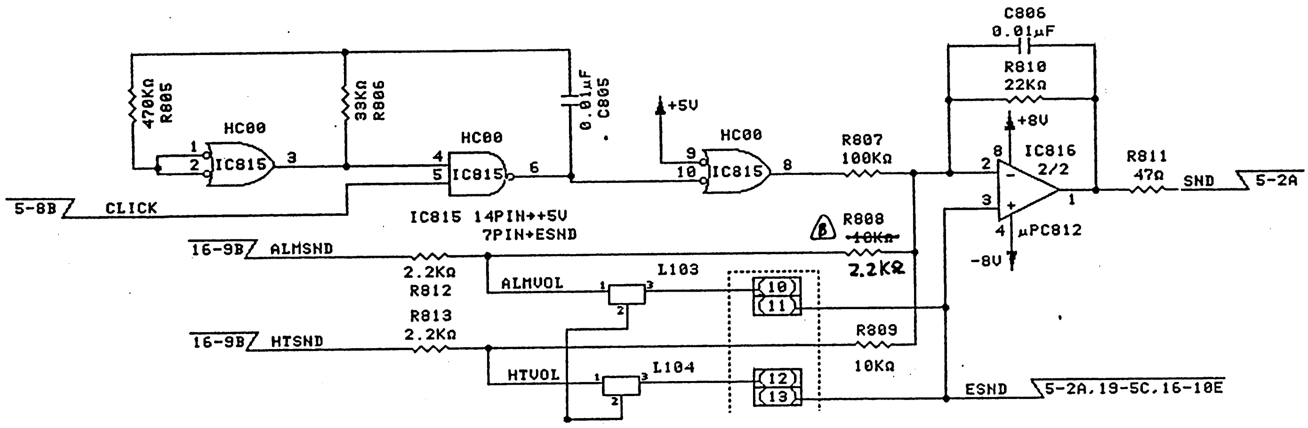
QRS synchronized tone is generated when address counter IC801 starts counting by HTSNDST signal. Data of address counter accesses IC802 ROM successively. As data from ROM is 8 bits, uppper digit and lower digit are switched by lowest bit of the counter to coincide to the IC804 sound synthetic IC. Tones can be chosen by changing upper bit of ROM.



In the same manner as QRS tone, alarm tone is generated when address counter IC805 starts counting. For alarm tone generation, upper address sets to counters on IC811 and IC812 by the CPU. In opposite way, counter address of currently generated tone can be read. Therefore alarm tone length can be freely selected. In the same manner of QRS tone, upper digit and lower digit is switched by lowest bit of counter to coincide to the IC808 sound synthetic IC. IC814 1/2 and IC814 2/2 are for a high cut filter to remove high frequency component from the sound synthetic IC output signal. Cut-off frequency of this filter is 6kHz.



Alarm tone and QRS tone are independently adjustable by the volumes on the front panel of the bedside monitor. Tone signals are added to key click tone by IC816 and sent to audio power amplifier on the CRTC board in the SND signal line.

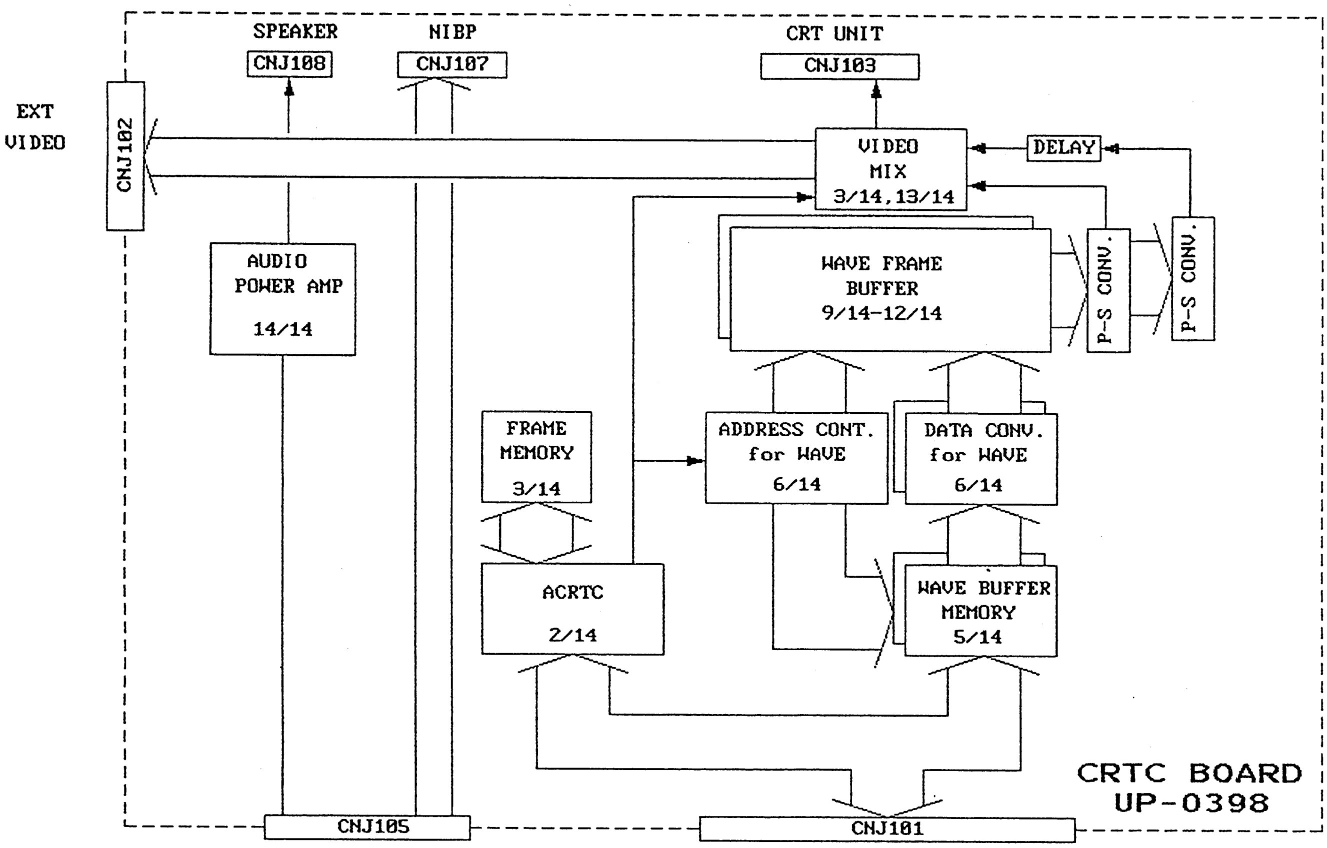


4.2.2 CRTC board UP-0398

CRTC board generates signals for screen display of numerical data such as heart rate, BP values, etc., trendgraphs, and waveforms such as ECG, BP, and respiration curve, etc. This board also provides with a connector for an external display monitor which permits color display.

Character and graphic data and command are written into the ACRTC (Advanced CRT Controller) and waveform data are written into waveform buffer RAM for display.

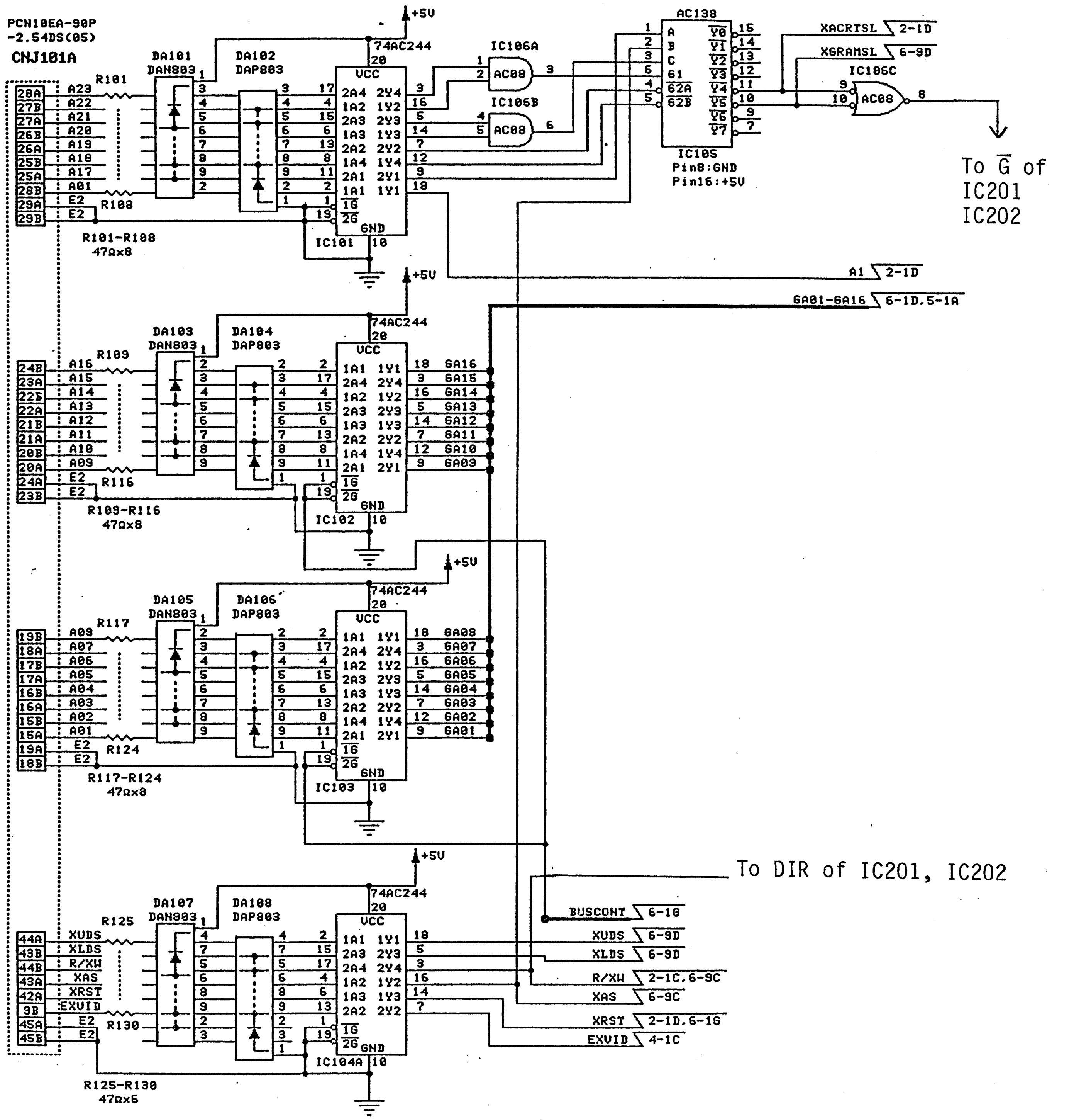
System clock is generated in this CRTC board for main board. The CRTC board interconnects the NIBP unit and the main board and sound audio power amplifier circuit is mounted.



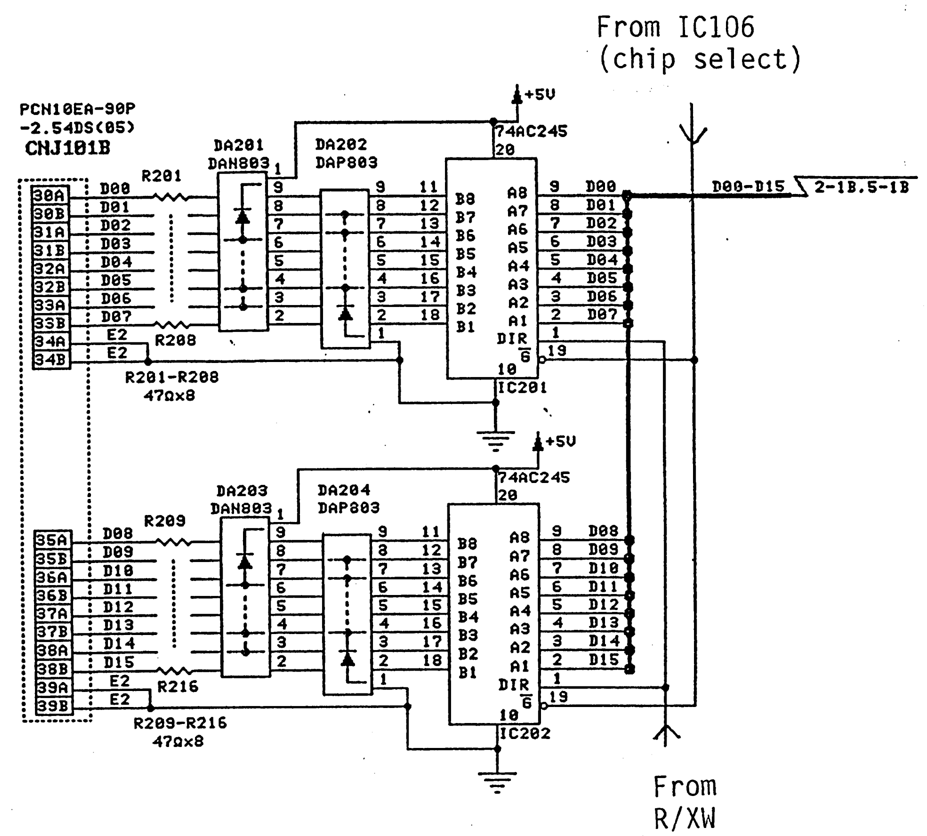
1) CPU interface circuit block

There are protection circuit for the address bus A01- A23 from the main board and control signals on the CRTC board. Upper address A23- A17 via buffer IC101 becomes chip select signals for ACRTC (Advanced CRT Controller) on the character/graphic display circuit and for ACW (Address Controller for Waveform) on the waveform display circuit by IC106 and IC105. Inside the ACW, ACW becomes chip select signal for waveform buffer RAM together with XUDS, XLDS and R/XW signals.

Lower address A16- A01 becomes waveform buffer RAM address GA01- GA16 via buffer IC102 and IC103 by control of BCONT signal from ACW.

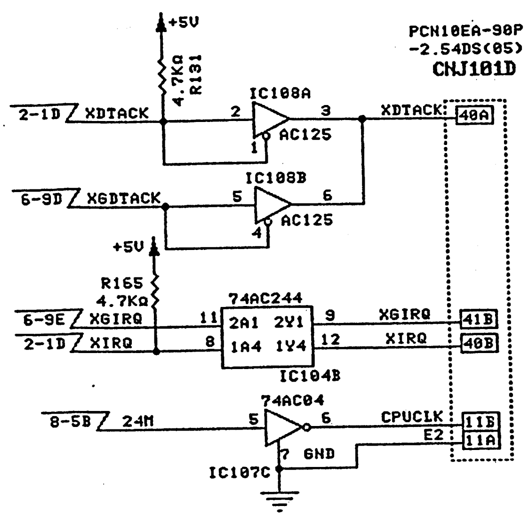


Data bus D00- D15 becomes internal bus (D00- D15) in the CRTC board via data buffer IC201 and IC202 by control of chip select signals of ACRTC and ACW and then becomes data signal to the ACRTC and waveform buffer RAM.



XDTACK acknowledge signal, XIRQ and XGIRQ interrupt signals and clock signal are sent back to the main board.

Acknowledge signals from the ACRTC and ACW pass through 3-state buffer IC108A and with the output signals they are operated with wired OR logic to be XDACK signal and then sent to the main board. XIQR and XGIRQ signals are separately sent to the main board after buffer IC104B.



2) Character/graphic display circuit block

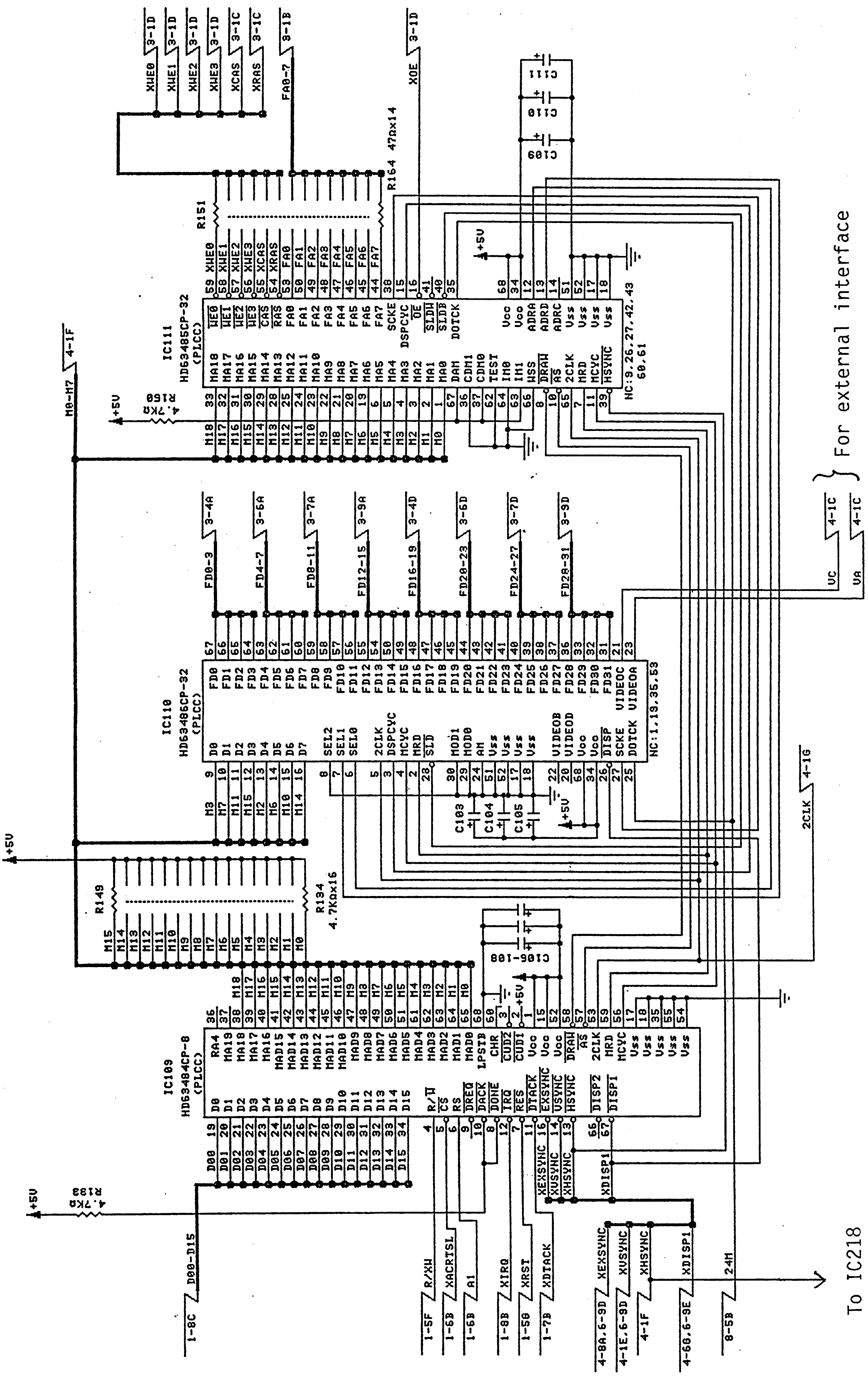
This circuit block draws characters and trendgraph into graphic RAM using data from CPU with ACRTC and its related devices.

ACRTC (Advanced CRT Controller IC109) generates data for drawing into graphic RAM by control of CPU. Also it converts into internal bus (M0- M18) for communciation with the ACRTC related devices and generates synchronization signals SYNC, XVSYNC, XHSYNC, and XDISP1 that are necessory for CRT display. With these signals, CRT raster scanning is made in 24.59kHz horizontally and 62.03Hz vertically with 793 raster lines of interlaced scanning. Synchronization signals are used for waveform display and character/graphic display and waveform display are synchronized.

When ACRTC receives data and commands from CPU, it turns XDACK to active to inform CPU receipt of data. After data reception, ACRTC starts received command and after finishing the command, ACRTC outputs XIRQ to CPU to inform end of command. Therefore, data transfer between ACRTC and CPU is done only when screen is re-drawn.

In this bedside monitor, character font (bit image) is transferred from character ROM in the ROM pack to non-displaying area of graphic RAM through CPU and ACRTC at power on. Font data is output from the graphic RAM with copy command for character/graphic display. Therefore there is no special character ROM on the CRTC board.

ACRTC device outputs graphic RAM address information and data time-sharingly to its internal bus and MCYC (Memory CYCle) signal indicates which is being output. IC110 reads out data and IC111 reads out address information and access into graphic RAM. Attribute information which is written in synchronization with horizontal synchronization signal is being output. It is possible to output externally by latching this data. In this bedside monitor, attribute information is is output with color palette so that an external color display monitor can be used.

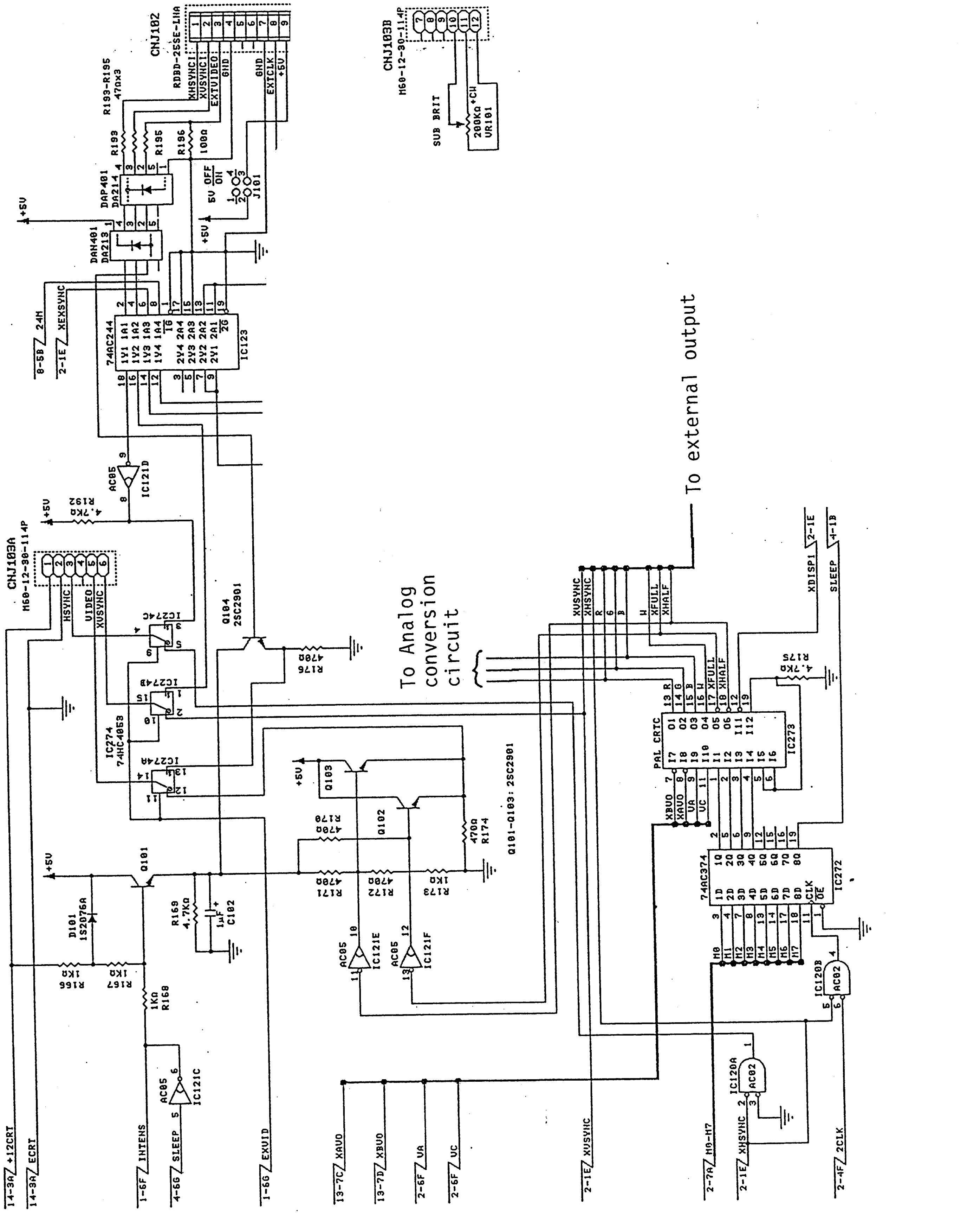

IC109
HD63484CP-8
(PLCC)
IC110
HD63486CP-32
(PLCC)
IC111
HD63486CP-32
(PLCC)
R149
R134
4.7KΩx16
R151
R164 47Ωx14
R133
4.7KΩ
R150
4.7KΩ
C103
C104
C105
C106-108
C109
C110
C111
+5V
D00-D15
M0-M7
FD0-3
FD4-7
FD8-11
FD12-15
FD16-19
FD20-23
FD24-27
FD28-31
FA0-7
XWE0
XWE1
XWE2
XWE3
XCAS
XRAS
XOE
2CLK
VC
VA
R/XW
XACRTSL
A1
XIRQ
XRST
XDTACK
XEXSYNC
XVSYNC
XHSYNC
XDISP1
24M
For external interface
To IC218

3) External interface circuit block

This circuit block composes of video signals from character/graphic display circuit block and waveform display circuit block to be converted into analog signal to display on the CRT screen.

Video signals of TTL level from character/graphic display circuit and waveform display circuit are converted into analog video signal with Q102 and Q103 after passing through IC273 and IC121E-F for CRT display by the bedside monitor. This video signal for both character/graphic and waveform has 2 bits information per one dot. With combination of 2 dots, full brightness, half brightness and off can be selected.

J101 is a jumper to supply external instrument with +5V power. The uppermost bit of attribute information is for sleep mode screen. When it is "H", screen is of sleep mode. Q101 is for sleep mode control and brightness adjustment. VR101 sets adjustable brightness range of display.


To external output
To Analog conversion circuit
CNJ102
RDBD-25SE-LHA
CNJ103B
M60-12-30-114P
CNJ103A
M60-12-30-114P
SUB BRIT
200KΩ+CH
VR101
R193-R195
47Ω×3
R196
100Ω
DAP401
DA214
DAN401
DA213
J101
74AC244
IC123
IC121D
AC05
R192
4.7KΩ
IC274
74HC4053
Q104
2SC2901
R176
470Ω
Q101
Q102
Q103
Q101-Q103: 2SC2901
R170
R171
R172
R173
R174
D101
1S2076A
R166
R167
R168
R169
C102
IC121C
IC121E
IC121F
PAL CRTC
IC273
R175
4.7KΩ
74AC374
IC272
IC120A
IC120B
AC02
XHSYNC1
XVSYNC1
EXTVIDEO
GND
EXTCLK
+5V
HSYNC
VIDEO
XVSYNC
XHSYNC
XFULL
XHALF
XDISP1
SLEEP
14-3A +12CRT
14-3A ECRT
1-6F INTENS
4-6G SLEEP
1-6G EXVID
13-7C XAVO
13-7D XBVO
2-6F VA
2-6F VC
2-1E XVSYNC
2-7A M0-M7
2-1E XHSYNC
2-4F 2CLK
8-5B 24M
2-1E XEXSYNC

4) Waveform buffer RAM circuit block

Waveform buffer RAM is for storage of command signal from CPU and waveform data. Waveform buffer RAM is separated into two groups which always work in parallel. This is to increase horizontal resolution of the screen and obtain 6 or 8 waveform traces.

There are two buffer RAM accesses. One is that ACW reads data from CPU as command data and the other is that DCW reads waveform data and writes it into waveform buffer RAM. Both accesses are controlled by ACW.

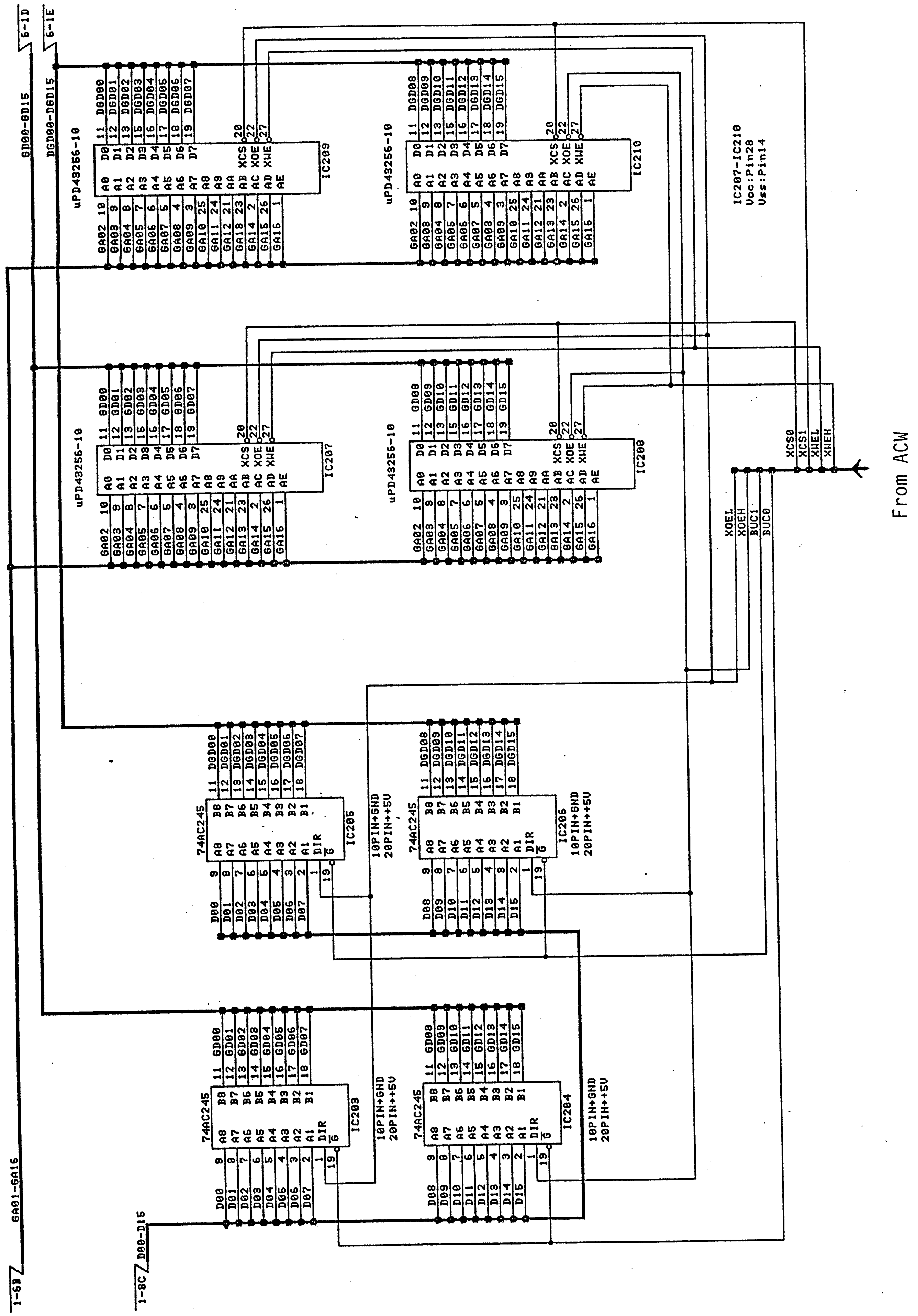
Usually, address bus GA02- GA16 is controlled by address bus of CPU. When accessing by ACW, BCONT (Bus CONTrol) signal separates CPU bus from internal bus with IC102 and IC103. The lowest address GA01 of CPU branches internal bus D00-D15 into two groups of GD00- GD15 and DGD00- DGD15 and also swithes BUC0/1 and XCS0/1.

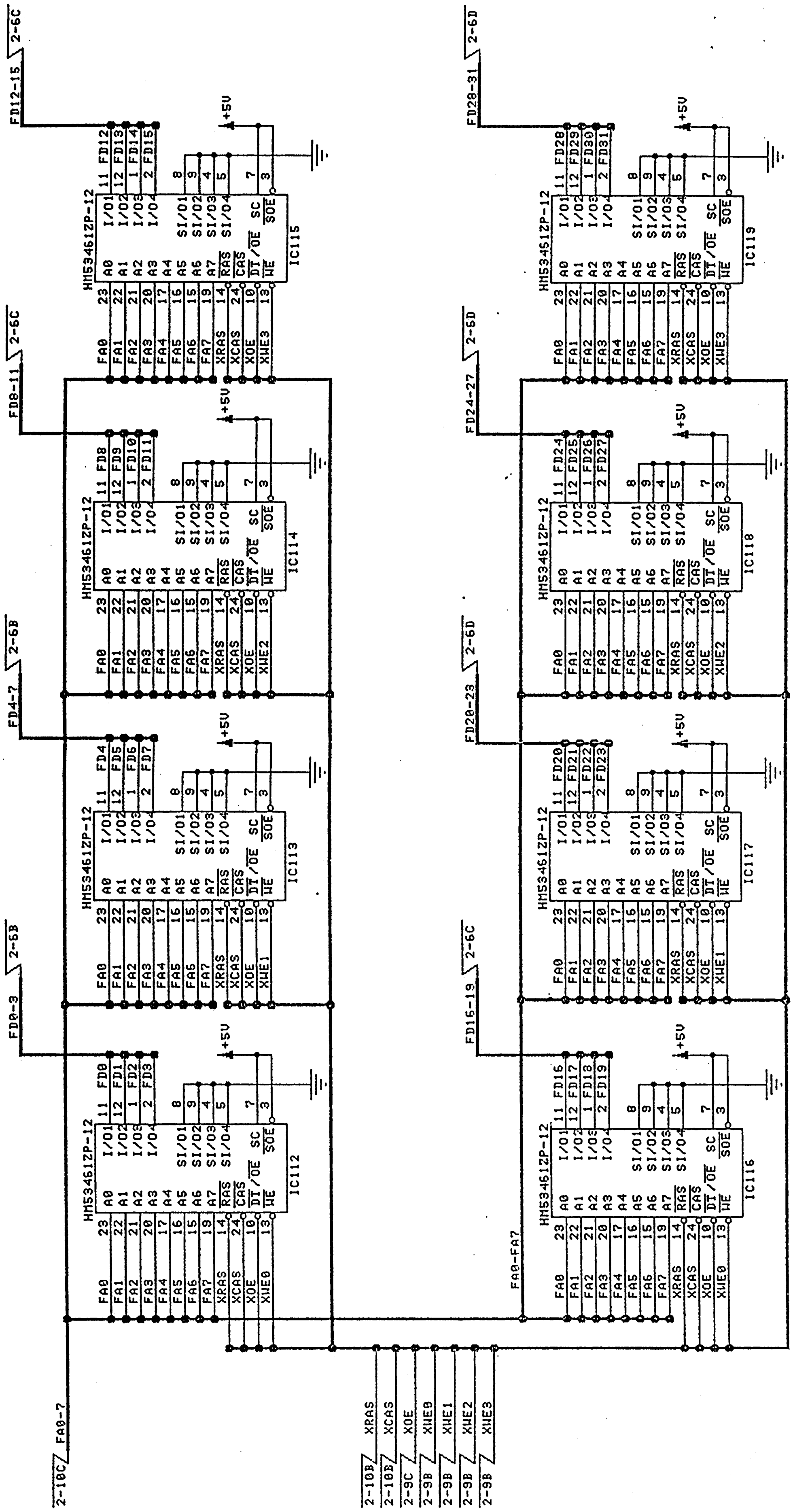
When access competes with CPU, XGDTACK is delayed and CPU waits. XOEH/L and XWEH/L are switched by upper byte and lower byte. For example, from the viewpoint of CPU even words whose GA01="0" are accessed with memory chips as follows:

xxx0, xxx4, xxx8, xxxC: IC207
xxx1, xxx5, xxx9, xxxD: IC208

In the same manner odd words whose GA01="1" are accessed with memory chips as follows:

xxx2, xxx6, xxxA, xxxE: IC209
xxx3, xxx7, xxxB, xxxF: IC210.


6-1D
6-1E
GD00-GD15
DGD00-DGD15
uPD43256-10
IC209
IC210
IC207
IC208
IC207-IC210
Vcc:Pin28
Vss:Pin14
XCS0
XCS1
XHEL
XHEH
From ACW
XOEL
XOEH
BUC1
BUC0
74AC245
IC205
IC206
IC203
IC204
10PIN+GND
20PIN++5V
GA01-GA16
D00-D15
1-6B
1-8C


HM53461ZP-12
IC112
IC113
IC114
IC115
IC116
IC117
IC118
IC119
FD0-3
FD4-7
FD8-11
FD12-15
FD16-19
FD20-23
FD24-27
FD28-31
2-6B
2-6C
2-6D
FA0-7
FA0-FA7
2-10C
XRAS
XCAS
XOE
XWE0
XWE1
XWE2
XWE3
2-10B
2-9C
2-9B
+5V

5) Waveform conversion circuit block

This circuit block converts waveform data written into waveform buffer into dot data (drawing) for screen display. This operation is the most important for waveform display. Almost of all the operation is done by DCW and waveform frame memory and address signal from ACW sometimes access the operation.

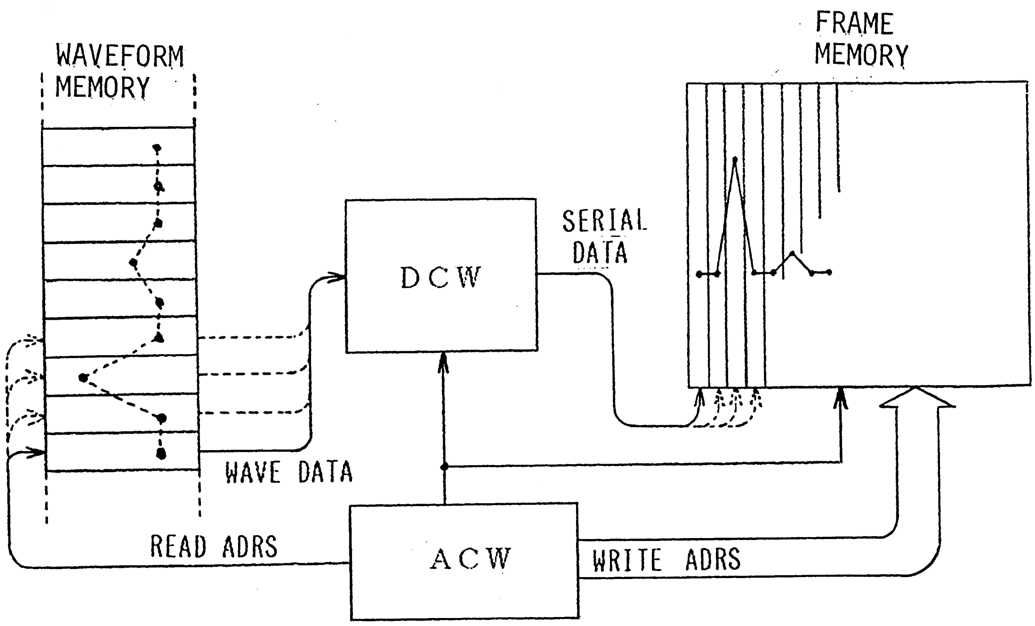
Waveform frame memory provides shift register function and accesses one by one with clock input to memory. In this bedside monitor, waveform data output from serial port is dot interpolated.

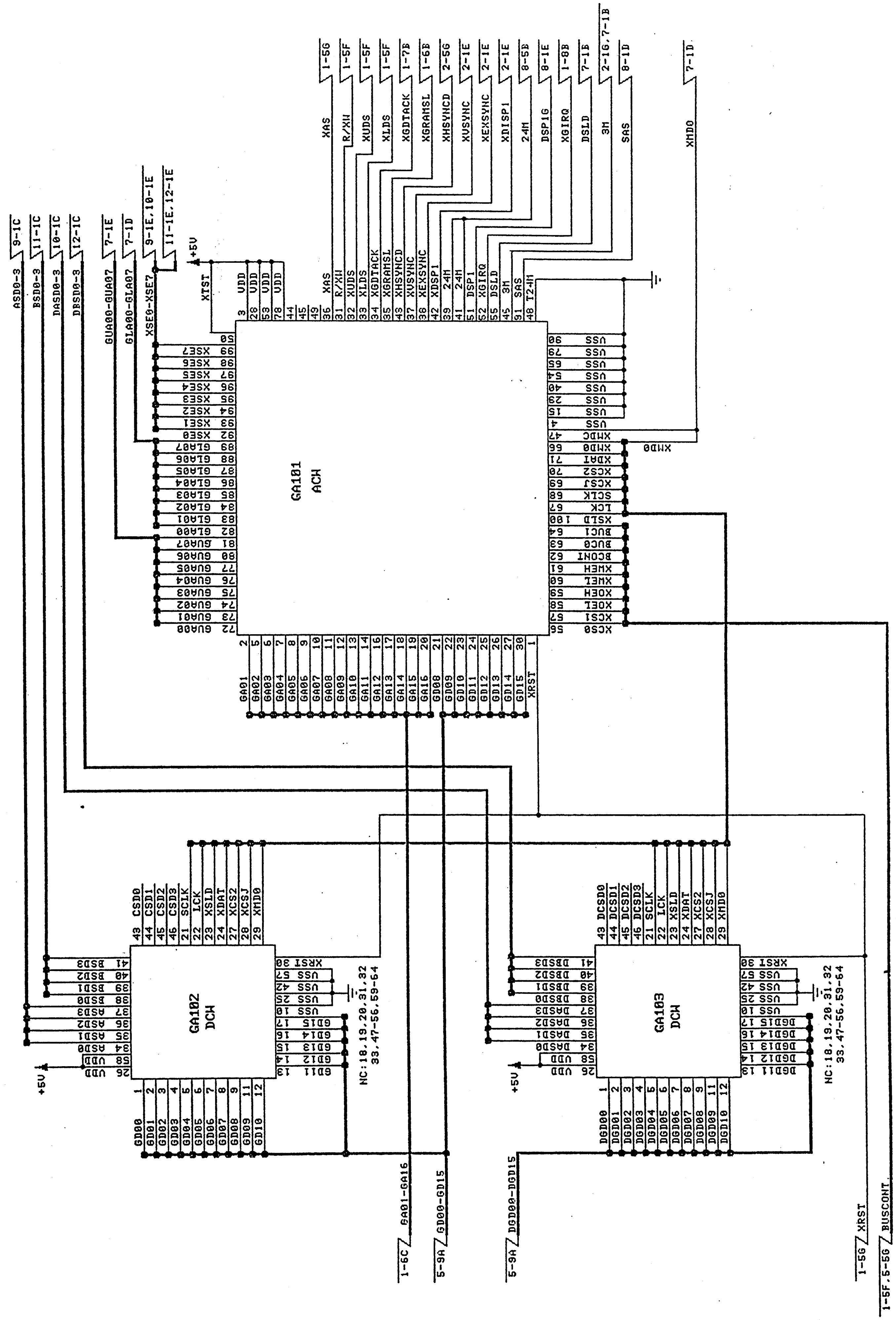
Details of drawing

At rising of DSLD (Delayed Serial Lead Data), ACW device GA101 outputs address data to waveform buffer RAM and starts accessing. DCW devices GA102 and GA103 acquire 16 data (4 data x 4 traces = 16) from waveform buffer RAM by LCK (Latch ClocK) signal from ACW.

With XSLD (Serial Lead Data) signal generated before the next DSLD output, counter inside DCW is cleared and after the next DSLD output, by using SCLK (Shift ClocK) signal from ACW, aquired data is interpolated and output to ASDO- 3 ("A" Shift Data), BSDO- 3 ("B" Shift Data), DASDO- 3 (Delayed "A" Shift Data), and DBSDO- 3 (Delayed "B" Shift Data).

On the other hand, waveform frame memory (IC230- 237, IC240- 247, IC250- 257, IC260- 267) whose address is set simultaneously with DSLD, aquires serial data from the SI/OO- 4 terminal by using SAS (Serial Access Strobe) signal as clock signal. ACW switches address to waveform buffer memory or waveform frame memory every XSLD (DSLD) and repeats above procedures.



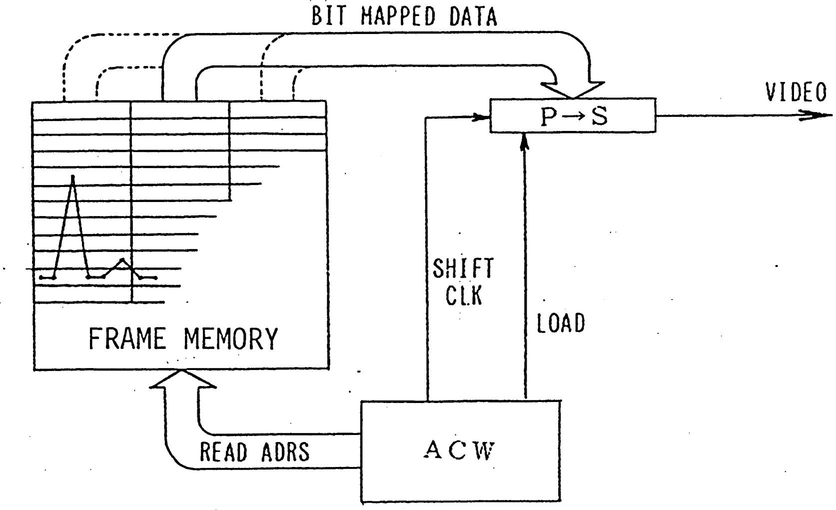

GA101
ACH
GA102
DCW
GA103
DCW

6) Waveform display circuit block

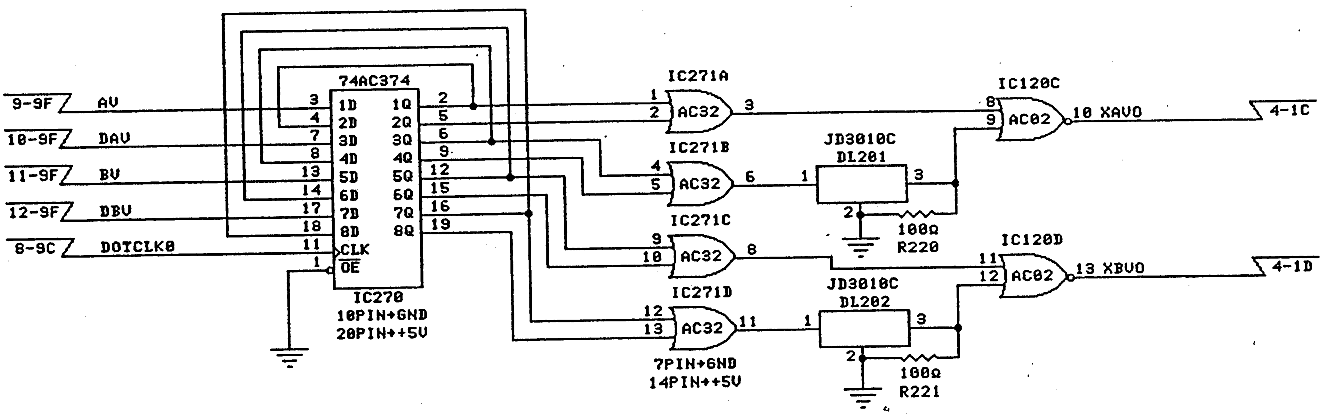
Dot data written into waveform frame memory is vertical/horizontal converted and read out from parallel port. This parallel data is again converted into serial data by shift register as video signal for screen display.

Two data groups brached in waveform buffer RAM are added by shifting half dot time to increase horizontal resolution of the screen display. This output signal is transferred to external interface circuit block.

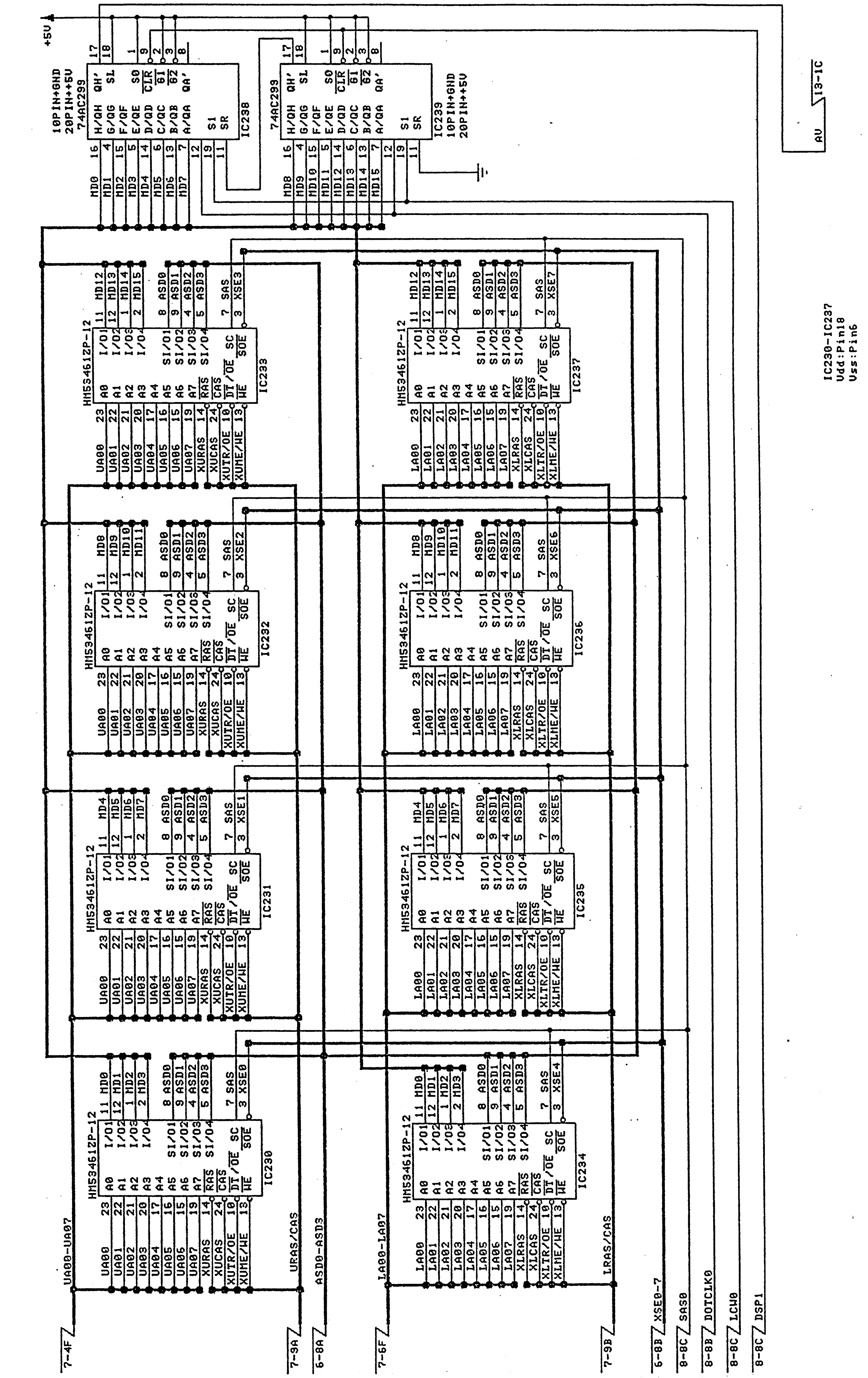
Dot data drawn vertically is read out horizontally (corresponding to CRT screen) for horizontal electron beam scanning on the screen.



Display address counter in ACW is cleared by XDSP1 (DiSPlay) signal from ACRTC and DSP1G is output to start waveform display. Synchronized with 3M (3MHz clock) from ACW, ACW accesses waveform frame memory, shift resistor (IC238- 239, IC248- 249, IC258- 259, IC268- 269) and simultaneously latches 16 bits of data from waveform frame memory. Latches data is output from shift register by 49MHz dot clock signal and acquired by IC270 latch device and once more synchronized with clock. Output pulses of IC270 are widened by IC271 and one of two data groups branched in waveform buffer RAM is half dot time delayed by DL201 or DL202 and two groups of signals are added.

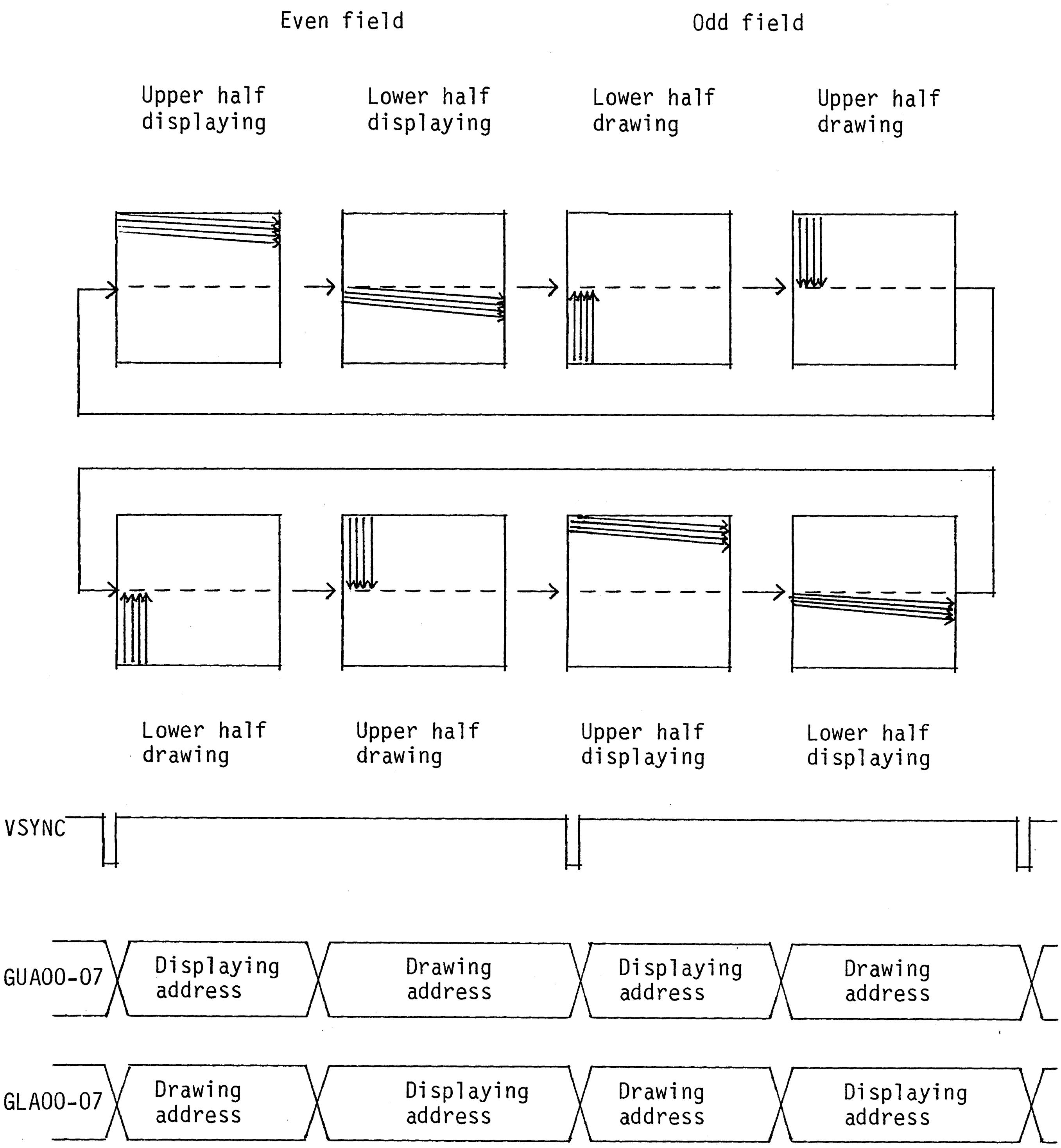


With above procedure one line scanning is made. Every 3M (3MHz clock), address is advanced and address is advance by HSYNC signal to complete one screen scanning.


+5V
10PIN+GND
20PIN++5V
74AC299
IC238
IC239
HM53461ZP-12
IC230
IC231
IC232
IC233
IC234
IC235
IC236
IC237
IC230-IC237
Vdd:Pin18
Vss:Pin6
UA00-UA07
URAS/CAS
ASD0-ASD3
LA00-LA07
LRAS/CAS
XSE0-7
SAS0
DOTCLK0
LCW0
DSP1
7-4F
7-9A
6-8A
7-6F
7-9B
6-8B
8-8C
8-8B
8-8C
8-8C
AV
I3-1C

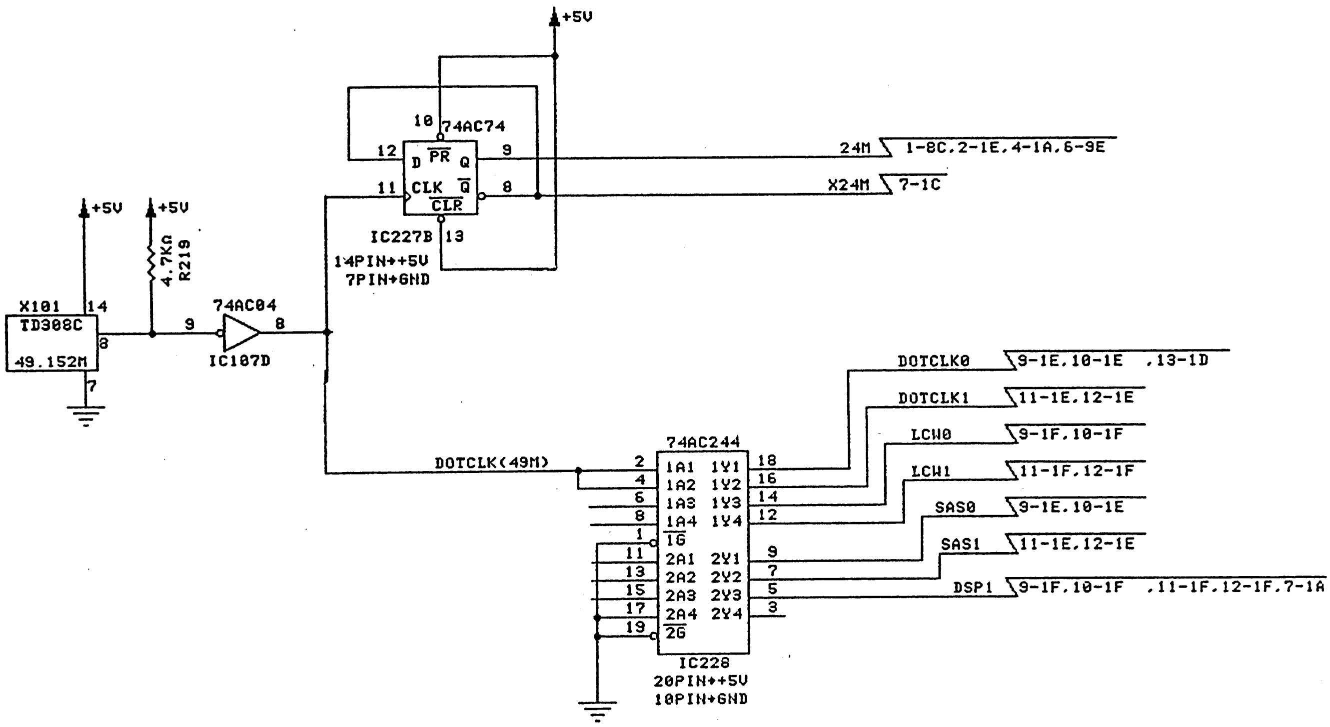
As waveform frame memory must display and draw data simultaneously, one screen is separated into upper half and lower half screen. While one half is drawing (writing data into memory) the other half is displaying (beam scanning on the screen). Therefore, devices are also separated for each half.

Addresses GUA00- 07 (Upper Address) and GLA00- 07 (Lower Address) switch according to drawing and displaying cycle.



7) Clock oscillation circuit block

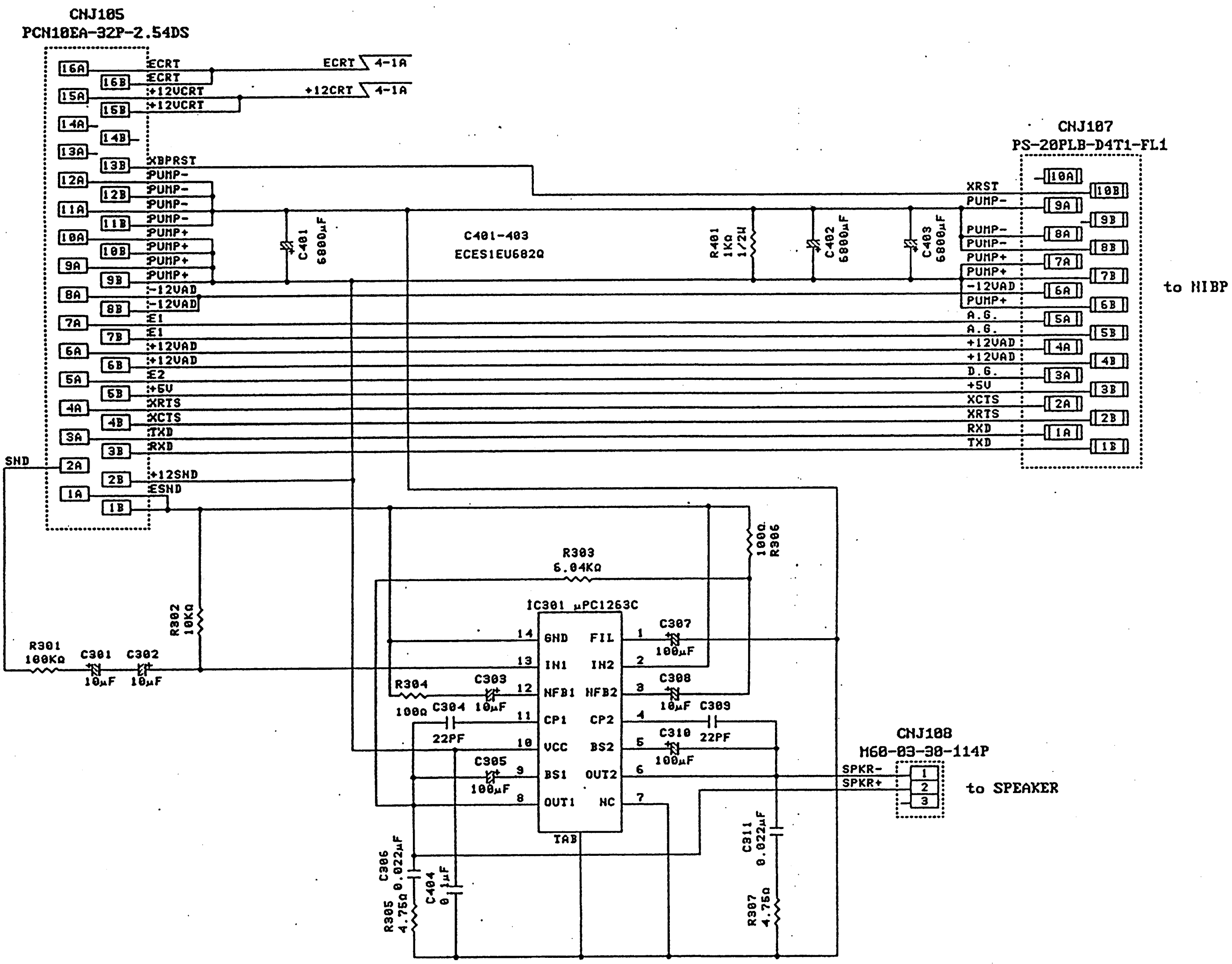
System clock is generated in this circuit block. Original oscillation 49.152MHz is input through buffer to shift register as shift clock. IC227B half divides the original clock into 24.576MHz. This clock is branched to 24M and X24M that are used as system clock in CRTC board and main board (24.576MHz clock is half divided into 12.288MHZ in main board which is used as system clock for main board).



9) Audio power amplifier circuit block and NIBP line junction block

Approximately 0.3/vp-p QRS synchronized tone or alarm tone from main unit is attenuated with R301 and R302 to 1/10 and then approximately 60 times amplified to a level for speaker. Total amplification is 6 times. IC301 is a stereo amplifier. In this circuit, both channels are connected in bridge and operates in BTL (Balanced Transformer Less) operation to increase output power.

NIBP junction block only passes signals from main board to NIBP unit, however, capacitors are mounted on this part to reduce surge current appearing when NIBP pump starts rotation for cuff inflation.



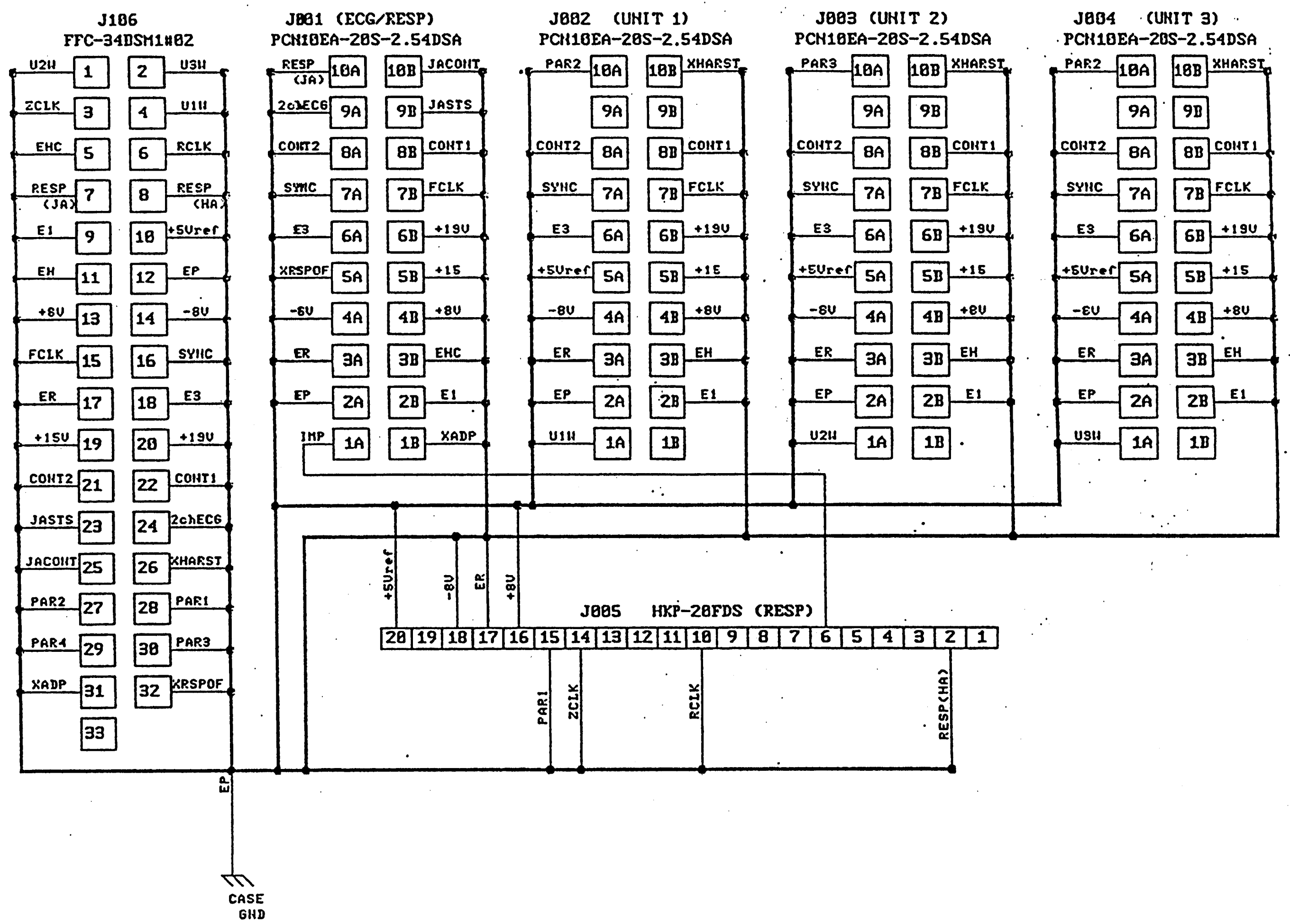
4.2.3 Head amplifier mother board, RESP board and operation boards

Head amplifier mother board gathers signals from the head amplifiers and sends them to the main board. And it transmits and receives data to and from the RESP board. RESP board detects impedance variation between the ECG electrodes to obtain respiration activity. As the ECG/RESP head amplifier is provided with isolation transformers, this circuit is not isolated.

Components on the operation boards are switches, connectors, lamps and volumes that are connected to the main board.

1) Head amplifier mother board UP-0399

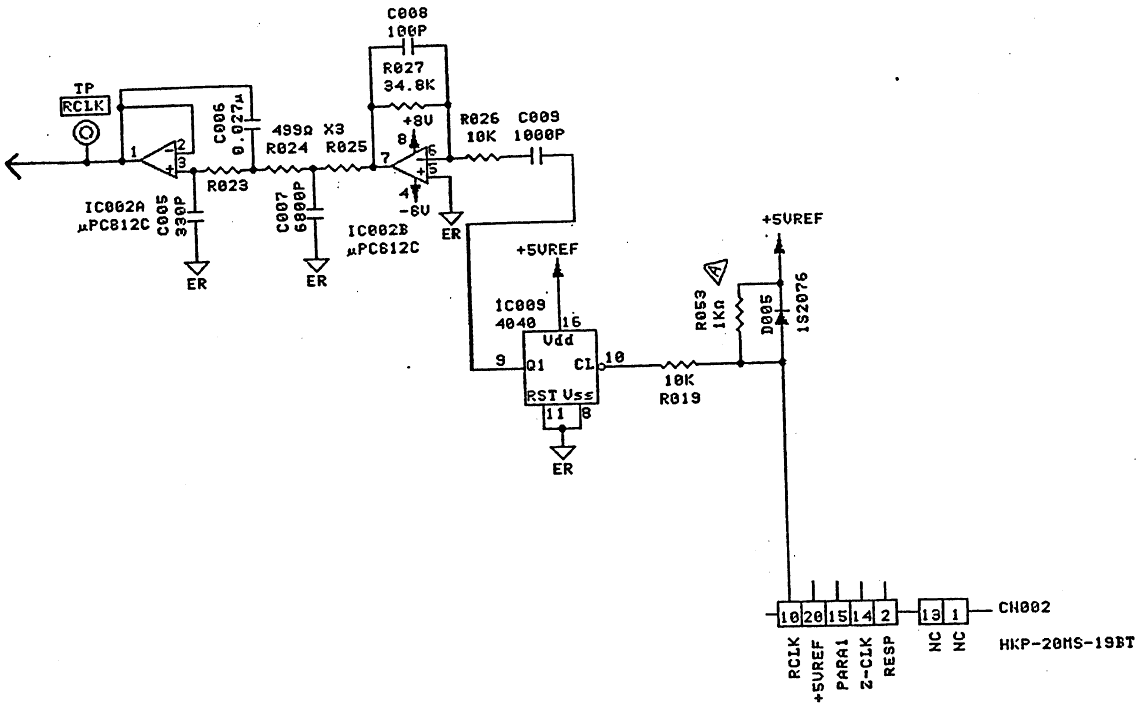
Head amplifier mother board UP-0399 is composed of four connectors J001- J004 for connecting with head amplifiers including ECG/RESP head amplifier, connector J005 for RESP board and connector J106 for the main board. Connector pin assignment of J002- J004 is fully compatible. J001 for ECG/RESP head amplifier has special pin assignment.



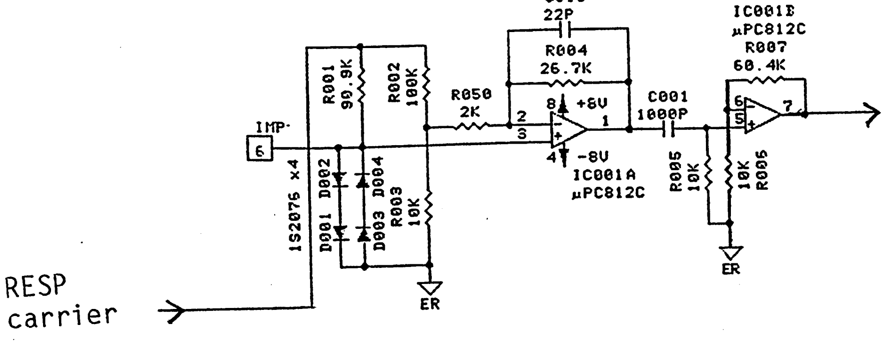
2) RESP board UP-0519

RESP board UP-0519 mounts circuits for respiration detector, carrier signal generator, 20 times gain preamplifier, respiration synchronization detector, 5Hz high-cut filter, auto shift circuit including 91 times gain amplifier, output buffer including 5Hz low-pass filter, and respiration measure on/off control comparator.

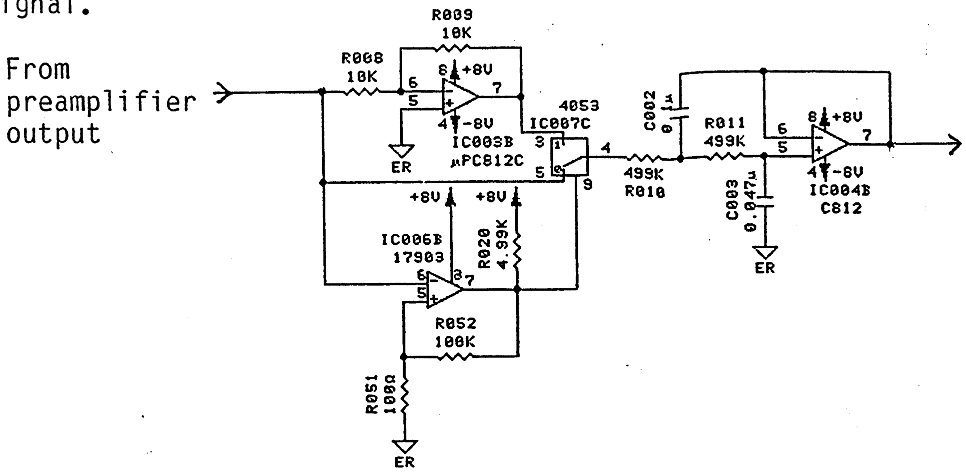
In respiration detection carrier generator, 153.6kHz RCLK frequency is divided into 76.8kHz 5Vp-p squarewave, and then filtered by three steps of low-pass filter composed of IC002, R023- R026 and C005- C007 into 10Vp-p 76.8kHz sinewave respiration detection carrier signal.



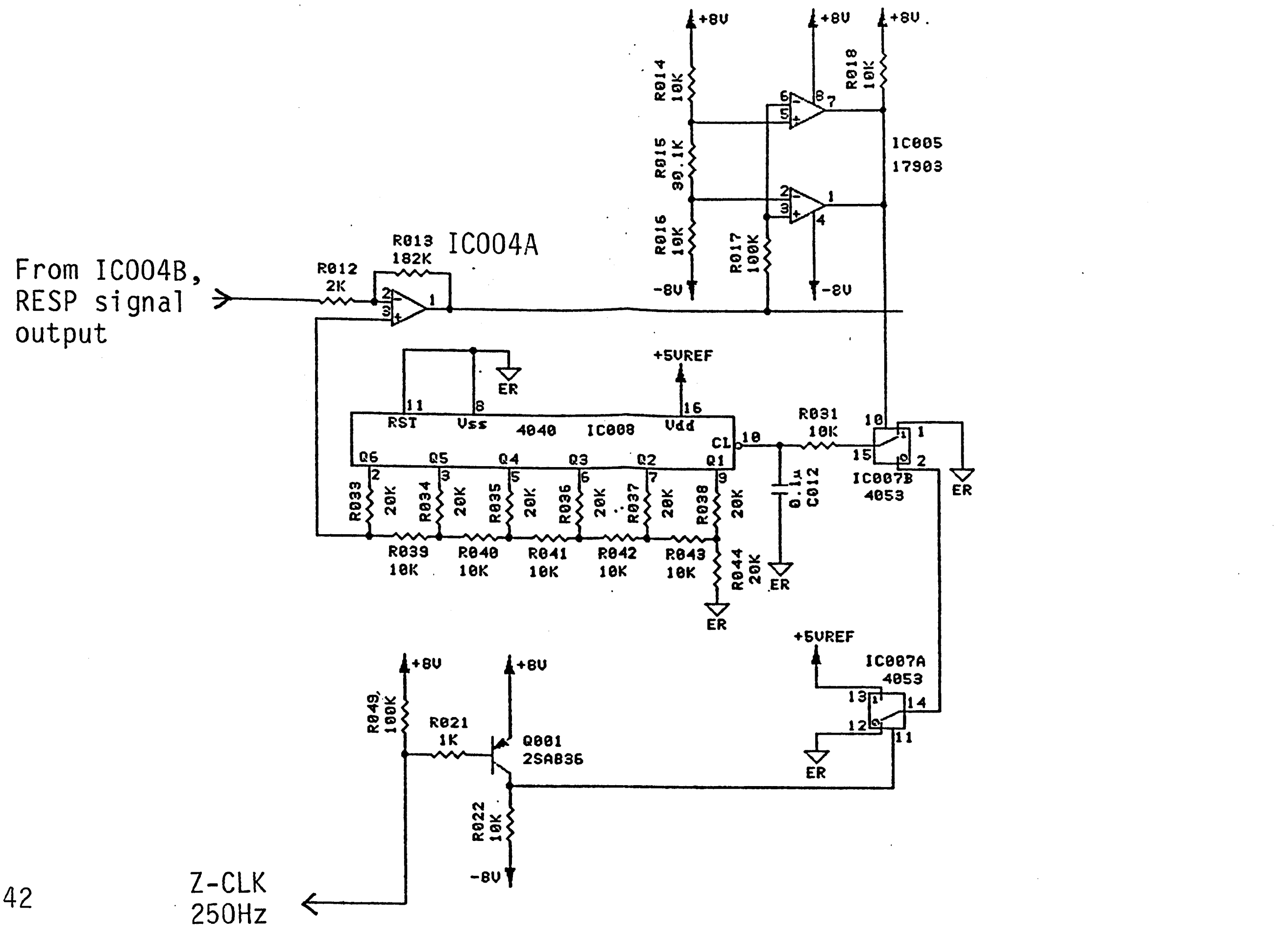
Patient circuit composes of a bridge circuit with R001- R003 and impedance of patient's chest. Bridge circuit is excited by respiration detection carrier and imbalance component of the bridge is approximately 20 times amplified by IC001A and IC001B. When impedance of the patient is high, imbalance component of the bridge becomes large and output of preamplifier becomes large. D001- D004 are for protection of the circuit against over input such as defibrillation discharge.



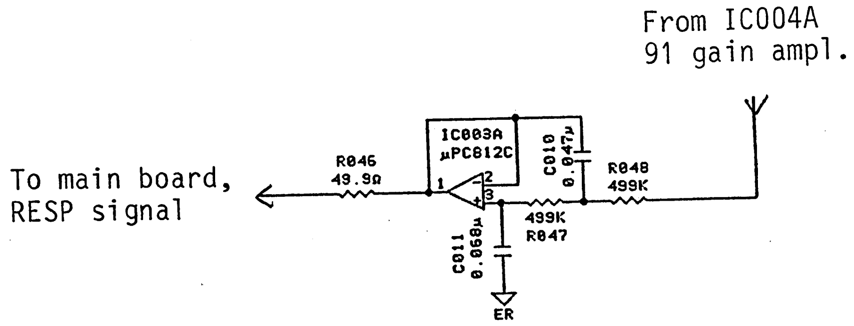
Preamplifier output signal is sent to respiration synchronization detector and low-pass filter. Respiration waveform is full-wave rectified with zero-cross comparator IC006B and analog switch IC007C according to polarity of respiration waveform signal.



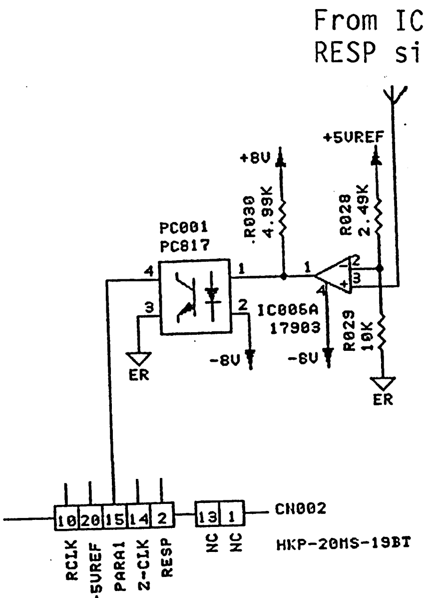
Auto shift circuit block limits amplitude of respiration waveform so that signal does not saturate in the next 91 times gain amplifier. When output of 91 times gain amplifier IC004A is over +4.8V or below -4.8V, comparator IC005 turns to Low and analog switch IC007B is switched to side "0". Then Z-CLK signal (250Hz) is applied to counter IC008 and the counter starts counting. Output of IC008 is D/A converter by R-2R ladder and 0V to 5V staircase waveform is superimposed on the input signal at IC104A to shift output signal. When output voltage returns inside +4.8V and -4.8V comparator output turns to High and stops Z-CLK signal. IC007A is a level shifter device generating 0V- 5V level voltage from 0V- 8V Z-CLK signal.



IC003A functions as output buffer to the main board and noise component is removed.



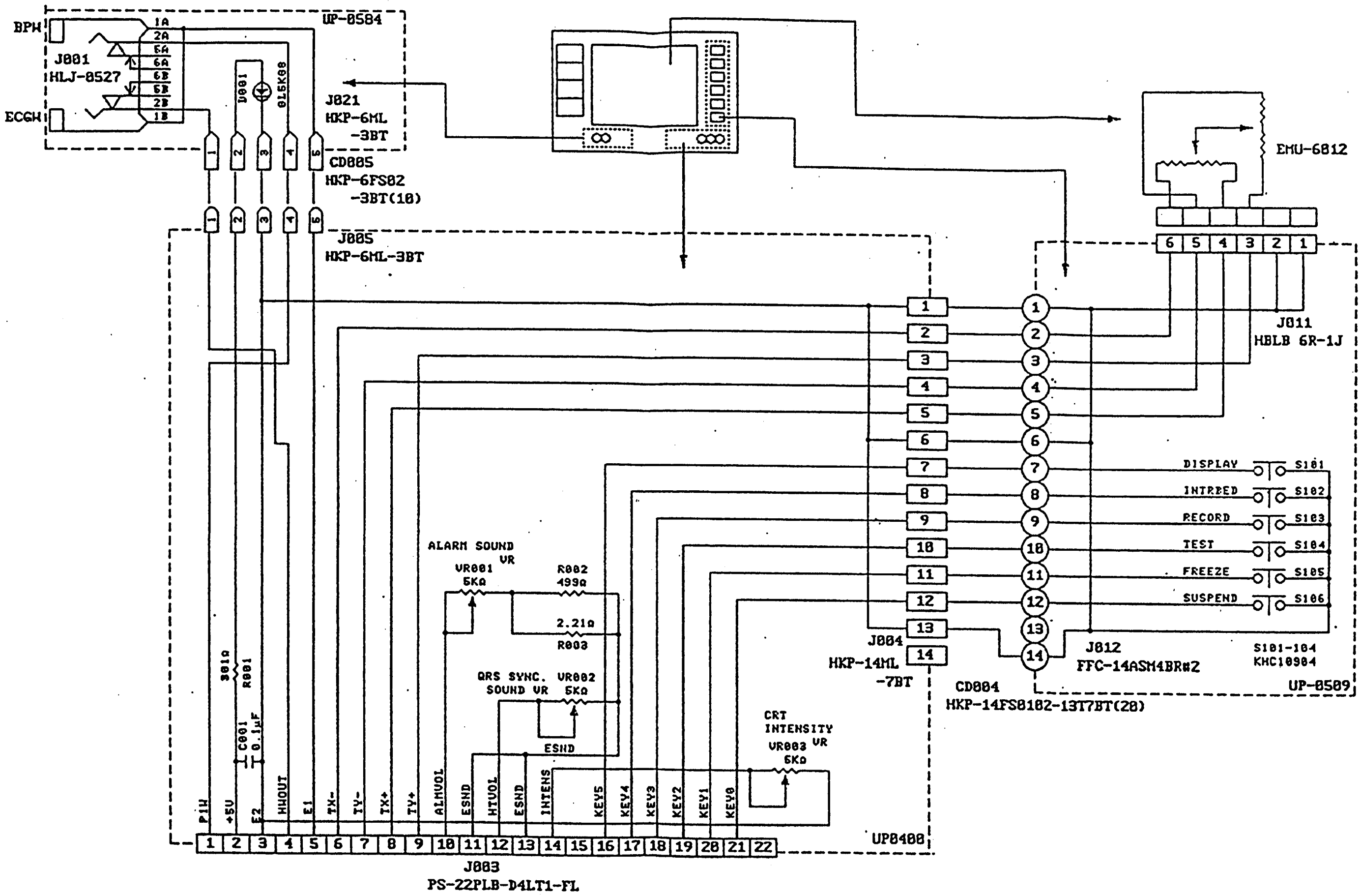
In respiration measuring condition detector, output signal before auto shift circuit is compared with voltage (4.3V) corresponding to 2 kohm impedance by comparator IC006A by using a nature that output signal becomes large when impedance is high. When impedance is low comparator output is Low and PARA1 signal is High. When impedance is high, PARA1 signal is Low to indicate that respiration measurement is off condition. PARA1 signal is indicated with PAR1 in the main board.



3) Operation boards UP-0400, UP-0509 and UP-0584

Three operation boards are fixed to front chassis and touch key panel assembly and mounts tone and brightness volumes, push button switches, power indication lamp and ECG1 and BP1 output jacks. At factory set, alarm tone cannot be adjusted fully fadeable but by shortening the jumper line R003 with a wire it can be fully fadeable with the volume on the front (R003 reads 2.21ohm in circuit diagram).

Touch key panel data is sent to main board via UP-0509 and UP-0400.



4.2.4 Power supply SC-006R, SC-006RK

SC-006R/RK supplies power (±8V, ±19V, +5V and +12V) from AC100V- 125V line voltage and SC-006P/RK supplies power from AC220V- 240V. Switching regulation method is used in this power unit to design the unit small and light weight.

Line voltage setting can be set by moving the plug P003 to/from J003 (100V) or J002 (200V).

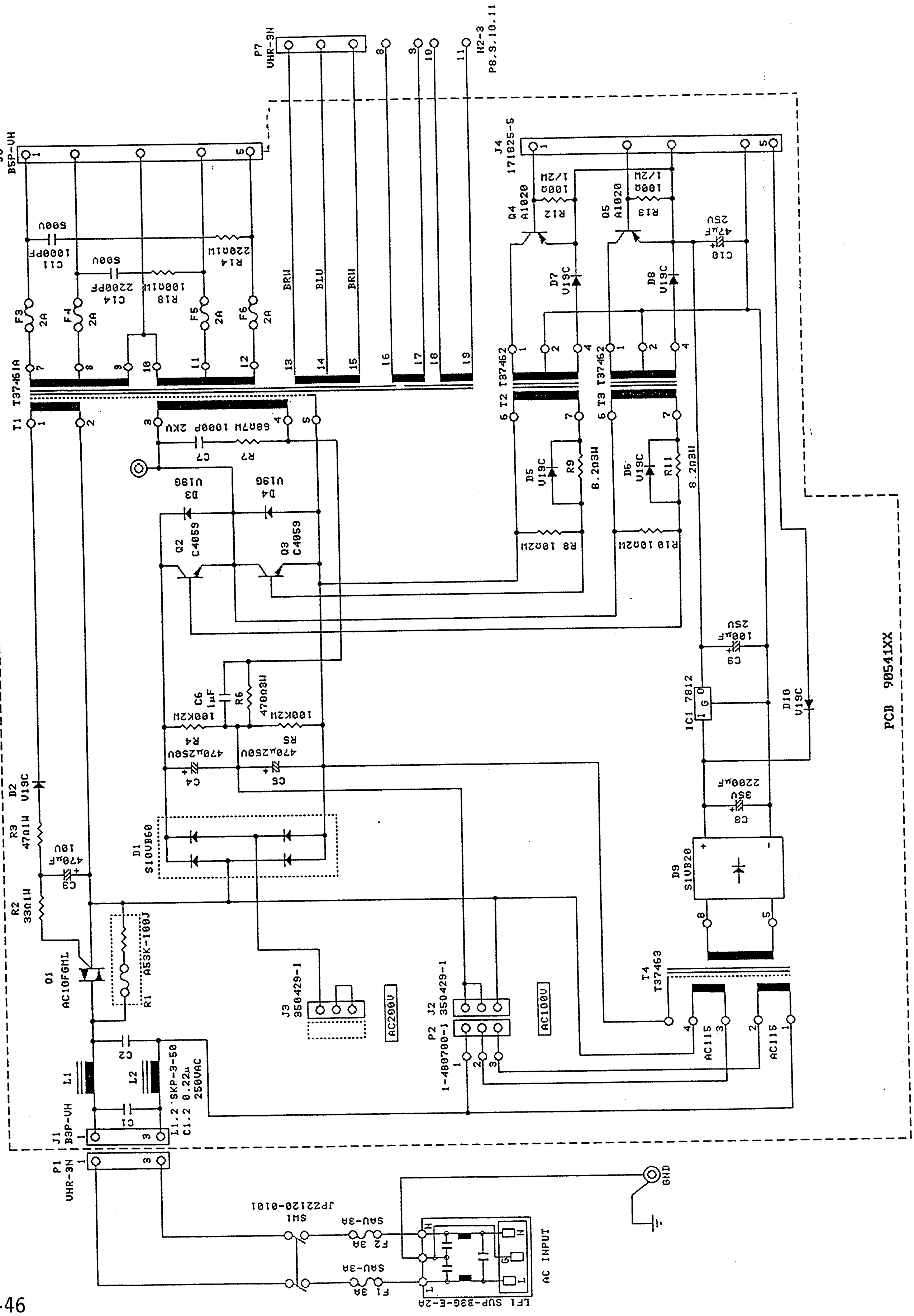
1) Primary circuit

AC line voltage is connected to a surge-current protector composed of Q1 and R1 after passing through line filter, power switch and power fuses. The line voltage is connected to rectifier diode D1, and smoothers C4 and C5 and applied to power transformer T4 in drive circuit. Q2 and Q3 switch rectified DC voltage under control of approximately 24kHz drive transformers T2 and T3.

At secondary circuit of power transformer T4, rectified, smoothed and regulated voltage by D9, C8, and IC1, is connected to drive transisters Q4 and Q5. this power voltage is used at power on to start drive circuit. In stable condition after power on, +19V power voltage is supplied for the drive circuit.

Q1 in surge-current protector circuit is off when power switch is turned R1 to on, and connected with capacitors is limitting large charging current into capacitors. After drive circuit starts switching operation with Q2 and Q3, Q1 turns to on and AC line voltage is directly applied to circuit. Fuse resistor is used for R1 as when Q1 does not turn to on continuously due to drive circuit failure, large power is exhausted. Be sure that R001 must be replaced with a fuse resistor when servicing.

Power supply unit circuit diagram



2) Secondary circuit

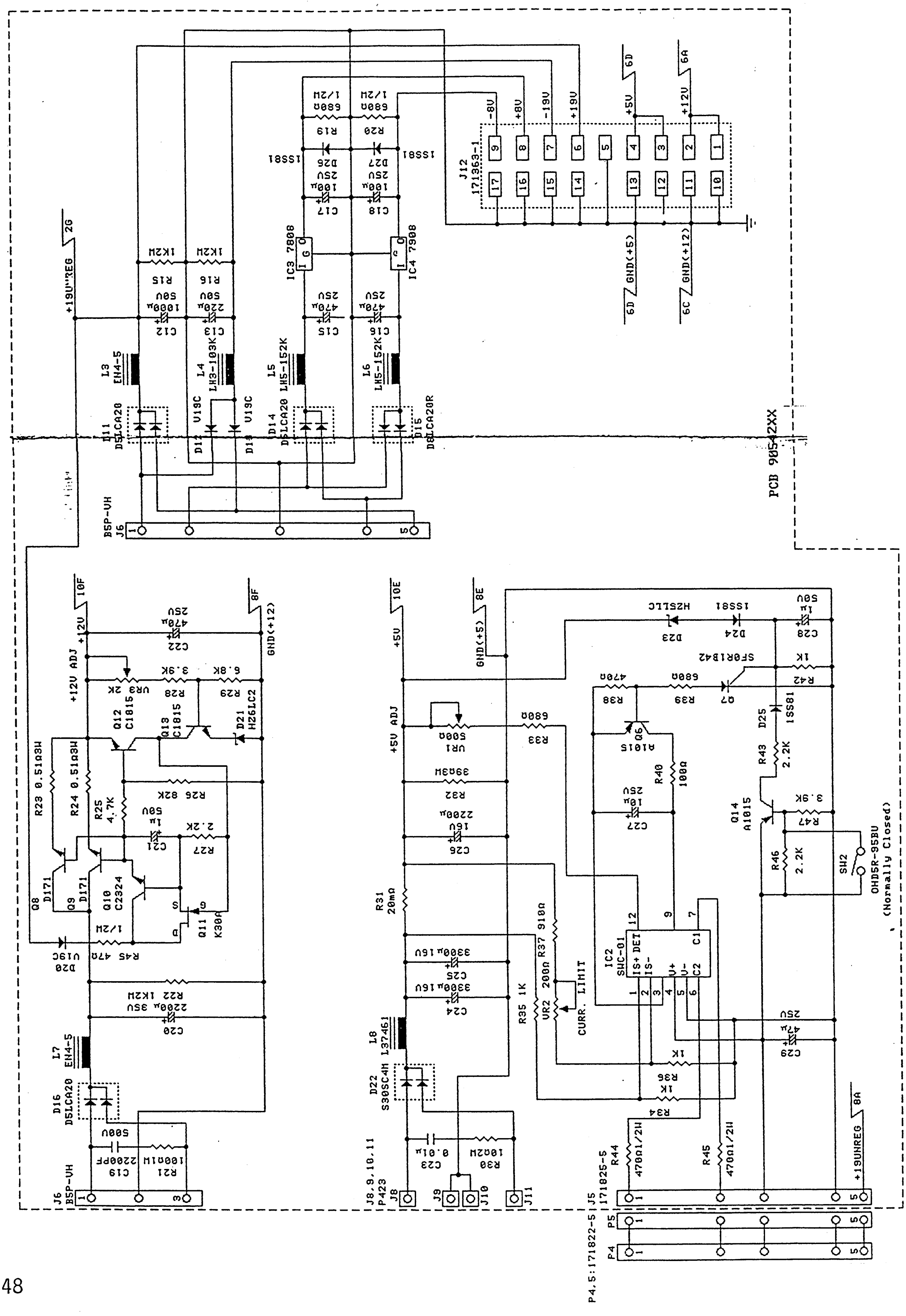
Secondary circuit of transformer T1 is separated into three circuits, ±19V and ±8V (J6) for analog circuits, +5V (P8-11) for digital circuits, and +12V (P6) for CRT unit, NIBP unit and sound board.

Fuses P3- P6 (2A) are inserted into the ±19V and ±8V lines before applying these power line to rectifiers D11- D15, L3- L6, and C12- C16. Fuses are not inserted in the +5V and +12V lines as they are provided with protection circuits in later circuit block.

Rectifiers in the secondary circuits are all choke input type for power efficiency. Rectified ±19V are directly output from the power unit without regulation while ±8V are regulated with IC3 and IC4 three terminal regulators. +12V is obtained by regulating with series regulator composed of transisters Q8- Q12. +12V line is adjusted to +12V ±0.1V with volume VR3. Q12 is used to protect over-current which operates within 3.2A output current.

+5V is the largest power supply in the power unit. This voltage controls Q2 and Q3 switching transisters in the primary switching circuit for power regulation. IC002 controls Q2 and Q3 operation. +5V output voltage is adjusted to +5V ±0.1V with the volume VR1. D23, D26, Q6, and Q7 compose of an over-voltage protector which stops power supply when over-voltage is detected. Thermal switch SW2 and Q14 compose of an over-heat protector which stops power supply when heatsink temperature exceeds 95°C.

Power supply secondary circuit

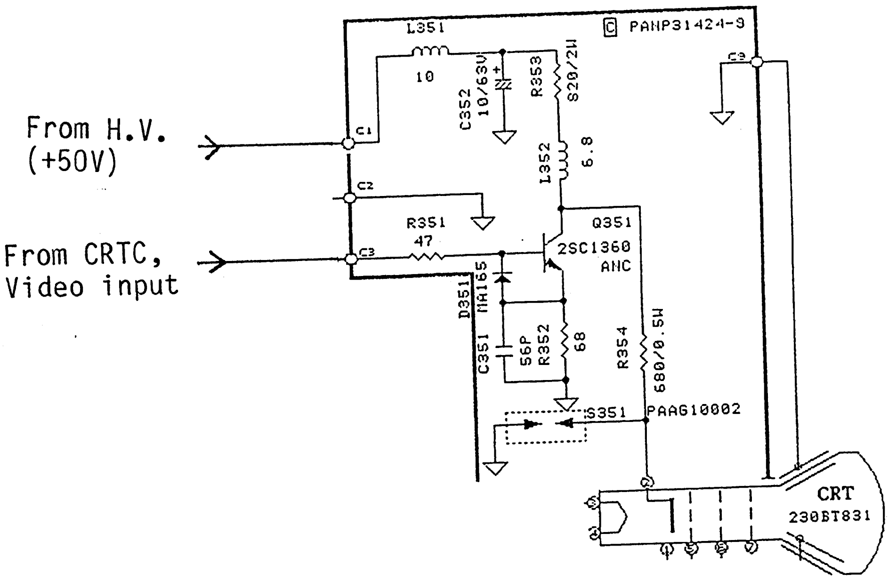


4.2.5 CRT unit VM-004P

CRT unit VM-004P receives synchronization signal and video signal from the CRTC board and displays on the screen. Screen brightness control is done by the volume on the front of the bedside monitor and the SUB-BRIGHT volume on the CRTC board.

1) Video signal circuit

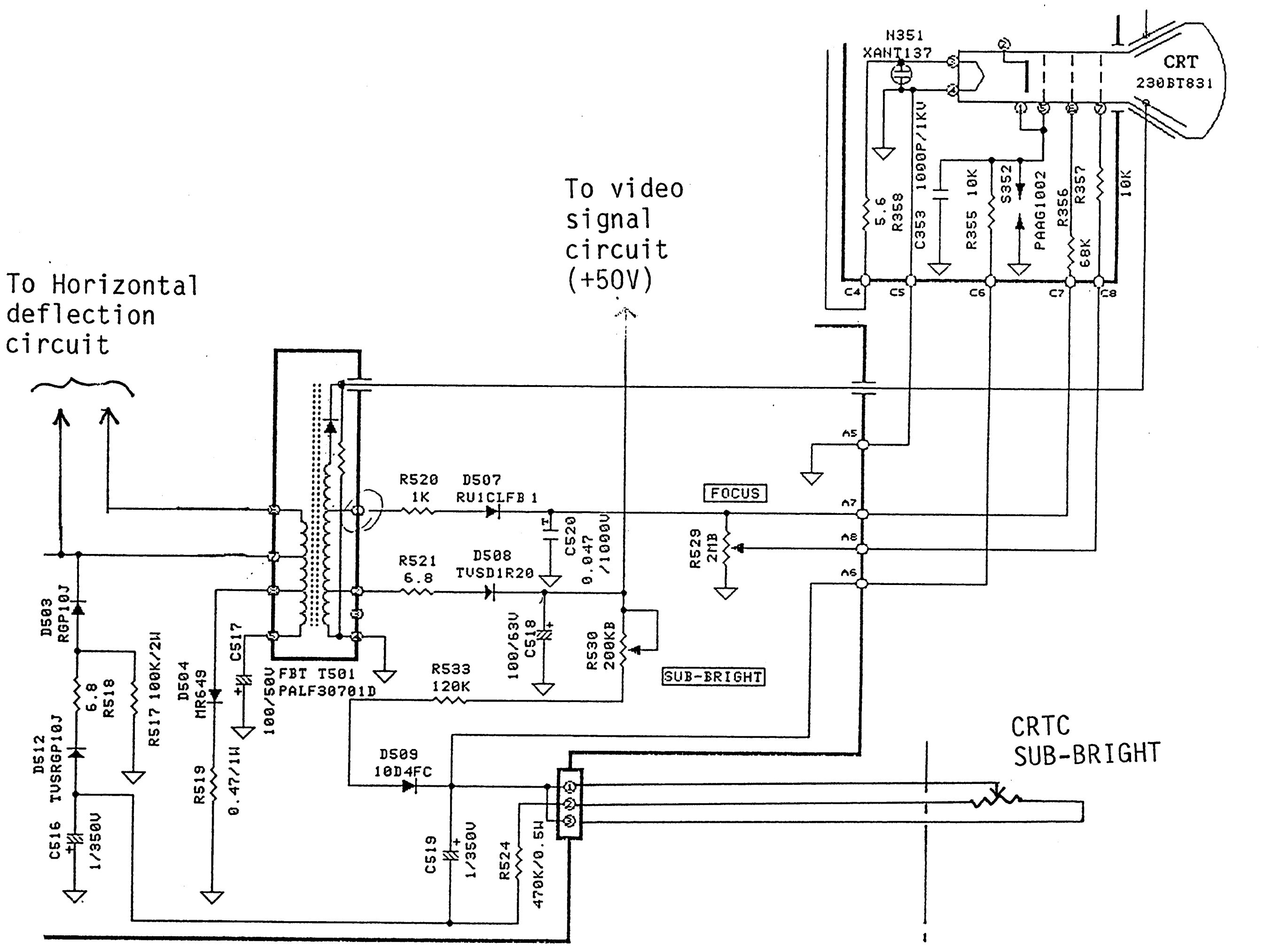
Video signal from the CRTC board is input to the video signal amplifier on the board mounted on the neck of the CRT through the input connector. Video signal is approximately 12 times invertedly amplified and drives CRT cathode. R353 is metal oxide film resistor for heat tolerance due to large power exhaust in the resistor.



1) CRT and peripherals

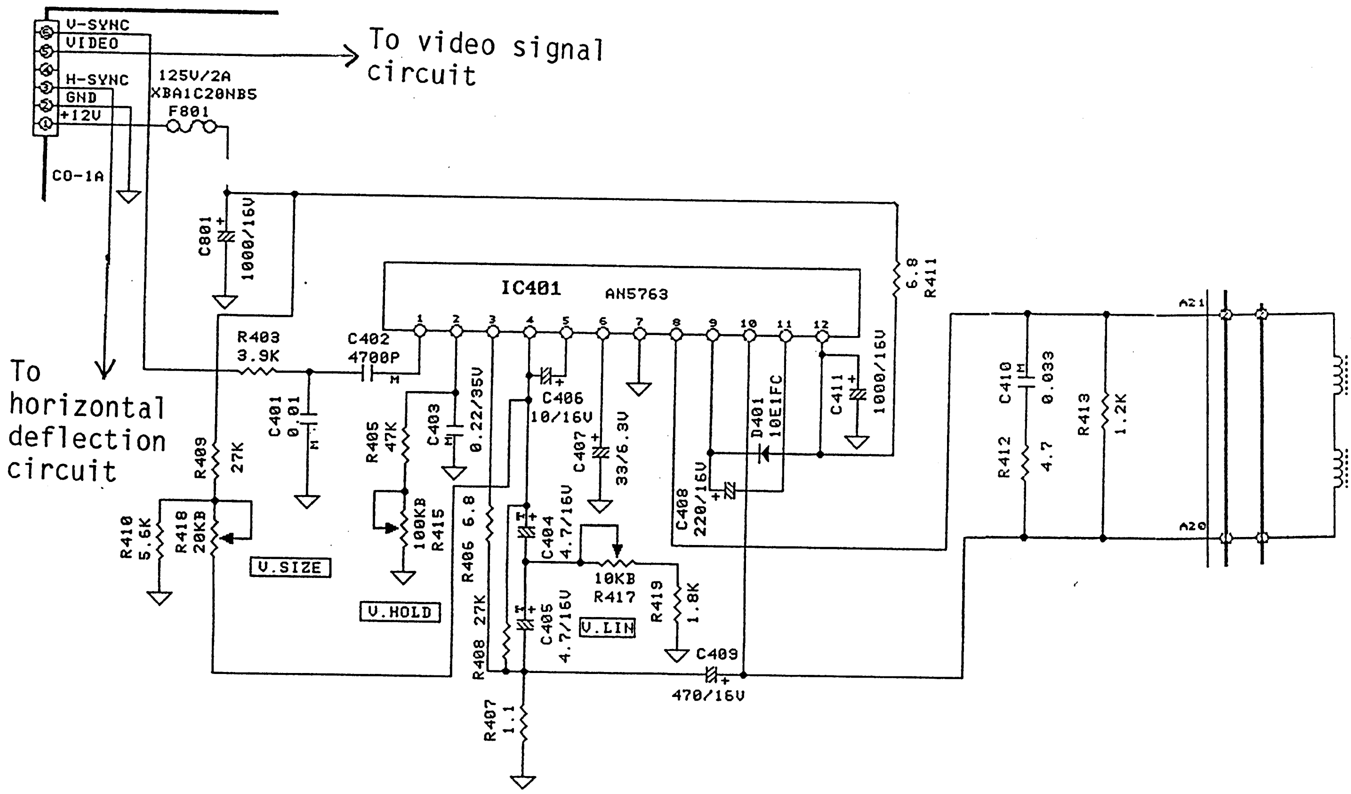
Electron beam controlled by bias voltage between the 1st grid voltage and video signal voltage illuminates fluorecent screen of the CRT. By shifting 1st grid voltage, overall screen brightness can be controlled. SUB-BRIGHT adjustement with R530 is to determine the first grid voltage for CRT biasing. This volume is used to limit maximum brightness to gether is the SUB-BRIGHT volume mounted on the CRTC board. Charge circuit composed of C519, R524, R518, and D510 is a spot killer which prevents electron beam focusing at the center of the screen at power off which will burn fluorecent material.

4th grid controls focusing of the screen.



2) Vertical deflection circuit

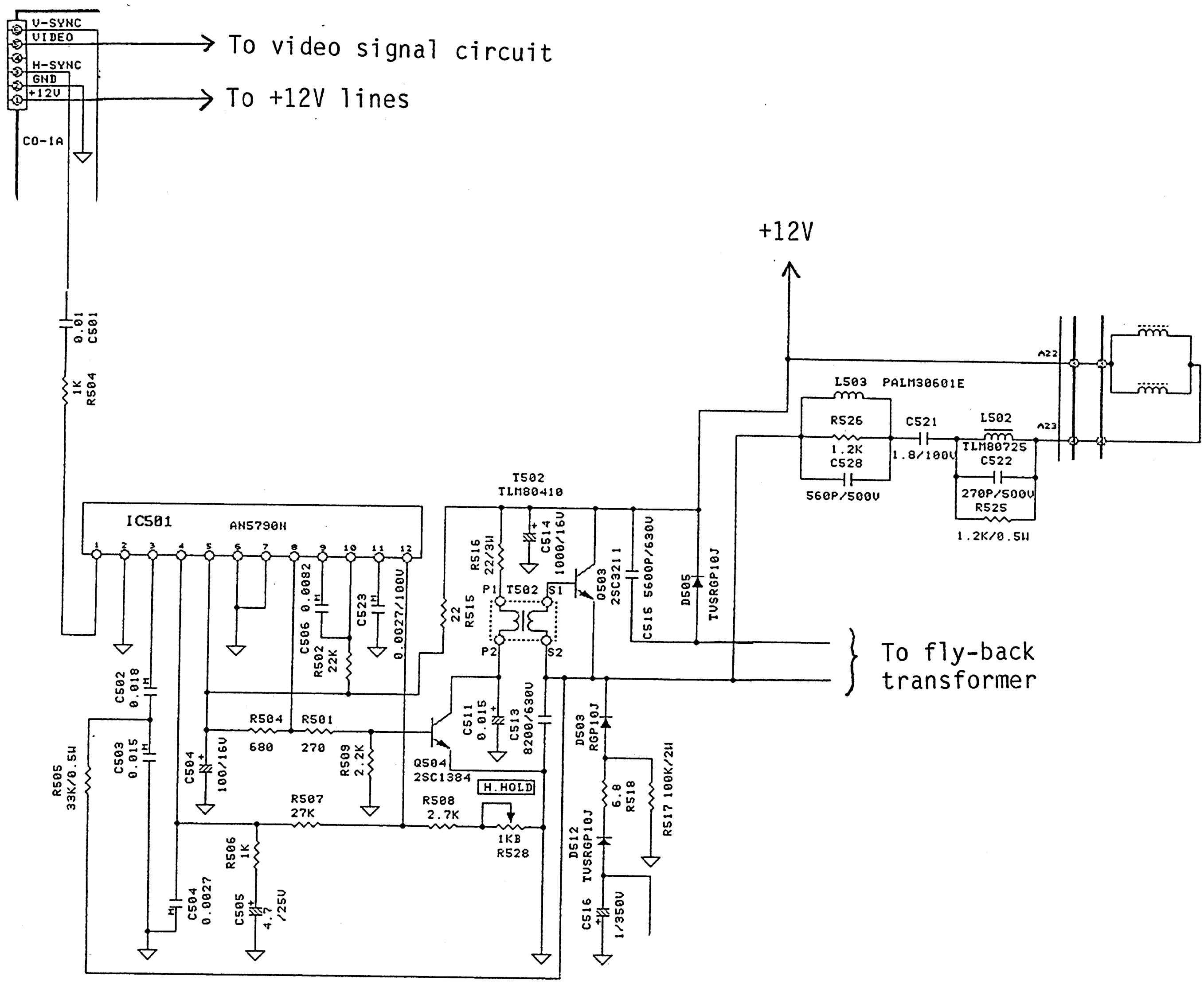
Vertical synchronization signal is input to IC401 pin-1 and controls ON/OFF of charge/discharge circuit composed of C403, R405, and R416 to generate approximately 62kHz sawtooth voltage. VR416 adjusts time constant to synchronize vertically. This sawtooth voltage drives vertical deflection yoke to vertically deflect electron beam VR417 adjusts vertical linearity and VR418 adjusts vertical amplitude.



3) Horizontal deflection circuit

Sawtooth voltage is generated by charge/discharge circuit composed of C506, C523, R508 and R528. The·frequency is automatically controlled with AFC (Automatic Frequency Control) circuit to 24.6kHz which is synchronized with horizontal synchronization signal. Driver Q504 drives horizontal output transister Q503 via T502 to operate horizontal deflection circuit and high voltage circuit.

L502 inserted in series to deflection yoke is for horizontal width adjustment and L503 and C521 are for fine linearity adjustment.

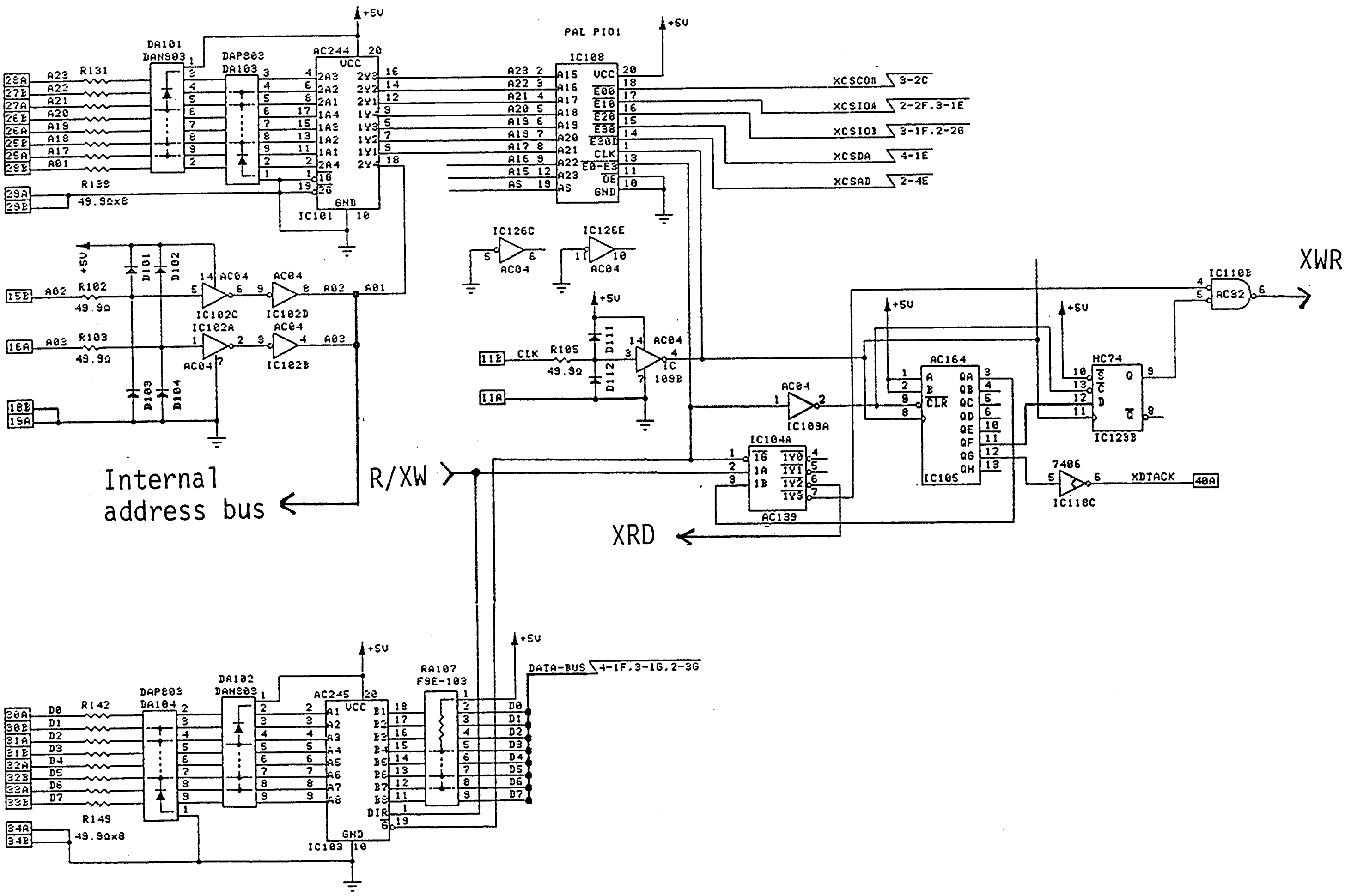


4.2.6 Central monitor interface unit QI-814P

This unit is required to connect the bedside monitor with OGP-7000 or CNS-8200 series central monitor. The unit provides AUX connector for external signal input such as CO2 data from OIR-7101/A CO2 monitor.

1) CPU interface circuit block

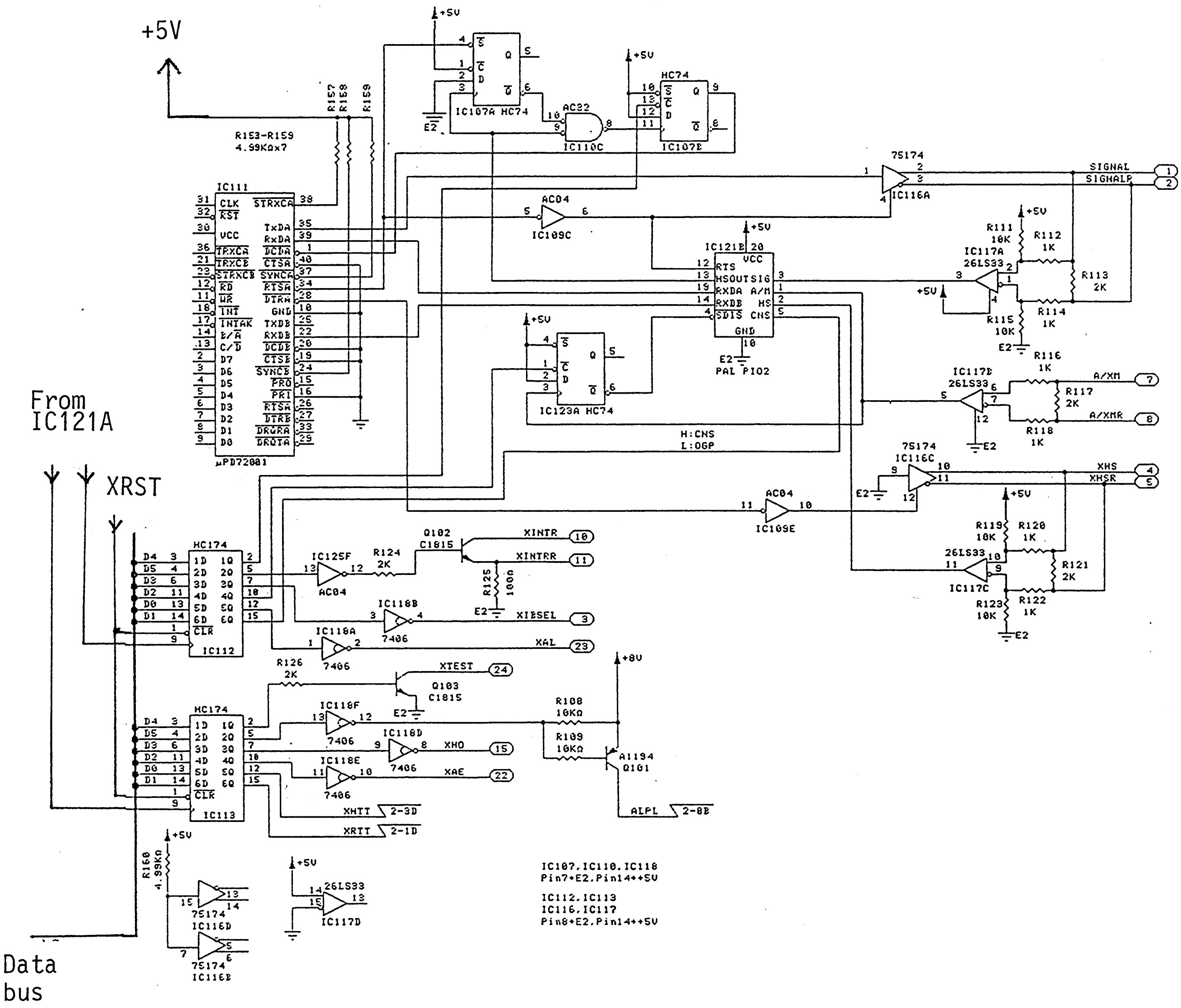
This block is assigned to I/O address E00XXXH- E38XXXH and IC108 generates chip select signal for each device on the PC board when the address area is accessed. Lower address A01- 03 is used for central communication register selection and A/D converter register address. On the other hand, data bus is connected to internal bus via bus buffer. DTACK signal to CPU is output from IC108 which is delayed by 24MHz system clock. XWR signal is output from IC123B which is delayed to coincide timing of A/D conversion operation.



2) Central communication circuit block

Numerical value and status signal communication is done in digital and waveforms are sent to central monitor in analog. IC111 serial communication controller converts parallel data into serial to be transmitted to central monitor and converts serial data of the central monitor into parallel and transmits to CPU.

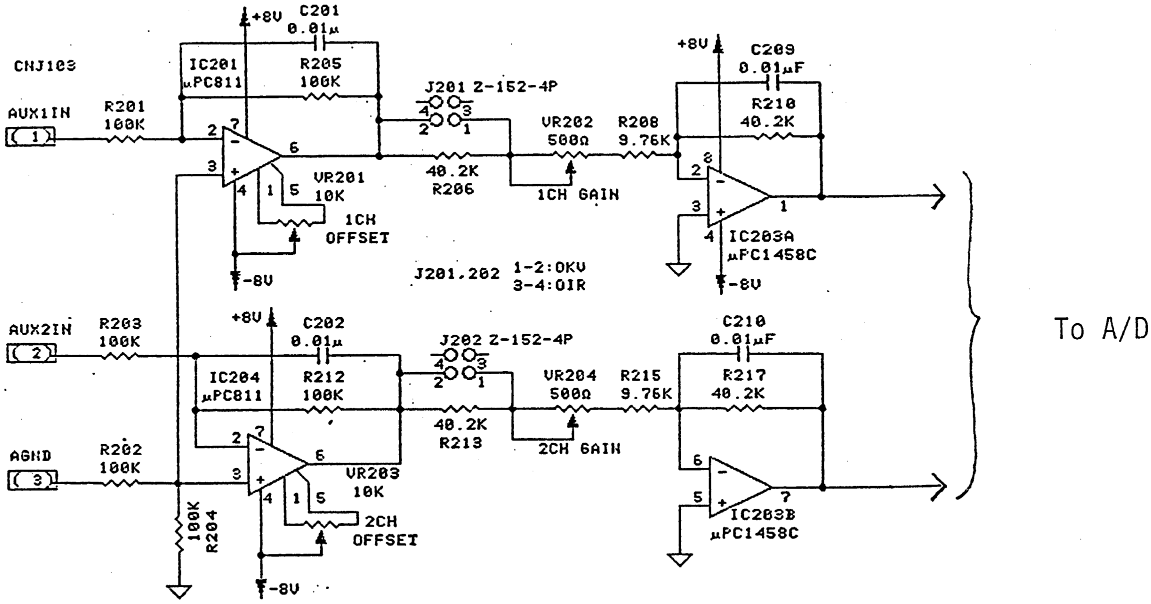
IC107, IC106, IC117, IC123A, and IC121B compose of an I/O interface to arrange communication protocol according to OGP or CNS communciation. IC121B switches the protocol. Output data from IC111 is transferred to SIGNAL line in both OGP and CNS communication protocol and input data from SIGNAL line is input to RxDA when OGP at ADDRESS and is input to RxDB at MESSAGE. XHS signal input to DCDA via IC121B, IC107, and IC110C. Output is done by control of DTRA. When CNS communication protocol, input data from A/XM line is input to RxDA. IC112 and IC113 compose of latch circuit which drives status signals XAL, XAE, XHO, and XTEST and an alarm pole (optional alarm indicator pole used for neonatal monitors) and handles QRS and respiration synchronized signals.



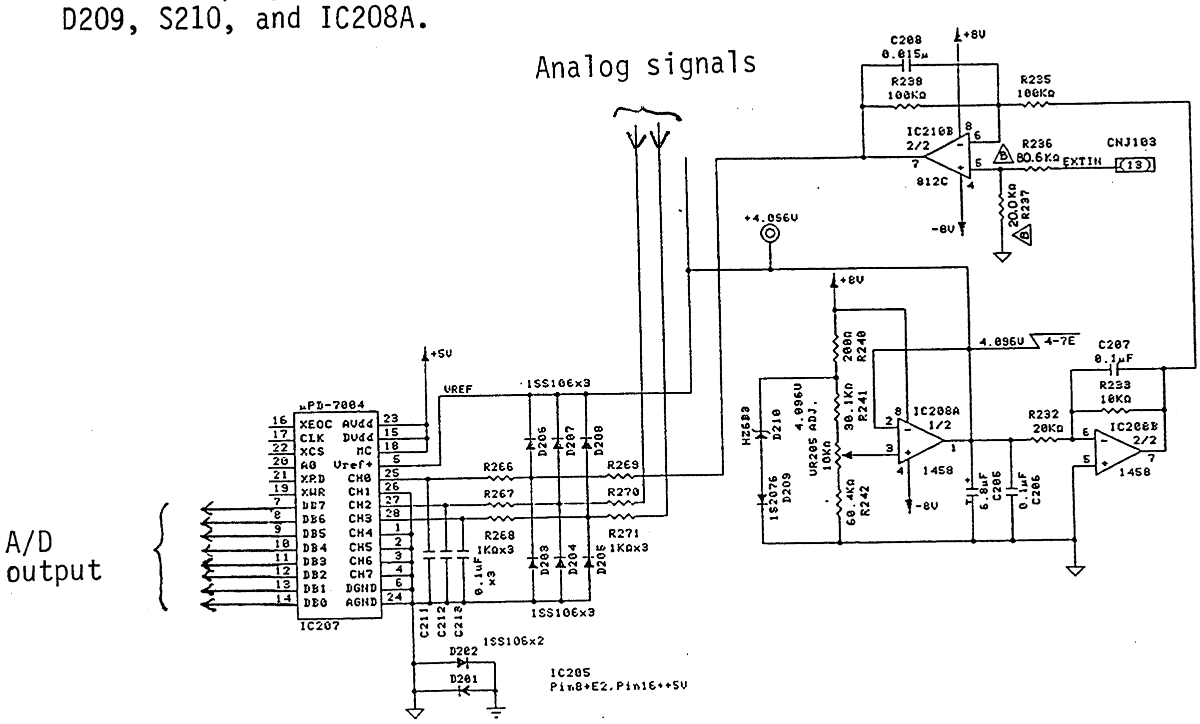
3) AUX input circuit block

This circuit block handles external input signals. CO2 and tcPCO2/tcPCO2 signals are differentially amplified by IC201 and IC202 to remove external noise. ETCO2 and instCO2 data level from OIR is 40mmHg/1V and tcPO2/tcPCO2 data level from OKV (for Japanese market only) is 100mmHg/0.1V. Jumper J201 and J202 are for selection of signal level. Change short circuit plug according to external instrument (factory set is 40mmHg/1V for CO2 data input).

When connecting OKV for tcPO2/tcPCO2 data input, offset adjustment is required (see section for adjustment).

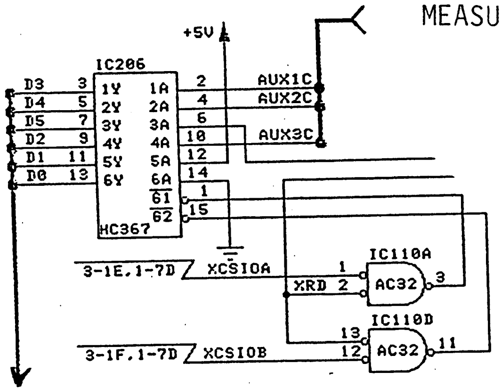


Universal waveform input (WAVE selection on the SETUP screen) is added with offset voltage from IC207 D/A converter to shift waveform level and A/D converted for screen display. Reference voltage 4.096V for A/D conversion is obtained with D209, S210, and IC208A.



Logical signal such as measuring condition indication signal is transferred to system bus via IC206.

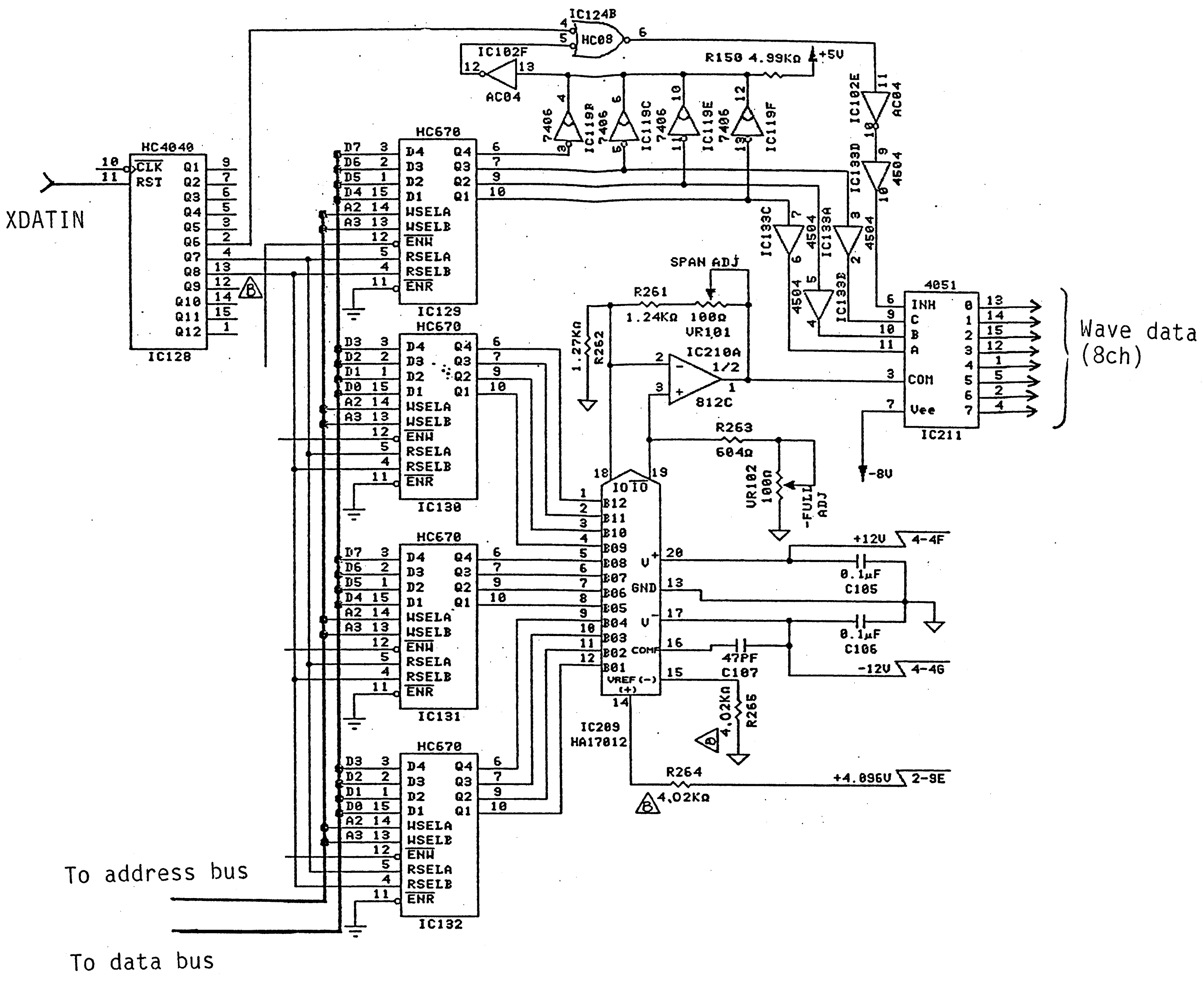
MEASURE signal



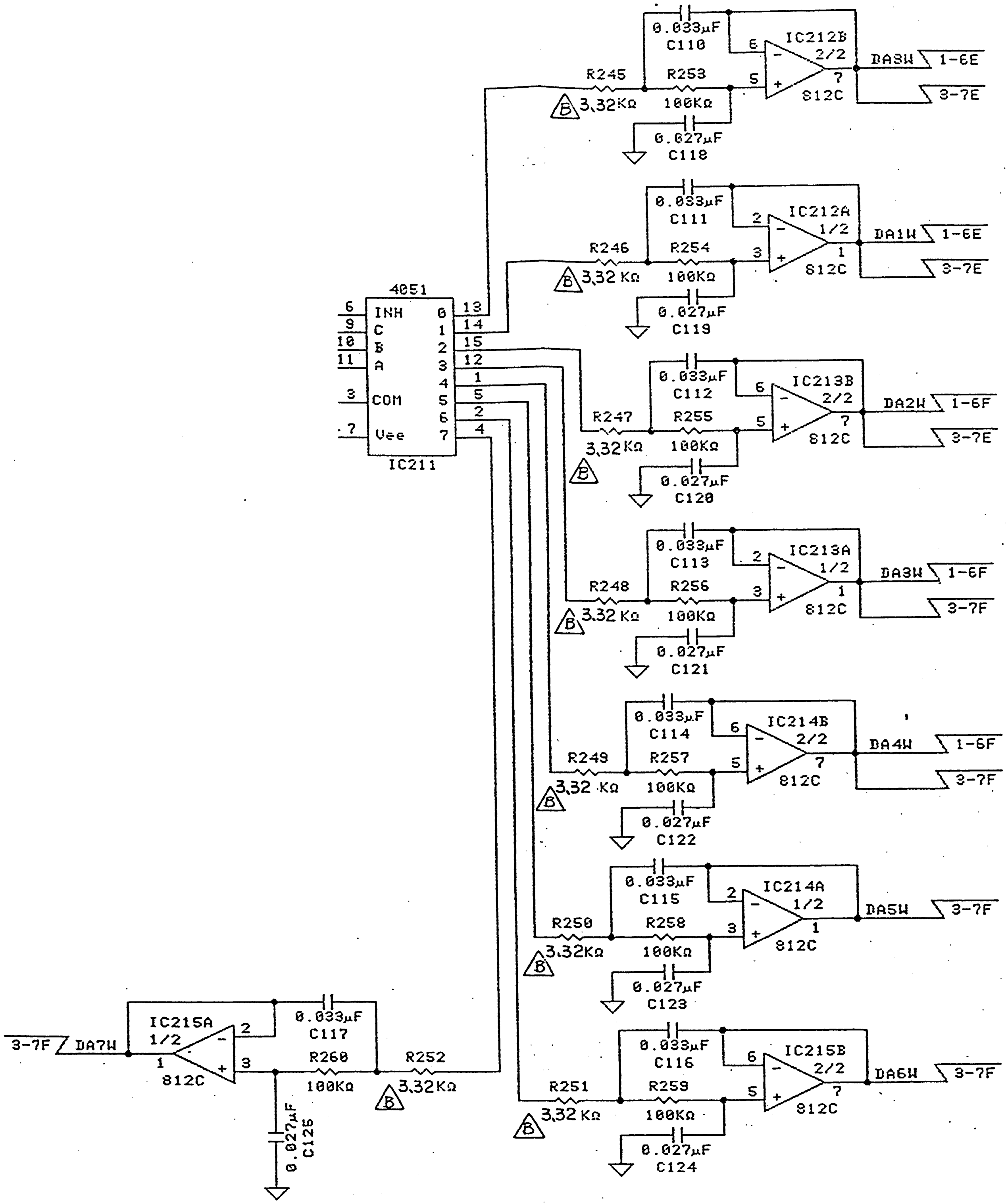
To system bus

4) Waveform output circuit block

This circuit is for waveform output to central monitor or other external instrument. Waveform data from CPU is written into IC129- IC132 register file. This file has capacity to store four 16 bit data. 16 bit data is read out while XDATIM signal is "L". Among 16-bit data, lower 12 bits are for D/A converter form waveform signals. Upper 4 bits include information to which line D/A converter output waveform signal should be connected. IC211 switches output line. D/A output channel "0" is inhibitted by setting IC211 to OFF. Maximum 8 waveform output channels are available as additional 4 waveform signals can be output after 4 waveform channels output in the next timing.



Waveform signal distributed by IC211 are smoothed with IC212- 215 and output to central monitor and WS interface.

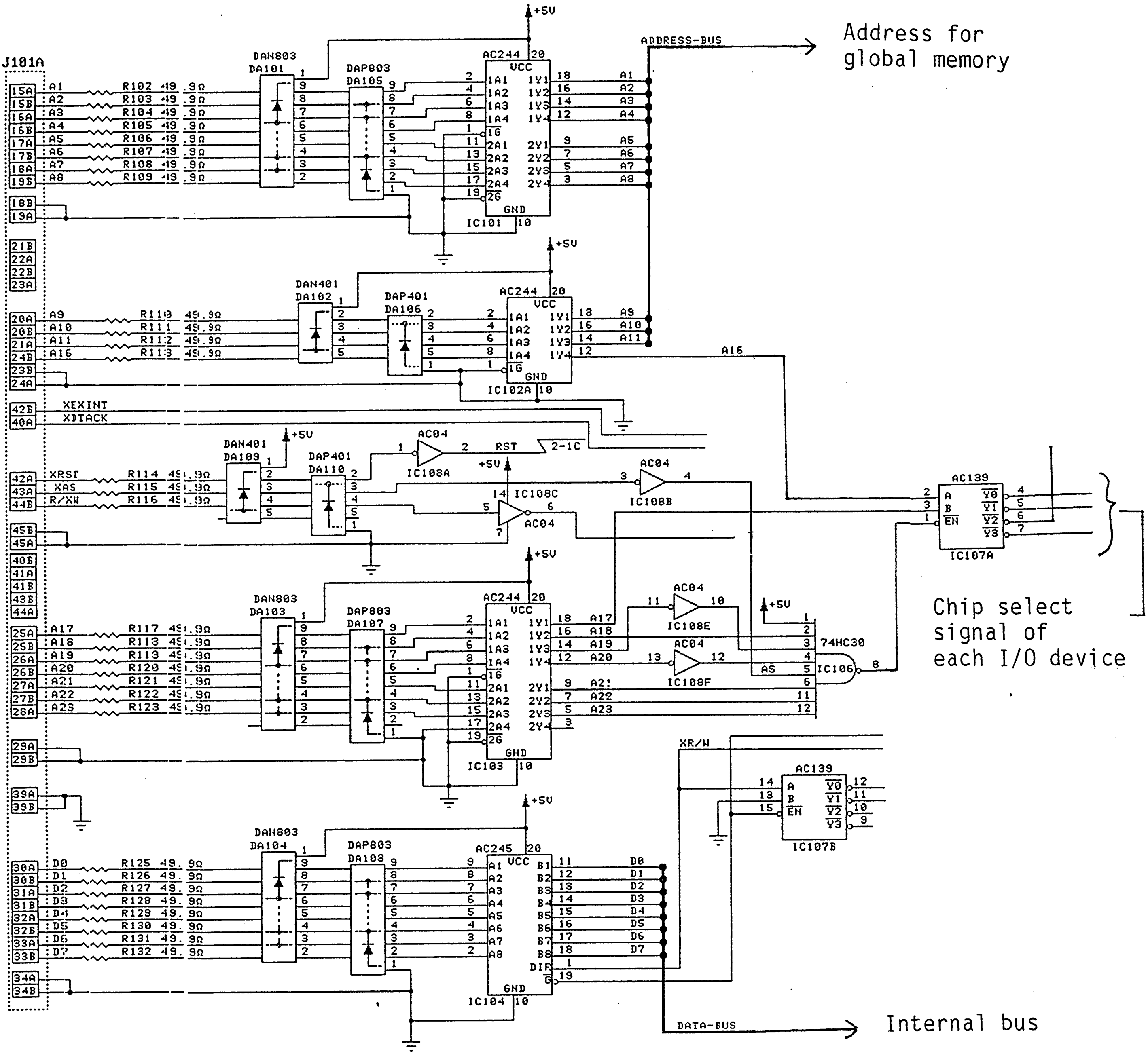


4.2.7 WS interface unit QI-812P

This unit is required to connect the bedside monitor with WS-841R/821R thermal array recorder. This unit is provided RS232C communication interface for output data to a personal computer.

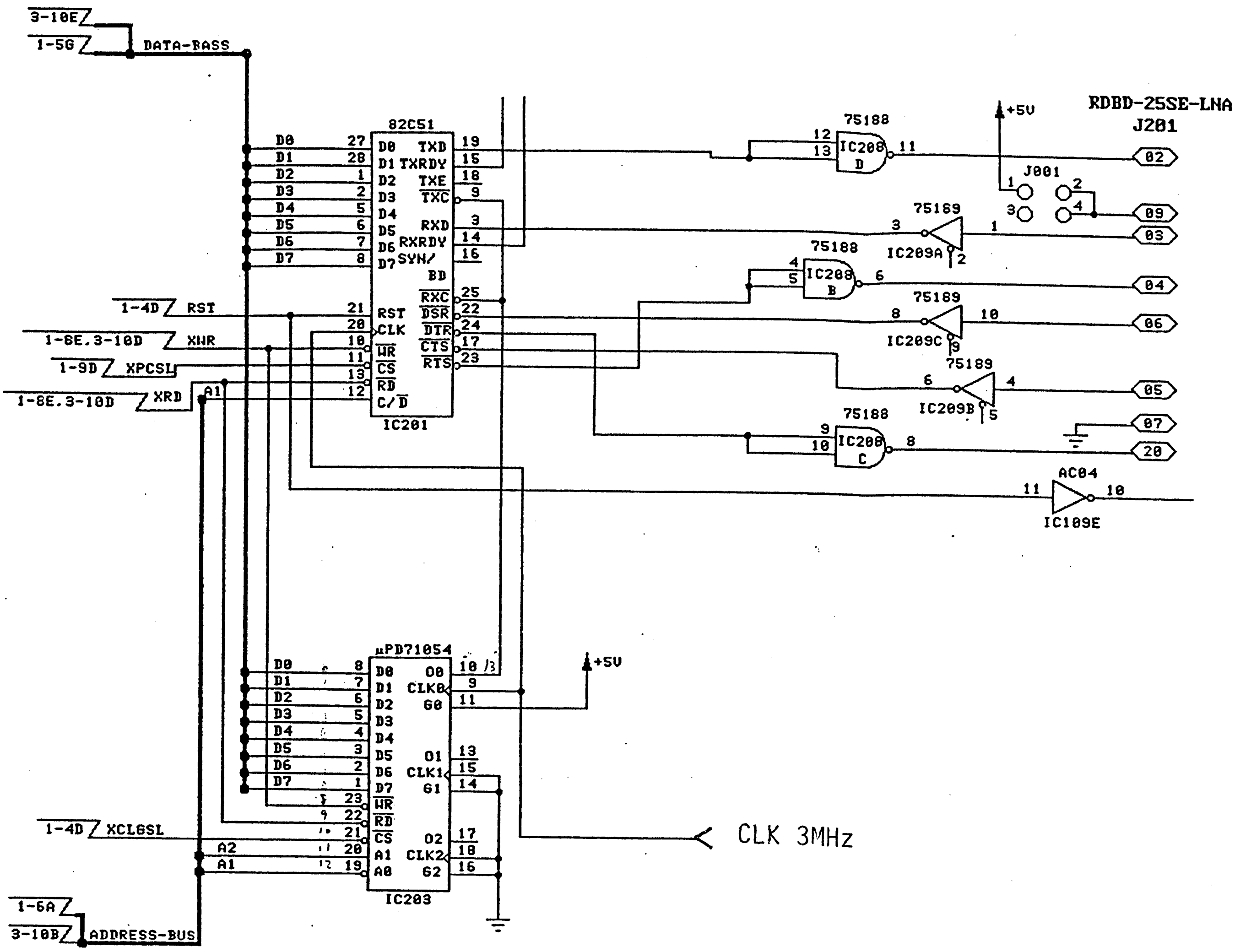
1) CPU inferface circuit block

This block is assigned to address E50000H- E70000H and IC106, IC107 and IC108 decode to assign each address. IC107A outputs chip select signal for each I/O device. Lower address A1- 11 is for global memory (dual-port RAM) address which is used to communicate with WS recorder. Lower bits only of data become internal bus via buffer and connected to each block.



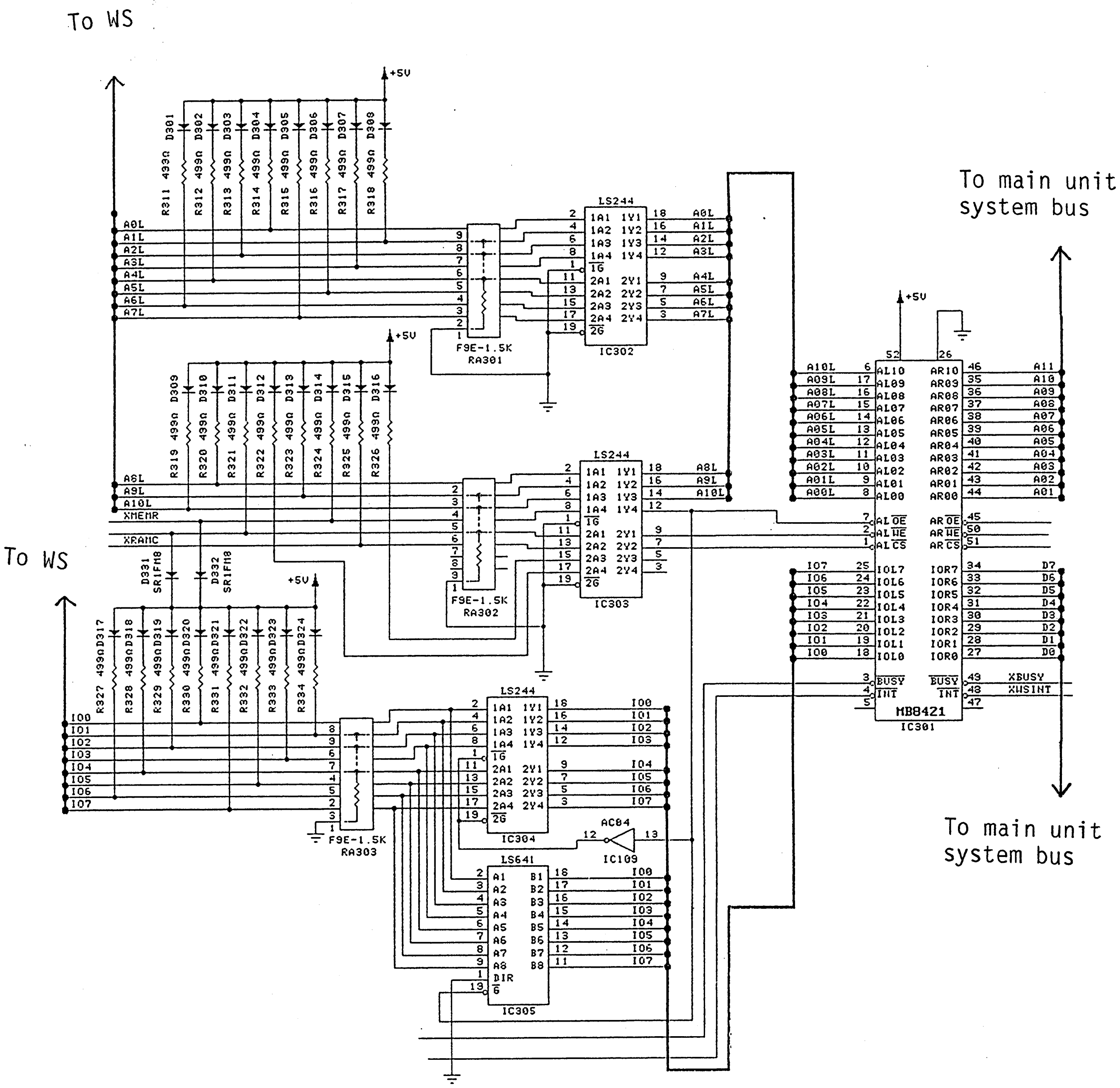
2) Serial communication circuit block

IC201 is a serial communicaiton controller device. Parallel data from CPU is converted into serial data. In order to convert serial data into RS232C standard format, data is output through IC208 and IC209 to communicate with a personal computer. IC203 is a clock oscillator (baud rate generater) which determines communication speed. Various buad rates are provided by changing frequency dividing ratio.



3) Global memory (dual-port RAM) circuit block

This circuit communicates with WS thermal array recorder. IC301 is the center of this block. It is called a dual-port RAM which provides L (Left) port and R (Right) port, and 2K byte memory capacity. Memory can be accessed through the both ports. When data is written into specified address, other side port is interrupted. Communcaition is made each other by writing data into memory and writing command to address. System bus of bedside monitor is connected to port R and system bus of WS is connected to port L. Buffer to drive connection cable and terminator are connected to port L for recorder.



Section 5

5. Circuit descriptions for head amplifiers

5.1 ECG Head Amp board, UP-0272 (AC-800PA/PJ)

5.1.1 General

The hybrid IC (IC007) "ISOLATE" is mounted not only on this ECG head amplifier but also on other head amplifier boards. In the IC007, F-CLK Generator supplies power to the floating circuit, and the switching circuit SW1 demodulates the modulated signal from the floating circuit.

The hybrid IC (IC009-012) "ECG BUF" bufs the ECG input signal and detects any electrode disconnection.

The hybrid IC (IC008) "ECG SEL" selects an ECG lead. In the IC008, the switching circuit SW3 modulates the selected ECG signal.

The S-P converter (IC005) outputs the ECG lead selection signal to the multiplexer (MPX1) in IC008 and the neutral electrode selection signal (for negative feed-back) to the analog switch SW2 (IC003B) or IC009-011.

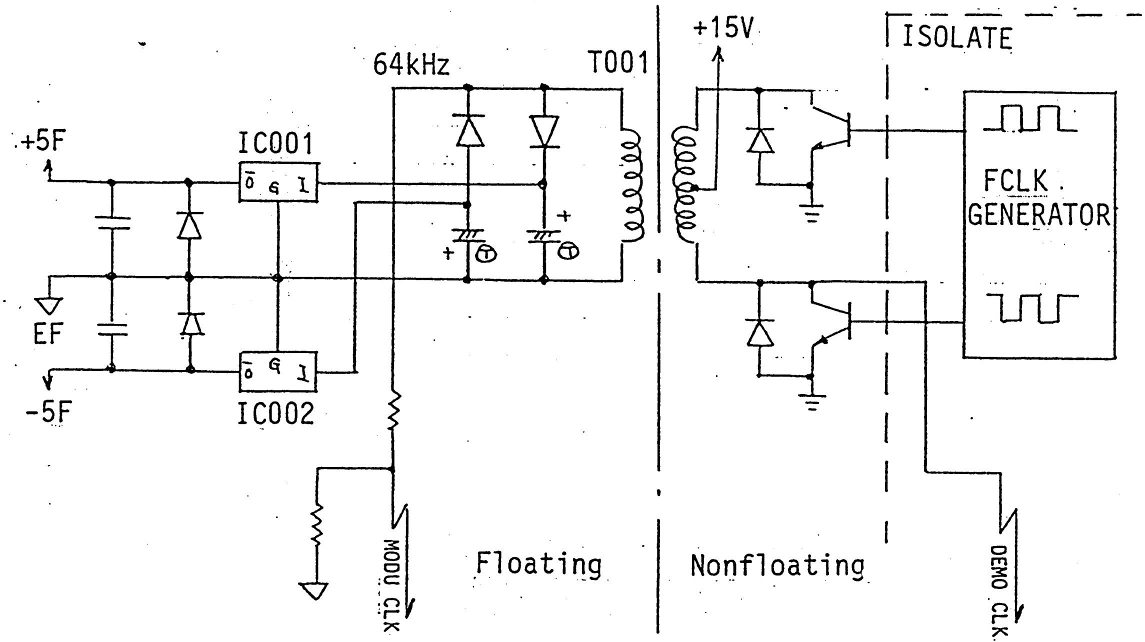
The counter (IC006) controls the IC005 and the multiplexer (IC004) "MPX2" for time-sharing electrode disconnection signals.

5.1.2 Floating power circuit

On the following circuit, the DC-DC converter circuit supplies power (+5F, EF, -5F) to the floating circuit.

The MODU CLK signal is 64kHZ chopping signal to modulate the time-shared signal so as to transfer the time-shared signal from the floating circuit to the nonfloating circuit.

The DEMO CLK signal is 64kHz chopping signal to demodulate the chopped signal. The MODU CLK and DEMO CLK signals are synchronized with opposite polarity.



NOTE: The floating power circuit for the other Head Amp boards are same as the above circuit.

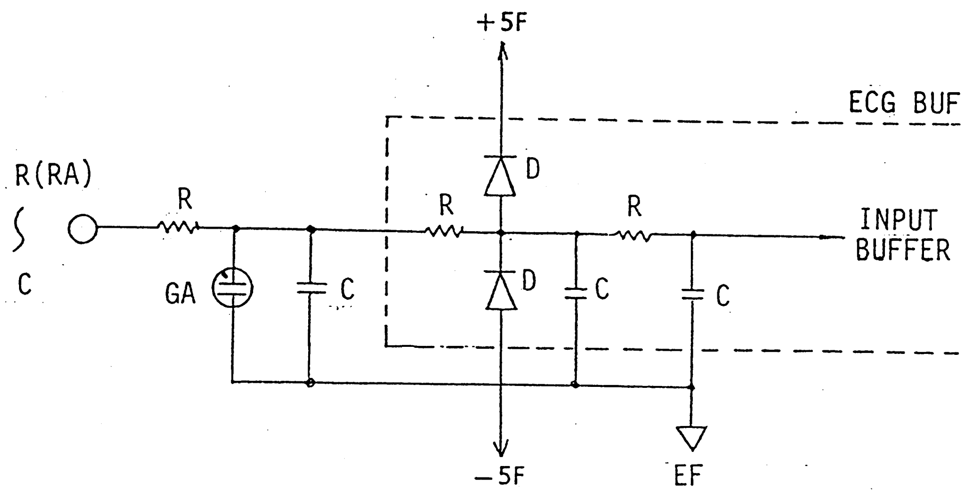
5.1.3 Input protection circuit

1) Electrosurgery interference elimination filter

On the following circuit, a low-pass filter composed of 3-stage R-C connection attenuates high frequency component (100dB down or more between 300kHz and 5MHz) of electrosurgery interference. The low-pass filter is intended to monitor ECG, to protect the input circuit and to reduce heat in case of simultaneous use of an electrosurgery unit.

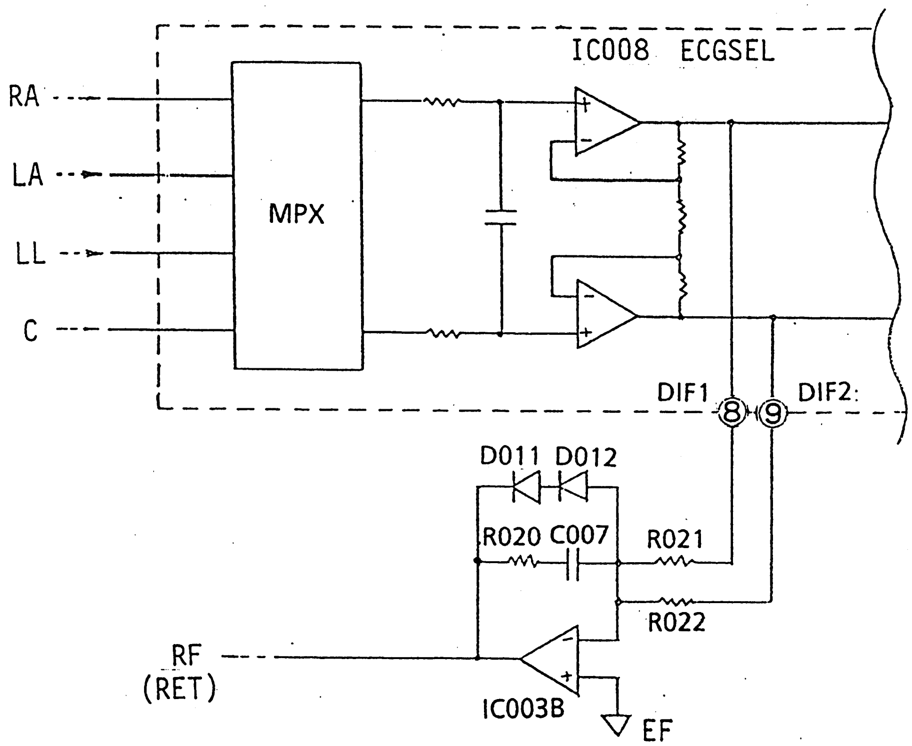
2) Defibrillator discharge protector

On the following circuit, the series-connected resistors limit the discharge current to protect the input circuit against an excessive voltage input signal, and the gas arrestor and diodes limit the discharge voltage when a discharge is started with a defibrillator.



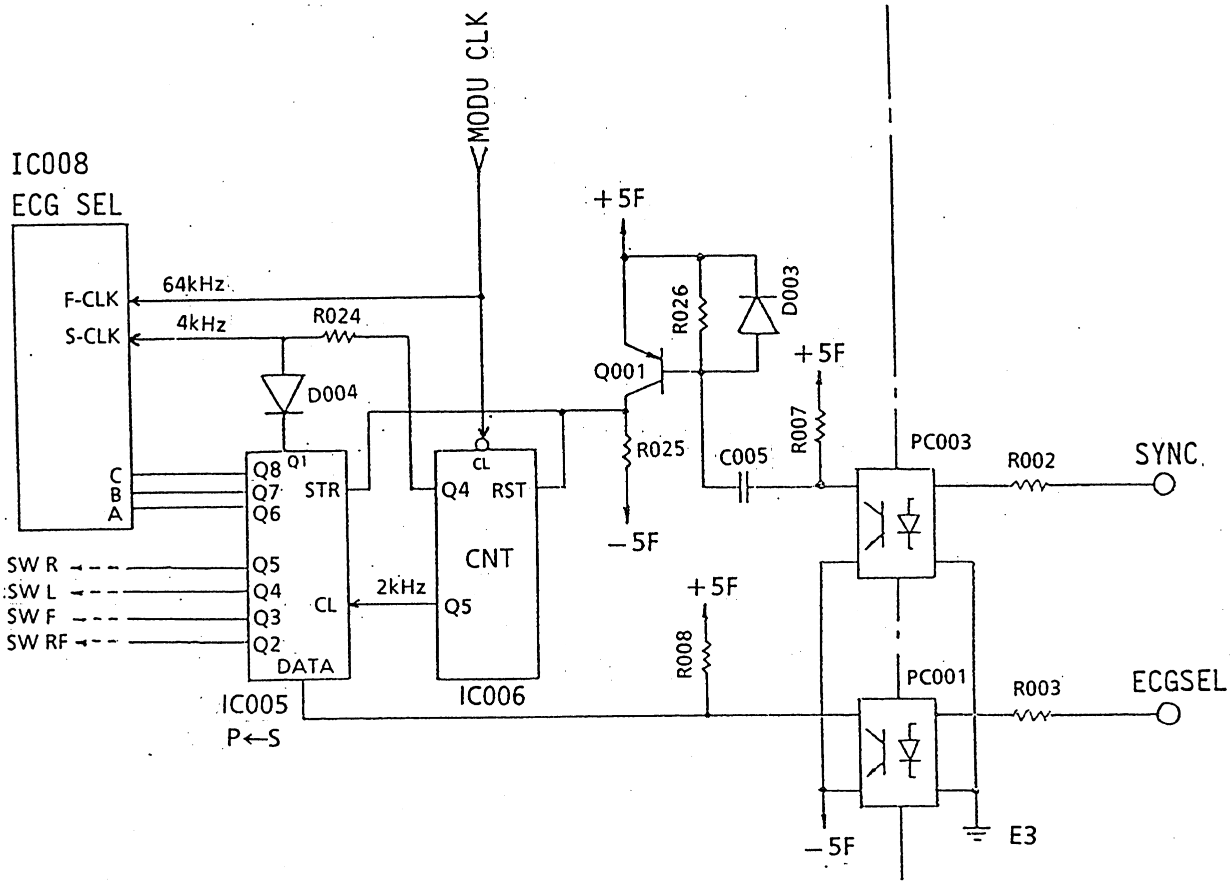
5.1.4 Negative feed-back circuit

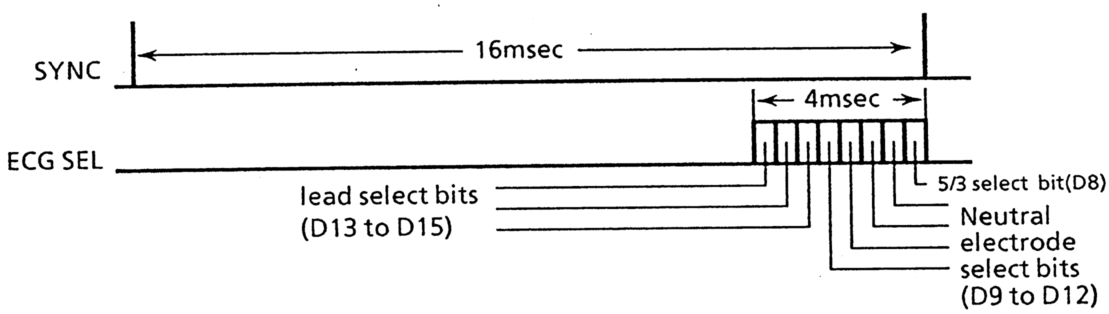
In theory, in-phase artifact included in ECG wave should not interfere with ECG wave signal since ECG signal is pre-amplified with a differential amplifier. However, actually ECG signal with in-phase artifact appears between the DIF1 and DIF2 since in-phase signal changes to a signal with some phase difference due to impedance imbalance between the electrodes. To overcome this, the output signals from the differential amplifiers are branched to the negative feed-back circuit for neutral electrode (DIF1 and DIF2). The negative feed-back circuit attenuates in-phase component based on the Floating Ground (EF) and obtains high Common Mode Rejection Ratio (CMRR).



5.1.5 ECG lead selection circuit

The following ECG SEL signal through the photocoupler (PC001) selects and ECG lead and a nuetral electrode line for negative feed-back from input signal lines. The ECG SEL signal is converted with the S-P converter (IC005) to parallel signals. SW R, SW L, SW F, or SW RF of the parallel signals control each ECG BUF (IC009-012) to select a neutral electrode from the four electrodes.





Each bit combination of the ECG SEL signal and ECG lead is related as follows:

[3 electrode lead]

Lead	Electrodes						ECG SEL bits							
	ECG1			ECG2			D15	D14	D13	D12	D11	D10	D9	D8
	+	N	-	(=ECG1)										
I	L	F	R	L	F	R	1	1	1	1	1	0	1	1
II	F	L	R	F	L	R	1	1	0	1	0	1	1	1
III	F	R	L	F	R	L	1	0	1	0	1	1	1	1

[5 electrode leads]

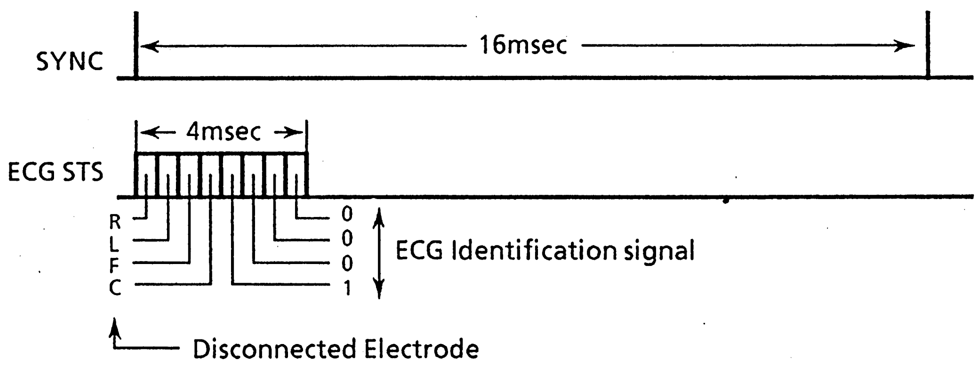
Lead	Electrodes						ECG SEL bits							
	ECG1			ECG2			D15	D14	D13	D12	D11	D10	D9	D8
	+	N	-	+	N	-								
I	L	RF	R	F	RF	R	1	1	1	1	1	1	0	0
II	F		R				1	1	0	1	1	1	0	0
III	F		L				1	0	1	1	1	1	0	0
aVR	R		(L+F)/2				1	0	0	1	1	1	0	0
aVL	L		(R+F)/2				0	1	1	1	1	1	0	0
aVF	F		(R+L)/2				0	1	0	1	1	1	0	0
V	C		(R+L+F)/2				0	0	1	1	1	1	0	0
MCL	C		L				0	0	0	1	1	1	0	0

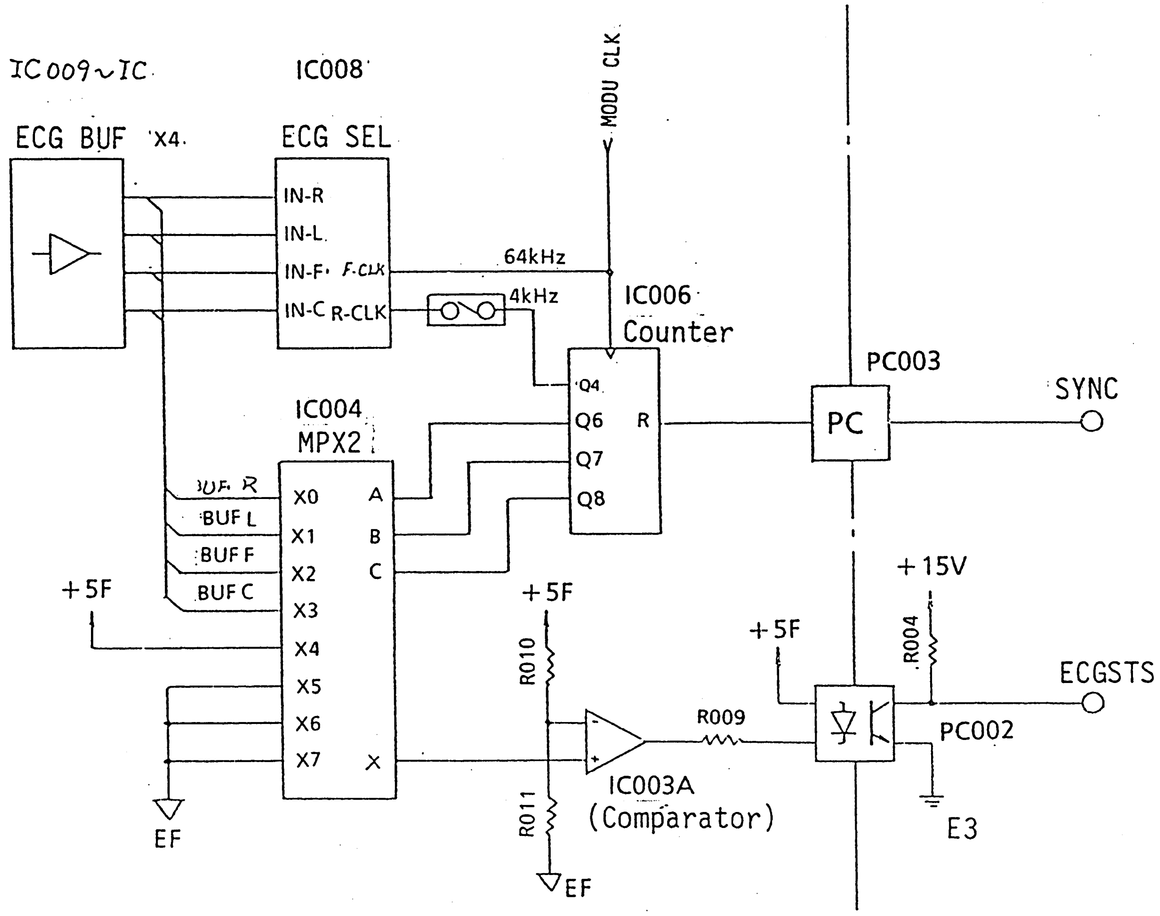
5.1.6 Electrode disconnection detection circuit

The loop circuit between a patient and the input circuit is closed through negative feed-back circuit when the electrode leads are connected to the patient. However, the loop circuit is opened and related ECG BUF output (BUF R, BUF L, BUF F or BUF C) is drawn to the floating power voltage when an electrode is disconnected.

The multiplexer (IC004) "MPX2" time-shares the BUF F, L, F or C signal to be a serial format signal (ECG STS signal).

The comparator (IC003A) compares the time-shared signal with the reference voltage and outputs ECG STS signal to the nonfloating circuit.





A disconnected electrode and bits combination of ECG STS signal are related as follows:

[3 electrode leads]

Lead	Neutral electrode	Electrode condition	ECG STS bits			
			D7	D6	D5	D4
			R	L	F	C
I	F	Normal	0	0	0	1
		R: disconnect	1	0	0	1
		L: disconnect	0	1	0	1
		F: disconnect	1	1	0	1
		Open	1	1	0	1
II	L	Normal	0	0	0	1
		R: disconnect	1	0	0	1
		L: disconnect	1	0	1	1
		F: disconnect	0	0	1	1
		Open	1	0	1	1
III		Normal	0	0	0	1
		R: disconnect	0	1	1	1
		L: disconnect	0	1	0	1
		F: disconnect	0	0	1	1
		Open	0	1	1	1

[5 electrode leads]

Lead	Neutral electrode	Electrode condition	ECG STS bits			
			D7	D6	D5	D4
			R	L	F	C
All leads	RF	Normal	0	0	0	0
		R: disconnect	1	0	0	0
		L: disconnect	0	1	0	0
		F: disconnect	0	0	1	0
		F: disconnect	0	0	1	1
		C: disconnect	0	0	0	1
		RF: disconnect	1	1	1	1
		Open	1	1	1	1

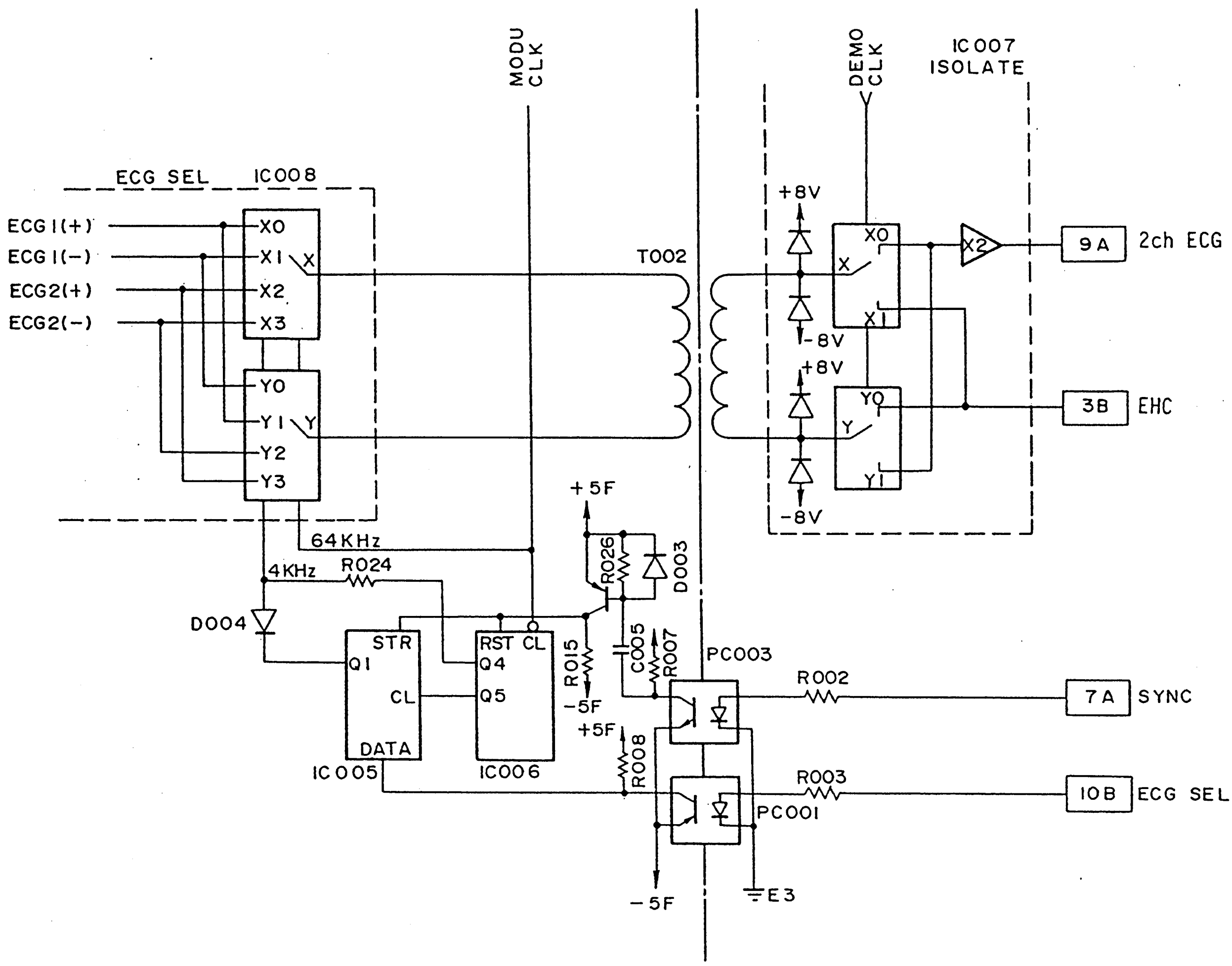
5.1.7 ECG signal modulation/demodulation circuit

When the 3-electrode lead mode is selected, only ECG1 is modulated with the MODU CLK signal on the floating circuit and demodulated with DEMO CLK signal on the nonfloating circuit since IC005-Q1 is set to low level.

When the 5-electrode lead mode is selected, ECG1 and ECG2 are alternately time-shared every 125usec with 4kHz clock from IC006-Q4 and modulated with MODU CLK since IC005-Q1 is set to high level.

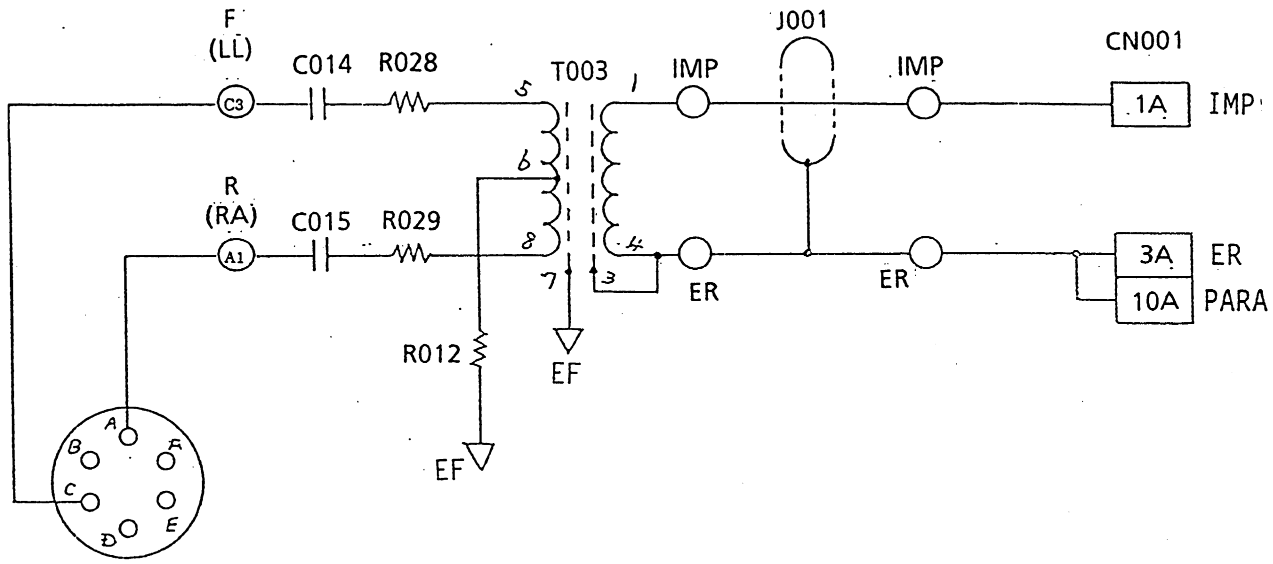
The time-shared 2ch ECG signal is divided into two signals, ECG1 and ECG2 on the UP-0270.

NOTE: Modulation with MODU CLK circuit and demodulation with DEMO CLK circuit, which are provided with the other head amp boards are the same as the above circuit.



5.1.8 Respiration signal detection circuit

Respiration waveform is detected by means of impedance method. Impedance between the R (RA) and F (LL) electrodes is excited with 76.8kHz carrier signal (10Vp-p) from the UP-0519. Impedance is changed by inspiration and expiration.



5.2 RESP Amp board, UP-0519

This board of the BSM-8300 series bedside monitors is not a component of the head amplifiers. However, explanation of this board is neccessory to understand the functions of the AC-800PA/J ECG/Resp head amplifier when used with the BSM-8300.

5.2.1 General

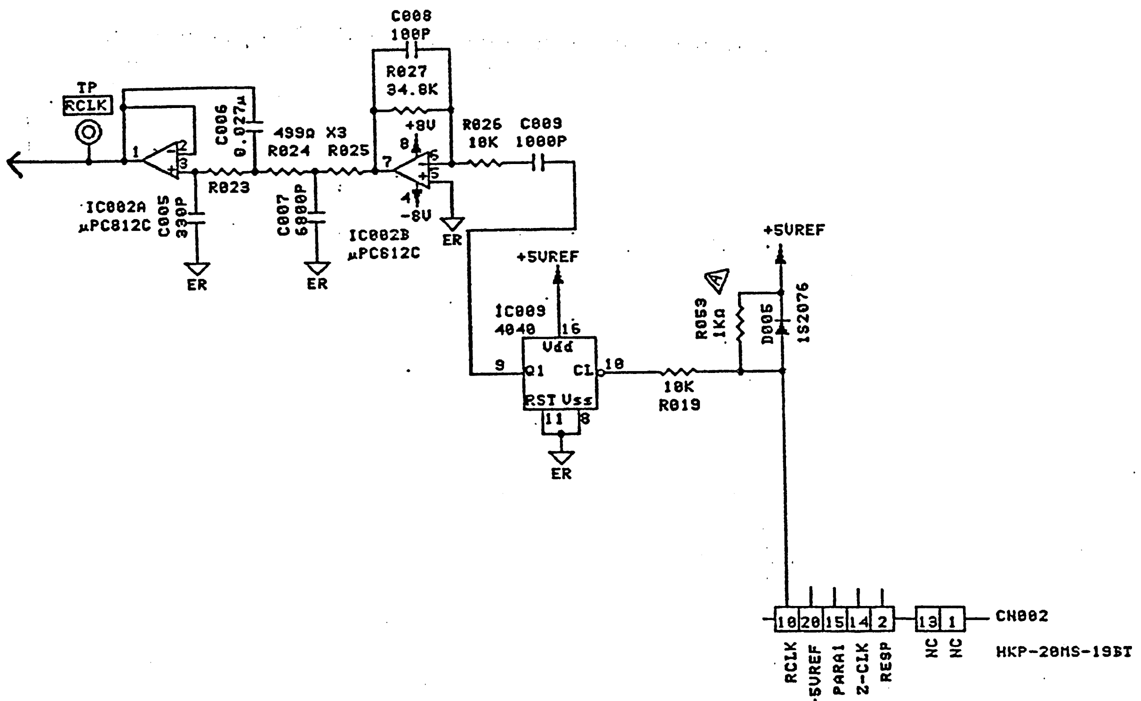
The respiration amplifier board UP-0519 consists of the following components:

1) 76.8kHz carrier generator to detect and carry respiration signal
2) 20-times preamplifier
3) Respiration synchronization detector
4) 5Hz low-pass filter
5) Auto-shift circuit with 91-times amplifier
6) Output buffer with 5Hz low-pass filter
7) Respiration measure on/off control comparator

5.2.2 76.8kHz carrier generator circuit

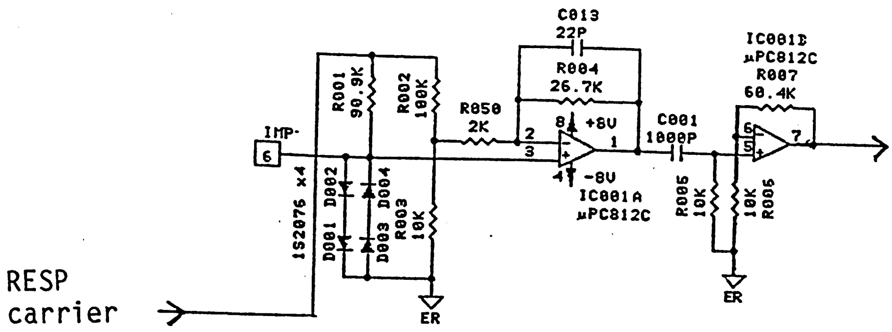
In the following circuit, 76.8Hz carrier wave (10Vp-p) is generated to detect respiration.

In respiration detection carrier generator, 153.6kHz RCLK frequency is divided into 76.8kHz 5Vp-p squarewave, and then filtered by three steps of low-pass filter composed of IC002, R023- R026 and C005- C007 into 10Vp-p 76.8kHz sinewave respiration detection carrier signal.



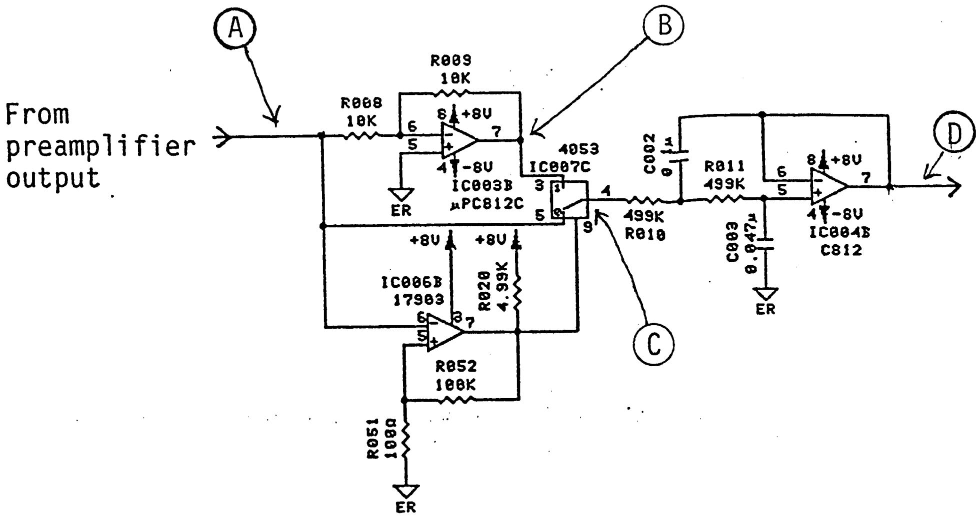
5.2.3 Preamplifier circuit

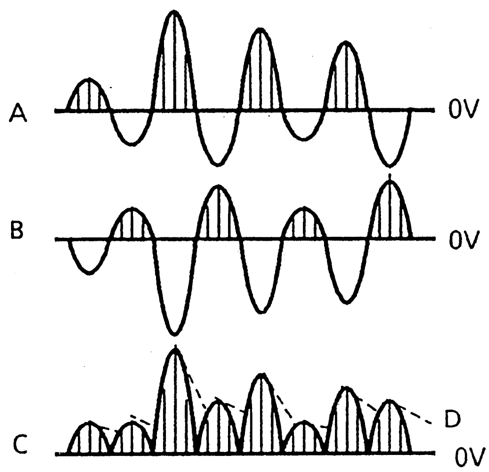
Patient circuit composes of a bridge circuit with R001- R003 and impedance of patient's chest. Bridge circuit is excited by respiration detection carrier and imbalance component of the bridge is approximately 20 times amplified by IC001A and IC001B. When impedance of the patient is high, imbalance component of the bridge becomes large and output of preamplifier becomes large. D001- D004 are for protection of the circuit against over input such as defibrillation discharge.



5.2.4 Synchronization detector

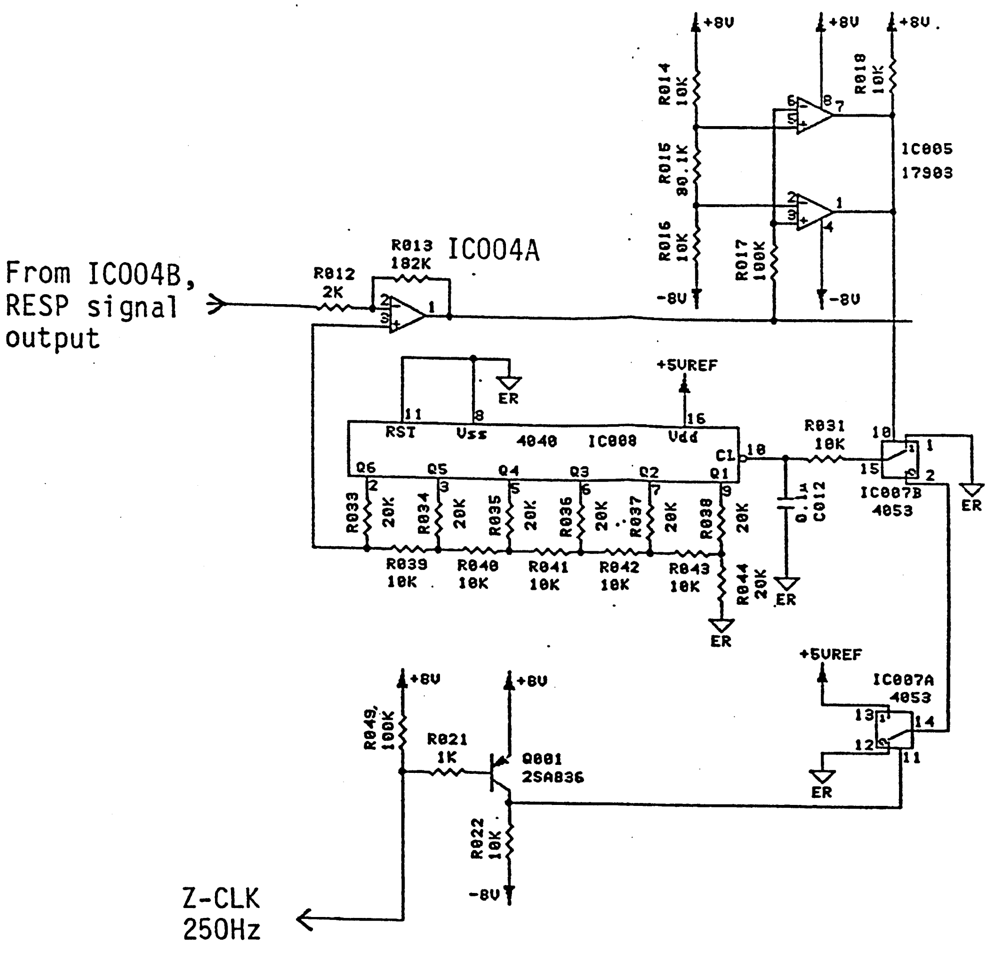
Preamplifier output signal is sent to respiration synchronization detector and low-pass filter. Respiration waveform is full-wave rectified with zero-cross comparator IC006B and analog switch IC007C according to polarity of respiration waveform signal.





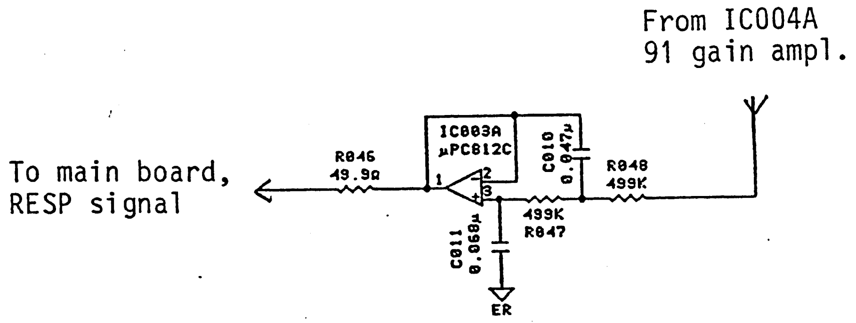
5.2.5 Auto-shift circuit

Auto shift circuit block limits amplitude of respiration waveform so that signal does not saturate in the next 91 times gain amplifier. When output of 91 times gain amplifier IC004A is over +4.8V or below -4.8V, comparator IC005 turns to Low and analog switch IC007B is switched to side "0". Then Z-CLK signal (250Hz) is applied to counter IC008 and the counter starts counting. Output of IC008 is D/A converter by R-2R ladder and 0V to 5V staircase waveform is superimposed on the input signal at IC104A to shift output signal. When output voltage returns inside +4.8V and -4.8V comparator output turns to High and stops Z-CLK signal. IC007A is a level shifter device generating 0V- 5V level voltage from 0V- 8V Z-CLK signal.



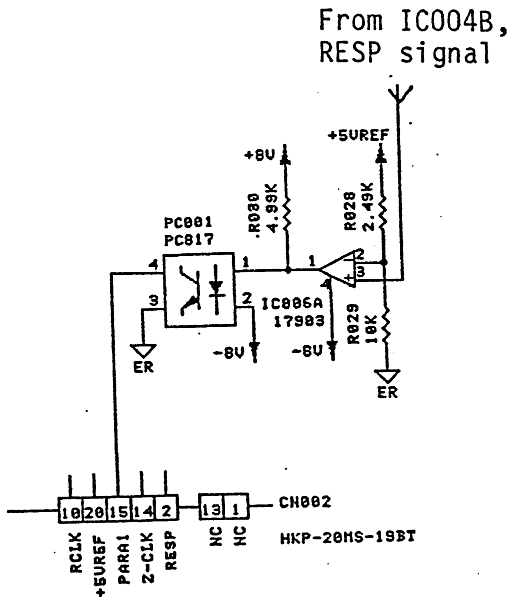
5.2.6 Output buffer circuit

IC003A functions as output buffer to the main board and noise component is removed.



5.2.7 Respiration measure signal generator circuit

In respiration measuring condition detector, output signal before auto shift circuit is compared with voltage (4.3V) corresponding to 2 kohm impedance by comparator IC006A by using a nature that output signal becomes large when impedance is high. When impedance is low comparator output is Low and PARA1 signal is High. When impedance is high, PARA1 signal is Low to indicate that respiration measurement is off condition. PARA1 signal is indicated with PAR1 in the main board.



5.3 Press Head Amp board UP-0369 (AP-800PA)

5.3.1 General

The exciter (IC006) generates excitation voltage to drive a blood pressure transducer (BP1, BP2).

Blood pressure signals, P1 and P2, from the BP transducers are time-shared with an analog switch (IC003A) through a 200-times preamplifier (P1: IC007/008/011B, P2: IC009/010/012B) and 33Hz low-pass filter (P1: IC011A, P2: IC012A).

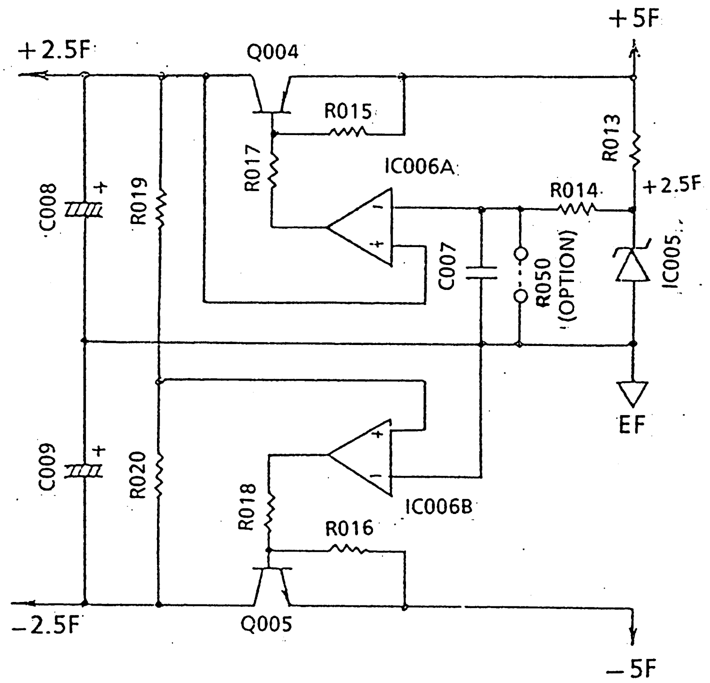
The analog switch (IC003A) is controlled with 125Hz from a counter (IC004).

The comparator (IC013A/B) selects one of four states of PARA signal according to the connection of BP1 and BP2.

5.3.2 Exciter circuit

This circuit generates ±2.5V excitation voltages to excite the blood pressure transducers. The ±2.5V excitation voltages are stabilized through the reference voltage generator (IC005). The excitation voltages can drive two transducers with a load of up to 200ohm.

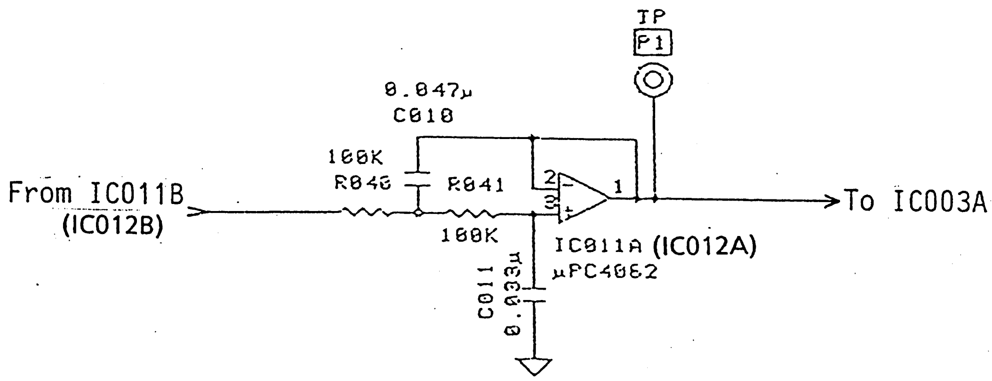
The excitation voltages can be attenuated by mounting a resistor on "R050" location and can be set to a proper voltages for a BP transducer by combining the resistor (R050) with 10kohm (R014).



5.3.3 33Hz low-pass filter circuit

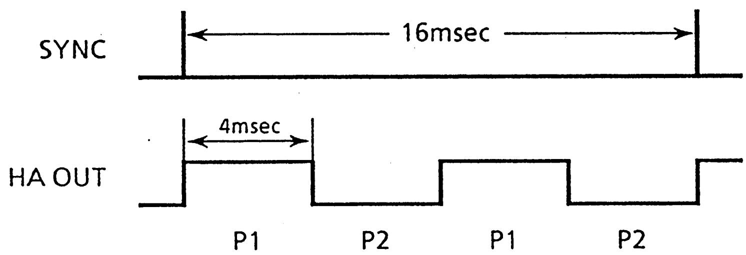
The following 2-stage low-pass filter is provided through the preamplifier to pass the frequency component of blood pressure signal only.

In the following filter, the cut-off frequency is 33Hz. However, the total cut-off frequency is 20Hz or 10Hz (selectable on the SYSTEM SETUP display) by passing software filter of the bedside monitor main unit.



[Output timing]

The P1 and P2 signals are alternately outputted from HA OUT terminal every 4msec synchronizing with the SYNC signal as follows:



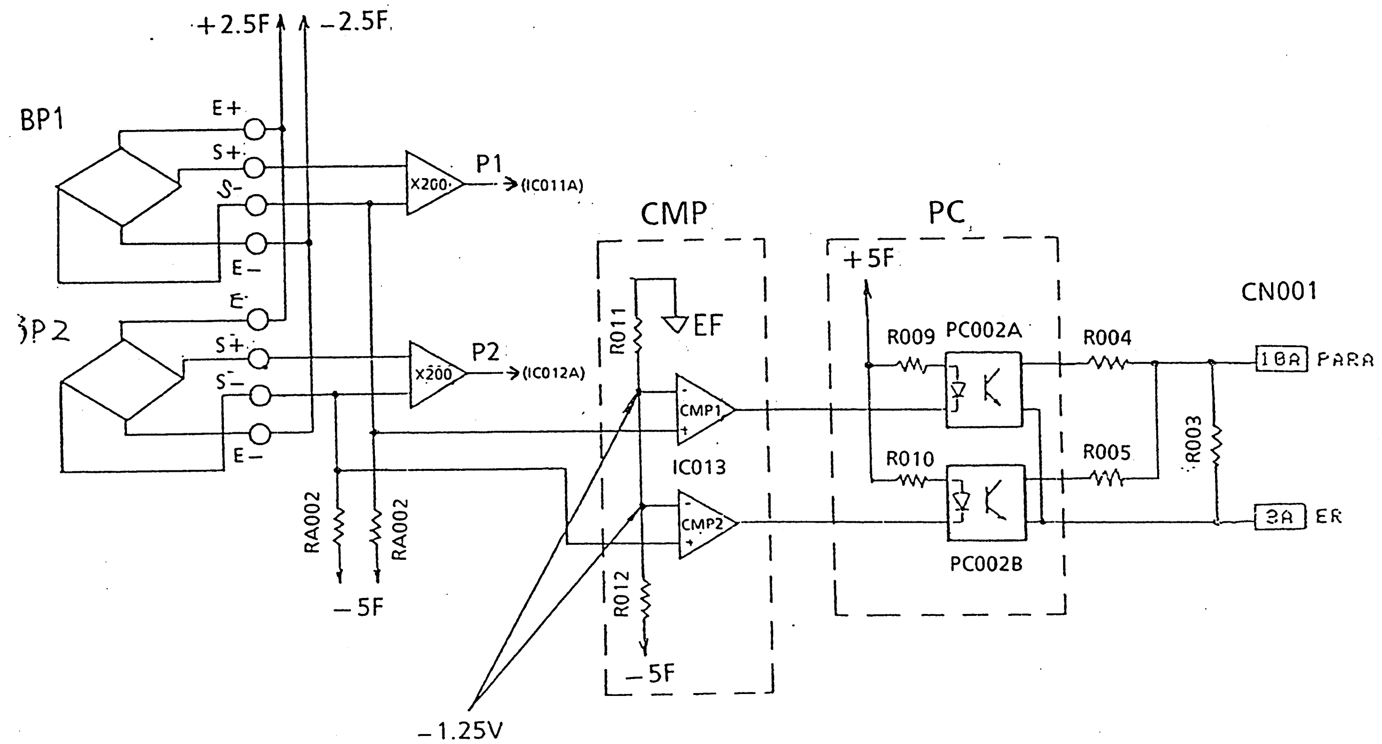
5.3.4 PARA signal generating circuit

The following voltages for the PARA signal are generated according to the connection of BP transducers BP1 and BP2.

Connected transducer	PARA voltage
BP1 and BP2	1.5V $\pm$25mV
BP1	1.35V $\pm$25mV
BP2	1.2V $\pm$20mV
No connection	1.1V $\pm$20mV

When a transducer is not connected, the output from the comparator (IC013A/B) is low level since the positive terminal on the IC013A/B is biased to 5V. The photocoupler (PC002A/B) is set to "ON". The generating voltage for the PARA signal is 1.1V since +5V REF is divided between the pull-up resistor (10kohm) for 5V and resistors (R003-005) in parallel.

When one or two transducers are connected, the output from the IC013A/B is high level since the positive terminal of the IC013A/B is approx. 0V. The PC002A/B is set to "OFF". The generating voltage for the PARA signal is different from 1.1V since resistors in parallel decrease according to the BP1 or BP2 connection.



5.4 CO Head Amp board, UP-0318 (AH-800PA)

5.4.1 General

The 16Hz low-pass filter (R015 & C009, R023 & C011) eliminates only high frequency component, such as electrosurgery interference.

The multiplexer (IC009) time-shares reference signal (REF), injection fluid temp. signal (Ti), blood temp. signal (Tb) and blood temperature variation signal (Tb).

The auto-shift circuit (IC012) shifts DC voltage of the baseline so as not to saturate Tb signal due to 1000-times amplification.

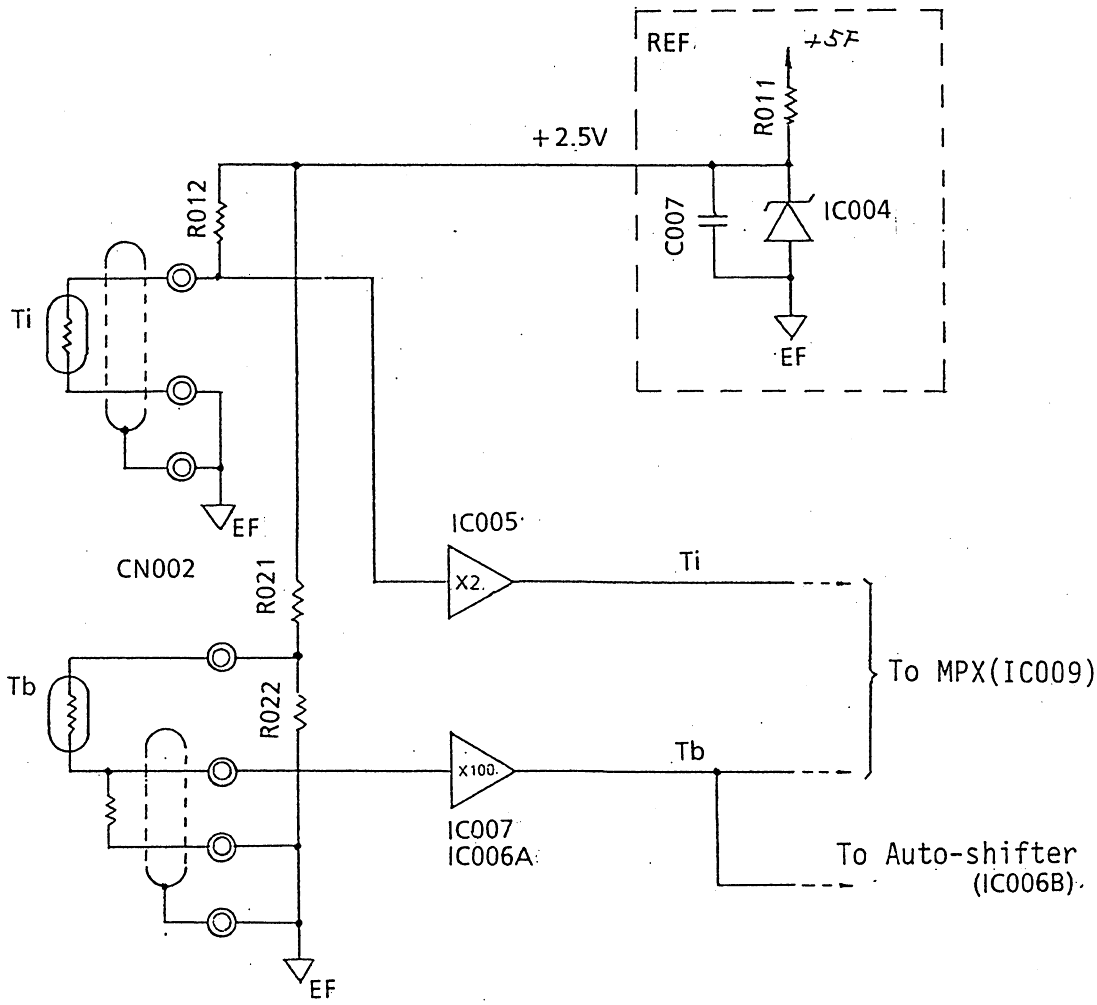
The S-P converter (IC011) controls the IC012.

The counter (IC010) generates 250Hz clock for the IC012 and control signals for the IC009.

5.4.2 Resistance-Voltage (R-V) converter circuit

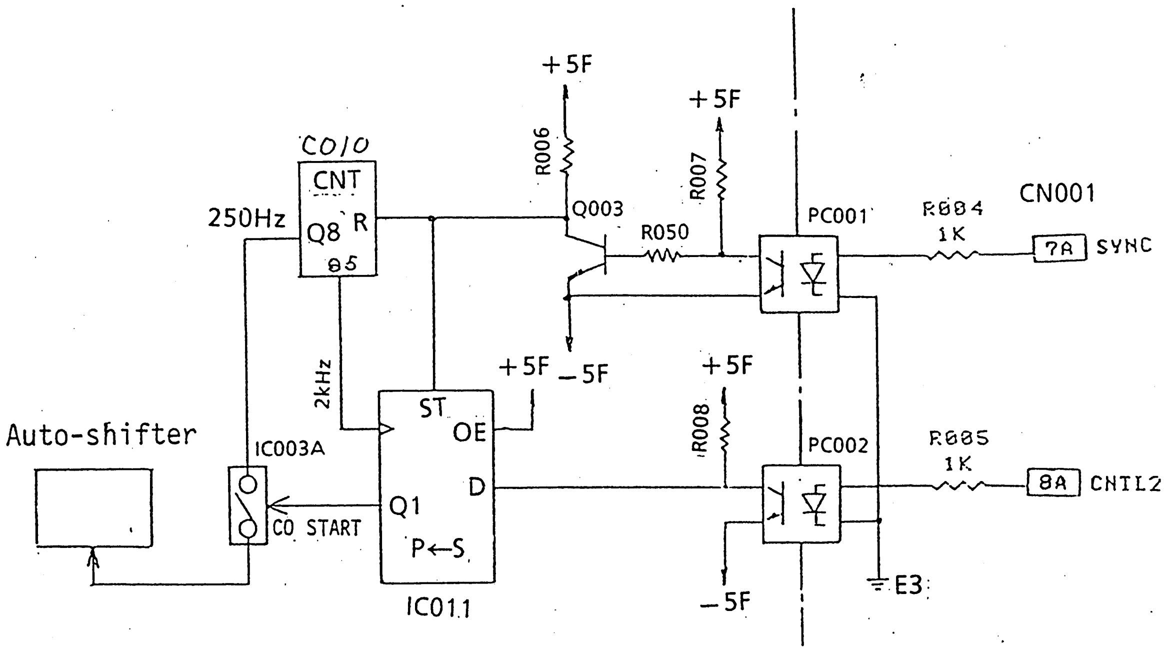
The following IC004 generates +2.5V reference voltage. By dividing the reference voltage between the R012 and Ti-thermistor resistance, the Ti-voltage is obtained according to the Ti-thermistor resistance variation caused by injection fluid temperature.

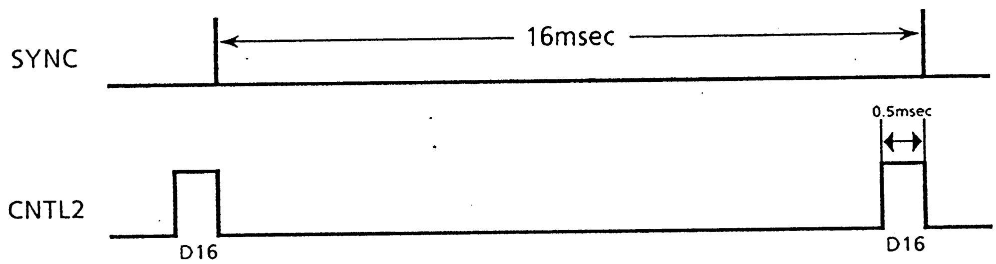
By dividing the reference voltage between the R021 and R022 and shunting the Tb-catheter thermistor resistance, the Tb-voltage is obtained according to the Tb-resistance variation caused by fluid injection.



5.4.3 S-P converter circuit

The "ST" terminal of the S-P converter (IC011) is set to High level when the SYNC signal varies from Low level to High level. Then the analog switch (IC003A) is connected to 250Hz clock to work the Auto-shifter (IC012) with Low signal from Q1 on the IC011 after the D16 on serial format signal CNTL2 is set to High level (CO start signal) as follows:



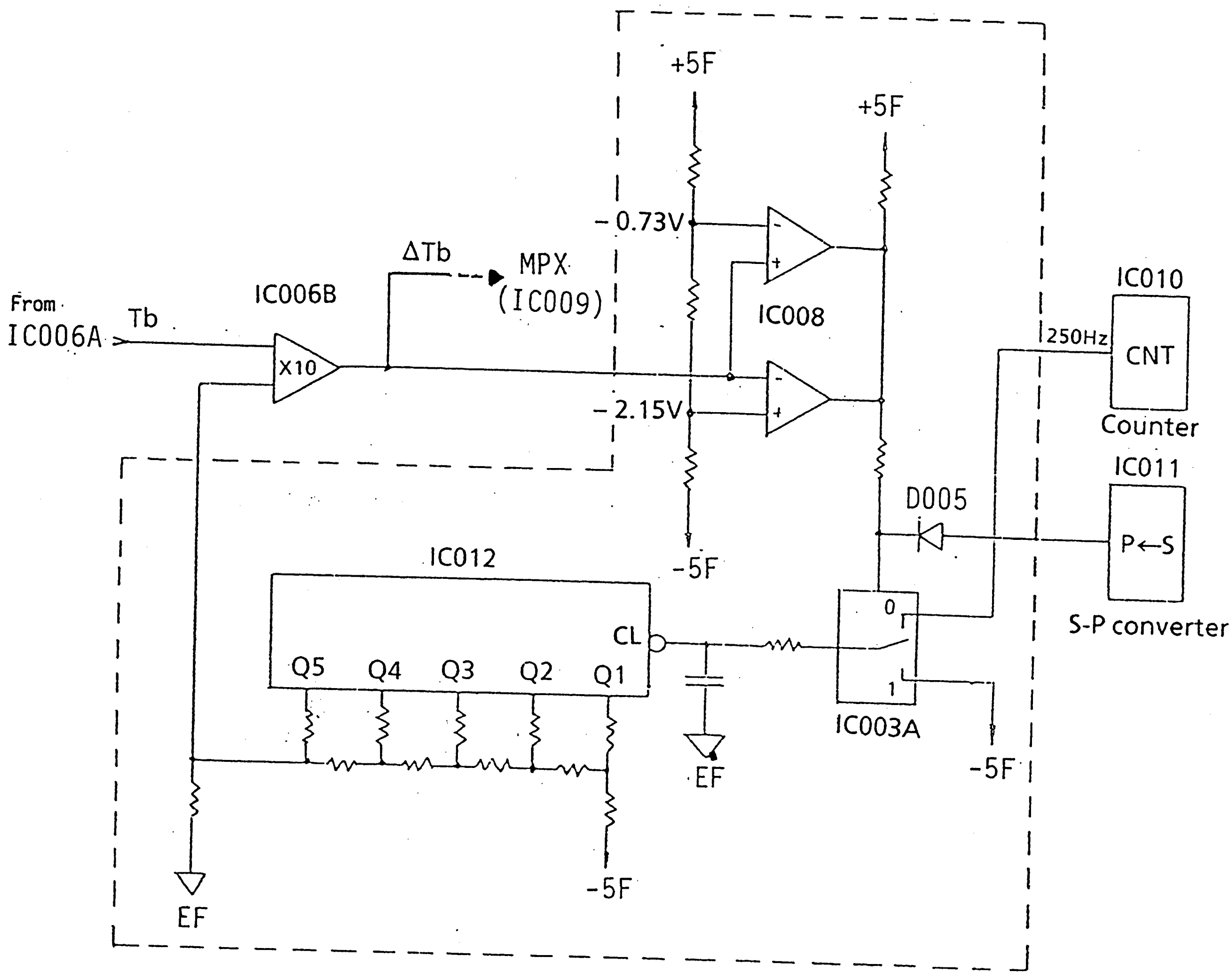


5.4.4 Auto-shift circuit

Blood temperature variation ΔTb needs more amplification than Ti and Tb since the ΔTb signal is a smaller signal variation than Ti and Tb.

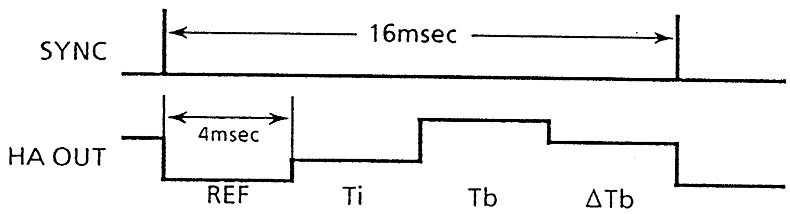
The following auto-shift circuit shifts the ΔTb output voltage so as not to saturate the ΔTb output. When the S-P converter (IC011) outputs a Low level signal to the analog switch (IC003A) after the CO start signal on serial format signal CNTL2 is inputted to the IC011, the IC003A connects the counter (IC010) with the auto-shifter stair-type wave generator (IC012) to shift the ΔTb output voltage from the 10-times amplifier (IC006B).

When the output voltage falls within -2.15V to -0.73V, the comparator (IC008) outputs a High level signal to the IC003A so as to complete the auto-shift function.



[Output timing]

REF, Ti, Tb and Tb are outputted from the HA OUT every 4msec in the following order:



5.5 Temp Head Amp board, UP-0319 (AW-800PA)

5.5.1 General

160Hz low-pass filter (R022 & C107, R023 & C008) eliminates high frequency component, such as electrosurgery interference.

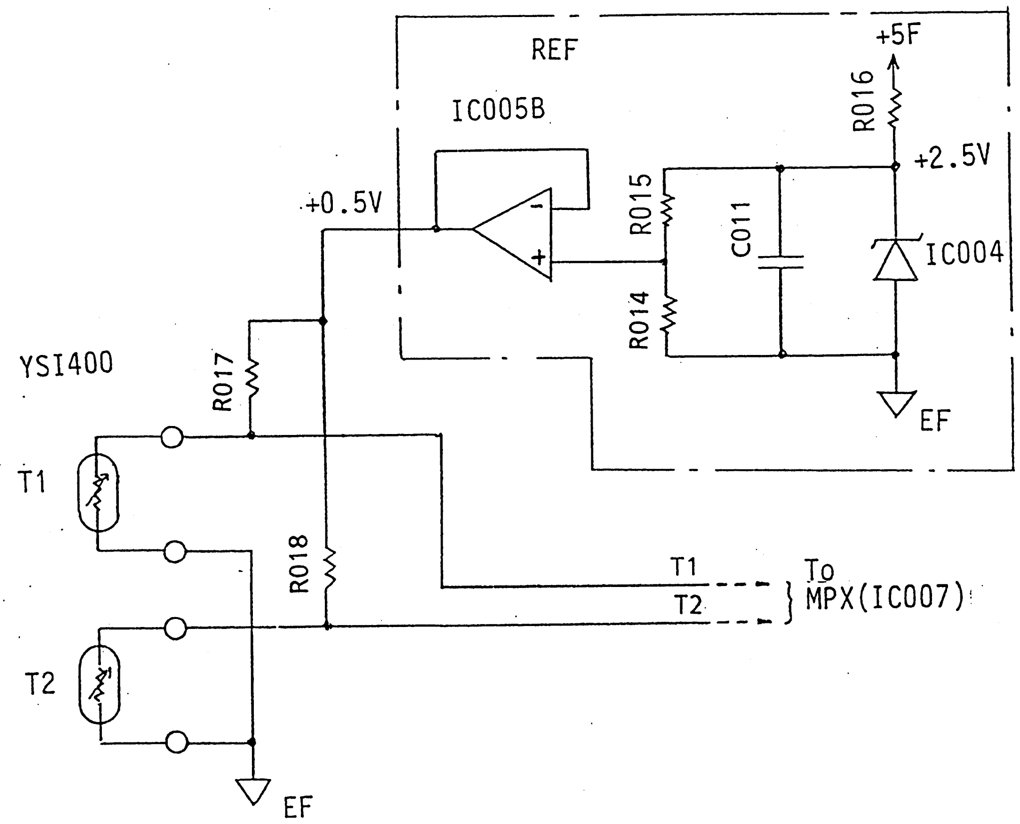
The multiplexer (IC007) time-shares the reference voltage for 27°C (REF0), calibration voltage for 37°C (CAL37) and body temperatures T1 and T2.

The counter (IC008) generates control signals for the IC007.

5.5.2 R-V converter circuit

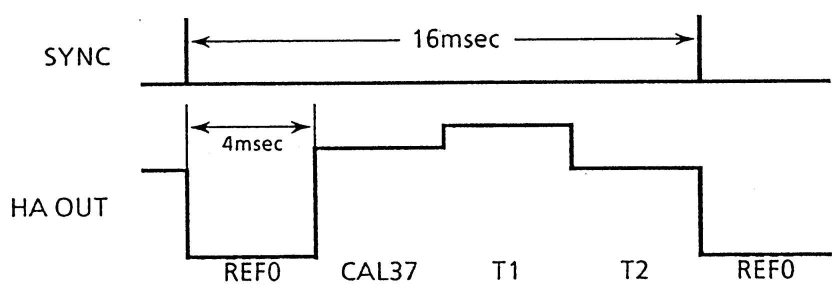
The following circuit composed of the IC004/005B, R014-016 and C011 generates +0.5V reference voltage.

T1 or T2 voltage is obtained according to temperature by dividing the 0.5V reference voltage between the R017 and Ti-thermistor resistance or R018 and T2-thermistor.



[Output timing]

REFO, CA37, T1 and T2 are outputted from the HA OUT every 4msec in the following order.



5.6 EEG head amplifier (AE-800PA)

5.6.1 General

The AE-800PA consists of UP-0421 EEG main board mounting, an EEG, control, output and floating power supply circuits, and UP-0422 EEG sub board mounting an amplifier processing circuit.

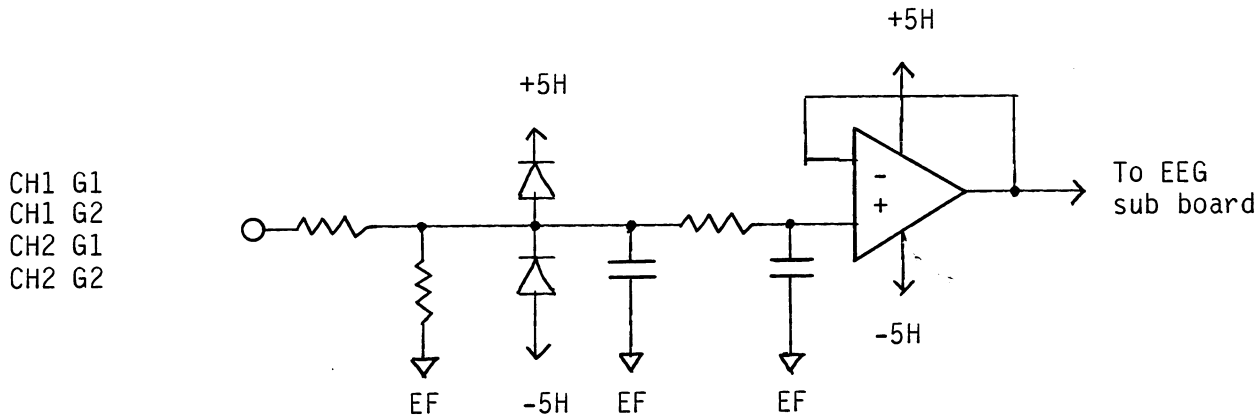
1) UP-0421 EEG main board

Protection filters protect the circuits against large input generated by an ESU and defibrillator, etc. EEG input signals after the protection filters are transfered to the EEG sub board, and amplified, filtered and then returned to the EEG main board. Two EEG signals are time shared every 4msec into EEG1 and EEG2 output signals of the AE-800PA EEG head amplifier. Each buffer output is fed back to the EEG neutral electrode terminal (N) to increase the CMRR(Common Mode Rejection Ratio) to be called Reference Feedback for later descriptions.

2) UP-0422 EEG sub board

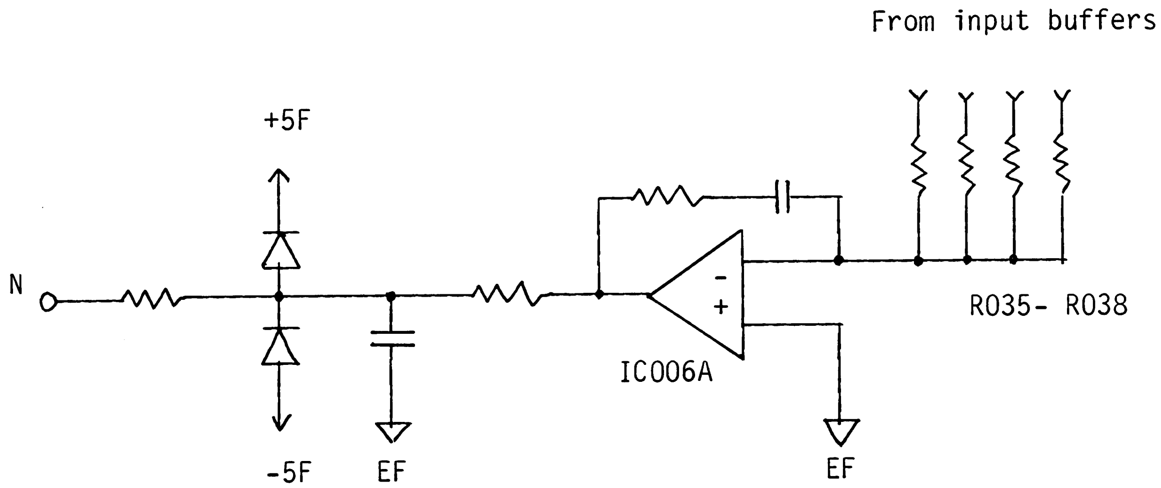
The UP-0422 consists of pairs of total 5000 gain amplifiers, 35Hz high-cut filters and AC interference filters. 0.3sec time constant is determined in this block.

5.6.2 Input buffer on the UP-0421 main board



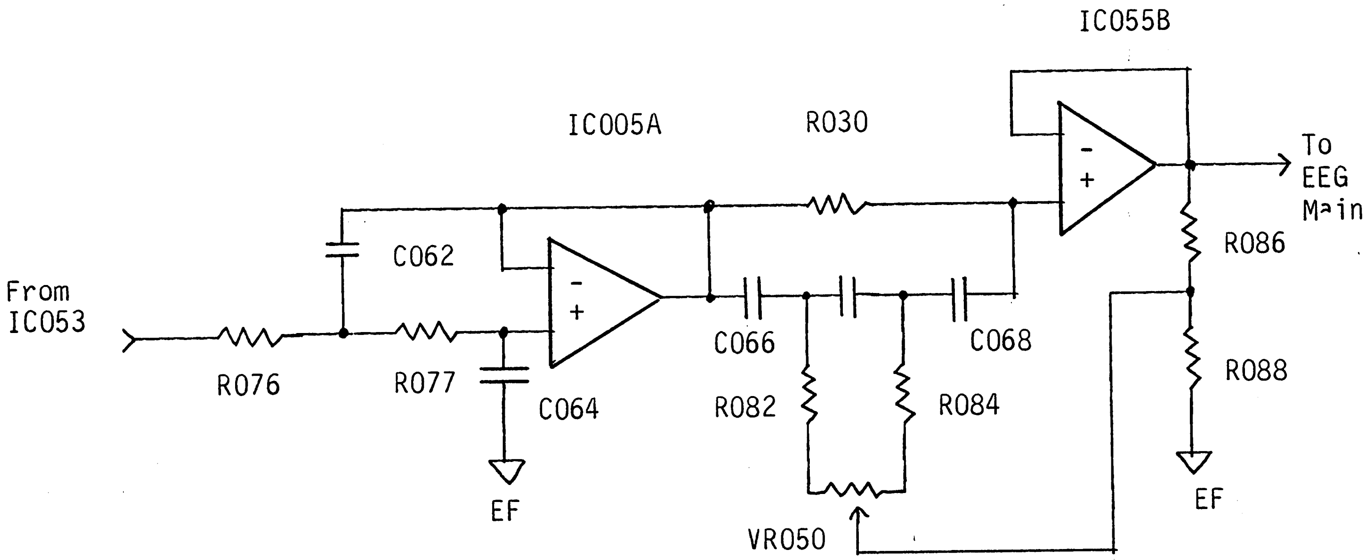
Two CR high-cut filters attenuate noise component in the EEG signal. Resistors limit large current and diodes limit large voltage (from ESU, defibrillator, etc.) to protect against damage of the circuit.

5.6.3 Reference feedback

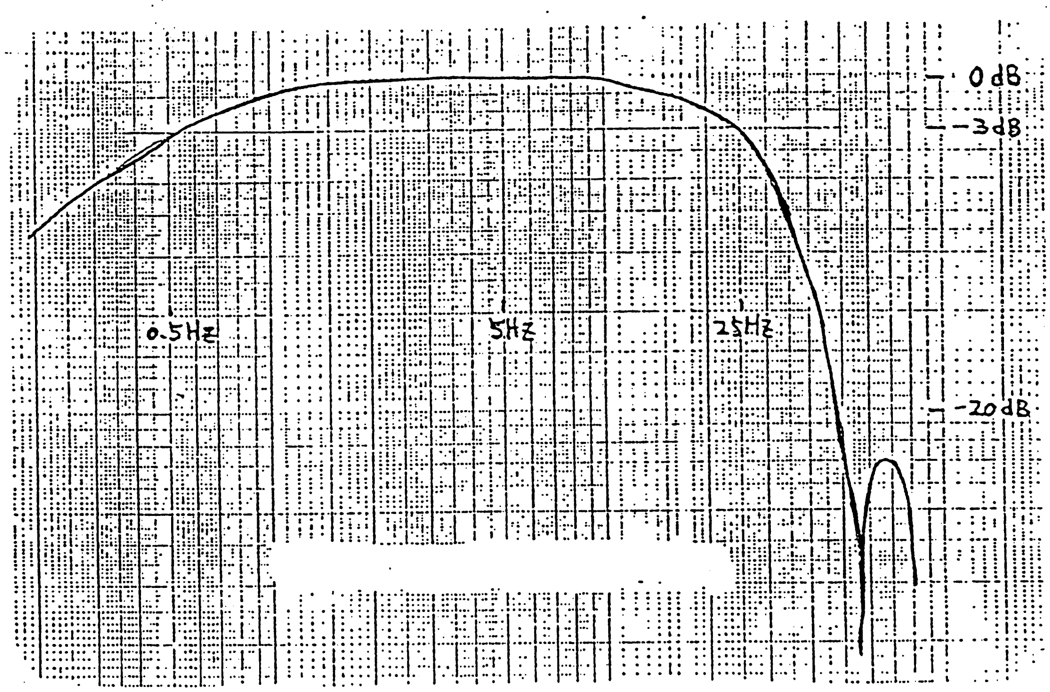


As the EEG signal is amplified by the differential amplifier, theoretically it is not interfered by common mode noise. However, due to variation in electrode impedance and electronic devices used, difference between the phases of the common mode component appears at the EEG amplifier output as noise. By feeding back (negatively) each buffer output to the neutral electrode terminal(N), common mode component referred to the floating ground (EF) is reduced and the CMRR is increased.

5.6.4 High-cut filter and AC filter on the UP-0422 EEG sub board

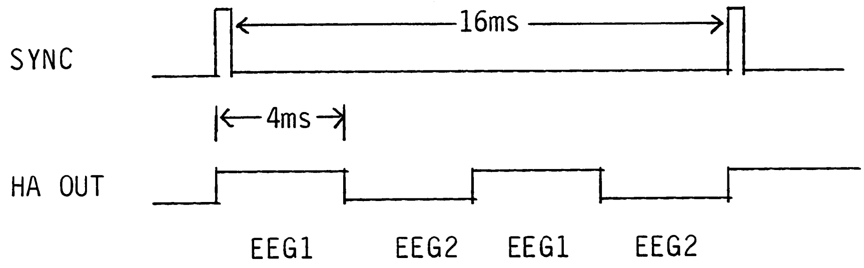


Two stage high-cut filters consisting of IC055A, C062, C064, R076 and R077, and AC filter consisting of IC005B, C066, C067, C068, R080, R082, R084, R086, R088 and VR050 filter high frequency components and AC noise in the EEG signal. Total frequency characteristics of the filters is shown below.



5.6.5 Timing of the output signals

This EEG head amplifier outputs in the following timing



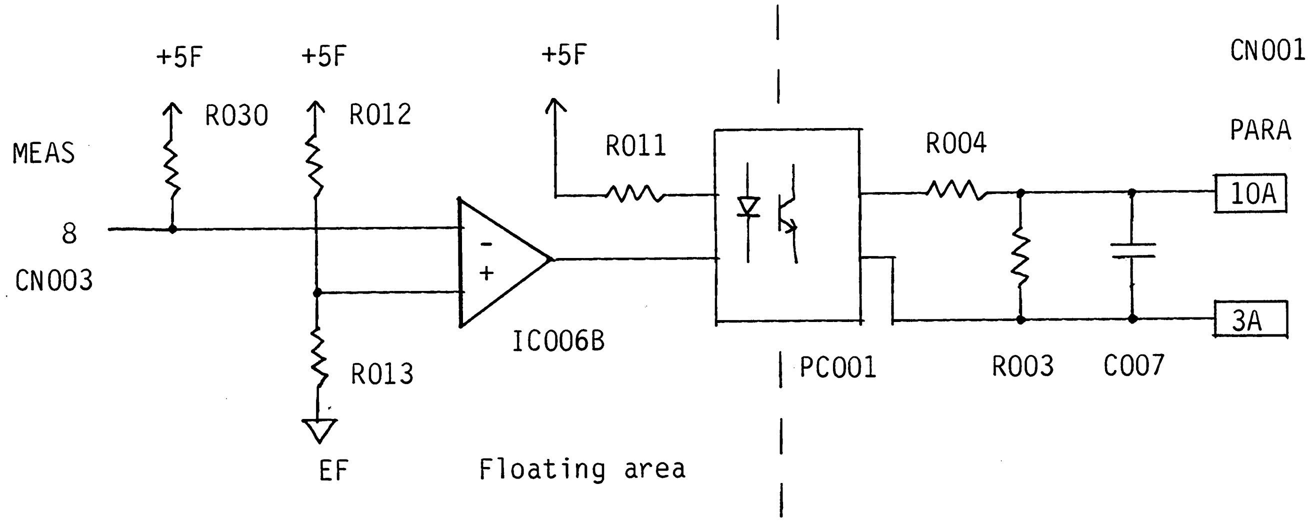
* Refer to the pages of BP head amplifier for signal signal modulation/ demodualtion between the floating area and grounded area.

5.6.6 PAPA signal generating circuit

Connection and disconnection of the EEG cable change the PARA voltage as below:

+1.7V ±40mV ...... not connected

+1.9V ±40mV ...... connected



When the EEG cable is not connected, comparator input pin-6 of the IC006B is pulled up to +5F through the R030, and the comparator outputs level L. At this condition, the PC001 photocoupler is conductive and the resistance (PARA resistance) across the PARA and ER terminals is a parallel value of the R004 and R003, and the PARA voltage reads +1.7V. This voltage indicates EEG non measuring condition.

When the cable is connected, the PC001 is not conductive, the PARA resistance is R003 only, and PARA voltage reads +1.9V. This voltage indicates EEG measuring condition.

5.7 Respiration head amplifier (AR-800PA)

5.7.1 General

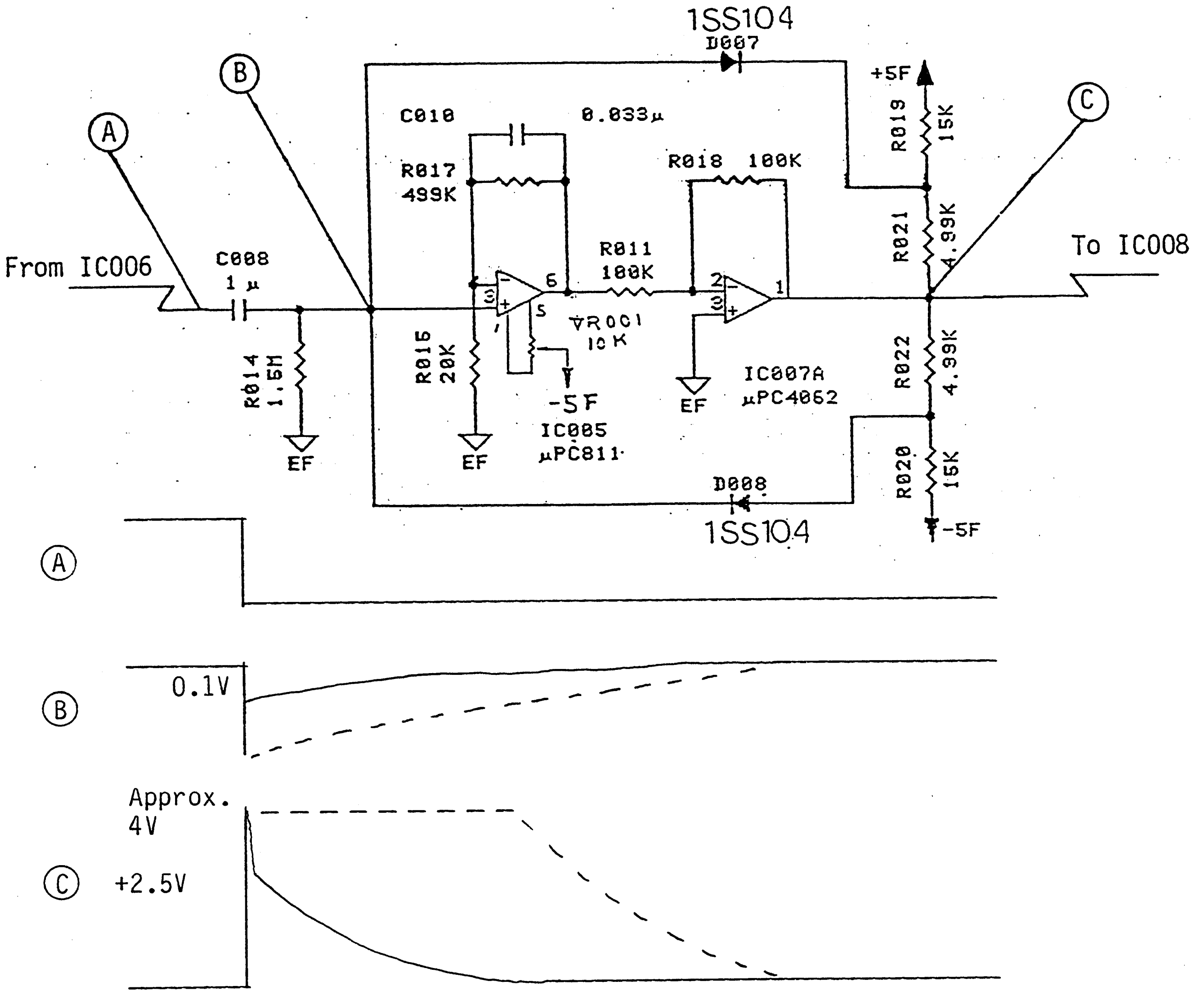
The AR-800PA consists of UP-0458 respiration board mounting floating power supply, respiration pickup exciter voltage (EXC) generator, input high-cut filter (3Hz), amplifier, auto inst (instantaneous baseline recovery) circuit, etc.

5.7.2 Output

Analog signal is outputted without being time shared which is different from other head amplifiers.

5.7.3 Auto Inst (instantaneous baseline recovery) circuit

Auto Inst function works when respiration waveform signal saturates in the circuit just after the pickup is connected to the amplifier or due to over-input.



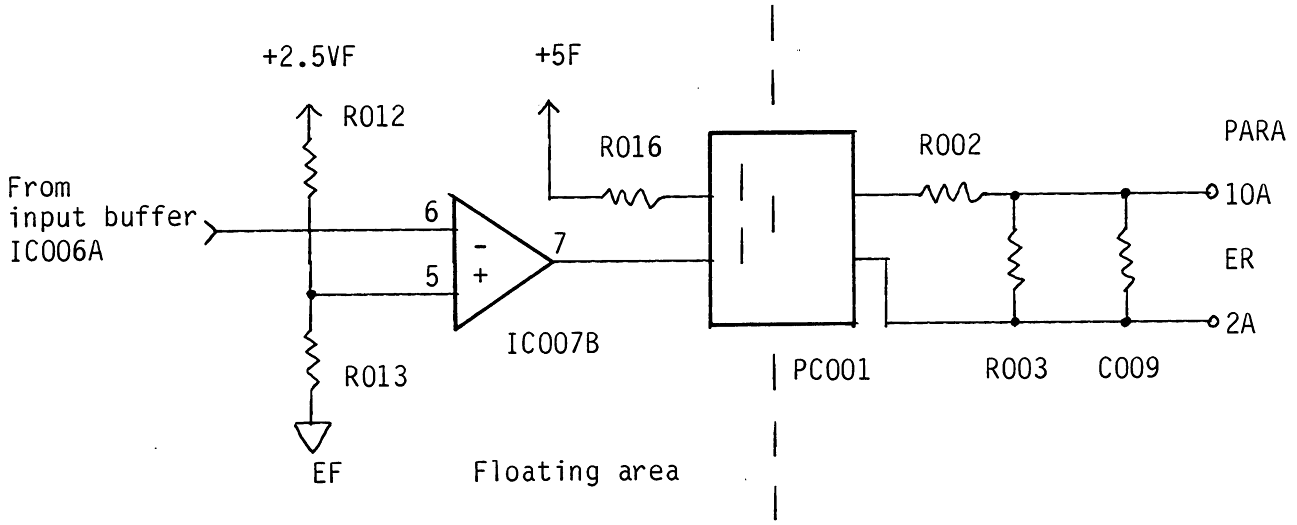
Straight lines indicate the voltages with the auto inst function and dotted lines indicate the voltages without diodes D007 and D008.

5.7.4 PARA signal generating circuit

Connection and disconnection of the respiration pickup change the PARA voltage as below:

+0.58V ±20mV .... no connection

+0.65V ±20mV .... connection



When the thermistor respiration pickup is not connected, copmarator input pin-6 of the IC007B is approximately +2.5V and the comparator outputs level L. At this condition, PC001 photocoupler is conductive and +0.58V PARA output voltage is obtained. This voltage indicates no respiration measuring condition with the thermistor pickup.

When the pickup is connected, comparator pin-6 input is approximately +1V and the PC001 photocoupler becomes off, and +0.65V PARA voltage is obtained. This voltage indicates respiration measuring condition with the thermistor pickup.

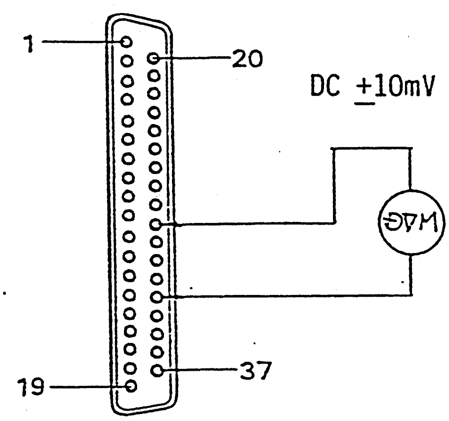
5.7.5 Adjustment

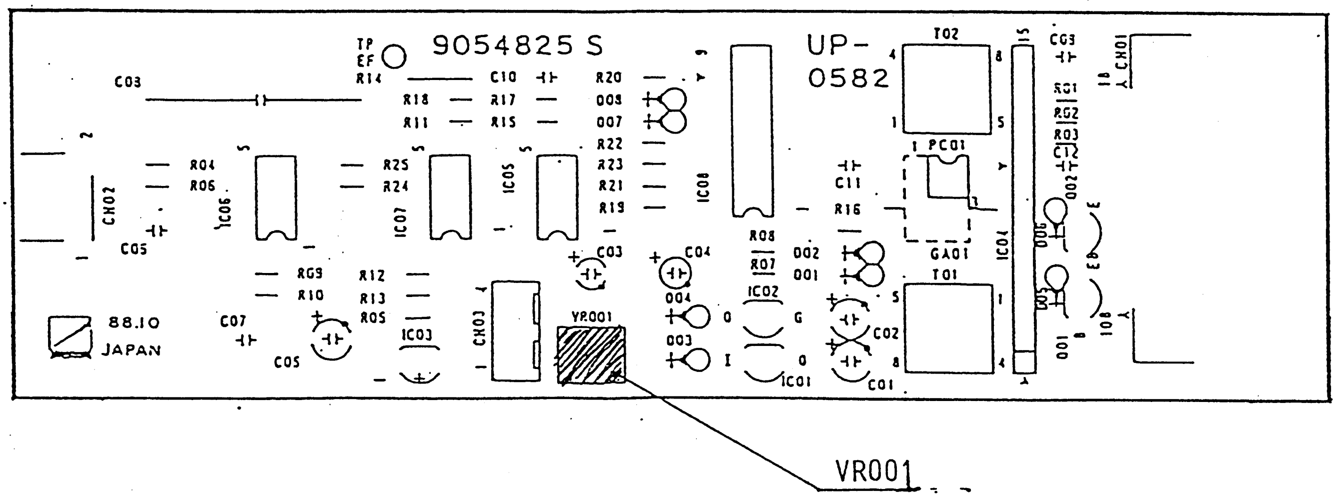
When IC005 and/or VR001 is replaced, offset adjustment is required. QI-814P central interface is required for this adjustment.

<Offset adjustment>

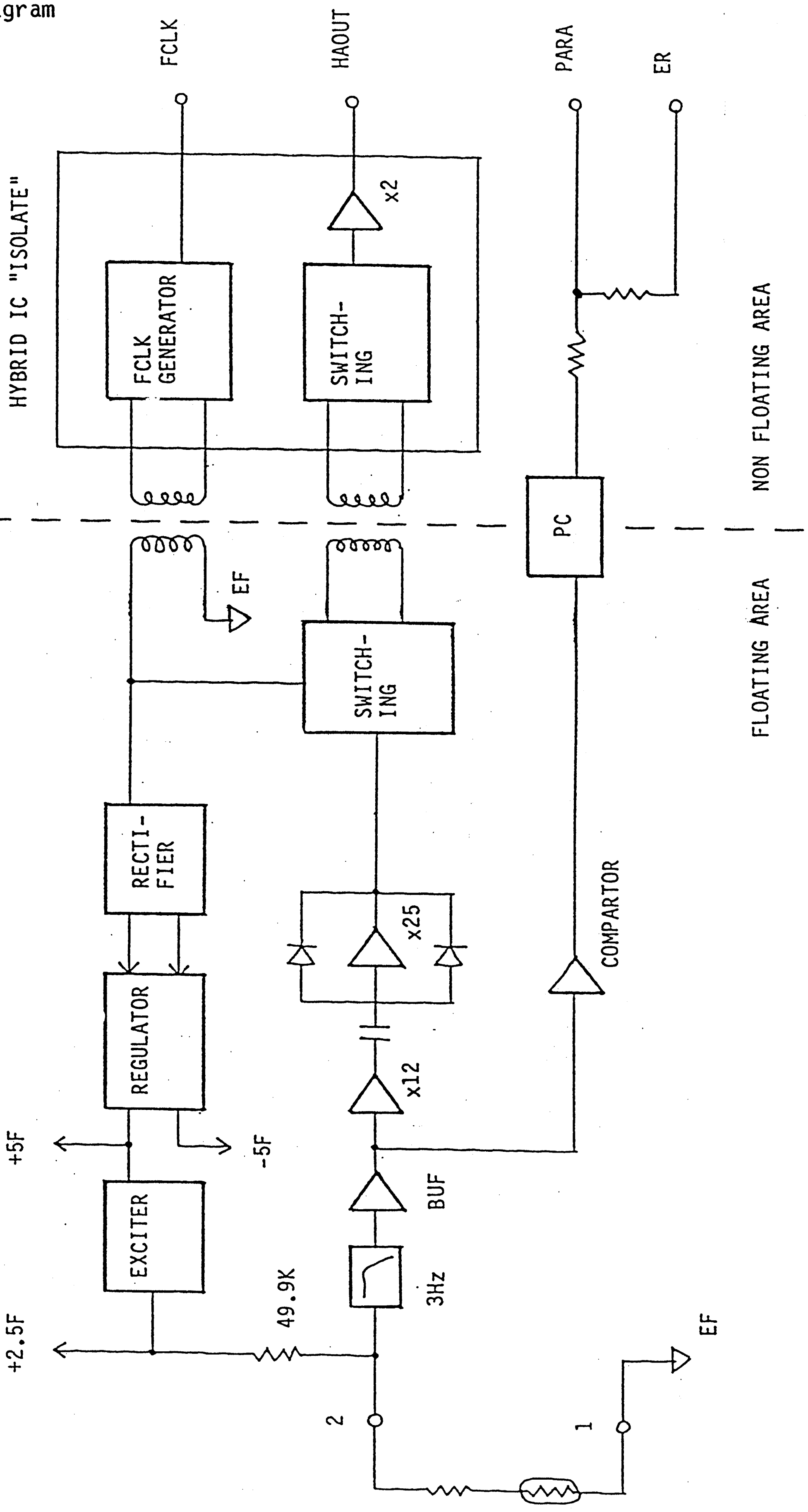
1) Connect the respiration pickup to the respiration head amplifier.
2) Measure voltage with a digital voltmeter across the pin-29 (RW) and pin-33 (GND) of the CNS connector on the QI-814P interface.
3) Adjust the VR001 so that the voltmeter reads DC $\pm 10mV$.

CNS connector





5.7.6 Block diagram



5.8 SaO2 head amplifier (AL-800PA)

5.8.1 General

This unit has a function to detect the following four signals for calculation of % SaO2 (oxygen saturation).

R .... Transmitted red light intensity
ΔR .... Transmitted red light intensity variation (ΔR1 = ΔR2 x 8)

IR .... Transmitted InfraRed light intensity
ΔIR ...... Transmitted InfraRed light intensity variation (ΔIR1 = ΔIR2 x 8)

The SaO2 head amplifier composes of UP-0551 Main board and UP-0552 Sub board. Block diagram on page 16 shows major functions of each board.

1) UP-0551 Main board

Red light and infrared light are emitted from the two LED lamps alternatively at 1kHz interval which is controlled by LED control circuit. Transmitted light through the subject are detected and converted into voltages by a photo detector and an amplifier, amplified to a specified level of signal by an auto gain controller, and then transferred to the Sub board.

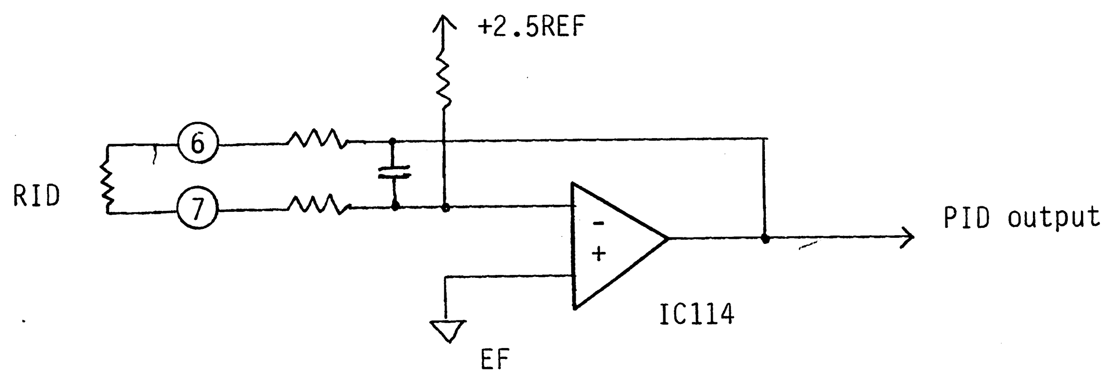
2) UP-0552 Sub board

Noise in the transmitted light signal from the Main board is reduced by a time sharing filter. Base hold circuit holds the signal level while there is no light emission to the -2.5V reference voltage (REF). R (Red light intensity signal) and IR (InfraRed light signal) are separately demodulated by two sample hold circuits and ΔR2 and ΔIR2 are outputted by AC amplifiers with auto inst (instantaneous baseline recovery) function. At the same time, ΔR1 and ΔIR1 are outputted by 8 time gain amplifiers. Finally these signals are converted into a time-shared signal by a multiplexer and then outputted through the UP-0551 Main board.

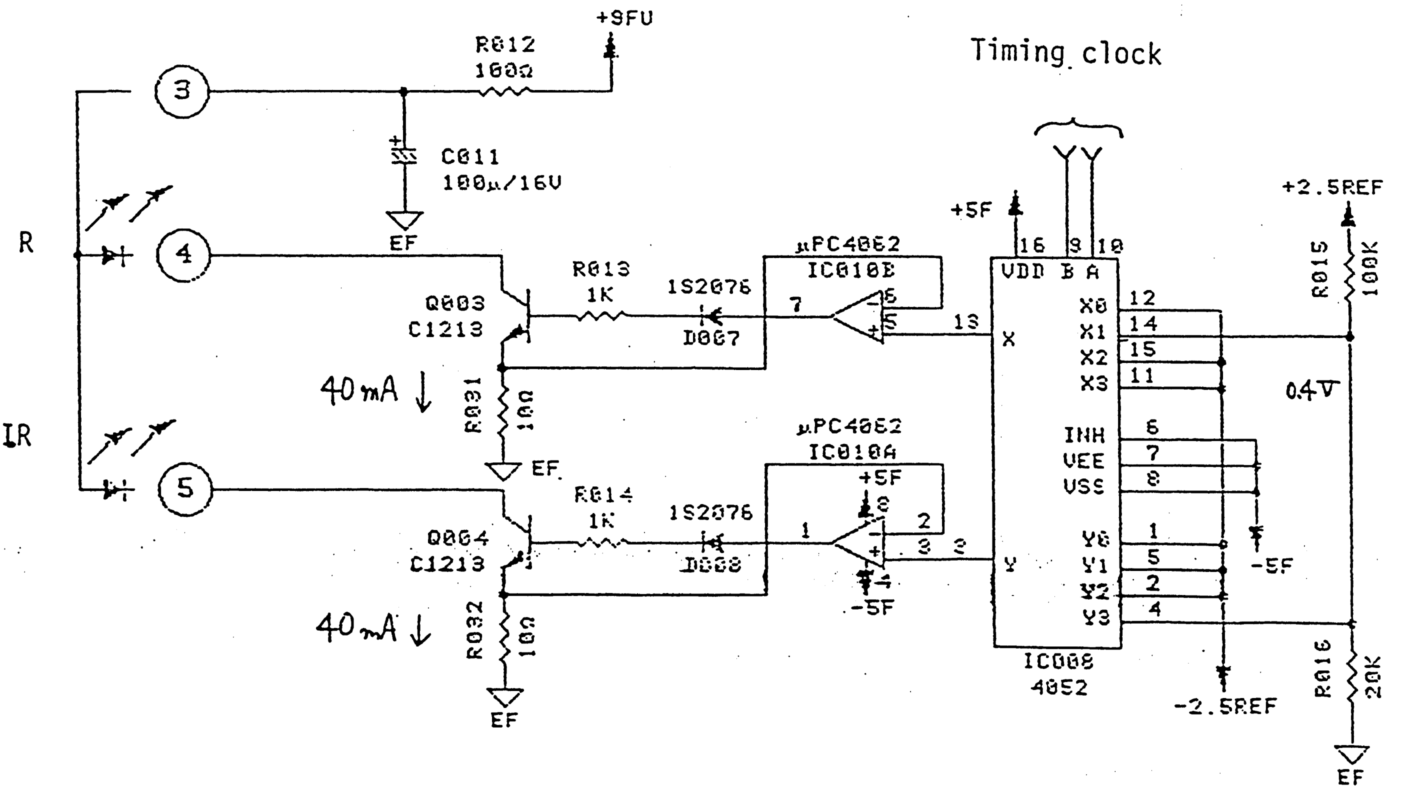
5.8.2 Probe ID amplifier

The probe ID amplifier compensates the variations of wavelength of light emitted from the LED lamps and also detects probe connection to the SaO2 head amplifier.

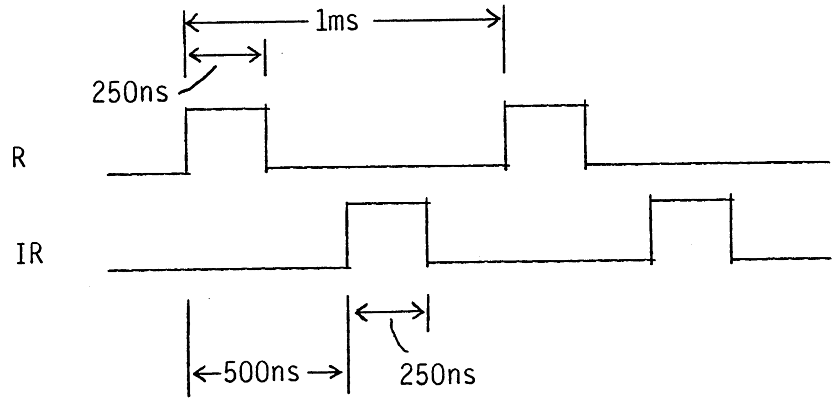
Each SaO2 probe has its own ID (determined by the RID) which is converted into voltage signal (PID: Probe ID).



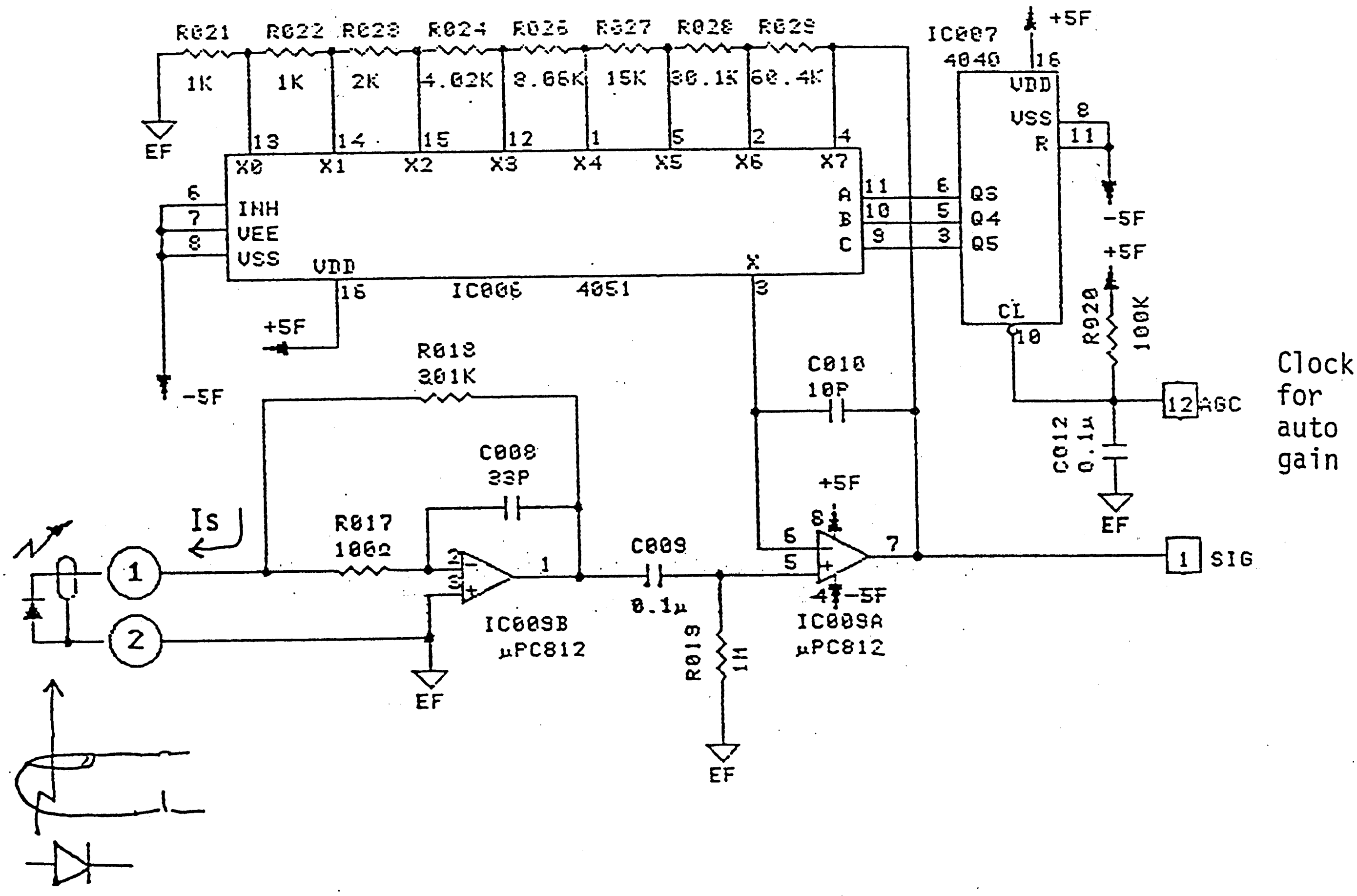
5.8.3 LED control circuit



Red light and infrared light are emitted from the two LED lamps alternatively at 1kHz interval controlled by above LED control circuit. Peak current flow of each LED is 40mA.



5.8.4 Input amplifier and auto gain control circuit



Transmitted light detected by the photodiode and the detection current "Is" is converted into voltage signal by the amplifier and the feedback resistor R018.

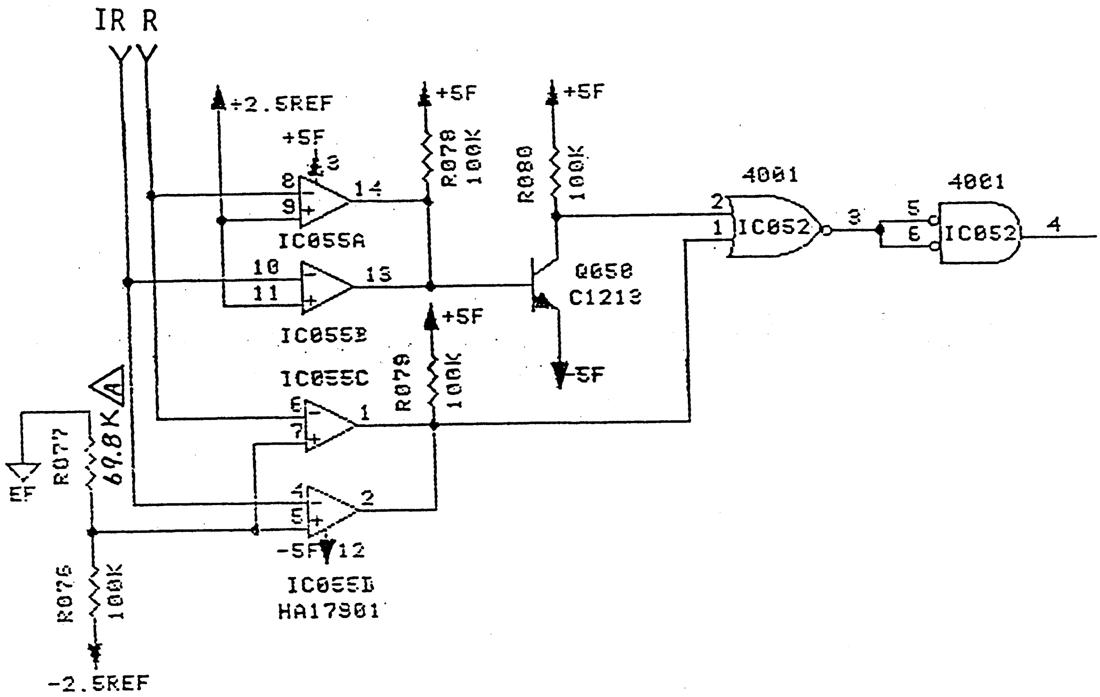
After being DC cut by the capacitor C009, voltage signal is amplified to a specified level by the auto gain control circuit consists of the IC switch IC006 and resistors.

AGC (Auto Gain Clock singal) stops which is triggered by the auto gain control circuit when R or IR signal comes into a specified range.

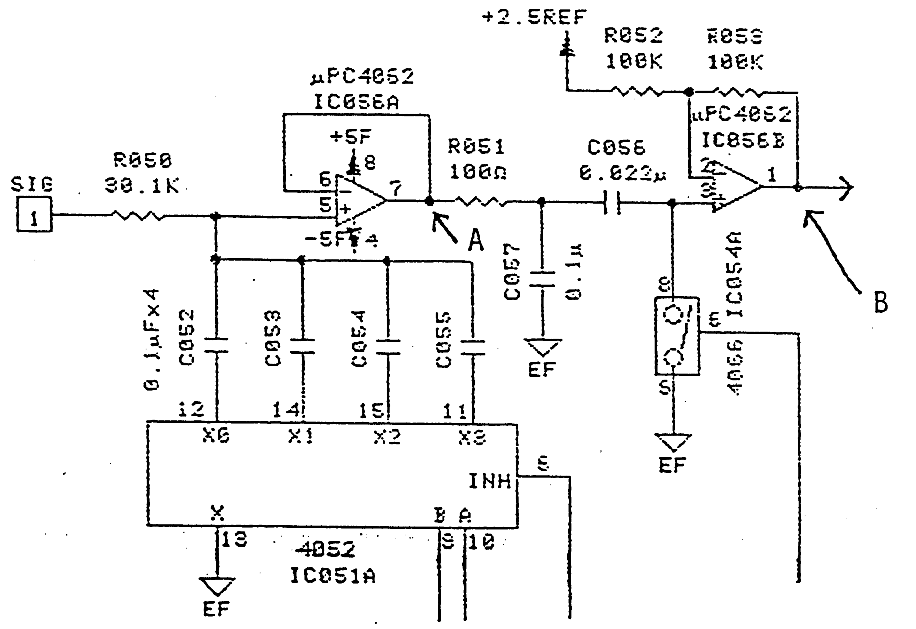
5.8.5 Comparator for auto gain control

The comparator controls the AGC (Auto Gain Clock signal) on/off or the auto gain control circuit.

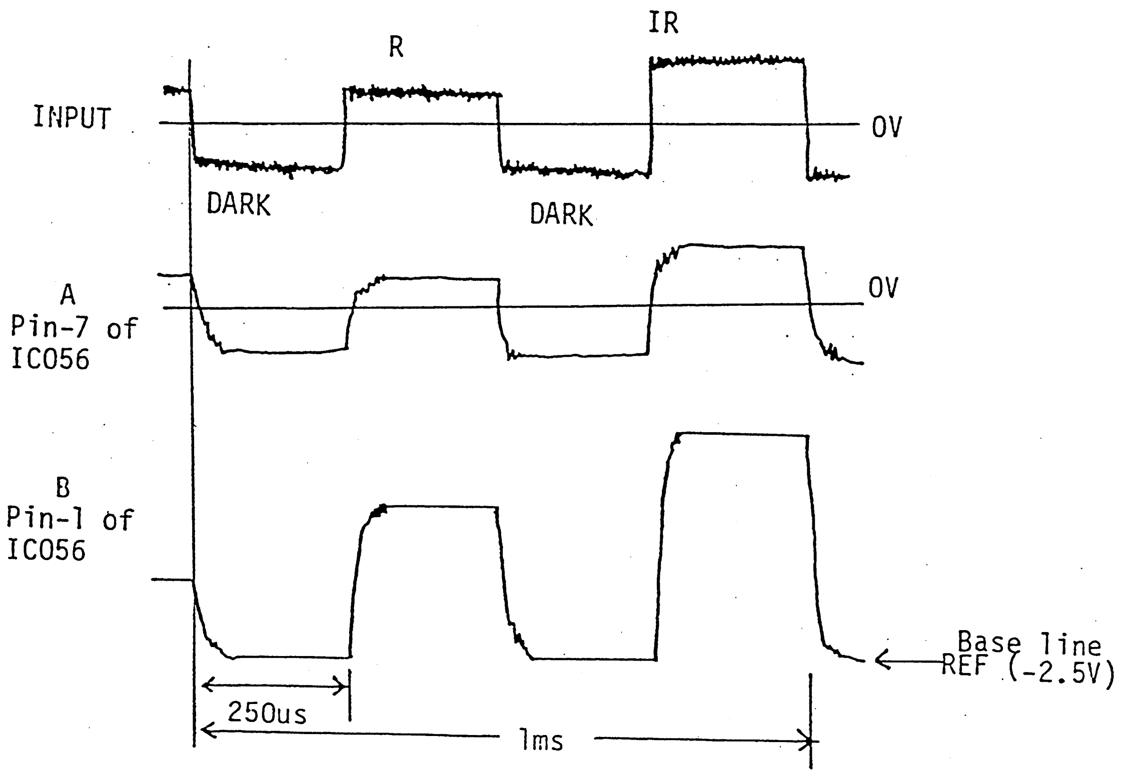
When either R or IR signal comes into a range from -1V to +2.5V, the output pin-4 of the IC052 turns to LOW to stop the AGC signal.



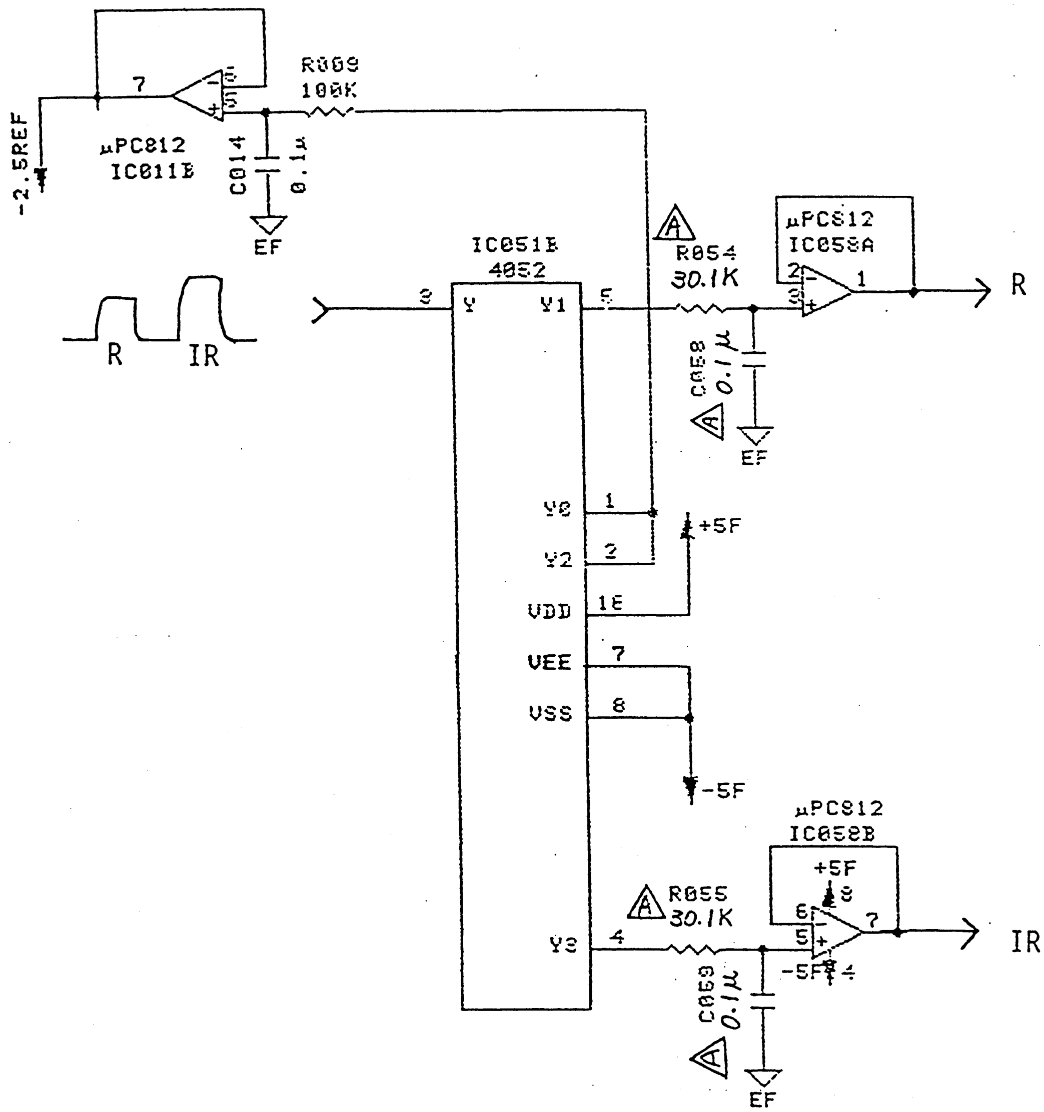
5.8.6 Time sharing filter with base hold circuit (Sub board)



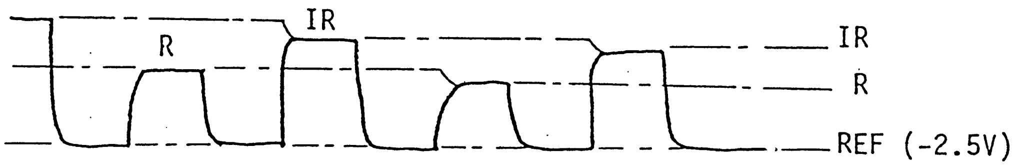
This circuit reduces noise component in the signal from the Main board and holds the baseline (signal level while there is light emission) of the signal to -2.5V reference voltage (REF).



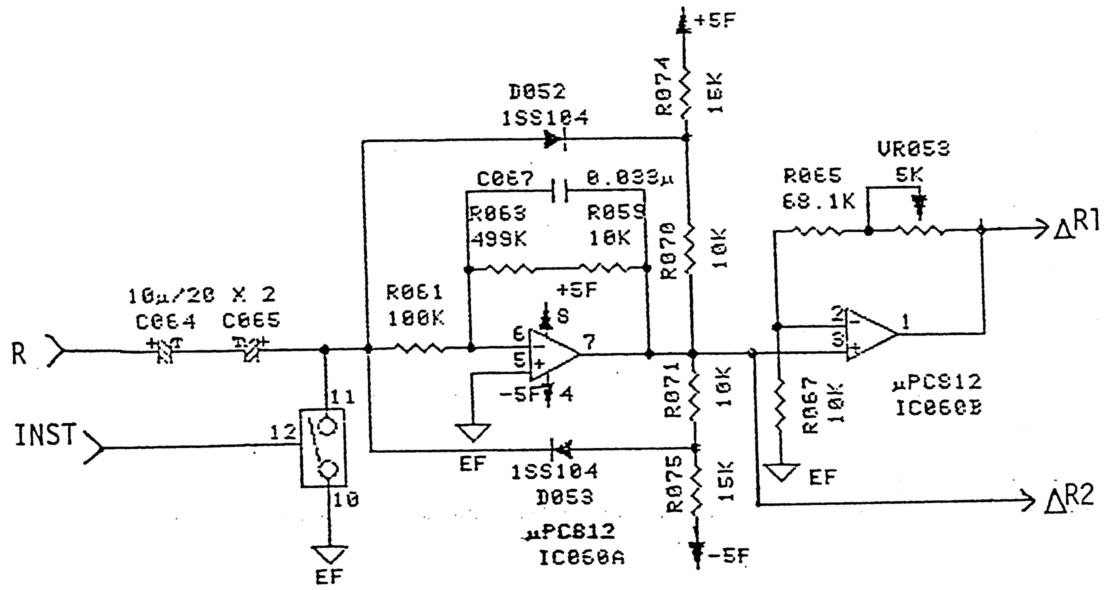
5.8.7 Sample hold circuit



This circuit sample holds the R, IR, and REF (baseline) signals of the base held signal as below:



5.8.8 AC amplifier with auto inst function



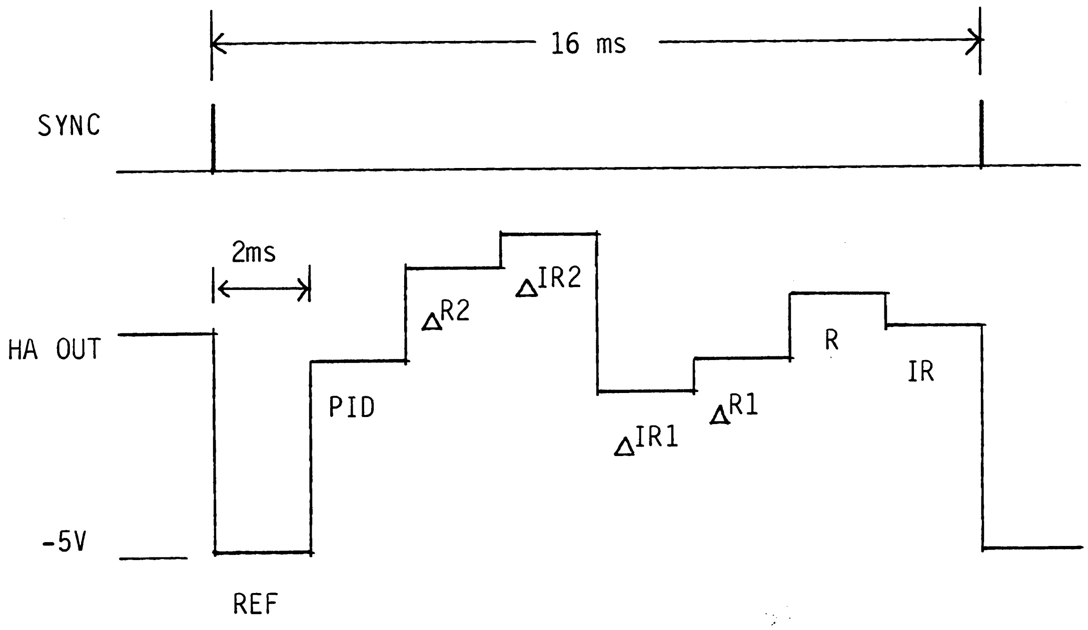
After being DC cut by the capacitors C062 and C063, the sample-held R signal is 5 times amplified by the IC059A to be the $_\Delta$R2 signal.

The diodes D050 and D051 recover the baseline when the signal level is saturated in the circuit (auto inst function).

The analog switch IC054B shortens the input line of the amplifier IC059A during auto gain control so that the signal level can quickly recover after the auto gain control is released. $_\Delta$R2 signal is 8 times amplified by the IC059B into the $_\Delta$R1 signal.

Above operations are applied to the IR singal in the same manner applied to the R signal.

5.8.9 Output timing



5.8.10 Adjustment

Volume on the PC boards are for gain adjustment of amplifiers. If you replace resistors concerning amplification gain, volumes should be readjusted.

There is no need to adjust the volumes when IC chips are replaced.

5.9 CO2 head amplifier (AG-800PA)

5.9.1 General

AG-800PA is one of the head amplifiers for the BSM-8500 series bedside monitors to measure CO2 partial pressure of expired gas of a patient with TG-706P CO2 sensor.

5.9.2 Description of each function block

1) UP-0588 CO2 Main board

Power (DC-DC) line is a power to drive the CO2 sensor TG-706P and DRIVER is a electrical current driver of a motor in the sensor.

S-P and D/A circuit reads the linearizer data (compensation factor for CO2 calculation, differs in each sensor) which written in the ROM in the sensor.

TIMING CONTL 1 circuit controls output timing for reading linearizer data, and HAOUT output timing.

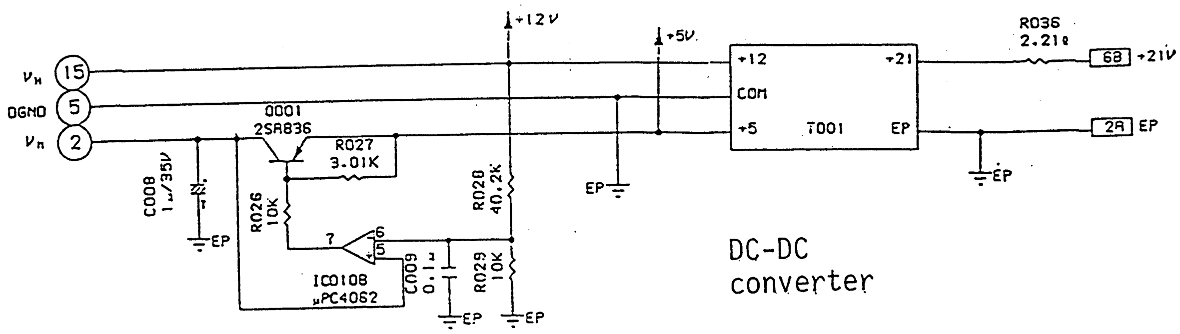
2) UP-0589 CO2 Sub board

ZERO SHIFT circuit shifts the V_{AC} sensor signal baseline to -5REF (-4.75V) in order to widen dynamic range of the signal.

P/H (peak-hold) circuit holds amplitude of the signal based on -5REF reference voltage.

3.75S/H (Sample and hold) and 4.3S/H circuits sample each V3.7 signal and V4.3 signal in the V_{AC} signal.

. Sensor driver power (DC-DC, DRIVER on CO2 Main board)



Driver

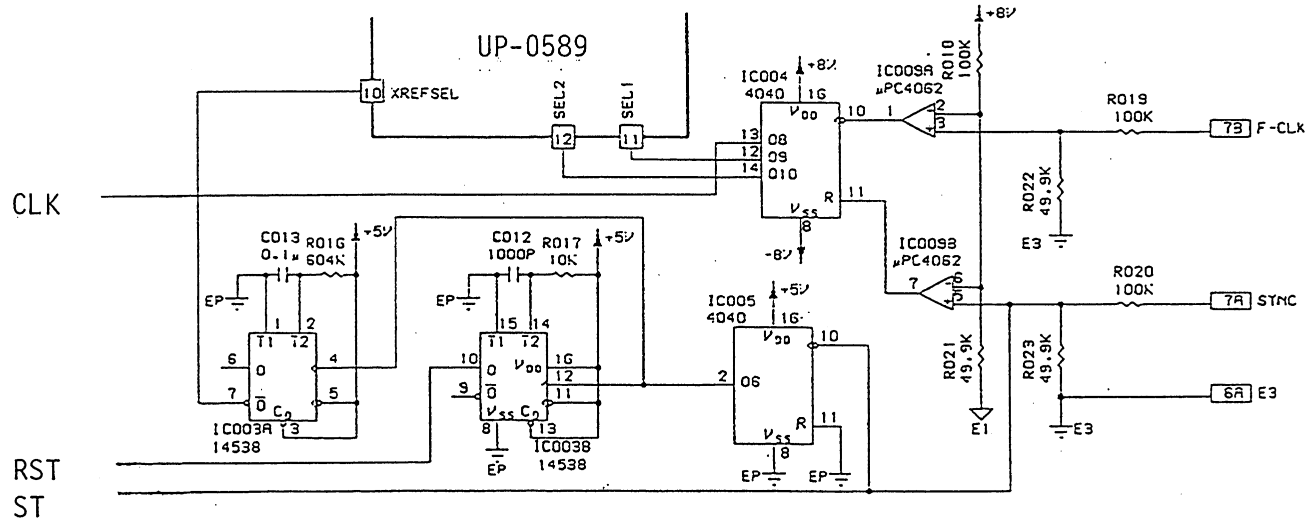
DC-DC
converter

. DC-DC (T001) is a DC-DC converter that generates +12V and +5V voltages from +21V unregulated power.

+12V is a power for an infrared ray lamp in the CO2 sensor of 120mA continuous load current and +12V ±1% stability.

+5V drives a motor and digital IC devices in the sensor. The circuit indicated with DRIVER drives the motor.

. TIMING CNTL 1 (C02 Main board)



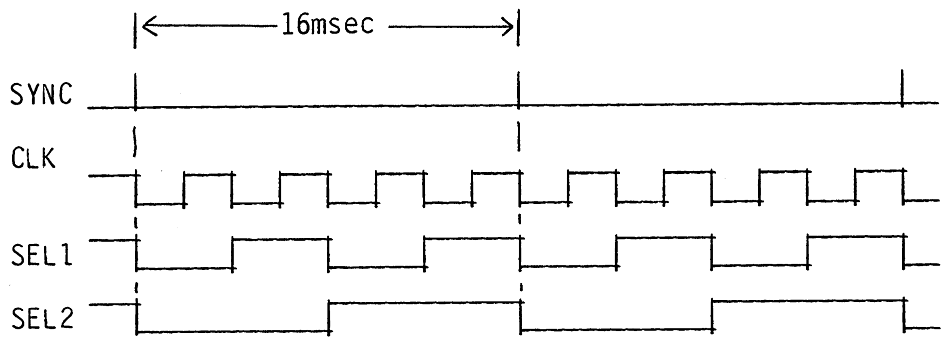
. SEL1, SEL2 ...... Clock signals to control HAOUT signal output timing.

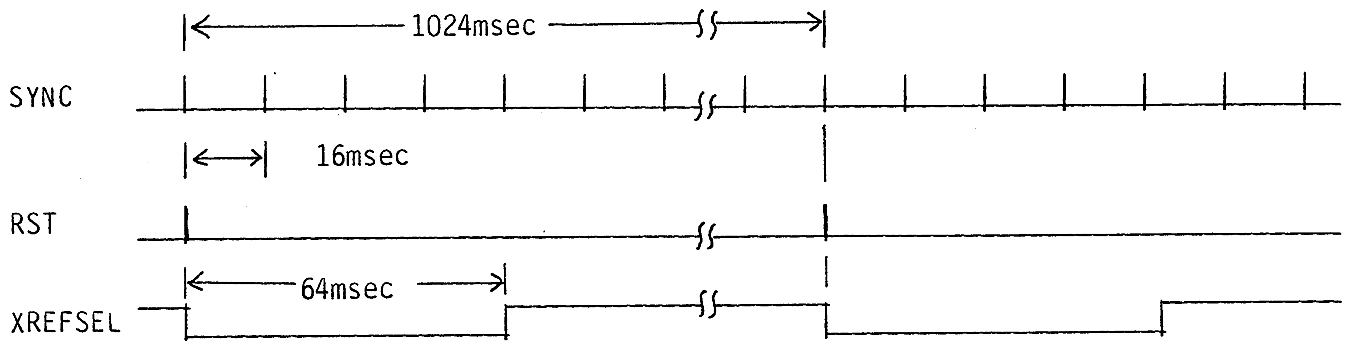
. XREFSEL .... Control signal to output data to HAOUT by switching -5REF signal and linearizer data.

. CLK .... Clock signal to control ROM and S/P (Serial to Parallel) converter in the sensor.

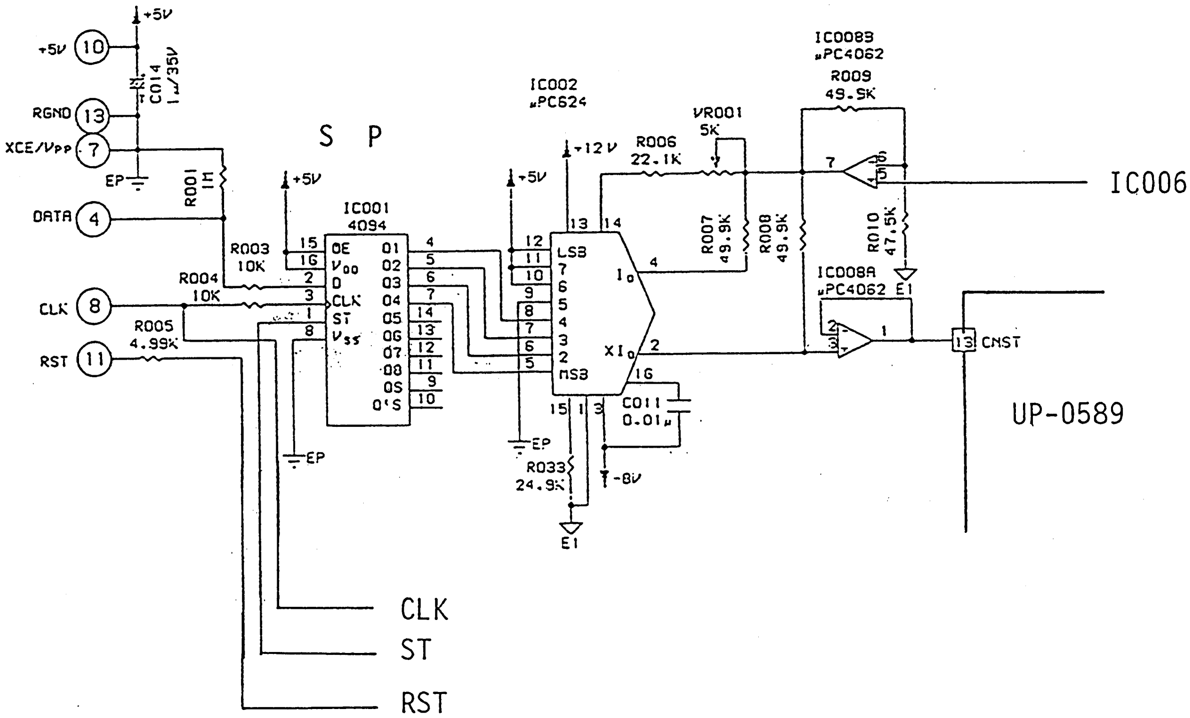
. RST .... Signal to reset the ROM in the sensor.

. ST .... Signal to control S/P conversion.





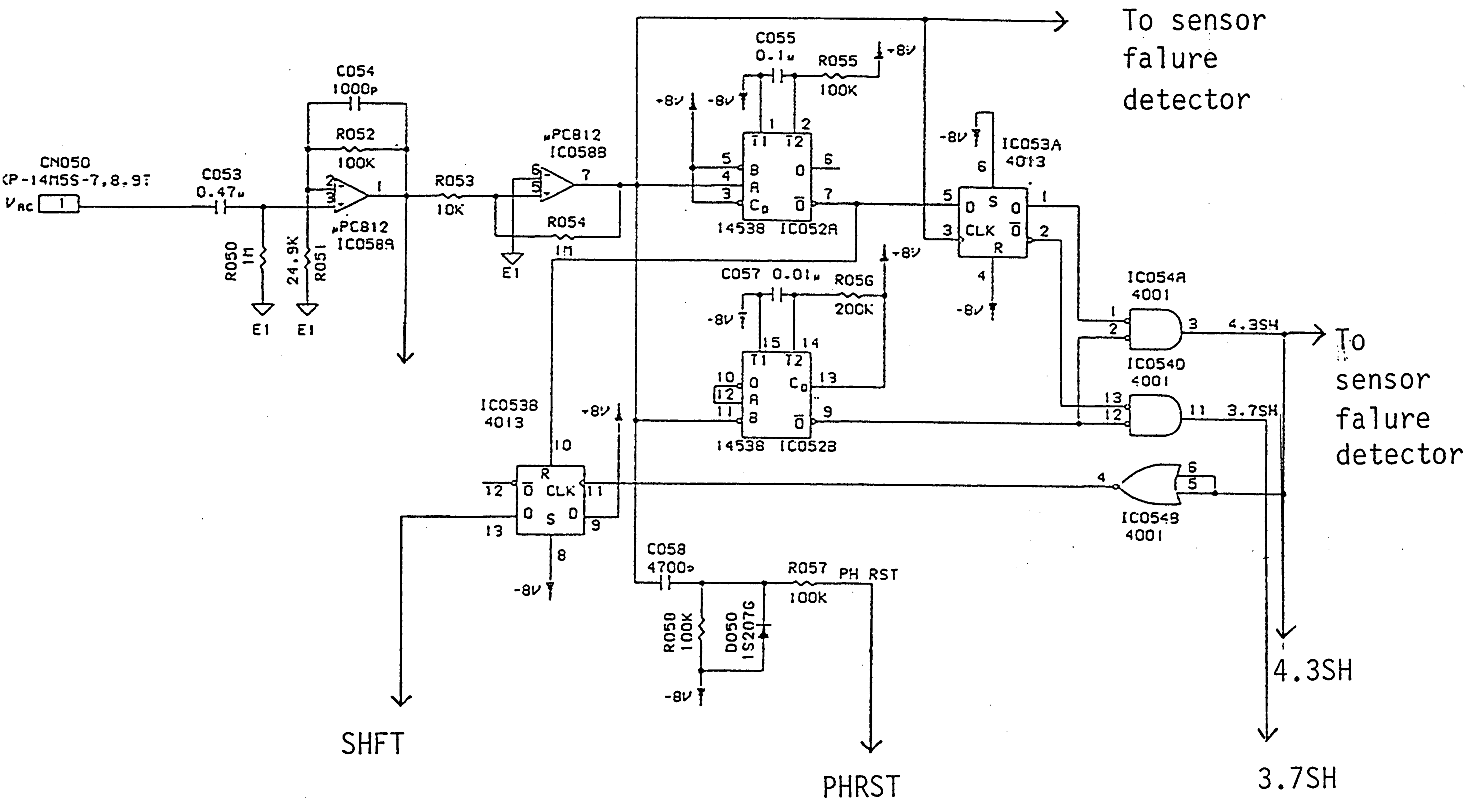
. S/P conversion and D/A conversion (C02 Main board)



Linearizer data (DATA) stored in the ROM in the sensor is output from the ROM in synchronization with CLK signal in serial format data. This serial format data is S/P converted into parallel format data in synchronization with ST signal. Relation between the linearizer data and D/A output is as below.

Linearizer data	D/A out (V)	Linearizer data	D/A out (V)
0 0 0 0	-4.80	1 0 0 0	+0.32
0 0 0 1	-4.16	1 0 0 1	+0.96
0 0 1 0	-3.52	1 0 1 0	+1.60
0 0 1 1	-2.88	1 0 1 1	+2.24
0 1 0 0	-2.24	1 1 0 0	+2.88
0 1 0 1	-1.60	1 1 0 1	+3.52
0 1 1 0	-0.96	1 1 1 0	+4.16
0 1 1 1	-0.32	1 1 1 1	+4.80

. TIMING CONTL 2 (CO2 Sub board)



. SHFT .... Control signal to shift V_{AC} signal baseline in the ZERO SHIFT circuit to -5REF (-4.75V) level.

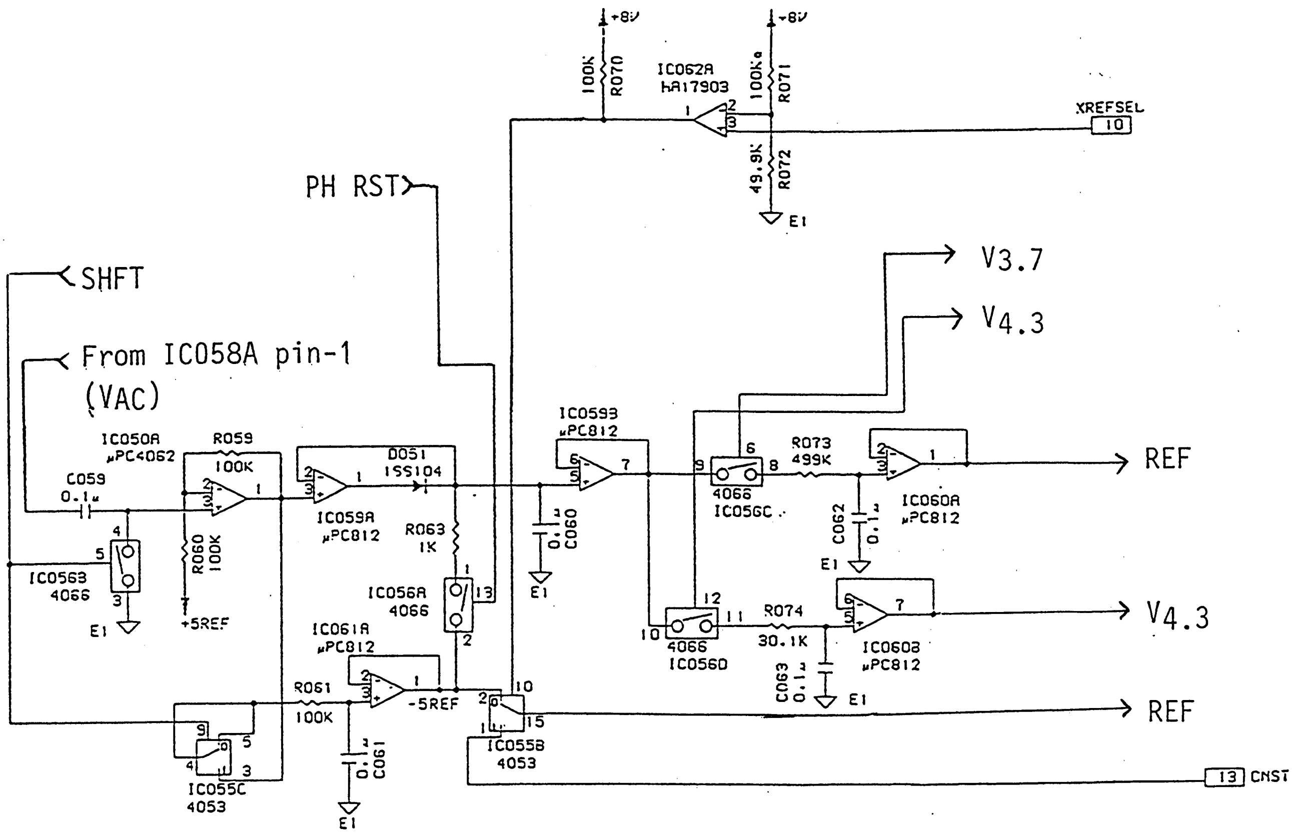
. PH RST .... Pulse to reset Peak-Hold circuit following the ZERO SHIFT circuit.

. 3.7SH .... Sampling pulse of V3.7 signal in the V_{AC} singal.

. 4.3SH .... Sampling pulse of V4.3 signal in the V_{AC} singal.

Refer to page for CO2 signal demodulation timing.

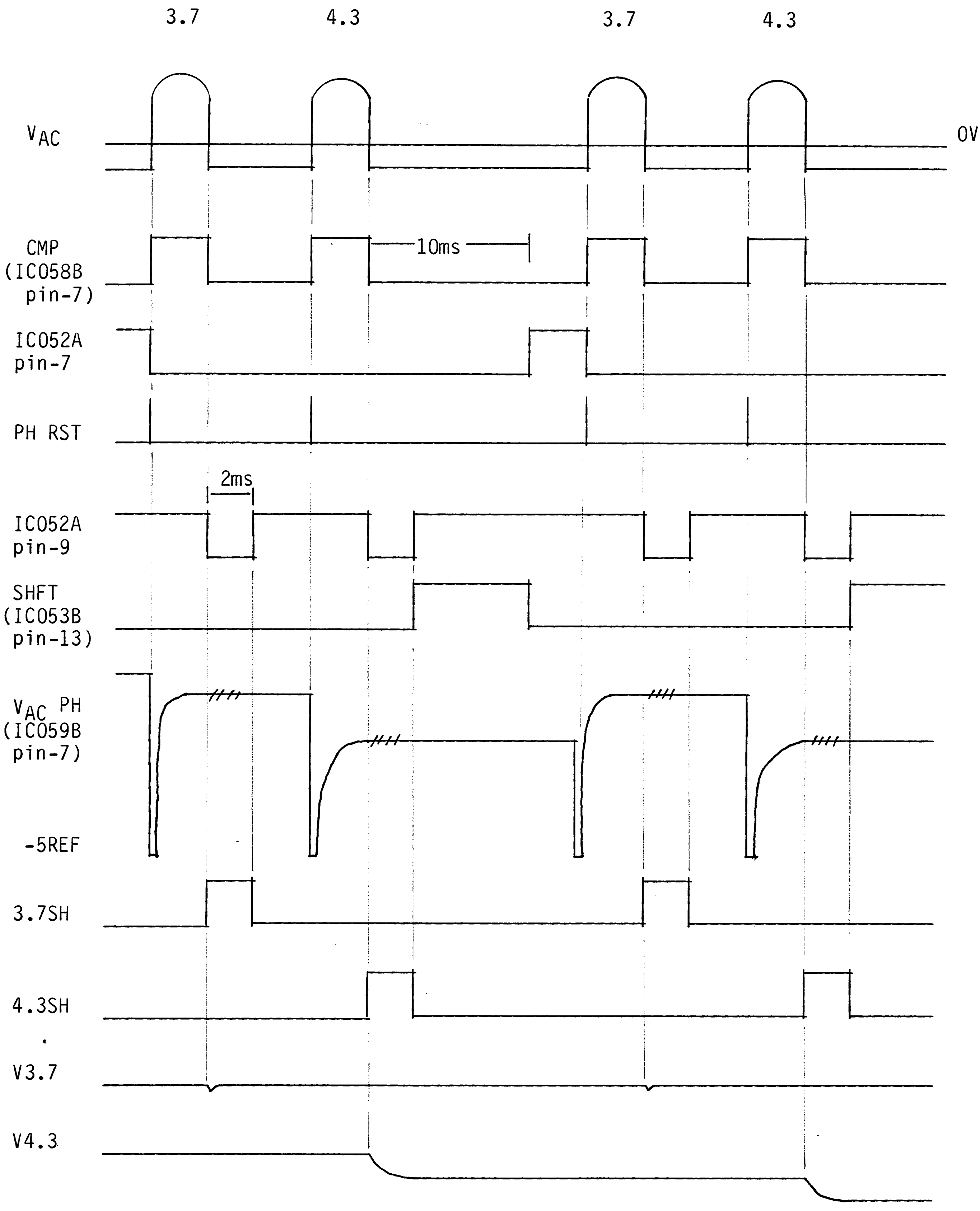
. V3.7, V4.3 and REF signal detection circuit (C02 Sub board)



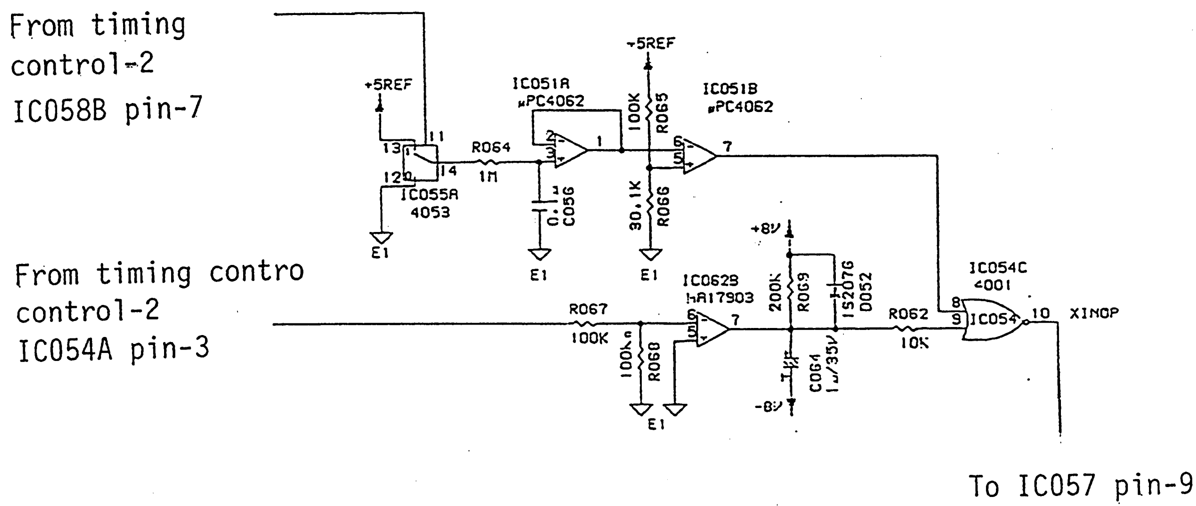
VAC signal baseline is shifted (IC050A pin-1) into -5REF signal (IC061A pin-1) by SHFT pulse. CNST signal is D/A converted lenearizer data. This CNST and -REF signal output as REF signal by switching CNST signal and -5REF signal by XRESET signal.

The IC059A peak-holds the amplitude of V_{AC} signal based on -5REF signal and the IC060A and IC060B sample hold V3.7 and V4.3 signals composing of V_{AC} signal and output the signals as V3.7 and V4.3.

. CO2 signal demodulation timing



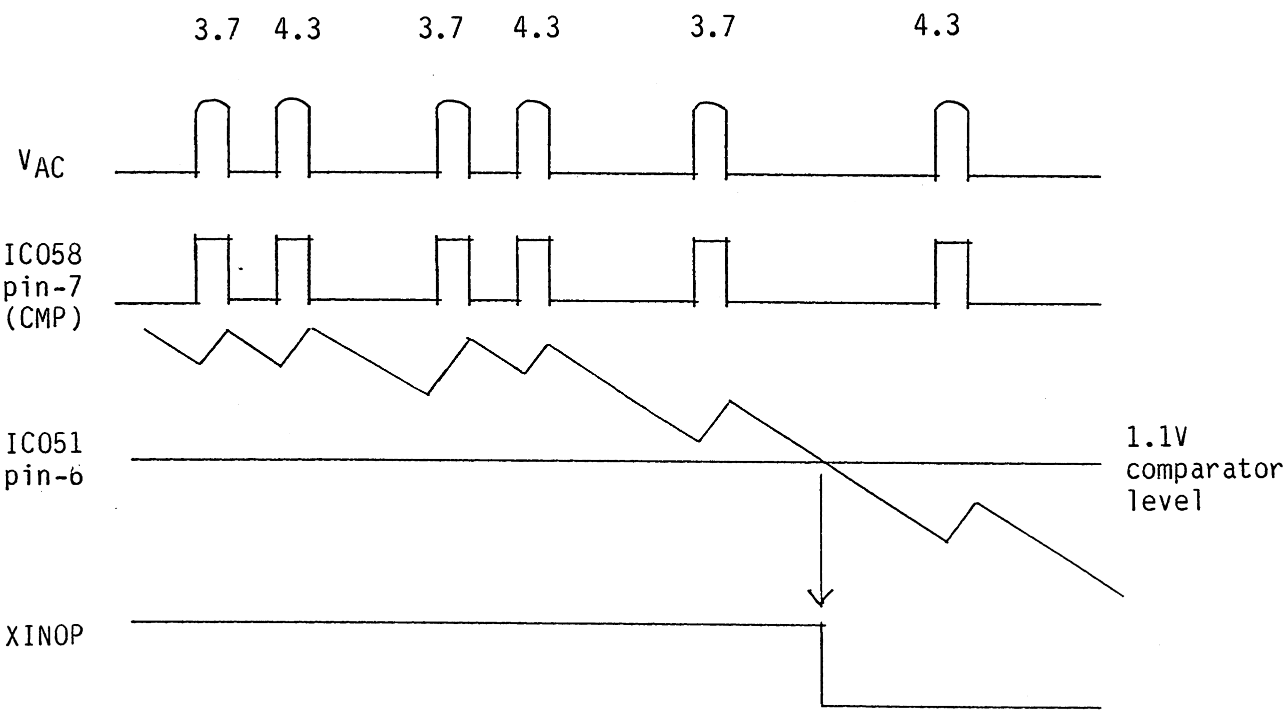
. Operation of sensor failure detection



In normal operation, both IC054 pin-8 and piun-9 are "L" (-8V) logic level and pin-10 XINOP (Inoperative) output is "H" level.

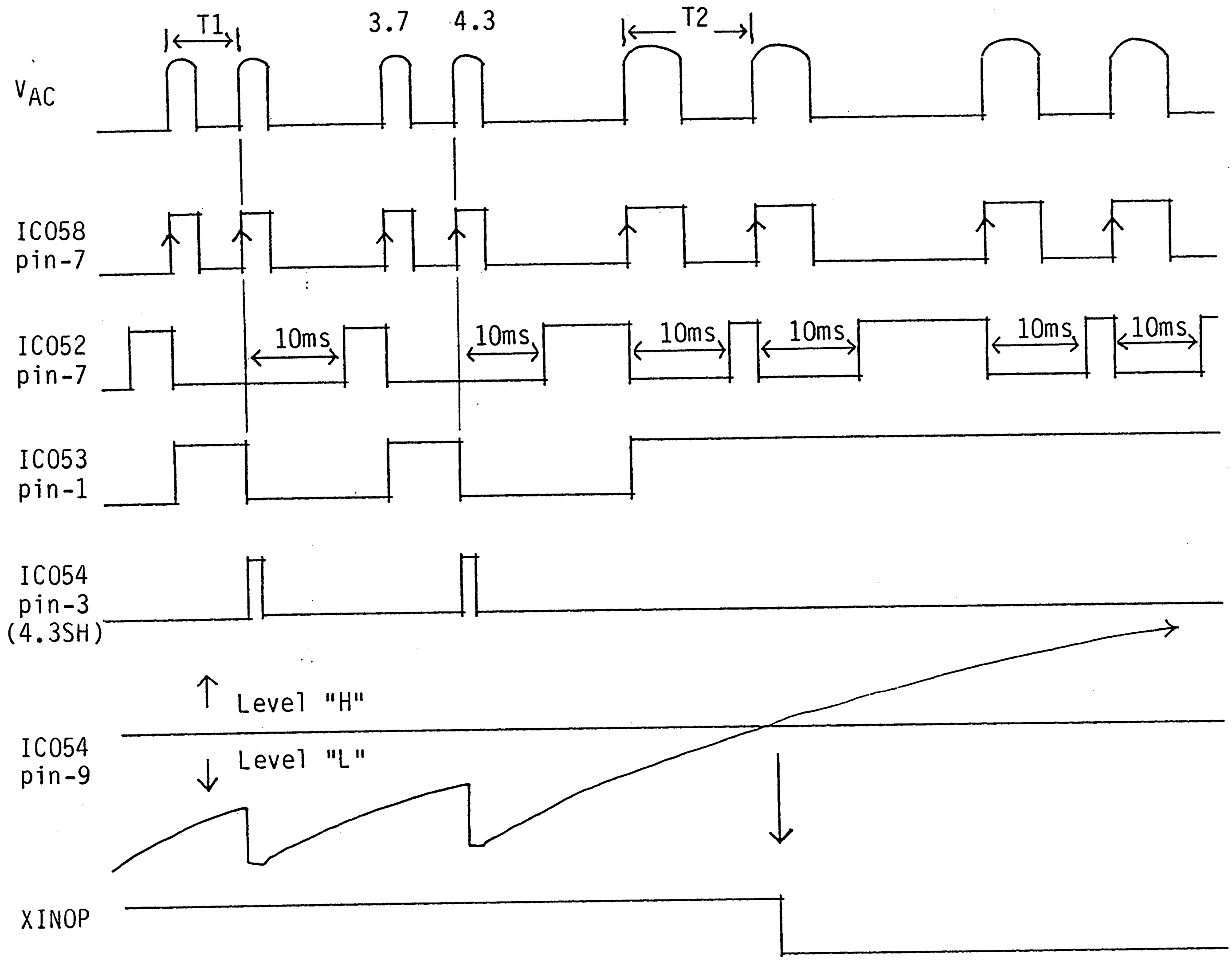
a) When there is no 3.7 or 4.3 or both in the V_{AC} signal

When there is no 3.7 or 4.3 or both in the V_{AC} signal, CMP pulse is not generated or number of pulses decreases to half, and charging time of the C056 becomes short, then the comparator (IC051B) outputs "H" level and XINOP signal becomes "L". The head amplifier output signal HAOUT is -5V in this condition.



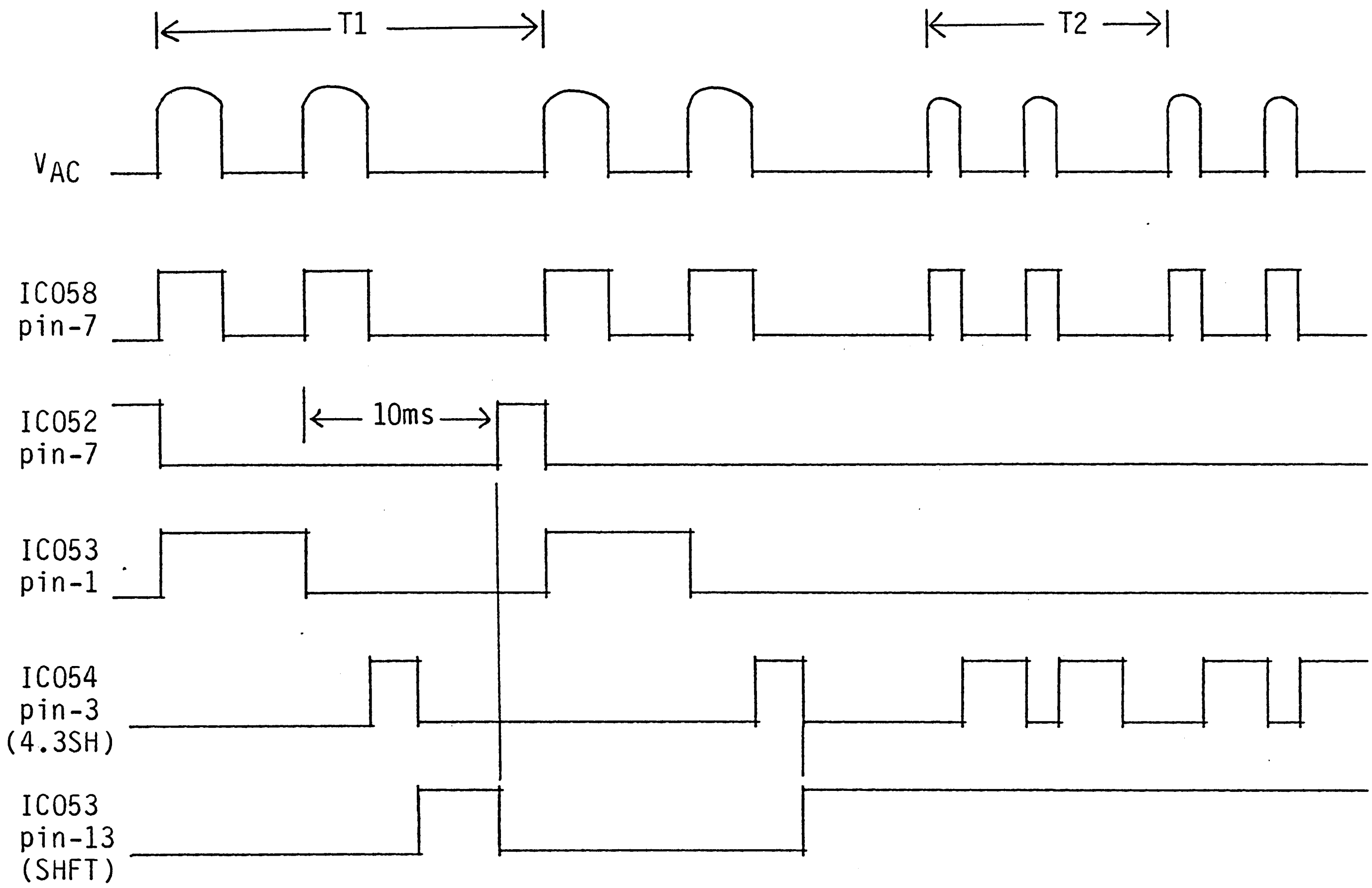
b) When the V_{AC} output interval is prolonged (decrease of motor revolution)

When the V_{AC} output interval T1 between 3.7 and 4.3 is prolonged it exceeds 10msec of one-shot time of IC052A, output of the IC053A (pin-1) becomes always "H" and the C064 is charged up by +8V, then XINOP singal turns to "L" and HAOUT head amplifier output becomes -5V.

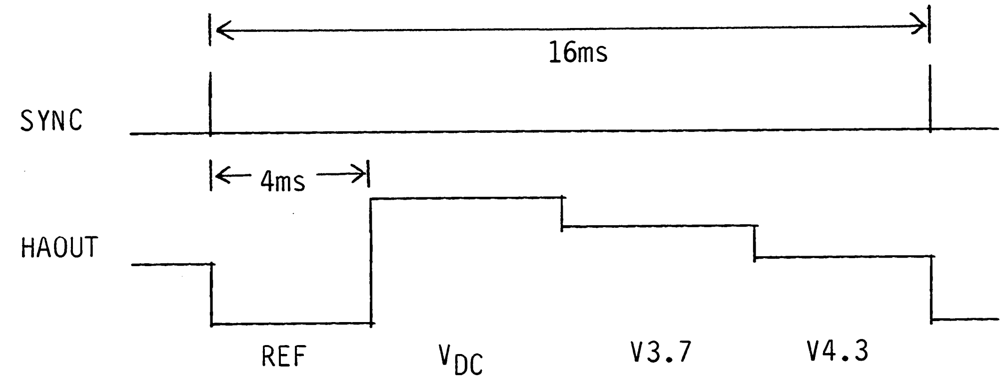


c) When the V_{AC} output interval is shortened (increase of motor revolution)

When the interval T2 between the 3.7 and next 3.7, it becomes shorter than 10msec one-shot time of the iC052A IC052A output (pin-7) becomes "L" and SHFT pulse (IC053 pin-13 is fixed to "H". Then IC050A input pin-3 is fixed to E1 (ground) and head amplifier output HA4.3 becomes equal to -5REF voltage.

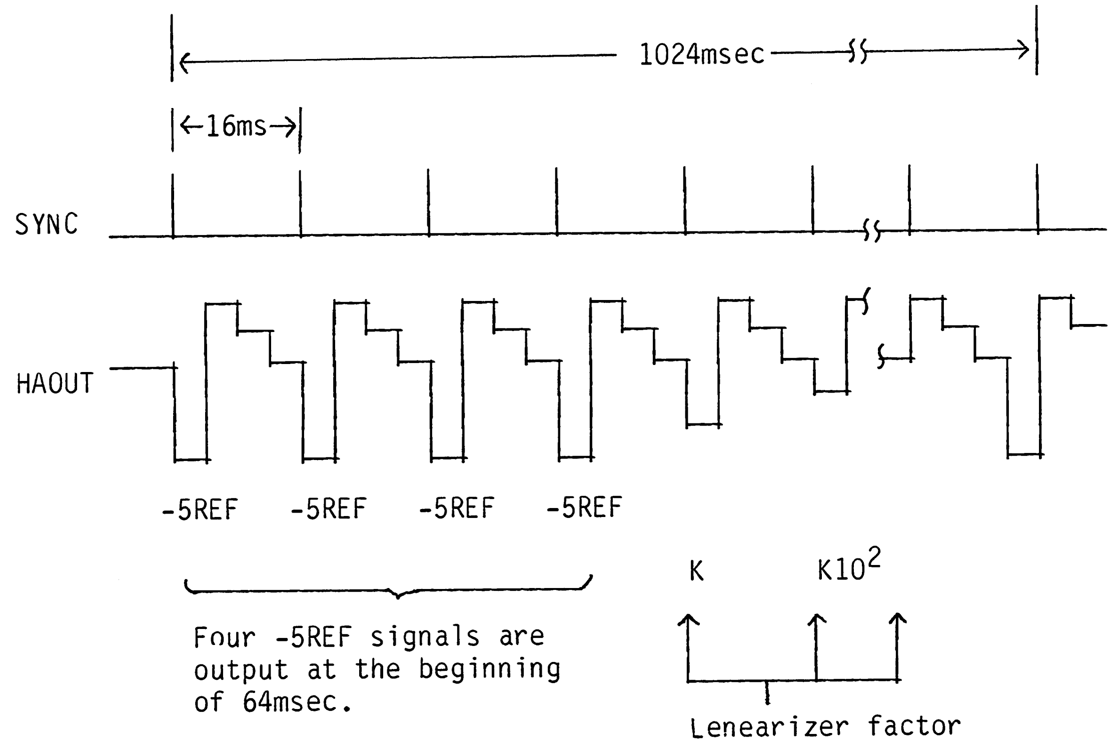


. Timing of output signal

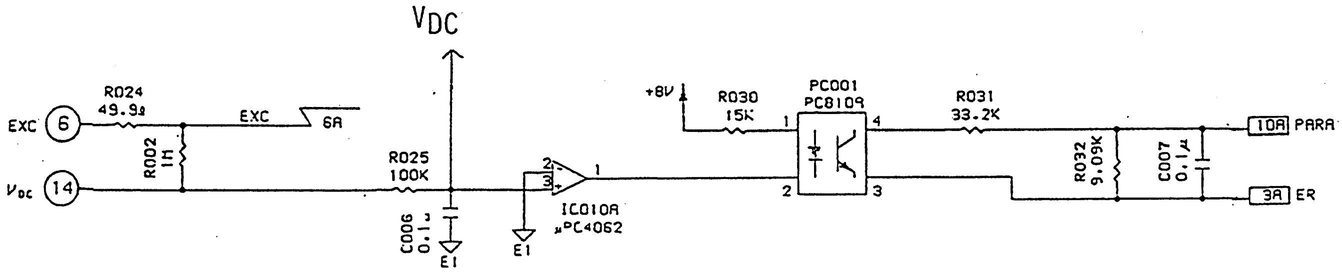


REF: -REF signal which is a reference of V3.7 and V4.3 signals and linearizer data of each sensor required for CO2 calculation are output for 4msec from the SYNC pulse every 16msec in a cycle of 1204msec.

-5REF output range: -4.75V $\pm$ 0.2V



. Unit discrimination signal (PARA voltage)



PARA (parameter) voltage changes when the CO2 sensor is connected and disconnected as below.

Sensor	PARA voltage (V)
Connection	2.40 ±0.05
Disconnection	2.10 ±0.05

When the sensor is not connected, EXC (-5V) is applied to the comparator input terminal (IC101A pin-3) and comparator output is "L". With this voltage, the photocoupler PC001 is conductive and 2.1V voltage attenuated with R031 and R032 resistors appears as PARA voltage at no sensor connection.

When the sensor is connected, +1V to +5V voltage is applied to the comparator input terminal (IC101A pin-3) and comparator output turns to "H". With this voltage PC001 becomes off and 2.4V appears as PARA voltage at sensor connection.

. **Adjustment of the AG-800PA C02 head amplifier**

Basecally there is no need to adjust each component, however, when the IC002 D/A converter is replaced adjust the VR001.

Adjustment: VR001

1) Read DC voltage across the TP $\boxed{E1}$ (analog ground) and IC008 pin-8 with a digital voltmeter.

2) Disconnect the C02 sensor and adjust the VR001 so that the voltmeter reads -4.8V ±0.01V.

5.9.3 CO2 sensor TG-706P

a) General

The infrared ray which is absorbed by CO2 gas (4.3um wavelength) and the infrared ray which is not affected by CO2 gas (3.7us wave length) are used in the CO2 sensor.

b) Sensor output signals

The CO2 sensor outputs three signals.

VDC ...... DC voltage for compensating signal drift due to temperature change of the sensor. It corresponds to resistor value of the infrared ray detector.

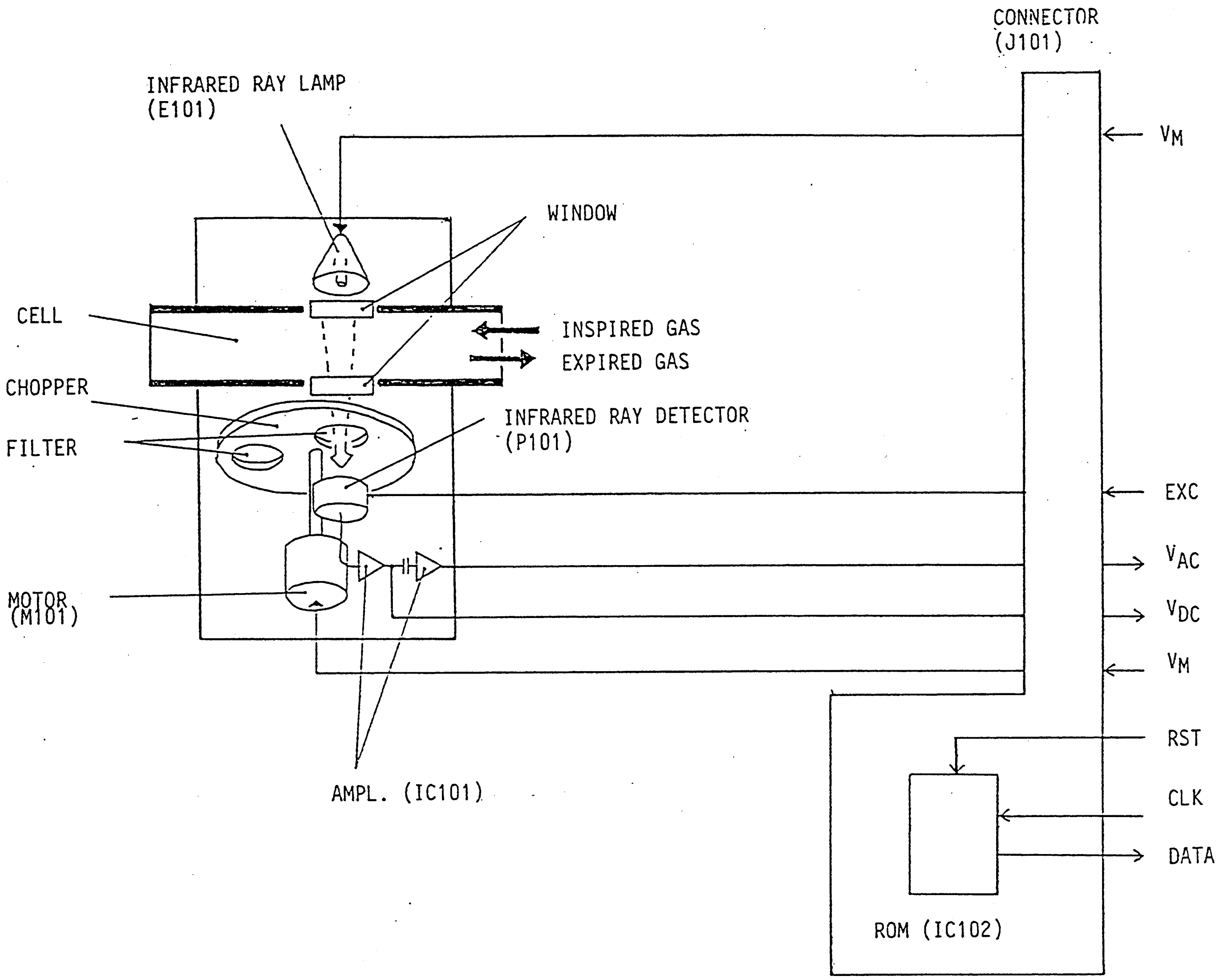
VAC ...... AC voltage of light strength signal. The infrared ray that passes through expiratory gas in the cell and the filter is converted into a light strength signal after being converted to a resistance signal and then to an electrical signal. One rotation of the chopper is taken to be one cycle, and the signal (V4.3) through the 4.3um filter (altered CO2 partial pressure) and the signal (V3.7) through the 3.7um filter (not affected by Co2 gas, used for reference), are output alternatively.

VAC singal is a mixture of the V4.3 and V3.7 signals.

DATA ..... Compensation coefficient to calculate CO2 value, 256 bit serial data stored in ROM chip inside each CO2 sensor.

c) Head amplifier output signals

The AG-800PA CO2 head amplifier separates V4.3 and V3.7 signals from VAC signal and outputs DATA, VDC, V3.7 and V4.3 signals in order successively.



VDC ..... DC voltage indicating infrared ray detector resistance value.

VAC ..... AC voltage including V4.3 singal (altered by CO2 partial pressure) and V3.7 signal (not affeted by CO2 gas, used for reference).

DATA .... Compensation coefficient to calculate CO2 value, 256 bit serial data stored in ROM chip inside each CO2 sensor (linearizer data).

EXC ..... -5V $\pm$2% power voltage to drive (excite) the infrared ray detector.

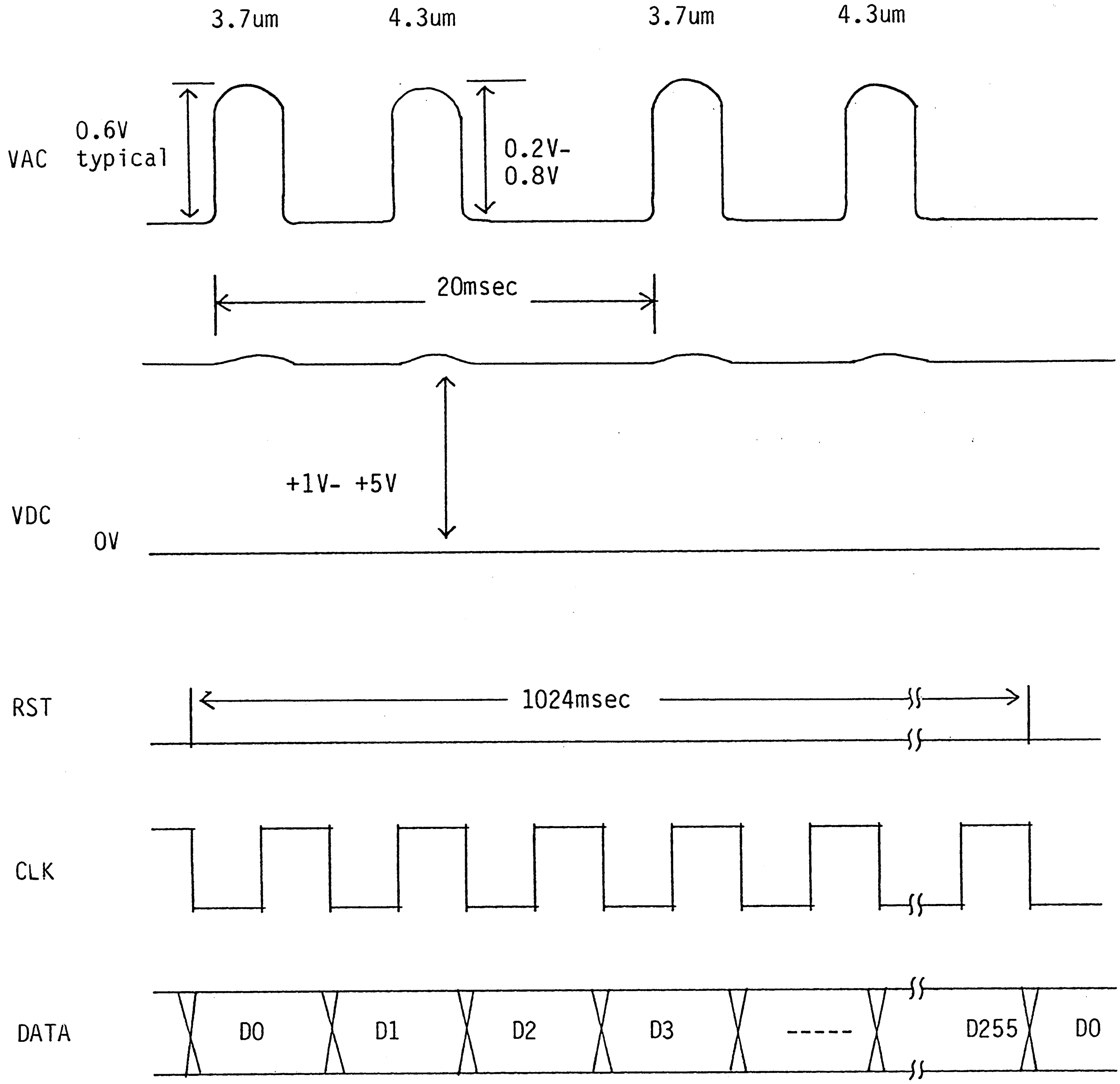
VH ...... +12V $\pm$ power voltage to drive (heat) the infrared ray lamp.

VM ...... +2.4V $\pm$2% power voltage to drive the motor for chopper disk.

RST ..... ROM reset pulse, 1024msec interval.

CLK ..... 250Hz clock signal.

d) CO2 sensor input/output signal timing



VAC and DATA are asynchronous.

5.10 O2 head amplifier AG-820PA

5.10.1 General

The AG-820PA is one of the head amplifiers of BSM-8000 series bedside monitors to measure fraction of inspired oxygen (FiO2) using an O2 sensor connected with a ventillator, etc.

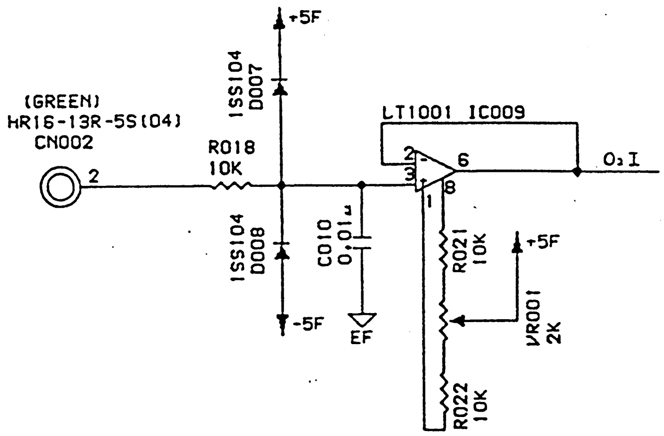
Diodes for over-voltage protection and high-cut filter for noise reduction are employed in the input circuit block.

. **Composition**

After filtering, signal is buffed with IC009 and IC010 and then multiplexed with IC007 multiplexer device. Multiplexer output signals are Ref0, O2I, and O2II. Multiplexing is controlled by clock signal generated by IC006 counter.

. **Input buffer**

There are two similar circuits of input buffer for O2I and O2II. Description below is for O2I.

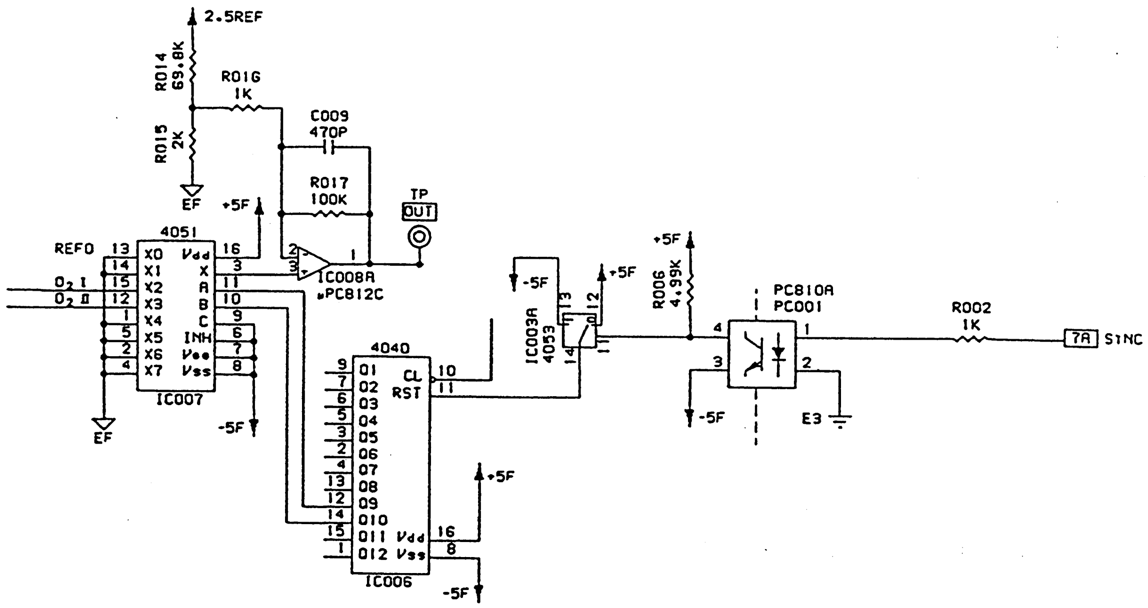


Voltage generated by the O2 sensor in proportion to O2 density is inputted to the IC009 through the D007 and D008 protective diodes and low-pass filter composed of R018 and C010. This low impedance signal is outputted to the multiplexer.

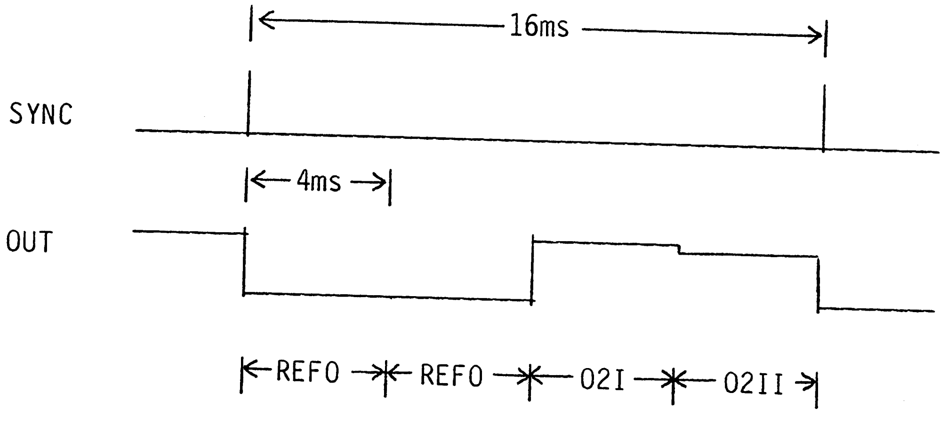
The VR001 is for offset adjustment of IC009 buffer amplifier. When the IC009 is replaced, VR001 adjustment is required.

• Output signal timing

Time-shared output signal is amplified and transmitted by a circuit shown below.



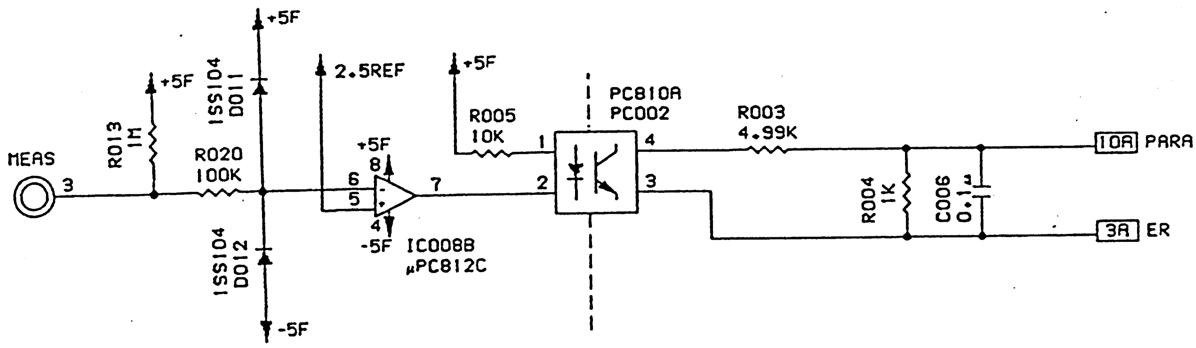
Multiplexer IC007 outputs Ref0, 02I and 02II signals in the timing below by the control signal from IC006 counter.



Multiplexed output signal is 35 times amplified with IC008A and level shifted (output is -4.8 ±0.25V when input is shortened) an then transferred to a modulation circuit.

Refer to the pages for BP head amplifier output signal modulation and demodulation of descriptions for timing from floating area to the non-floating area.

. Unit discrimination signal (PARA voltage)



PARA (parameter) voltage changes when the 02 sensor is connected and disconnected as below.

Sensor	PARA voltage (V)
Connection	0.45 ±0.02
Disconnection	0.40 ±0.02

When the sensor is not connected, IC008A comparator output is LOW level. With this voltage, the photocoupler PC002 is conductive and 0.4 ± 0.02V voltage attenuated with R003 and R004 resistors appears as PARA voltage at no sensor connection.

When the sensor is connected, comparator output is HI. With this voltage, PC002 becomes off and 0.45 ±0.02V appears as PARA voltage at sensor connection.

. **Adjustment of the O2 head amplifier**

When the IC009 (O2I) or IC010 (O2II) is replaced, offset adjustment is required.

IC009 (O2I) VR001
IC010 (O2II) VR002

1) Insert the O2 head amplifier into the last slot of the input box.

2) Call up the A/D Test Screen of the bedside monitor main unit.

3) Shorten the input connector pins 2, 3, and 5 to the pins 1 and 4 (EF: floating ground) and adjust each volume so that Test pins TS6 and TS8 becomes within ±10mV of REFO.

NOTE: TS2 value and TS4 value of #5 (O2) lines in the table indicate REFO voltage, and TS6 value indicates O2I voltage and TS8 indicates O2II voltage.

Unit of the value is mV and upper numerals show maximum value and lower numerals show minimum value in one second.

AD TEST	TS1	TS2	TS3	TS4	TS5	TS6	TS7	TS8
CH#1 (ECG1)		5117 5117		5117 5117		5117 5117		5117 5117
CH#2 (ECG2)		-10 2		-10 2		-10 5		-10 5
CH#3 (RESP)		0 7		-2 7		0 10		-2 7
CH#4 ( )		5 12		5 12		7 12		-15 -10
CH#5 (O2)		**-4870 -4865**		**-4870 -4865**		**-4875 -4870**		**-4872 -4865**
CH#6 ( )		2 10		2 7		2 10		2 10
CH#7 ( )	5 12	5 10	2 10	5 10	5 12	2 7	7 12	5 12
CH#8 ( )	5 10	5 10	7 10	5 10	5 12	5 10	5 12	2 10
CH#9 ( )	-17 -10	17 22	-12 -5	17 22	10 15	5 10	8 12	5 10
CH#10( )	2 7	2 7	2 10	2 7	5 10	2 7	5 10	2 10
CH#11(PARA)	97 102	5020 5025	457 462	5020 5025	5017 5022	5020 5025	5017 5022	5020 5025
CH#12( )	0 2	-5030 -5027	-2515 -2512	2 2	2512 2515	5027 5030	5020 5022	2 2
HEAD AMP INSTALLED	ECG		O2					

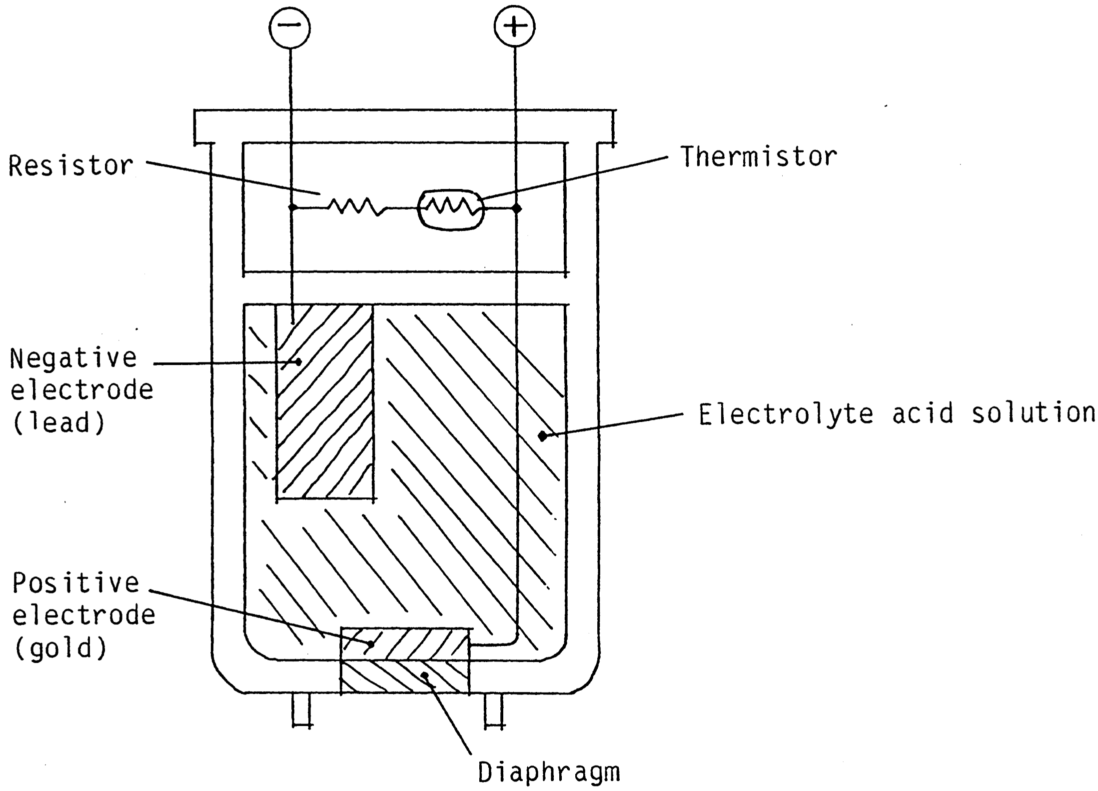
5.10.2 OS-1000 02 sensor (AIKA, Japan)

Measuring principle of 02 and construction of the 02 sensor

As figured, 02 sensor is an oxygen-lead battery composed of gold as positive electrode, lead as negative electrode and special electrolyte acid solution.

Oxygen in 02 measurement atmosphere diffuses to gold electrode through a non porous fluororesin diaphragm and deoxydated by electolysis and current which is proportional to oxygen dencity flows in the electrodes.

Voltage across a resistor and a thermitor for temperature compensation serially connected is obtained to measure oxygen density.



Life time of the 02 sensor

the 02 sensor has a life time as it is an oxygen battery which generates voltage in response to oxygen in atmosphere. Life time depends upon oxygen density of measuring gas. The higher oxygen density, the shorter life time of the 02 sensor.

It is not sure to define life time of the 02 sensor as measurement will be done with various oxygen density.

End of life of the 02 sensor means that the sensor does not generate voltage which is high enough for 02 measurement.

Figure on the next page shows relation between oxygen density and output voltage of 02 sensor model OS-1000, a product of AIKA, Japan.

When O2 sensor is exposed in oxygen for a long time of period, slope of the output voltage curve becomes small.

Nihon Kohden O2 measurement is designed to define the end of life of the O2 sensor when output voltage corresponding to that of 100% oxygen shows less than 35mV.

When an exhausted sensor is used, measurement error goes out of specified normal range. When such condition is detected at calibration, message "INOP" (inoperative) is displayed on the screen and "CAL??" remains on the screen without measurement.

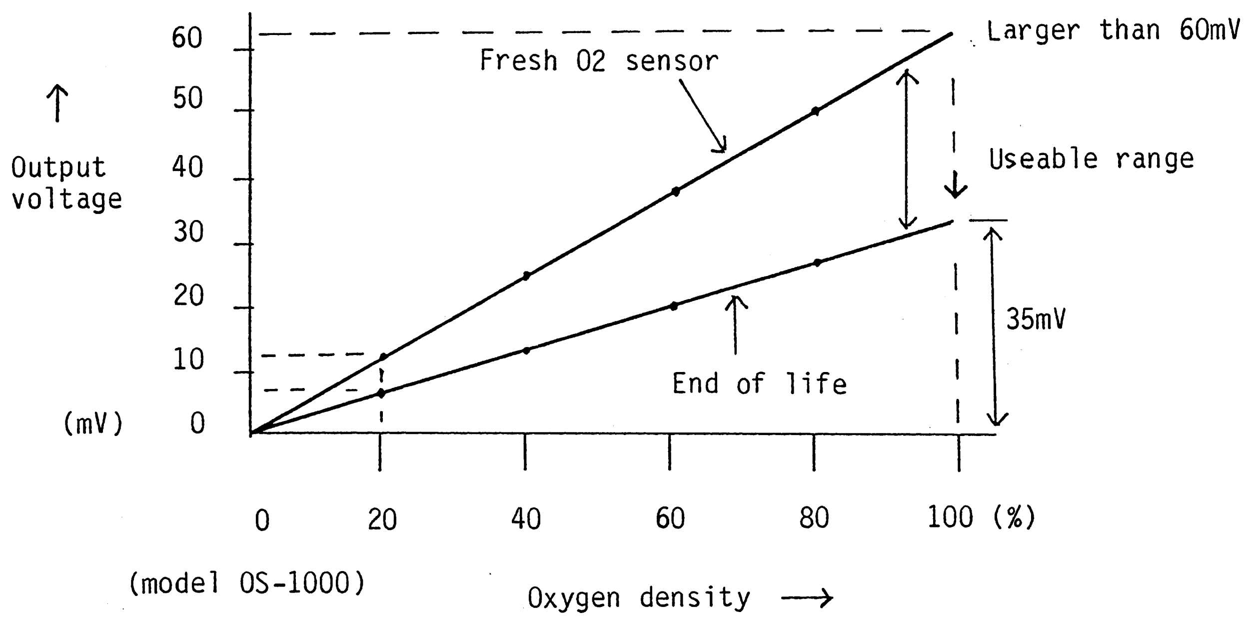
It is estimated that life time of the O2 sensor is three to five years.

Precautions when handling the O2 sensor

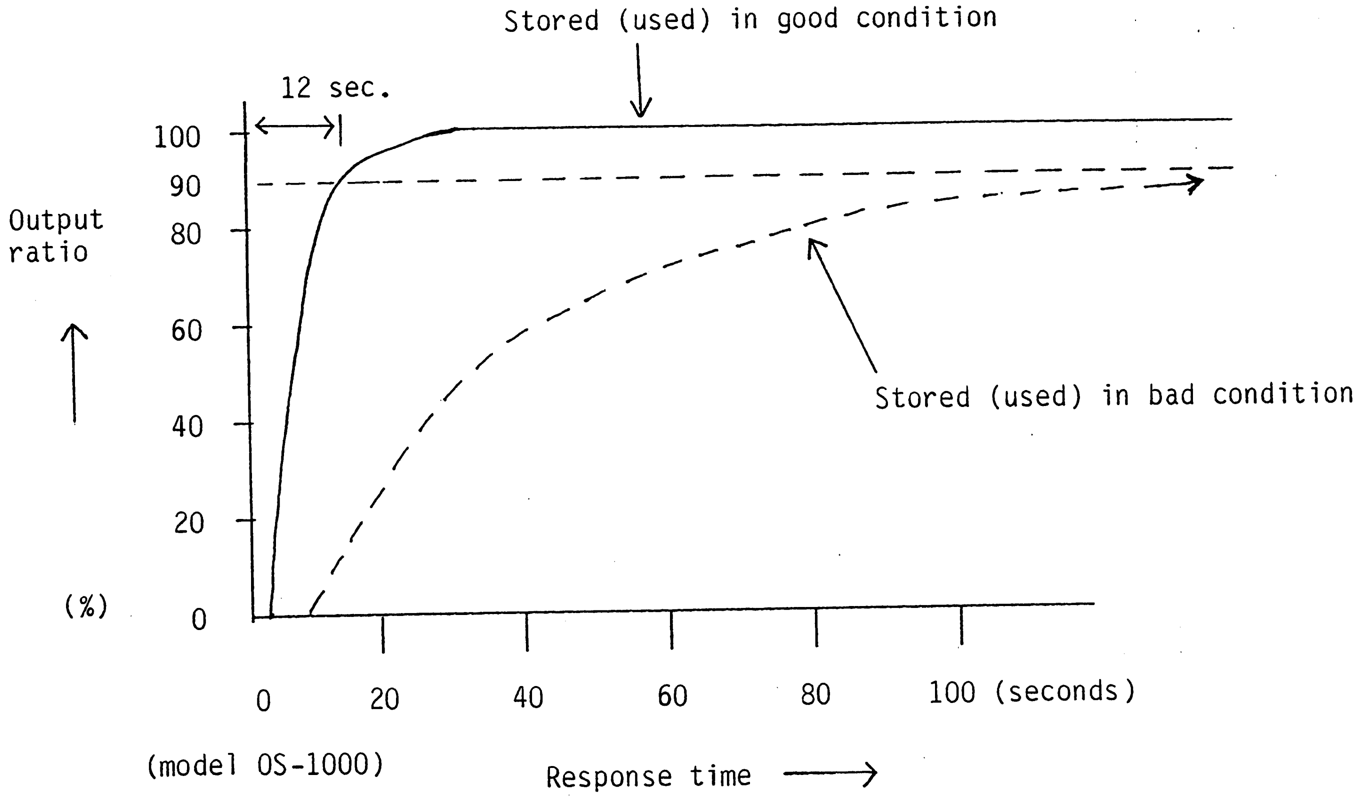
In order to avoid influence by pressure change inside the sensor due to change of atmospheric pressure, gas is filled in the sensor chamber. Therefore, when sensing part is located upwards, gas bubble will be placed on the diaphragm or electrode which will prevent electrolysis inside the chamber and correct data cannot be obtained.

Be sure to put the sensor so that the sensing part is facing downwards for correct measurement. When storing the O2 sensor, it is recommended to put the sensing part downwards.

If the sensing part is kept upwards it takes several minutes for the sensor to become stabilized before calibration. Be sure to calibrate the sensor after several minutes.



(model OS-1000)


Stored (used) in good condition
12 sec.
100
90
80
60
40
20
0
Output ratio
(%)
Stored (used) in bad condition
0
20
40
60
80
100 (seconds)
(model OS-1000)
Response time

Section 6

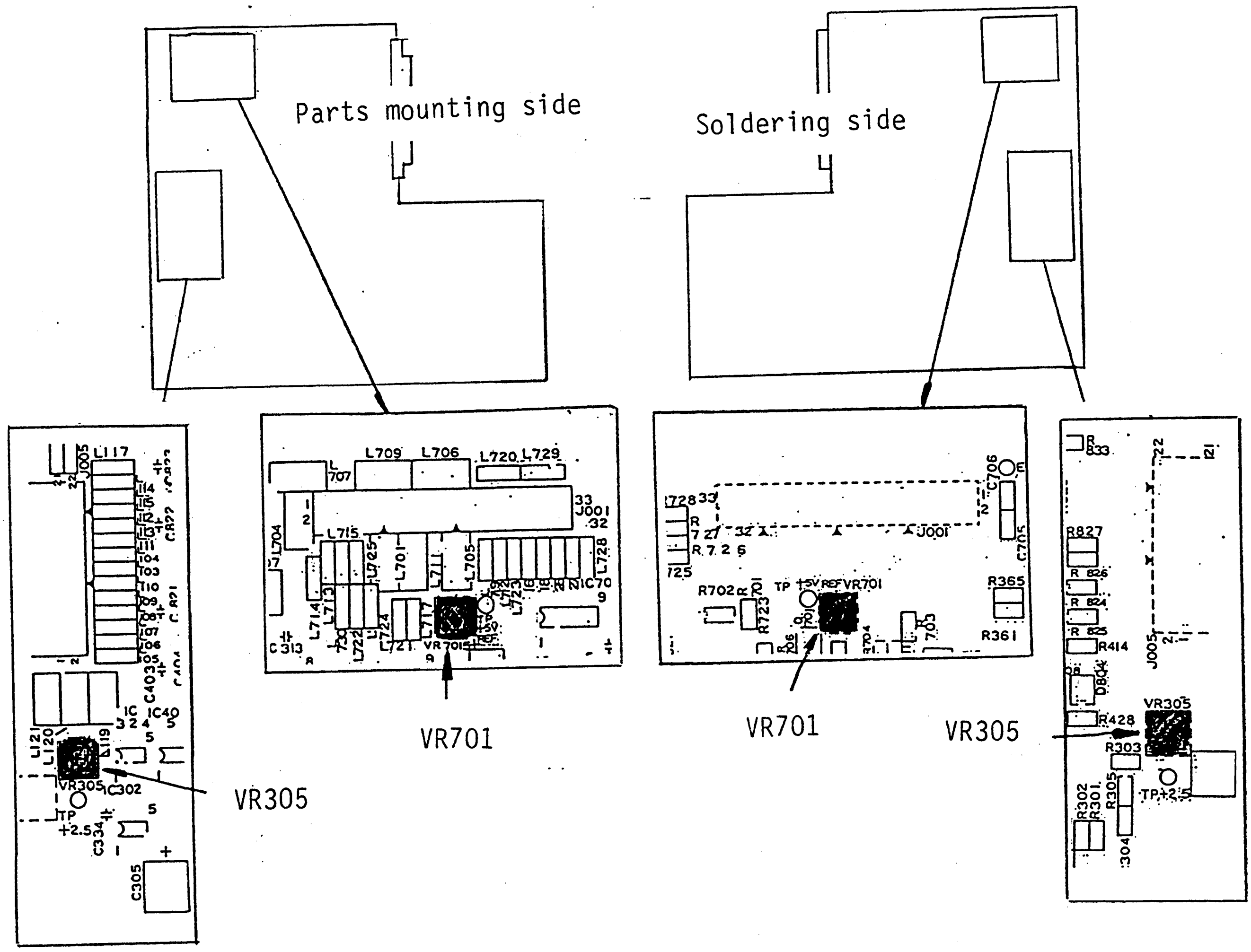
6. Adjustment

6.1 Main board (UP-0397)

1) Reference voltage
   Reference voltage is used for testing conversion sensitivity of A/D converter and for PARA voltage for head amplifier discrimination.

   . Adjust VR305 so that Test Point reads 2.500V $\pm$0.001V

   . Adjust VR701 so that Test Point reads 5.000V $\pm$0.001V



2) D/A converter

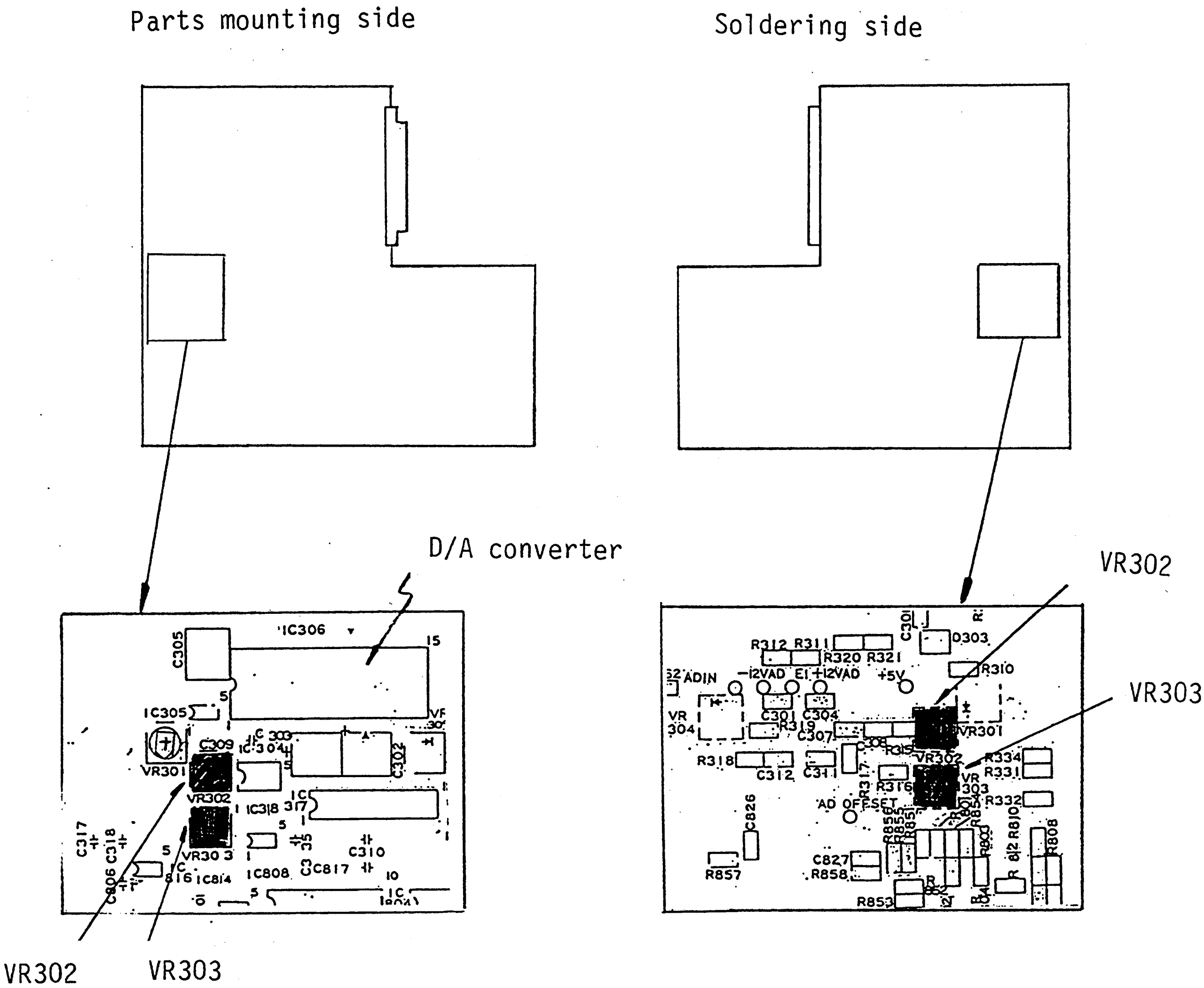
Adjustment of D/A conversion sensitivity and offset voltage.

. Call up Self Test screen No.1 and select A/D, D/A TEST mode (by pressing DISPLAY key) and then select D/A TEST mode.

. Adjust VR302 so that BP1 output on the front panel reads -5.118V $\pm$0.01V at D/A 000.

. Adjust VR303 so that BP1 output on the front panel reads +5.120V $\pm$0.01V at D/A FFF.

. Repeat above two adjustment procedures. (D/A 000 and FFF can be changed by pressing the FREEZE key on the front of the bedside monitor.)



3) A/D converter

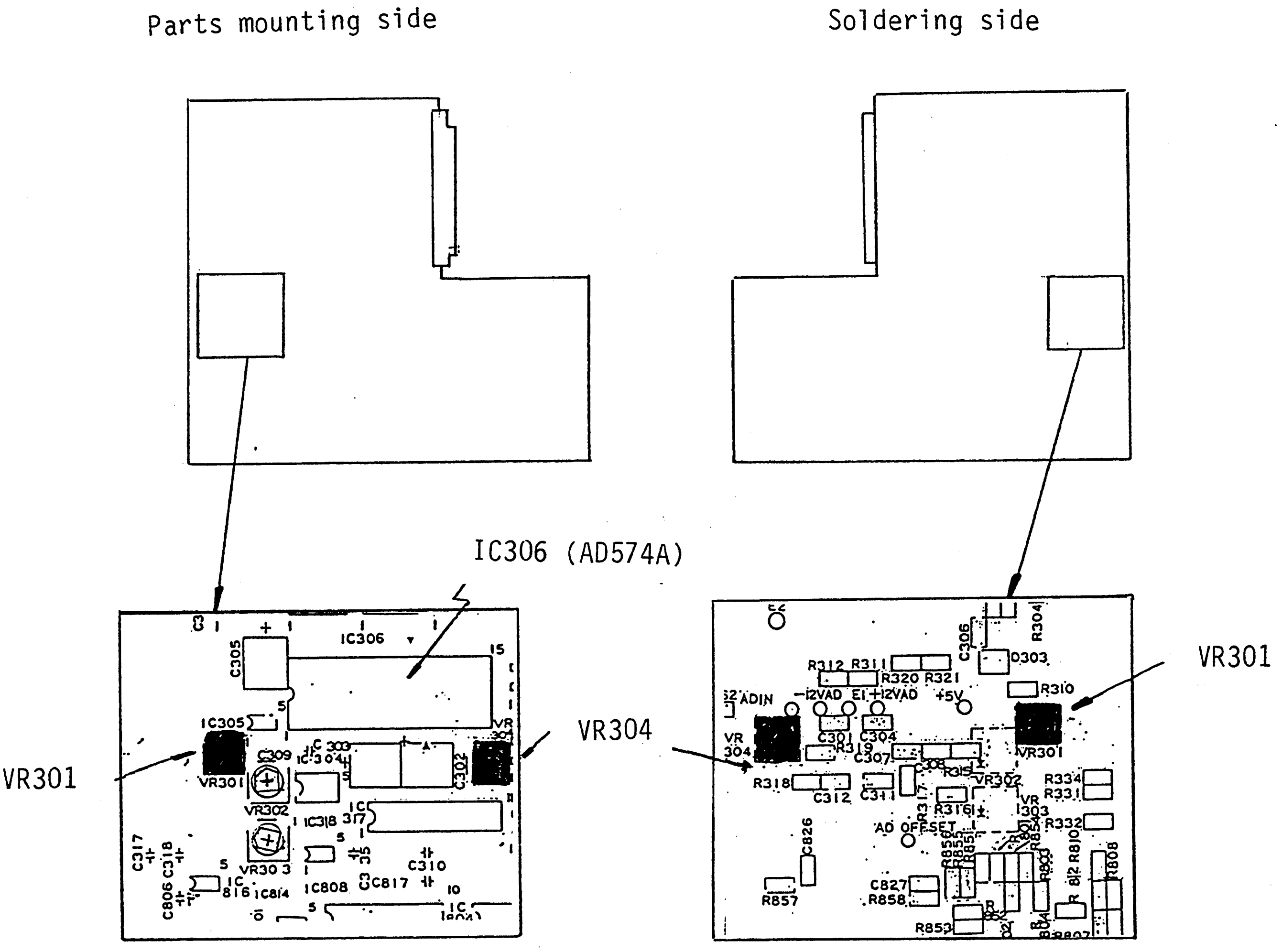
Adjustment of A/D conversion sensitivity and offset voltage.

. After D/A converter adjustment, select Self Test No.1 A/D, D/A TEST. Select TEST item 2 (SELECT) (by pressing the SUSPEND key).

. Adjust VR304 so that A/D GAIN reads 7D0.

. Adjust VR301 so that A/D ADJ 0V read 800.

. Adjust VR302 and and VR303 so that D/A ADJ 0V and GAIN read 800 and 7D0.

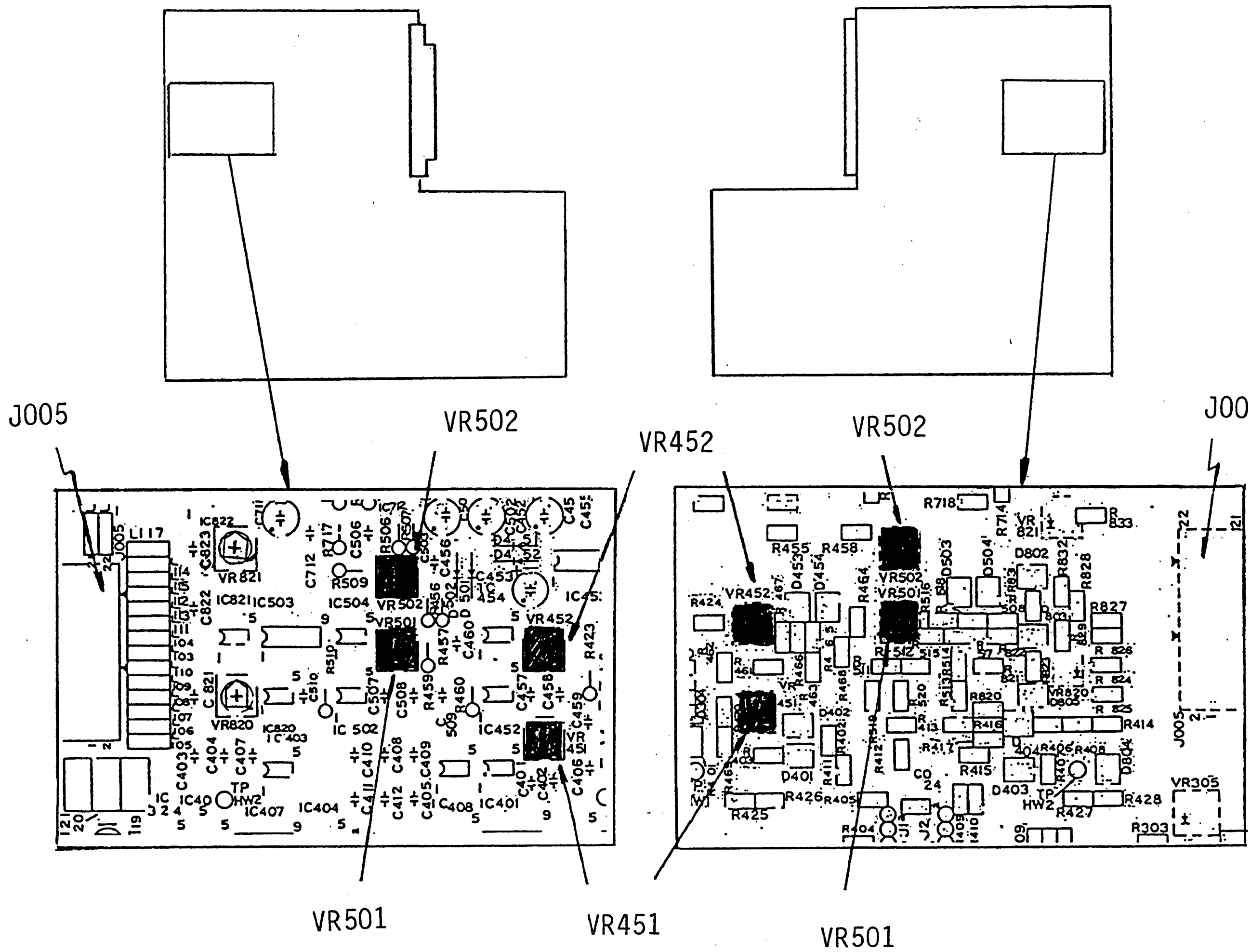


4) ECG circuit

Adjustment of ECG circuit offset voltage and hum filter characteristics

- Shorten all ECG input terminals.
- Adjust VR452 and VR502 so that both Test Points HW1 and HW2 read 0V $\pm$0.01V.
- Apply 54Hz 6mVp-p sinewave between ECG leads L and F (or LA and LL) and select ECG lead II at 3 wire mode and set HUM FILTER to ON.
- Adjust VR451 and VR501 so that both Test Pins HW1 and HW2 become minimum.

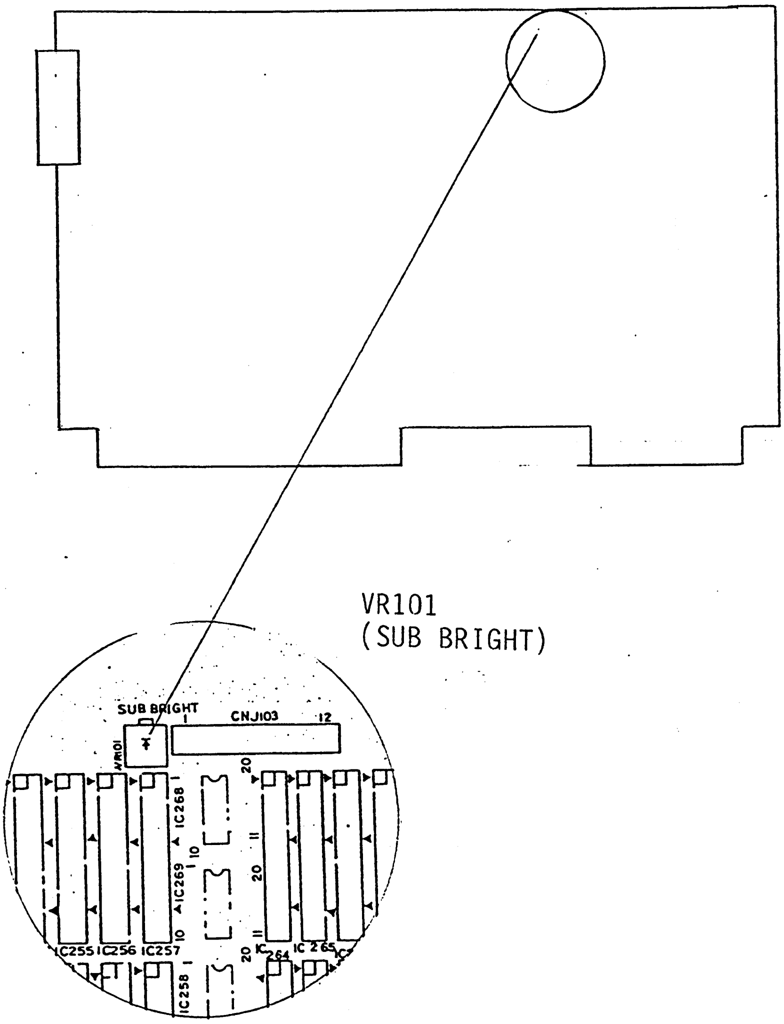
Parts mounting side | Soldering side



6.2 CRTC board (UP-0398)

There is only one adjustment point on the CRTC board.

. If screen is dark and not bright enough even if screen surface is cleaned, adjust VR101 SUB-BRIGHT volume. If this adjustment cannot make the screen bright enough, CRT board must be adjusted as below.



6.3 CRT unit (VM-004P)

CRT unit has adjustment points of screen synchronization, brightness, screen size, position, linearity (distortion) and focusing. Call up Self Test Screen No.2.

1) Horizontal and vertical synchronization

- Find out volume positions by rotating the VR528 (H-HOLD) clockwise and counterclockwise where screen becomes out of synchronization horizontally.

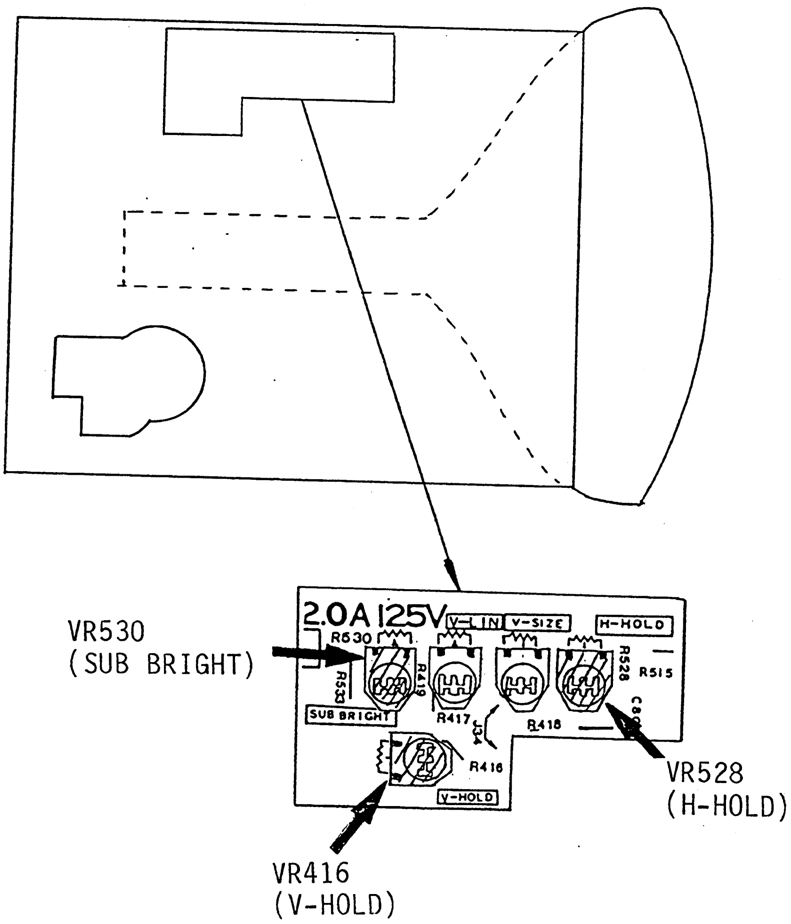
- Set volume position at the center of two points. If screen does not become out of synchronization even if the volume is fully rotated, assume the position to be the position.

- Adjust the VR416 (V-HOLD) for the vertical synchronization in the same manner as for H-HOLD.

2) Screen brightness

If screen is dark and not bright enough even if screen surface is cleaned and CRTC board SUB-BRIGHT is adjusted, adjust the CRT unit brightness. When this adjustment is required, the screen is becoming end of life. Prepare a new CRT unit for the bedside monitor.

- Adjust VR530 (SUB-BRIGHT) so bright up the screen. If you have an illumination meter, adjust to 240cd/m^2 $\pm$ 20cd/m^2 at Self Test All Raster mode screen.



3) Screen size

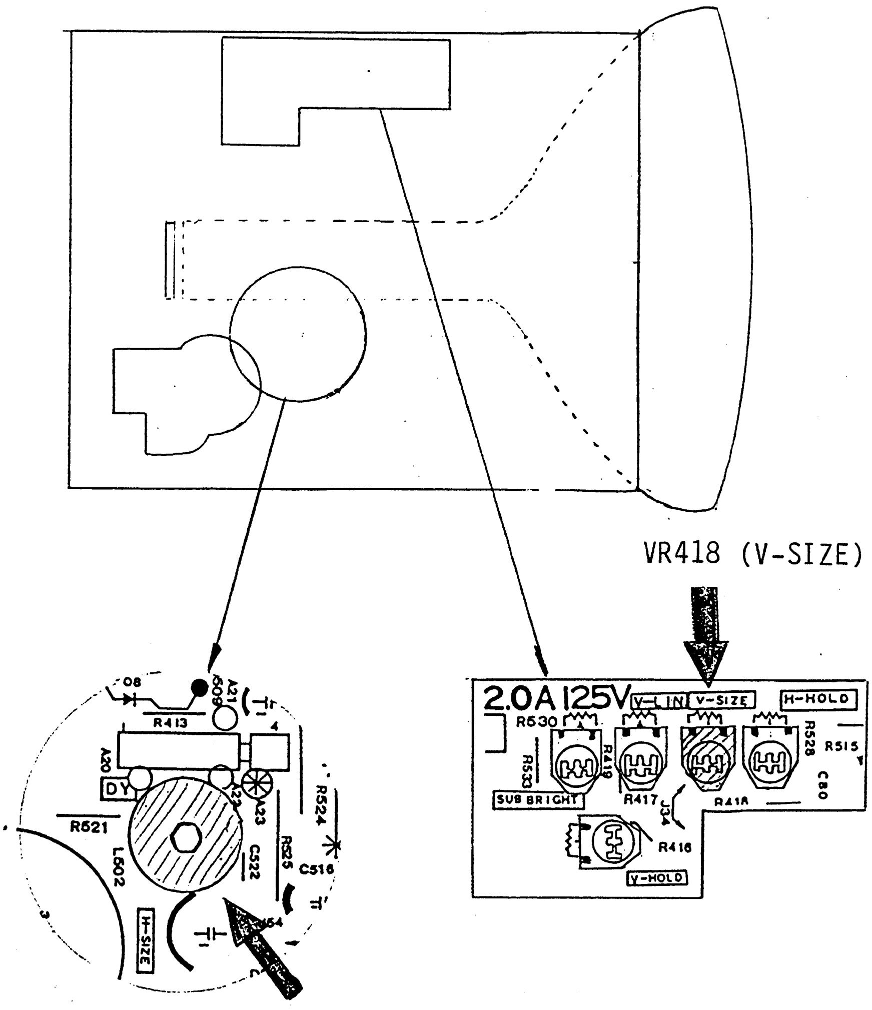
Adjustment of vertical and horizontal length. Call up Self Test Grid screen.

. Adjust VR418 (V-SIZE) so that vertical size becomes 120mm ±4mm.

. Adjust L502 (H-SIZE) so that horizontal size becomes 160mm ±4mm.

Be sure to use a ferrite core screw driver for the L502 otherwise the core can be broken.

Material: Non-magnetic

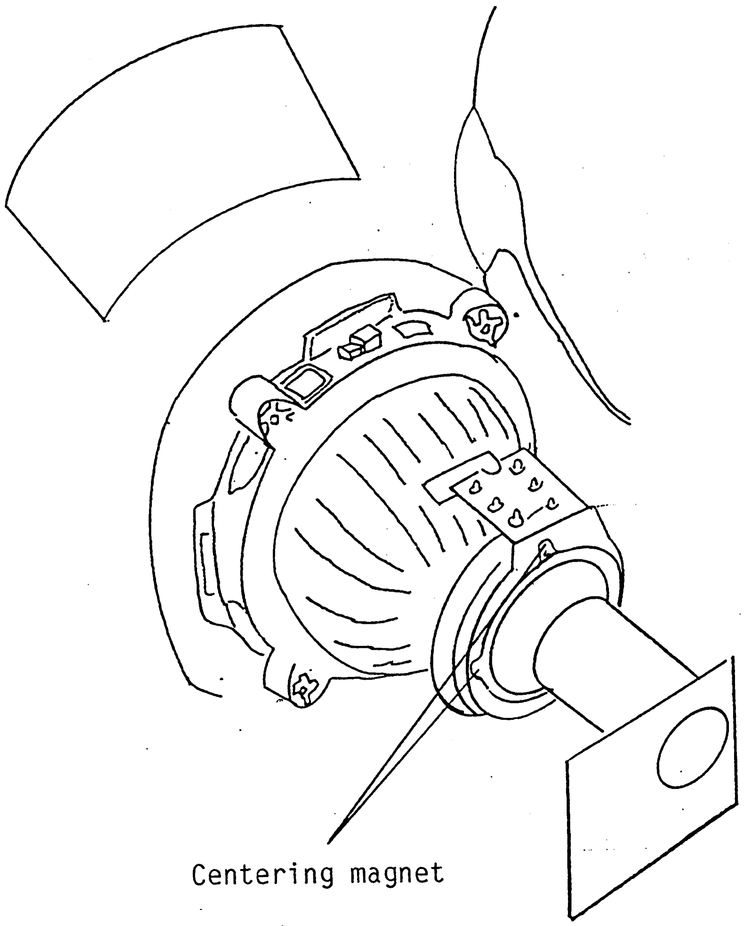


L502 (H-SIZE)

4) Screen position

Adjustment of raster position.

. Rotate magnetic rings around the CRT neck so that display area becomes at the center of the screen.



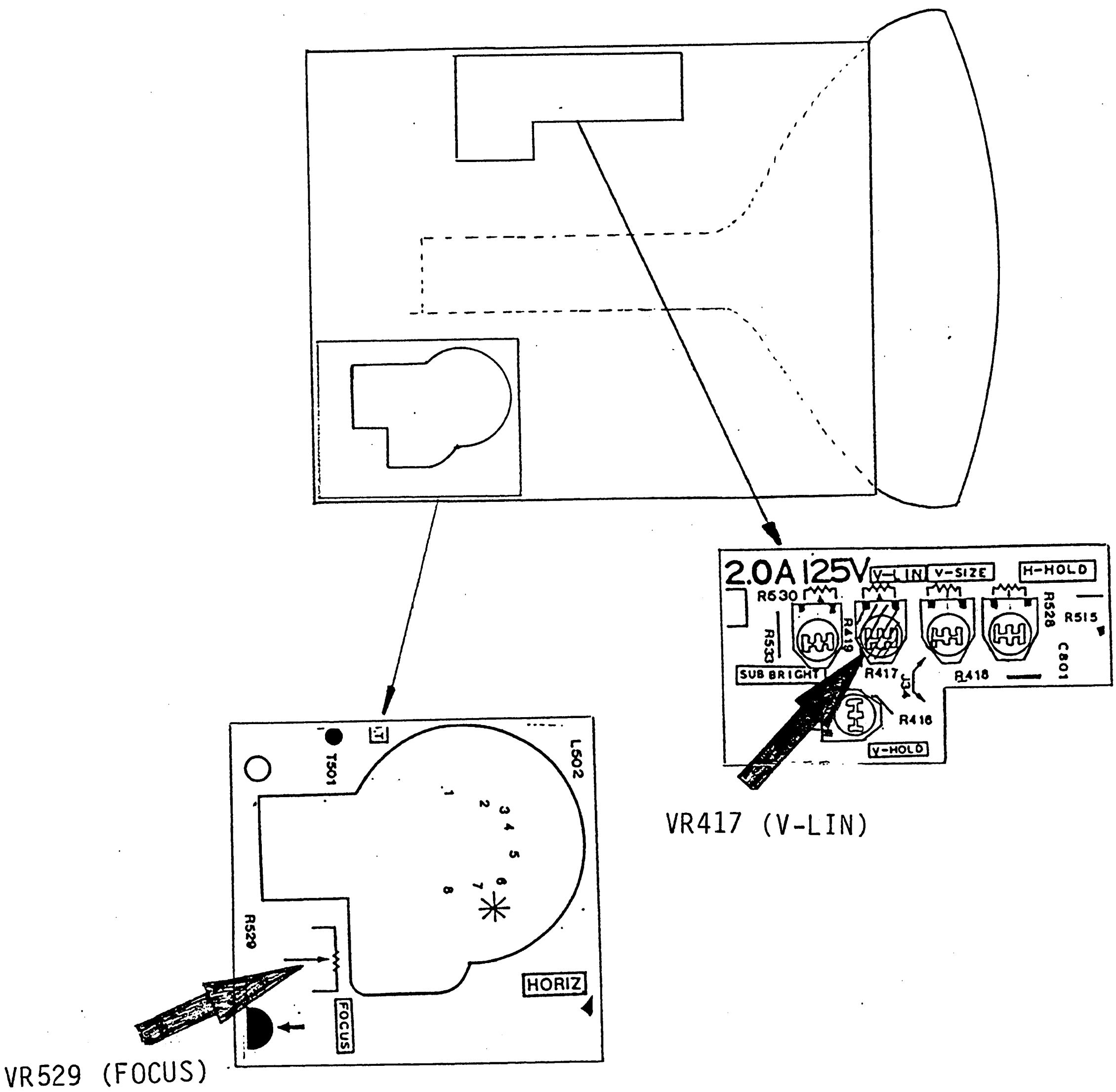
5) Screen linearity (distortion)

Adjustment of screen distortion.

. Adjust VR417 (V-LIN) so that grid spaces become equal vertically.

6) Focusing

. Adjust VR529 (FOCUS) so that entire screen focus is equal.



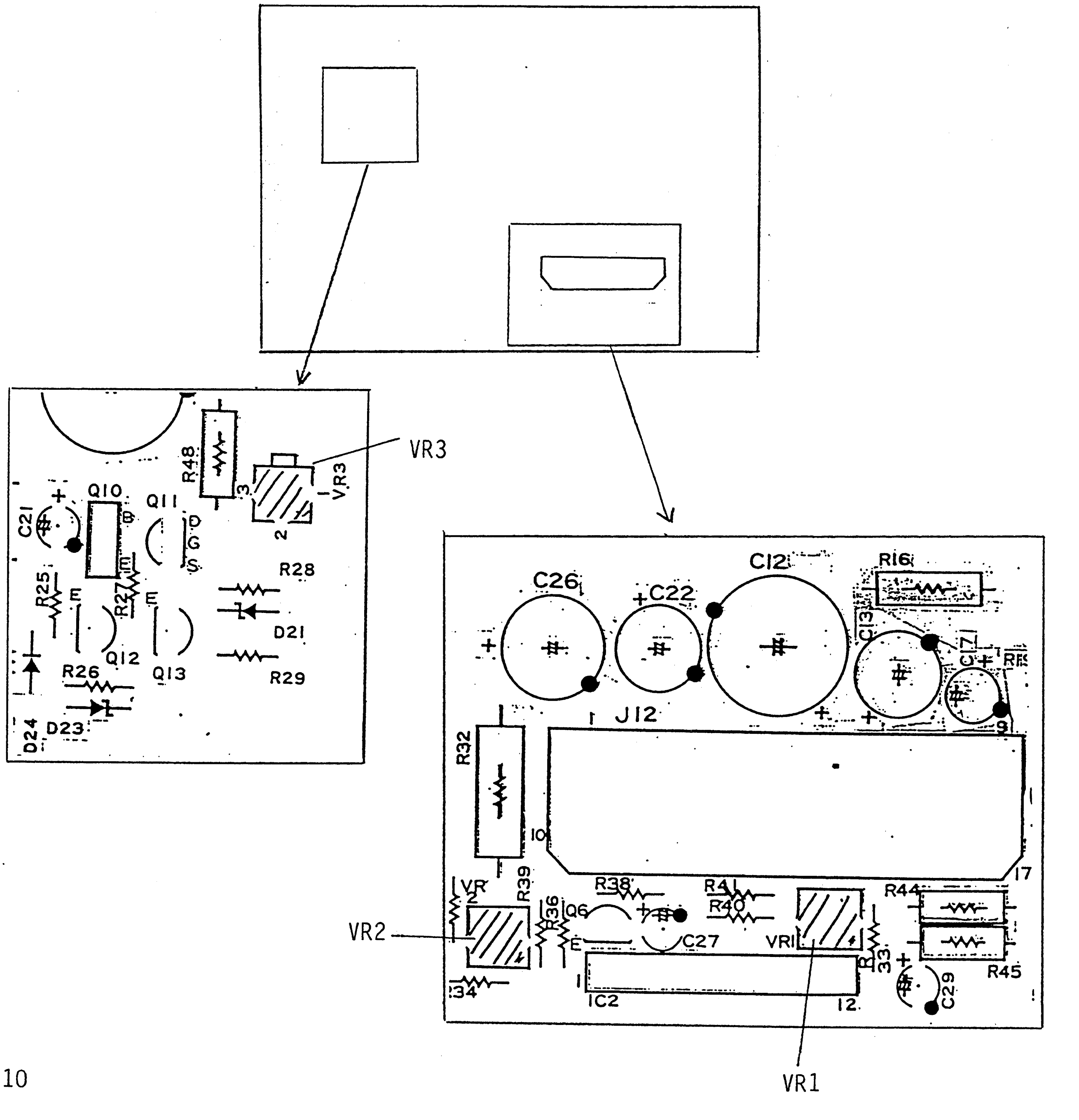
6.4 Power supply adjustment

Adjustment of voltage and current limitter. Adjustment is done with loaded +5V current flow, adjustment must be done with a 1.7ohm, 20W resistance load (Io = 3A) to +5V when adjusting.

. Adjust VR1 so that voltage across pin-13, 12 and pin-4, 3 (last end of connector) reads +5.0V $\pm$0.05V.

. Adjust VR3 so that voltage across pin-11, 10 and pin-2, 1 (last end of connector) reads +12.0V $\pm$0.1V.

. Adjust VR2 so that current limitter of +5V line functions at 3.2A current flow. (Connect a 20ohm, 2W resister in parallel of the 1.7ohm resistanve load. Adjust VR2 so that +5V voltage drops to 4 to 3 volts.



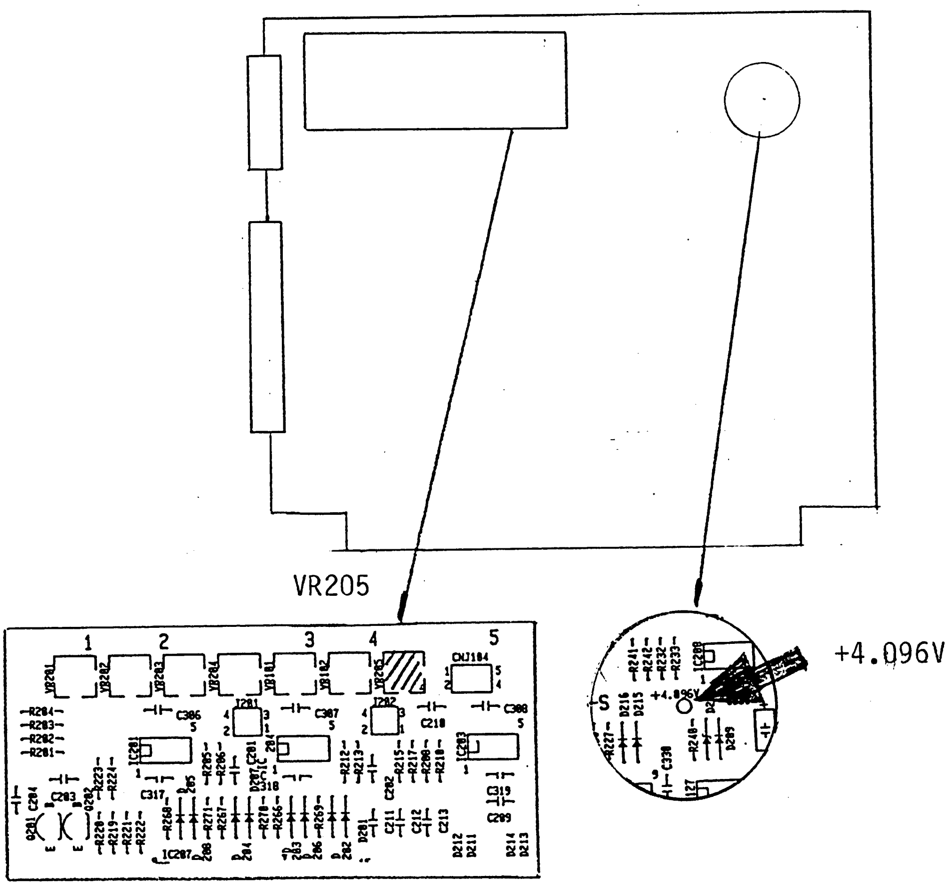
6.5 Central interface unit adjustment

Adjustment of D/A converter for waveform output to the central monitor and sensitivity and offset voltage for externally inputted voltage.

1) Reference voltage

Adjustment of reference voltage for A/D, D/A conversions.

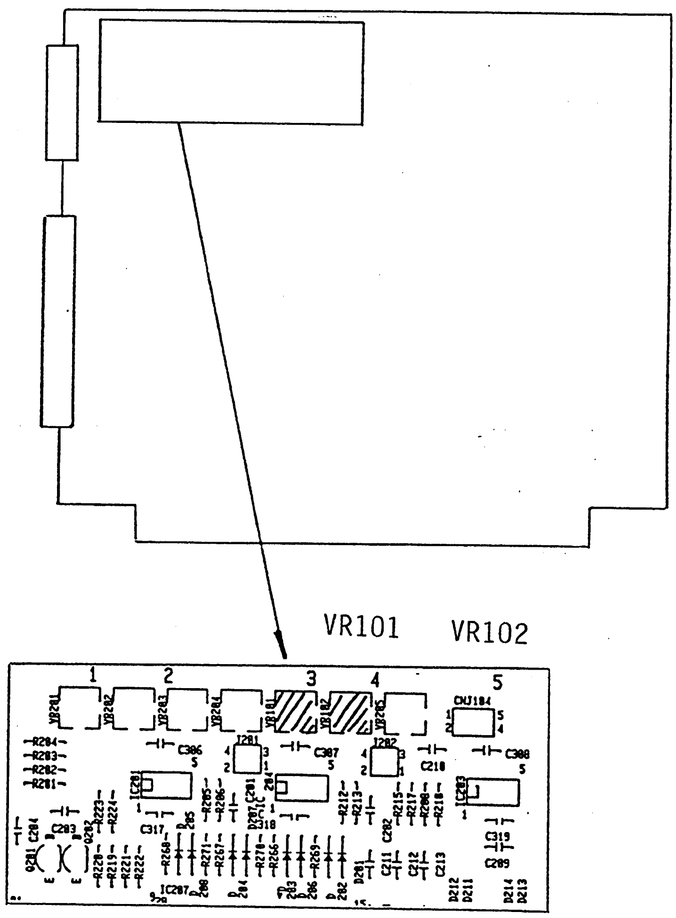
- Adjust VR205 so that voltage across the Test Point 4.096V and E1 reads 4.096V $\pm$0.001V.



2) D/A conversion related

Adjustment of D/A converter for waveform output to the central monitor. Call up Self Test screen No.1 and select A/D, D/A TEST (by pressing the DISPLAY key) and then select D/A TEST (by pressing the RECORD key).

- Adjust VR101 so that CNS output BP1W terminal (voltage across pin-30 and pin-33, 34) reads +5.120V ±0.01V at D/A FFF.
- Adjust VR102 so that CNS output BP1W terminal (voltage across pin-30 and pin-33, 34) reads -5.118V ±0.01V at D/A 000.
- Repeat above adjustment procedures. (D/A FFF and D/A 000 can be selected by pressing the FREEZE key on the front of the bedside monitor).



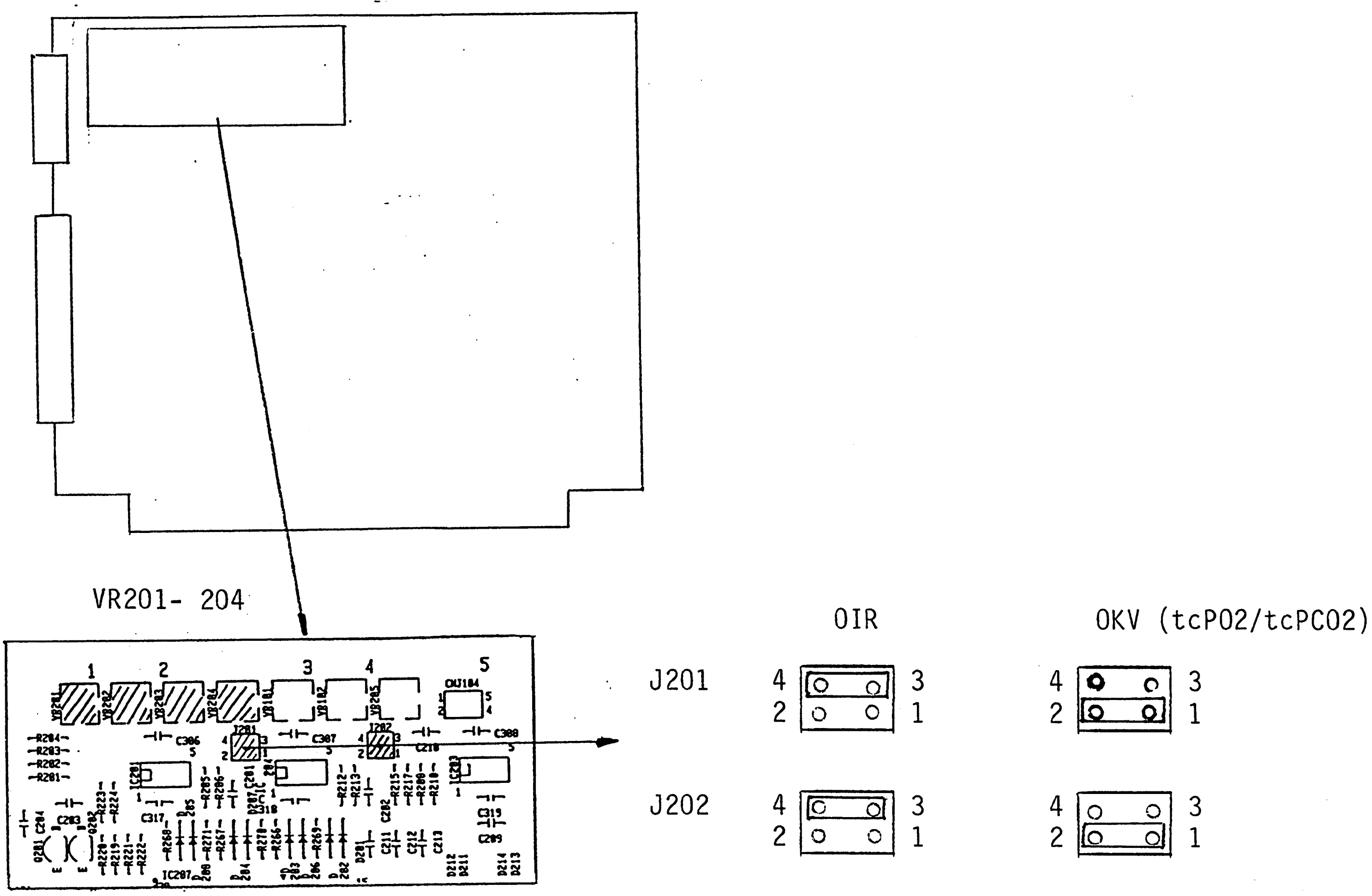
3) Sensitivity and offset for externally inputted signals

Adjustment of sensitivity and offset voltage for externally inputted signals.
Be sure that sensitivity differs according the instrument which is connected to the bedside monitor to the AUX connector. Sensitivity change is done with a short pin.

When adjusting, set the short pin to "1-2" which provides higher sensitivity.
When external instrument is OIR, move the short pin to "3-4" after adjustment.
Call up the Self Test screen No.1 and select item 6 (SELECT) by pressing the FREEZE key on the front of the bedside monitor.

- Shorten the AUX1IN (pin-1), AUX2IN (pin-2) and AGND (pin-3) and adjust VR201 so that CHANNEL 2 reads 0, and adjust VR203 so that CHANNEL 3 reads 0V. There is no minus data indication. Stop at just 0V position.

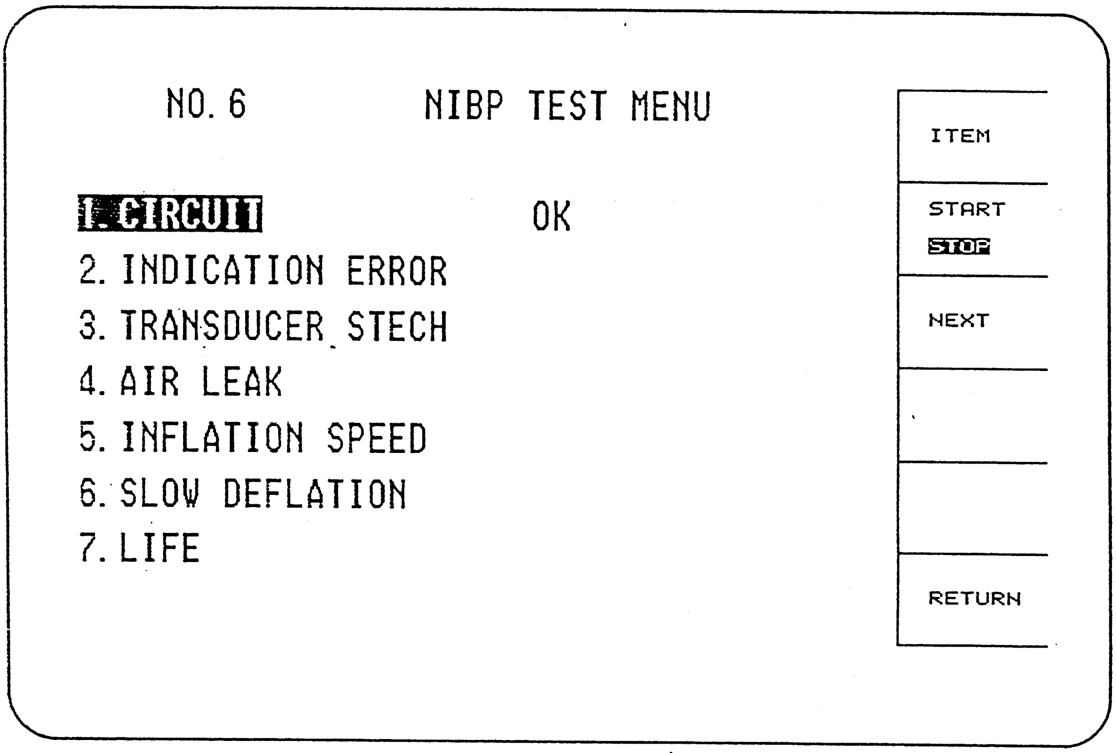
- Apply +1.0V to AUX1IN and AUX2IN across AGND and adjust VR202 so that CHANNEL 2 reads 3E8 and adjust VR204 so that CHANNEL 3 reads 3E8.



6.6 NIBP adjustment

<Preparation>

- Call up Self Test screen No.6 and select NIBP Test. Refer to page 2-28 for details.
- Connect a dummy cuff chamber (800cc) to the cuff hose connector.



1) AIR LEAK

This item is to test air leakage inside the NIBP unit and air system. 280mmHg cuff pressure is kept for three minutes to check pressure drop due to air leakage.

Connect a dummy cuff chamber (800cc) to the cuff hose connector.

Press the ALARM SUSPEND key to select item 4. AIR LEAK. Press the FREEZE key. Pressure motor starts running and cuff pressure is indicated on the center top of the screen. Wait for three minutes. Test results are indicated as below.

4. AIR LEAK *** *.*

- *.* : Cuff pressure drop (mmHg) after three minutes
- *** : Cuff pressure (mmHg) after three minutes

Pressure drop must be less than 4.5mmHg in this test.

If pressure drop is larger than 5mmHg, check air system or replace the NIBP unit.

2) INFLATION SPEED

This item is to check cuff inflation speed.

Connect the dummy cuff chamber (800cc) to the cuff hose connector.

Press the ALARM SUSPEND key to select item 5. INFLATION SPEED. Press the FREEZE key. Pressure motor starts running and cuff pressure is indicated on the center top of the screen. Test results are indicated as below.

```
5. INFLATION SPEED  *.*   *.*
                     |     |___ Time to reach 250mmHg (seconds)
                     |
                     |_________ Time to reach 150mmHg (seconds)
```

Time to reach 250mmHg must be 2.8 to 7.0 seconds.

3) SLOW DEFLATION

This item is to test slow cuff deflation speed with with a valve for air bleeding.

Connect a dummy cuff chamber (800cc) to the cuff hose connector.

Press the ALARM SUSPEND key to select item 6. SLOW DEFLATION. Press the FREEZE key. Pressure motor starts running. Cuff pressure is indicated on the center top of the screen. It takes approximately two munutes to complete this test. Test results are indicated as below.

```
6. SLOW DEFLATION  *.*   *.*   *.*   *.*
                    |     |     |     |___ Deftation speed at 40mmHg (mmHg/sec)
                    |     |     |
                    |     |     |___ Deflation speed at 80mmHg (mmHg/sec)
                    |     |
                    |     |___ Deflation speed at 160mmHg (mmHg/sec)
                    |
                    |___ Deflation speed at 240mmHg (mmHg)
```

Each speed must be as below.

40mmHg ...... 2.6- 4.4mmHg/sec.
80mmHg ...... 4.6- 6.2mmHg/sec.
160mmHg ..... 4.6- 6.2mmHg/sec.
240mmHg ..... 4.6- 6.2mmHg/sec.

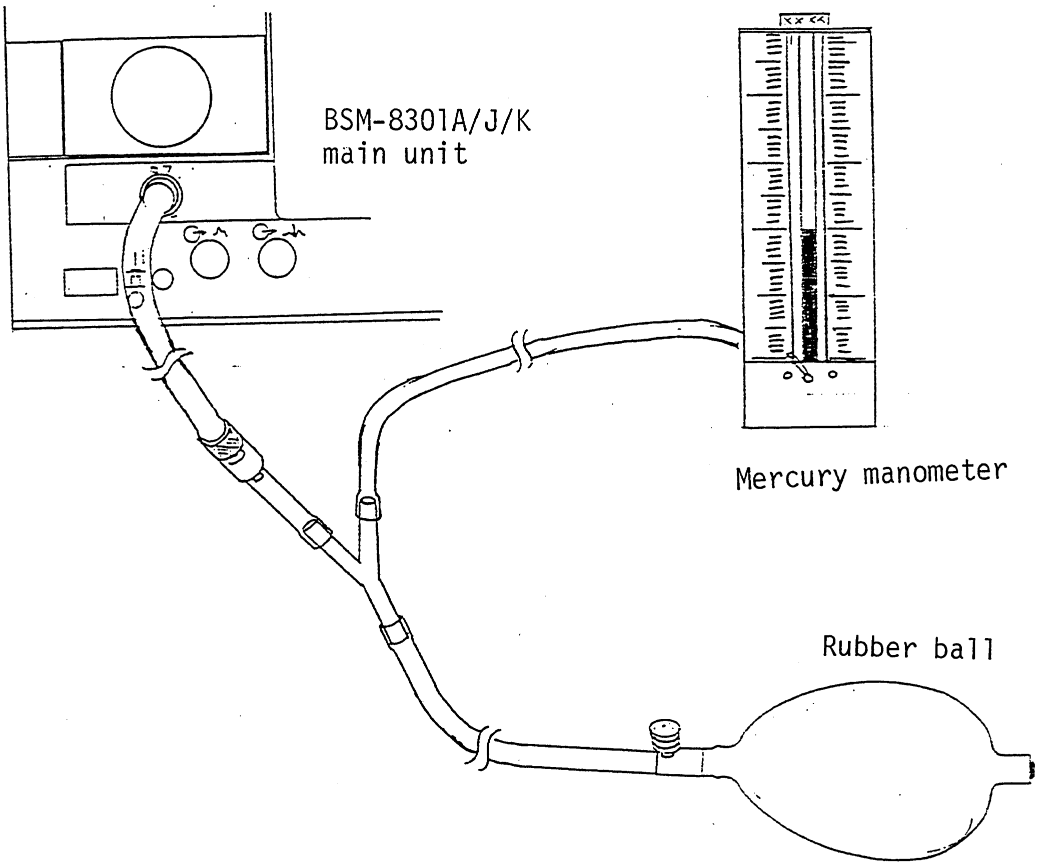
5) INDICATION ERROR

When above items 1) to 3) have passed, check pressure sensor accuracy by using mercury manometer.

Connect a dummy cuff chamber (800cc) to the cuff hose connector.

Press the ALARM SUSPEND key to select item 2. INICATION ERROR. Press the FREEZE key. Pressure motor starts running and stops at approximately 180mmHg. Cuff pressure is indicated on the center top of the screen.

Remove the dummy cuff chamber and connect the mercury manometer and rubber ball as illustrated.



Increse pressure with the rubber ball and compare pressure readings of mercury manometer and on the screen. Reads three points of 50, 150, and 250mmHg during inflation and deflation.

Difference between the two readings must be less than ±4.5mmHg.

NOTE: Items 3. TRANSDUCER STRECH and 7. LIFE are factory use only. There is no need to used the items in the field.

Section 7

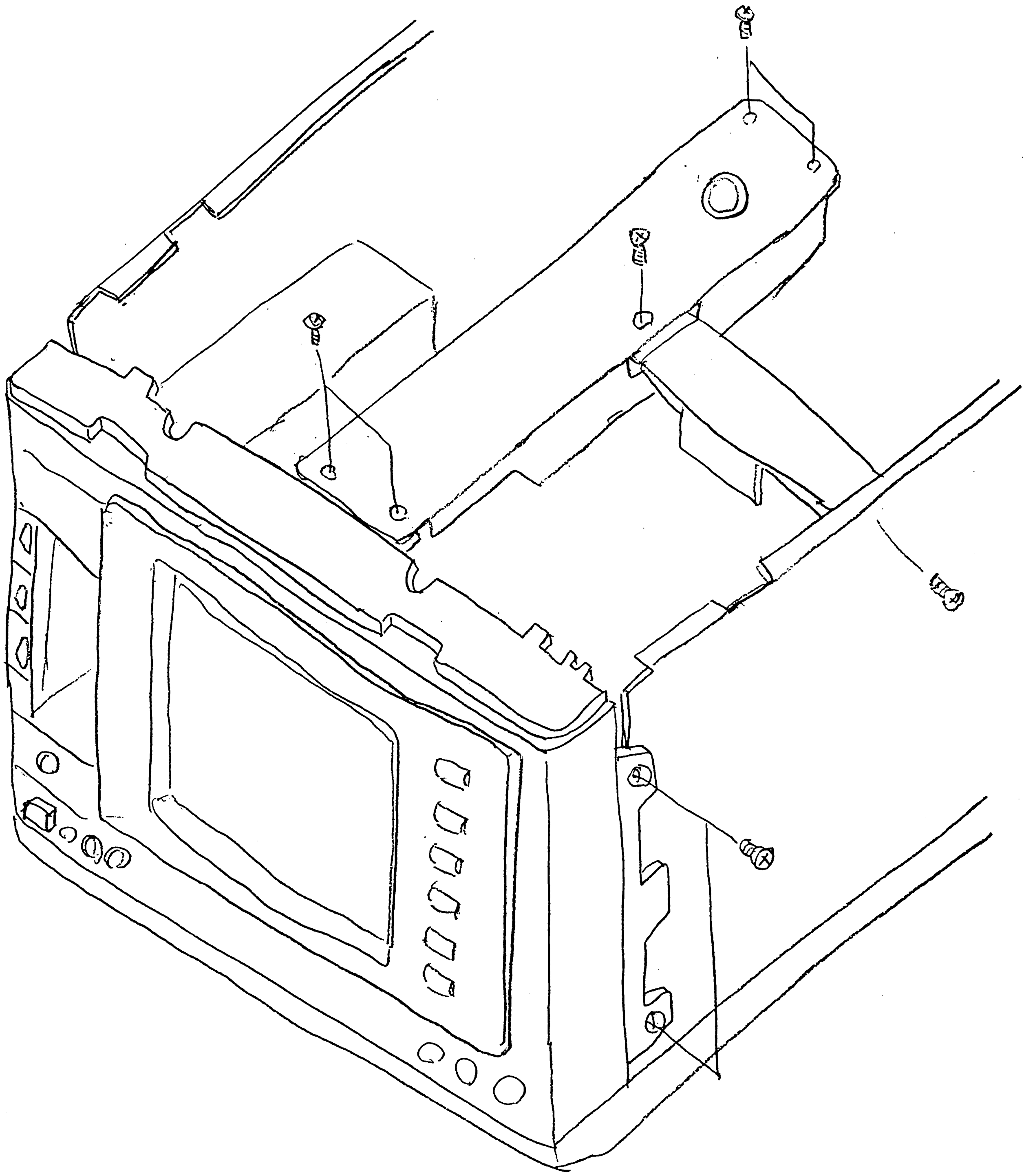
7. Disassembly and assembly

7.1 Front frame

1) Remove four screws fixing front panel, four screws fixing speaker holder, and two screws fixing PC board holder.

2) Remove the front frame by pulling out it forward you.

3) Remove the cable connector between the head amplifier mother board and main board, and between the operation board and main board.

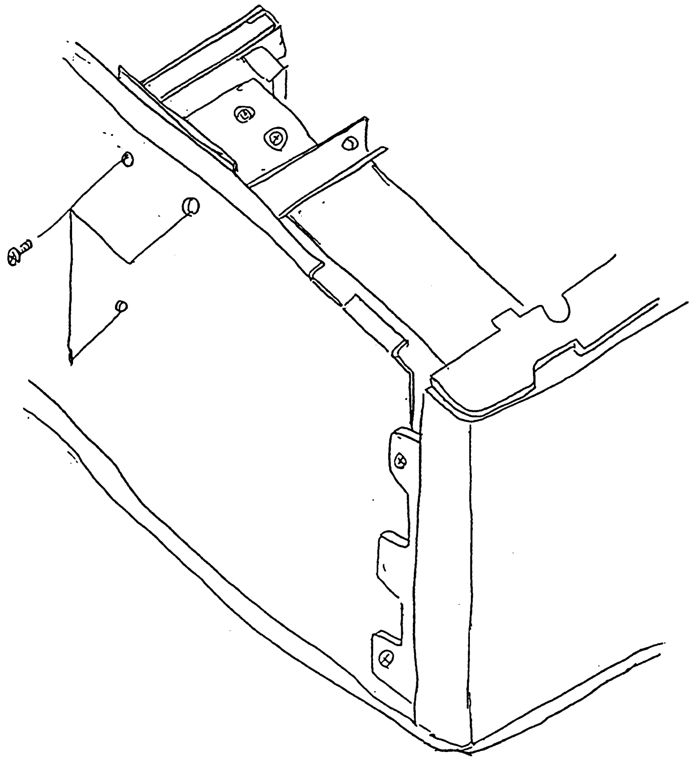


7.2 NIBP unit

1) Before disassembling the NIBO unit, remove the front panel and speaker holder as describe in page 7-2.

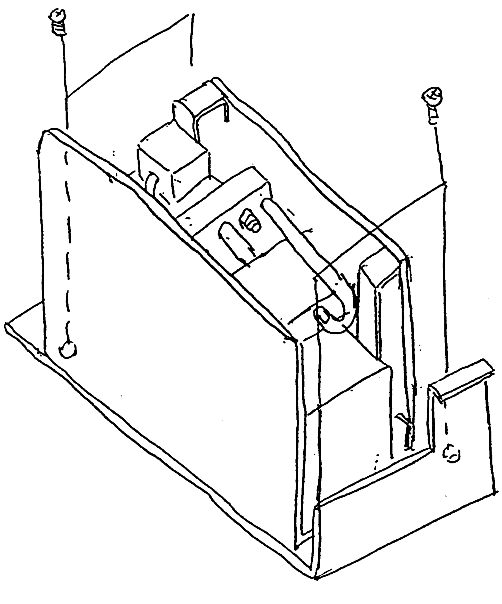
2) Remove three screws fixing the NIBP unit from the left side chassis.

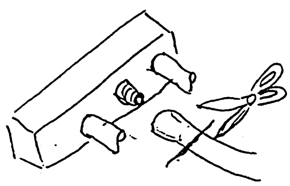
3) Remove the tube and cable connector.



4) Remove the four screws fixing the NIBP unit on the holder.

5) Cut the tuve a small amount before re-attaching the tube to the NIBP unit.



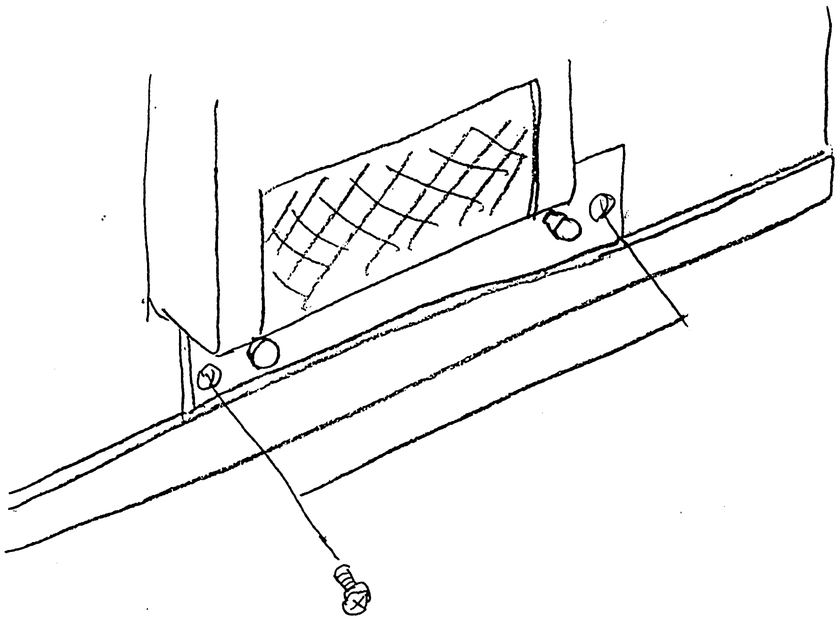


Cut the tube end
before re-attaching.

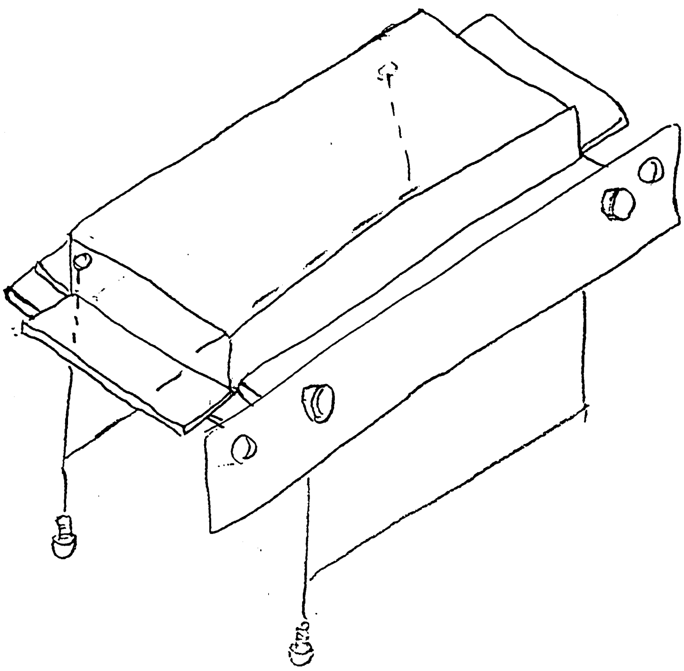
7.3 ROM pack

1) Remove the two screws fixing the ROM pack.

2) Take out the ROM pack by pulling out the two knobs on the ROM pack.



3) Remove the four screws fixing the metal shield case.



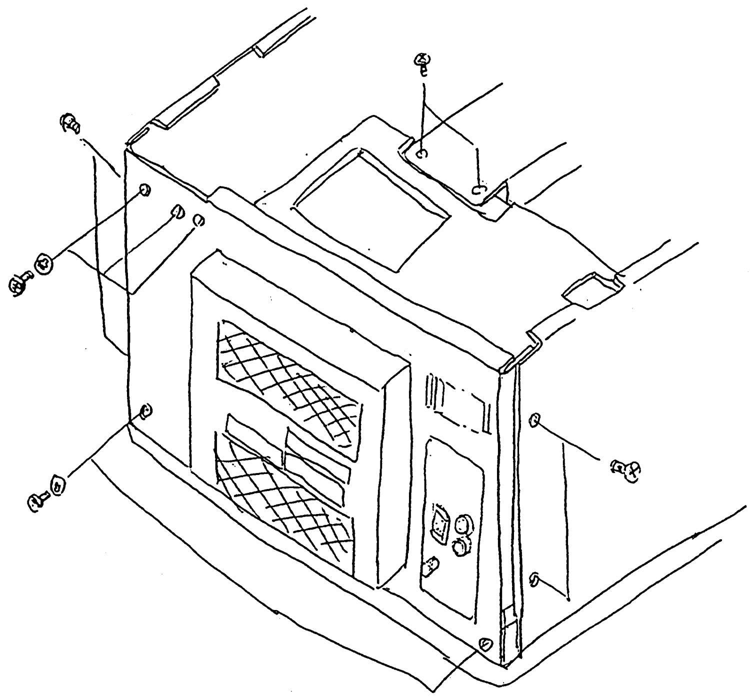
7.4 Power unit

1) Remove the two screws fixing the speaker holder, three screws fixing the PC board, and six screws fixing the rear chassis.

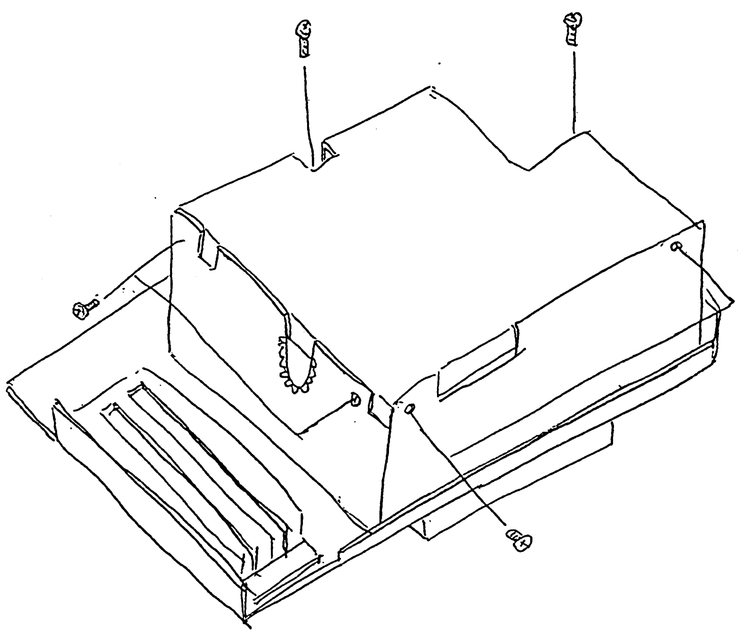
2) Pull out the rear chassis forward you.

3) Care should be given to the part of power switch and power switch holder bracket.

4) Remove the cable connector between the main unit.



5) Remove the six screws fixing the cover.



7.5 Main board

1) Remove the CRTC and PIO boards.

2) Remove the cable connector between the power unit.

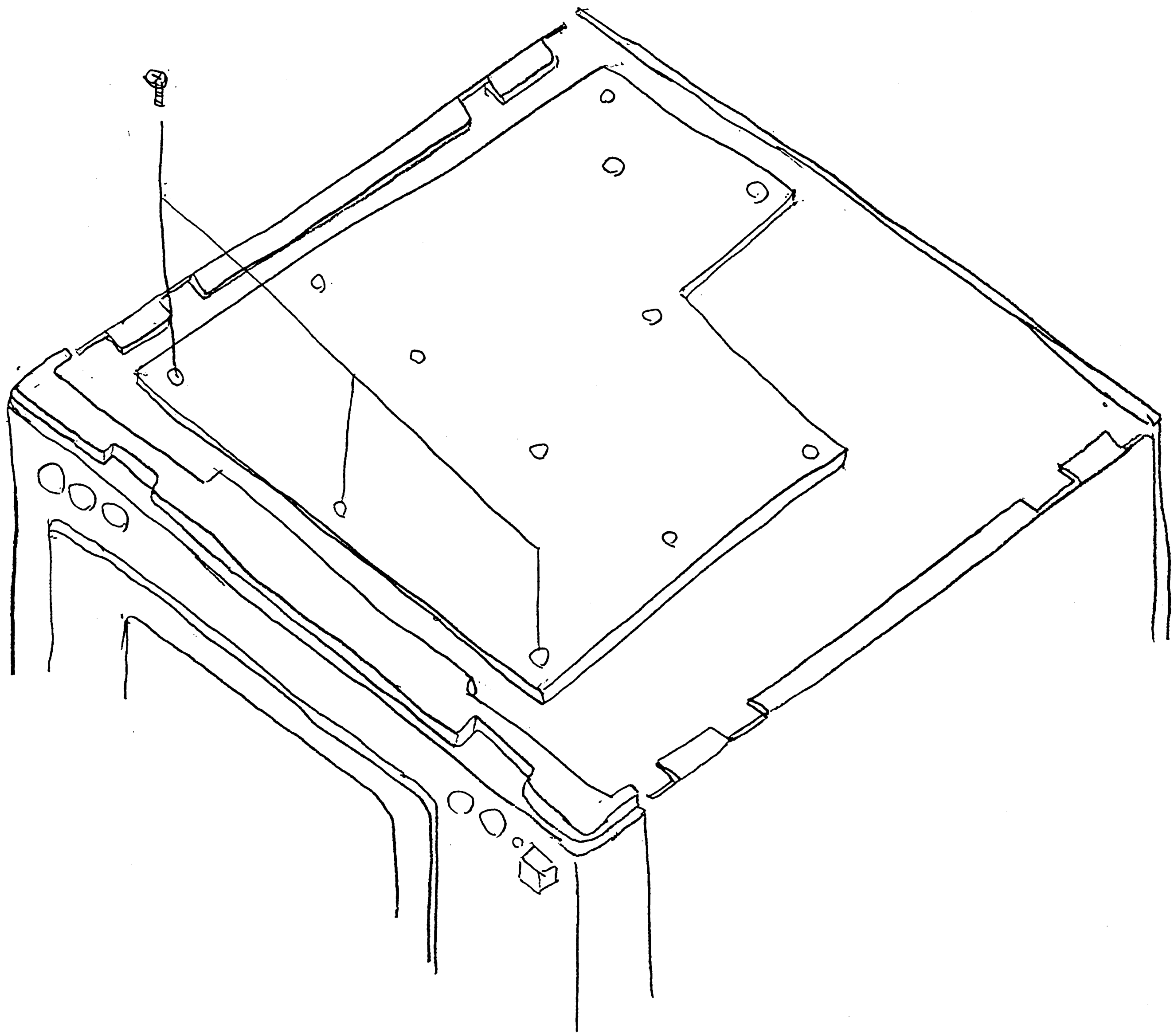
3) Remove the ROM pack.

4) Put the main unit up side down on a soft sheet.

5) Remove the bottom cover and remove the twelve screws fixing the main board.

6) Remove the cable connector between the head amplifier mother board.

7) Remove the main board from the main unit.



7.6 CRT unit

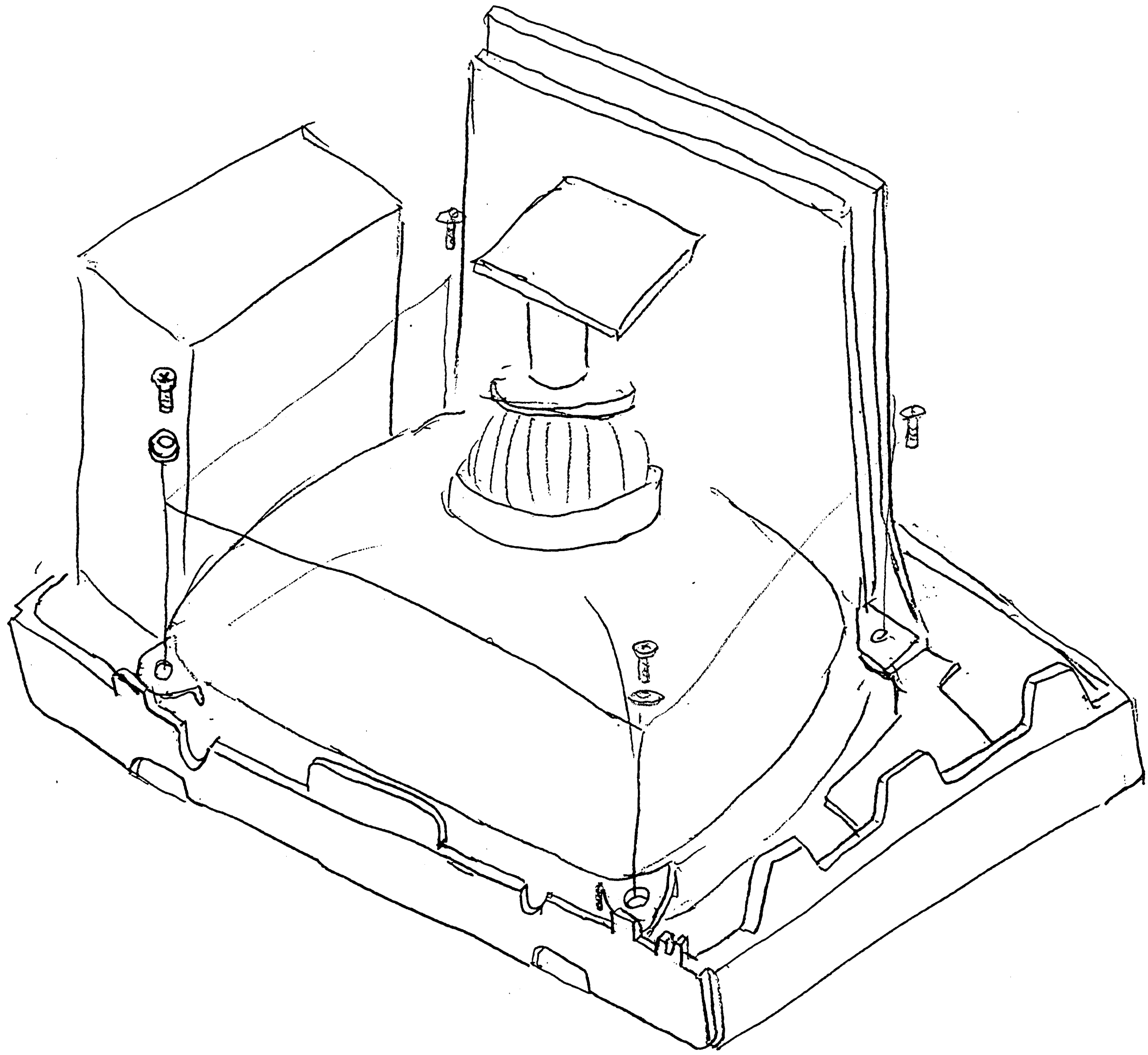
1) Remove the front panel assembly including the CRT unit.

2) Put the front panel assembly facing down.

3) Remove the four screws fixing the CRT unit.

4) Remove the CRT.

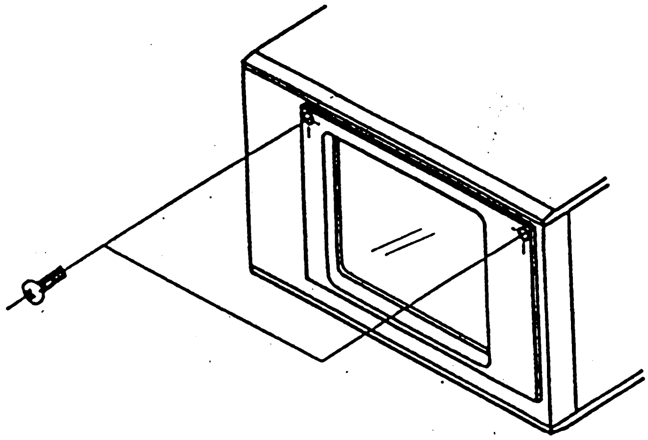
Be sure that two top screws are with flat washers.



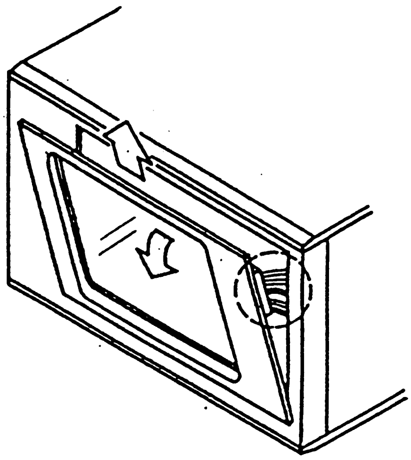
7.7 Replacement of touch key panel assembly

When toych key screen surface is broken or cracked due to drop of the unit or by touching the panel with sharp material and the key operation becomes incorrect replace the touch key panel assembly according to the instructions.

1. Remove the two screws fixing the touch key panel.

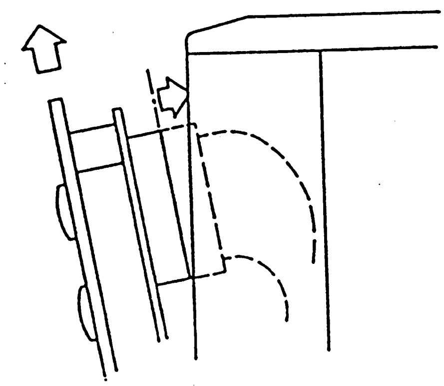


2. Take forward the top of the panel and then push it up.



3. Remove the connection cable from the operation board.

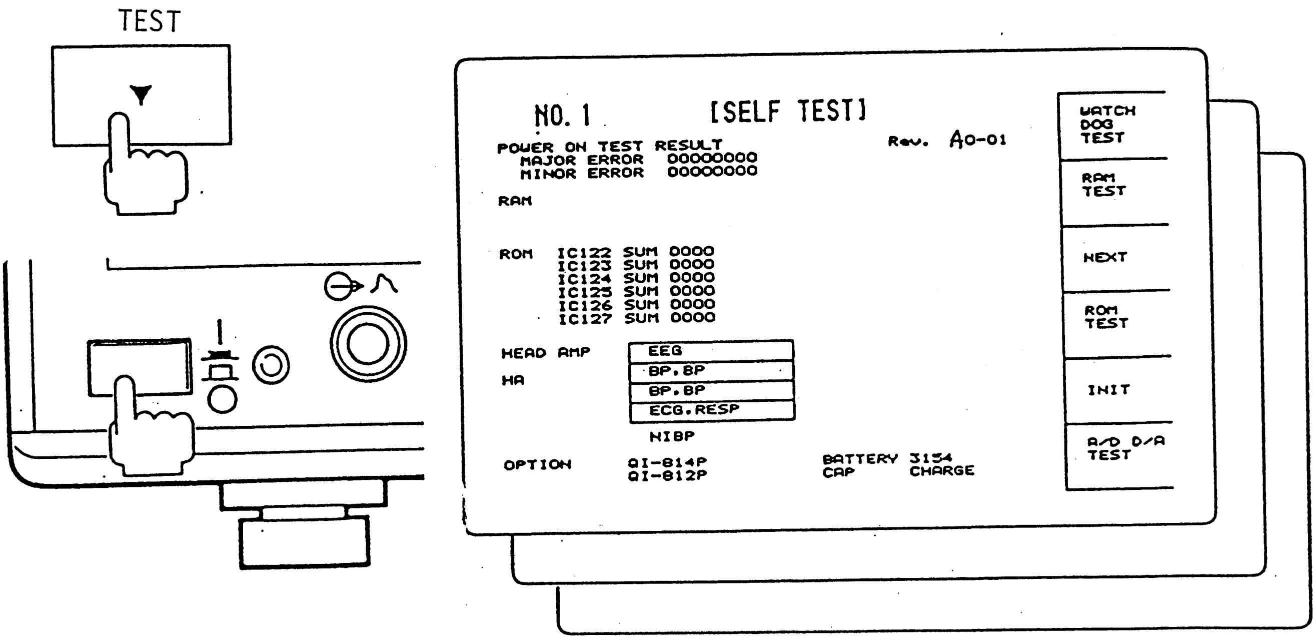
4. Replace the touch key panel and reassembly the components in the reverse prder of disassembly.



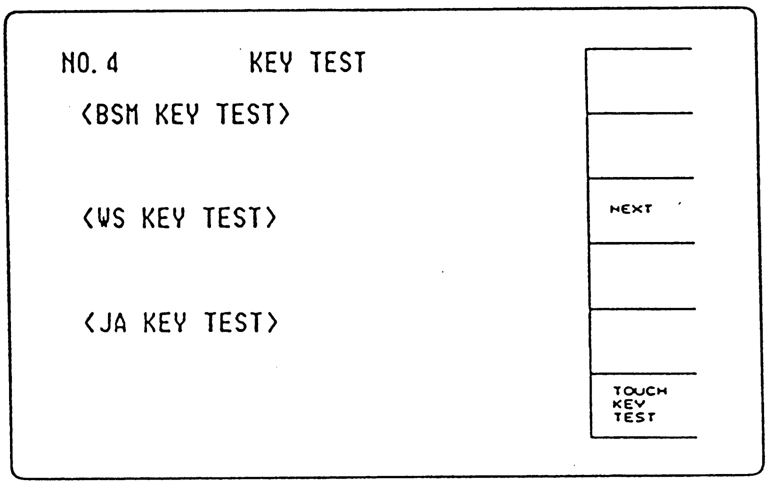
Touch key panel data setting

When the touch key panel is replaced or key touch response seems to be incorrect, touch key position assignment for the main unit is required. After data is stored in the main unit, it does not go out while power is off.

1. Turn power on of the main unit while pressing the TEST key on the front. Self Test program screen will appear on the screen.

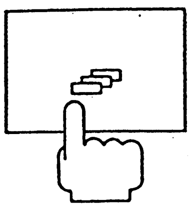


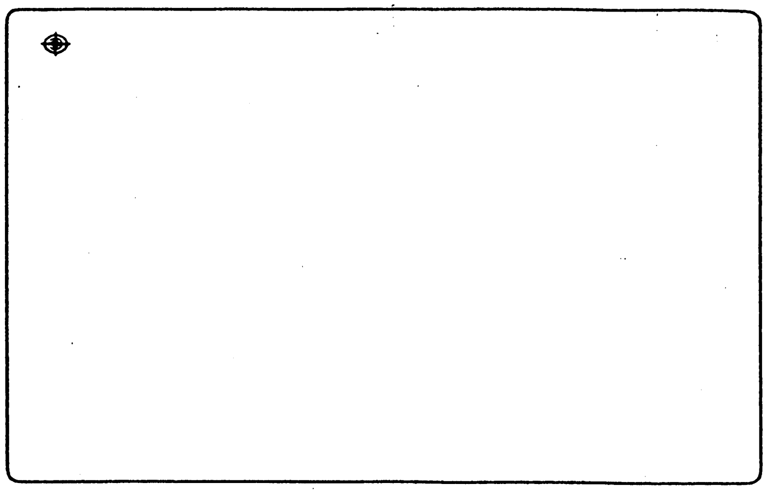
2. press the TEST key three times to call up Screen No.4 for KEY TEST.



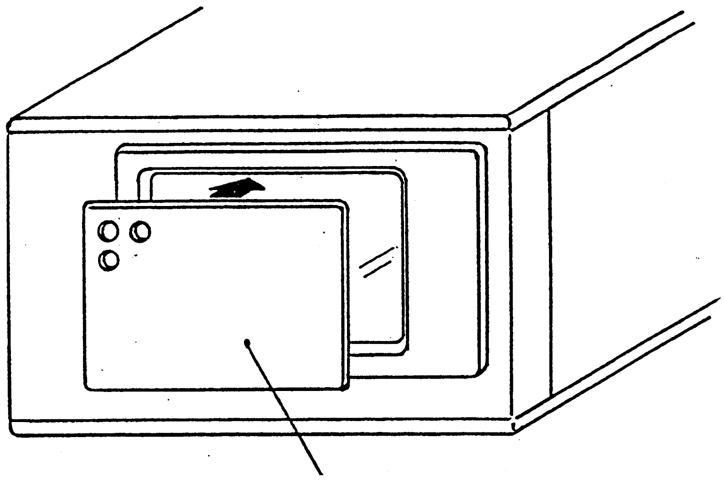
3. Press the DISPLAY SELECT key on the front corresponing the TOUCH KEY TEST area on the screen twice so that a mark ⊕ appears on the left top of the screen.

DISPLAY

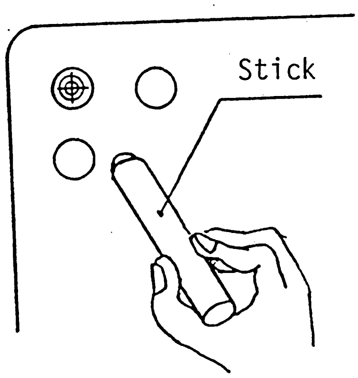




4. Set the test plate onto the frame of the CRT screen.



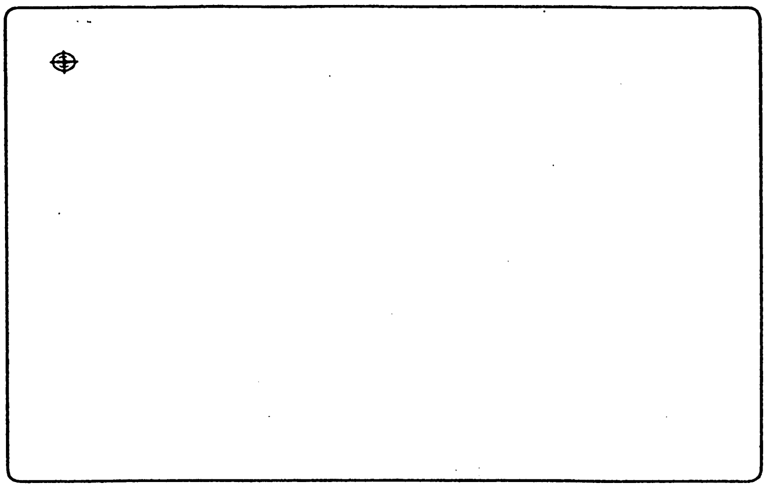
5. Push the marked surface throuh the test plate with the provided stick. The mark will move to right.



6. Push the moved mark with the test stick through the hole of the test plate.

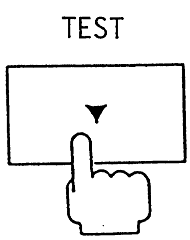
Repeat above procedure for all marked positions in all lines until the mark returns to the left top original position on the screen.

Be careful not to touch incorrect position othewise mistakenly set position is registered to the main unit.



7. After setting all positions, press the TEST key repeatedly until message "SELF TEST AGAIN?" appears on the screen.

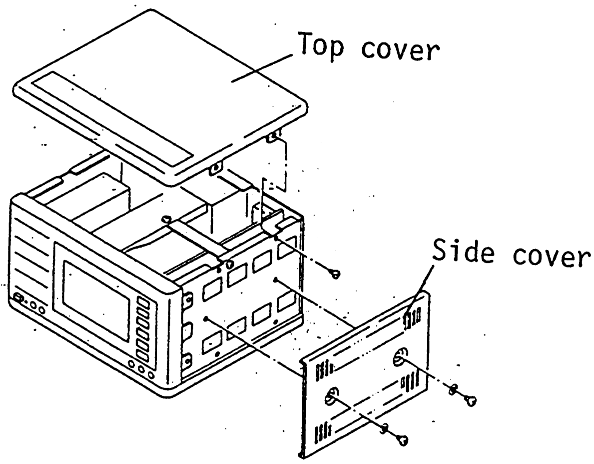
Wail for several seconds until the screen returns to the normal operation mode.



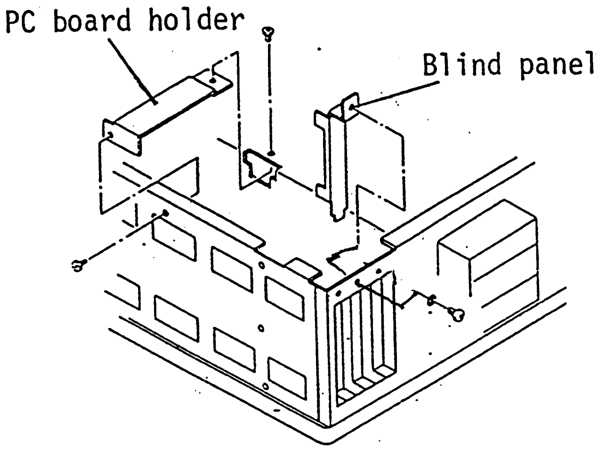
7.8 Mounting the QI-812P interface to the BSN-8300 series bedside monitor

The QI-812P interface provides two connectors, one for WS-841/821RA/J/K thermal array recorders and the other (RS-232C) for an external instrument especially a personal computer.

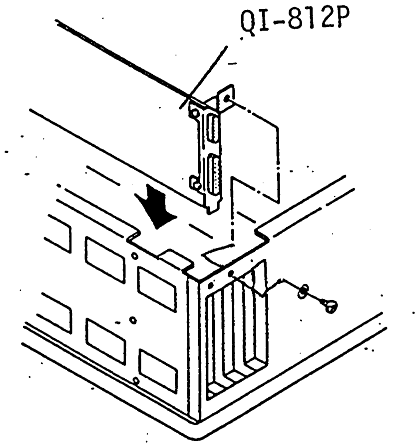
1. Remove the side covers (2 screws each) and top cover (4 screws).



2. Remove the PC board holder (2 screws) and left side blind panel (1 screw) on the rear.



3. Insert the QI-812P interface into the slot and connect it with a screw which is previously removed.

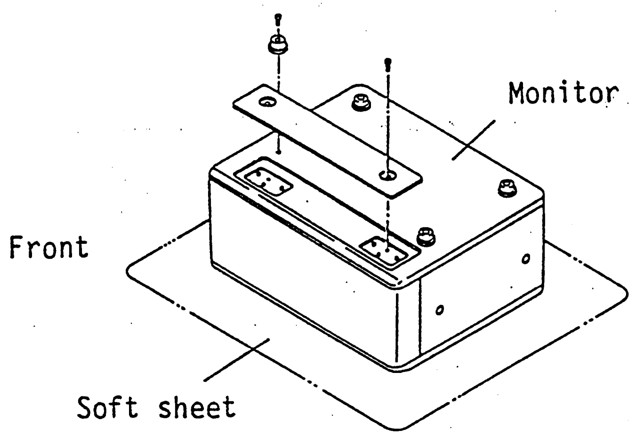


4. Assemble the units.

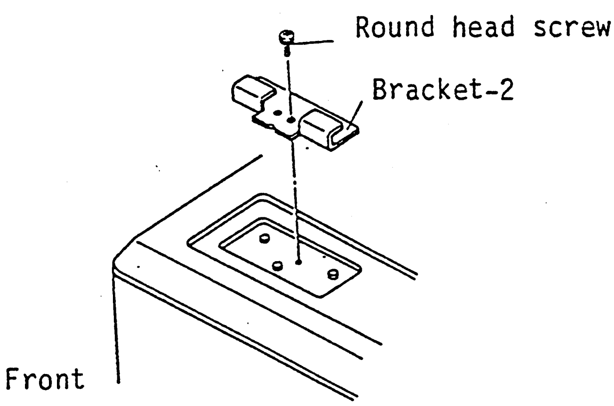
Coupling the bedside monitor and the thermal array recorder

1. Turn over the monitor and remove the 4 rubber feet and blind plate (2 screws).

   NOTE: Put the monitor on a soft sheet or paper when turning it over.

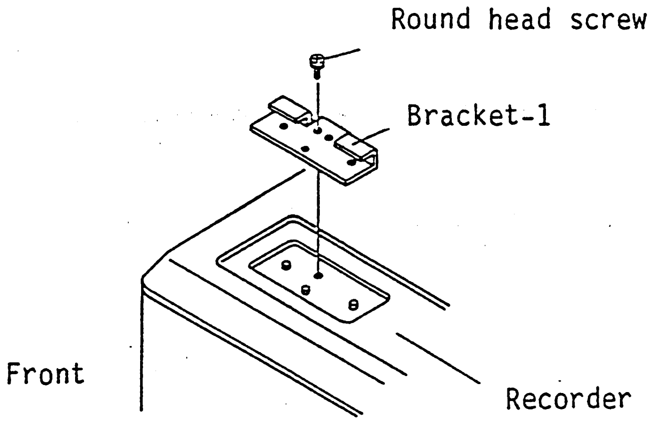


2. Put the provided two coupling brackets-2 (gray color) onto the dents under the removed blind panel and secure them with screws (1pc. each).



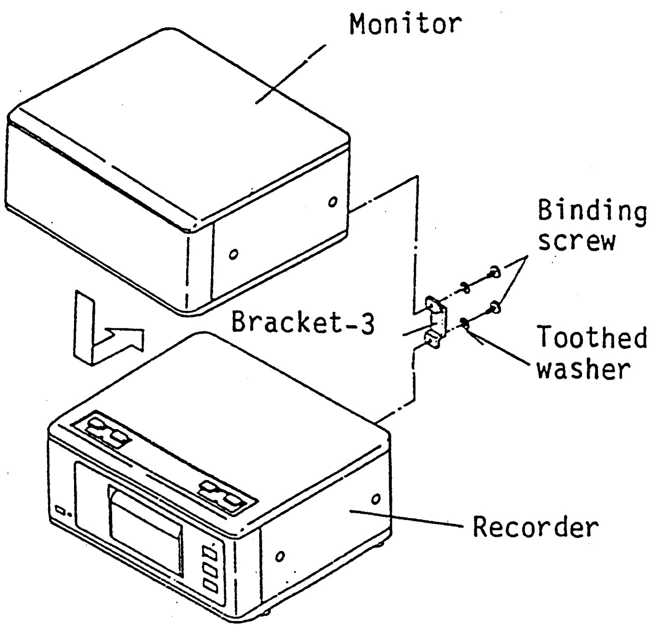
3. Remove the blind panel on the top of the thermal array recorder.

4. Put the provided two coupling brackets-1 (black color) on the dents under the removed blind panel and secure them with screws (1pc. each).

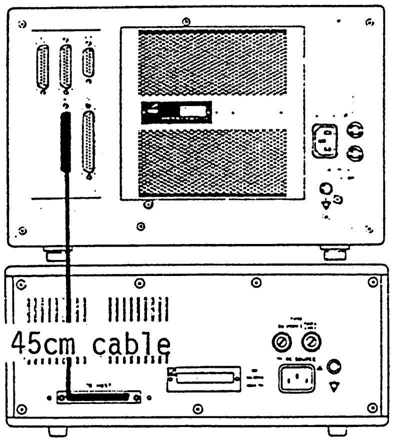


5. Set the monitor on the top of the recorder and hook the brackets-2 with brackets-1 by sliding the monitor backwards.

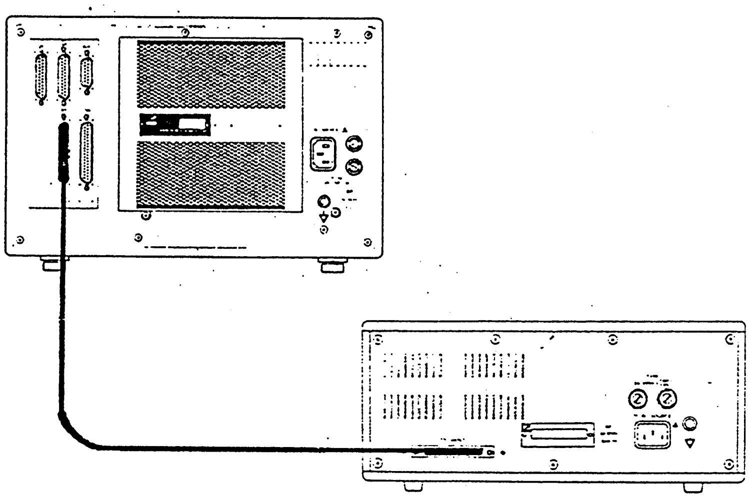
   Secure the monitor and recorder with the coupling bracket-3 and binding screws with toothed washers.



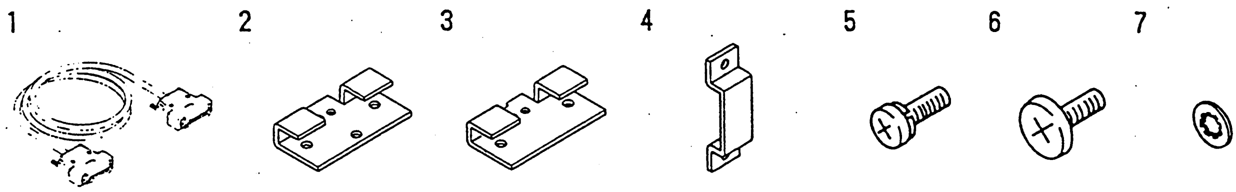
5. Connect the monitor and recorder with the 45cm connection cable provided with the interface when the two units are coupled.



If the recorder is located separately from the monitor use the longer cable which is provided with the recorder.



Accessories of the QI-812P intreface

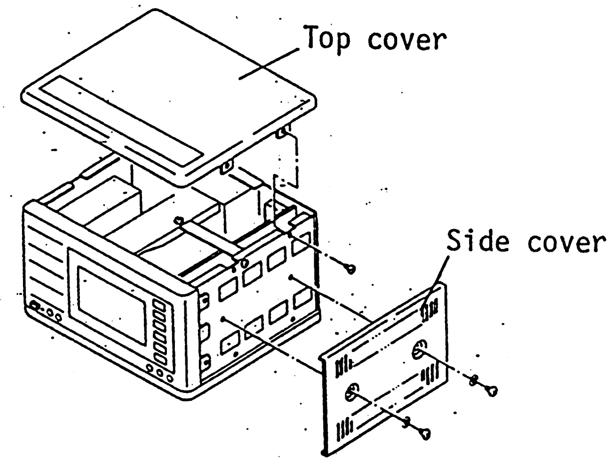


1.	WS connection cable YS-015P9 (45cm)	1 pc.
2.	Coupling bracket-1 (black) 1114-199694	2 pcs.
3.	Coupling bracket-2 (gray) 1114-199702	2 pcs.
4.	Coupling bracket-3 (ivory)	2 pcs.
5.	Round head screw PS4x8SUS 6410563	4 pcs.
6.	Binding screw BH4x8SUS 6402607	4 pcs.
7.	Toothed washer M4 6440557	4 pcs.

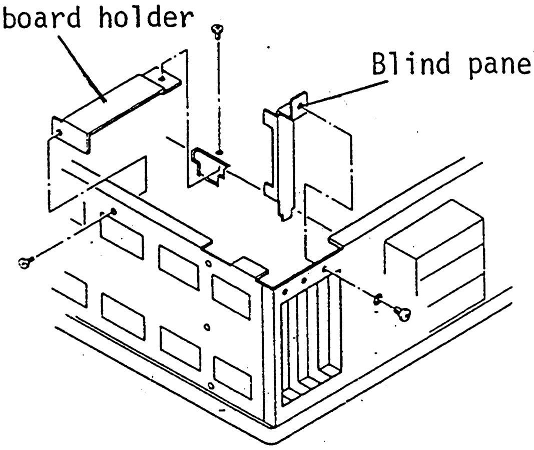
7.9 Mounting the QI-814P interface to the BSM-8300 series bedside monitor

The QI-814P interface provides two connectors, one for central monitor (CNS) and the other for auxiliary singal input (AUX).

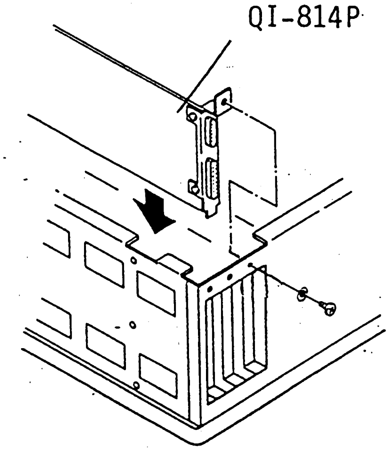
1. Remove the side covers (2 screws each) and top cover (4 screws).



2. Remove the PC board holder (2 screws) and right blind panel (1 screw) on the rear.



3. Insert the QI-814P interface into the slot and connect it with a screw which is previously removed.



4. Assemble the units.

5. Connect the monitor and signal exchanger with a connection cable.

NOTE: The connection cable should be made at the installation site.

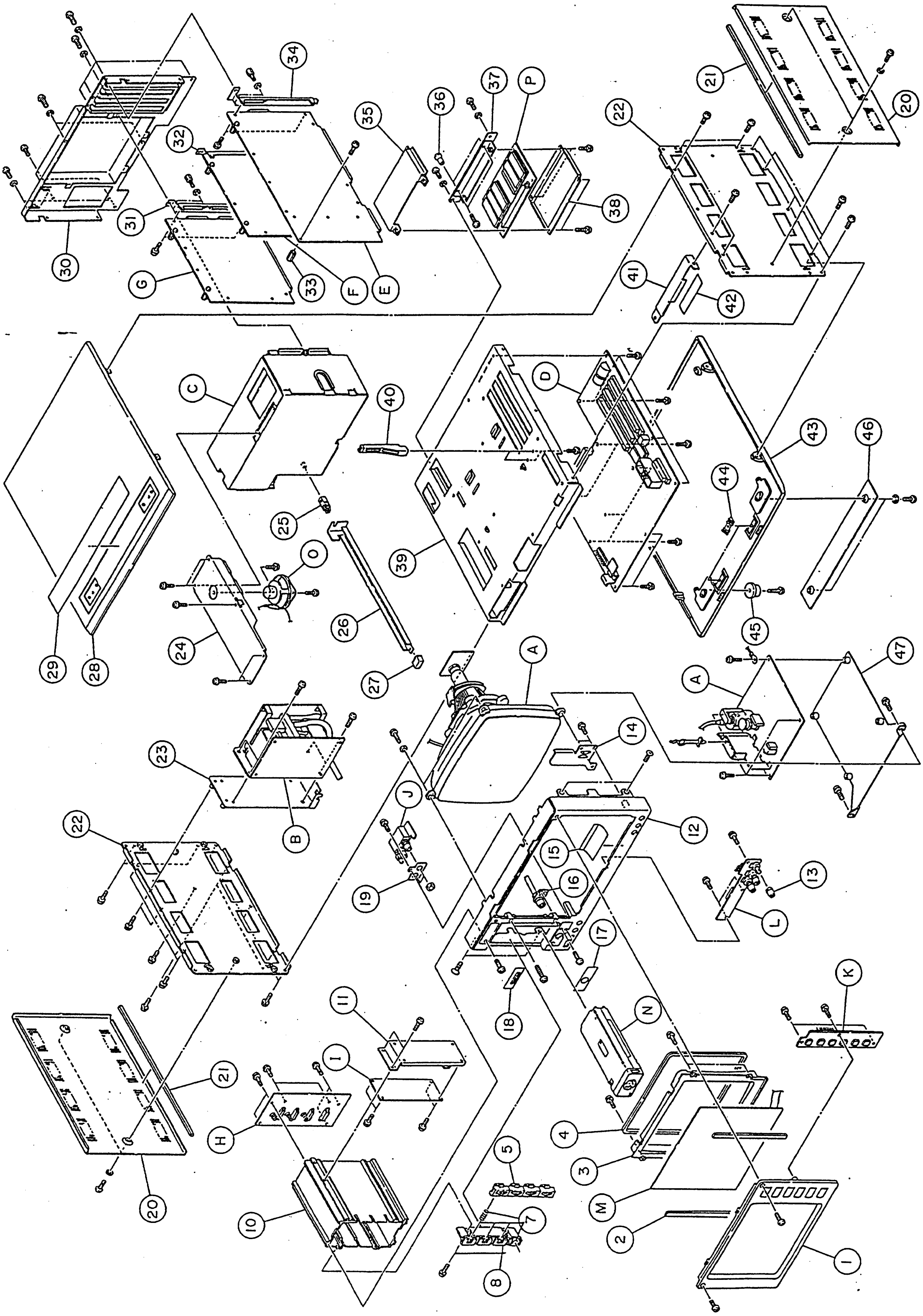
Section 8

8. Mechanical part list

8.1 MU-831R/MU-832RA/J/K bedisde monitor main unit

Index	Code No.	Description
1,2,3 M,K	YS-017P1	Touch panel frame assembly:
1	1143-006536B	Touch panel frame 1A ASSY
2	1114-212466	Dumper sponge
3	1112-016272D	Touch panel frame 2
4	1114-198686	CRT sponge
5,7,8	1114-016318	Stopper Assembly
5	1114-210539B	Amplifier unit stopper 1
7	1114-177325A	Stopper pressure spring
8	1113-055949B	Stopper holder
9	1114-210548A	Amplifier unit stopper 2
10	1113-055931E	Head amplifier case
11	1114-210566	Shield case 1
12	1123-017678C	BSM front panel
13	1114-154858	VR touch knob
14	1114-206999A	CRT holder bracket
15	1114-213901	Protection sheet
16	1114-175443	Joint holder (included in AP-712P)
17	1124-039456	Cuff panel A (MU-831RA/J/K)
	1114-207623A	Blank panel 2 (MU-832RA/J/K)
18	1124-039224A	NK mark panel
19	1114-210557A	PCB holder
20	1113-052293	Side cover 210A
21	1114-196296	Dumper sponge
22	1112-016307A	Side chassis 210A

Index	Code No.	Description
23	1114-210512A	NIBP unit holder (MU-831RA/J/K only)
24	1114-206785B	Speaker holder
25	1114-171795B	Switch holder
26	1114-210388A	BSM extender shaft
27	1114-202842C	Power switch knob
28	1112-016102B	Top cover 330
29	1123-018641	BSM caution panel A1
30	1143-005733C	BSM rear chassis assembly
31	1114-210352	Connector holder (for UP-0401, QI-814P)
32	1114-210361	Connector holder (for UP-0402, QI-812P)
33	6491457	Spacer nut, l=10 (for UP-0401, UP-0402, UP-0398)
34	1114-210334	Connector holder (for UP-0398 CRTC board)
35	1114-206811A	ROM pack shield case 10 (included in UP-0520 ROM pack)
36	1114-135683A	ROM pack knob (included in UP-0520 ROM pack)
37	1114-210477	ROM pack panel (included in UP-0520 ROM pack)
38	1113-055085B	Shield case 9 (included in UP-0520 ROM pack)
39	1112-017467C	BSM chassis
40	6001871	PCB guide 50-4010
41	1114-210503A	PCB holder
42	1114-210575	Felt sheet for PCB holder
43	1112-015718B	Bottom cover 330
44	1114-197232A	Grounding spring 1
45	1114-167087A	Rubber foot
46	1114-199658A	Sub panel
47	1114-206829A	CRT board holder
A	VM-004P	CRT unit
B	AP-712P	NIBP unit (MU-831RA/J/K)
C	SC-006P	Power supply unit (MU-831/832RA/J)
	SC-006PK	Power supplu unit (MU-831/832RK)
D	UP-0397	Main board
E	UP-0398	CRTC board
F	UP-0402	WSIF board for QI-812P
G	UP-0401	PIO board for QI-814P
H	UP-0399	Head amplifier mother board
I	UP-0519	Resp. board
J	UP-0584	Operation board-3
K	UP-0509	Operation board-2
L	UP-0400	Operation board-1
M		Touch key panel EMU-6012 (Not supplied. Order YS-017P1)
N	AC-800PA	ECG/Resp. head amplifier (MU-831/832RA)
	AC-800PJ	ECG/Resp. head amplifier (MU-831/832RJ/K)
O	US-0520A	ROM pack (including Indexes 35, 36, 37, and 38)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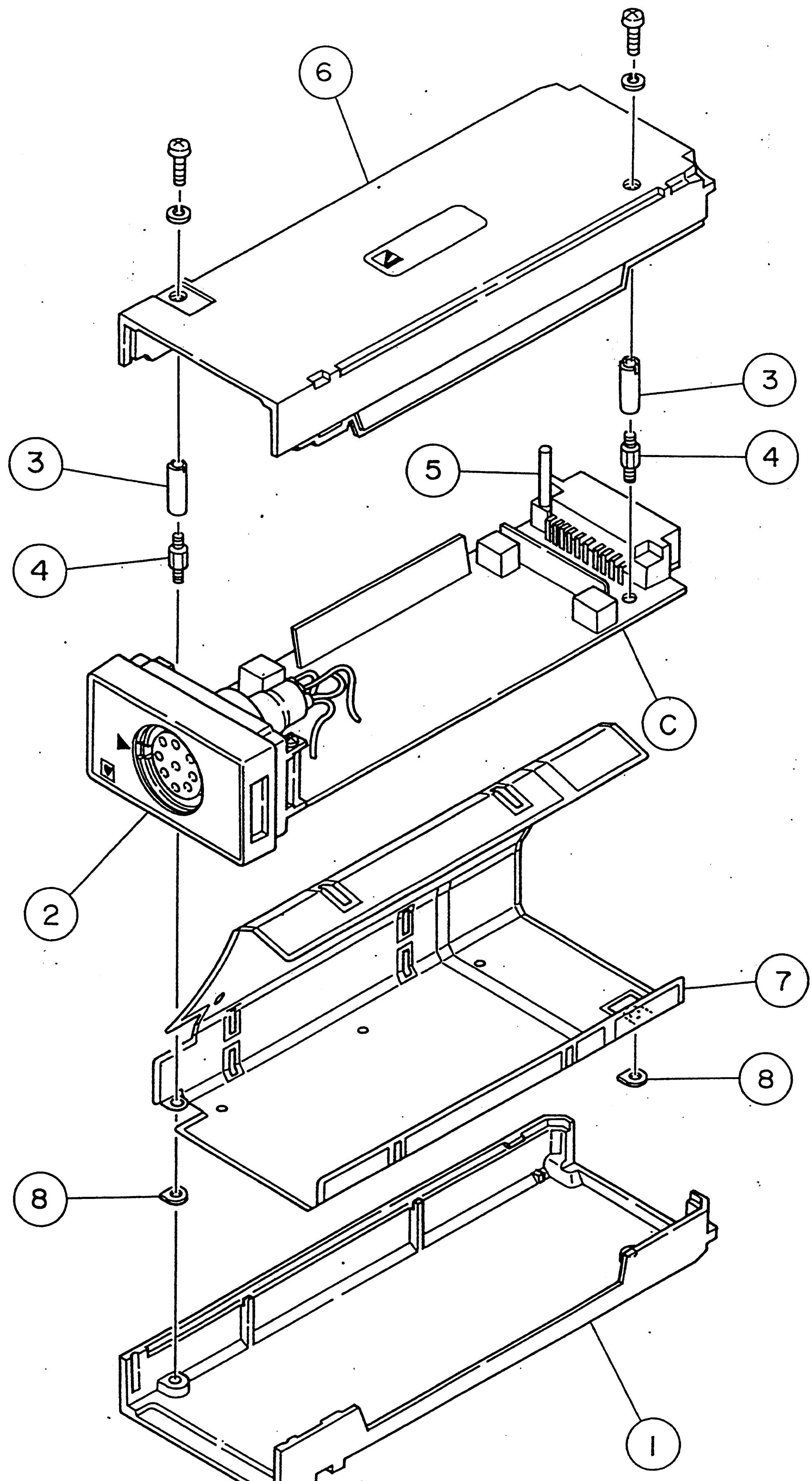
8.2 AC-800PA/PJ ECG/Resp. head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-013542A	ECG input connector case
	1124-035014A	AC-800PA front panel
	1124-036601	AC-800PJ front panel
3	1114-190025B	PCB support-2
4	1114-190052	PCB support-1
5	1114-177281	Spacer
6	1112-013533	Head amplifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
C	UP-0272	ECG head amplifier board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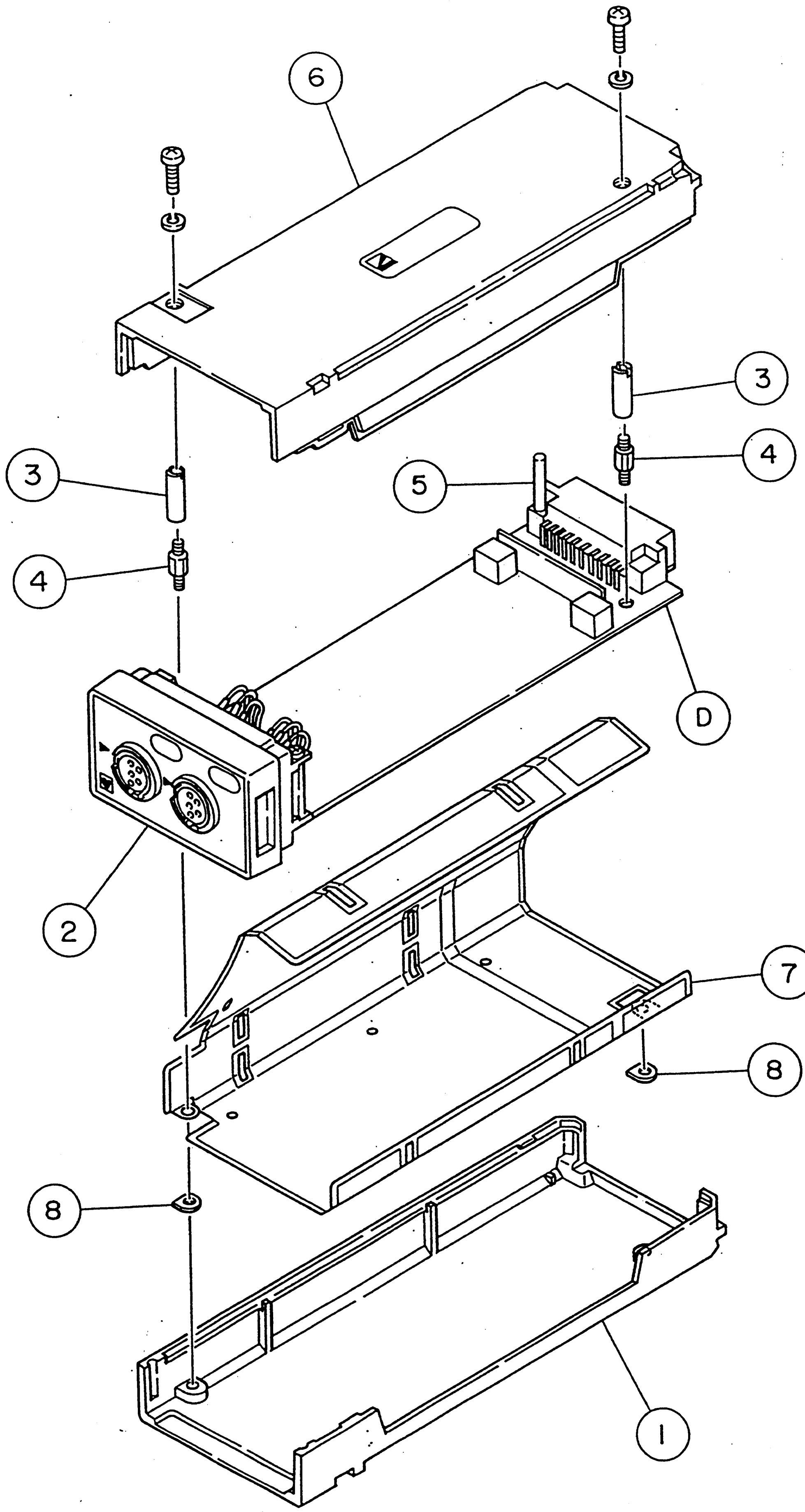
8.3 AP-800PA BP head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-014238A	BP input connector case
	1124-035023C	AP-800PA front panel
3	1114-190025B	PCB support-2
4	1114-190052	PCB support-1
5	1114-177281	Spacer
6	1112-013533	Head amplifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
D	UP-0369	BP head amplifier board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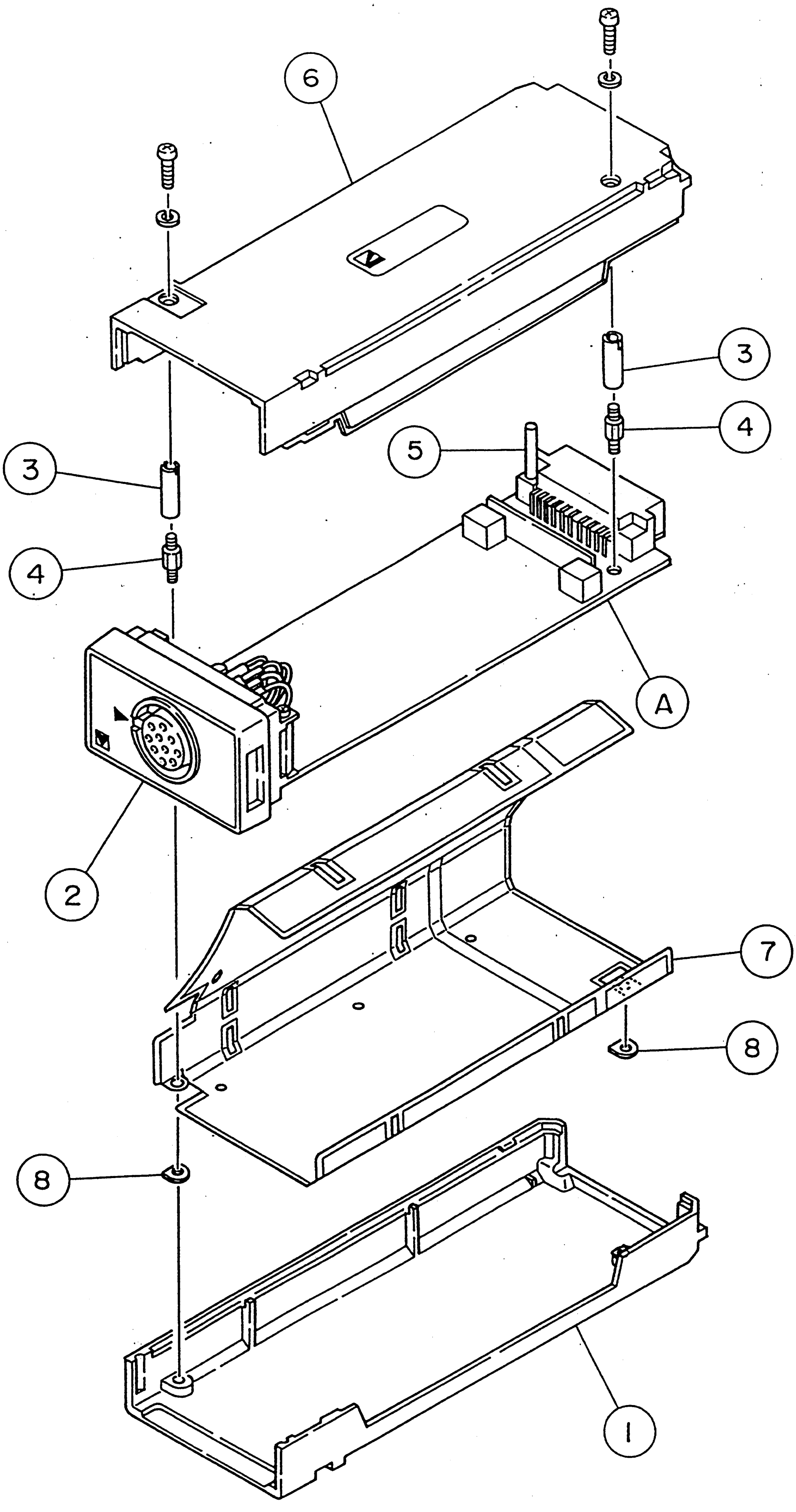
8.4 AH-800PA Cardiac output head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-014211A 1124-036503	CO input connector case AH-800PA front panel
3	1114-190025A	PCB support-2
4	1114-190052	PCB support-1
5	1114-177281	Spacer
6	1112-013533	Head amplifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
A	UP-0318	CO head amplifier board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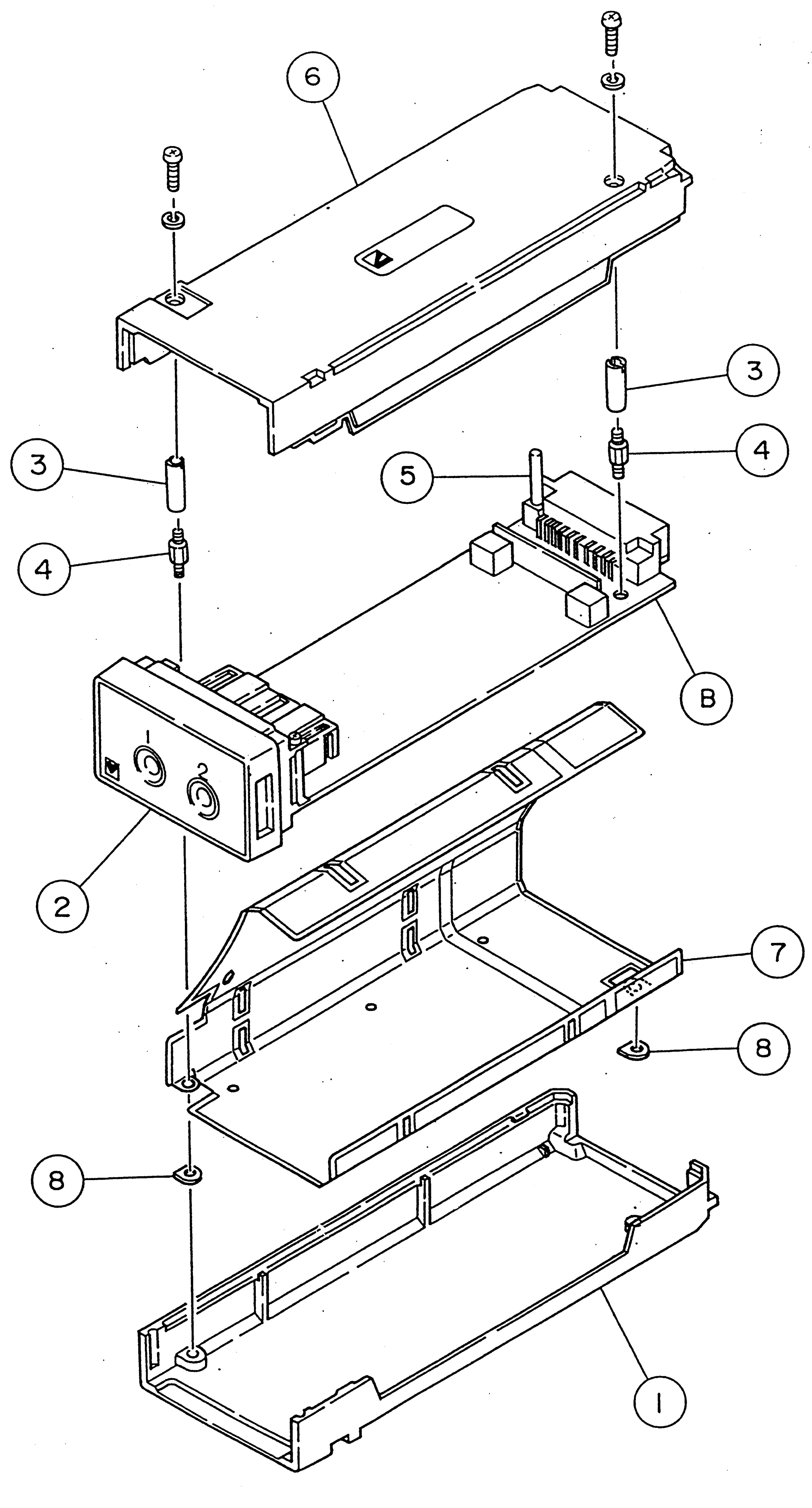
8.5 AW-800PA temperature head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-013587 1124-035005A	TEMP input connector case AW-800PA front panel
3	1114-190025A	PCB support-2
4	1114-190052	PCB support-1
5	1114-177281	Spacer
6	1112-013533	Head amplifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
B	UP-0319	Temperature head amplifier board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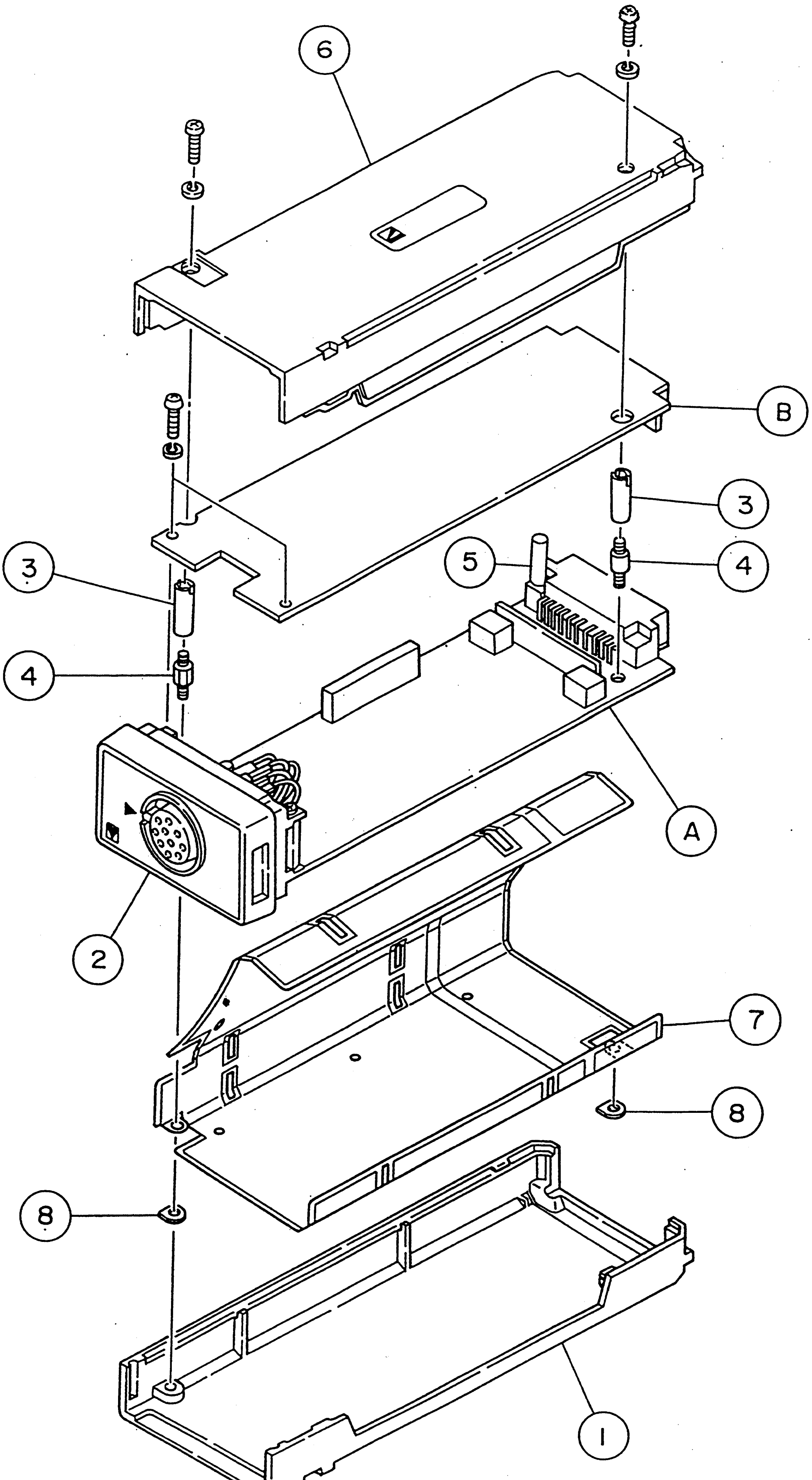
8.6 AE-800PA EEG head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-014211A 1124-033132	EEG input connector case AE-800PA front panel
3	1114-190025A	PCB support-2
4	1114-190052	PCB support-1
5	1114-199738	Spacer-B
6	1112-013533	Head ampifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
A	UP-0421	EEG main board
B	UP-0422	EEG sub board



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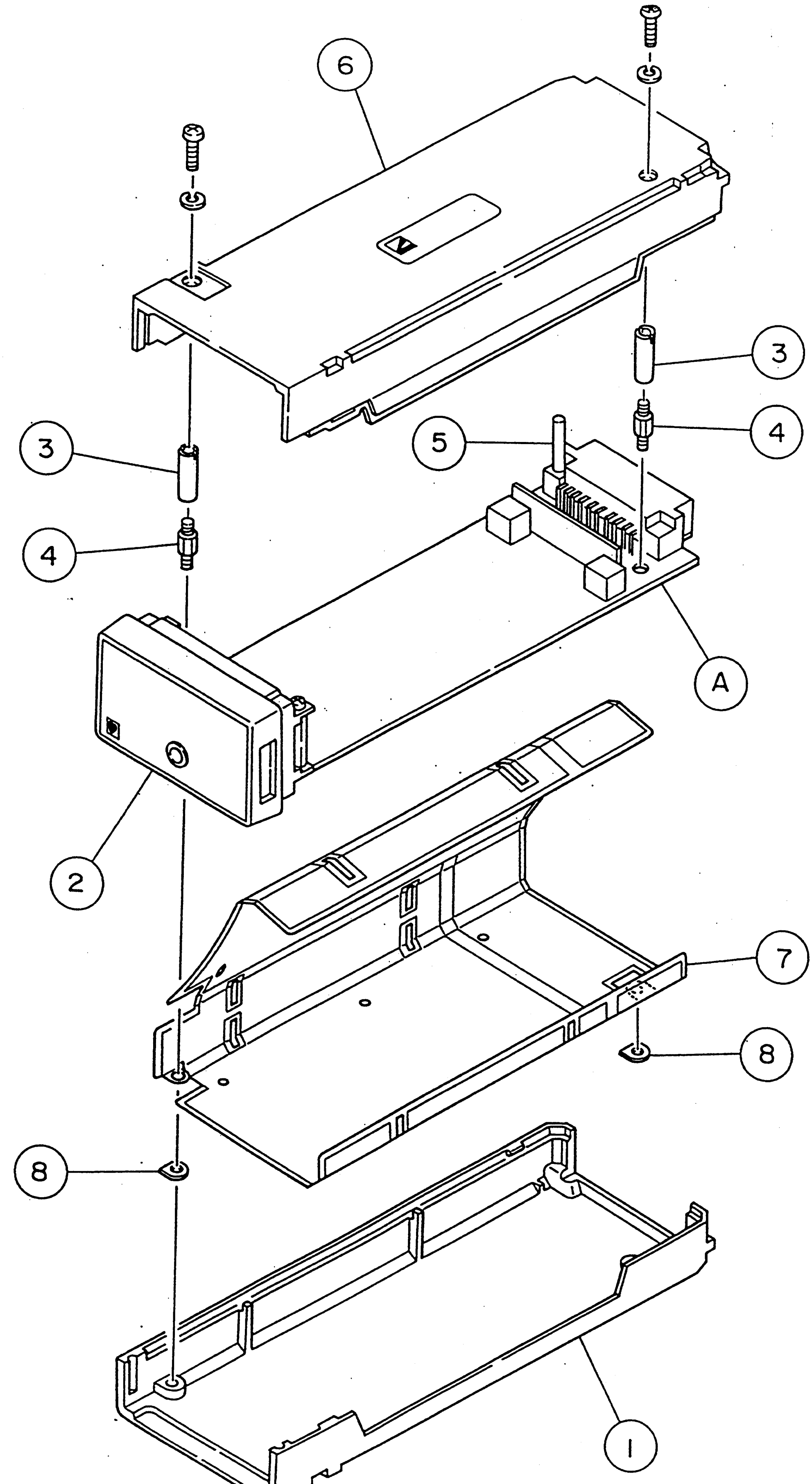
8.7 AR-800PA Respiration head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-014211A 1124-038778	10P, 15P amiplifier main unit AR-800PA front panel
3	1114-190025A	PCB support-2
4	1114-190052	PCB support-1
5	1114-177281	Spacer
6	1112-013533	Head amplifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
A	UP-0548	Respiration board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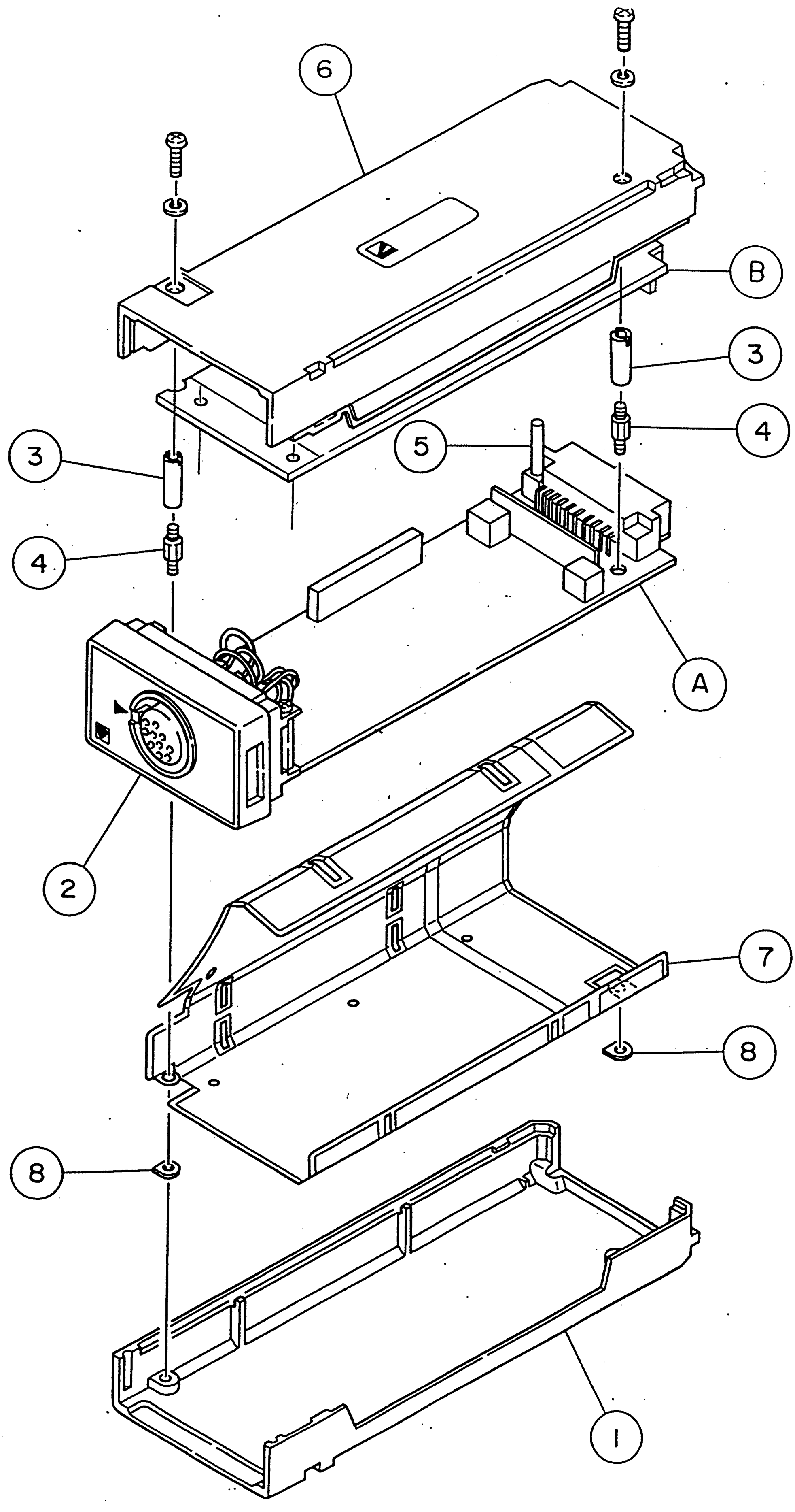
8.8 AL-800PA Sa02 head amplifier

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-014211A 1124-038537	10P, 15P ammplifier main unit AL-800PA front panel
3	1114-190025A	PCB support-2
4	1114-190052	PCB support-1
5	1114-199738	Spacer
6	1112-013533	Head amplifier housing (left)
7	1113-047299	Laminated shielding plate
8	1114-205946	Spacer
A	UP-0551	Sa02 main board
B	UP-0552	Sa02 sub board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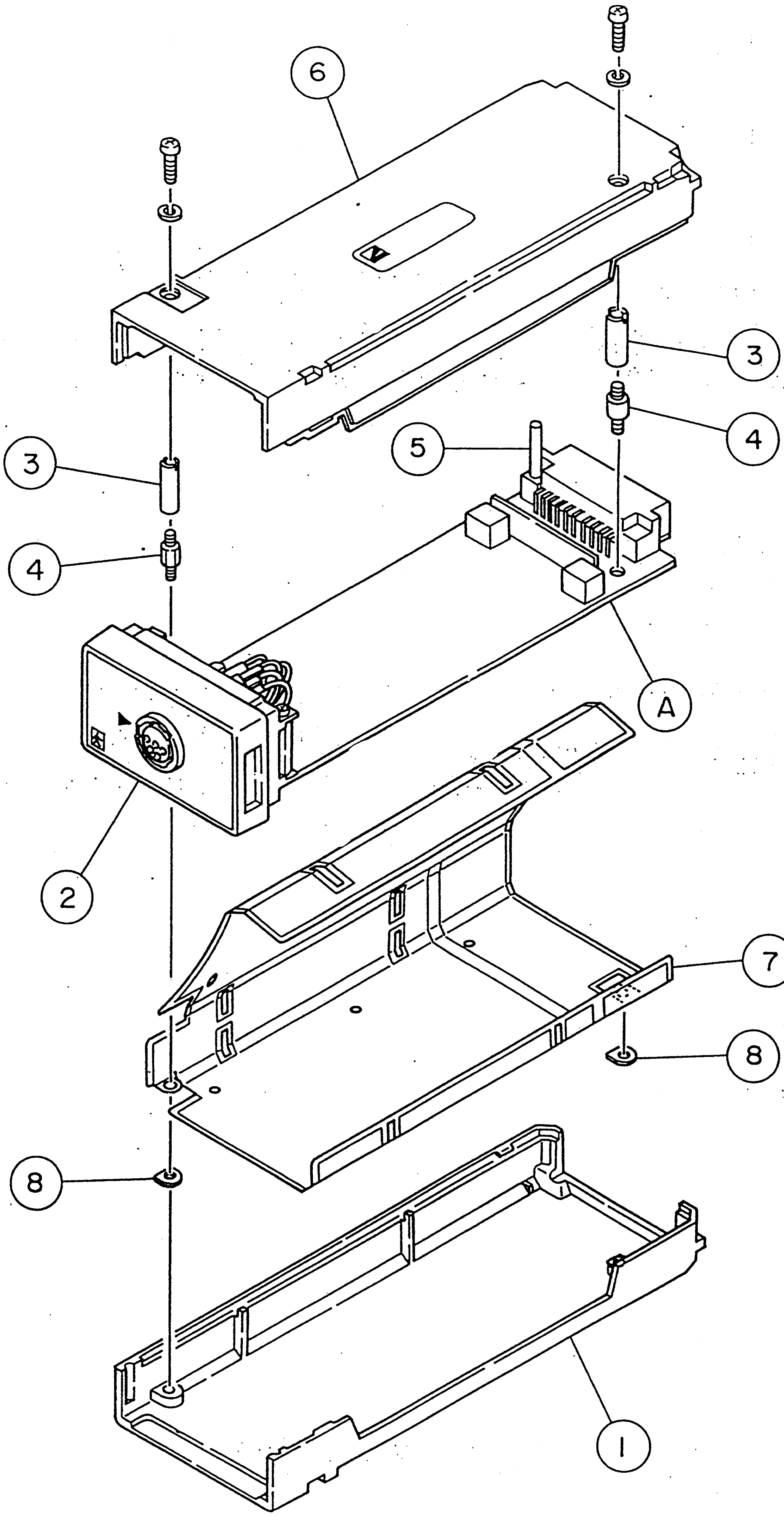
8.9 AG-820PA 02 head amplifier

Index	Code No.	Description
1	1112-013569	Amp. unit case, right
2	1112-014238A 1124-039206A	Amp. unit front frame (5p x 2) AG-820PA front panel
3	1114-190025B	PC board support-2
4	1114-190052	PC board support-1
5	1114-177281	Spacer
6	1112-013533	Amp. unit case, left
7	1113-047299	Laminated shield cover
8	1114-205946	Spacer
A	UP-0592	02 head amplifier board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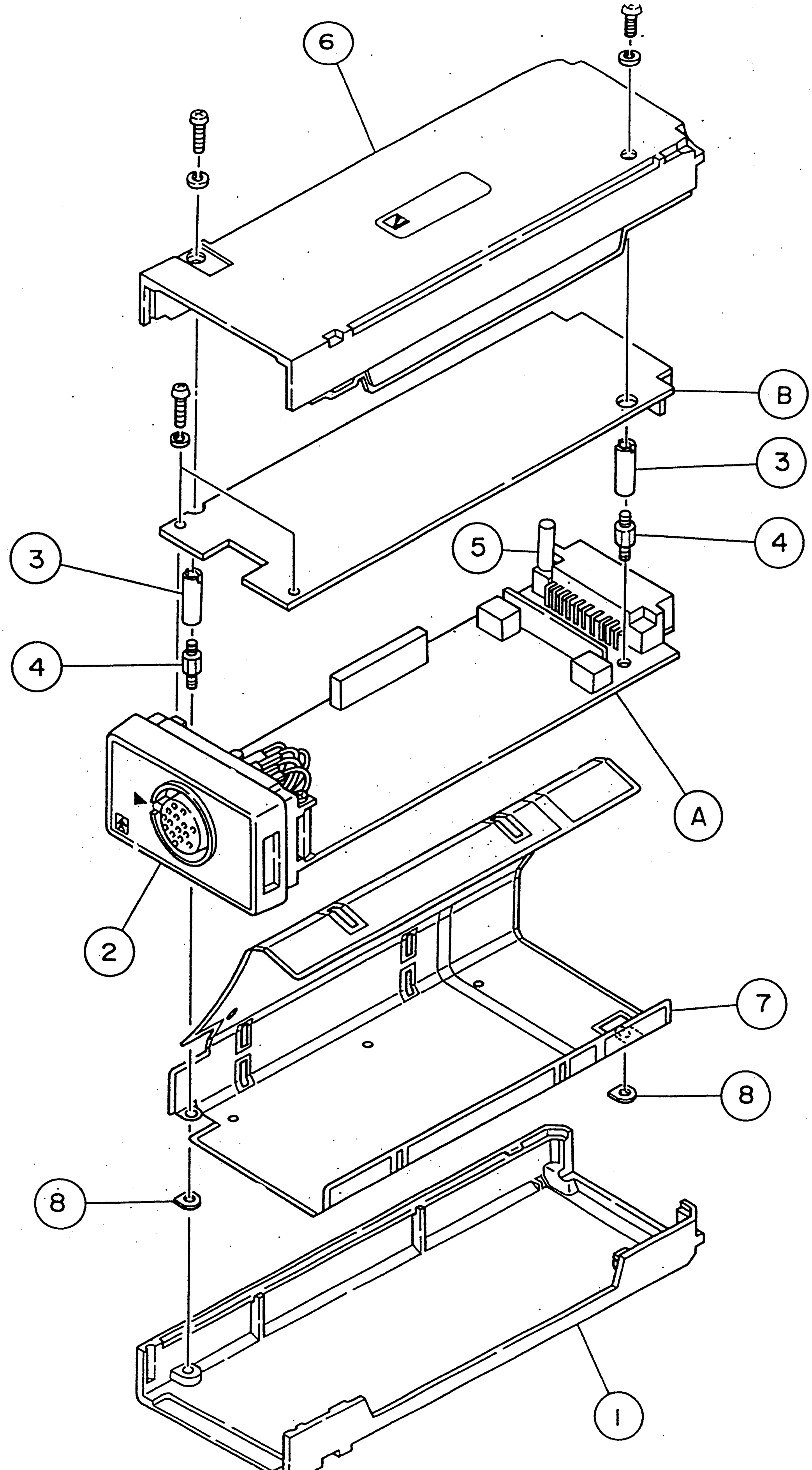
8.10 AG-800PA C02 heade amplifier

Index	Code No.	Description
1	1112-013569	Amp. unit case, right
2	1112-014211A 1124-038796	Amp. unit front frame (10p, 15p) AG-800PA front panel
3	1114-190025B	PC board support.2
4	1114-190052	PC board support.1
5	1114-199738	Spacer.B
6	1112-013533	Amp. unit case, left
7	1113-047299	Laminated shield cover
8	1114-205946	Spacer
A	UP-0588	C02 main board
B	UP-0589	C02 sub board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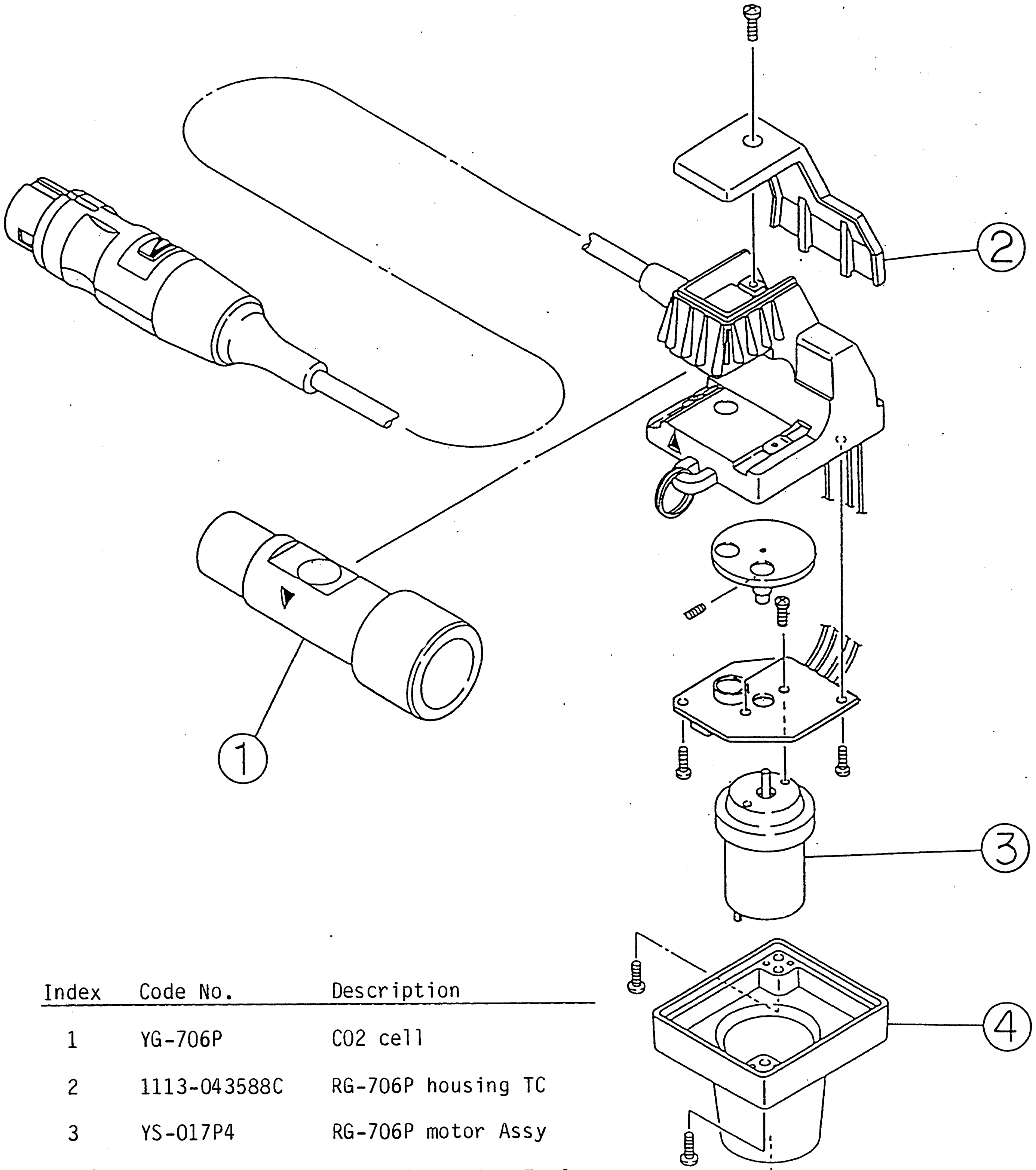
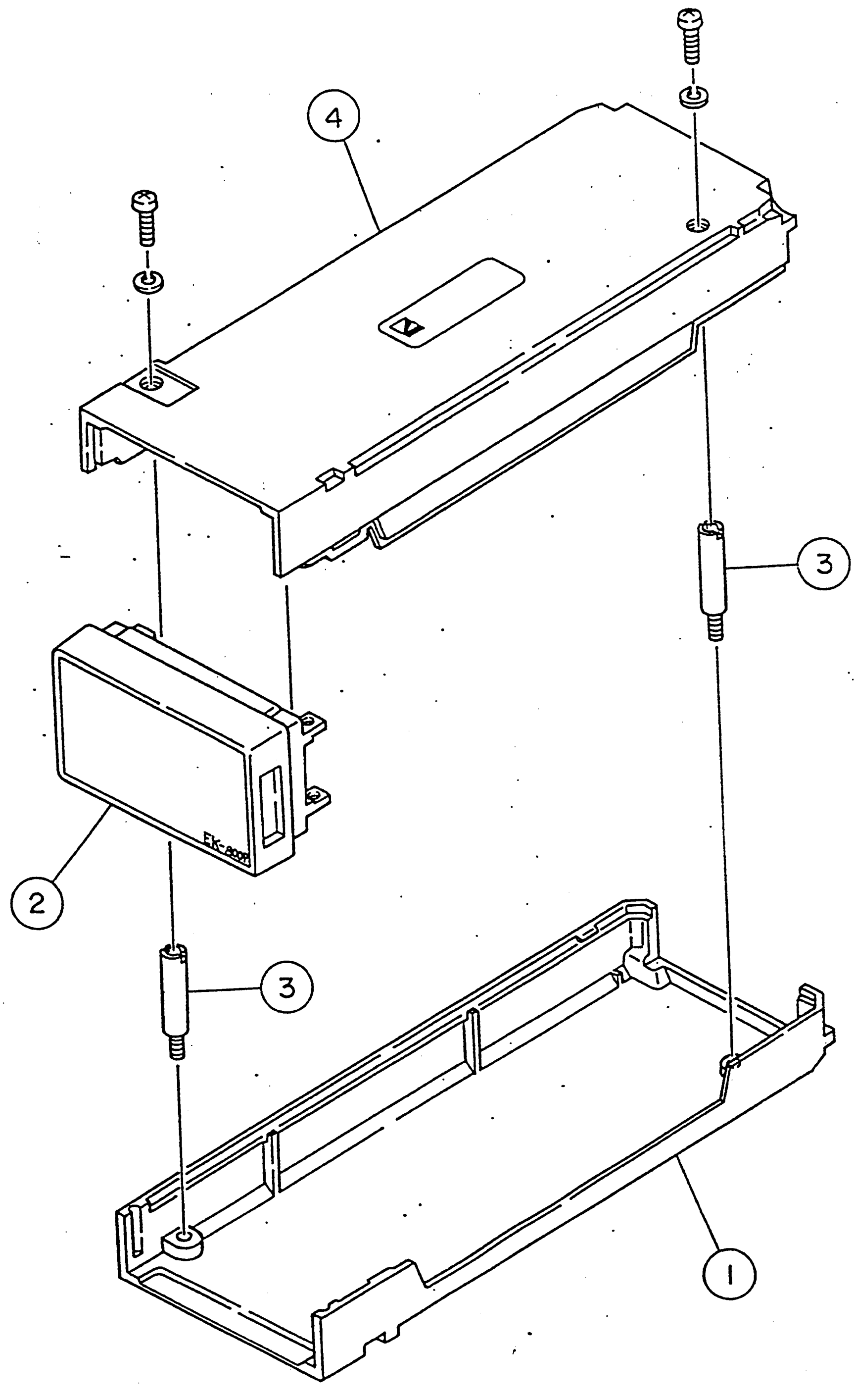
8.11 TG-706P CO2 sensor



Index	Code No.	Description
1	YG-706P	CO2 cell
2	1113-043588C	RG-706P housing TC
3	YS-017P4	RG-706P motor Assy
4	1113-052943	RG-706P housing TA.2

8.12 EK-800P Blank module

Index	Code No.	Description
1	1112-013569	Head amplifier housing (right)
2	1112-013587	TEMP amplifier unit case
	1124-034987A	EK-800P front panel
3	1114-171376	Housing spacer
4	1112-013533	Head amplifier housing (left)



Section 9

9. Electrical part list

Abbreviations

CN CONNECTOR

ACN	Square
ACN1	Square, plug
ACN2	Square, receptacle
BCN	Card edge
CCN	Round
CCN1	Round, plug
CCN2	Round, receptacle
CN	Coaxial plug or other types
CORD	Accessory cord
NCN	Nylon connector and pins
PCN	For use on PC board, short plug, terminal board

C CAPACITOR

MPC	Metallized fim
OFC	Oil
TAC	Tantalum
TC02	Tantalum, tubelar
TC04	Tantalum, vertical
VC	Variable
C	Barium titanate, paper, etc.
CEC1	Ceramic, withstanding voltage; <100V
CEC2	Ceramic, withstanding voltage; ≥100V
CM	Module
ECB	Electrolytic, block
CE02	Electrolytic, tubelar
CE04	Electrolytic, vertical
FLC	Plastic film, ±5%
FLCB	Plastic film, block
FLC1	Plastic film, vertical
FLC2	Plastic film, tubelar
MCC	Mica

D DIODE

D	Diode, array, for small signal
DB	Block, power, bridge
DP	Power, silicon diode, etc.
LCD	Liquid crystal idsplay
LED	Light emitting diode, LED array
LEDC	LED charactor
SCR	Silicon controlled rectifier(SCR, thyristor)
ZD1	Zenor, ≤5V
ZD2	Zenor, ≤10V
ZD3	Zenor, ≥10V

IC INTEGRATED CIRCUIT

ADIC	A/D or D/A converter
AIC	Analog (log. amp., comparator, switch, sample & hold etc.)
CPU	CPU, CPU peripheral devices (RAM, I/O port, etc.)
DIC	Digital (timer, NMOS, PMOS, registor, etc.)
MIC	CMOS
OPIC	Operational amp. buffer amp., etc
REG	Regulator
TIC	TTL

Q TRANSISTOR

TR	Uni-junction, etc.
TRA	Type 2SA; PNP, high speed
TRB	Type 2SA; PNP, low speed
TRC	Type 2SC; NPN, high speed
TRD	Type 2SD; NPN, low speed
TRP	Photo-electric device, photo-fiber, etc.
FET	**FIELD EFFECT TRANSITOR**
FET	Type 3SK/3SJ(dual gate, N-ch/P-ch)
FETJ	Type 2SJ (mono gate, P-ch)
FETK	Type 2SK (mono gate, N-ch)

SW SWITCH

ATT	Attenuator
DSW	Digital
PSW1	Push button, 1 button type
"	" " , " "
PSW9	Push button, 9 button type
PSW0	Push button, 10 button type
RSW	Rotary
SW	Micro, DIP, Toggle(tumbler), disc, etc.

T TRANSFORMER

CH	Choke coil
FBTF	Flyback
L	Inductance(coil)
MATF	Matching (IPTF, OPTF, IFTF)
PLTF	Pulse, oscillation TF
PT	Power(except for switching purpose)
T	High voltage, differential, HV unit, power supply, etc.
YOKE	Deflecting yoke

MOTOR

ACMO	AC (including gear head)
DCMO	DC (including gear head)
FAMO	Fan
PUMO	Pulse step (with gear head)

TUBE

CRT	Cathode ray tube
GA	Gas arrestor
NE	Neon tube, neon discharge tube
TUBE	Vacuum tube

R RESISTOR

RM	R module(including R and C)

RV VARIABLE RESISTOR

POT	Potentiometer
TPOT	Potentiometer on PCB, >15mm in dia.
TVR1	Carbon on PCB
TVR2	Carbon on PCB
TWVR	Wirewound on PCB
VR	On panel
VR1	On panel, ≤30mm in dia.
VR2	On panel, ≥30mm in dia.
WVR	Wirewound, large current

MISCELLANEOUS

GAGE	Gauge
METR	Meter, digital meter, manometer, electromagnetic counter, etc.
PRB	Pick-up, microphone, ultrasonic probe, etc.
SP	Speaker, headphone, earphone, buzzer, etc.
TD	Transducer, galvanometer coil, pressure meter, differential pressure meter
THP	Thermal/temperature sensor/probe, thermometer, etc.
SOCK	Socket, cap
FH	Fuse holder
FUSE	Fuse
TERM	Terminal, lug board, etc.
BUS	Bus bar
LAMP	Lamp. bracket
BATT	Battery, battery holder, recharger, etc.
UNIT	Display/recorder/printer/disc-drive unit, etc.
MD	Module, unit, hybrid IC, etc.
TH	Line filter, thermistor, varistor, CdS, etc.
RY	Relay, reed relay, solenoid relay
ANT	Antenna
XTAL	Crystal
HEAD	Thermal head/array, discharge head/array
VALV	Valve, electomagnetic valve,

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

CD-056P CHASSIS PARTS-1

CD-056P		4600576	1	UNIT	Touch key EMU-6012
CD-056P	CD001	5502395	1	CORD	BSM-Y CRT Cable 2
CD-056P	CD003	5429643	1	PCN	PS-22SLA(15)
CD-056P	CD004	5429697	1	PCN	HKP-34F02-17BT(20)
CD-056P	CD005	5502386	1	CORD	HKP-14FS01/02-13T/7BT(20)
CD-056P	CD006	5552848	1	PCN	HKP-6FS02-3BT(10)
CD-056P	J001	5427592	1	PCN	M62-03-0003SA(60)
CD-056P	SPK001	4700601	1	SP	EAS-65P34S 16OHM

UP-0397 MAIN BOARD

UP-0397		5601528	2	SOKT	AXS112813
UP-0397		7412889	72		ERD-S2TJ
UP-0397		5650546	1	BATT	CR17335SE-T-C7
UP-0397	C001	3853367	1		EECF5R5U105 1F/5.5V
UP-0397	C010-C014	7407128	5		267M3502-685MR
UP-0397	C020-C076	7407119	57		GR40-F104Z50T
UP-0397	C101	4312575	1	TC04	204M2002 226MB(22uF/20V)
UP-0397	C102	7407119	1		GR40-F104Z50T
UP-0397	C103	4312771	1	TC04	204M3502 475MB(4.7uF/35V)
UP-0397	C104	4317552	1	CEC2	DD05-989SL 220K500 (22pF)
UP-0397	C105	7407128	1		267M3502-685MR
UP-0397	C106-C108	7407119	3		GR40-F104Z50T
UP-0397	C301	7407119	1		GR40-F104Z50T
UP-0397	C302-C303	7407128	2		267M3502-685MR
UP-0397	C304	7407119	1		GR40-F104Z50T
UP-0397	C305	7407128	1		267M3502-685MR
UP-0397	C306-C308	7407119	3		GR40-F104Z50T
UP-0397	C309	3820928	1	FLC1	ECQP1H102JZ 1000pF
UP-0397	C310	4317579	1	CEC2	DD05-989SL 470K500 (47pF)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0397	C507-C509	4315269	3	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-0397	C510	4315385	1	FLC1 ECQ-V 1H 474JZ3 (0.47uF)
UP-0397	C701-C702	4315304	2	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0397	C704	7407128	1	267M3502-685MR
UP-0397	C705-C706	7407119	2	GR40-F104Z50T
UP-0397	C707	7407128	1	267M3502-685MR
UP-0397	C709	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0397	C710-C711	4312557	2	TC04 204M2002 106MB(10uF/20V)
UP-0397	C712	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0397	C713-C714	7407128	2	267M3502-685MR
UP-0397	C715	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0397	C801-C804	4315046	4	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-0397	C805-C806	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0397	C816-C817	4315046	2	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-0397	C821	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0397	C822-C823	4315144	2	FLC1 ECQ-B 1H 682JZ3 0.0068uF
UP-0397	C824-C825	4315135	2	FLC1 ECQ-B 1H 562JZ3 0.0056uF
UP-0397	C826-C827	7407119	2	GR40-F104Z50T
UP-0397	D101	7407093	1	1SS-307
UP-0397	D103	7407075	1	1SS-226
UP-0397	D301	7407075	1	1SS-226
UP-0397	D303-D305	7407093	3	1SS-307
UP-0397	D401-D404	7407101	4	RA-24M
UP-0397	D451-D452	4320022	2	D 1SS106TE Schottky
UP-0397	D453-D454	7407093	2	1SS-307
UP-0397	D501-D502	4320022	2	D 1SS106TE Schottky
UP-0397	D503-D504	7407093	2	1SS-307
UP-0397	D701-D703	7407075	3	1SS-226
UP-0397	D801	7407093	1	1SS-307
UP-0397	D802-D805	7407075	4	1SS-226
UP-0397	IC101	7406495	1	CD74AC161M
UP-0397	IC102	7406691	1	TL7705ACPS

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0397	IC103	7406584	1		MC14538F
UP-0397	IC104	7406949	1		HD74HC148FP
UP-0397	IC105	7406593	1		HD68HC000CP-12
UP-0397	IC106	7406388	1		SN74LS07NS
UP-0397	IC107	1304091	1	MIC	74AC10SC TRIP 3/N NAND
UP-0397	IC108	7407012	1		HD74HC393FP
UP-0397	IC109	1304082	1	MIC	74AC04SC HEX INVERTER
UP-0397	IC111	7406397	1		74AC00SJ(CD74AC00M)
UP-0397	IC112	7406423	1		74AC139SJ(CD74AC139M)
UP-0397	IC113	1304117	1	MIC	74AC138SC 1-8 DECORDER
UP-0397	IC115-IC117	1304117	3	MIC	74AC138SC 1-8 DECORDER
UP-0397	IC118	7406503	1		CD74AC164M
UP-0397	IC119	7406423	1		74AC139SJ(CD74AC139M)
UP-0397	IC121	7406405	1		74AC32SJ(CD74AC32M)
UP-0397	IC128-IC135	7406619	8		MPD43256AGU-10L
UP-0397	IC136	1304108	1	MIC	74AC244SC OCTAL BUFFER
UP-0397	IC137	7411613	1		TMP82C51AM-10(M5M82C51FP)
UP-0397	IC138	1304108	1	MIC	74AC244SC OCTAL BUFFER
UP-0397	IC139	7406994	1		HD74HC273FP
UP-0397	IC140	7406628	1		MSM6242GS
UP-0397	IC141	7406601	1		HN58C65FPT
UP-0397	IC142	7406904	1		HD74HC00FP
UP-0397	IC143	7407003	1		HD74HC390FP
UP-0397	IC151-IC153	7406441	3		74AC373SJ(CD74AC373M)
UP-0397	IC154-IC155	7406432	2		74AC245SJ(CD74AC245M)
UP-0397	IC156	1304082	1	MIC	74AC04SC HEX INVERTER
UP-0397	IC157-IC159	7406414	3		74AC74SJ(CD74AC74M)
UP-0397	IC161-IC166	7406432	6		74AC245SJ(CD74AC245M)
UP-0397	IC167	7406486	1		CD74AC86M
UP-0397	IC301	7406557	1		JLC113JF(MC14051)
UP-0397	IC302	7406655	1		uPC812G
UP-0397	IC303	7406557	1		JLC113JF(MC14051)
UP-0397	IC304	1253386	1	AIC	uPC649C
UP-0397	IC305	7406655	1		uPC812G
UP-0397	IC306	1254215	1	ADIC	ADC574AJH 12BITADC
UP-0397	IC307	7406994	1		HD74HC273FP
UP-0397	IC308	7406575	1		MC14504F
UP-0397	IC309	1304108	1	MIC	74AC244SC OCTAL BUFFER
UP-0397	IC310	7406922	1		HD74HC04FP
UP-0397	IC311	1304108	1	MIC	74AC244SC OCTAL BUFFER
UP-0397	IC313	7406931	1		HD74HC74FP
UP-0397	IC315-IC316	7406994	2		HD74HC273FP
UP-0397	IC317	1253626	1	ADIC	HA-17012PB 12BIT DA

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0397	IC318	7406655	1		uPC812G
UP-0397	IC324	7406682	1		LT1009CS8
UP-0397	IC328	7406994	1		HD74HC273FP
UP-0397	IC331-IC332	7406575	2		MC14504F
UP-0397	IC335	7406664	1		uPC458G
UP-0397	IC337	7406673	1		HA17903FS
UP-0397	IC338	7406976	1		HD74HC164FP
UP-0397	IC340	7406904	1		HD74HC00FP
UP-0397	IC341	1253314	1	REG	uPC7812H Regulator
UP-0397	IC342	1253341	1	REG	uPC7912H Regulator
UP-0397	IC401-IC405	7406655	5		uPC812G
UP-0397	IC406-IC407	7406566	2		MC14053F
UP-0397	IC408-IC409	7406655	2		uPC812G
UP-0397	IC411	7406566	1		MC14053F
UP-0397	IC451-IC452	7406655	2		uPC812G
UP-0397	IC453	7406566	1		MC14053F
UP-0397	IC454	7406646	1		uPC811G
UP-0397	IC502	7406655	1		uPC812G
UP-0397	IC503	7406566	1		MC14053F
UP-0397	IC504	7406646	1		uPC811G
UP-0397	IC701	7406655	1		uPC812G
UP-0397	IC702	7406575	1		MC14504F
UP-0397	IC703-IC704	7406388	2		SN74LS07NS
UP-0397	IC705	7406922	1		HD74HC04FP
UP-0397	IC706	7406566	1		MC14053F
UP-0397	IC707	7406655	1		uPC812G
UP-0397	IC708	7406557	1		JLC113JF(MC14051)
UP-0397	IC709	1253323	1	REG	uPC7815H Regulator
UP-0397	IC710	7406655	1		uPC812G
UP-0397	IC711	7406566	1		MC14053F
UP-0397	IC712	7406673	1		HA17903FS
UP-0397	IC714	7406922	1		HD74HC04FP
UP-0397	IC716-IC719	7407048	4		uPD74HC4094G
UP-0397	IC720-IC723	7407021	4		HD74HC597FP
UP-0397	IC724	7406967	1		HD74HC161FP
UP-0397	IC725	7407039	1		HD74HC4040FP
UP-0397	IC726	7406931	1		HD74HC74FP
UP-0397	IC727	7406913	1		HD74HC02FP
UP-0397	IC729	7406994	1		HD74HC273FP
UP-0397	IC730-IC731	7406931	2		HD74HC74FP
UP-0397	IC732	7407003	1		HD74HC390FP
UP-0397	IC733	7406958	1		HD74HC157FP
UP-0397	IC801	7407039	1		HD74HC4040FP

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0397	IC802	1206491	1	CPU	MBM27C512-20CZ-G
UP-0397	IC803	7406958	1		HD74HC157FP
UP-0397	IC804	1254028	1	ADIC	MSM-5205RS Speach synthesizer
UP-0397	IC805	7407039	1		HD74HC4040FP
UP-0397	IC806	1206491	1	CPU	MBM27C512-20CZ-G
UP-0397	IC807	7406958	1		HD74HC157FP
UP-0397	IC808	1254028	1	ADIC	MSM-5205RS Speach synthesizer
UP-0397	IC809	7406985	1		HD74HC244FP
UP-0397	IC810	7406922	1		HD74HC04FP
UP-0397	IC811-IC812	7406967	2		HD74HC161FP
UP-0397	IC814	7406655	1		uPC812G
UP-0397	IC815	7406904	1		HD74HC00FP
UP-0397	IC816	7406655	1		uPC812G
UP-0397	IC817-IC818	7412158	2		TC7S32F(1gate OR)
UP-0397	IC820-IC821	7406655	2		uPC812G
UP-0397	IC822-IC823	7406566	2		MC14053F
UP-0397	IC824	7406584	1		MC14538F
UP-0397	J001	5429661	1	PCN	FFC-34BSM1#2
UP-0397	J004	5427903	1	PCN	PCN10EA-32S-2.54DSA(05)
UP-0397	J005	5429296	1	PCN	PS-22PLB-D4LT1-FL
UP-0397	J006	5415239	1	NCN	171363-1 17pin
UP-0397	J007-J009	5427948	3	PCN	PCN10EA-90S-2.54DSA(05)
UP-0397	J010	5428876	1	PCN	PCN10C-64S-2.54-DS(05)
UP-0397	J011	5445474	1	PCN	IL-2P-S3FP2-1
UP-0397	L001-L003	1706013	3	TH	BNX002-01 DC line filter
UP-0397	Q101	7407057	1		2SA-1122CC-TR
UP-0397	Q102	7407066	1		2SC-27120-TE85R
UP-0397	Q701	7407057	1		2SA-1122CC-TR
UP-0397	Q702	7407066	1		2SC-27120-TE85R
UP-0397	RA101-RA111	4093222	11	RM	EXB-F9E 103J 10K
UP-0397	R101	7411159	1		RK73K2B 47Kohm J 1/8W
UP-0397	R102-R103	7411079	2		RK73K2B 10Kohm J 1/8W
UP-0397	R104	7411195	1		RK73K2B100Kohm J 1/8W
UP-0397	R105	7411159	1		RK73K2B 47Kohm J 1/8W
UP-0397	R106	7407262	1		RK73K2B 100ohm J 1/8W
UP-0397	R107	7411319	1		RK73K2B 1 Mohm J 1/8W
UP-0397	R108-R109	7411079	2		RK73K2B 10Kohm J 1/8W
UP-0397	R110	7410953	1		RK73F2B 1 Kohm J 1/8W
UP-0397	R111	7411079	1		RK73K2B 10Kohm J 1/8W
UP-0397	R112	7410917	1		RK73K2B 470ohm J 1/8W
UP-0397	R113	7408519	1		RN73F2B 301ohm D 1/8W
UP-0397	R115	7407226	1		RK73K2B 47 ohm J 1/8W
UP-0397	R116-R123	7411079	8		RK73K2B 10Kohm J 1/8W

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0397	R130	7411079	1	RK73K2B 10Kohm J 1/8W
UP-0397	R145-R148	7411079	4	RK73K2B 10Kohm J 1/8W
UP-0397	R218-R225	7411195	8	RK73K2B100Kohm J 1/8W
UP-0397	R228-R243	7411195	16	RK73K2B100Kohm J 1/8W
UP-0397	R301-R302	7409955	2	RN73F2B10.0KohmD 1/8W
UP-0397	R303	7411079	1	RK73K2B 10Kohm J 1/8W
UP-0397	R304-R305	7409019	2	RN73F2B1.00KohmD 1/8W
UP-0397	R307	7410231	1	RN73F2B20.0KohmD 1/8W
UP-0397	R308	7409955	1	RN73F2B10.0KohmD 1/8W
UP-0397	R309	7410392	1	RN73F2B30.1KohmD 1/8W
UP-0397	R310	7410329	1	RN73F2B24.9KohmD 1/8W
UP-0397	R311-R312	7407226	2	RK73K2B 47 ohm J 1/8W
UP-0397	R315	7409108	1	RN73F2B1.27KohmD 1/8W
UP-0397	R316	7409091	1	RN73F2B1.24KohmD 1/8W
UP-0397	R317	7408804	1	RN73F2B 604ohm D 1/8W
UP-0397	R318-R320	7409955	3	RN73F2B10.0KohmD 1/8W
UP-0397	R321	7410035	1	RN73F2B12.4KohmD 1/8W
UP-0397	R322	7411079	1	RK73K2B 10Kohm J 1/8W
UP-0397	R323	7410115	1	RN73F2B15.0KohmD 1/8W
UP-0397	R324	7410329	1	RN73F2B24.9KohmD 1/8W
UP-0397	R325	7411079	1	RK73K2B 10Kohm J 1/8W
UP-0397	R331	7410115	1	RN73F2B15.0KohmD 1/8W
UP-0397	R332	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R334	7407226	1	RK73K2B 47 ohm J 1/8W
UP-0397	R361-R364	7411079	4	RK73K2B 10Kohm J 1/8W
UP-0397	R365-R368	7411195	4	RK73K2B100Kohm J 1/8W
UP-0397	R401	7411195	1	RK73K2B100Kohm J 1/8W
UP-0397	R402-R403	7411079	2	RK73K2B 10Kohm J 1/8W
UP-0397	R404-R405	7409955	2	RN73F2B10.0KohmD 1/8W
UP-0397	R406	7411195	1	RK73K2B100Kohm J 1/8W
UP-0397	R407-R408	7411079	2	RK73K2B 10Kohm J 1/8W
UP-0397	R409-R410	7409955	2	RN73F2B10.0KohmD 1/8W
UP-0397	R411	7411159	1	RK73K2B 47Kohm J 1/8W
UP-0397	R412-R413	7411275	2	RK73K2B470Kohm J 1/8W
UP-0397	R414	7407226	1	RK73K2B 47 ohm J 1/8W
UP-0397	R415-R416	7411275	2	RK73K2B470Kohm J 1/8W
UP-0397	R417	7411159	1	RK73K2B 47Kohm J 1/8W
UP-0397	R418-R421	7407226	4	RK73K2B 47 ohm J 1/8W
UP-0397	R424	7408234	1	RN73F2B 150ohm D 1/8W
UP-0397	R425-R428	7409955	4	RN73F2B10.0KohmD 1/8W
UP-0397	R451-R452	7410891	2	RN73F2B 100KohmD 1/8W
UP-0397	R454	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R455	7410998	1	RK73K2B2.2Kohm J 1/8W

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0397	R458	7410115	1	RN73F2B15.0KohmD 1/8W
UP-0397	R461	7409643	1	RN73F2B4.75KohmD 1/8W
UP-0397	R462	7410739	1	RN73F2B68.1KohmD 1/8W
UP-0397	R463-R464	7411319	2	RK73K2B 1 Mohm J 1/8W
UP-0397	R465	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R466-R467	7411079	2	RK73K2B 10Kohm J 1/8W
UP-0397	R468	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R469	7409456	1	RN73F2B3.01KohmD 1/8W
UP-0397	R470	7408938	1	RN73F2B 825ohm D 1/8W
UP-0397	R501-R502	7410891	2	RN73F2B 100KohmD 1/8W
UP-0397	R504	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R505	7410998	1	RK73K2B2.2Kohm J 1/8W
UP-0397	R508	7410115	1	RN73F2B15.0KohmD 1/8W
UP-0397	R511	7409643	1	RN73F2B4.75KohmD 1/8W
UP-0397	R512	7410739	1	RN73F2B68.1KohmD 1/8W
UP-0397	R513-R514	7411319	2	RK73K2B 1 Mohm J 1/8W
UP-0397	R515	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R516-R517	7411079	2	RK73K2B 10Kohm J 1/8W
UP-0397	R518	7411132	1	RK73K2B 33Kohm J 1/8W
UP-0397	R519	7409456	1	RN73F2B3.01KohmD 1/8W
UP-0397	R520	7408938	1	RN73F2B 825ohm D 1/8W
UP-0397	R701	7410953	1	RK73F2B 1 Kohm J 1/8W
UP-0397	R702	7411195	1	RK73K2B100Kohm J 1/8W
UP-0397	R703	7410953	1	RK73F2B 1 Kohm J 1/8W
UP-0397	R704	7410392	1	RN73F2B30.1KohmD 1/8W
UP-0397	R705	7409955	1	RN73F2B10.0KohmD 1/8W
UP-0397	R706	7409964	1	RN73F2B10.2KohmD 1/8W
UP-0397	R707	7409955	1	RN73F2B10.0KohmD 1/8W
UP-0397	R708	7410953	1	RK73F2B 1 Kohm J 1/8W
UP-0397	R709	7411079	1	RK73K2B 10Kohm J 1/8W
UP-0397	R710-R711	7410953	2	RK73F2B 1 Kohm J 1/8W
UP-0397	R712-R713	7410891	2	RN73F2B 100KohmD 1/8W
UP-0397	R714	7410953	1	RK73F2B 1 Kohm J 1/8W
UP-0397	R718	7410115	1	RN73F2B15.0KohmD 1/8W
UP-0397	R720-R722	7411195	3	RK73K2B100Kohm J 1/8W
UP-0397	R723	7411079	1	RK73K2B 10Kohm J 1/8W
UP-0397	R725-R728	7409955	4	RN73F2B10.0KohmD 1/8W
UP-0397	R729	7411195	1	RK73K2B100Kohm J 1/8W
UP-0397	R730	7411114	1	RK73K2B 22Kohm J 1/8W
UP-0397	R731-R735	7410953	5	RK73F2B 1 Kohm J 1/8W
UP-0397	R801-R804	7411123	4	RK73K2B 27Kohm J 1/8W
UP-0397	R805	7411275	1	RK73K2B470Kohm J 1/8W
UP-0397	R806	7411132	1	RK73K2B 33Kohm J 1/8W

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0397	R807	7411195	1		RK73K2B100Kohm J 1/8W
UP-0397	R808-R809	7410998	2		RK73K2B2.2Kohm J 1/8W
UP-0397	R810	7411114	1		RK73K2B 22Kohm J 1/8W
UP-0397	R811	7407226	1		RK73K2B 47 ohm J 1/8W
UP-0397	R812-R813	7410998	2		RK73K2B2.2Kohm J 1/8W
UP-0397	R820	7410392	1		RN73F2B30.1KohmD 1/8W
UP-0397	R821-R823	7409955	3		RN73F2B10.0KohmD 1/8W
UP-0397	R824-R827	7407226	4		RK73K2B 47 ohm J 1/8W
UP-0397	R828-R829	7411079	2		RK73K2B 10Kohm J 1/8W
UP-0397	R830	7411088	1		RK73K2B 12Kohm J 1/8W
UP-0397	R831-R832	7411079	2		RK73K2B 10Kohm J 1/8W
UP-0397	R833	7411088	1		RK73K2B 12Kohm J 1/8W
UP-0397	R834	7410953	1		RK73F2B 1 Kohm J 1/8W
UP-0397	R835-R836	7411079	2		RK73K2B 10Kohm J 1/8W
UP-0397	R837	7411212	1		RK73K2B150Kohm J 1/8W
UP-0397	R838-R840	7411079	3		RK73K2B 10Kohm J 1/8W
UP-0397	R851	7411079	1		RK73K2B 10Kohm J 1/8W
UP-0397	R852	7411141	1		RK73K2B 39Kohm J 1/8W
UP-0397	R853-R854	7411079	2		RK73K2B 10Kohm J 1/8W
UP-0397	R855	7411141	1		RK73K2B 39Kohm J 1/8W
UP-0397	R856	7411079	1		RK73K2B 10Kohm J 1/8W
UP-0397	R857-R858	7410917	2		RK73K2B 470ohm J 1/8W
UP-0397	VC101	3890469	1	VC	TZ03R 300ER 5.2-30pF
UP-0397	VR301	4250071	1	TPOT	EVM-4LG 1KOHM
UP-0397	VR302-VR303	4256537	2	TPOT	EVM-4LG-A00B12
UP-0397	VR304	4256546	1	TPOT	EVM-4LG-A00B22
UP-0397	VR305	4250098	1	TPOT	EVM-4LD 10KOHM
UP-0397	VR451	4250106	1	TPOT	EVM-4LG 20KOHM
UP-0397	VR452	4250098	1	TPOT	EVM-4LD 10KOHM
UP-0397	VR501	4250106	1	TPOT	EVM-4LG 20KOHM
UP-0397	VR502	4250098	1	TPOT	EVM-4LD 10KOHM
UP-0397	VR701	4250089	1	TPOT	EVM-4LG 500OHM
UP-0397	VR820-VR821	4250044	2	TPOT	EVM-4LG 5K
UP-0397	X101	1702597	1	XTAL	KF38G 32.768KHZ

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	

UP-0398 CRTC BOARD

UP-0398		5423159	1	SOKT	IC SOCKET DL-2-20A(01)
UP-0398	CNJ101	5427939	1	PCN	PCN10EA-90P-2.54DS(05)
UP-0398	CNJ102	5408033	1	ACN2	RDBD-25SE-LNA FEMALE
UP-0398	CNJ103	5427663	1	PCN	M60-12-30-114P
UP-0398	CNJ105	5427895	1	PCN	PCN10EA-32P-2.54DS(05)
UP-0398	CNJ107	5428787	1	PCN	PS-20PLB-D4T1-FL1
UP-0398	CNJ108	5427636	1	PCN	M60-03-30-114P
UP-0398	C101	4312503	1	TC04	ECSZ35HS6R8B 6.8uF/35V
UP-0398	C102-C111	3810306	10	TC04	221M35V1.0MF-M1(CS04E)
UP-0398	C112-C165	7407119	54		GR40-F104Z50T
UP-0398	C167-C202	7407119	36		GR40-F104Z50T
UP-0398	C301-C303	4310176	3	EC04	ECEA1VU 100B (10uF/35V)
UP-0398	C304	4317552	1	CEC2	DD05-989SL 220K500 (22pF)
UP-0398	C305	4310211	1	EC04	ECEA1VU 101B (100uF/35V)
UP-0398	C306	4315206	1	FLC1	ECQ-B 1H 223JZ3 0.022uF
UP-0398	C307	4310211	1	EC04	ECEA1VU 101B (100uF/35V)
UP-0398	C308	4310176	1	EC04	ECEA1VU 100B (10uF/35V)
UP-0398	C309	4317552	1	CEC2	DD05-989SL 220K500 (22pF)
UP-0398	C310	4310211	1	EC04	ECEA1VU 101B (100uF/35V)
UP-0398	C311	4315206	1	FLC1	ECQ-B 1H 223JZ3 0.022uF
UP-0398	C312	3851101	1	CEC2	DD05B101K500 500V100pF
UP-0398	C401-C403	3801967	3	EC04	ECES1EU682Q
UP-0398	C404	7407119	1		GR40-F104Z50T
UP-0398	DL201-DL202	3780855	2	L	JD3010C
UP-0398	DL212-DL213	3780891	2	L	DCS10-10
UP-0398	GA101	1208328	1	CPU	Gate array ACW
UP-0398	GA102-GA103	1208319	2	CPU	Gate array DCW
UP-0398	IC101-IC104	1304108	4	MIC	74AC244SC OCTAL BUFFER
UP-0398	IC105	1304117	1	MIC	74AC138SC 1-8 DECORDER
UP-0398	IC106	7406477	1		74AC08SJ(CD74AC08M)
UP-0398	IC107	1304082	1	MIC	74AC04SC HEX INVERTER
UP-0398	IC108	7411604	1		HD74AC125FP
UP-0398	IC109	7411569	1		HD63484CP-8
UP-0398	IC110	7411587	1		HD63486CP-32
UP-0398	IC111	7411578	1		HD63485CP-32
UP-0398	IC112-IC119	1207614	8	CPU	HM53461 ZP-12 ZIP RAM
UP-0398	IC120	7406468	1		74AC02SJ(CD74AC02M)
UP-0398	IC121	7406539	1		CD74AC05M
UP-0398	IC122-IC123	1304108	2	MIC	74AC244SC OCTAL BUFFER
UP-0398	IC124	7406468	1		74AC02SJ(CD74AC02M)

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0398	IC201-IC206	7406432	6		74AC245SJ(CD74AC245M)
UP-0398	IC207-IC210	7406619	4		MPD43256AGU-10L
UP-0398	IC215	7406477	1		74AC08SJ(CD74AC08M)
UP-0398	IC216-IC217	7406512	2		74AC158SJ(CD74AC158M)
UP-0398	IC218-IC219	7406414	2		74AC74SJ(CD74AC74M)
UP-0398	IC220-IC221	1304108	2	MIC	74AC244SC OCTAL BUFFER
UP-0398	IC227	7406414	1		74AC74SJ(CD74AC74M)
UP-0398	IC228	1304108	1	MIC	74AC244SC OCTAL BUFFER
UP-0398	IC230-IC237	1207614	8	CPU	HM53461 ZP-12 ZIP RAM
UP-0398	IC238-IC239	7406521	2		CD74AC299M
UP-0398	IC240-IC247	1207614	8	CPU	HM53461 ZP-12 ZIP RAM
UP-0398	IC248-IC249	7406521	2		CD74AC299M
UP-0398	IC250-IC257	1207614	8	CPU	HM53461 ZP-12 ZIP RAM
UP-0398	IC258-IC259	7406521	2		CD74AC299M
UP-0398	IC260-IC267	1207614	8	CPU	HM53461 ZP-12 ZIP RAM
UP-0398	IC268-IC269	7406521	2		CD74AC299M
UP-0398	IC270	7406459	1		74AC374SJ(CD74AC374M)
UP-0398	IC271	7406405	1		74AC32SJ(CD74AC32M)
UP-0398	IC272	7406459	1		74AC374SJ(CD74AC374M)
UP-0398	IC274	7411596	1		HD74HC4053FP
UP-0398	IC301	1204947	1	AIC	uPC1263C2 AUDIO AMP
UP-0398	L101	1706013	1	TH	BNX002-01 DC line filter
UP-0398	R101-R130	7407226	30		RK73K2B 47 ohm J 1/8W
UP-0398	R131	7411034	1		RK73K2B4.7Kohm J 1/8W
UP-0398	R133-R150	7411034	18		RK73K2B4.7Kohm J 1/8W
UP-0398	R151-R164	7407226	14		RK73K2B 47 ohm J 1/8W
UP-0398	R165	7411034	1		RK73K2B4.7Kohm J 1/8W
UP-0398	R166	7410953	1		RK73F2B 1 Kohm J 1/8W
UP-0398	R167	7410917	1		RK73K2B 470ohm J 1/8W
UP-0398	R168	7410953	1		RK73F2B 1 Kohm J 1/8W
UP-0398	R169	7411034	1		RK73K2B4.7Kohm J 1/8W
UP-0398	R170-R171	7410917	2		RK73K2B 470ohm J 1/8W
UP-0398	R172-R173	7410953	2		RK73F2B 1 Kohm J 1/8W
UP-0398	R174	7410917	1		RK73K2B 470ohm J 1/8W
UP-0398	R175	7411034	1		RK73K2B4.7Kohm J 1/8W
UP-0398	R176-R177	7410917	2		RK73K2B 470ohm J 1/8W
UP-0398	R178	7407262	1		RK73K2B 100ohm J 1/8W
UP-0398	R179	7407226	1		RK73K2B 47 ohm J 1/8W
UP-0398	R180	7407262	1		RK73K2B 100ohm J 1/8W
UP-0398	R181	7410917	1		RK73K2B 470ohm J 1/8W
UP-0398	R182-R183	7407226	2		RK73K2B 47 ohm J 1/8W
UP-0398	R184	7407262	1		RK73K2B 100ohm J 1/8W
UP-0398	R185	7410917	1		RK73K2B 470ohm J 1/8W

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0398	R186	7407262	1		RK73K2B 100ohm J 1/8W
UP-0398	R187	7407226	1		RK73K2B 47 ohm J 1/8W
UP-0398	R188-R189	7407262	2		RK73K2B 100ohm J 1/8W
UP-0398	R190	7407226	1		RK73K2B 47 ohm J 1/8W
UP-0398	R191	7410917	1		RK73K2B 470ohm J 1/8W
UP-0398	R192	7411034	1		RK73K2B4.7Kohm J 1/8W
UP-0398	R193-R195	7407226	3		RK73K2B 47 ohm J 1/8W
UP-0398	R196	7407262	1		RK73K2B 100ohm J 1/8W
UP-0398	R197	7410953	1		RK73F2B 1 Kohm J 1/8W
UP-0398	R198	7410917	1		RK73K2B 470ohm J 1/8W
UP-0398	R201-R216	7407226	16		RK73K2B 47 ohm J 1/8W
UP-0398	R217-R218	7407262	2		RK73K2B 100ohm J 1/8W
UP-0398	R219	7411034	1		RK73K2B4.7Kohm J 1/8W
UP-0398	R220-R221	7407262	2		RK73K2B 100ohm J 1/8W
UP-0398	VR101	4161042	1	TPOT	GF-06S(ET-6S)200KOHM
UP-0398	X101	1752792	1	XTAL	TD308C 49.152MHZ

UP-0399 HA MOTHER BOARD

UP-0399	J001-J004	5427886	4	PCN	PCN10EA-20S-2.54DSA(05)
UP-0399	J105	5429857	1	PCN	HKP-20FDS2-19
UP-0399	J106	5429661	1	PCN	FFC-34BSM1#2

UP-0400 OPERATION BOARD-1

UP-0400	C001	3853313	1	CEC1	D55Y5V1H104Z51 0.1uF
UP-0400	J003	5429296	1	PCN	PS-22PLB-D4LT1-FL
UP-0400	J004	5422285	1	PCN	HKP-14ML-7BT
UP-0400	J005	5422249	1	PCN	HKP-6ML-3BT
UP-0400	VR001-VR003	4150241	3	TVR1	EVJ-2KA 5Kohm L=10

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-0401 PIO BOARD (QI-814P central interface)

UP-0401	CNJ101	5427939	1	PCN	PCN10EA-90P-2.54DS(05)
UP-0401	CNJ102	5408024	1	ACN2	RDCD-37SE-LNA FEMALE
UP-0401	CNJ103	5408042	1	ACN2	RDAD-15SE-LNA FEMALE
UP-0401	CNJ104	5422249	1	PCN	HKP-6ML-3BT
UP-0401	C101-C102	4312503	2	TC04	ECSZ35HS6R8B 6.8uF/35V
UP-0401	C103-C106	4317525	4	CEC1	TP D55Y5V1H 104Z 5-W
UP-0401	C107	4317579	1	CEC2	DD05-989SL 470K500 (47pF)
UP-0401	C110-C117	4315242	8	FLC1	ECQ-V 1H 333JZ3 (0.033uF)
UP-0401	C118-C125	4315233	8	FLC1	ECQ-V 1H 273JZ3 (0.027uF)
UP-0401	C201-C202	4315162	2	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0401	C203-C204	4315189	2	FLC1	ECQ-B 1H 153JZ3 0.015uF
UP-0401	C205	4312503	1	TC04	ECSZ35HS6R8B 6.8uF/35V
UP-0401	C206	4317525	1	CEC1	TP D55Y5V1H 104Z 5-W
UP-0401	C207	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0401	C208	4315189	1	FLC1	ECQ-B 1H 153JZ3 0.015uF
UP-0401	C209-C210	4315162	2	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0401	C211-C213	4317525	3	CEC1	TP D55Y5V1H 104Z 5-W
UP-0401	C305	4312503	1	TC04	ECSZ35HS6R8B 6.8uF/35V
UP-0401	C306-C315	4317525	10	CEC1	TP D55Y5V1H 104Z 5-W
UP-0401	C316	4312503	1	TC04	ECSZ35HS6R8B 6.8uF/35V
UP-0401	C317-C358	4317525	42	CEC1	TP D55Y5V1H 104Z 5-W
UP-0401	D101-D120	4320031	20	D	1S2076ATE
UP-0401	D201-D208	4320022	8	D	1SS106TE Schottky
UP-0401	D209	4322528	1	D	1S2076ARE
UP-0401	D210	4325026	1	ZD2	HZ6B3LTE (5.7-6.0V)
UP-0401	D211-D216	4320031	6	D	1S2076ATE
UP-0401	IC101	1304055	1	MIC	74AC244PC OCTAL BUFFER
UP-0401	IC102	1303974	1	MIC	74AC04PC HEX INVERTER
UP-0401	IC103	1304064	1	MIC	74AC245PC OCT.BIDIR BUFF
UP-0401	IC104	1304037	1	MIC	74AC139PC DUAL 1-4DECD
UP-0401	IC105	1304144	1	MIC	HD74AC164P SHIFT REG.
UP-0401	IC106	1304278	1	MIC	CD74AC161E BINARY CNT
UP-0401	IC107	1303092	1	MIC	HD74HC74P(uPD74HC74C)
UP-0401	IC109	1303974	1	MIC	74AC04PC HEX INVERTER
UP-0401	IC110	1304001	1	MIC	74AC32PC QUAD 21N OR
UP-0401	IC111	1207365	1	CPU	uPD72001C
UP-0401	IC112-IC113	1303047	2	MIC	HD74HC174P(uPD74HC174C)
UP-0401	IC116	1206758	1	TIC	SN75174N LINE DRIVER
UP-0401	IC117	1252957	1	DIC	AM26LS33PC QUAD L.REC.
UP-0401	IC118-IC119	1200719	2	TIC	SN7406N

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-0401	IC123	1303092	1	MIC	HD74HC74P(uPD74HC74C)
UP-0401	IC124	1302948	1	MIC	uPD74HC08C(HD74HC08P)
UP-0401	IC125-IC126	1303974	2	MIC	74AC04PC HEX INVERTER
UP-0401	IC127	1303029	1	MIC	uPD74HC161C(HD74HC161P)
UP-0401	IC128	1303074	1	MIC	uPD74HC4040C(HD74HC4040P)
UP-0401	IC129-IC132	1304269	4	MIC	HD74HC670P 4-4 REG.
UP-0401	IC133	1301263	1	MIC	MC14504BCP
UP-0401	IC201	1253698	1	OPIC	uPC 811C(LF 411CN)
UP-0401	IC203	1251165	1	OPIC	uPC1458C
UP-0401	IC204	1253698	1	OPIC	uPC 811C(LF 411CN)
UP-0401	IC205	1301601	1	MIC	HD14538BP(MC14538BCP)
UP-0401	IC206	1303109	1	MIC	uPD74HC367C(HD74HC367P)
UP-0401	IC207	1253501	1	ADIC	uPD-7004C8CH10BITA/D
UP-0401	IC208	1251165	1	OPIC	uPC1458C
UP-0401	IC209	1253626	1	ADIC	HA-17012PB 12BIT DA
UP-0401	IC210	1253715	1	OPIC	uPC812C(LF412CN)2FET
UP-0401	IC211	1300611	1	MIC	HD14051BP(MC14051BCP)
UP-0401	IC212-IC215	1253715	4	OPIC	uPC812C(LF412CN)2FET
UP-0401	IC216	1251361	1	REG	uPC78L12J(NJM78L12A)
UP-0401	IC217	1251379	1	REG	uPC79L12J(NJM79L12A)
UP-0401	Q201-Q202	4335069	2	TRC	2SC1213AKDTZ
UP-0401	RA107	4093222	1	RM	EXB-F9E 103J 10K
UP-0401	VR101-VR102	4160979	2	TPOT	GF-06S(ET-6S)100 OHM
UP-0401	VR201	4160916	1	TPOT	GF-06S(ET-6S) 10KOHM
UP-0401	VR202	4160934	1	TPOT	GF-06S(ET-6S)500 OHM
UP-0401	VR203	4160916	1	TPOT	GF-06S(ET-6S) 10KOHM
UP-0401	VR204	4160934	1	TPOT	GF-06S(ET-6S)500 OHM
UP-0401	VR205	4160916	1	TPOT	GF-06S(ET-6S) 10KOHM

UP-0402 WSIF BOARD (QI-812P WS interface)

UP-0402	C001-C010	4317525	10	CEC1	TP D55Y5V1H 104Z 5-W
UP-0402	C011-C012	4312503	2	TC04	ECSZ35HS6R8B 6.8uF/35V
UP-0402	D101-D104	4320031	4	D	1S2076ATE
UP-0402	D301-D327	4320022	27	D	1SS106TE Schottky
UP-0402	D331-D332	0910008	2	DP	SR1FM8 800mA 400V
UP-0402	IC001	1251361	1	REG	uPC78L12J(NJM78L12A)
UP-0402	IC002	1251379	1	REG	uPC79L12J(NJM79L12A)
UP-0402	IC101-IC103	1304055	3	MIC	74AC244PC OCTAL BUFFER
UP-0402	IC104	1304064	1	MIC	74AC245PC OCT.BIDIR BUFF

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0402	IC105	1304144	1	MIC	HD74AC164P SHIFT REG.
UP-0402	IC106	1302966	1	MIC	uPD74HC30C(HD74HC30P)
UP-0402	IC107	1304037	1	MIC	74AC139PC DUAL 1-4DECD
UP-0402	IC108-IC109	1303974	2	MIC	74AC04PC HEX INVERTER
UP-0402	IC110	1205759	1	TIC	SN74LS07
UP-0402	IC111	1304001	1	MIC	74AC32PC QUAD 21N OR
UP-0402	IC201	1350619	1	CPU	MSM82C51ARS
UP-0402	IC202	1304278	1	MIC	CD74AC161E BINARY CNT
UP-0402	IC203	1206455	1	CPU	uPD71054C
UP-0402	IC204	1303109	1	MIC	uPD74HC367C(HD74HC367P)
UP-0402	IC206	1303047	1	MIC	HD74HC174P(uPD74HC174C)
UP-0402	IC208	1205206	1	TIC	SN75188N
UP-0402	IC209	1205198	1	TIC	SN75189AN
UP-0402	IC301	1207285	1	CPU	MB8421-12LP
UP-0402	IC302-IC304	1203966	3	TIC	SN74LS244
UP-0402	IC305	1204992	1	TIC	SN74LS641
UP-0402	J101	5427939	1	PCN	PCN10EA-90P-2.54DS(05)
UP-0402	J201	5408033	1	ACN2	RDBD-25SE-LNA FEMALE
UP-0402	J301	5408024	1	ACN2	RDCD-37SE-LNA FEMALE
UP-0402	RA201	4093222	1	RM	EXB-F9E 103J 10K
UP-0402	RA301-RA303	4093926	3	RM	EXB-F9E-152

UP-0509 OPERATION BOARD-2

UP-0509	J011	5428804	1	PCN	HBLB-6R-1
UP-0509	J012	5429679	1	PCN	FFC-14ASM4BR#2
UP-0509	S101-S106	3352088	6	SW	SKHCAD (KHC10904)

UP-0519 RESPIRATION BOARD

UP-0519	CN002	5423453	1	PCN	HKP-20M5LS-19T
UP-0519	C001	4315046	1	FLC1	ECQ-B 1H 102JZ3 0.001uF
UP-0519	C002	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0519	C003	4315269	1	FLC1	ECQ-V 1H 473JZ3 (0.047uF)
UP-0519	C005	4317623	1	CEC2	DD05-989B 331K500 (330pF)
UP-0519	C006	4315233	1	FLC1	ECQ-V 1H 273JZ3 (0.027uF)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-0519	C007	4315144	1	FLC1	ECQ-B 1H 682JZ3 0.0068uF
UP-0519	C008	4317597	1	CEC2	DD05-989B 101K500 (100pF)
UP-0519	C009	4315046	1	FLC1	ECQ-B 1H 102JZ3 0.001uF
UP-0519	C010	4315269	1	FLC1	ECQ-V 1H 473JZ3 (0.047uF)
UP-0519	C011	4315287	1	FLC1	ECQ-V 1H 683JZ3 (0.068uF)
UP-0519	C012	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0519	C013	4317561	1	CEC2	DD05-989SL 330K500 (33pF)
UP-0519	C021-C022	4317525	2	CEC1	TP D55Y5V1H 104Z 5-W
UP-0519	D001-D005	4322528	5	D	1S2076ARE
UP-0519	IC001-IC004	1253715	4	OPIC	uPC812C(LF412CN)2FET
UP-0519	IC005-IC006	1204867	2	AIC	HA17903PS Comparator
UP-0519	IC007	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-0519	IC008-IC009	1300504	2	MIC	HD14040BP(MC14040BCP)
UP-0519	PC001	1704345	1	TRP	PC817 PHOTOCOUPLER
UP-0519	Q001	4330011	1	TRA	2SA836 C or D TZ

UP-0520 ROM PACK WITHOUT ROM CHIPS

UP-0520		5601519	6	SOKT	AXS114013
UP-0520	C111-C116	7407119	6		GR40-F104Z50T
UP-0520	D001-D023	7407075	23		1SS-226
UP-0520	D031-D046	7407075	16		1SS-226
UP-0520	D071-D073	7407075	3		1SS-226
UP-0520	IC011	1304117	1	MIC	74AC138SC 1-8 DECORDER
UP-0520	IC012	1304082	1	MIC	74AC04SC HEX INVERTER
UP-0520	IC013	1304091	1	MIC	74AC10SC TRIP 3/N NAND
UP-0520	J101	5427912	1	PCN	PCN10EA-64P-2.54DS(05)
UP-0520	R001-R023	7407226	23		RK73K2B 47 ohm J 1/8W
UP-0520	R031-R046	7407226	16		RK73K2B 47 ohm J 1/8W
UP-0520	R071-R073	7407226	3		RK73K2B 47 ohm J 1/8W

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-0584 OPERATION BOARD-3

UP-0584	D001	1102335	1	LED GL3KG8 3-dia green
UP-0584	J001	5445349	1	CN JACKHLJ0527-01-030
UP-0584	J021	5422249	1	PCN HKP-6ML-3BT
UP-0584		5631415	1	LAMP PC board holder PCL-490

YS-007R3 CABLE

YS-007R3	CD002	5502377	1	CORD PS-20SD/SLA(40)

AC-800PJ ECG HEAD AMPLIFIER

AC-800PJ	CN002	5395108	1	CCN2 XZ-123R (8S)

AC-800PA ECG HEAD AMPLIFIER

AC-800PA	CN002	5395206	1	CCN2 HR16-17R-6S 6P RECEPTACLE FEMALE

UP-0272 ECG HEAD AMPLIFIER BOARD

UP-0272	CN001	5427877	1	PCN PCN10EA-20P-2.54DS(05)
UP-0272	C001-C002	3810645	2	TC04 221M 16V10uF-M1
UP-0272	C003-C004	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-0272	C005	4317579	1	CEC2 DD05-989SL 470K500 (47pF)
UP-0272	C006	4317597	1	CEC2 DD05-989B 101K500 (100pF)
UP-0272	C007	4315349	1	FLC1 ECQ-V 1H 224JZ3 (0.22uF)
UP-0272	C008-C013	4315046	6	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-0272	C014-C015	3853385	2	CEC2 DE7090B 102K VA1-KC
UP-0272	D001-D004	4320031	4	D 1S2076ATE
UP-0272	D005-D006	4322519	2	D 1SS104,TPB2 (RADIAL)

ASSY	CKT NO.	PART NO.	Q'TY		DESCRIPTION
UP-0272	D007-D008	4322528	2	D	1S2076ARE (RADIAL)
UP-0272	D011-D012	4322519	2	D	1SS104,TPB2 (RADIAL)
UP-0272	D013-D014	4322528	2	D	1S2076ARE (RADIAL)
UP-0272	GA001	2100389	1	GA	GAS ARRESTOR T08-800B
UP-0272	GA002-GA006	2100415	5	GA	Y06S-90B GAS ARRESTOR
UP-0272	IC001	1251601	1	REG	uPC78L05J (NJM78L05A)
UP-0272	IC002	1252494	1	REG	uPC79L05J (NJM79L05A)
UP-0272	IC003	1253715	1	OPIC	uPC812C(LF412CN)2FET
UP-0272	IC004	1300611	1	MIC	CD4051BE (MC14051BCP)
UP-0272	IC005	1301049	1	MIC	CD4094BE (MC14094BCP)
UP-0272	IC006	1300504	1	MIC	HD14040BP (MC14040BCP)
UP-0272	IC007	1601946	1	MD	EHD-HA1270 ISOLATE
UP-0272	IC008	1601964	1	MD	EHD-HA1272 ECGSEL
UP-0272	IC009-IC012	1601955	4	MD	EHD-HA1271 ECGBUF
UP-0272	PC001-PC003	0600307	3	TRP	PC810A
UP-0272	Q001	4330011	1	TRA	2SA836 C or D TZ
UP-0272	Q002	4340009	1	FETK	2SK163 L1 or L2-T
UP-0272	Q003-Q004	4335069	2	TRC	2SC1213AKDTZ
UP-0272	R001	4303424	1	MR1	SN14C2CT26 8.06KOHM F
UP-0272	R002-R003	4302559	2	MR1	SN14C2CT26 1.00KOHM F
UP-0272	R004	4303513	1	MR1	SN14C2CT26 10.0KOHM F
UP-0272	R005-R006	4304183	2	MR1	SN14C2CT26 49.9KOHM F
UP-0272	R007	4302844	1	MR1	SN14C2CT26 2.00KOHM F
UP-0272	R008	4303513	1	MR1	SN14C2CT26 10.0KOHM F
UP-0272	R009	4303228	1	MR1	SN14C2CT26 4.99KOHM F
UP-0272	R010-R011	4303513	2	MR1	SN14C2CT26 10.0KOHM F
UP-0272	R019	4304325	1	MR1	SN14C2CT26 69.8KOHM F
UP-0272	R020-R022	4302559	3	MR1	SN14C2CT26 1.00KOHM F
UP-0272	R023	4305431	1	MR1	SN14C2CT26 1.00MOHM F
UP-0272	R024-R027	4303513	4	MR1	SN14C2CT26 10.0KOHM F
UP-0272	T001	3772365	1	PLTF	T3772365 EP10PS
UP-0272	T002	3772356	1	PLTF	T3772356 EP10IS
UP-0272	T003	3772383	1	PLTF	T3772383 EP10IS(Red)
UP-0272	VR001	4160604	1	TPOT	ET-6P(GF-06P) 5KOHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

AP-800PA BLOOD PRESSURE HEAD AMPLIFIER

AP-800PA	CN002-CN003	5350273	2	CCN2	HR16-13R-5S(02) Orange

UP-0369 PRESS HEAD AMP BOARD

UP-0369	CN001	5427877	1	PCN	PCN10EA-20P-2.54DS(05)
UP-0369	CN004	5427645	1	PCN	M60-06-30-114P STRAIGHT
UP-0369	C001-C002	4312557	2	TC04	204M2002 106MB(10uF/20V)
UP-0369	C003-C004	4317525	2	CEC1	TP D55Y5V1H 104Z 5-W
UP-0369	C006	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0369	C007	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0369	C008-C009	4312557	2	TC04	204M2002 106MB(10uF/20V)
UP-0369	C010	4315269	1	FLC1	ECQ-V 1H 473JZ3 (0.047uF)
UP-0369	C011	4315242	1	FLC1	ECQ-V 1H 333JZ3 (0.033uF)
UP-0369	C012	4315269	1	FLC1	ECQ-V 1H 473JZ3 (0.047uF)
UP-0369	C013	4315242	1	FLC1	ECQ-V 1H 333JZ3 (0.033uF)
UP-0369	C016	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0369	C017-C021	4315304	5	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0369	D001-D004	4322528	4	D	1S2076ARE (RADIAL)
UP-0369	D006-D013	4322519	8	D	1SS104,TPB2 (RADIAL)
UP-0369	D014-D015	4322528	2	D	1S2076ARE (RADIAL)
UP-0369	GA001	2100389	1	GA	GAS ARRESTOR T08-800B
UP-0369	IC001	1251601	1	REG	uPC78L05J (NJM78L05A)
UP-0369	IC002	1252494	1	REG	uPC79L05J (NJM79L05A)
UP-0369	IC003	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-0369	IC004	1300504	1	MIC	HD14040BP (MC14040BCP)
UP-0369	IC005	1253519	1	REG	LT1009CZ 2.5VREF
UP-0369	IC006	1253617	1	OPIC	uPC4062C DUAL LOW POWER

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0369	IC007-IC010	1253279	4	OPIC LT1001CN8 LOW DRIFT
UP-0369	IC011-IC013	1253617	3	OPIC uPC4062C DUAL LOW POWER
UP-0369	IC014	1601946	1	MD EHD-HA1270 ISOLATE
UP-0369	PC001	0600307	1	TRP PC810A
UP-0369	PC002	0600263	1	TRP PC-827 PHOTOCOUPLER DUAL
UP-0369	Q001-Q003	4335069	3	TRC 2SC1213AKDTZ
UP-0369	Q004	0100384	1	TRA 2SA673AC
UP-0369	Q005	4335069	1	TRC 2SC1213AKDTZ
UP-0369	RA001	4093196	1	RM EXB-F8V 103J 10K
UP-0369	RA002	4093632	1	RM EXB-F5E-105
UP-0369	R001	4303513	1	MR1 SN14C2CT26 10.0KOHM F
UP-0369	R002	4302559	1	MR1 SN14C2CT26 1.00KOHM F
UP-0369	R003	4303166	1	MR1 SN14C2CT26 4.32KOHM F
UP-0369	R004	4303567	1	MR1 SN14C2CT26 11.3KOHM F
UP-0369	R005	4303897	1	MR1 SN14C2CT26 24.9KOHM F
UP-0369	R006	4304183	1	MR1 SN14C2CT26 49.9KOHM F
UP-0369	R007	4302844	1	MR1 SN14C2CT26 2.00KOHM F
UP-0369	R008-R011	4303513	4	MR1 SN14C2CT26 10.0KOHM F
UP-0369	R012	4303977	1	MR1 SN14C2CT26 30.1KOHM F
UP-0369	R013	4302559	1	MR1 SN14C2CT26 1.00KOHM F
UP-0369	R014	4303513	1	MR1 SN14C2CT26 10.0KOHM F
UP-0369	R015-R016	4303014	2	MR1 SN14C2CT26 3.01KOHM F
UP-0369	R017	4302559	1	MR1 SN14C2CT26 1.00KOHM F
UP-0369	R018	4303513	1	MR1 SN14C2CT26 10.0KOHM F
UP-0369	R019-R020	4304477	2	MR1 SN14C2CT26 100KOHM F
UP-0369	R021	4304183	1	MR1 SN14C2CT26 49.9KOHM F
UP-0369	R026-R029	4304477	4	MR1 SN14C2CT26 100KOHM F
UP-0369	R030-R031	4302844	2	MR1 SN14C2CT26 2.00KOHM F
UP-0369	R032-R035	4303513	4	MR1 SN14C2CT26 10.0KOHM F
UP-0369	R036-R039	4303843	4	MR1 SN14C2CT26 22.1KOHM F
UP-0369	R040-R043	4304477	4	MR1 SN14C2CT26 100KOHM F
UP-0369	R046	4301301	1	MR1 SN14C2CT26 49.9 OHM F
UP-0369	R047	4304477	1	MR1 SN14C2CT26 100KOHM F
UP-0369	T001	3772365	1	PLTF T3772365 EP10PS
UP-0369	T002	3772356	1	PLTF T3772356 EP10IS
UP-0369	VR001-VR002	4160792	2	TPOT GF06P 200 OHM

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

AH-800PA CARDIAC OUTPUT HEAD AMPLIFIER

AH-800PA	CN002	5350344	1	CCN2 HR16-18R-10S(01) Red

UP-0318 CO HEAD AMP BOARD

UP-0318	CN001	5427877	1	PCN	PCN10EA-20P-2.54DS(05)
UP-0318	CN003	5428234	1	PCN	M60-04-30-114P
UP-0318	C001-C002	4312557	2	TC04	204M2002 106MB(10uF/20V)
UP-0318	C003-C004	4317525	2	CEC1	TP D55Y5V1H 104Z 5-W
UP-0318	C006	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0318	C007	3810645	1	TC04	221M 16V10uF-M1
UP-0318	C008	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0318	C009-C012	4315304	4	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0318	C013-C014	4315162	2	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0318	D001	4322528	1	D	1S2076ARE (RADIAL)
UP-0318	D002-D007	4320031	6	D	1S2076ATE
UP-0318	GA001	2100389	1	GA	GAS ARRESTOR T08-800B
UP-0318	IC001	1251601	1	REG	uPC78L05J (NJM78L05A)
UP-0318	IC002	1252494	1	REG	uPC79L05J (NJM79L05A)
UP-0318	IC003	1300638	1	MIC	CD4053BE(MC14053BCP)
UP-0318	IC004	1253519	1	REG	LT1009CZ 2.5VREF
UP-0318	IC005-IC006	1253617	2	OPIC	uPC4062C DUAL LOW POWER
UP-0318	IC007	1253279	1	OPIC	LT1001CN8 LOW DRIFT
UP-0318	IC008	1204867	1	AIC	HA17903PS COMPARATOR
UP-0318	IC009	1300611	1	MIC	CD4051BE (MC14051BCP)
UP-0318	IC010	1300504	1	MIC	HD14040BP (MC14040BCP)
UP-0318	IC011	1301049	1	MIC	CD4094BE (MC14094BCP)
UP-0318	IC012	1300504	1	MIC	HD14040BP (MC14040BCP)
UP-0318	IC013	1601946	1	MD	EHD-HA1270 ISOLATE
UP-0318	PC001-PC002	0600307	2	TRP	PC810A
UP-0318	Q001-Q003	4335069	3	TRC	2SC1213AKDTZ
UP-0318	R001	4303513	1	MR1	SN14C2CT26 10.0KOHM F
UP-0318	R002	4302826	1	MR1	SN14C2CT26 1.91KOHM F
UP-0318	R003	4304183	1	MR1	SN14C2CT26 49.9KOHM F
UP-0318	R004-R005	4302559	2	MR1	SN14C2CT26 1.00KOHM F
UP-0318	R006	4303513	1	MR1	SN14C2CT26 10.0KOHM F
UP-0318	R007	4302844	1	MR1	SN14C2CT26 2.00KOHM F

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0318	R008	4303513	1	MR1 SN14C2CT26 10.0KOHM F
UP-0318	R009	4301301	1	MR1 SN14C2CT26 49.9 OHM F
UP-0318	R010	4304183	1	MR1 SN14C2CT26 49.9KOHM F
UP-0318	R011	4302265	1	MR1 SN14C2CT26 499 OHM F
UP-0318	R012	4304521	1	MR1 SN14C2CT26 113KOHM F
UP-0318	R013	4303807	1	MR1 SN14C2CT26 20.0KOHM F
UP-0318	R014	4304851	1	MR1 SN14C2CT26 249KOHM F
UP-0318	R015-R017	4304477	3	MR1 SN14C2CT26 100KOHM F
UP-0318	R018	4304263	1	MR1 SN14C2CT26 60.4KOHM F
UP-0318	R021	4302844	1	MR1 SN14C2CT26 2.00KOHM F
UP-0318	R022	4301596	1	MR1 SN14C2CT26 100 OHM F
UP-0318	R023	4304477	1	MR1 SN14C2CT26 100KOHM F
UP-0318	R024	4304085	1	MR1 SN14C2CT26 39.2KOHM F
UP-0318	R025	4302559	1	MR1 SN14C2CT26 1.00KOHM F
UP-0318	R026	4304646	1	MR1 SN14C2CT26 150KOHM F
UP-0318	R027	4304414	1	MR1 SN14C2CT26 86.6KOHM F
UP-0318	R028	4303807	1	MR1 SN14C2CT26 20.0KOHM F
UP-0318	R031	4304762	1	MR1 SN14C2CT26 200KOHM F
UP-0318	R032	4303799	1	MR1 SN14C2CT26 19.6KOHM F
UP-0318	R033	4304263	1	MR1 SN14C2CT26 60.4KOHM F
UP-0318	R034-R039	4304762	6	MR1 SN14C2CT26 200KOHM F
UP-0318	R040-R043	4304477	4	MR1 SN14C2CT26 100KOHM F
UP-0318	R044	4304094	1	MR1 SN14C2CT26 40.2KOHM F
UP-0318	R045	4303513	1	MR1 SN14C2CT26 10.0KOHM F
UP-0318	R046	4303807	1	MR1 SN14C2CT26 20.0KOHM F
UP-0318	R047-R049	4303513	3	MR1 SN14C2CT26 10.0KOHM F
UP-0318	R050	4304477	1	MR1 SN14C2CT26 100KOHM F
UP-0318	T001	3772365	1	PLTF T3772365 EP10PS
UP-0318	T002	3772356	1	PLTF T3772356 EP10IS
UP-0318	VR001	4160809	1	TPOT ET-6P(GF-06P RJ-6P) 2KOHM
UP-0318	VR002-VR003	4160596	2	TPOT ET-6P(GF-06P) 1KOHM
UP-0318	VR004	4160613	1	TPOT ET-6P(GF-06P) 10KOHM
UP-0318	VR005	4160596	1	TPOT ET-6P(GF-06P) 1KOHM

YZ-000P3 CO CATHETER CONNECTION CABLE

YZ-000P3		5300372	1	CCN1 HR16-18P-10P(01) Red
YZ-000P3		5305242	1	CCN1 206430-2
YZ-000P3		5390327	1	CCN 206062-1 AMP CRAMP
YZ-000P3		5415506	2	NCN 170252-1 AMP PIN

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
YZ-000P3		5553036	1	CORD	THERMISTOR PROBE SP5030
YZ-000P3		5553045	1	CORD	CATHETER CORD SP4035

UP-0319 TEMP HEAD AMP BOARD

UP-0319	CN001	5427877	1	PCN	PCN10EA-20P-2.54DS(05)
UP-0319	CN002	5445349	1	CN	JACK HLJ0527-01-030
UP-0319	CN003	5428234	1	PCN	M60-04-30-114P
UP-0319	C001-C002	3810645	2	TC04	221M 16V10uF-M1
UP-0319	C003-C004	4317525	2	CEC1	TP D55Y5V1H 104Z 5-W
UP-0319	C006	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0319	C007-C008	4315304	2	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0319	C009	4317632	1	CEC2	DD05-989B 471K500 (470pF)
UP-0319	C010	4315046	1	FLC1	ECQ-B 1H 102JZ3 0.001uF
UP-0319	C011	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0319	C014	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0319	D001-D006	4322528	6	D	1S2076ARE (RADIAL)
UP-0319	GA001	2100389	1	GA	GAS ARRESTOR T08-800B
UP-0319	IC001	1251601	1	REG	uPC78L05J (NJM78L05A)
UP-0319	IC002	1252494	1	REG	uPC79L05J (NJM79L05A)
UP-0319	IC003	1300638	1	MIC	CD4053BE(MC14053BCP)
UP-0319	IC004	1253519	1	REG	LT1009CZ 2.5VREF
UP-0319	IC005	1253617	1	OPIC	uPC4062C DUAL LOW POWER
UP-0319	IC006	1253279	1	OPIC	LT1001CN8 LOW DRIFT
UP-0319	IC007	1300611	1	MIC	CD4051BE (MC14051BCP)
UP-0319	IC008	1300504	1	MIC	HD14040BP (MC14040BCP)
UP-0319	IC009	1601946	1	MD	EHD-HA1270 ISOLATE
UP-0319	PC001	0600307	1	TRP	PC810A
UP-0319	Q001-Q002	4335069	2	TRC	2SC1213AKDTZ
UP-0319	R001	4303513	1	MR1	SN14C2CT26 10.0KOHM F
UP-0319	R002	4302933	1	MR1	SN14C2CT26 2.49KOHM F
UP-0319	R003	4304183	1	MR1	SN14C2CT26 49.9KOHM F
UP-0319	R004	4302559	1	MR1	SN14C2CT26 1.00KOHM F
UP-0319	R005	4302844	1	MR1	SN14C2CT26 2.00KOHM F
UP-0319	R006	4304183	1	MR1	SN14C2CT26 49.9KOHM F
UP-0319	R007	4302559	1	MR1	SN14C2CT26 1.00KOHM F
UP-0319	R008	4304031	1	MR1	SN14C2CT26 34.8KOHM F
UP-0319	R009	4303513	1	MR1	SN14C2CT26 10.0KOHM F
UP-0319	R010	4304477	1	MR1	SN14C2CT26 100KOHM F
UP-0319	R011-R012	4303513	2	MR1	SN14C2CT26 10.0KOHM F

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION	
UP-0319	R013	4304067	1	MR1	SN14C2CT26 37.4KOHM F
UP-0319	R014	4303228	1	MR1	SN14C2CT26 4.99KOHM F
UP-0319	R015	4303807	1	MR1	SN14C2CT26 20.0KOHM F
UP-0319	R016	4302844	1	MR1	SN14C2CT26 2.00KOHM F
UP-0319	R017-R019	4007664	3	MR1	MFAAT1 1060 OHM
UP-0319	R020	4007673	1	MR1	MFAAT1 311.6 OHM
UP-0319	R021	4007682	1	MR1	MFAAT1 1753.4 OHM
UP-0319	R022-R023	4303513	2	MR1	SN14C2CT26 10.0KOHM F
UP-0319	T001	3772365	1	PLTF	T3772365 EP10PS
UP-0319	T002	3772356	1	PLTF	T3772356 EP10IS
UP-0319	VR001	4160809	1	TPOT	ET-6P(GF-06P RJ-6P) 2KOHM
UP-0319	VR002	4160596	1	TPOT	ET-6P(GF-06P) 1KOHM

CD-050PA AE-800PA HEAD AMPLIFIER CHASSIS PART

CD-050PA	CN003	5350371	1	CCN2	HR16-18R-10S(04) green

UP-0421 EEG MAIN BOARD

UP-0421	CN001	5427877	1	PCN	PCN10EA-20P-2.54DS(05)
UP-0421	CN002	5427137	1	PCN	HKP-14FDS2-7,8,9T
UP-0421	C001-C002	4312557	2	TC04	204M2002 106MB(10uF/20V)
UP-0421	C003-C004	4317525	2	CEC1	TP D55Y5V1H 104Z 5-W
UP-0421	C005-C006	4315162	2	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0421	C007	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0421	C008-C016	4315046	9	FLC1	ECQ-B 1H 102JZ3 0.001uF
UP-0421	C017	4315206	1	FLC1	ECQ-B 1H 223JZ3 0.022uF
UP-0421	C018-C019	4312557	2	TC04	204M2002 106MB(10uF/20V)
UP-0421	D001-D010	4322528	10	D	1S2076ARE
UP-0421	D030-D039	4320013	10	D	1SS104,TP3
UP-0421	GA001	2100389	1	GA	Gas Arrestor T08-800B
UP-0421	IC001	1251601	1	REG	uPC78L05J (NJM78L05A)
UP-0421	IC002	1252494	1	REG	uPC79L05J (NJM79L05A)
UP-0421	IC003	1300638	1	MIC	HD14053BP(MC14053BCP)
UP-0421	IC004	1300504	1	MIC	HD14040BP (MC14040BCP)
UP-0421	IC005	1601946	1	MD	EHD-HA1270 ISOLATE
UP-0421	IC006	1253617	1	OPIC	uPC4062C DUAL Low Power
UP-0421	IC007-IC008	1253715	2	OPIC	uPC812C(LF412CN)2FET
UP-0421	PC001-PC002	0600307	2	TRP	PC810A

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0421	Q001-Q003	4335069	3	TRC 2SC1213AKDTZ
UP-0421	T001	3772365	1	PLTF T3772365 EP10PS
UP-0421	T002	3772356	1	PLTF T3772356 EP10IS
UP-0421	VR001	4160604	1	TPOT GF06P 5KOHM

UP-0422 EEG SUB BOARD

UP-0422	CN050	5427003	1	PCN HKP-14M5S-7,8,9T RECEPTACLE MALE
UP-0422	C050-C057	4312557	8	TC04 204M2002 106MB(10uF/20V)
UP-0422	C058-C059	4315144	2	FLC1 ECQ-B 1H 682JZ3 0.0068uF
UP-0422	C060-C061	4315126	2	FLC1 ECQ-B 1H 472JZ3 0.0047uF
UP-0422	C062-C063	4315206	2	FLC1 ECQ-B 1H 223JZ3 0.022uF
UP-0422	C064-C065	4315135	2	FLC1 ECQ-B 1H 562JZ3 0.0056uF
UP-0422	C066-C071	4315269	6	FLC1 ECQ-V 1H 473JZ3 (0.047uF)
UP-0422	C072-C073	4312557	2	TC04 204M2002 106MB(10uF/20V)
UP-0422	C074-C075	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-0422	D050-D053	4322528	4	D 1S2076ARE
UP-0422	IC050	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-0422	IC051-IC054	1253279	4	OPIC LT1001CN8 LOW DRIFT
UP-0422	IC055-IC056	1253617	2	OPIC uPC4062C DUAL Low Power
UP-0422	VR050-VR051	4160925	2	TPOT GF-06S(ET-6S) 20KOHM
UP-0422	VR054-VR055	4160934	2	TPOT GF-06S(ET-6S)500 OHM

UP-0548 AR-800PA RESP HEAD AMPLIFIER BOARD

UP-0548	CN001	5427877	1	PCN PCN10EA-20P-2.54DS(05)
UP-0548	CN002	5430721	1	CN LGY 6501-0101
UP-0548	CN003	5428234	1	PCN M60-04-30-114P
UP-0548	C001-C002	4312557	2	TC04 204M2002 106MB(10uF/20V)
UP-0548	C003-C004	4312735	2	TC04 204M3502 105MB (1uF/35V)
UP-0548	C005	4312557	1	TC04 204M2002 106MB(10uF/20V)
UP-0548	C006	4315385	1	FLC1 ECQ-V 1H 474JZ3 (0.47uF)
UP-0548	C007	4315242	1	FLC1 ECQ-V 1H 333JZ3 (0.033uF)
UP-0548	C008	3834031	1	MPC DH4M2A105K 100V1uF
UP-0548	C009	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0548	C010	4315242	1	FLC1 ECQ-V 1H 333JZ3 (0.033uF)
UP-0548	C011-C012	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0548	D001-D006	4322528	6	D 1S2076ARE
UP-0548	D007-D008	4322519	2	D 1SS104,TPB2
UP-0548	GA001	2100389	1	GA Gas Arrestor T08-800B

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0548	IC001	1251601	1	REG uPC78L05J (NJM78L05A)
UP-0548	IC002	1252494	1	REG uPC79L05J (NJM79L05A)
UP-0548	IC003	1253519	1	REG LT1009CZ 2.5VREF
UP-0548	IC004	1601946	1	MD EHD-HA1270 ISOLATE
UP-0548	IC005	1253698	1	OPIC uPC 811C (LF 411CN)
UP-0548	IC006	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-0548	IC007	1253617	1	OPIC uPC4062C DUAL Low Power
UP-0548	IC008	1300638	1	MIC HD14053BP(MC14053BCP)
UP-0548	PC001	0600307	1	TRP PC810A
UP-0548	Q001-Q002	4335069	2	TRC 2SC1213AKDTZ
UP-0548	T001	3772365	1	PLTF T3772365 EP10PS
UP-0548	T002	3772356	1	PLTF T3772356 EP10IS
UP-0548	VR001	4160613	1	TPOT GF06P 10KOHM

CD-062PA Sa02 HEAD AMPLIFIER CHASSIS PART

CD-062PA		5350389	1	CCN2 HR16-18R-10S(05) Blue

UP-0551 Sa02 MAIN BOARD

UP-0551	CN001	5427877	1	PCN PCN10EA-20P-2.54DS(05)
UP-0551	CN003	5427101	1	PCN HKP-18FDS2-7,8,9T Receptacle
UP-0551	C001-C002	4312557	2	TC04 204M2002 106MB(10uF/20V)
UP-0551	C003-C004	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-0551	C005	4315126	1	FLC1 ECQ-B 1H 472JZ3 0.0047uF
UP-0551	C006	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0551	C007	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-0551	C008	4317561	1	CEC2 DD05-989SL 330K500 (33pF)
UP-0551	C009	4315304	1	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0551	C010	4317534	1	CEC2 DD05-989SL 100D500 (10pF)
UP-0551	C011	4310042	1	EC04 ECEA1CU 101B (100uF/16V)
UP-0551	C012-C014	4317525	3	CEC1 TP D55Y5V1H 104Z 5-W
UP-0551	C015	4315046	1	FLC1 ECQ-B 1H 102JZ3 0.001uF
UP-0551	D001-D009	4322528	9	D 1S2076ARE
UP-0551	GA001	2100389	1	GA Gas Arrestor T08-800B
UP-0551	IC001	1251601	1	REG uPC78L05J (NJM78L05A)
UP-0551	IC002	1252494	1	REG uPC79L05J (NJM79L05A)
UP-0551	IC003	1300638	1	MIC HD14053BP(MC14053BCP)
UP-0551	IC004	1253519	1	REG LT1009CZ 2.5VREF
UP-0551	IC005	1601946	1	MD EHD-HA1270 ISOLATE

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0551	IC006	1300611	1	MIC HD14051BP(MC14051BCP)
UP-0551	IC007	1300504	1	MIC HD14040BP (MC14040BCP)
UP-0551	IC008	1300629	1	MIC HD14052BP(MC14052BCP)
UP-0551	IC009	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-0551	IC010	1253617	1	OPIC uPC4062C DUAL Low Power
UP-0551	IC011	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-0551	PC001	0600307	1	TRP PC810A
UP-0551	Q001-Q004	4335069	4	TRC 2SC1213AKDTZ
UP-0551	T001	3772365	1	PLTF T3772365 EP10PS
UP-0551	T002	3772356	1	PLTF T3772356 EP10IS

UP-0552 Sa02 SUB BOARD

UP-0552	CN050	5427146	1	PCN HKP-18M5S-7,8,9T Receptacle Male
UP-0552	C050-C051	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-0552	C052-C055	4315304	4	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0552	C056	4315206	1	FLC1 ECQ-B 1H 223JZ3 0.022uF
UP-0552	C057-C059	4315304	3	FLC1 ECQ-V 1H 104JZ3 (0.1uF)
UP-0552	C061-C065	4312557	5	TC04 204M2002 106MB(10uF/20V)
UP-0552	C066-C067	4315242	2	FLC1 ECQ-V 1H 333JZ3 (0.033uF)
UP-0552	D050-D054	4322519	5	D 1SS104,TPB2
UP-0552	IC050	1300504	1	MIC HD14040BP (MC14040BCP)
UP-0552	IC051	1300629	1	MIC HD14052BP(MC14052BCP)
UP-0552	IC052	1300112	1	MIC MC14001UBCP (CD4001UBE)
UP-0552	IC053	1300611	1	MIC HD14051BP(MC14051BCP)
UP-0552	IC054	1300763	1	MIC HD14066BP (MC14066BCP)
UP-0552	IC055	1204894	1	AIC HA17901P Comparator
UP-0552	IC056	1253617	1	OPIC uPC4062C DUAL Low Power
UP-0552	IC058-IC060	1253715	3	OPIC uPC812C(LF412CN)2FET
UP-0552	Q050	4335069	1	TRC 2SC1213AKDTZ
UP-0552	VR051	4160925	1	TPOT GF-06S(ET-6S) 20KOHM
UP-0552	VR052-VR053	4160961	2	TPOT GF-06S(ET-6S) 5KOHM

AG-800PA C02 HEAD AMPLIFIER CHASSIS PART

AG-800PA	CN003	5350487	1	CCN2 HR16-18R-15S(07) brown

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION

UP-0588 C02 MAIN BOARD

UP-0588	CN001	5427877	1	PCN	PCN10EA-20P-2.54DS(05)
UP-0588	CN002	5427137	1	PCN	HKP-14FDS2-7,8,9T FEMALE
UP-0588	C001-C002	4312557	2	TC04	204M2002 106MB(10uF/20V)
UP-0588	C003-C007	4317525	5	CEC1	TP D55Y5V1H 104Z 5-W
UP-0588	C008	4312735	1	TC04	204M3502 105MB (1uF/35V)
UP-0588	C009	4317525	1	CEC1	TP D55Y5V1H 104Z 5-W
UP-0588	C010-C011	4315162	2	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0588	C012	4315046	1	FLC1	ECQ-B 1H 102JZ3 0.001uF
UP-0588	C013	4315304	1	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0588	C014	4312735	1	TC04	204M3502 105MB (1uF/35V)
UP-0588	D001-D004	4322528	4	D	1S2076ARE
UP-0588	IC001	1301049	1	MIC	CD4094BE (MC14094BCP)
UP-0588	IC002	1251174	1	ADIC	uPC624C (DAC-08CQ)
UP-0588	IC003	1301601	1	MIC	HD14538BP (MC14538BCP)
UP-0588	IC004-IC005	1300504	2	MIC	HD14040BP (MC14040BCP)
UP-0588	IC006	1253519	1	REG	LT1009CZ 2.5VREF
UP-0588	IC007	1253715	1	OPIC	uPC812C(LF412CN)2FET
UP-0588	IC008-IC010	1253617	3	OPIC	uPC4062C DUAL
UP-0588	Q001	4330011	1	TRA	2SA836 CorD TZ
UP-0588	T001	3790354	1	T	DC-DC converter KDC-3826
UP-0588	VR001	4160961	1	TPOT	GF-06S(ET-6S) 5KOHM

UP-0589 C02 SUB BOARD

UP-0589	CN050	5427003	1	PCN	HKP-14M5S-7,8,9T receptacle male
UP-0589	C050-C052	4317525	3	CEC1	TP D55Y5V1H 104Z 5-W
UP-0589	C053	4315385	1	FLC1	ECQ-V 1H 474JZ3 (0.47uF)
UP-0589	C054	4315046	1	FLC1	ECQ-B 1H 102JZ3 0.001uF
UP-0589	C055-C056	4315304	2	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0589	C057	4315162	1	FLC1	ECQ-B 1H 103JZ3 0.01uF
UP-0589	C058	4315126	1	FLC1	ECQ-B 1H 472JZ3 0.0047uF
UP-0589	C059-C063	4315304	5	FLC1	ECQ-V 1H 104JZ3 (0.1uF)
UP-0589	C064	4312735	1	TC04	204M3502 105MB (1uF/35V)
UP-0589	D050	4322528	1	D	1S2076ARE
UP-0589	D051	4322519	1	D	1SS104,TPB2
UP-0589	D052	4322528	1	D	1S2076ARE
UP-0589	IC050-IC051	1253617	2	OPIC	uPC4062C DUAL
UP-0589	IC052	1301601	1	MIC	HD14538BP (MC14538BCP)
UP-0589	IC053	1300237	1	MIC	MC14013BCP (CD4013BE)

ASSY	CKT NO.	PART NO.	Q'TY	DESCRIPTION
UP-0589	IC054	1302298	1	MIC HD14001BP(MC14001BCP)
UP-0589	IC055	1300638	1	MIC HD14053BP(MC14053BCP)
UP-0589	IC056	1300763	1	MIC HD14066BP (MC14066BCP)
UP-0589	IC057	1300611	1	MIC HD14051BP(MC14051BCP)
UP-0589	IC058-IC061	1253715	4	OPIC uPC812C(LF412CN)2FET
UP-0589	IC062	1204867	1	AIC HA17903PS comparator
UP-0589	IC063	1253617	1	OPIC uPC4062C DUAL

AG-820PA 02 HEAD AMPLIFIER CHASSIS PART

AG-820PA	CN002	5350291	1	CCN2 HR16-13R-5S(04) green

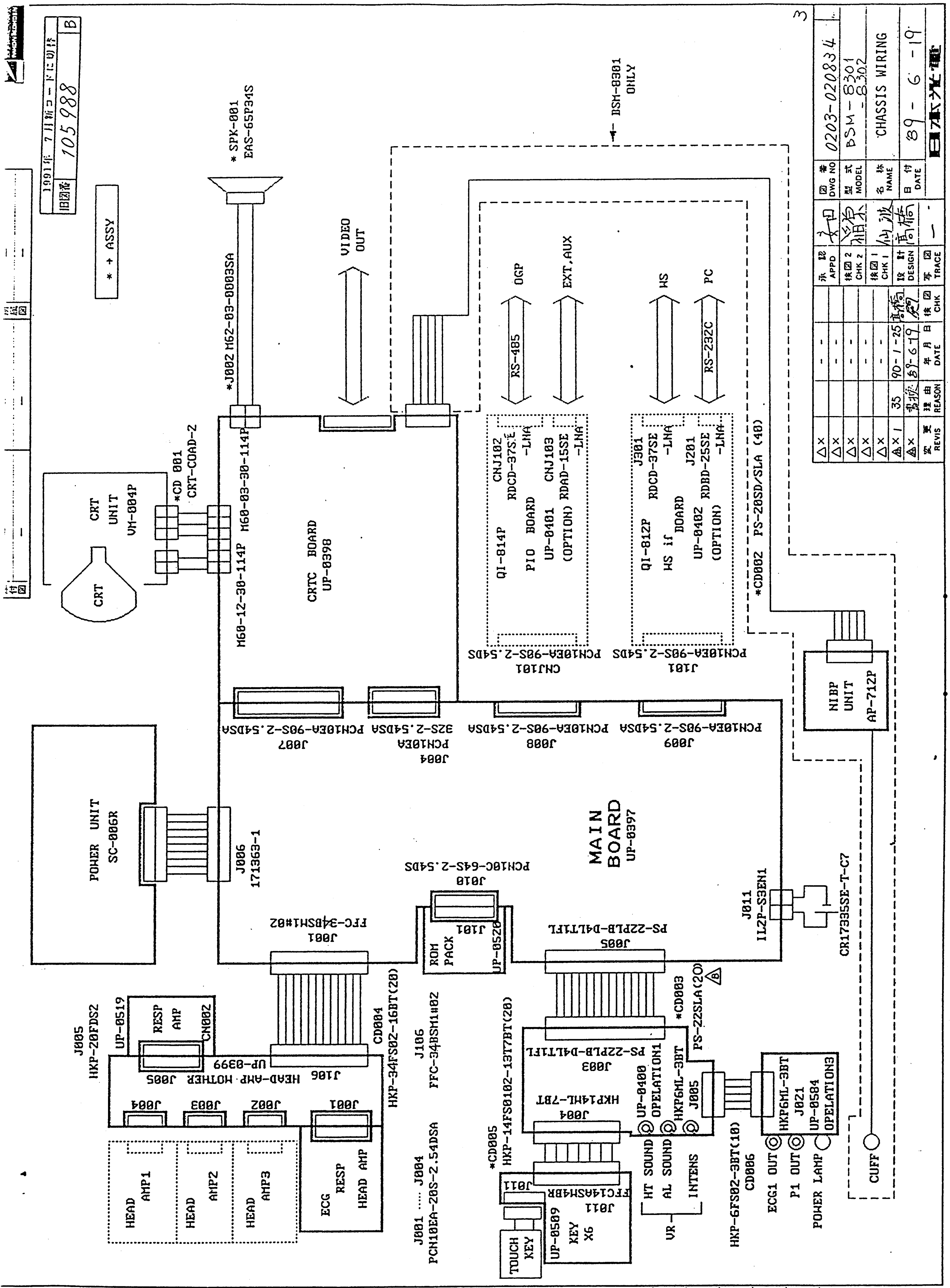
UP-0592 02 HEAD AMPLIFIER BOARD

UP-0592	CN001	5427877	1	PCN PCN10EA-20P-2.54DS(05)
UP-0592	CN003	5428234	1	PCN M60-04-30-114P
UP-0592	C001-C002	4312557	2	TC04 204M2002 106MB(10uF/20V)
UP-0592	C003-C004	4317525	2	CEC1 TP D55Y5V1H 104Z 5-W
UP-0592	C005	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0592	C006	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-0592	C007	4315162	1	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0592	C008	4317525	1	CEC1 TP D55Y5V1H 104Z 5-W
UP-0592	C009	4317632	1	CEC2 DD05-989B 471K500 (470pF)
UP-0592	C010-C011	4315162	2	FLC1 ECQ-B 1H 103JZ3 0.01uF
UP-0592	D001-D006	4322528	6	D 1S2076ARE
UP-0592	D007-D012	4322519	6	D 1SS104,TPB2
UP-0592	GA001	2100424	1	GA Y08-2100B
UP-0592	IC001	1251601	1	REG uPC78L05J (NJM78L05A)
UP-0592	IC002	1252494	1	REG uPC79L05J (NJM79L05A)
UP-0592	IC003	1300638	1	MIC HD14053BP(MC14053BCP)
UP-0592	IC004	1601946	1	MD EHD-HA1270 ISOLATE
UP-0592	IC005	1253519	1	REG LT1009CZ 2.5VREF
UP-0592	IC006	1300504	1	MIC HD14040BP (MC14040BCP)
UP-0592	IC007	1300611	1	MIC HD14051BP(MC14051BCP)
UP-0592	IC008	1253715	1	OPIC uPC812C(LF412CN)2FET
UP-0592	IC009-IC010	1253279	2	OPIC LT1001CN8 LOW DRIFT
UP-0592	Q001-Q002	4335069	2	TRC 2SC1213AKDTZ
UP-0592	T001	3772365	1	PLTF T3772365 EP10PS
UP-0592	T002	3772356	1	PLTF T3772356 EP10IS
UP-0592	VR001-VR002	4160809	2	TPOT GF06P 2KOHM

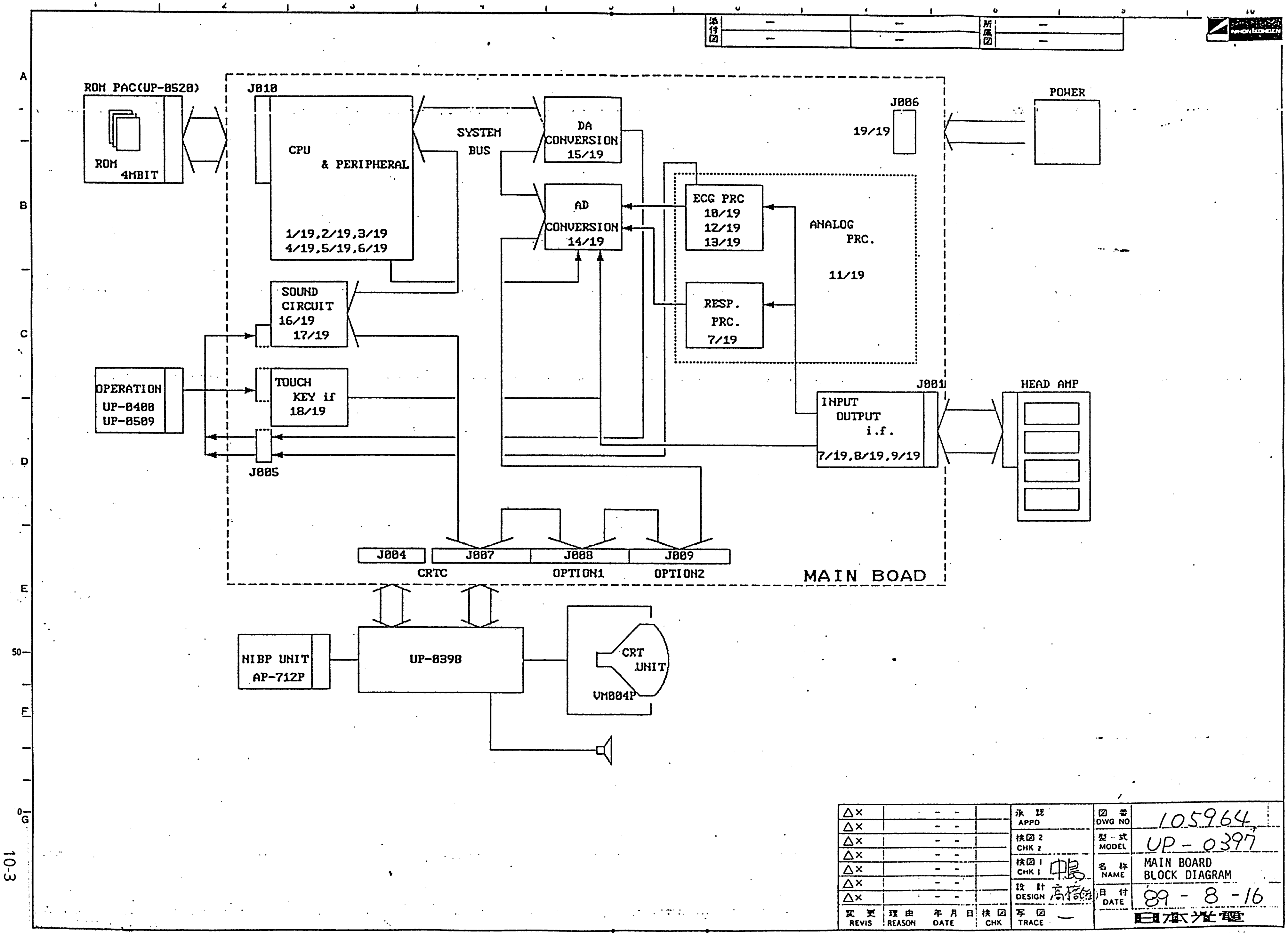
Section 10

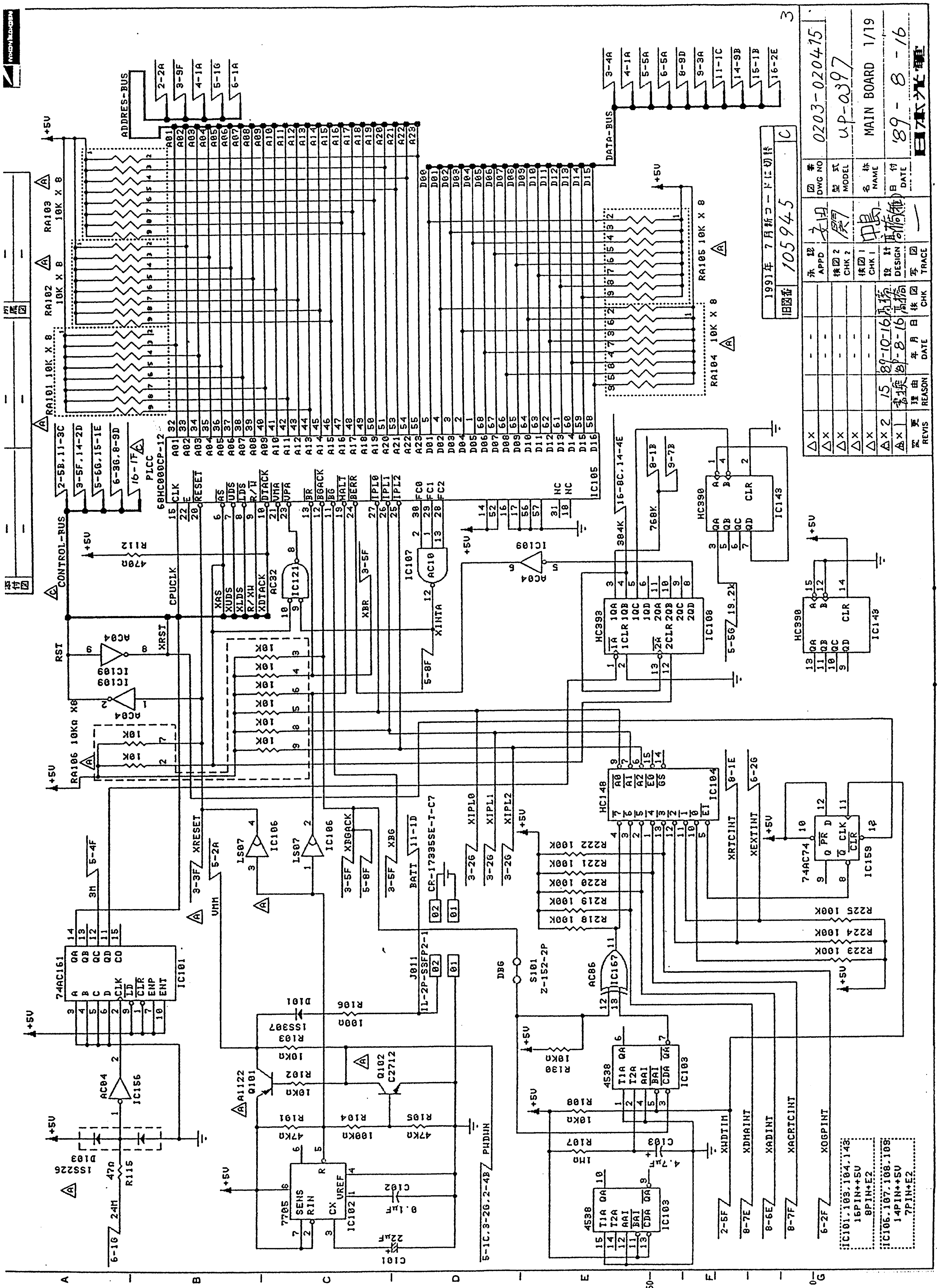
10. Circuit diagrams

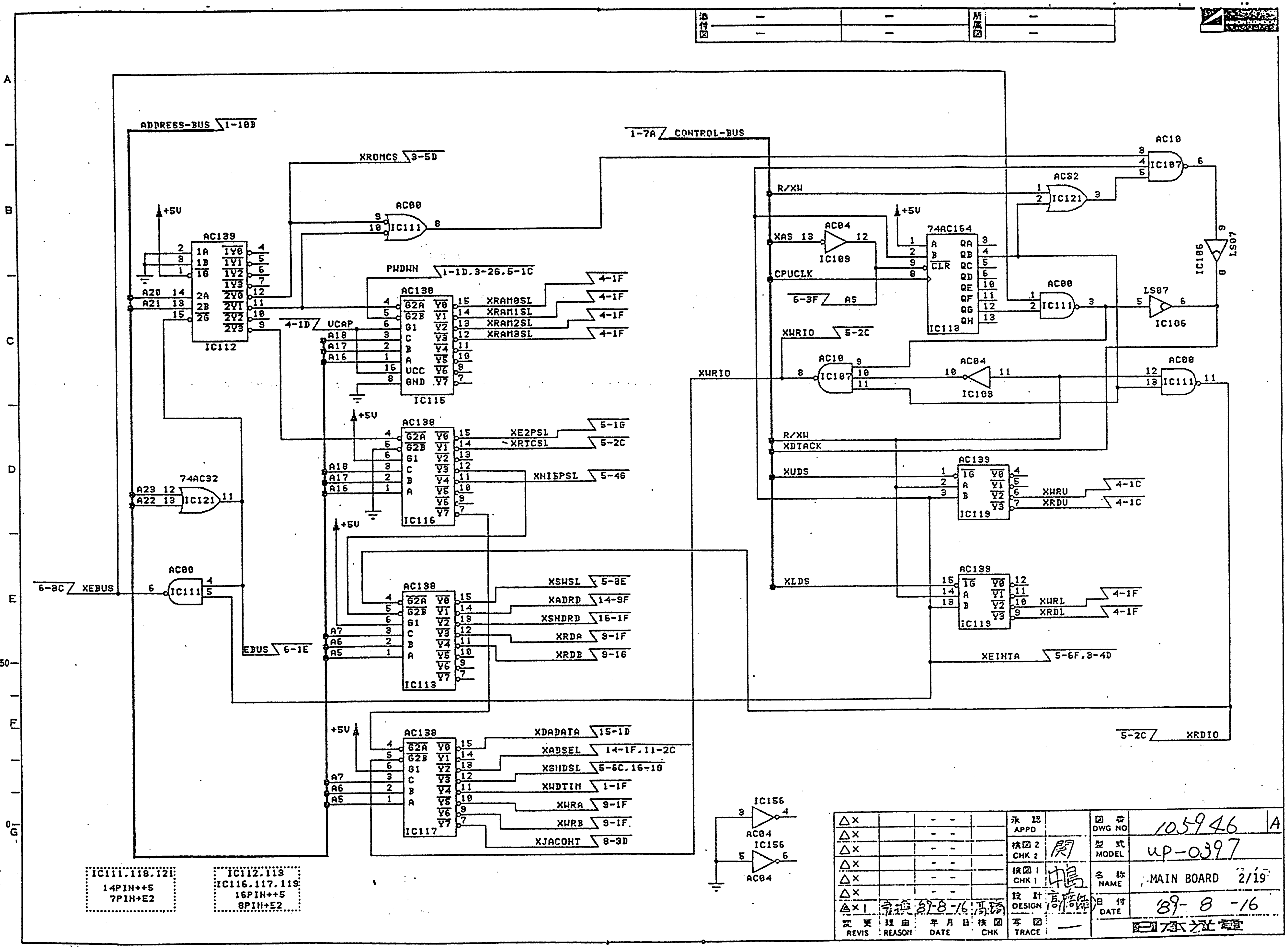
Page

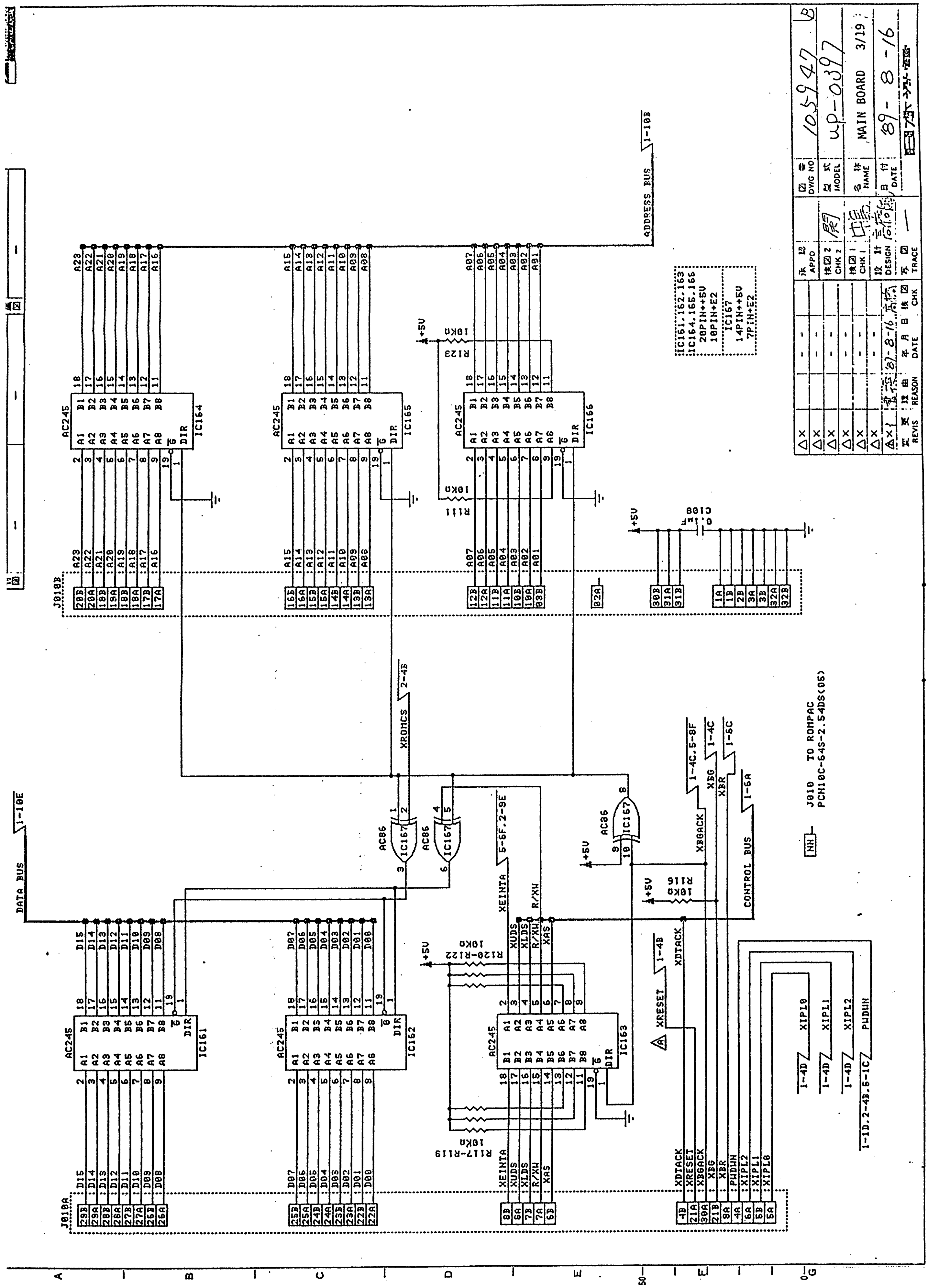


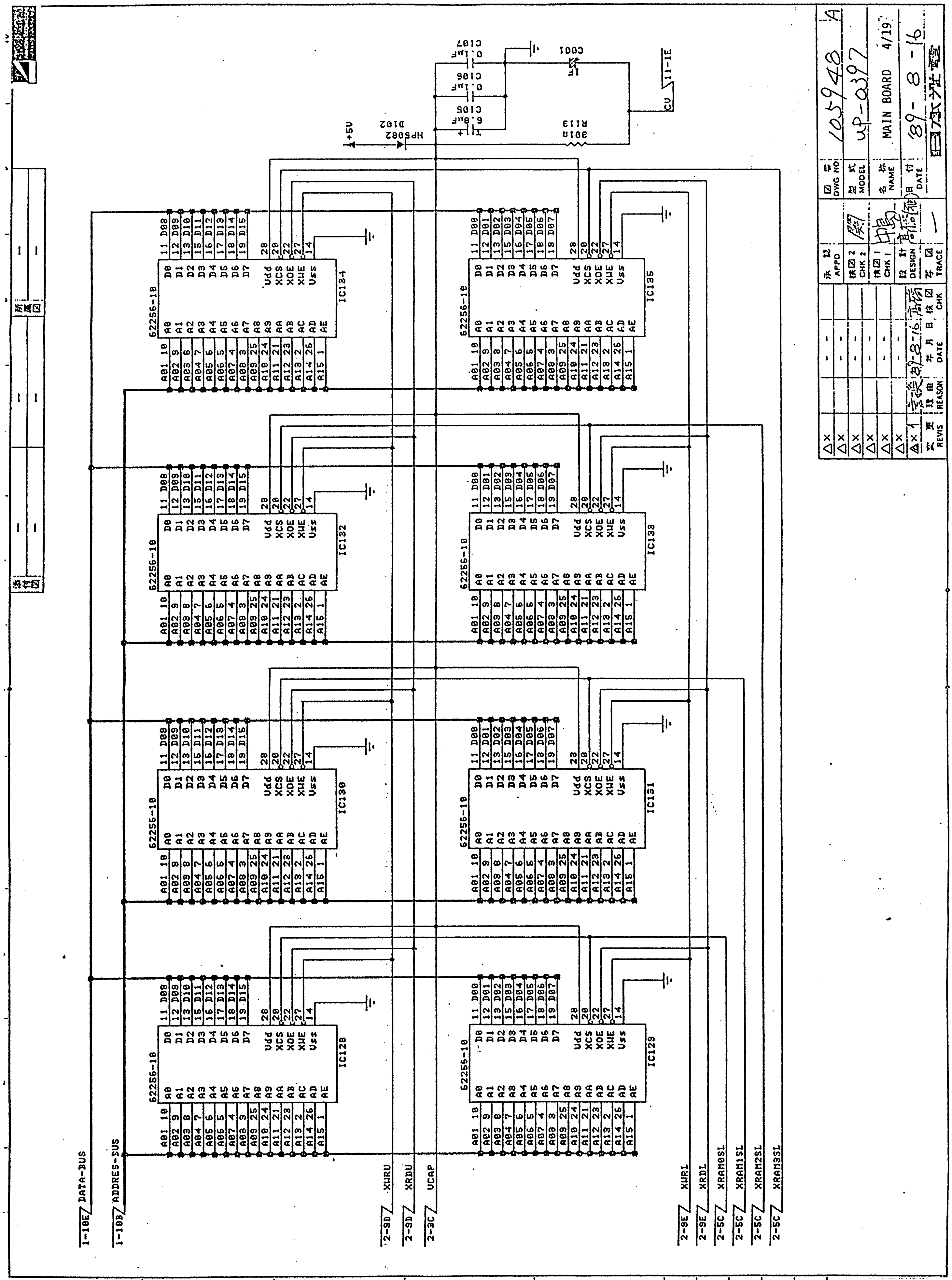
0203-020834
BSM-8301
-8302
CHASSIS WIRING
89 - 6 - 19
105988
* + ASSY
*SPK-001
EAS-65P34S
*J002 M62-03-0003SA
VIDEO OUT
BSM-8301 ONLY
OGP
EXT.AUX
HS
PC
RS-485
RS-232C
CRT
CRT UNIT
VM-004P
*CD 001
CRT-COAD-2
M60-03-30-114P
M60-12-30-114P
CRTC BOARD
UP-0398
QI-814P
PIO BOARD
UP-0401
(OPTION)
CNJ102 RDCD-37SE-LNA
CNJ103 RDAD-15SE-LNA
QI-812P
HS if BOARD
UP-0402
(OPTION)
J301 RDCD-37SE-LNA
J201 RDBD-25SE-LNA
*CD002 PS-20SD/SLA (40)
CNJ101 PCN10EA-90S-2.54DS
J101 PCN10EA-90S-2.54DS
NIBP UNIT
AP-712P
J007 PCN10EA-90S-2.54DSA
J004 PCN10EA 32S-2.54DSA
J008 PCN10EA-90S-2.54DSA
J009 PCN10EA-90S-2.54DSA
POWER UNIT
SC-006R
J006
171363-1
MAIN BOARD
UP-0397
J010 PCN10C-64S-2.54DS
J011
IL2P-S3EN1
CR17335SE-T-C7
J001 FFC-34BSM1#02
J101
ROM PACK
UP-0520
J005 PS-22PLB-D4LT1FL
CD004 HKP-34FS02-16BT(20)
J106 FFC-34BSM1#02
*CD003 PS-22SLA(20)
J005 HKP-20FDS2
UP-0519
RESP AMP
CN002
UP-0399
HEAD-AMP MOTHER J005
J106
J004
J003
J002
J001
J003 PS-22PLB-D4LT1FL
UP-0400 OPELATION1
J004 HKP14HL-7BT
J005 HKP6ML-3BT
HKP6ML-3BT
J021
UP-0584
OPELATION3
HEAD AMP1
HEAD AMP2
HEAD AMP3
ECG RESP HEAD AMP
J001 ..... J004
PCN10EA-20S-2.54DSA
*CD005
HKP-14FS0102-13T7BT(20)
J011
FFC14ASM4BR
J011
UP-0509
KEY X6
TOUCH KEY
HT SOUND
AL SOUND
INTENS
VR
HKP-6FS02-3BT(10)
CD006
ECG1 OUT
P1 OUT
POWER LAMP
CUFF

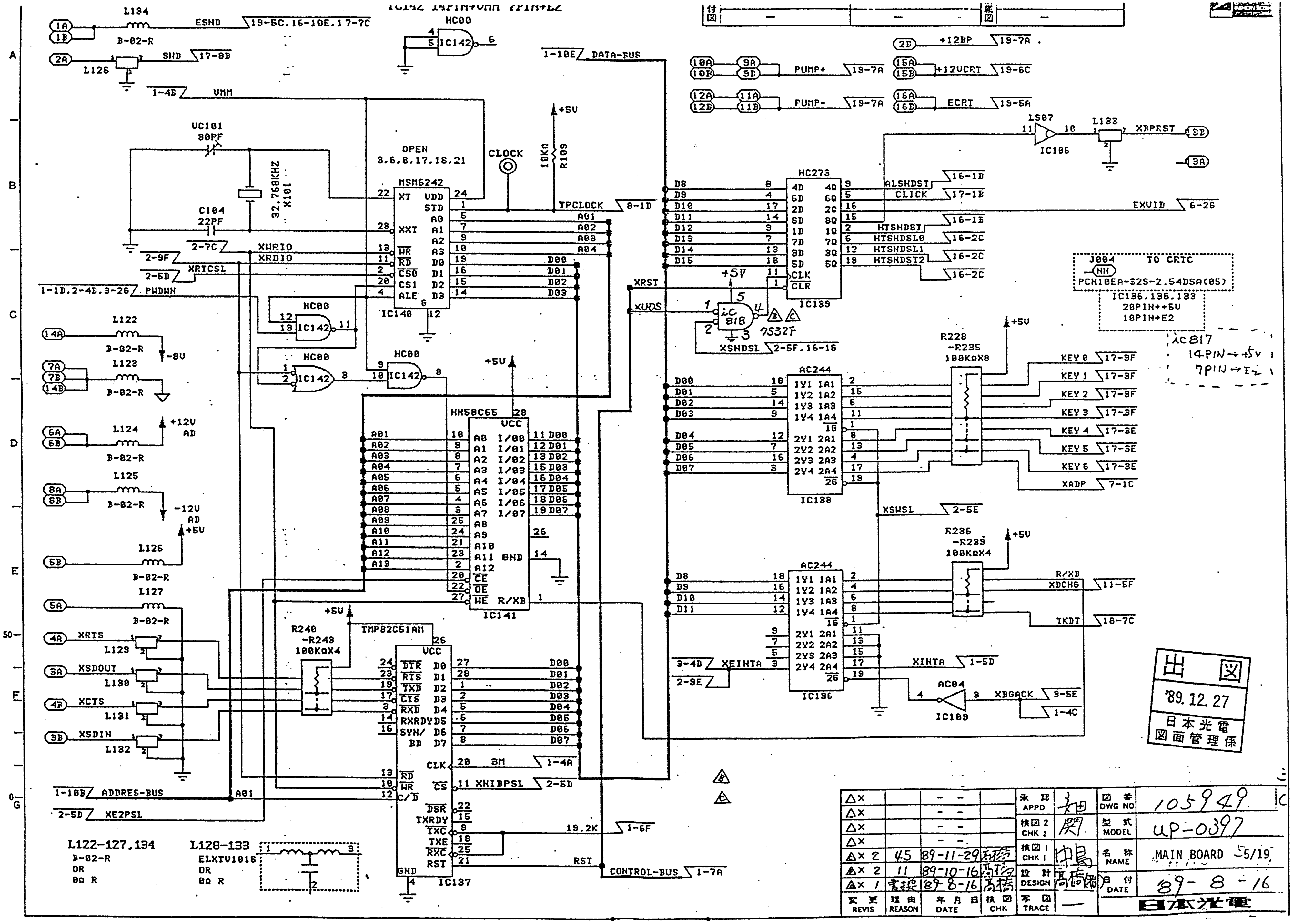

ROM PAC(UP-0520)
ROM
4MBIT
J010
CPU
& PERIPHERAL
1/19,2/19,3/19
4/19,5/19,6/19
SYSTEM
BUS
DA
CONVERSION
15/19
AD
CONVERSION
14/19
J006
19/19
POWER
ECG PRC
10/19
12/19
13/19
ANALOG
PRC.
11/19
RESP.
PRC.
7/19
SOUND
CIRCUIT
16/19
17/19
OPERATION
UP-0400
UP-0509
TOUCH
KEY if
18/19
J005
J001
INPUT
OUTPUT
i.f.
7/19,8/19,9/19
HEAD AMP
J004
J007
J008
J009
CRTC
OPTION1
OPTION2
MAIN BOAD
NIBP UNIT
AP-712P
UP-0398
CRT
UNIT
VM004P
DWG NO 105964
MODEL UP-0397
NAME MAIN BOARD
BLOCK DIAGRAM
DATE 89-8-16
APPD
CHK 2
CHK 1 中島
DESIGN 高橋
TRACE —
REVIS
REASON
DATE
CHK
日本光電

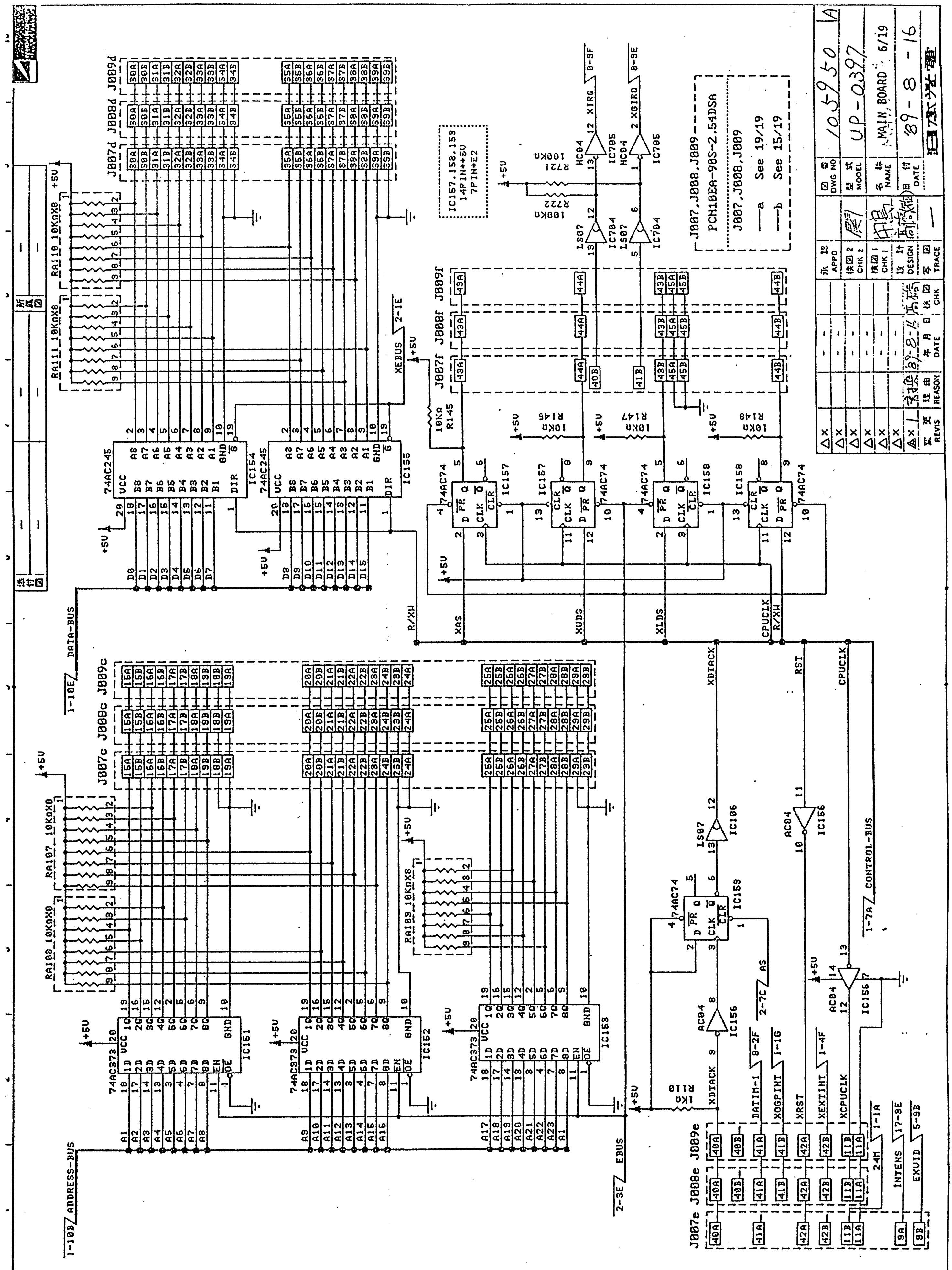

MAIN BOARD 1/19
0203-020415
UP-0397
'89-8-16


ADDRESS-BUS 1-10B
1-7A CONTROL-BUS
XROMCS 3-5D
PWDWN 1-1D.3-26.5-1C
4-1D VCAP
XRAM0SL 4-1F
XRAM1SL 4-1F
XRAM2SL 4-1F
XRAM3SL 4-1F
XE2PSL 5-1G
~XRTCSL 5-2C
XNISPSL 5-4G
XSWSL 5-8E
XADRD 14-9F
XSNDRD 16-1F
XRDA 9-1F
XRDB 9-1G
XDADATA 15-1D
XADSEL 14-1F.11-2C
XSNDSL 5-6C.16-10
XWDTIM 1-1F
XWRA 9-1F
XWRB 9-1F.
XJACONT 8-3D
6-8C XEBUS
EBUS 6-1E
R/XW
XAS
CPUCLK
6-3F AS
XWRIO 5-2C
XWRIO
XDTACK
XUDS
XLDS
XWRU 4-1C
XRDU 4-1C
XWRL 4-1F
XRDL 4-1F
XEINTA 5-6F.3-4D
5-2C XRDIO
AC139 IC112
AC138 IC115
AC138 IC116
AC138 IC113
AC138 IC117
74AC32 IC121
AC08 IC111
AC32 IC121
AC10 IC107
74AC164 IC118
AC04 IC109
LS07 IC106
AC139 IC119
IC156 AC04
IC111.118.121 14PIN++5 7PIN+E2
IC112.113 IC116.117.119 16PIN++5 8PIN+E2
図番 DWG NO 105946 A
型式 MODEL up-0397
名称 NAME MAIN BOARD 2/19
日付 DATE 89- 8 -16
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
添付図
所属図

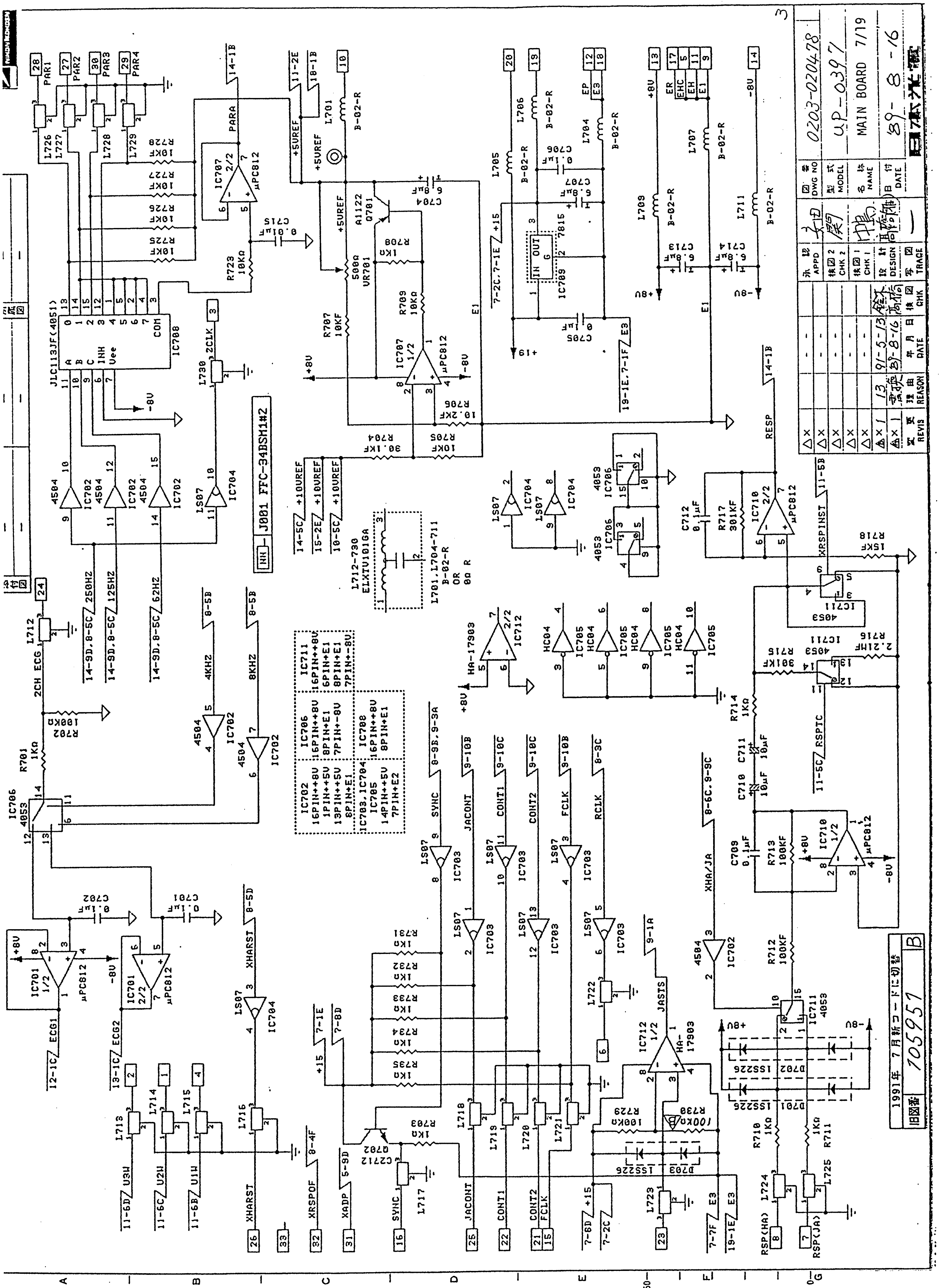

MAIN BOARD 3/19
ADDRESS BUS
DATA BUS
CONTROL BUS
J010 TO ROMPAC
PCN10C-64S-2.54DS(05)

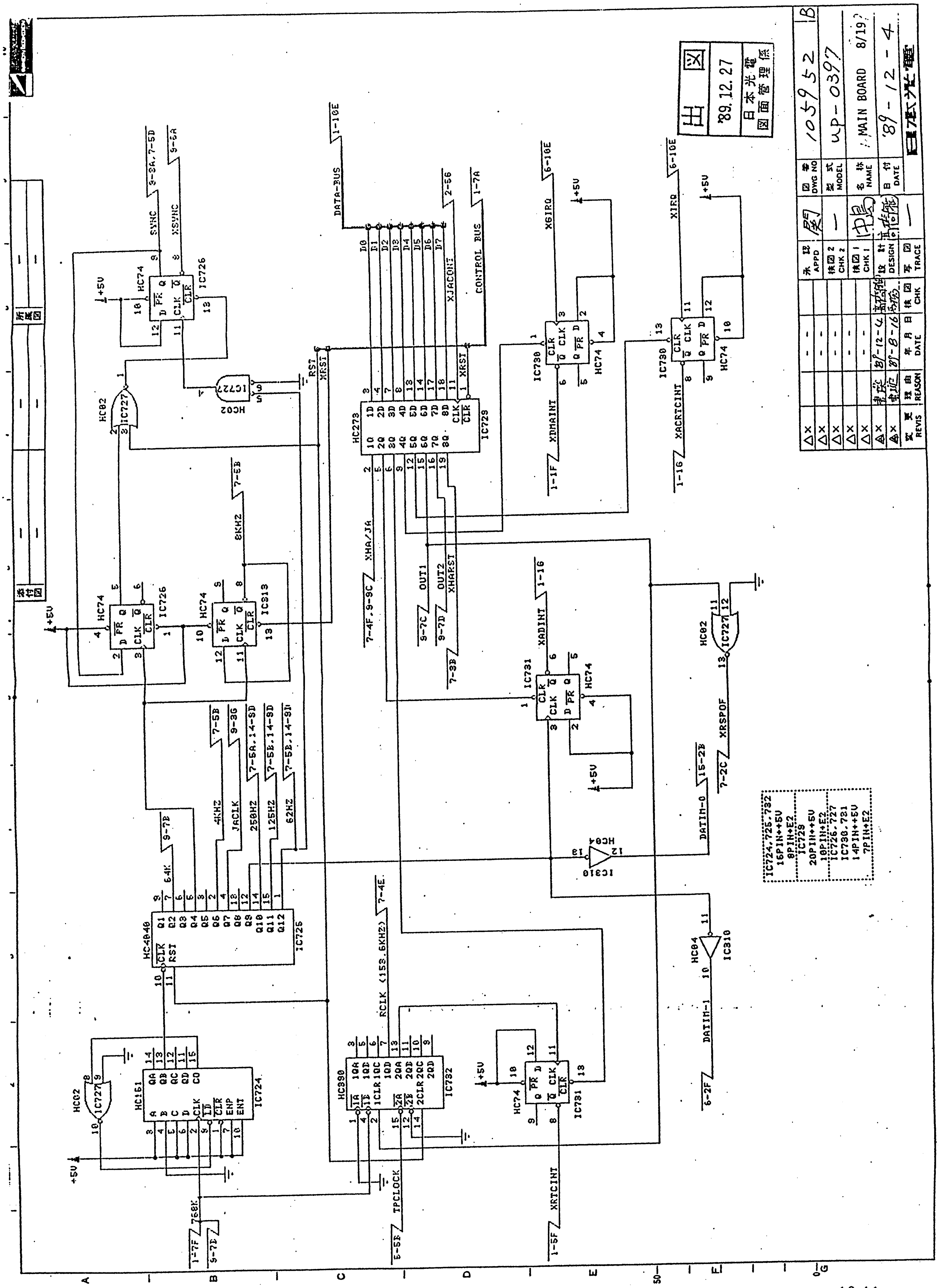

MAIN BOARD 4/19
DATA-BUS
ADDRES-BUS
62256-10
IC128
IC129
IC130
IC131
IC132
IC133
IC134
IC135
XWRU
XRDU
VCAP
XWRL
XRDL
XRAM0SL
XRAM1SL
XRAM2SL
XRAM3SL
HP5082 D102
+5V


MAIN BOARD 5/19
DWG NO 105949
MODEL UP-0397
DATE 89-8-16
日本光電
出図 '89.12.27 日本光電 図面管理係
HC273
AC244
HN58C65
MSN6242
TMP82C51AN
IC136
IC137
IC138
IC139
IC140
IC141
IC142
DATA-BUS
ADDRES-BUS
CONTROL-BUS
CLOCK
J004 TO CRTC
PCN10EA-S2S-2.54DSA(05)
L122-127,134 B-02-R OR 0Ω R
L128-133 ELXTV1016 OR 0Ω R

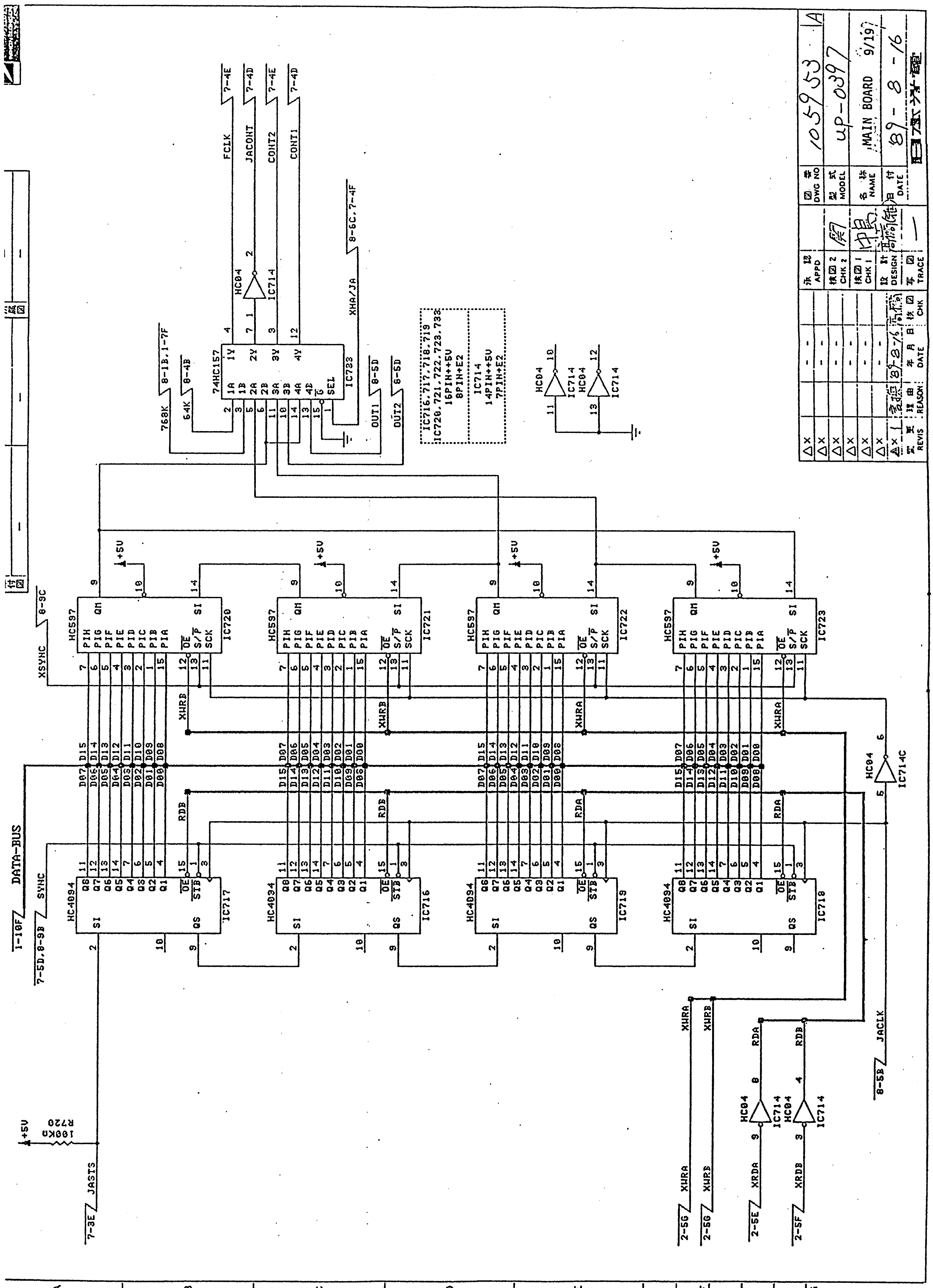


ADDRESS-BUS
DATA-BUS
CONTROL-BUS
EBUS
XEBUS
74AC373
74AC245
74AC74
IC151
IC152
IC153
IC154
IC155
IC157
IC158
IC159
IC156
IC106
IC704
IC705
J007,J008,J009
PCN10EA-90S-2.54DSA
J007,J008,J009
—a See 19/19
—b See 15/19
IC157,158,159
14PIN=+5V
7PIN=E2
MAIN BOARD 6/19
UP-0397
105950

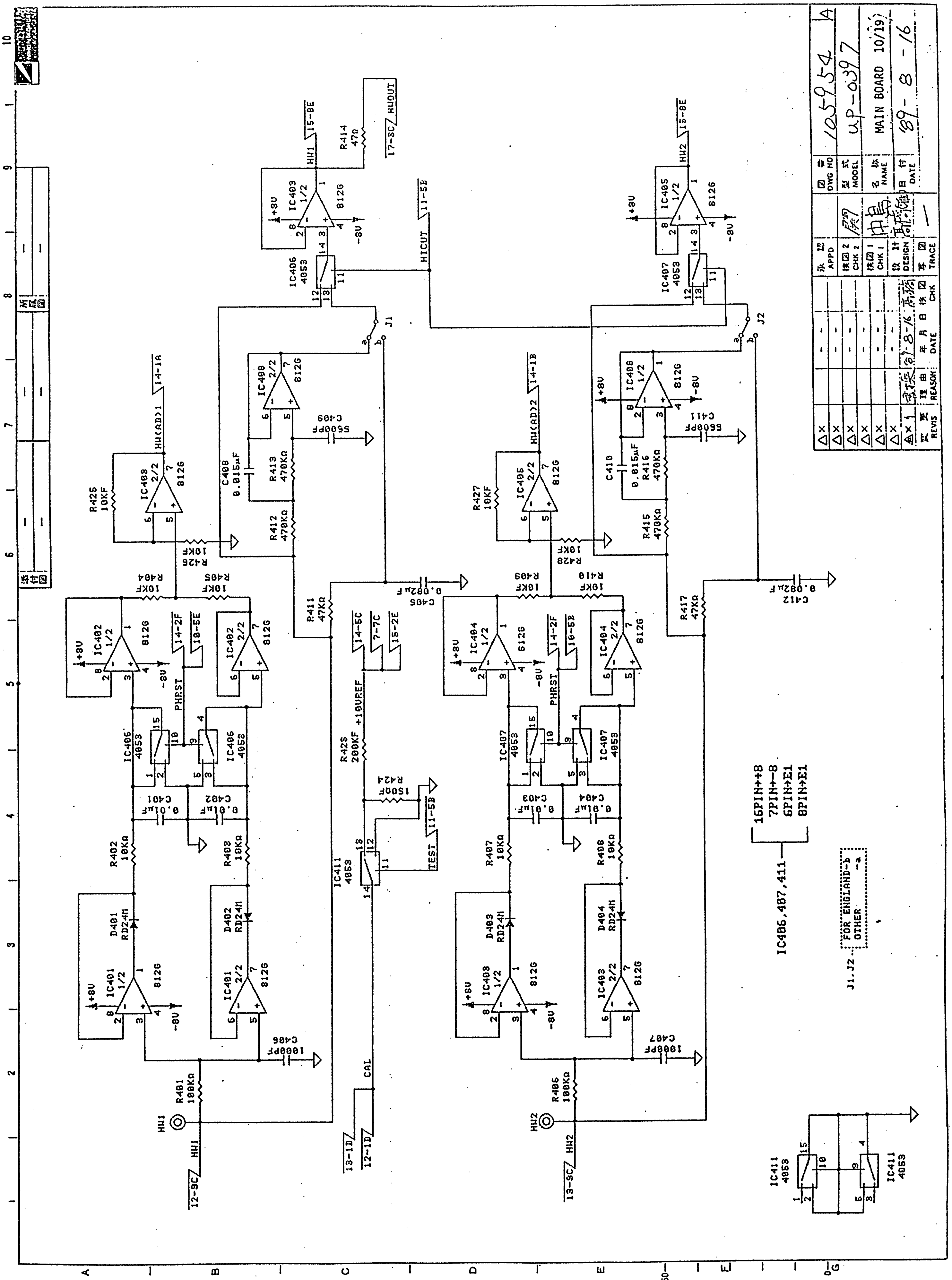

MAIN BOARD 7/19
0203-020478
UP-0397
89-8-16
1991年 7月新コードに切替
旧図番 105951
B
J001 FFC-34BSM1#2



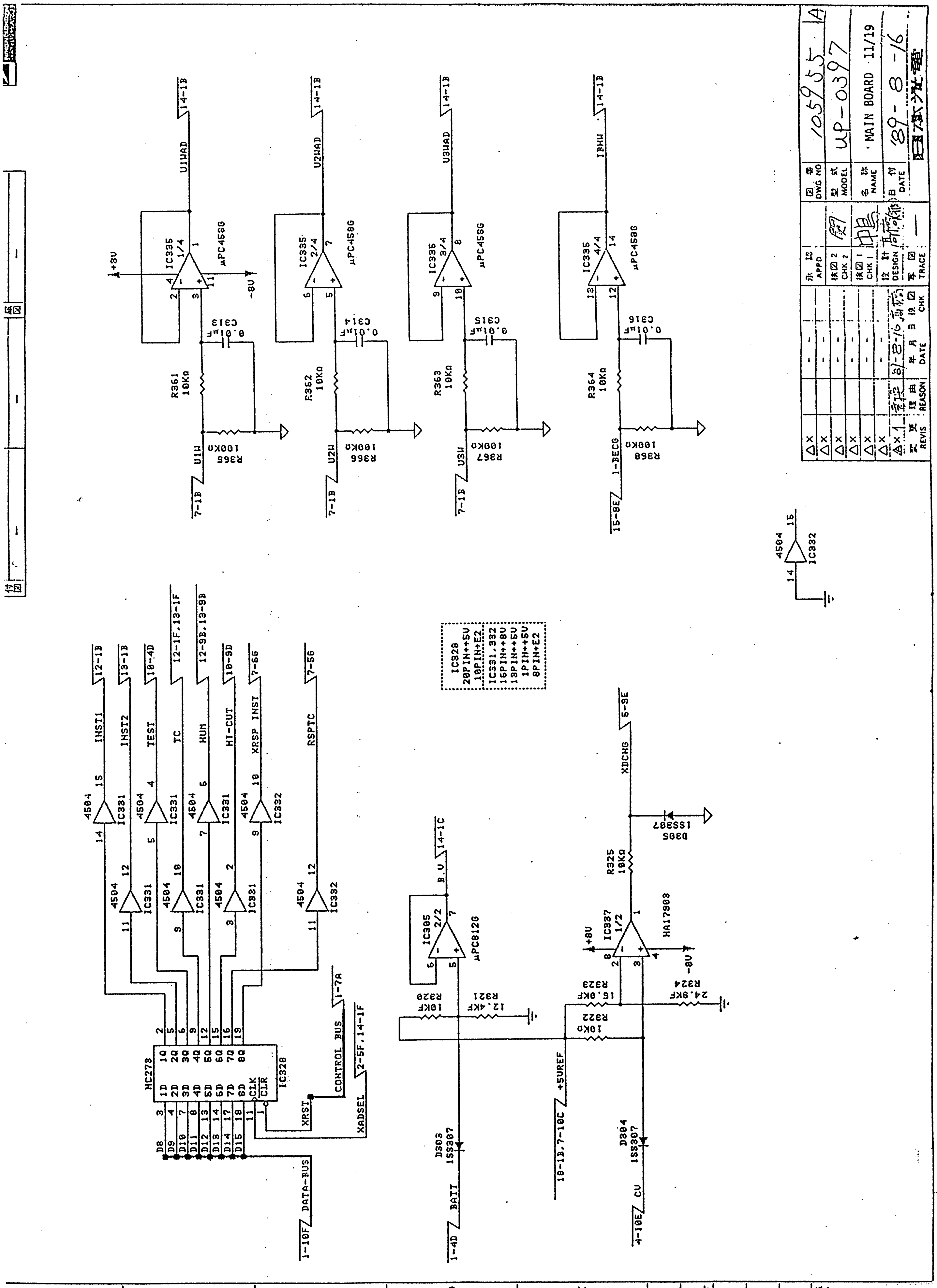
1059452
up-0397
MAIN BOARD 8/19
'89-12-4
'89.12.27
日本光電
図面管理係
DWG NO
MODEL
NAME
DATE
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATA-BUS
CONTROL BUS

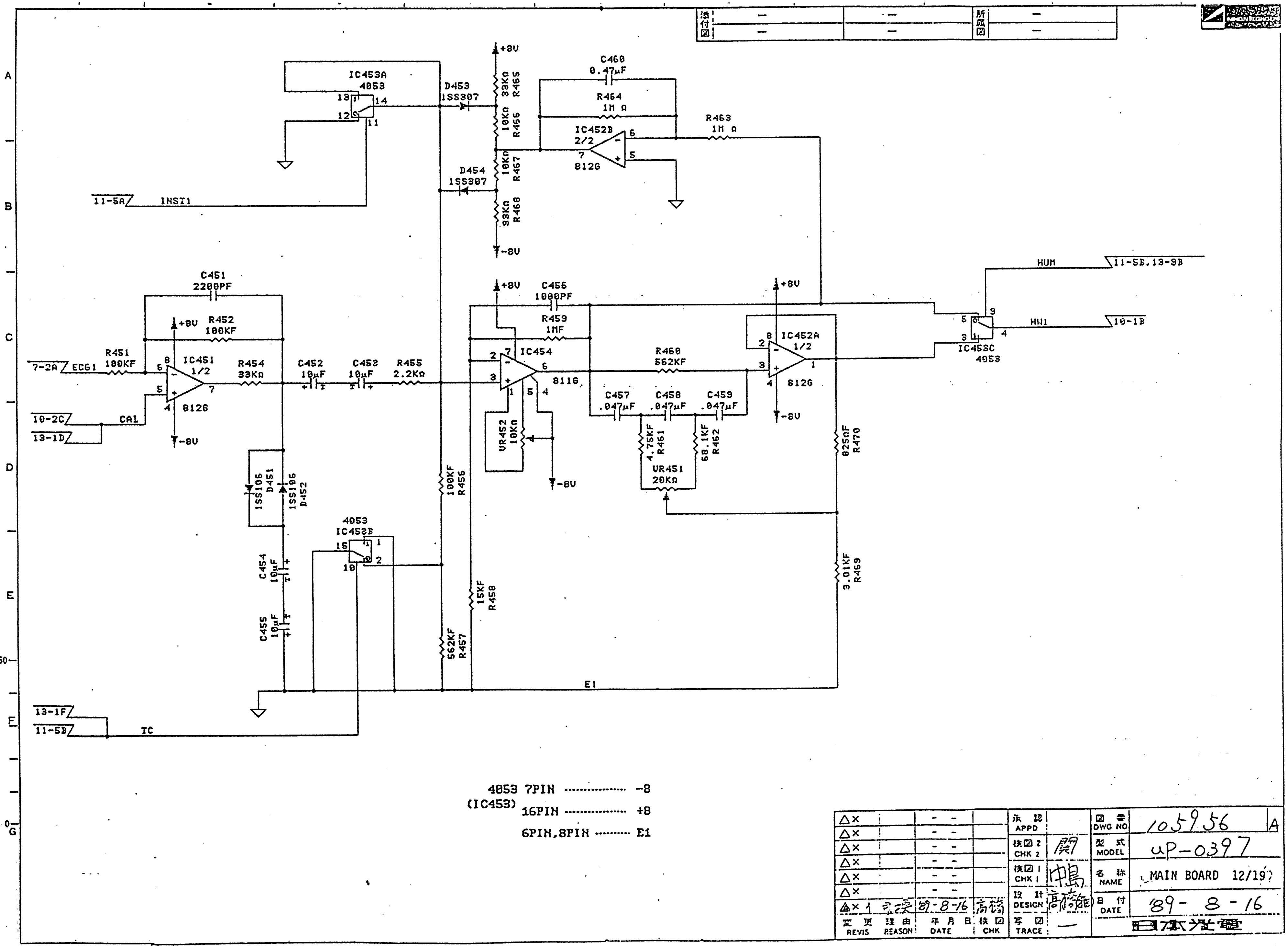


DATA-BUS
105953 A
UP-0397
MAIN BOARD 9/19
89-8-16



105954 A
UP-0397
MAIN BOARD 10/19
89-8-16
DWG NO
MODEL
NAME
DATE
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
IC406,407,411
16PIN→+8
7PIN→-8
6PIN→E1
8PIN→E1
J1,J2
FOR ENGLAND-b
OTHER -a

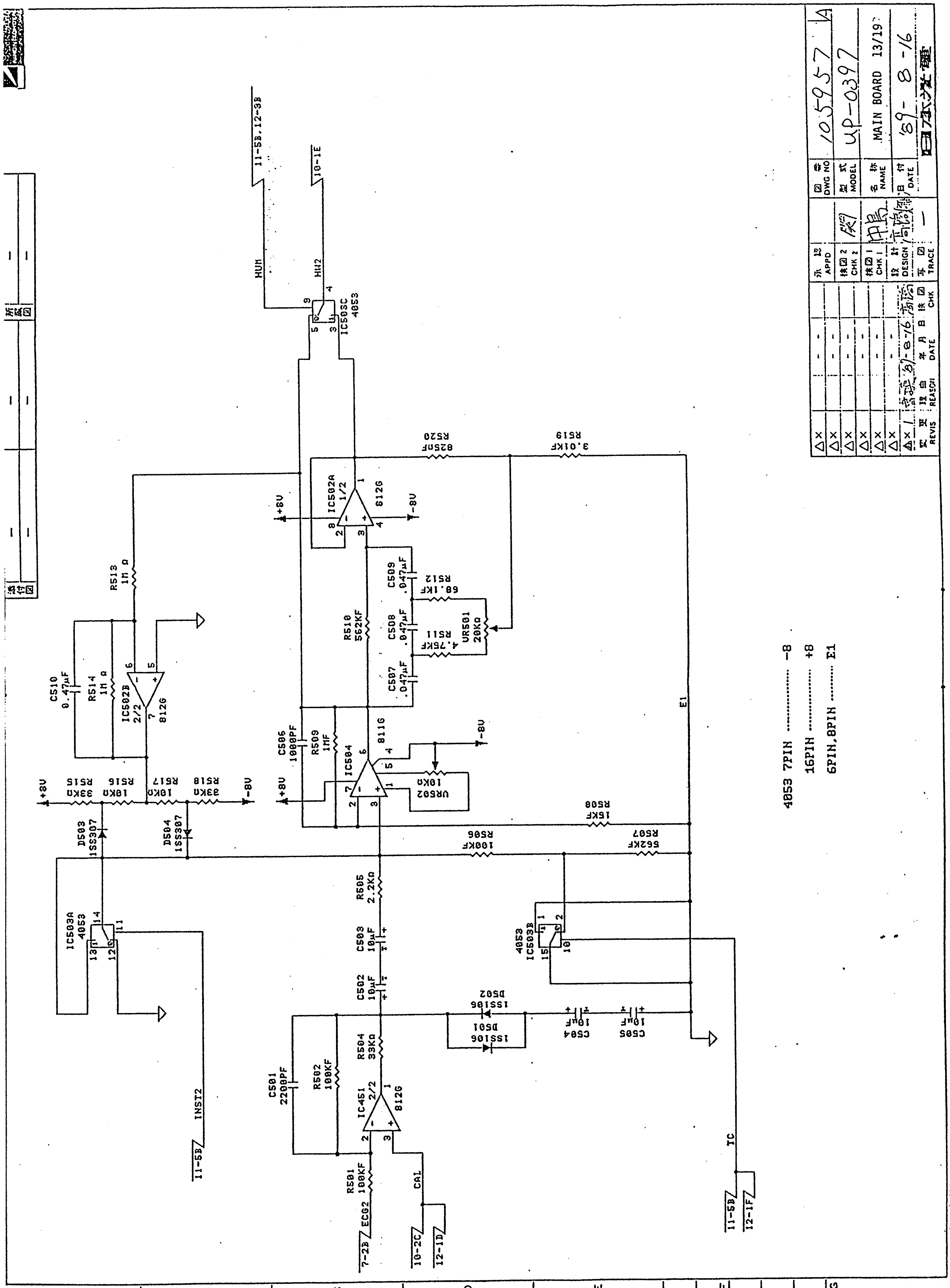

MAIN BOARD 11/19
UP-0397
HC273
IC328
DATA-BUS
CONTROL BUS
XADSEL
XRST
INST1
INST2
TEST
TC
HUM
HI-CUT
XRSP INST
RSPTC
XDCHG
+5VREF
BATT
CV
B.V
U1HAD
U2HAD
U3HAD
IBHW
U1W
U2W
U3W
1-BECG
μPC458G
μPC812G
HA17903
IC335
IC305
IC337
IC331
IC332
4504

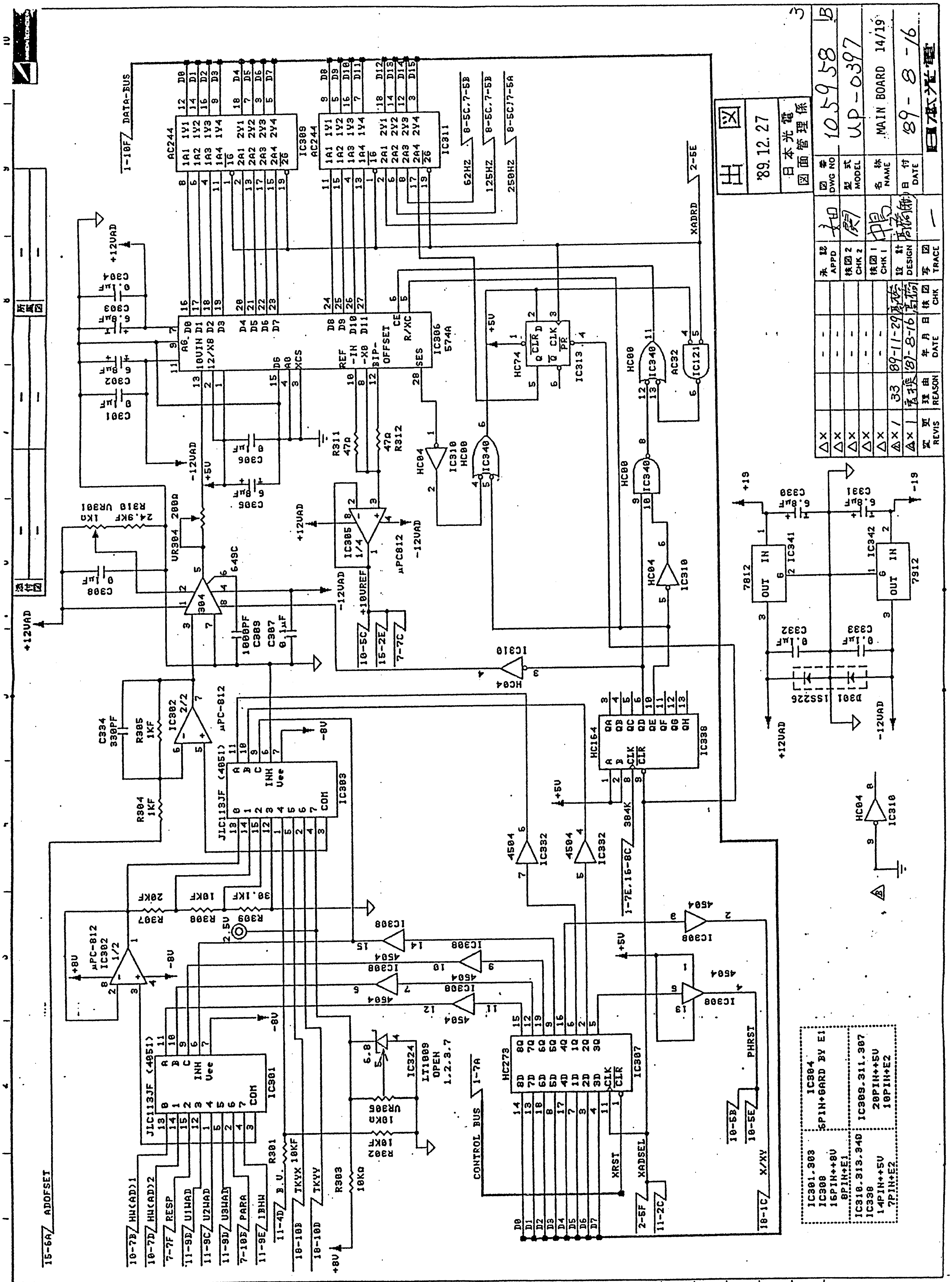


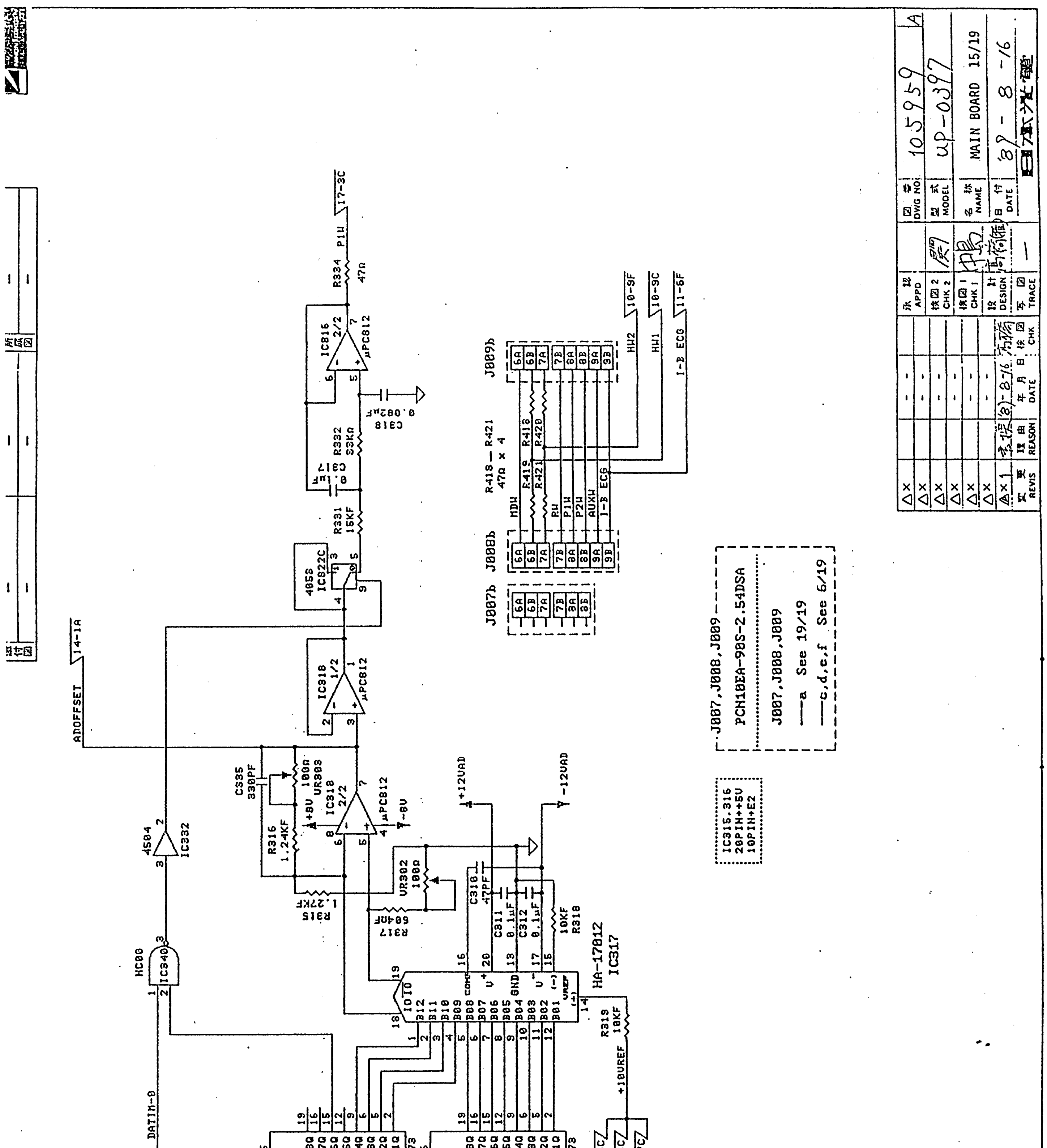
4053 7PIN .... -8
(IC453) 16PIN .... +8
6PIN,8PIN E1

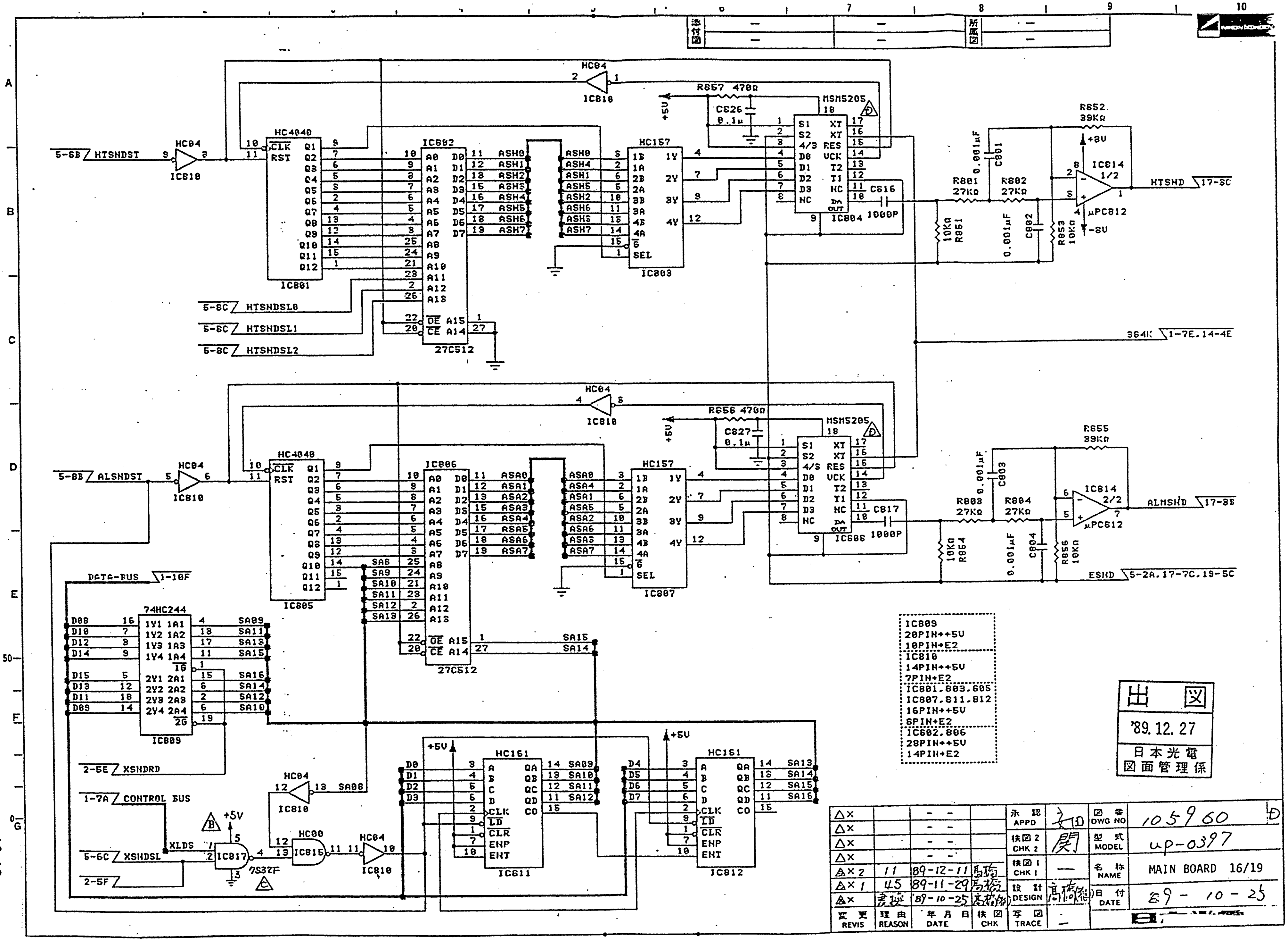
図番 DWG NO	105956 A
型式 MODEL	uP-0397
名称 NAME	MAIN BOARD 12/19?
日付 DATE	89-8-16
承認 APPD	
検図2 CHK 2	関
検図1 CHK 1	中島
設計 DESIGN	高橋
写図 TRACE	—

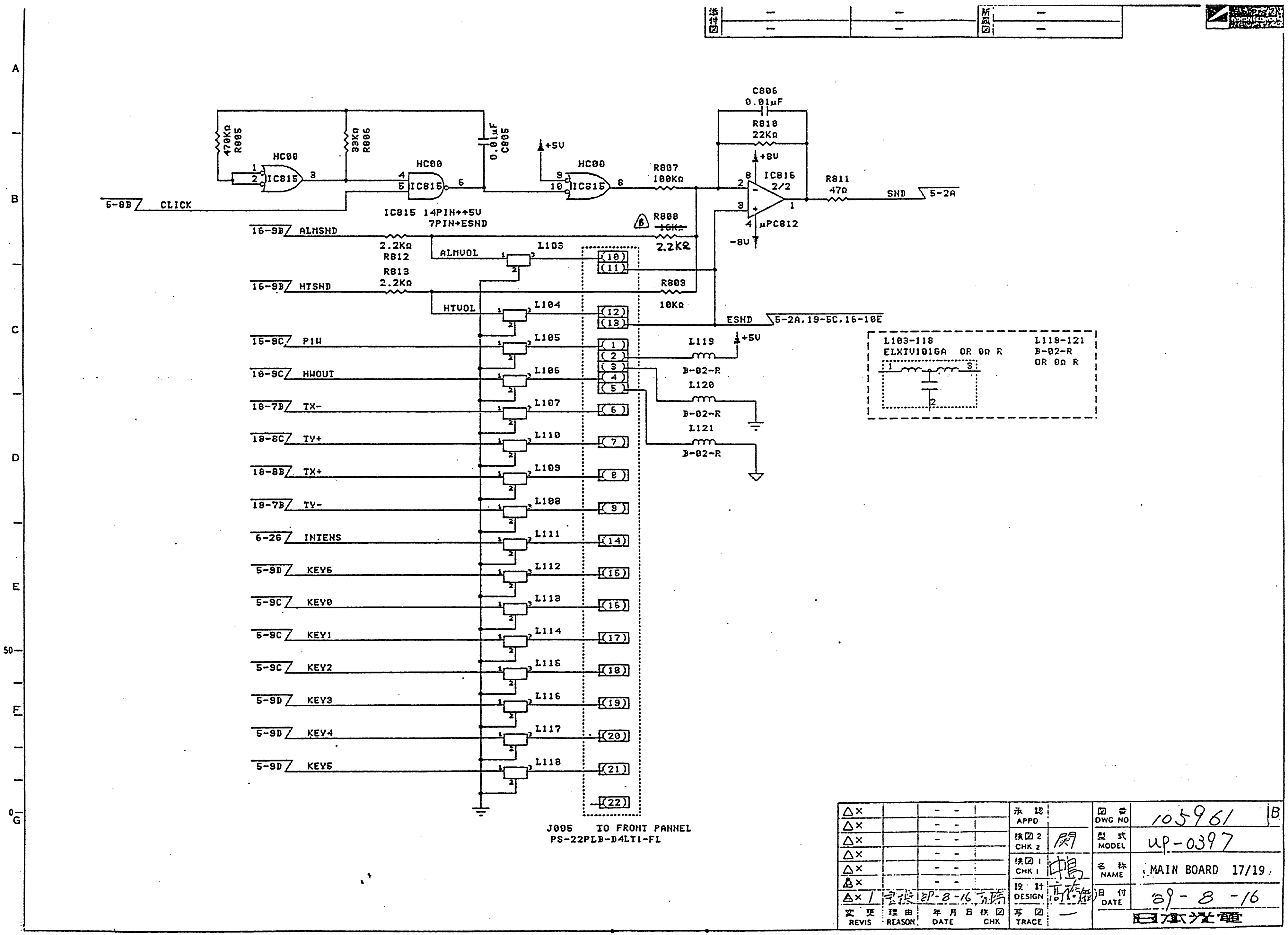
日本光電

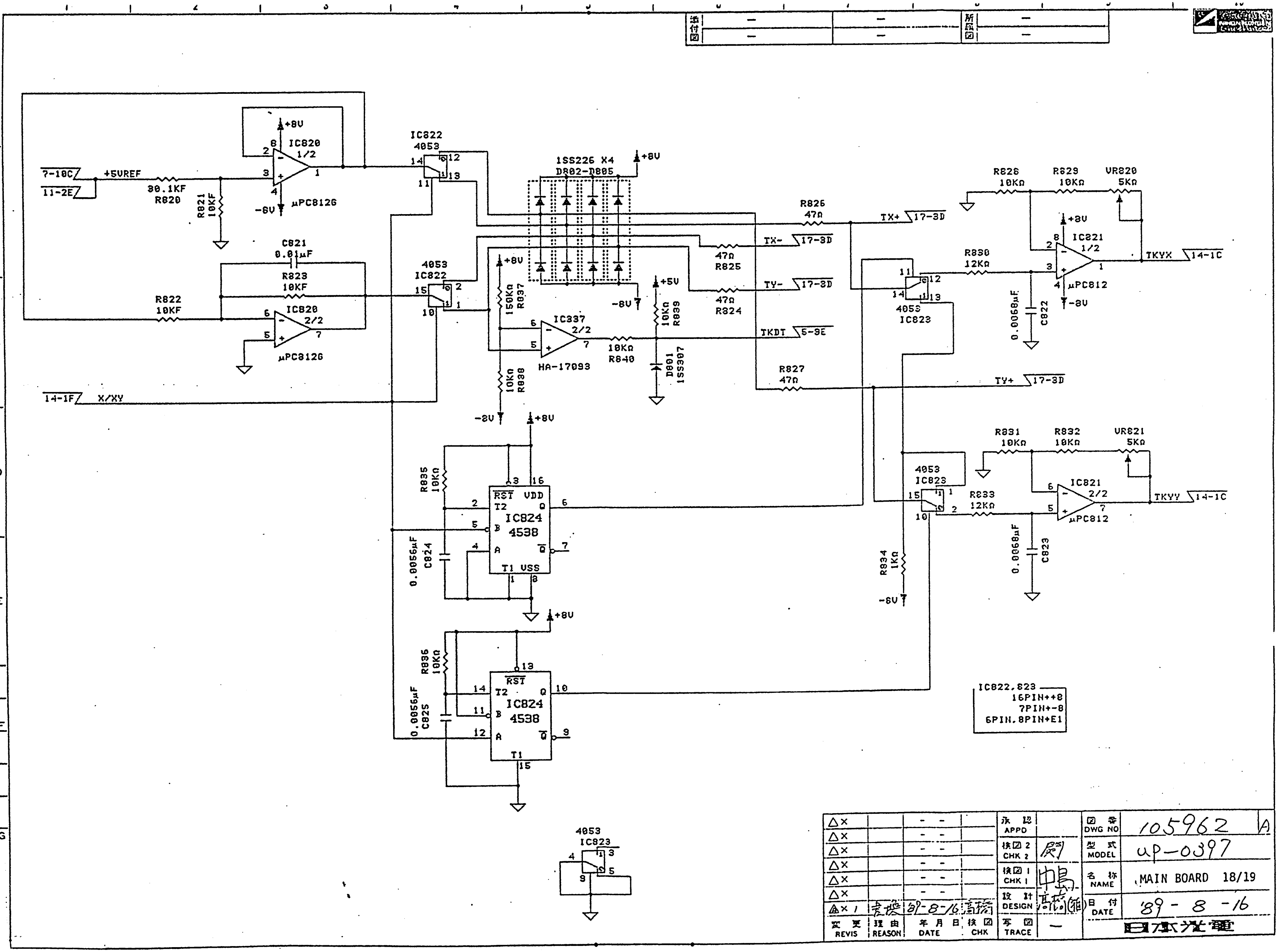

MAIN BOARD 13/19
4053 7PIN .... -8
16PIN .... +8
6PIN,8PIN E1


出図
'89.12.27
日本光電
図面管理係
DWG NO 1059583 B
MODEL UP-0397
NAME MAIN BOARD 14/19
DATE 89-8-16
日本光電
IC301.303 IC308 16PIN+8V 8PIN+E1
IC304 6PIN+GARD BY E1
IC309.311.307 20PIN+5V 10PIN+E2
IC310.313.340 IC338 14PIN+5V 7PIN+E2

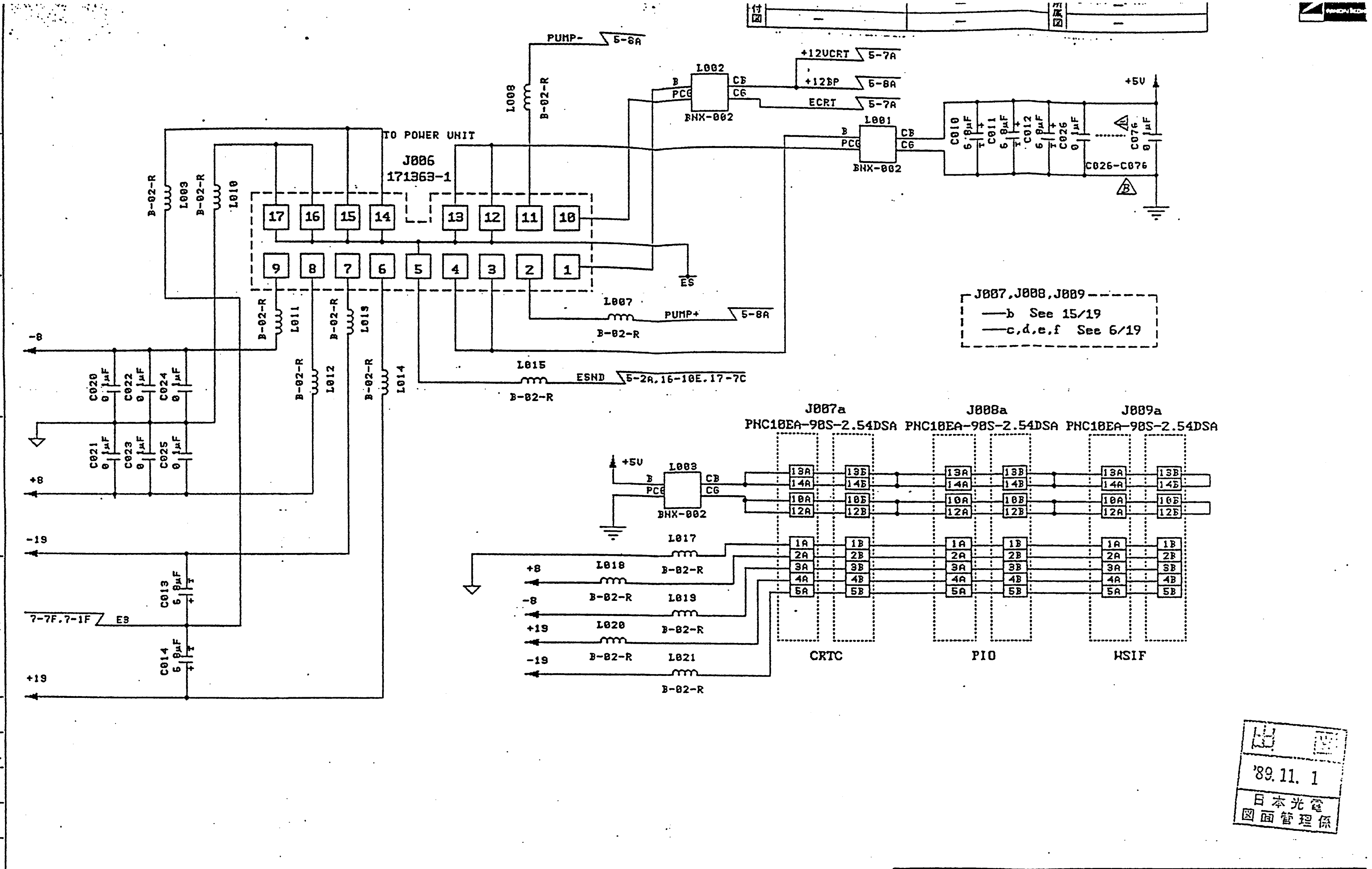

MAIN BOARD 15/19
105959
UP-0397
J007,J008,J009
PCN10EA-9DS-2.54DSA
J007,J008,J009
a See 19/19
c,d,e,f See 6/19
IC315,316
20PIN→+5V
10PIN→E2
HA-17012
IC317
74HC273
IC315
IC316
DATA-BUS
CONTROL BUS
XDADATA
ADOFFSET
DATIN-0
μPC812
IC318
IC816
4053
IC822C
R418 — R421
47Ω × 4
J007b
J008b
J009b
+12VAD
-12VAD
+10VREF


HC4040
IC801
IC802
27C512
HC157
IC803
MSM5205
IC804
C816 1000P
R857 470Ω
C826 0.1μ
R852 39KΩ
IC814 1/2
μPC812
R801 27KΩ
R802 27KΩ
R851 10KΩ
R853 10KΩ
C801 0.001μF
C802 0.001μF
HTSHD 17-5C
5-6B HTSHDST
5-8C HTSHDSL0
5-8C HTSHDSL1
5-8C HTSHDSL2
S64K 1-7E.14-4E
IC805
IC806
IC807
IC808
C817 1000P
R856 470Ω
C827 0.1μ
R855 39KΩ
IC814 2/2
R803 27KΩ
R804 27KΩ
R854 10KΩ
R856 10KΩ
C803 0.001μF
C804 0.001μF
ALMSHD 17-3B
5-8B ALSNDST
ESHD 5-2A.17-7C.19-5C
DATA-BUS 1-10F
74HC244
IC809
2-5E XSHDRD
1-7A CONTROL BUS
5-6C XSHDSL
2-5F
XLDS
IC817 7S32F
HC00 IC815
HC04 IC810
HC161
IC811
IC812
IC809 20PIN++5V 10PIN+E2
IC810 14PIN++5V 7PIN+E2
IC801.803.805 IC807.811.812 16PIN++5V 8PIN+E2
IC802.806 28PIN++5V 14PIN+E2
出図
'89.12.27
日本光電
図面管理係
図番 DWG NO 105960 D
型式 MODEL up-0397
名称 NAME MAIN BOARD 16/19
日付 DATE 89-10-25
△×2 11 89-12-11
△×1 45 89-11-29
△× 89-10-25
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE

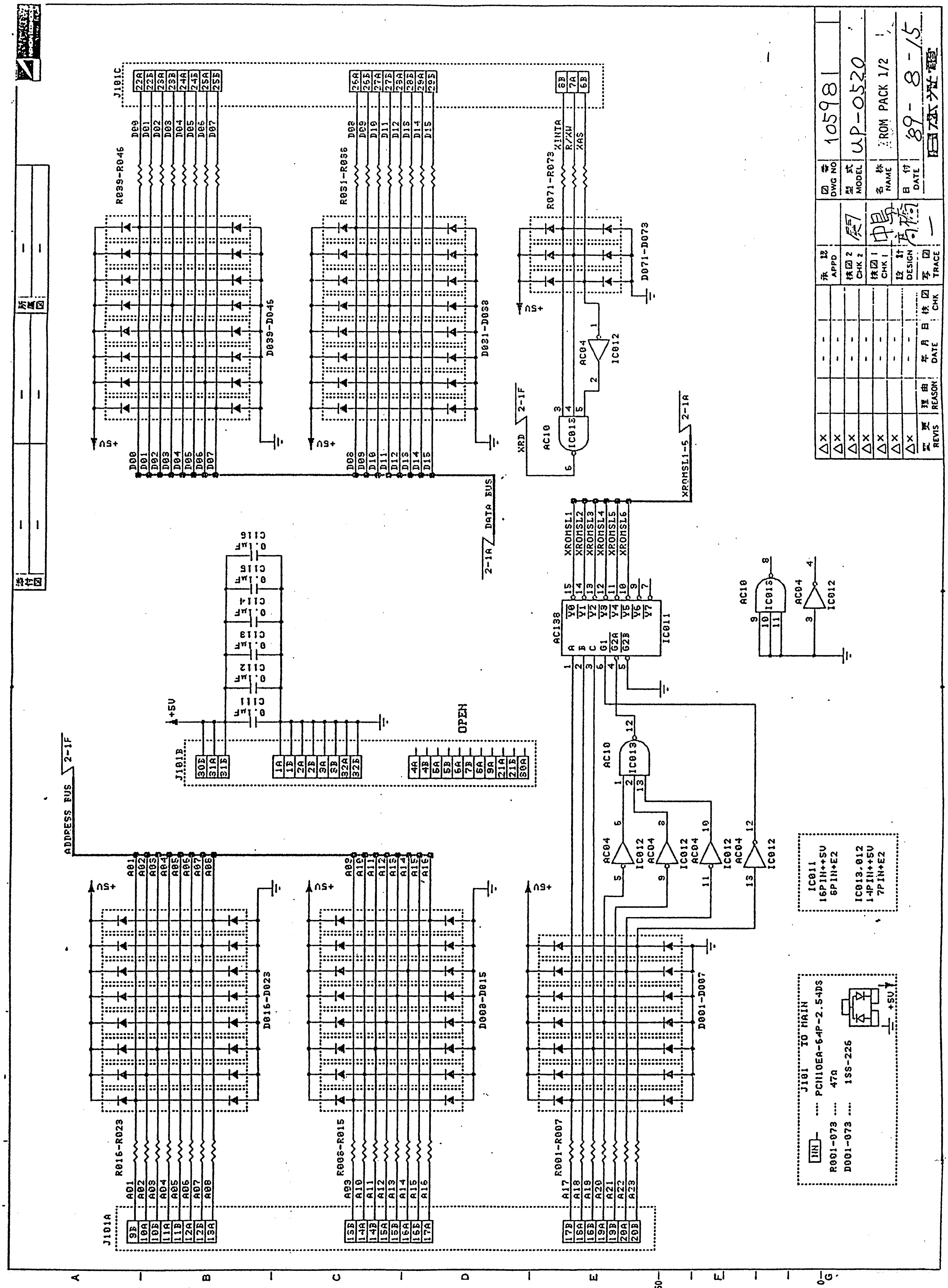

HC00
IC815
R805 470KΩ
R806 33KΩ
C805 0.01μF
+5V
6-8B CLICK
IC815 14PIN→+5V 7PIN→ESND
R807 100KΩ
C806 0.01μF
R810 22KΩ
+8V
IC816 2/2
μPC812
-8V
R811 47Ω
SND 5-2A
R808 10KΩ 2.2KΩ
R809 10KΩ
16-9B ALMSND
2.2KΩ R812
ALMVOL
L103
16-9B HTSND
R813 2.2KΩ
HTVOL
L104
ESND 6-2A.19-5C.16-10E
15-9C P1W
L105
L119
B-02-R
10-9C HWOUT
L106
L120
B-02-R
18-7B TX-
L107
L121
B-02-R
18-8C TY+
L110
18-8B TX+
L109
18-7B TY-
L108
6-26 INTENS
L111
5-9D KEY6
L112
5-9C KEY0
L113
5-9C KEY1
L114
5-9C KEY2
L115
5-9D KEY3
L116
5-9D KEY4
L117
5-9D KEY5
L118
L103-118
ELXTV101GA OR 0Ω R
L119-121
B-02-R
OR 0Ω R
J005 TO FRONT PANNEL
PS-22PLB-D4LT1-FL
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
図番 DWG NO 105961 B
型式 MODEL UP-0397
名称 NAME MAIN BOARD 17/19
日付 DATE 89-8-16

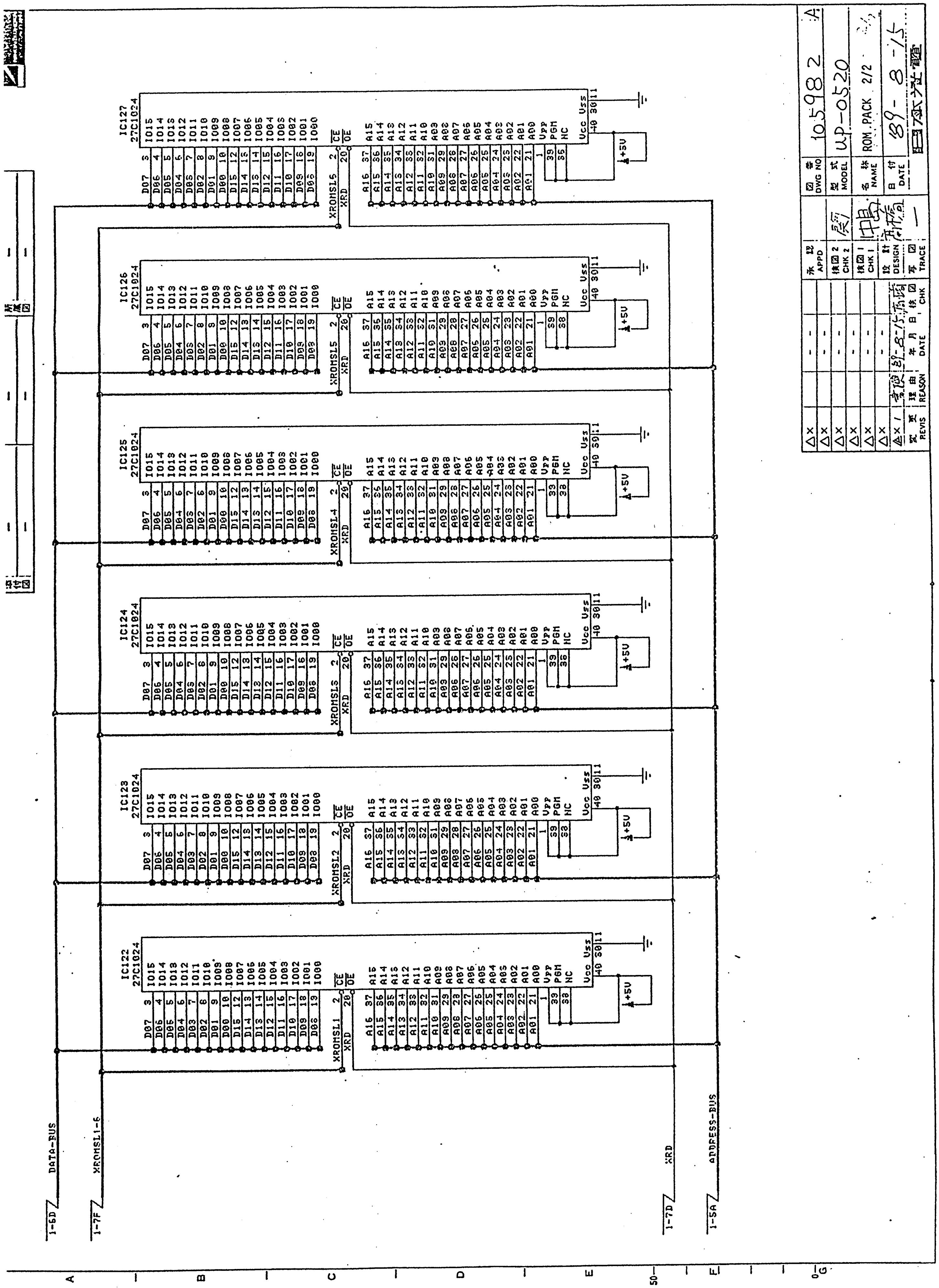


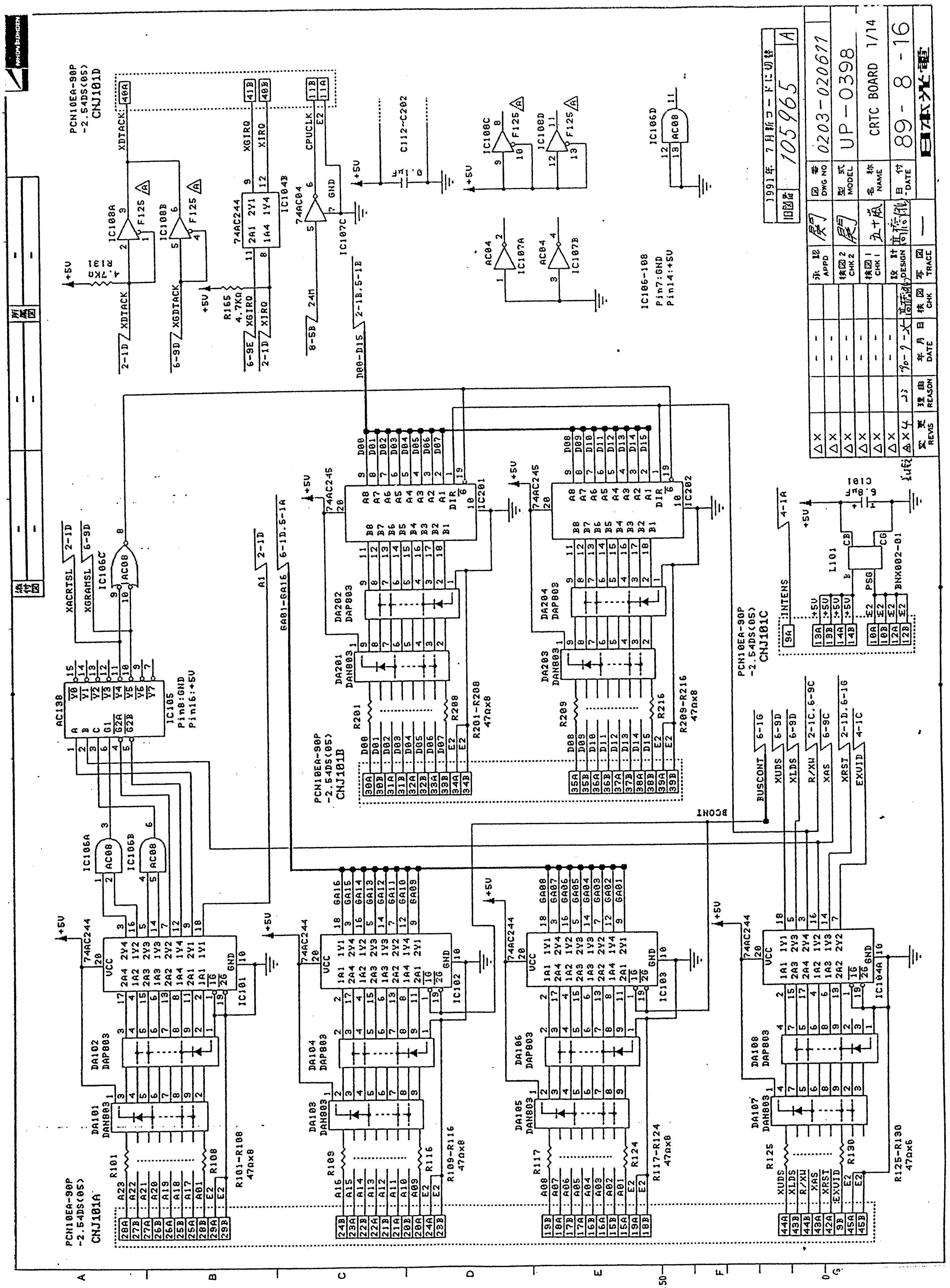
IC820 1/2
μPC812G
IC820 2/2
+5VREF
30.1KF R820
R821 10KF
C821 0.01μF
R823 10KF
R822 10KF
7-10C
11-2E
14-1F
X/XY
IC822 4053
1SS226 X4
D802-D805
IC337 2/2
HA-17093
R837 150kΩ
R838 10kΩ
R839 10kΩ
R840 10kΩ
D801 1SS307
R826 47Ω
R825 47Ω
R824 47Ω
R827 47Ω
TX+ 17-3D
TX- 17-3D
TY- 17-3D
TY+ 17-3D
TKDT 5-9E
IC823 4053
R830 12kΩ
R833 12kΩ
R834 1kΩ
IC821 1/2
IC821 2/2
μPC812
R826 10kΩ
R829 10kΩ
VR820 5kΩ
R831 10kΩ
R832 10kΩ
VR821 5kΩ
C822 0.0068μF
C823 0.0068μF
TKYX 14-1C
TKYY 14-1C
IC824 4538
R835 10kΩ
C824 0.0056μF
R836 10kΩ
C825 0.0056μF
IC822,823
16PIN++8
7PIN+-8
6PIN,8PIN+E1
DWG NO 105962 A
MODEL up-0397
NAME MAIN BOARD 18/19
DATE '89-8-16

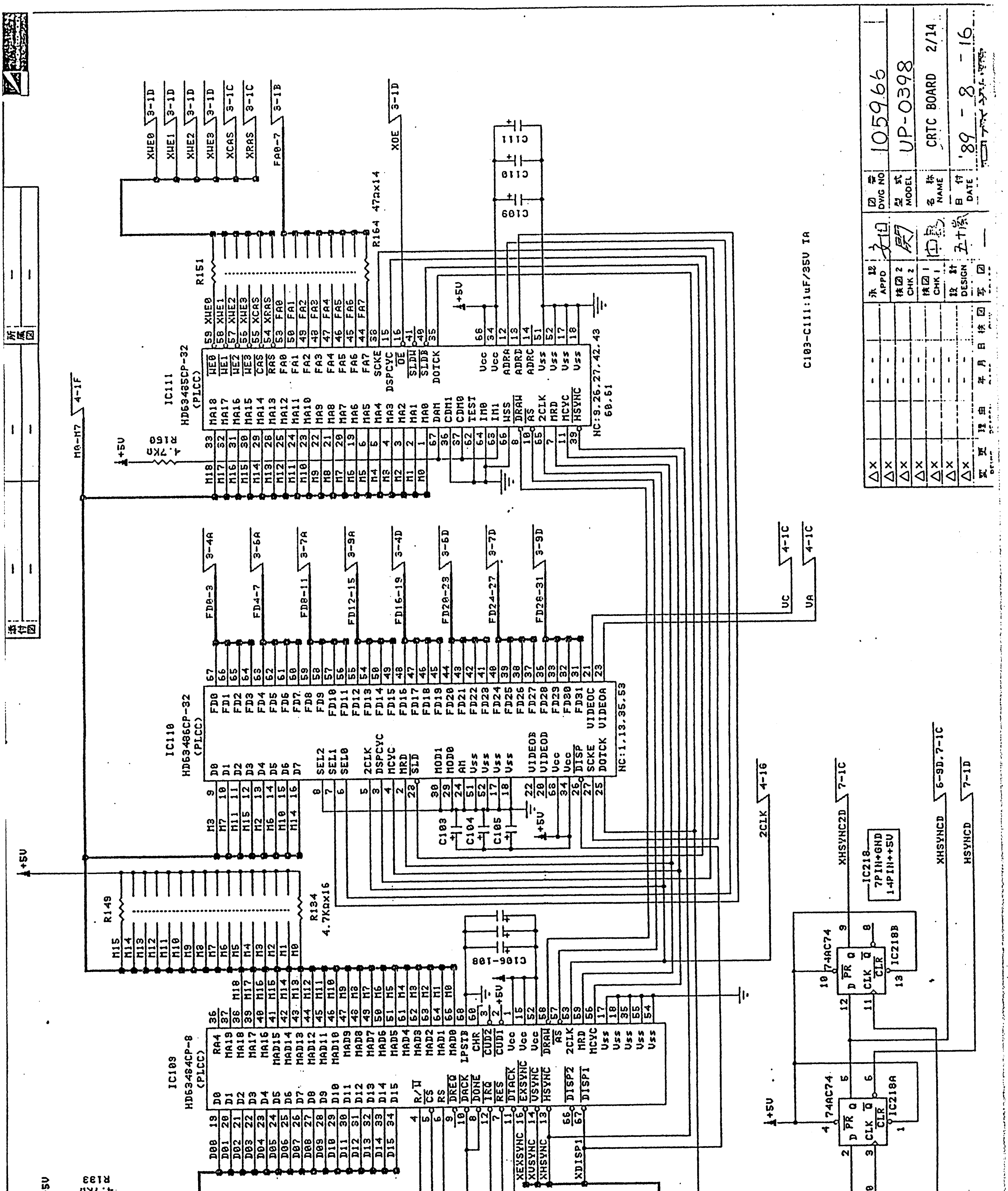


変更 REVIS	理由 REASON	年月日 DATE	検図 CHK				
△×		- -		承認 APPD	太田	図番 DWG.NO	105963 B
△×		- -		検図2 CHK 2	関	型式 MODEL	UP-0397
△×		- -		検図1 CHK 1	中島	名称 NAME	MAIN BOARD 19/19
△×		- -		設計 DESIGN	高橋	日付 DATE	89-8-16
△×2	33	89-10-25	高橋	写図 TRACE	—		
△×1	書類	89-8-16	高橋				

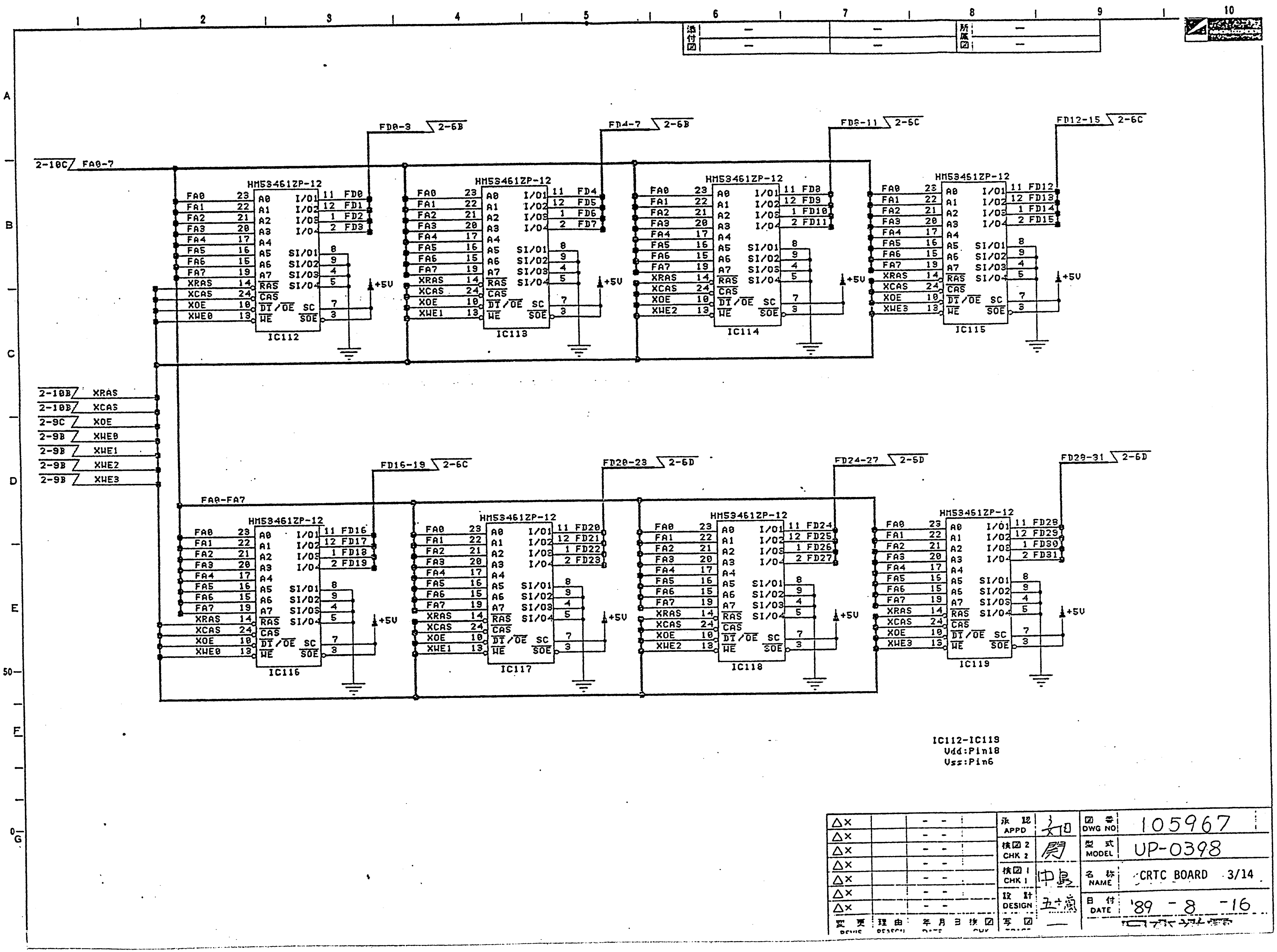

ROM PACK 1/2
UP-0520
105981
89-8-15
DWG NO
MODEL
NAME
DATE
APPD
CHK 2
CHK 1
DESIGN
TRACE
REVIS
REASON
DATE
CHK
DATA BUS
ADDRESS BUS
OPEN
J101A
J101B
J101C
AC138
IC011
AC04
IC012
AC10
IC013
R001-R007
R008-R015
R016-R023
R031-R036
R039-R046
R071-R073
D001-D007
D008-D015
D016-D023
D031-D038
D039-D046
D071-D073
XRD
XINTA
R/XW
XAS
XROMSL1-6
XROMSL1
XROMSL2
XROMSL3
XROMSL4
XROMSL5
XROMSL6
IC011
16PIN→+5V
8PIN→E2
IC013.012
14PIN→+5V
7PIN→E2
J101 TO MAIN
PC110EA-64P-2.54DS
R001-073 .... 47Ω
D001-073 .... 1SS-226
+5V

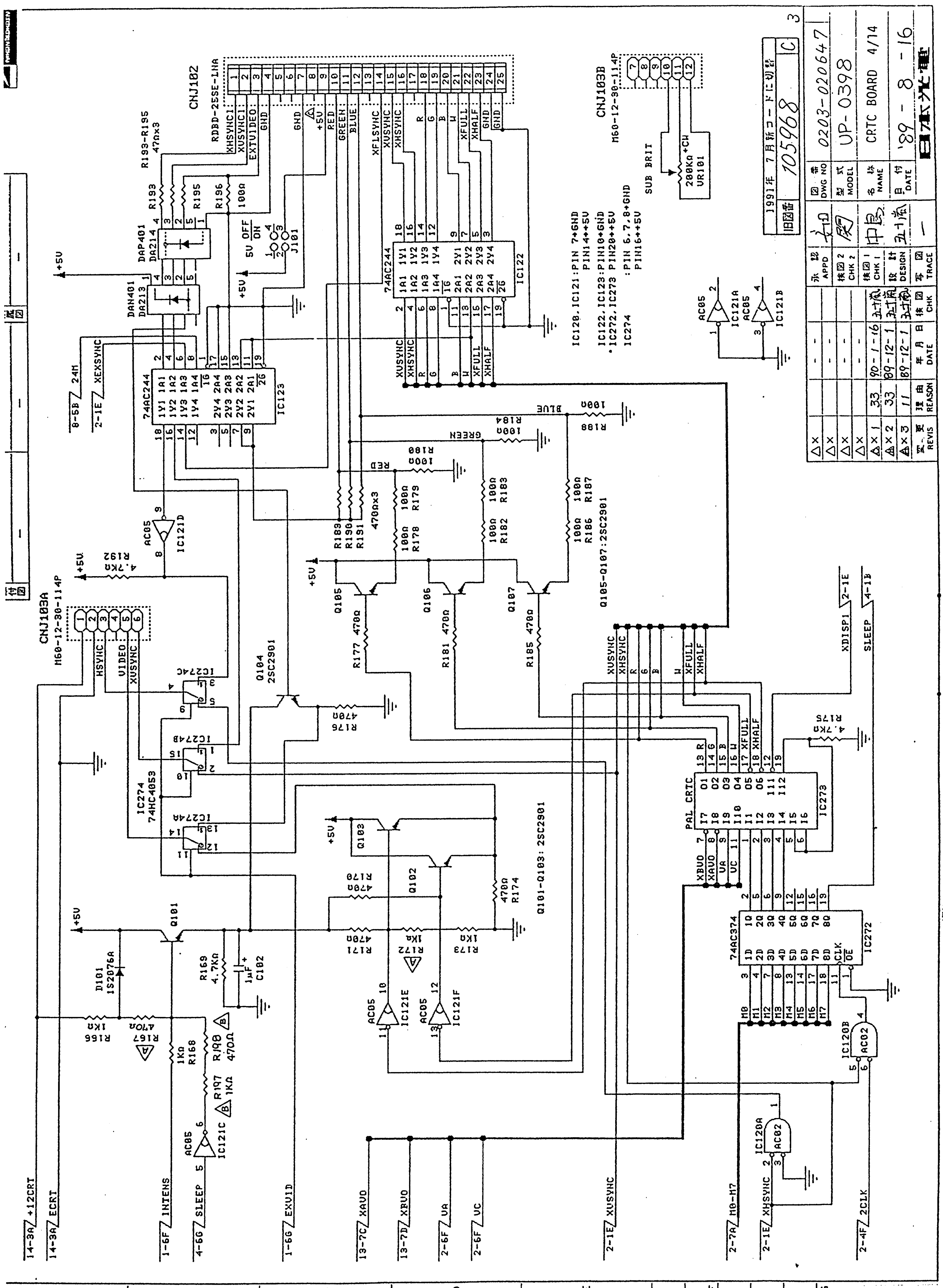

IC127 27C1024
IC126 27C1024
IC125 27C1024
IC124 27C1024
IC123 27C1024
IC122 27C1024
DATA-BUS
XROMSL1-6
XRD
ADDRESS-BUS
1-6D
1-7F
1-7D
1-5A
105982
UP-0520
ROM.PACK 2/2
89-8-15


CRTC BOARD 1/14
UP-0398
0203-020611
105965
89-8-16

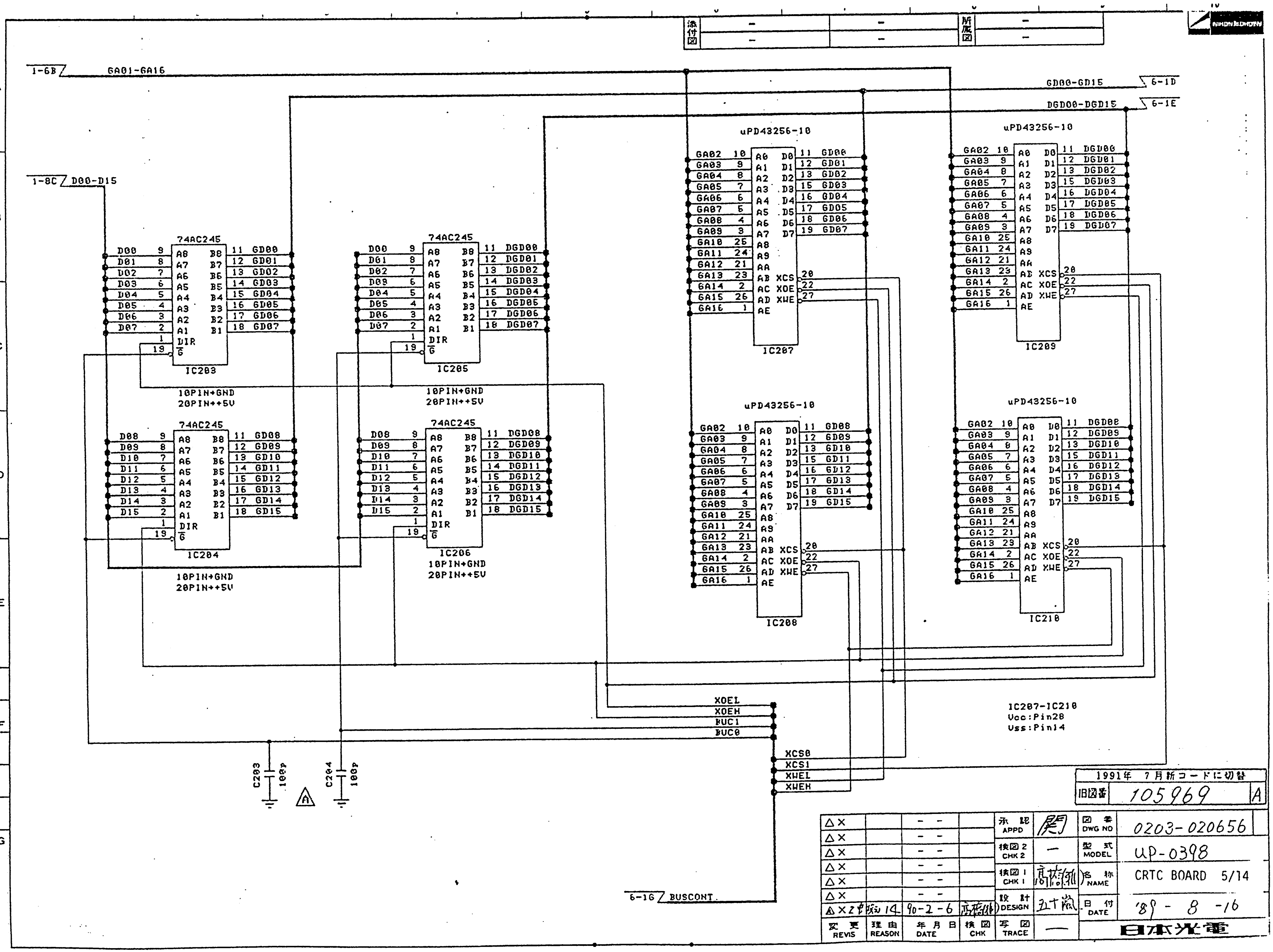


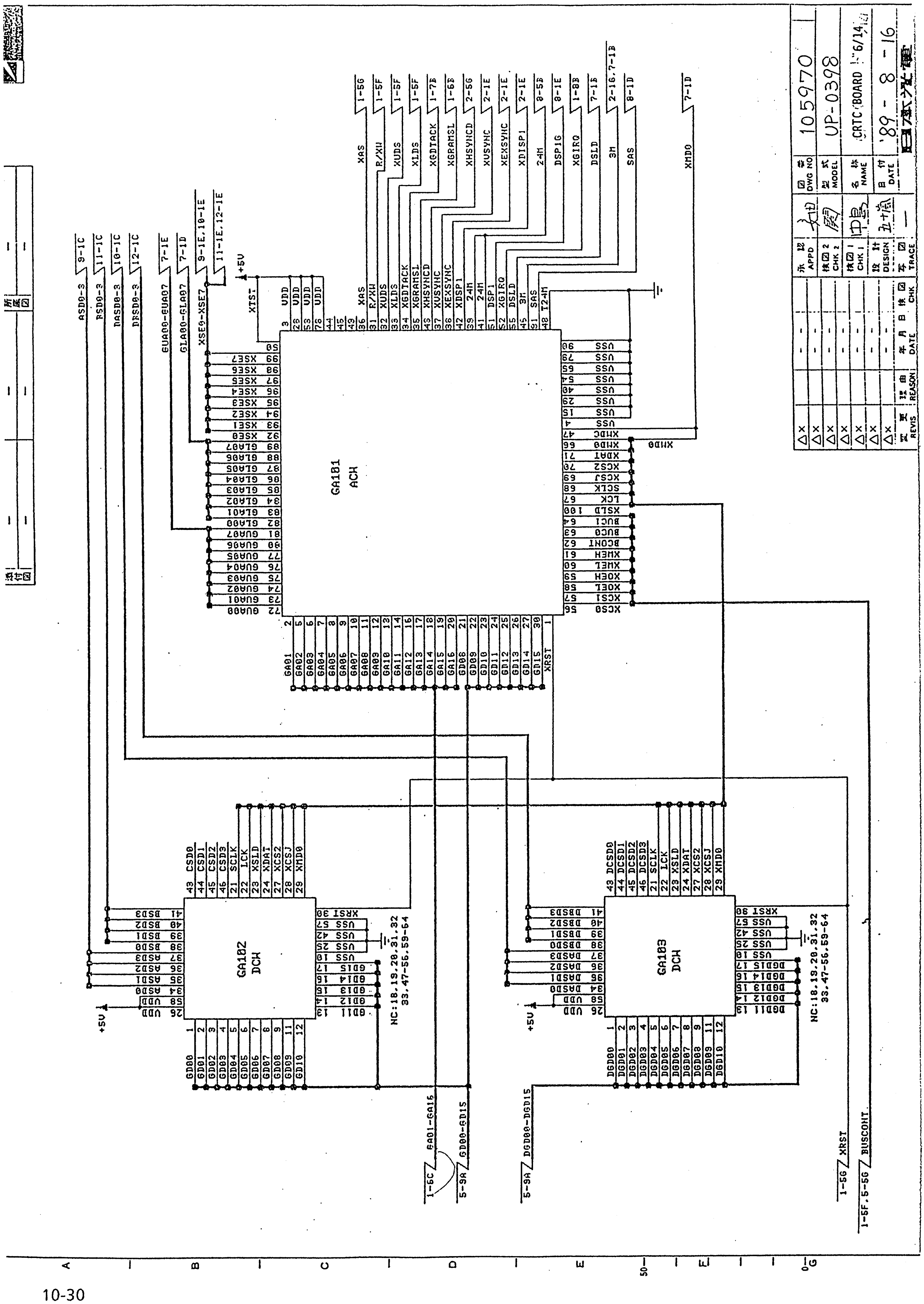
CRTC BOARD 2/14
UP-0398
105966
'89 - 8 - 16
IC109
HD63484CP-8
(PLCC)
IC110
HD63486CP-32
(PLCC)
IC111
HD63485CP-32
(PLCC)
IC218
74AC74
IC107E
AC04
C103-C111:1uF/35V TA
R164 47Ωx14
R134 4.7KΩx16


HM53461ZP-12
IC112
IC113
IC114
IC115
IC116
IC117
IC118
IC119
FA0-7
FA0-FA7
FD0-3
FD4-7
FD8-11
FD12-15
FD16-19
FD20-23
FD24-27
FD28-31
XRAS
XCAS
XOE
XWE0
XWE1
XWE2
XWE3
+5V
IC112-IC119
Vdd:Pin18
Vss:Pin6
DWG NO 105967
MODEL UP-0398
NAME CRTC BOARD 3/14
DATE '89 - 8 - 16

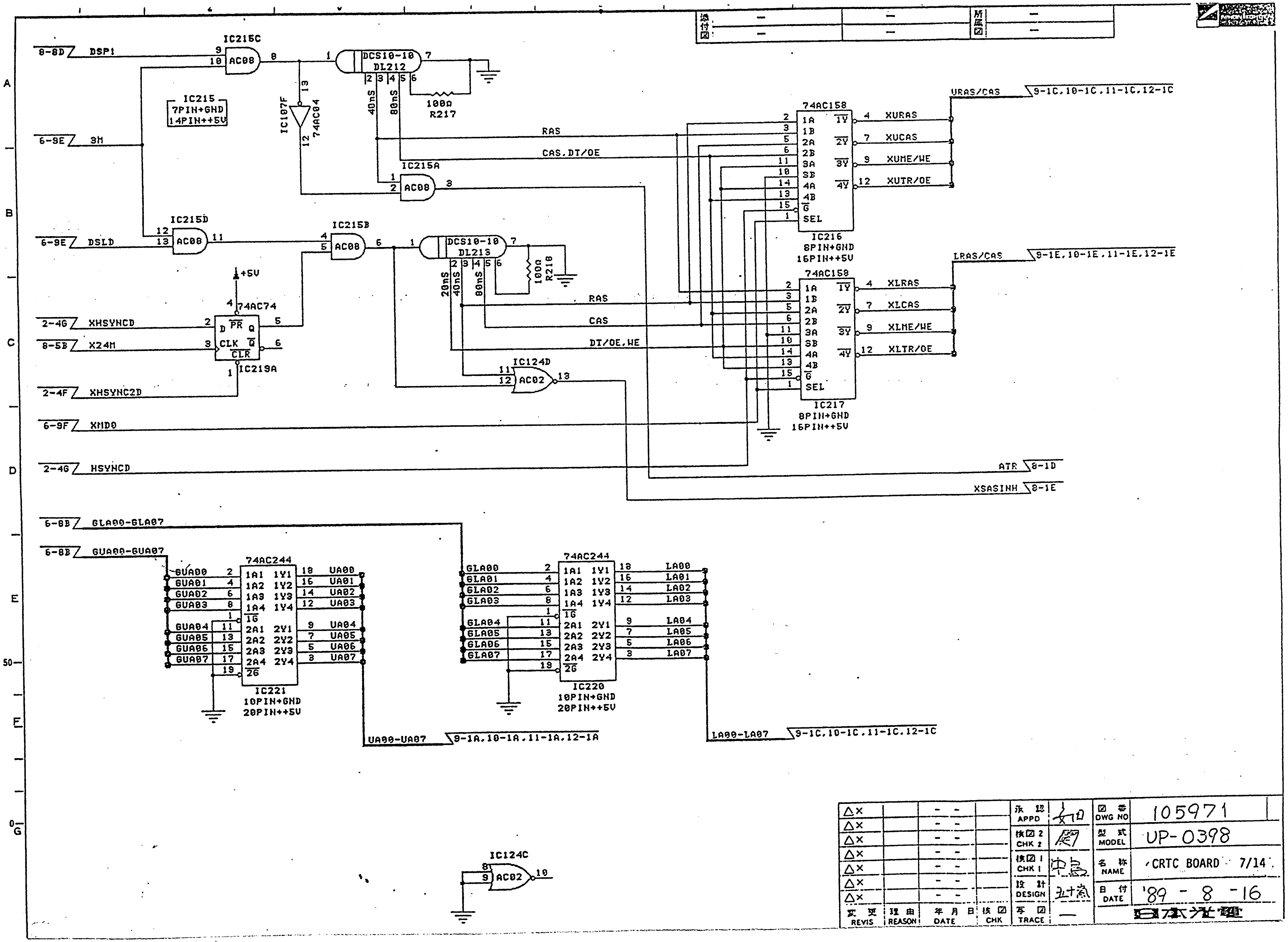


CRTC BOARD 4/14
UP-0398
0203-020647
105968
'89 - 8 - 16
CNJ102
RDBD-25SE-1HA
CNJ103A
M60-12-30-114P
CNJ103B
M60-12-30-114P
IC123 74AC244
IC122 74AC244
IC272 74AC374
IC273 PAL CRTC
IC274 74HC4053
Q105-Q107:2SC2901
Q101-Q103:2SC2901
SUB BRIT

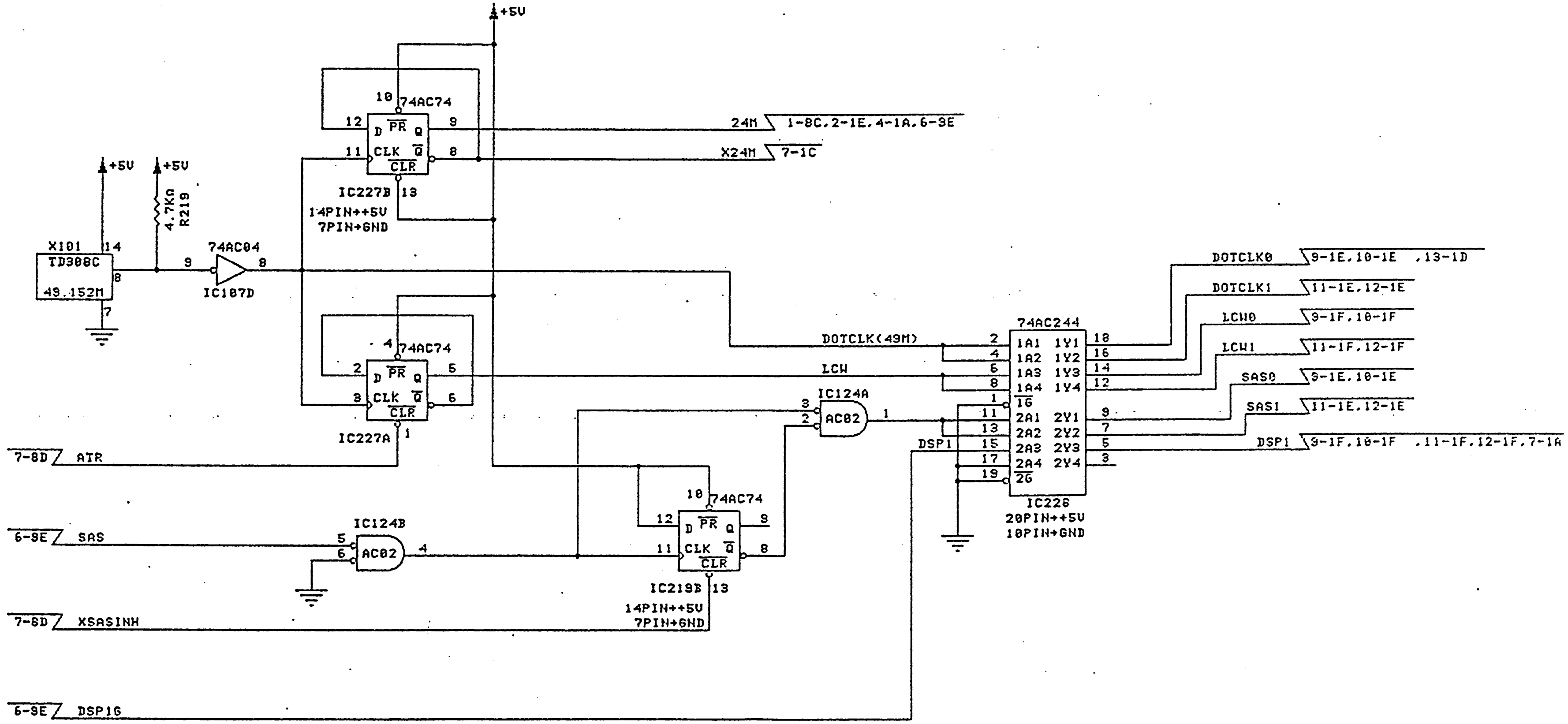

CRTC BOARD 5/14
0203-020656
UP-0398
105969
1991年 7月新コードに切替
IC207-IC210
Vcc:Pin28
Vss:Pin14
uPD43256-10
74AC245
IC203
IC204
IC205
IC206
IC207
IC208
IC209
IC210
BUSCONT
GA01-GA16
D00-D15
GD00-GD15
DGD00-DGD15
XCS0
XCS1
XWEL
XWEH
XOEL
XOEH
BUC1
BUC0
C203
C204
100p
10PIN+GND
20PIN++5V
日本光電



105970
UP-0398
CRTC BOARD
'89-8-16
GA1B1
ACH
GA1B2
DCH
GA1B3
DCH

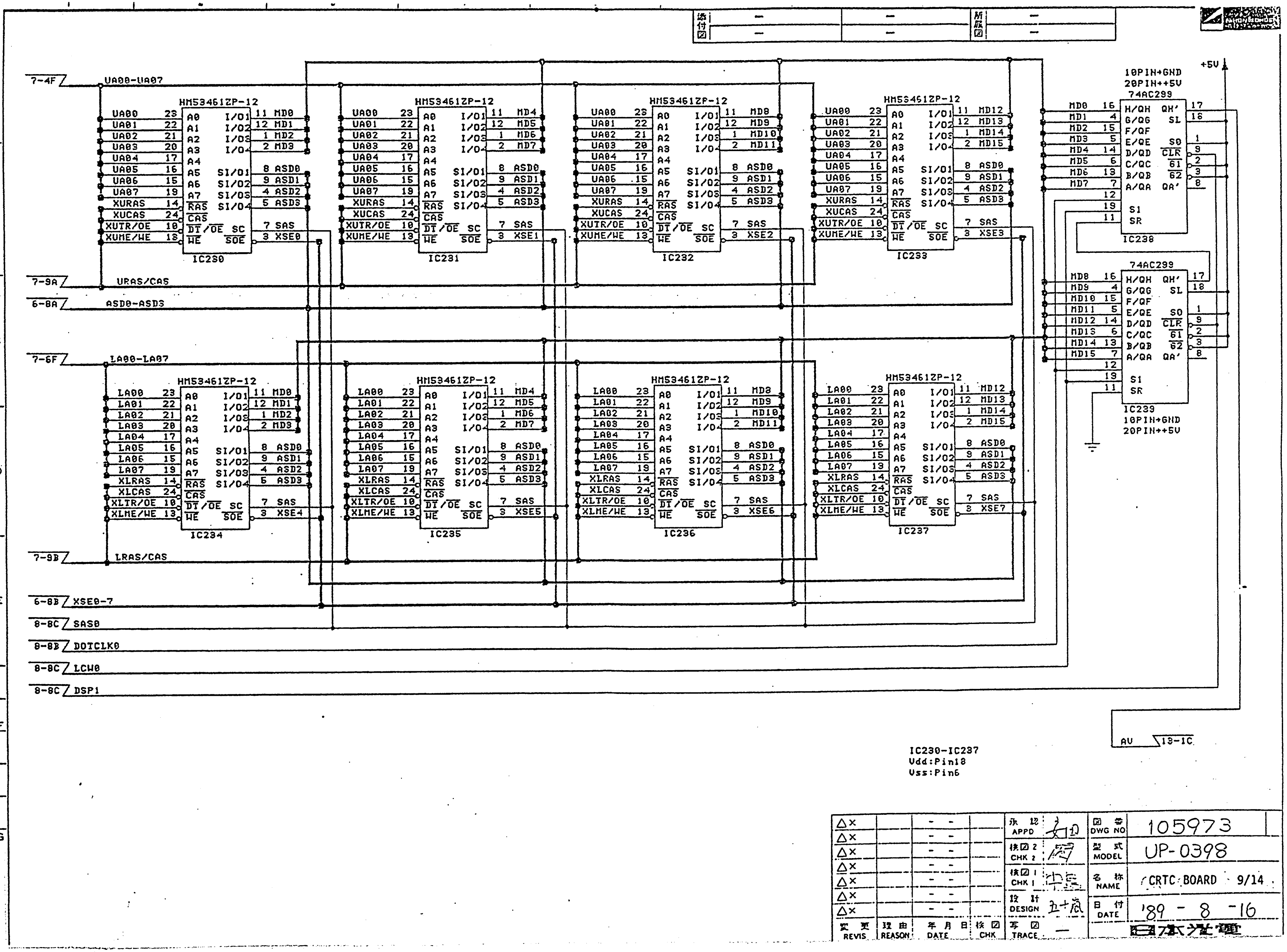


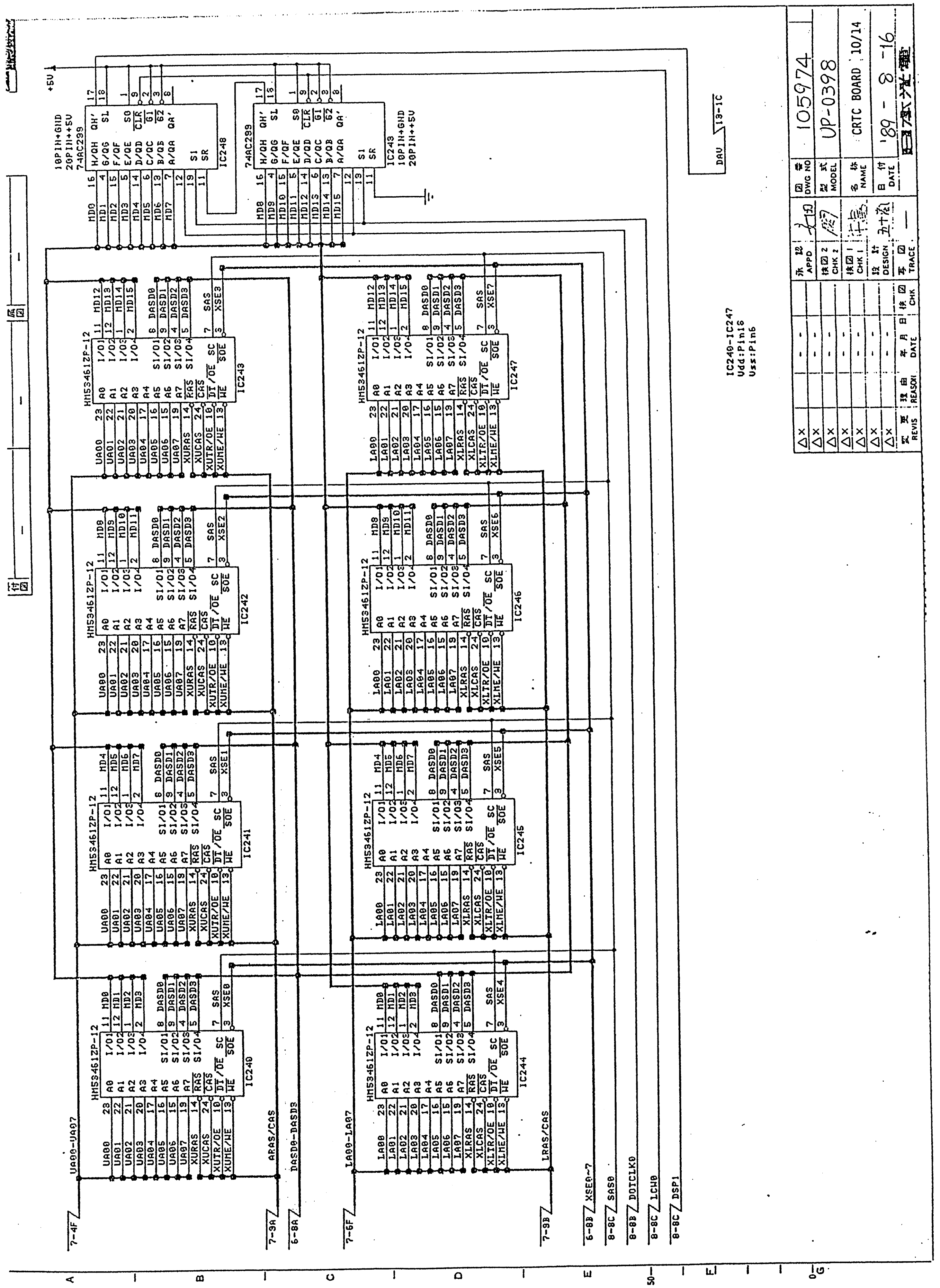
IC215C
AC08
DSP1
8-8D
3M
6-9E
DSLD
IC215
7PIN+GND
14PIN++5V
DCS10-10
DL212
100Ω
R217
40nS
80nS
IC107F
74AC04
IC215A
IC215D
IC215B
DL213
100Ω
R218
20nS
40nS
80nS
+5V
74AC74
IC219A
XHSYNCD
2-4G
X24M
8-5B
XHSYNC2D
2-4F
XMD0
6-9F
HSYNCD
2-4G
IC124D
AC02
RAS
CAS.DT/OE
CAS
DT/OE.WE
74AC158
IC216
8PIN+GND
16PIN++5V
IC217
8PIN+GND
16PIN++5V
URAS/CAS
9-1C,10-1C,11-1C,12-1C
XURAS
XUCAS
XUWE/WE
XUTR/OE
LRAS/CAS
9-1E,10-1E,11-1E,12-1E
XLRAS
XLCAS
XLWE/WE
XLTR/OE
ATR
8-1D
XSASINH
8-1E
GLA00-GLA07
6-8B
GUA00-GUA07
6-8B
74AC244
IC221
10PIN+GND
20PIN++5V
IC220
10PIN+GND
20PIN++5V
UA00-UA07
9-1A,10-1A,11-1A,12-1A
LA00-LA07
9-1C,10-1C,11-1C,12-1C
IC124C
AC02
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
図番 DWG NO
105971
型式 MODEL
UP-0398
名称 NAME
CRTC BOARD 7/14
日付 DATE
'89 - 8 - 16
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK



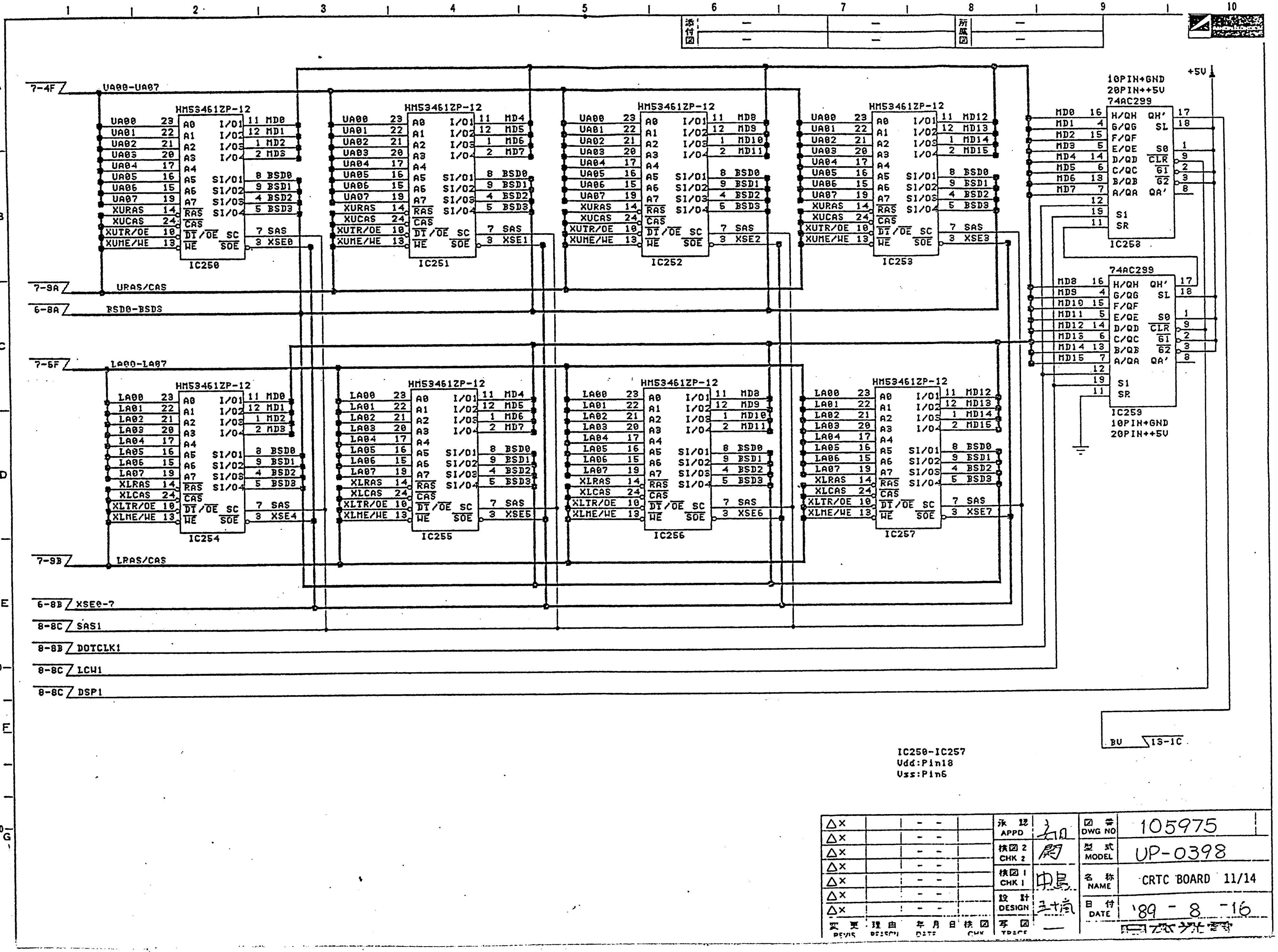
承認 APPD	知	図番 DWG NO	105972
検図2 CHK 2	関	型式 MODEL	UP-0398
検図1 CHK 1	中島	名称 NAME	CRTC BOARD 8/14
設計 DESIGN	五十嵐	日付 DATE	'89 - 8 -16
写図 TRACE	—		日本光電

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK
△×		- -	
△×		- -	
△×		- -	
△×		- -	
△×		- -	
△×		- -	
△×		- -	

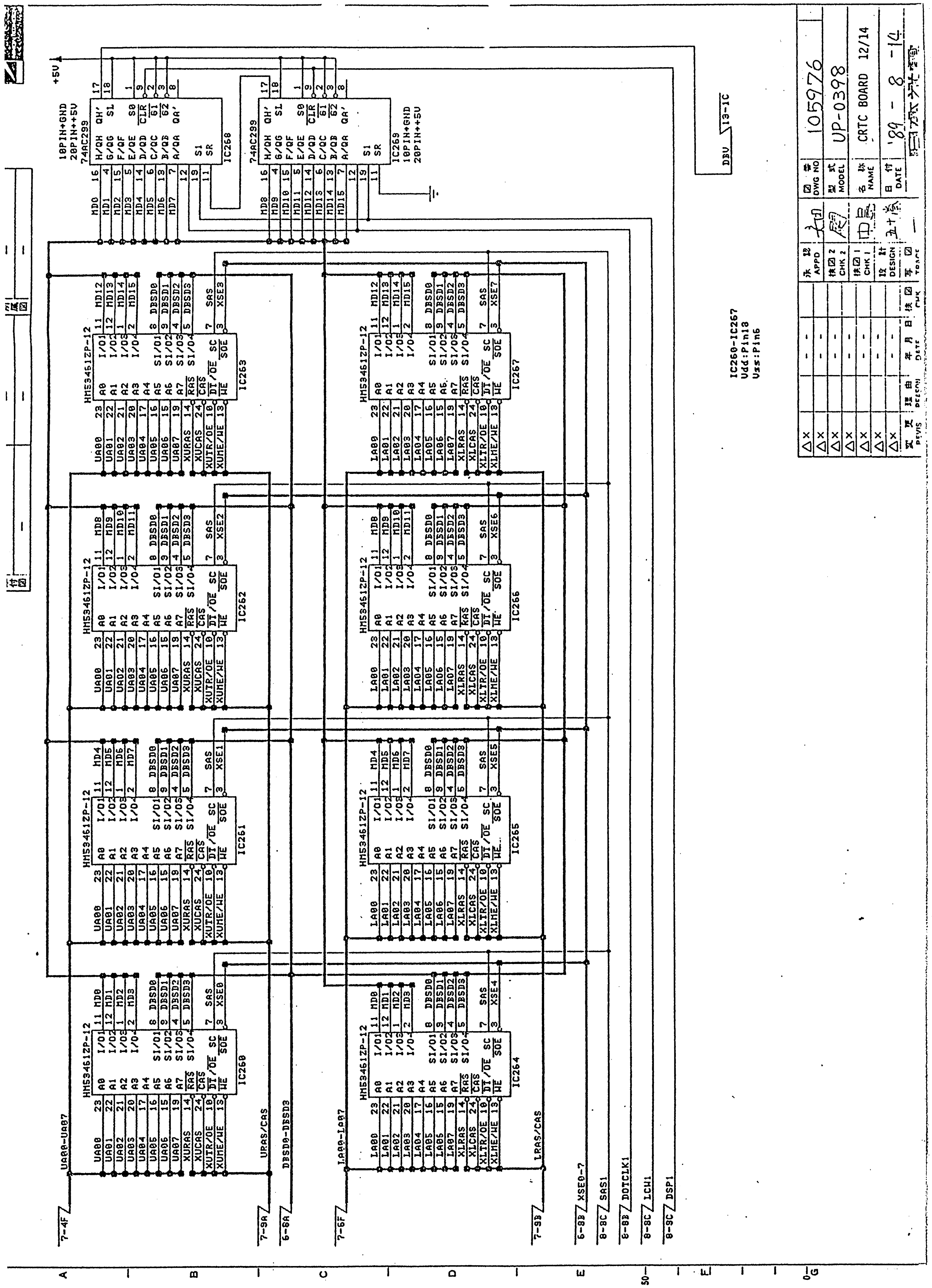

HM53461ZP-12
IC230
IC231
IC232
IC233
IC234
IC235
IC236
IC237
74AC299
IC238
IC239
10PIN+GND
20PIN++5V
+5V
7-4F UA00-UA07
7-9A URAS/CAS
6-8A ASD0-ASD3
7-6F LA00-LA07
7-9B LRAS/CAS
6-8B XSE0-7
8-8C SAS0
8-8B DOTCLK0
8-8C LCW0
8-8C DSP1
AV 13-1C
IC230-IC237
Vdd:Pin18
Vss:Pin6
105973
UP-0398
CRTC BOARD 9/14
'89 - 8 -16
APPD
CHK 2
CHK 1
DESIGN
TRACE
DWG NO
MODEL
NAME
DATE
REVIS
REASON
CHK

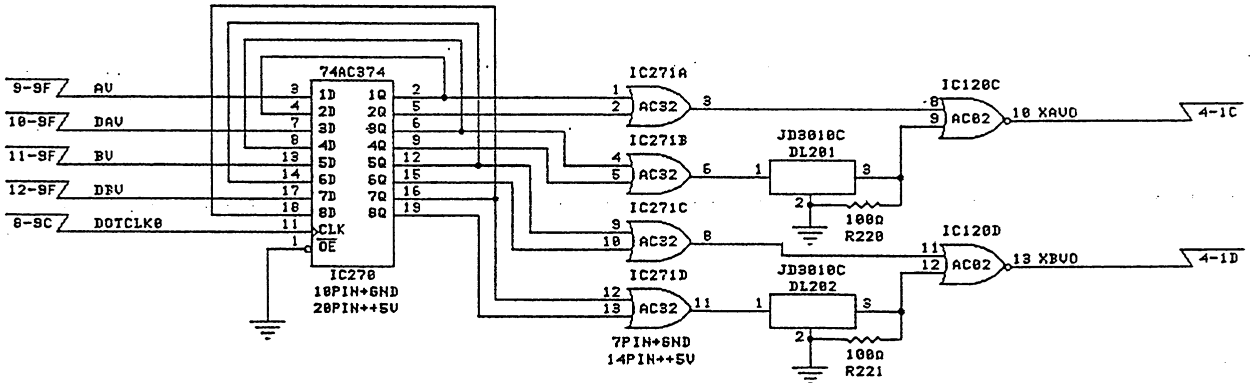


105974
UP-0398
CRTC BOARD 10/14
'89 - 8 - 16
74AC299
IC248
IC249
10PIN→GND
20PIN→+5V
+5V
HM53461ZP-12
IC240
IC241
IC242
IC243
IC244
IC245
IC246
IC247
IC240-IC247
Vdd:Pin16
Vss:Pin6
DAV 13-1C
UA00-UA07
RRAS/CAS
DASD0-DASD3
LA00-LA07
LRAS/CAS
XSE0-7
SAS0
DOTCLK0
LCH0
DSP1



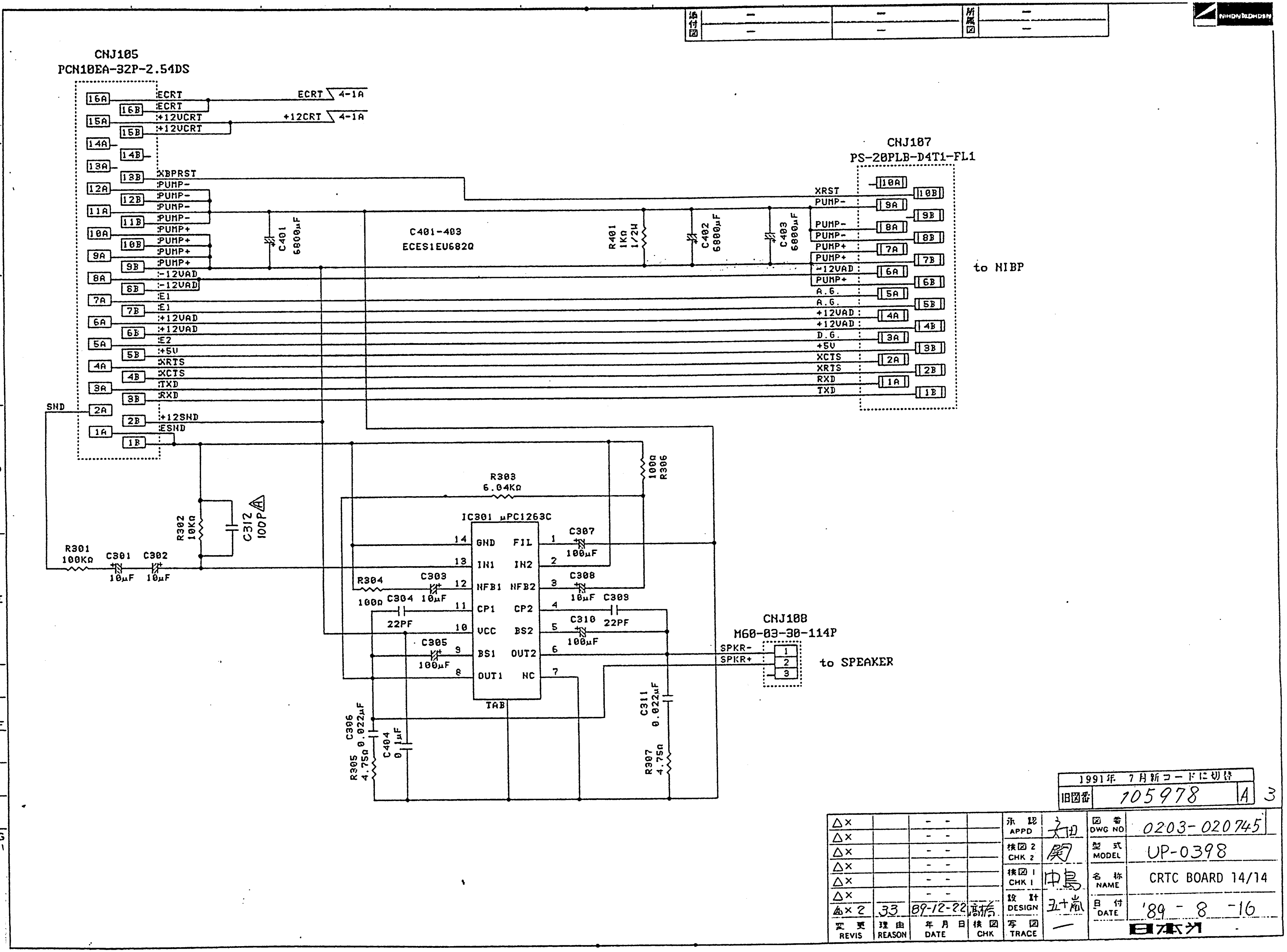
HM53461ZP-12
IC250
IC251
IC252
IC253
IC254
IC255
IC256
IC257
74AC299
IC258
IC259
10PIN+GND
20PIN++5V
+5V
7-4F UA00-UA07
7-9A URAS/CAS
6-8A BSD0-BSD3
7-5F LA00-LA07
7-9B LRAS/CAS
6-8B XSE0-7
8-8C SAS1
8-8B DOTCLK1
8-8C LCH1
8-8C DSP1
BU 13-1C
IC250-IC257
Vdd:Pin18
Vss:Pin6
105975
UP-0398
CRTC BOARD 11/14
'89 - 8 - 16

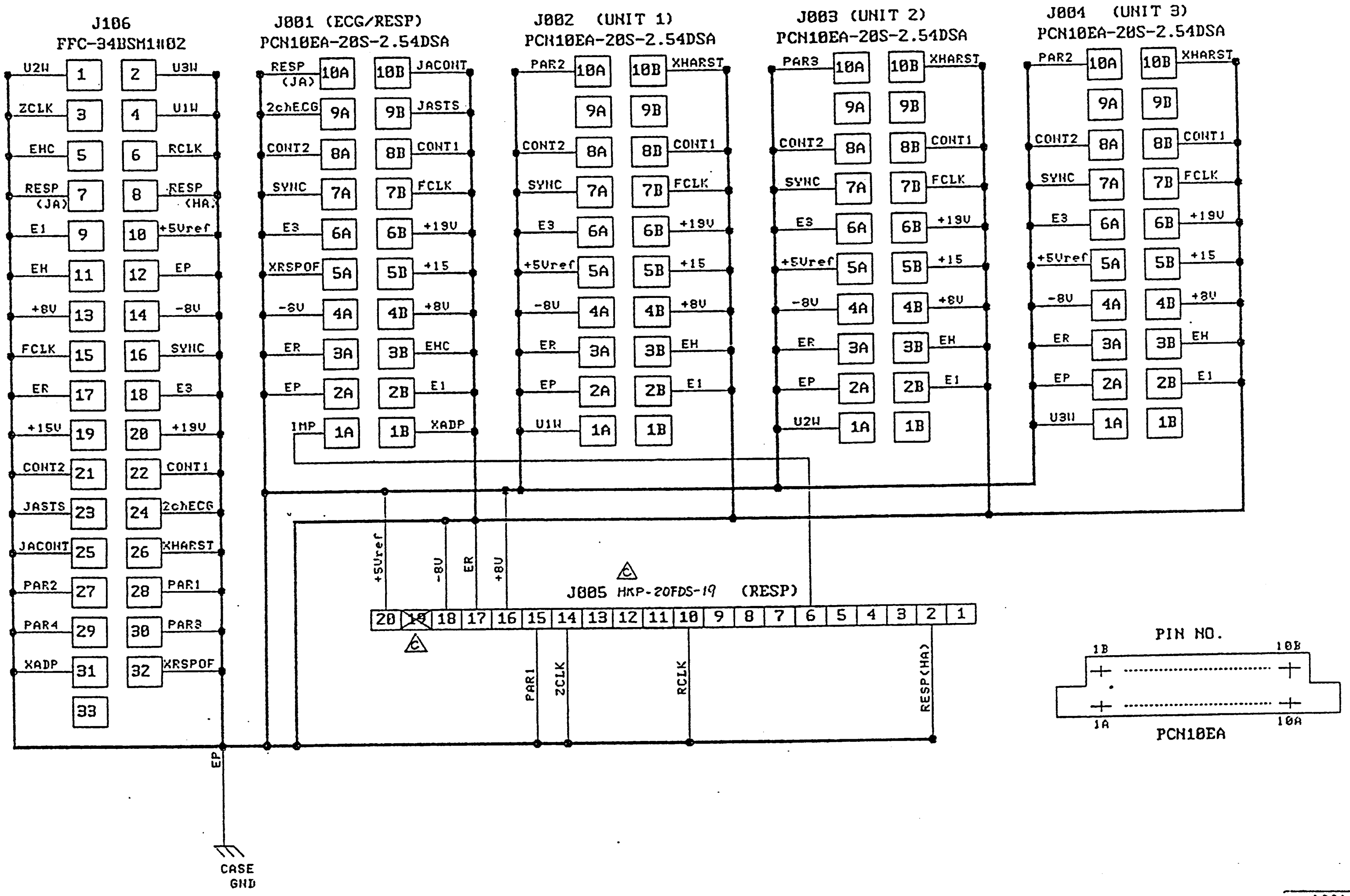

105976
UP-0398
CRTC BOARD 12/14
'89 - 8 - 14
HM53461ZP-12
IC260
IC261
IC262
IC263
IC264
IC265
IC266
IC267
74AC299
IC268
IC269
IC260-IC267
Vdd:Pin18
Vss:Pin6
+5V



3

△×		- -		承認 APPD		図番 DWG NO	105977
△×		- -		検図2 CHK 2	関	型式 MODEL	UP-0398
△×		- -		検図1 CHK 1	中島	名称 NAME	CRTC BOARD 13/14
△×		- -		設計 DESIGN		日付 DATE	'89 - 8 -16
△×		- -		写図 TRACE	一		日本光電
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK				


CNJ105
PCN10EA-32P-2.54DS
ECRT
+12VCRT
4-1A
XBPRST
PUMP-
PUMP+
-12VAD
E1
+12VAD
E2
+5V
XRTS
XCTS
TXD
RXD
+12SND
ESND
SND
C401 6800μF
C401-403
ECES1EU682Q
R401 1KΩ 1/2W
C402 6800μF
C403 6800μF
CNJ107
PS-20PLB-D4T1-FL1
XRST
A.G.
D.G.
to NIBP
R306 100Ω
R303 6.04KΩ
R302 10KΩ
C312 100P
IC301 μPC1263C
GND
IN1
NFB1
CP1
VCC
BS1
OUT1
FIL
IN2
NFB2
CP2
BS2
OUT2
NC
TAB
R301 100KΩ
C301 10μF
C302 10μF
R304 100Ω
C303 10μF
C304 22PF
C305 100μF
C307 100μF
C308 10μF
C309 22PF
C310 100μF
C306 0.022μF
R305 4.75Ω
C404 0.1μF
C311 0.022μF
R307 4.75Ω
CNJ108
M60-03-30-114P
SPKR-
SPKR+
to SPEAKER
1991年 7月新コードに切替
旧図番 105978 A 3
図番 DWG NO 0203-020745
型式 MODEL UP-0398
名称 NAME CRTC BOARD 14/14
日付 DATE '89 - 8 - 16
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
33
89-12-22
日本光電
NIHON KOHDEN



1991年 7月新コードに切替

旧図番 105979 C 3

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK		
△×		- -		承認 APPD	安田
△×		- -		検図2 CHK 2	稲泉
△×		- -		検図1 CHK 1	仙波
△×		- -		設計 DESIGN	高橋
△×2	14	89-10-31	高橋	写図 TRACE	
△×	書捺	89-6-19	高橋		
△×		- -			

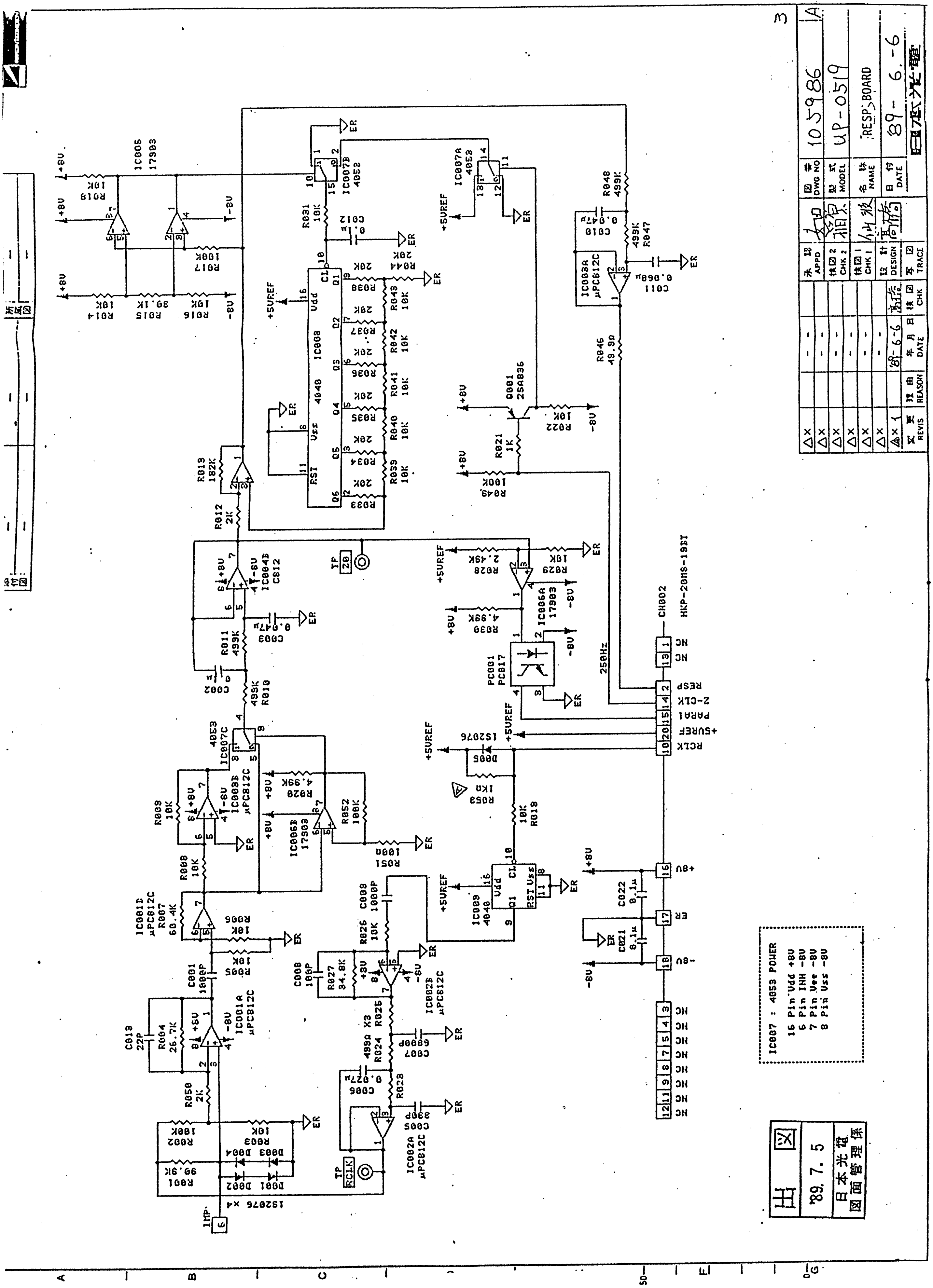
図番 DWG NO: 0203-020754

製式 MODEL: UP-0399

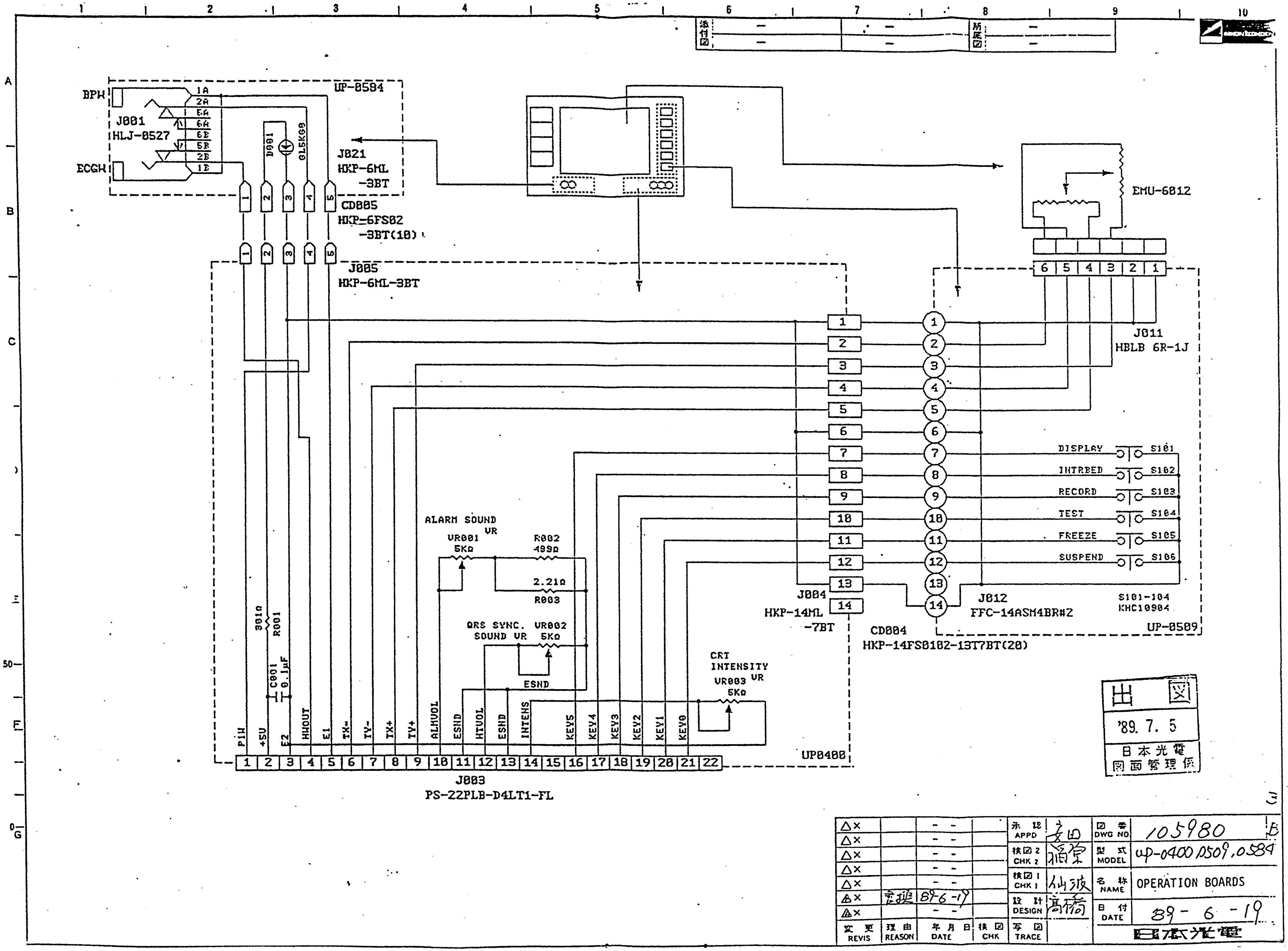
名称 NAME: HEAD AMPLIFIER MOTHER BOARD

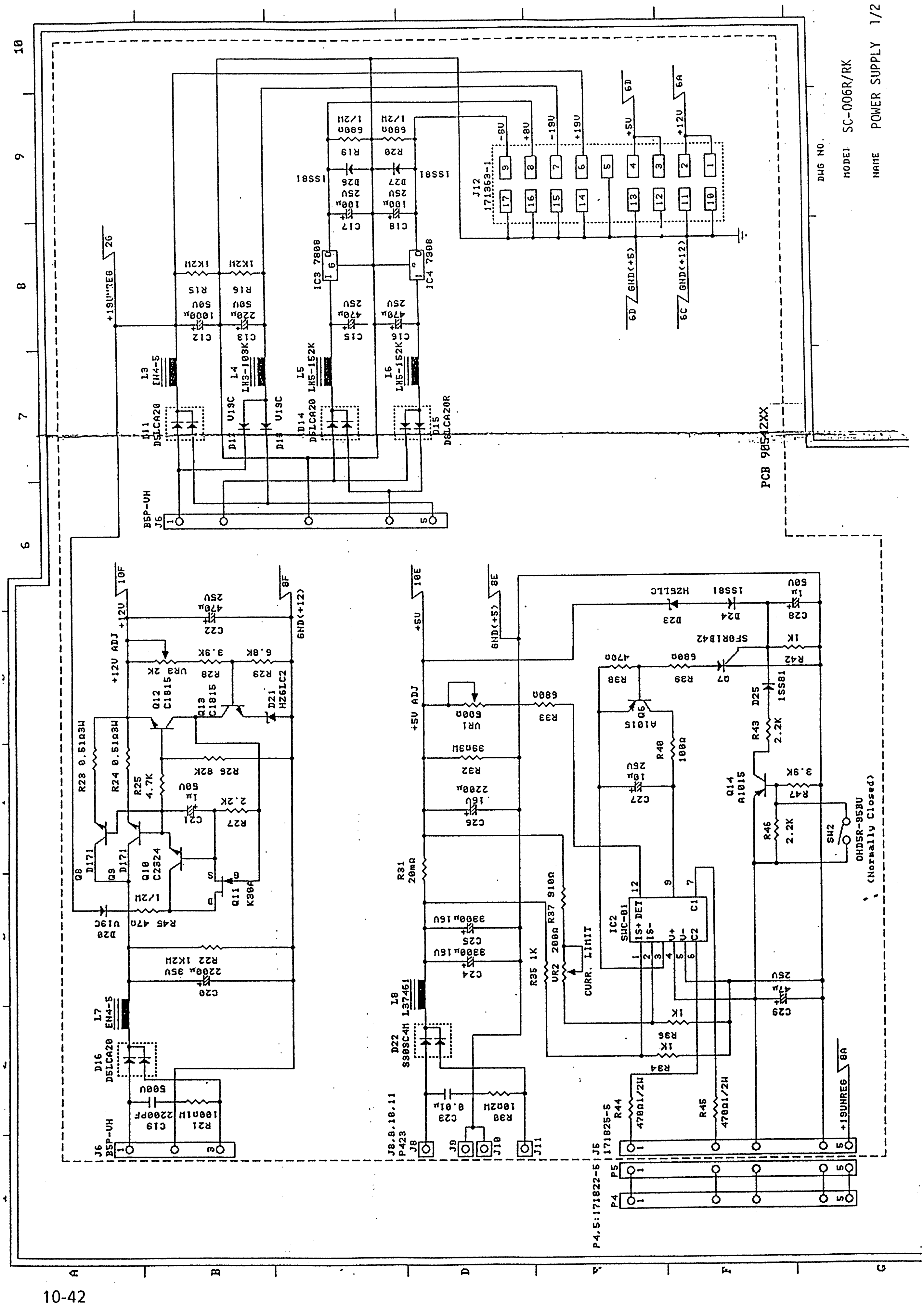
日付 DATE: 89-6-19

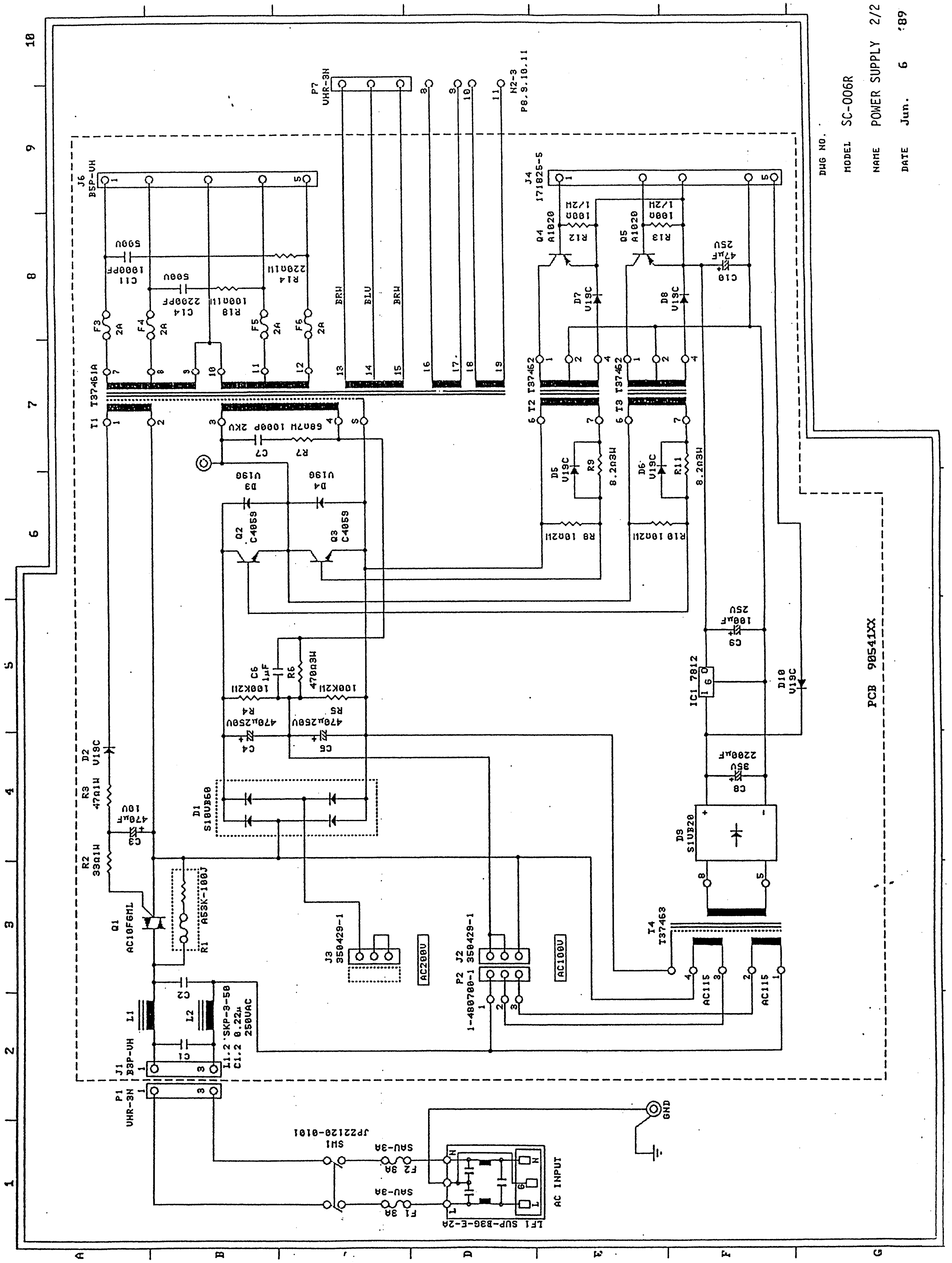
日本光電



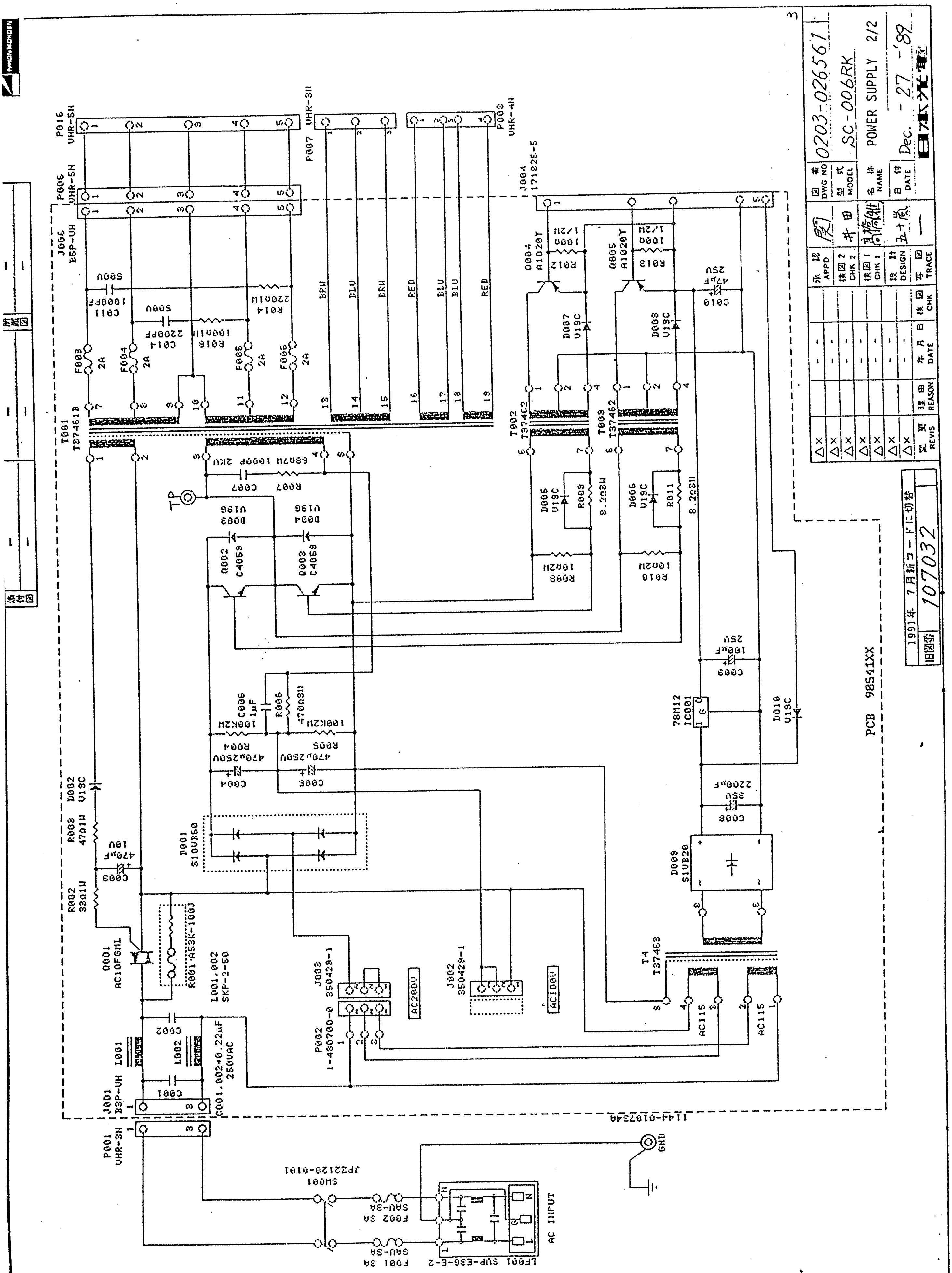
105986 1A
UP-0519
RESP BOARD
89-6-6
IC007 : 4053 POWER
16 Pin Vdd +8V
6 Pin INH -8V
7 Pin Vee -8V
8 Pin Vss -8V
'89. 7. 5
日本光電
図面管理係
HKP-20MS-19DI
CN002


UP-0504
BPH
ECGH
J001
HLJ-0527
D001
GL5K69
J021
HKP-6ML
-3BT
CD005
HKP-6FS02
-3BT(10)
J005
HKP-6ML-3BT
EMU-6012
J011
HBLB 6R-1J
DISPLAY
INTRBED
RECORD
TEST
FREEZE
SUSPEND
S101
S102
S103
S104
S105
S106
S101-104
KHC10904
UP-0509
J012
FFC-14ASM4BR#2
J004
HKP-14ML
-7BT
CD004
HKP-14FS0102-13T7BT(20)
ALARM SOUND VR
VR001
5kΩ
R002
499Ω
2.21Ω
R003
QRS SYNC. SOUND VR
VR002
5kΩ
ESND
CRT INTENSITY VR
VR003
5kΩ
301Ω
R001
C001
0.1μF
PIH
+5V
E2
HHOUT
E1
TX-
TY-
TX+
TY+
ALHVOL
ESND
HIVOL
ESND
INTENS
KEY5
KEY4
KEY3
KEY2
KEY1
KEY0
UP0400
J003
PS-22PLB-D4LT1-FL
出図
'89. 7. 5
日本光電
図面管理係
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
図番 DWG NO
105980
B
型式 MODEL
UP-0400,0509,0504
名称 NAME
OPERATION BOARDS
日付 DATE
89-6-19
89-6-19
日本光電

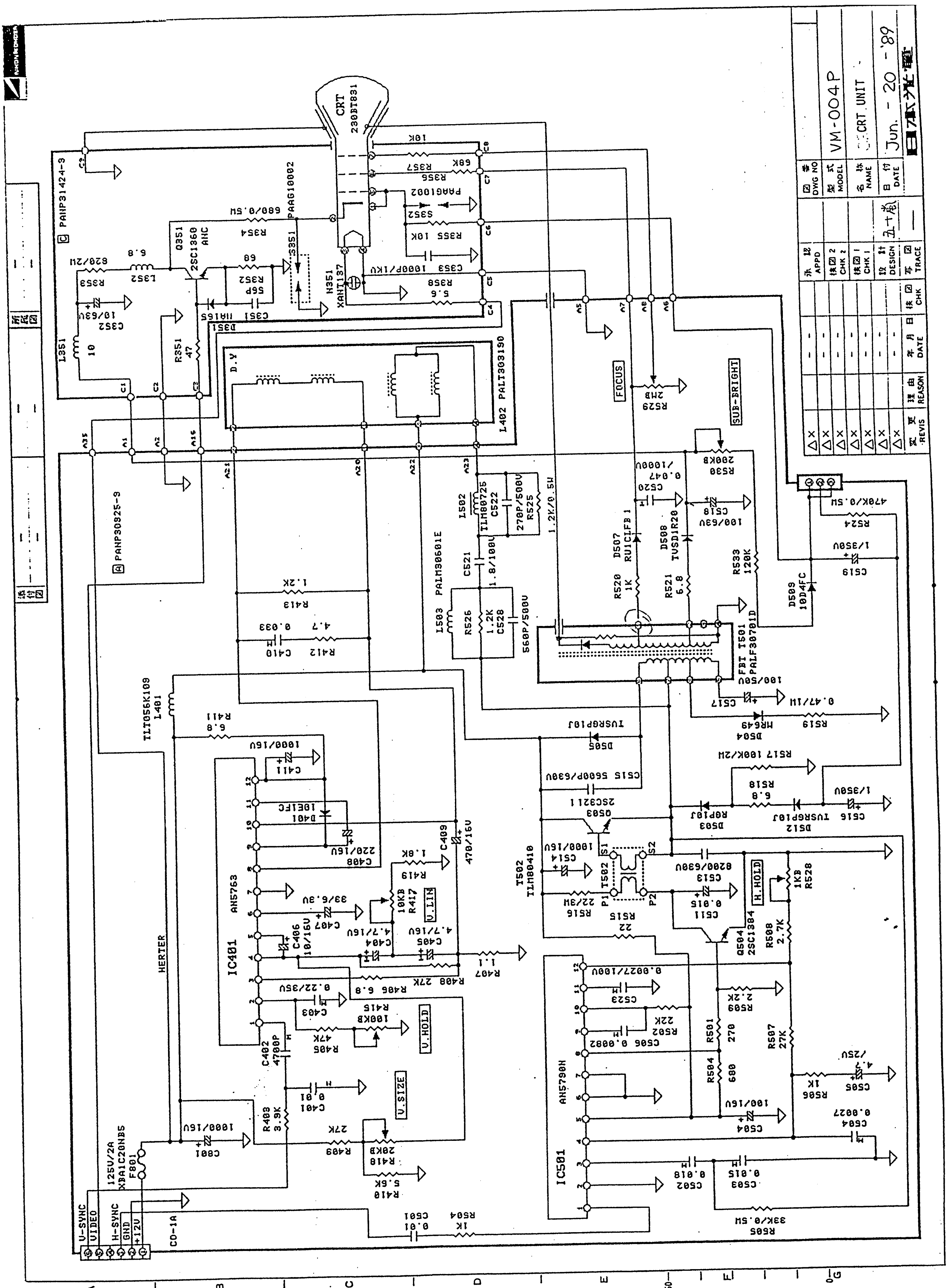

DWG NO.
MODEL SC-006R/RK
NAME POWER SUPPLY 1/2
PCB 9054ZXX

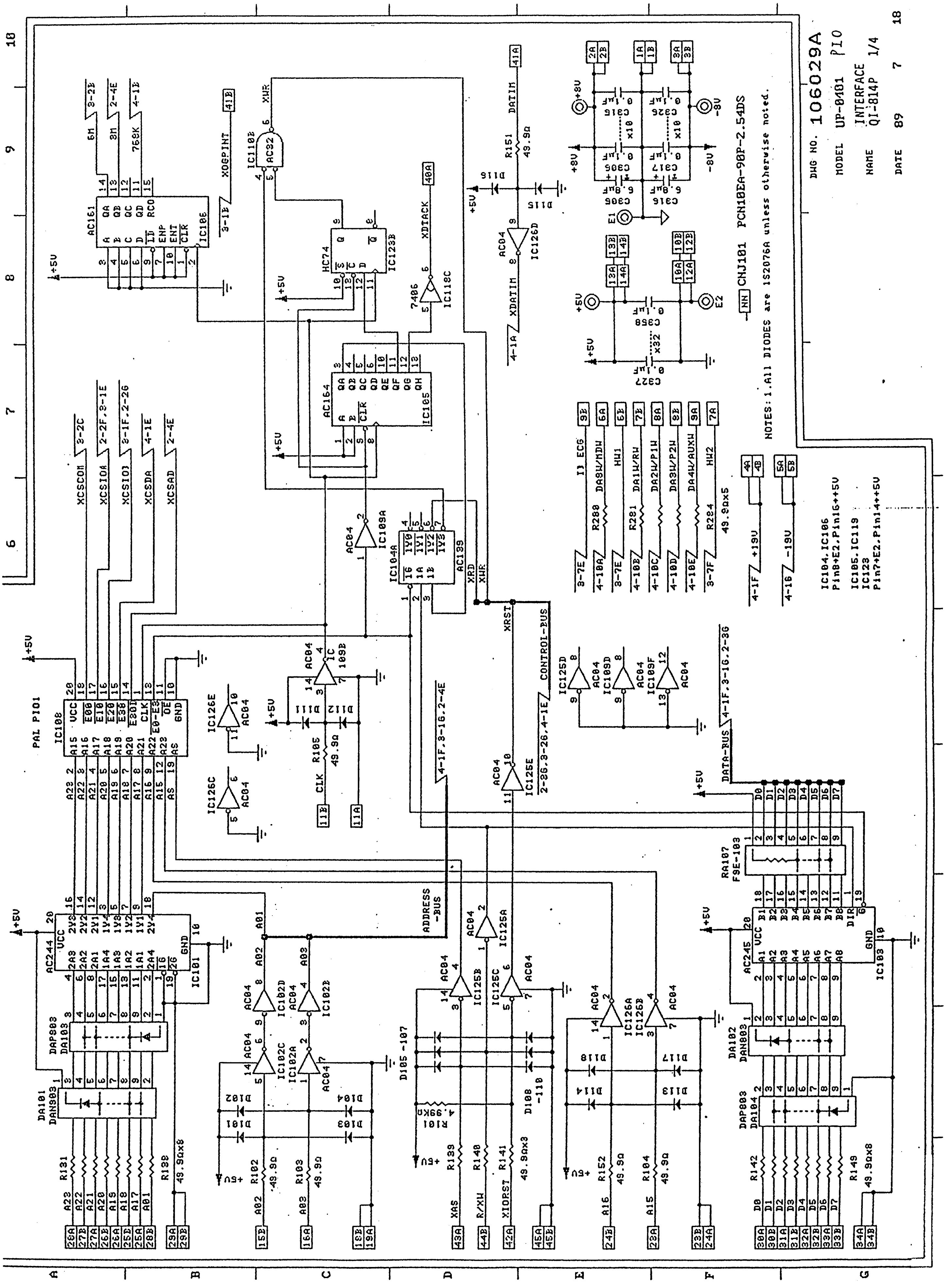


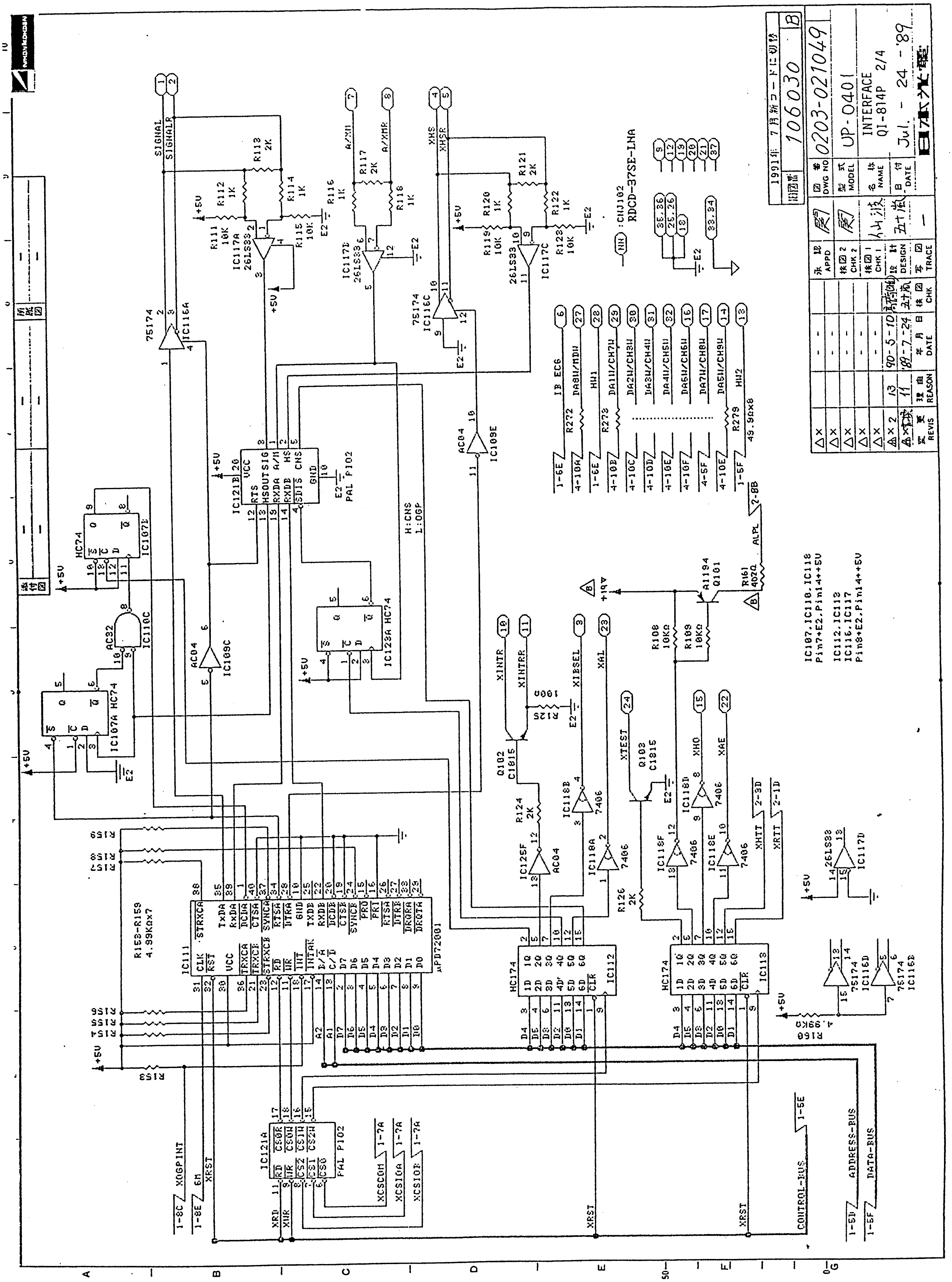
DWG NO.
MODEL SC-006R
NAME POWER SUPPLY 2/2
DATE Jun. 6 '89
PCB 90541XX
AC INPUT
GND
AC100V
AC200V

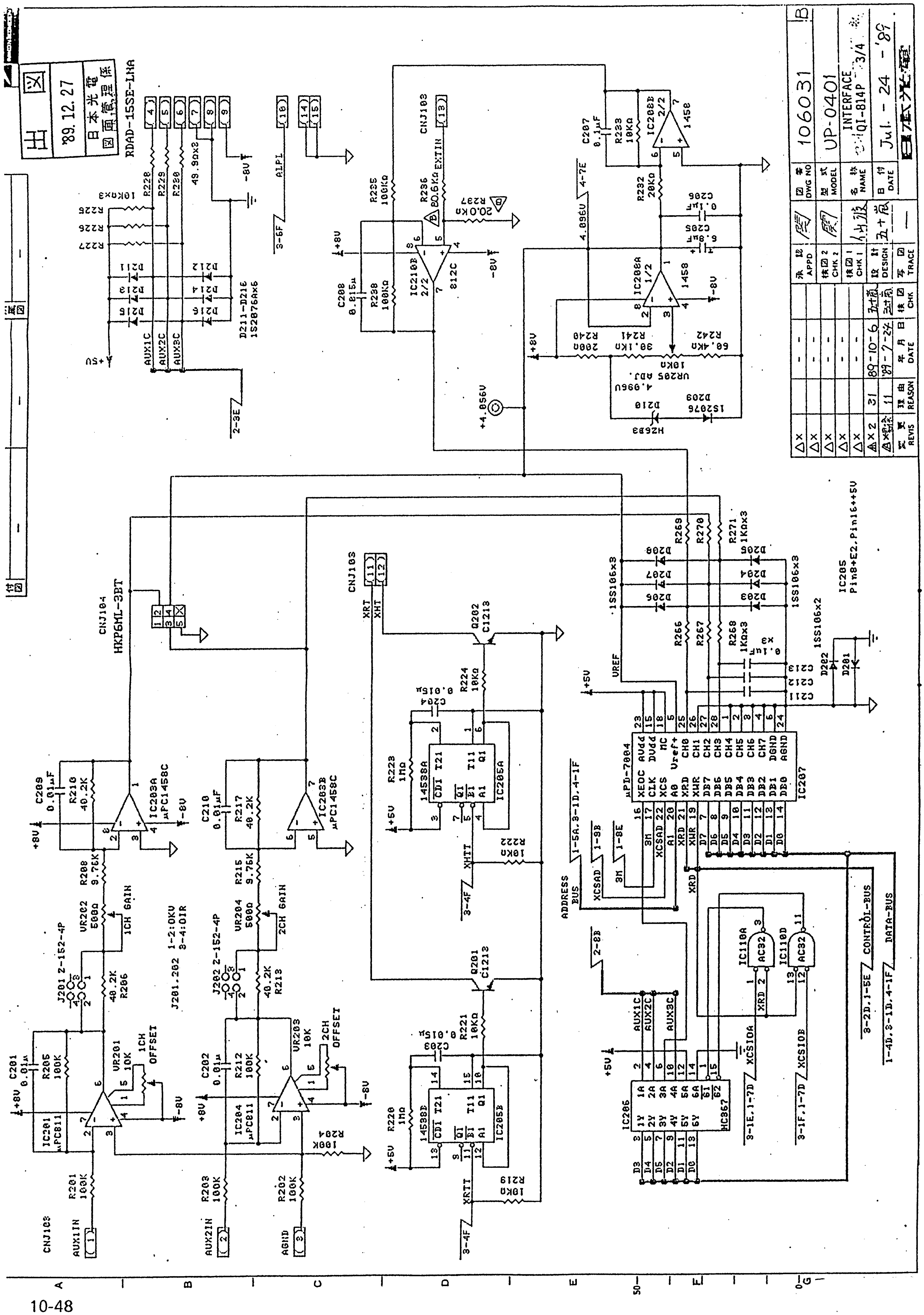


0203-026561
SC-006RK
POWER SUPPLY 2/2
Dec. 27 '89
PCB 90541XX
1991年 7月新コードに切替
107032
AC INPUT

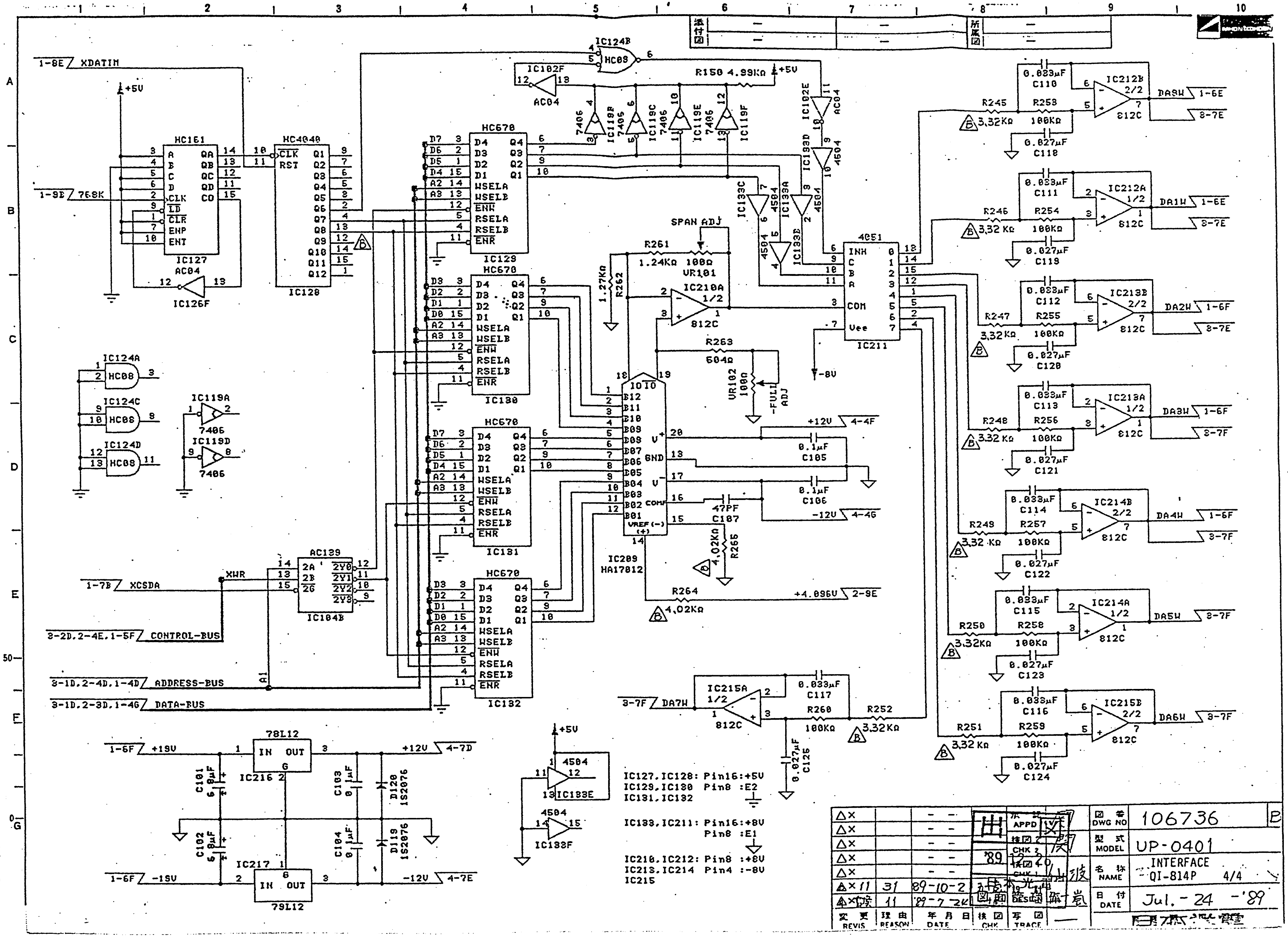

VM-004P
CRT UNIT
Jun. - 20 - '89
CRT
230BT831
IC401
AN5763
IC501
AN5790N
FOCUS
SUB-BRIGHT
H.HOLD
V.HOLD
V.SIZE
V.LIN
HERTER
D.Y
FBT T501
PALF307010
CD-1A
U-SYNC
VIDEO
H-SYNC
GND
+12V

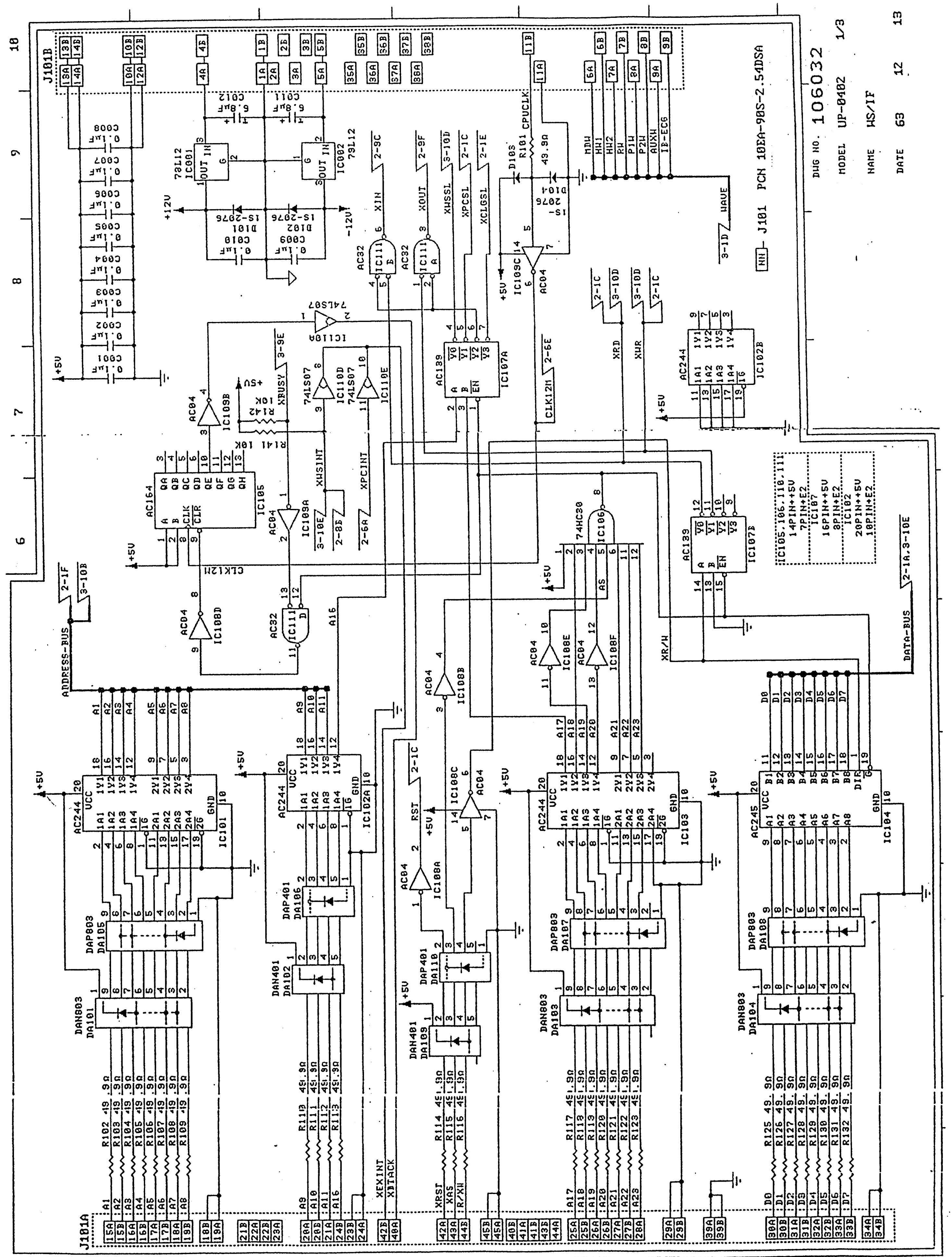

DWG NO. 106029A
MODEL UP-0101 PIO
NAME INTERFACE QI-814P 1/4
DATE 89 7 18
CNJ101 PCN10EA-90P-2.54DS
NOTES: 1.All DIODES are 1S2076A unless otherwise noted.
ADDRESS-BUS
DATA-BUS
CONTROL-BUS

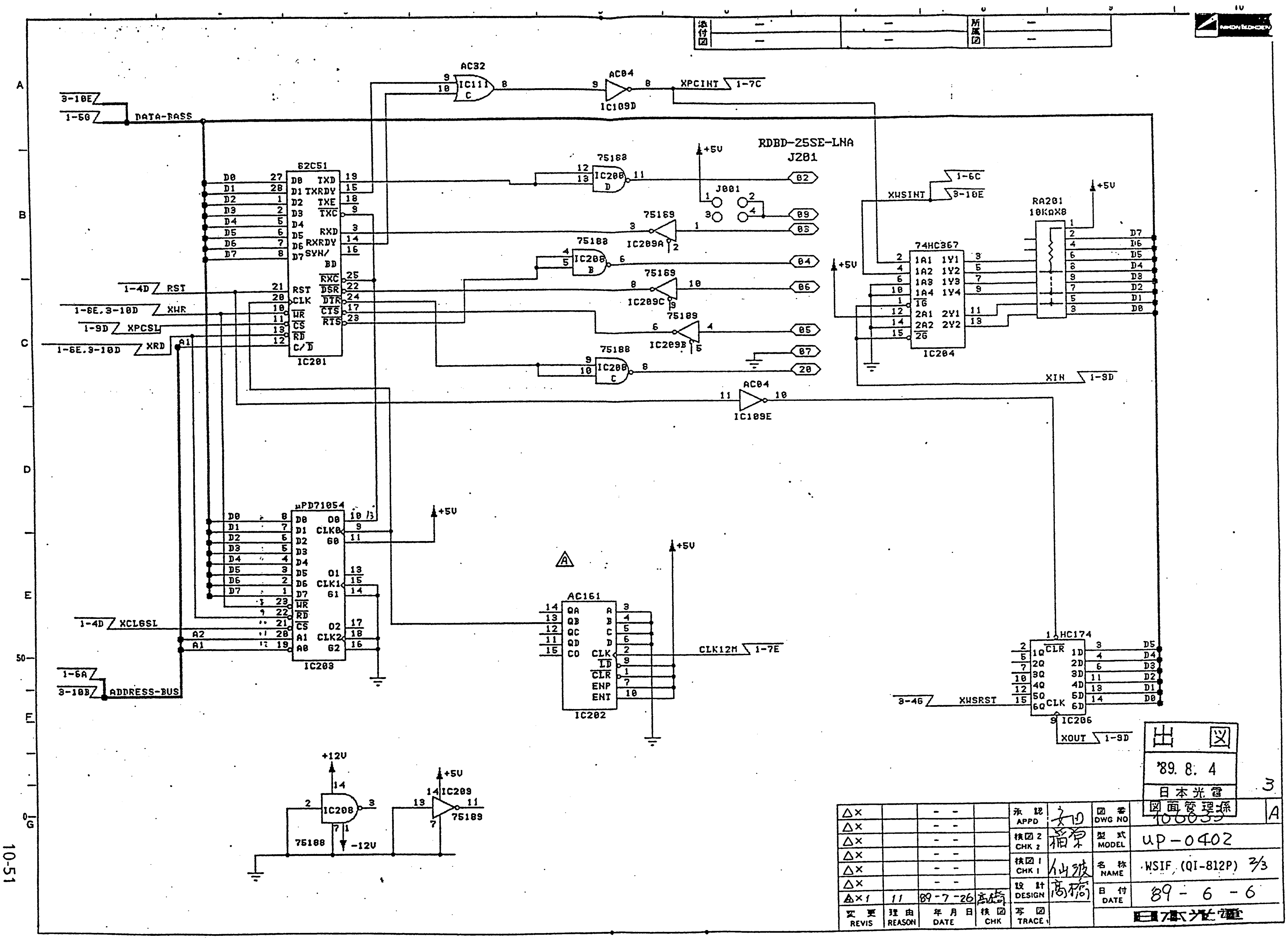

INTERFACE
QI-814P 2/4
UP-0401
0203-021049
106030
Jul. - 24 - '89
RDCD-37SE-LMA
μPD72001
PAL P102

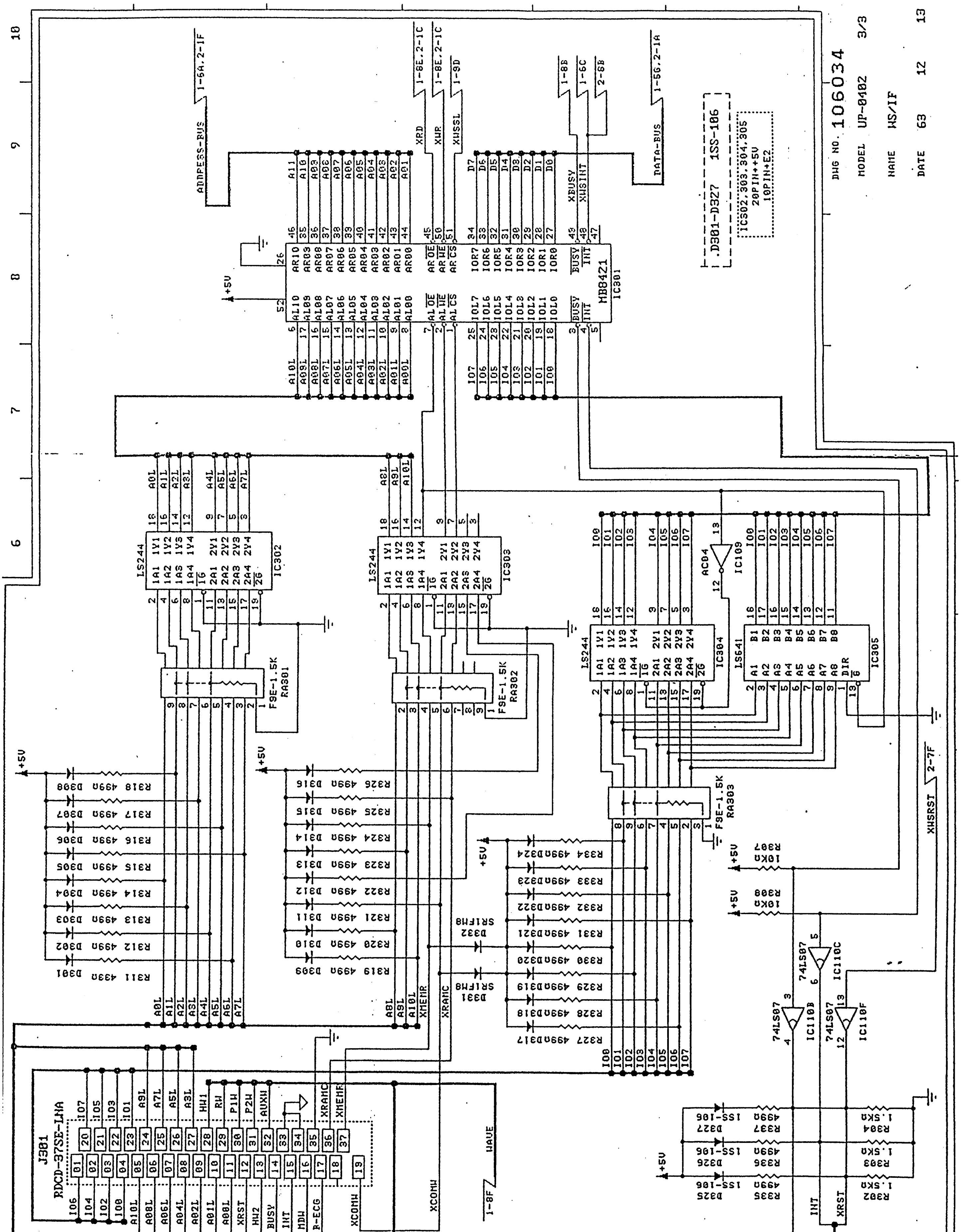


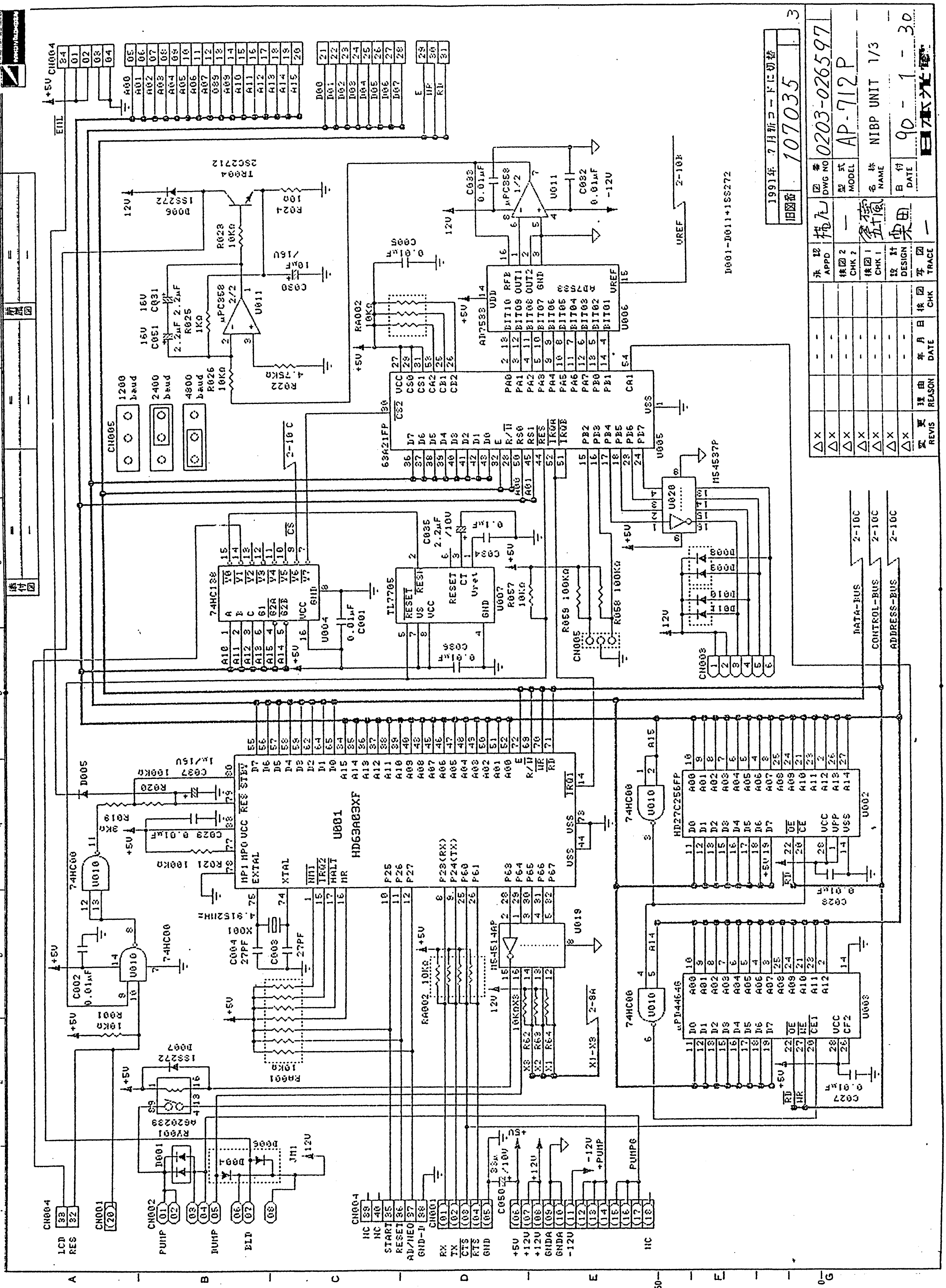
106031
UP-0401
INTERFACE
QI-814P 3/4


XDATIM
768K
HC161
IC127
HC4040
IC128
HC670
IC129
IC130
IC131
IC132
AC139
IC104B
XCSDA
XWR
CONTROL-BUS
ADDRESS-BUS
DATA-BUS
IC124B
HC08
IC102F
AC04
R150 4.99KΩ
SPAN ADJ
R261 1.24KΩ
VR101 100Ω
IC210A 1/2
812C
R262 1.27KΩ
R263 604Ω
VR102 100Ω
-FULL ADJ
IC209
HA17812
R264 4.02KΩ
R265 4.02KΩ
C187 47PF
C105 0.1μF
C106 0.1μF
+4.096V
4051
IC211
IC212B 2/2
IC212A 1/2
IC213B 2/2
IC213A 1/2
IC214B 2/2
IC214A 1/2
IC215B 2/2
IC215A 1/2
DA0W
DA1W
DA2W
DA3W
DA4W
DA5W
DA6W
DA7W
78L12
IC216
79L12
IC217
D120 1S2076
D119 1S2076
4504
IC133E
IC133F
IC127.IC128: Pin16:+5V
IC129.IC130 Pin8 :E2
IC131.IC132
IC133.IC211: Pin16:+8V
Pin8 :E1
IC210.IC212: Pin8 :+8V
IC213.IC214 Pin4 :-8V
IC215
106736
UP-0401
INTERFACE
QI-814P 4/4
Jul. - 24 - '89

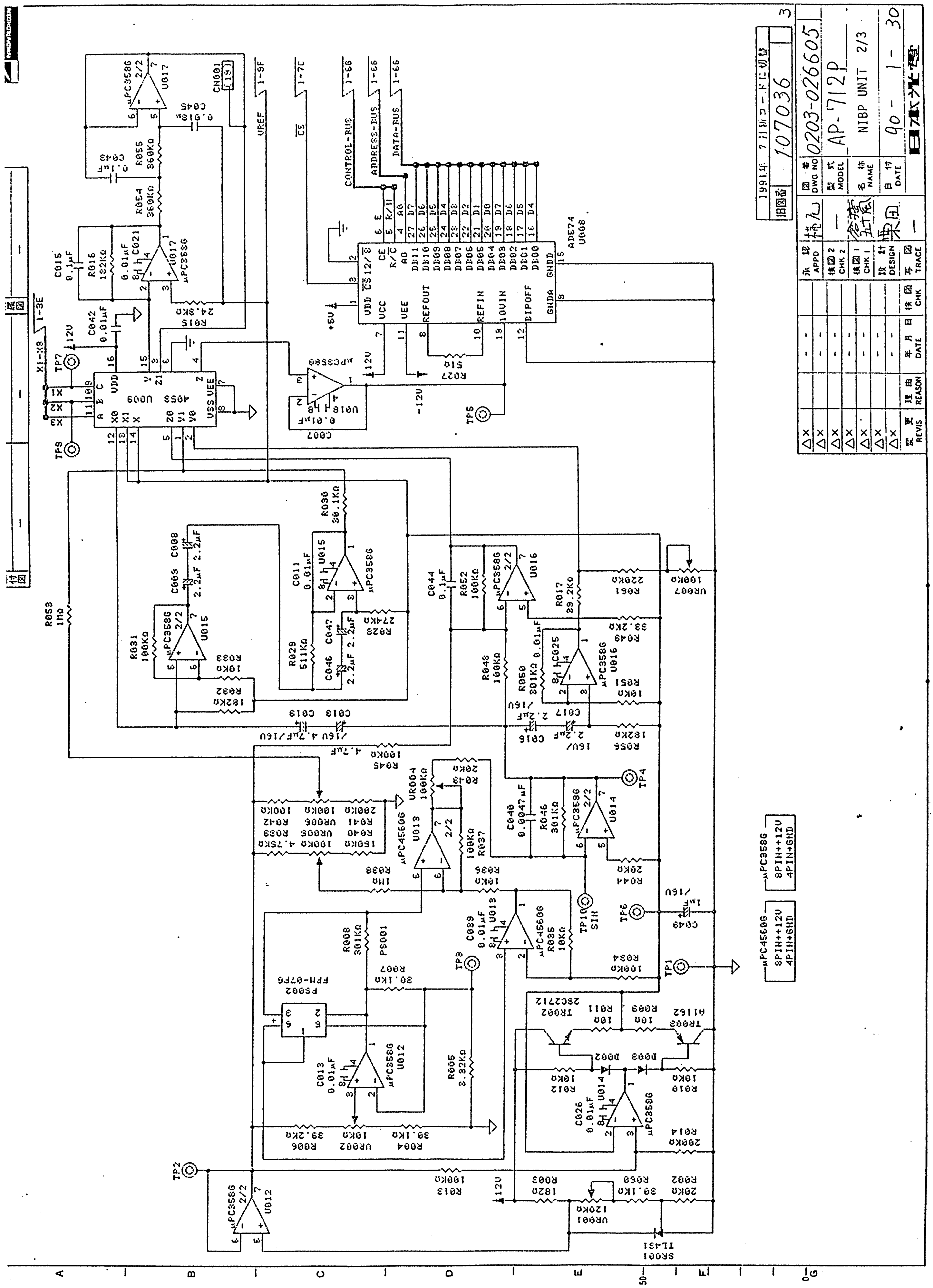

DWG NO. 106032 1/3
MODEL UP-0402
NAME WS/IF
DATE 63 12 13
J101 PCN 10EA-90S-2.54DSA
ADDRESS-BUS
DATA-BUS


AC32
IC111 C
AC04
IC109D
XPCINT
1-7C
3-10E
1-50
DATA-BASS
RDBD-25SE-LNA
J201
75188
IC208 D
IC208 B
IC208 C
75189
IC209A
IC209C
IC209B
J001
+5V
82C51
D0 D1 D2 D3 D4 D5 D6 D7
TXD
TXRDY
TXE
TXC
RXD
RXRDY
SYN/BD
RXC
DSR
DTR
CTS
RTS
RST
CLK
WR
CS
RD
C/D
IC201
1-4D
RST
1-6E,3-10D
XWR
1-9D
XPCSL
1-6E,9-10D
XRD
A1
XWSINT
1-6C
3-10E
RA201
10KΩX8
74HC367
1A1 1A2 1A3 1A4 1G 2A1 2A2 2G
1Y1 1Y2 1Y3 1Y4 2Y1 2Y2
IC204
XIN
1-9D
AC04
IC109E
μPD71054
CLK0
G0
O0
O1
CLK1
G1
O2
CLK2
G2
A1
A0
IC203
XCL6SL
A2
1-6A
3-10B
ADDRESS-BUS
AC161
QA QB QC QD CO
A B C D
CLK
LD
CLR
ENP
ENT
IC202
CLK12M
1-7E
HC174
CLR
1Q 2Q 3Q 4Q 5Q 6Q
1D 2D 3D 4D 5D 6D
IC206
3-46
XWSRST
XOUT
1-9D
+12V
IC208
75188
-12V
IC209
75189
出図
'89. 8. 4
日本光電
図面管理係
3
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
図番 DWG NO
型式 MODEL
名称 NAME
日付 DATE
A
UP-0402
WSIF (QI-812P) 2/3
89 - 6 - 6
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
11
89-7-26
日本光電

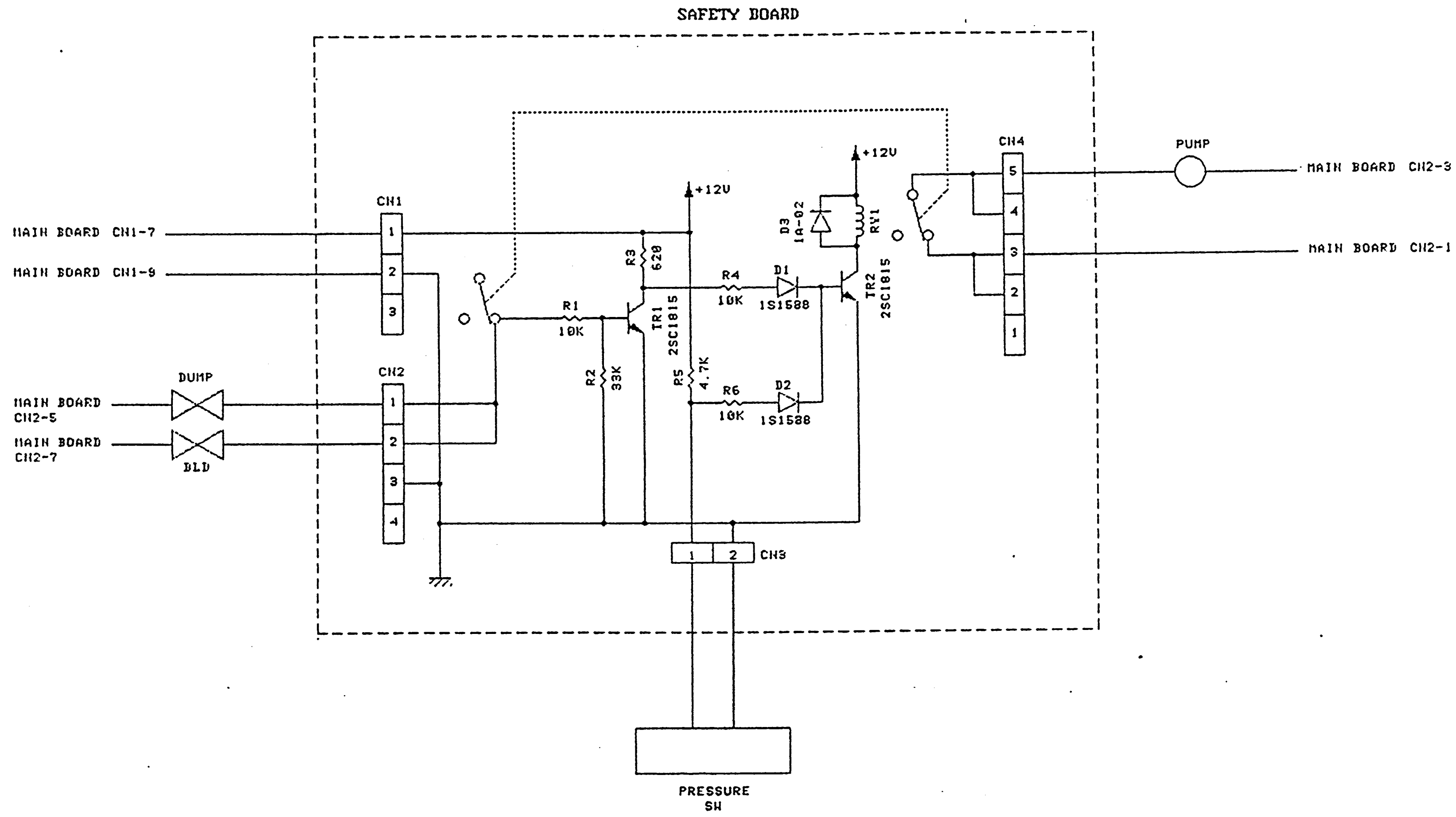

DWG NO. 106034
3/3
MODEL UP-0402
NAME WS/IF
DATE 63 12 13
D301-D327 1SS-106
IC302,303,304,305
20PIN+5V
10PIN+E2



NIBP UNIT 1/3
AP-712P
0203-026597
107035
HD63A03XF
HD27C256FP
63A21FP
AD7533
74HC138
TL7705
DATA-BUS
CONTROL-BUS
ADDRESS-BUS



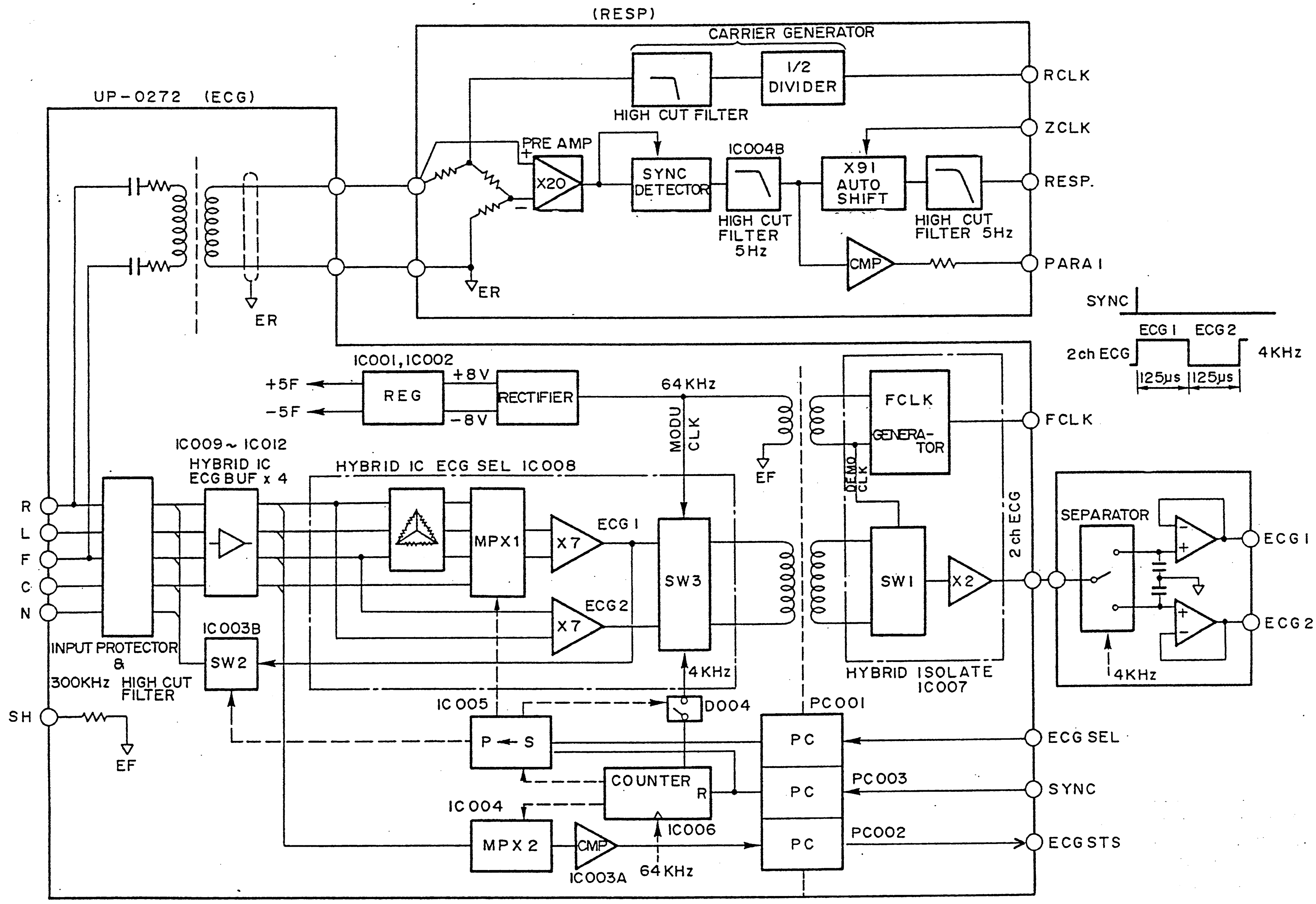
0203-026605
AP-712P
NIBP UNIT 2/3
107036
AD574
U008
4053
U009
CONTROL-BUS
ADDRESS-BUS
DATA-BUS



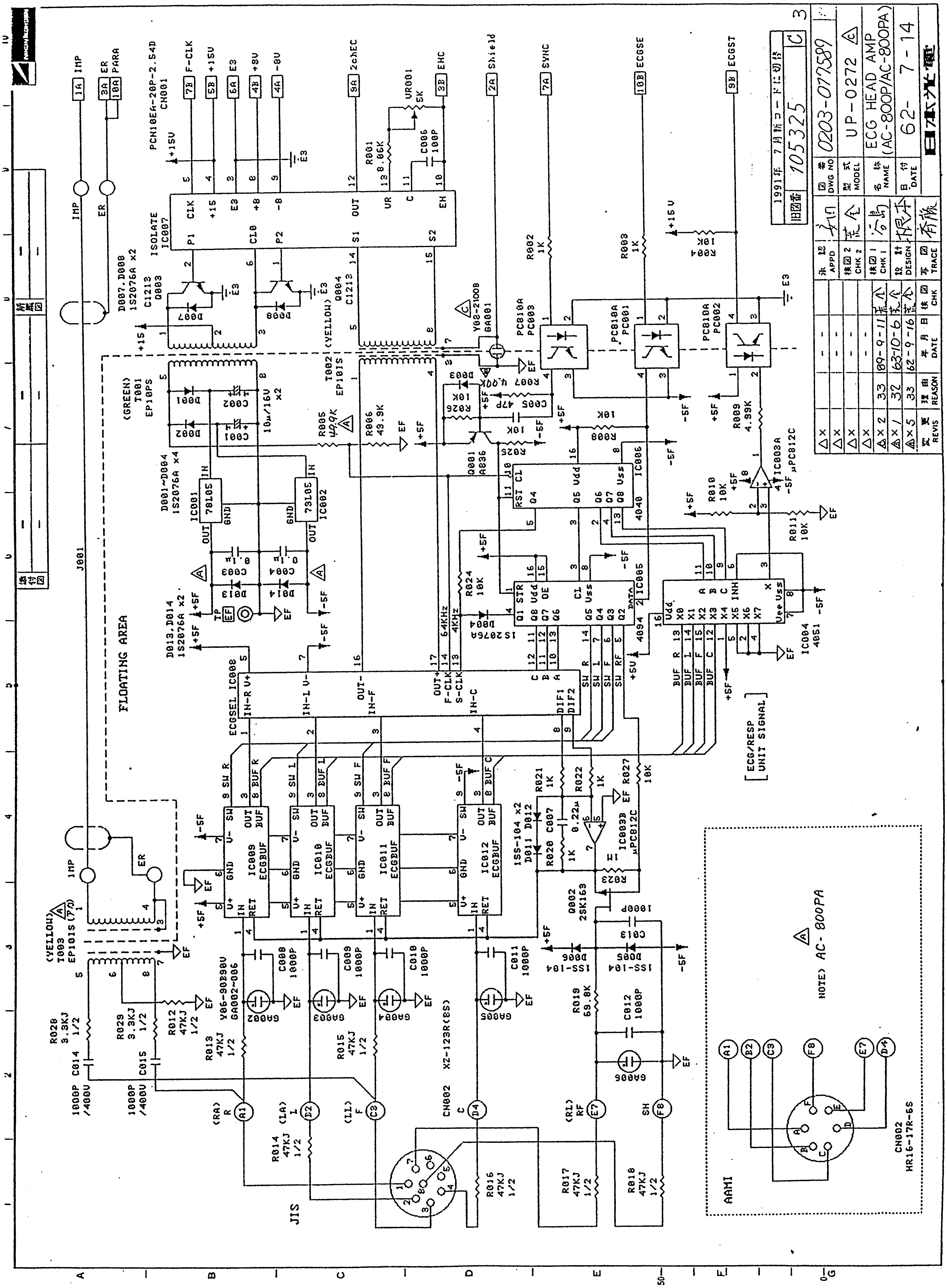
1991年 7月新コードに切替

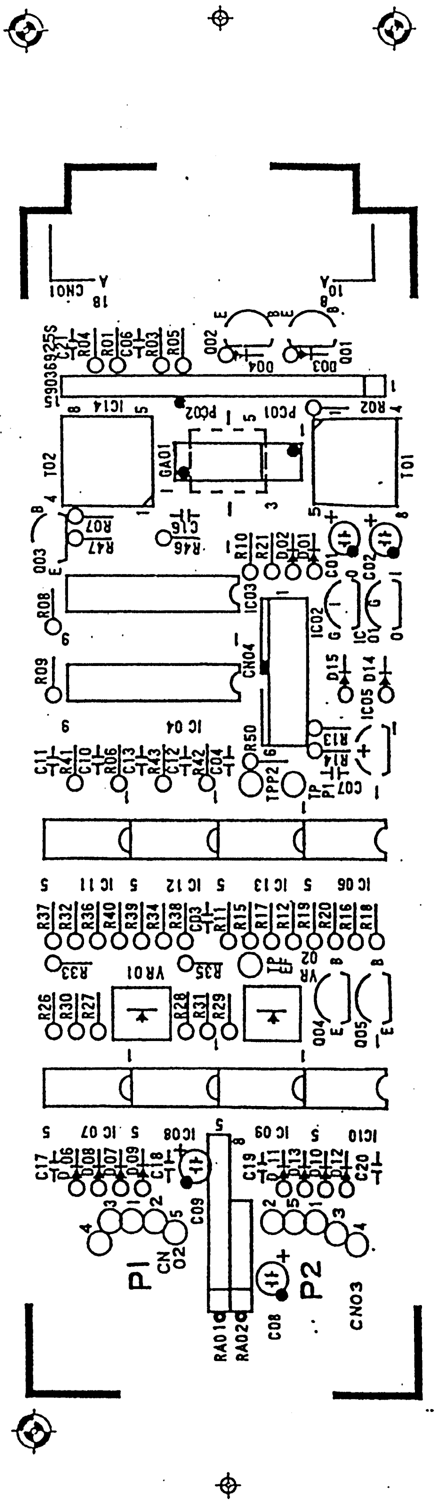
旧図番 107049 3

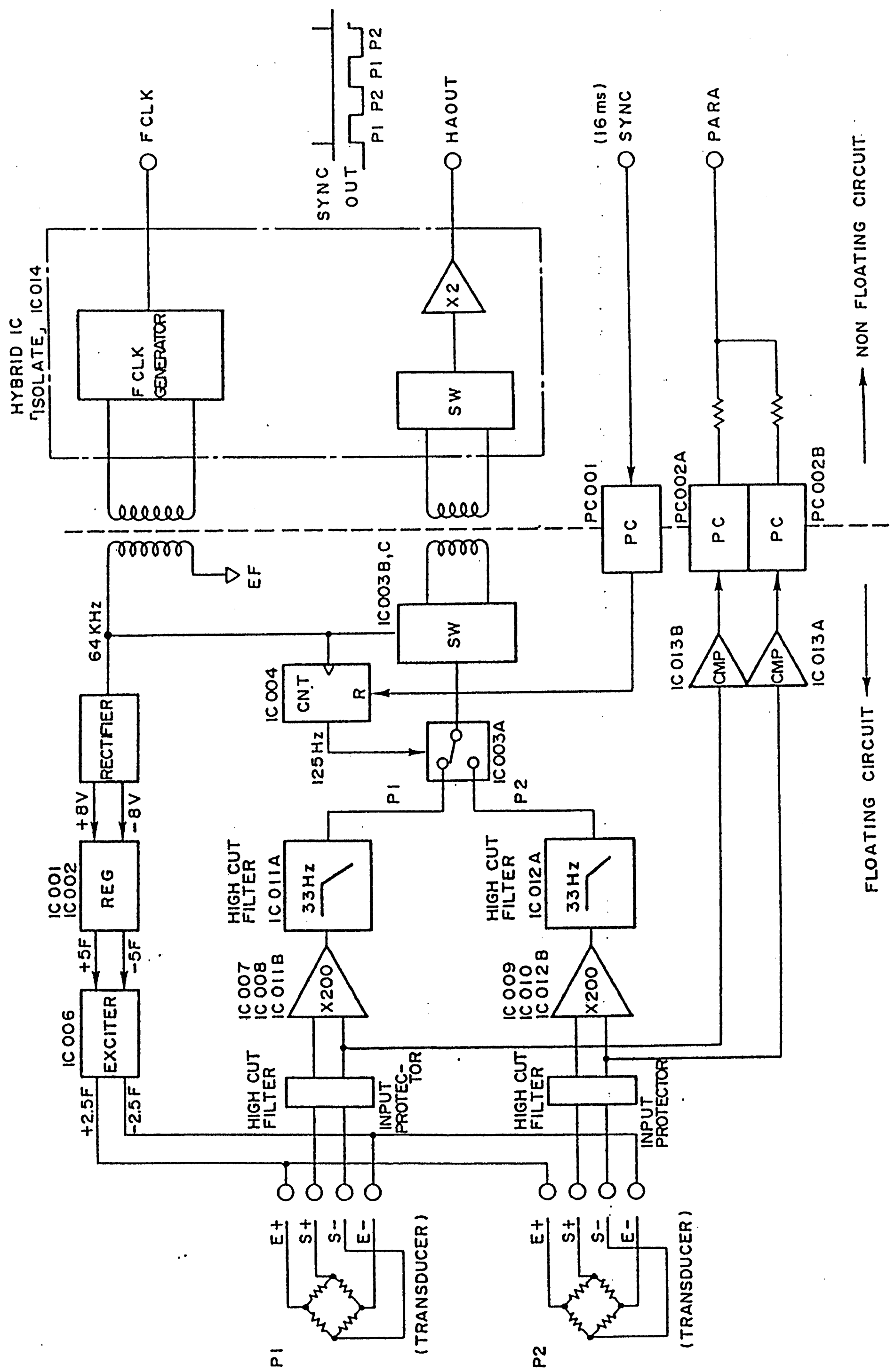
承認 APPD	楢尾	図番 DWG NO	0203-026695
検図2 CHK 2	—	型式 MODEL	AP-712P
検図1 CHK 1	金森 五十嵐	名称 NAME	NIBP UNIT 3/3
設計 DESIGN	栗田	日付 DATE	89-11-9
写図 TRACE	—		日本光電

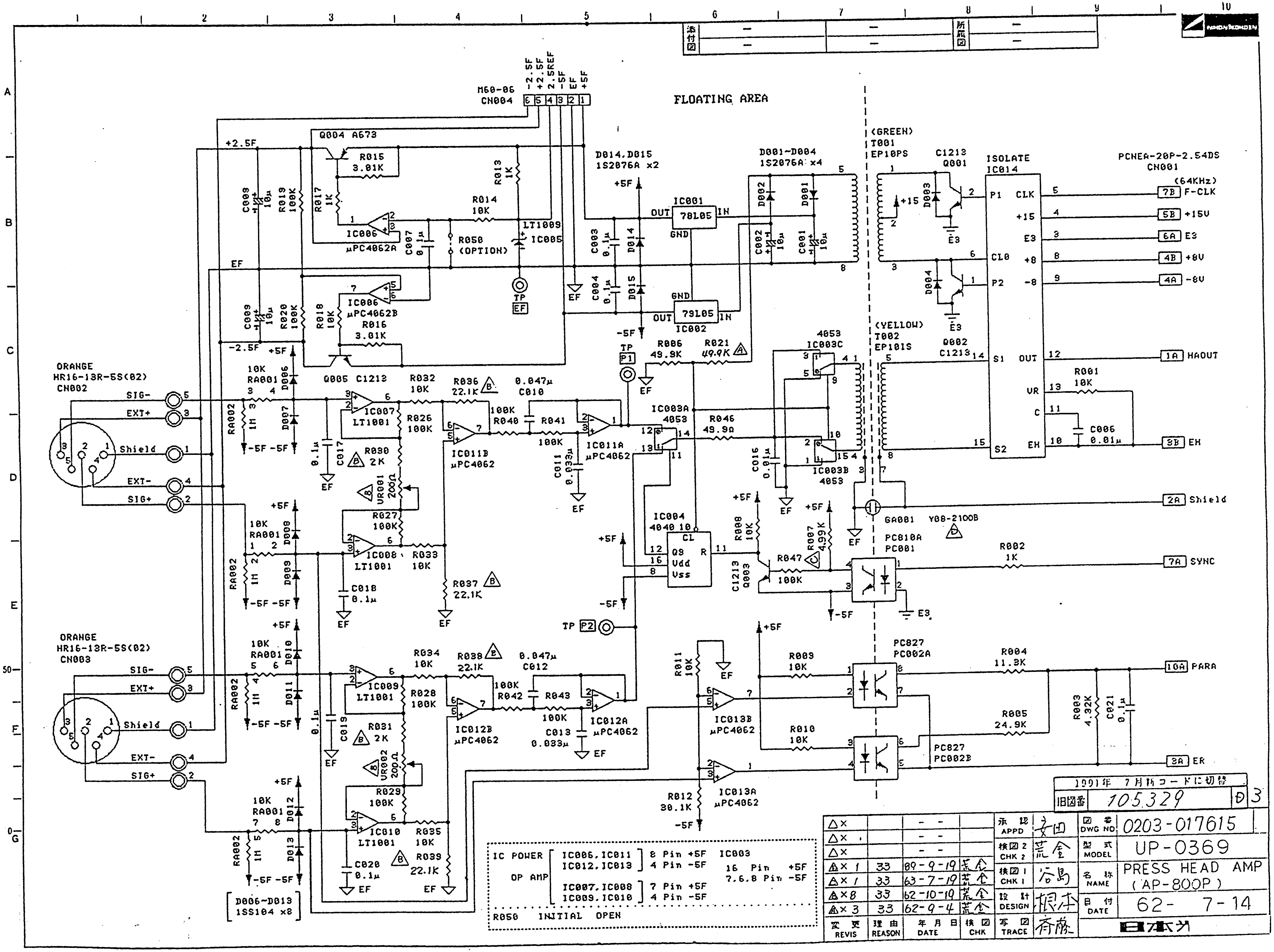


(RESP)
CARRIER GENERATOR
1/2 DIVIDER
HIGH CUT FILTER
RCLK
ZCLK
RESP.
PARA I
PRE AMP
X20
SYNC DETECTOR
IC004B
HIGH CUT FILTER 5Hz
X91 AUTO SHIFT
HIGH CUT FILTER 5Hz
CMP
ER
UP-0272 (ECG)
SYNC
2ch ECG
ECG I
ECG 2
4KHz
125μs
125μs
IC001, IC002
REG
+8V
-8V
RECTIFIER
+5F
-5F
64KHz
MODU CLK
EF
FCLK GENERA-TOR
DEMO CLK
FCLK
2ch ECG
SW1
X2
HYBRID ISOLATE IC007
SEPARATOR
4KHz
ECG1
ECG2
IC009 ~ IC012
HYBRID IC ECG BUF x 4
HYBRID IC ECG SEL IC008
MPX1
X7
X7
SW3
4KHz
D004
R
L
F
C
N
INPUT PROTECTOR & 300KHz HIGH CUT FILTER
IC003B
SW2
SH
IC005
P ← S
COUNTER
IC006
IC004
MPX 2
CMP
IC003A
64KHz
PC001
PC
PC
PC
PC003
PC002
ECG SEL
SYNC
ECG STS

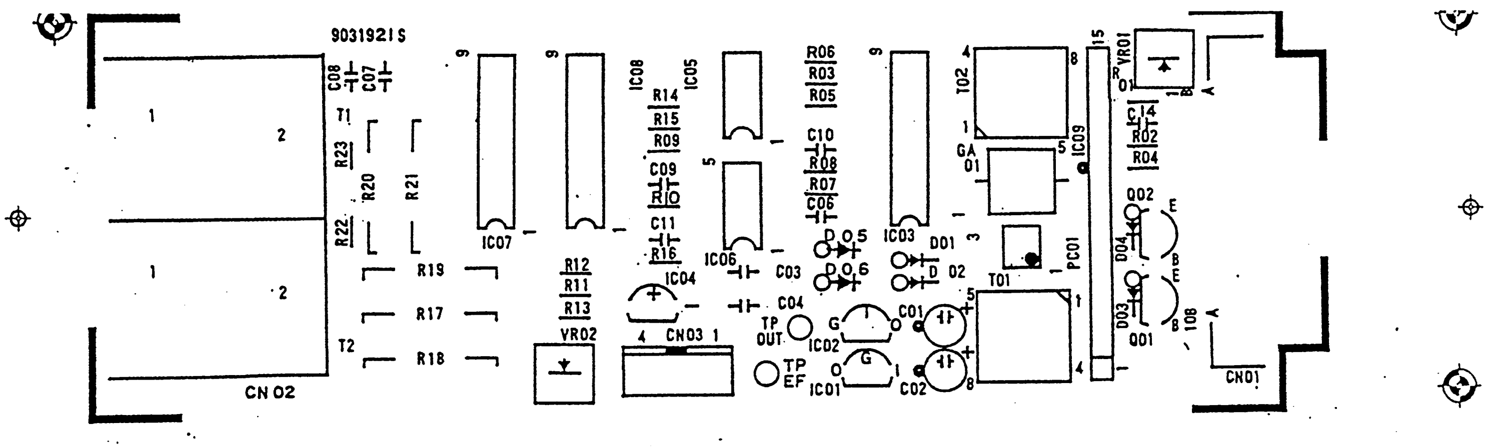

ECG HEAD AMP
(AC-800P/AC-800PA)
UP-0272
0203-077589
105325
FLOATING AREA
ECG/RESP UNIT SIGNAL
NOTE) AC-800PA
JIS
AAMI

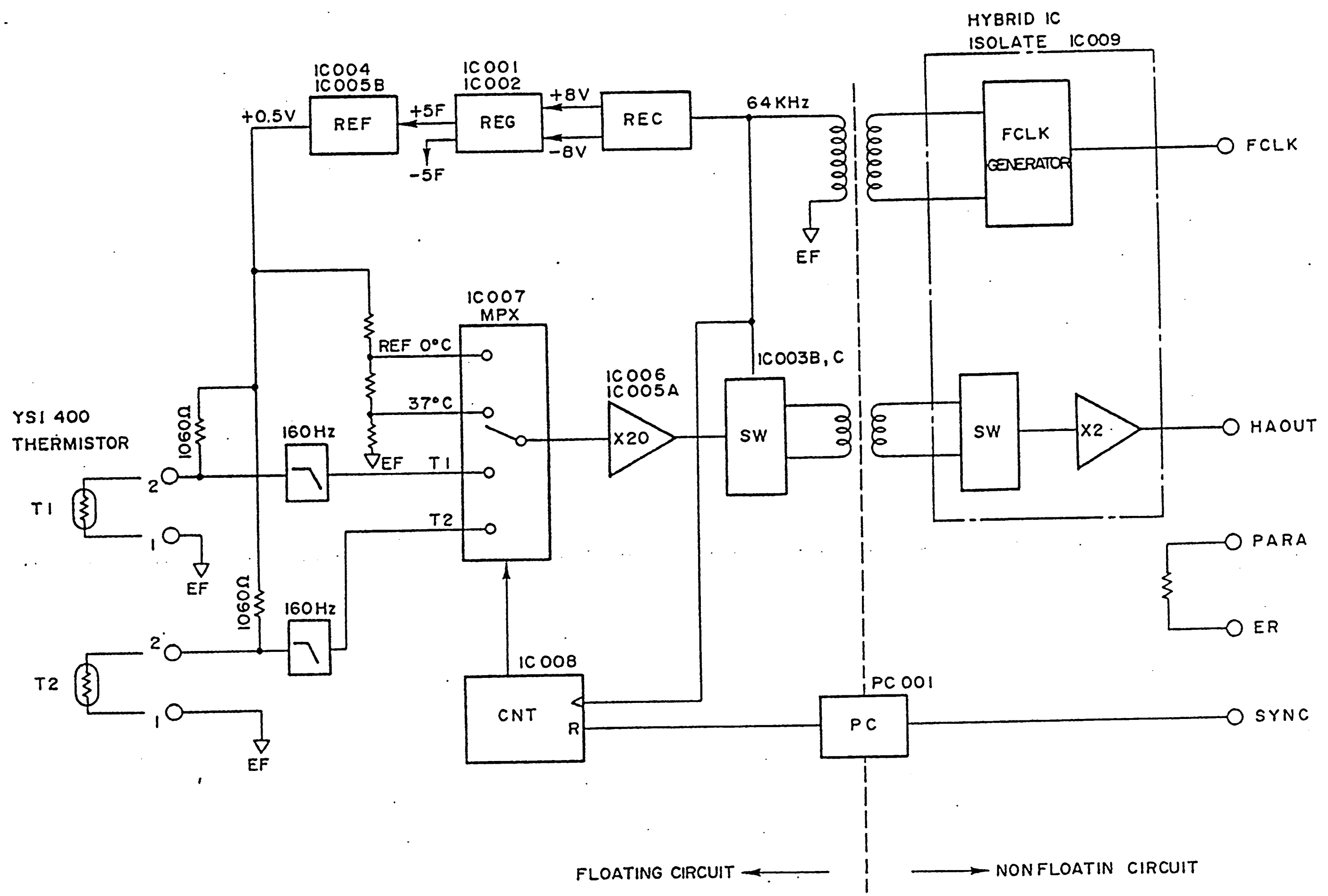


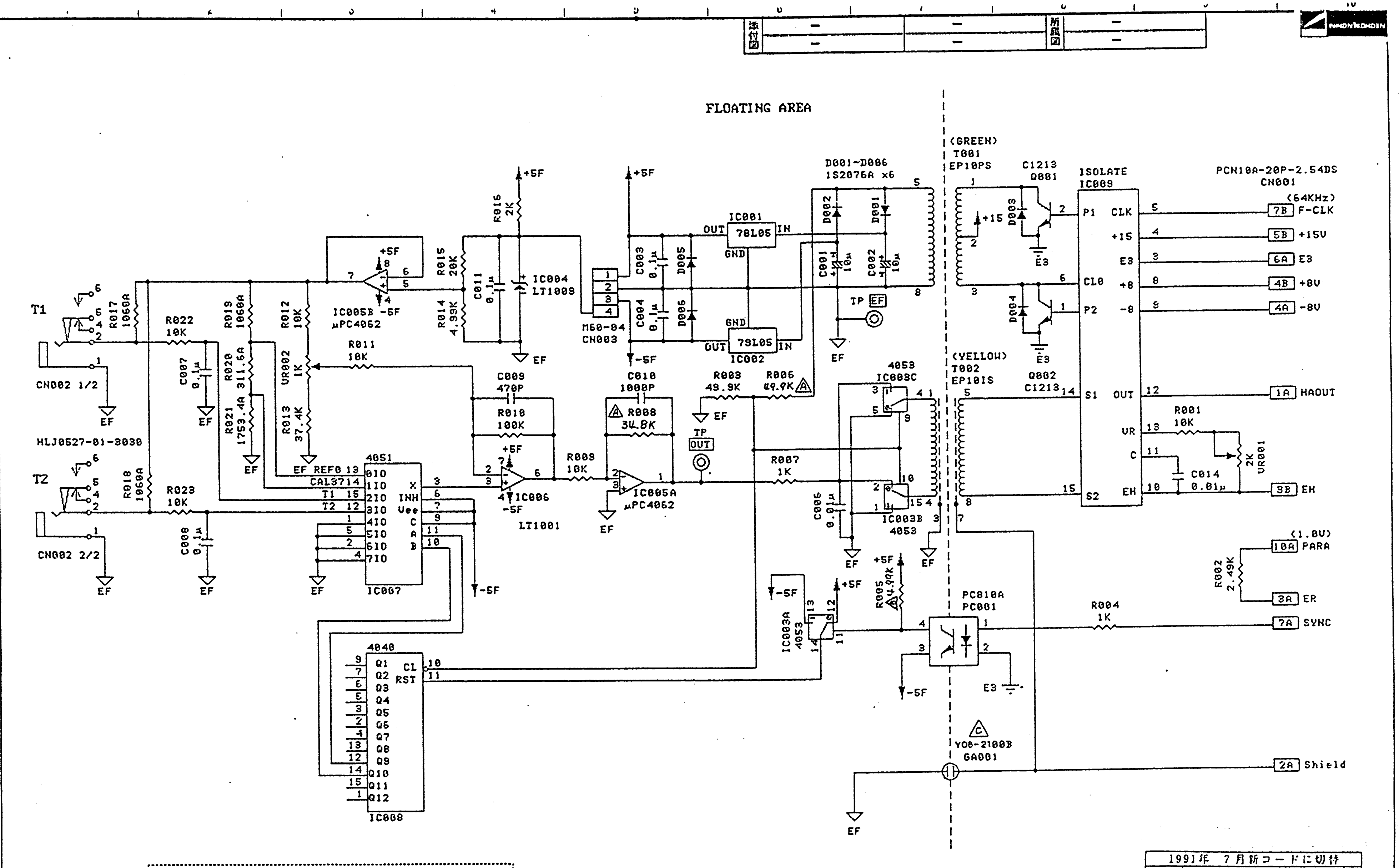

HYBRID IC
ISOLATE, IC014
F CLK GENERATOR
F CLK
SYNC OUT
P1 P2 P1 P2
HAOUT
(16 ms) SYNC
PARA
X2
SW
PC001
PC002A
PC002B
PC
NON FLOATING CIRCUIT
FLOATING CIRCUIT
IC013B
IC013A
CMP
EF
64 KHz
IC003B, C
IC004
CNT
R
125Hz
IC003A
RECTIFIER
+8V
-8V
IC001
IC002
REG
+5F
-5F
IC006
EXCITER
+2.5F
-2.5F
HIGH CUT FILTER
IC011A
33Hz
IC012A
IC007
IC008
IC011B
IC009
IC010
IC012B
X200
INPUT PROTECTOR
E+
S+
S-
E-
(TRANSDUCER)
P1
P2



					1991年 7月新コードに切替		
					旧図番	105329	D 3
△×		- -		承認 APPD 安田	図番 DWG NO	0203-017615	
△×		- -		検図2 CHK 2 荒金	型式 MODEL	UP-0369	
△×		- -		検図1 CHK 1 谷島	名称 NAME	PRESS HEAD AMP (AP-800P)	
⚠×1	33	89-9-19	荒金	設計 DESIGN 根本	日付 DATE	62- 7-14	
⚠×1	33	63-7-19	荒金	写図 TRACE 斉藤		日本光電	
⚠×8	33	62-10-19	荒金				
⚠×3	33	62-9-4	荒金				
変更 REVIS	理由 REASON	年月日 DATE	検図 CHK				


9031921S
CN02
CN01
CN03
VR01
VR02
TP OUT
TP EF


HYBRID IC
ISOLATE IC009
IC004
IC005B
REF
+0.5V
IC001
IC002
REG
+5F
-5F
+8V
-8V
REC
64KHz
EF
FCLK
GENERATOR
FCLK
IC007
MPX
REF 0°C
37°C
T1
T2
IC006
IC005A
X20
IC003B, C
SW
SW
X2
HAOUT
PARA
ER
YSI 400
THERMISTOR
1060Ω
160Hz
T1
T2
IC008
CNT
R
PC001
PC
SYNC
FLOATING CIRCUIT
NONFLOATIN CIRCUIT

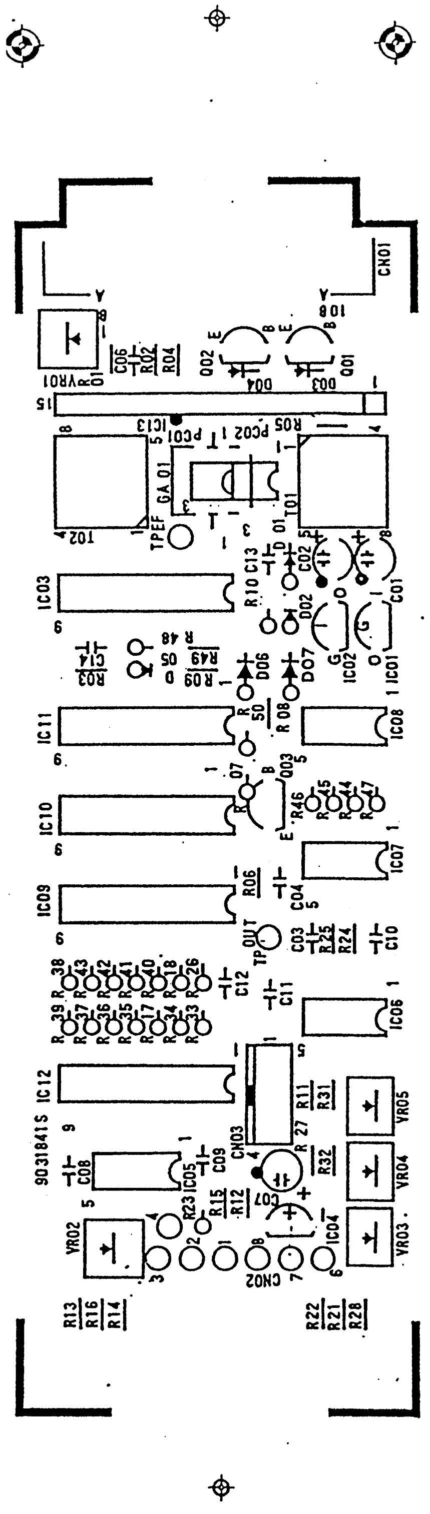


IC103 16 Pin +5F, 6.7.8 Pin -5F
IC007 16 Pin +5F, 8 Pin -5F
IC008 16 Pin +5F, 8 Pin -5F
R017~R021 A : ±0.05%

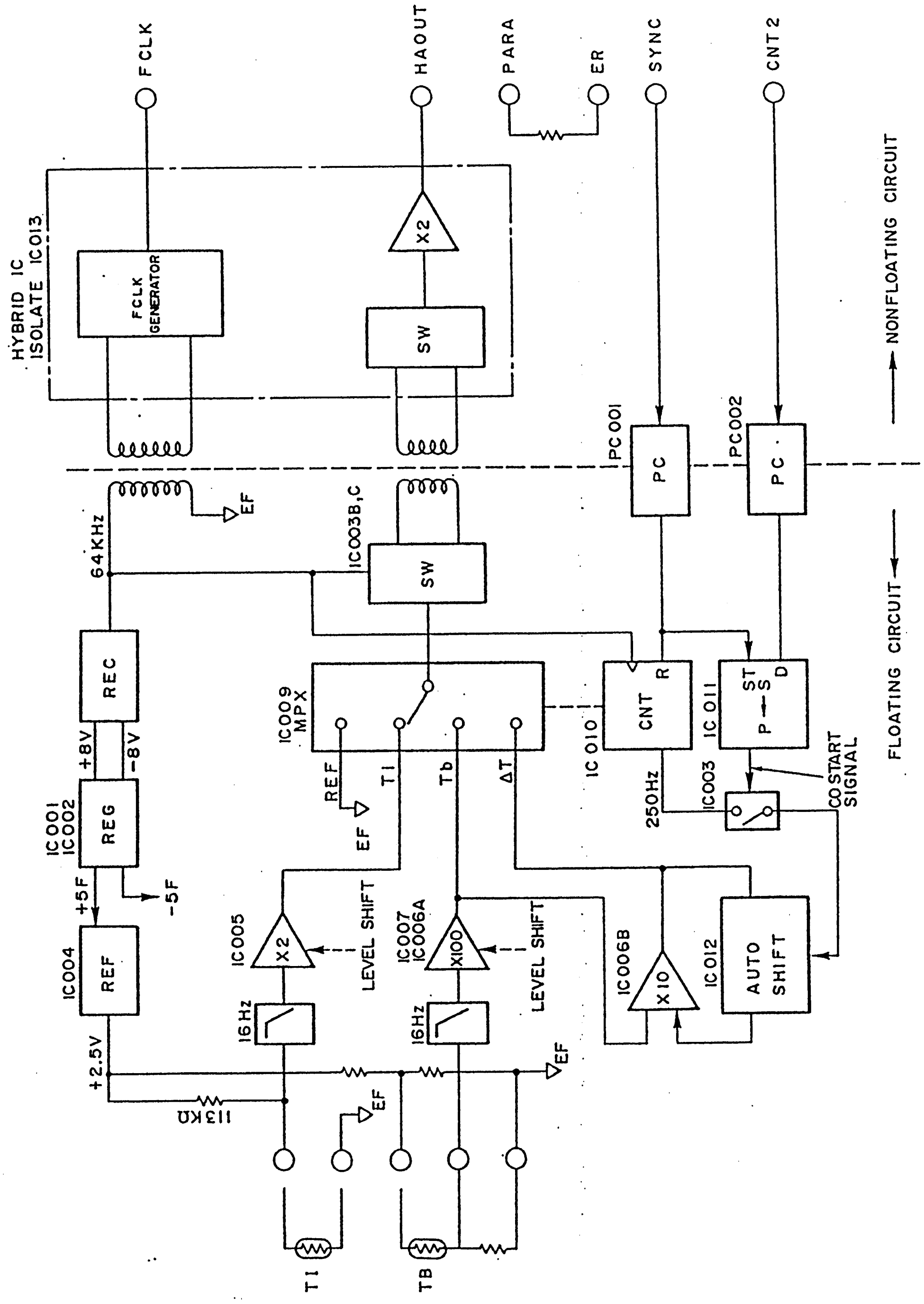
1991年 7月新コードに切替
旧図番 105327 C 3

変更 REVIS	理由 REASON	年月日 DATE	検図 CHK
△×		- -	
△×		- -	
△×		- -	
△×		- -	
△× 1	33	89-9-19	荒金
△× 1	32	63-10-6	荒金
△× 2	33	62-9-4	荒金

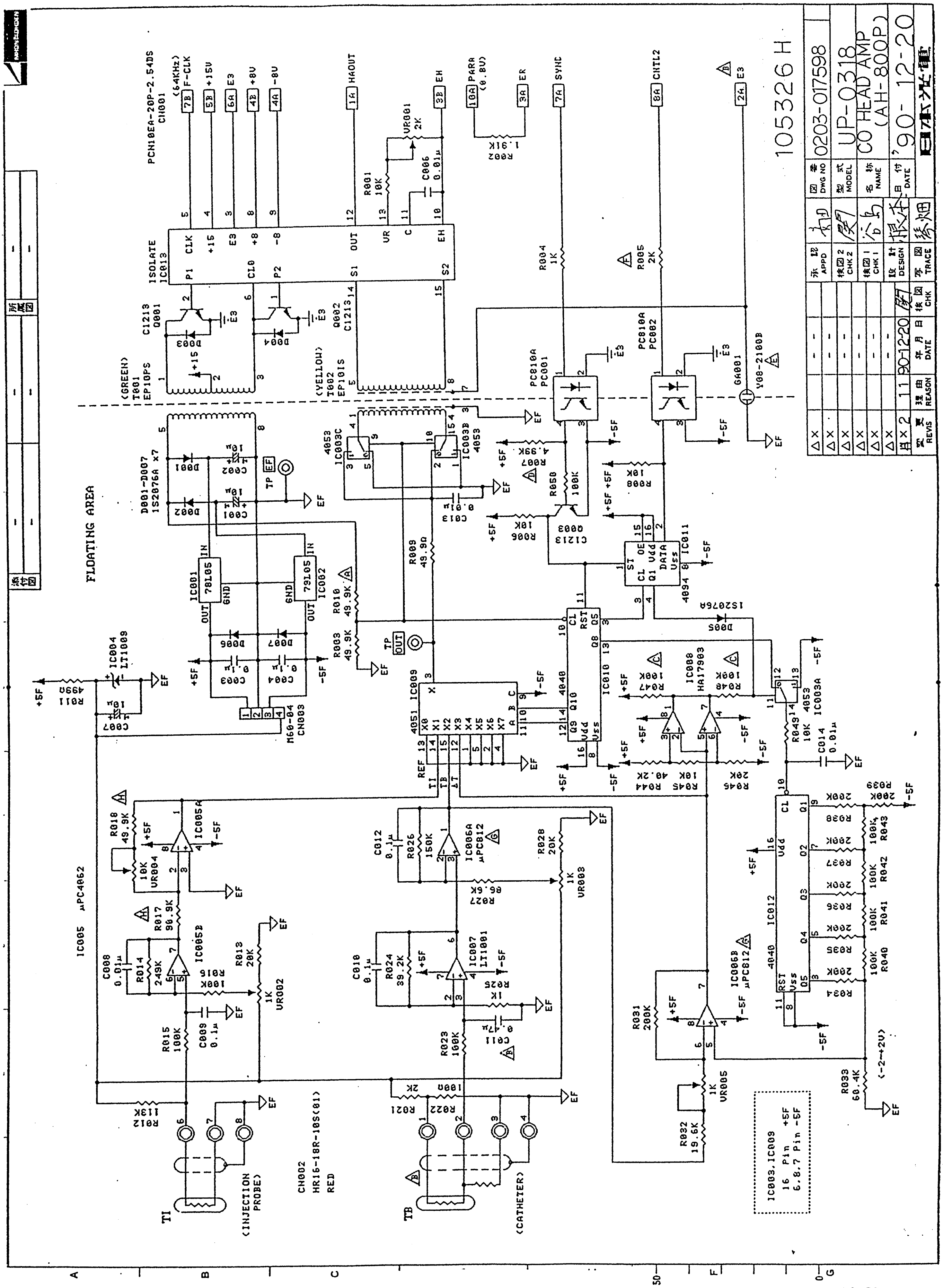
承認 APPD	安田	図番 DWG NO	0203-077606 C
検図2 CHK 2	荒金	型式 MODEL	UP-0319
検図1 CHK 1	谷島	名称 NAME	TEMP HEAD AMP (AW-800P)
設計 DESIGN	根本	日付 DATE	62- 7-14
写図 TRACE	斎藤		日本光電

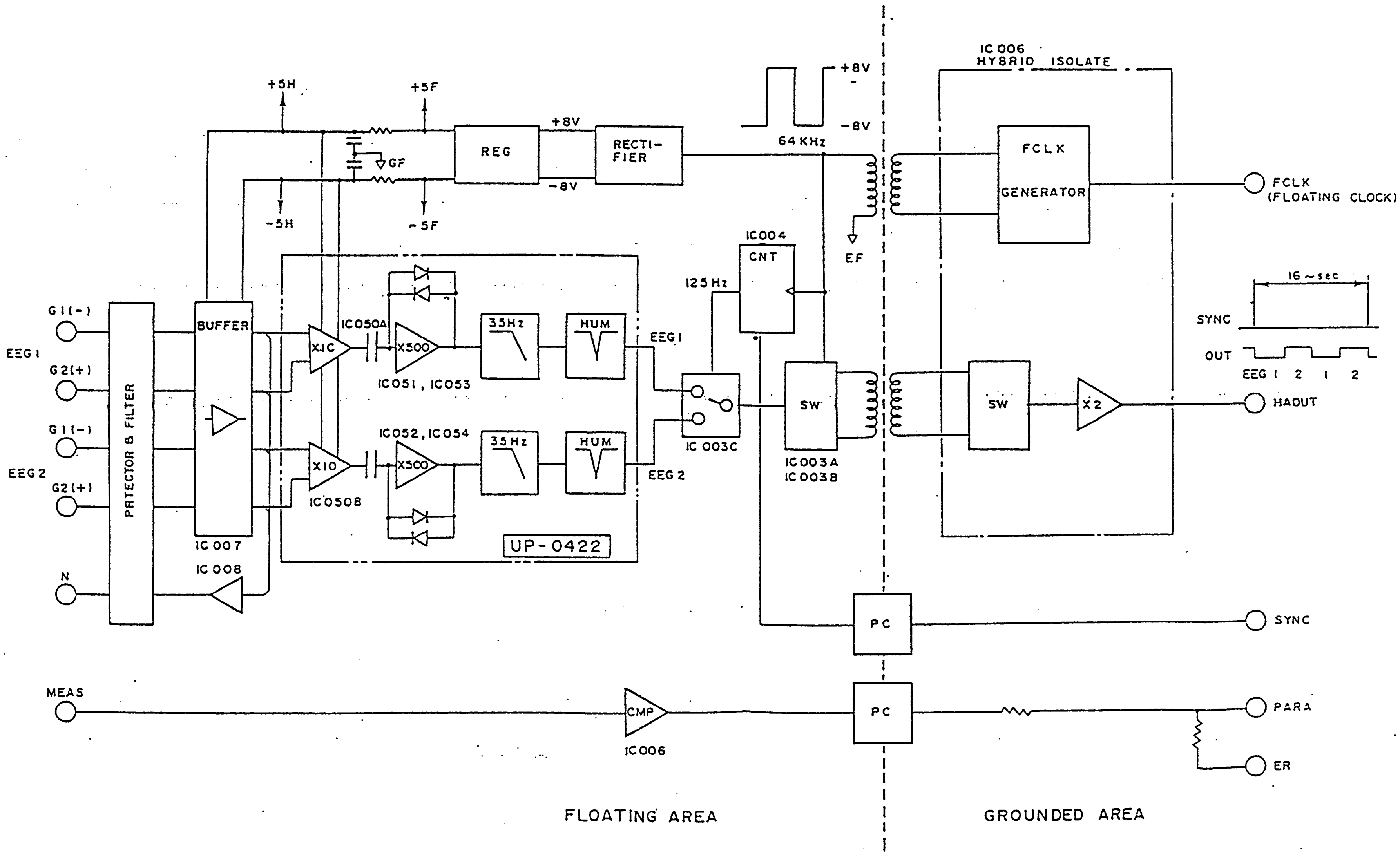


CN01
CN02
CN03
VR01
VR02
VR03
VR04
VR05
IC03
IC11
IC10
IC09
IC12
IC13
IC01
IC02
IC04
IC05
IC06
IC07
IC08
T01
T02
TPEF
TPOUT
9031841S



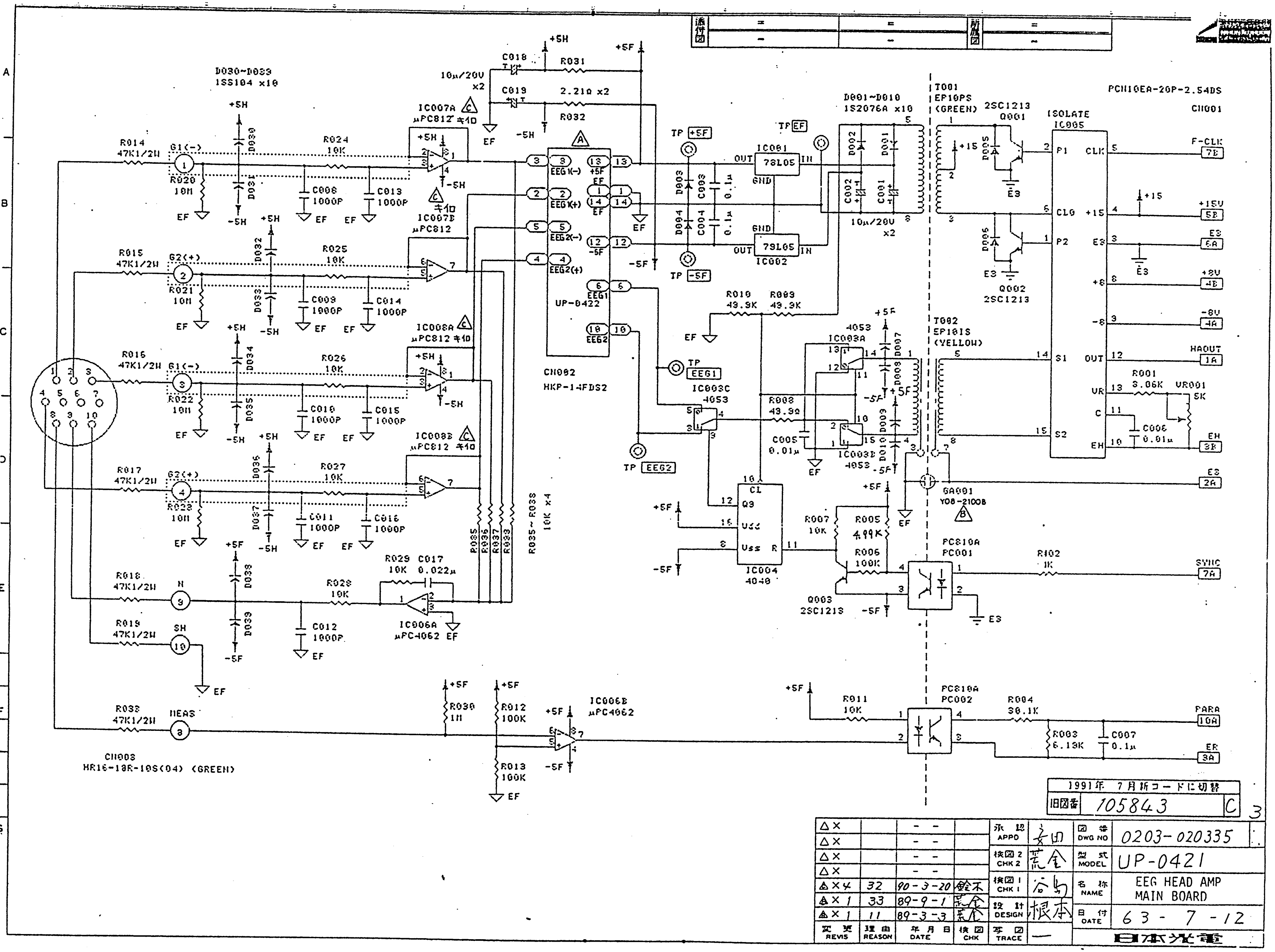
FCLK
HAOUT
PARA
ER
SYNC
CNT2
HYBRID IC
ISOLATE IC013
FCLK GENERATOR
X2
SW
NONFLOATING CIRCUIT
FLOATING CIRCUIT
PC001
PC002
PC
PC
64KHz
EF
IC003B,C
SW
REC
REG
+8V
-8V
IC001
IC002
+5F
-5F
REF
IC004
+2.5V
113KΩ
IC009
MPX
REF
TI
Tb
ΔT
CNT
R
IC010
ST
P — S
D
IC011
250Hz
IC003
COSTART SIGNAL
IC005
X2
LEVEL SHIFT
IC007
IC006A
X100
LEVEL SHIFT
IC006B
X10
IC012
AUTO SHIFT
16Hz
16Hz
TI
TB

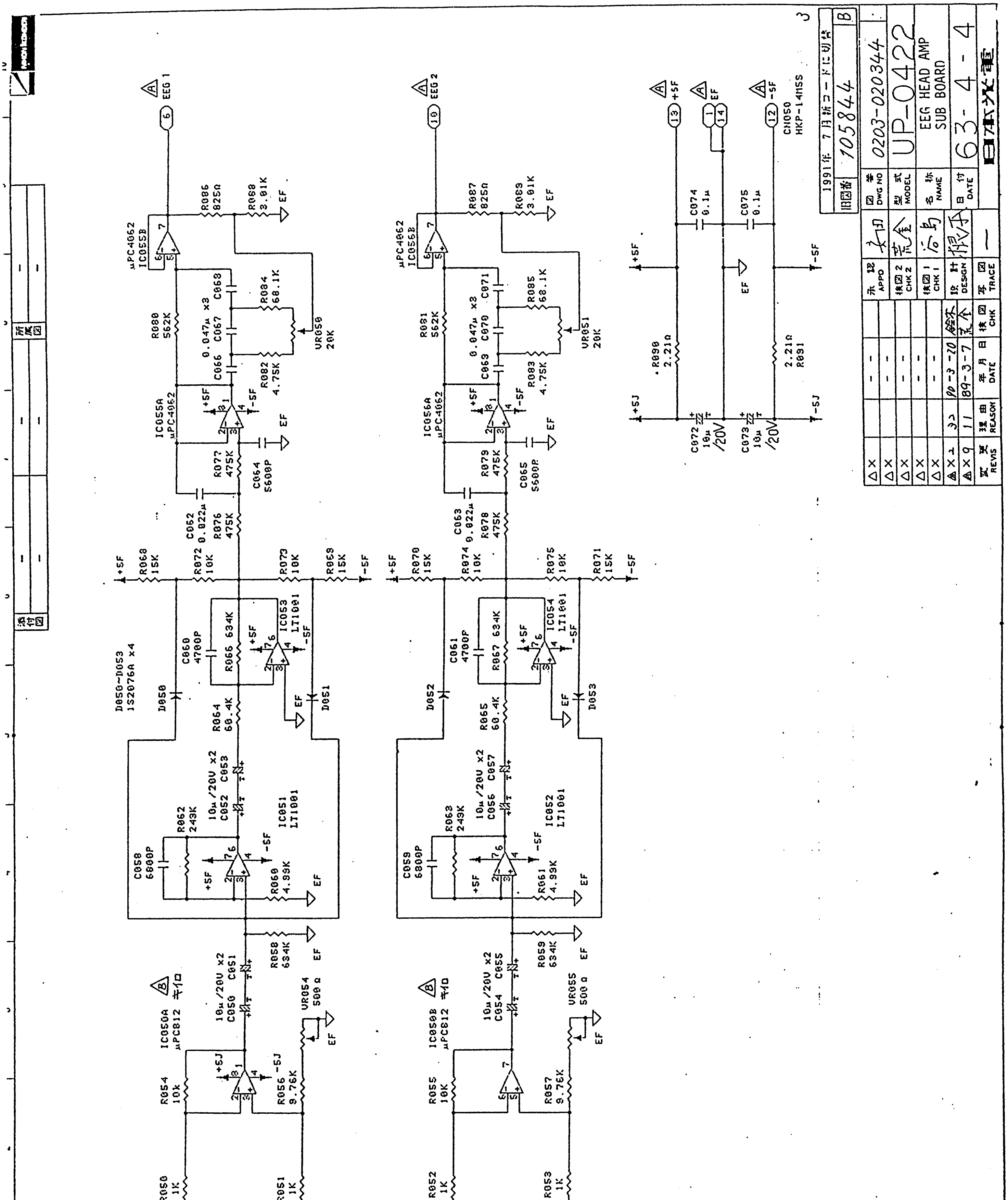

105326 H
0203-017598
UP-0318
CO HEAD AMP
(AH-800P)
'90-12-20
FLOATING AREA
(INJECTION PROBE)
(CATHETER)
CN002
HR16-18R-10S(01)
RED
IC003, IC009
16 Pin +5F
6, 8, 7 Pin -5F

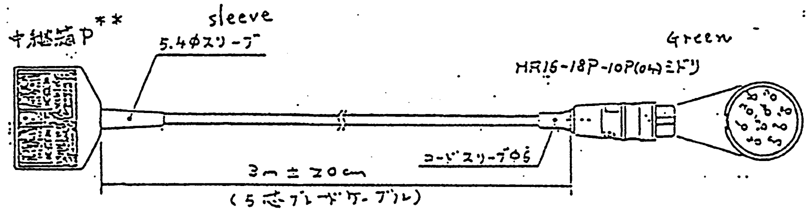


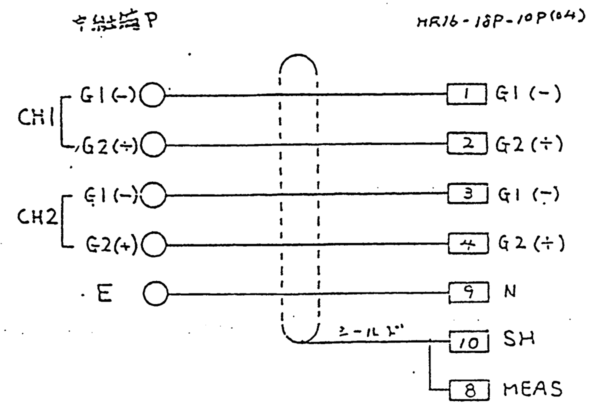
UP-0421

AE-800PA Block diagram


PCH10EA-20P-2.54DS
CH001
ISOLATE
IC005
T001
EP10PS
(GREEN)
T002
EP101S
(YELLOW)
D001~D010
1S2076A x10
D030~D033
1SS104 x10
IC001 78L05
IC002 79L05
IC003A 4053
IC003B 4053
IC003C 4053
IC004 4040
IC006A μPC4062
IC006B μPC4062
IC007A μPC812
IC007B μPC812
IC008A μPC812
IC008B μPC812
CH002
HKP-14FDS2
UP-0422
CH003
HR16-10R-10S(04) (GREEN)
PC810A
PC001
PC002
Q001 2SC1213
Q002 2SC1213
Q003 2SC1213
GA001
Y08-2100B
R035~R038
10K x4
F-CLK 7B
+15V 5B
E3 6A
+8V 4B
-8V 4A
HAOUT 1A
EH 3B
E3 2A
SYNC 7A
PARA 10A
ER 3A
TP +5F
TP -5F
TP EF
TP EEG1
TP EEG2
1991年 7月新コードに切替
旧図番 105843 C 3
図番 DWG NO 0203-020335
型式 MODEL UP-0421
名称 NAME EEG HEAD AMP MAIN BOARD
日付 DATE 63-7-12
承認 APPD
検図2 CHK 2
検図1 CHK 1
設計 DESIGN
写図 TRACE
変更 REVIS
理由 REASON
年月日 DATE
検図 CHK
△x4 32 90-3-20
△x1 33 89-9-1
△x1 11 89-3-3
日本光電

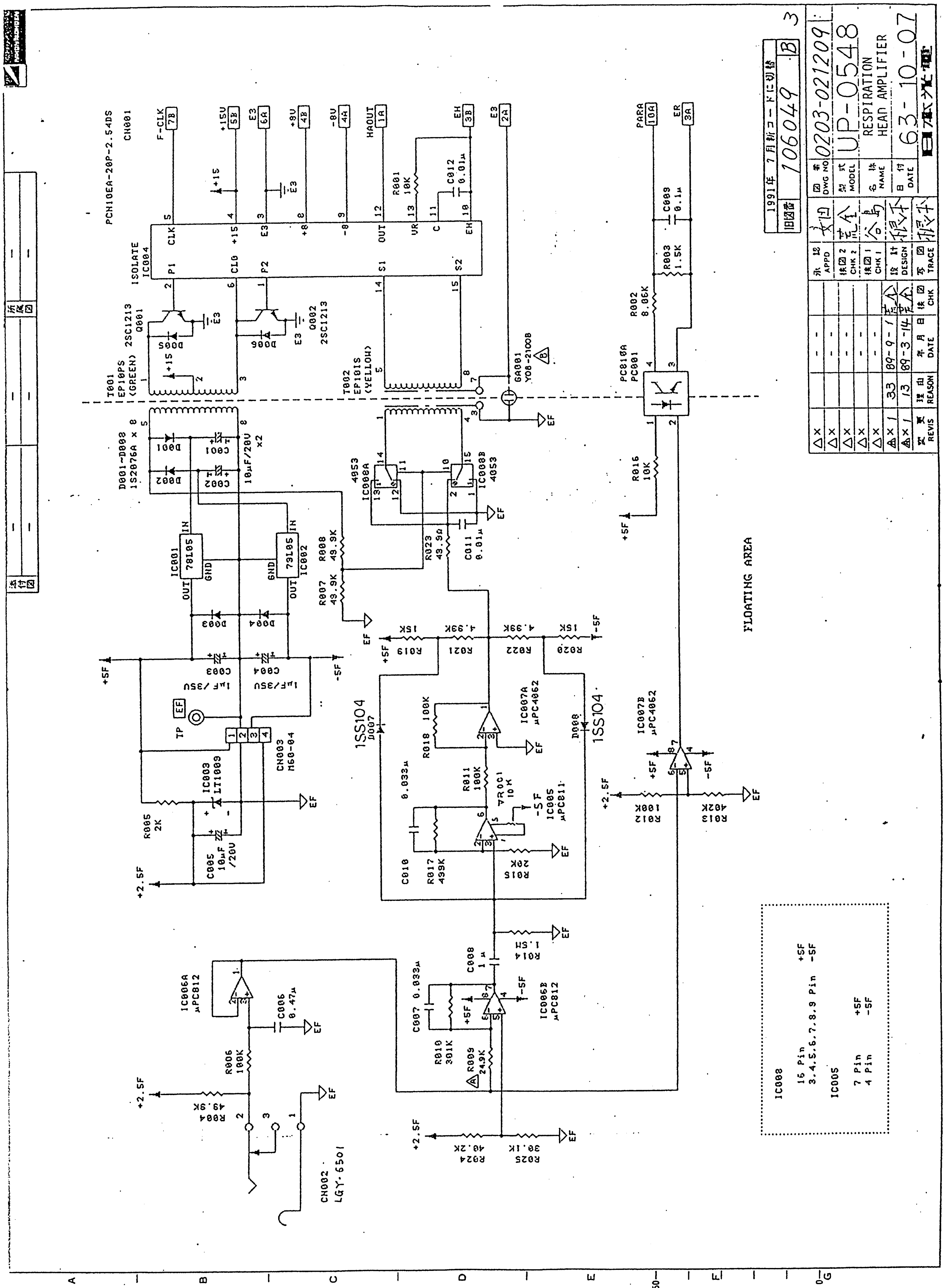

EEG HEAD AMP
SUB BOARD
UP-0422
0203-020344
105844
63-4-4
EEG 1
EEG 2
EEG1(-)
EEG1(+)
EEG2(-)
EEG2(+)
HKP-14MSS
CN050

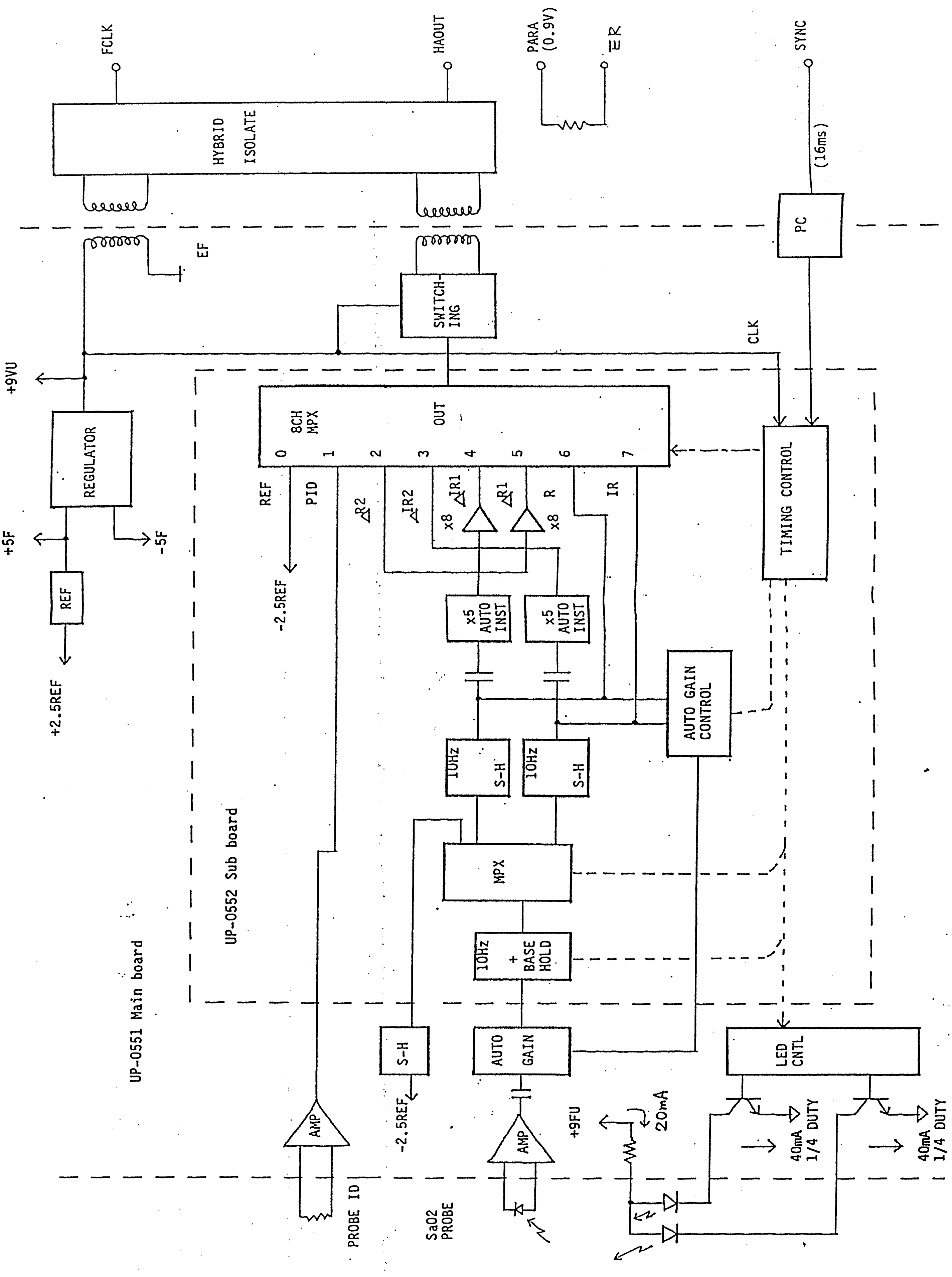


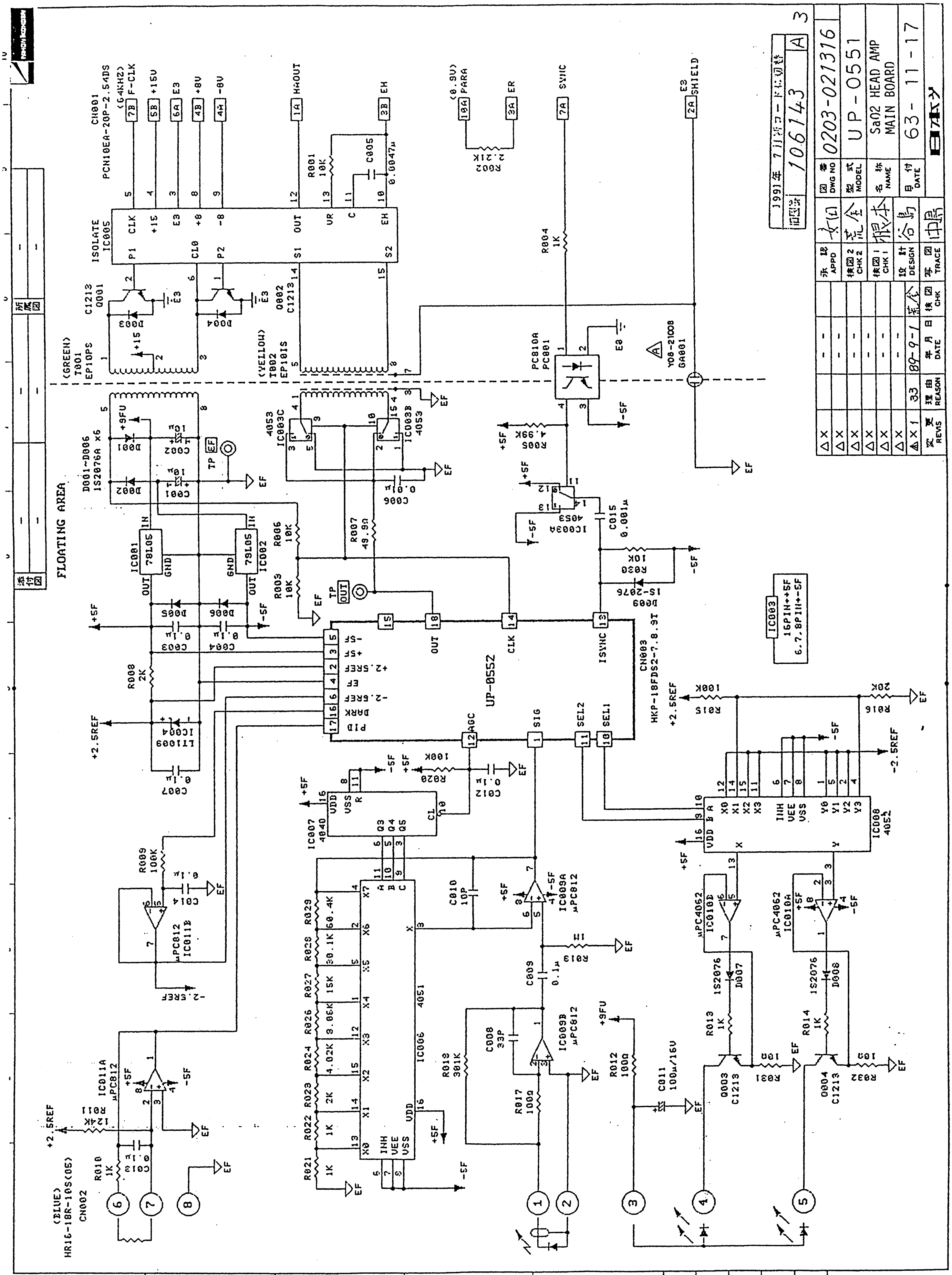


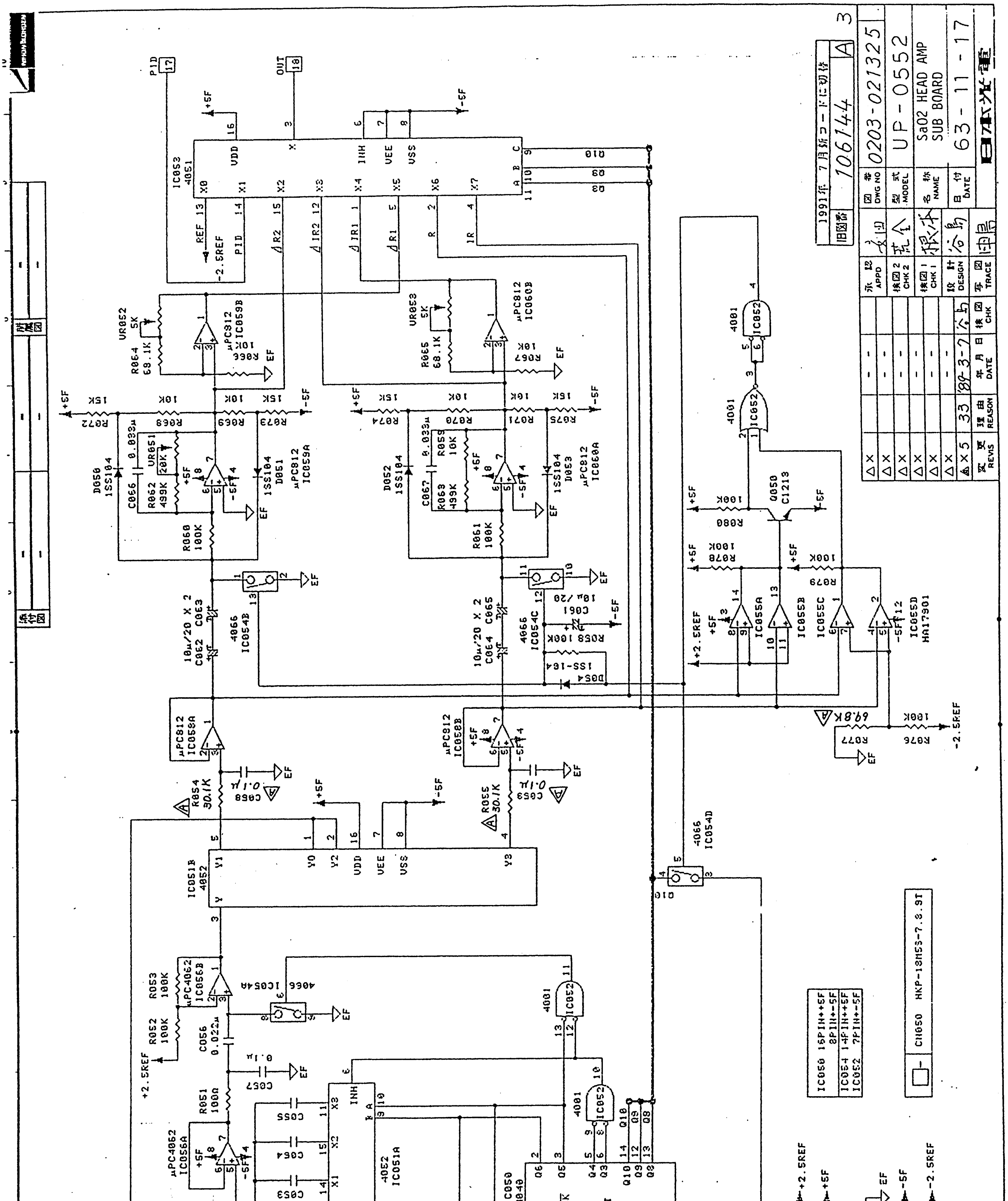
承認 APPO	太田	図番 DWG NO	105842
検図2 CHK2	荒金	型式 MODEL	JE-001P
検図1 CHK1	谷島	名称 NAME	EEG connection cable
設計 DESIGN	根本	日付 DATE	63-3-31
写図 TRACE			日本光電

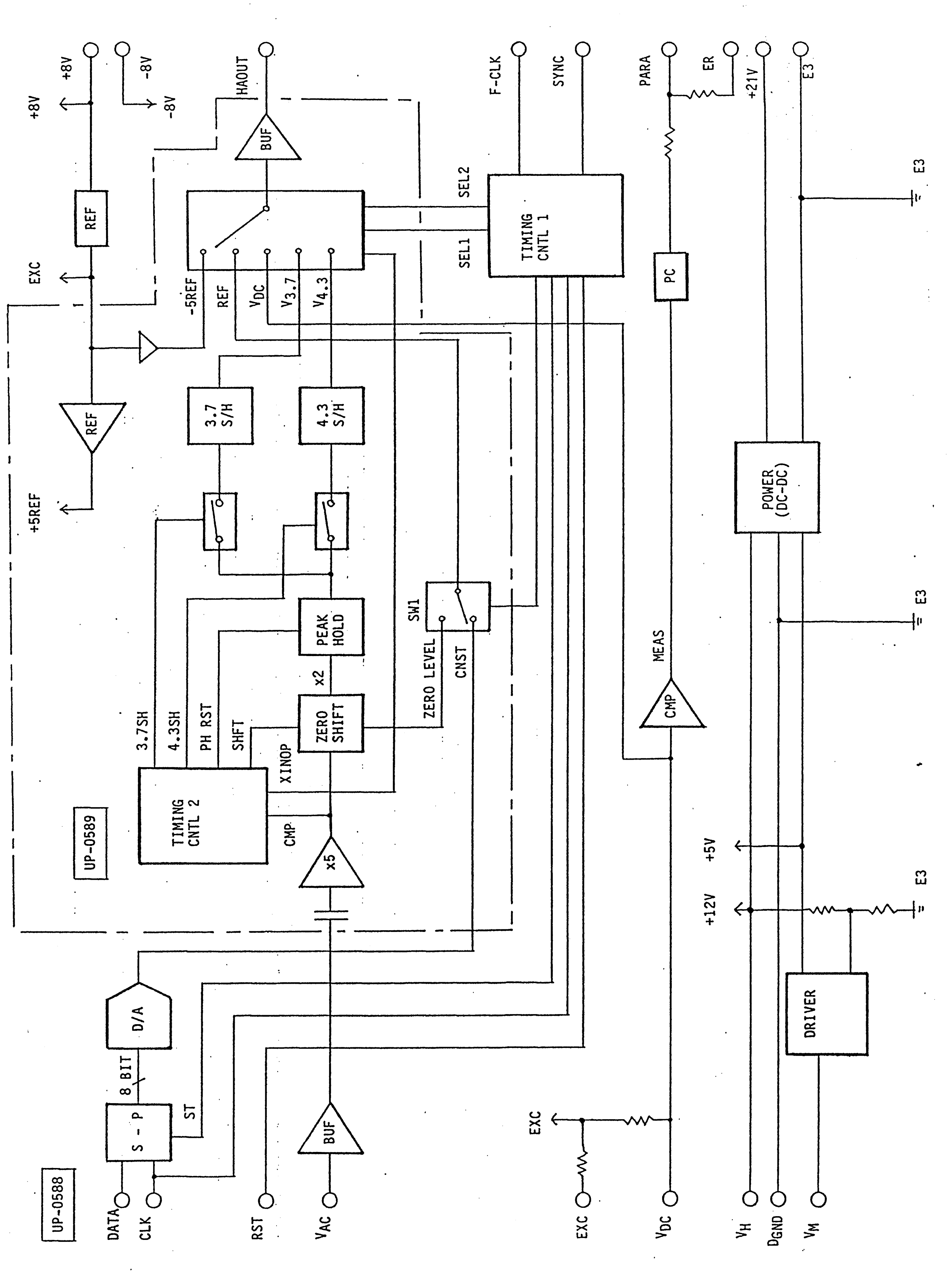
変更 REVS	理由 REASON	年月日 DATE	検図 CHK
Δ×		– –	
Δ×		– –	
Δ×		– –	
Δ×		– –	
Δ×		– –	
Δ×		– –	
Δ×		– –	


UP-0548
RESPIRATION
HEAD AMPLIFIER
0203-021209
63-10-07
FLOATING AREA
ISOLATE
IC004

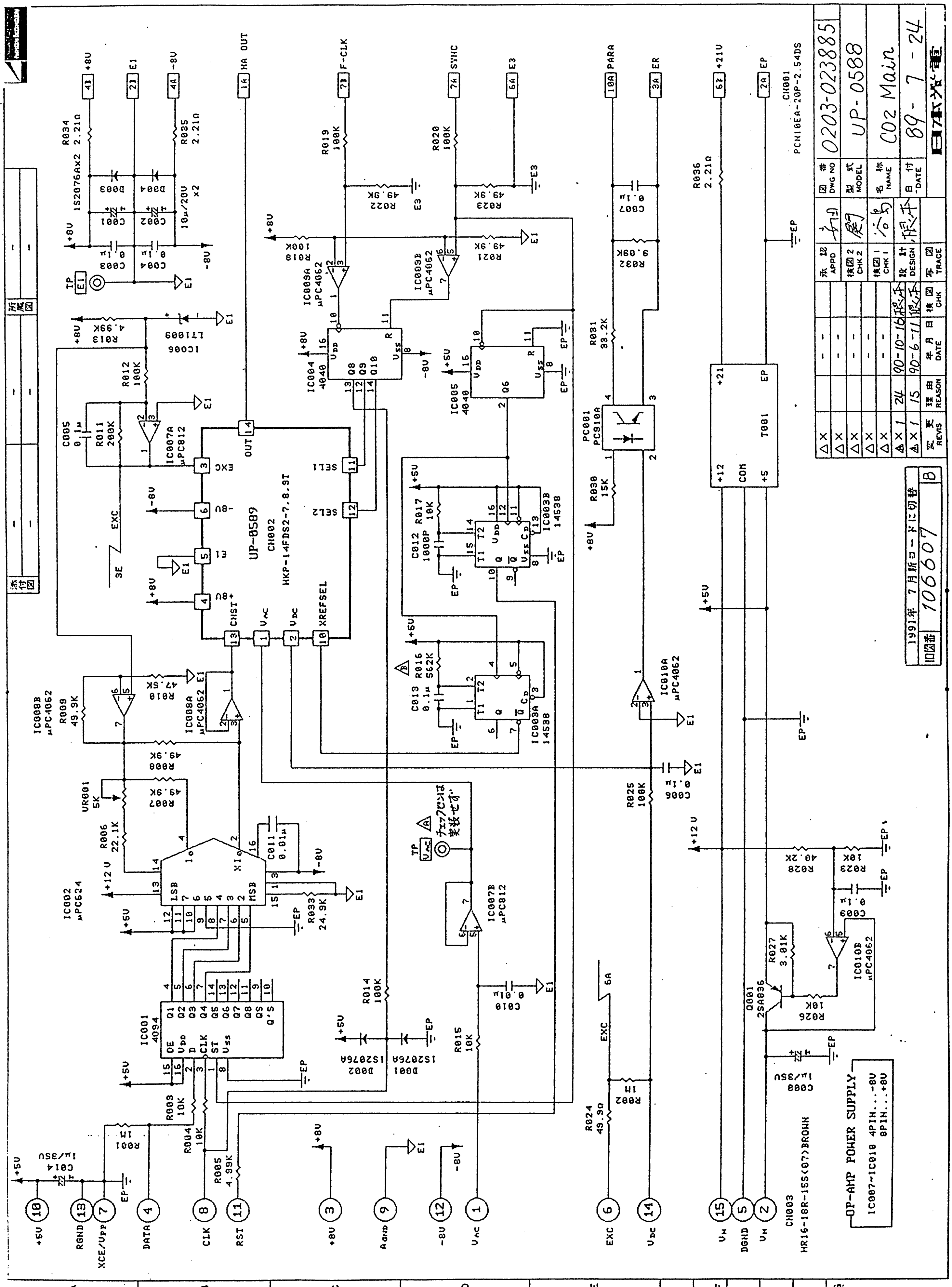

FCLK
HAOUT
PARA (0.9V)
ER
SYNC
HYBRID ISOLATE
(16ms)
PC
EF
SWITCH-ING
CLK
+9VU
REGULATOR
+5F
-5F
REF
+2.5REF
8CH MPX
OUT
0
1
2
3
4
5
6
7
REF
PID
R2
IR2
IR1
R1
R
IR
x8
x8
-2.5REF
TIMING CONTROL
x5 AUTO INST
x5 AUTO INST
AUTO GAIN CONTROL
10Hz S-H
10Hz S-H
MPX
10Hz + BASE HOLD
UP-0552 Sub board
UP-0551 Main board
S-H
AUTO GAIN
LED CNTL
AMP
AMP
-2.5REF
+9FU
20mA
40mA 1/4 DUTY
40mA 1/4 DUTY
PROBE ID
SaO2 PROBE

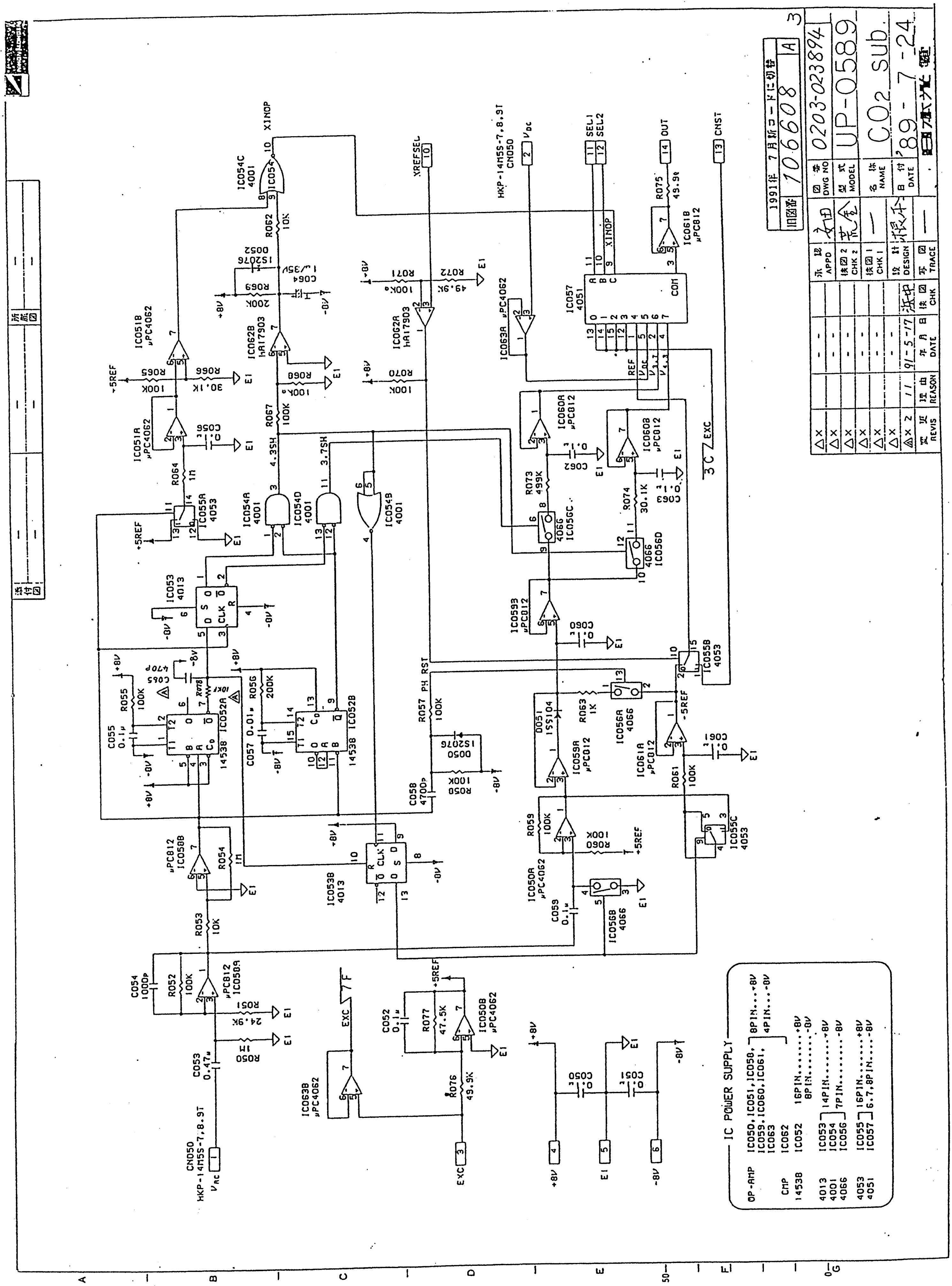

FLOATING AREA
UP-0552
0203-021316
UP-0551
Sa02 HEAD AMP
MAIN BOARD
63-11-17
106143

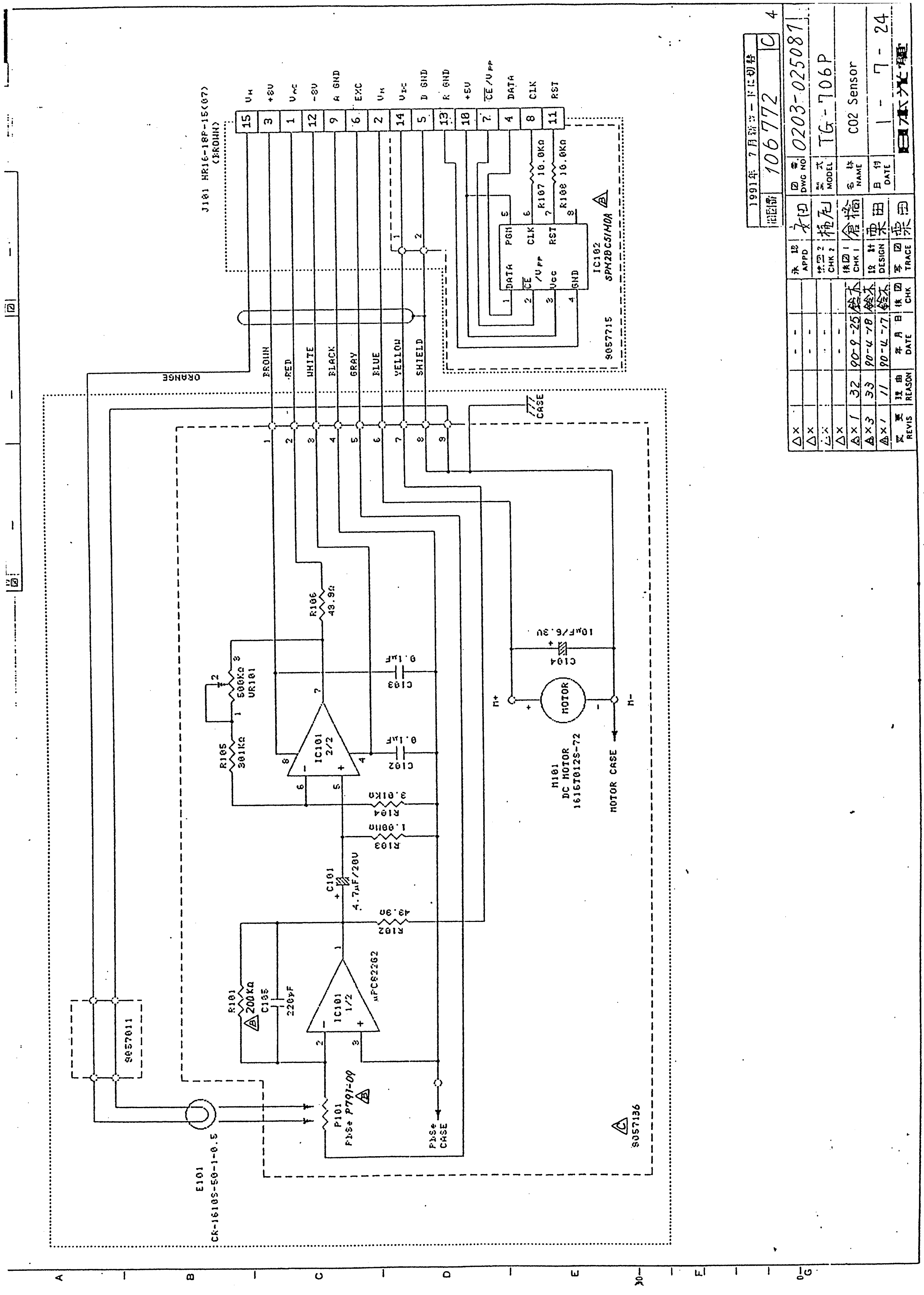

1991年 7月分コードに切替
旧図番 106144 A
3
0203-021325
UP-0552
SaO2 HEAD AMP
SUB BOARD
63-11-17



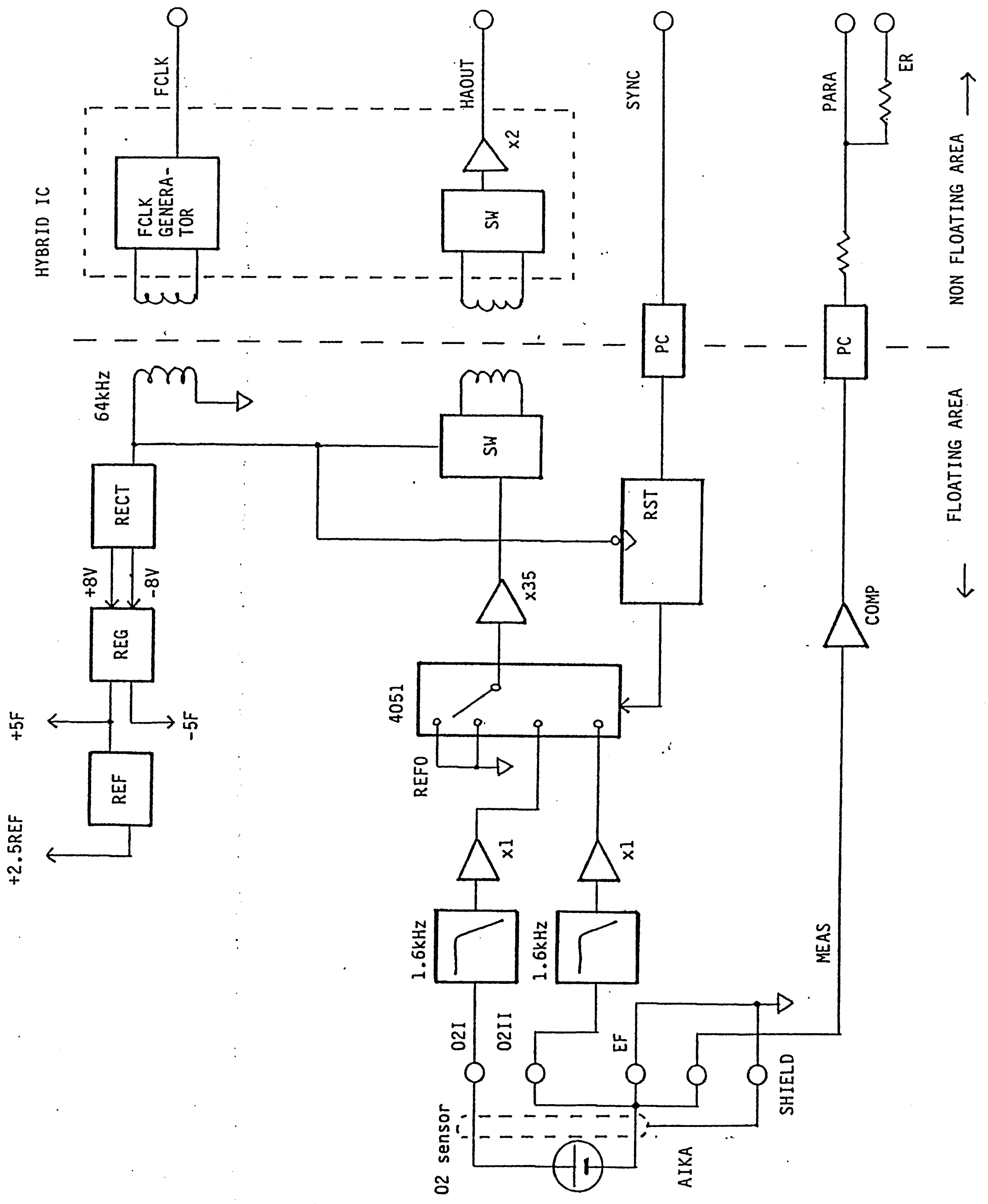
UP-0588
UP-0589
DATA
CLK
RST
VAC
EXC
VDC
VH
DGND
VM
S - P
8 BIT
ST
D/A
BUF
x5
CMP
TIMING CNTL 2
3.7SH
4.3SH
PH RST
SHFT
XINOP
ZERO SHIFT
x2
PEAK HOLD
3.7 S/H
4.3 S/H
SW1
ZERO LEVEL
CNST
REF
+5REF
EXC
+8V
-8V
-5REF
REF
VDC
V3.7
V4.3
HAOUT
SEL1
SEL2
TIMING CNTL 1
F-CLK
SYNC
PARA
ER
PC
MEAS
CMP
POWER (DC-DC)
+21V
E3
+5V
+12V
DRIVER


0203-023885
UP-0588
C02 Main
89-7-24
OP-AMP POWER SUPPLY
IC007~IC010 4PIN...-8V
8PIN...+8V
UP-0589
CN002
HKP-14FDS2-7.8.9T
CN001
PC(N10EA-20P-2.54DS
CN003
HR16-18R-15S(07)BROWN
1991年 7月新コードに切替
旧図番 10607 B

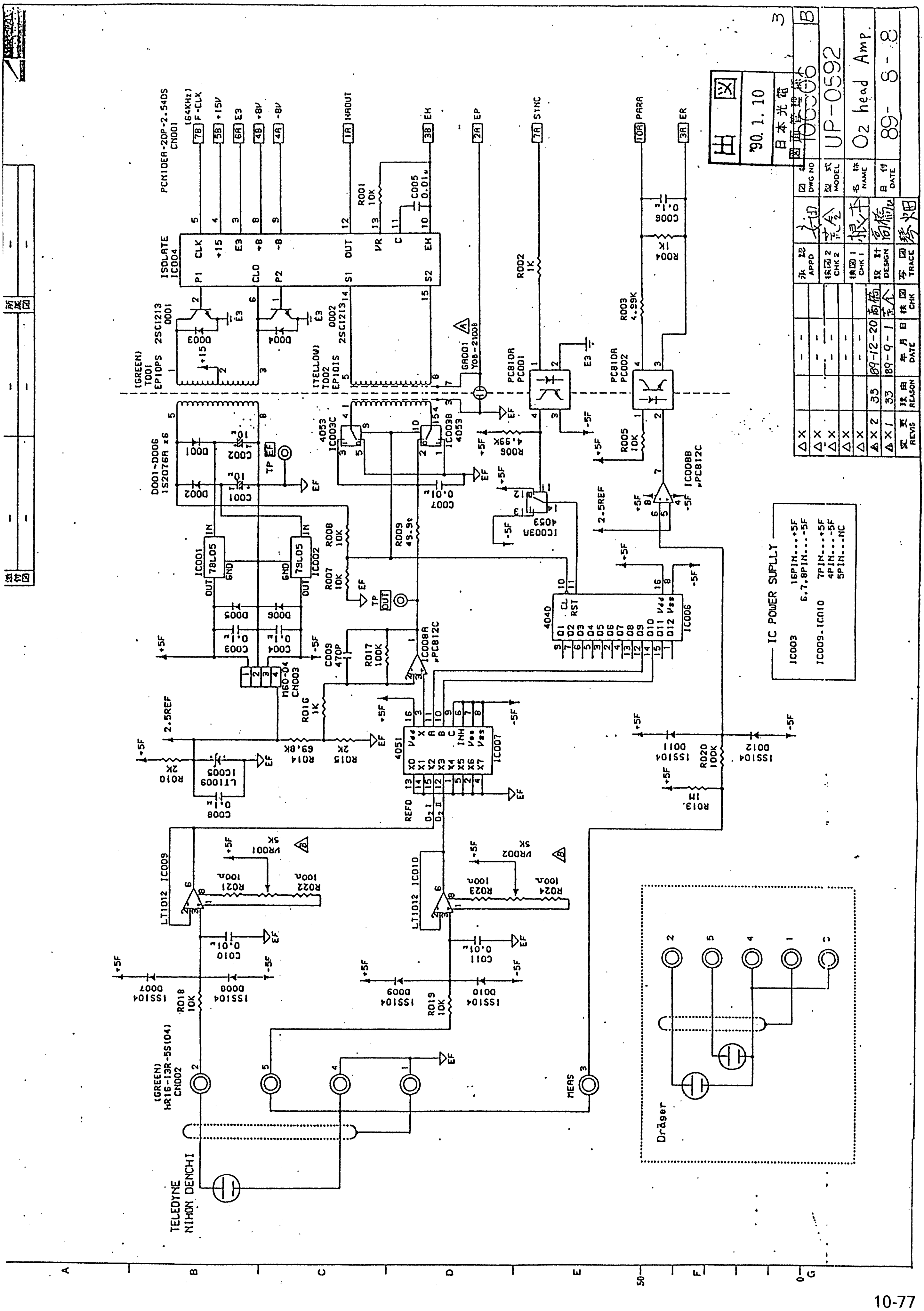

IC POWER SUPPLY
OP-AMP IC050, IC051, IC058, IC059, IC060, IC061, IC063 8PIN...+8V 4PIN...-8V
IC062
CMP 14538 IC052 16PIN.....+8V 8PIN.....-8V
4013 4001 4066 IC053 IC054 IC056 14PIN.....+8V 7PIN.....-8V
4053 4051 IC055 IC057 16PIN.....+8V 6,7,8PIN.....-8V
1991年 7月新コードに切替
旧図番 10608 A 3
0203-023894
UP-0589
CO2 sub
'89-7-24



1991年 7月新ツー下に切替
106772
C
4
0203-025081
TG-706P
CO2 Sensor
1 - 7 - 24
J101 HR16-18P-15(07) (BROWN)
IC102 SPM28C51M0A
R107 10.0KΩ
R108 10.0KΩ
9057715
9057136
9057011
BROWN
RED
WHITE
BLACK
GRAY
BLUE
YELLOW
SHIELD
ORANGE
CASE
R106 43.9Ω
C104 10μF/6.3V
C103 0.1μF
C102 0.1μF
VR101 500KΩ
R105 301KΩ
IC101 2/2
IC101 1/2
μPC8226
R104 3.01KΩ
R103 1.00MΩ
C101 4.7μF/20V
R102 43.9Ω
R101 200KΩ
C105 220pF
MOTOR
M101 DC MOTOR 1616T012S-72
MOTOR CASE
P101 PbSe P791-09
PbSe CASE
E101 CK-1610S-50-1-0.5



HYBRID IC
FCLK
FCLK GENERA-TOR
HAOUT
x2
SW
SYNC
PARA
ER
NON FLOATING AREA
FLOATING AREA
PC
PC
64kHz
RECT
+8V
-8V
REG
+5F
-5F
REF
+2.5REF
SW
RST
x35
COMP
4051
REFO
x1
x1
1.6kHz
1.6kHz
MEAS
O2I
O2II
EF
SHIELD
O2 sensor
AIKA



O2 head Amp.
UP-0592
89- 8- 8
'90. 1. 10
日本光電
IC POWER SUPPLY
IC003 16PIN...+5F 6,7,8PIN...-5F
IC009.IC010 7PIN...+5F 4PIN...-5F 5PIN...NC
ISOLATE IC004
PCN10EA-20P-2.54DS CN001
(GREEN) HR16-13R-5S(04) CN002
TELEDYNE NIHON DENCHI
Dräger

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Telephone: 0181-568-5655
Facsimile: 0181-560-9066

The model and serial number of your instrument are identified on the rear or bottom of the unit. Write the model and serial number in the spaces provided below. Whenever you call your distributor concerning this instrument, these two pieces of information should be mentioned for quick and accurate service.

Model ____________________ Serial Number ____________________

YOUR DISTRIBUTOR

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