Anritsu

SERVICE MANUAL

SPECTRUM ANALYZER
MS2601A/J

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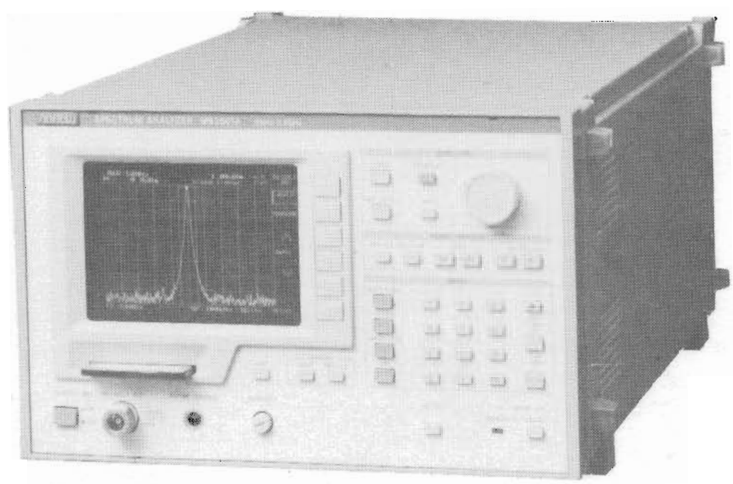


ANRITRU CORPORATION

Applicable Serial Nos.
start from M04160
1989.10 Ver. I
Printed in Japan
1990.02 x 100 N-9(Y)

CERTIFICATION

ANRITSU CORPORATION certifies that this instrument has been thoroughly tested and inspected, and found to meet published specifications prior to shipping.
Anritsu further certifies that its calibration measurements are based on the Japanese Electrotechnical Laboratory and Radio Research Laboratory standards.

WARRANTY

All parts of this product are warranted by Anritsu Corporation of Japan against defects in material or workmanship for a period of one year from the date of delivery. In the event of a defect occurring during the warranty period, Anritsu Corporation will repair or replace this product within a reasonable period of time after notification, free-of-charge, provided that: it is returned to Anritsu; has not been misused; has not been damaged by an act of God; and that the user has followed the instructions in the operation manual.

Any unauthorized modification, repair, or attempt to repair, will render this warranty void.

This warranty is effective only for the original purchaser of this product and is not transferable if it is resold.

ALL OTHER EXPRESSED WARRANTIES ARE DISCLAIMED AND ALL IMPLIED WARRANTIES FOR THIS PRODUCT, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO A PERIOD OF ONE YEAR FROM THE DATE OF DELIVERY. IN NO EVENT SHALL ANRITSU CORPORATION BE LIABLE TO THE CUSTOMER FOR ANY DAMAGES, INCLUDING LOST PROFITS, OR OTHER INCIDENTAL OR CONSEQUENTIAL DAMAGES, ARISING OUT OF THE USE OR INABILITY TO USE THIS PRODUCT.

All requests for repair or replacement under this warranty must be made as soon as possible after the defect has been noticed and must be directed to Anritsu Corporation or its representative in your area.

Note 1:

1. The instrument is operable on a nominal voltage of 85 to 140 Vac or 170 to 250 Vac by changing the connections on the power transformer taps. (see the Z4 REGULATOR circuit diagram 27.)

   The voltage and current ratings are indicated on the rear panel when the instrument is shipped from the factory.

   To operate on the other voltage, change the connections on the power supply transformer. The plate on the rear panel indicating the voltage and current ratings should be changed to the appropriate one. Order the plate from ANRITSU CORP. if needed.

2. In this manual, the power supply voltage and current ratings are represented by **Vac and ***A, respectively.

3. The relationship between power supply voltage and current rating is shown below.

**Vac	***A
85 to 140 V	3.15 A
170 to 250 V	1.6 A

Note 2:

WARNINGs, CAUTIONs, Notes, and Explanatory footnotes are used in this manual. Their meanings are given below:

WARNING: WARNING is used when there is a personal injury hazard.

CAUTION: CAUTION is used when the equipment may be damaged.

Note: Note is used to provide information about exceptions, corrections, and restrictions.

Explanatory footnote:
Explanatory footnotes provide comments on the same page as the text, figure or table. They are referenced by either an asterisk (*) or by combination of an asterisk and numeral.

HISTORY OF MODIFICATIONS
(MS2601A/J Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.3-19	MS2601A Circuit Diagram 33W29909 1/1	33W29909 1/1 M-1	From M04160

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

SECTION 1

GENERAL

This manual describes how to troubleshoot and adjust the MS2601A/J Spectrum Analyzer. It is composed of the following sections.

SECTION 2 MECHANICAL CONFIGURATION

This section describes the mechanical parts and how to disassemble each unit (PCB etc.)

SECTION 3 TROUBLESHOOTING AND ADJUSTMENT

This section describes the operation of each circuit, troubleshooting procedures, and adjustment procedures.

SECTION 4 CALIBRATION OF COMPENSATION DATA

This section describes how to enter the compensation data for internal characteristics after repair.

SECTION 5 REPLACEABLE PARTS

This section includes the parts list and describes how to order replaceable parts.

SECTION 2

MECHANICAL ASSEMBLY

2.1 Introduction

This section describes the mechanical structure, the position of the internal units, and the procedures for removing these units to disassemble/reassemble the MS2601A/J.

The numbers in Figs. 2-1 to 2-6 indicate the mechanical parts. Tables 2-1 to 2-6 lists the parts with the corresponding numbers.

Figure 2-7 shows the relationship between the options and panel displays.

CAUTION

When disassembling/reassembling the MS2601A/J, turn off the POWER switch on the front panel and unplug the power supply cord from the ac outlet.

2.2 Cabinet Disassembly

This paragraph describes how to remove the covers with reference to Fig. 2-1.

(1) Top cover removal

Step	Procedure
1	Remove the two screws #1 at the rear of the top cover.
2	Slightly lift the back of the top cover 5 and slide it backwards. Separate the top cover from the front frame and lift it off.

(2) Right and left side cover removal

(a) Left side cover (7) removal

Step	Procedure
1	Use a screwdriver to open the screw covers (parts marked with *1) on each end of the handle at the center of the side covers (7).
2	Remove the handle (9) and the side cover (7) by removing the screws #2 under the screw covers.
3	Remove four screws #3 at the corners of the side cover (7).

(b) Right side cover (8) removal

Remove four screws #4 at the corners of the side cover (8).

(3) Bottom cover (6) removal

Step	Procedure
1	Remove the two screws #5 at the rear of the bottom cover (6).
2	Remove the bottom cover by sliding it until it separates from the frame.

2.3 Front Panel Removal

(1) Key top removal

To replace the key tops shown in Fig. 2-2, remove the decorative panel (50) using the following procedures and pull off the key tops by holding them with pliers.

Step	Procedure
1	Remove the CRT cover (21) by pulling it toward you while lifting the part marked with *2 with both hands. (See Fig. 2-3.)
2	Remove the top cover (5) as described in paragraph 2.2.
3	Loosen the screw #6 and remove the knob (22).
4	Remove two screws #7 at the bottom and two screws #8 at the top and remove both clamps (51) and (52).

(2) Front panel removal

To disassemble the front panel, remove the top cover (5) as described in paragraph 2.2 and follow the procedures described below.

Step	Procedure
1	Remove two screws #7 at the bottom and two screws at the top by referring to Fig. 2-3 and remove both clamps (51) and (52).
2	Remove the W1 connector connected to A5 FRONT BOARD.

(continued)

Step	Procedure
3	Slide the front panel 53 little by little towards you.

2.4 Main Unit Removal (A2, A3, A4, A6, A8, and A10)

1. A2 IF BPF
2. A3 IF LOG/DET
3. A4 PTA (OPT 01)
4. A6 YTO DRIVE/SCAN
5. A8 MAIN CPU and A9 GP-IB or A11 RS-232C (OPT 02)
6. A10 DISP CPU

To remove the above-mentioned unit, remove the top cover 5 as described in paragraph 2.2 and follow the procedures described below. (See Fig. 2-3)

Step	Procedure
1	Remove the screw #9 and the clamp 59 .
2	Remove the connectors connected to the unit.
3	Lift the ejector at both sides of the unit as shown in *3 (Fig. 2-3).
4	Hold the ejector and slide the unit out little by little. Note: Since the unit is under spring tension, some force is required to remove it.

2.5 Rear Panel Removal

Step	Procedure
1	Remove the top cover (5), side covers (7) (8) and bottom cover (6) as described in paragraph 2.2.
2	Remove the rear panel (70) as described below by referring to Fig. 2-4. 1) Remove the screw #10 at the center of the rear panel. 2) Remove the four screws (two at each side) #11 at the sides of the rear panel. 3) Remove the connectors J29, J16, J7 (OPT 01) and W3 connected to each unit. 4) Remove the rear panel by sliding it backwards little by little. Note: If it is tight and difficult to remove, loosen the screw #12 and it can be removed easily.

2.6 A7 REF OSC Unit Removal

Step	Procedure
1	Remove the top cover (5) as described in paragraph 2.2.
2	Remove the A7 REF OSC as described below by referring to Fig. 2-4. 1) Remove the screw #13 and then the clamp (91) . 2) Remove the three screws #14 and then remove the cover (78) . 3) Pinch the part marked with *4 with pliers and lift it up. Note: Since it is under spring tension, some force is required to remove it.

2.7 Z3 CRT Unit, and Z4 REGULATOR Unit Removal

To remove the Z3 CRT unit, first remove the Z4 REGULATOR unit.

The following paragraph describes how to remove the REGULATOR unit and CRT unit with reference to Fig. 2-5.

(1) Z4 REGULATOR removal

Step	Procedure
1	Remove the top cover 5 as described in paragraph 2.2.
2	Remove the screw #13 and then remove the clamp 91 by referring to Fig. 2-4.
3	Remove the screw #15 by referring to Fig. 2-5.
4	Remove the connectors J24, J27, J28, and J29.
5	Lift out the Z4 REGULATOR unit.

(2) Z3 CRT unit removal

Step	Procedure
1	Remove the Z4 REGULATOR unit as described in paragraph 2.7 (1).
2	Remove the screw #16.
3	Remove the left side cover 7 as described in paragraph 2.2.
4	Remove the two screws #17.
5	Lift out the Z3 CRT unit while sliding it backwards.

2.8 Z1 YTO Removal

Step	Procedure
1	Remove the front panel 50 53 as described in paragraph 2.3 (2).

(continued)

Step	Procedure
2	Remove the Z1 YTO by following the below procedures and referring to Fig. 2-5. 1) Remove the screw #18 and the cover 110 . 2) Remove the screw #19 and the upper case 108 . 3) Remove the screw #20 and the bracket 105 . 4) Remove the support 102 and move the Z1 YTO to the left to remove the W1 connector. 5) Remove J11 (Fig. 2-3).

2.9 A1 RF/PLL BLOCK Disassembly

The shield case, chassis, etc. are integrated in the A1 RF/PLL BLOCK, which cannot be disassembled.

Figure 2-6 shows the position of each unit in the A1 RF/PLL BLOCK and the cover assembly diagram.

When checking and adjusting the unit, refer to this Fig. 2-6.

Remove the bottom cover as described in paragraph 2.2 to obtain the condition shown in Fig. 2-6.

2.10 Options and Panel Displays

Figure 2-7 shows the difference between the displays of the front and rear panels when the A-type, J-type, and options are added.

The table in Item 3 shows the relationship between the panel displays and part numbers.

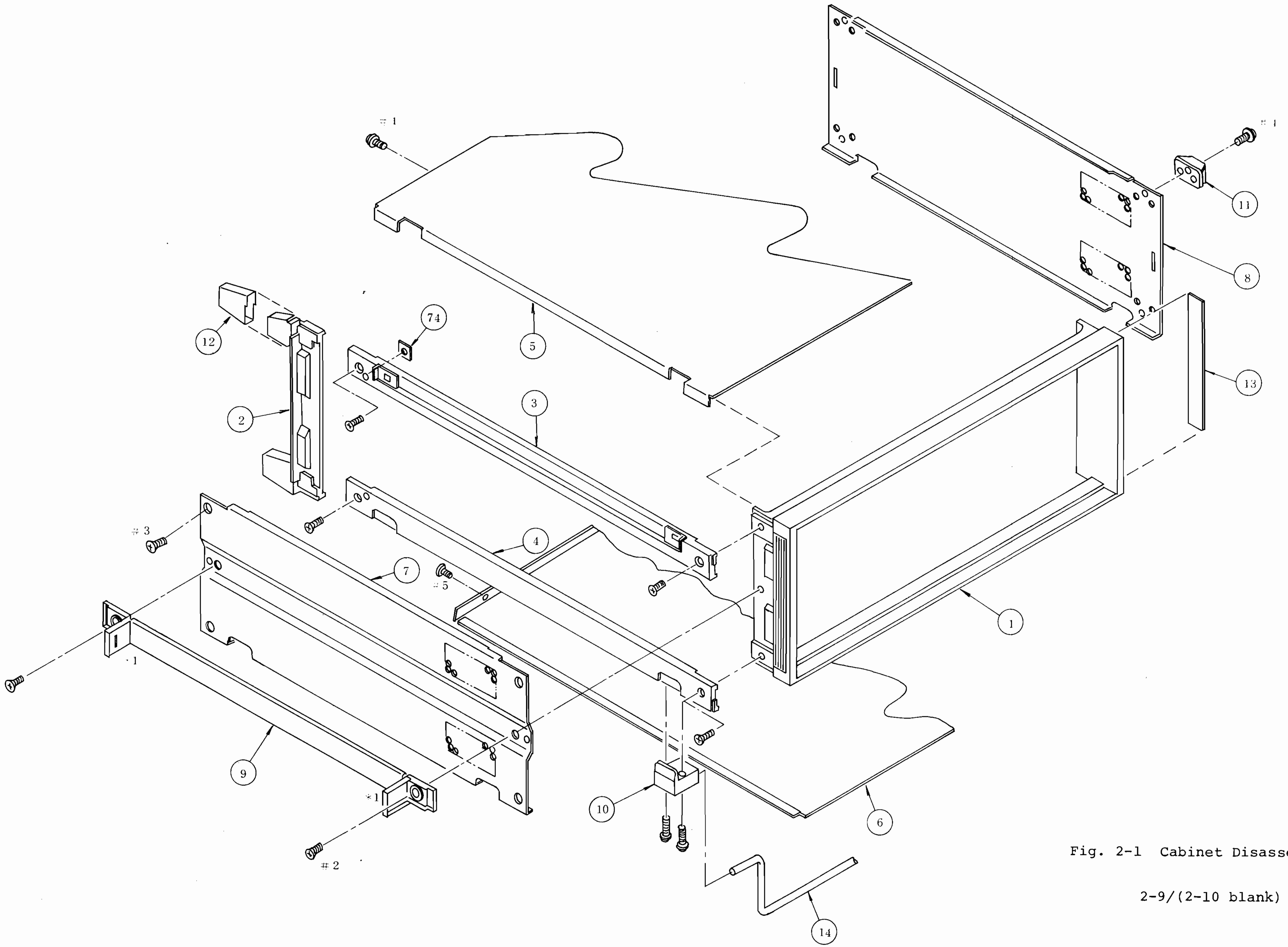


Fig. 2-1 Cabinet Disassembly

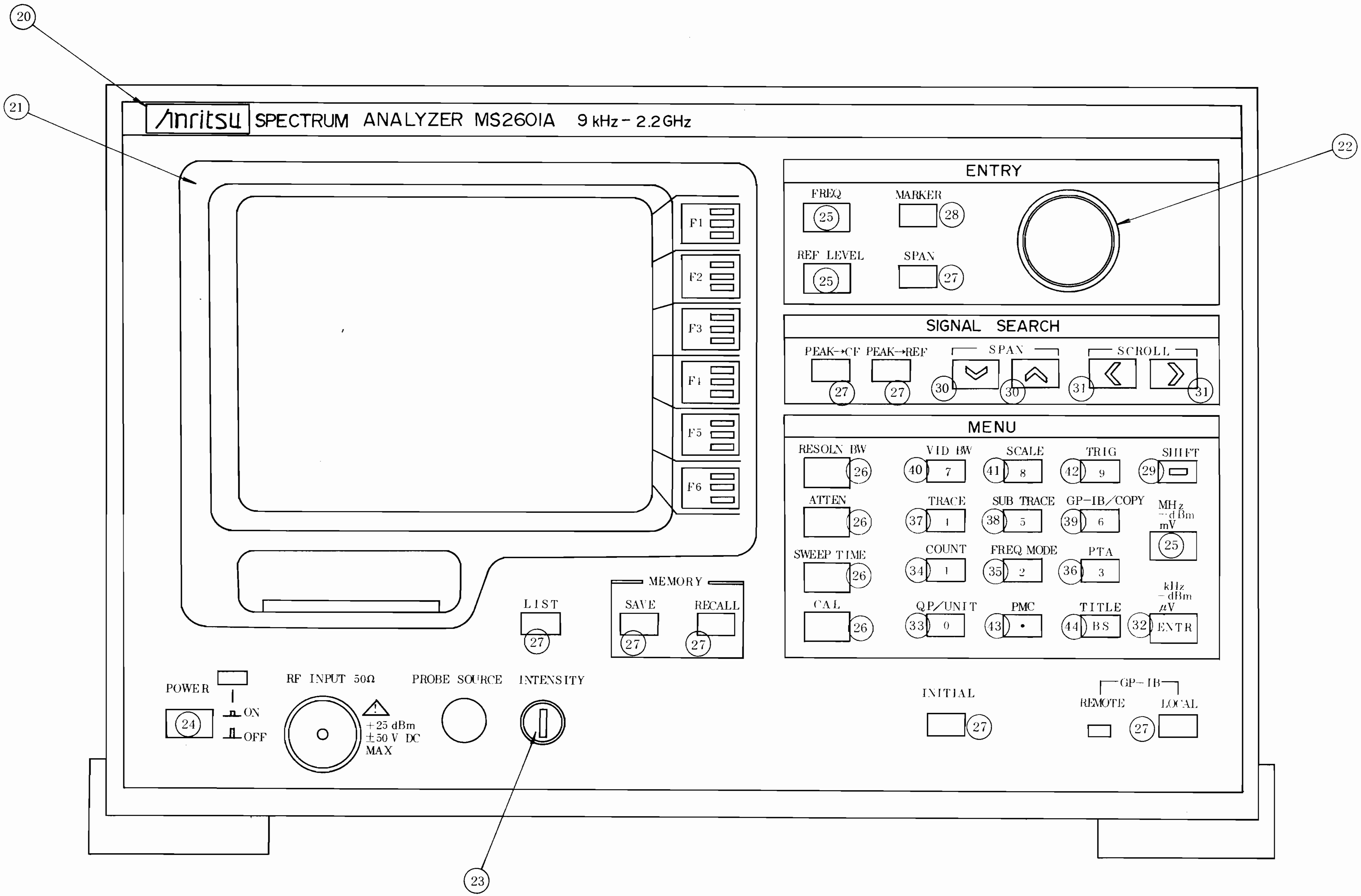


Fig. 2-2 Key Top Layout

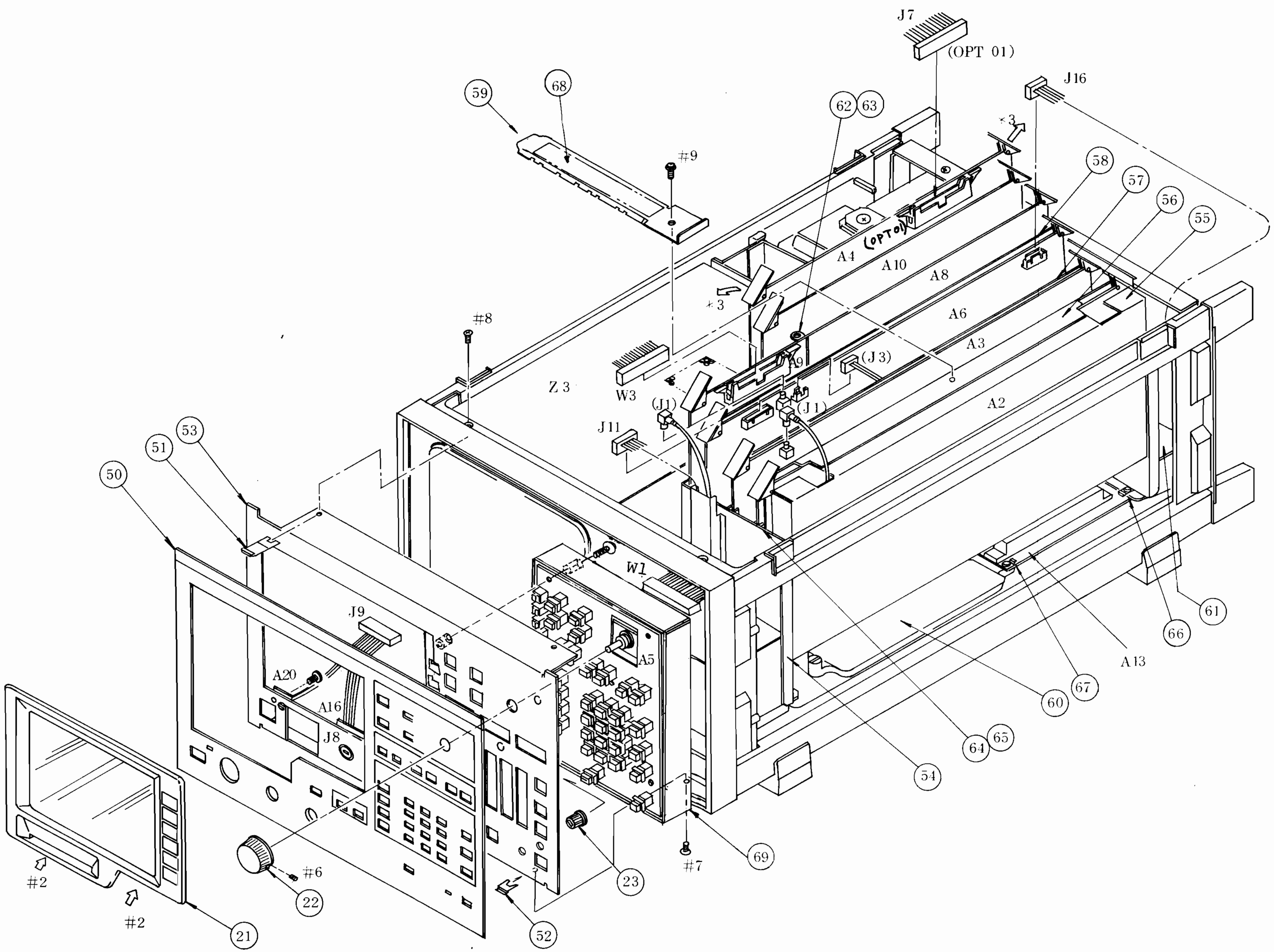


Fig. 2-3 Front Panel/Main Unit (A2, A3, A4, A6, A8, A10) Removal

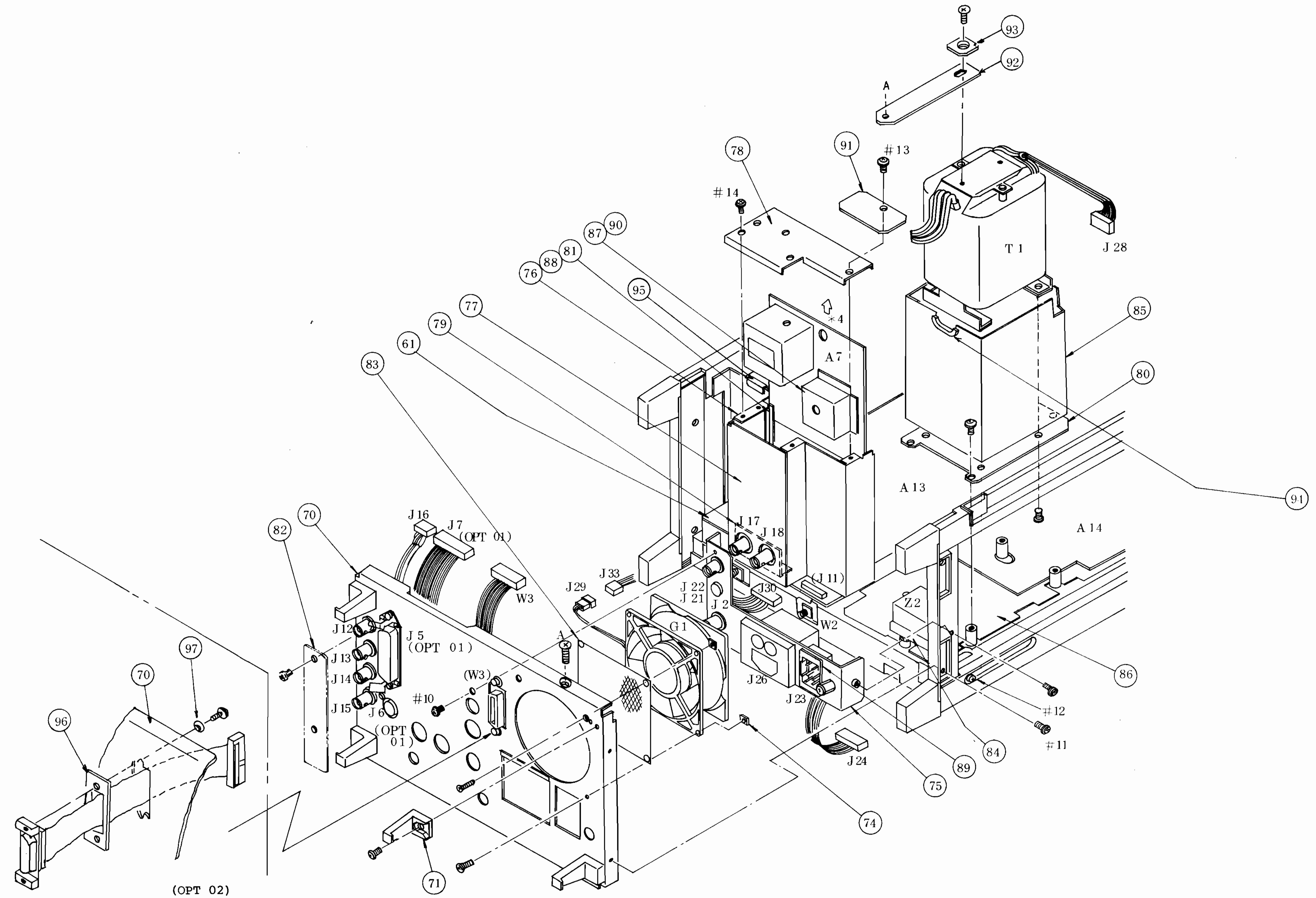


Fig. 2-4 Rear Panel Removal

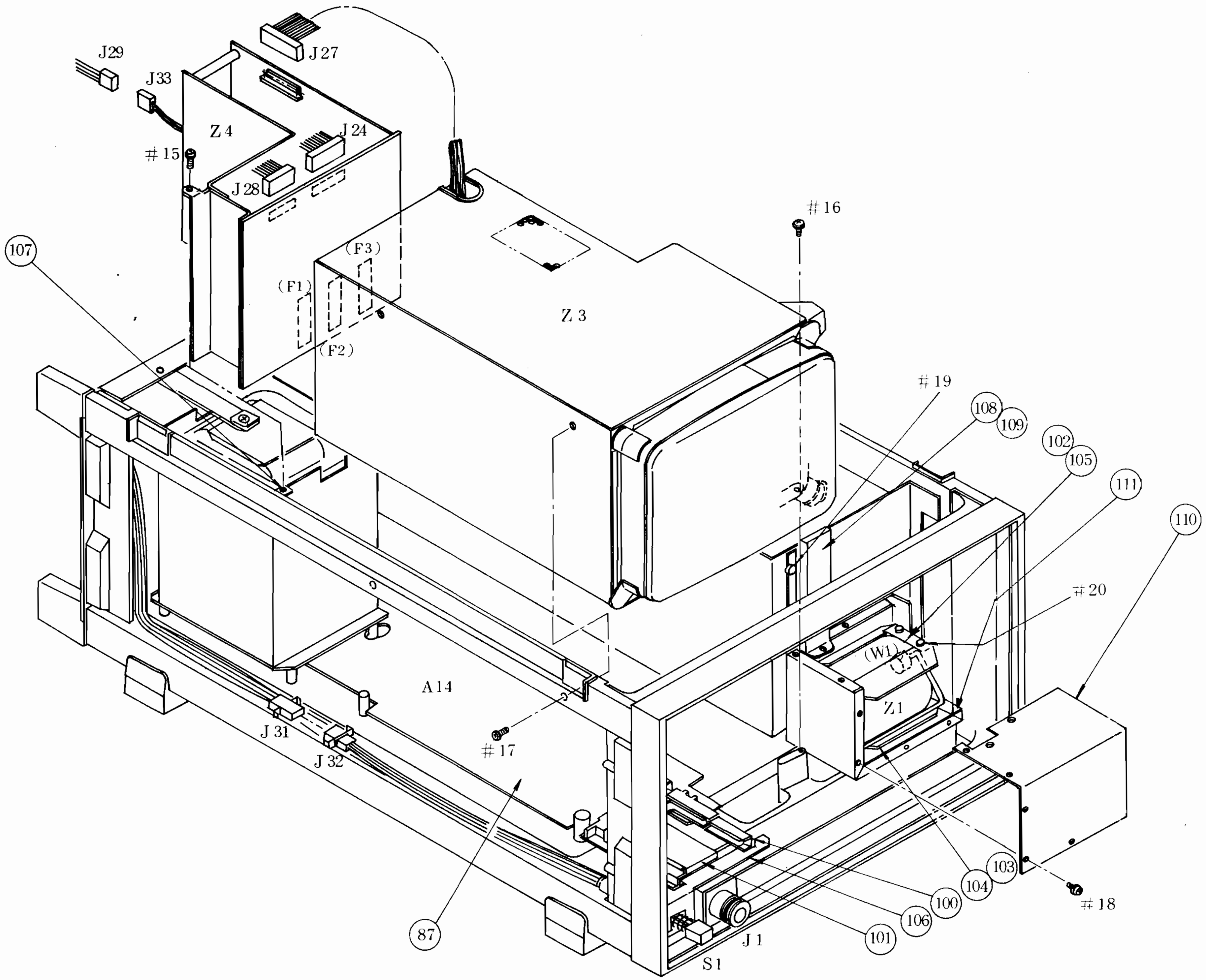


Fig. 2-5 Z3 CRT Unit, Z4 REGULATOR Unit, and Z1 YTO Unit Removal

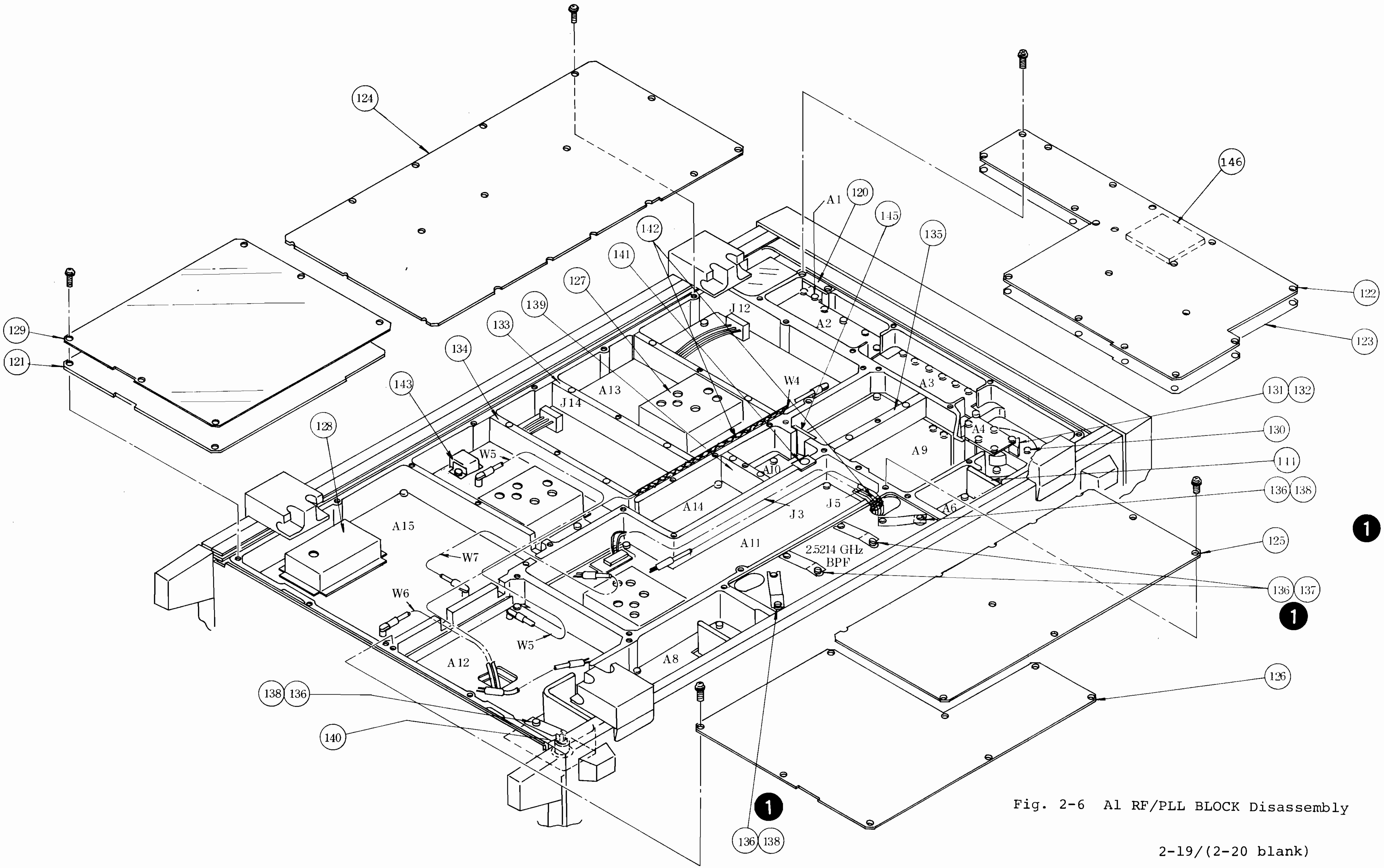


Fig. 2-6 A1 RF/PLL BLOCK Disassembly

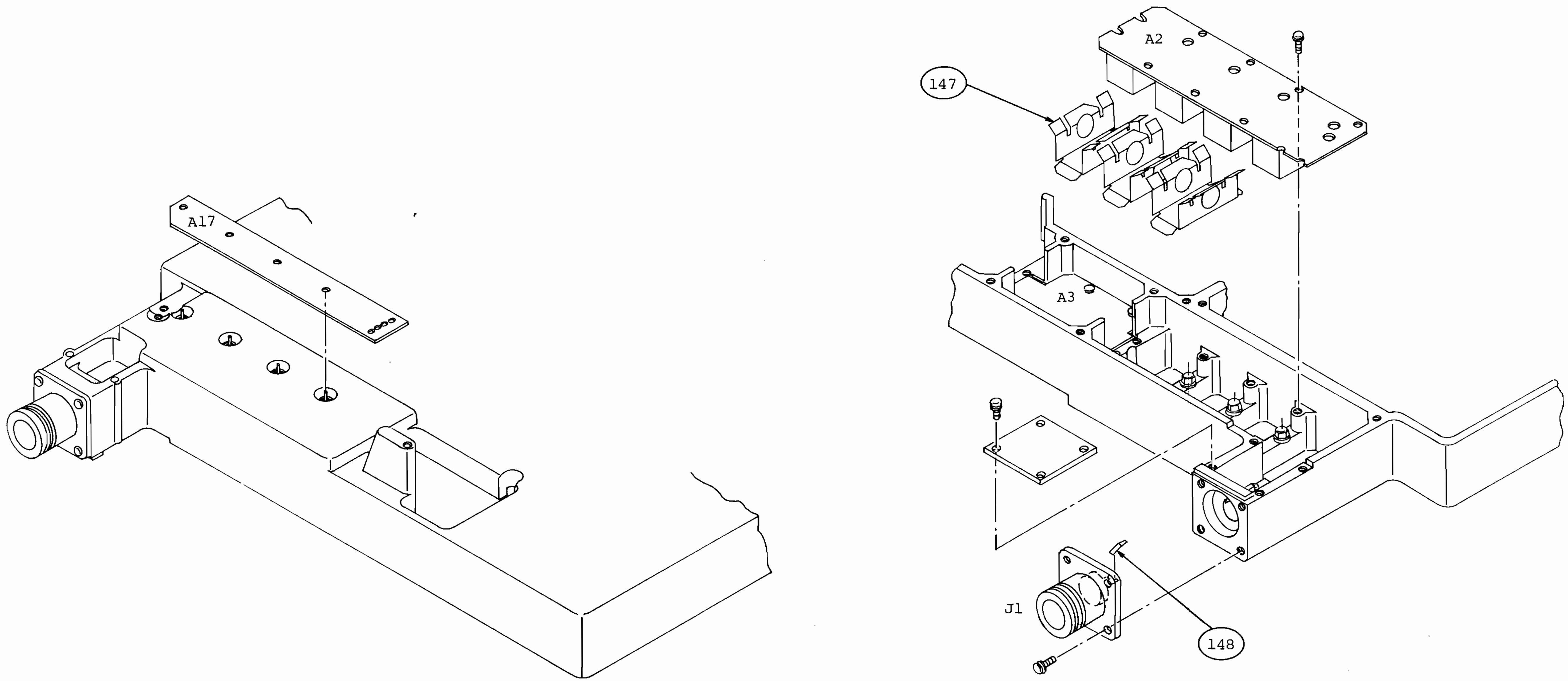


Fig. 2-7 A1 RF/PLL Block
Disassembly

Table 2-1 Mechanical Parts List for Fig. 2-1

No.	Part No.	Description	Remarks	Q'ty.
1	32B7680	Frame	2/3MU	1
2	32B7666	Channel	4U	2
3	32B7670	Upper channel	450	2
4	32B7671	Lower channel	450	2
5	33B22455	Top cover	2/3MW4U	1
6	33B22624	Bottom cover	2/3MW4U	1
7	33B22516B	Left side cover	450D	1
8	33B28978B	Right side cover	450D	1
9	349B73661C	Handle	450D	1
10	322B7672	Unit leg		4
11	34E84192	Side leg		4
12	33B20662	Protector		4
13	34B73660C	Side sheet		2
14	34B73674B	Tilt stand		1

Table 2-2 Mechanical Parts List for Fig. 2-2

No.	Part No.	Description	Remarks	Q'ty.
20	34N39557	Nameplate		1
21	333E29148	CRT cover		1
22	342E91592	Rotary encoder knob	ϕ27	1
23	34E73722	Knob	ϕ11	1
24	44E68583	Knob		1
25	44E85793	Key top	10	2
26	44E85793B	Key top	10	5
27	34E91915	Key top	10-S	8
28	34E91915B	Key top	10-S	1
29	34E91915C	Key top	10-S	1
30	342E92806	Key top	$\wedge$, $\vee$	2
31	342E92806	Key top	$<$, $>$	2
32	342E92806	Key top	ENTR	1
33	342E92807	Key top	0	1
34	342E92807	Key top	1	1
35	342E92807	Key top	2	1
36	342E92807	Key top	3	1
37	342E92807	Key top	4	1
38	342E92807	Key top	5	1
39	342E92807	Key top	6	1
40	342E92807	Key top	7	1
41	342E92807	Key top	8	1
42	342E92807	Key top	9	1
43	342E92807	Key top	.	1
44	342E92807	Key top	BS	1

Table 2-3 Mechanical Parts List for Fig. 2-3

No.	Part No.	Description	Remarks	Q'ty.
50	322B10452[]	Decorative panel	See paragraph 2.10	1
51	34B7833D	Clamp		2
52	34B78330B	Clamp		2
53	322B10454	Front panel		1
54	322B10383	Shield plate		1
55	322B10574	Shield case		1
56	322B10573	Shield plate		1
57	332B28887	Shield plate		1
58	332B28887B	Shield plate		1
59	34B92505	PC board clamp		1
60	34B91176	Cover		1
61	34B91177	Cover		1
62	34B91672	Angle		1
63	34B91672B	Angle		1
64	34B91345	Guide		6
65	34H59371E	Spring		6
66	34B93233	Earth spring		1
67	34B93233B	Earth spring		1
68	34N94674	Shield plate		1
69	342B95145	Shield plate		1

Table 2-4 Mechanical Parts List for Fig. 2-4

No.	Part No.	Description	Remarks	Q'ty.
70	333B29164	Rear panel		1
71	34B73670	Cord holder		4
72	Not assigned			
73	Not assigned			
74	34B73668	Floating nut		8
75	332B28885	Angle		1
76	332B28892	Shield case		1
77	34B91179	Cover		1
78	34B91180	Cover		1
79	34B91181	Bracket		1
80	34B91182	Plate		1
81	34B91345	Guide		2
82	34B92799	Plate	Not assigned for option 01	1
83	34B64690	Guide		1
84	34B92416	Shield case		1
85	332B29511	Transformer case		1
86	33B29513	Shield plate		1
87	34B91356	Shield case		1
88	34H59371E	Spring		2
89	34B93519	Spacer		2
90	34B91355	Shield case		1
91	34B92504	Clamp plate		1
92	342B93867	Plate		1
93	34B93868	Washer		1

Table 2-4 Mechanical Parts List for Fig. 2-4 (Cont'd)

No.	Part No.	Description	Remarks	Q'ty.
94	C4W005890	KG016 flexible bush		0.5
95	44D55830	CE-012 edging		0.3
96	342B92800	Plate		1
97	34H92803	Collar		2

Table 2-5 Mechanical Parts List for Fig. 2-5

No.	Parts No.	Description	Remarks	Q'ty.
100	33E29405	Guide		2
101	34B93313	Earth spring		1
102	34B91613A	Support	ℓ=43 M2.6	4
103	34H39509	Support	ℓ=8 M2.6	4
104	34B91401	Bracket		1
105	34B91401B	Bracket		1
106	34B91580	Angle		1
107	34B92688	Angle		1
108	34B92414	Upper case		1
109	34B92415	Rear case		1
110	34B92418	Cover		1
111	332B29512	Shield case		1

Table 2-6 Mechanical Parts List for Fig. 2-6

No.	Part No.	Description	Remarks	Q'ty.
120	34B91175	Cover		1
121	34B91178	Cover		1
122	33B28888	Cover		1
123	33B29703	Cover		1
124	33B28889	Cover		1
125	33B28890	Cover		1
126	33B28891	Cover		1
127	34B91323	Shield case		3
128	34B91324	Shield case		1
129	34B92417	Shield plate		1
130	342H85560	MIX assembly		1
131	34B85886	Diode ring		1
132	34B90180	Cover		1
133	34H91185	Partition plate		1
134	34H91185B	Partition plate		2
135	34H91186	Partition plate		1
136	34H79935	Spring		5
137	34H84919	Trimmer		2
138	34H84919B	Trimmer		3
139	34H91187	Partition plate		1
140	349H80146	Oscillator assembly		1
141	34H93481	Clamp plate		1

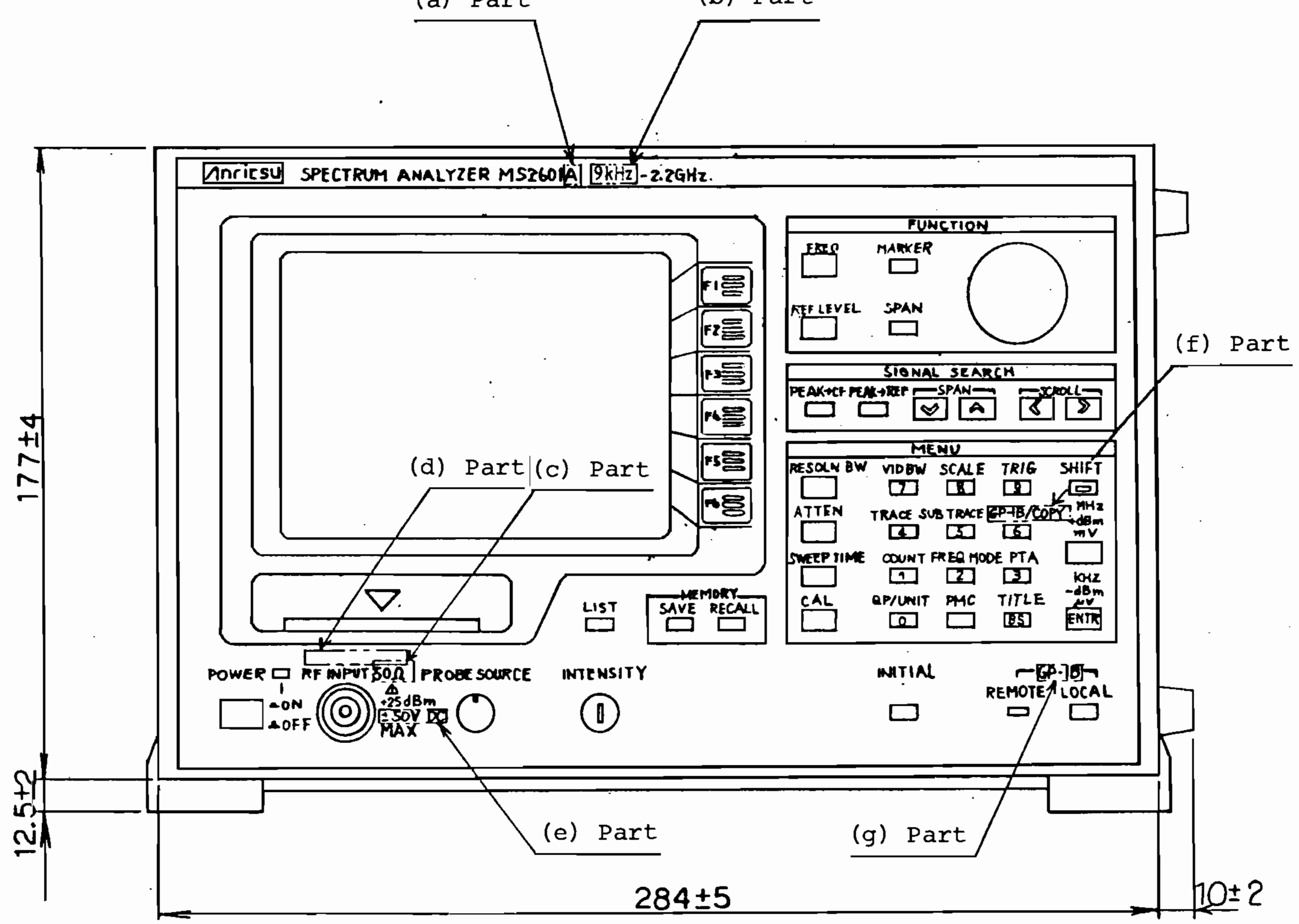
Table 2-6 Mechanical Parts List for Fig. 2-6 (Cont'd)

No.	Part No.	Description	Remarks	Q'ty.
142	34D94376	Shield type		20 cm
143	34B92557	Earth spring		2
144	342H93387	Wave absorber		1
145	34B94334	Shield plate		1
146	342Z96135	Wave absorber		1

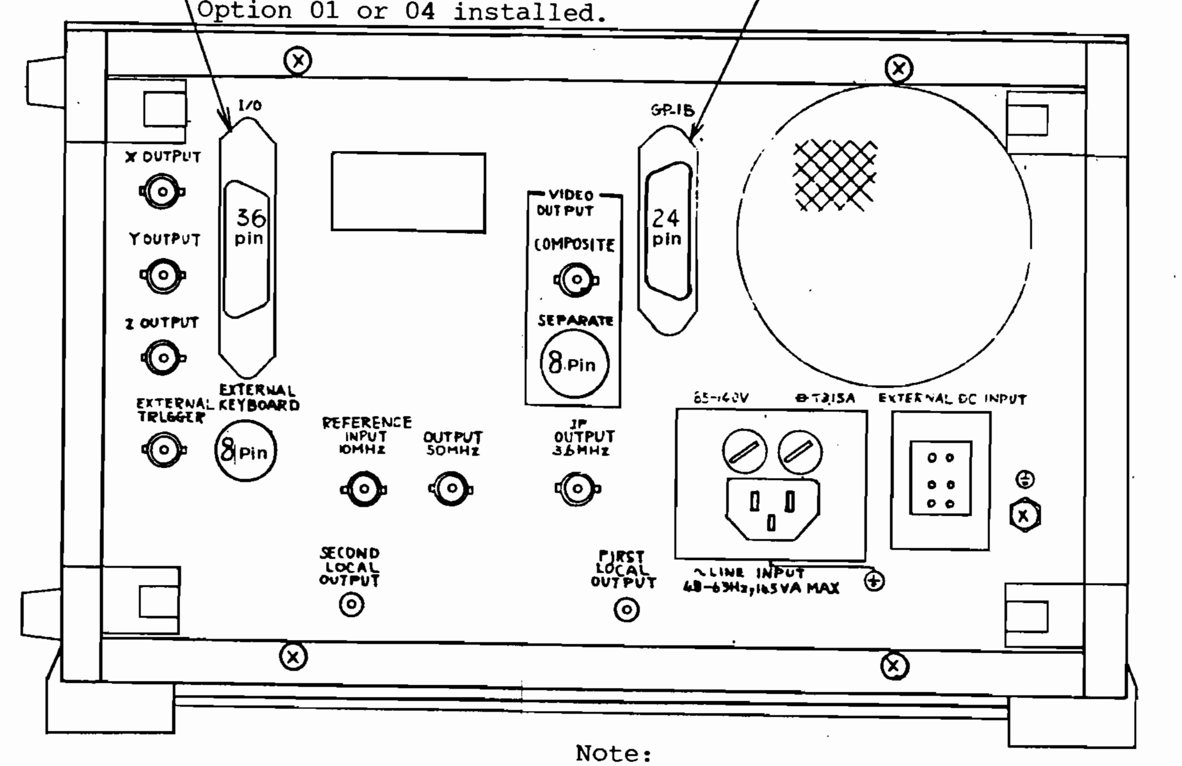
Table 2-7 Mechanical Parts List for Fig. 2-7

No.	Part No.	Description	Remarks	Q'ty.
147	34B96362	Spring		3
148	34B96292	Conductor		1

1. Front View

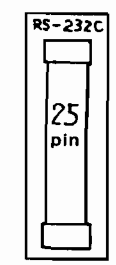


2. Rear View



Note:

RS-232C connector Option 02



3. Front panel trim options

(Above figure shows standard trim 332B10452A Decorative panel)

Impedance	Model name	OPTION	(a)	(b)	(c)	(d)	(e)	(f)	(g)	Part No.
50 Ω	A	01;04	A	10 kHz	50 Ω		±50 V DC	GP-IB/ COPY	GP-IB	322B10452A
		02,01&02; 04&02	A	10 kHz	50 Ω		±50 V DC	COPY	RS-232C	322B10452C
		05;01&05; 04&05	A	100 Hz	50 Ω		±0 V DC	GP-IB/ COPY	GP-IB	322B10452E
		02&05;01&02& 05;02&04&05	A	100 Hz	50 Ω		±0 V DC	COPY	RS-232C	322B10452G
75 Ω	J	01;04	J	10 kHz	75 Ω	USE THE ˋNCˊ TYPE PLUG	±50 V DC	GP-IB/ COPY	GP-IB	322B10452B
		02,01&02;04& 02	J	10 kHz	75 Ω	USE THE ˋNCˊ TYPE PLUG	±50 V DC	COPY	RS-232C	322B10452D
		05;01&05;04& 05	J	100 Hz	75 Ω	USE THE ˋNCˊ TYPE PLUG	±0 V DC	GP-IB/ COPY	GP-IB	322B10452F
		02&05;01&02& 05;02&04&05	J	100 Hz	75 Ω	USE THE ˋNCˊ TYPE PLUG	±0 V DC	COPY	RS-232C	322B10452H

Fig. 2-8 Options and Panel Appearance

SECTION 3

TROUBLESHOOTING AND ADJUSTMENT

3.1 Introduction

3.1.1 Composition

This section describes how the circuit operates, and how to troubleshoot and adjust the MS2601A/J after repair, etc.

When making a repair, first refer to paragraph 3.2 and determine the defective unit and locate the problem in the unit by referring to paragraph 3.3

Table 3-1 lists the circuit diagrams, parts lists and PC boards.

Note:

Calibration of compensation data

The MS2601A/J measuring accuracy can be improved by entering the compensation data shown below in the built-in memory.

1. Frequency response compensation value
2. CAL level compensation value

If the specifications are not met for the performance test described in paragraph 4.4 of the operation manual after the circuit related to these compensation data has been repaired, the compensation data must be reentered. The input method is described in Section 4.

Table 3-1 Circuit Reference

Schematic No.	A-No.	Name	PC Board No.	Parts List No.
1		MS2601A/J		34W93351
2	A1	RF/PLL BLOCK		34W93317
3	A1-A1	DC BLOCK	342U91131	34W93328
4	A1-A2	P-ATT	332U30567	34W96386
5	A1-A3	2.2 G LPF	34U95036	———
6	A1-A4	EQU	342U91129	34W93330
7	A1-A6	2.5214 GHz PRE AMP	332U28853	34W93331
8	A1-A8	2nd CONV	332U28847	34W93332
9	A1-A9	1st LO AMP	332U28861	34W93333
10	A1-A10	SAMPLER	342U92018	34W93334
11	A1-A12	2nd LOCAL PLL	332U28857	34W93335
12	A1-A13	50 k/50 M STEP SYNTH	322U10359	34W93336
13	A1-A14	PULSE AMP	332U28855	34W93337
14	A1-A15	20 Hz STEP VCO CONT	322U10357	34W93338
15	A1-A16	YTO PLL PD & LOOP FILTER	322U10367	34W93339
16	A2	IF BPF	322U10365	34W93318
17	A3	IF LOG/DET	322U10419	34W93319
18	A5	FRONT BOARD	332U28863	34W93320
19	A6	SCAN/YTO DRIVE	322U10369	34W93321
20	A7	REF OSC	322U10421	34W93322

Table 3-1 Circuit Reference (Cont'd)

Schematic No.	A-No.	Name	PC Board No.	Parts List No.
21	A8	MAIN CPU	332U28843	34W93323
22	A9	GP-IB	332U28859	34W93324
23	A10	DISP CPU	332U28845	34W93325
24	A13	MAIN MOTHER BOARD	322U10415	34W93326
25	A14	SUB MOTHER BOARD	322U10462	34W93327
26	A15	LED	342U91135	34W93349
27	Z4	REGULATOR	3A22-49A53	22-49A36
28	A16	FILTER	342U95236	34W95267
29	A4	PTA (OPT 01, 04)	332U29991	34W94043
30	A11	RS232 (OPT 02)	342U93955	34W94044
31	A17	CONNECTOR	342U96122	

Note:

The A1-A3 2.2 GHz LPF and A17 CONNECTOR consist of a PC board only without a capacitor, resistor, or semiconductor etc.

So, a A1-A3 and A17 parts lists are not provided.

3.1.2 Checking and Replacement of Parts

(1) Explanation of identification markings on the PC board

As shown in Fig. 3-1, the MS2601A/J PC board has the A number, PC board number with the revision number, PC board name, and test point name.

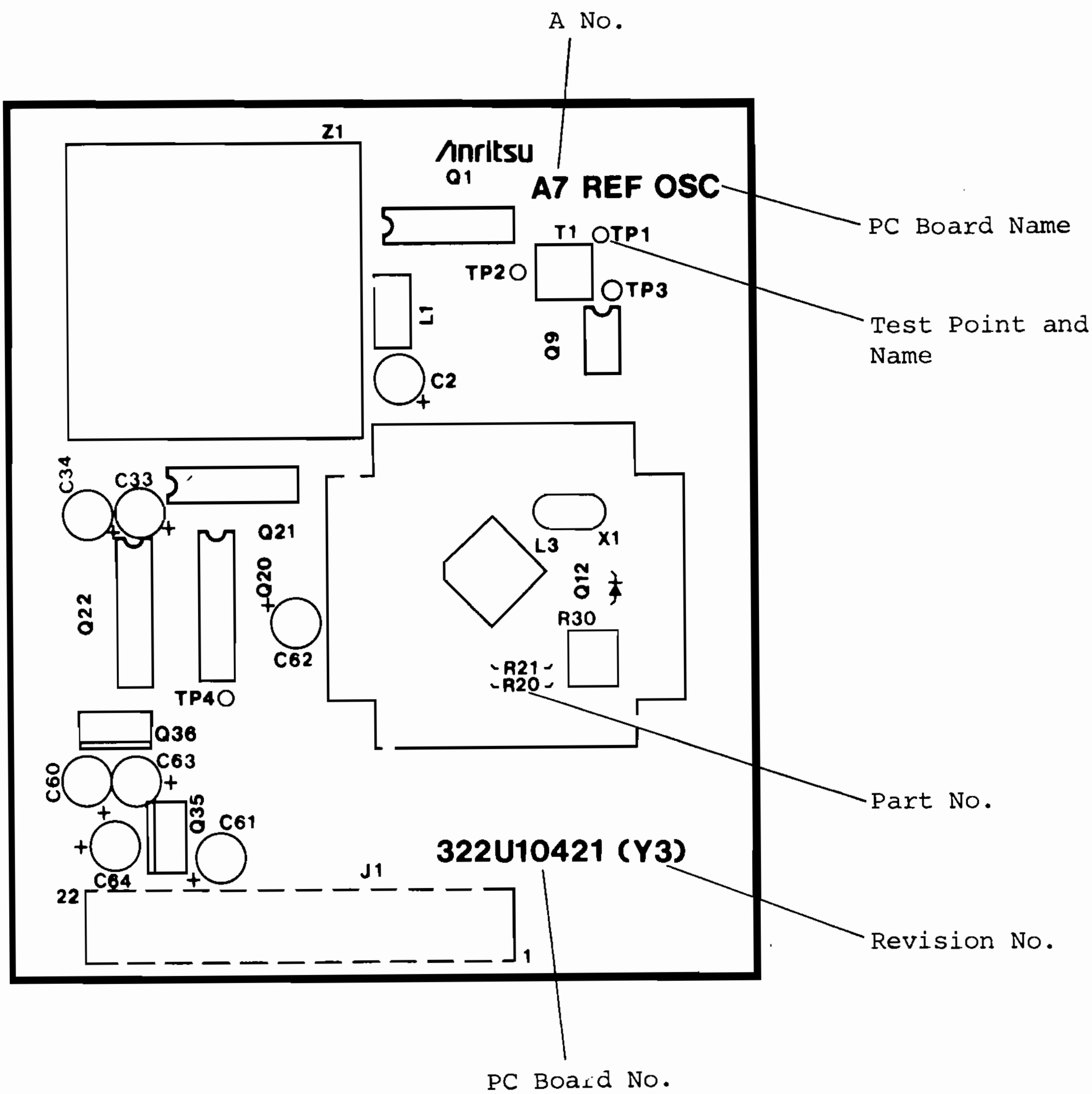


Fig. 3-1 PC Board Identification Markings

(2) Notes on soldering

1. Use an ordinary 30 to 40 watt pencil type soldering iron.

2. Before using the soldering iron, be sure it is insulated. If not, it may damage the part.

3. When removing a soldered part from a circuit board or soldering in a new part, nip the part lead with tweezers to shunt heat.

4. The tips of major part leads are bend behind the PC board to ensure tight support. To remove a part, first lift up the tips of the leads and then remove the part.

(3) Transistor and diode check

(a) Check of transistors mounted on the PC board

Transistors can be checked for acceptable quality in the operating state by measuring the base and emitter potentials. The NPN type silicon transistor shows a value that the base potential is 0.6 or 0.7 V higher than the emitter potential. In the PNP silicon transistor, the former is 0.6 or 0.7 V lower than the latter. Transistors are, therefore, faulty if these relationships are not satisfied.

(b) Check of transistors removed from the PC board

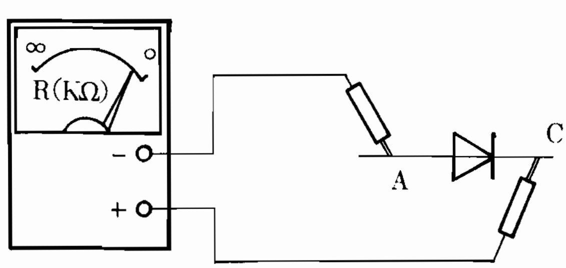
Transistors can be checked by measuring the resistance values among the emitter, base, and collector using a circuit tester. Standard values are given in Table 3-2. Note that this check should be performed at a measuring current of less than 100 μA.

Table 3-2 Test of Transistors Removed from the PC Board

Type of transistor	Connector Ohmmeter		Resistance to be measured (ohm)
	Positive lead to	Negative lead to	
PNP silicon	Emitter, collector	Base	1 to 10 k
	Emitter	Collector	Very high
NPN silicon	Base	Emitter, Collector	1 to 10 k
	Emitter	Collector	Very high

(c) Check of diodes removed from the PC board

Diodes can be checked by measuring the resistance between the anode and cathode and the cathode and anode. If the resistance between the anode and cathode (A-C) is high and the resistance between C-A is low, when measured with an ohmmeter as shown in Fig. 3-2, the diode is normal.



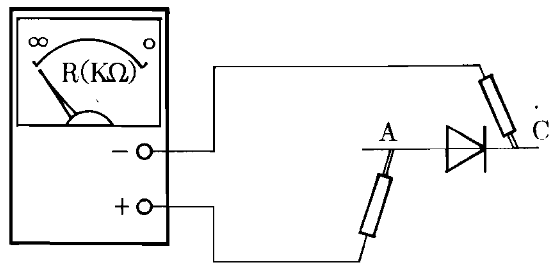
(1) Between C-A

Example: 1S953

A-C: ∞

C-A: ≅9 kΩ

Fig. 3-2 Diode Check



(2) Between A-C

Fig. 3-2 Diode Check (Continued)

3.2 Overall Troubleshooting

Figure 3-3 and 1 show the overall block diagram and the overall circuit diagram, respectively.

The following paragraphs describe the overall circuit opetation and troubleshooting.

3.2.1 Overall circuit description

The MS2601A/J is a superheterodyne system scanning-type spectrum analyzer. The input signal is mixed with the 1st LOCAL signal at the [RF/PLL BLOCK] 1st MIXER and is converted to the 2.5214 GHz 1st IF signal.

The 1st IF signal is mixed with the 2nd LOCAL signal at the 2nd MIXER and is converted to the 21.4 MHz 2nd IF signal.

The 1st and 2nd LOCAL OSC frequencies are stabilized in the PLL (Phase Locked Loop) circuits based on the reference signal supplied by [REFERENCE OSC]. The SCAN GENERATOR circuit of [SCAN/YTO DEIVE] sweeps the YTO (1st LOCAL OSC) frequency.

The 21.4 MHz 2nd IF signal is mixed with the 3rd LOCAL signal at the 3rd MIXER of ⌈IF BPF⌉ and is converted to the 3.6 MHz final IF signal. The 3.6 MHz IF signal passes through variable gain amplifiers and BPFs which determine RBW (resolution bandwidth) and also passes through LOG or LIN amplifiers of ⌈IF LOG/DET⌉ for detection.

⌈IF LOG/DET⌉ sends CAL signal to the RF section for internal calibration of LOG linearity and reference level accuracy.

The detected signal passes through the VF (Video Filter) or QP detector and is converted to a digital signal by the A/D converter.

The converted digital signal is processed at ⌈MAIN CPU⌉ and also sent to ⌈DISP CPU⌉ for display on the CRT.

The data (frequency, reference level value, etc.) entered at the ⌈FRONT BOARD⌉ panel keys is sent to the ⌈MAIN CPU⌉ which controls each unit depending on the data content.

⌈MAIN CPU⌉, ⌈DISP CPU⌉, and ⌈PTA⌉ have each one CPU, and configure the multi-processor system through a common bus and common RAM. (Refer to Fig. 3-3 (1/2)). The ⌈GP-IB (or RS-232C)⌉ is connected to the ⌈MAIN CPU⌉ CPU bus. The ⌈FRONT BOARD⌉ is connected with ⌈MAIN CPU⌉ I/O bus.

3.2.2 Overall troubleshooting

Problems are roughly divided into the following four categories. Locate the defective unit from the symptom.

1. Abnormal CRT display
2. Abnormal frequency
3. Abnormal level
4. Abnormal front panel key entry

(1) Abnormal CRT display

Locate the faulty unit by referring to the symptoms listed in Table 3-3.

Table 3-3 Abnormal CRT Display

Symptom	Cause	Unit to be checked
1. The screen is dark and nothing is displayed		
a. POWER ON lamp is off	i) AC fuse is blown	Rear panel (J26) Z4 REGULATOR
	ii) DC fuse for +5 V is blown	
b. POWER ON lamp is on		
1) When the INTENSITY knob is turned clockwise, the graduation lines and characters are displayed on the CRT.	Intensity shortage	————
2) When the INTENSITY knob is turned clockwise, the screen brightens	i) Defective power reset signal ii) Defective CRT drive signal	Z4 REGULATOR A10 DISP CPU A8 MAIN CPU

Table 3-3 Abnormal CRT Display (Continued)

Symptom		Cause	Unit to be checked
	3) When the INTENSITY knob is turned clockwise, nothing is displayed	i) DC fuse for +12 V is blown or CRT power supply is defective	Z4 REGULATOR
		ii) Defective CRT	Z3 CRT UNIT
2.	The screen is bright and nothing is displayed	i) Defective power reset signal	Z4 REGULATOR
		ii) Defective CRT drive signal	Z10 DISP CPU A8 MAIN CPU

(2) Frequency abnormality

Although the spectrum waveform or noise is displayed on the screen, if the frequency display value is abnormal, there may be a problem around the LOCAL OSC. The following describes how to find out the faulty unit by referring to the examples in Table 3-4.

Table 3-4 Abnormal Frequency Measurement

	Symptom	Cause	Unit to be checked
1.	The frequency is fluctuating in approx. the 10 MHz range	The 2nd Local PLL is not locked	A1 RF/PLL BLOCK
2.	There is a large frequency display error		
	a. Little or no fluctuation in frequency display value	Defective 1st Local PLL circuit i) YTO PLL not locked ii) 50 kHz or 50 MHz STEP SYNTH PLL not locked iii) Defective 20 Hz STEP VCO	A1 RF/PLL BLOCK
	b. Large error at SPAN 520 kHz or more	Defective YTO DRIVER circuit	A6 SCAN/ YTO DRIVE
	c. Large error at SPAN 500 kHz or less	Defective 20 Hz STEP VCO in 1st Local PLL circuit	A1 RF/PLL BLOCK
	d. Large error to right of screen center	Defective span signal	A6 SCAN/ YTO DRIVE
	e. Large error of same frequency ratio regardless of absolute frequency value (5×10^{-5} to 5×10^{-7})	Defective Reference OSC operation	A7 REF OSC
3.	Abnormal FREQ COUNT value	Defective frequency counter circuit	A3 IF LOG/DET

(3) Level abnormality

The cause of the level defects is widespread in the parts ranging from the RF section to the IF section. Locate the defective unit from the display contents by referring to the examples in Table 3-5.

Table 3-5 Level Measurement Abnormality

Symptom	Cause	Unit to be checked
1. Signal level very low or not displayed Turn on the power again, press the [INITIAL] key to enter the FULL SPAN mode and check the following:		
a. Zero beat signal and noise displayed Zero beat: $\geq$-30 dBm Noise: -60 to -70 dBm	i) Defective input ATT	A1 RF/PLL BLOCK
	ii) Defective 1st MIXER	
b. Noise displayed but zero beat not displayed	i) Defective 1st local oscillation	A6 SCAN/ YTO DRIVE Z1 YTO
	ii) Defective 2nd local oscillation	A1 RF/PLL BLOCK
c. Both zero beat and noise low	Defective circuit near 2nd or 3rd MIXER	A1 RF/PLL BLOCK A2 IF BPF
d. Neither zero beat nor noise displayed	i) Defective detector or circuit near A/D	A3 IF LOG/DET
	ii) Defective final RBW (BPF) circuit	A2 IF BPF

Table 3-5 Level Measurement Abnormality (Continued)

Symptom	Cause	Unit to be checked
2. Large level measurement error Perform LEVEL CAL again and check the following:		
a. Reference level accuracy out of specification	Defective CAL signal level	A3 IF LOG/DET
b. LOG linearity out of specification	Defective CAL ATT	A3 IF LOG/DET
c. Large error depending on frequency	i) Defective input ATT	A1 RF/PLL BLOCK
	ii) Defective 1st MIXER	
3. Other symptoms Turn on the power again and check the following:		
a. Large RBW switching deviation	Defective RBW switching circuit	A2 IF BPF
b. Signal level value fluctuates with REF LEVEL	i) Defective input ATT	A1 RF/PLL BLOCK
	ii) Defective IF variable gain amplifier switch-ing circuit	A2 IF BPF
c. Signal level decreases for cases other than above	BPF tuning slippage in each IF stage or defective IF amplifiers	A1 RF/PLL BLOCK A2 IF BPF A3 IF LOG/DET

(4) Defective front panel key setting

Table 3-6 Defective Panel Key Setting

Symptom	Cause	Unit to be checked
1. Setting impossible at all keys	Defective CPU or FRONT BOARD	A8 MAIN CPU A5 FRONT BOARD
2. Setting impossible at some keys	Defective key select circuit	A5 FRONT BOARD
3. Setting impossible at a specify key	Defective key switch	A5 FRONT BOARD

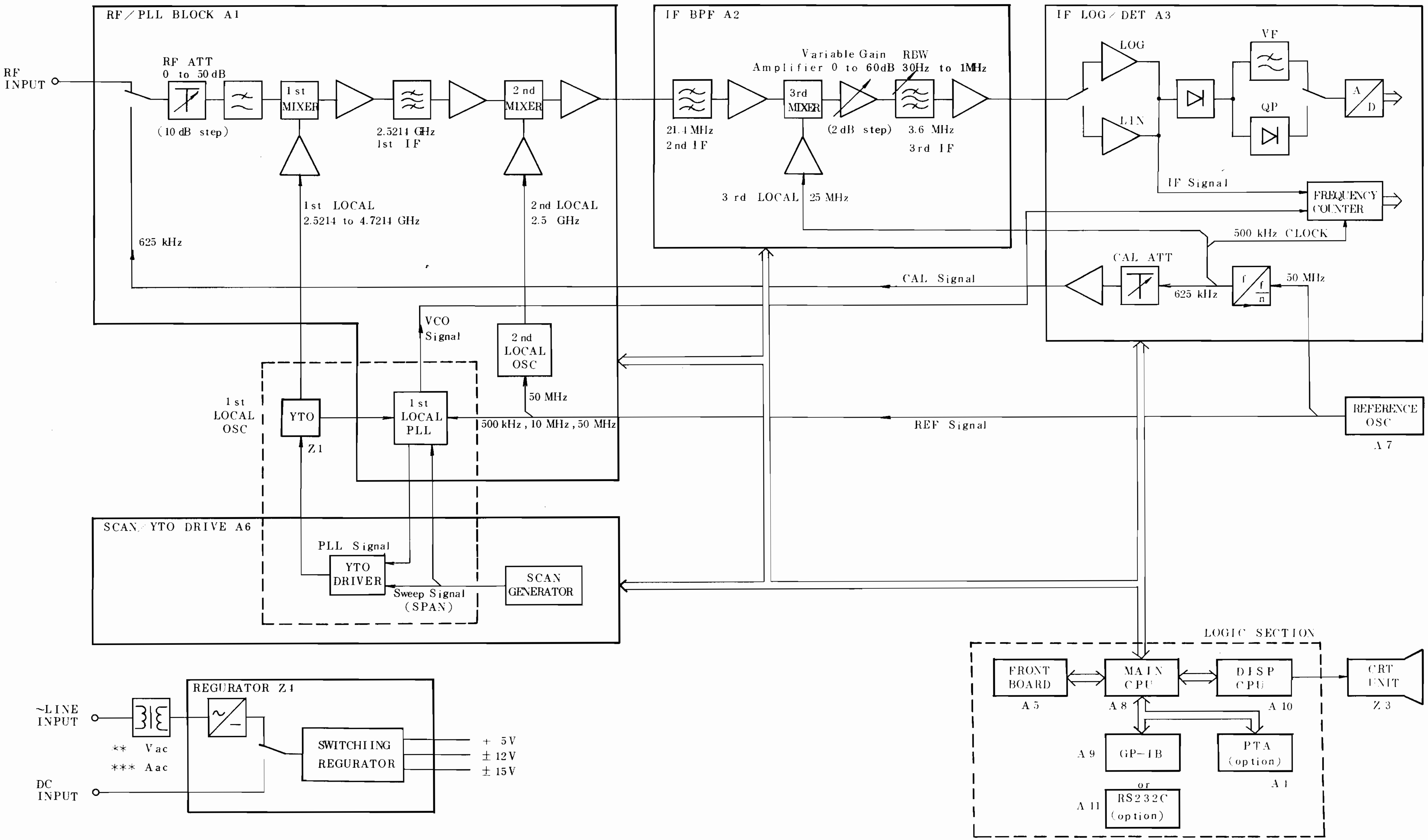


Fig. 3-3 (1/2) Overall Block Diagram

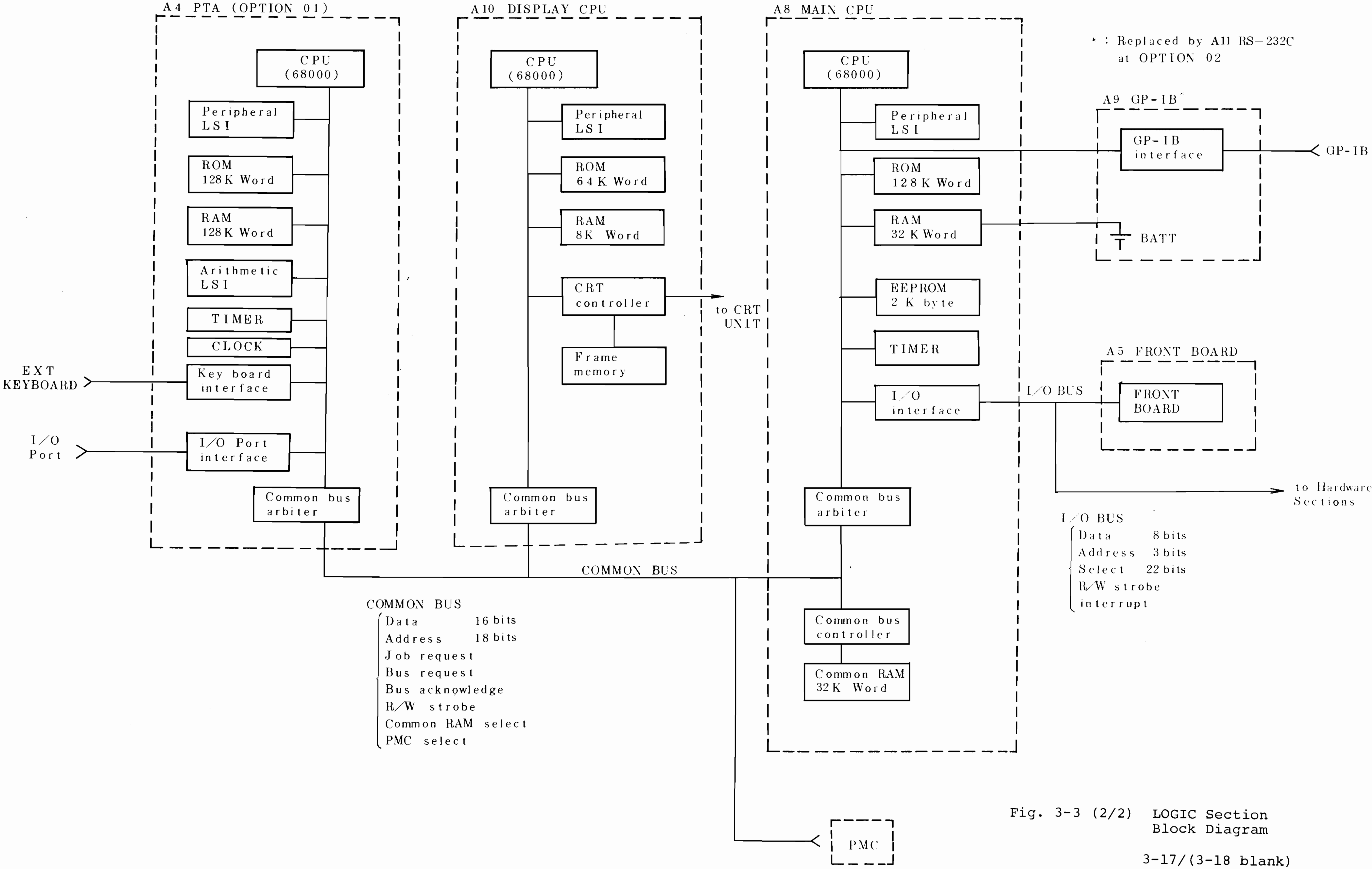
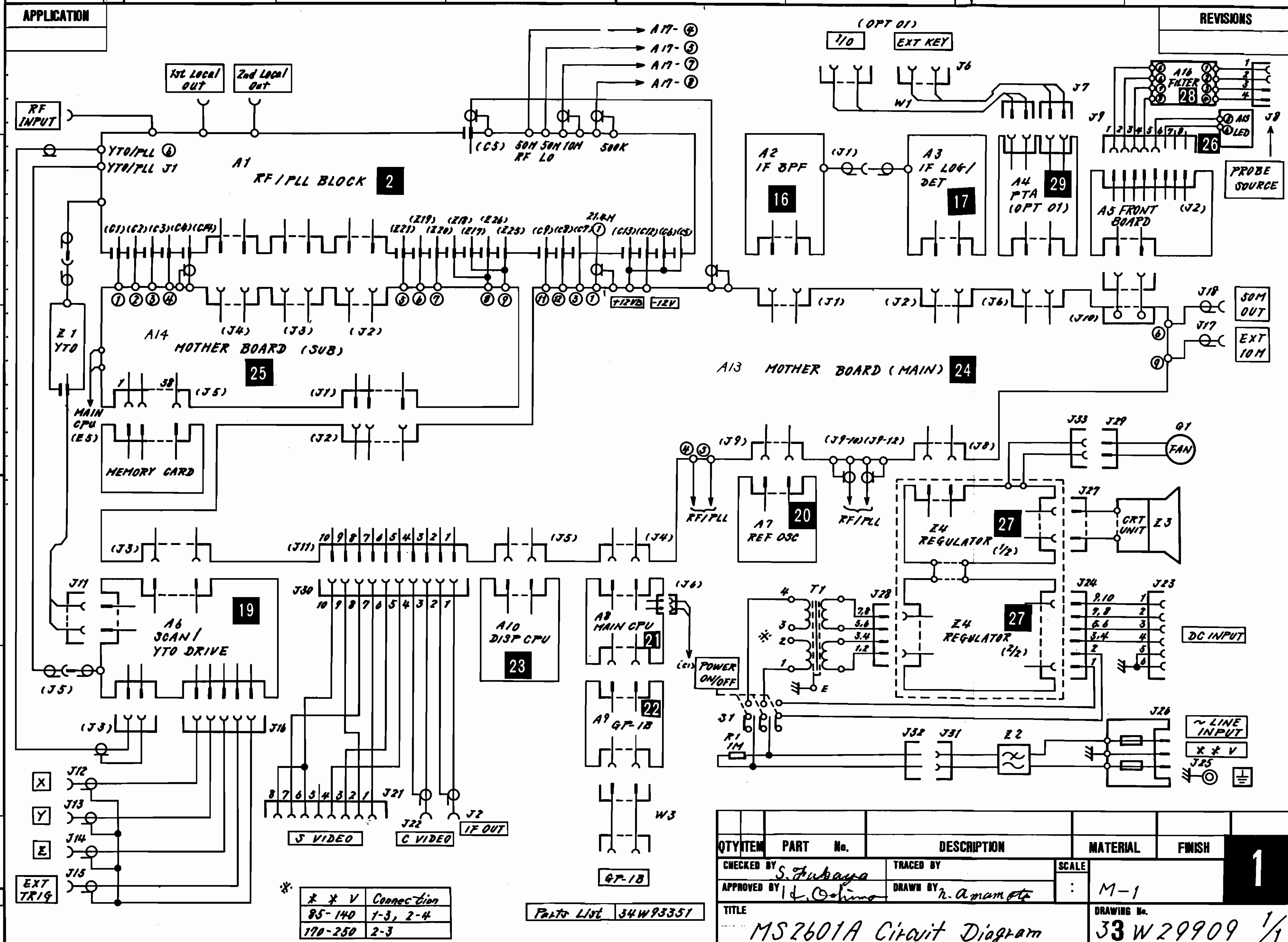


Fig. 3-3 (2/2) LOGIC Section Block Diagram



※ V	Connection
85-140	1-3, 2-4
170-250	2-3

Parts List 34W93351

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY S. Fukaya
APPROVED BY H. Oshima
TRACED BY
DRAWN BY N. Amamoto
SCALE :
M-1

TITLE MS2601A Circuit Diagram

DRAWING No. 33 W29909 1/1

ANRITSU CORP.

3-19/3-20

No. 9023-1985.08

3.3 Troubleshooting and Adjustment of Each Circuit

3.3.1 Introduction

This paragraph describes the PC boards and units indicated by numbers A and Z.

1. Circuit description

   Describes circuit operation using circuit diagram or block diagram

2. Symptom

   Describes symptoms when trouble has occurred

3. Troubleshooting

   Describes troubleshooting showing the normal value at checkpoint (waveform, signal level, etc.) using circuit diagram, PC board layout diagram, etc.

   If the normal value does not appear, repair the related circuit.

4. Adjustment

   Describes adjustment locations and procedures

3.3.2 Equipment required for troubleshooting, repair and adjustment

Troubleshoot, repair and adjust using the measuring instruments listed in Table 3-7. In addition, use the service kit (sold separately), including an extender board, extender cable, etc. for dedicated use shown in Table 3-8.

Table 3-7 Equipment Required for Troubleshooting, Repair and Adjustment

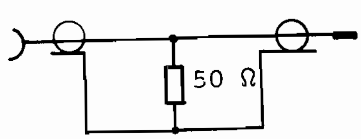
Instrument	Required Performance	Model (Anritsu)
Digital voltmeter	5 digits, Maximum digit: 1 mV	
Oscilloscope	Dc to 200 MHz	
Frequency counter	Frequency range: 100 kHz to 5 GHz	MF76A
Spectrum analyzer	Frequency range: 100 kHz to 5 GHz	MS612A
with High impedance probe	Frequency range: 100 kHz to 200 MHz	
Signal generator	Frequency range: 10 kHz to 2 GHz	MG649A
Network/Spectrum analyzer	Frequency range: 10 kHz to 30 MHz	MS420K
Signal generator	Frequency range: 10 kHz to 30 MHz	MG443B
Dc voltage standard	Output: 0 to 99.9 V, 3 digits	
50 Ω Terminator (feed-through)	Connector: BNC 	
Slide regulator	0 to 300 Vac output	

Table 3-8 Service Kit

[mm Unit]

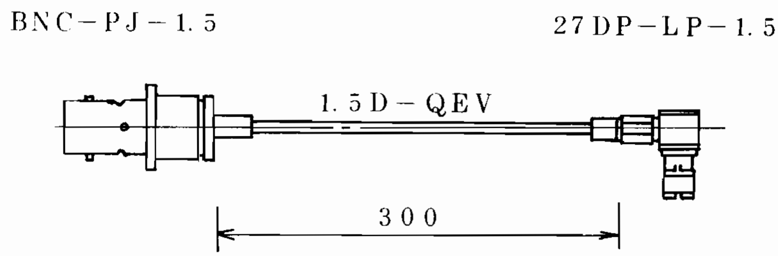
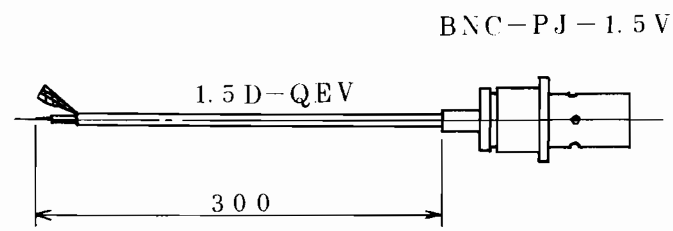
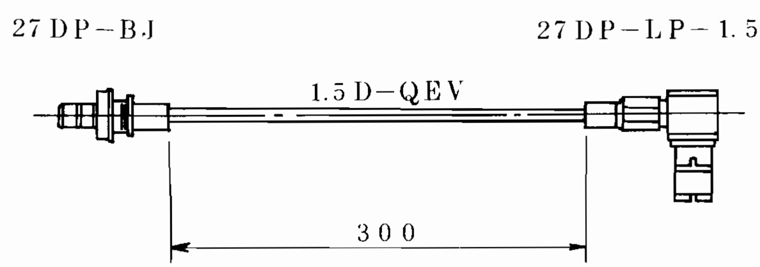
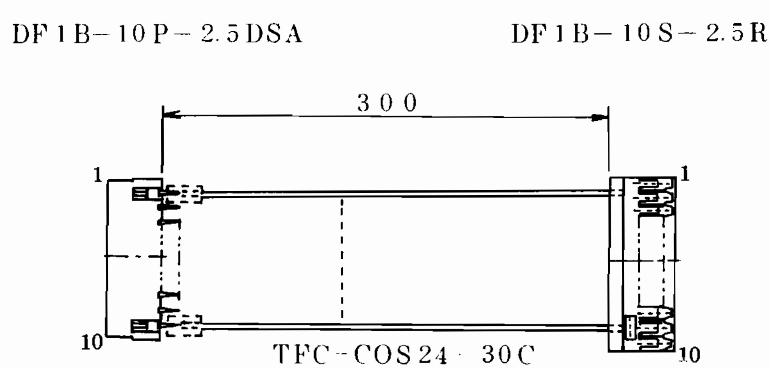
No.	Name	Configulation	Dwg. No.
1	Extender cable 1		34J92837F
2	Extender cable 2		34J94206
3	Extender cable 3		34J94207
4	Extender cable 4		349J-94208

Table 3-8 Service Kit (Cont.)

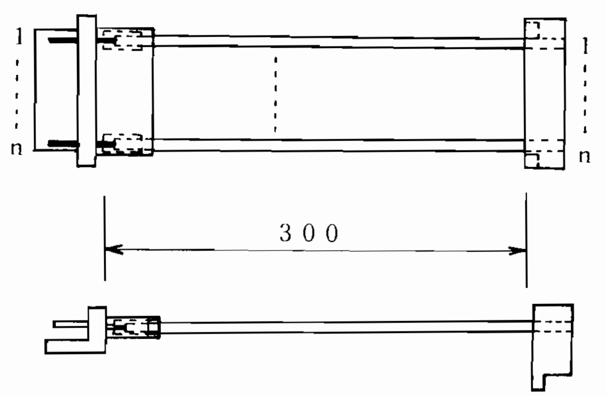
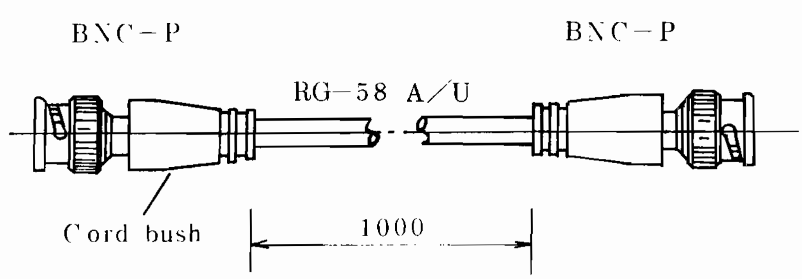
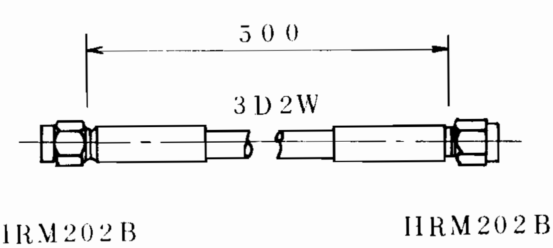
No.	Name	Configulation	Dwg. No.
5	Extender cable 5	DF1-2P2.5DSA, DF1-2S2.5R24 n=2	449J81722G
6	Extender cable 6	DF1-8P2.5DSA, DF1-8S2.5R24 n=8	449J81722C
7	Extender cable 7	DF1-10P2.5DSA, DF1-10S2.5R24 n=10 	449J81722D
8	Extender cable 8		34J88878A
9	Extender cable 9		449J25501F

Table 3-8 Service Kit (Cont.)

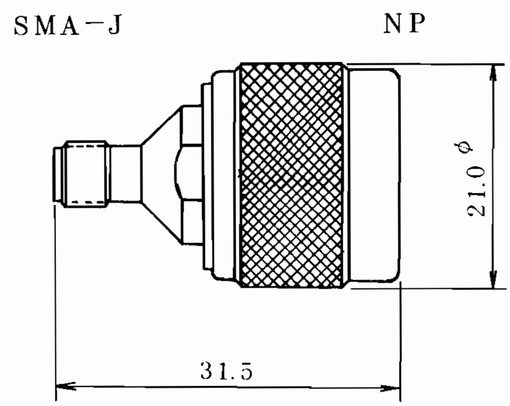
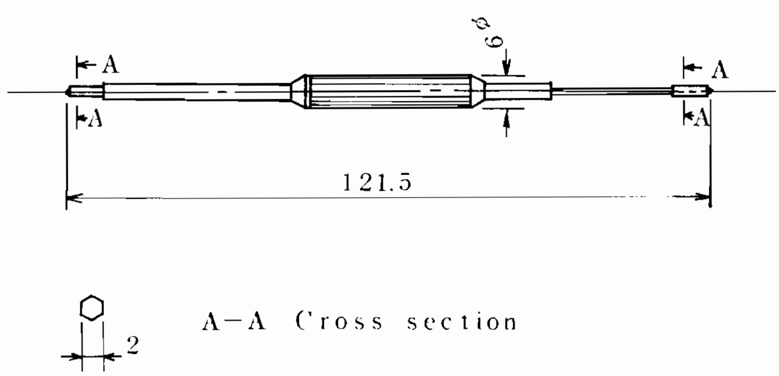
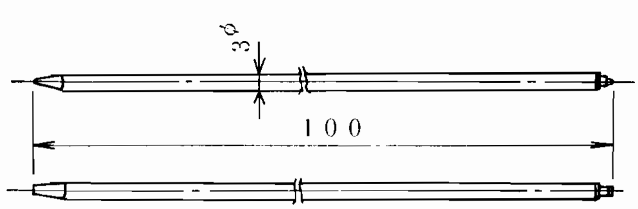
No.	Name	Configuration	Dwg. No.
10	Conversion adapter NP-NMJ		No. 1289
11	Adjustment bar 1		24Z92109
12	Adjustment bar 2		34Z81433

Table 3-8 Service Kit (Cont.)

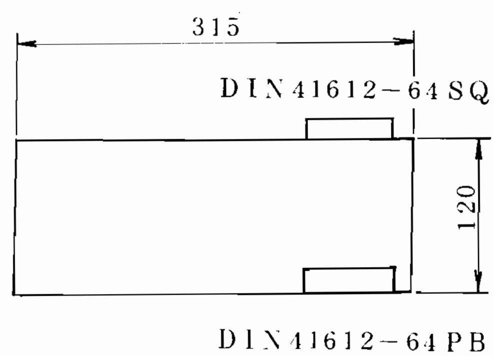
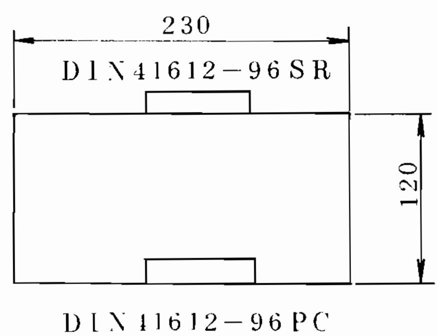
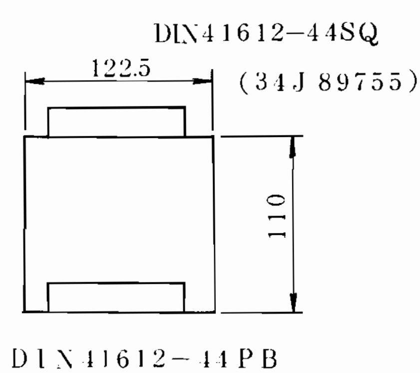
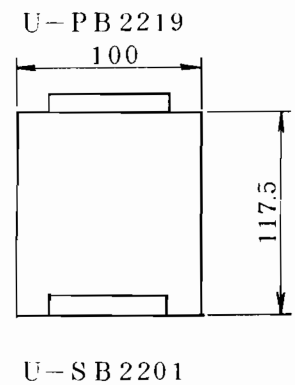
No.	Name	Configuration	Dwg. No.
13	Extender board 1		322U10455
14	Extender board 2		332U29124
15	Extender board 3		332U29125

Table 3-8 Service Kit (Cont.)

No.	Name	Configuration	Dwg. No.
16	Reference extender		342U91137
17	Carrying case for service kit	———	———

3.3.3 Z4 REGULATOR 27

(1) Circuit description

The Z4 REGULATOR consists of two PC boards, each of which is clamped with screws to a heat sink to form a block.

The Z4 REGULATOR unit rectifies input ac voltage, stabilizes it, generates the dc power supplies, and feeds them to each unit.

The Z4 REGULATOR also has a ac power source voltage monitor circuit and a dc input selecting circuit.

A detailed circuit description is given below with reference to Fig. 3-4 and 27.

The output from power transformer T1 is rectified by the Q2 and Q4 bridge rectifiers. The ripple component is decreased by capacitors C3 to C7 and C8 to C10.

The positive output is stabilized by two switching regulators; one has a switching frequency of approximately 35 kHz. This output is sent to three 3-terminal regulators (Q7, Q9 and Q11), is stabilized, and becomes the +12 V power supply. Another switching regulator has a switching frequency of approximately 20 kHz and this output becomes the +5 V power supply.

The negative output is stabilized by a switching regulator which has a switching frequency of approximately 20 kHz. This output is sent to two 3-terminal regulators (Q18 and Q20), is stabilized, and becomes the -12 V power supply.

This switching regulator output for -12 V is also stepped-up by a up-converter, is sent to two 3-terminal regulators (Q28 and Q29), and becomes the ±15 V power supply.

The ac power source voltage monitor circuit generates a reset signal at regular interval after power-on.

The ac power source voltage monitor circuit quickly detects the voltage drop when the ac power source is turned off, and sends a power fail signal (NPWRFAIL) to the A8 MAIN CPU.

When the A8 MAIN CPU receives this fail signal, it stores the setting parameter contents in the backed-up internal memory.

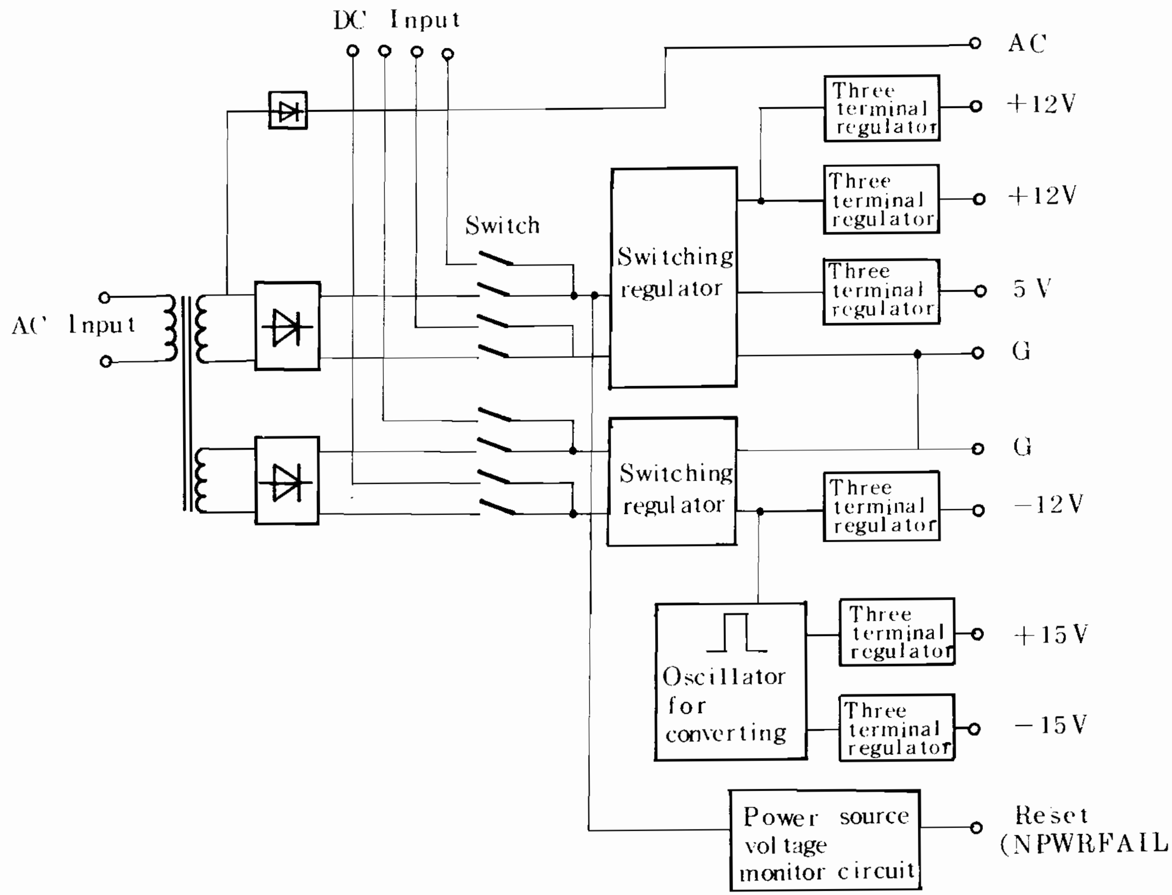


Fig. 3-4 Z4 REGULATOR Block Diagram

(2) Symptom

When the Z4 REGULATOR unit is faulty, the MS2601A/J does not operate at all or malfunctions frequently (e.g. abnormal CRT display).

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove the Z4 REGULATOR unit by referring to paragraph 2.7.
2	Remount the Z4 REGULATOR unit using an extender board.
3	Reconnect J28 from T1 to the Z4 REGULATOR unit using an extender cable (Fig. 2-5).

(c) Troubleshooting

Check each checkpoint with reference to Fig. 3-6 and 27.

Table 3-9 Z3 Troubleshooting

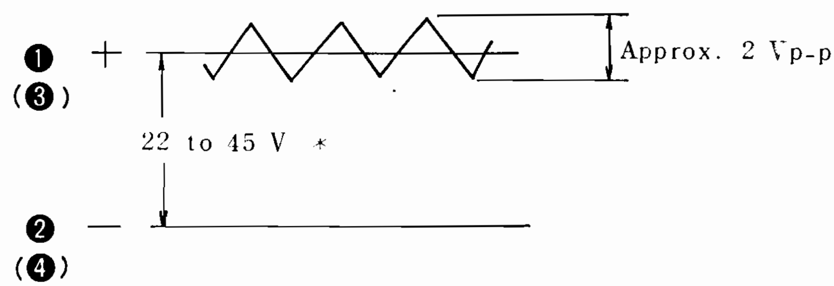
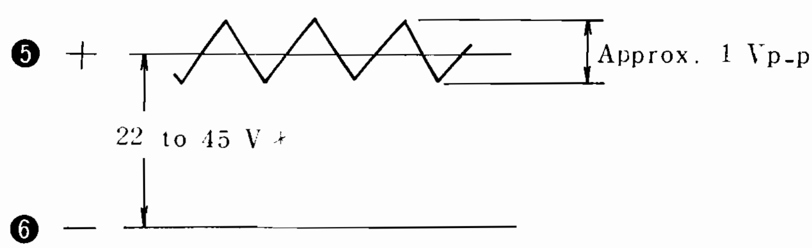
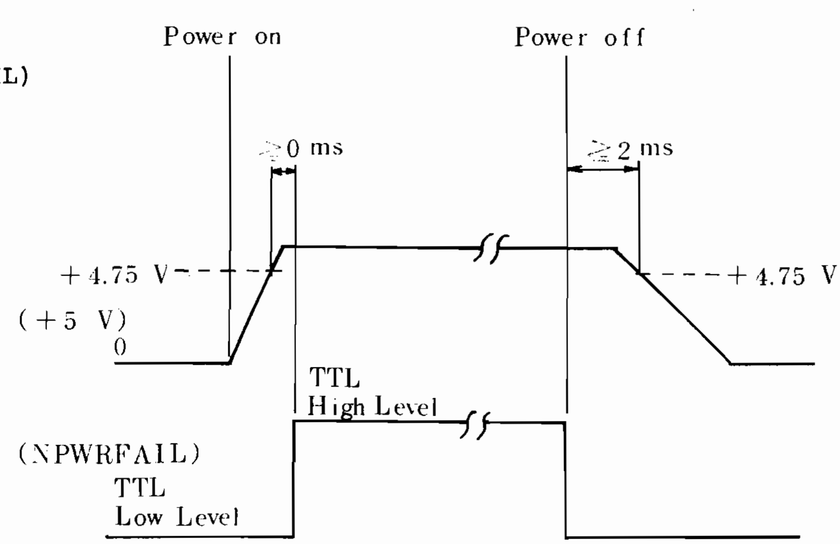
Checkpoint	Normal condition
1. Rectified voltage check	
❶ - ❷ or ❸ - ❹	
❺ - ❻	
	* When the ac power source voltage is 100 V (with a 100 V system: 85 to 140 V) or 200 V (with a 200 V system: 170 to 250 V), this voltage is approx. 30 V.
2. Switching regulator output voltage check	
❼ (+) - ❽ (-) or ❾ (+) - ❿ (-)	+12.5 to +14 V

Table 3-9 Z3 Troubleshooting

Checkpoint	Normal condition
3. Input voltage check for ±15 V three terminal regulators	
11 - [GROUND]	+16.5 to +18 V
12 - [GROUND]	-16.5 to -18 V
4. Output voltage check	(With reference to [GROUND] in 27)
J4-3 13	+4.75 to +5.25 V
J4-13 14	+14.3 to +15.7 V
J4-14 15	+11.5 to +12.5 V
J4-16 16	+11.5 to +12.5 V
J4-19 17	-11.5 to -12.5 V
J4-22 18	-14.3 to -15.7 V
J3-1 19	+11.5 to +12.5 V
5. Power fail signal check	
J4-3 13 (+5 V)	
J4-5a 20 (NPWRFAIL)	



(4) Adjustment

The power source voltage monitor circuit is adjusted as follows:

(a) Setup

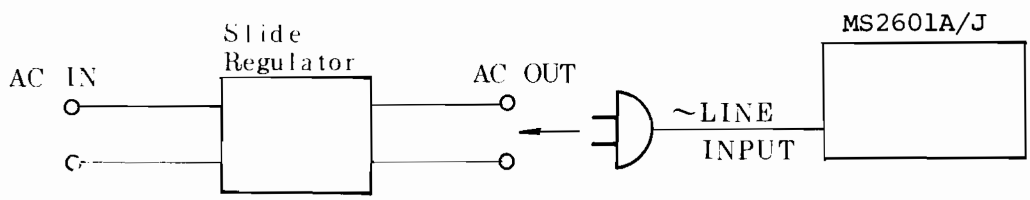


Fig. 3-5 Z3 Adjustment Setup

(b) Adjustment

Step	Procedure
1	When ∿ LINE INPUT range is 85 to 140 V with a 100 V system, set the ac output voltage of the slide regulator to 75 ±1 V. (When ∿ LINE INPUT range is 170 to 250 V with a 200 V system, set the ac output voltage of the slide regulator to 150 ±2 V [75 V x 2].)
2	Turn R23 ㉑ fully clockwise, graduation lines or setting parameters on the CRT should disappear.
3	Turn R23 ㉑ counterclockwise little-by-little until the CRT becomes normal.
4	When ∿ LINE INPUT range is 85 to 140 V with a 100 V system, confirm that the MS2601A/J operates normally even when the ac input voltage is set to 140 V. (Set this voltage to 250 V when the ∿ LINE INPUT range is 170 to 250 V with a 200 V system).

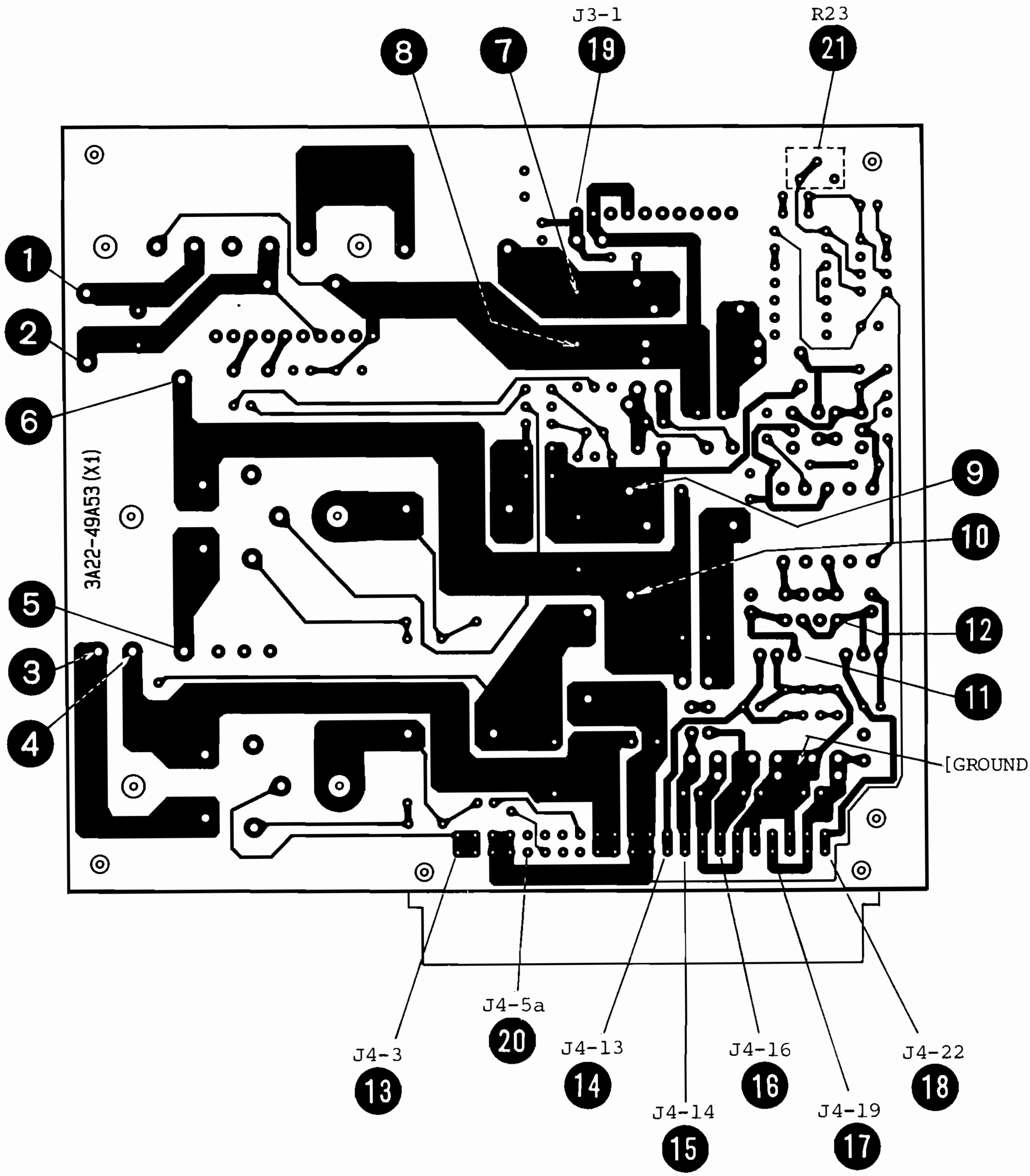
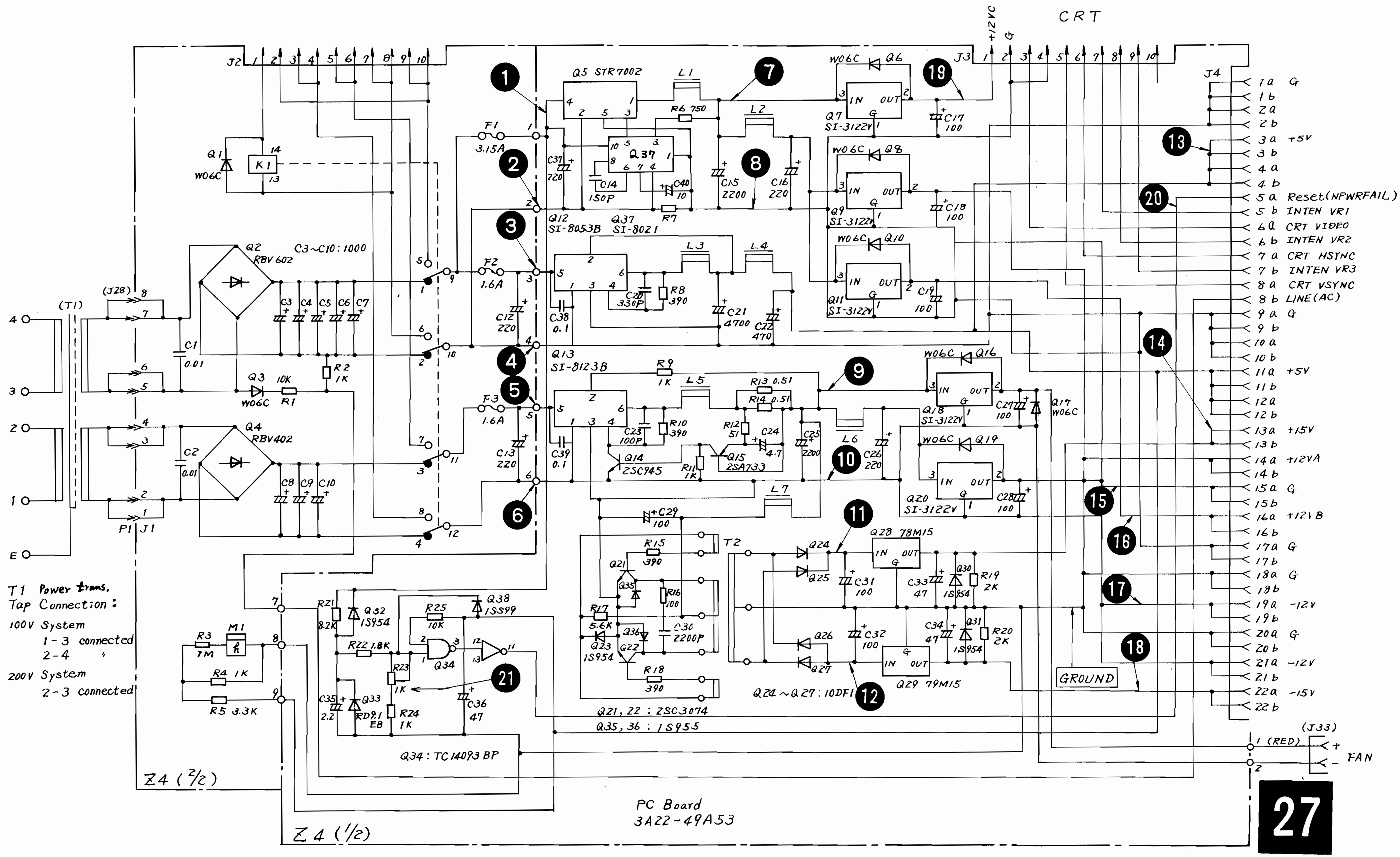


Fig. 3-6 Z4 REGULATOR PC Board Parts Layout



Parts List : 22-49A36

Z4 REGULATOR Circuit Diagram

3.3.4 A1 RF/PLL BLOCK 2 to 15

(1) Circuit description

The A1 RF/PLL BLOCK is composed of the RF section and the PLL section (LOCAL section). The following paragraphs describe the circuits of each section with reference to Fig. 3-7.

(a) RF section

(i) A1-A1 DC BLOCK 3

The dc component of the input RF signal from the RF INPUT connector is removed here.

(ii) A1-A2 P ATT 4

This circuit is composed of a switching section and the ATT section of the RF/CAL signals. The ATT section consists of three parts: 20 dB, 10 dB, and 20 dB attenuators.

(iii) A1-A3 2.2 GHz LPF 5

This circuit is composed of a PC board only, and does not have a fixed capacitor, resistor, and semiconductor.

This printed circuit board LPF lowers the image frequency component reception.

(iv) A1-A4 EQU/1st MIXER 6

These circuits mix the input signal with the local signal from A1-A8 1st LOCAL AMP and converts it to the 1st IF signal (2.5214 GHz).

(v) A1-A6 2.5214 GHz PRE AMP

The 1st IF signal (2.5214 GHz) is amplified here by 5 dB.

(vi) A1-   2.5214 GHz BPF

This is the 1st IF BPF which is composed of 4 cavity stages. In this BPF, the image frequency component 42.8 MHz apart from the 1st IF signal is removed to convert the 1st IF signal to the 2nd IF signal (21.4 MHz) at the 2nd converter.

(vii) A1-A8 2nd CONV 8

The 1st IF sginal (2.5214 GHz) is mixed with the 2nd local signal (2.5 GHz) and is converted to the 21.4 MHz 2nd IF signal to be amplified.

Furthermore, the 2.5 GHz 2nd local signal is also supplied to A1-A12 2nd LOCAL PLL to stabilize the oscillation frequency of A1- 2.5 GHz OSC.

(b) PLL section (LOCAL section)

(i) A1-A9 1st LO AMP 9

This circuit is composed of an amplifier, which amplifies the Z1 YTO output signal to supply the local signal to A1-A4 1st MIX, and an isolation amplifier which supplies the RF signal to A1-A10 SAMPLER. The isolation amplifier reduces the leak level to A1-A4 1st MIX due to the high-level harmonic frequency component generated by A1-A4 PULSE AMP.

(ii) A1-A10 SAMPLER 10

This circuit mixes the Z1 YTO output with the harmonic frequency output (A1-A10 SAMPLER output), and converts the Z1 output frequency to 11.0 to 11.5 MHz.

(iii) A1-A12 2nd LOCAL PLL 11

This circuit receives the 50 MHz reference frequency from the A7 REF OSC, generates a pulse, supplies it to the MIX sampler, and samples the signal from the A1- 2.5 GHz CAVITY OSC.

The sampler output locks the A1- 2.5 GHz CAVITY OSC frequency to 2.5 GHz.

(iv) A1-A13 50 kHz/50 MHz STEP SYNTH 12

This circuit is composed of a 50 kHz-step synthesizer, that changes in 50 kHz steps, and a 50 MHz-step synthesizer that changes in 50 MHz steps. The output frequency of the 50 kHz-step synthesizer is divided by 2 M to make a reference signal for the 50 MHz-step synthesizer. The output of the 50 MHz-step synthesizer is supplied to the A1-A14 PULSE AMP.

The output frequency changes of the 50 kHz-step synthesizer is equal to that of Z1 YTO. The output frequency change of the 50 MHz-step synthesizer is 1/M of that of Z1 YTO.

(v) A1-A14 PULSE AMP **13**

This circuit amplifies the output signal of the A1-A13 50 kHz/50 MHz STEP SYNTH and generate a sampling pulse which is supplied to the A1-A10 SAMPLER.

(vi) A1-A15 20 Hz STEP VCO CONT **14**

This circuit is a feedback control circuit to improve the frequency stability and sweep linearity of the 11 to 11.55 MHz VCO mounted in the A1-A16 YTO PLL PD & LOOP FILTER.

Furthermore, the signal in this control circuit is supplied to the A3 IF LOG/DET and used when the frequency count function is selected or the frequency is calibrated.

(vii) A1-A16 YTO PLL PD & LOOP FILTER **15**

This circuit is composed of an amplifier for the A1-A10 SAMPLER output signal, 11 to 11.55 MHz VCO which can be changed in 20 Hz steps, a phase/frequency detector of the YTO PLL, and a loop filter of the YTO PLL. The amplified output signal from the A1-A10 SAMPLER is compared to the 11 to 11.55 MHz VCO output signal by the phase/frequency detector.

The comparison result passes through the loop filter and is supplied to the A6 SCAN YTO DRIVER and finally controls Z1 YTO.

(viii) A1- 2.5 GHz CAVITY OSC

This is a 2.5 GHz oscillator used as the 2nd Local oscillator.

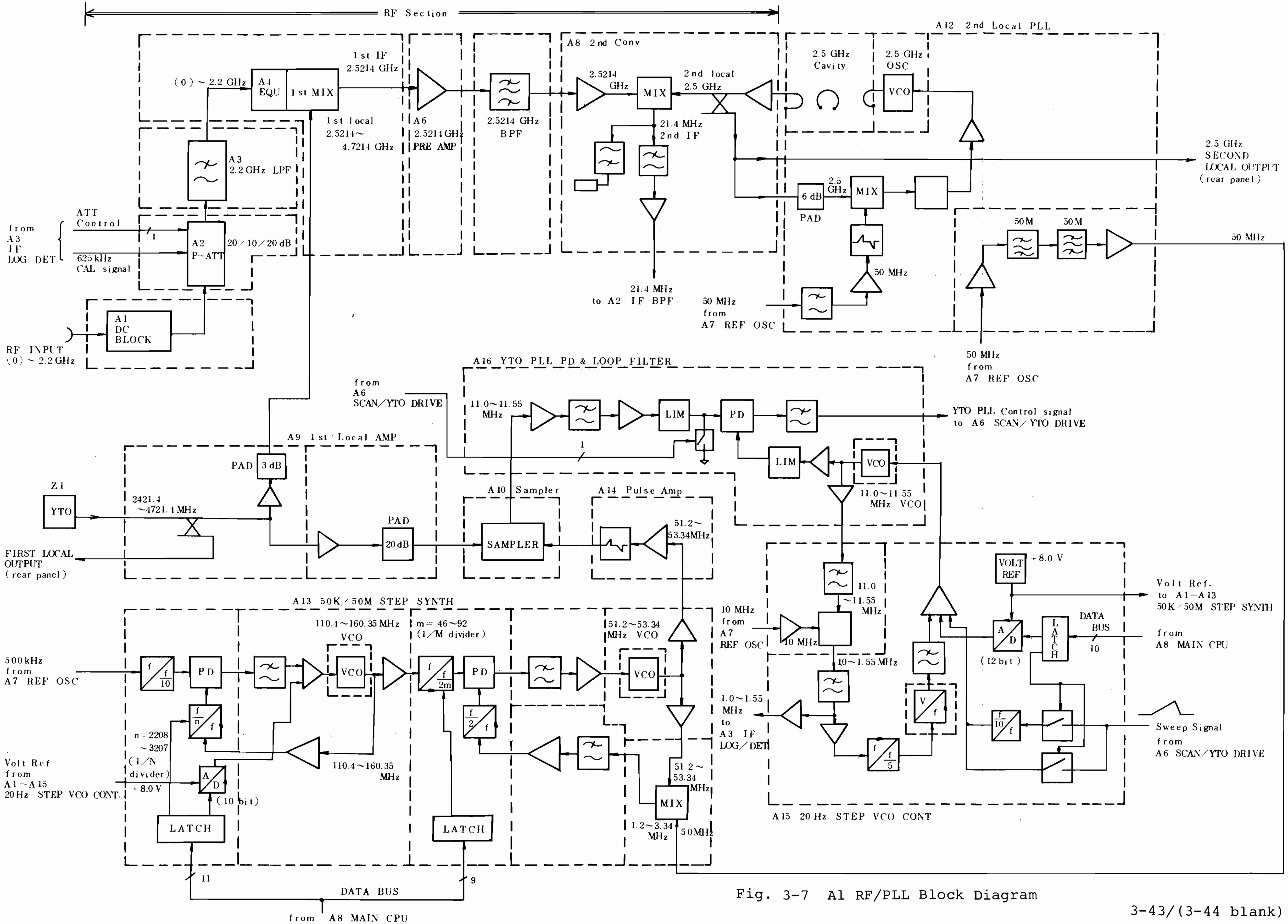


Fig. 3-7 A1 RF/PLL Block Diagram

(2) Symptom and cause

Symptom		Cause	Unit to be checked
(RF section)			
1. Inferior frequency response	(a)	Defective input ATT	A1-A2 P-ATT
	(b)	Defective 1st MIX	A1-A4 EQU/1st MIX
2. Signal level is low	(a)	Defective IF amplifier	A1-A6 2.5214 GHz Pre Amp A1-A8 2nd CONV
	(b)	1st BPF tuning slippage	A1- 2.5214 GHz BPF
(PLL section [Local section])			
1. Frequency drifts more than 10 MHz	(a)	YTO PLL is unlocked	A1-A16 YTO PLL PD & LOOP FILTER
	(b)	Output signal of the A1-A10 SAMPLER is faulty	A1-A10 SAMPLER
2. Frequency drifts less than 10 MHz	(a)	50 kHz STEP SYNTH is unlocked	A1-A13 50 kHz/ 50 MHz STEP SYNTH
	(b)	50 MHz STEP SYNTH is unlocked	A1-A13 50 kHz/ 50 MHz STEP SYNTH
	(c)	11.0 to 11.55 MHz VCO output frequency is not correct	A1-A16 YTO PLL PD & LOOP FILTER A1-A15 20 Hz STEP VCO CONT
3. Does not sweep properly when the SPAN is set to 500 kHz or less	(a)	Sweep frequency width of the 11.0 to 11.55 MHz VCO output is not correct	A1-A16 YTO PLL PD & LOOP FILTER A1-A15 20 Hz STEP VCO CONT
4. Whole waveform swings from left to right and vice versa	(a)	2nd LOCAL PLL is unlocked	A1-A12 2nd LOCAL PLL
	(b)	YTO PLL is unlocked	A1-A16 YTO PLL PD & LOOP FILTER

(3) Troubleshooting

This paragraph first describes how to troubleshoot the RF section and then the PLL section (LOCAL section).

(a) RF section troubleshooting

(i) Required equipment

Digital voltmeter

Signal generator: MG649A

Spectrum analyzer: MS612A (with high-impedance probe)

(ii) Preparation

CAUTION

o For the MS2601J, connect the MB-009 impedance transformer to the RF output of the MG649A signal generator.

When connecting the impedance transformer, set the signal generator output level 6 dB higher than the setting for the MS2601A.

o Turn off the power before disassembly.

Step	Procedure
1	Remove the bottom cover (paragraph 2.2).
2	Remove the cover of the unit to be checked by referring to Fig. 2-6.

(iii) Troubleshooting

Check each part as shown below by referring to the level diagram in Fig. 3-8.

Step	Procedure
1	Apply the 100 MHz, -30 dBm signal to the RF INPUT.
2	Set the MS2601A/J as shown below. CENTER FREQ: 100 MHz SPAN: 0 kHz ATT: 0 dB
3	Check A1-A8 2nd CONV 8 as shown below (Fig. 3-16, 8).

Checkpoint	Normal condition
Terminal 7, 21.4 MHz OUT 1	-26 to -30 dBm (Use high-impedance probe.)
Terminal 2, +12 V 2	+11.5 to +12.5 V
SECOND LOCAL OUTPUT (rear panel) (Check 2nd LOCAL signal.)	-20 dBm or more, 2.5 GHz

(continued)

Step	Procedure
4	Check the 1st local signal as shown below. Check the output level from the FIRST LOCAL OUTPUT on the rear panel. . -10 dBm or more (2.6214 GHz)
5	Check A1-A6 2.5214 GHz PRE AMP 7 as shown below (Fig. 3-15, 7). . +12 V ❶ : +11.5 to +12.5 V.
6	Check A1-A2 P ATT 4 as shown below (Fig. 3-12, 4).

Check point	Normal condition
(I/O level) ❶, ❷	-30 dBm
(K1 to K4 control voltage) K1 ❸ K2 ❹ K3 ❺ K4 ❻	see tables below

Input switching	K1 ❸
RF	1
CAL	0

("0" during CAL)

ATT set value	K2 ❹	K3 ❺	K4 ❻
0 dB	0	0	0
10 dB	0	1	0
20 dB	1	0	0
30 dB	1	1	0
40 dB	1	0	1
50 dB	1	1	1

0: Indicates approx. 0 V
1: Indicates approx. -9 V

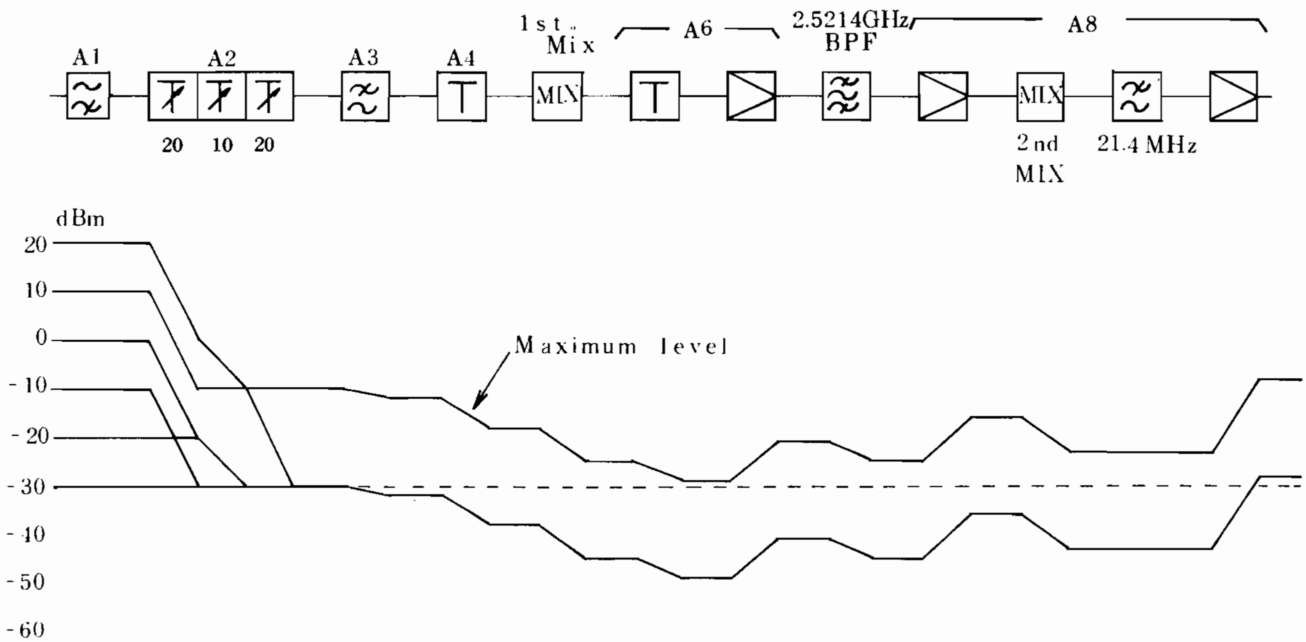


Fig. 3-8 (a) RF Section Level Diagram (MS2601A)

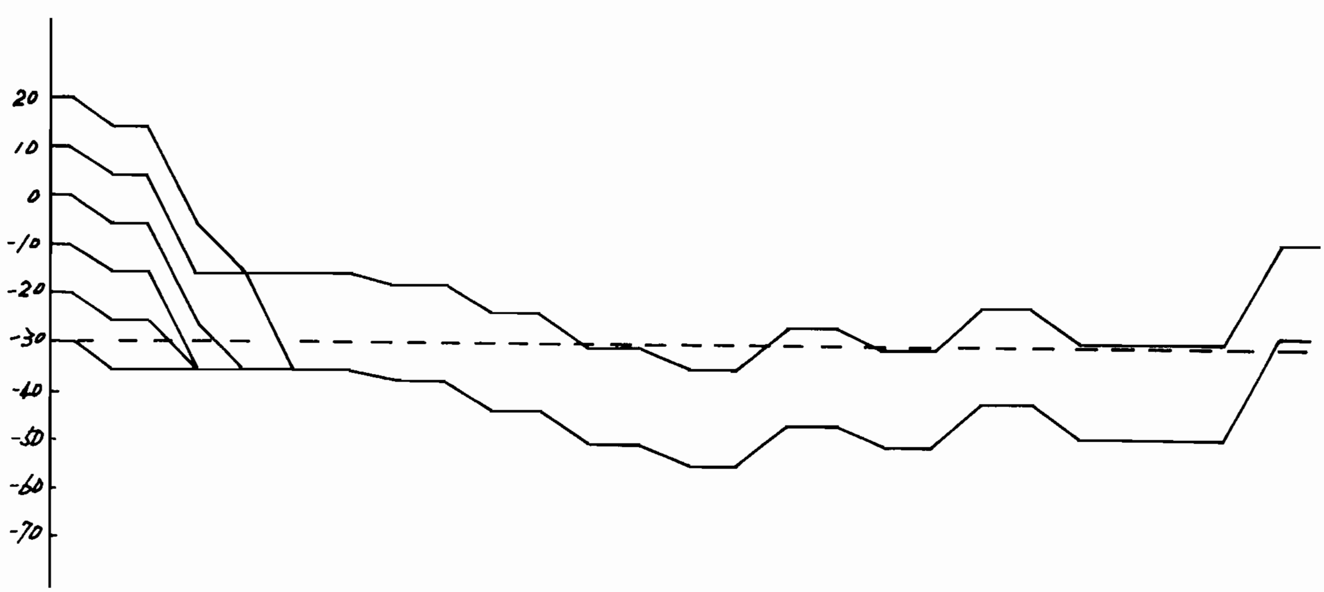


Fig. 3-8 (b) RF Section Level Diagram (MS2601J)

(b) PLL section (LOCAL section) troubleshooting

(i) Required equipment

Digital voltmeter

Frequency counter: MF76A

Oscilloscope

Spectrum analyzer: MS612A (with high-impedance probe)

(ii) Preparation

CAUTION

Turn off the power before disassembly

Step	Procedure
1	Remove the bottom cover (Paragraph 2.2).
2	Remove the cover of the unit to be checked by referring to Fig. 2-6.

(iii) Troubleshooting

The troubleshooting procedures for the following circuits are described below.

1. A1-A13 50 kHz/50 MHz STEP SYNTH
2. A1-A15 20 Hz STEP VCO CONT
3. A1-A16 YTO PLL PD & LOOP FILTER
4. A1-A12 2nd LOCAL PLL

a) A1-A13 50 kHz/50 MHz STEP SYNTH (Fig. 3-20, 12) troubleshooting

Step	Procedure
1	First check whether or not the Q10 and Q44 LEDs are on. If they are both off, the 50 kHz-step synthesizer and 50 MHz-step synthesizer are locking normally. If only the Q10 LED is on, the 50 kHz-step synthesizer is unlocked. If only the Q44 LED is on, the 50 MHz-step synthesizer is unlocked. When Q10 is on, check steps 2 to 5; when Q44 is on, check steps 6 to 8. Troubleshooting the 50 kHz-step synthesizer is described in steps 2 to 6.
------	50 kHz-step synthesizer troubleshooting -----
2	Check the following voltages.

Checkpoint	Normal condition
J9-13	+11.5 to +12.5 V
Terminal 1 2	-11.5 to -12.5 V
Q16-16 3	+4.75 to +5.25 V

(continued)

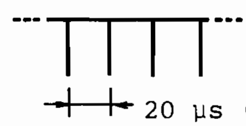
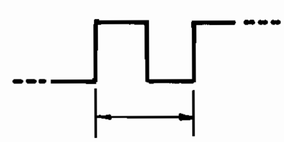
Step	Procedure
3	Check the J1 reference input (500 kHz). J1 ❹ 500 kHz TTL level
4	Check the linearity of the 110.4 to 160.35 MHz VCO using the following procedures. 1) First, connect the frequency counter to J2 ❺, then short-circuit between pins 2 and 3 of J6 ❻ with J5 (the synthesizer enters an unlocked condition). 2) Set the MS2601A/J as follows: START FREQ: 0 Hz SPAN: 0 Hz 3) Change the START FREQ setting, and check that the 110.4 to 160.35 MHz VCO output frequency (J2 ❺) changes according to the following table.

START FREQ Setting	TP3 voltage ❼	Frequency at J2 ❺
0 Hz	−4.5 V typ.	110.4 MHz ±1.0 MHz
49.95 MHz	+5 V typ.	160.35 MHz ±4.0 MHz

If the 110.4 to 160.35 MHz VCO output frequency is abnormal, readjust the linearity of the 110.4 to 160.35 MHz VCO (paragraph 3.3.4 (4) (iii)).

(continued)

Step	Procedure
5	Check the signal at each checkpoint according to the following table.

Checkpoint	Normal condition
TP1 8	 TTL level 20 μs Const. (50 kHz Const.)
TP2 9	110.4 to 160.35 MHz, 0.8 Vp-p typ., in 50 kHz steps
J2 5	110.4 to 160.35 MHz, -8 dBm typ., in 50 kHz steps
Q2-1 10	 TTL level 20 μs Const. (50 kHz Const.)
Q6-15 11	+8.0 ±0.1 V from A1-A15 20 Hz STEP VCO CONT

Notes:

1. The output frequency (J2 5) of the 50 kHz-step synthesizer changes in 50 kHz steps, which is equal to the 50 kHz step changes of the START or CENTER FREQ.

(continued)

Step	Procedure
5 (Cont.)	Notes: (cont.)

1. (cont.)

   Example

START FREQ (MHz)	50 kHz-step synthesizer output frequency (MHz)
X X00.00X XXX	110.400
X X00.05X XXX	110.450
X X00.10X XXX	110.500
⋮	⋮
X X49.95X XXX	160.350
X X50.00X XXX	110.400
X X50.05X XXX	110.450
⋮	⋮
X X99.95X XXX	160.350

2. The signal purity and spurious allowance of the 50 kHz-step synthesizer output are as follows:

   . Signal purity (observed by MS612A)

   $\leq$-65 dBc at ±2 kHz offset from output frequency (At RBW 100 Hz of the MS612A)

   $\leq$-75 dBc at ±10 kHz offset from output frequency (At RBW 100 Hz of the MS612A)

   . Spurious

   $\leq$-55 dBc at ±50 kHz offset from output frequency.

(continued)

Step	Procedure
6	Check the set value of the 1/N divider and D/A converter according to Table 3-10.

Table 3-10 1/N Divider and D/A Converter
Set Values from the A8 MAIN CPU

VCO oscillation frequency (MHz)	N	Set Value of D/A Converter (Q6)										Set Value of 1/N Divider (Q16, Q17, Q18, and Q19)											
		Q6 pin No.										Q19 pin No.			Q18 pin No.				Q17 pin No.	Q16 pin No.			
		4	5	6	7	8	9	10	11	12	13	10	1	15	9	10	1	15	15	9	10	1	15
110.40	2208	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
110.45	2209	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	1
110.50	2210	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	1	0
110.55	2211	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	1	1
110.60	2212	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	0	1	0	0
110.65	2213	0	0	0	0	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	1	0	1
110.70	2214	0	0	0	0	0	0	0	1	1	0	1	0	0	0	1	0	0	0	0	1	1	0
110.75	2215	0	0	0	0	0	0	0	1	1	1	1	0	0	0	1	0	0	0	0	1	1	1
110.80	2216	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0
⋮	⋮						⋮						⋮				⋮		⋮		⋮		
160.30	3206	1	1	1	1	1	0	0	1	1	0	1	1	0	0	0	1	1	0	0	1	1	0
160.35	3207	1	1	1	1	1	0	0	1	1	1	1	1	0	0	0	1	1	0	0	1	1	1

Note: TTL level (positive logic)

(continued)

Step	Procedure
	Troubleshooting the 50 MHz-step synthesizer in described below in steps 7 to 9.
-----	50 MHz-step synthesizer troubleshooting -----
7	Check the following voltages:

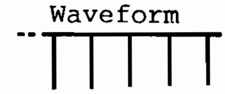
Checkpoint	Normal condition
Terminal (2) ⓯	+11.5 to +12.5 V
Terminal (3) ⓰	+11.5 to +12.5 V
Terminal (4) ⓱	-11.5 to -12.5 V
Terminal (7) ⓲	-11.5 to -12.5 V
Q35-16 ⓳	+4.75 to +5.25 V

Step	Procedure
8	Check the 1/2M divider output TP7 ㉒ signal, which is the Q38 frequency/phase detector reference input, according to Table 3-11. The TP7 signal frequency is (50 kHz-step synthesizer output frequency/2M).

Step	Procedure

8
(Cont.)

Table 3-11 Relationship between 2M Value and the TP7 Signal

START FREQ (MHz)	2M value	TP7 22 signal (MHz)		
0	96	1.15	(110.4 MHz/96)	Waveform
50	98	1.126530	(110.4 MHz/98)	
100	100	1.104	(110.4 MHz/100)	
150	102	1.082353	(110.4 MHz/102)	TTL level
⋮	⋮	⋮		
1000	136	0.811765	(110.4 MHz/136)	
⋮	⋮	⋮		
2200	184	0.6	(110.4 MHz/184)	
100.050	100	1.1045	(110.45 MHz/100)	
100.100	100	1.1050	(110.50 MHz/100)	
100.150	100	1.1055	(110.55 MHz/100)	
⋮	⋮	⋮		
149.900	100	1.6030	(160.30 MHz/100)	
149.950	100	1.6035	(160.35 MHz/100)	
150.000	102	1.082353	(110.4 MHz/102)	
150.050	102	1.082843	(110.45 MHz/102)	

When the TP7 22 signal is abnormal, an error occurs at the 1/2M divider which is composed of Q32, Q35, Q36, Q37, etc.

Check the 2M set value in accordance with Table 3-12.

Notes:

1. The 2M value increases from 96 to 184 for START FREQ setting of 0 to 2200 MHz, and changes in double steps for a 50 MHz change in the START FREQ setting.

(continued)

Step	Procedure
8 (Cont.)	Notes: (cont.)

2. The signal frequency at TP7 ㉒ can be calculated from the following equation.

50 kHz-step synthesizer output frequency/2M
(110.4 to 160.35 MHz)

Table 3-12 Set Value of the 1/2M Divider from the A8 MAIN CPU

START FREQ (MHz)	2M	Q37 Pin No. 15	Q36 Pin No. 9	10	1	15	Q35 Pin No. 9	10	1
0	96	0	1	0	0	0	0	1	1
50	98	0	1	0	0	0	1	0	0
100	100	0	1	0	0	1	0	0	0
150	102	0	1	0	0	1	0	0	1
200	104	0	1	0	0	1	0	1	0
250	106	0	1	0	0	1	0	1	1
300	108	0	1	0	0	1	1	0	0
350	110	0	1	0	1	0	0	0	0
400	112	0	1	0	1	0	0	0	1
450	114	0	1	0	1	0	0	1	0
500	116	0	1	0	1	0	0	1	1
550	118	0	1	0	1	0	1	0	0
600	120	0	1	0	1	1	0	0	0
2150	182	1	0	0	0	1	0	0	1
2200	184	1	0	0	0	1	0	1	0

Note:

TTL level (positive logic)

(continued)

Step	Procedure
9	Check the signal at each checkpoint in accordance with the following table.

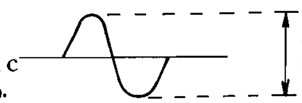
Checkpoint	Normal condition
TP8 24 J4 (output signal) 25	

Table 3-13 Relationship between START FREQ and 50 MHz-Step Synthesizer Output (J4) Frequency

START FREQ (MHz)	M	50 MHz-step synthesizer output (J4) frequency 25 (MHz)	
0	48	52.3	(50 MHz + 1.5 MHz x 2)
50	49	52.25306	(50 MHz + 1.126530 MHz x 2)
100	50	52.208	(50 MHz + 1.104 MHz x 2)
150	51	52.164706	(50 MHz + 1.082353 MHz x 2)
⋮	⋮	⋮	
1000	68	51.62353	(50 MHz + 0.811765 MHz x 2)
⋮	⋮	⋮	
2200	92	51.2	(50 MHz + 0.6 MHz x 2)
100.050	50	52.209	(50 MHz + 1.1045 MHz x 2)
100.100	50	52.21	(50 MHz + 1.1050 MHz x 2)
100.150	50	51.211	(50 MHz + 1.1055 MHz x 2)
⋮	⋮	⋮	
149.900	50	53.206	(50 MHz + 1.6030 MHz x 2)
149.950	50	53.207	(50 MHz + 1.6035 MHz x 2)
150.000	51	52.164706	(50 MHz + 1.082353 MHz x 2)
150.050	51	52.165686	(50 MHz + 1.082843 MHz x 2)

Note:

The 50 MHz-step synthesizer output frequency (J4) can be calculated from the following equation.

(50 kHz-step synthesizer output frequency/2M) x 2 + 50 MHz
= (50 kHz-step synthesizer output frequency/M) +50 MHz

b) A1-A15 20 Hz STEP VCO CONT troubleshooting (Fig. 3-22, 14)

Step	Procedure
1	Check the following voltages:

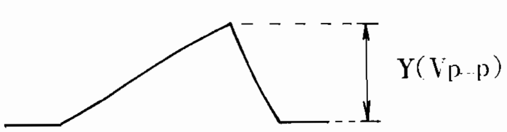
Checkpoint	Normal condition
Terminal ① ❶	-11.5 to -12.5 V
Terminal ② ❷	+11.5 to +12.5 V
Q8 ❸	+4.75 to +5.25 V

Step	Procedure
2	Check the signal at each checkpoint in accordance with the following table.

Checkpoint	Normal condition
TP1 ❺ (Reference voltage)	+8.00 ±0.05 Vdc
TP2 ❻	See table below

SPAN set value	Y (Vp-p)	Q7 (analog switch) pin No. 1	8	9
500 kHz	Approx. 8.0	1	0	1
50 kHz	Approx. 0.8	1	1	0
5 kHz	Approx. 0.08	1	1	0
≥501 kHz	Approx. 0.0	0	1	1

(TTL level, positive logic)



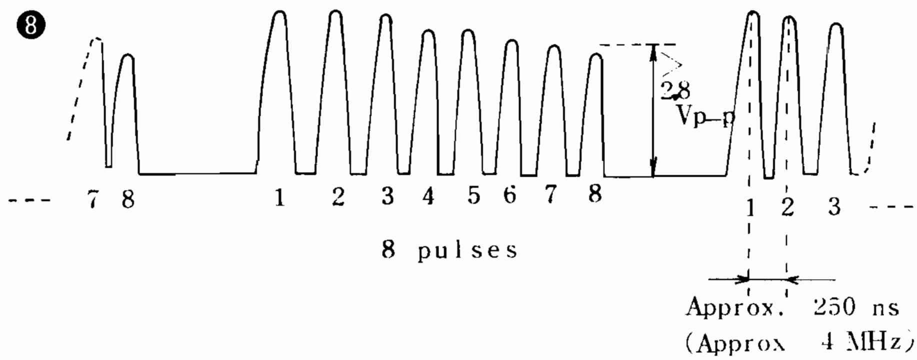
Sweep Voltage at SPAN 1 kHz to 500 kHz

(continued)

Step	Procedure

2 (Cont.)

(Cont.)

Checkpoint	Normal condition
TP6 ❼	TTL level 200 to 310 kHz
TP7 ❽	

3 Check the relationship between the TP4 ⓫ voltage and the 11.0 to 11.5 MHz VCO output frequency (A1-A16, J2 ❼) in accordance with the following table.

Condition	START FREQ (SPAN 0 Hz)	TP4 ⓫	J2 ❼ frequency in A1-A16
CORR D OFF	1.0 MHz	Approx. 0 V	11.0 MHz ±15 kHz
	1.049 980 MHz	Approx. 5.0 V	11.049 980 MHz ±15 kHz

If the above-mentioned frequency is abnormal, readjust the A1-A15 20 Hz STEP VCO CONT (paragraph 3.3.4 (4) (b) (ii)).

(continued)

Step	Procedure
3 (Cont.)	Note:

When CORR D ON at the normal condition of frequency control, the 20 Hz STEP VCO CONT compensates the 11.0 to 11.55 MHz VCO (in A1-A16 YTO PLL PD & LOOP FILTER) frequency error.

Frequency error, which is found during Maintenance use setting of CORR D OFF, is compensated to set the frequency to the specified value by the (+) or (-) compensation value.

Table 3-14 shows the relationship with the frequency setting.

The 11.0 to 11.5 MHz VCO frequency, which is controlled by this A1-A15 20 Hz STEP VCO CONT circuit, changes in 20 Hz steps, which is equal to the change in the START FREQ setting of 20 Hz, as shown below.

START FREQ at SPAN 0 Hz	11.0 to 11.5 MHz VCO output frequency
X XXX.X00 000 (MHz)	Approx. 11.000 000 (MHz)
X XXX.X00 020	Approx. 11.000 020
X XXX.X00 040	Approx. 11.000 040
X XXX.X00 060	Approx. 11.000 060
⋮	⋮
X XXX.X49 980	Approx. 11.049 980
X XXX.X50 000	Approx. 11.000 000

Where, the above-mentioned VCO frequency value occurs after frequency calibration.

Step	Procedure

3 (Cont.) Note: (cont.)

Table 3-14 Relationship with frequency Setting

Set frequency (kHz)		11.0 to 11.55 MHz VCO (A1-A16 J2 ❼, specified frequency value)	TP4 ⓫ typ. (V)	Q5 (D/A converter) pin No. (MSB) 4	5	6	7	8	9	10	11	12	13	14	(LSB) 15	
For (+) compensation (At CORR D ON)	+15.94		+6.5	1	1	1	1	1	1	1	1	1	1	1	1	
	+15.92		⋮	1	1	1	1	1	1	1	1	1	1	1	0	
	⋮		⋮						⋮							
	+0.04		⋮	1	1	0	0	1	1	1	0	0	1	0	0	
	+0.02		⋮	1	1	0	0	1	1	1	0	0	0	1	1	
Set frequency at CORR D OFF	49.98	11.04998	+5.0	1	1	0	0	1	1	1	0	0	0	1	0	
	49.96	11.04996	⋮	1	1	0	0	1	1	1	0	0	0	0	1	
	⋮	⋮	⋮						⋮							
	0.04	11.000040	⋮	0	0	1	1	0	0	1	0	0	0	0	0	0.08 kHz compensation
	0.02	11.000020		0	0	1	1	0	0	0	1	1	1	1	1	
	0.00	11.000000	0.0	0	0	1	1	0	0	0	1	1	1	1	0	
For (-) compensation (At CORR D ON)	-0.02		⋮	0	0	1	1	0	0	0	1	1	1	0	1	(See example
	-0.04		⋮	0	0	1	1	0	0	0	1	1	1	0	0	
	⋮		⋮						⋮							
	-15.94		⋮	0	0	0	0	0	0	0	0	0	0	0	1	
	-15.96		-1.5	0	0	0	0	0	0	0	0	0	0	0	0	

Note:
TTL level (positive logic)

Example:

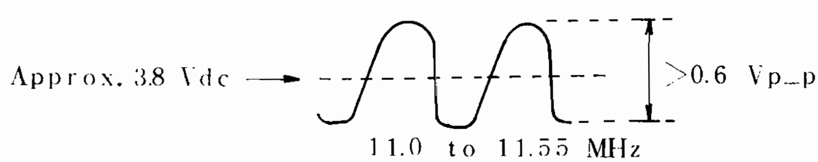
When the 11.0 to 11.55 VCO frequency is larger than the specified frequency by +0.08 kHz at START FREQ X XXX.X00 040 MHz (CORR D ON), the +0.08 kHz is compensated and the signal to Q5 becomes 0011 0001 1100 as shown in Table 3-14.

c) A1-A16 YTO PLL PD & LOOP FILTER (Fig. 3-23 , **15**)
troubleshooting

Step	Procedure
1	Check the following voltages:

Checkpoint	Normal condition
Terminal ④ ❶	+11.5 to +12.5 V
Terminal ⑤ ❷	-11.5 to -12.5 V
Q12-14 ❸	+4.75 to +5.25 V

Step	Procedure
2	Check the signal at each checkpoint in accordance with the following table.

Checkpoint	Normal condition
TP1 , TP2 ❹ ❺	
J2 (11.0 to 11.55 MHz VCO check terminal) ❼	-3 dBm typ. 11.0 to 11.55 MHz
Terminal ⑦ (to A1-A15 20 Hz STEP VCO CONT) ❽	+4 dBm typ. 11.0 to 11.55 MHz
TP3 (to A6 SCAN/YTO DRIVE) ❾	+8 to -10 V Change the START FREQ in 50 MHz steps from 0 Hz to 2200 MHz to check.

If the TP1 ❹ signal is abnormal, check the following:

TP4 ❿	>-50 dBm at 50 ohm termination, 11.0 to 11.55 MHz

If this TP4 ❿ signal is abnormal, the A1-A10 sampler output may not be output normally. Therefore, check the A1-A14 PULSE AMP and A1-A9 1st LOCAL AMP.

If TP3 ❾ voltage is abnormal, check A6 SCAN/YTO DRIVE.

d) A1-A12 2nd LOCAL PLL (Fig. 3-19, 11) troubleshooting

Step	Procedure
1	Check the following voltages:

Checkpoint	Normal condition
Terminal 9 ❶	+11.5 to +12.5 V
Terminal 10 ❷	-11.5 to -12.5 V

Step	Procedure
2	Check the signal at each checkpoint in accordance with the following table.

Checkpoint	Normal condition
Terminal 1 (Sampling signal from A7 REF OSC) ❸	>+3 dBm 50 MHz
Terminal 3 (2.5 GHz cavity OSC control signal) ❺	+3.0 V typ.
Terminal 5 ❼	-11.4 V typ.
Terminal 6 ❽	+8.0 V typ.

If Terminal 1 ❸ is abnormal, check the A7 REF OSC.

If terminal 3 ❺ is abnormal, check the sampler output and Search OSC output shown in the following table.

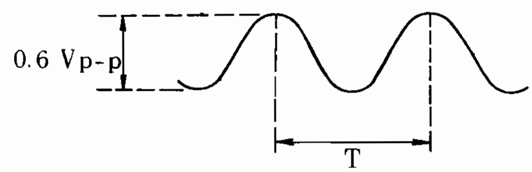
Step	Procedure
2 (Cont.)	

Checkpoint	Normal condition

Check the following with J1 removed from J2 ⑩ (PLL off).

(a) Sampler

TP1 (Sampler output) ⑨

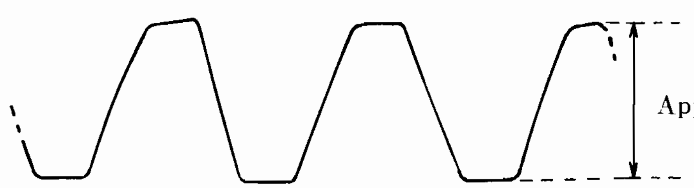


$$\left(\frac{1}{T}\right) = 2500\ \text{MHz} - \left(\begin{array}{l}\text{2.5 GHz Cavity OSC} \\ \text{output frequency}\end{array}\right)$$

$$\lesssim 300\ \text{kHz}$$

(b) Search OSC

Q9-7 pin ⑪
(Search OSC output)



- Frequency Approx. 10Hz
- Duty factor Approx. 50%

If the above-mentioned signals are abnormal, readjust the A1-A12 2nd LOCAL PLL (paragraph 3.3.4 (4) (iv)).

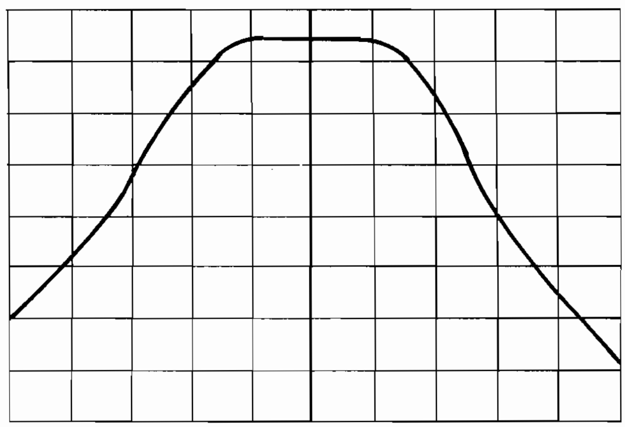
(4) A1 RF/PLL BLOCK Adjustment

The following paragraph first describes how to adjust the RF section and then the PLL section (LOCAL section)

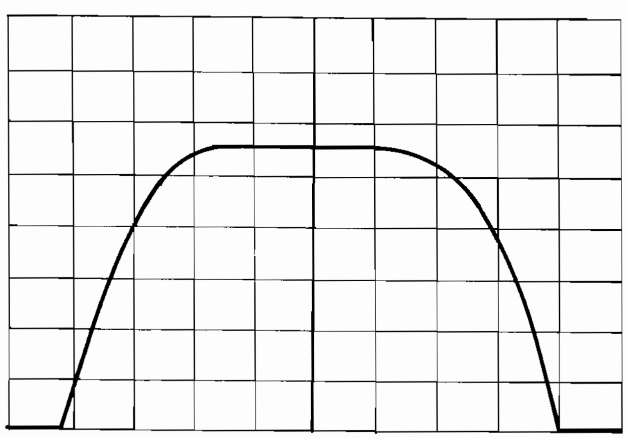
(a) RF section adjustment

(i) 2.5214 GHz BPF adjustment

Step	Procedure
1	Remove the A2 IF BPF by referring to paragraph 2.4.
2	Solder the extender cable to Terminal 7 (21.4 MHz OUT) ❶ in A1-A8 2nd CONV and connect the other end of the extender cable to the MS612A Spectrum Analyzer.
3	Set the MS2601A/J as shown below. CENTER FREQ: 100 MHz SPAN: 20 MHz ATT: 0 dB
4	Input a 100 MHz, -30 dBm signal to the RF INPUT.
5	Adjust the four trimmers ❶ (Fig. 2-6) so that the characteristic shown in Fig. 3-9 is obtained.
6	Adjust the A1-A8 2nd CONV R11 ❸ so that the output level at 21.4 MHz OUT ❶ is -28 ±1 dBm.

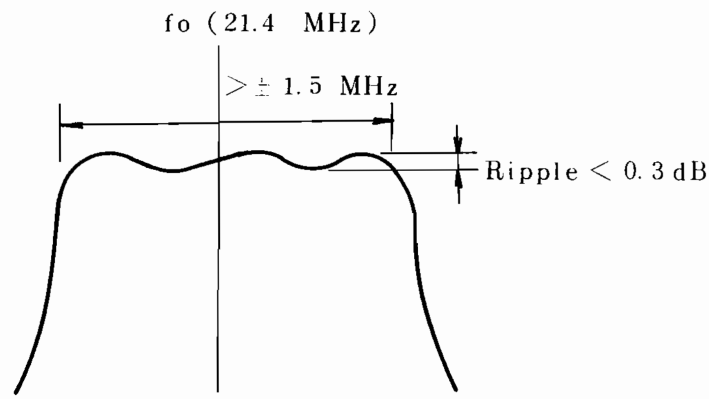


(1) Total Pass-band/Attenuation



(2) Pass Band

Fig. 3-9 2.5214 GHz BPF Characteristics



(3) Pass Band Required Characteristic

Fig. 3-9 2.5214 GHz BPF Characteristics (Cont.)

(b) PLL section adjustment

(i) A1-A16 YTO PLL PD & LOOP FILTER adjustment

Adjust the 11.0 to 11.55 MHz VCO as shown below.

Step	Procedure
1	Connect the dc voltage standard to Terminal ③ ⓫. (Remove the control line connected to Terminal ③ from A1-A15 unit.)
2	Change the output voltage of the dc voltage standard as shown below and adjust the VCO oscillation frequency (J2 ❼) for each voltage by C39 ⓬, L1 ⓭ and L2 ⓮.

DC voltage standard output voltage (terminal ③ ⓫)	VCO oscillation frequency (J2 ❼)
0 V	11.00 MHz ±10 kHz
+5 V	11.50 MHz ±10 kHz

C39 ⓬ .... 11.50 MHz adjustment
L1 ⓭, L2 ⓮ ... 11.00 MHz adjustment

(ii) A1-A15 20 Hz STEP VCO CONT adjustment

Before making this adjustment, the A6 SCAN GENERATOR adjustment (paragraph 3.3.8 (4)(a)) and the 11.0 to 11.55 MHz VCO adjustment (paragraph 3.3.4 (4)(b)(i)) above in the A1-A16 YTO PLL PD & LOOP FILTER must be completed.

Step	Procedure
1	Connect a digital voltmeter to TP1 ❺ and adjust R7 ⓭ to make the voltage to +8.00 ±0.01 V.
2	Rough-adjust the VCO tuning voltage supply circuit as shown below. 1) Connect pin 2 to pin 3 of J5 ⓮ with J4. 2) Adjust R19 ⓰ so that the voltage difference at TP4 ⓫ is approx. 5.0 V between CENTER FREQ 1.00 MHz/SPAN 0 Hz and CENTER FREQ 1.049 980 MHz/SPAN 0 Hz. 3) Set the CENTER FREQ to 1.00 MHz and SPAN to 0 Hz again and adjust R13 ⓱ so that the TP4 ⓫ voltage is 0.0 ±0.01 V. Afterwards, adjust R31 ⓲ so that the 11.0 to 11.55 MHz VCO frequency (A1-A16 J2 ❼) in the A1-A16 YTO PLL PD & LOOP FILTER is 11.0 MHz ±100 Hz.

(continued)

Step	Procedure
3	Adjust the compensation circuit linearity as shown below. 1) Connect pin 1 to pin 2 of J5 ⓮ with J4. 2) Set the START FREQ to 1 MHz and SPAN to 500 kHz. Input a signal to the RF INPUT. Display the spectrum on the CRT and adjust the linearity using the following procedures. a) Input a 1.05 MHz signal to RF INPUT and read the signal frequency displayed on the CRT. b) Input a 1.45 MHz signal to RF INPUT and read the signal frequency displayed on the CRT. c) Adjust L7 ⓳ so that the frequency difference b) - a) is 400 kHz ±400 Hz.
4	Finally, adjust the VCO tuning voltage supply circuit as shown below. 1) Set the START FREQ to 1 MHz and SPAN to 0 Hz, and adjust R31 ⓲ so that the 11.0 to 11.55 MHz VCO frequency (A1-A16, J2 ❼) is 11.0 MHz ±100 Hz. 2) Set the START FREQ to 1.049 980 MHz and SPAN to 0 Hz, and adjust R19 ⓰ so that the 11.0 to 11.55 MHz VCO frequency is 11.049 980 MHz ±100 Hz at this time.

(iii) A1-A13 50 kHz/50 MHz STEP SYNTH adjustment

Before making this adjustment, the A7 REF OSC (paragraph 3.3.9) and A1-A15 20 Hz STEP VCO CONT adjustment (paragraph 3.3.4 (4)(b)(ii)) must be completed.

Step	Procedure
------	50 kHz STEP SYNTH adjustment -----
1	Connect pin 2 to pin 3 of J6 ❻ with J5.
2	Set the START FREQ to 49.95 MHz and adjust R30 ㉘ so that +5.0 V is obtained at TP3 ❼ . Then, set the START FREQ to 0 MHz and check that approx. -4.5 V is obtained at TP3 ❼ .
3	Adjust the 110.4 to 160.35 MHz VCO as shown below. 1) Set the START FREQ to 0 MHz. 2) Adjust L5 ㉙ so that the VCO frequency (J2 ❺) is 110.4 ±0.1 MHz. 3) Set the START FREQ to 49.95 MHz. 4) Check that the VCO frequency is 160.35 ±4 MHz.
-----	50 MHz STEP SYNTH adjustment -----
4	Adjust the 51.2 to 53.34 MHz VCO as shown below. 1) Remove J7 connected between pins 1 and 2 of J8 ㉚ and connect a dc voltage standard to TP19 ㉗ . 2) Connect the digital voltmeter to TP18 ㉛ and adjust the dc voltage standard so that the TP18 ㉛ voltage is as follows. Adjust C82 ㉜ and L11 ㉝ so that the VCO frequency (J4 ㉕) for the TP18 ㉛ voltage is as follows.

(continued)

Step	Procedure
4 (Cont.)	

Voltage TP18 31	VCO frequency (J4 25)
0 V	51.2 $^{+0}_{-0.1}$ MHz
-5 V	53.34 ±0.1 MHz

C82 32 .... 53.34 MHz adjustment

L11 32 .... 51.2 MHz adjustment

(iv) A1-A12 2nd LOCAL PLL adjustment

Step	Procedure
1	Remove J1 from J2 10 .
2	Connect an oscilloscope to Q9-pin 7 11 .
3	Adjust R20 13 so that the duty factor of the search OSC waveform at 11 is approx. 50%.
4	Connect an oscilloscope to TP5 9 .
5	Turn the 2.6 GHz Cavity OSC trimmer (Fig. 3-10 1) to set the 2.5 GHz cavity OSC frequency (rear panel SECOND LOCAL OUTPUT) to 2500 MHz ±100 kHz.
6	Adjust R21 12 so that the TP5 9 beat voltage is 0.7 Vp-p.
7	Connect J1 to J2 10 .
8	Connect an oscilloscope to Q9-pin 7 11 .
9	Adjust the 2.5 GHz Cavity OSC trimmer (Fig. 3-10 1) so that the Q9-pin 7 11 voltage is approx. 0 Vdc.

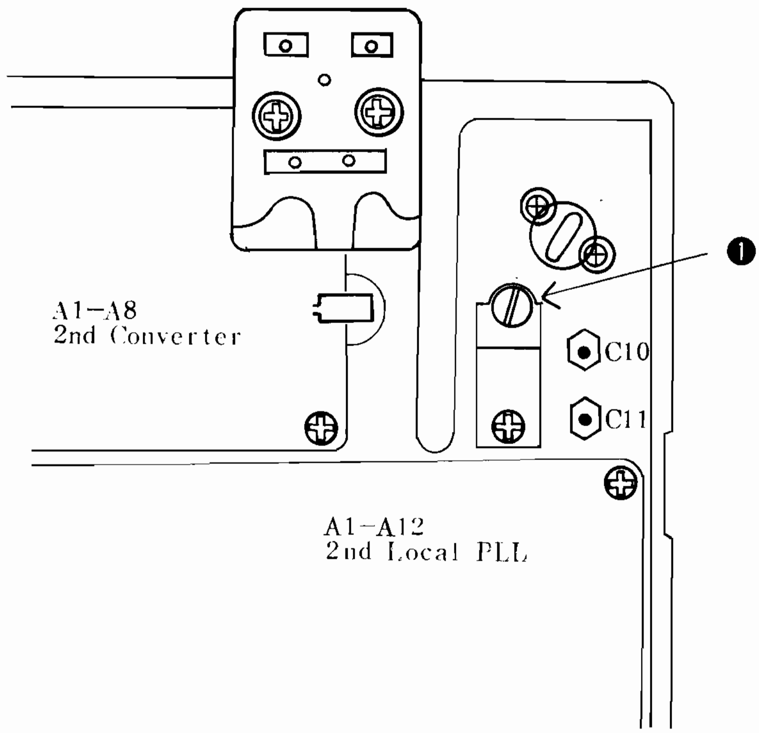
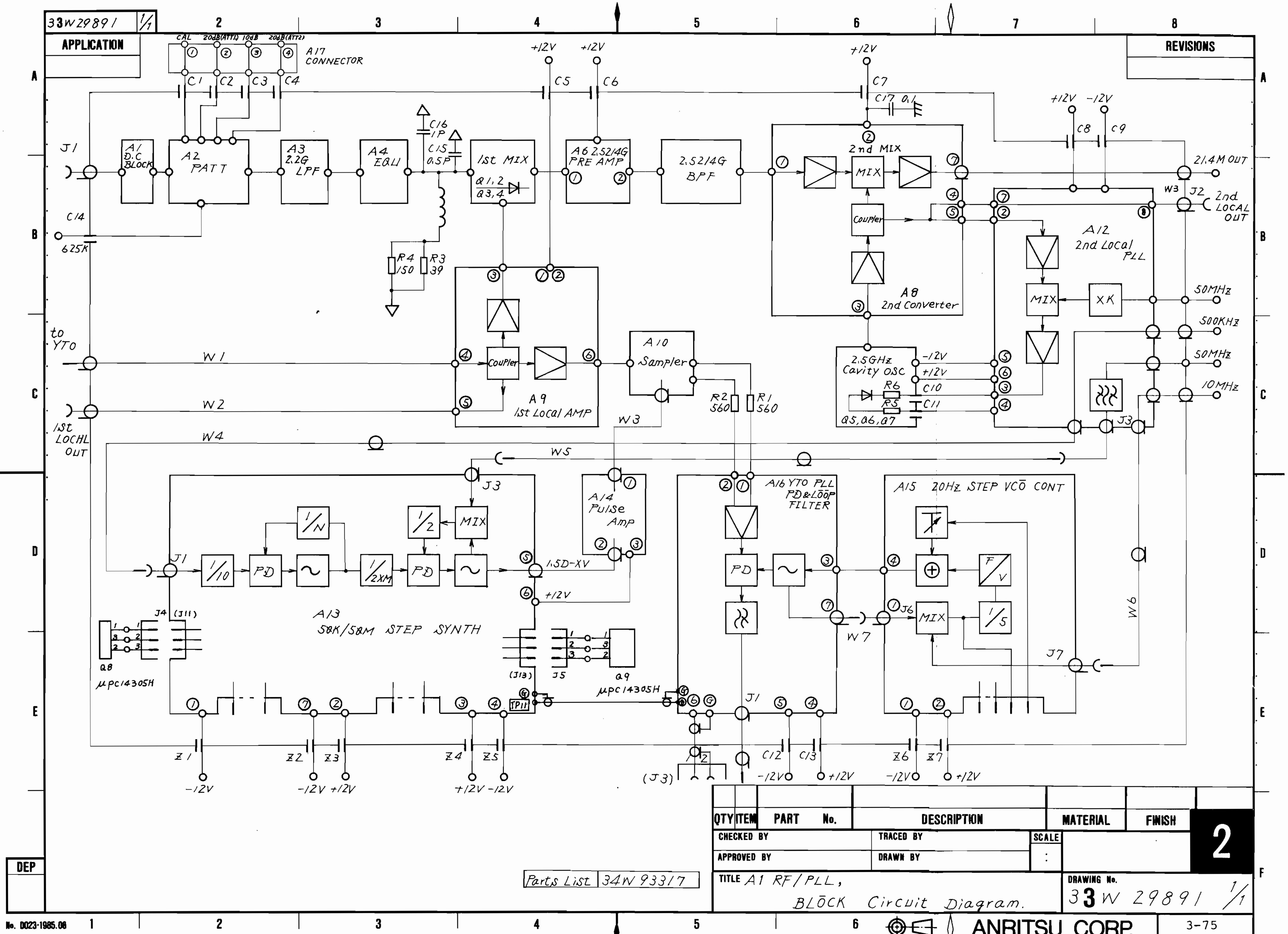


Fig. 3-10 2.5 GHz Cavity OSC



33W29891 1/1
APPLICATION
REVISIONS
CAL 20dB(ATT1) 10dB 20dB(ATT2)
A17 CONNECTOR
C1 C2 C3 C4 C5 C6 C7
+12V
C17 0.1
+12V -12V
C8 C9
J1
A1 D.C BLOCK
A2 PATT
A3 2.2G LPF
A4 EQU
C16 1P
C15 0.5P
1st MIX
Q1,2 Q3,4
A6 2.52/4G PRE AMP
2.52/4G BPF
2nd MIX
MIX
Coupler
A8 2nd Converter
21.4M OUT
W3 J2 2nd LOCAL OUT
A12 2nd Local PLL
C14 625K
R4 150 R3 39
A9 1st Local AMP
A10 Sampler
2.5GHz Cavity osc
R6 R5 C10 C11
Q5,Q6,Q7
-12V +12V
50MHz
500KHz
50MHz
10MHz
XK
to YTO
W1
W2
1st LOCAL OUT
W4
W5
R2 560 R1 560
J3
A14 Pulse Amp
A16 YTO PLL PD&LOOP FILTER
A15 20Hz STEP VCO CONT
1/N
1/2
1/10
PD
1/2XM
1.5D-XV
+12V
A13 50K/50M STEP SYNTH
J4 (J11)
Q8 μPC14305H
(J13) J5
Q9 μPC14305H
TP11
F/V
1/5
W7
J6
J7
W6
Z1 Z2 Z3 Z4 Z5
C12 C13
Z6 Z7
-12V -12V +12V +12V -12V
(J3)
Parts List 34W93317
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CHECKED BY TRACED BY SCALE
APPROVED BY DRAWN BY
TITLE A1 RF/PLL, BLOCK Circuit Diagram.
DRAWING No. 33W 29891 1/1
2
DEP
No. D023-1985.06
ANRITSU CORP.
3-75

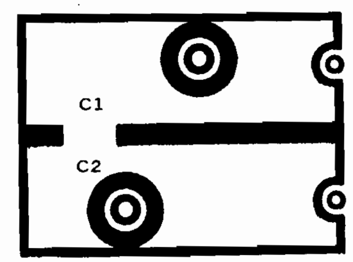

Fig. 3-11 (a) A1-A1 Dc Block PC Board Parts Layout (MS2601A) 3

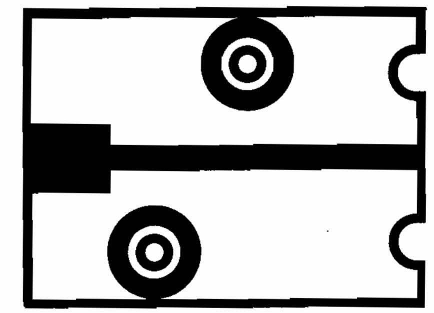

Fig. 3-11 (b) A1-A1 Dc Block PC Board Parts Layout (MS2601A OPT 05) 3

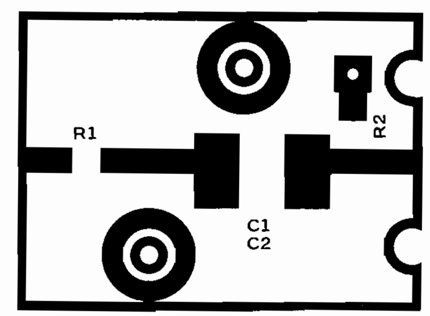

Fig. 3-11 (c) A1-A1 Dc Block PC Board Parts Layout (MS2601J) 3

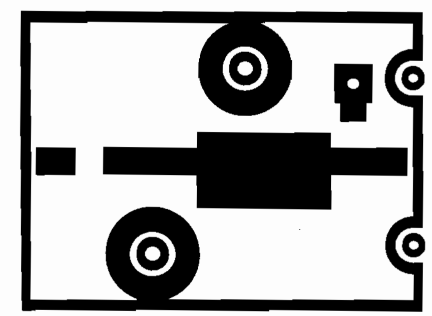

Fig. 3-11 (d) A1-A1 Dc Block PC Board Parts Layout (MS2601J OPT 05) 3

34W 93340 1/1

APPLICATION

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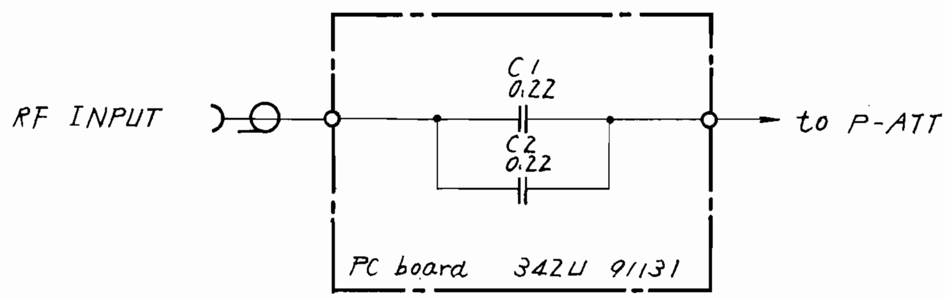

Parts List	34W 93328

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APPROVED BY	DRAWN BY	:

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TITLE A1-A1, DC BLOCK Circuit Diagram (MS2601A)

DRAWING No. 34W 93340 1/1

No. D025-1985.08

ANRITSU CORP.

34W95707 /

APPLICATION

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A

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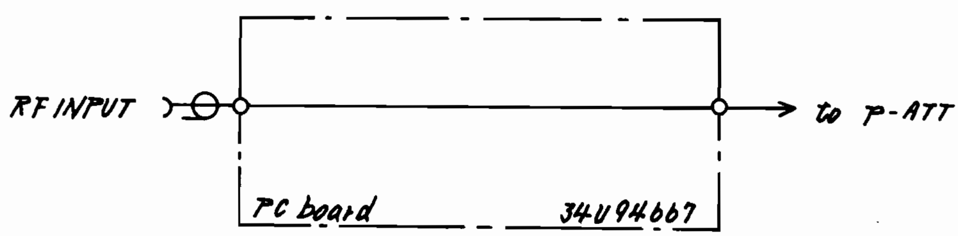

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D

E

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH	3

CHECKED BY	TRACED BY	SCALE	
APPROVED BY	DRAWN BY	:	

DEP

TITLE A1-A1,
DC BLOCK Circuit Diagram (MS2601A OPT05)

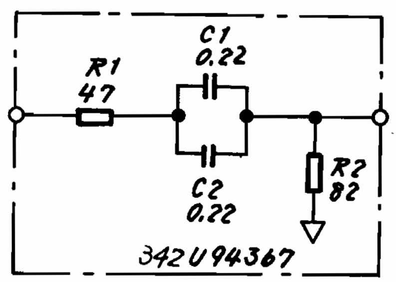
DRAWING No. 34W95707 /

ANRITSU CORP.

34W94375 1/1

APPLICATION
34W94374

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY	TRACED BY	SCALE
APPROVED BY	DRAWN BY	:

3

DEP

TITLE A1-A1, DC BLOCK Circuit Diagram (MS2601J)

DRAWING No. 34W 94375 1/1

No. 0025·1985.08

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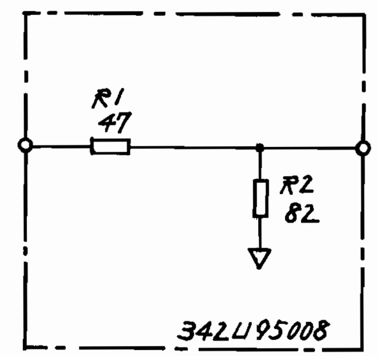
34W96454 1/1

APPLICATION

REVISIONS



Parts List	34W96455

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY M. Takano	TRACED BY	SCALE
APPROVED BY H. Itoya	DRAWN BY K. Amamoto	:

3

DEP

TITLE A1-A1, DC BLOCK Circuit Diagram. (MS2601J OPT 05)

DRAWING No. 34W 96454 1/1

No. 0025·1985.08

ANRITSU CORP.

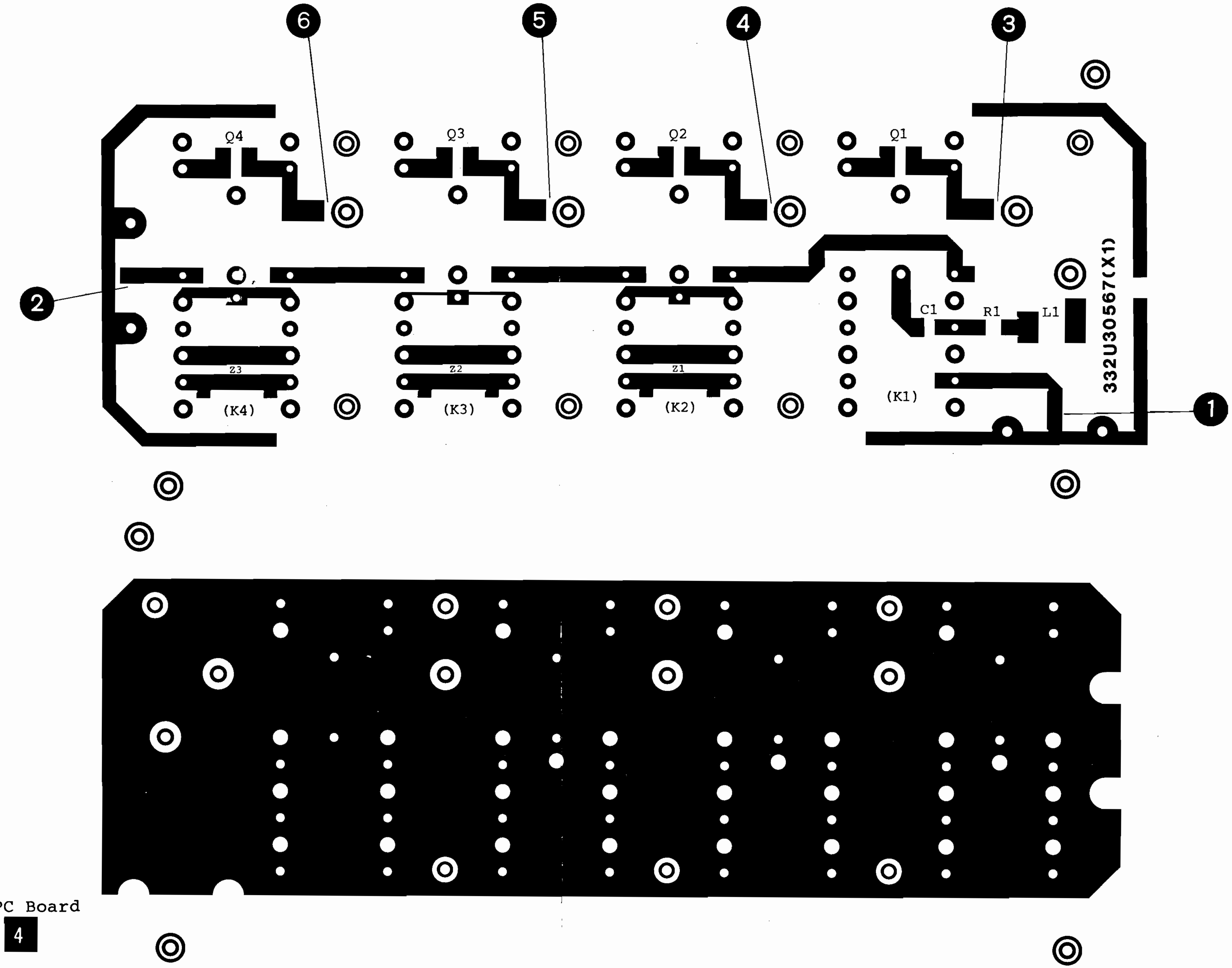


Fig. 3-12 A1-A2 P-ATT PC Board
Parts Layout 4

33 W 29902 1/1

APPLICATION

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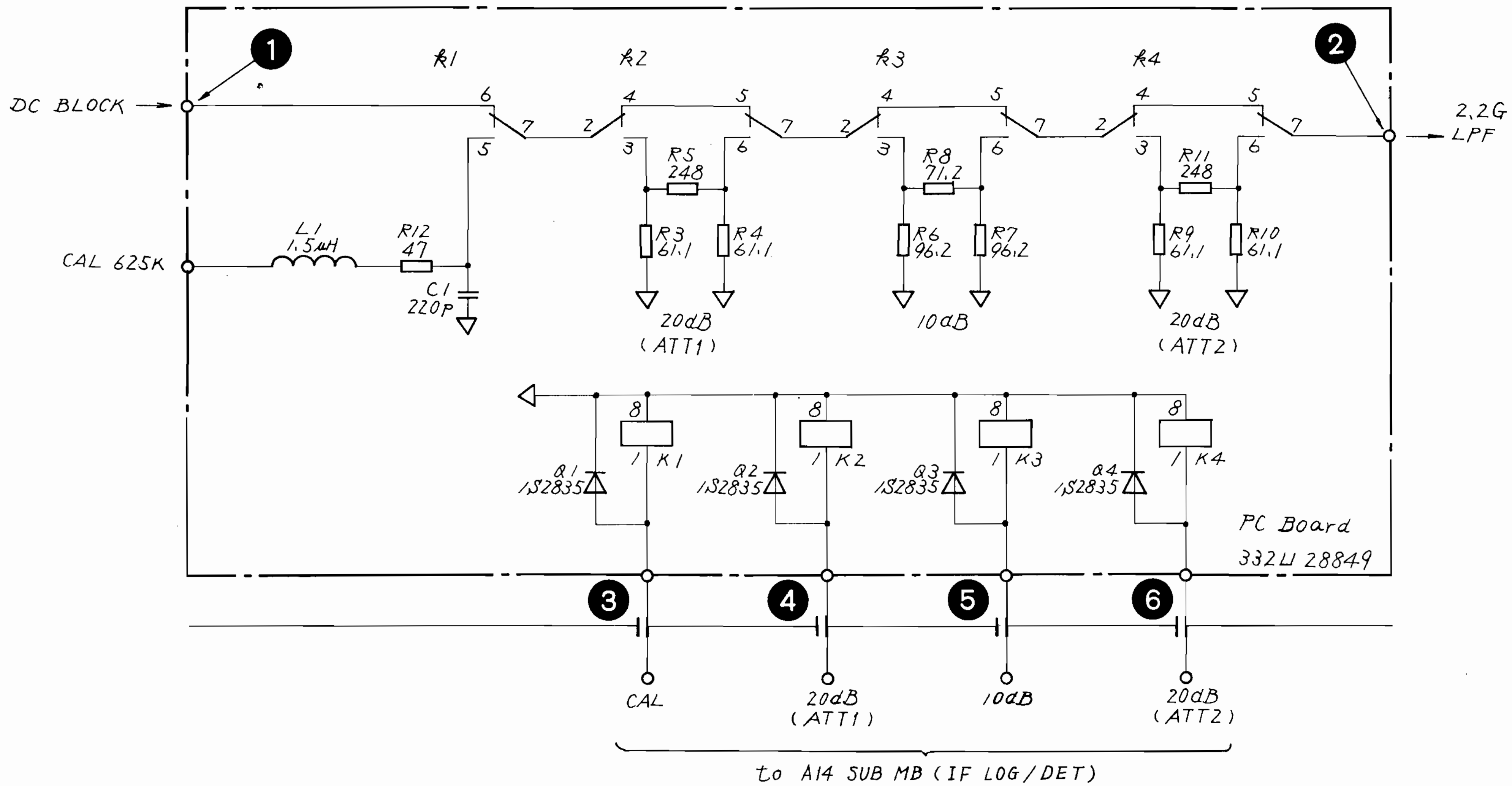

Parts List 34W96386

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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APPROVED BY | DRAWN BY

TITLE A1-A2, P-ATT Circuit Diagram.

DRAWING No. 33 W 29902 1/1

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No. D023-1985.08

ANRITSU CORP.

3-81

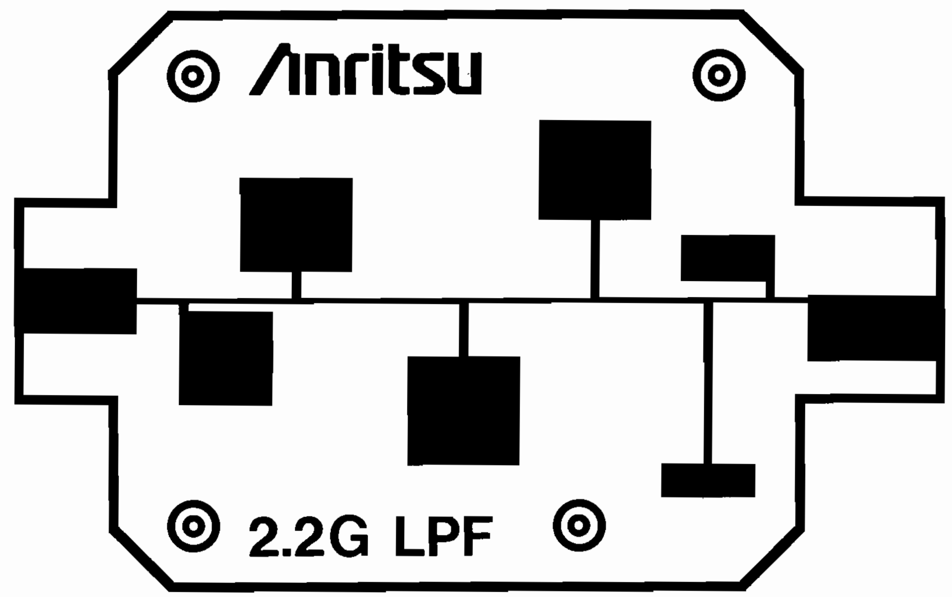

Fig. 3-13 A1-A3 2.2 G LPF
PC Board Layout 5

4	/

APPLICATION

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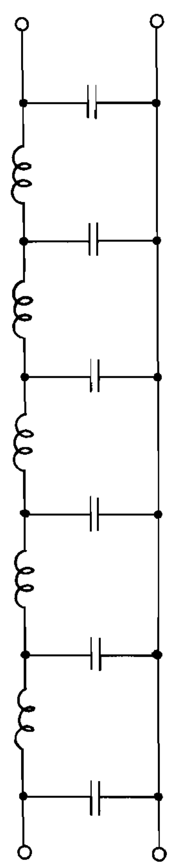


PC Board : 34U95036

Parts List : ______

Note : All parts are composed of a printed circuit board.

5					
QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

DEP				
	CHECKED BY	TRACED BY	SCALE	
	APPROVED BY	DRAWN BY	:	
	TITLE A1—A3, 2.2G LPF Circuit Diagram.			DRAWING No. 4 /

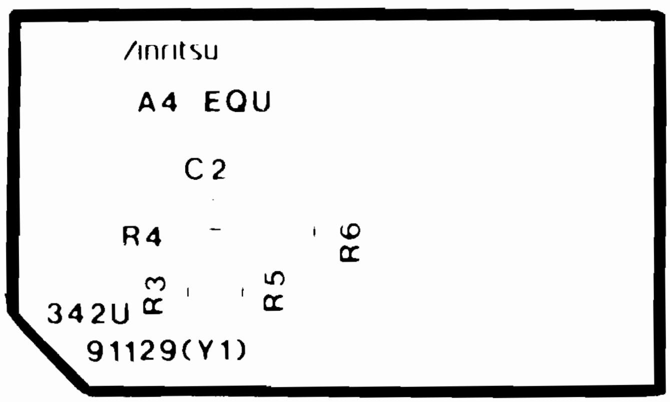
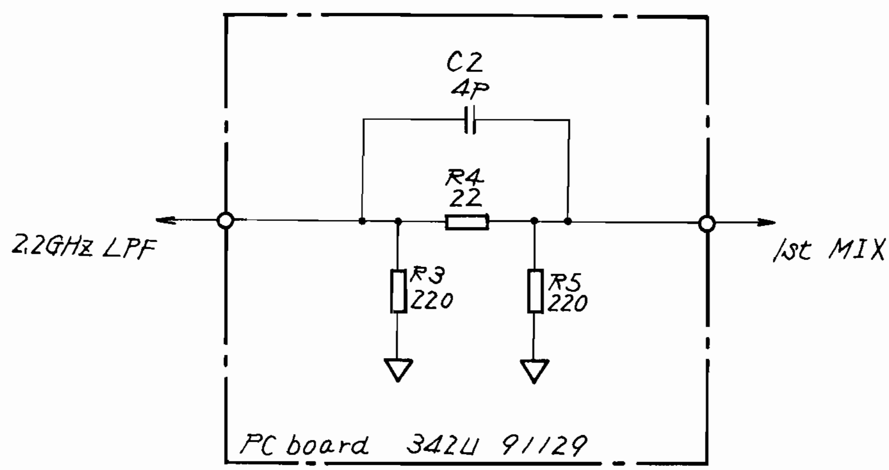


Fig. 3-14 A1-A4 EQU PC Board Parts Layout 6

34W93341 1/1

APPLICATION

REVISIONS



Parts List	34W93330

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CHECKED BY	TRACED BY	SCALE		6
APPROVED BY	DRAWN BY	:		

DEP	TITLE A1–A4, EQU Circuit Diagram.	DRAWING No. 34W93341 1/1

No. D025-1985.08

ANRITSU CORP.

3-85

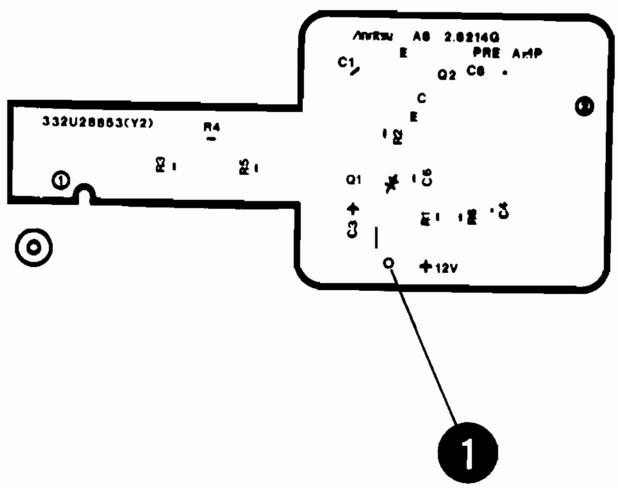
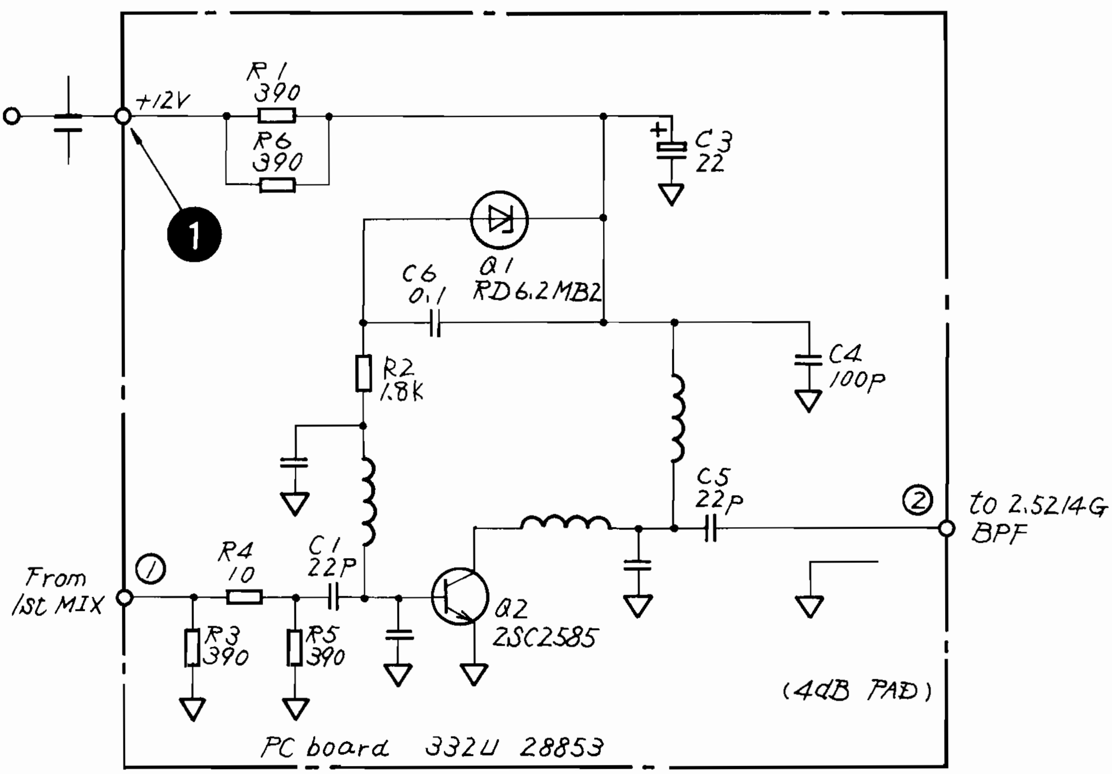


Fig. 3-15 A1-A6 2.5214 GHz PRE AMP
PC Board Parts Layout 7

34W 93342 1/1

APPLICATION

REVISIONS



Parts List	34W 93331

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :

APPROVED BY | DRAWN BY

DEP

TITLE A1–A6,
2.5214 GHz PRE AMP Circuit Diagram.

DRAWING No. 34W 93342 1/1

7

No. 0025-1985.08

ANRITSU CORP.

3-87

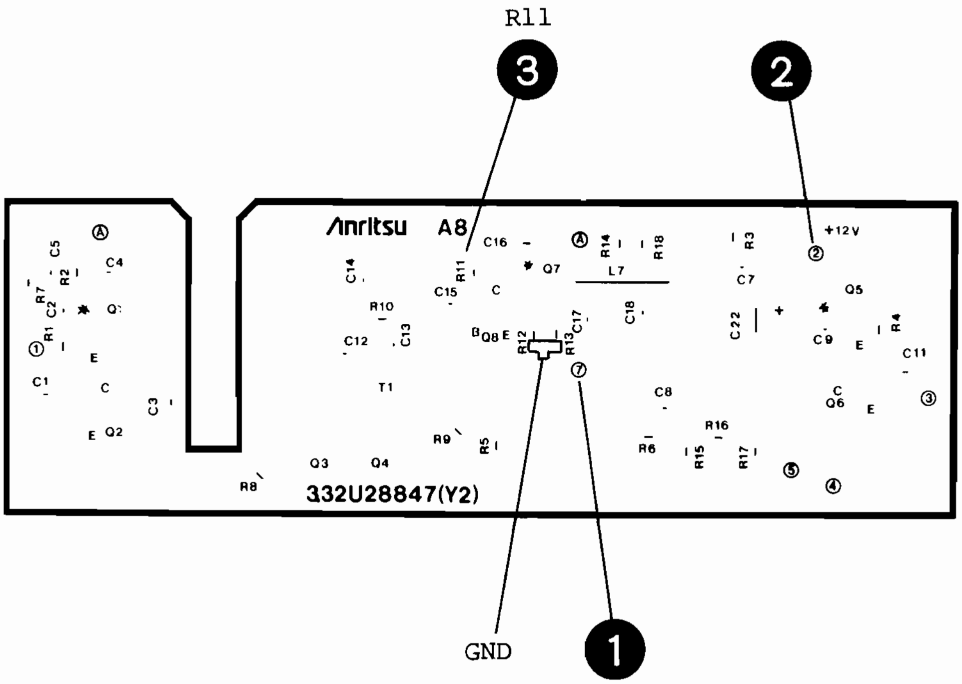
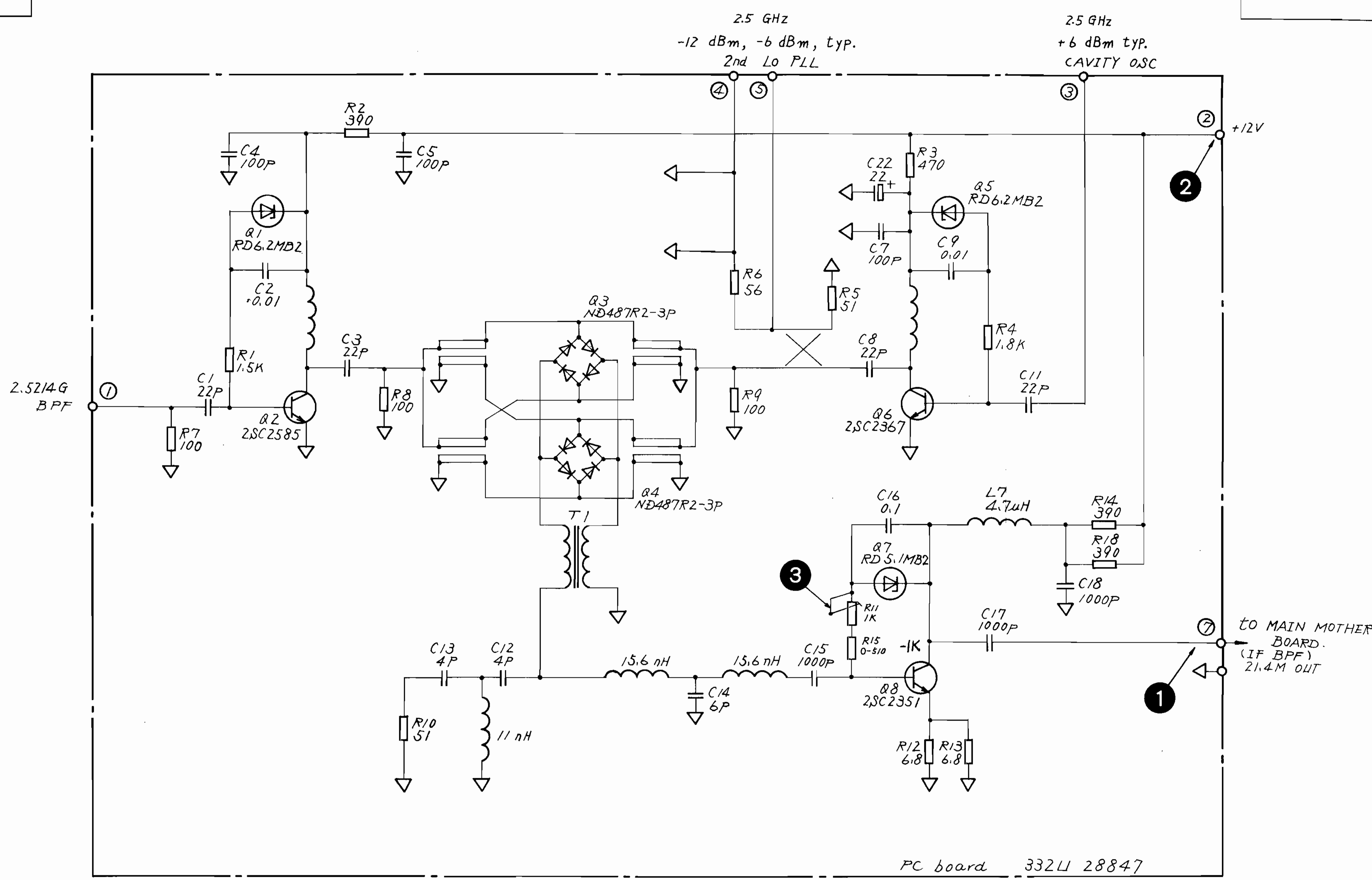


Fig. 3-16 A1-A8 2nd CONV PC Board
Parts Layout 8



R11 { 500 Ω (MS2601A) / 1K Ω (MS2601J) }

Parts List	34W 93332

33W 29903 1/1

APPLICATION

REVISIONS

DEP

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :
APPROVED BY | DRAWN BY

TITLE A1-A8, 2ND CONV Circuit Diagram.

DRAWING No. 33W 29903 1/1

8

ANRITSU CORP. 3-89

No. D023-1985.08

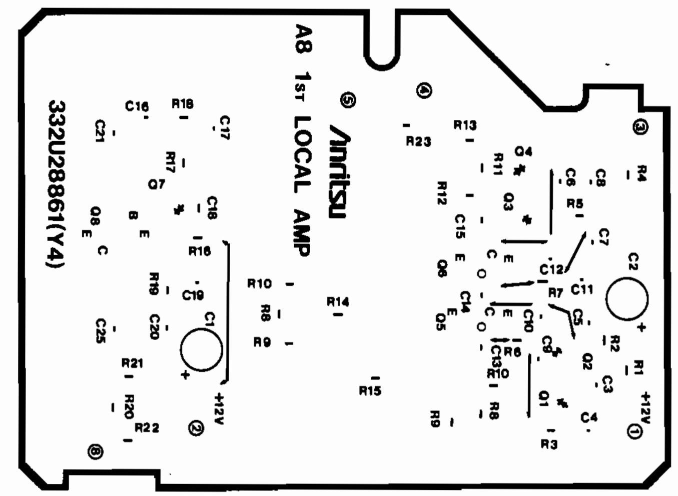


Fig. 3-17 A1-A9 1st LOCAL AMP PC Board
Parts Layout 9

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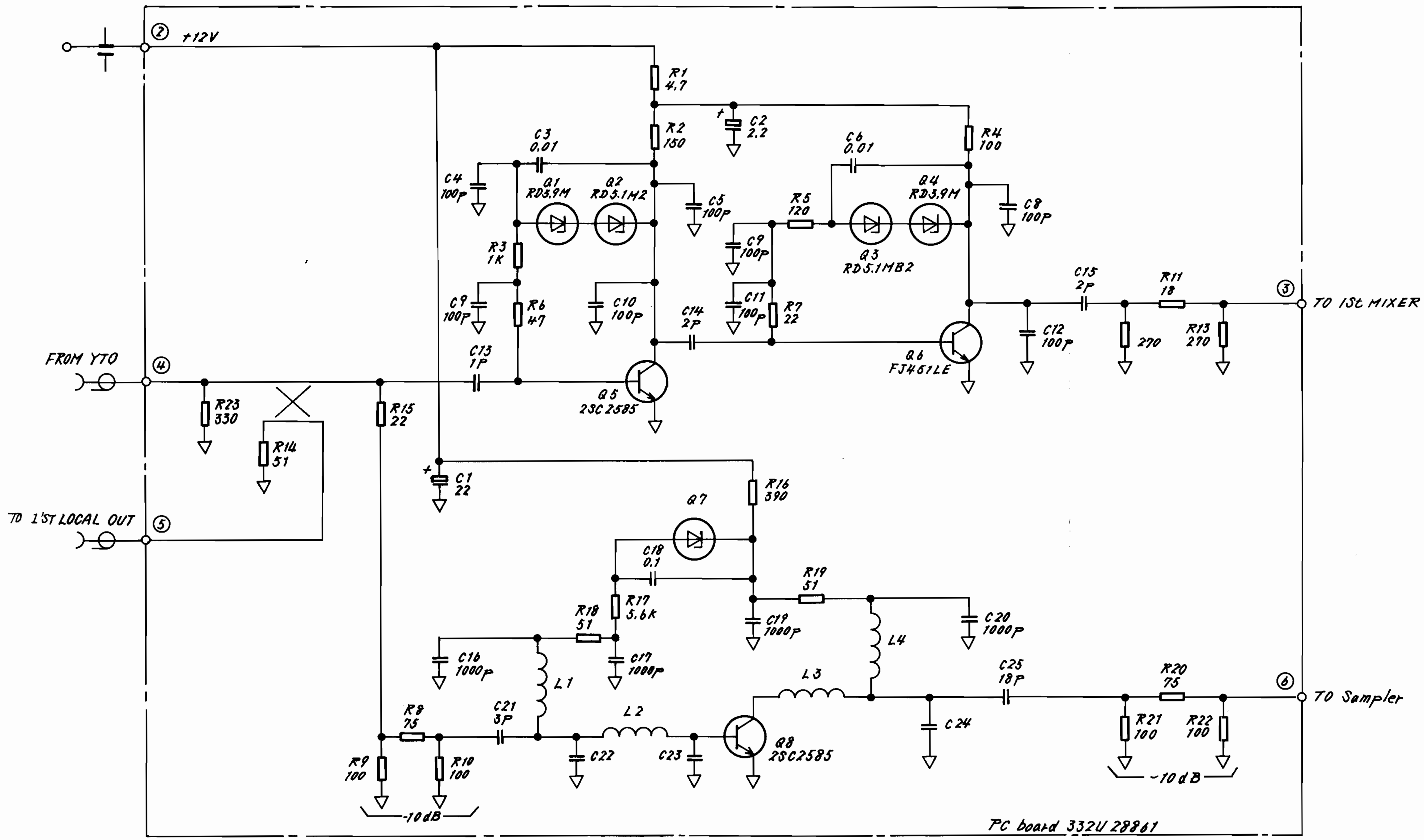

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TRACED BY

SCALE :

APPROVED BY H. Oshima

DRAWN BY H. Yanagawa

9

Parts List 34W93333

TITLE A1-A9, 1st LO AMP Circuit Diagram

DRAWING No. 33W29904 1/1

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3-91

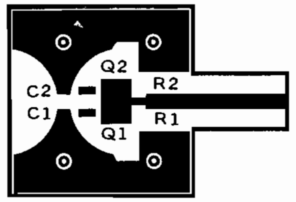

Fig. 3-18 A1-A10 SAMPLER PC Board Parts Layout 10

34W93343 1/1

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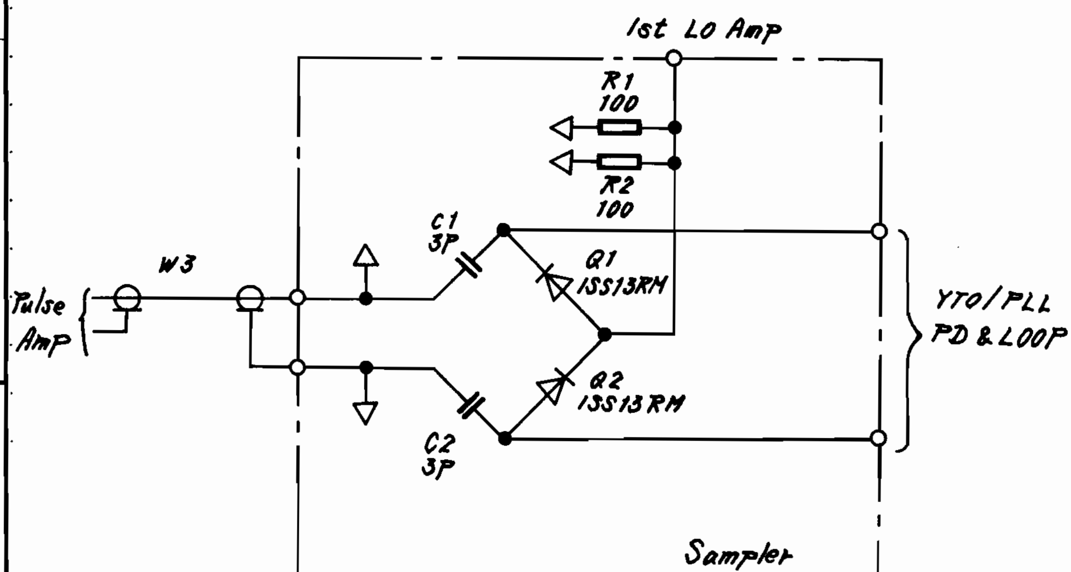

Parts List	34W93334

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TITLE
A1-A10, SAMPLER Circuit Diagram

DRAWING No.
34W 93343 1/1

No. D025-1985.08

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3-93/3-94

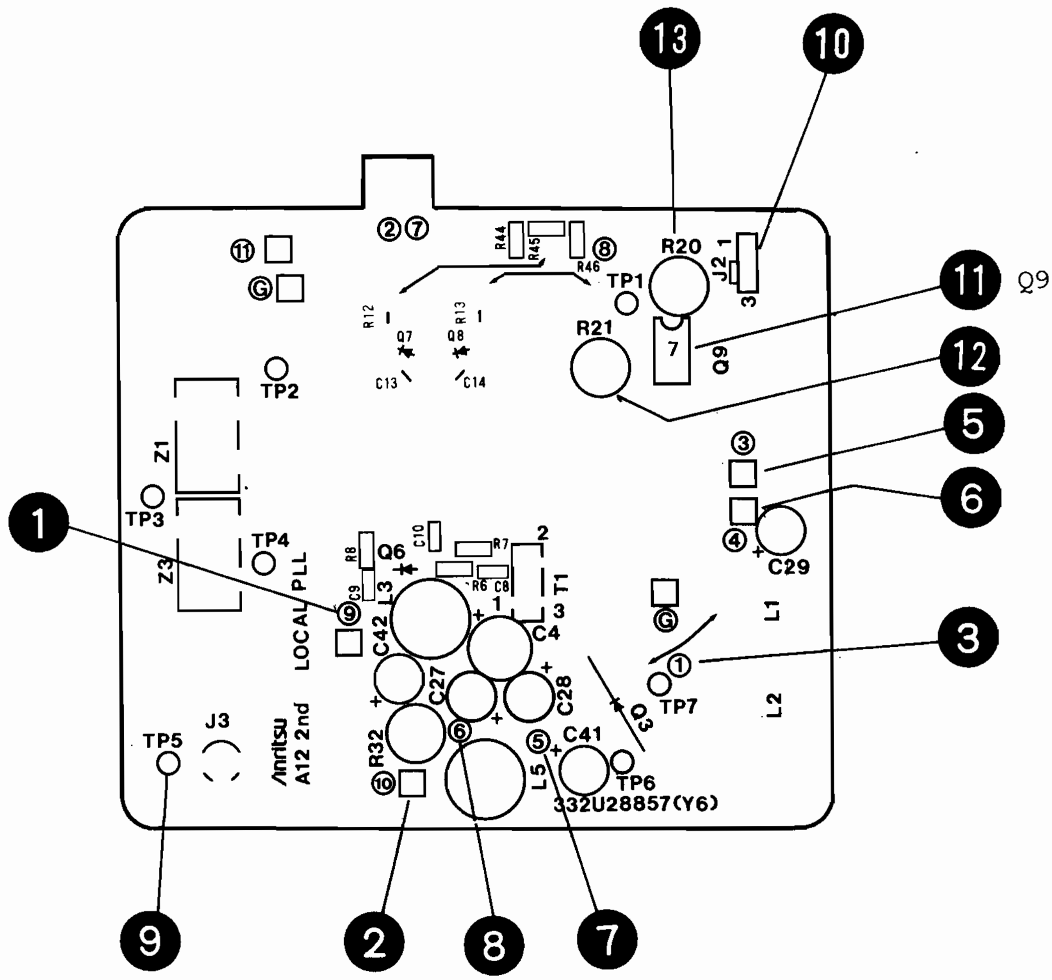

Fig. 3-19 (a) A1-A12 2nd LOCAL PLL PC Board Parts Layout (Parts Side) **11**

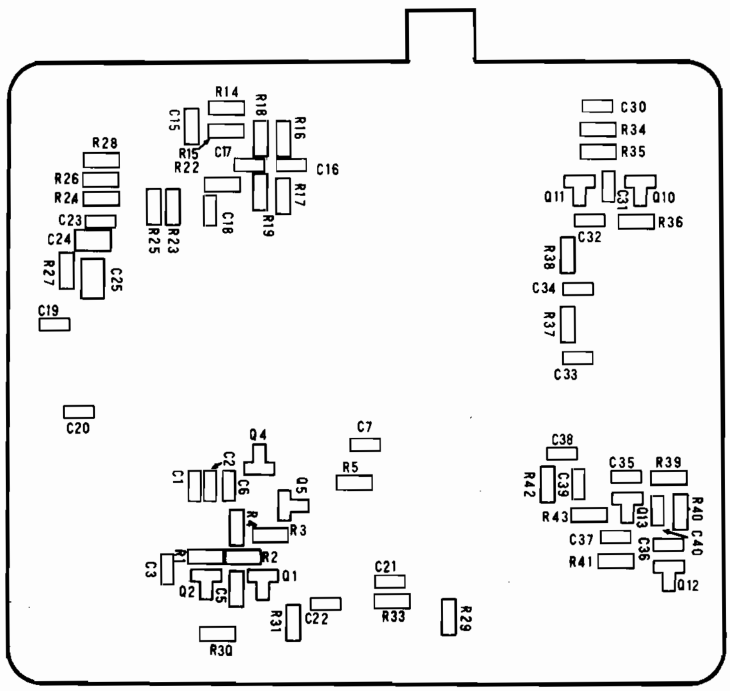

Fig. 3-19 (b) A1-A12 2nd LOCAL PLL PC Board
Parts Layout (Pattern Side) 11

APPLICATION

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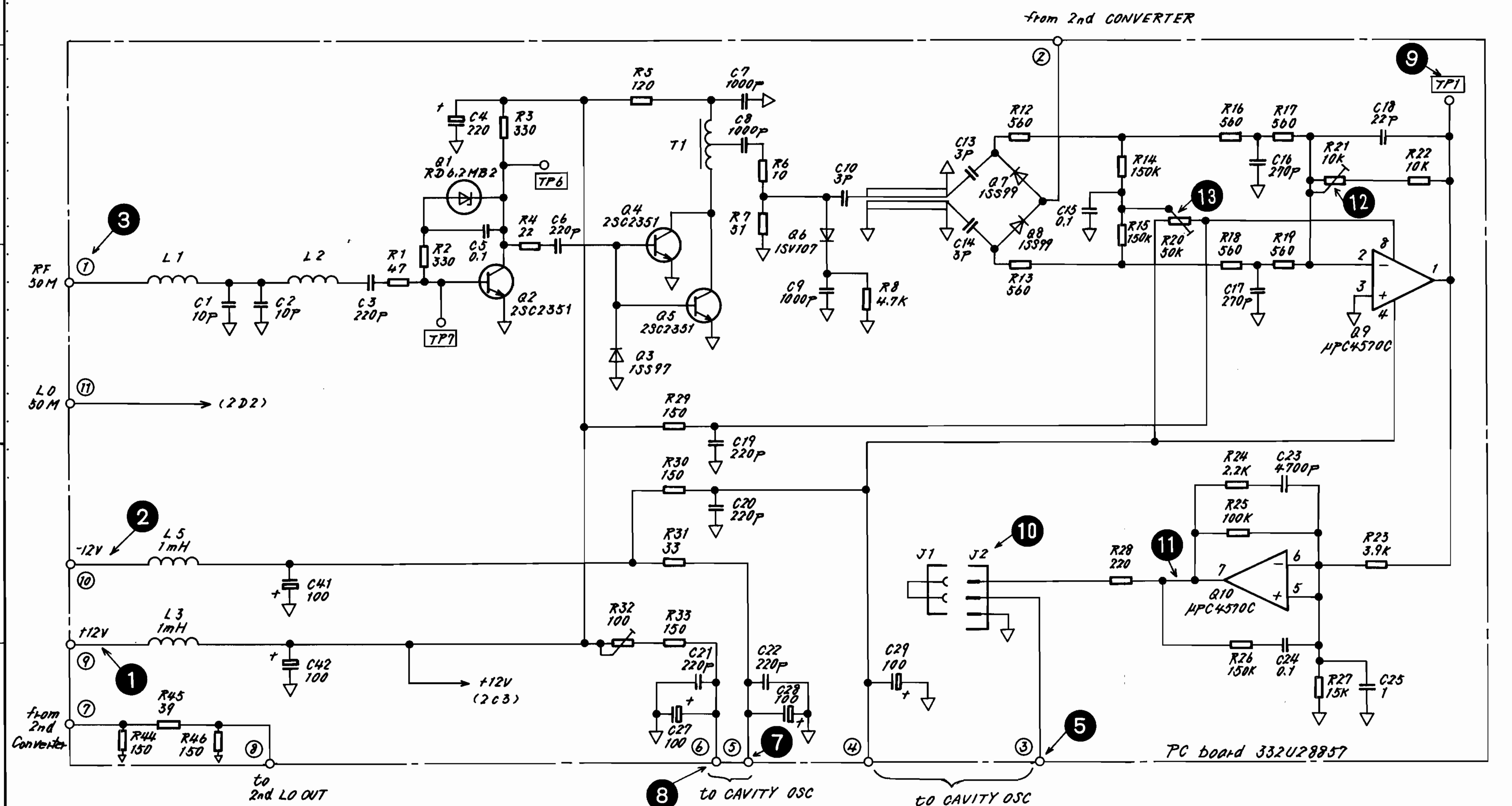

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Parts List 34W93335

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TITLE A1-A12, 2nd LOPLL Circuit Diagram		DRAWING No. 33W29905 1/2	11

DEP

No. D023-1985.08

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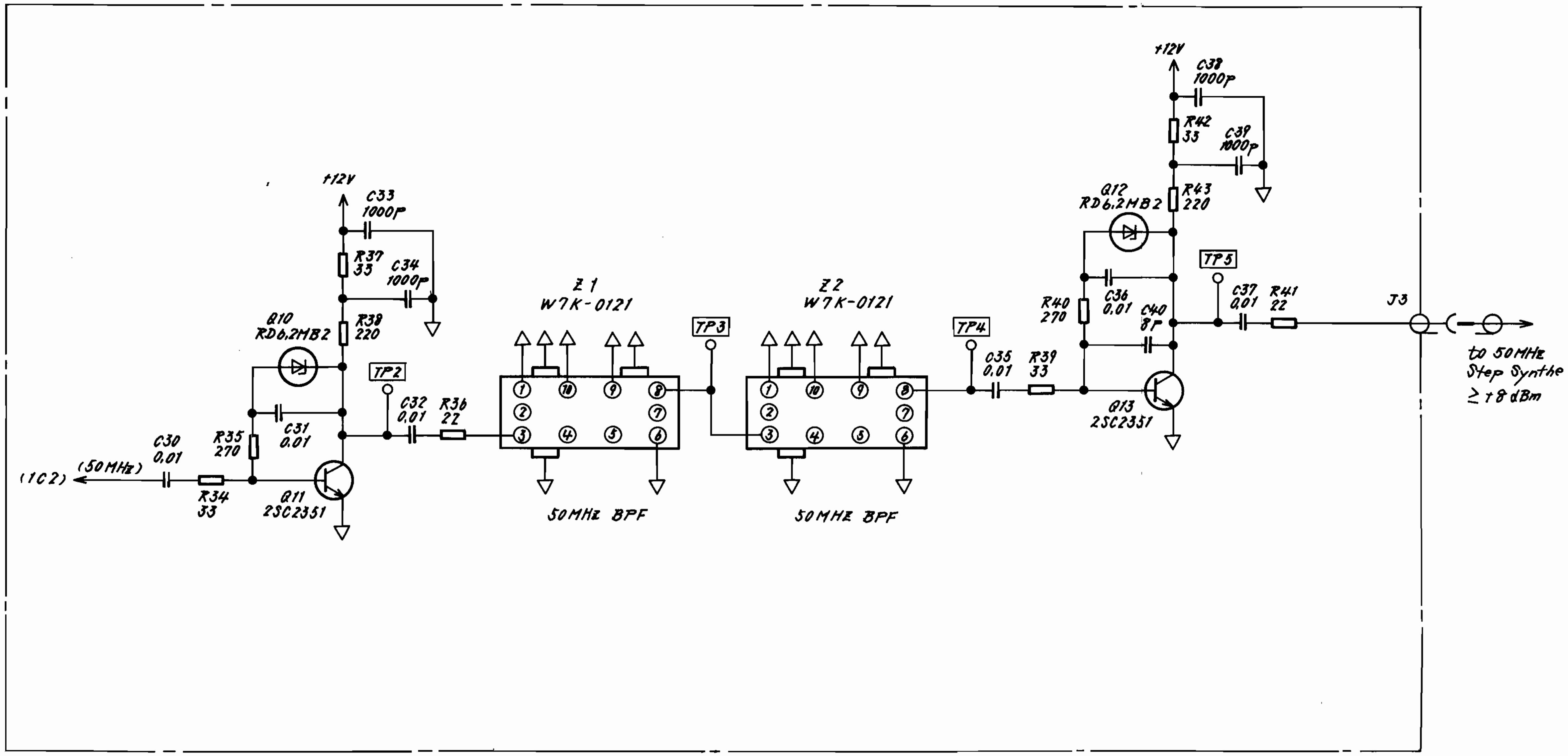

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CHECKED BY S. Fukaya			TRACED BY	SCALE :		
APPROVED BY			DRAWN BY H. Yanagawa			

TITLE A1-A12, 2nd LOPLL Circuit Diagram

DRAWING No. 33 W 29905 2/2

DEP

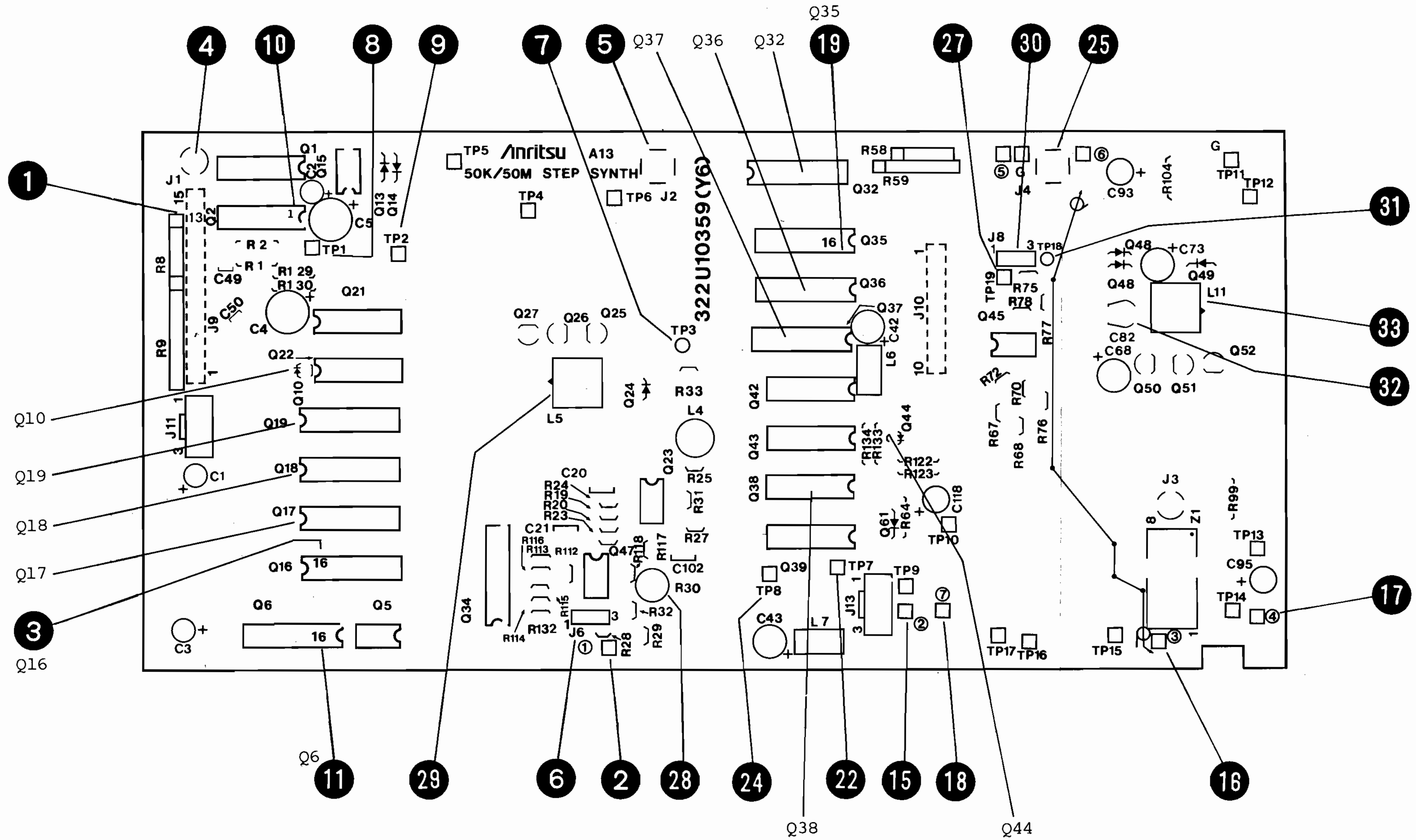

Fig. 3-20 (a) A1-A13 50 k/50 M STEP SYNTH PC Board Parts Layout (Parts Side) 12

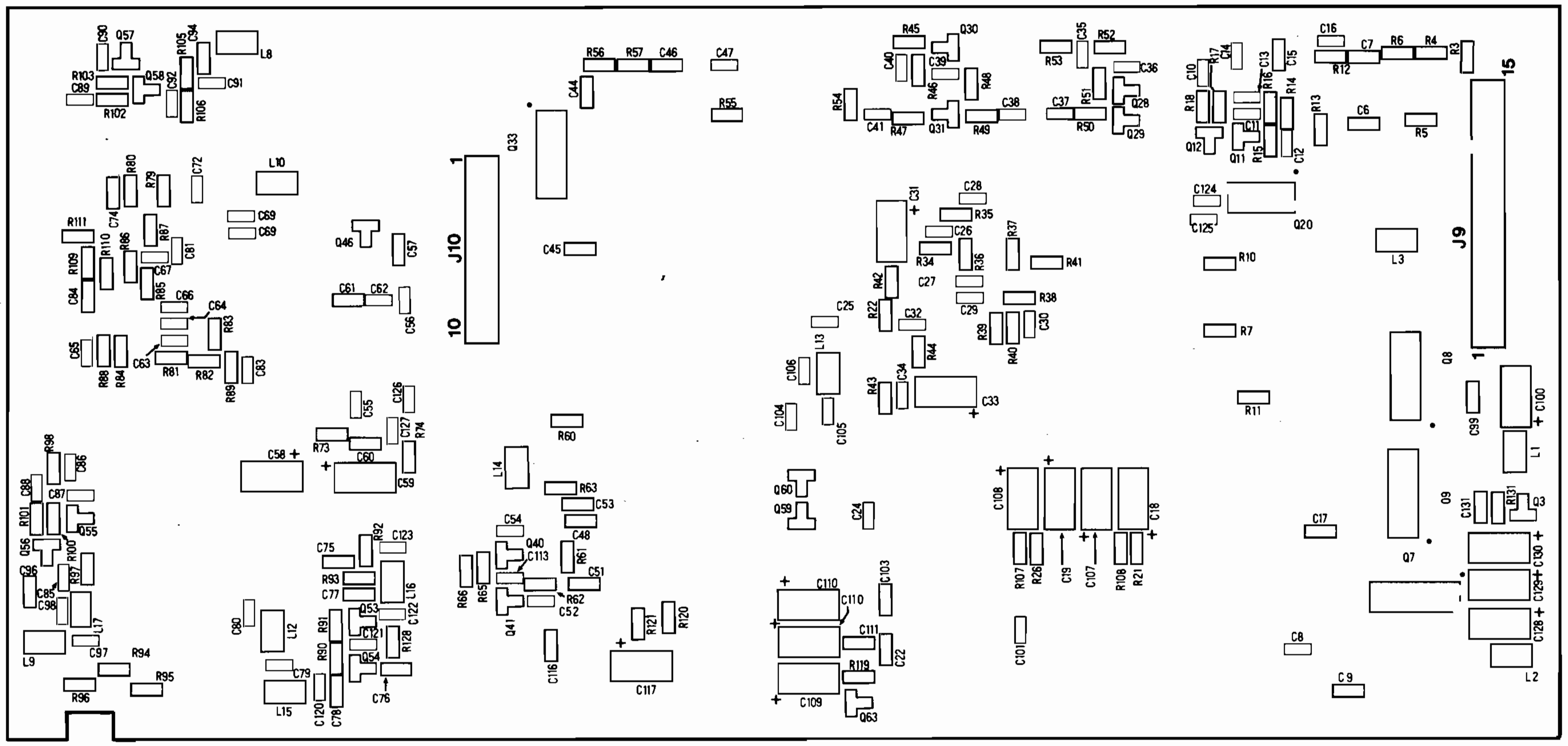

Fig. 3-20 (b) A1-A13 50 k/50 M STEP
SYNTH PC Board
Parts Layout (Pattern Side) 12

33W 29906 1/4

APPLICATION

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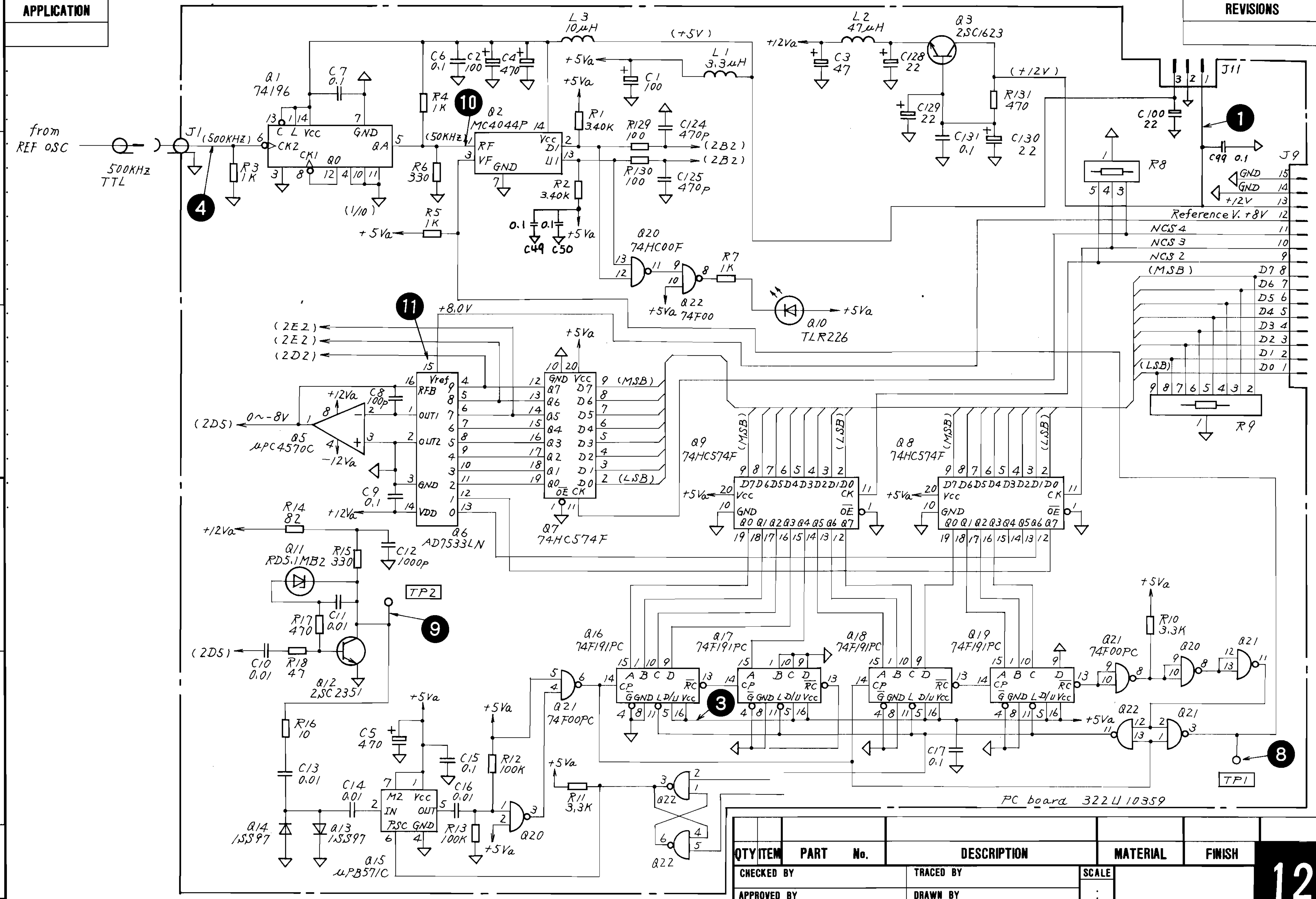

Parts List 34W 93336

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH
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APPROVED BY		DRAWN BY		:	

12

TITLE A1-A13, 50K/50M STEP SYNTHE Circuit Diagram.

DRAWING No. 33W 29906 1/4

DEP

No. D023-1985.08

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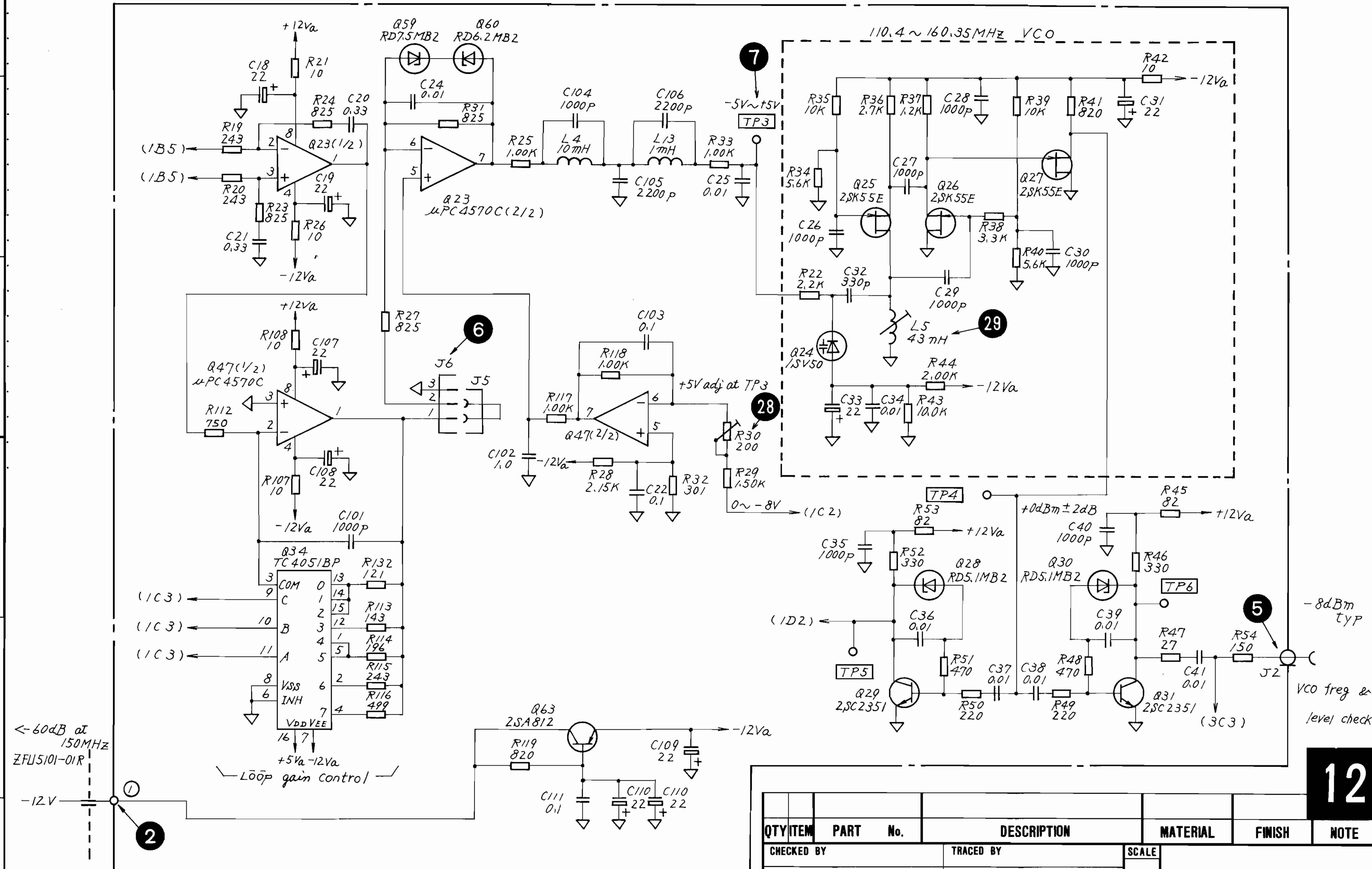
3-103/3-104

33W 29906 2/4

APPLICATION

REVISIONS



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QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH	NOTE

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TITLE A1-A13, 50K/50M STEP SYNTHE Circuit Diagram.

DRAWING No. 33W 29906 2/4

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33W 29906 3/4

APPLICATION

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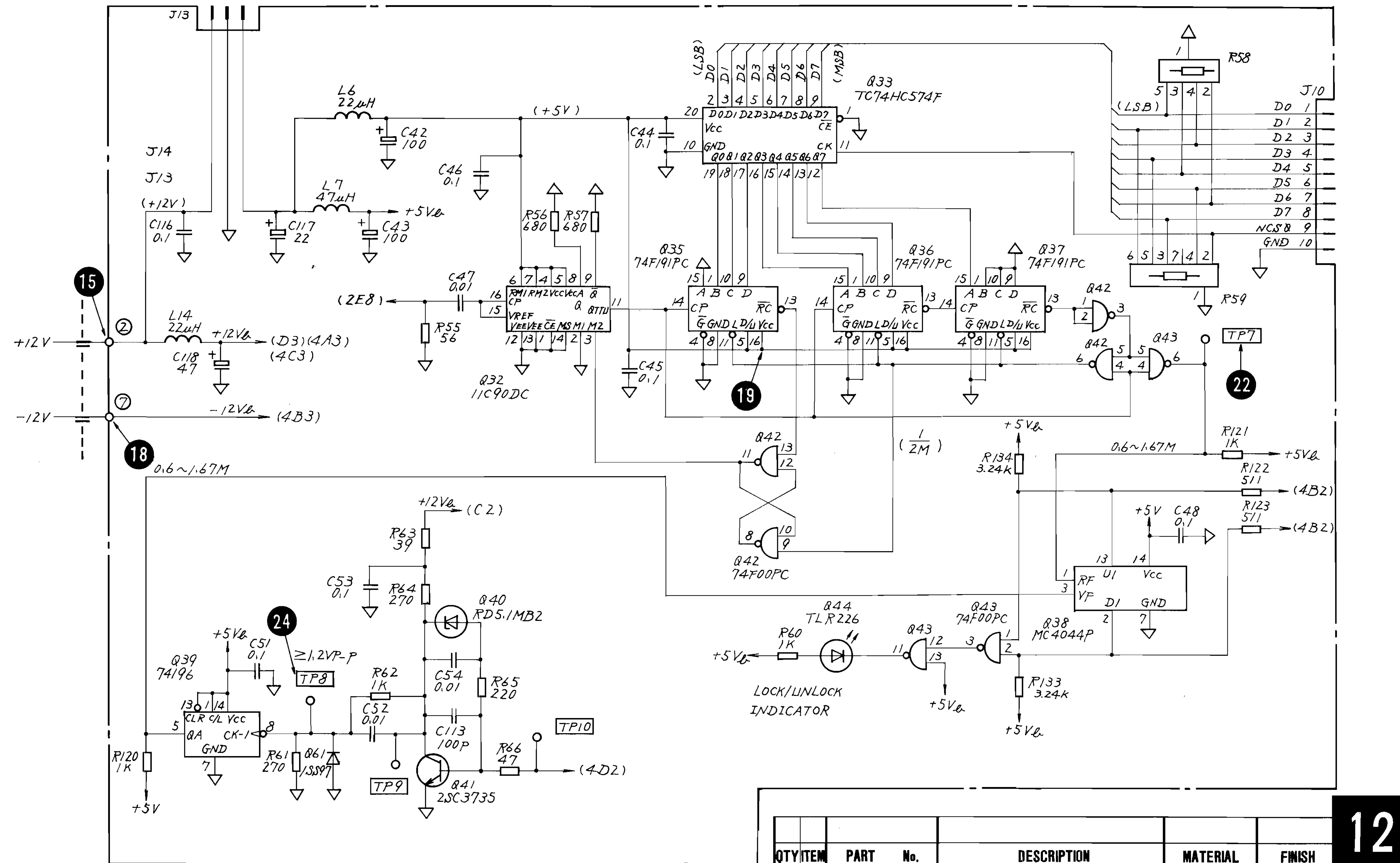

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QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TITLE A1-A13,
50K/50M STEP SYNTHE Circuit Diagram.

DRAWING No. 33W 29906 3/4

DEP

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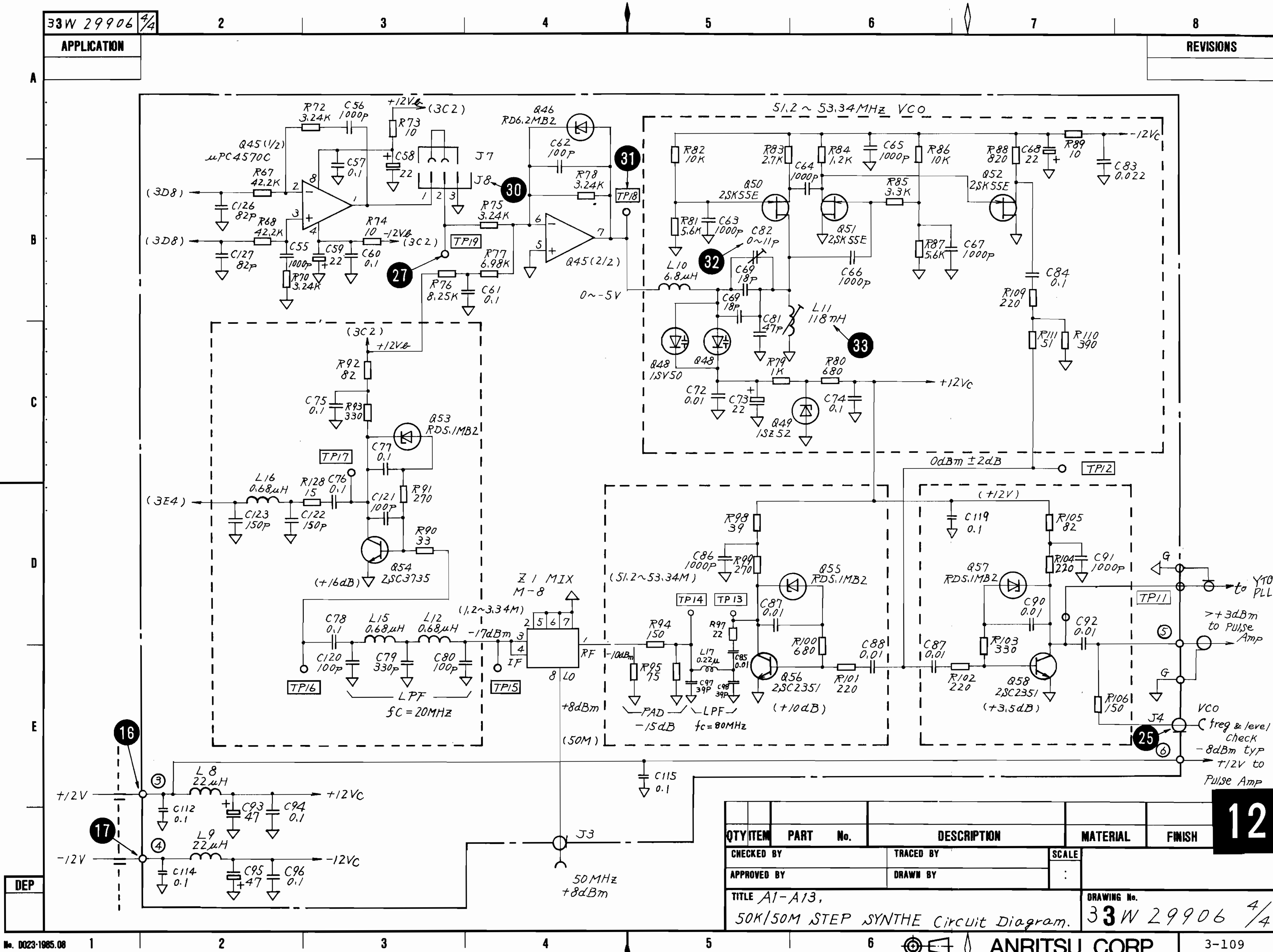

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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APPROVED BY | DRAWN BY

TITLE A1-A13, 50K/50M STEP SYNTHE Circuit Diagram.

DRAWING No. 33W 29906 4/4

ANRITSU CORP. 3-109

No. D023-1985.08

DEP

12

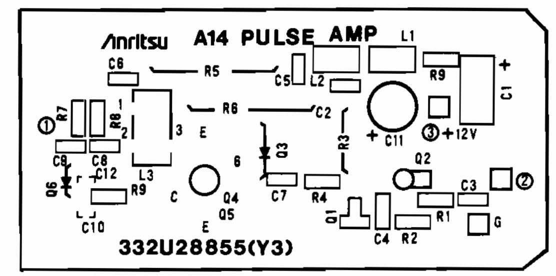

Fig. 3-21 A1-A14 PULSE AMP PC Board
Parts Layout 13

33W30034 1/1

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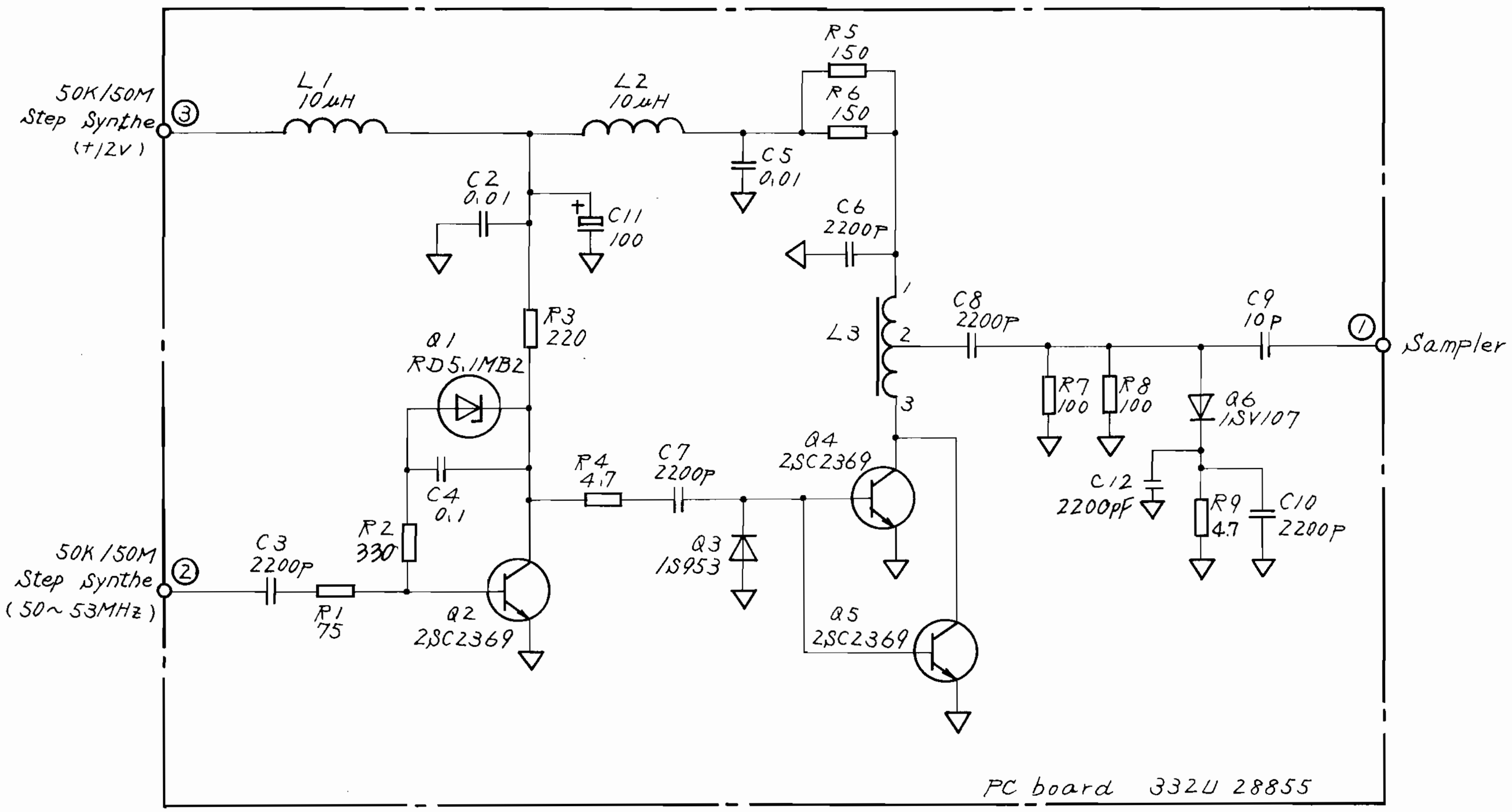

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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Parts List 34W93337

TITLE A1-A14, PULSE AMP Circuit Diagram.

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13

DEP

No. D023-1985.08

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3-111/3-112

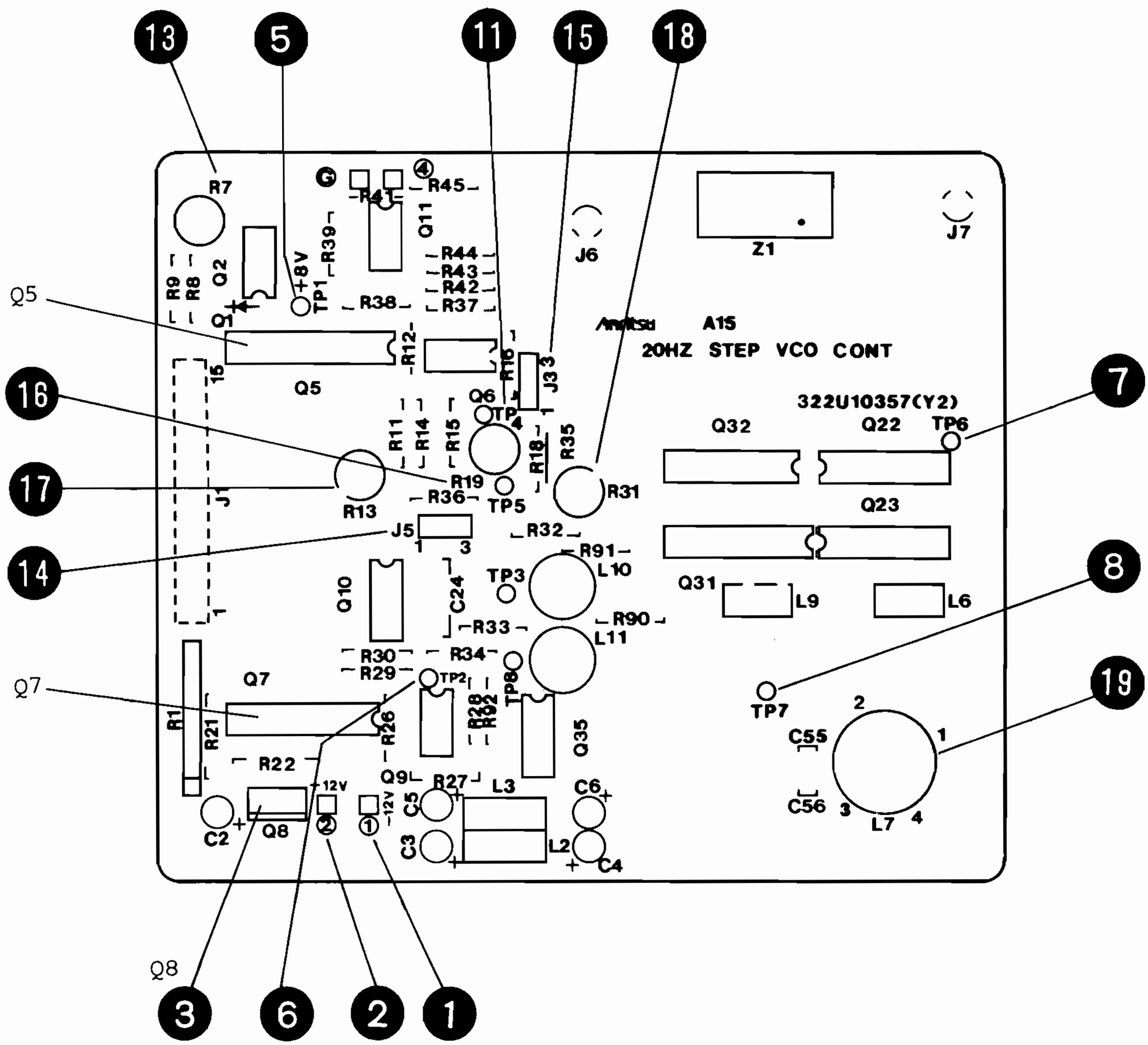

Fig. 3-22 (a) A1-A15 20 Hz STEP VCO CONT
PC Board Parts Layout
(Parts Side) 14

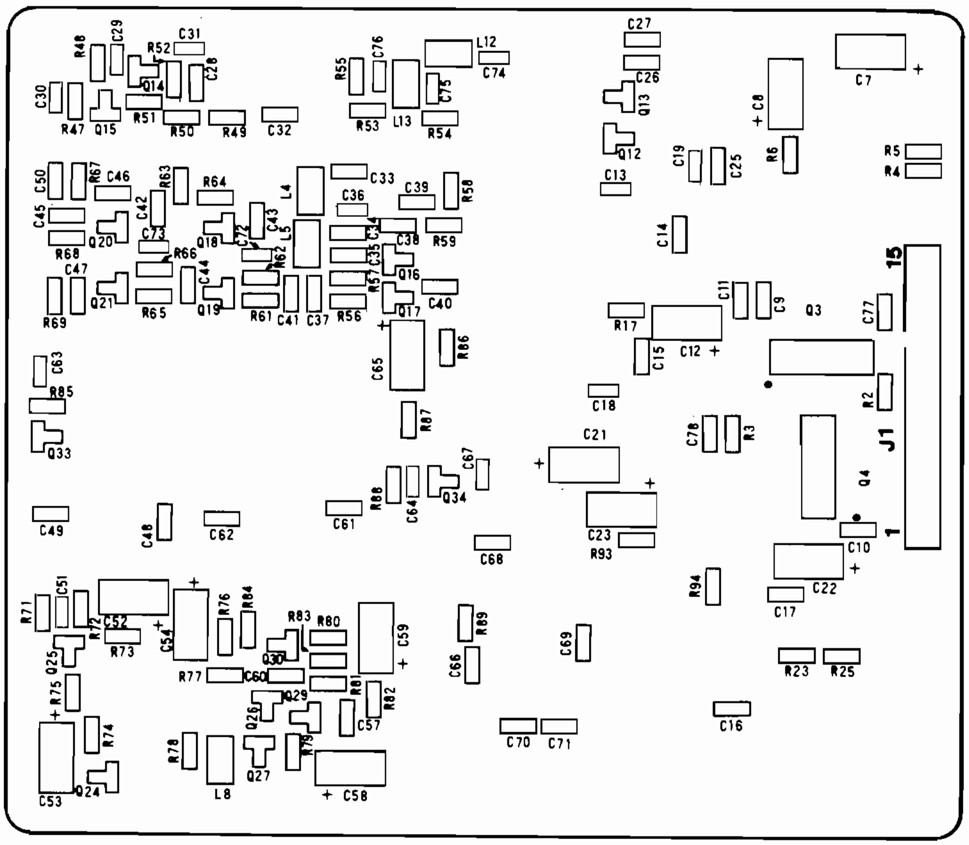

Fig. 3-22 (b) A1-A15 20 Hz STEP VCO CONT
PC Board Parts Layout
(Pattern Side) **14**

33W29907 1/2

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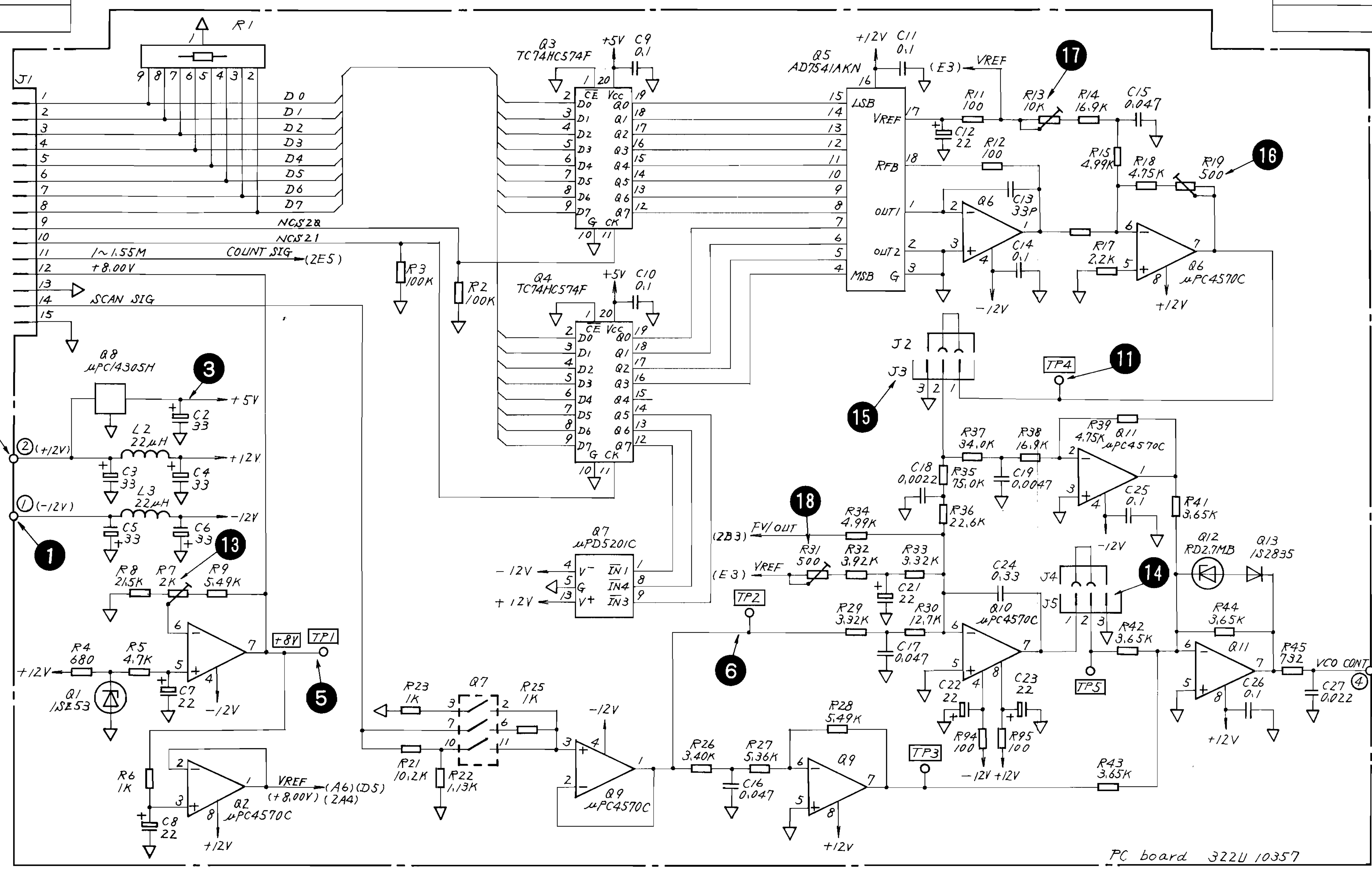

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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Parts List 34W93338

TITLE A1-A15, 20Hz STEP VCO CONT Circuit Diagram.

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33W29907 2/2

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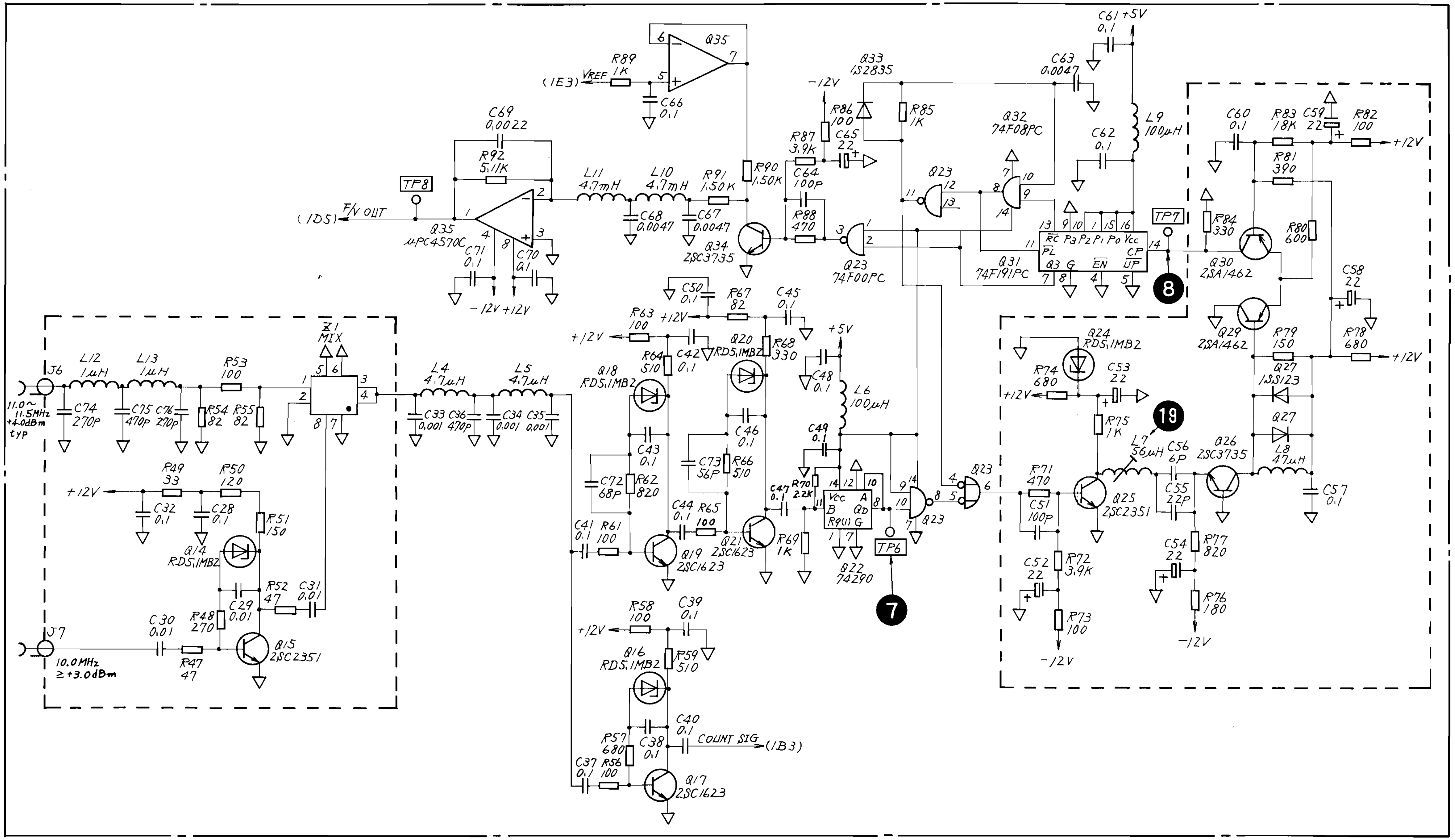

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

14

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TITLE A1-A15, 20Hz STEP VCO CONT Circuit Diagram.

DRAWING No. 33W29907 2/2

DEP

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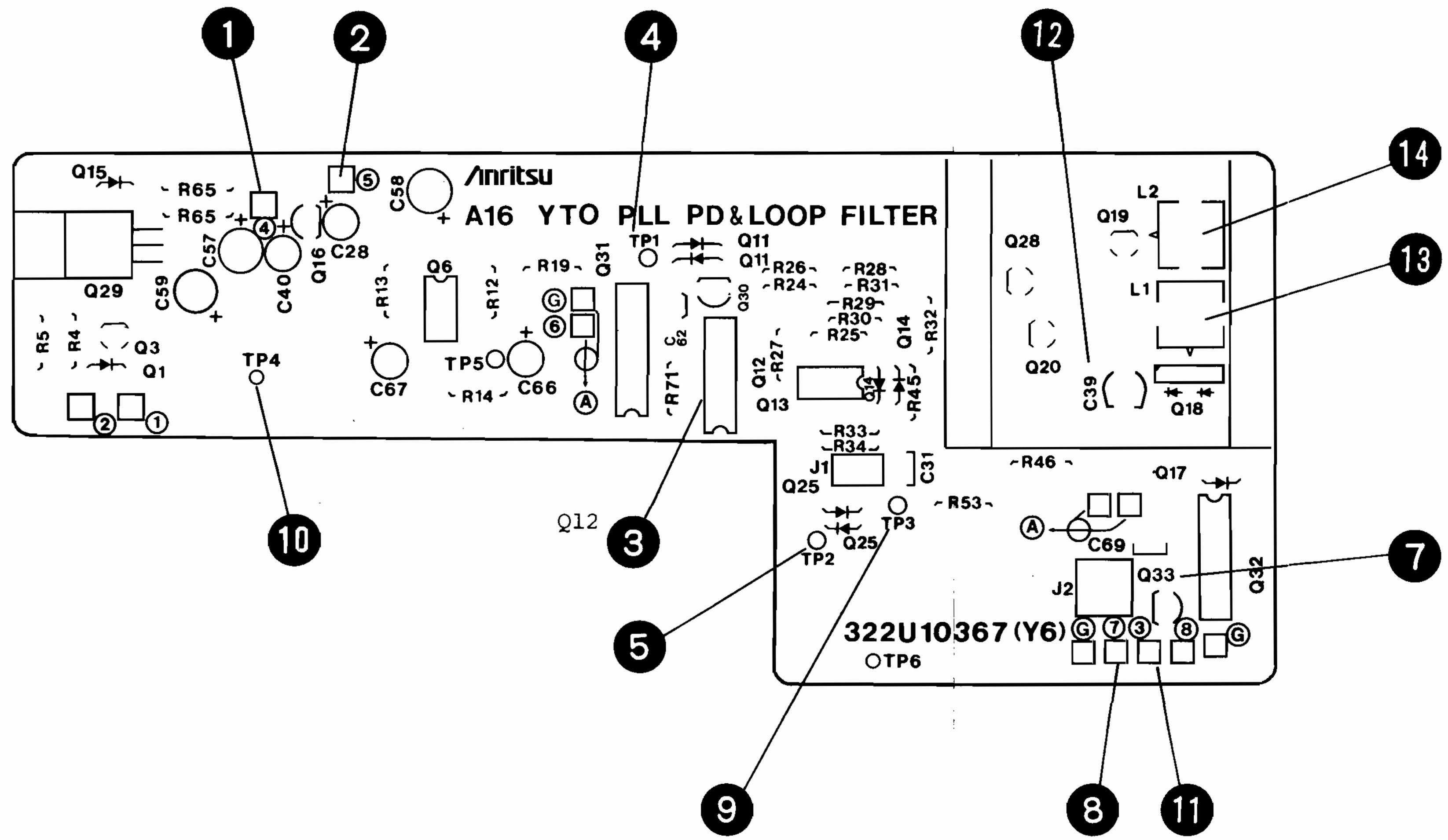


Fig. 3-23 (a) A1-A16 YTO PLL PD & LOOP FILTER PC Board Parts Layout (Parts Side) 15

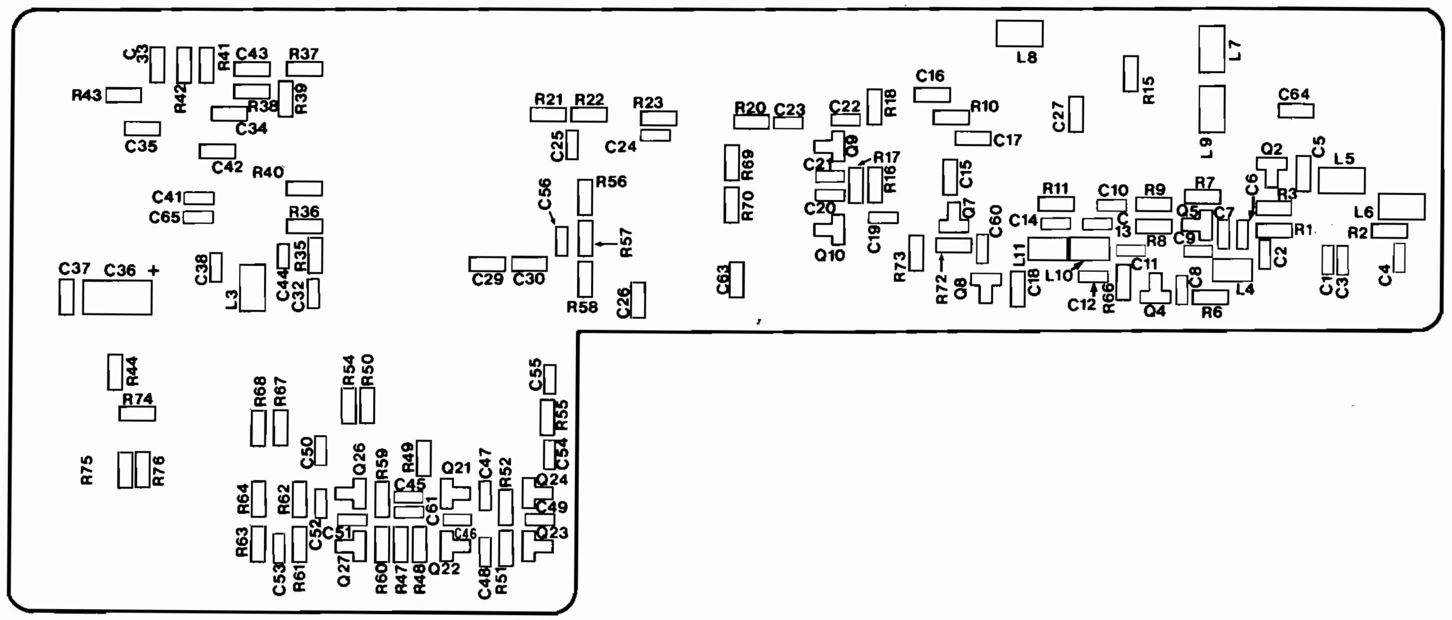
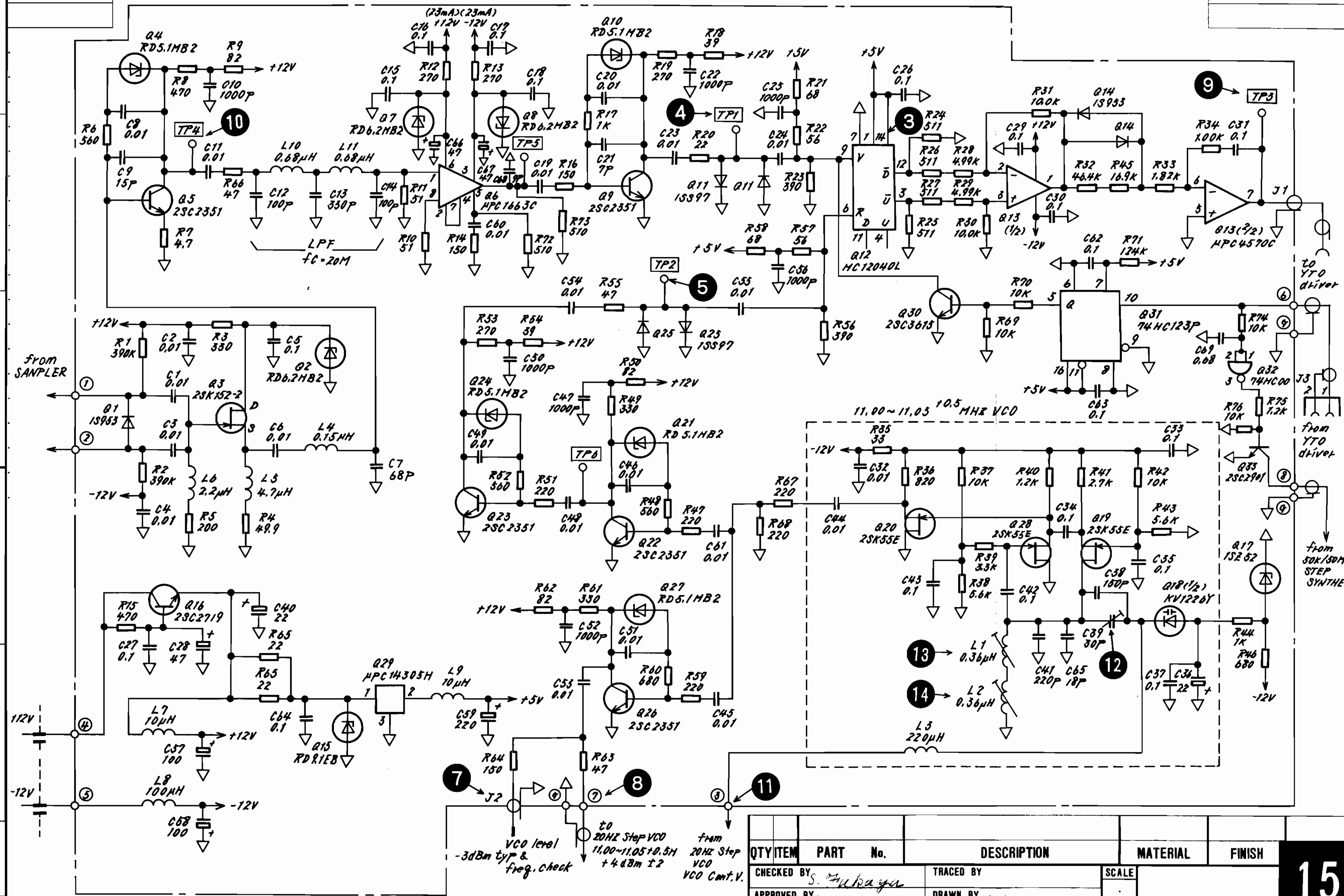


Fig. 3-23 (b) A1-A16 YTO PLL PD & LOOP
FILTER PC Board Parts Layout
(Pattern Side) 15



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY S. Fukaya — TRACED BY — SCALE :

APPROVED BY H. Oshima — DRAWN BY H. Yamagawa

Parts List 34W93339

TITLE A1-A16, YTO PLL PD & LOOP FILTER Circuit Diagram

DRAWING No. 33W29908 1/1

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No. D023-1985.08

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3-121/3-122

3.3.5 A2 IF BPF 16

(1) Circuit description

The 2nd IF signal (21.4 MHz) is converted to the 3rd IF signal (3.6 MHz) at A2 IF BPF. RBW and REF LEVEL are determined in this 3rd IF section.

The 21.4 MHz 2nd IF signal is output from A1-A8 2nd CONV in the A1 RF/PLL BLOCK. The A2 IF BPF is divided into 7 parts as shown in Fig. 3-26. The following paragraph describes the details of these circuits.

(a) 21.4 MHz BPF section

The 3rd IF 3.6 MHz image signal in the 21.4 MHz input signal is rejected using a band-pass filter which has a 3 dB bandwidth of approx. 2 MHz.

The front and rear stage buffer amplifiers use a transistors to match with the 21.4 MHz BPF impedance, and they have 50 ohm input impedance.

The overall gain is approx. 3 dB.

(b) Frequency converter section

This section uses a double-balanced mixer and the harmonic distortion is 70 dB or more. Furthermore, leakage of the local signal to the output is minimized.

(c) BPF switching section

This section uses a capacitor-coupled resonance filter. It is inserted to prevent level saturation of the crystal filter during QP measurement. The 3 dB bandwidth is approx. 15 kHz.

(d) 1st variable gain amplifier section

This amplifier section is composed of two feedback amplifiers and a switch circuit, each of which is composed of hybrid ICs. The 1st-stage amplifier gain can be changed from 0 to 10 dB in 2 dB steps in combination with the switch circuit. Also, the 2nd-stage amplifier gain can be changed from 0 to 20 dB in 10 dB steps.

(e) 1st variable BPF section

After the signal has passed through the 1st variable gain amplifier, it enters the 1st variable BPF which sets the RBW from 30 Hz to 1 MHz. A crystal filter and an LC filter are used for the 30 Hz to 3 kHz RBWs and 10 kHz to 1 MHz RBWs, respectively.

The principle of the 10 kHz to 1 MHz LC filter is described below.

The signal V is supplied to the high-Q LC parallel resonance circuit via the variable resistance R as shown below.

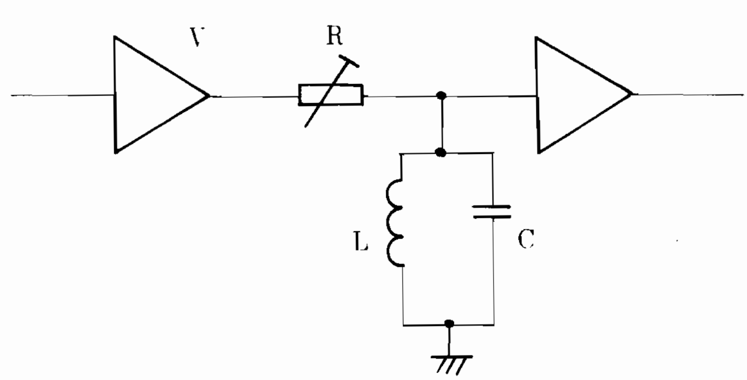


Fig. 3-24 Principle of LC Filter

The signal V is divided by the variable resistance R and the LC resonator because the input impedance of the buffer amplifier is high. If the L and C are ideal elements without any loss, the impedance of the LC resonator will be infinity at the resonance frequency, and the signal will be transmitted without any loss regardless of value R. When the frequency separates from the resonance frequency, the impedance of the resonator becomes small and the transmission loss becomes large because the signal V is divided by R. Therefore, when R becomes large, the BPF bandwidth becomes small and is controlled by the value R.

The principle of the 30 Hz to 3 kHz crystal filter is described below.

The crystal filter is composed of C1, which cancels the parastic capacity such as the parallel capacity of crystal X1 and the output buffer amplifier, and the resonance circuits L and C2 as shown on the next page.

By this parastic capacity cancellation, the equivalent circuit becomes the LC series resonance circuit as shown on the next page.

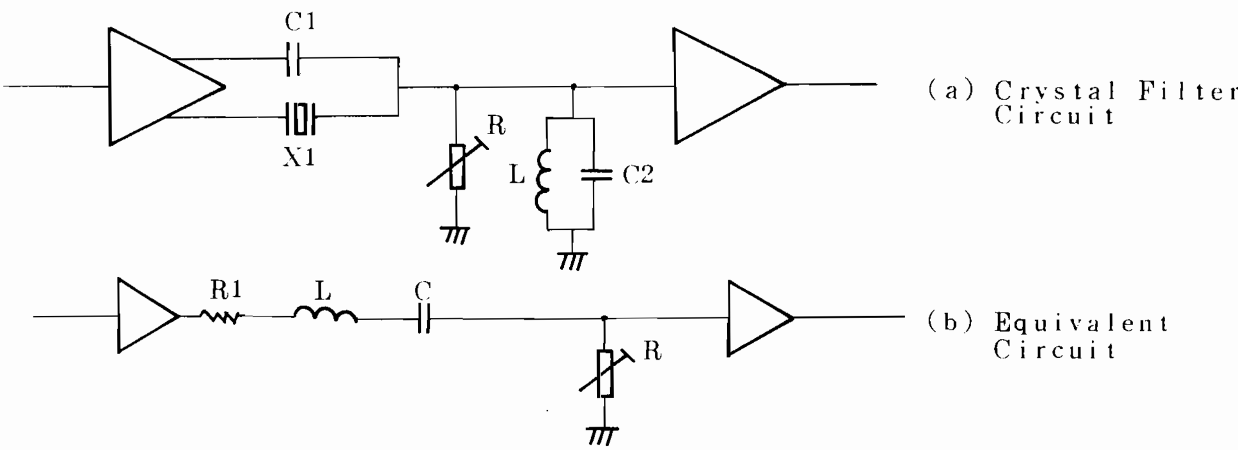


Fig. 3-25 Principle of Crystal Filter

If the crystal equivalent resistance is small enough and the buffer amplifier input impedance is high, the transmission loss is negligible. When the signal frequency separates from the resonance frequency, the impedance of the crystal resonator becomes high and the signal is divided by R so that the transmission loss becomes large. Therefore, when R becomes small, the bandpass filter bandwidth becomes small and the bandwidth is controlled by the value R.

In the actual circuit, hybrid ICs are used for the buffer amplifier and variable resistor. Furthermore, to simplify the circuit, the resonance circuit for crystal filter parastic capacity cancelling is the same as the LC filter resonance circuit.

Also, since neither the LC filter circuit nor the crystal filter circuit is an ideal resonance circuit, the loss changes when the bandwidth (RBW) is switched. The Z5 amplifier gain is changed by the Z6 switch circuit to reduce the deviation when the RBW is switched.

(f) 2nd variable gain amplifier section

This section has the same circuit configuration as the 1st variable gain amplifier section and is also composed of hybrid ICs. The 1st-stage amplifier is a compensation amplifier to reduce the deviation when the RBW is switched.
The 2nd-stage amplifier gain changes from 0 to 30 dB in 10 dB steps.

(g) 2nd variable BPF section

This section has the same circuit configuration as the 1st variable BPF section. The specified RBW can be obtained by combining the 1st variable BPF section with this 2nd variable BPF section. One output of this 2nd variable BPF section becomes the IF OUTPUT via a buffer amplifier and the other output enters A3 IF LOG/DET.

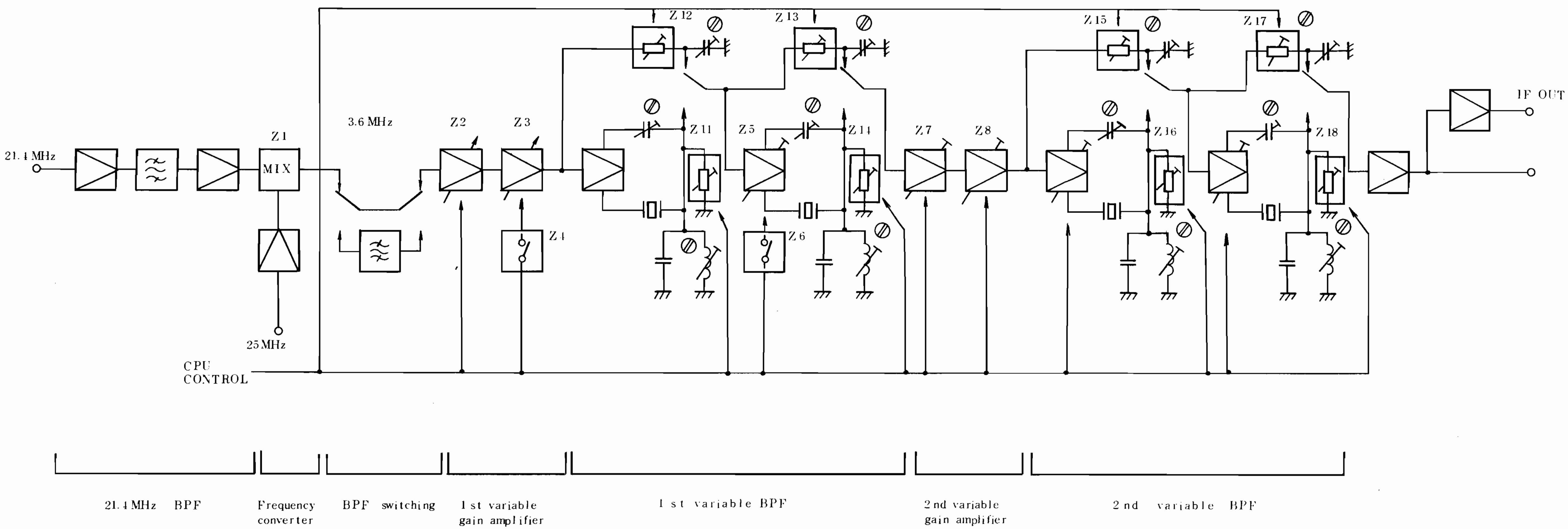


Fig. 3-26 A2 IF BPF Block Diagram

(2) Symptom and cause

	Symptom	Cause
1.	No signal on CRT	Defective 2nd variable gain amplifier section or 2nd variable BPF section
2.	Absolute level value incorrect	Defective 21.4 MHz BPF section or 3.6 MHz stage amplifier
3.	Spurious generated due to 3.6 MHz image frequency	Defective 21.4 MHz BPF section
4.	Step change incorrect when REF LEVEL changed	Defective 1st and 2nd variable gain amplifiers
5.	RBW bandwidth incorrect	Defective 1st and 2nd variable BPF sections
6.	Level at 30 Hz to 3 kHz RBW incorrect	Defective BPF switching section
7.	Large level deviation at RBW switching	Defective 1st and 2nd variable BPF sections and defective Z6 changeover switch

(3) Troubleshooting

(a) Required equipment

Signal generator: MG443B

Digital voltmeter

Oscilloscope

Network/spectrum Analyzer: MS420K

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove the bottom cover by referring to paragraph 2.2.
2	Remove the cover of A1-A8 2nd CONV by referring to Fig. 2-6.
3	Remove the coaxial cable connected to terminal 7 (21.4 MHz OUT) 1 (Fig. 3-16, 8) of A1-A8.
4	Remove the A2 IF BPF by referring to paragraph 2.4 and then remove the shielding case 55 (Fig. 2-3).
5	Reattach the A2 IF BPF using the extender board.

(c) Troubleshooting
(Fig. 3-38, 16)

Step	Procedure
1	Check the power supply voltages according to the following table.

Checkpoint	Normal condition
J2-17 ❶	+14.3 to +15.7 V
J2-12 ❷	-14.3 to -15.7 V
J2-15 ❸	+11.5 to +12.5 V
J2-13 ❹	-11.5 to -12.5 V
J2-18 ❺	+4.75 to +5.25 V

Step	Procedure
2	Solder the extender cable to J2-6 ㉝ and connect the other end of the cable (connector side) to a signal generator (SG).
3	Set the SG as follows: Output impedance: 50 ohm (for MG443B) Output level: -8 dBm Output frequency: 21.4 MHz
4	Press the 「INITIAL」 key and set the MS2601A/J as follows: CENTER FREQ: 50 MHz REF LEVEL: 0 dBm SPAN: 0 kHz RBW: 3 kHz ATT: 10 dB

(continued)

Step	Procedure
5	Decrease the SG output attenuator from 0 to -8 dB in 2 dB steps. At the same time, decrease the REF LEVEL setting in the same way according to the SG output attenuator. If the difference between the display level and REF LEVEL is within ±0.5 dB, the 1st variable gain amplifier Z3 is normal.
6	Decrease the SG output attenuator from 0 to -60 dB in 10 dB steps. At the same time, decrease the REF LEVEL setting value in the same way according to the SG output attenuator. If the difference between the display level and REF LEVEL is within ±1.0 dB, the 1st and 2nd variable gain amplifiers Z2 and Z8 are normal.
7	Remove the extender cable from J2-6 ㉝ and reconnect terminal ⑦ (21.4 MHz OUT) ❶ of A1-A8.
8	Connect J1 ㉛ to J1 ❾ (Fig. 3-43, 17) of A3 IF LOG/DET using the extender cable.
9	Apply a 20 MHz, 0 dBm signal to the RF INPUT.
10	Press the [INITIAL] key and set the MS2601A/J as follows: CENTER FREQ: 20 MHz REF LEVEL: 0 dBm SPAN: 5 MHz (at RBW 1 MHz)

(continued)

Step	Procedure
11	Check that the RBW (3 dB bandwidth) is within ±20% of the specifications. Change the RBW setting down to 30 Hz and check that it is within ±20% of the specifications. When it is checked, the displayed waveform must be a single peak. (See paragraph 4.4.4 in the operation manual.)
12	Check the set value of the control signal shown in Tables 3-15 and 3-16.

Table 3-15 RBW Control Signal

RBW set value	Q13 pin No.						Q12 pin No.
	19	18	17	16	15	14	19
1 MHz	1	0	1	0	0	0	0
300 kHz	1	0	1	1	0	0	0
100 kHz	1	0	1	1	1	0	0
30 kHz	1	0	1	0	0	1	0
10 kHz	1	0	1	1	0	1	0
3 kHz	0	0	0	1	1	0	1
1 kHz	1	0	0	1	1	0	1
300 Hz	0	1	0	1	1	0	1
100 Hz	0	0	1	1	1	0	1
30 Hz	1	0	1	1	1	0	1

1: Approx. 5 V
0: Approx. 0 V

(continued)

Step	Procedure

12 (Cont.)

Table 3-16 IF GAIN Control Signal (at ATT 10 dB setting)

REF LEVEL set value (dBm)	Q11 pin No. 19	18	17	16	15	14	13	Q12 pin No. 14	13	12
0 dBm	0	0	0	0	0	0	0	0	0	0
-2	0	0	0	1	0	0	0	0	0	0
-4	0	0	0	0	1	0	0	0	0	0
-6	0	0	0	0	0	1	0	0	0	0
-8	0	0	0	0	0	0	1	0	0	0
-10	1	0	0	0	0	0	0	0	0	0
-20	0	1	0	0	0	0	0	0	0	0
-30	0	1	0	0	0	0	0	0	0	1
-40	0	1	0	0	0	0	0	0	1	0
-50	0	1	0	0	0	0	0	1	0	0

1: Approx. 5 V

0: Approx. 0 V

(4) Adjustment

(a) 21.4 MHz BPF adjustment

(i) Setup

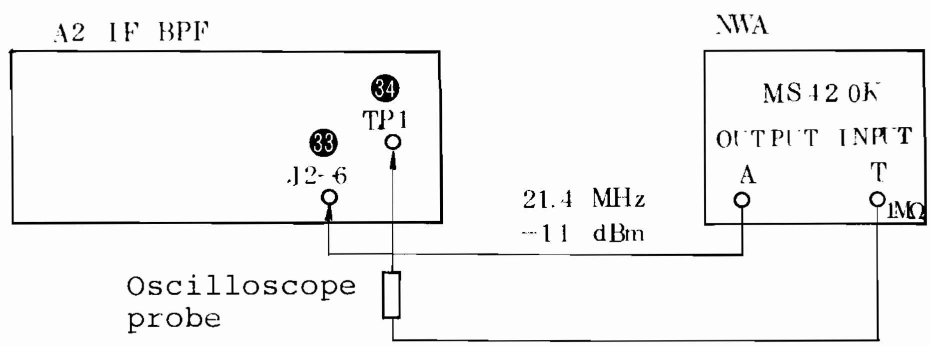
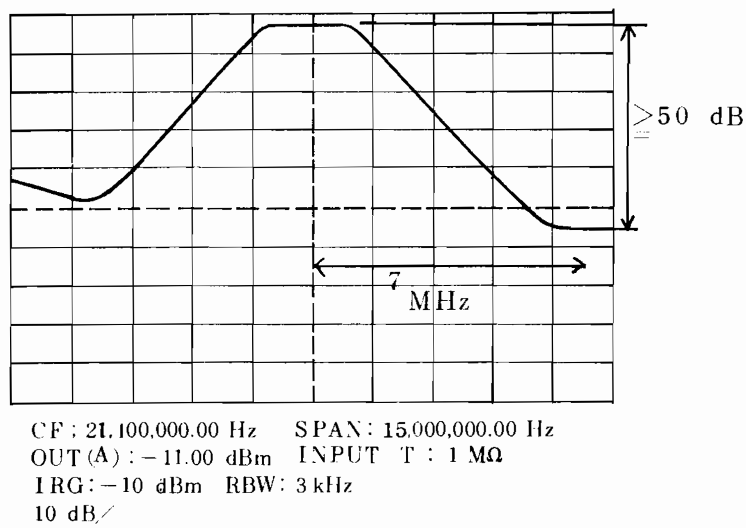


Fig. 3-27 21.4 MHz BPF Adjustment Setup

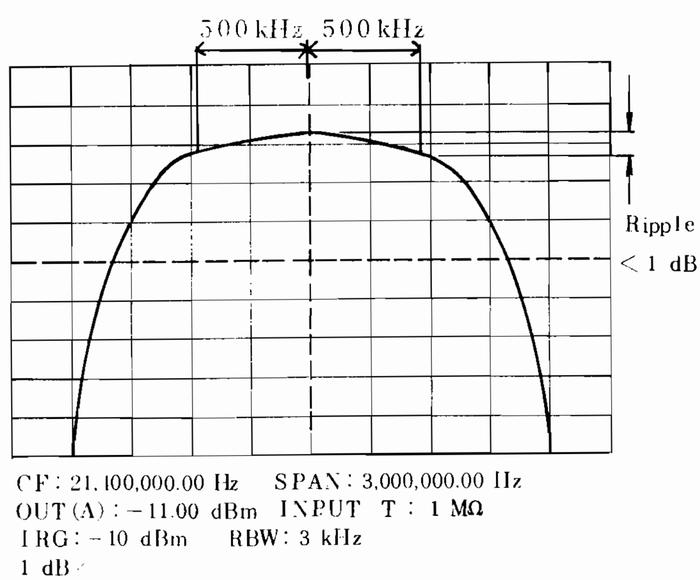
(ii) Adjustment

Step	Procedure
1	Remove the coaxial cable connected to terminal ⑦ (21.4 MHz OUT) ❶ on A1-A8 2nd CONV (Fig. 3-16, 8).
2	Solder the extender cable directly to J2-6 ㉝ as shown in Fig. 3-27.
3	Adjust L2 ❻ , L3 ❼ and L4 ❽ so that the characteristics shown in the figures on the next page are obtained. . Attenuation ≥50 dB at 7 MHz from center frequency . Pass-band ripple <1 dB within center frequency ±500 kHz

Step	Procedure
3 (Cont.)	



(1) Total Pass-band/Attenuation



(2) Pass-band

Fig. 3-28 21.4 MHz BPF Characteristics

(b) 3.6 MHz BPF adjustment

(i) Setup

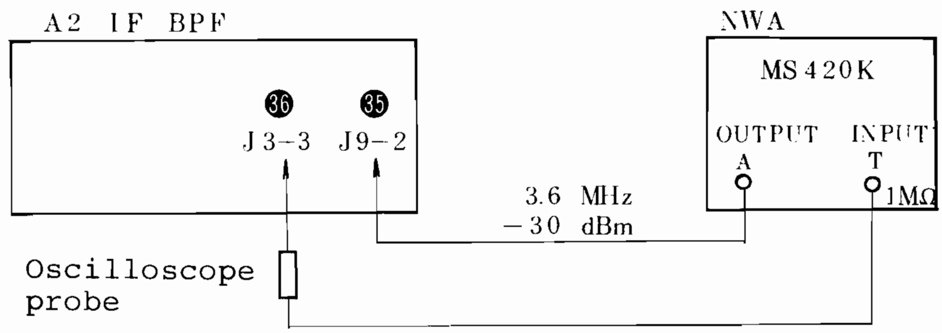
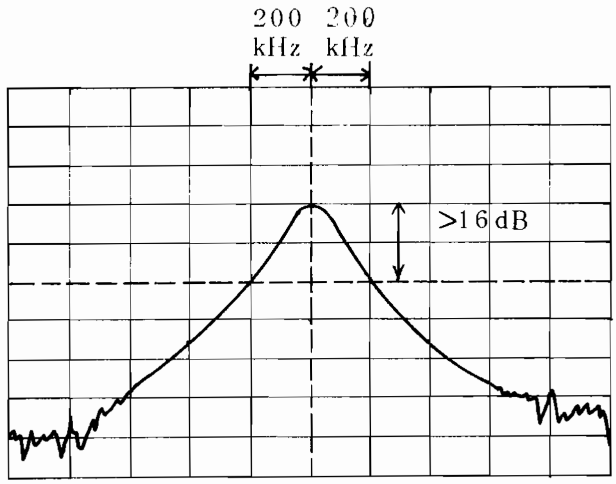


Fig. 3-29 3.6 MHz BPF Adjustment Setup

(ii) Adjustment

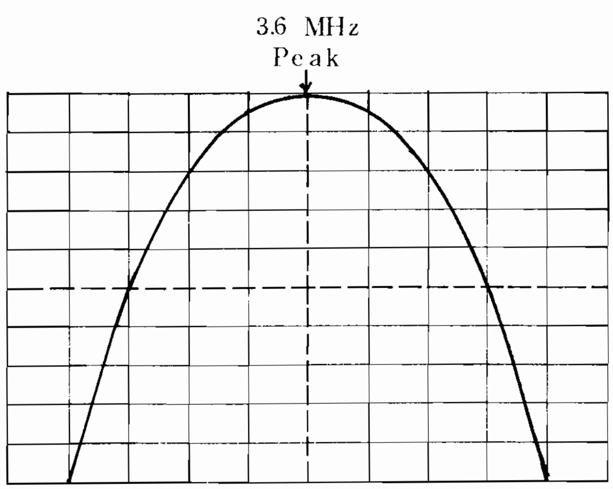
Step	Procedure
1	Remove the shielding case 56 (Fig. 2-3) attached to the pattern side of the A2 PC board and solder the extender cable to J9 35 -pin 2 on the pattern side (Pin 3 is ground pin).
2	Reattach the shielding case 56 .
3	Remove J10 connected to J9 35 .
4	Set the MS2601A RBW to 3 kHz.
5	Adjust L8 9 , L9 10 and L10 11 so that the characteristics shown on the next page are obtained. . Attenuation ≥16 dB at ±200 kHz from center frequency . Peak frequency to 3.6 MHz

Step	Procedure
5 (Cont.)	



CF: 3,600,000.00 Hz SPAN: 2,000,000.00 Hz
OUT (A): −30.00 dBm INPUT T: 1 MΩ
TRG: −10 dBm RBW: 3 kHz
10 dB/

(1) Total Pass-band/Attenuation



CF: 3,600,000.00 Hz SPAN: 300,000.00 Hz
OUT (A): −30.00 dBm INPUT T: 1 MΩ
TRG: −10 dBm RBW: 3 kHz
1 dB/

(2) Pass-band

Fig. 3-30 3.6 MHz BPF Characteristics

(c) Crystal filter adjustment

(i) Setup

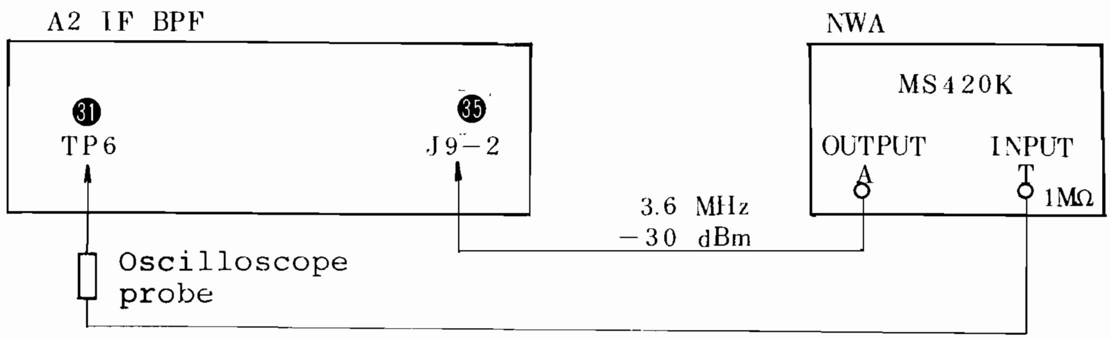


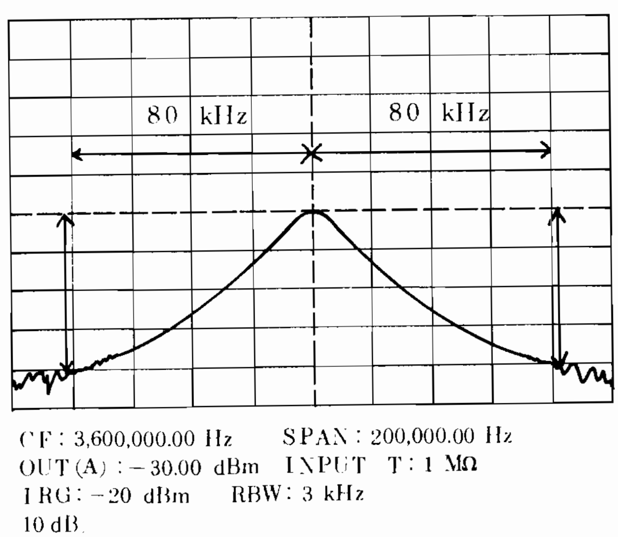
Fig. 3-31 Crystal Filter Adjustment Setup

(ii) Adjustment

Step	Procedure
1	Press the MS2601A/J [INITIAL] key and set the RBW to 9 kHz.
	---------------- 1st stage adjustment ----------------
2	Connect J6, J8, J12, and J14 to J5 ⓬ , J7 ⓭ , J11 ⓮ , and J13 ⓯ , respectively, as follows: J6 → J5 ⓬ between pins 2 and 3 (normal connection) J8 → J7 ⓭ between pins 1 and 2 J12 → J11 ⓮ between pins 1 and 2 J14 → J13 ⓯ between pins 1 and 2 Note: At normal connection, J6, J8, J12, and J14 are connected between pins 2 and 3 of J5, J7, J11, and J13, respectively.

(continued)

Step	Procedure
3	Adjust C34 ⓰ so that the characteristic shown in Fig. 3-32 (1) is obtained (same attenuation at ±80 kHz from center frequency).
4	Set the SCALE of the MS420K to 1 dB/DIV and adjust L13 ⓱ so that the peak frequency is 3.6 MHz as shown in Fig. 3-32 (2).
5	Repeat steps 3 and 4 two or three times to obtain both the characteristics simultaneously.

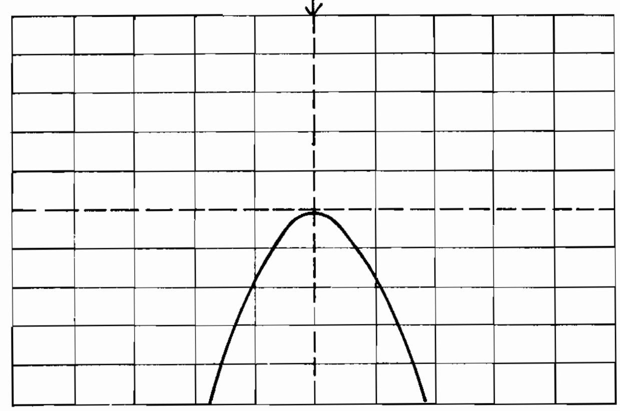


(1) Total Pass-band/Attenuation

Fig. 3-32 Crystal Filter Adjustment

(continued)

Step	Procedure



(2) Pass-band

Fig. 3-32 Crystal Filter Adjustment (Cont'd)

(continued)

Step	Procedure
	------------- 3rd stage adjustment -------------
6	Connect J6, J8, J12, and J14 to J5 ⓬ , J7 ⓭ , J11 ⓮ , and J13 ⓯ , respectively, as follows:
	J6 → J5 ⓬ between pins 1 and 2
	J8 → J7 ⓭ between pins 1 and 2 (same as step 2)
	J12 → J11 ⓮ between pins 2 and 3 (normal connection)
	J14 → J13 ⓯ between pins 1 and 2 (same as step 2)
7	Perform steps 3, 4, and 5 described above. However, use C51 ⓲ and L19 ⓳ instead of C34 and L13 for adjustment.
	------------- 4th stage adjustment -------------
8	Connect J6, J8, J12, and J14 to J5 ⓬ , J7 ⓭ , J11 ⓮ , and J13 ⓯ , respectively, as follows:
	J6 → J5 ⓬ between pins 1 and 3 (same as step 6)
	J8 → J7 ⓭ between pins 1 and 2 (same as steps 2 and 6)
	J12 → J11 ⓮ between pins 1 and 2
	J14 → J13 ⓯ between pins 2 and 3 (normal connection)
9	Perform steps 3, 4, and 5 described above. However, use C58 ⓴ and L21 ㉑ instead of C34 and L13 for adjustment.

(continued)

Step	Procedure
	------------ 2nd stage adjustment ------------
10	Connect J6, J8, J12, and J14 to J5 ⓬ , J7 ⓭ , J11 ⓮ , and J13 ⓯ , respectively, as follows: J6 → J5 ⓬ between pins 1 and 2 (same as steps 6 and 8) J8 → J7 ⓭ between pins 2 and 3 (normal connection) J12 → J11 ⓮ between pins 1 and 2 (same as step 8) J14 → J13 ⓯ between pins 2 and 3 (normal connection)
11	Change the RBW of the MS2601A/J to 3 kHz.
12	Perform steps 3, 4, and 5 described above. However, use C40 ㉒ and L15 ㉓ instead of C34 and L13 for adjustment.
13	Connect J6, J8, J12, and J14 between pins 2 and 3 of J5 ⓬ , J7 ⓭ , J11 ⓮ , and J13 ⓯ , respectively (normal connection). Check that the filter characteristic is as shown in the following figure. Center frequency: 3.6 MHz 3 dB BW: 3 kHz ±20%

Step	Procedure
13 (Cont.)	

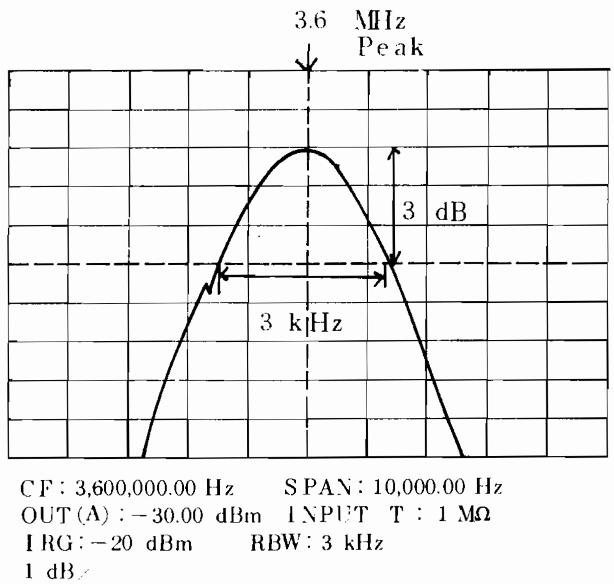


Fig. 3-33 Crystal Filter Pass-band Characteristic

(d) LC filter adjustment

(i) Setup

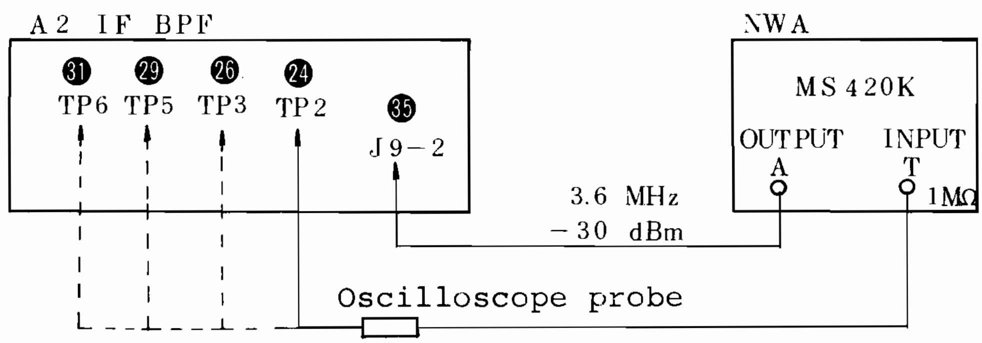
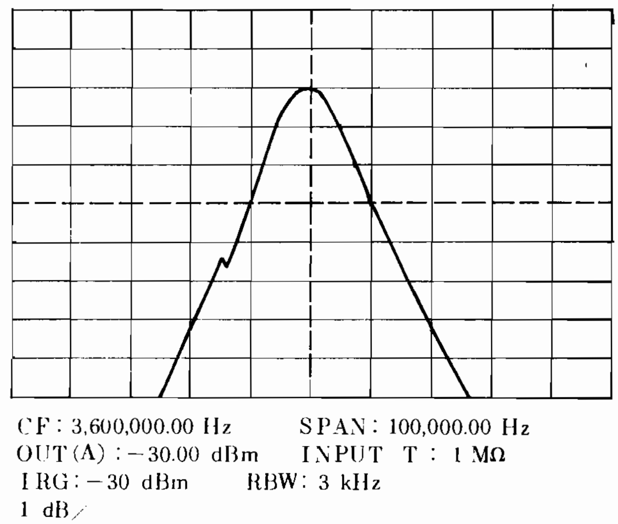


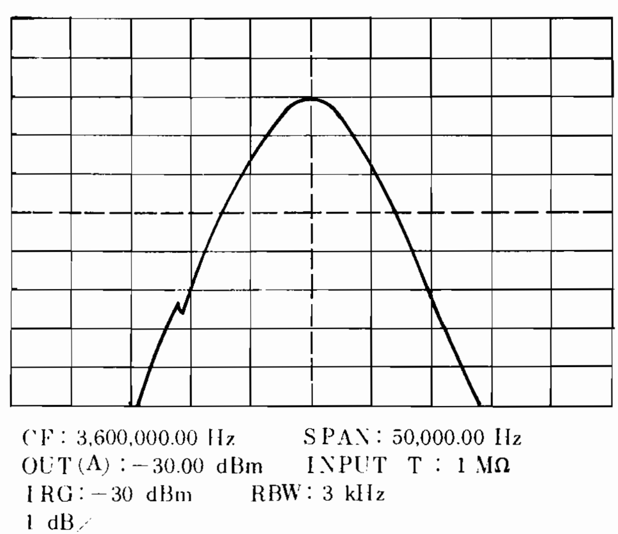
Fig. 3-34 LC-Filter Adjustment Setup

(ii) Adjustment

Step	Procedure
1	Connect an oscilloscope probe to INPUT T (1 MΩ) of the MS420K for use in the following steps.
2	Set the RBW of the MS2601A/J to 10 kHz.
3	Connect INPUT T of the MS420K to TP2 ㉔ .
4	Adjust C35 ㉕ so that the peak frequency is 3.6 MHz as shown in Fig. 3-35 (1).
5	Connect INPUT T of the MS420K to TP3 ㉖ .
6	Adjust C50 ㉗ so that the peak frequency is 3.6 MHz as shown in Fig. 3-35 (2).
7	Connect INPUT T of the MS420K to TP5 ㉙ .
8	Adjust C52 ㉘ so that the peak frequency is 3.6 MHz as shown in Fig. 3-35 (3).
9	Connect INPUT T of the MS420K to TP6 ㉛ .
10	Adjust C62 ㉚ so that the peak frequency is 3.6 MHz as shown in Fig. 3-35 (4).

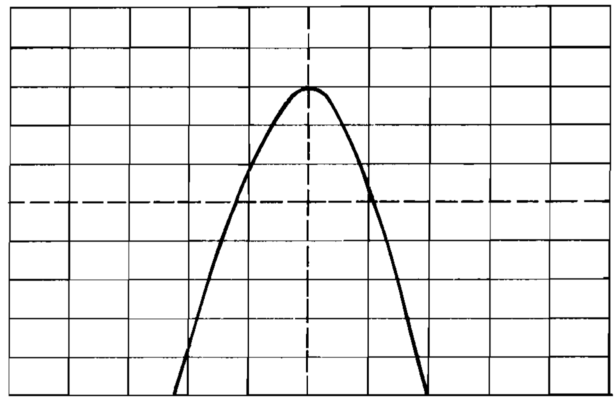


(1) TP2



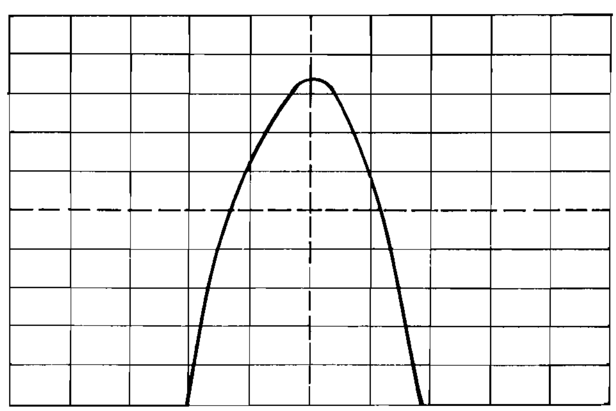
(2) TP3

Fig. 3-35 LC Filter Adjustment



CF : 3,600,000.00 Hz SPAN : 50,000.00 Hz
OUT(A) : −30.00 dBm INPUT T : 1 MΩ
IRG : −30 dBm RBW : 3 kHz
1 dB/

(3) TP5



CF : 3,600,000.00 Hz SPAN : 50,000.00 Hz
OUT(A) : −30.00 dBm INPUT T : 1 MΩ
IRG : −30 dBm RBW : 3 kHz
1 dB

(4) TP6

Fig. 3-35 LC Filter Adjustment (Cont'd.)

(e) Variable gain amplifier adjustment

(i) Setup

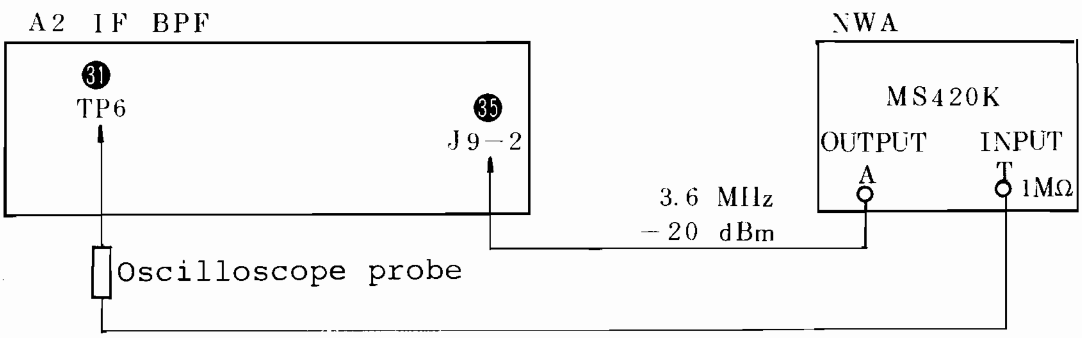


Fig. 3-36 Variable Gain Amplifier Adjustment Setup

(ii) Adjustment

Step	Procedure
1	Press the MS2601A/J [INITIAL] key and set as shown below. REF LEVEL: -10 dBm RBW: 3 kHz ATT: 0 dB
2	Change the REF LEVEL of the MS2601A/J to -10, -12, -14, -16, -18, and -20 dBm and check that the MS420K display changes by 2 ±0.5 dB each.

(continued)

Step	Procedure
3	Also, read the MS420K displayed value when the REF LEVEL is -20 dBm. (This value is used in the next step.)

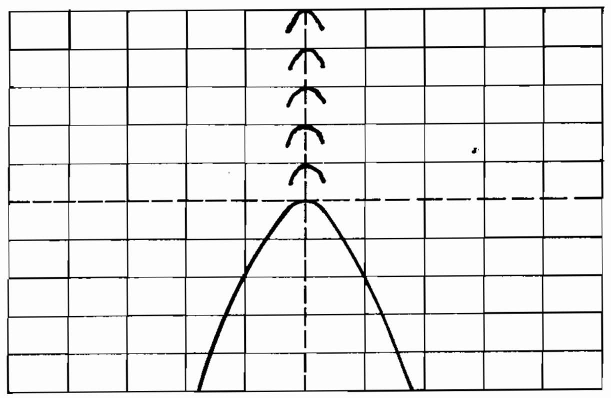
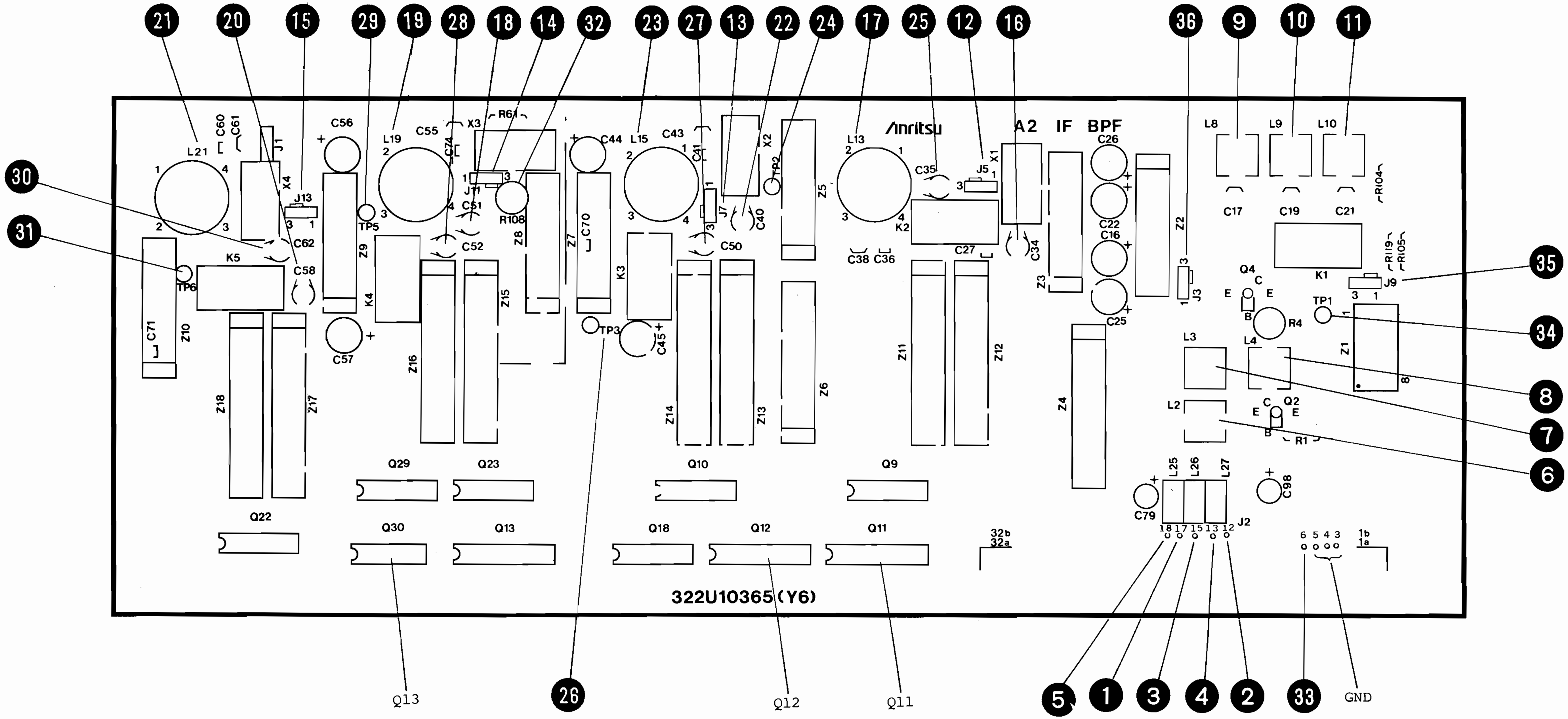
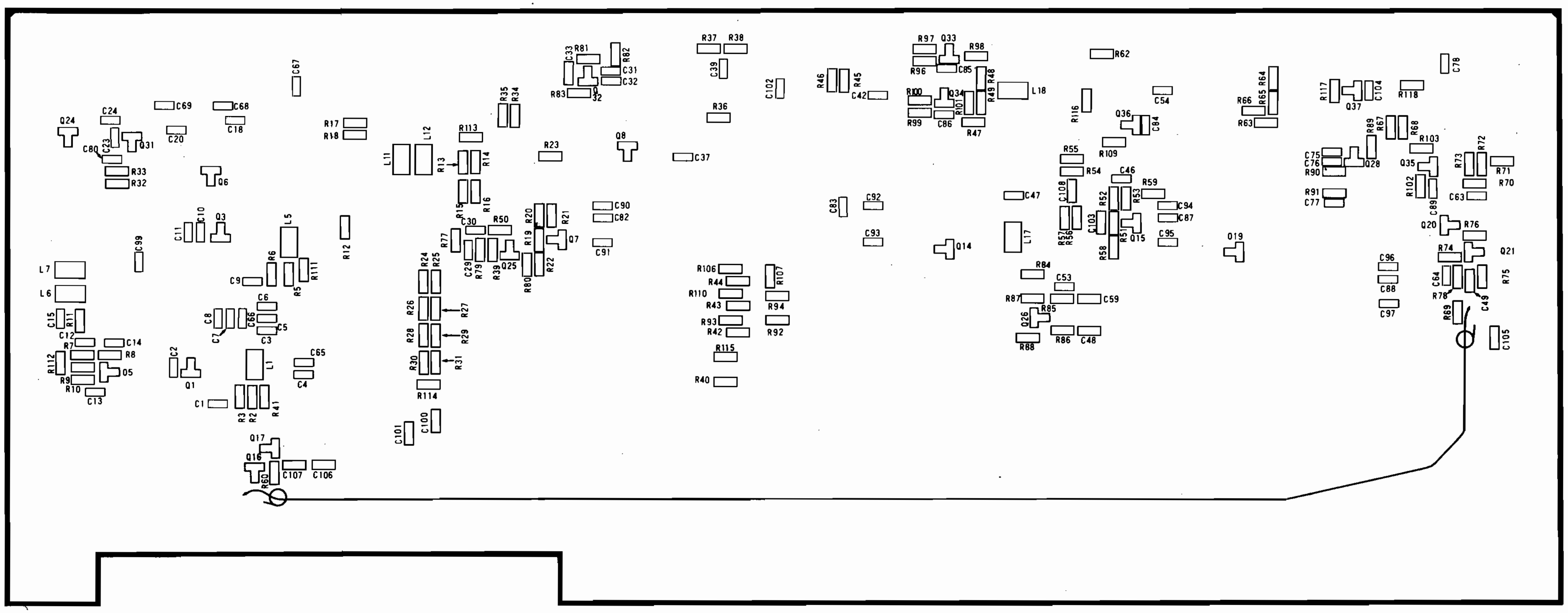


Fig. 3-37 Variable Gain Amplifier Adjustment

Step	Procedure
4	Set the MS420K output level and the MS2601A/J REF LEVEL to -60 dBm.
5	Adjust R108 ㉜ so that the MS420K displayed value is the same as in step 2.



3-38 (a) A2 IF BPF PC Board
Parts Layout (Parts Side) 16



3-38 (b) A2 IF BPF PC Board
Parts Layout (Pattern Side) 16

33W 29892 1/4

APPLICATION

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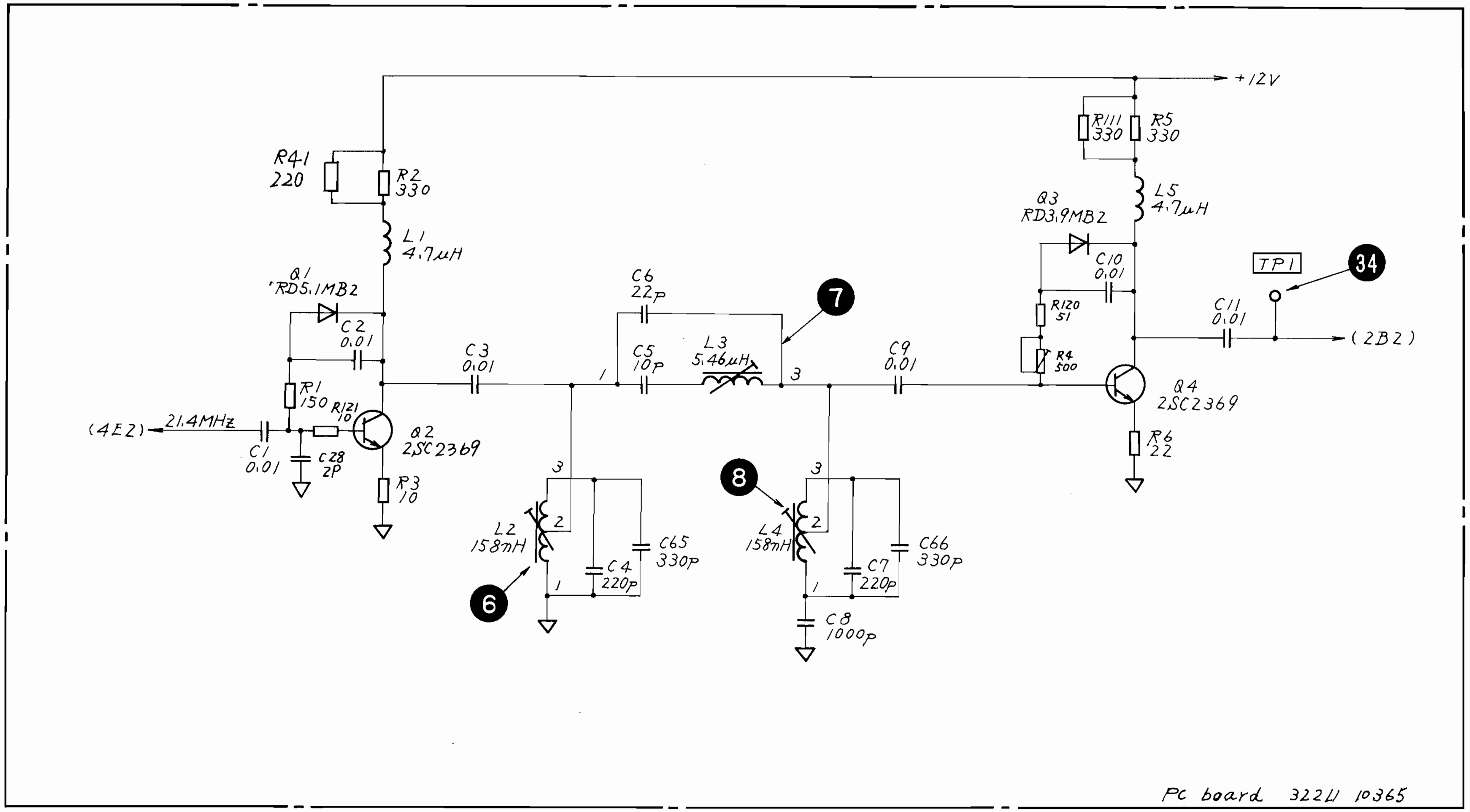


Parts List 34W 93318

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :

APPROVED BY | DRAWN BY

TITLE A2, IF BPF Circuit Diagram.

DRAWING No. 33W 29892 1/4

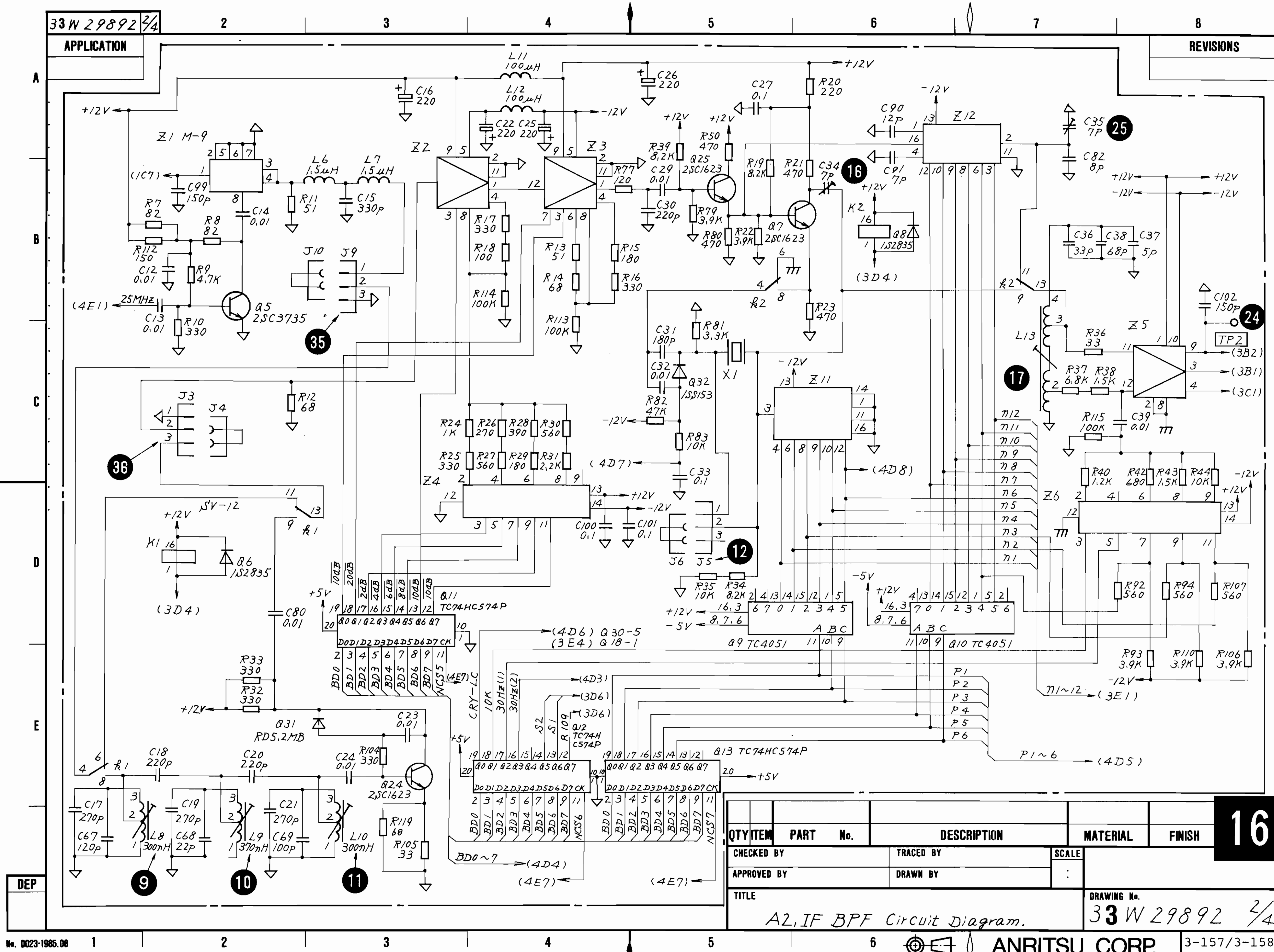
16

DEP

No. D023-1985.08

ANRITSU CORP.

3-155/3-156



A2, IF BPF Circuit Diagram.

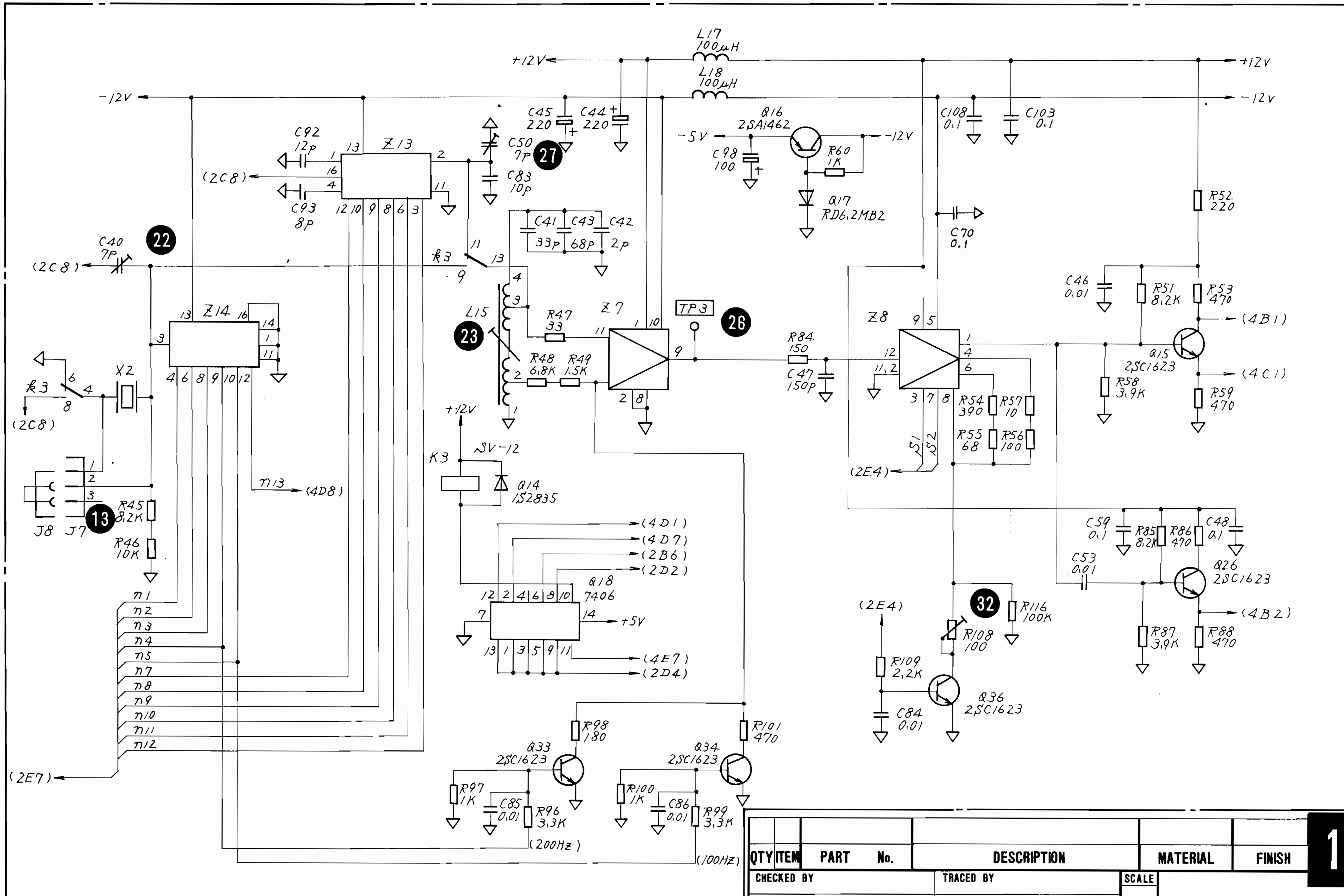
QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY / TRACED BY / SCALE
APPROVED BY / DRAWN BY
TITLE: A2, IF BPF Circuit Diagram.
DRAWING No. 33W29892 2/4
16
DEP
ANRITSU CORP.

33W29892 3/4

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

16

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TITLE A2, IF BPF Circuit Diagram.

DRAWING No. 33W29892 3/4

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No. 0023-1985.08

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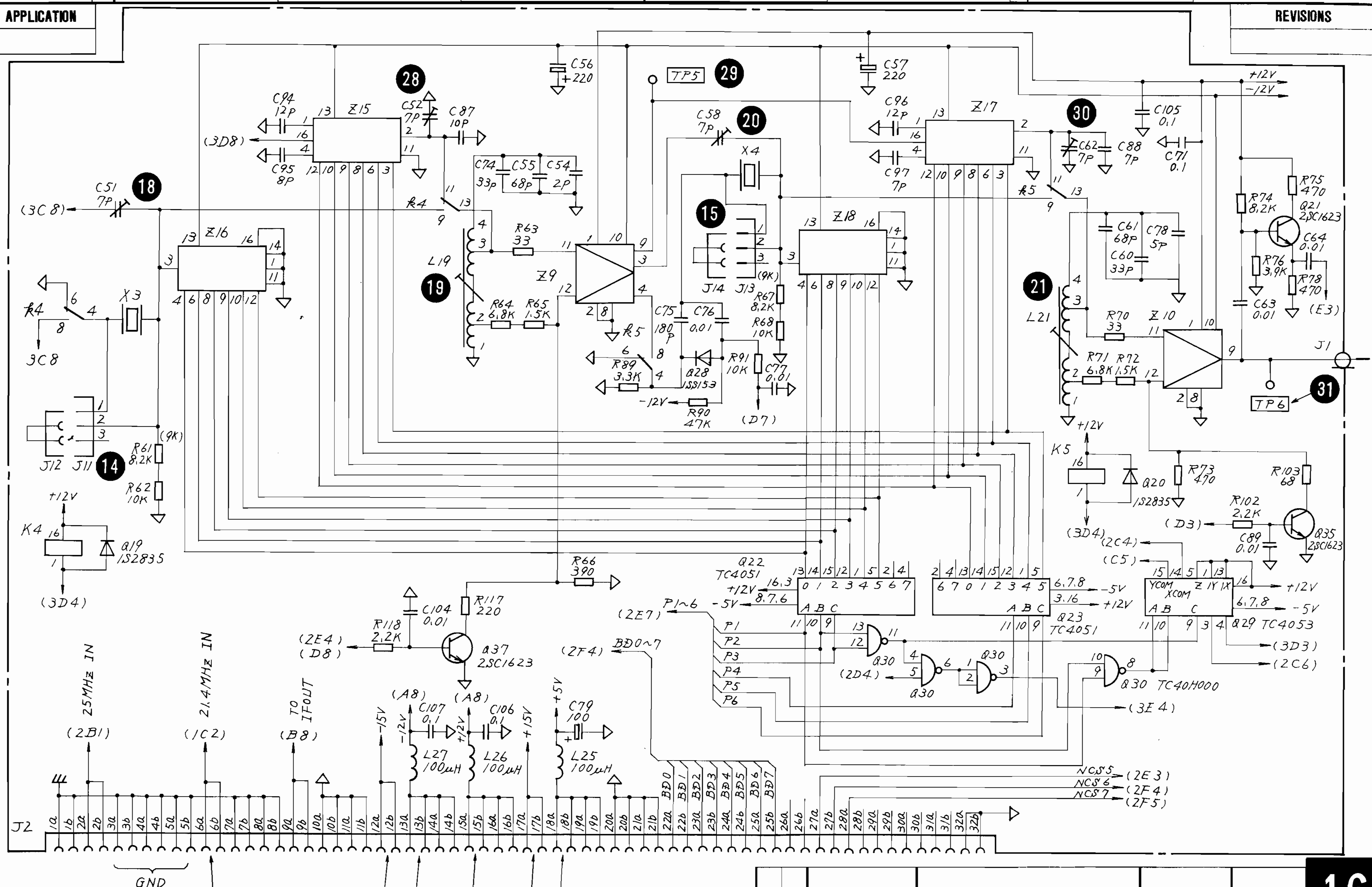
3-159/3-160

33W29892 4/4

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TITLE

A2, IF BPF Circuit Diagram.

DRAWING No. 33W29892 4/4

16

No. D023-1985.08

ANRITSU CORP. 3-161/3-162

3.3.6 A3 IF LOG/DET 17

(1) Circuit description

The A3 IF LOG/DET section logarithmically compresses and detects the 3.6 MHz 3rd IF input signal. This detected signal is input to the video filter section. This dc output filtered signal is A/D converted and the digitallized signal is sent to the A8 MAIN CPU.

In the QP detection mode, a QP detector is inserted after the detector.

A3 IF LOG/DET has a frequency distributor for supplying the various reference frequency signals to each circuit.

A reference signal and reference variable attenuator used in automatic calibration are also provided. These circuits are described below in detail in Fig. 3-39 and 17.

(a) LOG amplifier

This LOG amplifier is a current addition type ac LOG compression circuit. A seven-stage differential amplifier is used. It has an 80 dB dynamic range. These consists of four hybrid ICs. Outputs of Q87-1 and Q87-7 are used as the reference power sources supplied to the hybrid ICs.

LIN/LOG mode switching is also performed in this section. In the LIN mode, the input signal is not passed through the LOG amplifier but is supplied to the Q2 transistor amplifier directly by switching K1 relay.

(b) Detector

The detector consists of a three-transistor dc amplifier and two-diode detector. It is a feedback type detection circuit.

Its detected output is amplified by the dc amplifier and supplied to a variable VIDEO FILTER, which has a dynamic range of 40 dB. In the QP detection mode, this detector is used as an envelop detector.

(c) QP detector

The input signal is detected by diode Q30. The electrical charge and discharge time-constants are switched by Q72 and Q37. These time-constants conform to CISPR standards. The dc output is LOG-compressed by pair transistor Q34, which has a dynamic range of 50 dB. The output also enters the filter circuit which determines the mechanical time-constant. This time-constant also conforms to CISPR standards.

(d) Video filter

The video filter consists of six low-pass filter circuits. These circuits are switched by switch ICs Q12 and Q13.

(e) Frequency counter

The frequency counter counts the Q2 output signal frequency. The receive signal frequency is 3.6 MHz. This signal waveform is shaped by transistor Q18, Q22 limiter circuit and the frequency is counted by the counter IC Q24.

(f) A/D converter

The A/D converter consists of a peak signal detection circuit, negative signal detection circuit, sample hold circuit, A/D conversion circuit, and a circuit which controls the timing of these circuits.

The peak signal detection circuit consists of diodes Q39 and Q40 with high impedance at reverse bias, charging capacitor C35, and high input impedance IC to detect the positive signal.

The C35 charged voltage is discharged instantly by the signal from the timing control circuit. At the negative signal detection circuit, the arrangement of diodes Q39 and Q40 is opposite to than of the peak signal detection circuit to detect the negative signal.

(g) Frequency distributor

Frequency distribution is performed by digital ICs Q50, Q51, and Q52. The 50 MHz input signal from the REF OSC section is divided by 2 to obtain 25 MHz and becomes the A2 IF BPF 3rd local signal. This signal is further divided by 50 to obtain 500 kHz and becomes the counter circuit reference signal.

The 25 MHz signal is also divided by 40 to obtain 625 kHz and becomes the reference signal for automatic calibration.

(h) Reference variable attenuator

Because the power supply voltage of Q52 is highly stabilized, the output level of Q52 is very accurate. The Q56 switch circuit which attenuates the signal level from 0 to 3 dB in 1 dB steps, the Q57 switch circuit which attenuates the signal level from 0 to 12 dB in 4 dB steps, and the Q58 switch circuit which attenuates the signal level to 0, 32, and 36 dB; all of these are cascade-connected so that this Q52 output level can be attenuated from 0 to 52 dB in 1 dB steps. The Q84 IC amplifier output signal is passed through emitter-follower transistor Q85 and is supplied to the RF section in the A1 RF/PLL BLOCK.

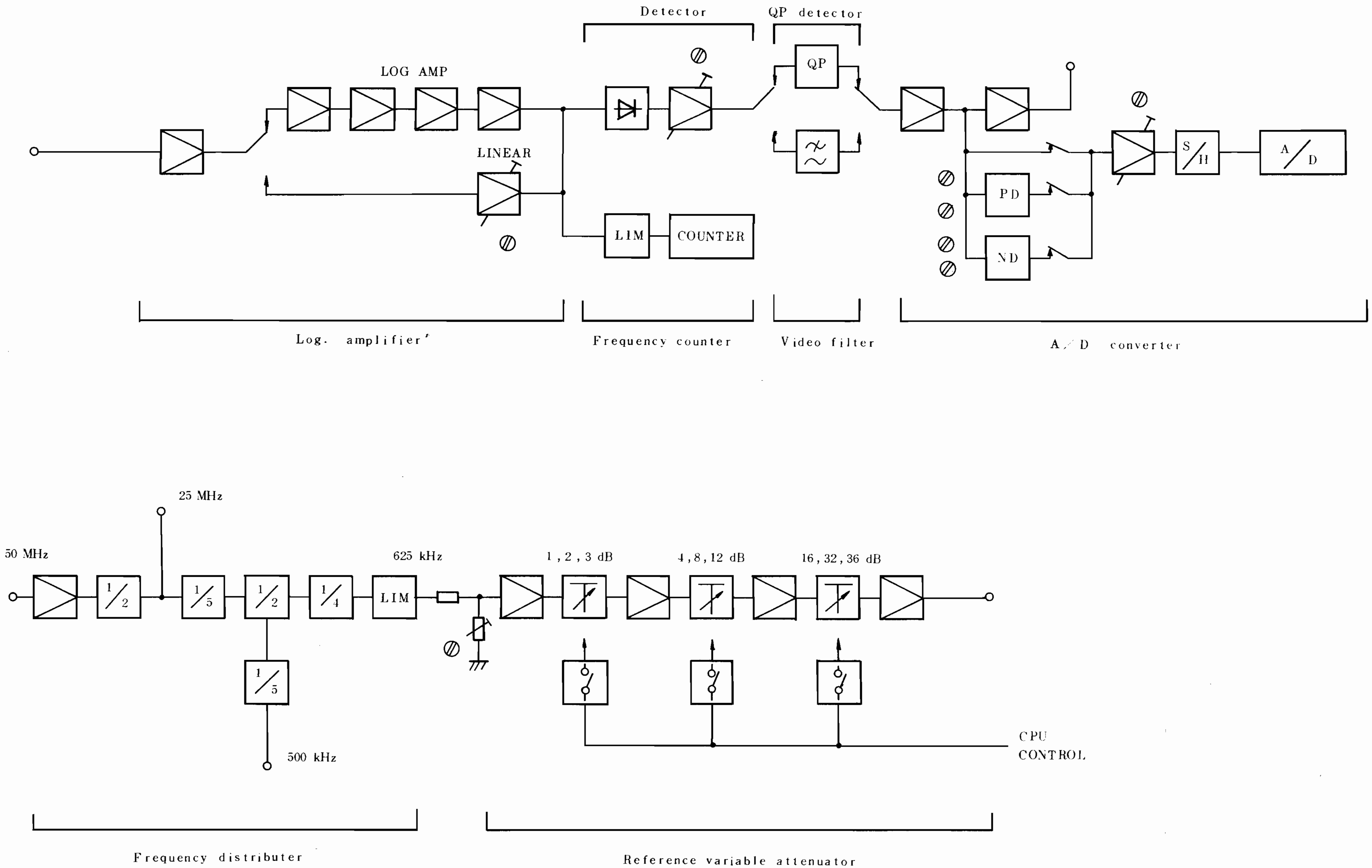

Fig. 3-39 A3 IF LOG/DET Block Diagram

(2) Symptoms and causes

	Symptom	Cause
1.	No signal on CRT.	LOG amplifier, detector, video filter faulty.
2.	Linearity very poor when input signal varied key 10 dB.	LOG detector faulty.
3.	Video filter not switched correctly.	Video filter faulty.
4.	QP operation not switched correctly.	QP detector faulty.
5.	Frequency counter does not count correctly.	a) Frequency counter faulty. b) Frequency distributor faulty.
6.	Level change is large at line spectrum display.	A/D converter faulty
7.	No sweep.	A/D converter faulty
8.	FREQ CAL automatic calibration cannot be performed.	a) Frequency distributor faulty. b) Reference variable attenuator faulty.
9.	LEVEL CAL 1 and LEVEL CAL 2 automatic calibration cannot be performed.	Reference variable attenuator faulty.

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

Signal generator: MG443B

50 Ω terminator

Frequency counter: MF76A

(b) Preparations

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove A3 IF LOG/DET by referring to paragraph 2.4.
2	Reinstall A3 IF LOG/DET by using an extender board.

(c) Troubleshooting

(Fig. 3-43, 17)

Step	Procedure
1	Check the power supply voltages according to the table below.

Checkpoint	Normal condition
J2-12 ❶	-14.3 to -15.7 V
J2-13 ❷	-11.5 to -12.5 V
J2-15 ❸	+11.5 to +12.5 V
J2-17 ❹	+14.3 to +15.7 V
J2-18 ❺	+4.75 to +5.25 V

Step	Procedure
2	Check the LOG amplifier reference voltage according to the table below.

Checkpoint	Normal condition
Z3-17 ❻	-11.5 to -12.5 V
Z3-14 ❼	-7.0 to -8.0 V
Z3-12 ❽	-3.0 to -4.0 V

(continued)

Step	Procedure
3	Connect J1 ❾ to a signal generator (SG) through an extender cable and 50 Ω terminator as shown below.

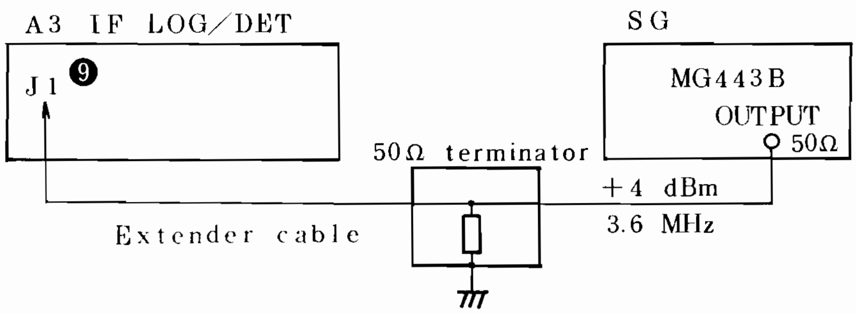

Fig. 3-40 A3 Troubleshooting Setup

Step	Procedure
4	Press the MS2601A/J [INITIAL] key, then set as follows: SPAN: 0 kHz VID BW: 1 Hz
5	Lower the SG output level from 0 to 70 dB in 10 dB steps. If the corresponding MS2601A/J display level at this time is within ±2 dB, LOG amplifier operation is normal.
6	Check the frequencies of the following points with a frequency counter: Q51-8 ⓲ 500 kHz TP6 ⓳ 25 MHz Q52-9 ⓴ 625 kHz
7	Connect J1 ❾ to J1 (Fig. 2-3) in A2 IF BPF with an extender cable.

(continued)

Step	Procedure
8	Check the automatic calibration function as follows: Press the ⌈LEVEL CAL 1⌉, ⌈LEVEL CAL 2⌉, or ⌈FREQ CAL⌉ keys and check if the operating time becomes: LEVEL CAL 1 Approx. 30 s LEVEL CAL 2 Approx. 45 s FREQ CAL Approx. 7 s If not OK, the frequency distributor or reference variable attenuator is faulty.
9	Check the A3 IF LOG/DET control signal set values shown in Tables 3-17 to 3-21.

Table 3-17 VBW Control Signals

VBW set value	Q14 pin No.				Q15 pin No.	
	19	18	16	15	12	13
100 kHz	0	0	1	0	0	0
10 kHz	1	1	1	0	0	0
1 kHz	1	0	1	0	0	0
100 Hz	0	0	1	0	1	0
10 Hz	1	1	1	0	1	0
1 Hz	0	1	1	0	1	0
OFF	0	1	1	1	0	0

1 ... Approx. 5 V
0 ... Approx. 0 V

(continued)

Step	Procedure
9 (Cont.)	Table 3-18 QP Control Signals

QP set value	Q14 pin No. 16	14	13
QP 120 k	0	0	0
QP 9 k	0	1	0
QP 200 Hz	0	0	1
OFF	1	*	*

1 ... Approx. 5 V
0 ... Approx. 0 V
* ... Don't care

Table 3-19 LOG/LIN Control Signals

	Q14 pin No. 17	Q15 pin No. 12
LOG	1	0
LIN	0	1

1 ... Approx. 5 V
0 ... Approx. 0 V

(continued)

Step	Procedure
9 (Cont.)	Table 3-20 RF ATT Control Signals

RF ATT set value (dB)	Q60 pin No. 12	13	14
0	0	0	0
10	0	1	0
20	0	0	1
30	0	1	1
40	1	0	1
50	1	1	1

1 ... Approx. 5 V
0 ... Approx. 0 V

Table 3-21 CAL Control Signals

	Q15 pin No. 19	Q60 pin No. 15
CAL ON	0	1

1 ... Approx. 5 V
0 ... Approx. 0 V

(4) Adjustment

(a) LOG detector adjustment

(i) Setup

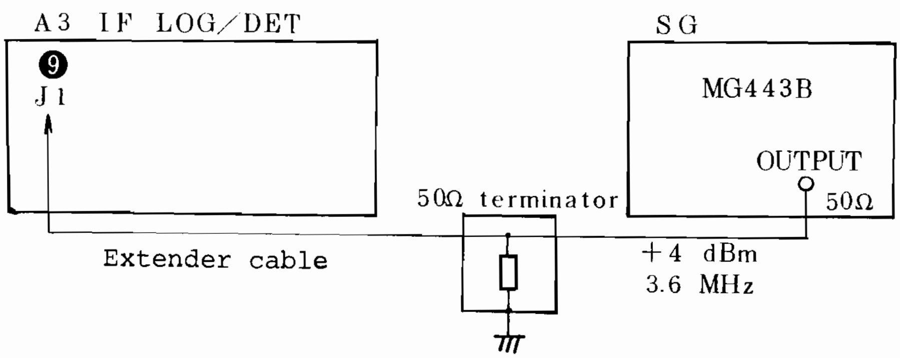

Fig. 3-41 A3 Adjustment Setup

(ii) Adjustment

Step	Procedure
1	Apply a 3.6 MHz, +4 dBm signal from a signal generator (SG) to J1 ❾ .
2	Adjust R22 ⓫ to obtain a voltage of 4.00 V at TP2 ❿ .

(b) DET mode adjustment

(i) Setup

(Same as Fig. 3-41)

(ii) Adjustment

Step	Procedure
1	Connect J4 (connected to J3 ⓬) to between J3 ⓬ pins 2 and 3.
2	Press the [INITIAL][SHIFT] and [5] keys in this sequence to set the DET mode (menu display: SUB TRACE).
3	Press the [F3] key to set the SMP mode.
4	Measure the TP5 ⓭ voltage. Assume this voltage to be the reference voltage (Approx. 0 V), which is used later for adjustment.
5	Press the [F3] key to set the PEAK mode.
6	Adjust R84 ⓮ to set TP5 ⓭ voltage to the reference voltage in step 4.
7	Press the [F3] key to set the DIP mode.
8	Adjust R150 ⓯ to set TP5 ⓭ voltage to the reference voltage in step 4.
9	Connect J4 (connected to J3 ⓬) to J3 ⓬ pins 1 and 2. (Return to original state.)
10	Set the SMP mode.
11	Measure the TP5 ⓭ voltage. Assume this voltage to be the reference voltage (Approx. 2 V), which is used later for adjustment.
12	Set the PEAK mode.
13	Adjust R86 ⓰ to set TP5 ⓭ voltage to the reference voltage in step 11.

(continued)

Step	Procedure
14	Set the DIP mode.
15	Adjust R153 ⑰ to set TP5 ⑬ voltage to the reference voltage in step 11.

(c) Overall adjustment

(i) Setup

(Same as Fig. 3-14)

(ii) Adjustment

Step	Procedure
1	Apply a 3.6 MHz, +4 dBm signal from a signal generator (SG) to J1 ❾ .
2	After pressing the MS2601A/J [INITIAL] key, set the DET mode to PEAK.
3	Adjust R98 ㉑ to set the display level to 0.00 dBm ±0.02 dB.
4	Press the keys in [SHIFT][8][F5] order to change the MS2601A/J setting from the LOG mode to the LIN mode.
5	Adjust R5 ㉒ to set the display voltage to 224 ±1 mV.

(d) QP function adjustment

(i) Setup

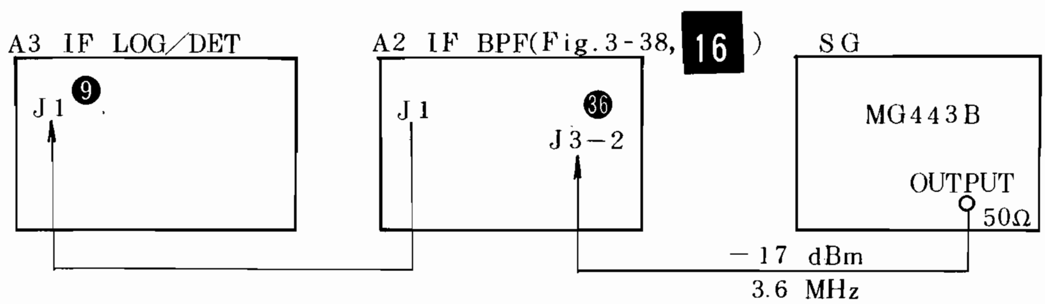

Fig. 3-42 QP Function Adjustment

(ii) Adjustment

Step	Procedure
1	Setup as follows: . By referring to paragraph 2.4, remove A2 IF BPF and also remove the shield cases 55 and 56 (Fig. 2-3). . Disconnect J4 (connected to J3 36 in A2 IF BPF) and solder an extender cable to J3 36 pin 2 on the pattern side. (Pin 1 is a ground pin.) . Next, reinstall the shield case 56 and A2 IF BPF in the chassis.
2	Connect J1 9 to J1 (Fig. 2-3) in A2 IF BPF with an extender cable and apply a 3.6 MHz, -17 dBm signal from the SG to A2 J3-2 36 .

(continued)

Step	Procedure
3	After pressing the MS2601A/J [INITIAL] key, set as follows: SPAN: 0 Hz REF LEVEL: -10 dBm RBW: 1 kHz SCALE: LOG 1 dB
4	Change the SG frequency in 100 Hz steps to set it to the frequency at which the MS2601A/J display level is maximum.
5	Change the SG output level so that the marker level is at the top of the MS2601A/J CRT scale.
6	Change the MS2601A/J SCALE to the LIN mode and check if the level value is at the top of the scale. If not OK, adjust R5 ㉒ to set the level value at the top of the scale.
------	Adjustment when 6 dB bandwidth = 120 kHz ------
7	Set the MS2601A/J RBW to 6 dB bandwidth 120 kHz.
8	Change the SG output level so that the MS2601A/J level value is at the top of the CRT scale.
9	Connect J4 (connected to J3 ⓬) to J3 ⓬ pins 2 and 3. Adjust R43 ㉔ to set the Q70-1 ㉓ voltage to 0.00 ±0.05 mV.

(continued)

Step	Procedure
10	Connect J4 (connected to J3 ⑫) to J3 ⑫ pins 1 and 2. (Return to original state.) Adjust R47 ㉕ to set the Q70-1 ㉓ voltage to 10.00 ±0.05 V.
11	Set the QP mode to ON.
12	Set the Δ marker to ON to set the level display to 0.00 dB.
13	Lower the SG output level by 10 dB.
14	Adjust R74 ㉖ to display the level value to -10.1 dB.
15	Return the SG output level to its original value.
16	Press the [Δ] key (F2) to set the marker level display to 0.00 dB again.
17	Lower the SG output level by 10 dB.
18	Check if the displayed value is -10.1 ±0.05 dB.
19	When the displayed value is not -10.1 ±0.05 dB, repeat steps 14 through 18.
20	Return the SG output level to its original value and adjust R68 ㉗ so that the level value at this time is at the top of the CRT scale.
21	Lower the SG output level by 40 dB.
22	Adjust R63 ㉘ so that the level value is at the 40 dB line (indicated by ⊳—) display position.

(continued)

Step	Procedure
------	Adjustment when 6 dB bandwidth = 9 kHz ------
23	Set the 6 dB bandwidth to 9 kHz.
24	Change the SG frequency in 10 Hz steps to set it to the frequency at which the MS2601A/J display level becomes maximum.
25	Change the SG output level so that the marker level is at the top of the MS2601A/J CRT scale.
26	Lower the SG output level by 40 dB.
27	Adust R62 ㉙ so that the level value is at the 40 dB line (indicated by ▷——) display position.
------	Adjustment when 6 dB bandwidth = 200 Hz ------
28	Set the 6 dB bandwidth to 200 Hz.
29	Change the SG frequency in 1 Hz steps to set it to the frequency at which the MS2601A/J display level is maximum.
30	Change the SG output level so that the marker level is at the top of the MS2601A/J CRT.
31	Lower the SG output level by 40 dB.
32	Check if the level value is at the 40 dB line (indicated by ▷——) display position. If not OK, recheck from step 23.

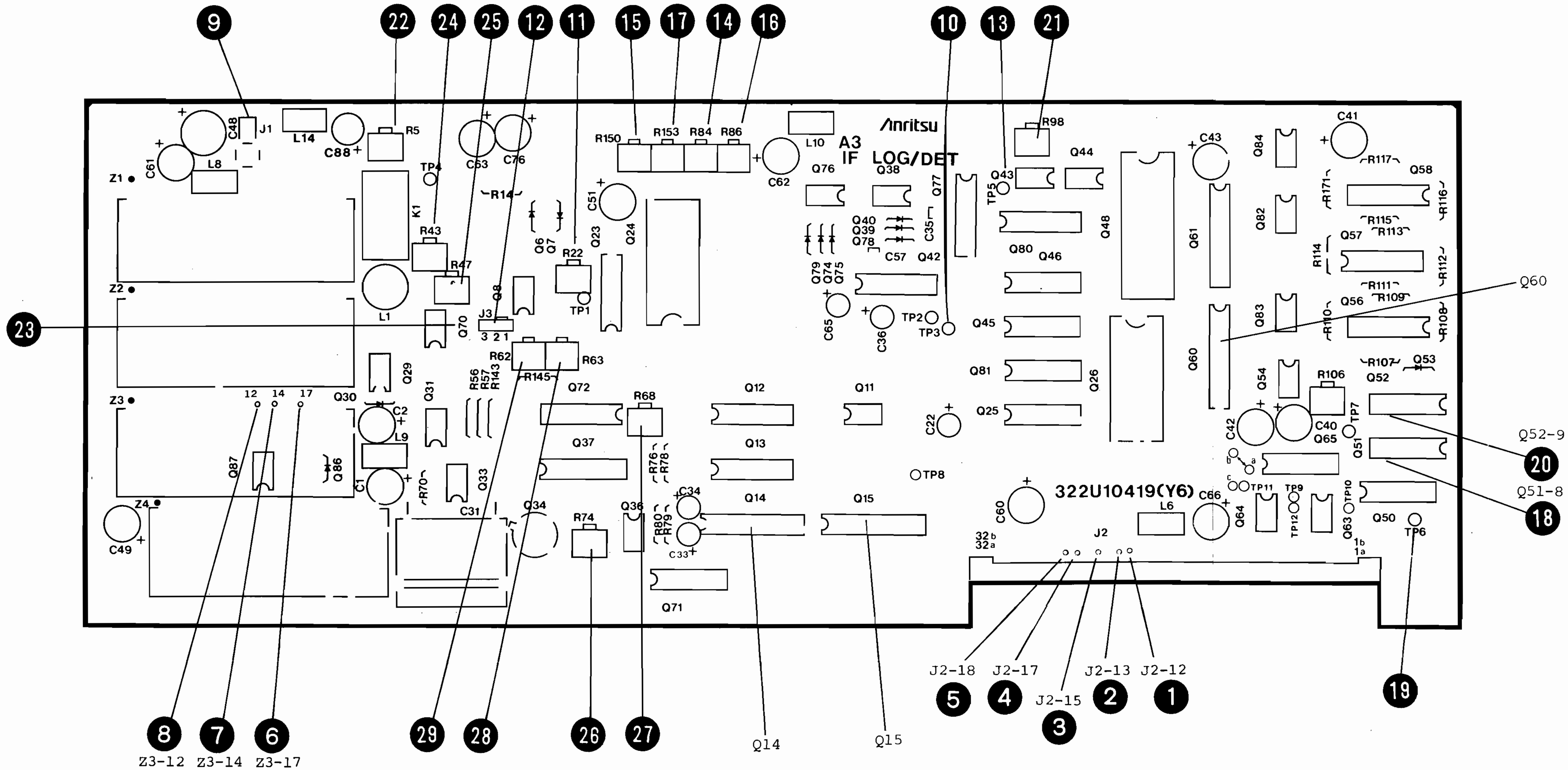

Fig. 3-43 (a) A3 IF LOG/DET PC Board Parts Layout (Parts Side) 17

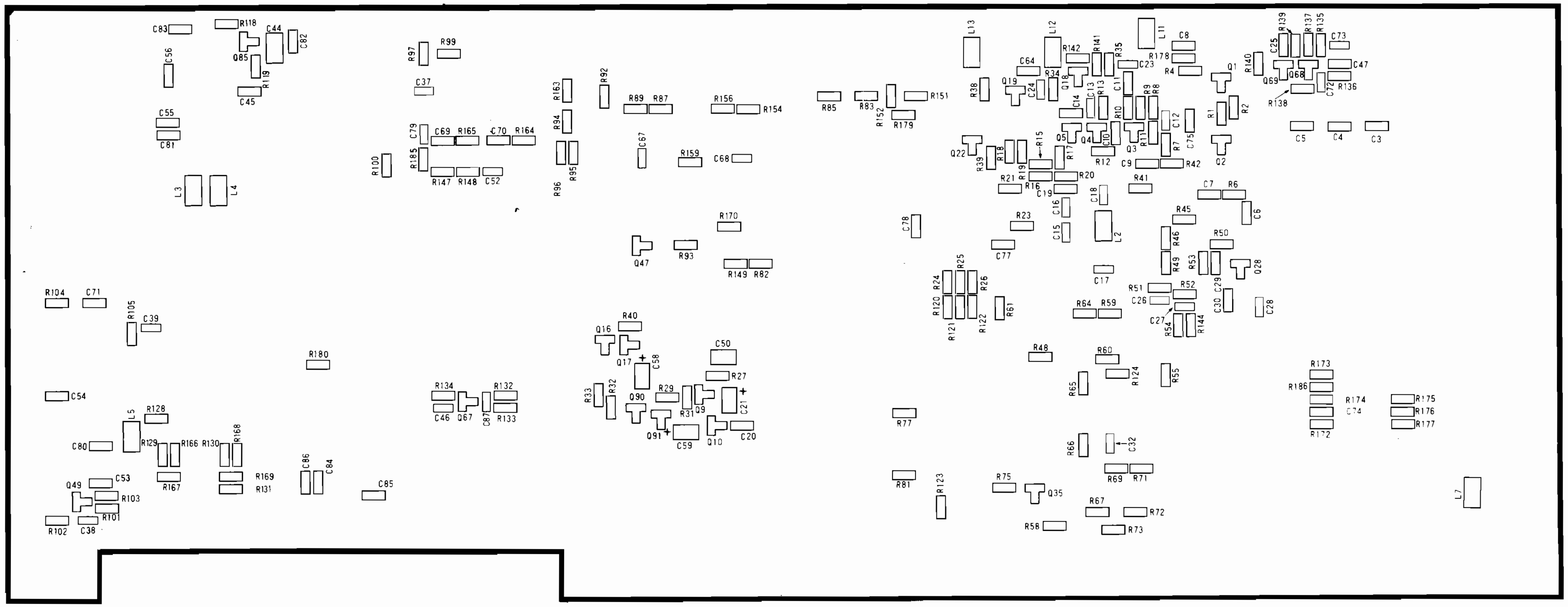

Fig. 3-43 (b) A3 IF LOG/DET PC Board
Parts Layout (Pattern Side) 17

33W29893 1/5

APPLICATION

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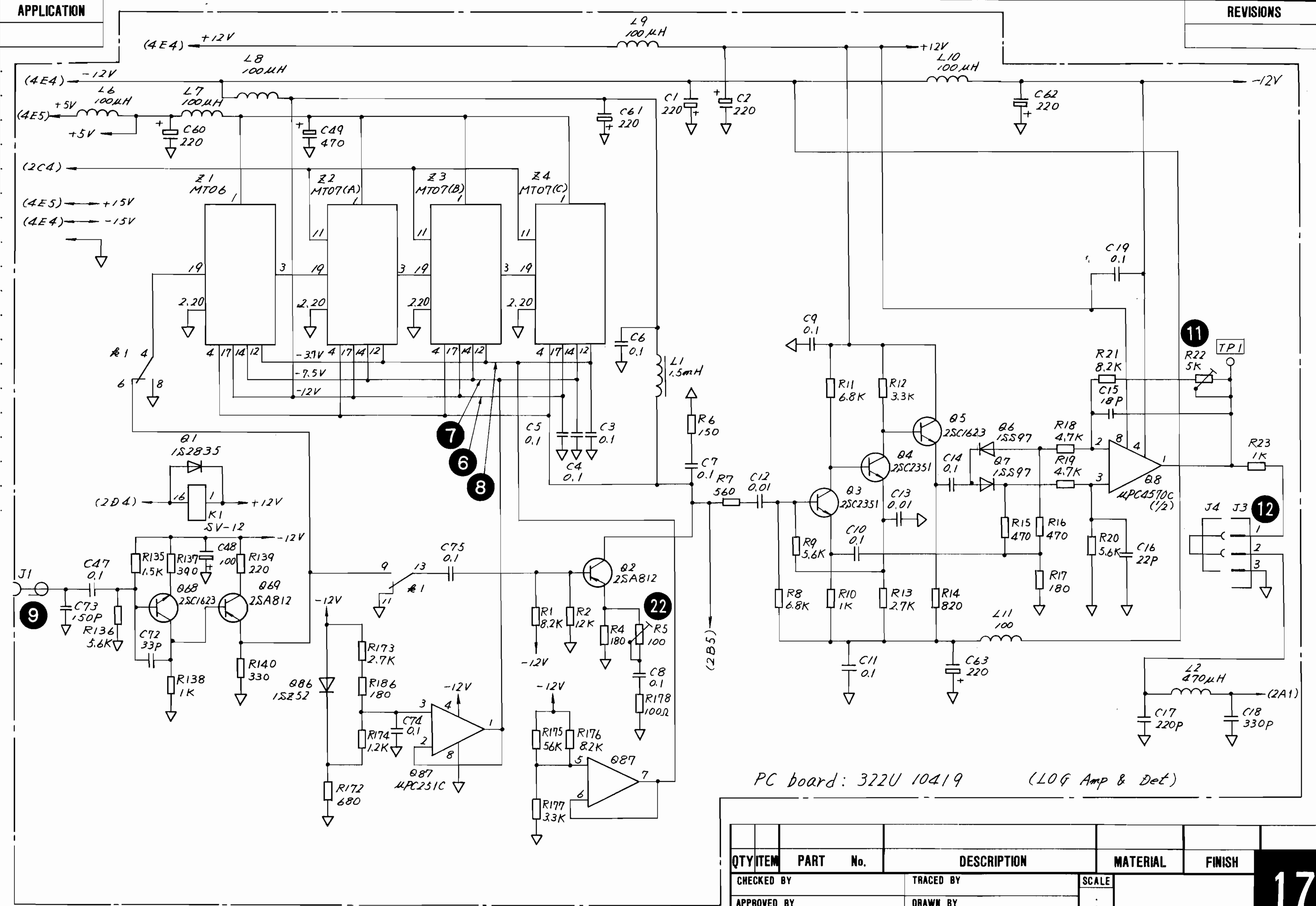

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APPROVED BY | DRAWN BY

Parts List 34W93319

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17

DEP

33W29893 2/5

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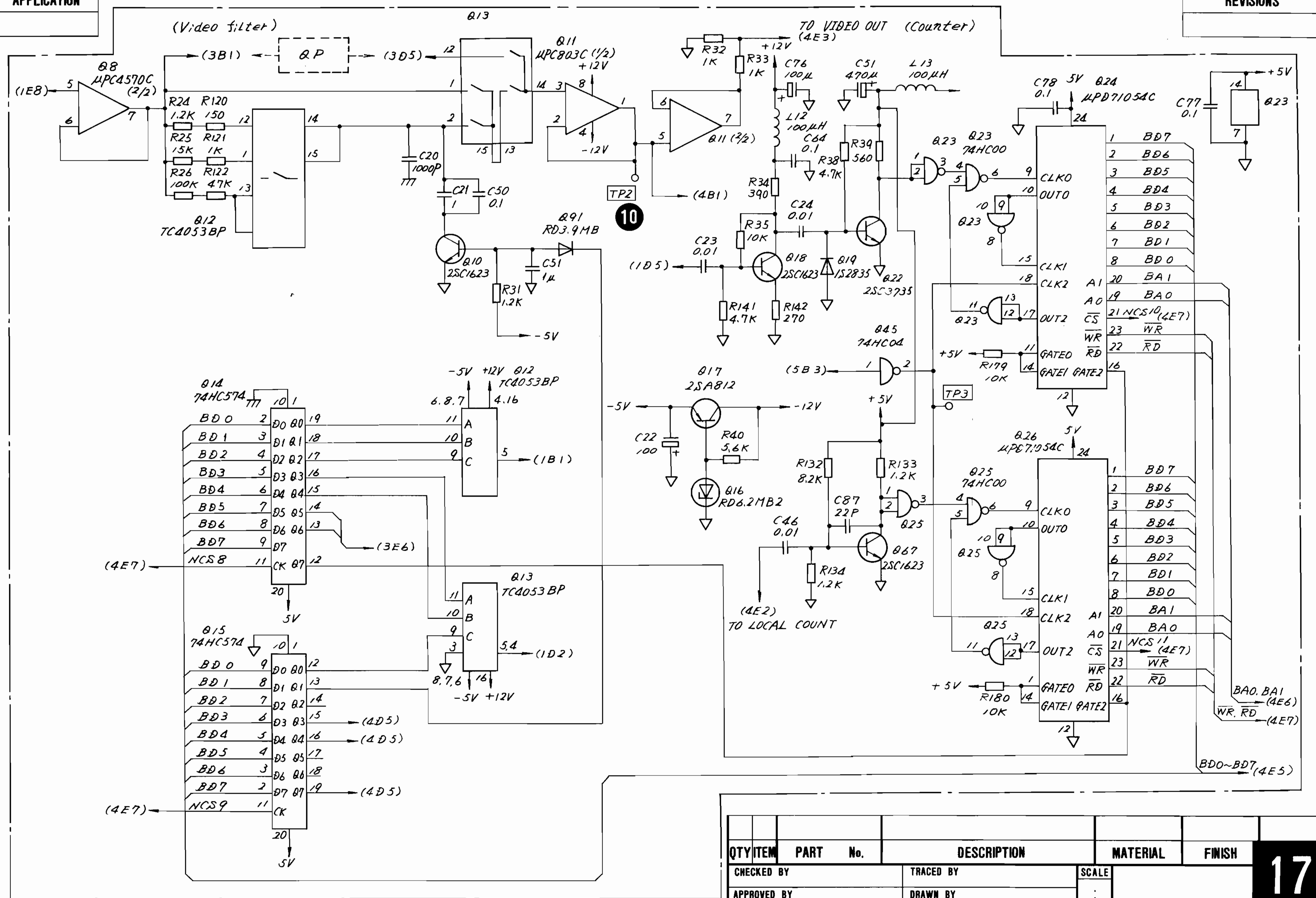

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TITLE A3, IF LOG/DET Circuit Diagram

DRAWING No. 33W29893 2/5

17

DEP

APPLICATION

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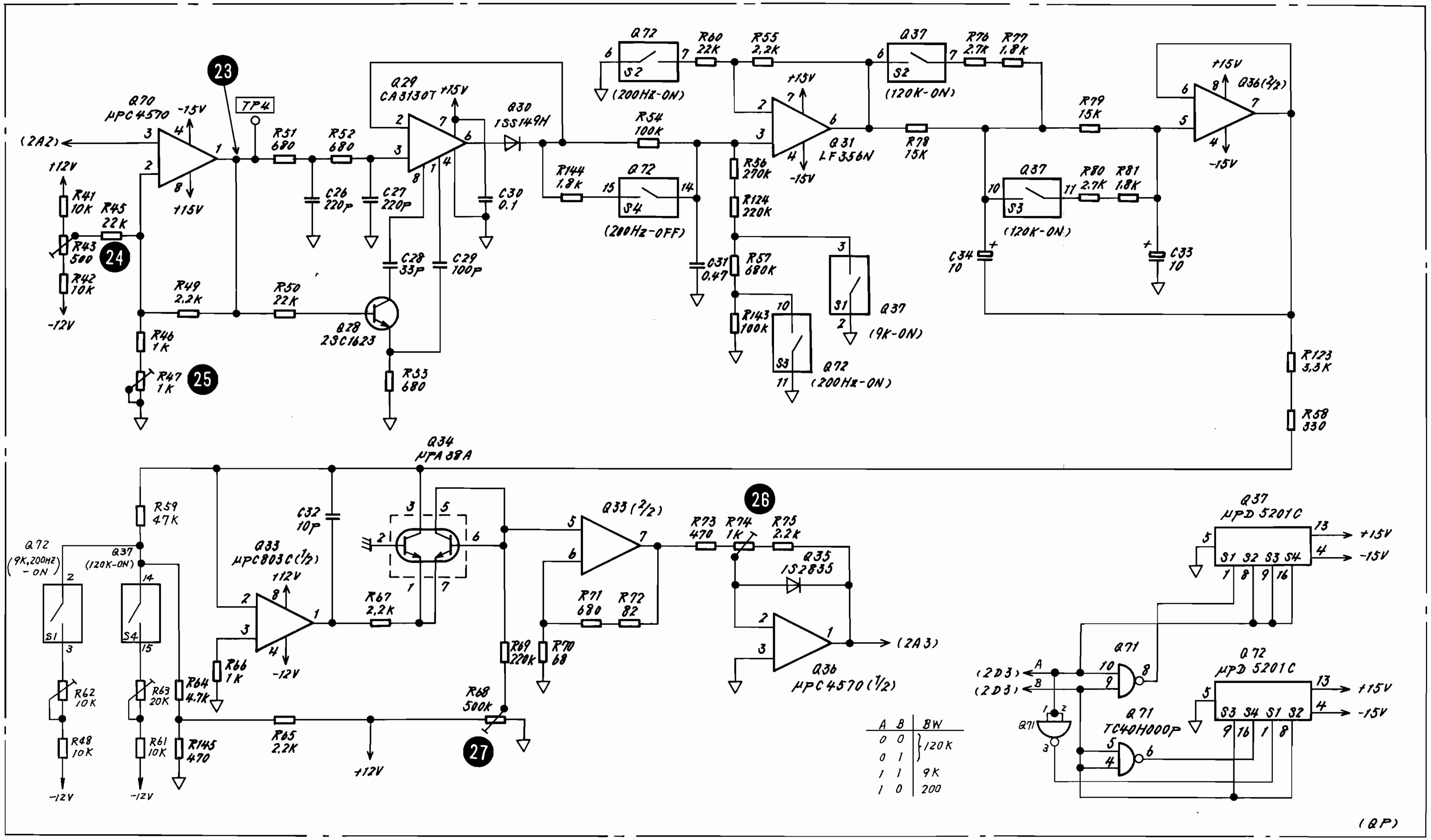

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TRACED BY
SCALE
APPROVED BY
DRAWN BY N. Umamoto

TITLE A3, IF LOG/DET Circuit Diagram

17

DRAWING No. 33W29893 3/5

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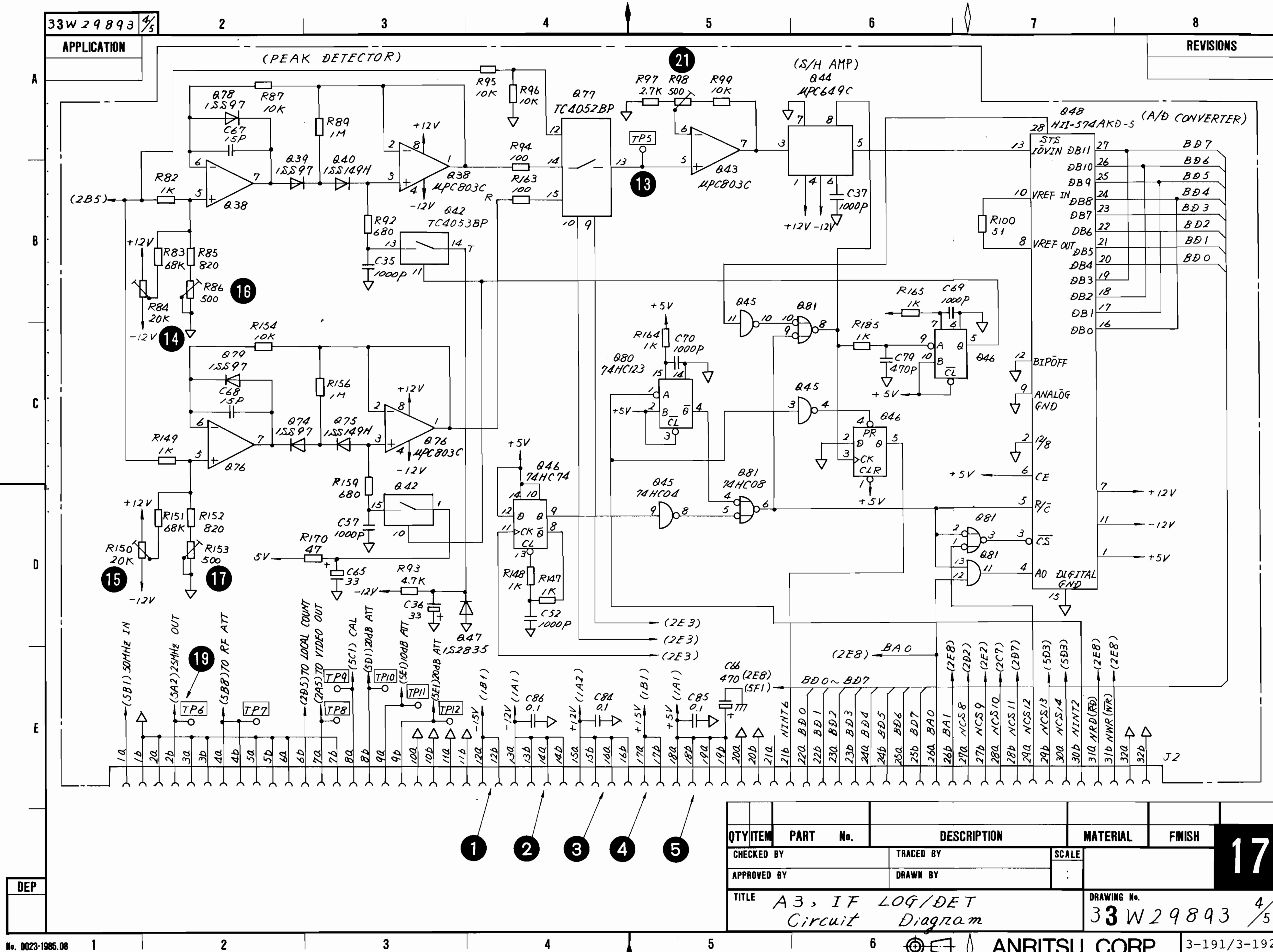
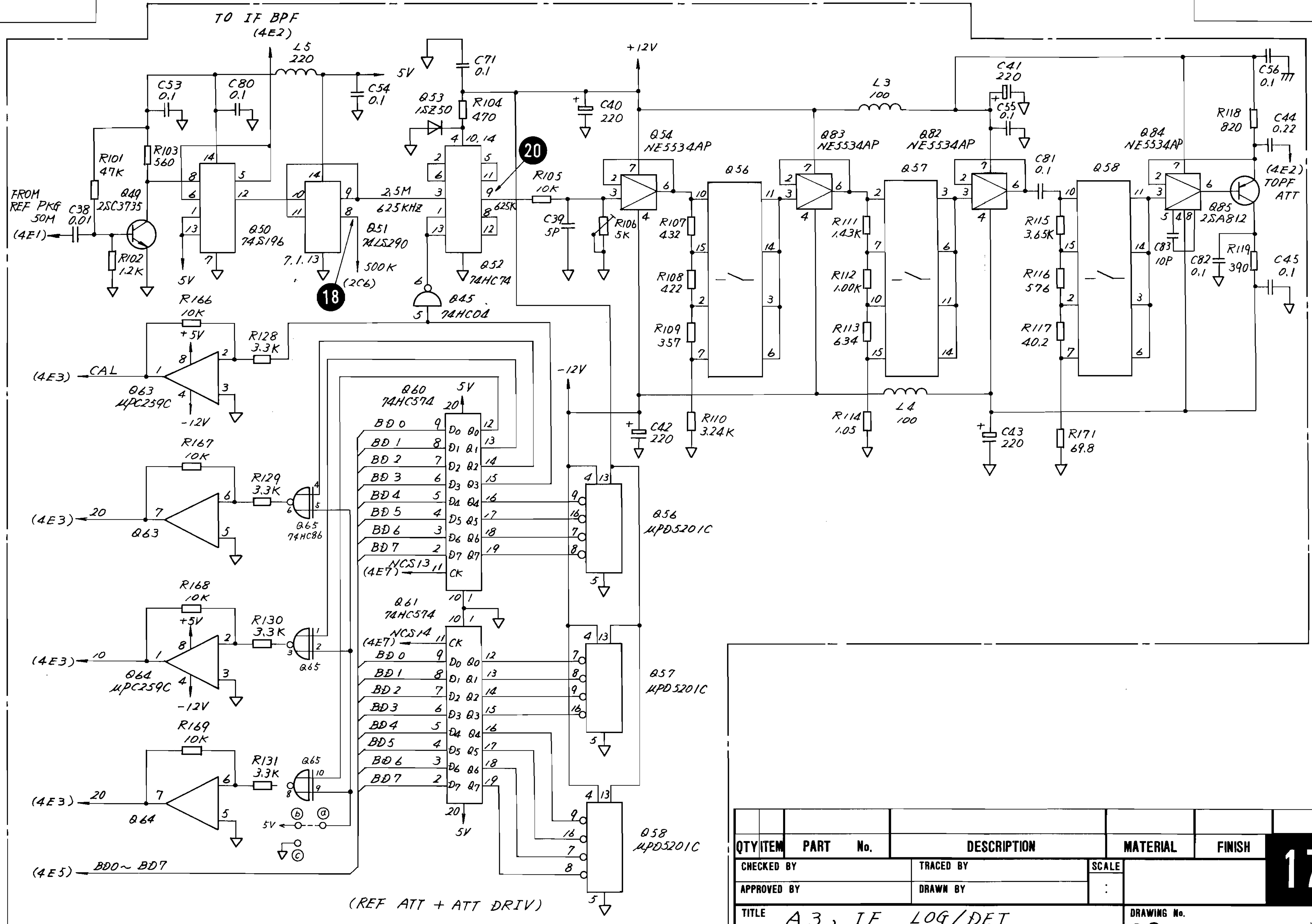
3-189/3-190



33W29893 4/5
APPLICATION
REVISIONS
(PEAK DETECTOR)
(S/H AMP)
(A/D CONVERTER)
Q77 TC4052BP
Q44 μPC649C
Q48 HI-574AKD-5
Q38 μPC803C
Q42 TC4053BP
Q76 μPC803C
Q43 μPC803C
Q80 74HC123
Q46 74HC74
Q45 74HC04
Q81 74HC08
Q47 1S2835
TP5
TP6
TP7
TP8
TP9
TP10
TP11
TP12
(5B1) 50MHz IN
(5A2) 25MHz OUT
(5B8) TO RF ATT
(2B5) TO LOCAL COUNT
(2A5) TO VIDEO OUT
(5C1) CAL
(5D1) 20dB ATT
(5E1) 10dB ATT
(5E1) 20dB ATT
BD0~BD7
(2E8) BA0
J2
QTY
ITEM
PART No.
DESCRIPTION
MATERIAL
FINISH
17
CHECKED BY
TRACED BY
SCALE
APPROVED BY
DRAWN BY
TITLE
A3, IF LOG/DET Circuit Diagram
DRAWING No.
33W29893 4/5
DEP
No. D023-1985.08
ANRITSU CORP.
3-191/3-192

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH
CHECKED BY		TRACED BY	SCALE :		17
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TITLE: A3, IF LOG/DET Circuit Diagram

DRAWING No. 33W29893 5/5

DEP

ANRITSU CORP.

3.3.7 A5 FRONT BOARD **18**

(1) Circuit description

A5 FRONT BOARD includes key switches, key encoder, rotary encoder, buzzer, etc. Figure 3-44 shows the block diagram.

(2) Symptom

1. When a specific key is defective, only that key function is not accepted

2. When the key encoder is defective, all keys of the key matrix or all keys in a specific row or column cease operation

3. When the rotary encoder or pulse detection section is defective, data entry becomes impossible with the data knob, or the value changes in a reverse direction to the knob turning

4 When the buzzer is defective, the buzzer does not sound at wrong key entry (For example, when unit key is pressed without entering a numeric key)

(3) Troubleshooting

(a) Required equipment

digital voltmeter

Oscilloscope

(b) Preparation

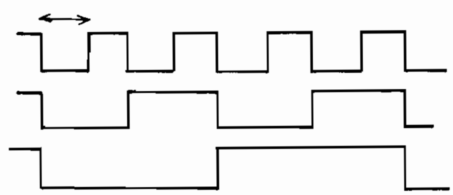
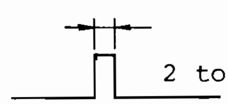
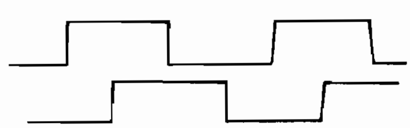
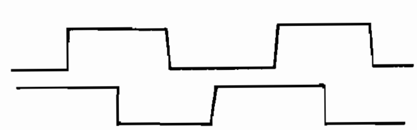
CAUTION

Turn off the power before disassembly.

Remove the front panel as described in paragraph 2.3. However, do not remove the W1 connector.

(c) Troubleshooting

Check each checkpoint by referring to the following table.

Signal name	Checkpoint	Normal condition
+5 V	❶ (Q1-40)	+5 ±0.25 V
CPU8MZ	❷ (Q2-11)	8 MHz pulse wave
SLO SL1 SL2	❸ (Q3-1) ❹ (Q3-2) ❺ (Q3-3)	Approx. 0.05 ms 
IRQ	❻ (Q1-4)	 2 to 10 μs When key pressed
(Rotary encoder) (Rotary encoder)	❼ (Q5-2) ❽ (Q5-11)	When encoder turned clockwise ❼ ❽  When encoder turned counterclockwise ❼ ❽ 

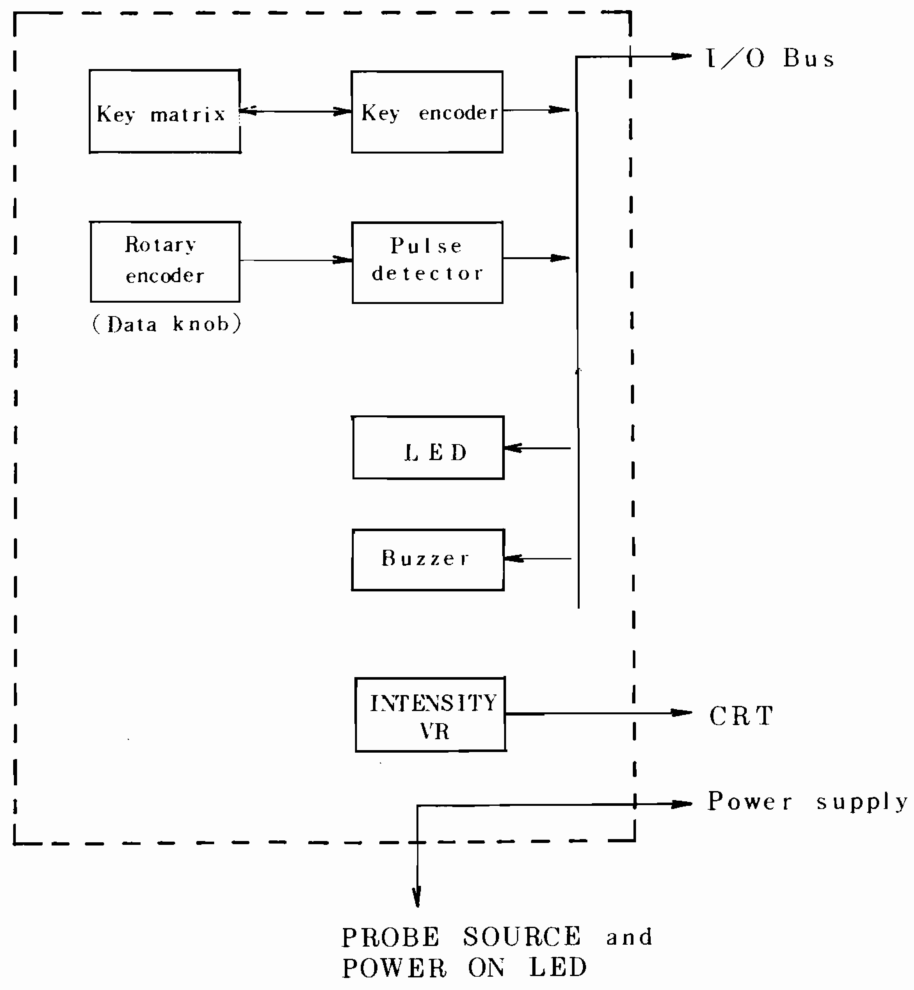


Fig. 3-44 A5 FRONT BOARD Block Diagram

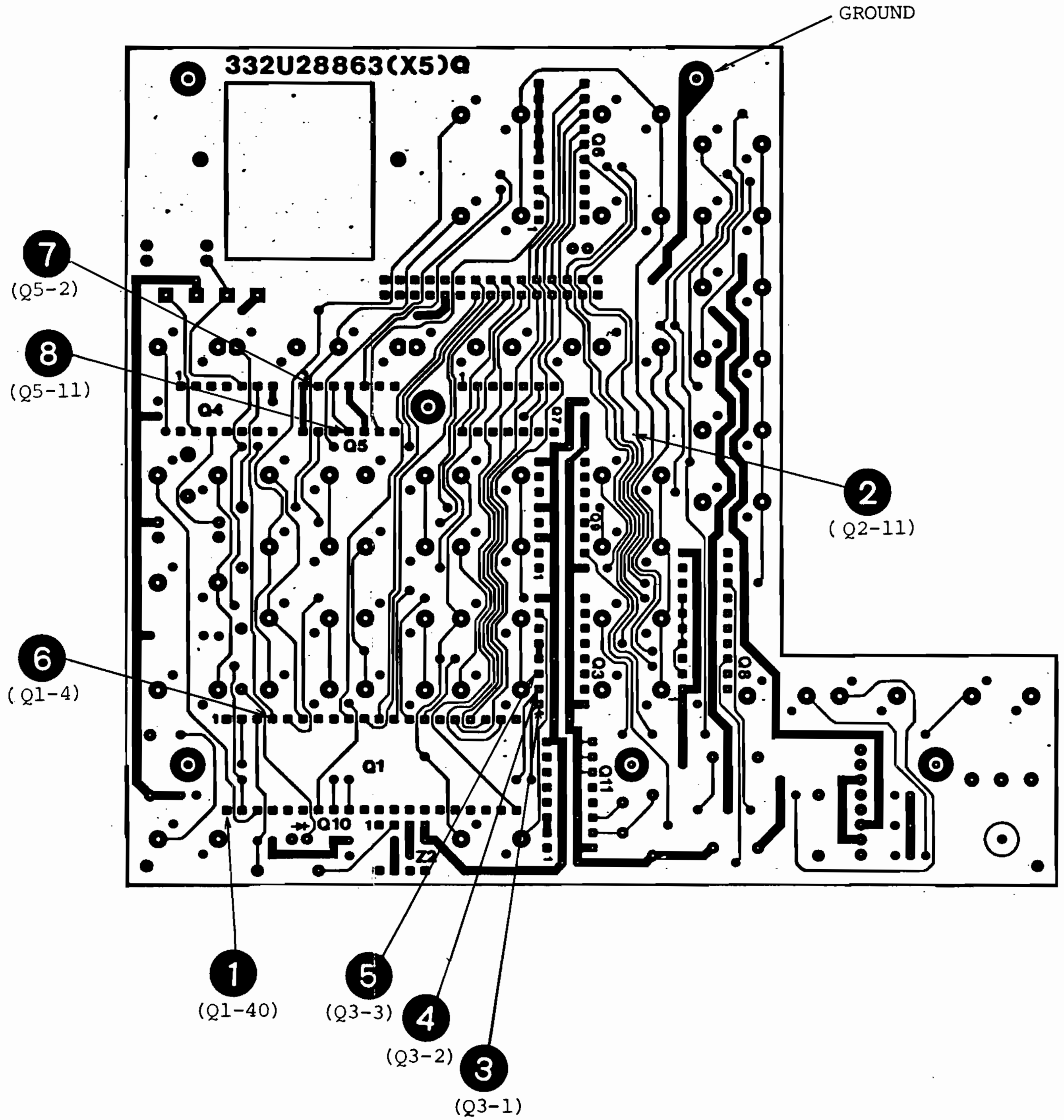


Fig. 3-45 (a) A5 FRONT BOARD PC Board
Parts Layout (Pattern Side) 18

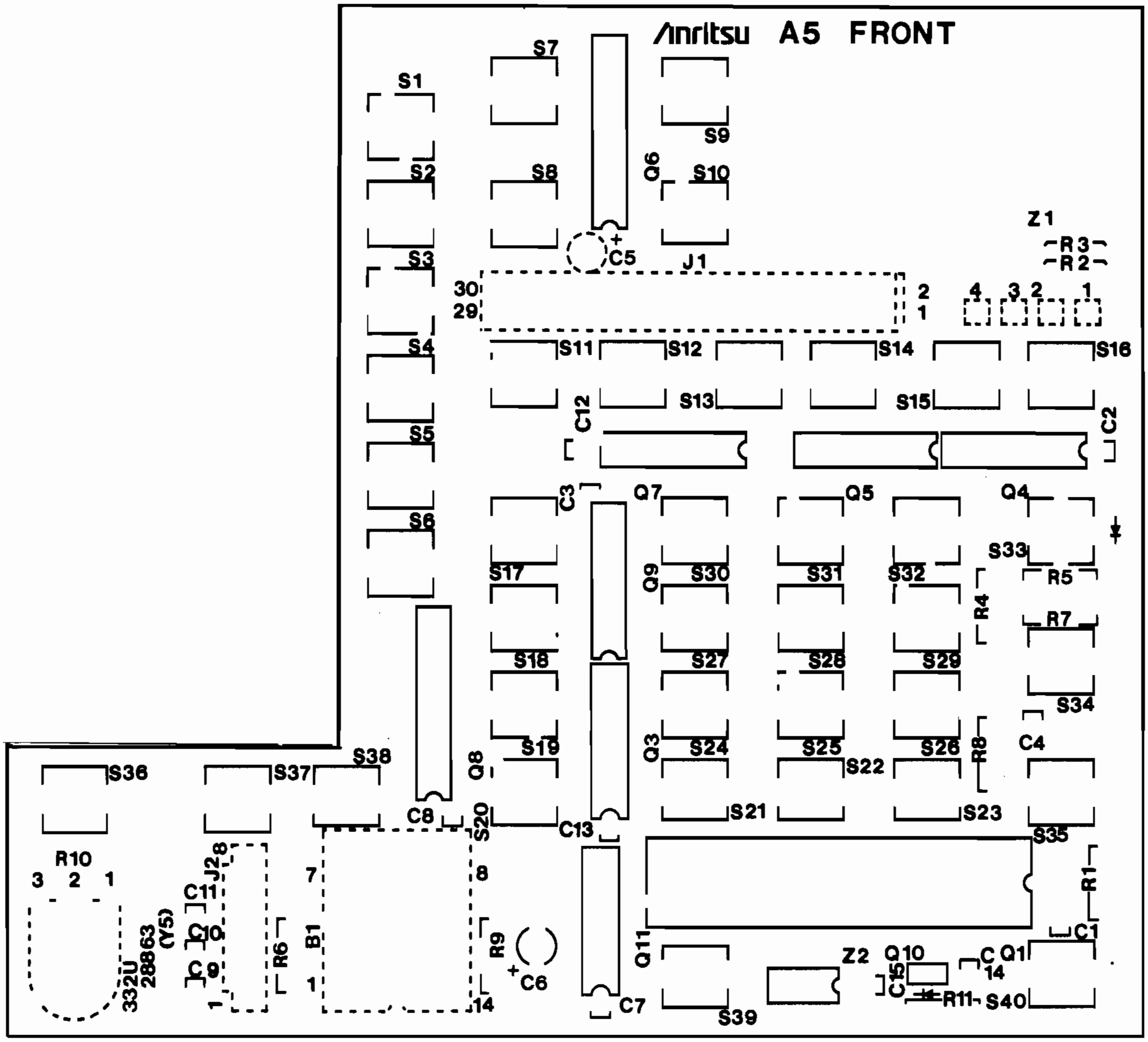


Fig. 3-45 (b) A5 FRONT BOARD PC Board
Parts Layout (Parts Side)

18

33W29894 1/2

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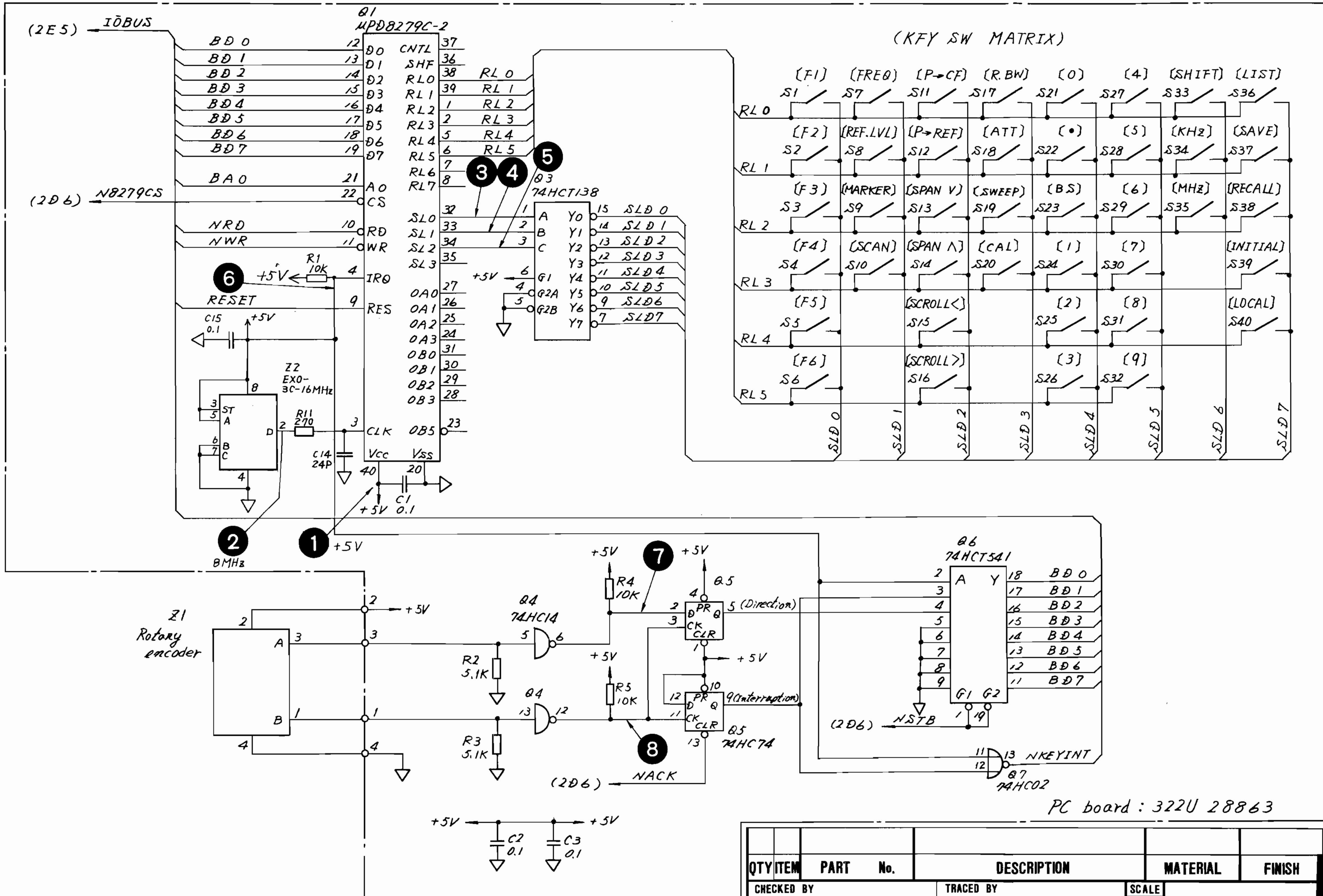

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18

Parts List 34W93320

TITLE A5, FRONT BOARD Circuit Diagram

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33W29894 2/2

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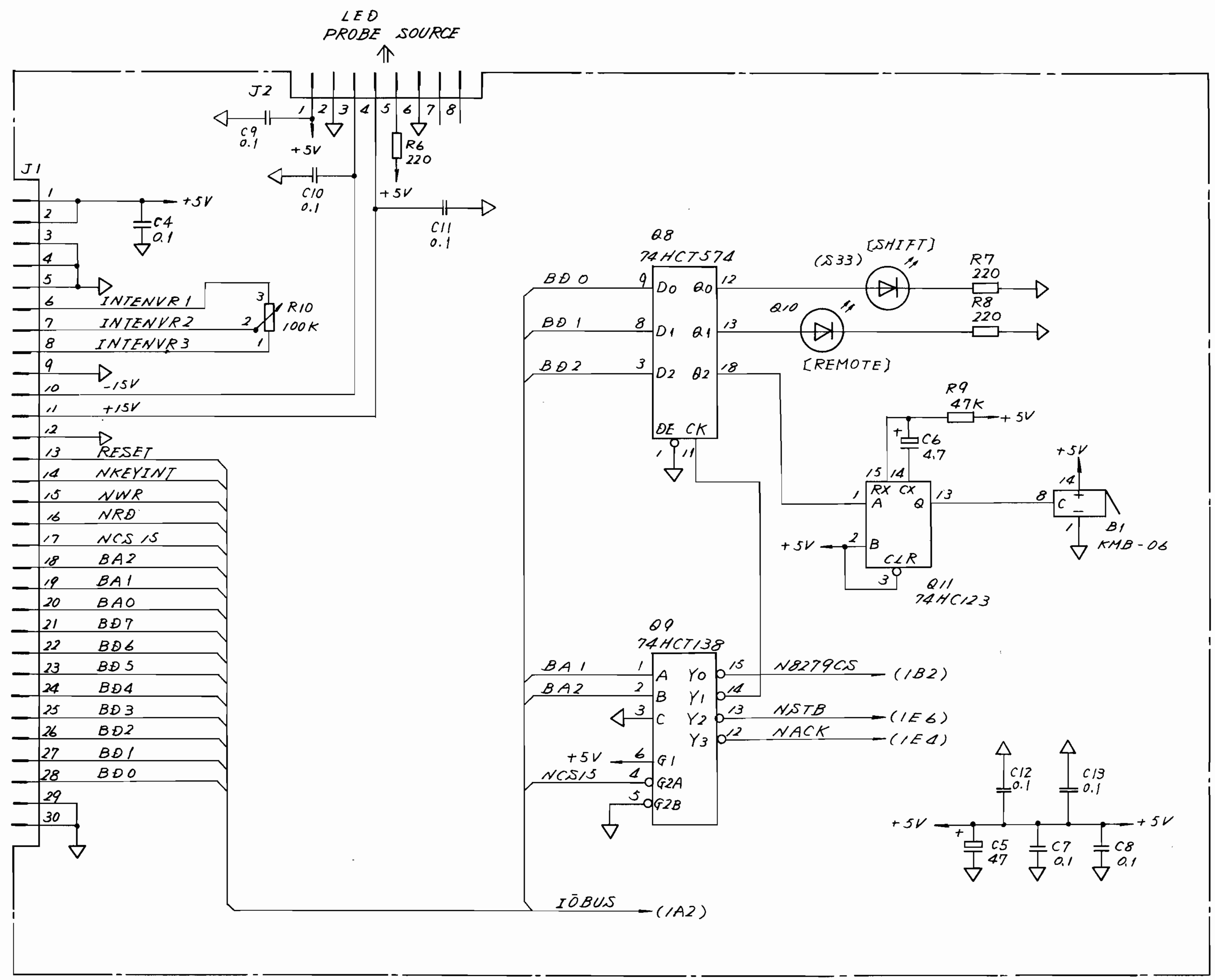

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TITLE A5, FRONT BOARD Circuit Diagram

DRAWING No. 33W29894 2/2

18

DEP

No. D023-1985.08

ANRITSU CORP.

3-203/3-204

3.3.8 A6 SCAN/YTO DRIVE, Z1 YTO 19

(1) Circuit description

Refer to the A6 block diagram shown in Fig. 3-46.

(a) A6 SCAN/YTO DRIVE

This part is composed of two circuits: a SCAN GENERATOR circuit and YTO DRIVE circuit.

(i) SCAN GENERATOR

This generator produces a sweep voltage (ramp voltage), which is applied to A1-A15 20 Hz STEP VCO CONT and A6 YTO driver, that varies the frequency sweep according to the frequency span setting. A8 MAIN CPU controls the sweep time, trigger mode, sweep start/stop, etc.

(ii) YTO DRIVE

This part drives the Z1 YTO. The sweep voltage for a SPAN exceeding 5.2 MHz is applied to the TUNE coil driver. The YTO PLL control voltage from A1-A16 YTO PLL PD & LOOP FILTER and the sweep voltage for a SPAN (520 kHz to 5.0 MHz) are applied to the FM coil driver. Moreover, the tuning voltage is applied to the TUNE coil driver by the D/A converter controlled by the A8 MAIN CPU according to the START FREQ change in 1 MHz step.

(b) Z1 YTO

The YTO contains a TUNE coil and an FM coil which are driven by current.

The YTO is a YIG-tuned oscillator which generates a 2.5214 to 4.7214 GHz signal as the 1st local OSC.

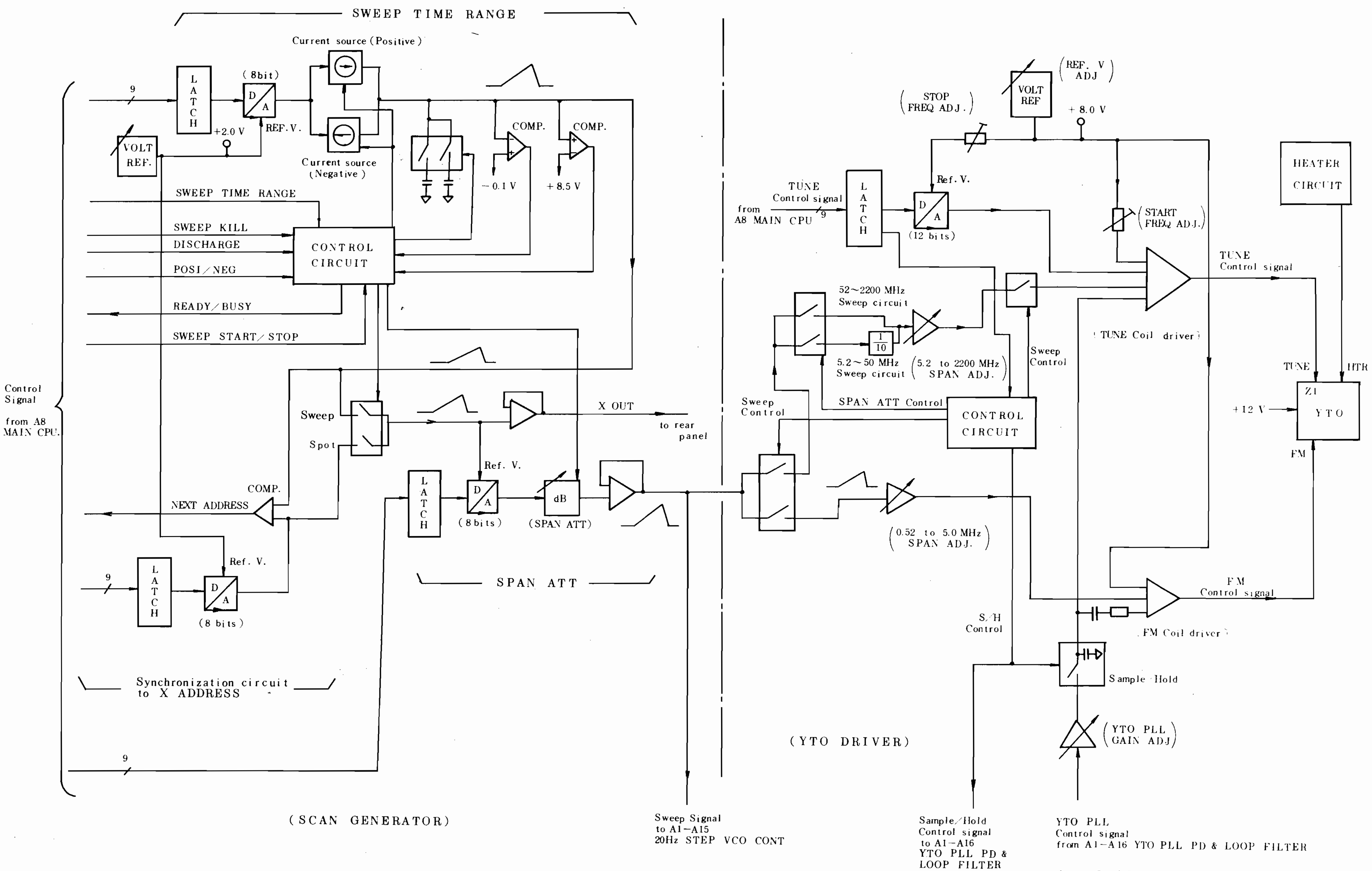


Fig. 3-46 A6 SCAN/YTO DRIVE, Z1 YTO Block Diagram

(2) Symptom and cause

	Symptom		Cause	Unit to be checked
1.	Frequency drifts by 10 MHz or more	(a)	YTO PLL unlocked	A6 SCAN/YTO DRIVE Z1 YTO
2.	Does not sweep properly when SPAN set to 500 kHz or less	(a)	Sweep signal not output	A6 SCAN/YTO DRIVE (SCAN GENERATOR)
		(b)	Sweep start operation not functioning normally	
3.	Does not sweep properly when SPAN set to 501 kHz or more	(a)	Defective YTO Driver (Sweep control)	A6 SCAN/YTO DRIVE (YTO DRIVER) Z1 YTO
4.	Entire waveform swings left and right	(a)	YTO PLL unlocked	A6 SCAN/YTO DRIVE

(3) Troubleshooting A6 SCAN/YTO DRIVE

(a) Required equipment

Digital voltmeter

Frequency counter: MF76A

Oscilloscope

Spectrum analyzer: MS612A

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove the top cover (paragraph 2.2).
2	Remove the A6 SCAN/YTO DRIVE unit. (paragraph 2.4, Fig. 2-3).
3	Reconnect the A6 SCAN/YTO DRIVE unit again using a extender board and extender cable.

(c) A6 SCAN/YTO DRIVE troubleshooting

The A6 SCAN/YTO DRIVE unit is composed of two circuits: a SCAN GENERATOR circuit and YTO DRIVER circuit.

The troublehsooting procedures for the two circuits are explained separately in steps 2 to 3 and 4 to 9.

Step	Procedure
1	Check the following voltages: . Voltage vetween J1-13 (a, b) ❶ and J1-1 (a, b) ❷ (GND) is within -11.5 to -12.5 V . Voltage between J1-15 (a, b) ❸ and J1-1 (a, b) ❷ (GND) is within +11.5 to +12.5 V . Voltage between J1-18 (a, b) ❹ and J1-1 (a, b) ❷ (GND) is within +4.75 to +5.25 V If the above-mentioned voltages are abnormal, check Z4 REGULATOR section (paragraph 3.3.3).

(continued)

Step	Procedure

------ SCAN GENERATOR troubleshooting ------

2 Check the signal at each checkpoint according to the following table.

Checkpoint	Normal condition
TP4 (V REF) ❺	+2.00 V ±0.1 V

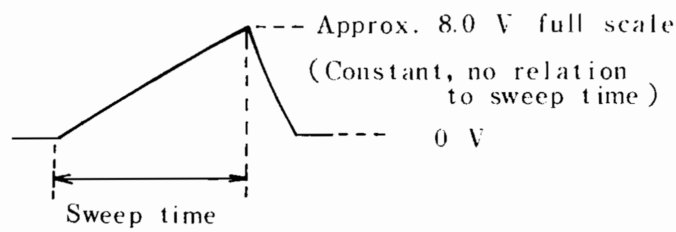
TP1 ❻
(Reference voltage
for sweep time:

$$\left[\frac{N}{256}\right] \times 2 \times 1.21 \text{ Vdc}$$

typ. [Table 3-22])

Sweep time set value	TP1 ❻ (Const. Voltage)
50 ms	0.756 V typ.
200 ms	1.89 V typ.
2 s	1.89 V typ.
20 s	1.89 V typ.
100 s	0.378 V typ.

TP3 ❼
(Sweep time range
setting circuit
output)



TP5 ❽
(X-address data
synchronous with
sweep on CRT)

Same as TP3 waveform

Q41-7 pin ❾
(SPAN ATT output
signal)

SPAN set value	Q41-7 pin ❾ Y Vp-p
50 kHz	Approx. 8.0
2.0 MHz	Approx. 3.20
100 MHz	Approx. 1.60

(continued)

Step	Procedure
3	Check the control signals of the SCAN GENERATOR circuit shown in Table 3-22 to 3-24.

Table 3-22 D/A Converter (Q2) Control Signal for Setting Sweep Time

Sweep Time $\times 10^n$ (s)	Q2 pin No. (MSB) 5	6	7	8	9	10	11	(LSB) 12	N
2	1	1	0	0	1	0	0	0	200
3	1	0	0	0	0	1	0	1	133
5	0	1	0	1	0	0	0	0	80
7	0	0	1	1	1	0	0	1	57
10	0	0	1	0	1	0	0	0	40
15	0	0	0	1	1	0	1	1	27

Note:

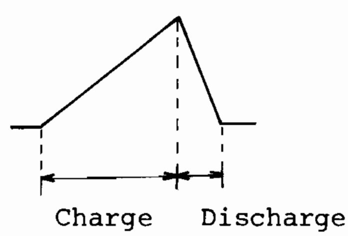
TTL level (Positive logic)
$n = -2$ to $+1$

TP1 ❻ voltage $= \frac{N}{256} \times 2 \times 1.21$ [Vdc] typ.

(continued)

Step	Procedure
3 (Cont.)	Table 3-23 Sweep Time Range Change-over Switch Control Singal

	Sweep Time Range	Q4,Q5 Control Signal (ST3)	(ST2)	(ST1)	(ST0)	K1 Control Signal (ST4)
Charge	50 to 150 ms	0	1	0	1	1
	02 to 1.5 s	1	1	0	1	1
	2 to 15 s	0	1	1	1	0
	20 to 100 s	1	1	1	1	0
Dis-charge	50 to 150 ms	0	0	0	0	1
	0.2 to 1.5 s	0	1	0	0	1
	2 to 15 s	0	0	0	0	0
	20 to 100 s	0	0	1	0	0



Note:

TTL level (Positive logic)

(continued)

Step	Procedure

3 (cont.)

Table 3-24 D/A Converter (Q40) Control Signal for Setting SPAN ATT

SPAN $\times 10^n$ (kHz)	Q40 pin No. (MSB) 5	6	7	8	9	10	11	(LSB) 12	N
52	0	0	0	1	1	0	1	0	25
54	0	0	0	1	1	0	1	1	26
56	0	0	0	1	1	1	0	0	27
⋮				⋮					⋮
198	0	1	1	0	0	0	1	1	99
200	0	1	1	0	0	1	0	0	100
202	0	1	1	0	0	1	0	1	101
204	0	1	1	0	0	1	1	0	102
⋮				⋮					⋮
490	1	1	1	1	0	1	0	1	245
⋮				⋮					⋮
500	1	1	1	1	1	0	1	0	250

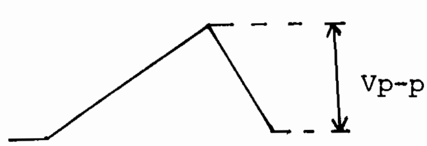
Note:

TTL level (Positive logic)

$n = -2$ to $+4$

TP7 voltage =

$\frac{N}{256}$ x TP6 voltage Vp-p value x 0.93 [Vp-p] typ.



(continued)

Step	Procedure
	------ YTO DRIVER troubleshooting ------
4	Check the signal at each checkpoint according to the following table.

Checkpoint	Normal condition
TP8 (VOLT REF.) ⑩	+8.00 V ±0.1 V
TP9 ⑪ (YTO PLL Control voltages)	≤±8.0 V at 0° to 50°C when START FREQ is from 0 to 2200 MHz
TP12 ⑫ (Tuning voltage)	

START FREQ (MHz)	TP12 ⑫ (V)
0	Approx. +0.195
100	Approx. +0.39
500	Approx. +1.17
1000	Approx. +2.15
1500	Approx. +3.12
2000	Approx. +4.10
2200	Approx. +4.49

If the voltages at TP8, TP9, and TP12 are abnormal, YTO PLL may become unlocked. If these voltages are abnormal, the YTO DRIVER must be readjusted (paragraph 3.3.8(4)(b)).

5	Check the D/A converter (Q63) control signal for setting the tuning voltage shown in Table 3-47.
6	Check the YTO DRIVER sweep control signal shown in Table 3-48.
7	Check the TUNE coil driver control signal shown in Table 3-49.

(continued)

Step	Procedure
8	Check the heater voltage applied to Z1 YTO according to the following table.

Checkpoint	Level
J4-3 pin (HTR1)	-3.5 V typ.
J4-2 pin (HTR2)	GND
J4-1 pin (HTR3)	-5.3 V typ.

Step	Procedure
9	Check the relationship between the START FREQ and the 1st local output frequency shown in Table 3-50.

Table 3-47 D/A Converter (Q63) Control Signal for Setting Tuning Voltage

START FREQ (MHz)	1st local output frequency (MHz)	Q63 pin No. (MSB) 4	5	6	7	8	9	10	11	12	13	14	(LSB) 15	N
0	2521.4	0	0	0	0	0	1	1	0	0	1	0	0	100
1	2522.4	0	0	0	0	0	1	1	0	0	1	0	1	101
2	2523.4	0	0	0	0	0	1	1	0	0	1	1	0	102
3	2524.4	0	0	0	0	0	1	1	0	0	1	1	1	103
4	2525.4	0	0	0	0	0	1	1	0	1	0	0	0	104
⋮	⋮						⋮							⋮
100	2621.4	0	0	0	0	1	1	0	0	1	0	0	0	200
⋮	⋮						⋮							⋮
500	3021.4	0	0	1	0	0	1	0	1	1	0	0	0	600
⋮	⋮						⋮							⋮
1000	3521.4	0	1	0	0	0	1	0	0	1	1	0	0	1100
⋮	⋮						⋮							⋮
1500	4021.4	0	1	1	0	0	1	0	0	0	0	0	0	1600
⋮	⋮						⋮							⋮
2000	4521.4	1	0	0	0	0	0	1	1	0	1	0	0	2100
⋮	⋮						⋮							⋮
2200	4721.4	1	0	0	0	1	1	1	1	1	1	0	0	2300

Note:

TTL level (Positive logic)

TP12 tuning voltage $= \frac{N}{4096} \times$ (-ref. voltage at Q63-17 pin) [V] typ.

Table 3-48 YTO DRIVE Sweep Control Signal

Q62 pin No.	SPAN set value				
		FM coil	TUNE coil		
	0 Hz	0.52 to 5.0 MHz	5.2 to 50 MHz	52 to 500 MHz	520 to 2200 MHz
(D0) 19	0	0	1	1	1
(D1) 18	0	1	1	1	1
(D2) 17	1	1	0	1	1
(D3) 16	1	0	0	0	0

Note:

D0: Selects FM or TUNE coil
1: TUNE coil
2: FM coil

D1: Selects whether the YTO DRIVER sweep is on or off
1: YTO DRIVER sweep
0: A1-A15 20 Hz STEP VCO CONT. sweep

D2: Controls SPAN ATT chargeover switch (Q65)
1: Selects 52 to 2200 MHz sweep circuit
0: Selects 5.2 to 50 MHz sweep circuit

D3: Selects sample or Hold
1: Sample
0: Hold

Table 3-49 TUNE Coil Driver Control Signal

Relay	SPAN set value				
	FM coil	TUNE coil			0 Hz and 1 to 500 kHz
	0.52 to 5.0 MHz	5.2 to 50 MHz	52 to 500 MHz	520 to 2200 MHz	
K2	ON	OFF	OFF	OFF	ON
K3	ON	OFF	OFF	OFF	OFF

Note:

Switch between pin Nos. 3 and 4 of Q65 are ON only at sampling when the TUNE coil is selected

Table 3-50 Relationship between the START FREQ and 1st Local Output Frequency

START FREQ (MHz)	1st Local Output Frequencies (MHz)
0	2521.4
100	2621.4
500	3021.4
1000	3521.4
1500	4021.4
2000	4521.4
2200	4721.4

(4) A6 SCAN/YTO DRIVE Adjustment

(a) SCAN GENERATOR adjustment

This circuit must be adjusted before the following adjustments.

1. A1-A15 20 Hz STEP VCO CONT. 1 kHz to 500 kHz SPAN linear adjustment

2. YTO DRIVER 520 kHz to 2200 MHz SPAN linearity adjustment (paragraph 3.3.8 (4) (b)(iii) and (iv))

(i) Reference voltage (TP4 ❺, +2.00 V) adjustment

Step	Procedure
1	Connect a digital voltmeter to TP4 ❺.
2	Adjust R22 ⓭ so that +2.00 ±0.01 V is obtained.

(ii) SCAN GENERATOR level adjustment

Step	Procedure
1	Press the [INITIAL] key.
2	Press the [SHIFT] [TRIG] keys and then [F5] SINGLE key on the CRT menu to stop sweep.
3	Press [SHIFT] [CAL] keys and then [F3] SCAN ADJ1 soft key on the CRT menu.
4	Connect a digital voltmeter to Q41-pin 7 ❾.
5	Adjust R40 ⓮ so that ❾ voltage is +8.00 ±0.01 V.

(b) YTO DRIVER adjustment

Make this adjustment 15 minutes or more after power-on. (After the Z1 YTO oscillation frequency has stabilized.)

YTO DRIVER 520 kHz to 2200 MHz SPAN linearity adjustments (paragraphs 3.3.8(4) (b)(iii) and (iv) must be performed after SCAN GENERATOR adjustment (paragraph 3.3.8(4)(a)).

(i) Reference voltage (TP8 ⑩ , +8.00 V) adjustment

Step	Procedure
1	Connect a digital voltmeter to TP8 ⑩ .
2	Adjust R88 ⑮ so that +8.00 ±0.01 V is obtained.

(ii) START FREQ (2521.4 MHz) and STOP FREQ (4721.4 MHz) adjustment

Step	Procedure
1	Press the [INITIAL] key.
2	Set as follows: START FREQ: 0 Hz SPAN: 0 Hz
3	Connect a frequency counter to the FIRST LOCAL OUTPUT on the rear panel.
4	Adjust R99 ⑯ so that the FIRST LOCAL OUTPUT frequency is 2521.4 ±1 MHz.

(continued)

Step	Procedure
5	Set as follows: START FREQUENCY: 2200 MHz SPAN: 0 Hz
6	Adjust R82 ⓱ so that the FIRST LOCAL OUTPUT frequency is 4721.4 ±1 MHz.

(iii) 0.52 to 5.0 MHz SPAN linearity adjustment

Step	Procedure
1	Set the SPAN to 1.0 MHz.
2	Set the CENTER FREQ properly and input a signal equal to that frequency from the RF INPUT.
3	Adjust R121 ⓲ so that the signal trace is at the center.
4	Change the input signal frequency in 100 kHz steps and check the SPAN accuracy.

(iv) 5.2 to 2200 MHz SPAN linearity adjustment

Step	Procedure
1	Set the SPAN to 10 MHz.
2	Set the CENTER FREQ properly and input a signal equal to that frequency from the RF INPUT.
3	Adjust R117 ⓳ so that the signal trace is at the center.
4	Change the input signal frequency in 1 MHz steps and check the SPAN accuracy

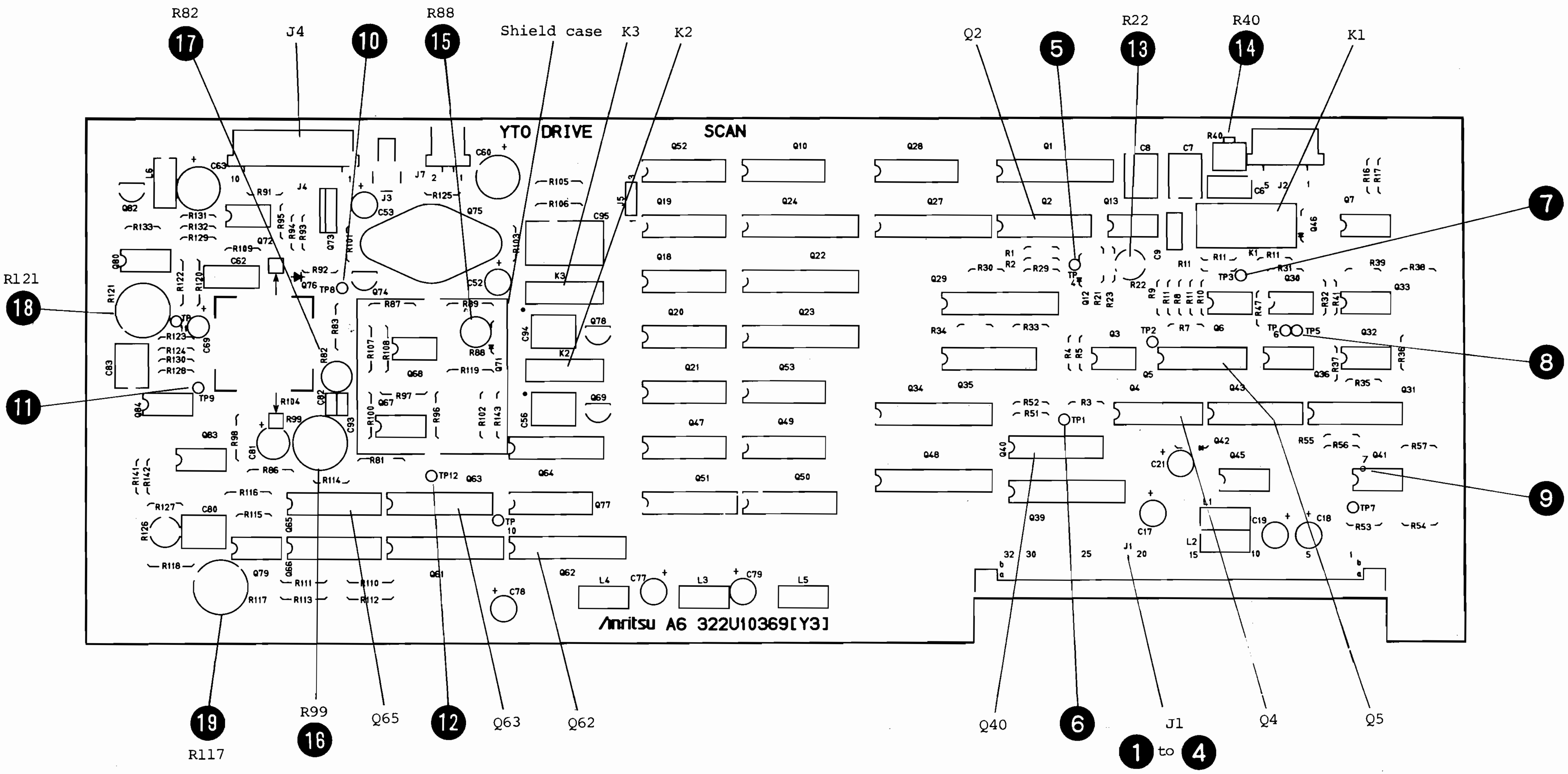


Fig. 3-51 (a) A6 SCAN/YTO DRIVE
PC Board Parts Layout
(Parts Side) 19

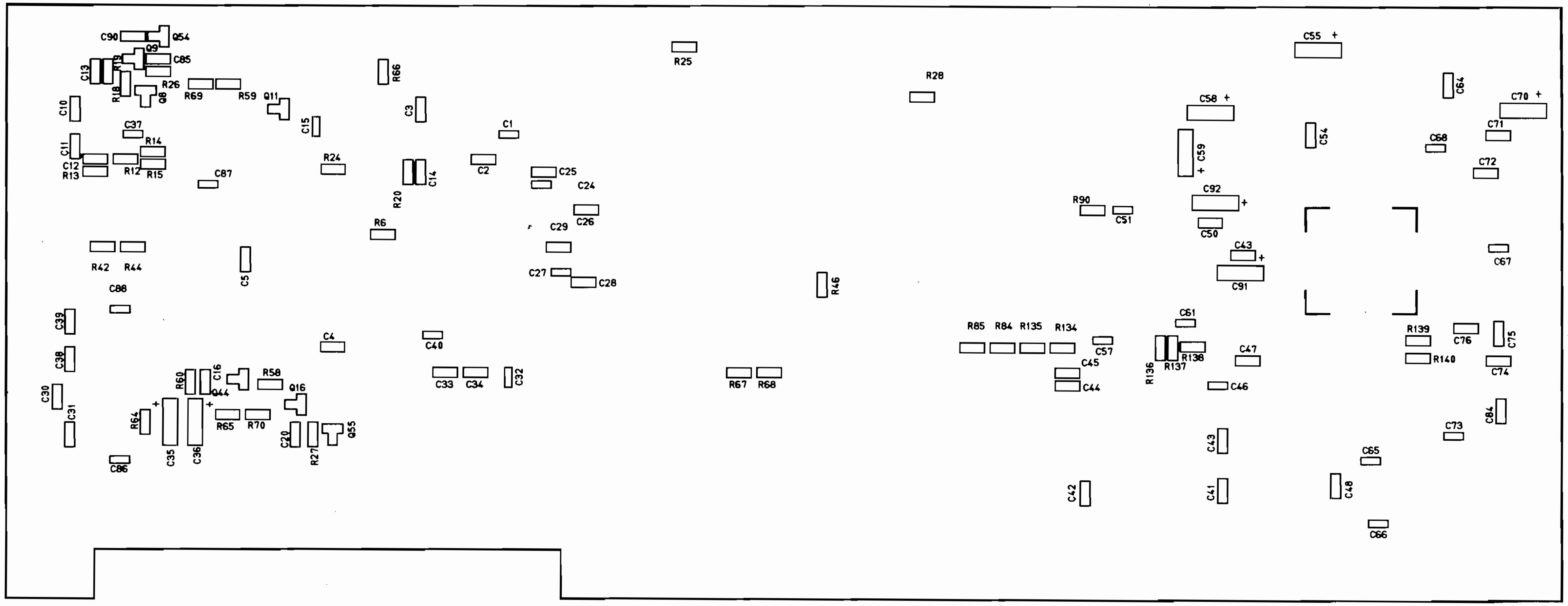


Fig. 3-51 (b) A6 SCAN/YTO DRIVE
PC Board Parts Layout
(Pattern Side) 19

33W29895 1/6

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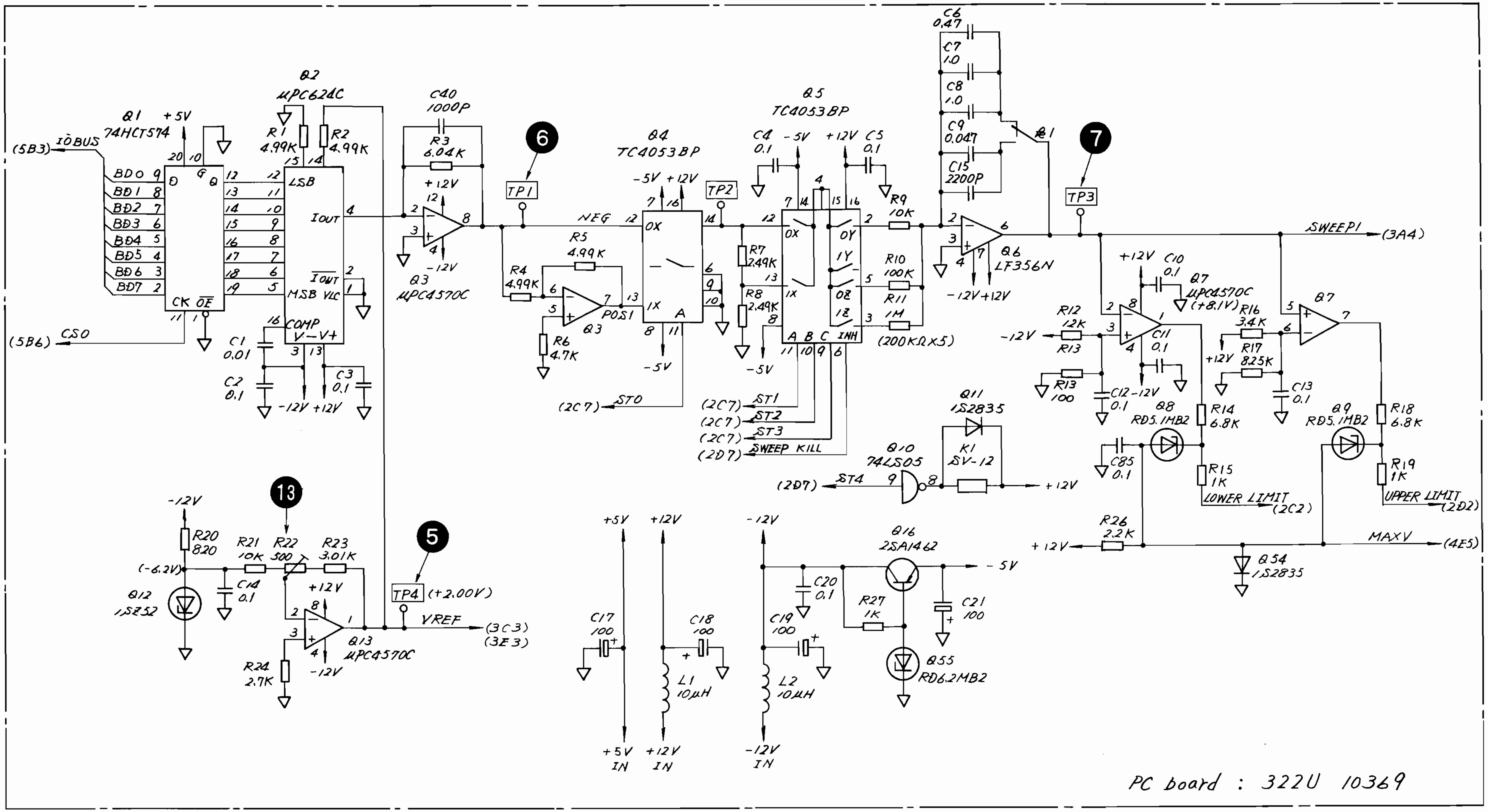

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Parts List 34W93321

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33W29895 2/6

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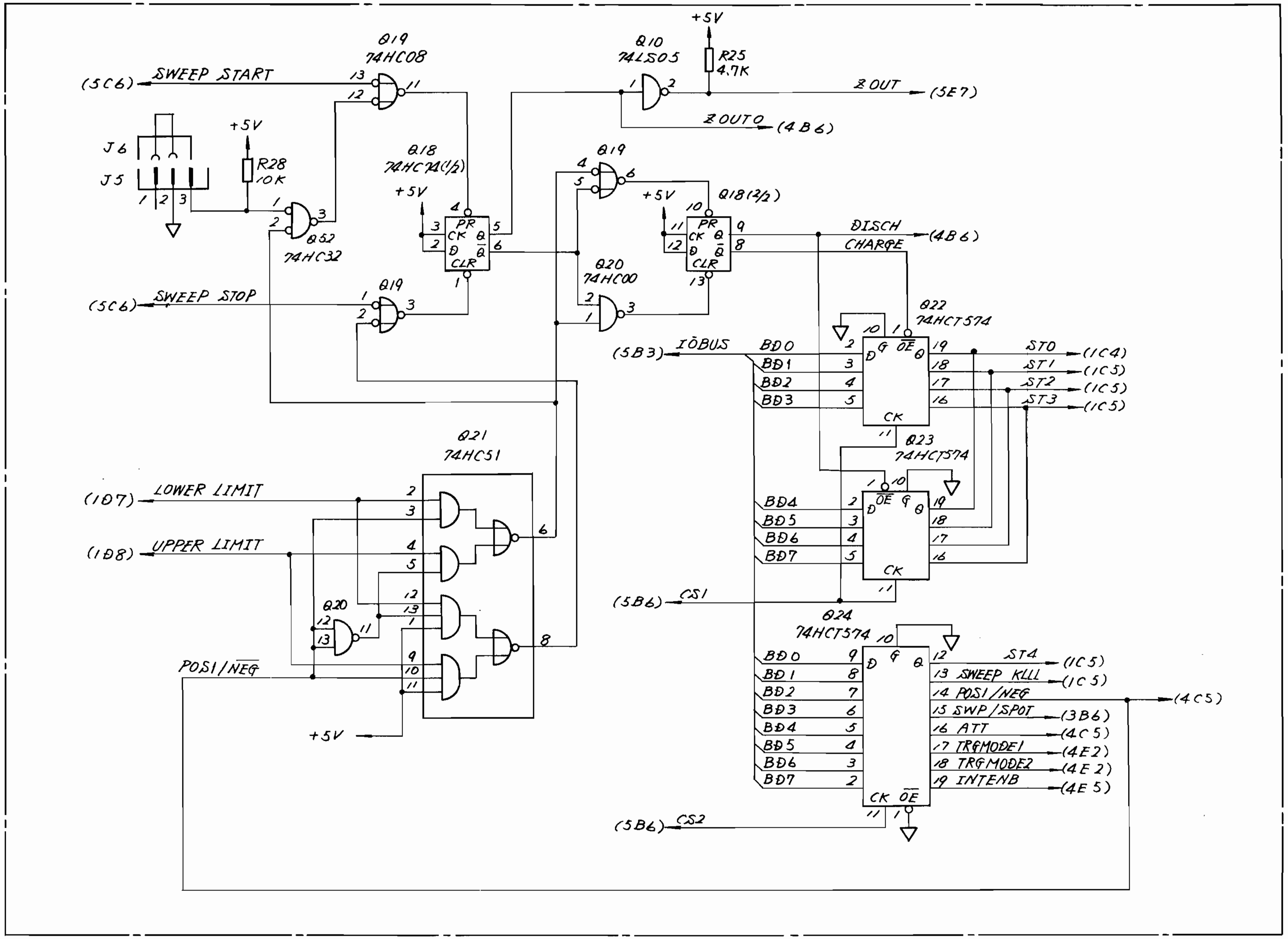

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :

APPROVED BY | DRAWN BY

TITLE: A6, SCAN/YTO DRIVER Circuit Diagram

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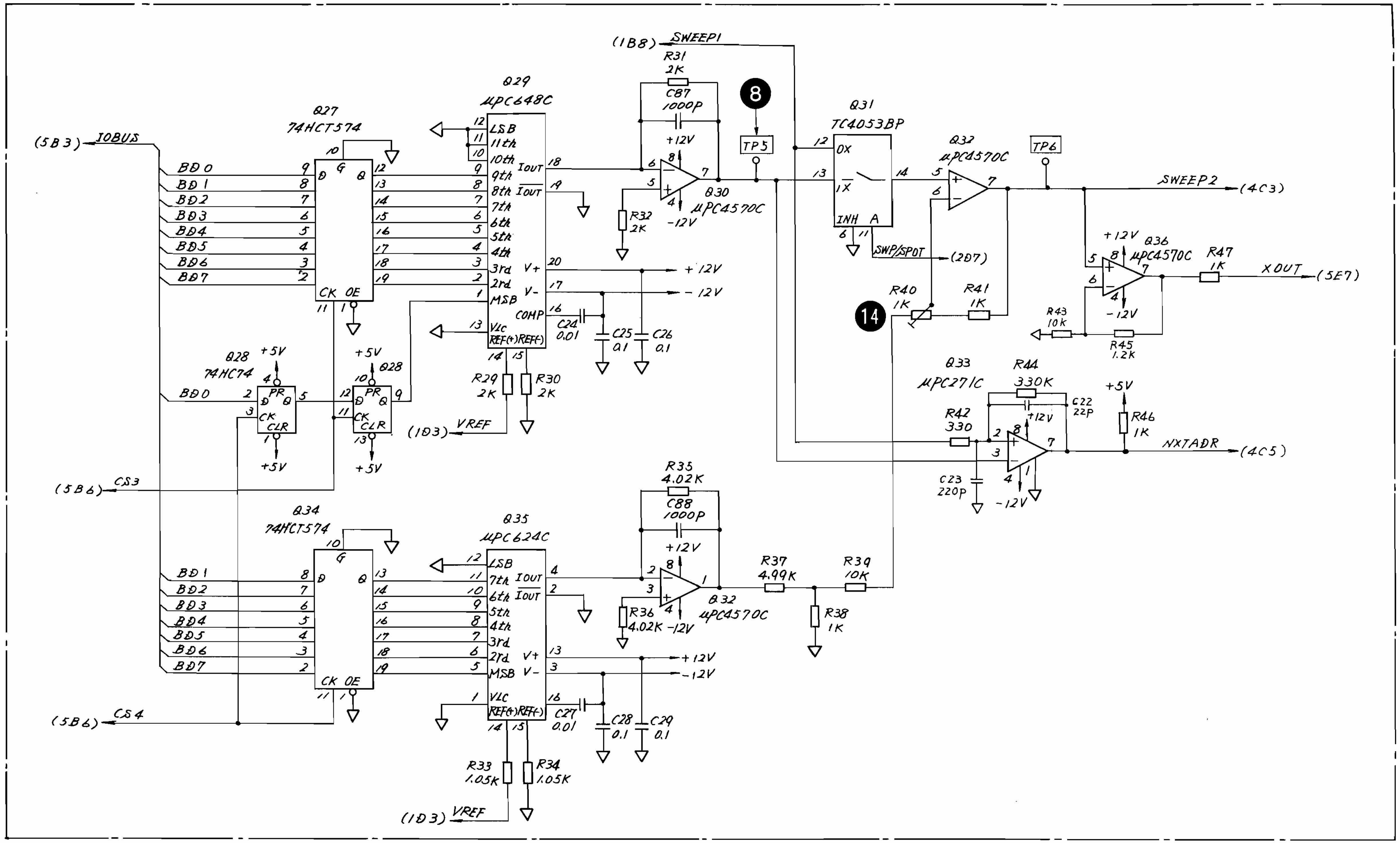

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TITLE A6, SCAN/YTO DRIVER Circuit Diagram

DRAWING No. 33W29895 3/6

19

DEP

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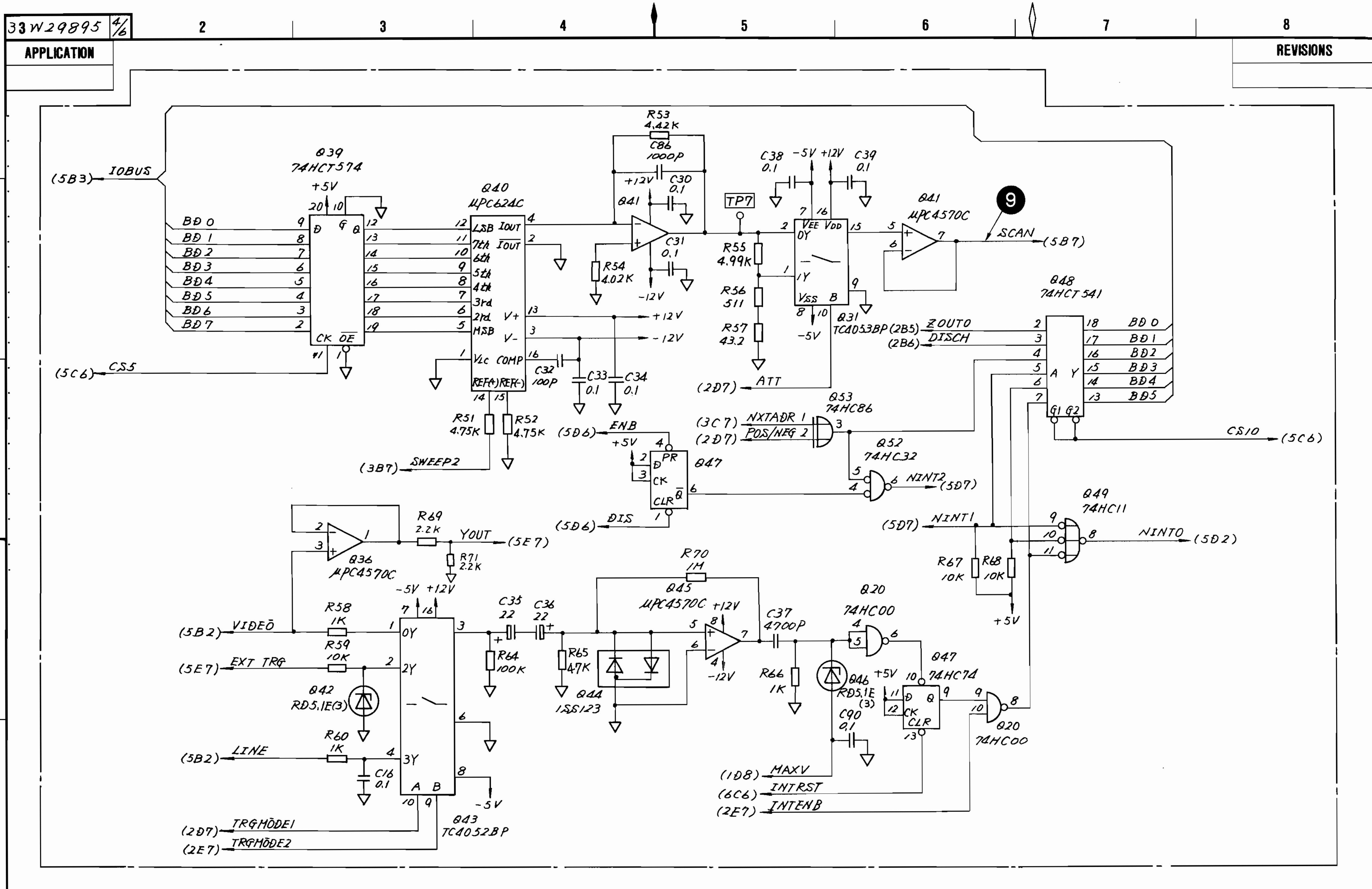
3-229/3-230



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CHECKED BY | TRACED BY | SCALE :
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TITLE: A6, SCAN/YTO DRIVER Circuit Diagram

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No. 0023-1985.08

33W29895 5/6

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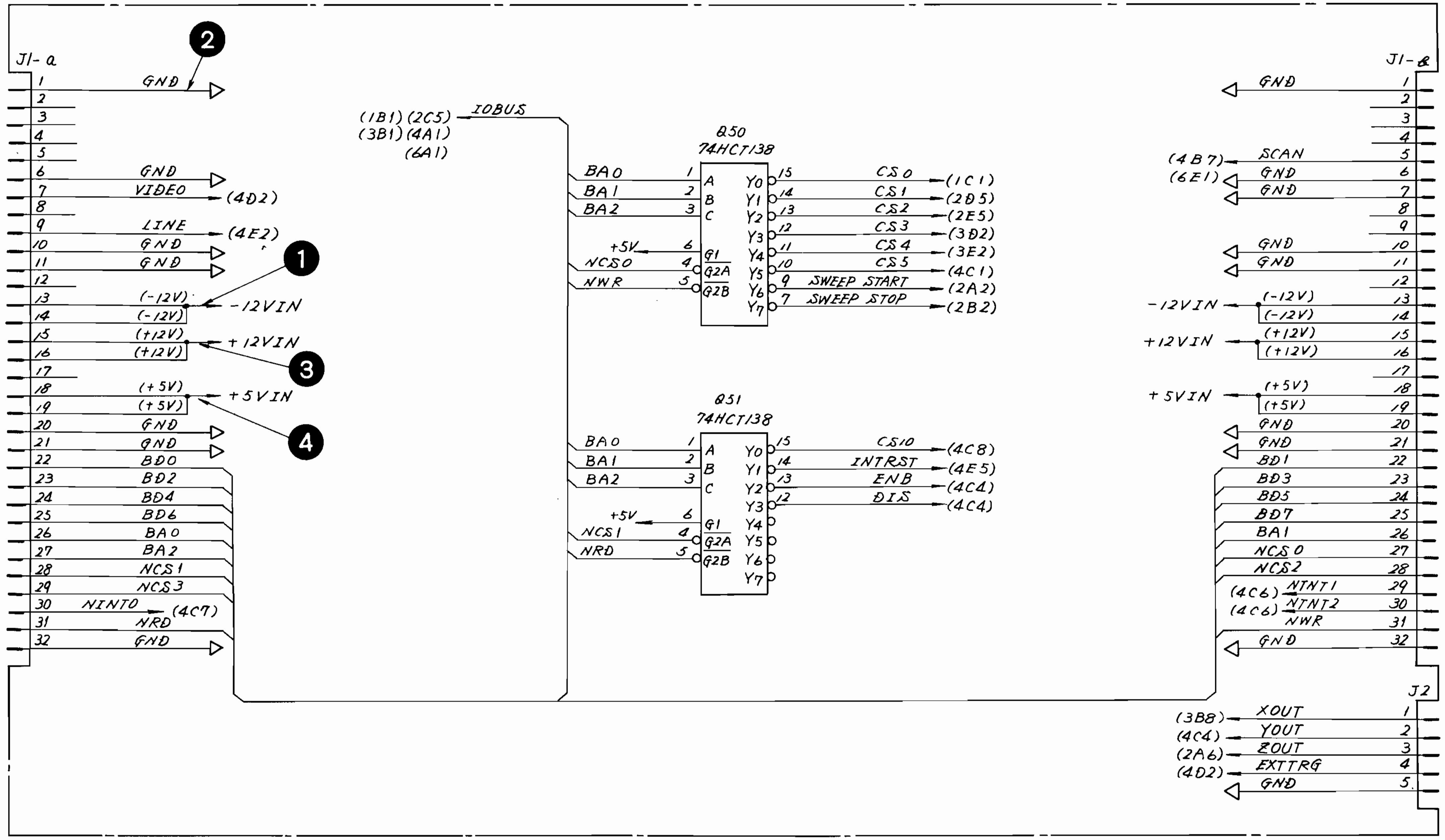

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TITLE A6, SCAN/YTO DRIVER Circuit Diagram

DRAWING No. 33W29895 5/6

19

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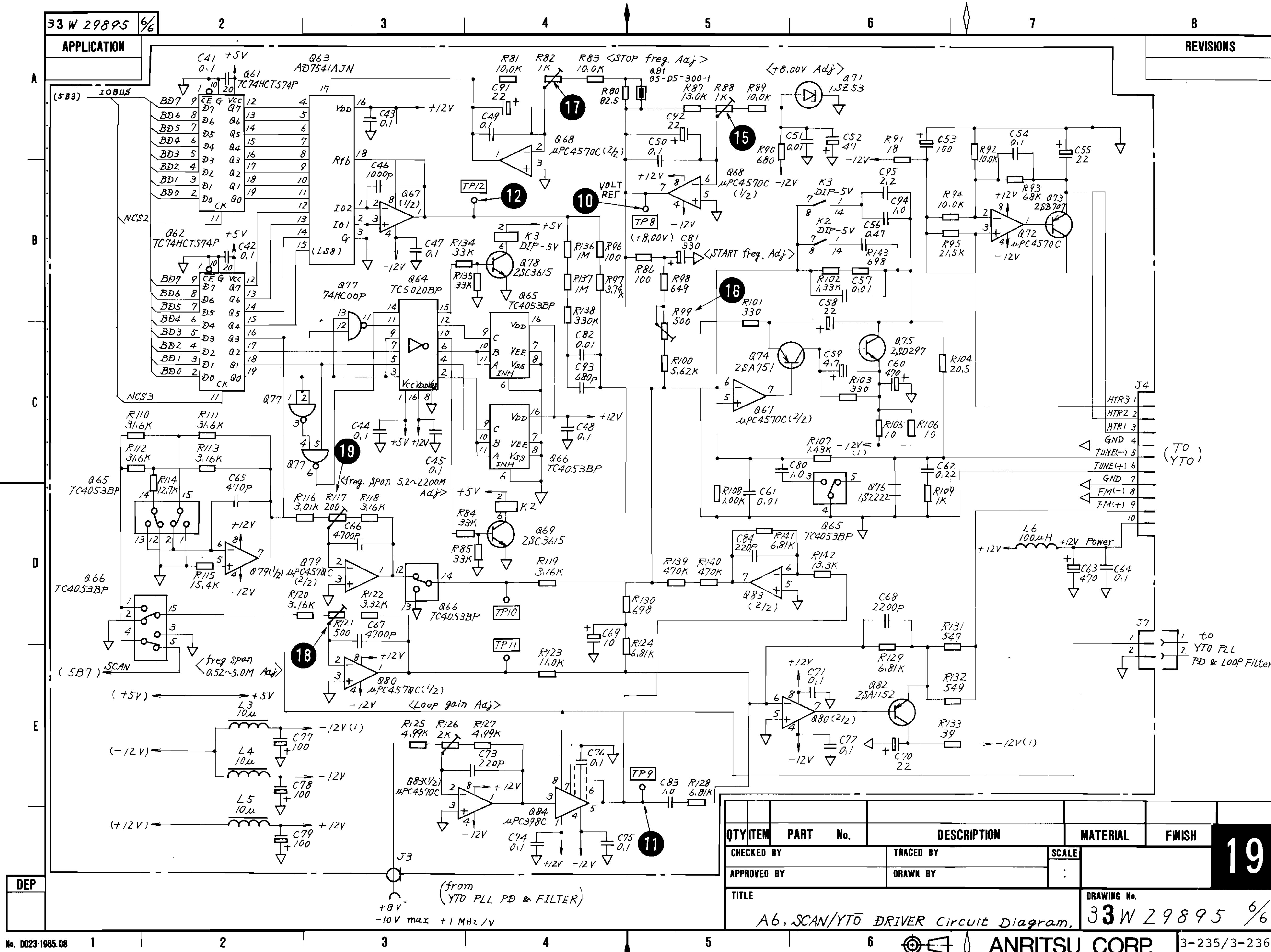
No. 0023-1985.08

ANRITSU CORP. 3-233/3-234


33W 29895 6/6
APPLICATION
REVISIONS
IOBUS
(5B3)
NCS2
NCS3
Q61 7C74HCT574P
Q62 7C74HCT574P
Q63 AD7541AJN
Q64 TC5020BP
Q65 TC4053BP
Q66 TC4053BP
Q67 μPC4570C
Q68 μPC4570C
Q69 2SC3615
Q71 1SZ53
Q72 μPC4570C
Q73 2SB707
Q74 2SA751
Q75 2SD297
Q76 1S2222
Q77 74HC00P
Q78 2SC3615
Q79 μPC4578C
Q80 μPC4578C
Q81 05-D5-300-1
Q82 2SA1152
Q83 μPC4570C
Q84 μPC398C
K2 DIP-5V
K3 DIP-5V
<STOP freq. Adj>
(+8.00V Adj)
VOLT REF
TP8
(+8.00V)
<START freq. Adj>
TP12
TP10
TP11
TP9
<freq. Span 5.2~2200M Adj>
<freq span 0.52~5.0M Adj>
<Loop gain Adj>
(5B7) SCAN
(+5V) +5V
(−12V)
(+12V) +12V
J3
+8V −10V max +1 MHz/V
(from YTO PLL PD & FILTER)
J4
HTR3 1
HTR2 2
HTR1 3
GND 4
TUNE(−) 5
TUNE(+) 6
GND 7
FM(−) 8
FM(+) 9
10
(TO YTO)
L6 100μH +12V Power
J7
to YTO PLL PD & LOOP Filter
QTY
ITEM
PART No.
DESCRIPTION
MATERIAL
FINISH
19
CHECKED BY
TRACED BY
SCALE
APPROVED BY
DRAWN BY
TITLE
A6, SCAN/YTO DRIVER Circuit Diagram.
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No. D023·1985.08
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3-235/3-236

3.3.9 A7 REF OSC 20

(1) Circuit description

Refer to the A7 block diagram shown in Fig. 3-52.

This circuit supplies the reference signal, etc. to each synthesizer of the 1st local oscillator and the 2nd local oscillator. This circuit configures a PLL circuit with a 50 MHz VCXO, 1/5 divider, phase detector (PD), 10 MHz crystal oscillator and generates high purity 50 MHz signals. This circuit supplies the 50 MHz signals to other units as well as the 500 kHz signal (divided by 100) to A1-A13 to 50 kHz/50 MHz STEP SYNTH and the 10 MHz signal to A1-A15 20 Hz STEP VCO CONT.

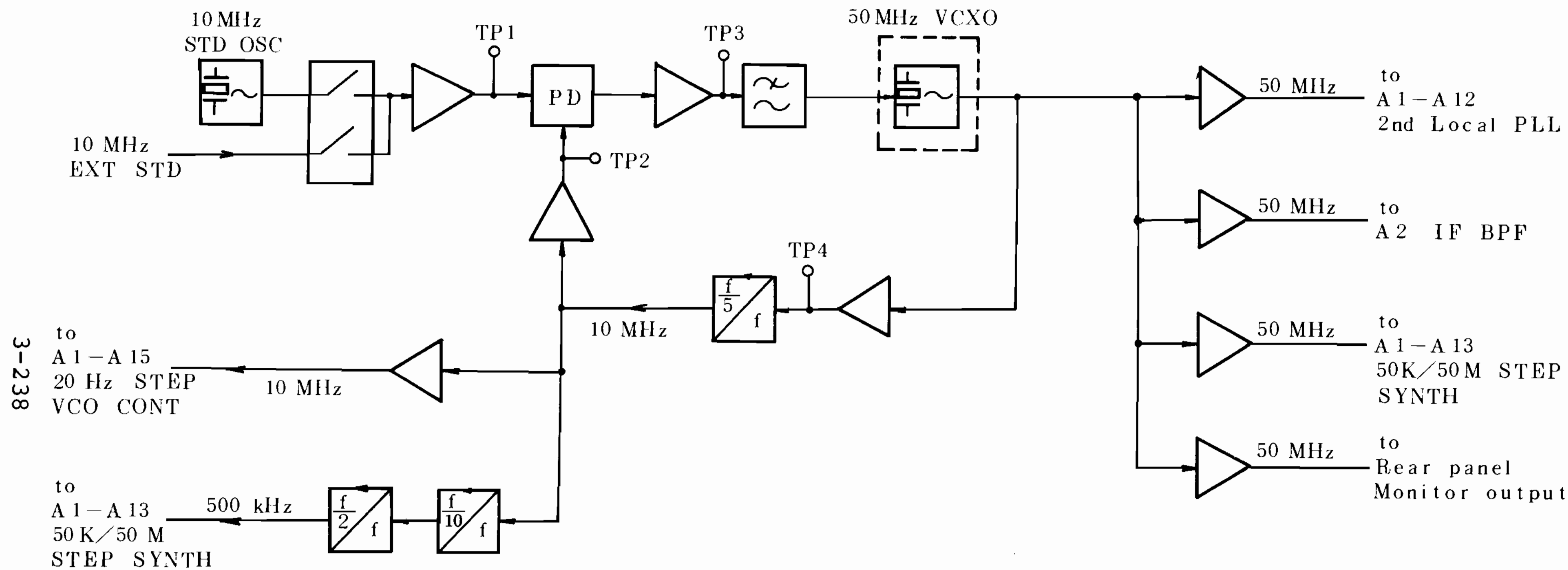

Fig. 3-52 A7 REF OSC Block Diagram

(2) Symptoms

When A7 REF OSC is abnormal, the following two symptoms occur frequently.

1. Frequency uniformally drifts by about 100 Hz to 10 kHz

2. Frequency display error is large in same error ratio to frequency regardless of the frequency

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Frequency counter: MF76A

Oscilloscope

Spectrum analyzer
with high-impedance probe: MS612A

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove the top cover (paragraph 2.2).
2	Remove the top cover of the A7 REF OSC shield case (paragraph 2.6, Fig. 2-4).
3	Remove the A7 REF OSC unit from the shield case.
4	Reattach the A7 REF OSC unit to the shield case using a extender board.

(c) Troubleshooting (Fig. 3-53, 20)

Step	Procedure
1	Check the following voltages:

. Voltage between J1-14 ❶ and J1-15 ❷ (GND) is within -11.5 to -12.5 V.

. Voltage between J1-18 ❸ and J1-15 ❷ (GND) is within +11.5 to +12.5 V.

If these voltages are abnormal, check the Z4 REGULATOR section (paragraph 3.3.3).

. Voltage between Q22-pin 16 and Q22-pin 14 (GND) is within +4.75 to +5.25 V.

If this voltage is abnormal, check the Q36 three-terminal regulator IC.

Step	Procedure
2	Check the signal at each checkpoint according to the following table.

Checkpoint	Normal condition
TP4 ❹ (1/5 divider drive signal)	50 MHz TTL level
TP2 ❺ (PD drive signal)	10 MHz ≥8 Vp-p
TP1 ❻ (PD input RF signal)	10 MHz ≥6 Vp-p
Note: The voltage difference between TP2 and TP1 must be 2 V or more.	
TP3 ❼ (50 MHz VCXO Control Voltage)	0 ±0.5 V at 20° to 30°C +9.0 V, -3.0 V at 0° to 50°C
EXT REF Signal Input level J1-20 ❽	10 MHz, 2 Vp-p or more (Internal or external reference mode is selected automatically.)

(continued)

Step	Procedure
2 (Cont.)	If these values are abnormal, the A7 REF OSC PLL is unlocked.
3	Check each output level with a high-impedance probe.

J1-8 (to rear panel)	9	50 MHz, -3 dBm typ. (At 50 Ω termination)
J1-6 (to A1-A13 50 k/50 M STEP SYNTH)	10	50 MHz, -3 dBm typ. (At 50 Ω termination)
J1-4 (to A2 IF BPF)	11	50 MHz, -3 dBm typ. (At 50 Ω termination)
J1-2 (to A1-A12 2nd Local PLL)	12	50 MHz, -3 dBm typ. (At 50 Ω termination)
J1-10 (to A1-A15 20 Hz STEP VCO CONT)	13	10 MHz, +3 dBm or more (At 50 Ω termination)
J1-12 (to A1-A13 50 k/50 M STEP SYNTH)	14	500 kHz TTL level

(4) Adjustment

Make this adjustment 15 minutes or more after power-on.
(After the 10 MHz STD OSC oscillation frequency has stabilized).

(a) 50 MHz VCXO oscillation frequency adjustment

Step	Procedure
1	Connect a digital voltmeter to TP3 ❼ .
2	Adjust L3 and R30 through the adjustment holes in the shield case so that the TP3 ❼ voltage is approx. 0 V.

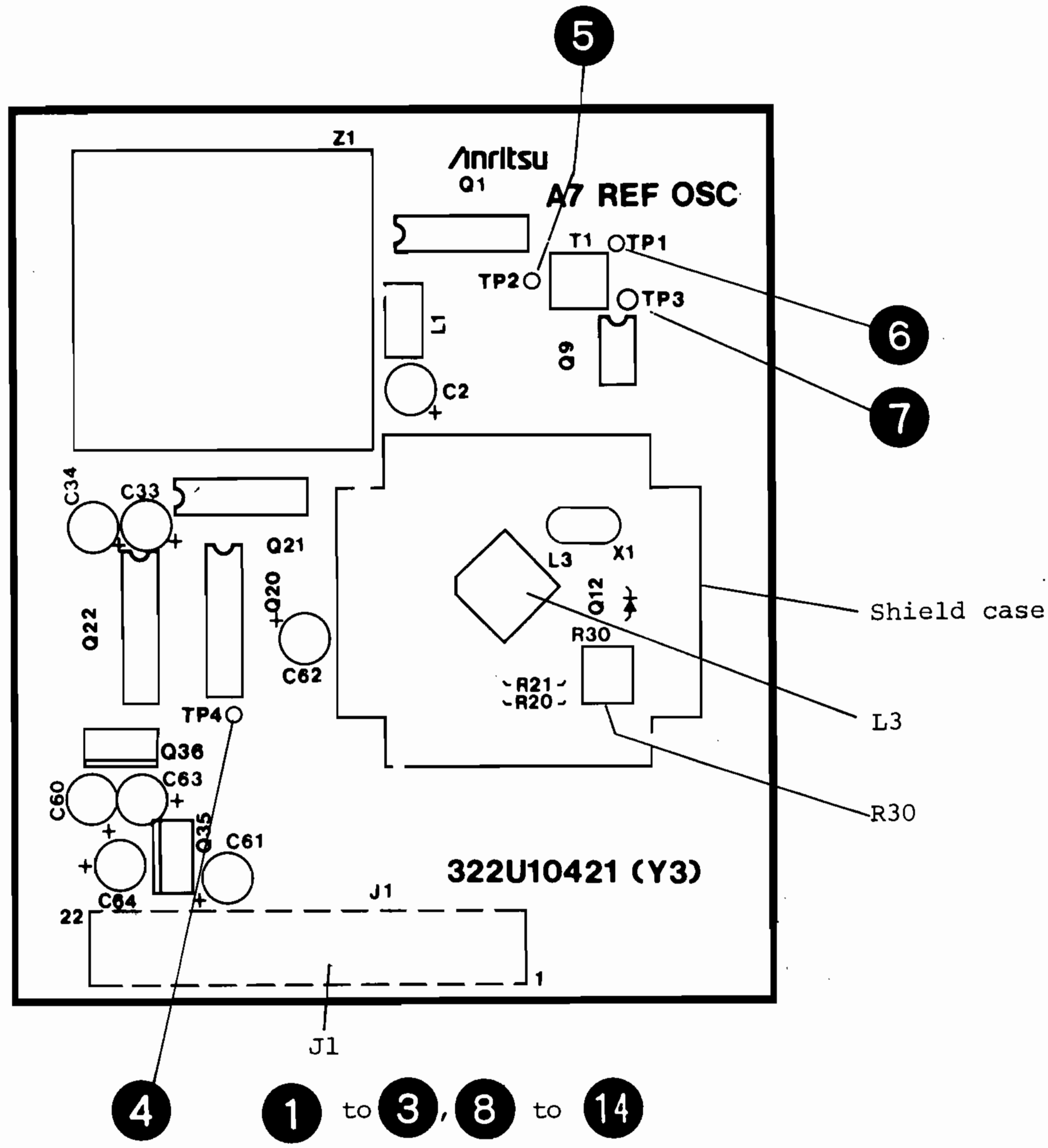

Fig. 3-53 (a) A7 REF OSC PC Board Parts Layout (Parts Side) **20**

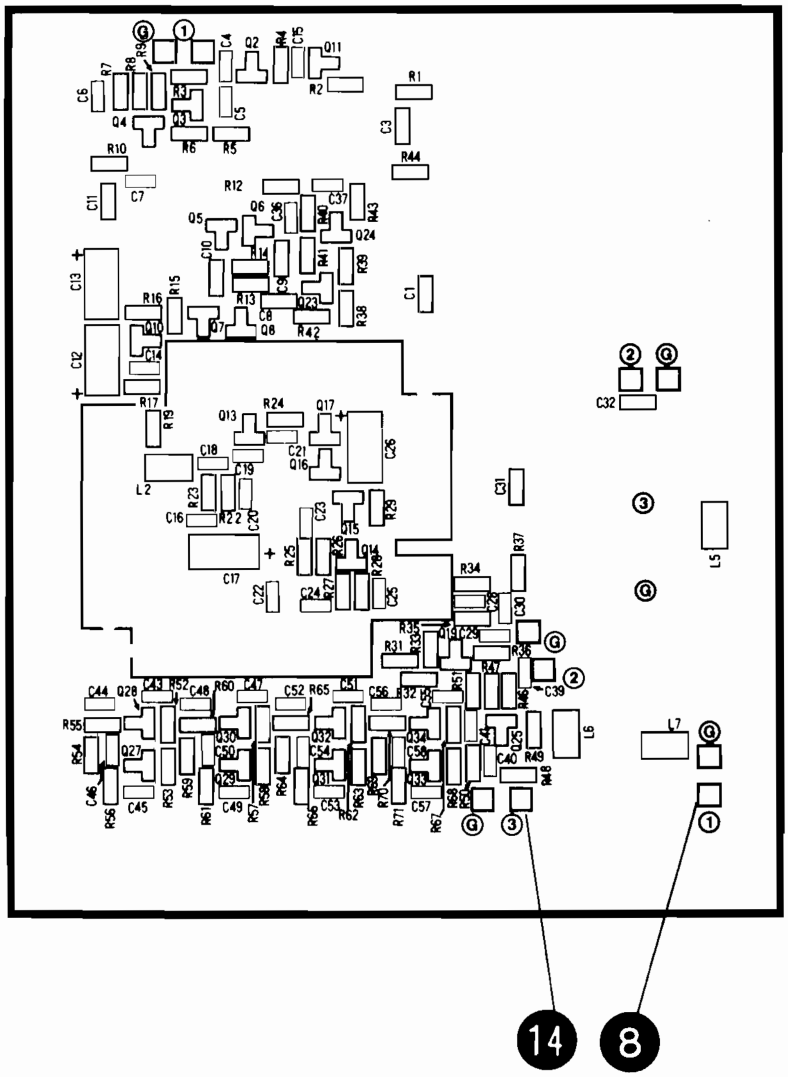

Fig. 3-53 (b) A7 REF OSC PC Board Parts Layout
(Pattern Side) 20

33W29896 1/1

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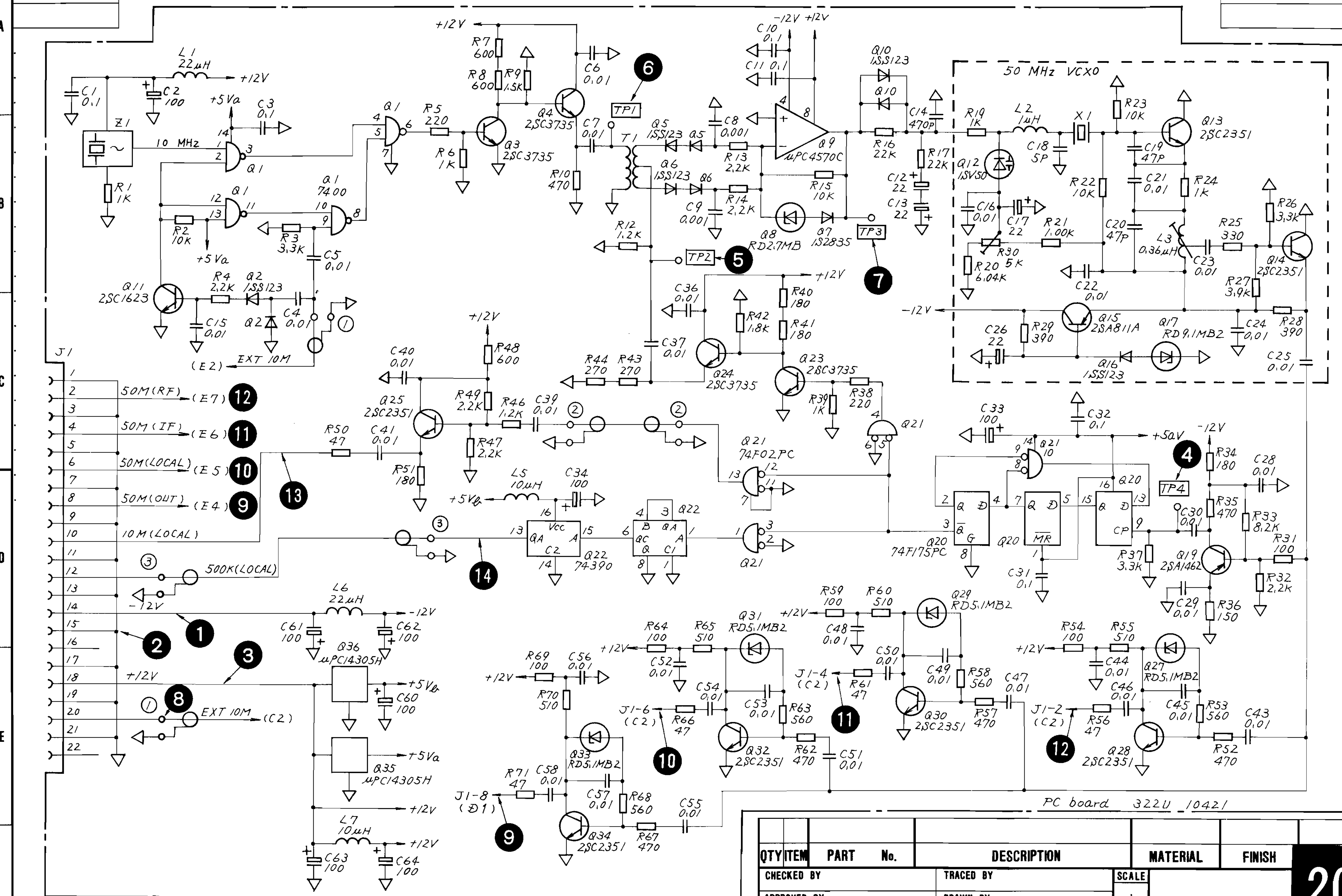

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TITLE: A7, REF OSC Circuit Diagram.

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Parts List 34W93322

DEP

3.3.10 A8 MAIN CPU 21

(1) Circuit description

The MAIN CPU controls the A9 GP-IB (or A11 RS-232C), PMC, and common RAM as well as the entry from the A5 FRONT BOARD and each part of the hardware. (Fig. 3-3 (2/2)).

Figure 3-55 shows the interrupt system diagram. Note that the interrupt signal from A5 FRONT BOARD is applied to MAIN CPU through A6 SCAN/YTO DRIVER.

(2) Symptoms

1. If the MAIN CPU is not operating normally, all the MS2601A/J functions do not operate.
2. When the life of the battery on the A9 GP-IB PC board (or A11 RS-232C PC board) has expired, the set parameters are not backed-up when the power is turned off.

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

(b) Preparation

CAUTION

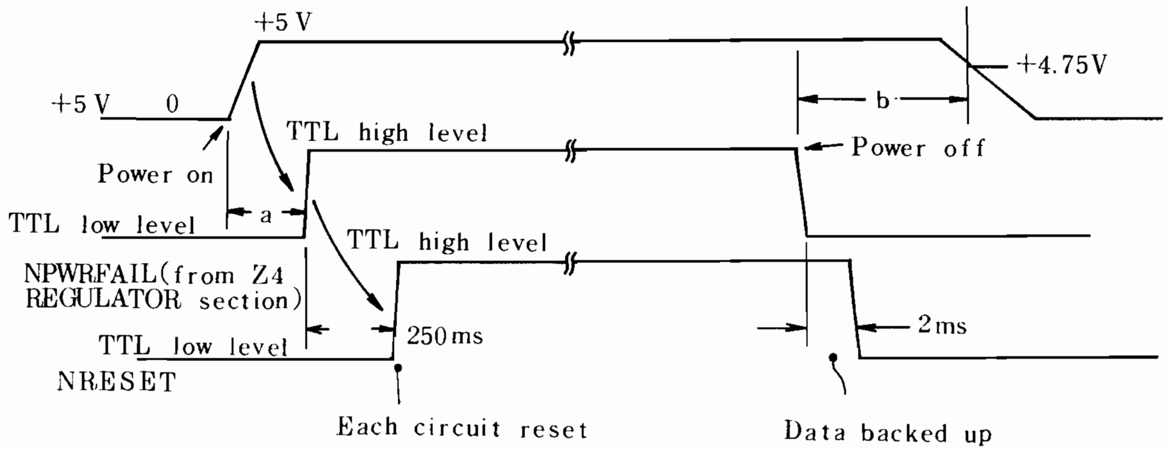
Turn off the power before disassembly.

Step	Procedure
1	Remove the A8 MAIN CPU along with A9 GP-IB as described in paragraph 2.4.
2	Reattach them using an extender board.

(c) Troubleshooting

Check each checkpoint by referring to the following table.

Signal name	Checkpoint	Normal condition
+5 V	❶ (Q26-16)	+5 ±0.25 V
CPU8MZ	❷ (Q15-15)	8 MHz pulse wave
+5 V NPWRFAIL NRESET	❶ ❸ (Q23-21) ❹ (Q23-17)	The waveforms at power-on and power-off are shown in Fig. 3-54



+5 V : LOGIC section power supply

NPWRFAIL: Power fail signal, output to each CPU from the Z4 REGULATOR section.

NRESET : Generated by Q23 using internal timing when it is received from the NPWRFAIL signal.

Fig. 3-54 RESET TIMING CHART

Note:

The value of "a" and "b" may differ somewhat depending on whether the A4 PTA PC board (option 01) is installed and not installed.

The waveforms shown in the above figure are examples when the A4 PTA is not installed. In either case, the following two conditions must be satisfied.

1. NPWRFAIL goes TTL low level → TTL high level after +5 V is raised.

2. +5 V held for at least 3 ms after NPWRFAIL goes TTL high level → TTL low level.

When condition 1 is not satisfied, the MS2601A does not operate normally at power-on.

When condition 2 is not satisfied, the panel setting data is not backed up into the internally memory at power-off.

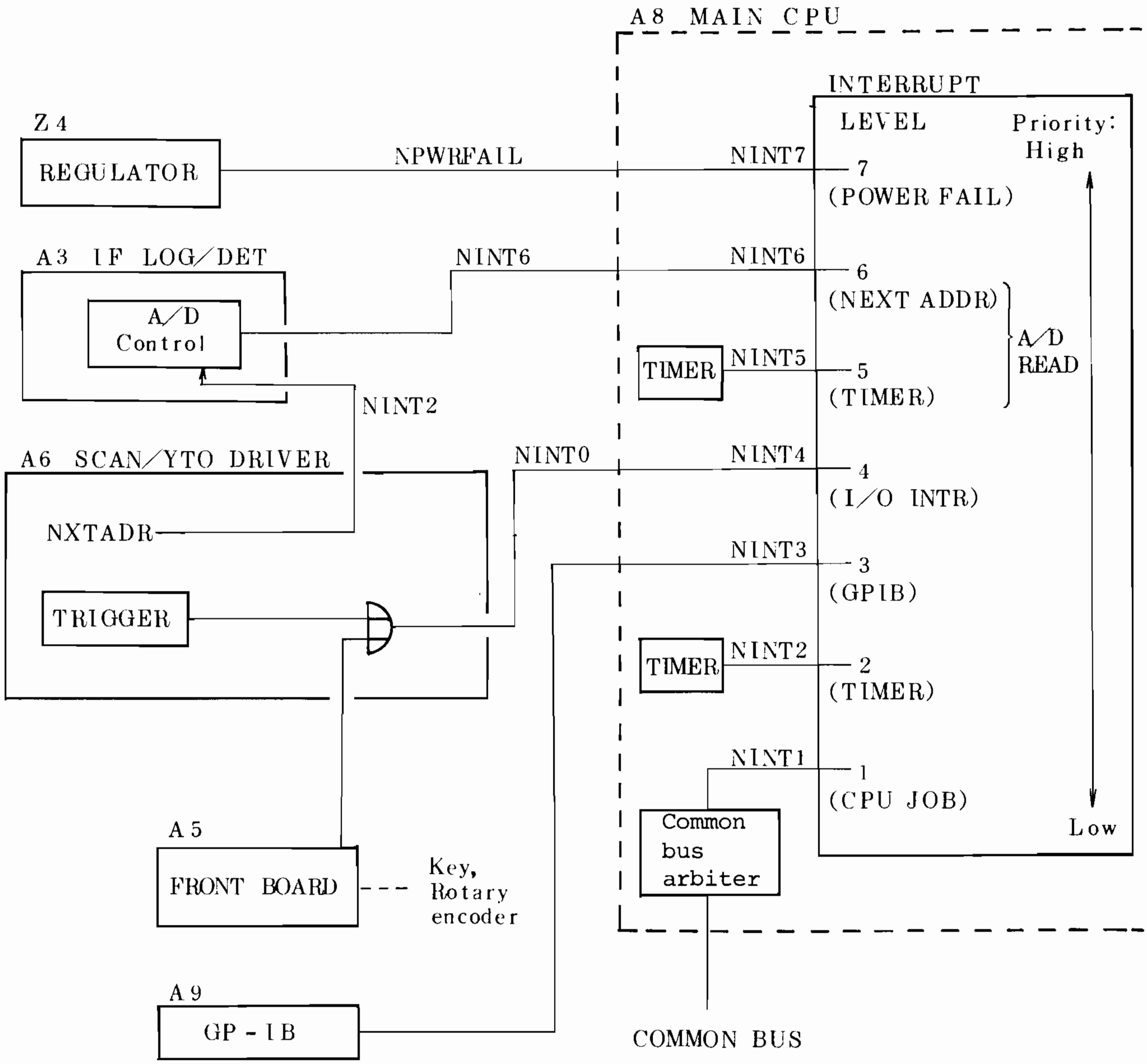


Fig. 3-55 A8 MAIN CPU Interrupt System Diagram

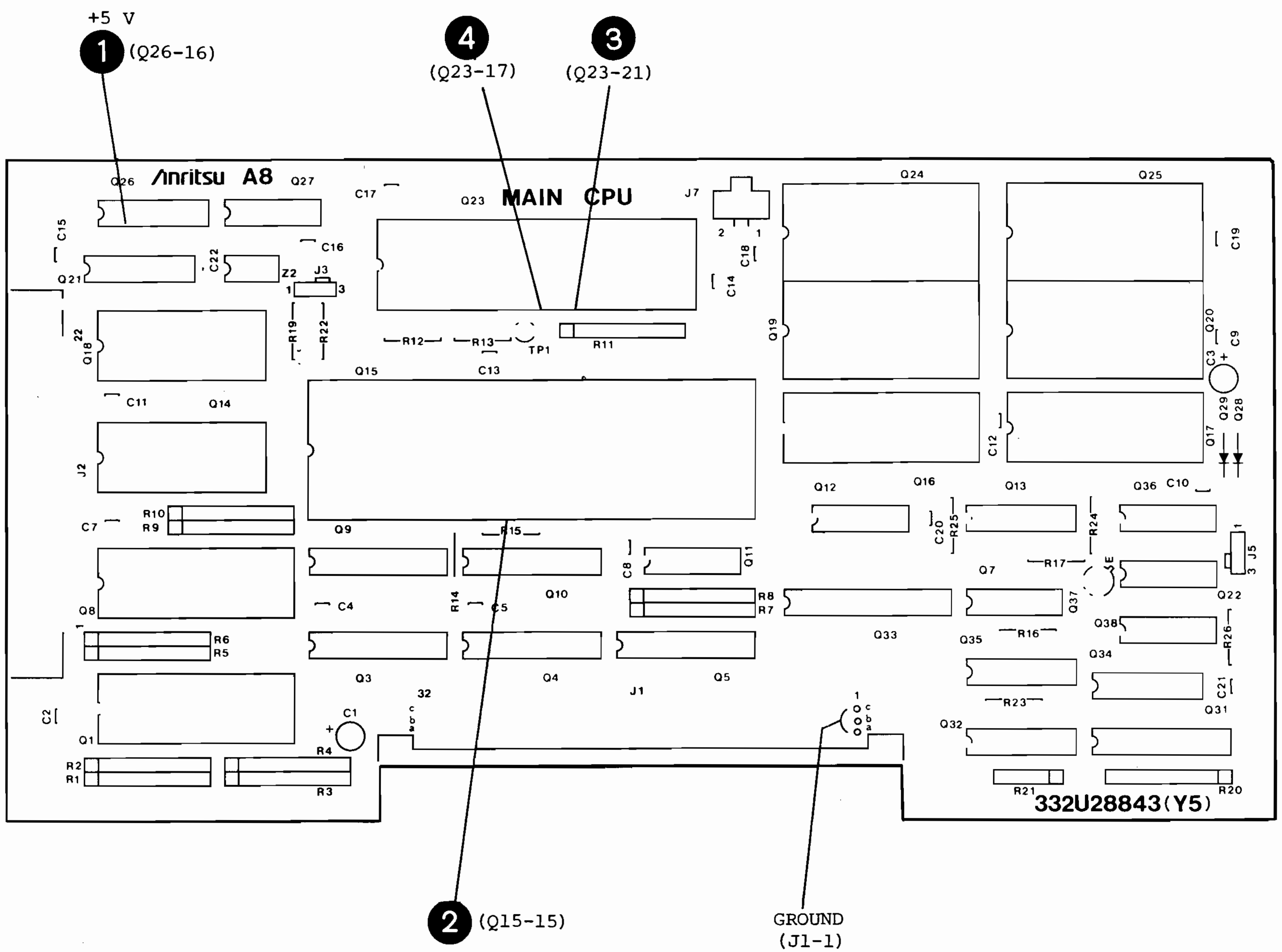
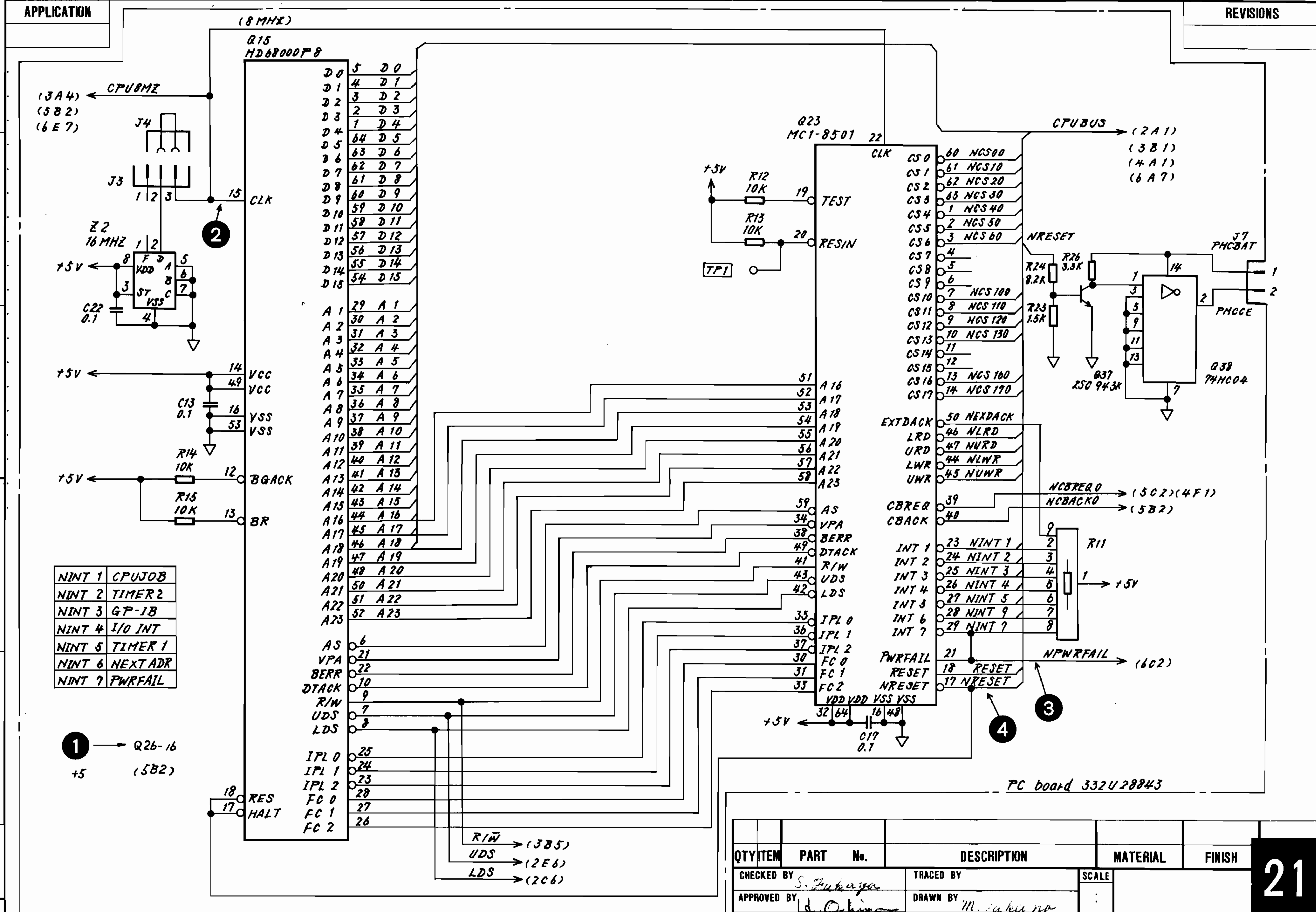


Fig. 3-56 A8 MAIN CPU PC Board
Parts Layout 21



NINT 1	CPUJOB
NINT 2	TIMER 2
NINT 3	GP-IB
NINT 4	I/O INT
NINT 5	TIMER 1
NINT 6	NEXT ADR
NINT 7	PWRFAIL

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Parts List 34W93323

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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TITLE A8, MAIN CPU Circuit Diagram

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3-253/3-254

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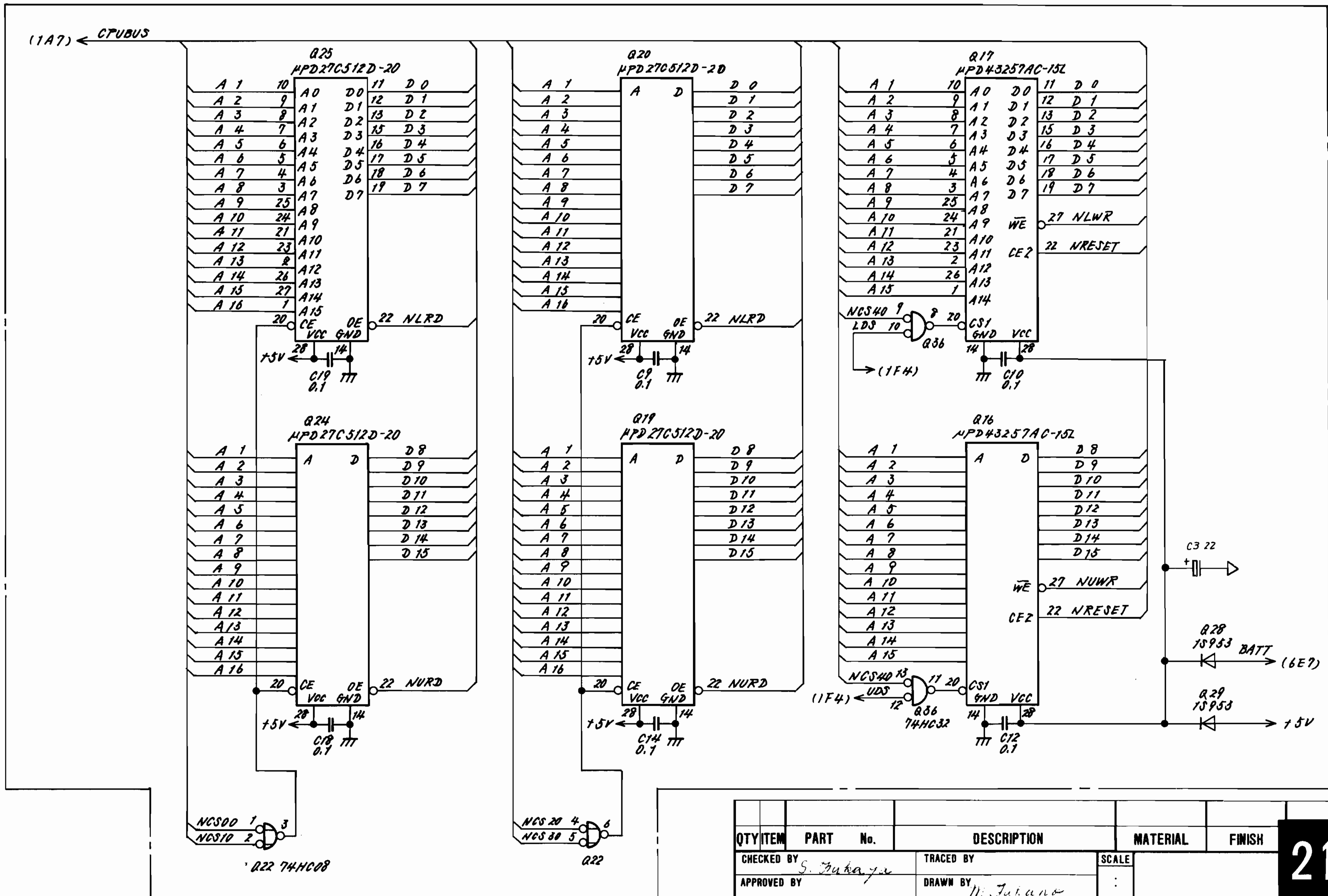

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APPROVED BY
TRACED BY
DRAWN BY M. Fukano
SCALE :

TITLE A8, MAIN CPU Circuit Diagram

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No. D023-1985.08

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33W29897 3/6

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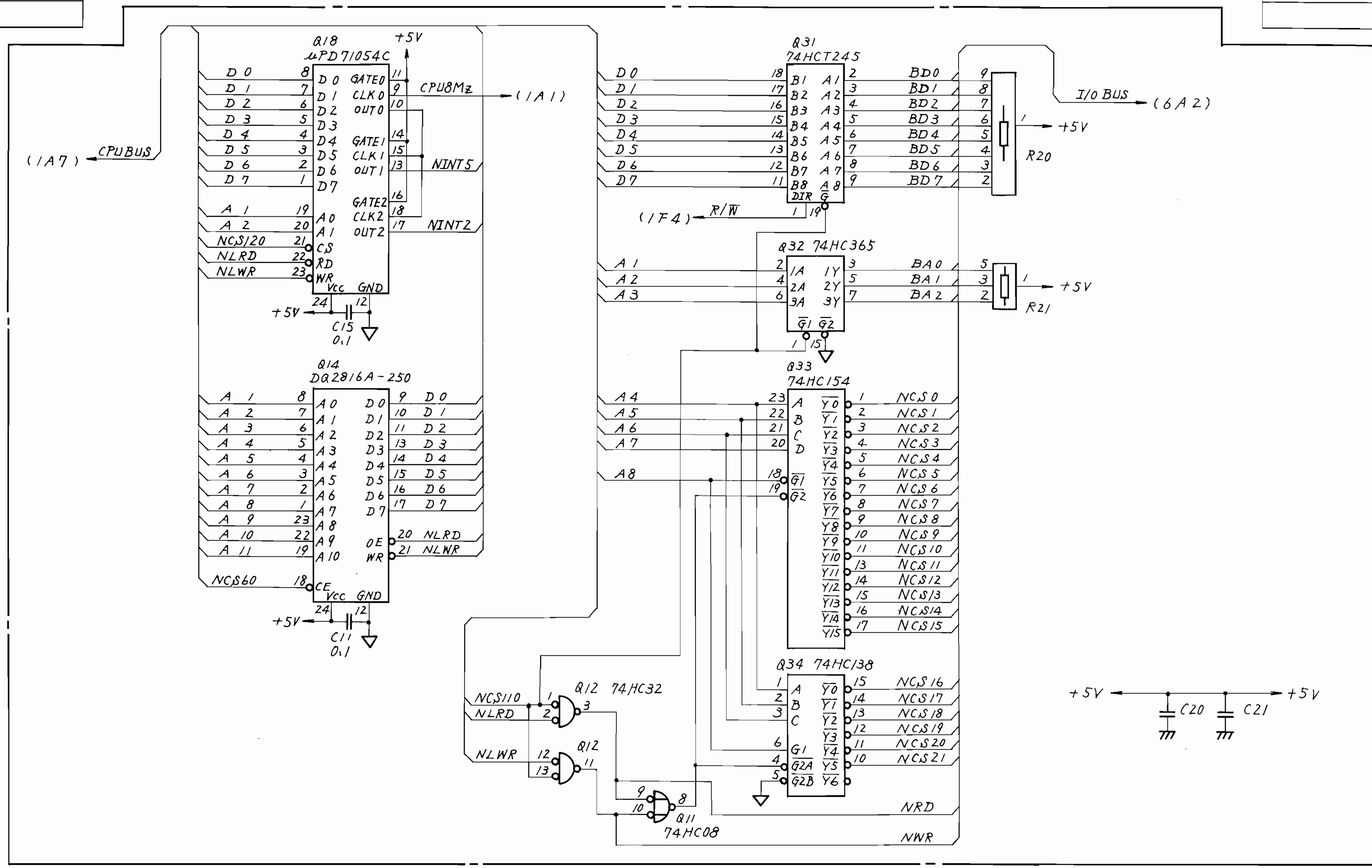

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TITLE: A8, MAIN CPU Circuit Diagram.

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3-257/3-258

33W29897 4/6

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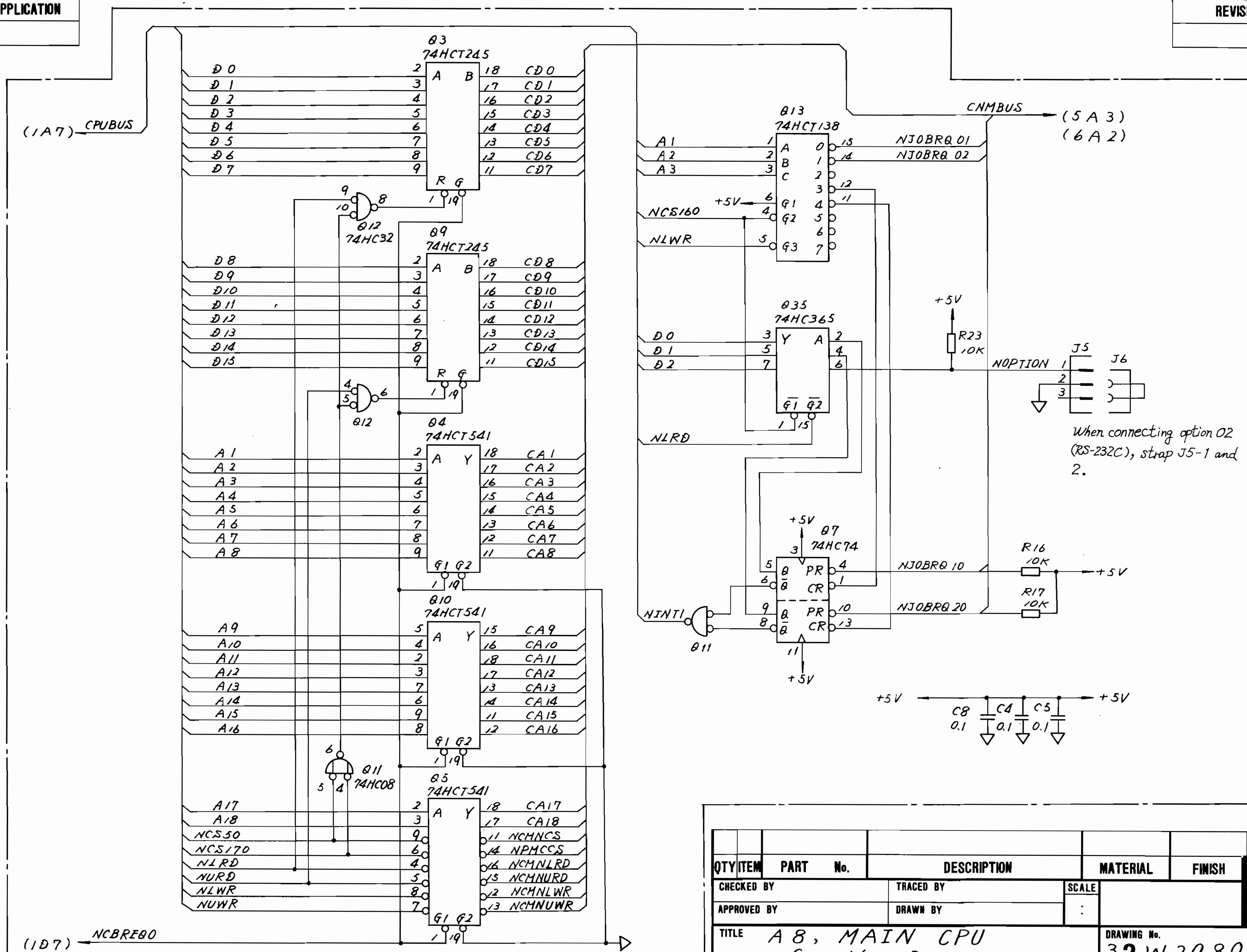

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TITLE A8, MAIN CPU Circuit Diagram

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21

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No. D023-1985.08

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3-259/3-260

33W29897 5/6

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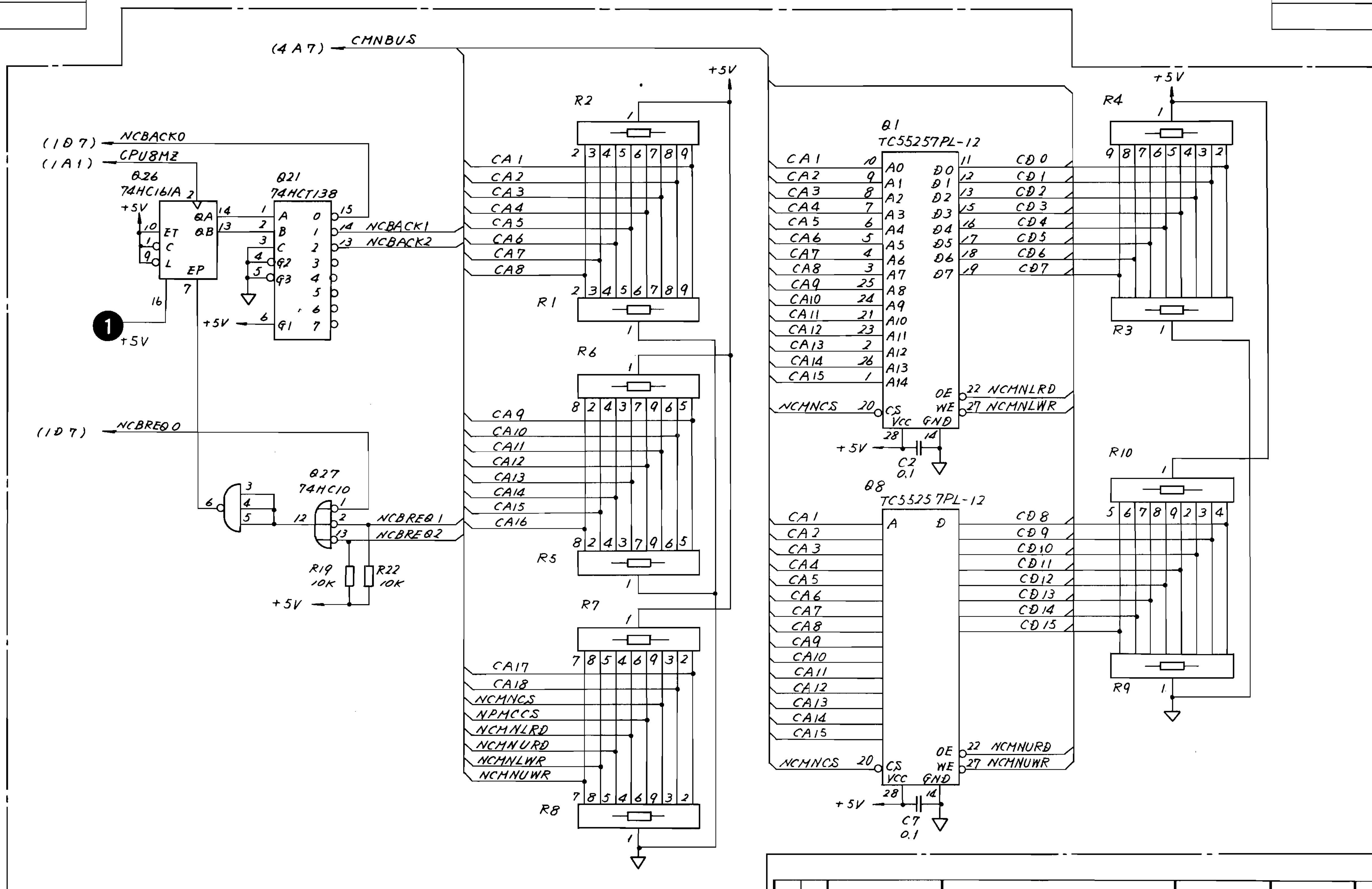

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY

TRACED BY

SCALE :

APPROVED BY

DRAWN BY

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TITLE A8, MAIN CPU Circuit Diagram

DRAWING No. 33W29897 5/6

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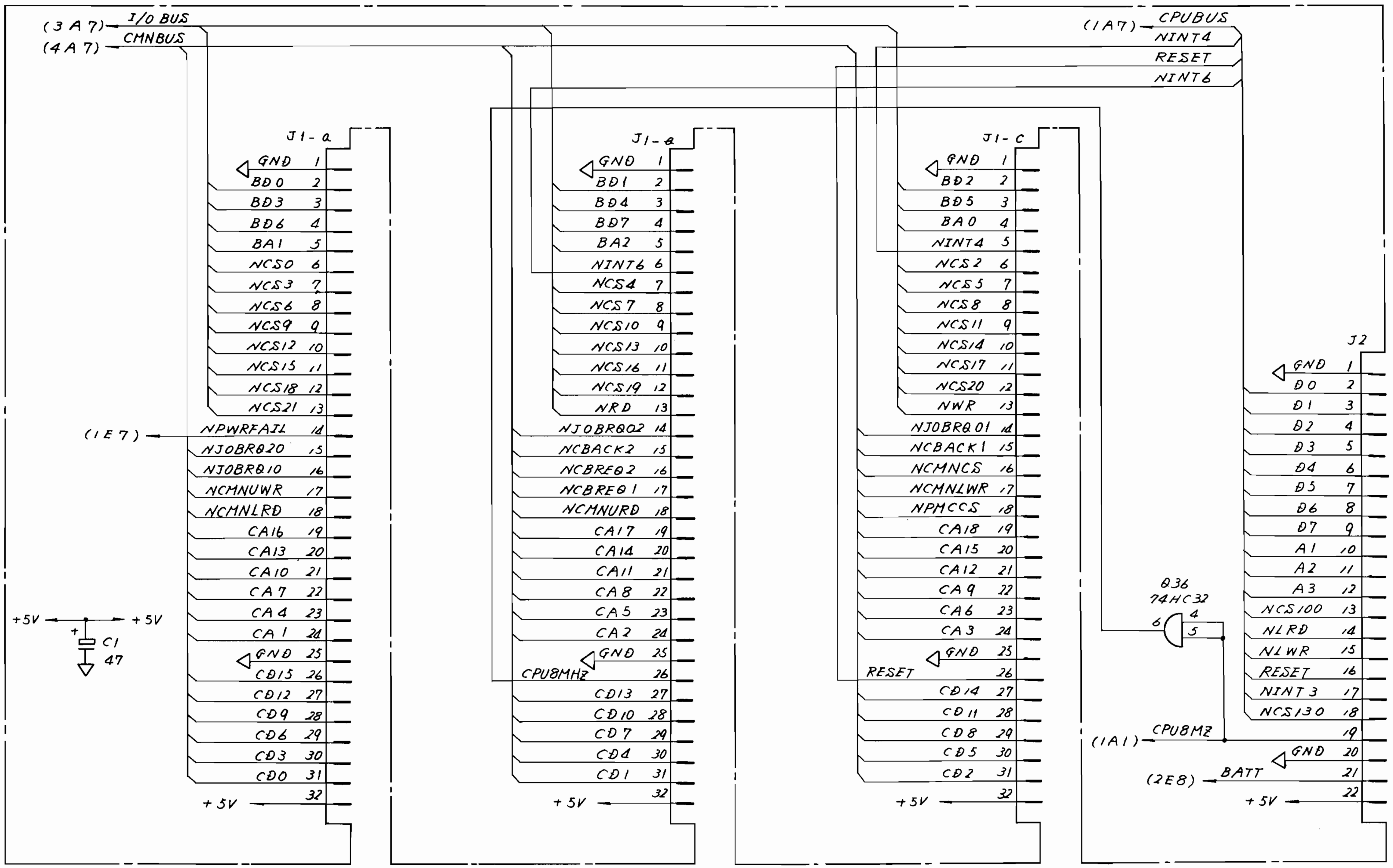
No. D023-1985.08

ANRITSU CORP.

3-261/3-262



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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APPROVED BY | DRAWN BY

TITLE A8, MAIN CPU Circuit Diagram

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21

ANRITSU CORP.

3-263/3-264

No. D023-1985.08

3.3.11 A9 GP-IB 22

(1) Circuit description

GP-IB adapter LSI, GP-IB bus driver/receiver and RAM back-up battery of the MAIN CPU are include in this section.

(2) Symptom

When the A9 GP-IB board is defective, GP-IB control is impossible.

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove A8 MAIN CPU along with A9 GP-IB as described in paragraph 2.4.
2	Reattach them using an extender board.

(c) Troubleshooting

Check each checkpoint by referring to the following table.

Signal name	Checkpoint	Normal condition
+5 V	❶ (Q1-40)	+5 ±0.25 V
CPU 8MZ	❷ (Q1-3)	8 MHz pulse wave
Battery voltage	❸ (R3)	≧3 Vdc

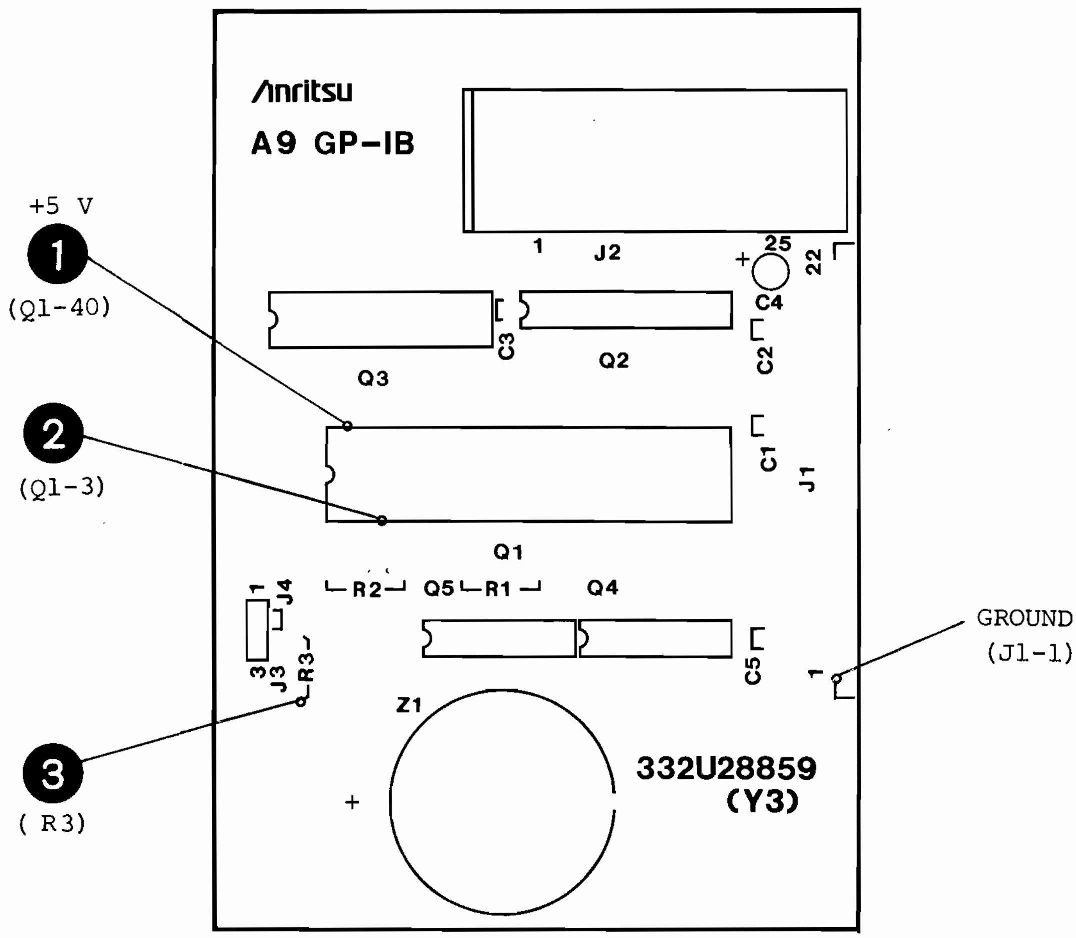

Fig. 3-57 A9 GP-IB PC Board Parts Layout **22**

33W29898 1/1

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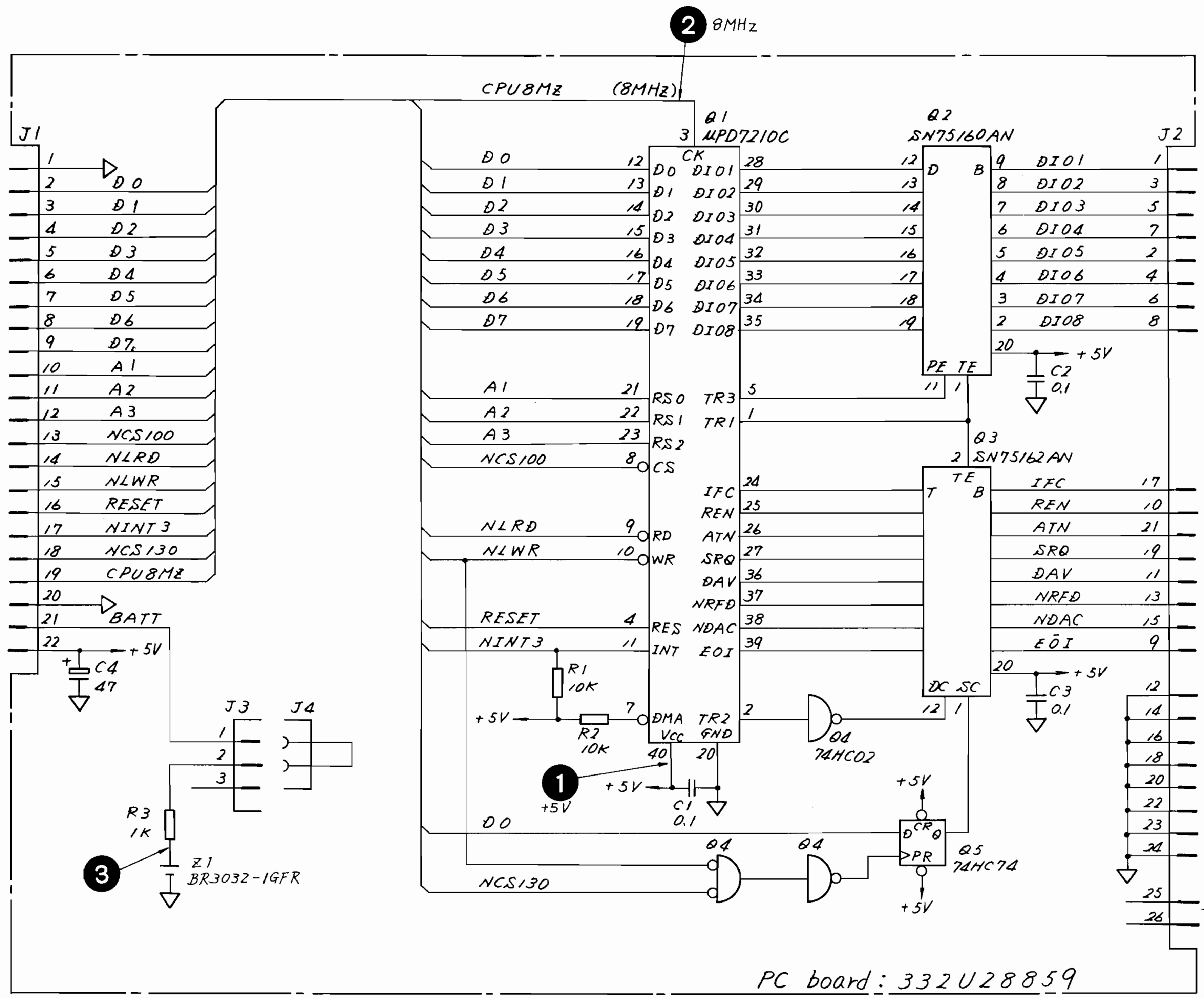

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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Parts List 34W93324

TITLE A9, GP-IB Circuit Diagram

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22

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3.3.12 A10 DISP CPU 23

(1) Circuit description

This circuit displays on the CRT the display data sent from the A8 MAIN CPU via a common RAM. Figure 3-58 shows the block diagram of the CRT controller section.

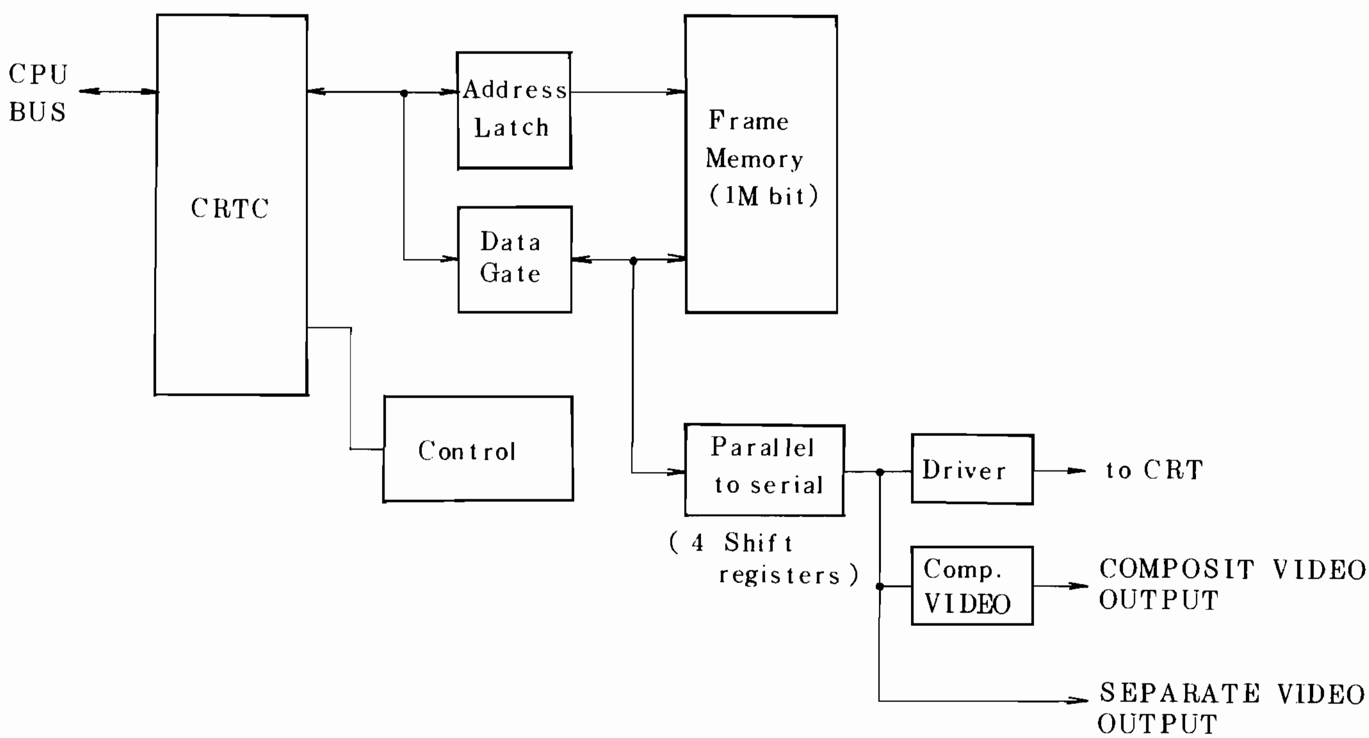


Fig. 3-58 A10 DISP CPU-CRT Controller Block Diagram

(2) Symptoms

1. If A10 DISP CPU is not operating normally, the CRT does not display anything.

2. If the DISP CPU is operating, but the CRT controller section is defective, part or all of the graduation lines and characters may be dislocated or distorted, or unnecessary dots and lines may be displayed.

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

(b) Preparation

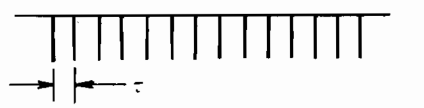
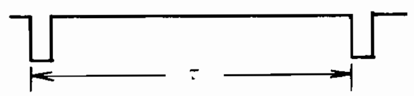
CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove A10 DISP CPU as described in paragraph 2.4.
2	Reattach it using an extender board.

(c) Troubleshooting

Check each checkpoint by referring to the following table.

Signal name	Checkpoint	Normal condition
+5 V	❶ (Q5-20)	+5 ±0.25 V
CPU Clock	❷ (Q7-15)	8 MHz Pulse wave (τ ≒ 125 ns)
CRTC Clock (1)	❸ (Q4-50)	6.4 MHz Pulse wave (τ ≒ 156 ns)
CRTC Clock (2)	❹ (Q9-15)	12.8 MHz Pulse wave (τ ≒ 78 ns)
+5 V	❶	Same as A8 MAIN CPU (See Fig. 3-54, paragraph 3.3.10)
NPWRFAIL	❺ (Q1-21)	
NRESET	❻ (Q1-17)	
CRTHSYNC	❼ (Q39-12)	 (τ ≒ 63 μs)
CRTVSYNC	❽ (Q39-10)	 (τ ≒ 16.7 ms)

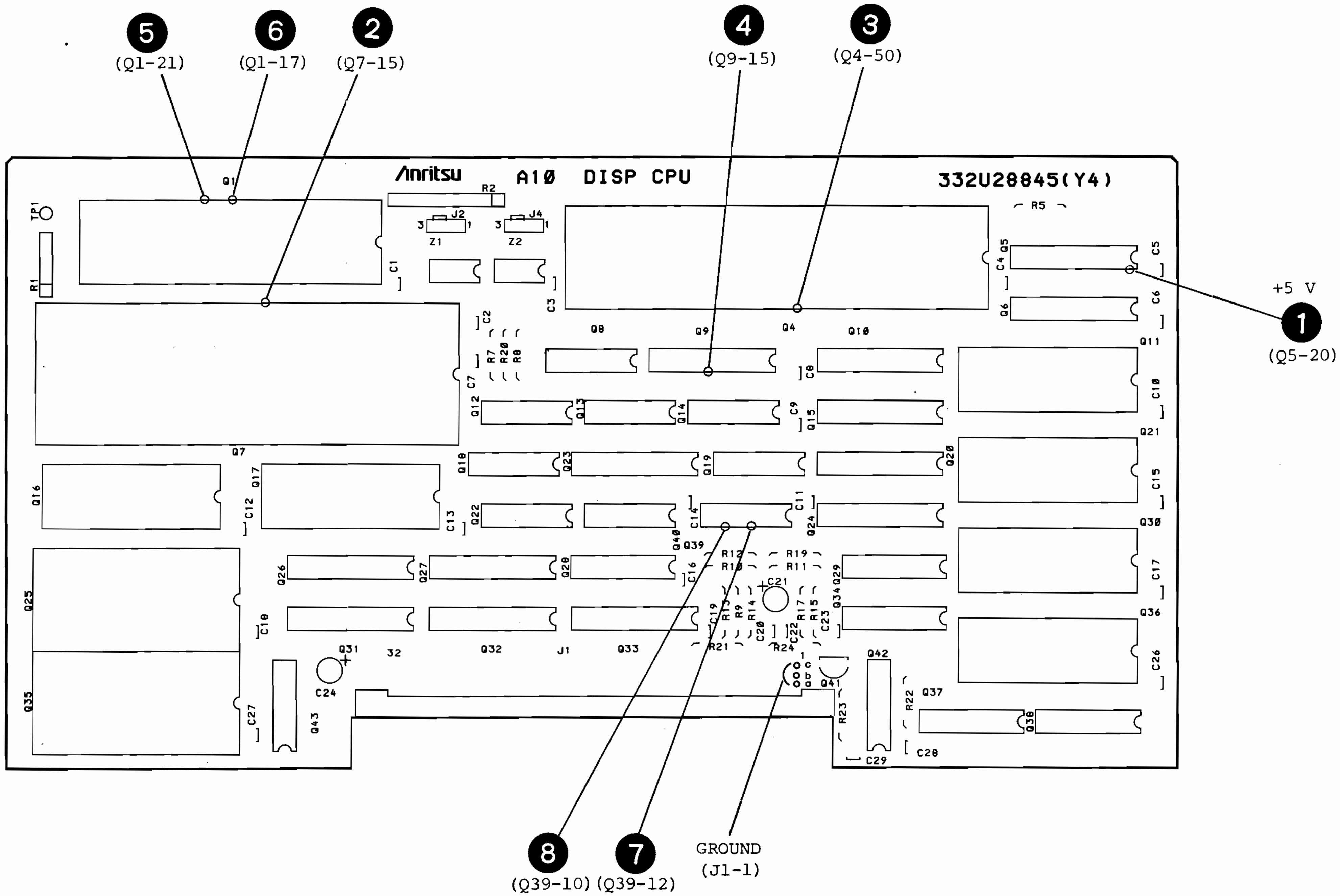
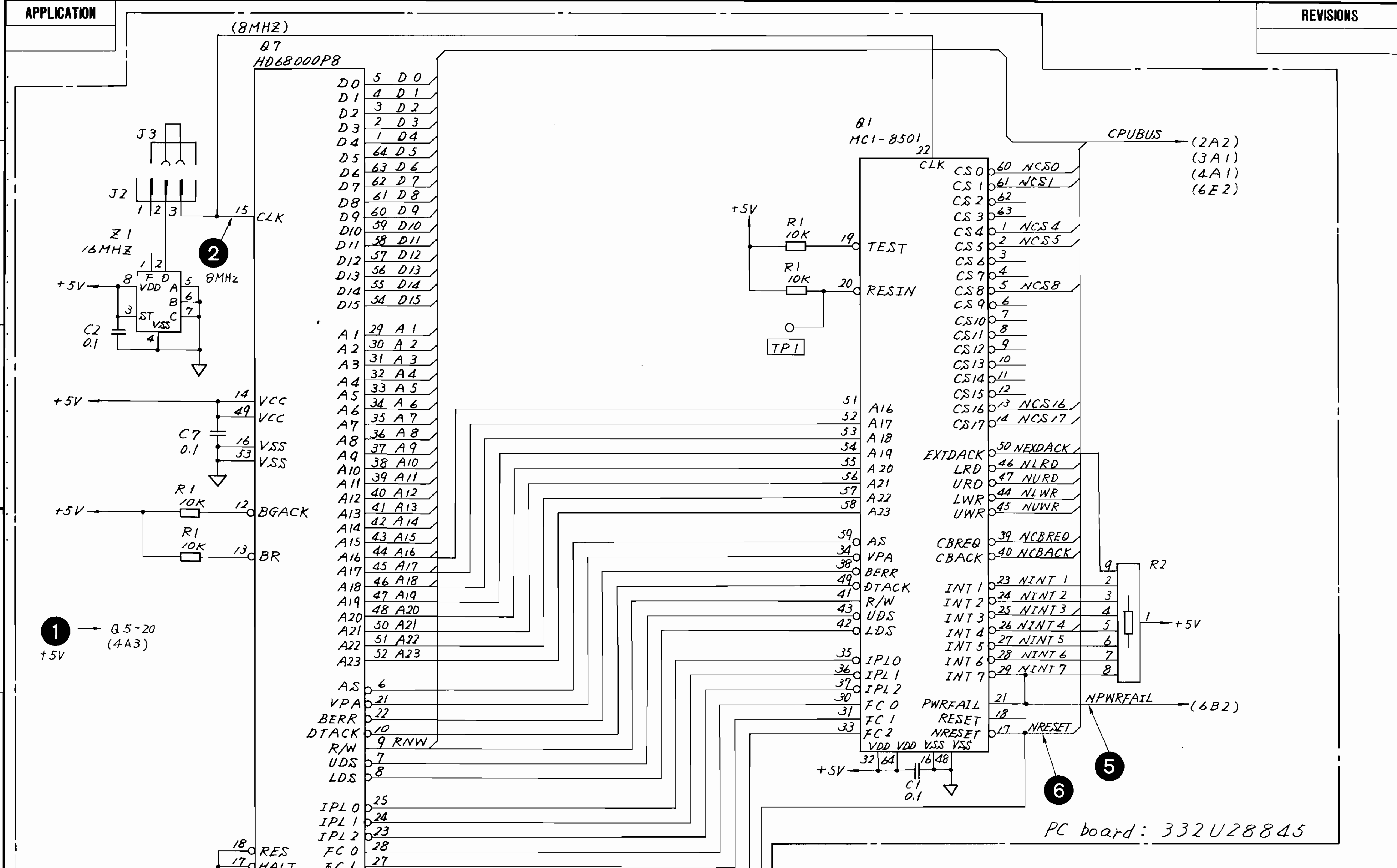


Fig. 3-59 A10 DISP CPU PC Board
Parts Layout 23

33W29899 1/6

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

DEP

CHECKED BY	TRACED BY	SCALE	
APPROVED BY	DRAWN BY	:	

Parts List 34W93325

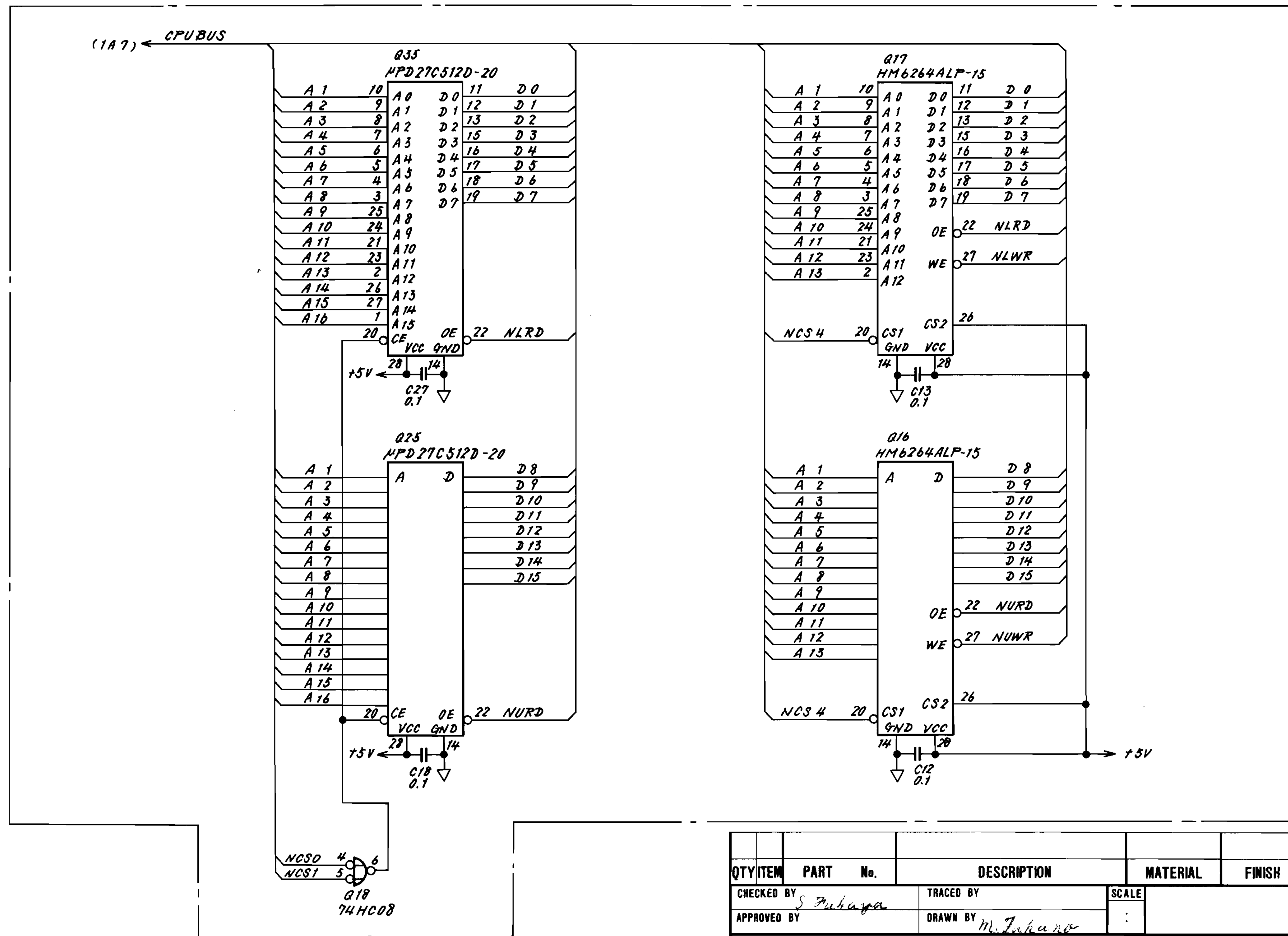
TITLE A10, DISPLAY CPU Circuit Diagram

DRAWING No. 33W29899 1/6

23

ANRITSU CORP. 3-275/3-276

No. D023-1985.08



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY S. Fukaya
APPROVED BY
TRACED BY
DRAWN BY M. Takano
SCALE :

TITLE A10, DISPLAY CPU Circuit Diagram

DRAWING No. 33W29899 2/6

23

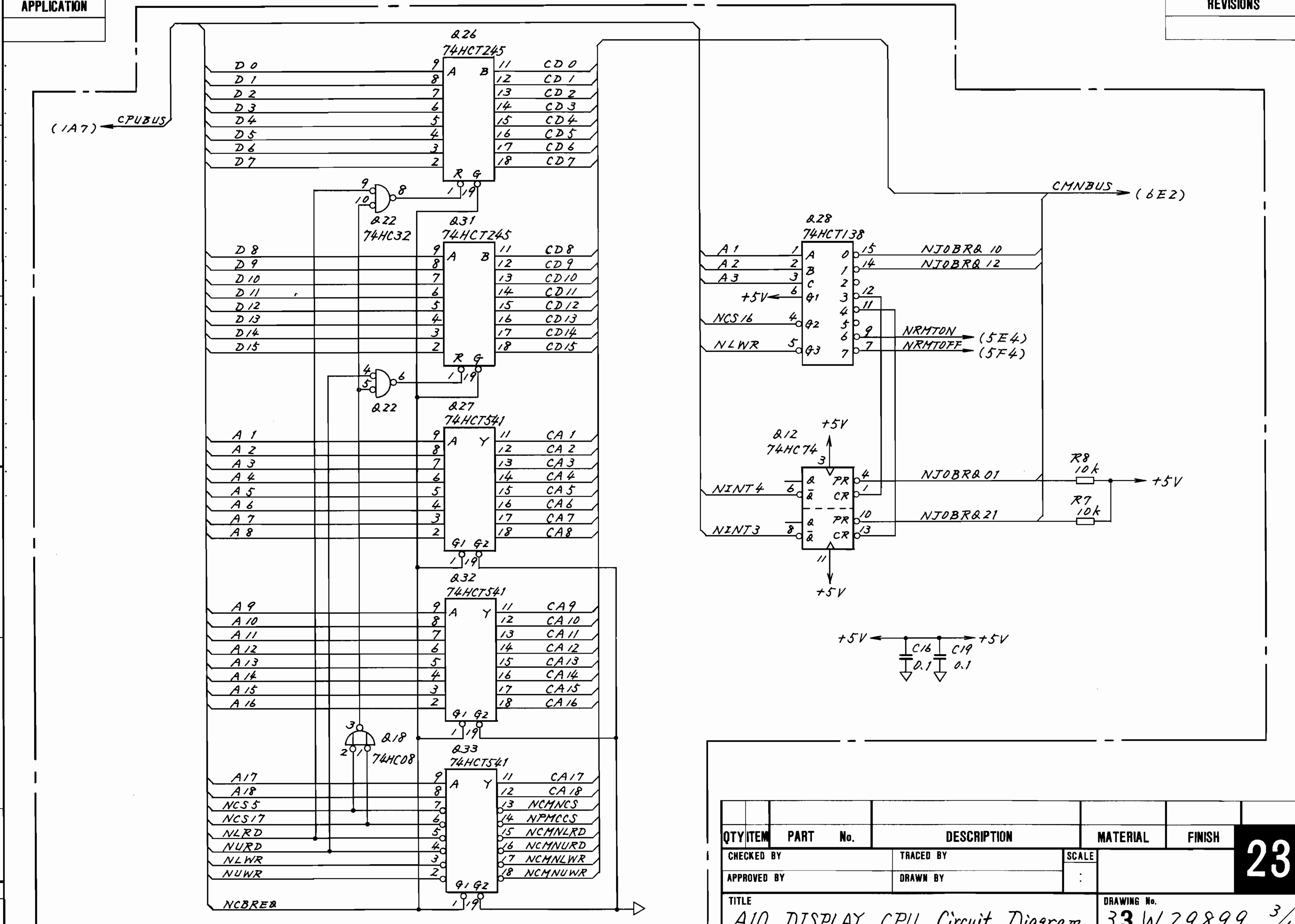
ANRITSU CORP.

3-277/3-278

33W29899 3/6

APPLICATION

REVISIONS



DEP

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :

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TITLE: A10, DISPLAY CPU Circuit Diagram.

DRAWING No. 33W29899 3/6

23

No. D023-1985.08

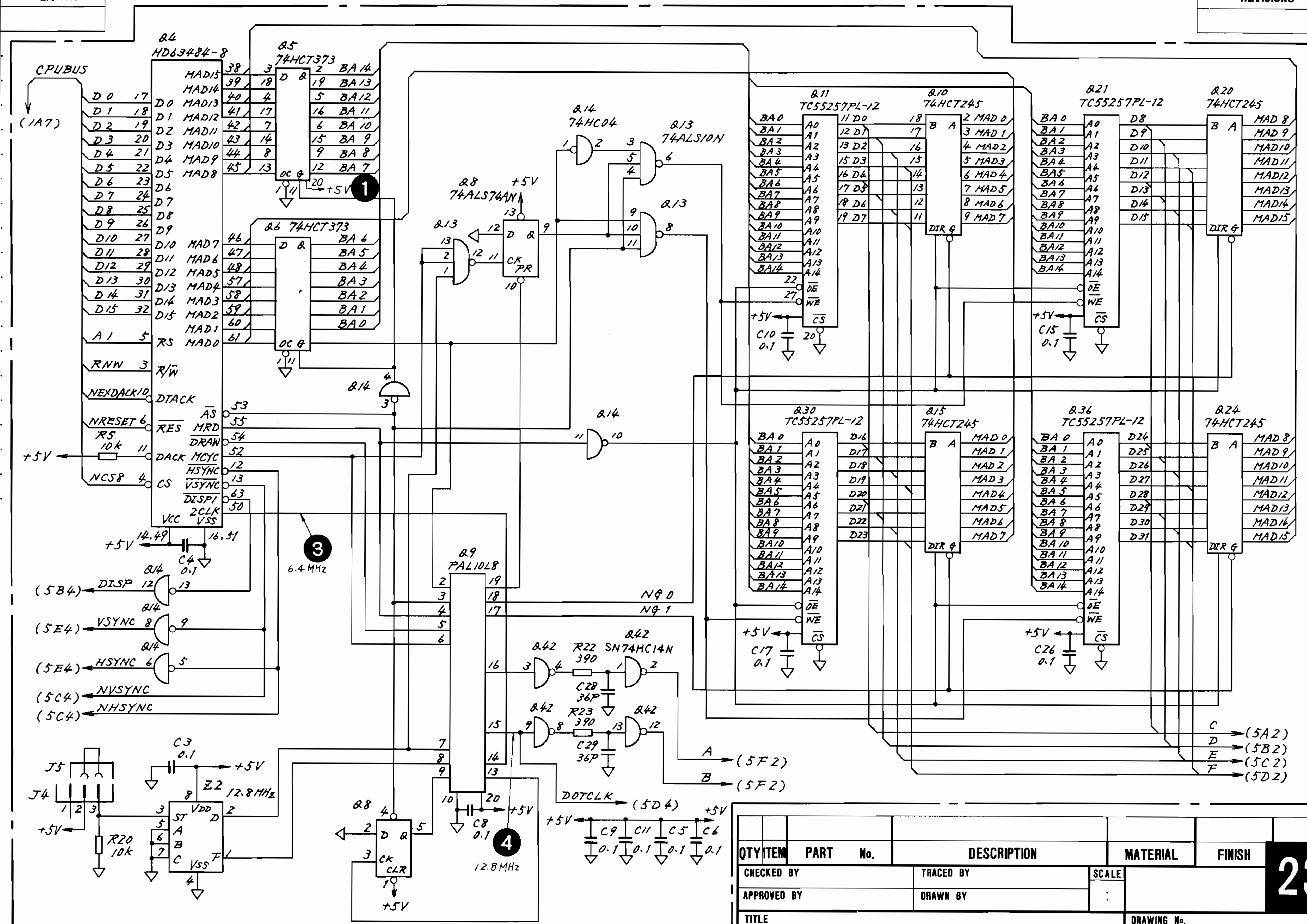
ANRITSU CORP.

3-279/3-280

33W29899 4/6

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY — TRACED BY — SCALE :

APPROVED BY — DRAWN BY

TITLE: A10, DISPLAY CPU Circuit Diagram.

DRAWING No. 33W29899 4/6

23

DEP

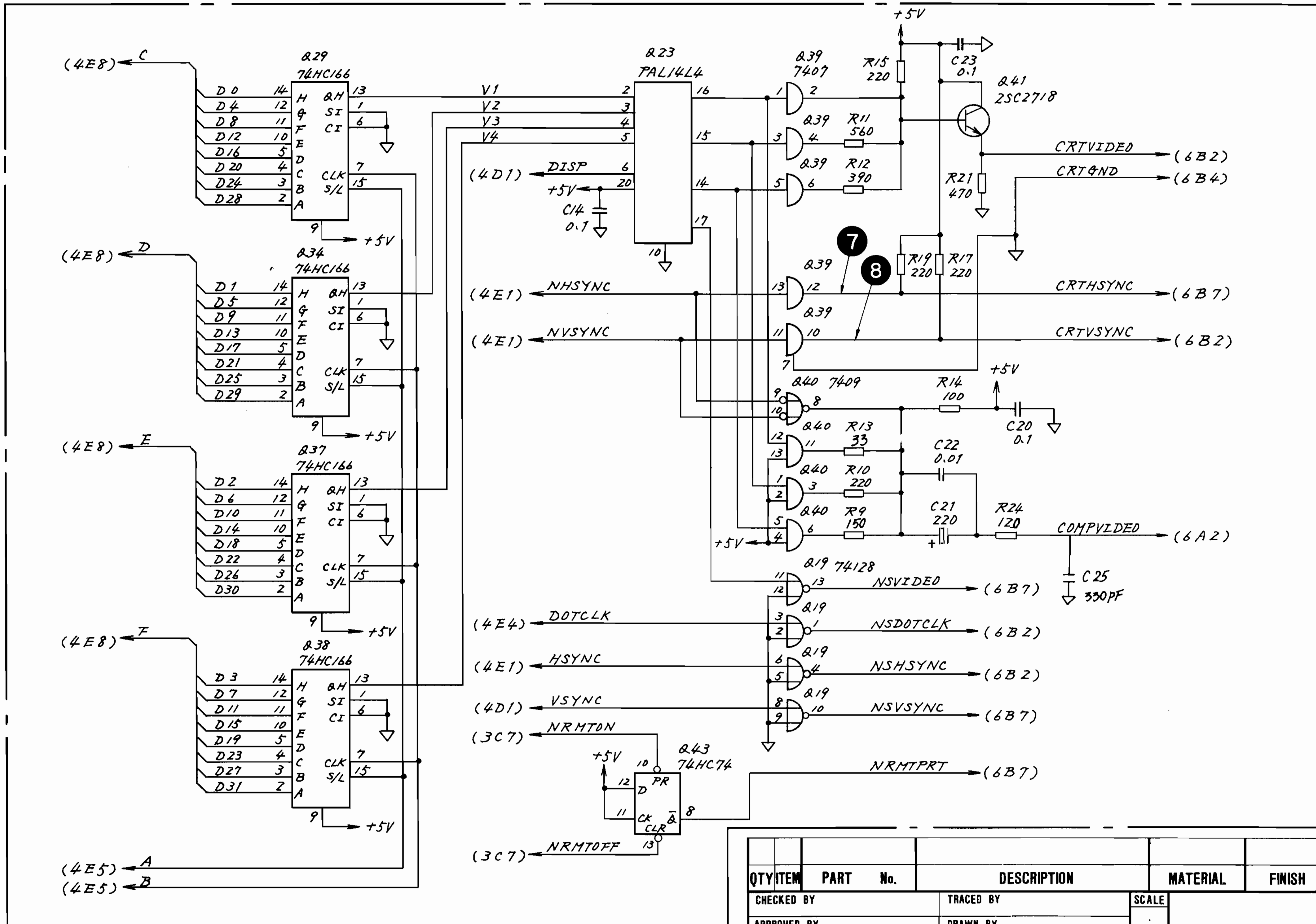
No. D023-1985.08

ANRITSU CORP. 3-281/3-282

33W29899 5/6

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :

APPROVED BY | DRAWN BY

TITLE: A10, DISPLAY CPU Circuit Diagram.

DRAWING No. 33W29899 5/6

23

DEP

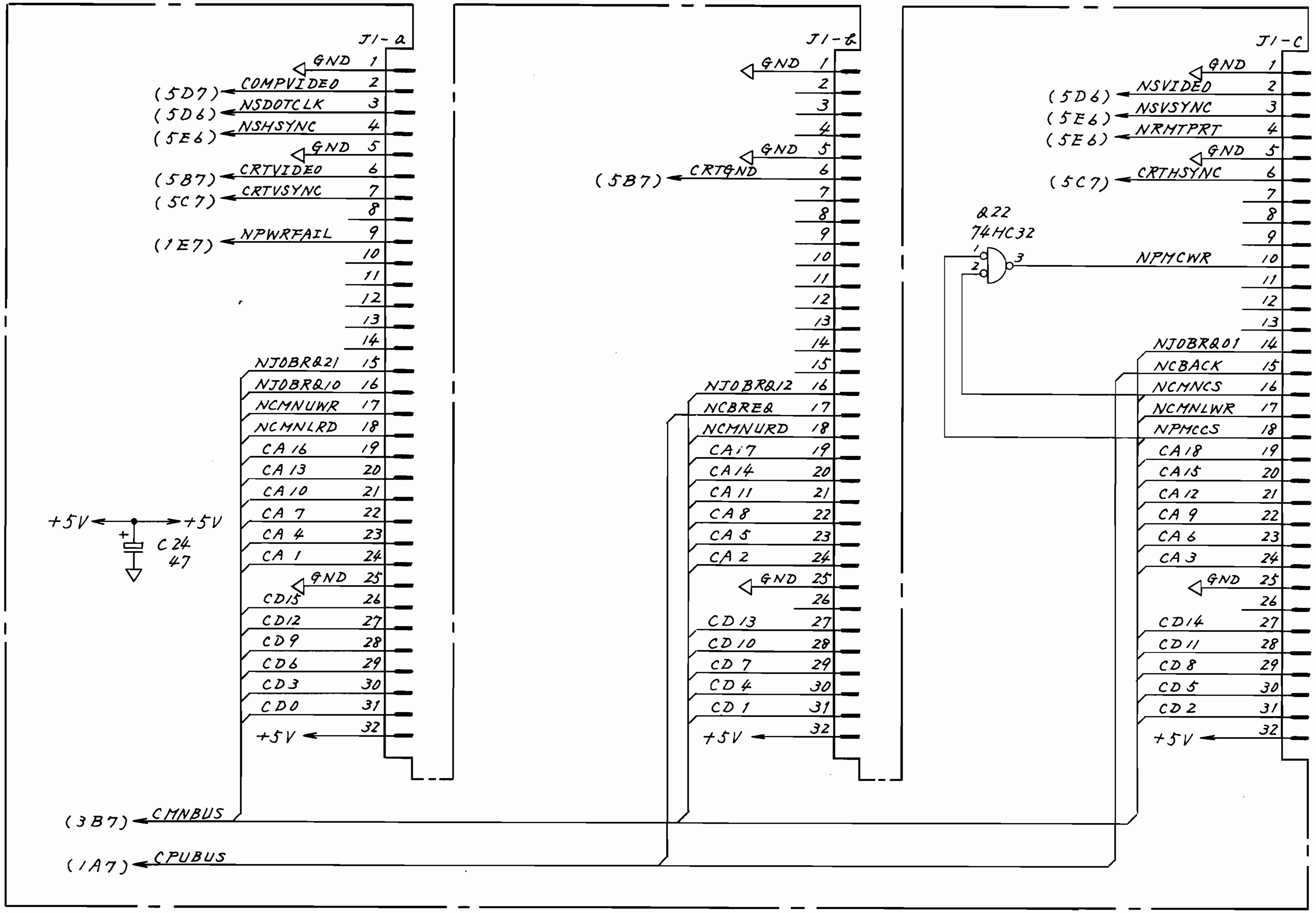
No. D023-1985.08

ANRITSU CORP. 3-283/3-284

33W29899 6/6

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY | TRACED BY | SCALE :

APPROVED BY | DRAWN BY

TITLE: A10, DISPLAY CPU Circuit Diagram.

DRAWING No. 33W29899 6/6

23

DEP

No. D023-1985.08

ANRITSU CORP.

3-285/3-286

3.3.13 A13 MAIN MOTHERBOARD 24, A14 SUB MOTHERBOARD 25, and A15 LED 26

1. A13 MAIN MOTHERBOARD (Fig. 3-60, 24)

2. A14 SUB MOTHERBOARD (Fig. 3-61 , 25)

   These are junction boards that supply dc voltages from the Z4 REGULATOR to each unit, send the control signal from A8 MAIN CPU to each unit, and send and receive other signals.

3. A15 LED (Fig. 3-62, 26)

   When the MS2601A/J is operating, the LED mounted on this board comes on.

4. A16 FILTER (Fig. 3-63, 28)

   This board has a PROBE SOURCE (power supply for high impedance probe) noise filter.

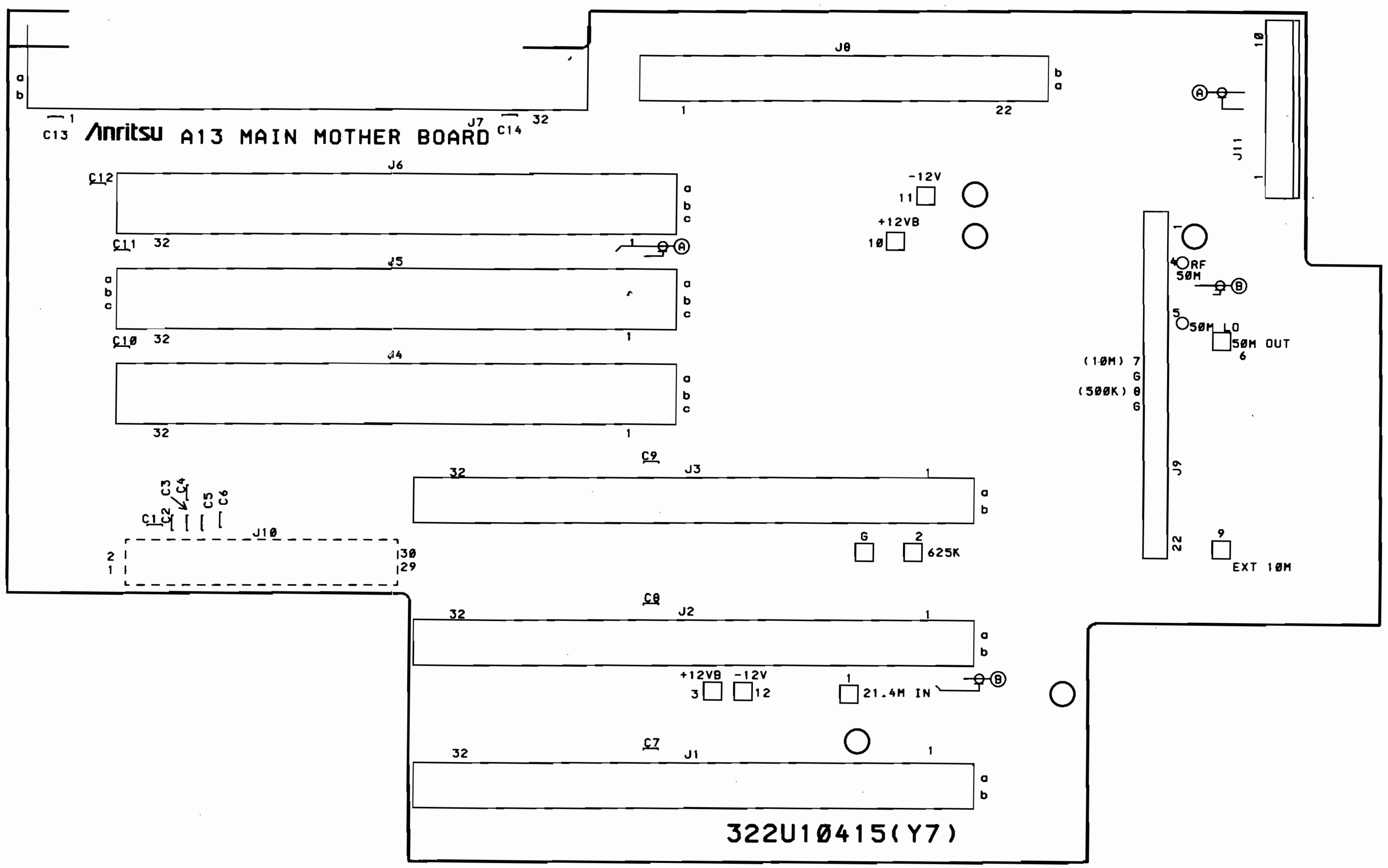


Fig. 3-60 A13 MAIN MOTHERBOARD
PC Board Parts Layout 24

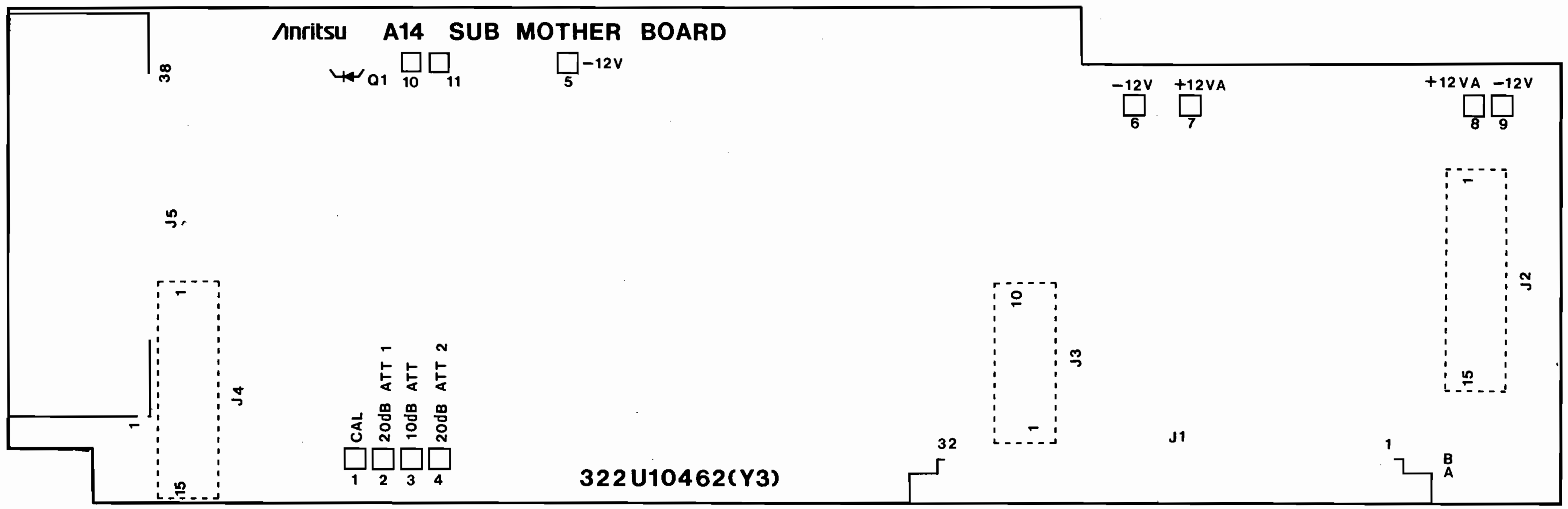


Fig. 3-61 A14 SUB MOTHERBOARD
PC Board Parts Layout

25

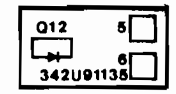


Fig. 3-62 A15 LED PC Board Parts Layout 26

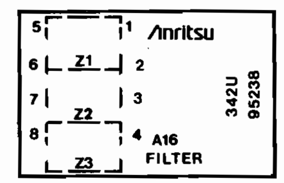
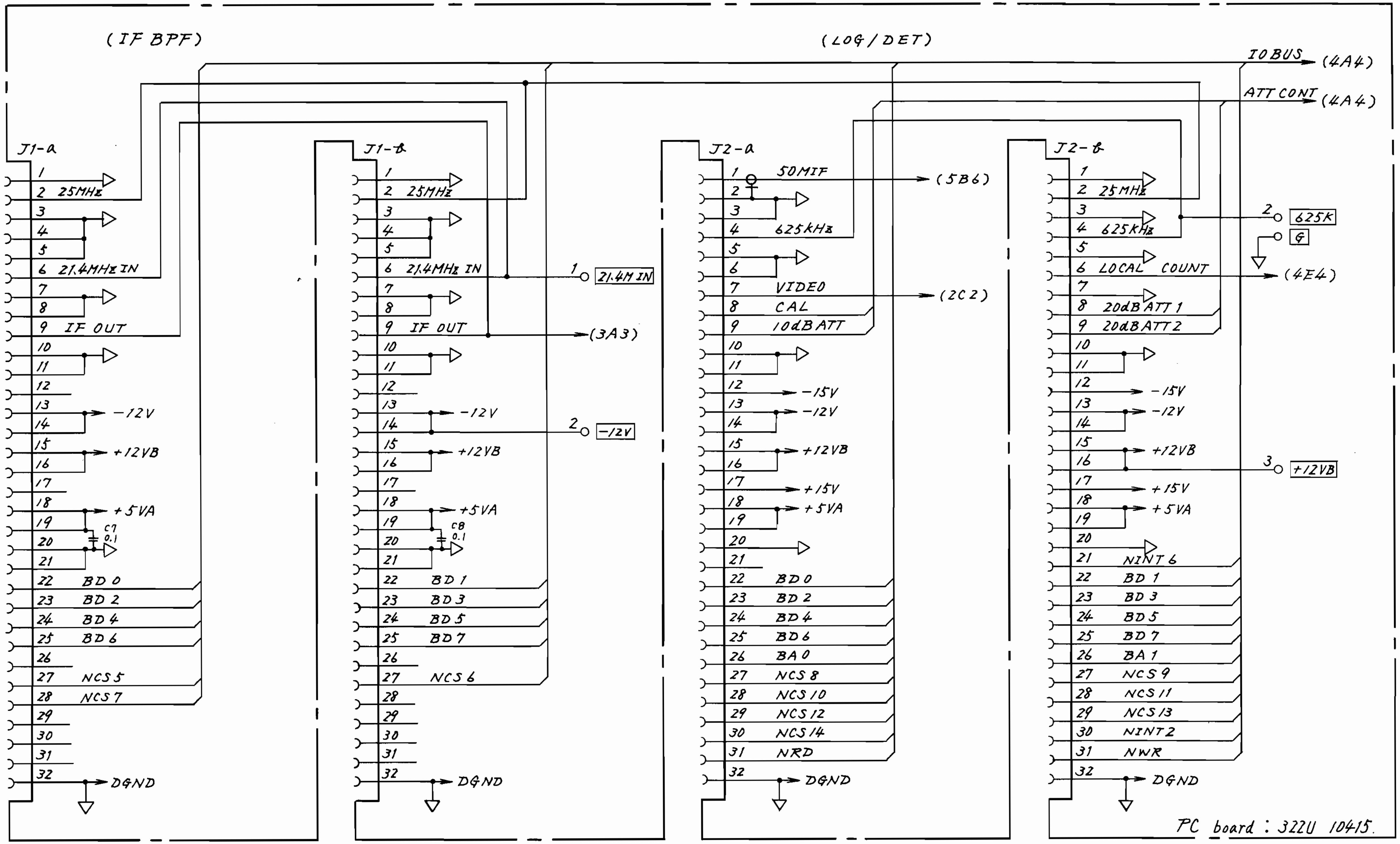


Fig. 3-63 A16 FILTER PC Board Parts Layout 28



Parts List ; 34W93326.

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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SCALE	:		

TITLE: A13, MAIN MOTHERBOARD Circuit Diagram.

DRAWING No. 33W29900 1/5

24

33W29900 1/5

APPLICATION

REVISIONS

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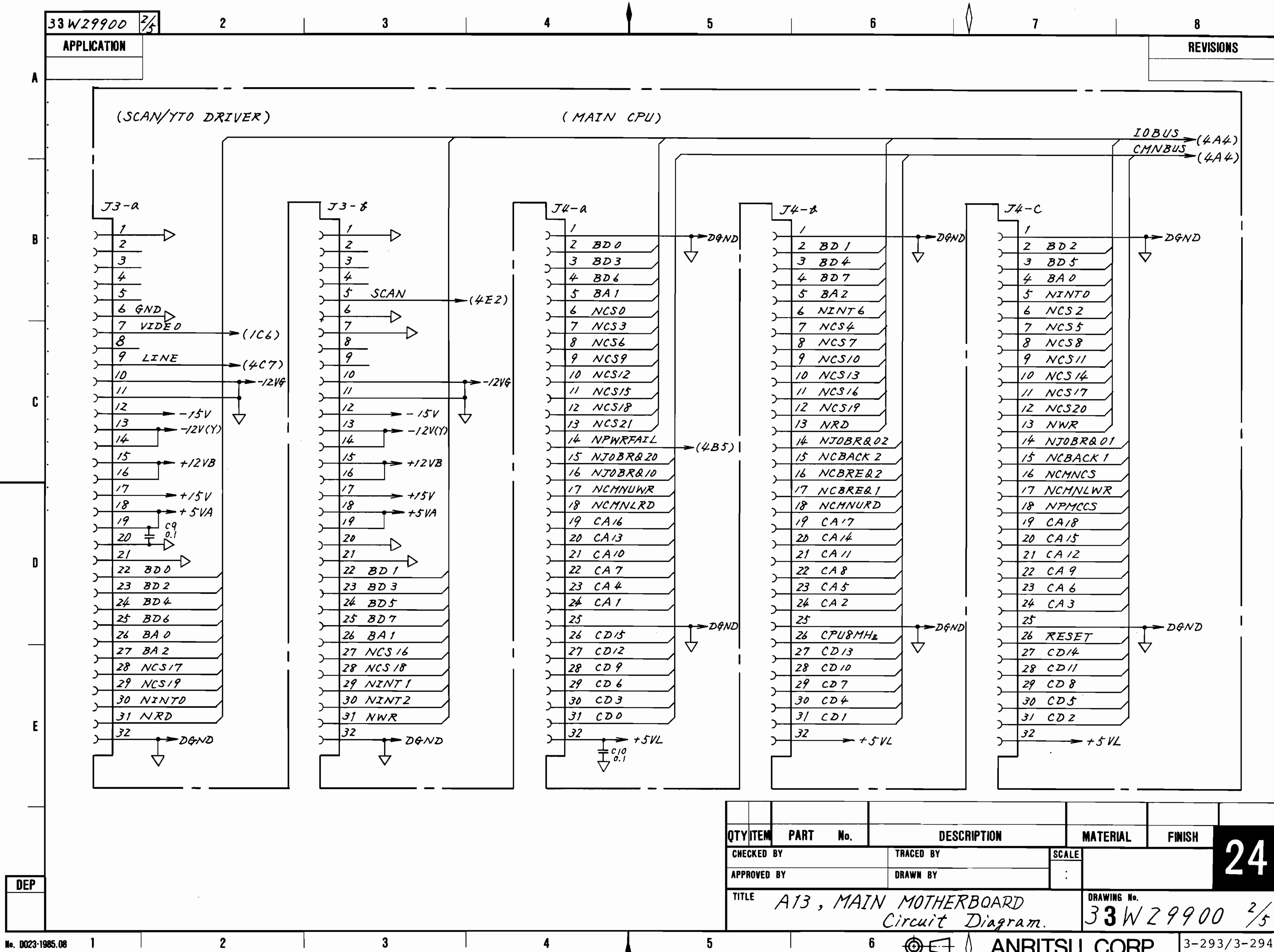
No. D023·1985.08

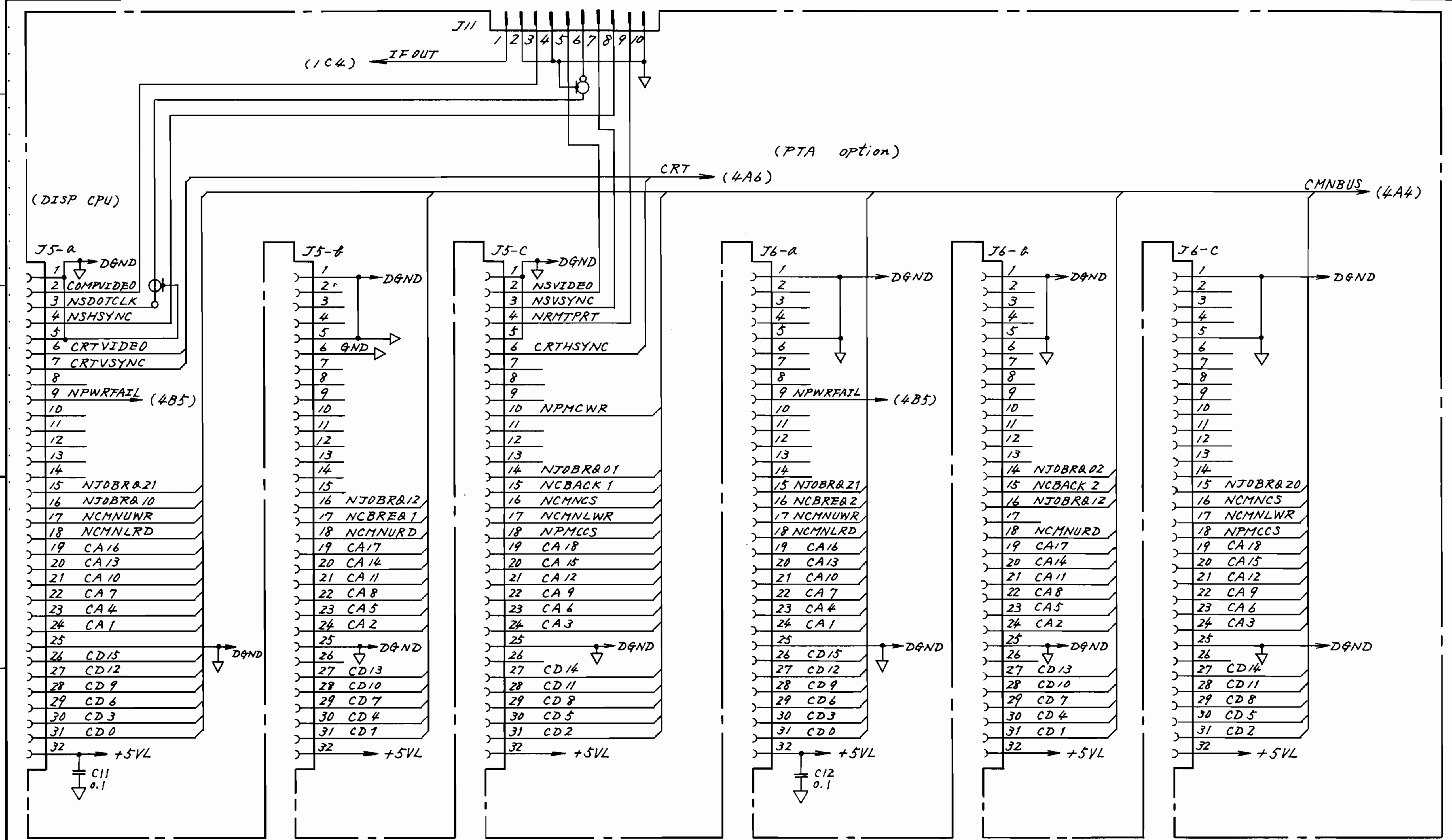
ANRITSU CORP.


33W29900 2/5
APPLICATION
REVISIONS
(SCAN/YTO DRIVER)
(MAIN CPU)
IOBUS (4A4)
CMNBUS (4A4)
J3-a
1
2
3
4
5
6 GND
7 VIDEO (1C6)
8
9 LINE (4C7)
10 -12VG
11
12 -15V
13 -12V(Y)
14
15 +12VB
16
17 +15V
18 +5VA
19
20 C9 0.1
21
22 BD0
23 BD2
24 BD4
25 BD6
26 BA0
27 BA2
28 NCS17
29 NCS19
30 NINT0
31 NRD
32 DGND
J3-b
1
2
3
4
5 SCAN (4E2)
6
7
8
9
10 -12VG
11
12 -15V
13 -12V(Y)
14
15 +12VB
16
17 +15V
18 +5VA
19
20
21
22 BD1
23 BD3
24 BD5
25 BD7
26 BA1
27 NCS16
28 NCS18
29 NINT1
30 NINT2
31 NWR
32 DGND
J4-a
1 DGND
2 BD0
3 BD3
4 BD6
5 BA1
6 NCS0
7 NCS3
8 NCS6
9 NCS9
10 NCS12
11 NCS15
12 NCS18
13 NCS21
14 NPWRFAIL (4B5)
15 NJOBRQ20
16 NJOBRQ10
17 NCMNUWR
18 NCMNLRD
19 CA16
20 CA13
21 CA10
22 CA7
23 CA4
24 CA1
25 DGND
26 CD15
27 CD12
28 CD9
29 CD6
30 CD3
31 CD0
32 +5VL C10 0.1
J4-b
1 DGND
2 BD1
3 BD4
4 BD7
5 BA2
6 NINT6
7 NCS4
8 NCS7
9 NCS10
10 NCS13
11 NCS16
12 NCS19
13 NRD
14 NJOBRQ02
15 NCBACK2
16 NCBREQ2
17 NCBREQ1
18 NCMNURD
19 CA17
20 CA14
21 CA11
22 CA8
23 CA5
24 CA2
25 DGND
26 CPU8MHz
27 CD13
28 CD10
29 CD7
30 CD4
31 CD1
32 +5VL
J4-c
1 DGND
2 BD2
3 BD5
4 BA0
5 NINT0
6 NCS2
7 NCS5
8 NCS8
9 NCS11
10 NCS14
11 NCS17
12 NCS20
13 NWR
14 NJOBRQ01
15 NCBACK1
16 NCMNCS
17 NCMNLWR
18 NPMCCS
19 CA18
20 CA15
21 CA12
22 CA9
23 CA6
24 CA3
25 DGND
26 RESET
27 CD14
28 CD11
29 CD8
30 CD5
31 CD2
32 +5VL
QTY ITEM PART No. DESCRIPTION MATERIAL FINISH
24
CHECKED BY
TRACED BY
SCALE
APPROVED BY
DRAWN BY
TITLE A13, MAIN MOTHERBOARD Circuit Diagram.
DRAWING No. 33W29900 2/5
DEP
No. D023-1985.08
ANRITSU CORP.
3-293/3-294

33W29900 3/5

APPLICATION

REVISIONS



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TITLE A13, MAIN MOTERBOARD Circuit Diagram.

DRAWING No. 33W29900 3/5

DEP

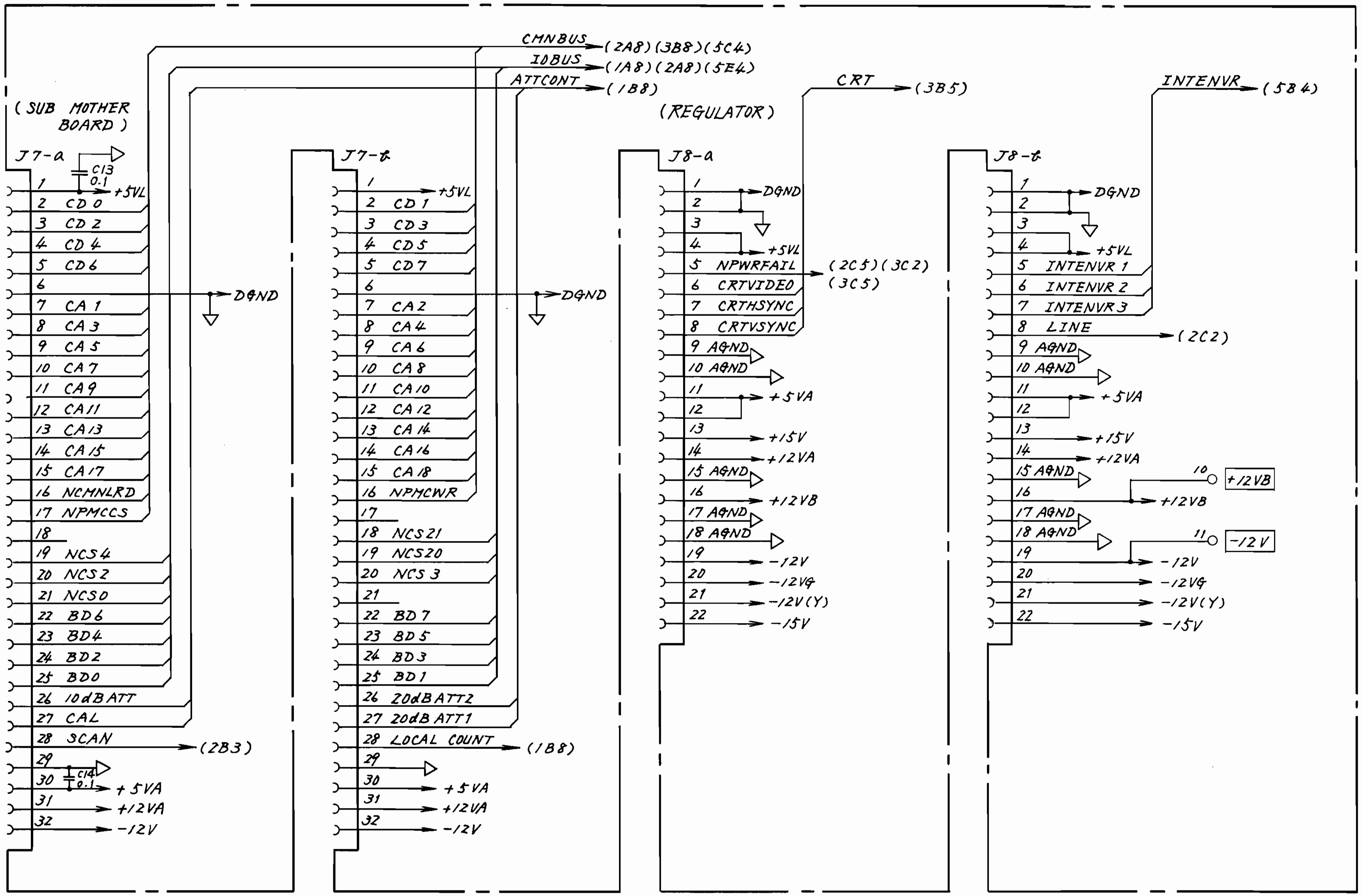
ANRITSU CORP.

3-295/3-296

33W29900 4/5

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

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24

TITLE A13, MAIN MOTHERBOARD Circuit Diagram.

DRAWING No. 33W29900 4/5

DEP

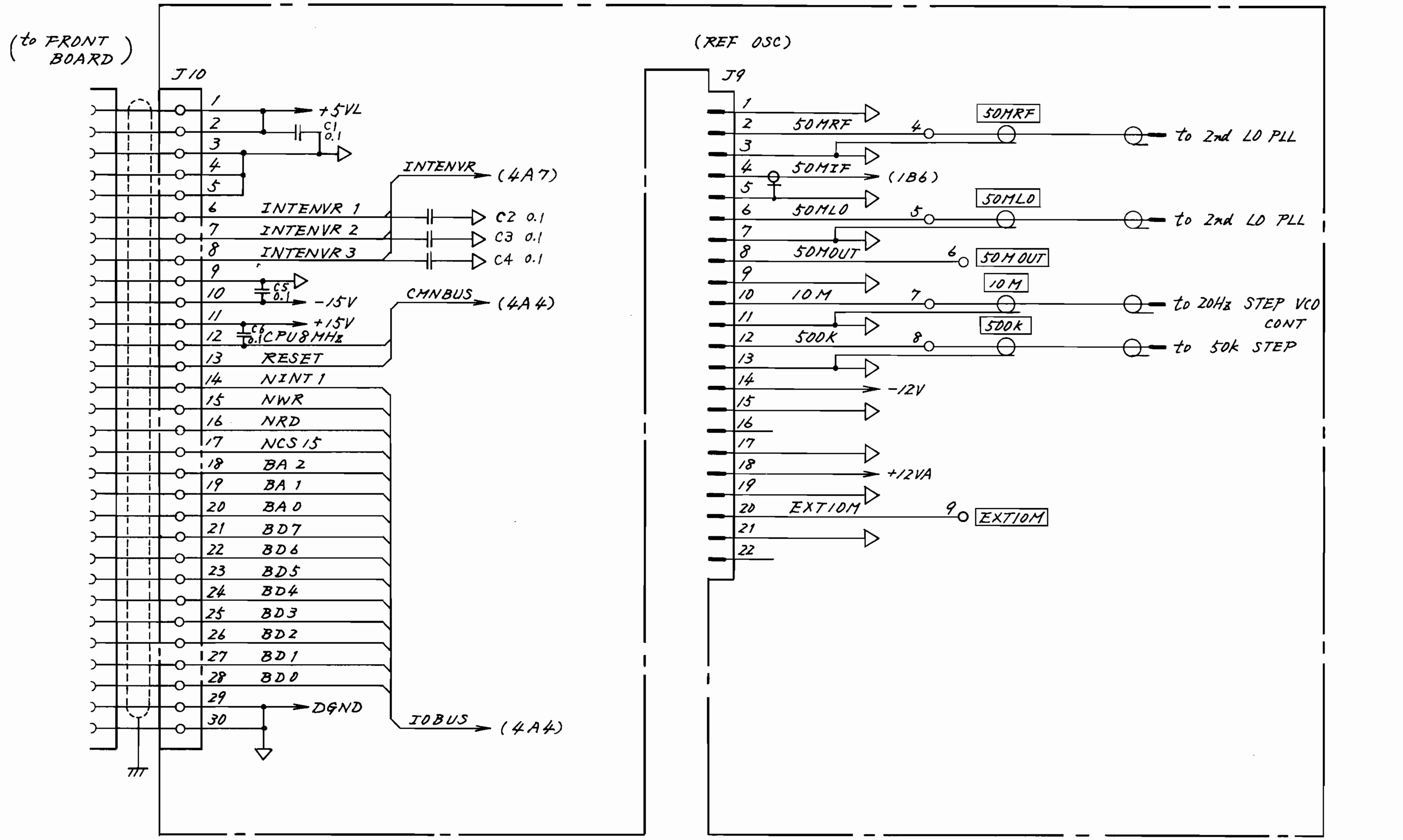
No. D023-1985.08

ANRITSU CORP. 3-297/3-298

33W29900 5/5

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY	TRACED BY	SCALE :	24
APPROVED BY	DRAWN BY		
TITLE A13, MAIN MOTERBOARD Circuit Diagram.		DRAWING No. 33W29900 5/5	

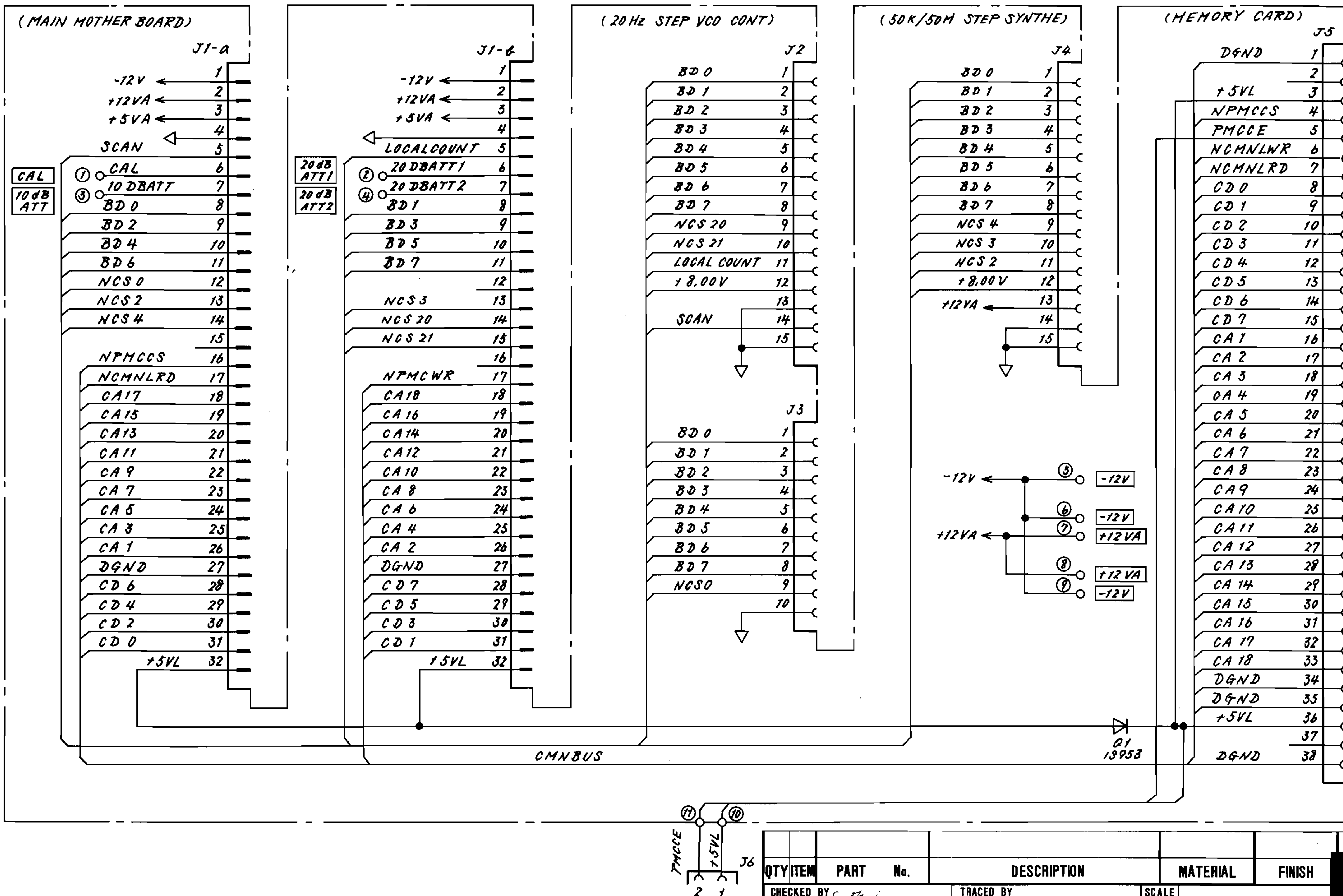
DEP

No. D023-1985.08

ANRITSU CORP. 3-299/3-300

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY S. Fukatsu

APPROVED BY H. Oshima

TRACED BY

DRAWN BY

SCALE :

Parts List 34W93327

TITLE A14, SUB MB Circuit Diagram

DRAWING No. 33W29901 1/1

25

DEP

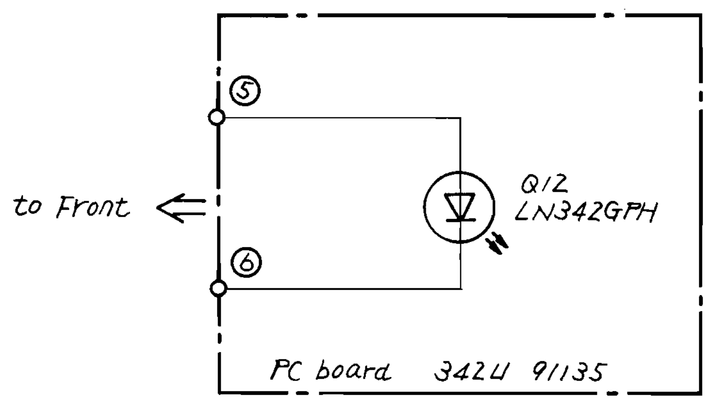
ANRITSU CORP.

3-301/3-302

34W 93348 1/1

APPLICATION

REVISIONS



Parts List	34W 93349

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

26

CHECKED BY | TRACED BY | SCALE :
APPROVED BY | DRAWN BY

DEP

TITLE
A15, LED Circuit Diagram.

DRAWING No.
34W 93348 1/1

34W95268 1/1

APPLICATION

REVISIONS

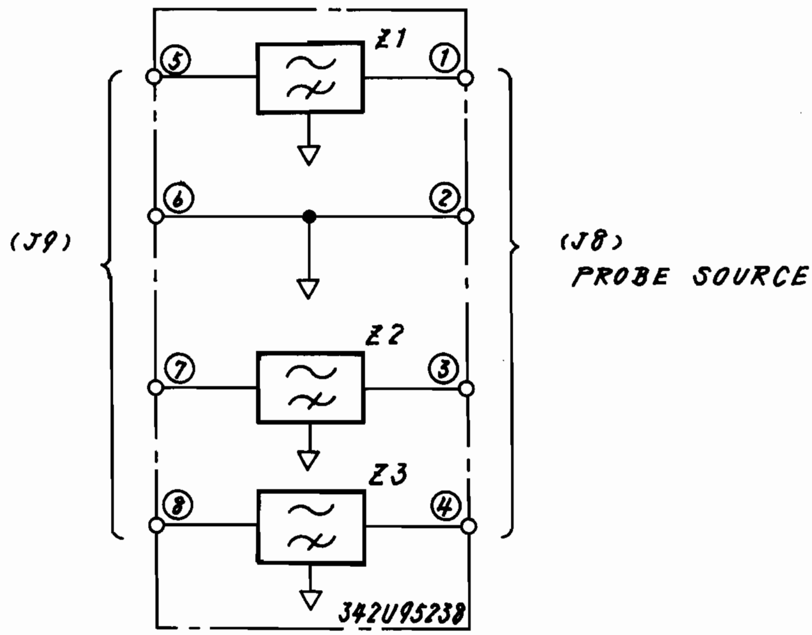
A

B

C

D

E



Parts List	34W95267

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

28

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DEP

TITLE A16, FILTER Circuit Diagram

DRAWING No. 34W95268 1/1

No. D025-1985.08

ANRITSU CORP.

3-305/3-306

3.3.14 A4 PTA BOARD (Option 01, 04) 29

(1) Circuit description

The PTA executes the PTA program created by the user. An external keyboard can be connected via the keyboard interface. Parallel data is input/output to external equipment via the I/O port interface. Data is exchanged between the MAIN CPU and DISP CPU through a common RAM.

This board has a calendar clock IC. It is backed up by a battery.

(2) Symptoms

1. If A4 PTA is not operating normally, a PTA menu is not displayed.

2. If the external keyboard or the keyboard interface is faulty, characters input at the external keyboard are not displayed on the PTA menu screen.

3. If the battery is dead, the contents of the calendar clock are not normally maintained when power is turned OFF.

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove A4 PTA as described in paragraph 2.4.
2	Reattach it using an extender board

(c) Troubleshooting

Check each checkpoint by refering to the following table.

Signal name	Checkpoing	Normal condition
+5 V	❶ (Q4-24)	+5 ±0.25 V
CPU Clock	❷ (Q5-15)	8 MHz pulse wave
+5 V	❶	Same as A8 MAIN CPU (See Fig. 3-54, paragraph 3.3.10)
NPWRF AIL	❸ (Q2-21)	
NRESET	❹ (Q2-17)	
Battery Voltage	❺ (R7, R8)	$\geqq$+2 V

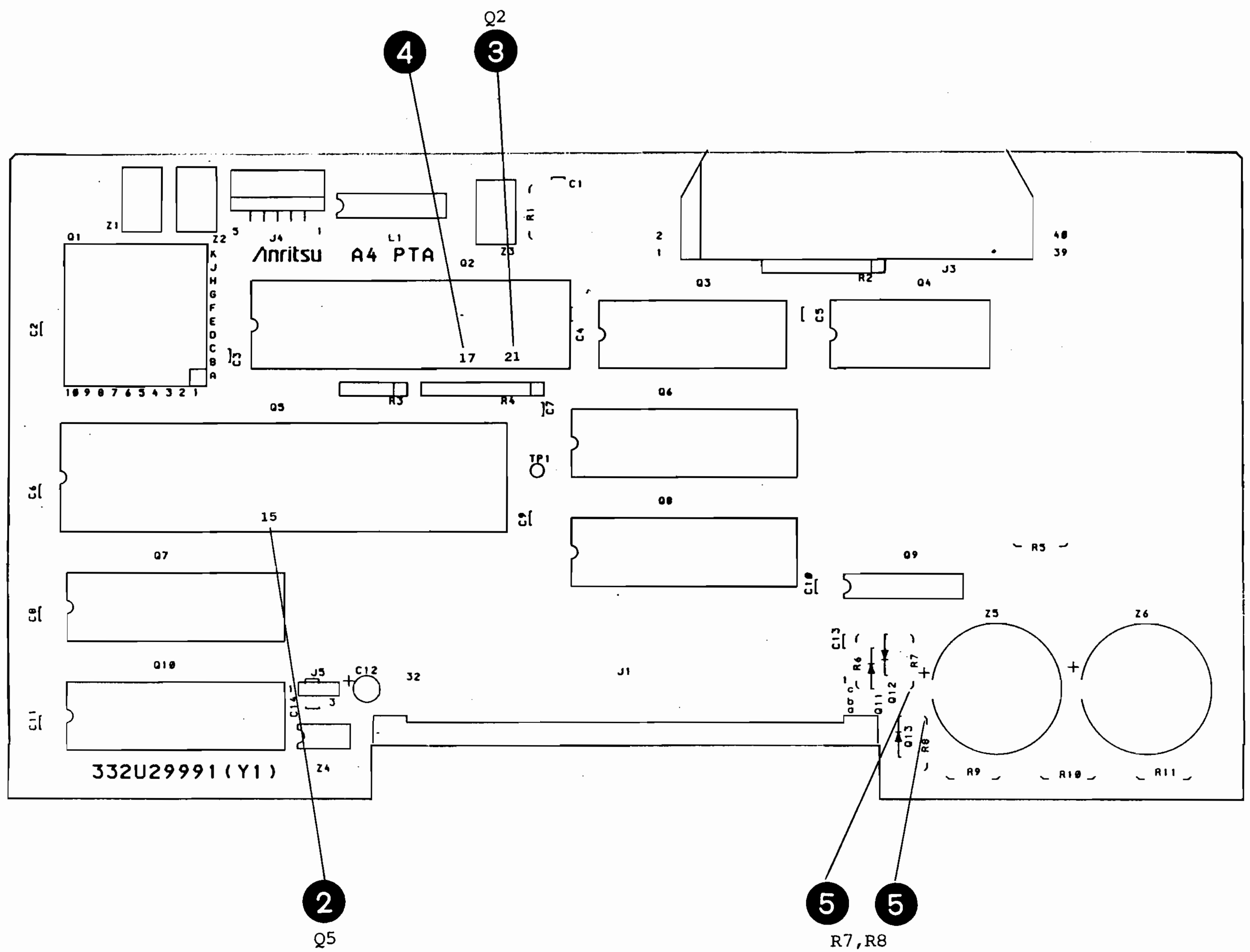


Fig. 3-64 (a) A4 PTA (OPTION 01)
PC Board Parts Layout
(Parts Side) 29

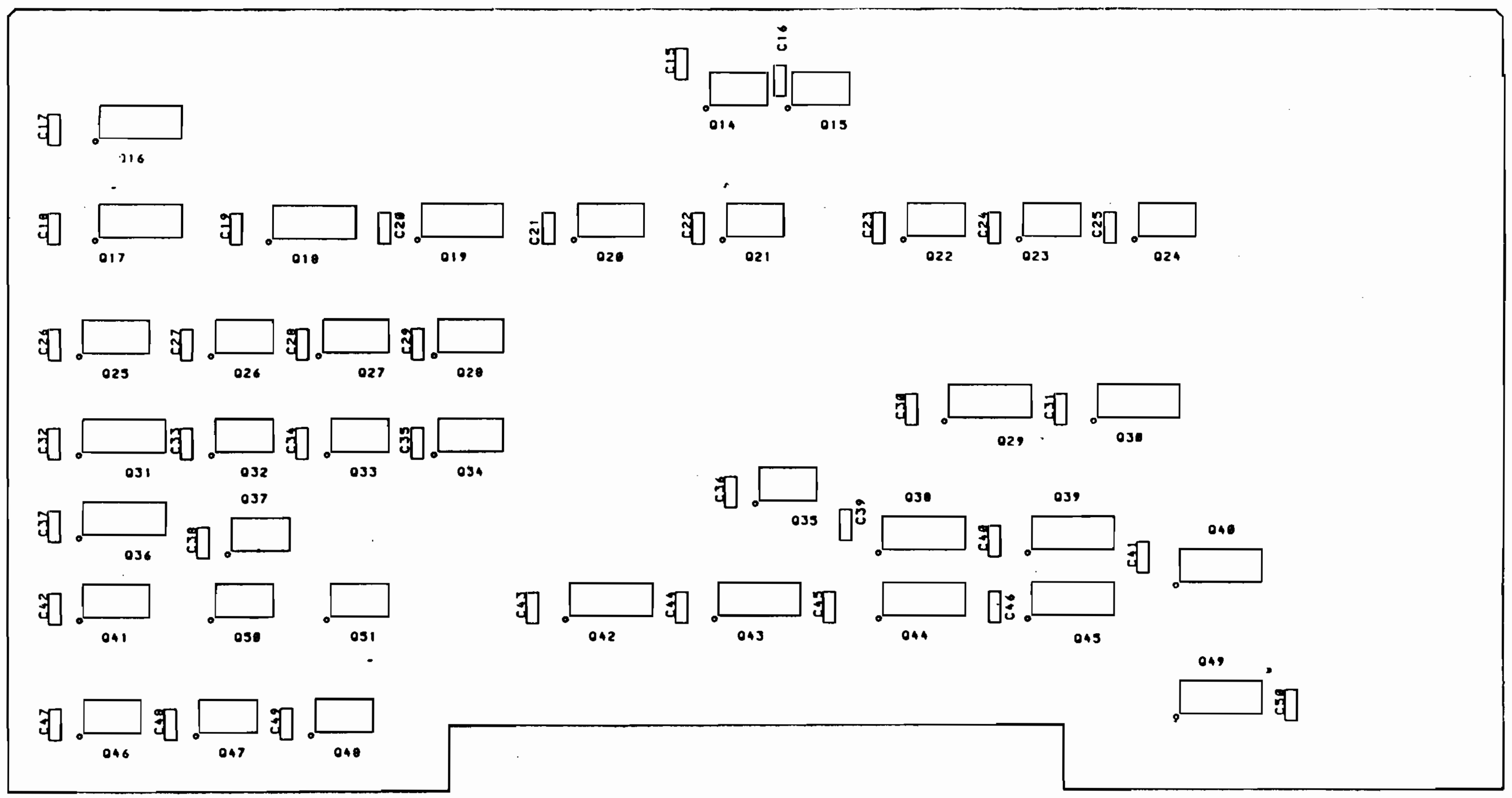
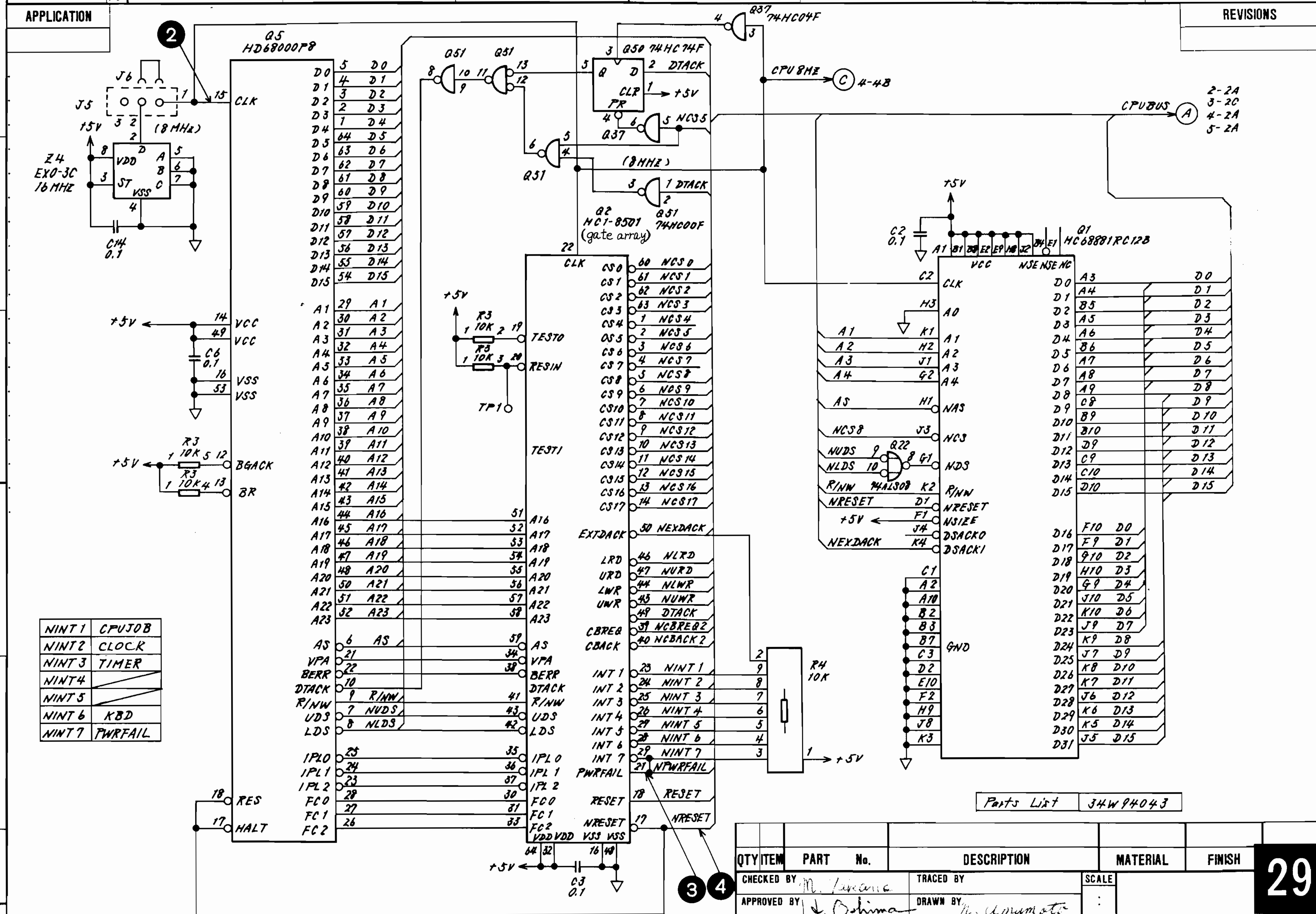


Fig. 3-64 (b) A4 PTA (OPTION 01)
PC Board Parts Layout
(Pattern Side) 29

33W30121	1/6

APPLICATION

REVISIONS



NINT1	CPUJOB
NINT2	CLOCK
NINT3	TIMER
NINT4	
NINT5	
NINT6	KBD
NINT7	PWRFAIL

Parts List 34W94043

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY M. Likanic

TRACED BY

APPROVED BY I. Oshima

DRAWN BY N. Umamoto

SCALE :

TITLE A4, PTA (OPT01) Circuit Diagram

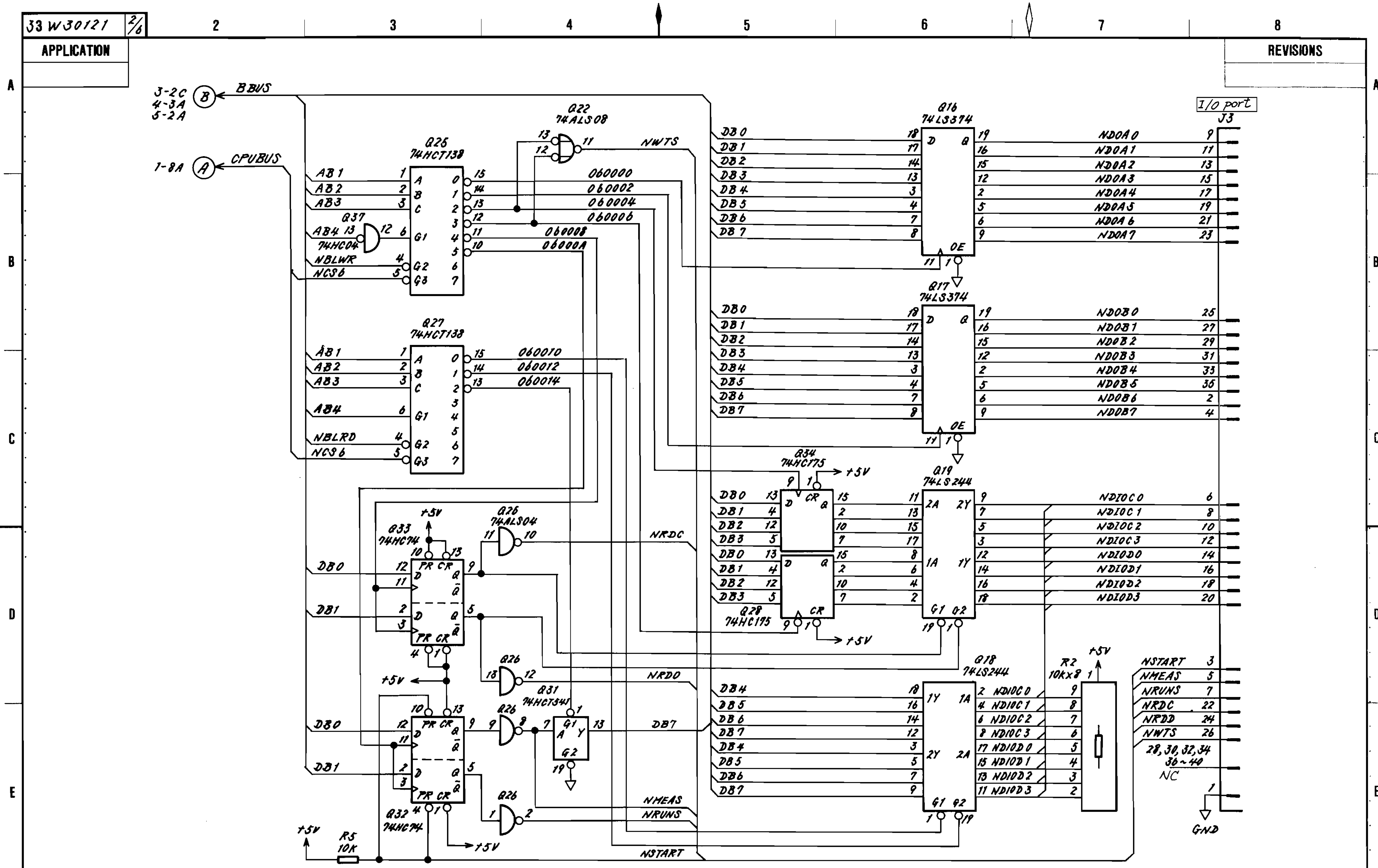
DRAWING No. 33W30121 1/6

29

DEP

No. D023-1985.08

ANRITSU CORP.



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY M. Tokane | TRACED BY | SCALE :

APPROVED BY | DRAWN BY N. Amamoto

TITLE A4, PTA (OPT 01) Circuit Diagram

DRAWING No. 33 W 30121 2/6

29

No. D023-1985.08

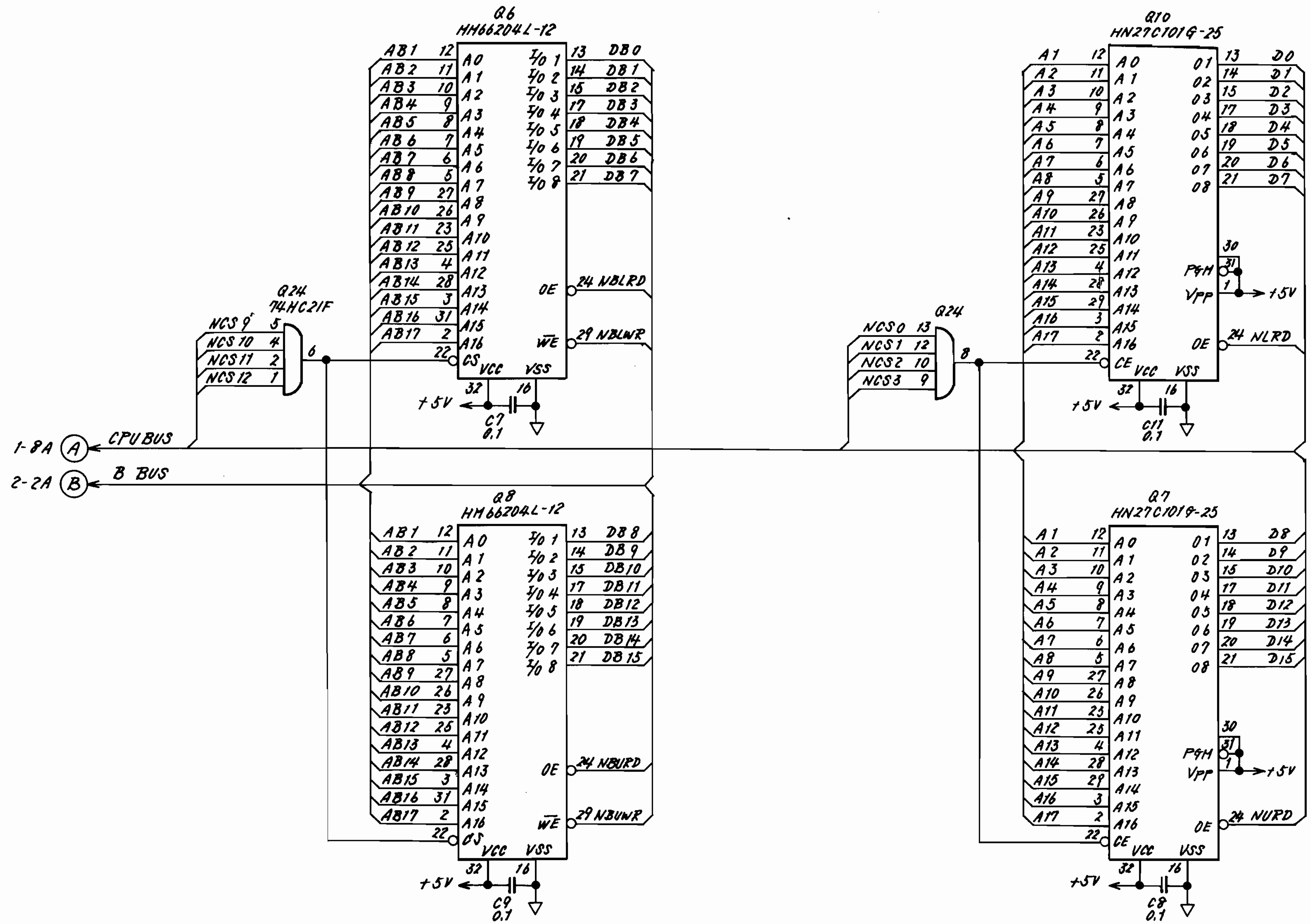
ANRITSU CORP.

3-315/3-316

33W30121 3/6

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

29

CHECKED BY N. Takano

TRACED BY

SCALE :

APPROVED BY

DRAWN BY N. Amamoto

TITLE A4, PTA (OPT 01) Circuit Diagram

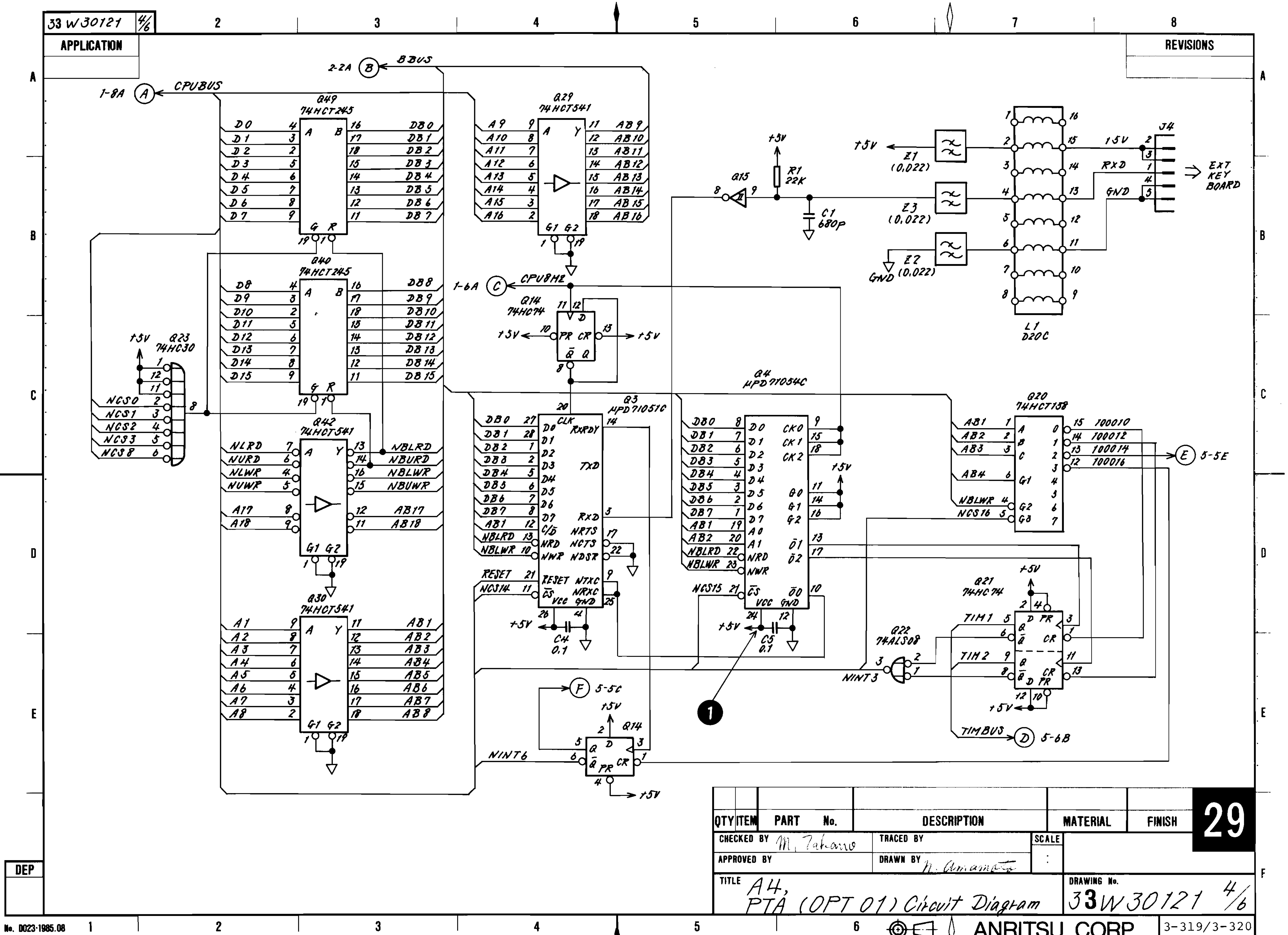
DRAWING No. 33W30121 3/6

DEP

No. D023-1985.08

ANRITSU CORP.

3-317/3-318



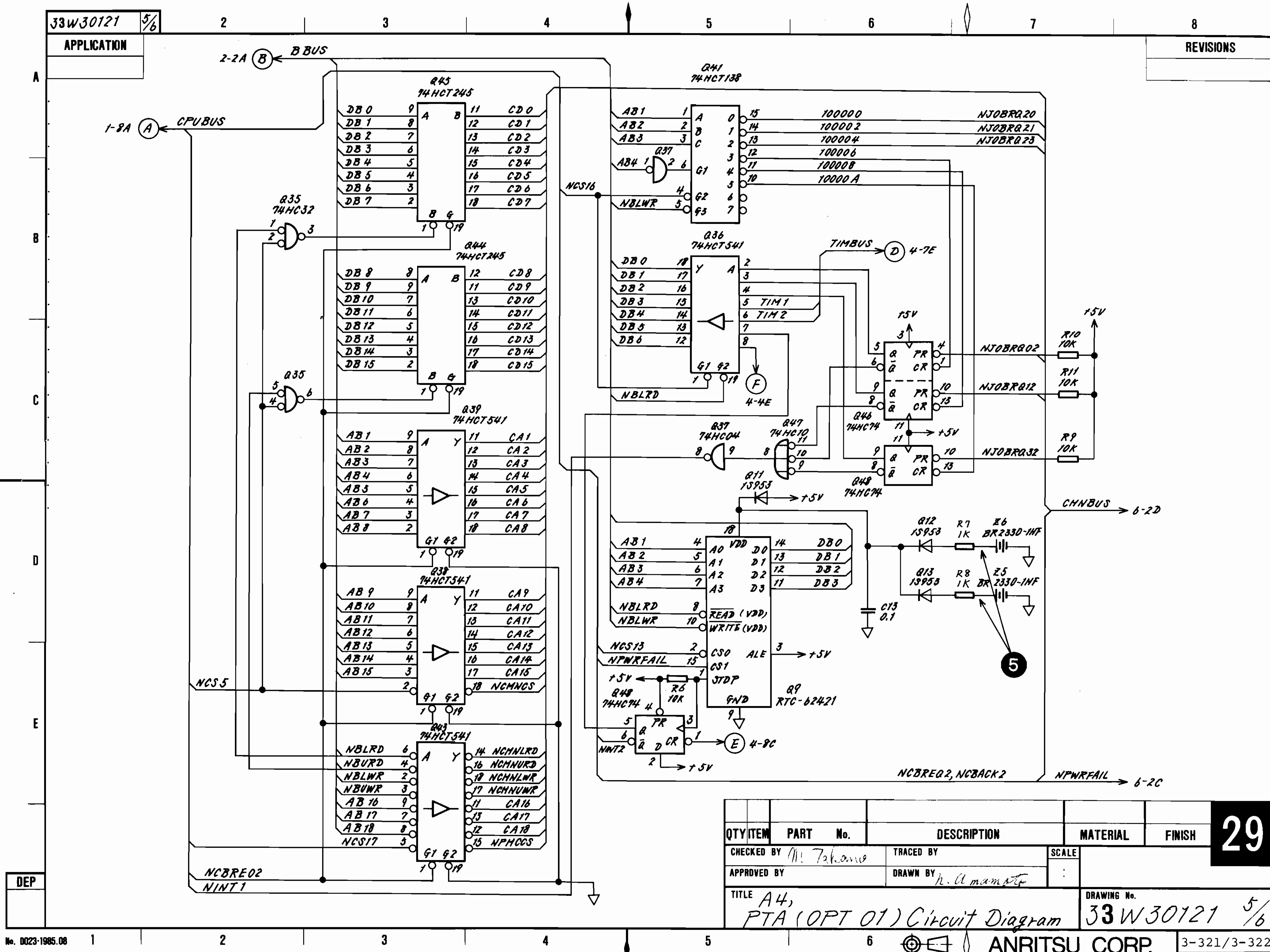
QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY M. Takano
TRACED BY
SCALE :
APPROVED BY
DRAWN BY N. Amamoto
TITLE A4, PTA (OPT 01) Circuit Diagram
DRAWING No. 33W30121 4/6

29

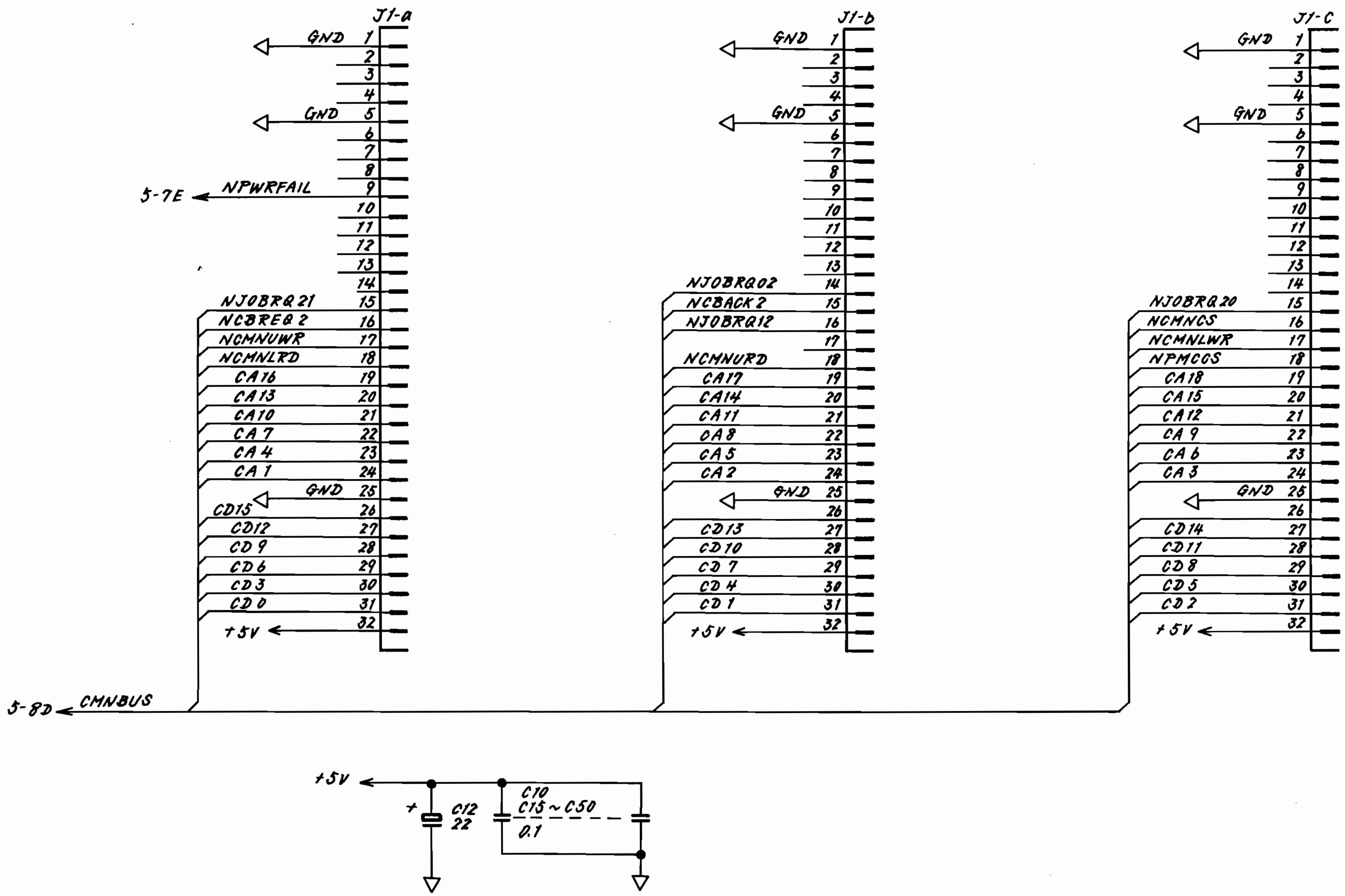
No. D023-1985.08

ANRITSU CORP.


33W30121 5/6
APPLICATION
REVISIONS
2-2A B BBUS
1-8A A CPUBUS
Q45 74HCT245
DB 0 … DB 7
CD 0 … CD 7
Q44 74HCT245
DB 8 … DB 15
CD 8 … CD 15
Q35 74HC32
Q39 74HCT541
AB 1 … AB 8
CA 1 … CA 8
Q38 74HCT541
AB 9 … AB 15
CA 9 … CA 15
NCMNCS
NCS 5
Q43 74HCT541
NBLRD NBURD NBLWR NBUWR AB 16 AB 17 AB 18 NCS17
NCMNLRD NCMNURD NCMNLWR NCMNUWR CA16 CA17 CA18 NPHCCS
NCBREQ2
NINT1
Q41 74HCT138
AB1 AB2 AB3 AB4
NCS16
NBLWR
100000 100002 100004 100006 100008 1000A
NJOBRQ20 NJOBRQ21 NJOBRQ23
Q36 74HCT541
TIMBUS D 4-7E
TIM1 TIM2
F 4-4E
NBLRD
+5V
Q46 74HC74
NJOBRQ02 NJOBRQ12 NJOBRQ32
R10 10K R11 10K R9 10K
Q37 74HC04
Q47 74HC10
Q48 74HC74
Q11 1S953
CHNBUS 6-2D
Q12 1S953 R7 1K Z6 BR2330-1HF
Q13 1S953 R8 1K Z5 BR2330-1HF
C13 0.1
5
AB 1 AB 2 AB 3 AB 4
NBLRD NBLWR
NCS13 NPWRFAIL
A0 A1 A2 A3 VDD D0 D1 D2 D3
READ (VDD) WRITE (VDD)
CS0 CS1 STOP ALE GND
DB0 DB1 DB2 DB3
Q9 RTC-62421
R6 10K
Q48 74HC74
NINT2
E 4-8C
NCBREQ2, NCBACK2
NPWRFAIL 6-2C
QTY ITEM PART No. DESCRIPTION MATERIAL FINISH
29
CHECKED BY M. Takano
TRACED BY
SCALE :
APPROVED BY
DRAWN BY h. Umamoto
TITLE A4, PTA (OPT 01) Circuit Diagram
DRAWING No. 33W30121 5/6
ANRITSU CORP.
3-321/3-322
DEP
No. D023-1985.08

APPLICATION

REVISIONS



QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

29

CHECKED BY M. Takano
TRACED BY
SCALE :
APPROVED BY
DRAWN BY N. Amamoto

TITLE A4, PTA (OPT 01) Circuit Diagram

DRAWING No. 33 W 30121 6/6

DEP

ANRITSU CORP.

3.3.15 A22 RS-232C BOARD (Option 02) 30

(1) Circuit description

This section includes the serial interface LSI, timer LSI for baud rate generator, RS-232C driver/receiver (with built-in dc-dc converter), and RAM backup battery for the main CPU.

(2) Symptom

If A11 RS-232C boards are faulty, the RS-232C cannot be controlled.

(3) Troubleshooting

(a) Required equipment

Digital voltmeter

Oscilloscope

(b) Preparation

CAUTION

Turn off the power before disassembly.

Step	Procedure
1	Remove A8 MAIN CPU along with A11 RS-232C as described in paragraph 2.4.
2	Reattach them using an extender board

(c) Troubleshooting

Check each checkpoint by referring to the following table.

Signal name	Checkpoint	Normal condition
+5 V	❶ (Q2-26)	+5 ±0.25 V
CPU 8 MHz	❷ (Q1-9)	8 MHz Pulse wave
Baud Rate Clock	❸ (Q1-10)	Pulse wave
Battery Voltage	❹ (R1)	$\geq$+3 V

Baud Rate Clock Frequency

Baud Rate	Frequency
300	4.8 kHz
600	9.6 kHz
1200	19.2 kHz
2400	38.4 kHz
4800	768.8 kHz

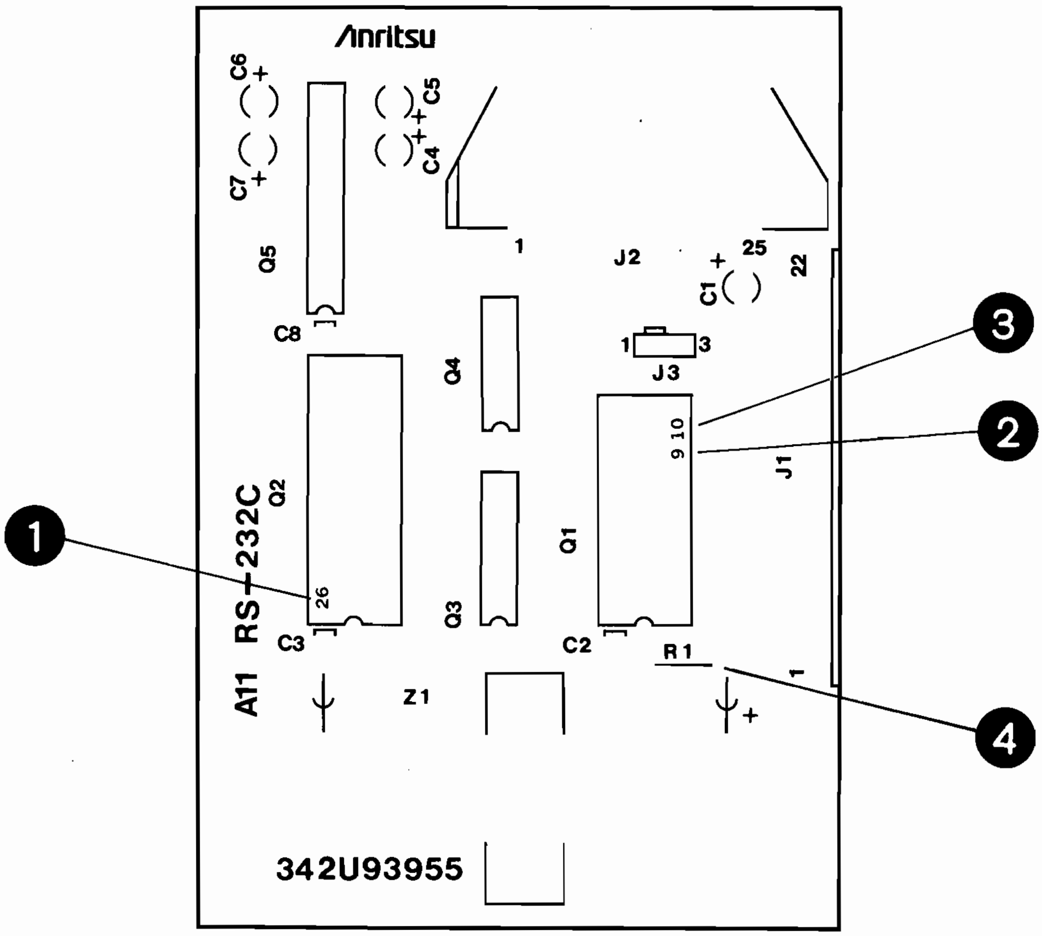
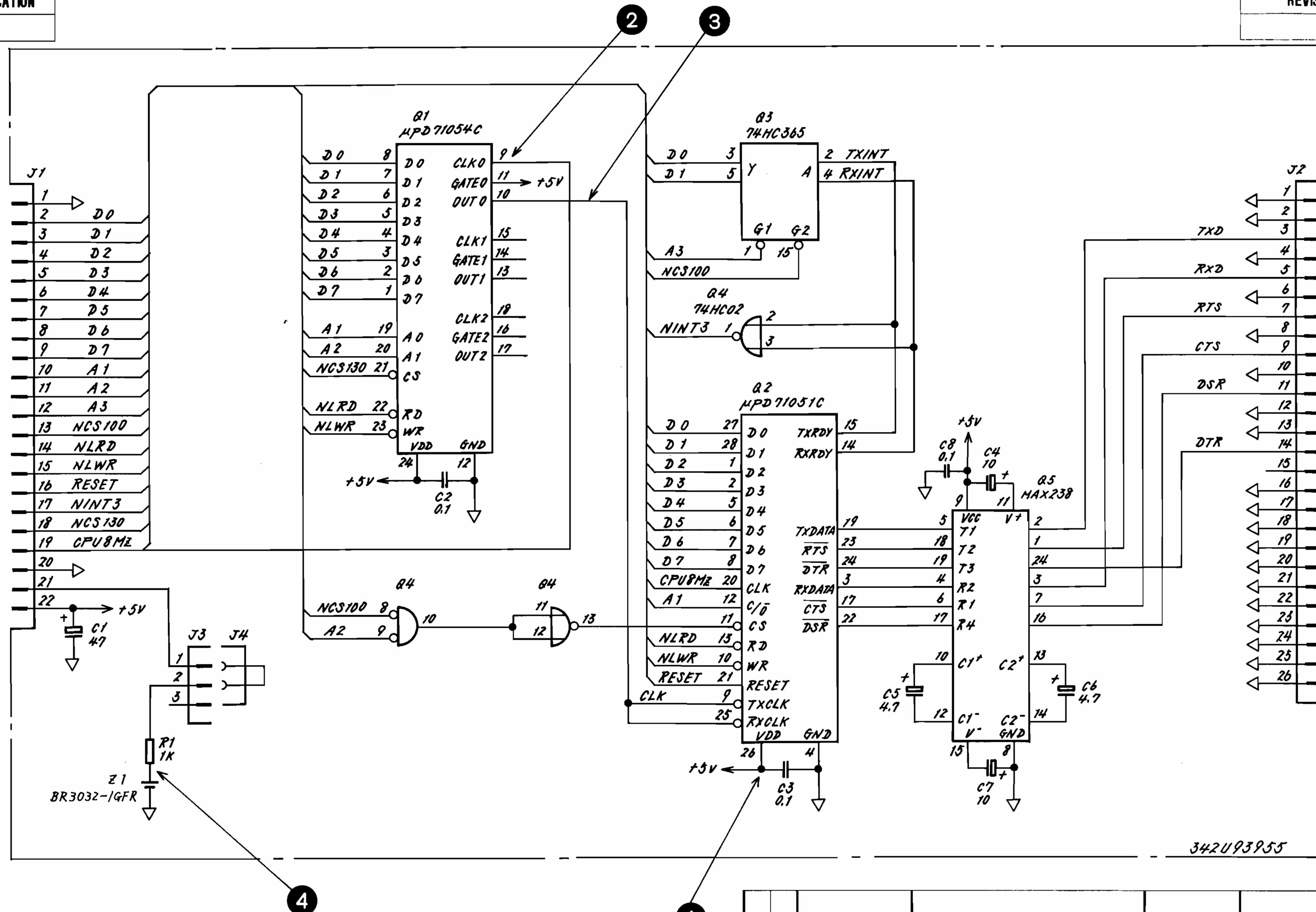


Fig. 3-65 A11 RS-232C (OPTION 02)
PC Board Parts Layout **30**

33 W 30722 1/1

APPLICATION

REVISIONS



Parts List 34W94044

QTY	ITEM	PART No.	DESCRIPTION	MATERIAL	FINISH

CHECKED BY
APPROVED BY H. O
TRACED BY
DRAWN BY
SCALE :

TITLE A11, RS232C (OPTION 02) Circuit Diagram

DRAWING No. 33 W 30722 1/1

30

DEP

No. D023-1985.08

ANRITSU CORP.

3-329/3-330

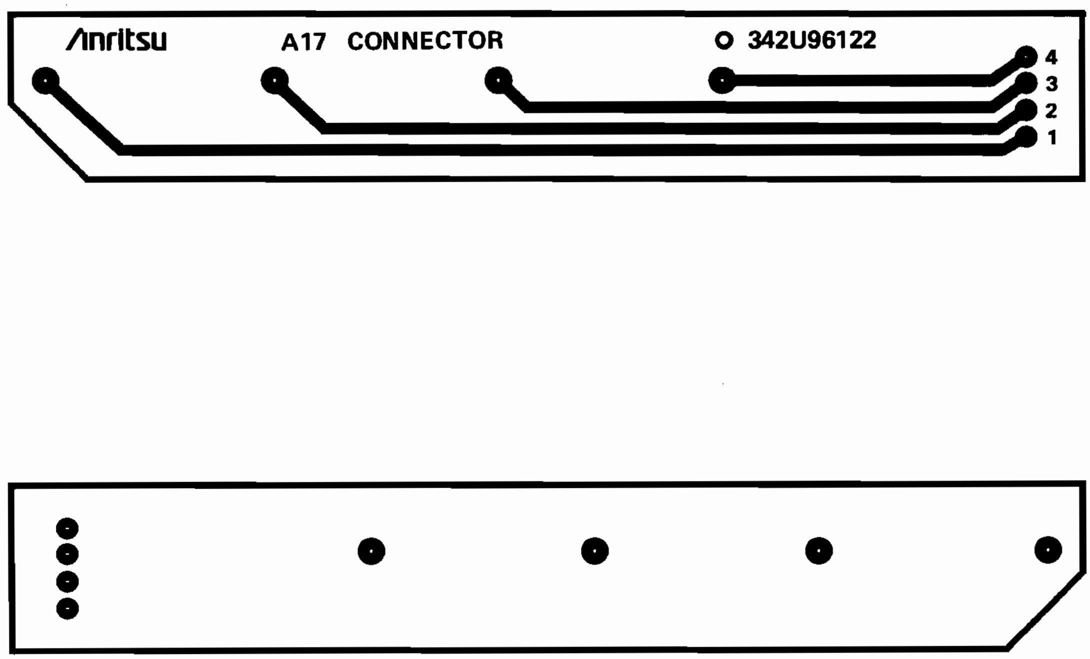


Fig. 3-66 A17 CONNECTOR PC Board
Parts Layout 31

SECTION 4

CALIBRATION OF COMPENSATION DATA

The MS2601A/J measuring accuracy can be improved by entering the compensation data shown below in the built-in memory.

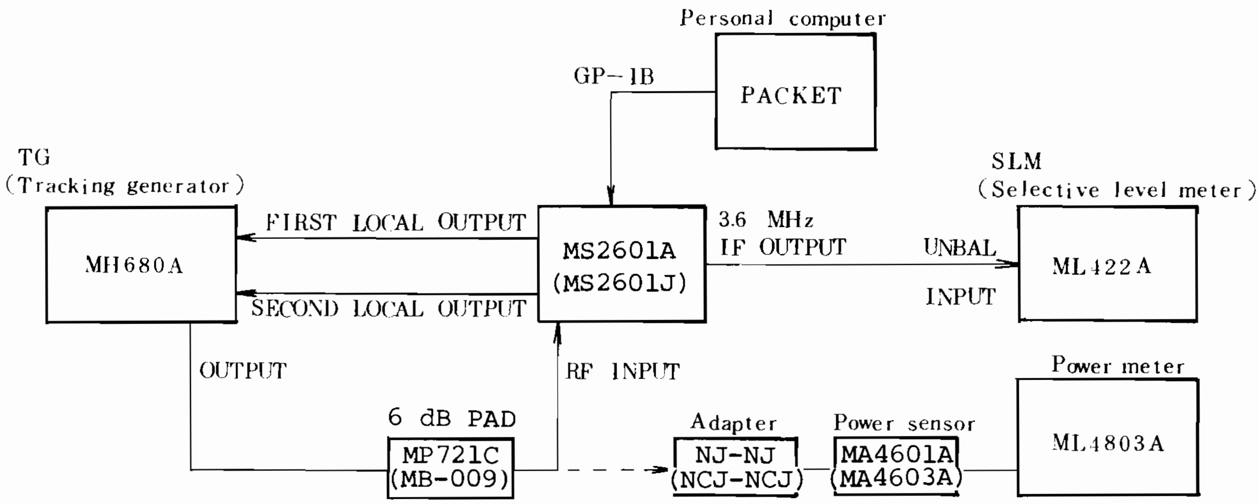
1. Frequency response compensation value
2. CAL level compensation value

If the specifications are not met for the performance test described in paragraph 4.4 of the operation manual after the circuit related to these compensation data has been repaired, the compensation data must be reentered. The input method is described below.

4.1 Frequency Response Calibration

If the specifications are not met for the performance test of the frequency response (paragraph 4.4.8 in the operation manual) after the circuit between the RF INPUT and 1st MIXER has been repaired, calibrate the compensation data according to the procedures described below.

(1) Setup



* The units in parenthesis indicate the composition of the MS2601J.

Fig. 4-1 Frequency Response Calibration

(2) Calibration

Step	Procedure
1	Press the MS2601A/J [INITIAL] key, and set as follows: CENTER FREQ: 625 kHz REF LEVEL: -10 dBm SPAN: 0 kHz RBW: 10 kHz ATTEN: 20 dB
2	Set the Selective Level Meter (SLM) as follows: IMPEDANCE: 75 Ω UNBAL BW: 1.74 kHz LEVEL: AUTO FREQUENCY: 3.6 MHz AFC: ON

(continued)

Step	Procedure
3	Adjust the Tracking Generator (TG) output level so that the SLM measured value is 4 ±1 dBm.
4	Set the SLM to the relative value measuring mode to set the measurement value to 0.00 dB. Press the [RELATIVE (R)] key and then the [MEMORY] key. Press the [MODE] key to set dB (X-R) display mode.
5	Change the MS2601A/J CENTER FREQ from 5 MHz to 2000 MHz in 5 MHz steps and read the SLM measured value each time.

Frequency	Measurement value
5 MHz	X(1) dB
10 MHz	X(2) dB
∫	∫
50 MHz	X(10) dB
∫	∫
2000 MHz	X(400) dB

Step	Procedure
6	Set the MS2601A/J CENTER FREQ to 625 kHz.
7	Connect the output side of the 10 dB PAD shown in Fig. 4-1 to the power sensor.
8	Press the [dB (REL)] key of the power meter to set the relative value measuring mode and set the measurement value to 0.00 dB.

(continued)

Step	Procedure
9	Change the MS2601A/J CENTER FREQ from 5 MHz to 2000 MHz in 5 MHz steps and read the value measured at the power meter each time.

Frequency	Measurement value
5 MHz	R(1) dB
10 MHz	R(2) dB
⁓	⁓
50 MHz	R(10) dB
⁓	⁓
2000 MHz	R(400) dB

Step	Procedure
10	Find the frequency response data D(N) from the values measured in steps 5 and 9 from:

D(N) = X(N) - R(N) dB

where N = 1 to 400

Calculate the following equation but omit figures after the decimal point to give integer CD(N).

CD(N) = (D(N) x 100 + 2)/5

Example:

D(N)		CD(N)
-1.01 →	-20.6 →	-20
-1.02 →	-20.8 →	-20
-1.03 →	-21 →	-21

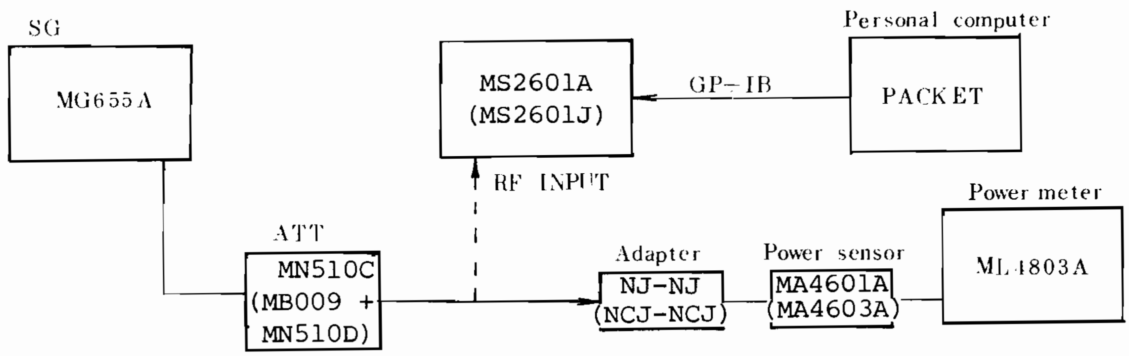
(continued)

Step	Procedure
11	Enter the CD(N) values to the MS2601A/J via GP-IB using a personal computer using the following procedures. WRITE @101:"CD2,0" ... Enter the frequency response input condition. WRITE @101:0 ... Enter data 0 in address 0. WRITE @101:CD(N) ... Enter the CD(N) data at 400 points from N=1 to 400 sequentially. FOR I=1 to 40 WRITE @101:CD(400) } .. Enter the CD(400) data at 2000 MHz in address 401 to 440. NEXT I

4.2 CAL Level Calibration

If the specification is not met for the performance test of the CRT display amplitude scale linearity (paragraph 4.4.7 in the operation manual) after the CAL circuit has been repaired, calibrate the compensation data using the following procedures.

(1) Setup



* The units in parenthesis indicate the composition of the MS2601J.

Fig. 4-2 CAL Level Calibration

(2) Calibration

Step	Procedure
1	Set the SG as follows: Level: +2 dBm (MS2601A is used) +8 dBm (MS2601J is used) Frequency: 625 kHz Set the ATT to 0 dB.
2	Adjust the SG output level so that the value measured at the power meter is +2 ±0.2 dBm. This measured value is L(1) dBm.
3	Calculate the output level at each ATT attenuation of 1 to 51 dB (1 dB steps) as shown below.

ATT (dB)	Attenuation (calibration value)	ATT output level (dBm)
0	AT(1) dB (= 0 dB)	L(1)
1	AT(2) dB	L(2) = L(1) - AT(2)
2	AT(3) dB	L(3) = L(1) - AT(3)
⋮	⋮	⋮
50	AT(51) dB	L(51) = L(1) - AT(51)
51	AT(52) dB	L(52) = L(1) - AT(52)

Step	Procedure
4	Connect the ATT output side to the MS2601A/J RF INPUT.
5	Set the ATT to 5 dB.
6	Set the MS2601A/J in the following order. Press the [INITIAL] key CENTER FREQ: 625 kHz REF LEVEL: +2 dBm

(continued)

Step	Procedure
6 (cont.)	SPAN: 5 kHz RBW: 3 kHz ATTEN: 20 dB VBW: 10 Hz Press the [PEAK→CF] key to more the waveform peak to the center of the screen.
7	Change the ATT from 0 to 51 dB in 1 dB steps and read the MS2601A/J marker level each time.

ATT (dB)	Marker level (dBm)
0	R(1)
1	R(2)
2	R(3)
∫	∫
50	R(51)
51	R(52)

Step	Procedure
8	Set the MS2601A/J in the following order without changing the ATT setting (51 dB). Press the [SHIFT] key. Press the [CAL] key. Press the [F1] key. (RF* → CAL*)
9	Press the [F5] key (⩓) several times until the marker level indicates the maximum value. (When pressing the [F5] key several times, the marker level falls suddenly. Next, when the [F6] key (⩔) is pressed, the marker level reaches the maximum.) At this time, this maximum marker level value is X(1) dBm. (CAL ATT = 0 dB).

(continued)

Step	Procedure
10	Press the [F5] key (∨) 51 times and read the marker level each time. (Every time the key is pressed, CAL ATT increases towards 51 dB in 1 dB steps.)

CAL ATT (dB)	Marker level (dBm)
0	X(1)
1	X(2)
2	X(3)
∫	∫
50	X(51)
51	X(52)

Step	Procedure
11	Calculate the CAL level D(N) from the values measured in steps 3, 7 and 10 as shown below. D(N) = X(N) - R(N) + L(N) dBm where N = 1 to 52 Also, calculate the following equation but omit the figures after the decimal point to give integer values. CD(N) = D(N) x 100

(continued)

Step	Procedure
11 (cont.)	Example: D(N) +0.03 → 3 -10.05 → -1005
12	Enter the CD(N) values to the MS2601A/J via GP-IB using a personal computer using the following procedures. WRITE @101:"CD1,0" ..... Enter the CAL data input condition. WRITE @101:CD(N) .... Enter the CD (N) values at the 52 points from N = 1 to 52 sequentially.

SECTION 5

REPLACEABLE PARTS

5.1 Introduction

This section contains information relative to ordering replacement parts.

The following table shows circuit reference (hereinafter CKT REF) and abbreviations used for parts given in the Parts List.

In the Parts List, the quantity of each part is one if no quantitative description is given in the "NOTE" column.

5.2 Ordering Information

When ordering parts, please give the following descriptions by referring to the PARTS LIST.

	Item	Example
(1)	Name of instrument	Spectrum Analyzer MS2601A/J
(2)	Name of parts list	Parts of MS2601A/J OVERALL CIRCUIT
(3)	CKT REF	Z 1
(4)	Name of part	YTO, (MP657A) Note: Parts name is given in parentheses ( ) in the Parts List. Parts with asterisk* are those that require factory adjustment upon repairing. When ordering a part or parts with asterisk, give full description of the part.
(5)	Quantity	1
(6)	Serial No. of instrument	Serial No. M31257

When ordering PC boards with parts mounted, please include the A-number under item (2) above instead of items (3) and (4). (See Table 3-1 for PC board number.)

(1) Circuit references

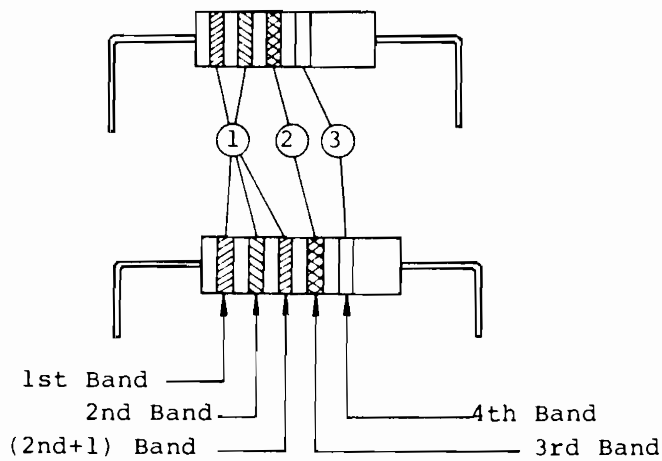
A:	Unit (PCB)	J:	Jack, plug, connector	Q:	Transistor, diode, IC, rectifier	V:	Vacuum tube
AT:	Attenuator	K:	Relay	R:	Resistor	W:	Connector with cable
B:	Speaker, Bell	L:	Coil, microconductor	S:	Switch	X:	Crystal OSC
C:	Capacitor	M:	Meter, timer	T:	Transformer	Z:	Unit
F:	Fuse	P:	Lamp				
G:	Fan						

(2) Abbreviations

A:	amperes	Multi:	multiplying
Att, R var:	variable attenuator using film elements	N-ch:	N-channel
BL:	boundary layer	non-lin:	non-linear taper
Cer:	ceramic	Non-pol:	non polarity
CF:	carbon film	NPN:	negative-positive-negative
Comp:	composition	Ω:	ohms
CRT:	cathode-ray tube	p:	pico (x 10^{-12})
Di:	diode	Plast:	plastic film
DIP:	dual in-line package	PMTR:	potentiometer
Elect:	electrolytic aluminum	PNP:	positive-negative-positive
F:	farad	p-p:	peak-to-peak value
FET:	field-effect transistor	RFC:	RF choke
G:	ground	R-lamp:	resistor lamp
Ge:	germanium	rms:	effective value (root-mean-square)
H:	henry	SBD:	Schottky barrier diode
Hz:	hertz	SCR:	silicon-controlled rectifier
IC:	integrated circuit	Si:	silicon
IEC:	Conforms to IEC Safety Standards.	SRD:	step-recovery diode
J-FET:	junction FET	Tant:	tantalum
k:	kilo (x 10^{3})	TM:	time-lag
LED:	light-emitting diode	Tr:	transistor
M:	mega (x 10^{6})	Trans:	transformer
m:	milli (x 10^{-3})	μ:	micro (x 10^{-6})
MF:	metallized film	V:	volt
MOS-FET:	metal-oxide semiconductor FET	Var:	variable
M paper:	metallized paper	WW:	wire-wound
M plast:	metallized plastic film	XTAL:	crystal

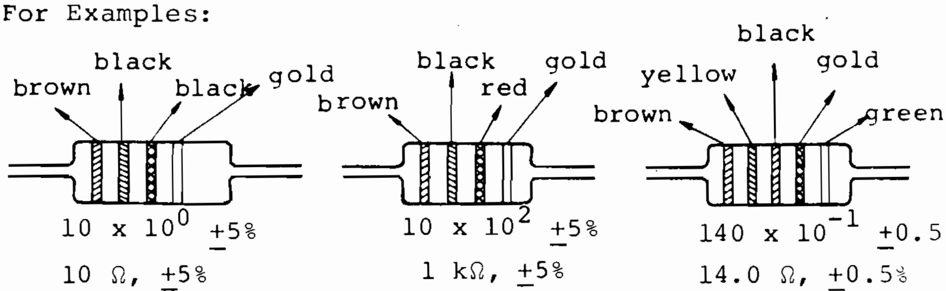
5.3 Reading Capacitance and Resistance

(1) Reading resistance

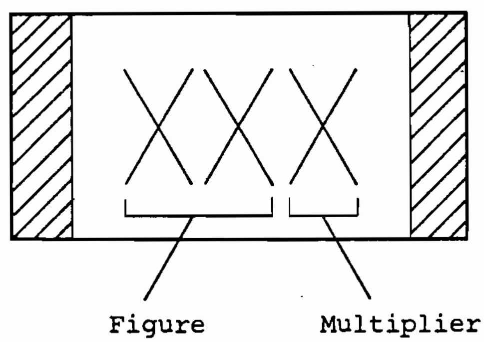


	1		2	3
COLOR	Figure		Multiplier	Tolerance
	1st	2nd	3rd	4th
Black	0	0	$x10^0$	-
Brown	1	1	$x10^1$	-
Red	2	2	$x10^2$	-
Orange	3	3	$x10^3$	-
Yellow	4	4	$x10^4$	-
Green	5	5	$x10^5$	$\pm0.5\%$
Blue	6	6	$x10^6$	-
Purple	7	7	$x10^7$	-
Gray	8	8	$x10^8$	-
White	9	9	$x10^9$	-
Gold	-	-	$x10^{-1}$	$\pm5\%$
Silver	-	-	$x10^{-2}$	$\pm10\%$
-----	-	-		$\pm20\%$

For Examples:



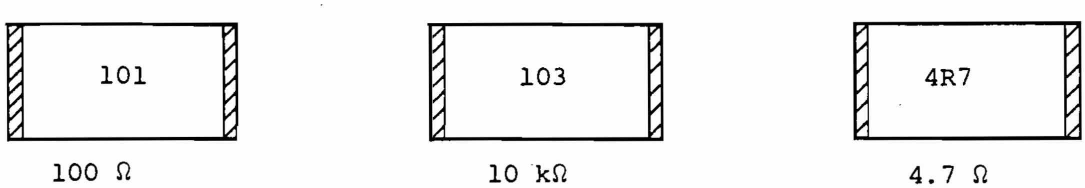
(2) Reading chip resistance



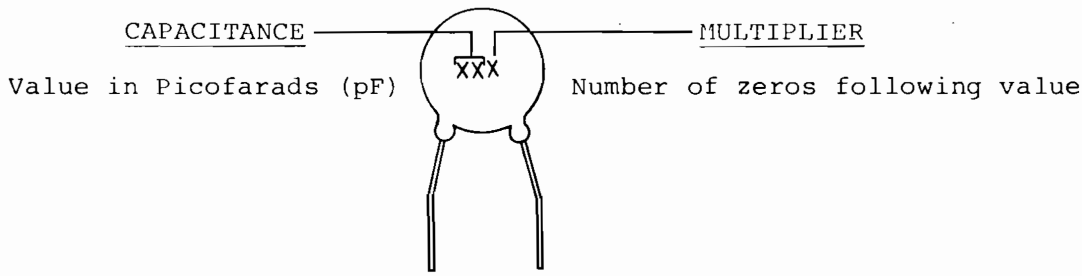
The first two characters are significant digits and the last numeric character indicates the number of zeroes that follow the first two characters.

A decimal point is represented by the character R, and numeric characters are all significant digits in the R representation.

For Examples:



(3) Reading capacitance



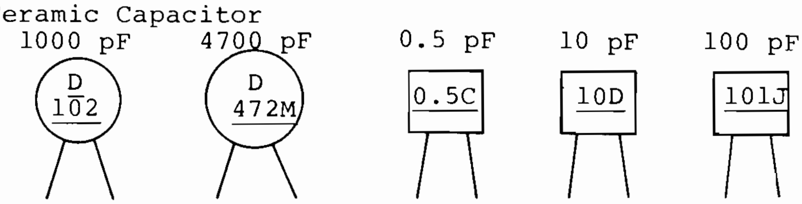
EXAMPLES:

103 = 10,000 pF = 10^{-8} F or 0.01 µF
302 = 3,000 pF = 3×10^{-9} F or 0.003 µF
676 = 67,000,000 pF = 67×10^{-6} F or 67 µF

(a) Ceramic and polyester capacitors

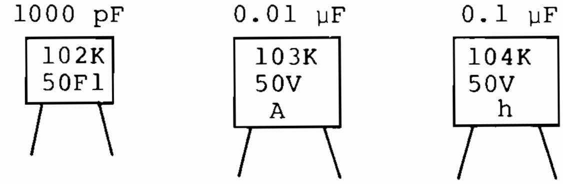
Indication	0.5	1	10	101	102	103	104
Capacity	0.5 pF	1 pF	10 pF	100 pF	1000 pF	0.01 µF	0.1 µF

Example:
Ceramic Capacitor



Capacity values are always underlined.

Polyester Capacitor

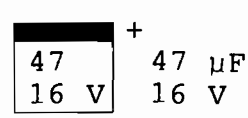


(b) Tantalum, metallized, and electrolytic capacitors

Indication	OR47	010	100	101
Capacity	0.47 µF	1 µF	10 µF	100 µF

(c) Chip tantalum capacitance

Indication	0.47	4.7	47
Capacity	0.47 µF	4.7 µF	47 µF



(4) Reading chip ceramic capacitance

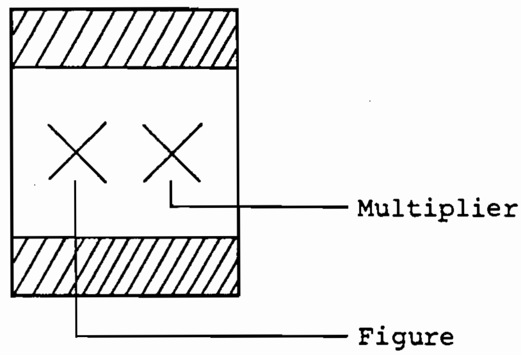
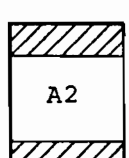
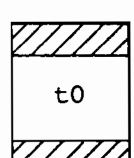


Figure						Multimeter	
Indicated alphabetic character	Corre-sponding value	Indicated alphabetic character	Corre-sponding value	Indicated alphabetic character	Corre-sponding value	Indicated value	Corresponding multiplier
A	1.0	M	3.0	Y	8.2	0	10^0
B	1.1	N	3.3	Z	9.1	1	10^1
C	1.2	P	3.6	a	2.5	2	10^2
D	1.3	Q	3.9	b	3.5	3	10^3
E	1.5	R	4.3	d	4.0	4	10^4
F	1.6	S	4.7	e	4.5	5	10^5
G	1.8	T	5.1	f	5.0	6	10^6
H	2.0	U	5.6	m	6.0	7	10^7
J	2.2	V	6.2	n	7.0	8	10^8
K	2.4	W	6.8	t	8.0	9	10^{-1}
L	2.7	X	7.5	y	9.0		

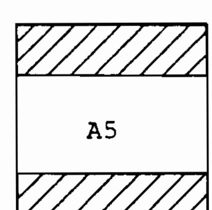
Examples:



100 pF

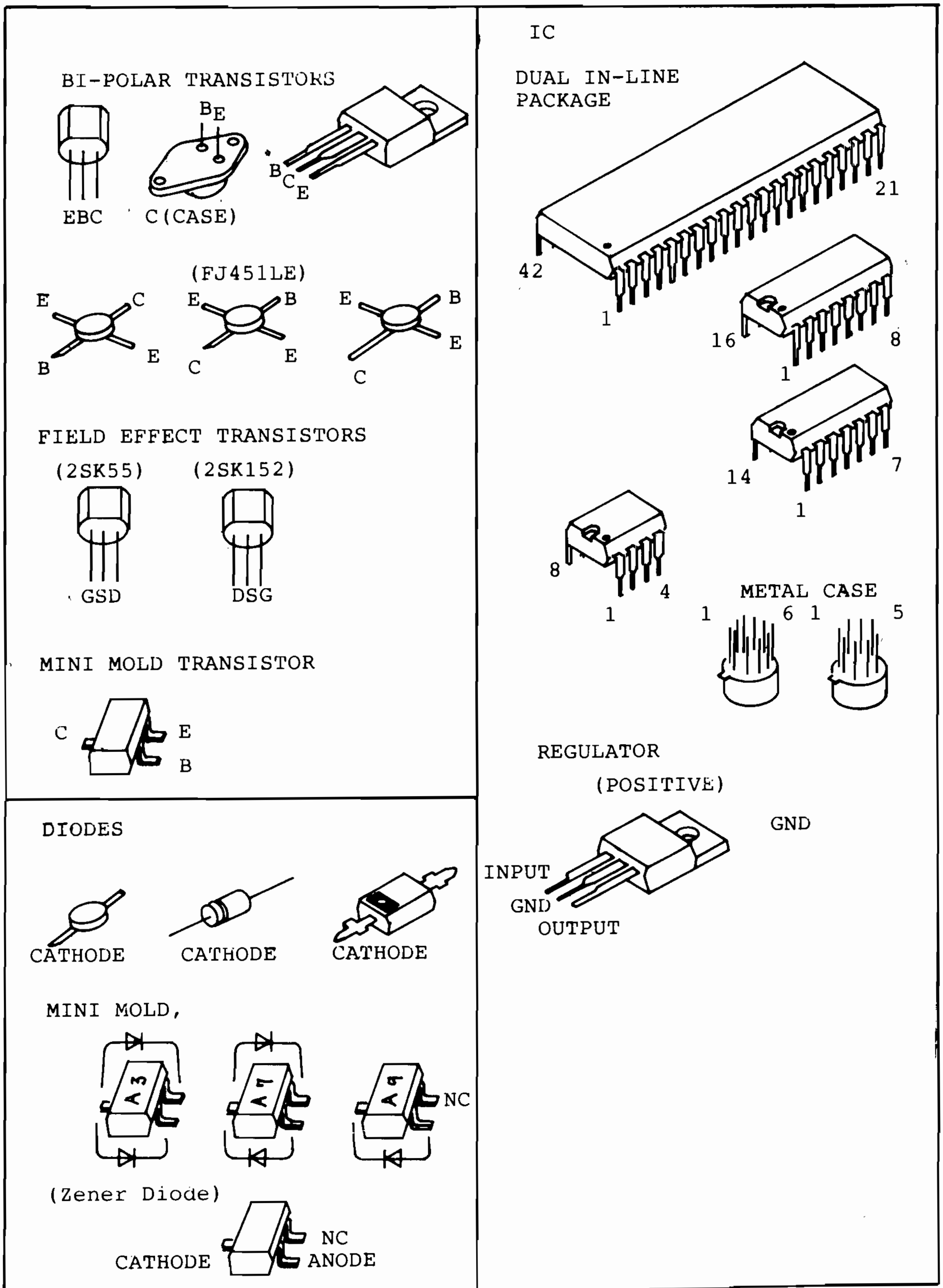


8 pF



0.1 μF

5.4 Semiconductor Markings



5.5 Parts List

Note:

For the PC board number, see Table 3-1.

Parts List: MS2601A

CKT REF	DESCRIPTION	RATING		NOTE
A 1	RF/PLL BLOCK			
A 2	IF BPF			
A 3	IF LOG/DET			
A 4	PTA			OPT 01 only
A 5	FRONT			
A 6	SCAN/YTO DRIVE			
A 7	REF OSC			
A 8	MAIN CPU			
A 9	GP-IB			Not assigned for OPT 01
A 10	DISP CPU			
A 11	RS 232C			OPT 02 only
A 12	Not assigned			
A 13	MAIN MOTHER BOARD			
A 14	SUB MOTHER BOARD			
A 15	LED			
G 1	Fan, (FBH-08A12H)			
J 1	Not assigned			
J 2	Connector, (BNC-071)			
J 3	Not assigned			
J 4	Not assigned			
J 5	Connector, (57-40360)			OPT 01 only
J 6	Connector, (TCS0254-01-0101)			OPT 01 only
J 7	Connector, (CNF3-40D-2.54R)			OPT 01 only
J 8	Connector, (RA0304NAG)			
J 9	Connector, (DF1-8S-2.5R24)			
J 10	Not assigned			
J 11	Connector, (DF1B-10S-2.5R)			
J 12	Connector, (BNC-071)			
J 13	Connector, (BNC-071)			
J 14	Connector, (BNC-071)			
J 15	Connector, (BNC-071)			
J 16	Connector, (DF1-5S2.5R24)			
J 17	Connector, (3CR)			
J 18	Connector, (3CR)			
J 19	Not assigned			
J 20	Not assigned			

( ): Manufacturer's part number
* : Selected at factory

34W93351 1/2

Parts List: MS2601A

CKT REF	DESCRIPTION	RATING		NOTE
J 21	Connector, (TCS0284-01-0101)			
J 22	Connector, (BNC-071)			
J 23	Connector, (P-1306-DB)			
J 24	Connector, (DF1-10S2.5R24)			
J 25	Ground terminal			
J 26	Inlet, (NC-165)			
J 27	Jack, (DF1-10S2.5R24)			Attached to CRT UNIT
J 28	Jack, (DF1-8S2.5R24)			
J 29	Connector, (1625-02P1)			
J 30	Connector, (DF1-10S2.5R24)			
J 31	Connector, (1625-03R1)			
J 32	Connector, (1625-03P1)			
J 33	Connector, (1625-02R1)			Attached to REGULATOR UNIT
R 1	CF, (ARD25T105J)	1.0MΩ, ±5%, 1/4W		
S 1	Switch, (SDU3P2106)			
T 1	Power transformer			
W 1	Not assigned			
W 2	Not assigned			
W 3	Cable, (57FE-450-GP-IB)			
Z 1	YTO, (MP657A)			
Z 2	Noise filter, (ZMB 2203-13)			
Z 3	CRT unit, (DDC-V6ND)			
Z 4	Regulator unit			

( ): Manufacturer's part number
* : Selected at factory

34W93351 2/2

Parts List: A1, RF/PLL BLOCK

CKT REF	DESCRIPTION	RATING		NOTE
A 1	A01 DC BLOCK			34W93328
A 2	A02 P ATT			34W93329
A 3	A03 2.2G LPF			
A 4	A04 EQU			34W93330
A 5	Not assigned			
A 6	A06 2.5214GHZ PRE AMP			34W93331
A 7	A07 2'ND CONV			34W93332
A 8	A08 1'ST LO AMP			34W93333
A 9	Not assigned			
A 10	A10 SAMPLER			34W93334
A 11	Not assigned			
A 12	A12 2'ND LO PLL			34W93335
A 13	A13 50K/50M STEP SYNTHE			34W93336
A 14	A14 PULSE AMP			34W93337
A 15	A15 20HZ STEP VCO CONT			34W93338
A 16	A16 YTO/PLL PD&LOOP FILTER			34W93339
A 17	A17 CONNECTOR			
C 1 to C 14	Cer, (DF553F102Y50)	1000pf, +100/-0%, 50V		
C 15	Cer, (CC45CK1H0R5CY)	0.5pF, ±0.25pF, 50V		*
C 16	Cer, (CC45CK1H1R0CY)	1.0pF, ±0.25pF, 50V		*
C 17	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
J 1	Connector, (N-R(NICKEL))			
J 2	Connector, (HRM304B)			
J 3	Not assigned			
J 4	Socket, (DF1-3S2.5R28)			
J 5	Socket, (DF1-3S2.5R28)			
Q 1	Di, (1SS97)			34W91578
Q 2	Di, (1SS97)			34W91578
Q 3	Di, (1SS97)			34W91578
Q 4	Di, (1SS97)			34W91578
Q 5	Di, vari-cap, (1S2208)			
Q 6	Di, Vari-cap, (1SS208)			
Q 7	Di, vari-cap, (1SS208)			
Q 8	IC, (μPC14305H)			
Q 9	IC, (μPC14305H)			
R 1	CF, (ARD25T561J)	560Ω, ±5%, 1/4W		
R 2	CF, (ARD25T561J)	560Ω, ±5%, 1/4W		
R 3	CM, (RM73B2B390JD)	39Ω, ±5%, 1/8W		
R 4	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 5	MF, (RN14K2E1001D)	1.00kΩ, ±0.5%, 1/4W		

( ): Manufacturer's part number
* : Selected at factory

34W93317 1/2

Parts List: A1, RF/PLL BLOCK

CKT REF	DESCRIPTION	RATING		NOTE
R 6	MF, (RN14K2E1001D)	1.00kΩ, ±0.5%, 1/4W		
W 1	Semi-rigid cable, (34J92577)			
W 2	Semi-rigid cable, (34J92578)			
W 3	Semi-rigid cable, (34J95262)			
W 4	Coaxial cable, (34J91082K)			
W 5	Coaxial cable, (34J91082G)			
W 6	Coaxial cable, (34J91082G)			
W 7	Coaxial cable, (34J91082E)			
Z 17	Noise filter, (ZFN5101-01R-A)			
Z 18	Noise filter, (ZFN5101-01R-A)			
Z 19	Noise filter, (ZFN5101-01R-A)			
Z 20	Noise filter, (ZFN5101-01R-A)			
Z 21	Noise filter, (ZFN5101-01R-A)			
Z 25	Noise filter, (ZFN5101-01R-A)			
Z 26	Noise filter, (ZFN5101-01R-A)			

( ): Manufacturer's part number
* : Selected at factory

34W93317 2/2

Parts List: A1-A1, DC BLOCK (MS2601A) 3

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(GR44-1W5R224K100)	0.22μF,±20%,100V		
C 2	Cer,(GR44-1W5R224K100)	0.22μF,±20%,100V		

( ): Manufacturer's part number
* : Selected at factory

34W93328 1/1

Parts List: A1-A1 DC BLOCK (MS2601J) 3

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(GR44-1W5R224Z100)	0.22μF,+80/-20%,100V		
C 2	Cer,(GR44-1W5R224Z100)	0.22μF,+80/-20%,100V		
R 1	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 2	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W94374 1/1

Parts List: A1-A1 DC BLOCK (MS2601J OPT 05) 3

CKT REF	DESCRIPTION	RATING		NOTE
R 1	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 2	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W96453 1/1

Parts List: A1-A2, P-ATT 4

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
K 1	Relay,(UH-12)	+12V		
K 2	Relay,(UH-12)	+12V		
K 3	Relay,(UH-12)	+12V		
K 4	Relay,(UH-12)	+12V		
L 1	Coil,(NL453232-1R5K)	1.5μH,±10%		
Q 1	Di,(1S2835(A3))			
Q 2	Di,(1S2835(A3))			
Q 3	Di,(1S2835(A3))			
Q 4	Di,(1S2835(A3))			
R 1	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
Z 1	Att,(20DB)			
Z 2	Att,(10DB)			
Z 3	Att,(20DB)			

( ): Manufacturer's part number
* : Selected at factory

34W96386 1/1

Parts List: A1-A4, EQU

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Cer, (CC732CH1H040D)	4pF, ±0.5pF, 50V		*
R 1	Not assigned			
R 2	Not assigned			
R 3	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R 4	CM, (RM73B2B220JD)	22Ω, ±5%, 1/8W		
R 5	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93330 | 1/1

Parts List: A1-A6, 2.5214 GHZ PRE AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CH1H220J(J1))	22pF, ±5%, 50V		
C 2	Not assigned			
C 3	Tant, (CS734E1C226M)	22μF, ±20%, 16V		
C 4	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 5	Cer, (CC732CH1H220J(J1))	22pF, ±5%, 50V		
C 6	Cer, (CK733F1H104Z(A5))	0.1μF, +80/-20%, 50V		
Q 1	Di, breakdown, (RD6.2MB2(622))	6.0 to 6.39V, 200mW		
Q 2	Tr, (2SC2585)			
R 1	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 2	CM, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W		
R 3	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 4	CM, (RM73B2B100JD)	10Ω, ±5%, 1/8W		
R 5	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 6	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93331 | 1/1

Parts List: A1-A8, 2ND CONV

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CH1H220J(J1))	22pF, ±5%, 50V		
C 2	Cer, (CK732B1H103K(A4))	0.01μF, ±10%, 50V		
C 3	Cer, (CC732CH1H220J(J1))	22pF, ±5%, 50V		
C 4	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 5	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 6	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 7	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 8	Cer, (CC732CH1H220J(J1))	22pF, ±5%, 50V		
C 9	Cer, (CK732B1H103K(A4))	0.01μF, ±10%, 50V		
C 10	Not assigned			
C 11	Cer, (CC732CH1H220J(J1))	22pF, ±5%, 50V		
C 12	Cer, (CC732CH1H040D(d0))	4pF, ±0.5pF, 50V		
C 13	Cer, (CC732CH1H040D(d0))	4pF, ±0.5pF, 50V		
C 14	Cer, (CC732CH1H060D(m0))	6pF, ±0.5pF, 50V		
C 15	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 16	Cer, (CK733F1H104Z(A5))	0.1μF, +80/-20%, 50V		
C 17	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 18	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 19	Not assigned			
C 20	Not assigned			
C 21	Not assigned			
C 22	Tant, (CS734E1C226M)	22μF, ±20%, 16V		
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Not assigned			
L 5	Not assigned			
L 6	Not assigned			
L 7	Coil, (SP0408-4R7K)	4.7μH		
Q 1	Di, breakdown, (RD6.2MB2(622))	6.0 to 6.39V, 200mW		
Q 2	Tr, (2SC2585)			
Q 3	Di, (ND487R2-3P)			
Q 4	Di, (ND487R2-3P)			
Q 5	Di, breakdown, (RD6.2MB2(622))	6.0 to 6.39V, 200mW		
Q 6	Tr, (2SC2367)			
Q 7	Di, breakdown, (RD5.1MB2(512))	4.97 to 5.24V, 200mW		
Q 8	Tr, (2SC2351(R2 OR R3))			

( ): Manufacturer's part number
* : Selected at factory

34W93332 | 1/2

Parts List: A1-A8, 2ND CONV

CKT REF	DESCRIPTION	RATING		NOTE
R 1	CM, (RM73B2B152JD)	1.5kΩ, ±5%, 1/8W		
R 2	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 3	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 4	CM, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W		
R 5	CM, (RM73B2B510JD)	51Ω, ±5%, 1/8W		
R 6	CM, (RM73B2B560JD)	56Ω, ±5%, 1/8W		
R 7	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 8	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 9	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 10	CM, (RM73B2B510JD)	51Ω, ±5%, 1/8W		
R 11	Ver, MF, (RJ-6P 1KΩ)	1kΩ, 1/2W		
R 12	CM, (RM73B2B6R8JD)	6.8Ω, ±5%, 1/8W		
R 13	CM, (RM73B2B6R8JD)	6.8Ω, ±5%, 1/8W		
R 14	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 15	CM, (RM73B2B511JD)	510Ω, ±5%, 1/8W		
R 16	CM, (RM73B2B390JD)	39Ω, ±5%, 1/8W		
R 17	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 18	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
T 1	Trans, (342T74443)			

( ): Manufacturer's part number
* : Selected at factory

34W93332 | 2/2

Parts List: A1-A9, 1ST LO AMP

9

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04C1H220A)	22µF,±20%,50V		
C 2	Elect,(CE04C1H220A)	22µF,±20%,50V		
C 3	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 4	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 5	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 6	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 7	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 8	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 9	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 10	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 11	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 12	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 13	Cer,(CC732CK1H010C(A0))	1pF,±0.25pF,50V		
C 14	Cer,(CC732CK1H020C(H0))	2pF,±0.25pF,50V		
C 15	Cer,(CC732CK1H020C(H0))	2pF,±0.25pF,50V		
C 16	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 17	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 18	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 19	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 20	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 21	Cer,(CC732CJ1H030C(M0))	3pF,±0.25pF,50V		
C 22	Not assigned			
C 23	Not assigned			
C 24	Not assigned			
C 25	Cer,(CC732CH1H180J(G1))	18pF,±5%,50V		
L 1	Coil			Printed pattern
L 2	Coil			Printed pattern
L 3	Coil			Printed pattern
L 4	Coil			Printed pattern
Q 1	Di,breakdown, (RD3.9MB(39))	3.7 to 4.1V,200mW		
Q 2	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 3	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 4	Di,breakdown, (RD3.9MB(39))	3.7 to 4.1V,200mW		
Q 5	Tr,(2SC2585)			
Q 6	Tr,(FJ451LE)			

( ): Manufacturer's part number
* : Selected at factory

34W93333 1/2

Parts List: A1-A9, 1ST LO AMP

CKT REF	DESCRIPTION	RATING		NOTE
Q 7	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 8	Tr,(2SC2585)			
R 1	CM,(RM73B2B4R7JD)	4.7Ω,±5%,1/8W		
R 2	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 3	CM,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R 4	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 5	CM,(RM73B2B121JD)	120Ω,±5%,1/8W		
R 6	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 7	CM,(RM73B2B220JD)	22Ω,±5%,1/8W		
R 8	CM,(RM73B2B750JD)	75Ω,±5%,1/8W		
R 9	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 10	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 11	CM,(RM73B2B180JD)	18Ω,±5%,1/8W		
R 12	CM,(RM73B2B271JD)	270Ω,±5%,1/8W		
R 13	CM,(RM73B2B271JD)	270Ω,±5%,1/8W		
R 14	CM,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 15	CM,(RM73B2B220JD)	22Ω,±5%,1/8W		
R 16	CM,(RM73B2B391JD)	390Ω,±5%,1/8W		
R 17	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 18	CM,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 19	CM,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 20	CM,(RM73B2B750JD)	75Ω,±5%,1/8W		
R 21	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 22	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 23	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93333 2/2

Parts List: A1-A10, SAMPLER

10

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CJ1H030C(M0))	3pF,±0.25pF,50V		
C 2	Cer,(CC732CJ1H030C(M0))	3pF,±0.25pF,50V		
Q 1	Di,(1SS13RM)			
Q 2	Di,(1SS13RM)			
R 1	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 2	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
W 3	Semi-rigid cable, (34J92579)			

( ): Manufacturer's part number
* : Selected at factory

34W93334 1/1

Parts List: A1-A12, 2ND LO PLL

11

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CH1H100D(A1))	10pF,±0.5pF,50V		
C 2	Cer,(CC732CH1H100D(A1))	10pF,±0.5pF,50V		
C 3	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 4	Elect,(CE04C1E221A)	220µF,±20%,25V		
C 5	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 6	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 7	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 8	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 9	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 10	Cer,(CC732CJ1H030C(M0))	3pF,±0.25pF,50V		
C 11	Not assigned			
C 12	Not assigned			
C 13	Cer,(CC45CJ1H030CY)	3pF,±0.25pF,50V		
C 14	Cer,(CC45CJ1H030CY)	3pF,±0.25pF,50V		
C 15	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 16	Cer,(CC732CH1H271J(L2))	270pF,±5%,50V		
C 17	Cer,(CC732CH1H271J(L2))	270pF,±5%,50V		
C 18	Cer,(CC732CH1H220J(J1))	22pF,±5%,50V		
C 19	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 20	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 21	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 22	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 23	Cer,(CK732B1H472K(S3))	4700pF,±10%,50V		
C 24	Cer,(CK734B1H104K(1A5))	0.1µF,±10%,50V		
C 25	Tant,(CS732E1V105M)	1µF,±20%,35V		
C 26	Not assigned			
C 27	Elect,(CE04C1E101A)	100µF,±20%,25V		
C 28	Elect,(CE04C1E101A)	100µF,±20%,25V		
C 29	Elect,(CE04C1E101A)	100µF,±20%,25V		
C 30	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 31	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 32	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 33	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 34	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 35	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 36	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 37	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 38	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 39	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 40	Cer,(CC732CH1H080D(t0))	8pF,±0.5pF,50V		
C 41	Elect,(CE04C1E101A)	100µF,±20%,25V		
C 42	Elect,(CE04C1E101A)	100µF,±20%,25V		
J 1	Connector, (008261-024200-870)			

( ): Manufacturer's part number
* : Selected at factory

34W93335 1/3

Parts List: A1-A12, 2ND LO PLL

CKT REF	DESCRIPTION	RATING		NOTE
J 2	Connector, (008261-033311-852)			
J 3	Receptacle, (FL-R-PC(2))			
L 1	Coil			Printed pattern
L 2	Coil			Printed pattern
L 3	Coil, (ELF1010SKI-102K)	1mH		
L 4	Not assigned			
L 5	Coil, (ELF1010SKI-102K)	1mH		
Q 1	Di, breakdown, (RD6.2MB2(622))	6.0 to 6.39V, 200mW		
Q 2	Tr, (2SC2351(R2 OR R3))			
Q 3	Di, (1SS97)			
Q 4	Tr, (2SC2351(R2 OR R3))			
Q 5	Tr, (2SC2351(R2 OR R3))			
Q 6	Di, (1SV107)			
Q 7	Di, (1SS99)			
Q 8	Di, (1SS99)			
Q 9	Di, (µPC4570C)			
Q 10	Di, breakdown, (RD6.2MB2(622))	6.0 to 6.39V, 200mW		
Q 11	Tr, (2SC2351(R2 OR R3))			
Q 12	Di, breakdown, (RD6.2MB2(622))	6.0 to 6.39V, 200mW		
Q 13	Tr, (2SC2351(R2 OR R3))			
R 1	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R 2	CM, (RM73B2B331JD)	330Ω, ±5%, 1/8W		
R 3	CM, (RM73B2B331JD)	330Ω, ±5%, 1/8W		
R 4	CM, (RM73B2B220JD)	22Ω, ±5%, 1/8W		
R 5	CM, (RM73B2B121JD)	120Ω, ±5%, 1/8W		
R 6	CM, (RM73B2B100JD)	10Ω, ±5%, 1/8W		
R 7	CM, (RM73B2B510JD)	51Ω, ±5%, 1/8W		
R 8	CM, (RM73B2B472JD)	4.7kΩ, ±5%, 1/8W		
R 9	Not assigned			
R 10	Not assigned			
R 11	Not assigned			
R 12	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 13	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 14	CM, (RM73B2B154JD)	150kΩ, ±5%, 1/8W		
R 15	CM, (RM73B2B154JD)	150kΩ, ±5%, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93335 2/3

Parts List: A1-A12, 2ND LO PLL

CKT REF	DESCRIPTION	RATING		NOTE
R 16	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 17	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 18	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 19	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 20	Var, MF, (RJ-6P 50KΩ)	50kΩ, 1/2W		
R 21	Var, MF, (RJ-6P 10KΩ)	10kΩ, 1/2W		
R 22	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 23	CM, (RM73B2B392JD)	3.9kΩ, ±5%, 1/8W		
R 24	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 25	CM, (RM73B2B104JD)	100kΩ, ±5%, 1/8W		
R 26	CM, (RM73B2B154JD)	150kΩ, ±5%, 1/8W		
R 27	CM, (RM73B2B153JD)	15kΩ, ±5%, 1/8W		
R 28	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R 29	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 30	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 31	CM, (RM73B2B330JD)	33Ω, ±5%, 1/8W		
R 32	Var, MF, (RJ-6P 100Ω)	100Ω, 1/2W		
R 33	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 34	CM, (RM73B2B330JD)	33Ω, ±5%, 1/8W		
R 35	CM, (RM73B2B271JD)	270Ω, ±5%, 1/8W		
R 36	CM, (RM73B2B220JD)	22Ω, ±5%, 1/8W		
R 37	CM, (RM73B2B330JD)	33Ω, ±5%, 1/8W		
R 38	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R 39	CM, (RM73B2B330JD)	33Ω, ±5%, 1/8W		
R 40	CM, (RM73B2B271JD)	270Ω, ±5%, 1/8W		
R 41	CM, (RM73B2B220JD)	22Ω, ±5%, 1/8W		
R 42	CM, (RM73B2B330JD)	33Ω, ±5%, 1/8W		
R 43	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R 44	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 45	CM, (RM73B2B390JD)	39Ω, ±5%, 1/8W		
R 46	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
T 1	Trans, (342T60521B)			
Z 1	BPF, (AKW-50M)	50MHz		34Z92892
Z 2	BPF, (AKW-50M)	50MHz		34Z92892

( ): Manufacturer's part number
* : Selected at factory

34W93335 3/3

Parts List: A1-A13, 50K/50M STEP SYNTHE

12

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE04C1E101A)	100µF, ±20%, 25V		
C 2	Elect, (CE04C1A101A)	100µF, ±20%, 10V		
C 3	Elect, (CE04C1E470A)	47µF, ±20%, 25V		
C 4	Elect, (CE04C1A471A)	470µF, ±20%, 10V		
C 5	Elect, (CE04C1A471A)	470µF, ±20%, 10V		
C 6	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 7	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 8	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 9	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 10	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 11	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 12	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 13	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 14	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 15	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 16	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 17	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 18	Tant, (CS734E1C226M)	22µF, ±20%, 16V		
C 19	Tant, (CS734E1C226M)	22µF, ±20%, 16V		
C 20	Plast, (ECQ-V1H334JW)	0.33µF, ±5%, 50V		
C 21	Plast, (ECQ-V1H334JW)	0.33µF, ±5%, 50V		
C 22	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 23	Not assigned			
C 24	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 25	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 26	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 27	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 28	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 29	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 30	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 31	Tant, (CS734E1C226M)	22µF, ±20%, 16V		
C 32	Cer, (CC732CH1H331J(N2))	330pF, ±5%, 50V		
C 33	Tant, (CS734E1C226M)	22µF, ±20%, 16V		
C 34	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 35	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 36	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 37	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 38	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 39	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 40	Cer, (CK732B1H102K(A4))	1000pF, ±10%, 50V		
C 41	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 42	Elect, (CE04C1A101A)	100µF, ±20%, 16V		
C 43	Elect, (CE04C1A101A)	100µF, ±20%, 10V		
C 44	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 45	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 46	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 47	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		

( ): Manufacturer's part number
* : Selected at factory

34W93336 1/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
C 48	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 49	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 50	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 51	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 52	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 53	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 54	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 55	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 56	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 57	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 58	Tant, (CS734E1C226M)	22µF, ±20%, 16V		
C 59	Tant, (CS734E1C226M)	22µF, ±20%, 16V		
C 60	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 61	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 62	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 63	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 64	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 65	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 66	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 67	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 68	Elect, (CE04C1H220A)	22µF, ±20%, 50V		
C 69	Cer, (CC732C1H180J(G1))	18pF, ±5%, 50V		Q'ty 2
C 70	Not assigned			
C 71	Not assigned			
C 72	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 73	Elect, (CE04C1H220A)	22µF, ±20%, 50V		
C 74	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 75	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 76	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 77	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 78	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 79	Cer, (CC732CH1H331J(N2))	330pF, ±5%, 50V		
C 80	Cer, (CC732CH1H101J(A2))	100pF, ±5%, 50V		
C 81	Cer, (CC732CH1H470J(S1))	47pF, ±5%, 50V		
C 82	Var, Cer, (TZ03T110A)	11pF, 100V		
C 83	Cer, (CK732B1H223K)	0.022µF, ±10%, 50V		
C 84	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 85	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 86	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 87	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 88	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 89	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 90	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 91	Cer, (CK732B1H102K(A3))	1000pF, ±10%, 50V		
C 92	Cer, (CK732B1H103K(A4))	0.01µF, ±10%, 50V		
C 93	Elect, (CE04C1E470A)	47µF, ±20%, 25V		
C 94	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 95	Elect, (CE04C1E470A)	47µF, ±20%, 25V		

( ): Manufacturer's part number
* : Selected at factory

34W93336 2/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
C 96	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 97	Cer,(CC732CH1H390J(Q1))	39pF,±5%,50V		
C 98	Cer,(CC732CH1H390J(Q1))	39pF,±5%,50V		
C 99	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C100	Tant,(CS734E1C226M)	22µF,±20%,16V		
C101	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C102	Plast,(ECQ-V1H105JW)	1µF,±5%,50V		
C103	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C104	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C105	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C106	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C107	Tant,(CS734E1C226M)	22µF,±20%,16V		
C108	Tant,(CS734E1C226M)	22µF,±20%,16V		
C109	Tant,(CS734E1C226M)	22µF,±20%,16V		
C110	Tant,(CS734E1C226M)	22µF,±20%,16V		
C111	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C112	Not assigned			
C113	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C114	Not assigned			
C115	Not assigned			
C116	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C117	Tant,(CS734E1C226M)	22µF,±20%,16V		
C118	Elect,(CE04C1E470A)	47µF,±20%,25V		
C119	Not assigned			
C120	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C121	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C122	Cer,(CC732CH1H151J(E2))	150pF,±5%,50V		
C123	Cer,(CC732CH1H151J(E2))	150pF,±5%,50V		
C124	Cer,(CC732CH1H471J(S2))	470pF,±5%,50V		
C125	Cer,(CC732CH1H471J(S2))	470pF,±5%,50V		
C126	Cer,(CC732CH1H820J(Y1))	82pF,±5%,50V		
C127	Cer,(CC732CH1H820J(Y1))	82pF,±5%,50V		
C128	Tant,(CS734E1C226M)	22µF,±20%,16V		
C129	Tant,(CS734E1C226M)	22µF,±20%,16V		
C130	Tant,(CS734E1C226M)	22µF,±20%,16V		
C131	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
J 1	Receptacle,(FL-R-PC(A))			
J 2	Connector,(27DP-R-PC-1)			
J 3	Receptacle,(FL-R-PC(A))			
J 4	Connector,(27DP-R-PC-1)			
J 5	Connector, (008261-024200-870)	2pins		
J 6	Connector, (008261-033311-852)	3pins		

( ): Manufacturer's part number
* : Selected at factory

34W93336 3/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
J 7	Connector, (008261-024200-870)	2pins		
J 8	Connector, (008261-033311-852)	3pins		
J 9	Connector,(U-PA1521)	15pins		
J 10	Connector(U-PA1021)	10pins		
J 11	Plug,(DF1-3P-2.5DSA)	3pins		
J 12	Not assigned			
J 13	Plug,(DF1-3P-2.5DSA)	3pins		
J 14	Not assigned			
L 1	Coil,(NL453232-3R3K)	3.3µH		
L 2	Coil,(NL453232-470K)	47µH		
L 3	Coil,(NL453232-100K)	10µH		
L 4	Coil,(ELF0708SKI-103K)	10mH		
L 5	Coil,(E526HN-100116)	43nH		
L 6	Coil,(LF8-220K)	22µH		
L 7	Coil,(LF8-470K)	47µH		
L 8	Coil,(NL453232-220K)	22µH		
L 9	Coil,(NL453232-220K)	22µH		
L 10	Coil,(NL453232-6R8K)	6.8µH		
L 11	Coil,(E526HN-100118)	118nH		
L 12	Coil,(NL322522-R68K)	0.68µH		
L 13	Coil,(NL453232-102K)	1mH		
L 14	Coil,(NL453232-220K)	22µH		
L 15	Coil,(NL322522-R68K)	0.68µH		
L 16	Coil,(NL322522-R68K)	0.68µH		
L 17	Coil,(NL322522-R22K)	0.22µH		
Q 1	IC,(74196)			
Q 2	IC,(MC4044P)			With socket
Q 3	Tr,(2SC1623(L5 OR L6))			
Q 4	Not assigned			
Q 5	IC,(µPC4570C)			
Q 6	IC,(AD7533LN)			
Q 7	IC,(TC74HC574F)			
Q 8	IC,(TC74HC574F)			
Q 9	IC,(TC74HC574F)			
Q 10	LED,(TLR226)			
Q 11	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 12	Tr,(2SC2351(R2 OR R3))			

( ): Manufacturer's part number
* : Selected at factory

34W93336 4/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
Q 13	Di,(1SS97)			
Q 14	Di,(1SS97)			
Q 15	IC,(µPB571C)			
Q 16	IC,(74F191PC)			
Q 17	IC,(74F191PC)			
Q 18	IC,(74F191PC)			
Q 19	IC,(74F191PC)			
Q 20	IC,(TC74HC00F)			
Q 21	IC,(74F00PC)			
Q 22	IC,(74F00PC)			
Q 23	IC,(µPC4570C)			
Q 24	Di,vari-cap,(1SV50)			
Q 25	FET,(2SK55E)			
Q 26	FET,(2SK55E)			
Q 27	FET,(2SK55E)			
Q 28	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 29	Tr,(2SC2351(R2 OR R3))			
Q 30	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 31	Tr,(2SC2351(R2 OR R3))			
Q 32	IC,(11C90DC)			
Q 33	IC,(TC74HC574F)			
Q 34	IC,(TC4051BP)			
Q 35	IC,(74F191PC)			
Q 36	IC,(74F191PC)			
Q 37	IC,(74F191PC)			
Q 38	IC,(MC4044P)			
Q 39	IC,(74196)			
Q 40	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 41	Tr, (2SC3735(B34 OR B35))			
Q 42	IC,(74F00PC)			
Q 43	IC,(74F00PC)			
Q 44	LED,(TLR226)			
Q 45	IC,(µPC4570C)			
Q 46	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 47	IC,(µPC4570C)			
Q 48	Di,vari-cap,(1SV50)			
Q 49	Di,breakdown,(1SZ52)	5.9 to 6.5V 250mW		
Q 50	FET,(2SK55E)			
Q 51	FET,(2SK55E)			
Q 52	FET,(2SK55E)			
Q 53	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		

( ): Manufacturer's part number
* : Selected at factory

34W93336 5/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
Q 54	Tr, (2SC3735(B34 OR B35))			
Q 55	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 56	Tr,(2SC2351(R2 OR R3))			
Q 57	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 58	Tr,(2SC2351(R2 OR R3))			
Q 59	Di,breakdown, (RD7.5MB2(752))	7.23 to 7.66V,200mW		
Q 60	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 61	Di,(1SS97)			
Q 62	Not assigned			
Q 63	Tr,(2SA812(M5 OR M6))			
Q 64	Not assigned			
Q 65	Not assigned			
R 1	Not assigned			
R 2	Not assigned			
R 3	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 4	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 5	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 6	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 7	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 8	SIL type,(RRS-4-104JA)	100kΩ x 4,±5%,1/8W		
R 9	SIL type,(RRS-8-104JA)	100kΩ x 8,±5%,1/8W		
R 10	CM,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 11	CM,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 12	CM,(RM73B2B104JD)	100kΩ,±5%,1/8W		
R 13	CM,(RM73B2B104JD)	100kΩ,±5%,1/8W		
R 14	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 15	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 16	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 17	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 18	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 19	MF,(RE35-YP-243Ω-B)	243Ω,±0.1%,1/8W		
R 20	MF,(RE35-YP-243Ω-B)	243Ω,±0.1%,1/8W		
R 21	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 22	CM,(RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R 23	MF,(RE35-YP-825Ω-B)	825Ω,±0.1%,1/8W		
R 24	MF,(RE35-YP-825Ω-B)	825Ω,±0.1%,1/8W		
R 25	MF,(RE35-YP-1.00KΩ-B)	1.00kΩ,±0.1%,1/8W		
R 26	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 27	MF,(RE35-YP-825Ω-B)	825Ω,±0.1%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93336 6/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
R 28	MF,(RE35-YP-2.15KΩ-B)	2.15kΩ,±0.1%,1/8W		
R 29	MF,(RE35-YP-1.50KΩ-B)	1.50kΩ,±0.1%,1/8W		
R 30	Var,MF,(RJ-6P 200Ω)	200Ω,1/2W		
R 31	MF,(RE35-YP-825Ω-B)	825Ω,±0.1%,1/8W		
R 32	MF,(RE35-YP-301Ω-B)	301Ω,±0.1%,1/8W		
R 33	MF,(RE35-YP-1.00KΩ-B)	1.00kΩ,±0.1%,1/8W		
R 34	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 35	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 36	CM,(RM73B2B272JD)	2.7kΩ,±5%,1/8W		
R 37	CM,(RM73B2B122JD)	1.2kΩ,±5%,1/8W		
R 38	CM,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 39	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 40	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 41	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 42	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 43	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 44	CM,(RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R 45	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 46	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 47	CM,(RM73B2B270JD)	27Ω,±5%,1/8W		
R 48	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 49	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 50	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 51	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 52	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 53	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 54	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 55	CM,(RM73B2B560JD)	56Ω,±5%,1/8W		
R 56	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 57	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 58	SIL type,(RRS-4-104JA)	100kΩ x 4,±5%,1/8W		
R 59	SIL type,(RRS-6-104JA)	100kΩ x 6,±5%,1/8W		
R 60	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 61	CM,(RM73B2B271JD)	270Ω,±5%,1/8W		
R 62	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 63	CM,(RM73B2B390JD)	39Ω,±5%,1/8W		
R 64	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 65	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 66	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 67	MF,(RE35-YP-42.2KΩ-B)	42.2kΩ,±0.1%,1/8W		
R 68	MF,(RE35-YP-42.2KΩ-B)	42.2kΩ,±0.1%,1/8W		
R 69	Not assigned			
R 70	MF,(RE35-YP-3.24KΩ-B)	3.24kΩ,±0.1%,1/8W		
R 71	Not assigned			
R 72	MF,(RE35-YP-3.24KΩ-B)	3.24kΩ,±0.1%,1/8W		
R 73	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 74	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93336 | 7/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
R 75	MF,(RE35-YP-3.24KΩ-B)	3.24kΩ,±0.1%,1/8W		
R 76	MF,(RE35-YP-8.25KΩ-B)	8.25kΩ,±0.1%,1/8W		
R 77	MF,(RE35-YP-6.98KΩ-B)	6.98kΩ,±0.1%,1/8W		
R 78	MF,(RE35-YP-3.24KΩ-B)	3.24kΩ,±0.1%,1/8W		
R 79	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 80	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 81	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 82	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 83	CM,(RM73B2B272JD)	2.7kΩ,±5%,1/8W		
R 84	CM,(RM73B2B122JD)	1.2kΩ,±5%,1/8W		
R 85	CM,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 86	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 87	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 88	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 89	CM,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 90	CM,(RM73B2B330JD)	33Ω,±5%,1/8W		
R 91	CM,(RM73B2B271JD)	270Ω,±5%,1/8W		
R 92	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 93	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 94	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 95	CM,(RM73B2B750JD)	75Ω,±5%,1/8W		
R 96	CM,(RM73B2B750JD)	75Ω,±5%,1/8W		
R 97	CM,(RM73B2B220JD)	22Ω,±5%,1/8W		
R 98	CM,(RM73B2B390JD)	39Ω,±5%,1/8W		
R 99	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R100	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R101	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R102	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R103	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R104	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R105	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R106	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R107	CM,(RM73B2B220JD)	22Ω,±5%,1/8W		
R108	CM,(RM73B2B390JD)	39Ω,±5%,1/8W		
R109	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R110	CM,(RM73B2B391JD)	390Ω,±5%,1/8W		
R111	CM,(RM73B2B510JD)	51Ω,±5%,1/8W		
R112	MF,(RE35-YP-499Ω-B)	499Ω,±0.1%,1/8W		
R113	MF,(RE35-YP-143Ω-B)	143Ω,±0.1%,1/8W		
R114	MF,(RE35-YP-196Ω-B)	196Ω,±0.1%,1/8W		
R115	MF,(RE35-YP-243Ω-B)	243Ω,±0.1%,1/8W		
R116	MF,(RE35-YP-499Ω-B)	499Ω,±0.1%,1/8W		
R117	MF,(RE35-YP-1.00KΩ-B)	1.00kΩ,±0.1%,1/8W		
R118	MF,(RE35-YP-1.00KΩ-B)	1.00kΩ,±0.1%,1/8W		
R119	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R120	CM,(RM73B2B102JD)	1.00kΩ,±5%,1/8W		
R121	CM,(RM73B2B102JD)	1.00kΩ,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93336 | 8/9

Parts List: A1-A13, 50K/50M STEP SYNTHE

CKT REF	DESCRIPTION	RATING		NOTE
R122	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R123	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R124	Not assigned			
R125	Not assigned			
R126	Not assigned			
R127	Not assigned			
R128	CM,(RM73B2B150JD)	15Ω,±5%,1/8W		
R129	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R130	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R131	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R132	MF,(RE35-YP-121Ω-B)	121Ω,±0.1%,1/8W		
R133	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R134	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
Z 1	Mixer,(M-8)			

( ): Manufacturer's part number
* : Selected at factory

34W93336 | 9/9

Parts List: A1-A14, PULSE AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 3	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 4	Cer,(CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 5	Cer,(CK732B1H103K(A4))	0.01µF,±10%,50V		
C 6	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 7	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 8	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 9	Cer,(CC732CH1H100D)	10pF,±0.5%,50V		
C 10	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 11	Elect,(CE04C1E101A)	100µF,±20%,25V		
C 12	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
L 1	Coil,(NL453232-100K)	10µH		
L 2	Coil,(NL453232-100K)	10µH		
L 3	Coil,(342T60521B)			
Q 1	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 2	Tr,(2SC2369)			
Q 3	Di,(1S953)			
Q 4	Tr,(2SC2369)			
Q 5	Tr,(2SC2369)			
Q 6	Di,(1SV107)			
R 1	CM,(RM73B2B750JD)	75Ω,±5%,1/8W		
R 2	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 3	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 4	CM,(RM73B2B4R7JD)	4.7Ω,±5%,1/8W		
R 5	MF,(RS1FB150ΩJ)	150Ω,±5%,1W		
R 6	MF,(RS1FB150ΩJ)	150Ω,±5%,1W		
R 7	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 8	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 9	CM,(RM73B2B472JD)	4.7kΩ,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93337 | 1/1

Parts List: A1-A15, 20HZ STEP VCO CONT

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Elect,(CE04C1V330A)	33μF,±20%,35V		
C 3	Elect,(CE04C1V330A)	33μF,±20%,35V		
C 4	Elect,(CE04C1V330A)	33μF,±20%,35V		
C 5	Elect,(CE04C1V330A)	33μF,±20%,35V		
C 6	Elect,(CE04C1V330A)	33μF,±20%,35V		
C 7	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 8	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 9	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 10	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 11	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 12	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 13	Cer,(CC732CH1H330J(N1))	33pF,±5%,50V		
C 14	Cer,(CC733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 15	Cer,(CK733B1H473K(1S4))	0.047μF,±10%,50V		
C 16	Cer,(CK733B1H473K(1S4))	0.047μF,±10%,50V		
C 17	Cer,(CK733B1H473K(1S4))	0.047μF,±10%,50V		
C 18	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 19	Cer,(CK732B1H472K(S3))	4700pF,±10%,50V		
C 20	Not assigned			
C 21	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 22	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 23	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 24	Plast,(ECQ-P1333FZ)	33000pF,100V		
C 25	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 26	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 27	Cer,(CK733B1H223K(1J4))	0.022μF,±10%,50V		
C 28	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 29	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 30	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 31	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 32	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 33	Cer,(CC733CH1H102J(A3))	1000pF,±5%,50V		
C 34	Cer,(CC733CH1H102J(A3))	1000pF,±5%,50V		
C 35	Cer,(CC733CH1H102J(A3))	1000pF,±5%,50V		
C 36	Cer,(CC732CH1H471J(S2))	470pF,±5%,50V		
C 37 to C 49	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 50	Not assigned			
C 51	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 52	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 53	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 54	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 55	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C 56	Cer,(CC450J1H060DY)	6pF,±0.5pF,50V		
C 57	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		

( ): Manufacturer's part number

* : Selected at factory

34W93338 1/6

Parts List: A1-A15, 20HZ STEP VCO CONT

CKT REF	DESCRIPTION	RATING		NOTE
C 58	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 59	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 60	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 61	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 62	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 63	Cer,(CK732B1H472K(S3))	4700pF,±10%,50V		
C 64	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 65	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 66	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 67	Cer,(CK732B1H472K(S3))	4700pF,±10%,50V		
C 68	Cer,(CK732B1H472K(S3))	4700pF,±10%,50V		
C 69	Cer,(CK732B1H222K(J3))	2200pF,±10%,50V		
C 70	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 71	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 72	Cer,(CC732CH1H680J(W1))	68pF,±5%,50V		
C 73	Cer,(CC732CH1H560J(U1))	56pF,±5%,50V		
C 74	Cer,(CC732CH1H271J(L2))	270pF,±5%,50V		
C 75	Cer,(CC732CH1H471J(S2))	470pF,±5%,50V		
C 76	Cer,(CC732CH1H271J(L2))	270pF,±5%,50V		
C 77	Not assigned			
C 78	Not assigned			
J 1	Connector,(U-PA1521)			
J 2	Connector, (008261-024200-870)			
J 3	Connector, (008261-033311-852)			
J 4	Connector, (008261-024200-870)			
J 5	Connector, (008261-033311-852)			
J 6	Receptacle,(FL-R-PC(A))			
J 7	Receptacle,(FL-R-PC(A))			
L 1	Not assigned			
L 2	Coil,(LF8-220K)			
L 3	Coil,(LF8-220K)			
L 4	Coil,(NL453232-4R7K)			
L 5	Coil,(NL453232-4R7K)			
L 6	Coil,(LF8-101K)			
L 7	Coil,(339T20176F)			
L 8	Coil,(NL453232-470K)			
L 9	Coil,(LF8-101K)			
L 10	Coil,(ELF1010SKI-472K)			

( ): Manufacturer's part number

* : Selected at factory

34W93338 2/6

Parts List: A1-A15, 20HZ STEP VCO CONT

CKT REF	DESCRIPTION	RATING		NOTE
L 11	Coil,(ELF1010SKI-472K)			
L 12	Coil,(NL453232-1R0K)			
L 13	Coil,(NL453232-1R0K)			
Q 1	Di,breakdown,(1SZ53)	5.9 to 6.5V,250mW		
Q 2	IC,(μPC4570C)			
Q 3	IC,(TC74HC574F)			
Q 4	IC,(TC74HC574F)			
Q 5	IC,(AD7541AKN)			
Q 6	IC,(μPC4570C)			
Q 7	IC,(μPD5201C)			
Q 8	IC,(μPC14305H)			
Q 9	IC,(μPC4570C)			
Q 10	IC,(μPC4570C)			
Q 11	IC,(μPC4570C)			
Q 12	Di,breakdown, (RD2.7MB(27))	2.5 to 2.9V,200mW		
Q 13	Di,(1S2835(A3))			
Q 14	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 15	Tr,(2SC2351(R2 OR R3))			
Q 16	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 17	Tr,(2SC1623(L5 OR L6))			
Q 18	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 19	Tr,(2SC1623(L5 OR L6))			
Q 20	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 21	Tr,(2SC1623(L5 OR L6))			
Q 22	IC,(74290)			
Q 23	IC,(74F00PC)			
Q 24	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 25	Tr,(2SC2351(R2 OR R3))			
Q 26	Tr, (2SC3735(B34 OR B35))			
Q 27	Di,(1SS123(A7))			
Q 28	Not assigned			
Q 29	Tr, (2SA1462(Y33 OR Y34))			
Q 30	Tr, (2SA1462(Y33 OR Y34))			
Q 31	IC,(74F191PC)			
Q 32	IC,(74F08PC)			
Q 33	Di,(1S2835(A3))			

( ): Manufacturer's part number

* : Selected at factory

34W93338 3/6

Parts List: A1-A15, 20HZ STEP VCO CONT

CKT REF	DESCRIPTION	RATING		NOTE
Q 34	Tr, (2SC3735(B34 OR B35))			
Q 35	IC,(μPC4570C)			
R 1	SIL type,(RRS-8-104JA)	100kΩ x 8,±5%,1/8W		
R 2	CM,(RM73B2B104JD)	100kΩ,±5%,1/8W		
R 3	CM,(RM73B2B104JD)	100kΩ,±5%,1/8W		
R 4	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 5	CM,(RM73B2B472JD)	4.7kΩ,±5%,1/8W		
R 6	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 7	Var,MF,(RJ-6P 2KΩ)	2.0kΩ,1/2W		
R 8	MF,(RN14K2E2152D)	21.5kΩ,±0.5%,1/4W		
R 9	MF,(RN14K2E5491D)	5.49kΩ,±0.5%,1/4W		
R 10	Not assigned			
R 11	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R 12	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R 13	Var,MF,(RJ-6P 10KΩ)	10kΩ,1/2W		
R 14	MF,(RN14K2E1692D)	16.9kΩ,±0.5%,1/4W		
R 15	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 16	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 17	CM,(RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R 18	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R 19	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R 20	Not assigned			
R 21	MF,(RN05E2B1022B)	10.2kΩ,±0.1%,1/8W		
R 22	MF,(RN05E2B1131B)	1.13kΩ,±0.1%,1/8W		
R 23	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 24	Not assigned			
R 25	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 26	MF,(RN14K2E3401D)	3.40kΩ,±0.5%,1/4W		
R 27	MF,(RN14K2E5361D)	5.36kΩ,±0.5%,1/4W		
R 28	MF,(RN14K2E5491D)	5.49kΩ,±0.5%,1/4W		
R 29	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R 30	MF,(RN14K2E1272D)	12.7kΩ,±0.5%,1/4W		
R 31	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R 32	MF,(RN14K2E3921D)	3.92kΩ,±0.5%,1/4W		
R 33	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R 34	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 35	MF,(RN14K2E7502D)	75.0kΩ,±0.5%,1/4W		
R 36	MF,(RN14K2E2262D)	22.6kΩ,±0.5%,1/4W		
R 37	MF,(RN14K2E3402D)	34.0kΩ,±0.5%,1/4W		
R 38	MF,(RN14K2E1692D)	16.9kΩ,±0.5%,1/4W		
R 39	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R 40	Not assigned			
R 41	MF,(RN14K2E3651D)	3.65kΩ,±0.5%,1/4W		
R 42	MF,(RN14K2E3651D)	3.65kΩ,±0.5%,1/4W		

( ): Manufacturer's part number

* : Selected at factory

34W93338 4/6

Parts List: A1-A15, 20HZ STEP VCO CONT

CKT REF	DESCRIPTION	RATING		NOTE
R 43	MF,(RN14K2E3651D)	3.65kΩ,±0.5%,1/4W		
R 44	MF,(RN14K2E3651D)	3.65kΩ,±0.5%,1/4W		
R 45	MF,(RN14K2E7320D)	732Ω,±0.5%,1/4W		
R 46	Not assigned			
R 47	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 48	CM,(RM73B2B271JD)	270Ω,±5%,1/8W		
R 49	CM,(RM73B2B330JD)	33Ω,±5%,1/8W		
R 50	CM,(RM73B2B121JD)	120Ω,±5%,1/8W		
R 51	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 52	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 53	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 54	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 55	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 56	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 57	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 58	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 59	CM,(RM73B2B511JD)	510Ω,±5%,1/8W		
R 60	Not assigned			
R 61	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 62	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 63	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 64	CM,(RM73B2B511JD)	510Ω,±5%,1/8W		
R 65	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 66	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 67	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 68	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 69	CM,(RM73B2B391JD)	390Ω,±5%,1/8W		
R 70	Not assigned			
R 71	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 72	CM,(RM73B2B392JD)	390Ω,±5%,1/8W		
R 73	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 74	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 75	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 76	CM,(RM73B2B181JD)	180Ω,±5%,1/8W		
R 77	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 78	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 79	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 80	CM,(RM73B2B601JD)	600Ω,±5%,1/8W		
R 81	CM,(RM73B2B391JD)	390Ω,±5%,1/8W		
R 82	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 83	CM,(RM73B2B183JD)	18kΩ,±5%,1/8W		
R 84	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 85	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 86	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 87	CM,(RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 88	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 89	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93338 | 5/6

Parts List: A1-A15, 20HZ STEP VCO CONT

CKT REF	DESCRIPTION	RATING		NOTE
R 90	MF,(RN14K2E1691D)	1.69kΩ,±0.5%,1/4W		
R 91	MF,(RN14K2E1501D)	1.50kΩ,±0.5%,1/4W		
R 92	MF,(RN14K2E5111D)	5.11kΩ,±0.5%,1/4W		
R 93	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 94	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
Z 1	Mixer,(M-8)			

( ): Manufacturer's part number
* : Selected at factory

34W93338 | 6/6

Parts List: A1-A16, YTO PLL PD & LOOP FILTER

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 2	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 3	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 4	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 5	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 6	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 7	Cer,(CC732CH1H680J(W1))	68pF,±5%,50V		
C 8	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 9	Cer,(CC732CH1H150J(E1))	15pF,±5%,50V		
C 10	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 11	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 12	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 13	Cer,(CC732CH1H331J(N2))	330pF,±5%,50V		
C 14	Cer,(CC732CH1H101J(A2))	100pF,±5%,50V		
C 15	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 16	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 17	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 18	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 19	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 20	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 21	Cer,(CC732CH1H150J(E1))	15pF,±5%,50V		
C 22	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 23	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 24	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 25	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 26	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 27	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 28	Elect,(CE04C1E470A)	47μF,±20%,25V		
C 29	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 30	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 31	Plast,(ECQ-V1H104JW)	0.1μF,±5%,50V		
C 32	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 33	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 34	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 35	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 36	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 37	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 38	Cer,(CC732CH1H151J(E2))	150pF,±5%,50V		
C 39	Var,cer,(TZ03R300A)	30pF,100V		
C 40	Elect,(CE04C1H220A)	22μF,±20%,50V		
C 41	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 42	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 43	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 44	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 45	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 46	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 47	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		

( ): Manufacturer's part number
* : Selected at factory

34W93339 | 1/5

Parts List: A1-A16, YTO PLL PD & LOOP FILTER

CKT REF	DESCRIPTION	RATING		NOTE
C 48	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 49	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 50	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 51	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 52	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 53	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 54	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 55	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 56	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 57	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 58	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 59	Elect,(CE04C1A221A)	220μF,±20%,10V		
C 60	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 61	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 62	Plast,(ECQ-V1H104JW)	0.1μF,±5%,50V		
C 63	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 64	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 65	Cer,(CC732CH1H180J(G1))	18pF,±5%,50V		
C 66	Elect,(CE04C1E470A)	47μF,±20%,25V		
C 67	Elect,(CE04C1E470A)	47μF,±20%,25V		
C 68	Cer,(CC45CH1H090DY)	9pF,±0.5pF,50V		
C 69	Plast,(ECQ-V1H684JW)	0.68μF,±5%,50V		
J 1	Connector,(27DP-PC TERMINAL CABLE)			S4J10004K
J 2	Connector,(27DP-R-PC-1)			
J 3	Connector, (DF1-2S-2.5R24)			
L 1	Coil,(E526HN-100109)	0.36μH		With case
L 2	Coil,(E526HN-100109)	0.36μH		With case
L 3	Coil,(NL453232-221K)	220μH		
L 4	Coil,(NL322522-R15K)	0.15μH		
L 5	Coil,(NL453232-4R7K)	4.7μH		
L 6	Coil,(NL453232-2R2K)	2.2μH		
L 7	Coil,(NL453232-100K)	10μH		
L 8	Coil,(NL453232-101K)	100μH		
L 9	Coil,(NL453232-100K)	10μH		
L 10	Coil,(NL322522-R68K)	0.68μH		
L 11	Coil,(NL322522-R68K)	0.68μH		
Q 1	Di,(1S953)			
Q 2	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 3	FET,(2SK152-2)			
Q 4	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 5	Tr,(2SC2351(R2 OR R3))			
Q 6	Di,(μPC1663C)			

( ): Manufacturer's part number
* : Selected at factory

34W93339 | 2/5

Parts List: A1-A16, YTO PLL PD & LOOP FILTER

CKT REF	DESCRIPTION	RATING		NOTE
Q 7	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 8	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 9	Tr,(2SC2351(R2 OR R3))			
Q 10	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 11	Di,(1SS97)			Q'ty 2
Q 12	IC,(MC12040L)			
Q 13	IC,(μPC4570C)			
Q 14	Di,(1S953)			Q'ty 2
Q 15	Di,breakdown, (RD9.1EB)	8.5 to 9.6V,400mW		
Q 16	Tr,(2SC2719)			
Q 17	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q 18	Di,vari-cap,(KV1226Y)			
Q 19	FET,(2SK55E)			
Q 20	FET,(2SK55E)			
Q 21	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 22	Tr,(2SC2351(R2 OR R3))			
Q 23	Tr,(2SC2351(R2 OR R3))			
Q 24	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 25	Di,(1SS97)			Q'ty 2
Q 26	Tr,(2SC2351(R2 OR R3))			
Q 27	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 28	FET,(2SK55E)			
Q 29	IC,(μPC14305H)			
Q 30	Tr,(2SC3615)			
Q 31	IC,(74HC123)			
Q 32	IC,(74HC00)			
Q 33	Tr,(2SC2901)			
R 1	CM,(RM73B2B394JD)	390kΩ,±5%,1/8W		
R 2	CM,(RM73B2B394JD)	390kΩ,±5%,1/8W		
R 3	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 4	MF,(RN14K2E49R9D)	49.9Ω,±0.5%,1/4W		
R 5	MF,(RN14K2E2000D)	200Ω,±0.5%,1/4W		
R 6	CM,(RM73B2B561JD)	560Ω,±5%,1/8W		
R 7	CM,(RM73B2B4R7JD)	4.7Ω,±5%,1/8W		
R 8	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 9	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 10	CM,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 11	CM,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 12	CF,(ARD25T271J)	270Ω,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

34W93339 3/5

Parts List: A1-A16, YTO PLL PD & LOOP FILTER

CKT REF	DESCRIPTION	RATING		NOTE
R 13	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 14	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R 15	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 16	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 17	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 18	CM,(RM73B2B390JD)	39Ω,±5%,1/8W		
R 19	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 20	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 21	CM,(RM73B2B680JD)	68Ω,±5%,1/8W		
R 22	CM,(RM73B2B560JD)	56Ω,±5%,1/8W		
R 23	CM,(RM73B2B391JD)	390Ω,±5%,1/8W		
R 24	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R 25	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R 26	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R 27	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R 28	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 29	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 30	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 31	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 32	MF,(RN14K2E4642D)	46.4kΩ,±0.5%,1/4W		
R 33	MF,(RN14K2E1821D)	1.82kΩ,±0.5%,1/4W		
R 34	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R 35	CM,(RM73B2B330JD)	33Ω,±5%,1/8W		
R 36	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 37	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 38	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 39	CM,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 40	CM,(RM73B2B122JD)	1.2kΩ,±5%,1/8W		
R 41	CM,(RM73B2B272JD)	2.7kΩ,±5%,1/8W		
R 42	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 43	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 44	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 45	MF,(RN14K2E1692D)	16.9kΩ,±0.5%,1/4W		
R 46	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 47	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 48	CM,(RM73B2B561JD)	560Ω,±5%,1/8W		
R 49	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 50	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 51	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 52	CM,(RM73B2B561JD)	560Ω,±5%,1/8W		
R 53	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 54	CM,(RM73B2B390JD)	39Ω,±5%,1/8W		
R 55	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 56	CM,(RM73B2B391JD)	390Ω,±5%,1/8W		
R 57	CM,(RM73B2B560JD)	56Ω,±5%,1/8W		
R 58	CM,(RM73B2B680JD)	68Ω,±5%,1/8W		
R 59	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93339 4/5

Parts List: A1-A16, YTO PLL PD & LOOP FILTER

CKT REF	DESCRIPTION	RATING		NOTE
R 60	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 61	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 62	CM,(RM73B2B820JD)	82Ω,±5%,1/8W		
R 63	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 64	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 65	MF,(RN14K2H220J)	22Ω,±5%,1/2W		
R 66	CM,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 67	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 68	CM,(RM73B2B221JD)	220Ω,±5%,1/8W		
R 69	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 70	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 71	MF,(RN14K2E1243D)	124kΩ,±0.5%,1/4W		
R 72	CM,(RM73B2B511JD)	510Ω,±5%,1/8W		
R 73	CM,(RM73B2B511JD)	510Ω,±5%,1/8W		
R 74	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 75	CM,(RM73B2B122JD)	1.2kΩ,±5%,1/8W		
R 76	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93339 5/5

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 2	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 3	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 4	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 5	Cer,(CC732CH1H100D(A1))	10pF,±0.5pF,50V		
C 6	Cer,(CC732CH1H220J(J1))	22pF,±5%,50V		
C 7	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 8	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 9	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 10	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 11	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 12	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 13	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 14	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 15	Cer,(CC732CH1H331J(N2))	330pF,±5%,50V		
C 16	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 17	Cer,(CC45SH1H271JY)	270pF,±5%,50V		
C 18	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 19	Cer,(CC45SH1H271JY)	270pF,±5%,50V		
C 20	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 21	Cer,(CC45SH1H271JY)	270pF,±5%,50V		
C 22	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 23	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 24	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 25	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 26	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 27	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 28	Cer,(CC732CK1H020C(H0))	2pF,±0.25pF,50V		
C 29	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 30	Cer,(CC732CH1H221J(J2))	220pF,±5%,50V		
C 31	Cer,(CC732CH1H181J(G2))	180pF,±5%,50V		
C 32	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 33	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 34	Var,cer,(TZ03Z070A)	7pF,100V		
C 35	Var,cer,(TZ03Z070A)	7pF,100V		
C 36	Cer,(CC45PH1H330JY)	33pF,±5%,50V		
C 37	Cer,(CC732CH1H050D(F0))	5pF,±0.5pF,50V		
C 38	Cer,(CC45SH1H680JY)	68pF,±5%,50V		
C 39	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 40	Var,cer,(TZ03Z070A)	7pF,100V		
C 41	Cer,(CC45PH1H330JY)	33pF,±5%,50V		
C 42	Cer,(CC732CK1H020C(H0))	2pF,±0.25pF,50V		
C 43	Cer,(CC45SH1H680JY)	68pF,±5%,50V		
C 44	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 45	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 46	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 47	Cer,(CC732CH1H151J(E2))	150pF,±5%,50V		

( ): Manufacturer's part number
* : Selected at factory

34W93318 1/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
C 48	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 49	Not assigned			
C 50	Var,cer, (TZ03Z070A)	7pF,100V		
C 51	Var,cer, (TZ03Z070A)	7pF,100V		
C 52	Var,cer, (TZ03Z070A)	7pF,100V		
C 53	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 54	Cer, (CC732CK1H020C(H0))	2pF,±0.25pF,50V		
C 55	Cer, (CC45SH1H680JY)	68pF,±5%,50V		
C 56	Elect, (CE04C1E221A)	220µF,±20%,25V		
C 57	Elect, (CE04C1E221A)	220µF,±20%,25V		
C 58	Var,cer, (TZ03Z070A)	7pF,100V		
C 59	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 60	Cer, (CC45PH1H330JY)	33pF,±5%,50V		
C 61	Cer, (CC45SH1H680JY)	68pF,±5%,50V		
C 62	Var,cer, (TZ03Z070A)	7pF,100V		
C 63	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 64	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 65	Cer, (CC732CH1H331J(N2))	330pF,±5%,50V		
C 66	Cer, (CC732CH1H331J(N2))	330pF,±5%,50V		
C 67	Cer, (CC732CH1H121J(C2))	120pF,±5%,50V		
C 68	Cer, (CC732CH1H220J(J1))	22pF,±5%,50V		
C 69	Cer, (CC732CH1H101J(A2))	100pF,±5%,50V		
C 70	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 71	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 72	Not assigned			
C 73	Not assigned			
C 74	Cer, (CC45PH1H330JY)	33pF,±5%,50V		
C 75	Cer, (CC732CH1H181J(G2))	180pF,±5%,50V		
C 76	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 77	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 78	Cer, (CC732CH1H050D(f0))	5pF,±0.5pF,50V		
C 79	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 80	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 81	Not assigned			
C 82	Cer, (CC732CH1H080D(t0))	8pF,±0.5pF,50V		
C 83	Cer, (CC732CH1H100D(A1))	10pF,±0.5pF,50V		
C 84	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 85	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 86	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 87	Cer, (CC732CH1H100D(t0))	10pF,±0.5pF,50V		
C 88	Cer, (CC732CH1H070D(n0))	7pF,±0.5pF,50V		
C 89	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 90	Cer, (CC732CH1H120J(C1))	12pF,±5%,50V		
C 91	Cer, (CC732CH1H070D(n0))	7pF,±0.5pF,50V		
C 92	Cer, (CC732CH1H120J(C1))	12pF,±5%,50V		
C 93	Cer, (CC732CH1H080D(t0))	8pF,±0.5pF,50V		
C 94	Cer, (CC732CH1H120J(C1))	12pF,±5%,50V		

( ): Manufacturer's part number
* : Selected at factory

34W93318 | 2/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
C 95	Cer, (CC732CH1H080D(t0))	8pF,±0.5pF,50V		
C 96	Cer, (CC732CH1H120J(C1))	12pF,±5%,50V		
C 97	Cer, (CC732CH1H070D(n0))	7pF,±0.5pF,50V		
C 98	Elect, (CE04C1A101A)	100µF,±20%,10V		
C 99	Cer, (CC732CH1H151J(E2))	150pF,±5%,50V		
C100	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C101	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C102	Cer, (CC732CH1H151J(E2))	150pF,±5%,50V		
C103	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C104	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C105	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C106	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C107	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C108	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
J 1	Connector, (27DP-PC TERMINAL CABLE)			
J 2	Connector, (DIN41612-64PB)	64pins		
J 3	Connector, (008261-033311-852)	3pins		
J 4	Connector, (008261-024200-870)	2pins		
J 5	Connector, (008261-033311-852)	3pins		
J 6	Connector, (008261-024200-870)	2pins		
J 7	Connector, (008261-033311-852)	3pins		
J 8	Connector, (008261-024200-870)	2pins		
J 9	Connector, (008261-033311-852)	3pins		
J 10	Connector, (008261-024200-870)	2pins		
J 11	Connector, (008261-033311-852)	3pins		
J 12	Connector, (008261-024200-870)	2pins		
J 13	Connector, (008261-033311-852)	3pins		
J 14	Connector, (008261-024200-870)	2pins		
K 1	Relay, (SV-12)			
K 2	Relay, (SV-12)			

( ): Manufacturer's part number
* : Selected at factory

34W93318 | 3/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
K 3	Relay, (SV-12)			
K 4	Relay, (SV-12)			
K 5	Relay, (SV-12)			
L 1	Coil, (NL453232-4R7K)	4.7µH		
L 2	Coil, (10K17-45T)	158nH		With case
L 3	Coil, (339T25552)	5.46µH		
L 4	Coil, (10K17-45T)	158nH		With case
L 5	Coil, (NL453232-4R7K)	4.7µH		
L 6	Coil, (NL453232-1R5K)	1.5µH		
L 7	Coil, (NL453232-1R5K)	1.5µH		
L 8	Coil, (33T25551A 10K COIL)	300nH		With case
L 9	Coil, (33T25551B 10K COIL)	370nH		With case
L 10	Coil, (33T25551A 10K COIL)	300nH		With case
L 11	Coil, (NL453232-101K)	100µH		
L 12	Coil, (NL453232-101K)	100µH		
L 13	Coil, (339T25509)	16.4µH		
L 14	Not assigned			
L 15	Coil, (339T25509)	16.4µH		
L 16	Not assigned			
L 17	Coil, (NL453232-101K)	100µH		
L 18	Coil, (NL453232-101K)	100µH		
L 19	Coil, (339T25509)	16.4µH		
L 20	Not assigned			
L 21	Coil, (339T25509)	16.4µH		
L 22	Not assigned			
L 23	Not assigned			
L 24	Not assigned			
L 25	Coil, (LF8-101K)	100µH		
L 26	Coil, (LF8-101K)	100µH		
L 27	Coil, (LF8-101K)	100µH		
Q 1	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 2	Tr, (2SC2369)			
Q 3	Di,breakdown, (RD3.9MB2(392))	3.87 to 4.10V		
Q 4	Tr, (2SC2369)			
Q 5	Tr, (2SC3735(B34 OR B35))			
Q 6	Di, (1S2835(A3))			
Q 7	Tr, (2SC1623(L5 OR L6))			
Q 8	Di, (1S2835(A3))			

( ): Manufacturer's part number
* : Selected at factory

34W93318 | 4/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
Q 9	IC, (TC4051BP)			
Q 10	IC, (TC4051BP)			
Q 11	IC, (TC74HC574P)			
Q 12	IC, (TC74HC574P)			
Q 13	IC, (TC74HC574P)			
Q 14	Di, (1S2835(A3))			
Q 15	Tr, (2SC1623(L5 OR L6))			
Q 16	Tr, (2SA1462(Y33 OR Y34))			
Q 17	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 18	IC, (7406)			
Q 19	Di, (1S2835(A3))			
Q 20	Di, (1S2835(A3))			
Q 21	Tr, (2SC1623(L5 OR L6))			
Q 22	IC, (TC4051BP)			
Q 23	IC, (TC4051BP)			
Q 24	Tr, (2SC1623(L5 OR L6))			
Q 25	Tr, (2SC1623(L5 OR L6))			
Q 26	Tr, (2SC1623(L5 OR L6))			
Q 27	Not assigned			
Q 28	Di, (1SS153(A9))			
Q 29	IC, (TC4053BP)			
Q 30	IC, (TC40H000)			
Q 31	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 32	Di, (1SS153(A9))			
Q 33	Tr, (2SC1623(L5 OR L6))			
Q 34	Tr, (2SC1623(L5 OR L6))			
Q 35	Tr, (2SC1623(L5 OR L6))			
Q 36	Tr, (2SC1623(L5 OR L6))			
Q 37	Tr, (2SC1623(L5 OR L6))			
R 1	MF, (LP1/8 150ΩJT51)	150Ω,±5%,1/8W		
R 2	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 3	CM, (RM73B2B100JD)	10Ω,±5%,1/8W		
R 4	Var,MF, (RJ-6P 100Ω)	100Ω,1/2W		
R 5	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 6	CM, (RM73B2B220JD)	22Ω,±5%,1/8W		
R 7	CM, (RM73B2B820JD)	82Ω,±5%,1/8W		
R 8	CM, (RM73B2B820JD)	82Ω,±5%,1/8W		
R 9	CM, (RM73B2B472JD)	4.7kΩ,±5%,1/8W		
R 10	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 11	CM, (RM73B2B510JD)	51Ω,±5%,1/8W		
R 12	CM, (RM73B2B680JD)	68Ω,±5%,1/8W		
R 13	CM, (RM73B2B510JD)	51Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93318 | 5/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
R 14	CM, (RM73B2B680JD)	68Ω,±5%,1/8W		
R 15	CM, (RM73B2B181JD)	180Ω,±5%,1/8W		
R 16	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 17	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 18	CM, (RM73B2B101JD)	100Ω,±5%,1/8W		
R 19	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 20	CM, (RM73B2B221JD)	220Ω,±5%,1/8W		
R 21	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 22	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 23	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 24	CM, (RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 25	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 26	CM, (RM73B2B271JD)	270Ω,±5%,1/8W		
R 27	CM, (RM73B2B561JD)	560Ω,±5%,1/8W		
R 28	CM, (RM73B2B391JD)	390Ω,±5%,1/8W		
R 29	CM, (RM73B2B181JD)	180Ω,±5%,1/8W		
R 30	CM, (RM73B2B561JD)	560Ω,±5%,1/8W		
R 31	CM, (RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R 32	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 33	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R 34	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 35	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 36	CM, (RM73B2B330JD)	33Ω,±5%,1/8W		
R 37	CM, (RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 38	CM, (RM73B2B152JD)	1.5kΩ,±5%,1/8W		
R 39	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 40	CM, (RM73B2B122JD)	1.2kΩ,±5%,1/8W		
R 41	CM, (RM73B2B221JD)	220Ω,±5%,1/8W		
R 42	CM, (RM73B2B681JD)	680Ω,±5%,1/8W		
R 43	CM, (RM73B2B152JD)	1.5kΩ,±5%,1/8W		
R 44	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 45	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 46	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 47	CM, (RM73B2B330JD)	33Ω,±5%,1/8W		
R 48	CM, (RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 49	CM, (RM73B2B152JD)	1.5kΩ,±5%,1/8W		
R 50	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 51	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 52	CM, (RM73B2B221JD)	220Ω,±5%,1/8W		
R 53	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 54	CM, (RM73B2B391JD)	390Ω,±5%,1/8W		
R 55	CM, (RM73B2B680JD)	68Ω,±5%,1/8W		
R 56	CM, (RM73B2B101JD)	100Ω,±5%,1/8W		
R 57	CM, (RM73B2B100JD)	10Ω,±5%,1/8W		
R 58	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 59	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 60	CM, (RM73B2B102JD)	1.0kΩ,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93318 6/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
R 61	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 62	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 63	CM, (RM73B2B330JD)	33Ω,±5%,1/8W		
R 64	CM, (RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 65	CM, (RM73B2B152JD)	1.5kΩ,±5%,1/8W		
R 66	CM, (RM73B2B391JD)	390Ω,±5%,1/8W		
R 67	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 68	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 69	Not assigned			
R 70	CM, (RM73B2B330JD)	33Ω,±5%,1/8W		
R 71	CM, (RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 72	CM, (RM73B2B152JD)	1.5kΩ,±5%,1/8W		
R 73	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 74	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 75	CM, (RM73B2B221JD)	220Ω,±5%,1/8W		
R 76	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 77	CM, (RM73B2B121JD)	120Ω,±5%,1/8W		
R 78	CM, (RM73B2B221JD)	220Ω,±5%,1/8W		
R 79	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 80	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 81	CM, (RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 82	CM, (RM73B2B473JD)	47kΩ,±5%,1/8W		
R 83	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 84	CM, (RM73B2B151JD)	150Ω,±5%,1/8W		
R 85	CM, (RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 86	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 87	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 88	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R 89	CM, (RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 90	CM, (RM73B2B473JD)	47kΩ,±5%,1/8W		
R 91	CM, (RM73B2B103JD)	10kΩ,±5%,1/8W		
R 92	CM, (RM73B2B561JD)	560Ω,±5%,1/8W		
R 93	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R 94	CM, (RM73B2B561JD)	560Ω,±5%,1/8W		
R 95	Not assigned			
R 96	CM, (RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 97	CM, (RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 98	CM, (RM73B2B181JD)	180Ω,±5%,1/8W		
R 99	CM, (RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R100	CM, (RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R101	CM, (RM73B2B471JD)	470Ω,±5%,1/8W		
R102	CM, (RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R103	CM, (RM73B2B680JD)	68Ω,±5%,1/8W		
R104	MF, (LP1/8 330ΩJT52)	330Ω,±5%,1/8W		
R105	CF, (ARD25T330J)	33Ω,±5%,1/4W		
R106	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R107	CM, (RM73B2B561JD)	560Ω,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93318 7/8

Parts List: A2, IF BPF

CKT REF	DESCRIPTION	RATING		NOTE
R108	Var, MF, (RJ-6P 100Ω)	100Ω,1/2W		
R109	CM, (RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R110	CM, (RM73B2B392JD)	3.9kΩ,±5%,1/8W		
R111	CM, (RM73B2B331JD)	330Ω,±5%,1/8W		
R112	CM, (RM73B2B151JD)	150Ω,±5%,1/8W		
R113	CM, (RM73B2B104JD)	100kΩ,±5%,1/8W		
R114	CM, (RM73B2B104JD)	100kΩ,±5%,1/8W		
R115	CM, (RM73B2B104JD)	100kΩ,±5%,1/8W		
R116	CM, (RM73B2B104JD)	100kΩ,±5%,1/8W		
R117	CM, (RM73B2B221JD)	220Ω,±5%,1/8W		
R118	CM, (RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R119	CF, (ARD25T680J)	68Ω,±5%,1/4W		
R120	CM, (RM73B2B510JD)	51Ω,±5%,1/8W		
R121	CM, (RM73B2B100JD)	10Ω,±5%,1/8W		
X 1	Crystal vibrator	3.6MHz(B)		
X 2	Crystal vibrator	3.6MHz(A)		
X 3	Crystal vibrator	3.6MHz(C)		
X 4	Crystal vibrator	3.6MHz(A)		
Z 1	Mixer, (M-9)	8pins		
Z 2	IC, (UH4)			
Z 3	IC, (UH4)			
Z 4	IC, (UZ3)			
Z 5	IC, (UH3)			
Z 6	IC, (UZ3)			
Z 7	IC, (UH3)			
Z 8	IC, (UH4)			
Z 9	IC, (UH3)			
Z 10	IC, (UH3)			
Z 11	IC, (UZ2)			
Z 12	IC, (UZ1)			
Z 13	IC, (UZ1)			
Z 14	IC, (UZ2)			
Z 15	IC, (UZ1)			
Z 16	IC, (UZ2)			
Z 17	IC, (UZ1)			
Z 18	IC, (UZ2)			

( ): Manufacturer's part number
* : Selected at factory

34W93318 8/8

Parts List: A3, IF LOG/DET

17

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE04C1E221A)	220μF,±20%,25V		
C 2	Elect, (CE04C1E221A)	220μF,±20%,25V		
C 3	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 4	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 5	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 6	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 7	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 8	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 9	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 10	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 11	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 12	Cer, (CK732B1H103K(A4))	0.01μF,±10%,50V		
C 13	Cer, (CK732B1H103K(A4))	0.01μF,±10%,50V		
C 14	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 15	Cer, (CC732CH1H180J(G1))	18pF,±5%,50V		
C 16	Cer, (CC732CH1H220J(J1))	22pF,±5%,50V		
C 17	Cer, (CC732CH1H221J(J2))	220pF,±5%,50V		
C 18	Cer, (CC732CH1H331J(N2))	330pF,±5%,50V		
C 19	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 20	Cer, (CC733CH1H102J(A3))	1000pF,±5%,50V		
C 21	Tant, (CS732E1V105M)	1μF,±20%,35V		
C 22	Elect, (CE04C1A101A)	100μF,±20%,10V		
C 23	Cer, (CK732B1H103K(A4))	0.01μF,±10%,50V		
C 24	Cer, (CK732B1H103K(A4))	0.01μF,±10%,50V		
C 25	Not assigned			
C 26	Cer, (CC732CH1H221J(J2))	220pF,±5%,50V		
C 27	Cer, (CC732CH1H221J(J2))	220pF,±5%,50V		
C 28	Cer, (CC732CH1H330J(N1))	33pF,±5%,50V		
C 29	Cer, (CC733CH1H102J(A3))	1000pF,±5%,50V		
C 30	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 31	Plast, (ECQ-P1474FZ)	0.47μF,±1%,100V		
C 32	Cer, (CC732CH1H100D(A1))	10pF,±0.5pF,50V		
C 33	Elect, (CE04C1H100A)	10μF,±20%,50V		
C 34	Elect, (CE04C1H100A)	10μF,±20%,50V		
C 35	Cer, (CC924CH1H102J)	1000pF,±5%,50V		
C 36	Elect, (CE04C1V330A)	33μF,±20%,35V		
C 37	Cer, (CK732B1H102K(A3))	1000pF,±10%,50V		
C 38	Cer, (CK732B1H103K(A4))	0.01μF,±10%,50V		
C 39	Cer, (CC732CH1H050D(f0))	5pF,±0.5pF,50V		
C 40	Elect, (CE04C1E221A)	220μF,±20%,25V		
C 41	Elect, (CE04C1E221A)	220μF,±20%,25V		
C 42	Elect, (CE04C1E221A)	220μF,±20%,25V		
C 43	Elect, (CE04C1E221A)	220μF,±20%,25V		
C 44	Cer, (CK737B1H224K(1J5))	0.22μF,±10%,50V		
C 45	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 46	Cer, (CK732B1H103K(A4))	0.01μF,±10%,50V		
C 47	Cer, (CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		

( ): Manufacturer's part number
* : Selected at factory

34W93319 1/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
C 48	Elect,(CE04C1J101A)	100μF,±20%,63V		
C 49	Elect,(CE04C1A471A)	470μF,±20%,10V		
C 50	Cer,(CK734B1H104K(1A5))	0.1μF,±10%,50V		
C 51	Elect,(CE04C1A471A)	470μF,±20%,10V		
C 52	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 53	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 54	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 55	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 56	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 57	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C 58	Not assigned			
C 59	Tant,(CS732E1V105M)	1μF,±20%,35V		
C 60	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 61	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 62	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 63	Elect,(CE04C1E221A)	220μF,±20%,25V		
C 64	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 65	Elect,(CE04C1V330A)	33μF,±20%,35V		
C 66	Elect,(CE04C1A471A)	470μF,±20%,10V		
C 67	Cer,(CC732CH1H150J(E1))	15pF,±5%,50V		
C 68	Cer,(CC732CH1H150J(E1))	15pF,±5%,50V		
C 69	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 70	Cer,(CK732B1H102K(A3))	1000pF,±10%,50V		
C 71	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 72	Cer,(CC732CH1H330J(N1))	33pF,±0.5pF,50V		
C 73	Cer,(CC732CH1H151J(E2))	150pF,±5%,50V		
C 74	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 75	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 76	Elect,(CE04C1H101A)	100μF,±20%,50V		
C 77	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 78	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 79	Cer,(CC732CH1H471J(S2))	470pF,±5%,50V		
C 80	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 81	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 82	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 83	Cer,(CC732CH1H100D(A1))	10pF,±0.5pF,50V		
C 84	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 85	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 86	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 87	Cer,(CC732CH1H220J(J1))	22pF,±0.5pF,50V		
J 1	Connector,(27DP-LR-PC)			
J 2	Connector, (DIN41612-64PB)			
J 3	Connector, (008261-033311-852)			

( ): Manufacturer's part number
* : Selected at factory

34W93319 2/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
J 4	Connector, (008261-024200-870)			
K 1	Relay,(SV-12)			
L 1	Coil,(FS1012-152K)	1.5mH		
L 2	Coil,(NL453232-471K)	470μH		
L 3	Coil,(NL453232-101K)	100μH		
L 4	Coil,(NL453232-101K)	100μH		
L 5	Coil,(NL453232-221K)	220μH		
L 6	Coil,(LF8-101K)	100μH		
L 7	Coil,(NL453232-101K)	100μH		
L 8	Coil,(LF8-101K)	100μH		
L 9	Coil,(LF8-101K)	100μH		
L 10	Coil,(LF8-101K)	100μH		
L 11	Coil,(NL453232-101K)	100μH		
L 12	Coil,(NL453232-101K)	100μH		
L 13	Coil,(NL453232-101K)	100μH		
Q 1	Di,(1S2835(A3))			
Q 2	Tr,(2SA812(M5 OR M6))			
Q 3	Tr,(2SC2351(R2 OR R3))			
Q 4	Tr,(2SC2351(R2 OR R3))			
Q 5	Tr,(2SC1623(L5 OR R6))			
Q 6	Di,(1SS97)			
Q 7	Di,(1SS97)			
Q 8	IC,(μPC4570C)			
Q 9	Not assigned			
Q 10	Tr,(2SC1623(L5 OR L6))			
Q 11	IC,(μPC803C)			
Q 12	IC,(TC4053BP)			
Q 13	IC,(TC4053BP)			
Q 14	IC,(74HC574)			
Q 15	IC,(74HC574)			
Q 16	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 17	Tr,(2SA812(M5 OR M6))			
Q 18	Tr,(2SC1623(L5 OR L6))			
Q 19	Di,(1S2835(A3))			
Q 20	Not assigned			
Q 21	Not assigned			
Q 22	Tr,(2SC1623(L5 OR L6))			
Q 23	IC,(74HC00)			

( ): Manufacturer's part number
* : Selected at factory

34W93319 3/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
Q 24	IC,(μPD71054C)			
Q 25	IC,(74HC00)			
Q 26	IC,(μPD71054C)			
Q 27	Not assigned			
Q 28	Tr,(2SC1623(L5 OR L6))			
Q 29	IC,(CA3130T)			
Q 30	Di,(1SS149H)			
Q 31	IC,(LF356N)			
Q 32	Not assigned			
Q 33	IC,(μPC803C)			
Q 34	Tr,(μPA38A)			
Q 35	Di,(1S2835(A3))			
Q 36	IC,(μPC4570C)			
Q 37	IC,(TC4066BP)			
Q 38	IC,(μPC803C)			
Q 39	Di,(1SS97)			
Q 40	Di,(1SS149H)			
Q 41	Not assigned			
Q 42	IC,(TC4053BP)			
Q 43	IC,(μPC803C)			
Q 44	IC,(μPC649C)			
Q 45	IC,(74HC04)			
Q 46	IC,(74HC74)			
Q 47	Di,(1S2835(A3))			
Q 48	IC,(HI-574AKD-5)			
Q 49	Tr, (2SC3735(B34 OR B35))			
Q 50	IC,(74S196)			
Q 51	IC,(74LS290)			
Q 52	IC,(74HC74)			
Q 53	Di,breakdown,(1SZ50)	5.9 to 6.5V,250mW		
Q 54	IC,(NE5534A)			
Q 55	Not assigned			
Q 56	IC,(μPD5201C)			
Q 57	IC,(μPD5201C)			
Q 58	IC,(μPD5201C)			
Q 59	Not assigned			
Q 60	IC,(74HC574)			
Q 61	IC,(74HC574)			
Q 62	Not assigned			
Q 63	IC,(μPC259C)			
Q 64	IC,(μPC259C)			
Q 65	IC,(74HC86)			
Q 66	Not assigned			
Q 67	Tr,(2SC1623(L5 OR L6))			
Q 68	Tr,(2SC1623(L5 OR L6))			
Q 69	Tr,(2SA812(M5 OR M6))			

( ): Manufacturer's part number
* : Selected at factory

34W93319 4/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
Q 70	IC,(μPC4570C)			
Q 71	IC,(TC40H000P)			
Q 72	IC,(μPD5201C)			
Q 73	Not assigned			
Q 74	Di,(1SS97)			
Q 75	Di,(1SS149H)			
Q 76	IC,(μPC803C)			
Q 77	IC,(TC4052BP)			
Q 78	Di,(1SS97)			
Q 79	Di,(1SS97)			
Q 80	IC,(TC74HC123P)			
Q 81	IC,(74HC08)			
Q 82	IC,(NE5534A)			
Q 83	IC,(NE5534A)			
Q 84	IC,(NE5534A)			
Q 85	Tr,(2SA812(M5 OR M6))			
Q 86	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q 87	IC,(μPC251C)			
Q 88	Tr,(2SC1623(L5 OR L6))			
Q 89	Tr,(2SC1623(L5 OR L6))			
Q 90	Not assigned			
Q 91	Di,breakdown, (RD3.9MB(39))	3.7 to 4.1V,200mW		
R 1	CM,(RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 2	CM,(RM73B2B123JD)	12kΩ,±5%,1/8W		
R 3	Not assigned			
R 4	CM,(RM73B2B181JD)	180Ω,±5%,1/8W		
R 5	Var,MF,(RJ-6S 100Ω)	100Ω,1/2W		
R 6	CM,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 7	CM,(RM73B2B561JD)	560Ω,±5%,1/8W		
R 8	CM,(RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 9	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 10	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 11	CM,(RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 12	CM,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 13	CM,(RM73B2B272JD)	2.7kΩ,±5%,1/8W		
R 14	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 15	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 16	CM,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 17	CM,(RM73B2B181JD)	180Ω,±5%,1/8W		
R 18	CM,(RM73B2B472JD)	4.7kΩ,±5%,1/8W		
R 19	CM,(RM73B2B472JD)	4.7kΩ,±5%,1/8W		
R 20	CM,(RM73B2B562JD)	5.6kΩ,±5%,1/8W		
R 21	CM,(RM73B2B822JD)	8.2kΩ,±5%,1/8W		
R 22	Var,MF,(RJ-6S 5KΩ)	5.0kΩ,1/2W		

( ): Manufacturer's part number
* : Selected at factory

34W93319 5/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
R 23	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 24	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R 25	CM, (RM73B2B153JD)	15kΩ, ±5%, 1/8W		
R 26	CM, (RM73B2B104JD)	100kΩ, ±5%, 1/8W		
R 27	Not assigned			
R 28	Not assigned			
R 29	Not assigned			
R 30	Not assigned			
R 31	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R 32	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 33	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 34	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 35	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 36	Not assigned			
R 37	Not assigned			
R 38	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 39	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 40	CM, (RM73B2B562JD)	5.6kΩ, ±5%, 1/8W		
R 41	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 42	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 43	Var, MF, (RJ-6S 500Ω)	500Ω, 1/2W		
R 44	Not assigned			
R 45	CM, (RM73B2B223JD)	22kΩ, ±5%, 1/8W		
R 46	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 47	Var, MF, (RJ-6S 1KΩ)	1.0kΩ, 1/2W		
R 48	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 49	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 50	CM, (RM73B2B223JD)	22kΩ, ±5%, 1/8W		
R 51	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R 52	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R 53	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R 54	CM, (RM73B2B104JD)	100kΩ, ±5%, 1/8W		
R 55	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 56	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W		*
R 57	CF, (ARD25T684J)	680kΩ, ±5%, 1/4W		*
R 58	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 59	CM, (RM73B2B473JD)	47kΩ, ±5%, 1/8W		
R 60	CM, (RM73B2B333JD)	33kΩ, ±5%, 1/8W		
R 61	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		*
R 62	Var, MF, (RJ-6S 10KΩ)	10kΩ, 1/2W		
R 63	Var, MF, (RJ-6S 20KΩ)	20kΩ, 1/2W		
R 64	CM, (RM73B2B472JD)	4.7kΩ, ±5%, 1/8W		
R 65	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 66	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 67	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 68	Var, MF, (RJ-6S 500KΩ)	500kΩ, 1/2W		
R 69	CM, (RM73B2B224JD)	220kΩ, ±5%, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93319 | 6/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
R 70	MF, (LP1/8 68ΩJT54)	68Ω, ±5%, 1/8W		
R 71	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R 72	CM, (RM73B2B820JD)	82Ω, ±5%, 1/8W		
R 73	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 74	Var, MF, (RJ-6S 1KΩ)	1.0kΩ, 1/2W		
R 75	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 76	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W		*
R 77	CM, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W		
R 78	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W		*
R 79	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W		*
R 80	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W		*
R 81	CM, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W		
R 82	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 83	CM, (RM73B2B683JD)	68kΩ, ±5%, 1/8W		
R 84	Var, MF, (RJ-6S 20KΩ)	20kΩ, 1/2W		
R 85	CM, (RM73B2B821JD)	820Ω, ±5%, 1/8W		
R 86	Var, MF, (RJ-6S 500Ω)	500Ω, 1/2W		
R 87	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 88	Not assigned			
R 89	CM, (RM73B2B105JD)	1MΩ, ±5%, 1/8W		
R 90	Not assigned			
R 91	Not assigned			
R 92	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R 93	CM, (RM73B2B472JD)	4.7kΩ, ±5%, 1/8W		
R 94	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 95	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 96	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 97	CM, (RM73B2B272JD)	2.7kΩ, ±5%, 1/8W		
R 98	Var, MF, (RJ-6S 500Ω)	500Ω, 1/2W		
R 99	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R100	CM, (RM73B2B510JD)	51Ω, ±5%, 1/8W		
R101	CM, (RM73B2B472JD)	4.7kΩ, ±5%, 1/8W		
R102	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R103	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R104	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R105	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R106	Var, MF, (RJ-6S 5KΩ)	5.0kΩ, 1/2W		
R107	MF, (RN14K2E4320D)	432Ω, ±0.5%, 1/4W		
R108	MF, (RN14K2E4220D)	422Ω, ±0.5%, 1/4W		
R109	MF, (RN14K2E3570D)	357Ω, ±0.5%, 1/4W		
R110	MF, (RN14K2E3241D)	3.24kΩ, ±0.5%, 1/4W		
R111	MF, (RN14K2E1431D)	1.43kΩ, ±0.5%, 1/4W		
R112	MF, (RN14K2E1001D)	1.00kΩ, ±0.5%, 1/4W		
R113	MF, (RN14K2E6340D)	634Ω, ±0.5%, 1/4W		
R114	MF, (RN14K2E1051D)	1.05kΩ, ±0.5%, 1/4W		
R115	MF, (RN14K2E3651D)	3.65kΩ, ±0.5%, 1/4W		
R116	MF, (RN14K2E5760D)	576Ω, ±0.5%, 1/4W		

( ): Manufacturer's part number
* : Selected at factory

34W93319 | 7/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
R117	MF, (RN14K2E40R2D)	40.2Ω, ±0.5%, 1/4W		
R118	CM, (RM73B2B821JD)	820Ω, ±5%, 1/8W		
R119	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R120	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R121	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R122	CM, (RM73B2B473JD)	47kΩ, ±5%, 1/8W		
R123	CM, (RM73B2B331JD)	330Ω, ±5%, 1/8W		
R124	CM, (RM73B2B224JD)	220kΩ, ±5%, 1/8W		
R125	Not assigned			
R126	Not assigned			
R127	Not assigned			
R128	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R129	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R130	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R131	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R132	CM, (RM73B2B822JD)	8.2kΩ, ±5%, 1/8W		
R133	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R134	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R135	CM, (RM73B2B152JD)	1.5kΩ, ±5%, 1/8W		
R136	CM, (RM73B2B562JD)	5.6kΩ, ±5%, 1/8W		
R137	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R138	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R139	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R140	CM, (RM73B2B331JD)	330Ω, ±5%, 1/8W		
R141	CM, (RM73B2B472JD)	4.7kΩ, ±5%, 1/8W		
R142	CM, (RM73B2B271JD)	270Ω, ±5%, 1/8W		
R143	CF, (ARD25T104J)	100kΩ, ±5%, 1/4W		*
R144	CM, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W		
R145	MF, (LP1/8 470ΩJT51)	470Ω, ±5%, 1/8W		
R146	Not assigned			
R147	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R148	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R149	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R150	Var, MF, (RJ-6S 20KΩ)	20kΩ, 1/2W		
R151	CM, (RM73B2B683JD)	68kΩ, ±5%, 1/8W		
R152	CM, (RM73B2B821JD)	820Ω, ±5%, 1/8W		
R153	Var, MF, (RJ-6S 500Ω)	500Ω, 1/2W		
R154	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R155	Not assigned			
R156	CM, (RM73B2B105JD)	1MΩ, ±5%, 1/8W		
R157	Not assigned			
R158	Not assigned			
R159	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R160	Not assigned			
R161	Not assigned			
R162	Not assigned			
R163	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93319 | 8/9

Parts List: A3, IF LOG/DET

CKT REF	DESCRIPTION	RATING		NOTE
R164	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R165	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R166	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R167	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R168	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R169	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R170	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R171	MF, (RN14K2E69R8D)	69.8Ω, ±0.5%, 1/4W		
R172	CM, (RM73B2B681JD)	680Ω, ±5%, 1/8W		
R173	CM, (RM73B2B272JD)	2.7kΩ, ±5%, 1/8W		
R174	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R175	CM, (RM73B2B563JD)	56kΩ, ±5%, 1/8W		
R176	CM, (RM73B2B822JD)	8.2kΩ, ±5%, 1/8W		
R177	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R178	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R179	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R180	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R181	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R182	CM, (RM73B2B682JD)	6.8kΩ, ±5%, 1/8W		
R183	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R184	CM, (RM73B2B682JD)	6.8kΩ, ±5%, 1/8W		
R185	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R186	CM, (RM73B2B181JD)	180Ω, ±5%, 1/8W		
Z 1	IC, (UH5)			
Z 2	IC, (MT07(A))			
Z 3	IC, (MT07(B))			
Z 4	IC, (MT07(C))			

( ): Manufacturer's part number
* : Selected at factory

34W93319 | 9/9

Parts List: A5, FRONT BOARD

18

CKT REF	DESCRIPTION	RATING		NOTE
B 1	Buzzer, (KMB-06)			
C 1	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 2	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 3	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 4	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 5	Elect, (CE04C1E470A)	47µF,±20%,25V		
C 6	Tant, (CS-E1A4R7M)	4.7µF,±20%,10V		
C 7	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 8	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 9	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 10	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 11	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 12	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 13	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 14	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 15	Cer, (CK924F1H104Z)	0.1µF,+80/-20%,50V		
J 1	Connector, (CNF3-30P-2.54DSA)			
J 2	Plug, (DF1-8P2.5DSA)			
Q 1	IC, (µPD8279C-2)			
Q 2	Not assigned			
Q 3	IC, (74HCT138)			
Q 4	IC, (74HC14)			
Q 5	IC, (74HC74)			
Q 6	IC, (74HCT541)			
Q 7	IC, (74HC02)			
Q 8	IC, (74HCT574)			
Q 9	IC, (74HCT138)			
Q 10	LED, (LN342GPH)			
Q 11	IC, (TC74HC123P)			
R 1	CF, (ARD25T103J)	10kΩ,±5%,1/4W		
R 2	Not assigned			
R 3	Not assigned			
R 4	CF, (ARD25T103J)	10kΩ,±5%,1/4W		
R 5	CF, (ARD25T103J)	10kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

34W93320 1/2

Parts List: A5, FRONT BOARD

CKT REF	DESCRIPTION	RATING		NOTE
R 6	CF, (ARD25T221J)	220Ω,±5%,1/4W		
R 7	CF, (ARD25T221J)	220Ω,±5%,1/4W		
R 8	CF, (ARD25T221J)	220Ω,±5%,1/4W		
R 9	CF, (ARD25T473J)	47kΩ,±5%,1/4W		
R 10	Var, MF (RG161P15SB100KΩM)	100kΩ,±10%,1/2W		
R 11	CF, (ARD25T271J)	270Ω,±5%,1/4W		
S 1 to S 32	Key switch (HL20-NS)			
S 33	Key switch, (HL20-LSYG)			
S 34	Key switch, (HL20-NS)			
S 35	Key switch, (HL20-NS)			
S 36	Key switch, (HL20-NS)			
S 37	Key switch, (HL20-NS)			
S 38	Key switch, (HL20-NS)			
S 39	Key switch, (HL20-NS)			
S 40	Key switch, (HL20-NS)			
Z 1	Rotary encoder, (EC201E050-23.5R)			
Z 2	Oscillator, (EXO-3C-16MHz)			

( ): Manufacturer's part number
* : Selected at factory

34W93320 2/2

Parts List: A6, SCAN/YTO DRIVE

19

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 2	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 3	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 4	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 5	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 6	Plast, (ECQ-V1H474JW)	0.47µF,±5%,50V		
C 7	Plast, (ECQ-V1H105JW)	1µF,±5%,50V		
C 8	Plast, (ECQ-V1H105JW)	1µF,±5%,50V		
C 9	Plast, (ECQ-V1H473JW)	0.047µF,±5%,50V		
C 10	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 11	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 12	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 13	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 14	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 15	Cer, (CK732B1H222K(J3))	2200pF,±10%,50V		
C 16	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 17	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 18	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 19	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 20	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 21	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 22	Not assigned			
C 23	Not assigned			
C 24	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 25	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 26	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 27	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 28	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 29	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 30	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 31	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 32	Cer, (CC732CH1H101J(A2))	100pF,±5%,50V		
C 33	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 34	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 35	Tant, (CS734E1C226M)	22µF,±20%,16V		
C 36	Tant, (CS734E1C226M)	22µF,±20%,16V		
C 37	Cer, (CK732B1H472K(S3))	4700pF,±10%,50V		
C 38	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 39	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 40	Cer, (CK732B1H102K(A3))	1000pF,±10%,50V		
C 41	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 42	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 43	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 44	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 45	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 46	Cer, (CK732B1H102K(A3))	1000pF,±10%,50V		
C 47	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		

( ): Manufacturer's part number
* : Selected at factory

34W93321 1/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
C 48	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 49	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 50	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 51	Cer, (CK732B1H103K(A4))	0.01µF,±20%,50V		
C 52	Elect, (CE04C1E470A)	47µF,±20%,25V		
C 53	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 54	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 55	Elect, (CS734E1C226M)	22µF,±20%,16V		
C 56	Plast, (ECQ-V1H474JW)	0.47µF,±5%,50V		
C 57	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 58	Elect, (CS734E1C226M)	22µF,±20%,16V		
C 59	Elect, (CS734E1V475M)	4.7µF,±20%,35V		
C 60	Elect, (CE04C1C471A)	470µF,±20%,16V		
C 61	Cer, (CK732B1H103K(A4))	0.01µF,±10%,50V		
C 62	Plast, (CF922N2A224K)	0.22µF,±10%,100V		
C 63	Elect, (CE04C1C471A)	470µF,±20%,16V		
C 64	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 65	Cer, (CC732CH1H471J(S2))	470pF,±5%,50V		
C 66	Cer, (CK732B1H472K(S3))	4700pF,±10%,50V		
C 67	Cer, (CK732B1H472K(S3))	4700pF,±10%,50V		
C 68	Cer, (CK732B1H222K(J3))	2200pF,±10%,50V		
C 69	Elect, (CE04C1H100A)	10pF,±20%,25V		
C 70	Elect, (CS734E1C226M)	22µF,±20%,16V		
C 71	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 72	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 73	Cer, (CC732CH1H221(J2))	220pF,±5%,50V		
C 74	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 75	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 76	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 77	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 78	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 79	Elect, (CE04C1E101A)	100µF,±20%,25V		
C 80	Plast, (ECQ-V1H105JW)	1µF,±5%,50V		
C 81	Elect, (CE04C1C331A)	330µF,±20%,16V		
C 82	Cer, (CK924C1H103M)	0.01µF,±20%,50V		
C 83	Plast, (ECQ-V1H105JW)	1.0µF,±5%,50V		
C 84	Cer, (CC732CH1H221J(J2))	220pF,±5%,50V		
C 85	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 86	Cer, (CK732B1H102K(A3))	1000pF,±10%,50V		
C 87	Cer, (CK732B1H102K(A3))	1000pF,±10%,50V		
C 88	Cer, (CK732B1H102K(A3))	1000pF,±10%,50V		
C 89	Not assigned			
C 90	Cer, (CK733F1H104Z(A5))	0.1µF,+80/-20%,50V		
C 91	Tant, (CS734E1C226M)	22µF,±20%,50V		
C 92	Tant, (CS734E1C226M)	22µF,±20%,50V		
C 93	Cer, (CC924CH1H681J)	680pF,±5%,50V		
C 94	Plast, (ECQ-V1H105JW)	1.0µF,±5%,50V		

( ): Manufacturer's part number
* : Selected at factory

34W93321 2/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
C 95	Plast,(CF922N2A225K)	2.2μF,±10%,100V		
J 1	Connector, (DIN41612-64PB)	64pins		
J 2	Plug,(DF1-5P2.5DS)	5pins		
J 3	Connector,(27DP-LR-PC)			
J 4	Plug,(DF1B-10P-2.5DS)	10pins		
J 5	Connector, (008261-033311-852)	3pins		
J 6	Connector, (008261-024200-870)	2pins		
J 7	Plug,(DF1-2P-2.5DS)	2pins		
K 1	Relay,(SV-12)			
K 2	Lead relay,(DIP-5V)			
K 3	Lead relay,(DIP-5V)			
L 1	Coil,(LF8-100K)	10μH		
L 2	Coil,(LF8-100K)	10μH		
L 3	Coil,(LF8-100K)	10μH		
L 4	Coil,(LF8-100K)	10μH		
L 5	Coil,(LF8-100K)	10μH		
L 6	Coil,(LF8-101K)	100μH		
Q 1	IC,(74HCT574)			
Q 2	IC,(μPC624C)			
Q 3	IC,(μPC4570C)			
Q 4	IC,(TC4053BP)			
Q 5	IC,(TC4053BP)			
Q 6	IC,(LF356N)			
Q 7	IC,(μPC4570C)			
Q 8	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 9	Di,breakdown, (RD5.1MB2(512))	4.97 to 5.24V,200mW		
Q 10	IC,(74LS05)			
Q 11	Di,(1S2835(A3))			
Q 12	Di,breakdown,(1S252)	5.9 to 6.5V,250mW		
Q 13	IC,(μPC4570C)			
Q 14	Not assigned			
Q 15	Not assigned			
Q 16	Tr, (2SA1462(Y33 OR Y34))			

( ): Manufacturer's part number
* : Selected at factory

34W93321 3/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
Q 17	Not assigned			
Q 18	IC,(74HC74)			
Q 19	IC,(74HC08)			
Q 20	IC,(74HC00)			
Q 21	IC,(74HC51)			
Q 22	IC,(74HCT574)			
Q 23	IC,(74HCT574)			
Q 24	IC,(74HCT574)			
Q 25	Not assigned			
Q 26	Not assigned			
Q 27	IC,(74HCT574)			
Q 28	IC,(74HC74)			
Q 29	IC,(μPC648C)			
Q 30	IC,(μPC4570C)			
Q 31	IC,(TC4053BP)			
Q 32	IC,(μPC4570C)			
Q 33	IC,(μPC271C)			
Q 34	IC,(74HCT574)			
Q 35	IC,(μPC624C)			
Q 36	IC,(μPC4570C)			
Q 37	Not assigned			
Q 38	Not assigned			
Q 39	IC,(74HCT574)			
Q 40	IC,(μPC624C)			
Q 41	IC,(μPC4570C)			
Q 42	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 43	IC,(TC4052BP)			
Q 44	Di,(1SS123(A7))			
Q 45	IC,(μPC4570C)			
Q 46	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 47	IC,(74HC74)			
Q 48	IC,(74HCT541)			
Q 49	IC,(74HC11)			
Q 50	IC,(74HCT138)			
Q 51	IC,(74HCT138)			
Q 52	IC,(74HC32)			
Q 53	IC,(74HC86)			
Q 54	Di,(1S2835(A3))			
Q 55	Di,breakdown, (RD6.2MB2(622))	6.0 to 6.39V,200mW		
Q 56	Not assigned			
Q 57	Not assigned			
Q 58	Not assigned			
Q 59	Not assigned			
Q 60	Not assigned			
Q 61	IC,(74HCT574)			
Q 62	IC,(74HCT574)			

( ): Manufacturer's part number
* : Selected at factory

34W93321 4/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
Q 63	IC,(AD7541AJN)			
Q 64	IC,(TC5020BP)			
Q 65	IC,(TC4053BP)			
Q 66	IC,(TC4053BP)			
Q 67	IC,(μPC4570C)			
Q 68	IC,(μPC4570C)			
Q 69	Tr,(2SC3615)			
Q 70	Not assigned			
Q 71	Di,breakdown,(1S253)	5.9 to 6.5V,250mW		
Q 72	IC,(μPC4570C)			
Q 73	Tr,(2SB707)			
Q 74	Tr,(2SA1151)			
Q 75	Tr,(2SD297)			
Q 76	Di,(1S2222)			
Q 77	IC,(74HC00)			
Q 78	Tr,(2SC3615)			
Q 79	IC,(μPC4570C)			
Q 80	IC,(μPC4570C)			
Q 81	Not assigned			
Q 82	Tr,(2SA1152)			
Q 83	IC,(μPC4570C)			
Q 84	IC,(μPC398C)			
R 1	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 2	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 3	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R 4	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 5	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 6	CM,(RM73B2B472JD)	4.7kΩ,±5%,1/8W		
R 7	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R 8	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R 9	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 10	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R 11	MF,(RN14K2E2003D)	200kΩ,±0.5%,1/4W		*,Q'ty 5, series
R 12	CM,(RM73B2B123JD)	12.0kΩ,±5%,1/8W		
R 13	CM,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 14	CM,(RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 15	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 16	CM,(RN14K2E3401D)	3.40kΩ,±0.5%,1/4W		
R 17	MF,(RN14K2E8251D)	8.25kΩ,±0.5%,1/4W		
R 18	CM,(RM73B2B682JD)	6.8kΩ,±5%,1/8W		
R 19	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 20	CM,(RM73B2B821JD)	820Ω,±5%,1/8W		
R 21	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 22	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		

( ): Manufacturer's part number
* : Selected at factory

34W93321 5/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
R 23	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R 24	CM,(RM73B2B272JD)	2.7kΩ,±5%,1/8W		
R 25	CM,(RM73B2B472JD)	4.7kΩ,±5%,1/8W		
R 26	CM,(RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R 27	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 28	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 29	MF,(RN14K2E2001D)	2.00kΩ,±0.5%,1/4W		
R 30	MF,(RN14K2E2001D)	2.00kΩ,±0.5%,1/4W		
R 31	MF,(RN14K2E2001D)	2.00kΩ,±0.5%,1/4W		
R 32	MF,(RN14K2E2001D)	2.00kΩ,±0.5%,1/4W		
R 33	MF,(RN14K2E1051D)	1.05kΩ,±0.5%,1/4W		
R 34	MF,(RN14K2E1051D)	1.05kΩ,±0.5%,1/4W		
R 35	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R 36	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R 37	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 38	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R 39	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 40	Var,MF,(RJ-6S 1KΩ)	1.0kΩ,1/2W		
R 41	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R 42	CM,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 43	Not assigned			
R 44	CM,(RM73B2B334JD)	330kΩ,±5%,1/8W		
R 45	Not assigned			
R 46	CM,(RM73B2B102JD)	1.0kΩ,±5%,1/8W		
R 47	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 48	Not assigned			
R 49	Not assigned			
R 50	Not assigned			
R 51	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R 52	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R 53	MF,(RN14K2E4421D)	4.42kΩ,±0.5%,1/4W		
R 54	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R 55	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R 56	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R 57	MF,(RN14K2E43R2D)	43.2Ω,±0.5%,1/4W		
R 58	CM,(RM73B2B102JD)	1.00kΩ,±5%,1/8W		
R 59	CM,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 60	CM,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R 61	Not assigned			
R 62	Not assigned			
R 63	Not assigned			
R 64	CM,(RM73B2B104JD)	100kΩ,±5%,1/8W		
R 65	CM,(RM73B2B473JD)	47kΩ,±5%,1/8W		
R 66	CM,(RM73B2B102JD)	1.00kΩ,±5%,1/8W		
R 67	CM,(RM73B2B103JD)	10.0kΩ,±5%,1/8W		
R 68	CM,(RM73B2B103JD)	10.0kΩ,±5%,1/8W		
R 69	CM,(RM73B2B102JD)	1.00kΩ,±5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93321 6/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
R 70	CM,(RM73B2B105JD)	1MΩ,±5%,1/8W		
R 71	Not assigned			
R 72	Not assigned			
R 73	Not assigned			
R 74	Not assigned			
R 75	Not assigned			
R 76	Not assigned			
R 77	Not assigned			
R 78	Not assigned			
R 79	Not assigned			
R 80	Not assigned			
R 81	MF,(RN05E2B1002B)	10.0kΩ,±0.1%,1/8W		
R 82	Var,MF,(RJ-6P 1KΩ)	1.0kΩ,1/2W		
R 83	MF,(RN05E2B1002B)	10.0kΩ,±0.1%,1/8W		
R 84	CM,(RM73B2B333JD)	33kΩ,±5%,1/8W		
R 85	CM,(RM73B2B333JD)	33kΩ,±5%,1/8W		
R 86	MF,(RN05E2B1000B)	100Ω,±0.1%,1/8W		
R 87	MF,(RN05E2B1302B)	13kΩ,±0.1%,1/8W		
R 88	Var,MF,(RJ-6P 1KΩ)	1.0kΩ,1/2W		
R 89	MF,(RN05E2B1002B)	10.0kΩ,±0.1%,1/8W		
R 90	CM,(RM73B2B681JD)	680Ω,±5%,1/8W		
R 91	CF,(ARD25T180J)	18Ω,±5%,1/4W		
R 92	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 93	CF,(ARD25T683J)	68kΩ,±5%,1/4W		
R 94	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R 95	MF,(RN14K2E2152D)	10.0kΩ,±0.5%,1/4W		
R 96	MF,(RN05E2B1000B)	100Ω,±0.1%,1/8W		
R 97	MF,(RN05E2B3741B)	3.74kΩ,±0.1%,1/8W		
R 98	MF,(RN05E2B6490B)	649Ω,±0.1%,1/8W		
R 99	Var,MF,(RA-12P-500Ω)	500Ω,1/2W		
R100	MF,(RN05E2B5621B)	5.62kΩ,±0.1%,1/8W		
R101	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R102	MF,(RN05E2B1331B)	1.33kΩ,±0.1%,1/8W		
R103	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R104	WW,(RHF-10-20.5ΩF)	5.62kΩ,±1%,10W		
R105	MF,(RN14K2H100J)	10Ω,±5%,1/2W		
R106	MF,(RN14K2H100J)	10Ω,±5%,1/2W		
R107	MF,(RN05E2B1431B)	1.43kΩ,±0.1%,1/8W		
R108	MF,(RN05E2B1001B)	1.0kΩ,±0.1%,1/8W		
R109	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R110	MF,(RN05E2B3162B)	31.6kΩ,±0.1%,1/8W		
R111	MF,(RN05E2B3162B)	31.6kΩ,±0.1%,1/8W		
R112	MF,(RN05E2B3162B)	31.6kΩ,±0.1%,1/8W		
R113	MF,(RN05E2B3161B)	3.16kΩ,±0.1%,1/8W		
R114	MF,(RN14K2E1272D)	12.7kΩ,±0.5%,1/4W		
R115	MF,(RN14K2E1542D)	15.4kΩ,±0.5%,1/4W		
R116	MF,(RN05E2B3011B)	3.01kΩ,±0.1%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93321 7/8

Parts List: A6, SCAN/YTO DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
R117	Var,MF,(RA-12P-200Ω)	200Ω,1/2W		
R118	MF,(RN05E2B3161B)	3.16kΩ,±0.1%,1/8W		
R119	MF,(RN05E2B3161B)	3.16kΩ,±0.1%,1/8W		
R120	MF,(RN14K2E3161D)	3,16kΩ,±0.5%,1/4W		
R121	Var,MF,(RA-12P-500Ω)	500Ω,1/2W		
R122	MF,(RN05E2B3321B)	3.32kΩ,±0.1%,1/8W		
R123	MF,(RN14K2E1102D)	11.0kΩ,±0.5%,1/4W		
R124	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R125	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R126	Var,MF,(RJ-6P 2KΩ)	2.0kΩ,1.2W		
R127	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R128	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R129	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R130	MF,(RN14K2E6980D)	698Ω,±0.5%,1/4W		
R131	MF,(RN14K2E5490D)	549Ω,±0.5%,1/4W		
R132	MF,(RN14K2E5490D)	549Ω,±0.5%,1/4W		
R133	CF,(ARD25T390J)	39Ω,±5%,1/4W		
R134	CM,(RM73B2B333JD)	33kΩ,±5%,1/8W		
R135	CM,(RM73B2B333JD)	33kΩ,±5%,1/8W		
R136	CM,(RM73B2B105JD)	1MΩ,±5%,1/8W		
R137	CM,(RM73B2B105JD)	1MΩ,±5%,1/8W		
R138	CM,(RM73B2B334JD)	330kΩ,±5%,1/8W		
R139	CM,(RM73B2B474JD)	470kΩ,±5%,1/8W		
R140	CM,(RM73B2B474JD)	470kΩ,±5%,1/8W		
R141	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R142	MF,(RN14K2E1332D)	13.3kΩ,±0.5%,1/4W		
R143	MF,(RN05E2B6980B)	698Ω,±0.5%,1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93321 8/8

Parts List: A7, REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer.(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 2	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 3	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 4	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 5	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 6	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 7	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 8	Cer,(CC733CH1H102J(A3))	1000pF,±5%,50V		
C 9	Cer,(CC733CH1H102J(A3))	1000pF,±5%,50V		
C 10	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 11	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 12	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 13	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 14	Cer,(CC732CH1H471J(S2))	470pF,±5%,50V		
C 15	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 16	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 17	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 18	Cer,(CC732CH1H050D(f0))	5pF,±0.5pF,50V		
C 19	Cer,(CC732CH1H470J(S1))	47pF,±5%,50V		
C 20	Cer,(CC732CH1H470J(S1))	47pF,±5%,50V		
C 21	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 22	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 23	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 24	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 25	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 26	Tant,(CS734E1C226M)	22μF,±20%,16V		
C 27	Not assigned			
C 28	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 29	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 30	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 31	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 32	Cer,(CK733F1H104Z(A5))	0.1μF,+80/-20%,50V		
C 33	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 34	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 35	Not assigned			
C 36	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 37	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 38	Not assigned			
C 39	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 40	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 41	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 42	Not assigned			
C 43 to C 58	Cer,(CK732B1H103K(A4))	0.01μF,±10%,50V		
C 59	Not assigned			
C 60	Elect,(CE04C1E101A)	100μF,±20%,25V		

( ): Manufacturer's part number
* : Selected at factory

34W93322 1/5

Parts List: A7, REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
C 61	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 62	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 63	Elect,(CE04C1E101A)	100μF,±20%,25V		
C 64	Elect,(CE04C1E101A)	100μF,±20%,25V		
J 1	Connector,(U-SA2201)			
L 1	Coil,(LF8-220K)	22μH		
L 2	Coil,(NL453232-1R0K)	1μH		
L 3	Coil,(10K17-85T)	0.36μH		
L 4	Not assigned			
L 5	Coil,(NL453232-100K)	10μH		
L 6	Coil,(NL453232-220K)	22μH		
L 7	Coil,(NL453232-100K)	10μH		
Q 1	IC,(7400)			
Q 2	Di,(1SS123(A7))			
Q 3	Tr, (2SC3735(B34 OR B35))			
Q 4	Tr, (2SC3635(B34 OR B35))			
Q 5	Di,(1SS123(A7))			
Q 6	Di,(1SS123(A7))			
Q 7	Di,(1S2835(A3))			
Q 8	Di,breakdown, (RD2.7MB(27))	2.5 to 2.9V,200mW		
Q 9	IC,(μPC4570C)			
Q 10	Di,(1SS123(A7))			
Q 11	Tr,(2SC1623(L5 OR L6))			
Q 12	Di,vari-cap,(1SV50)			
Q 13	Tr,(2SC2351(R2 OR R3))			
Q 14	Tr,(2SC2351(R2 OR R3))			
Q 15	Tr, (2SA811A(C16 OR C17))			
Q 16	Di,(1SS123(A7))			
Q 17	Di,breakdown, (RD9.1MB2(912))	8.8 to 9.3V,200mW		
Q 18	Not assigned			
Q 19	Tr, (2SA1462(Y33 OR Y34))			
Q 20	IC,(74F175PC)			
Q 21	IC,(74F02PC)			
Q 22	IC,(74390)			
Q 23	Tr, (2SC3735(B34 OR B35))			

( ): Manufacturer's part number
* : Selected at factory

34W93322 2/5

Parts List: A7, REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
Q 24	Tr, (2SC3735(B34 OR B35))			
Q 25	Tr, (2SC2351(R2 OR R3))			
Q 26	Not assigned			
Q 27	Di, breakdown, (RD5.1MB2(512))	4.97 to 5.24V, 200mW		
Q 28	Tr, (2SC2351(R2 OR R3))			
Q 29	Di, breakdown, (RD5.1MB2(512))	4.97 to 5.24V, 200mW		
Q 30	Tr, (2SC2351(R2 OR R3))			
Q 31	Di, breakdown, (RD5.1MB2(512))	4.97 to 5.24V, 200mW		
Q 32	Tr, (2SC2351(R2 OR R3))			
Q 33	Di, breakdown, (RD5.1MB2(512))	4.97 to 5.24V, 200mW		
Q 34	Tr, (2SC2351(R2 OR R3))			
Q 35	IC, (μPC14305H)			
Q 36	IC, (μPC14305H)			
R 1	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 2	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 3	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 4	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 5	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R 6	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 7	CM, (RM73B2B601JD)	600Ω, ±5%, 1/8W		
R 8	CM, (RM73B2B601JD)	600Ω, ±5%, 1/8W		
R 9	CM, (RM73B2B152JD)	1.5kΩ, ±5%, 1/8W		
R 10	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 11	Not assigned			
R 12	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R 13	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 14	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 15	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 16	CM, (RM73B2B223JD)	22kΩ, ±5%, 1/8W		
R 17	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 18	Not assigned			
R 19	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 20	MF, (RN14K2E6041D)	6.04kΩ, ±0.5%, 1/4W		
R 21	MF, (RN14K2E1001D)	1.00kΩ, ±0.5%, 1/4W		
R 22	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 23	CM, (RM73B2B103JD)	10kΩ, ±5%, 1/8W		
R 24	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 25	CM, (RM73B2B331JD)	330Ω, ±5%, 1/8W		
R 26	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 27	CM, (RM73B2B392JD)	3.9kΩ, ±5%, 1/8W		

( ): Manufacturer's part number
* : Selected at factory

34W93322 3/5

Parts List: A7, REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
R 28	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 29	CM, (RM73B2B391JD)	390Ω, ±5%, 1/8W		
R 30	Var, MF, (RJ-6S 5KΩ)	5kΩ, 1/2W		
R 31	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 32	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 33	CM, (RM73B2B822JD)	8.2kΩ, ±5%, 1/8W		
R 34	CM, (RM73B2B181JD)	180Ω, ±5%, 1/8W		
R 35	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 36	CM, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 37	CM, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 38	CM, (RM73B2B221JD)	220Ω, ±5%, 1/8W		
R 39	CM, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 40	CM, (RM73B2B181JD)	180Ω, ±5%, 1/8W		
R 41	CM, (RM73B2B181JD)	180Ω, ±5%, 1/8W		
R 42	CM, (RM73B2B182JD)	1.8kΩ, ±5%, 1/8W		
R 43	CM, (RM73B2B271JD)	270Ω, ±5%, 1/8W		
R 44	CM, (RM73B2B271JD)	270Ω, ±5%, 1/8W		
R 45	Not assigned			
R 46	CM, (RM73B2B122JD)	1.2kΩ, ±5%, 1/8W		
R 47	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 48	CM, (RM73B2B601JD)	600Ω, ±5%, 1/8W		
R 49	CM, (RM73B2B222JD)	2.2kΩ, ±5%, 1/8W		
R 50	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R 51	CM, (RM73B2B181JD)	180Ω, ±5%, 1/8W		
R 52	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 53	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 54	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 55	CM, (RM73B2B511JD)	510Ω, ±5%, 1/8W		
R 56	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R 57	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 58	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 59	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 60	CM, (RM73B2B511JD)	510Ω, ±5%, 1/8W		
R 61	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R 62	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 63	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 64	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 65	CM, (RM73B2B511JD)	510Ω, ±5%, 1/8W		
R 66	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
R 67	CM, (RM73B2B471JD)	470Ω, ±5%, 1/8W		
R 68	CM, (RM73B2B561JD)	560Ω, ±5%, 1/8W		
R 69	CM, (RM73B2B101JD)	100Ω, ±5%, 1/8W		
R 70	CM, (RM73B2B511JD)	510Ω, ±5%, 1/8W		
R 71	CM, (RM73B2B470JD)	47Ω, ±5%, 1/8W		
T 1	Trans, (342T55677H)			

( ): Manufacturer's part number
* : Selected at factory

34W93322 4/5

Parts List: A7, REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
X 1	XTAL, (34X92451)	50MHz		
Z 1	XTAL OSC, (NSA0149B)	10MHz		

( ): Manufacturer's part number
* : Selected at factory

34W93322 5/5

Parts List: A8, MAIN CPU

21

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (SRC10VB-47M)	47μF, ±20%, 50V		
C 2	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 3	Elect, (CE04C1H220A)	22μF, ±20%, 50V		
C 4	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 5	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 6	Not assigned			
C 7 to C 22	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
J 1	Connector, (DIN41612-96PC)	96pins		
J 2	Connector, (U-SA2201)	22pins		
J 3	Connector, (008261-033311-852)	3pins		
J 4	Connector, (008261-024200-870)	2pins		
J 5	Connector, (008261-033311-852)	3pins		
J 6	Connector, (008261-024200-870)	2pins		
Q 1	IC, (TC55257APL-12)			
Q 2	Not assigned			
Q 3	IC, (74HCT245)			
Q 4	IC, (74HCT541)			
Q 5	IC, (74HCT541)			
Q 6	Not assigned			
Q 7	IC, (74HC74)			
Q 8	IC, (TC55257APL-12)			
Q 9	IC, (74HCT245)			
Q 10	IC, (74HCT541)			
Q 11	IC, (74HC08)			
Q 12	IC, (74HC32)			
Q 13	IC, (74HCT138)			
Q 14	IC, (DQ2816A250)			With socket
Q 15	IC, (HD68000P8)			
Q 16	IC, (μPD43257AC-15L)			
Q 17	IC, (μPD43257AC-15L)			
Q 18	IC, (μPD71054C)			
Q 19	IC, (μPD27C512D-20)			With socket
Q 20	IC, (μPD27C512D-20)			With socket
Q 21	IC, (74HCT138)			
Q 22	IC, (74HC08)			
Q 23	IC, (MC1-8501)			

( ): Manufacturer's part number
* : Selected at factory

34W93323 1/2

Parts List: A8, MAIN CPU

CKT REF	DESCRIPTION	RATING		NOTE
Q 24	IC, (μPD27C512D-20)			With socket
Q 25	IC, (μPD27C512D-20)			With socket
Q 26	IC, (74HC161)			
Q 27	IC, (74HC10)			
Q 28	Di, (1S953)			
Q 29	Di, (1S953)			
Q 30	Not assigned			
Q 31	IC, (74HCT245)			
Q 32	IC, (74HC365)			
Q 33	IC, (74HC154)			
Q 34	IC, (74HC138)			
Q 35	IC, (74HC365)			
Q 36	IC, (74HC32)			
R 1	SIL type, (RRS-8-472JA)	4.7kΩ x 8, ±5%, 1/8W		
R 2	SIL type, (RRS-8-222JA)	2.2kΩ x 8, ±5%, 1/8W		
R 3	SIL type, (RRS-8-472JA)	4.7kΩ x 8, ±5%, 1/8W		
R 4	SIL type, (RRS-8-222JA)	2.2kΩ x 8, ±5%, 1/8W		
R 5	SIL type, (RRS-8-472JA)	4.7kΩ x 8, ±5%, 1/8W		
R 6	SIL type, (RRS-8-222JA)	2.2kΩ x 8, ±5%, 1/8W		
R 7	SIL type, (RRS-8-222JA)	2.2kΩ x 8, ±5%, 1/8W		
R 8	SIL type, (RRS-8-472JA)	4.7kΩ x 8, ±5%, 1/8W		
R 9	SIL type, (RRS-8-472JA)	4.7kΩ x 8, ±5%, 1/8W		
R 10	SIL type, (RRS-8-222JA)	2.2kΩ x 8, ±5%, 1/8W		
R 11	SIL type, (RRS-8-103JA)	10kΩ x 8, ±5%, 1/8W		
R 12	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 13	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 14	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 15	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 16	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 17	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 18	Not assigned			
R 19	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 20	SIL type, (RRS-8-472JA)	4.7kΩ x 8, ±5%, 1/8W		
R 21	SIL type, (RRS-4-472JA)	4.7kΩ x 4, ±5%, 1/8W		
R 22	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 23	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
Z 1	Not assigned			
Z 2	XTAL OSC, (EXO-3C-16MHZ)			

( ): Manufacturer's part number
* : Selected at factory

34W93323 2/2

Parts List: A9, GP-IB

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 2	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 3	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 4	Elect, (SRC10VB-47M)	47μF, ±20%, 50V		
J 1	Connector, (U-PA2219)	22pins		
J 2	Connector, (CNF3-26P-2.54DS)	26pins		
J 3	Connector, (008261-033311-852)			
J 4	Connector, (008261-024200-870)			
Q 1	IC, (μPD7210C)			
Q 2	IC, (SN75160AN)			
Q 3	IC, (SN75162AN)			
Q 4	IC, (74HC02)			
Q 5	IC, (74HC74)			
R 1	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 2	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 3	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
Z 1	Lithium battery, (BR3032-1GFR)			

( ): Manufacturer's part number
* : Selected at factory

34W93324 1/1

Parts List: A10, DISP CPU

CKT REF	DESCRIPTION	RATING		NOTE
C 1 to C 20	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 21	Cer, (SRC10VB-220M)	220μF, ±20%, 50V		
C 22	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C 23	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 24	Elect, (SRC10VB-47M)	47μF, ±20%, 50V		
C 25	Cer, (CC924CH1H331J)	330pF, ±5%, 50V		
C 26	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 27	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 28	Cer, (CC924CH1H360J)	36pF, ±5%, 50V		
C 29	Cer, (CC924CH1H360J)	36pF, ±5%, 50V		
J 1	Connector, (DIN41612-96PC)	96pins		
J 2	Connector, (008261-03-3311-852)	3pins		
J 3	Connector, (008261-024200-870)	2pins		
J 4	Connector, (008261-033311-852)	3pins		
J 5	Connector, (008261-024200-870)	2pins		
Q 1	IC, (MC1-8501)			
Q 2	Not assigned			
Q 3	Not assigned			
Q 4	IC, (HD63484P8)			
Q 5	IC, (74HCT373)			
Q 6	IC, (74HCT373)			
Q 7	IC, (HD68000P8)			With socket
Q 8	IC, (SN74ALS74AN)			
Q 9	IC, (PAL10L8A2NCSPA-1)			
Q 10	IC, (74HCT245)			
Q 11	IC, (TC55257APL-12)			
Q 12	IC, (74HC74)			
Q 13	IC, (SN74ALS10N)			
Q 14	IC, (74HC04)			
Q 15	IC, (74HCT245)			
Q 16	IC, (HM6264ALP-15)			
Q 17	IC, (HM6264ALP-15)			
Q 18	IC, (74HC08)			
Q 19	IC, (74128)			
Q 20	IC, (74HCT245)			

( ): Manufacturer's part number
* : Selected at factory

34W93325 1/3

Parts List: A10, DISP CPU

CKT REF	DESCRIPTION	RATING		NOTE
Q 21	IC, (TC55257APL-12)			
Q 22	IC, (74HC32)			
Q 23	IC, (PAL14L4A2NCSPA-2)			
Q 24	IC, (74HCT245)			
Q 25	IC, (μPD27C512D-20)			With socket
Q 26	IC, (74HCT245)			
Q 27	IC, (74HCT541)			
Q 28	IC, (74HCT138)			
Q 29	IC, (74HC166)			
Q 30	IC, (TC55257APL-12)			
Q 31	IC, (74HCT245)			
Q 32	IC, (74HCT541)			
Q 33	IC, (74HCT541)			
Q 34	IC, (74HC166)			
Q 35	IC, (μPD27C512D-20)			With socket
Q 36	IC, (TC55257APL-12)			
Q 37	IC, (74HC166)			
Q 38	IC, (74HC166)			
Q 39	IC, (7407)			
Q 40	IC, (7409)			
Q 41	Tr, (2SC2718)			
Q 42	IC, (SN74HC14N)			
Q 43	IC, (74HC74)			
R 1	SIL type, (RRS-4-103JA)	10kΩ x 4, ±5%, 1/8W		
R 2	SIL type, (RRS-8-103JA)	10kΩ x 8, ±5%, 1/8W		
R 3	Not assigned			
R 4	Not assigned			
R 5	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 6	Not assigned			
R 7	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 8	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 9	CF, (ARD25T151J)	150Ω, ±5%, 1/4W		
R 10	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 11	CF, (ARD25T561J)	560Ω, ±5%, 1/4W		
R 12	CF, (ARD25T391J)	390Ω, ±5%, 1/4W		
R 13	CF, (ARD25T330J)	33Ω, ±5%, 1/4W		
R 14	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R 15	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 16	Not assigned			
R 17	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 18	Not assigned			
R 19	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 20	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		
R 21	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R 22	CF, (ARD25T391J)	390Ω, ±5%, 1/4W		

( ): Manufacturer's part number
* : Selected at factory

34W93325 2/3

Parts List: A10, DISP CPU

CKT REF	DESCRIPTION	RATING		NOTE
R 23	CF, (ARD25T391J)	390Ω, ±5%, 1/4W		
R 24	CF, (ARD25T121J)	120Ω, ±5%, 1/4W		
Z 1	XTAL OSC, (EXO-3C-16MHZ)			
Z 2	XTAL OSC, (EXO-3C-12.8MHZ)			

( ): Manufacturer's part number 34W93325 3/3

* : Selected at factory

Parts List: A13, MAIN MOTHER BOARD 24

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 2	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 3	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 4	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 5	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 6	Cer, (CK733F1H104Z(A5))	0.1µF, +80/-20%, 50V		
C 7	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 8	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 9	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 10	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 11	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 12	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 13	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C 14	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
J 1	Connector, (DIN41612-64SB)			
J 2	Connector, (DIN41612-64SB)			
J 3	Connector, (DIN41612-64SB)			
J 4	Connector, (DIN41612-96SC)			
J 5	Connector, (DIN41612-96SC)			
J 6	Connector, (DIN41612-96SC)			
J 7	Connector, (DIN41612-64SQ)			
J 8	Connector, (DIN41612-44SB)			
J 9	Connector, (U-PA2221)			
J 10	Not assigned			
J 11	Connector, (DF1-10P2.5DSA)			
W 1	Cable, (34J95168)			

( ): Manufacturer's part number 34W93326 1/1

* : Selected at factory

Parts List: A14, SUB MOTHER BOARD 25

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector, (DIN41612-64PB)			
J 2	Connector, (U-SA1501)			
J 3	Connector, (U-SA1001)			
J 4	Connector, (U-SA1501)			
J 5	Connector, (BC1R)			
J 6	Connector, (DF1-2S2.5R24)			
Q 1	Di, (1S953)			
R 1	CF, (ARD25T103J)	10kΩ, ±5%, 1/4W		

( ): Manufacturer's part number 34W93327 1/1

* : Selected at factory

Parts List: A15, LED 26

CKT REF	DESCRIPTION	RATING		NOTE
Q 1 to Q 11	Not assigned			
Q 12	LED, (LN342GPH)			

( ): Manufacturer's part number 34W93349 1/1

* : Selected at factory

Parts List: Z4 REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(ECK-D2H103PE)	0.01μF,+100/-0%,500V		
C 2	Cer,(ECK-D2H103PE)	0.01μF,+100/-0%,500V		
C 3	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 4	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 5	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 6	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 7	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 8	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 9	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 10	Elect,(KME63VB-1000(M))	1000μF,±20%,63V		
C 11	Not assigned			
C 12	Elect,(KME63VB-220(M))	220μF,±20%,63V		
C 13	Elect,(KME63VB-220(M))	220μF,±20%,63V		
C 14	Cer,(ECK-D2H151KB2)	150pF,±10%,500V		
C 15	Elect,(KME25VB-2200(M))	2200μF,±20%,25V		
C 16	Elect,(KME25VB-220(M))	220μF,±20%,25V		
C 17	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 18	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 19	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 20	Cer,(ECK-D2H331KB2)	330pF,±10%,500V		
C 21	Elect, (KME6.3VB-4700(M))	4700μF,±20%,6.3V		
C 22	Elect,(KME6.3VB-470(M))	470μF,±20%,6.3V		
C 23	Cer,(ECK-D2H101KB2)	100pF,±10%,500V		
C 24	Elect,(KME50VB-4.7(M))	4.7μF,±20%,50V		
C 25	Elect,(KME25VB-2200(M))	2200μF,±20%,25V		
C 26	Elect,(KME25VB-220(M))	220μF,±20%,25V		
C 27	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 28	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 29	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 30	Cer,(ECK-D2H222KB2)	2200pF,±10%,500V		
C 31	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 32	Elect,(KME25VB-100(M))	100μF,±20%,25V		
C 33	Elect,(KME25VB-47(M))	47μF,±20%,25V		
C 34	Elect,(KME25VB-47(M))	47μF,±20%,25V		
C 35	Elect,(KME50VB-2.2(M))	2.2μF,±20%,50V		
C 36	Elect,(KME25VB-47(M))	47μF,±20%,25V		
C 37	Elect,(KME63VB-220(M))	220μF,±20%,63V		
C 38	Plast,(MDD21J104K)	0.1μF,±10%,63V		
C 39	Plast,(MDD21J104K)	0.1μF,±10%,63V		
C 40	Elect,(KME63VB-10(M))	10μF,±20%,63V		
J 1	Connector, (DF1-8P-2.5DS)			
J 2	Connector, (DF1-10P-2.5DS)			

( ): Manufacturer's part number
* : Selected at factory

22-49A36 1/4

Parts List: Z4 REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
J 3	Connector, (DF1-10P-2.5DS)			
J 4	Connector,(XC5A-4422)			
K 1	Relay,(HC4-P-DC24V)			
L 1	Choke coil,(HP-034)			
L 2	Choke coil,(SF-T10-50)			
L 3	Choke coil,(HP-023)			
L 4	Choke coil,(SF-T10-50)			
L 5	Choke coil,(HP-034)			
L 6	Choke coil,(SF-T10-50)			
L 7	Choke coil, (TSL0707-101KR66)			
M 1	Timer,(TM-O)			
F 1	Fuse, (MF51NN250V3.15ADC01)			
F 2	Fuse, (MF51NN250V1.6ADC01)			
F 3	Fuse, (MF51NN250V1.6ADC01)			
Q 1	Di,(W06C)			
Q 2	Rectifier,(RBV602)			
Q 3	Di,(W06C)			
Q 4	Rectifier,(RBV402)			
Q 5	IC,(STR7002)			
Q 6	Di,(W06C)			
Q 7	IC,(SI-3122V)			
Q 8	Di,(W06C)			
Q 9	IC,(SI-3122V)			
Q 10	Di,(W06C)			
Q 11	IC,(SI-3122V)			
Q 12	IC,(SI-8053B)			
Q 13	IC,(SI-8123B)			
Q 14	Tr,(2SC945)			
Q 15	Tr,(2SA733)			
Q 16	Di,(W06C)			
Q 17	Di,(W06C)			
Q 18	IC,(SI-3122V)			

( ): Manufacturer's part number
* : Selected at factory

22-49A36 2/4

Parts List: Z4 REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
Q 19	Di,(W06C)			
Q 20	IC,(SI-3122V)			
Q 21	Tr,(2SC3074)			
Q 22	Tr,(2SC3074)			
Q 23	Di,(1S954)			
Q 24	Di,(10DF1)			
Q 25	Di,(10DF1)			
Q 26	Di,(10DF1)			
Q 27	Di,(10DF1)			
Q 28	IC,(μPC78N15H)			
Q 29	IC,(μPC79N15H)			
Q 30	Di,(1S954)			
Q 31	Di,(1S954)			
Q 32	Di,(1S954)			
Q 33	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q 34	IC,(TC4093BP)			
Q 35	Di,(1S955)			
Q 36	Di,(1S955)			
Q 37	IC,(SI-8021)			
Q 38	Di,(1SS99)			
R 1	CF,(RD25S10KΩJ)	10kΩ,±5%,1/4W		
R 2	CF,(RD25S1KΩJ)	1kΩ,±5%,1/4W		
R 3	CF,(RD25S1MΩJ)	1MΩ,±5%,1/4W		
R 4	CF,(RD25S1KΩJ)	1kΩ,±5%,1/4W		
R 5	CF,(RD25S3.3KΩJ)	3.3kΩ,±5%,1/4W		
R 6	CF,(RD25S * J)	470Ω to 1.2kΩ,±5%, 1/4W		* 750Ω
R 7	Manganin wire	Approx. 30mΩ		0.75ø Approx. 30mm
R 8	CF,(RD25S * J)	100 to 470kΩ,±5%, 1/4W		* 390kΩ
R 9	CF,(RD25S * J)	470Ω to 1.2kΩ,±5%, 1/4W		* 1kΩ
R 10	CF,(RD25S * J)	100 to 470kΩ,±5%, 1/4W		* 390kΩ
R 11	CF,(RD25S1KΩJ)	1kΩ,±5%,1/4W		
R 12	CF,(RD25S51ΩJ)	51Ω,±5%,1/4W		
R 13	MF,(RSF1B0.51ΩJ)	0.51Ω,±5%,1W		
R 14	MF,(RSF1B0.51ΩJ)	0.51Ω,±5%,1W		
R 15	CF,(RD25S * J)	220Ω to 1kΩ,±5%,1/4W		* 390Ω
R 16	CF,(RD25S100ΩJ)	100Ω,±5%,1/4W		
R 17	CF,(RD25S5.6KΩJ)	5.6kΩ,±5%,1/4W		
R 18	CF,(RD25S * J)	220Ω to 1kΩ,±5%,1/4W		* 390Ω
R 19	CF,(RD25S2KΩJ)	2kΩ,±5%,1/4W		
R 20	CF,(RD25S2KΩJ)	2kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

22-49A36 3/4

Parts List: Z4 REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
R 21	CF,(RD25S8.2KΩJ)	8.2kΩ,±5%,1/4W		
R 22	CF,(RD25S1.8KΩJ)	1.8kΩ,±5%,1/4W		
R 23	Var,MF,(RG06X 1KΩ)	1kΩ,1/2W		
R 24	CF,(RD25S1KΩJ)	1kΩ,±5%,1/4W		
R 25	CF,(RD25S10KΩJ)	10kΩ,±5%,1/4W		
T 1	Not assigned			
T 2	Trans			22-49A49

( ): Manufacturer's part number
* : Selected at factory

22-49A36 4/4

Parts List: A16 FILTER

28

CKT REF	DESCRIPTION	RATING		NOTE
Z 1	Filter,(DSS310-55D223S)			
Z 2	Filter,(DSS310-55D223S)			
Z 3	Filter,(DSS310-55D223S)			

( ): Manufacturer's part number
* : Selected at factory

34W95267 1/1

Parts List: A4 PTA (OPTION 01)

29

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC924CH1H681J)	680pF,±5%,50V		
C 2	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 3	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 4	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 5	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 6	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 7	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 8	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 9	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 10	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 11	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 12	Elect,(CE04C1H220A)	22µF,±20%,50V		
C 13	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 14	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 15 to C 50	Cer,(CK733F1H104Z)	0.1µF,+80/-20%,50V		
J 1	Connector, (DIN41612-96PC)			
J 2	Not assigned			
J 3	Connector, (HIF3BAG-40PA-2.54DS)	40pins		
J 4	Connector, (DF1-5P-2.5DS)			
J 5	Receptacle, (008261-033311-852)	3pins		
J 6	Receptacle, (008261-024200-870)	2pins		
L 1	Noise filter,(D20C)			
Q 1	IC,(MC68881 RC12B)			With socket
Q 2	IC,(MC1-8501)			
Q 3	IC,(µPD71051C)			
Q 4	IC,(µPD71054C)			
Q 5	IC,(HD68000P8)			With socket
Q 6	IC,(HM66204L-12)			
Q 7	IC,(HN27C101G-25)			With socket
Q 8	IC,(HM66204L-12)			
Q 9	IC,(RTC-62421B)			
Q 10	IC,(HN27C101G-25)			With socket
Q 11	Di,(1S953)			
Q 12	Di,(1S953)			
Q 13	Di,(1S953)			

( ): Manufacturer's part number
* : Selected at factory

34W94043 1/3

Parts List: A4 PTA (OPTION 01)

CKT REF	DESCRIPTION	RATING		NOTE
Q 14	IC,(74HC74F)			
Q 15	IC,(SN74LS14NS)			
Q 16	IC,(SN74LS374NS)			
Q 17	IC,(SN74LS374NS)			
Q 18	IC,(SN74LS244NS)			
Q 19	IC,(SN74LS244NS)			
Q 20	IC,(TC74HCT138F)			
Q 21	IC,(74HC74F)			
Q 22	IC,(SN74ALS08NS)			
Q 23	IC,(74HC30F)			
Q 24	IC,(74HC21F)			
Q 25	IC,(TC74HCT138F)			
Q 26	IC,(SN74ALS04ANS)			
Q 27	IC,(TC74HCT138F)			
Q 28	IC,(74HC175F)			
Q 29	IC,(SN74HCT541NS)			
Q 30	IC,(SN74HCT541NS)			
Q 31	IC,(SN74HCT541NS)			
Q 32	IC,(74HC74F)			
Q 33	IC,(74HC74F)			
Q 34	IC,(74HC175F)			
Q 35	IC,(74HC32F)			
Q 36	IC,(SN74HCT541NS)			
Q 37	IC,(74HC04F)			
Q 38	IC,(SN74HCT541NS)			
Q 39	IC,(SN74HCT541NS)			
Q 40	IC,(TC74HCT245F)			
Q 41	IC,(TC74HCT138F)			
Q 42	IC,(SN74HCT541NS)			
Q 43	IC,(SN74HCT541NS)			
Q 44	IC,(TC74HCT245F)			
Q 45	IC,(TC74HCT245F)			
Q 46	IC,(74HC74F)			
Q 47	IC,(74HC10F)			
Q 48	IC,(74HC74F)			
Q 49	IC,(TC74HCT245F)			
Q 50	IC,(74HC74F)			
Q 51	IC,(74HC00F)			
R 1	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 2	SIP type,(RRS-8-103JA)	10kΩ x 8,±5%,1/8W		
R 3	SIP type,(RRS-4-103JA)	10kΩ x 4,±5%,1/8W		
R 4	SIP type,(RRS-8-103JA)	10kΩ x 8,±5%,1/8W		
R 5	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 6	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 7	CF,(ARD25T102J)	1kΩ,±5%,1/4W		

( ): Manufacturer's part number
* : Selected at factory

34W94043 2/3

Parts List: A4 PTA (OPTION 04)

CKT REF	DESCRIPTION	RATING		NOTE
R 8	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 9	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 10	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 11	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
Z 1	Filter,(DSS310-55D223S)			
Z 2	Filter,(DSS310-55D223S)			
Z 3	Filter,(DSS310-55D223S)			
Z 4	XTAL OSC,(EXO-3C(16MHZ))			
Z 5	Battery,(BR2330-1HF)	3.6V		
Z 6	Battery,(BR2330-1HF)	3.6V		

( ): Manufacturer's part number
* : Selected at factory

34W94043 3/3

Parts List: All RS-232C (OPTION 02)

30

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(SRC10VB-47M)	47µF,±20%,10V		
C 2	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 3	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 4	Elect,(SRC16VB-10M)	10µF,±20%,16V		
C 5	Elect,(SRC50VB-4.7M)	4.7µF,±20%,50V		
C 6	Elect,(SRC50VB-4.7M)	4.7µF,±20%,50V		
C 7	Elect,(SRC16VB-10M)	10µF,±20%,16V		
C 8	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
J 1	Connector,(U-PA2219)	22pins		
J 2	Connector,(CNP3-26P-2.54DS)	26pins		
J 3	Connector,(008261-033311-852)	3pins		
J 4	Connector,(008261-024200-870)	2pins		
Q 1	IC,(µPD71054C)			
Q 2	IC,(µPD71051C)			
Q 3	IC,(74HC365)			
Q 4	IC,(74HC02)			
Q 5	IC,(MAX238)			
R 1	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
Z 1	Lithium battery,(BR3032-1GFR)			

( ): Manufacturer's part number

* : Selected at factory

34W94044 | 1/1