Anritsu

SERVICE MANUAL

SPECTRUM ANALYZER

MS710C/D/E/F

Applicable Serial Nos.
start from MT05177
1991.03 Ver. III
Printed in Japan
1991.03 x 100 N(III)-21(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.

WARNING

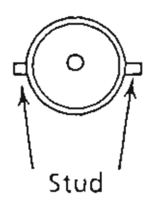
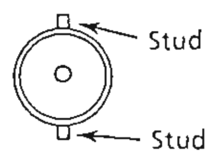
NO OPERATOR SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED PERSONNEL.

CAUTION

FOR CONTINUED FIRE PROTECTION REPLACE
ONLY WITH SPECIFIED TYPE AND RATED FUSE.

BNC-TYPE CONNECTOR INSTALLATION

The BNC-type connector installation has been modified as follows:

Before Modification	After Modification
	

HISTORY OF MODIFICATIONS
(MS710C/D/E/F Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.6-25	Parts List: Z22 IF BPF/AMP 1 (44W83950 6/16)		
	J3 CONNECTOR, (27DP-LP-1.5W-201)	J3 PLUG,(27DP-LP-1.5QEW-AA)	
P.6-30	Parts List: Z24 LOCAL CONTROL 2 (44W83952 1/5)		
	C10 CER,(CK924F1H104Z) 0.1µF,+80/-20%,50V C24 CER,(CK924F1H104Z) 0.1µF,+80/-20%,50V	C10 ELECT,(CE04C1A101A) 100µF,±20%,10V C24 PLAST,(ECQ-V1H105JW) 1µF,±5%,50V	
P.5-167/ (5-168 blank)	Fig. 5-62 (2/3) Z24 LOCAL CONTROL 2 Circuit Diagram (43W33955 2/3)		
	C10 0.1	C10 100	
P.6-35	Parts List: Z26 CPU BOARD (44W83954 4/6)		
	R6 Not assigned	R6 CF,(ARD25T272J) 2.7kΩ,±5%,1/4W	
P.5-211/ (5-212 blank)	Fig. 5-71 (2/5) Z26 CPU BOARD Circuit Diagram		
	43W33957 2/5	43W33957 2/5 M-1	
P.6-36	Parts List: Z27 DISPLAY CONTROL (44W83955 2/7)		
	C77 Not assigned	C77 CER,(CK924C1H222-104M) Note: 0 to 1 open	
P.5-169/ (5-170 blank)	Fig. 5-62 (3/3) Z24 LOCAL CONTROL 2 Circuit Diagram (43W33955 3/3)		
	C24 0.1	C24 1	
P.5-237/ (5-238 blank)	Fig. 5-82 (1/6) Z27 DISPLAY CONTROL Circuit Diagram		
	43W33958 1/6	43W33958 1/6 M-1	From MT97674

1/3

HISTORY OF MODIFICATIONS
(MS710C/D/E/F Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.5-239/ (5-240 blank)	Fig. 5-82 (2/6) Z27 DISPLAY CONTROL Circuit Diagram 43W33958 2/6 M-1	43W33958 2/6 M-2	
P.5-241/ (5-242 blank)	Fig. 5-82 (3/6) Z27 DISPLAY CONTROL Circuit Diagram 43W33958 3/6 M-1	43W33958 3/6 M- 2	From MT97674

HISTORY OF MODIFICATIONS
(MS710C/D/E/F Ser.)

ITEM	DESCRIPTION		Applicable Serial No.
	Before Modification	After Modification	
P.5-147	Fig.5-58 (3/6) Z22 IF BPF/AMP 1 Circuit Diagram (3/6) (43W33953)		
	R125 68 k	R125 22 k to 68 k	
P.5-181	Fig. 5-64 (1/5) Z25 LOG/LIN AMP DETECTOR Circuit Diagram (1/5) (43W33956)		
	R 9 1.00 k to 1.15 k	R 9 909 to 1.15 k	
P.6-8	Parts List: Z1 FRONT PANEL I (44W83921 2/4)		
	R 2 Var,MF,(RJ-6P 100Ω) 100Ω,1/2W	R 2 Var,MF,(RJ-6S 100Ω) 100Ω,1/2W	
P.6-26	Parts List: Z22 IF BPF/AMP 1 (44W83950 12/16)		
	R125 CF,(ARD25T683J) 68kΩ,±5%,1/4W	R125 CF,(ARD25T * J) 22k to 68kΩ,±5%,1/4W NOTE: *	
P.6-33	Parts List: Z25 LOG/LIN AMP DETECTOR (44W83953 8/13)		
	R 9 MF,(RN14K2E * D) 1k to 1.15kΩ,±0.5%,1/4W	R 9 MF,(RN24K2E * D) 909Ω to 1.15kΩ,±0.5%,1/4W	
			From MT82668

3/3

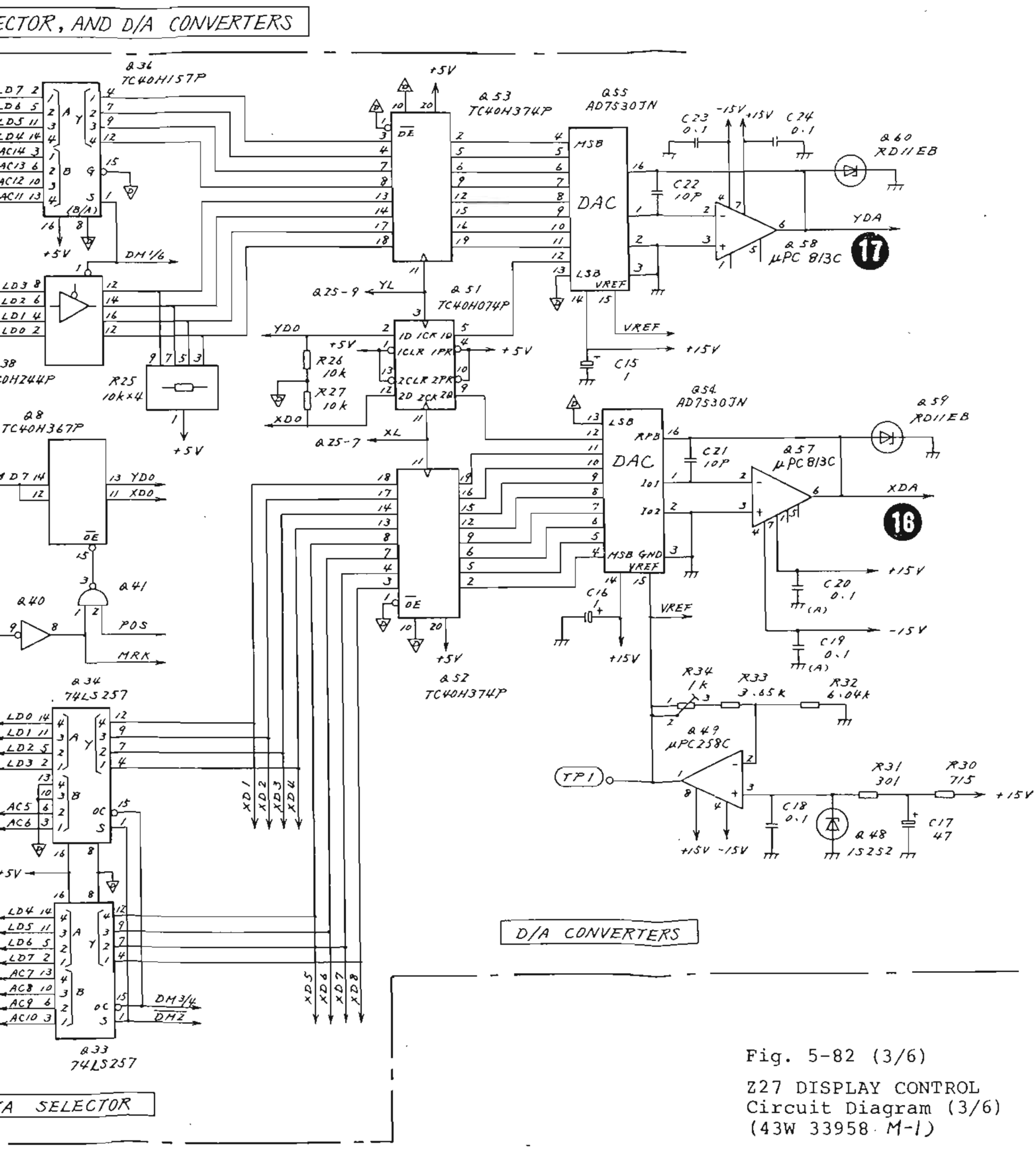
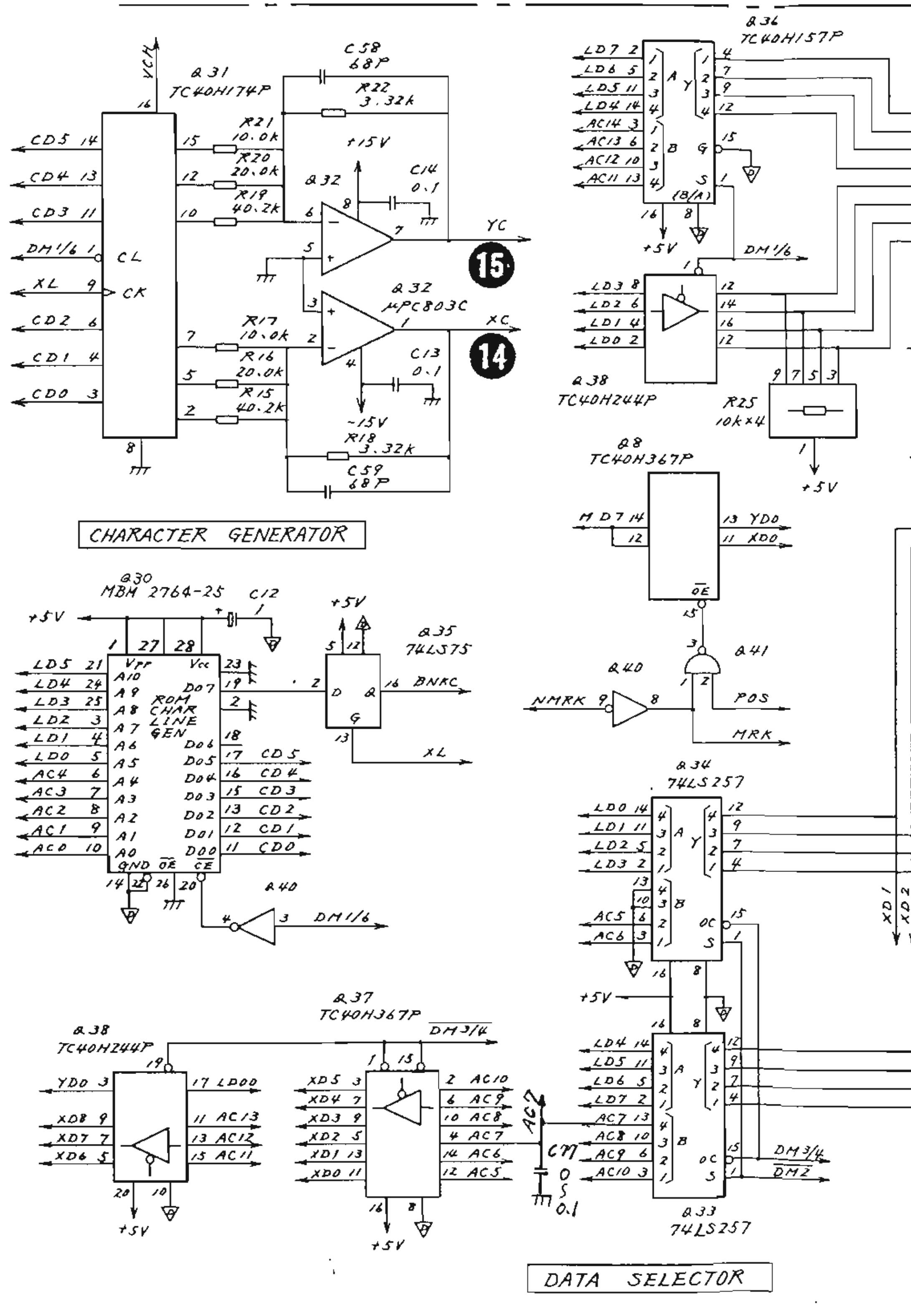
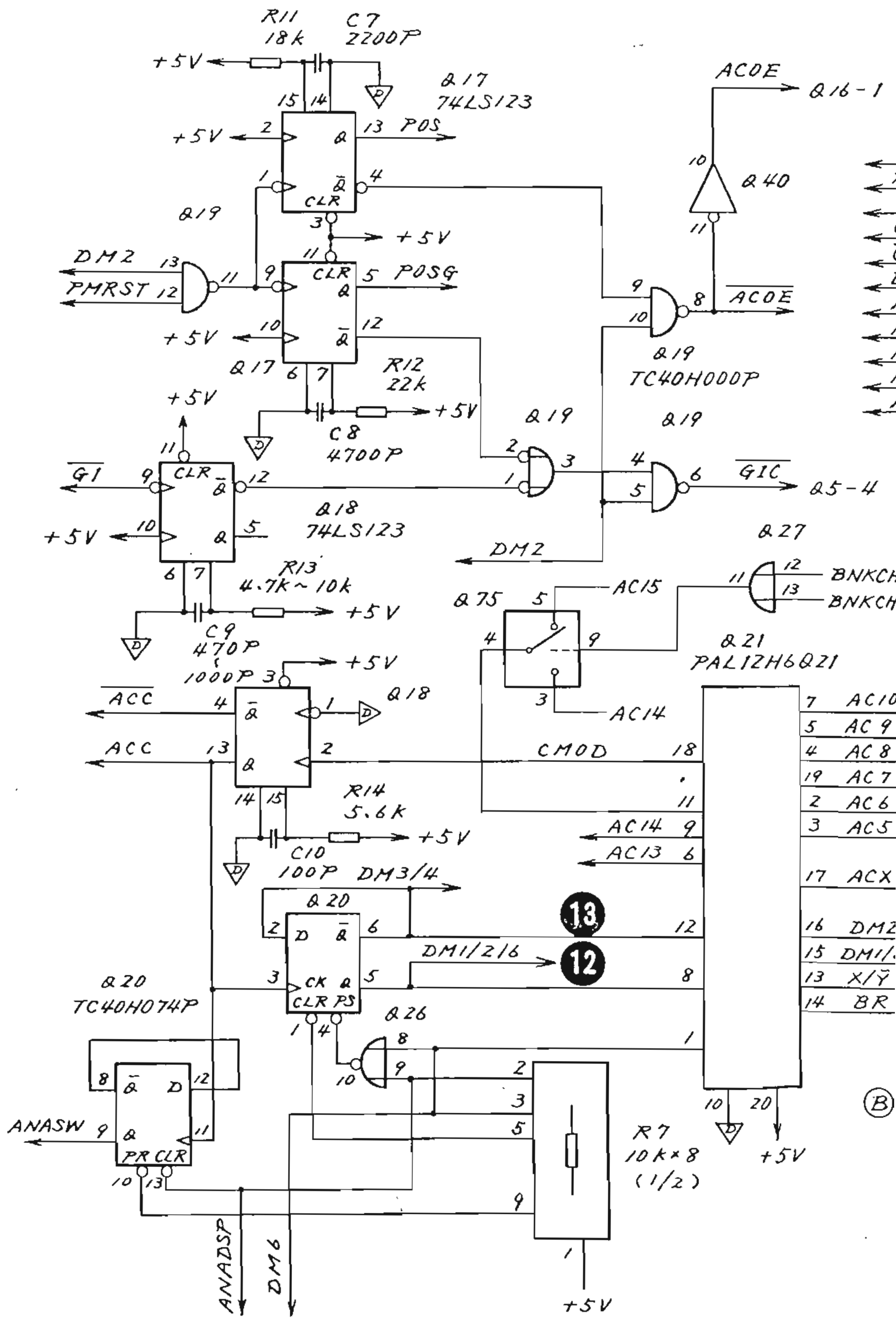


Fig. 5-82 (3/6)

Z27 DISPLAY CONTROL
Circuit Diagram (3/6)
(43W 33958 M-1)

(C) CHARACTER GENERATER, DATA SELECTOR, AND D/A CONVERTE




R11
18k
C7
2200P
+5V
Q17
74LS123
POS
POSG
ACOE
Q16-1
Q40
Q19
DM2
PMRST
CLR
+5V
Q17
R12
22k
C8
4700P
Q19
TC40H000P
GIC
Q5-4
G1
Q18
74LS123
R13
4.7k~10k
C9
470P
1000P
Q27
BNKCH
BNKCH
Q75
AC15
AC14
Q21
PAL12H6Q21
ACC
ACC
CMOD
R14
5.6k
C10
100P
DM3/4
Q20
DM1/2/6
AC14
AC13
AC10
AC9
AC8
AC7
AC6
AC5
ACX
X/Y
BR
Q20
TC40H074P
Q26
ANASW
R7
10k×8
(1/2)
ANADSP
DM6
+5V
B

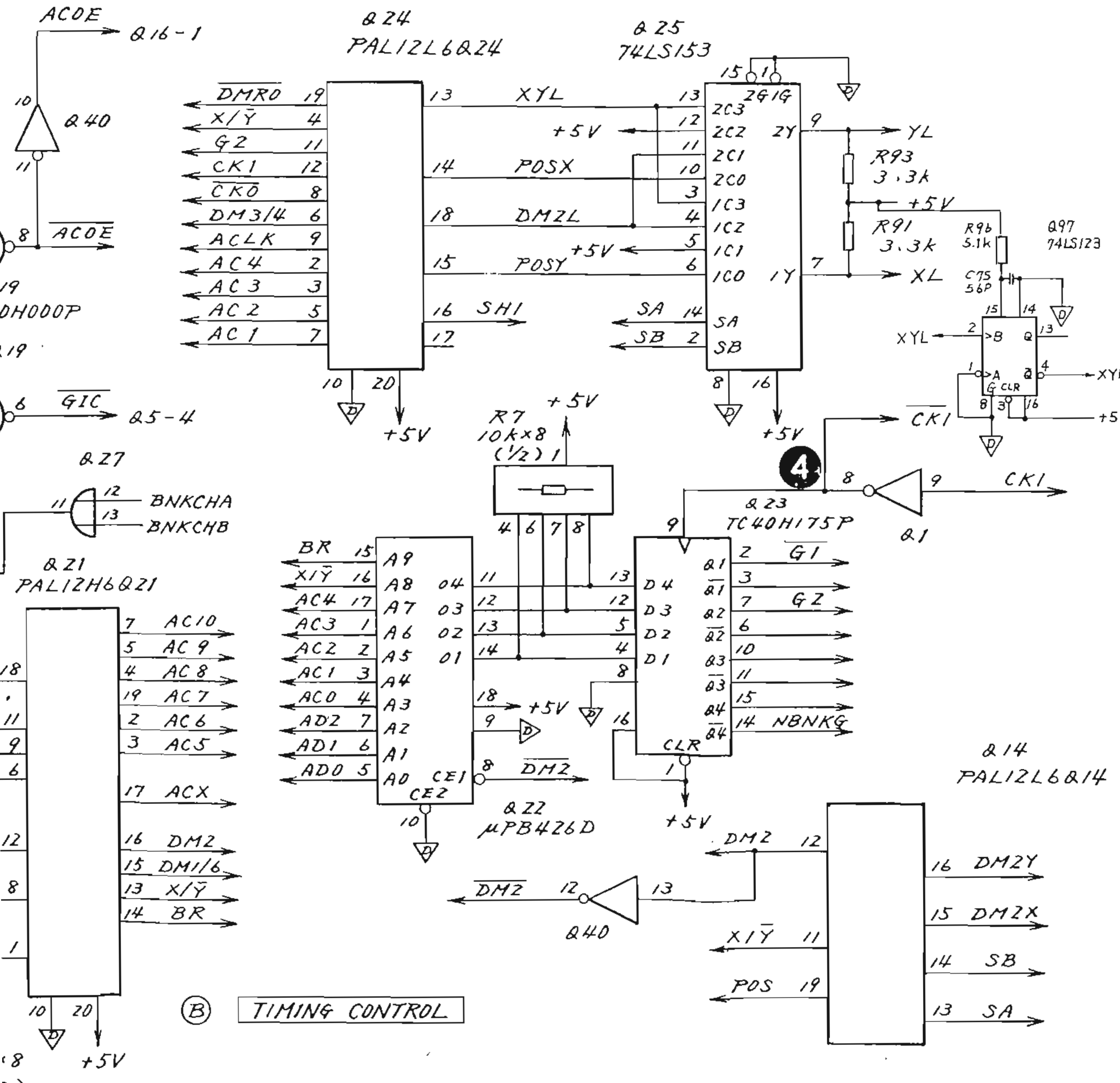
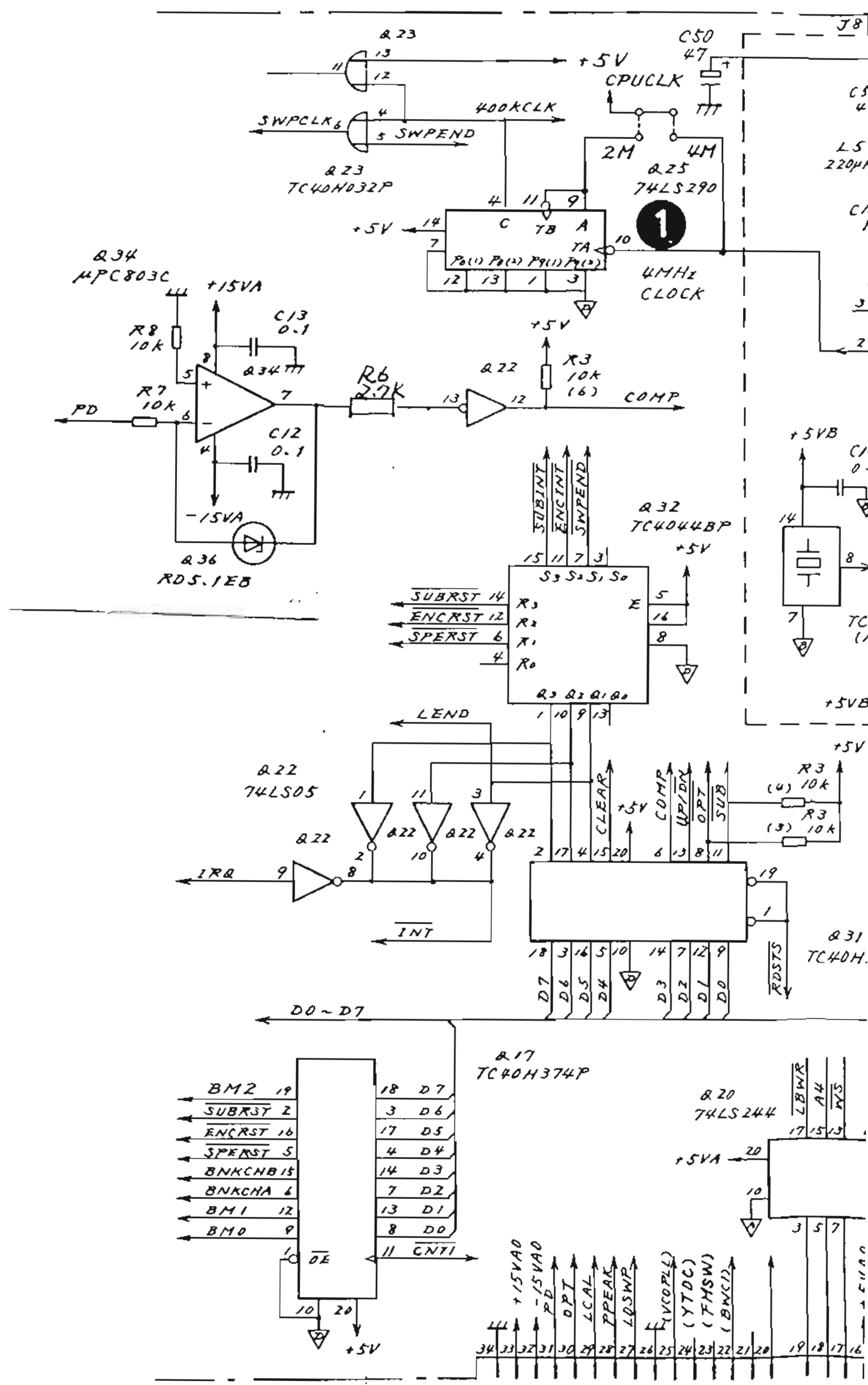


Fig. 5-82 (2/6)

Z27 DISPLAY CONTROL
Circuit Diagram (2/6)
(43W 33958 M-2)

(B) CLOCK OSC AND I/O PORTS



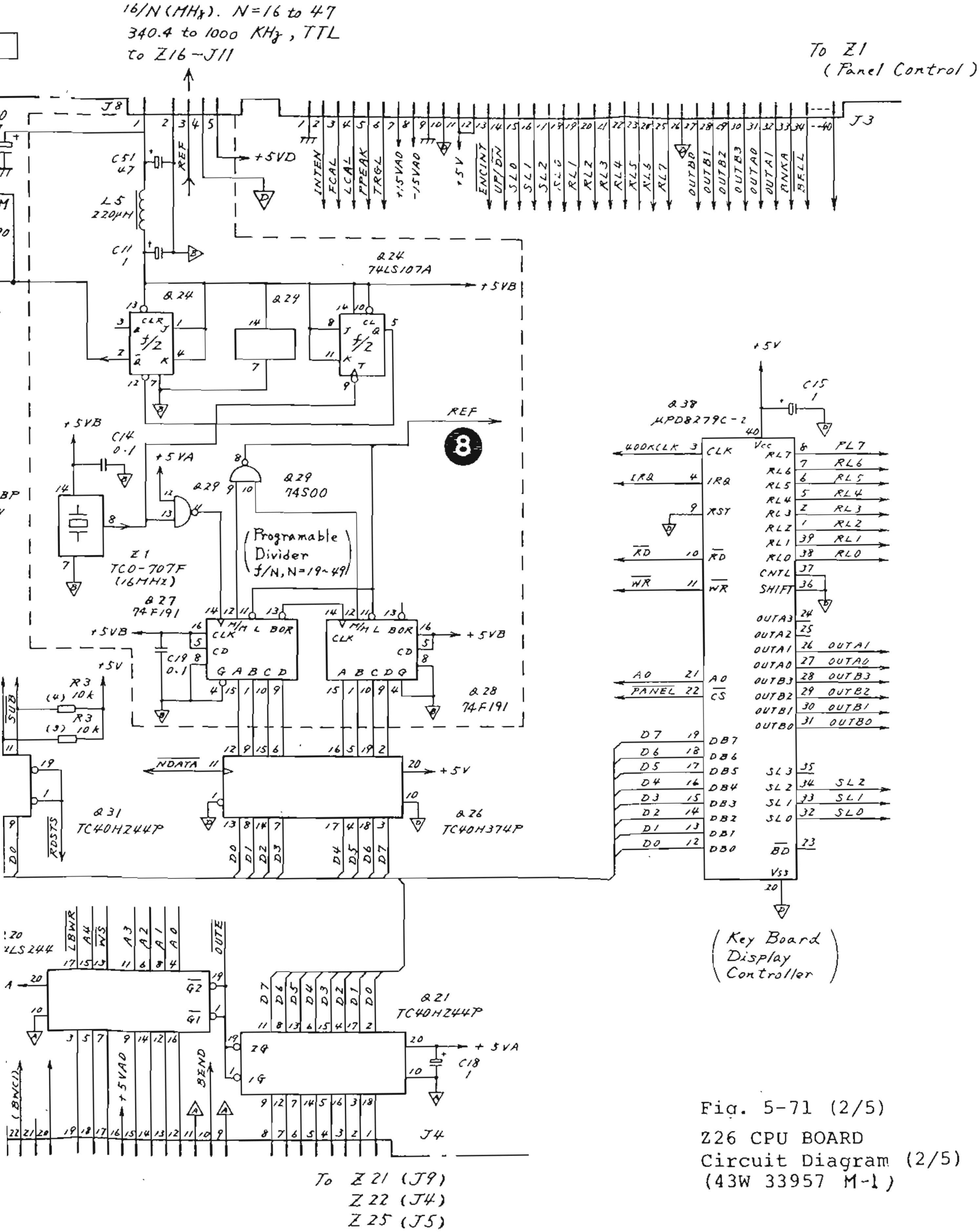
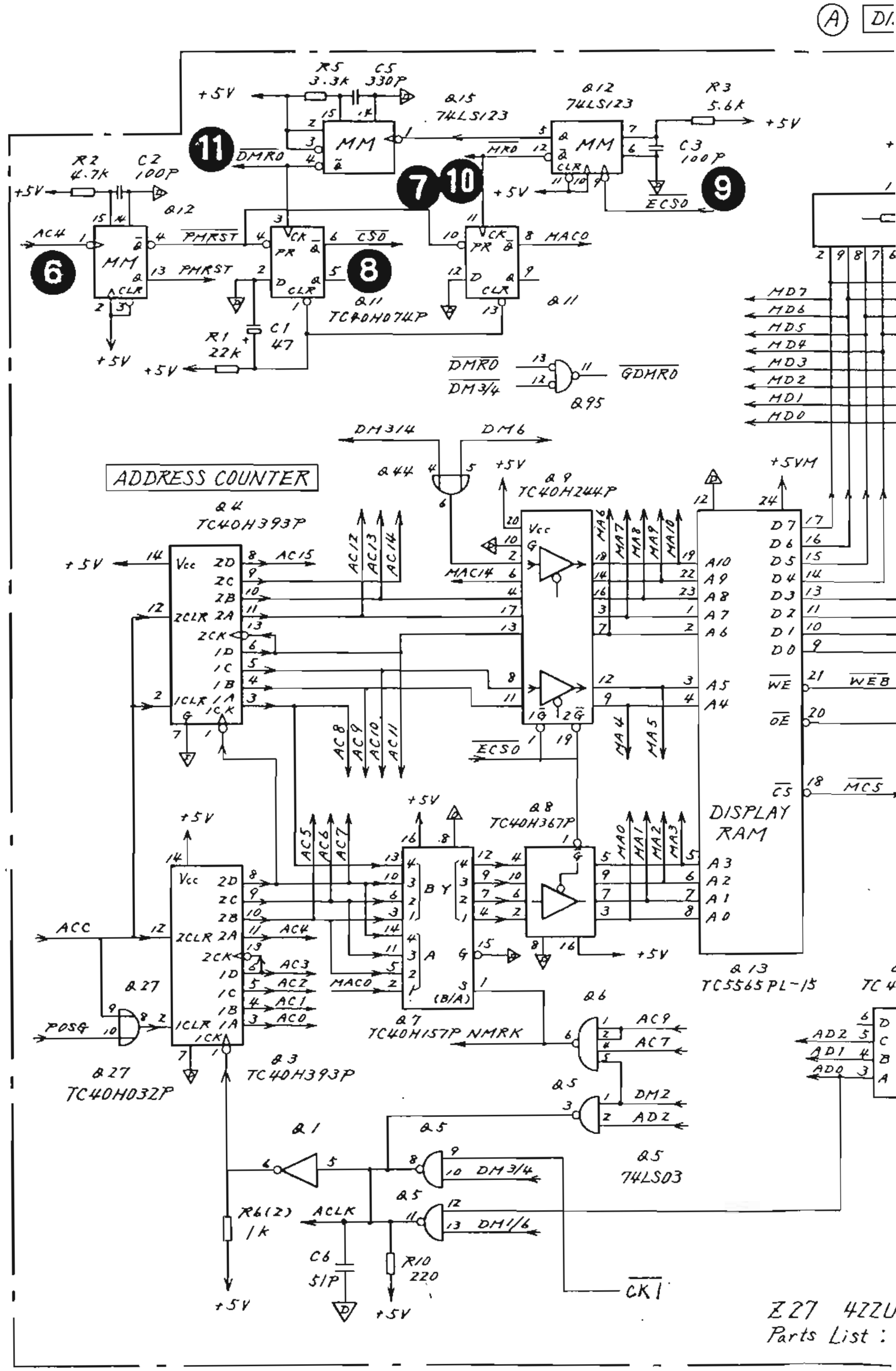
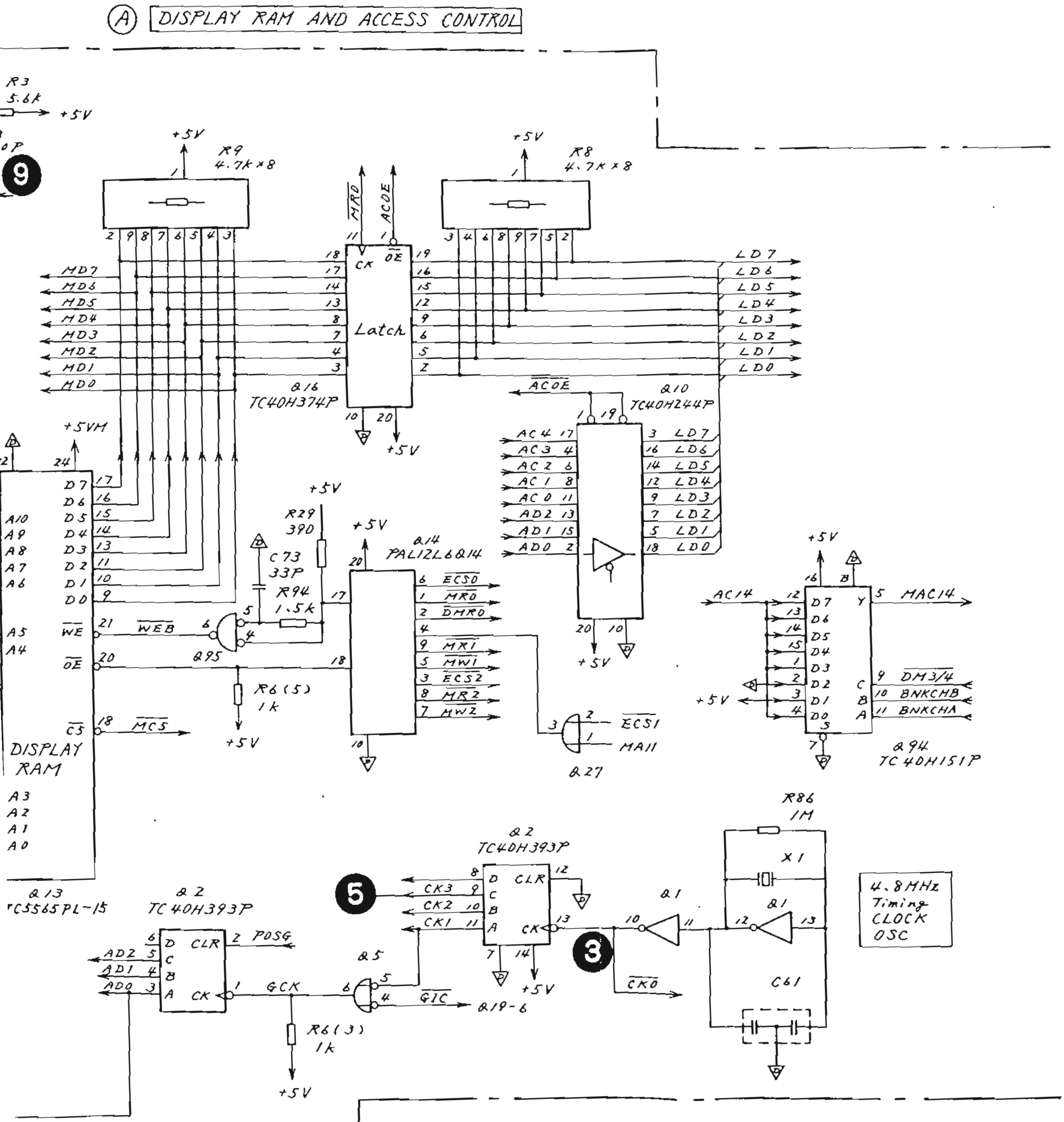


Fig. 5-71 (2/5)

Z26 CPU BOARD
Circuit Diagram (2/5)
(43W 33957 M-1)


ADDRESS COUNTER
DISPLAY RAM
Q13 TC5565PL-15
Q4 TC40H393P
Q3 TC40H393P
Q9 TC40H244P
Q8 TC40H367P
Q7 TC40H157P NMRK
Q27 TC40H032P
Q5 74LS03
Q11 TC40H074P
Q12 74LS123
Q15 74LS123
Q95
Q44
Q1
Q6
R5 3.3k
C5 330P
R3 5.6k
C3 100P
R2 4.7k
C2 100P
R1 22k
C1 47
C6 51P
R10 220
R6(2) 1k
+5V
+5VM
DMRO
GDMRO
DM3/4
DM3/4
DM6
DM1/6
MRO
ECSO
PHRST
CSO
MACO
MAC14
AC4
ACC
POSG
ACLK
CK1
WEB
MCS
AD2
AD1
AD0
DM2
MD7
MD6
MD5
MD4
MD3
MD2
MD1
MD0
Z27 422U
Parts List :



Z27 422U12714
Parts List : 44W83955

Fig. 5-82 (1/6)

Z27 DISPLAY CONTROL
Circuit Diagram (1/6)
(43W 33958 M-1)

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SECTION 1

GENERAL

1.1 Configuration

This manual explains the troubleshooting and repair procedures for the MS710C/D/E/F (called MS710[ ] hereafter) Spectrum Analyzer. It contains the following contents:

Section 2 explains how to disassemble each part necessary when checking a suspected faulty block. This section also includes the parts list of mechanical components.

Section 3 explains the entire signal flow for each part based on the MS710[ ] block diagram, and provides the basic knowledge required for MS710[ ] troubleshooting.

Section 4 explains how to locate a faulty block according to the failure symptoms. This section also contains the overall circuit diagram of the MS710[ ] (interblock connection diagram).

Section 5 contains circuit diagrams and a detailed description of each block (PC board). The voltages, signal levels, and waveforms are explained at the check-points for troubleshooting. The adjustment procedure for each block is also included.

Section 6 explains the replaceable parts list and precautions when ordering.

1.2 Parts/Block Indications

In this manual, each part (block) mounted on the MS710[ ] is indicated by a part number (Z number) which is commonly used in the explanations and drawings.

The connection part for each cable has the same J number in the explanations and drawings in this manual.

In this manual, when two part numbers are indicated by - (Z14-Z8 for example), the number after the hyphen is a smaller block number in the larger block indicated by the number preceding the hyphen.

For example, Z14-Z8 indicates that the Z8 100 MHz REF OSC PC board is mounted in the larger block Z14 (0 to 2 GHz RF block).

Z14 (0 to 2 GHz RF block) —— Z8 (100 MHz REF OSC)

↑ larger block ↑ smaller block

1.3 Repair Precautions

(1) Electrostatic charge

The MS710[ ] contains many components that are subject to electrostatic damage, such as high-density integrated circuits and super high-frequency semiconductors with precision structures.

These are protected when they are mounted in the MS710[ ]. If a PC board is removed for repair, take preventive measures against electrostatic damage. When soldering, use a soldering iron in which leakage current is not applied to the tip.

(2) CRT high voltage

Because some CRT peripheral circuits generate dangerous high-voltage signals, be especially careful when checking these circuits in their "live" state. Do not remove the plastic protective panel that covers the PC board of the Z30 CRT BIAS/X-Y AMP except when checking this circuit.

1.4 Service Kits

The extender board, extender cable, and various connector adapters are required for efficient troubleshooting. These are provided in service kits and are optionally available.

Table 1-1 Service Kit

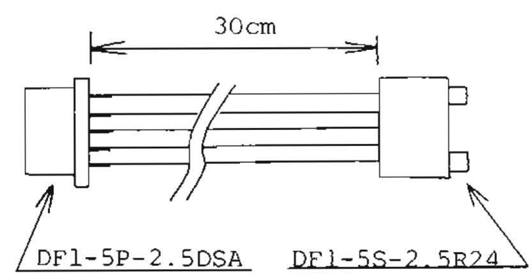
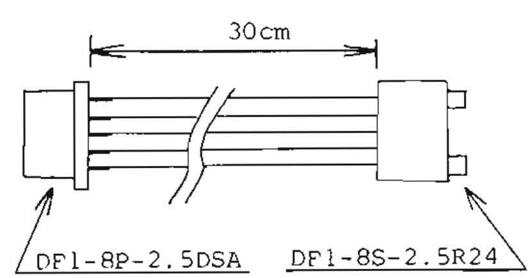
Ordering No.	Name	Qty.	Remarks
449J81722B	Extender Cable	2	
449J81722C	Extender Cable	2	

Table 1-1 Service Kit (Continued)

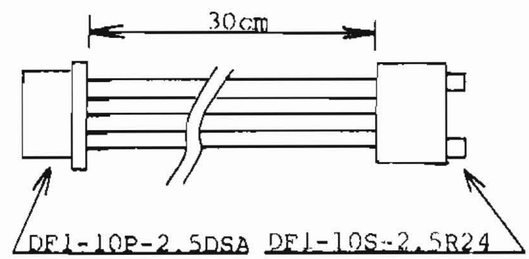
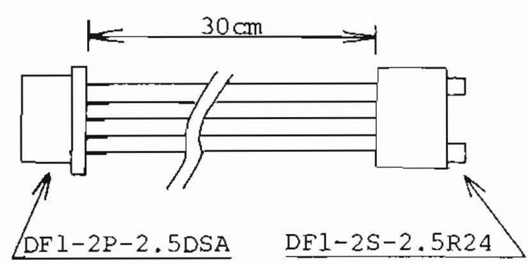
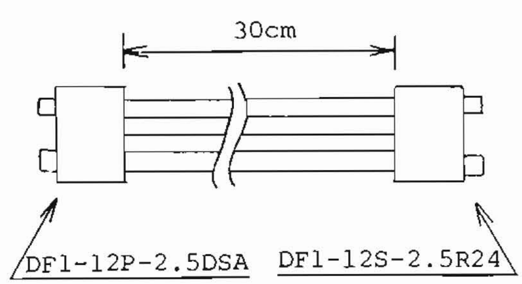
Ordering No.	Name	Qty.	Remarks
49J81722D	Extender Cable	2	
449J81722E	Extender Cable	2	
449J81722F	Extender Cable	1	

Table 1-1 Service Kit (Continued)

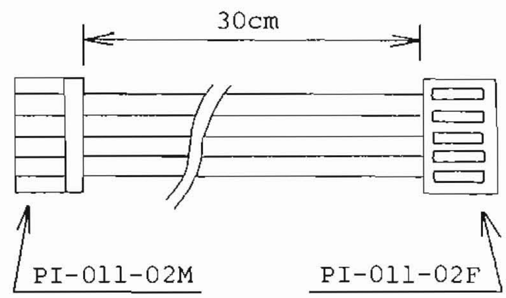
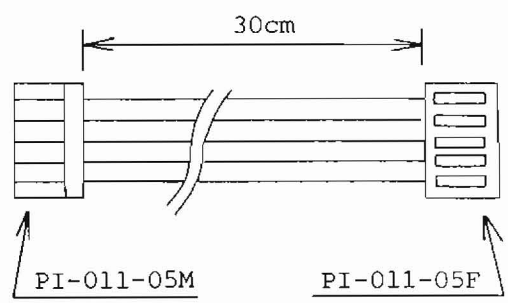
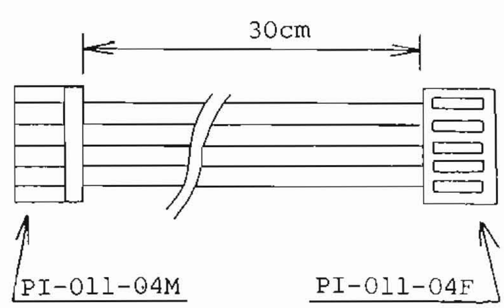
Ordering No.	Name	Qty.	Remarks
449J81723A	Extender Cable	3	
49J81723B	Extender Cable	3	
449J81723F	Extender Cable	2	

Table 1-1 Service Kit (Continued)

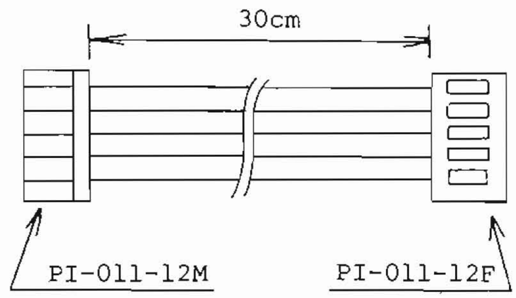
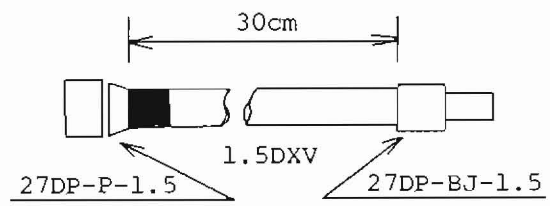
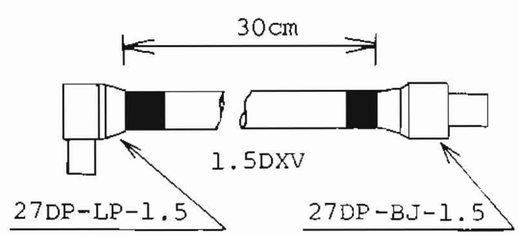
Ordering No.	Name	Qty.	Remarks
449J81723G	Extender Cable	1	
449J81725A	Extender Cable	3	
449J81725B	Extender Cable	3	

Table 1-1 Service Kit (Continued)

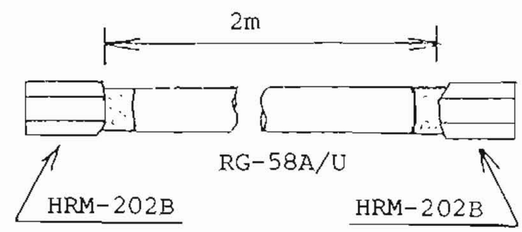
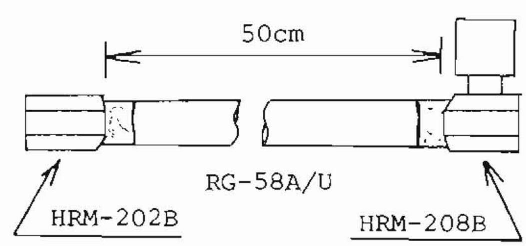
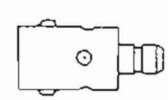
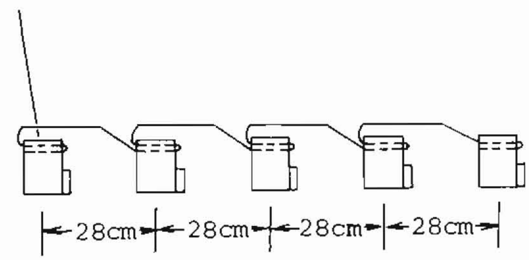
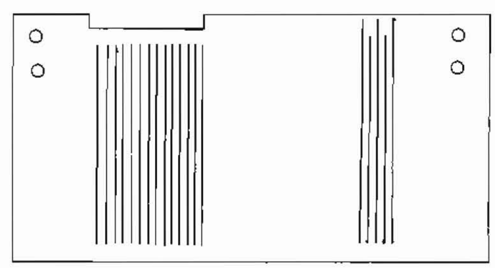
Ordering No.	Name	Qty.	Remarks
449J81725C	Extender Cable	2	
449J81725D	Extender Cable	3	
No. 1305	BNC(J)-UMJ Adapter-2	1	

Table 1-1 Service Kit (Continued)

Ordering No.	Name	Qty.	Remarks
44J74489C	Flat Cable	1	HIF3A-34D-2.54R 
422U13360	Extender Board	1	

SECTION 2

MECHANICAL CONFIGURATION

2.1 Introduction

This section will explain disassembling procedures and mechanical configurations of the MS710[ ].

CAUTION

When disassembling/reassembling the MS710[ ], turn off the POWER switch on the front panel and disconnect the power supply cord from the ac outlet.

2.2 Cabinet Assembly

Tables 2-1 to 2-7 list mechanical parts.

Figures 2-1 to 2-7 show exploded views of the MS710[ ].

Table 2-1 Mechanical Parts List

	No.	PART No.	DESCRIPTION	REMARK	Q'TY
Fig. 2-1	1	32B7662	Frame, Front	1MW·4U	1
	2	32B7666	Channel, Rear	4U	2
	3	33B20662	Protector		4
	4		NOT ASSIGNED		
	5	32B7670	Channel, Top	450D	2
	6	32B7671	Channel, Bottom	450D	2
	7	322B7672	Standard Foot		4
	8	34B73660C	Tape, Trim	4U	2
	9	349B73661	Handle, Side	450D	2
	10	33B22452	Cover, Top		1
	11	33B22512	Cover, Bottom		1
	12	33B22472	Cover, Side		2
	13	4BPS8S3	Screw		2
	14	4BPS8S3	Screw		2
	15	5FPS12S7	Screw		4
	16	5FPS10S7	Screw		8
	17	4NPS20S7	Screw		8
	18	4SW-SU	Spring Washer		8
	19	4WBS-B3	Plain Washer		12
	20	3HRPS10S3	Screw		8
	21	34B73674	Tilt Stand		1

Cabinet Assembly

(1) Removing the top cover (10)

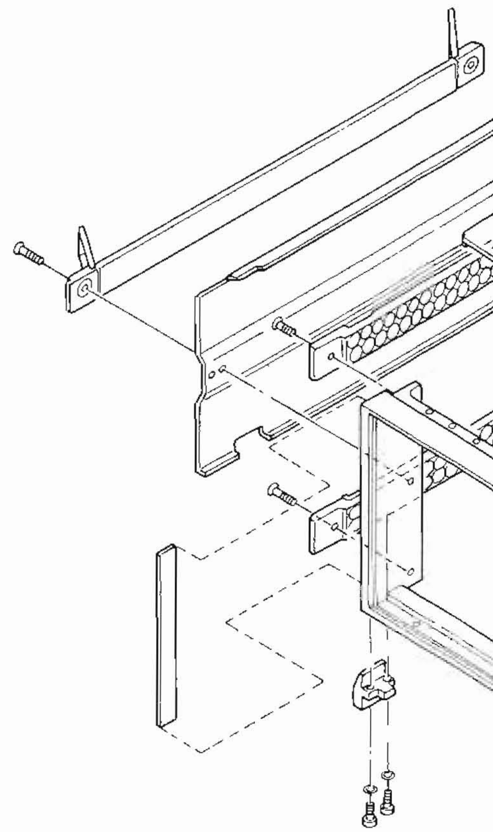
Remove the two screws (13). Then, remove the top cover (10) by lifting the rear in the direction indicated by the * arrow.

(2) Removing the bottom cover (11)

Remove the two screws (14). Then, remove the bottom cover (11) from the rear as indicated by the * arrow.

(3) Removing the side cover (12)

Open the handle cover (9) in the direction indicated by the * arrow and remove the two screws (15). Then, remove the four screws (20) and remove the side cover (12).



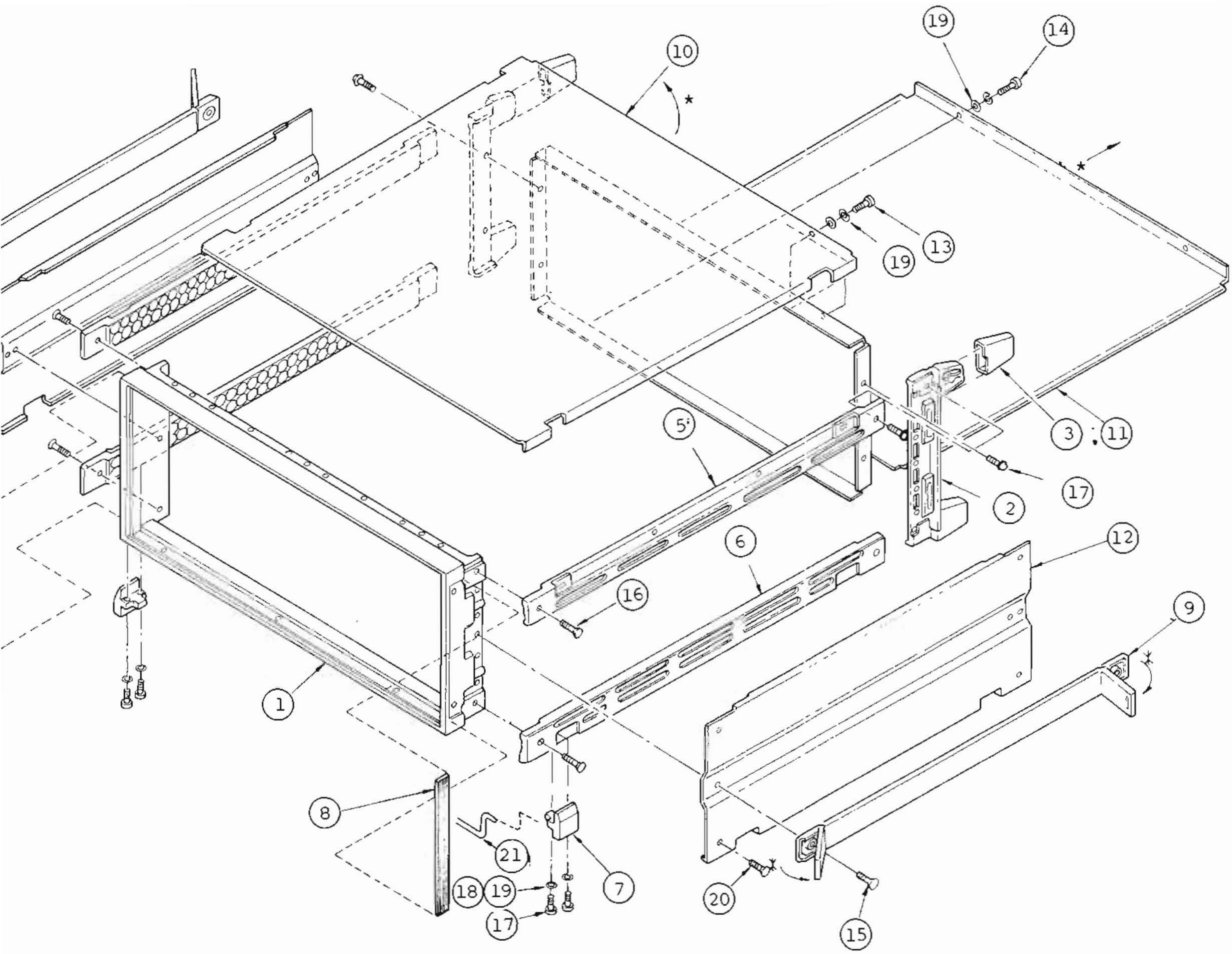


Fig. 2-1 Cabinet Assembly

Table 2-2 Mechanical Parts List

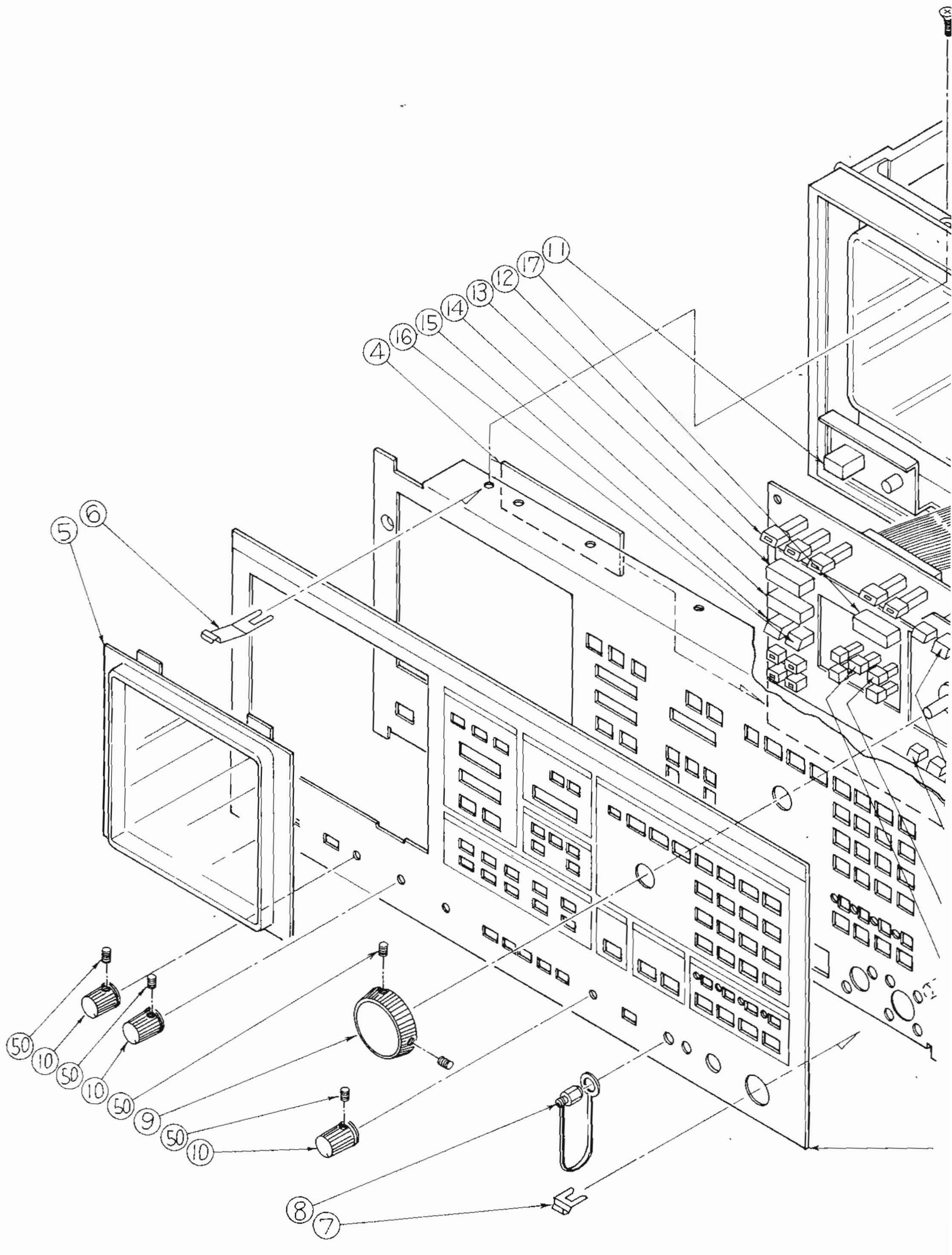
	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-2	1	42B12743C	Front panel		1
	2	422B12745	Sub panel		1
	3		Z1 front panel I		1
	4		Z2 front panel II		1
	5	349B86530B	Bezel		1
	6	34B78330A	Panel clamp		3
	7	34B78330B	Panel clamp		3
	8	1305	HRM-601D	(MS710C/D only)	1
	9	342E73700	Knob		1
	10	342E73701	Knob		3
	11	44E68583	Button	Character; Power	1
	12	342E76657	Button	Character; 10 k - 30 MHz 100 k - 2 GHz etc.	19
	13	442E83897A	Button	Character; A	1
	14	442E83897B	Button	Character; B	1
	15	442E83898A	Button	Character; C	1
	16	442E74806B	Button	Character; D	1
	17	442E83897C	Button	Character; E	1
	18	442E74806C	Button	Character; F	1
	19	442E74806D	Button	Character; G	1
	20	442E74806E	Button	Character; H	1
	21	442E74806F	Button	Character; I	1
	22	442E74806G	Button	Character; J	1

Table 2-2 Mechanical Parts List (continued)

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-2	23	442E74806H	Button	Character; K	1
	24	442E74806J	Button	Character; L	1
	25	442E74806K	Button	Character; M	1
	26	442E74806L	Button	Character; N	1
	27	442E74806M	Button	Character; O	1
	28	442E74806N	Button	Character; P	1
	29	442E74806P	Button	Character; Q	1
	30	442E74806Q	Button	Character; R	1
	31	442E74806R	Button	Character; S	1
	32	442E74806S	Button	Character; T	1
	33	442E74806T	Button	Character; U	1
	34	442E74806AB	Button	Character; V	1
	35	442E74806V	Button	Character; W	1
	36	442E74806AC	Button	Character; X	1
	37	442E74806X	Button	Character; Y	1
	38	442E74806Y	Button	Character; Z	1
	39	442E74806AA	Button	Character; BS	1
	40	442E74806Z	Button	Character; SP	1
	41	442E74817A	Button	Character; « . »	2
	42	442E74817C	Button	Character; ⋀ . ⋁	2
	43	34E76656A	Button	Character; PEAK → CRT, etc.	9

Table 2-2 Mechanical Parts List (continued)

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-2	44	34E70073E	Button	Character; TITLE MARKER	2
	45	34E70073G	Button	Character; SHIFT	1
	46	34E70073D	Button	Character; COPY	1
	47	3FPS6B3	Screw		6
	48	3FPS10B3	Screw		6
	49	3NPS6B3+SW	Screw		10
	50	3AOS3	Screw		5



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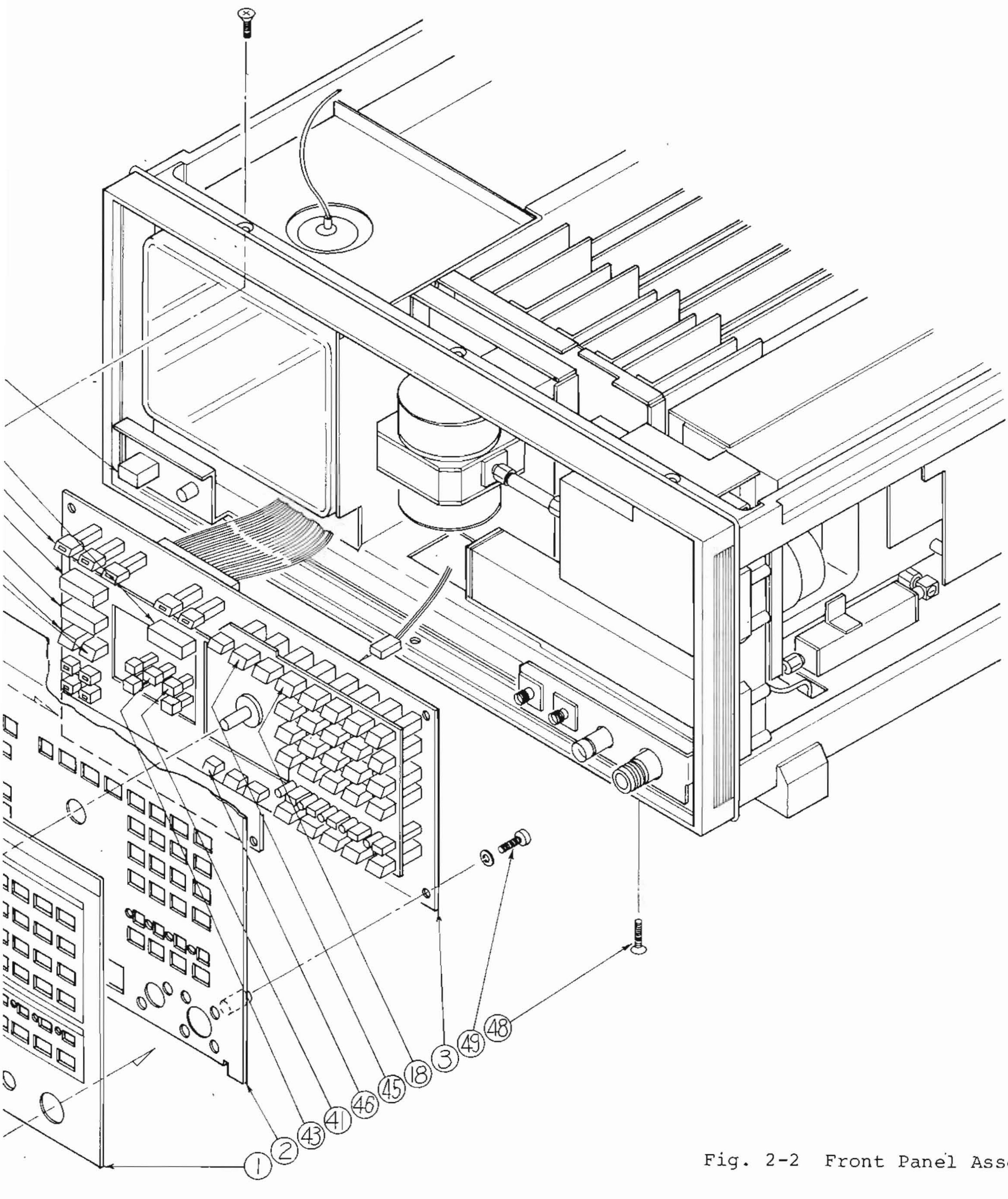
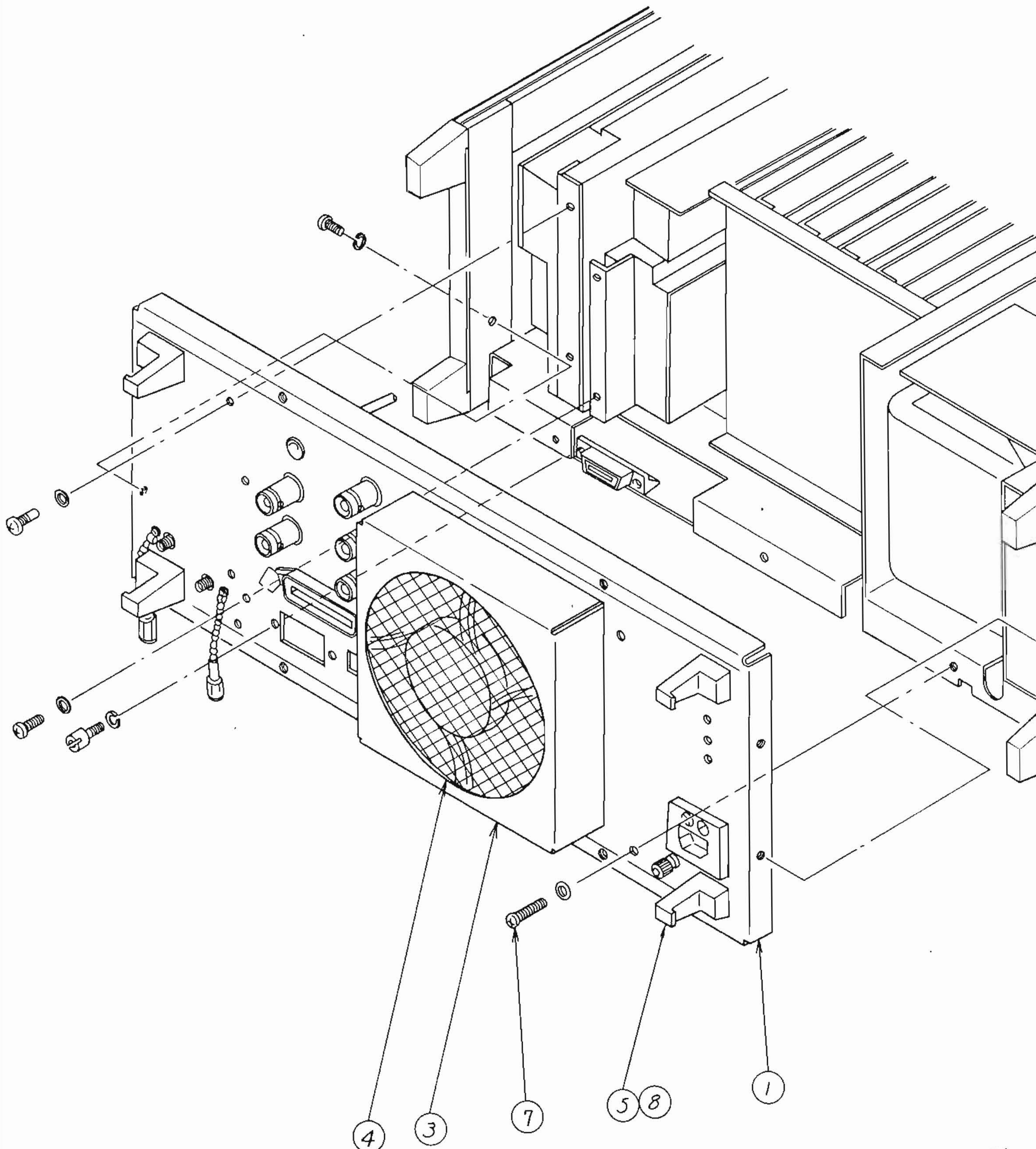


Fig. 2-2 Front Panel Assembly

Table 2-3 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-3	1	422B13225	Rear panel		1
	2		Not assigned		
	3	43B28619	Cover		1
	4	44B73523	Expanded metal		1
	5	34B73670	Cord holder		4
	6		Not assigned		
	7	3BPS851+WBS	Screw		3
	8	4NPS10S7SW	Screw		4
	9	4NPS12S7SW	Screw		4
	10	4BPS8S1+WBS	Screw		4



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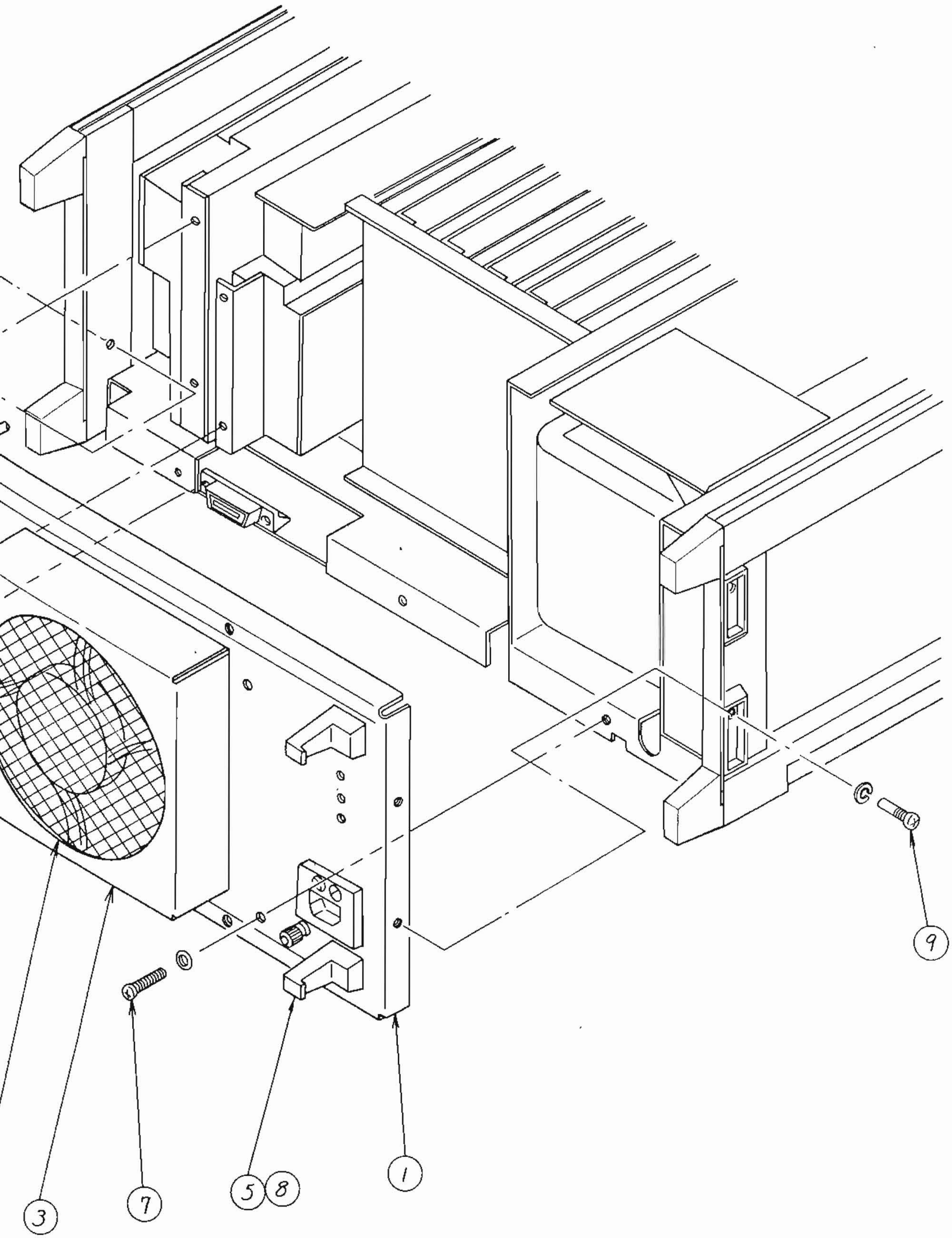
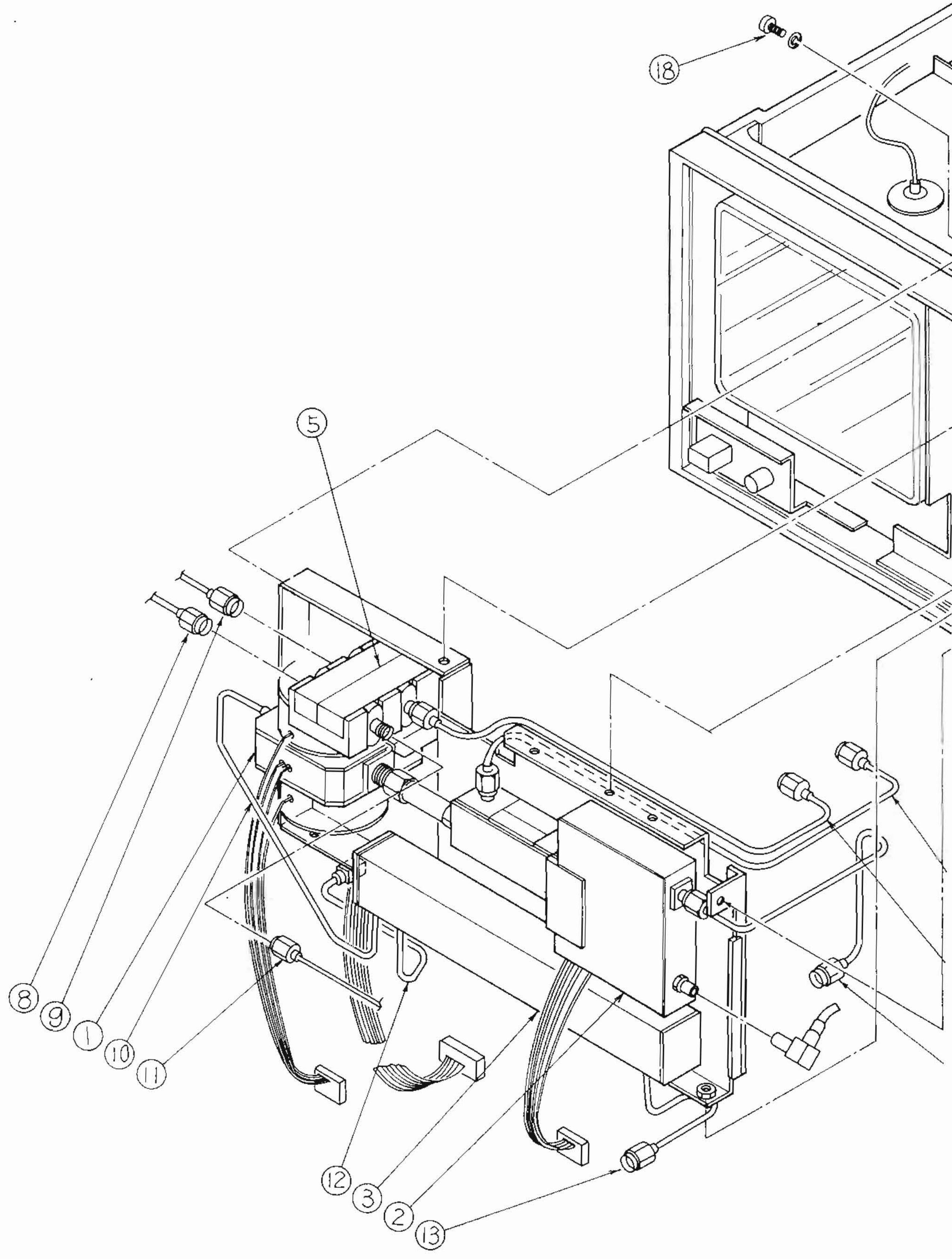


Fig. 2-3 Rear Panel Assembly

Table 2-4 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-4	1	429H10413	Z5 YTF		1
	2	429H11322	Z6 μ 1st converter		1
	3	429H10423	Z3 RF ATT		1
	4		NOT ASSIGNED		
	5	439H33847	Z7 Coupler	(MS710C/D only)	1
	6	43B33914	Cover plate		1
	7	44B74002B	Joint plate		1
	8	449J84195	Semirigid cable	(MS710C/D only)	1
	9	439J33920	Semirigid cable	(MS710C/D only)	1
	10	449J74008	Semirigid cable		1
	11	439J33916	Semirigid cable	(MS710C/D only)	1
	12	449J84197 449J84194	Semirigid cable	(MS710C MS710D/E/F)	1
	13	449J74143B	Semirigid cable		1
	14	439J33917	Semirigid cable		1
	15	439J33918	Semirigid cable	(MS710C/D only)	1
	16	439J33919	Semirigid cable		1
	17	449J84196	Semirigid cable	(MS710C/D only)	1
	18	3NPS8B3+SW	Screw		24
	19	3NPS14B3+SW	Screw		1
	20	4NPS6B3+SW	Screw		1



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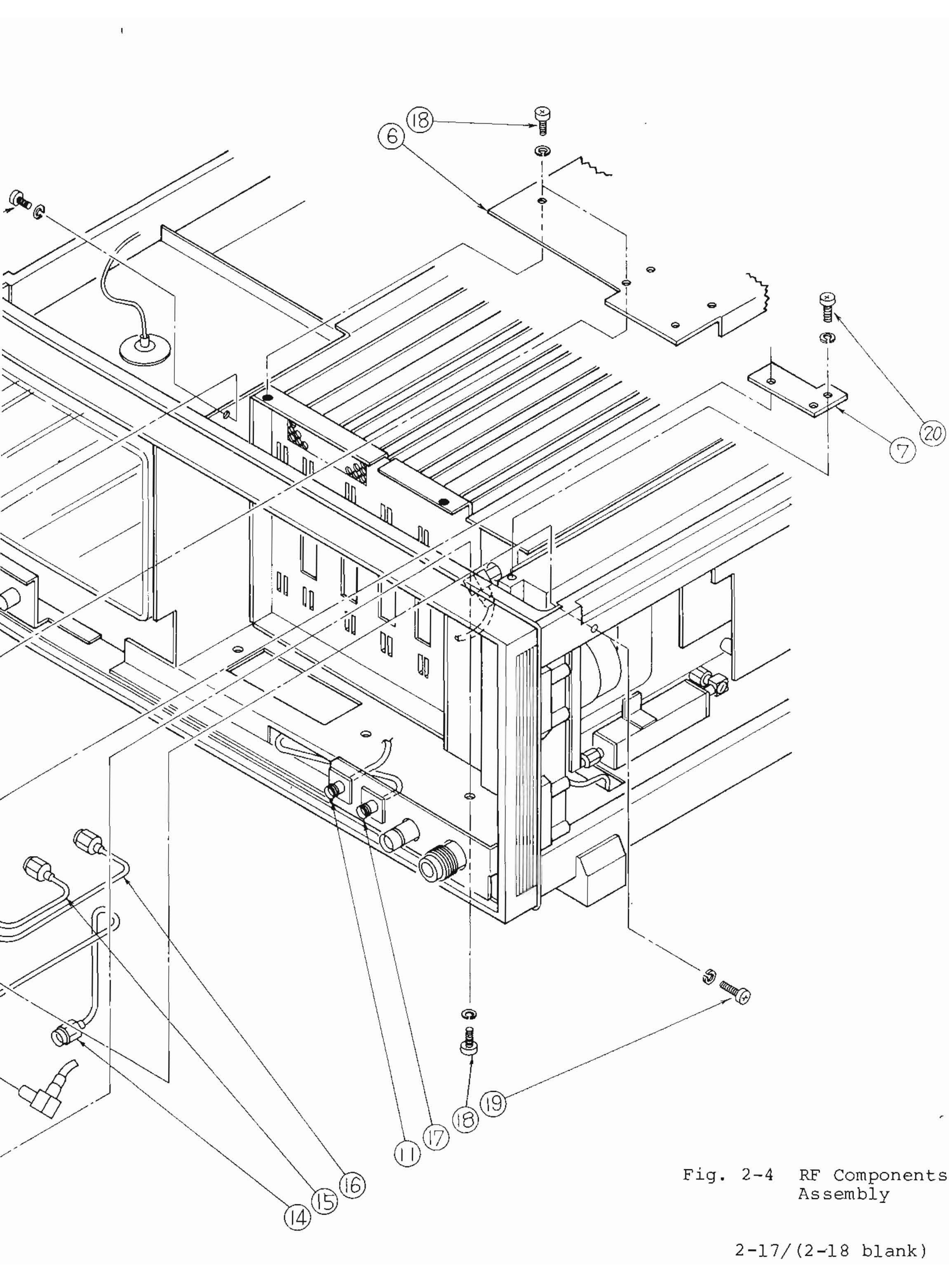


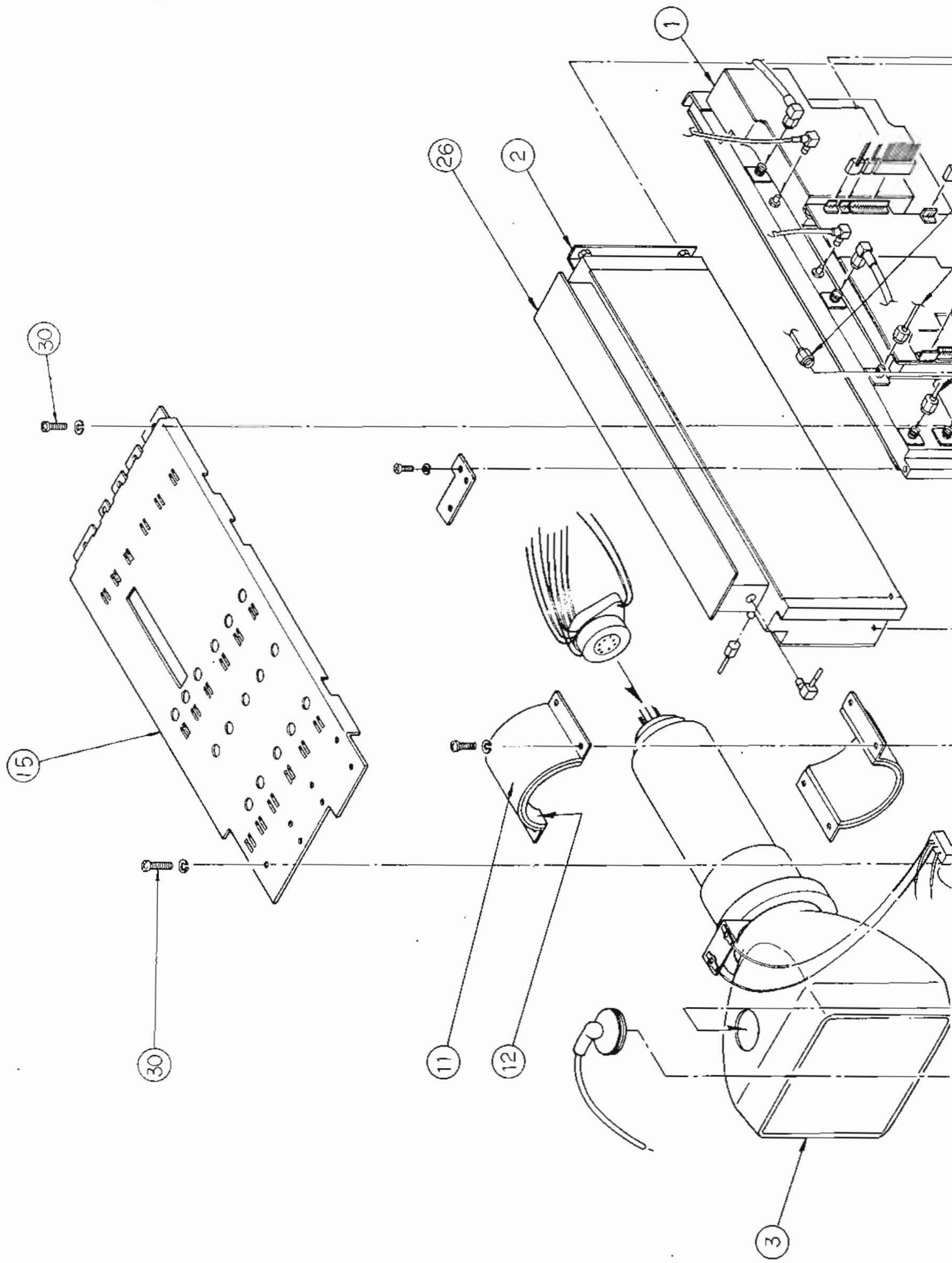
Fig. 2-4 RF Components
Assembly

Table 2-5 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-5	1	329H9345C	Z14 0 to 2 GHz RF block		1
	2	329H8667	Z16 PLL block		1
	3	14V80089	CRT		1
	4		Z21 local control 1		1
	5		Z22 IF BPF/AMP 1		1
	6		Z24 local control 2	(MS710C/E only)	1
	7		Z23 IF BPF/AMP 2		1
	8		Z27 display control		1
	9		Z26 CPU board		1
	10		Z25 LOG/LIN AMP DETECTOR		1
	11	44B78070	Clamp		2
	12	34E67754A	Rubber spacer		2
	13	34E67754E	Rubber spacer		1
	14	34E67754F	Rubber spacer		2
	15	43B33914	Cover plate		1
	16	43B31520	Cover plate		1
	17	44B74002B	Joint plate		1
	18	449J84198 449J84194	Semirigid cable	(MS710C) (MS710D/E/F)	1

Table 2-5 Mechanical Parts List (continued)

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-5	19	439J33921	Semirigid cable		1
	20	439J33918 449J86184	Semirigid cable	(MS710C/D) (MS710E/F)	1
	21	439J33919	Semirigid cable		1
	22	439J33917	Semirigid cable		1
	23	439H26785	Z9 YTO		1
	24	439H26785	Z12 Filter		1
	25		Z10 YTO/YTF DRIVE		1
	26	44Y85780	Z18 μ 2nd converter 1 Z19 μ 2nd converter 2		1
	27	2.6NPS5B3+SW	Screw		7
	28	2.6NPS6B3+SW	Screw		4
	29	3FPS8B3	Screw		2
	30	3NPS8B3+SW	Screw		20
	31	3NPS14S7+SW	Screw		4
	32	4NPS6B3+SW	Screw		1
	33	4NPS8B3+SW	Screw		4
	34	4BPS8B3+WB	Screw		4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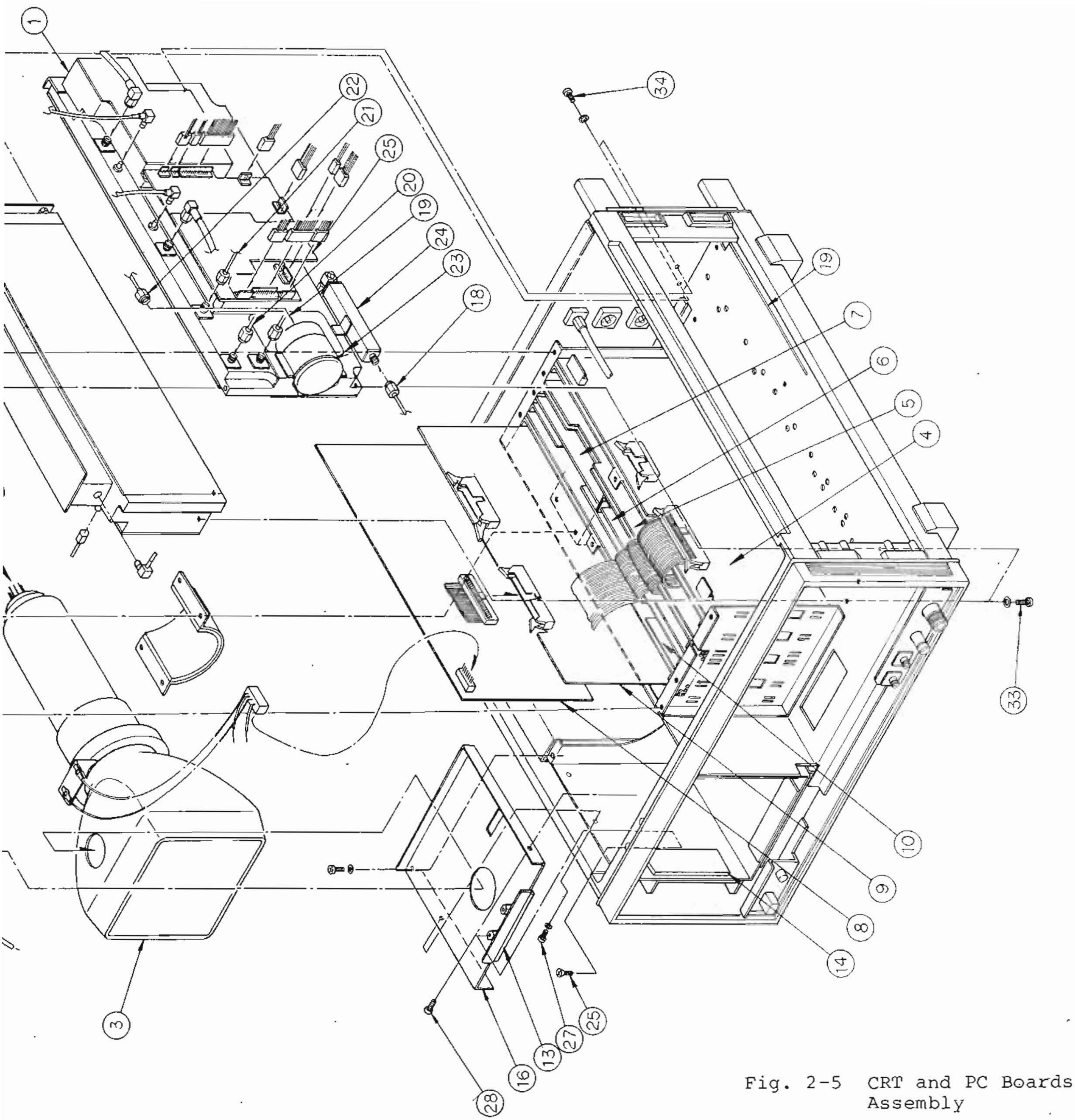
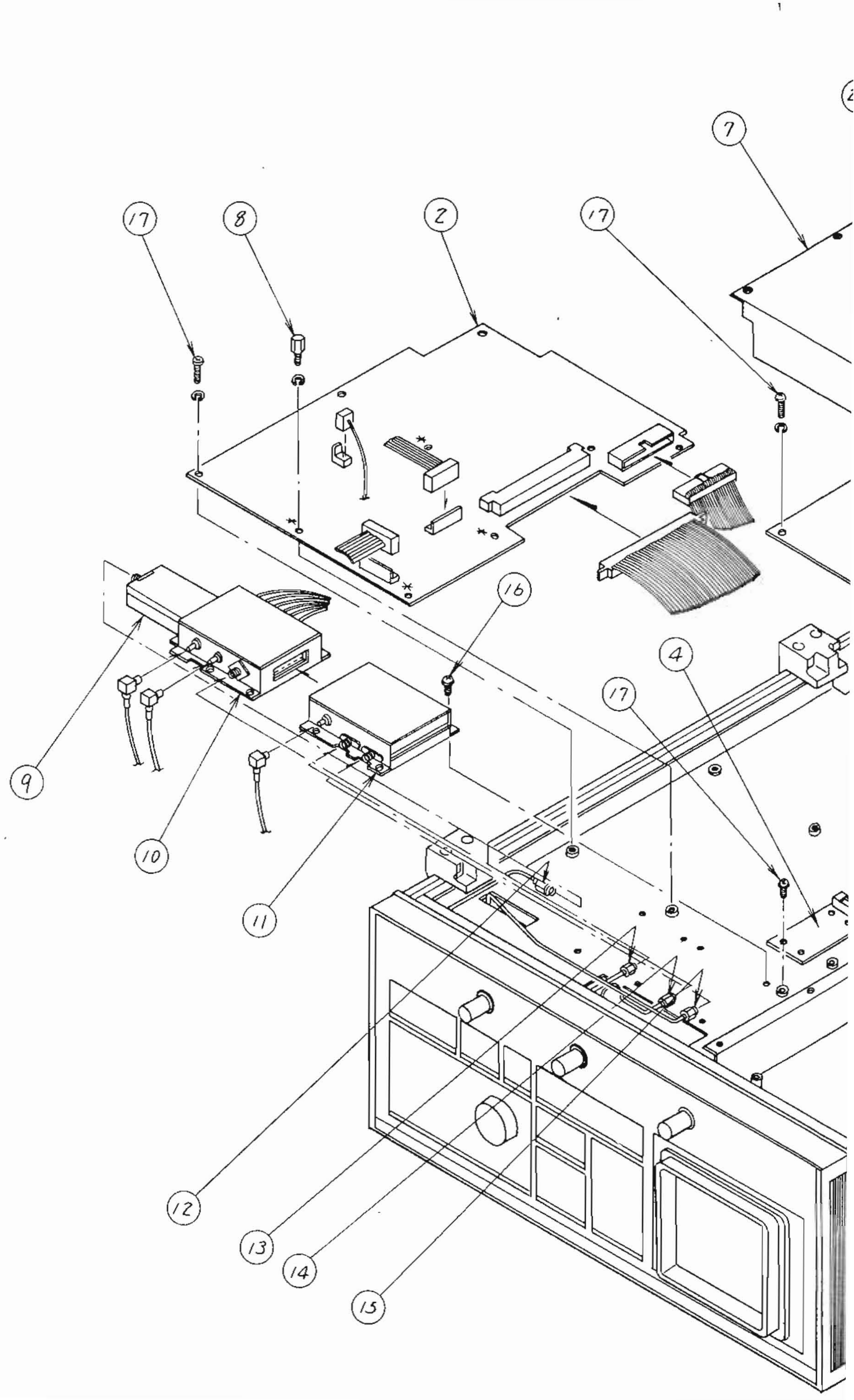


Fig. 2-5 CRT and PC Boards Assembly

Table 2-6 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-6	1		Z30 CRT bias/ X-Y AMP		1
	2		Z34 digital memory/GP-IB		1
	3		Z32 switching regulator		1
	4		Z33 connection board		1
	5	33B5112B	Screw support		8
	6	43B28641	Protective board		1
	7	42B11719	Cover		1
	8	34H39505	Screw support		4
	9	449H83798	Diplexer	(MS710C/D only)	1
	10	44Y85778	Ext IF AMP	(MS710C/D only)	1
	11	44Y85779	Low 1st MIX	(MS710C only)	1
	12	449J84195	Semirigid cable		1
	13	449J84196	Semirigid cable	(MS710C/D only)	1
	14	449J84197	Semirigid cable	(MS710C only)	1
	15	449J84198	Semirigid cable	(MS710C only)	1
	16	2.6NPS6B3+SW	Screw		8
	17	3NPS6B3+SW	Screw		20
	18	3NPS8B3+SW	Screw		3
	19	3NPS16B3+SW	Screw		3
	20	3FPS6B3	Screw		8
	21	5NPS12S7+SW	Screw		1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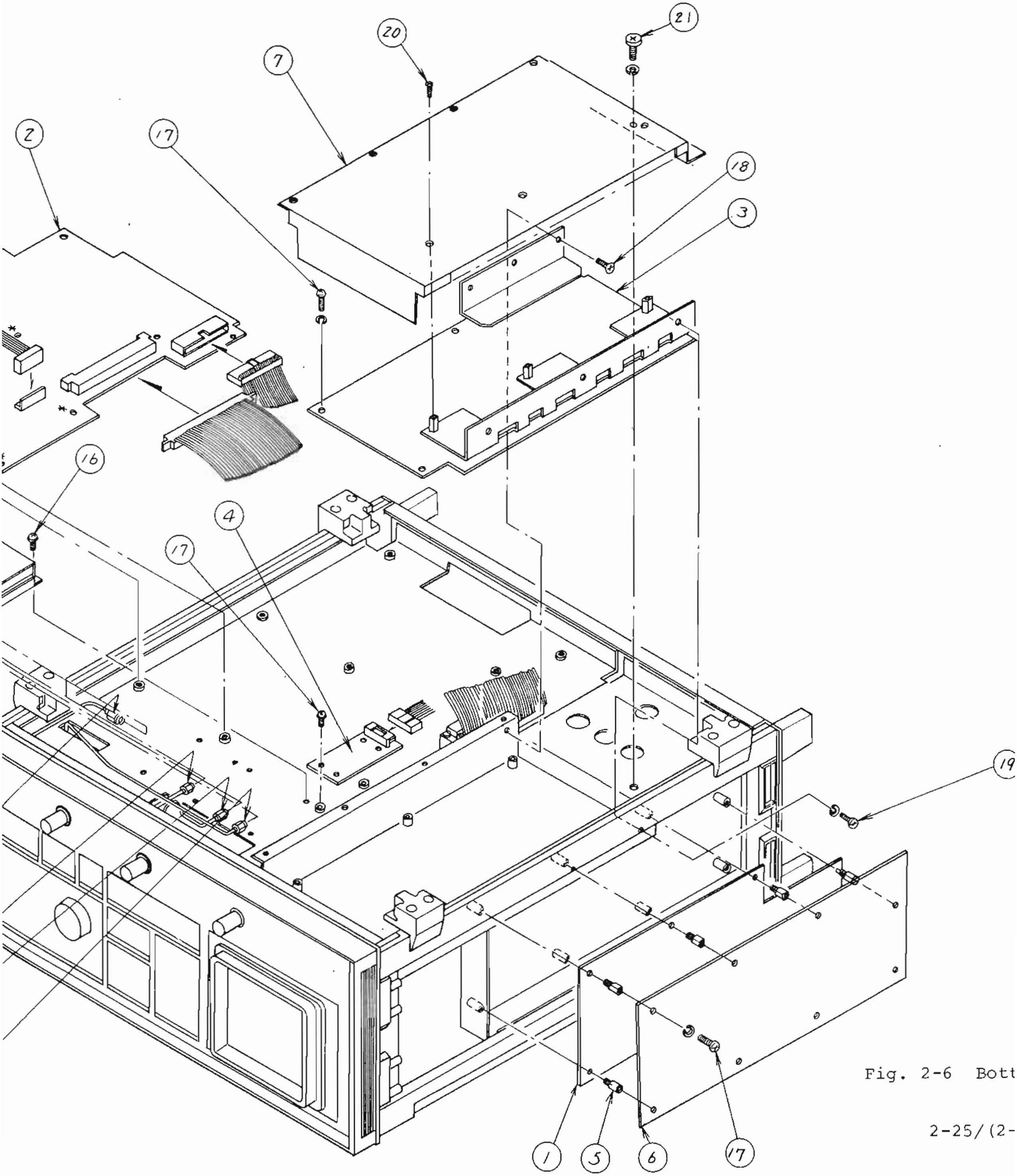
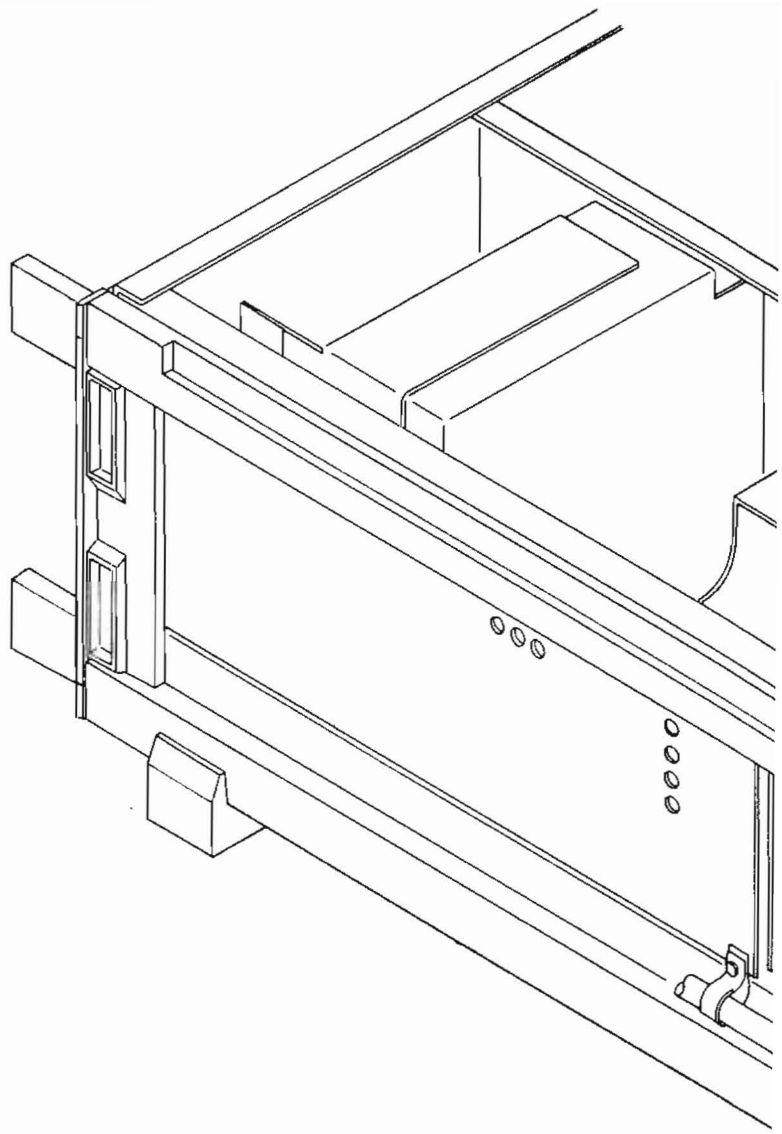


Fig. 2-6 Bott

Table 2-7 Mechanical Parts List

	NO.	PARTS NO.	DESCRIPTION	REMARKS	Q'TY
Fig. 2-7	1	44Y85777	Low local block	(MS710C only)	1
	2	34H38590D	Spacer	(MS710C only)	2
	3	3NPS8B3+SW	Screw	(MS710C only)	2
	4	3NPS12B3+SW	Screw	(MS710C only)	2



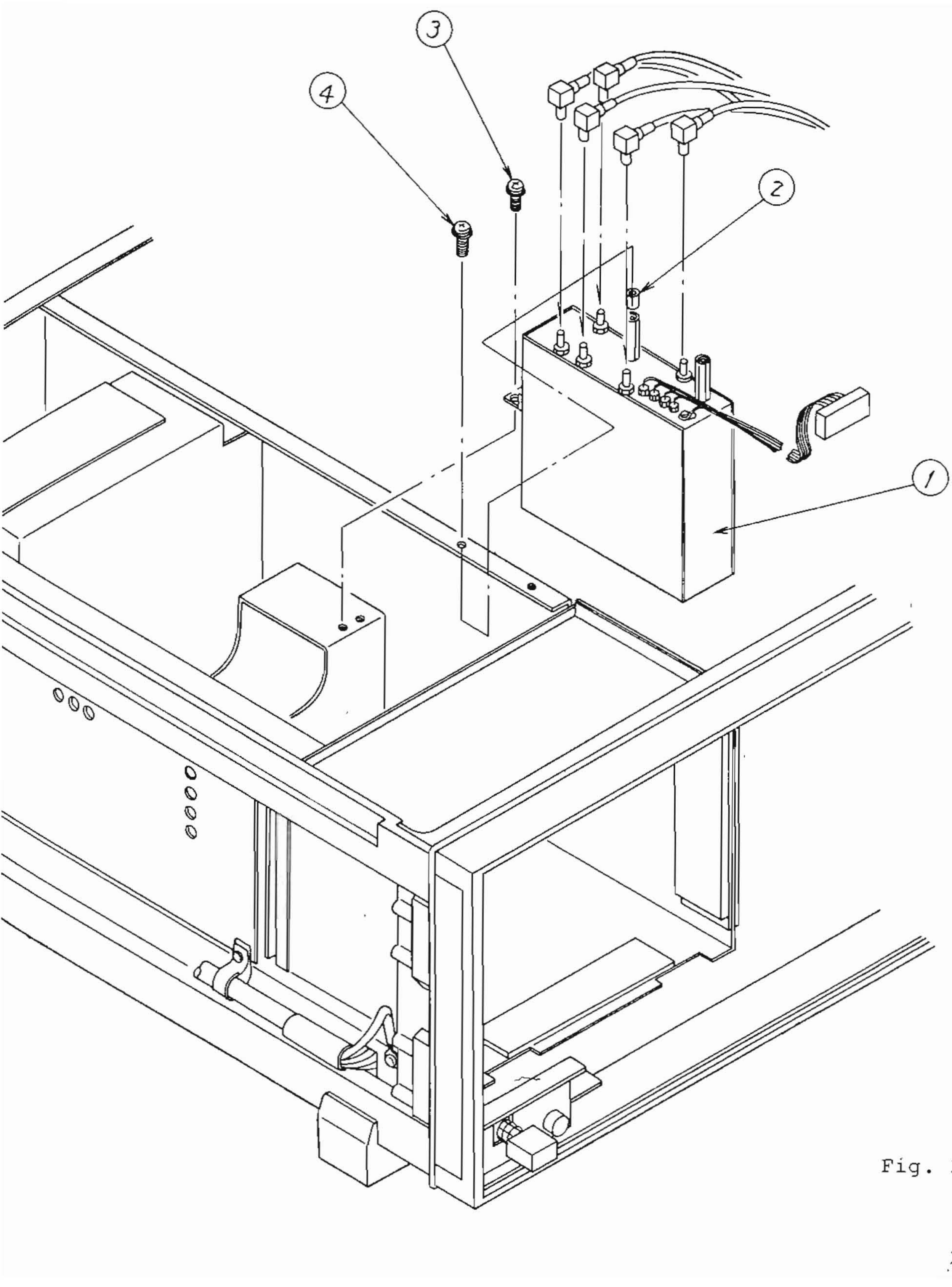
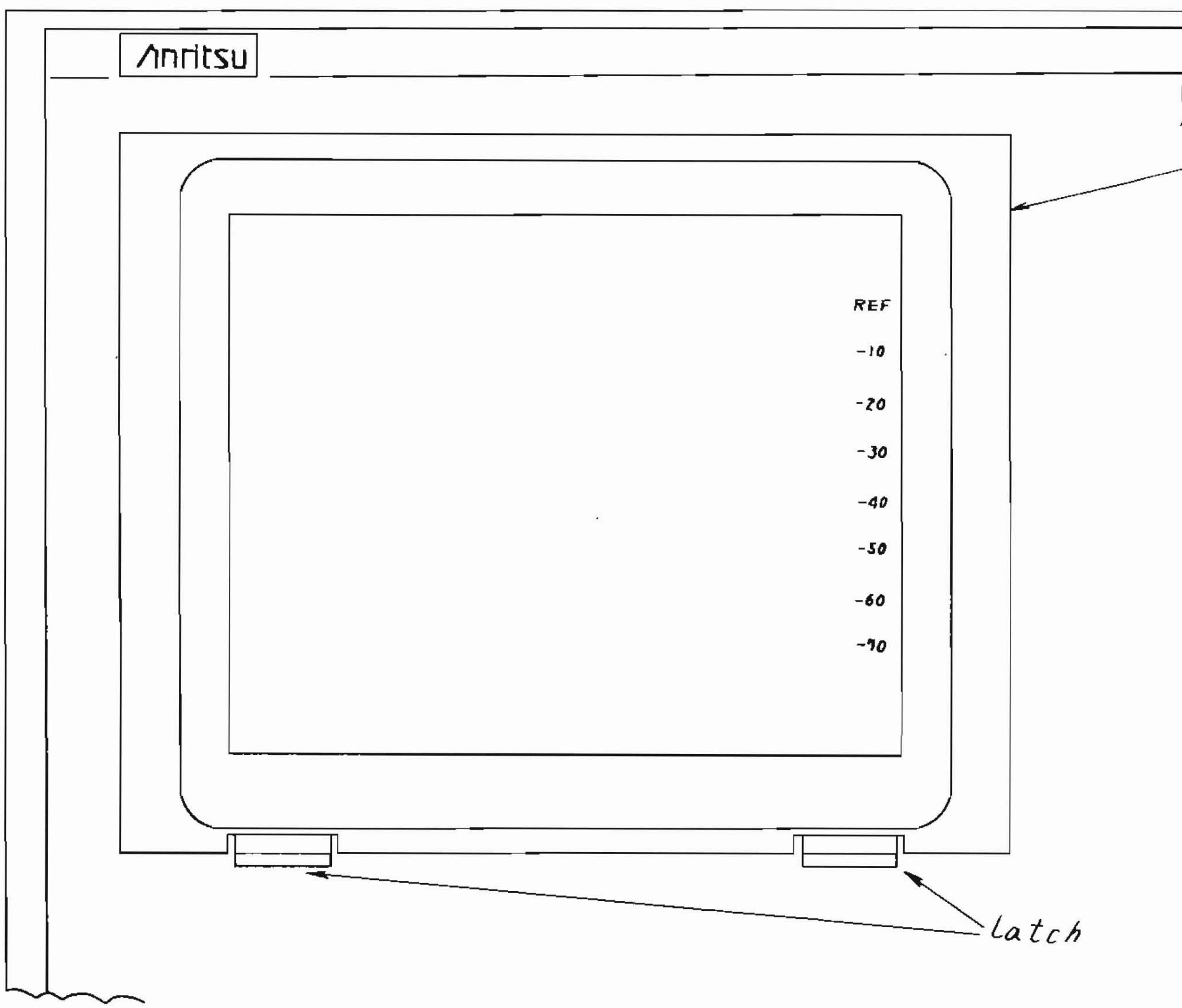


Fig. 2-7 Low Band Local Assembly

2.3 CRT Faceplate Cleaning Procedure

Step	Procedure
1	Turn off the power and remove the power cord from the ac outlet.
2	Lift the bezel latch with a fingertip and pull the bezel toward you.
3	Clean the CRT faceplate with a dry cloth.
4	Insert the tip of the bezel into the latch and push the lower side of the frame to lock the bezel.



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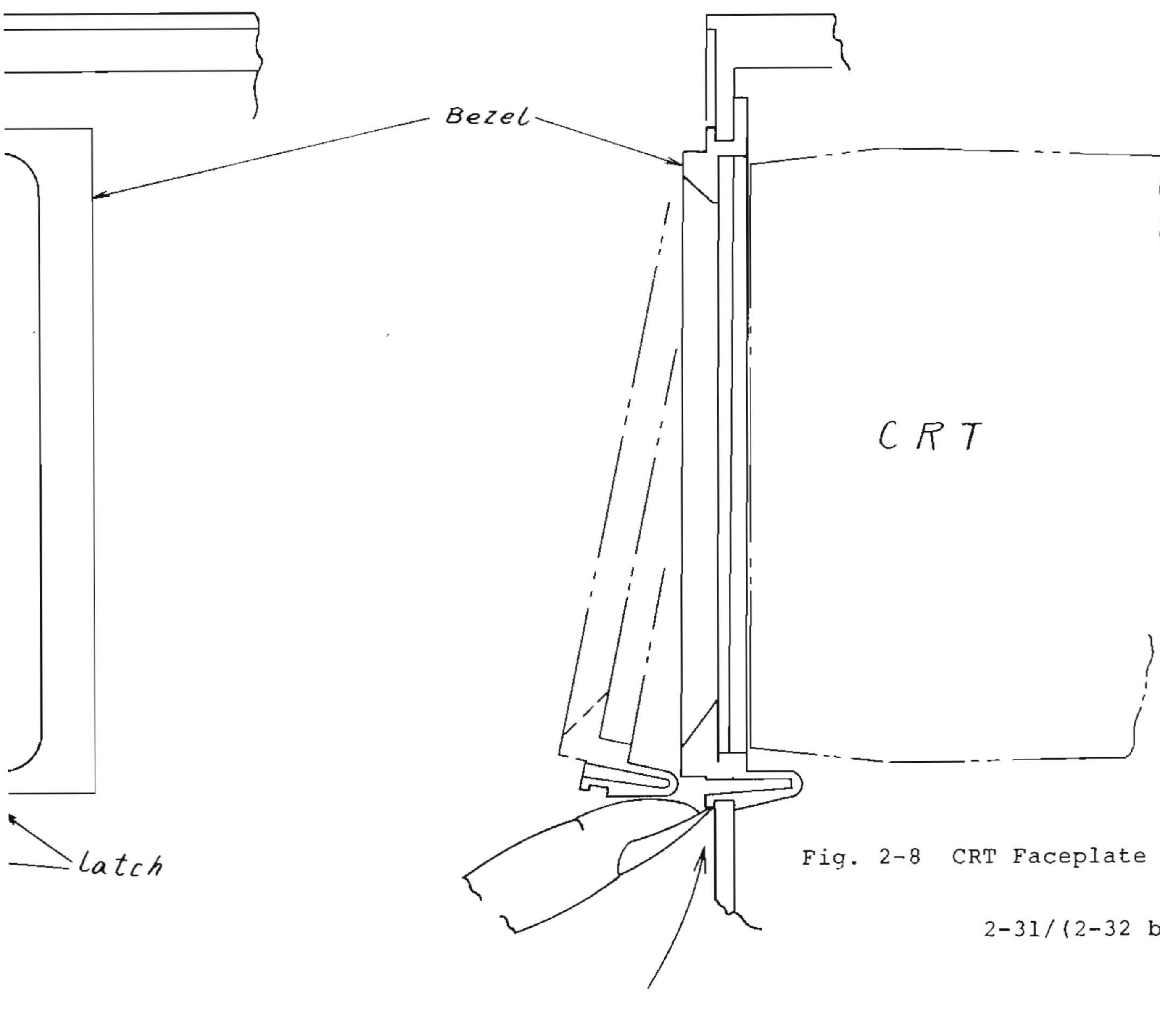


Fig. 2-8 CRT Faceplate Cleaning

SECTION 3

OVERALL CIRCUIT DESCRIPTION

Refer to the Block Diagrams attached at the end of this section.

3.1 Frequency Converters (Ref: Figs. 3-1, 3-2, and 3-3 (1/4))

The MS710[ ] is a swept front-end type superheterodyne spectrum analyzer. The relationship between the RF input frequency and the first local frequency is expressed by the following formula.

$$f_{RF} = N * f_{LO} \pm f_{IF}$$

f_{RF} = RF input frequency f_{LO} = 1st local frequency
f_{IF} = 1st IF frequency (2.5214 GHz or 521.4 MHz)

N is the ordinal number of the local harmonics used for the mixing. The mixing mode is expressed with this number and a plus or minus sign as 1-, 1+, 2-, ---.

The input RF signal in the 100 kHz to 2 GHz range is directed to the Z14 (0 to 2 GHz RF BLOCK) through the Z3 (RF ATT) and Z12 (2 GHz LPF). In this RF BLOCK, the RF signal is mixed with the first local signal of 2.5215 GHz to 4.5214 GHz, and converted to 2.5214 GHz first IF signal. This first IF signal goes to the 2nd converter through a Directional Filter, Preamplifier, and Bandpass Filter. At the 2nd Converter, the 2.5214 GHz IF signal is mixed with the 2nd local signal of 2.5 GHz and converted to the 21.4 MHz IF signal.

The RF signal in the 1.7 to 23 GHz range is directed to the Preselector (Z5 YTF) and then to the Z6 (μ 1st Converter). In this converter unit, the RF signal is harmonicaly mixed with the local signal of 2.2214 to 6.0000 GHz and converted to the first IF signal of 521.4 MHz.

The relationship between the RF INPUT FREQUENCY and the FIRST LOCAL FREQUENCY in each mixing mode is shown in Fig. 3-1 and Fig. 3-2. The 521.4 MHz IF Signal is applied to the μ 2nd Converter (Z18, Z19) and converted to a 21.4 MHz IF signal by mixing it with the 500 MHz 2nd local signal.

The differences in the first Converter efficiency for the different mixing modes are compensated by adjusting the IF amplifier gain in the μ 2nd converter 2 (Z19). The IF signal selection switches are also included in this unit.

Nominal loss or gain of each part is written in Fig. 3-3 (1/4). Overall conversion gain of these frequency converters is typically +7 dB.

The input RF signal in the 10 kHz to 30 MHz range of the MS710C is directed to the Z35 (low 1st MIX) through the Z3 (RF ATT). In Z35, after going through 30 MHz LPF, the RF signal is mixed with the first local signal of 521.4 MHz to 551.4 MHz, and converted to 521.4 MHz first IF signal.

This first IF signal, after passing the switch and IF AMP on the Z36 EXT IF AMP, is sent to the μ 2nd converter (Z18, Z19) and converted to a 21.4 MHz second IF signal in the same way as the 1.7 to 23 GHz range.

In the 18 to 140 GHz EXTERNAL MIXER mode of the MS710C/D, the RF signal input to the external mixer is mixed with the first local signal applied via the Z7 coupler and converted to a 521.4 MHz first IF signal.

Both two- and three-port mixers can be used with the MS710C/D. When the two-port mixer is used, the 521.4 MHz first IF signal is sent to the Z36 EXT IF AMP through the Z8 diplexer. When the three-port mixer is used, the 521.4 MHz first IF signal is sent to the Z36 EXT IF AMP through the EXTERNAL MIXER IF INPUT connector.

One of these 521.4 MHz IF signals is selected by the Z36 EXT IF AMP and sent to the μ 2nd converter (Z18, Z19) via the IF AMP in Z36 in the same way as the 1.7 to 23 GHz range.

3.2 IF Section (Ref: Fig. 3-3 (2/4))

The 21.4 MHz IF signal from the frequency converters is applied to the Z22 IF BPF/AMP 1.

In Z22, the IF signal goes to the two-stage variable bandwidth BPF circuit which sets the resolution bandwidth (RBW) after passing the level calibration attenuator and buffer amplifier. This BPF circuit operates with the subsequent three-stage variable bandwidth BPF circuits to determine the MS710[ ] sensitivity and RBW when the RBW to be set is from 300 kHz to 3 MHz.

The output IF signal of the BPF is switched to one of the two routes according to the RBW setting value after passing the variable gain amplifiers.

When the RBW setting value is less than or equal to 100 kHz, the 21.4 MHz IF signal is mixed with the 19.9 MHz signal and down-converted to a 1.5 MHz signal. This signal goes to the variable gain amplifiers and variable bandwidth BPF circuits which determine the sensitivity and the resolution bandwidth of the analyzer when the RBW setting is between 100 Hz to 100 kHz. Then it is mixed with the same 19.9 MHz signal again and up-converted to the 21.4 MHz IF signal. This reconverted signal is applied to the three-stage BPF circuit whose bandwidth is selectable from 300 kHz to 3 MHz.

When the RBW setting is more than or equal to 300 kHz, the above Down and Up converting processes are bypassed and the input IF signal is directly applied to the three-stage BPF circuit.

The band-limited and level-controlled IF signal is applied to the LOG/LIN amplifier in the Z25. This LOG/LIN amplifier consists of seven amplifier stages and works as a 70 dB log-amplifier or a 10 to 40 dB step gain linear amplifier according to the control signal. After amplification, the IF signal is detected to produce the video signal which is the vertical signal of the analyzer. The detected signal or the video signal goes out to the video signal processing section through the video filter, scale attenuator, and buffer amplifiers. Their sample and hold circuits are used to hold the video signal level when the mixing mode is changed.

3.3 Video Signal Processor and Display Control (Ref: Fig. 3-3 (3/4))

Only when the analyzer is set to the zero-span mode and a fast sweep time of less than 2 ms/div, the video signal is directly sent to the vertical deflection amplifier in the Z30 for the CRT display.

In all other cases, the video signal is sampled or digitized in the Z34 synchronized with the sampling pulses from the sweep signal generator circuit in the Z26. This sampling is managed by a microprocessor in the Z34 and the digitized video signal data are stored in the display RAM in the Z27. The stored data with other character data are readout with a constant refresh rate by the display control circuit to display them on the CRT.

3.4 Local Control Section (Ref: Fig. 3-3 (4/4))

The first local signal of the MS710[ ] is generated by a 2.2 to 6 GHz YIG Tuned Oscillator (Z9 YTO) except for the 10k-30MHz Band of the MS710C. The frequency and sweep width (span) is controlled, using the control circuits in the Z21, by the main microprocessor in the Z26.

To obtain accurate frequency settings, a phase lock loop (PLL) technique is used. For wider spans, the phase lock loop is closed in each sweep reset period to correct the center frequency, and then opened to make a wide frequency sweep. For the narrower spans, the phase lock loop is always closed and the reference oscillator is swept to get a stable swept frequency signal.

When the sweep width* is set to wider than 2 GHz by using START-STOP frequency settings, the first local frequency is swept by the output of the Main Tune D/A converter in the Z21 which is directly controlled by the main microprocessor in the Z26. In this sweep mode, when the local frequency comes to the upper end of the YTO (6 GHz), the harmonic mixing mode is automatically changed. Frequency correction by the PLL is used at the start frequency in each mixing mode. The relationship between the RF frequency and the first local frequency in each mixing mode is shown in Fig. 3-1.

When the sweep width* is less than or equal to 2 GHz, the Main Tune D/A converter is set to the fixed value corresponding to the center frequency. The sweep ramp signal from the generator in the Z26 is used to sweep the YTO as described below. In this sweep mode, the mixing mode is never changed in a sweep because of the 2 GHz overlap at each mixing mode end. The relationship between the RF frequency and the first local frequency is shown in

Fig. 3-2. As far as the YTO can cover the whole sweep width, the lowest mixing mode is chosen in the range where the RF frequency overlaps. This is why the conversion loss is less in the lower mixing mode.

When the sweep width* is between 2 GHz and 21 MHz, the sweep signal from the Z26 is added to the main tune voltage through the Span Control Attenuator. This swept tuning voltage is applied to the YTO main coil to get a swept frequency signal. When the sweep width* is between 20 MHz and 1.01 MHz, the sweep signal is applied to the FM coil of the YTO while the main tune voltage is fixed to the center frequency value to get a stable narrow span swept signal. In both cases the center frequency is corrected in the sweep reset period by the PLL.

When the sweep width* is less than 1 MHz, the PLL is always closed and the reference oscillator for the PLL is swept.

The simplified block diagram of this PLL circuit and formulae for the frequency at each section are shown in Fig. 3-4.

A part of the first local signal is branched by couplers and applied to the PLL Block (Z16). In this block, the local signal is applied to the sampler (Z16-Z3). At the sampler it is mixed with the high ordinal (16th to 47th) harmonics of the sampling signal which is generated at the M/N VCO (Z16-Z6) and divided by 8 at the pulse amplifier (Z16-Z5). At the YTO PD circuit (Z16-Z9) the difference frequency signal from the sampler is phase locked to the 17.4 MHz reference signal which is generated by the REF VCO and divided by 8 in the Z21. The correction voltage for the center frequency is held in a sample and hold circuit (a part of Z16-Z10) while the wide sweep is operating.

As the frequency of the M/N VCO is controlled by a sub PLL circuit precisely according to the equation shown in Fig. 3-4, the center frequency can be determined with an accuracy of ±30 kHz, except for sweep signal error. The sub PLL circuit for the M/N VCO consists of the 5 x 100 MHz (Z16-Z8), M/N MIX (Z16-Z7), M/N PD (part of Z16-Z10) and a clock oscillator with programmable divider in the Z26.

All the internal settings and controls for these circuits in the PLL are managed by the main microprocessor.

The preselector (Z5 YTF; YIG Tuned Filter) tuning signal is generated in the Z21 by using the main tune signal and the information for the harmonic mixing mode. The mixer bias for the μ 1st converter and IF gain control signal for loss compensation at the μ 2nd converter (2) is also supplied from the circuit in the Z21.

* The term "Sweep Width" refers to the "Sweep Width of the first local oscillator." This is equal to the "span" set by the front panel operation only when the fundamental mixing mode (1+ or 1-) is used. When a higher mixing mode is used, the "Sweep Width" is equal to the value of "span divided by the harmonic number." For example, when the 4+ mode is used, the sweep width is only 500 MHz even if the span is set to the 2 GHz or 200 MHz/div by a panel operation.

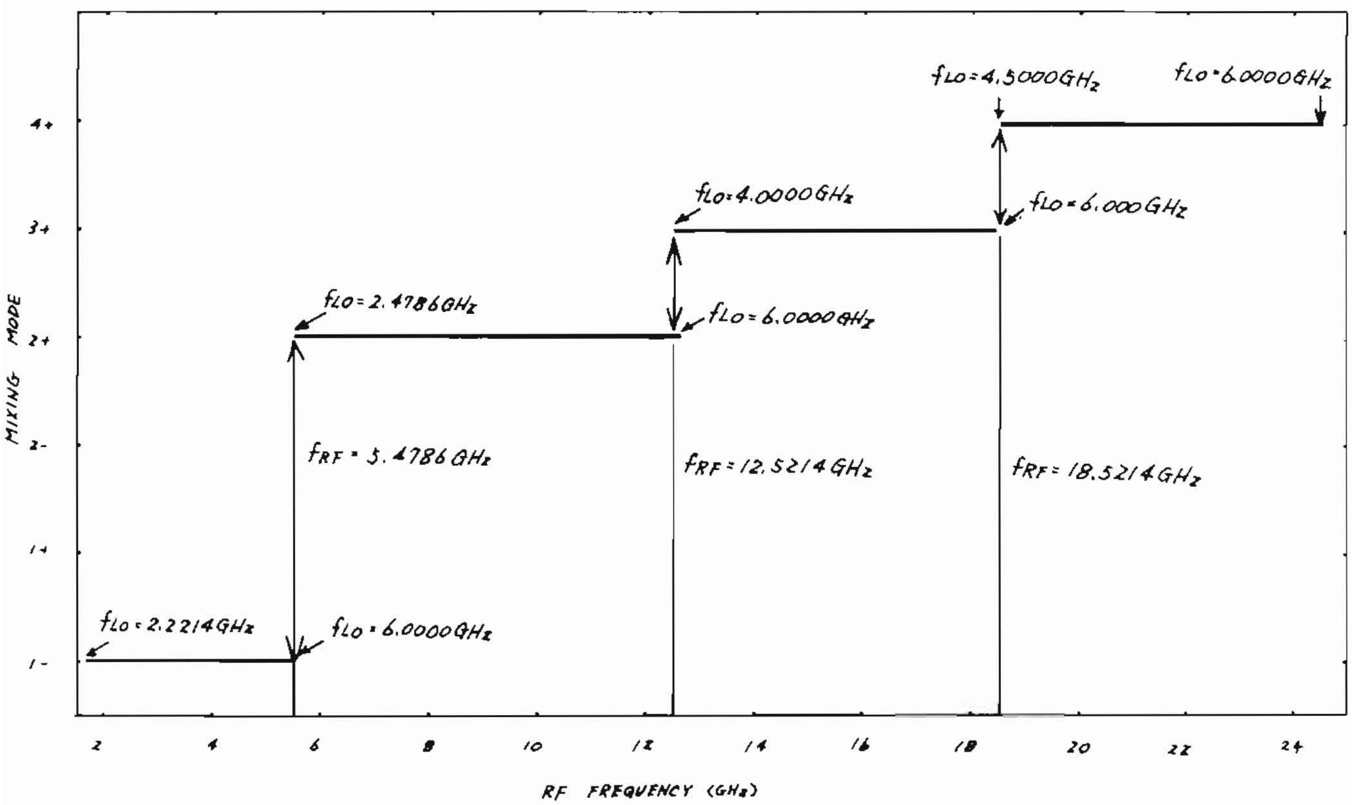


Fig. 3-1 Harmonic Mixing Mode Change for Span > 2 GHz (200 MHz/div)

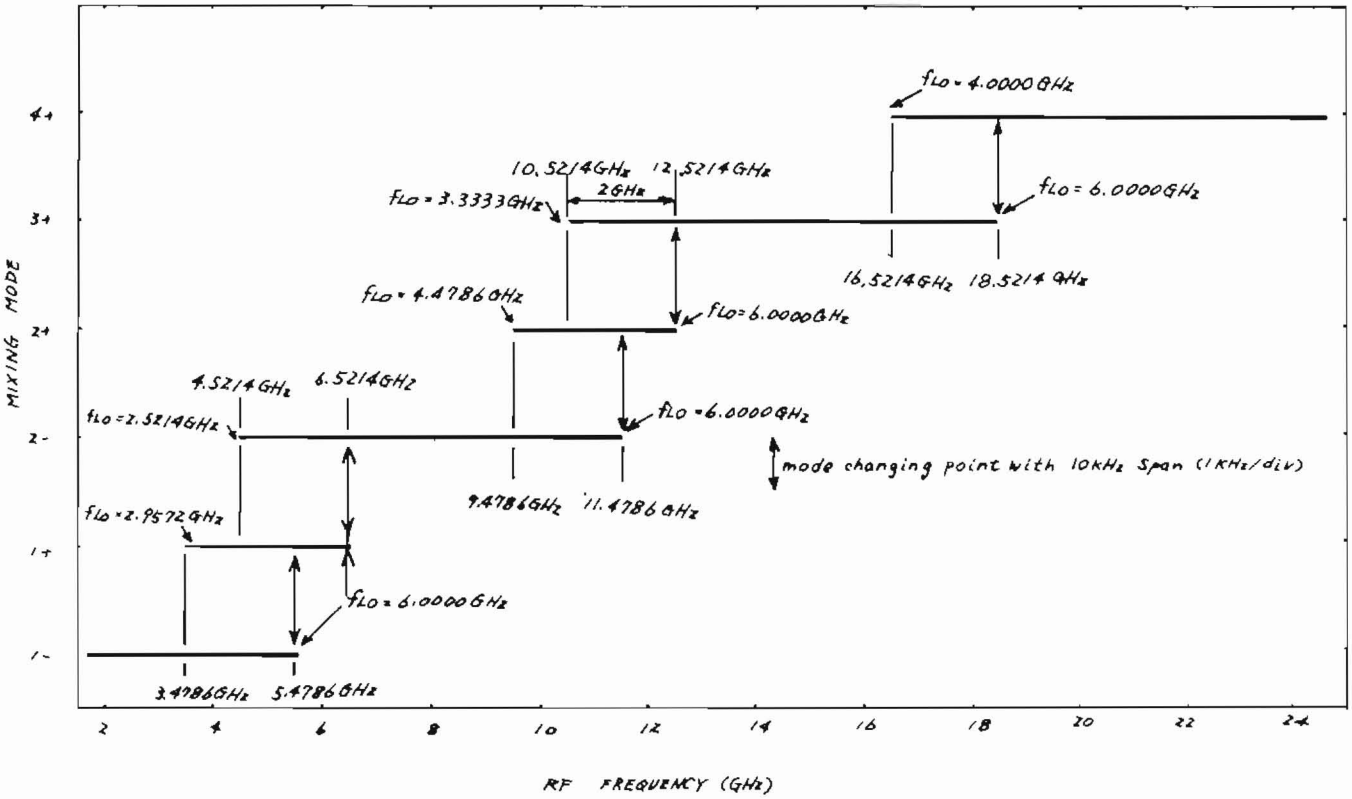
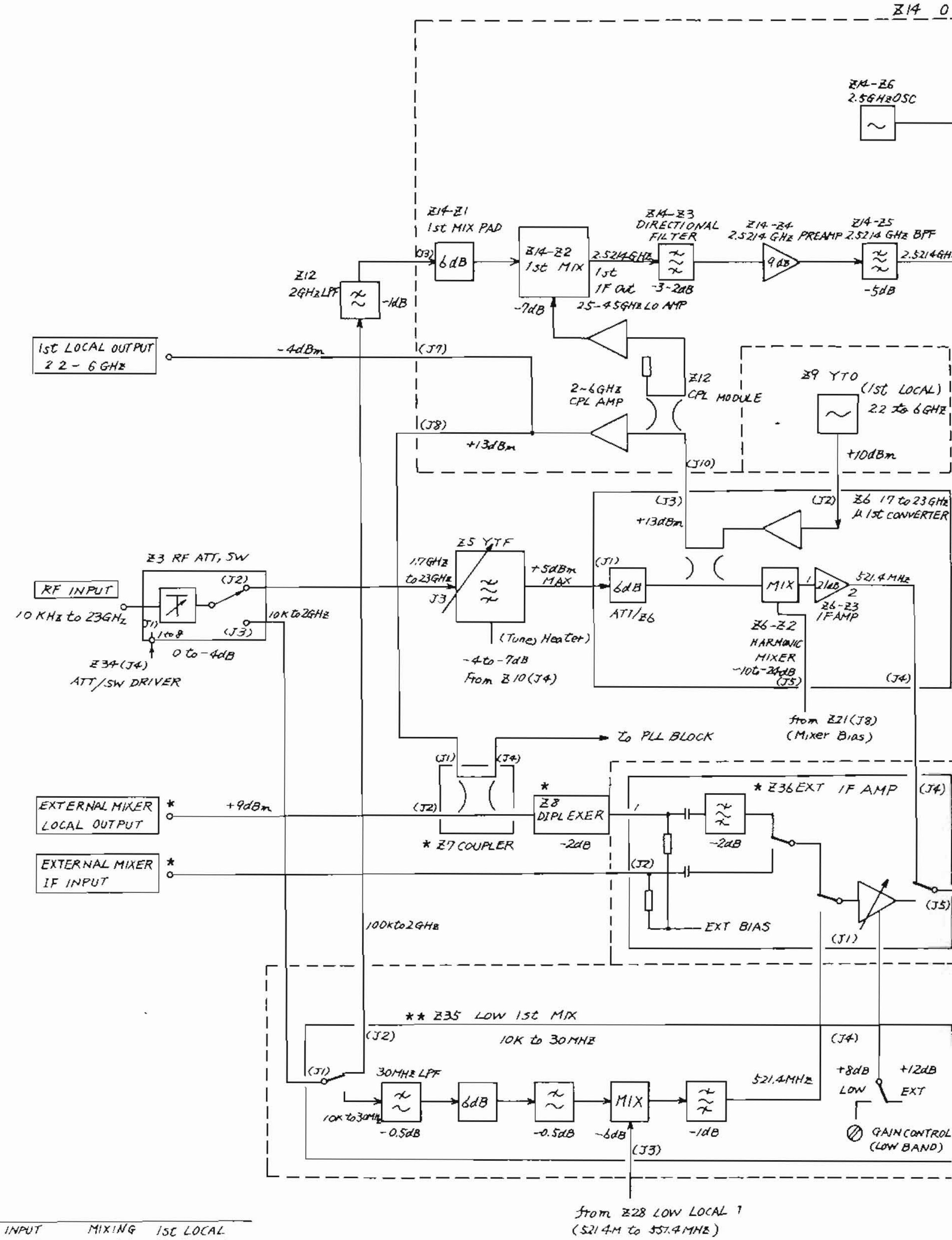
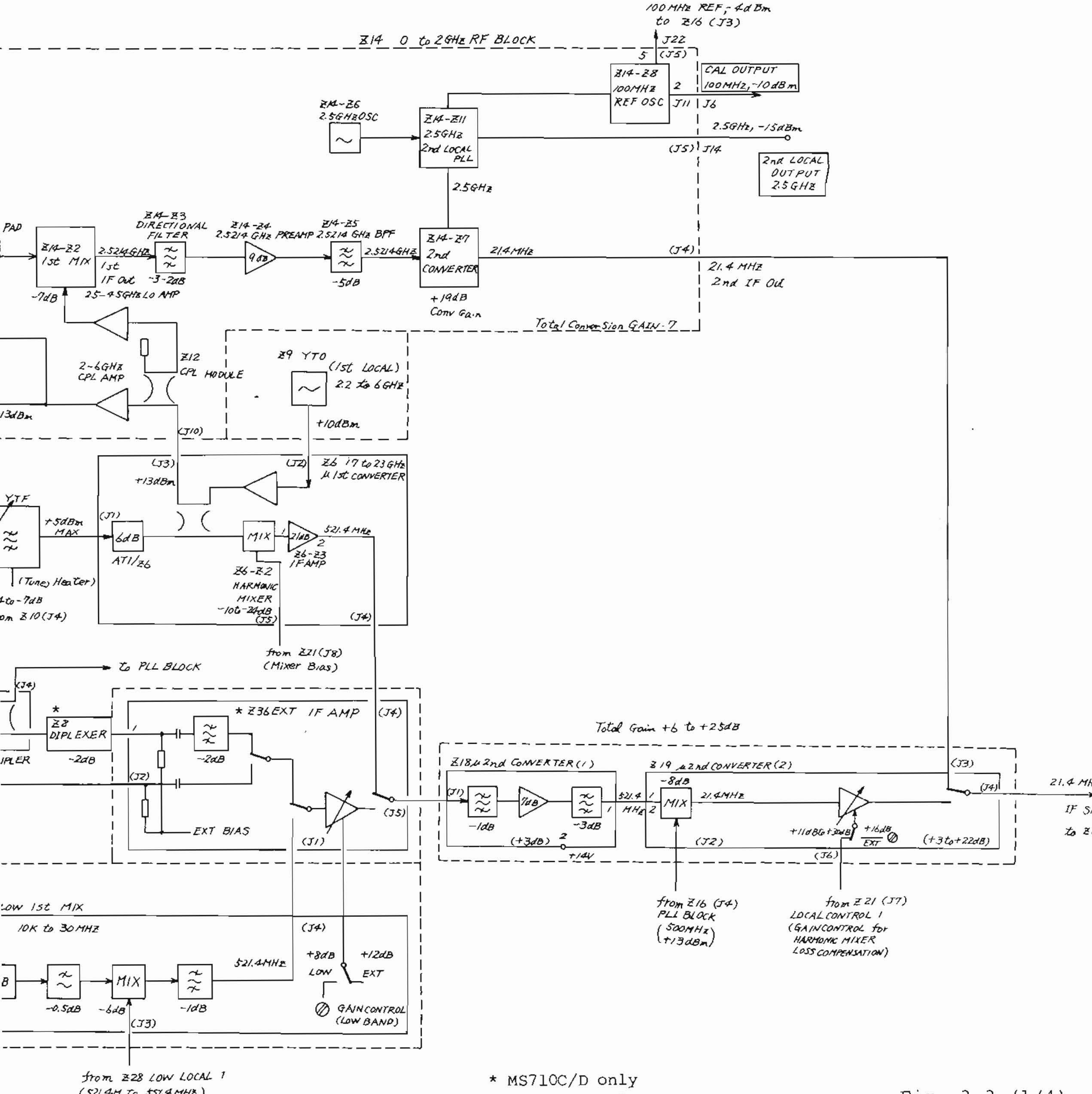


Fig. 3-2 Harmonic Mixing Mode Change for Span $\leqq$ 2 GHz ($\leqq$ 200 MHz/div)

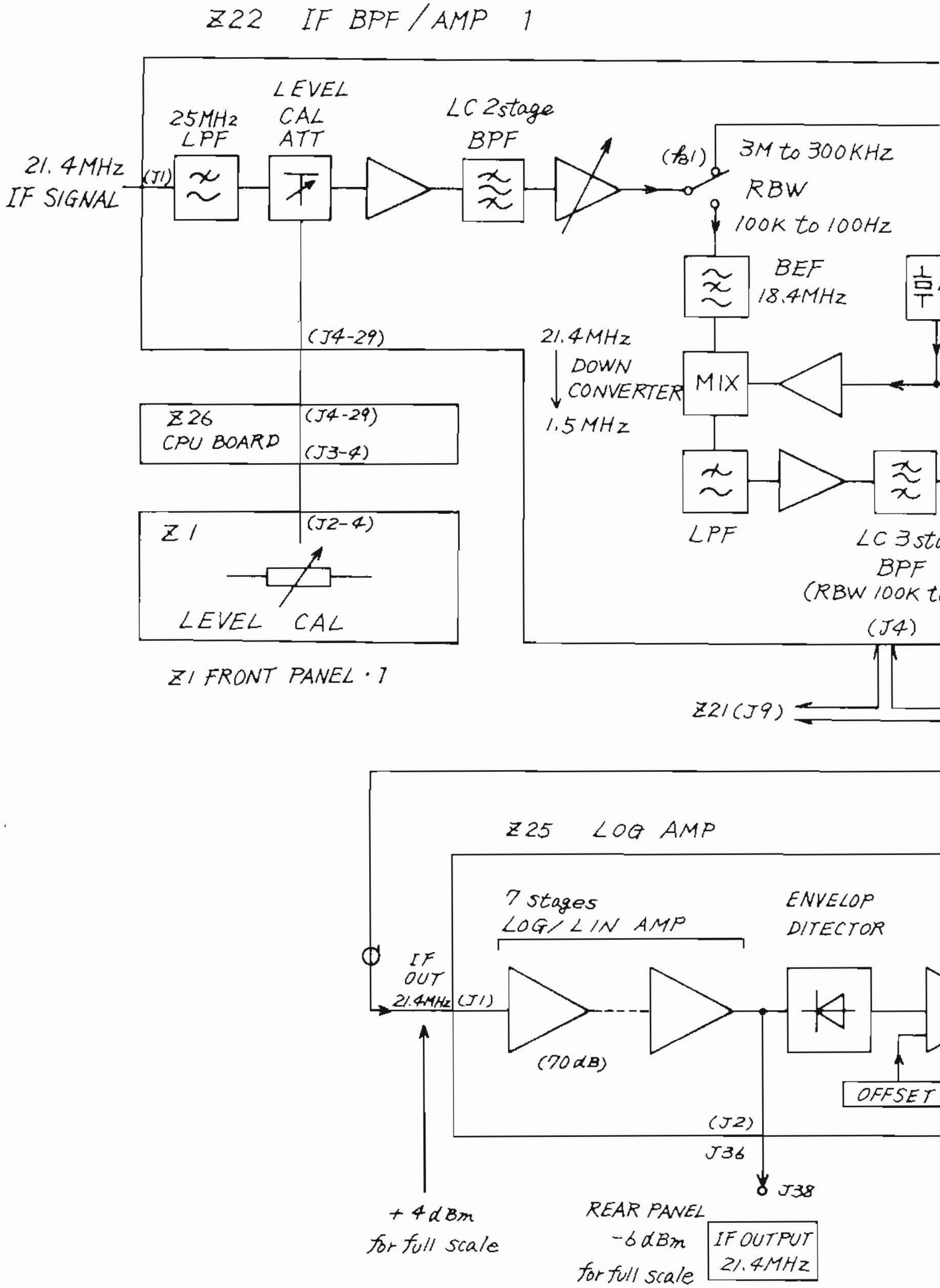


RF INPUT FREQ (GHz)	MIXING MODE	1st LOCAL FREQ. (GHz)
10K to 30 MHz	1⁻	0.52141 to 0.5514
0.0001 to 2.0000	1−	2.5215 to 4.5214
1.7000 to 5.4786	1−	2.2214 to 6.0000
3.4786 to 6.5214	1+	2.9572 to 6.0000
4.5214 to 11.4786	2−	2.5214 to 6.0000
5.4786 to 12.5214	2+	2.4786 to 6.0000
10.5213 to 18.5214	3+	3.3333 to 6.0000
16.5214 to 24.5214	4+	4.0000 to 6.0000



* MS710C/D only
** MS710C only

Fig. 3-3 (1/4)
MS710[ ] Block D
(Frequency Conve


Z22 IF BPF / AMP 1
21.4MHz IF SIGNAL
(J1)
25MHz LPF
LEVEL CAL ATT
LC 2stage BPF
(RL1)
3M to 300KHz
RBW
100K to 100Hz
BEF 18.4MHz
(J4-29)
21.4MHz DOWN CONVERTER 1.5MHz
MIX
LPF
LC 3st
BPF
(RBW 100K t
(J4)
Z26 CPU BOARD
(J4-29)
(J3-4)
Z1
(J2-4)
LEVEL CAL
Z1 FRONT PANEL · 1
Z21 (J9)
Z25 LOG AMP
7 stages
LOG/LIN AMP
ENVELOP DITECTOR
IF OUT 21.4MHz
(J1)
(70dB)
OFFSET
(J2)
J36
J38
+4dBm for full scale
REAR PANEL
-6dBm for full scale
IF OUTPUT 21.4MHz

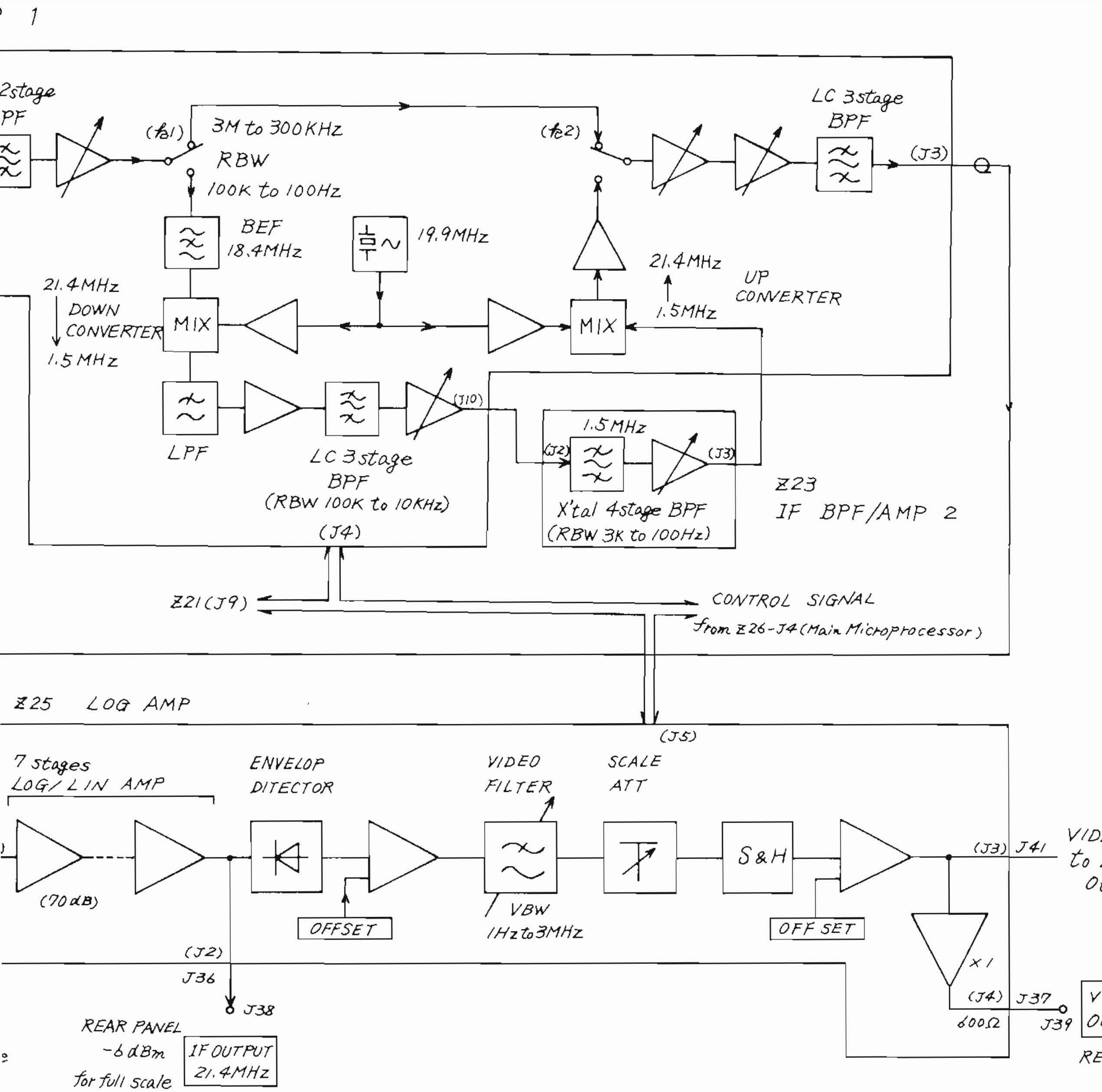
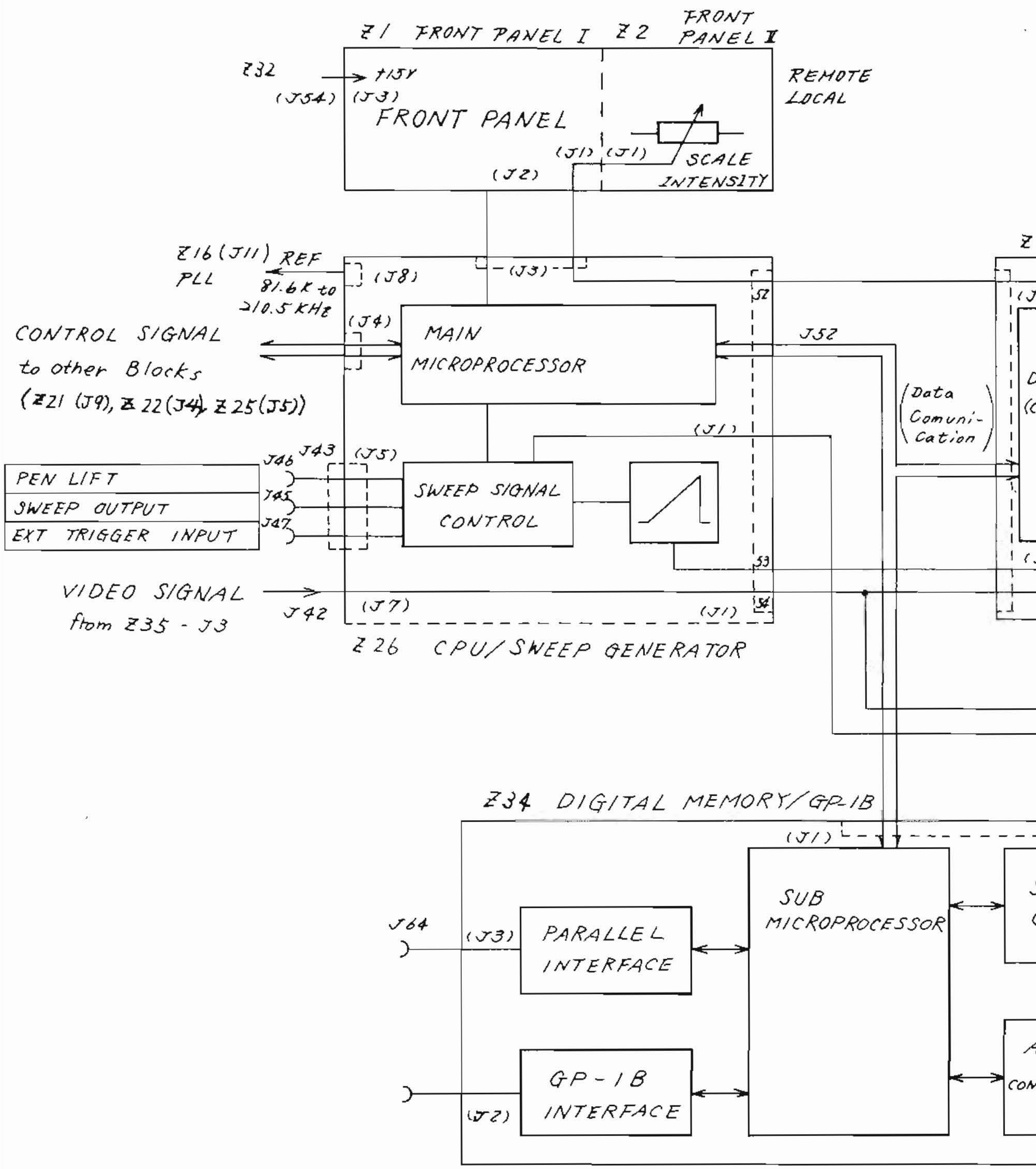


Fig. 3-3 (2/4)

MS710[ ] Block Diagr
(IF Section)



Z1 FRONT PANEL I
Z2 FRONT PANEL II
Z32
+15V
(J54) (J3)
FRONT PANEL
REMOTE LOCAL
SCALE INTENSITY
(J1) (J1)
(J2)
Z16 (J11) REF PLL
81.6K to 210.5KHz
(J8)
(J3)
CONTROL SIGNAL to other Blocks (Z21 (J9), Z22 (J4), Z25 (J5))
(J4)
MAIN MICROPROCESSOR
J52
(Data Comunication)
(J1)
PEN LIFT
SWEEP OUTPUT
EXT TRIGGER INPUT
J46 J43 (J5)
J45
J47
SWEEP SIGNAL CONTROL
VIDEO SIGNAL from Z35 - J3
J42 (J7)
(J1)
Z26 CPU/SWEEP GENERATOR
Z34 DIGITAL MEMORY/GP-IB
(J1)
SUB MICROPROCESSOR
J64 (J3)
PARALLEL INTERFACE
GP-1B INTERFACE
(J2)

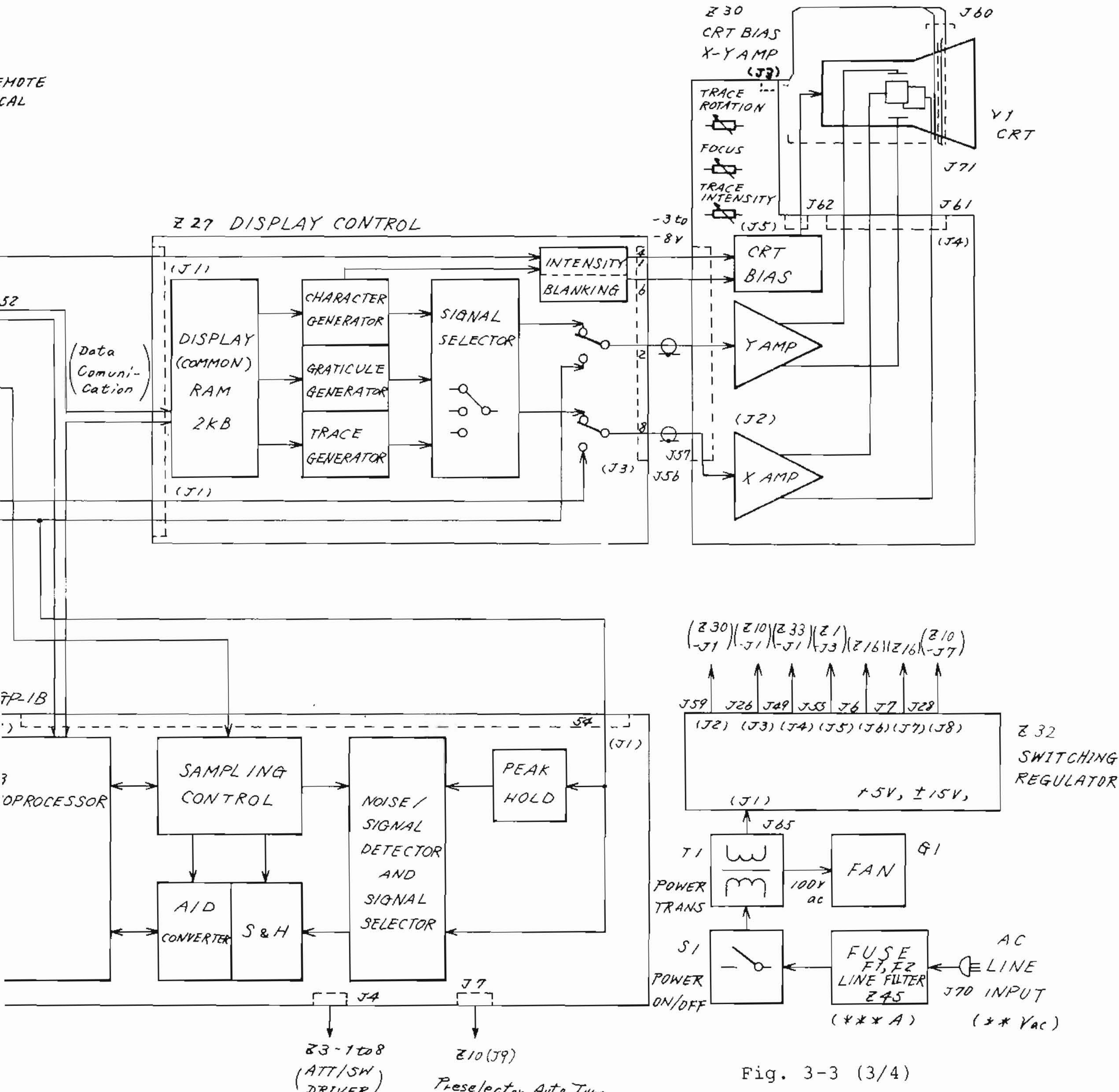
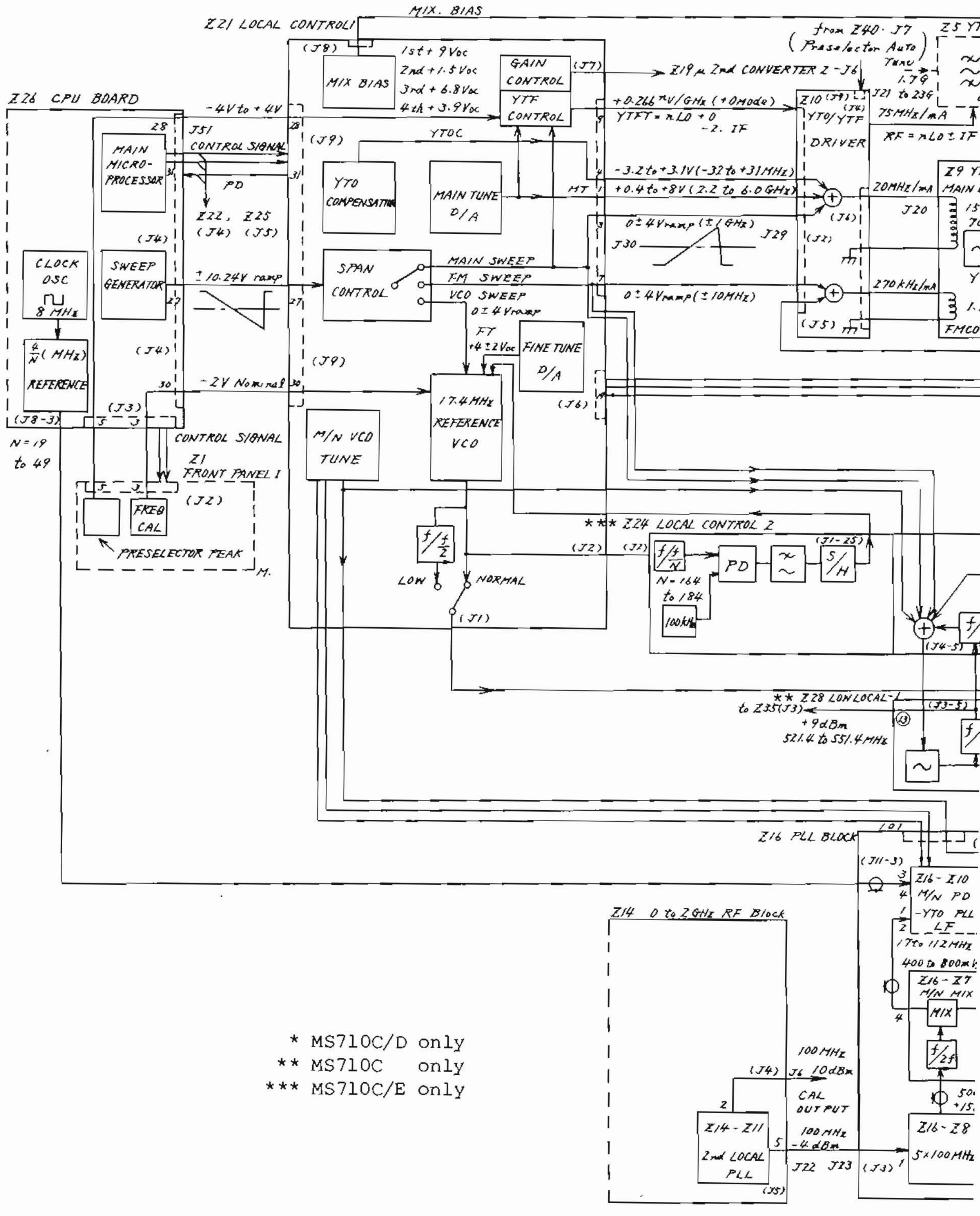


Fig. 3-3 (3/4)

MS710[ ] Block Diagram (3/4)
(Video Signal Processor
and Display Control)



* MS710C/D only
** MS710C only
*** MS710C/E only

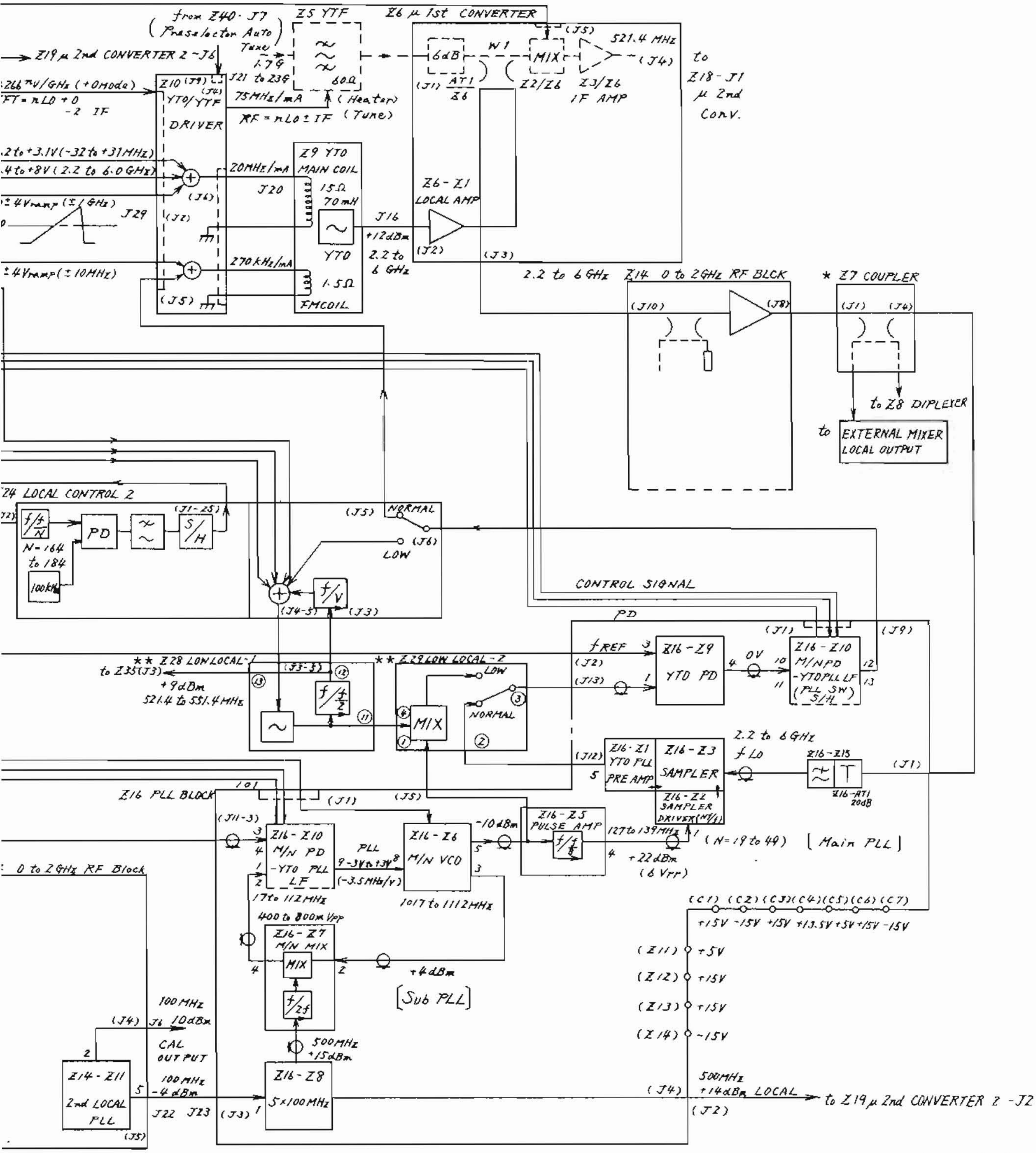


Fig. 3-3 (4/4)

MS710[ ] Block Diagram (4
(Local Control Section)

When PLL Closed

(Normal Band)

$f_{M/N} = 1000 + 16 \cdot \frac{M}{N}$ (MHz)

$f_{LO} = f_{REF} + \frac{N \cdot f_{M/N}}{8}$

$\quad = f_{REF} + 125N + 2M$ (MHz)

N (= 16 to 47) and
M (= 50 to 112) are chosen
to the appropriate value
by the microprocessor

Example:

If f_{RF} = 3000 MHz
then f_{LO} must be
3.000 + 521.4 = 3521.4 MHz

In this case
N = 27, M = 64 are used
resulting for f_{REF} = 18.4 MHz,
f_{LO} = 18.4 + 125 x 27 + 2 x 64
= 3521.4 (MHz)

By changing the M by one,
f_{LO} can be changed exactly
by 2 MHz.
For the fine tuning between
these 2 MHz steps, fine
frequency tuning of REF VCO
(f_{REF}) is used.

(Low Band) **

N = 16 (fixed)

$f_{M/N} = 1000 + M$ (MHz)

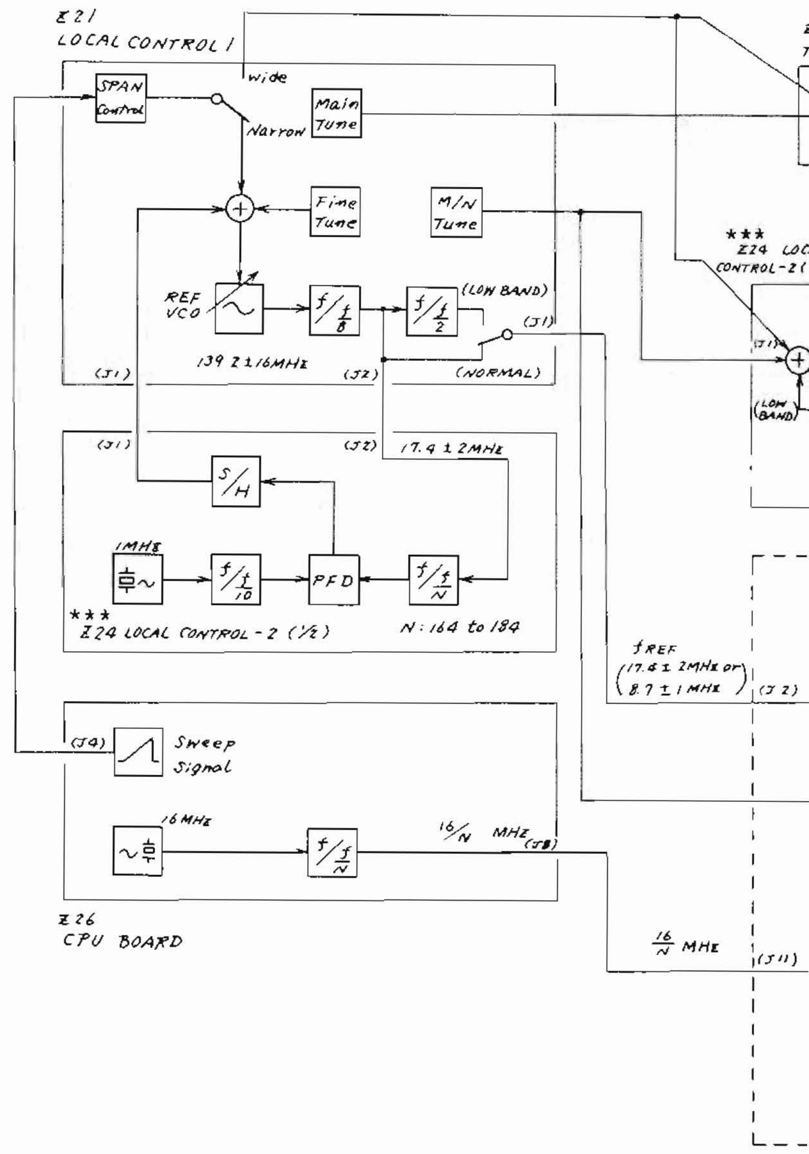
$2 \cdot f_{LLO} = f_{REF} + f_{M/N}$

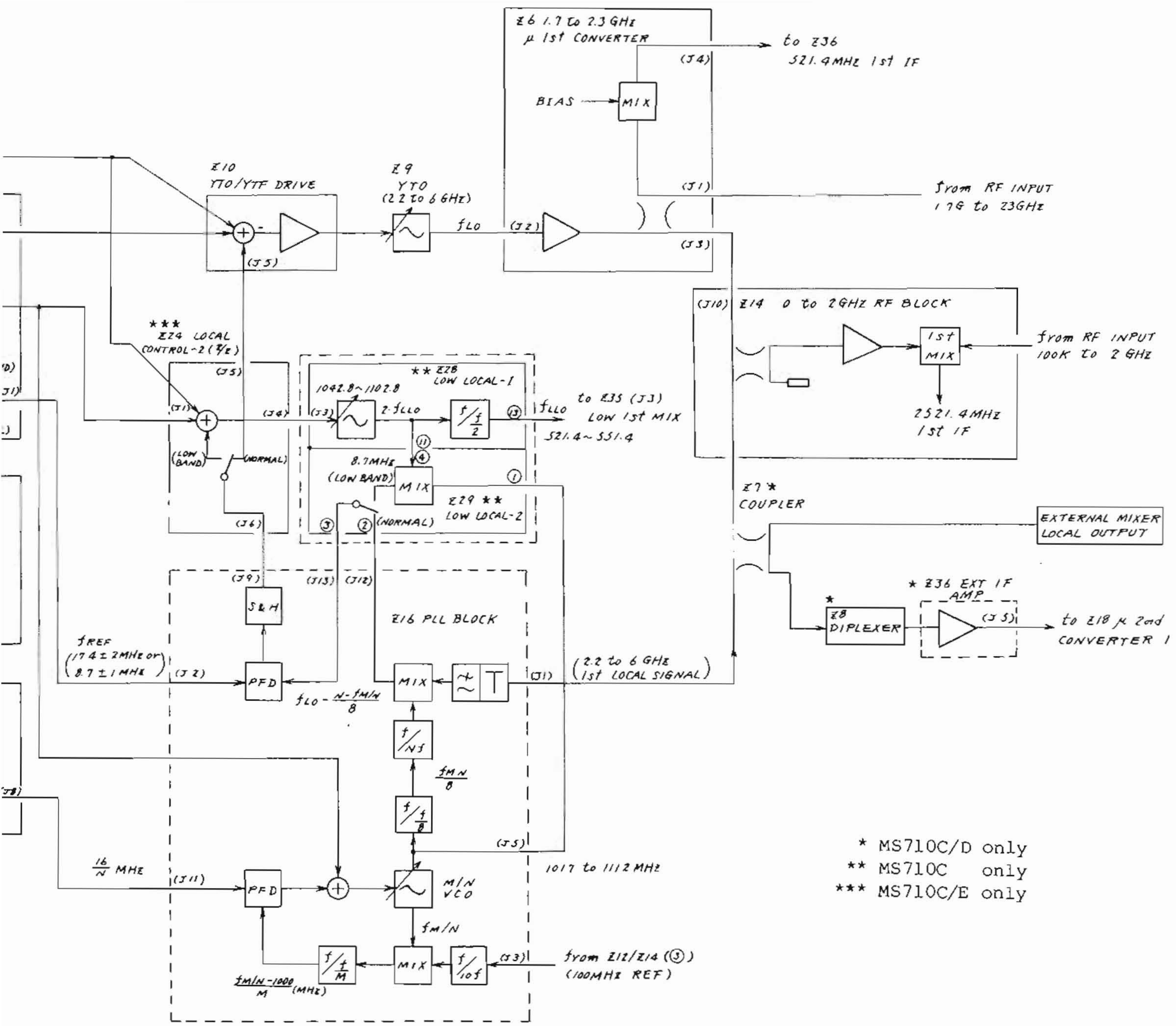
$f_{LLO} = \frac{1}{2}(f_{REF} + f_{M/N})$ (MHz)

M (=34 to 94) are chosen
to the appropriate value
by the microprocessor

Example:

IF f_{RF} = 15 MHz
then f_{LLO} must be
15 + 521.4 = 536.4 MHz
In this case
M = 64 is used
resulting for f_{REF} = 8.8 MHz
$f_{LLO} = \frac{1}{2}$ (8.8 + 1064)
= 536.4 MHz





* MS710C/D only
** MS710C only
*** MS710C/E only

Fig. 3-4 PLL CIRCUIT Simplified Block Diagram

SECTION 4

OVERALL TROUBLESHOOTING

Refer to the MS710[ ] circuit diagram attached at the end of this section.

4.1 Introduction

This section explains which part (up to the block level) is to be checked according to the failure symptoms. Refer to the circuit explanations in Section 3 before troubleshooting, because the entire signal flow must be fully understood beforehand.

4.2 Troubleshooting

4.2.1 Faulty block location troubleshooting

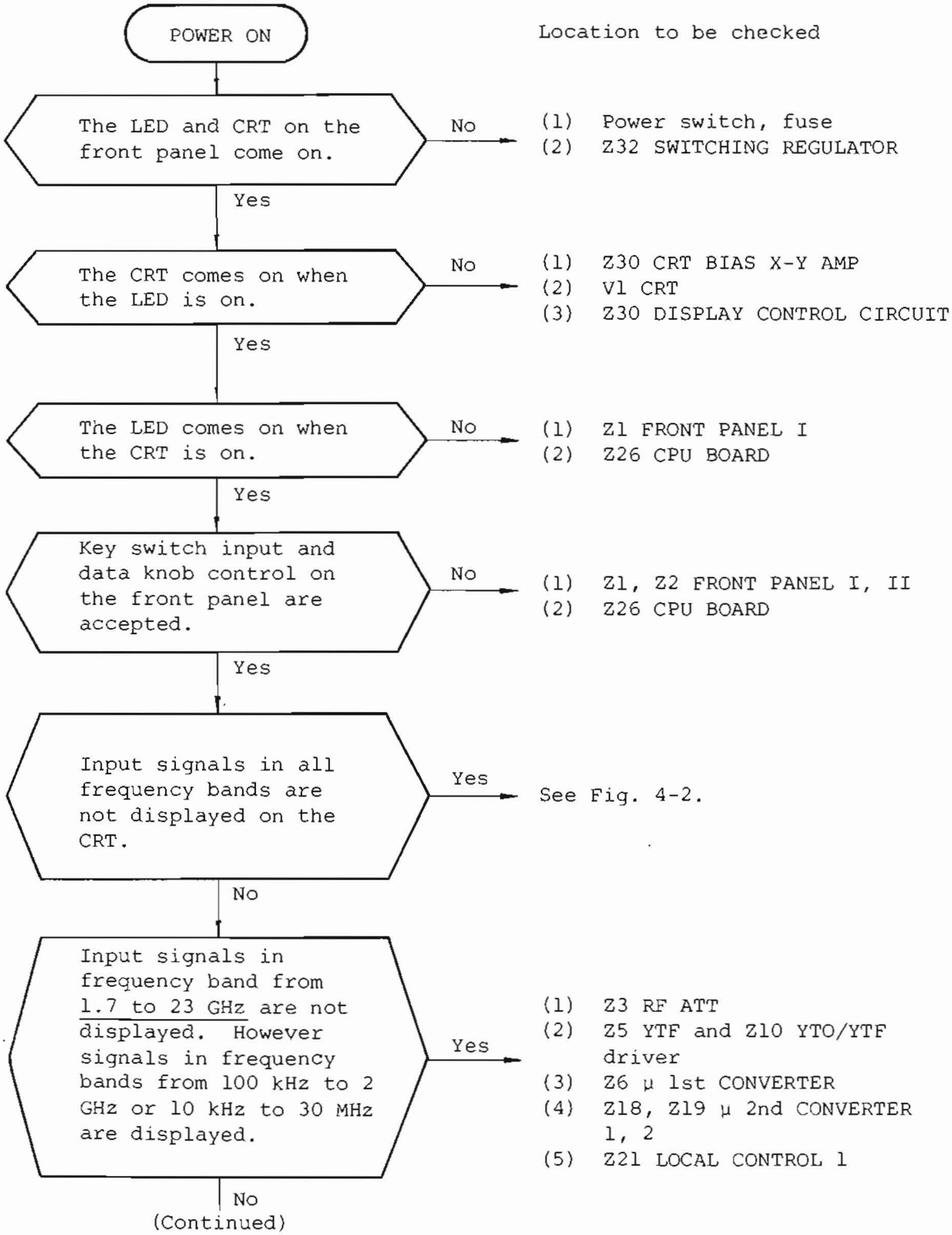


Fig. 4-1 (1/2) Faulty Block Location Troubleshooting Flowchart

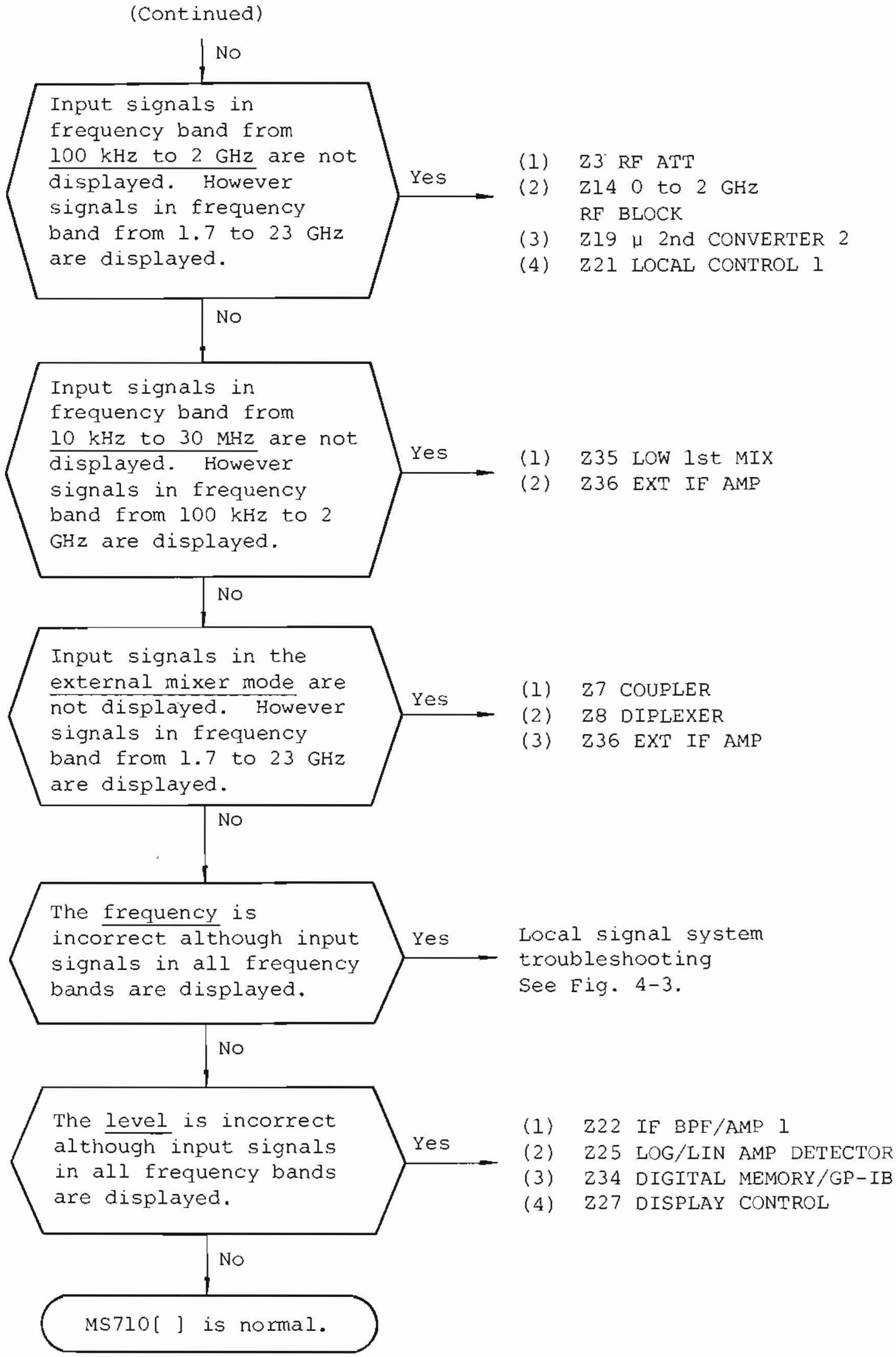


Fig. 4-1 (2/2) Faulty Block Location Troubleshooting Flowchart

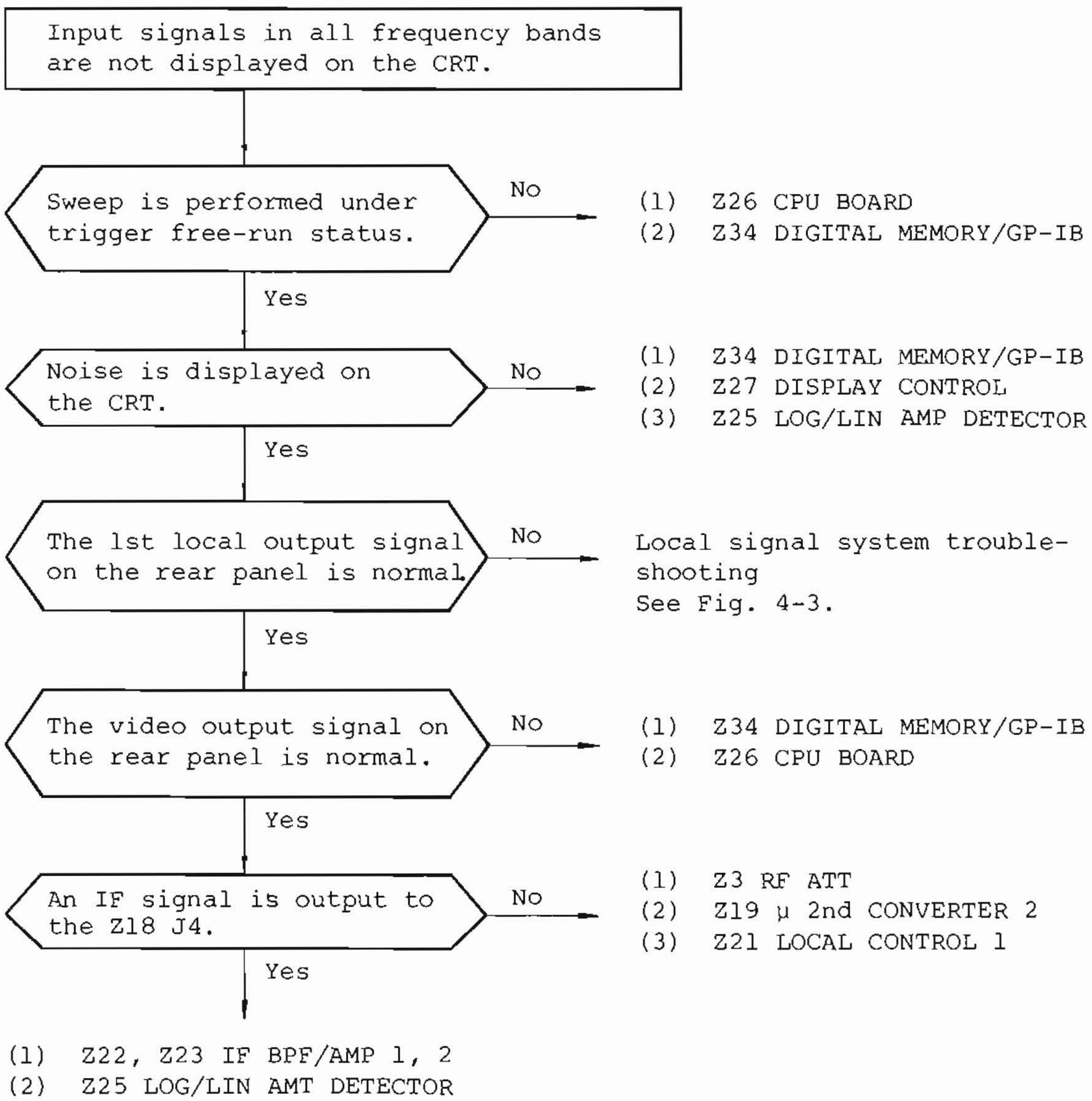


Fig. 4-2 Troubleshooting Flowchart (When Input Signals In All Freq. Bands [10 k to 30 MHz, 100 k to 2 GHz, 1.7 to 23 GHz] Are Not Displayed.)

4.2.2 Local signal system troubleshooting (Ref. Figs. 3-3 (4/4) & 3-4)

As explained in paragraph 3.4, many parts are related to the MS710C local signal control system. Simplified troubleshooting can be done according to the following procedures:

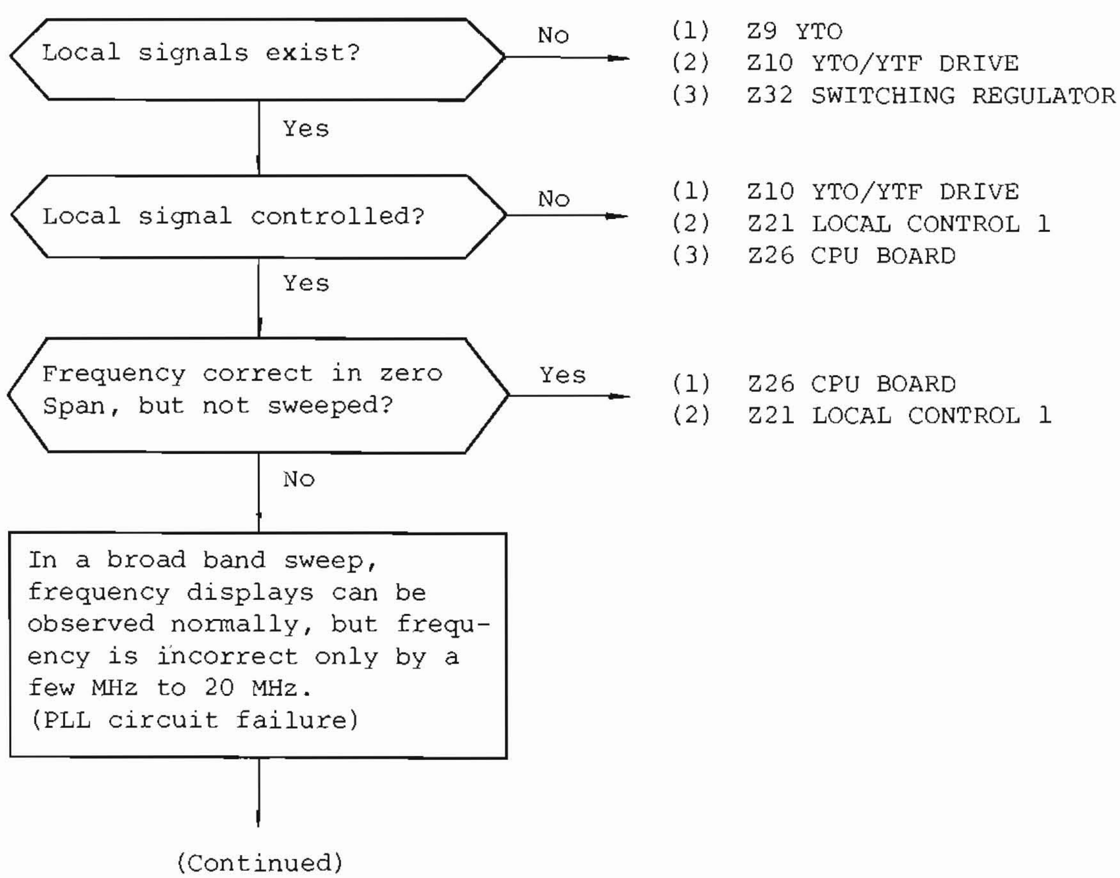


Fig. 4-3 (1/2) Troubleshooting Flowchart (When Local Signal System Is Faulty)

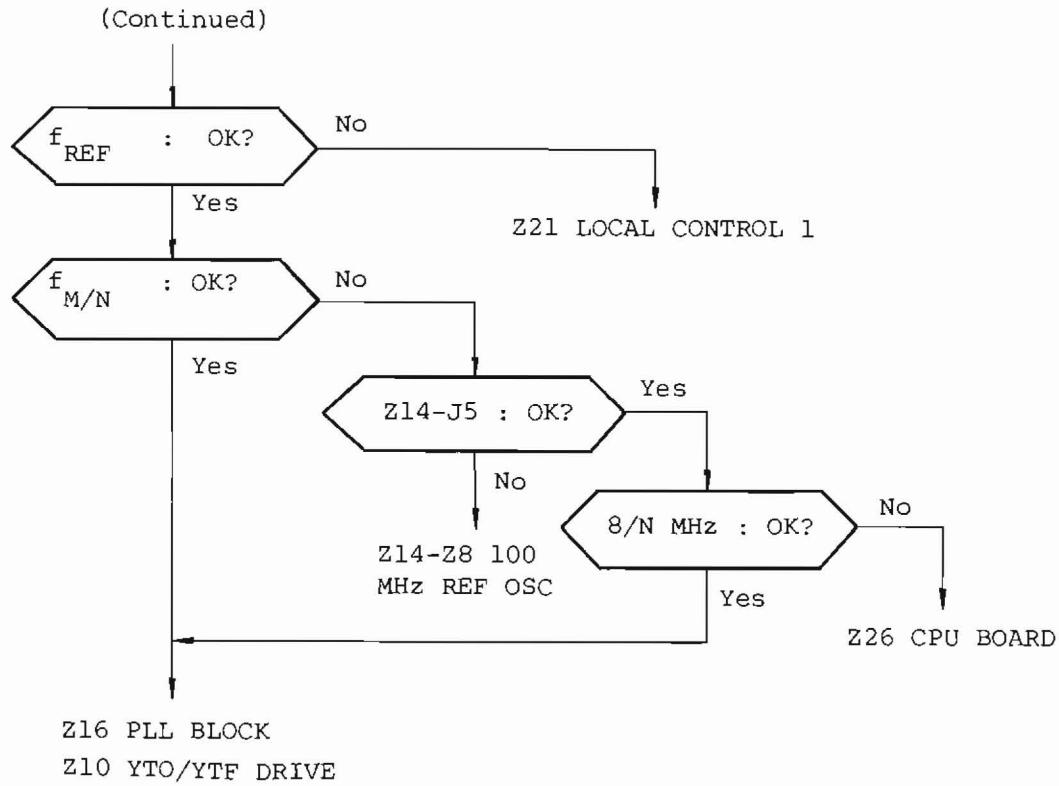


Fig. 4-3 (2/2) Troubleshooting Flowchart (When Local Signal System Is Faulty)

The best method of local signal system troubleshooting is to check each checkpoint frequency (Fig. 3-4) by setting zero span. The relationship between the center frequency and 1st local frequency is explained in paragraph 3.1. The relationships between 1st local frequency, M and N values, and f(M/N) values are listed in Table 4-1 shown below.

Table 4-1 (1/2) Relationship among N, M and F(M/N) for F(LO) (1st Local Frequency)

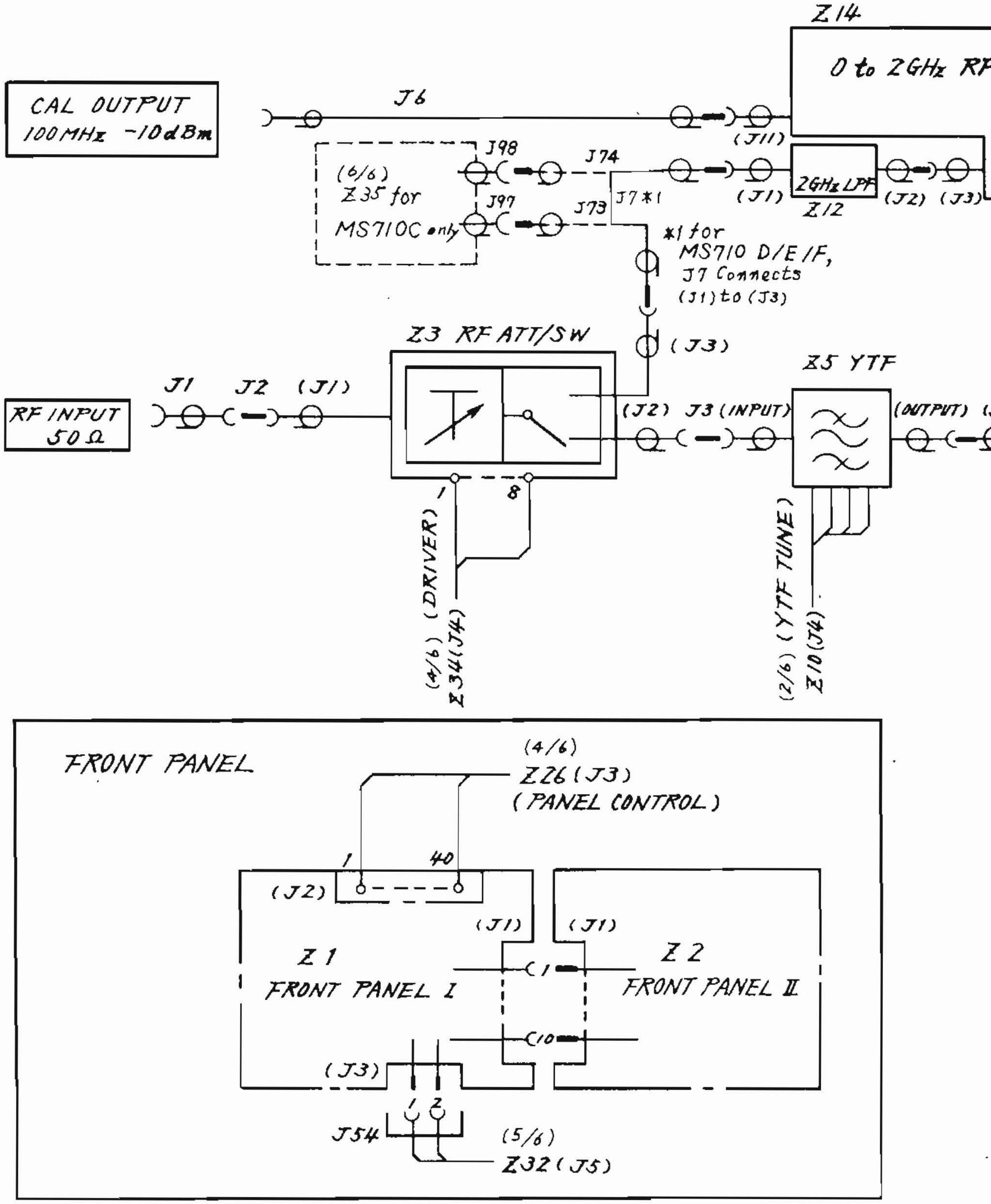
[F(LO) = Fref + 125N+2M (Fref=18.4 MHz) $F(M/N) = 1000 + 16\frac{M}{N}$]

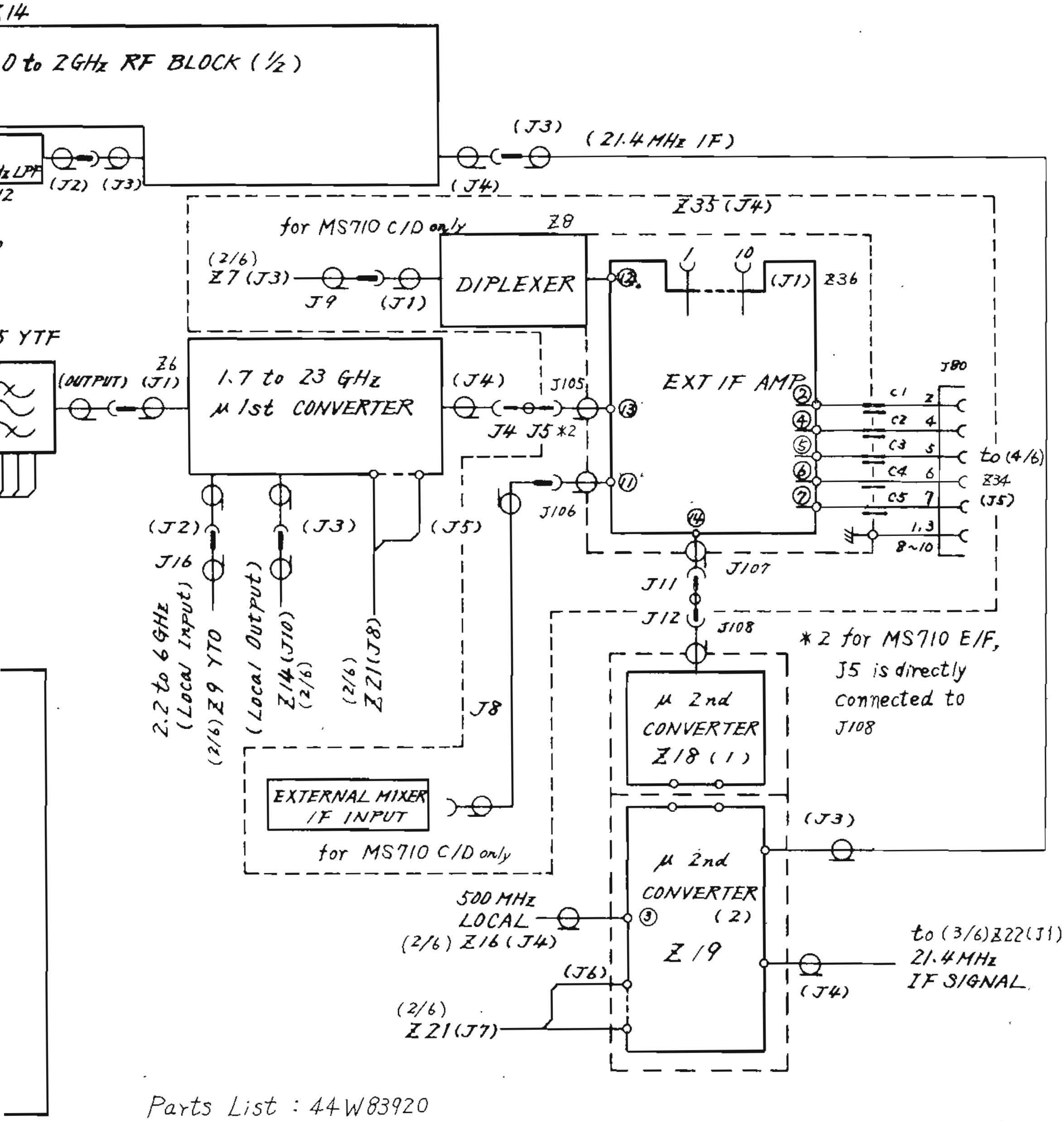
F(LO) MHz	N	M	F(M/N) MHz
2118.4	16	50	1050.00
2242.4	16	112	1112.00
2243.4	17	50	1047.06
2367.4	17	112	1105.41
2368.4	18	50	1044.44
2492.4	18	112	1099.56
2493.4	19	50	1042.11
2617.4	19	112	1094.32
2618.4	20	50	1040.00
2742.4	20	112	1089.60
2743.4	21	50	1038.10
2867.4	21	112	1085.33
2868.4	22	50	1036.36
2992.4	22	112	1081.45
2993.4	23	50	1034.78
3117.4	23	112	1077.91
3118.4	24	50	1033.33
3242.4	24	112	1074.67
3243.4	25	50	1032.00
3367.4	25	112	1071.68
3368.4	26	50	1030.77
3492.4	26	112	1068.92
3493.4	27	50	1029.63
3617.4	27	112	1066.37
3618.4	28	50	1028.57
3742.4	28	112	1064.00
3743.4	29	50	1027.59
3867.4	29	112	1061.79
3868.4	30	50	1026.67
3992.4	30	112	1059.73
3993.4	31	50	1025.81
4117.4	31	112	1057.81

Table 4-1 (2/2) Relationship among N, M and F(M/N) for F(LO) (1st Local Frequency)

$$[F(LO) = Fref + 125N+2M \quad (Fref=18.4\ MHz) \quad F(M/N) = 1000 + 16\frac{M}{N}]$$

F(LO) MHz	N	M	F(M/N) MHz
4118.4	32	50	1025.00
4242.4	32	112	1056.00
4243.4	33	50	1024.24
4367.4	33	112	1054.30
4368.4	34	50	1023.53
4492.4	34	112	1052.71
4493.4	35	50	1022.86
4617.4	35	112	1051.20
4618.4	36	50	1022.22
4742.4	36	112	1049.78
4743.4	37	50	1021.62
4867.4	37	112	1048.43
4868.4	38	50	1021.05
4992.4	38	112	1047.16
4993.4	39	50	1020.51
5117.4	39	112	1045.95
5118.4	40	50	1020.00
5242.4	40	112	1044.80
5243.4	41	50	1019.51
5367.4	41	112	1043.71
5368.4	42	50	1019.05
5492.4	42	112	1042.67
5493.4	43	50	1018.60
5617.4	43	112	1041.67
5618.4	44	50	1018.18
5742.4	44	112	1040.73
5743.4	45	50	1017.78
5867.4	45	112	1039.82
5868.4	46	50	1017.39
5992.4	46	112	1038.96


CAL OUTPUT 100MHz -10dBm
J6
Z14
0 to 2GHz RF
(J11)
J98
J74
(6/6) Z35 for MS710C only
J97
J73
J7 *1
(J1)
2GHz LPF
Z12
(J2) (J3)
*1 for MS710 D/E/F, J7 Connects (J1) to (J3)
Z3 RF ATT/SW
(J3)
Z5 YTF
RF INPUT 50Ω
J1 J2 (J1)
(J2) J3 (INPUT)
(OUTPUT)
1 8
(4/6) Z34(J4) (DRIVER)
(2/6) Z10(J4) (YTF TUNE)
FRONT PANEL
(4/6) Z26(J3) (PANEL CONTROL)
1 40
(J2)
(J1) (J1)
Z1 FRONT PANEL I
Z2 FRONT PANEL II
1
10
(J3)
1 2
J54
(5/6) Z32(J5)



Parts List : 44W83920

Fig. 4-4 (1/6)
MS710[ ] Circuit Diagram (1/6)
(43W34994)

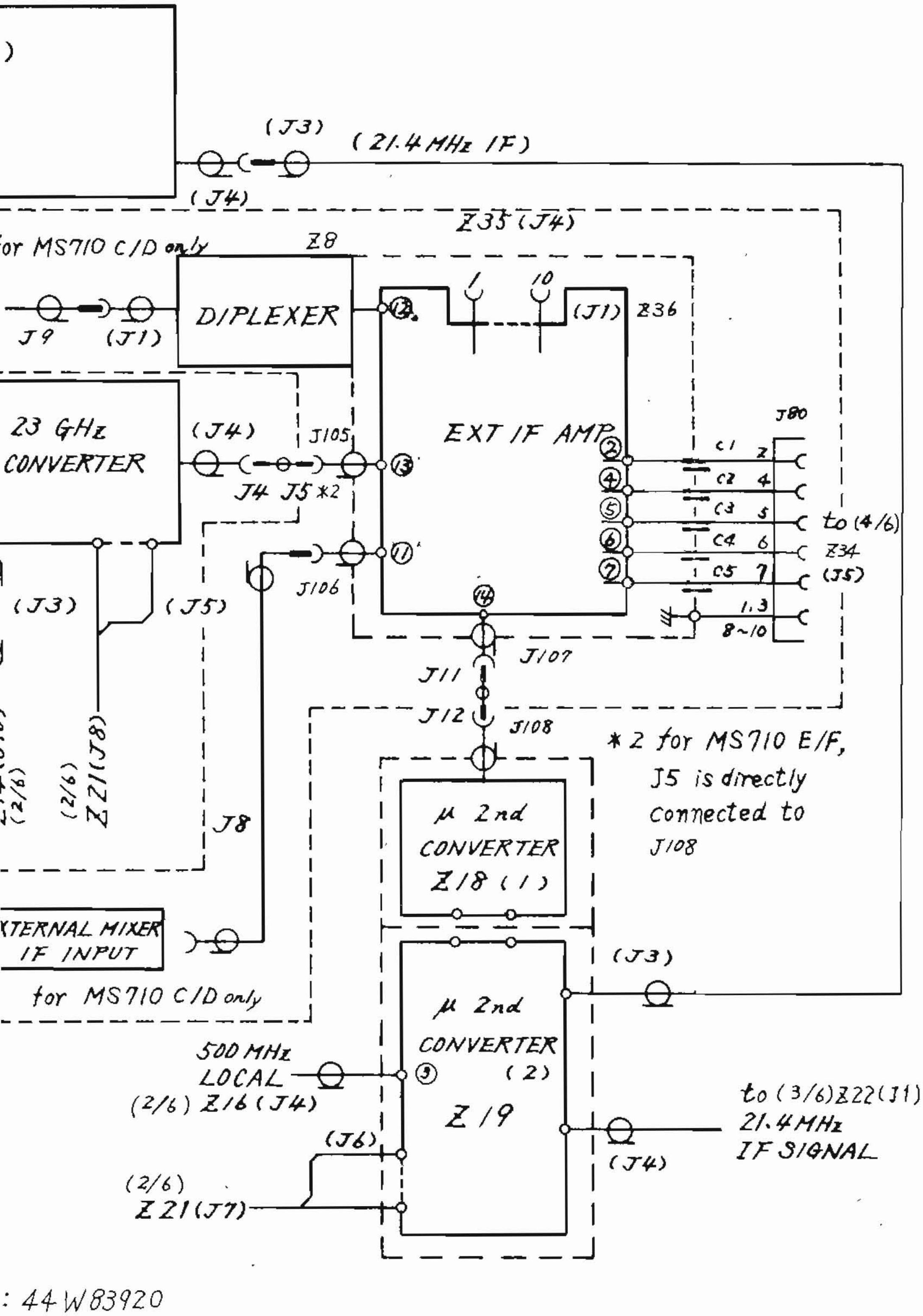
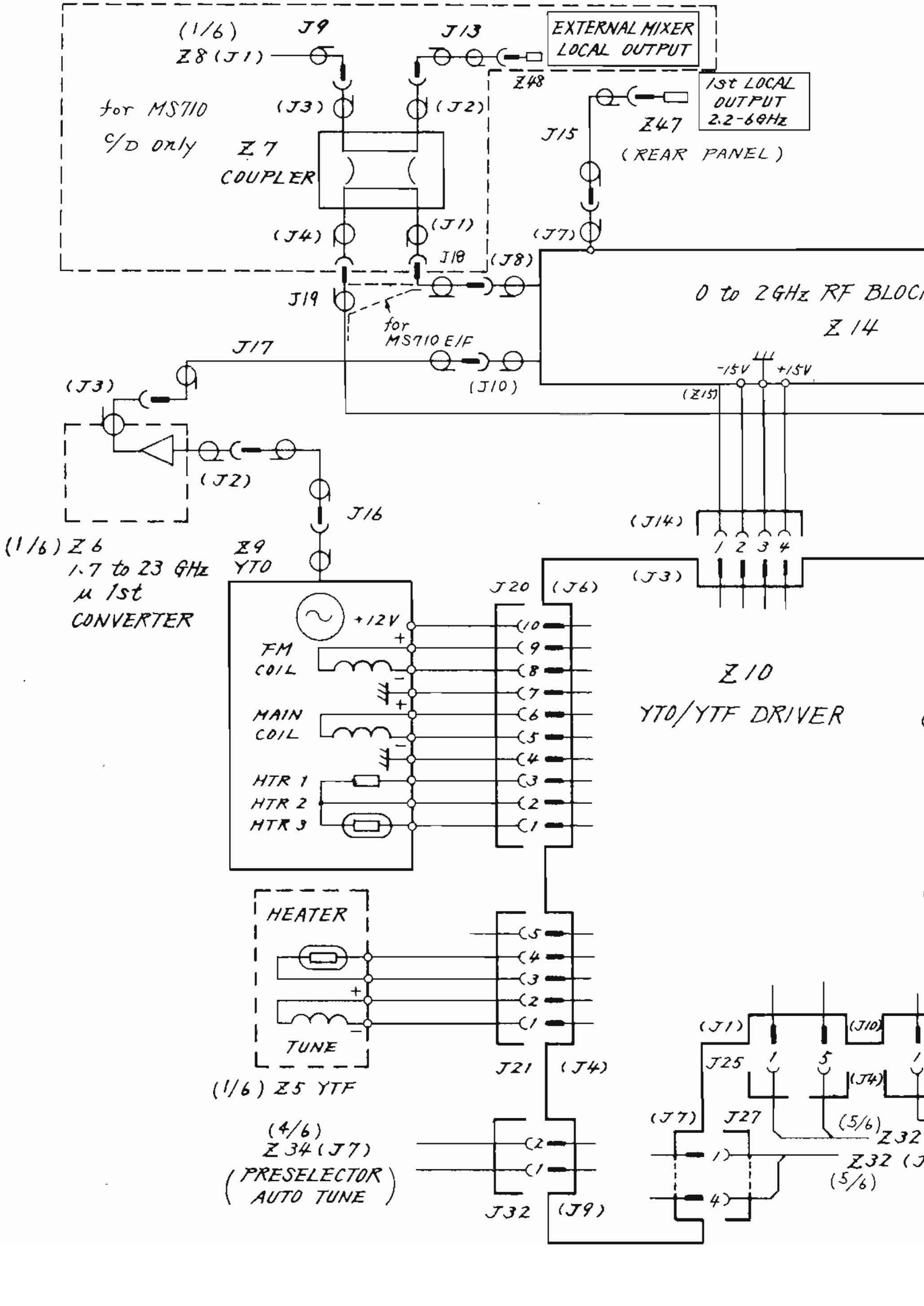


Fig. 4-4 (1/6)

MS710[ ] Circuit Diagram (1/6)
(43W34994)



(1/6) Z8 (J1)
J9
J13
EXTERNAL MIXER LOCAL OUTPUT
Z48
1st LOCAL OUTPUT 2.2-6GHz
Z47
(REAR PANEL)
J15
for MS710 C/D only
(J3)
(J2)
Z7 COUPLER
(J4)
(J1)
(J7)
J18
(J8)
J19
0 to 2GHz RF BLOCK
Z14
for MS710 E/F
J17
(J10)
-15V
+15V
(Z15)
(J3)
(J2)
J16
(J14)
1 2 3 4
(J3)
(1/6) Z6 1.7 to 23 GHz μ 1st CONVERTER
Z9 YTO
J20
(J6)
+12V
FM COIL
MAIN COIL
HTR 1
HTR 2
HTR 3
Z10 YTO/YTF DRIVER
HEATER
TUNE
(1/6) Z5 YTF
J21
(J4)
(J1)
(J10)
J25
(J4)
(J7)
J27
(5/6) Z32
Z32 (5/6)
(4/6) Z34 (J7) (PRESELECTOR AUTO TUNE)
J32
(J9)

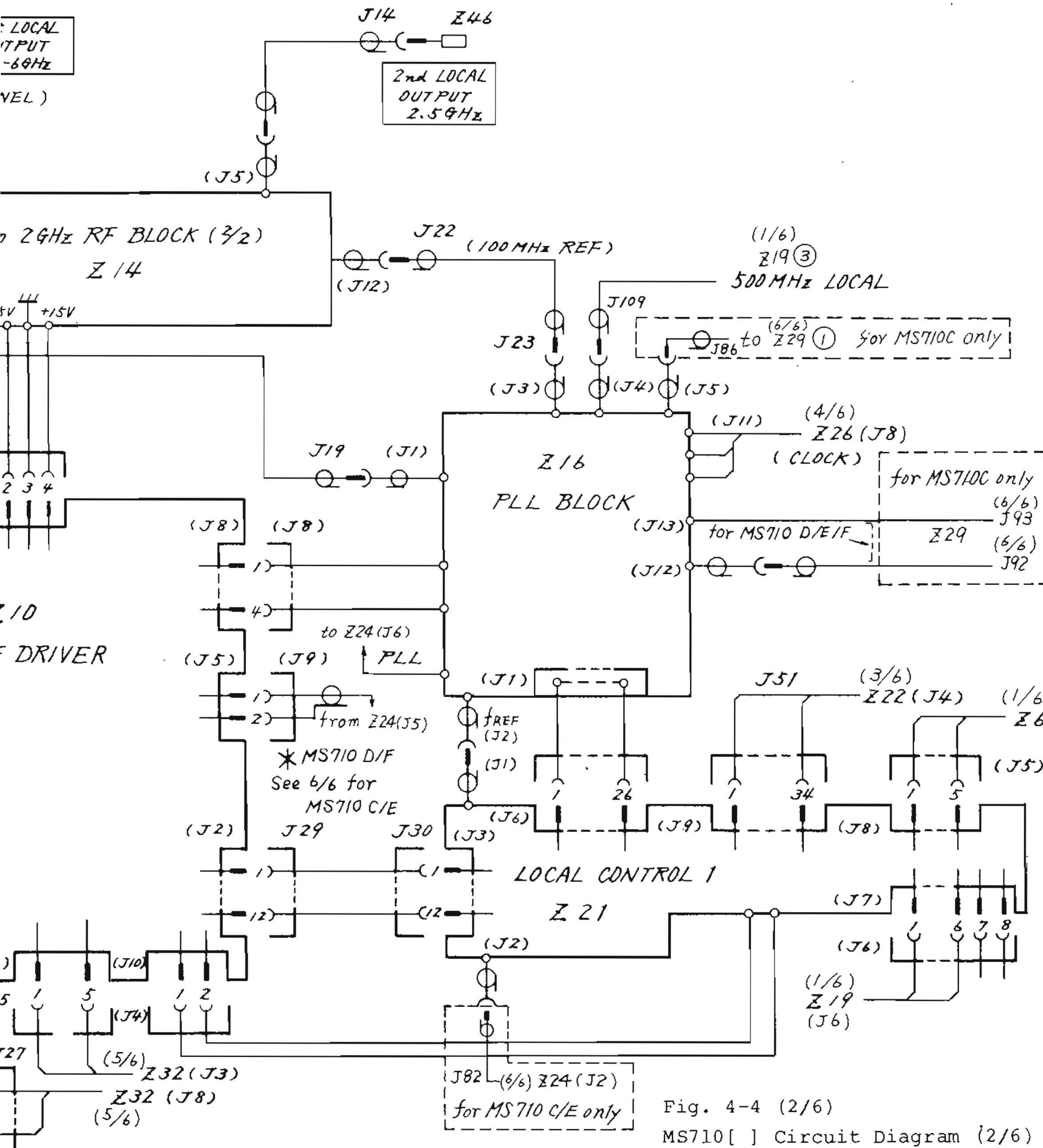


Fig. 4-4 (2/6)
MS710[ ] Circuit Diagram (2/6)
(43W34994)

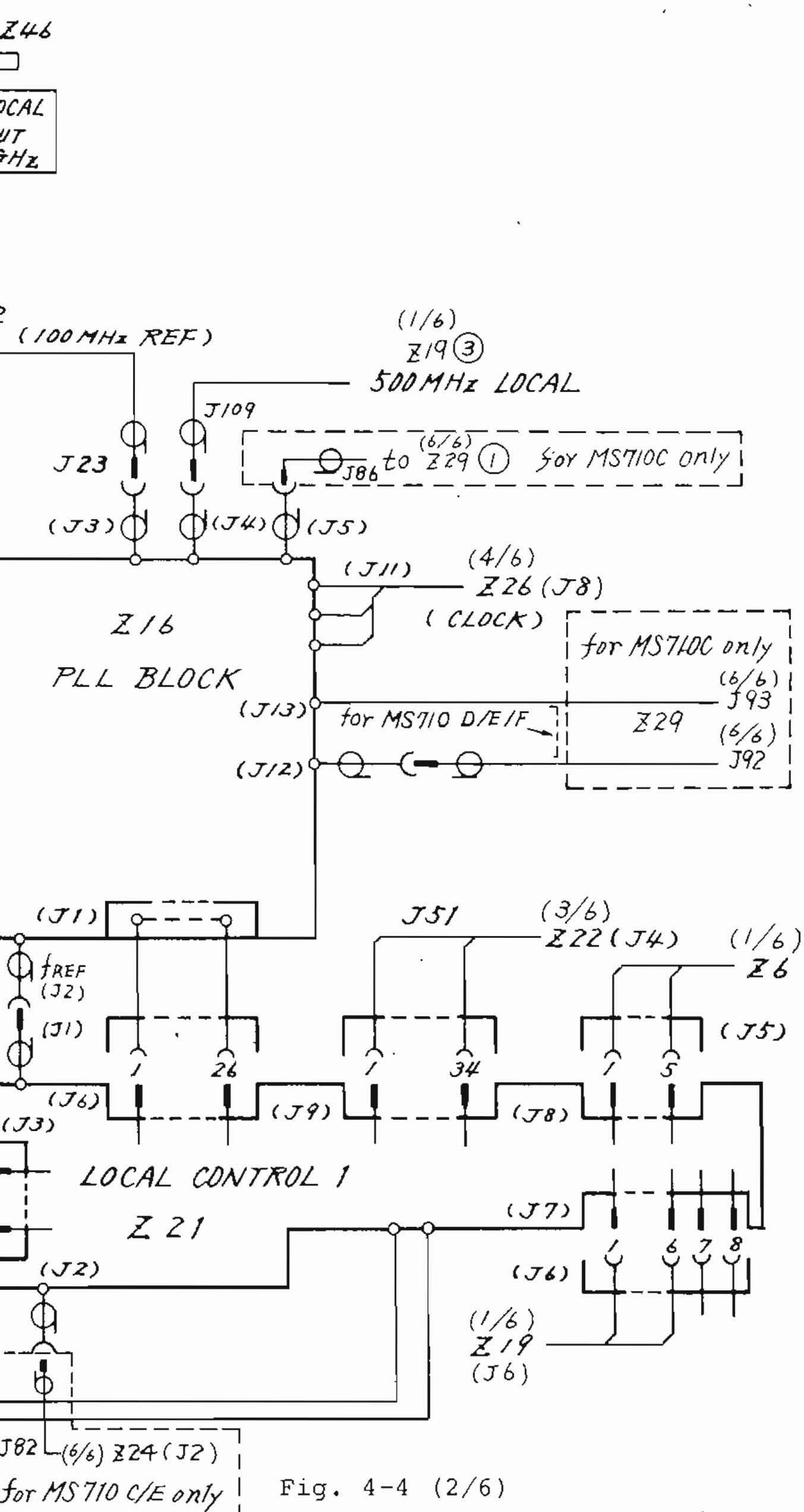
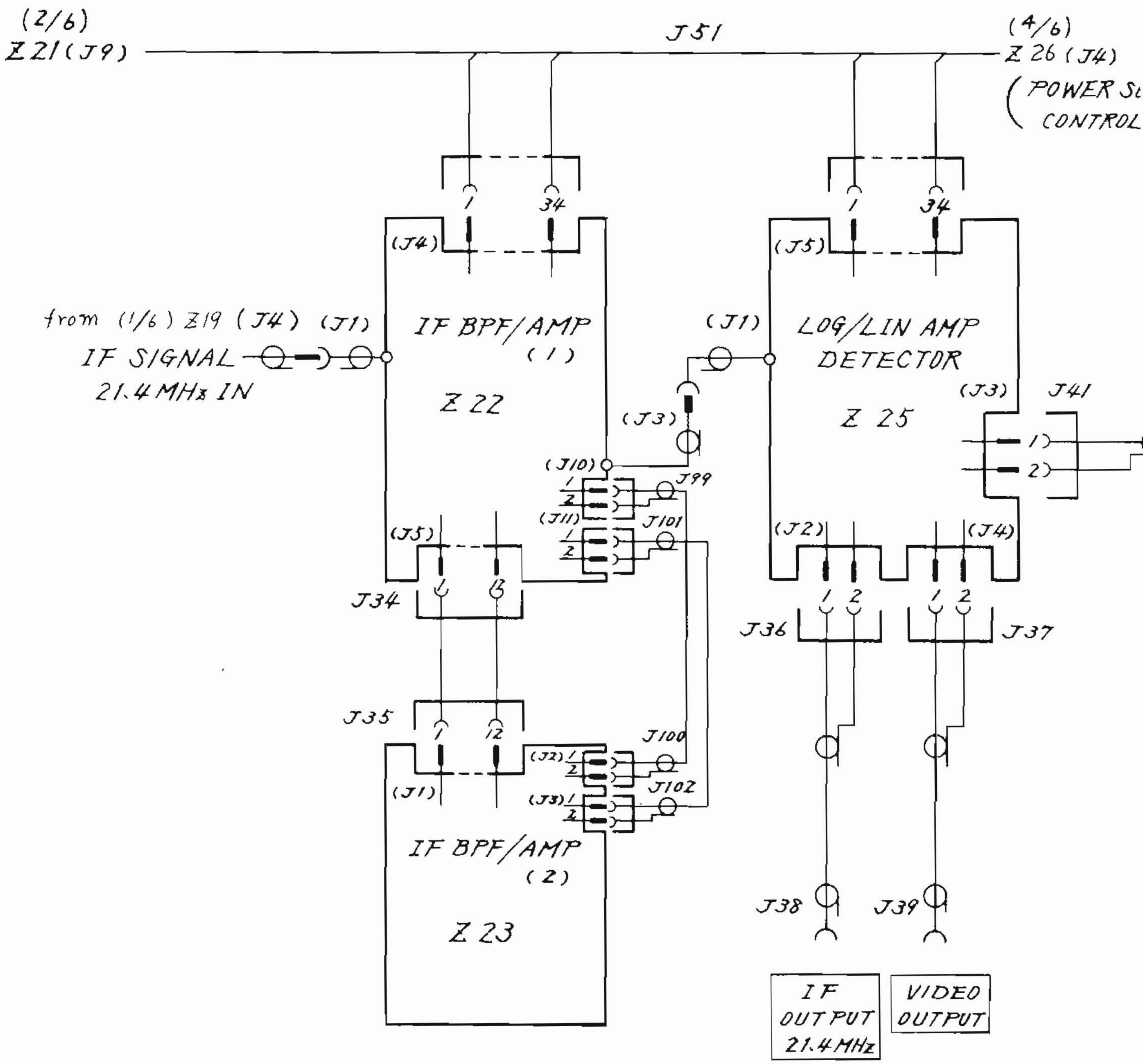


Fig. 4-4 (2/6)

MS710[ ] Circuit Diagram (2/6)
(43W34994)


(2/6)
Z21 (J9)
J51
(4/6)
Z 26 (J4)
(POWER S
CONTROL
1
34
(J4)
(J5)
from (1/6) Z19 (J4) (J1)
IF SIGNAL
21.4 MHz IN
IF BPF/AMP
(1)
Z 22
(J1)
(J3)
(J10)
J99
(J11)
J101
LOG/LIN AMP
DETECTOR
Z 25
(J3)
J41
(J2)
(J4)
J34
J36
J37
J35
J100
J102
(J2)
(J3)
IF BPF/AMP
(2)
Z 23
J38
J39
IF
OUTPUT
21.4 MHz
VIDEO
OUTPUT

Fig

MS7

(43

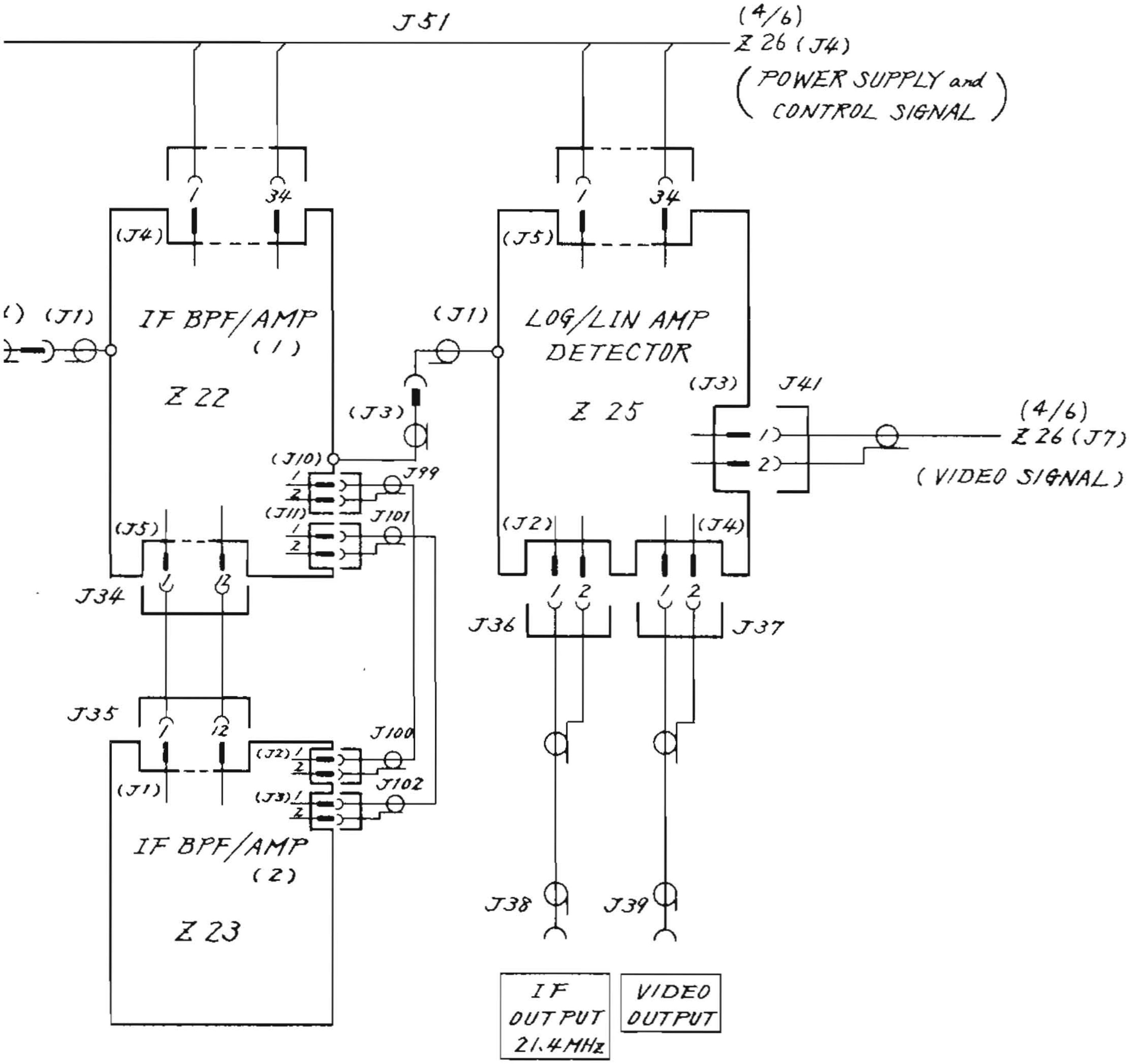
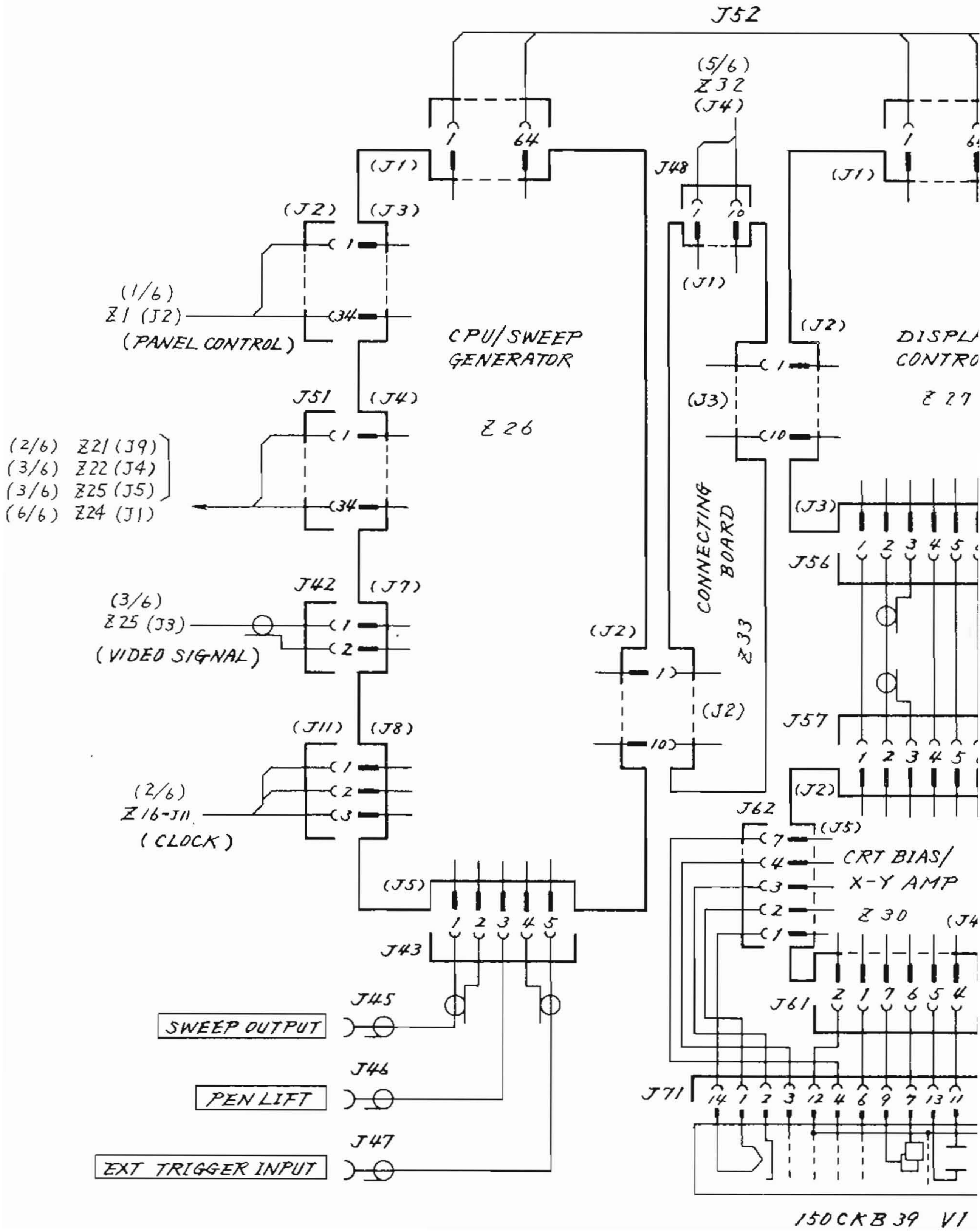


Fig. 4-4 (3/6)

MS710[ ] Circuit Diagram (3/6)
(43W34994)


J52
(5/6)
Z32
(J4)
J48
(J1)
(J2)
(J3)
(1/6)
Z1 (J2)
(PANEL CONTROL)
CPU/SWEEP
GENERATOR
J51
(J4)
Z 26
(2/6) Z21 (J9)
(3/6) Z22 (J4)
(3/6) Z25 (J5)
(6/6) Z24 (J1)
J42
(J7)
(3/6)
Z25 (J3)
(VIDEO SIGNAL)
(J11)
(J8)
(2/6)
Z16-J11
(CLOCK)
(J5)
J43
J45
SWEEP OUTPUT
J46
PEN LIFT
J47
EXT TRIGGER INPUT
CONNECTING
BOARD
Z33
DISPLA
CONTRO
Z 27
J56
J57
J62
CRT BIAS/
X-Y AMP
Z 30
J61
J71
150CKB39 V1

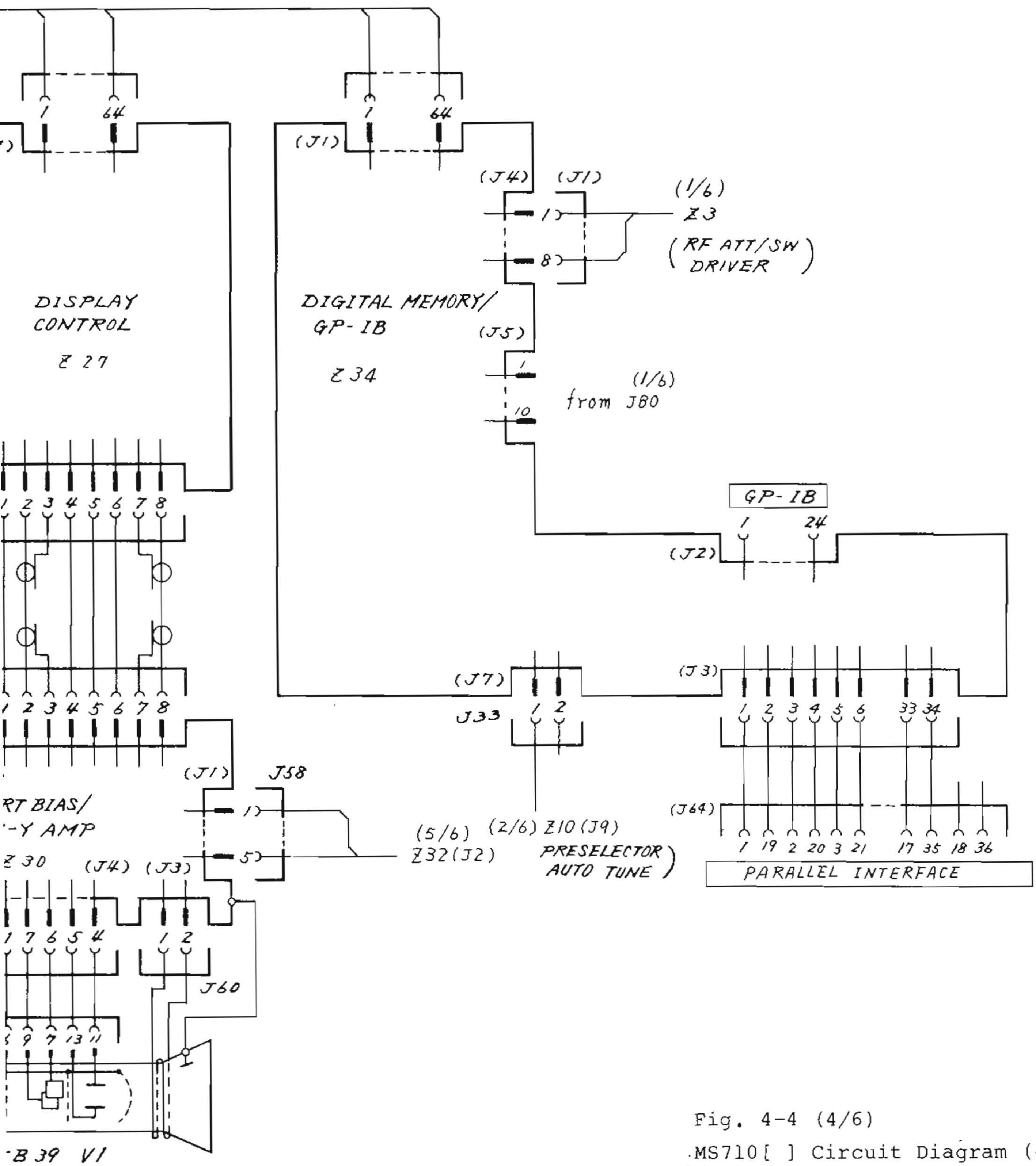
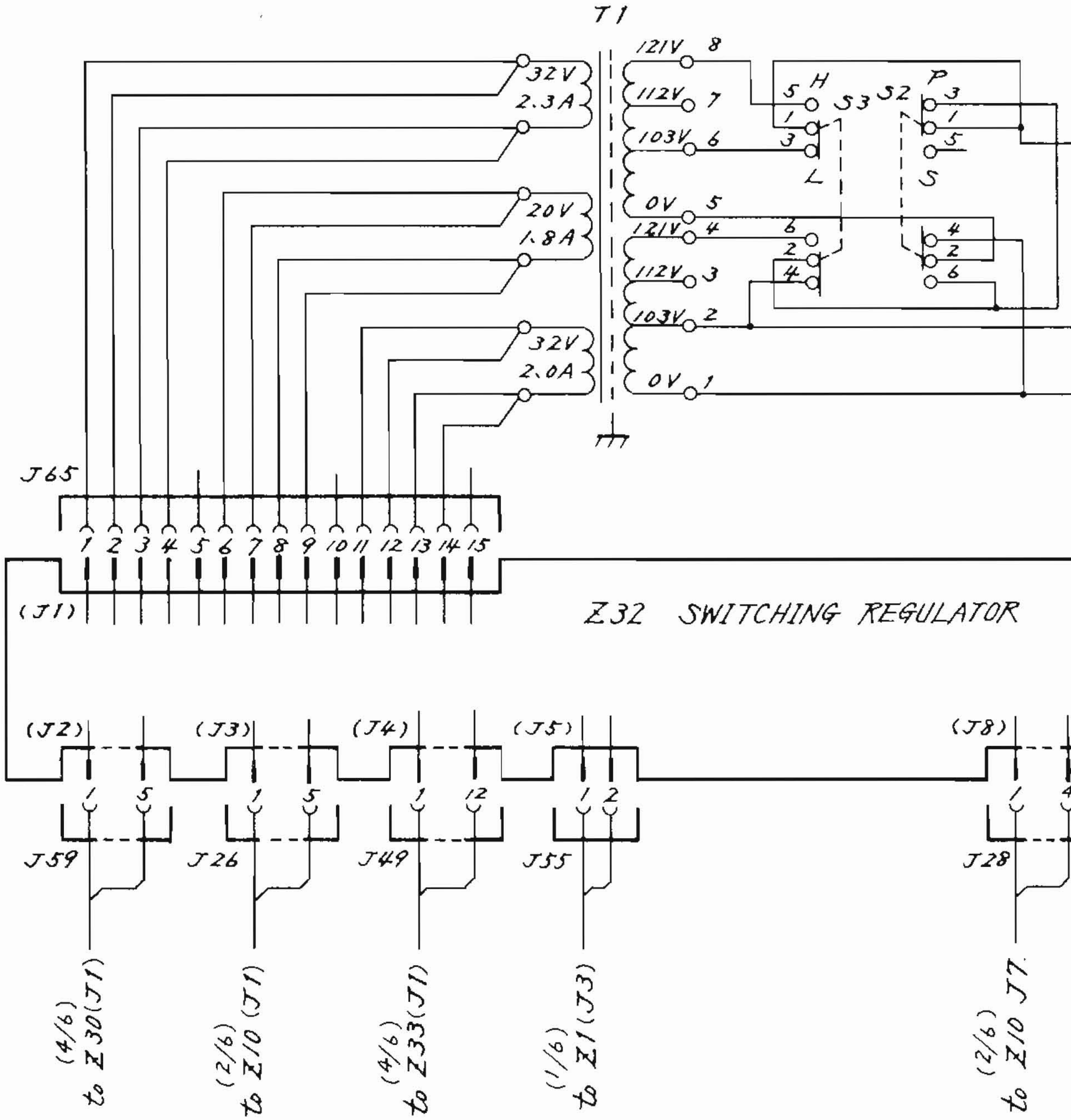


Fig. 4-4 (4/6)
MS710[ ] Circuit Diagram (4/6)
(43W34994)



T1
32V
2.3A
20V
1.8A
32V
2.0A
121V 8
112V 7
103V 6
0V 5
121V 4
112V 3
103V 2
0V 1
H
L
S3
S2
P
S
J65
(J1)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Z32 SWITCHING REGULATOR
(J2)
(J3)
(J4)
(J5)
(J8)
J59
J26
J49
J55
J28
(4/6) to Z30(J1)
(2/6) to Z10(J1)
(4/6) to Z33(J1)
(1/6) to Z1(J3)
(2/6) to Z10 J7

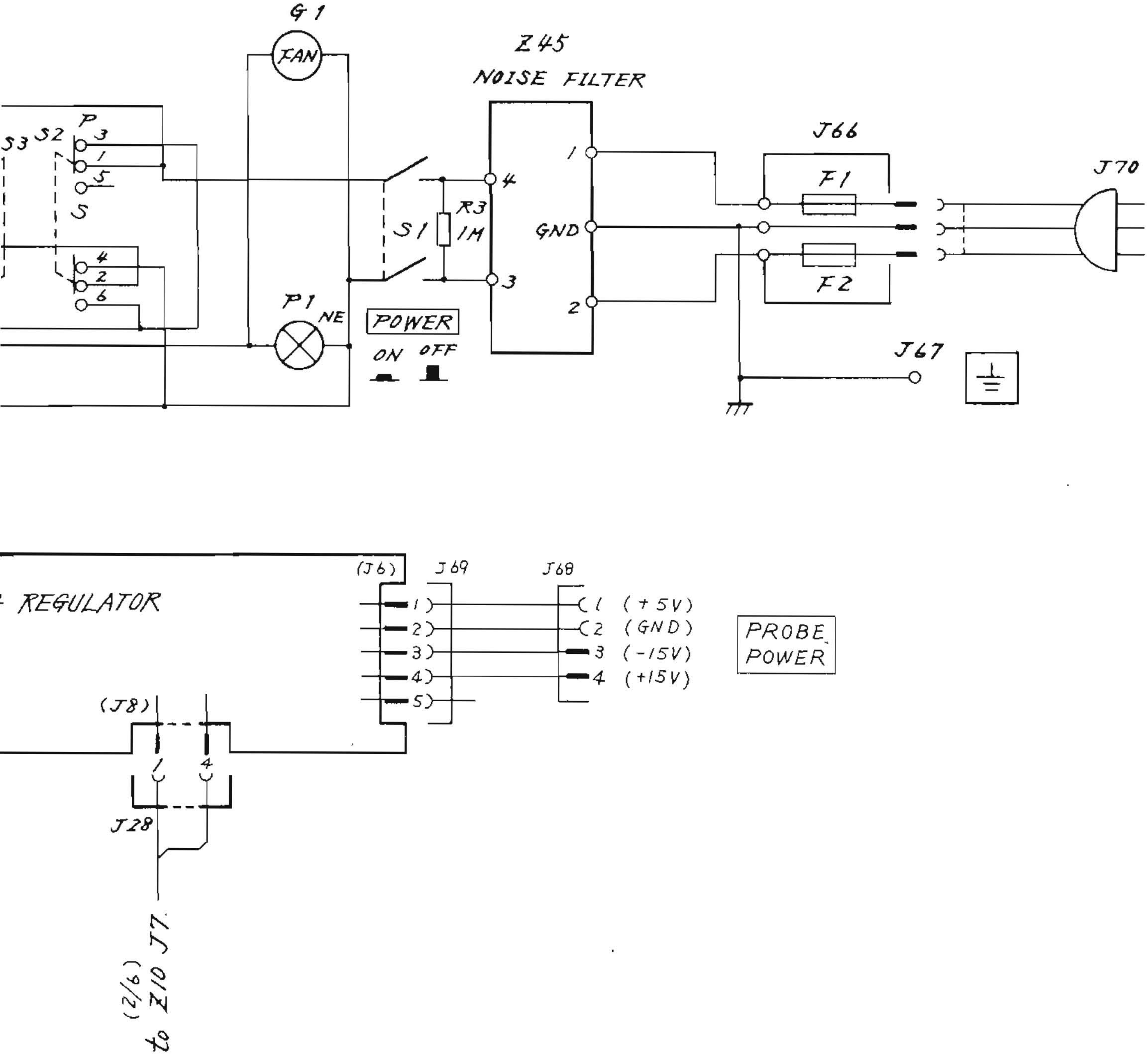
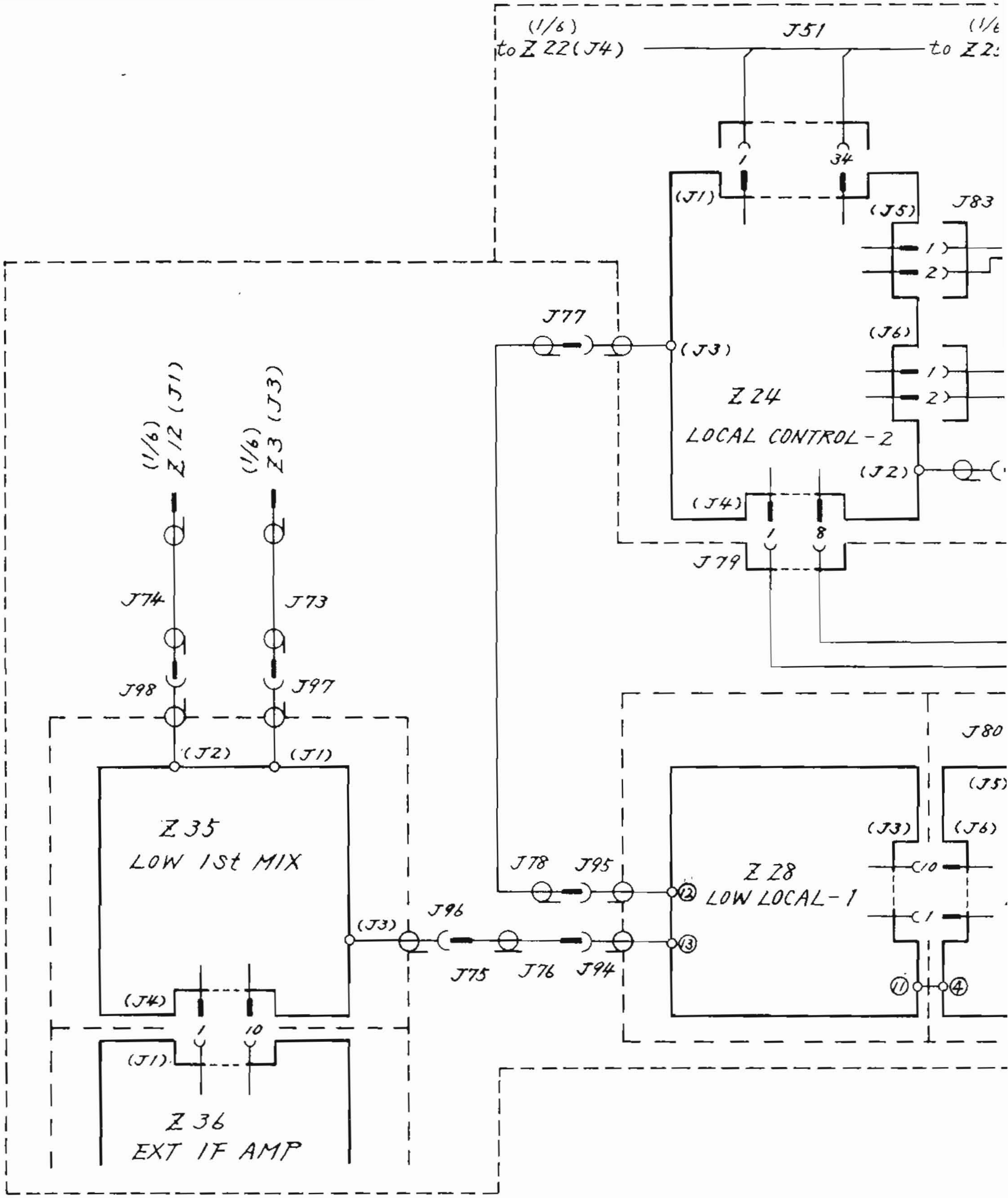


Fig. 4-4 (5/6)
MS710[ ] Circuit Diagram (5/6)
(43W34994)



(1/6)
to Z 22 (J4)
J51
(1/6
to Z 2
1
34
(J1)
(J5)
J83
J77
(J3)
(J6)
Z 24
LOCAL CONTROL-2
(J2)
(J4)
J79
8
(1/6)
Z 12 (J1)
(1/6)
Z 3 (J3)
J74
J73
J98
J97
(J2)
(J1)
Z 35
LOW 1st MIX
(J3)
J96
J75
J76
J94
J78
J95
Z 28
LOW LOCAL-1
J80
(J5)
(J3)
(J6)
10
(J4)
(J1)
Z 36
EXT IF AMP

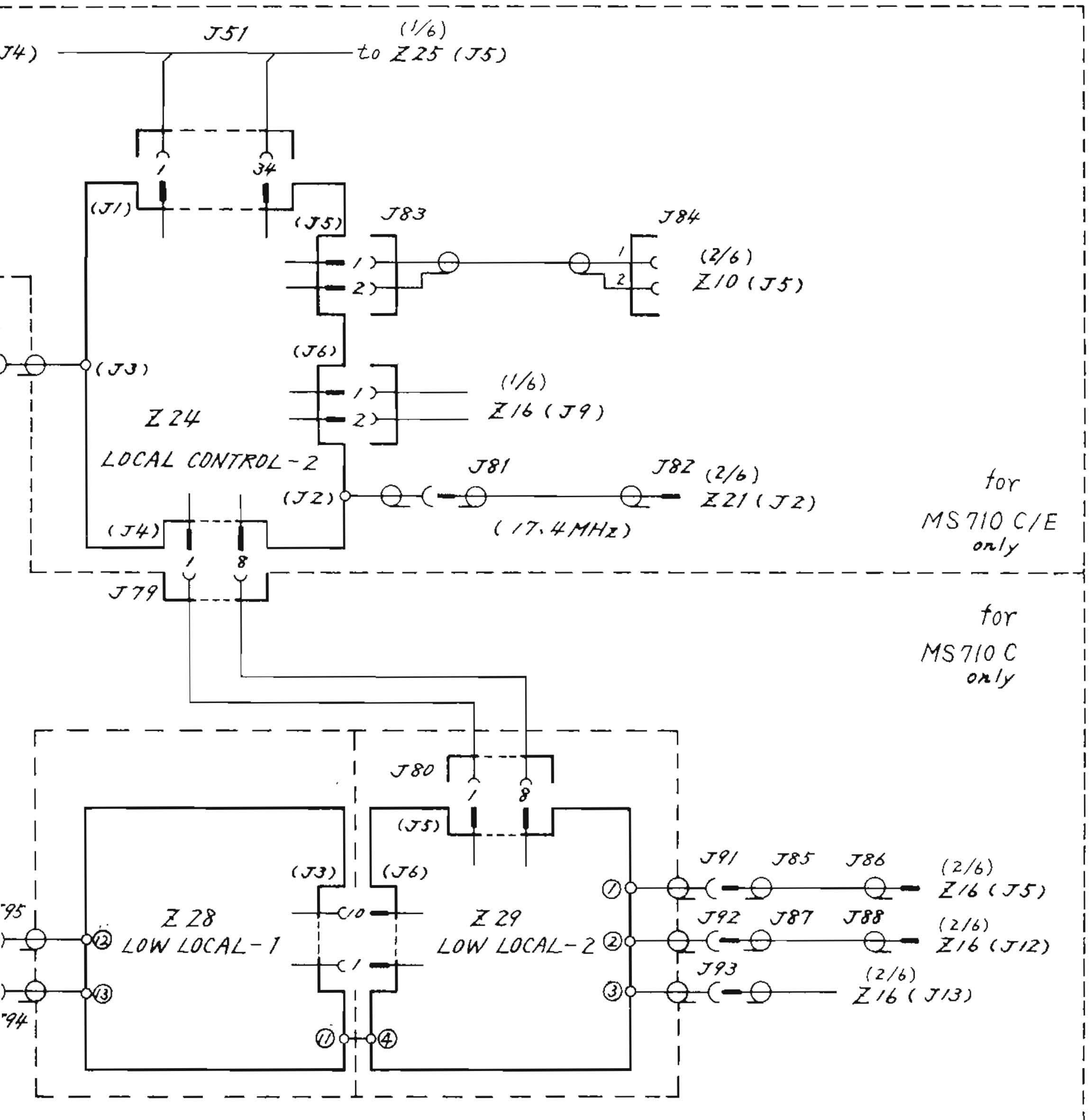


Fig. 4-4 (6/6)

MS710[ ] Circuit Diagram (6/6)
(43W34994)

SECTION 5

EACH PC BOARD TROUBLESHOOTING, REPAIR, AND ADJUSTMENT

5.1 General

5.1.1 Configuration

In this section, blocks are classified according to their printed circuit boards or corresponding units in the order of Z numbers. The following three points are explained.

1. Circuit and operation of each block
2. Checkpoints to be analyzed and signal levels and waveforms at these points
3. Adjustment locations and methods of adjustment

The explanation of each block includes the related diagram and parts layout.

5.1.2 Required equipment

When removing internal blocks and PC boards from the mainframe and checking them, note that the extension cable and extender board are different from those used in the inter-mainframe package.

The extender board, extender cable, and various adapters for troubleshooting are provided in service kits and are optionally available.

In addition, Table 5-1 lists the measuring equipment required for troubleshooting, repair and adjustment.

Table 5-1 Equipment for Troubleshooting, Repair, and Adjustment

EQUIPMENT	REQUIRED PERFORMANCE	MODEL (Anritsu)	APPLICATION
Power Meter & Sensor	Range: -20 to +20 dBm Frequency range: 10 kHz to 1000 MHz Frequency range: 10 MHz to 18 GHz Frequency range: 18 to 23 GHz	ML69A ML83A (Indica- tor) MA72B (Sensor)	5.4, 5.6, 5.7, 5.9
Frequency Counter	Frequency range: 10 kHz to 18 GHz Frequency range: 18 to 23 GHz	MF76A	5.4, 5.5, 5.6, 5.7, 5.9, 5.13 5.11, 5.16
Signal Generator	Frequency range: 100 kHz to 1300 MHz Frequency range: 1 to 23 GHz	MG655A MG724[ ]	5.4, 5.5, 5.11, 5.16 5.8, 5.10 5.21, 5.22 5.12
Spectrum Analyzer	Frequency range: 10 MHz to 1 GHz	MS610A	5.4, 5.6, 5.15, 5.7, 5.10, 5.21, 5.22
Oscilloscope (High-voltage probe)	Frequency range: 200 MHz, 5 mV High-voltage probe: 10 kV		5.3, 5.5, 5.7, 5.9, 5.13, 5.14, 5.17, 5.20, 5.18, 5.11
Digital Volt Meter	5 digits, Minimum digit: 1 mV		5.9, 5.12, 5.18
Spectrum/ Network Analyzer	Frequency range: 30 Hz to 30 MHz	MS420B	5.10, 5.16
Resistance Attenuator	Frequency range: DC to 500 MHz Attenuation: 0 to 90 dB Impedance: 50 Ω	MN510C	5.12

5.2 Basic Troubleshooting and Postprocessing

Refer to Section 3 to fully understand the entire signal flow, which is prerequisite to efficient troubleshooting.

General troubleshooting involves the checking of I/O signal frequency, waveforms, and the levels of each part or voltage.

If an abnormality is detected, check the previous checkpoint and isolate the part at which abnormal operation was detected. It is assumed, of course, that the correct power is being supplied to the part(s) in question. If the setting conditions of the MS710[ ] functions are not explicitly specified in the description, assume that the automatic setting status after power on is in effect.

After an abnormality or defective part is located and has been repaired, check whether or not any adjustment is required, as explained in this section. If necessary, make the correct adjustment(s).

Refer to the explanations given in the section 8 of the Operation Manual for the performance check to be made following the adjustment(s).

5.3 Z1 Front Panel I and Z2 Front Panel II

5.3.1 Circuit description - Z1 and Z2
(Refer to Fig. 3-3 (3/4), Fig. 5-3)

All switches, variable resistors, and LEDs used for front-panel status indications are mounted on the above two PC boards.

All push-button switches are connected in a matrix format. Status is read by the keyboard display controller (Z26-Q38).

This controller is mounted on the Z26 CPU/Sweep Generator PC Board and is connected by scanning lines SL0 to RL7, which are distributed through the Q11 decoder. All LEDs except the sweep LED are dynamically driven under control of the same keyboard display controller (Z26-Q38). Q10 is the anode-side scanning line decoder and Q12 and Q13 are drivers. Q14 is the cathode-side driver.

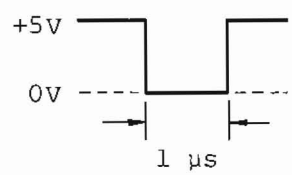
The rotary encoder consists of Z1-Z2, Q3, and Q4 and is used for setting and changing continuous data. This output pulse is sent to the Z26 CPU/Sweep Generator PC Board through the direction-of-rotation decision circuit consisting of Q5, Q6, and Q7, and, the waveform-shaping circuit. Whenever the rotary encoder is moved by one click, a CPU interrupt occurs. When this interrupt is accepted, the CPU reads the UP/DOWN directions and performs the required processing.

The amplitudes and destinations of the analog control signals generated by the five variable resistors are shown in Table 5-1 in Fig. 5-3.

Z1-Z1 is the electronic buzzer that sounds an alarm.

5.3.2 Checking procedure - Z1 and Z2

Step	Procedure
1.	See Fig. 2-2; remove the front panel.
2.	Use an oscilloscope to confirm that the voltages of checkpoint ❶ to ❾, shown in Figs. 5-2 and 5-3, satisfy the values listed in Table 5-1 and are indicated in the figures.
3.	While turning the rotary encoder (data knob), observe the waveforms at checkpoint ❿ on the oscilloscope and confirm that the pulse-shaped signals are being generated as below.



Step	Procedure
4.	When turning the rotary encoder clockwise, confirm that the checkpoing level ⓫ is set to the low level (0 V). When turning it counterclockwise, confirm that the checkpoint level at ⓫ is set to the high level (5 V).
5.	If an abnormality occurs during the check explained in procedure 3 or 4, recheck the abnormality by adjusting R2 ⓬ .
6.	If the signal waveforms at checkpoint ⓭ SL0 to SL2 and checkpoint ⓮ OUTB0 to OUTA1 appear as shown in Fig. 5-1, they are normal.

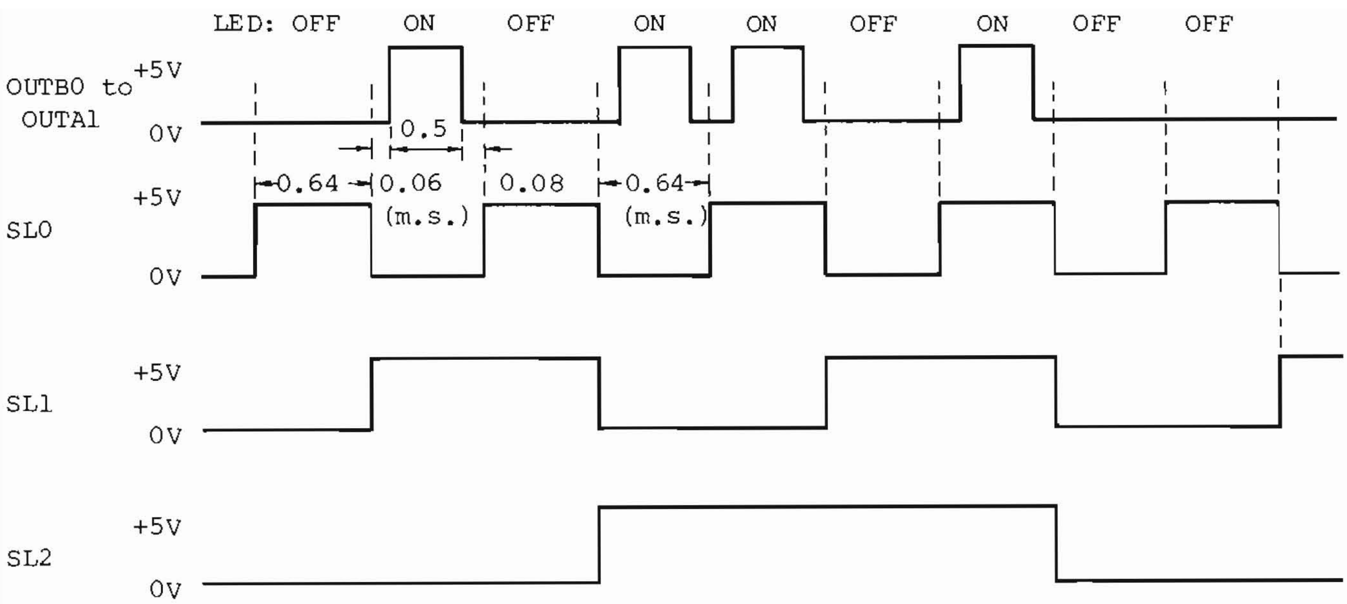


Fig. 5-1 Display Scan Timing (Z1 FRONT PANEL I)

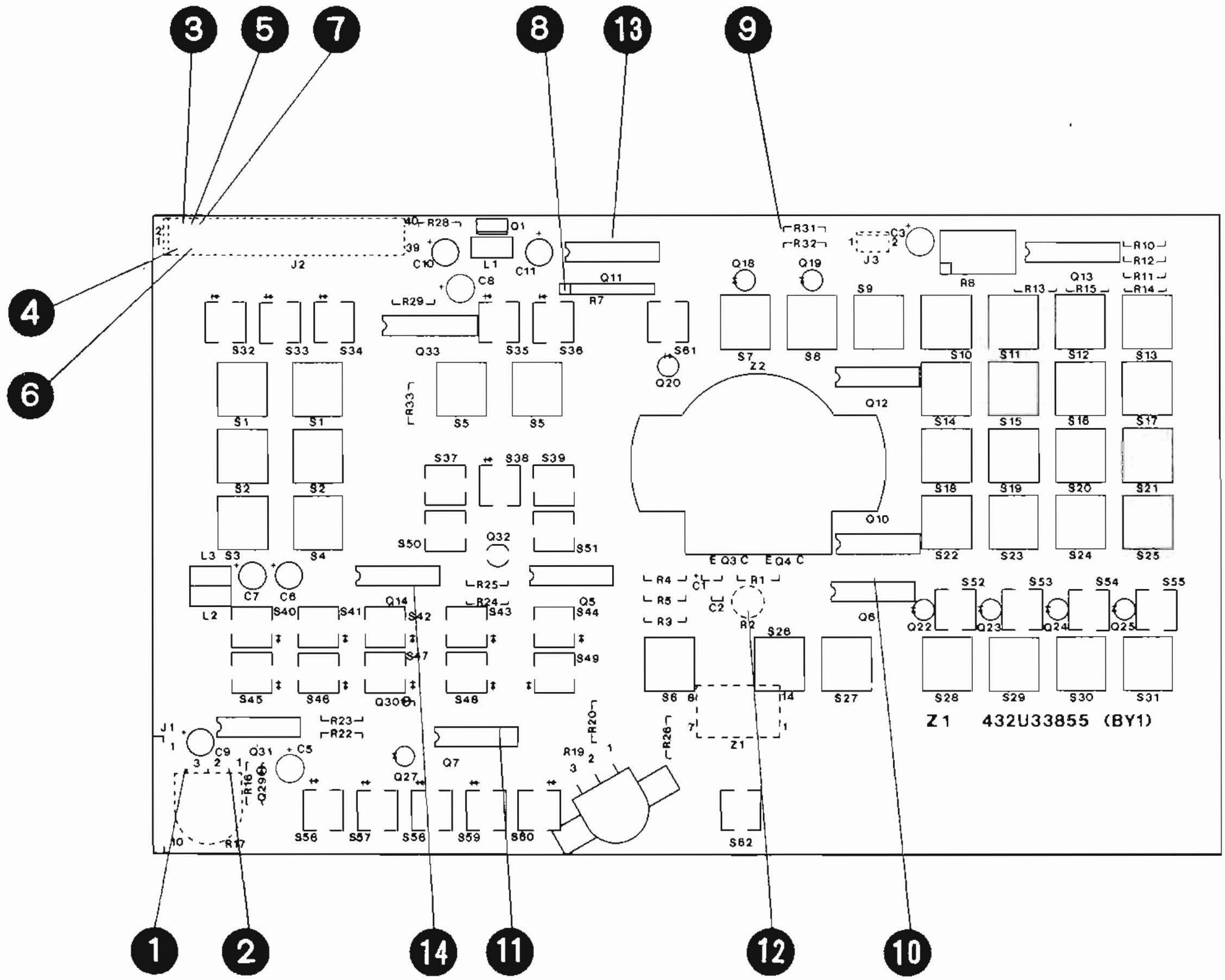
Note 1: The waveform at OUTB0 to OUTA1 depends on the status indicated by the LED. This figure shows an example.

Note 2: The unit of time is milliseconds (ms).

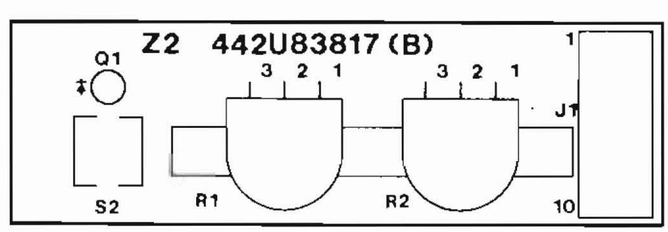
5.3.3 Adjustment - Z1 and Z2

Z1-R2 adjusts the brightness of the built-in rotary encoder LED to accurately indicate clockwise and counterclockwise rotations.

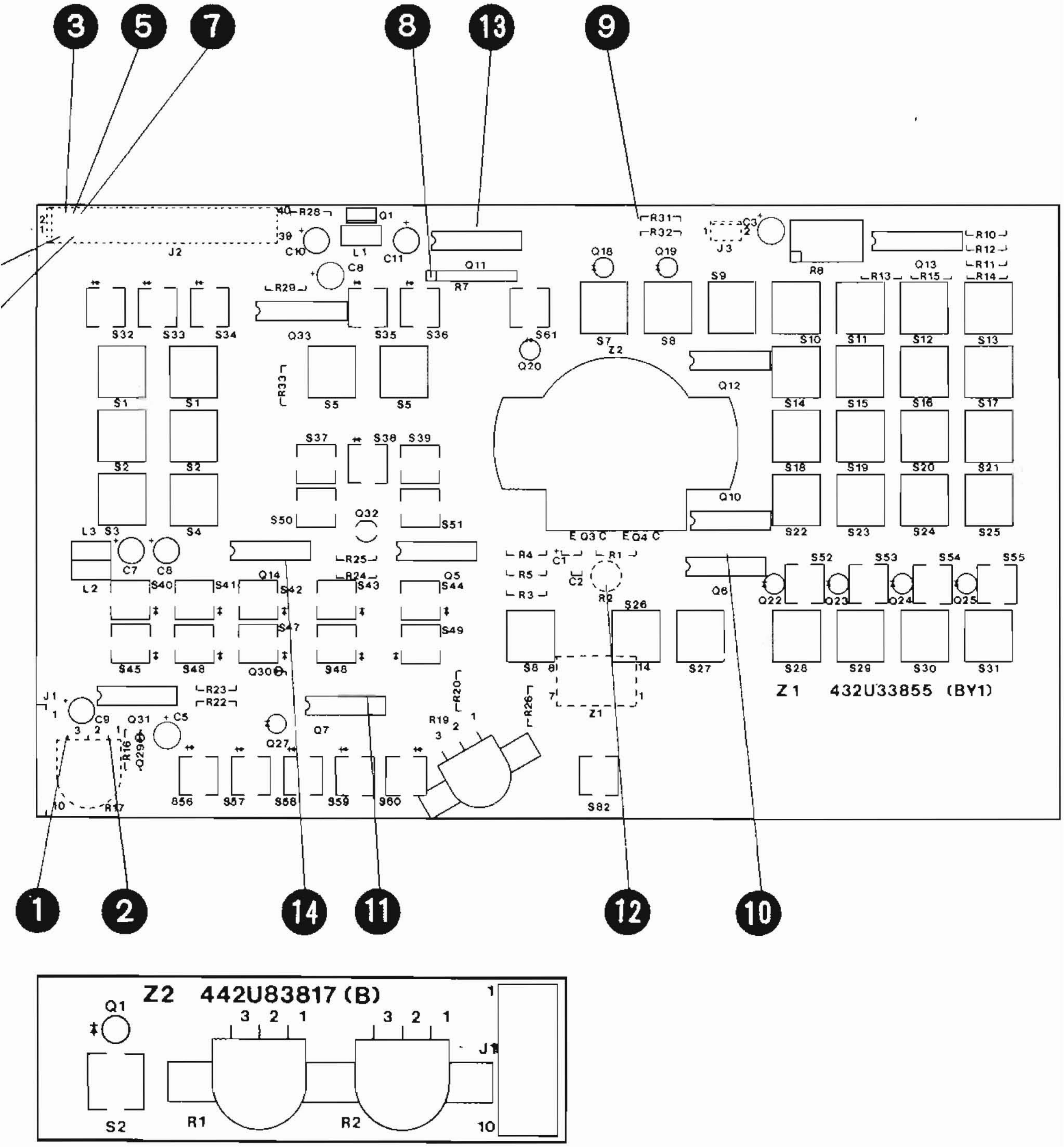
Step	Procedure
1.	Press the center frequency switch.
2.	Adjust R2 so that the frequency display on the CRT can be increased when turning the encoder clockwise, and decreased when turning it counterclockwise. (Set R2 to the center of the normal operation range by turning the R2 adjustment screw at both ends.)



3
5
7
8
13
9
4
6
1
2
14
11
12
10
Z1 432U33855 (BY1)



Z2 442U83817 (B)



3
5
7
8
13
9
Z1 432U33855 (BY1)
1
2
14
11
12
10
Z2 442U83817 (B)

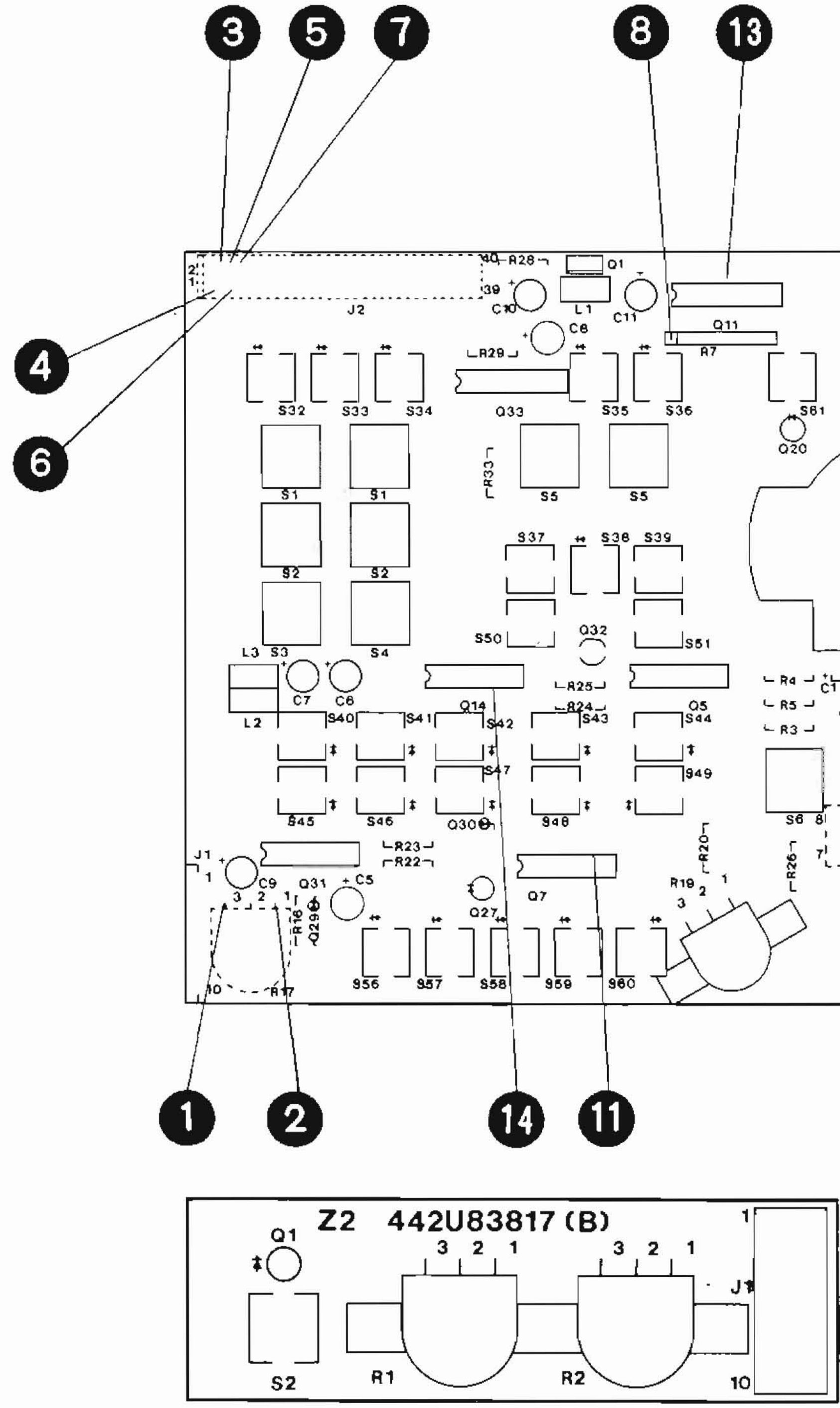
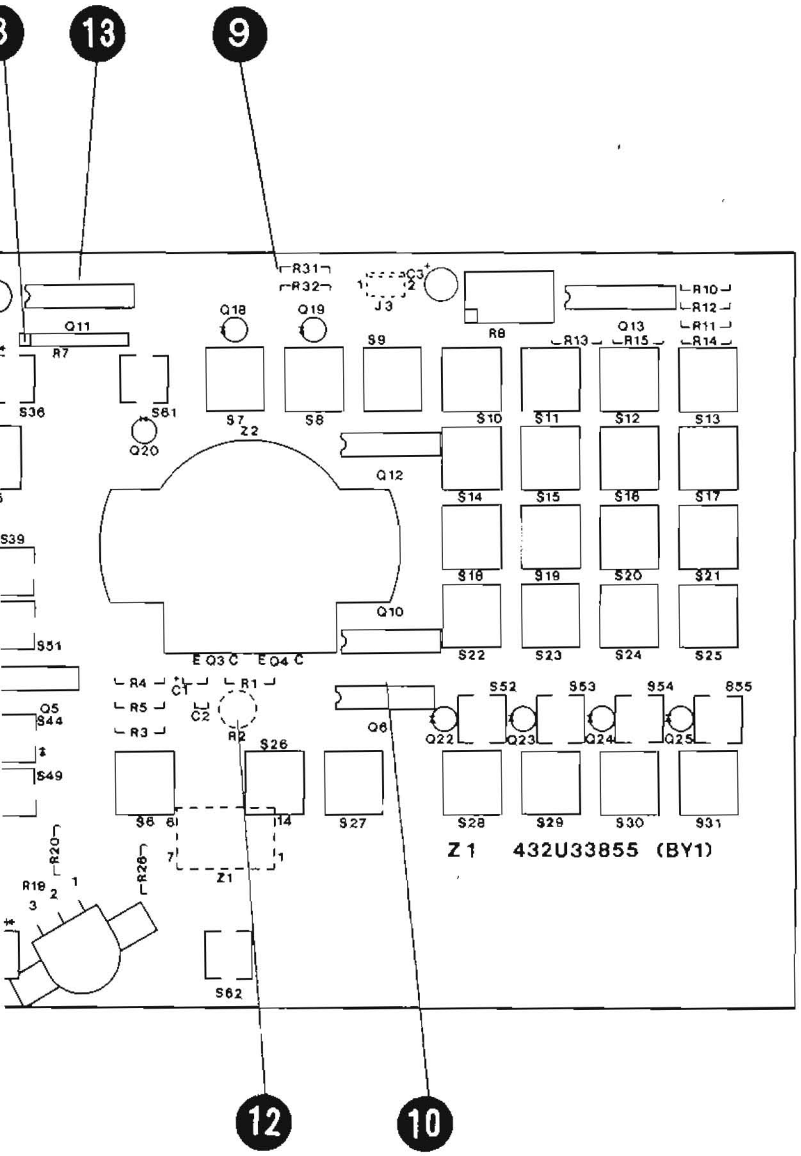


Fig. 5-2 Z1 and Z2
Parts Layout



13
9
12
10
Z1 432U33855 (BY1)

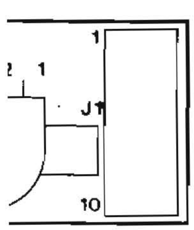


Table 5-2

Nominal Output Voltage of Variable Resistor Controls (V)

Control	Test Point	MIN ···	MAX
INTENSITY (R1/Z2)	3	$-V_R$	$+V_R$
FREQ CAL (R16/Z1)	4	$-V_R$	0
LEVEL CAL (R17/Z1)	5	$-V_R$	$+V_R$
PRESELECTOR PEAK (R12/Z1)	6	$-V_R$	$+V_R$
TRIGGER LEVEL (R19/Z1)	7	+0.2	$+V_R$

1 2 V_R = 3.6 to 4.0V

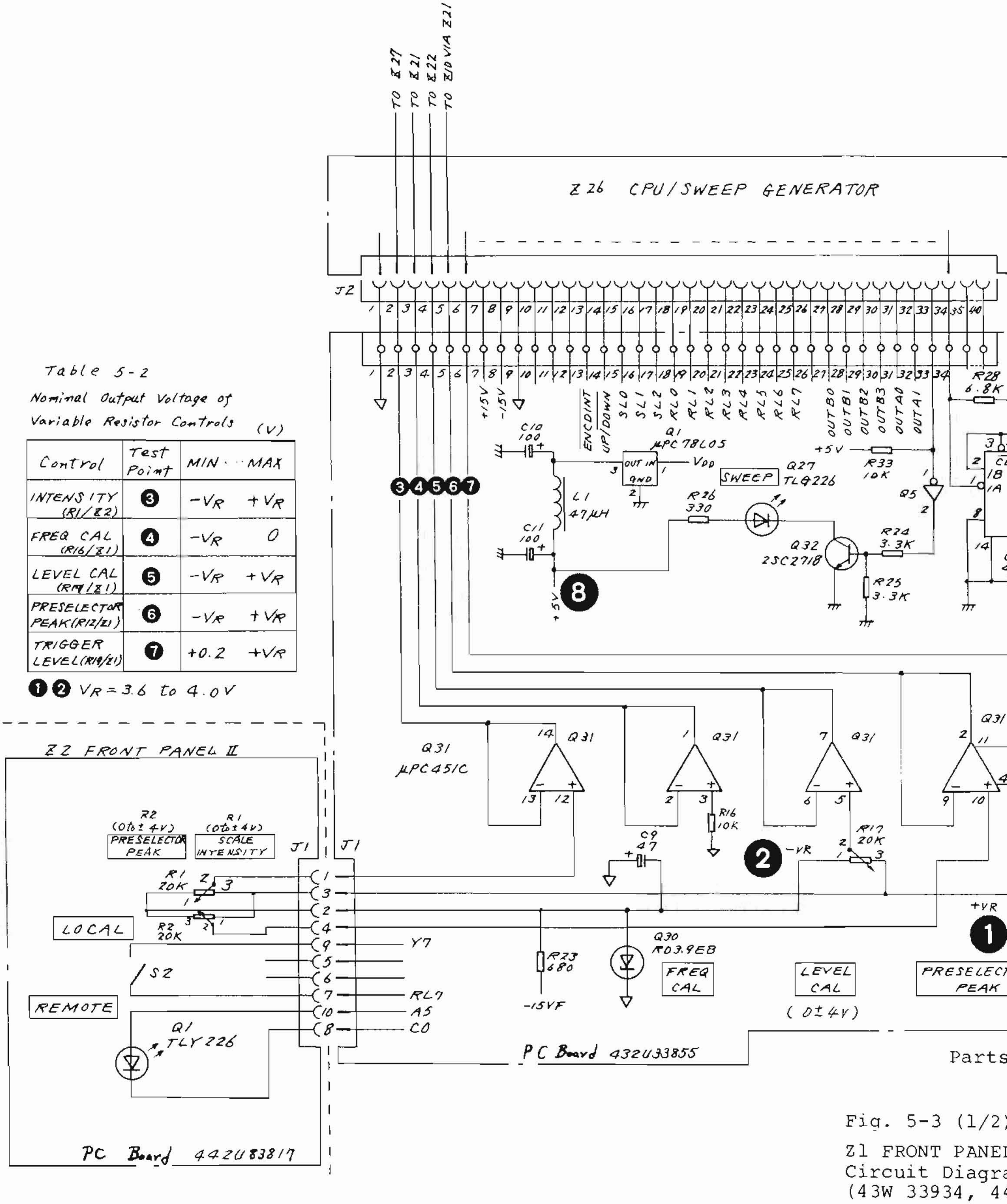
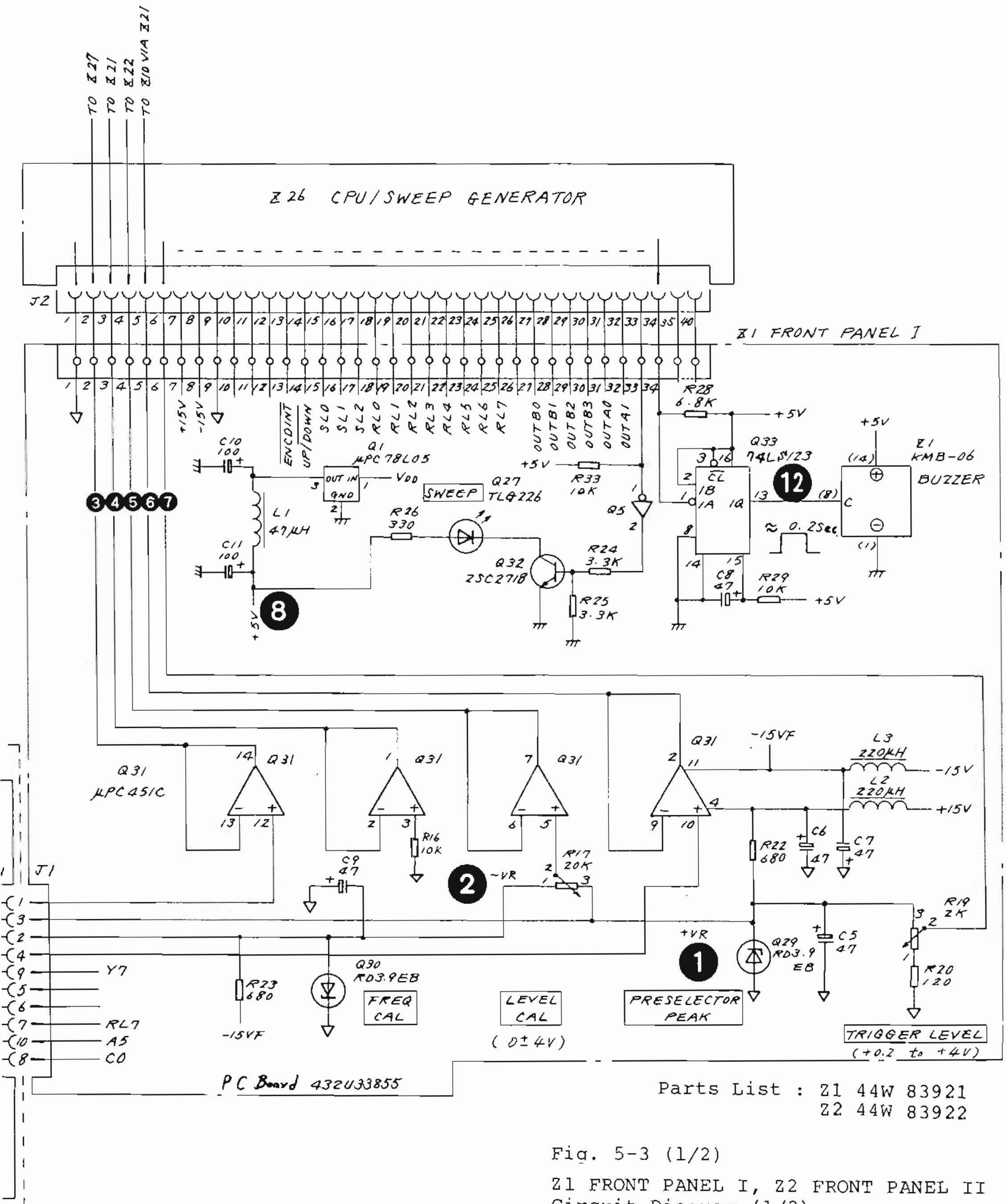


Fig. 5-3 (1/2)

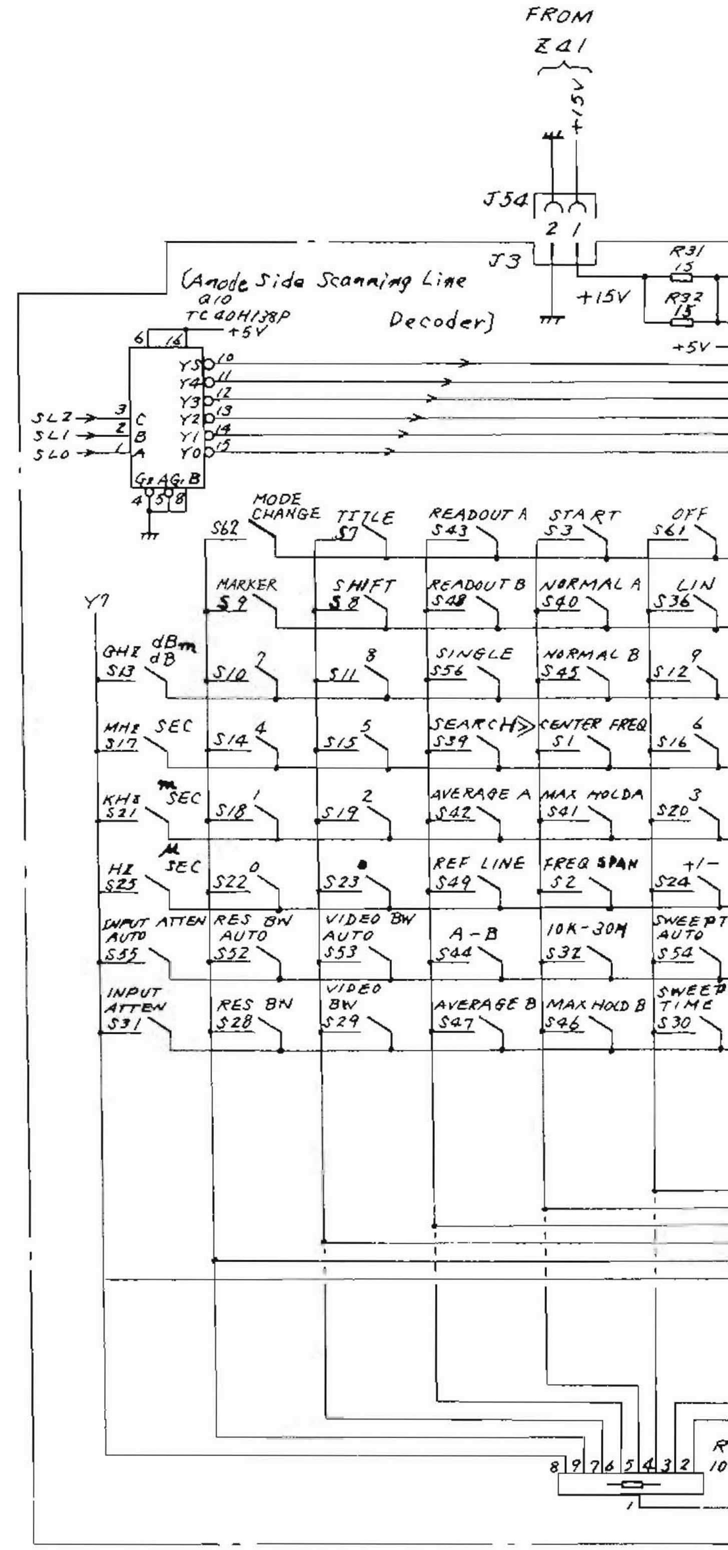
Z1 FRONT PANEL
Circuit Diagra
(43W 33934, 44

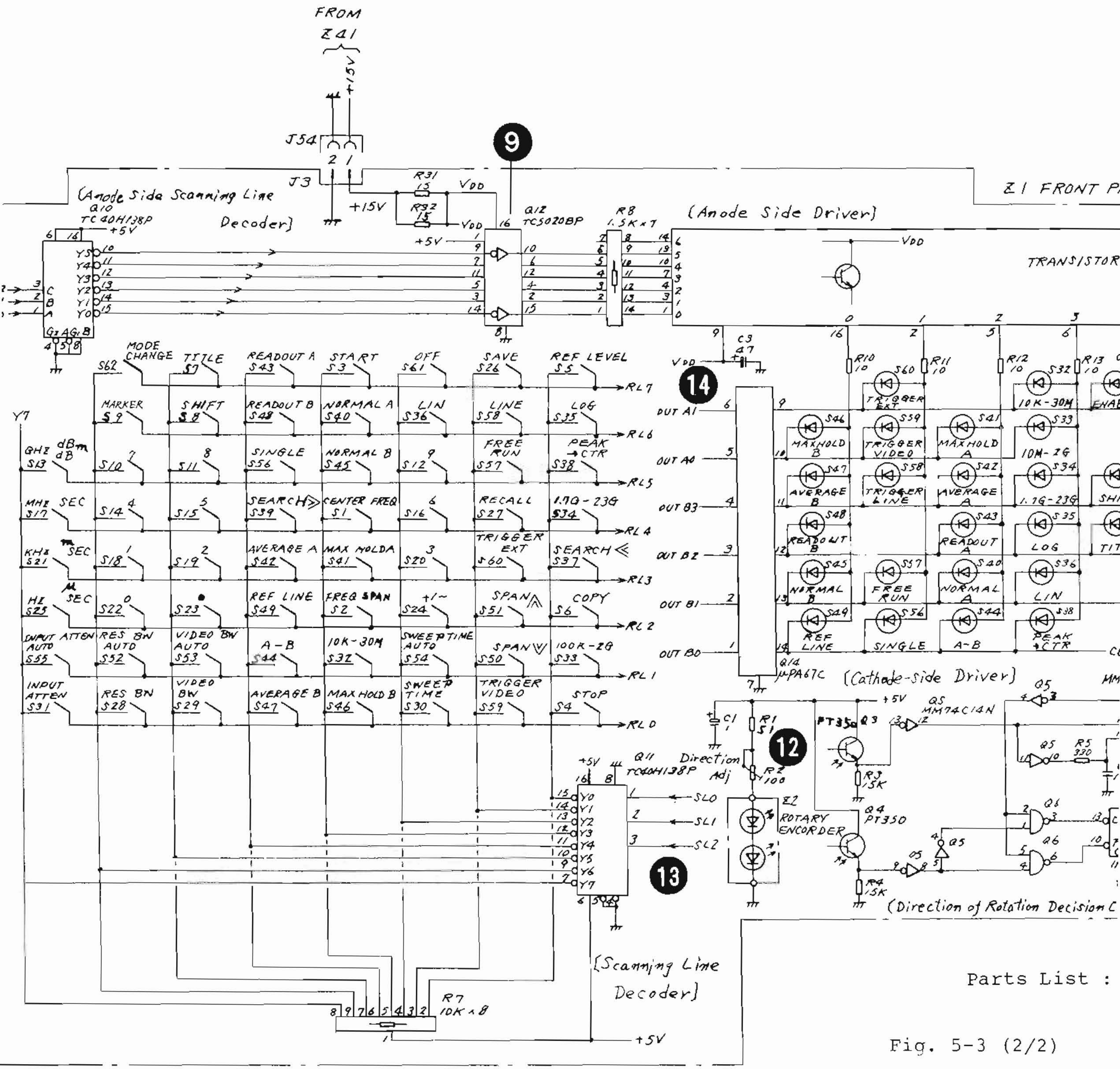


Parts List : Z1 44W 83921
Z2 44W 83922

Fig. 5-3 (1/2)

Z1 FRONT PANEL I, Z2 FRONT PANEL II
Circuit Diagram (1/2)
(43W 33934, 44W 84111)

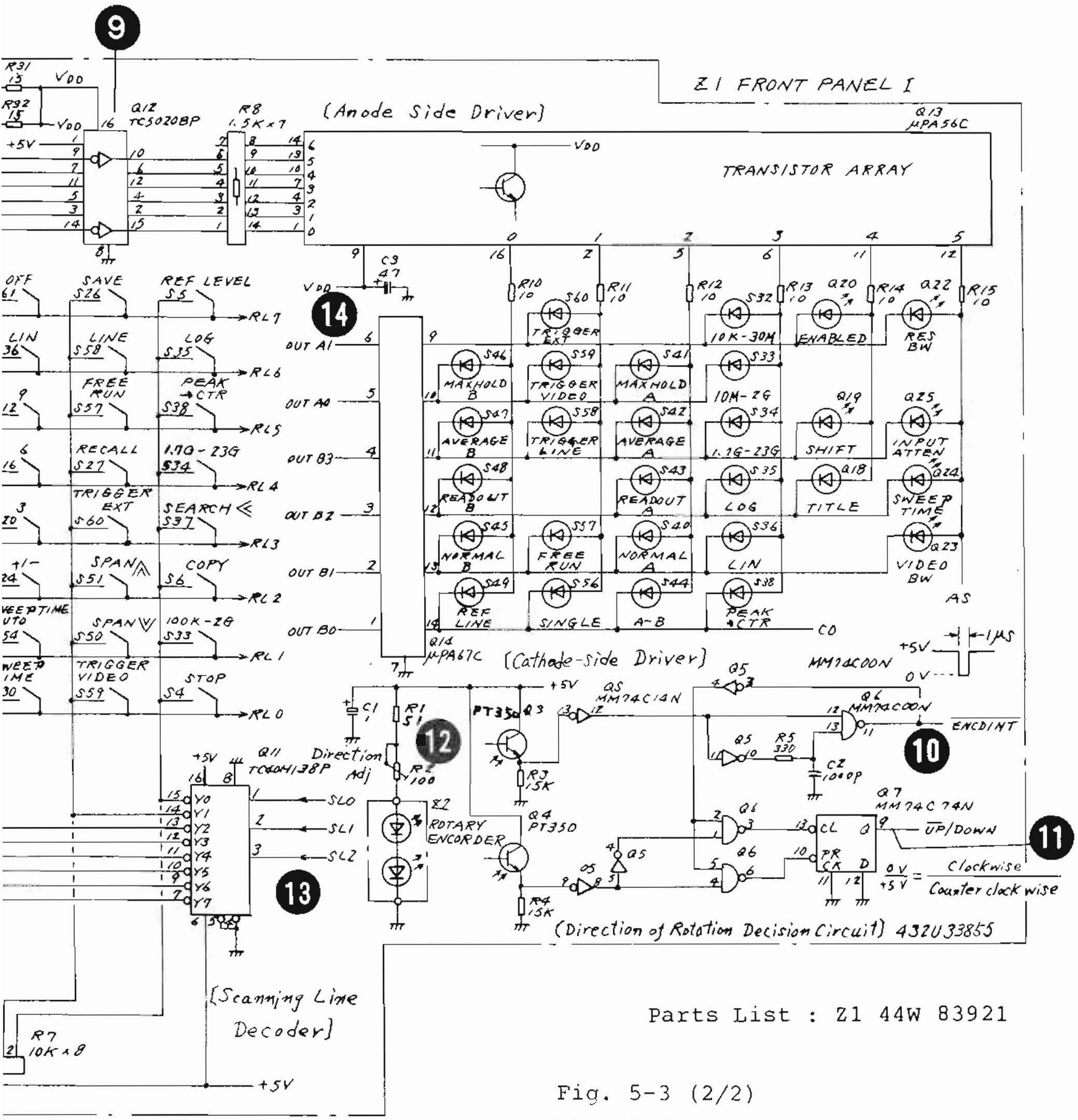

FROM
Z41
+15V
J54
J3
R31
15
R32
15
+15V
+5V
(Anode Side Scanning Line
Decoder)
Q10
TC40H138P
+5V
Y5
Y4
Y3
Y2
Y1
Y0
SL2
SL1
SL0
C
B
A
G1 AG2B
Y7
S62
MODE CHANGE
TITLE
S7
READOUT A
S43
START
S3
OFF
S61
MARKER
S9
SHIFT
S8
READOUT B
S48
NORMAL A
S40
LIN
S36
GHZ
S13
dBm
dB
S10
7
S11
8
SINGLE
S56
NORMAL B
S45
S12
9
MHZ
S17
SEC
S14
4
S15
5
SEARCH
S39
CENTER FREQ
S1
S16
6
KHZ
S21
mSEC
S18
1
S19
2
AVERAGE A
S42
MAX HOLD A
S41
S20
3
HZ
S25
μSEC
S22
0
S23
REF LINE
S49
FREQ SPAN
S2
+/-
S24
INPUT ATTEN AUTO
S55
RES BW AUTO
S52
VIDEO BW AUTO
S53
A-B
S44
10K-30M
S32
SWEEP T AUTO
S54
INPUT ATTEN
S31
RES BW
S28
VIDEO BW
S29
AVERAGE B
S47
MAX HOLD B
S46
SWEEP TIME
S30
8 9 7 6 5 4 3 2
R
10
1



Parts List :

Fig. 5-3 (2/2)

Z1 FRONT PANEL I, Z
Circuit Diagram (2/
(43W 33934, 44W 84



Parts List : Z1 44W 83921

Fig. 5-3 (2/2)

Z1 FRONT PANEL I, Z2 FRONT PANEL II
Circuit Diagram (2/2)
(43W 33934, 44W 84111)

5.4 (Z3 RF ATT
Z5 YTF
Z6 μ 1st CONVERTER
Z7 COUPLER (MS710C/D only)
(Z4 is not assigned))

All these components are mounted on a vertical chassis. This component-mounted chassis can be removed from the top. Simply remove the top plate, bottom plate, right-side plate, and the vertical chassis by loosening the screws that hold it on the main chassis.

CAUTION

Do not remove the cover of Z6-Z2; it is an air-tight protective cover for the internal microwave IC circuits.

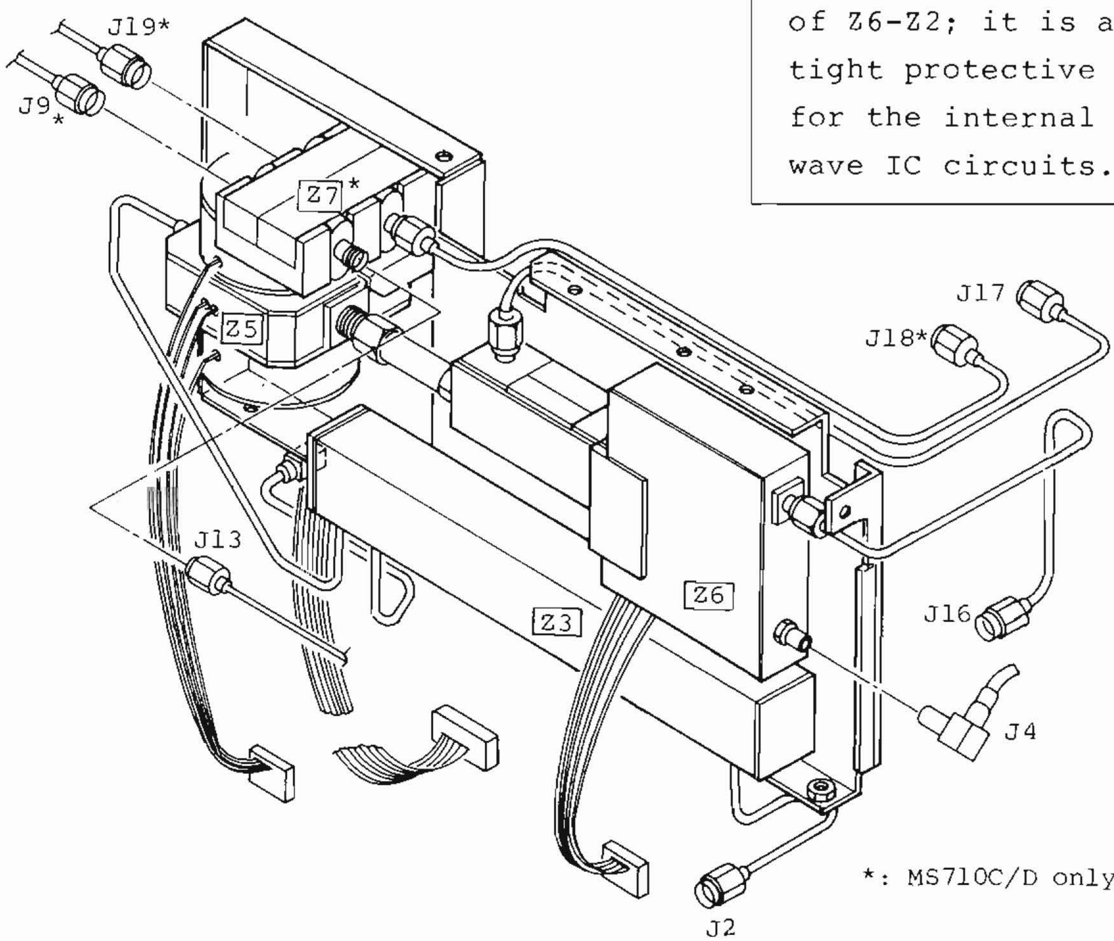


Fig. 5-4 RF Input Circuit Components Layout

CAUTION

1. The Z6-Z2 harmonic mixer is sealed airtight; it is a microwave IC component. Do not remove the protective cover of this component. The user must not attempt any repairs of this component. If this component is assumed to be faulty, replace the entire Z6 or return it for factory inspection and repair.

2. The vertical chassis upon which Z3 to Z6 are mounted can be removed by disconnecting the cable and removing the setscrews that secure this block. It is not necessary to remove the entire front panel (Fig. 5-1 shown before).

3. When disconnecting the connectors used to connect Z5 and Z6, do not apply excessive force.

5.4.1 Circuit description - Z3, Z5, and Z6
(Refer to Fig. 3-3 (1/4), Fig. 3-3 (4/4), Figs. 5-5 to 5-8)

The measurement signals from the front-panel RF-INPUT terminal J1 are sent to the Z3 RF ATT (attenuator and switch) through the J2 cable. The input signals are sent by the switch in Z3 to the Z14 0 to 2 GHz RF block through the switch in Z35 LOW 1st MIX for 100 kHz to 2 GHz band and to the Z5 YTF through the J3 cable for the 1.7 to 23 GHz band.

Attenuation select and switch changeover signals of the Z3 RF ATT/SW are supplied through the driver circuit mounted on the Z34 DIGITAL MEMORY/GP-IB PC board with the control signals generated by the Z26 CPU board. Z5 YTF is the YIG-tuned filter whose center frequency corresponds to the measurement frequency, and functions as the preselector for the 1.7 to 23 GHz band. The Z5 output is sent directly to the Z6 μ 1st converter input Z6-J1. Z5 YTF tuning signals and heater power signals are supplied from the Z10 YTO YTF driver.

As shown in circuit diagram Fig. 5-5, Z6-Z1 local AMP amplifies the output of the 2.2 to 6 GHz local oscillator (Z9 YTO) sent through J2. This output is then sent to the harmonic mixer Z6-Z2 along with the 1.7 to 23 GHz input RF signals sent through Z6-J1 by using the internal coupler W1.

The harmonic mixer Z6-Z2 performs up to the fourth-order of harmonic mixing, depending on the input RF signal frequency, and converts this signal into 521.4 MHz first IF signals. First IF signals are amplified by approximately 20 dB by the Z6-Z3 IF amplifier and are output to the J4 output terminal. Then, IF signals are sent to the Z18 μ 2nd converter 1.

The power voltage (+15 V) and mixer bias current are supplied from the Z21 local control 1 through J5.

5.4.2 Checking procedure - Z3, Z5, and Z6

Step	Procedure
1.	See Fig. 2-1; remove the bottom cover.
2.	Apply a test signal of approximately 2 GHz to the RF input of MS710[ ].

(cont.)

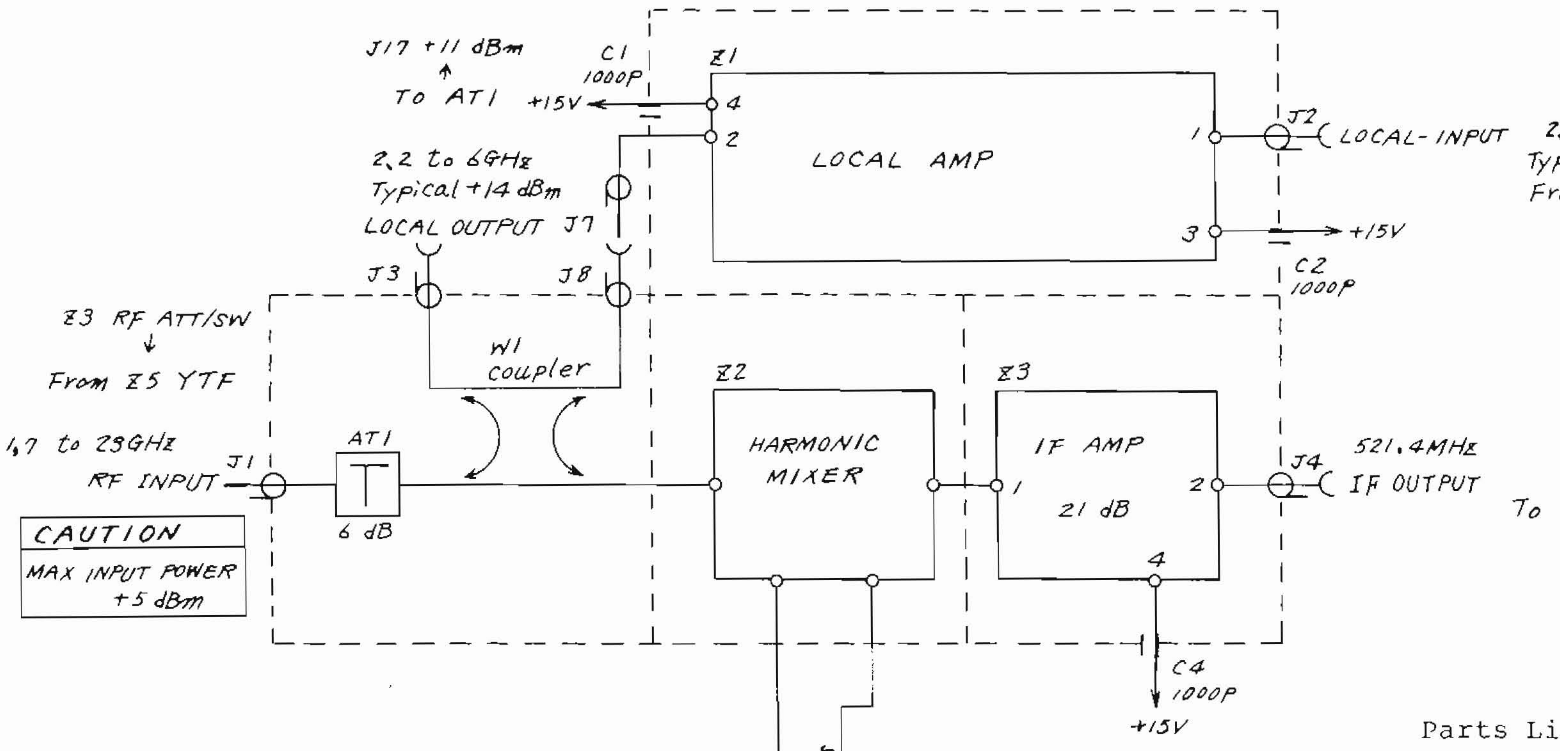
Step	Procedure
3.	Disconnect the semirigid cable connected to the Z3 output ports (Z3-J2 and Z3-J3) and check the Z3 output with another spectrum analyzer. Confirm that input signals are sent to the Z3 correct output port at the proper attenuation.
4.	If an abnormality is detected during the check described in Item 3, it is assumed that the Z3 or the Z34 driver circuits are faulty, or, the Z26 control signal generation circuit is faulty. See the related sections on Z34 and Z26 for details on their checking procedures.
5.	See Fig. 2-4; remove the top cover.
6.	Set the center frequency to the input signal frequency and set the span to zero.
7.	Observe Z6-J4 IF output by using another spectrum analyzer. When the input signal frequency is set within the fundamental wave mixing range (1.7 to 6.5 GHz), parts Z3 to Z6 are assumed to be normal if the level of the generated IF signal is roughly equivalent to (input signal level - INPUT ATTEN) and the frequency is 521.4 MHz. In this case, the preselector peak must be adjusted to obtain maximum output.
8.	Disconnect the J16 (connected to Z6-J2) cable. Then check the local signal input from Z9 YTO to Z6-Z1 and the related level (+12 dBm Typical).

(cont.)

Step	Procedure
9.	Disconnect the J17 (AT1 output) cable. Then check the AT1 output level (+11 dBm Typical). When the signal described in Item 8 is normal and this output is abnormal, the Z6-Z1 local amplifier is faulty.
10.	If Z5 YTF operation is abnormal, first check the Z10 YTO/YTF driver circuit (paragraph 5.5).
11.	The Z6 μ 1st converter can be analyzed by checking the signal level shown in Fig. 5-5.

5.4.3 Adjustment - Z3, Z5 and Z6

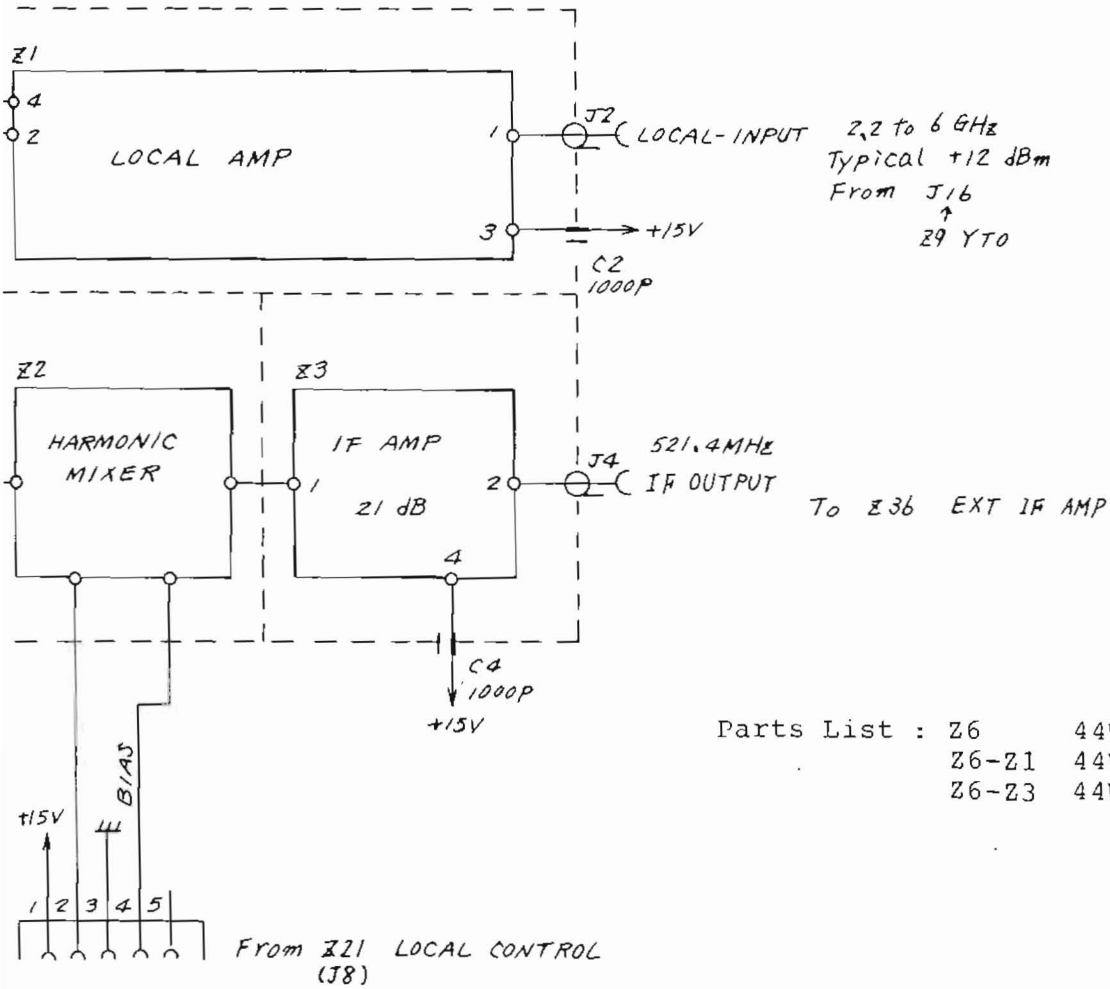
These components require no special adjustments. Z6-Z2 harmonic mixer bias and the frequency characteristics of conversion loss are adjusted by using the Z21 local control 1 PC board.



Parts Li

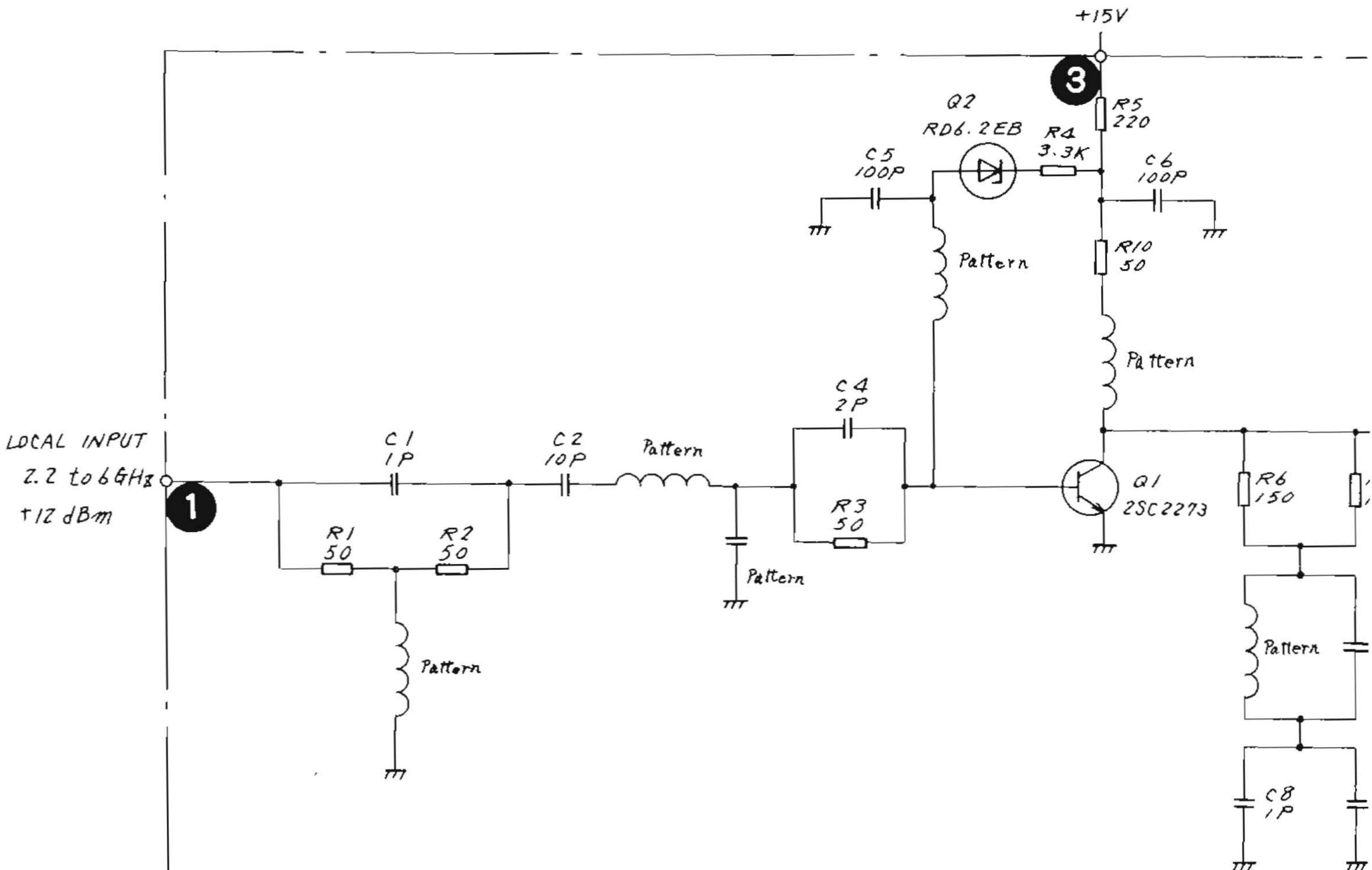
TYPICAL CONVERSION GAIN (J1 To J4)

RF FREQ (GHz)	HARMONIC	CONV. GAIN
1.7 to 6.5	1	+4 dB
6.5 to 12.5	2	-2 dB
12.5 to 18.5	3	-5 dB
18.5 to 23	4	-10 dB

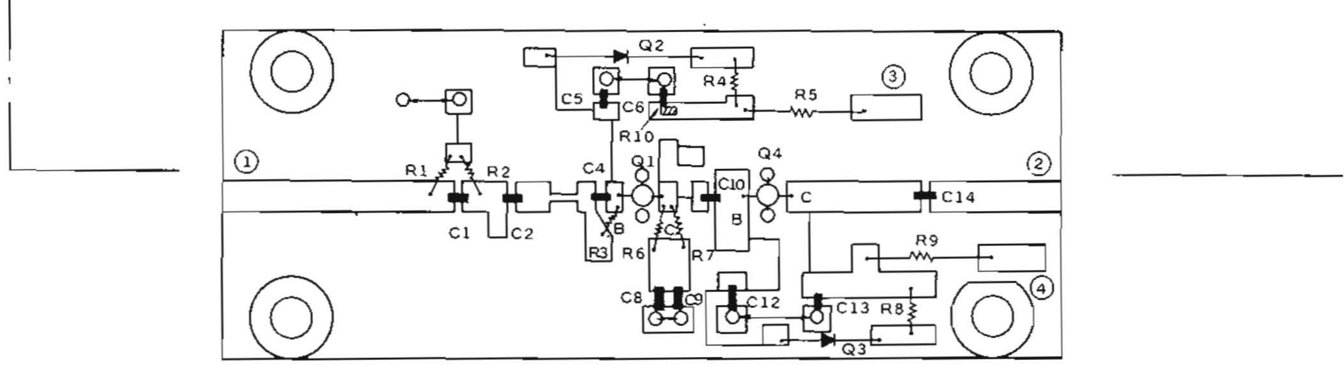


Parts List : Z6 44W 83923
Z6-Z1 44W 83924
Z6-Z3 44W 83925

Fig. 5-5 Z6 μ 1st CONVERTER Circuit Diagram (43W 33935)



+15V
Q2
RD6.2EB
R5
220
R4
3.3K
C5
100P
C6
100P
R10
50
Pattern
C4
2P
LOCAL INPUT
2.2 to 6GHz
+12 dBm
C1
1P
C2
10P
R1
50
R2
50
R3
50
Q1
2SC2273
R6
150
C8
1P



Q2
R4
R5
C5
C6
R10
R1
R2
C4
Q1
Q4
C10
B
C
C14
C1
C2
R3
R6
R7
R9
C8
C9
C12
C13
R8
Q3

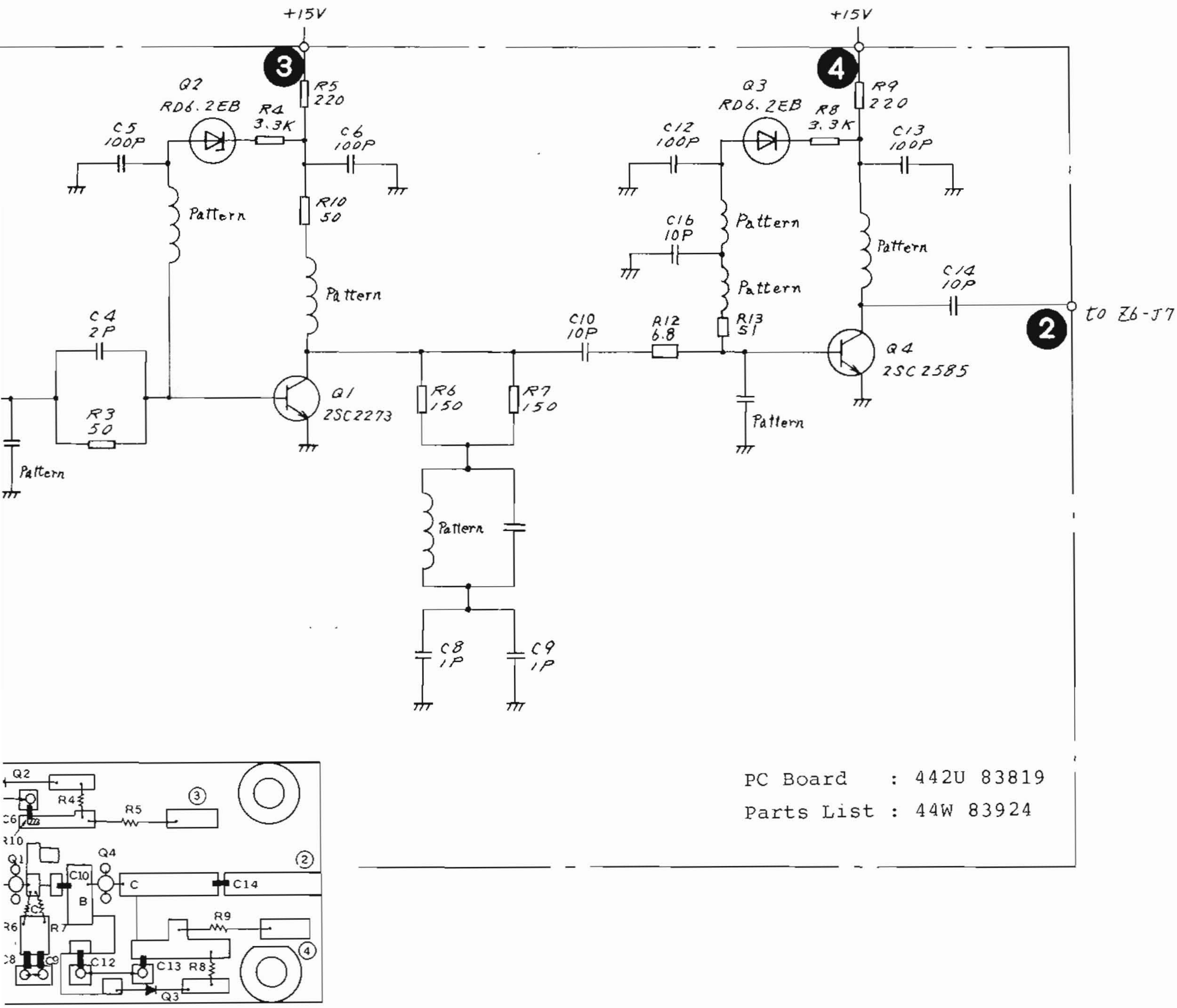


Fig. 5-6 Z6-Z1 LOCAL AMP
Circuit Diagram
and Parts Layout
(43W 33936)

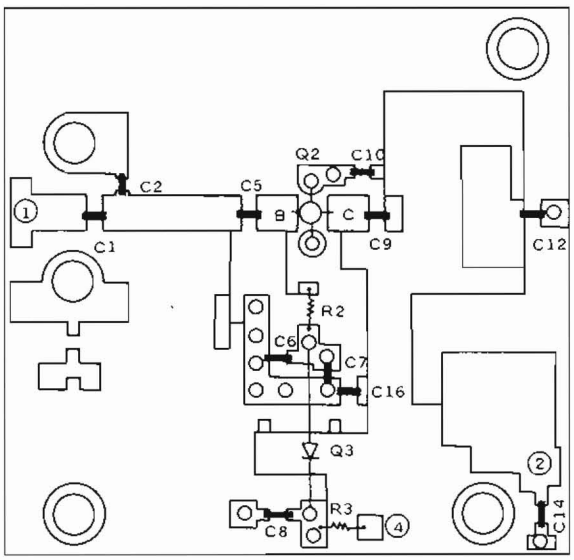
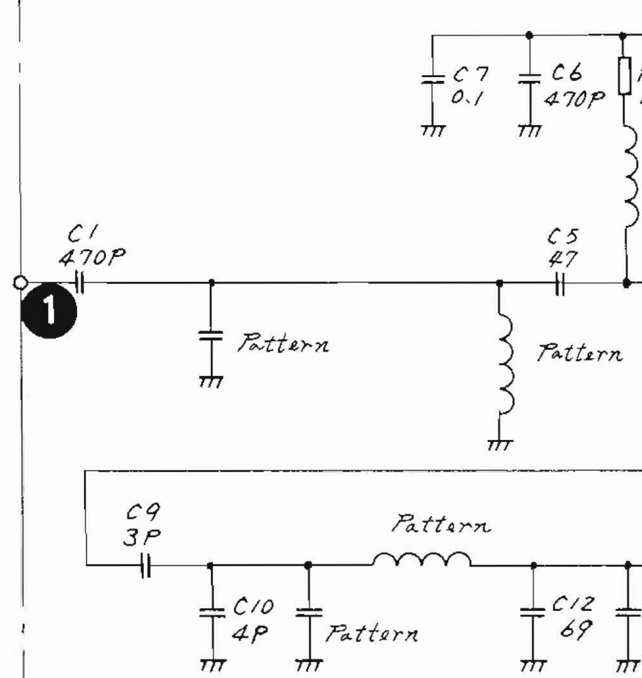


Fig. 5-7 Z6-Z3 IF AMP Parts Layout

PC Board   : 442U 83821

Parts List : 44W 83925



Typical Gain 21 dB

Fig. 5-8 Z6-Z3 IF AMP Circui

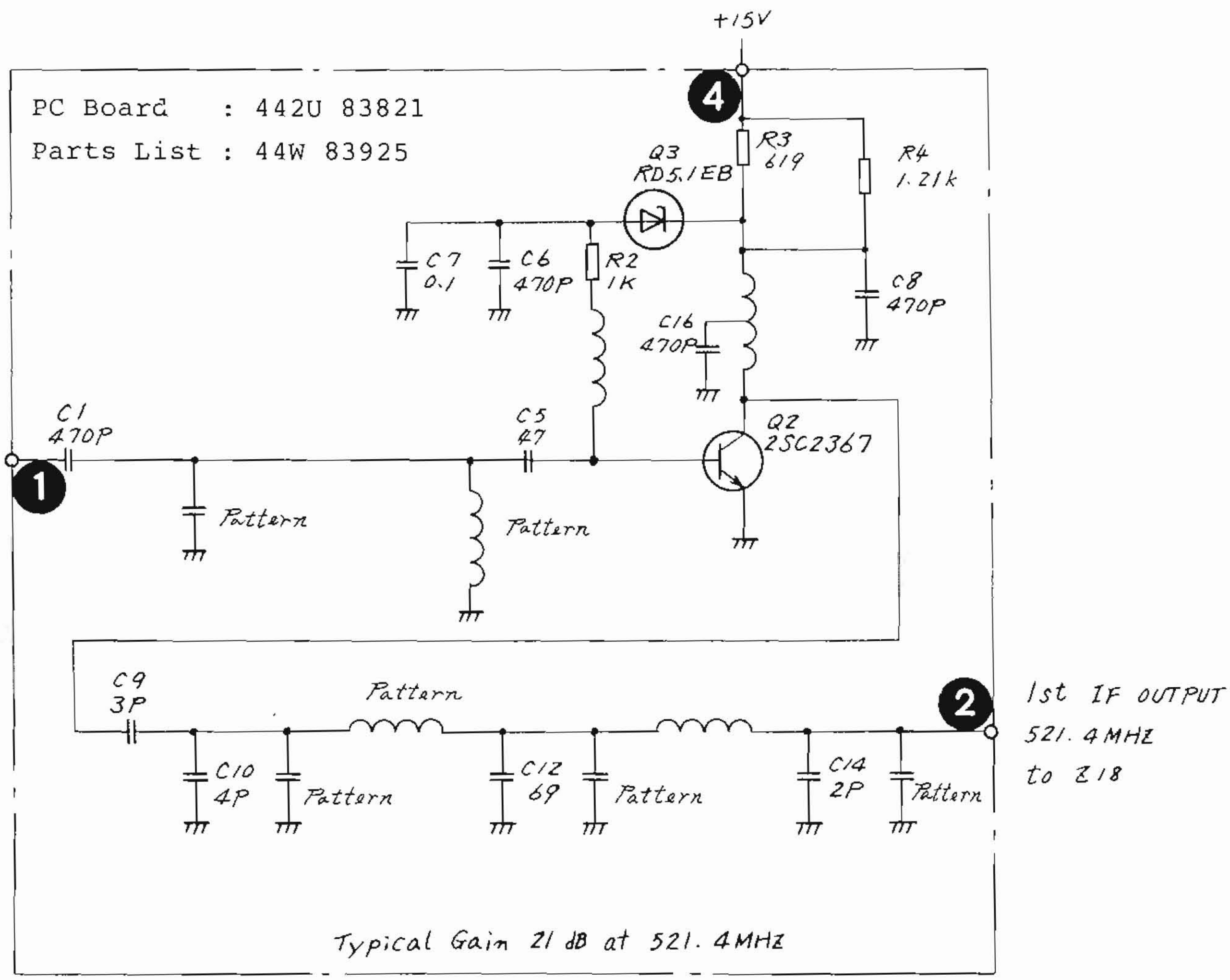


Fig. 5-8 Z6-Z3 IF AMP Circuit Diagram (43W84112)

5.5 Z9 YTO, Z10 YTO/YTF DRIVER

5.5.1 Circuit description - Z9, Z10

(Refer to Fig. 3-3 (1/4), Fig. 3-3 (4/4), Figs. 5-10 to 5-17)

Z9 YTO is the 2.2 to 6 GHz YIG-tuned oscillator used to generate the MS710[ ]'s first local signal. The power and tuning signals of this YTO are supplied from the Z10 YTO/ YTF driver. The first local signal is sent through the local amplifier Z6-Z1 and coupler Z6-W1 in the Z6 μ 1st converter and the coupler Z7 (paragraph 5.4) to the Z14 0 to 2 GHz RF block and Z16 PLL block. Z9 and Z10 are mounted on the Z14 0 to 2 GHz RF block shown in Fig. 5-9.

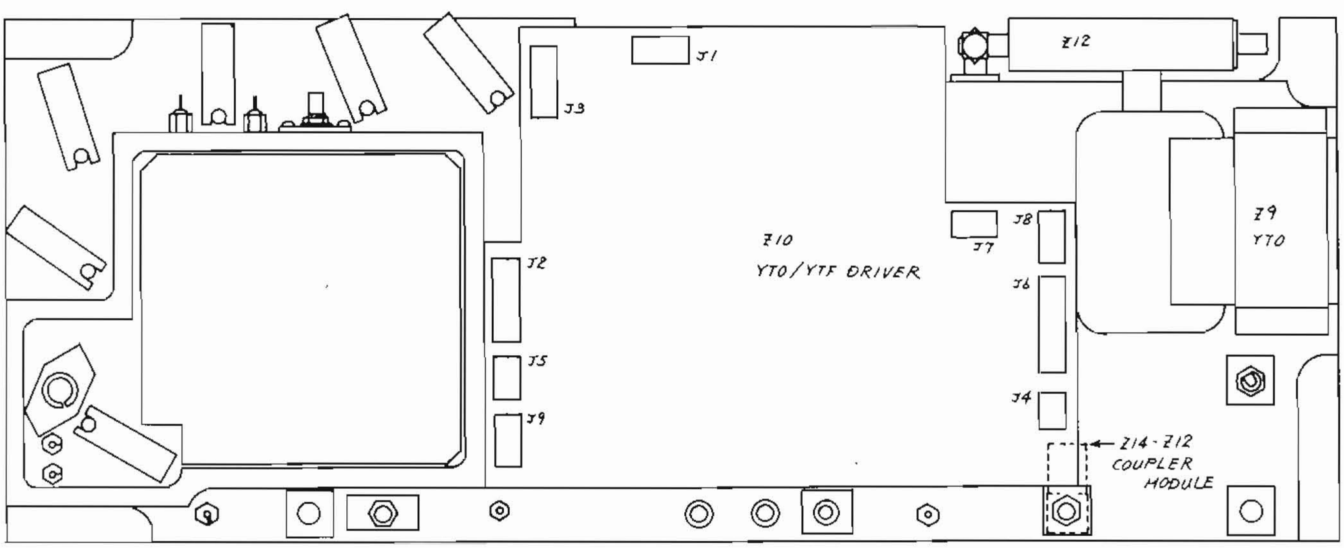


Fig. 5-9 Z9, Z10, and Z14-Z12 Parts Layout

A conversion circuit on the Z10 YTO/YTF driver PC board (Fig. 5-16) is used to convert local signal frequency control signals generated by the Z21 local control 1 circuit and Z16 PLL block, into drive signals required by Z9 YTO.

The circuit on the Z10 is divided into the main coil driver circuit with Q11, Q12, and Q13 and the FM coil driver circuit with Q15, Q16, and Q17. The main tune signal (MT) from the Z21 that determines Z9 YTO frequency is input to the main coil driver circuit of Z10 through the Z10-J2 connector.

A frequency sweep in the start/stop mode, in which the sweep width exceeds 2 GHz, is performed by directly varying the MT signal. (See Fig. 5-10, and 5-12.)

When the SPAN ranges from 200 MHz/div to 2.1 MHz/div in the fundamental mixing range, the main tune (MT) signal is fixed to the value corresponding to the center frequency. A sweep is performed by adding the main sweep (MSWP) sent from Z21 through Z10-J2 to the main coil driver circuit. (See Figs. 5-10 and 5-14.)

The YTOC signal is also sent to the main coil driver and is used as an offset signal to correct YTO frequency deviation.

The main coil driver circuit is the voltage-current conversion circuit used to convert the sum of the MT, MSWP, and YTOC signals into YTO main coil drive current.

When the SPAN ranges from 2.0 MHz/div to 101 kHz/div in the fundamental mixing range, the MT is fixed to the value corresponding to the center frequency and MSWP is fixed to 0 V. Sweeps are performed by FM coil sweep (FM SWP) signals. The FM coil driver circuit converts FM SWP signals into YTO FM coil drive current. (See Figs. 5-10 and 5-15.)

A PLL signal is sent to the Z10 FM coil driver circuit to accurately maintain the local frequency. When the SPAN is set to a narrower fundamental mixing range less than or equal to 100 kHz/div, the FM SWP signal is set to 0 V and the PLL circuit reference frequency is used in a sweeping.

Consequently, the local frequency is obtained through driving the YTO FM coil by using these PLL signals. (See Figs. 5-10 and 5-15.)

The circuit with Z10-Q3 and Z10-Q5 controls the YTO built-in heater, and the heater voltage (H) is controlled by a temperature sensor(T).

The circuit with Z10-Q20, Z10-Q21, and Z10-Q22 is the Z5 YTF (preselector) drive circuit described in paragraph 5.4.

This circuit adds the YTF tune (YTFT) signal sent from the Z21, the preselector peak signal sent from the front-panel preselector peak control (Z1-R18) through Z21, and the signal for the preselector auto tuning sent from Z34. Then, these signals are supplied to the Z5 YTF tuning coil through the voltage current conversion circuit (Fig. 5-11).

The relationship between YTO/YTF tuning, sweep control signals, and frequencies are shown in Figs. 5-10 and 5-11.

Z9 YTO oscillation frequency is obtained by setting the MS710[ ] to ZERO SPAN and measuring the first local output on the rear panel.

5.5.2 Checking procedure - Z9, Z10

Step	Procedure
1.	When the right-side cover is removed according to Fig. 2-1, the location of parts can be seen as shown in Fig. 5-9.
2.	Set the MS710[ ] into resetting status (1.7 to 23 GHz full band sweep status) by pressing the 1.7 to 23 GHz band selection switch.
3.	Observe the voltage of Z10 checkpoints ❶ and ❷ (Figs. 5-16 and 5-17) on the oscilloscope and confirm as shown in Fig. 5-12. If this signal is abnormal, the Z21 local control circuit is assumed to be faulty. Note: Make sure that the voltage at checkpoints ❶ and ❷ is 1.7% and 5% less than that of the MT voltage and YTFT voltage, respectively.
4.	Observe the voltage at Z10 checkpoints ❸ and ❹. If the voltage is as shown in Fig. 5-13, the YTF driver circuit is normal.
5.	Select the STOP FREQUENCY as 5.478 GHz. (The indication is STOP:5.480 GHz. The START remains set to 1.700 GHz.) This status is used when a sweep is performed for the entire band used by the YTO.
6.	Observe the voltage at Z10 checkpoints ❶ and ❺ and confirm as shown in Fig. 5-14.

(cont.)

Step	Procedure
7.	Press the 100 kHz to the 2 GHz BAND switch and then press the SPAN switch.
8.	Observe the voltage at Z10 checkpoints ❻ and ❺ and confirm as shown in Fig. 5-14.
9.	Set the SPAN to 2 MHz/div.
10.	Observe the voltage at Z10 checkpoints ❼ and ❽ and confirm as shown in Fig. 5-15.
11.	If an abnormality occurs during the check described in Item 10, disconnect the PLL signal connector connected to Z10-J5 and repeat Item 10.
12.	If a normal status results in Item 11, the Z16 PLL block is assumed to be faulty. In a normal operation status, voltage ❾ appears as the waveform shown in Fig. 5-15.
13.	Set the SPAN to 100 kHz/div.
14.	Observe the voltage at checkpoint ❾ and check it as the lower waveform shown in Fig. 5-15.
15.	Check the voltage at Z10 checkpoints ❿ and ⓫ . If each voltage is approximately +6 V and +4 V under normal environmental conditions (ambient temperature of approximately 25°C), it is normal.

5.5.3 Adjustment - Z9, Z10

NOTE

If the Z21 local control circuit operates normally and a valid control signal is input to Z10, the following method of adjustment is used. Unless already done, adjust Z21 first.

(1) Adjusting YTO Main Coil Driver

Step	Procedure
1.	Connect the MS710[ ] rear first local signal output to the microwave counter.
2.	Set the SPAN to ZERO SPAN.
3.	Disconnect the PLL signal connector connected to Z10-J5 and open Z10-J5.
4.	Set the center frequency to 1.700 GHz.
5.	Set the first local output frequency to 2.2214 GHz by adjusting Z10-R17 (offset adjustment).
6.	Set the center frequency to 5.470 GHz.
7.	Set the first local output frequency to 5.9914 GHz by adjusting Z9-R21 (sensitivity adjustment).
8.	Reduce the frequency error to less than 3 MHz by repeating steps 4 to 7.

(cont.)

Step	Procedure
9.	Set the center frequency to 3 GHz and SPAN to 200 MHz/div.
10.	Use the microwave signal generator to send 2 GHz and 4 GHz signals to the MS710[ ] and adjust Z10-R12 so that each signal can be displayed at the left (2 GHz) and right (4 GHz) ends of the CRT scale (main coil sweep sensitivity adjustment).

(2) YTO FM Coil Driver Adjustment

Step	Procedure
1.	Set the center frequency to 3 GHz and SPAN to 2.0 MHz/div.
2.	Display the spectrum at the CRT central scale position by varying the frequency of the microwave signal source.
3.	Adjust Z9-R39 by varying the frequency of the microwave signal source by -10 MHz and +10 MHz so that the spectrum on the CRT can be displayed at the left (3 GHz - 10 MHz) and right (3 GHz + 10 MHz) ends (FM coil sweep sensitivity adjustment).

(3) YTF Driver Adjustment

Step	Procedure
1.	Remove the Z10-J9 preselector auto signal connector and open Z10-J9.
2.	Send the Z10-J5 PLL signal as is.
3.	Align the front panel preselector peak knob to the center mark.
4.	Set the center frequency to 1.7 GHz and SPAN to 2 GHz/div.
5.	Use the microwave signal source to send 1.7 GHz signal to the MS710[ ] and adjust Z10-R48 to maximize the display level (offset adjustment).
6.	Set the MS710[ ] center frequency and microwave signal source frequency to 15 GHz.
7.	Adjust R46 to maximize the signal display level (sensitivity adjustment).
8.	Reduce the frequency error by repeating steps 4 to 7.
9.	Reset the Z9-J5 connection to its original state.

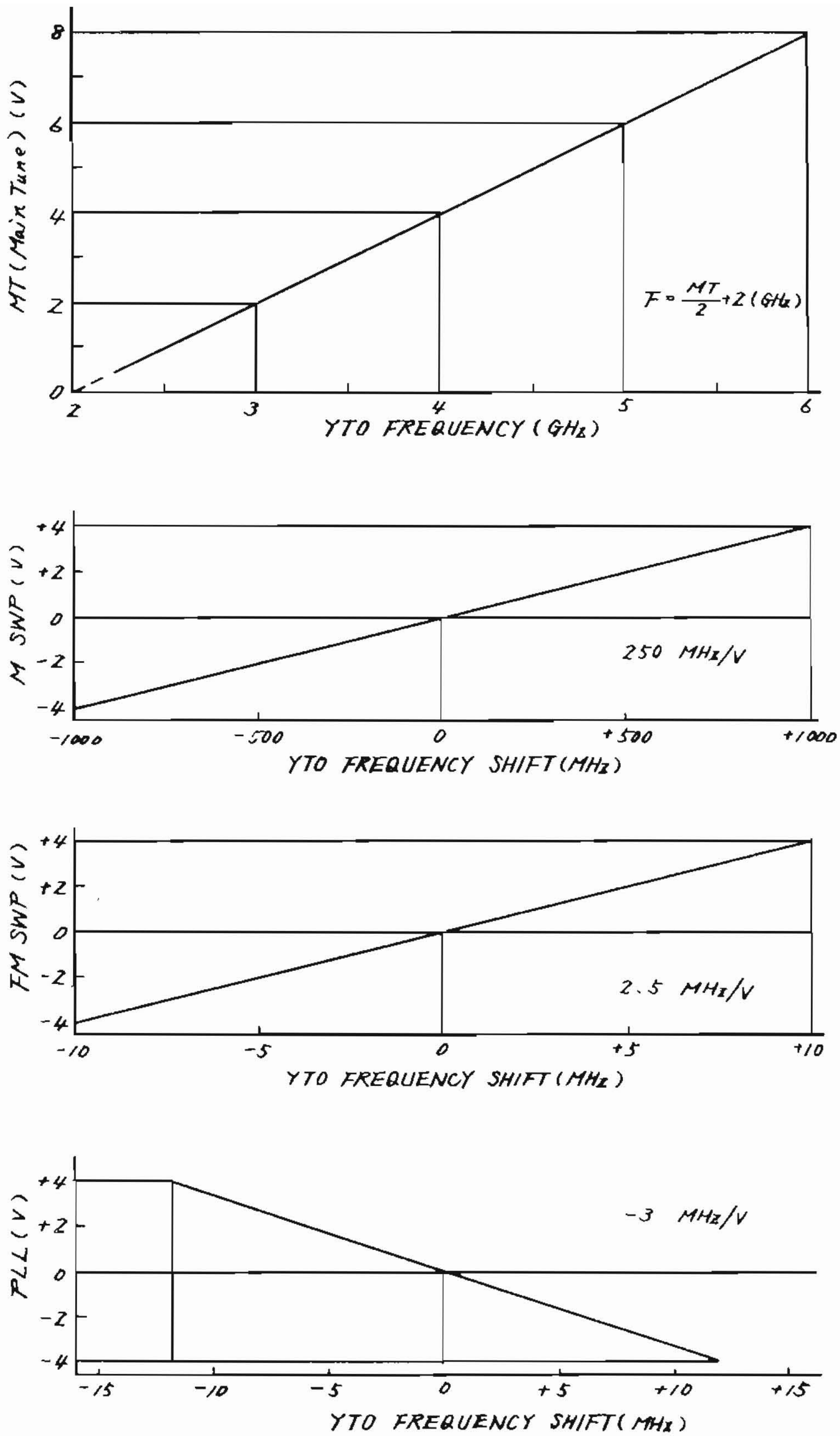


Fig. 5-10 YTO Frequency vs Control Voltage

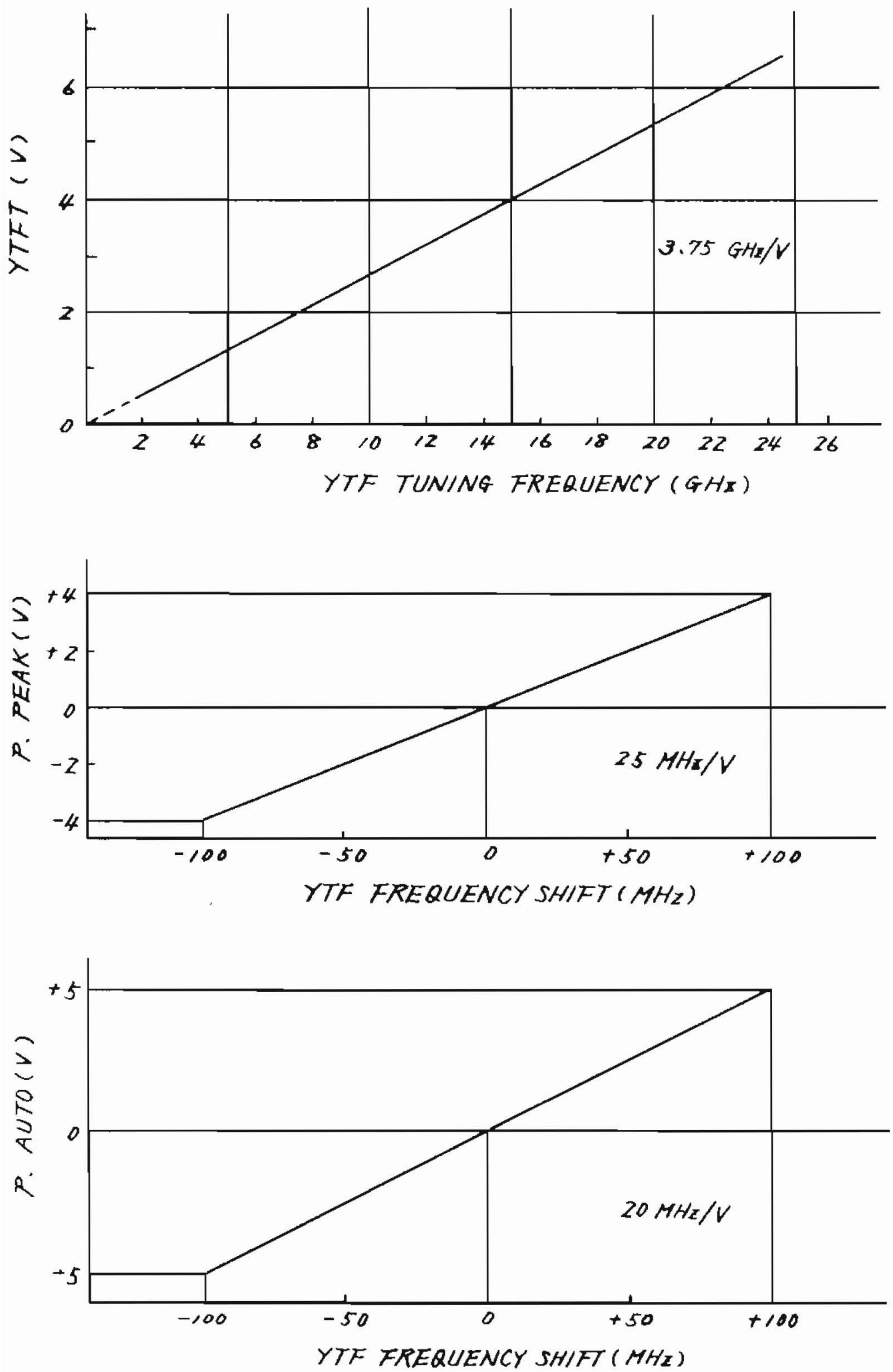


Fig. 5-11 YTF Tuning Frequency vs Control Voltage

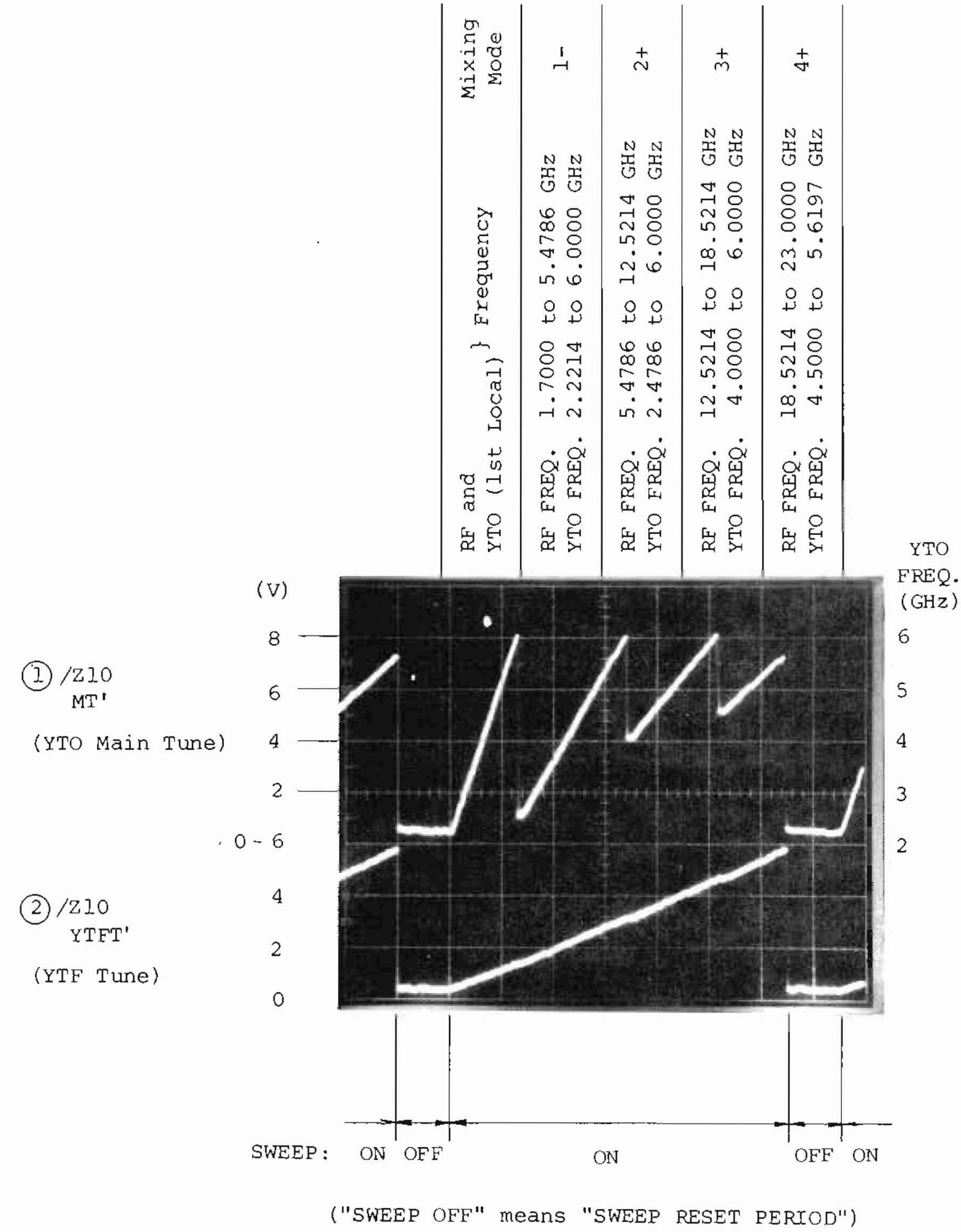


Fig. 5-12 YTO and YTF Tuning Signal during POWER ON RESET Status
(1.7 to 23 GHz Full Band Sweep Status)

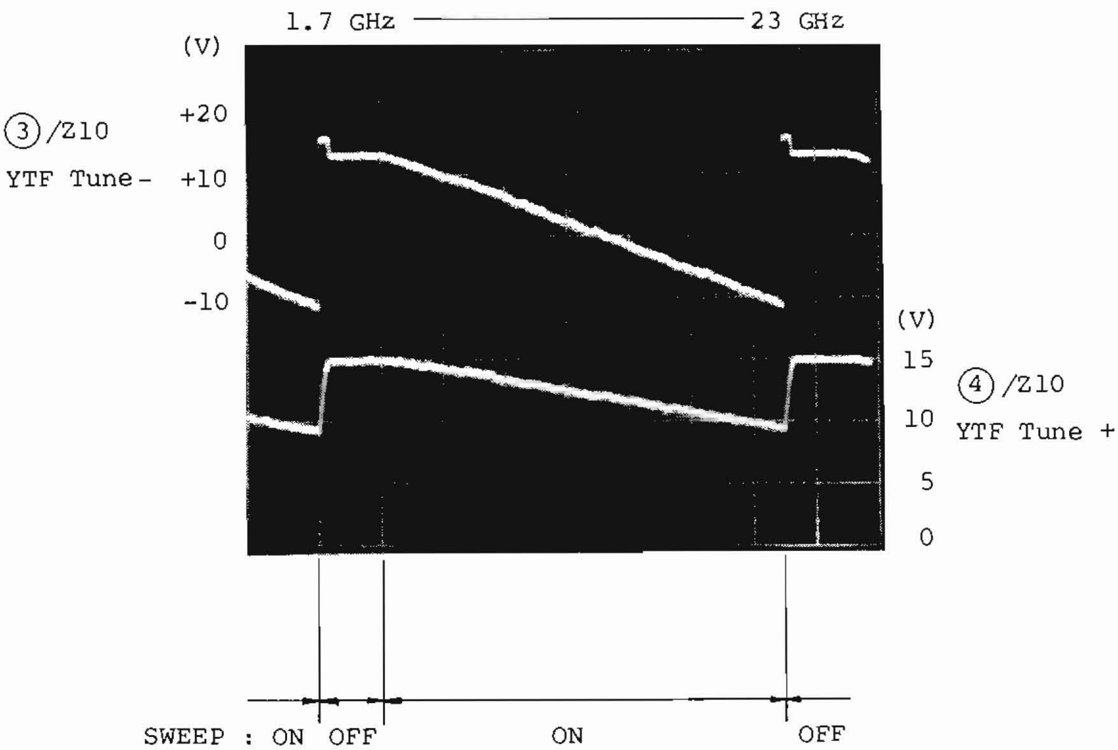
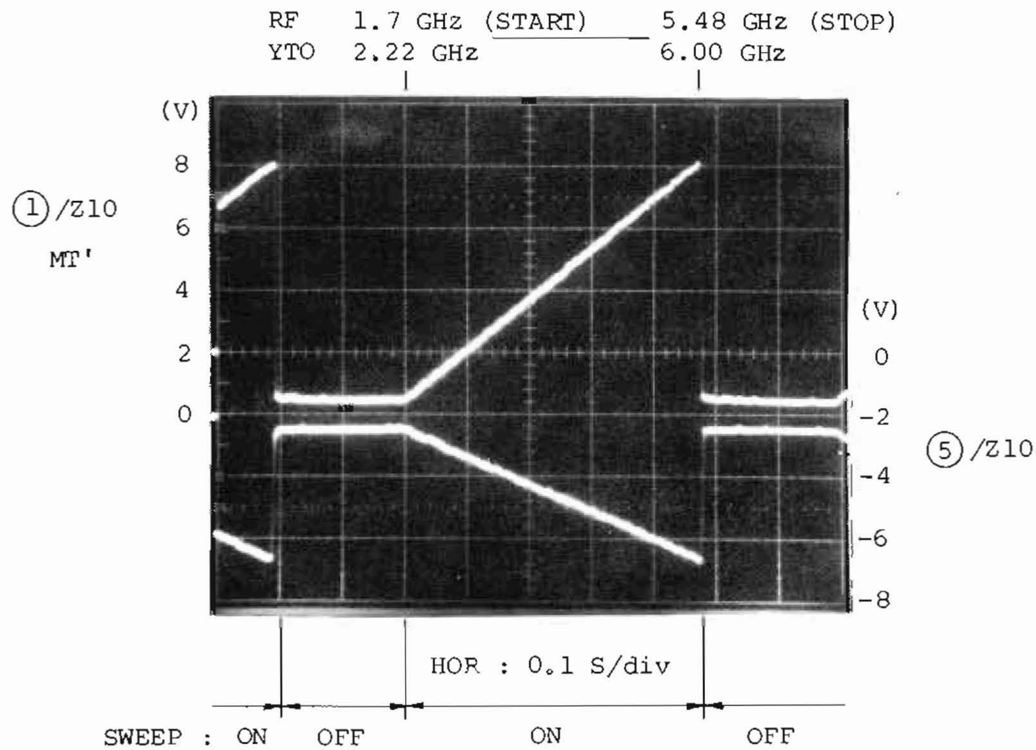


Fig. 5-13 YTF Driver Check Points
(During POWER ON RESET Status,
1.7 to 23 GHz Full Band Sweep Status)

A. YTO Full Sweep



B. 200 MHz/div

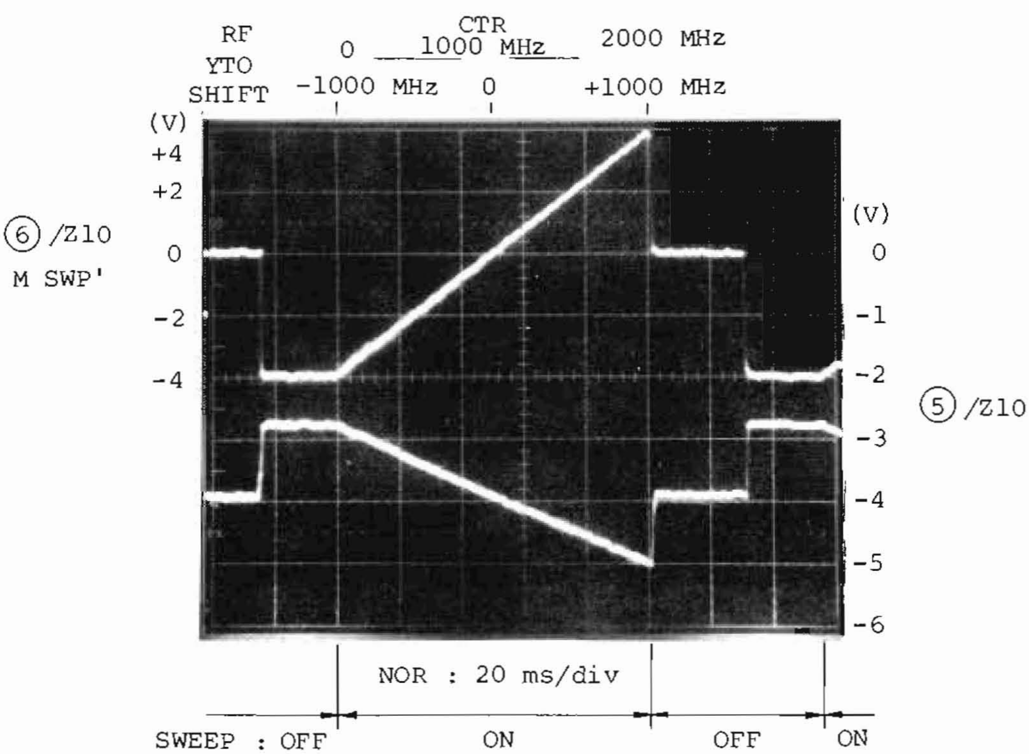
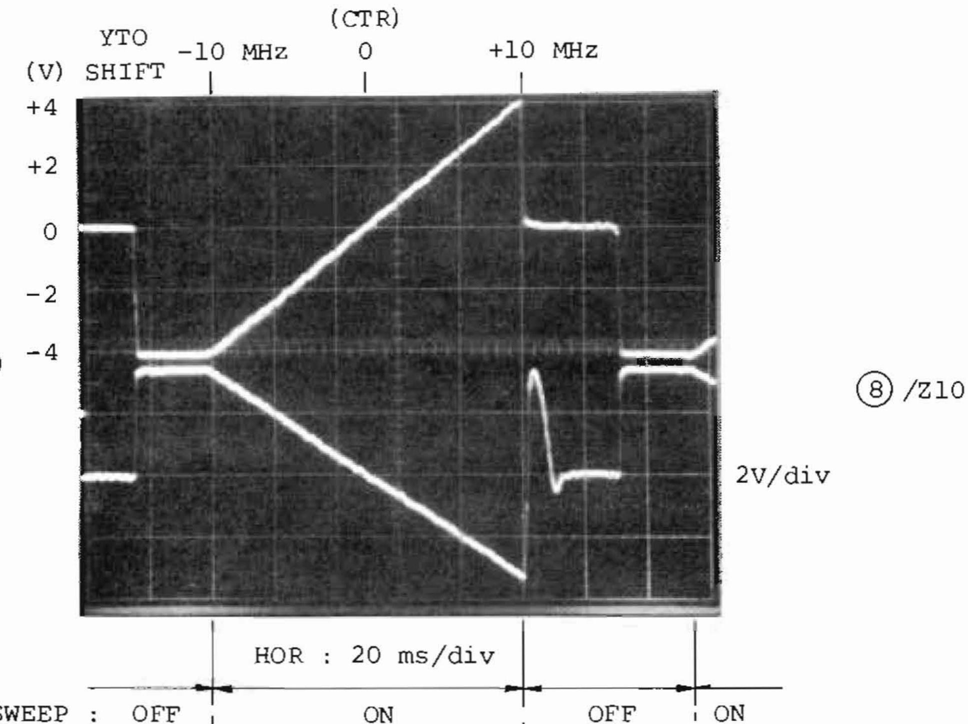


Fig. 5-14 YTO Main Coil Driver Check Points

A. FM Coil Sweep



B. PLL Signal

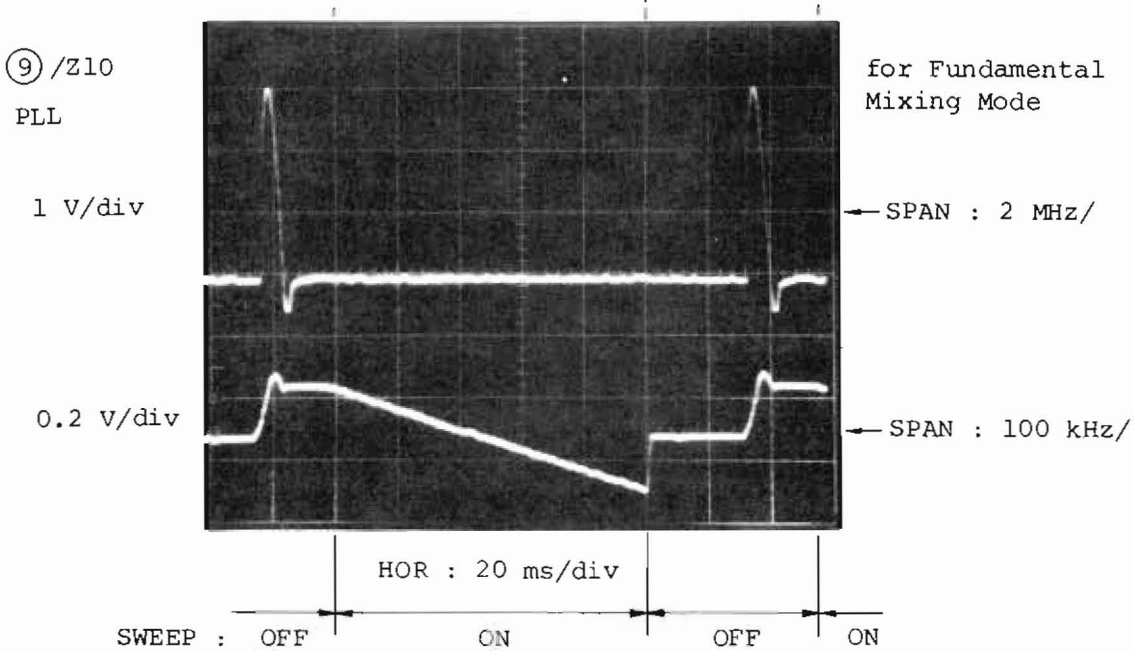


Fig. 5-15 YTO FM Coil Driver Check Points

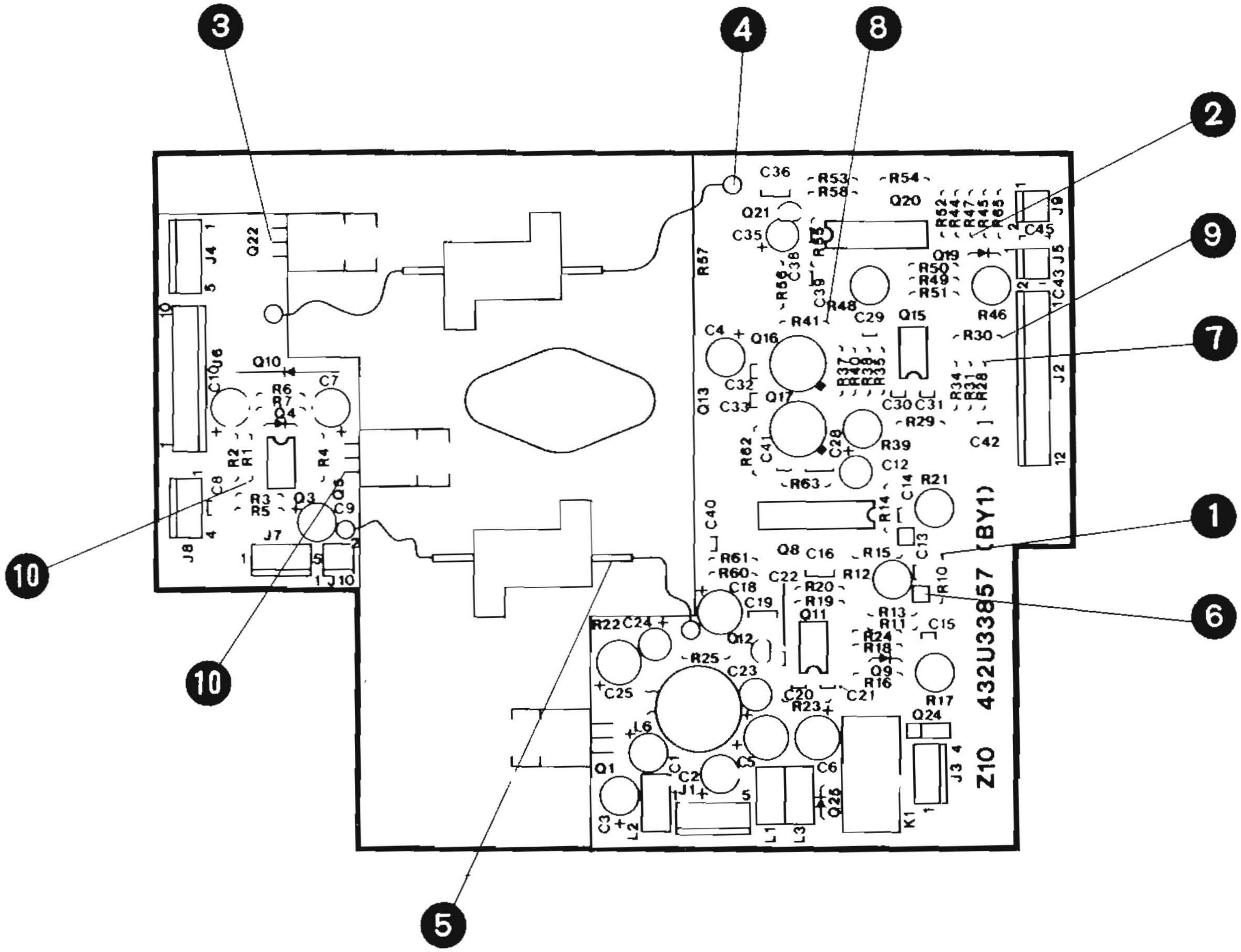
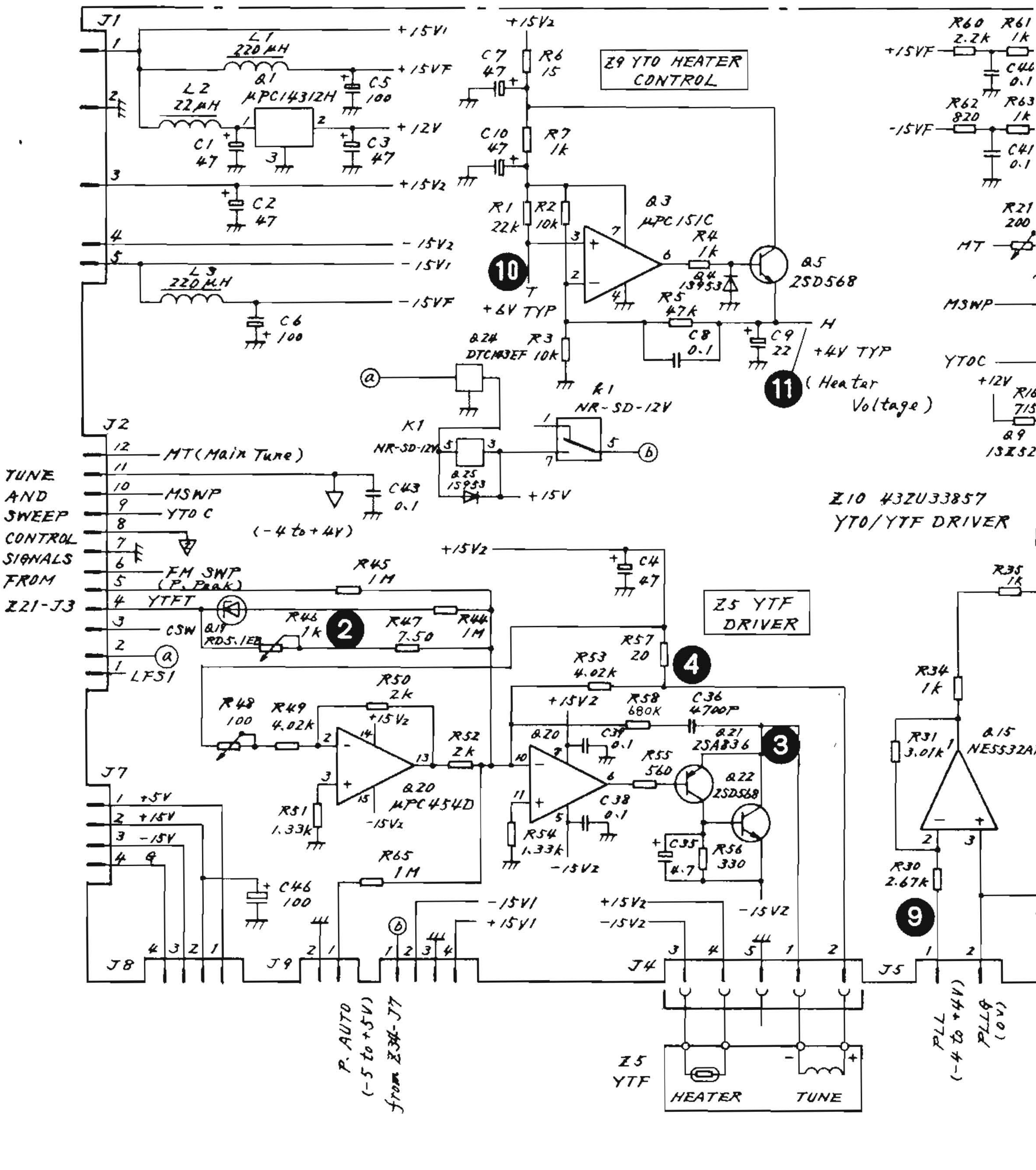


Fig. 5-16 Z10 Parts Layout



Z9 YTO HEATER CONTROL
Z5 YTF DRIVER
Z10 43ZU33857
YTO/YTF DRIVER
TUNE AND SWEEP CONTROL SIGNALS FROM Z21-J3
J1
J2
J7
J8
J9
J4
J5
+15V1
+15VF
+12V
+15V2
-15V2
-15V1
-15VF
L1 220µH
L2 22µH
L3 220µH
Q1 µPC14312H
C1 47
C2 47
C3 47
C5 100
C6 100
C7 47
C10 47
R6 15
R7 1k
R1 22k
R2 10k
R3 10k
R4 1k
R5 47k
C8 0.1
C9 22
Q3 µPC151C
Q4 1S953
Q5 2SD568
+6V TYP
H
+4V TYP
(Heater Voltage)
Q24 DTC143EF
K1 NR-SD-12V
Q25 1S953
+15V
MT (Main Tune)
MSWP
YTO C
FM SWP (P. Peak)
YTFT
CSW
LFS1
C43 0.1
(-4 to +4V)
R45 1M
R46 1k
R47 7.50
R44 1M
Q19 RD5.1EB
C4 47
R57 20
R53 4.02k
R58 680K
C36 4700P
R48 100
R49 4.02k
R50 2k
R51 1.33k
R52 2k
Q20 µPC454D
Q21 2SA836
Q22 2SD568
R55 560
R54 1.33k
R56 330
C35 4.7
C37 0.1
C38 0.1
R65 1M
+5V
+15V
-15V
C46 100
P. AUTO (-5 to +5V) from Z34-J7
Z5 YTF
HEATER
TUNE
R60 2.2k
R61 1k
R62 820
R63 1k
C40 0.1
C41 0.1
R21 200
MT
MSWP
YTOC
+12V
Q9
R35 1k
R34 1k
R31 3.01k
R30 2.67k
Q15 NE5532A
PLL (-4 to +4V)
PLLG (0V)

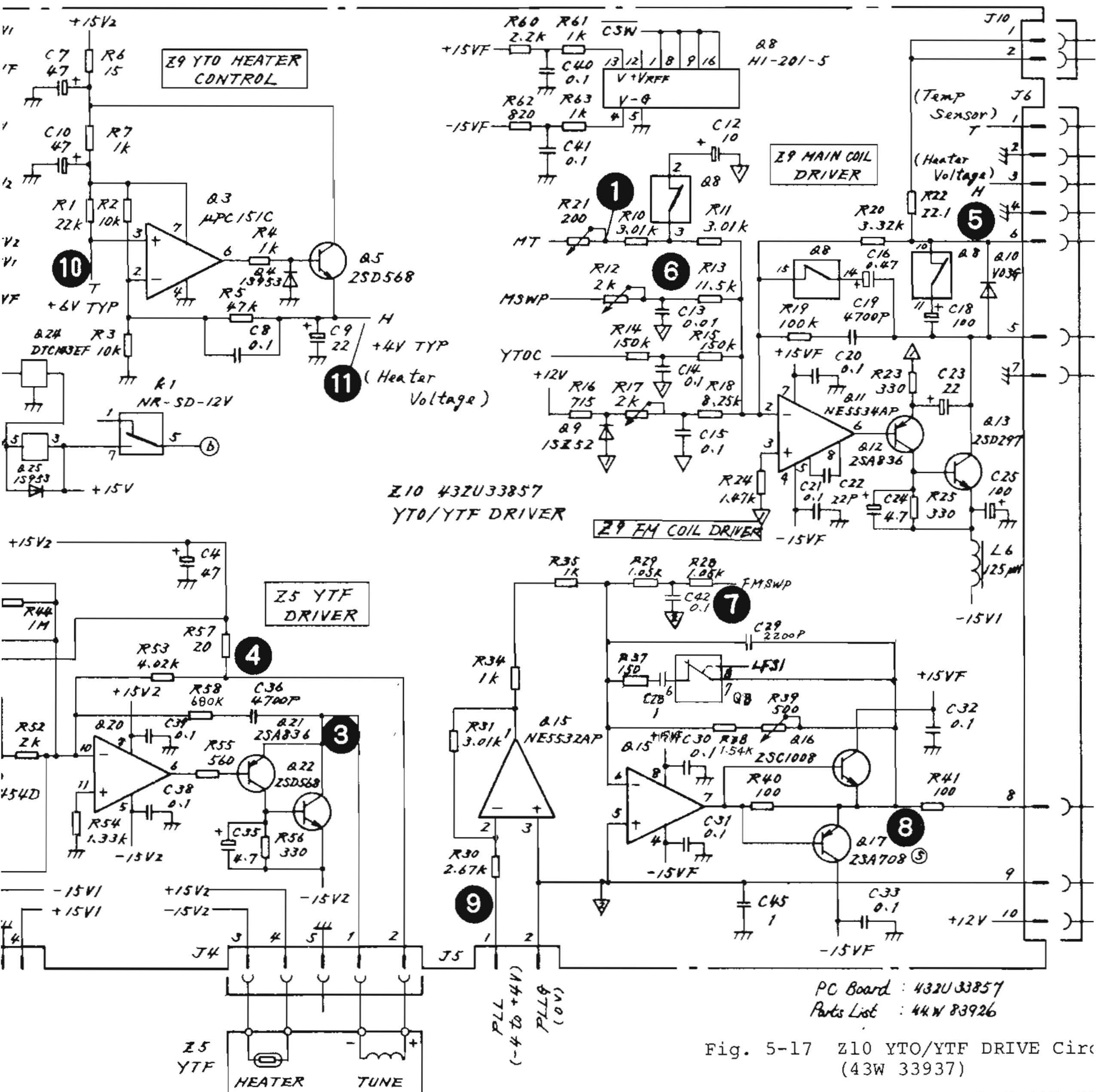


Fig. 5-17 Z10 YTO/YTF DRIVE Circ
(43W 33937)

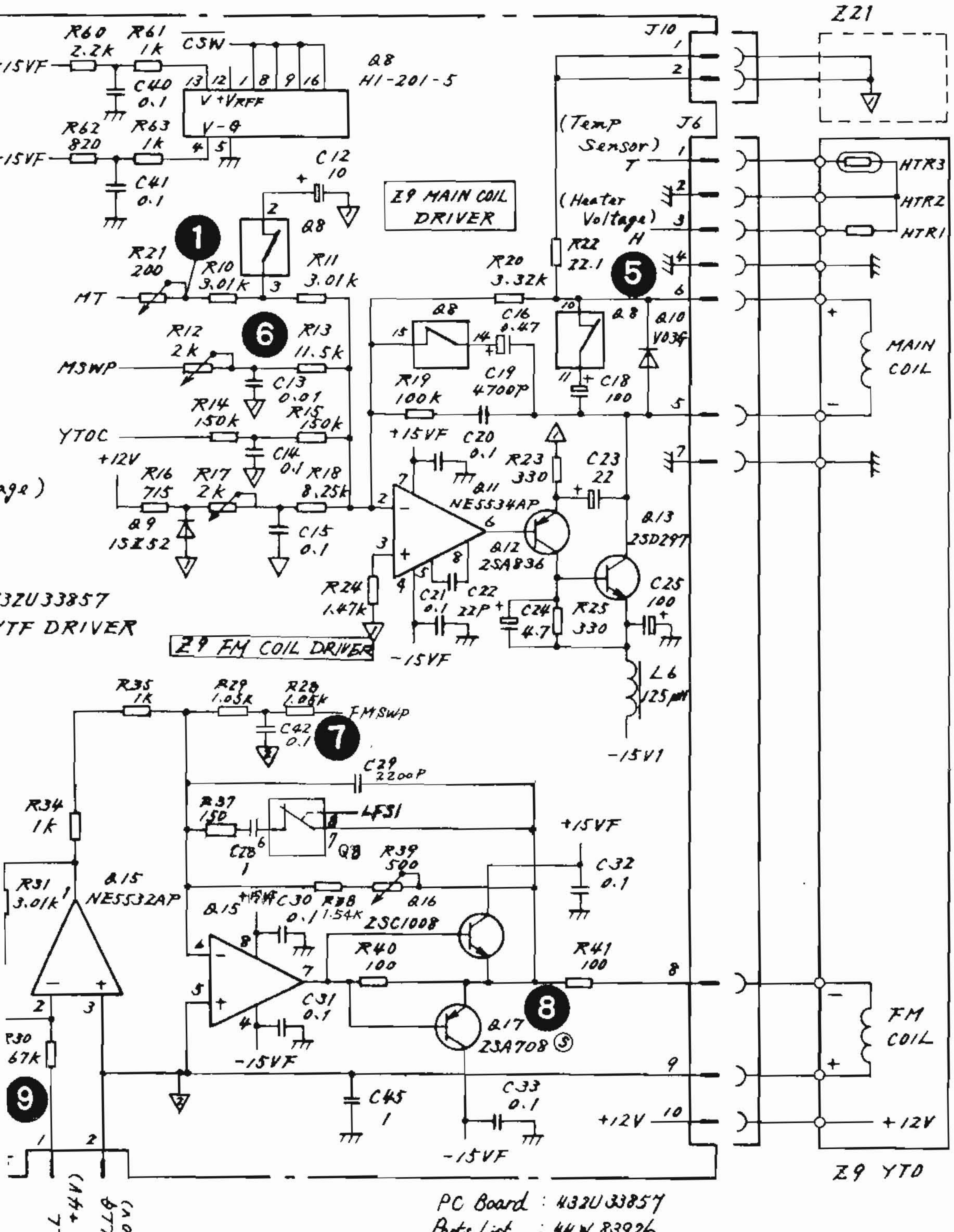


Fig. 5-17 Z10 YTO/YTF DRIVE Circuit Diagram
(43W 33937)

5.6 Z14 0 to 2 GHz RF Block

This block contains two frequency converters in an aluminum block case. The first converter perform up conversion of a 100 kHz to 2 GHz band input signal to a 2.5214 GHz IF signal. By mixing this with a 2.5 GHz second local signal, this is finally converted to the final IF 21.4 MHz signal.

The arrangement of this block's units (Z14-Z1 to Z14-Z12) is shown in Fig. 5-18.

5.6.1 Circuit description - Z14

(Refer to Figs. 3-3 (1/4) to 3-3 (4/4), Figs. 5-19 to 5-30)

When the 100 kHz to 2 GHz band is selected, the input RF signal passing through input circuit Z3 RF ATT/SW (paragraph 5.4) is sent to the Z12 2 GHz LPF via J7. This LPF functions as the preselector for the 100 kHz to 2 GHz band. The signal sent through the LPF is mixed with the first local signal amplified by the Z14-Z9 2.5 to 4.5 GHz LO AMP and is converted into a 2.5214 GHz first IF signal.

The first IF signal is amplified by approximately 10 dB by the Z14-Z4 2.5214 GHz preamplifier through the Z14-Z3 directional filter. The amplified first IF signal is sent to the Z14-Z7 2nd converter through the Z14-Z5 2.5214 GHz BPF, which consists of cavity resonators. The Z14-Z7 mixes this first IF signal with the 2.5 GHz second local signal from Z14-Z6, which is amplified by the 2.5 to 4.5 GHz LO amplifier on Z14-Z7. In this way, the Z14-Z7 converts the first IF signal into a 21.4 MHz final IF signal.

The IF signal is then sent from this RF block through Z14-J3 to the IF switching circuit of the Z19 μ 2nd converter 2. The signal flow, gain, and loss at each part are shown in Fig. 5-19.

The Z14 also contains the Z14-Z8 100 MHz REF OSC oscillator circuit. This circuit is used to generate a 100 MHz signal which becomes the source signal of the Z14-Z11 2nd LOCAL PLL and Z16-Z8 5X multiplier circuits in the Z16 PLL Block. The front panel 100 MHz CAL OUTPUT signal is also supplied from this Z14-Z8. The power to the Z14 is supplied from Z10-J3 through Z14-J14.

5.6.2 Checking procedure - Z14

Step	Procedure
1.	See Fig. 2-1; remove the top, bottom, and right-side covers.
2.	Before removing the Z14 from the main unit, check the I/O signal to this block as shown in Fig. 5-20 to determine whether or not this block is faulty.
3.	When a fault is clearly indicated in Z14, remove the screw that secures the block from the rear and bottom, as well as other Z14-mounted components. CAUTION The Z12 2 GHz LPF and Z14-Z3 directional filter uses microwave circuits including a thin film circuit. Gold wires, not visible to the naked eye, are bonded on these substrates. Never touch the surface of these substrates with your hands or any other objects because the gold wires might be damaged.

(cont.)

Step	Procedure
4.	The cover of this RF block is divided into several parts. Therefore, remove only the cover of the required parts by referring to the layout shown in Fig. 5-18.
5.	Connect the extension cable to Z14-J14 to supply power from the MS710[ ] main unit.
6.	Supply local signals to Z14-J10 from the MS710[ ] main unit by using the extension cable.
7.	Apply the signal that corresponds to the input frequency at Z14-J1 to detect any faulty part by tracing the signal flow through each part as shown in Fig. 5-19.

5.6.3 Adjustment - Z14

Adjust the following when the Z14 RF block is properly mounted on and connected to the MS710[ ] main unit.

(1) Z14-Z8 100 MHz REF OSC frequency adjustment

Measure the front panel CAL OUTPUT signal by using the frequency counter and adjust the trimmer screw through the frequency adjustment hole at the top of Z14 to obtain 100.000 MHz.

(2) Z14-Z8 100 MHz REF OSC level adjustment

Measure the output of the front panel CAL OUTPUT terminal with a power meter, and set it to a level of -10.0 dBm by turning VR(R14) on the Z14-Z8 through the level adjustment hole at the top of Z14 RF BLOCK.

(3) Z14-Z5 2.5214 GHz BPF adjustment

Step	Procedure
1.	Send MS710[ ] CAL OUTPUT signals to the RF input terminal.
2.	Set the center frequency to 100 MHz and SPAN to 1 MHz.
3.	Send the 21.4 MHz IF signal obtained from Z14-J4 to another spectrum analyzer which can measure the 21.4 MHz ±5 MHz signal.
4.	Adjust the six trimmer screws of the Z14-Z5 so that a display like that in Fig. 5-20 can be obtained on the spectrum analyzer display used to measure the 21.4 MHz IF signal.

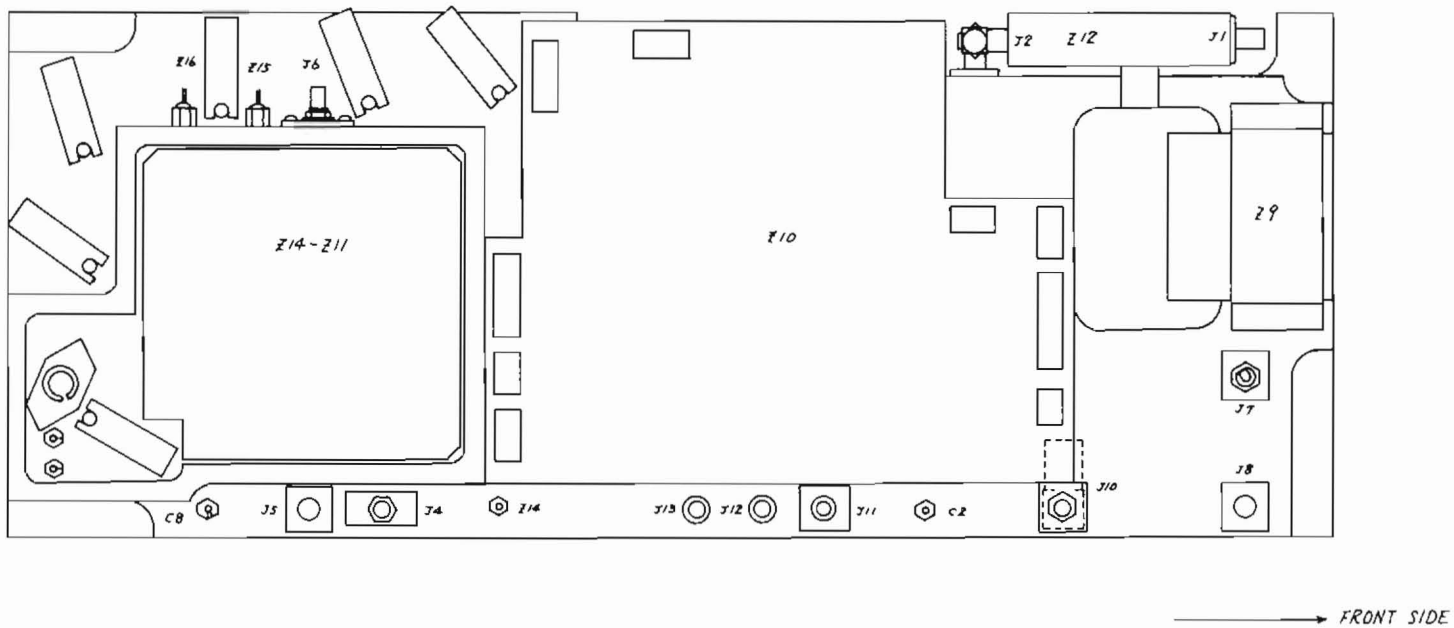


Fig. 5-18 (1/2) Z14 Parts Layout (1/2)

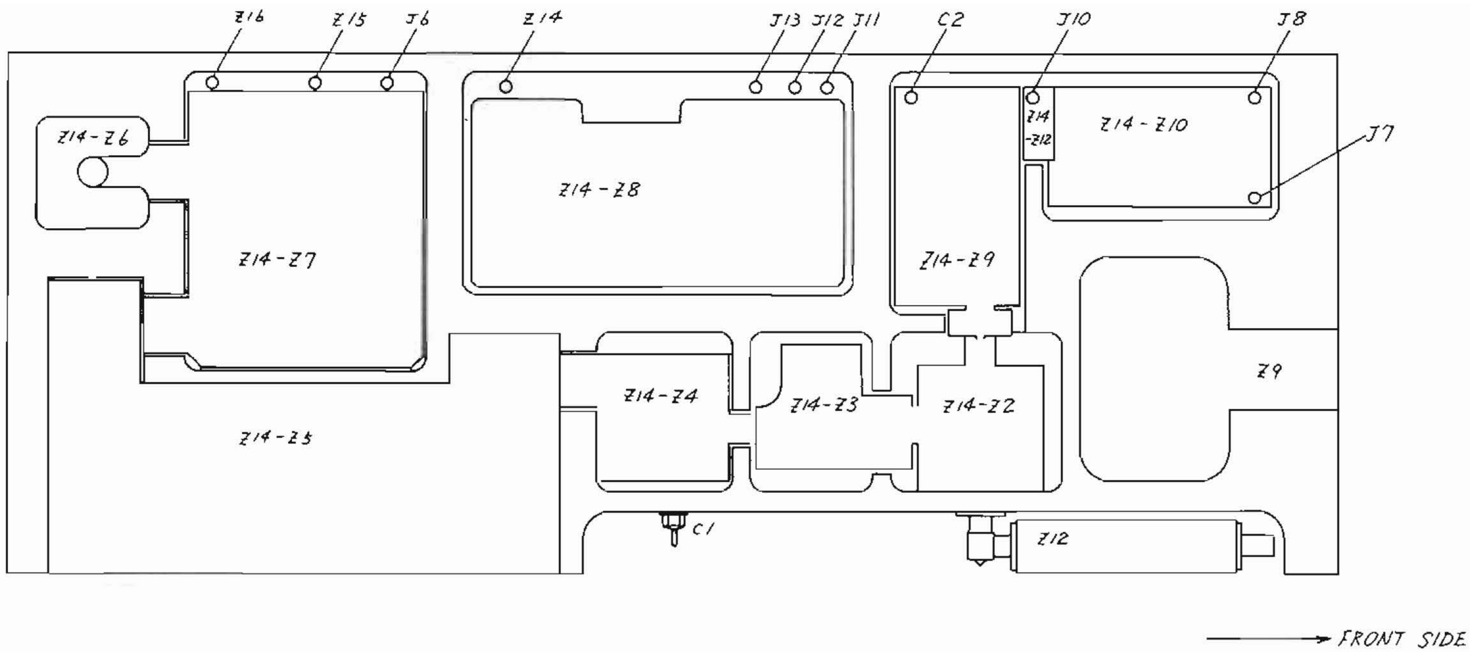
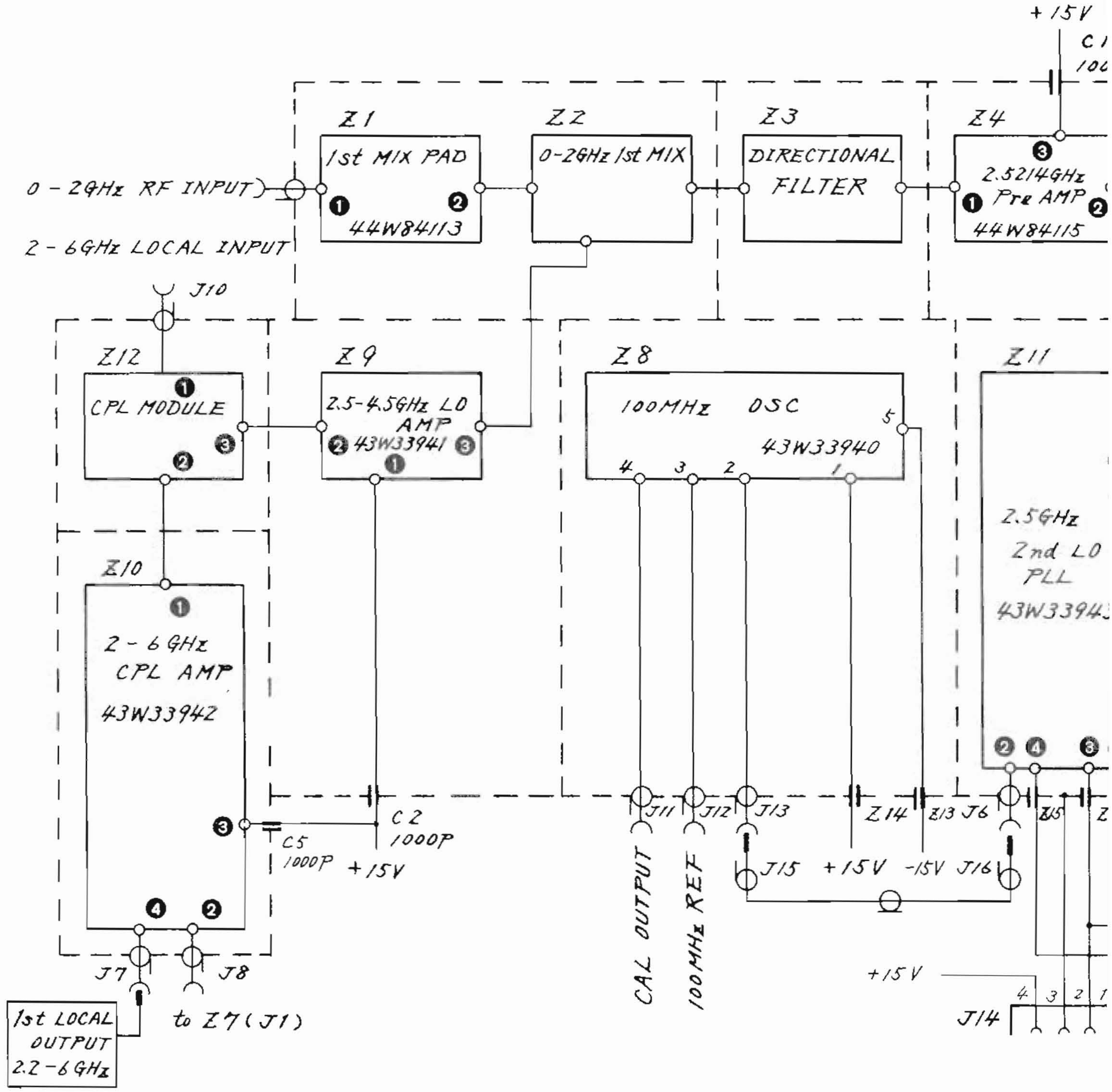


Fig. 5-18 (2/2) Z14 Parts Layout (2/2)



Parts List ; 44W83928

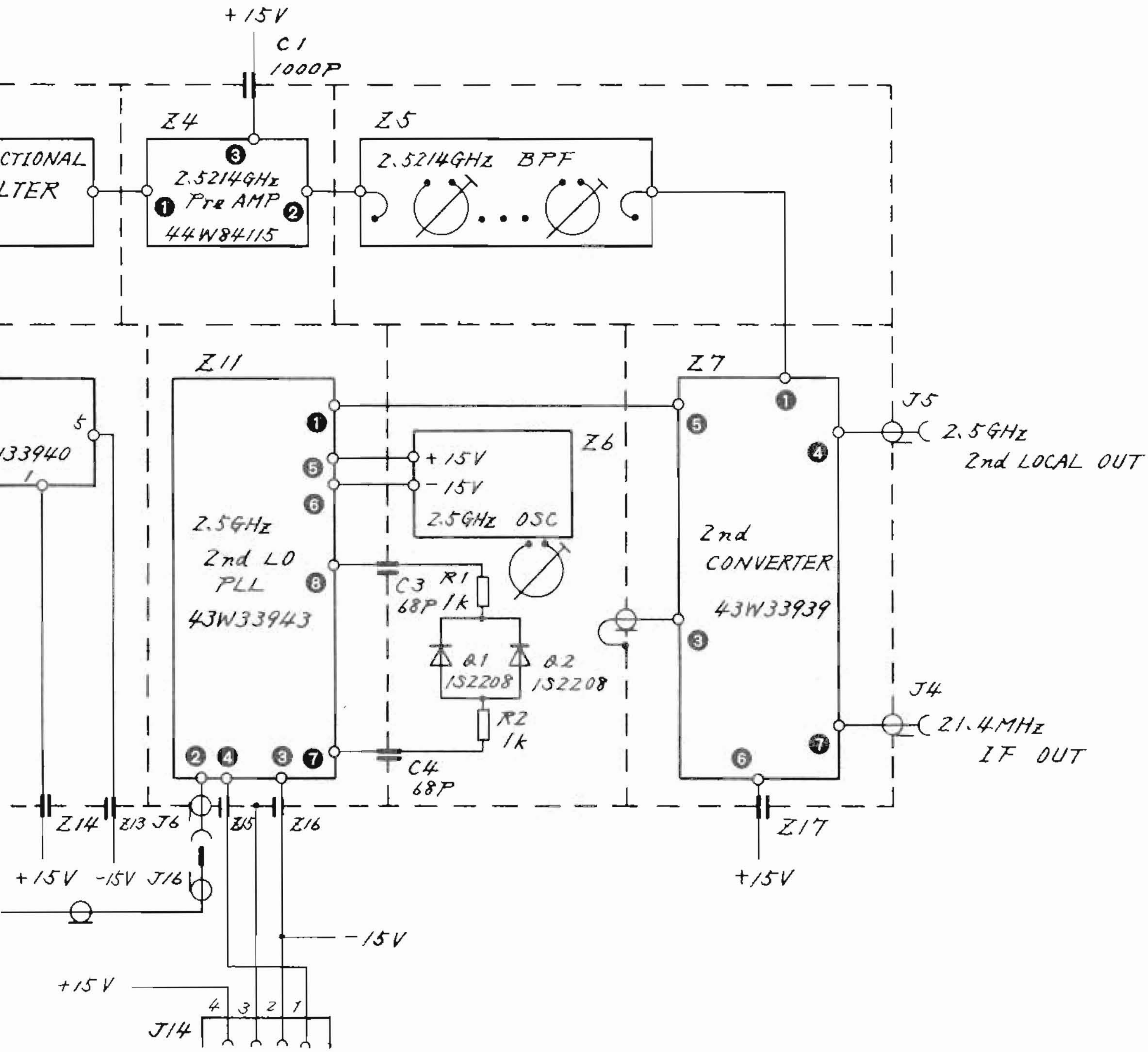
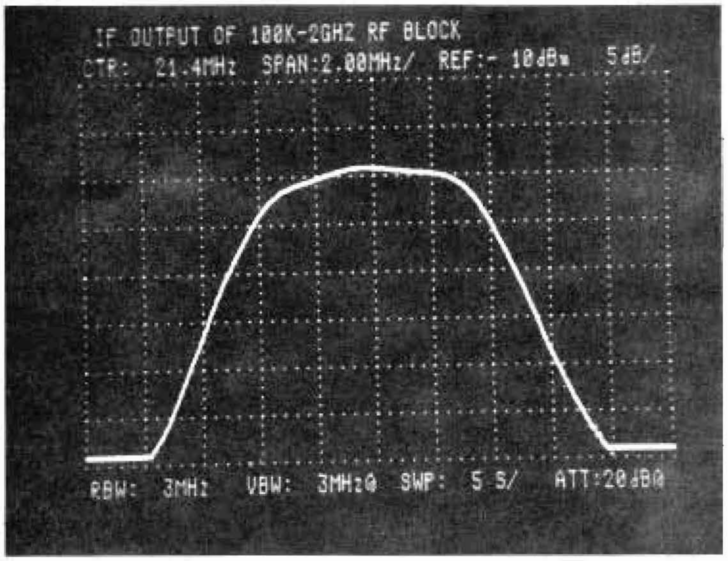
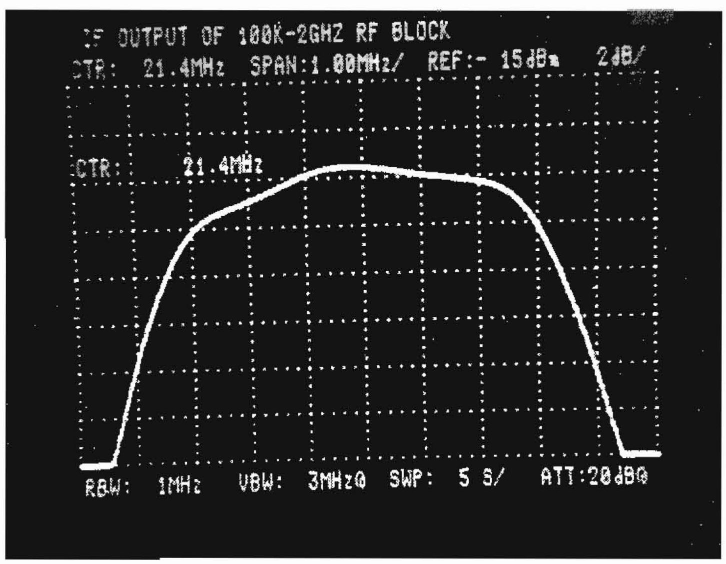


Fig. 5-19 Z14 0 to 2 GHz RF BLOCK Circuit Diagram (43W33938)

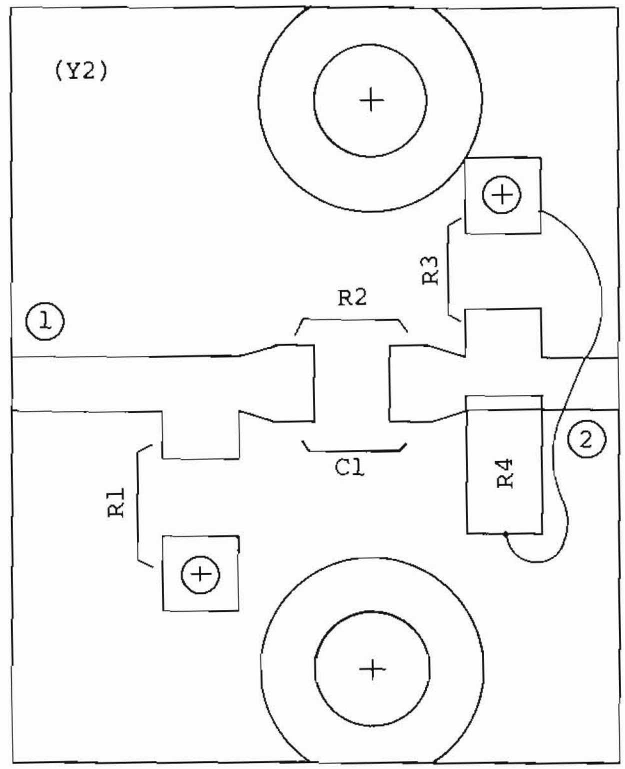


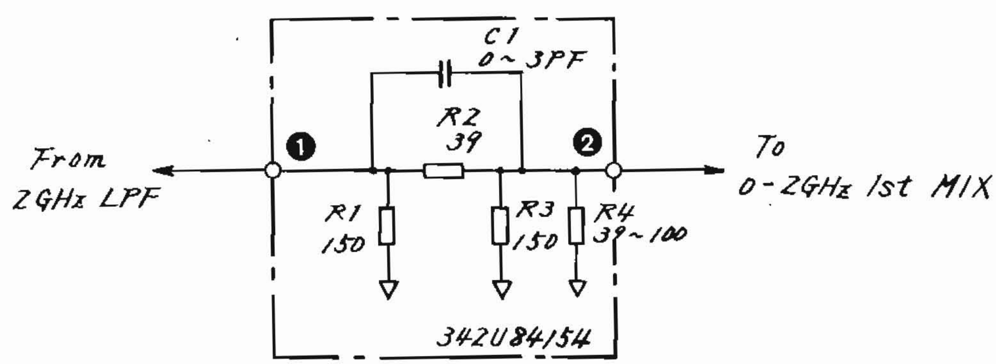
(1) SPAN 2 MHz/div,
5 dB/div



(2) SPAN 1 MHz/div,
2 dB/div

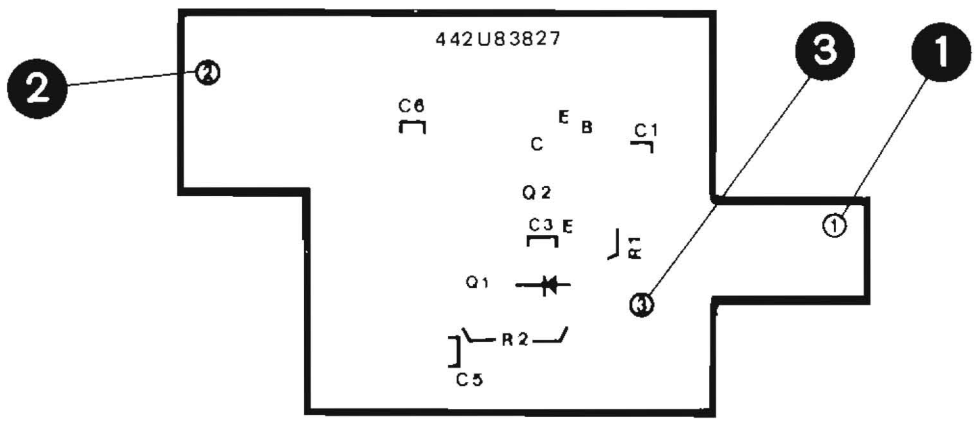
Fig. 5-20. Z14-Z5 2.5214 GHz BPF Adjustment

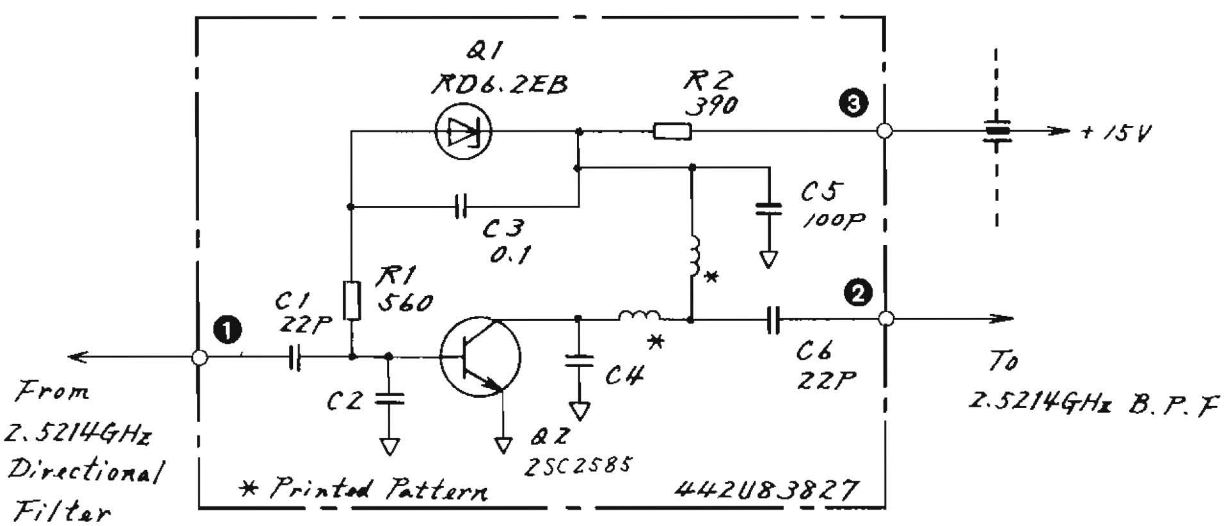




PC Board : 442U83825
Parts List : 44W83929

Fig. 5-21 Z14-Z1 1st MIX PAD Circuit Diagram and Parts Layout (44W84113)





PC Board : 442U83827.
Parts List : 44W83931

Fig. 5-22 Z14-Z4 2.5214 GHz PRE AMP Circuit Diagram and Parts Layout (44W84115)

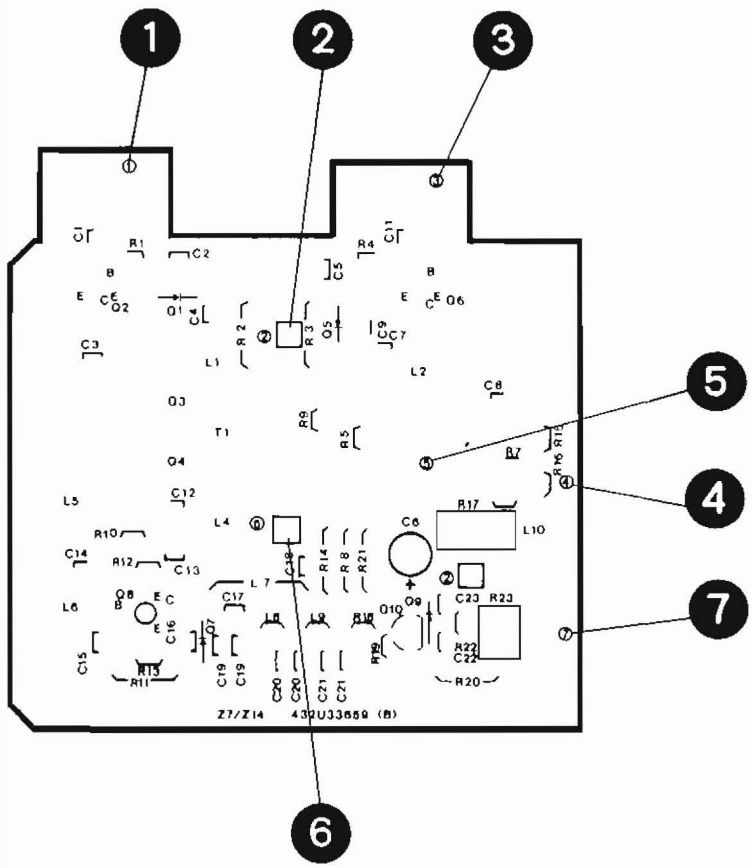
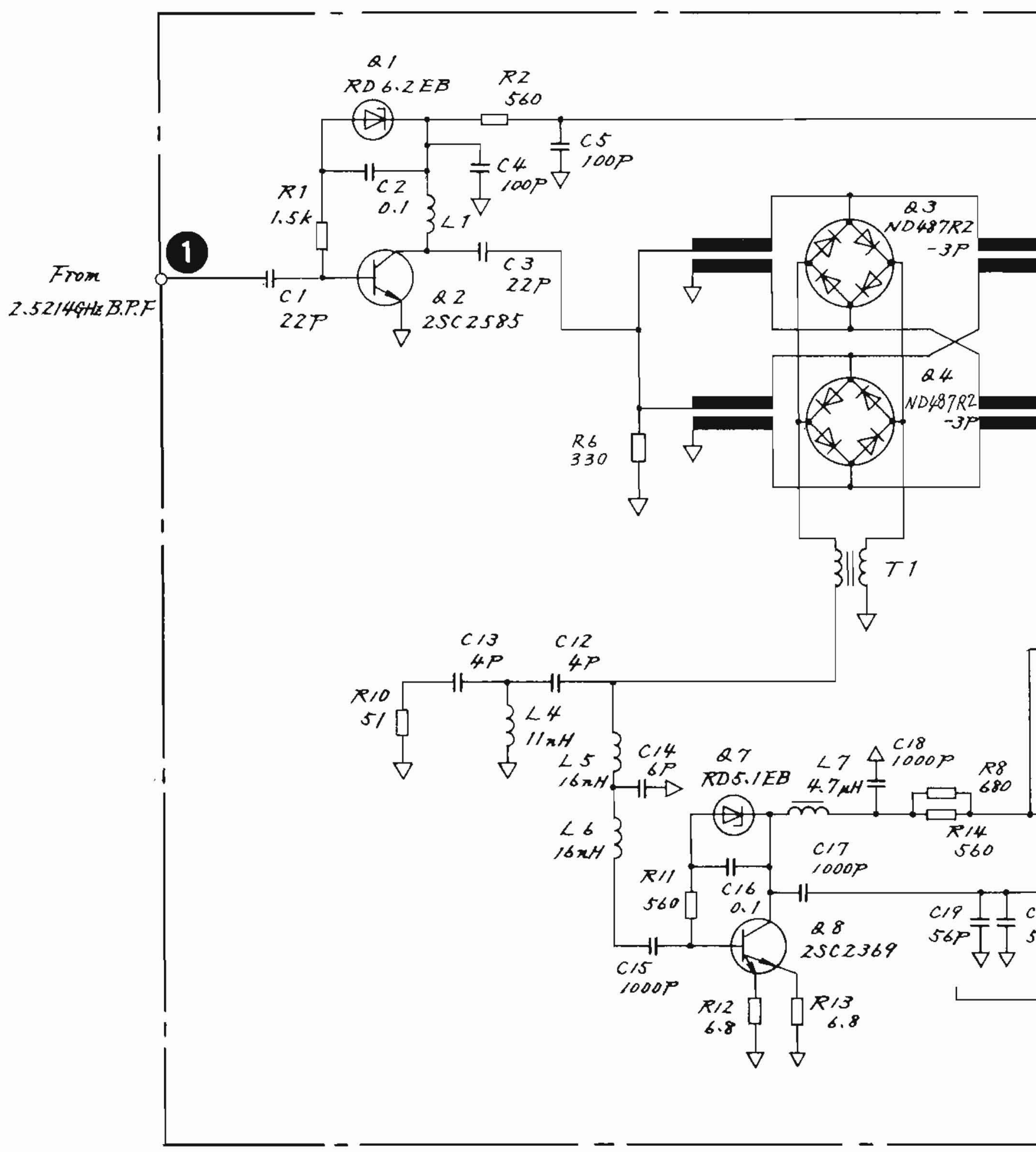
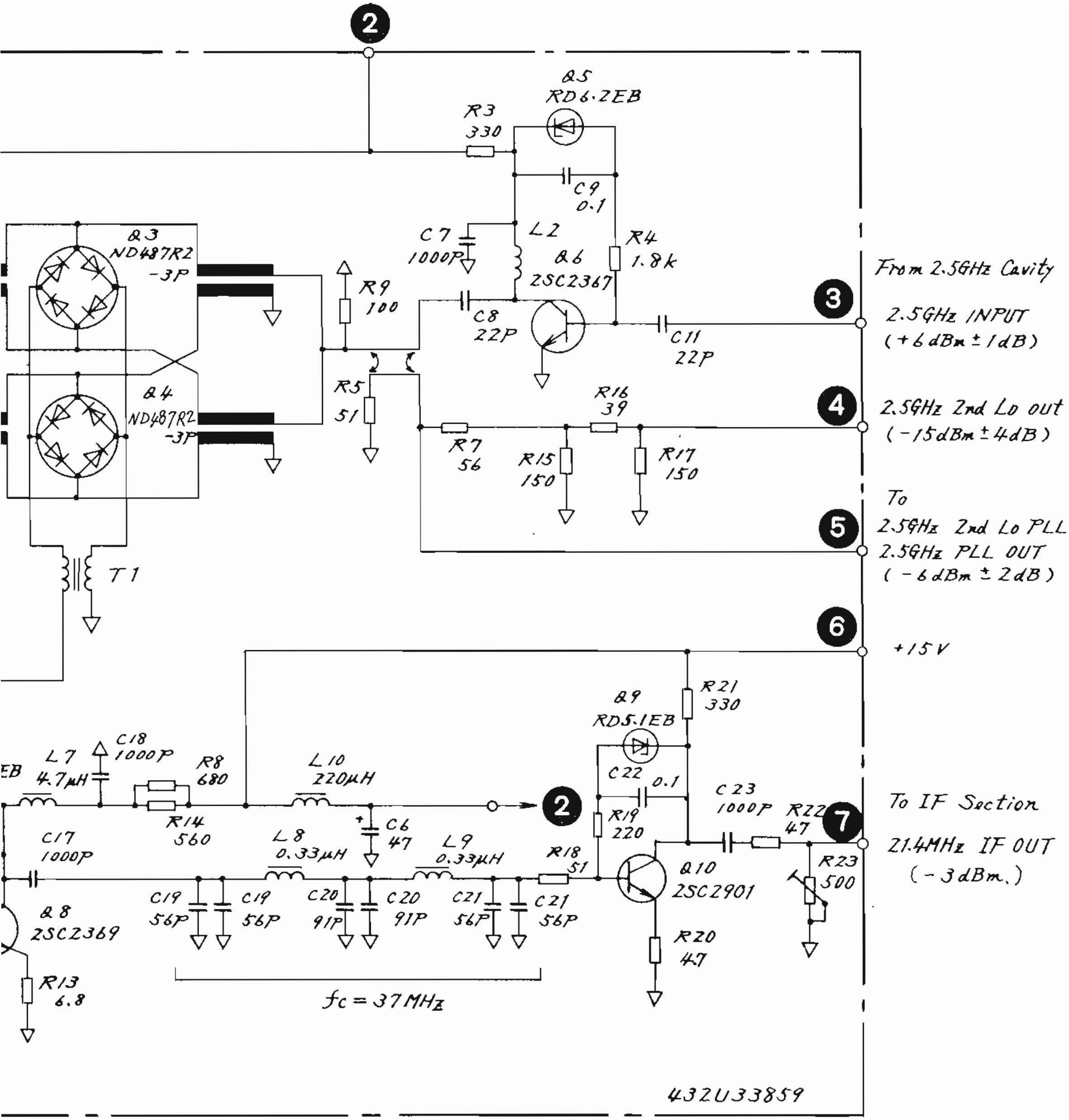


Fig. 5-23 Z14-Z7 Parts Layout



From
2.5214GHz B.P.F
1
Q1
RD6.2EB
R2
560
C5
100P
C4
100P
R1
1.5k
C2
0.1
L1
C1
22P
Q2
2SC2585
C3
22P
Q3
ND487R2
-3P
Q4
ND487R2
-3P
R6
330
T1
C13
4P
C12
4P
R10
51
L4
11nH
L5
16nH
C14
6P
L6
16nH
Q7
RD5.1EB
L7
4.7μH
C18
1000P
R8
680
R14
560
R11
560
C17
1000P
C16
0.1
C19
56P
Q8
2SC2369
C15
1000P
R12
6.8
R13
6.8



PC Board ; 432U33859
Parts List : 44W83932

Fig. 5-24 Z14-Z7 2nd CONVERTER Circuit Diagram (43W33939)

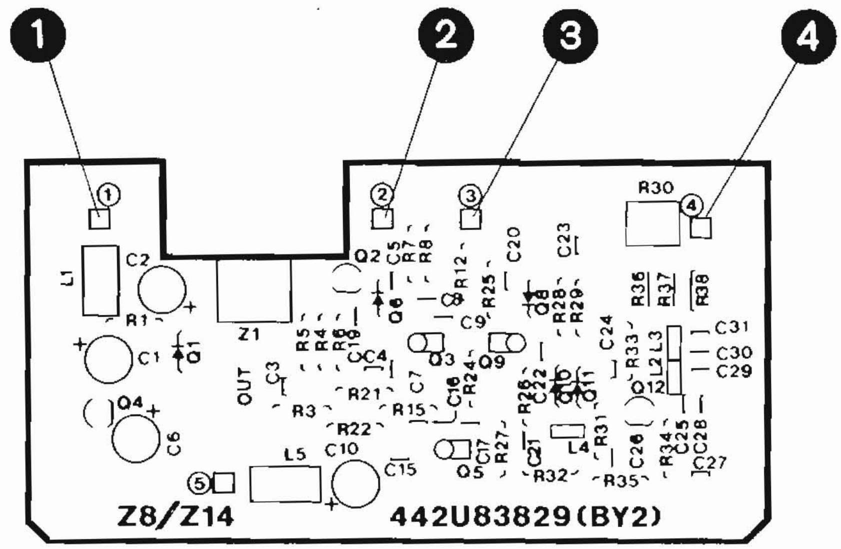
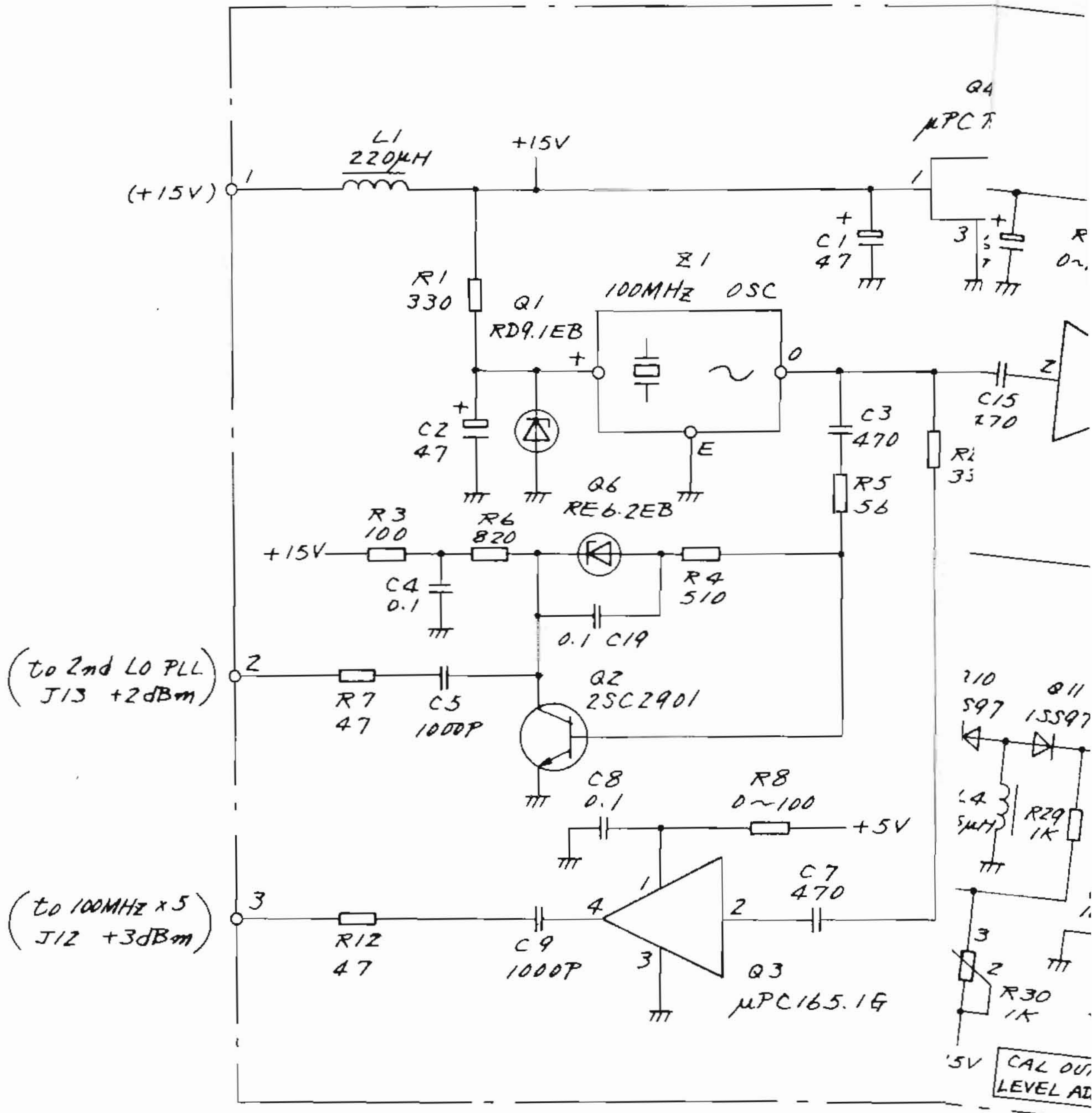
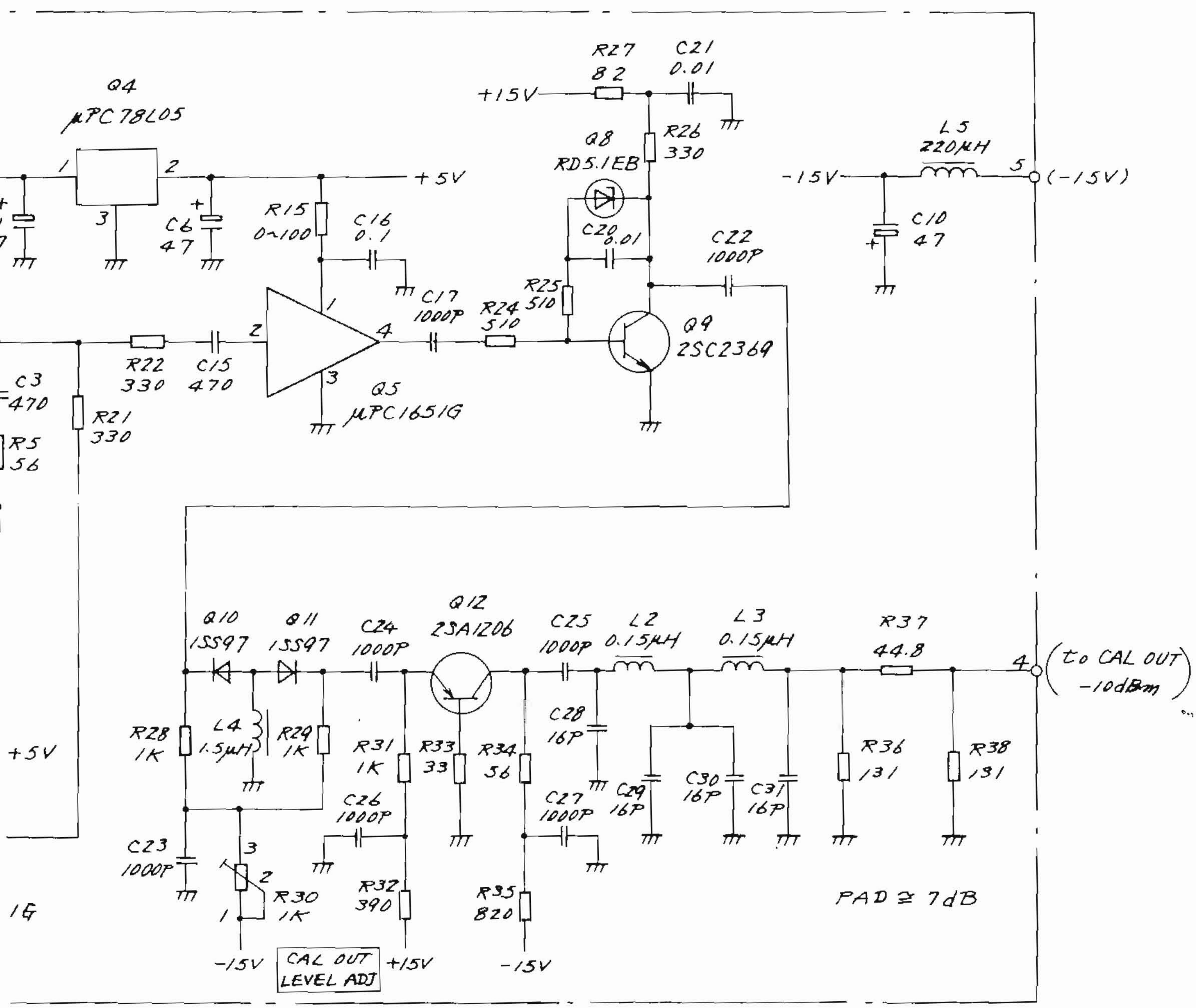


Fig. 5-25 Z14-Z8 Parts Layout

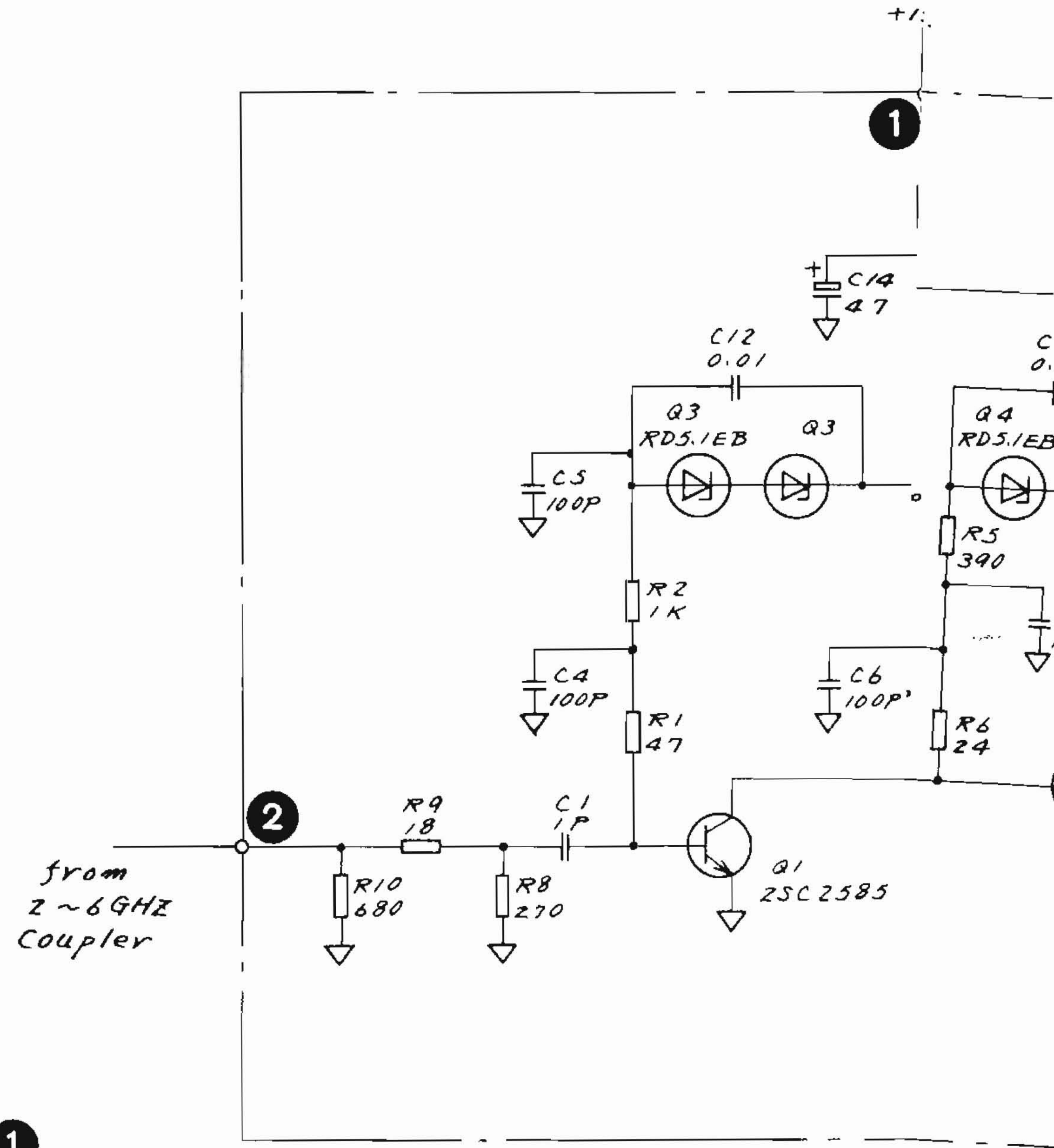


(+15V)
L1 220μH
+15V
Q4 μPC7
C1 47
Z1 100MHz OSC
R1 330
Q1 RD9.1EB
C2 47
C3 470
C15 470
R5 56
Q6 RE6.2EB
R3 100
R6 820
+15V
C4 0.1
R4 510
0.1 C19
(to 2nd LO PLL J13 +2dBm)
R7 47
C5 1000P
Q2 2SC2901
C8 0.1
R8 0~100
+5V
(to 100MHz ×5 J12 +3dBm)
R12 47
C9 1000P
C7 470
Q3 μPC165.1G
R29 1K
R30 1K
CAL OUT LEVEL AD

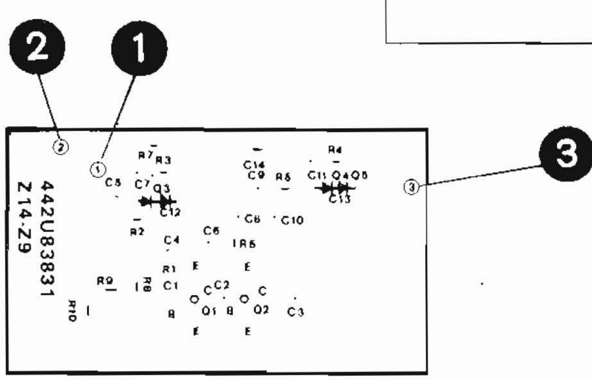


PC Board : 442U83829
Parts List : 44W83933

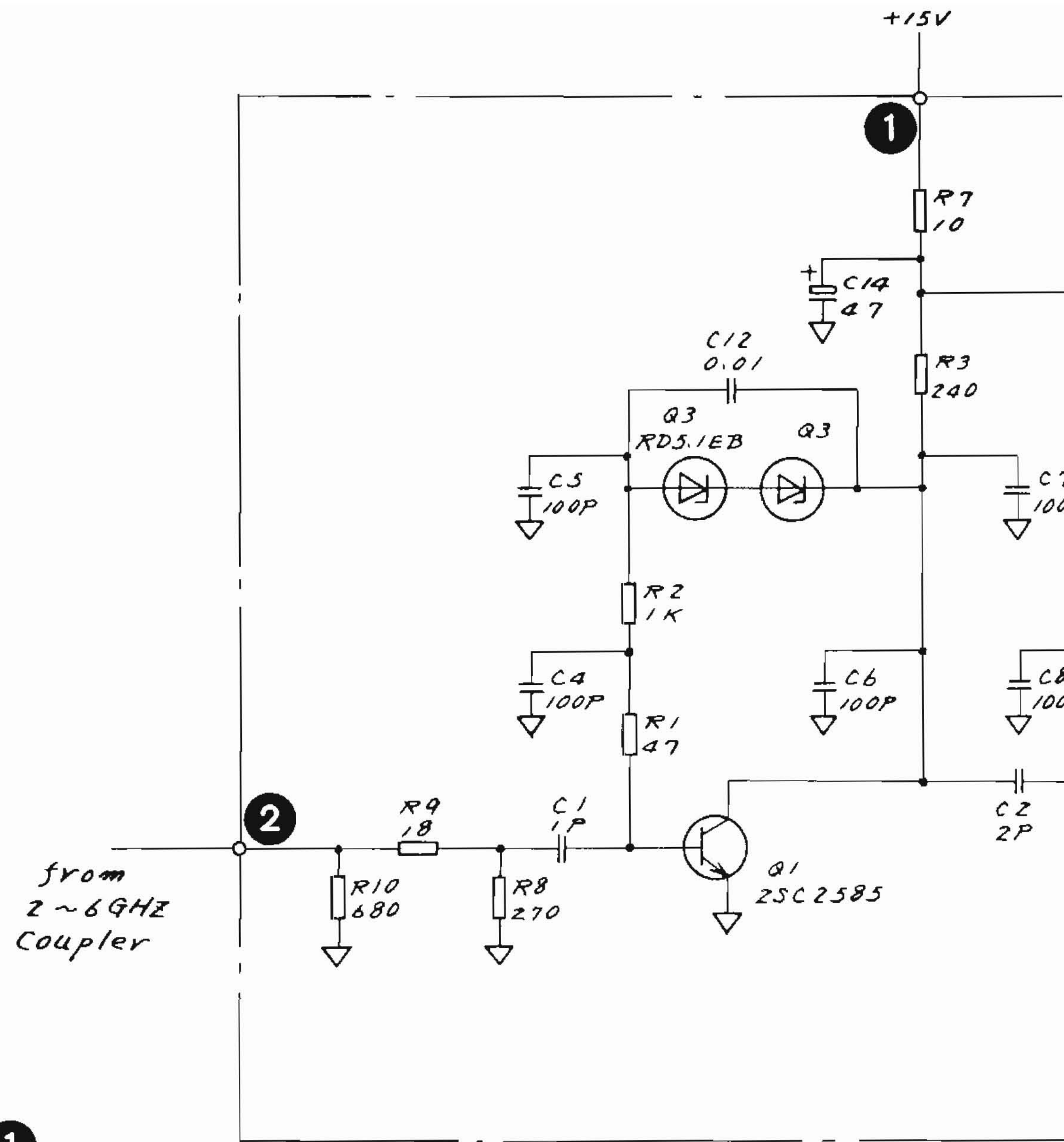
Fig. 5-26 Z14-Z8 100 MHz
REF OSC Circuit Diagram
(43W33940)

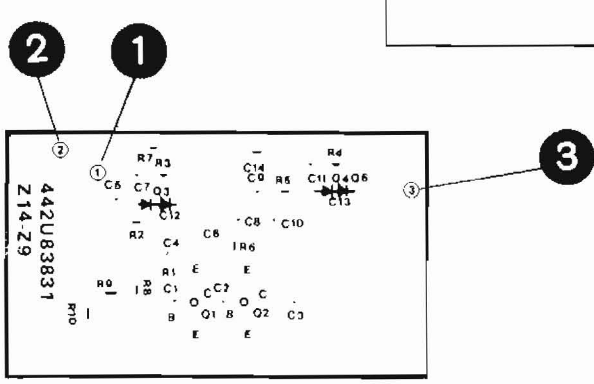


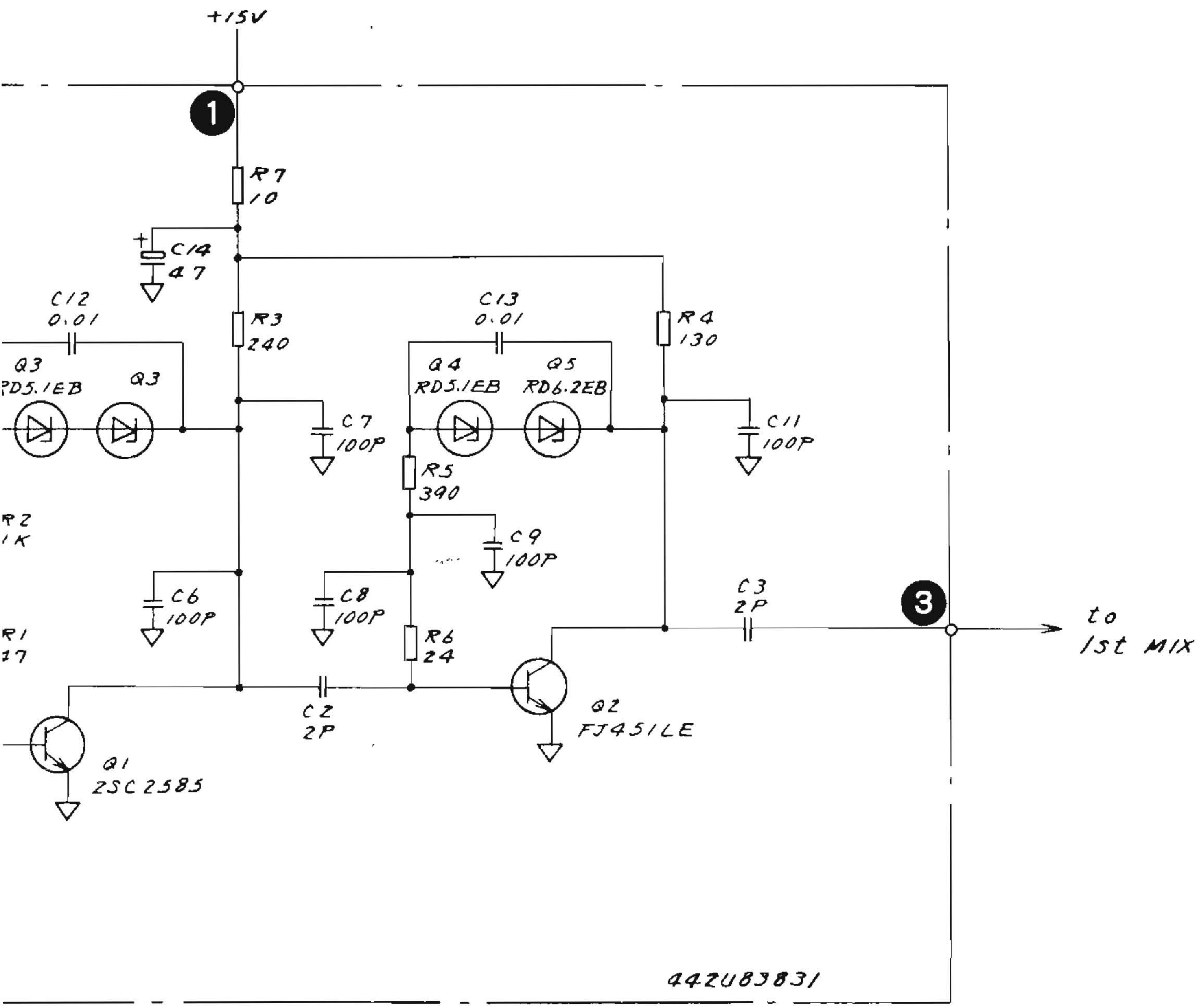
C14
47
C12
0.01
Q3
RD5.1EB
Q3
Q4
RD5.1EB
C5
100P
R5
390
R2
1K
C4
100P
C6
100P
R1
47
R6
24
R9
18
C1
1P
R10
680
R8
270
Q1
2SC2585
from
2~6GHZ
Coupler



442U83831
Z14-Z9

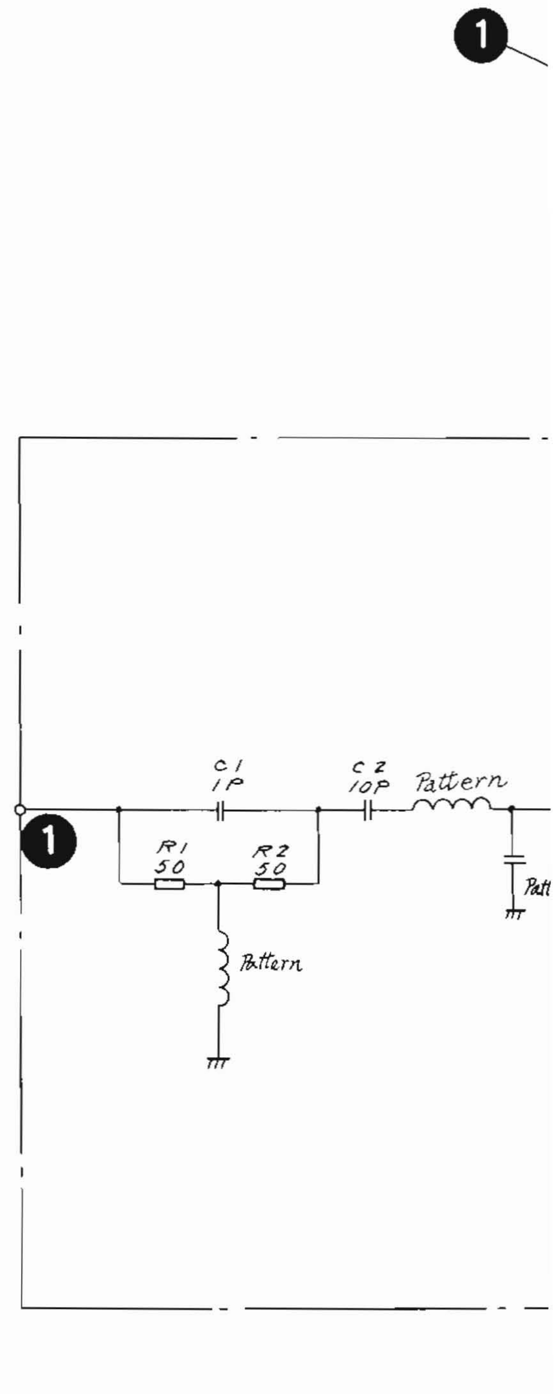

+15V
1
2
R7
10
C14
47
C12
0.01
Q3
RD5.1EB
Q3
C5
100P
R3
240
R2
1K
C4
100P
C6
100P
R1
47
R9
18
C1
1P
R10
680
R8
270
Q1
2SC2585
C2
2P
from
2~6GHZ
Coupler


2
1
3
442U83831
Z14-Z9

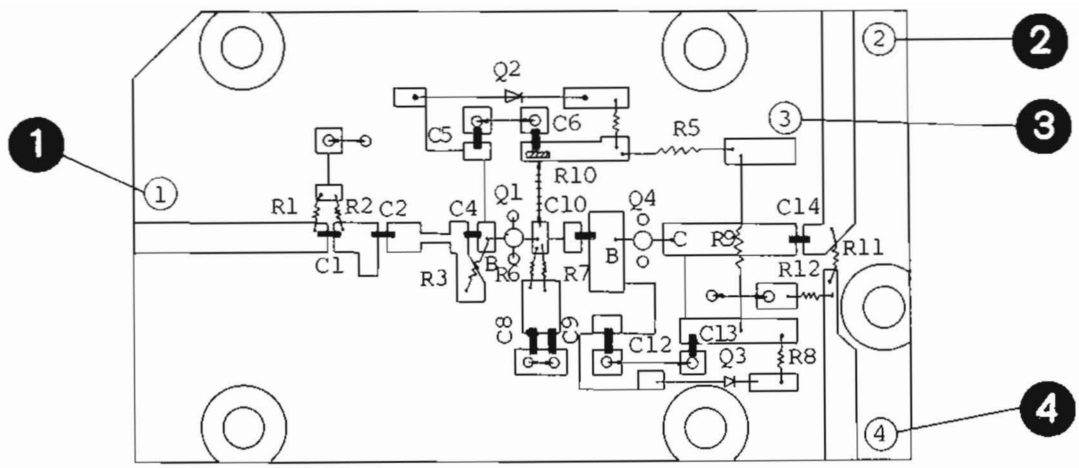


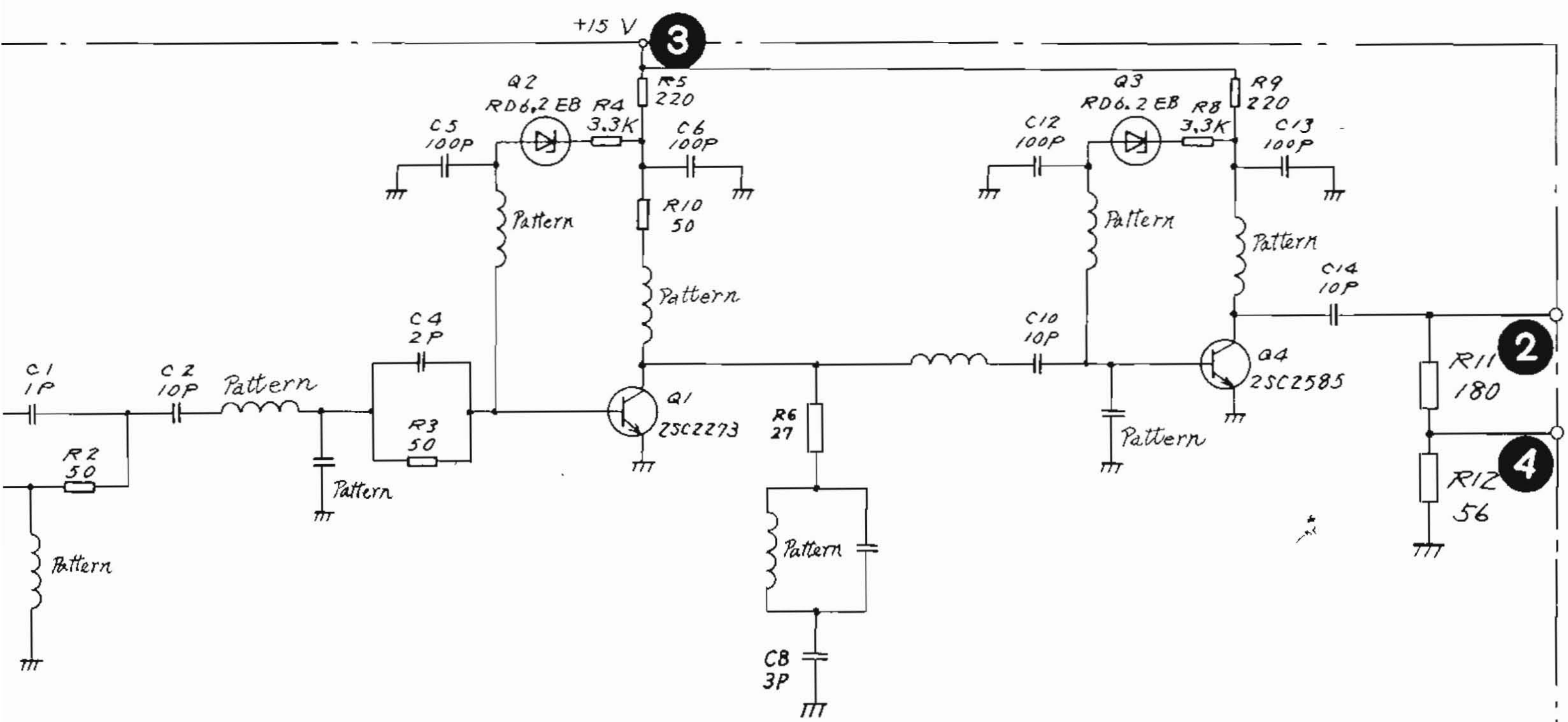
PC Board : 442U83831
Parts List : 44W83934

Fig. 5-27 Z14-Z9 2.5 - 4.5 GHz LO AMP Circuit Diagram and Parts Layout (43W33941)



1
C1
1P
C2
10P
Pattern
R1
50
R2
50
Pattern





PC Board : 442U 83833

Parts List : 44W83935

Fig. 5-28 Z14-Z10 2 to 6 GHz CPL AMP Circuit Diagram and Parts Layout (44W 33942 M-1

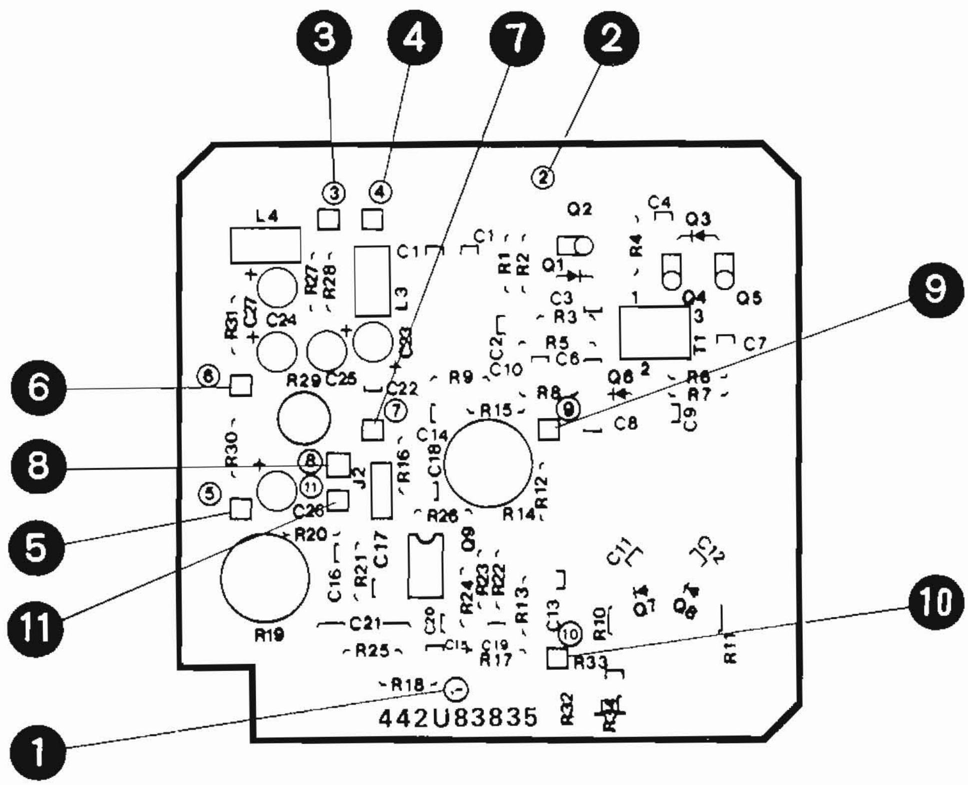
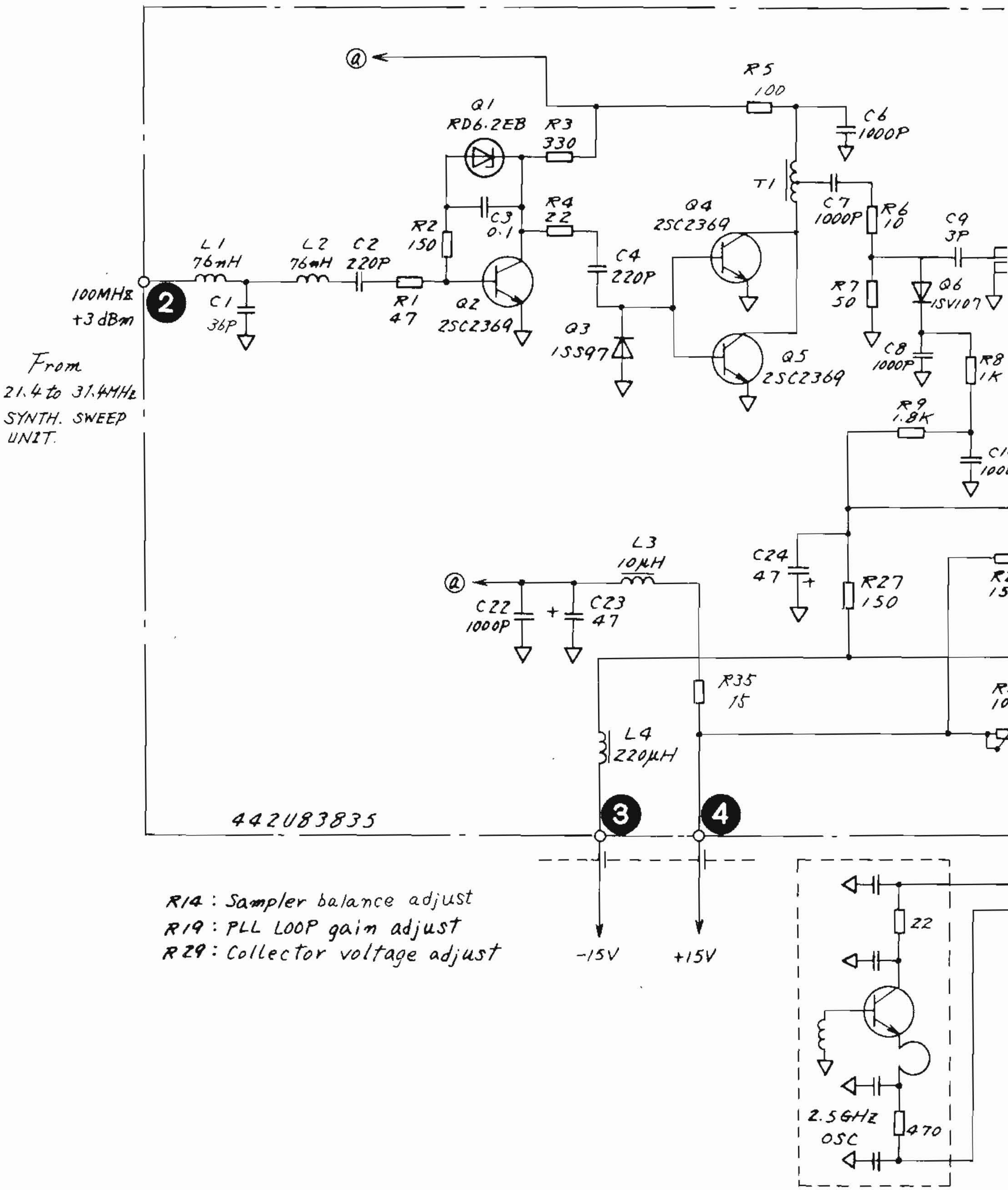


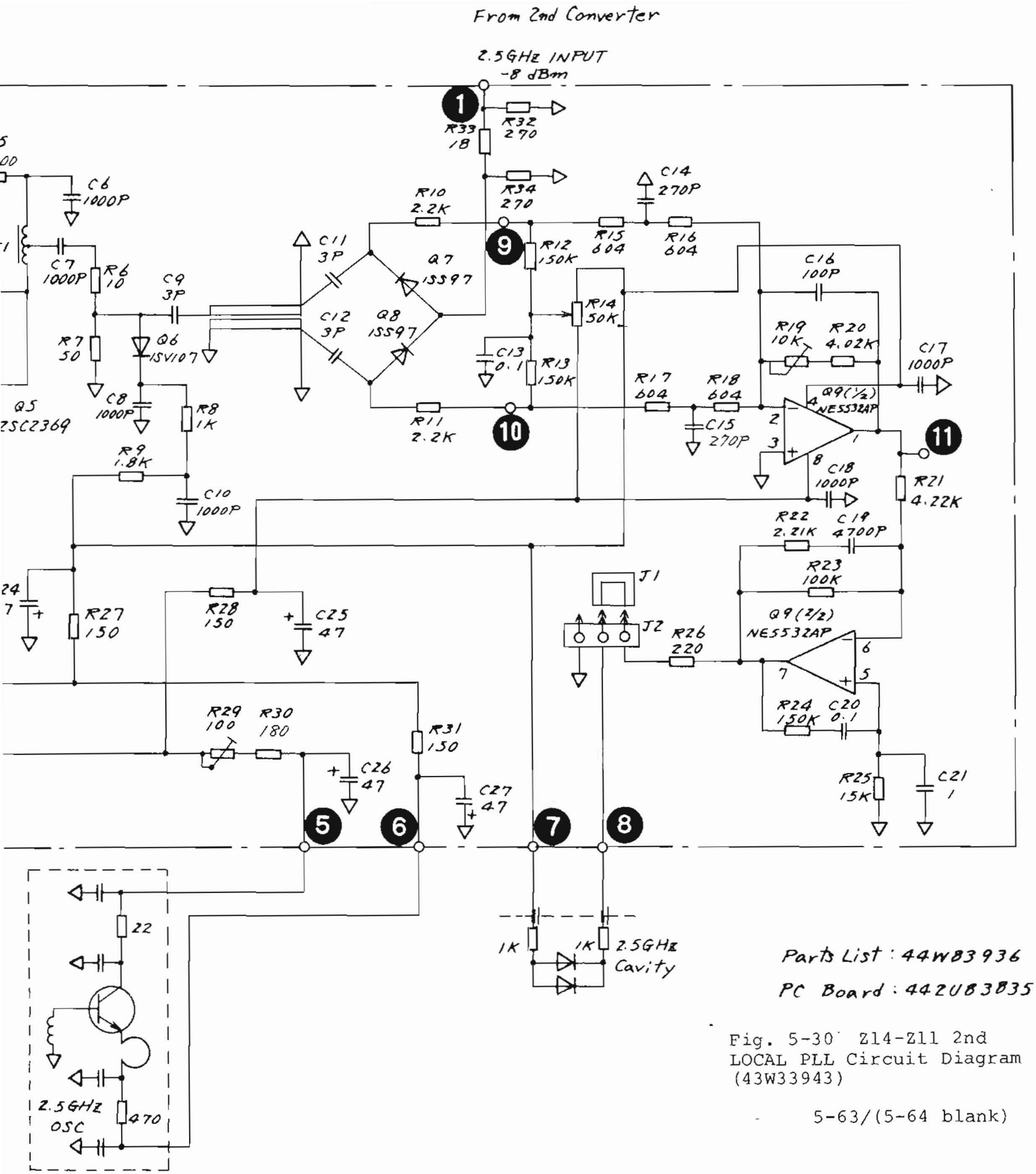
Fig. 5-29 Z14-Z11 Parts Layout



R14 : Sampler balance adjust
R19 : PLL LOOP gain adjust
R29 : Collector voltage adjust

−15V

+15V



Parts List : 44W83936

PC Board : 442U83835

Fig. 5-30 Z14-Z11 2nd LOCAL PLL Circuit Diagram (43W33943)

5.7 Z16 PLL Block

5.7.1 Circuit Description - Z16
(Refer to Fig. 3-3 (4/4), Figs. 5-31 to 5-46)

This block contains the main part of the phase lock loop (PLL) circuit that maintains the accuracy of the MS710[ ] first local frequency.

Because comprehensive explanations of the configuration and operation are given in Section 3, only the Z16 PLL block is explained here.

A part of the first local signal distributed by the Z7 coupler (Paragraph 5.5) is sent from Z16-J1 to the Z16-Z3 sampler RF input through the Z16-Z11 HPF.

The signals with a precisely determined frequency that are generated in Q1 of the Z16-Z6 M/N VCO are passed through the Q10 of Z16-Z6 buffer amplifier and are sent to the Z16-Z5 pulse amplifier circuit.

The signal frequency is divided to one-eighth by Q3 of Z16-Z5; it is then amplified by Q6, Q8, and Q9 of Z16-Z5. Then, the signal is sent to the Z16-Z2 sampler driver circuit.

The Z16-Z2 sampler driver circuit generates a number of high-order harmonics of input signals by using the Q1 step recovery diode, and then outputs them to the Z16-Z3 sampler.

In this way, the Z16-Z3 sampler performs a kind of mixing of the high-order harmonics of a one-8th frequency divided signal from the Z16-Z6 M/N VCO with the output signal from the Z7 coupler. The Z16-Z3 sampler generates a number of IF signal components.

IF signal components in the 17.4 MHz range are selectively amplified by the Z16-Z1 YTO PLL preamplifier and are sent to the Z16-Z9 YTO PD circuit through the Z29 low local 2.

The Z16-Z9 YTO PD circuit removes high-frequency components by using an LC LPF. In this way a selected component is amplified by Q2, Q4, and Q6 of Z16-Z9 and is converted by the Q8 limiter circuit into a signal with an amplitude of the ECL level. Then this signal is sent to the Q14 phase detector.

The 17.4 ±2 MHz reference signal generated by the Z21 local control 1 circuit is also input to the Q14 of Z16-Z9 circuit and the phase difference between these signals is detected. These phase differences are converted by the Q14 circuit into the error voltage signal and are sent to the YTO PLL LF circuit in Z16-Z10 after being amplified by Q15 of Z16-Z9.

The Z16-Z10 YTO PLL LF circuits are the active two-stage LPF circuits used as the loop filter which comprises Q29 as the main part in Z16-Z10. The error signal passing through the loop filter, the Q15 analog switch, and the Q30 of Z16-Z10 sample-hold circuit, is sent to the Z10 YTO/YTF driver as the PLL signal. Q30 holds the error voltage signals when the PLL operates at the center frequency for wideband sweeps during the sweep resetting. The Q15 analog Sw. is used to improve the PLL response when Q30 samples error voltage signals during sweep resetting.

Z16-Z7, Z16-Z8 and parts of the Z16-Z10 form a sub-PLL circuit used to accurately determine the Z16-Z6 M/N VCO frequency. The Z16-Z6 M/N VCO output is isolated by Q6 of Z16-Z6 and is sent to the Z16-Z7 M/N mixer circuit.

The Z16-Z7 mixes the 1000 MHz signal generated by the Z16-Z8 5 x 100 MHz circuit and a doubler in the Z16-Z7 with the Z16-Z6 M/N VCO output using Z1 mixer in Z16-Z7. The frequency difference component signal from Z1 is sent to the Z16-Z10 M/N PD circuit through the Q7 and Q9 amplification circuits of Z16-Z7.

The Z16-Z10 M/N PD circuit performs a one-Mth-frequency division of this signal from Z16-Z7 by using the Q1, Q4, Q5, and Q6 programmable frequency divider circuits of Z16-Z10, and compares the phases of this signal with the 16/N MHz (340.4 to 1000 kHz) signal sent from the Z26 CPU board at Q8. The Q7 of Z16-Z10 converts the difference phase into voltage signal and this signal is amplified by Q20 and Q17. Then this signal is sent to Q2 of Z16-Z6 M/N VCO in order to control M/N VCO oscillation frequency.

In this way, the M/N VCO oscillation frequency is accurately controlled at the value expressed in the following formula.

$$f_{M/N\ VCO} = 1000 + 16 \times \frac{M}{N}$$

The values of f M/N VCO, M, and N actually used are listed in Tables 4-1 (1/2) and (2/2).

5.7.2 Checking procedure - Z16

After resetting the MS710C, set the center frequency to 3 GHz and SPAN to 0 MHz. In this case, the following is obtained during normal operation. (Refer to Fig. 3-4.)

$$F_{Lo}(f_{YT0}) = 3521.4 \text{ MHz}$$

where, numbers N and M are N=27 and M=64, and fM/N VCO is set to 1037.92 MHz.

(1) Checking the main PLL

If 129.740 MHz is not obtained at terminal ❹ of Z16-Z6, first check the sub PLL, as described in (2).

(a) Z16-Z5 pulse AMP

The input level is set to -10 dBm and the output level is set to +22 dBm.

The AMP is normal if about 6 Vp-p sine waves are observed when monitoring terminal ❹ with the oscilloscope.

(b) Z16-Z2 Sampler Driver, Z16-Z3 Sampler, and Z16-Z1 YTO PLL PRE AMP

The 3521.4 MHz, -2 dBm signal from Z16-J1 is converted into a 18.4 MHz signal by using the signal of a 129.740 MHz frequency from the Z16-Z5 pulse amplifier.

The level is approximately -30 dBm at terminal ❺ for Z16-Z1 YTO PLL PRE AMP output.

The relational expression of the frequency conversion is obtained as 3521.4 -(129.740 x 27) = 18.4 (MHz).

(c) Z16-Z9 YTO PD

If the signal at ❽ has 1 Vp-p amplitude with +4 Vdc, Q2 through Q8 are normal. (To prevent any malfunctions due to noise, an offset bias voltage is applied.)

The signal at ❸ is normal for 17.4 MHz and approximately 800 mVp-p. If abnormal, check the Z21 local control 1 circuit.

When a main PLL is set normally, the voltage of terminal ❹ becomes set to 0 V. When unlock becomes set, it becomes set to +2 V or -2 V.

(d) Z16-Z10 M/N PD - YTO PLL LF (2/2)

When the main PLL operates normally, both terminal ⓾ and ⓳ are set to 0 V.

In an unlock, ⓳ is set to +0.7 V or -0.7 V, and ⓴ is set to -4 V or +4 V.

(2) Checking the Sub PLL

(a) Z16-Z8 5 x 100 MHz

In normal operation ❶ is 100 MHz, -4 dBm ❷ is 500 MHz, +13 dBm and ❸ is 1000 MHz, -5 dBm.

(b) Z16-Z7 M/N MIX

In the present settings, the Z16-Z6 fM/N VCO is 1037.92 MHz, so the frequency of ❹ of Z16-Z7 is 37.92 MHz.

The normal level of ❹ is 400 mVp-p to 800 mVp-p.

(c) Z16-Z6 M/N VCO

The tuning voltage is applied to terminal ❶. The typical characteristics of the tuning voltage versus the fM/N VCO are shown in Fig. 5-40.

Also, because the aluminium cover of the oscillators (Q1 to 5) forms a part of the resonance circuit, the oscillators do not operate normally if the cover is removed, so the voltage at ❶ is checked at C10 of Z16 PLL Block.

(d) Z16-Z10 M/N PD - YTO PLL LF (1/2)

This PC board includes both the sub PLL circuit and main PLL circuit, and the part shown in Fig. 5-46 (1/2) is the sub PLL circuit.

Check the 16/N (MHz) signals at terminal ❸ , which are sent from the Z26 CPU board.

Assume that N is 27 and 592.59 kHz is obtained. The signal level is set to the TTL level. (If normal signals are not obtained, check the operation of the Z26 CPU board.) Then, signals at terminal ❶ must be checked to determine whether they are the same as those at M/N MIX (Z16-Z7) terminal ❹ , which was checked in Item (b) (37.92 MHz).

The value M used to divide 37.92 MHz is set to 64, 37.92 MHz divided by 64 is 592.5 kHz, and is equal to the frequency of previously checked terminal ❸ of Z16-Z10. Then, the output of ⓱ is set to 0 V.

This voltage is set to +7 V or -7 V for an abnormal (unlocked) status.

5.7.3 Adjustment - Z16

(1) Z16-Z8 5 x 100 MHz Adjustment

(a) Z1, Z2 of Z16-Z8 500 MHz BPF Adjustment

Adjust the trimmer capacitor so that the maximum level can be obtained at terminal ❷ .

After adjusting the trimmer, confirm that the level is at ≧ +13 dBm.

(b) Z3 of Z16-Z8 Adjustment

Connect an oscilloscope to terminal ❹ of the Z16-Z7 M/N MIXER PC Board.

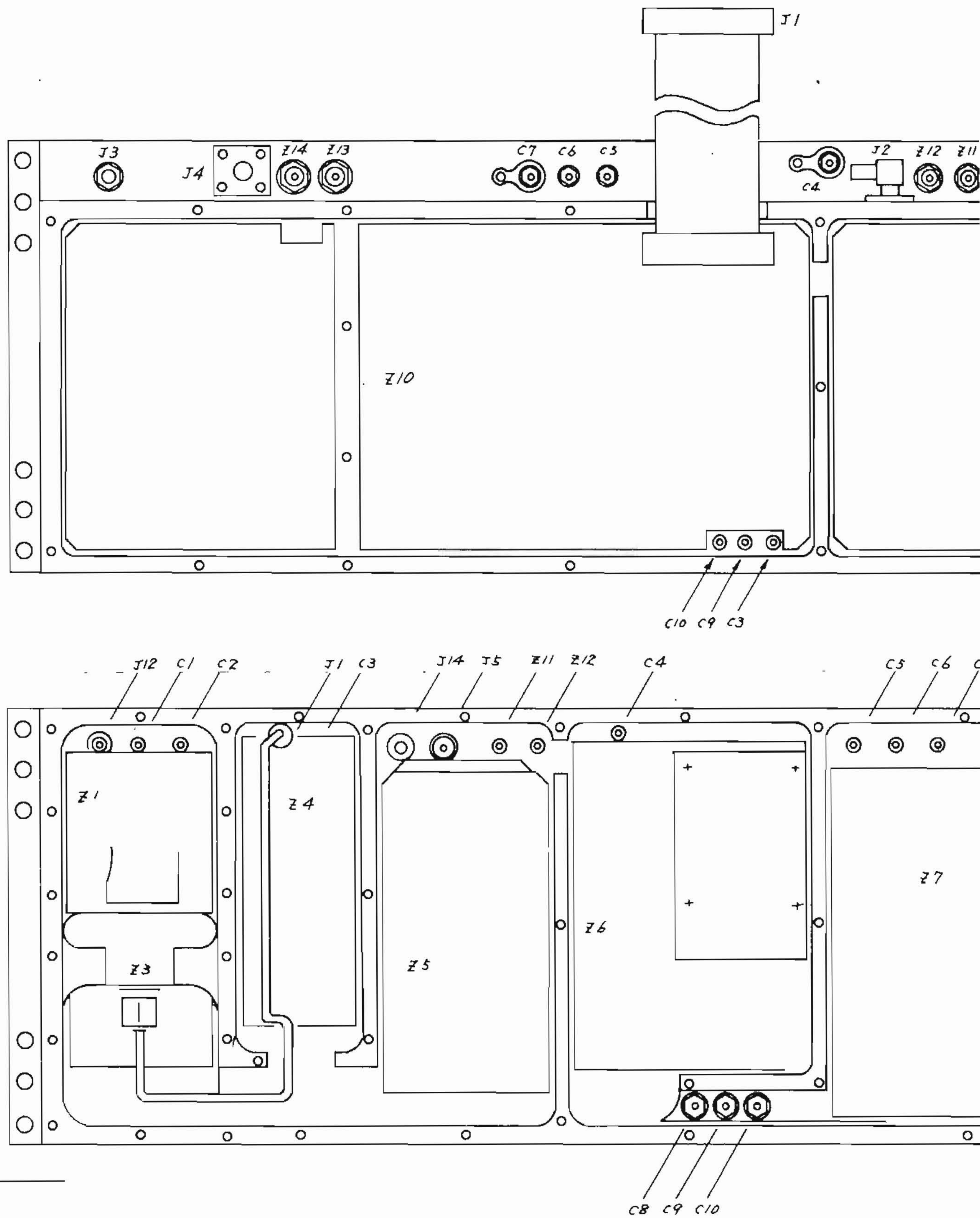
Adjust so as to obtain maximum voltage amplitude while observing the oscilloscope.

(2) Z16-Z10 (1/2) M/N PD-YTO PLL LF Adjustment

Tracking on M/N VCO tuning signal:

Adjust R42, R43 to get the minimum PLL control voltage (≦ ±2 V) at terminal ⓱ in the following locked condition.

Adj. Position	CTR (1.7 to 23 GHz BAND)	SPAN	M/N VCO	(M/N VCO)/8
R42	5472 MHz	0	1017.021 MHz	127.127 MHz
R43	1720 MHz	0	1112.00 MHz	139.00 MHz


J1
J3
J4
Z14
Z13
C7
C6
C5
C4
J2
Z12
Z11
Z10
C10 C9 C3
J12 C1 C2
J1 C3
J14 J5 Z11 Z12
C4
C5 C6
Z1
Z4
Z3
Z5
Z6
Z7
C8 C9 C10

FRONT SIDE ←

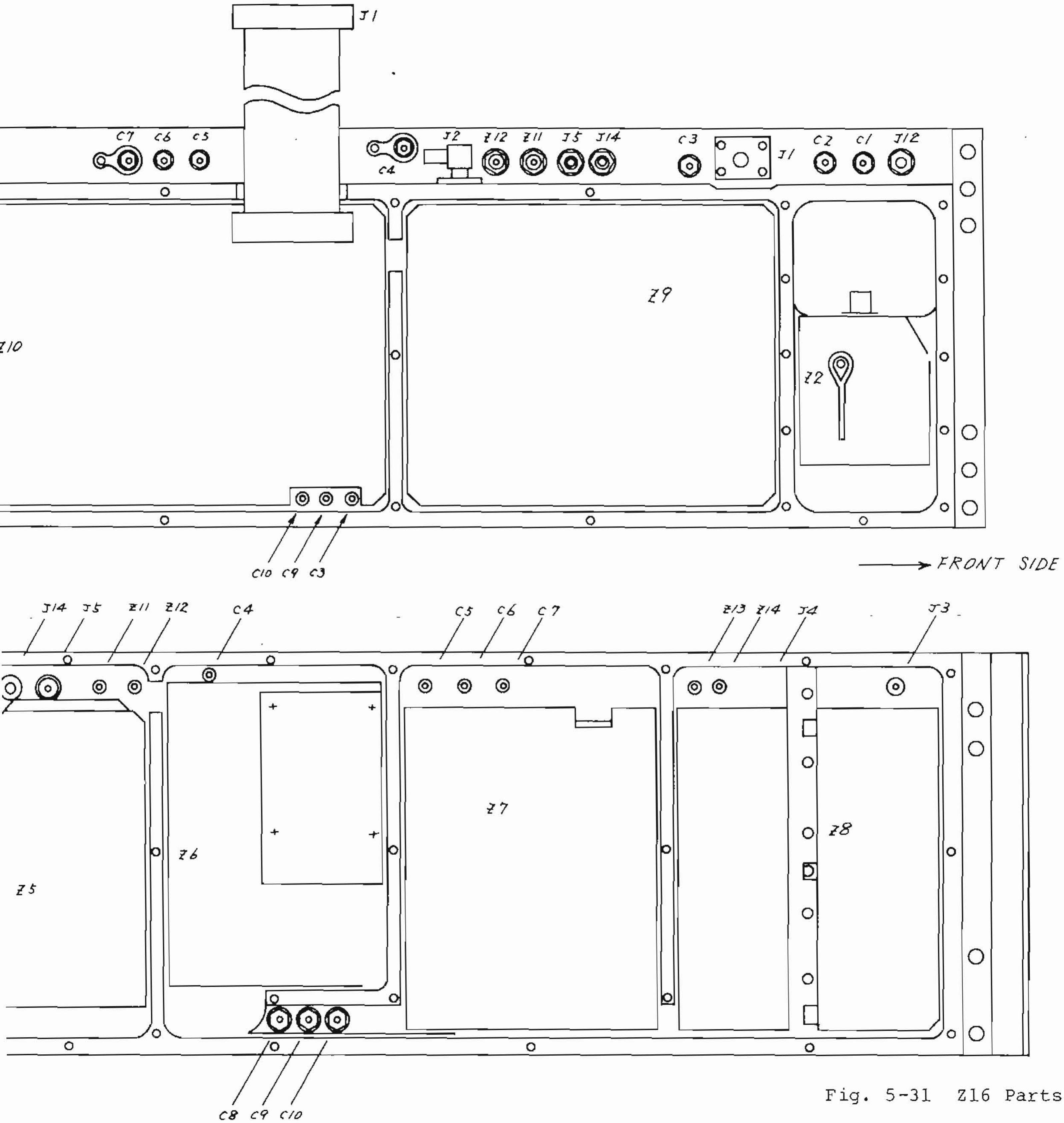
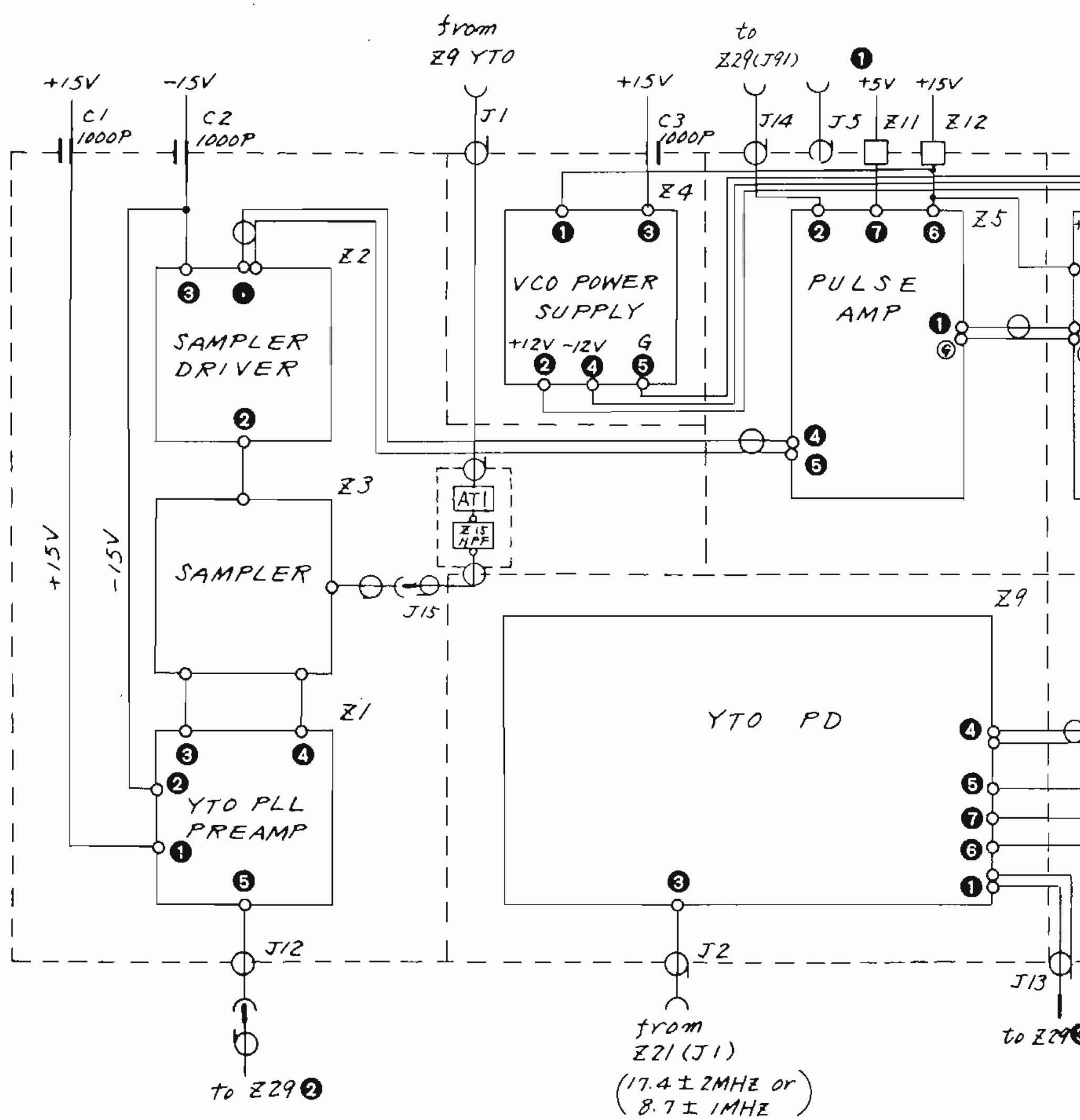
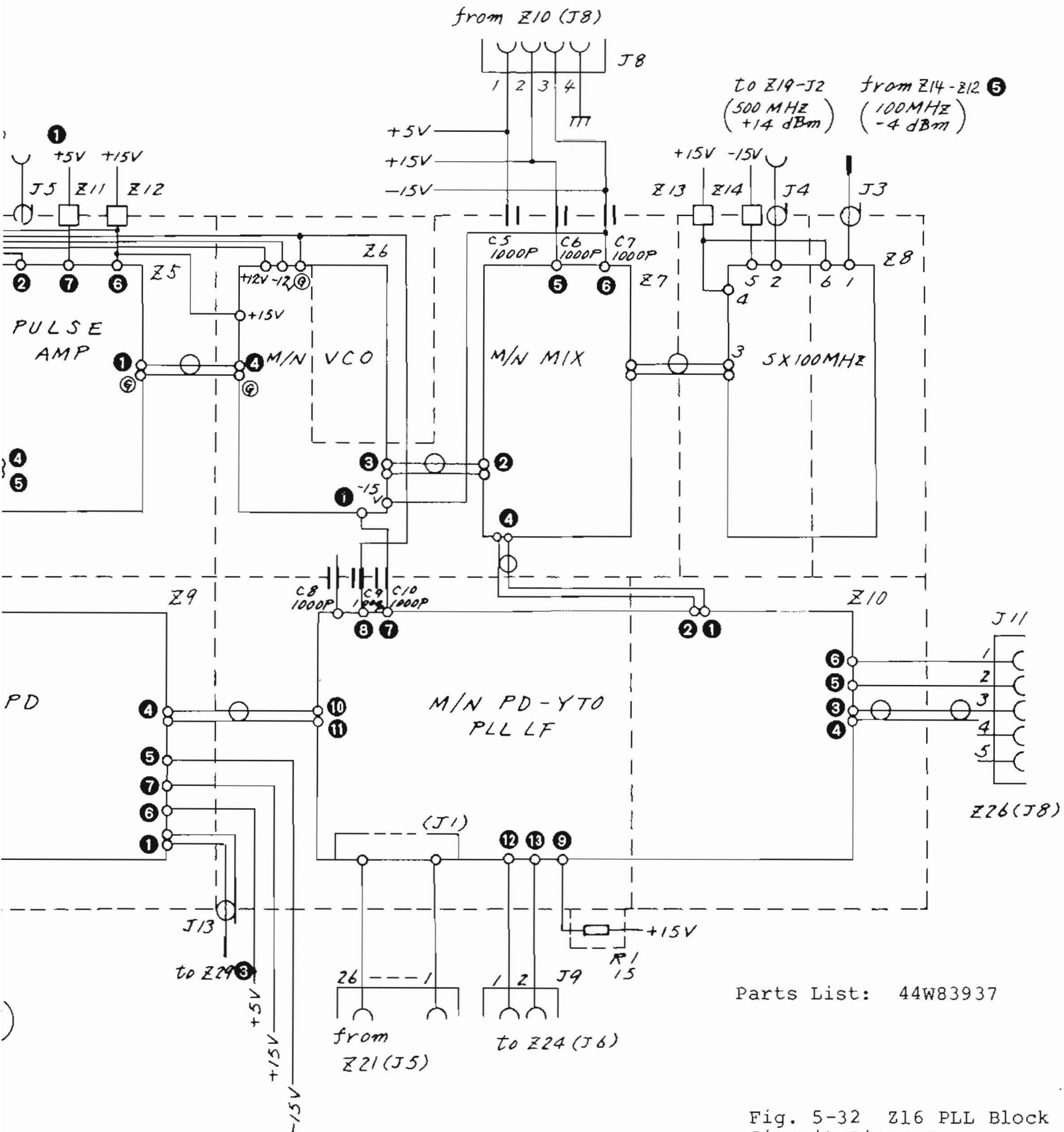


Fig. 5-31 Z16 Parts L

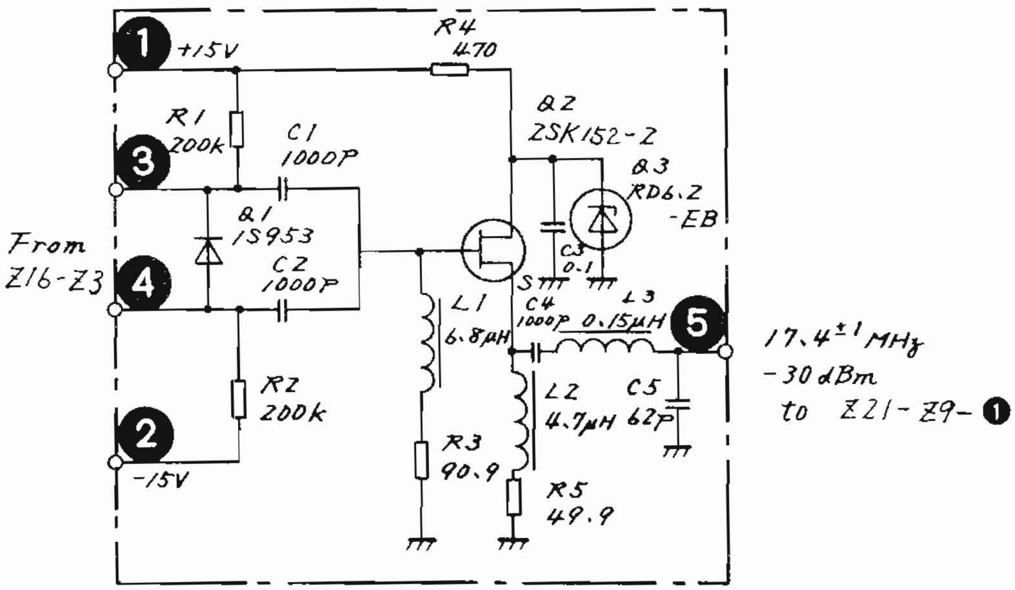


from Z9 YTO
to Z29(J91)
+15V
-15V
C1 1000P
C2 1000P
J1
+15V
C3 1000P
J14
J5
+5V
+15V
Z11
Z12
Z4
Z2
Z5
SAMPLER DRIVER
VCO POWER SUPPLY
+12V -12V G
PULSE AMP
Z3
AT1
Z15 HPF
SAMPLER
J15
+15V
-15V
Z9
YTO PD
Z1
YTO PLL PREAMP
J12
J2
J13
to Z29
from Z21 (J1)
(17.4 ± 2MHz or 8.7 ± 1MHz)
to Z29



Parts List: 44W83937

Fig. 5-32 Z16 PLL Block Circuit Diagram (43W33944)



Parts List: 44W83938

PC board: 342U82181

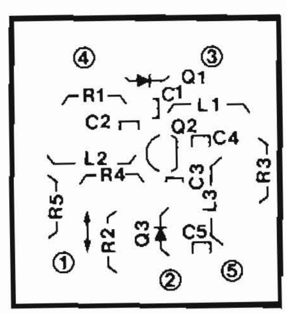
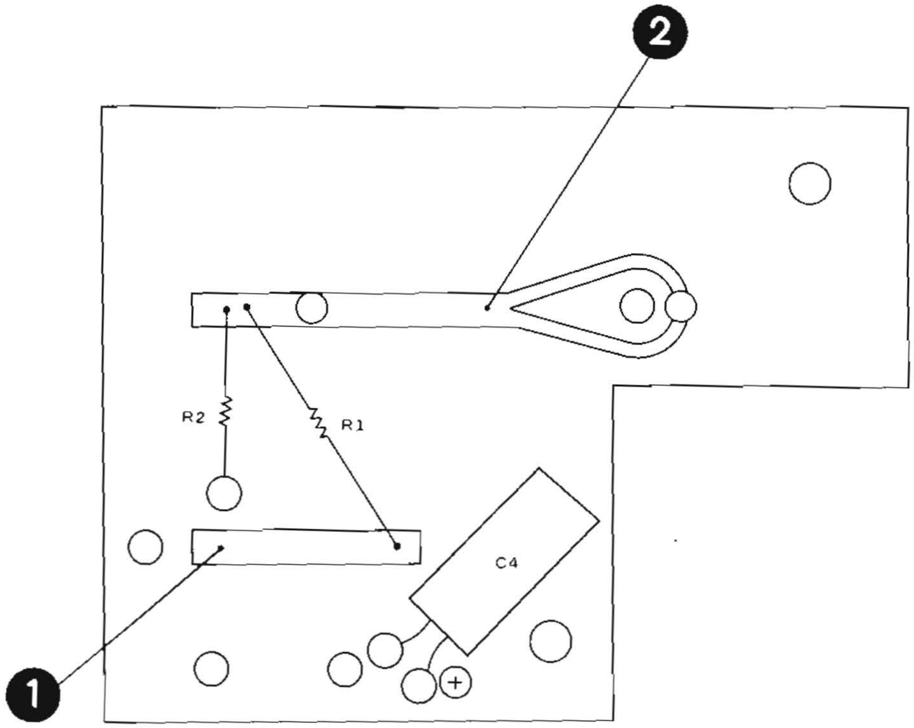
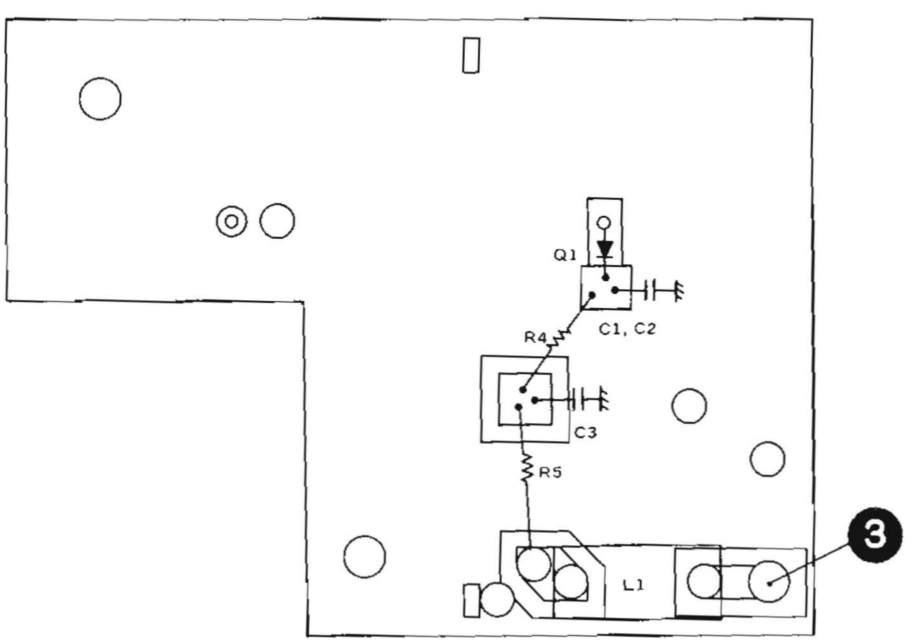
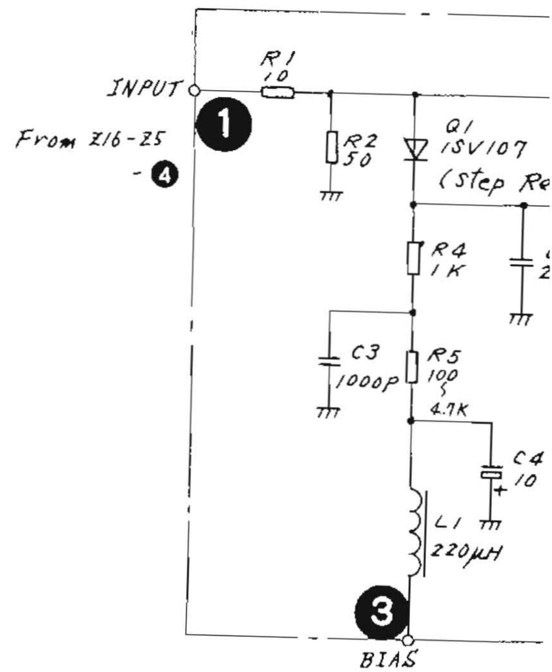


Fig. 5-33 Z16-Z1 YTO PLL PRE AMP
Circuit Diagram and Parts Layout
(44W84116)

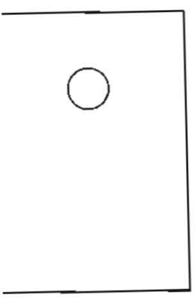


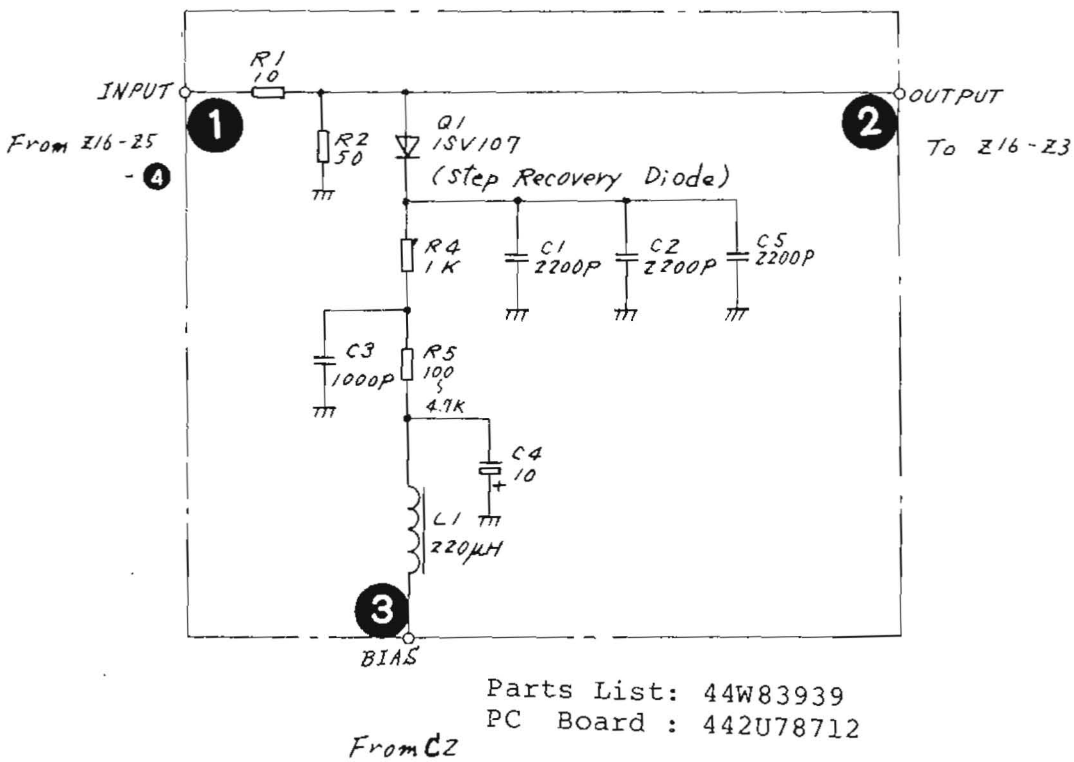




Par
PC

From CZ





Parts List: 44W83939
PC Board : 442U78712

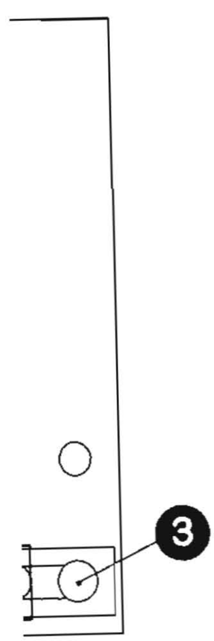
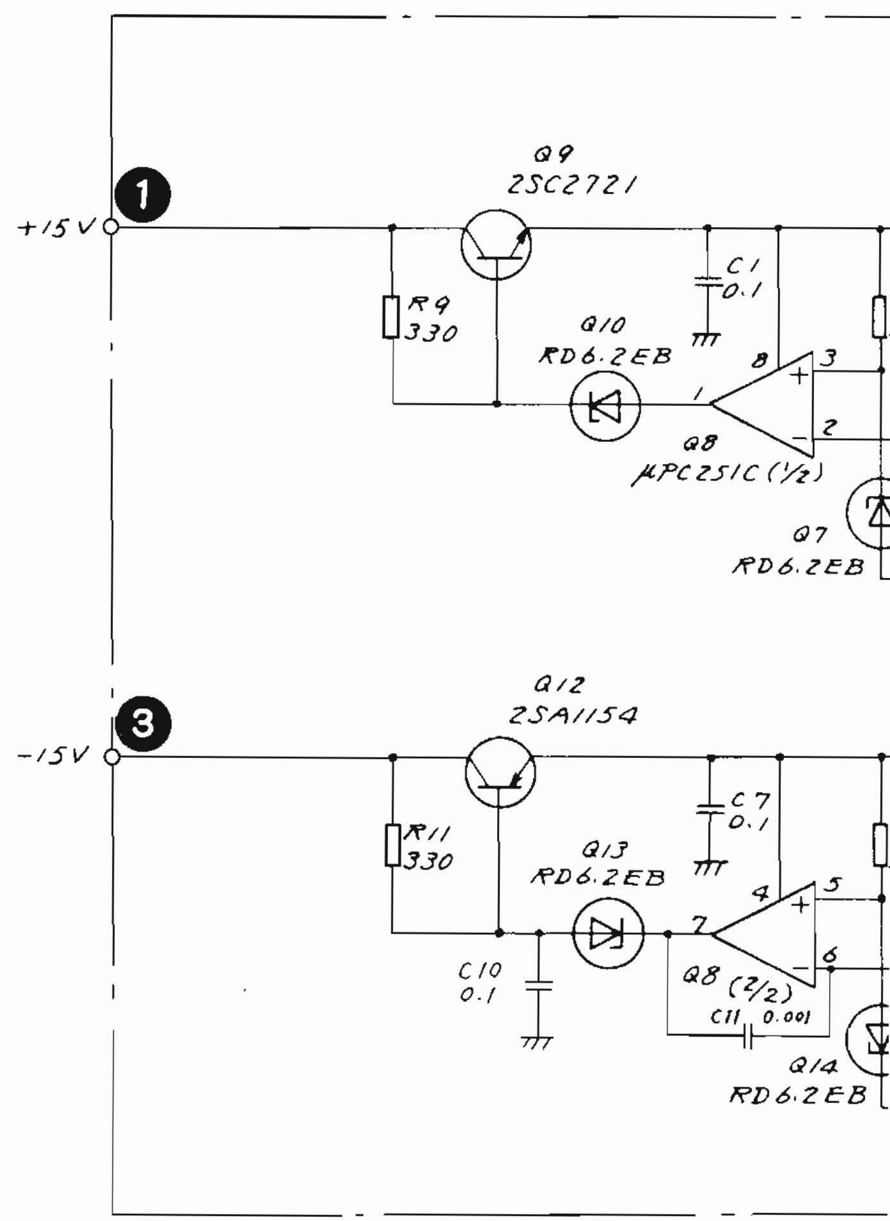
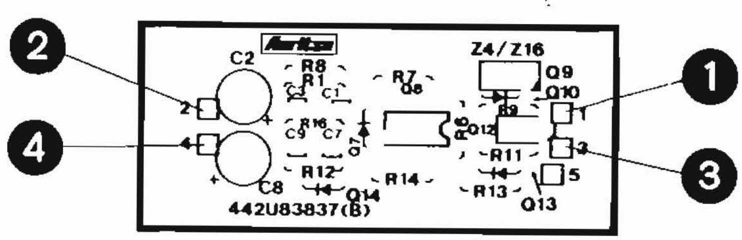


Fig. 5-34 Z16-Z2 SAMPLER DRIVER Circuit Diagram and Parts Layout (43W84117)





PC Board : 442U83837

Parts List: 44W83940

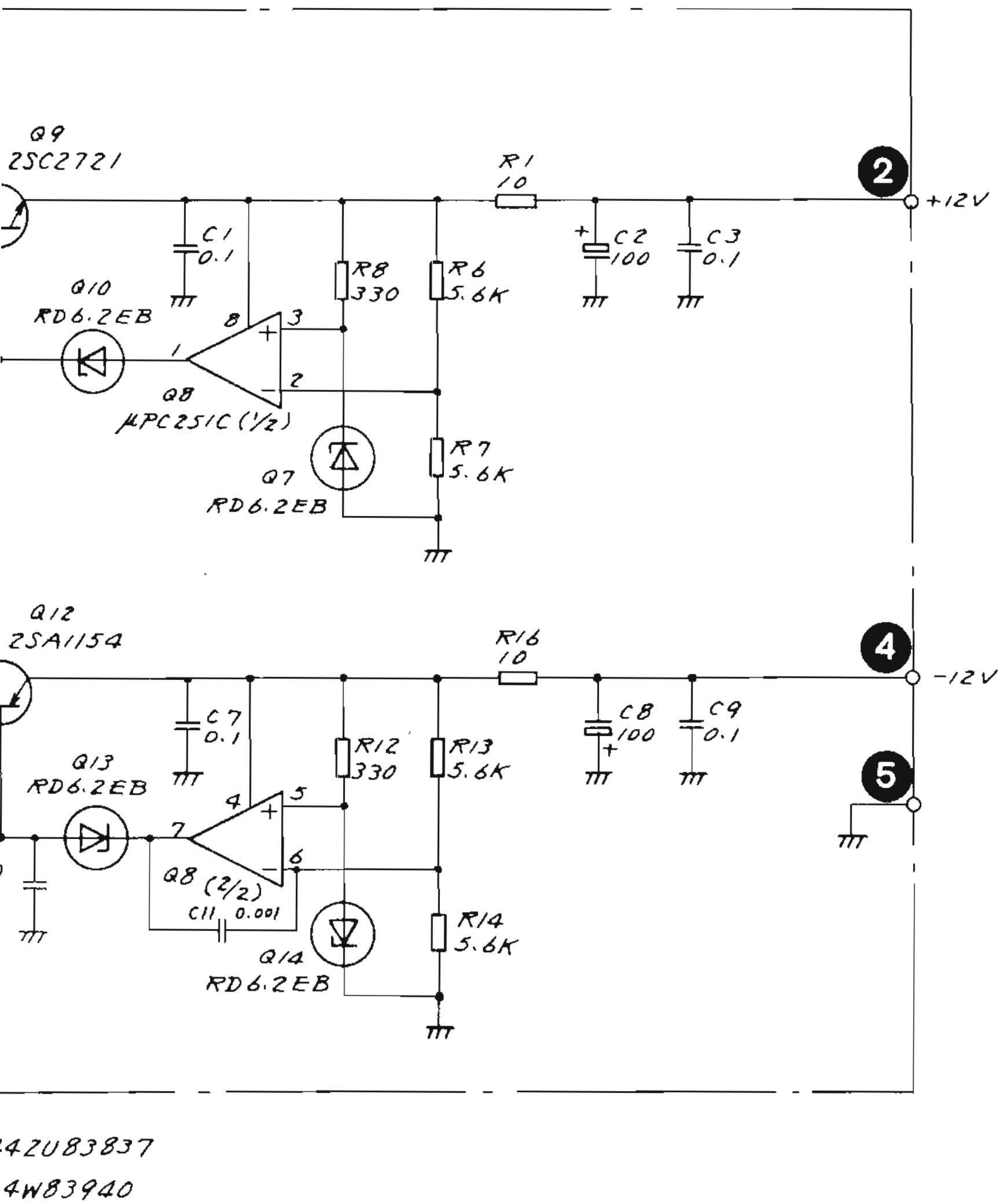
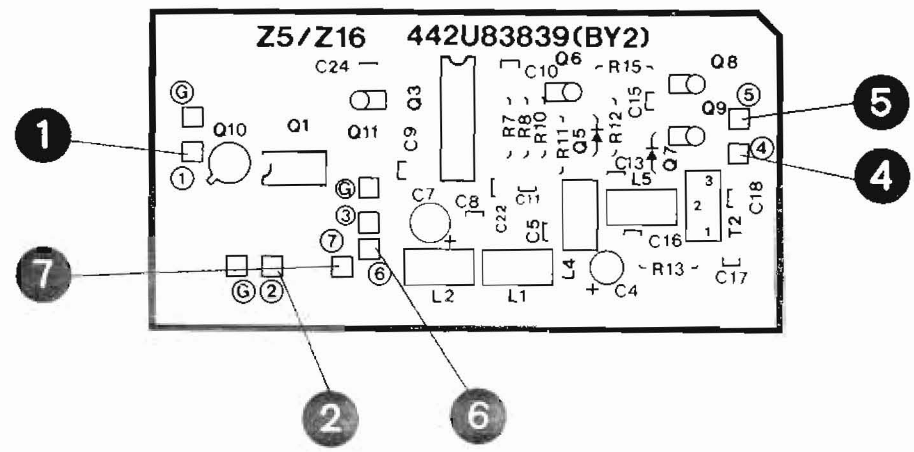


Fig. 5-35 Z16-Z4 ISOLATION AMP Circuit Diagram and Parts Layout (43W33945 M-1)



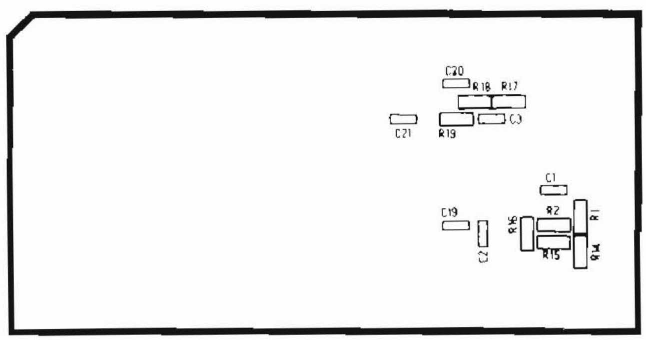
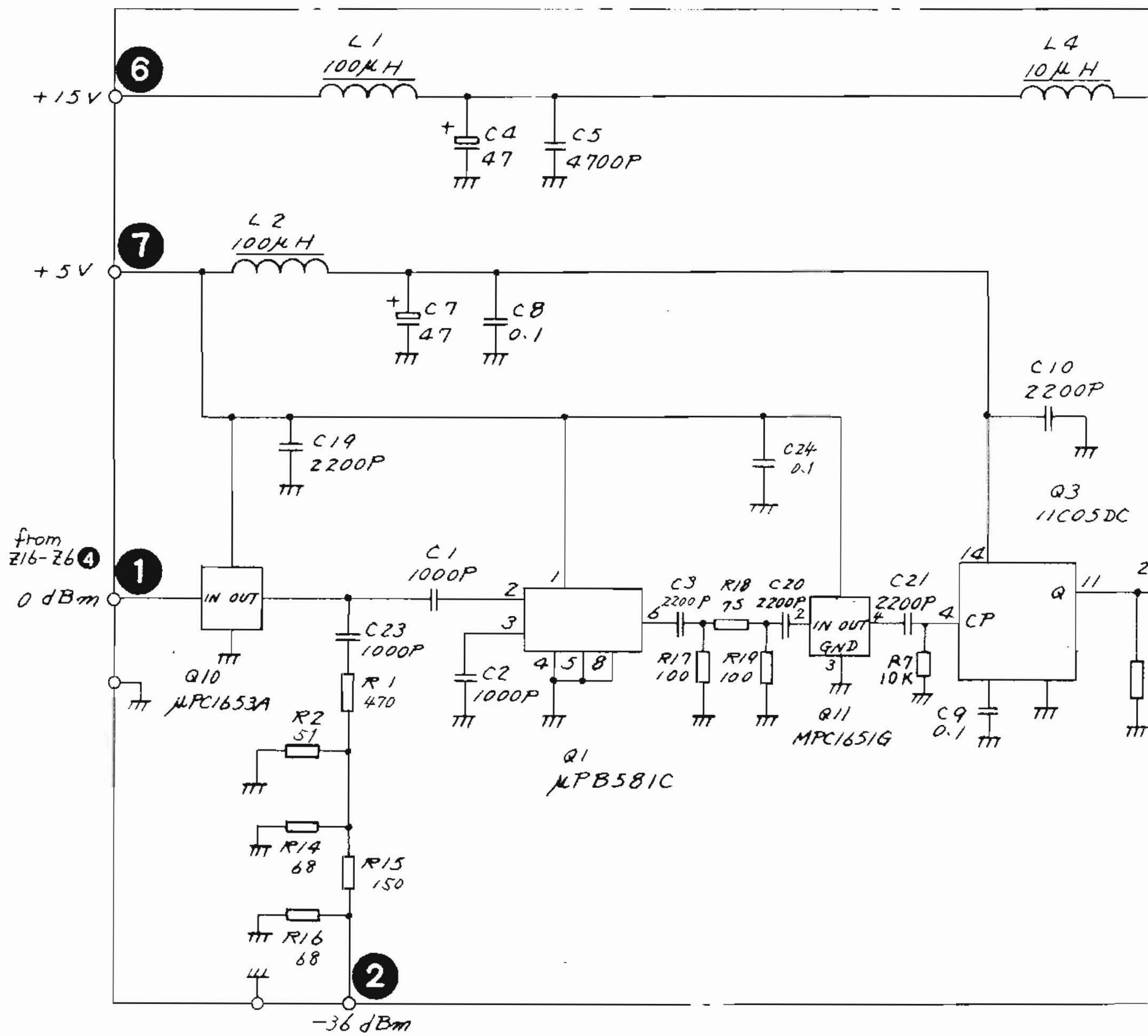


Fig. 5-36 Z16-Z5 Parts Layout



PC Board : 442U83839
Parts List : 44W83941

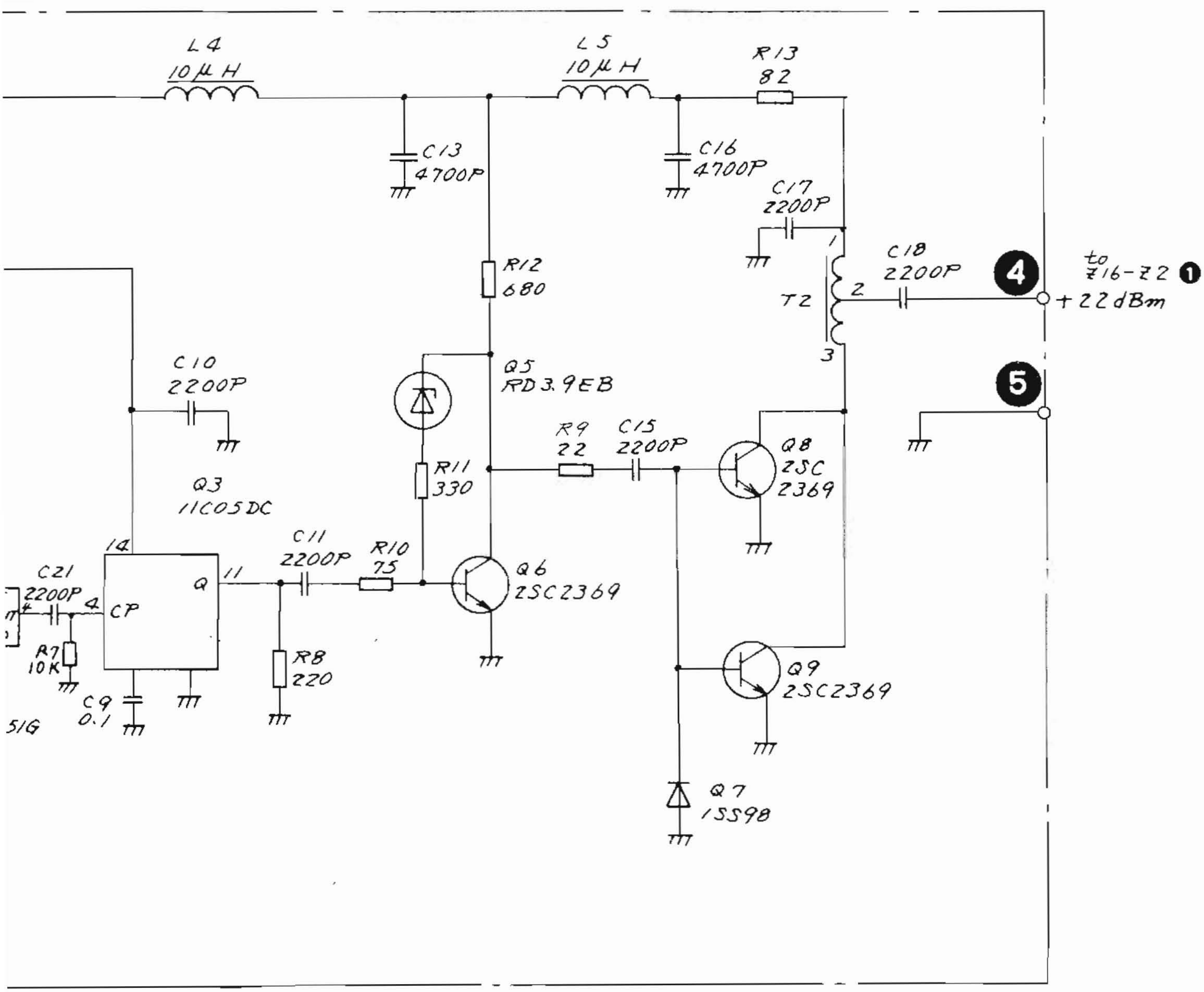


Fig. 5-37 Z16-Z5 PULSE AMP Circuit Diagram (43W33946)

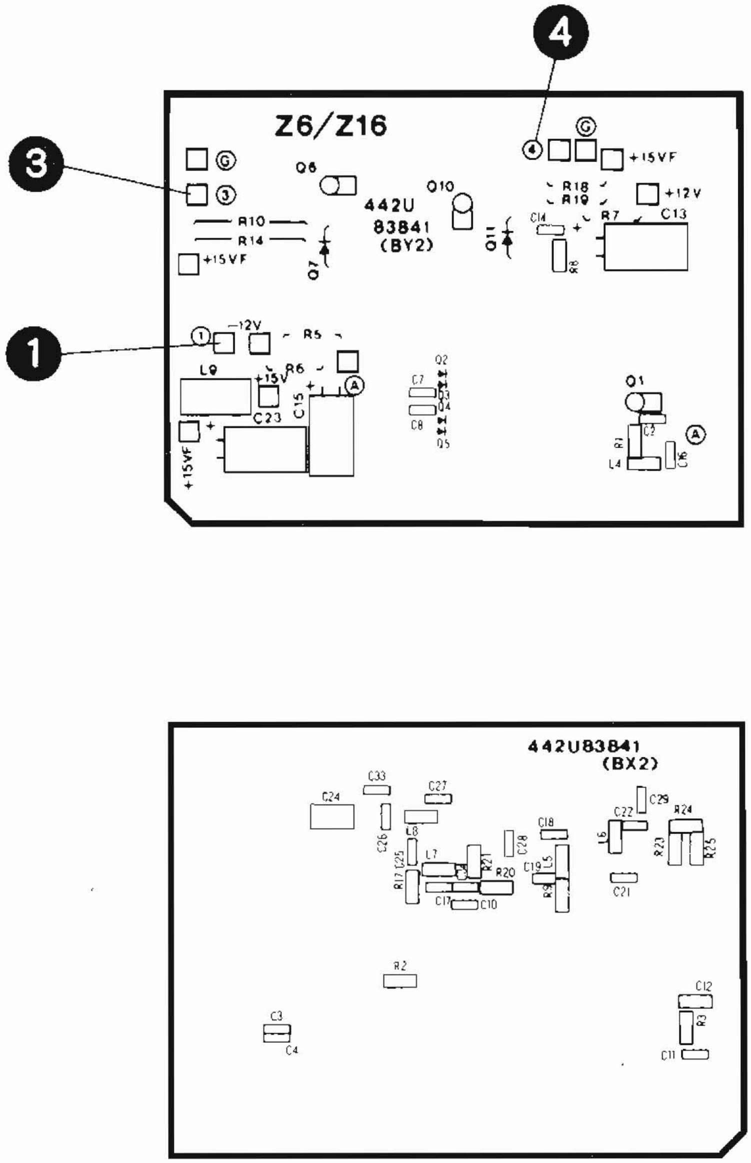


Fig. 5-38 Z16-Z6 Parts Layout

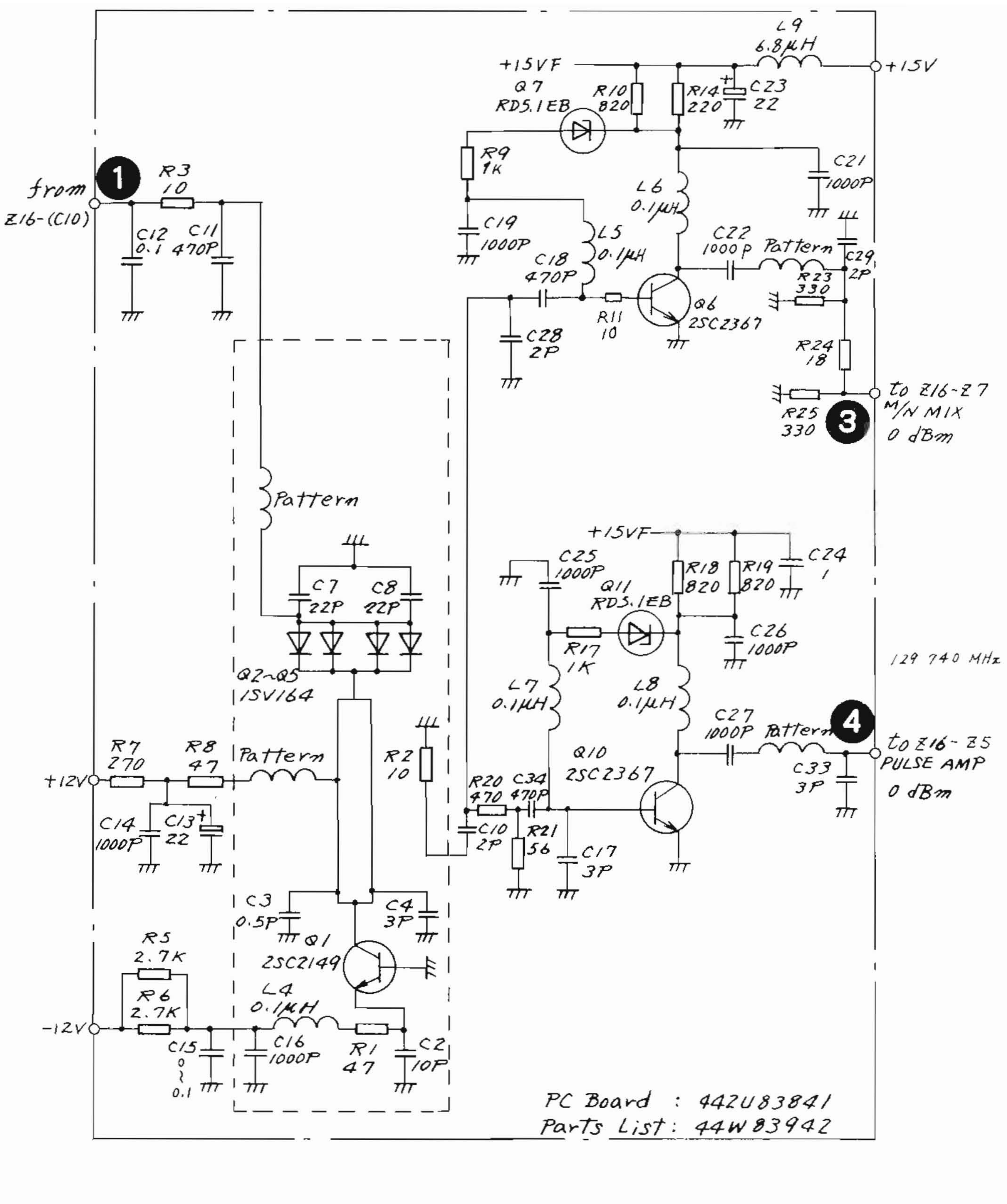


Fig. 5-39 Z16-Z6 N/N VCO
Circuit Diagram (44W84118)

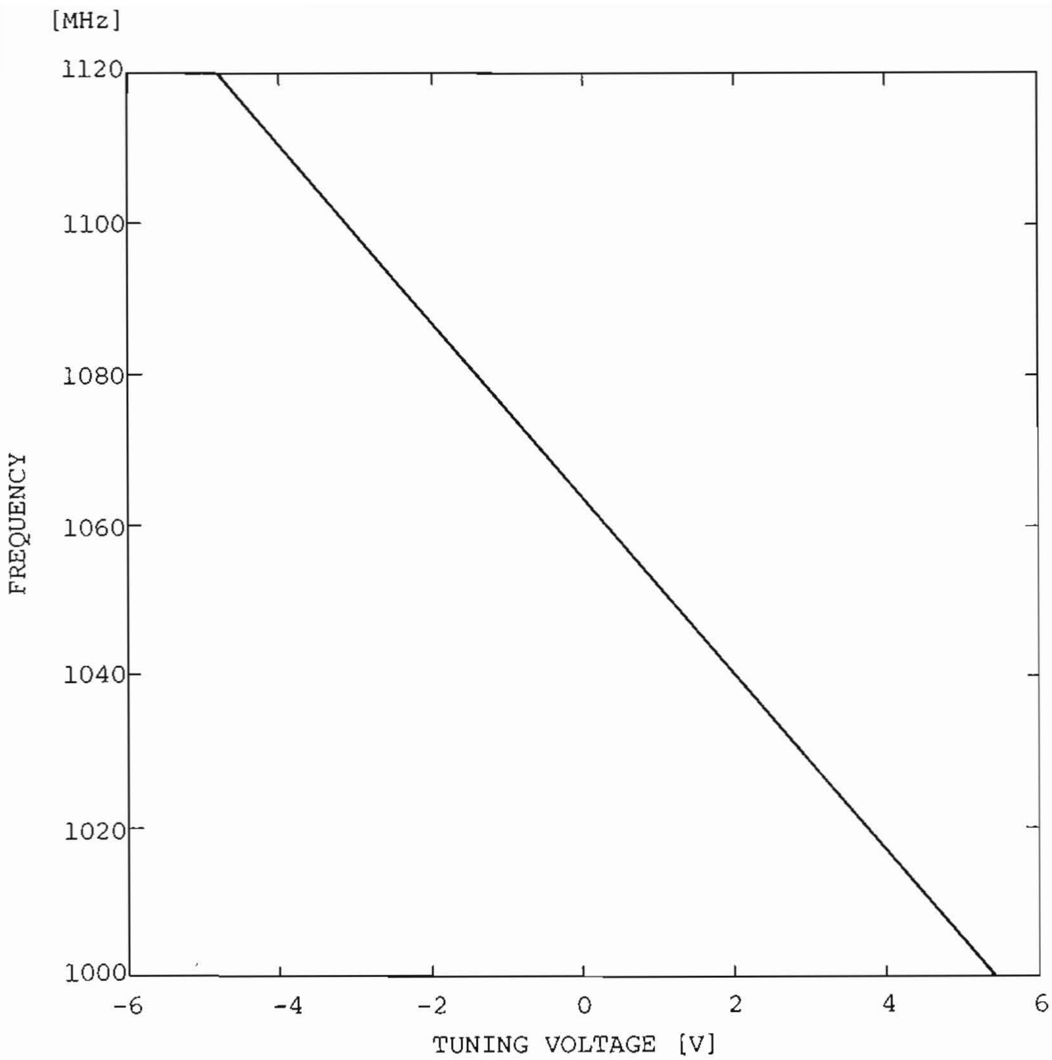


Fig. 5-40 Tuning Characteristics of M/N VCO (Z16-Z6)

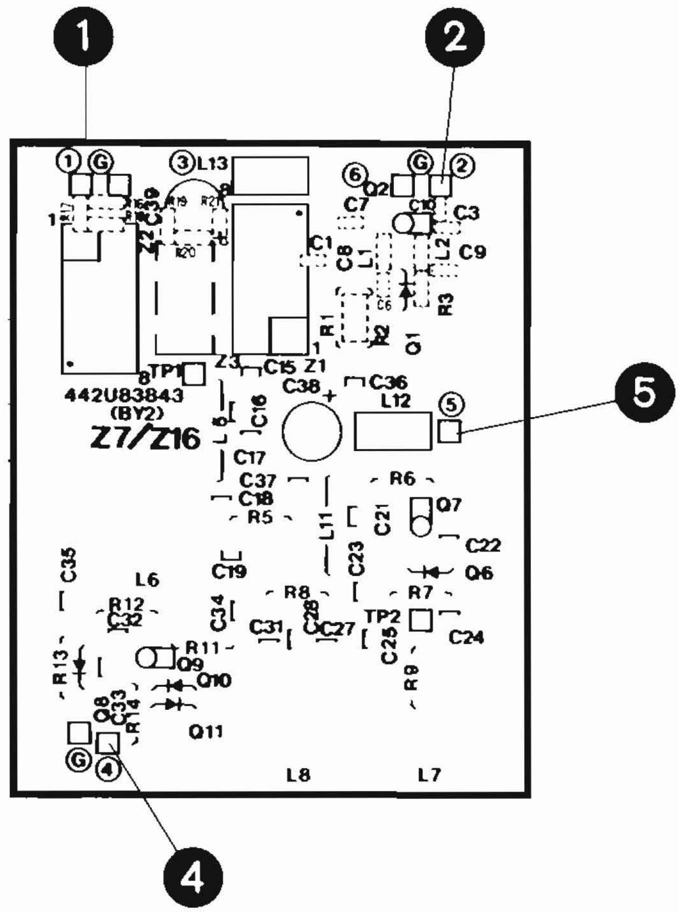
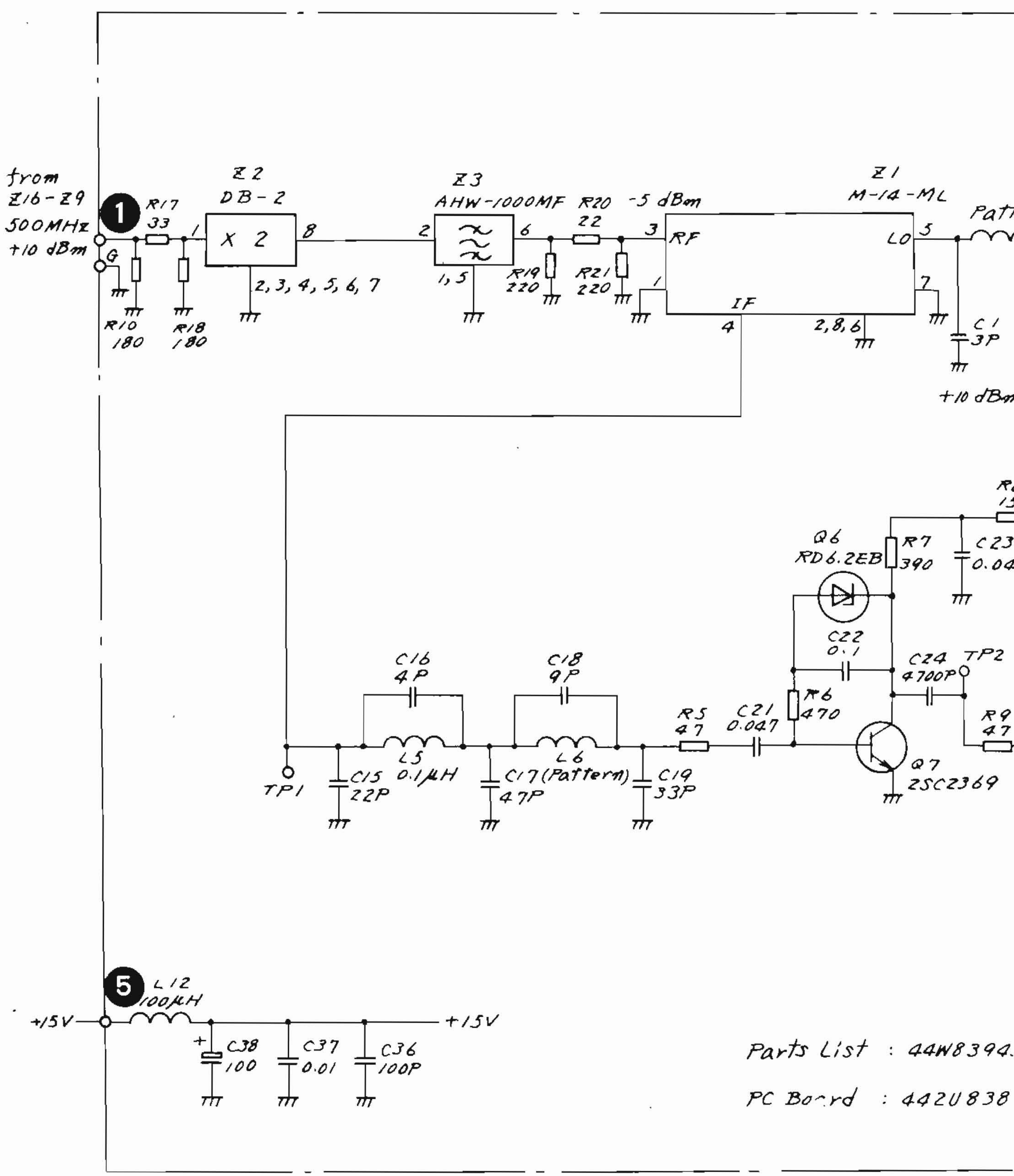


Fig. 5-41 Z16-Z7 Parts Layout



from Z16 - Z9
500MHz
+10 dBm
G
R17
33
R10
180
R18
180
Z2
DB - 2
X 2
2, 3, 4, 5, 6, 7
Z3
AHW-1000MF
1, 5
R20
22
R19
220
R21
220
-5 dBm
Z1
M-14-ML
RF
LO
IF
2, 8, 6
C1
3P
+10 dBm
Q6
RD6.2EB
R7
390
C23
C22
0.1
C24
4700P
TP2
R6
470
R9
47
Q7
2SC2369
C16
4P
C18
9P
L5
0.1μH
L6
C15
22P
C17 (Pattern)
47P
C19
33P
R5
47
C21
0.047
TP1
L12
100μH
+15V
C38
100
C37
0.01
C36
100P
Parts List : 44W8394
PC Board : 442U838

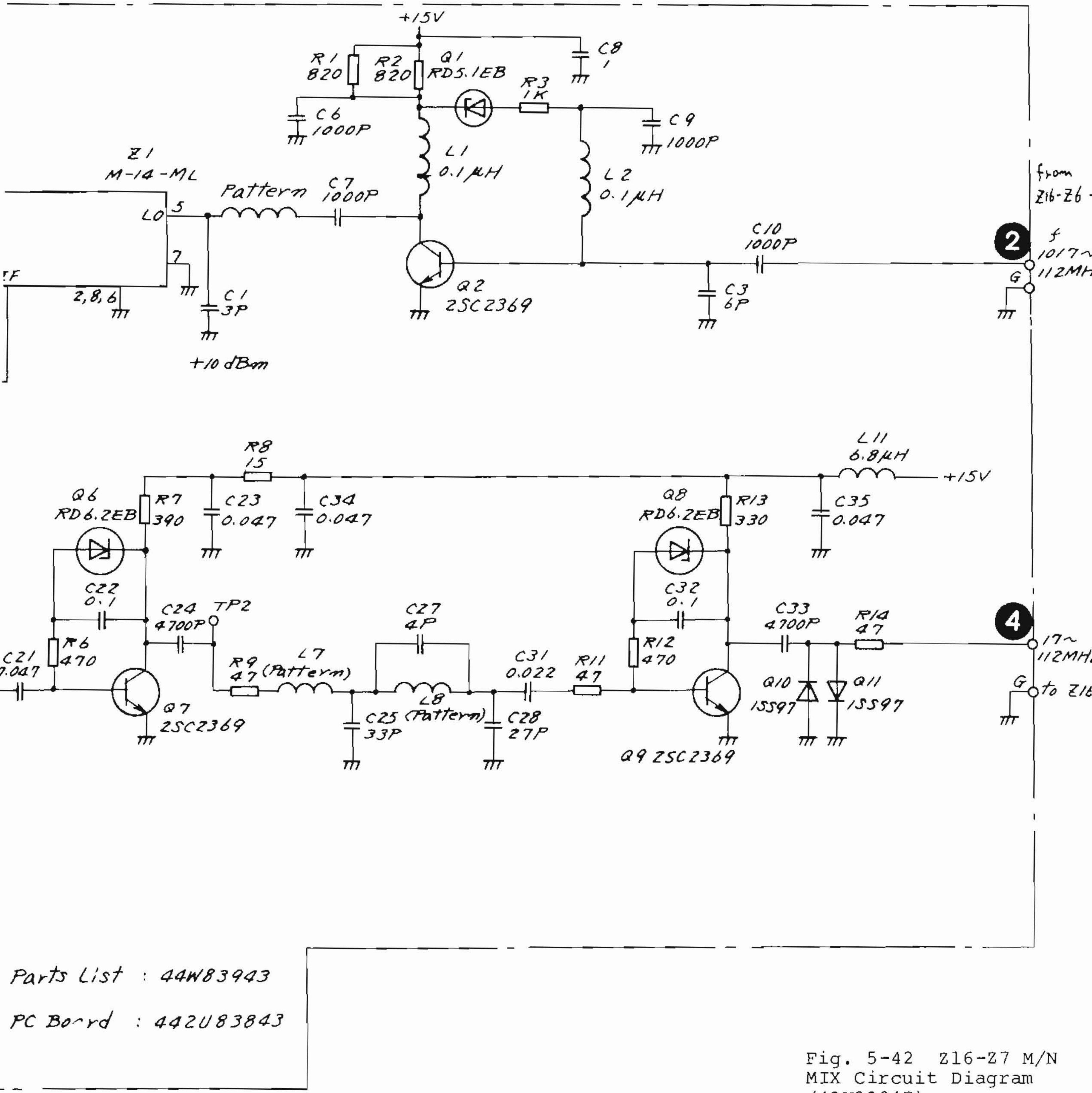


Fig. 5-42 Z16-Z7 M/N
MIX Circuit Diagram
(43W33947)

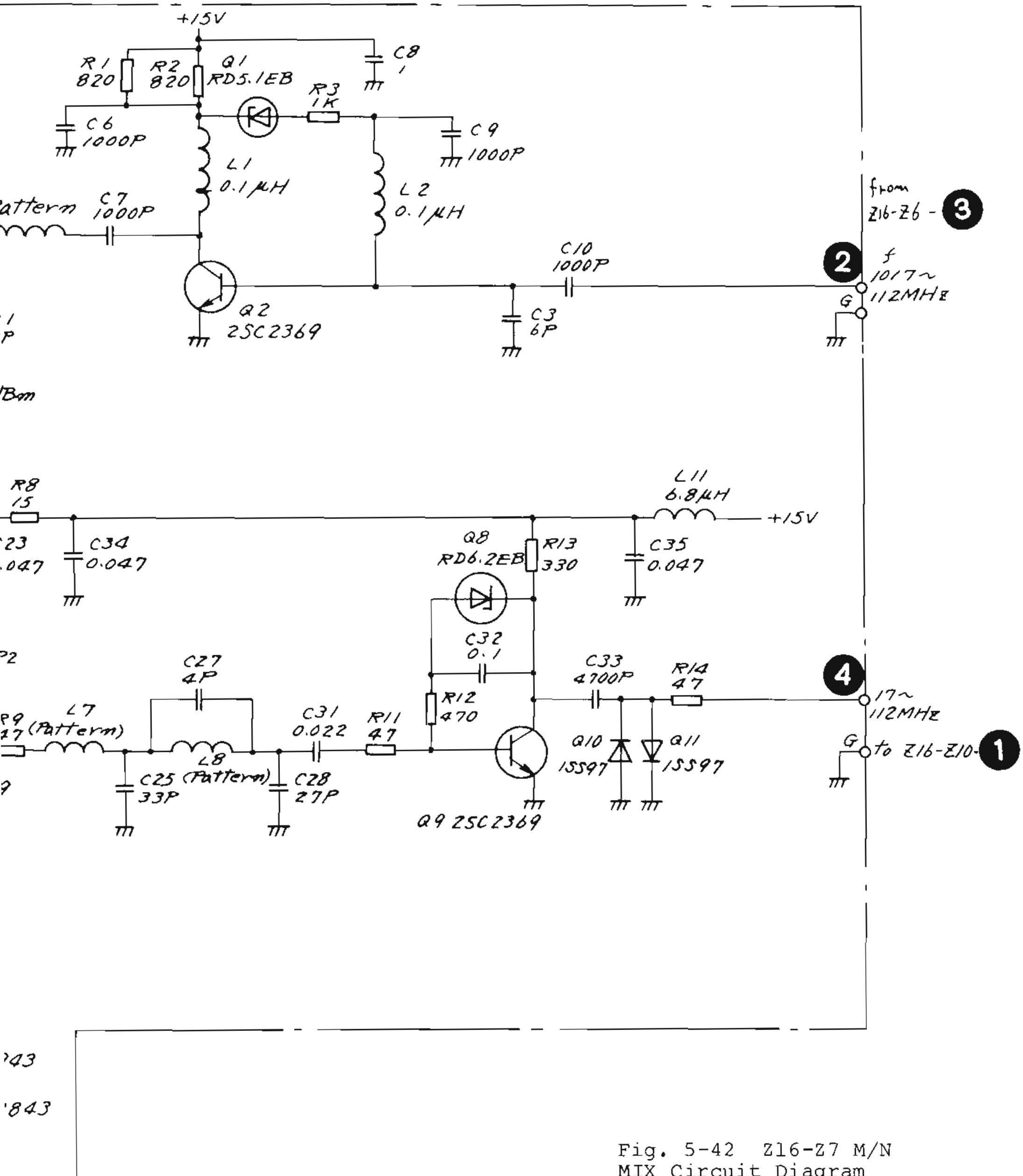
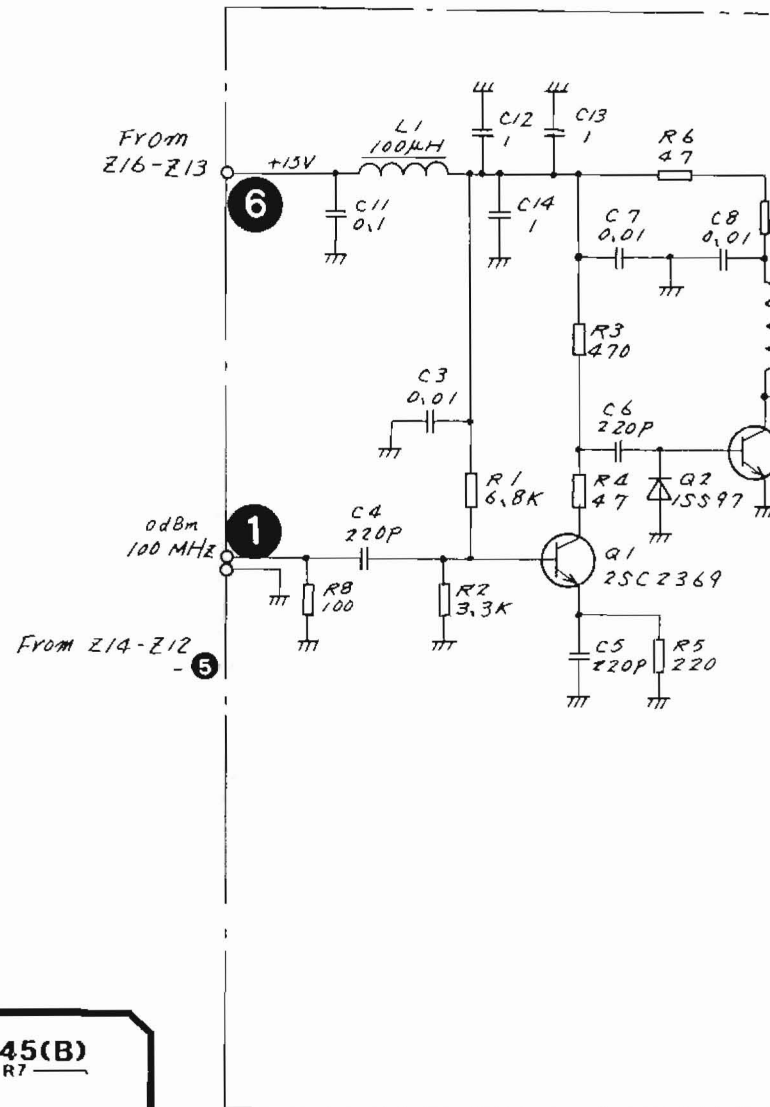
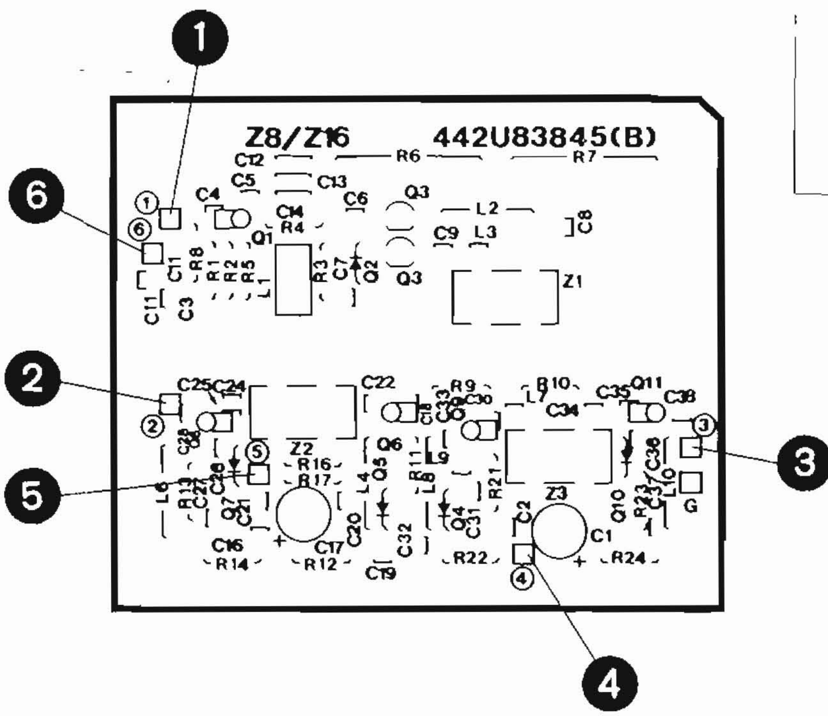
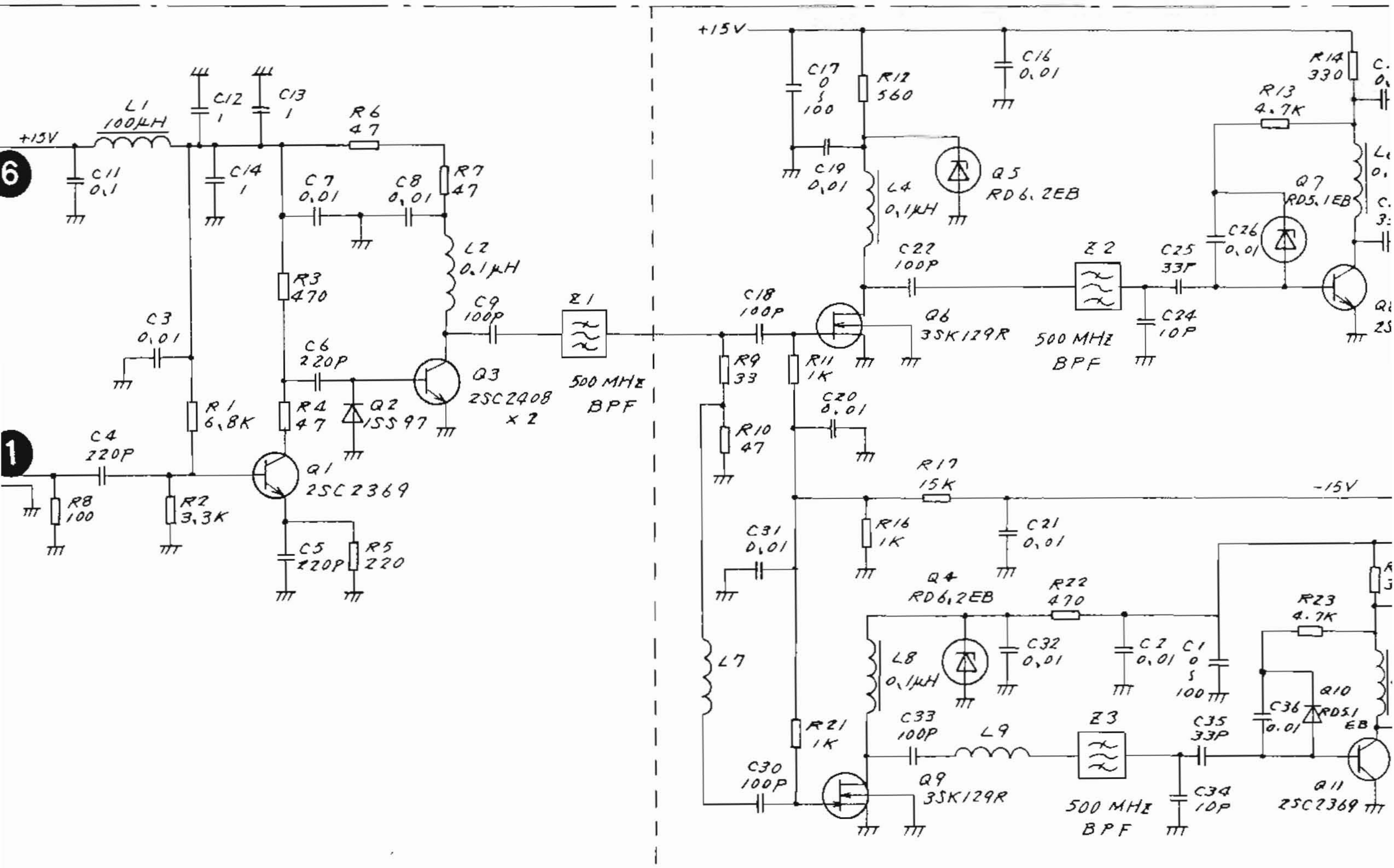


Fig. 5-42 Z16-Z7 M/N
MIX Circuit Diagram
(43W33947)


From
Z16-Z13
+15V
6
L1
100μH
C12
1
C13
1
R6
47
C11
0.1
C14
1
C7
0.01
C8
0.01
R3
470
C3
0.01
C6
220P
R1
6.8K
R4
47
Q2
1SS97
0dBm
100 MHz
1
C4
220P
Q1
2SC2369
R8
100
R2
3.3K
From Z14-Z12
5
C5
220P
R5
220


Z8/Z16
442U83845(B)
1
2
3
4
5
6
C12
R6
R7
C5
C13
C4
C6
Q3
C14
R4
Q1
L2
C9
L3
C8
R8
C11
R1
R2
R5
L1
R3
C7
Q2
Q3
Z1
C3
C25
C24
C22
R9
R10
C35
Q11
C38
C33
C30
L7
C34
Q6
Z2
R16
R17
L6
R13
C27
L4
Q5
R11
L9
L8
R21
Z3
C36
C37
L10
G
Q7
C21
C20
C32
Q4
C31
C2
Q10
R23
C16
C17
C1
R14
R12
C19
R22
R24



PC Board : 442U 8

Parts List : 44W 83

Fig. 5-43 Z16-Z8 5
Circuit I
Component
(43W 339

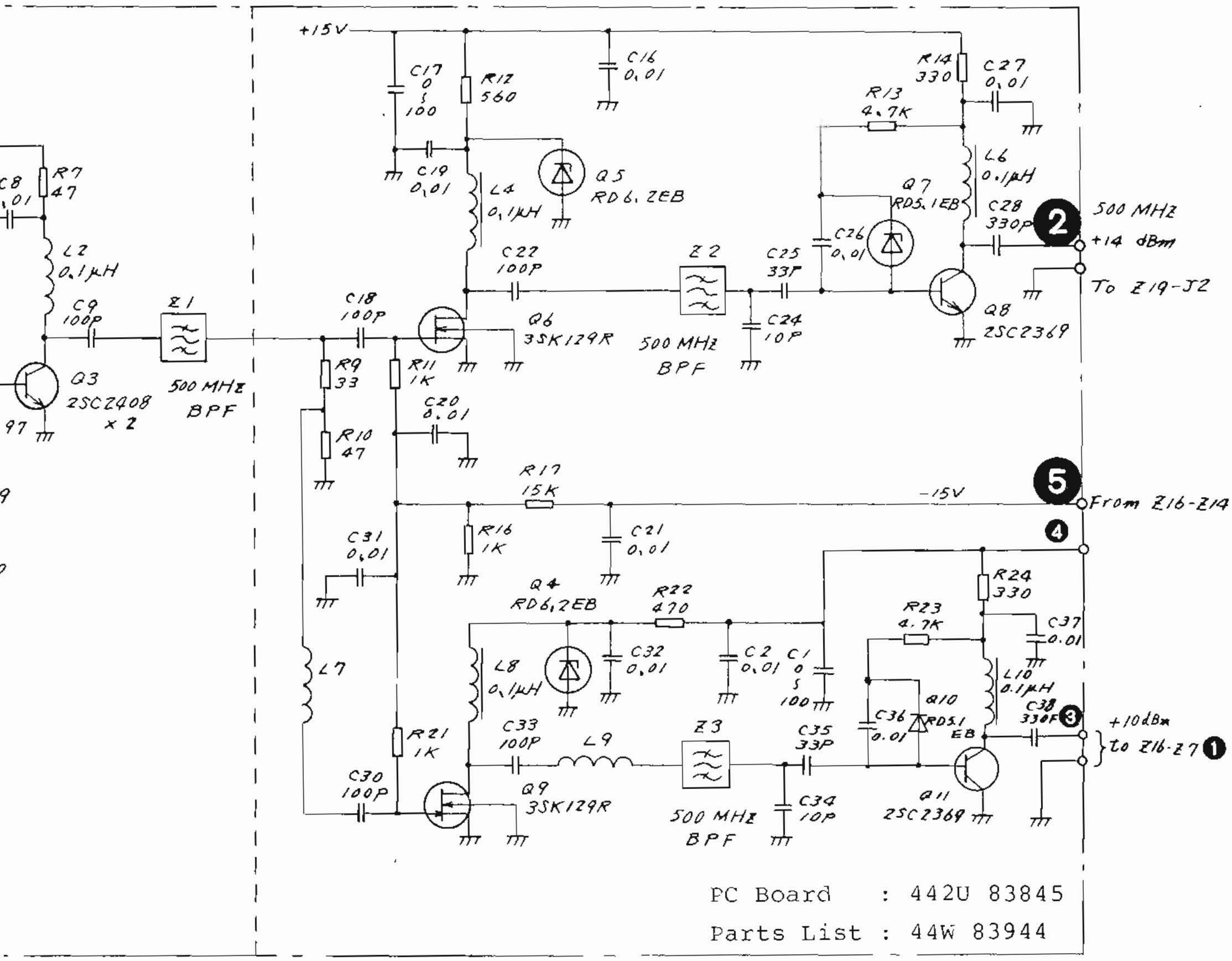
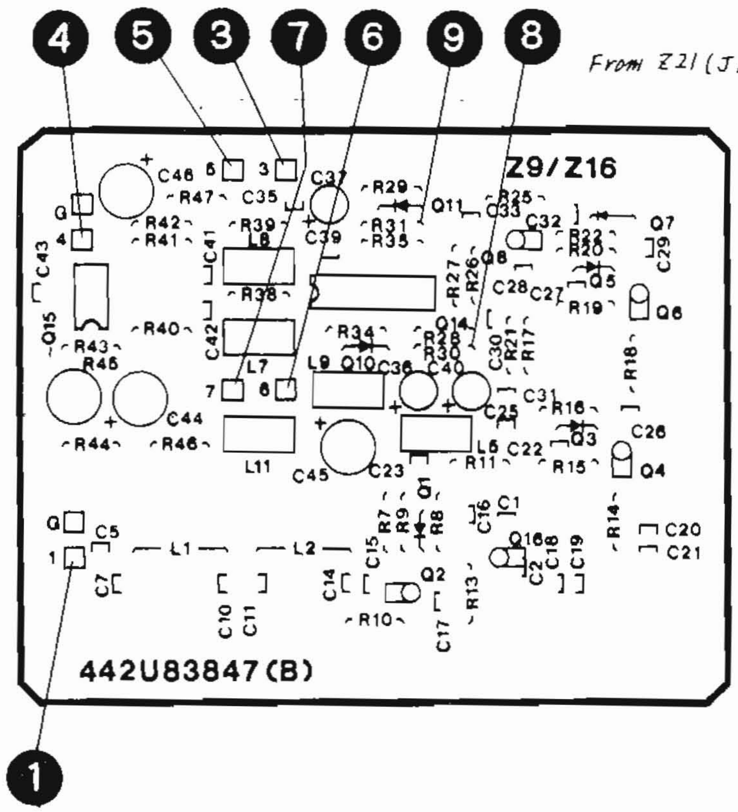
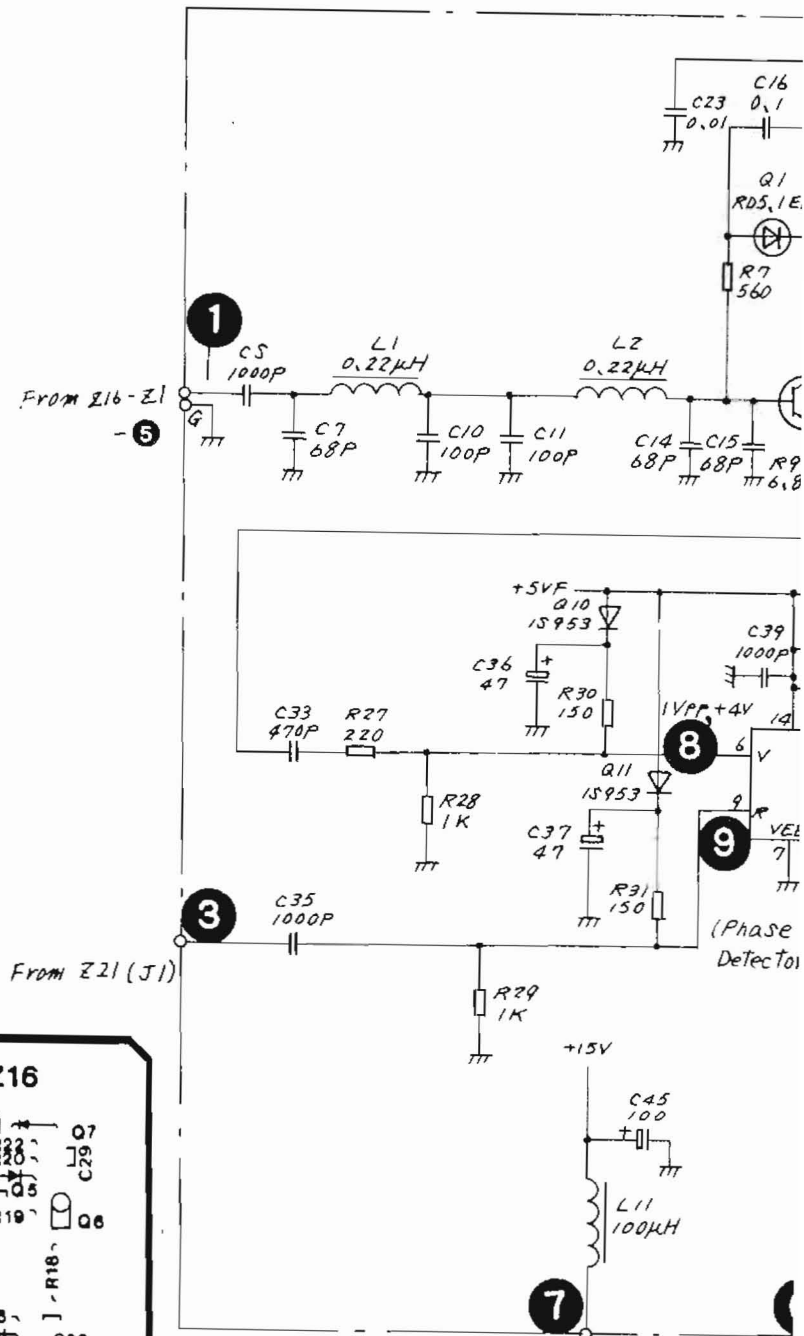
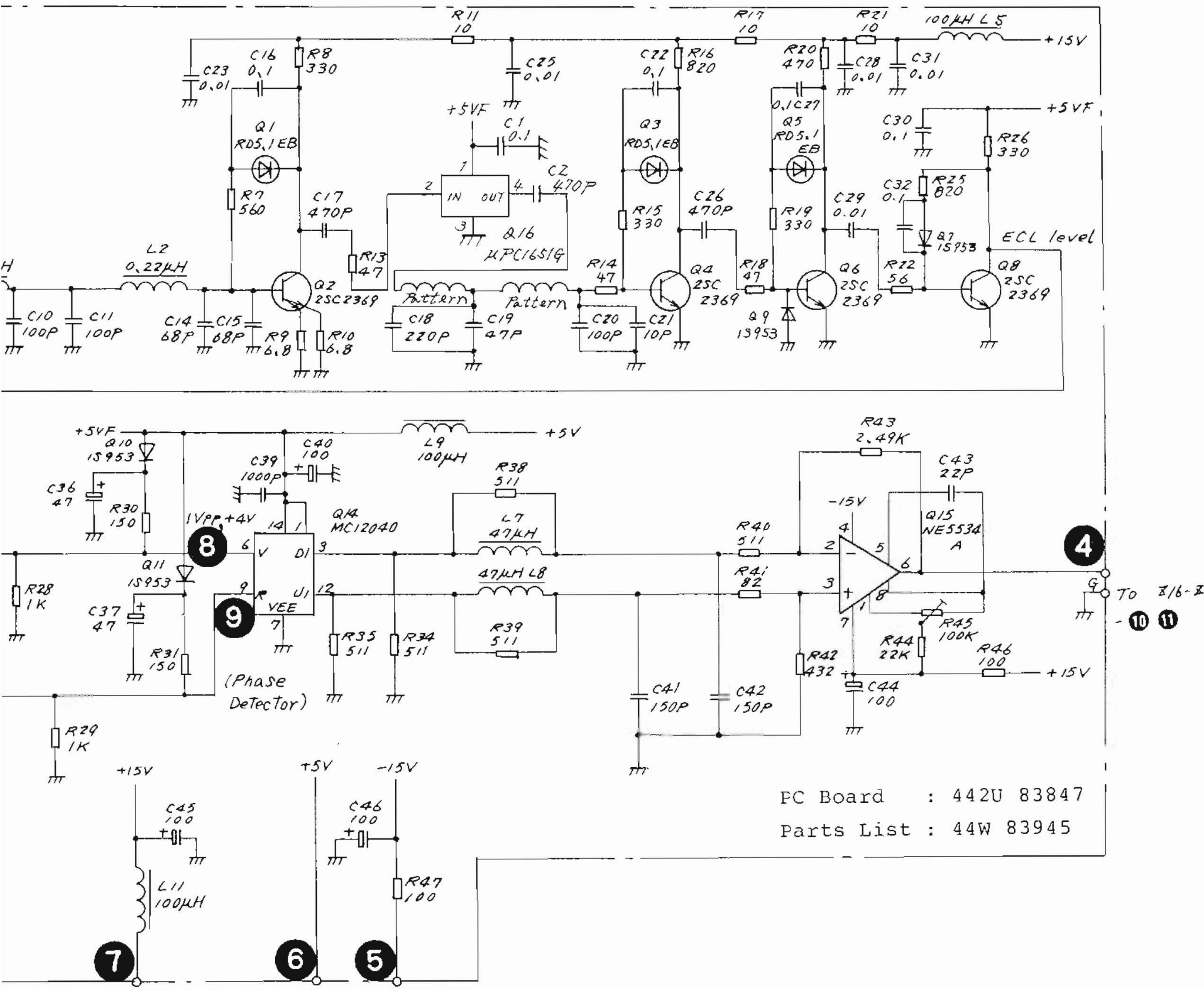


Fig. 5-43 Z16-Z8 5 x 100 MHz Circuit Diagram and Component Layout (43W 33948)


4
5
3
7
6
9
8
Z9/Z16
C46
C37
R29
Q11
R25
C33
C35
R47
R42
R41
R39
C39
R31
R35
C32
R22
R20
Q7
C29
C43
C41
L8
R38
R27
R26
Q8
Q5
C28
C27
R19
Q6
Q15
R40
R43
R45
C42
L7
R34
Q10
C36
C40
R28
R30
Q14
C30
R21
R17
R18
L9
C31
R16
C25
C44
R44
R46
L11
C45
C23
L6
C22
R11
R15
Q3
C26
Q4
Q1
R7
R9
R8
C16
C1
R14
C20
C21
C5
L1
L2
C15
Q16
C18
C19
C7
C10
C11
C14
Q2
R13
C2
R10
C17
442U83847(B)
1


From Z16-Z1 - 5
1
C5 1000P
L1 0.22μH
L2 0.22μH
C7 68P
C10 100P
C11 100P
C14 68P
C15 68P
C23 0.01
C16 0.1
Q1 RD5.1E
R7 560
+5VF
Q10 1S953
C36 47
R30 150
C39 1000P
C33 470P
R27 220
R28 1K
1VPP +4V
8
Q11 1S953
C37 47
R31 150
9
VE
(Phase Detector
3
From Z21(J1)
C35 1000P
R29 1K
+15V
C45 100
L11 100μH
7



PC Board : 442U 83847

Parts List : 44W 83945

Fig. 5-44 Z16-Z9 YTO PD Circuit Diagram and Parts Layout (43W 33949)

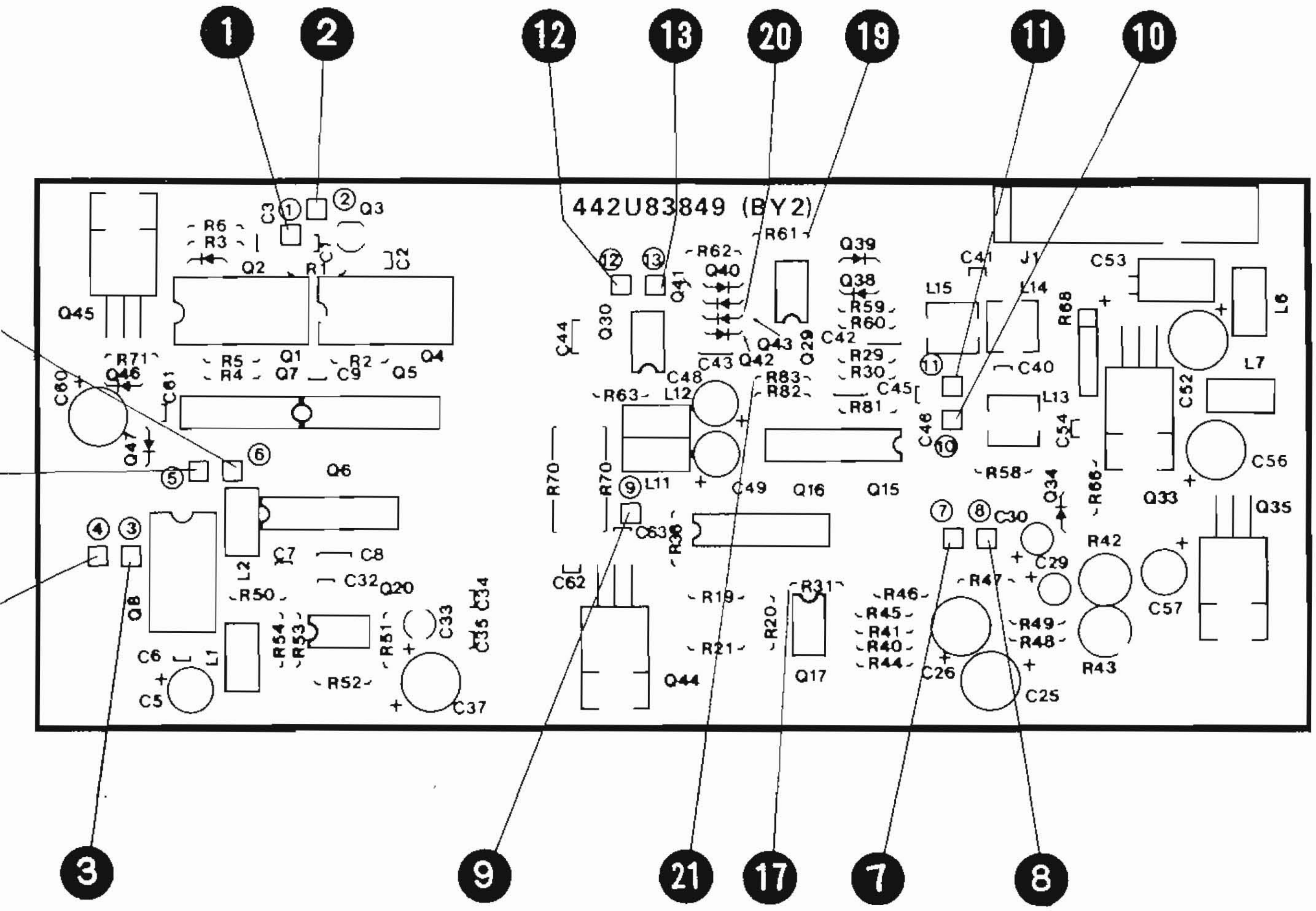


Fig. 5-45 Z16-Z10
Parts Layout

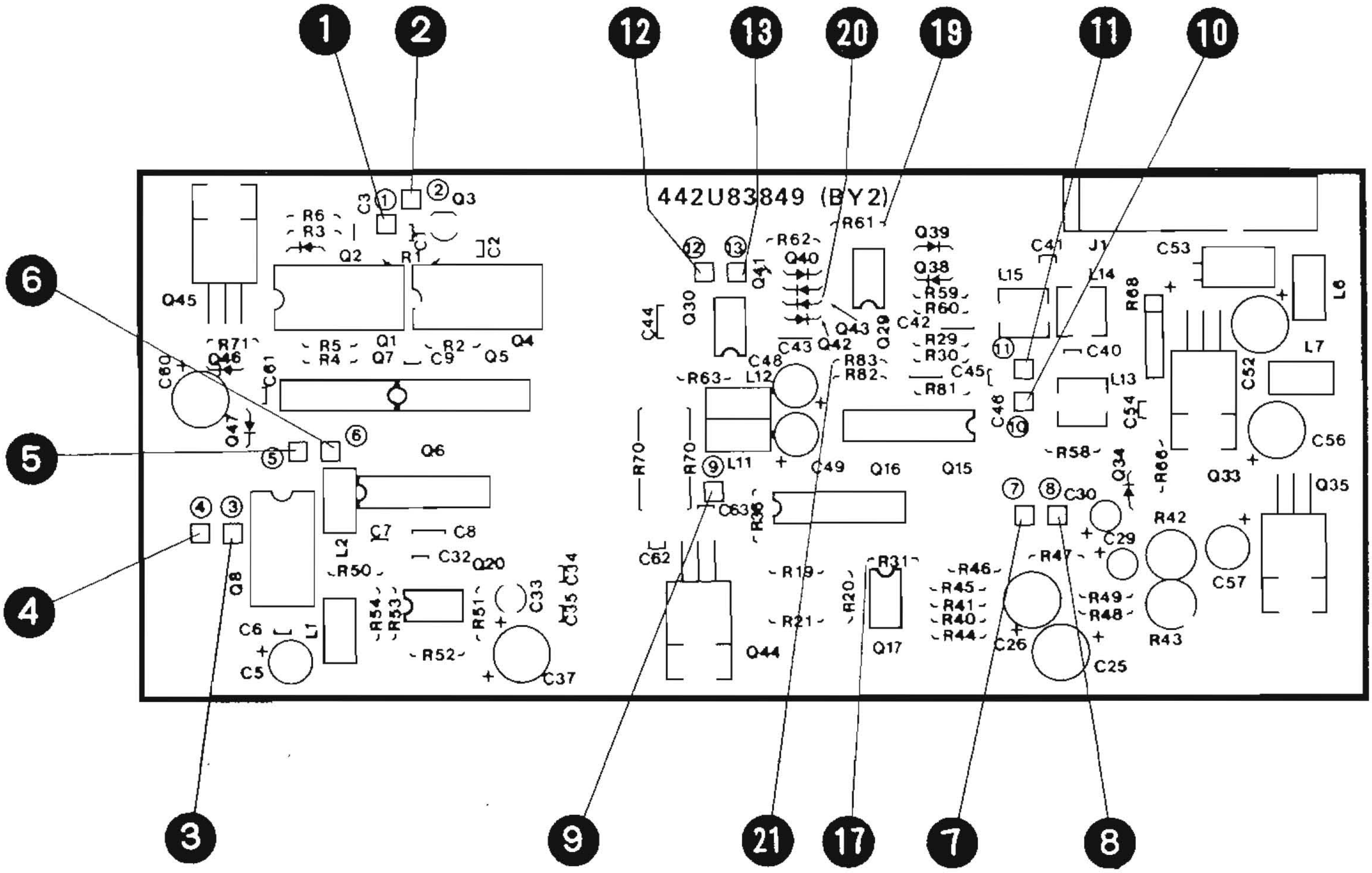
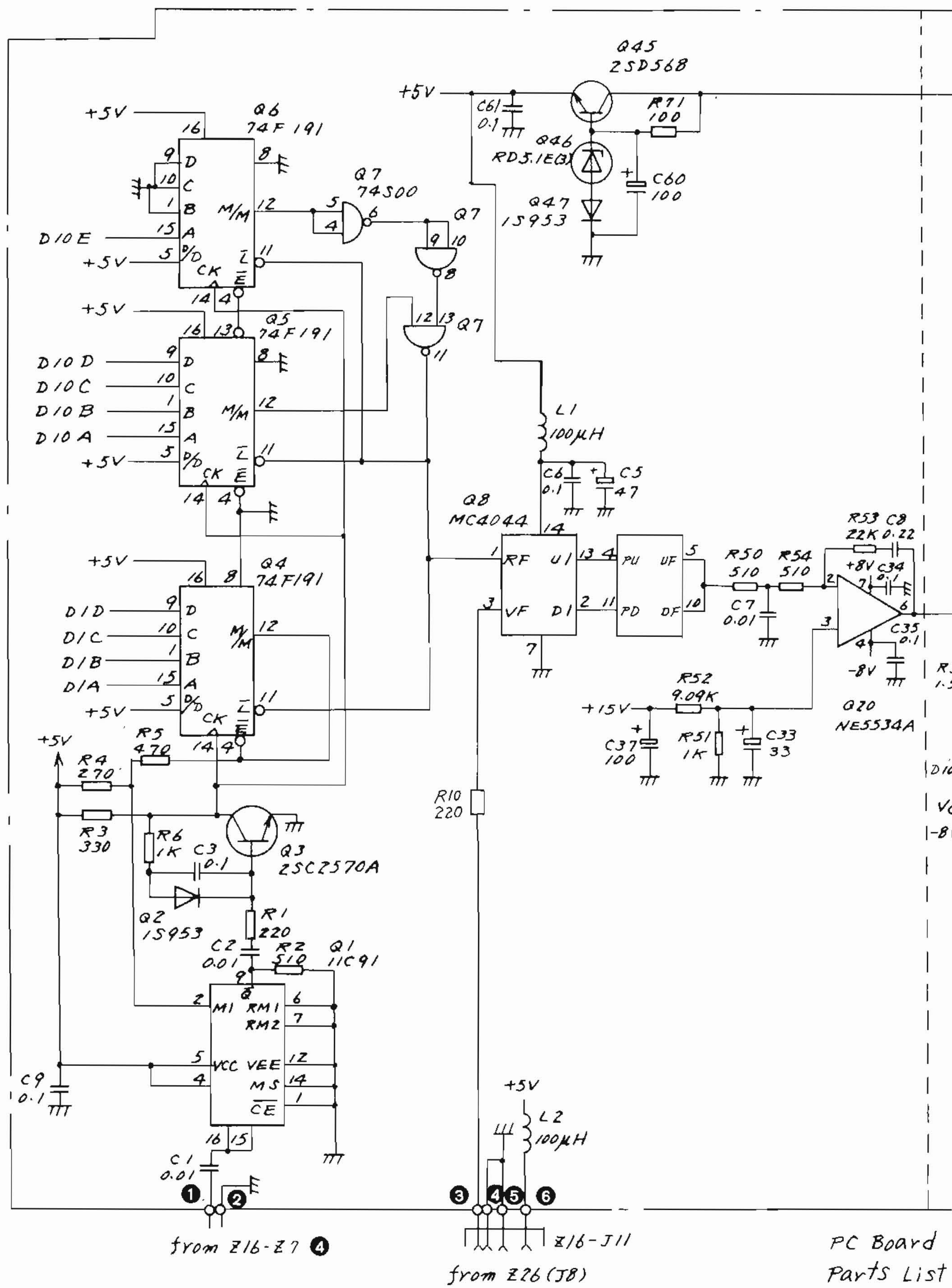


Fig. 5-45 Z16-Z10
Parts Layout


Q45
2SD568
+5V
C61
0.1
R71
100
Q46
RD5.1E(B)
C60
100
Q47
1S953
Q6
74F191
Q7
74S00
D10E
Q5
74F191
D10D
D10C
D10B
D10A
L1
100μH
C6
0.1
C5
47
Q8
MC4044
RF
U1
VF
D1
PU
UF
PD
DF
R53
22K
C8
0.22
R50
510
R54
510
+8V
C34
0.1
C7
0.01
C35
0.1
-8V
Q4
74F191
D1D
D1C
D1B
D1A
R52
9.09K
+15V
C37
100
R51
1K
C33
33
Q20
NE5534A
R5
470
R4
270
R3
330
R6
1K
C3
0.1
Q3
2SC2570A
R10
220
Q2
1S953
R1
220
C2
0.01
R2
510
Q1
11C91
M1
RM1
RM2
VCC
VEE
MS
CE
C9
0.1
C1
0.01
L2
100μH
from Z16-Z7
Z16-J11
from Z26(J8)
PC Board
Parts List

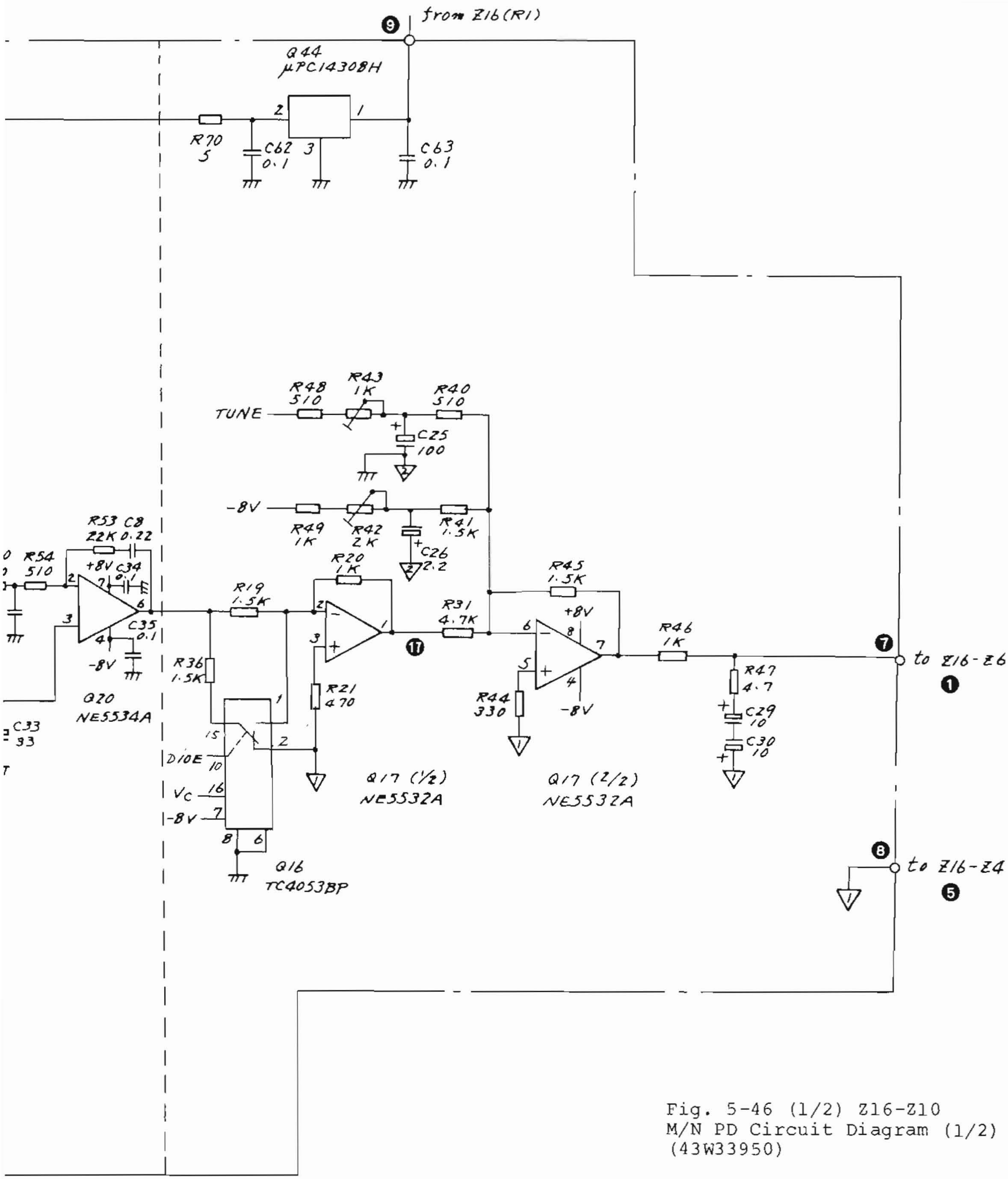
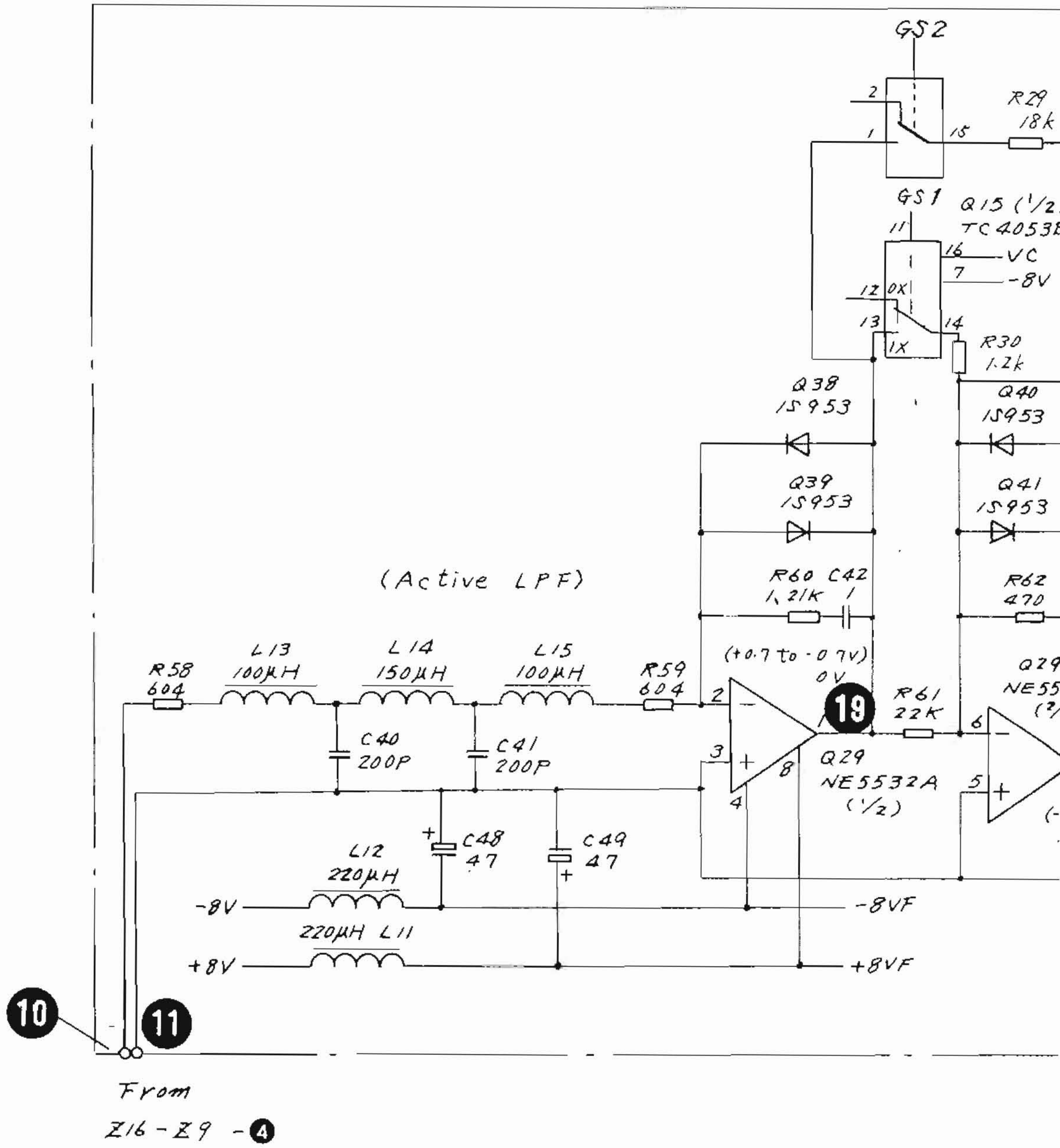


Fig. 5-46 (1/2) Z16-Z10
M/N PD Circuit Diagram (1/2)
(43W33950)

PC Board : 442U83849

Parts List : 44W83946



GS2
R29
18k
GS1
Q15 (1/2)
TC4053B
VC
-8V
R30
1.2k
Q38
1S953
Q40
1S953
Q39
1S953
Q41
1S953
(Active LPF)
R60 C42
1.21K 1
R62
470
L13
100μH
L14
150μH
L15
100μH
R58
604
R59
604
(+0.7 to -0.7V)
0V
19
R61
22K
Q29
NE5532A
(1/2)
C40
200P
C41
200P
C48
47
C49
47
L12
220μH
220μH L11
-8V
+8V
-8VF
+8VF
10
11
From
Z16-Z9-4

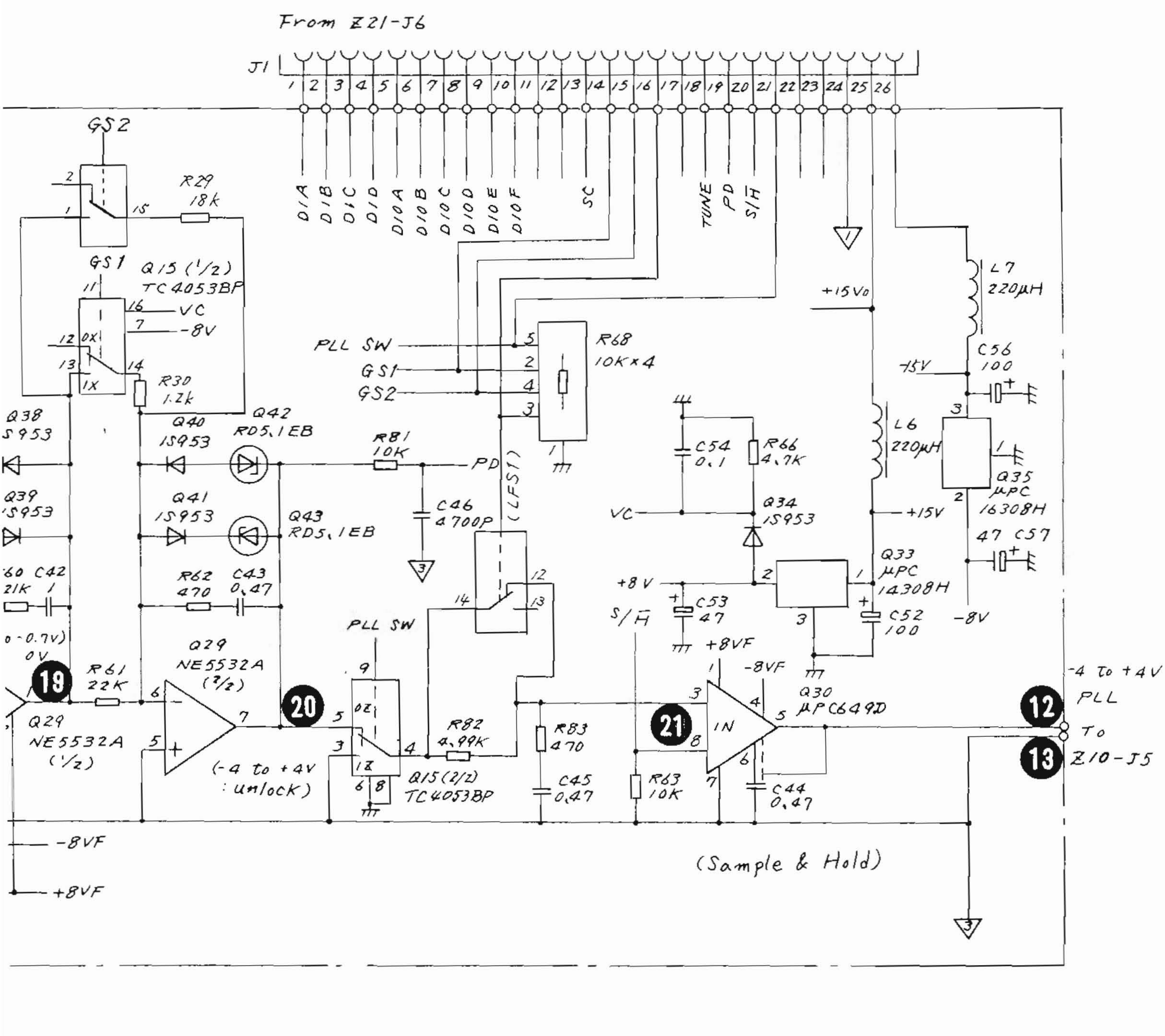
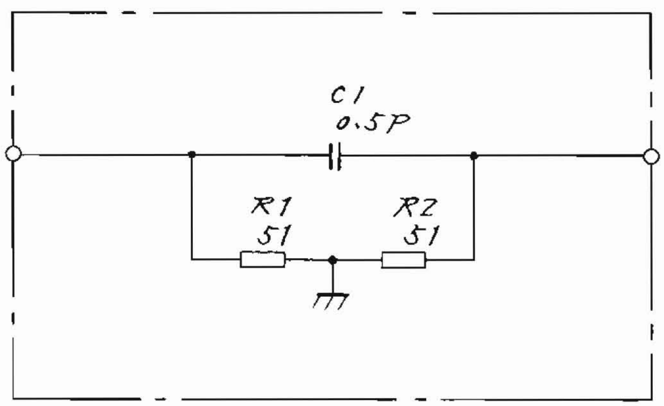


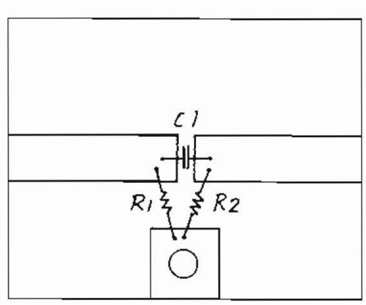
Fig. 5-46 (2/2)

Z16-Z10 M/N PD Circuit
Diagram (2/2) (43W 33950)



PC Board : 442U83849

Parts List :	44W85782



Z16-Z15 HPF Circuit Diagram and Parts Layout
(44W85781)

5.8 Z18 μ 2nd CONVERTER 1 and Z19 μ 2nd CONVERTER 2

5.8.1 Circuit description - Z18 and Z19
(Refer to Fig. 3-3 (1/4), Fig. 5-49 and Fig. 5-50)

Z18 includes the amplifier Z18-Z2 (hybrid IC: gain 7 dB) which amplifies the 521.4 MHz first IF signal from the Z36 EXT IF AMP and two Helical resonator BPFs (Z18-Z1 and Z18-Z3) whose configuration is functionally arranged to incorporate the amplifier. The BPFs included in Z18 are used to remove image signals (478.6 MHz).

Z19 mixes the 521.4 MHz IF signal sent from Z18 and the 500 MHz second local signal sent from the Z16-Z8 5 x 100 MHz circuit, and converts the 521.4 MHz IF signal into a 21.4 MHz IF signal. The PIN diode attenuator and amplifier of Z19 are used to compensate the Z6-Z2 mixer conversion loss characteristics. Then, the 21.4 MHz IF signal is sent to the IF selection circuit. Selection of this IF signal (10 kHz to 30 MHz, 1.7 to 23 GHz and external mixer band) or the (100 kHz to 2 GHz band) IF signal sent from the Z14 0 to 2 GHz RF block is performed by the relay K1 of Z19. A selected IF signal is sent to the Z22 IF BPF/AMP 1 circuit through Z19-J4.

The power and control signals sent to Z18 and Z19 are supplied from the Z21 local control 1 PC board through Z24-J6.

Z18 and Z19 are packaged in a long, narrow aluminum case as shown in Fig. 5-47. This case is mounted on top of the Z16 PLL block case.

5.8.2 Checking Procedure - Z18 and Z19

Step	Procedure
1.	Remove the top cover. See Fig. 5-47.
2.	Set the center frequency to 4 GHz.
3.	Input a 521.4 MHz, -20 dBm signal to Z18-J1 from a signal generator.
4.	Observe the Z19-J4 output using a spectrum analyzer. It is normal if the signal is 21.4 MHz and -10 to -15 dBm.
5.	Change the center frequency to 23 GHz. Confirm that the Z19-J4 output rises approximately by 20 dB. When there is no change in the output, confirm that "GC1" and "GC2" control signals connected to pins 5 and 6 of the Z19-J6 have changed. If they have not changed, the Z21 local control 1 may be faulty.
6.	If there is no 21.4 MHz IF output at Z19-J4, check the output at Z16-J4 connected to Z19-J2. If the output at Z16-J4 is about 500 MHz, +13 dBm, it is normal.
7.	Press the 100 kHz to 2 GHz band switch.
8.	Input a 21.4 MHz, -10 dBm signal to Z19-J3 from a signal generator, and confirm that the same signal (21.4 MHz, -10 dBm) is output to Z19-J4.

(cont.)

Step	Procedure
9.	If it is determined from the above check that the Z18 and Z19 internal circuits are faulty, remove the case that holds them by unscrewing the front and rear screws securing the case to the Z16 PLL block.
10.	Check the signal levels at the checkpoints shown in Figs. 5-49 and 5-50.

5.8.3 Adjustment - Z18 and Z19

Adjust the 521.4 MHz BPF of Z18-Z1 and Z18-Z3 as follows.

Step	Procedure
1.	Input a 3 GHz (2 to 6 GHz is acceptable), 0 dBm signal to the MS710[ ] from a signal generator.
2.	Set the center frequency to the input signal frequency and the span to 10 MHz/div.
3.	Observe the 21.4 MHz IF output at the Z18-J4 using another spectrum analyzer, and adjust the Z18-Z1 and Z18-Z3 adjustment screws so that the waveform shown in Fig. 5-48 is obtained.

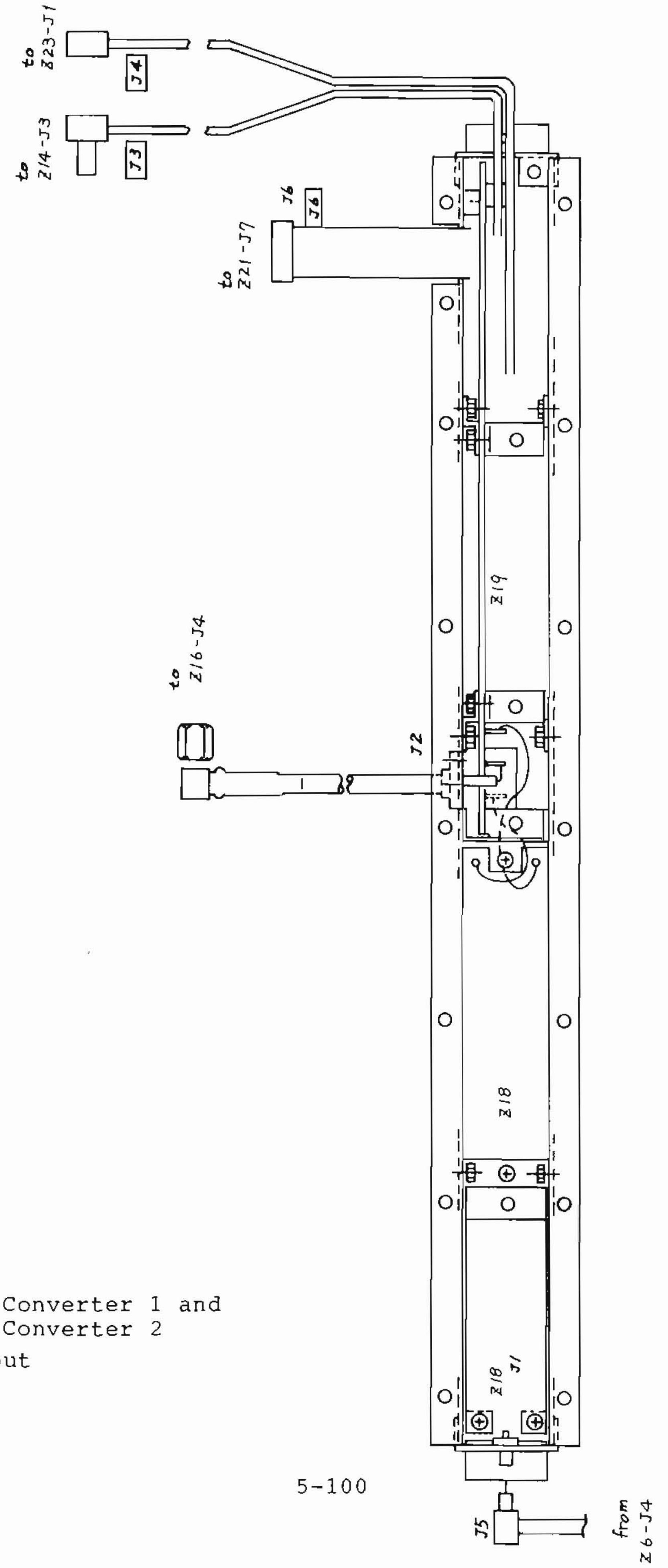
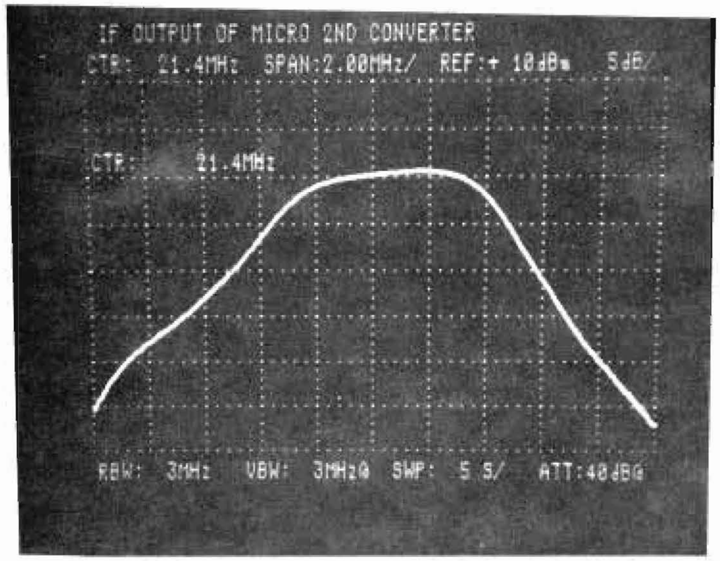


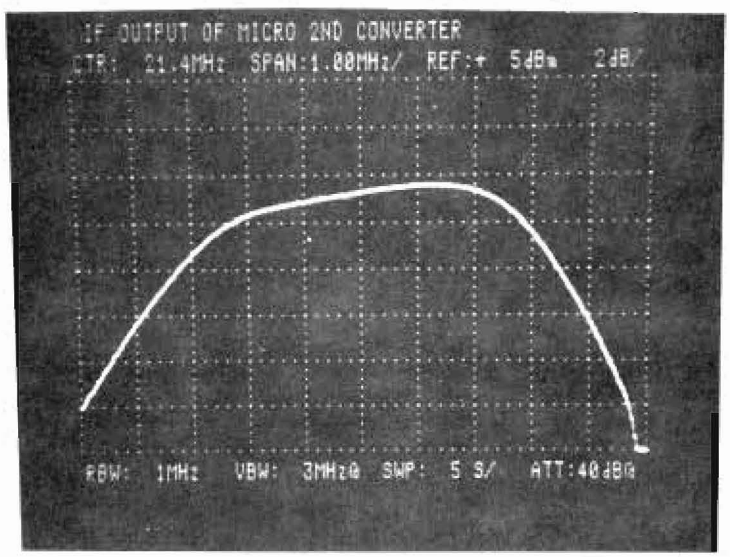
Fig. 5-47

Z18 μ 2nd Converter 1 and
Z19 μ 2nd Converter 2

Parts Layout

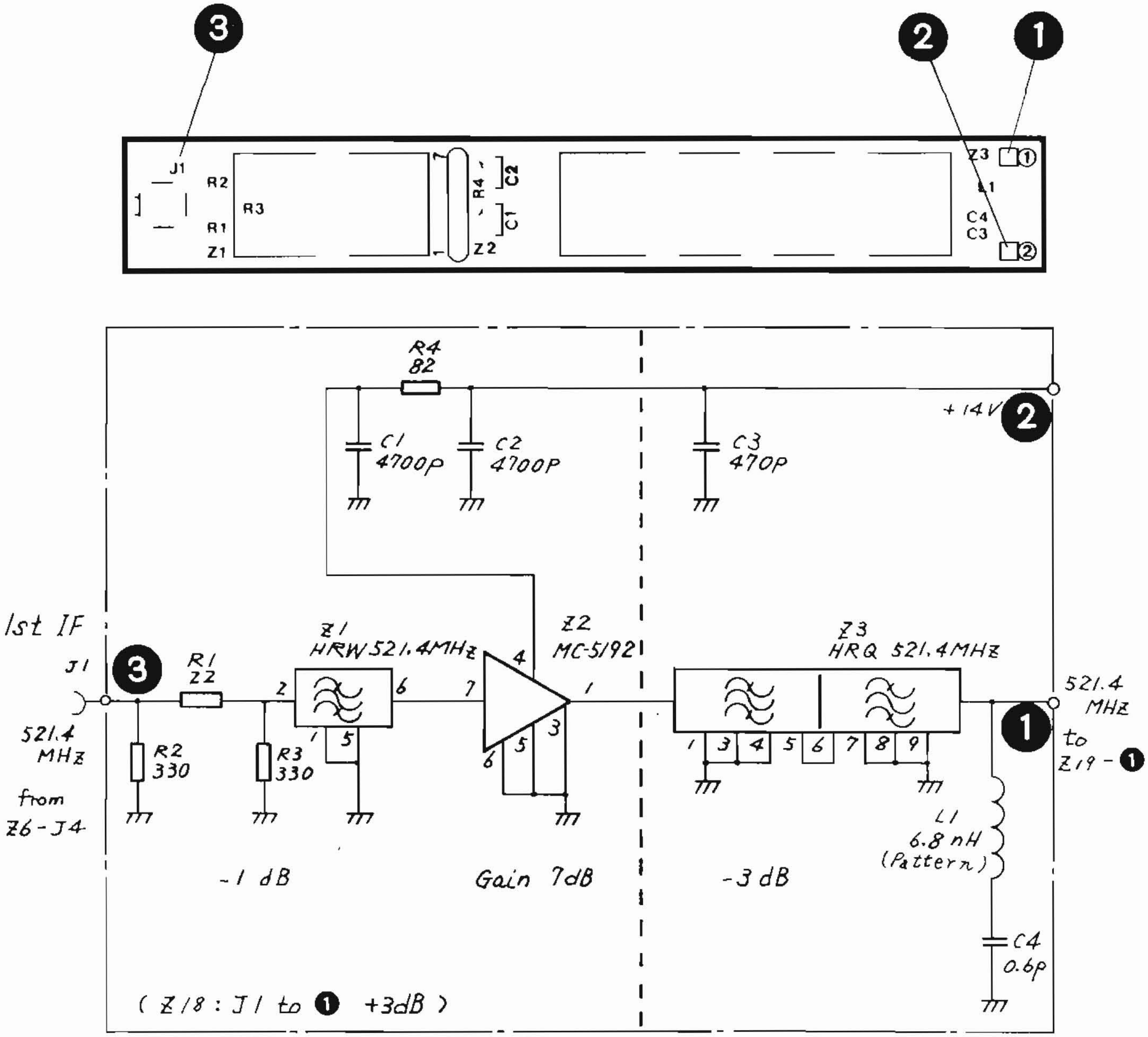


(1) SPAN 2 MHz/div,
5 dB/div



(2) SPAN 1 MHz/div,
2 dB/div

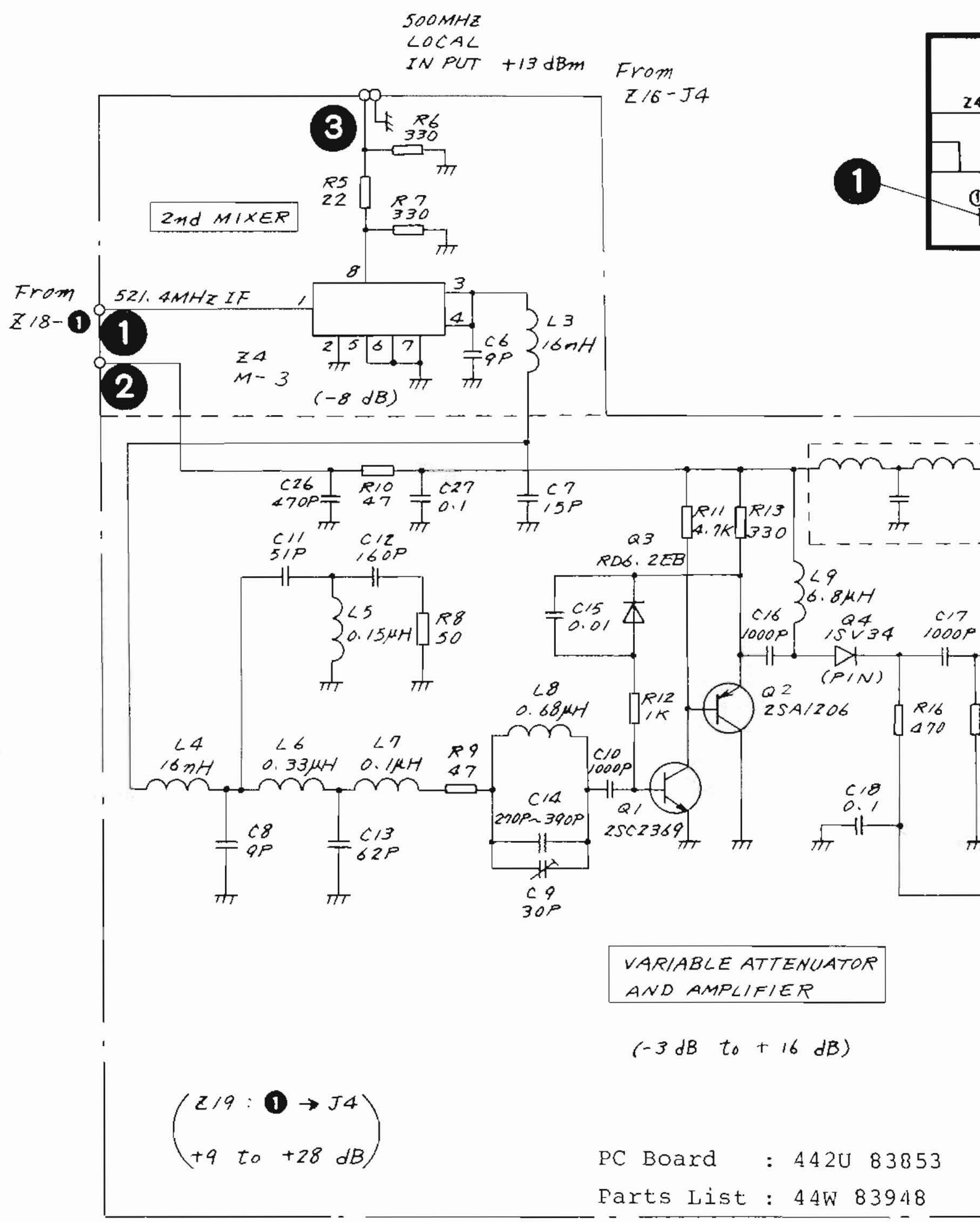
Fig. 5-48 Z18 BPF Adjustment



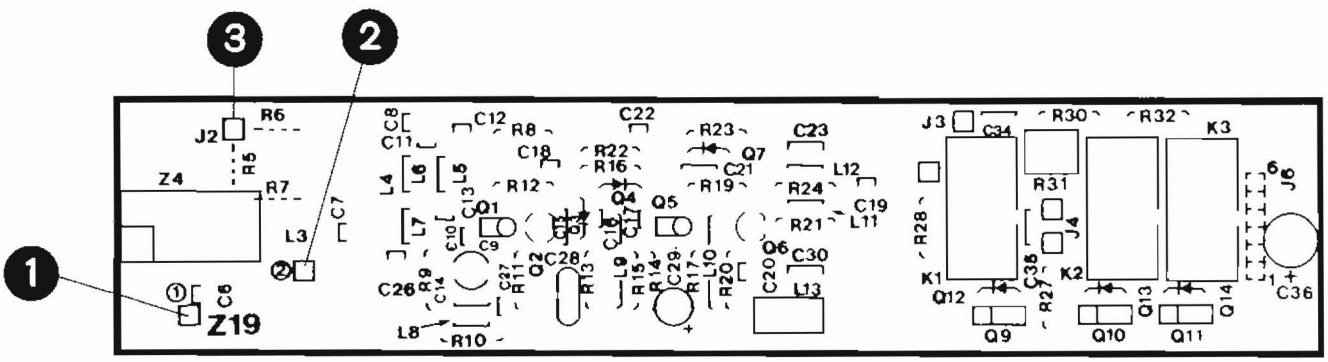
PC Board : 442U 83851

Parts List: 44W 83947

Fig. 5-49 Z18 μ 2nd CONVERTER 1 Circuit Diagram and Parts Layout (44W84119)



500MHZ
LOCAL
IN PUT +13 dBm
From
Z16-J4
2nd MIXER
From
Z18-1
521.4MHz IF
Z4
M-3
(-8 dB)
R6 330
R5 22
R7 330
C6 9P
L3 16nH
C26 470P
R10 47
C27 0.1
C7 15P
C11 51P
C12 160P
L5 0.15μH
R8 50
Q3 RD6.2EB
C15 0.01
R11 4.7K
R13 330
L9 6.8μH
C16 1000P
Q4 1SV34
(PIN)
C17 1000P
R12 1K
Q2 2SA1206
R16 470
L4 16nH
L6 0.33μH
L7 0.1μH
R9 47
L8 0.68μH
C10 1000P
C14 270P~390P
Q1 2SC2369
C8 9P
C13 62P
C9 30P
C18 0.1
VARIABLE ATTENUATOR
AND AMPLIFIER
(-3 dB to +16 dB)
(Z19 : 1 → J4
+9 to +28 dB)
PC Board : 442U 83853
Parts List : 44W 83948



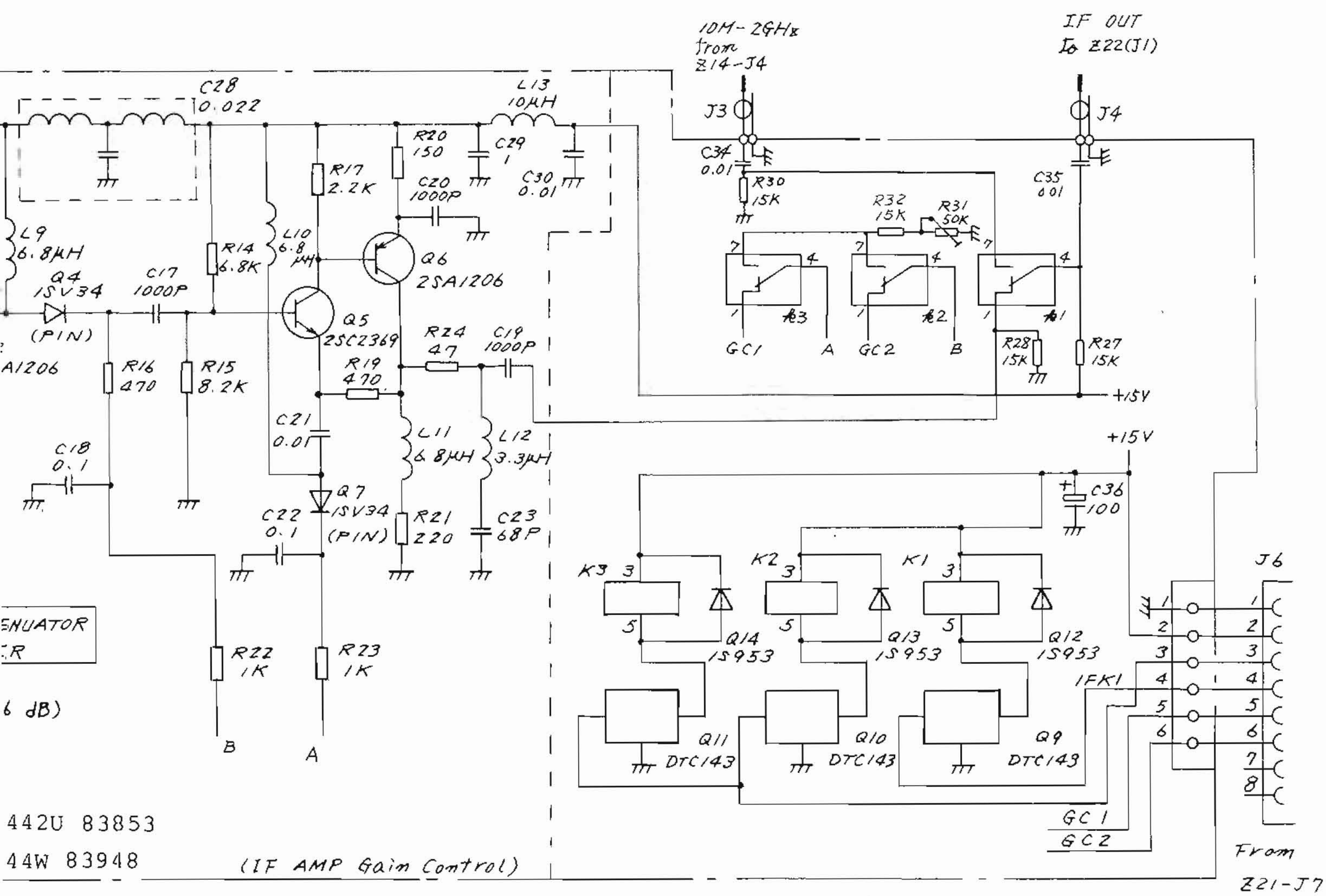


Fig. 5-50

Z19 μ 2nd CONVERTER 2
Circuit Diagram and Parts Layout
(43W 33951)

5.9 Z21 LOCAL CONTROL 1

5.9.1 Circuit description - Z21

(Refer to Fig. 3-3 (4/4) and Fig. 5-55)

With the MS710[ ], except the 10 kHz to 30 MHz band of the MS710C, the center frequency setting and span setting data are all supplied to the Z9 1st LOCAL OSC (YTO). All the oscillators in the 2nd LOCAL OSC (Z14-Z8 and Z14-Z6) are fixed frequency oscillators.

The main role of Z21 local control 1 is generation of the signals which control the Z9 1st LOCAL OSC (YTO) output frequency and sweep frequency. Moreover, the Z5 YTF tune signal and 1.7 to 23 GHz band flatness compensation signal are generated from this YTO control signal in Z21. The 1.7 to 23 GHz band mixer bias signal is also generated in this Z21.

In the 10 kHz to 30 MHz band, the VCO in the Z28 low local 1 is used as the 1st local oscillator instead of the Z9 YTO.

The signals generated in the Z21 local control 1 are used to control the 1st local VCO in Z28 after they are modified in the Z24 local control 2.

As the function of the Z21 local control 1 can be adequately demonstrated with 100 kHz to 2 GHz band and 1.7 to 23 GHz band operation, the Z21 circuit is described only on these 2 frequency bands.

(1) Tuning voltage generation (Main Tune, M/N VCO Tune, and Fine Tune)

There are three VCO (Z9 YTO, Z16-Z6 M/N VCO, and REF VCO in Z21) in the MS710[ ] 1st LOCAL OSC (YTO) control system. Z21 local control 1 uses a D/A converter to generate each tuning voltage from the digital signals which come from the Z26 CPU board for these VCOs.

Basically, the MT (Main Tune) signal is generated from the Z21-Q33 D/A converter and supplied to the Z9 YTO; the Z16-Z6 M/N VCO tuning voltage (VCO tune) is generated by the Q71 D/A converter in Z21 and supplied to the Z16 PLL BLOCK. The FT (Fine Tune) signal is generated by the two D/A converters Q41 and Q43 and supplied to the Q1 and Q2 REF VCO to generate the 17.4 MHz reference signal on this Z21 PC board.

(2) Sweep signal control (VCO Sweep, FM Sweep, and Main Sweep)

The sweep reference signal (constant amplitude ramp) supplied from the Z26 CPU board is passed through the multiplying D/A converter Z21-Q47, 1/2 and 1/20 switching circuit Z21-Q50, and a 1/N amplitude divide circuit Z21-Q53. It is finally converted to a RAMP signal of the necessary amplitude. Thereafter, when the sweep width is a narrow bandwidth sweep of 1 MHz (100 kHz/div) or less, this ramp signal is supplied to the Q1 and Q2 REF VCO on this PC board.

However, when the sweep width is 1.01 MHz to 20 MHz (101 kHz/div to 2 MHz/div), the signal is supplied to the YTO FM coil drive circuit (Z10), and when the sweep width is 21 MHz to 2 GHz (2.1 MHz/div to 200 MHz/div), it is supplied to the YTO main coil driver circuit (Z10).

(3) REF VCO circuit

The 100 kHz and the lower values of the frequency of the 1st LOCAL (Z9, YTO) are controlled by the frequency of the REF VCO of Z21, which is the reference frequency of the main PLL of Z16.

The signal from the REF VCO (which consists of oscillation elements of Q1 and Q2, and the tank circuit of L1, Q3, Q4, and C9) is divided by 8 using Q9, Q12 and becomes fREF (17.4 +1.5/-0.5 MHz). This fREF signal is supplied to Z16-Z9 YTO PD in the Z16 PLL BLOCK through the Z21-Q13 buffer amp and Z21-J1.

On the other hand, this fREF signal is further divided by 64 by Q12 and Q16, and supplied to the PCD (Pulse Count Discriminator) consisting of monostable multivibrator Q17, current switch Q18 and Q19, integrator C38 and C39, and differential amp Q21. A DC voltage proportional to the REF VCO frequency is generated here.

⑱ voltage is equal to the reference voltage supplied to pin ⑰ when a negative feedback loop is formed so that the REF VCO frequency is compensated by ⑯ voltage.

When the ⑳ voltage is 0 V and fRF is 17.4 MHz, the PCD output ⑱ becomes approximately +1.5 V. The reference voltage is set to this value. Since the negative feedback loop acts so that the PCD output voltage remains constant, fRF is controlled by the ⑳ voltage.

On the other hand, the voltage of ⑳ is applied to the VCO through R230 and R228 to lighten the load of Q22. Further, it is used to compensate the insufficient loop response through R78, R79, C60, and R9.

(4) YTF tuning circuit (YTFT)

Q89 and Q59 are the circuit which generates the signal (YTFT) which becomes the base of the YTF tuning voltage.

This signal is applied to the Z10 YTO/YTF DRIVER through J3-9. The YTF tuning current is made proportional to fRF (center frequency). The relationship among fRF, fLO (1st LO. frequency), and fIF (1st IF frequency) is given by the following equation:

$$fRF = N \times fLO \pm fIF$$

Since the voltage of LCLV is set proportionally to fLO, the output of the N multiple circuit (Q89-13) corresponds to N X fLO. By switching the fixed component corresponding to 2fIF by Q50, the YTFT voltage becomes N x fLO +0/-2 fIF. After this, the fixed voltage corresponding to fIF is added in the Z10 YTO/YTF DRIVER and this YTFT voltage is converted to be directly proportional to fRF = N X fLO ±fIF

(5) 1.7 to 23 GHz gain compensation circuit

The 1.7 to 23 GHz band 1st MIXER Z6 is a harmonic mixer. The harmonic mixer conversion loss increases as the harmonic number increases. Thereupon, the increase component of this conversion loss must be compensated by switching the IF stage gain.

Actually, the IF AMP gain is switched by the two PIN diodes Q4 and Q7 on Z19 μ 2nd CONVERTER 2. The constant current power supply that drives this is the two voltage-current conversion circuits consisting of Q65, Q66, and Q93. The voltage which is supplied to this voltage-current conversion circuit is switched according to the harmonic number. This role is played by the circuit consisting of Q64, Q57.

Furthermore, since the level of the radio-frequency (RF) signals generally decreases as the frequency rises because of the transmission line loss, this slope is compensated for by using the YTFT signal, which is a voltage almost directly proportional to the input frequency (RF). R175 and R174 are the reverse slope compensation circuit.

(6) 1.7 to 23 GHz mixer bias circuit

The optimum bias of the Z6 harmonic mixer differs according to harmonic number. The circuit which switches this bias according to the harmonic number is Q75 and Q76.

(7) Others

J9-1 to J9-8 pass through the DATA (DB0 to DB7) from the Z26 CPU board. This data is stored in a latch circuit and the latch output is supplied to the D/A converters and other circuits. LATCH is selected by the 1-of-8 decoder of Q79 and Q88.

5.9.2 Checking procedure - Z21

(1) Tuning Voltage Check (MT, FT, M/N VCO Tune, and YTOC)

Step	Procedure
1.	Press the 100 kHz to 2 GHz band selection switch. Then set the CENTER FREQ to 100 MHz and the span to 0 Hz. The f_{LO}(f_{YTO}, Z9 1st Local Output frequency) will be 2621.4 MHz.

(cont.)

Step	Procedure
2.	Confirm that the ❶ MT (Main Tune) voltage (V_{MT}, Q32-13) is 1.243 V. The following relationship exists between V_{MT} and f_{LO} which gives a sensitivity of 2 mV/MHz. $$V_{MT} = (f_{LO} \text{ (GHz)} - 2) \times 2 \quad \text{(V)}$$
3.	Confirm that the ❷ FT (Fine Tune) voltage (V_{FT}, Q42-1) value is 0 V. The f_{FT} is expressed by the following equations. $$f_{FT} = f_{LO} - (125 \times N + 2 \times M + 17.4) \text{ (MHz)}$$ At above settings N and M becomes 20 and 52 respectively (see Table 4-1), so f_{FT} becomes 0. And the following relationship exists between V_{FT} and f_{FT}, which gives a sensitivity of 2 mV/kHz. $$V_{FT} = f_{FT} \text{ (MHz)} \times 2 \text{ (V)}$$
4.	Confirm that the ❸ M/N VCO TUNE voltage (V_{VCOT}, Q72-1) is 2.5 V. The following relationship exists between V_{VCOT} and $f_{M/NVCO}$, which gives a sensitivity of 0.1 V/MHz. $$v_{VCOT} = (f_{M/NVCO} - 1017)/10$$ In the current panel setting, $f_{M/NVCO}$ must be 1041.6 MHz.
5.	Check the ❹ YTOC voltage (Q40-1). This voltage is a compensating voltage for MT voltage and is normally within the range of -2.0 V to +2.0 V. The sensitivity is 0.1 V/MHz.

(2) Sweep Voltage Check
(Main Sweep, FM Sweep, and VCO Sweep)

Step	Procedure
1.	Set CENTER FREQ to 100 MHz and the span to 200 MHz/div
2.	Confirm that the ❺ voltage (Q49-1) is as shown in Fig. 5-46 (1).
3.	Confirm that the three waveforms of ❻/Z21 Main Sweep signal at 200 MHz/div, ❼/Z21 FM Sweep signal at 2 MHz/div, and ❽/Z21 VCO Sweep signal at 100 kHz/div are the same as shown in Fig. 5-52 (2). These three settings are the maximum settings for each sweep mode (MAIN Sweep, FM Sweep, and VCO Sweep). For example, if the span is 1 MHz/div, an FM Sweep signal ❼ whose amplitude is cut in half of Fig. 5-52 (2) appears and the Main Sweep and VCO Sweep signals are zero.

(3) REF VCO Check

Step	Procedure
1.	Press the 100 kHz to 2 GHz band selection switch. After resetting, set the CENTER FREQ to 100 MHz and the span to 100 kHz/div.
2.	Confirm that the ⑳ voltage waveform (Q22-1) is as shown in Fig. 5-53 (1).

(cont.)

Step	Procedure
3.	Confirm that the ⓲ voltage (Q22-6) coincides with the ⓱ voltage (Q22-5). About +1.5 VDC is the normal value.
4.	Confirm that the ⓰ voltage waveform (Q22-7) is as shown in Fig. 5-53 (1).
5.	Set the span to 0 MHz (other settings remain the same).
6.	If the frequency of the ⓭ signal (Q9-6) is 139.2 MHz and its amplitude is approx. 800 mVp-p, it is normal.
7.	If the frequency of the ⓮ signal (J1) is 17.4 MHz and its amplitude is a square wave of about 800 mVp-p, it is normal.
8.	If the ⓯ (Q17-6) and ⓳ (Q21-7) voltage waveforms are as shown in Fig. 5-53 (2), it is normal.

(4) Checking the YTF Tuning Voltage (YTFT) and 1.7 to 23 GHz Band Flatness Calibration Circuit

Press the 1.7 to 23 GHz band selection switch and reset the MS710[ ]. If the ❾ (Q89-6), ❿ (Q89-13), and ⓫ (Q66) voltage waveforms are as shown in Fig. 5-54, it is normal. The waveform of ⓬ (Q93) is similar to ⓫. The relationship between ❾, ❿ voltages and the Z5 YTF tuning frequency (CENTER FREQ) are -1 V/GHz and 0.2667 V/GHz respectively.

(5) 1.7 to 23 GHz Band Mixer Bias Generation Circuit

Press the 1.7 to 23 GHz band selection switch and reset the MS710[ ]. The ㉑ voltage waveform will be as shown in Fig. 5-54.

5.9.3 Adjustment - Z21

(1) Tuning Voltage Adjustment

Adjust R85, R128 repeatedly to get ❾ (Q89-6) voltage as follows.

Adj. Position	CENTER FREQ	SPAN	❾ voltage (Q89-6)
R85 (Gain)	6.521 GHz	0	-5999.6 mV ±1 mV
R128 (Offset)	1.978 GHz	0	-2499.4 mV ±1 mV

(2) REF VCO Adjustment

Step	Procedure
1.	Ground the center of R71 and R72.
2.	Set CENTER FREQ 100 MHz, SPAN 0 MHz.
3.	Adjust the pitch of REF VCO coil L1 so that ⓰ (Q22-7) voltage becomes about -6.5 V (±1 V).
4.	Adjust the spaces between L1 and L2 coils so that the level at ⓭ (Q9-6) becomes 800 mVp-p.

17.4 MHz Frequency Adjustment:

Step	Procedure
5.	Adjust R91 so that Q42-1 voltage is at 0 V ±1 mV.
6.	Set SPAN 1 kHz/div.
7.	Apply 100 MHz signal to the MS710[ ] RF INPUT connector.
8.	Adjust R61 so that the waveform comes to the center of the CRT.

SPAN and FT Adjustment:

Step	Procedure
9.	Set SPAN 100 kHz/div.
10.	Apply the 99.5 MHz and 100.5 MHz signal to the MS710[ ] RF INPUT connector, and adjust R66 so that SPAN becomes exactly equal to 1 MHz.
11.	Set SPAN 1 kHz/div.
12.	Apply the 101 MHz signal to the MS710[ ] RF INPUT connector and adjust R66 so that the waveform comes to the center of the CRT.
13.	Disconnect the wiring between the center of R71 and R72 and ground.

(4) YTFT Adjustment

Step	Procedure
1.	Memorize the output voltage at ⑩ (Q89-13) when setting to CENTER FREQ 5.479 GHz, SPAN 0 Hz.
2.	Adjust R143 so that the ⑩ voltage (Q89-13) at the time of setting to CENTER FREQ 5.478 GHz is equal to the voltage memorized previously (±1 mV).
3.	Set CENTER FREQ 3 GHz, SPAN 200 MHz/div, and SCALE 2 dB/div.
4.	Input a 3 GHz signal. Adjust the PRESELECTOR PEAK knob (on front panel) to get a maximum peak display of 3 GHz spectrum.
5.	Input a swept signal of 2 GHz to 4 GHz. Adjust the R126 so that the frequency-level characteristics of the CRT display become optimum.

(5) 1.7 to 23 GHz Band Flatness Adjustment

Input a RF signal, and adjust each frequency band gain as follows. Adjust the offset and gradient repeatedly.

FREQ BAND		Adj. Position	
1st:	1.7 to 5.5 GHz	R165 (offset)	R147 (gradient)
2nd:	5.5 to 12.5 GHz	R166 (offset)	R149 (gradient)
3rd:	12.5 to 18.5 GHz	R167 (offset)	R151 (gradient)
4th:	18.5 to 23 GHz	R168 (offset)	R153 (gradient)

Moreover, R173 is for overall offset and R174 is for overall gradient.

(6) 1.7 to 23 GHz Band Mixer Bias Adjustment

(a) COARSE Adjustment:

Connect a digital voltmeter (DVM) to test point ㉑ (Q76-1) or ㉒ (Q76-6) and adjust R192, R193, R194, and R195 to get voltages as follow.

CENTER FREQ	3.5 GHz (1st)	9 GHz (2nd)	13 GHz (3rd)	21 GHz (4th)
Test Point	㉑	㉑	㉒	㉑
DVM	+9 V	+1 V	+0.5 V	+2 V
Adj. Position	R194	R192	R195	R193

(SPAN 2 MHz/div)

Note: 1st (1.7 to 5.5 GHz)
2nd (5.5 to 12.5 GHz)
3rd (12.5 to 18.5 GHz)
4th (18.5 to 23 GHz)

(b) FINE Adjustment:

Actually input the signals (3.5 GHz, 9 GHz, 13 GHz, and 21 GHz) and adjust the resistors (R194, R192, R195, and R193) so that the signal spectrum traces are maximized on the CRT at the same settings as COARSE Adjustment.

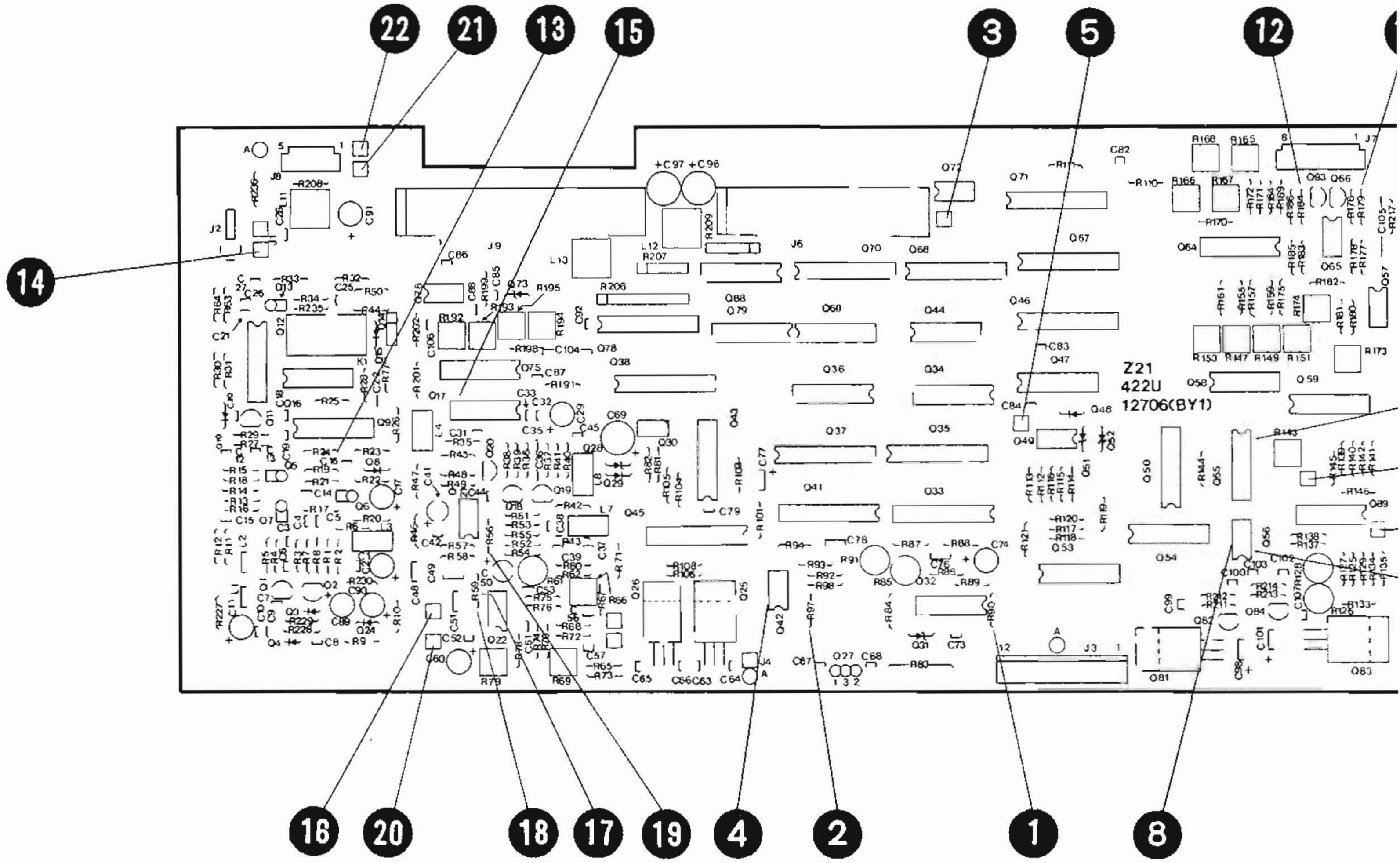


Fig. 5-51 Z21

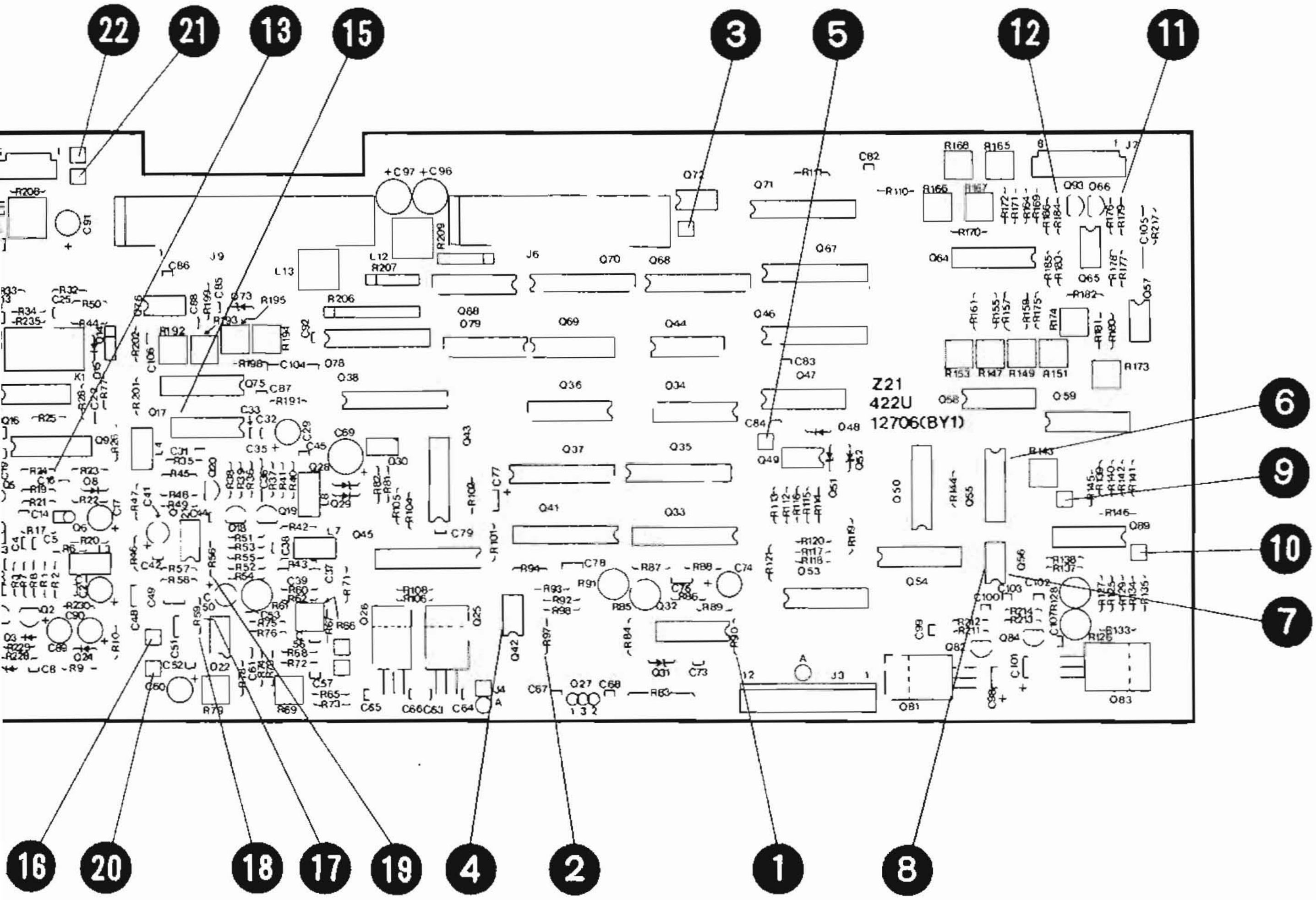
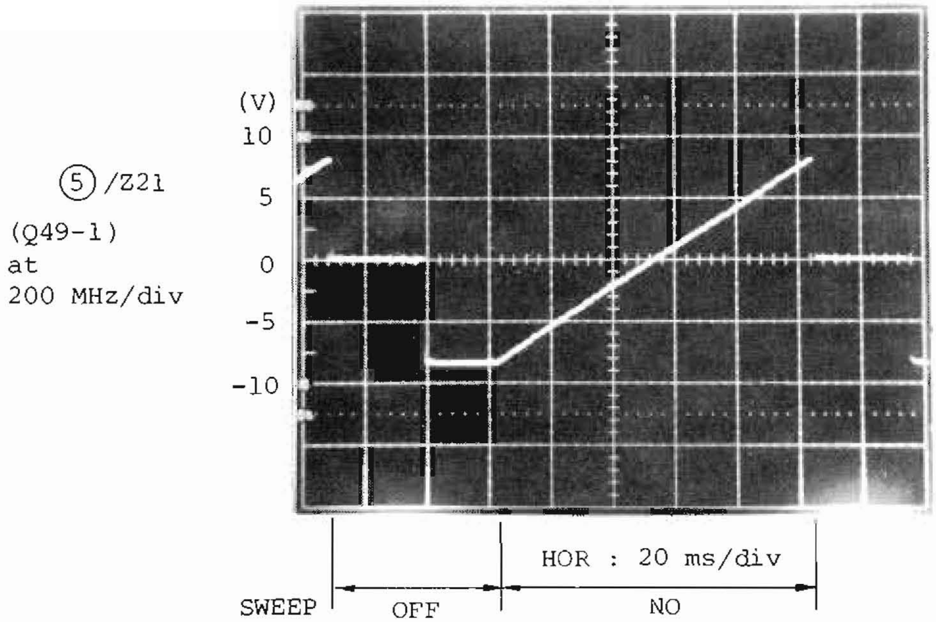
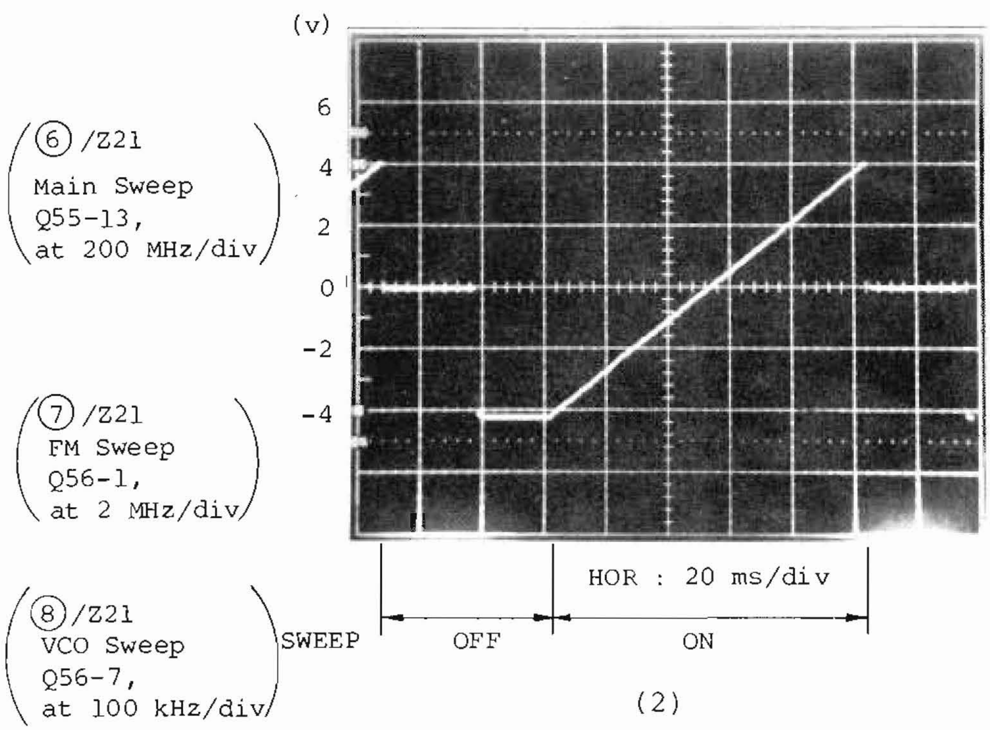


Fig. 5-51 Z21 Parts Layout

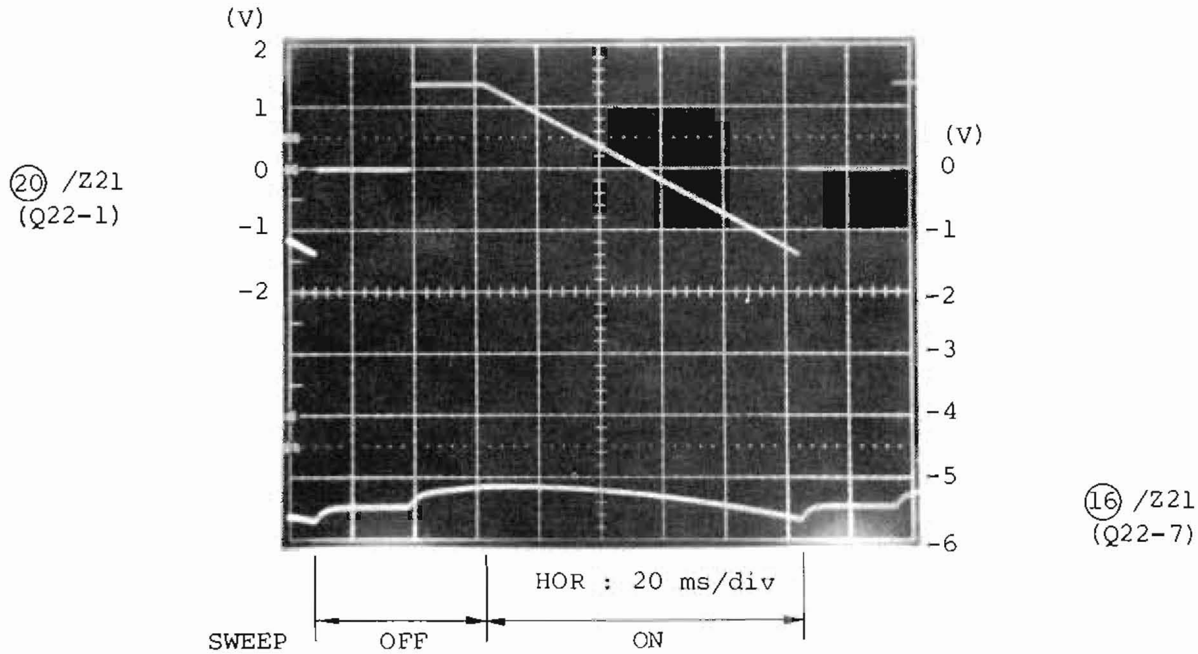


(1)

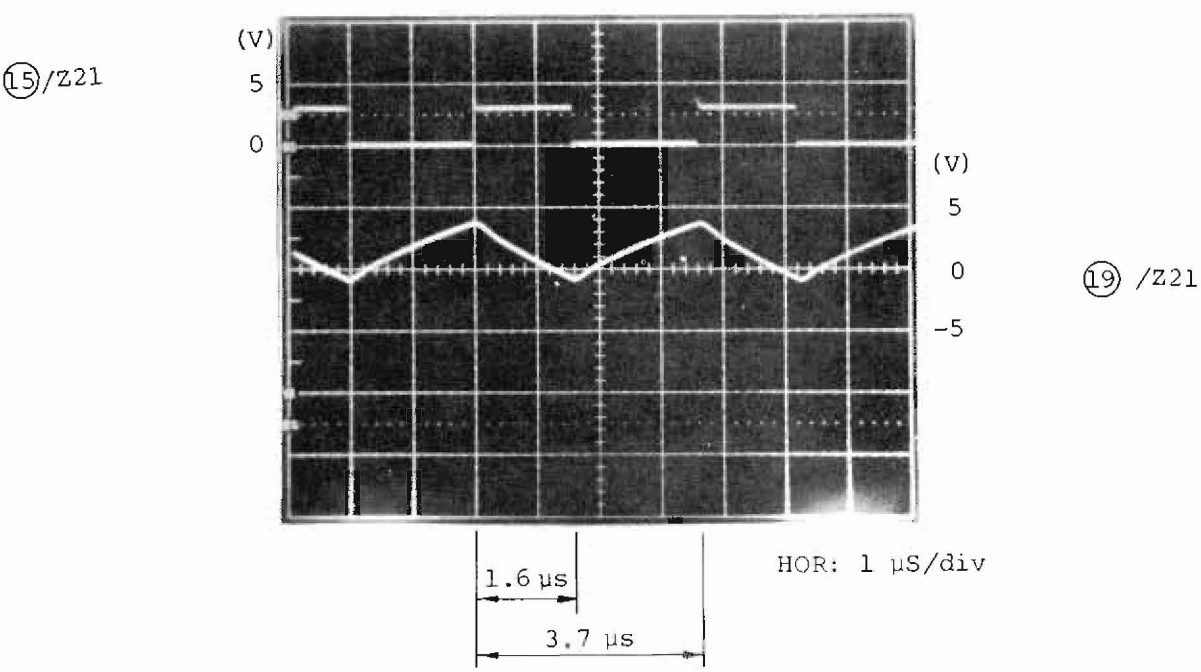


(2)

Fig. 5-52 Waveform of the Sweep Signals in Z21
at CENTER FREQ 100 MHz



(1) At CENTER FREQ 100 MHz, 100 kHz/div



(2) At CENTER FREQ 100 MHz, 0 MHz/div

Fig. 5-53 Waveforms of the Signals at the REF VCO Circuits in Z21

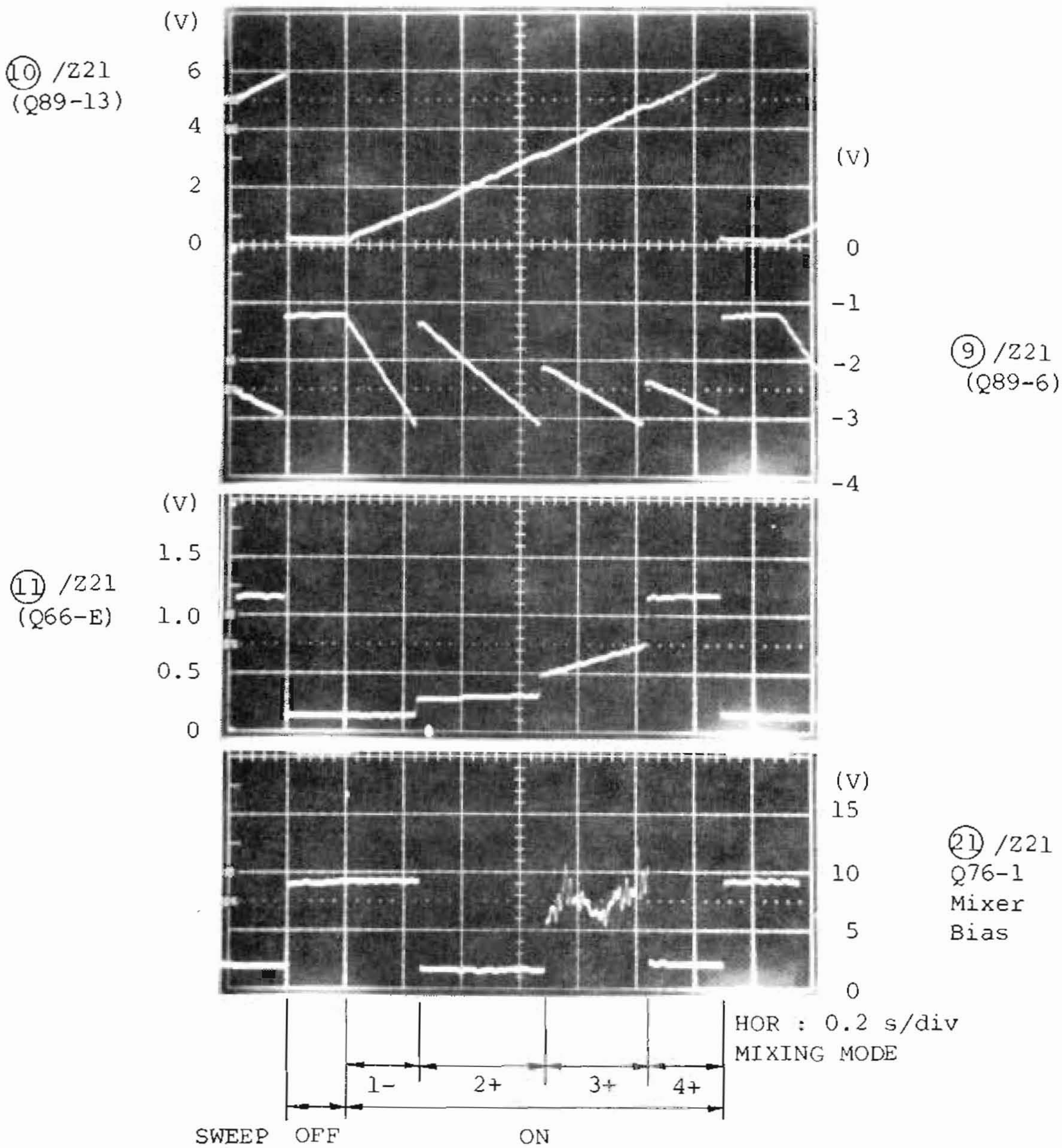
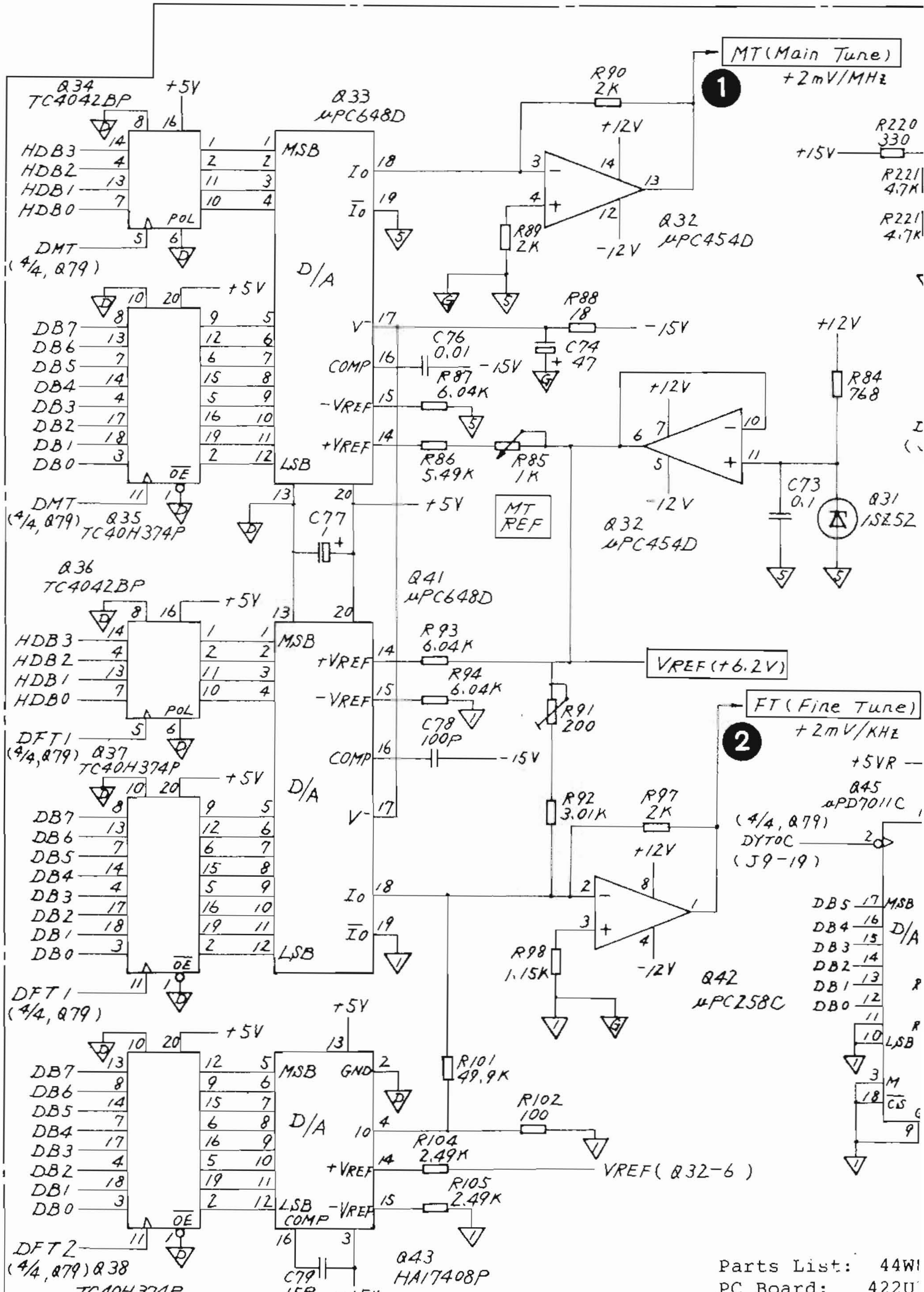


Fig. 5-54 Waveforms of the Signals in the 1.7 to 23 GHz Band


MT(Main Tune)
+2mV/MHz
1
R90
2K
+12V
-12V
Q32
μPC454D
Q34
TC4042BP
+5V
Q33
μPC648D
HDB3
HDB2
HDB1
HDB0
DMT
(4/4, Q79)
POL
MSB
LSB
D/A
Io
V-
COMP
-VREF
+VREF
R89
2K
R88
18
-15V
C76
0.01
C74
47
R87
6.04K
R86
5.49K
R85
1K
MT
REF
Q35
TC40H374P
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
OE
C77
1
R220
330
+15V
R221
4.7K
+12V
R84
768
C73
0.1
Q31
1SZ52
Q36
TC4042BP
Q41
μPC648D
R93
6.04K
R94
6.04K
VREF(+6.2V)
FT(Fine Tune)
+2mV/KHz
2
R91
200
C78
100P
DFT1
(4/4, Q79)
Q37
TC40H374P
+5VR
Q45
μPD7011C
(4/4, Q79)
DYTOC
(J9-19)
R92
3.01K
R97
2K
R98
1.15K
Q42
μPC258C
DFT2
(4/4, Q79) Q38
TC40H374P
GND
R101
49.9K
R102
100
R104
2.49K
VREF(Q32-6)
R105
2.49K
C79
15P
Q43
HA17408P
CS
Parts List: 44W
PC Board: 422U

P87.04
87.08.21 (6/6)
ERRATA (MS710C/D/E/F S)

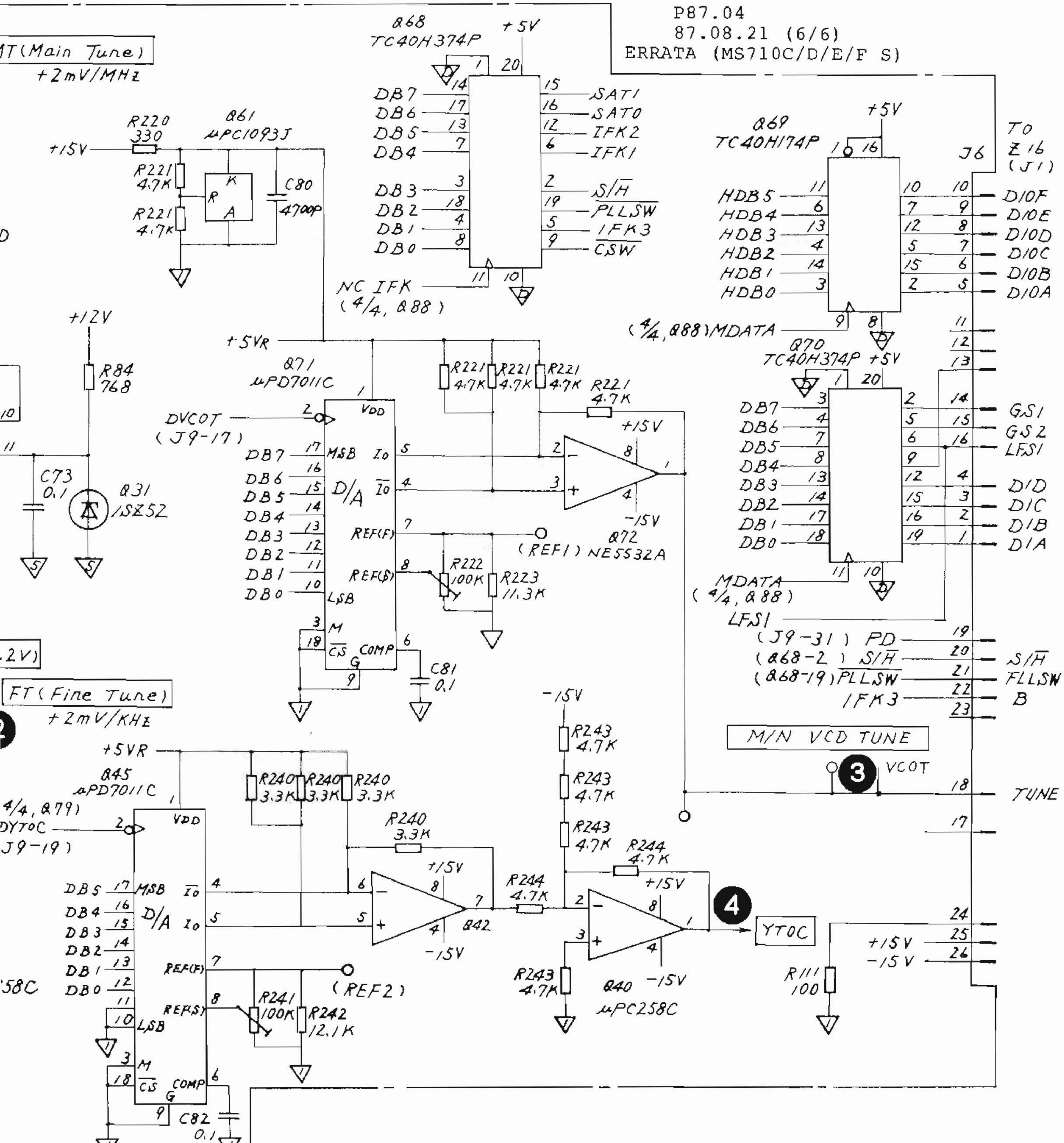
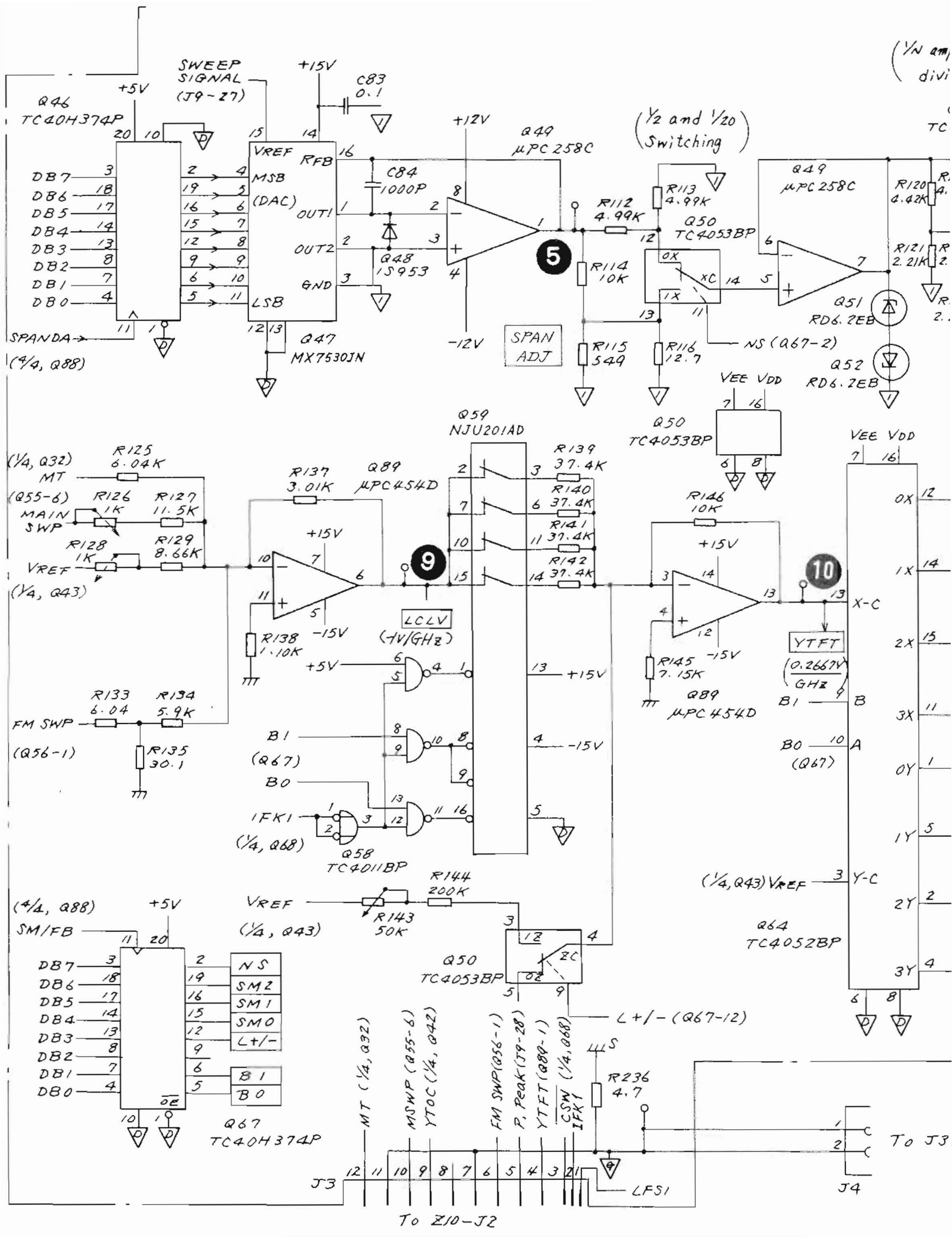


Fig. 5-55 (1/4)

Z21 LOCAL CONTROL Circuit Diagram (1/4)
(MT, VCO tune, and FT generation)
(43W 33952)
CORRECTED

rts List: 44W83949
Board: 422U12706


Q46 TC40H374P
+5V
SWEEP SIGNAL (J9-27)
+15V
C83 0.1
Q47 MX7530JN
VREF RFB MSB (DAC) OUT1 OUT2 GND LSB
C84 1000P
Q48 1S953
+12V
-12V
Q49 μPC258C
(1/2 and 1/20 Switching)
R112 4.99K
R113 4.99K
R114 10K
R115 549
R116 12.7
SPAN ADJ
Q50 TC4053BP
NS (Q67-2)
R120 4.42K
R121 2.21K
Q51 RD6.2EB
Q52 RD6.2EB
(1/N amp divi
DB7 DB6 DB5 DB4 DB3 DB2 DB1 DB0
SPANDA
(4/4, Q88)
(1/4, Q32) MT
(Q55-6) MAIN SWP
VREF (1/4, Q43)
R125 6.04K
R126 1K
R127 11.5K
R128 1K
R129 8.66K
R137 3.01K
Q89 μPC454D
R138 1.10K
-15V
LCLV (-1V/GHz)
Q59 NJU201AD
R139 37.4K
R140 37.4K
R141 37.4K
R142 37.4K
R146 10K
R145 7.15K
YTFT (0.2667V/GHz)
VEE VDD
Q64 TC4052BP
X-C B A Y-C 0X 1X 2X 3X 0Y 1Y 2Y 3Y
B1 B0 (Q67)
(1/4, Q43) VREF
FM SWP (Q56-1)
R133 6.04
R134 5.9K
R135 30.1
Q58 TC4011BP
IFK1 (1/4, Q68)
+15V -15V
R144 200K
R143 50K
VREF (1/4, Q43)
L+/- (Q67-12)
(4/4, Q88) SM/FB
Q67 TC40H374P
NS SM2 SM1 SM0 L+/- B1 B0
MT (1/4, Q32)
MSWP (Q55-6)
YTOC (1/4, Q42)
FM SWP (Q56-1)
P. Peak (J9-28)
YTFT (Q89-1)
CSW
IFK1 (1/4, Q68)
R236 4.7
J3
To Z10-J2
LFS1
To J3
J4

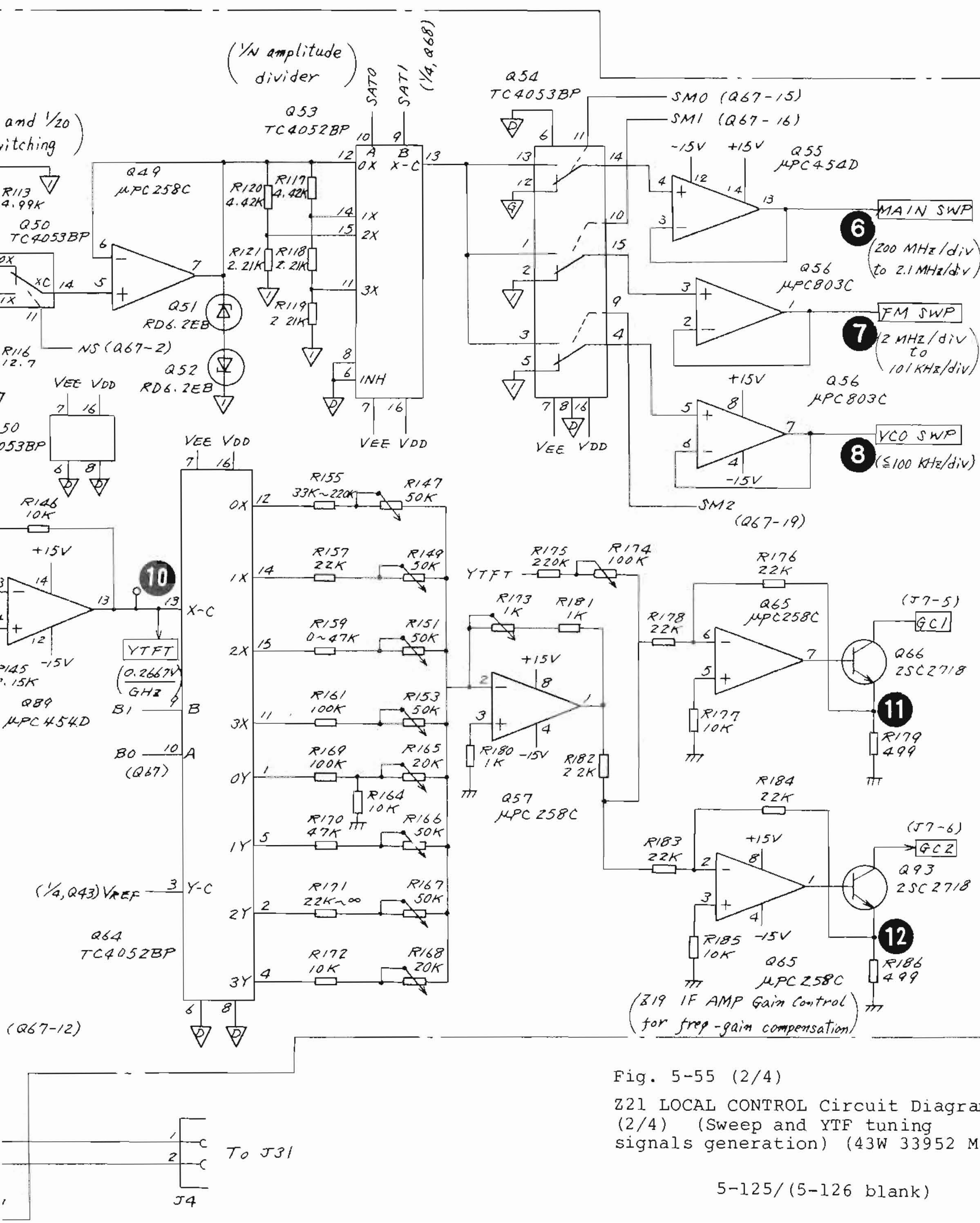
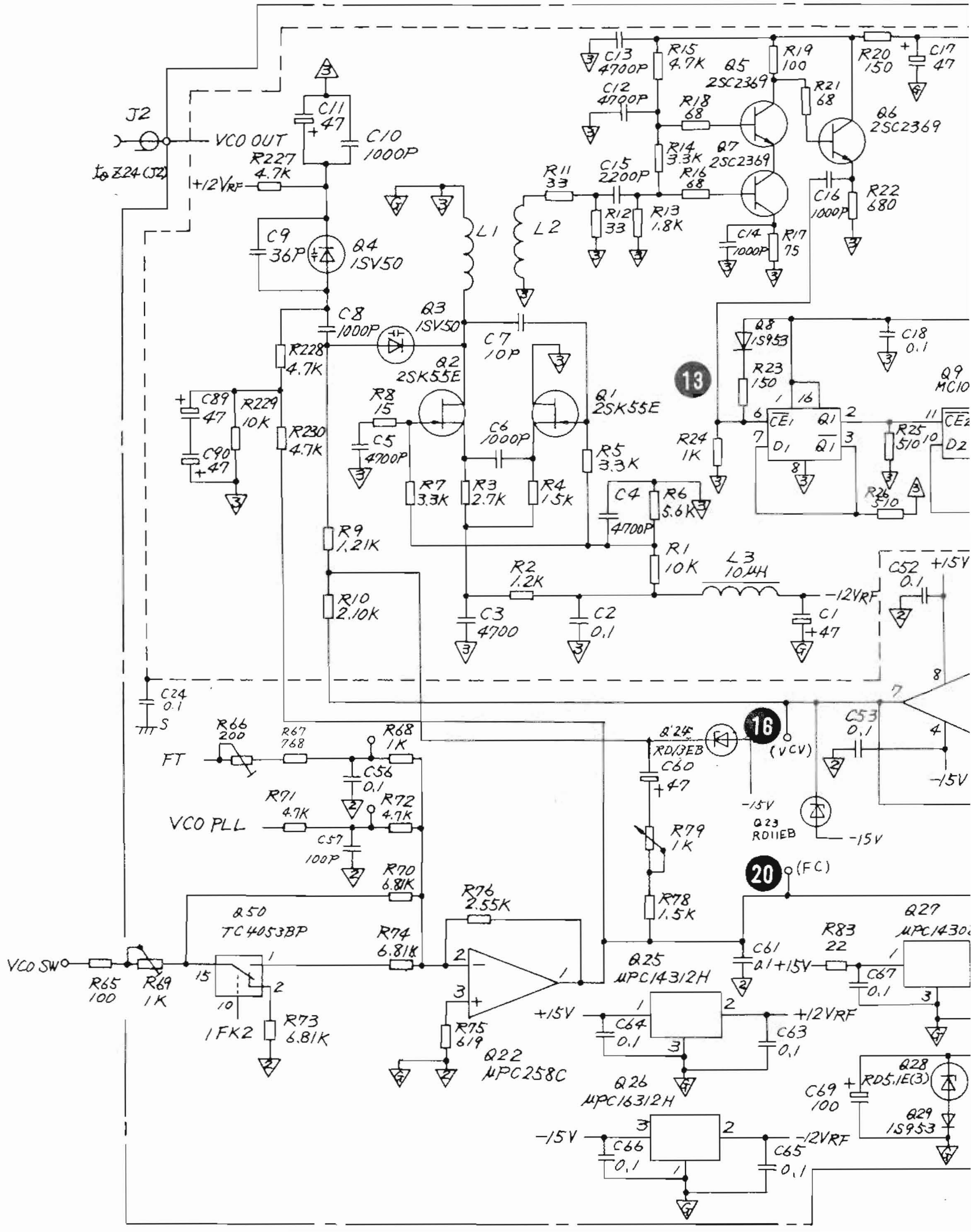


Fig. 5-55 (2/4)

Z21 LOCAL CONTROL Circuit Diagram (2/4) (Sweep and YTF tuning signals generation) (43W 33952 M-1)


J2
VCO OUT
to Z24 (J2)
+12VRF
R227 4.7K
C11 47
C10 1000P
C9 36P
Q4 1SV50
C8 1000P
Q3 1SV50
R228 4.7K
C89 47
R229 10K
C90 47
R230 4.7K
R9 1.21K
R10 2.10K
L1
L2
Q2 2SK55E
Q1 2SK55E
R8 15
C5 4700P
C7 10P
C6 1000P
R7 3.3K
R3 2.7K
R4 1.5K
R5 3.3K
C4 4700P
R6 5.6K
R1 10K
R2 1.2K
L3 10μH
-12VRF
C3 4700
C2 0.1
C1 47
R11 33
C15 2200P
R12 33
R13 1.8K
C13 4700P
R15 4.7K
C12 4700P
R18 68
R14 3.3K
R16 68
Q5 2SC2369
Q7 2SC2369
R19 100
R21 68
Q6 2SC2369
R20 150
C17 47
C16 1000P
R22 680
C14 1000P
R17 75
Q8 1S953
C18 0.1
R23 150
13
R24 1K
CE1 D1 Q1
R25 510
R26 510
Q9 MC10
CE2 D2
C52 0.1
+15V
C24 0.1
S
R66 200
R67 768
R68 1K
FT
C56 0.1
R71 4.7K
R72 4.7K
VCO PLL
C57 100P
R70 6.81K
Q24 RD13EB
16
(VCV)
C60 47
C53 0.1
-15V
Q23 RD11EB
R79 1K
20
(FC)
R78 1.5K
R76 2.55K
Q50 TC4053BP
R74 6.81K
VCO SW
R65 100
R69 1K
1FK2
R73 6.81K
R75 619
Q22 μPC258C
C61 0.1
Q25 μPC14312H
+15V
+12VRF
C64 0.1
C63 0.1
R83 22
Q27 μPC1430
C67 0.1
Q28 RD5.1E(3)
C69 100
Q29 1S953
Q26 μPC16312H
-15V
C66 0.1
C65 0.1
-12VRF

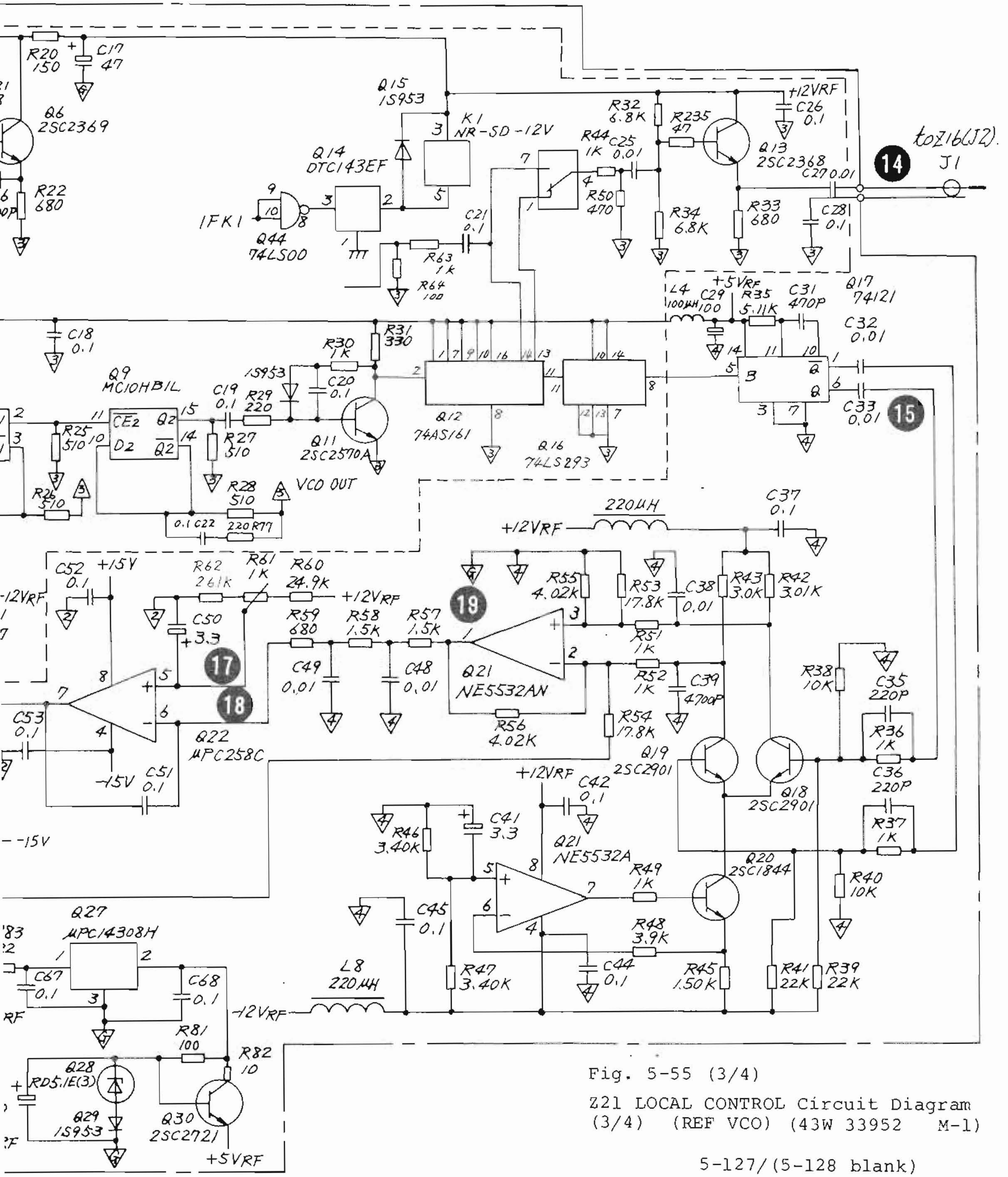
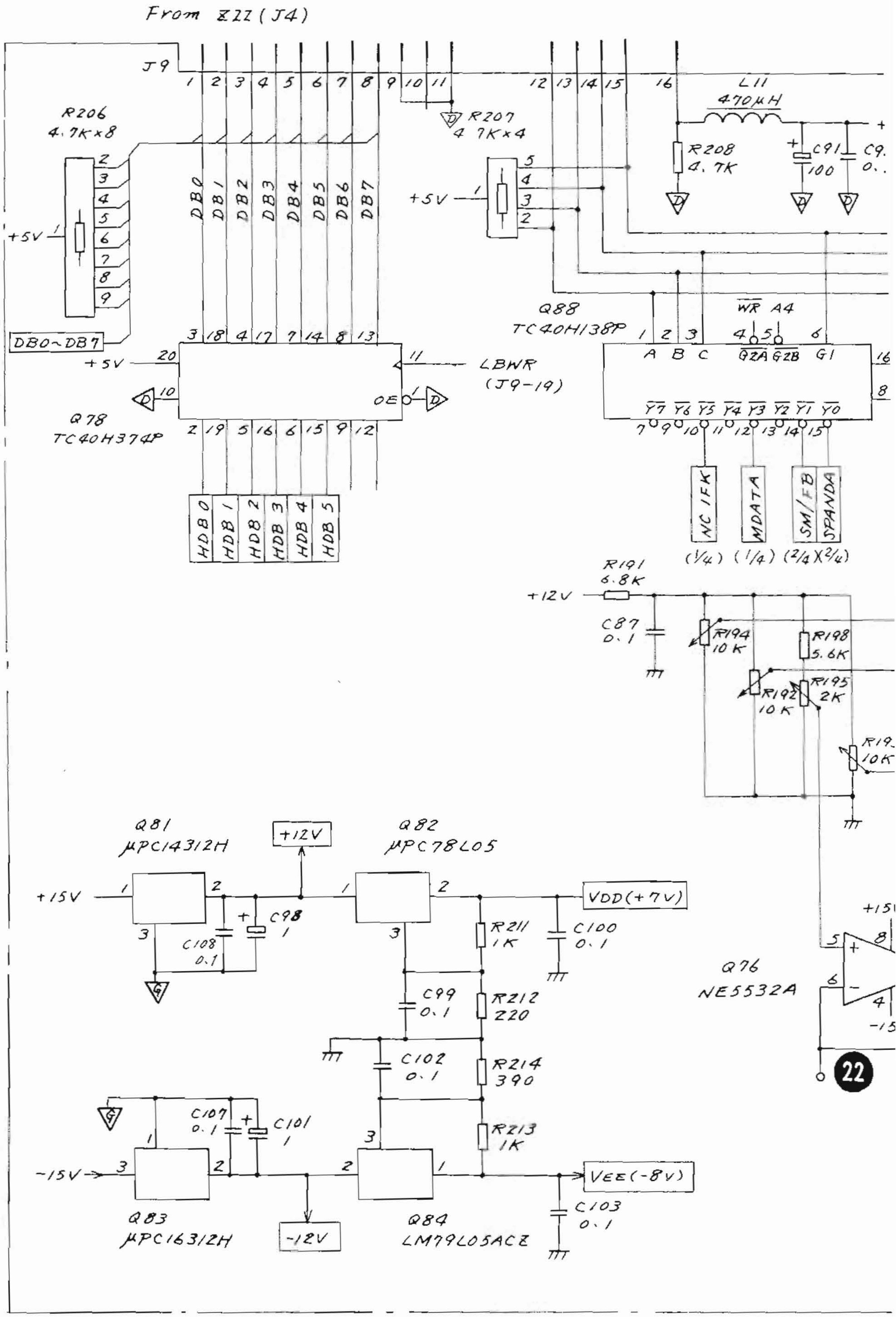


Fig. 5-55 (3/4)

Z21 LOCAL CONTROL Circuit Diagram (3/4) (REF VCO) (43W 33952 M-1)



From Z22 (J4)
J9
R206 4.7K×8
R207 4.7K×4
R208 4.7K
L11 470μH
C91 100
DB0 DB1 DB2 DB3 DB4 DB5 DB6 DB7
DB0~DB7
+5V
Q78 TC40H374P
LBWR (J9-19)
OE
HDB0 HDB1 HDB2 HDB3 HDB4 HDB5
Q88 TC40H138P
A B C G2A G2B G1
WR A4
Y7 Y6 Y5 Y4 Y3 Y2 Y1 Y0
NC IFK
MDATA
SM/FB
SPANDA
(1/4) (1/4) (2/4)(2/4)
R191 6.8K
+12V
C87 0.1
R194 10K
R198 5.6K
R192 10K
R195 2K
Q81 μPC14312H
+15V
C108 0.1
C98 1
Q82 μPC78L05
VDD(+7V)
R211 1K
C100 0.1
C99 0.1
R212 220
C102 0.1
R214 390
R213 1K
C107 0.1
C101 1
-15V
Q83 μPC16312H
-12V
Q84 LM79L05ACZ
VEE(-8V)
C103 0.1
Q76 NE5532A
22

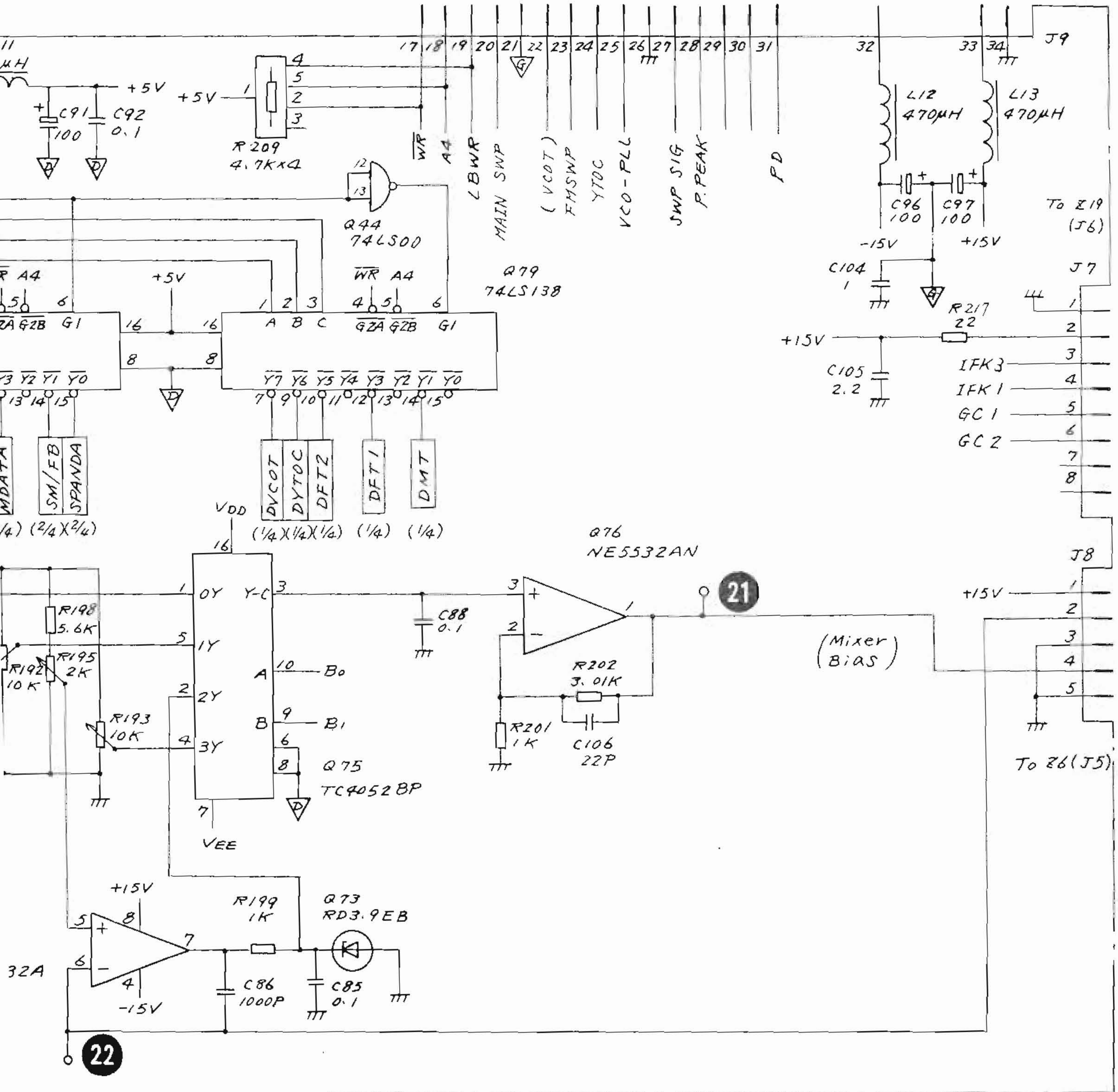


Fig. 5-55 (4/4)

Z21 LOCAL CONTROL Circuit Diagram (4/4) (Control and Mixer Bias signal generation) (43W 33952)

5.10 Z22 IF BPF/AMP 1 and Z23 IF BPF/AMP 2

5.10.1 Circuit description - Z22 and Z23
(Refer to Fig. 3-3 (2/4), Figs. 5-58 and 5-60)

One set of two PC boards constitutes the IF section which determines the resolution bandwidth and reference level of the MS710[ ]. The 21.4 MHz IF signal selected by the IF switching circuit in the Z19 μ 2nd converter 2 is input to the Z22 PC board through Z22-J1.

The Z22 and Z23 circuits are divided into the 9 parts A to I shown in Figs. 5-58 and 5-60, and the circuit description for each part is as follows:

<u>Part A:</u> Level Cal. and Buffer

The input IF signal is passed through the LC LPF and is input to variable attenuator circuit Q3 and Q4. The bias current of PIN diodes Q3 and Q4 is controlled by the LEVEL CAL control on the front panel. The input IF signal is corrected to the standard level.

Then the signal is input to the 21.4 MHz BPF circuit through buffer amplifier Q5 and Q6.

<u>Part B:</u> 21.4 MHz BPF

After the Q8 buffer amplifier, the IF signal applied to a 2-stage variable bandwidth BPF circuit. The center frequency of this circuit is 21.4 MHz. The bandwidth can be varied from 300 kHz to 3 MHz by using a variable R of PIN diodes (Q9, Q12).

The principle of the variable bandwidth BPF circuit is as follows.

A signal is applied to a high Q LC parallel resonant circuit through a variable resistance as shown in Fig. 5-56 and the voltage divided by this resistance component and the resonant circuit impedance is extracted by a high input impedance buffer amplifier.

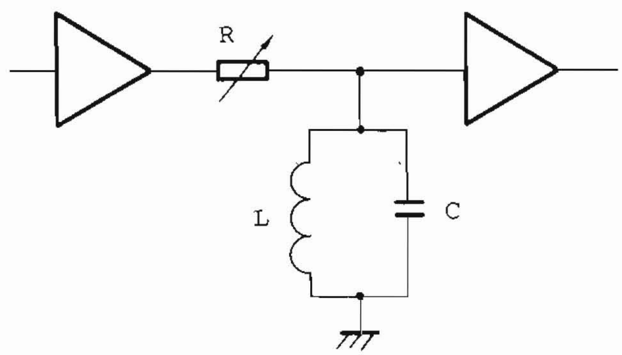


Fig. 5-56 Principles of the Variable BPF Circuit of Z22 (RBW: 300 kHz to 3 MHz)

If L and C are ideal or lossless, at the resonant frequency the impedance of the LC resonant circuit is infinite and the signal is transmitted without loss regardless of the value of R. The impedance of the resonant circuit decreases as the frequency moves away from the resonant frequency and the transmission loss is increased by division with R.

Therefore, as R becomes larger, a narrower bandwidth BPF characteristic is obtained and its bandwidth can be controlled by the value of R.

Describing the actual circuit by taking the initial stage circuit as an example, the value of R is set by PIN diode Q9 according to the RBW set value.

L is L11 and C is the parallel capacitance of C21, C22, and C23. The buffer amplifier is transistor Q11. Actually, since these elements are not ideal, when R is increased to obtain a very narrow bandwidth, the loss becomes large. To compensate for this, a part of the output signal is positively fed back by R19 and an increase in loss is prevented.

Part C: IF Switch

K1 and K2 switch the IF signal path according to the resolution bandwidth (RBW) set value.

For RBW: 300 kHz to 3 MHz, they are turned OFF; for RBW: 100 Hz to 100 kHz, they are turned ON.

For RBW: 300 kHz to 3 MHz, the IF signal passes K1 and K2 and enters buffer amplifier Q57 directly.

Part D: 1.5 MHz Down Converter

On the other hand, for RBW: 100 Hz to 100 kHz, the IF signal passed through K1 is passed through BEF (C49, C51, L15) and is mixed with the 19.9 MHz signal by Z2 MIXER and converted to a 1.5 MHz IF signal. The 1.5 MHz IF signal is sent to an amplifier Q101 through an LPF.

Part E: 19.9 MHz LOCAL

Z1 is a crystal oscillator which generates the 19.9 MHz signal. Its output is amplified by Q26 and Q27, or Q28 and Q29, and is used as the local signal of the 21.4 MHz to 1.5 MHz, or 1.5 MHz to 21.4 MHz down (Z2) or up (Z3) converters, respectively. When one of the RBW of 300 kHz to 5 MHz is set, this 19.9 MHz signal is blocked by gate Q24 and is not applied to the MIXER of Z2 and Z3.

Part (F): 1.5 MHz BPF/AMP

This 1.5 MHz BPF circuit, which is a three-stage variable bandwidth BPF circuit, sets RBWs of 10, 30, and 100 kHz. The operation principle is the same as that described in Part (B). However, the fixed resistor is switched by the diode switch instead of using the PIN diode as a variable resistor.

After the IF signal has passed the BPF circuit, it is sent to the crystal BPF in Z23 via the programmable gain amplifier consisting of Q43 and Q51.

Part (G): 21.4 MHz Step Gain Amplifier/BPF

The 21.4 MHz IF signal from K2 is output to J3 through a 2-stage amplifier whose gain is controlled in 10 dB steps, an amplifier whose gain is controlled in 0.1 dB steps, and a 3-stage BW 300 kHz to 3 MHz variable BPF circuit the same as in Part (B). The signal is then sent to the following Z25 LOG/LIN AMP/DETECTOR PC board through J3.

Part (H): Gain and BW Controls

Z22 contains address decoder Q92 and latches Q89, Q90, and Q91 for receiving the various logic control signals from the Z26 CPU board; it also contains a circuit for converting the received logic control signals to the actual BPF bandwidth control and the amplifier gain control signals.

Part (I): 1.5 MHz CRYSTAL BPF (Z23 IF BPF/AMP 2)

This four-stage variable bandwidth crystal BPF circuit sets RBWs of 100 Hz to 3 kHz.

It also contains the circuit which compensates the IF gain variation due to the RBW change and the programmable gain amplifier circuit to switch the IF gain.

5.10.2 Checking procedure - Z22 and Z23

Step	Procedure
1.	Remove the top cover and the PC board cover plate (15). See Fig. 2-1 and 2-5.
2.	Measure the output level at the Z22-J3 by using another spectrum analyzer or a power meter that can receive 21.4 MHz. This output level at the Z22-J3 is referred to as "level 1" afterward.
3.	Remove the Z19-J4 cable connected to the Z22-J1 and input a 21.4 MHz, -20 dBm signal to the Z22-J1 from a signal generator.
4.	Set the MS710[ ] as follows: CENTER FREQUENCY 100 MHz REFERENCE LEVEL 0 dBm RESOLUTION BW 3 MHz INPUT ATT 10 dB
5.	Fully turn the front panel LEVEL CAL adjustment variable resistor and confirm that "level 1" can be varied from approximately -18 dBm to -6 dBm (approximately -12 ±6 dBm). If it is not varied, there is a fault in Part (A), (B), (C), (G), or (H).

(cont.)

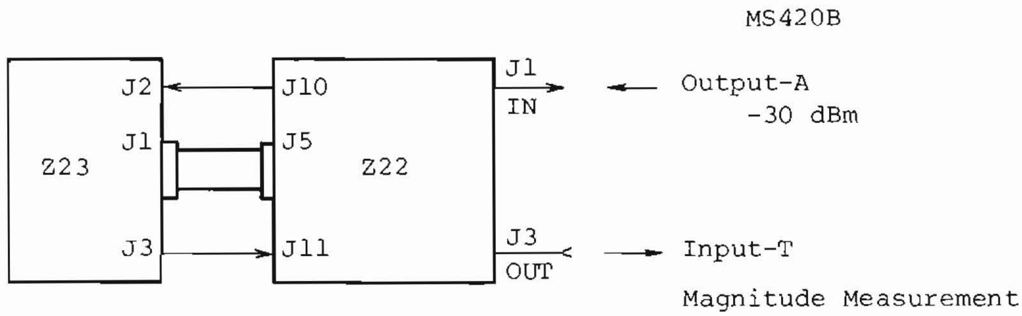
Step	Procedure
6.	Fix the LEVEL CAL adjustment variable resistor to the center and set the resolution BW to 100 kHz.
7.	Finely adjust the frequency of the signal generator by approximately 100 kHz around 21.4 MHz and fix the frequency to the point where "level 1" indicates the maximum level.
8.	In this case, when "level 1" is -12 ±2 dBm, it is normal. If the level is abnormal, there is a fault or faulty BPF adjustment (center frequency shift) in the 1.5 MHz IF CIRCUITS Part C, D, E, F, H, or in the Z23 IF BPF/AMP 2 section.
9.	Reducing the output level of the signal generator to -30, -40, -50, and -60 dBm in steps of 10 dB, vary the MS710C reference level to -10, -20, -30, and -40 dBm corresponding to the above signal generator level and confirm that "level 1" is always set to the level in step (8). If not, the two 10 dB step gain amplifiers of the 1.5 MHz IF circuit is faulty.
10.	Reset the output level of the signal generator to -20 dBm, the MS710[ ] reference level to 0 dBm, and the Resolution BW to 3 MHz.
11.	Measure the output level at the Z23-J3 (level 1) by using another spectrum analyzer (21.4 MHz) or a power meter. When the output is -12 ±2 dBm, it is normal.

(cont.)

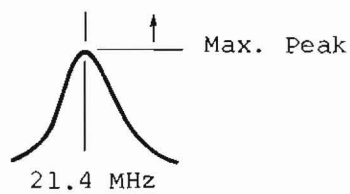
Step	Procedure
12.	Vary the output level of the signal generator to -30, -40, -50, and -60 dBm and the MS710[ ] reference level to -10, -20, -30, and -40 dBm and confirm that "level 1" is always maintained. If not, the Z23 21.4 MHz 10 dB step gain amplifier is faulty.
13.	Varying the MS710[ ] reference level to -61, -62, ..., and -69 dBm in steps of 1 dB using the data knob, confirm that "level 1" increases in steps of 1 dB.
14.	Connect the Z22-J3 to the Z25-J1 and Z19-J4 to Z22-J1 as previously connected and change the MS710[ ] setting as follows: REFERENCE LEVEL -20 dBm SPAN 1 MHz/div SCALE 1 dB/div
15.	Connect the output of the signal generator to the MS710[ ] RF INPUT connector. Set the signal generator frequency to 100 MHz. Finely adjust the output level of the signal generator to -20 dBm and by changing the Resolution BW, check that the RBW (-6 dB bandwidth) varies correctly. If there is an abnormality, check the control voltage of each checkpoint shown in the Z22 and Z23 circuit diagrams Figs. 5-58 and 5-59. In this case, remove the Z22 and Z23 by pulling it up and use the service kit extender cable for the detailed analysis of these packages.

5.10.3 Adjustment - Z22 and Z23

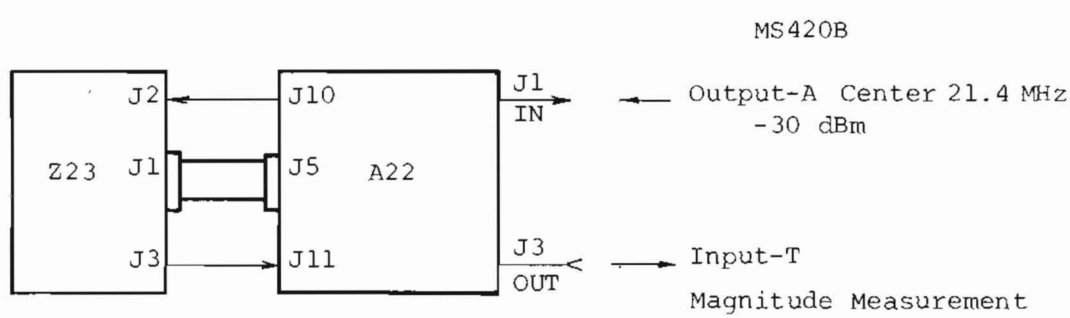
(1) Z22 and Z23 IF BPF/AMP Adjustment



Step	Procedure
1.	Adjust the voltage at checkpoint ❶ (Fig. 5-58 (5/6)) to +7.5 V with R211.
2.	Set the controls as follows: MS710[ ] ... RBW 300 kHz MS420B ..... Output-A, center 21.410 MHz, Span 1 MHz Adjust C23, C33, C179, C190 and C202 (Fig. 5-58 (1/6, 4/6)) to get max. peak level at the center of the MS420B display.
3.	Set the controls as follows: MS710[ ] ... RBW 30 kHz MS420B ..... Center 21.400 MHz, Span 100 kHz Adjust C84, C94, C104 (Fig. 5-58 (3/6)) to get max. peak level at the center of the MS420B display.

Step	Procedure
4.	Set the controls as follows: MS710[ ] ... RBW 1 kHz MS420B ..... Center 21.400 MHz, Span 3 kHz  Tune C12, L3, C30, L4, C44, L5, C57, and L7 (Fig. 5-59 (1/2, 2/2)) to get max. peak level at the center of the MS420B display.

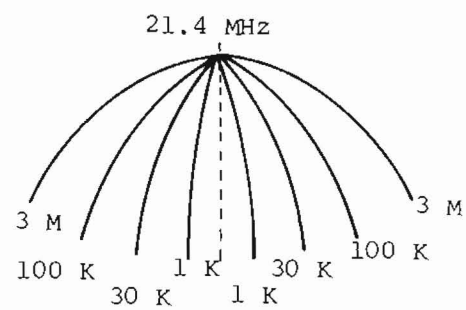
(2) RBW Gain Deviation and IF Gain Adjustment



(a) RBW gain deviation

Adjust the level of 21.4 MHz at RBW-300 kHz, 100 kHz, 10 kHz, 3 kHz, 1 kHz, 300 Hz, and 100 Hz equal to the level of 21.4 MHz at RBW=3 MHz.

Adj. Position	RBW
Fig. 5-58 (4/6) : R203	300 kHz
Fig. 5-58 (3/6) : R294	100 kHz
Fig. 5-60 (2/2) : R122	10 kHz
Fig. 5-60 (2/2) : R133	3 kHz
Fig. 5-60 (2/2) : R135	1 kHz
Fig. 5-60 (2/2) : R134	300 Hz
Fig. 5-60 (2/2) : R136	100 Hz



(b) IF Gain

Step	Procedure
1.	Set the controls as follows: MS710[ ] ... RBW 3 MHz, INPUT ATTEN MANUAL 10 dB REF 0 dBm
2.	Change the REFERENCE LEVEL from 0 to -9 dBm in 1 dB steps, and check that MS420B shows the same step level change to the reverse direction (Error ≦ ±0.2 dB). When the REFERENCE LEVEL is decreased, the level shown by the MS420B should be increased. Adj. Position: R286 — 1 dB/div. Steps: 0 to 9 dB (Refer to Fig. 5-58 (5/6))

(cont.)

Step	Procedure
3.	Change the REFERENCE LEVEL from 0 to -40 dBm in 10 dB steps, and check that the MS420B shows the same level change to the reverse direction (Error ≦ ±0.2 dB).

Adj. Position	REFERENCE LEVEL
R237	-10 dB
R238	-20 dB
R247	-30 dB
R248	-40 dB

(Refer to Fig. 5-58 (6/6))

Also check at RBW 30 kHz of MS710[ ].

Adj. Position	REFERENCE LEVEL
R136	-30 dB

(Refer to Fig. 5-58 (3/6))

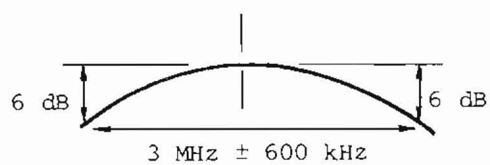
(c) RBW ±20%:

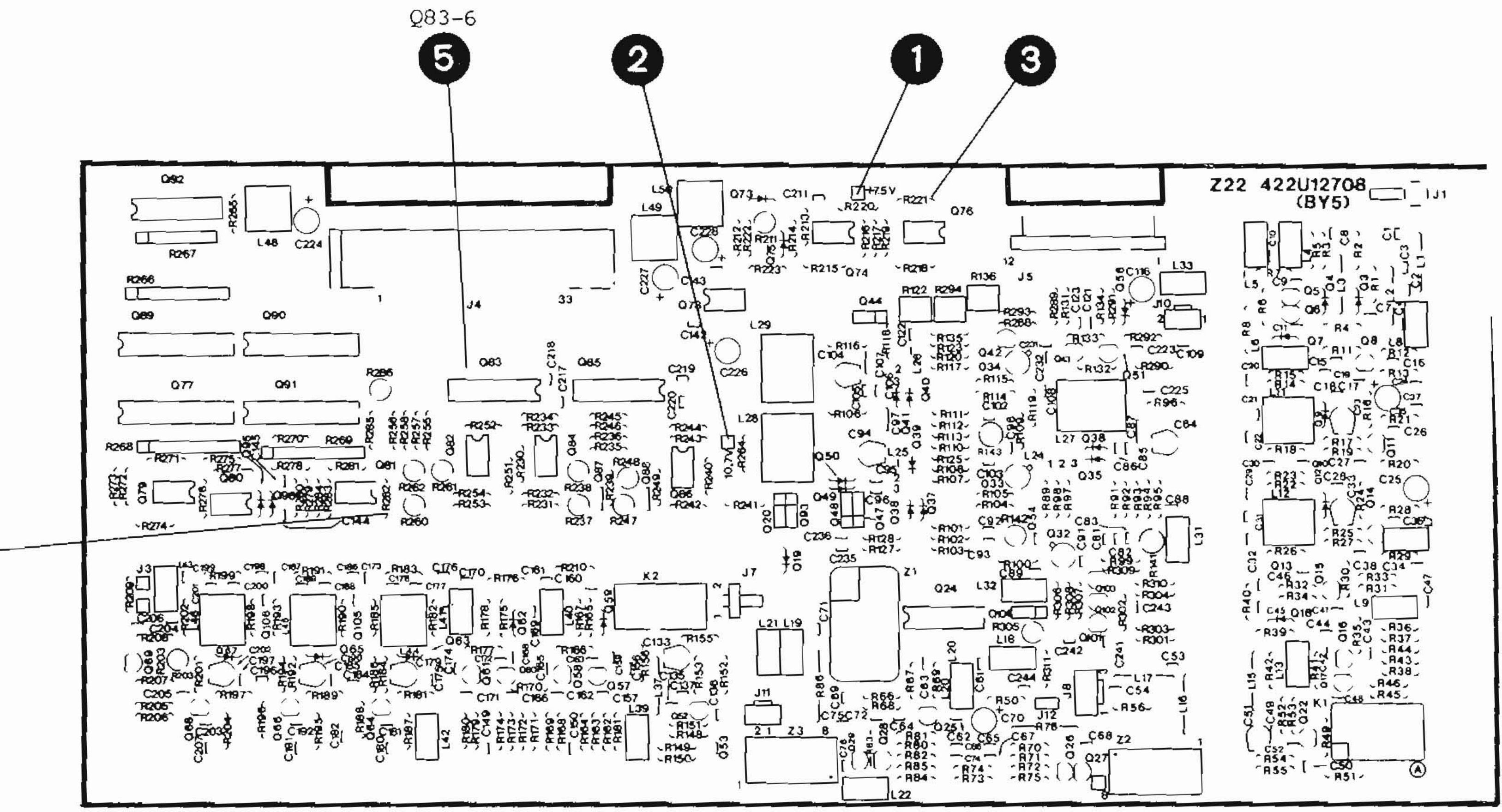
Check the RBW as follows.

Settings of MS420B		Adjustment of MS710[ ]	
CENTER FREQ	SPAN	Adj. Position	RBW
21.4 MHz	5 MHz	R262	3 MHz ±600 kHz
21.4 MHz	2 MHz	R261	1 MHz ±200 kHz
21.4 MHz	0.5 MHz	R260	300 kHz ±60 kHz

(Refer to Fig. 5-58 (6/6))

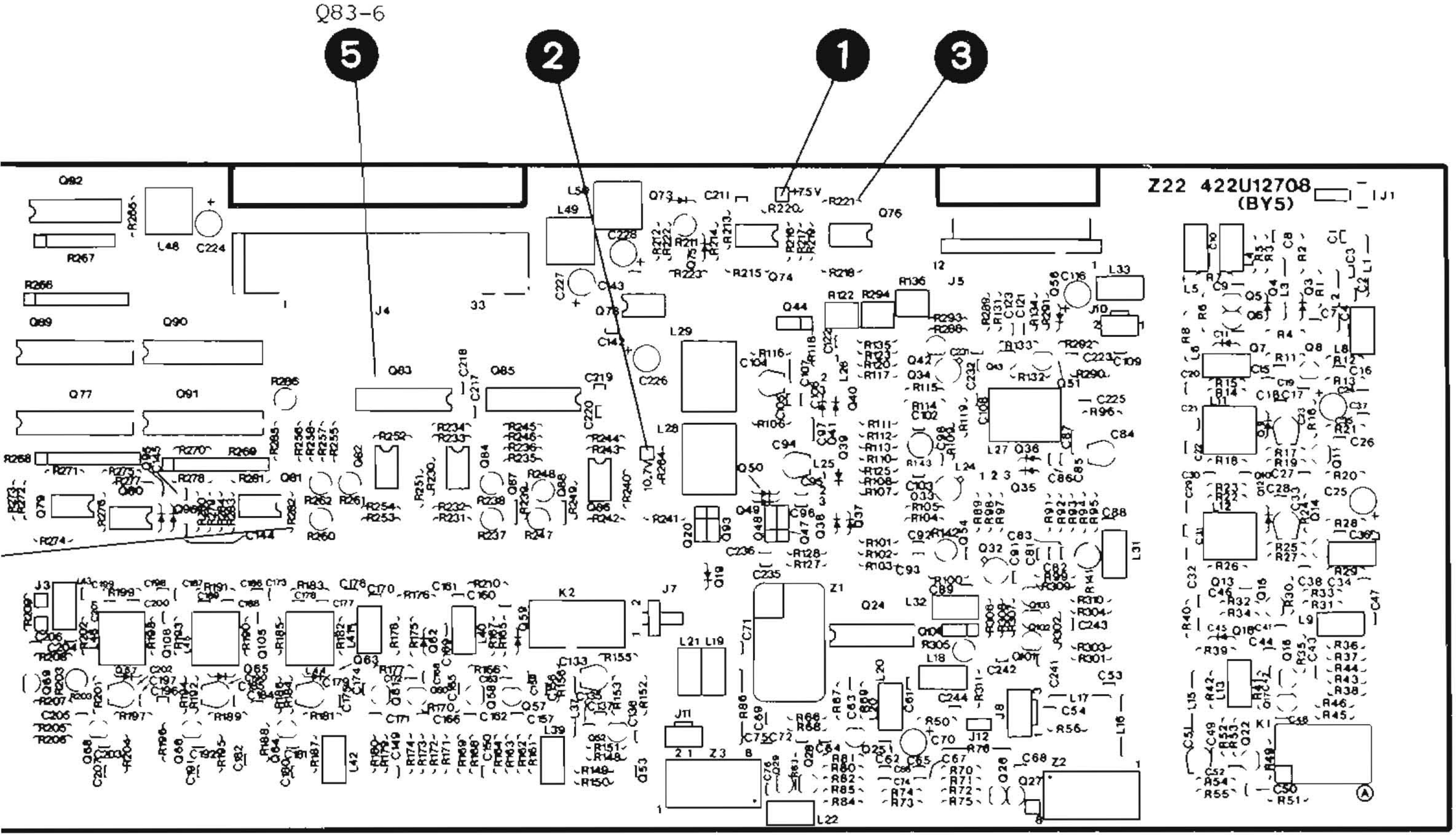
An example in case of RBW = 3 MHz is shown below.



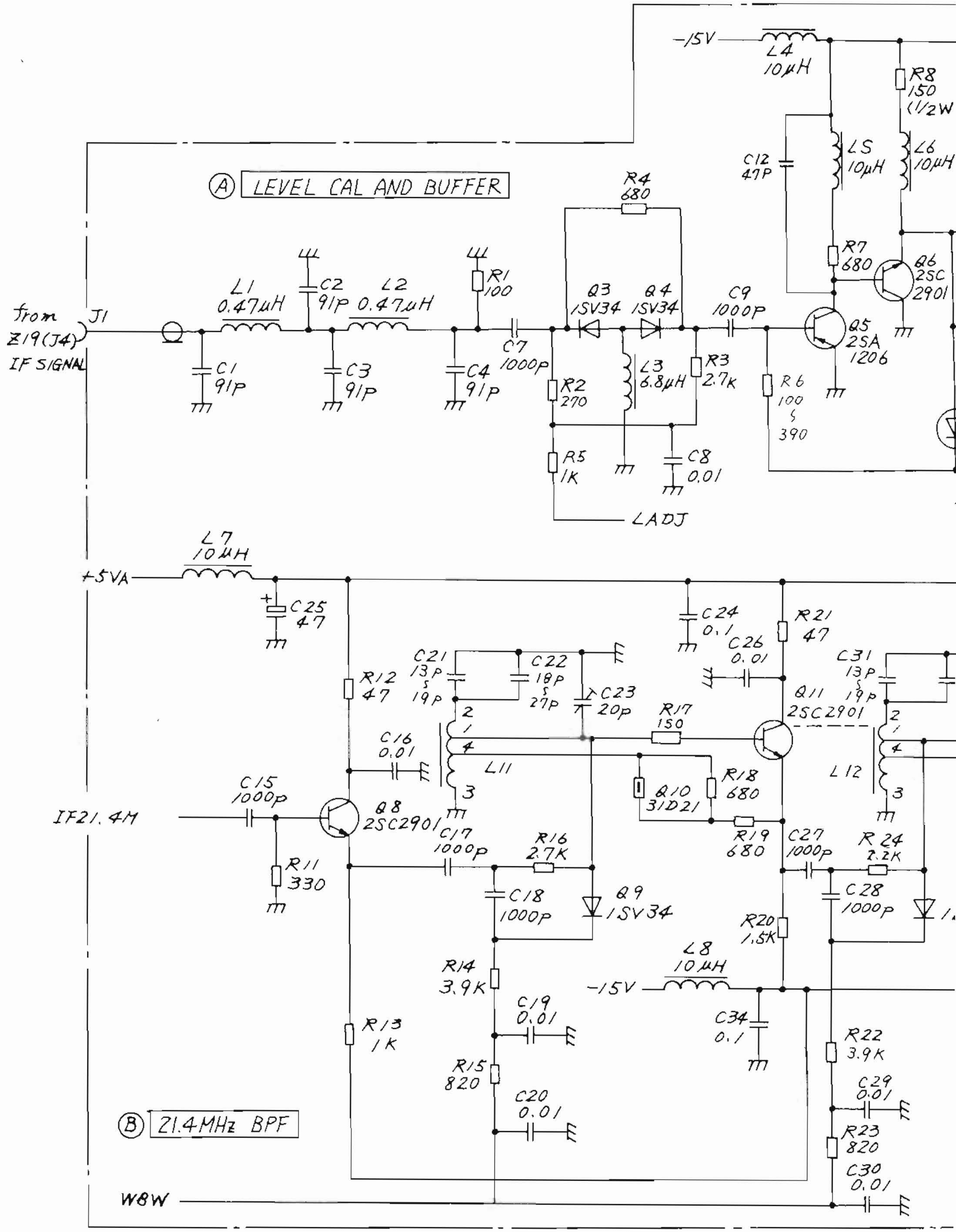


Parts Layout

Q83-6



s Layout



A LEVEL CAL AND BUFFER
from Z19(J4) IF SIGNAL
J1
L1 0.47µH
C1 91P
C2 91P
L2 0.47µH
C3 91P
C4 91P
R1 100
C7 1000P
R2 270
R5 1K
LADJ
R4 680
Q3 1SV34
Q4 1SV34
L3 6.8µH
R3 2.7K
C8 0.01
C9 1000P
R6 100 ~ 390
Q5 2SA1206
R7 680
Q6 2SC2901
-15V
L4 10µH
R8 150 (1/2W
C12 47P
L5 10µH
L6 10µH
+5VA
L7 10µH
C25 47
R12 47
R13 1K
IF21.4M
C15 1000p
R11 330
Q8 2SC2901
C16 0.01
C21 13P ~ 19P
C22 18P ~ 27P
C23 20p
L11
C17 1000p
R16 2.7K
C18 1000P
Q9 1SV34
R14 3.9K
C19 0.01
R15 820
C20 0.01
R17 150
Q10 31D21
R18 680
R19 680
C24 0.1
R21 47
C26 0.01
Q11 2SC2901
C31 13P ~ 19P
L12
C27 1000p
R24 2.2K
C28 1000p
R20 1.5K
L8 10µH
-15V
C34 0.1
R22 3.9K
C29 0.01
R23 820
C30 0.01
B 21.4MHz BPF
W8W

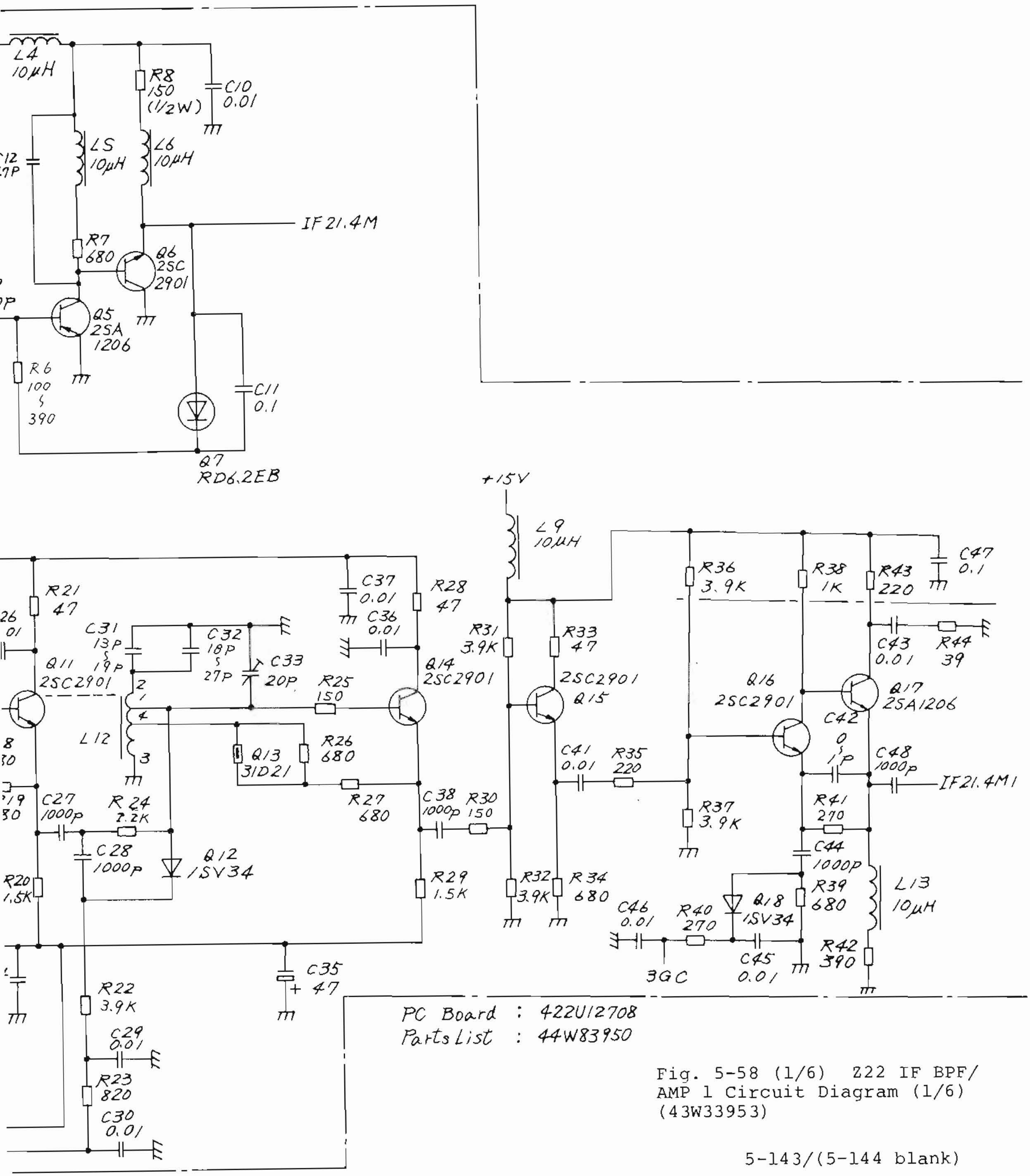
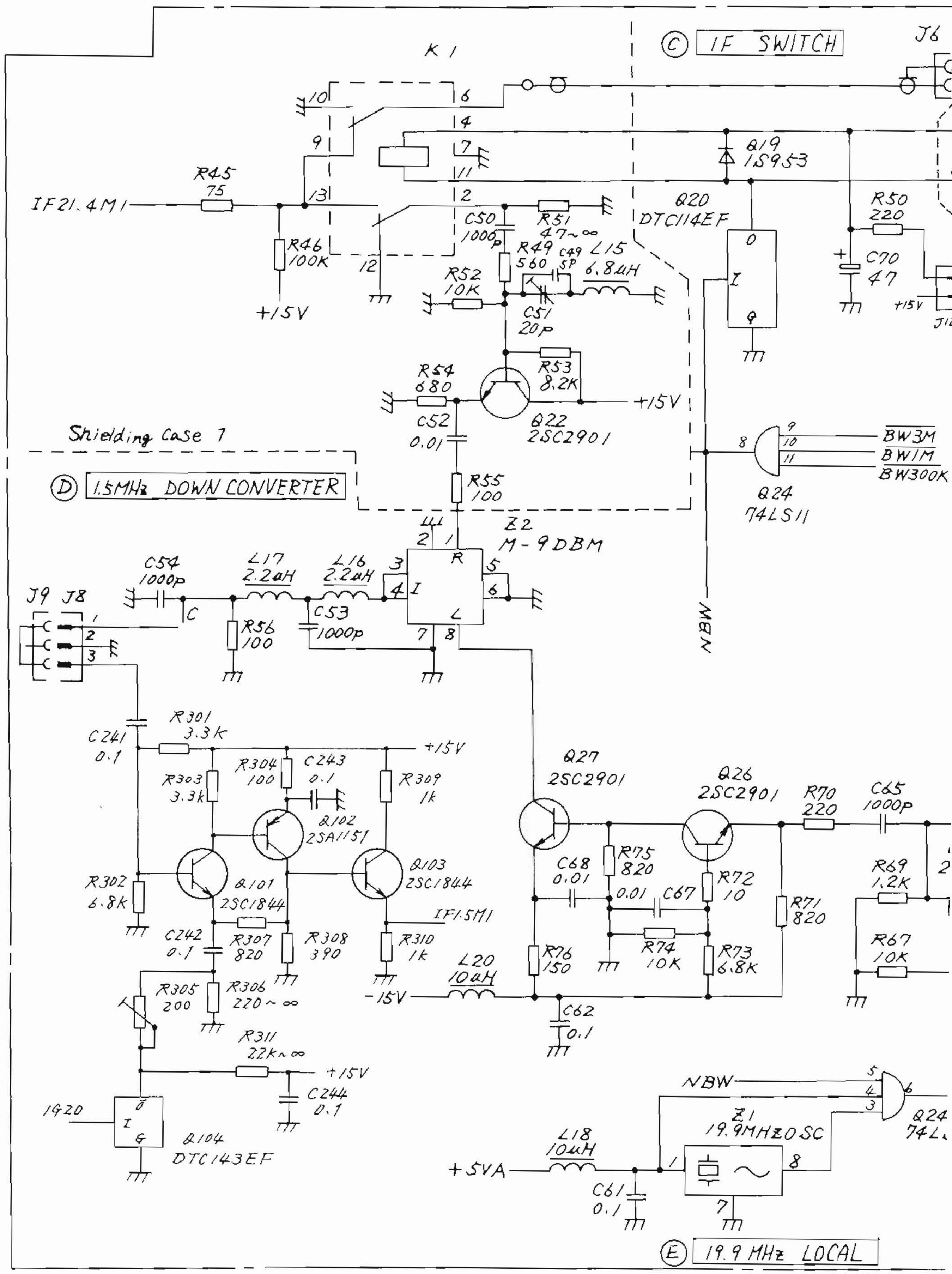


Fig. 5-58 (1/6) Z22 IF BPF/
AMP 1 Circuit Diagram (1/6)
(43W33953)


K 1
IF SWITCH
J6
IF21.4M1
R45
75
R46
100K
+15V
Q19
1S953
Q20
DTC114EF
R50
220
C70
47
C50
1000p
R51
47~∞
R49
560
C49
SP
L15
6.8µH
R52
10K
C51
20p
R54
680
R53
8.2K
+15V
C52
0.01
Q22
2SC2901
Shielding Case 1
1.5MHz DOWN CONVERTER
R55
100
BW3M
BW1M
BW300K
Q24
74LS11
Z2
M-9DBM
NBN
C54
1000p
L17
2.2µH
L16
2.2µH
C53
1000p
R56
100
J9
J8
C241
0.1
R301
3.3K
R303
3.3k
R304
100
C243
0.1
R309
1k
Q102
2SA1151
R302
6.8K
Q101
2SC1844
Q103
2SC1844
IF1.5M1
C242
0.1
R307
820
R308
390
R310
1k
R305
200
R306
220~∞
R311
22k~∞
C244
0.1
1G20
Q104
DTC143EF
Q27
2SC2901
Q26
2SC2901
R70
220
C65
1000p
C68
0.01
R75
820
C67
0.01
R72
10
R71
820
R69
1.2K
R76
150
R74
10K
R73
6.8K
R67
10K
L20
10µH
-15V
C62
0.1
NBW
Q24
Z1
19.9MHz OSC
L18
10µH
+5VA
C61
0.1
19.9 MHz LOCAL

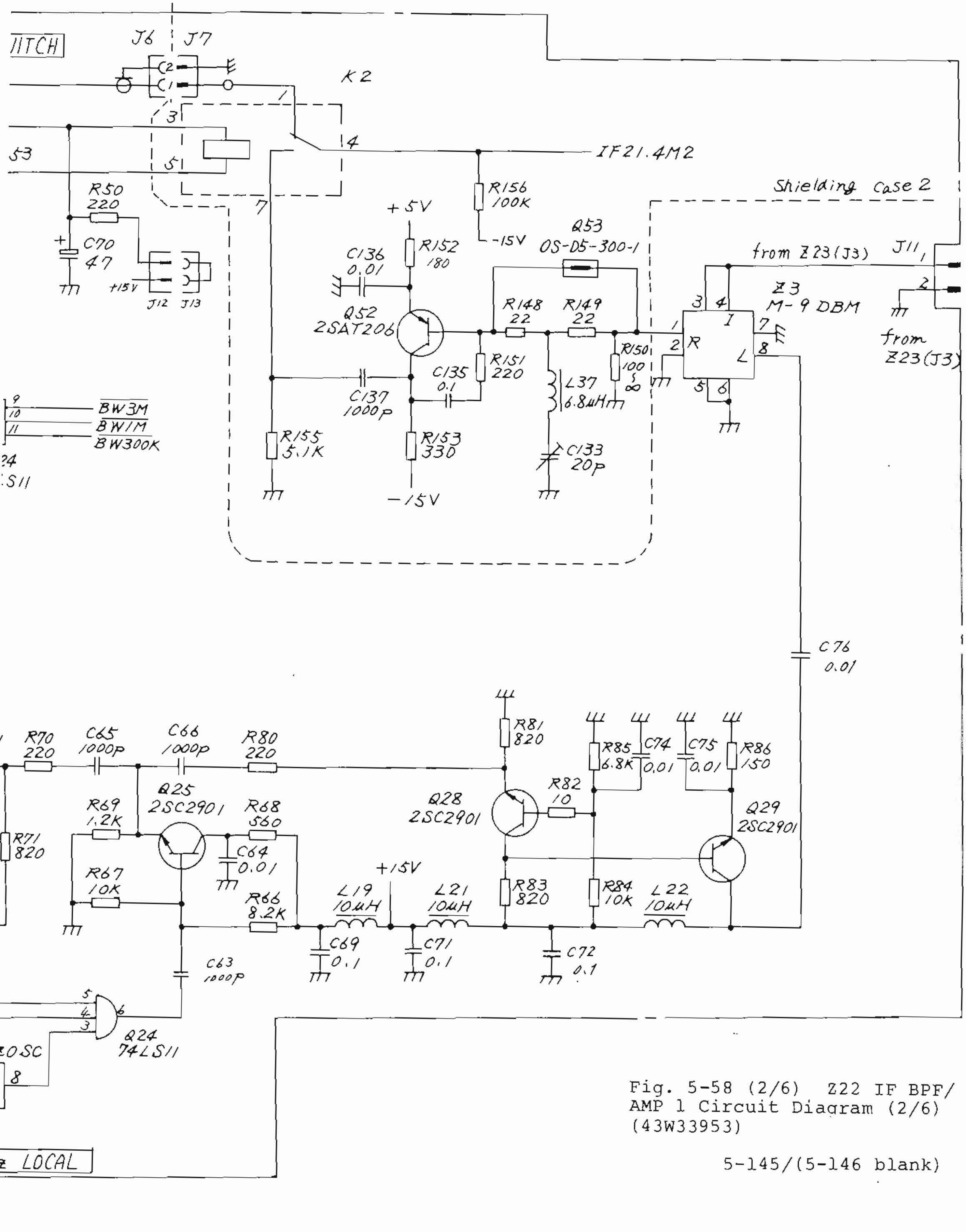
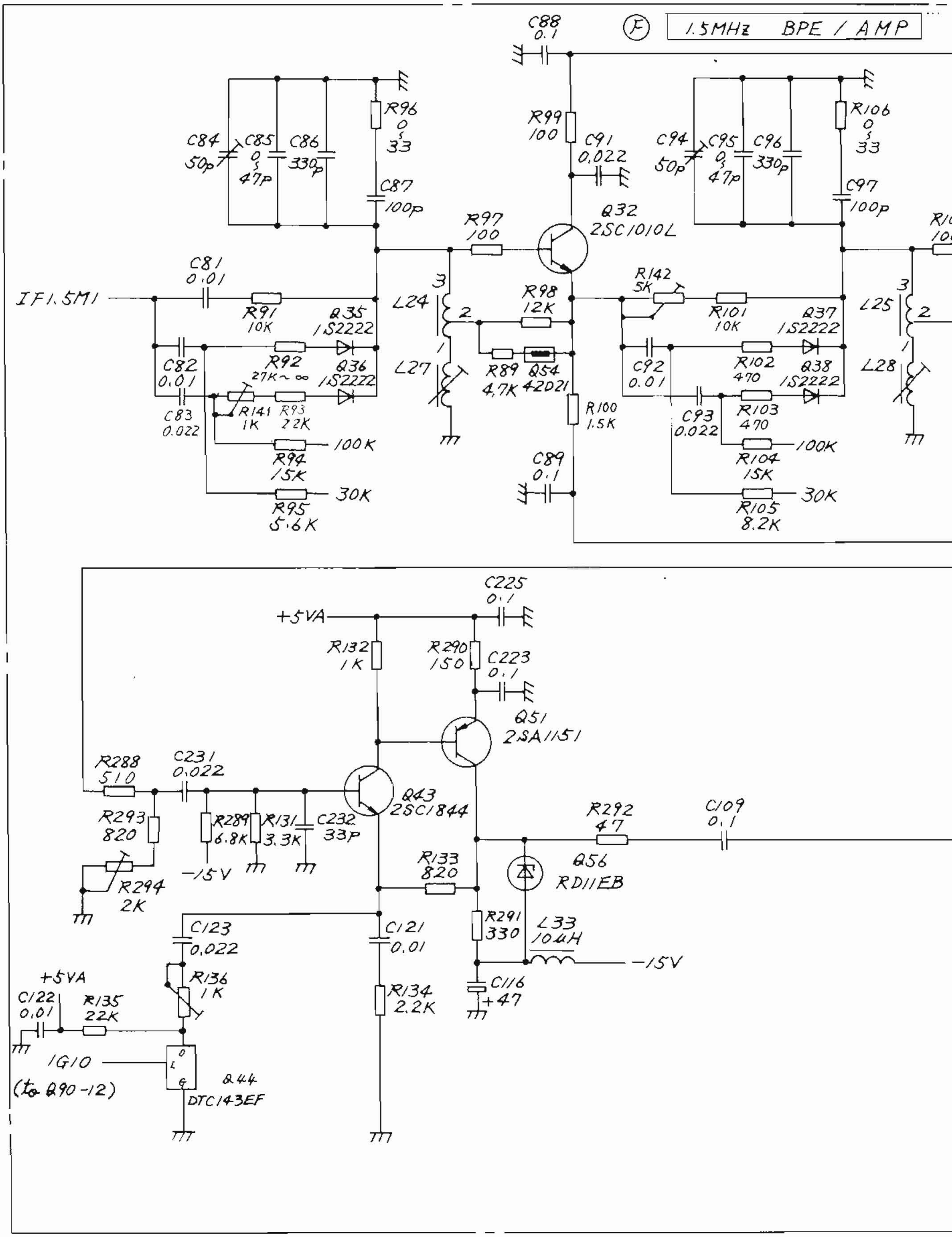


Fig. 5-58 (2/6) Z22 IF BPF/ AMP 1 Circuit Diagram (2/6) (43W33953)



F
1.5MHz BPE / AMP
C88 0.1
R96 0 ~ 33
C84 50p
C85 0 ~ 47p
C86 330p
C87 100p
R99 100
C91 0.022
Q32 2SC1010L
R97 100
C94 50p
C95 0 ~ 47p
C96 330p
R106 0 ~ 33
C97 100p
IF1.5M1
C81 0.01
R91 10K
Q35 1S2222
L24
L27
R98 12K
R89 4.7K
Q54 42D21
R142 5K
R101 10K
Q37 1S2222
L25
L28
C82 0.01
R92 27K~∞
Q36 1S2222
C83 0.022
R141 1K
R93 22K
R94 15K
100K
R95 5.6K
30K
R100 1.5K
C89 0.1
C92 0.01
R102 470
Q38 1S2222
C93 0.022
R103 470
R104 15K
100K
R105 8.2K
30K
C225 0.1
+5VA
R132 1K
R290 150
C223 0.1
Q51 2SA1151
R288 510
C231 0.022
Q43 2SC1844
R293 820
R289 6.8K
R131 3.3K
C232 33P
−15V
R294 2K
R292 47
C109 0.1
R133 820
Q56 RD11EB
C123 0.022
C121 0.01
R291 330
L33 10μH
−15V
R136 1K
C116 +47
R134 2.2K
+5VA
C122 0.01
R135 22K
1G10
(to Q90-12)
Q44
DTC143EF

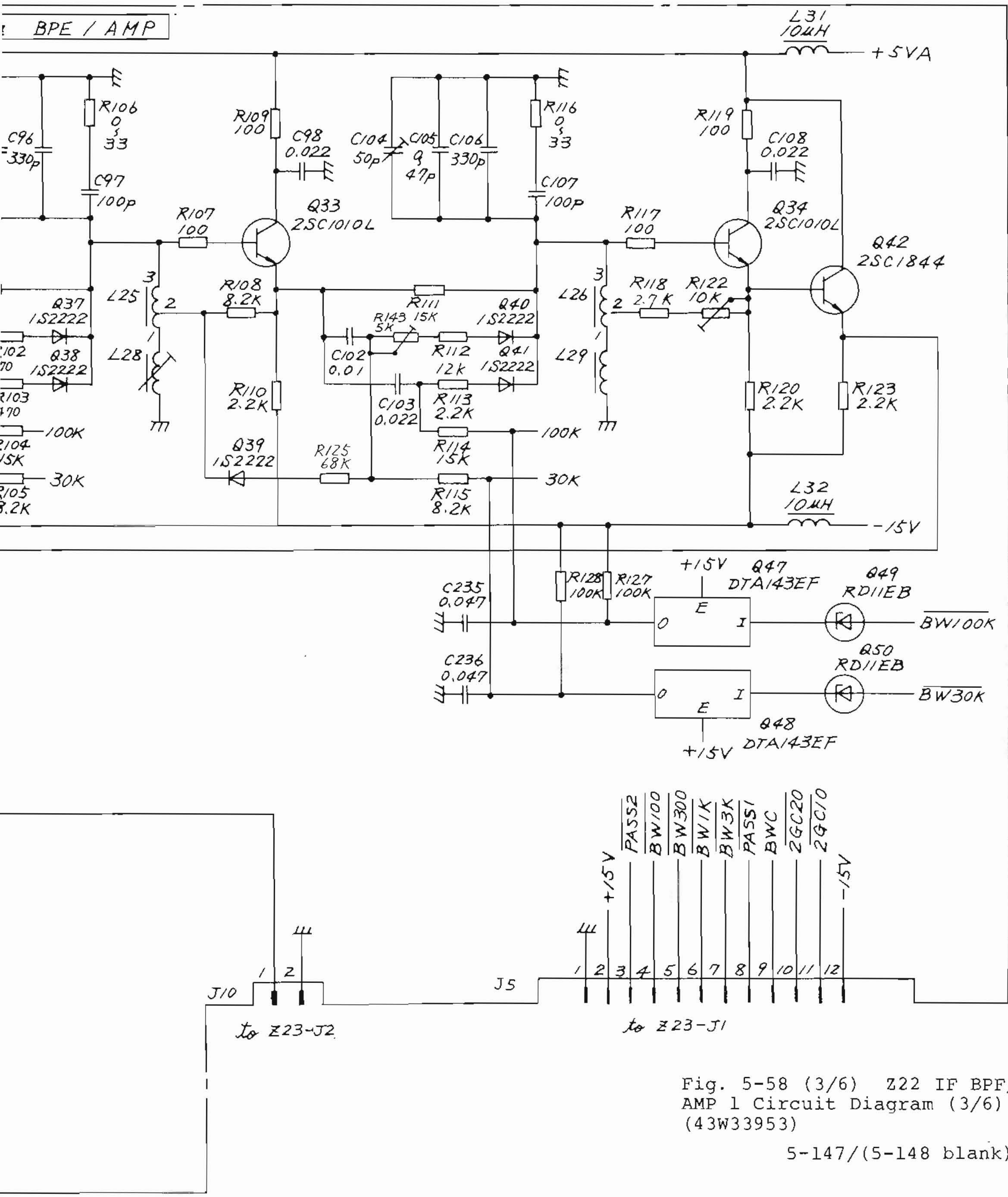
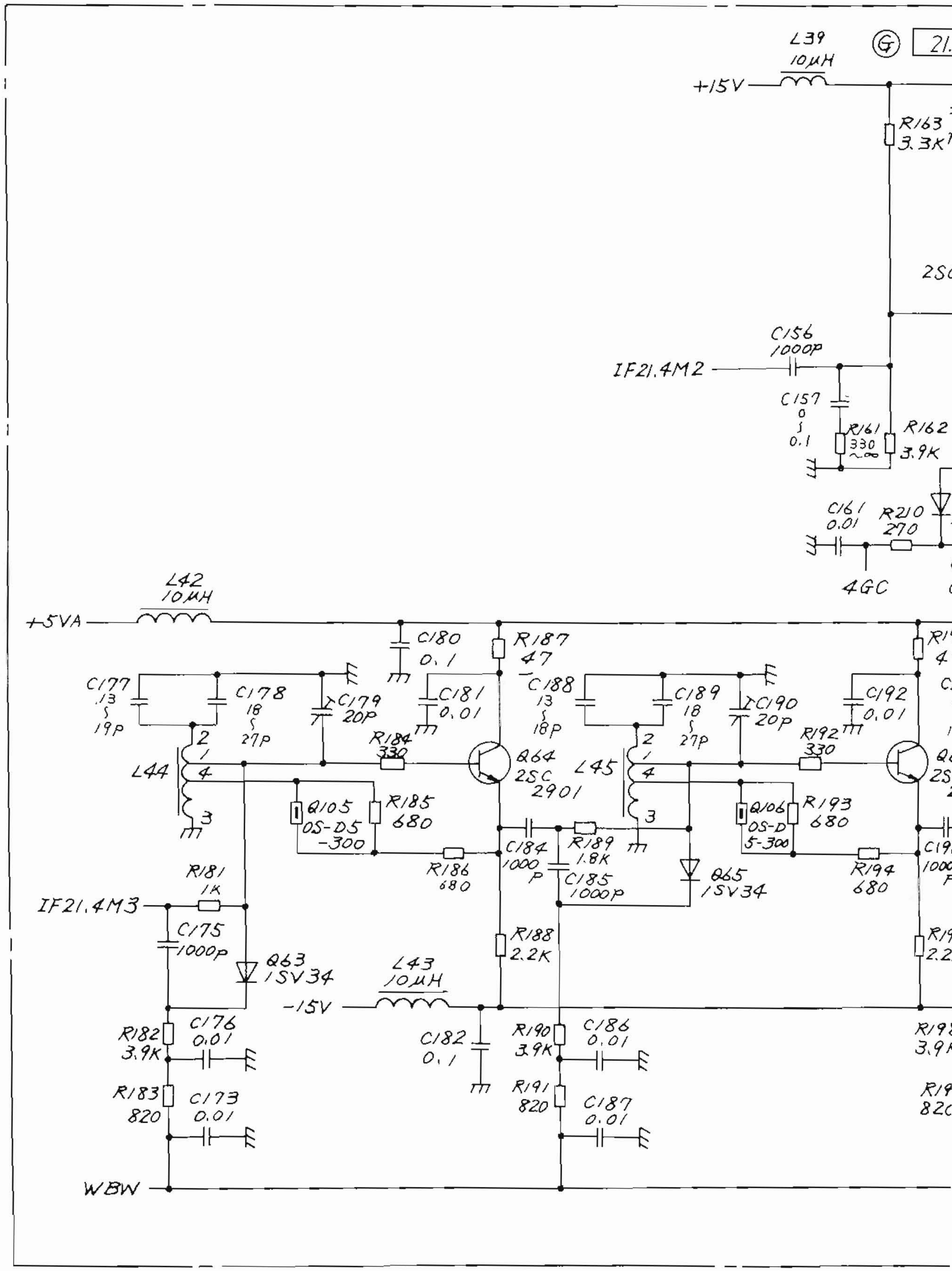


Fig. 5-58 (3/6) Z22 IF BPF/ AMP 1 Circuit Diagram (3/6) (43W33953)


L39
10μH
+15V
G
R163
3.3K
2SC
C156
1000P
IF21.4M2
C157
0
0.1
R161
330
R162
3.9K
C161
0.01
R210
270
4GC
L42
10μH
+5VA
C180
0.1
R187
47
C177
13
19P
C178
18
27P
C179
20P
C181
0.01
C188
13
18P
C189
18
27P
C190
20P
C192
0.01
R184
330
R192
330
Q64
2SC
2901
L44
L45
Q105
0S-D5
-300
R185
680
Q106
0S-D
5-300
R193
680
C184
1000
P
R189
1.8K
C185
1000P
Q65
1SV34
R186
680
R194
680
R181
1K
IF21.4M3
C175
1000P
Q63
1SV34
R188
2.2K
L43
10μH
-15V
C182
0.1
R182
3.9K
C176
0.01
R190
3.9K
C186
0.01
R183
820
C173
0.01
R191
820
C187
0.01
WBW

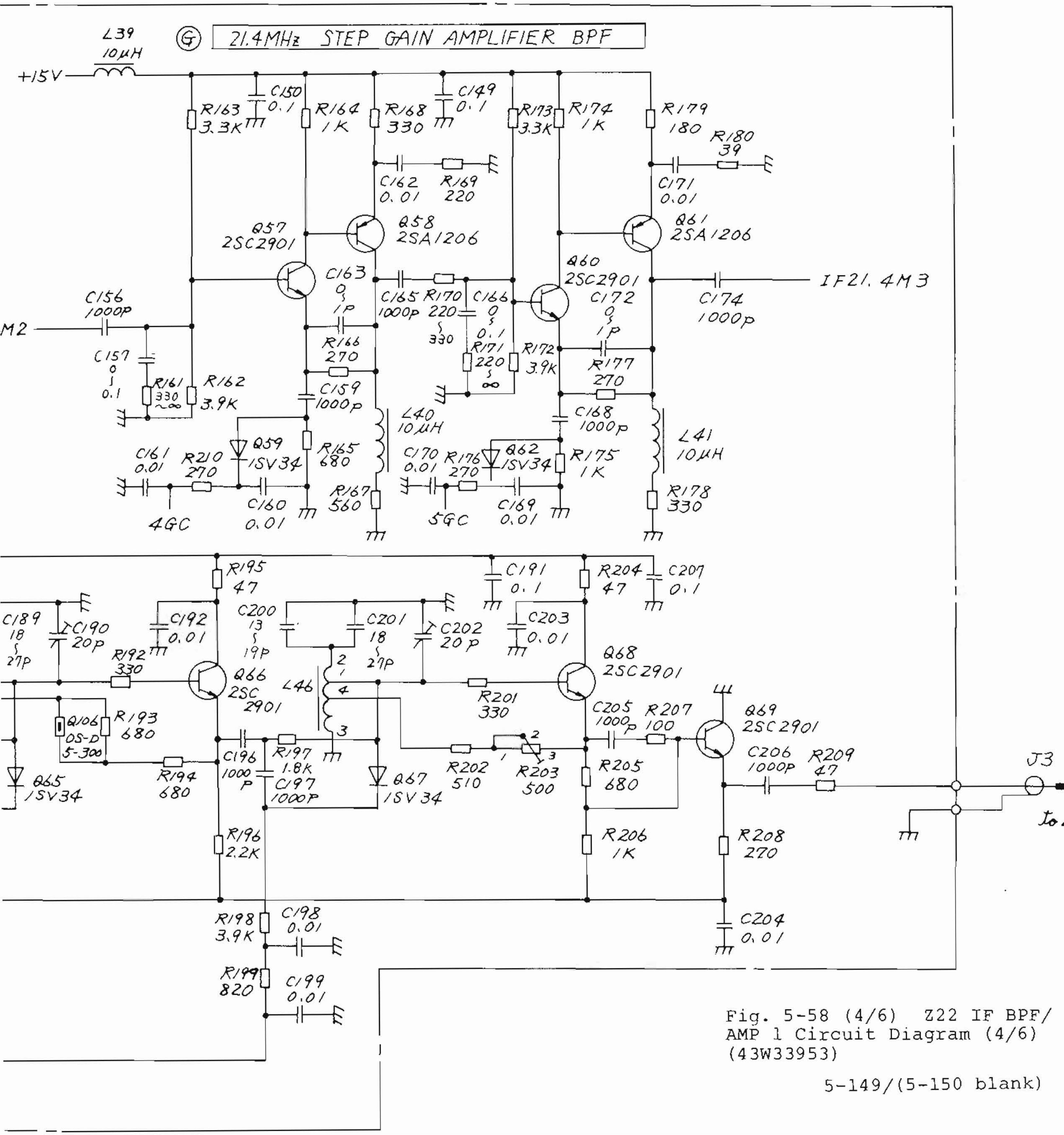


Fig. 5-58 (4/6) Z22 IF BPF/ AMP 1 Circuit Diagram (4/6) (43W33953)

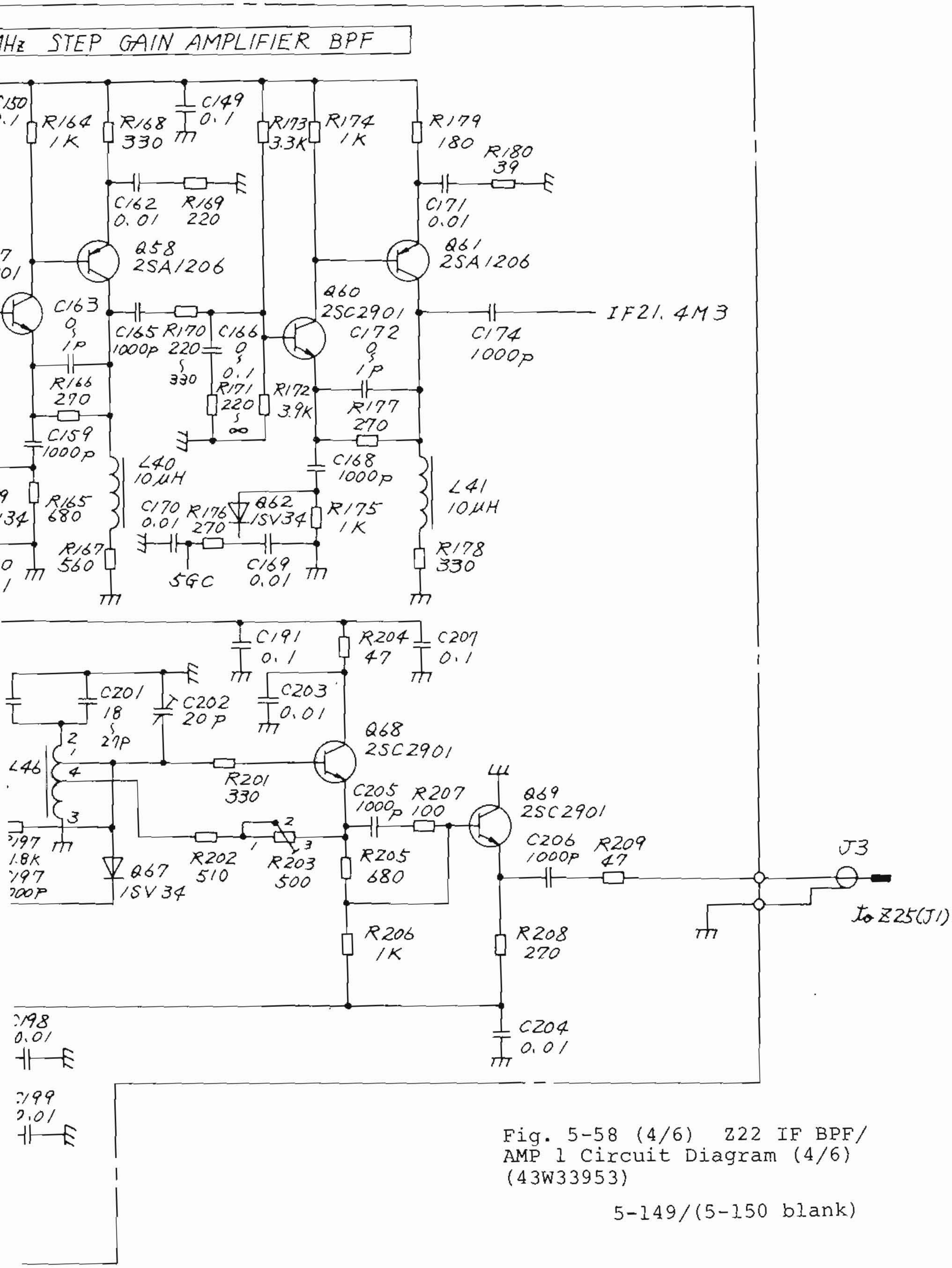
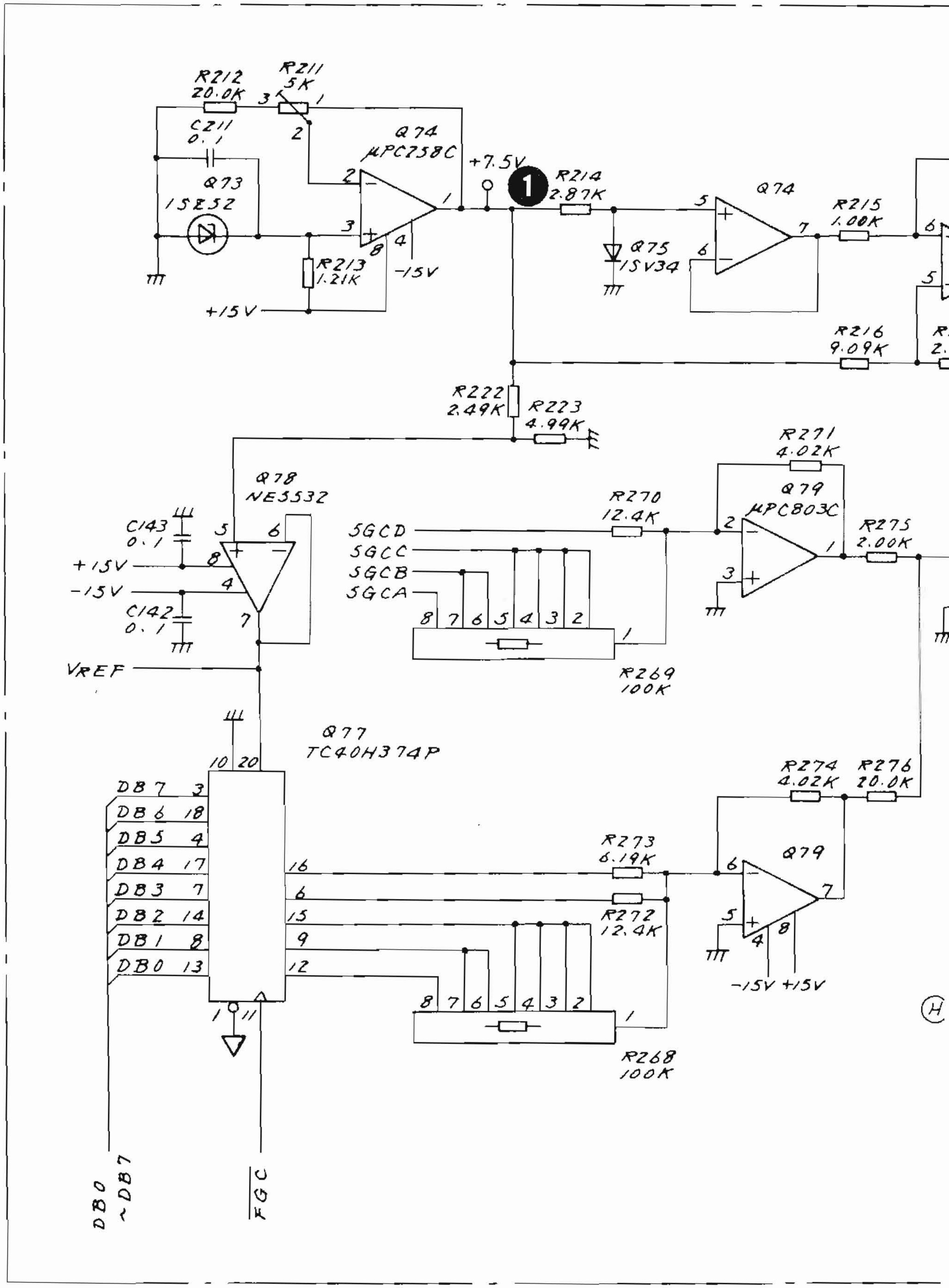


Fig. 5-58 (4/6) Z22 IF BPF/
AMP 1 Circuit Diagram (4/6)
(43W33953)


R212 20.0K
R211 5K
C211 0.1
Q73 1SZ52
Q74 μPC758C
+7.5V
1
R214 2.87K
Q74
R215 1.00K
Q75 1SV34
R213 1.21K
-15V
+15V
R216 9.09K
R222 2.49K
R223 4.99K
R271 4.02K
Q78 NE5532
Q79 μPC803C
C143 0.1
R270 12.4K
R275 2.00K
SGCD
SGCC
SGCB
SGCA
+15V
-15V
C142 0.1
R269 100K
VREF
Q77 TC40H374P
DB7
DB6
DB5
DB4
DB3
DB2
DB1
DB0
R274 4.02K
R276 20.0K
R273 6.19K
Q79
R272 12.4K
-15V +15V
R268 100K
DB0 ~DB7
FGC
H

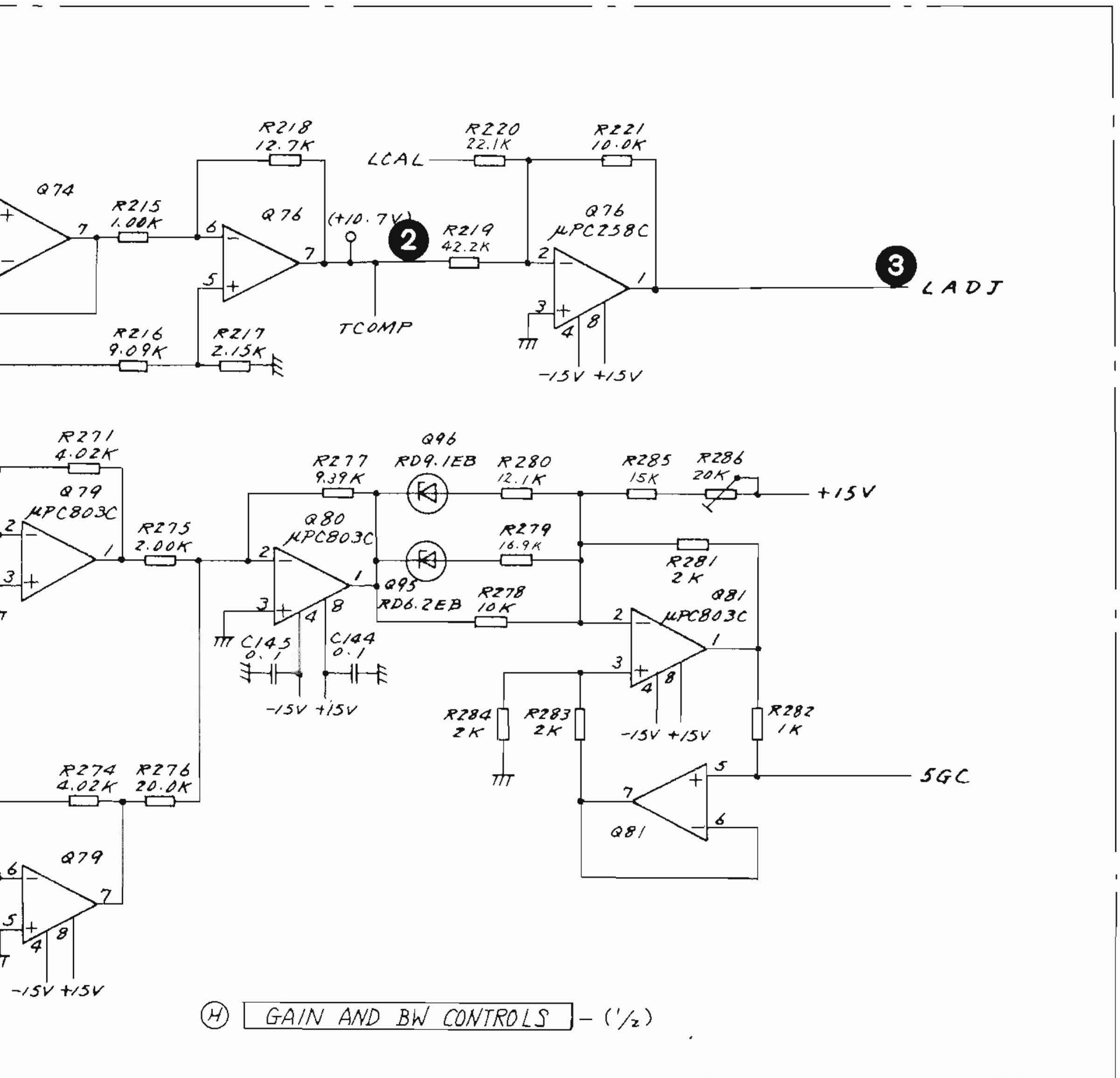
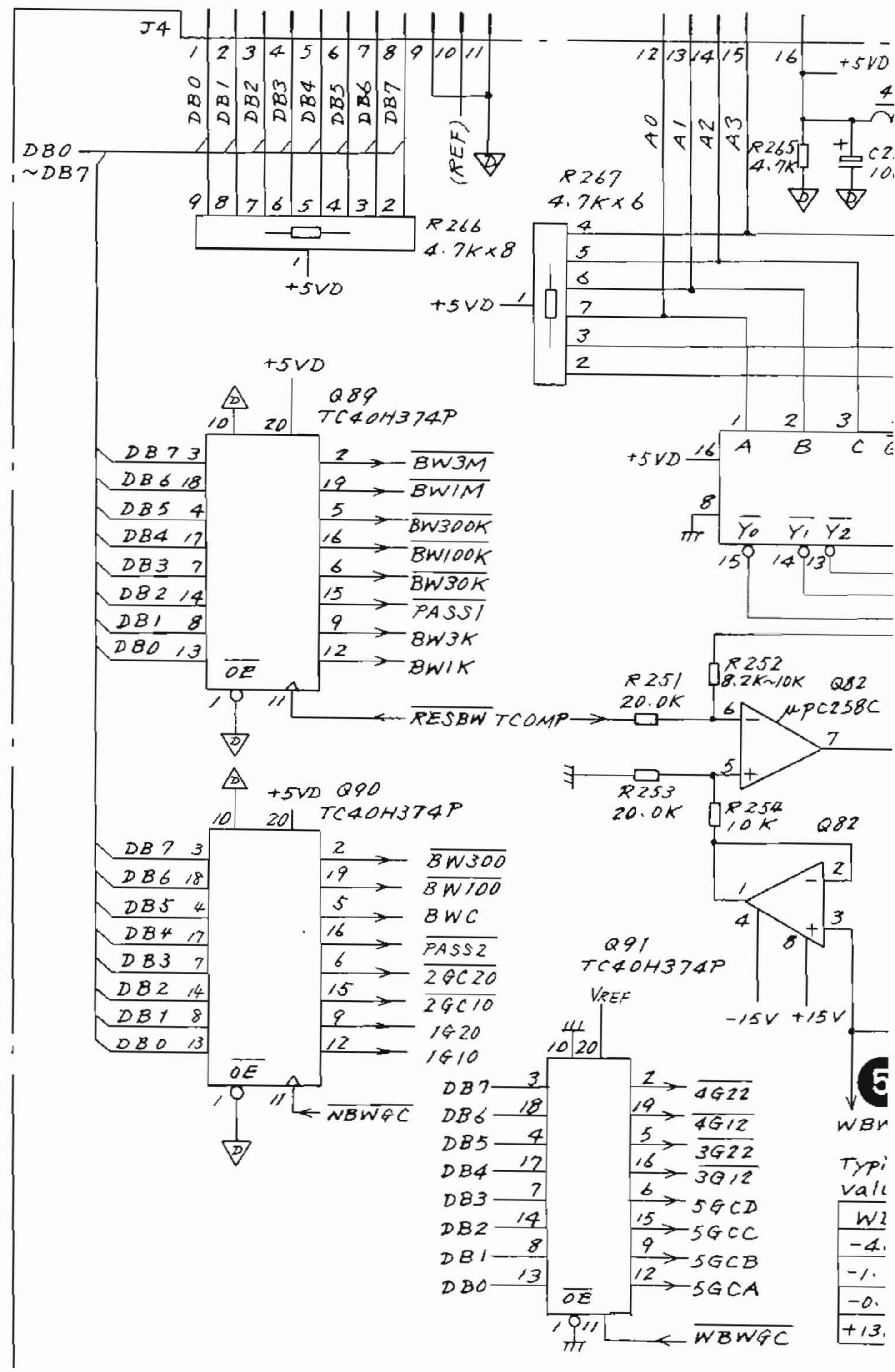
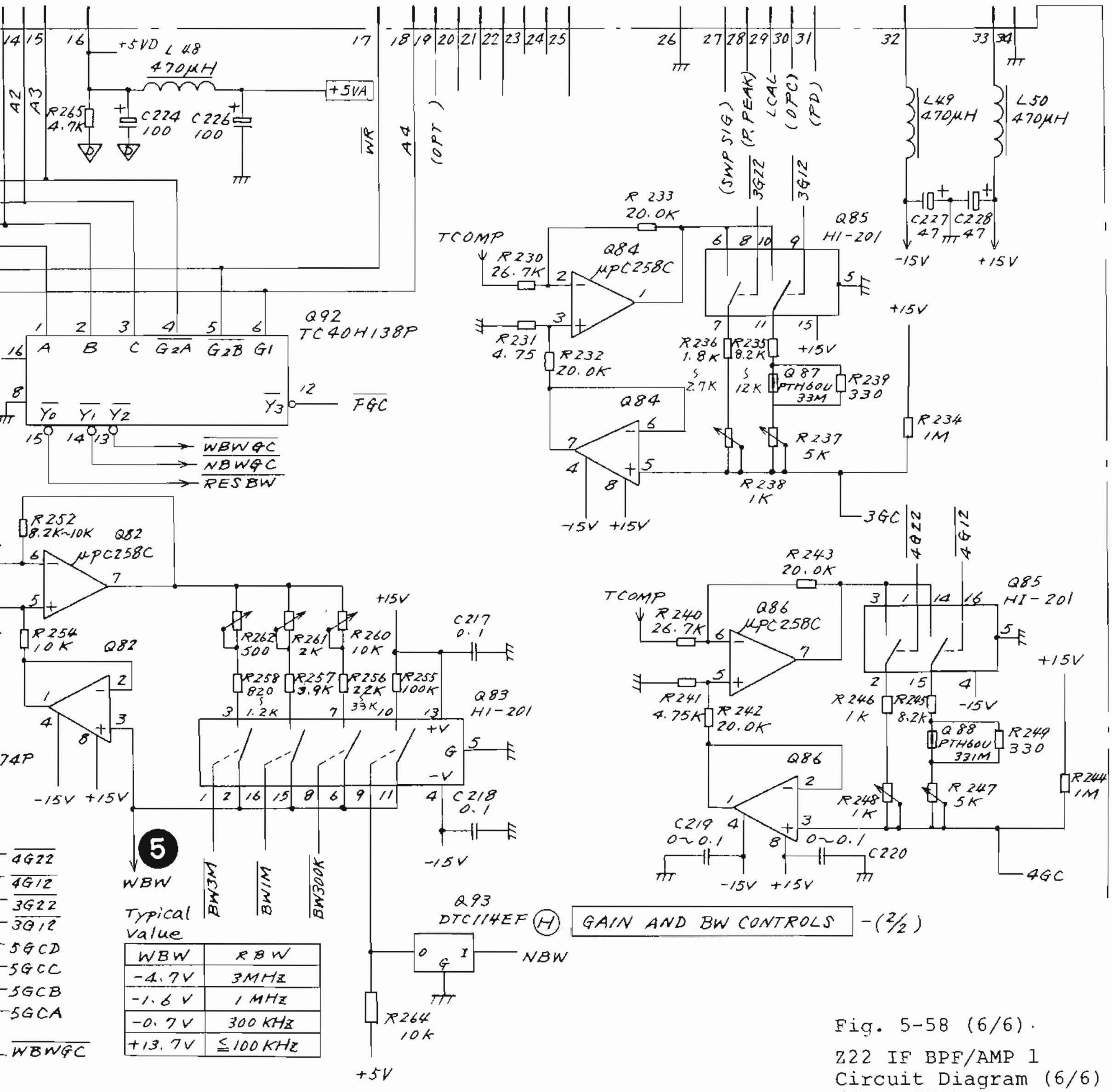


Fig. 5-58 (5/6) Z22 IF BPF/
AMP 1 Circuit Diagram (5/6)
(43W33953)

From Z26-J4


J4
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
(REF)
A0
A1
A2
A3
+5VD
R265
4.7K
R267
4.7K×6
DB0
~DB7
R266
4.7K×8
+5VD
+5VD
+5VD
Q89
TC40H374P
BW3M
BW1M
BW300K
BW100K
BW30K
PASS1
BW3K
BW1K
OE
RESBW
TCOMP
R251
20.0K
R252
8.2K~10K
Q82
μPC258C
R253
20.0K
R254
10K
Q82
A
B
C
Y0
Y1
Y2
+5VD
Q90
TC40H374P
BW300
BW100
BWC
PASS2
2GC20
2GC10
1G20
1G10
OE
NBWGC
Q91
TC40H374P
VREF
4G22
4G12
3G22
3G12
5GCD
5GCC
5GCB
5GCA
OE
WBWGC
-15V
+15V



Typical value

WBW	RBW
-4.7V	3MHz
-1.6V	1MHz
-0.7V	300KHz
+13.7V	≦100KHz

Fig. 5-58 (6/6)

Z22 IF BPF/AMP 1 Circuit Diagram (6/6) (43W33953)

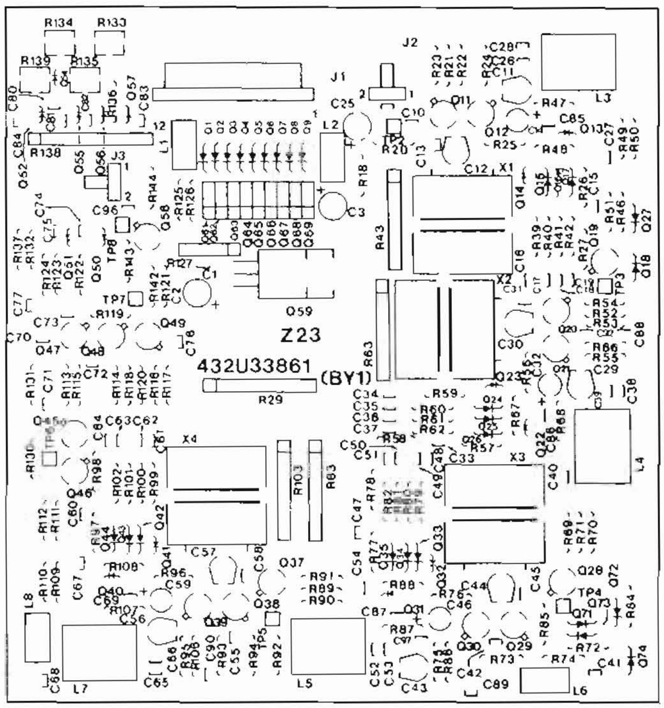
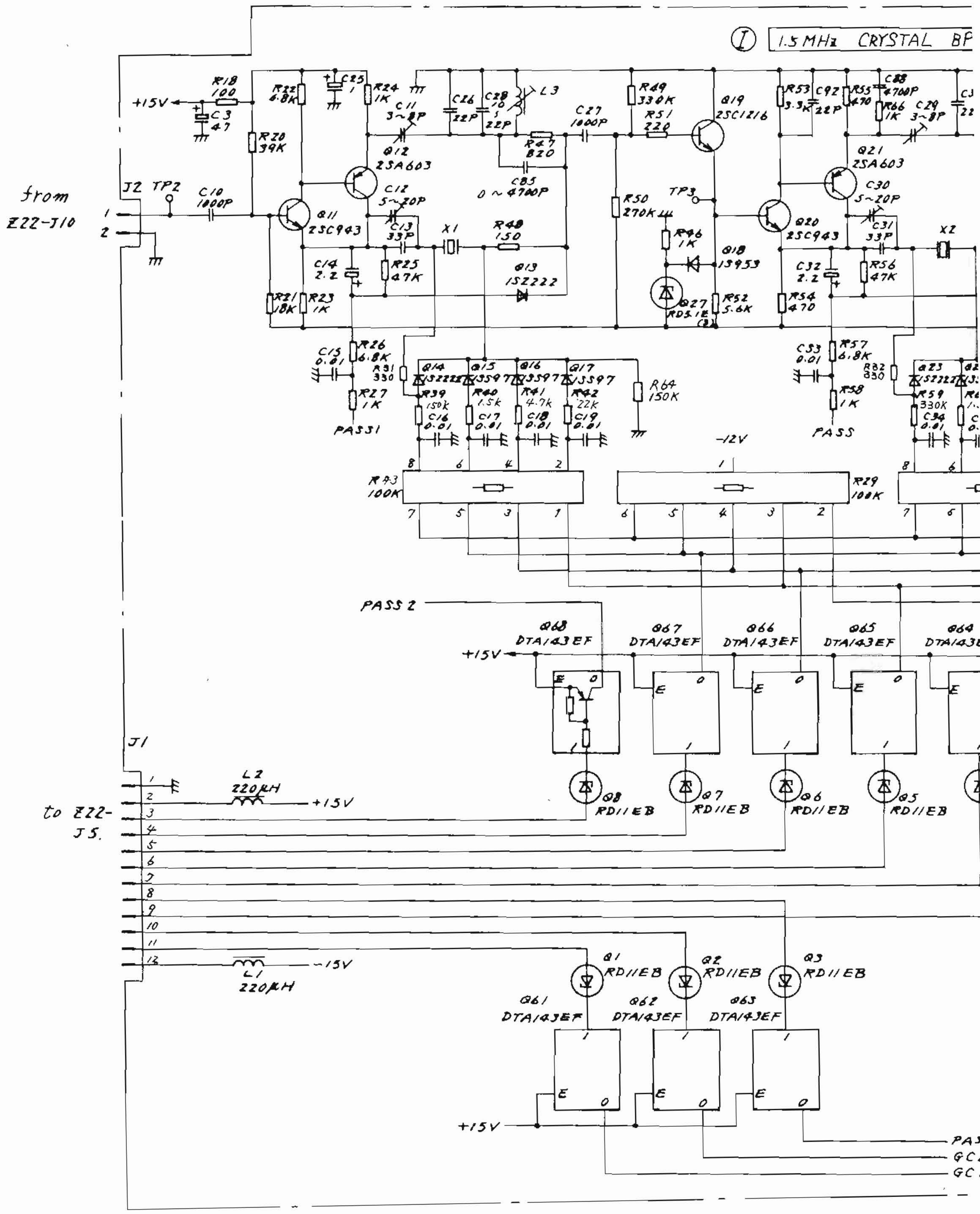
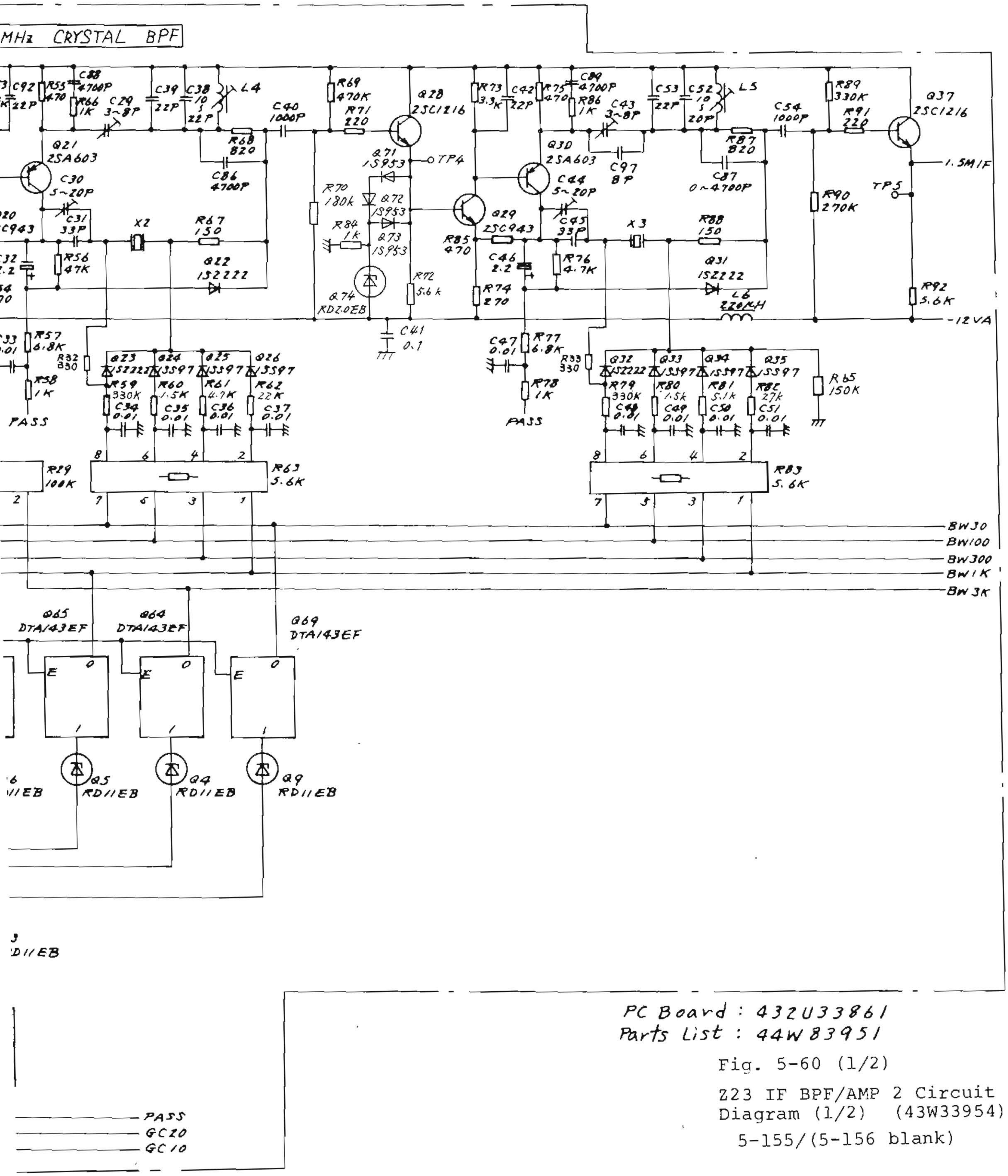


Fig. 5-59 Z23 Parts Layout



I 1.5MHz CRYSTAL BP
from
ZZ2-J10
J2 TP2
to ZZ2-
J5.
J1
+15V
-15V
-12V
R18 100
C3 47
R20 39K
R22 6.8K
C25 1
R24 1K
C10 1000P
Q11 2SC943
Q12 2SA603
C11 3~8P
C12 5~20P
C13 33P
C14 2.2
R25 47K
R21 18K
R23 1K
X1
R48 150
Q13 1S2222
C26 22P
C28 10 22P
L3
R47 820
C85 0~4700P
C27 1000P
R49 330K
R51 220
Q19 2SC1216
R50 270K
TP3
R46 1K
Q18 1S953
Q27 RD5.1E
R52 5.6K
R53 3.3K
C92 22P
R55 470
C88 4700P
R66 1K
C29 3~8P
Q21 2SA603
C30 5~20P
Q20 2SC943
C31 33P
X2
C32 2.2
R56 47K
R54 470
C15 0.01
R26 6.8K
R31 330
R27 1K
PASS1
Q14 1S2222
Q15 1S597
Q16 1S597
Q17 1S597
R39 150k
R40 1.5k
R41 4.7k
R42 22k
C16 0.01
C17 0.01
C18 0.01
C19 0.01
R64 150K
R43 100K
R29 100K
C33 0.01
R57 6.8K
R32 330
R58 1K
PASS
Q23 1S2222
R59 330K
C34 0.01
PASS 2
Q68 DTA143EF
Q67 DTA143EF
Q66 DTA143EF
Q65 DTA143EF
Q64 DTA143E
Q8 RD11EB
Q7 RD11EB
Q6 RD11EB
Q5 RD11EB
L2 220μH
L1 220μH
Q1 RD11EB
Q2 RD11EB
Q3 RD11EB
Q61 DTA143EF
Q62 DTA143EF
Q63 DTA143EF

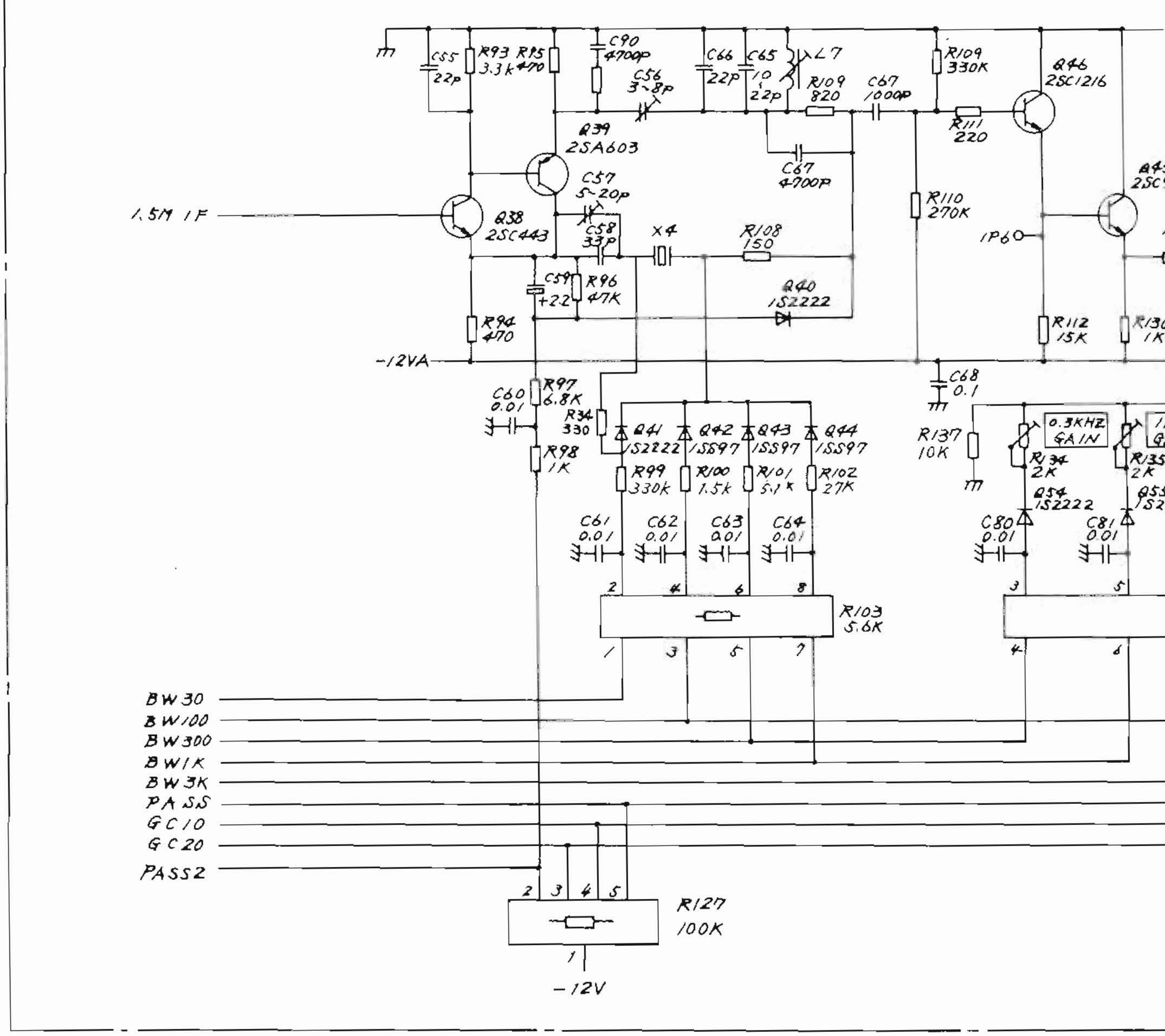


PC Board : 432U33861
Parts List : 44W83951

Fig. 5-60 (1/2)

Z23 IF BPF/AMP 2 Circuit Diagram (1/2) (43W33954)

1.5MHz X'tal BPF



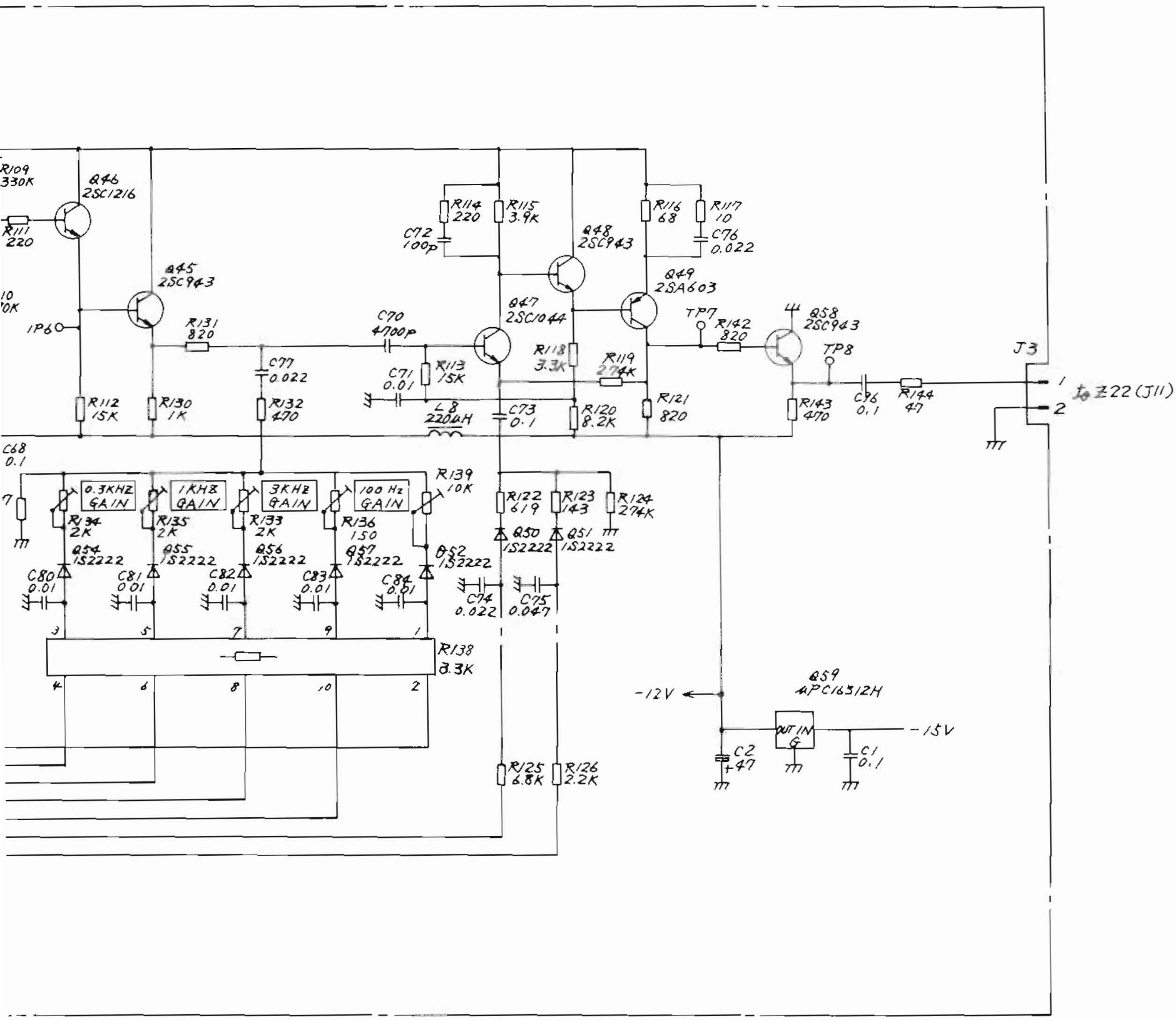


Fig. 5-60 (2/2)

Z23 IF BPF/AMP 2 Circuit Diagram (2/2) (43W33954)

5.11 Z24 LOCAL CONTROL 2 (MS710C/E only)

5.11.1 Circuit description - Z24

This circuit consists of a 100 kHz step PLL circuit of the synthesizer that generates the first local signal and an AFC loop that improves the sweep frequency linearity of the first local VCO of the 10 kHz to 30 MHz band.

Part A: 100 kHz step synthesizer

Latches Q2 and Q3 receive 10-bit frequency data sent from the Z26 CPU board and set the frequency division ratios for the 1/N programmable counters Q6 to Q8.

Decoder Q1 generates the chip selection signals of the latches Q2 and Q3 using CPU address data.

The 17.4 ±2 MHz REF VCO output signal sent from the Z21 local control 1 via J2 is amplified by amplifier Q11, frequency-divided in half by divider Q9, and sent to the 1/N programmable counters Q6 to Q8.

This 1/N output signal is compared to the 100 kHz reference signal by the phase frequency detector (PFD) Q13.

The PFD-detected voltage, which is amplified by dc amplifier Q14 and returned to the REF VCO in Z21 through sample hold Q15, controls the frequency of the REF VCO.

The Q15 is switched to the hold mode after the REF VCO frequency has been stabilized by the PLL.

Part B: AFC loop for low band local osc

The 521.4 to 551.4 MHz local signal for a 10 kHz to 30 MHz band that is sent from the Z28 low local 1 via J3 is frequency-divided by a factor of 640 by dividers Q45, Q24, and Q25. It is converted from frequency to voltage with a PCD consisting of the monostable multivibrator Q26 and current switches Q27 and Q28.

This output voltage is compared to the frequency control signal by dc amplifier Q29 and returned from J4 to the Z28 low local 1 oscillator via dc amplifiers Q32 and Q40.

5.11.2 Checking procedure - Z24

(1) 100 kHz step synthesizer check

Step	Procedure
1	Remove the shield case cover from the Z24 local control 2 according to Figs 2-1 and 2-5.
2	Set the MS710C/E as follows: . Frequency Band — 1.7 to 23 GHz . Center Frequency — 3 GHz . Span — 0 Hz/div
3	Measure the dc voltage at Q15-5 ❸ . The PLL circuit is normal when the measured value does not exceed ±5 V; is abnormal (PLL unlocked) when the value is close to the +15 or -15 V power source voltage.
4	Measure the frequency at Q13-3 ❶ . The 1/N programmable counter is normal when the measured value is 100 kHz.
5	Measure the frequency at Q12-9 ❷ . The reference signal is normal when the measured value is 100 kHz.

(2) AFC loop for low band local OSC check

Step	Procedure
1	Set the MS710C/E as follows: . Frequency band: 10 kHz to 30 MHz . Center frequency: 15 MHz . Span: 0 Hz/div
2	Measure the dc voltage at Q40-1 ❹. The circuit is normal when the measured value is within -2 to 0 V.
3	Set the signal generator as follows and connect the output signal to Z24-J3. . Frequency: 536.4 MHz . Output level: 0 dBm
4	Measure the frequency at Q26-1 ❺. The circuit between J3 and Q25 is normal when the measured value is 838.125 kHz.

5.11.3 Adjustment - Z24

(1) 100 kHz step synthesizer adjustment

This circuit requires no adjustment.

(2) AFC loop for low band local OSC adjustment

Step	Procedure
1	Remove the shield case cover of the Z24 local control 2 according to Figs. 2-1 and 2-5.
2	Disconnect connector Z24-J6 and strap pins 1 and 2.
3	Disconnect the Z24-YTO C (R75).
4	Set the MS710C/E as follows: Frequency band : 10 kHz to 30 MHz Connect the signal generator to the MS710[ ] RF INPUT connector and set the following: Frequency : 15 MHz Output level : 0 dBm Check that the input signal spectrum is displayed on the MS710C/E CRT.
5	Set the signal generator frequency to 30 MHz.
6	Set the MS710C/E as follows: Frequency band : 10 kHz to 30 MHz Center frequency : 0 Hz Span : 1 MHz/div Adjust R83 to set the zero beat to the CRT center.

(cont.)

Step	Procedure
7	Set the MS710C/E center frequency to 30 MHz and adjust R42 to set the 30 MHz spectrum to the CRT center.
8	Repeat steps 6 and 7 to confirm that the 0 and 30 MHz center frequencies have not shifted from the CRT center by more than 1 MHz.
9	Connect the Z24-YTO C (R75) and connector Z24-J6.
10	Set the MS710C/E center frequency and signal generator frequency to 15 MHz. Switch the MS710C/E span setting to 51 and 50 kHz/div alternately, and adjust R58 so that the spectrum waveforms correspond on the CRT overlap each other.
(SPAN	Adjustment)
11	Set the MS710C/E and signal generator as follows: (1) MS710C/E Frequency band : 10 kHz to 30 MHz Center frequency : 15 MHz Span : 3 MHz/div (2) Signal Generator Frequency : 15 MHz Output Level : 0 dBm
12	Adjust R36 so that the spectrum waveform is moved to the right or left edge of the CRT screen when the half-screen shift key (《 ,) is used.
13	Set the MS710C/E span to 100 kHz/div and adjust R40 in the same way as step 12.

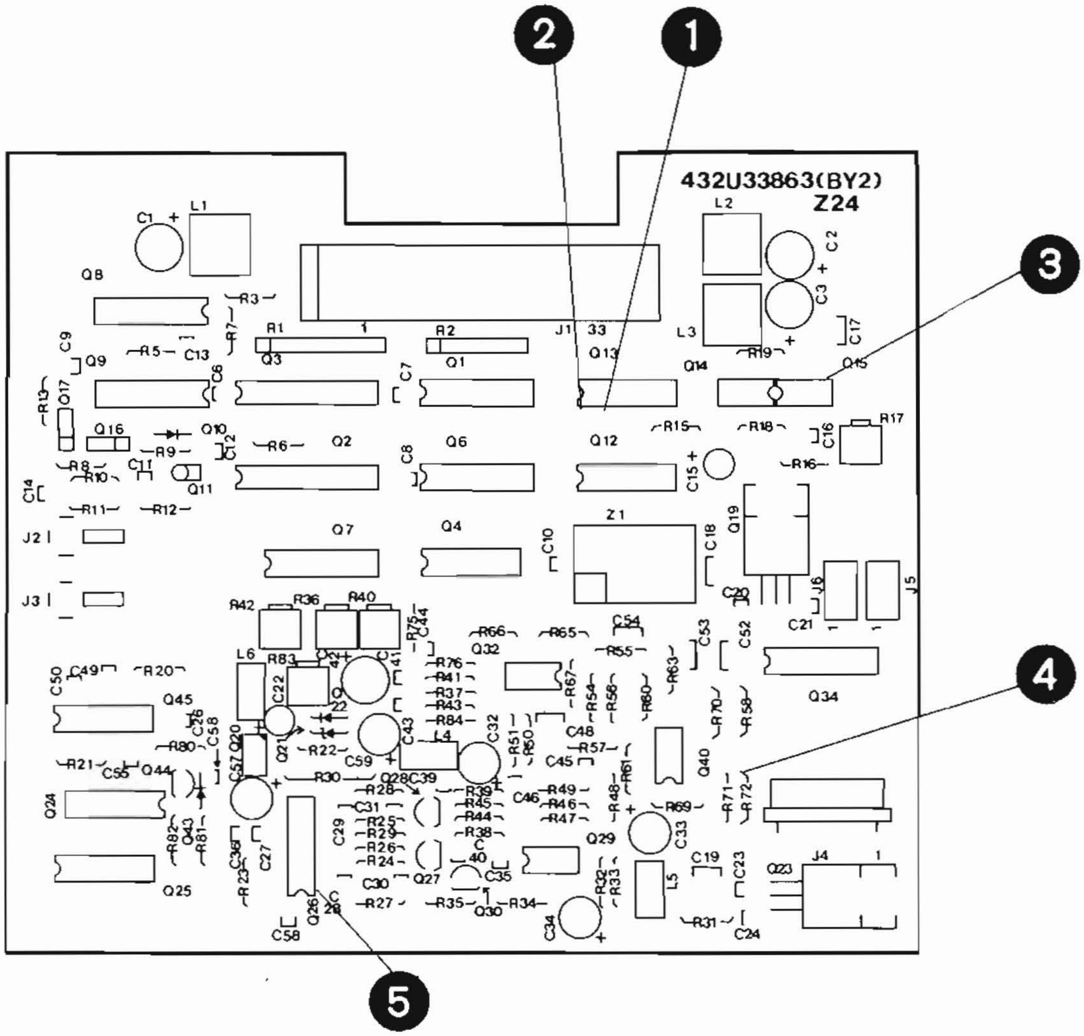
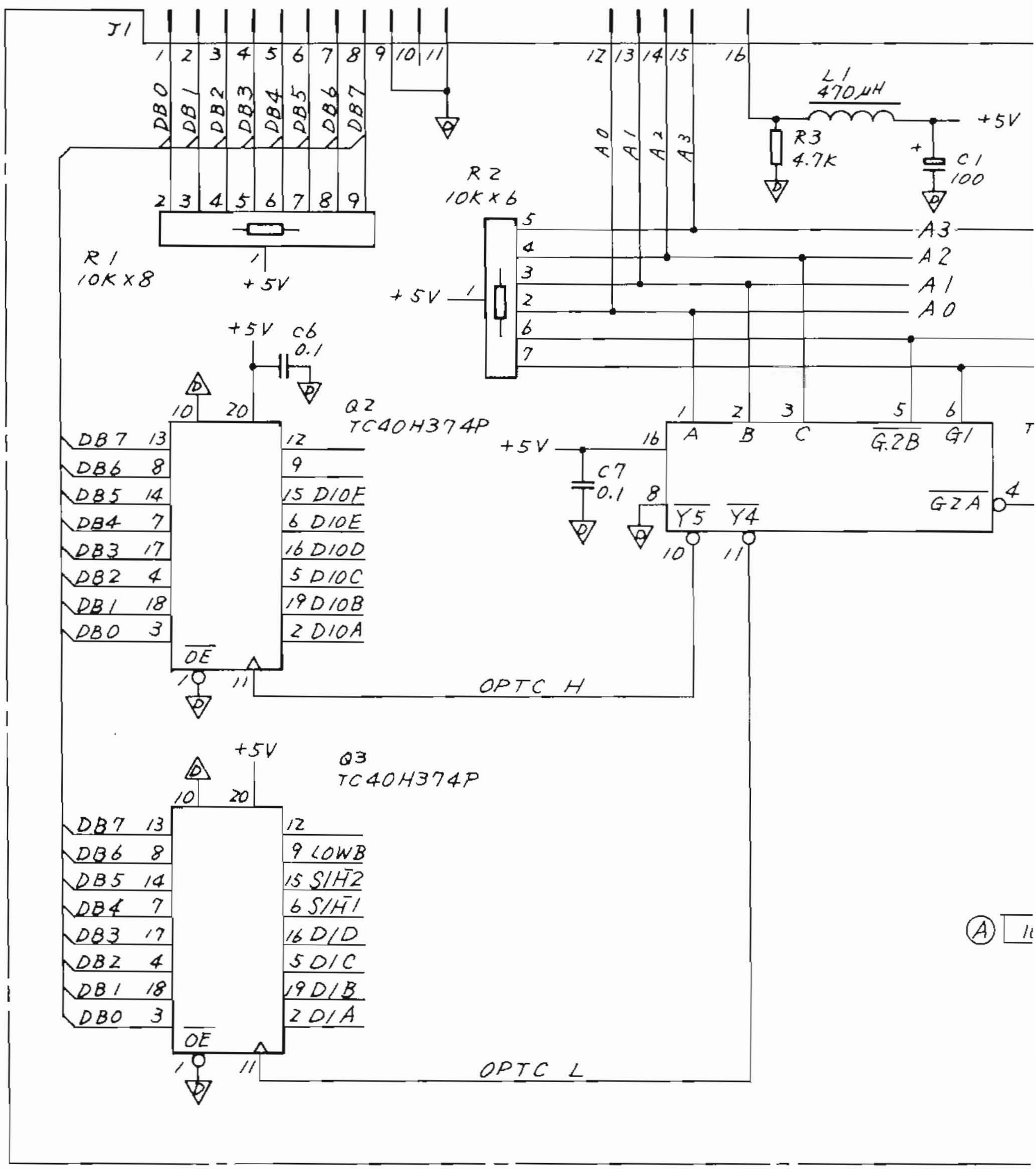


Fig. 5-61 Z24 Parts Layout



Pc Board: 432U33863
Parts List: 44W83952

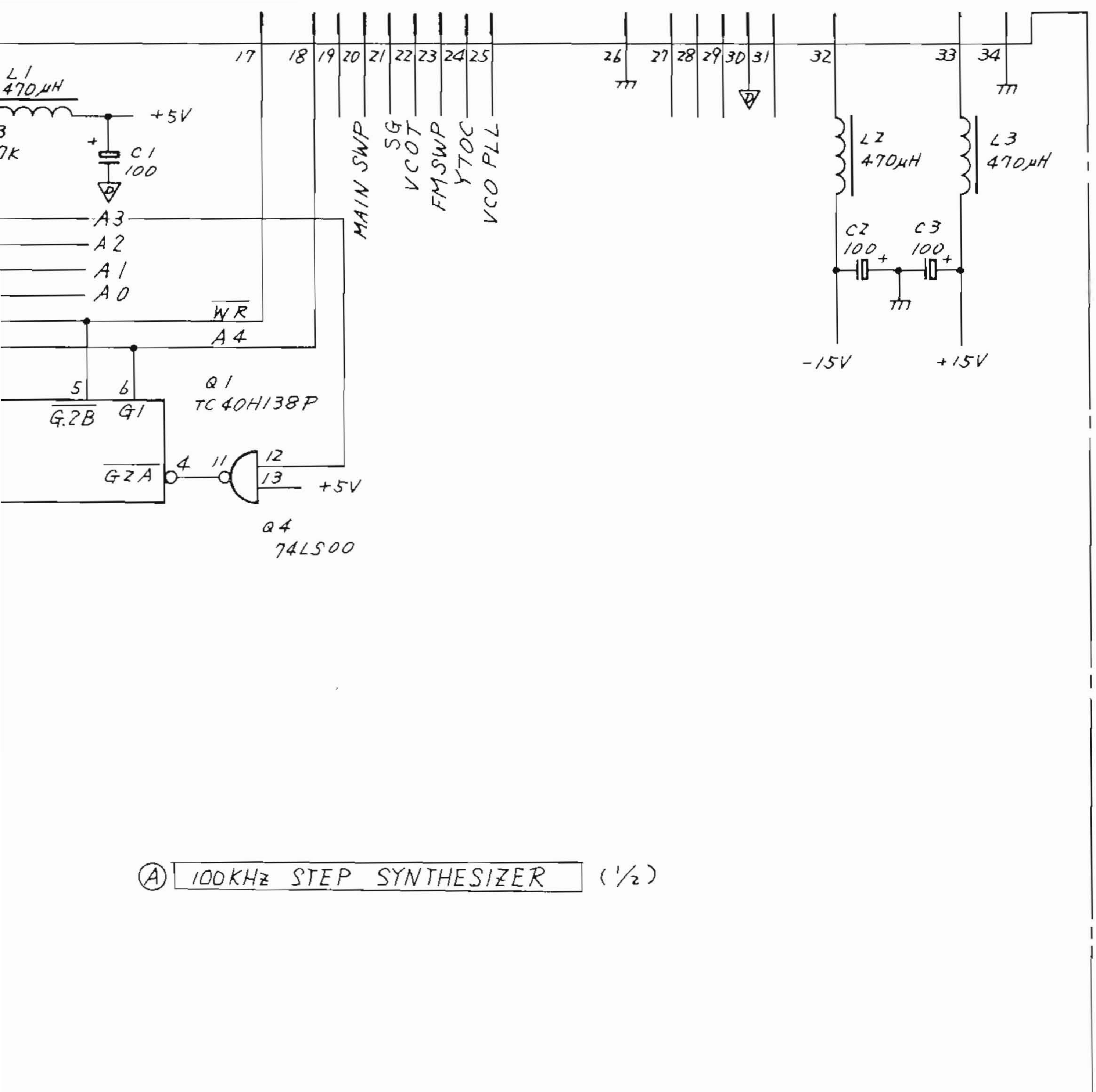
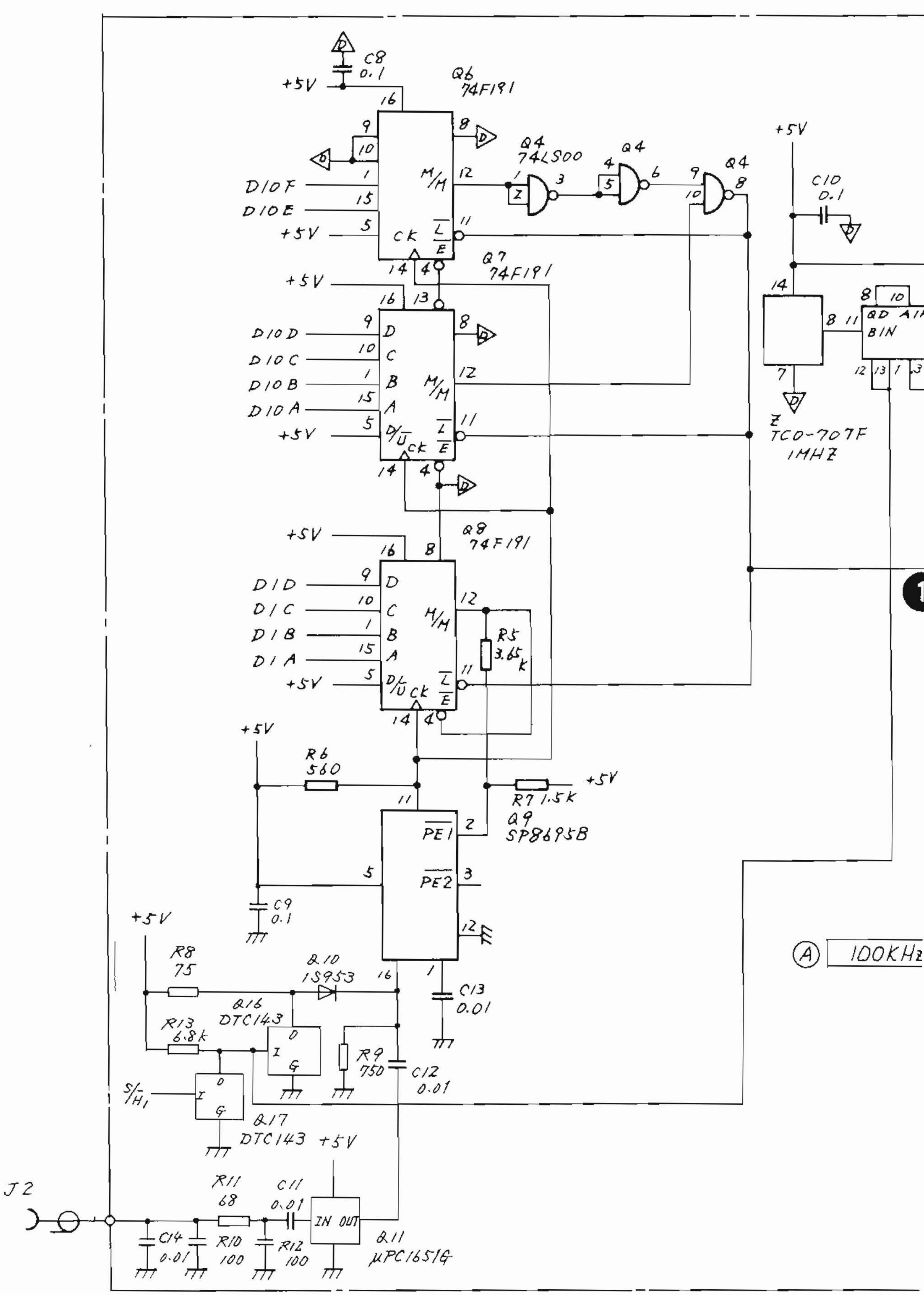


Fig. 5-62 (1/3) Z24 LOCAL CONTROL 2 Circuit Diagram (1/3) (43W33955)



C8
0.1
+5V
Q6
74F191
D10F
D10E
M/H
CK
L/E
Q4
74LS00
Q7
74F191
D10D
D10C
D10B
D10A
D/U
C10
0.1
TCO-707F
1MHZ
QD
BIN
Q8
74F191
D1D
D1C
D1B
D1A
R5
3.65k
R6
560
R7 1.5K
Q9
SP8695B
PE1
PE2
C9
0.1
C13
0.01
R8
75
Q10
1S953
Q16
DTC143
R13
6.8k
R9
750
C12
0.01
S/H1
Q17
DTC143
100KHz
J2
R11
68
C11
0.01
IN OUT
C14
0.01
R10
100
R12
100
Q11
μPC1651G

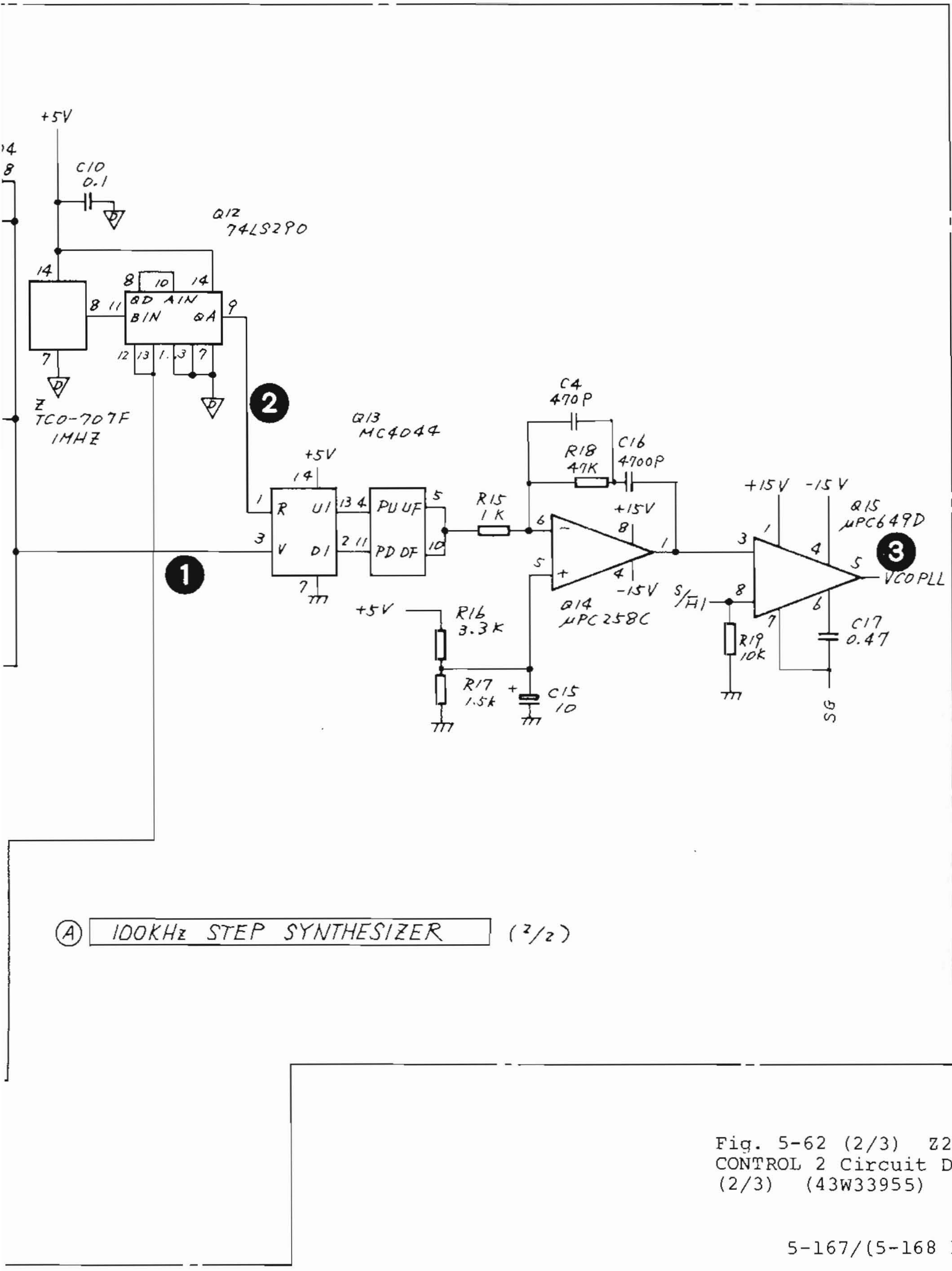
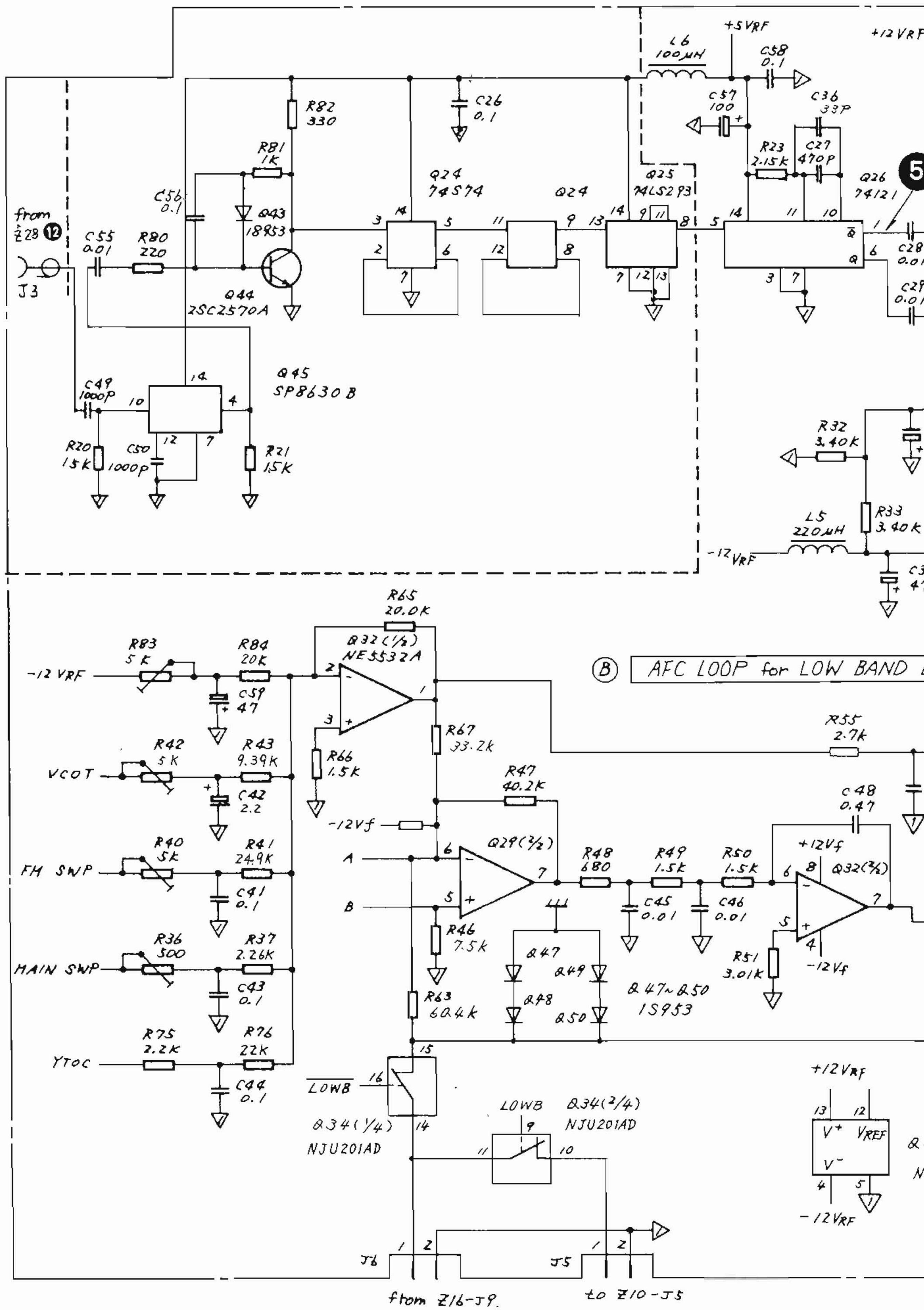


Fig. 5-62 (2/3) Z24 LOCAL CONTROL 2 Circuit Diagram (2/3) (43W33955)



+5VRF
+12VRF
L6 100μH
C58 0.1
C57 100
C36 33P
C27 470P
R23 2.15k
Q26 74121
5
R82 330
C26 0.1
R81 1k
Q24 74S74
Q24
Q25 74LS293
C56 0.1
Q43 1S953
from Z28 12
C55 0.01
R80 220
J3
Q44 2SC2570A
C28 0.01
C29 0.01
Q45 SP8630B
C49 1000P
R20 15k
C50 1000P
R21 15K
R32 3.40K
R33 3.40K
L5 220μH
-12VRF
R65 20.0K
Q32(1/2) NE5532A
R83 5K
R84 20K
C59 47
B
AFC LOOP for LOW BAND
R67 33.2K
R66 1.5K
R55 2.7k
R42 5K
R43 9.39K
C42 2.2
VCOT
R47 40.2K
C48 0.47
-12Vf
R40 5K
R41 24.9K
C41 0.1
FM SWP
A
B
Q29(1/2)
R48 680
R49 1.5k
R50 1.5k
+12Vf
Q32(2/2)
C45 0.01
C46 0.01
R46 7.5k
R51 3.01K
-12Vf
R36 500
R37 2.26K
C43 0.1
MAIN SWP
Q47
Q49
Q48
Q50
Q47~Q50 1S953
R63 60.4k
R75 2.2K
R76 22K
YTOC
C44 0.1
LOWB
Q34(1/4) NJU201AD
LOWB
Q34(2/4) NJU201AD
+12VRF
V+ VREF
V-
-12VRF
J6
J5
from Z16-J9.
to Z10-J5

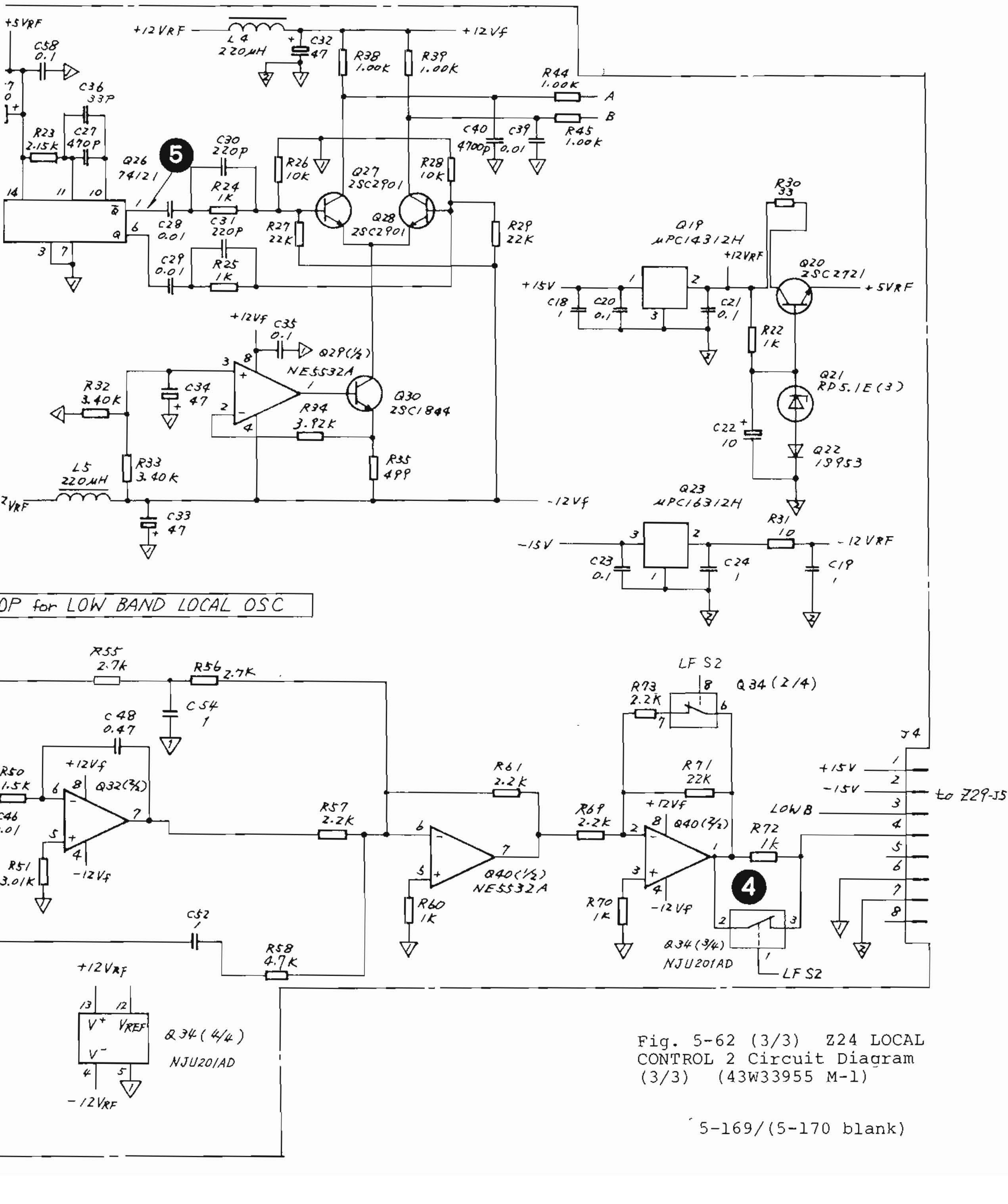


Fig. 5-62 (3/3) Z24 LOCAL CONTROL 2 Circuit Diagram (3/3) (43W33955 M-1)

5.12 Z25 LOG/LIN AMP DETECTOR

5.12.1 Circuit description - Z25
(Refer to Fig. 3-3 (2/4) and Fig. 5-64)

This PC board includes a log amplifier having 70 dB linearity for 21.4 MHz IF signals, a detector for envelope detection of 21.4 MHz IF signals, a video filter that restricts video signal bandwidth, a variable attenuator circuit, and an offset circuit for switching of CRT display sensitivity.

The Z25 circuit is divided into the 4 parts (A) to (D) shown in Fig. 5-64, and the circuit description for each part is as follows:

Part (A): 21.4 MHz LOG/LIN AMP

The 70 dB log amplifier consists of seven log amplifier stages having the same structure; 10 dB linearity is available for each stage.

When the MS710[ ] is used in the linear display mode, this circuit operates as the linear amplifier. Its gain can be switched in three steps in units of 10 dB by switching bias current.

Part (B): DETECTOR AND OFFSET CIRCUIT

The log amplifier output passes through the Q90 and Q91 buffer amplifiers and is detected by the envelope detector circuit that consists of Q95, Q96, and Q97.

Then the video signals in this output are filtered out. A part of the 21.4 MHz IF signals passing through the log amplifier is output to the rear panel through J2.

The video signal, buffered and added with offset voltage to set the reference levels by using the Q101 high-speed OP amplifier, is sent to the video filter circuit.

Part (C): VIDEO FILTER AND SCALE SELECTOR

The video filter is an RC LPF circuit and its cutoff frequency can be switched by the control signals sent from the Z26 CPU board through the Q119 latch. The video signal passing through the Q113 buffer amplifier is adjusted according to the CRT display scale value (10, 5, 2, and 1 dB/div) by the variable attenuator consisting of R196 to R200, Q115, and Q133.

This video signal is passed through the Q135 analog switch and Q136 buffer amplifier and then output to the Z26 CPU board.

The Q134 sample & hold and Q135 switching circuits are used to prevent unnecessary response from being generated in video output when the harmonic mixing is changed during a single sweep. These circuits are also used to eliminate unnecessary components when the sweep frequency exceeds the end of the frequency band.

A part of the video signal is also output to the rear panel through the Q137 buffer amplifier and J4.

Part (D): CONTROL CIRCUIT

Q118, Q119, and Q120 are used as the latch and address decoder that receives control signals from the Z26 CPU board. (See paragraph 5.13).

5.12.2 Checking procedure - Z25

Step	Procedure
1.	Remove the top cover and the PC board cover plate 15 . See Figs. 2-1 and 2-5.
2.	Remove the Z33-J3 connected to the Z25-J1 and input the 21.4 MHz, +4 dBm signal to the Z25-J1 from a signal generator.
3.	Turn on the MS710C power switch and set the CENTER FREQ to 3 GHz and the REFERENCE LEVEL to -40 dBm. In this case, a horizontal-line-shaped trace should be displayed near the Reference Level (uppermost scale) on the CRT when the MS710[ ] operation is normal.
4.	The correct 21.4 MHz IF OUTPUT level on the rear panel is -6 ±1 dBm, and the correct VIDEO OUTPUT value is +4 V. If the VIDEO OUTPUT is normal but display in step 3 is abnormal, circuits Z26 to Z34 are faulty. If the IF OUTPUT is normal but the VIDEO OUTPUT is abnormal, the circuit between Parts B and C following the envelope detector is faulty. In this case, go to step 9.
5.	Switch the Vertical Scale to LIN. In this case, both the screen display and IF OUTPUT vary only slightly, but they are normal.

Step	Procedure
6.	Reducing the signal generator level from +4 dBm to -6 dBm, -16 dBm, -26 dBm, and -36 dBm in steps of 10 dB, set the MS710[ ] reference level to -50, -60, -70, and -80 dBm corresponding to the step changes above and confirm that the IF OUTPUT level drops by 10 dB then returns to the original level in each change of the level. If the above check is all right, the operations of the linear amplifier in Part A are normal.
7.	Return the Vertical Scale to 10 dB/div, the Reference Level to -40 dBm, and the signal generator output level to +4 dBm. Finely adjust the output level of the signal generator and match the spectrum trace to the uppermost scale.
8.	When the signal generator output is reduced from the level in step 7 in 10 dB steps, the 21.4 MHz IF OUTPUT level on the rear panel and the CRT display should be as follows:

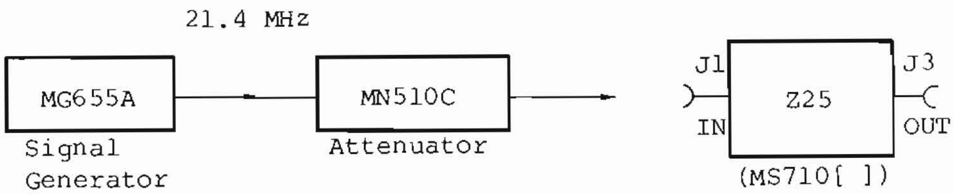
Signal generator level		IF OUTPUT		Display
Standard value	(+4 dBm)	-5.6 dBm	(0 dB)	REFERENCE LEVEL
-10 dB	(-6 dBm)	-6.8 dBm	(-1.2 dB)	-10 dB
-20 dB	(-16 dBm)	-8.1 dBm	(-2.5 dB)	-20 dB
-30 dB	(-26 dBm)	-9.7 dBm	(-4.1 dB)	-30 dB
-40 dB	(-36 dBm)	-11.6 dBm	(-6.0 dB)	-40 dB
-50 dB	(-46 dBm)	-14.1 dBm	(-8.5 dB)	-50 dB
-60 dB	(-56 dBm)	-17.6 dBm	(-12.0 dB)	-60 dB
-70 dB	(-66 dBm)	-23.7 dBm	(-18.1 dB)	-70 dB

Step	Procedure
9.	Turn off the power switch of the MS710[ ]. Using the service kit extender cable for J51, remove the Z25 PC board by pulling it up.

(cont.)

Step	Procedure
10.	Set as explained in Steps 2 and 3.
11.	Check the TP3 voltage using an oscilloscope or a digital voltmeter. When the voltage is approximately +4 V, the detector circuit in Part B is normal.
12.	Reduce the output level of the signal generator by 60 dB to -56 dBm and confirm that the TP3 voltage changes to approximately 1 V.
13.	After checking that the TP2 voltage is -5 V, vary the MS710C REFERENCE LEVEL from -40 dBm to -50 dBm, -60 dBm, ..., and -100 dBm in steps of 10 dB and check that the TP3 voltage increases by 0.5 V each and every time.
14.	Set the signal generator level so that the TP3 voltage is +4 V. Then check the voltage of TP4 (0 V), TP5 (0 V), and TP6 (+4 V).
15.	To check the VIDEO FILTER, use a low frequency oscillator to apply a signal from 0.1 Hz to 5 MHz to checkpoint ❶. Set the MS710[ ] VIDEO FILTER to 1 Hz to 3 MHz, measure the TP6 output using an oscilloscope, and check the video filter cutoff frequency.

5.12.3 Adjustment - Z25



(1) LOG Amplifier Tuning Adjustment

Step	Procedure
1.	Set the attenuation of the MN510C to 0 dB.
2.	Connect a digital voltmeter to TP3.
3.	Adjust C7, C17, C27, C37, C47, C57, and C67 so that the reading on the digital voltmeter is at a maximum.

(2) Reference Voltage Adjustment

Step	Procedure
1.	Connect the digital voltmeter to TP2.
2.	Adjust R169 so that the reading on the digital voltmeter indicates -5.000 V.

(3) DC Amplifier Adjustment

Step	Procedure
1.	Connect Q101-3 to the ground.
2.	Adjust R182 so that the reading on the digital voltmeter indicates 0.000 V at TP3.
3.	Adjust R193 so that the reading on the digital voltmeter indicates -8.000 V at TP4.
4.	Adjust R216 so that the reading on the digital voltmeter indicates 0.000 V at TP6.
5.	Adjust the level of the MG655A (approx. +4 dBm) so that the reading of the digital voltmeter idicates +4.000 V at TP3. The attenuation of MN510C has to be set to 0 dB at this time.
6.	Adjust R213 so that the reading on the digital voltmeter indicates +4.000 V at TP6.
7.	Repeat steps 4 to 6 a few times to satisfy the conditions simultaneously.

(4) Linearity Adjustment

Step	Procedure
1.	Connect Z25-J3 to Z26-J7.
2.	Set the MS710[ ] Vertical Scale to 10 dB/div.

(cont.)

Step	Procedure
3.	Confirm that the display line is at the top scale position of the CRT. If not, Z34 DIGITAL MEMORY/GP-IB PC board should be checked. See paragraph 5.20.
4.	Change the MN510C attenuation from 0 to 70 dB in 10 dB steps. Display error should be within ±1.5 dB at each step. If the error is out of the range of ±1.5 dB, adjust the following resistors according to the range where the error occurs. 0 to 10 dB: R9, R12 10 to 20 dB: R29 20 to 30 dB: R49 30 to 40 dB: R69 40 to 50 dB: R89 50 to 60 dB: R110 60 to 70 dB: R134
5.	Set the MS710[ ] Vertical Scale 1 dB/div.
6.	Set the MN510C to 0 dB.
7.	Change the MN510C attenuation from 0 to 8 dB by 1 dB steps. The display error should be within ±0.2 dB at each step. If the error is out of the range of ±0.2 dB, adjust R12.

(5) LIN Scale Level Adjustment

Step	Procedure
1.	Connect Z25-J3 to Z26-J7.
2.	Set the MS710C Vertical Scale to LIN.
3.	Set the MN510C to 0 dB. Adjust R107 so that the display line is at the top scale position on the CRT.

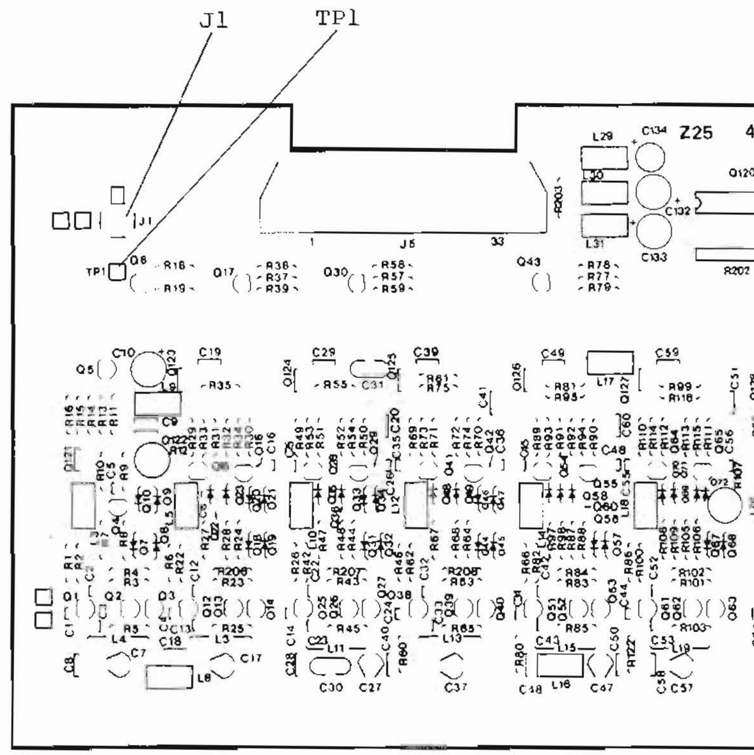
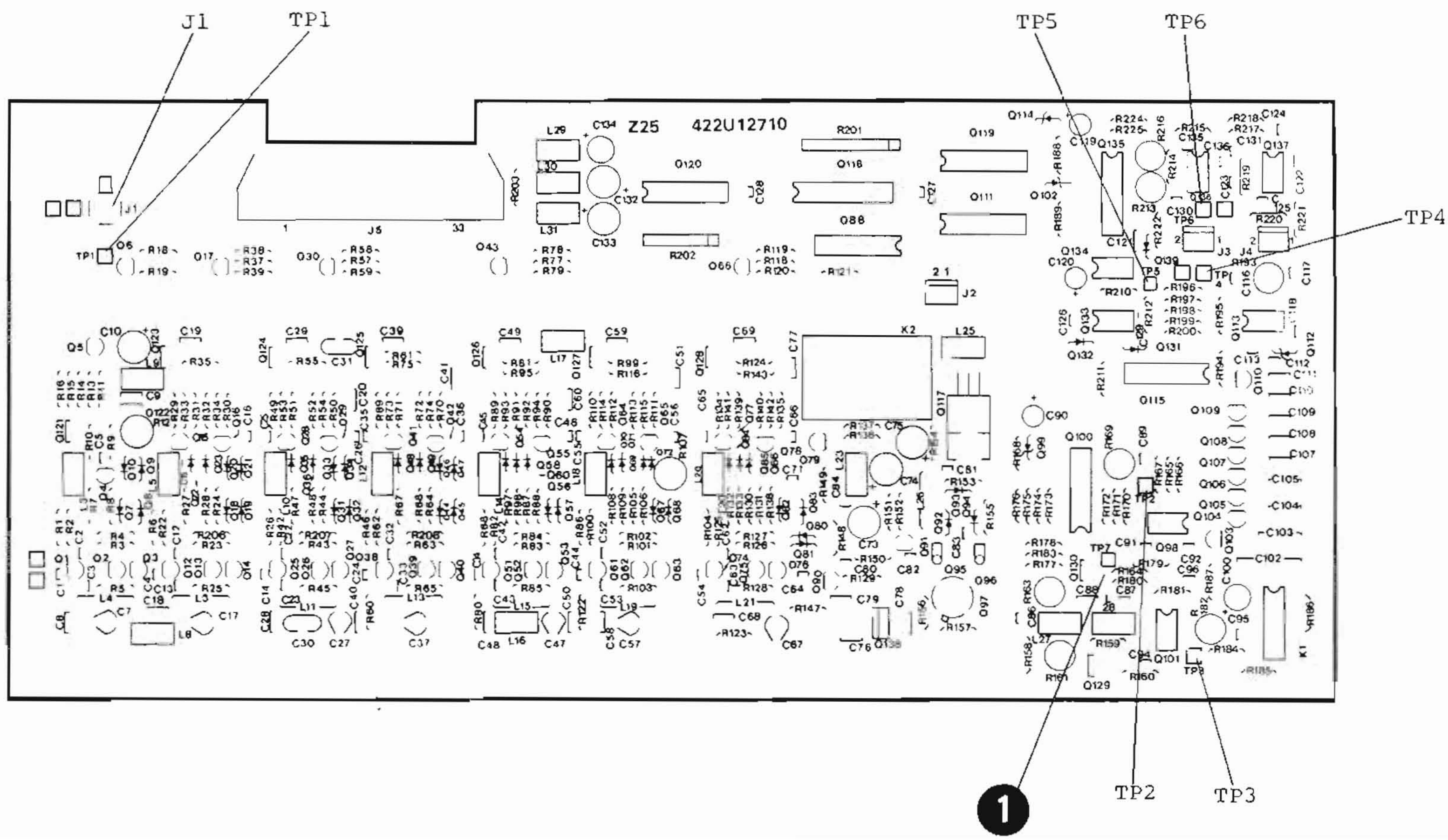
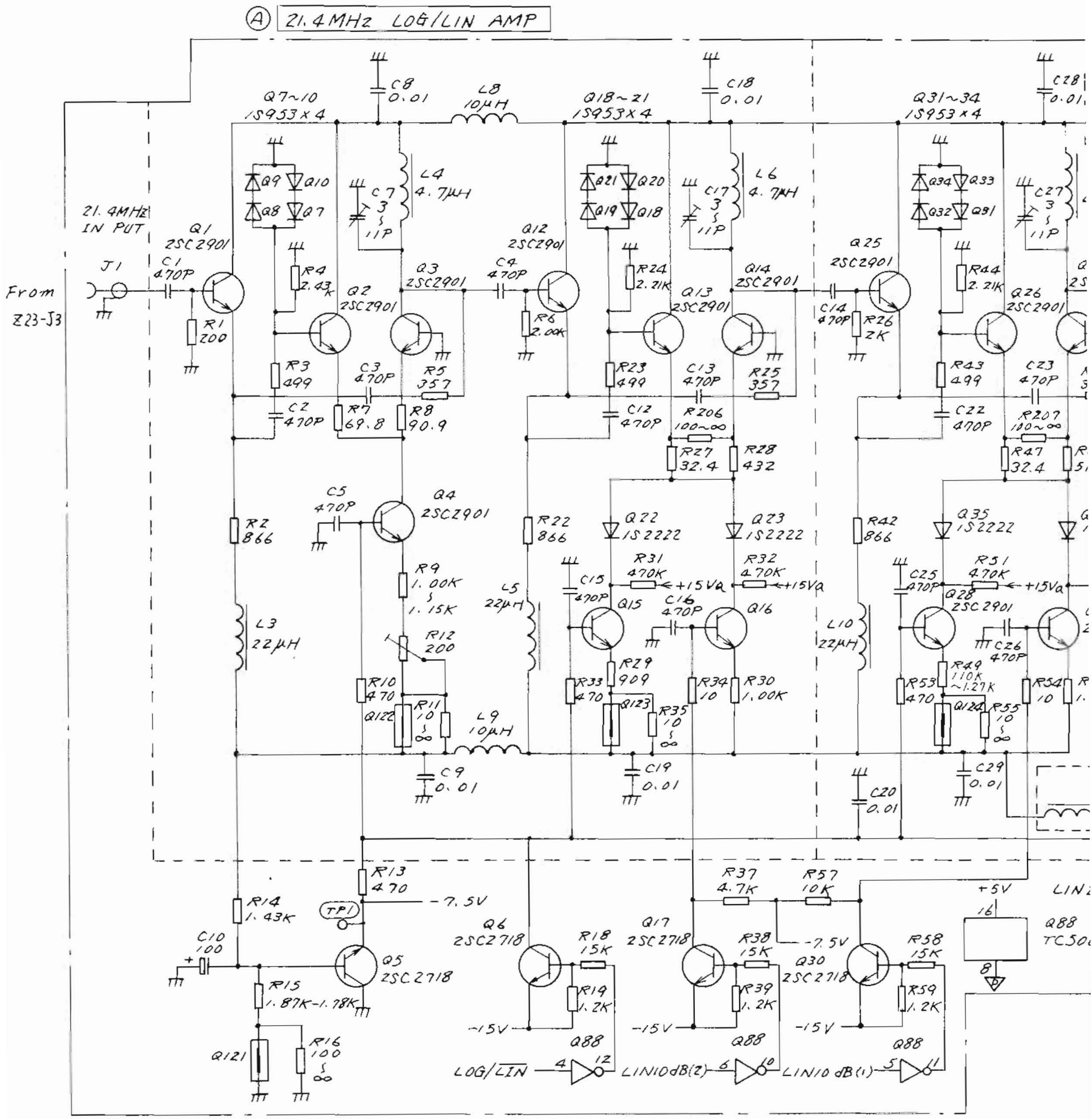


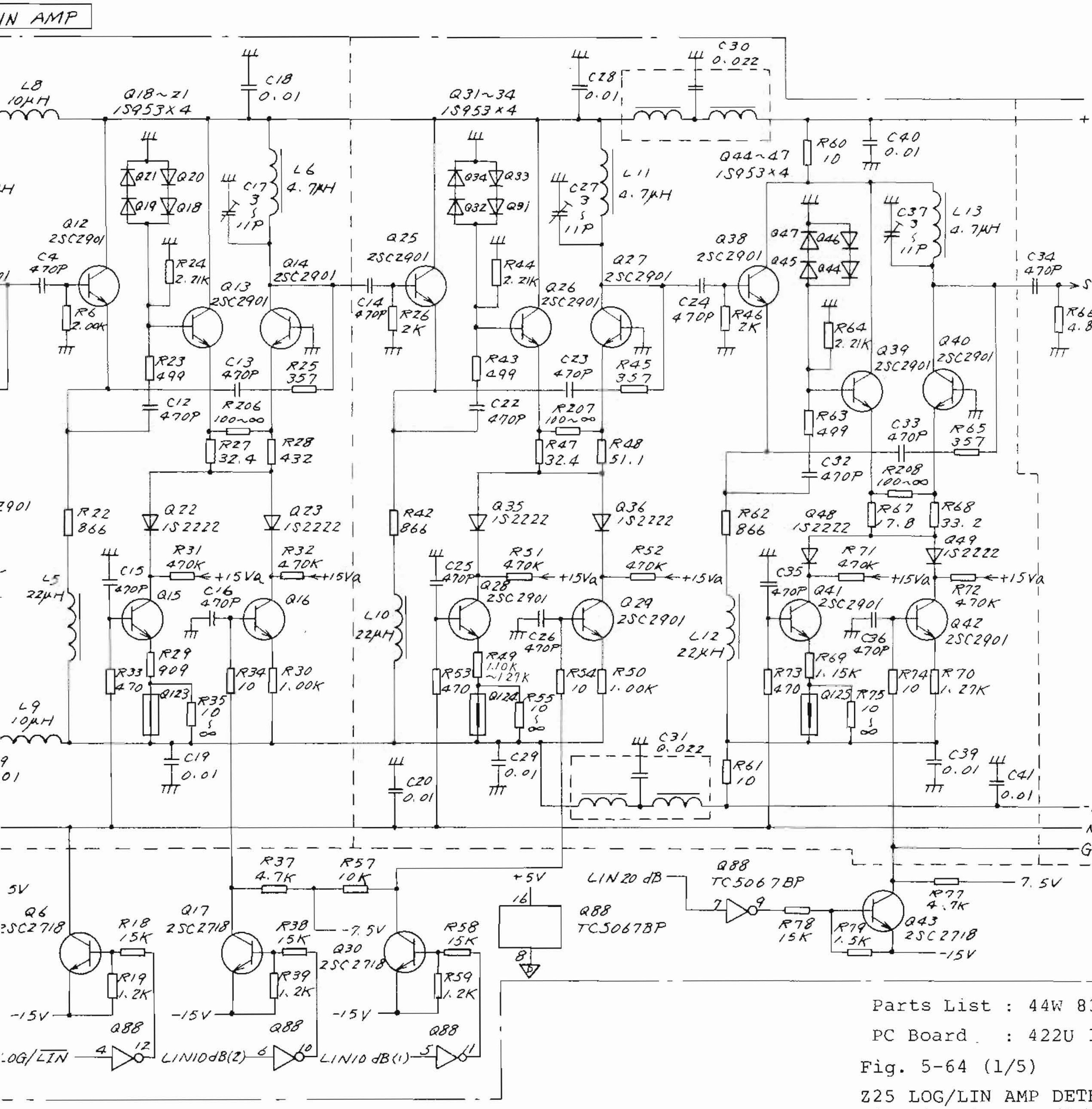
Fig. 5-63 Z25 Parts Layout



J1
TP1
TP5
TP6
TP4
TP2
TP3
1
Z25
422U12710



A 21.4MHz LOG/LIN AMP
From Z23-J3
21.4MHz INPUT
J1
C1 470P
R1 200
Q1 2SC2901
Q2 2SC2901
Q3 2SC2901
Q4 2SC2901
Q5 2SC2718
Q6 2SC2718
Q7~10 1S953×4
Q12 2SC2901
Q13 2SC2901
Q14 2SC2901
Q15
Q16
Q17 2SC2718
Q18~21 1S953×4
Q22 1S2222
Q23 1S2222
Q25 2SC2901
Q26 2SC2901
Q28 2SC2901
Q30 2SC2718
Q31~34 1S953×4
Q35 1S2222
Q88 TC50
Q121
Q122
Q123
Q124
L3 22μH
L4 4.7μH
L5 22μH
L6 4.7μH
L8 10μH
L9 10μH
L10 22μH
C2 470P
C3 470P
C4 470P
C5 470P
C7 3~11P
C8 0.01
C9 0.01
C10 100
C12 470P
C13 470P
C14 470P
C15 470P
C16 470P
C17 3~11P
C18 0.01
C19 0.01
C20 0.01
C22 470P
C23 470P
C25 470P
C26 470P
C27 3~11P
C28 0.01
C29 0.01
R2 866
R3 499
R4 2.43K
R5 357
R6 2.00K
R7 69.8
R8 90.9
R9 1.00K~1.15K
R10 470
R11 10~∞
R12 200
R13 470
R14 1.43K
R15 1.87K-1.78K
R16 100~∞
R18 15K
R19 1.2K
R22 866
R23 499
R24 2.21K
R25 357
R26 2K
R27 32.4
R28 432
R29 909
R30 1.00K
R31 470K
R32 470K
R33 470
R34 10
R35 10~∞
R37 4.7K
R38 15K
R39 1.2K
R42 866
R43 499
R44 2.21K
R47 32.4
R49 110K~1.27K
R51 470K
R53 470
R54 10
R55 10~∞
R57 10K
R58 15K
R59 1.2K
R206 100~∞
R207 100~∞
+15Va
-7.5V
-15V
+5V
TP1
LOG/LIN
LIN10dB(2)
LIN10dB(1)

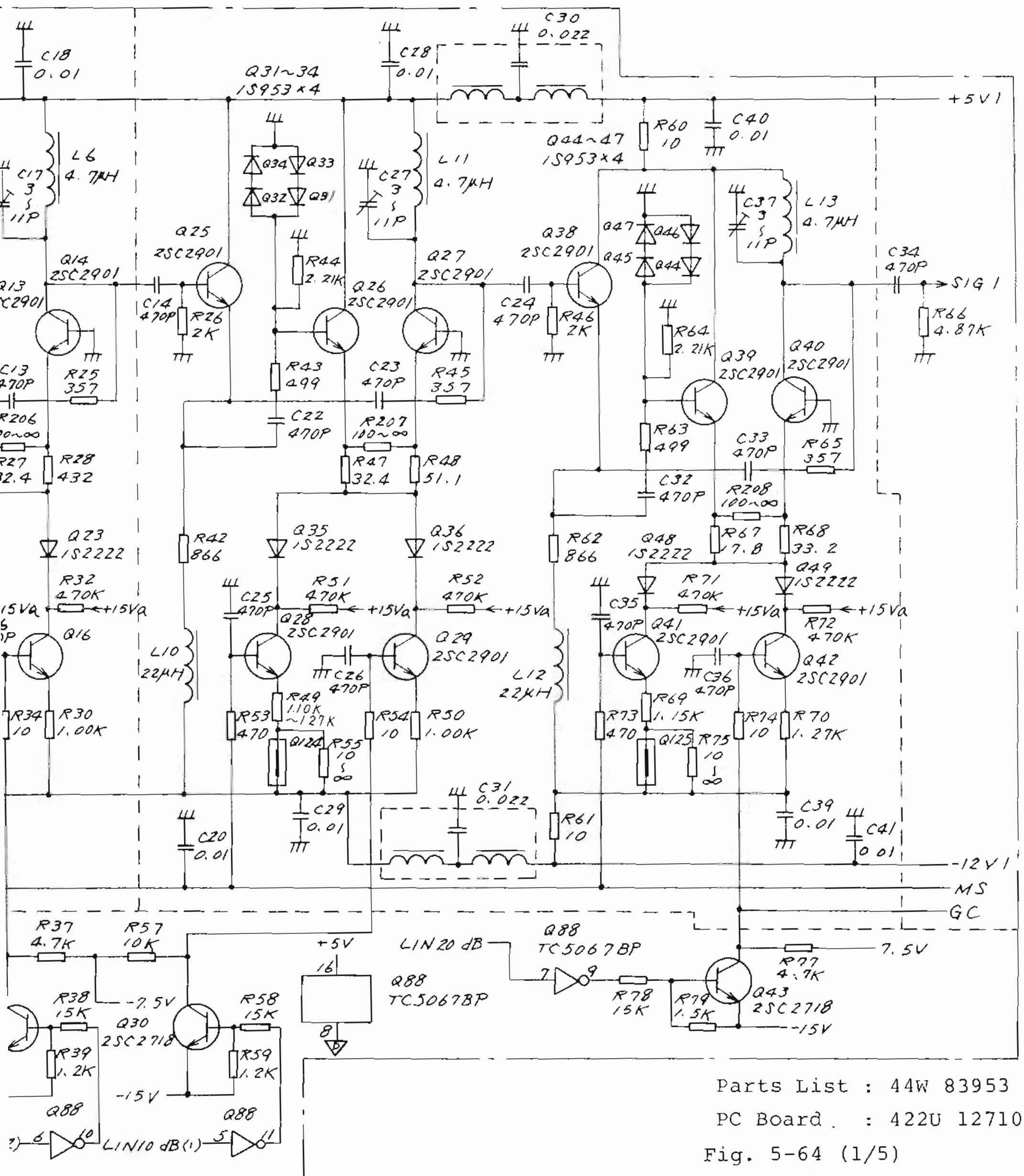


Parts List : 44W 8

PC Board : 422U 1

Fig. 5-64 (1/5)

Z25 LOG/LIN AMP DETE
Circuit Diagram (1/5
(43W 33956)



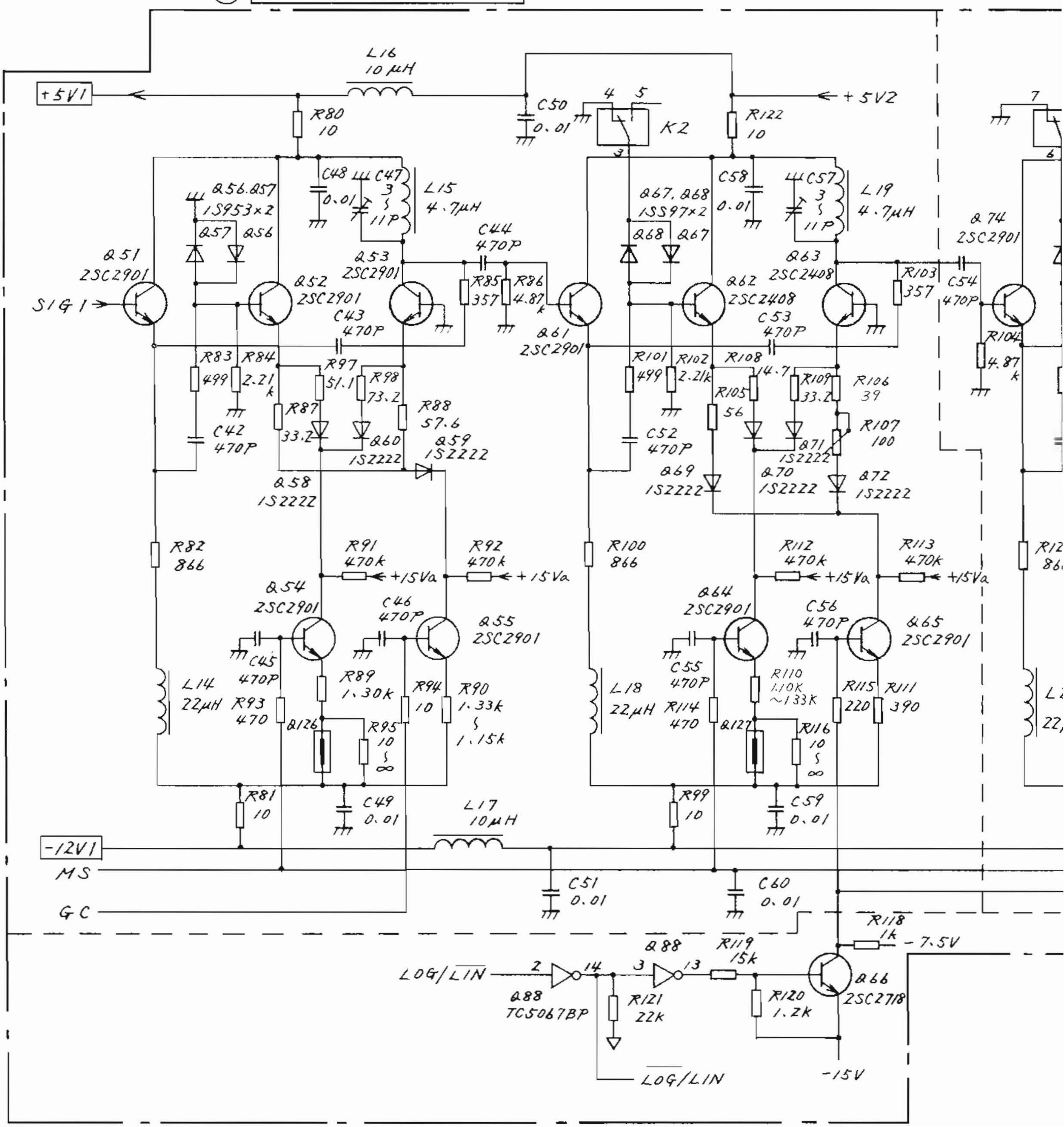
Parts List : 44W 83953

PC Board : 422U 12710

Fig. 5-64 (1/5)

Z25 LOG/LIN AMP DETECTOR
Circuit Diagram (1/5)
(43W 33956)

A 21.4MHz LOG/LIN AMP



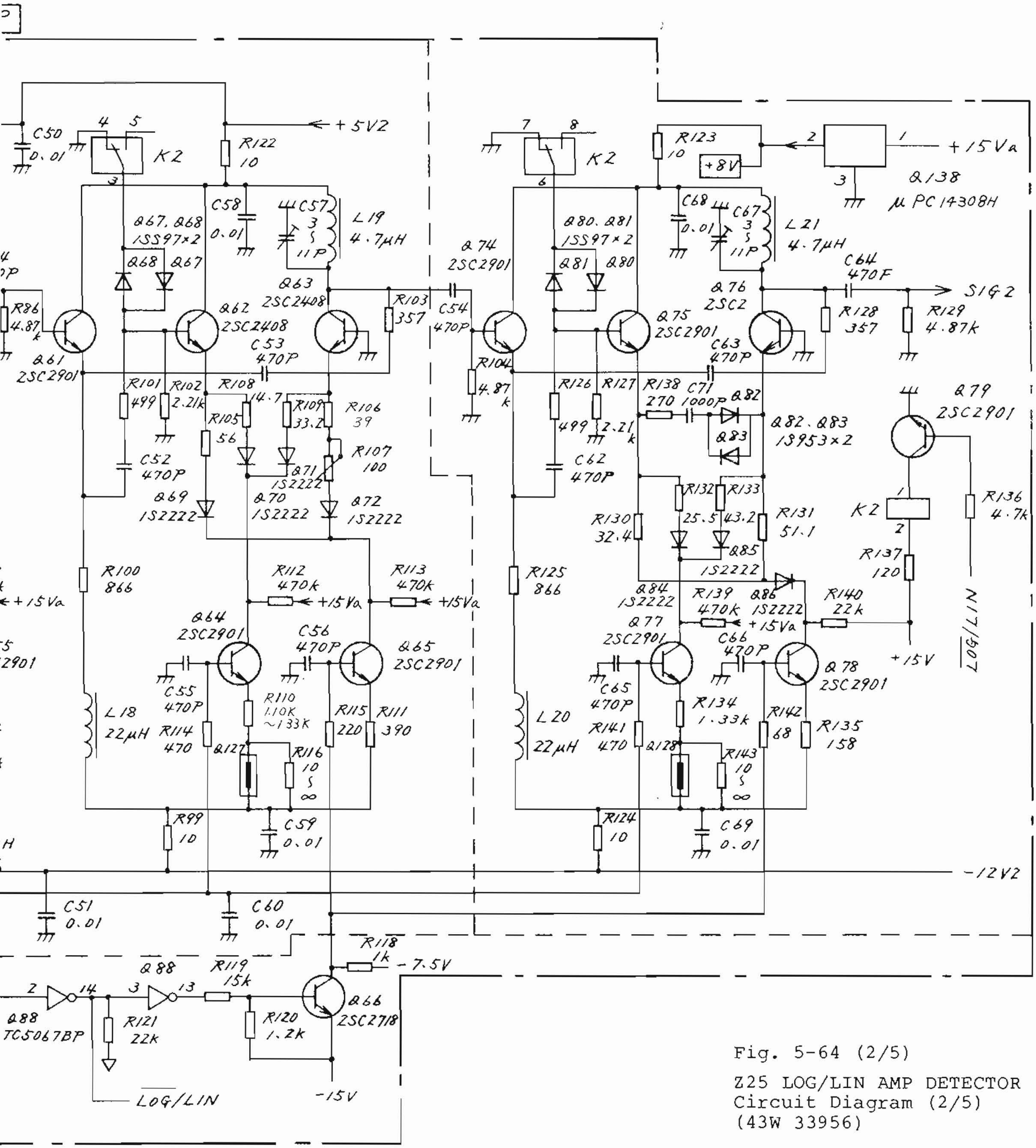
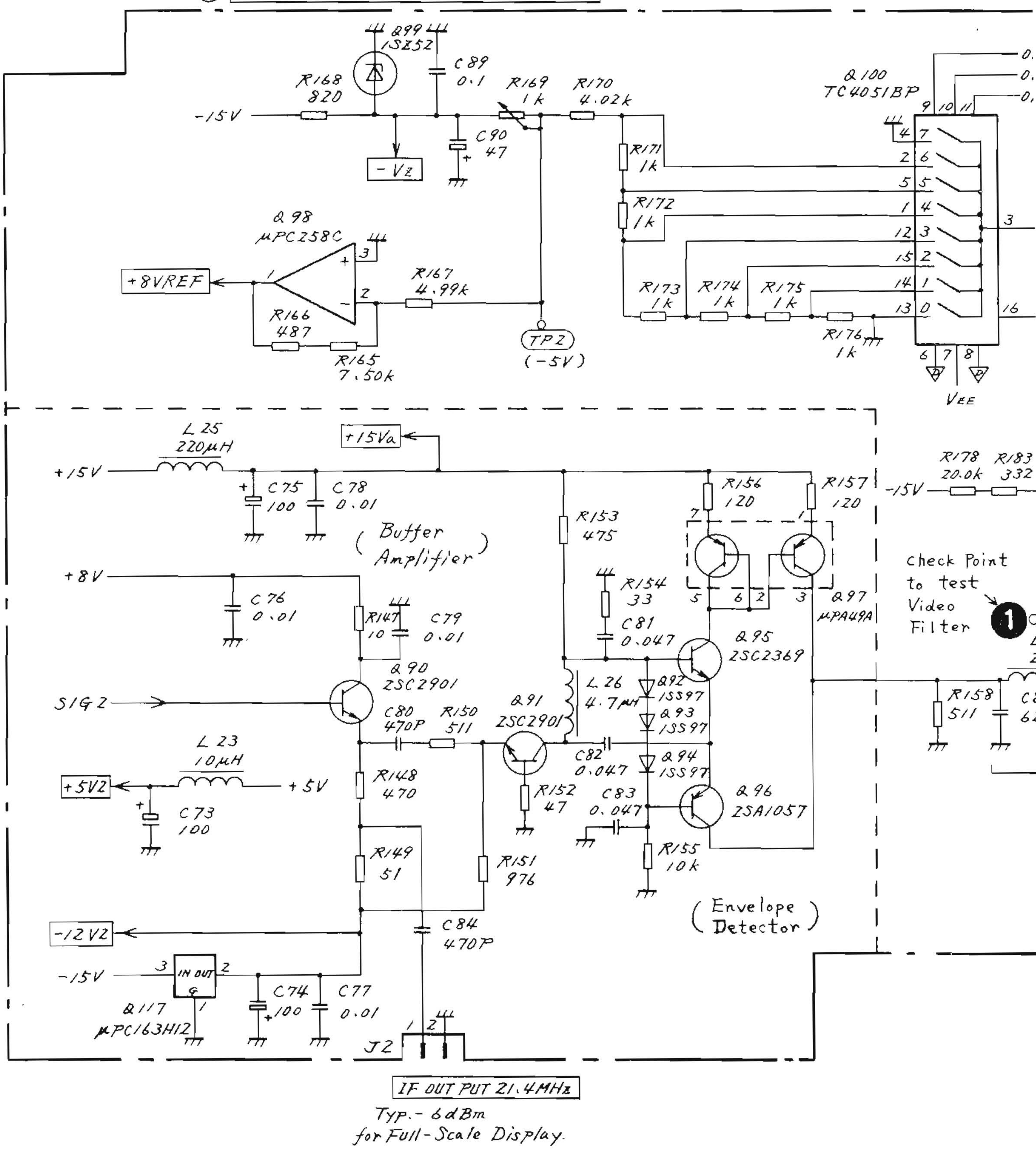


Fig. 5-64 (2/5)

Z25 LOG/LIN AMP DETECTOR
Circuit Diagram (2/5)
(43W 33956)

(B) DETECTOR AND OFFSET CIRCUIT



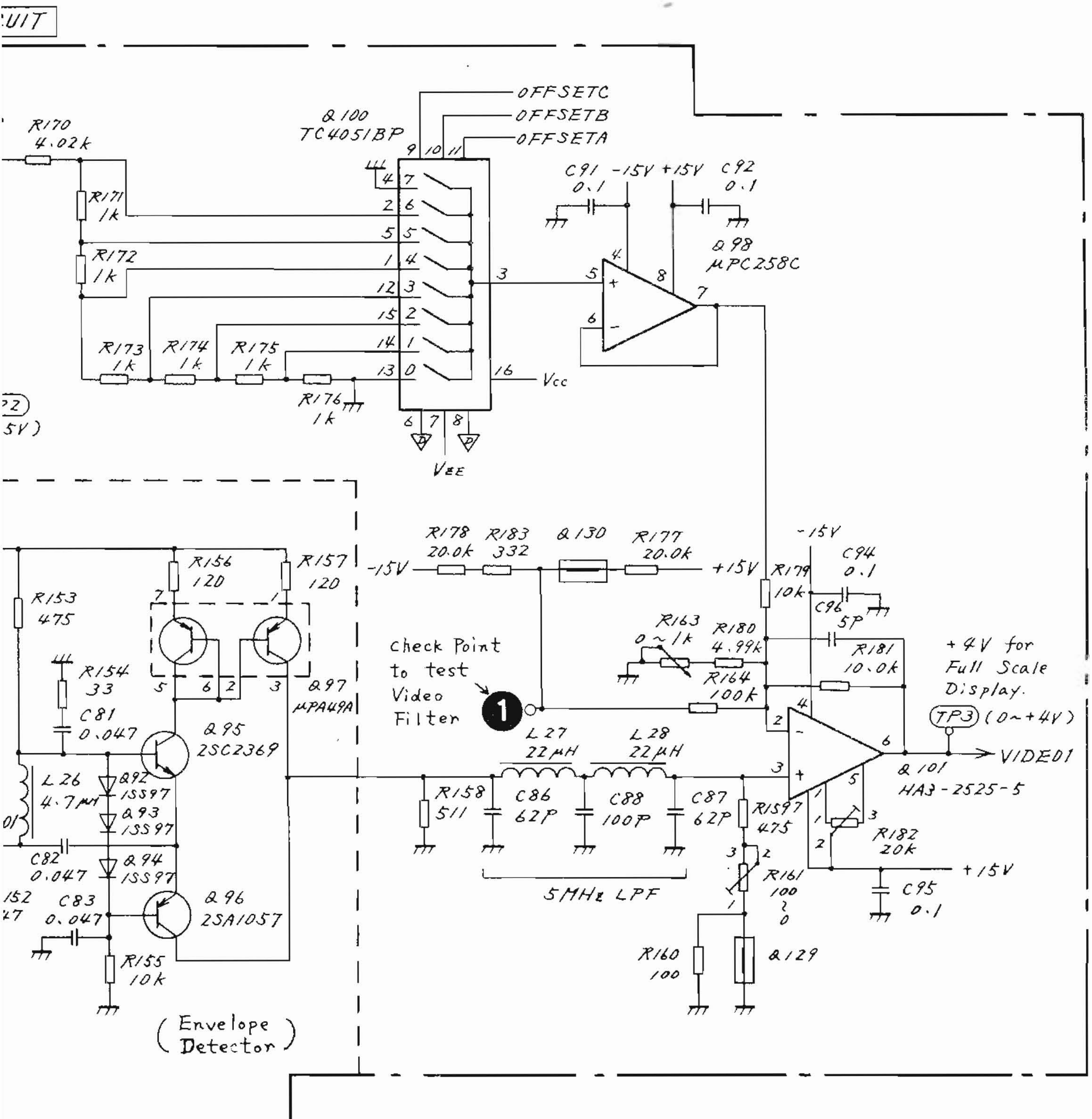
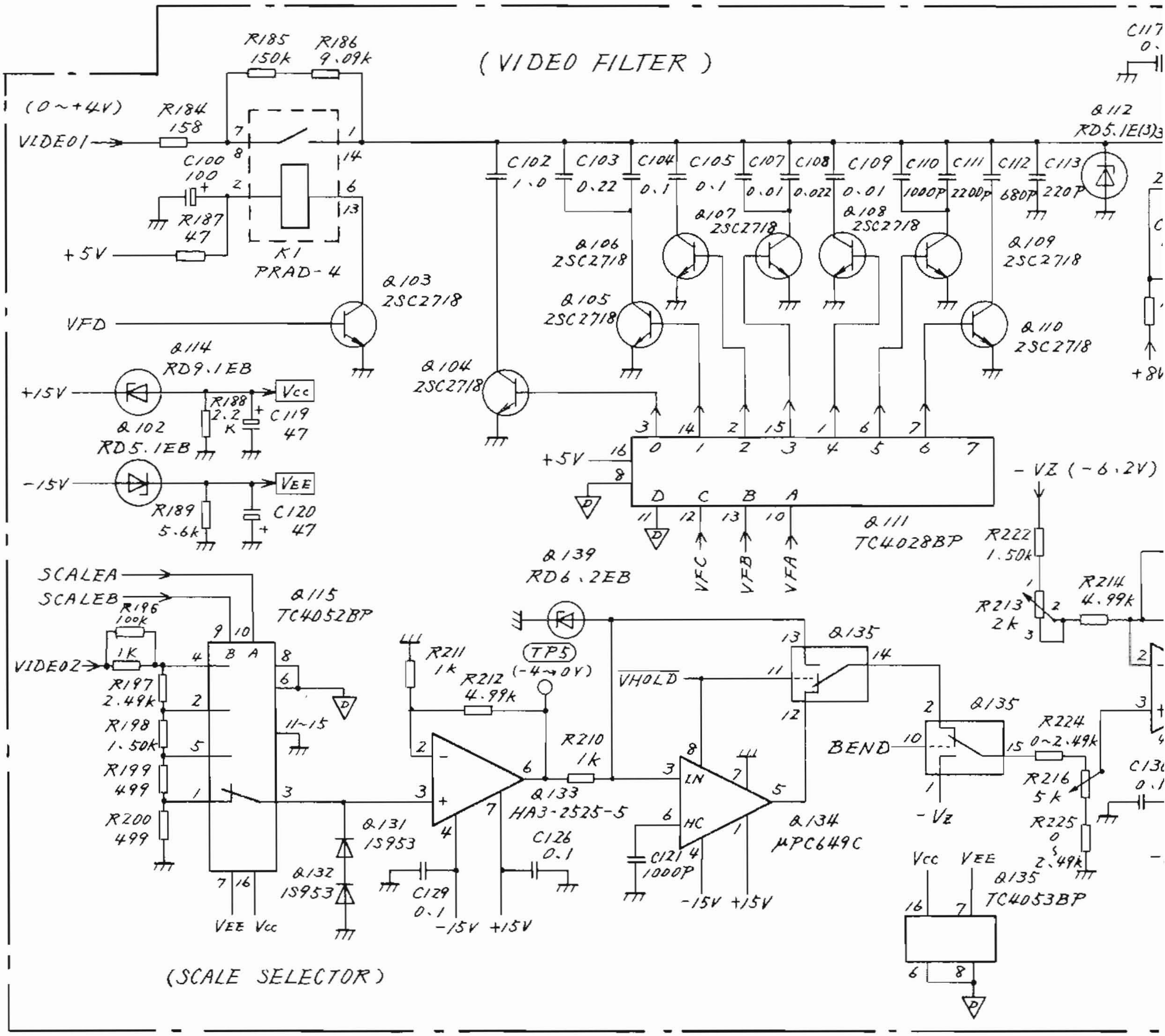


Fig. 5-64 (3/5)

Z25 LOG/LIN AMP DETECTOR
Circuit Diagram (3/5)
(43W 33956)

Ⓒ VIDEO FILTER AND SCALE SELECTOR



VBW (Hz)	1	3	10	30	100	300	1k	3k	10k	30k	100k	300k	1M	3M
VFD	0	0	0	0	0	0	0	1	1	1	1	1	1	1
VFC	0	0	0	0	1	1	1	0	0	0	1	1	1	1
VFB	0	0	1	1	0	0	1	0	1	1	0	0	1	1
VFA	0	1	0	1	0	1	0	1	0	1	0	1	0	1

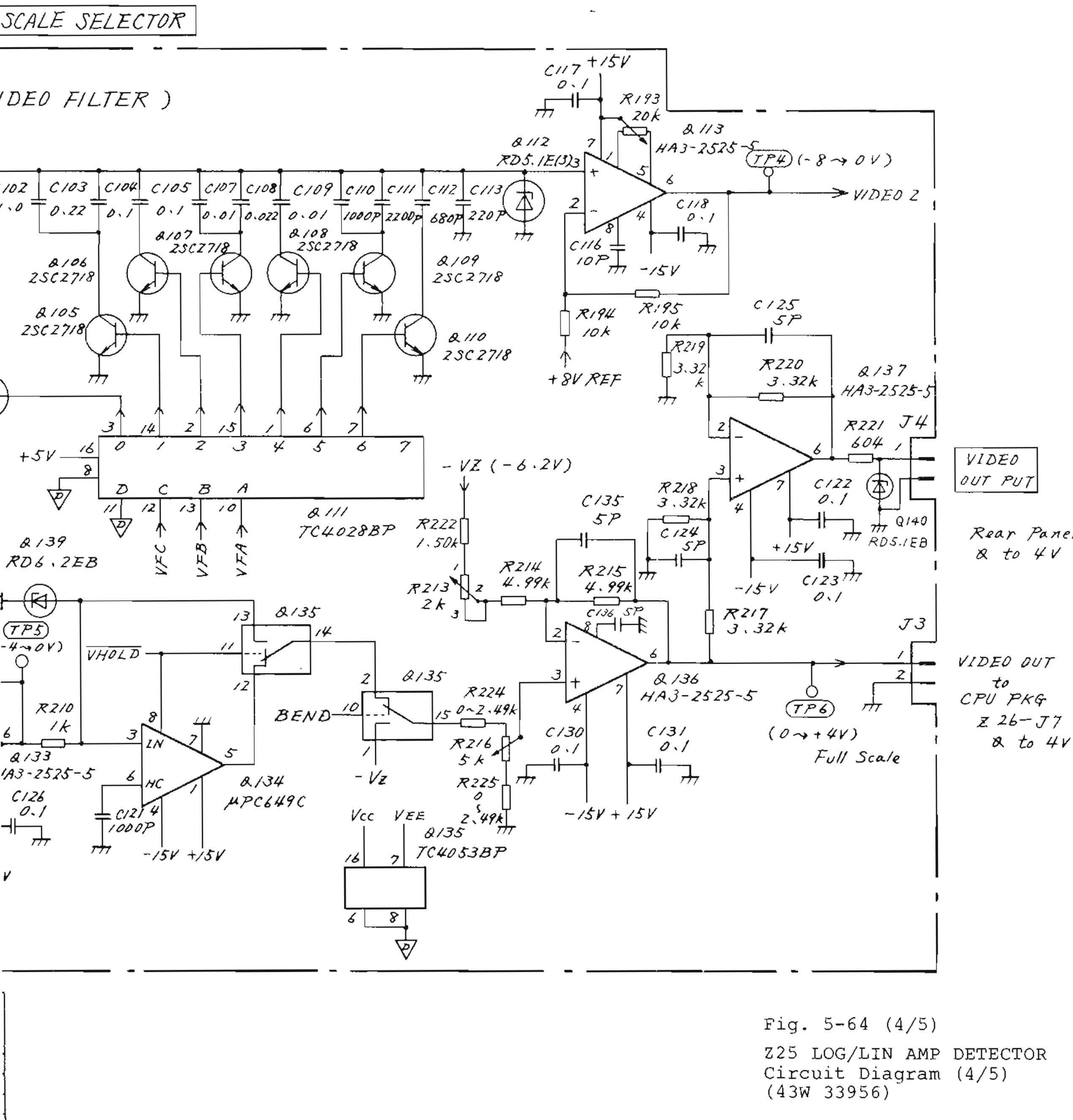


Fig. 5-64 (4/5)

Z25 LOG/LIN AMP DETECTOR
Circuit Diagram (4/5)
(43W 33956)

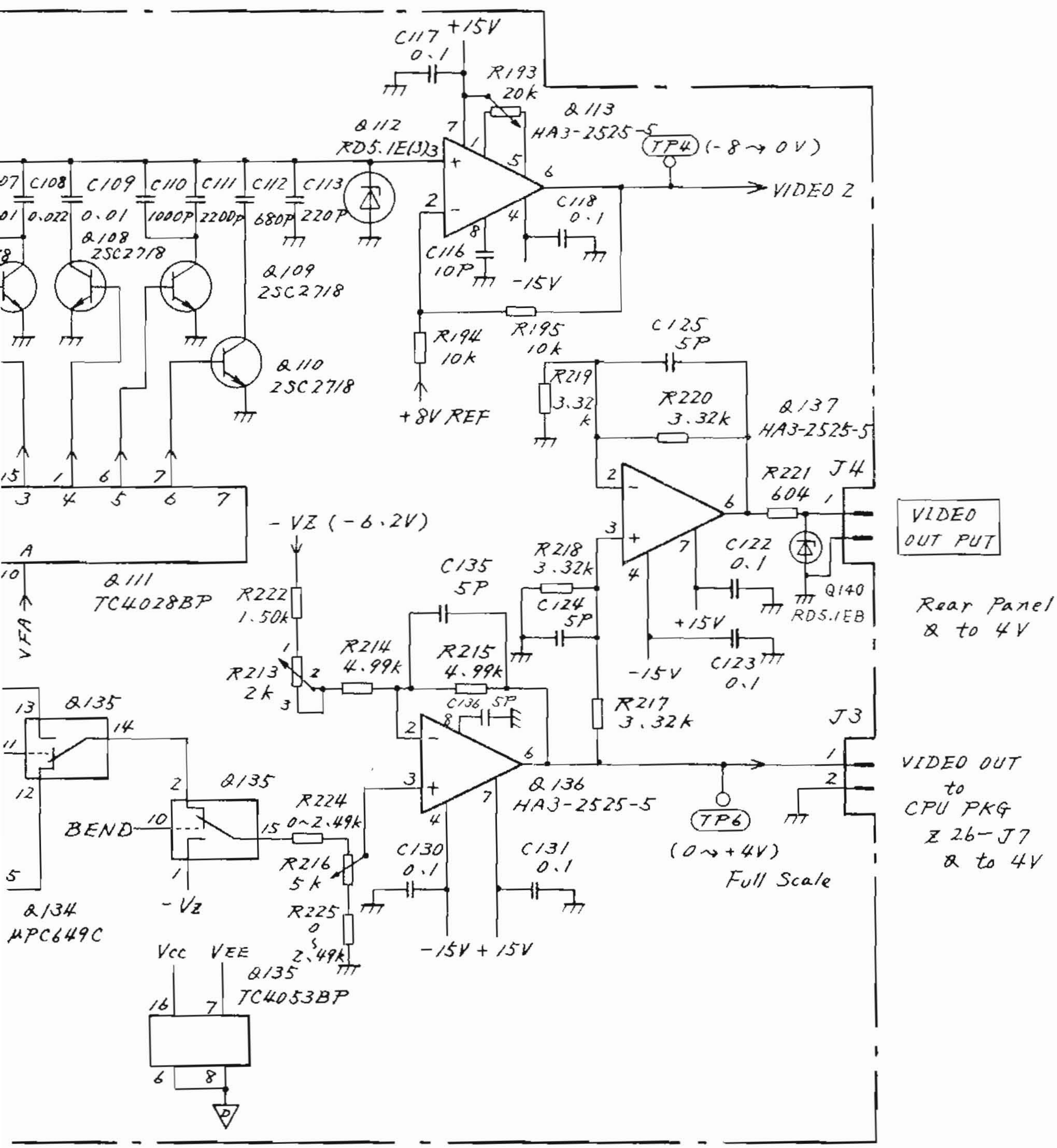
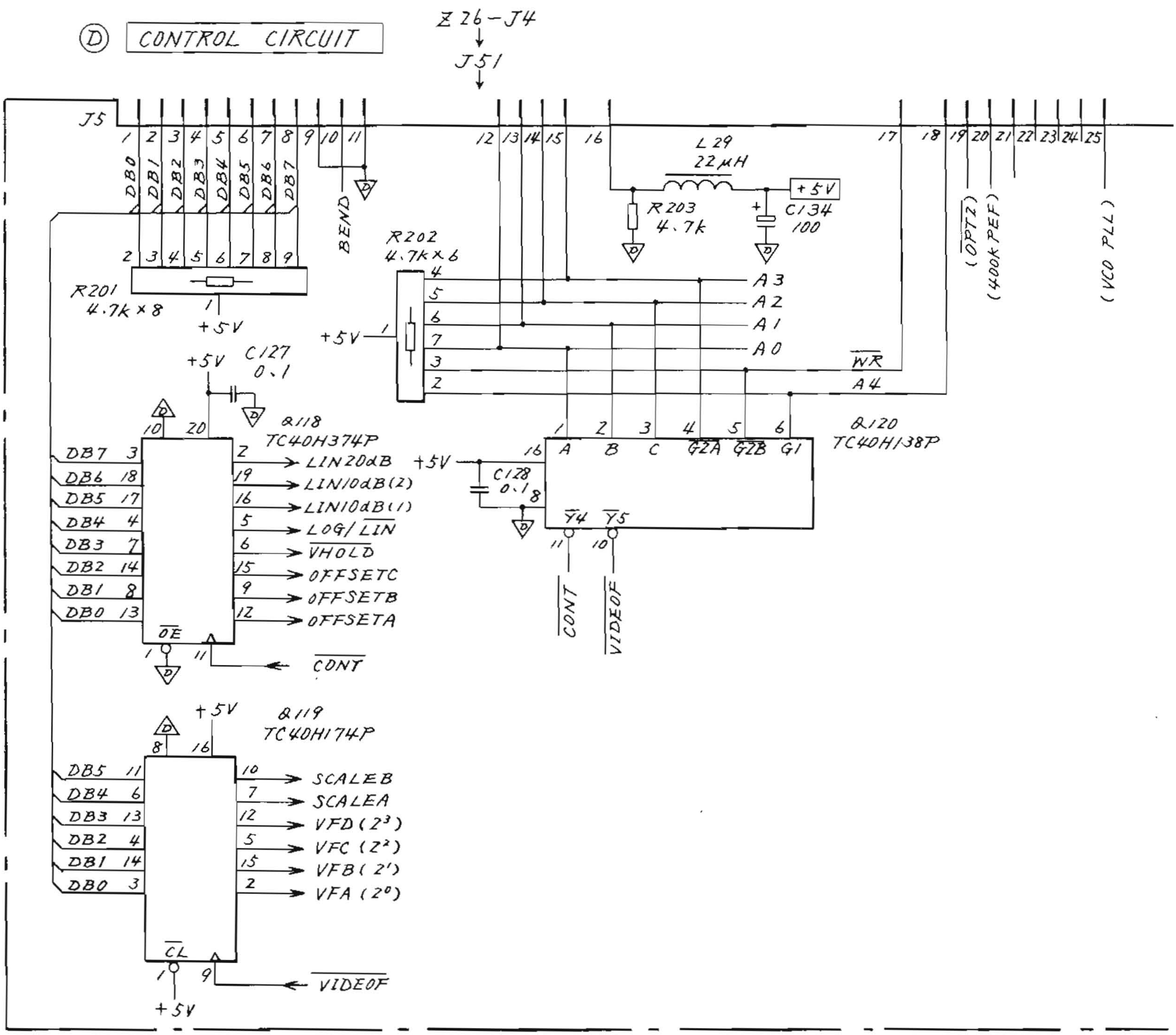


Fig. 5-64 (4/5)

Z25 LOG/LIN AMP DETECTOR
Circuit Diagram (4/5)
(43W 33956)

Ⓓ CONTROL CIRCUIT



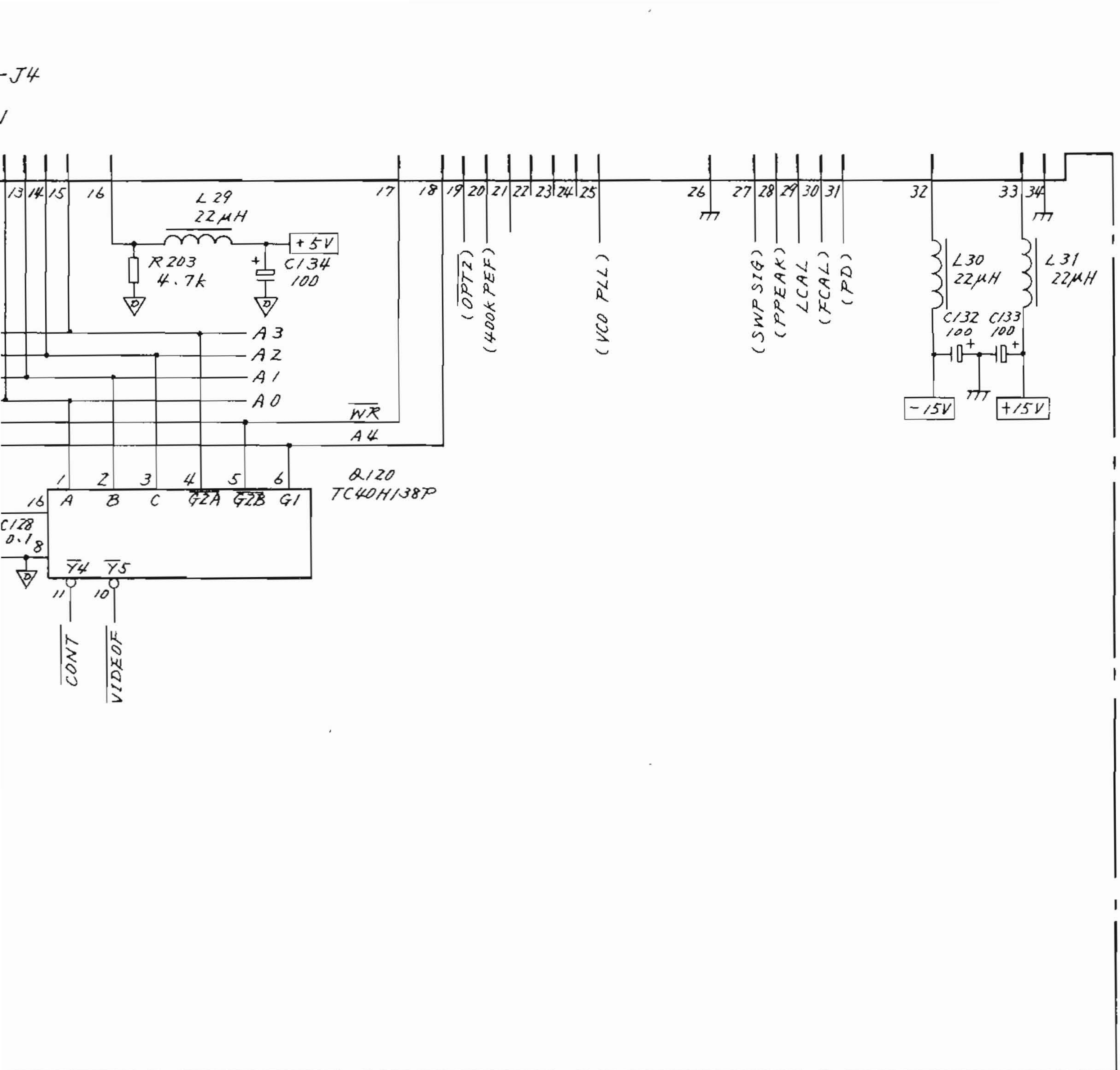


Fig. 5-64 (5/5)

Z25 LOG/LIN AMP DETECTOR
Circuit Diagram (5/5)
(43W 33956)

5.13 Z26 CPU Board

5.13.1 Circuit description - Z26
(Refer to Fig. 3-3 (3/4) and Fig. 5-71)

The microprocessor (main CPU) circuit, which analyzes the commands given by operation of the front panel switches and rotary encoder and determines the overall operation of the MS710[ ] by sending the necessary control signals, and a SWEEP GENERATOR circuit which generates sweep signals based on this control, are mounted on this PC board.

The Z26 circuit is divided into the 5 parts (A) to (E) shown in Fig. 5-71, and the circuit description for each part is as follows:

Part (A): CPU, ADDRESS DECODERS, ROMS, AND RAM

Q3 is an 8 bit microprocessor which is compatible with the Z80A and is operated by a 4 MHz clock. Q5, Q11, and Q12 are the address decoders, Q6, Q7, and Q8 are the firmware ROM, and Q9 is a 2 kbyte RAM. The main CPU address map is shown in Table 5-3.

Q16 is an I/O port which outputs the RF ATT/SW control signal and other signals. The signals input and output by the main CPU are also summarized in Table 5-3.

Part (B): CLOCK OSC AND I/O PORTS

Z1 is an 16 MHz crystal oscillator. Its output is divided by 1/4 by Q24 to get 4 MHz clock signal. The 400 kHz clock signal, which is the 1/10 divided output of Q25, is used as the reference clock signal of the SWEEP GENERATOR circuit of Part (C), as well as the LSI clock signal of the Q38 keyboard display controller.

The main CPU sends the control signals to the Z21 to Z25 PC boards, as well as performing control signal input/output with the circuits on the Z26 PC board. Q20 and Q21 are buffer which sends the address and data signals for this purpose.

Moreover, the 16 MHz signal is 1/N divided (N is an integer number from 16 to 47 determined by the CPU according to the 1st local frequency) by programmable divider Q27 and Q28 and sent to the SUB PLL circuit as a 16 MHz/N signal through J8. (See Figs. 3-3 (3/4) and 3-3 (4/4).)

Q32 is a flip flop circuit which stores interrupt requests from the SWEEP GENERATOR circuit, the front panel rotary encoder rotation detection circuit, and the sub CPU of Z34.

Parts C and D: SWEEP GENERATOR and SWEEP START/STOP CONTROL

Parts C and D are the circuit which generates the sweep signal. Q43 and Q44 are the latch which receives the control data from the CPU, and Q45 to Q48 are each a 4-bit programmable counter and operate as a total 16-bit programmable divider. Q49 and Q50 operate as a 12-bit binary counter.

Q51, Q52, and Q53 are the data selectors for selecting the data which is set at the Q54 of 12 bit current output D/A converter. Q61 is a dual OP AMP which converts the Q54 D/A output current to a voltage, and performs level shifting, and produces the sweep signal.

The circuit consisting of Q55 to Q60 of Part (D) is a logic circuit which controls start/stop of the sweep signal. Q63 and Q64 are the trigger signal selection circuit and Q41 latches the signal sent from the CPU to control the SWEEP GENERATOR circuit, Parts (C) and (D).

The operation of the sweep signal generation circuit of the MS710[ ] is divided into the following three types, depending on the sweep setting condition.

Type 1: Full sweep width at START/STOP mode exceeds 2 GHz.

Type 2: Full sweep width at START/STOP mode is 2 GHz or less, or when sweep speed at CENTER/SPAN mode is 2 ms/div to 10 s/div.

Type 3: Sweep speed at ZERO SPAN is 2 μs/div to 1 ms/div (Sweep speed 2 ms/div to 10 s/div at ZERO SPAN becomes type (2).)

Type 1

In this type of operation, this sweep generator circuit is used only to produce the DSPC signal which shows the waveform sampling timing. Frequency sweep is performed by directly controlling the MAIN TUNE D/A converter in Z21 local control 1 from the CPU. (See paragraph 5.9.)

The simplified composition of the SWEEP GENERATOR circuit in this case is shown in Fig. 5-65. The data is set from the CPU so that the DSPC signal is output at each frequency change corresponding to 1/500 of one sweep matched to the MAIN TUNE D/A data setting.

Type 2

The simplified sweep generator circuit composition is shown in Fig. 5-66 (1/2). After the 400 kHz reference clock signal (SWPCLK) is divided by 1/D by a programmable divider in accordance with data D set from the CPU, it is input to a 12-bit binary counter.

The output of the counter is input to a D/A converter through a data selector. Therefore, when the CLEAR signal is reset by the sweep trigger and the counter begins to count the divided SWPCLK, the D/A output begins to rise in the form of a small staircase. The counter output is monitored by the SWEEP END detection logic circuit. When it reaches 4064 counts, it is reset to 0 and the D/A output also returns to 0.

The D/A output sawtooth waveform produced in this manner is used as the sweep signal. Since the sweep time is determined by the period of the 1/D divider output which is input to the counter, it can be accurately controlled by changing the value of D with the CPU.

The DSPC signal which shows the timing at which the Z34 digital memory/GP-IB circuit samples the waveform data is output each time the counter output changes 8 times. Therefore, the sampling signal for a total of 4064/8 = 508 points is output at one sweep period. Of these, the 501 points (corresponding to 500 sample periods or 4000 counts) from the 6th to the 506th are displayed on the CRT screen. Therefore, the relationship between sweep time (ST ms/div) and division data D is exactly equal and becomes D=ST.

Type 3

The sweep signal generation circuit for 2 μs/div to 1 ms/div is outlined in Fig. 5-66 (2/2). Operation when the trigger is FREE RUN is described below. Q54 (D/A converter) operates as a constant current source that is programmable by CPU. Its output is converted to a sawtooth wave voltage by the integrator consisting of Q61 and C21. The integrator output (TP1 voltage) enters wind comparator Q63. COMP1 detects the point at which the sweep voltage (TP1) exceeds +1 V and generates the signal (BNKAF) which turns on the sweep LED at this time. COMP2 detects the point at which the sweep voltage (TP1) reaches +5 V and generates the signal which resets the sweep ($\overline{\text{SWPEF}}$).

When the COMP2 output ($\overline{\text{SWPEF}}$) becomes LOW, the $\overline{\text{FSRDY}}$ pulse (⊔⊓ width = 20 μs) is generated from Q75 monostable multivibrator 1 and the CLEAR (sweep reset) signal becomes HIGH. When CLEAR becomes HIGH, analog switch Q59 is switched, the charge across C21 of the integrator is discharged through R22, and the sweep voltage (TP1) returns to 0. Monostable multivibrator 2 is operated by the rising edge at the end of $\overline{\text{FSRDY}}$ and the next sweep trigger signal is generated (width: 3 μs). This trigger signal resets the flip-flop consisting of Q56 through switch Q64, the CLEAR signal returns to LOW, the integrator integrates the D/A converter output current again, and the sweep voltage (TP1) rises toward +5 V from 0 V. (When not FREE RUN, restarts if a separate trigger signal enters from switch Q64.)

Sweep is performed by repeating the above. To change the sweep time, the D/A converter set value is changed and the D/A output current is changed. (The sweep time becomes faster as the current becomes larger.) The relationship between data D set from the CPU and the sweep time (ST μs/div) is

$$D = 8000/ST$$

In this sweep mode, since the waveform data is not sampled (digitalized), the DSPC signal is not output. The TP1 sweep signal passes through level shift circuit Q62, becomes the CRTSWP signal (0 to +4 V), and is sent to the Z27 display control PC board. At Z27, the signal passes through analog switch Q67, becomes the X-OUT signal and is sent to CRT BIAS/X-Y AMP of Z30 as the CRT horizontal axis signal. (Refer to Fig. 5-75.)

Part (E): INTERFACE

The main CPU performs data communication with the DISPLAY RAM in Z27 display control and Z34 digital memory/ GP-IB. Q70, Q71, and Q72 switch the address bus and data bus for this purpose.

5.13.2 Checking procedure - Z26

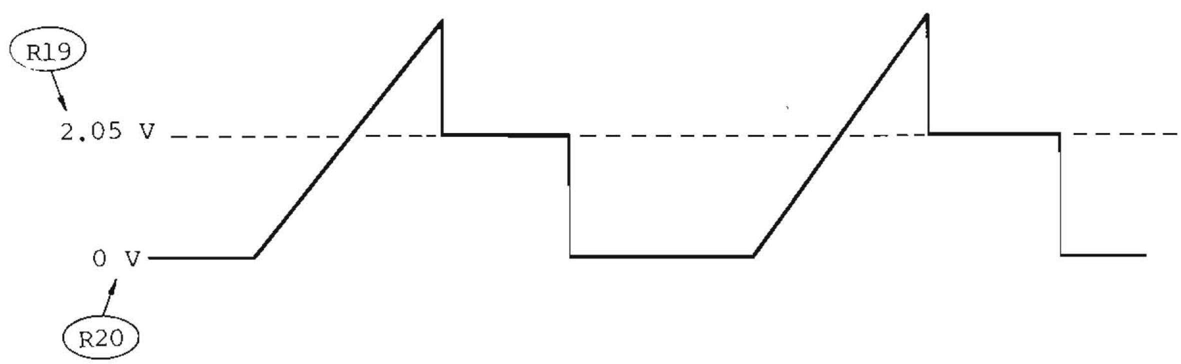
Step	Procedure
1.	Remove the top cover and the PC board cover plate (15). See Figs. 2-1 and 2-5.
2.	Remove the Z26 PC board by pulling it up. Insert the service kit extender board and attach the Z26 PC board. Replace cable J51 connecting Z26 and Z21 to Z25 with the service kit extender cable.
3.	Turn on the MS710[ ] power switch.
4.	Check that the clock signals of checkpoints ❶, ❷, and ❸ are normal (Refer to Fig. 5-68 for the waveforms of ❷ and ❸).
5.	Set the MS710C sweep time to 2 ms/div.
6.	Measure the waveforms of TP1, TP2, CLEAR ❹, and BNKA ❺. If they are as shown in Fig. 5-69, operations are normal.
7.	Set the MS710[ ] to ZERO SPAN and the sweep time to 2 μs/div.

(cont.)

Step	Procedure
8.	Measure the waveforms of TRG ❻, FSRDY ❼, TP1, and BNKA ❺. If they are as shown in Fig. 5-70, operations are normal.
9.	To check the 16 MHz/N signal to the SUB PLL circuit (Refer to paragraph 5.7 of Z16 PLL block), remove the aluminum shield case on the Z26 PC board and measure the REF ❽ frequency using a frequency counter. Operations are normal if f_{REF} = 16,000/27 = 592.592 kHz at N=27 when the center frequency is set to 3 GHz. Also, f_{REF} = 16,000/20 = 800.000 kHz at N = 20 when the center frequency is set to 100 MHz. Table 4-1 shows the relationship of the first local frequency and N.

5.13.3 Adjustment Procedure - Z26

Step	Procedure
1.	Adjust R11 so as to be VREF (between Q62-1 and analog ground, at Part C) = 6.00 V.
2.	Set the SWEEP TIME to 2 ms/div. Adjust OFFSET R20 and AMPLITUDE R19 as shown in the following figure while observing the waveform at TP1 on the oscilloscope (0.5 V/div.).



3.	Adjust OFFSET R34 as shown in the following figure while observing the waveform at TP2 on the oscilloscope (10 mV/div.).

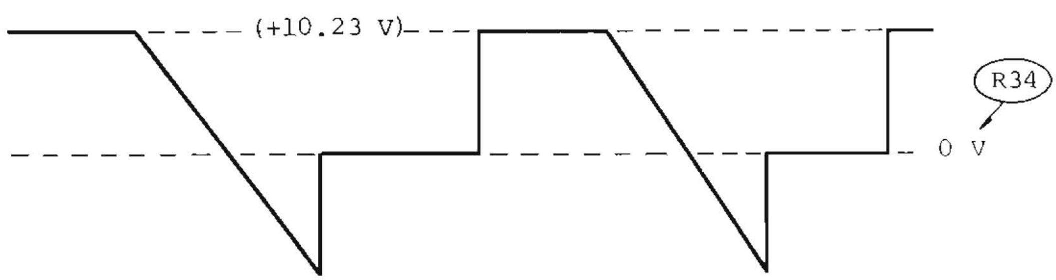


Table 5-3 Main CPU Address Map

ADDRESS	ROM/RAM
0000	ROM 1 (16K)
2000	
4000	ROM 2 (16K)
6000	
8000	ROM 3 (16K)
A000	
C000	RAM (8K)
D000	
E000	DISPLAY RAM (2K)
E800	MARKER RAM (1K)
F000	I/O Port
FFFF	

I/O Port

ADDRESS	Port Name	I/O	CONTROL	PKG
F000				Z21 LOCAL CONTROL 1
1	DMTL	O	MAIN TUNE D/A L	
2	DMTH	O	" H	
3	DFT1L	O	FINE TUNE D/A 1 L	
4	DFT1H	O	" H	
5	DFT2	O	FINE TUNE D/A 2	
6	DYTOC	O	YTO TUNE COMP.	
7	VCOT	O	M/N VCO TUNE D/A	
8	SPANDA	O	SPAN ATT D/A	
9	SMCNT	O	SWEEP MODE CONTROL	
A				
B	MDATAL	O	M/N LOOP : M L	
C	MDATAH	O	" : M H	
D	NCIFK	O		
E				
F				
F010	RES BW	O	RES BW	Z22 IF BPF/AMP 1
1	NBWGC	O	NARROW BW/GAIN	
2	WBWGC	O	WIDE BW/GAIN	
3	FGC	O	FINE GAIN	
F014	CONT	O	LOG/LIN	Z25 LOG/LIN AMP DETECTOR
5	VIDEOF	O	VIDEO FILTER	
6				
7				
F018				Z24 LOCAL CONTROL 2
9				
A				
B	OPTCL	O	DIVIDER L, S/H	
C	OPTCH	O	DIVIDER H,	
D				
E				
F				
F020	PANEL(0)	I/O	KEYBOARD, DISPLAY	Z26 CPU BOARD
1	" (1)	I/O	CONTROLLER 8279	
F040	NDATA	O	M/N LOOP : N-1	
1	COMPCH	O	COMPARATOR CH	
2	COMPDA	O	" D/A	
3	SWPCNT	O	SWEEP CONTROL	
4	SWPTL	O	SWEEP TIME L	
5	SWPTH	O	" H	
6	BELL	O	BUZZER	
7	SW/ATT	O	SW/ATT CONTROL	
F060	FDSTS	I	READ STATUS	

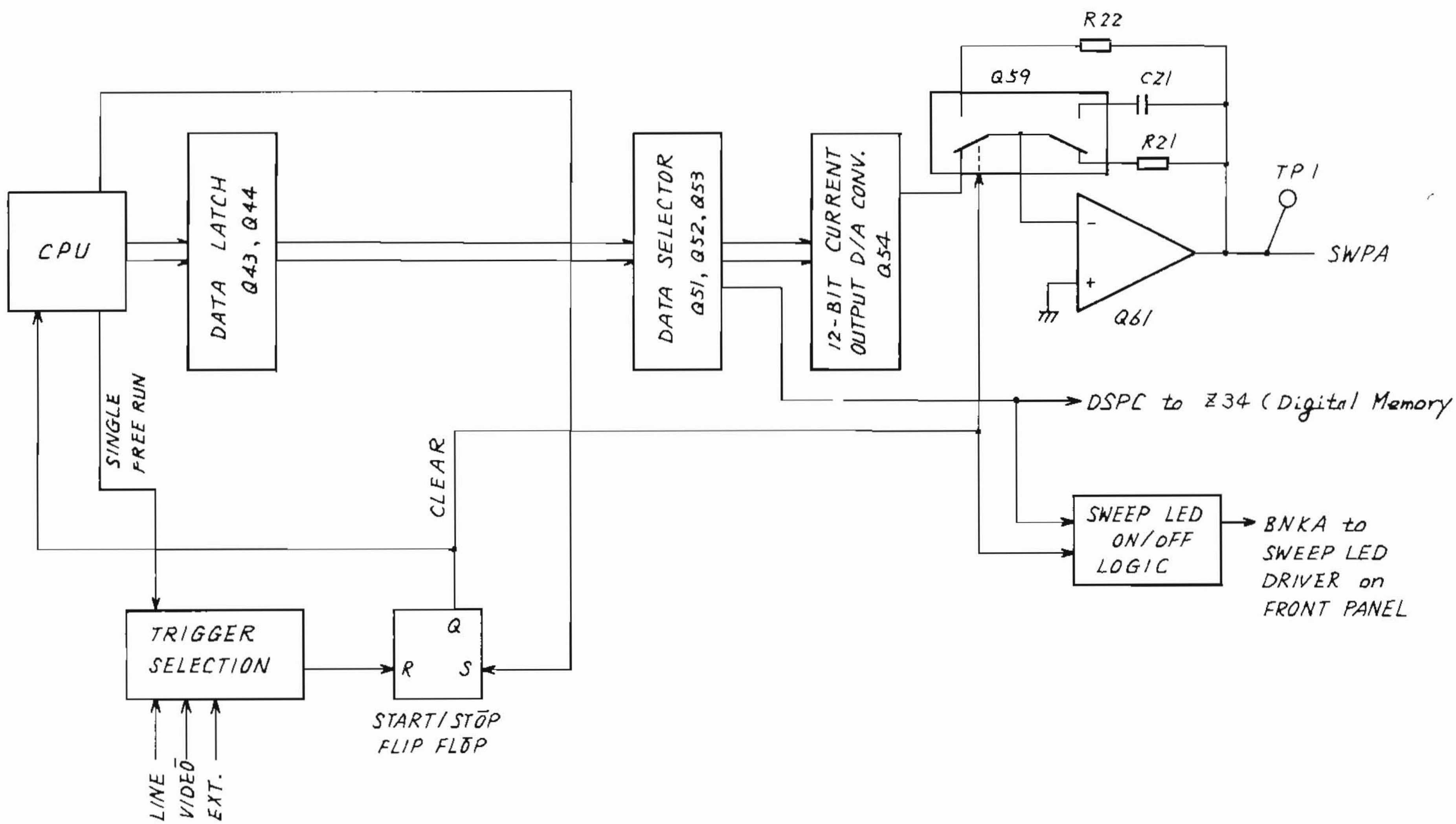


Fig. 5-65 Z26 CPU Board for SPAN > 2 GHz

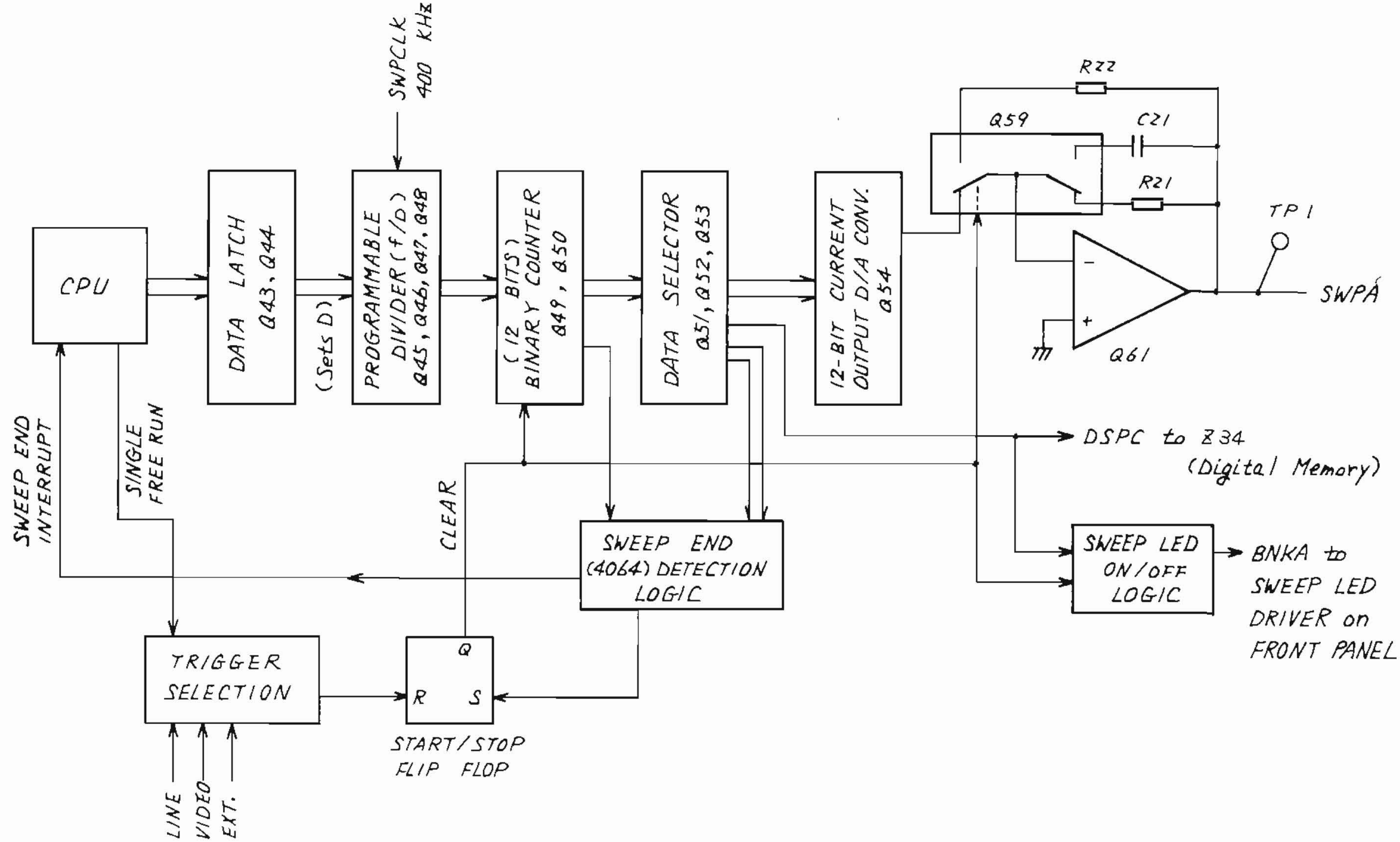


Fig. 5-66 (1/2) Z26 CPU Board for 2 ms/div to 10 s/div

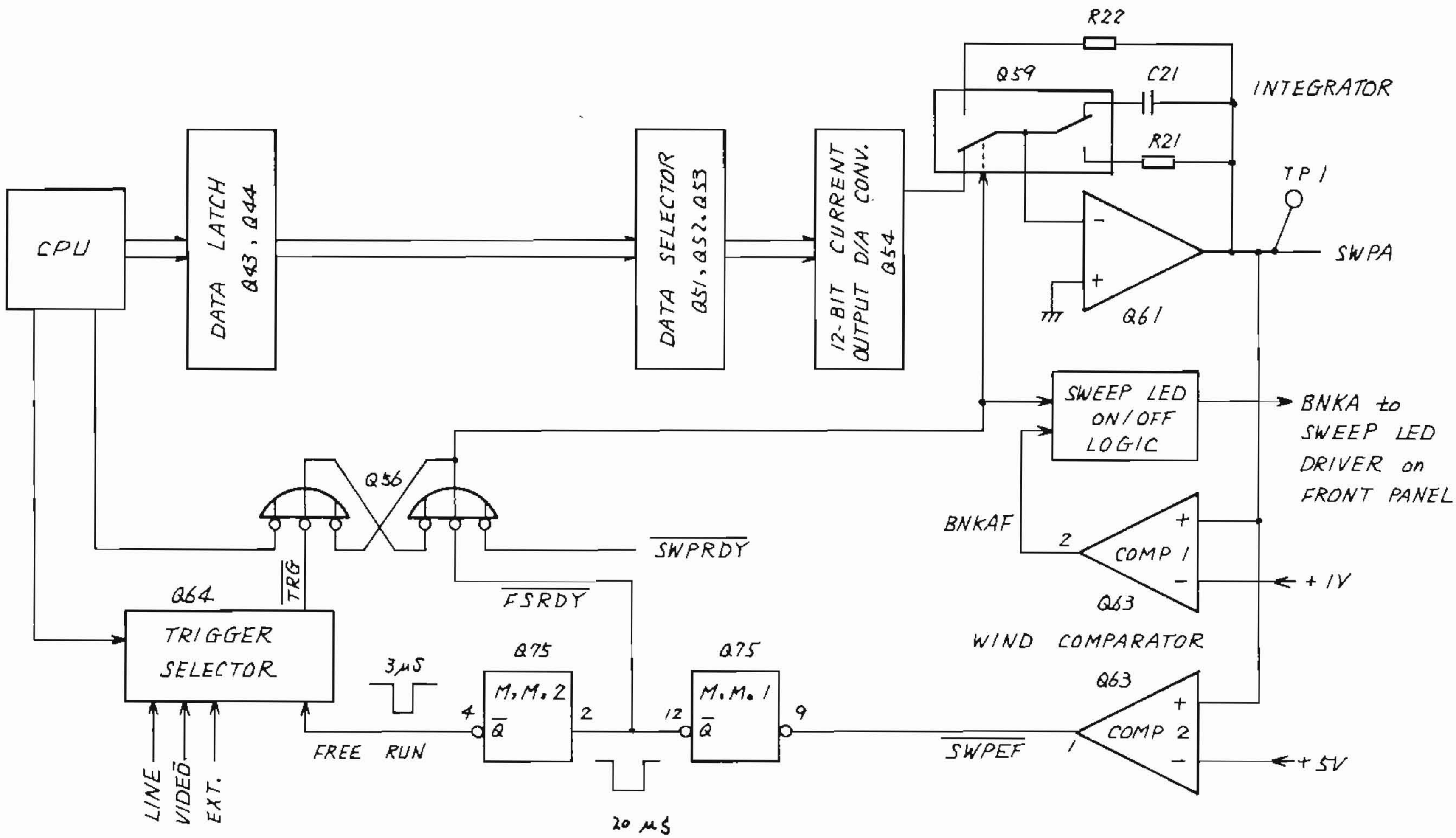
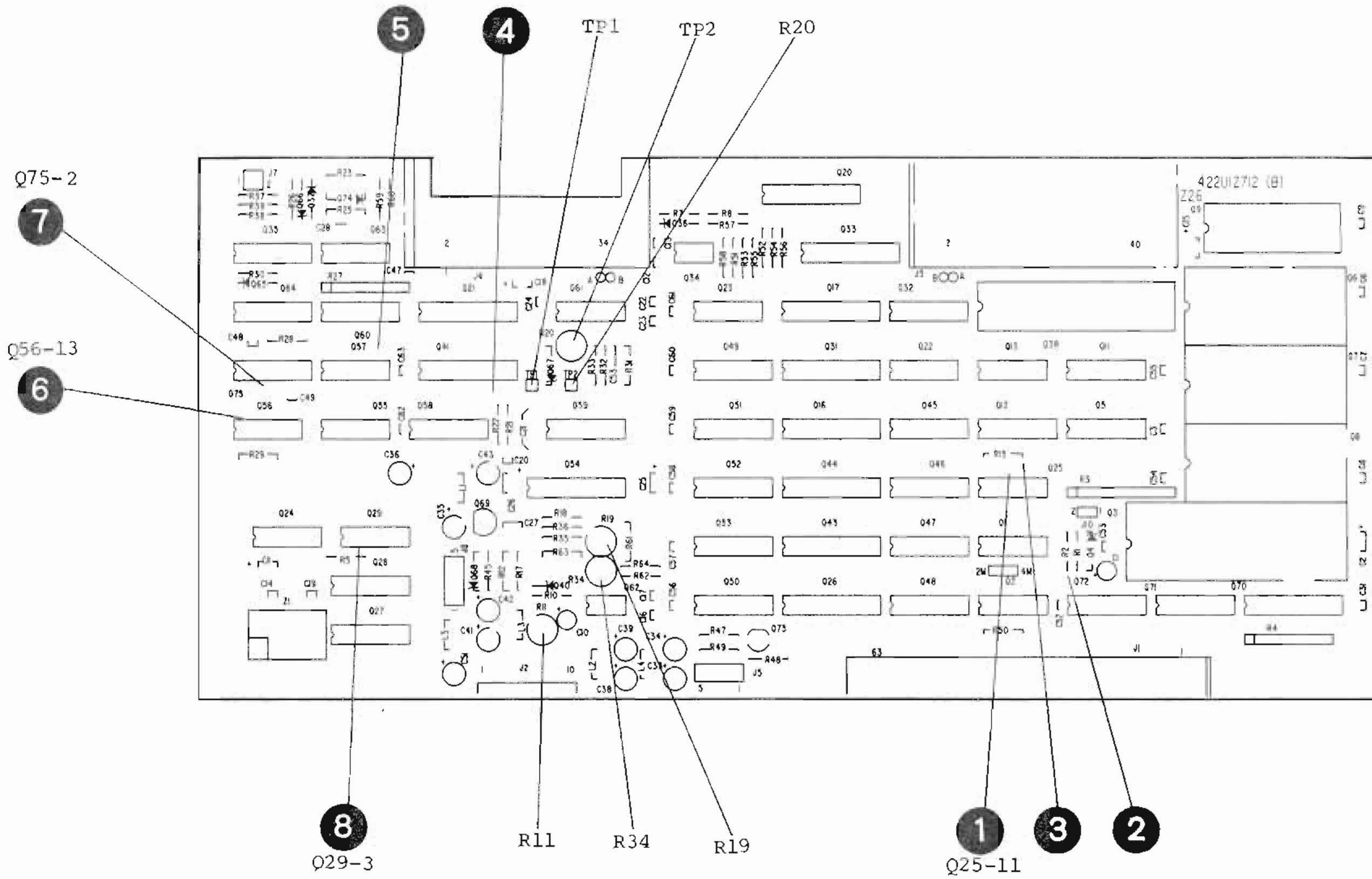
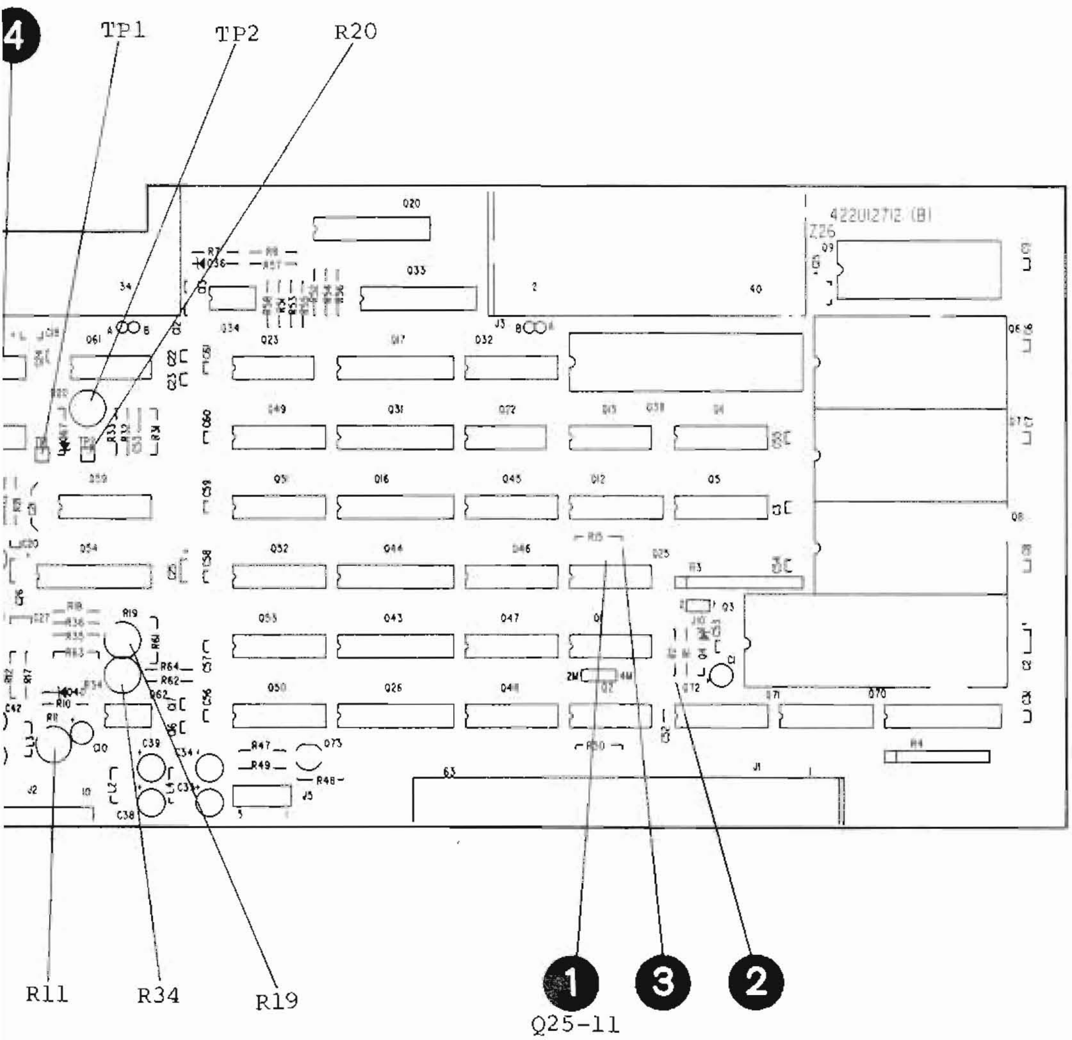


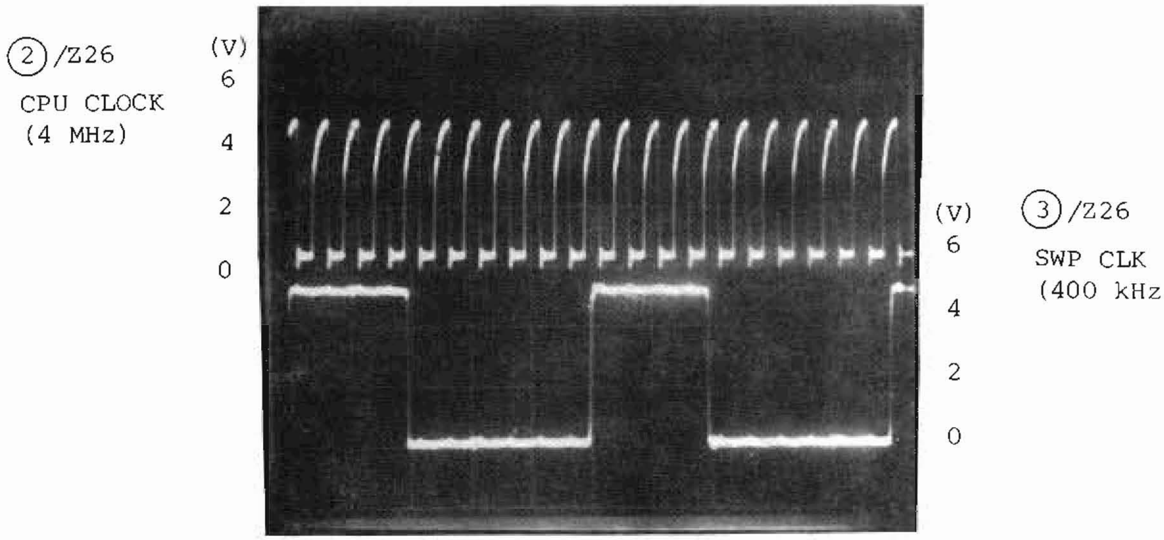
Fig. 5-66 (2/2) Z26 CPU Board for 2 μs/div to 1 ms/div (Fast Sweep)



26 Parts Layout



4
TP1
TP2
R20
R11
R34
R19
1
3
2
Q25-11



HOR: 0.5 μs/div

Fig. 5-68 Clock Signal for Z26 CPU Board

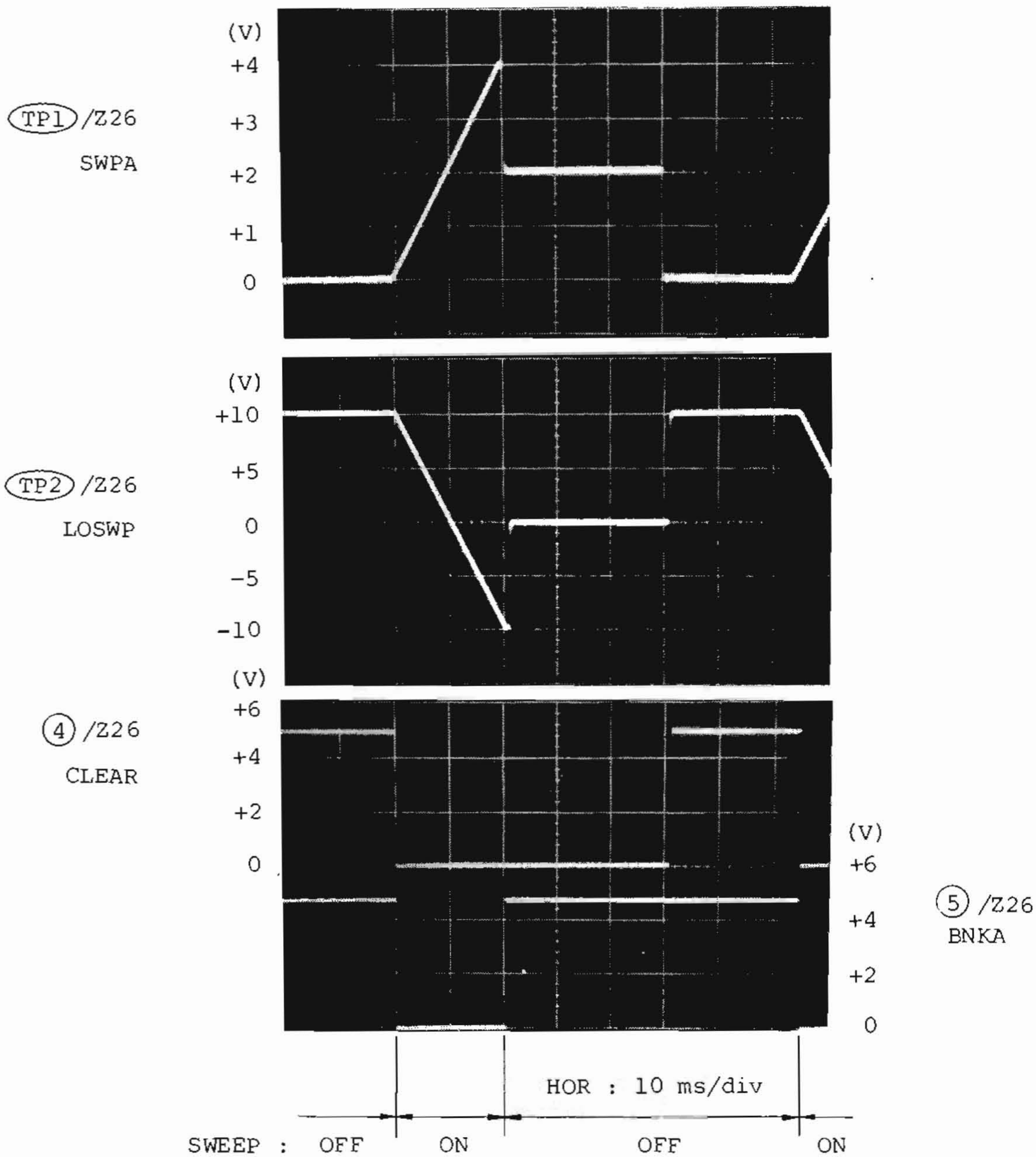


Fig. 5-69 Sweep Generator for 2 ms/div (FREE RUN)

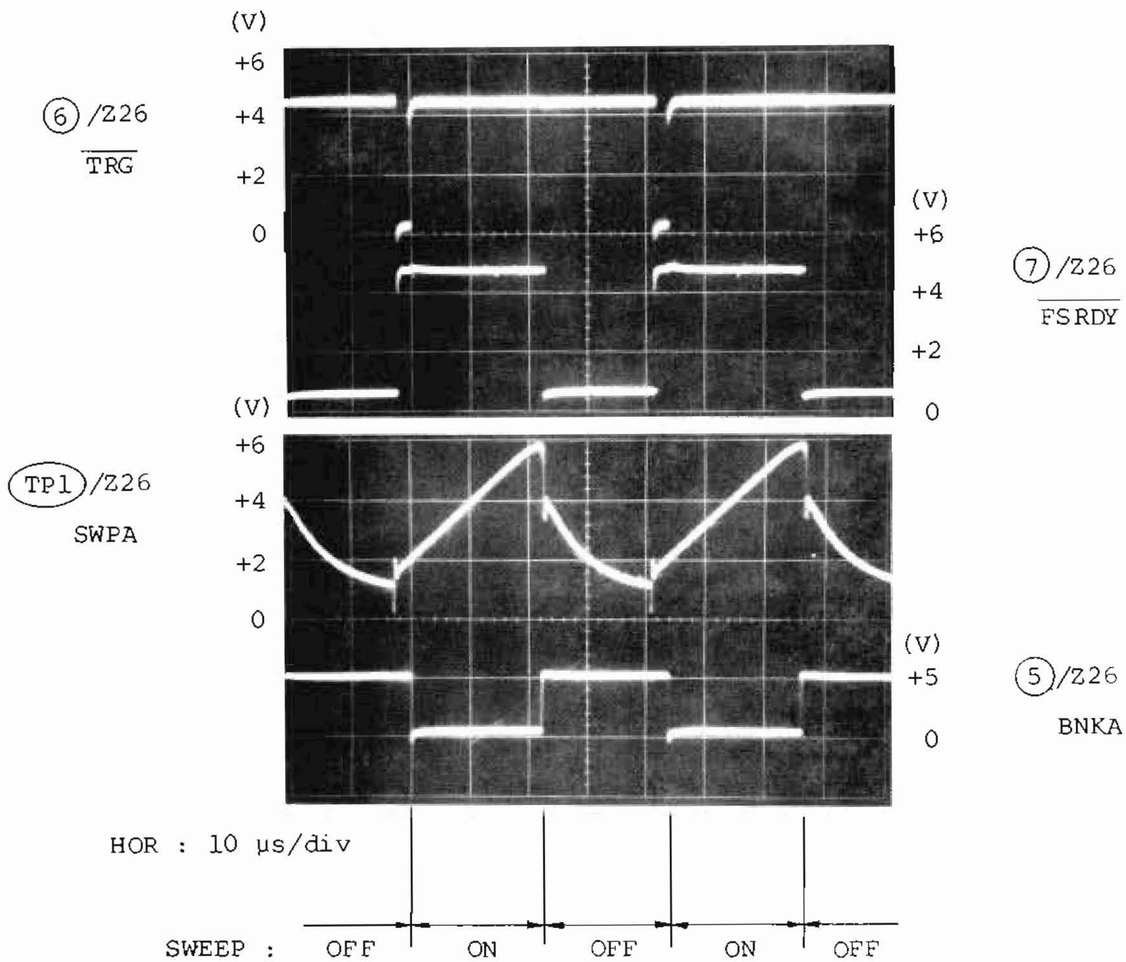
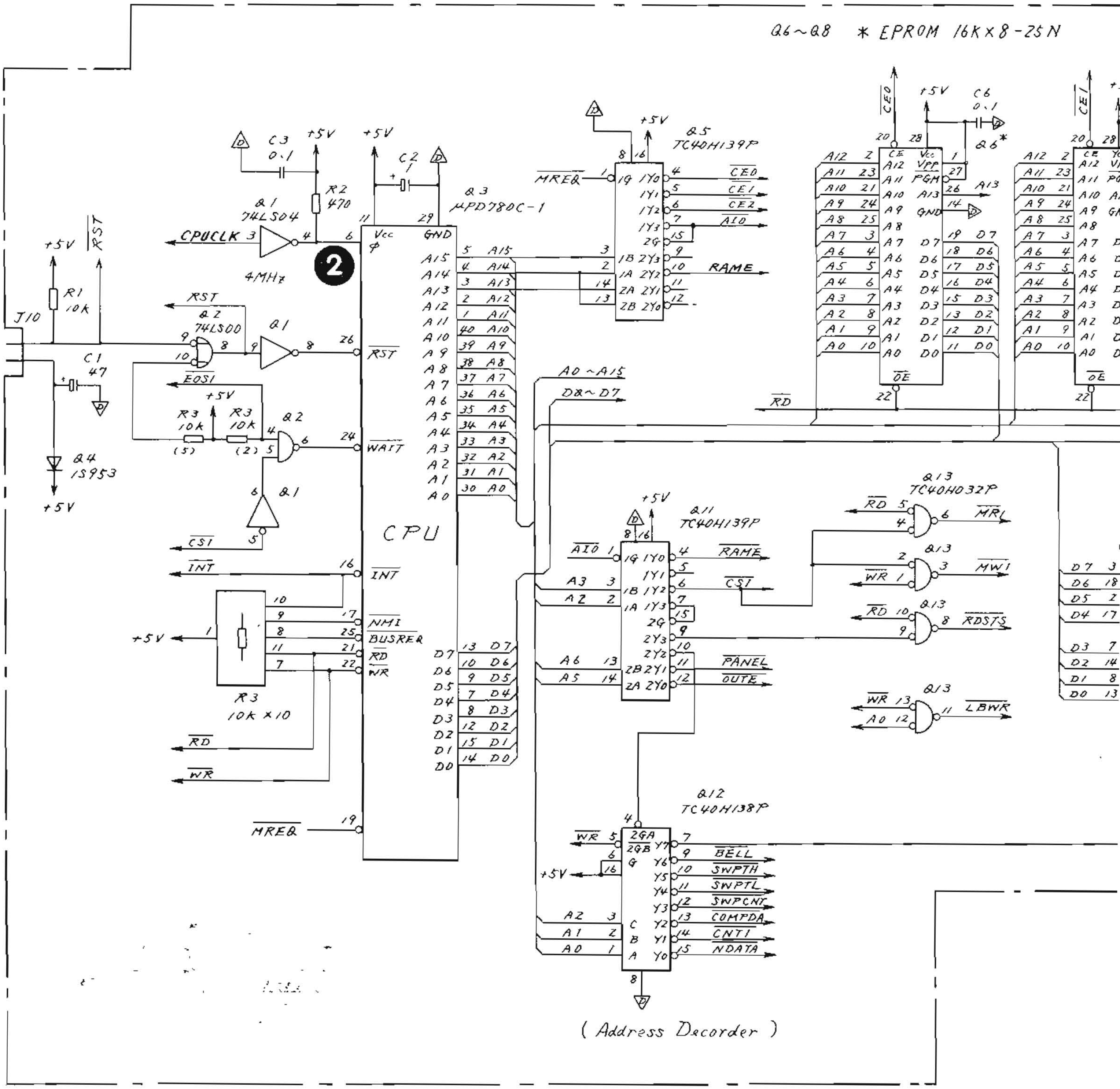


Fig. 5-70 Sweep Generator for 2 μs/div (FREE RUN)

(A) CPU, ADDRESS DECORDERS, ROMs, AND RAM



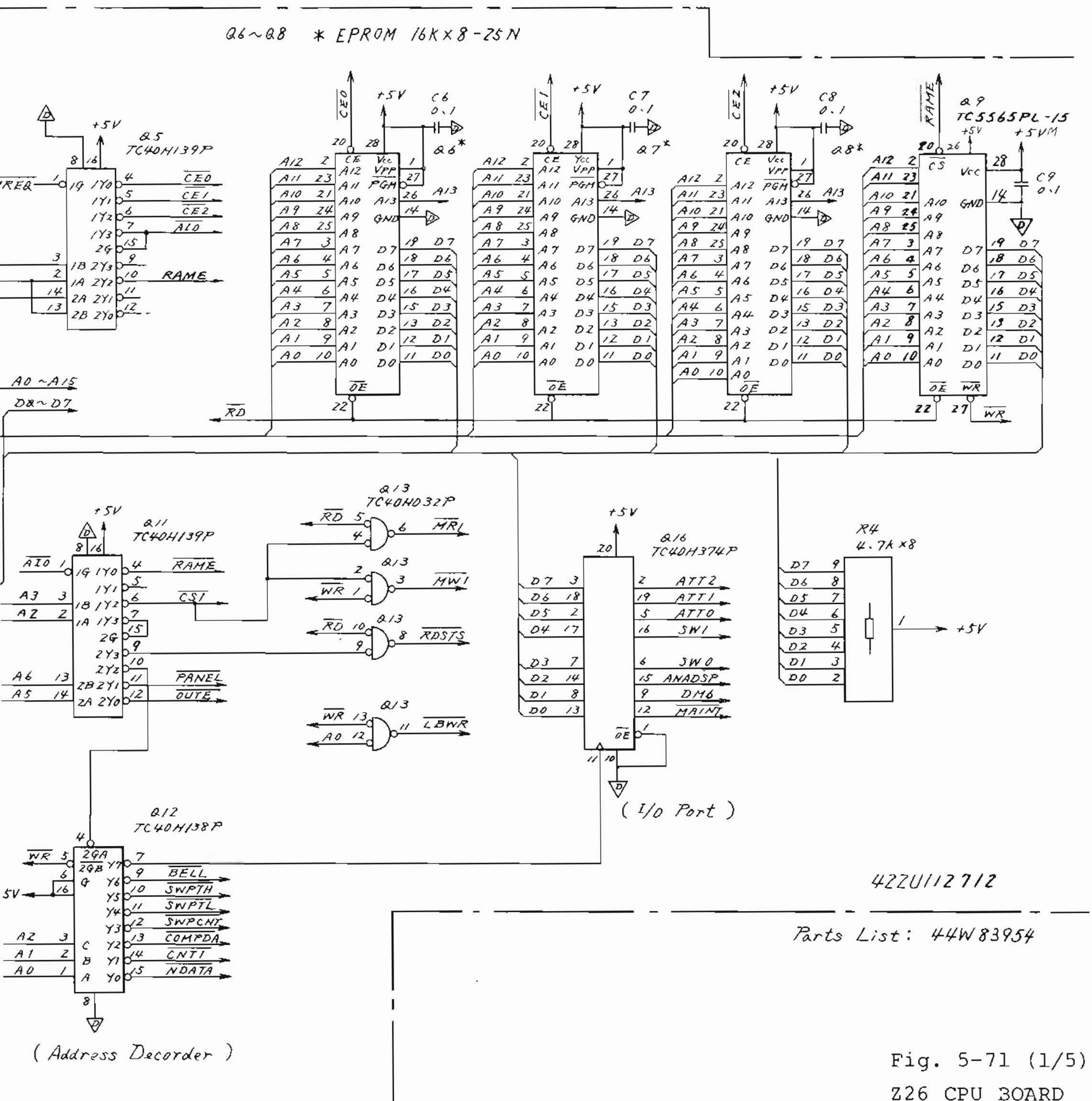
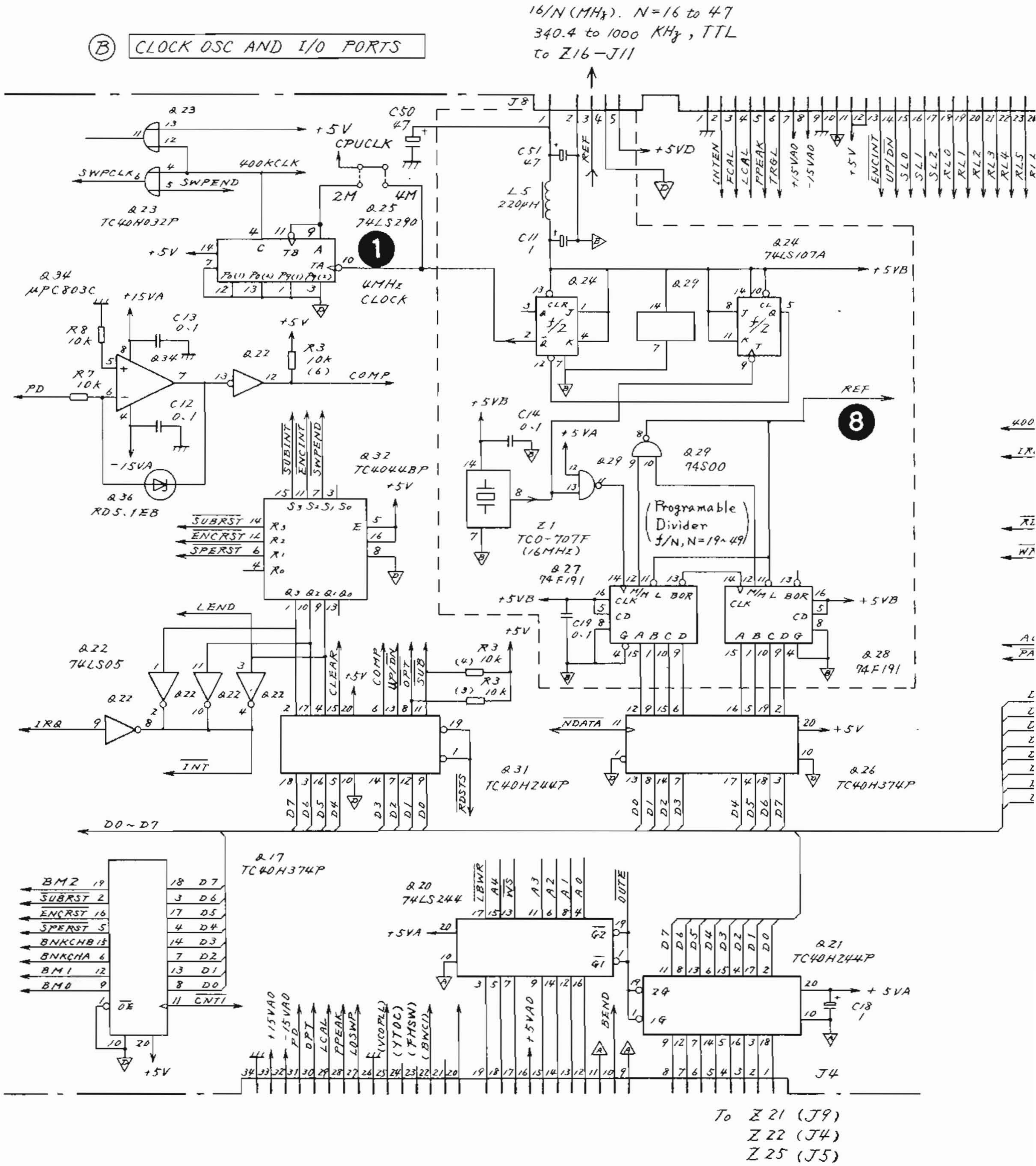


Fig. 5-71 (1/5)

Z26 CPU BOARD
Circuit Diagram (1/5)
(43W 33957)



B CLOCK OSC AND I/O PORTS
16/N (MHz). N=16 to 47
340.4 to 1000 KHz, TTL
to Z16-J11
Q23 TC40H032P
Q25 74LS290
4MHz CLOCK
CPUCLK
400KCLK
SWPCLK
SWPEND
Q34 μPC803C
Q22 74LS05
Q32 TC4044BP
Q24 74LS107A
Q29 74S00
Z1 TCO-707F (16MHz)
Programable Divider f/N, N=19~49
Q27 74F191
Q28 74F191
Q31 TC40H244P
Q26 TC40H374P
Q17 TC40H374P
Q20 74LS244
Q21 TC40H244P
Q36 RD5.1EB
D0~D7
IRQ
INT
LEND
COMP
REF
NDATA
RDSTS
J8
J4
To Z21 (J9)
Z22 (J4)
Z25 (J5)

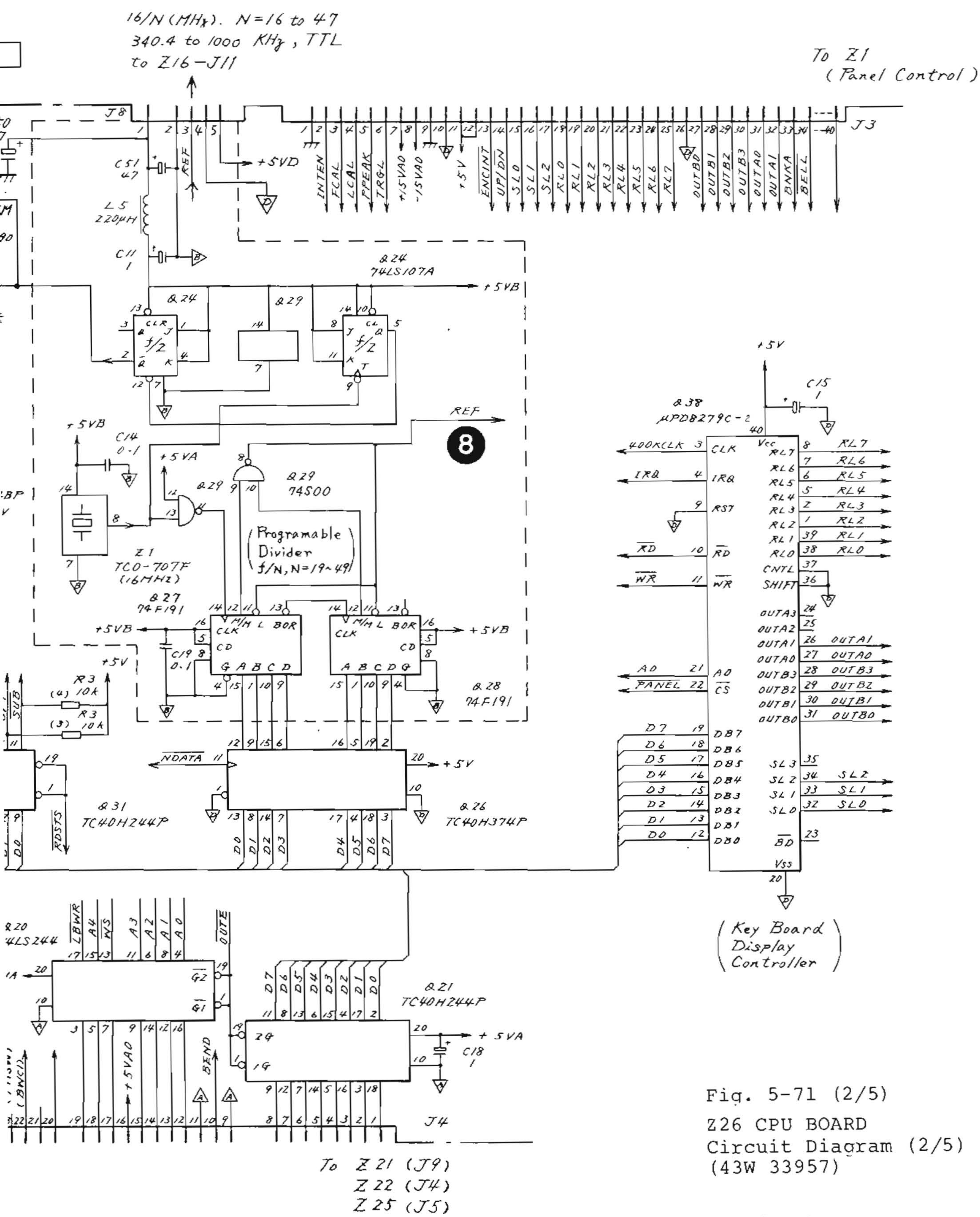
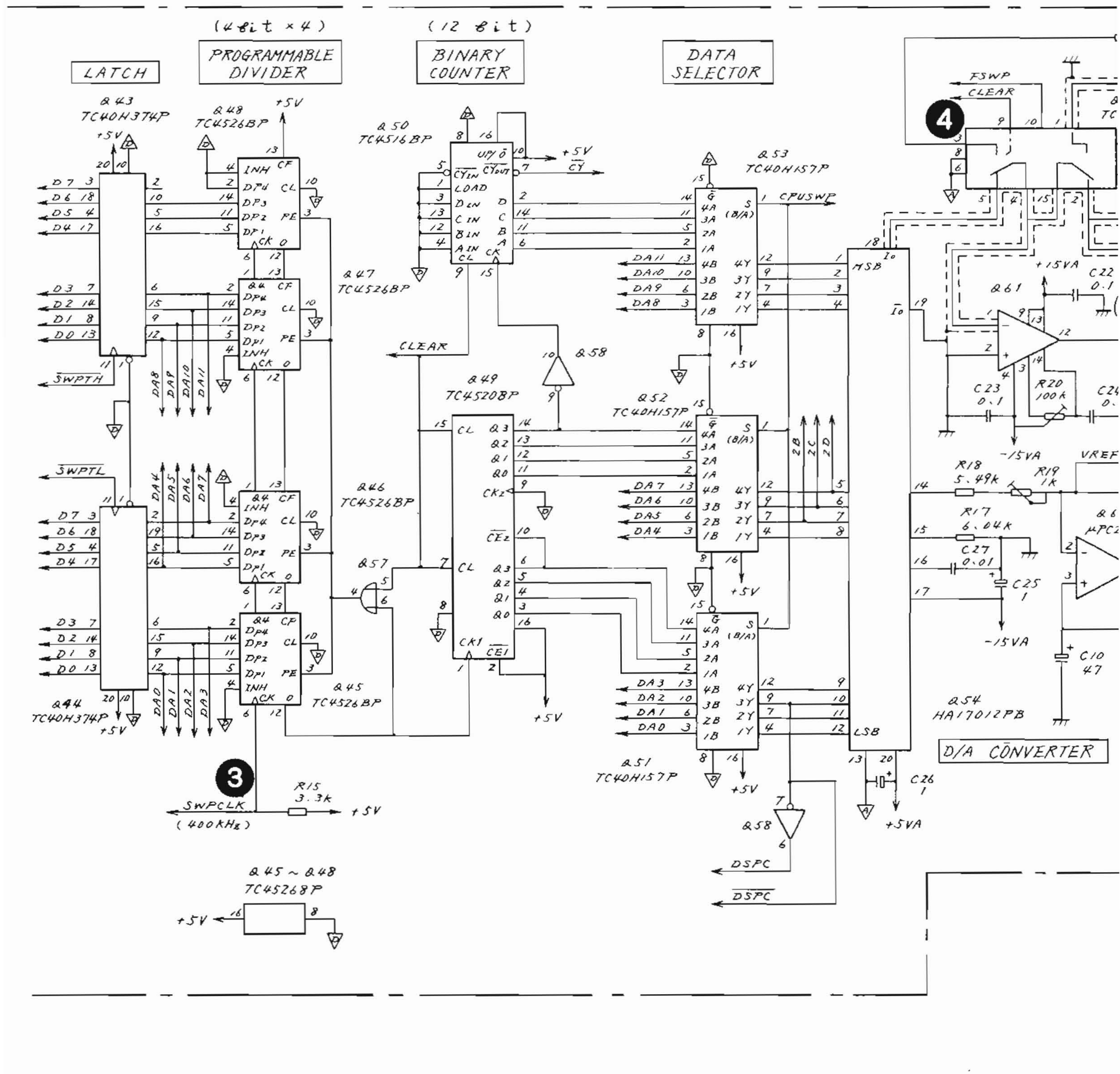


Fig. 5-71 (2/5)
Z26 CPU BOARD
Circuit Diagram (2/5)
(43W 33957)

© SWEEP GENERATOR



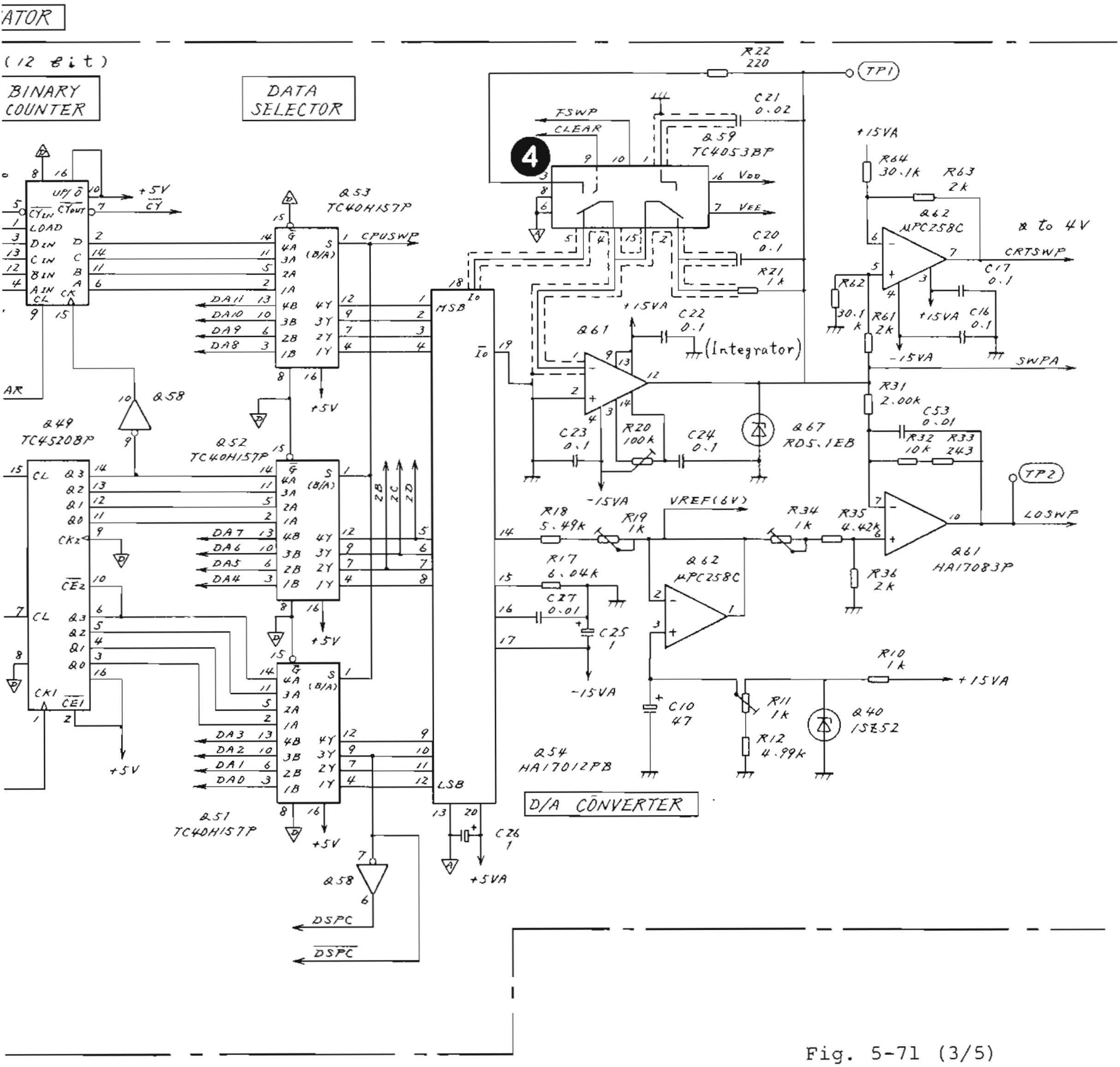
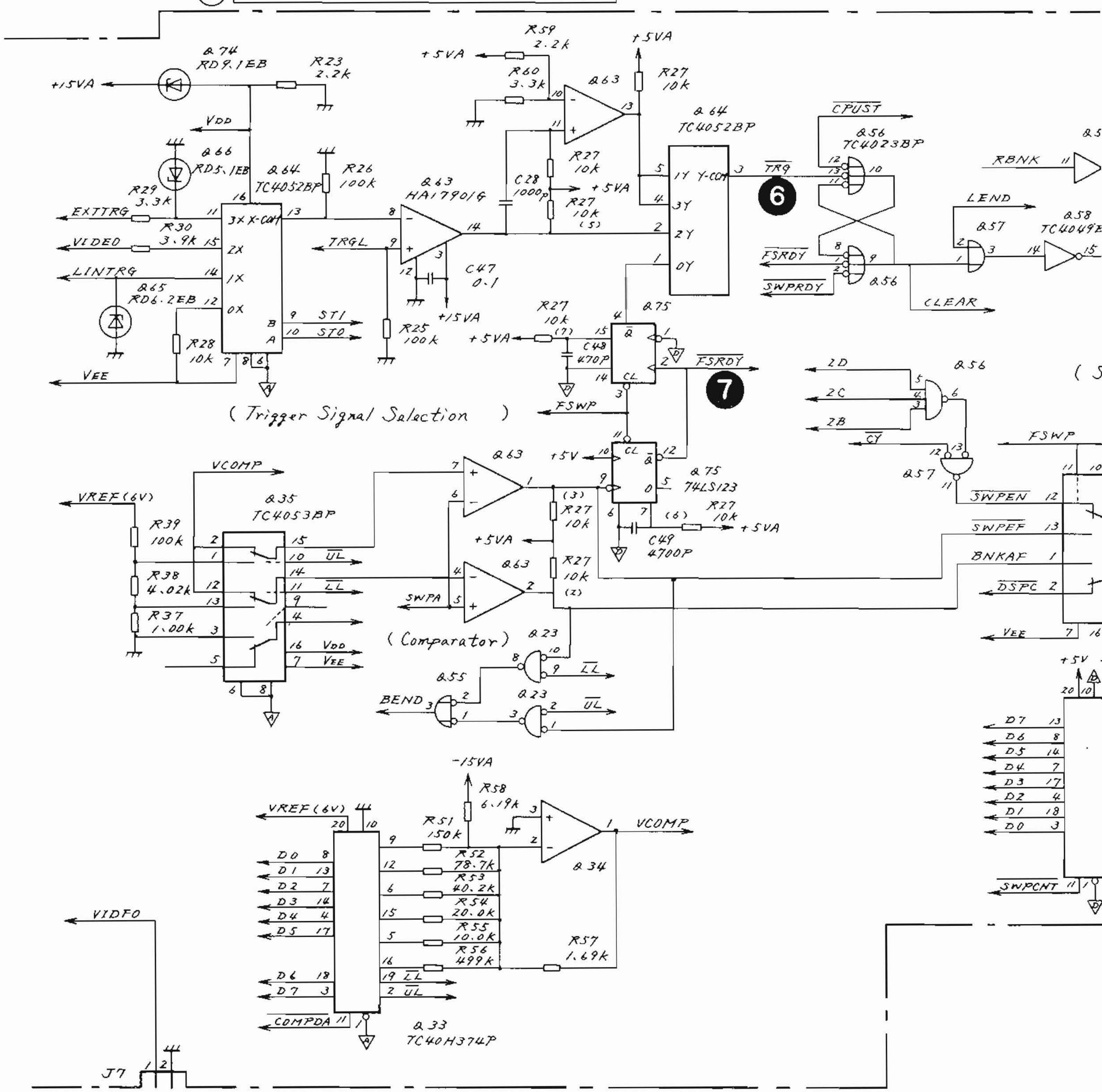


Fig. 5-71 (3/5)

Z26 CPU BOARD
Circuit Diagram (3/5)
(43W 33957)

(D) SWEEP START/STOP CONTROL



To Z25 (J3)
(Video Signal)

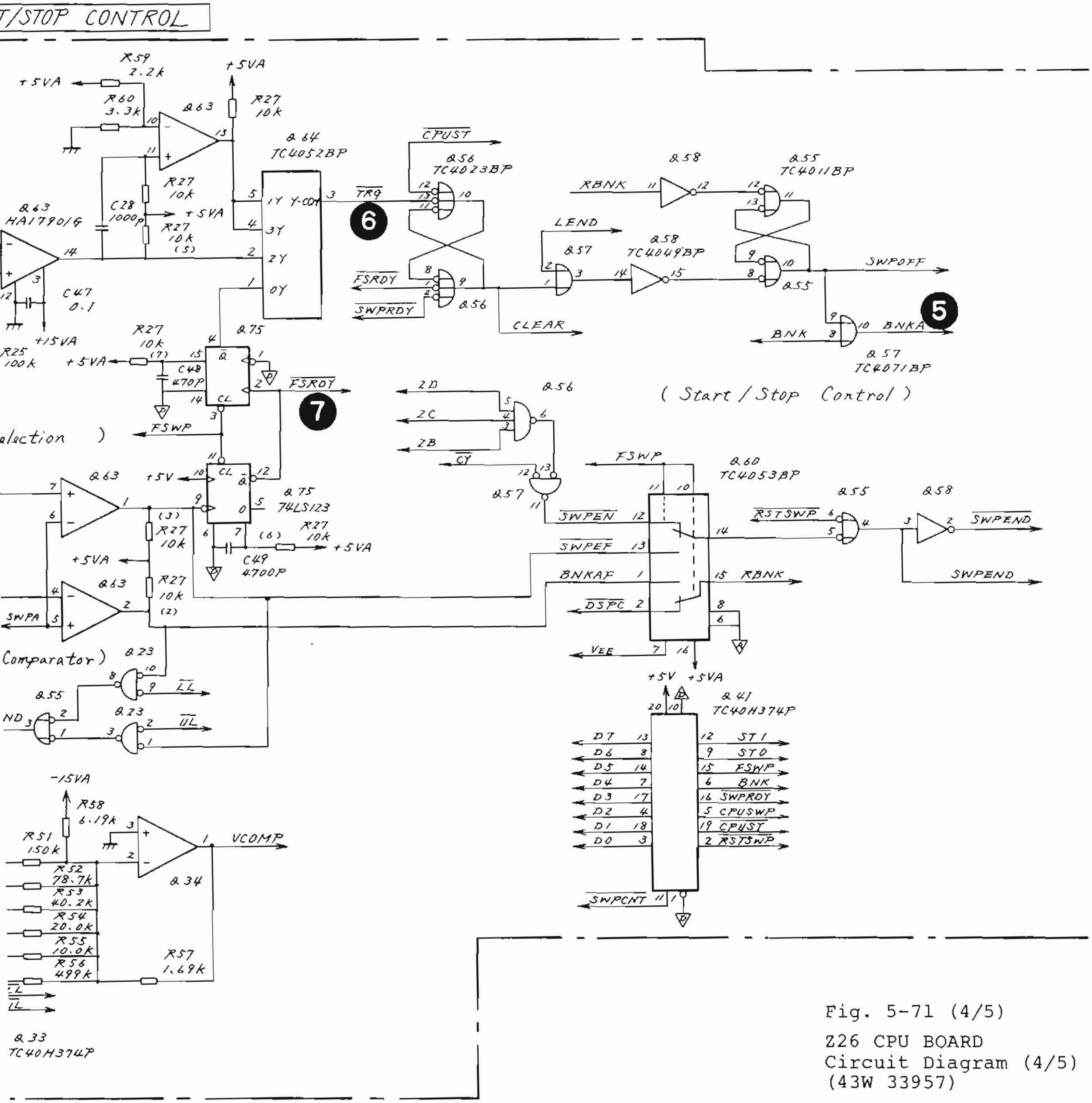
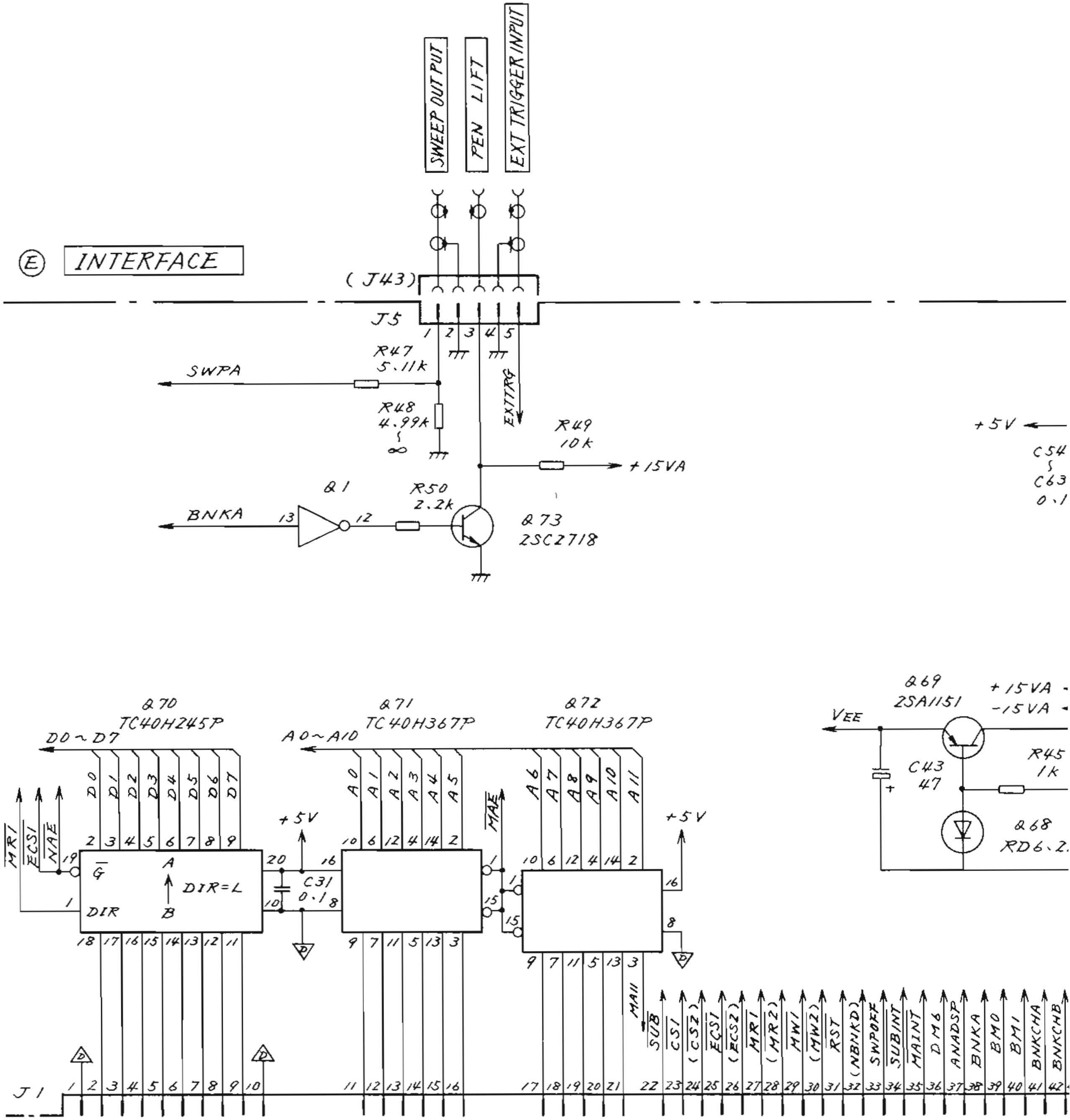


Fig. 5-71 (4/5)

Z26 CPU BOARD
Circuit Diagram (4/5)
(43W 33957)



To Z27-(J1)
and Z34-(J1)

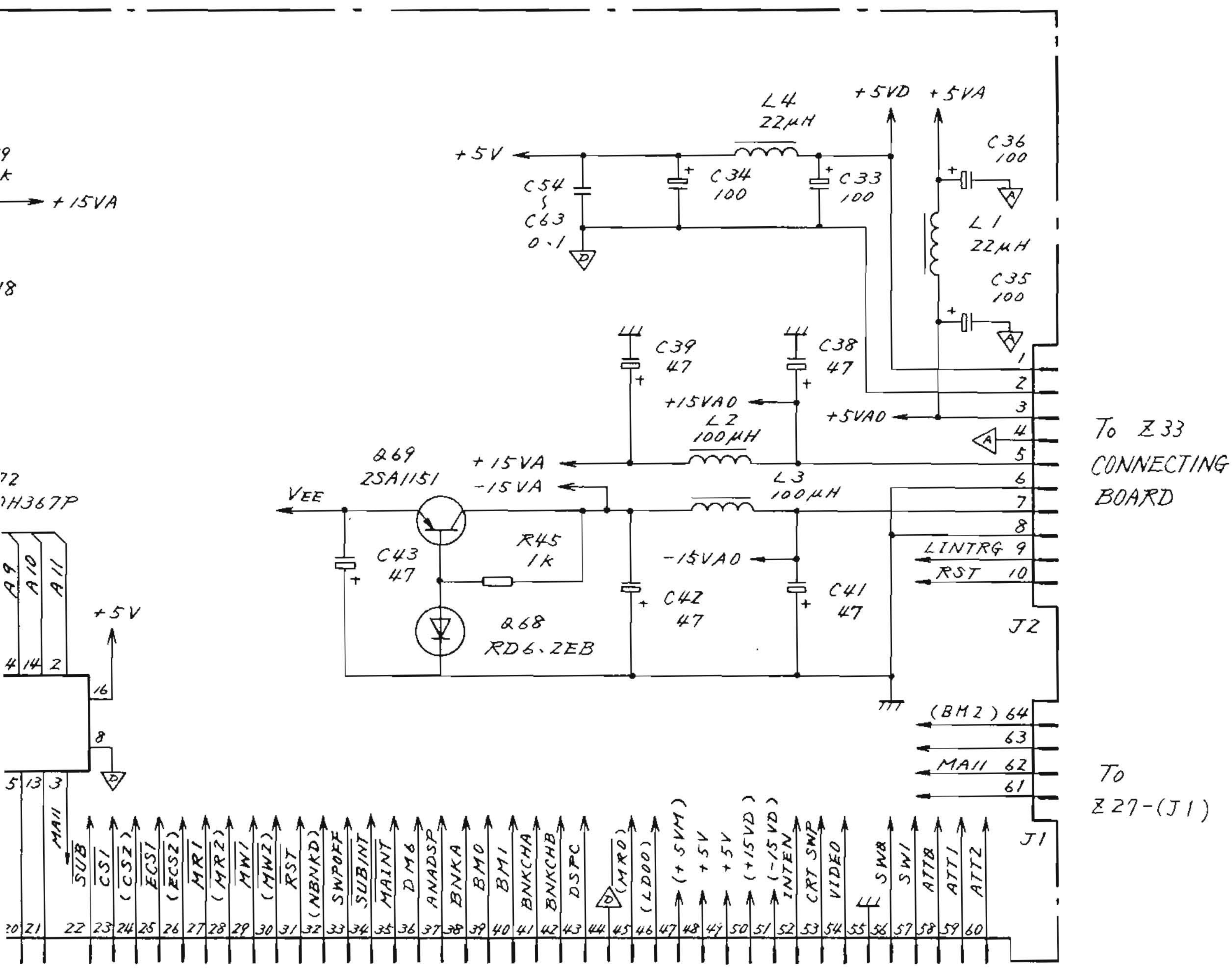


Fig. 5-71 (5/5)

Z26 CPU BOARD
Circuit Diagram (5/5)
(43W 33957)

5.14 Z27 DISPLAY CONTROL

5.14.1 Circuit description - Z27

(Refer to Fig. 3-3 (3/4) and Fig. 5-82)

This PC board includes a display RAM with a battery backup to store the waveform data which is sampled and digitalized in the Z34 digital memory/GP-IB circuit.

This waveform data is used by the digital-to-analog conversion circuit that reads data from this RAM and reproduces the waveform data on the CRT.

This PC board also includes a circuit that displays graticules and characters in addition to the waveform data. The Z27 PC board circuit block diagram is shown in Fig. 5-72.

The Z27 circuit is divided into the 6 parts A to F shown in Fig. 5-82, and the circuit description is given for each part as follows:

Part A: DISPLAY RAM AND ACCESS CONTROL

Q13 is the display RAM which has the 2 kbyte capacity and is the CMOS RAM with a battery backup. This RAM can be accessed from both the main CPU in Z26 and the sub CPU in Z34. It is used as a common RAM when data communication is performed between these CPUs.

The waveform data is written in this display RAM Q13 from the sub CPU in Z34. The character data codes to be displayed and the data that indicates the marker display positions are written by the main CPU in Z26.

The display RAM Q13 address map is listed in Table 5-4. Normally, the characters that indicate the measurement conditions, graticules (dot rows), and up to two waveform data items are displayed on the CRT.

These data items are arranged according to the display RAM address order listed in Table 5-4. Consequently, the above-mentioned display is performed by sequentially reading these data items, performing the required D/A conversion, and sending this data to the Z30 CRT bias/X-Y amplifier. The required character codes are written in a part of the waveform memory area by the main CPU for the SAVE/RECALL memory list display mode (DM6). They are sequentially read out so that character patterns can be created by using the character generator ROM. Then these patterns can be displayed on the CRT. The display sequence is shown in Fig. 5-73.

The basic timing clock signal used for this display sequence control is the 4.8 MHz clock signal (CKO) generated by X1 and Q1. Q2 is the dual 4-bit binary counter used to obtain clock signals CK1 to Ck3 and AD0 to AD3 which has cycle time multiplied CKO by the integer. These clock signals are shown in Fig. 5-76.

One of these signals is selected depending on display modes DM1 to DM4 and DM6, and is sent to the Q3 and Q4 counters.

The output of these counters are used as addresses (AC5 to AC14) to read data from the display RAM Q13.

Therefore, whenever AC5 varies, the access address in the display RAM is incremented by 1.

Whenever AC5 varies (whenever AC4 varies from H to L), the read control circuit consisting of the Q11, Q12, and Q15 (flip-flops and monostable multivibrators) operates and data is read from the display RAM and latched at Q16. The timing for this readout sequence is shown in Fig. 5-77.

Part (B): TIMING CONTROL

The address data for the DISPLAY RAM are also sent to the display mode control logic circuit consisting of Q20 and Q21 to generate display mode status signals DM1/6, DM2, and DM3/4.

DM1 is the mode for displaying characters which show the measurement conditions. DM2 is the mode for displaying the graticule dot lines. DM3 and DM4 are modes for displaying the waveform data. DM6 is the mode for displaying characters which show the memory list in the SAVE/RECALL operation.

In any mode, X-Y drive signals for the desired CRT display are generated by the X and Y D/A converters in Part (C). The logic circuit in Part (B) generates latch timing signals for the input data of these D/A converters.

Part (C): CHARACTER GENERATOR, DATA SELECTOR, AND D/A CONVERTERS

The data read from the display RAM are the character codes for DM1 and DM6. These data are used as the most significant 6-bit address of character generator ROM Q30. Because AC0 to AC4 are input to the least significant 5-bit address of the character generator, 32 addresses can be specified for one character display and data items CD0 to CD5 are output to generate character patterns.

The CD0 to CD5 signals are used to generate X-Y character pattern analog signals by using the D/A conversion circuit consisting of Q31 and Q32.

The data items corresponding to the X- and Y-axial direction character display positions are input to an X/Y D/A converter by the data selector using the address counter value. These data items are then converted into the corresponding analog signals.

These character pattern and character position signals are added by Q64 through the Q63 analog switch in Part D . Then they are converted into CRT driver input signals. In this case, offset signals used to determine displav line spacing are also added to the Y-axial direction signals.

The data read from the display RAM Q13 indicates the positions of the X- and Y-axial direction graticules for DM2.

A single graticule is generated for each data item. The dot positions and blanking control signals used to create individual single scale line dots are generated in Part B by the Q17, Q18, and Q19 timing circuits according to the ROM Q22 information.

The data corresponding to the scale-line position is input to one of the X/Y DA converters.

The dot position information generated by Q22 is input to another X/Y D/A converter. Thus analog signals are generated corresponding to the scale-line dot patterns.

The marker Y-axial direction line is also created in the same way as the scale line during the final cycle of this DM2.

The data read from the display RAM Q13 is the waveform data for DM3/4. The least significant 2-bit data contained in the Z34 (digital memory/GP-IB PC board) is also added to this data and is input to the Y D/A converter through the data selector as a total of 10-bits of the waveform data.

At the same time, the address counter value that sequentially reflects the incremented X-axial direction positions for waveform data changes is selected and input to the X D/A converter by using the data selector.

Part D: BLANKING CONTROL, LINE GENERATOR, SWITCH, AND ADDER

Because the Y D/A output in the mode DM3/4 represents the sampled waveform value, it is displayed as unconnected points when displayed as is. Therefore, to connect these points with a line, and reproduce the original analog waveform data, the Q65 and Q66 line generator circuits are used.

The analog X-Y signal needed in each display mode is selected by the switch and adder circuit Q63 and Q64 and then sent to the Z30 CRT BIAS/X-Y AMP PC board through connector J3.

The blanking control signals in all display modes are generated by the circuit consisting of Q40 to Q43 and are also sent to Z30.

Part E: INTENSITY CONTROL

The intensity of the CRT display should be changed for each display mode. The circuit consisting of Q73 to Q75 generates this intensity control signal.

The regulator circuits for VDD and VEE which are used in the analog switches are also included in this Part E.

Part F: MEMORY ACCESS PRIORITY CONTROL

The DISPLAY RAM Q13 has to be accessed at random by the display control on this Z27, the main CPU on Z26, and the sub CPU on Z34. So, access priority control must be done to avoid data collision. The access request signals $\overline{CS0}$, $\overline{CS1}$, and $\overline{CS2}$ are latched in Q85 and checked by the Q86 priority encoder. Then an access enable signal from among $\overline{ECS0}$, $\overline{ECS1}$, and $\overline{ECS2}$ is returned to each part.

The priority for the display control circuit ($\overline{CS0}$) is the highest and that for the sub CPU ($\overline{CS2}$) is the lowest.

5.14.2 Checking procedure - Z27

Step	Procedure
1.	Remove the top cover and the PC board cover plate ⑮ See Figs. 2-1 and 2-5.
2.	Remove the Z27 PC board by pulling it up. Insert the extender board and attach the Z27 PC board.
3.	Turn on the MS710C power switch.
4.	Observe the voltage waveforms of XOUT ❶ and YOUT ❷ using an oscilloscope. when they are as shown in Fig. 5-67, the operations from the input section to the Z27 PC board are assumed to be normal and the following checks are not required.
5.	Check that the 4.8 MHz reference clock $\overline{CK0}$ ❸ , the frequency-divided clocks $\overline{CK1}$ ❹ , and CK3 ❺ obtained from the reference clock operate normally as shown in Fig. 5-76.
6.	Using an oscilloscope, check that Display RAM Readout timing circuit signals of checkpoints ❻ to ⓫ operate normally as shown in Fig. 5-77.
7.	Check that the Display Mode Status signals DM1/2/6 ⓬ and DM3/4 ⓭ are as shown in Fig. 5-78.
8.	Using an oscilloscope, check that X output XC ⓮ and Y output YC ⓯ of the character generator are as shown in Fig. 5-79.

(cont.)

Step	Procedure
9.	Check that output XDA ⑯ of X-D/A and output YDA ⑰ of Y-D/A are as shown in Fig. 5-80.
10.	Check that the BLANKING CONTROL signal (H: BLANKING ON) BLANK ⑱ is as shown in Fig. 5-81.
11.	Turn the SCALE INTENSITY control knob on the front panel and check the voltage of ⑲ is as shown in Fig. 5-81.

5.14.3 Adjustment - Z27

(1) Sensitivity and Offset Adjustment Procedure

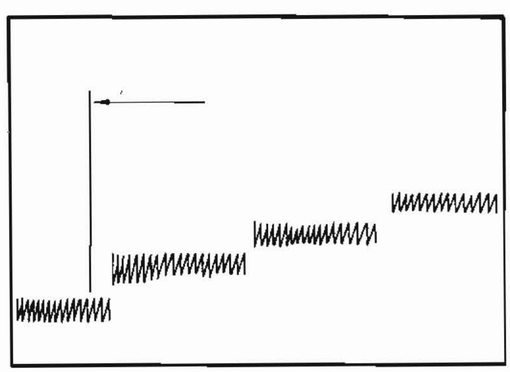
Step	Procedure
1.	Connect DVM between TP1 and analog ground and adjust R34 so as to obtain +10.23 V.
2.	Adjust R37 so that the characters on the upper and lower position of the scale line are at a suitable position. (It is better to leave a larger space between the lower characters and the bottom scale line than a space between the upper characters and the top scale line.) If the space between the upper or lower characters and the top or bottom scale line is too small to observe the scale, make R58 (6.81 kΩ) smaller to spread the space.

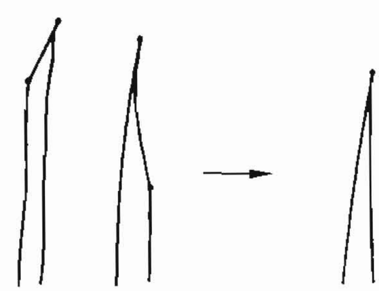
(cont.)

Step	Procedure
3.	Disconnect the video signal line between Z25-J3 and Z26-J7. (Disconnection at Z25-J3 is easy.)
4.	Under this condition (Video voltage = 0 V), write NORMAL to both A and B memories.
5.	As the contents of the A and B memories are equal by step 4 above, (A - B) will be 0. (The effect of offset of the sampling system can be canceled in this way.)
6.	Push the DISPLAY (A - B) key and set REF LINE on the screen to bottom. Set the offset with R36 in Z27 so that a trace display which is now a horizontal line coincides with the bottom scale line. (It is possible to perform this adjustment without lifting the printed board.)
7.	Push the DISPLAY (A - B) key and set REF LINE on the screen to top. Set sensitivity with R35 in Z27 so that the trace display coincides with the top scale line.
8.	Push the DISPLAY (A - B) key and set REF LINE on the screen to middle. Confirm that the trace display coincides with the center scale line.

(2) Marker Level Indication Adjustment Procedure

Step	Procedure
1.	Press the 1.7 G - 23 GHz FREQ BAND switch to reset.
2.	Send a signal in a frequency range of 2 GHz to 23 GHz, level approx. 0 dBm so that a single spectrum is indicated.
3.	Set WRITE to OFF to hold the waveform.
4.	Show the marker with SHIFT + CENTER FREQ.
5.	Overlap the marker with the spectrum.
6.	Adjust R43 so that the marker indication level coincides with the peak point of the spectrum line.





Note: If the displayed spectrum trace is not sharp and clear or is divided into two lines, adjust the frequency so that the trace converges into a single line.

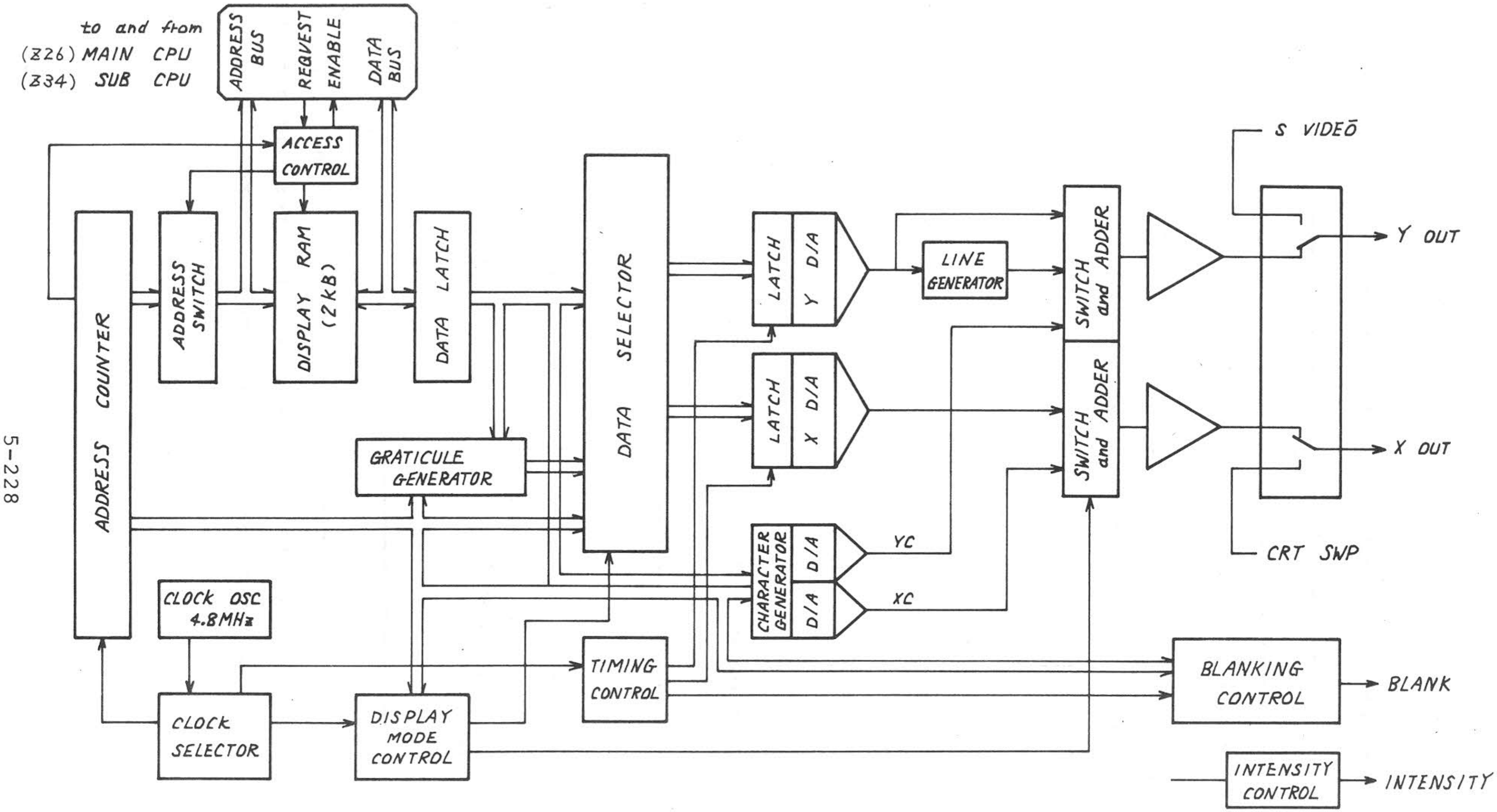
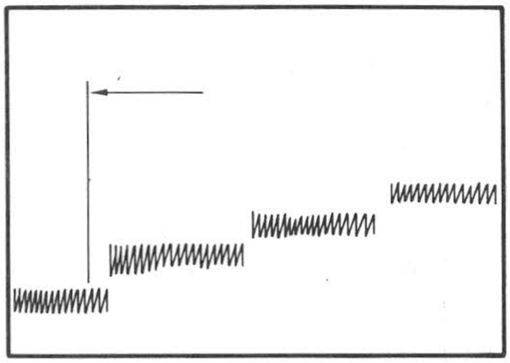
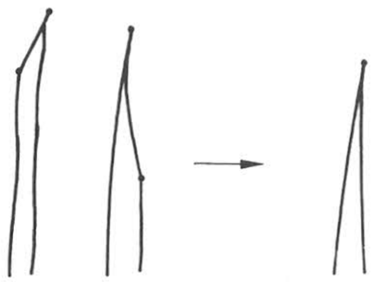


Fig. 5-72 Z27 Display Control Simplified Block Diagram

(2) Marker Level Indication Adjustment Procedure

Step	Procedure
1.	Press the 1.7 G - 23 GHz FREQ BAND switch to reset.
2.	Send a signal in a frequency range of 2 GHz to 23 GHz, level approx. 0 dBm so that a single spectrum is indicated.
3.	Set WRITE to OFF to hold the waveform.
4.	Show the marker with SHIFT + CENTER FREQ.
5.	Overlap the marker with the spectrum.
6.	Adjust R43 so that the marker indication level coincides with the peak point of the spectrum line.





Note: If the displayed spectrum trace is not sharp and clear or is divided into two lines, adjust the frequency so that the trace converges into a single line.

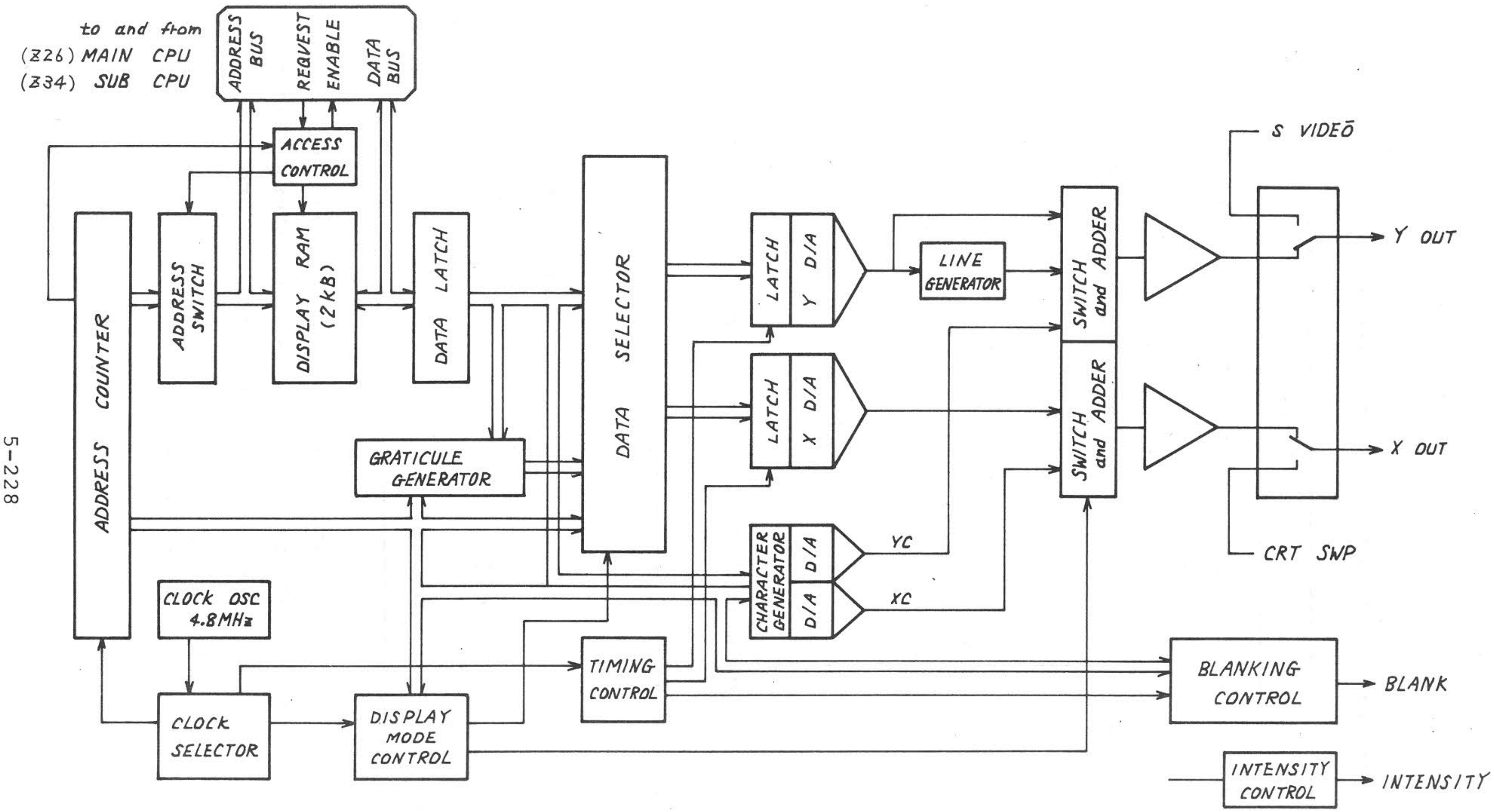


Fig. 5-72 Z27 Display Control Simplified Block Diagram

Table 5-4 Q13 DISPLAY RAM ADDRESS MAP

MODE	ADDRESS DECIMAL	ADDRESS HEX	DATA
DM3/4	2047 – 2043	7FF – 7FB	BLANKING AREA
DM3/4	2042 – 1542	7FA – 606	CH-B TRACE DATA
DM3/4, DM3	1541 – 1531	605 – 5FB	BLANKING AREA
DM3	1530 – 1030	5FA – 406	CH-A TRACE DATA
DM3	1029 – 1024	405 – 400	BLANKING AREA
DM2	1023 – 288	3FF – 120	COMMON RAM AREA for MAIN and SUB CPU
	287 – 256	11F – 100	MARKER POSITION DATA GRATICULE POSITION DATA
DM1	255 – 192	0FF – 0C0	CHARACTER CODE LINE 1
DM1	191 – 128	0BF – 080	CHARACTER CODE LINE 2
DM1	127 – 64	07F – 040	CHARACTER CODE LINE 3
DM1	63 – 0	03F – 000	CHARACTER CODE LINE 4

for NORMAL DISPLAY

MODE	ADDRESS DECIMAL	ADDRESS HEX	DATA
	2047 – 1792	7FF – 700	NOT USED
DM6	1791 – 1728	6FF – 6C0	CHARACTER CODE LINE 1
DM6	1727 – 1152	6BF – 480	⋮
DM6	1151 – 1088	47F – 440	CHARACTER CODE LINE 11
DM6	1087 – 1024	43F – 400	CHARACTER CODE LINE 12
	1023 – 0	3FF – 000	SAME AS NORMAL DISPLAY

for MEMORY LIST DISPLAY

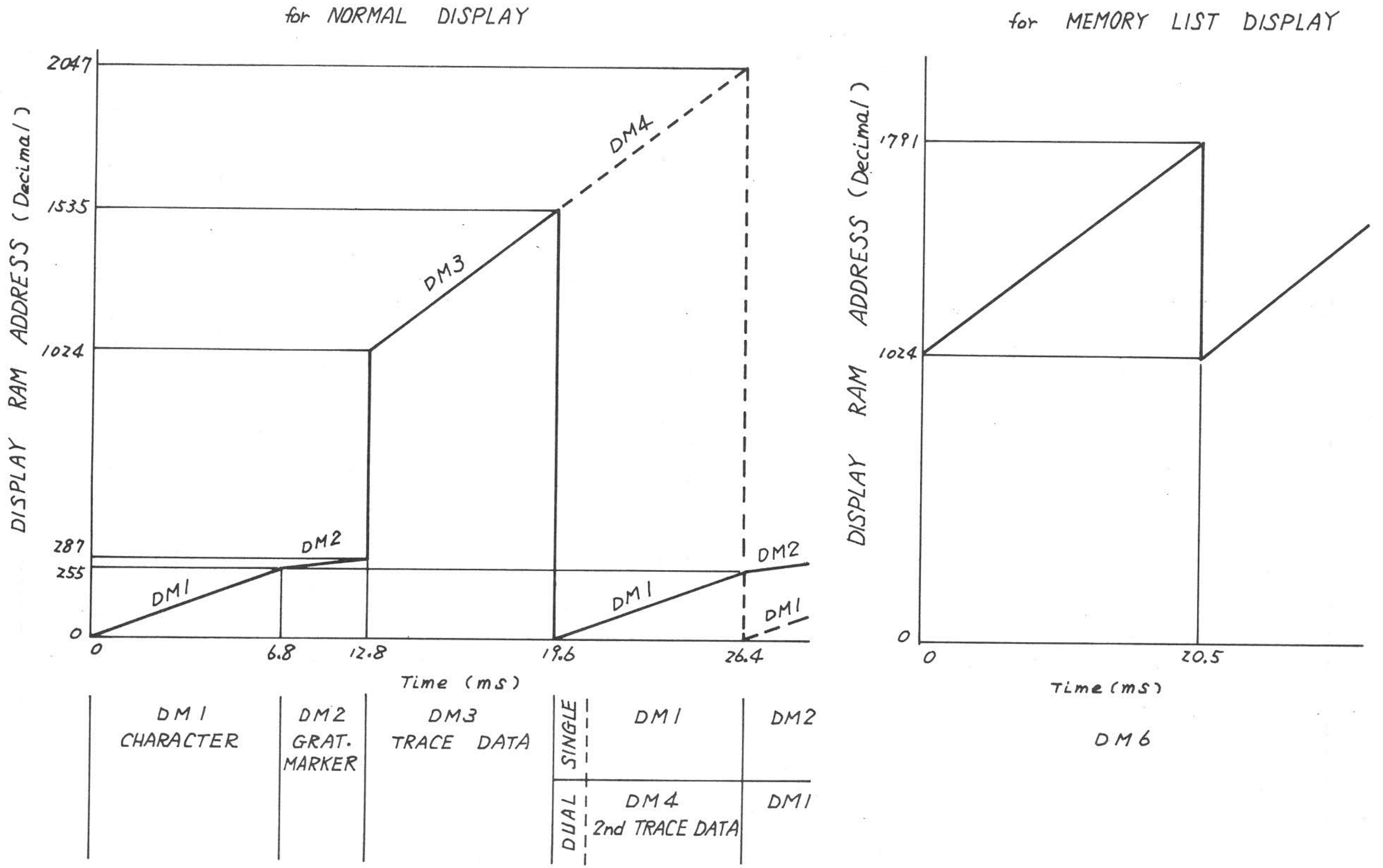


Fig. 5-73 Display Mode Timing Chart

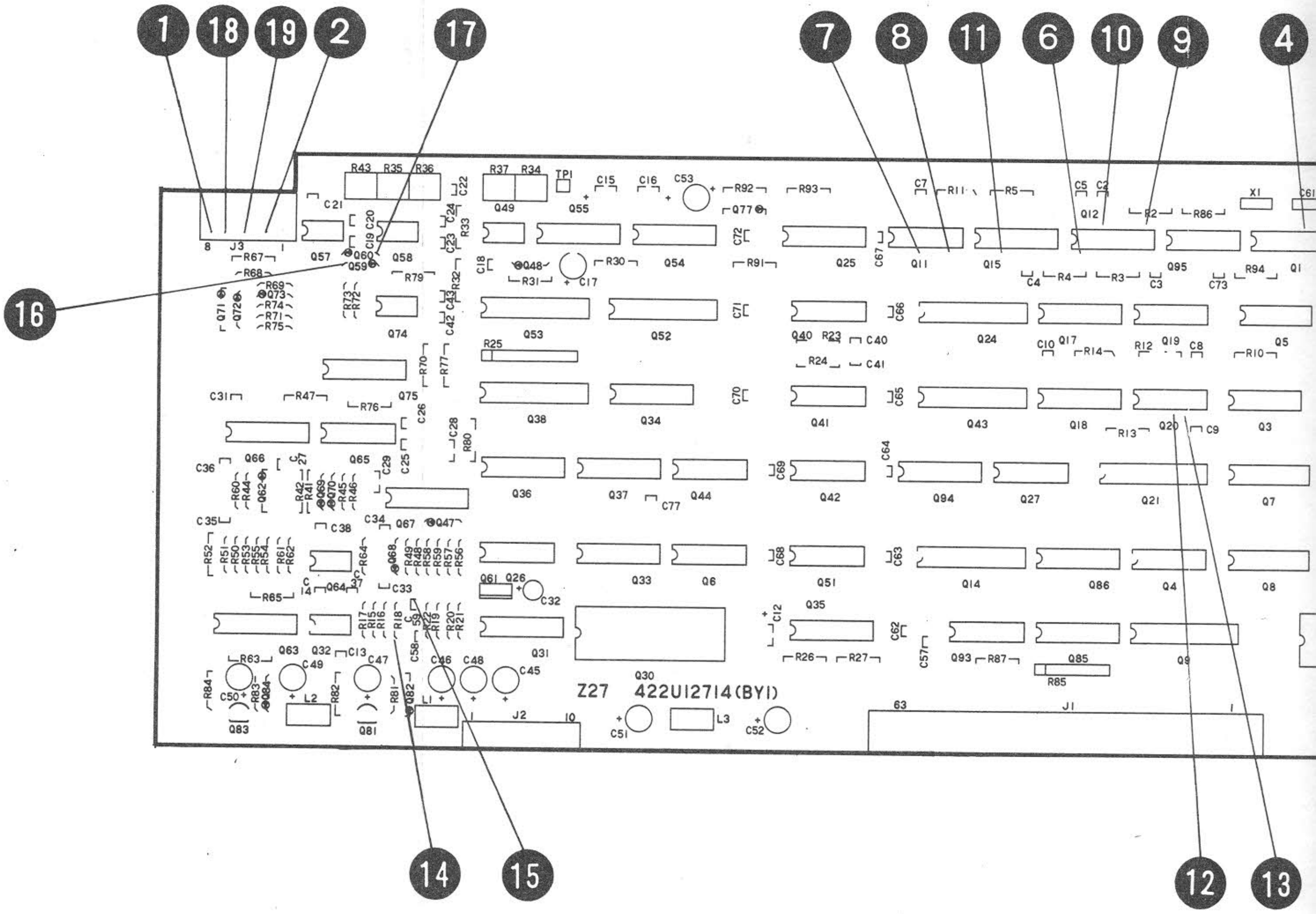
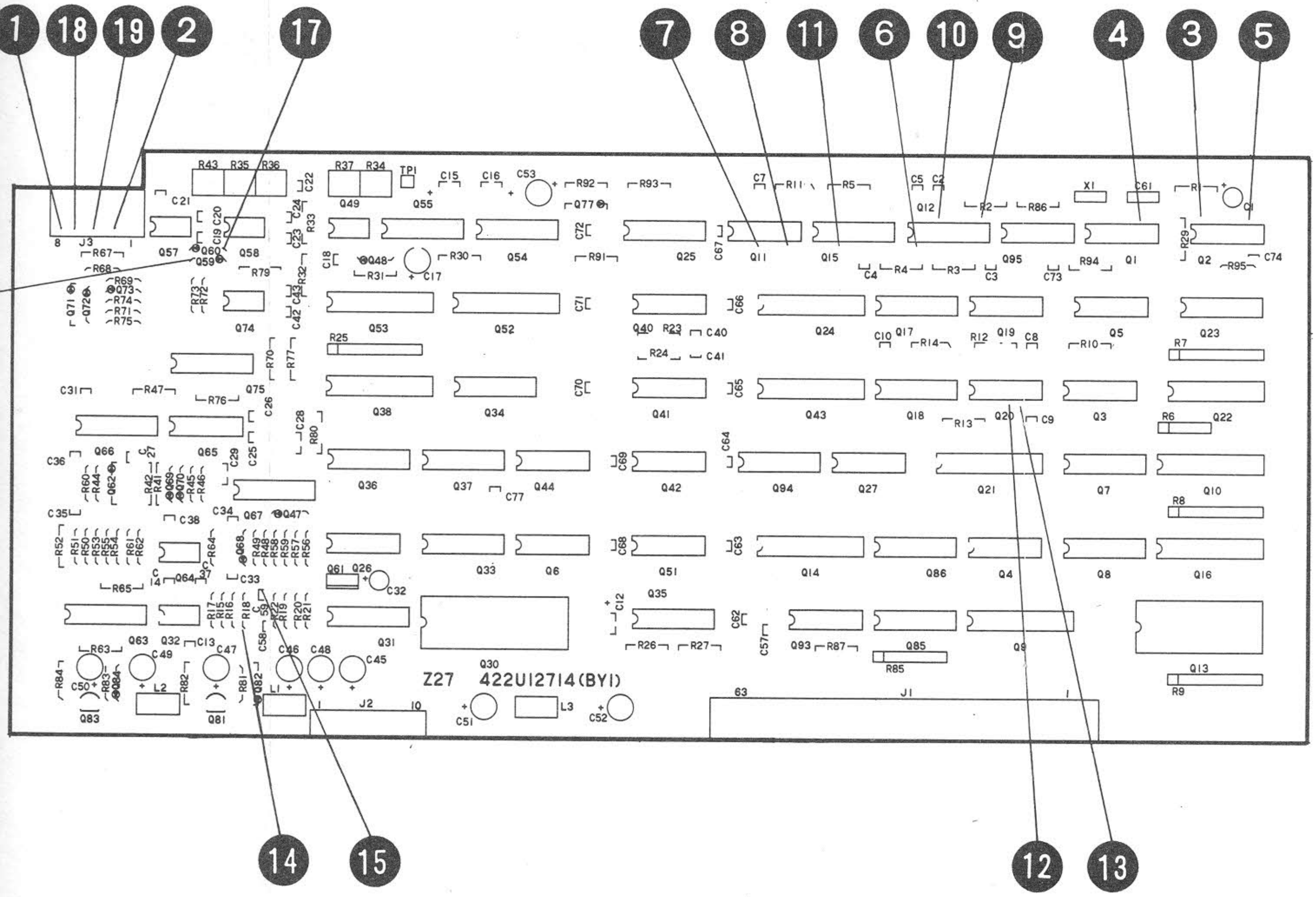


Fig. 5-74 Z27 Parts Layout



s Layout

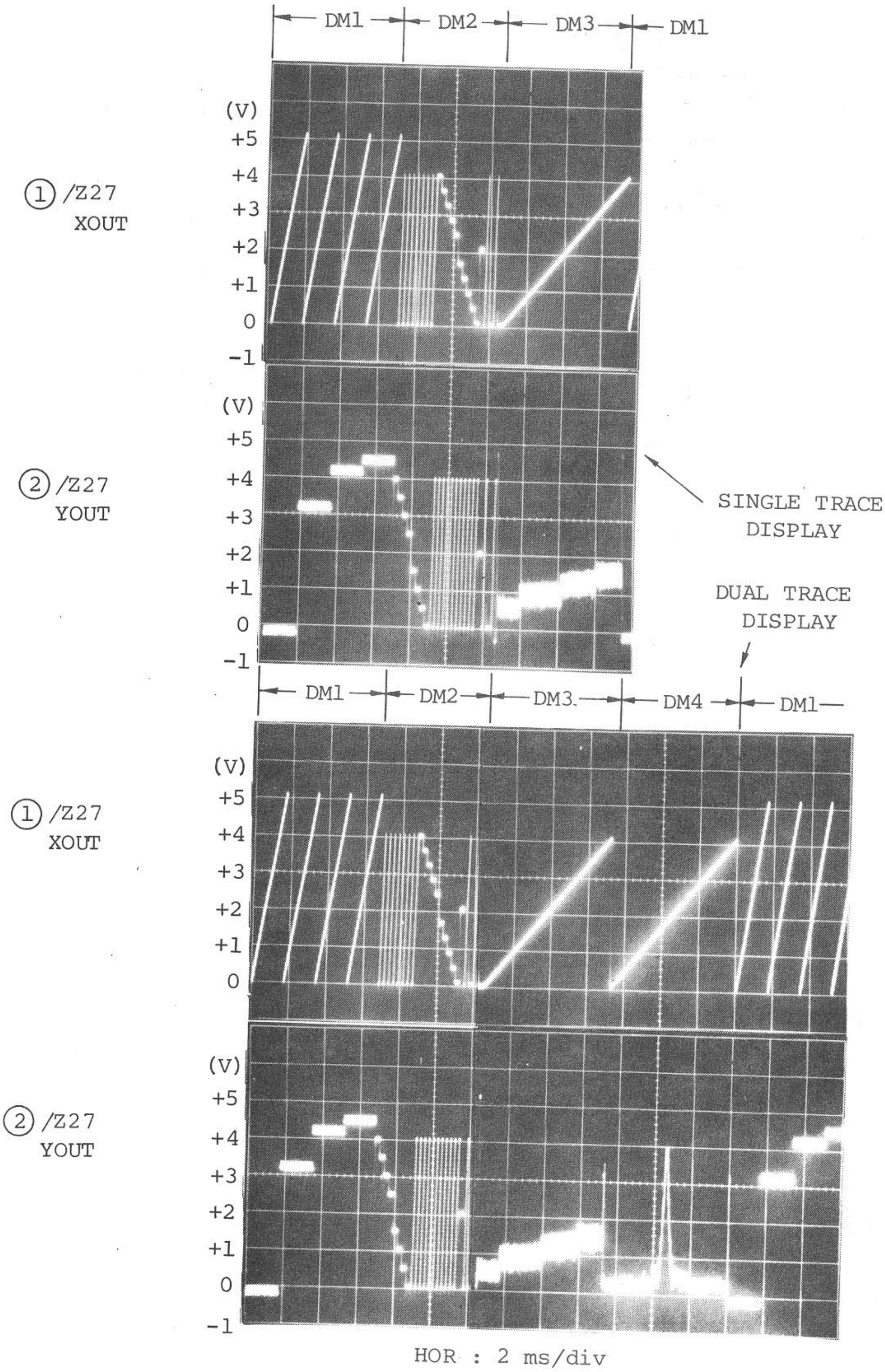


Fig. 5-75 Output of Z27 Display Control

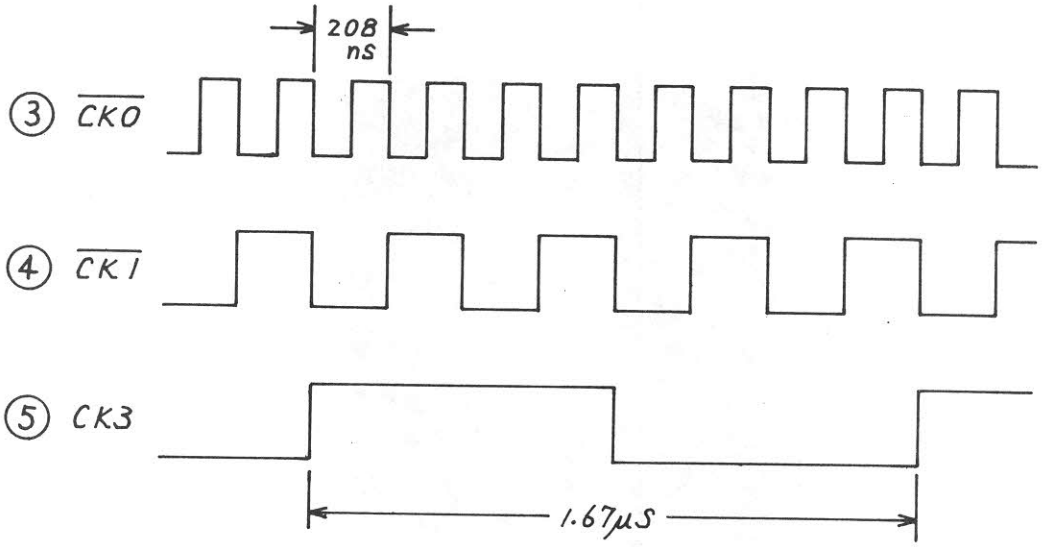


Fig. 5-76 Clock Signals for Display Control

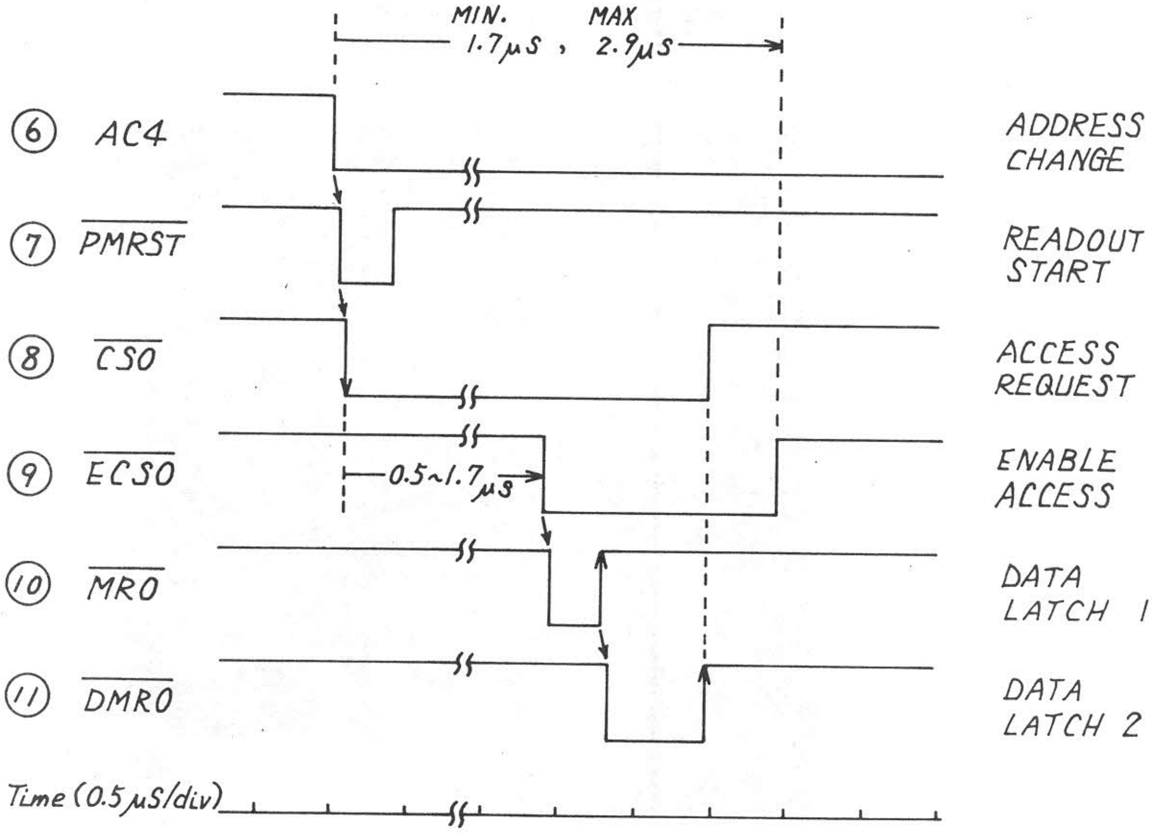


Fig. 5-77 Display RAM Access Timing Chart

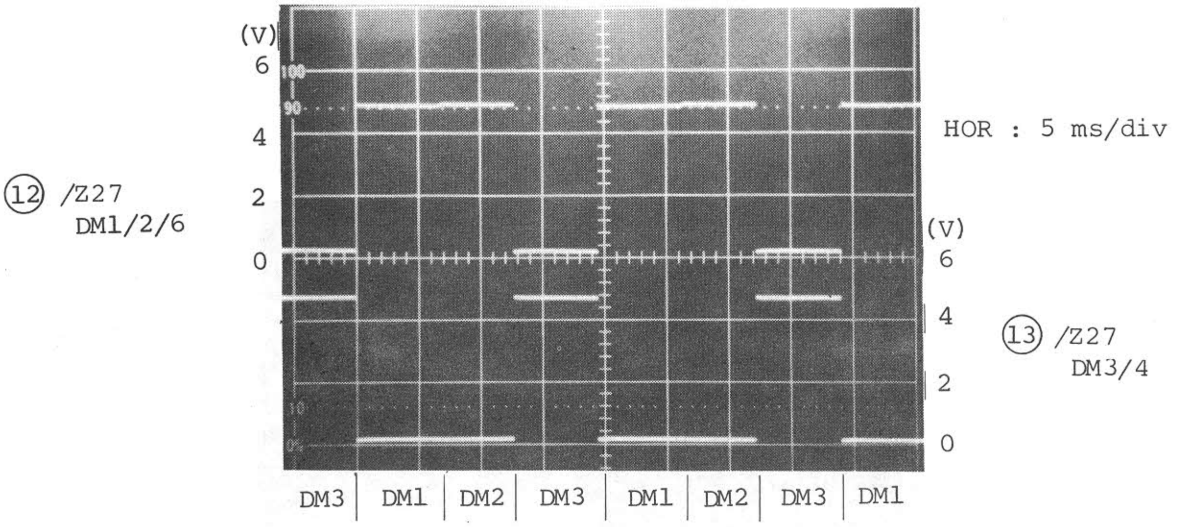


Fig. 5-78 Display Mode Status Signal

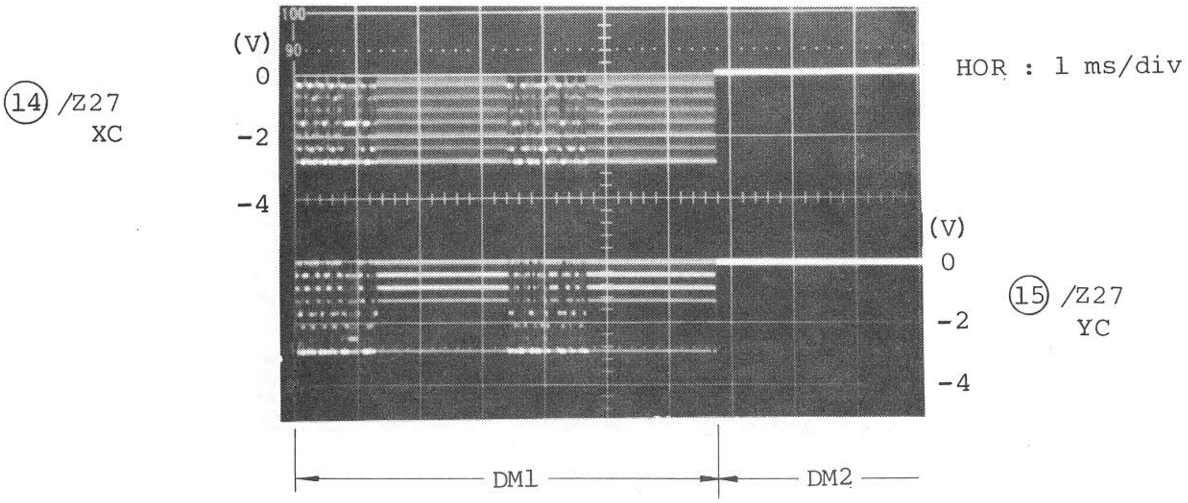


Fig. 5-79 Character Generator Output

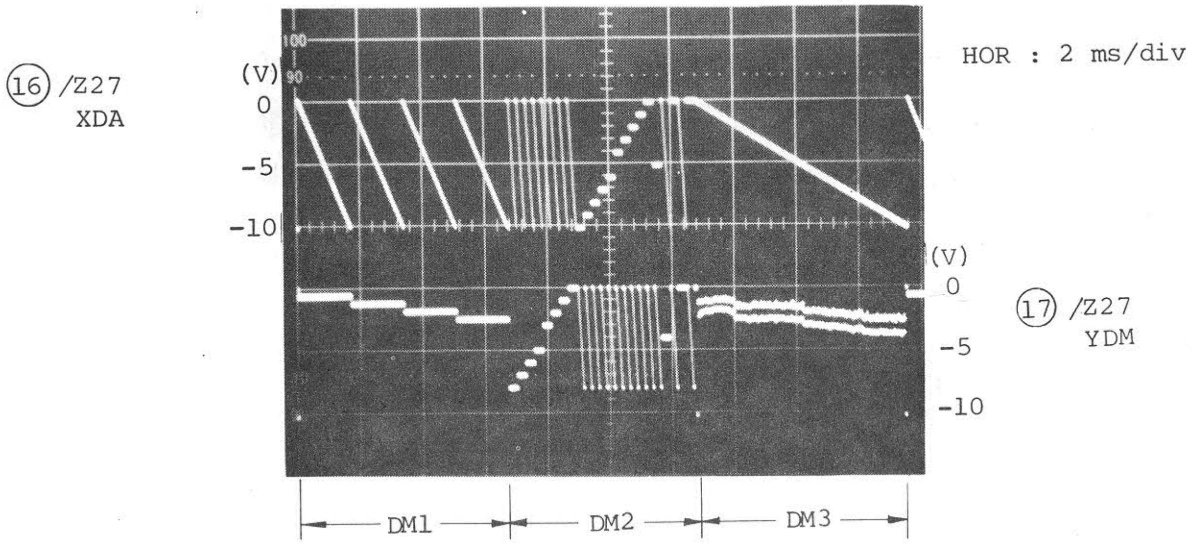


Fig. 5-80 X, Y D/A Output

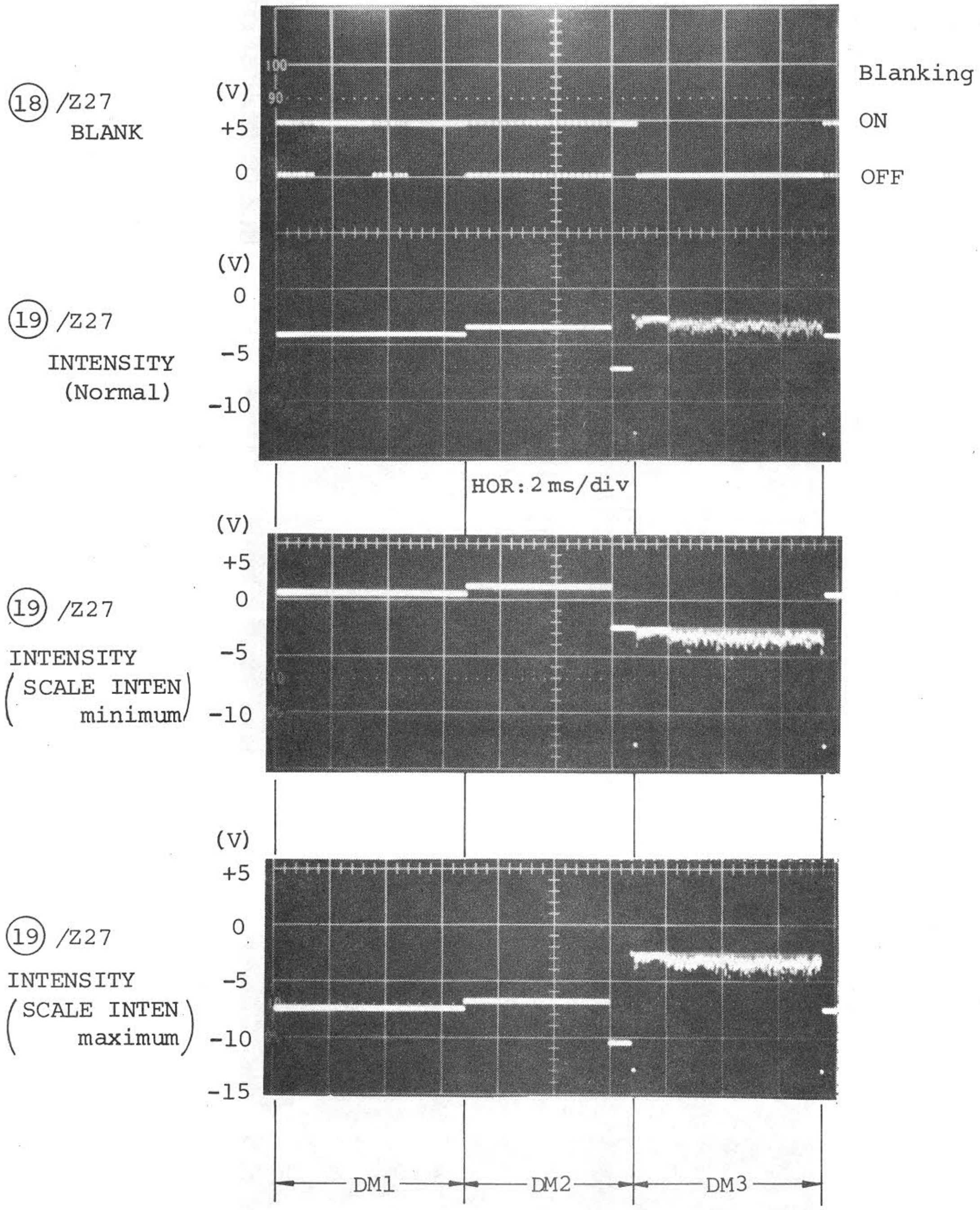
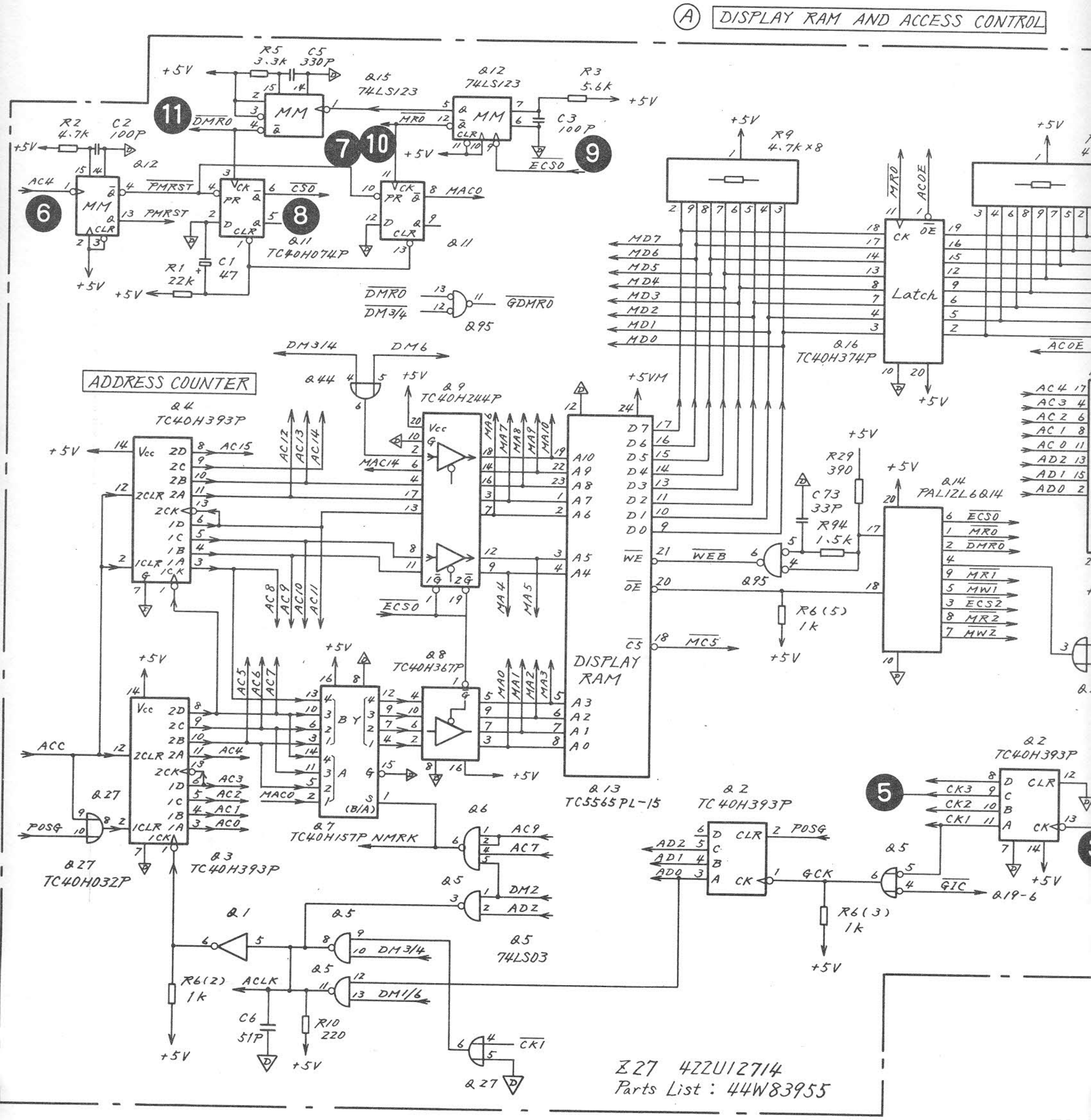


Fig. 5-81 BLANKING and INTENSITY Output



(A) DISPLAY RAM AND ACCESS CONTROL
ADDRESS COUNTER
Q4 TC40H393P
Q3 TC40H393P
Q27 TC40H032P
Q7 TC40H157P
Q8 TC40H367P
Q9 TC40H244P
Q11 TC40H074P
Q12 74LS123
Q15 74LS123
Q13 TC5565PL-15
DISPLAY RAM
Q16 TC40H374P
Latch
Q14 PAL12L6Q14
Q2 TC40H393P
Q5 74LS03
Q95
R9 4.7k×8
Z27 422U12714
Parts List : 44W83955

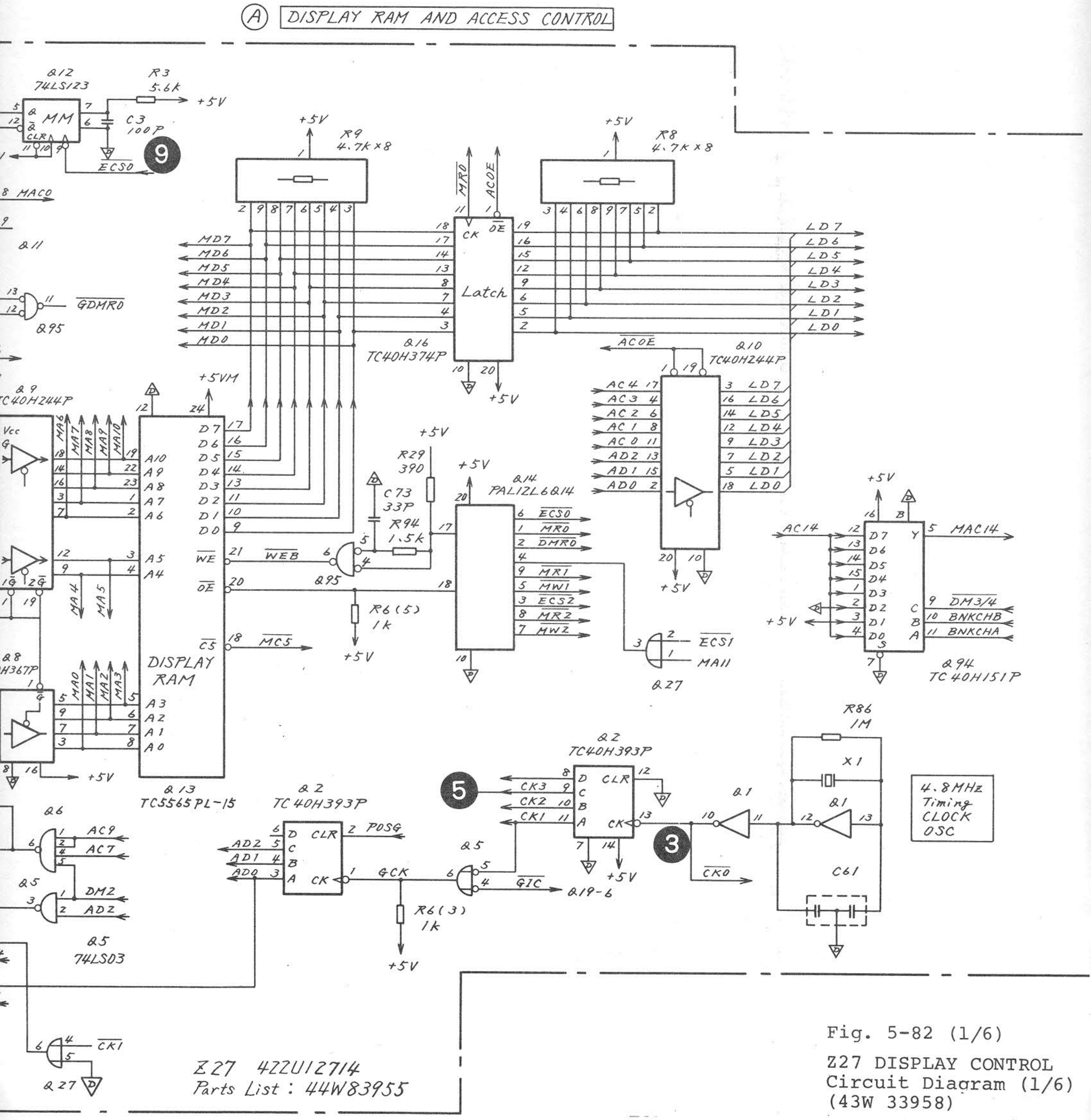
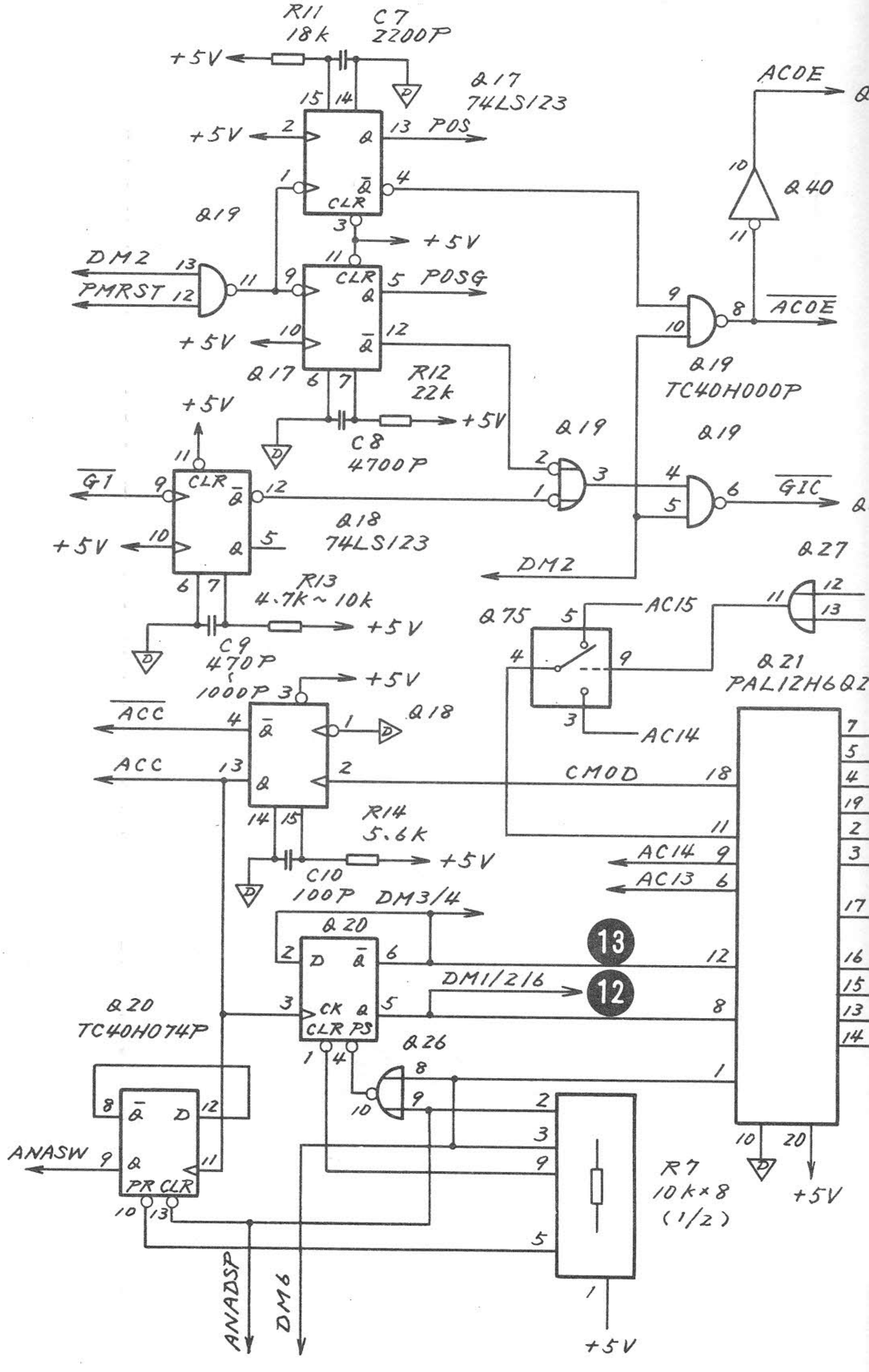


Fig. 5-82 (1/6)

Z27 DISPLAY CONTROL
Circuit Diagram (1/6)
(43W 33958)



R11
18k
C7
2200P
+5V
Q17
74LS123
POS
Q19
DM2
PMRST
POSG
Q17
R12
22k
C8
4700P
ACOE
Q40
Q19
TC40H000P
GIC
G1
Q18
74LS123
R13
4.7k~10k
C9
470P
1000P
DM2
Q27
Q75
AC15
AC14
Q21
PAL12H6Q
ACC
ACC
CMOD
R14
5.6k
C10
100P
AC14
AC13
DM3/4
Q20
13
DM1/2/6
12
Q20
TC40H074P
Q26
ANASW
R7
10k×8
(1/2)
ANADSP
DM6

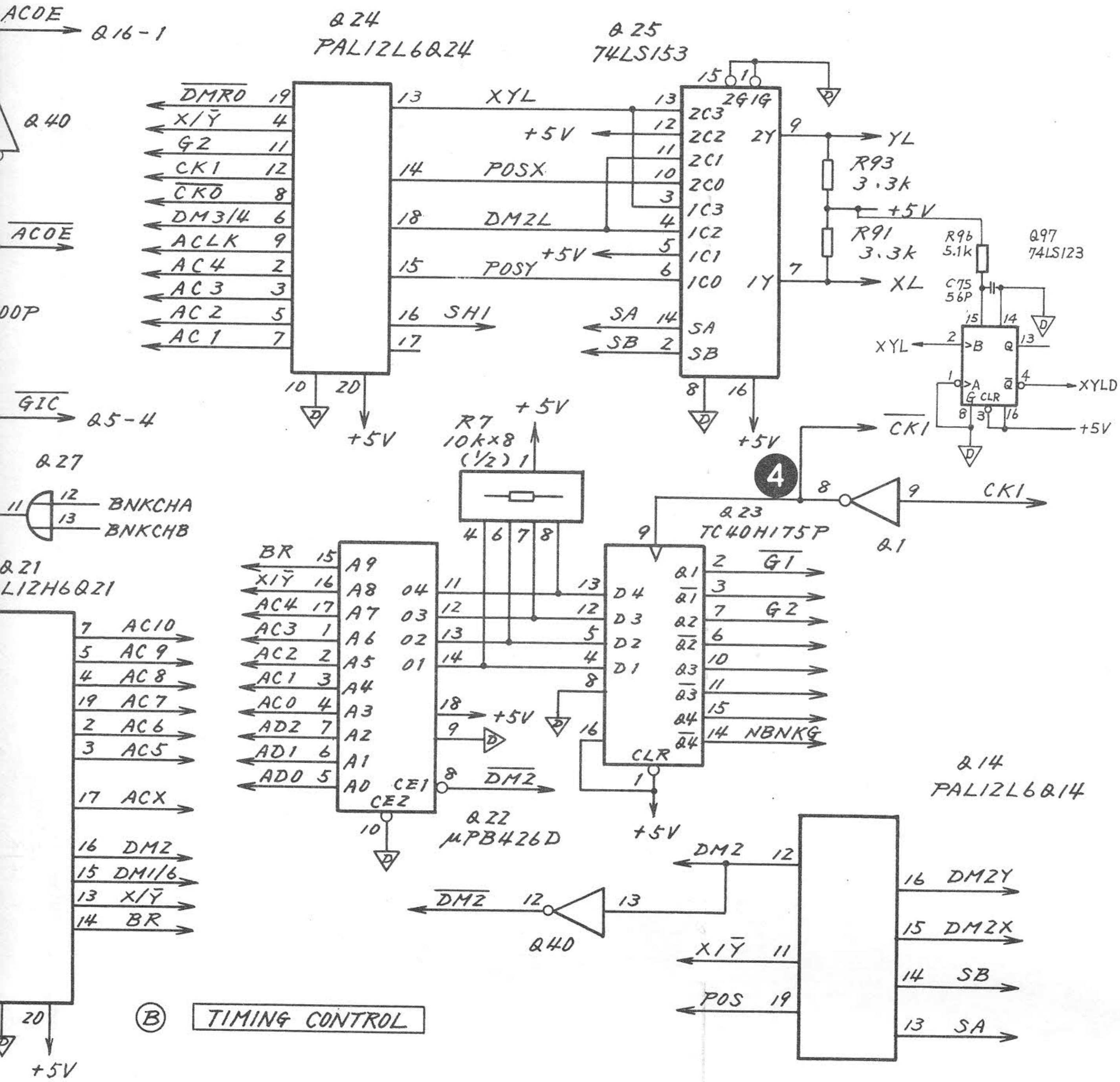
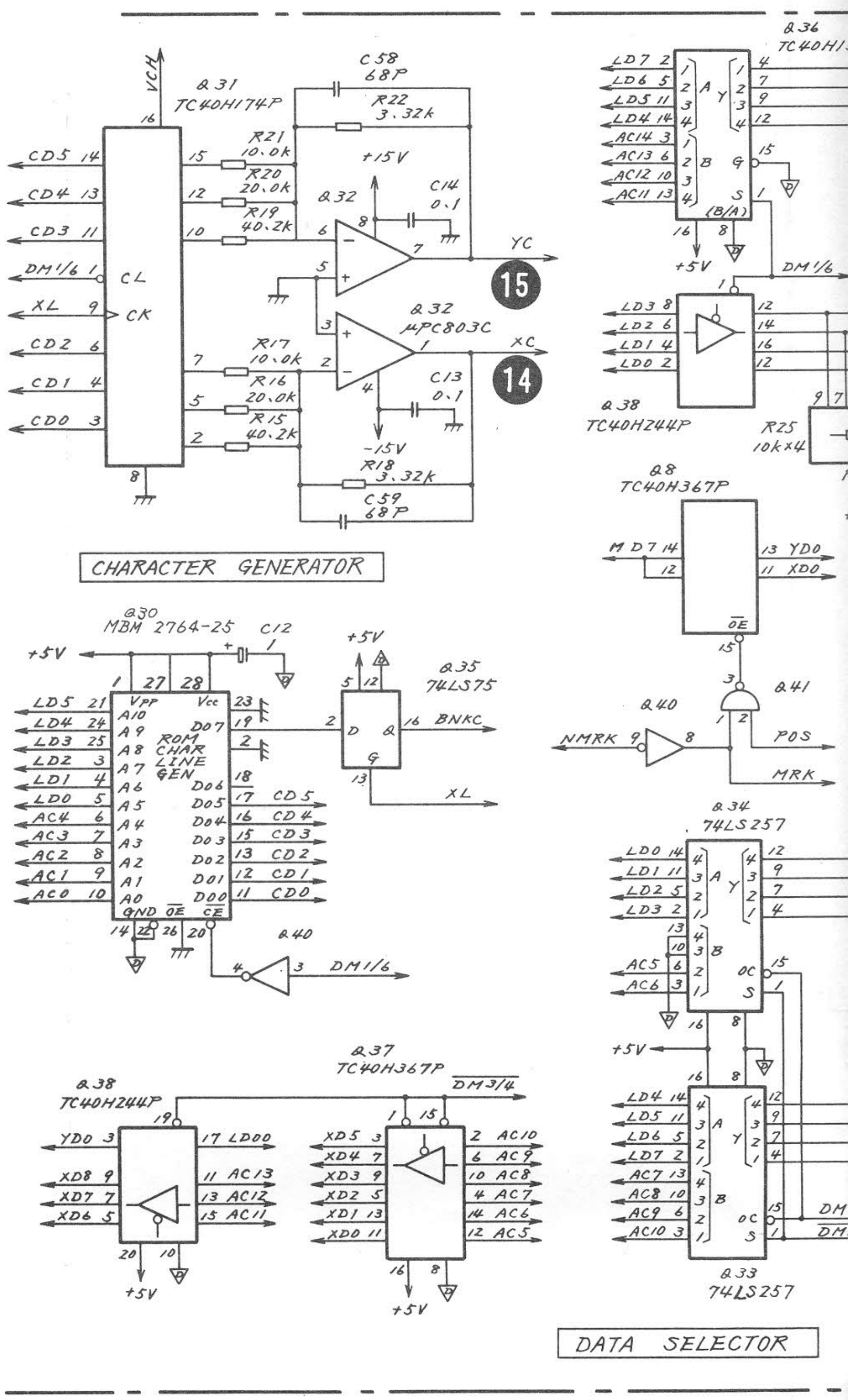


Fig. 5-82 (2/6)

Z27 DISPLAY CONTROL
Circuit Diagram (2/6)
(43W 33958 M-1)

(C) CHARACTER GENERATER, DATA SELECTOR, AND D/A C



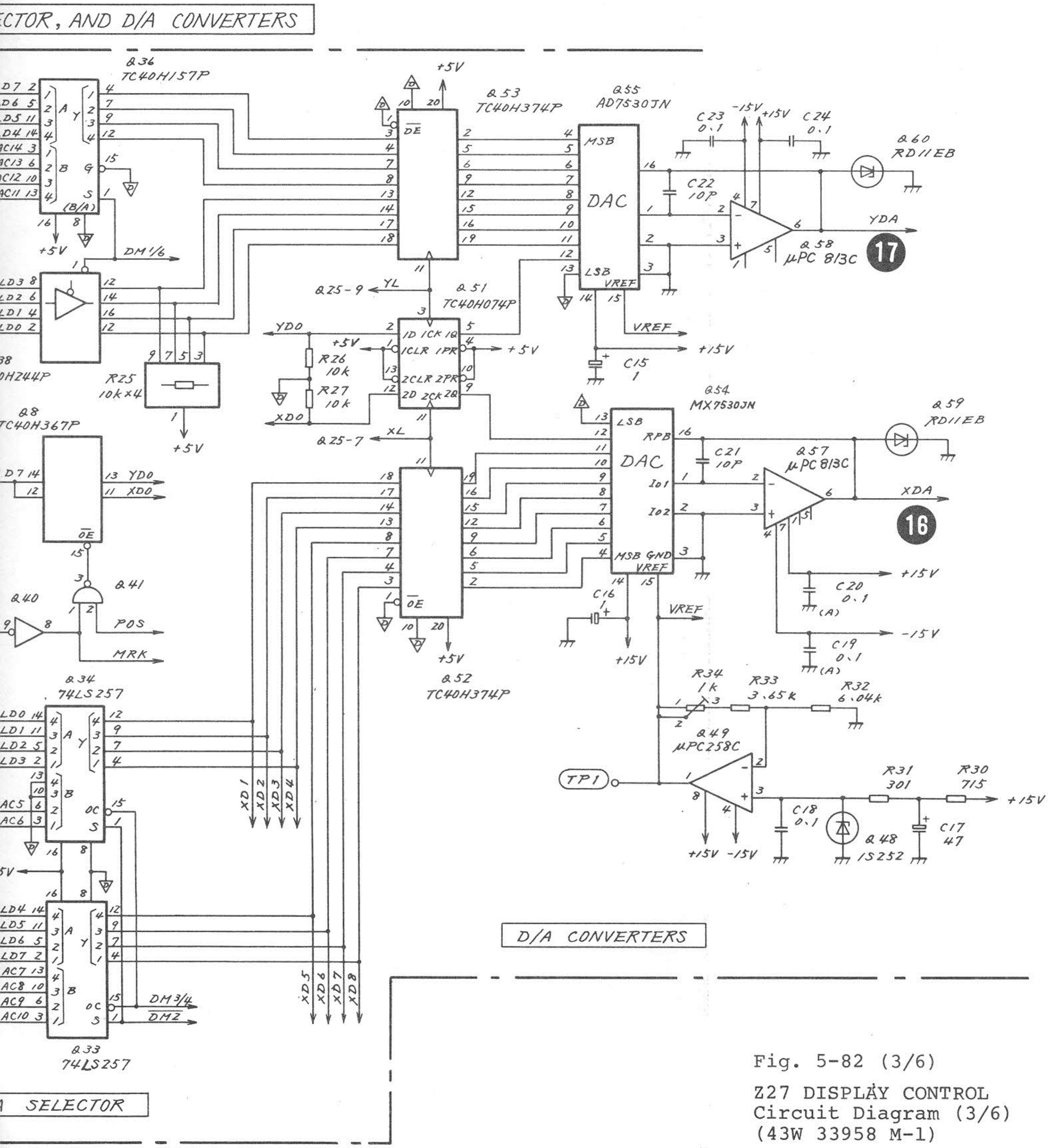
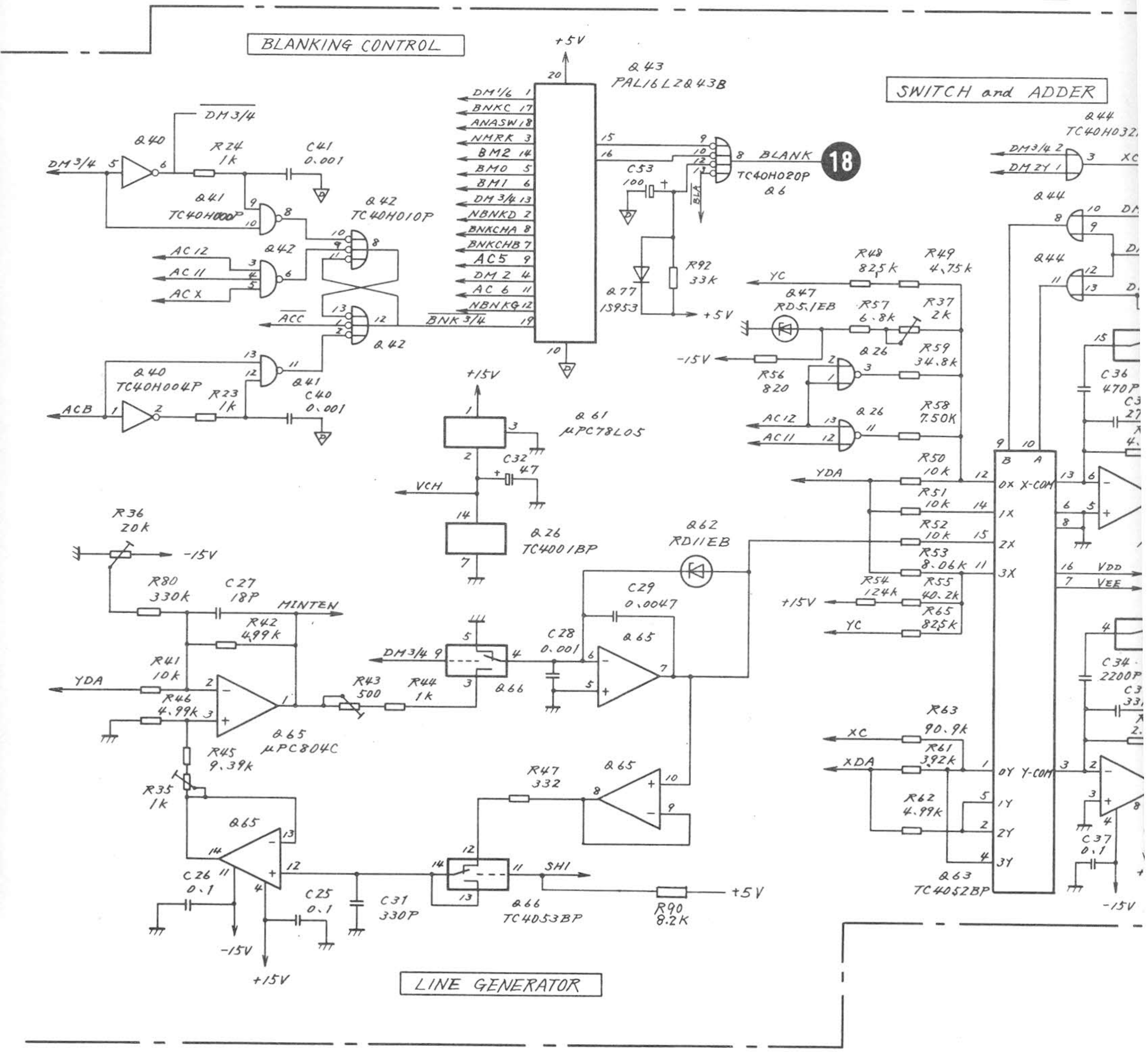


Fig. 5-82 (3/6)

Z27 DISPLAY CONTROL
Circuit Diagram (3/6)
(43W 33958 M-1)

D BLANKING CONTROL, LINE GENERATOR, SWITCH, AND ADDER



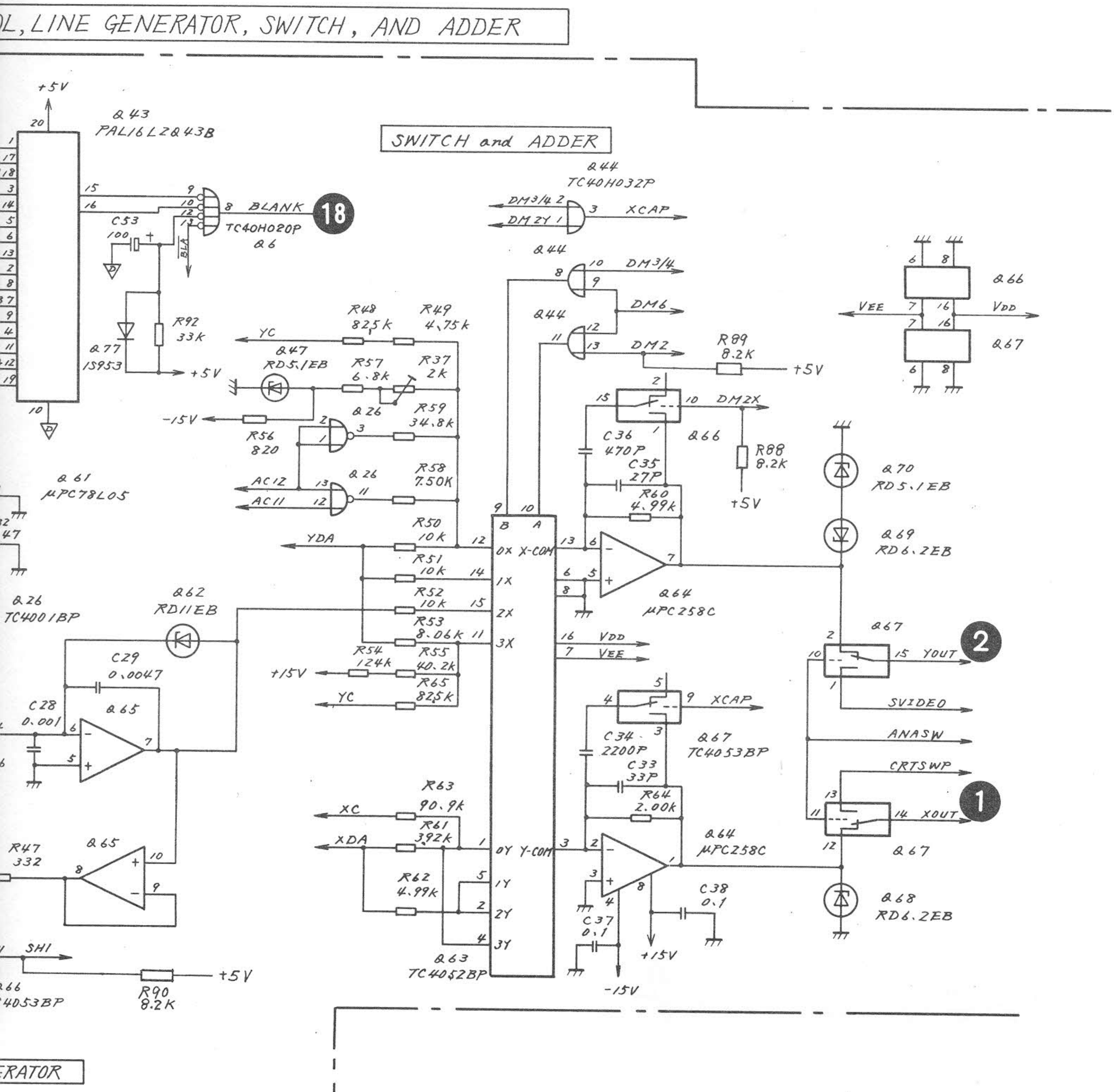
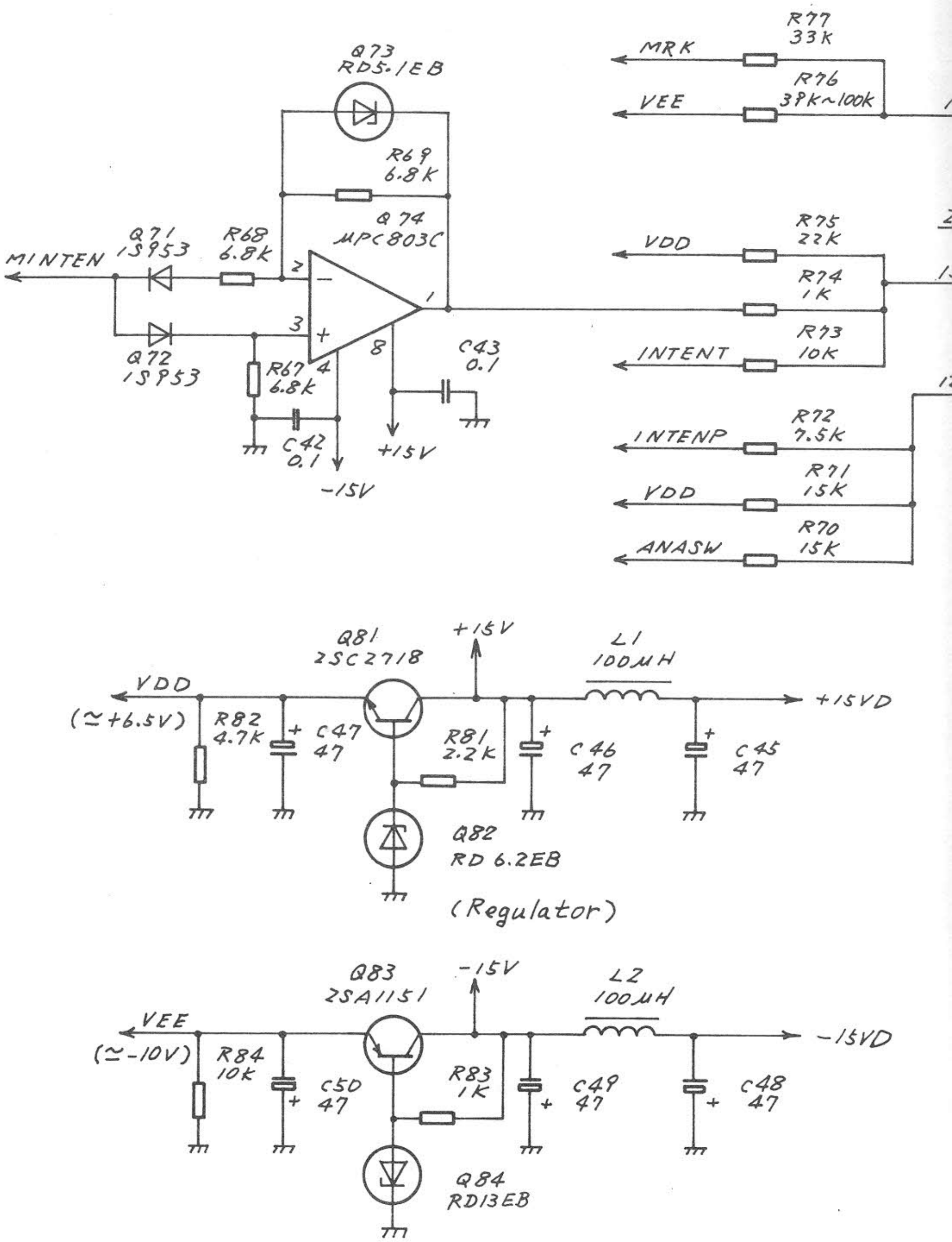


Fig. 5-82 (4/6)

Z27 DISPLAY CONTROL
Circuit Diagram (4/6)
(43W 33958)

(E) INTENSITY CONTRO



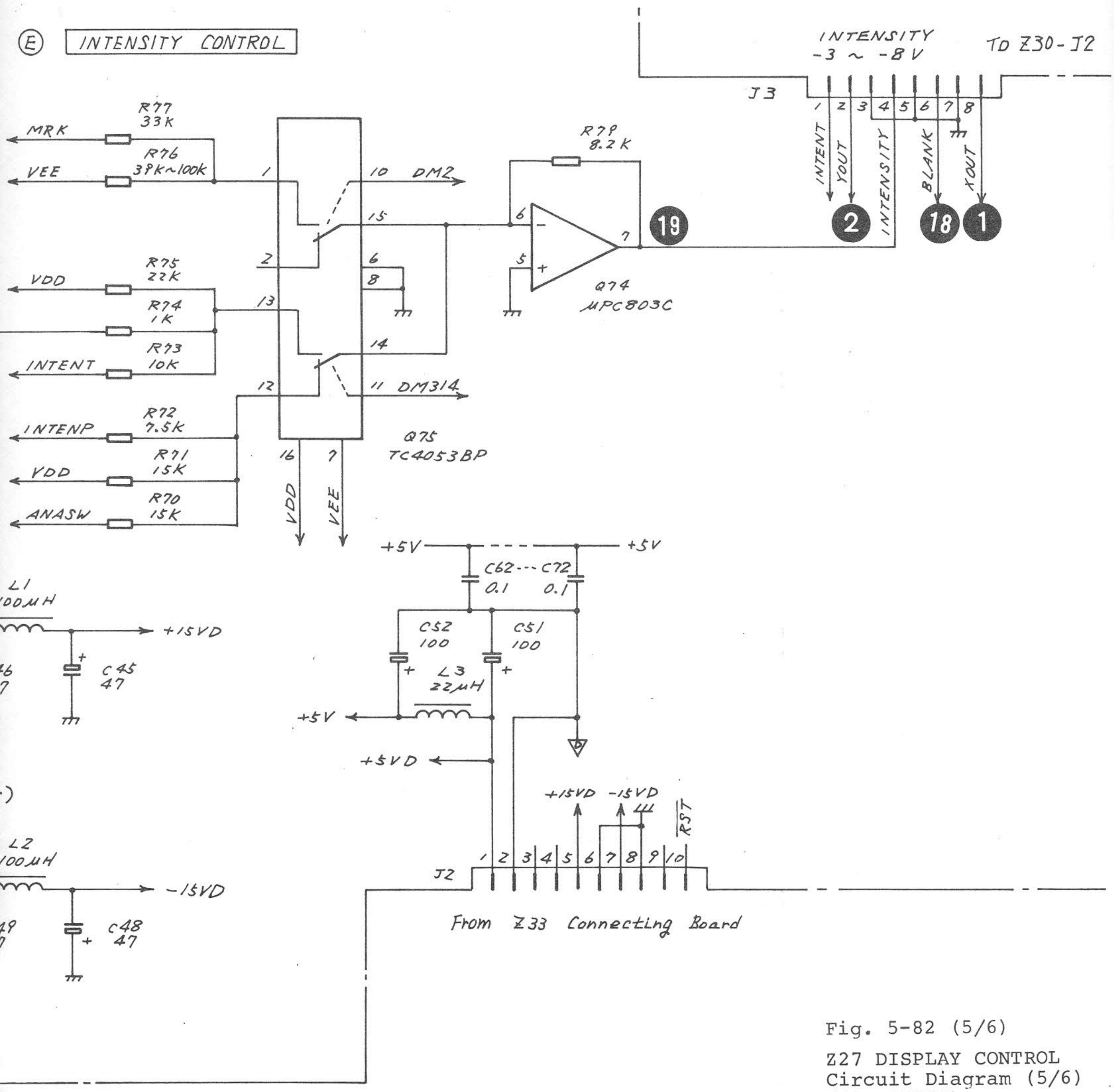
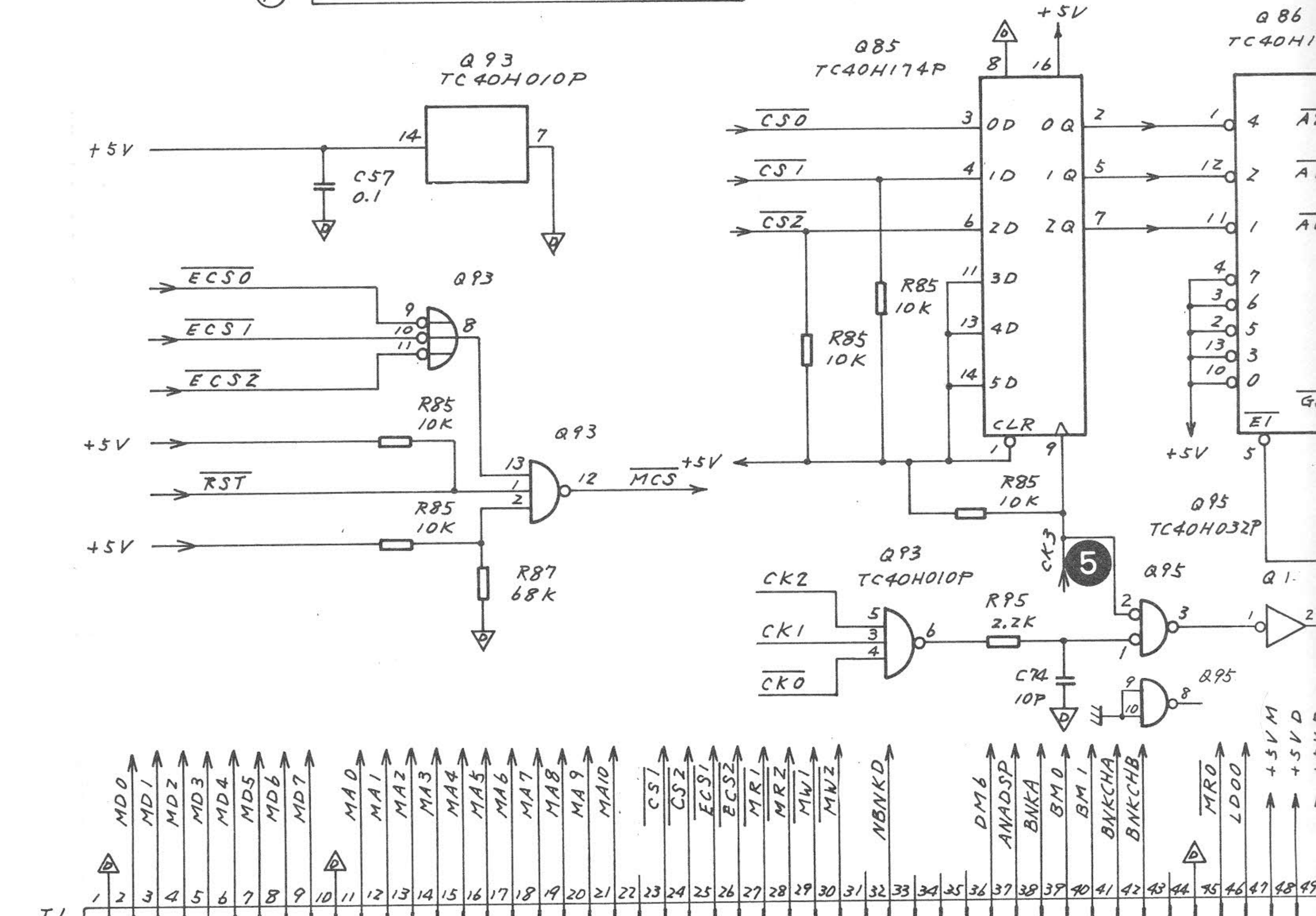


Fig. 5-82 (5/6)

Z27 DISPLAY CONTROL
Circuit Diagram (5/6)
(43W 33958)

Ⓕ MEMORY ACCESS PRIORITY CONTROL



To and From
Z26-J1, Z34-J1 via J52

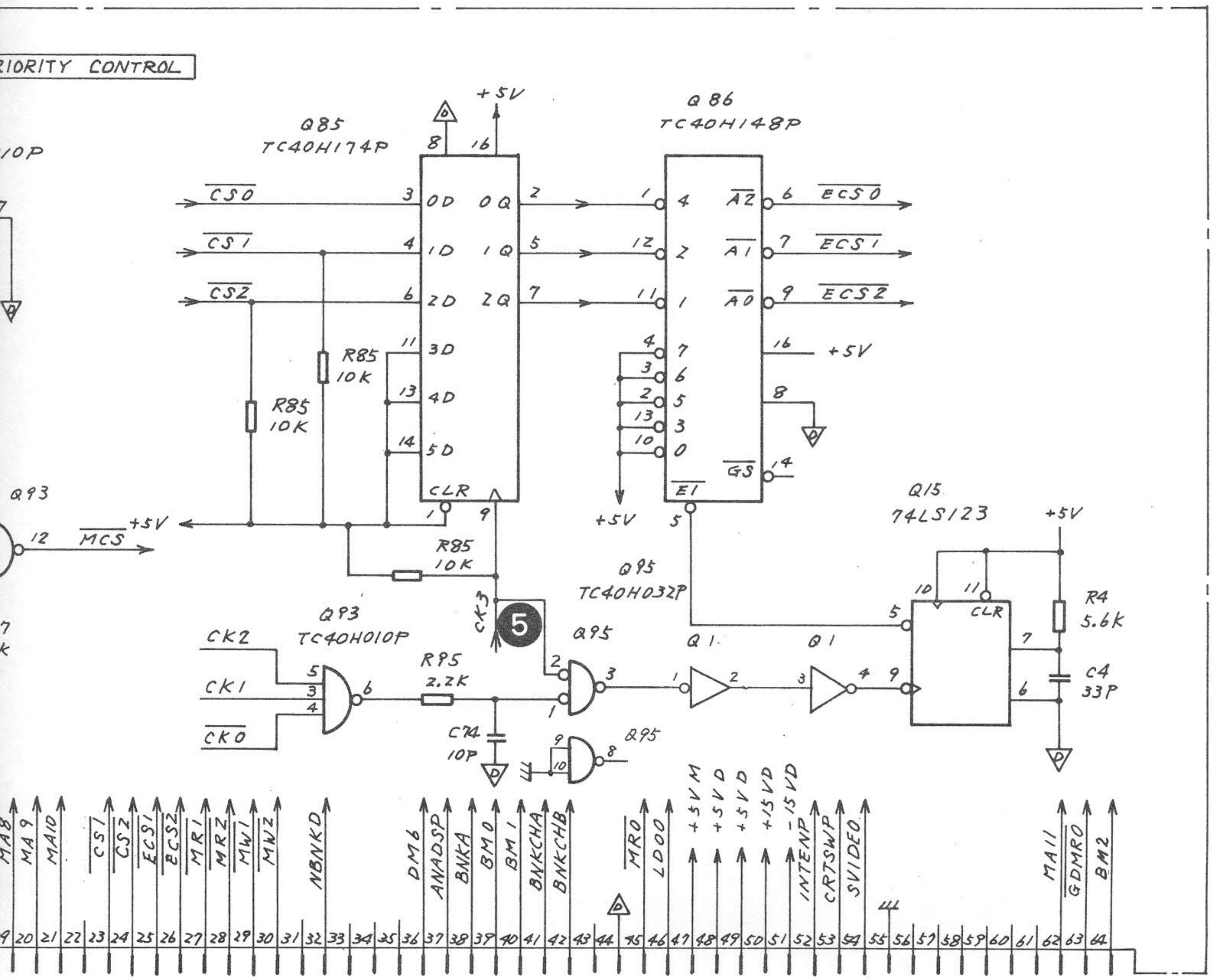


Fig. 5-82 (6/6)

Z27 DISPLAY CONTROL
Circuit Diagram (6/6)
(43W 33958)

5.15 Z28 LOW LOCAL 1 (MS710C only)

5.15.1 Circuit description - Z28
(Refer to Fig. 5-84)

This circuit generates the first local signal for the 10 kHz to 30 MHz band.

This local signal is generated by the voltage controlled oscillator consisting of Q1 to Q5. The frequency range is 1042.8 to 1102.8 MHz.

Part of the oscillator output signal is amplified by amplifier Q6 and sent to the Z29 low local 2 to be used in the PLL circuit for stabilizing the frequency.

Another part of the signal is amplified by Q10 and frequecy-divided in half by divider Q12.

The output from divider Q12-6 is amplified by Q13, and sent to J3 of the Z24 local control 2 as an AFC loop signal to improve linearity of the VCO frequency.

The output from divider Q12-7 is amplified by Q18, and sent to J3 of the Z35 low 1st MIX as a first mixer local signal for the 10 kHz to 30 MHz band.

5.15.2 Checking procedure - Z28

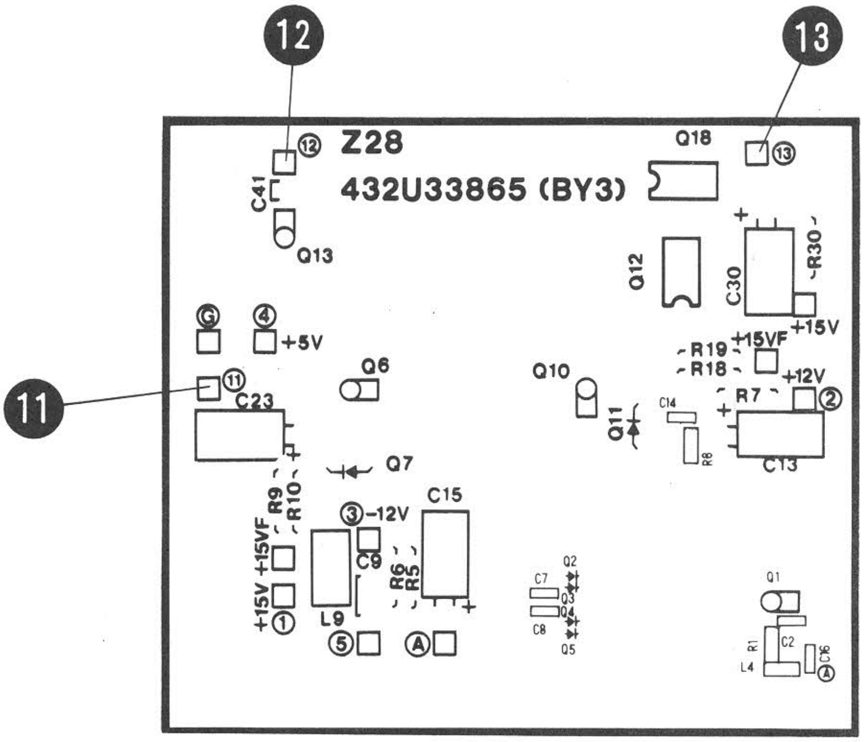
Step	Procedure
1	Set the MS710[ ] as follows: Frequency band : 10 kHz to 30 MHz Center frequency : 15 MHz Span : 0 Hz/div

(cont.)

Step	Procedure
2	Measure the frequency and level at connector Z28-J94 ⑬. This circuit is normal when the measured values are: Frequency : 536.4 MHz Level : approx. +9 dBm
3	Measure and compare the J3-5 voltage and the frequency at connector Z28-J94 ⑬ with the values shown in Fig. 5-40.

5.15.3 Adjustment - Z28

This circuit requires no adjustment. The Q1 VCO frequency is adjusted in the procedure for the Z24 local control 2.



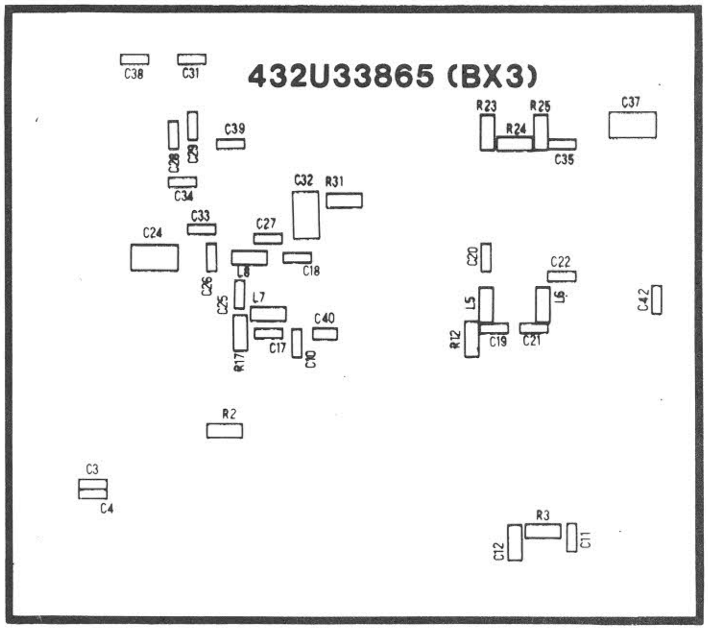
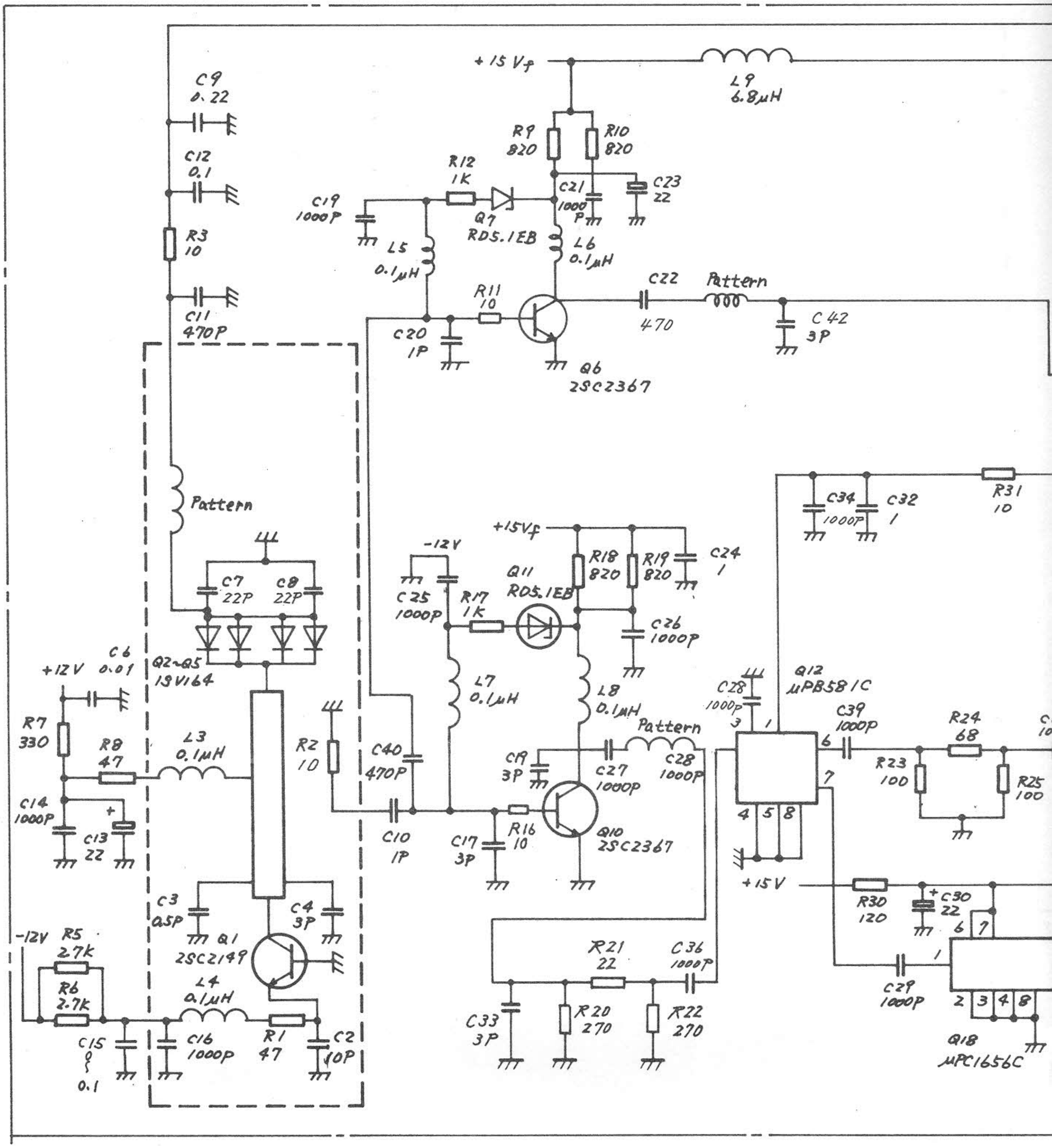
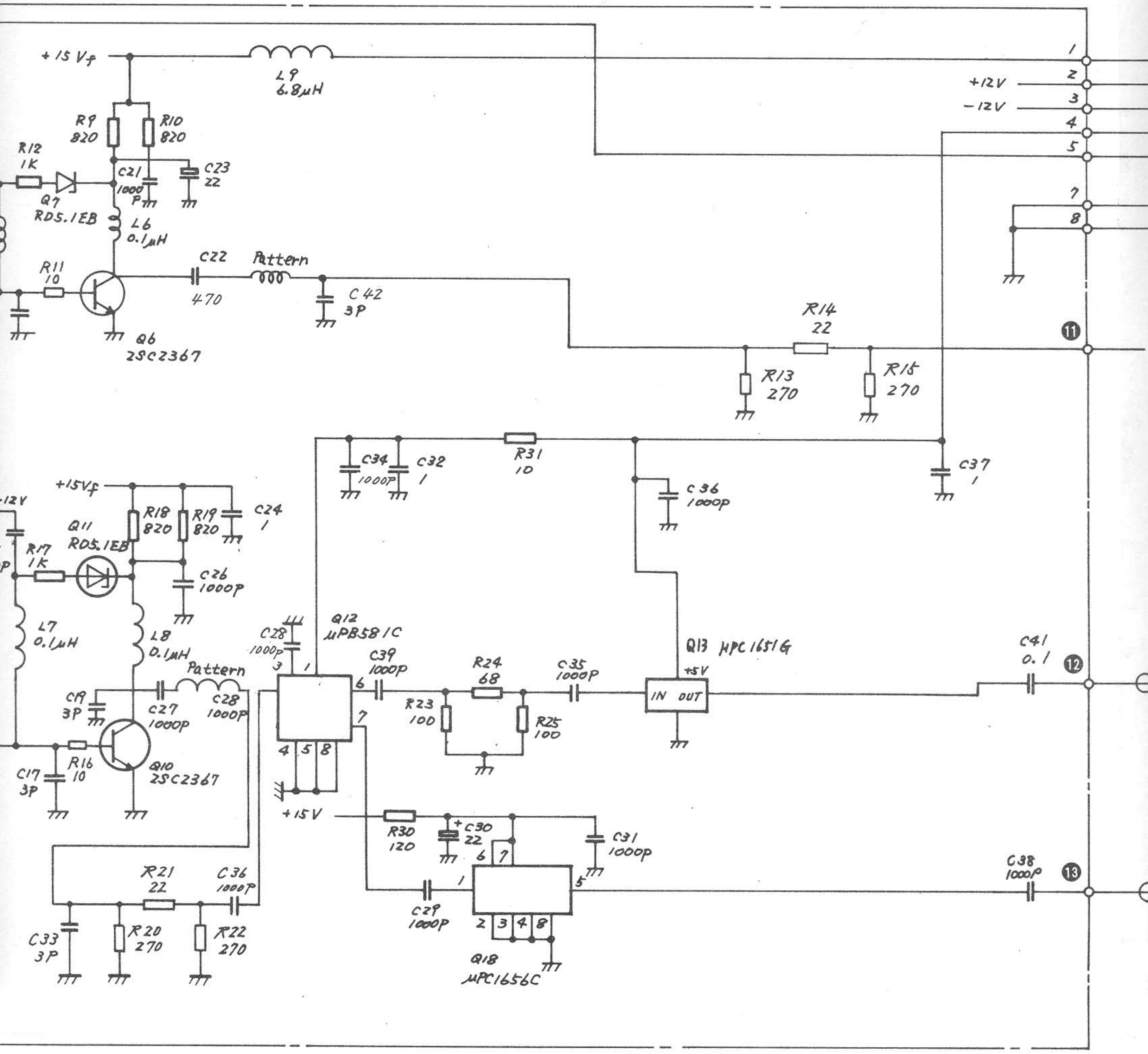


Fig. 5-83 Z28 Parts Layout



Parts List : 44W

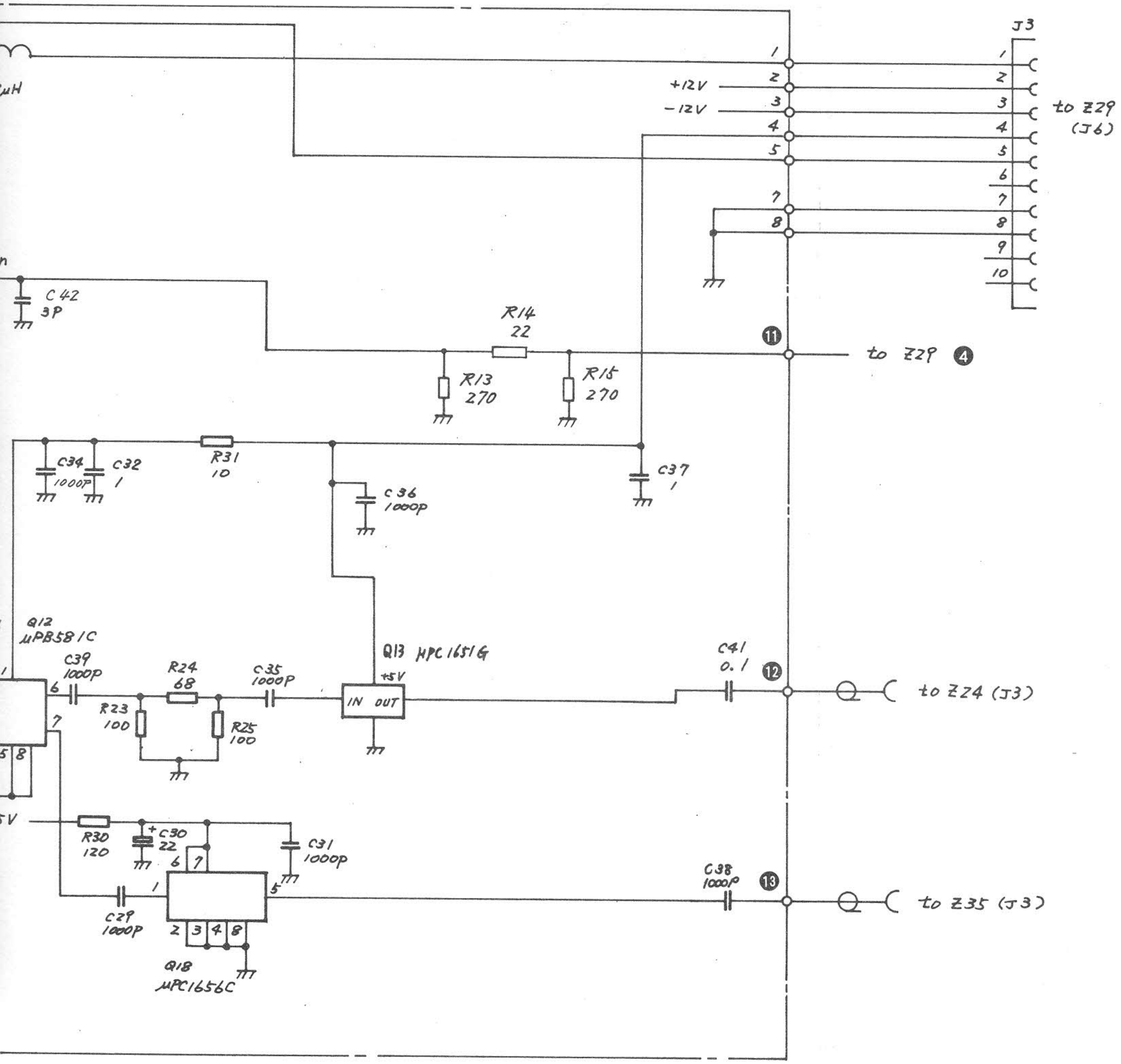
PC Board : 432U



Parts List : 44W83956

PC Board : 432U33865

Fig. 5-
Circuit



Parts List ; 44W83956

PC Board ; 432U33865

Fig. 5-84 Z28 LOW LOCAL 1 Circuit Diagram (43W33959)

5.16 Z29 LOW LOCAL 2 (MS710C only)

5.16.1 Circuit description - Z29

This circuit is part of the PLL which stabilizes the frequency of the first local signal for the 10 kHz to 30 MHz band.

The local signal ❹ is amplified by amplifier Q2 and mixed with the 2 MHz step M/N synthesizer output from the Z16 PLL block by the Z29-Z1 double-balance mixer to be converted to an 8.7 ±1 MHz signal.

This 8.7 MHz signal is amplified by Q17 and sent to J13 of the Z16 PLL block through relay K1. Relay K1 is switched according to the frequency band setting.

This circuit supplies dc power to the Z28 low local-1 through the following stabilizing power circuits.

Output voltage	Input voltage	Circuit
+12 V	+15 V	Q7 to Q9
+5 V	+15 V	Q18 to Q21
-12 V	-15 V	Q8, Q12 to Q14

5.16.2 Checking procedure - Z29

Step	Procedure
1	Set the MS710C as follows: Frequency band : 10 kHz to 30 MHz Center frequency : 15 MHz Span : 0 Hz
2	Disconnect connector Z29-J93 ❸ .
3	Connect the frequency counter to Z28-J94 ⓭ to measure low local frequency f_{LO}.
4	Connect the signal generator to connector Z29-J91 ❶ and apply the following signal: Frequency : f_{LO} + 8.7 MHz Level : +10 dBm
5	Connect Network/Spectrum Analyzer MS420B to connector J29-J92 ❷ and measure the frequency and level. Z29 is normal when the measured values are: Frequency : 8.7 MHz Level : approx. -10 dBm

5.16.3 Adjustment - Z29

This circuit requires no adjustment.

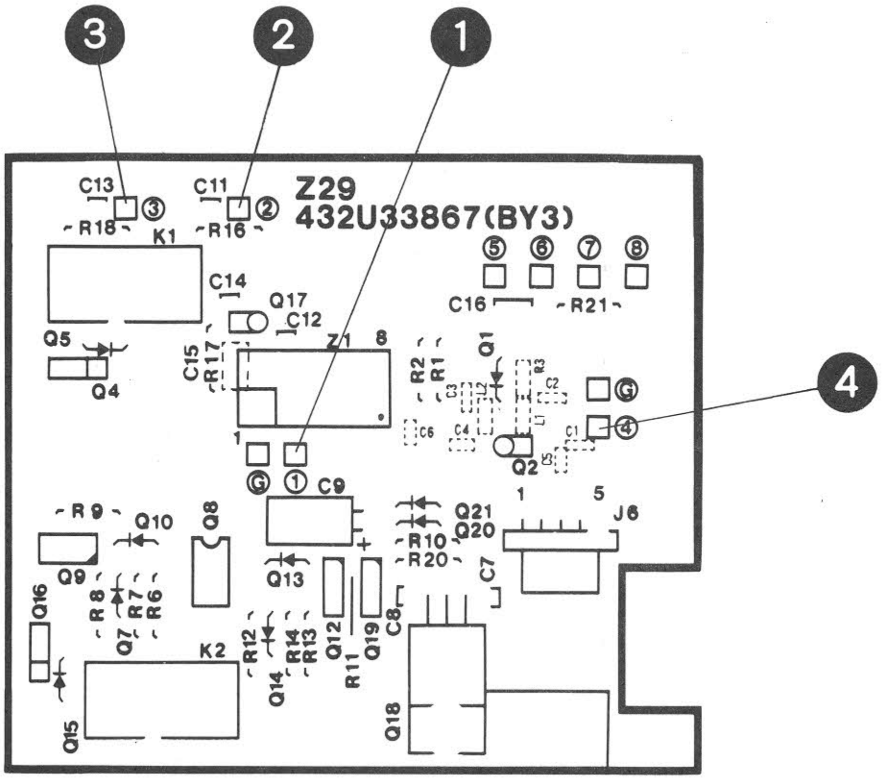
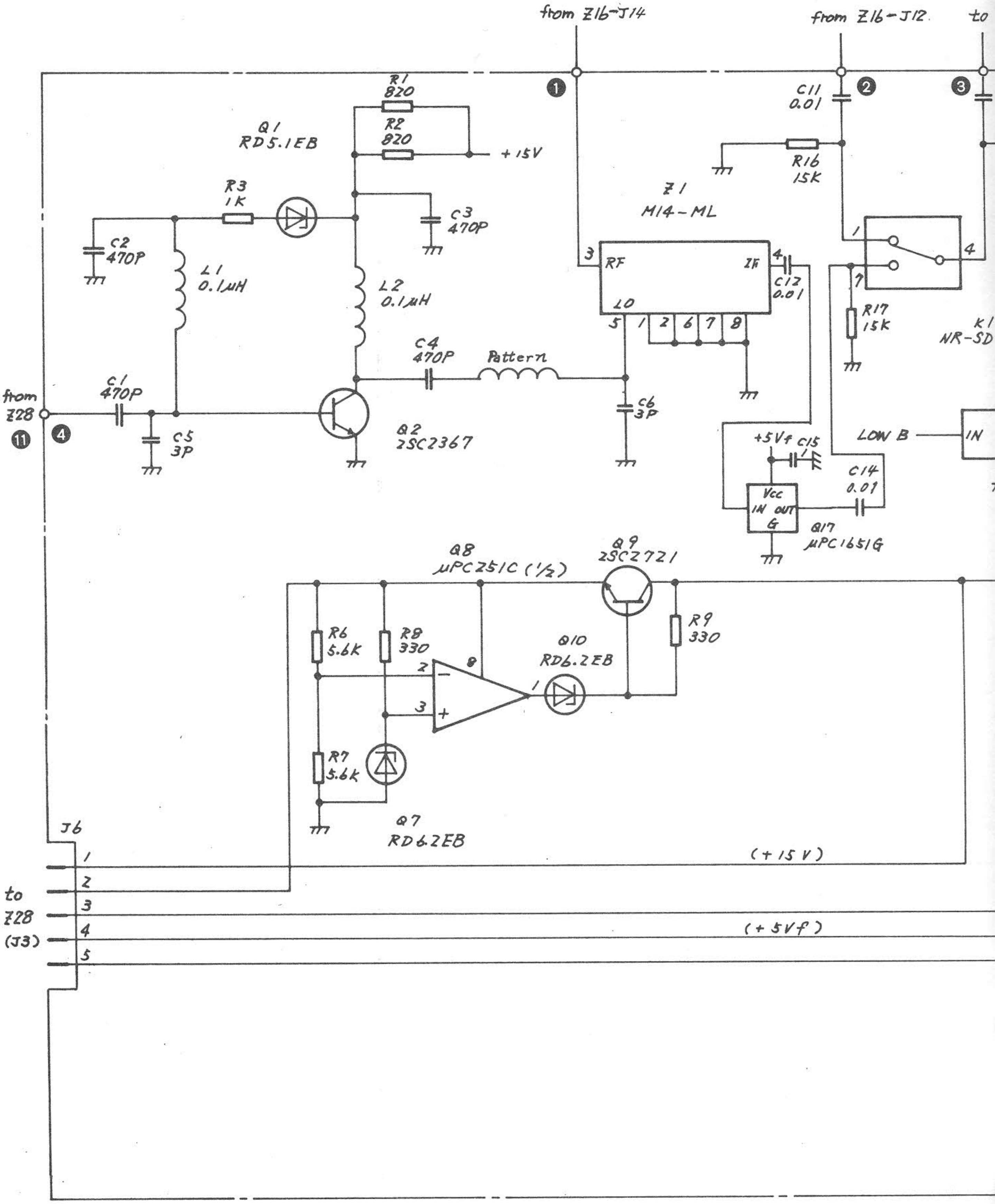


Fig. 5-85 Z29 Parts Layout



Parts List ; 44W

PC Board ; 432

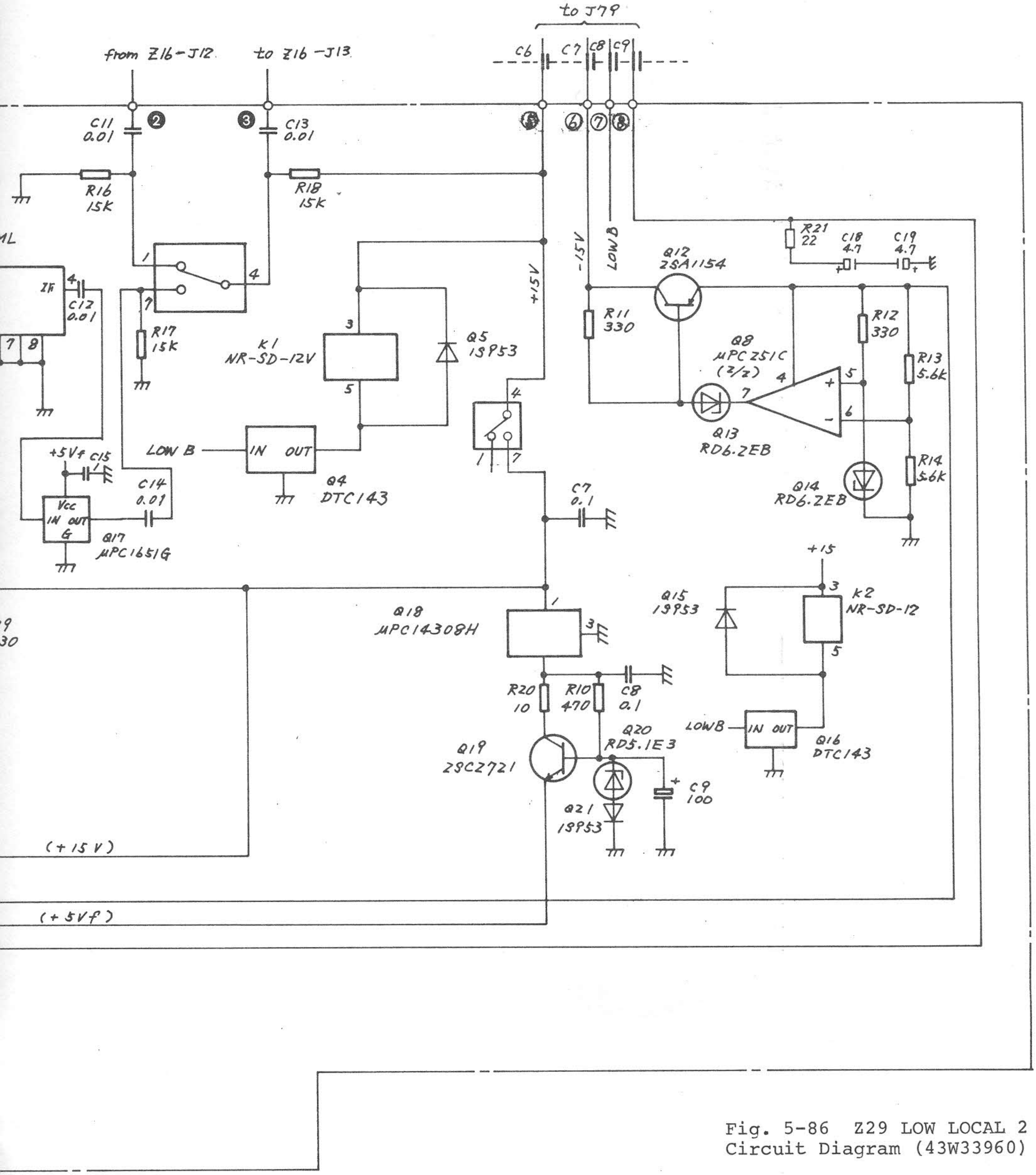


Fig. 5-86 Z29 LOW LOCAL 2
Circuit Diagram (43W33960)

Parts List ; 44W83957

PC Board ; 432U33867

5.17 Z30 CRT BIAS/X-Y AMP

5.17.1 Circuit description - Z30
(Refer to Fig. 3-3 (3/4) and Fig. 5-92)

This PC board contains the circuitry used to generate the high-voltage bias signals required to drive the CRT, and the deflection voltage signals in both horizontal (X) and vertical (Y) directions.

This circuitry, including the primary-side winding of T1, Q28, Q29, C11, and C12, is the oscillation circuit of approximately 25 kHz. The high-voltage 25 kHz signals are generated in the secondary-side winding of T1 according to the individual winding ratios, and by rectifying them various high dc voltages required for CRT operation are obtained.

CRT brightness is adjusted by varying the voltage applied to G1 (J5-4). The circuitry that includes Q35 to Q45 generates these signals. The blanking and intensity control signals sent from the Z27 display control circuit are applied to this brightness control circuit through the Q25 photocoupler.

The X-Y amplifier generates X- and Y-axial direction deflection signals and is a differential amplifier circuit that outputs symmetrical output signals to X+, X- and Y+, Y- deflection plates. The input signal sensitivity is approximately 2 cm/V on the CRT screen.

5.17.2 Checking Procedure - Z30

This PC board generates a high voltage signal (maximum of 5.5 kV) for the CRT bias, so be careful during servicing.

Step	Procedure
1.	Remove the left side panel as shown in Fig. 2-6.
2.	Turn the power supply switch OFF and remove the plastic protective board (6).
3.	Turn the power supply switch ON.
4.	To confirm the primary oscillation circuit operation of the high voltage generation circuit, observe the waveforms at checkpoints ❶ and ❷ using an oscilloscope. Check whether they are the same as shown in Fig. 5-88.
5.	Using a high-voltage probe, measure the secondary voltages of the high voltage generation circuit at checkpoints ❸ to ❼. Confirm that the values are as shown on the Z30 circuit diagram of Fig. 5-92.
6.	Observe the control signal ❽ of the blanking circuit, and confirm that the amplitude is approximately 3 Vp-p as shown in Fig. 5-89.
7.	Confirm that the drive signals of the two X-Y deflection plates at checkpoints ❾ to ⓬ are as shown in Fig. 5-90 and 5-91. If the drive signals are abnormal, check the Y and X amplifier inputs of J2-2 and J2-8, and check whether a correct signal is input from the Z27 display control. A normal input waveform with the power ON and in the reset state is shown in Fig. 5-75 (XOUT and YOUT waveforms of Z27).

5.17.3 Adjustment - Z30

Step	Procedure
1.	Focus the picture with R95, R99, and FOCUS R101.
2.	Set R63 by turning it an additional 1 mm from where the blanking part of the trace disappears.
3.	Adjust the brightness of the trace by SCALE INTENSITY (on the front panel).
4.	Adjust the horizontal line with TRACE ROTATION (on the rear panel).
5.	Set the trace position with R12 (vertical position), and R13 (horizontal position).
6.	Set the trace position with R19 (vertical gain), and R39 (horizontal gain).

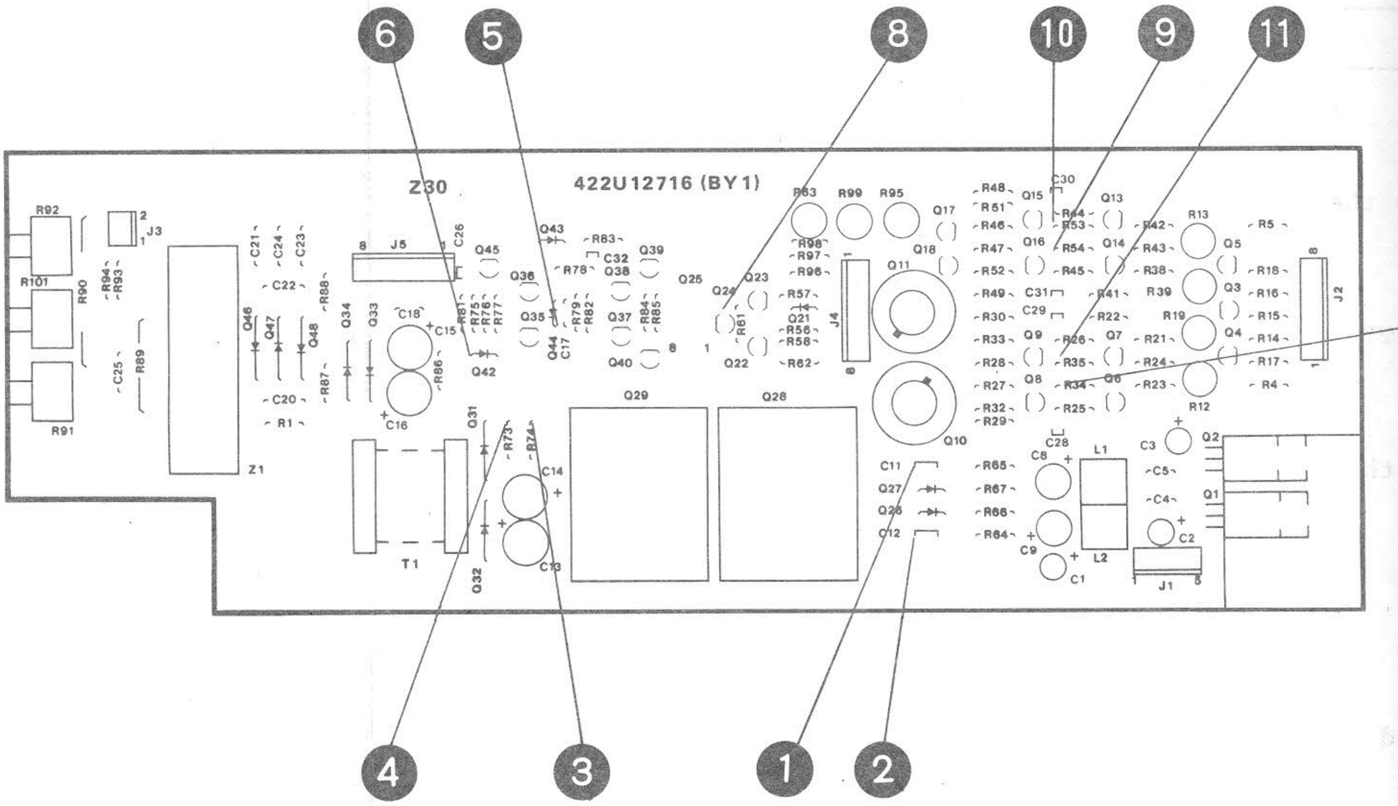
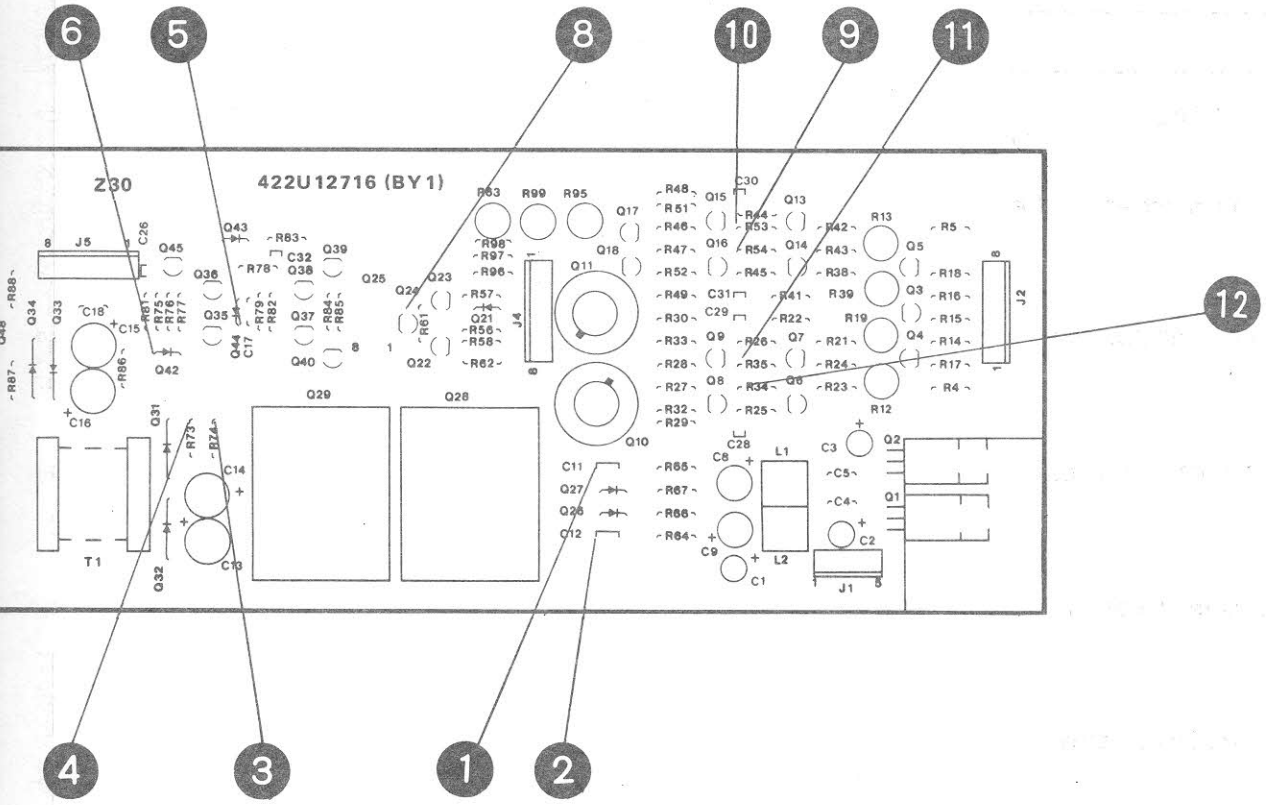


Fig. 5-87 Z30 Parts Layout



ut

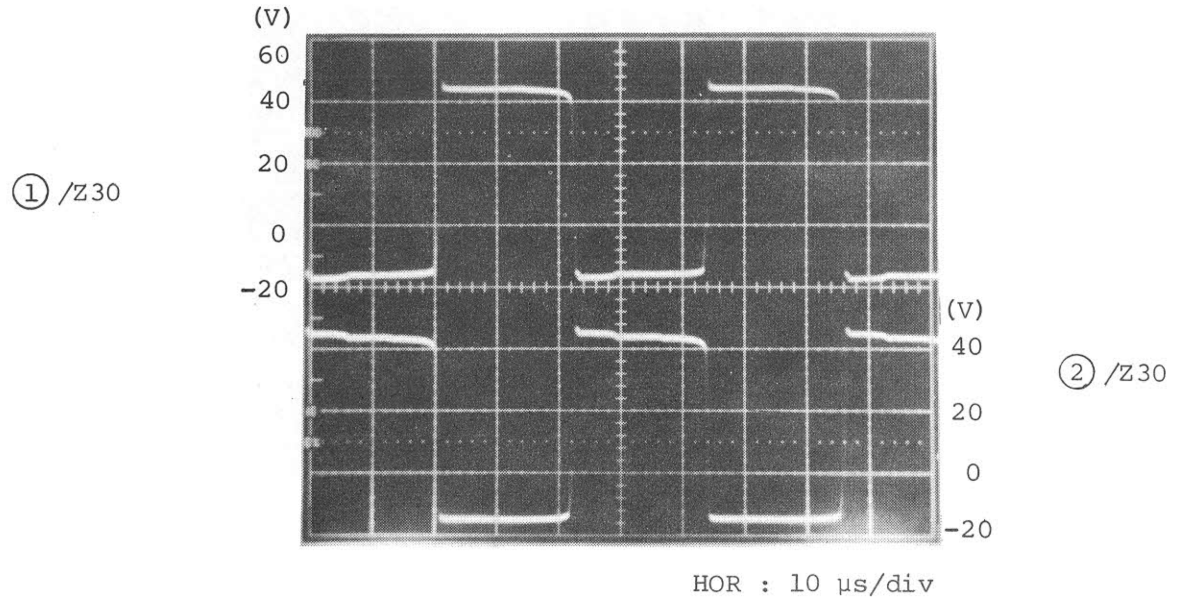


Fig. 5-88 25 kHz OSC

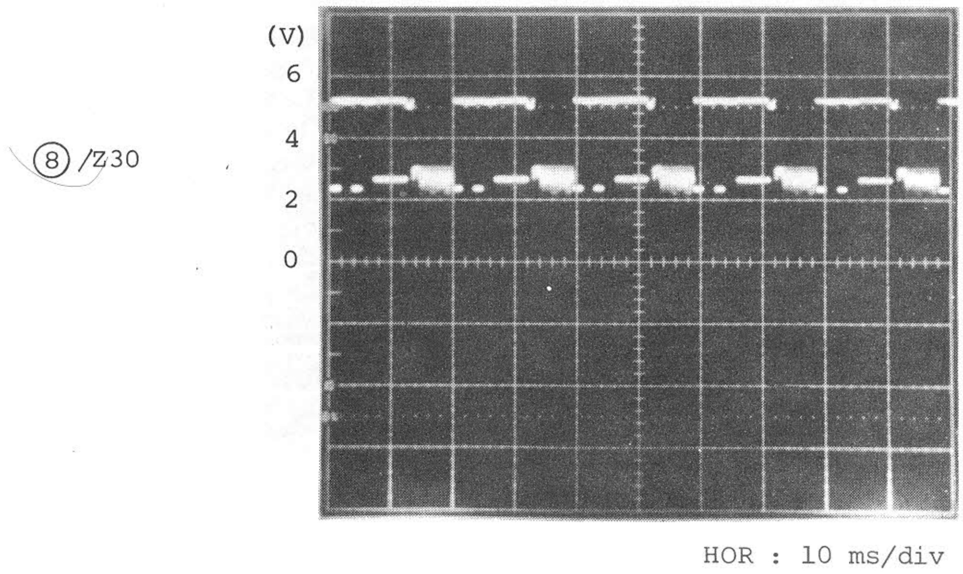


Fig. 5-89 BLANKING CONTROL

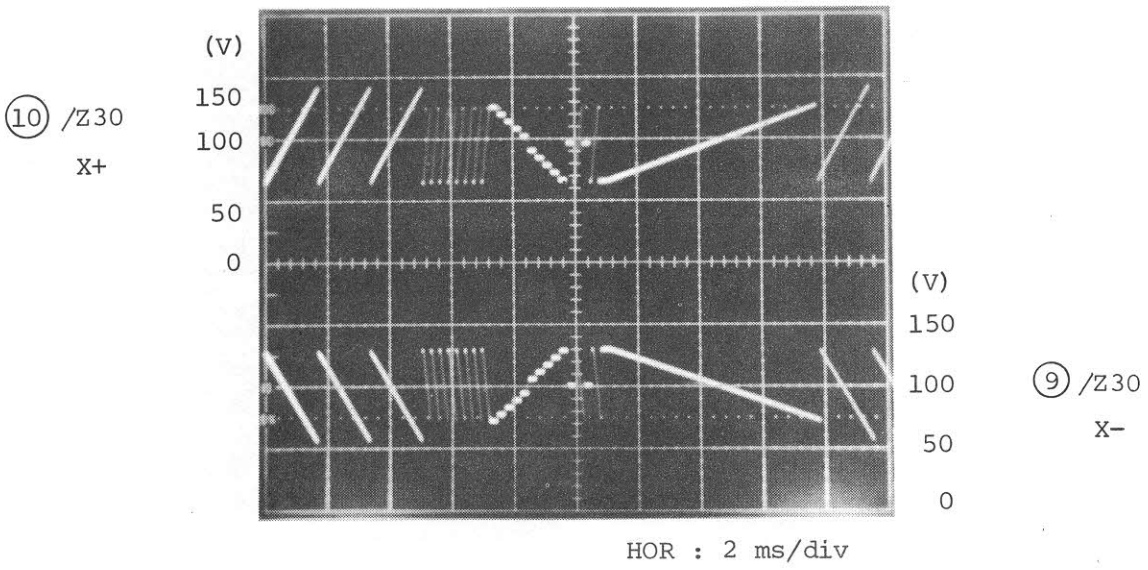


Fig. 5-90 X-AMP OUTPUT

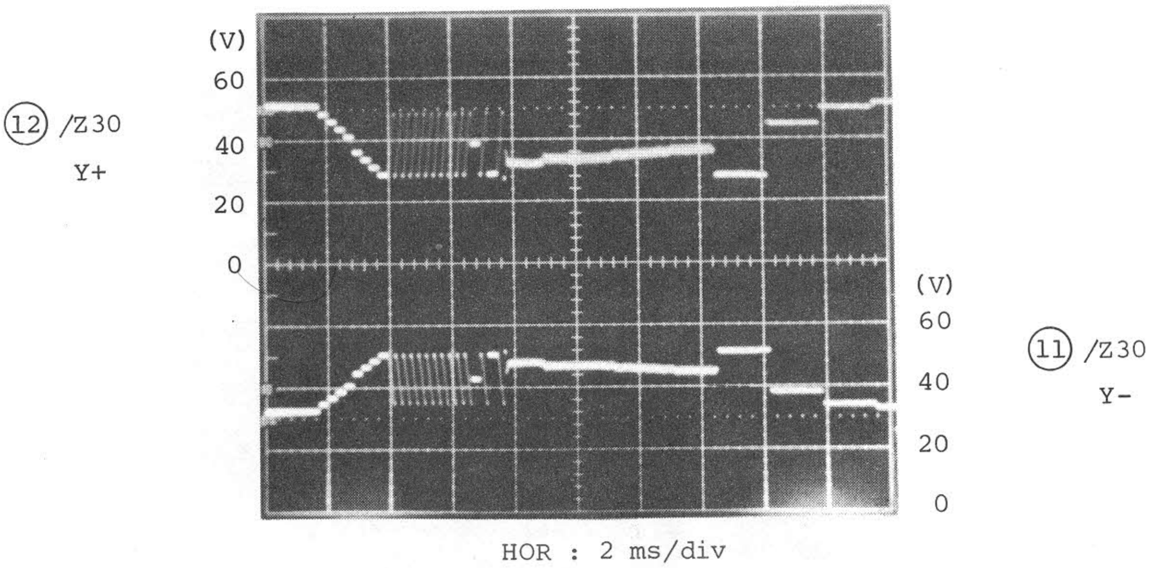
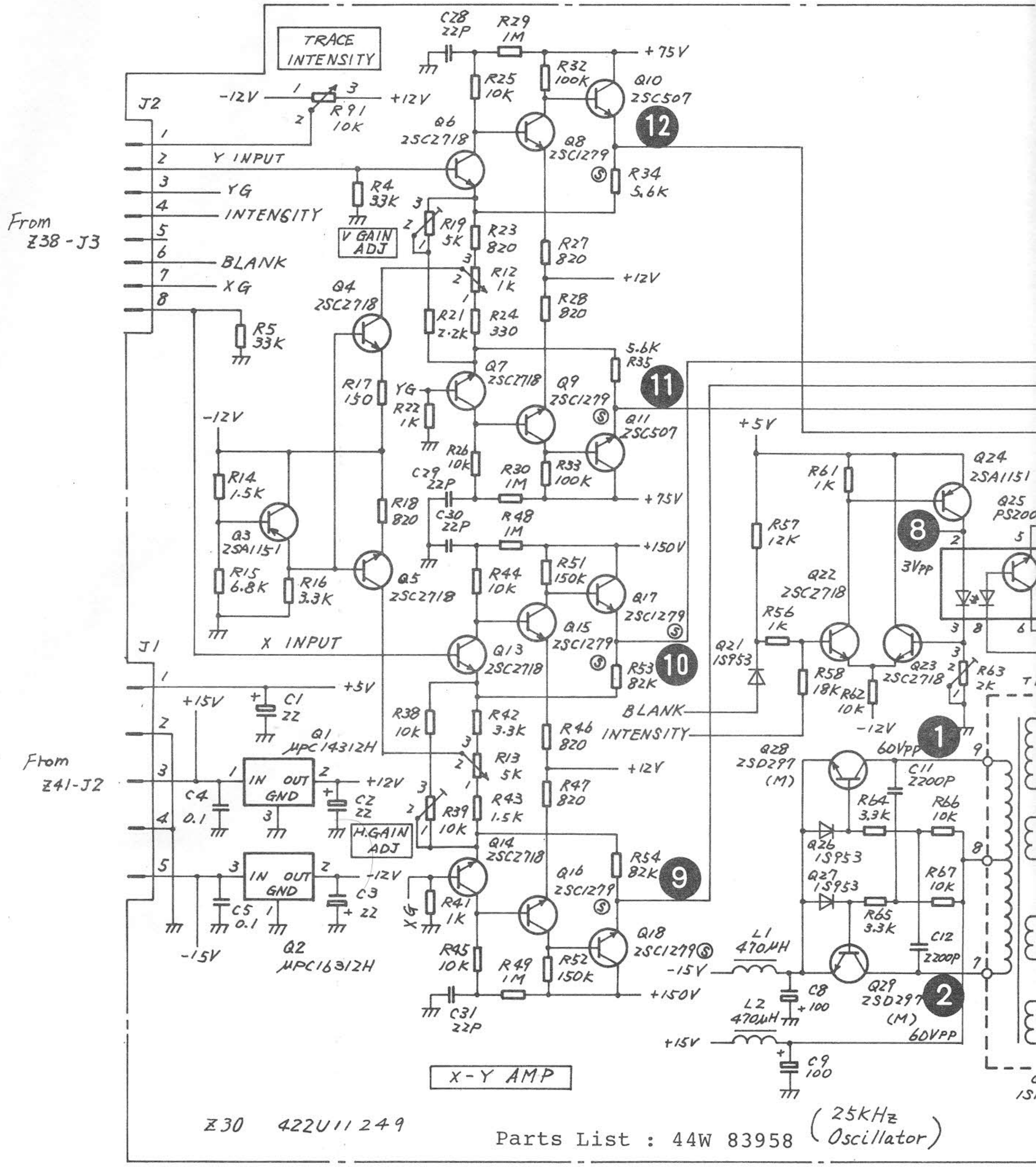


Fig. 5-91 Y-AMP OUTPUT



TRACE INTENSITY
J2
Y INPUT
YG
INTENSITY
BLANK
XG
From Z38-J3
V GAIN ADJ
H.GAIN ADJ
J1
X INPUT
From Z41-J2
Q1 μPC14312H
Q2 μPC16312H
IN OUT GND
+75V
+150V
+12V
-12V
+5V
+15V
-15V
BLANK
INTENSITY
3Vpp
60Vpp
X-Y AMP
Z30 422U11249
Parts List : 44W 83958
(25kHz Oscillator)

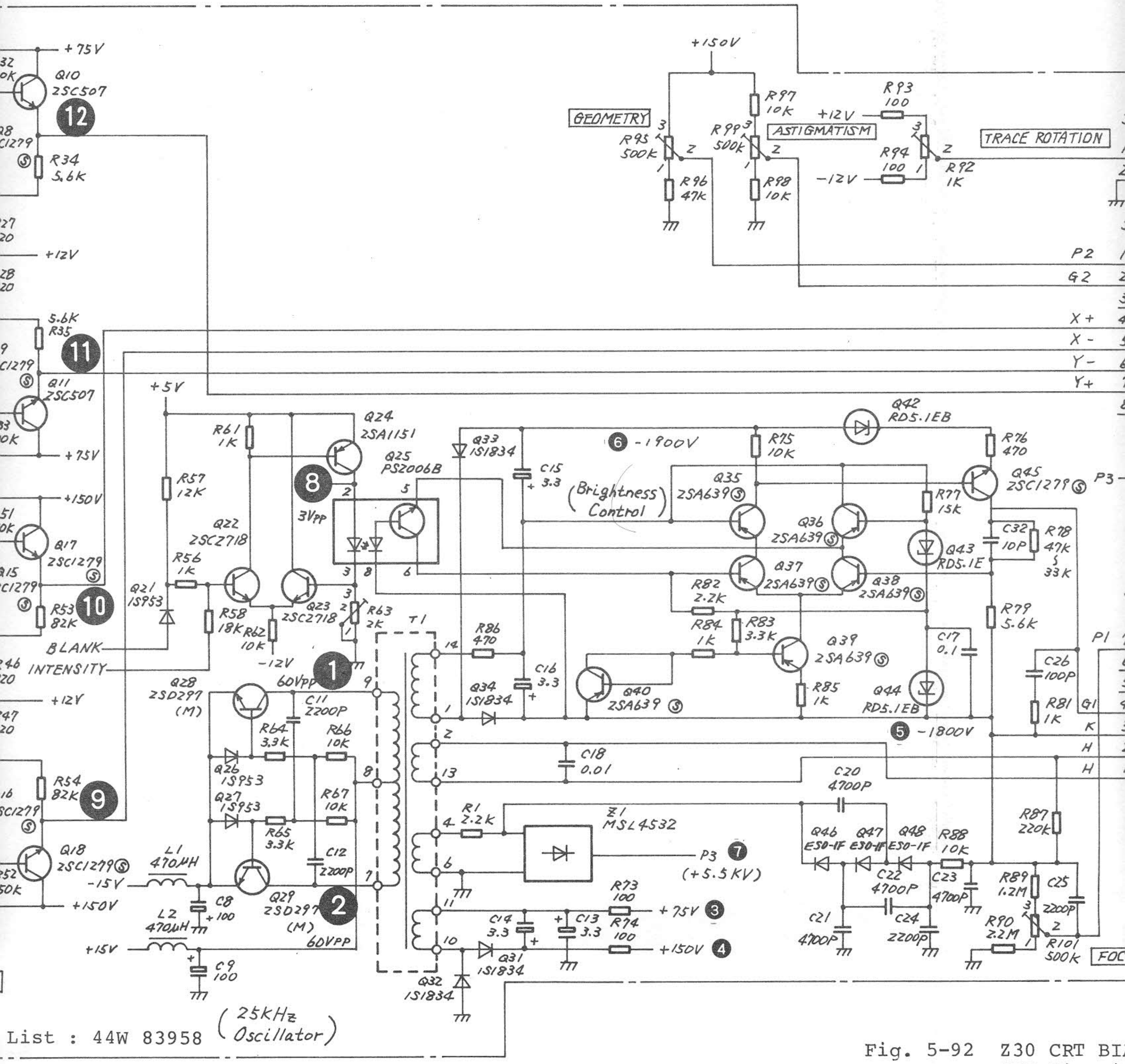


Fig. 5-92 Z30 CRT BI
AMP Circui
(43W 33961

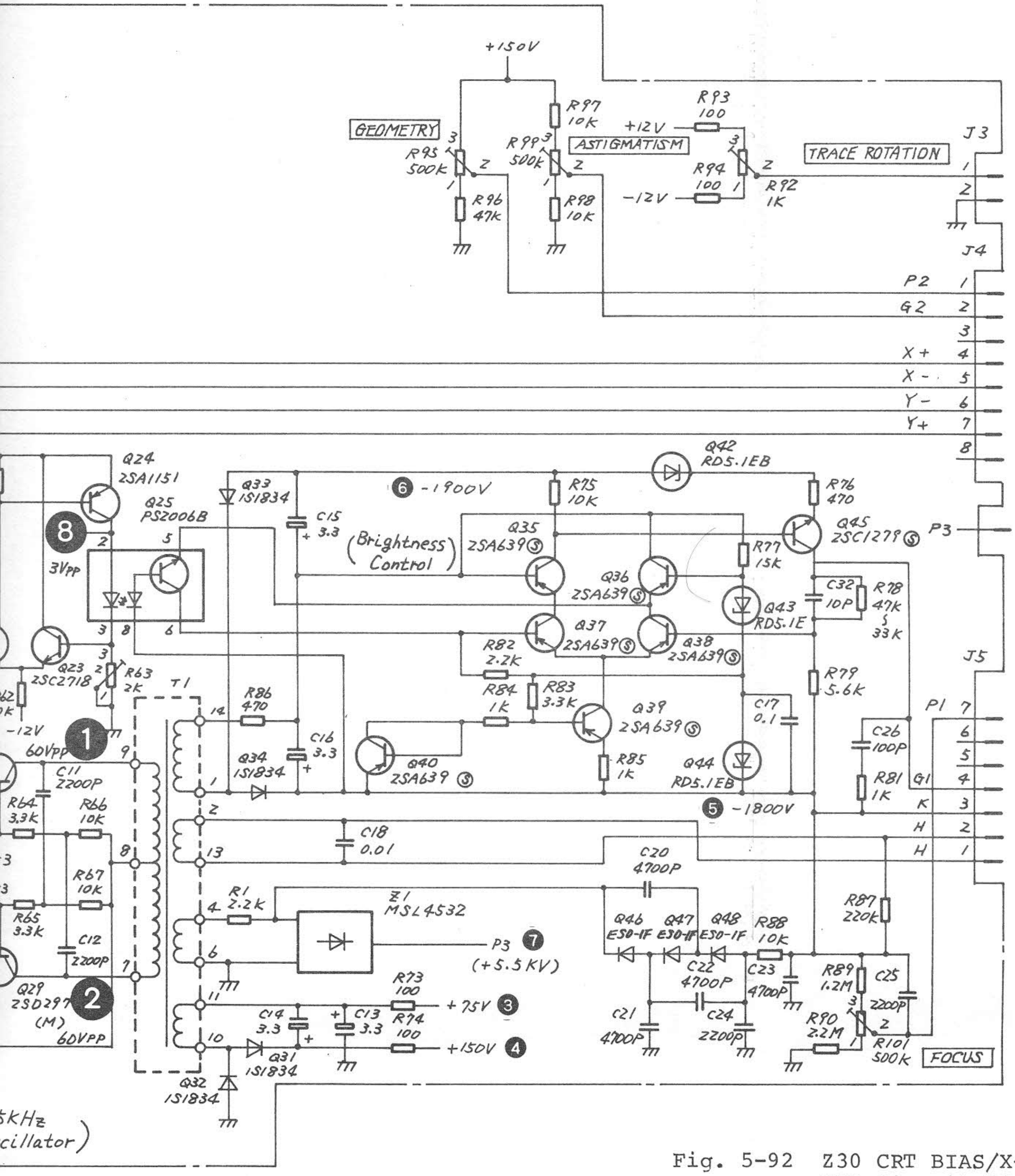


Fig. 5-92 Z30 CRT BIAS/X-Y AMP Circuit Diagram (43W 33961)

5.18 Z32 SWITCHING REGULATOR

5.18.1 Circuit description - Z32

(Refer to Fig. 3-3 (3/4) and Fig. 5-98)

The dc power for the MS710[ ] components are all supplied from this regulator.

Z32 has three switching regulator circuits for +15 V output, +5 V output, and -15 V output; all have similar structures.

As an example, the +15 V output circuit is explained below. The low voltage ac current supplied from the secondary-side winding of the T1 power transformer is rectified by the Q8 rectifier bridge.

The ripple components are reduced by the smoothing circuit that consists of C1, L1, C5, and C6.

The circuit around Q1 to Q6 and L3, C7 forms the chopper-type switching regulator circuit. The output voltage is divided by R2, R3, and R4 and is added to the negative input terminal of comparator Q2. The reference voltage generated by the Q1 zener diode is applied to the positive input terminal of the comparator. Therefore, when the output voltage drops, the comparator output voltage is increased and the Q3 transistor is switched on. As a result, the base potential of transistor Q4 decreases and the Q4 and Q5 transistors are switched on. Then the current flows to the load side and the output voltage is increased.

However, when the output voltage increases, the output voltage of comparator Q2 decreases and the Q3, Q4, and Q5 transistors are switched off. The output voltage is then no longer increased.

Consequently, constant voltage output is obtained by repeating this switching at a fixed cycle.

L4 and C10 or L5 and C9 are filters used to reduce the switching frequency ripple components contained in the output.

The circuit around Q28 and Q29 is the series regulator circuit. This circuit regulates dc power to the Z6/Z16 M/N VCO circuit where high-frequency signals with good purity are generated.

Q32 is the dc power voltage monitoring IC that generates the resetting signals during a fixed period of time (approximately 100 ms) when the power switch is turned on. Q32 also quickly detects any drop in +5 V output voltage when the power switch is turned off. It outputs a low-level logic signal and generates the PDN signal to prevent the contents of the memory from being destroyed when the dc power supply is switched to the backup battery.

5.18.2 Checking procedure - Z32

Step	Procedure
1.	Observe the voltage waveforms at checkpoints ❶ to ⓫ which is shown in Figs. 5-93 and 5-98. Compare these voltage waveforms at ❶ to ❾ with the normal waveforms shown in Figs. 5-94 to 5-96.
2.	Observe the waveforms at checkpoints ❿ and ⓫ on the storage oscilloscope and confirm that the power monitoring circuit is operating normally as shown in Fig. 5-97.

5.18.3 Adjustment - Z32

The variable resistors used to adjust output voltages +15 V, +5 V, and -15 V are R3, R66, and R30, respectively. Measure the output voltage with a digital voltmeter and adjust them to the specified value.

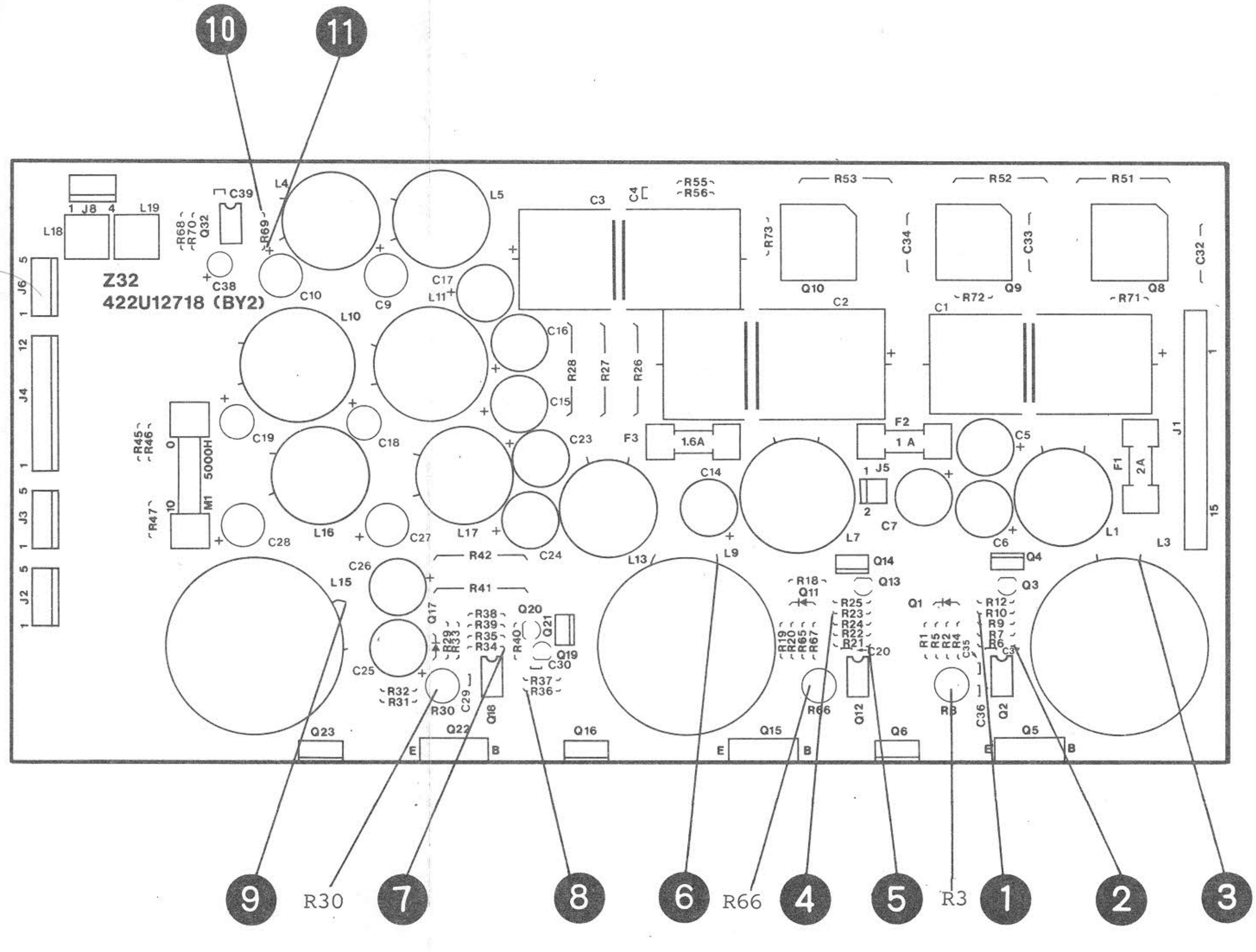
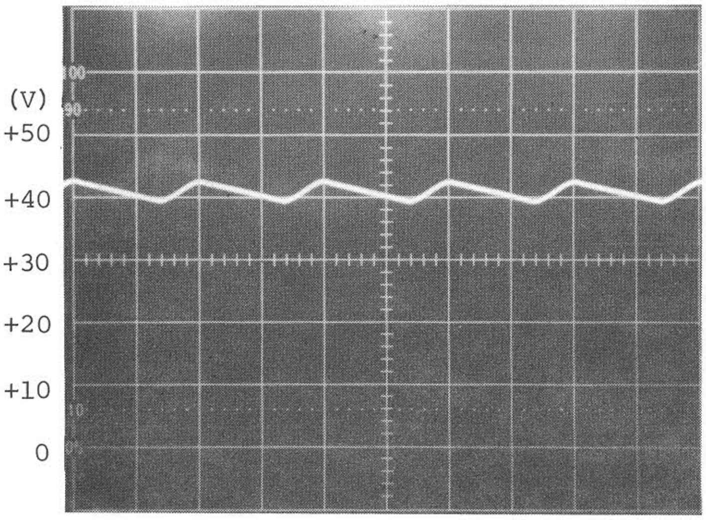
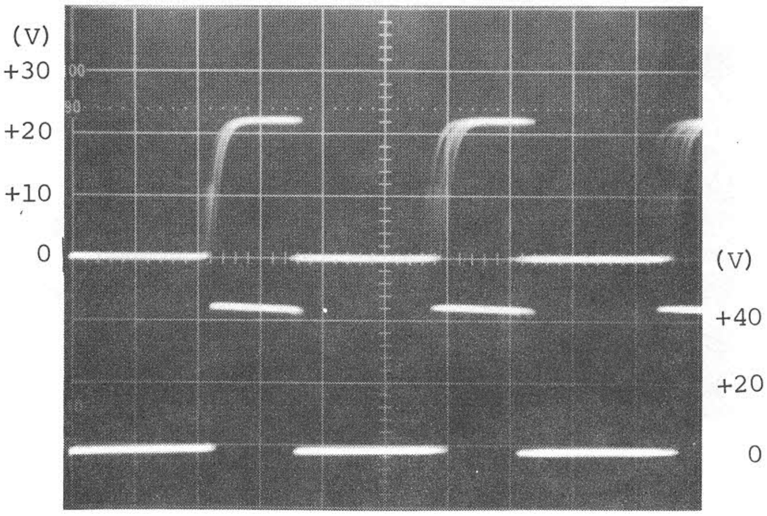


Fig. 5-93 Z32 Parts Layout



HOR : 5 ms/div

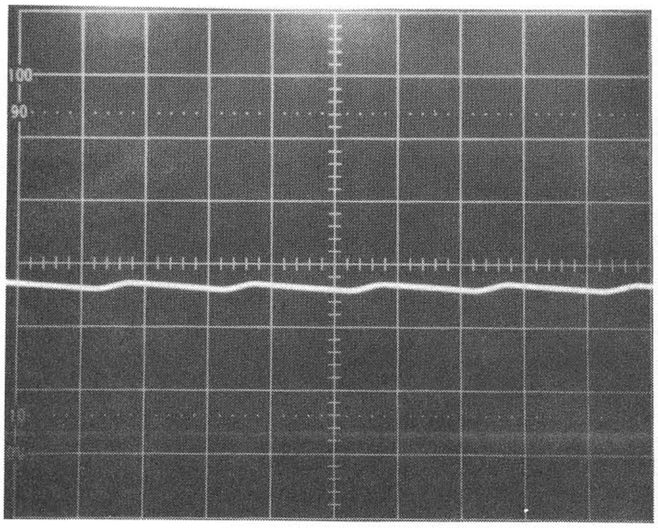


HOR : 20 μs/div

Fig. 5-94 +15 V Regulator

④ /Z32

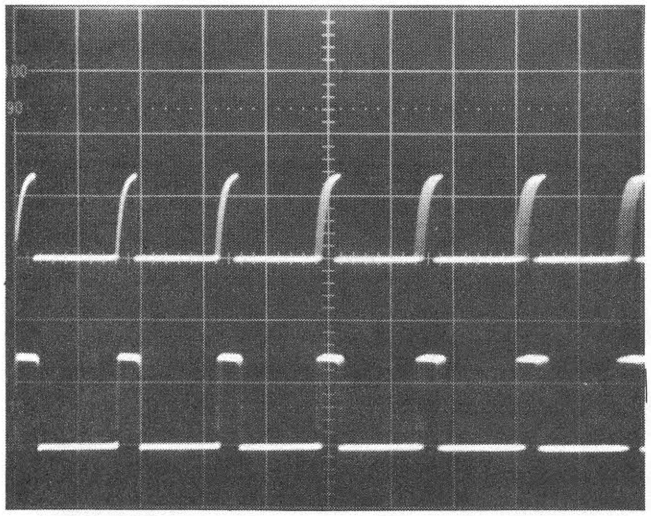
(V)
+30
+20
+10
0



HOR : 5 ms/div

(V)
+20
+10
0

⑤ /Z32

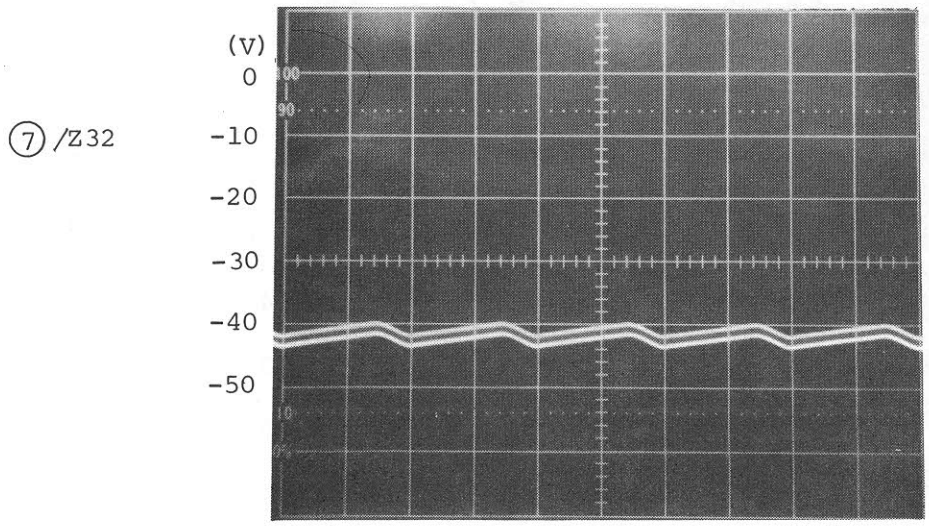


(V)
+40
+20
0

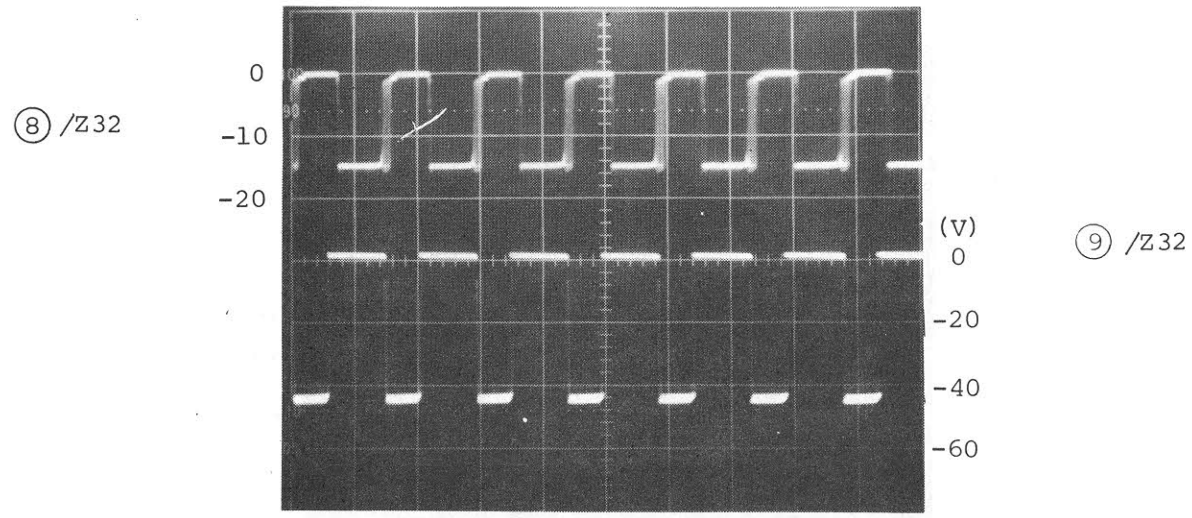
⑥ /Z32

HOR : 20 μs/div

Fig. 5-95 +5 V Regulator

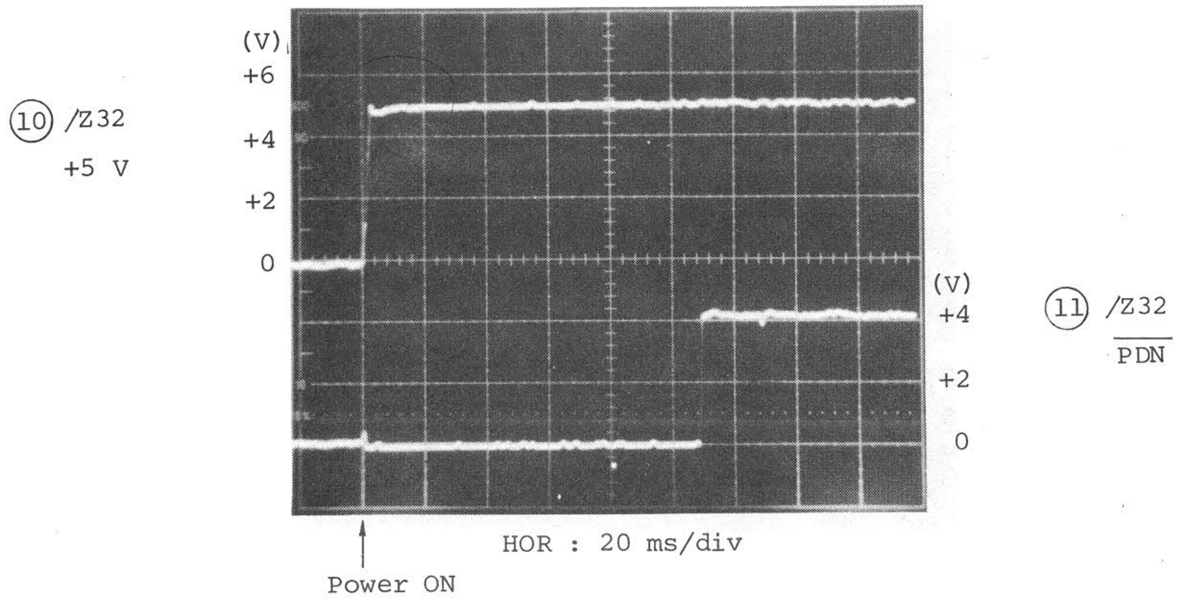


HOR : 5 ms/div



HOR 20 μs/div

Fig. 5-96 -15 V Regulator



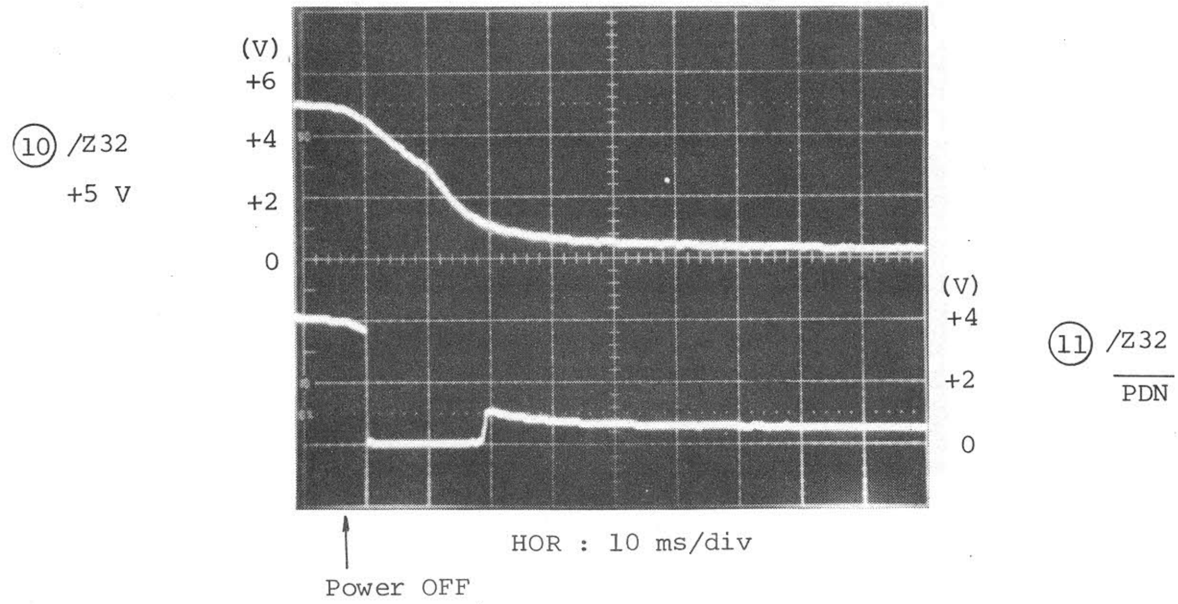
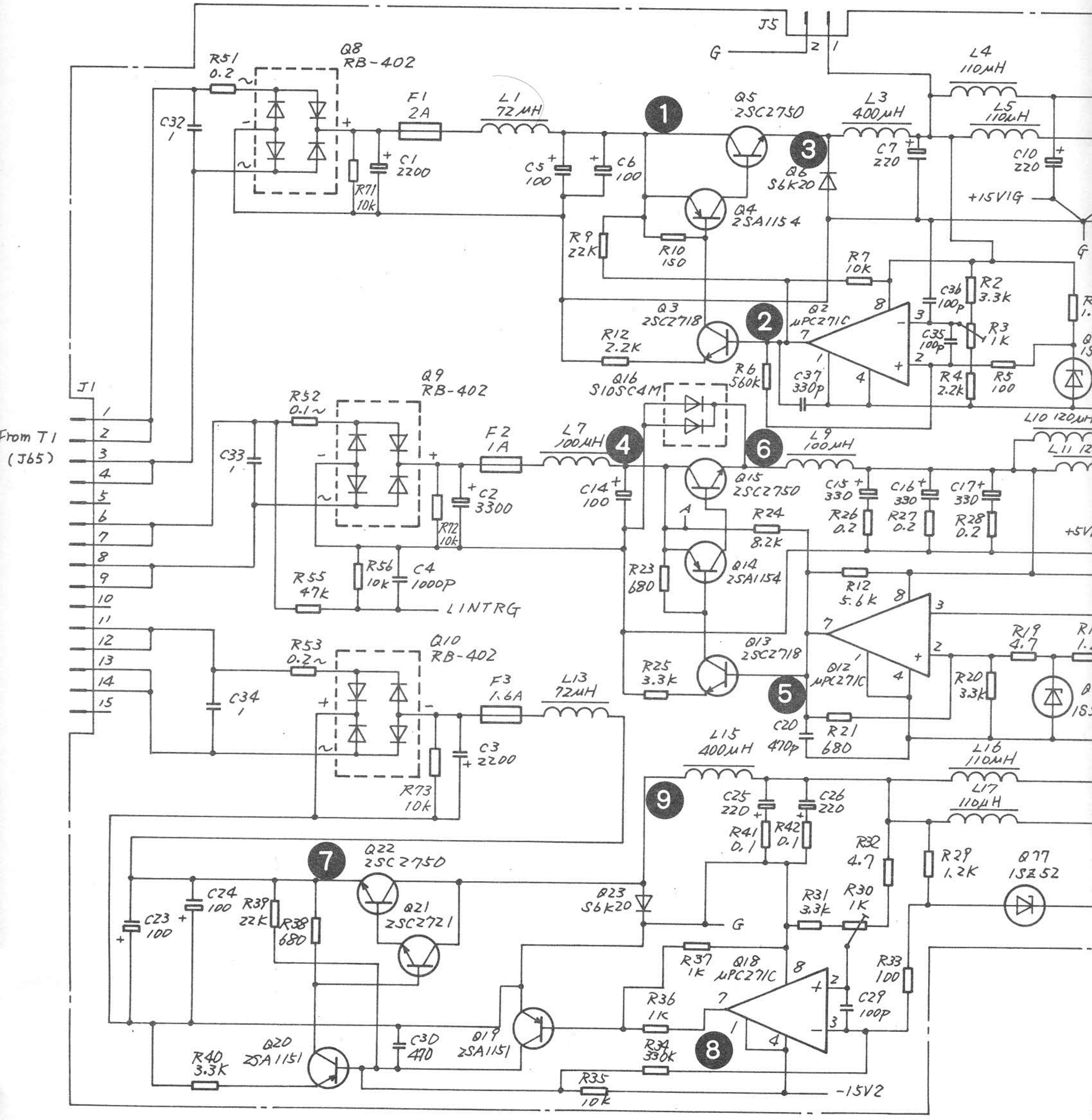
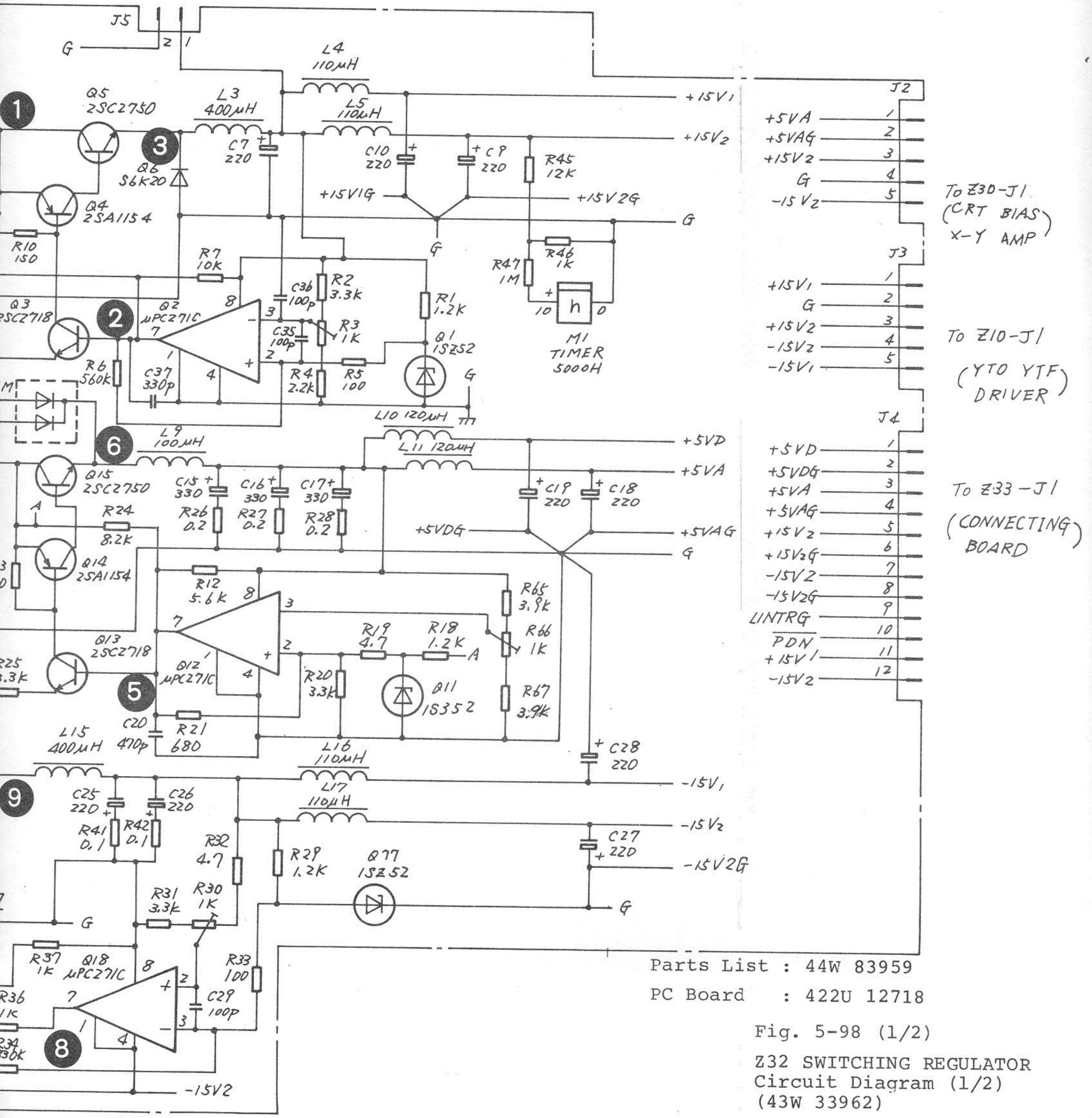


Fig. 5-97 Power ON Reset/Power Down Detector



J5
G
2
1
L4
110μH
R51
0.2
Q8
RB-402
F1
2A
L1
72μH
1
Q5
2SC2750
L3
400μH
3
L5
110μH
C32
1
C1
2200
R71
10k
C5
100
C6
100
Q6
S6k20
C7
220
C10
220
Q4
2SA1154
+15V1G
R9
22K
R10
150
R7
10K
G
R2
3.3K
C36
100p
Q3
2SC2718
2
Q2
μPC271C
R12
2.2K
C35
100p
R3
1K
R6
560k
C37
330p
R4
2.2k
R5
100
J1
Q16
S10SC4M
Q9
RB-402
R52
0.1
L10 120μH
From T1
(J65)
F2
1A
L7
100μH
4
6
L9
100μH
C33
1
C2
3300
R72
10k
C14
100
Q15
2SC2750
C15
330
C16
330
C17
330
R26
0.2
R27
0.2
R28
0.2
A
R24
8.2K
+5V
R56
10k
C4
1000P
R55
47k
R23
680
Q14
2SA1154
R12
5.6k
LINTRG
Q10
RB-402
R53
0.2
Q13
2SC2718
Q12
μPC271C
R19
4.7
R25
3.3K
5
R20
3.3k
C34
1
F3
1.6A
L13
72μH
C20
470p
R21
680
C3
2200
L15
400μH
L16
110μH
R73
10k
9
C25
220
C26
220
L17
110μH
R41
0.1
R42
0.1
R32
4.7
R29
1.2K
Q17
1SZ52
7
Q22
2SC2750
C24
100
R39
22K
R38
680
Q21
2SC2721
Q23
S6k20
G
R31
3.3k
R30
1K
C23
100
R37
1K
Q18
μPC271C
R33
100
R36
1K
C29
100P
Q20
2SA1151
C30
470
Q19
2SA1151
R34
330K
8
R40
3.3K
R35
10K
-15V2



Parts List : 44W 83959

PC Board : 422U 12718

Fig. 5-98 (1/2)

Z32 SWITCHING REGULATOR
Circuit Diagram (1/2)
(43W 33962)

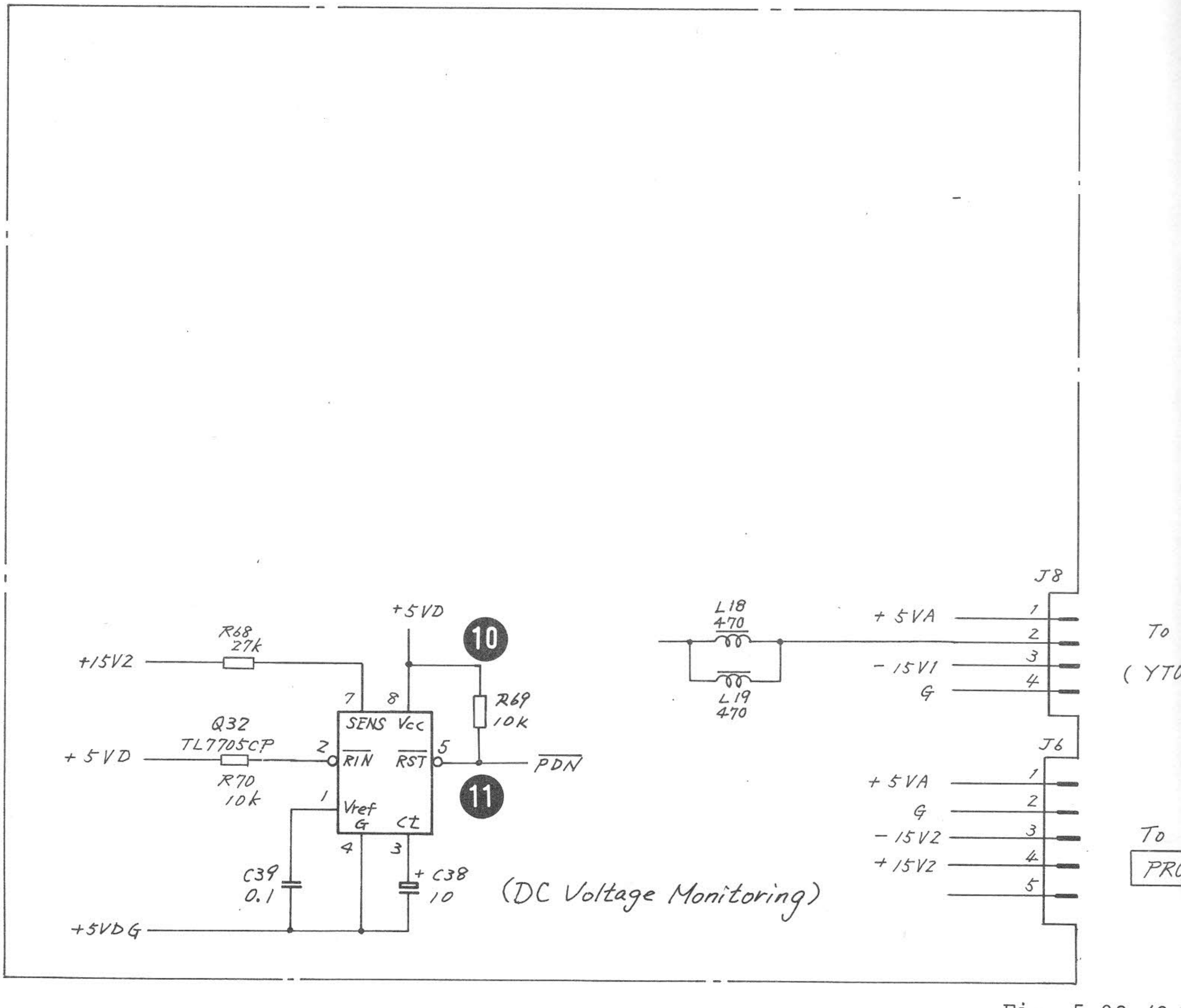


Fig. 5-98 (2/

Z32 SWITCHING
Circuit Diagr
(43W 33962)

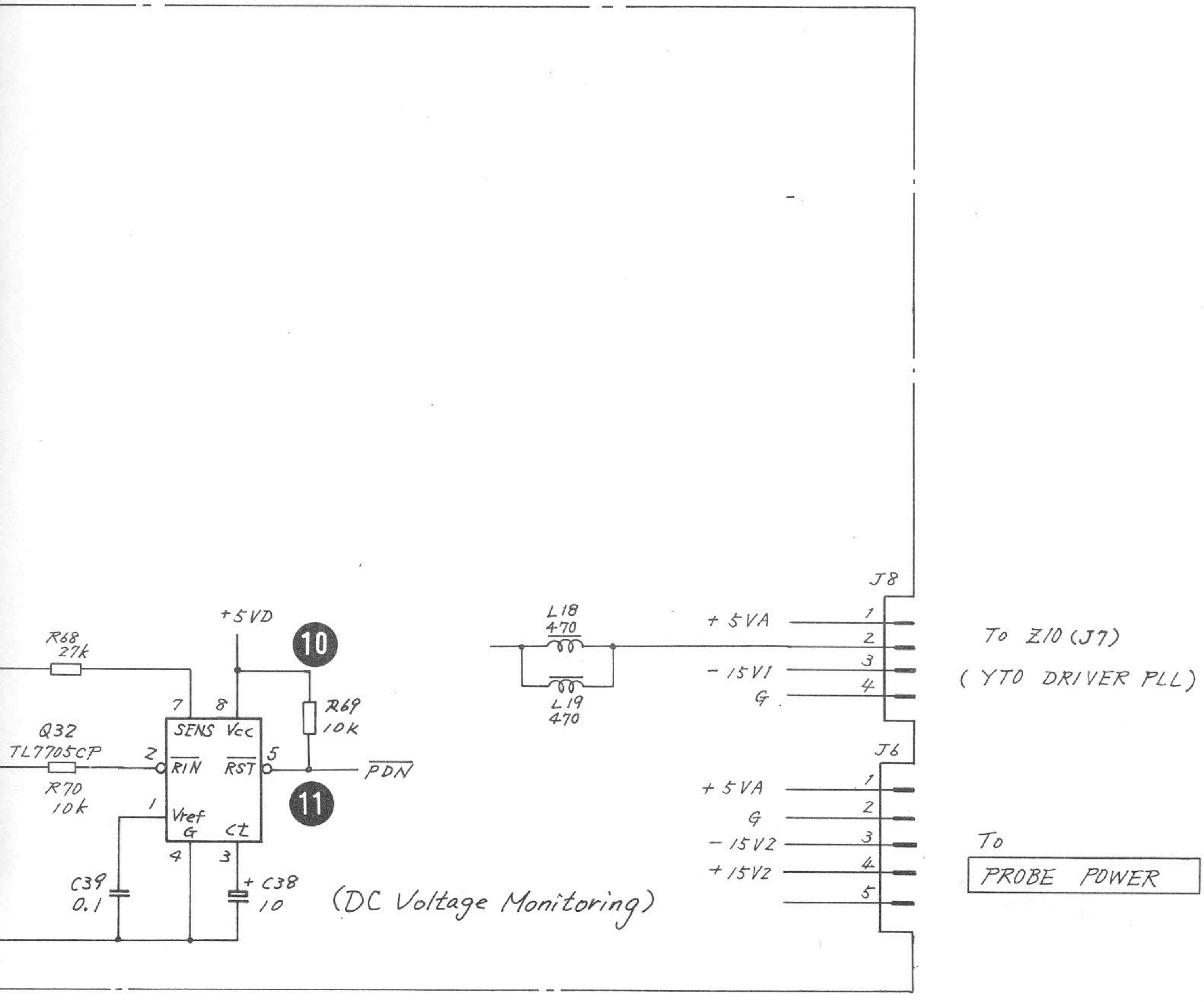
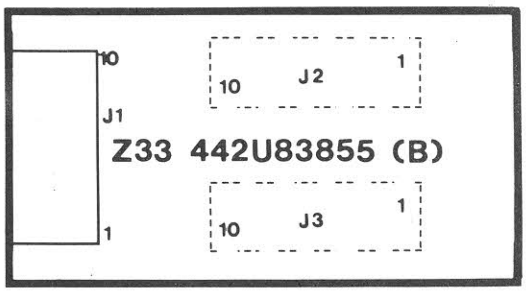
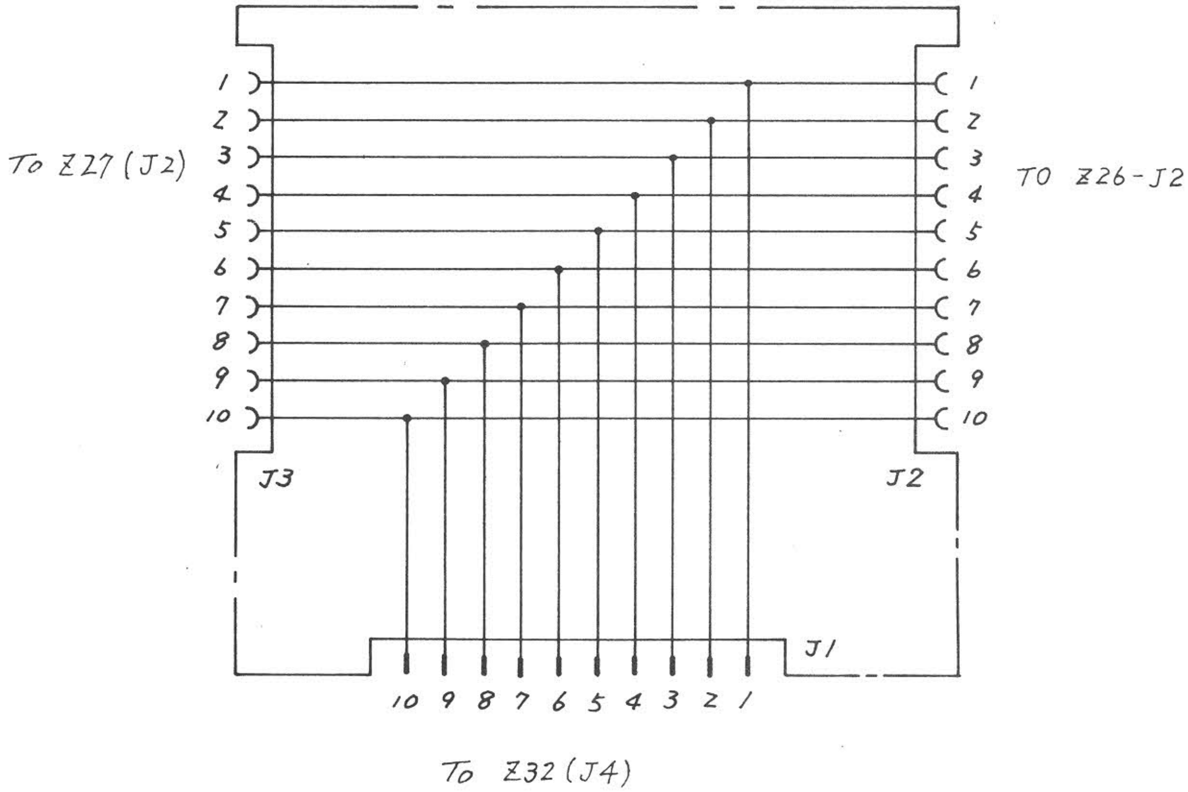


Fig. 5-98 (2/2)

Z32 SWITCHING REGULATOR
Circuit Diagram (2/2)
(43W 33962)

5.19 Z33 CONNECTION BOARD





PC Board : 442U 83855

Parts List : 44W 83960

Fig. 5-99 Z33 CONNECTION BOARD Circuit Diagram and Parts Layout (44W 84120)

5.20 Z34 DIGITAL MEMORY/GP-IB

5.20.1 Circuit description - Z34
(Refer to Fig. 3-3 (3/4) and Fig. 5-106)

This circuit samples and A/D converts the video signal, and outputs it to the CRT display memory (RAM); it controls the operation which performs data communication with the external devices through the GP-IB or PARALLEL INTERFACE. This circuit also generates the preselector auto tuning signal which is sent to the Z10 YTO/YTF driver and drives Z3 RF ATT.

The Z34 circuit is divided into the 8 parts (A) to (H), shown in Fig. 5-106, and a circuit description is given for each part as follows:

Part (A): VIDEO SIGNAL PROCESSORS

The video signal input through J1 is sampled and A/D converted gogether with the sample timing signal (DSPC) from the Z26 CPU board so that a 501 waveform data sample value per sweep is obtained.

In the normal mode, when the signal component is detected within one sampling period, the positive peak (PP) value of the video signal is sampled, and when no signal component is detected, the PP value and negative peak (NP) value are sampled alternately at each sampling. This is done to correctly reproduce the amplitude of both the signal component and the noise component.

In the MAX HOLD mode, the positive peak value of the video signal is always sampled. Moreover, in the AVERAGE mode, at the period judged to be the signal component, the PP value is sampled, and at the period judged to be the noise component only, peak hold is not performed and the video signal value itself at that time (SMP value) is sampled.

The circuit including Q71 to Q75 is the positive peak hold circuit for detecting the PP value and the circuit including Q81 to Q85 is the negative peak hold circuit for detecting the NP value.

The circuit including Q58, Q70, Q61, Q62, Q78, and Q87 is the circuit which performs signal and noise judgement. Q63 and Q64 are the switch circuit for selecting the NP, PP, and SMP signals. Q66 is the sample and hold circuit for holding the selected sampling voltage during A/D conversion.

Part B: A/D CONVERTER AND SAMPLING CONTROL

Besides performing waveform data A/D conversion in synchronization with DSPC as described above, when the sweep time is long (DSPC period is long), the PP value is sampled every 160 µs in synchronization with the CLK40 signal for performing peak hold digitally.

The circuit including Q53 to Q56 generates the timing which controls the starting of the A/D converter. Q57 is an A/D converter having a 10-bit resolution and a 35 µs conversion speed. Whether conversion is being performed or not is indicated by the STATUS signal (H level: A/D conversion being performed).

At the end of A/D conversion, the A/D converter output is latched in Q68 and Q69 by the pulse signal generated by monostable multivibrator Q56 and, at the same time, an interrupt request signal (IRQ0 or IRQ3) is generated for the Q2 interrupt controller. When this interrupt request is accepted by the Q27 microprocessor, the A/D conversion output latched in Q68 and Q69 is read to the microprocessor through Q51 PIO 1.

Parts (C), (D), and (E): MICROPROCESSOR, PERIPHERAL CIRCUIT FOR CPU, and EXTERNAL INTERFACE

Fig. 5-106 (3/8) shows the microprocessor and its clock generator circuit. Fig. 5-106 (4/8) shows the microprocessor peripheral ADDRESS DECODER, ROM, RAM, TIMER, and INTERRUPT CONTROL circuits. The control circuit of the PARALLEL INTERFACE and GP-IB which are used to interface with external devices is shown in Fig. 5-106 (5/8). LSI Q46 is used for GP-IB control.

Parts (F), (G), and (H): LS 2 bit MEMORY FOR TRACE DATA, MARKER CONTROL AND PRESELECTOR TUNE, and ATT/SW DRIVER

Fig. 5-87 (6/8) shows the DISPLAY RAM which stores the least significant 2 bits of the waveform data and its access control circuit. This DISPLAY RAM memory is integrated with the Z27-Q13 most significant 8-bit memory and forms a 10-bit memory for waveform display. It can also be accessed from the Z27 display control circuit. The Q122 for the marker function, its access control circuit, and the D/A converter (Q127) circuit which is the programmable voltage generation circuit for performing preselector auto tuning are shown in Fig. 5-106 (7/8).

The DRIVER circuit for driving the Z3 RF ATT/SW with the control signals sent from the Z26 CPU board through J1 is shown in Fig. 5-106 (8/8).

5.20.2 Checking Procedure - Z34

Step	Procedure
1.	Add the 100 MHz CAL OUTPUT signal to the RF input, and set as follows. FREQUENCY BAND 100 k to 2 GHz CENTER FREQUENCY 100 MHz SPAN/DIV 1 MHz/div REFERENCE LEVEL -10 dBm
2.	Using an oscilloscope, observe the TP7 video signal waveform and the signal waveform of SWPOFF of ❶ (Q99-1). Confirm that they are as shown in Fig. 5-101. If these waveforms are abnormal, the fault is probably before Z26.
3.	Observe the TP6 and TP5 waveforms and check the positive peak hold and negative peak hold output waveforms. (Fig. 5-101)
4.	Observe the TP2 and TP3 waveforms and confirm that the video signal is correctly sampled. (Fig. 5-101)
5.	Observe the sequence waveforms at checkpoints ❷ to ❽ to confirm that the A/D converter operation timing is normal. Check whether they are as shown in Fig. 5-102.
6.	Confirm that the ❾ and TP4 4 MHz clock signal (TTL level) is normal.
7.	Confirm that the ❿ and ⓫ timer output waveforms are set as shown in Fig. 5-103.

(cont.)

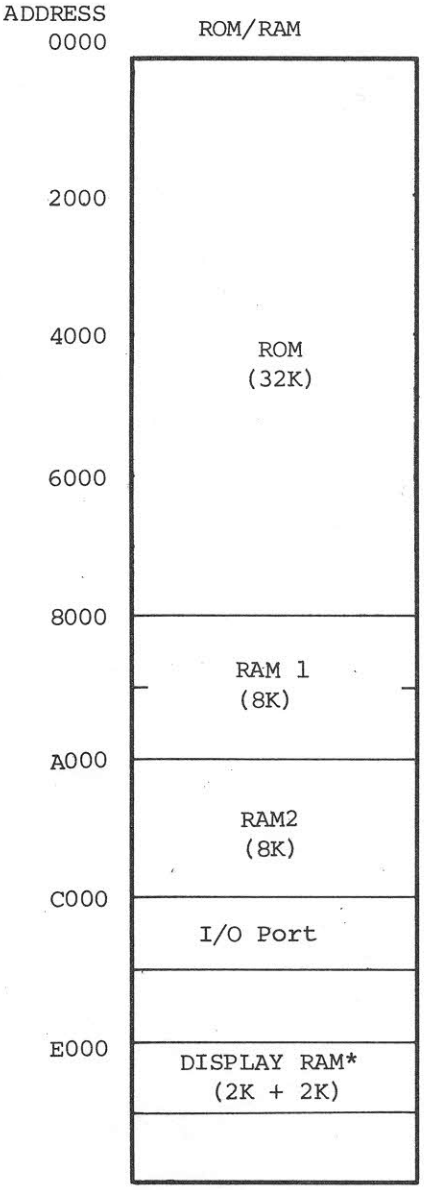
Step	Procedure
8.	Input a 3 GHz, -10 dBm signal from a signal generator to the RF INPUT, and set as follows. FREQUENCY BAND 1.7 G to 23 GHz CENTER FREQUENCY 3 GHz SPAN/DIV 1 MHz/div
9.	Set the PRESELECTOR PEAK knob on the front panel to the center of the ⌒ mark.
10.	Press the SHIFT + C(START) key switches (performs PRESELECTOR AUTO TUNING) and confirm that the ⓬ ADSMP and ⓭ P. Peak waveforms are as shown in Fig. 5-104. However, the voltages of the P. Peak waveform before and after AUTO TUNING do not be the same ordinarily. (In Fig. 5-104, the voltages happens to be the same, unexpectedly.)
11.	Press the INPUT ATTEN switch, turn the data knob, and confirm the drive signal waveforms for each section of the ATT/SW DRIVER when the attenuator is switched. An example of a control signal for SEC 1 is shown in Fig. 5-105. It is the same for the other sections.

5.20.3 Adjustment - Z34

(Prior to this adjustment, perform adjustment of the Z27 Display Section.)

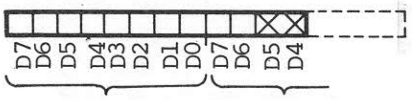
Step	Procedure
1.	Leave the Video input to Z26 (J7) open.
2.	Connect Z34 TP7 (Video input) to analog GND. Under the above conditions, adjust the offset with R44, R34, and R22 so that the voltage of TP5, TP6, and TP2 is 0 V.
3.	Under the above conditions, confirm that the CRT indication indicates 0. (Trace is on the bottom scale line.)
4.	Apply +4 V from the standard dc power source across TP7; adjust R33 so that the CRT indication coincides with the top scale line. Next, adjust R43 so that the voltage at TP5 is +2 V.
5.	Confirm the CRT trace movement at every graduation by performing input voltage variation on TP7 in 0.5 V steps.
6.	Adjust R75 so that the display line becomes the center of the noise during AVERAGE display mode.

Table 5-5 SUB CPU ADDRESS MAP



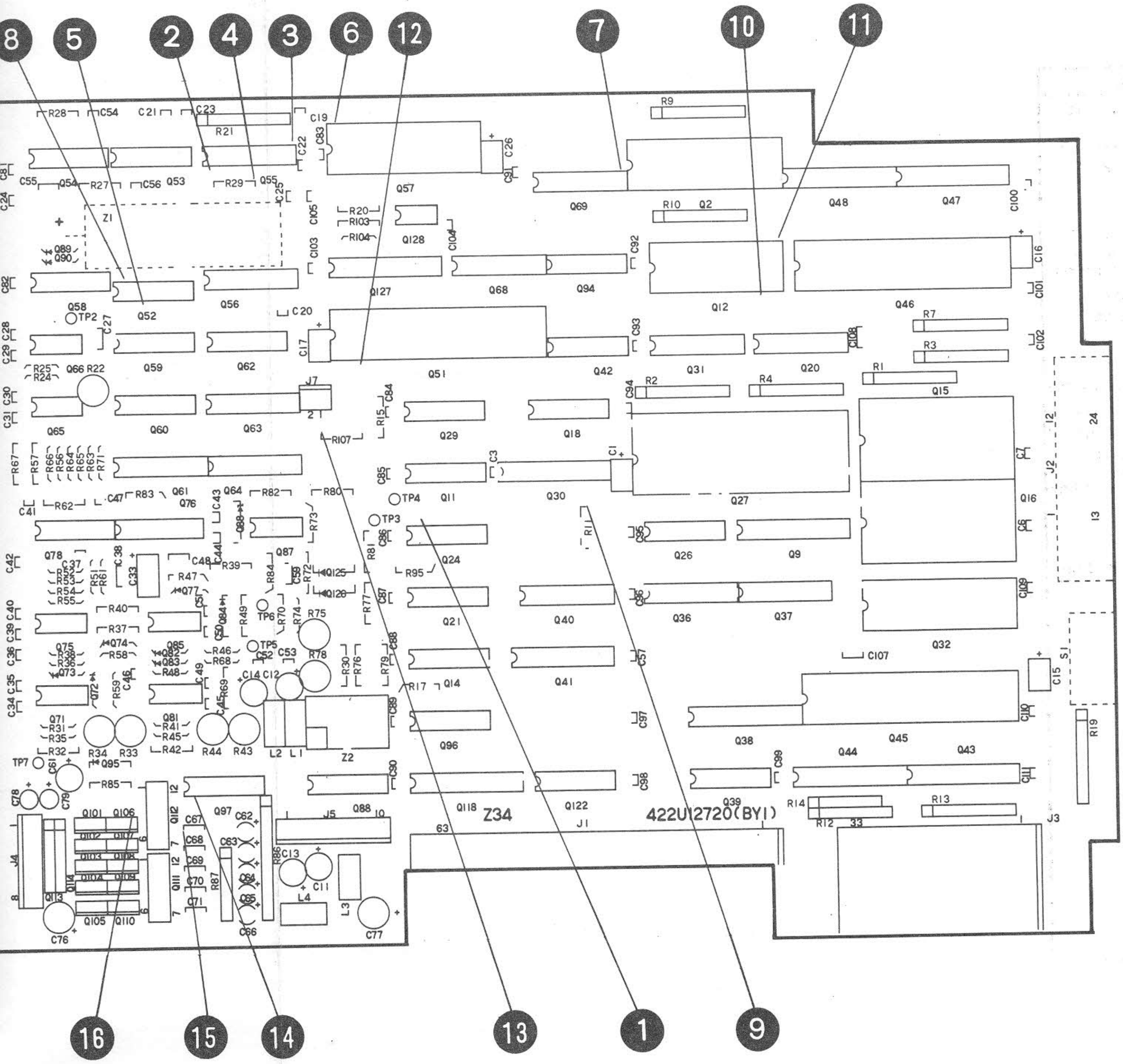
ADDRESS	Port Name	I/O	CONTROL
I/O F8	INTC 0	I/O	Interrupt Controller μPD8259
" F9	INTC 1	I/O	
I/O FC	CTC 0	I/O	Timer Clock
" FD	CTC 1	I/O	CLK 40
" FE	CTC 2	I/O	
" FF	CTC 3	O	CTC Control
C010	PIO1 A	O	Sampling Control
C011	PIO1 B	I	A/D MS 8 bit
C012	PIO1 C	I	A/D LS 2 bit
C013	PIO1 D	O	PIO 1 Control
C060	PIO2 A	I	GP-IB Address SW
C061	PIO2 B	O	Parallel Interface
C062	PIO2 C	I/O	Display, I/F Control
C063	PIO2 D	O	PIO2 Control
C070 ~ 7	GPIB 0 ~ GPIB 7	I/O	GP-IB Controller μPD7210
C000	PST	O	Preselecter Tune

* Odd Address : MS 8 bit
Even Address: LS 2 bit

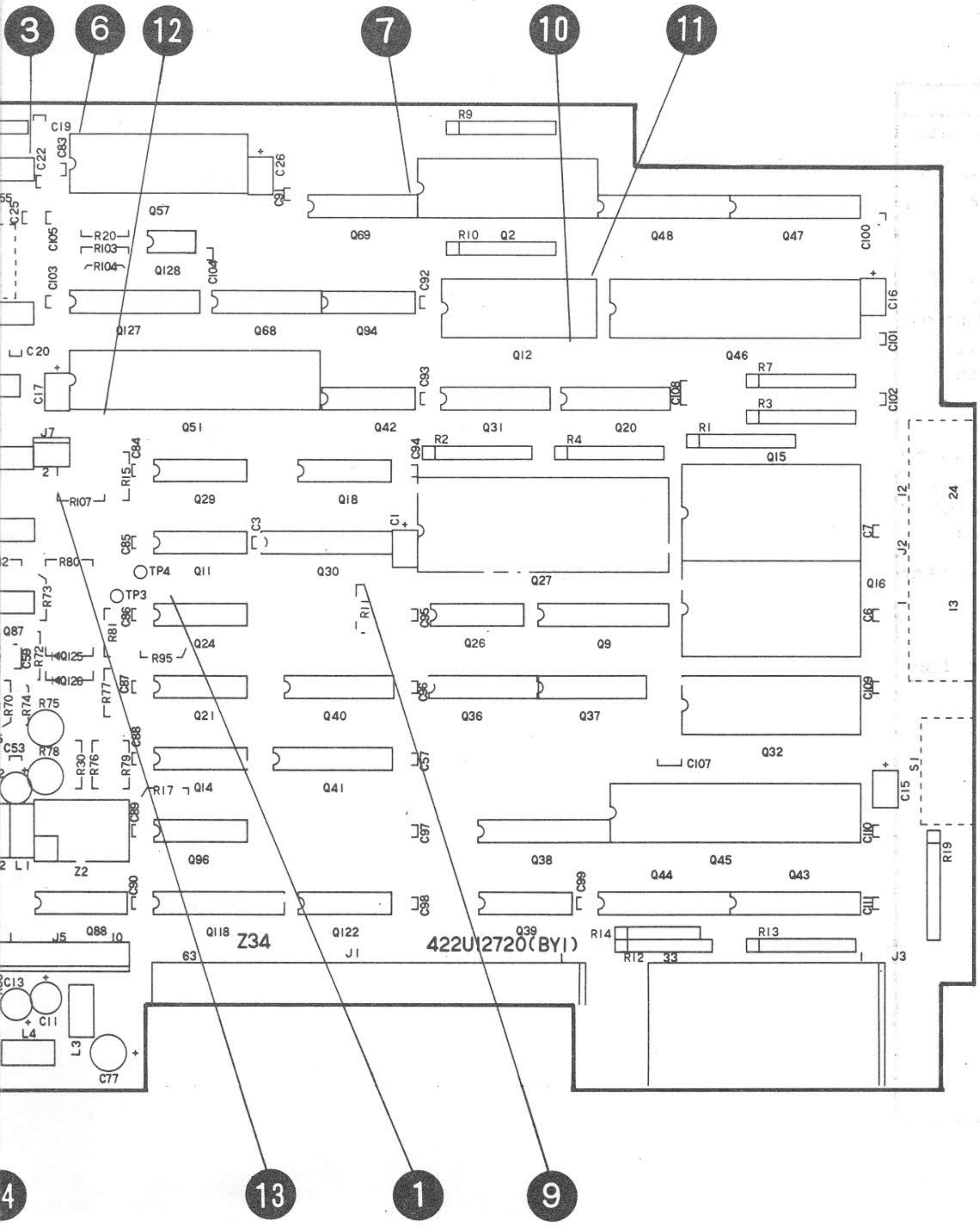


Address : 2N+1 Address : 2N

Address : 2N+1	Address : 2N
E001	E000
E003	E002
E005	E004
.	.
.	.
.	.



00 Z34 Parts Layout



3
6
12
7
10
11
C19
C83
C22
C26
C91
Q57
Q69
R9
R10
Q2
Q48
Q47
C100
C105
R20
R103
R104
Q128
C104
C103
C92
C16
Q127
Q68
Q94
Q12
Q46
C101
C20
C17
C93
C108
R7
R3
C102
Q51
Q42
Q31
Q20
R1
J7
R2
R4
C84
C94
Q15
R15
Q29
Q18
R107
24
I2
C85
C3
C1
C7
J2
TP4
Q11
Q30
Q27
Q16
R80
TP3
R73
R11
I3
Q87
R81
C86
C95
Q26
Q9
C6
Q24
R95
R72
Q125
Q126
C87
C96
C109
R70
R74
R75
R77
Q21
Q40
Q36
Q37
C53
R78
R30
R76
C88
C57
Q32
R79
R17
Q14
Q41
C107
C15
S1
C89
C97
C110
R19
Z2
L1
Q96
Q38
Q45
C90
C99
Q44
Q43
C98
C111
J5
Q88
10
Q118
Q122
Q39
R14
R13
63
Z34
J1
422U12720(BY1)
R12
33
J3
C13
C11
L4
L3
C77
13
1
9

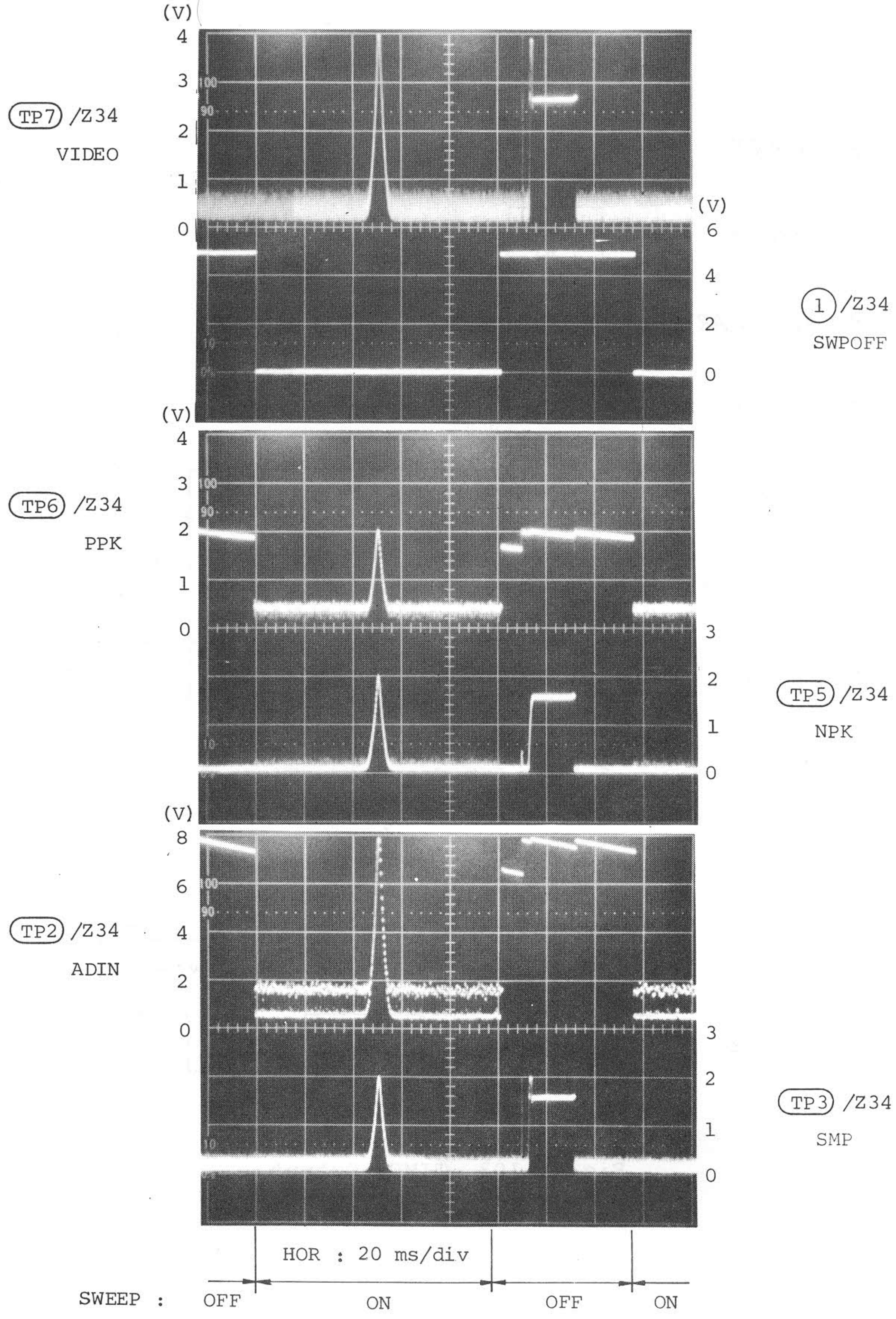


Fig. 5-101 Video Signal Processing

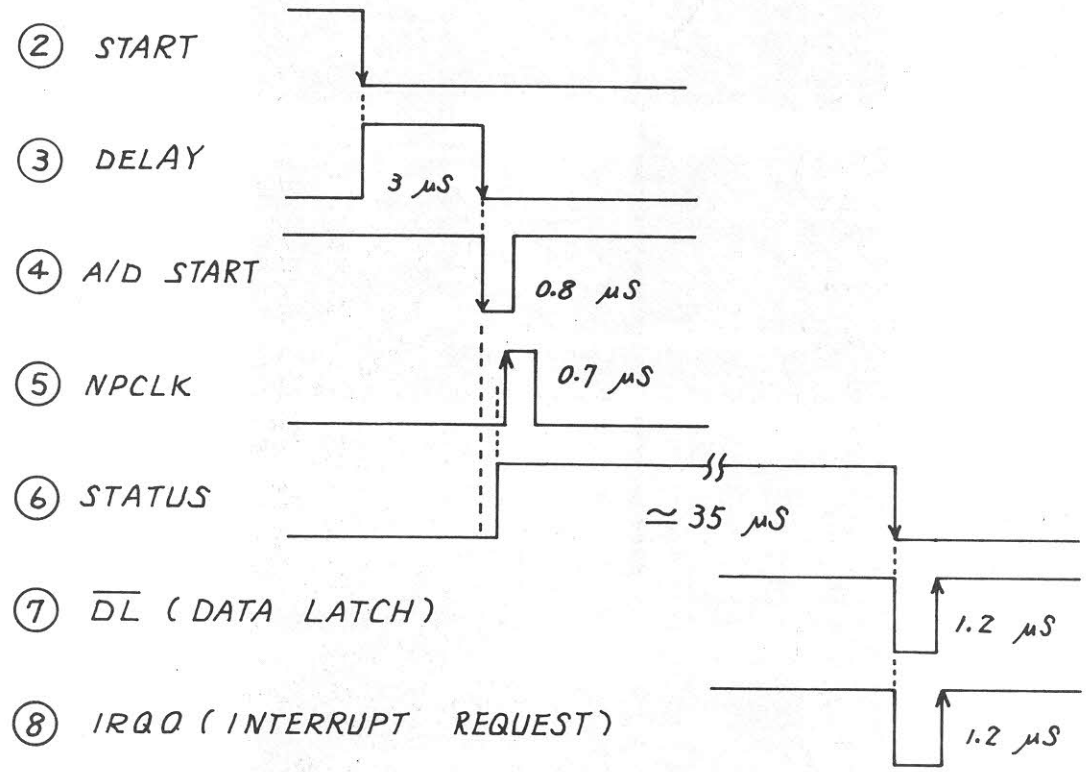


Fig. 5-102 A/D Converter Timing

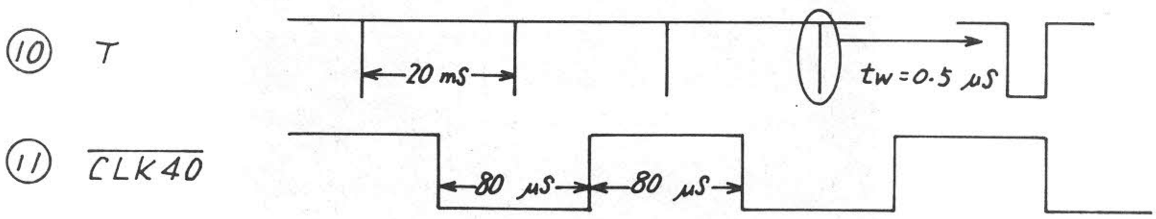


Fig. 5-103 TIMER Output

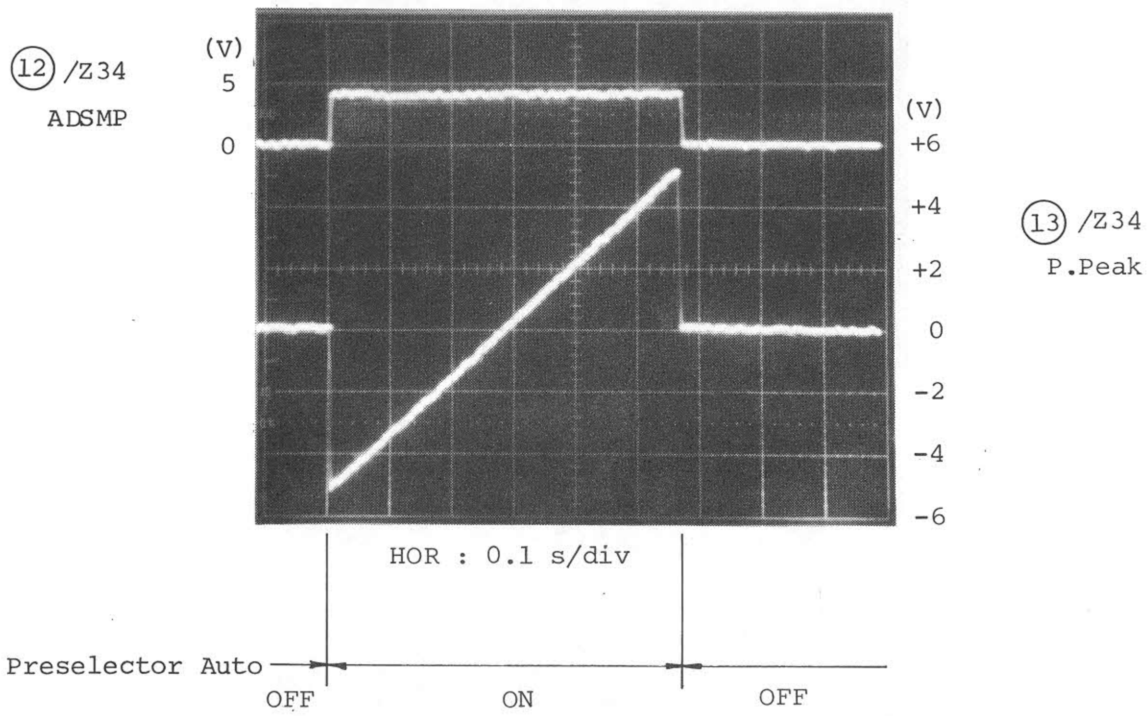
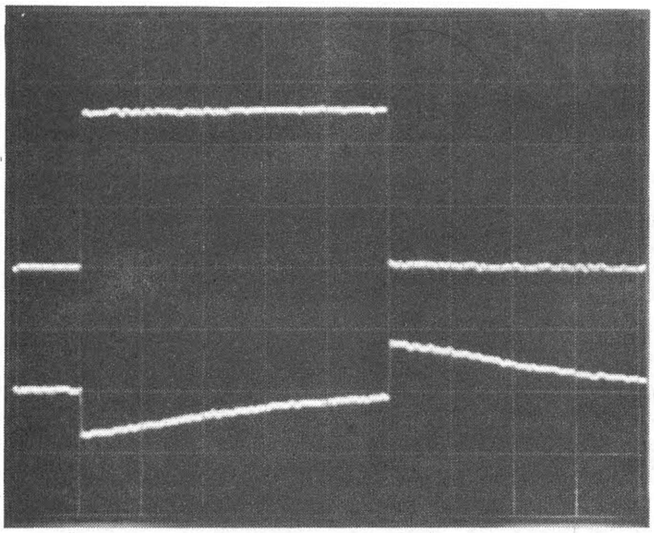


Fig. 5-104 Preselector Autotuning

(14) /Z34
ATTO

(V)
6
4
2
0



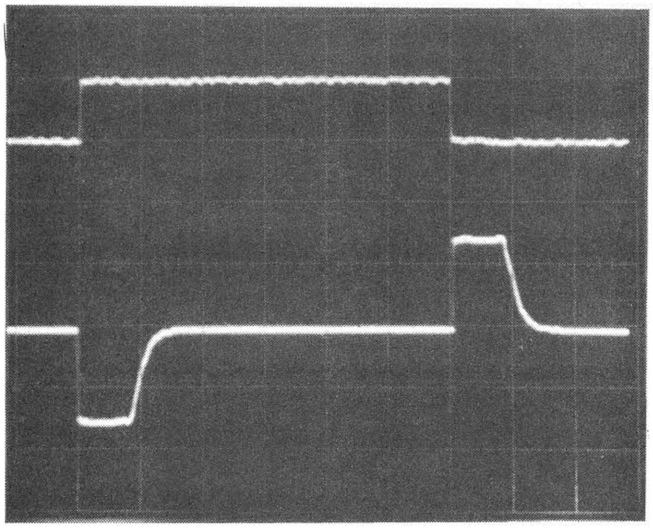
(V)
+1
0
-1

(15) /Z34

HOR : 0.1 s/div

(14) /Z34
ATTO

(V)
5
0



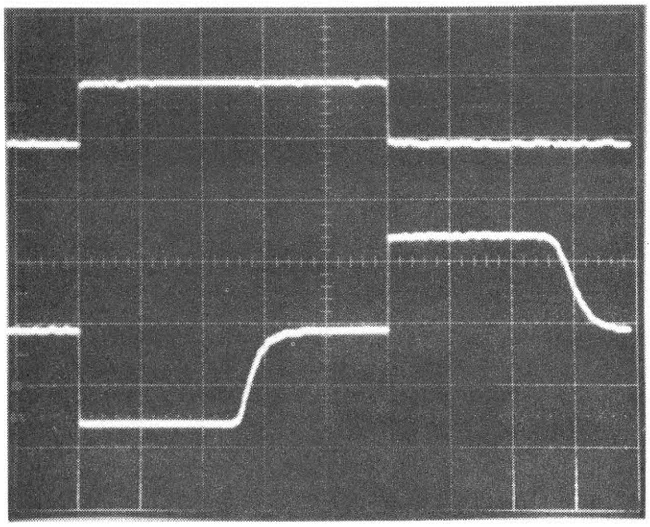
+20
+10
0
-10
-20

(16) /Z34
SEC 1

HOR : 0.1 s/div

(14) /Z34
ATTO

(V)
5
0

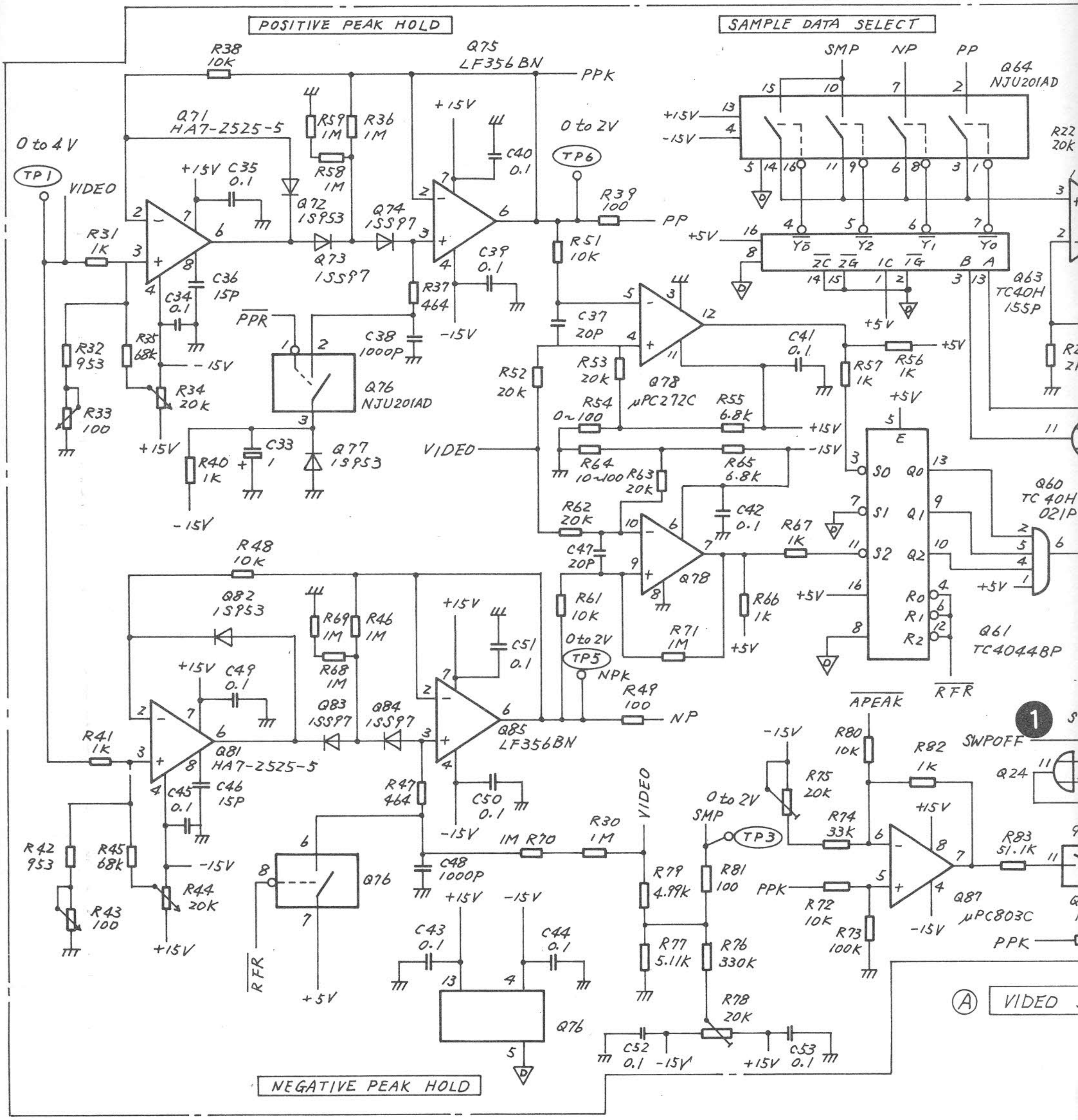


+20
+10
0
-10
-20

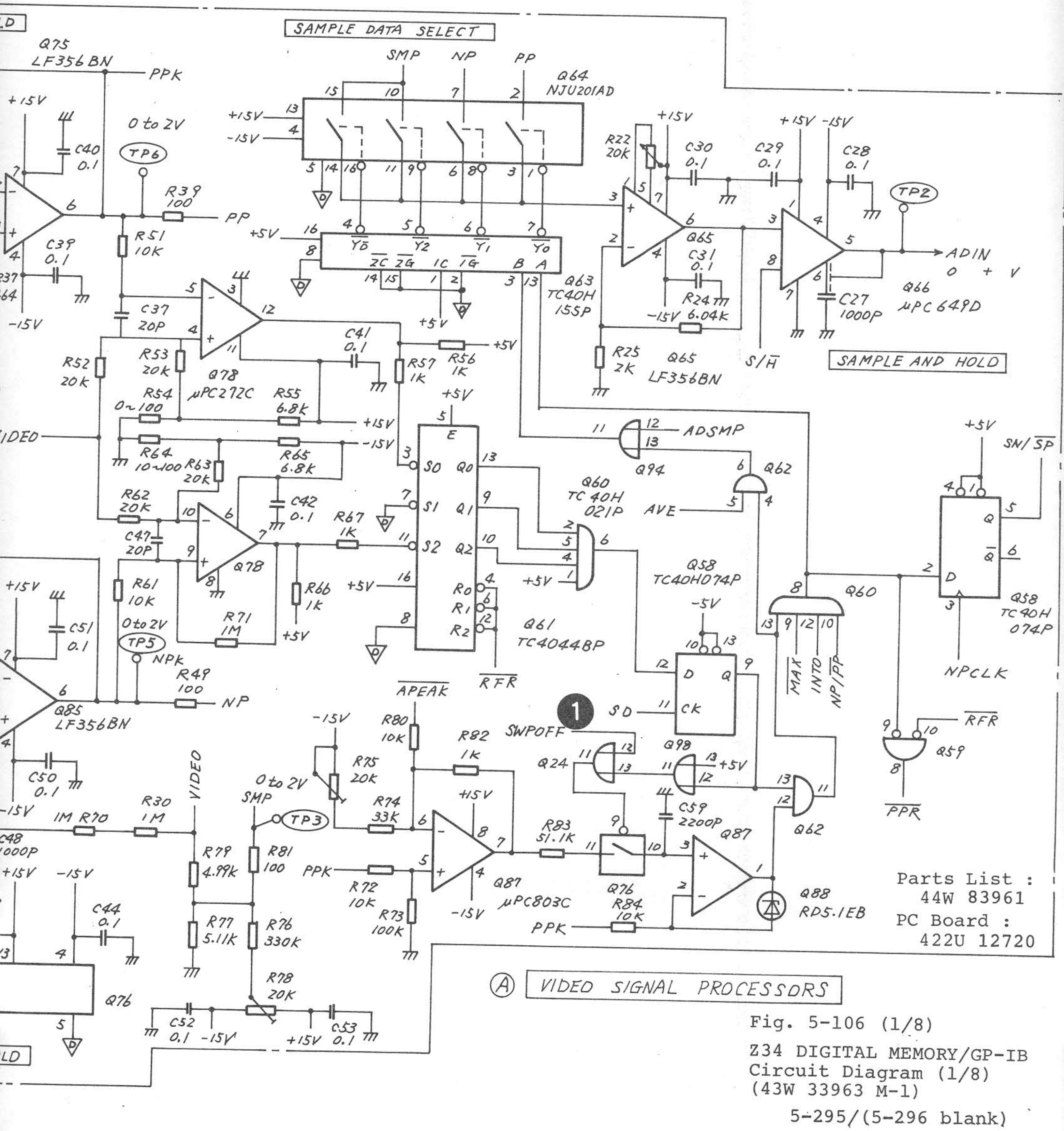
(16) /Z34
SEC 1
(J4 OPEN)

HOR : 0.1 s/div

Fig. 5-105 ATT/SW DRIVER



POSITIVE PEAK HOLD
SAMPLE DATA SELECT
NEGATIVE PEAK HOLD
A VIDEO
0 to 4V
TP1
VIDEO
R31 1K
R38 10K
Q71 HA7-2525-5
Q72 1S953
Q73 1SS97
Q74 1SS97
Q75 LF356BN
PPK
R59 1M
R36 1M
R58 1M
C35 0.1
C36 15P
C34 0.1
R35 68k
R32 953
R33 100
R34 20K
+15V
-15V
C40 0.1
C39 0.1
R37 464
C38 1000P
PPR
Q76 NJU201AD
R40 1K
C33 1
Q77 1S953
0 to 2V
TP6
R39 100
PP
R51 10K
C37 20P
R52 20K
R53 20K
Q78 μPC272C
R54 0~100
R55 6.8K
R64 10~100
R63 20K
R65 6.8K
R62 20K
C47 20P
C42 0.1
R61 10K
R71 1M
R67 1K
R66 1K
C41 0.1
R57 1K
R56 1K
+5V
SMP
NP
PP
Q64 NJU201AD
Q63 TC40H155P
Q61 TC4044BP
Q60 TC40H021P
S0 S1 S2
Q0 Q1 Q2
R0 R1 R2
E
RFR
R48 10K
Q82 1S953
R69 1M
R46 1M
R68 1M
C49 0.1
C46 15P
C45 0.1
Q81 HA7-2525-5
R41 1K
R42 953
R43 100
R44 20K
R45 68k
Q83 1SS97
Q84 1SS97
Q85 LF356BN
C51 0.1
C50 0.1
R47 464
C48 1000P
0 to 2V
TP5
NPK
R49 100
NP
IM R70
R30 1M
VIDEO
0 to 2V
SMP
TP3
R79 4.99K
R81 100
R77 5.11K
R76 330K
R78 20K
C52 0.1
C53 0.1
C43 0.1
C44 0.1
APEAK
R80 10K
R82 1K
R75 20K
R74 33K
R72 10K
R73 100K
Q87 μPC803C
R83 51.1K
SWPOFF
Q24
PPK



Parts List :
44W 83961
PC Board :
422U 12720

Fig. 5-106 (1/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (1/8)
(43W 33963 M-1)

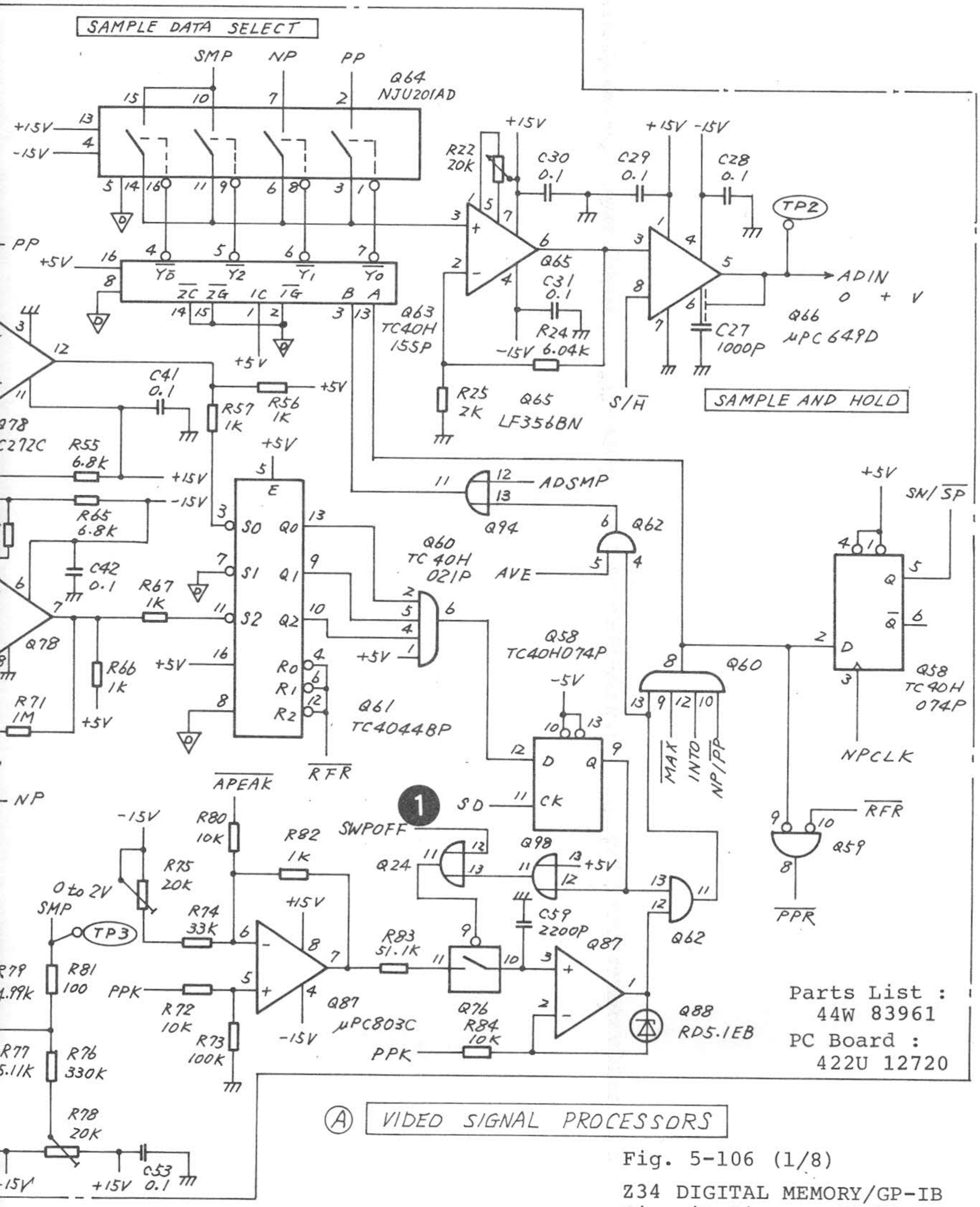
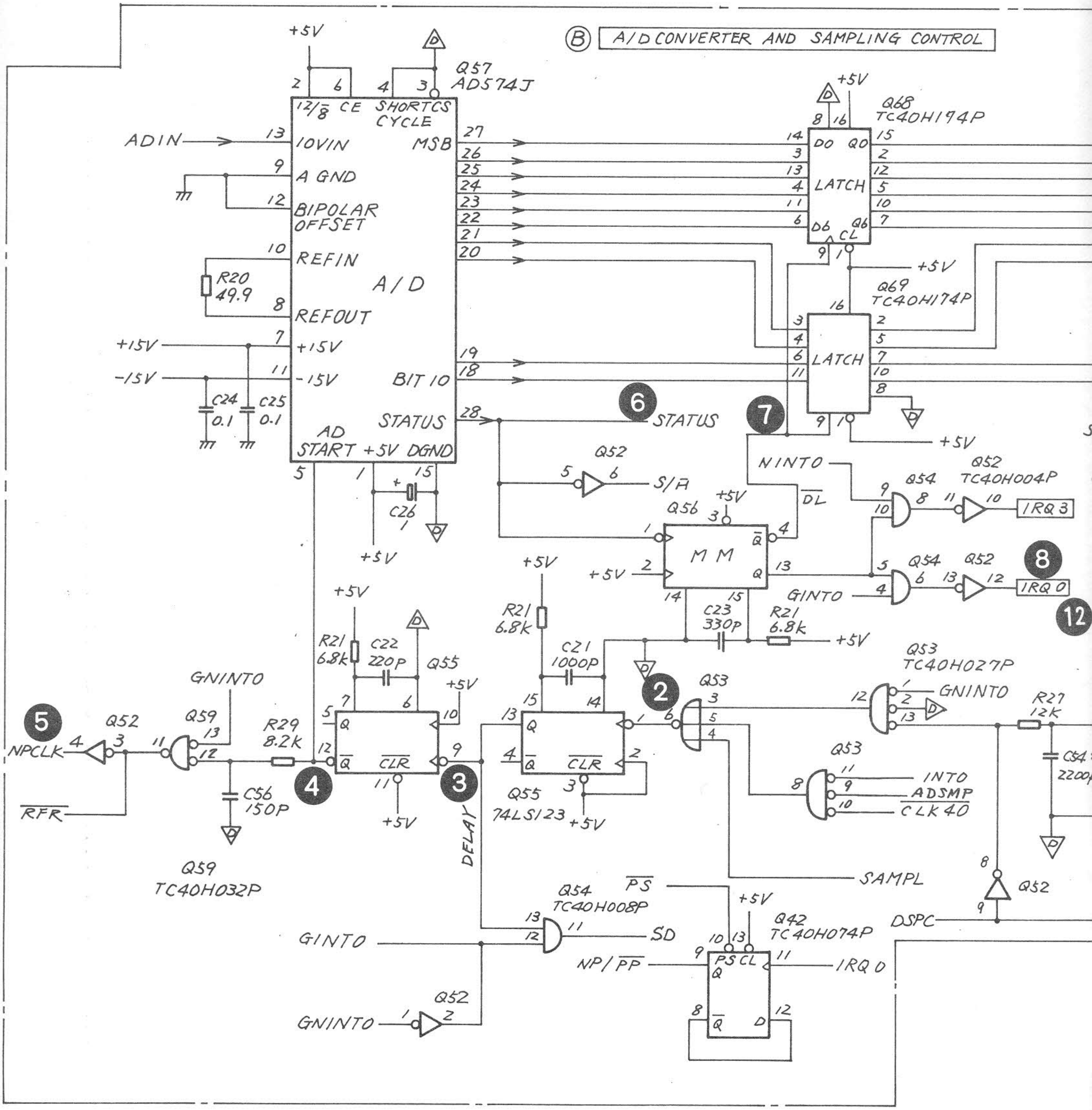


Fig. 5-106 (1/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (1/8)
(43W 33963 M-1)



(B) A/D CONVERTER AND SAMPLING CONTROL
Q57 AD574J
+5V
12/8 CE SHORT CYCLE CS
ADIN
10VIN
A GND
BIPOLAR OFFSET
REFIN
A/D
R20 49.9
REFOUT
+15V
-15V
C24 0.1
C25 0.1
MSB
BIT 10
STATUS
AD START +5V DGND
C26 1
6 STATUS
Q68 TC40H174P
D0 Q0
LATCH
D6 Q6 CL
Q69 TC40H174P
LATCH
7
Q52
S/A
NINTO
DL
Q56
MM
Q54
Q52 TC40H004P
IRQ 3
8 IRQ 0
12
GINTO
C23 330p
R21 6.8k
R21 6.8k
C21 1000P
C22 220P
Q55
CLR
Q53
2
Q53 TC40H027P
GNINTO
R27 12K
C54 2200P
INTO
ADSMP
CLK 40
5 NPCLK
Q52
Q59
GNINTO
R29 8.2k
4
3
RFR
C56 150P
Q59 TC40H032P
Q55 74LS123
DELAY
SAMPL
Q52
DSPC
PS
Q54 TC40H008P
SD
GINTO
Q42 TC40H074P
NP/PP
PS CL
IRQ 0
Q
Q D
Q52
GNINTO

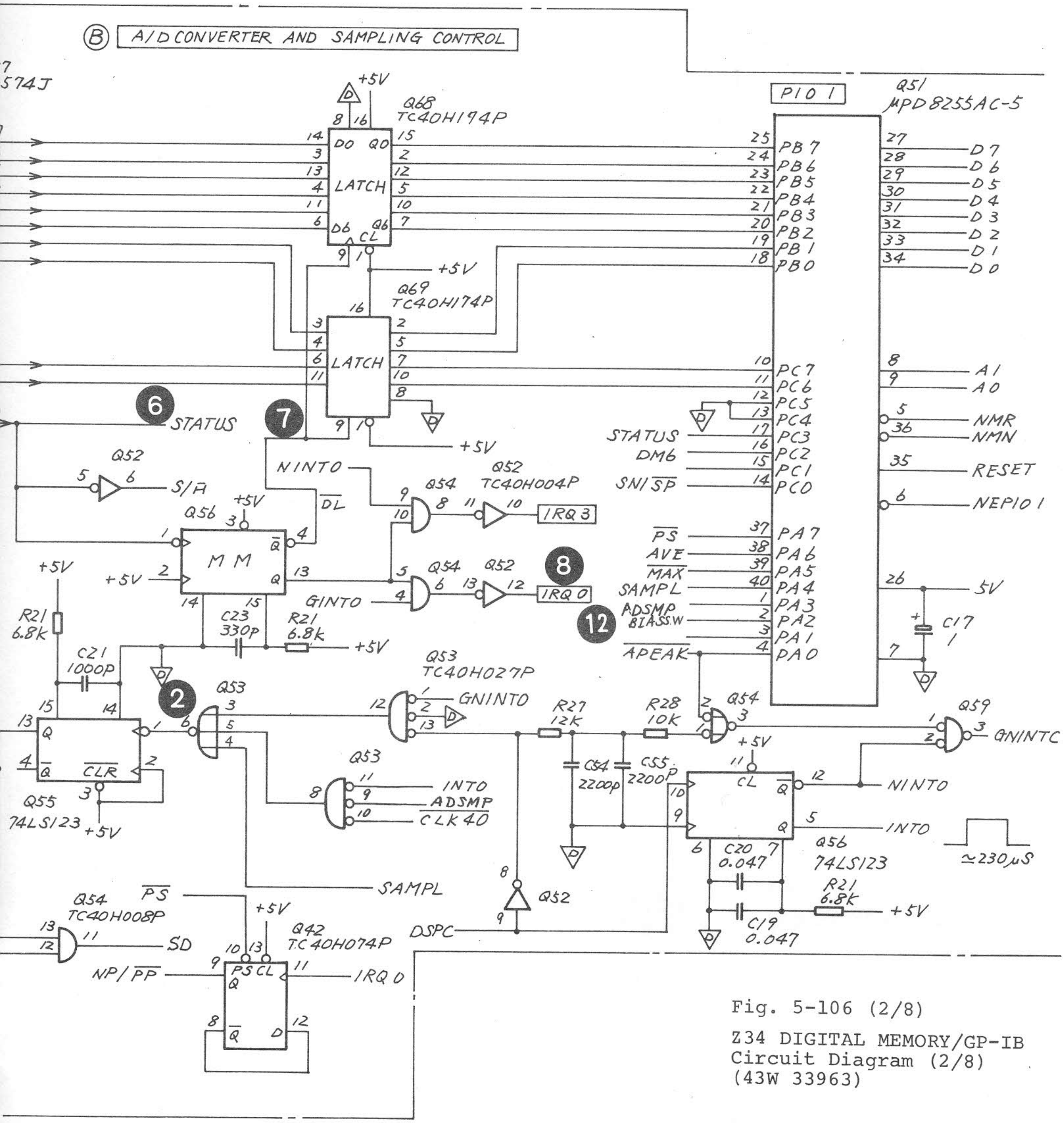
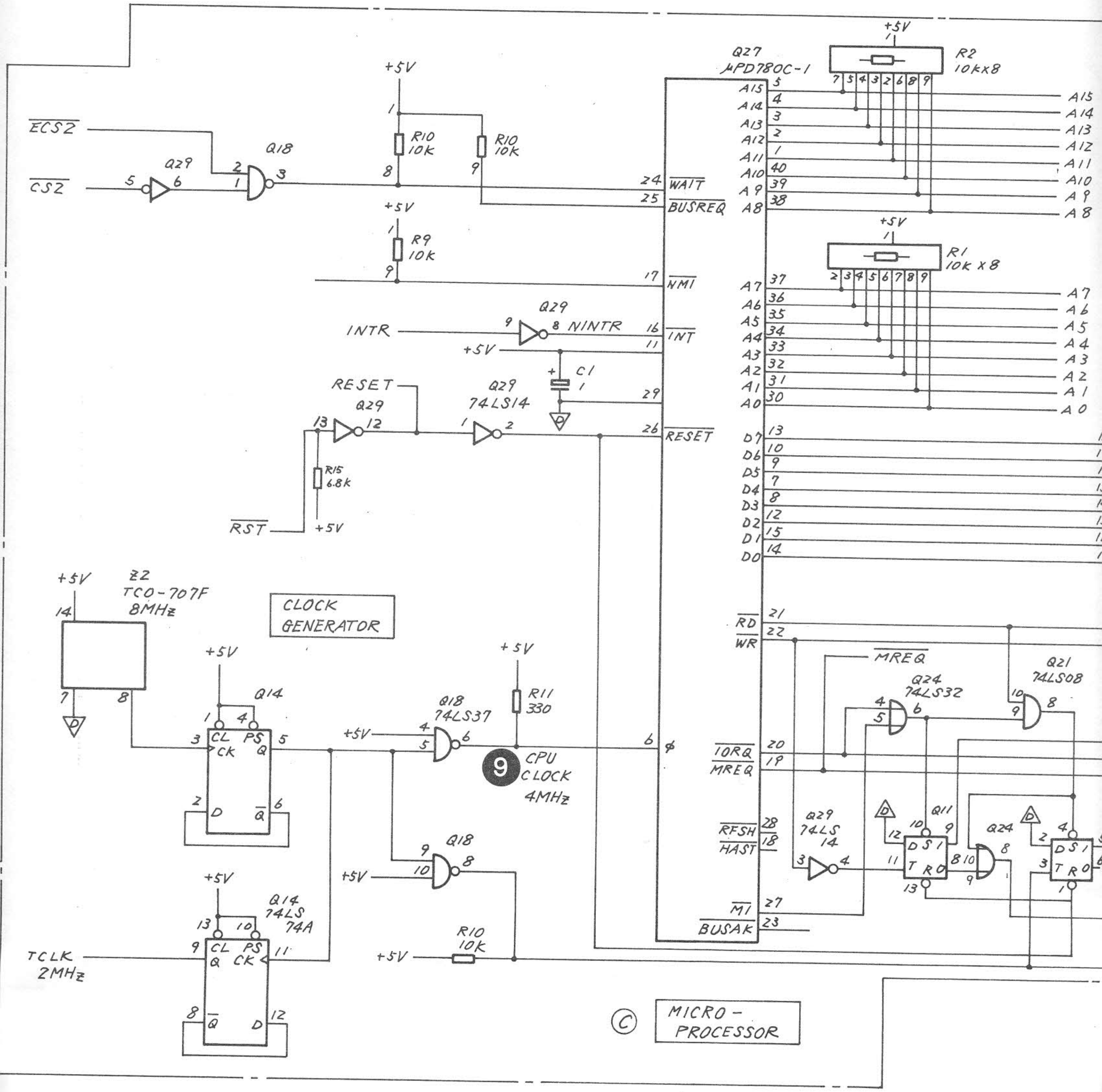


Fig. 5-106 (2/8)

Z34 DIGITAL MEMORY/GP-IB Circuit Diagram (2/8) (43W 33963)



Q27
μPD780C-1
R2
10k×8
R1
10k×8
R10
10k
R9
10k
R15
6.8k
R11
330
C1
1
Q18
Q29
74LS14
Q18
74LS37
Q14
Q14
74LS74A
Q24
74LS32
Q21
74LS08
Q11
Z2
TCO-707F
8MHz
CLOCK GENERATOR
ECS2
CS2
INTR
NINTR
RESET
RST
TCLK
2MHz
CPU CLOCK 4MHz
WAIT
BUSREQ
NMI
INT
MREQ
IORQ
RFSH
HAST
M1
BUSAK
RD
WR
+5V
MICRO-PROCESSOR

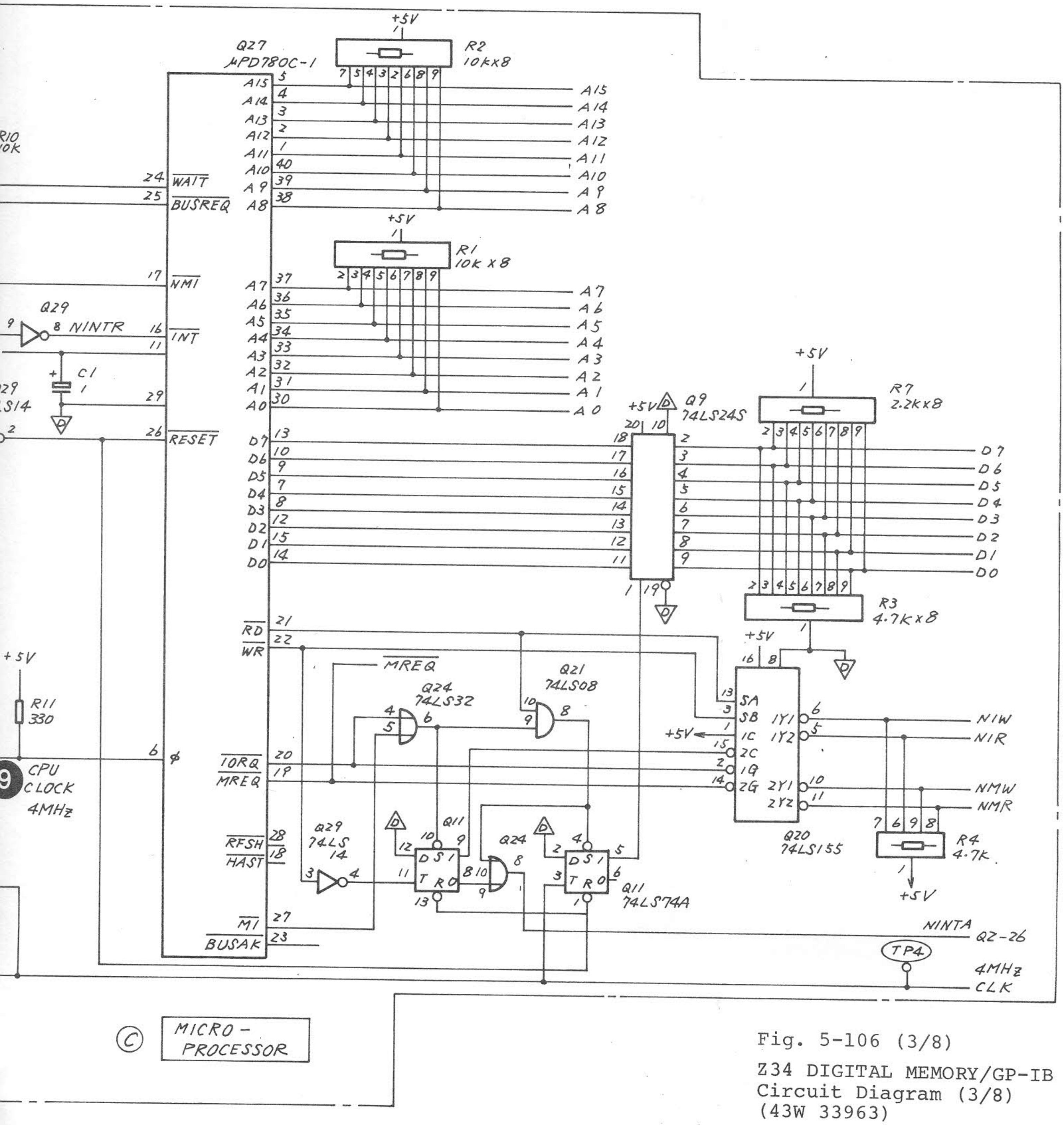
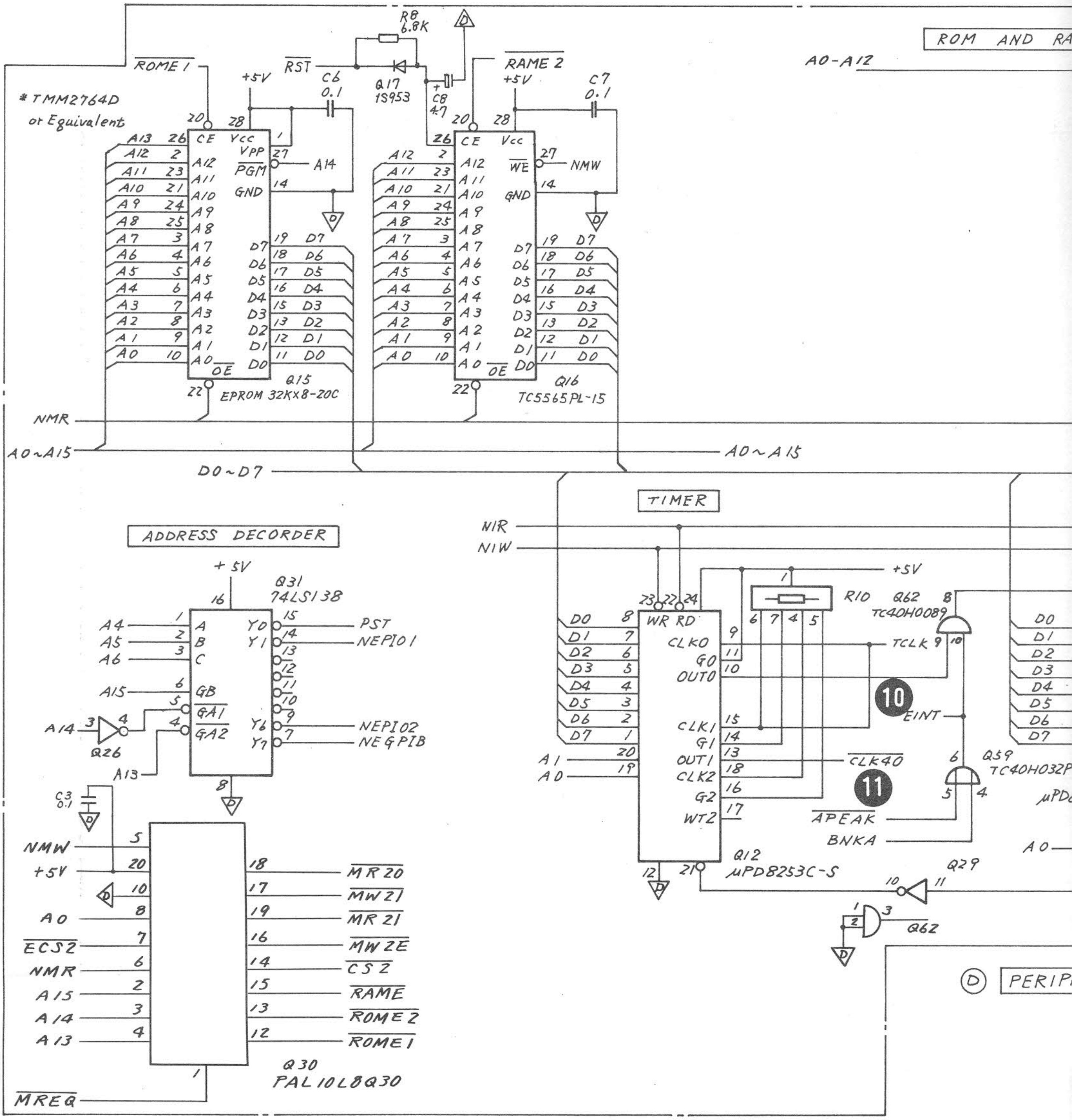


Fig. 5-106 (3/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (3/8)
(43W 33963)



ROM AND RA
A0-A12
ROME1
RST
R8 6.8K
Q17 1S953
C6 0.1
C8 4.7
RAME2
+5V
C7 0.1
* TMM2764D or Equivalent
Q15 EPROM 32Kx8-20C
Q16 TC5565PL-15
NMR
A0~A15
D0~D7
ADDRESS DECORDER
Q31 74LS138
PST
NEPIO1
NEPIO2
NEGPIB
A14
Q26
A13
C3 0.1
NMW
ECS2
MREQ
MR20
MW21
MR21
MW2E
CS2
RAME
ROME2
ROME1
Q30 PAL10L8Q30
TIMER
NIR
NIW
R10
Q62 TC40H0089
TCLK
10
EINT
CLK40
11
Q59 TC40H032P
APEAK
BNKA
Q12 µPD8253C-S
Q29
Q62
PERIPH

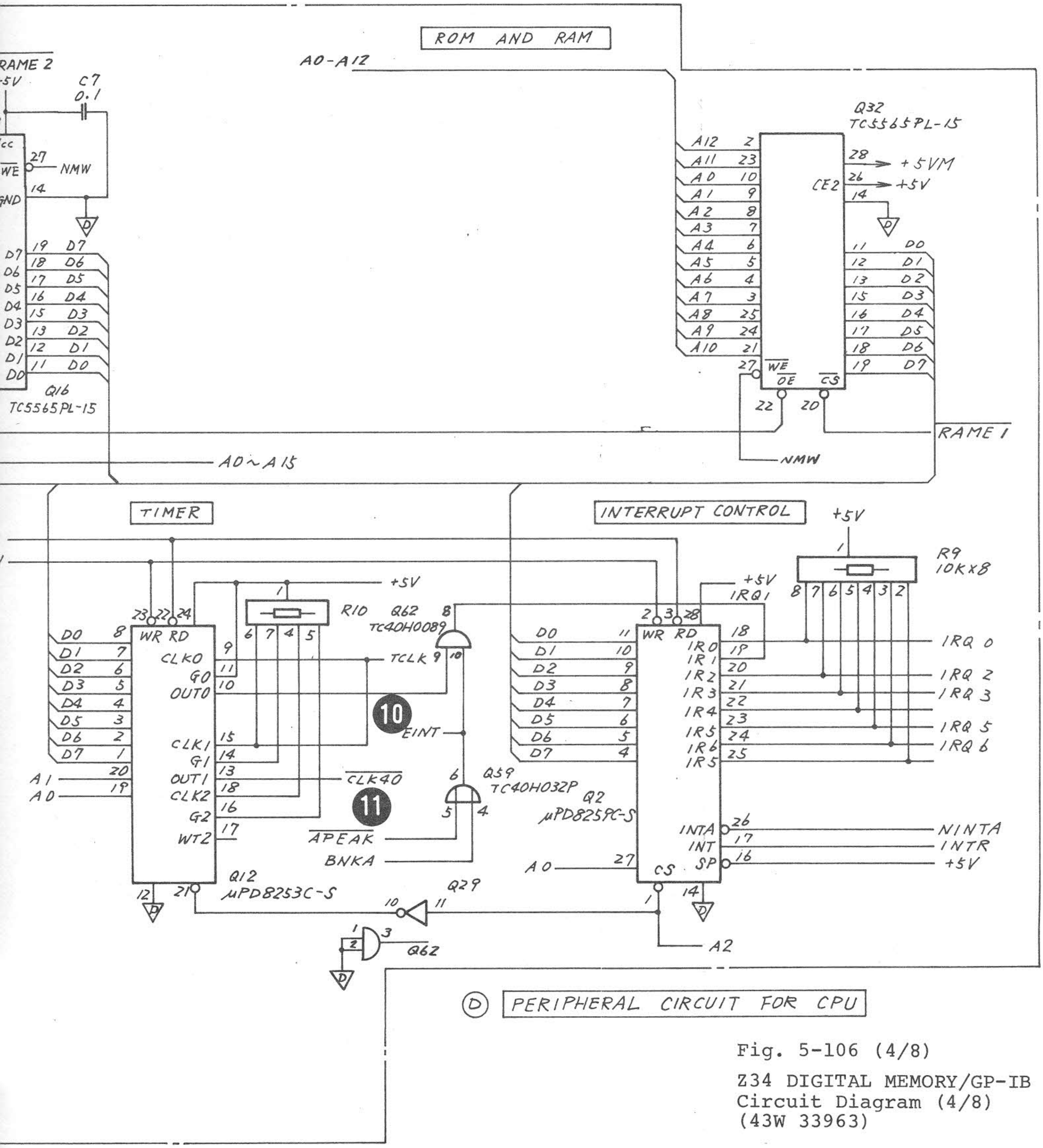
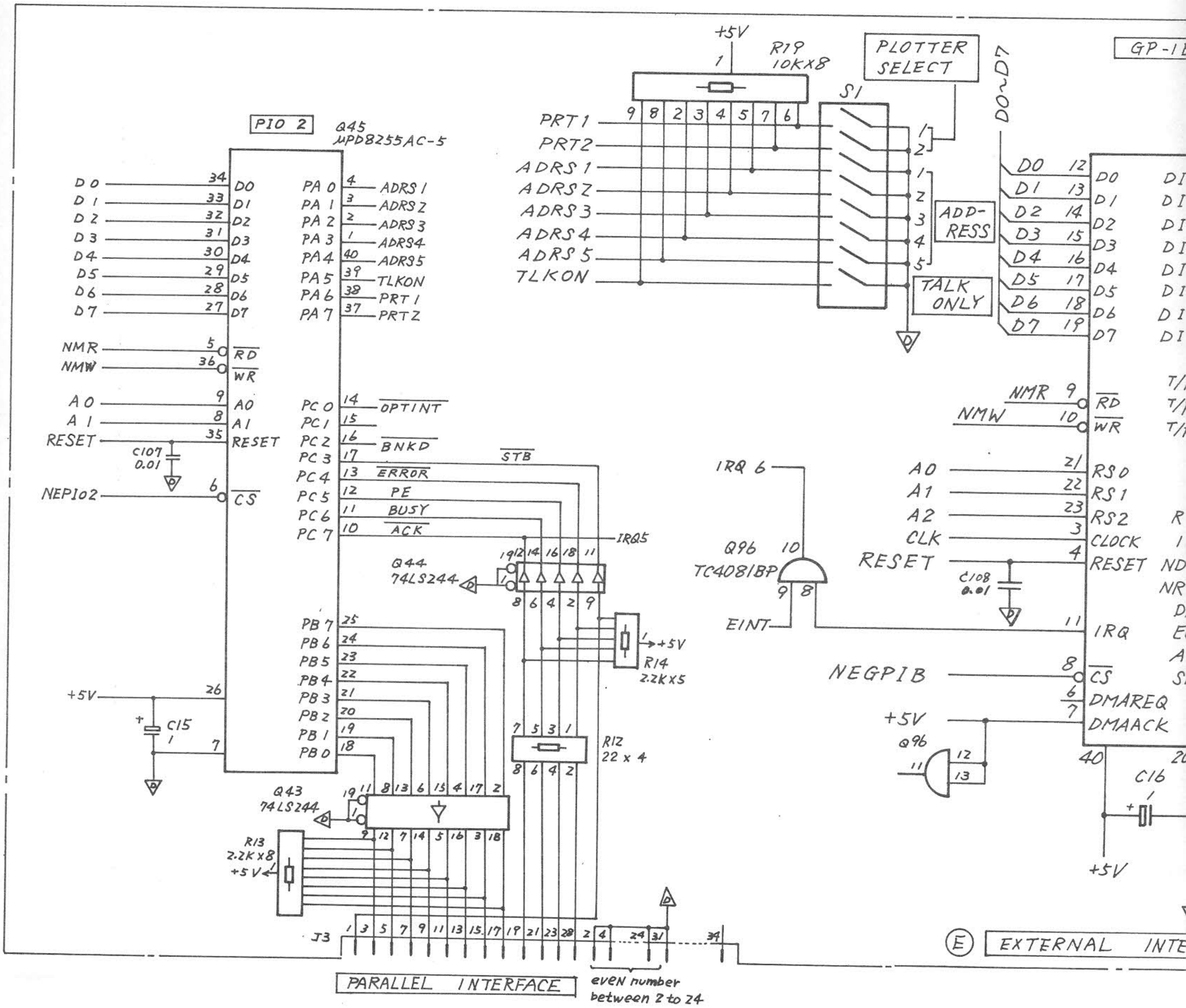


Fig. 5-106 (4/8)

Z34 DIGITAL MEMORY/GP-IB Circuit Diagram (4/8) (43W 33963)



PIO 2
Q45
μPD8255AC-5
PLOTTER SELECT
R19 10KX8
S1
ADDRESS
TALK ONLY
D0~D7
GP-IB
PRT 1
PRT 2
ADRS 1
ADRS 2
ADRS 3
ADRS 4
ADRS 5
TLKON
NMR
NMW
A0
A1
RESET
C107 0.01
NEPIO2
OPTINT
BNKD
STB
ERROR
PE
BUSY
ACK
IRQ5
Q44 74LS244
R14 2.2KX5
R12 22 x 4
Q43 74LS244
R13 2.2KX8
C15
+5V
IRQ 6
Q96 TC4081BP
EINT
A2
CLK
C108 0.01
IRQ
NEGPIB
DMAREQ
DMAACK
C16
J3
PARALLEL INTERFACE
even number between 2 to 24
E EXTERNAL INTE

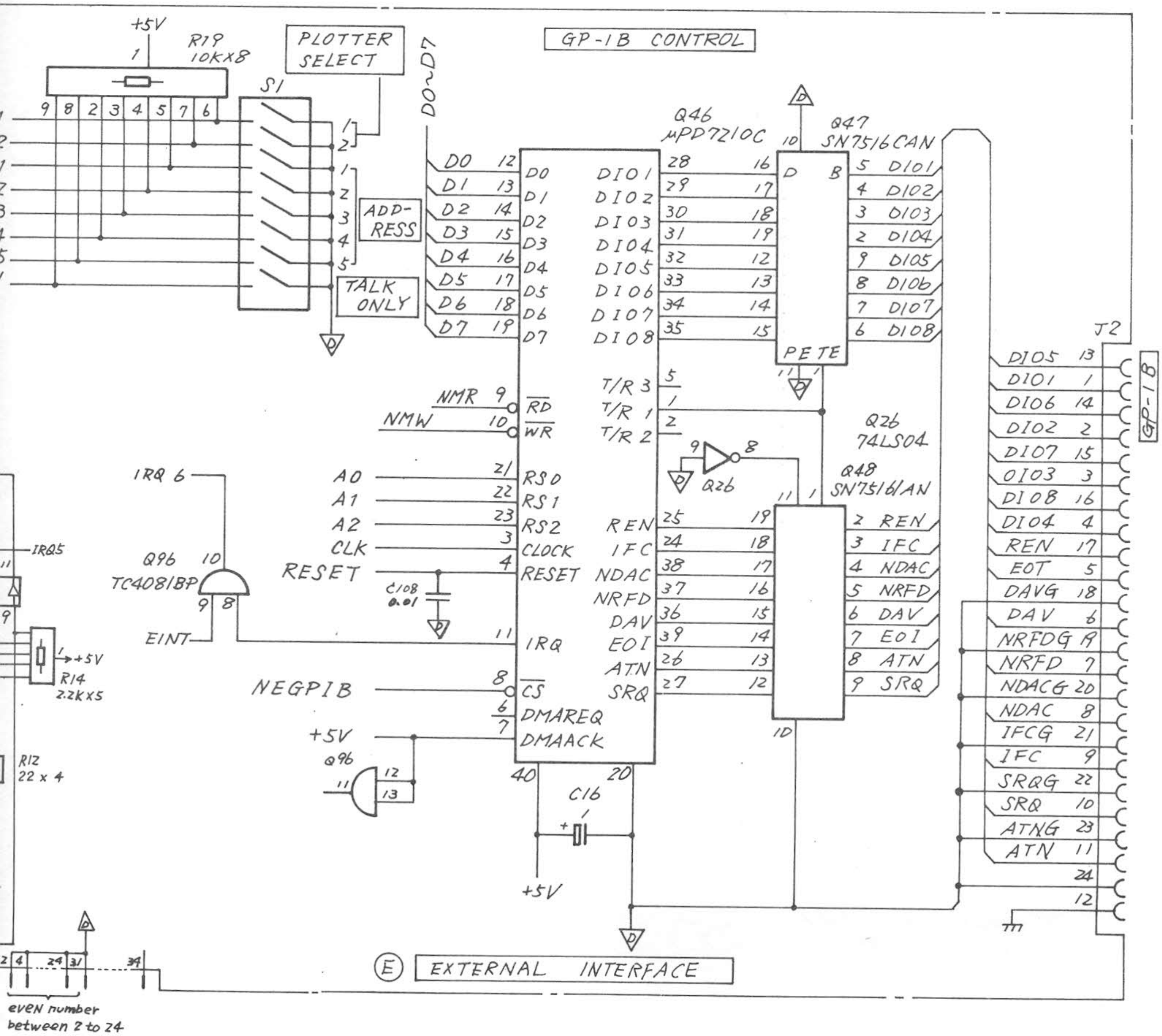
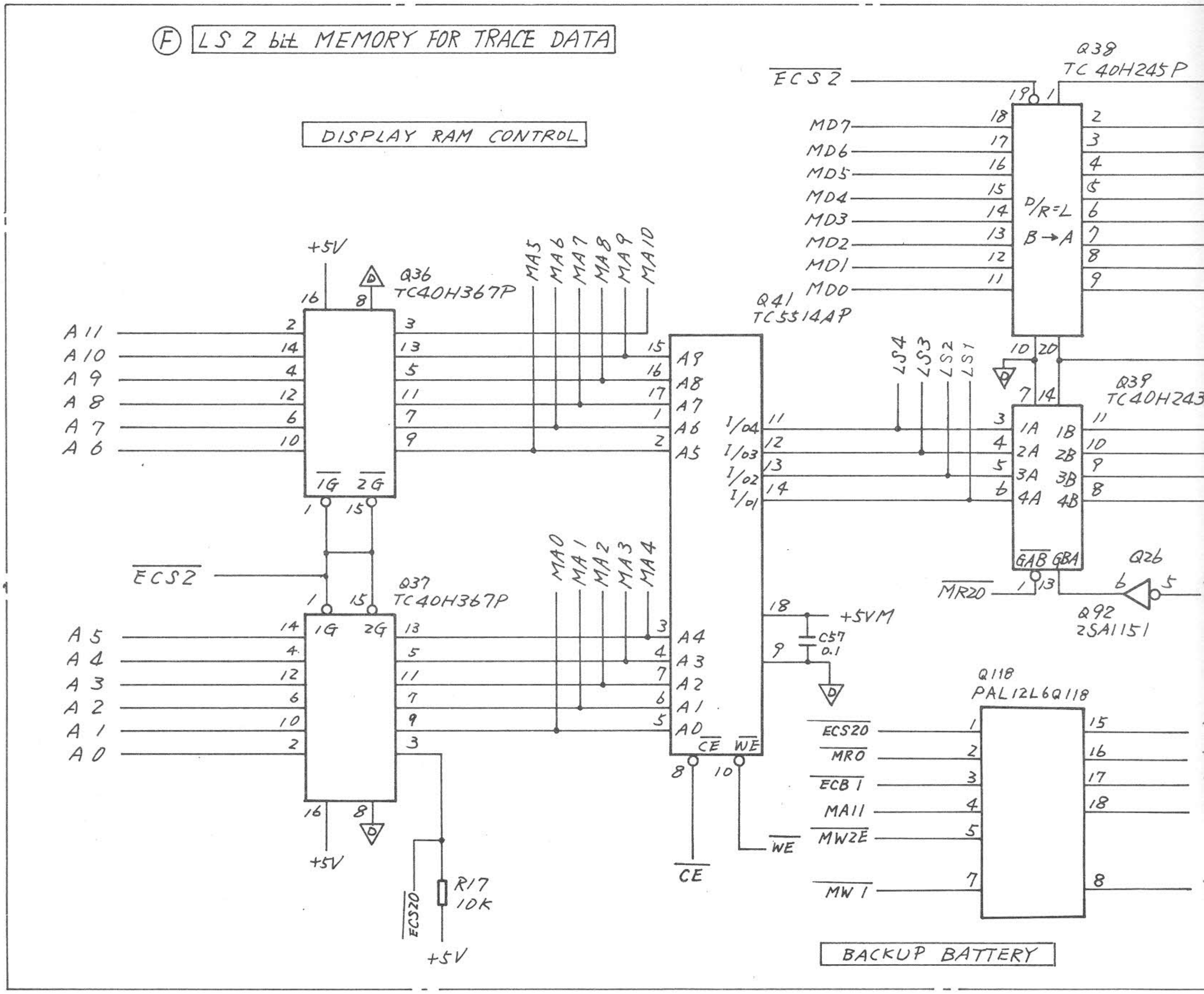


Fig. 5-106 (5/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (5/8)
(43W 33963 M-1)


F
LS 2 bit MEMORY FOR TRACE DATA
DISPLAY RAM CONTROL
+5V
Q36
TC40H367P
A11
A10
A9
A8
A7
A6
1G 2G
ECS2
Q37
TC40H367P
A5
A4
A3
A2
A1
A0
+5V
R17
10K
ECS20
+5V
MA5 MA6 MA7 MA8 MA9 MA10
MA0 MA1 MA2 MA3 MA4
Q41
TC5514AP
A9 A8 A7 A6 A5 A4 A3 A2 A1 A0
I/O4 I/O3 I/O2 I/O1
CE WE
+5VM
C57
0.1
CE
WE
ECS2
Q38
TC40H245P
MD7 MD6 MD5 MD4 MD3 MD2 MD1 MD0
D/R=L
B→A
LS4 LS3 LS2 LS1
Q39
TC40H243
1A 2A 3A 4A
1B 2B 3B 4B
GAB GBA
MR20
Q26
Q92
2SA1151
Q118
PAL12L6Q118
ECS20
MR0
ECB1
MA11
MW2E
MW1
BACKUP BATTERY

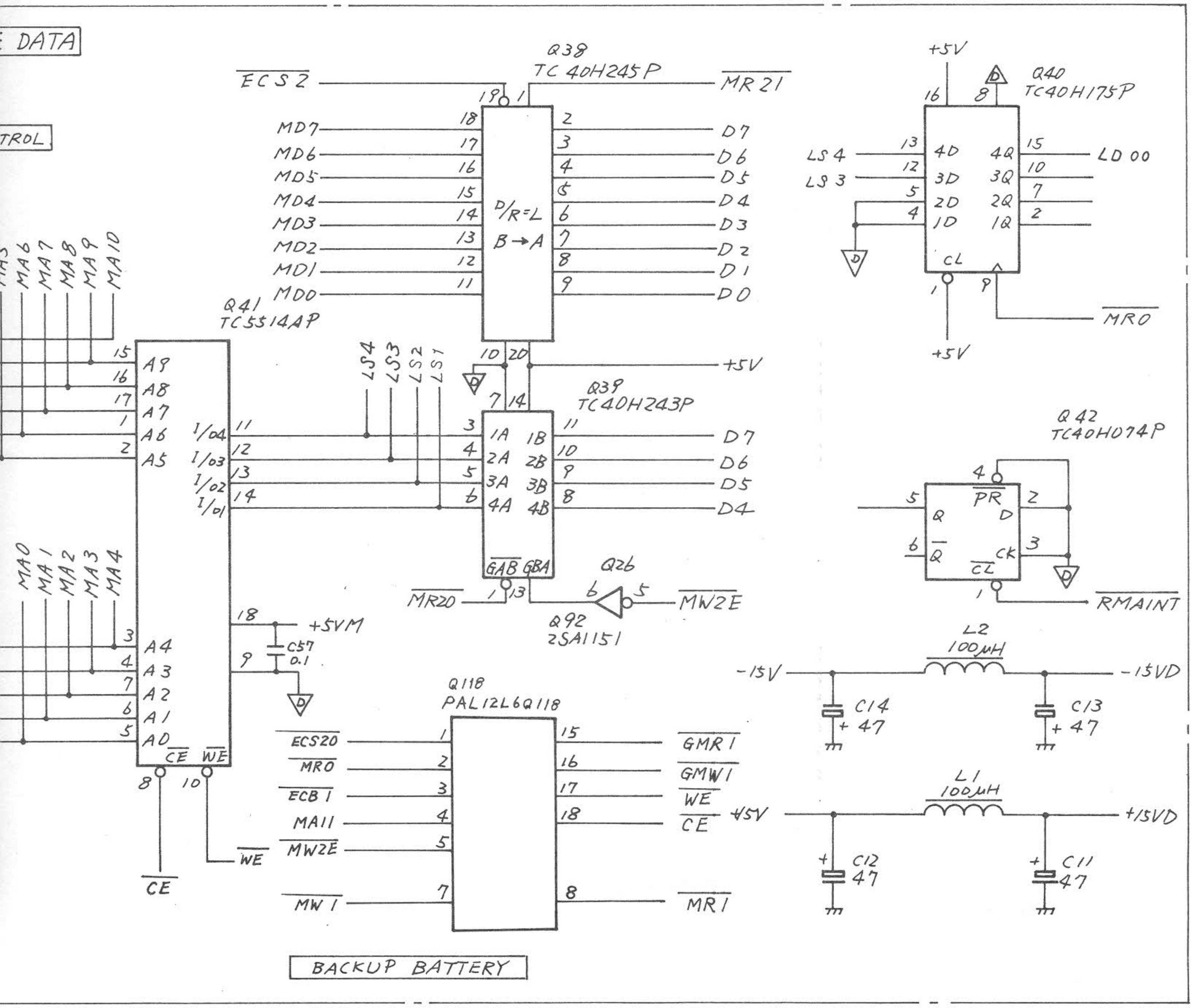
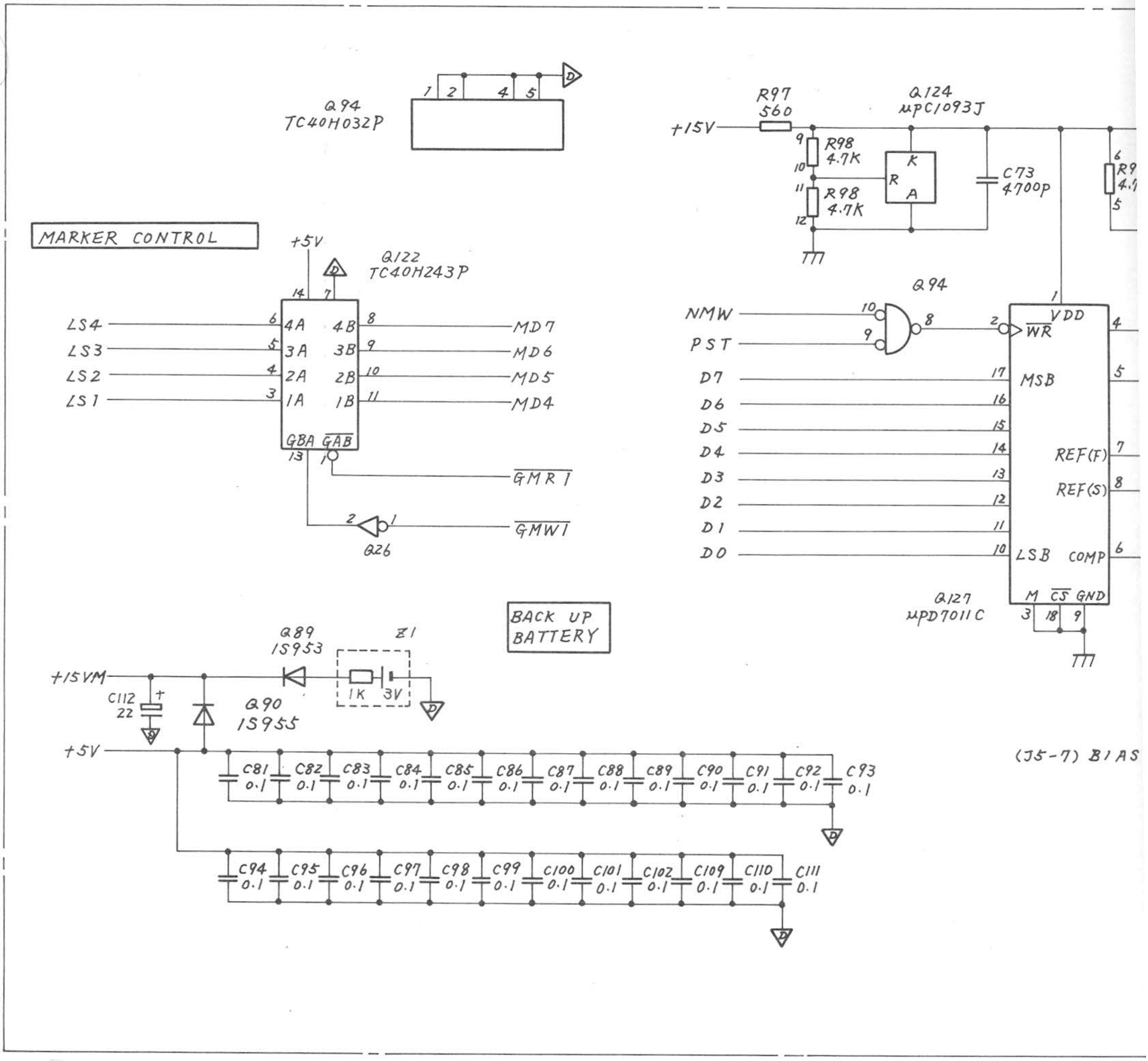


Fig. 5-106 (6/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (6/8)
(43W 33963)


Q94
TC40H032P
R97
560
Q124
μPC1093J
+15V
R98
4.7K
C73
4700P
MARKER CONTROL
+5V
Q122
TC40H243P
LS4
LS3
LS2
LS1
MD7
MD6
MD5
MD4
GMR1
GMW1
Q26
NMW
PST
D7
D6
D5
D4
D3
D2
D1
D0
VDD
WR
MSB
LSB
REF(F)
REF(S)
COMP
Q127
μPD7011C
BACK UP BATTERY
Q89
1S953
Z1
1K
3V
+15VM
C112
22
Q90
1S955
C81
C82
C83
C84
C85
C86
C87
C88
C89
C90
C91
C92
C93
0.1
C94
C95
C96
C97
C98
C99
C100
C101
C102
C109
C110
C111
(J5-7) BIAS

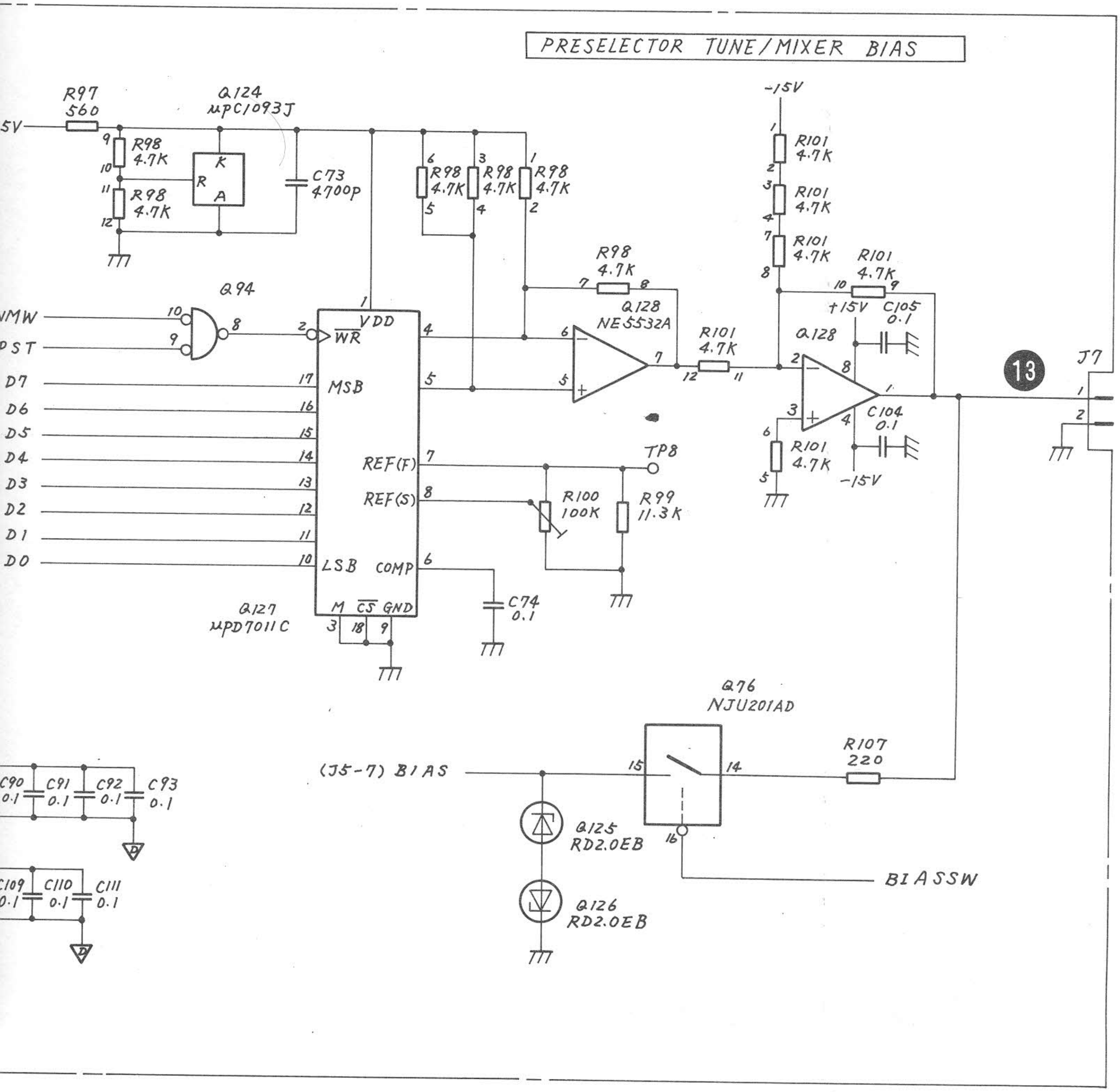
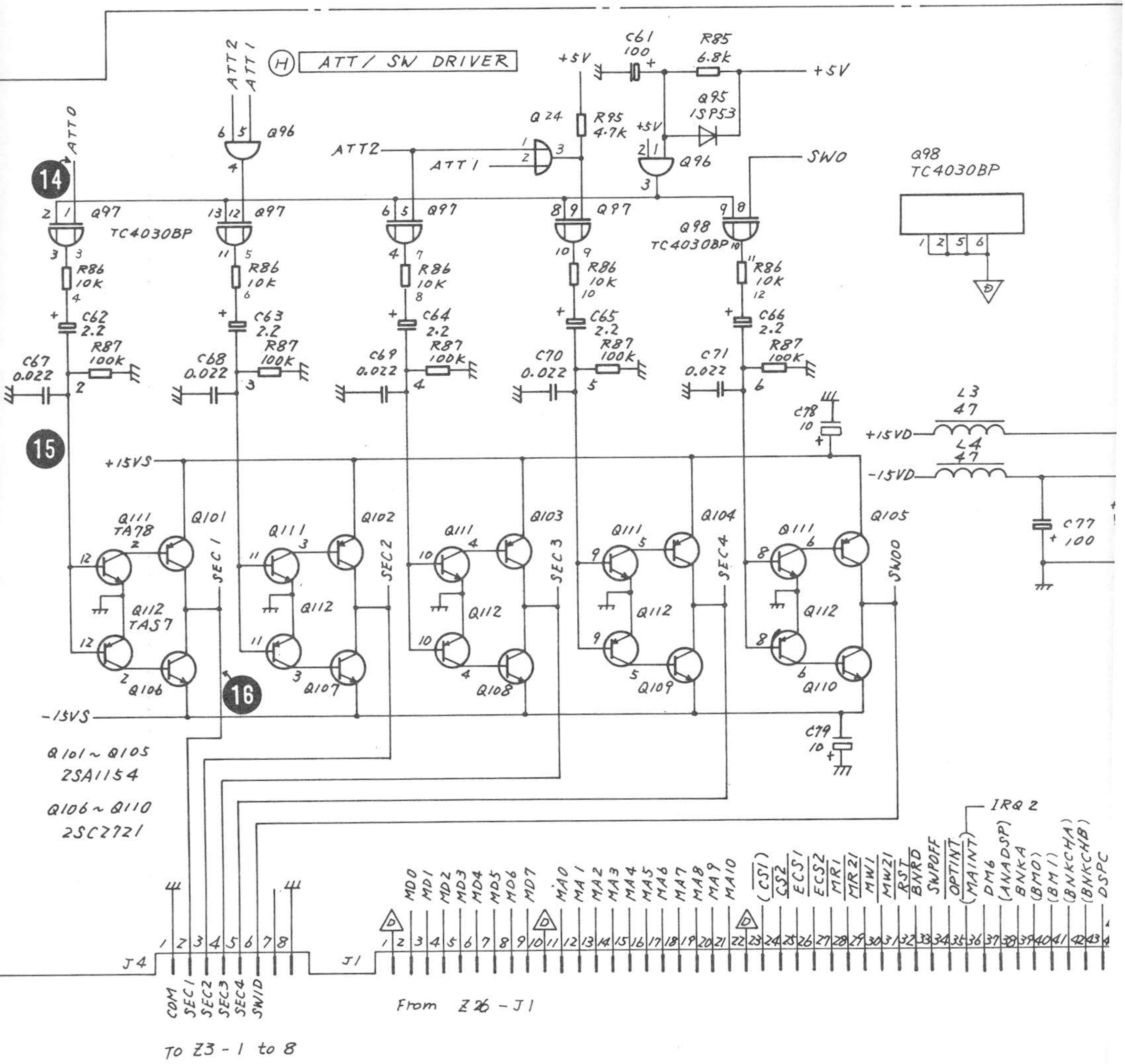


Fig. 5-106 (7/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (7/8)
(43W 33963 M-2)



H ATT/ SW DRIVER
ATT0
ATT2
ATT1
Q96
Q24
R95 4.7k
+5V
C61 100
R85 6.8k
Q95 1SP53
SW0
Q97 TC4030BP
Q98 TC4030BP
R86 10k
C62 2.2
C63 2.2
C64 2.2
C65 2.2
C66 2.2
R87 100k
C67 0.022
C68 0.022
C69 0.022
C70 0.022
C71 0.022
C78 10
C79 10
L3 47
L4 47
+15VD
-15VD
C77 100
+15VS
-15VS
Q111 TA78
Q112 TA57
Q101
Q102
Q103
Q104
Q105
Q106
Q107
Q108
Q109
Q110
SEC1
SEC2
SEC3
SEC4
SW00
Q101 ~ Q105 2SA1154
Q106 ~ Q110 2SC2721
IRQ 2
MD0 MD1 MD2 MD3 MD4 MD5 MD6 MD7
MA0 MA1 MA2 MA3 MA4 MA5 MA6 MA7 MA8 MA9 MA10
(CS1) CS2 ECS1 ECS2 MR1 MR21 MW1 MW21 RST BNRD SWPOFF OPTINT (MAINT) DM6 (ANADSP) BNKA (BM0) (BM1) (BNKCHA) (BNKCHB) DSPC
J4
J1
COM SEC1 SEC2 SEC3 SEC4 SW1D
To Z3 - 1 to 8
From Z26 - J1
14
15
16

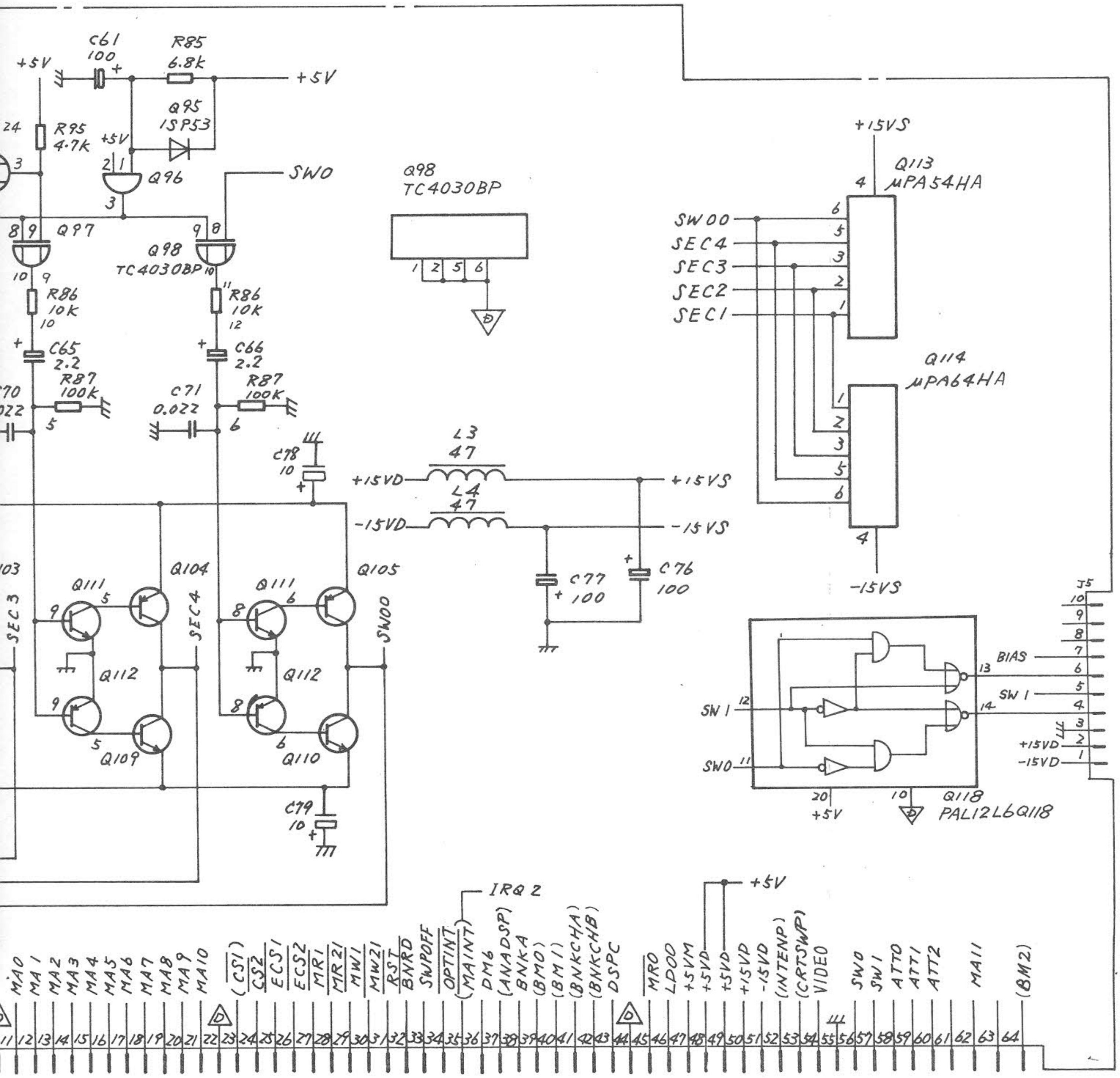


Fig. 5-106 (8/8)

Z34 DIGITAL MEMORY/GP-IB
Circuit Diagram (8/8)
(43W 33963)

5.21 Z35 Low 1st MIX (MS710C only)

5.21.1 Circuit description - Z35
(Refer to Fig. 5-108)

This circuit converts a 10 kHz to 30 MHz band input signal into a 521.4 MHz IF signal.

This 10 kHz to 30 MHz input signal supplied at J1 is sent to mixer Z1 through LPF L1 and L2. It is then mixed with the 521.4 to 551.4 MHz local signal for conversion into a 521.4 MHz IF signal. The 521.4 MHz IF signal is sent to the Z36 EXT IF AMP through J4.

The 521.4 to 551.4 MHz local signal supplied at J3 is amplified by Q6, and sent to mixer Z1.

5.21.2 Checking procedure - Z35

Before checking the Z35 operation, confirm that Z36 is operating normally.

Step	Procedure
1	Remove the MS710[ ] bottom cover according to Fig. 2-1.
2	Set the MS710[ ] as follows: . Frequency band: 10 kHz to 30 MHz . Center frequency: 15 MHz . FREQ SPAN/DIV: 0 Hz/div . Reference level: -10 dBm . INPUT ATTEN: 20 dB
3	Apply a 15 MHz, -10 dBm signal to the MS710[ ] RF INPUT connector. Z35 operation is normal when the Z36-J5 output is 521.4 MHz, -36 dBm.

5.21.3 Adjustment - Z35

Step	Procedure
1	Set the MS710C as follows: . Frequency band: 10 kHz to 30 MHz . Center frequency: 15 MHz . FREQ SPAN/DIV: 1 MHz/div . RES BW: 100 kHz . Reference level: -10 dBm
2	Apply a 15 MHz, -10 dBm signal to the MS710C RF INPUT connector.
3	Adjust Z35-R13 to set the signal to the uppermost scale line on the MS710C CRT.

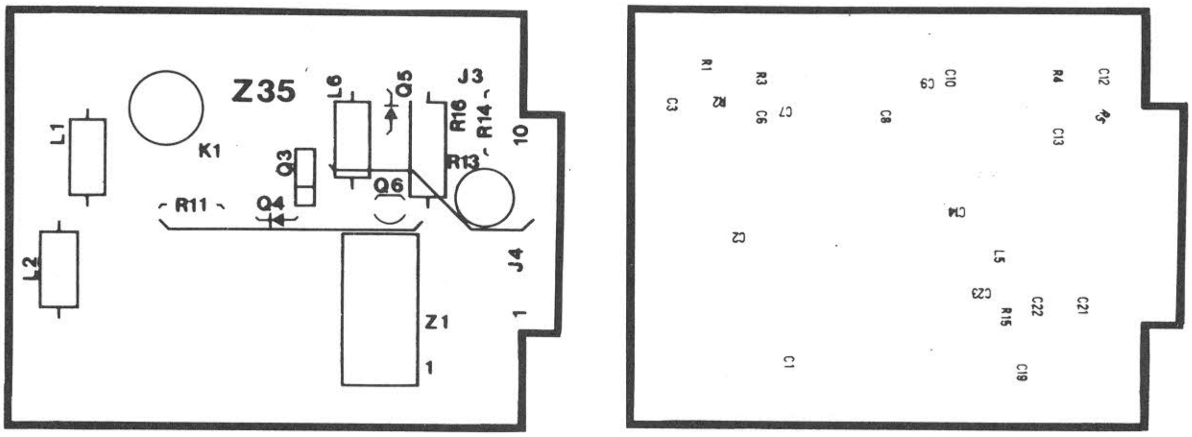
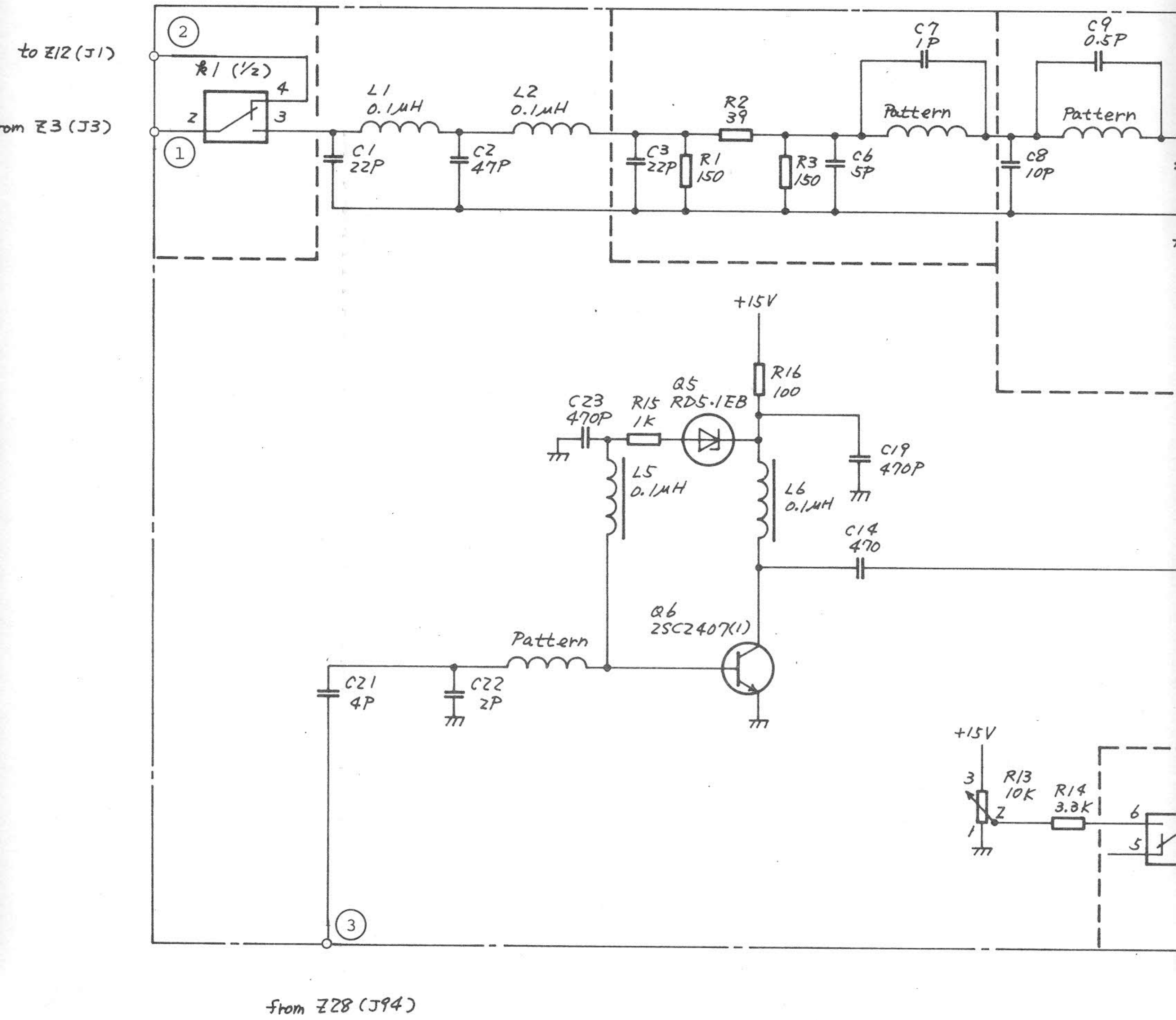
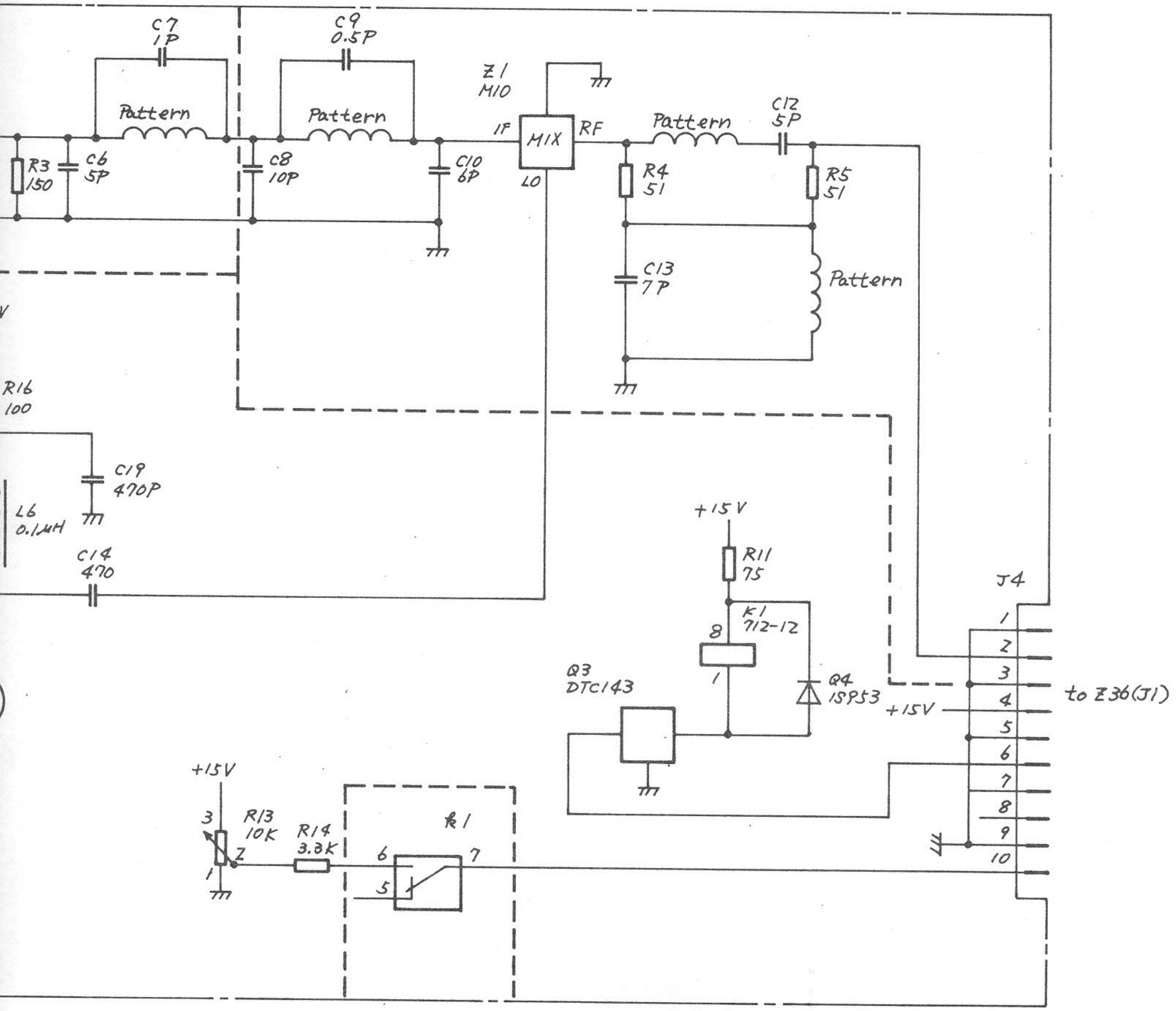


Fig. 5-107 Z35 Parts Layout



to Z12 (J1)
from Z3 (J3)
from Z28 (J94)
K1 (1/2)
L1 0.1μH
L2 0.1μH
C1 22P
C2 47P
C3 22P
R1 150
R2 39
R3 150
C6 5P
C7 1P
Pattern
C8 10P
C9 0.5P
Pattern
+15V
R16 100
Q5 RD5.1EB
C23 470P
R15 1K
C19 470P
L5 0.1μH
L6 0.1μH
C14 470
Q6 2SC2407(1)
Pattern
C21 4P
C22 2P
+15V
R13 10K
R14 3.3K



PC Board : 442U83857
Parts List : 44W83962

Fig. 5-108 Z35 LOW 1st MIX
Circuit Diagram (43W33964)

5.22 Z36 EXT IF AMP (MS710C/D only)

5.22.1 Circuit description - Z36
(Refer to Fig. 5-110)

This circuit receives, amplifies, and sends the 521.4 MHz IF signal from the external mixer to the Z18 μ 2nd converter 1 when the MS710C/D is operated with the external mixer.

The 521.4 MHz IF signal is input through ⑫ when the two-port mixer is used and through ⑪ when the three-port mixer is used.

Relay K2 selects 10 kHz to 30 MHz and external mixer bands.

The 521.4 MHz IF signal selected by this relay is amplified by Q1 and sent from ⑭ to the Z18 μ 2nd converter 1.

The 521.4 MHz IF signal of the 1.7 to 23 GHz band, which is sent from the Z6 μ 1st converter, enters relay K4 through ⑬ .

5.22.2 Checking procedure - Z36

Step	Procedure
1	Remove the MS710C/D bottom cover according to Fig. 2-1.
2	Set the MS710C/D as follows: Frequency band: EXT MIX (22 to 33 GHz, 3-port)
3	Apply a 521.4 MHz, -28 dBm signal to the MS710C/D EXTERNAL MIXER IF INPUT connector. The Z36 is normal when the output from Z36-J5 ⑭ is 521.4 MHz, -16 dBm.

5.22.3 Adjustment - Z36

This circuit requires no adjustment.

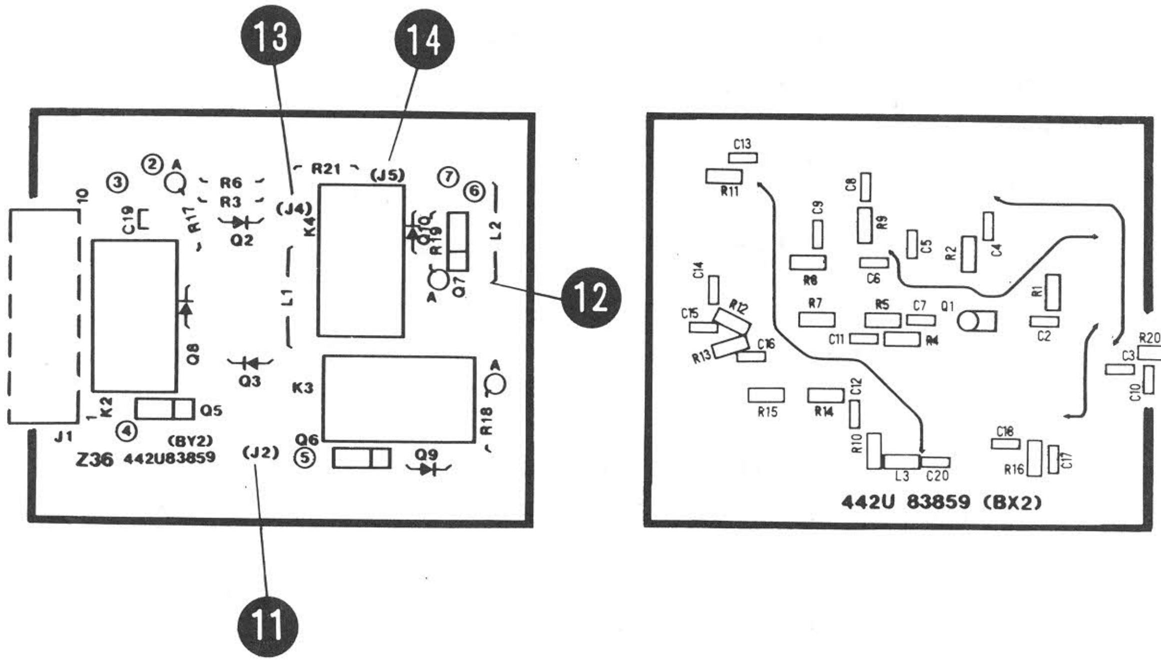
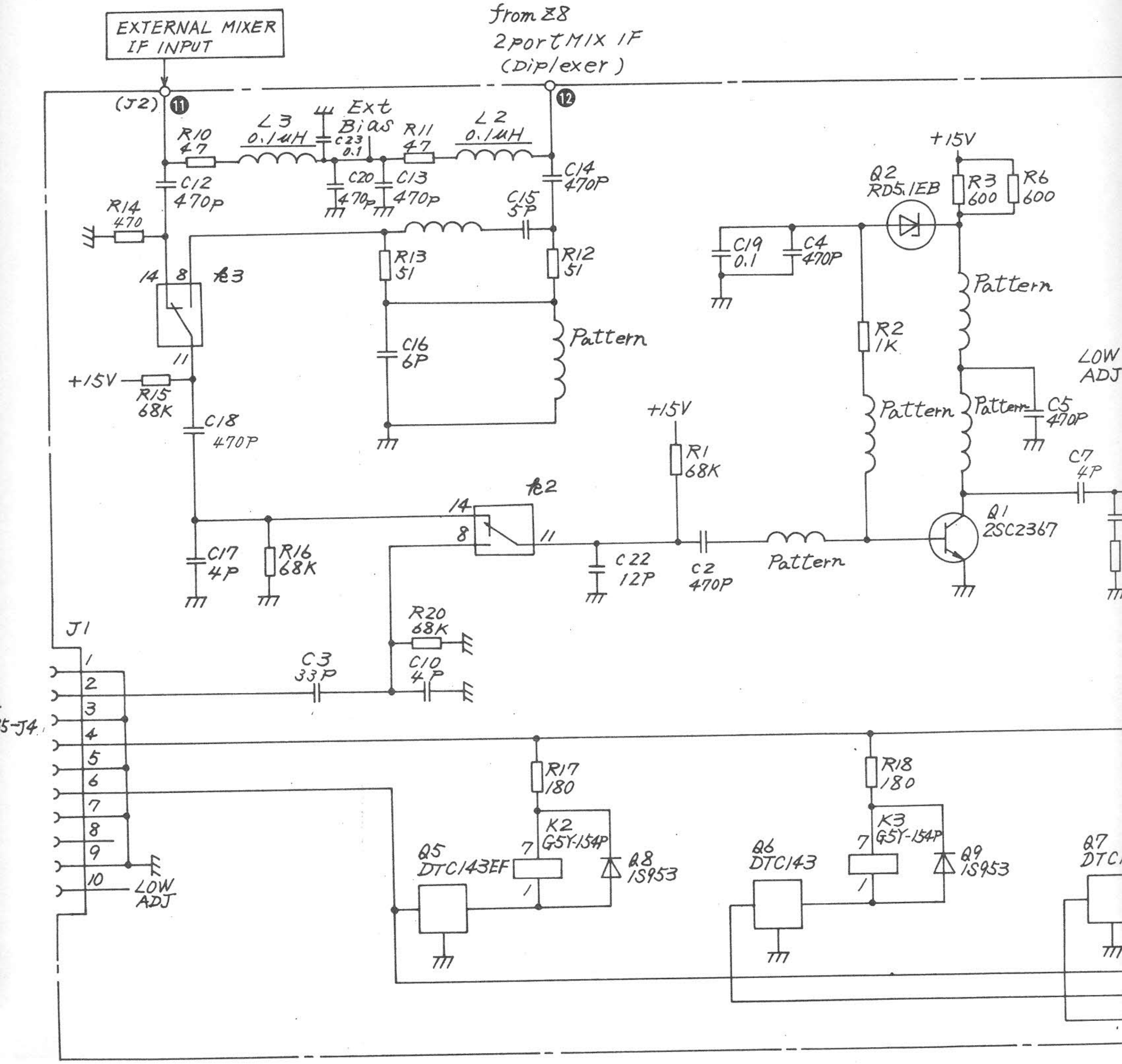
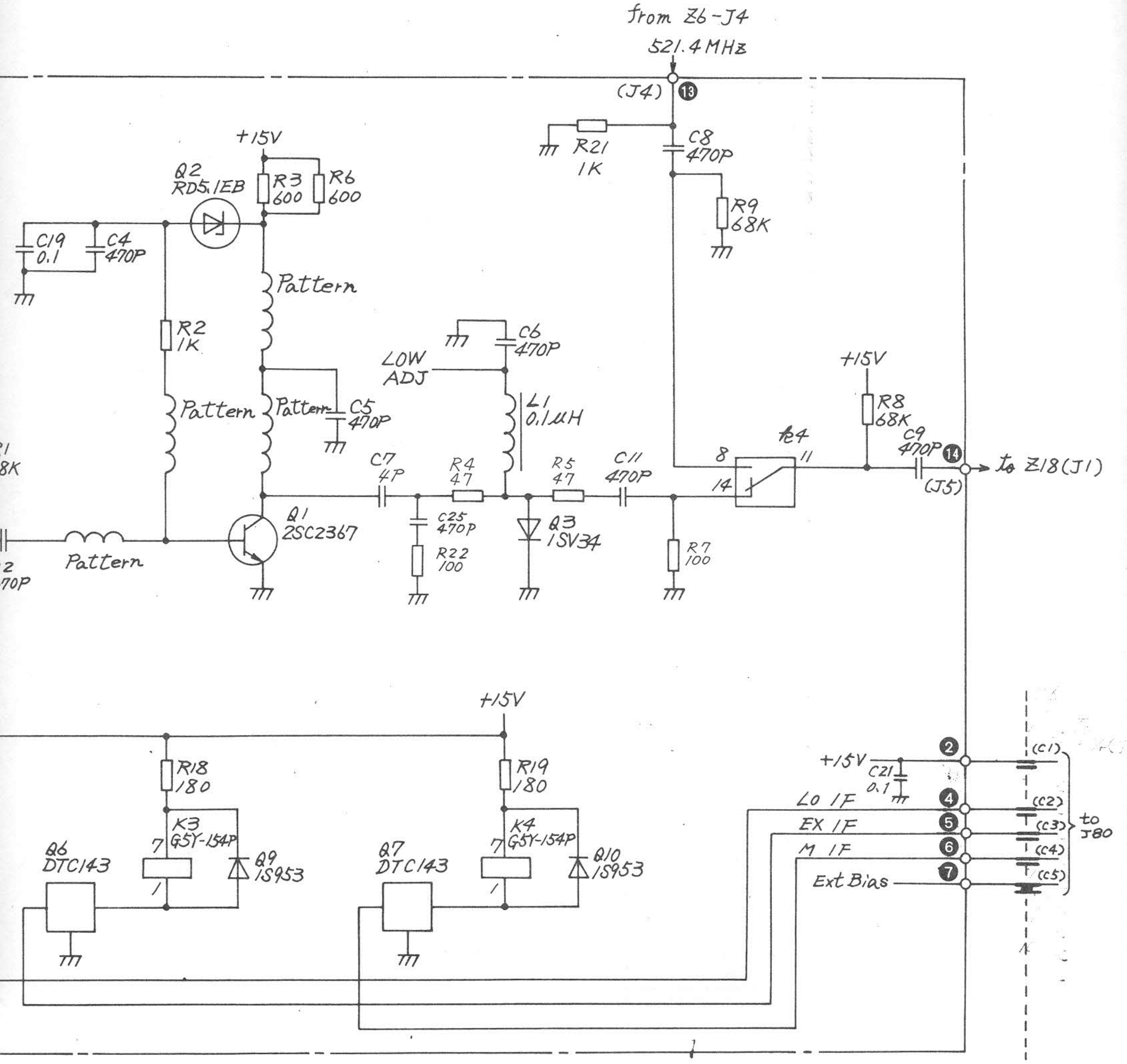


Fig. 5-109 Z36 Parts Layout



PC Board : 442U83859

Parts List : 44W83963



PC Board : 442U83859

Parts List : 44W83963

Fig. 5-110 Z36 EXT IF AMP Circuit Diagram (43W33965)

SECTION 6

REPLACEABLE PARTS

6.1 Introduction

This section contains informations 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.

6.2 Ordering Information

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

Item		Example
(1)	Name of instrument	Spectrum Analyzer MS710C/D/E/F
(2)	Name of part list	Parts List: SPECTRUM ANALYZER MS710[ ]
(3)	CKT REF	J 1
(4)	Name of part	HRM-556S Note: Part name is given in parentheses ( ) in the Parts List. Parts with asterisks* 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	M31257

(1) Circuit references

Table 6-1

AT:	Attenuator	K:	Relay	Q:	Transistor, diode, IC, rectifier	V:	Neon lamp, vacuum tube
C:	Capacitor	L:	Coil, microinductor	R:	Resistor	X:	Crystal OSC
F:	Fuse	M:	Meter, timer	S:	Switch	Z:	Unit
J:	Jack, plug, connector	P:	Lamp	T:	Transformer		

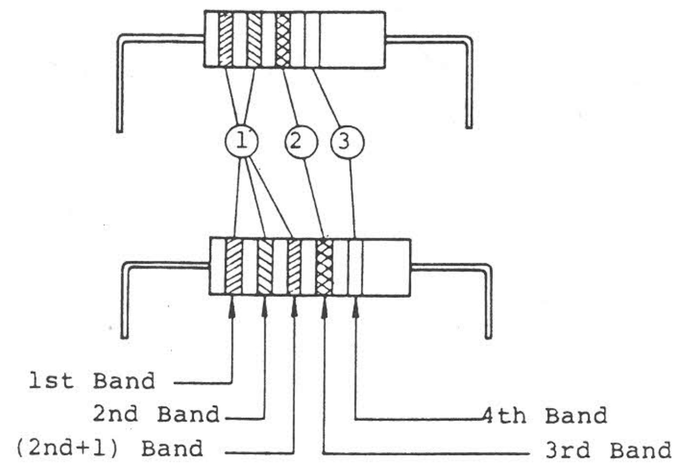
(2) Abbreviations

Table 6-2

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

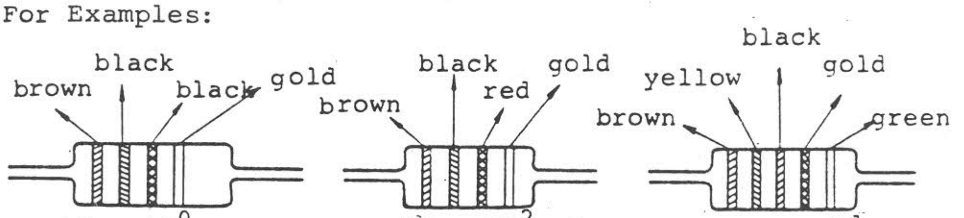
6.3 Reading Capacitance and Resistance

(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	$x10^5$	$\pm 0.5\%$
Blue	6	6	$x10^6$	-
Purple	7	7	$x10^7$	-
Grey	8	8	$x10^8$	-
White	9	9	$x10^9$	-
Gold	-	-	$x10^{-1}$	$\pm 5\%$
Silver	-	-	$x10^{-2}$	$\pm 10\%$
-----	-	-		$\pm 20\%$

For Examples:



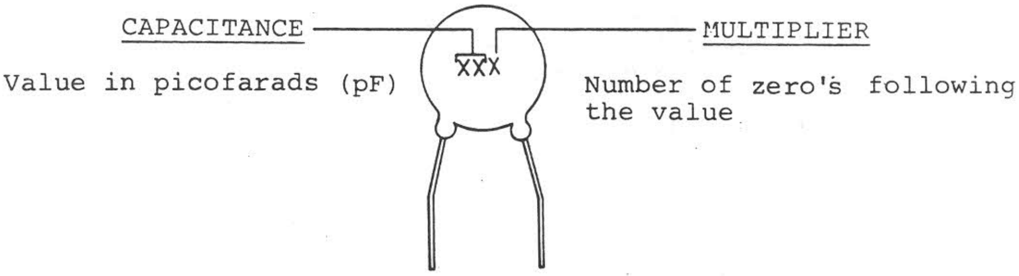
10×10^0 $\pm 5\%$ — $10\ \Omega$, $\pm 5\%$

10×10^2 $\pm 5\%$ — $1\ k\Omega$, $\pm 5\%$

140×10^{-1} $\pm 0.5\%$ — $14.0\ \Omega$, $\pm 0.5\%$

Fig. 6-1 Reading Resistance

(2) Reading capacitance

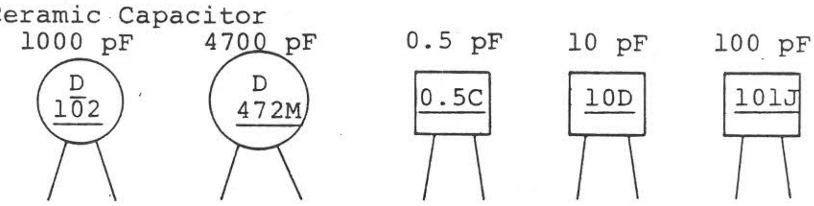


EXAMPLES: 103 = 10,000 pF = 10^{-8} F or 0.01 μF
302 = 3,000 pF = 3×10^{-9} F or 0.003 μF
676 = 67,000,000 pF = 67×10^{-6} F or 67 μF

(a) Ceramic capacitor, polyester capacitor

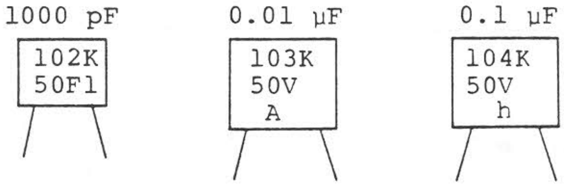
Indication	0.5	1	10	101	102	103	104
Capacity	0.5 pF	1 pF	10 pF	100 pF	1000 pF	0.01 μF	0.1 μF

Example:
Ceramic Capacitor



Capacity values are always underlined.

Polyester Capacitor



(b) Tantalum capacitor, Metallized capacitor and Electrolytic capacitor

Indication	0R47	010	100	101
Capacity	0.47 μF	1 μF	10 μF	100 μF

Fig. 6-2 Reading Capacitance

6.4 Semiconductor Markings

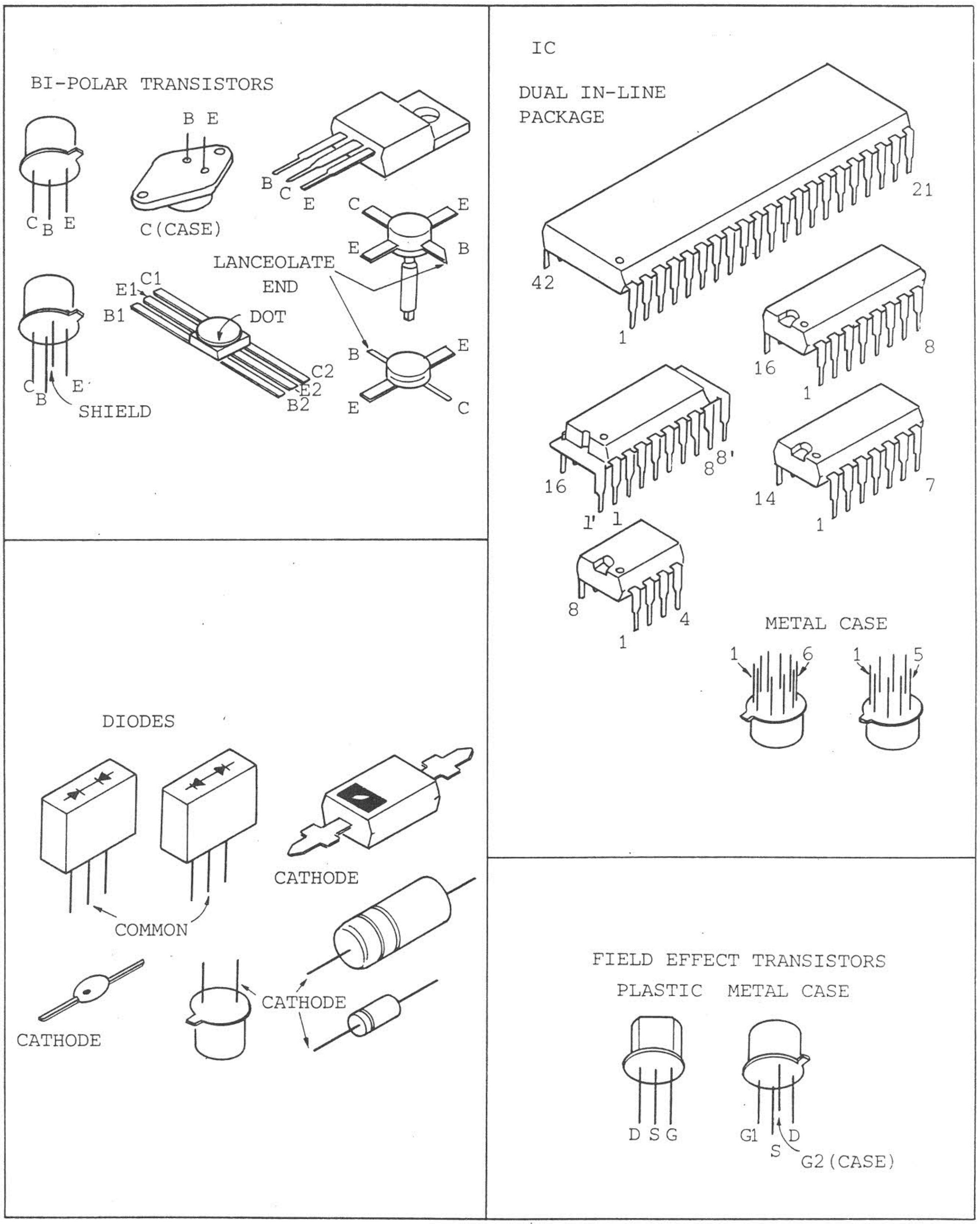


Fig. 6-3 Examples of Semiconductor Marking Methods

6.5 Parts List

Parts List : SPECTRUM ANALYZER MS710[ ]

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 2	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 3	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 4	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 5	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 6	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C
C 7	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 8	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C 9	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C10	Not assigned			
C11	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C
C12	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C13	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C14	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
C15	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		MS710C/D
F 1	Fuse,TM,(T***A250V)	100 to 127Vac ... 5A 200 to 254Vac ... 2A		
F 2	Fuse,TM,(T***A250V)	100 to 127Vac ... 5A 200 to 254Vac ... 2A		
G 1	Fan,(109S005UL)			
J 1	Connector,(HRM-556S)			
J 2	Semirigid cable, (449J74143B)			
J 3	Semirigid cable, (449J74008)			
J 4	Connector, (27DP-LP-1.5QEW-AA)			
J 5	Connector, (27DP-LP-1.5QEW-AA)			
J 6	Cable,(449J74487)			
J 7	Semirigid cable, (449J84194)			MS710D/E/F
J 8	Semirigid cable, (449J84196)			MS710C/D
J 9	Semirigid cable, (449J84195)			MS710C/D
J10	Not assigned			
J11	Connector, (27DP-LP-1.5QEW-AA)			MS710C/D
J12	Connector, (27DP-LP-1.5QEW-AA)			MS710C/D

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

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Parts List : SPECTRUM ANALYZER MS710[ ]

CKT REF	DESCRIPTION	RATING		NOTE
J13	Semirigid cable, (439J33916)			MS710C/D
J14	Cable,(449J74488C)			
J15	Semirigid cable, (439J33921)			
J16	Semirigid cable, (439J33917)			
J17	Semirigid cable, (439J34311)			
J18	Semirigid cable, (439J33918)			MS710C/D
J19	Semirigid cable, (439J33920)			MS710C/D
	Semirigid cable, (439J86184)			MS710E/F
J20	Plug,(PI011-10F)			
J21	Plug,(PI011-05F)			
J22	Connector, (27DP-LP-1.5QEW-AA)			
J23	Connector, (27DP-LP-1.5QEW-AA)			
J24	Not assigned			
J25	Plug,(PI011-05F)			
J26	Plug,(PI011-05F)			
J27	Plug,(PI011-04F)			
J28	Plug,(PI011-04F)			
J29	Plug,(PI011-12F)			
J30	Plug,(PU011-12F)			
J31	Not assigned			
J32	Connector, (DF1-2S2.5R24)			
J33	Connector, (DF1-2S2.5R24)			
J34	Connector, (DF1-12S2.5R24)			
J35	Connector, (DF1-12S2.5R24)			
J36	Connector, (DF1-2S2.5R24)			
J37	Connector, (DF1-2S2.5R24)			
J38	Receptacle, (BNC-R-101-NI)			
J39	Receptacle, (BNC-R-101-NI)			
J40	Not assigned			

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

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Parts List : SPECTRUM ANALYZER MS710[ ]

CKT REF	DESCRIPTION	RATING		NOTE
J41	Connector, (DF1-2S2.5R24)			
J42	Connector, (DF1-2S2.5R24)			
J43	Connector, (DF1-5S2.5R24)			
J44	Not assigned			
J45	Receptacle, (BNC-R-101-NI)			
J46	Receptacle, (BNC-R-101-NI)			
J47	Receptacle, (BNC-R-101-NI)			
J48	Plug,(PI011-10F)			
J49	Plug,(PI011-12F)			
J50	Not assigned			
J51	Cable,(44J74489A)			
J52	Connector,(44J79661)			
J53	Not assigned			
J54	Plug,(PI011-02F)			
J55	Plug,(PI011-02F)			
J56	Connector, (DF1-8S2.5R24)			
J57	Connector, (DF1-8S2.5R24)			
J58	Plug,(PI011-05F)			
J59	Plug,(PI011-05F)			
J60	Plug,(PI011-02F)			
J61	Plug,(PI011-08F)			
J62	Plug,(PI011-07F)			
J63	Not assigned			
J64	Connector, (57FE36-HIF3A34)			
J65	Connector,(U-SB15Ω3)			
J66	Inlet, (8843-2SPFL4/364)			
J67	Terminal,(A-12)			
J68	Connector, (RA0304NAG)			
J69	Connector, (DF1-5S2.5R24)			
J70	Not assigned			
J71	Socket,(CRT 14 pins)			
J72	Not assigned			
J73	Semirigid cable, (449J84107)			MS710C

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

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Parts List : SPECTRUM ANALYZER MS710[ ]

CKT REF	DESCRIPTION	RATING		NOTE
J74	Semirigid cable, (449J84198)			MS710C
J75	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J76	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J77	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J78	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J79	Connector, (DF1-8S2.5R24)			MS710C
J80	Connector, (DF1-10S2.5R24)			MS710C/D
J81	Connector, (27DP-LP-1.5QEW-AA)			MS710C/E
J82	Connector, (27DP-LP-1.5QEW-AA)			MS710C/E
J83	Plug,(PI011-02F)			MS710C/E
J84	Plug,(PI011-02F)			MS710C/E
J85	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J86	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J87	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J88	Connector, (27DP-LP-1.5QEW-AA)			MS710C
J89	Connector, (DF1-5S2.5R24)			MS710C
J90	Not assigned			
J91	Connector, (27DP-BJ-1.5)			MS710C
J92	Connector,(27DP-BR)			MS710C
J93	Connector,(27DP-BR)			MS710C
J94	Connector,(27DP-BR)			MS710C
J95	Connector,(27DP-BR)			MS710C
J96	Connector,(27DP-BR)			MS710C
J97	Connector, (2052-1659-02)			MS710C
J98	Connector, (2052-1659-02)			MS710C
J99	Not assigned			
J100	Not assigned			
J101	Connector, (DF1-2S2.5R24)			
J102	Connector, (DF1-2S2.5R24)			

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

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Parts List : SPECTRUM ANALYZER MS710[ ]

CKT REF	DESCRIPTION	RATING		NOTE
J103	Connector, (DF1-2S2.5R24)			
J104	Connector, (DF1-2S2.5R24)			
J105	Connector,(27DP-BR)			MS710C/D
J106	Semirigid cable, (449J84733)			MS710C/D
J107	Connector,(27DP-BR)			MS710C/D
J108	Connector,(27DP-BR)			
J109	Connector,(HRM-208B)			
P 1	Lamp,(BNS-3RU-C)			
R 1	Not assigned			
R 2	Not assigned			
R 3	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
S 1	Toggle,(ESB-99547S)			
S 2	Slide,(ESD-3994S)			
S 3	Slide,(ESD-3994S)			
T 1	Trans,(44T85035)			
V 1	CRT,(150CKB39)			
Z 1	FRONT PANEL I			
Z 2	FRONT PANEL II			
Z 3	RF ATT			
Z 4	Not assigned			
Z 5	YTF			
Z 6	μ 1st CONVERTER			
Z 7	COUPLER			MS710C/D
Z 8	DIPLEXER			MS710C/D
Z 9	YTO			
Z 10	YTO/YTF DRIVER			
Z 11	Not assigned			
Z 12	2 GHz LPF			
Z 13	Not assigned			
Z 14	0 to 2 GHz RF BLOCK			
Z 15	Not assigned			

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

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Parts List : SPECTRUM ANALYZER MS710[ ]

CKT REF	DESCRIPTION	RATING		NOTE
Z16	PLL BLOCK			
Z17	Not assigned			
Z18	μ 2nd CONVERTER 1			
Z19	μ 2nd CONVERTER 2			
Z20	Not assigned			
Z21	LOCAL CONTROL 1			
Z22	IF BPF/AMP 1			
Z23	IF BPF/AMP 2			
Z24	LOCAL CONTROL 2			MS710C/E
Z25	LOG LIN AMP DETECTOR			
Z26	CPU BOARD			
Z27	DISPLAY CONTROL			
Z28	LOW LOCAL 1			MS710C
Z29	LOW LOCAL 2			MS710C
Z30	CRT BIAS/X-Y AMP			
Z31	Not assigned			
Z32	SWITCHING REGULATOR			
Z33	CONNECTION BOARD			
Z34	DIGITAL MEMORY/GP-IB			
Z35	LOW 1st MIX			MS710C
Z36	EXT IF AMP			MS710C/D
Z37	Not assigned			
Z38	Not assigned			
Z39	Not assigned			
Z40	Not assigned			
Z41	Not assigned			
Z42	Not assigned			
Z43	Not assigned			
Z44	Not assigned			
Z45	NOISE FILTER, (ZMB2203-13)			
Z46	DUMMY LOAD,(HRM-603)			
Z47	DUMMY LOAD,(HRM-603)			
Z48	DUMMY LOAD,(HRM-601D)			MS710C/D

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

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Parts List : Z1 FRONT PANEL I

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CA92C-1C-1R000-R53)	1μF,-20%,16V		
C 2	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 3	Elect,(CE04W1E470)	47μF,±20%,25V		
C 4	Not assigned			
C 5	Elect,(CE04W1E470)	47μF,±20%,25V		
C 6	Elect,(CE04W1E470)	47μF,±20%,25V		
C 7	Elect,(CE04W1E470)	47μF,±20%,25V		
C 8	Elect,(CE04W1E470)	47μF,±20%,25V		
C 9	Elect,(CE04W1E470)	47μF,±20%,25V		
C10	Elect,(CE04W1A101)	100μF,±20%,10V		
C11	Elect,(CE04W1A101)	100μF,±20%,10V		
J 1	Connector,(U-PA1019)			
J 2	Connector, (HIF23A-40D-AA50S)			
J 3	Connector,(PI011-02M)			
L 1	Coil,(LF8-470K)	47μH		
L 2	Coil,(LF8-221K)	220μH		
L 3	Coil,(LF8-221K)	220μH		
Q 1	IC,(μPC78L05)			
Q 2	Not assigned			
Q 3	Tr,(PT350B)			
Q 4	Tr,(PT350B)			
Q 5	IC,(MM74C14N)			
Q 6	IC,(MM74C00N)			
Q 7	IC,(MM74C74N)			
Q 8	Not assigned			
Q 9	Not assigned			
Q10	IC,(TC40H138P)			
Q11	IC,(TC40H138P)			
Q12	IC,(TC5020BP)			
Q13	IC,(μPA56C)			
Q14	IC,(μPA67C)			
Q15	Not assigned			
Q16	Not assigned			
Q17	Not assigned			
Q18	LED,(TLY226)			
Q19	LED,(TLY226)			
Q20	LED,(TLG226)			

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

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Parts List : Z1 FRONT PANEL I

CKT REF	DESCRIPTION	RATING		NOTE
Q21	Not assigned			
Q22	LED,(TLG226)			
Q23	LED,(TLG226)			
Q24	LED,(TLG226)			
Q25	LED,(TLG226)			
Q26	Not assigned			
Q27	LED,(TLG226)			
Q28	Not assigned			
Q29	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q30	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q31	IC,(μPC451C)			
Q32	Tr,(2SC2718)			
Q33	IC,(74LS123)			
R 1	CF,(ARD25T510J)	51Ω,±5%,1/4W		
R 2	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R 3	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R 4	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R 5	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 6	Not assigned			
R 7	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 8	Dual in-line array, (AHR-7-152JB)	1.5kΩ x 7,1/8W		
R 9	Not assigned			
R10	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R11	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R12	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R13	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R14	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R15	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R16	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R17	Var,MF, (RG161N20SB 20kΩM)	20kΩ,1/2W		
R18	Not assigned			
R19	Var,MF, (RG161N15SB 2kΩM)	2kΩ,1/2W		
R20	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R21	Not assigned			
R22	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R23	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R24	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R25	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		

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

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Parts List : Z1 FRONT PANEL I

CKT REF	DESCRIPTION	RATING		NOTE
R26	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R27	Not assigned			
R28	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R29	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R30	Not assigned			
R31	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R32	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R33	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
S 1 to S31	Switch,(MM9-1)			
S32	Switch,(HL20-LSAB)			
S33	Switch,(HL20-LSAB)			
S34	Switch,(HL20-LSAB)			
S35	Switch,(HL20-LSAB)			
S36	Switch,(HL20-LSAB)			
S37	Switch,(HL20-NS)			
S38	Switch,(HL20-NS)			
S39	Switch,(HL20-NS)			
S40	Switch,(HL20-LSAB)			
S41	Switch,(HL20-LSAB)			
S42	Switch,(HL20-LSAB)			
S43	Switch,(HL20-LSAB)			
S44	Switch,(HL20-LSAB)			
S45	Switch,(HL20-LSAB)			
S46	Switch,(HL20-LSAB)			
S47	Switch,(HL20-LSAB)			
S48	Switch,(HL20-LSAB)			
S49	Switch,(HL20-NS)			
S50	Switch,(HL20-NS)			
S51	Switch,(HL20-NS)			
S52	Switch,(HL20-NS)			
S53	Switch,(HL20-NS)			
S54	Switch,(HL20-NS)			
S55	Switch,(HL20-NS)			
S56	Switch,(HL20-LSAB)			
S57	Switch,(HL20-LSAB)			
S58	Switch,(HL20-LSAB)			
S59	Switch,(HL20-LSAB)			
S60	Switch,(HL20-LSAB)			
S61	Switch,(HL20-NS)			
S62	Switch,(HL20-NS)			

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

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Parts List : Z1 FRONT PANEL I

CKT REF	DESCRIPTION	RATING		NOTE
Z 1	BUZZER,(KMB-06)			
Z 2	ENCODER,(349H74238)			

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

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Parts List : Z2 FRONT PANEL II

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector,(U-SA1001)			
Q 1	LED,(TLY226)			
R 1	Var,MF, (RG161N15SB 20kΩM)	20kΩ,1/2W		
R 2	Var,MF, (RG161N15SB 20kΩM)	20kΩ,1/2W		
S 1	Not assigned			
S 2	Switch,(HL20-NS)			

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

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Parts List: Z6 μ 1st CONVERTER

CKT REF	DESCRIPTION	RATING		NOTE
AT 1	Attenuator	6dB		
C 1	Cer,(DF553F102PY50)	1000pF,+100/-10%,50V		
C 2	Cer,(DF553F102PY50)	1000pF,+100/-10%,50V		
C 3	Not assigned			
C 4	Cer,(DF553F102PY50)	1000pF,+100/-10%,50V		
J 1	Connector,(HRM101)			
J 2	Connector,(HRM304B)			
J 3	Connector,(HRM300-1)			
J 4	Receptacle,(27DP-BR)			
J 5	Socket,(DF1-5S2.5R28)			
J 6	Not assigned			
J 7	Cable,(442H79019)			
J 8	Connector,(HRM300-1)			
W 1	Coupler,(10dB)			
Z 1	Local amp			44W79551
Z 2	Harmonic mixer			
Z 3	If amp			44W79552

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

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Parts List: Z6-Z1 LOCAL AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CK1H010C)	1pF, ±0.25pF, 50V		
C 2	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
C 3	Pattern			
C 4	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C 5	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 6	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C 7	Not assigned			
C 8	Cer, (CC732CK1H010C)	1pF, ±0.25pF, 50V		
C 9	Cer, (CC732CK1H010C)	1pF, ±0.25pF, 50V		
C10	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
C11	Not assigned			
C12	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C13	Cer, (CC732CH1H101J)	100pF, ±5%, 50V		
C14	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
C15	Not assigned			
C16	Cer, (CC732CH1H100D)	10pF, ±0.5pF, 50V		
Q 1	Tr, (2SC2273)			
Q 2	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 3	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 4	Tr, (2SC2585)			
R 1	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R 2	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R 3	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R 4	MF, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 5	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R 6	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 7	MF, (RM73B2B151JD)	150Ω, ±5%, 1/8W		
R 8	MF, (RM73B2B332JD)	3.3kΩ, ±5%, 1/8W		
R 9	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R10	MF, (RM73B2B500JD)	50Ω, ±5%, 1/8W		
R11	Not assigned			
R12	MF, (RM73B2B6R8JD)	6.8Ω, ±5%, 1/8W		
R13	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W		

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

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Parts List: Z6-Z3 IF AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C 2	Not assigned			
C 3	Not assigned			
C 4	Not assigned			
C 5	Cer, (CC732CH1H470J)	47pF, ±5%, 50V		
C 6	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C 7	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C 8	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C 9	Cer, (CC732CJ1H030C)	3pF, ±0.25PF, 50V		
C10	Cer, (CC732CH1H040D)	8pF, ±0.5pF, 50V		
C11	Not assigned			
C12	Cer, (CC732CH1H060D)	6pF, ±5%, 50V		
C13	Not assigned			
C14	Cer, (CC732CK1H020C)	2pF, ±0.25pF, 50V		
C15	Not assigned			
C16	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
Q 1	Not assigned			
Q 2	Tr, (2SC2367)			
Q 3	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
R 1	Not assigned			
R 2	MF, (RM73B2B102JD)	1.0kΩ, ±5%, 1/8W		
R 3	MF, (RN14K2E6190D)	619Ω, ±0.5%, 1/4W		
R 4	MF, (RN14K2E1211D)	1.21kΩ, ±0.5%, 1/4W		

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

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Parts List : Z10 YTO/YTF DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C 2	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C 3	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C 4	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C 5	Elect, (CE04W1E101)	100μF, ±20%, 25V		
C 6	Elect, (CE04W1E101)	100μF, ±20%, 25V		
C 7	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C 8	Cer, (CK924C1H104M)	0.1μF, ±20%, 50V		
C 9	Elect, (CE04W1V220)	22μF, ±20%, 35V		
C10	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C11	Not assigned			
C12	Elect, (CE04W1V100)	10μF, ±20%, 35V		
C13	Cer, (CK924C1H103M)	0.01μF, ±20%, 50V		
C14	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C15	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C16	Tant, (CSE1VR47M)	0.47μF, ±20%, 35V		
C17	Not assigned			
C18	Elect, (CE04W1E101)	100μF, ±20%, 25V		
C19	Plast, (ECQ-M1H472KZ)	4700pF, ±10%, 50V		
C20	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C21	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C22	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V		
C23	Elect, (CE04W1V220)	22μF, ±20%, 35V		
C24	Elect, (CE04W1J4R7)	4.7μF, ±20%, 63V		
C25	Elect, (CE04W1E101)	100μF, ±20%, 25V		
C26	Not assigned			
C27	Not assigned			
C28	Plast, (ECQ-V1H105JW)	1μF, ±5%, 50V		
C29	Cer, (CK924C1H222M)	2200pF, ±20%, 50V		
C30	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C31	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C32	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C33	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C34	Not assigned			
C35	Elect, (CE04W1J4R7)	4.7μF, ±20%, 63V		
C36	Plast, (ECQ-M1H472KZ)	4700pF, ±10%, 50V		
C37	Not assigned			
C38	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C39	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C40	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C41	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C42	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C43	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C44	Not assigned			
C45	Cer, (RPE113F105Z50)	1μF, ±5%, 50V		
C46	Elect, (CE04W1E101)	100μF, ±20%, 35V		

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

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Parts List : Z10 YTO/YTF DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector, (PI011-05M)			
J 2	Connector, (PI011-12M)			
J 3	Connector, (PI011-04M)			
J 4	Connector, (PI011-05M)			
J 5	Connector, (PI011-02M)			
J 6	Connector, (PI011-10M)			
J 7	Connector, (PI011-04M)			
J 8	Connector, (PI011-04M)			
J 9	Connector, (DF1-2P2.5DSA)			
J10	Connector, (PI011-02M)			
K 1	Relay, (NR-SD-12V)			
L 1	Coil, (LF8-221K)	220μH		
L 2	Coil, (LF8-220K)	22μH		
L 3	Coil, (LF8-221K)	220μH		
L 4	Not assigned			
L 5	Not assigned			
L 6	Coil, (SF-T8-50D)			
Q 1	IC, (μPC14312H)			
Q 2	Not assigned			
Q 3	IC, (μPC151C)			
Q 4	Di, (1S953)			
Q 5	Tr, (2SD568)			
Q 6	Not assigned			
Q 7	Not assigned			
Q 8	IC, (HI-201-5)			
Q 9	Di, breakdown, (1SZ52)	5.9 to 6.5V, 250mW		
Q10	Rectifier, (V03G)			
Q11	IC, (NE5534AP)			
Q12	Tr, (2SA836)			
Q13	Tr, (2SD297)			
Q14	Not assigned			
Q15	IC, (NE5532AP)			
Q16	Tr, (2SC1008)			
Q17	Tr, (2SA708)			
Q18	Not assigned			
Q19	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q20	IC, (μPC454D)			
Q21	Tr, (2SA836)			

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

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Parts List : Z10 YTO/YTF DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
Q22	Tr,(2SD568)			
Q23	Not assigned			
Q24	IC,(DTC143EF)			
Q25	Di,(1S953)			
R 1	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 2	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 3	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 4	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R 5	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R 6	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R 7	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R 8	Not assigned			
R 9	Not assigned			
R10	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R11	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R12	Var,MF,(RJ-6P 2kΩ)	2.0kΩ,1/2W		
R13	MF,(RN14K2E1152D)	11.5kΩ,±0.5%,1/4W		
R14	MF,(RN14K2E1503D)	150kΩ,±0.5%,1/4W		
R15	MF,(RN14K2E1503D)	150kΩ,±0.5%,1/4W		
R16	MF,(RN14K2E7150D)	715Ω,±0.5%,1/4W		
R17	Var,MF,(RJ-6P 2kΩ)	2.0kΩ,1/2W		
R18	MF,(RN14K2E8251D)	8.25kΩ,±0.5%,1/4W		
R19	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R20	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R21	Var,MF,(RJ-6P 200Ω)	200Ω,1/2W		
R22	WW,(RHF-10-22.1ΩF)	22.1Ω,±1%,10W		
R23	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R24	MF,(RN14K2E1471D)	1.47kΩ,±0.5%,1/4W		
R25	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R26	Not assigned			
R27	Not assigned			
R28	MF,(RN14K2E1051D)	1.05kΩ,±0.5%,1/4W		
R29	MF,(RN14K2E1051D)	1.05kΩ,±0.5%,1/4W		
R30	MF,(RN14K2E2671D)	2.67kΩ,±0.5%,1/4W		
R31	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R32	Not assigned			
R33	Not assigned			
R34	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R35	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R36	Not assigned			
R37	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R38	MF,(RN14K2E1541D)	1.54kΩ,±0.5%,1/4W		
R39	Var,MF,(RJ-6P 500Ω)	500Ω,1/2W		
R40	CF,(ARD25T101J)	100Ω,±5%,1/4W		

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

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Parts List : Z10 YTO/YTF DRIVE

CKT REF	DESCRIPTION	RATING		NOTE
R41	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R42	Not assigned			
R43	Not assigned			
R44	CF,(ARD25T105J)	1.0MΩ,±5%,1/4W		
R45	CF,(ARD25T105J)	1.0MΩ,±5%,1/4W		
R46	Var,MF,(RJ-6P 1kΩ)	1.0kΩ,1/2W		
R47	MF,(RN14K2E7501D)	7.50kΩ,±0.5%,1/4W		
R48	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R49	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R50	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R51	MF,(RN14K2E1331D)	1.33kΩ,±0.5%,1/4W		
R52	MF,(RN14K2E2001D)	2.00kΩ,±0.5%,1/4W		
R53	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R54	MF,(RN14K2E1331D)	1.33kΩ,±0.5%,1/4W		
R55	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R56	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R57	WW,(RHF-10-10ΩF)	10Ω,±1%,10W		
R58	CF,(ARD25T684J)	680kΩ,±5%,1/4W		
R59	Not assigned			
R60	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R61	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R62	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R63	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R64	Not assigned			
R65	CF,(ARD25T105J)	1MΩ,±5%,1/4W		

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

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Parts List : Z14 0 to 2 GHz RF BLOCK

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 2	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 3	Cer,(DF553YN680KY50)	68pF,±10%,50V		
C 4	Cer,(DF553YN680KY50)	68pF,±10%,50V		
C 5	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Connector,(HRM-305B)			
J 4	Connector,(27DP-BR)			
J 5	Connector,(HRM-304B)			
J 6	Connector,(27DP-BR)			
J 7	Connector,(HRM-304B)			
J 8	Connector,(HRM-304B)			
J 9	Not assigned			
J10	Connector,(HRM-304B)			
J11	Connector,(HRM-301B)			
J12	Connector,(27DP-BR)			
J13	Connector,(27DP-BR)			
J14	Connector,(PI011-04F)			
J15	Connector, (27DP-LP-1.5QEW-AA)			
J16	Connector, (27DP-LP-1.5QEW-AA)			
Q 1	Di,(1S2208)			
Q 2	Di,(1S2208)			
R 1	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R 2	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
Z 1	1st MIX PAD			
Z 2	0 to 2 GHz 1st MIX			
Z 3	DIRECTIONAL FILTER			
Z 4	2.5214 GHz PRE AMP			
Z 5	2.5214 GHz BPF			
Z 6	2.5 GHz OSC			
Z 7	2nd CONVERTER			
Z 8	100 MHz REF OSC			
Z 9	2.5 to 4.5 GHz LO AMP			
Z10	2 to 6 GHz CPL AMP			
Z11	2nd LOCAL PLL			
Z12	CPL MODULE			

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

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Parts List : Z14 0 to 2 GHz RF BLOCK

CKT REF	DESCRIPTION	RATING		NOTE
Z13	NOISE FILTER (ZFN5101-01R)			
Z14	NOISE FILTER (ZFN5101-01R)			
Z15	NOISE FILTER, (ZFN5101-01R)			
Z16	NOISE FILTER, (ZFN5101-01R)			
Z17	NOISE FILTER, (ZFN5101-01R)			

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

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Parts List : Z14-Z1 1st MIX PAD

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(HCC73CH2D*C)	0.5 to 3pF,±0.25pF, 200V		Q'ty 0 or 1,*
R 1	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 2	MF,(RM73B2B390JD)	39Ω,±5%,1/8W		
R 3	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 4	MF,(RM73B2B*JD)	39 to 100Ω,±5%,1/8W		*

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

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Parts List : Z14-Z4 2.5214 GHz PRE AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 2	Pattern			
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 4	Pattern			
C 5	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 6	Cer,(CC732CH1H220J)	22pF,±5%,50V		
Q 1	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 2	Tr,(2SC2585)			
R 1	MF,(RM73B2B561JD)	560Ω,±5%,1/8W		
R 2	CF,(ARD25T391J)	390Ω,±5%,1/4W		

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

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Parts List : Z14-Z7 2nd CONVERTER

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 2	Cer,(CK734B1H104K)	0.1μF,±10%,50V		
C 3	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 4	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 5	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 6	Elect,(CE04W1E470)	47μF,±20%,25V		
C 7	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 8	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 9	Cer,(CK734B1H104K)	0.1μF,±10%,50V		
C10	Not assigned			
C11	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C12	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C13	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C14	Cer,(CC732CH1H060D)	6pF,±0.5pF,50V		
C15	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C16	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C17	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C18	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C19	Cer,(CC924CH1H560J)	56pF,±5%,50V		Q'ty 2
C20	Cer,(CC924CH1H910J)	91pF,±5%,50V		Q'ty 2
C21	Cer,(CC924CH1H560J)	56pF,±5%,50V		Q'ty 2
C22	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C23	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
L 1	Pattern			
L 2	Pattern			
L 3	Pattern			
L 4	Pattern			
L 5	Pattern			
L 6	Pattern			
L 7	Coil,(SP0408-4R7K)	4.7μH,550mA		
L 8	Coil,(NL322522-R33K)	0.33μH,450mA		
L 9	Coil,(NL322522-R33K)	0.33μH,450mA		
L10	Coil,(LF8-221K)	220μH,100mA		
Q 1	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 2	Tr,(2SC2585)			
Q 3	Di,(ND487R2-3P)			
Q 4	Di,(ND487R2-3P)			
Q 5	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 6	Tr,(2SC2367)			
Q 7	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 8	Tr,(2SC2369)			
Q 9	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q10	Tr,(2SC2901)			

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

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Parts List : Z14-Z7 2nd CONVERTER

CKT REF	DESCRIPTION	RATING		NOTE
R 1	MF,(RM73B2B152JD)	1.5kΩ,±5%,1/8W		
R 2	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R 3	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 4	MF,(RM73B2B182JD)	1.8kΩ,±5%,1/8W		
R 5	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 6	MF,(RM73B2B331JD)	330Ω,±5%,1/8W		
R 7	MF,(RM73B2B560JD)	56Ω,±5%,1/8W		
R 8	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 9	MF,(RM73B2B101JD)	100Ω,±5%,1/8W		
R10	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R11	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R12	MF,(RM73B2B6R8JD)	6.8Ω,±5%,1/8W		
R13	MF,(RM73B2B6R8JD)	6.8Ω,±5%,1/8W		
R14	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R15	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R16	MF,(RM73B2B390JD)	39Ω,±5%,1/8W		
R17	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R18	MF,(RM73B2B510JD)	100Ω,±5%,1/8W		
R19	MF,(RM73B2B221JD)	220Ω,±5%,1/8W		
R20	CF,(ARD25T4R7J)	4.7Ω,±5%,1/4W		
R21	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R22	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R23	Var,MF,(RJ-6S 500Ω)	500Ω,1/2W		
T 1	Trans,(342T74443)			

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

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Parts List : Z14-Z8 100 MHz REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1E470)	47μF,±20%,25V		
C 2	Elect,(CE04W1E470)	47μF,±20%,25V		
C 3	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 4	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 5	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C 6	Elect,(CE04W1E470)	47μF,±20%,25V		
C 7	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 8	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 9	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C10	Elect,(CE04W1E470)	47μF,±20%,25V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Not assigned			
C15	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C16	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C17	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C18	Not assigned			
C19	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C20	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C21	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C22	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C23	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C24	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C25	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C26	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C27	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C28	Cer,(CC45CH1H160JY)	16pF,±5%,50V		
C29	Cer,(CC45CH1H160JY)	16pF,±5%,50V		
C30	Cer,(CC45CH1H160JY)	16pF,±5%,50V		
C31	Cer,(CC45CH1H160JY)	16pF,±5%,50V		
L 1	Coil,(LF8-221K)	220μH		
L 2	Coil,(NL322522-R15K)	0.15μH		
L 3	Coil,(NL322522-R15K)	0.15μH		
L 4	Coil,(NL453232-1R5K)	1.5μH		
L 5	Coil,(LF8-221K)	220μH		
Q 1	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q 2	Tr,(2SC2901)			
Q 3	Tr,(μPC1651G)			
Q 4	IC,(μPC78L05)			
Q 5	Tr,(μPC1651G)			

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

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Parts List : Z14-Z8 100 MHz REF OSC

CKT REF	DESCRIPTION	RATING		NOTE
Q 6	Di,breakdown,(FD6.2EB)	5.8 to 6.6V,400mW		
Q 7	Not assigned			
Q 8	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 9	Tr,(2SC2369)			
Q10	Di,(1SS97)			
Q11	Di,(1SS97)			
Q12	Tr,(2SA1206)			
R 1	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 2	Not assigned			
R 3	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 4	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R 5	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R 6	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R 7	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 8	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 9	Not assigned			
R10	Not assigned			
R11	Not assigned			
R12	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R13	Not assigned			
R14	Not assigned			
R15	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R16	Not assigned			
R17	Not assigned			
R18	Not assigned			
R19	Not assigned			
R20	Not assigned			
R21	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R22	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R23	Not assigned			
R24	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R25	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R26	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R27	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R28	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R29	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R30	Var,MF,(RJ-6S1kΩ)	1kΩ,1/2W		
R31	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R32	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R33	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R34	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R35	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R36	MF,(NRN 1/4C4131ΩD)	4.13kΩ,±0.5%,1/4W		
R37	MF,(NRN 1/4C444.8ΩD)	444.8Ω,±0.5%,1/4W		
R38	MF,(NRN 1/4C413ΩD)	413Ω,±0.5%,1/4W		
Z 1	XTAL OSC,(TA302ANS061B)	100 MHz		

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

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Parts List : Z14-Z9 2.5 to 4.5 GHz LO AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CK1H010C)	1pF,±0.25pF,50V		
C 2	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C 3	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C 4	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 5	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 6	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 7	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 8	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 9	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C10	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C11	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C12	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C13	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C14	Elect,(CE04W1E470)	47μF,±20%,25V		
Q 1	Tr,(2SC2585)			
Q 2	IC,(FJ451LE)			
Q 3	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 4	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 5	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
R 1	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 2	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R 3	MF,(RM73B2B241JD)	240Ω,±5%,1/8W		
R 4	MF,(RM73B2B131JD)	130Ω,±5%,1/8W		
R 5	MF,(RM73B2B391JD)	390Ω,±5%,1/8W		
R 6	MF,(RM73B2B240JD)	24Ω,±5%,1/8W		
R 7	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 8	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		
R 9	MF,(RM73B2B180JD)	18Ω,±5%,1/8W		
R10	MF,(RM73B2B681JD)	680Ω,±5%,1/8W		

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

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Parts List : Z14-Z10 2 to 6 GHz CPL AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CK1H010C)	1pF,±0.25pF,50V		
C 2	Cer,(CC732CH1H100D)	10pF,±0.5pF,50V		
C 3	Pattern			
C 4	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C 5	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 6	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C 7	Not assigned			
C 8	Cer,(CC732CJ1H030C(M0))	3pF,±0.25pF,50V		
C 9	Not assigned			
C10	Cer,(CC732CH1H100D)	10pF,±0.5pF,50V		
C11	Not assigned			
C12	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C13	Cer,(CC732CH1H101J)	100pF,±5%,50V		
C14	Cer,(CC732CH1H100D)	10pF,±0.5pF,50V		
Q 1	Tr,(2SC2273)			
Q 2	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 3	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 4	Tr,(2SC2585)			
R 1	MF,(RM73B2B500JD)	50Ω,±5%,1/8W		Q'ty 2, Parallel
R 2	MF,(RM73B2B500JD)	50Ω,±5%,1/8W		Q'ty 2, Parallel
R 3	MF,(RM73B2B500JD)	50Ω,±5%,1/8W		
R 4	MF,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 5	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 6	MF,(RM73B2B270JD)	27Ω,±5%,1/8W		
R 7	Not assigned			
R 8	MF,(RM73B2B332JD)	3.3kΩ,±5%,1/8W		
R 9	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R10	MF(RM73B2B500JD)	50Ω,±5%,1/8W		
R11	MF(RM73B2B181JD)	180Ω,±5%,1/8W		
R12	MF(RM73B2B560JD)	56Ω,±5%,1/8W		

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

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Parts List : Z14-Z11 2nd LOCAL PLL

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC45CH1H180JY)	18pF, 5%,50V		Q'ty 2, Parallel
C 2	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 4	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 5	Not assigned			
C 6	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C 7	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C 8	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C 9	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C10	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C11	Cer,(CC45CJ1H030CY)	3pF,±0.25pF,50V		
C12	Cer,(CC45CJ1H030CY)	3pF,±0.25pF,50V		
C13	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C14	Cer,(CC924CH1H271J)	270pF,±5%,50V		
C15	Cer,(CC924CH1H271J)	270pF,±5%,50V		
C16	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C17	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C18	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C19	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C20	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C21	M Plast,(CF922N2A105K)	1μF,±10%,100V		
C22	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C23	Elect,(CE04W1E470)	47μF,±20%,25V		
C24	Elect,(CE04W1E470)	47μF,±20%,25V		
C25	Elect,(CE04W1E470)	47μF,±20%,25V		
C26	Elect,(CE04W1E470)	47μF,±20%,25V		
C27	Elect,(CE04W1E470)	47μF,±20%,25V		
J 1	Connector,(DIC-128)			
J 2	Connector,(DIC-149-3P)			
L 1	Pattern			
L 2	Pattern			
L 3	Coil,(LF8-100K)	10μH,250mA		
L 4	Coil,(LF8-221K)	220μH,100mA		
Q 1	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 2	Tr,(2SC2369)			
Q 3	Di,(1SS97)			
Q 4	Tr,(2SC2369)			
Q 5	Tr,(2SC2369)			

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

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Parts List : Z14-Z11 2nd LOCAL PLL

CKT REF	DESCRIPTION	RATING		NOTE
Q 6	Di,(1SV107)			
Q 7	Di,(1SS97)			
Q 8	Di,(1SS97)			
Q 9	IC,(NE5532AP)			
R 1	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 2	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R 3	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 4	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R 5	MF,(RN14K2H101J)	100Ω,±5%,1/4W		
R 6	MF,(NRTF1/4C 10ΩJ)	10Ω,±5%,1/4W		
R 7	MF,(NRTF1/4C 50ΩJ)	50Ω,±5%,1/4W		
R 8	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 9	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R10	MF,(RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R11	MF,(RM73B2B222JD)	2.2kΩ,±5%,1/8W		
R12	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R13	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R14	Var,MF,(RJ-6P 50kΩ)	50kΩ,1/2W		
R15	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R16	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R17	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R18	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R19	Var,MF,(RA-12P 10kΩ)	10kΩ,1/2W		
R20	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R21	MF,(RN14K2E4221D)	4.22kΩ,±0.5%,1/4W		
R22	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R23	MF,(RN14K2E1003D)	100kΩ,±0.5%,1/4W		
R24	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R25	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R26	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R27	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R28	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R29	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		
R30	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R31	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R32	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		
R33	MF,(RM73B2B180JD)	18Ω,±5%,1/8W		
R34	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		
R35	CF,(ARD25T150J)	15Ω,±5%,1/4W		
T 1	Trans,(342T60521B)			

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

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Parts List : Z16 PLL BLOCK

CKT REF	DESCRIPTION	RATING		NOTE
AT1	Attenuator	20dB		
C 1	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 2	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 3	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 4	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 5	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 6	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 7	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 8	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C 9	Cer,(DF553F102PY50)	1000pF,+100/-0%,50V		
C10	Cer,(DF553YN680KY50)	68pF,±10%,50V		
J 1	Semirigid cable, (449J85925)			
J 2	Receptacle,(27DP-LR)			
J 3	Receptacle,(27DP-BR)			
J 4	Receptacle,(HRM-301B)			
J 5	Receptacle,(27DP-BR)			
J 6	Socket,(PI011 02F)			
J 7	Socket,(PI011-02F)			
J 8	Socket,(PI011-04F)			
J 9	Not assigned			
J10	Not assigned			
J11	Connector, (DF1-5S2.5R24)			
J12	Receptacle,(27DP-BR)			
J13	Plug,(27DP-LP-1.5)			
J14	Receptacle,(27DP-BR)			
J15	Semirigid cable, (449J85924)			
R 1	WW,(RHF-5J15Ω)	15Ω,±1%,5W		
Z 1	YTO PLL PREAMP			44W83938
Z 2	SAMPLER DRIVER			44W83939
Z 3	SAMPLER			
Z 4	ISOLATION AMP			44W83940
Z 5	PULSE AMP			44W83941
Z 6	M/N VCO			44W83942
Z 7	M/N MIX			44W83943
Z 8	5 X 100 MHz			44W83944
Z 9	YTO PD			44W83945
Z10	M/N PD			44W83946
Z11	LINE FILTER, (ZFN5101-01R)			
Z12	LINE FILTER, (ZFN5101-01R)			
Z13	LINE FILTER, (ZFN5101-01R)			
Z14	LINE FILTER (ZFN5101-01R)			
Z15	HPF			

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

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Parts List : Z16-Z1 YTO PLL PRE AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 2	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 3	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 4	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 5	Cer,(CC924CH1H620J)	62pF,±5%,50V		
L 1	Coil,(SP0408-6R8K)	6.8μH		
L 2	Coil,(SP0408-4R7K)	4.7μH		
L 3	Coil,(SP0408-R15K)	0.15μH		
Q 1	Di,(1S953)			
Q 2	FET,(2SK152-2)			
Q 3	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
R 1	MF,(RN14K2E2003D)	200kΩ,±0.5%,1/4W		
R 2	MF,(RN14K2E2003D)	200kΩ,±0.5%,1/4W		
R 3	MF,(RN14K2E90R9D)	90.9Ω,±0.5%,1/4W		
R 4	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 5	MF,(RN14K2E49R9D)	49.9Ω,±0.5%,1/4W		

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

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Parts List : Z16-Z2 SAMPLER DRIVER

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C 2	BL Cer,(BLPW1E222NA)	2200pF,±30%,25V		
C 3	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C 4	Elect,(CE04W1V100)	10μF,±20%,35V		
C 5	Cer,(CK732B1H222K)	2200pF,±10%,50V		
L 1	Coil,(LF8-221K)	220μH		
Q 1	Di,(1SV107)			
R 1	MF,(NRTF1/4C 10ΩJ)	10Ω,±5%,1/4W		
R 2	MF,(NRTF1/4C 50ΩJ)	50Ω,±5%,1/4W		
R 3	Not assigned			
R 4	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R 5	CF,(ARD25T*J)	100Ω to 4.7kΩ, ±5%, 1/4W		*

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

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Parts List : Z16-Z4 ISOLATION AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 2	Elect,(CE04W1E101)	100μF,±20%,25V		
C 3	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Not assigned			
C 7	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 8	Elect,(CE04W1E101)	100μF,±20%,25V		
C 9	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C10	Cer,(CK924F1H104Z)	0.1μF,+80/-20%		
C11	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
Q 1	Not assigned			
Q 2	Not assigned			
Q 3	Not assigned			
Q 4	Not assigned			
Q 5	Not assigned			
Q 6	Not assigned			
Q 7	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 8	IC,(μPC251C)			
Q 9	Tr,(2SC2721)			
Q10	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q11	Not assigned			
Q12	Tr,(2SA1154)			
Q13	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q14	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
R 1	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R 2	Not assigned			
R 3	Not assigned			
R 4	Not assigned			
R 5	Not assigned			
R 6	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 7	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 8	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 9	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R10	Not assigned			
R11	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R12	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R13	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R14	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R15	Not assigned			
R16	CF,(ARD25T100J)	10Ω,±5%,1/4W		

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

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Parts List : Z16-Z5 PULSE AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C 2	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C 3	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C 4	Elect,(CE04W1E470)	47μF,±20%,25V		
C 5	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 6	Not assigned			
C 7	Elect,(CE04W1A470)	47μF,±20%,10V		
C 8	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 9	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C10	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C11	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C12	Not assigned			
C13	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C14	Not assigned			
C15	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C16	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C17	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C18	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C19	Cer,(CK732B1H222K)	2200pF,±10%,50V		
C20	Cer,(CK732B1H222K)	2200pF,±10%,50V		
C21	Cer,(CK732B1H222K)	2200pF,±10%,50V		
C22	Not assigned			
C23	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C24	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
L 1	Coil,(LF8-101K)	100μH		
L 2	Coil,(LF8-101K)	100μH		
L 3	Not assigned			
L 4	Coil,(LF8-100K)	10μH		
L 5	Coil,(LF8-100K)	10μH		
Q 1	IC,(μPB581C)			
Q 2	Not assigned			
Q 3	IC,(11C05DC)			
Q 4	Not assigned			
Q 5	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q 6	Tr,(2SC2369)			
Q 7	Di,(1SS98)			
Q 8	Tr,(2SC2369)			
Q 9	Tr,(2SC2369)			
Q10	IC,(μPC1653A)			
Q11	IC,(μPC1651G)			

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

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Parts List : Z16-Z5 PULSE AMP

CKT REF	DESCRIPTION	RATING		NOTE
R 1	MF,(RM73B2B471JD)	470Ω,±5%,1/8W		
R 2	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 3	Not assigned			
R 4	Not assigned			
R 5	Not assigned			
R 6	Not assigned			
R 7	MF,(RM73B2B103JD)	10kΩ,±5%,1/8W		
R 8	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 9	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R10	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R11	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R12	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R13	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R14	MF,(RM73B2B680JD)	68Ω,±5%,1/8W		
R15	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R16	MF,(RM73B2B680JD)	68Ω,±5%,1/8W		
R17	MF,(RM73B2B101JD)	100Ω,±5%,1/8W		
R18	MF,(RM73B2B750JD)	75Ω,±5%,1/8W		
R19	MF,(RM73B2B101JD)	100Ω,±5%,1/8W		
T 1	Not assigned			
T 2	Trans,(342T60521)			

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

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Parts List : Z16-Z6 M/N VCO

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Cer,(CC732CK1H100D)	10pF,±0.5pF,50V		
C 3	Cer,(CC732CK1H0R5C)	0.5pF,±0.25pF,50V		
C 4	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C 5	Not assigned			
C 6	Not assigned			
C 7	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 8	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 9	Not assigned			
C10	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C11	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C12	Cer,(CK734B1H104K)	0.1μF,±10%,50V		
C13	Elect,(CE04W1V220)	22μF,±20%,35V		
C14	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C15	Cer,(CK924C1H*M)	2200pF to 0.1μF, ±20%,50V		Q'ty 0 or 1,*
C16	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C17	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C18	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C19	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C20	Not assigned			
C21	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C22	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C23	Elect,(CE04W1V220)	22μF,±20%,35V		
C24	Cer,(C4532Y5V1H105Z)	1μF,+80/-20%,50V		
C25	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C26	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C27	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C28	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C29	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C30	Not assigned			
C31	Not assigned			
C32	Not assigned			
C33	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C34	Cer,(CC732CH1H471J)	470pF,±5%,50V		
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Coil,(MLF3216DR10K)	0.1μH		
L 5	Coil,(MLF3216DR10K)	0.1μH		

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

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Parts List : Z16-Z6 M/N VCO

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Coil,(MLF3216DR10K)	0.1μH		
L 7	Coil,(MLF3216DR10K)	0.1μH		
L 8	Coil,(MLF3216DR10K)	0.1μH		
L 9	Coil,(SP0408-6R8K)	6.8μH		
Q 1	Tr,(2SC2149)			
Q 2	Di,(1SV164)			
Q 3	Di,(1SV164)			
Q 4	Di,(1SV164)			
Q 5	Di,(1SV164)			
Q 6	Tr,(2SC2367)			
Q 7	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 8	Not assigned			
Q 9	Not assigned			
Q10	Tr,(2SC2367)			
Q11	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
R 1	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 2	MF,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 3	MF,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 4	Not assigned			
R 5	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 6	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 7	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 8	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 9	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R10	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R11	CF,(ARD25T100JD)	10Ω,±5%,1/4W		
R12	Not assigned			
R13	Not assigned			
R14	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R15	Not assigned			
R16	Not assigned			
R17	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R18	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R19	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R20	MF,(RM73B2B471JD)	470Ω,±5%,1/8W		
R21	MF,(RM73B2B560JD)	56Ω,±5%,1/8W		
R22	Not assigned			
R23	MF,(RM73B2B331JD)	330Ω,±5%,1/8W		
R24	MF,(RM73B2B180JD)	18Ω,±5%,1/8W		
R25	MF,(RM73B2B331JD)	330Ω,±5%,1/8W		

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

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Parts List : Z16-Z7 M/N MIX

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C 2	Not assigned			
C 3	Cer,(CC732CH1H060D)	6pF,±0.5pF,50V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C 7	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C 8	Cer,(C4532Y5V1H105Z)	1μF,+80/-20%,50V		
C 9	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C10	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Not assigned			
C15	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C16	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C17	Cer,(CC732CH1H470J)	47pF,±5%,50V		
C18	Cer,(CC732CH1H090D)	9pF,±0.5pF,50V		
C19	Cer,(CC732CH1H330J)	33pF,±5%,50V		
C20	Not assigned			
C21	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C22	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C23	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C24	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C25	Cer,(CC732CH1H330J)	33pF,±5%,50V		
C26	Not assigned			
C27	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C28	Cer,(CC732CH1H270J)	27pF,±5%,50V		
C29	Not assigned			
C30	Not assigned			
C31	Cer,(CK732C1H223M)	0.022μF,±20%,50V		
C32	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C33	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C34	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C35	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C36	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C37	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C38	Elect,(CE04W1E101)	100μF,±20%,25V		
C39	Not assigned			
L 1	Coil,(MLF3216DR10K)	0.1μH		
L 2	Coil,(MLF3216DR10K)	0.1μH		
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil,(SP0408-R10M)	0.1μH		

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

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Parts List : Z16-Z7 M/N MIX

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Not assigned			
L 7	Not assigned			
L 8	Not assigned			
L 9	Not assigned			
L10	Not assigned			
L11	Coil,(SP0408-6R8K)	6.8μH		
L12	Coil,(LF8-101K)	100μH		
L13	Not assigned			
Q 1	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 2	Tr,(2SC2367)			
Q 3	Not assigned			
Q 4	Not assigned			
Q 5	Not assigned			
Q 6	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 7	Tr,(2SC2369)			
Q 8	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 9	Tr,(2SC2369)			
Q10	Di,(1SS97)			
Q11	Di,(1SS97)			
R 1	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R 2	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R 3	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R 4	Not assigned			
R 5	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 6	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 7	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R 8	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R 9	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R10	Not assigned			
R11	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R12	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R13	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R14	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R15	Not assigned			
R16	MF,(RM73B2B181JD)	180Ω,±5%,1/8W		
R17	MF,(RM73B2B330JD)	33Ω,±5%,1/8W		
R18	MF,(RM73B2B181JD)	180Ω,±5%,1/8W		
R19	MF,(RM73B2B221JD)	220Ω,±5%,1/8W		
R20	MF,(RM73B2B220JD)	22Ω,±5%,1/8W		
R21	MF,(RM73B2B221JD)	220Ω,±5%,1/8W		

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

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Parts List : Z16-Z7 M/N MIX

CKT REF	DESCRIPTION	RATING		NOTE
Z 1	M-14-ML(R.K)			
Z 2	DB-2(R.K)			
Z 3	AHW-1000MF,(44Z46089)			

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

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Parts List : Z16-Z8 5X 100 MHz

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1E101)	100μF,±20%,25V		
C 2	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 3	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 4	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 5	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 6	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C 7	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 8	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 9	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C10	Not assigned			
C11	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C12	Cer,(RPE113F105Z50)	1μF,+80/-20%,50V		
C13	Cer,(RPE113F105Z50)	1μF,+80/-20%,50V		
C14	Cer,(RPE113F105Z50)	1μF,+80/-20%,50V		
C15	Not assigned			
C16	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C17	Elect,(CE04W1E101)	100μF,±20%,25V		
C18	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C19	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C20	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C21	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C22	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C23	Not assigned			
C24	Cer,(CC45CH1H100DY)	10pF,±0.5pF,50V		
C25	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C26	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C27	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C28	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C29	Not assigned			
C30	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C31	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C32	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C33	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C34	Cer,(CC45CH1H100DY)	10pF,±0.5pF,50V		
C35	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C36	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C37	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C38	Cer,(CC924CH1H331J)	330pF,±5%,50V		
L 1	Coil,(LF8-101K)	100μH		
L 2	Coil,(SP0408-R10M)	0.1μH		
L 3	Not assigned			
L 4	Coil,(SP0408-R10M)	0.1μH		
L 5	Not assigned			

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

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Parts List : Z16-Z8 5X 100 MHz

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Coil,(SP0408-R10M)	0.1μH		
L 7	Coil,(34L74430C)			
L 8	Coil,(SP0408-R10M)	0.1μH		
L 9	Coil,(34L74430C)			
L10	Coil,(SP0408-R10M)	0.1μH		
Q 1	Tr,(2SC2369)			
Q 2	Di,(1SS97)			
Q 3	Tr,(2SC2408A)			Q'ty 2
Q 4	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 5	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 6	FET,(3SK129R)			
Q 7	Di,breakdown, (RD5.1EB(3))	4.95 to 5.2V,400mW		
Q 8	Tr,(2SC2369)			
Q 9	FET,(3SK129R)			
Q10	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q11	Tr,(2SC2369)			
R 1	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R 2	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 3	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 4	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R 5	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 6	MF,(RS2FB 47ΩJ)	47Ω,±5%,2W		
R 7	MF,(RS2FB 47ΩJ)	47Ω,±5%,2W		
R 8	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 9	MF,(NRTF1/4C 33ΩJ)	33Ω,±5%,1/4W		
R10	MF,(NRTF1/4C 47ΩJ)	47Ω,±5%,1/4W		
R11	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R12	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R13	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R14	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R15	Not assigned			
R16	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R17	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R18	Not assigned			
R19	Not assigned			
R20	Not assigned			
R21	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R22	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R23	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R24	CF,(ARD25T331J)	330Ω,±5%,1/4W		

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

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Parts List : Z16-Z8 5X 100 MHz

CKT REF	DESCRIPTION	RATING		NOTE
Z 1	BPF,(252MxPR-2700F)			500MHz
Z 2	BPF,(252MxPR-2700F)			500MHz
Z 3	BPF,(252MxPR-2700F)			500MHz

M-1

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

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Parts List : Z16-Z9 YTO PD

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 2	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C 3	Not assigned			
C 4	Not assigned			
C 5	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 6	Not assigned			
C 7	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C 8	Not assigned			
C 9	Not assigned			
C10	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C11	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C12	Not assigned			
C13	Not assigned			
C14	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C15	Cer,(CC924CH1H680J)	68pF,±5%,50V		
C16	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C17	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C18	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C19	Cer,(CC924CH1H470J)	47pF,±5%,50V		
C20	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C21	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C22	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C23	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C24	Not assigned			
C25	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C26	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C27	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C28	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C29	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C30	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C31	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C32	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C33	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C34	Not assigned			
C35	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C36	Elect,(CE04W1A470)	47μF,±20%,10V		
C37	Elect,(CE04W1A470)	47μF,±20%,10V		
C38	Not assigned			
C39	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C40	Elect,(CE04W1A101)	100μF,±20%,10V		
C41	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C42	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C43	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C44	Elect,(CE04W1E101)	100pF,±20%,25V		
C45	Elect,(CE04W1E101)	100pF,±20%,25V		

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

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Parts List : Z16-Z9 YTO PD

CKT REF	DESCRIPTION	RATING		NOTE
C46	Elect,(CE04W1E101)	100μF,±20%,25V		
L 1	Coil,(SP0408-R22K)	0.22μH		
L 2	Coil,(SP0408-R22K)	0.22μH		
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil,(LF8-101K)			
L 6	Not assigned			
L 7	Coil,(LF8-470K)	47μH		
L 8	Coil,(LF8-470K)	47μH		
L 9	Coil,(LF8-101K)	100μH		
L10	Not assigned			
L11	Coil,(LF8-101K)	100μH		
Q 1	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 2	Tr,(2SC2369)			
Q 3	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 4	Tr,(2SC2369)			
Q 5	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 6	Tr,(2SC2369)			
Q 7	Di,(1S953)			
Q 8	Tr,(2SC2369)			
Q 9	Di,(1S953)			
Q10	Di,(1S953)			
Q11	Di,(1S953)			
Q12	Not assigned			
Q13	Not assigned			
Q14	IC,(MC12040L)			
Q15	IC,(NE5534AP)			
Q16	IC,(μPC1651G)			
R 1	Not assigned			
R 2	Not assigned			
R 3	Not assigned			
R 4	Not assigned			
R 5	Not assigned			
R 6	Not assigned			
R 7	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R 8	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 9	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R10	CF,(ARD25T6R8J)	6.8Ω,±5%,1/4W		
R11	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R12	Not assigned			

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

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Parts List : Z16-Z9 YTO PD

CKT REF	DESCRIPTION	RATING		NOTE
R13	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R14	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R15	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R16	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R17	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R18	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R19	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R20	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R21	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R22	CF,(ARD25T560J)	56Ω,±5%,1/4W		
R23	Not assigned			
R24	Not assigned			
R25	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R26	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R27	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R28	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R29	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R30	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R31	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R32	Not assigned			
R33	Not assigned			
R34	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R35	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R36	Not assigned			
R37	Not assigned			
R38	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R39	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R40	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R41	CF,(ARD25T820J)	82Ω,±5%,1/4W		
R42	MF,(RN14K2E4320D)	432Ω,±0.5%,1/4W		
R43	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R44	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R45	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R46	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R47	CF,(ARD25T101J)	100Ω,±5%,1/4W		

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

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Parts List : Z16-Z10 M/N PD

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 2	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 3	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 4	Not assigned			
C 5	Elect,(CE04W1E470)	47μF,±20%,50V		
C 6	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 7	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 8	Plast,(ECQ-V1H224JW)	0.22μF,±5%,50V		
C 9	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C10 to C24	Not assigned			
C25	Elect,(CE04W1E101)	100μF,±20%,25V		
C26	Tant,(CS-E1D2R2M)	2.2μF,±20%,20V		
C27	Not assigned			
C28	Not assigned			
C29	Elect,(CE04W1V100)	10μF,±20%,35V		
C30	Elect,(CE04W1V100)	10μF,±20%,35V		
C31	Not assigned			
C32	Not assigned			
C33	Tant,(CS-E1C3R3M)	3.3μF,±20%,16V		
C34	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C35	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C36	Not assigned			
C37	Elect,(CE04W1E101)	100μF,±20%,25V		
C38	Not assigned			
C39	Not assigned			
C40	Cer,(RPE111CH201G50)	200pF,±2%,50V		
C41	Cer,(RPE111CH201G50)	200pF,±2%,50V		
C42	Plast,(ECQ-V1H105JW)	1μF,±5%,50V		
C43	Plast,(ECQ-V1H474JW)	0.47μF,±5%,50V		
C44	Plast,(ECQ-V1H474JW)	0.47μF,±5%,50V		
C45	Plast,(ECQ-V1H474JW)	0.47μF,±5%,50V		
C46	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C47	Not assigned			
C48	Elect,(CE04W1E470)	47μF,±20%,25V		
C49	Elect,(CE04W1E470)	47μF,±20%,25V		
C50	Not assigned			
C51	Not assigned			
C52	Elect,(CE04W1E101)	100μF,±20%,25V		
C53	Elect,(CE04W1E470)	47μF,±20%,25V		
C54	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C55	Not assigned			

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

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Parts List : Z16-Z10 M/N PD

CKT REF	DESCRIPTION	RATING		NOTE
C56	Elect,(CE04W1E101)	100μF,±20%,25V		
C57	Elect,(CE04W1E470)	47μF,±20%,25V		
C58	Not assigned			
C59	Not assigned			
C60	Elect,(CE04W1A101)	100μF,±20%,10V		
C61	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C62	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C63	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
J 1	Connector, (HIF23A-26D-AA40S)			
L 1	Coil,(LF8-101K)	100μH		
L 2	Coil,(LF8-101K)	100μH		
L 3	Not assigned			
L 4	Not assigned			
L 5	Not assigned			
L 6	Coil,(LF8-221K)	220μH		
L 7	Coil,(LF8-221K)	220μH		
L 8	Not assigned			
L 9	Not assigned			
L10	Not assigned			
L11	Coil,(LF8-221K)	220μH		
L12	Coil,(LF8-221K)	220μH		
L13	Coil,(339T20198G)			
L14	Coil,(339T20199A)			
L15	Coil,(339T20198G)			
Q 1	Di,(11C91)			
Q 2	Di,(1S953)			
Q 3	Tr,(2SC2570A)			
Q 4	IC,(74F191PC)			
Q 5	IC,(74F191PC)			
Q 6	IC,(74F191PC)			
Q 7	IC,(74S00)			
Q 8	IC,(MC4044P)			
Q 9	Not assigned			
Q10	Not assigned			
Q11	Not assigned			
Q12	Not assigned			
Q13	Not assigned			
Q14	Not assigned			
Q15	IC,(TC4053BP)			

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

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Parts List : Z16-Z10 M/N PD

CKT REF	DESCRIPTION	RATING		NOTE
Q16	IC,(TC4053BP)			
Q17	IC,(NE5532A)			
Q18	Not assigned			
Q19	Not assigned			
Q20	IC,(NE5534A)			
Q21	Not assigned			
Q22	Not assigned			
Q23	Not assigned			
Q24	Not assigned			
Q25	Not assigned			
Q26	Not assigned			
Q27	Not assigned			
Q28	Not assigned			
Q29	IC,(NE5532A)			
Q30	IC,(μPC649D)			
Q31	Not assigned			
Q32	Not assigned			
Q33	IC,(μPC14308H)			
Q34	Di,(1S953)			
Q35	IC,(μPC16308H)			
Q36	Not assigned			
Q37	Not assigned			
Q38	Di,(1S953)			
Q39	Di,(1S953)			
Q40	Di,(1S953)			
Q41	Di,(1S953)			
Q42	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q43	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q44	IC,(μPC14308H)			
Q45	Tr,(2SD568)			
Q46	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q47	Di,(1S953)			
R 1	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R 2	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R 3	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 4	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R 5	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 6	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 7	Not assigned			
R 8	Not assigned			
R 9	Not assigned			
R10	CF,(ARD25T221J)	220Ω,±5%,1/4W		

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

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Parts List : Z16-Z10 M/N PD

CKT REF	DESCRIPTION	RATING		NOTE
R11	Not assigned			
R12	Not assigned			
R13	Not assigned			
R14	Not assigned			
R15	Not assigned			
R16	Not assigned			
R17	Not assigned			
R18	Not assigned			
R19	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R20	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R21	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R22	Not assigned			
R23	Not assigned			
R24	Not assigned			
R25	Not assigned			
R26	Not assigned			
R27	Not assigned			
R28	Not assigned			
R29	CF,(ARD25T183J)	18kΩ,±5%,1/4W		
R30	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R31	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R32	Not assigned			
R33	Not assigned			
R34	Not assigned			
R35	Not assigned			
R36	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R37	Not assigned			
R38	Not assigned			
R39	Not assigned			
R40	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R41	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R42	Not assigned			
R43	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R44	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R45	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R46	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R47	CF,(ARD25T4R7J)	4.7Ω,±5%,1/4W		
R48	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R49	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R50	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R51	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R52	MF,(RN14K2E9091D)	9.09kΩ,±0.5%,1/4W		
R53	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R54	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R55	Not assigned			

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

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Parts List : Z16-Z10 M/N PD

CKT REF	DESCRIPTION	RATING		NOTE
R56	Not assigned			
R57	Not assigned			
R58	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R59	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R60	MF,(RN14K2E1211D)	1.21kΩ,±0.5%,1/4W		
R61	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R62	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R63	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R64	Not assigned			
R65	Not assigned			
R66	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R67	Not assigned			
R68	Single in-line array (IHR-4-103JA)	10kΩ x 4,1/8W		
R69	Not assigned			
R70	MF,(RS1FB10ΩJ)	10Ω,±10%,1W		
R71	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R72	Not assigned			
R73	Not assigned			
R74	Not assigned			
R75	Not assigned			
R76	Not assigned			
R77	Not assigned			
R78	Not assigned			
R79	Not assigned			
R80	Not assigned			
R81	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R82	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R83	CF,(ARD25T471J)	470Ω,±5%,1/4W		

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

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Parts List : Z16-Z15 HPF

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CC732CK1H0R5C)	0.5pF, ±0.25pF, 50V		
R 1	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W		
R 2	MF, (RM73B2B510JD)	51Ω, ±5%, 1/8W		

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

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Parts List: Z18 µ 2nd CONVERTER 1

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer, (CK45D1H472MY)	4700pF, ±20%, 50V		
C 2	Cer, (CK45D1H472MY)	4700pF, ±20%, 50V		
C 3	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
R 1	MF, (NRTF1/4C 22ΩJ)	22Ω, ±5%, 1/4W		
R 2	MF, (NRTF1/4C 330ΩJ)	330Ω, ±5%, 1/4W		
R 3	MF, (NRTF1/4C 330ΩJ)	330Ω, ±5%, 1/4W		
R 4	CF, (ARD25T820J)	82Ω, ±5%, 1/4W		
Z 1	231MT-1054A BPF			
Z 2	MC-5192			
Z 3	232MT-1040A BPF			

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

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Parts List : Z19 µ 2nd CONVERTER 2

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Not assigned			
C 3	Not assigned			
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer, (CC732CH1H090D)	9pF, ±0.5pF, 50V		
C 7	Cer, (CC732CH1H150J)	15pF, ±5%, 50V		
C 8	Cer, (CC732CH1H090D)	9pF, ±0.5pF, 50V		
C 9	Var, Cer, (TZ03R300A)	5.2 to 30pF, 100V		
C10	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C11	Cer, (CC924CH1H510J)	51pF, ±5%, 50V		
C12	Cer, (RPE111CH161G50)	160pF, ±2%, 50V		
C13	Cer, (CC924CH1H620J)	62pF, ±5%, 50V		
C14	Cer, (CC45SH1H * JY)	22 to 390pF, ±5%, 50V		Q'ty 1 or 2, *
C15	Cer, (CK45D1H103MY)	0.01µF, ±20%, 50V		
C16	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C17	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C18	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C19	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C20	Cer, (CK45B1H102KY)	1000pF, ±10%, 50V		
C21	Cer, (CK45D1H103MY)	0.01µF, ±20%, 50V		
C22	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C23	Cer, (CC45SH1H680JY)	68pF, ±5%, 50V		
C24	Not assigned			
C25	Not assigned			
C26	Cer, (CC732CH1H471J)	470pF, ±5%, 50V		
C27	Cer, (CK924F1H104Z)	0.1µF, +80/-20%, 50V		
C28	Cer, (DSS310-55D223S)	0.022µF, +50/-20%, 50V		
C29	Elect, (CE04W1J1R0)	1µF, ±20%, 63V		
C30	Cer, (CK45D1H103MY)	0.01µF, ±20%, 50V		
C31	Not assigned			
C32	Not assigned			
C33	Not assigned			
C34	Cer, (CK45D1H103MY)	0.01µF, ±20%, 50V		
C35	Cer, (CK45D1H103MY)	0.01µF, ±20%, 50V		
C36	Elect, (CE04W1E101)	100µF, ±20%, 25V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Connector, (27DP-LP-1.5QEW-AA)			
J 4	Connector, (27DP-LP-1.5QEW-AA)			
J 5	Not assigned			

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

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Parts List : Z19 µ 2nd CONVERTER 2

CKT REF	DESCRIPTION	RATING		NOTE
J 6	Connector, (DF1-8S-2.5R24)			
K 1	Relay, (NR-SD-12V)			
K 2	Relay, (NR-SD-12V)			
K 3	Relay, (NR-SD-12V)			
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil, (SP0408-R15K)	0.15µH		
L 6	Coil, (SP0408-R33K)	0.33µH		
L 7	Coil, (SP0408-R10M)	0.1µH		
L 8	Coil, (SP0408-R68K)	0.68µH		
L 9	Coil, (SP0408-6R8K)	6.8µH		
L10	Coil, (SP0408-6R8K)	6.8µH		
L11	Coil, (SP0408-6R8K)	6.8µH		
L12	Coil, (SP0408-3R3K)	3.3µH		
L13	Coil, (LF8-100K)	10µH		
Q 1	Tr, (2SC2369)			
Q 2	Tr, (2SA1206)			
Q 3	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q 4	Di, (1SV34)			
Q 5	Tr, (2SC2369)			
Q 6	Tr, (2SA1206)			
Q 7	Di, (1SV34)			
Q 8	Not assigned			
Q 9	Tr, (DTC143EF)			
Q10	Tr, (DTC143EF)			
Q11	Tr, (DTC143EF)			
Q12	Di, (1S953)			
Q13	Di, (1S953)			
Q14	Di, (1S953)			
R 1	Not assigned			
R 2	Not assigned			
R 3	Not assigned			
R 4	Not assigned			
R 5	MF, (NRTF1/4C 22ΩJ)	22Ω, ±5%, 1/4W		

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

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Parts List : Z19 μ 2nd CONVERTER 2

CKT REF	DESCRIPTION	RATING		NOTE
R 6	MF,(NRTF1/4C 330ΩJ)	330Ω,±5%,1/4W		
R 7	MF,(NRTF1/4C 330ΩJ)	330Ω,±5%,1/4W		
R 8	MF,(NRTF1/4C 50ΩJ)	50Ω,±5%,1/4W		
R 9	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R10	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R11	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R12	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R13	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R14	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R15	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R16	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R17	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R18	Not assigned			
R19	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R20	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R21	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R22	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R23	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R24	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R25	Not assigned			
R26	Not assigned			
R27	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R28	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R29	Not assigned			
R30	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R31	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R32	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
Z 1	Not assigned			
Z 2	Not assigned			
Z 3	Not assigned			
Z 4	MIXER,(M-3)			

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* : Selected at factory

Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1E470)	47μF,±20%,25V		
C 2	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C 3	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 4	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 5	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C 6	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 7	Cer,(CC924CH1H100D)	10pF,±0.5pF,50V		
C 8	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C 9	Cer,(CC924CH1H360J)	36pF,±5%,50V		
C10	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C11	Elect,(CE04W1E470)	47μF,±20%,25V		
C12	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C13	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C14	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C15	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C16	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C17	Elect,(CE04W1E470)	47μF,±20%,25V		
C18	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C19	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C20	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C21	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C22	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C23	Not assigned			
C24	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C25	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C26	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C27	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C28	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C29	Elect,(CE04W1A101)	100μF,±20%,10V		
C30	Not assigned			
C31	Cer,(RPE111CH471G50)	470pF,±2%,50V		
C32	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C33	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C34	Not assigned			
C35	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C36	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C37	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C38	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C39	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C40	Not assigned			
C41	Tant,(CS-E1C3R3M)	3.3μF,±20%,16V		
C42	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C43	Not assigned			
C44	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C45	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

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* : Selected at factory

Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
C46	Not assigned			
C47	Not assigned			
C48	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C49	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C50	Tant,(CS-E1C3R3M)	3.3μF,±20%,16V		
C51	M Plast, (CF922N2A104K)	0.1μF,±10%,100V		
C52	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C53	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C54	Not assigned			
C55	Not assigned			
C56	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C57	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C58	Not assigned			
C59	Not assigned			
C60	Elect,(CE04W1E470)	47μF,±20%,25V		
C61	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C62	Not assigned			
C63	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C64	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C65	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C66	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C67	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C68	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C69	Elect,(CE04W1E101)	100μF,±20%,25V		
C70	Not assigned			
C71	Not assigned			
C72	Not assigned			
C73	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C74	Elect,(CE04W1E470)	47μF,±20%,25V		
C75	Not assigned			
C76	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C77	Elect, (CA92C-1C-1R000-R53)	1μF,-20%,16V		
C78	Cer,(CC45CH1H101JY)	100pF,±5%,50V		
C79	Cer,(CC45CH1H150JY)	15pF,±5%,50V		
C80	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C81	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C82	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C83	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C84	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C85	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C86	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C87	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C88	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

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* : Selected at factory

Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
C89	Elect,(CE04W1E470)	47μF,±20%,25V		
C90	Elect,(CE04W1E470)	47μF,±20%,25V		
C91	Elect,(CE04W1A101)	100μF,±20%,10V		
C92	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C93	Not assigned			
C94	Not assigned			
C95	Not assigned			
C96	Elect,(CE04W1E101)	100μF,±20%,25V		
C97	Elect,(CE04W1E101)	100μF,±20%,25V		
C98	Elect, (CA92C-1C-1R000-R53)	1μF,-20%,16V		
C99	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C100	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C101	Elect, (CA92C-1C-1R000-R53)	1μF,-20%,16V		
C102	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C103	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C104	M Plast,(CF922N2A105K)	1μF,±10%,100V		
C105	M Plast,(CF922N2A225K)	2.2μF,±10%,100V		
C106	Cer,(CC924CH1H220J)	22pF,±5%,50V		
C107	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C108	Cer,(CK924F1H04Z)	0.1μF,+80/-20%,50V		
J 1	Connector,(27DP-LP-1.5)			
J 2	Connector,(27DP-LR-PC)			
J 3	Connector,(PI011-12M)	12 pins		
J 4	Connector,(PI011-02F)	2 pins		
J 5	Not assigned			
J 6	Connector, (HIF3-26P-2.54DS)	26 pins		
J 7	Connector, (DF1-8P-2.5DSA)	8 pins		
J 8	Connector, (DF1-5P-2.5DSA)	5 pins		
J 9	Connector, (HIF3-34P-2.54DS)	34 pins		
K 1	Relay,(NR-SD-12V)			
L 1	Coil,(44L46006C)	86 nH		
L 3	Coil,(34L52688B)	18 nH		
L 3	Coil,(LF8-100K)	10μH		
L 4	Coil,(LF8-101K)	100μH		
L 5	Not assigned			

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Not assigned			
L 7	Coil,(LF8-221K)	220μH		
L 8	Coil,(LF8-221K)	220μH		
L 9	Not assigned			
L10	Not assigned			
L11	Coil,(LH1-471K)	470μH		
L12	Coil,(LH1-471K)	470μH		
L13	Coil,(LH1-471K)	470μH		
Q 1	FET,(2SK55E)			
Q 2	FET,(2SK55E)			
Q 3	Di,(1SV50)			
Q 4	Di,(1SV50)			
Q 5	Tr,(2SC2369)			
Q 6	Tr,(2SC2369)			
Q 7	Tr,(2SC2369)			
Q 8	Di,(1S953)			
Q 9	IC,(MC10H131L)			
Q10	Di,(1S953)			
Q11	Tr,(2SC2570A)			
Q12	IC,(SN74AS161N)			
Q13	Tr,(2SC2368)			
Q14	IC,(DTC143EF)			
Q15	Di,(1S953)			
Q16	IC,(74LS293)			
Q17	IC,(74121)			
Q18	Tr,(2SC2901)			
Q19	Tr,(2SC2901)			
Q20	Tr,(2SC1844)			
Q21	IC,(NE5532A)			
Q22	IC,(μPC258C)			
Q23	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q24	Di,breakdown,(RD13EB)	12.4 to 14.1V,400mW		
Q25	IC,(μPC14312H)			
Q26	IC,(μPC16312H)			
Q27	IC,(μPC14308H)			
Q28	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q29	Di,(1S953)			
Q30	Tr,(2SC2721)			
Q31	Di,breakdown,(1SZ52)	5.9 to 6.5V,400mW		
Q32	IC,(μPC454D)			
Q33	IC,(μPC648D)			
Q34	IC,(TC4042BP)			
Q35	IC,(TC40H374P)			

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
Q36	IC,(TC4042BP)			
Q37	IC,(TC40H374P)			
Q38	IC,(TC40H374P)			
Q39	Not assigned			
Q40	IC,(μPC258C)			
Q41	IC,(μPC648D)			
Q42	IC,(μPC258C)			
Q43	IC,(HA17408P)			
Q44	IC,(74LS00)			
Q45	IC,(μPD7011C)			Q'ty 2
Q46	IC,(TC40H374P)			
Q47	IC,(MX7530JN)			
Q48	Di,(1S953)			
Q49	IC,(μPC258C)			
Q50	IC,(TC4053BP)			
Q51	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q52	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q53	IC,(TC4052BP)			
Q54	IC,(TC4053BP)			
Q55	IC,(μPC454D)			
Q56	IC,(μPC803C)			
Q57	IC,(μPC258C)			
Q58	IC,(TC4011BP)			
Q59	IC,(NJU201AD)			
Q60	Not assigned			
Q61	IC,(μPC1093J)			
Q62	Not assigned			
Q63	Not assigned			
Q64	IC,(TC4052BP)			
Q65	IC,(μPC258C)			
Q66	Tr,(2SC2718)			
Q67	IC,(TC40H374P)			
Q68	IC,(TC04H374P)			
Q69	IC,(TC04H174P)			
Q70	IC,(TC40H374P)			
Q71	IC,(μPD7011C)			
Q72	IC,(NE5532A)			
Q73	Di,breakdown,(RD3.9EB)	3.7 to 4.1V,400mW		
Q74	Not assigned			
Q75	IC,(TC4052BP)			
Q76	IC,(NE5532A)			
Q77	Not assigned			
Q78	IC,(TC40H374P)			
Q79	IC,(TC40H138P)			
Q80	Not assigned			

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

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
Q81	IC,(μPC14312H)			
Q82	IC,(μPC78L05)			
Q83	IC,(μPC16312H)			
Q84	IC,(LM79L05ACZ)			
Q85	Not assigned			
Q86	Not assigned			
Q87	Not assigned			
Q88	IC,(TC40H138P)			
Q89	IC,(μPC454D)			
Q90	Not assigned			
Q91	Not assigned			
Q92	Not assigned			
Q93	Tr,(2SC2718)			
Q94	Not assigned			
R 1	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 2	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R 3	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 4	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R 5	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 6	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 7	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 8	CF,(ARD25T150J)	15Ω,±5%,1/4W		
R 9	MF,(RN14K2E1211D)	1.21kΩ,±0.5%,1/4W		
R10	MF,(RN14K2E2101D)	2.10kΩ,±0.5%,1/4W		
R11	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R12	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R13	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R14	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R15	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R16	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R17	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R18	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R19	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R20	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R21	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R22	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R23	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R24	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R25	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R26	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R27	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R28	CF,(ARD25T511J)	510Ω,±5%,1/4W		

( ): Manufacturer's part number
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CKT REF	DESCRIPTION	RATING		NOTE
R29	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R30	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R31	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R32	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R33	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R34	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R35	MF,(RN14K2E5111D)	5.11kΩ,±0.5%,1/4W		
R36	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R37	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R38	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R39	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R40	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R41	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R42	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R43	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R44	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R45	MF,(RN14K2E1501D)	1.50kΩ,±0.5%,1/4W		
R46	MF,(RN14K2E3401D)	3.40kΩ,±0.5%,1/4W		
R47	MF,(RN14K2E3401D)	3.40kΩ,±0.5%,1/4W		
R48	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R49	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R50	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R51	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R52	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R53	MF,(RN14K2E1782D)	17.8kΩ,±0.5%,1/4W		
R54	MF,(RN14K2E1782D)	17.8kΩ,±0.5%,1/4W		
R55	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R56	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R57	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R58	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R59	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R60	MF,(RN14K2E2492D)	24.9kΩ,±0.5%,1/4W		
R61	Var,MF,(RJ-6S 1kΩ)	1.0kΩ,1/2W		
R62	MF,(RN14K2E2611D)	2.61kΩ,±0.5%,1/4W		
R63	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R64	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R65	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R66	Var,MF,(RJ-6S 200Ω)	200Ω,1/2W		
R67	MF,(RN14K2E7680D)	768Ω,±0.5%,1/4W		
R68	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R69	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R70	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R71	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R72	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R73	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		

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* : Selected at factory

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CKT REF	DESCRIPTION	RATING		NOTE
R74	MF,(RN14K2E6811D)	6.81kΩ,±0.5%,1/4W		
R75	MF,(RN14K2E6190D)	619Ω,±0.5%,1/4W		
R76	MF,(RN14K2E2551D)	2.55kΩ,±0.5%,1/4W		
R77	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R78	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R79	Var,MF,(RJ-6S 1kΩ)	1.0kΩ,1/2W		
R80	Not assigned			
R81	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R82	MF,(RN14K2E10R0D)	10.0Ω,±0.5%,1/4W		
R83	MF,(RS1FB22ΩJ)	22Ω,±5%,1W		
R84	MF,(RN14K2E7680D)	768Ω,±0.5%,1/4W		
R85	Var,MF,(RJ-6P 1kΩ)	1.0kΩ,1/2W		
R86	MF,(RN14K2E5491D)	5.49kΩ,±0.5%,1/4W		
R87	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R88	CF,(ARD25T180J)	18Ω,±5%,1/4W		
R89	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R90	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R91	Var,MF,(RJ-6P 200Ω)	200Ω,1/2W		
R92	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R93	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R94	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R95	Not assigned			
R96	Not assigned			
R97	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R98	MF,(RN14K2E1151D)	1.15kΩ,±0.5%,1/4W		
R99	Not assigned			
R100	Not assigned			
R101	MF,(RN14K2E4992D)	49.9kΩ,±0.5%,1/4W		
R102	MF,(RN14K2E1000D)	100Ω,±0.5%,1/4W		
R103	Not assigned			
R104	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R105	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R106	Not assigned			
R107	Not assigned			
R108	Not assigned			
R109	Not assigned			
R110	Not assigned			
R111	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R112	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R113	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R114	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R115	MF,(RN14K2E5490D)	549Ω,±0.5%,1/4W		
R116	MF,(RN14K2E1272D)	12.7kΩ,±0.5%,1/4W		
R117	MF,(RN14K2E4421D)	4.42kΩ,±0.5%,1/4W		
R118	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		

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

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
R119	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R120	MF,(RN14K2E4421D)	4.42kΩ,±0.5%,1/4W		
R121	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W		
R122	Not assigned			
R123	Not assigned			
R124	Not assigned			
R125	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R126	Var,MF,(RJ-6S 1kΩ)	1.0kΩ,1/2W		
R127	MF,(RN14K2E1152D)	11.5kΩ,±0.5%,1/4W		
R128	Var,MF,(RJ-6P 1kΩ)	1.0kΩ,1/2W		
R129	MF,(RN14K2E8661D)	8.66kΩ,±0.5%,1/4W		
R130	Not assigned			
R131	Not assigned			
R132	Not assigned			
R133	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R134	MF,(RN14K2E5901D)	5.90kΩ,±0.5%,1/4W		
R135	MF,(RN14K2E30R1D)	30.1Ω,±0.5%,1/4W		
R136	Not assigned			
R137	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R138	MF,(RN14K2E1101D)	1.10kΩ,±0.5%,1/4W		
R139	MF,(RN14K2E3742D)	37.4kΩ,±0.5%,1/4W		
R140	MF,(RN14K2E3742D)	37.4kΩ,±0.5%,1/4W		
R141	MF,(RN14K2E3742D)	37.4kΩ,±0.5%,1/4W		
R142	MF,(RN14K2E3742D)	37.4kΩ,±0.5%,1/4W		
R143	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R144	MF,(RN14K2E2003D)	200kΩ,±0.5%,1/4W		
R145	MF,(RN14K2E7151D)	7.15kΩ,±0.5%,1/4W		
R146	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R147	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R148	Not assigned			
R149	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R150	Not assigned			
R151	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R152	Not assigned			
R153	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R154	Not assigned			
R155	CF,(ARD25T * J)	33k to 220kΩ,±5%, 1/4W		*
R156	Not assigned			
R157	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R158	Not assigned			
R159	CF,(ARD25T * J)	1Ω to 47kΩ,±5%,1/4W		Q'ty 0 or 1, *
R160	Not assigned			

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

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
R161	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R162	Not assigned			
R163	Not assigned			
R164	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R165	Var,MF,(RJ-6S 20kΩ)	20kΩ,1/2W		
R166	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R167	Var,MF,(RJ-6S 50kΩ)	50kΩ,1/2W		
R168	Var,MF,(RJ-6S 20kΩ)	20kΩ,1/2W		
R169	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R170	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R171	CF,(ARD25T * J)	22k to 1MΩ,±5%,1/4W		Q'ty 0 or 1, *
R172	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R173	Var,MF,(RJ-6S 1kΩ)	1.0kΩ,1/2W		
R174	Var,MF,(RJ-6S 100kΩ)	100kΩ,1/2W		
R175	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R176	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R177	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R178	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R179	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W		
R180	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R181	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R182	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R183	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R184	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R185	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R186	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W		
R187	Not assigned			
R188	Not assigned			
R189	Not assigned			
R190	Not assigned			
R191	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R192	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R193	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R194	Var,MF,(RJ-6S 10kΩ)	10kΩ,1/2W		
R195	Var,MF,(RJ-6S 2kΩ)	2kΩ,1/2W		
R196	Not assigned			
R197	Not assigned			
R198	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R199	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R200	Not assigned			
R201	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R202	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R203	Not assigned			
R204	Not assigned			
R205	Not assigned			

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

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Parts List : Z21 LOCAL CONTROL 1

CKT REF	DESCRIPTION	RATING		NOTE
R206	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R207	Single in-line array, (IHR-4-472JA)	4.7kΩ x 4,1/8W		
R208	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R209	Single in-line array, (IHR-4-472JA)	4.7kΩ x 4,1/8W		
R210	Not assigned			
R211	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R212	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R213	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R214	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R215	Not assigned			
R216	Not assigned			
R217	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R218	Not assigned			
R219	Not assigned			
R220	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R221	Signal in-line array, (RRS-6-472JB)	4.7kΩx6,1/8W		
R222	Var,MF,(RJ-6P100kΩ)	100kΩ,1/2W		
R223	MF,(RN14K2E1132D)	11.3kΩ,±0.5%,1/4W		
R224	Not assigned			
R225	Not assigned			
R226	Not assigned			
R227	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R228	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R229	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R230	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R231	Not assigned			
R232	Not assigned			
R233	Not assigned			
R234	Not assigned			
R235	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R236	CF,(ARD25T4R7J)	4.7Ω,±5%,1/4W		
R237	Not assigned			
R238	Not assigned			
R239	Not assigned			
R240	Single in-line array, (RRS-4-332JB)	3.2kΩx4,1/8W		
R241	Var,MF,(RJ-6P100kΩ)	100kΩ,1/2W		
R242	MF,(RN14K2E1212D)	12.1kΩ,±0.5%,1/4W		
R243	Single in-line array, (RRS-4-472JB)	4.7kΩx4,1/8W		
R244	Single in-line array, (RRS-4-472JB)	4.7kΩx4,1/8W		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C 2	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C 3	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C 4	Cer,(CC924CH1H910J)	91pF,±5%,50V		
C 5	Not assigned			
C 6	Not assigned			
C 7	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C 8	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C 9	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C10	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C11	Cer,(CK924C1H104M)	0.01μF,±20%,50V		
C12	Cer,(CC45CH1H470JY)	47pF,±5%,50V		
C13	Not assigned			
C14	Not assigned			
C15	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C16	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C17	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C18	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C19	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C20	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C21	Cer,(CC45SH1H150JY)	15pF,±5%,50V		
C22	Cer,(CC45SH1H270JY)	27pF,±5%,50V		
C23	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C24	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C25	Elect,(CE04W1E470)	47μF,±20%,25V		
C26	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C27	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C28	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C29	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C30	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C31	Cer,(CC45SH1H150JY)	15pF,±5%,50V		
C32	Cer,(CC45SH1H270JY)	27pF,±5%,50V		
C33	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C34	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C35	Elect,(CE04W1E470)	47μF,±20%,25V		
C36	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C37	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C38	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C39	Not assigned			
C40	Not assigned			
C41	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C42	Cer,(CC45CK1H010CY)	1pF,±0.25pF,50V		Q'ty 0 or 1
C43	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C44	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C45	Cer,(CK924C1H103M)	0.01μF,±20%,50V		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
C46	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C47	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C48	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C49	Cer,(CC45CH1H050CY)	5pF,±0.25pF,50V		
C50	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C51	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C52	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C53	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C54	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C55	Not assigned			
C56	Not assigned			
C57	Not assigned			
C58	Not assigned			
C59	Not assigned			
C60	Not assigned			
C61	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C62	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C63	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C64	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C65	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C66	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C67	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C68	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C69	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C70	Elect,(CE04W1E470)	47μF,±20%,25V		
C71	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C72	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C73	Not assigned			
C74	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C75	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C76	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C77	Not assigned			
C78	Not assigned			
C79	Not assigned			
C80	Not assigned			
C81	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C82	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C83	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C84	Var,Cer,(TZ03Z500E)	6 to 50pF,100V		
C85	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C86	Cer,(RPE111CH331G50)	330pF,±2%,50V		
C87	Cer,(CC45SH1H101JY)	100pF,±5%,50V		
C88	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C89	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C90	Not assigned			

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
C91	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C92	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C93	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C94	Var,Cer,(TZ03Z500E)	6 to 50pF,100V		
C95	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C96	Cer,(RPE111CH331G50)	330pF,±2%,50V		
C97	Cer,(CC45SH1H101JY)	100pF,±5%,50V		
C98	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C99	Not assigned			
C100	Not assigned			
C101	Not assigned			
C102	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C103	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C104	Var,Cer,(TZ03Z500E)	6 to 50pF,100V		
C105	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C106	Cer,(RPE111CH331G50)	330pF,±2%,50V		
C107	Cer,(CC45SH1H101JY)	100pF,±5%,50V		
C108	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C109	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C110	Not assigned			
C111	Not assigned			
C112	Not assigned			
C113	Not assigned			
C114	Not assigned			
C115	Not assigned			
C116	Elect,(CE04W1E470)	47μF,±20%,25V		
C117	Not assigned			
C118	Not assigned			
C119	Not assigned			
C120	Not assigned			
C121	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C122	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C123	Cer,(CK924C1H223M)	0.022μF,±20%,50V		
C124	Not assigned			
C125	Not assigned			
C126	Not assigned			
C127	Not assigned			
C128	Not assigned			
C129	Not assigned			
C130	Not assigned			
C131	Not assigned			
C132	Not assigned			
C133	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C134	Not assigned			
C135	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
C136	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C137	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C138	Not assigned			
C139	Not assigned			
C140	Not assigned			
C141	Not assigned			
C142	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C143	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C144	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C145	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C146	Not assigned			
C147	Not assigned			
C148	Not assigned			
C149	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C150	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C151	Not assigned			
C152	Not assigned			
C153	Not assigned			
C154	Not assigned			
C155	Not assigned			
C156	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C157	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 0 or 1
C158	Not assigned			
C159	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C160	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C161	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C162	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C163	Cer,(CC45CK1H010CY)	1pF,±0.25pF,50V		Q'ty 0 or 1
C164	Not assigned			
C165	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C166	Cer,(CK924C1H104M)	0.1μF,±20%,50V		Q'ty 0 or 1
C167	Not assigned			
C168	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C169	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C170	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C171	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C172	Cer,(CC45CK1H010CY)	1pF,±0.25pF,50V		
C173	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C174	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C175	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C176	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C177	Cer,(CC45SH1H150JY)	15pF,±5%,50V		
C178	Cer,(CC45SH1H270JY)	27pF,±5%,50V		
C179	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C180	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
C181	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C182	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C183	Not assigned			
C184	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C185	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C186	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C187	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C188	Cer,(CC45SH1H150JY)	15pF,±5%,50V		
C189	Cer,(CC45SH1H270JY)	27pF,±5%,50V		
C190	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C191	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C192	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C193	Not assigned			
C194	Not assigned			
C195	Not assigned			
C196	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C197	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C198	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C199	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C200	Cer,(CC45SH1H150JY)	15pF,±5%,50V		
C201	Cer,(CC45SH1H270JY)	27pF,±5%,50V		
C202	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C203	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C204	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C205	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C206	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C207	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C208	Not assigned			
C209	Not assigned			
C210	Not assigned			
C211	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C212	Not assigned			
C213	Not assigned			
C214	Not assigned			
C215	Not assigned			
C216	Not assigned			
C217	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C218	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C219	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C220	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C221	Not assigned			
C222	Not assigned			
C223	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C224	Elect,(CE04W1A101)	100pF,±20%,10V		
C225	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
C226	Elect,(CE04W1A101)	100µF,±20%,10V		
C227	Elect,(CE04W1E470)	47µF,±20%,25V		
C228	Elect,(CE04W1E470)	47µF,±20%,25V		
C229	Not assigned			
C230	Not assigned			
C231	Cer,(CK924C1H223M)	0.022µF,±20%,50V		
C232	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C233	Not assigned			
C234	Not assigned			
C235	Cer,(CK924C1H473M)	0.047µF,±20%,50V		
C236	Cer,(CK924C1H473M)	0.047µF,±20%,50V		
C237	Not assigned			
C238	Not assigned			
C239	Not assigned			
C240	Not assigned			
C241	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C242	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C243	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C244	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
J 1	Connector, (27DP-LR-PC)			
J 2	Not assigned			
J 3	Connector, (27DP-LP-1.5W-201)			
J 4	Connector, (HIF3-34P-2.54DS)			
J 5	Connector, (DF1-12P-2.5DS)			
J 6	Connector, (DF1-2S-2.5R24)			
J 7	Connector, (DF1-2P-2.5DS)			
J 8	Connector, (DF1-3P-2.5DSA)			
J 9	Connector, (DF1-3S-2.5R24)			
J10	Connector, (DF1-2P-2.5DSA)			
J11	Connector, (DF1-2P-2.5DSA)			
K 1	Relay,(DX2-12V)			
K 2	Relay,(NR-HD-12V)			
L 1	Coil,(SP0408-R47K)	0.47µH		
L 2	Coil,(SP0408-R47K)	0.47µH		
L 3	Coil,(SP0408-6R8K)	6.8µH		
L 4	Coil,(LF8-100K)	10µH		
L 5	Coil,(LF8-100K)	10µH		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
L 6	Coil,(LF8-100K)	10µH		
L 7	Coil,(LF8-100K)	10µH		
L 8	Coil,(LF8-100K)	10µH		
L 9	Coil,(LF8-100K)			
L10	Not assigned			
L11	Coil,(339T13571)			
L12	Coil,(339T13571)			
L13	Coil,(LF8-100K)	10µH		
L14	Not assigned			
L15	Coil,(SP0408-6R8K)	6.8µH		
L16	Coil,(SP0408-2R2K)	2.2µH		
L17	Coil,(SP0408-2R2K)	2.2µH		
L18	Coil,(LF8-100K)	10µH		
L19	Coil,(LF8-100K)	10µH		
L20	Coil,(LF8-100K)	10µH		
L21	Coil,(LF8-100K)	10µH		
L22	Coil,(LF8-100K)	10µH		
L23	Not assigned			
L24	Coil,(342T70487B)	10.4µH		
L25	Coil,(342T70487B)	10.4µH		
L26	Coil,(342T70487B)	10.4µH		
L27	Coil,(339T18846)	13µH		
L28	Coil,(339T18846)	13µH		
L29	Coil,(339T18846)	13µH		
L30	Not assigned			
L31	Coil,(LF8-100K)	10µH		
L32	Coil,(LF8-100K)	10µH		
L33	Coil,(LF8-100K)	10µH		
L34	Not assigned			
L35	Not assigned			
L36	Not assigned			
L37	Coil,(SP0408-6R8K)	6.8µH		
L38	Not assigned			
L39	Coil,(LF8-100K)	10µH		
L40	Coil,(LF8-100K)	10µH		
L41	Coil,(LF8-100K)	10µH		
L42	Coil,(LF8-100K)	10µH		
L43	Coil,(LF8-100K)	10µH		
L44	Coil,(339T13571)			
L45	Coil,(339T13571)			
L46	Coil,(339T13571)			
L47	Not assigned			
L48	Coil,(LH1-471K)	470µH		
L49	Coil,(LH1-471K)	470µH		
L50	Coil,(LH1-471K)	470µH		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
Q 1	Not assigned			
Q 2	Not assigned			
Q 3	Di,(1SV34)			
Q 4	Di,(1SV34)			
Q 5	Tr,(2SA1206)			
Q 6	Tr,(2SC2901)			
Q 7	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 8	Tr,(2SC2901)			
Q 9	Di,(1SV34)			
Q10	Tr,(31D21)			
Q11	Tr,(2SC2901)			
Q12	Di,(1SV34)			
Q13	Tr,(31D21)			
Q14	Tr,(2SC2901)			
Q15	Tr,(2SC2901)			
Q16	Tr,(2SC2901)			
Q17	Tr,(2SA1206)			
Q18	Di,(1SV34)			
Q19	Di,(1S953)			
Q20	IC,(DTC114EF)			
Q21	Not assigned			
Q22	Tr,(2SC2901)			
Q23	Not assigned			
Q24	IC,(74LS11)			
Q25	Tr,(2SC2901)			
Q26	Tr,(2SC2901)			
Q27	Tr,(2SC2901)			
Q28	Tr,(2SC2901)			
Q29	Tr,(2SC2901)			
Q30	Not assigned			
Q31	Not assigned			
Q32	Tr,(2SC1010L)			
Q33	Tr,(2SC1010L)			
Q34	Tr,(2SC1010L)			
Q35	Di,(1S2222)			
Q36	Di,(1S2222)			
Q37	Di,(1S2222)			
Q38	Di,(1S2222)			
Q39	Di,(1S2222)			
Q40	Di,(1S2222)			
Q41	Di,(1S2222)			
Q42	Tr,(2SC1844)			
Q43	Tr,(2SC1844)			
Q44	IC,(DTC143EF)			
Q45	Not assigned			

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
Q46	Not assigned			
Q47	IC,(DTA143EF)			
Q48	IC,(DTA143EF)			
Q49	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q50	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q51	Tr,(2SA1151)			
Q52	Tr,(2SA1206)			
Q53	Thermistor, (OS-D5-300-1)			
Q54	Thermistor, (42D21)			
Q55	Not assigned			
Q56	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q57	Tr,(2SC2901)			
Q58	Tr,(2SA1206)			
Q59	Di,(1SV34)			
Q60	Tr,(2SC2901)			
Q61	Tr,(2SA1206)			
Q62	Di,(1SV34)			
Q63	Di,(1SV34)			
Q64	Tr,(2SC2901)			
Q65	Di,(1SV34)			
Q66	Tr,(2SC2901)			
Q67	Di,(1SV34)			
Q68	Tr,(2SC2901)			
Q69	Tr,(2SC2901)			
Q70	Not assigned			
Q71	Not assigned			
Q72	Not assigned			
Q73	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q74	IC,(μPC258C)			
Q75	Di,(1SV34)			
Q76	IC,(μPC258C)			
Q77	IC,(TC40H374P)			
Q78	IC,(NE5532)			
Q79	IC,(μPC803C)			
Q80	IC,(μPC803C)			
Q81	IC,(μPC803C)			
Q82	IC,(μPC258C)			
Q83	IC,(HI-201-5)			
Q84	IC,(μPC258C)			
Q85	IC,(HI-201-5)			
Q86	IC,(μPC258C)			
Q87	Posistor,(PTH60U331M)			
Q88	Posistor,(PTH60U331M)			

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
Q 89	IC,(TC40H374P)			
Q 90	IC,(TC40H374P)			
Q 91	IC,(TC40H374P)			
Q 92	IC,(TC40H138P)			
Q 93	IC,(DTC114EF)			
Q 94	Not assigned			
Q 95	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 96	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q 97	Not assigned			
Q 98	Not assigned			
Q 99	Not assigned			
Q100	Not assigned			
Q101	Tr,(2SC1844)			
Q102	Tr,(2SA1151)			
Q103	Tr,(2SC1844)			
Q104	Not assigned			
Q105	Thermister(CS-D5-300-1)			
Q106	Thermister(CS-D5-300-1)			Q'ty 0 or 1
R 1	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 2	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 3	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 4	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 5	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R 6	CF,(ARD25T * J)	100 to 390Ω,±5%,1/4W		*
R 7	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R 8	MF,(RN14K2H151J)	150Ω,±5%,1/4W		
R 9	Not assigned			
R10	Not assigned			
R11	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R12	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R13	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R14	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R15	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R16	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R17	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R18	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R19	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R20	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R21	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R22	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R23	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R24	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R25	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R26	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R27	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R28	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R29	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R30	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R31	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R32	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R33	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R34	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R35	CF,(ARD25T221J)	220Ω,±5%,1/4W		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
R36	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R37	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R38	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R39	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R40	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R41	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R42	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R43	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R44	CF,(ARD25T390J)	39Ω,±5%,1/4W		
R45	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R46	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R47	Not assigned			
R48	Not assigned			
R49	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R50	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R51	CF,(ARD25T470J)	47Ω,±5%,1/4W		Q'ty 0 or 1
R52	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R53	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R54	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R55	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R56	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R57	Not assigned			
R58	Not assigned			
R59	Not assigned			
R60	Not assigned			
R61	Not assigned			
R62	Not assigned			
R63	Not assigned			
R64	Not assigned			
R65	Not assigned			
R66	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R67	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R68	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R69	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R70	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R71	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R72	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R73	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R74	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R75	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R76	MF,(RS1FB 150Ω J)	150Ω,±5%,1W		
R77	Not assigned			
R78	Not assigned			
R79	Not assigned			
R80	CF,(ARD25T221J)	220 ,±5%,1/4W		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
R81	CF,(ARD25T821J)	820 ,±5%,1/4W		
R82	CF,(ARD25T100J)	10 ,±5%,1/4W		
R83	CF,(ARD25T821J)	820 ,±5%,1/4W		
R84	CF,(ARD25T103J)	10k ,±5%,1/4W		
R85	CF,(ARD25T682J)	6.8k ,±5%,1/4W		
R86	MF,(RS1FB 150 J)	150 ,±5%,1W		
R87	Not assigned			
R88	Not assigned			
R89	CF,(ARD25T472J)	4.7k ,±5%,1/4W		
R90	Not assigned			
R91	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R92	CF,(ARD25T*J)	27kΩ to 100kΩ,5%,1/4W		Q'ty 0 or 1
R93	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R94	CF,(ARD25T153J)	15k ,±5%,1/4W		
R95	CF,(ARD25T562J)	5.6k ,±5%,1/4W		
R96	CF,(ARD25T330J)	33 ,±5%,1/4W		Q'ty 0 or 1
R97	CF,(ARD25T101J)	100 ,±5%,1/4W		
R98	CF,(ARD25T123J)	12k ,±5%,1/4W		
R99	CF,(ARD25T101J)	100 ,±5%,1/4W		
R100	CF,(ARD25T152J)	1.5k ,±5%,1/4W		
R101	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R102	CF,(ARD25T273J)	27kΩ,±5%,1/4W		
R103	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R104	CF,(ARD25T153J)	15k ,±5%,1/4W		
R105	CF,(ARD25T822J)	8.2k ,±5%,1/4W		
R106	CF,(ARD25T330J)	33 ,±5%,1/4W		Q'ty 0 or 1
R107	CF,(ARD25T101J)	100 ,±5%,1/4W		
R108	CF,(ARD25T822J)	8.2k ,±5%,1/4W		
R109	CF,(ARD25T101J)	100 ,±5%,1/4W		
R110	CF,(ARD25T222J)	2.2k ,±5%,1/4W		
R111	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R112	CF,(ARD25T123J)	12k ,±5%,1/4W		
R113	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R114	CF,(ARD25T153J)	15k ,±5%,1/4W		
R115	CF,(ARD25T822J)	8.2k ,±5%,1/4W		
R116	CF,(ARD25T330J)	33 ,±5%,1/4W		Q'ty 0 or 1
R117	CF,(ARD25T101J)	100 ,±5%,1/4W		
R118	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R119	CF,(ARD25T101J)	100 ,±5%,1/4W		
R120	CF,(ARD25T222J)	2.2k ,±5%,1/4W		
R121	Not assigned			
R122	Var,MF,(RJ-6S 10k)	10k ,1/2W		
R123	CF,(ARD25T222J)	2.2k ,±5%,1/4W		
R124	Not assigned			
R125	CF,(ARD25T683J)	68kΩ,±5%,1/4W		

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

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CKT REF	DESCRIPTION	RATING		NOTE
R126	Not assigned			
R127	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R128	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R129	Not assigned			
R130	Not assigned			
R131	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R132	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R133	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R134	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R135	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R136	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R137 to R140	Not assigned			
R141	MF,Var,(RJ-4W 1kΩ)	1kΩ,1/2W		
R142	MF,Var,(RJ-4W 5kΩ)	5kΩ,1/2W		
R143	MF,Var,(RJ-4W 5kΩ)	5kΩ,1/2W		
R144 to R147	Not assigned			
R148	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R149	CF,(ARD25T220J)	22Ω,±5%,1/4W		
R150	Not assigned			
R151	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R152	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R153	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R154	Not assigned			
R155	CF,(ARD25T512J)	5.1kΩ,±5%,1/4W		
R156	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R157	Not assigned			
R158	Not assigned			
R159	Not assigned			
R160	Not assigned			
R161	CF,(ARD25T331J)	330Ω,±5%,1/4W		Q'ty 0 or 1
R162	CF,(ARD25T392J)	3.3kΩ,±5%,1/4W		
R163	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R164	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R165	CF,(ARE25T681F)	680Ω,±5%,1/4W		
R166	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R167	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R168	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R169	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R170	CF,(ARD25T*J)	220Ω to 330Ω,±5%,1/4W		*
R171	CF,(ARD25T*J)	220Ω to 1MΩ,±5%,1/4W		Q'ty 0 or 1
R172	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R173	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R174	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R175	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R176	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R177	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R178	CF,(ARD25T331J)	330Ω,±5%,1/4W		

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

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CKT REF	DESCRIPTION	RATING		NOTE
R179	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R180	CF,(ARD25T390J)	39Ω,±5%,1/4W		
R181	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R182	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R183	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R184	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R185	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R186	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R187	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R188	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R189	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R190	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R191	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R192	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R193	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R194	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R195	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R196	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R197	CF,(ARD25T182J)	1.8kΩ,±5%,1/4W		
R198	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R199	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R200	Not assigned			
R201	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R202	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R203	Var,MF,(RJ-4W 500Ω)	500Ω,1/2W		
R204	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R205	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R206	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R207	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R208	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R209	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R210	CF,(ARD25T271J)	270Ω,±5%,1/4W		
R211	Var,MF,(RJ-4W 5kΩ)	5kΩ,1/2W		
R212	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R213	MF,(RN14K2E1211D)	1.21kΩ,±0.5%,1/4W		
R214	MF,(RN14K2E2871D)	2.87kΩ,±0.5%,1/4W		
R215	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R216	MF,(RN14K2E9091D)	9.09kΩ,±0.5%,1/4W		
R217	MF,(RN14K2E2151D)	2.15kΩ,±0.5%,1/4W		
R218	MF,(RN14K2E1272D)	12.7kΩ,±0.5%,1/4W		
R219	MF,(RN14K2E4222D)	42.2kΩ,±0.5%,1/4W		
R220	MF,(RN14K2E2212D)	22.1kΩ,±0.5%,1/4W		
R221	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R222	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R223	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
R224	Not assigned			
R225	Not assigned			
R226	Not assigned			
R227	Not assigned			
R228	Not assigned			
R229	Not assigned			
R230	MF,(RN14K2E2672D)	26.7kΩ,±0.5%,1/4W		
R231	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R232	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R233	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R234	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R235	CF,(ARD25T * J)	8.2 to 12kΩ,±5%,1/4W		*
R236	CF,(ARD25T * J)	1.8 to 2.7kΩ,±5%,1/4W		*
R237	Var,MF,(RJ-4W 5kΩ)	5kΩ,1/2W		
R238	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R239	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R240	MF,(RN14K2E2672D)	26.7kΩ,±0.5%,1/4W		
R241	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R242	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R243	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R244	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R245	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R246	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R247	Var,MF,(RJ-4W 5kΩ)	5kΩ,1/2W		
R248	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R249	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R250	Not assigned			
R251	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R252	MF,(RN14K2E8871D)	8.87k to 10.0kΩ,±0.5%,1/4W		
R253	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R254	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R255	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R256	CF,(ARD25T * J)	22 to 33kΩ,±5%,1/4W		*
R257	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R258	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R259	Not assigned			
R260	Var,MF,(RJ-4W 10kΩ)	10kΩ,1/2W		
R261	Var,MF,(RJ-4W 2kΩ)	2kΩ,1/2W		
R262	Var,MF,(RJ-4W 1kΩ)	1kΩ,1/2W		
R263	Not assigned			
R264	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R265	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R266	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R267	Single in-line array, (IHR-6-472JA)	4.7kΩ x 6,1/8W		

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

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Parts List : Z22 IF BPF/AMP 1

CKT REF	DESCRIPTION	RATING		NOTE
R268	Single in-line array, (IHR-8-104JA)	100kΩ x 8,1/8W		
R269	Single in-line array, (IHR-8-104JA)	100kΩ x 8,1/8W		
R270	MF,(RN14K2E1242D)	12.4kΩ,±0.5%,1/4W		
R271	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R272	MF,(RN14K2E1242D)	12.4kΩ,±0.5%,1/4W		
R273	MF,(RN14K2E6191D)	6.19kΩ,±0.5%,1/4W		
R274	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R275	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R276	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R277	MF,(RN14K2E9391)	9.39kΩ,±0.5%,1/4W		
R278	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R279	MF,(RN14K2E1692D)	16.9kΩ,±0.5%,1/4W		
R280	MF,(RN14K2E1212D)	12.1kΩ,±0.5%,1/4W		
R281	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R282	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R283	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R284	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R285	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R286	Var,MF,(RJ-4W 20kΩ)	20kΩ,1/2W		
R287	Not assigned			
R288	CF,(ARD25T511J)	510Ω,±5%,1/4W		
R289	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R290	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R291	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R292	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R293	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R294	Var,MF,(RJ-6S 2kΩ)	2kΩ,1/2W		
R295	Not assigned			
R296	Not assigned			
R297	Not assigned			
R298	Not assigned			
R299	Not assigned			
R300	Not assigned			
R301	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R302	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R303	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R304	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R305	Var,MF,(RJ-4W200Ω)			
R306	CF,(ARD25T*J)	220Ω to 1MΩ,±5%,1/4W		*
R307	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R308	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R309	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R310	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R311	CF,(ARD25T*J)	22kΩ to 1MΩ,±5%,1/4W		*
Z 1	XTAL OSC,(TCO-706A)	19.9 MHz		
Z 2	M-9,(8 pins)			
Z 3	M-9,(8 pins)			

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 2	Elect,(CE04W1E470)	47µF,±20%,25V		
C 3	Elect,(CE04W1E470)	47µF,±20%,25V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Not assigned			
C 7	Not assigned			
C 8	Not assigned			
C 9	Not assigned			
C10	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C11	Var,Cer,(TZ03Z070A)	2 to 7pF,100V		
C12	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C13	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C14	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C15	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C16	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C17	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C18	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C19	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C20	Not assigned			
C21	Not assigned			
C22	Not assigned			
C23	Not assigned			
C24	Not assigned			
C25	Tant,(CS-E1V010M)	1µF,±20%,35V		
C26	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C27	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C28	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C29	Var,Cer,(TZ03Z070A)	2 to 7pF,100V		
C30	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C31	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C32	Tant,(CS-E1D2R2M)	2.2 F,±20%,20V		
C33	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C34	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C35	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C36	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C37	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C38	Cer,(CC45CH1H*JY)	10 to 22pF,±5%,50V		*
C39	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C40	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C41	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C42	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C43	Var,Cer,(TZ03Z070A)	2 to 7pF,100V		
C44	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C45	Cer,(CC45CH1H330JY)	33pF,±5%,50V		

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
C46	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C47	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C48	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C49	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C50	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C51	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C52	Cer,(CC45CH1H100JY)	10pF,±5%,50V		
C53	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C54	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C55	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C56	Var,Cer,(TZ03Z070A)	2 to 7pF,100V		
C57	Var,Cer,(TZ03T200E)	4.2 to 20pF,100V		
C58	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C59	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C60	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C61	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C62	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C63	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C64	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C65	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C66	Cer,(CC45UJ1H220JY)	22pF,±5%,50V		
C67	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C68	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C69	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C70	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C71	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C72	Cer,(CC45CH1H101JY)	100pF,±5%,50V		
C73	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C74	Cer,(CK924C1H223M)	0.022µF,±20%,50V		
C75	Cer,(CK924C1H473M)	0.047µF,±20%,50V		
C76	Cer,(CK924C1H223M)	0.022µF,±20%,50V		
C77	Cer,(CK924C1H223M)	0.022µF,±20%,50V		
C78	Not assigned			
C79	Not assigned			
C80	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C81	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C82	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C83	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C84	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C85	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C86	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C87	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C88	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C89	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C90	Cer,(CK924C1H472M)	4700pF,±20%,50V		

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
C91	Not assigned			
C92	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C93	Not assigned			
C94	Not assigned			
C95	Not assigned			
C96	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C97	Cer,(CC45CH1H080JY)	8pF,±5%,50V		
J 1	Connector, (DF1-12P2.5DS)			
J 2	Connector, (DF1-2P2.5DS)			
J 3	Connector, (DF1-2P2.5DS)			
L 1	Coil,(LF8-221K)	220µH		
L 2	Coil,(LF8-221K)	220µH		
L 3	Coil,(339T18847)			
L 4	Coil,(339T18847)			
L 5	Coil,(339T18847)			
L 6	Coil,(LF8-221K)	220µH		
L 7	Coil,(339T18847)			
L 8	Coil,(LF8-221K)	220µH		
Q 1	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 2	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 3	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 4	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 5	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 6	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 7	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 8	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q 9	Di,breakdown,(RD11EB)	10.4 to 11.6V,400mW		
Q10	Not assigned			
Q11	Tr,(2SC943)			
Q12	Tr,(2SA603)			
Q13	Di,(1S2222)			
Q14	Di,(1S2222)			
Q15	Di,(1SS97)			
Q16	Di,(1SS97)			
Q17	Di,(1SS97)			
Q18	Di,(1S953)			
Q19	Tr,(2SC1216)			
Q20	Tr,(2SC943)			

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
Q21	Tr,(2SA603)			
Q22	Di,(1S2222)			
Q23	Di,(1S2222)			
Q24	Di,(1SS97)			
Q25	Di,(1SS97)			
Q26	Di,(1SS97)			
Q27	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q28	Tr,(2SC1216)			
Q29	Tr,(2SC943)			
Q30	Tr,(2SA603)			
Q31	Di,(1S2222)			
Q32	Di,(1S2222)			
Q33	Di,(1SS97)			
Q34	Di,(1SS97)			
Q35	Di,(1SS97)			
Q36	Not assigned			
Q37	Tr,(2SC1216)			
Q38	Tr,(2SC943)			
Q39	Tr,(2SA603)			
Q40	Di,(1S2222)			
Q41	Di,(1S2222)			Q'ty 0 or 1,*
Q42	Di,(1SS97)			
Q43	Di,(1SS97)			
Q44	Di,(1SS97)			
Q45	Tr,(2SC943)			
Q46	Tr,(2SC1216)			
Q47	Tr,(2SC1044)			
Q48	Tr,(2SC943)			
Q49	Tr,(2SA603)			
Q50	Di,(1S2222)			
Q51	Di,(1S2222)			
Q52	Di,(1S2222)			
Q53	Not assigned			
Q54	Di,(1S2222)			
Q55	Di,(1S2222)			
Q56	Di,(1S2222)			
Q57	Di,(1S2222)			
Q58	Tr,(2SC943)			
Q59	IC,(µPC16312H)			
Q60	Not assigned			
Q61	IC,(DTA143EF)			
Q62	IC,(DTA143EF)			
Q63	IC,(DTA143EF)			
Q64	IC,(DTA143EF)			
Q65	IC,(DTA143EF)			

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
Q66	IC, (DTA143EF)			
Q67	IC, (DTA143EF)			
Q68	IC, (DTA143EF)			
Q69	IC, (DTA143EF)			
Q70	Not assigned			
Q71	Di, (1S953)			
Q72	Di, (1S953)			
Q73	Di, (1S953)			
Q74	Di, breakdown, (RD2.0EB)	1.88 to 2.12V, 400mW		
R 1 to R17	Not assigned			
R18	CF, (ARD25T101J)	100Ω, ±5%, 1/4W		
R19	Not assigned			
R20	CF, (ARD25T393J)	39kΩ, ±5%, 1/4W		
R21	CF, (ARD25T183J)	18kΩ, ±5%, 1/4W		
R22	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W		
R23	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R24	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R25	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W		
R26	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W		
R27	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R28	Not assigned			
R29	Single in-line array, (IHR-8-104JA)	100kΩ x 8, 1/8W		
R30	Not assigned			
R31	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R32	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R33	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R34	CF, (ARD25T331J)	330Ω, ±5%, 1/4W		
R35	Not assigned			
R36	Not assigned			
R37	Not assigned			
R38	Not assigned			
R39	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W		
R40	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R41	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R42	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W		
R43	Single in-line array, (IHR-4-562JB)	5.6kΩ x 4, 1/8W		
R44	Not assigned			
R45	Not assigned			

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
R46	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R47	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R48	CF, (ARD25T151J)	150Ω, ±5%, 1/4W		
R49	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R50	CF, (ARD25T274J)	270kΩ, ±5%, 1/4W		
R51	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R52	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W		
R53	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R54	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R55	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R56	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W		
R57	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W		
R58	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R59	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R60	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R61	CF, (ARD25T472J)	4.7kΩ, ±5%, 1/4W		
R62	CF, (ARD25T223J)	22kΩ, ±5%, 1/4W		
R63	Single in-line array, (IHR-4-562JB)	5.6kΩ x 4, 1/8W		
R64	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W		
R65	CF, (ARD25T154J)	150kΩ, ±5%, 1/4W		
R66	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R67	CF, (ARD25T151J)	150Ω, ±5%, 1/4W		
R68	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R69	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R70	CF, (ARD25T184J)	180kΩ, ±5%, 1/4W		
R71	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R72	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W		
R73	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R74	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R75	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R76	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W		
R77	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W		
R78	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R79	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R80	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R81	CF, (ARD25T512J)	5.1kΩ, ±5%, 1/4W		
R82	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W		
R83	Single in-line array, (IHR-4-562JB)	5.6kΩ x 4, 1/8W		
R84	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R85	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R86	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R87	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
R88	CF, (ARD25T151J)	150Ω, ±5%, 1/4W		
R89	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R90	CF, (ARD25T274J)	270kΩ, ±5%, 1/4W		
R91	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R92	CF, (ARD25T562J)	5.6kΩ, ±5%, 1/4W		
R93	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R94	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R95	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R96	CF, (ARD25T473J)	47kΩ, ±5%, 1/4W		
R97	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W		
R98	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R99	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R100	CF, (ARD25T152J)	1.5kΩ, ±5%, 1/4W		
R101	CF, (ARD25T512J)	5.1kΩ, ±5%, 1/4W		
R102	CF, (ARD25T273J)	27kΩ, ±5%, 1/4W		
R103	Single in-line array, (IHR-4-562JB)	5.6kΩ x 4, 1/8W		
R104	Not assigned			
R105	Not assigned			
R106	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		
R107	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R108	CF, (ARD25T151J)	150Ω, ±5%, 1/4W		
R109	CF, (ARD25T334J)	330kΩ, ±5%, 1/4W		
R110	CF, (ARD25T274J)	270kΩ, ±5%, 1/4W		
R111	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R112	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R113	CF, (ARD25T153J)	15kΩ, ±5%, 1/4W		
R114	CF, (ARD25T221J)	220Ω, ±5%, 1/4W		
R115	CF, (ARD25T392J)	3.9kΩ, ±5%, 1/4W		
R116	CF, (ARD25T680J)	68Ω, ±5%, 1/4W		
R117	CF, (ARD25T100J)	10Ω, ±5%, 1/4W		
R118	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R119	MF, (RN14K2E2741D)	2.74kΩ, ±0.5%, 1/4W		
R120	CF, (ARD25T822J)	8.2kΩ, ±5%, 1/4W		
R121	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R122	MF, (RN14K2E6190D)	619Ω, ±0.5%, 1/4W		
R123	MF, (RN14K2E1430D)	143Ω, ±0.5%, 1/4W		
R124	MF, (RN14K2E2741D)	2.74kΩ, ±0.5%, 1/4W		
R125	CF, (ARD25T682J)	6.8kΩ, ±5%, 1/4W		
R126	CF, (ARD25T222J)	2.2kΩ, ±5%, 1/4W		
R127	Single in-line array, (IHR-4-104JA)	100kΩ x 4, 1/8W		
R128	Not assigned			
R129	Not assigned			
R130	CF, (ARD25T102J)	1kΩ, ±5%, 1/4W		

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

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Parts List : Z23 IF BPF/AMP 2

CKT REF	DESCRIPTION	RATING		NOTE
R131	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R132	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R133	Var, MF, (RJ-6S 2k)	2kΩ, 1/2W		
R134	Var, MF, (RJ-6S 2k)	2kΩ, 1/2W		
R135	Var, MF, (RJ-6S 2k)	2kΩ, 1/2W		
R136	CF, (ARD25T151J)	150Ω, ±5%, 1/4W		
R137	CF, (ARD25T332J)	3.3kΩ, ±5%, 1/4W		
R138	Single in-line array, (IHR-5-332JB)	3.3kΩ x 5, 1/8W		
R139	Var, MF, (RJ-6S 10k)	10kΩ, 1/2W		
R140	Not assigned			
R141	Not assigned			
R142	CF, (ARD25T821J)	820Ω, ±5%, 1/4W		
R143	CF, (ARD25T471J)	470Ω, ±5%, 1/4W		
R144	CF, (ARD25T470J)	47Ω, ±5%, 1/4W		
X 1	XTAL OSC, (34X69276)			
X 2	XTAL OSC, (34X69276)			
X 3	XTAL OSC, (34X69276)			
X 4	XTAL OSC, (34X69276B)			

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

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1E101)	100µF,±20%,25V		
C 2	Elect,(CE04W1E101)	100µF,±20%,25V		
C 3	Elect,(CE04W1E101)	100µF,±20%,25V		
C 4	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C 5	Not assigned			
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		
C10	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C11	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C12	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C13	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C14	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C15	Elect,(CE04W1V100)	10µF,±20%,10V		
C16	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C17	Plast,(ECQ-V1H474JW)	0.47µF,±5%,50V		
C18	Plast,(ECQ-V1H105JW)	1µF,±5%,50V		
C19	Plast,(ECQ-V1H105JW)	1µF,±5%,50V		
C20	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C21	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C22	Elect,(CE04W1V100)	10µF,±20%,10V		
C23	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C24	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C25	Not assigned			
C26	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C27	Cer,(RPE111CH471G50)	470pF,±2%,50V		
C28	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C29	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C30	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C31	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C32	Elect,(CE04W1E470)	47µF,±20%,25V		
C33	Elect,(CE04W1E470)	47µF,±20%,25V		
C34	Elect,(CE04W1E470)	47µF,±20%,25V		
C35	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C36	Cer,(CC45CH1H330JY)	33pF,±5%,50V		
C37	Not assigned			
C38	Not assigned			
C39	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C40	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C41	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C42	Elect,(CE04C1H2R2A)	2.2µF,±20%,16V		
C43	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C44	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C45	Cer,(CK924C1H103M)	0.01µF,±20%,50V		

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

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING		NOTE
C46	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C47	Not assigned			
C48	Plast,(ECQ-V1H474JW)	0.47µF,±5%,50V		
C49	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C50	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C51	Not assigned			
C52	Plast,(ECQ-V1H105JW)	1µF,±5%,50V		
C53	Not assigned			
C54	Plast,(ECQ-V1H105JW)	1µF,±5%,50V		
C55	Cer,(CK924C1H103M)	0.01µF,±20%,50V		
C56	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C57	Elect,(CE04W1A101)	100µF,±20%,10V		
C58	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C59	Elect,(CE04W1E470)	47µF,±20%,25V		
J 1	Connector, (HIF3-34P-2.54DS)			
J 2	Connector,(27DP-LR-PC)			
J 3	Connector,(27DP-LR-PC)			
J 4	Connector, (DF1-8P-2.5DS)			
J 5	Connector,(PI021-2M)			
J 6	Connector,(PI021-2M)			
L 1	Coil,(LH1-471K)	470µH		
L 2	Coil,(LH1-471K)	470µH		
L 3	Coil,(LH1-471K)	470µH		
L 4	Coil,(LF8-221K)	220µH		
L 5	Coil,(LF8-221K)	220µH		
L 6	Coil,(LF8-101K)	100µH		
Q 1	IC,(TC40H138P)			
Q 2	IC,(TC40H374P)			
Q 3	IC,(TC40H374P)			
Q 4	IC,(74LS00)			
Q 5	Not assigned			
Q 6	IC,(74LS191)			
Q 7	IC,(74LS191)			
Q 8	IC,(74F191)			
Q 9	IC,(SP8695B)			
Q10	Di,(1S953)			
Q11	IC,(µPC1651G)			
Q12	IC,(74LS290)			
Q13	IC,(MC4044P)			
Q14	IC,(µPC258C)			
Q15	IC,(µPC649D)			

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

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING		NOTE
Q16	Tr,(DTC143EF)			
Q17	Tr,(DTC143EF)			
Q18	Not assigned			
Q19	IC,(µPC14312H)			
Q20	Tr,(2SC2721)			
Q21	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q22	Di,(1S953)			
Q23	IC,(µPC16312H)			
Q24	IC,(74S74)			
Q25	IC,(74LS393)			
Q26	IC,(74L21)			
Q27	Tr,(2SC2901)			
Q28	Tr,(2SC2901)			
Q29	IC,(NE5532A)			
Q30	Tr,(2SC1844)			
Q31	Not assigned			
Q32	IC,(NE5532A)			
Q33	Not assigned			
Q34	IC,(NJU201AD)			
Q35	Not assigned			
Q36	Not assigned			
Q37	Not assigned			
Q38	Not assigned			
Q39	Not assigned			
Q40	IC,(NE5532A)			
Q41	Not assigned			
Q42	Not assigned			
Q43	Di,(1S953)			
Q44	Tr,(2SC2570A)			
Q45	IC,(SP8630B)			
Q46	Not assigned			
Q47	Di,(1S953)			
Q48	Di,(1S953)			
Q49	Di,(1S953)			
Q50	Di,(1S953)			
R 1	Single in-line array, (IHR-8-103JB)	10kΩ x 8,1/8W		
R 2	Single in-line array, (IHR-6-103JB)	10kΩ x 6,1/8W		
R 3	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R 4	Not assigned			
R 5	MF,(RN14K2E3651D)	3.65kΩ,±0.5%,1/4W		
R 6	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R 7	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R 8	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R 9	CF,(ARD25T751J)	750Ω,±5%,1/4W		
R10	CF,(ARD25T101J)	100Ω,±5%,1/4W		

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

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING		NOTE
R11	CF,(ARD25T680J)	68Ω,±5%,1/4W		
R12	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R13	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R14	Not assigned			
R15	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R16	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R17	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R18	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R19	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R20	MF,(RM73B2B153JD)	15kΩ,±5%,1/8W		
R21	MF,(NRTF1/4C 1.5kΩJ)	1.5kΩ,±5%,1/4W		
R22	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R23	MF,(RN14K2E2151D)	2.15kΩ,±0.5%,1/4W		
R24	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R25	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R26	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R27	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R28	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R29	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R30	MF,(RS1FB 33ΩJ)	33Ω,±5%,1W		
R31	CF,(ARD25T100J)	10Ω,±5%,1/4W		
R32	MF,(RN14K2E3401D)	3.40kΩ,±0.5%,1/4W		
R33	MF,(RN14K2E3401D)	3.40kΩ,±0.5%,1/4W		
R34	MF,(RN14K2E3921D)	3.92kΩ,±0.5%,1/4W		
R35	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W		
R36	Var,MF,(RJ-6S 500Ω)	500Ω,1/2W		
R37	MF,(RN14K2E2261D)	2.26kΩ,±0.5%,1/4W		
R38	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R39	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R40	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R41	MF,(RN14K2E2492D)	24.9kΩ,±0.5%,1/4W		
R42	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R43	MF,(RN14K2E9391D)	9.39kΩ,±0.5%,1/4W		
R44	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R45	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R46	MF,(RN14K2E7501D)	7.50kΩ,±0.5%,1/4W		
R47	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R48	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R49	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R50	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R51	MF,(RN14K2E3011D)	3.01kΩ,±0.5%,1/4W		
R52	Not assigned			
R53	Not assigned			
R54	MF,(RN14K2E1502D)	15.0kΩ,±0.5%,1/4W		
R55	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		

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

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Parts List : Z24 LOCAL CONTROL 2

CKT REF	DESCRIPTION	RATING		NOTE
R56	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R57	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R58	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R59	Not assigned			
R60	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R61	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R62	Not assigned			
R63	MF,(RN14K2E6042D)	60.4kΩ,±0.5%,1/4W		
R64	Not assigned			
R65	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R66	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R67	MF,(RN14K2E3322D)	39.2kΩ,±0.5%,1/4W		
R68	Not assigned			
R69	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R70	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R71	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R72	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R73	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R74	Not assigned			
R75	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R76	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R77	Not assigned			
R78	Not assigned			
R79	Not assigned			
R80	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R81	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R82	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R83	Var,MF,(RJ-6S 5kΩ)	5kΩ,1/2W		
R84	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
Z 1	XTAL OSC,(TCO-707F)			

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 2	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 3	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 4	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 5	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C 6	Not assigned			
C 7	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C 8	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C 9	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C10	Elect,(CE04W1E101)	100μF,±20%,25V		
C11	Not assigned			
C12	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C13	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C14	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C15	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C16	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C17	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C18	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C19	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C20	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C21	Not assigned			
C22	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C23	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C24	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C25	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C26	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C27	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C28	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C29	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C30	Cer,(DSS310-55D223S)	0.022μF,+50/-20%,50V		
C31	Cer,(DSS310-55D223S)	0.022μF,+50/-20%,50V		
C32	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C33	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C34	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C35	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C36	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C37	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C38	Not assigned			
C39	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C40	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C41	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C42	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C43	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C44	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C45	Cer,(CK45B1H471KY)	470pF,±10%,50V		

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
C46	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C47	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C48	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C49	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C50	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C51	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C52	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C53	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C54	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C55	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C56	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C57	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C58	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C59	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C60	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C61	Not assigned			
C62	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C63	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C64	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C65	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C66	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C67	Var,Cer,(TZ03T110A)	3 to 11pF,100V		
C68	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C69	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C70	Not assigned			
C71	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C72	Not assigned			
C73	Elect,(CE04W1A101)	100μF,±20%,10V		
C74	Elect,(CE04W1A101)	100μF,±20%,10V		
C75	Elect,(CE04W1A101)	100μF,±20%,10V		
C76	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C77	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C78	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C79	Cer,(CK45D1H103MY)	0.01μF,±20%,50V		
C80	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C81	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C82	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C83	Cer,(CK924C1H473M)	0.047μF,±20%,50V		
C84	Cer,(CK45B1H471KY)	470pF,±10%,50V		
C85	Not assigned			
C86	Cer,(CC924CH1H620J)	62pF,±5%,50V		
C87	Cer,(CC924CH1H620J)	62pF,±5%,50V		
C88	Cer,(CC45CH1H101JY)	100pF,±5%,50V		
C89	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C90	Elect,(CE04W1A470)	47μF,±20%,10V		

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
C91	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C92	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C93	Not assigned			
C94	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C95	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C96	Cer,(CC45CH1H050CY)	5pF,±0.5pF,50V		
C97	Not assigned			
C98	Not assigned			
C99	Not assigned			
C100	Elect,(CE04W1A101)	100μF,±20%,10V		
C101	Not assigned			
C102	M Plast,(CF922N2A105K)	1μF,±10%,100V		
C103	M Plast,(CF922N2A224K)	0.22μF,±10%,100V		
C104	M Plast,(CF922N2A104K)	0.1μF,±10%,100V		
C105	M Plast,(CF922N2A104K)	0.1μF,±10%,100V		
C106	Not assigned			
C107	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C108	Plast,(ECQ-M1H223KZ)	0.022μF,±10%,50V		
C109	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C110	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C111	Plast,(ECQ-M1H222KZ)	0.022μF,±10%,50V		
C112	Cer,(RPE111CH681G50)	680pF,±2%,50V		
C113	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C114	Not assigned			
C115	Not assigned			
C116	Cer,(CC45CH1H100DY)	10pF,±0.5pF,50V		
C117	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C118	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C119	Elect,(CE04W1A470)	47μF,±20%,10V		
C120	Elect,(CE04W1A470)	47μF,±20%,10V		
C121	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C122	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C123	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C124	Cer,(CC45CH1H050CY)	5pF,±0.5pF,50V		
C125	Cer,(CC45CH1H050CY)	5pF,±0.5pF,50V		
C126	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C127	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C128	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C129	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C130	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C131	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
C132	Elect,(CE04W1E101)	100μF,±20%,25V		
C133	Elect,(CE04W1E101)	100μF,±20%,25V		
C134	Elect,(CE04W1A101)	100μF,±20%,25V		
C135	Cer,(CC45CH1H050CY)	5pF,±0.25pF,50V		
C136	Cer,(CC45CH1H050CY)	5pF,±0.25pF,50V		

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector,(27DP-LR-PC)			
J 2	Connector, (DF1-2P2.5DSA)			
J 3	Connector, (DF1-2P2.5DSA)			
J 4	Connector, (DF1-2P2.5DSA)			
J 5	Connector, (HIF3-34P-2.54DS)			
K 1	Relay,(PRAD-4)			
K 2	Relay,(NF2E-12V)			
L 1	Not assigned			
L 2	Not assigned			
L 3	Coil,(LF8-220K)	22μH		
L 4	Coil,(SP0408-4R7K)	4.7μH		
L 5	Coil,(LF8-220K)	22μH		
L 6	Coil,(SP0408-4R7K)	4.7μH		
L 7	Not assigned			
L 8	Coil,(LF8-100K)	10μH		
L 9	Coil,(LF8-100K)	10μH		
L10	Coil,(LF8-220K)	22μH		
L11	Coil,(SP0408-4R7K)	4.7μH		
L12	Coil,(LF8-220K)	22μH		
L13	Coil,(SP0408-4R7K)	4.7μH		
L14	Coil,(LF8-220K)	22μH		
L15	Coil,(SP0408-4R7K)	4.7μH		
L16	Coil,(LF8-100K)	10μH		
L17	Coil,(LF8-100K)	10μH		
L18	Coil,(LF8-220K)	22μH		
L19	Coil,(SP0408-4R7K)	4.7μH		
L20	Coil,(LF8-220K)	22μH		
L21	Coil,(SP0408-4R7K)	4.7μH		
L22	Not assigned			
L23	Coil,(LF8-100K)	10μH		
L24	Not assigned			
L25	Coil,(LF8-221K)	220μH		
L26	Coil,(SP0408-4R7K)	4.7μH		
L27	Coil,(LF8-220K)	22μH		
L28	Coil,(LF8-220K)	22μH		
L29	Coil,(LF8-220K)	22μH		
L30	Coil,(LF8-220K)	22μH		

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
L31	Coil,(LF8-220K)	22μH		
Q 1	Tr,(2SC2901)			
Q 2	Tr,(2SC2901)			
Q 3	Tr,(2SC2901)			
Q 4	Tr,(2SC2901)			
Q 5	Tr,(2SC2718)			
Q 6	Tr,(2SC2718)			
Q 7	Di,(1S953)			
Q 8	Di,(1S953)			
Q 9	Di,(1S953)			
Q10	Di,(1S953)			
Q11	Not assigned			
Q12	Tr,(2SC2901)			
Q13	Tr,(2SC2901)			
Q14	Tr,(2SC2901)			
Q15	Tr,(2SC2901)			
Q16	Tr,(2SC2901)			
Q17	Tr,(2SC2718)			
Q18	Di,(1S953)			
Q19	Di,(1S953)			
Q20	Di,(1S953)			
Q21	Di,(1S953)			
Q22	Di,(1S2222)			
Q23	Di,(1S2222)			
Q24	Not assigned			
Q25	Tr,(2SC2901)			
Q26	Tr,(2SC2901)			
Q27	Tr,(2SC2901)			
Q28	Tr,(2SC2901)			
Q29	Tr,(2SC2901)			
Q30	Tr,(2SC2718)			
Q31	Di,(1S953)			
Q32	Di,(1S953)			
Q33	Di,(1S953)			
Q34	Di,(1S953)			
Q35	Di,(1S2222)			
Q36	Di,(1S2222)			
Q37	Not assigned			
Q38	Tr,(2SC2901)			
Q39	Tr,(2SC2901)			
Q40	Tr,(2SC2901)			
Q41	Tr,(2SC2901)			
Q42	Tr,(2SC2901)			

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
Q43	Tr,(2SC2718)			
Q44	Di,(1S953)			
Q45	Di,(1S953)			
Q46	Di,(1S953)			
Q47	Di,(1S953)			
Q48	Di,(1S2222)			
Q49	Di,(1S2222)			
Q50	Not assigned			
Q51	Tr,(2SC2901)			
Q52	Tr,(2SC2901)			
Q53	Tr,(2SC2901)			
Q54	Tr,(2SC2901)			
Q55	Tr,(2SC2901)			
Q56	Di,(1S953)			
Q57	Di,(1S953)			
Q58	Di,(1S2222)			
Q59	Di,(1S2222)			
Q60	Di,(1S2222)			
Q61	Tr,(2SC2901)			
Q62	Tr,(2SC2901)			
Q63	Tr,(2SC2901)			
Q64	Tr,(2SC2901)			
Q65	Tr,(2SC2901)			
Q66	Tr,(2SC2718)			
Q67	Di,(1SS97)			
Q68	Di,(1SS97)			
Q69	Di,(1S2222)			
Q70	Di,(1S2222)			
Q71	Di,(1S2222)			
Q72	Di,(1S2222)			
Q73	Not assigned			
Q74	Tr,(2SC2901)			
Q75	Tr,(2SC2901)			
Q76	Tr,(2SC2901)			
Q77	Tr,(2SC2901)			
Q78	Tr,(2SC2901)			
Q79	Tr,(2SC2901)			
Q80	Di,(1SS97)			
Q81	Di,(1SS97)			
Q82	Di,(1S953)			
Q83	Di,(1S953)			
Q84	Di,(1S2222)			
Q85	Di,(1S2222)			
Q86	Di,(1S2222)			
Q87	Not assigned			

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
Q88	IC,(TC5067BP)			
Q89	Not assigned			
Q90	Tr,(2SC2901)			
Q91	Tr,(2SC2901)			
Q92	Di,(1SS97)			
Q93	Di,(1SS97)			
Q94	Di,(1SS97)			
Q95	Tr,(2SC2369)			
Q96	Tr,(2SA1057)			
Q97	IC,(μPA49A)			
Q98	IC,(μPC258C)			
Q99	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q100	IC,(TC4051BP)			
Q101	IC,(HA3-2525-5)			
Q102	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q103	Tr,(2SC2718)			
Q104	Tr,(2SC2718)			
Q105	Tr,(2SC2718)			
Q106	Tr,(2SC2718)			
Q107	Tr,(2SC2718)			
Q108	Tr,(2SC2718)			
Q109	Tr,(2SC2718)			
Q110	Tr,(2SC2718)			
Q111	IC,(TC4028BP)			
Q112	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		Q'ty 0 or 1
Q113	IC,(HA3-2525-3)			
Q114	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q115	IC,(TC4052BP)			
Q116	Not assigned			
Q117	IC,(μPC16312H)			
Q118	IC,(TC40H374P)			
Q119	IC,(TC40H174P)			
Q120	IC,(TC40H138P)			
Q121	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q122	Thermistor, (OS-D5-300-1)			
Q123	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q124	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q125	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1
Q126	Thermistor, (OS-D5-300-1)			Q'ty 0 or 1

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
Q127	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q128	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q129	Thermistor, (OS-D5-300-1)		
Q130	Thermistor, (OS-D5-300-1)		Q'ty 0 or 1
Q131	Di,(1S953)		Q'ty 0 or 1
Q132	Di,(1S953)		Q'ty 0 or 1
Q133	IC,(HA3-2525-5)		
Q134	IC,(μPC649C)		
Q135	IC,(TC4053BP)		
Q136	IC,(HA3-2525-5)		
Q137	IC,(HA3-2525-5)		
Q138	IC,(μPC1430 8H)		
Q139	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW	
Q140	Di,(RD5.1EB)	4.95 to 5.2V,400mW	
R 1	CF,(ARD25T201J)	200Ω,±5%,1/4W	
R 2	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W	
R 3	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W	
R 4	MF,(RN14K2E2431D)	2.43kΩ,±0.5%,1/4W	
R 5	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R 6	MF,(RN14K2E2001D)	2kΩ,±0.5%,1/4W	
R 7	MF,(RN14K2E69R8D)	69.8Ω,±0.5%,1/4W	
R 8	MF,(RN14K2E90R9D)	90.9Ω,±0.5%,1/4W	
R 9	MF,(RN14K2E * D)	1k to 1.15kΩ,±0.5%, 1/4W	Q'ty 0 or 1, *
R 10	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R 11	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R 12	Var,MF,(RJ-6P 200Ω)	200Ω,1/2W	
R 13	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R 14	MF,(RN14K2E1431D)	1.43kΩ,±0.5%,1/4W	
R 15	MF,(RN14K2E * D)	1.78k to 1.87kΩ, ±0.5%,1/4W	Q'ty 0 or 1, *
R 16	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R 17	Not assigned		
R 18	CF,(ARD25T153J)	15kΩ,±5%,1/4W	
R 19	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W	
R 20	Not assigned		

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
R21	Not assigned		
R22	MF,(RN14K2E8600D)	860Ω,±0.5%,1/4W	
R23	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W	
R24	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W	
R25	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R26	CF,(ARD25T202J)	2kΩ,±5%,1/4W	
R27	MF,(RN14K2E32R4D)	32.4Ω,±0.5%,1/4W	
R28	MF,(RN14K2E43R2D)	43.2Ω,±0.5%,1/4W	
R29	MF,(RN14K2E9090D)	909Ω,±0.5%,1/4W	
R30	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W	
R31	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R32	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R33	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R34	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R35	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R36	Not assigned		
R37	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R38	CF,(ARD25T153J)	15kΩ,±5%,1/4W	
R39	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W	
R40	Not assigned		
R41	Not assigned		
R42	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W	
R43	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W	
R44	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W	
R45	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R46	CF,(ARD25T202J)	2kΩ,±5%,1/4W	
R47	MF,(RN14K2E32R4D)	32.4Ω,±0.5%,1/4W	
R48	MF,(RN14K2E51R1D)	51.1Ω,±0.5%,1/4W	
R49	MF,(RN14K2E*D)	1.10k to 1.27kΩ,±0.5%,1/4W	*
R50	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W	
R51	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R52	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R53	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R54	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R55	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R56	Not assigned		
R57	CF,(ARD25T103J)	10kΩ,±5%,1/4W	
R58	CF,(ARD25T153J)	15kΩ,±5%,1/4W	
R59	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W	
R60	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R61	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R62	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W	
R63	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W	
R64	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W	

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
R65	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R66	MF,(RN14K2E4871D)	4.87kΩ,±0.5%,1/4W	
R67	MF,(RN14K2E17R8D)	17.8Ω,±0.5%,1/4W	
R68	MF,(RN14K2E33R2D)	33.2Ω,±0.5%,1/4W	
R69	MF,(RN14K2E1151D)	1.15kΩ,±0.5%,1/4W	
R70	MF,(RN14K2E1271D)	1.27kΩ,±0.5%,1/4W	
R71	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R72	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R73	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R74	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R75	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R76	Not assigned		
R77	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W	
R78	CF,(ARD25T153J)	15kΩ,±5%,1/4W	
R79	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W	
R80	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R81	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R82	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W	
R83	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W	
R84	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W	
R85	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R86	MF,(RN14K2E4871D)	4.87kΩ,±0.5%,1/4W	
R87	MF,(RN14K2E33R2D)	33.2Ω,±0.5%,1/4W	
R88	MF,(RN14K2E57R6D)	57.6Ω,±0.5%,1/4W	
R89	MF,(RN14K2E1301D)	1.3kΩ,±0.5%,1/4W	
R90	MF,(RN14K2E * D)	1.15k to 1.33kΩ, ±0.5%,1/4W	*
R91	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R92	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R93	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R94	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R95	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R96	Not assigned		
R97	MF,(RN14K2E51R1D)	51.1Ω,±0.5%,1/4W	
R98	MF,(RN14K2E73R2D)	73.2Ω,±0.5%,1/4W	
R99	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R100	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W	
R101	MF,(RN14K2E4490D)	449Ω,±0.5%,1/4W	
R102	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W	
R103	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R104	MF,(RN14K2E4871D)	4.87kΩ,±0.5%,1/4W	
R105	CF,(ARD25T560J)	56Ω,±5%,1/4W	

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING	NOTE
R106	CF,(ARD25T390J)	39Ω,±5%,1/4W	
R107	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W	
R108	MF,(RN14K2E14R7D)	14.7Ω,±0.5%,1/4W	
R109	MF,(RN14K2E33R2D)	33.2Ω,±0.5%,1/4W	
R110	MF,(RN14K2E * D)	1.1k to 1.33kΩ, ±0.5%,1/4W	*
R111	CF,(ARD25T391J)	390Ω,±5%,1/4W	
R112	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R113	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R114	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R115	CF,(ARD25T221J)	220Ω,±5%,1/4W	
R116	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R117	Not assigned		
R118	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R119	CF,(ARD25T153J)	15kΩ,±5%,1/4W	
R120	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W	
R121	CF,(ARD25T223J)	22kΩ,±5%,1/4W	
R122	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R123	CF,(ARD25T270J)	27Ω,±5%,1/4W	
R124	CF,(ARD25T100J)	10Ω,±5%,1/4W	
R125	MF,(RN14K2E8660D)	866Ω,±0.5%,1/4W	
R126	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W	
R127	MF,(RN14K2E2211D)	2.21kΩ,±0.5%,1/4W	
R128	MF,(RN14K2E3570D)	357Ω,±0.5%,1/4W	
R129	MF,(RN14K2E4871D)	4.87kΩ,±0.5%,1/4W	
R130	MF,(RN14K2E32R4D)	32.4Ω,±0.5%,1/4W	
R131	MF,(RN14K2E51R1D)	51.1Ω,±0.5%,1/4W	
R132	MF,(RN14K2E25R5D)	25.5Ω,±0.5%,1/4W	
R133	MF,(RN14K2E43R2D)	43.2Ω,±0.5%,1/4W	
R134	MF,(RN14K2E1331D)	1.33kΩ,±0.5%,1/4W	
R135	MF,(RN14K2E1580D)	158Ω,±0.5%,1/4W	
R136	CF,(ARD25T102J)	1kΩ,±5%,1/4W	
R137	CF,(ARD25T121J)	120Ω,±5%,1/4W	
R138	CF,(ARD25T271J)	270Ω,±5%,1/4W	
R139	CF,(ARD25T474J)	470kΩ,±5%,1/4W	
R140	CF,(ARD25T223J)	22kΩ,±5%,1/4W	
R141	CF,(ARD25T471J)	470Ω,±5%,1/4W	
R142	CF,(ARD25T680J)	68Ω,±5%,1/4W	
R143	CF,(ARD25T * J)	10Ω to 100kΩ,±5%, 1/4W	Q'ty 0 or 1, *
R144	Not assigned		
R145	Not assigned		
R146	Not assigned		
R147	CF,(ARD25T100J)	10Ω,±5%,1/4W	

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
R148	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R149	CF,(ARD25T510J)	51Ω,±5%,1/4W		
R150	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R151	MF,(RN14K2E9760D)	976Ω,±0.5%,1/4W		
R152	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R153	MF,(RN14K2E4750D)	475Ω,±0.5%,1/4W		
R154	CF,(ARD25T330J)	33Ω,±5%,1/4W		
R155	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R156	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R157	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R158	MF,(RN14K2E5110D)	511Ω,±0.5%,1/4W		
R159	MF,(RN14K2E4750D)	475Ω,±0.5%,1/4W		
R160	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R161	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		Q'ty 0 or 1
R162	Not assigned			
R163	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		Q'ty 0 or 1
R164	CF,(ARD25T104J)	100kΩ,±5%,1/4W		Q'ty 0 or 1
R165	MF,(RN14K2E7501D)	7.5kΩ,±0.5%,1/4W		
R166	MF,(RN14K2E4870D)	487Ω,±0.5%,1/4W		
R167	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R168	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R169	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R170	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R171	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R172	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R173	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R174	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R175	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R176	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R177	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		Q'ty 0 or 1
R178	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		Q'ty 0 or 1
R179	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R180	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R181	MF,(RN14K2E1002D)	10kΩ,±0.5%,1/4W		
R182	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R183	MF,(RN14K2E3320D)	332Ω,±0.5%,1/4W		Q'ty 0 or 1
R184	MF,(RN14K2E1580D)	158Ω,±0.5%,1/4W		
R185	MF,(RN14K2E1503D)	150kΩ,±0.5%,1/4W		
R186	MF,(RN14K2E9091D)	9.09kΩ,±0.5%,1/4W		
R187	CF,(ARD25T470J)	47Ω,±5%,1/4W		
R188	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R189	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R190	Not assigned			
R191	Not assigned			
R192	Not assigned			

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

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Parts List : Z25 LOG/LIN AMP DETECTOR

CKT REF	DESCRIPTION	RATING		NOTE
R193	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R194	MF,(RN14K2E1002D)	1kΩ,±0.5%,1/4W		
R195	MF,(RN14K2E1002D)	100kΩ,±5%,1/4W		
R196	MF,(RN14K2E1001D) CF,(ARD25T104J)	1kΩ,±0.5%,1/4W 100kΩ,±5%,1/4W		Parallel
R197	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		
R198	MF,(RN14K2E1501D)	1.5kΩ,±0.5%,1/4W		
R199	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W		
R200	MF,(RN14K2E4990D)	499Ω,±0.5%,1/4W		
R201	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R202	Single in-line array, (IHR-6-472JA)	4.7kΩ x 6,1/8W		
R203	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R204	Not assigned			
R205	Not assigned			
R206	MF,(RN14K2E * D)	100Ω to 10kΩ,±0.5%, 1/4W		Q'ty 0 or 1, *
R207	MF,(RN14K2E * D)	100Ω to 10kΩ,±0.5%, 1/4W		Q'ty 0 or 1, *
R208	MF,(RN14K2E * D)	100Ω to 10kΩ,±0.5%, 1/4W		Q'ty 0 or 1, *
R209	Not assigned			
R210	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R211	MF,(RN14K2E1001D)	1kΩ,±0.5%,1/4W		
R212	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R213	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R214	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R215	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R216	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R217	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R218	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R219	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R220	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R221	MF,(RN14K2E6040D)	604Ω,±0.5%,1/4W		
R222	MF,(RN14K2E1501D)	1.50kΩ,±0.5%,1/4W		
R223	Not assigned			
R224	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		Q'ty 0 or 1
R225	MF,(RN14K2E2491D)	2.49kΩ,±0.5%,1/4W		Q'ty 0 or 1

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

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1A470)	47µF,±20%,10V		
C 2	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C 3	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 4	Not assigned			
C 5	Not assigned			
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		
C10	Elect,(CE04W1A470)	47µF,±20%,10V		
C11	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C12	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C13	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C14	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C15	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C16	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C17	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C18	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C19	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C20	Cer,(CK924C1H104M)	0.1µF,±20%,50V		
C21	Plast,(ECQ-P1 203FZ)	0.02µF,±1%,100V		
C22	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C23	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C24	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C25	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C26	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C27	Plast,(ECQ-M1H103KZ)	0.01µF,±10%,50V		
C28	Cer,(CK924C1H102M)	1000pF,±20%,50V		
C29	Not assigned			
C30	Not assigned			
C31	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C32	Not assigned			
C33	Elect,(CE04W1A101)	100µF,±20%,10V		
C34	Elect,(CE04W1A101)	100µF,±20%,10V		
C35	Elect,(CE04W1A101)	100µF,±20%,10V		
C36	Elect,(CE04W1A101)	100µF,±20%,10V		
C37	Not assigned			
C38	Elect,(CE04W1E470)	47µF,±20%,25V		
C39	Elect,(CE04W1E470)	47µF,±20%,25V		
C40	Not assigned			

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

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING		NOTE
C41	Elect,(CE04W1E470)	47µF,±20%,25V		
C42	Elect,(CE04W1E470)	47µF,±20%,25V		
C43	Elect,(CE04W1E470)	47µF,±20%,25V		
C44	Not assigned			
C45	Not assigned			
C46	Not assigned			
C47	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C48	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C49	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C50	Elect,(CE04W1A470)	47µF,±20%,10V		
C51	Elect,(CE04W1A470)	47µF,±20%,10V		
C52	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C53	Plast,(ECQ-M1H103KZ)	0.01µF,±10%,50V		
C54	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C55	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C56	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C57	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C58	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C59	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C60	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C61	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C62	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C63	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
J 1	Connector, (8301-064-290)			
J 2	Connector,(U-PA1019)			
J 3	Connector, (HIF3-40P-2.54DS)			
J 4	Connector, (HIF3-34P-2.54DS)			
J 5	Connector, (DF1-5P-2.5DSA)			
J 6	Not assigned			
J 7	Connector, (DF1-2P-2.5DSA)			
J 8	Connector, (DF1-5P-2.5DSA)			
J 9	Not assigned			
J10	Not assigned			
L 1	Coil,(LF8-220K)	22µH		
L 2	Coil,(LF8-101K)	100µH		
L 3	Coil,(LF8-101K)	100µH		

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

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING		NOTE
L 4	Coil,(LF8-220K)	22μH		
L 5	Coil,(LF8-221K)	220μH		
Q 1	IC,(74LS04)			
Q 2	IC,(74LS00)			
Q 3	IC,(μPD780C-1)			
Q 4	Di,(1S953)			
Q 5	IC,(TC40H139P)			
Q 6	IC,(EPROM16Kx8-25N)			
Q 7	IC,(EPROM16Kx8-25N)			
Q 8	IC,(EPROM16Kx8-25N)			
Q 9	IC,(TC5565PL-15)			
Q10	Not assigned			
Q11	IC,(TC40H139P)			
Q12	IC,(TC40H138P)			
Q13	IC,(TC40H032P)			
Q14	Not assigned			
Q15	Not assigned			
Q16	IC,(TC40H374P)			
Q17	IC,(TC40H374P)			
Q18	Not assigned			
Q19	Not assigned			
Q20	IC,(74LS244)			
Q21	IC,(TC40H244P)			
Q22	IC,(74LS05)			
Q23	IC,(TC40H032P)			
Q24	IC,(74LS107A)			
Q25	IC,(74LS290)			
Q26	IC,(TC40H374P)			
Q27	IC,(74F191PC)			
Q28	IC,(74F191PC)			
Q29	IC,(74S00)			
Q30	Not assigned			
Q31	IC,(TC40H244P)			
Q32	IC,(TC4044BP)			
Q33	IC,(TC40H374P)			
Q34	IC,(μPC803C)			
Q35	IC,(TC4053BP)			
Q36	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q37	Not assigned			
Q38	IC,(μPD8279C-2)			
Q39	Not assigned			
Q40	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		

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

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING		NOTE
Q41	IC,(TC40H374P)			
Q42	Not assigned			
Q43	IC,(TC40H374P)			
Q44	IC,(TC40H374P)			
Q45	IC,(TC4526BP)			
Q46	IC,(TC4526BP)			
Q47	IC,(TC4526BP)			
Q48	IC,(TC4526BP)			
Q49	IC,(TC4520BP)			
Q50	IC,(TC4516BP)			
Q51	IC,(TC40H157P)			
Q52	IC,(TC40H157P)			
Q53	IC,(TC40H157P)			
Q54	IC,(HA17012PB)			
Q55	IC,(TC4011BP)			
Q56	IC,(TC4023BP)			
Q57	IC,(TC4071BP)			
Q58	IC,(TC4049BP)			
Q59	IC,(TC4053BP)			
Q60	IC,(TC4053BP)			
Q61	IC,(HA17083P)			
Q62	IC,(μPC258C)			
Q63	IC,(HA17901G)			
Q64	IC,(TC4052BP)			
Q65	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q66	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q67	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q68	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q69	Tr,(2SA1151)			
Q70	IC,(TC40H245P)			
Q71	IC,(TC40H367P)			
Q72	IC,(TC40H367P)			
Q73	Tr,(2SC2718)			
Q74	Di,breakdown,(RD9.1EB)	8.5 to 9.6V,400mW		
Q75	IC,(74LS123)			
R 1	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 2	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R 3	Single in-line array, (IHR-10-103JA)	10kΩ x 10,1/8W		
R 4	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R 5	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R 6	Not assigned			
R 7	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

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

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING		NOTE
R 8	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 9	Not assigned			
R10	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R11	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R12	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R13	Not assigned			
R14	Not assigned			
R15	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R16	Not assigned			
R17	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R18	MF,(RN14K2E5491D)	5.49kΩ,±0.5%,1/4W		
R19	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R20	Var,MF,(RJ-6P 100kΩ)	100kΩ,1/2W		
R21	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R22	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R23	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R24	Not assigned			
R25	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R26	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R27	Single in-line array, (IHR-8-103JA)	100kΩ x 8,1/8W		
R28	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R29	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R30	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R31	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R32	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R33	MF,(RN14K2E2430D)	243Ω,±0.5%,1/4W		
R34	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R35	MF,(RN14K2E4421D)	4.42kΩ,±0.5%,1/4W		
R36	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R37	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R38	MF,(RN14K2E4021D)	4.02kΩ,±0.5%,1/4W		
R39	MF,(RN14K2E1001D)	1.00kΩ,±0.5%,1/4W		
R40	Not assigned			
R41	Not assigned			
R42	Not assigned			
R43	Not assigned			
R44	Not assigned			
R45	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R46	Not assigned			
R47	MF,(RN14K2E5111D)	5.11kΩ,±0.5%,1/4W		
R48	Not assigned			
R49	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R50	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R51	MF,(RN14K2E1503D)	150kΩ,±0.5%,1/4W		
R52	MF,(RN14K2E7872D)	78.7kΩ,±0.5%,1/4W		

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

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Parts List : Z26 CPU BOARD

CKT REF	DESCRIPTION	RATING		NOTE
R53	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R54	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R55	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R56	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R57	MF,(RN14K2E1691D)	1.69kΩ,±0.5%,1/4W		
R58	MF,(RN14K2E6191D)	6.19kΩ,±0.5%,1/4W		
R59	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R60	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R61	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R62	MF,(RN14K2E3012D)	30.1kΩ,±0.5%,1/4W		
R63	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R64	MF,(RN14K2E3012D)	30.1kΩ,±0.5%,1/4W		
Z 1	XTAL OSC,(TCO-707F)	16MHz		

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

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Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CE04W1A470)	47μF, ±20%, 10V		
C 2	Cer, (CC924CH1H101J)	100pF, ±5%, 50V		
C 3	Cer, (CC924CH1H101J)	100pF, ±5%, 50V		
C 4	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V		
C 5	Cer, (CC924CH1H331J)	330pF, ±5%, 50V		
C 6	Cer, (CC924CH1H510J)	51pF, ±5%, 50V		
C 7	Cer, (CK924C1H222M)	2200pF, ±20%, 50V		
C 8	Cer, (CK924C1H472M)	4700pF, ±20%, 50V		
C 9	Cer, (CC924CH1H * J)	470 to 1000pF, ±5%, 50V		Q'ty 0 or 1, *
C10	Cer, (CC924CH1H101J)	100pF, ±5%, 50V		
C11	Cer, (CC45CH1H220JY)	22pF, ±5%, 50V		
C12	Elect, (CA92C-1C-1R000-R53)	1μF, -20%, 16V		
C13	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C14	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C15	Elect, (CA92C-1C-1R000-R53)	1μF, -20%, 16V		
C16	Elect, (CA92C-1C-1R000-R53)	1μF, -20%, 16V		
C17	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C18	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C19	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C20	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C21	Cer, (CC924CH1H100D)	10pF, ±0.5pF, 50V		
C22	Cer, (CC924CH1H100D)	10pF, ±0.5pF, 50V		
C23	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C24	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C25	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C26	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C27	Cer, (CC924CH1H180J)	18pF, ±0.5pF, 50V		
C28	Plast, (ECQ-M1H102KZ)	1000pF, ±10%, 50V		
C29	Plast, (ECQ-M1H472KZ)	4700pF, ±10%, 50V		
C30	Not assigned			
C31	Cer, (CC924CH1H331J)	330pF, ±5%, 50V		
C32	Elect, (CE04W1A470)	47μF, ±20%, 10V		
C33	Cer, (CC924CH1H330J)	33pF, ±5%, 50V		
C34	Cer, (CK924C1H222M)	2200pF, ±20%, 50V		
C35	Cer, (CC924CH1H270J)	27pF, ±5%, 50V		
C36	Cer, (CC924CH1H471J)	470pF, ±5%, 50V		
C37	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C38	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C39	Not assigned			
C40	Cer, (CK924C1H102M)	1000pF, ±20%, 50V		
C41	Cer, (CK924C1H102M)	1000pF, ±20%, 50V		
C42	Cer, (CK924F1H104Z)	0.1μF, -80/+20%, 50V		
C43	Cer, (CK924F1H104Z)	0.1μF, -80/+20%, 50V		
C44	Not assigned			
C45	Elect, (CE04W1E470)	47μF, ±20%, 25V		

( ): Manufacturer's part number — 44W83955 1/7
* : Selected at factory

Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
C46	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C47	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C48	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C49	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C50	Elect, (CE04W1E470)	47μF, ±20%, 25V		
C51	Elect, (CE04W1A101)	100μF, ±20%, 10V		
C52	Elect, (CE04W1A101)	100μF, ±20%, 10V		
C53	Elect, (CE04W1A101)	100μF, ±20%, 10V		
C54	Not assigned			
C55	Not assigned			
C56	Not assigned			
C57	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C58	Cer, (CC924CH1H680J)	68pF, ±5%, 50V		
C59	Cer, (CC924CH1H680J)	68pF, ±5%, 50V		
C60	Not assigned			
C61	Cer, (CSC300K)	30pF x 2, ±10%, 50V		
C62	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C63	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C64	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C65	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C66	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C67	Cer, (CK924F1H104Z)	0.1μF, +80/-20%, 50V		
C68	Not assigned			
C69	Not assigned			
C70	Not assigned			
C71	Not assigned			
C72	Not assigned			
C73	Cer, (CC45CH1H330JY)	33pF, ±5%, 50V		
C74	Cer, (CC45CH1H100DY)	10pF, ±0.5pF, 50V		
C75	Cer, (CC924CH1H560J)	56pF, ±5%, 50V		
J 1	Connector, (8301-064-290)			
J 2	Connector, (U-PA1019)			
J 3	Connector, (DF1-8P-2.5DS)			
L 1	Coil, (LF8-101K)	100μH		
L 2	Coil, (LF8-101K)	100μH		
L 3	Coil, (LF8-220K)	22μH		
Q 1	IC, (TC40H004P)			
Q 2	IC, (TC40H393P)			

( ): Manufacturer's part number — 44W83955 2/7
* : Selected at factory

Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
Q 3	IC, (74HC393)			
Q 4	IC, (TC40H393P)			
Q 5	IC, (74LS03)			
Q 6	IC, (TC40H020P)			
Q 7	IC, (TC40H157P)			
Q 8	IC, (TC40H367P)			
Q 9	IC, (TC40H244P)			
Q10	IC, (TC40H244P)			
Q11	IC, (TC40H074P)			
Q12	IC, (74LS123)			
Q13	IC, (TC5565PL-15)			
Q14	Tr, (PAL12L6Q14)			
Q15	IC, (74LS123)			
Q16	IC, (TC40H374P)			
Q17	IC, (74LS123)			
Q18	IC, (74LS123)			
Q19	IC, (TC40H000P)			
Q20	IC, (TC40H074P)			
Q21	Tr, (PAL12H6Q21B)			
Q22	IC, (μPB426D)			
Q23	IC, (TC40H175P)			
Q24	Tr, (PAL12L6Q24)			
Q25	IC, (74LS153)			
Q26	IC, (TC4001BP)			
Q27	IC, (TC40H032P)			
Q28	Not assigned			
Q29	Not assigned			
Q30	IC, (MBM2764-25)			
Q31	IC, (TC40H174P)			
Q32	IC, (μPC803C)			
Q33	IC, (74LS257)			
Q34	IC, (74LS257)			
Q35	IC, (74LS75)			
Q36	IC, (TC40H157P)			
Q37	IC, (TC40H367P)			
Q38	IC, (TC40H244P)			
Q39	Not assigned			
Q40	IC, (TC40H004P)			
Q41	IC, (TC40H000P)			
Q42	IC, (TC40H010P)			
Q43	Tr, (PAL16L2Q43B)			
Q44	IC, (TC40H032P)			
Q45	Not assigned			
Q46	Not assigned			
Q47	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		

( ): Manufacturer's part number — 44W83955 3/7
* : Selected at factory

Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
Q48	Di, breakdown, (1SZ52)	5.9 to 6.5V, 250mW		
Q49	IC, (μPC258C)			
Q50	Not assigned			
Q51	IC, (TC40H074P)			
Q52	IC, (TC40H374P)			
Q53	IC, (TC40H374P)			
Q54	IC, (MX7530JN)			
Q55	IC, (MX7530JN)			
Q56	Not assigned			
Q57	IC, (μPC813C)			
Q58	IC, (μPC813C)			
Q59	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW		
Q60	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW		
Q61	IC, (μPC78L05)			
Q62	Di, breakdown, (RD11EB)	10.4 to 11.6V, 400mW		
Q63	IC, (TC4052BP)			
Q64	IC, (μPC258C)			
Q65	IC, (μPC804C)			
Q66	IC, (TC4053BP)			
Q67	IC, (TC4053BP)			
Q68	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q69	Di, breakdown, (RD6.2EB)	5.8 to 6.6V, 400mW		
Q70	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q71	Di, (1S953)			
Q72	Di, (1S953)			
Q73	Di, breakdown, (RD5.1EB)	4.8 to 5.4V, 400mW		
Q74	IC, (μPC803C)			
Q75	IC, (TC4053BP)			
Q76	Not assigned			
Q77	Di, (1S953)			
Q78	Not assigned			
Q79	Not assigned			
Q80	Not assigned			
Q81	Tr, (2SC2718)			
Q82	Di, breakdown, (RD6.2EB)	58 to 6.6V, 400mW		
Q83	Tr, (2SA1151)			
Q84	Di, breakdown, (RD13EB)	12.4 to 14.1V, 400mW		
Q85	IC, (TC40H174P)			
Q86	IC, (TC40H148P)			
Q87	Not assigned			
Q88	Not assigned			
Q89	Not assigned			
Q90	Not assigned			
Q91	Not assigned			
Q92	Not assigned			

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( ): Manufacturer's part number — 44W83955 4/7
* : Selected at factory

Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
Q93	IC,(TC40H010P)			
Q94	IC,(TC40H151P)			
Q95	IC,(TC40H032P)			
Q96	Not assigned			
Q97	IC,(74LS123)			
R 1	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R 2	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R 3	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 4	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 5	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 6	Single in-line array, (IHR-4-102JA)	1kΩ x 4,1/8W		
R 7	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 8	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R 9	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R10	CF,(ARD25T221J)	220Ω,±5%,1/4W		
R11	CF,(ARD25T183J)	18kΩ,±5%,1/4W		
R12	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R13	CF,(ARD25T*J)	3.3k to 10kΩ,±5%,1/4W		Q'ty 0 or 1, *
R14	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R15	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R16	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R17	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R18	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R19	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R20	MF,(RN14K2E2002D)	20.0kΩ,±0.5%,1/4W		
R21	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R22	MF,(RN14K2E3321D)	3.32kΩ,±0.5%,1/4W		
R23	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R24	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R25	Single in-line array, (IHR-8-103JA)	1kΩ x 8,1/8W		
R26	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R27	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R28	Not assigned			
R29	CF,(ARD25T391J)	390Ω,±5%,1/4W		
R30	MF,(RN14K2E7150D)	715Ω,±0.5%,1/4W		
R31	MF,(RN14K2E3010D)	301Ω,±0.5%,1/4W		
R32	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R33	MF,(RN14K2E3651D)	3.65kΩ,±0.5%,1/4W		

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

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Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
R34	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R35	Var,MF,(RJ-6S 1kΩ)	1kΩ,1/2W		
R36	Var,MF,(RJ-6S 20kΩ)	20kΩ,1/2W		
R37	Var,MF,(RJ-6S 2kΩ)	2kΩ,1/2W		
R38	Not assigned			
R39	Not assigned			
R40	Not assigned			
R41	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R42	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R43	Var,MF,(RJ-6S 500Ω)	500Ω,1/2W		
R44	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R45	MF,(RN14K2E9391D)	9.39kΩ,±0.5%,1/4W		
R46	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R47	MF,(RN14K2E3320D)	332Ω,±0.5%,1/4W		
R48	MF,(RN14K2E8252D)	82.5kΩ,±0.5%,1/4W		
R49	MF,(RN14K2E4751D)	4.75kΩ,±0.5%,1/4W		
R50	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R51	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R52	MF,(RN14K2E1002D)	10.0kΩ,±0.5%,1/4W		
R53	MF,(RN14K2E8061D)	8.06kΩ,±0.5%,1/4W		
R54	MF,(RN14K2E1243D)	124kΩ,±0.5%,1/4W		
R55	MF,(RN14K2E4022D)	40.2kΩ,±0.5%,1/4W		
R56	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R57	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R58	MF,(RN14K2E7501D)	7.50kΩ,±0.5%,1/4W		
R59	MF,(RN14K2E3482D)	34.8kΩ,±0.5%,1/4W		
R60	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R61	MF,(RN14K2E3921D)	3.92kΩ,±0.5%,1/4W		
R62	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R63	MF,(RN14K2E9092D)	90.9kΩ,±0.5%,1/4W		
R64	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R65	MF,(RN14K2E8252D)	82.5kΩ,±0.5%,1/4W		
R66	Not assigned			
R67	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R68	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R69	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R70	Not assigned			
R71	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R72	MF,(RN14K2E7501D)	7.50kΩ,±0.5%,1/4W		
R73	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R74	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R75	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R76	CF,(ARD25T * J)	39k to 100kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R77	CF,(ARD25T333J)	33kΩ,±5%,1/4W		

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

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Parts List : Z27 DISPLAY CONTROL

CKT REF	DESCRIPTION	RATING		NOTE
R78	Not assigned			
R79	CF,(ARD25T * J)	4.7k to 10kΩ,±5%, 1/4W		Q'ty 0 or 1, *
R80	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R81	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R82	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R83	CF,(ARD25T102J)	1.0kΩ,±5%,1/4W		
R84	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R85	Single in-line array, (IHR-6-103JA)	10kΩ x 6,1/8W		
R86	CF,(ARD25T105J)	1.0MΩ,±5%,1/4W		
R87	CF,(ARD25T683J)	68kΩ,±5%,1/4W		Q'ty 0 or 1
R88	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R89	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R90	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R91	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R92	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R93	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R94	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R95	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R96	CF,(ARD25T512J)	5.1kΩ,±5%,1/4W		
X 1	CSA 4.80MG			

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

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Parts List : Z28 LOW LOCAL 1

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Cer,(CC732CH1H100D)	10pF,±0.5pF,50V		
C 3	Cer,(CC732CK1H0R5C)	0.5pF,±0.25pF,50V		
C 4	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C 5	Not assigned			
C 6	Cer,(CK924C1H103M)	0.1μF,±20%,50V		
C 7	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 8	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 9	Plast,(ECQ-V1H224JW)	0.22μF,±5%,50V		
C10	Cer,(CC732CK1H010C)	1pF,±0.25pF,50V		
C11	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C12	Cer,(CK734B1H104K)	0.1μF,±10%,50V		
C13	Elect,(CE04W1V220)	22μF,±20%,35V		
C14	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C15	Cer,(CK924C1H*M)	2200pF to 0.1μF,±20%,50V		Q'ty 0 or 1*
C16	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C17	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C18	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C19	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C20	Cer,(CC732CK1H010C)	1pF,±0.25pF,50V		
C21	Cer,(CK732B1H102K)	1000pF,±20%,50V		
C22	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C23	Elect,(CE04W1V220)	22μF,±20%,35V		
C24	Cer,(C4532Y5V1H105Z)	1μF,+80/-20%,50V		
C25	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C26	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C27	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C28	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C29	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C30	Elect,(CE04W1V220)	22μF,±20%,35V		
C31	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C32	Cer,(CK737F1H105Z)	1μF,+80/-20%,50V		
C33	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C34	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C35	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C36	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C37	Cer,(C4532Y5V1H105Z)	1μF,+80/-20%,50V		
C38	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C39	Cer,(CK732B1H102K)	1000pF,±10%,50V		
C40	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C41	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C42	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		

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

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Parts List : Z28 LOW LOCAL 1

CKT REF	DESCRIPTION	RATING		NOTE
L 1	Not assigned			
L 2	Not assigned			
L 3	Not assigned			
L 4	Coil,(MLF3216DR10K)	0.1μH		
L 5	Coil,(MLF3216DR10K)	0.1μH		
L 6	Coil,(MLF3216DR10K)	0.1μH		
L 7	Coil,(MLF3216DR10K)	0.1μH		
L 8	Coil,(MLF3216DR10K)	0.1μH		
L 9	Coil,(SP0408-6R8K)	6.8μH		
Q 1	Tr,(2SC2149)			
Q 2	Di,(1SV164)			
Q 3	Di,(1SV164)			
Q 4	Di,(1SV164)			
Q 5	Di,(1SV164)			
Q 6	Tr,(2SC2367)			
Q 7	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 8	Not assigned			
Q 9	Not assigned			
Q10	Tr,(2SC2367)			
Q11	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q12	IC,(μPB581C)			
Q13	IC,(μPC1651G)			
Q14	Not assigned			
Q15	Not assigned			
Q16	Not assigned			
Q17	Not assigned			
Q18	IC,(μPC1656C)			
R 1	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 2	MF,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 3	MF,(RM73B2B100JD)	10Ω,±5%,1/8W		
R 4	Not assigned			
R 5	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 6	CF,(ARD25T272J)	2.7kΩ,±5%,1/4W		
R 7	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 8	CM,(RM73B2B470JD)	47Ω,±5%,1/4W		
R 9	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R10	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R11	MF,(RM73B100JD)	10Ω,±5%,1/8W		
R12	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R13	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		
R14	MF,(RM73B2B220JD)	22Ω,±5%,1/8W		
R15	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		

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

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Parts List : Z28 LOW LOCAL 1

CKT REF	DESCRIPTION	RATING		NOTE
R16	MF,(RM73B2B100JD)	10Ω,±5%,1/8W		
R17	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R18	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R19	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R20	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		
R21	MF,(RM73B2B220JD)	22Ω,±5%,1/8W		
R22	MF,(RM73B2B271JD)	270Ω,±5%,1/8W		
R23	MF,(RM73B2B101JD)	100Ω,±5%,1/8W		
R24	MF,(RM73B2B680JD)	68Ω,±5%,1/8W		
R25	MF,(RM73B2B101JD)	100Ω,±5%,1/8W		
R26	Not assigned			
R27	Not assigned			
R28	Not assigned			
R29	Not assigned			
R30	CF,(ARD25T121J)	120Ω,±5%,1/4W		
R31	MF,(RM73B2B100JD)	10Ω,±5%,1/8W		

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

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Parts List : Z29 LOW LOCAL 2

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CH1H471J)	470pF,±0.5pF,50V		
C 2	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 3	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 4	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 5	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C 6	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C 7	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 8	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C 9	Elect,(CE04W1A101)	100μF,±20%,10V		
C10	Not assigned			
C11	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C12	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C13	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C14	Cer,(CK924C1H103M)	0.01μF,±20%,50V		
C15	Cer,(CK737F1H105Z)	1μF,+80/-20%,50V		
C16	Not assigned			
C17	Cer,(CC732CJ1H030C)	3pF,±0.25pF,50V		
C18	Elect,(CE04W1V4R7)	4.7μF,±20%,35V		
C19	Elect,(CE04W1V4R7)	4.7μF,±20%,35V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Not assigned			
J 4	Not assigned			
J 5	Not assigned			
J 6	Connector, (DF1-5P-2.5DS)			
K 1	Relay,(NR-SD-12V)			
K 2	Relay,(NR-SD-12V)			
L 1	Coil,(MLF3216DR10K)	0.1μH		
L 2	Coil,(MLF3216DR10K)	0.1μH		
Q 1	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 2	Tr,(2SC2367)			
Q 3	Not assigned			
Q 4	Tr,(DTC143EF)			
Q 5	Di,(1S953)			
Q 6	Not assigned			
Q 7	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q 8	IC,(μPC251C)			
Q 9	Tr,(2SC2721)			
Q10	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		

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

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Parts List : Z29 LOW LOCAL 2

CKT REF	DESCRIPTION	RATING		NOTE
Q11	Not assigned			
Q12	Tr,(2SA1154)			
Q13	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q14	Di,breakdown,(RD6.2EB)	5.8 to 6.6V,400mW		
Q15	Di,(1S953)			
Q16	Tr,(DTC143EF)			
Q17	IC,(μPC1651G)			
Q18	IC,(μPC14308H)			
Q19	Tr,(2SC2721)			
Q20	Di,breakdown, (RD5.1E(3))	4.95 to 5.2V,400mW		
Q21	Di,(1S953)			
R 1	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R 2	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R 3	MF,(RM73B2B102JD)	1kΩ,±0.5%,1/8W		
R 4	Not assigned			
R 5	Not assigned			
R 6	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 7	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R 8	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R 9	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R10	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R11	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R12	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R13	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R14	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R15	Not assigned			
R16	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R17	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R18	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R19	Not assigned			
R20	MF,(RS1FB 10 J)	10Ω,±5%,1W		
R21	CF,(ARD25T220J)	22Ω,±5%,1/4W		
Z 1	M14-ML(R.K)			

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

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE04W1V220)	22μF,±20%,35V		
C 2	Elect,(CE04W1V220)	22μF,±20%,35V		
C 3	Elect,(CE04W1V220)	22μF,±20%,35V		
C 4	M Plast,(CF922N2A104K)	0.1μF,±10%,100V		
C 5	M Plast,(CF922N2A104K)	0.1μF,±10%,100V		
C 6	Not assigned			
C 7	Not assigned			
C 8	Elect,(CE04W1E101)	100μF,±20%,25V		
C 9	Elect,(CE04W1E101)	100μF,±20%,25V		
C10	Not assigned			
C11	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C12	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C13	Elect,(KX100VB-3.3)	3.3μF,100V		
C14	Elect,(KX100VB-3.3)	3.3μF,100V		
C15	Elect,(KX100VB-3.3)	3.3μF,100V		
C16	Elect,(KX100VB-3.3)	3.3μF,100V		
C17	M Plast,(CF922N2A104K)	0.1μF,±10%,100V		
C18	Plast,(ECQ-M1H103KZ)	0.01μF,±10%,50V		
C19	Not assigned			
C20	Cer,(DE1710R472K1kV)	4700pF,±10%,1kV		
C21	Cer,(DE1710R472K1kV)	4700pF,±10%,1kV		
C22	Cer,(DE1710R472K1kV)	4700pF,±10%,1kV		
C23	Cer,(DE2110R472K2kV)	4700pF,±10%,2kV		
C24	Cer,(DE1710R222K3kV)	2200pF,±10%,3kV		
C25	Cer,(DE1710R222K3kV)	2200pF,±10%,3kV		
C26	Cer,(CC45CH1H101JY)	100pF,±5%,50V		Q'ty 0 or 1,*
C27	Not assigned			
C28	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C29	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C30	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C31	Cer,(CC45CH1H220JY)	22pF,±5%,50V		
C32	Cer,(CC45CH1H100DY)	10pF,±0.5pF,50V		
J 1	Connector,(PI011-05M)			
J 2	Connector,(DF1-8P-2.5DSA)			
J 3	Connector,(PI011-02M)			
J 4	Connector,(PI011-08M)			
J 5	Connector,(PI011-07M)			
L 1	Coil,(LH1-471K)	470μH		
L 2	Coil,(LH1-471K)	470μH		

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

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING		NOTE
Q 1	IC,(μPC14312H)			
Q 2	IC,(μPC16312H)			
Q 3	Tr,(2SA1151)			
Q 4	Tr,(2SC2718)			
Q 5	Tr,(2SC2718)			
Q 6	Tr,(2SC2718)			
Q 7	Tr,(2SC2718)			
Q 8	Tr,(2SC1279S)			
Q 9	Tr,(2SC1279S)			
Q10	Tr,(2SC507)			
Q11	Tr,(2SC507)			
Q12	Not assigned			
Q13	Tr,(2SC2718)			
Q14	Tr,(2SC2718)			
Q15	Tr,(2SC1279S)			
Q16	Tr,(2SC1279S)			
Q17	Tr,(2SC1279S)			
Q18	Tr,(2SC1279S)			
Q19	Not assigned			
Q20	Not assigned			
Q21	Di,(1S953)			
Q22	Tr,(2SC2718)			
Q23	Tr,(2SC2718)			
Q25	Tr,(2SA1151)			
Q25	Photocoupler,(PS2006B)			
Q26	Di,(1S953)			
Q27	Di,(1S953)			
Q28	Tr,(2SD297(M))			
Q29	Tr,(2SD297(M))			
Q30	Not assigned			
Q31	Rectifier,(1S1834)			
Q32	Rectifier,(1S1834)			
Q33	Rectifier,(1S1834)			
Q34	Rectifier,(1S1834)			
Q35	Tr,(2SA639S)			
Q36	Tr,(2SA639S)			
Q37	Tr,(2SA639S)			
Q38	Tr,(2SA639S)			
Q39	Tr,(2SA639S)			
Q40	Tr,(2SA639S)			
Q41	Not assigned			
Q42	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q43	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q44	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		

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

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING		NOTE
Q45	Tr,(2SC1279S)			
Q46	Rectifier,(ES01F)			
Q47	Rectifier,(ES01F)			
Q48	Rectifier,(ES01F)			
R 1	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 2	Not assigned			
R 3	Not assigned			
R 4	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R 5	CF,(ARD25T333J)	33kΩ,±5%,1/4W		
R 6	Not assigned			
R 7	Not assigned			
R 8	Not assigned			
R 9	Not assigned			
R10	Not assigned			
R11	Not assigned			
R12	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R13	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R14	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R15	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R16	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R17	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R18	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R19	Var,MF,(RJ-6P 5kΩ)	5kΩ,1/2W		
R20	Not assigned			
R21	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R22	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R23	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R24	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R25	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R26	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R27	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R28	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R29	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R30	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R31	Not assigned			
R32	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R33	CF,(ARD25T104J)	100kΩ,±5%,1/4W		
R34	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R35	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R36	Not assigned			
R37	Not assigned			
R38	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R39	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R40	Not assigned			

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

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING		NOTE
R41	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R42	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R43	CF,(ARD25T152J)	1.5kΩ,±5%,1/4W		
R44	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R45	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R46	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R47	CF,(ARD25T821J)	820Ω,±5%,1/4W		
R48	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R49	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R50	Not assigned			
R51	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R52	CF,(ARD25T154J)	150kΩ,±5%,1/4W		
R53	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R54	CF,(ARD25T823J)	82kΩ,±5%,1/4W		
R55	Not assigned			
R56	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R57	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R58	CF,(ARD25T183J)	18kΩ,±5%,1/4W		
R59	Not assigned			
R60	Not assigned			
R61	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R62	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R63	Var,MF,(RJ-6P 2kΩ)	2kΩ,1/2W		
R64	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R65	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R66	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R67	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R68	Not assigned			
R69	Not assigned			
R70	Not assigned			
R71	Not assigned			
R72	Not assigned			
R73	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R74	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R75	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R76	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R77	CF,(ARD25T153J)	15kΩ,±5%,1/4W		
R78	CF,(ARD25T * J)	33k to 47kΩ,±5%,1/4W		Q'ty 0 or 1, *
R79	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R80	Not assigned			
R81	CF,(ARD25T102J)	1kΩ,±5%,1/4W		Q'ty 0 or 1
R82	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R83	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		

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

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Parts List : Z30 CRT BIAS/X-Y AMP

CKT REF	DESCRIPTION	RATING		NOTE
R84	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R85	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R86	CF,(ARD25T471J)	470Ω,±5%,1/4W		
R87	CF,(ARD25T224J)	220kΩ,±5%,1/4W		
R88	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R89	WW,(RH1HVS1.2MΩJ)	1.2MΩ,±5%,1W		
R90	WW,(RH2HVS2.2MΩJ)	2.2MΩ,±5%,2W		
R91	Var,MF,(RJ-13SR 10kΩ)	10kΩ,1/2W		
R92	Var,MF,(RJ-13SR 1kΩ)	1kΩ,1/2W		
R93	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R94	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R95	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R96	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R97	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R98	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R99	Var,MF,(RJ-6P 500kΩ)	500kΩ,1/2W		
R100	Not assigned			
R101	Var,MF,(RJ-13SR 500kΩ)	500kΩ,1/2W		
T 1	Trans,(439T23554)			
Z 1	RECTIFIER,(MSL4532)			

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

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect,(CE02W1J222)	2200μF,±20%,63V		
C 2	Elect,(CE02W1J332)	3300μF,±20%,63V		
C 3	Elect,(CE02W1J222)	2200μF,±20%,63V		
C 4	Cer,(CK45B1H102KY)	1000pF,±10%,50V		
C 5	Elect,(CE04C1J101)	100μF,±20%,63V		
C 6	Elect,(CE04C1J101)	100μF,±20%,63V		
C 7	Elect,(CE04C1E221)	220μF,±20%,25V		
C 8	Not assigned			
C 9	Elect,(CE04W1E221)	220μF,±20%,25V		
C10	Elect,(CE04W1E221)	220μF,±20%,25V		
C11	Not assigned			
C12	Not assigned			
C13	Not assigned			
C14	Elect,(CE04C1J101)	100μF,±20%,63V		
C15	Elect,(CE04C1A331)	330μF,±20%,10V		
C16	Elect,(CE04C1A331)	330μF,±20%,10V		
C17	Elect,(CE04C1A331)	330μF,±20%,10V		
C18	Elect,(CE04W1A221)	220μF,±20%,10V		
C19	Elect,(CE04W1A221)	220μF,±20%,10V		
C20	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C21	Not assigned			
C22	Not assigned			
C23	Elect,(CE04C1J101)	100μF,±20%,63V		
C24	Elect,(CE04C1J101)	100μF,±20%,63V		
C25	Elect,(CE04C1E221)	220μF,±20%,25V		
C26	Elect,(CE04C1E221)	220μF,±20%,25V		
C27	Elect,(CE04W1E221)	220μF,±20%,25V		
C28	Elect,(CE04W1E221)	220μF,±20%,25V		
C29	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C30	Cer,(CC924CH1H471J)	470pF,±5%,50V		
C31	Not assigned			
C32	M Plast,(CF922N2A105K)	1μF,±10%,100V		
C33	M Plast,(CF922N2A105K)	1μF,±10%,100V		
C34	M Plast,(CF922N2A105K)	1μF,±10%,100V		
C35	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C36	Cer,(CC924CH1H101J)	100pF,±5%,50V		
C37	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C38	Elect,(CE04W1J100)	10μF,±20%,63V		
C39	Cer,(CK924F1H104Z)	0.1μF,+80/-20%,50V		
F 1	Fuse, TM,(T 2A 250V)	2A		
F 2	Fuse, TM,(T 1A 250V)	1A		
F 3	Fuse, TM,(T 1.6A 250V)	1.6A		

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

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector,(U-PB1521)			
J 2	Connector,(PI011-05M)			
J 3	Connector,(PI011-05M)			
J 4	Connector,(PI011-12M)			
J 5	Connector,(PI011-02M)			
J 6	Connector,(DF1-5P-2.5DSA)			
J 7	Not assigned			
J 8	Connector,(PI011-04M)			
L 1	Coil,(SF-T10-40)			
L 2	Not assigned			
L 3	Coil,(MS-2405)			
L 4	Coil,(SF-T10-50)			
L 5	Coil,(SF-T10-50)			
L 6	Not assigned			
L 7	Coil,(SF-T12-50)			
L 8	Not assigned			
L 9	Coil,(MS-1210)			
L10	Coil,(MS-0503)			
L11	Coil,(MS0503)			
L12	Not assigned			
L13	Coil,(SF-T10-40)			
L14	Not assigned			
L15	Coil,(MS-2405)			
L16	Coil,(SF-T10-50)			
L17	Coil,(SF-T10-50)			
L18	Coil,(LH1-471K)			
L19	Coil,(LH1-471K)			
M 1	Timer,(TM-0)			
Q 1	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q 2	IC,(μPC271C)			
Q 3	Tr,(2SC2718)			
Q 4	Tr,(2SA1154)			
Q 5	Tr,(2SC2750)			
Q 6	Rectifier,(S6K20)			
Q 7	Not assigned			
Q 8	Rectifier,(RB-402)			
Q 9	Rectifier,(RB-402)			
Q10	Rectifier,(RB-402)			
Q11	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q12	IC,(μPC271C)			
Q13	Tr,(2SC2718)			

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

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
Q14	Tr,(2SA1154)			
Q15	Tr,(2SC2750)			
Q16	Rectifier,(S10SC4M)			
Q17	Di,breakdown,(1SZ52)	5.9 to 6.5V,250mW		
Q18	IC,(μPC271C)			
Q19	Tr,(2SA1151)			
Q20	Tr,(2SA1151)			
Q21	Tr,(2SC2721)			
Q22	Tr,(2SC2750)			
Q23	Rectifier,(S6K20)			
Q24	Not assigned			
Q25	Not assigned			
Q26	Not assigned			
Q27	Not assigned			
Q28	Not assigned			
Q29	Not assigned			
Q30	Not assigned			
Q31	Not assigned			
Q32	IC,(TL7705CP)			
R 1	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R 2	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R 3	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R 4	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R 5	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R 6	CF,(ARD25T564J)	560kΩ,±5%,1/4W		
R 7	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R 8	Not assigned			
R 9	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R10	CF,(ARD25T151J)	150Ω,±5%,1/4W		
R11	Not assigned			
R12	CF,(ARD25T222J)	2.2kΩ,±5%,1/4W		
R13	Not assigned			
R14	Not assigned			
R15	Not assigned			
R16	Not assigned			
R17	Not assigned			
R18	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R19	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R20	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R21	CF,(ARD25T684J)	680kΩ,±5%,1/4W		
R22	CF,(ARD25T562J)	5.6kΩ,±5%,1/4W		
R23	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R24	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R25	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		

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

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Parts List : Z32 SWITCHING REGULATOR

CKT REF	DESCRIPTION	RATING		NOTE
R26	WW,(ERF-2SKR20)	0.2Ω,±10%,2W		
R27	WW,(ERF-2SKR20)	0.2Ω,±10%,2W		
R28	WW,(ERF-2SKR20)	0.2Ω,±10%,2W		
R29	CF,(ARD25T122J)	1.2kΩ,±5%,1/4W		
R30	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R31	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R32	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R33	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R34	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R35	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R36	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R37	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R38	CF,(ARD25T681J)	680Ω,±5%,1/4W		
R39	CF,(ARD25T223J)	22kΩ,±5%,1/4W		
R40	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R41	WW,(ERF-2SKR10)	0.1Ω,±10%,2W		
R42	WW,(ERF-2SKR10)	0.1Ω,±10%,2W		
R43	Not assigned			
R44	Not assigned			
R45	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R46	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R47	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R48	Not assigned			
R49	Not assigned			
R50	Not assigned			
R51	WW,(ERF-2SKR20)	0.2Ω,±10%,2W		
R52	WW,(ERF-2SKR10)	0.1Ω,±10%,2W		
R53	WW,(ERF-2SKR20)	0.2Ω,±10%,2W		
R54	Not assigned			
R55	CF,(ARD25T473J)	47kΩ,±5%,1/4W		
R56	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R57	Not assigned			
R58	Not assigned			
R59	Not assigned			
R60	Not assigned			
R61	Not assigned			
R62	Not assigned			
R63	Not assigned			
R64	Not assigned			
R65	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R66	Var,MF,(RJ-6P 1kΩ)	1kΩ,1/2W		
R67	CF,(ARD25T392J)	3.9kΩ,±5%,1/4W		
R68	CF,(ARD25T273J)	27kΩ,±5%,1/4W		
R69	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R70	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R71	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R72	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R73	CF,(ARD25T103J)	10kΩ,±5%,1/4W		

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

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Parts List: Z33 CONNECTION BOARD

CKT REF	DESCRIPTION	RATING		NOTE
J 1	Connector,(PI021-10M)			
J 2	Connector,(U-SA1001)			
J 3	Connector,(U-SA1001)			

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

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C 2	Not assigned			
C 3	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 7	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C 8	Elect,(CE04W1V4R7)	4.7µF,±20%,35V		
C 9	Not assigned			
C10	Not assigned			
C11	Elect,(CE04W1E470)	47µF,±20%,25V		
C12	Elect,(CE04W1E470)	47µF,±20%,25V		
C13	Elect,(CE04W1E470)	47µF,±20%,25V		
C14	Elect,(CE04W1E470)	47µF,±20%,25V		
C15	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C16	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C17	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C18	Not assigned			
C19	Cer,(CK924C1H473M)	0.047µF,±20%,50V		
C20	Cer,(CK924C1H473M)	0.047µF,±20%,50V		
C21	Cer,(CC924CH1H102J)	1000pF,±5%,50V		
C22	Cer,(CC924CH1H221J)	220pF,±5%,50V		
C23	Cer,(CC924CH1H331J)	330pF,±5%,50V		
C24	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C25	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C26	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C27	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C28	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C29	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C30	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C31	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C32	Not assigned			
C33	Elect, (CA92C-1C-1R000-R53)	1µF,-20%,16V		
C34	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C35	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C36	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C37	Cer,(CC924CH1H200J)	20pF,±5%,50V		
C38	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		

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

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING		NOTE
C39	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C40	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C41	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C42	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C43	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C44	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C45	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C46	Cer,(CC924CH1H150J)	15pF,±5%,50V		
C47	Cer,(CC924CH1H200J)	20pF,±5%,50V		
C48	Plast,(ECQ-M1H102KZ)	1000pF,±10%,50V		
C49	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C50	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C51	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C52	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C53	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C54	Cer,(CK924C1H222M)	2200pF,±20%,50V		
C55	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C56	Cer,(CC924CH1H151J)	150pF,±5%,50V		
C57	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C58	Not assigned			
C59	Plast,(ECQ-M1H222KZ)	2200pF,±10%,50V		
C60	Not assigned			
C61	Elect,(CE04W1A101)	100µF,±20%,10V		
C62	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C63	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C64	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C65	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C66	Tant,(CS-E1D2R2M)	2.2µF,±20%,20V		
C67	Plast,(ECQ-M1H223KZ)	0.022µF,±10%,50V		
C68	Plast,(ECQ-M1H223KZ)	0.022µF,±10%,50V		
C69	Plast,(ECQ-M1H223KZ)	0.022µF,±10%,50V		
C70	Plast,(ECQ-M1H223KZ)	0.022µF,±10%,50V		
C71	Plast,(ECQ-M1H223KZ)	0.022µF,±10%,50V		
C72	Not assigned			
C73	Cer,(CK924C1H472M)	4700pF,±20%,50V		
C74	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C75	Not assigned			
C76	Elect,(CE04W1E101)	100µF,±20%,25V		
C77	Elect,(CE04W1E101)	100µF,±20%,25V		
C78	Elect,(CE04W1V100)	10µF,±20%,35V		
C79	Elect,(CE04W1V100)	10µF,±20%,35V		
C80	Not assigned			
C81	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C82	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C83	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		

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

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CKT REF	DESCRIPTION	RATING		NOTE
C84	Not assigned			
C85	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C86	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C87	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C88	Not assigned			
C89	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C90	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C91	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C92	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C93	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C94	Not assigned			
C95	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C96	Not assigned			
C97	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C98	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C99	Not assigned			
C100	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C101	Not assigned			
C102	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C103	Not assigned			
C104	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C105	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C106	Not assigned			
C107	Cer,(CK45D1H103MY)	0.01µF,±20%,50V		
C108	Cer,(CK45D1H103MY)	0.01µF,±20%,50V		
C109	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C110	Not assigned			
C111	Cer,(CK924F1H104Z)	0.1µF,+80/-20%,50V		
C112	Elect,(CE04C1E220)	22µF,±20%,25V		
J 1	Connector, (8301-064-290)			
J 2	Connector, (57LE-GP-IB)			
J 3	Connector, (HIF3F-34P-2.54DS)			
J 4	Connector, (DF1-8P-2.5DSA)			
J 5	Connector, (DF1-10P-2.5DSA)			
J 6	Not assigned			
J 7	Connector, (DF1-2P-2.5DSA)			

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

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CKT REF	DESCRIPTION	RATING		NOTE
L 1	Coil,(LF8-101K)	100µH		
L 2	Coil,(LF8-101K)	100µH		
L 3	Coil,(LF8-470K)	47µH		
L 4	Coil,(LF8-470K)	47µH		
Q 1	Not assigned			
Q 2	IC,(µPD8259AC-2)			
Q 3	Not assigned			
Q 4	Not assigned			
Q 5	Not assigned			
Q 6	Not assigned			
Q 7	Not assigned			
Q 8	Not assigned			
Q 9	IC,(74LS245)			
Q10	Not assigned			
Q11	IC,(74LS74A)			
Q12	IC,(µPD8253C-2)			
Q13	Not assigned			
Q14	IC,(74LS74A)			
Q15	IC,(EPROM32Kx8-20C)			
Q16	IC,(TC5565PL-15)			
Q17	Di,(1S953)			
Q18	IC,(74LS37)			
Q19	Not assigned			
Q20	IC,(74LS155)			
Q21	IC,(74LS08)			
Q22	Not assigned			
Q23	Not assigned			
Q24	IC,(74LS32)			
Q25	Not assigned			
Q26	IC,(74LS04)			
Q27	IC,(µPD780C-1)			
Q28	Not assigned			
Q29	IC,(74LS14)			
Q30	Tr,(PAL10l8Q30C)			
Q31	IC,(74LS138)			
Q32	IC,(TC5565PL-15)			
Q33	Not assigned			
Q34	Not assigned			
Q35	Not assigned			
Q36	IC,(TC40H367P)			
Q37	IC,(TC40H367P)			
Q38	IC,(TC40H245P)			
Q39	IC,(TC40H243P)			
Q40	IC,(TC40H175P)			

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

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CKT REF	DESCRIPTION	RATING		NOTE
Q41	IC,(TC5514AP-2)			
Q42	IC,(TC40H074P)			
Q43	IC,(74LS244)			
Q44	IC,(74LS244)			
Q45	IC,(µPD8255AC-2)			
Q46	IC,(µPD7210C)			
Q47	IC,(SN75160AN)			
Q48	IC,(SN75161AN)			
Q49	Not assigned			
Q50	Not assigned			
Q51	IC,(µPD8255AC-2)			
Q52	IC,(TC40H004P)			
Q53	IC,(TC40H027P)			
Q54	IC,(TC40H008P)			
Q55	IC,(74LS123)			
Q56	IC,(74LS123)			
Q57	IC,(ADC574AJH)			
Q58	IC,(TC40H074P)			
Q59	IC,(TC40H032P)			
Q60	IC,(TC40H021P)			
Q61	IC,(TC4044BP)			
Q62	IC,(TC40H008P)			
Q63	IC,(TC40H155P)			
Q64	IC,(NJU201AD)			
Q65	IC,(LF356BN)			
Q66	IC,(µPC649D)			
Q67	Not assigned			
Q68	IC,(TC40H174P)			
Q69	IC,(TC40H174P)			
Q70	Not assigned			
Q71	IC,(HA3-2525-5)			
Q72	Di,(1S953)			
Q73	Di,(1SS97)			
Q74	Di,(1SS97)			
Q75	IC,(LF356BN)			
Q76	IC,(NJU201AD)			
Q77	Di,(1S953)			
Q78	IC,(µPC272C)			
Q79	Not assigned			
Q80	Not assigned			
Q81	IC,(HA3-2525-5)			
Q82	Di,(1S953)			
Q83	Di,(1SS97)			
Q84	Di,(1SS97)			
Q85	IC,(LF356BN)			

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

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CKT REF	DESCRIPTION	RATING		NOTE
Q86	Not assigned			
Q87	IC,(µPC803C)			
Q88	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q89	Di,(1S953)			
Q90	Di,(1S955)			
Q91	Not assigned			
Q92	Not assigned			
Q93	Not assigned			
Q94	IC,(TC40H032P)			
Q95	Di,(1S953)			
Q96	IC,(TC4081BP)			
Q97	IC,(TC4030BP)			
Q98	IC,(TC4030BP)			
Q99	Not assigned			
Q100	Not assigned			
Q101	Tr,(2SA1154)			
Q102	Tr,(2SA1154)			
Q103	Tr,(2SA1154)			
Q104	Tr,(2SA1154)			
Q105	Tr,(2SA1154)			
Q106	Tr,(2SC2721)			
Q107	Tr,(2SC2721)			
Q108	Tr,(2SC2721)			
Q109	Tr,(2SC2721)			
Q110	Tr,(2SC2721)			
Q111	IC,(TA78)			
Q112	IC,(TA57)			
Q113	IC,(µPA54HA)			
Q114	IC,(µPA54HA)			
Q115	Not assigned			
Q116	Not assigned			
Q117	Not assigned			
Q118	Tr,(PAL12L6Q118)			
Q119	Not assigned			
Q120	Not assigned			
Q121	Not assigned			
Q122	IC,(TC40H243P)			
Q123	Not assigned			
Q124	IC,(µPC1093J)			
Q125	Di,breakdown,(RD2.0EB)	1.88 to 2.12V,400mW		
Q126	Di,breakdown,(RD2.0EB)	1.88 to 2.12V,400mW		
Q127	IC,(µPC7011C)			
Q128	IC,(NE5532)			

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

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING		NOTE
R 1	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 2	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R 3	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R 4	Single in-line array, (IHR-8-472JA)	4.7kΩ x 8,1/8W		
R 5	Not assigned			
R 6	Not assigned			
R 7	Single in-line array, (IHR-8-222JA)	2.2kΩ x 8,1/8W		
R 8	Not assigned			
R 9	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R10	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R11	CF,(ARD25T331J)	330Ω,±5%,1/4W		
R12	Single in-line array, (RRS-4-220JB)	22Ω,1/8W		
R13	Single in-line array, (IHR-8-222JA)	2.2kΩ x 8,1/8W		
R14	Single in-line array, (IHR-6-222JA)	2.2kΩ x 6,1/8W		
R15	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R16	Not assigned			
R17	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R18	Not assigned			
R19	Single in-line array, (IHR-8-103JA)	10kΩ x 8,1/8W		
R20	MF,(RN14K2E49R9D)	49.9Ω,±0.5%,1/4W		
R21	Single in-line array, (IHR-8-682JA)	6.8kΩ x 8,1/8W		
R22	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R23	Not assigned			
R24	MF,(RN14K2E6041D)	6.04kΩ,±0.5%,1/4W		
R25	MF,(RN14K2E2001D)	2.0kΩ,±0.5%,1/4W		
R26	Not assigned			
R27	CF,(ARD25T123J)	12kΩ,±5%,1/4W		
R28	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R29	CF,(ARD25T822J)	8.2kΩ,±5%,1/4W		
R30	CF,(ARD25T105J)	1MΩ,±5%,1/4W		
R31	MF,(RN14K2E1001D)	1.0kΩ,±0.5%,1/4W		
R32	MF,(RN14K2E9530D)	953Ω,±0.5%,1/4W		
R33	Var,MF,(RJ-6P 100Ω)	100Ω,1/2W		

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

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING		NOTE
R34	Var,MF,(RJ-6P 20k)	20k ,1/2W		
R35	CF,(ARD25T683J)	68k ,±5%,1/4W		
R36	Not assigned			
R37	MF,(RN14K2E4640D)	464 ,±0.5%,1/4W		
R38	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W		
R39	CF,(ARD25T101J)	100 ,±5%,1/4W		
R40	CF,(ARD25T102J)	1k ,±5%,1/4W		
R41	MF,(RN14K2E1001D)	1k ,±0.5%,1/4W		
R42	MF,(RN14K2E9530D)	953 ,±0.5%,1/4W		
R43	Var,MF,(RJ-6P 100)	100 ,1/2W		
R44	Var,MF,(RJ-6P 20k)	20k ,1/2W		
R45	CF,(ARD25T683J)	68k ,±5%,1/4W		
R46	Not assigned			
R47	MF,(RN14K2E4640D)	464 ,±0.5%,1/4W		
R48	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W		
R49	CF,(ARD25T101J)	100 ,±5%,1/4W		
R50	Not assigned			
R51	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W		
R52	MF,(RN14K2E2002D)	20k ,±0.5%,1/4W		
R53	MF,(RN14K2E2002D)	20k ,±0.5%,1/4W		
R54	CF,(ARD25T * J)	10 to 100 ,±5%,1/4W		Q'ty 0 or 1, *
R55	CF,(ARD25T682J)	6.8k ,±5%,1/4W		
R56	CF,(ARD25T102J)	1k ,±5%,1/4W		
R57	CF,(ARD25T102J)	1k ,±5%,1/4W		
R58	NOt assigned			
R59	Not assigned			
R60	Not assigned			
R61	MF,(RN14K2E1002D)	10k ,±0.5%,1/4W		
R62	MF,(RN14K2E2002D)	20k ,±0.5%,1/4W		
R63	MF,(RN14K2E2002D)	20k ,±0.5%,1/4W		
R64	CF,(ARD25T * J)	10 to 100 ,±5%,1/4W		Q'ty 0 or 1, *
R65	CF,(ARD25T682J)	6.8k ,±5%,1/4W		
R66	CF,(ARD25T102J)	1k ,±5%,1/4W		
R67	CF,(ARD25T102J)	1k ,±5%,1/4W		
R68	Not assigned			
R69	Not assigned			
R70	CF,(ARD25T105J)	1M ,±5%,1/4W		
R71	CF,(ARD25T105J)	1M ,±5%,1/4W		
R72	CF,(ARD25T103J)	10k ,±5%,1/4W		
R73	CF,(ARD25T104J)	100k ,±5%,1/4W		
R74	CF,(ARD25T333J)	33k ,±5%,1/4W		
R75	Var,MF,(RJ-6P 20k)	20k ,1/2W		

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

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Parts List : Z34 DIGITAL MEMORY / GP-IB

CKT REF	DESCRIPTION	RATING		NOTE
R76	CF,(ARD25T334J)	330kΩ,±5%,1/4W		
R77	MF,(RN14K2E5111D)	5.11kΩ,±0.5%,1/4W		
R78	Var,MF,(RJ-6P 20kΩ)	20kΩ,1/2W		
R79	MF,(RN14K2E4991D)	4.99kΩ,±0.5%,1/4W		
R80	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R81	CF,(ARD25T101J)	100Ω,±5%,1/4W		
R82	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R83	MF,(RN14K2E5112D)	51.1kΩ,±0.5%,1/4W		
R84	CF,(ARD25T103J)	10kΩ,±5%,1/4W		
R85	CF,(ARD25T682J)	6.8kΩ,±5%,1/4W		
R86	Single in-line array, (IHR-6-103JB)	10kΩ x 6,1/8W		
R87	Single in-line array, (IHR-6-104JA)	100kΩ x 6,1/8W		
R88	Not assigned			
R89	Not assigned			
R90	Not assigned			
R91	Not assigned			
R92	Not assigned			
R93	Not assigned			
R94	Nottassigned			
R95	CF,(ARD25T472J)	4.7kΩ,±5%,1/4W		
R96	Not assigned			
R97	CF,(ARD25T561J)	560Ω,±5%,1/4W		
R98	Single in-line array, (RRS-6-472JB)	4.7kΩx6,1/8W		
R99	MF,(RN14K2E1132D)	11.3kΩ,±5%,1/4W		
R100	Var,MF,(RJ-6P100kΩ)	100kΩ,1/2W		
R101	Single in-line array, (RRS-6-472JB)	4.7kΩx6,1/8W		
R102	Not assigned			
R103	Not assigned			
R104	Not assigned			
R105	Not assigned			
R106	Not assigned			
R107	CF,(ARD25T221J)	220Ω,±5%,1/4W		
S 1	Dip switch,(44S70581)			
Z 1	BATTERY WITH RESISTOR, (S49Z10069D)			
Z 2	XTAL OSC,(TCO-707F)	8.0 MHz		

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

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Parts List : Z35 LOW 1st MIX

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 2	Cer,(CC732CH1H470J)	47pF,±5%,50V		
C 3	Cer,(CC732CH1H220J)	22pF,±5%,50V		
C 4	Not assigned			
C 5	Not assigned			
C 6	Cer,(CC732CH1H050D)	5pF,±0.5pF,50V		
C 7	Cer,(CC732CK1H010C)	1pF,±0.25pF,50V		
C 8	Cer,(CC732CH1H100D)	10pF,±0.5pF,50V		
C 9	Cer,(CC732CK1H0R5C)	0.5pF,±0.25pF,50V		
C10	Cer,(CC732CH1H060D)	6pF,±0.5pF,50V		
C11	Not assigned			
C12	Cer,(CC732CH1H060D)	6pF,±0.5pF,50V		
C13	Cer,(CC732CH1H070D)	7pF,±0.5pF,50V		
C14	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C15	Not assigned			
C16	Not assigned			
C17	Not assigned			
C18	Not assigned			
C19	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C20	Not assigned			
C21	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C22	Cer,(CC732CK1H020C)	2pF,±0.25pF,50V		
C23	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C24	Plast,(ECQ-V1H105JW)	1μF,±5%,50V		
J 1	Not assigned			
J 2	Not assigned			
J 3	Not assigned			
J 4	Connector,(U-PA1019)			
K 1	Relay,(712-12)			
L 1	Coil,(SP0408-R10M)	0.1μH		
L 2	Coil,(SP0408-R10M)	0.1μH		
L 3	Not assigned			
L 4	Not assigned			
L 5	Coil,(MLF3216DR10K)	0.1μH		
L 6	Coil,(SP0408-R10M)	0.1μH		
Q 1	Not assigned			
Q 2	Not assigned			
Q 3	IC,(DTC143EF)			

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

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Parts List : Z35 LOW 1st MIX

CKT REF	DESCRIPTION	RATING		NOTE
Q 4	Di,(1S953)			
Q 5	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 6	Tr,(2SC2407(1))			
R 1	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 2	MF,(RM73B2B390JD)	39Ω,±5%,1/8W		
R 3	MF,(RM73B2B151JD)	150Ω,±5%,1/8W		
R 4	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 5	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R 6	Not assigned			
R 7	Not assigned			
R 8	Not assigned			
R 9	Not assigned			
R10	Not assigned			
R11	CF,(ARD25T750J)	75Ω,±5%,1/4W		
R12	Not assigned			
R13	Var,MF,(RJ-6P 10kΩ)	10kΩ,1/2W		
R14	CF,(ARD25T332J)	3.3kΩ,±5%,1/4W		
R15	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R16	MF,(RS1FB100ΩJ)	100Ω,±5%,1W		
Z 1	MIXER,(M-10(8P))			

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

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Parts List : Z36 EXT MIX IF AMP

CKT REF	DESCRIPTION	RATING		NOTE
C 1	Not assigned			
C 2	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 3	Cer,(CC732CH1H330J)	33pF,±5%,50V		
C 4	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 5	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 6	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 7	Cer,(CC732CJ1H040D)	4pF,±0.5pF,50V		
C 8	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C 9	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C10	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C11	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C12	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C13	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C14	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C15	Cer,(CC732CH1H060D)	6pF,±0.5pF,50V		
C16	Cer,(CC732CH1H060D)	6pF,±0.5pF,50V		
C17	Cer,(CC732CH1H040D)	4pF,±0.5pF,50V		
C18	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C19	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C20	Cer,(CC732CH1H471J)	470pF,±5%,50V		
C21	Cer,(CK924C1H104M)	0.1μF,±20%,50V		
C22	Cer,(CC732CH1H120J)	12pF,±5%,50V		
C23	Cer,(CK734B1H104K)	0.1μF,±10%,50V		
C24	Not assigned			
C25	Cer,(CC732CH1H471J)	470pF,±5%,50V		
J 1	Connector,(u-SA1001)			
K 1	Not assigned			
K 2	Relay,(G5Y-154P DC12V)			
K 3	Relay,(G5Y-154P DC12V)			
K 4	Relay,(G5Y-154P DC12V)			
L 1	Coil,(SP0408-R10M)	0.1μH		
L 2	Coil,(SP0408-R10M)	0.1μH		
L 3	Coil,(MLF3216DR10K)	0.1μH		
Q 1	Tr,(2SC2367)			
Q 2	Di,breakdown,(RD5.1EB)	4.8 to 5.4V,400mW		
Q 3	Di,(1SV34)			

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

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Parts List : Z36 EXT MIX IF AMP

CKT REF	DESCRIPTION	RATING		NOTE
Q 4	Not assigned			
Q 5	IC,(DTC143EF)			
Q 6	IC,(DTC143EF)			
Q 7	IC,(DTC143EF)			
Q 8	Di,(1S953)			
Q 9	Di,(1S953)			
Q10	Di,(1S953)			
R 1	MF,(RM73B2B683JD)	68kΩ,±5%,1/8W		
R 2	MF,(RM73B2B102JD)	1kΩ,±5%,1/8W		
R 3	CF,(ARD25T601J)	600Ω,±5%,1/4W		
R 4	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 5	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R 6	CF,(ARD25T601J)	600Ω,±5%,1/4W		
R 7	MF,(RM73B2B101JD)	100Ω,±5%,1/8W		
R 8	MF,(RM73B2B683JD)	68kΩ,±5%,1/8W		
R 9	MF,(RM73B2B683JD)	68kΩ,±5%,1/8W		
R10	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R11	MF,(RM73B2B470JD)	47Ω,±5%,1/8W		
R12	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R13	MF,(RM73B2B510JD)	51Ω,±5%,1/8W		
R14	MF,(RM73B2B471JD)	470Ω,±5%,1/8W		
R15	MF,(RM73B2B683JD)	68kΩ,±5%,1/8W		
R16	MF,(RM73B2B683JD)	68kΩ,±5%,1/8W		
R17	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R18	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R19	CF,(ARD25T181J)	180Ω,±5%,1/4W		
R20	MF,(RM73B2B683JD)	68kΩ,±5%,1/4W		
R21	CF,(ARD25T102J)	1kΩ,±5%,1/4W		
R22	MF,(RM73B2B101J)	100Ω,±5%,1/4W		

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

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