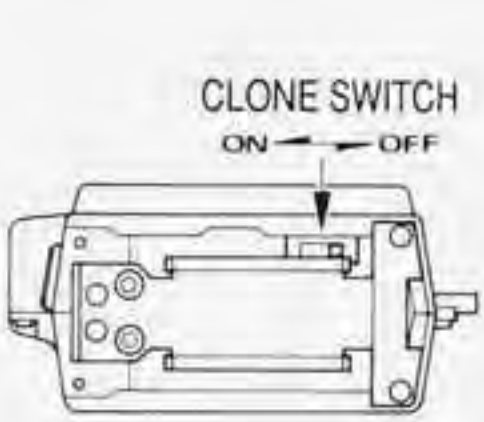
FT-23R
TECHNICAL SUPPLEMENT

YAESU MUSEN CO., LTD.
C.P.O. BOX 1500, TOKYO, JAPAN

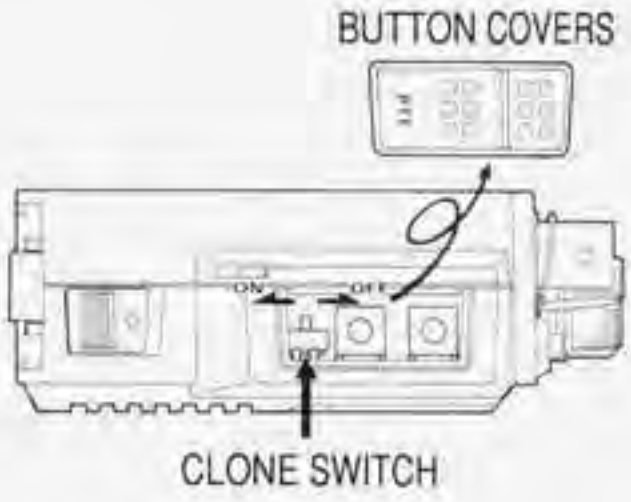
YAESU U.S.A.
17210 Edwards Rd., Cerritos, California 90701, U.S.A.

YAESU EUROPE B.V.
Snipweg 3. 1118AA Schiphol, The Netherlands

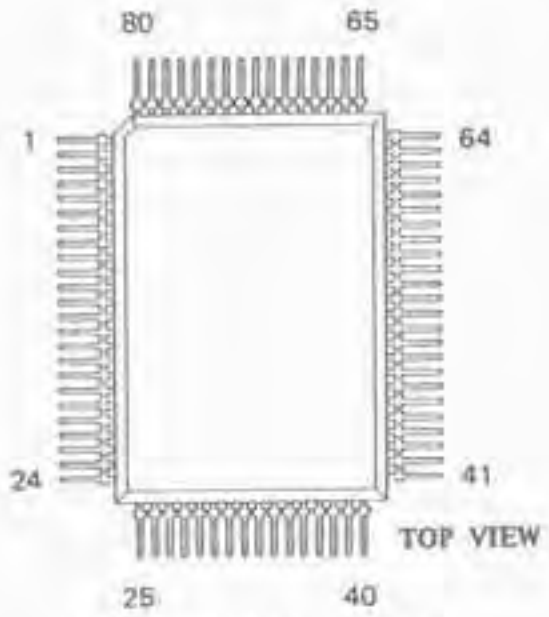
Eatly and late models can be listinguished by the location of the clone switch, as shown below.



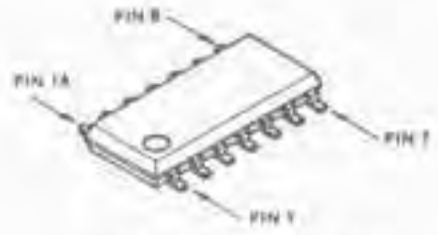
Early Model



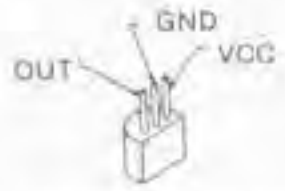
Late Model



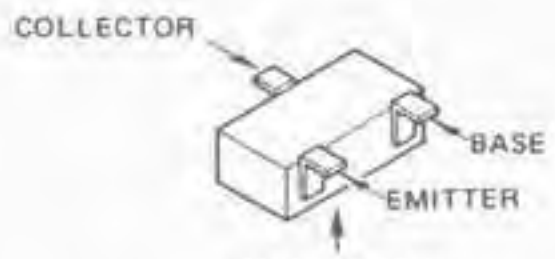
HD613901A51 (Q1001)



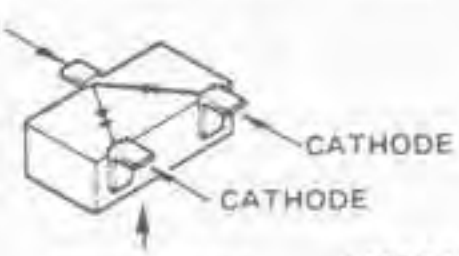
μPD4066BG (Q1008)
μPD4001BG (Q1009)



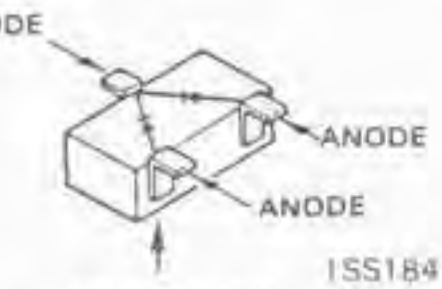
PST523G (Q1007)



2SA1162GR (SG) : (Q1002,1012)
2SC2712GR (LG) : (Q1003,1004
1005,1006
1010)
FA1A4M (L33) : (Q1011,1013)

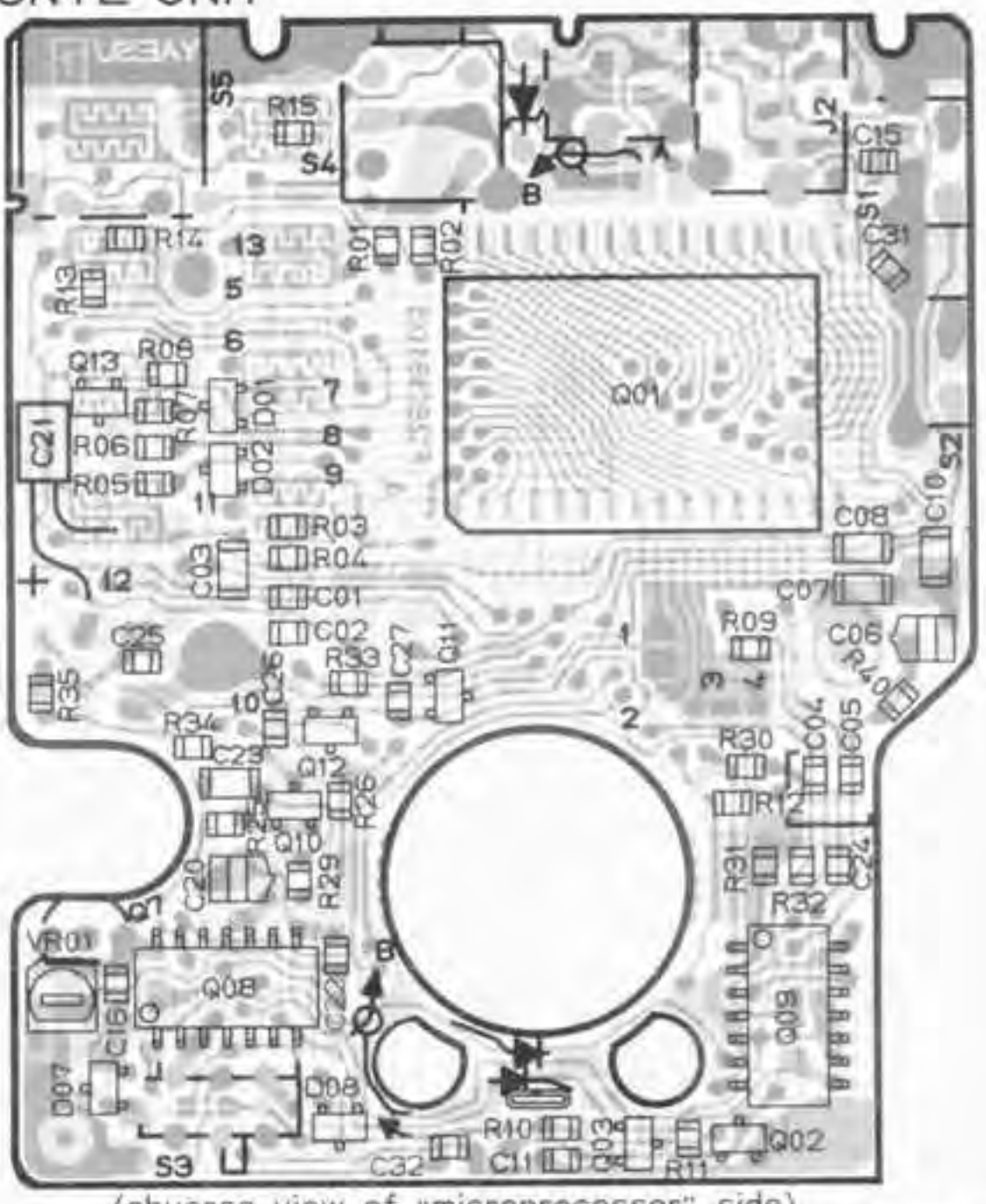


1SS181 (A3) :
(D1001,1002,1008)

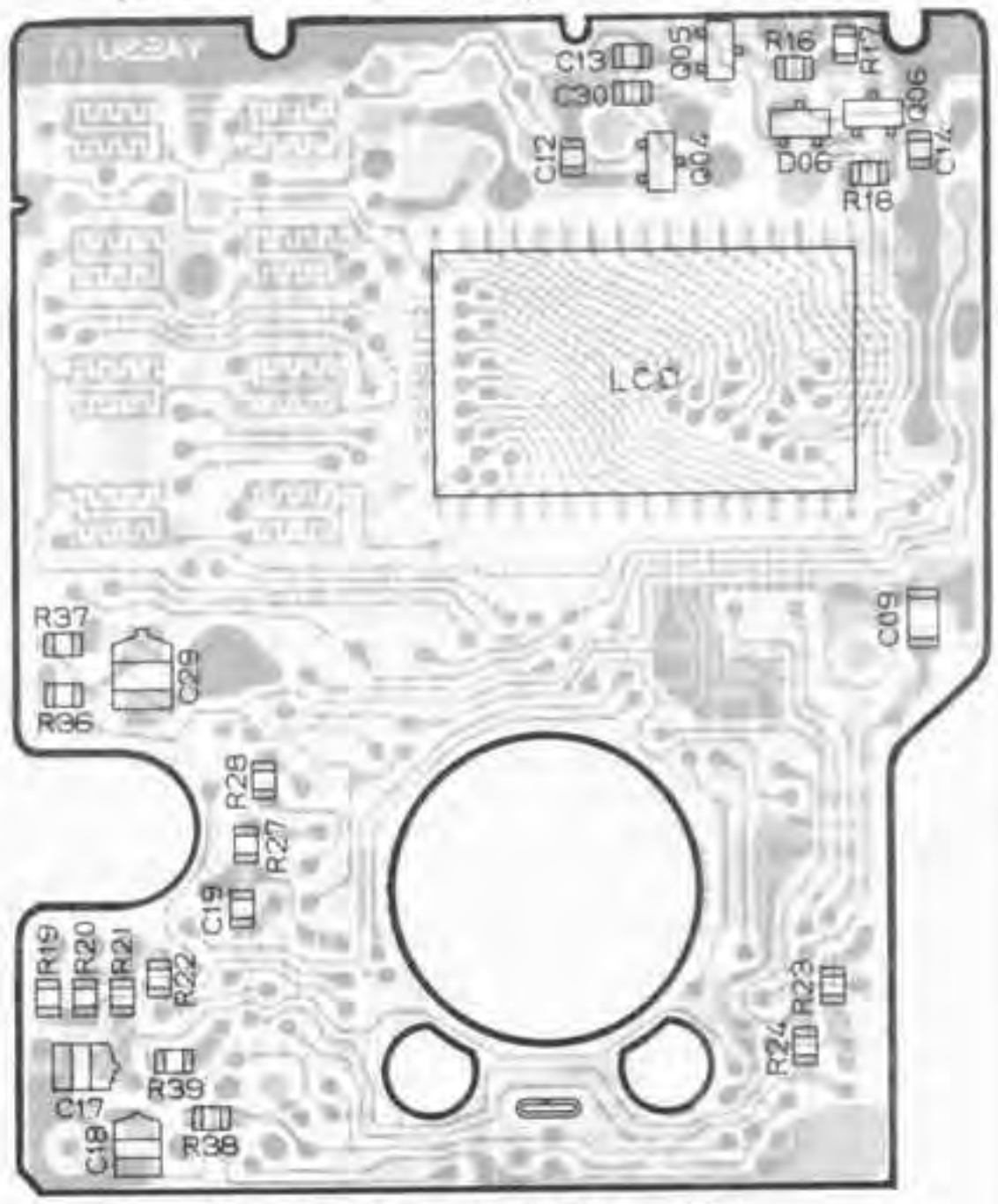


1SS184 (B3) : (D1007)
SLM-23VMW (D1006)
(LED)

CNTL UNIT

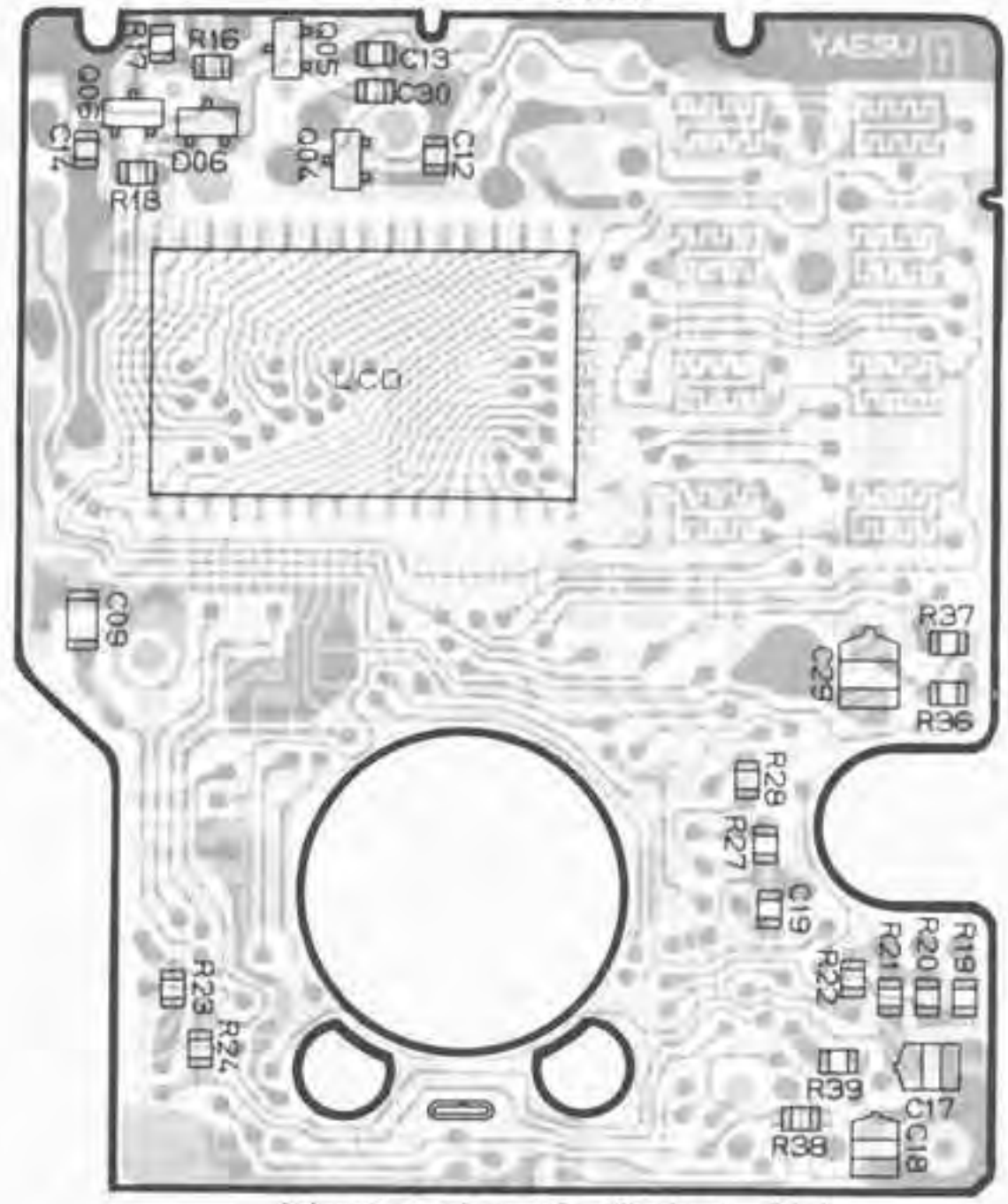


(obverse view of "microprocessor" side)



(reverse view of "display" side)

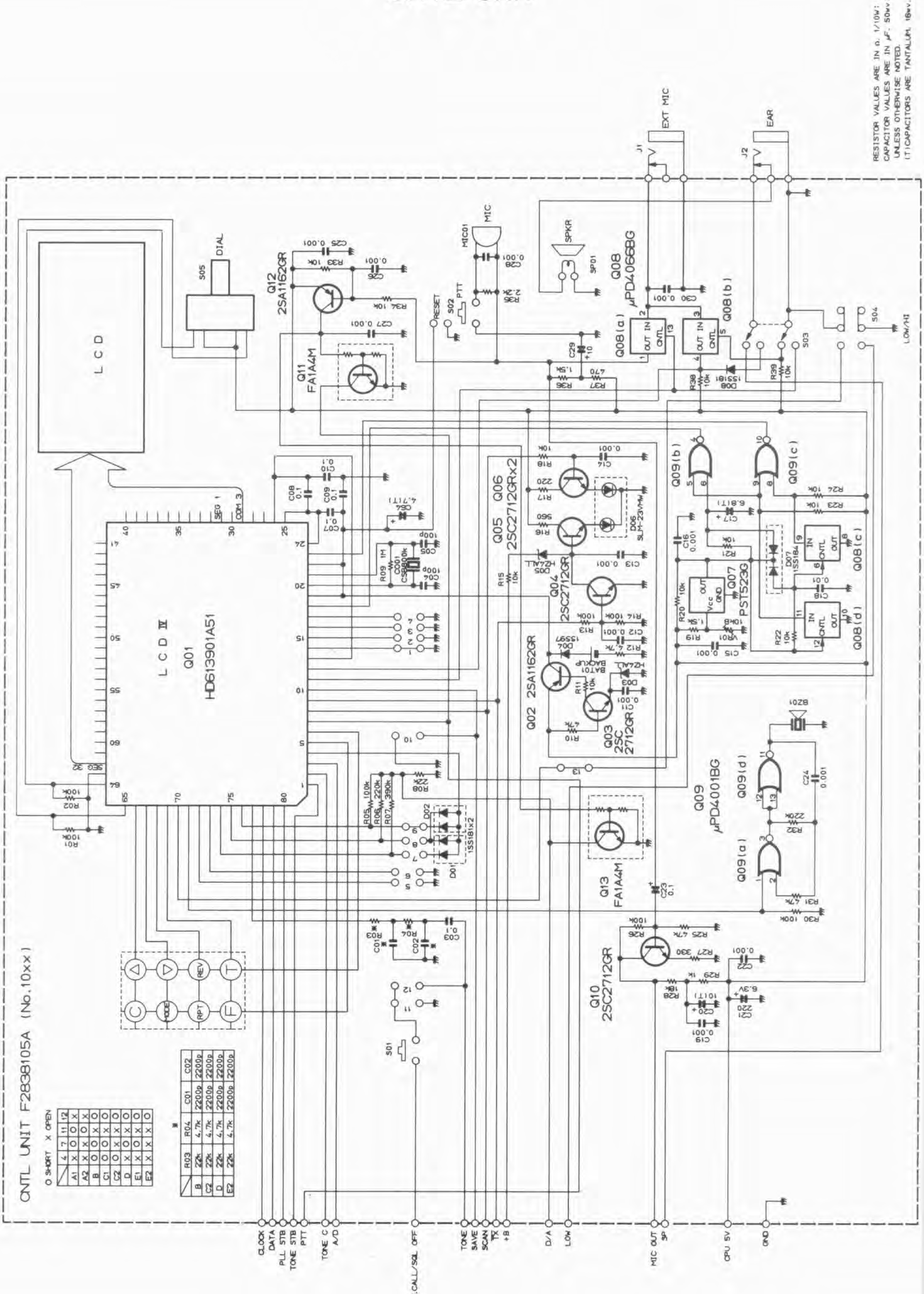
CNTL UNIT



(obverse view of "display" side)

(reverse view of "microprocessor" side)

CNTL UNIT



O SHORT X OPEN

	4	7	11	12
A1	X	O	O	X
A2	X	X	O	X
B	O	O	X	O
C1	O	O	X	O
C2	O	X	X	O
D	X	O	X	O
E1	X	O	X	O
E2	X	X	X	O

※

	R03	R04	C01	C02
B	22k	4.7k	2200p	2200p
C2	22k	4.7k	2200p	2200p
D	22k	4.7k	2200p	2200p
E2	22k	4.7k	2200p	2200p

ALIGNMENT

The FT-23R has been carefully aligned by highly skilled technicians at the factory, and is designed so that no further alignment should ever be required. However, in the unlikely event of a component failure, re-alignment may be necessary. All component replacement and service should be performed only by an authorized Yaesu representative, or the warranty policy may be voided.

The following test equipment is required for alignment:

RF Signal Generator:
calibrated output level at 150 MHz

Deviation Meter (linear detector)

Oscilloscope

AF Millivoltmeter

SINAD Meter

Inline Wattmeter: 150 MHz

Regulated DC Power Supply:
adjustable from 4 to 17V, 2A

50-ohm Non-reactive Dummy Load: 10W at 150 MHz

Frequency Counter: 0.2ppm accuracy at 150 MHz

AF Signal Generator

DC Voltmeter: high impedance

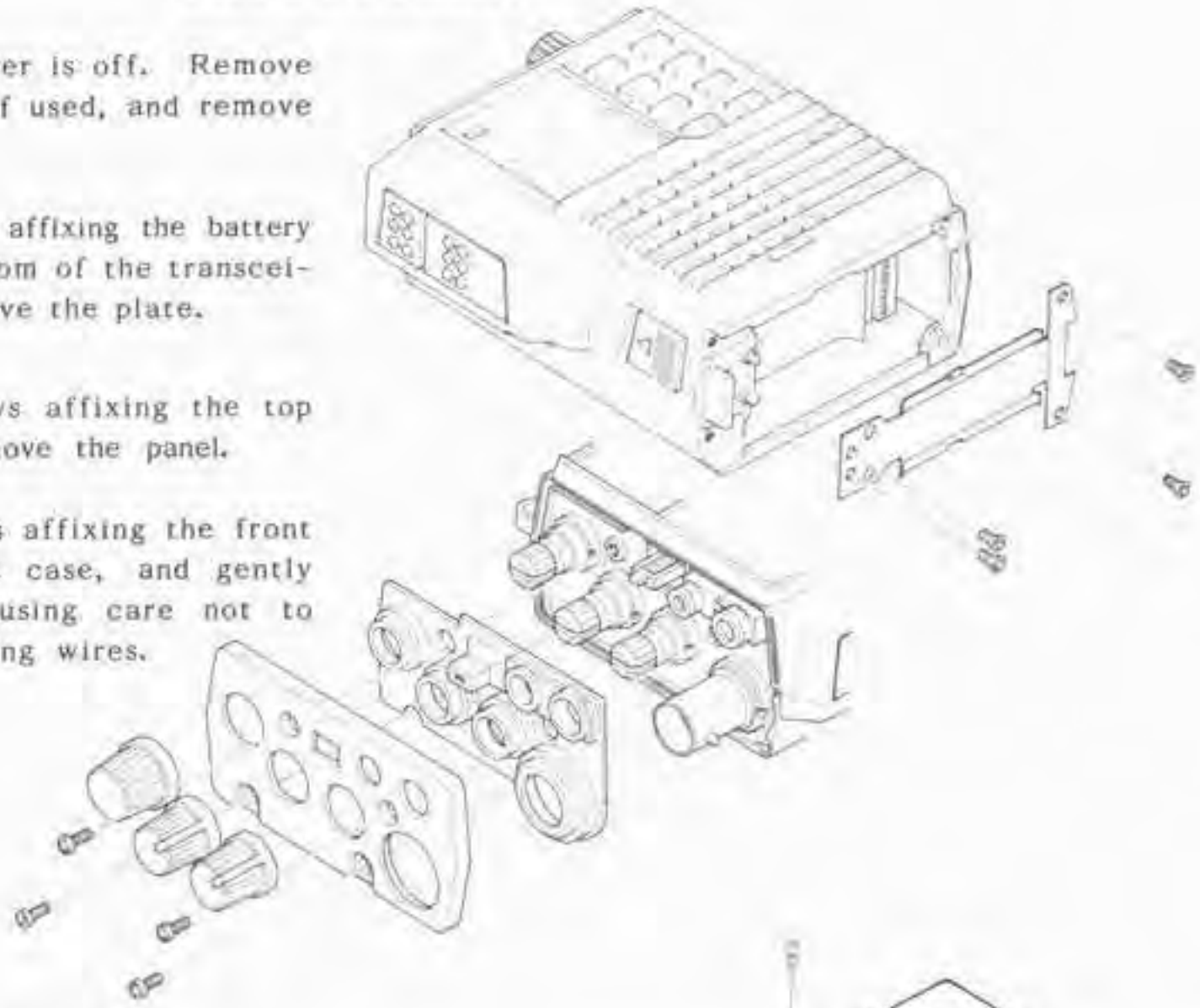
CASE DISASSEMBLY

1. Make sure the transceiver is off. Remove the hard or soft case, if used, and remove the battery pack.

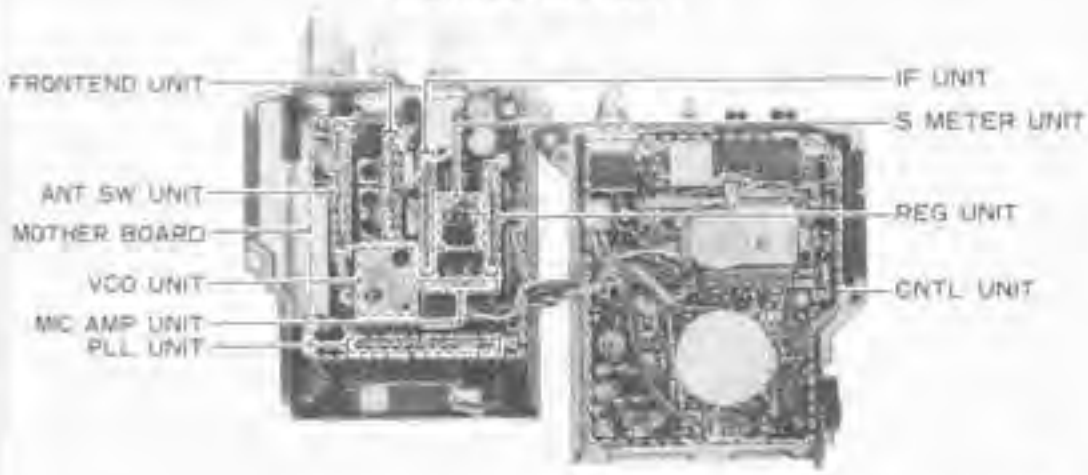
2. Remove the four screws affixing the battery spring plate on the bottom of the transceiver, and carefully remove the plate.

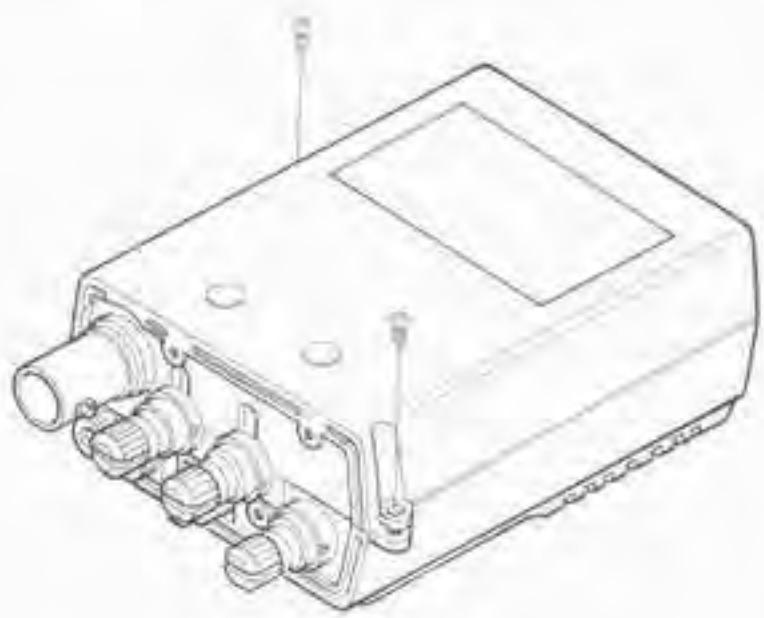
3. Remove the four screws affixing the top panel, and carefully remove the panel.

4. Remove the two screws affixing the front and rear halves of the case, and gently separate the halves, using care not to stress the interconnecting wires.



BOARD LAYOUT





I. PLL & TRANSMITTER

Set up the test equipment as shown in the diagram below for transmitter alignment. Adjust the supply voltage to 12.0V for all steps except Transmitter Output Power alignment (B).

A. PLL VCV (Varactor Control Voltage)

(1) Connect the DC voltmeter between C416 on the PLL Unit and chassis ground.

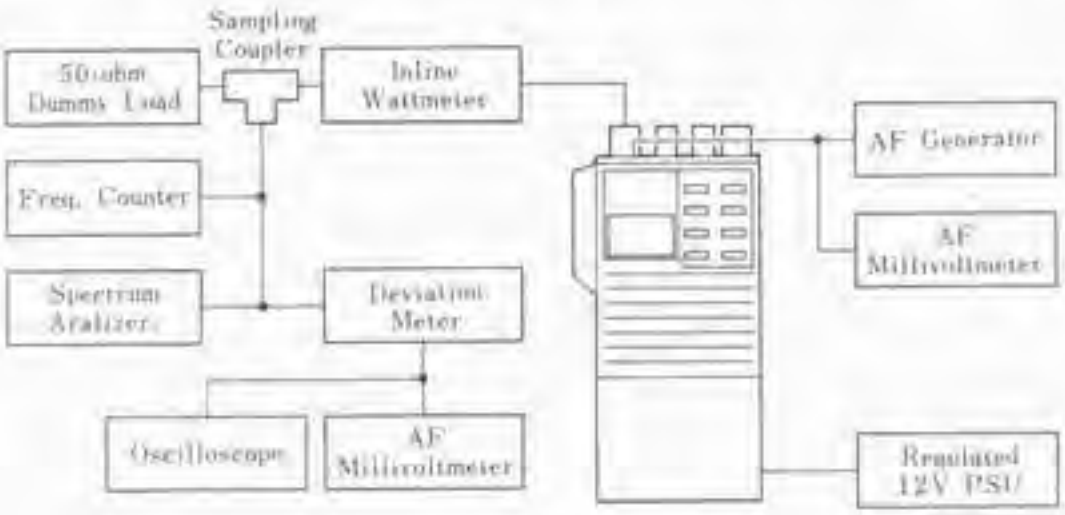
(2) While transmitting on 144.000 MHz adjust transformer T501 on the VCO Unit for 1.35 ±0.05 VDC.

(3) While receiving on 144.000 MHz adjust trimmer TC501 on the VCO Unit for 1.1 ±0.05 VDC.

(4) Retune the transceiver and confirm the high-end VCV for the transceiver version being aligned, as follows:

Version	Frequency	Tx VCV	Rx VCV
A, C, E	148.000	1.8V	1.6V
B, D	146.000	1.7V	1.5V

PLL & TRANSMITTER ALIGNMENT SETUP



B. Transmitter Output Power

(1) Tune the transceiver to band center (145 or 146 MHz), and set the LOW switch to the undepressed position.

(2) Increase the supply voltage to 12.5V.

(3) Adjust TC101 on the Mother Board for peak output power on the wattmeter (at least 5W with less than 1.5A supply current).

(4) Press the LOW switch on the top panel, and adjust VR105 on the Mother Board for 0.5 watts output.

(5) Return the supply voltage to 12.0V.

C. PLL Reference Frequency

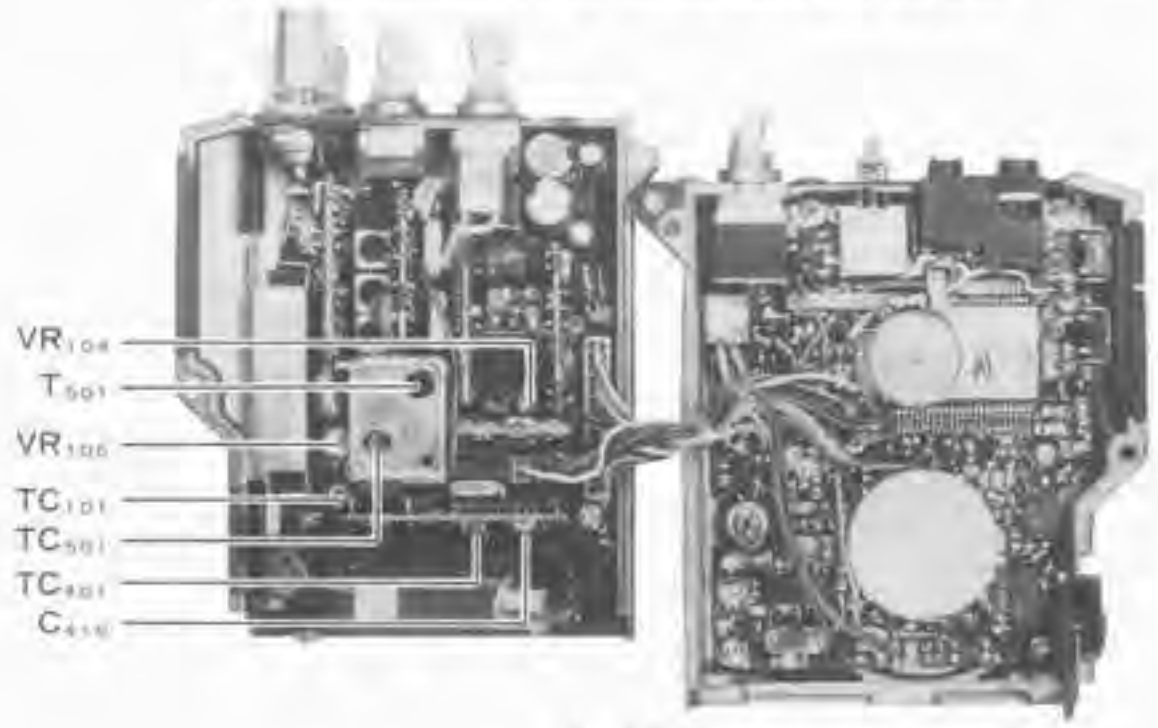
With the transceiver tuned to band center (145 or 146 MHz), adjust TC401 on the PLL Unit, if necessary, so that the display frequency matches the frequency counter when transmitting.

D. Modulation Level

(1) With the transceiver tuned to band center (145 or 146 MHz), adjust the AF generator for 25mV output at 1 kHz to the MIC jack.

(2) Adjust VR104 on the Mother Board for ±4.5 kHz deviation on the deviation meter.

PLL & TRANSMITTER ALIGNMENT POINTS



II. RECEIVER

Set up the test equipment as shown above for receiver alignment.

A. Sensitivity

(1) With the transceiver and RF signal generator both tuned to band center (145 or 146 MHz), set the generator for ±3.5 kHz deviation of 1 kHz tone modulation, and set the output level for 40 dBu at the antenna jack.

(2) Preset VR103 on the Mother Board fully clockwise.

(3) Adjust T101 through T104 on the Mother Board for maximum S-meter indication, reducing the generator level if more than four bargraph segments turn on.

After step (3), generator level should be 0.2 uV or less for 12dB SINAD. Perform the following adjustment next.

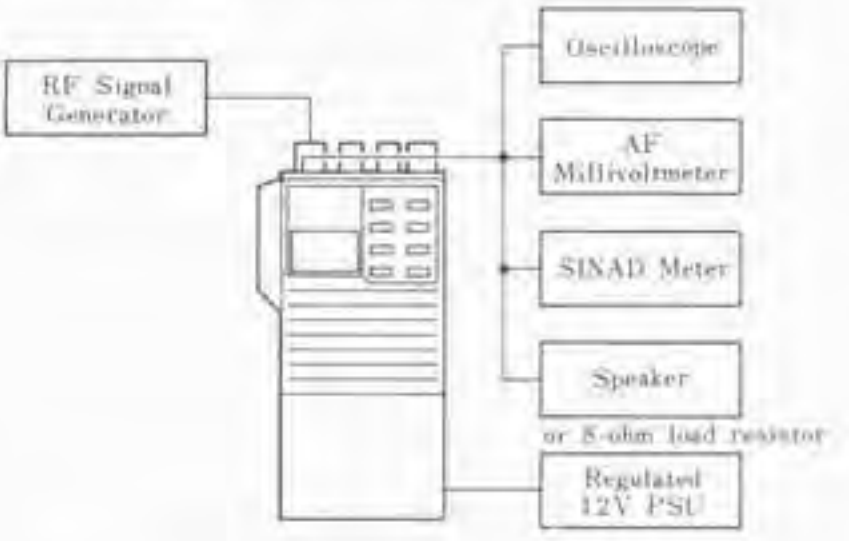
B. S-meter Sensitivity

(1) With the transceiver and RF signal generator set up as in step (1) of the above Sensitivity adjustment procedure, set the signal generator for 20 dBu output.

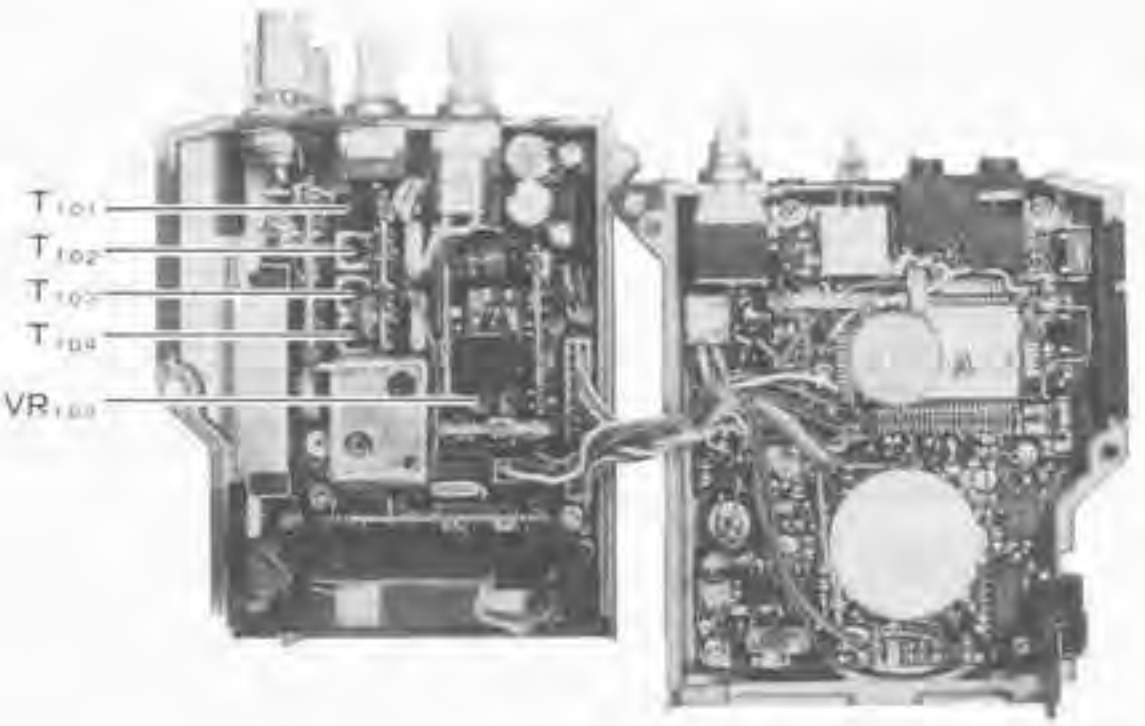
(2) Adjust VR103 on the Mother Board so that all bargraph segments are just turned on.

(3) Reduce the generator output so that only two bargraph segments are on, and confirm that the generator output level is now 5 dBu or less.

RECEIVER ALIGNMENT SETUP



RECEIVER ALIGNMENT POINTS



PARTS LIST

MAIN CHASSIS

Symbol No.	Part No.	Name & Description
		CONNECTOR
J01	P1090541	BNC-RM ANT
		MISCELLANEOUS
	R3116390	DIAL Knob
	R3116620	VOL,SQL Knobs
	R3508300	PTT Button Cover
	R3508310	UNLOCK Lever
	R0117370	Coil Spring
	R0507950B	Battery Spring Plate
	R3503650A	Top Panel Gasket
	R3507960	Jack Seal Gasket

MOTHER BOARD

Symbol No.	Part No.	Name & Description
	F2838104A	Printed Circuit Board
	C028384AA	PCB with Components
		IC
Q101	G1090558	LA4145
		PWR-MODULE
Q107	G1090732	M57796MA
		TRANSISTORS
Q102	G3111627G	2SA1162GRTE85R
Q103	G3327127G	2SC2712GRTE85R
Q104	G3070001	FA1A4M
Q105	G3333567	2SC3356-T2B
Q106	G3329547	2SC2954-T2B
		DIODE
D101	G2070009	1SS184TE85R Si
		CRYSTAL FILTER
XF101	H1102114	10M15BM 10.7MHz

		CERAMIC FILTER
CF101	H3900280	LF-B12
		RESISTORS
R112	J24205479	RMC 1/10T4R7J 1/10W 4.7Ω
R113	J24205100	" " 100J " 10Ω
R102	J24205220	" " 220J " 22Ω
R106,109	J24205221	" " 221J " 220Ω
R110	J24205331	" " 331J " 330Ω
R111	J24205102	" " 102J " 1kΩ
R114	J24205103	" " 103J " 10kΩ
R107,118A,F	J24205223	" " 223J " 22kΩ
R116	J00215223	Carbon film 1/8W 22kΩ
R101	J24205333	RMC 1/10T333J 1/10W33kΩ
R108,115	J24205473	" " 473J " 47kΩ
R103-105,117	J24205104	" " 104J " 100kΩ
		POTENTIOMETERS
VR101	J60800128	K091K0004-20KB 20kΩ B
VR102	J60800129	K0911100D-20KA 20kΩ A
VR103-105	J51776473	RH0411CS4J 47kΩ B
		CAPACITORS
C104-106	K22170203	Chip Ceramic 50WV 2pF CH (C2012CH1H020CFA)
C107	K22170204	" " " 3pF " (C2012CH1H030CFA)
C101,108	K22170206	" " " 5pF " (C2012CH1H050CFA)
C130,133	K22170209	" " " 8pF " (C2012CH1H080DFA)
C143	K22170211	" " " 10pF " (C2012CH1H100DFA)
C103	K22170221	" " " 27pF " (C2012CH1H270JFA)
C111,122,125-127 131,135-141	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C102,132,134	K22170817	" " " 0.01μF " (C2012B1H103MFA)
C128,142	K22171008	" " " 0.047μF F (C2012F1H473ZFA)
C109,110,112,115 119,120,129	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)
C121	K78130001	Tantalum 20WV 0.47μF (F951D474MRAAF1Q2)
C113,118,123	K40129052	Electrolytic 16WV 10μF (RC3-16V100M)
C114,124	K40129038	" " 16WV 100μF (RC2-16V101M)
C116,117	K40089020	" " 6.3WV 100μF (RC3-6V101M)
		TRIMMER CAPACITOR
TC101	K91000149	VCT31E161A 20pF

		TRANSFORMERS
T101	L0021416	145MHz
T102-104	L0021418	"
		INDUCTORS
L101,102	L1190275	LAL02NAR22M 0.22μH
L103	L1020671	
		CONNECTORS
J101	P0090599	IL-Y-5P-S15T2-EF
J102	P0090601	IL-Y-14P-S15T2-EF
J103	P0090598	IL-Y-4P-S15T2-EF
P101(with wire)	T9205436	

FRONT END UNIT		
Symbol No.	Part No.	Name & Description
	P2838111A	Printed Circuit Board
	C02838BAA	PCB with Components
		FETS
Q201,202	G3803027Y	2SK302YTE85R
		DIODES
D201-203	G2090248	1T32 Varactor
		RESISTORS
R201	J24205560	RMC 1/10T 560J 1/10W 56Ω
R206,209,210	J24205101	" " 101J " 100Ω
R207	J24205471	" " 471J " 470Ω
R202-204	J24205104	" " 104J " 100kΩ
R205	J24205474	" " 474J " 470kΩ
		CAPACITORS
C202,203,205,207	K22170221	Chip Ceramic 50WV 27pF CH (C2012CH1H270JFA)
C201,210	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C206,209	K22170817	" " " 0.01μF " (C2012B1H103MFA)
C208	K22171008	" " " 0.047μF F (C2012F1H473ZFA)
C204	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)
		INDUCTORS
L201	L1190292	LAL02NA5R6K 5.6μH
L202	L1190289	LAL02NA3R3K 3.3μH

IF UNIT		
Symbol No.	Part No.	Name & Description
	F2838102	Printed Circuit Board
	C028382AA	PCB with Components
		IC
Q302	G1090698	TK10420M
		TRANSISTOR
Q301	G3326207B	2SC2620QBTR
		DIODES
D301,302	G2070007	1SS226TE85L Si
		CRYSTAL
X301	H0102773	UM-1 10.245MHz
		CERAMIC DISCRIMINATOR
CD301	H7900260	D455C
		RESISTORS
R305	J24205101	RMC 1/10T101J 1/10W100Ω
R304	J20205471	" " 471J " 470Ω
R311	J24205152	" " 152J " 1.5kΩ
R301,307,308	J24205222	" " 222J " 2.2kΩ
R314	J24205392	" " 392J " 3.9kΩ
R315	J24205472	" " 472J " 4.7kΩ
R313	J24205682	" " 682J " 6.8kΩ
R309,316	J24205103	" " 103J " 10kΩ
R303,310	J24205473	" " 473J " 47kΩ
R306	J24205823	" " 823J " 82kΩ
R302	J24205224	" " 224J " 220kΩ
R312	J24205474	" " 474J " 470kΩ
		CAPACITORS
C303	K22170213	Chip Ceramic 50WV 12pF CH (C2012CH1H120JFA)
C304,310	K22170229	" " " 56pF " (C2012CH1H560JFA)
C305	K22170237	" " " 120pF " (C2012CH1H121JFA)
C309	K22170239	" " " 150pF " (C2012CH1H151JFA)
C315	K22170243	" " " 220pF " (C2012CH1H221JFA)
C302,306,314	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C301,312,317	K22170817	" " " 0.01μF " (C2012B1H103MFA)
C307,308,313	K22141904	" " 25V 0.1μF D (C3216D1E104MFA)
C316,318	K78120013	Chip Tantalum 10WV 1μF (F951C105MRAAF1Q2)

C311	K78080004	Chip Tantalum 6.3W 15μF (F950J156MVCAF1Q2)
		INDUCTOR
L301	L1190344	LAL02KR100K 10μH

PLL UNIT

Symbol No.	Part No.	Name & Description
	F2838108A	Printed Circuit Board
	C028388AA	PCB with Components
		Model A1,A2,D,E2 5kHz steps
	C028388AB	" " "
		Model F 10kHz steps
	C028388AC	" " "
		Model B,C2 12.5kHz steps
		ICs
Q401	G1090725	MC12017P
Q402	G1090582	JLC1007P
		DIODE
D401	G2090118	1SS97 Schottky
		CRYSTAL
X401**	H0102771	UM-1 10.240MHz
X401■	H0102772	UM-1 12.800MHz
		RESISTORS
R408	J24205000	RMC 1/10T 000J 1/10W 0Ω
R402,403	J24205220	" " 220J " 22Ω
R404,405,407	J24205222	" " 222J " 2.2kΩ
R406■	J24205472	" " 472J " 4.7kΩ
R401,406*	J24205103	" " 103J " 10kΩ
R406*	J24205153	" " 153J " 15kΩ
		CAPACITORS
C401	K22170206	Chip Ceramic 50WV 5pF CH (C2012CH1H050CFA)
C411,412	K22170227	" " " 47pF " (C2012CH1H470JFA)
C408-410,419	K22170235	" " " 100pF " (C2012CH1H101JFA)
C402,403,405,407 413-415	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C416,417	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)
C404,406,420	K78080002	Chip Tantalum 6.3WV 4.7μF (F950J475MSAAF1Q2)
C418	K78100003	" " 10WV 6.8μF (F951A685MTAAF1Q2)

		TRIMMER CAPACITOR
TC401	K91000154	ECR-KN020E11X 20pF
		INDUCTORS
L401	L1190311	LAL02NA221K 220μH

VCO UNIT

Symbol No	Part No.	Name & Description
	P2838106	Printed Circuit Board
		VCO-LC
	F2838110	" " "
		VCO-OSC
	C028386AF	PCB with Components
		FET
Q501	G3802387S	2SK238-K17
		TRANSISTOR
Q502	G3327597C	2SC2759-T2B U23
		DIODES
D501	G2090297	1SS110 Si
D502,503	G2090271	1T33 Varactor
		RESISTORS
R504	J24205470	RMC 1/10T 470J 1/10W 47Ω
R505	J24205101	" " 101J " 100Ω
R501	J24205682	" " 682J " 6.8kΩ
R506	J24205683	" " 683J " 68kΩ
R503	J24205224	" " 224J " 220kΩ
R502	J24205225	" " 225J " 2.2MΩ
		CAPACITORS
C508	K22170201	Chip Ceramic 50WV 0.5pF CH (C2012CH1H0R5CFA)
C503	K22170211	" " " 10pF " (C2012CH1H100DFA)
C506,507	K22170311	" " " " UJ (C2012UJ1H100DFA)
C501	K22170215	" " " 15pF CH (C2012CH1H150JFA)
C502,505,510	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C509	K78080002	Chip Tantalum 6.3WV 4.7μF (F950J475MSAAF1Q2)
C504	K78080003	" " " 10μF (F950J106MTAAF1Q2)

* Model A1,A2,D,E2
■ Model B,C2

		TRIMMER CAPACITOR
TC501	K91000152	ECR-JA040G12X
		INDUCTORS
L501-503	L1190283	LAL02NA1R0M 1μH
L504	L1190342	LAL02KRR22M 0.22μH
		TRANSFORMER
T501	L0021684A	R12-E991X 150MHz
		TEST POINTS
TP	Q5000082	IPS-1091-01
	R0116640	SHIELD CASE
	R0117100	SHIELD TOP

REG UNIT

Symbol No.	Part No.	Name & Description
	F2838109A	Printed Circuit Board
	C028389AA	PCB with Components
		IC
Q504	G1090736	LVC550C-2
		TRANSISTORS
Q601	G3207997L	2SB799ML
Q602,603,608	G3327127G	2SC2712GRTE85R
Q605-607	G3111627G	2SA1162GRTE85R
		DIODES
D601,604	G2090027	1SS53 Si
D602	G2090183	HZ9A2L Zener
D603	G2070009	1SS184TE85R Si
		RESISTORS
R602	J01245829	Carbon film 1/4W 8.2Ω TJ
R601	J24205101	RMC 1/10T101J 1/10W 100Ω
R608	J24205222	" " 222J " 2.2kΩ
R606,607,612	J24205472	" " 472J " 4.7kΩ
R605,611	J24205103	" " 103J " 10kΩ
R603	J24205223	" " 223J " 22kΩ
R604,609,610	J24205104	" " 104J " 100kΩ
		CAPACITORS
C601,603,604 606,608-613	K22170805	Chip Ceramic 50WV 0.001μF B (2012B1H102MFA)
C605	K78120002	Chip Tantalum 16WV 2.2μF (F951C225MSAAF1Q2)
C602	K78100003	Chip Tantalum 10WV 6.8μF (F951A685MTAAF1Q2)
C607	K78080003	" " 6.3WV 10μF (F950J106MTAAF1Q2)

MIC AMP UNIT

Symbol No.	Part No.	Name & Description
	F2838101	Printed Circuit Board
	C028381AA	PCB with Componnents Model A1,A2,F
	C028381AB	" " " Model B,C2,D,E2
		IC
Q701	G1090726	M5224FP
		RESISTORS
R705	J24205332	RMC 1/10T332J1/10W3.3kΩ
R710	J24205562	" " 562J " 5.6kΩ
R701*,702*,709 711-713	J24205103	" " 103J " 10kΩ
R704*,715	J24205223	" " 223J " 22kΩ
R708	J24205333	" " 333J " 33kΩ
R707	J24205563	" " 563J " 56kΩ
R716	J24205104	" " 104J " 100kΩ
R703,714	J24205225	" " 225J " 2.2MΩ
R706	J24205335	" " 335J " 3.3MΩ
		CAPACITORS
C705,708,710,711 713,714	K22170805	Chip Ceramic 50WV 0.001μF B (C2012B1H102MFA)
C703*	K22170809	" " " 0.0022μF " (C2012B1H220MFA)
C702*,703*,709	K22170817	" " " 0.01μF B (C2012B1H103MFA)
C706	K22171008	" " " 0.047μF " (C2012B1H473ZFA)
C701*,704*,707 712	K22141904	" " " 0.1μF D (C3216D1E104MFA)

S METER UNIT

Symbol No.	Part No.	Name & Description
	F2838103	Printed Circuit Board
	C028383AA	PCB with Components
		TRANSISTORS
Q801,802	G3327127G	2SC2712GRTE85R

* Model A1,A2,F
* Model B,C2,D,E2

Early Model FT-23R

CONTENTS

		DIODES
D801,802	G2090029	1N60 Ge
		RESISTORS
R802	J24205102	RMC 1/10T102J 1kΩ
R804	J01245102	Carbon film 1/4W 1kΩ
R801,803	J24205104	RMC 1/10T104J 100kΩ
		CAPACITORS
C801	K22170801	Chip Ceramic 50WV 470pF B (C2012B1H471MFA)
C802,803	K22170817	" " " 0.01μF " (C2012B1H103MFA)

ANT SW UNIT

Symbol No.	Part No.	Name & Description
	F2838107A	Printed Circuit Board
	C028387AA	PCB with Components
		TRANSISTORS
Q901,905	G3207997L	2SB799ML
Q902-904	G3327127G	2SC2712GRTE85R
		DIODES
D901,902	G2090027	1SS53 Si
D903	G2070007	1SS226TE85R "
		RESISTORS
R905	J24205221	RMC 1/10T221J 1/10W 220Ω
R903	J24205471	" " 471J " 470Ω
R901,904,906	J24205222	" " 222J " 2.2kΩ
R902	J24205473	" " 473J " 47kΩ
		CAPACITORS
C916	K22170207	Chip Ceramic 50WV 6pF CH (C2012CH1H060DFA)
C914	K22170209	" " " 8pF " (C2012CH1H080DFA)
C917	K22170217	" " " 18pF " (C2012CH1H180JFA)
C913,915	K22170223	" " " 33pF " (C2012CH1H330JFA)
C901,903,905 907-912	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C904	K40179033	Electrolytic " 0.47μF (RC3-50VR47M)
C902,906	K40129052	" 16WV 10μF (RC3-16V100M)

		INDUCTORS
L901	L1190344	LAL02KR100K 10μH
L902, L904	L0021683	
L903	L0021682	
		TERMINAL POSTS
TP901	Q5000016	TP-E/MS-60124

CNTL UNIT

Symbol No.	Part No.	Name & Description
	F2838105A	Printed Circuit Board
	C028385AA	PCB with Components Model F
	C028385AB	" " " Model A1, A2
	C028385AC	" " " Model B, C2, D, E2 w/o BAT1001
		ICs
Q1001	G1090741	HD613901A51
Q1007	G1090752	PST523G
Q1008	G1090602	μPD4066BG
Q1009	G1090601	μPD4001BG
		TRANSISTORS
Q1002,1012	G3111627G	2SA1162GRTE85R
Q1003-1006,1010	G3327127G	2SC2712GRTE85R
Q1011,1013	G3070001	FA1A4M
		DIODES
D1001,1002,1008	G2070001	1SS181TE85R Si
D1003,1005	G2090334	HZ4ALL Zener
D1004	G2090118	1SS97 Schottky
D1006	G2070028	SLM-23VMW T-97 LED
D1007	G2070009	1SS184TE85R Si
		LIQUID CRYSTAL DISPLAY
DS1001	G6090060	LR-541C
		CERAMIC RESONATOR
X1001	H7900270	CSB800K

		RESISTORS
R1017	J24205221	RMC 1/10T221J 1/10W 220Ω
R1027	J24205331	" " 331J " 330Ω
R1037	J24205471	" " 471J " 470Ω
R1016	J24205561	" " 561J " 560Ω
R1029	J24205102	" " 102J " 1kΩ
R1019, 1036	J24205152	" " 152J " 1.5kΩ
R1035	J24205222	" " 222J " 2.2kΩ
R1004*,1012,1020 1038	J24205472	" " 472J " 4.7kΩ
R1011, 1015,1018 1021-1024,1033 1034,1039	J24205103	" " 103J " 10kΩ
R1028	J24205183	" " 183J " 18kΩ
R1003*,1008	J24205223	" " 223J " 22kΩ
R1010,1025,1031	J24205473	" " 473J " 47kΩ
R1001,1002,1005 1013,1014,1026 1030	J24205104	" " 104J " 100kΩ
R1006,1032	J24205224	" " 224J " 220kΩ
R1007	J24205394	" " 394J " 390kΩ
R1009	J24205105	" " 105J " 1MΩ
		POTENTIOMETER
VR1001	J51771103	RVG4F03103-TG 10kΩ
		CAPACITORS
C1004,1005	K22170235	Chip Ceramic 50WV 100pF CH (C2012CH1H101MFA)
C1011-1016,1019 1022,1024-1027 1030	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C1028	K10176102	Ceramic disc " 0.001μF " (DD104B102K50)
C1001,1002	K22170809	Chip Ceramic " 0.0022μF " (C2012B1H222MFA)
C1018	K22170817	" " " 0.01μF " (C2012B1H103MFA)
C1003,1007-1010 1023	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)
C1006	K78080002	" " 6.3WV 4.7μF (F950J475MSAAF1Q2)
C1017	K78100003	" " 10WV 6.8μF (F951A685MTAAF1Q2)
C1020,1029	K78080003	" " 6.3WV 10μF (F950J106MTAAF1Q2)
C1021	K40089010	Electrolytic " 220μF (RC2-6V221M)
		CONNECTORS
P1001*	T9205433	
P1001*	T9205434	
P1002*	T9205432	
P1002*	T9205435A	
		BUZZER
BZ1001	M4290001	EFBRE-25D02

		SPEAKER
SP1001	M4090063	T036S13Y2611
		MIC
MIC1001	M3290008	EM-78CYE
		SWITCHES
S1001,1002	N5090018	KHH15951 SQL, OFF*, BURST*, PTT
S1003	N6090063	SSSS22050A
S1004	N4090088	SPJ622N09 HI/LO
S1005	N0190139	SRBMIL066 DIAL
		CONNECTORS
J1001	P1090369	HSJ0838-01-010 MIC
J1002	P1090370	HSJ0836-01-010 EAR
		LITHIUM BATTERY
BAT1001	Q9000366	CR2025
		RUBBER CONDUCTOR
	S2000026	24.3x1.8x1 SS

ACCESSORIES*

Symbol No.	Part No.	Name & Description
		ANTENNA
	Q3000049	YHA-16
	S6000098	HAND STRAP
		BATTERY PACK*
	D3000493	FNB-10
		VINYL SOFT CASE*
	D3000477	CSC-23 u/w FNB-10
	D3000504	CSC-25 u/w FNB-10, FTT-4
		* Optional same models

* Model A1,A2,F
* Model B,C2,D,E2

MOTHER BOARD UNIT F2838104

IF UNIT F2838102
f:10.245MHz
X301
OSC
SQL SW
NOISE AMP
Q302 TK10420M
Q301 2SC2620B IF AMP
2nd MIX
LIM AMP
DISC
TO CNTL UNIT

FRONTEND UNIT F2838111
Q201 2SK302Y RF AMP
D1-D3 IT32 BPF TUNE
Q202 2SK302Y 1st MIX
BPF
T102-T104
f:10.7MHz
BPF
XF01

Q101 LA4145 AF AMP
SPKR
AF IN
AF OUT
TONE SQL UNIT F2839101 (OPTION) FTS-12
TONE OUT

S MTR AMP
Q801 2SC2712GR
Q802 2SC2712GR
S METER UNIT F2838103
f:455kHz LF-B12
BPF
CF101

MIC AMP UNIT F2838101
Q701 M5224FP
S METER COMPARATOR

Q105 2SC3356 BUFF
D101 1SS184 T/R SW
f2
f1

VCO UNIT F2838106 F2838110
f1:TX
f2:RX
RX 5V
D501 1SS110 SHIFT
Q501 2SK238 OSC/MOD
Q502 2SC2759 BUFF

Q106 2SC2954 DRIVE
Q107 M57796MA PWR AMP

ANTENNA SW UNIT F2838107
ANT
D901 D902 T/R SW
LPF
HI/LOW
S1004
FINAL TX 5V
TX 5V
Q904 Q905 Q906 FINAL REG
Q901 2SC2712GR V CNTL

DTMF UNIT F2856101 (OPTION) FTT-4
DTMF OUT

RX 5V
Q104 FA1A4M MOD SW
CNTL Vcc

LIM AMP/LPF
Q701 M5224FP MOD SW
MIC AMP UNIT F2838101

Q401 MC12017 PRESCALER

CNTL UNIT F2838105
LCD
KEY BOARD
Q1001 CPU HD613901A51
D/A
A/D
Q1010 2SC2712GR MIC AMP
MIC

PLL UNIT F2838108
VCV
ø DET
P DIV
Q402 JLC1007P
f3
X401
OSC/DIV
LATCH
PLL DATA

5V CPU 5V
SAVE
SQL SW
D603 D604 1SS184,1SS53 SW
Q605 23A1162GR 5V SW
Q604 LVC550C REG
+B
TX
RX 5V
TX 5V
Q606 Q607 Q608 T/R SW
Q603 2SC2712GR AF+B SW
Q601 Q602 AF+B REG
AF+B
REG UNIT F2838109

	A1.C1.G1	A2.C2.E2	B.D
f1	144-148MHz	140-160MHz	144-146MHz
f2	133.3-137.3MHz	129.3-149.3MHz	133.3-135.3MHz

	A1.A2.D.E1.E2	B.C1.C2
f3	10.240MHz	12.8MHz

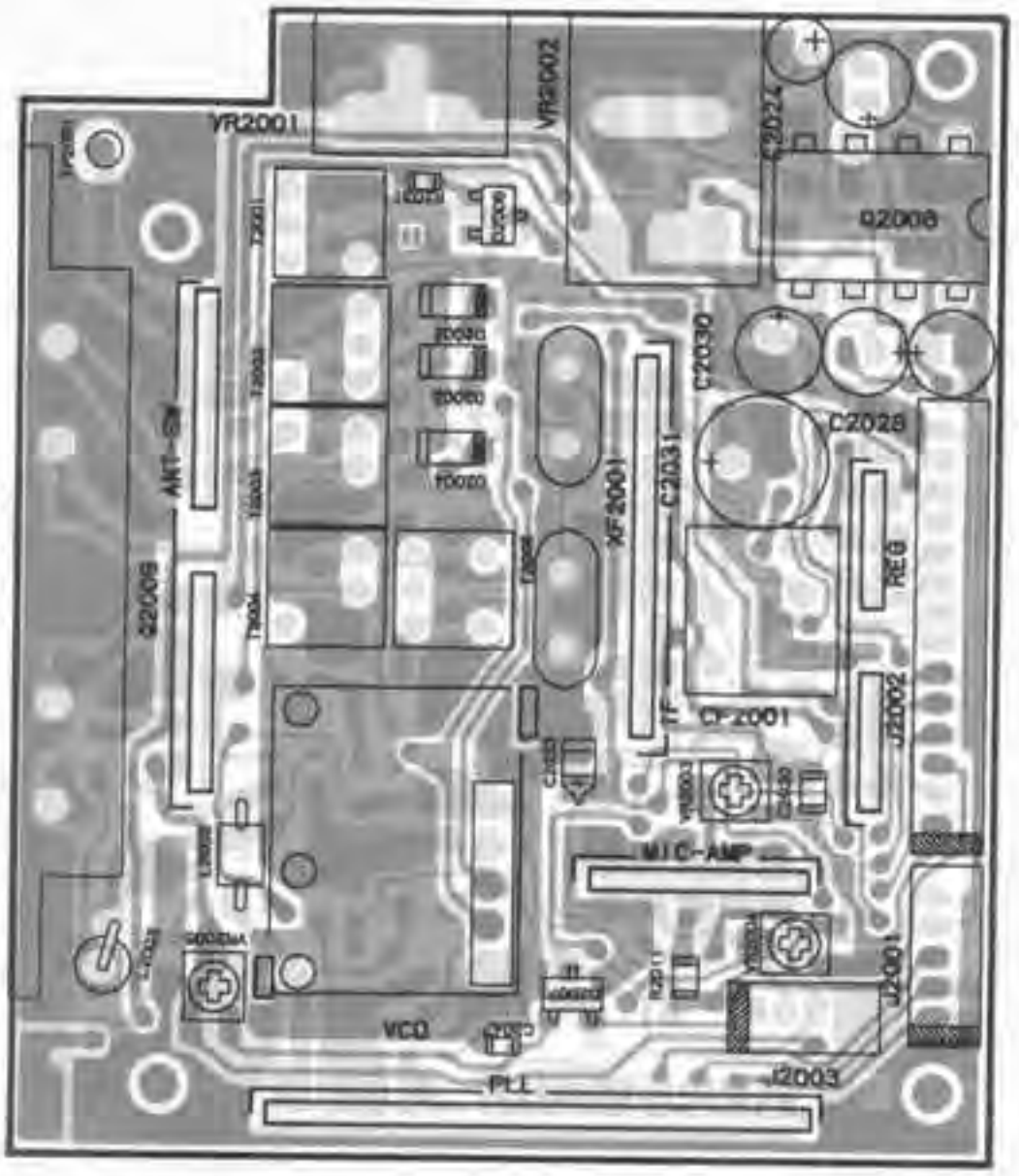
RECEIVE
TRANSMIT
COMMON/CNTL

FT-23R
BLOCK DIAGRAM

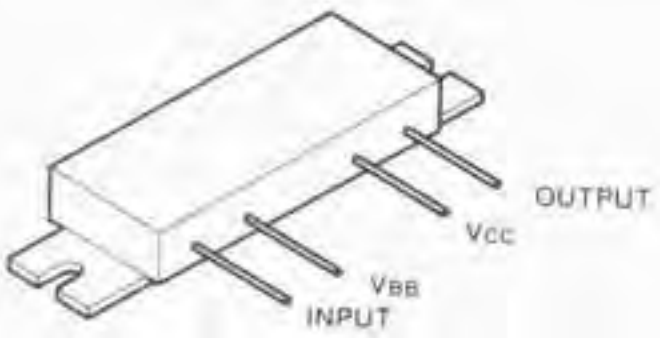
Late Model FT-23R

CONTENTS

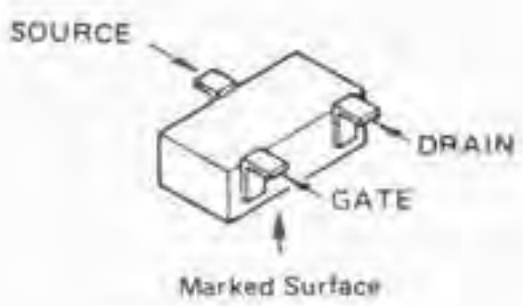
MOTHER BOARD



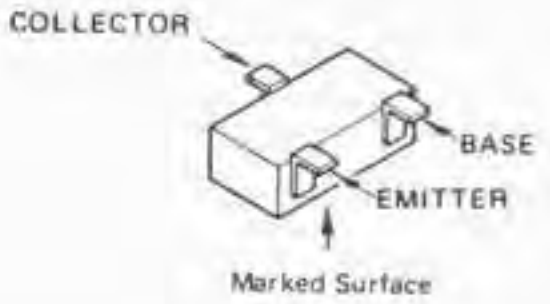
(obverse view of "mixed-component" side)



M57796MA (Q2009)



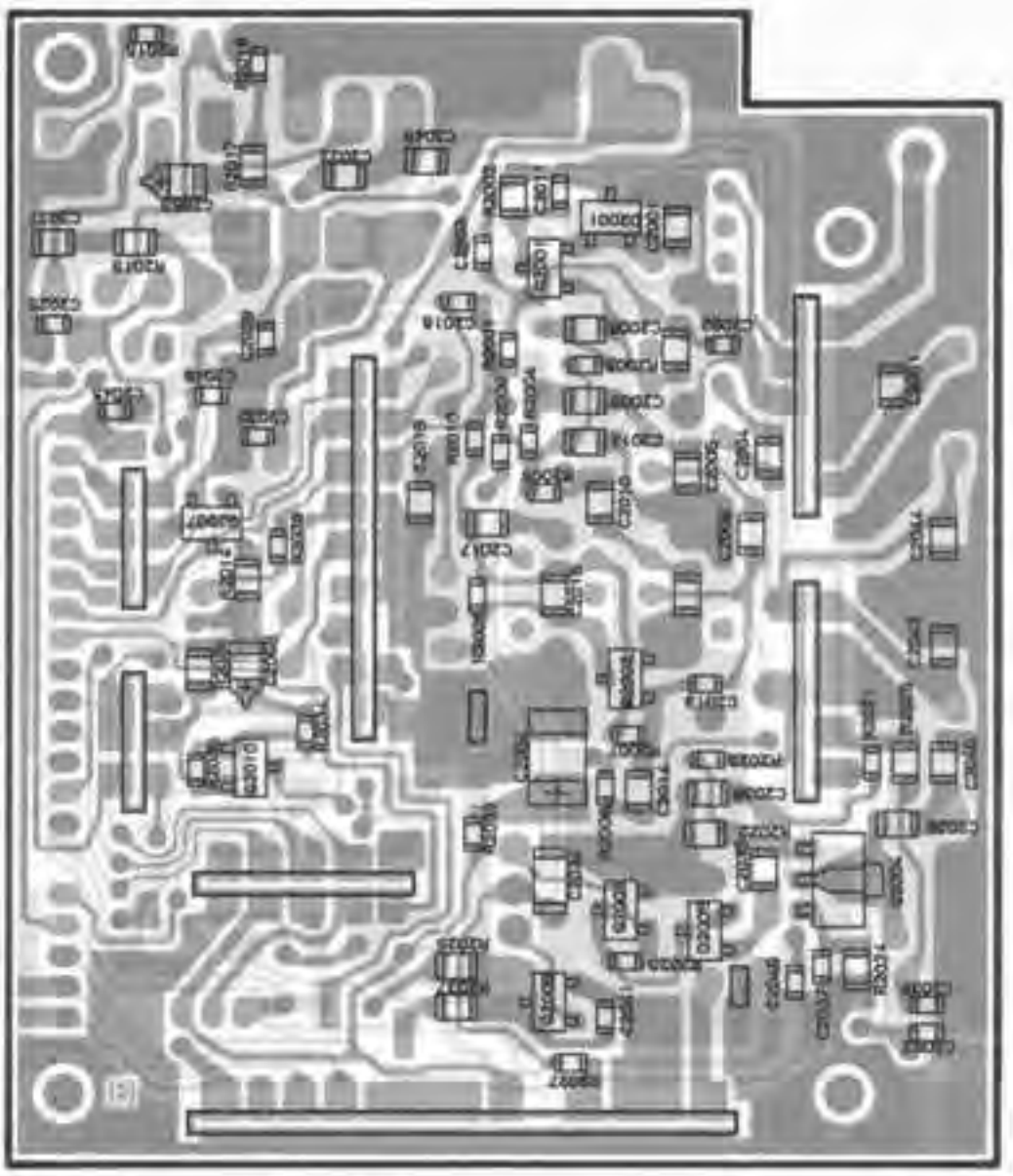
2SK302Y (TY) : (Q2001)



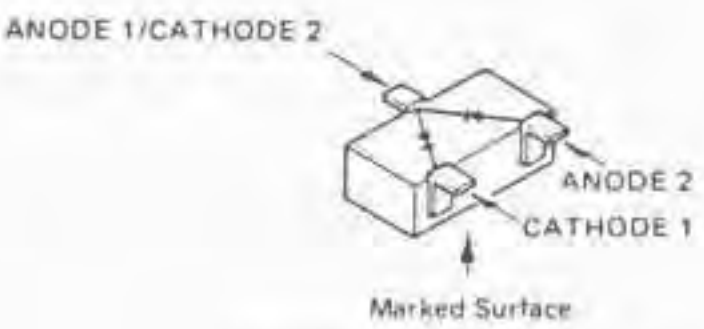
2SC3120 (HB) : (Q2002)
2SC3356 (R22) : (Q2003)
FA1A4M (L33) : (Q2005)
2SC2712GR (LG) : (Q2007)
2SA1162GR (SG) : (Q2010)

2SC2954 (OK) : (2004)

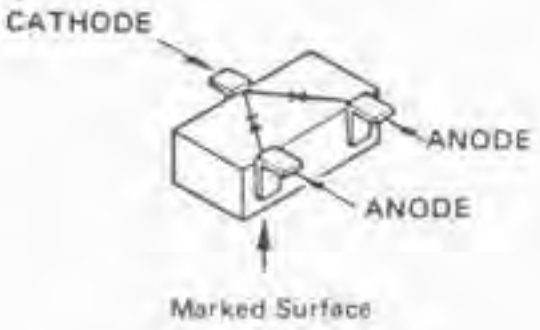
MOTHER BOARD



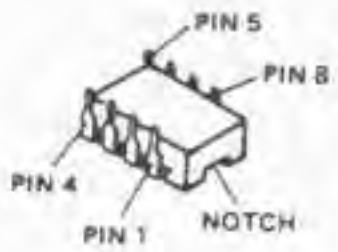
(obverse view of "chip-only" side)



1SS226 (03) : (D2001,D2007)

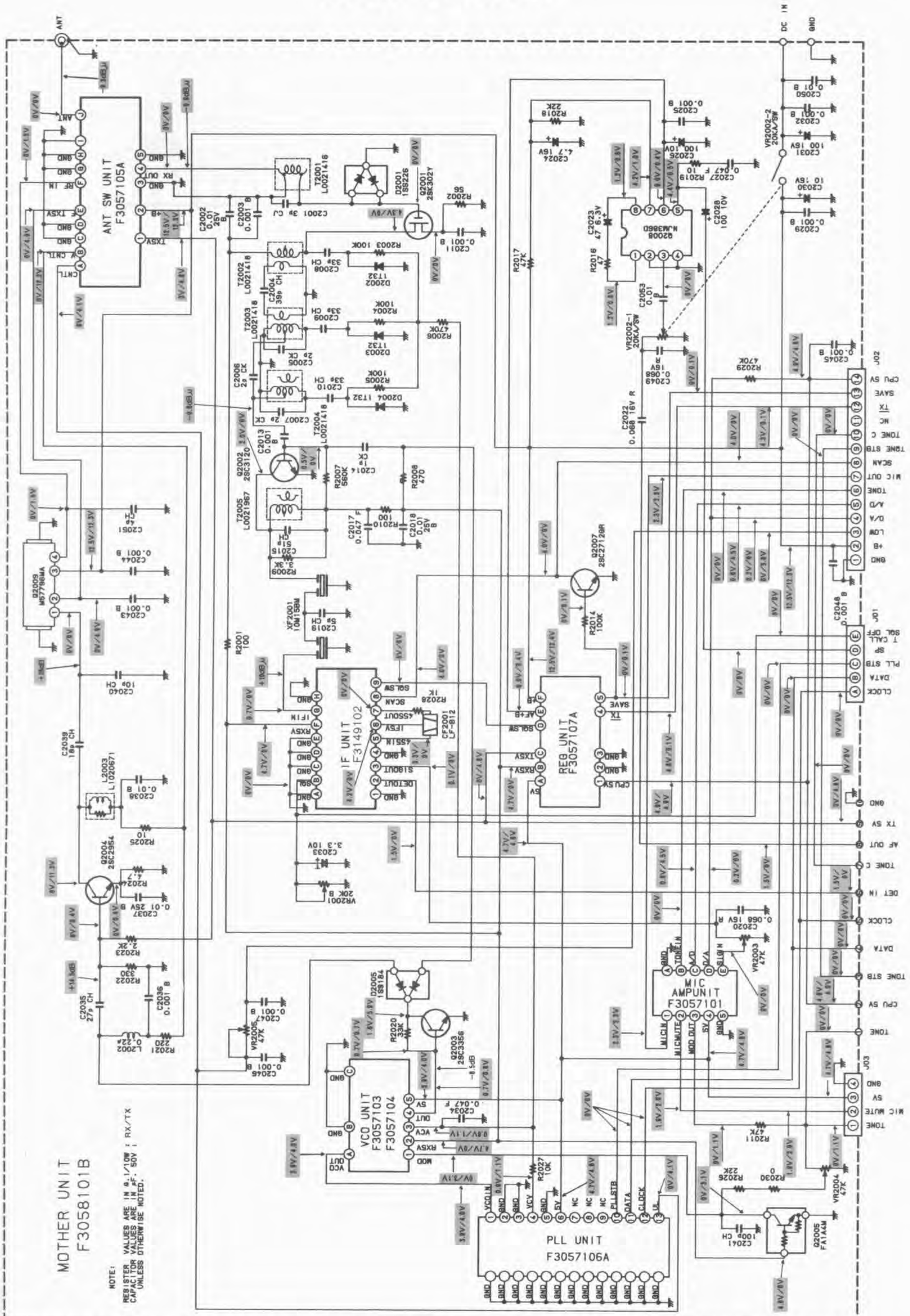


1SS184 (B3) : (D2005)

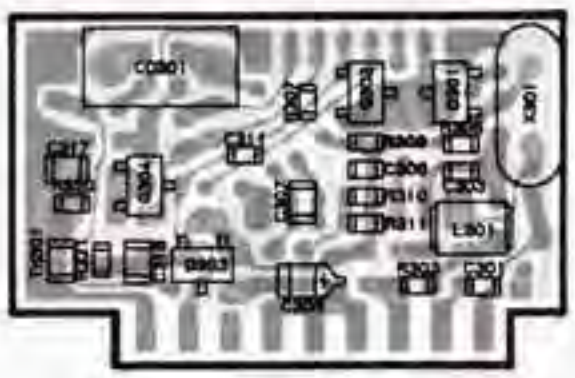


NJM386D (02008)

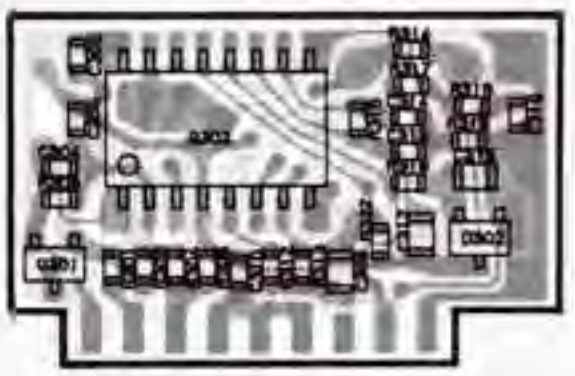
MOTHER BOARD



IF UNIT



(obverse view of "mixed-component" side)



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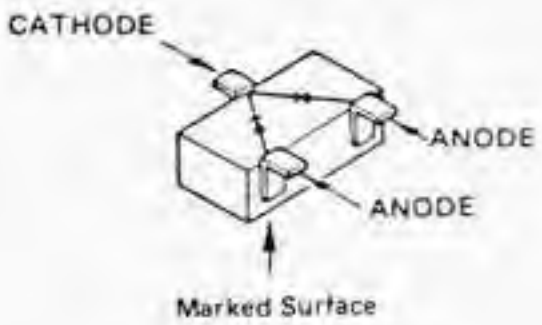
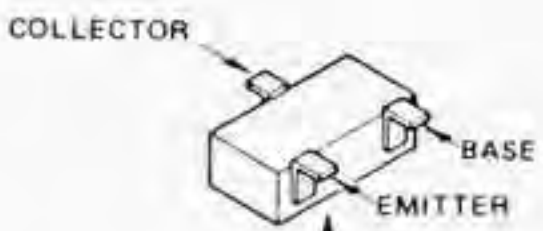
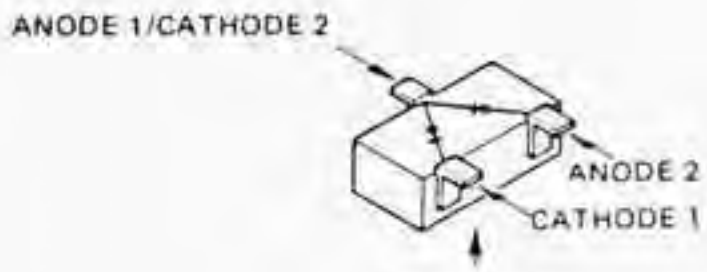
MC3372ML (Q302)



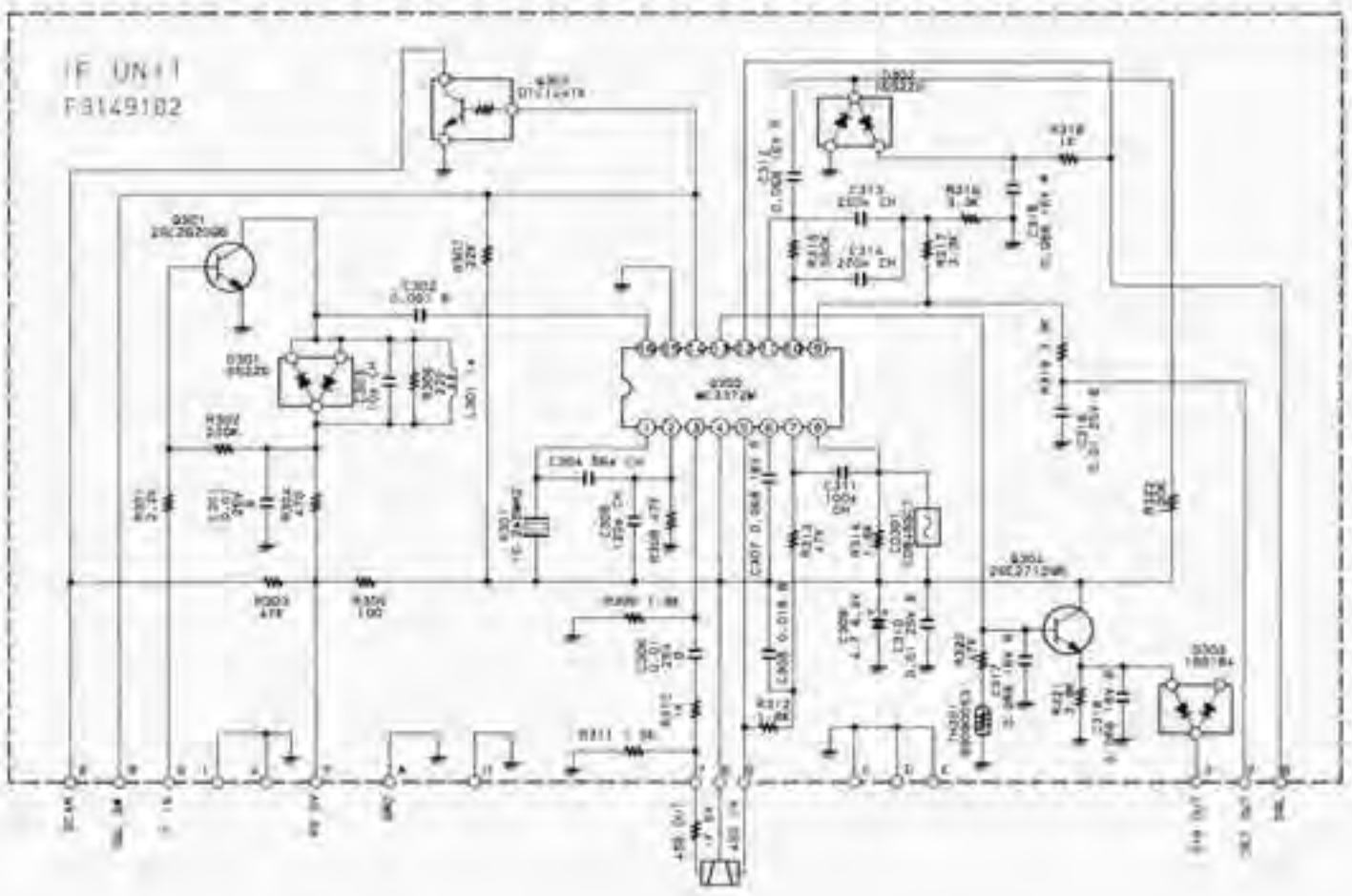
1SS184 (B3) : (D303)



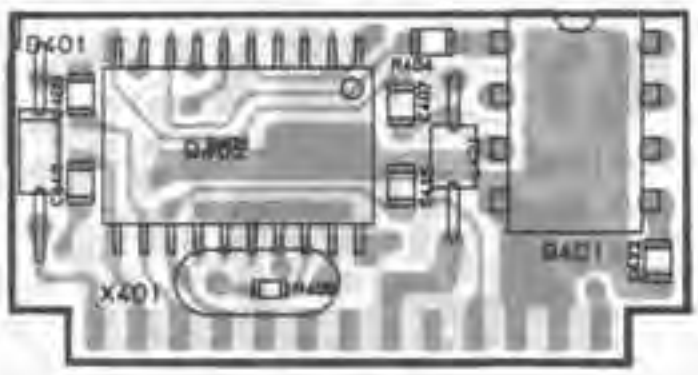
2SC2620B (QB)
(Q301)
2SC2712GR (LG)
(Q304)
DTC124TK (05)
(Q303)



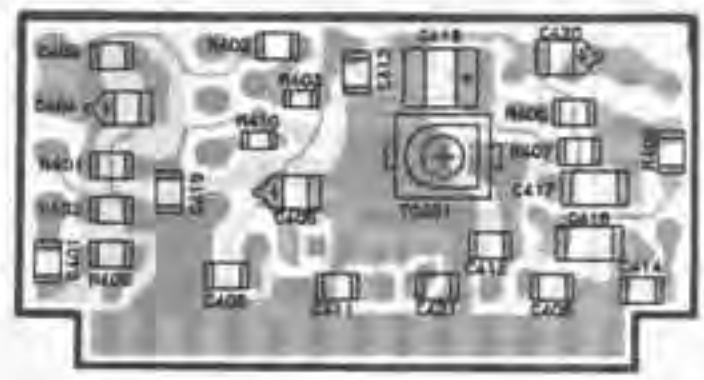
1SS226 (C3)
(D301,302)



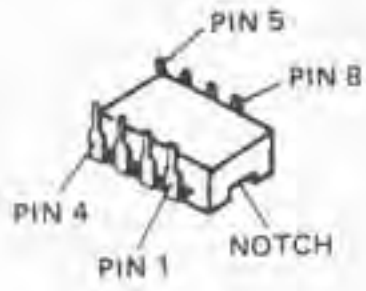
PLL UNIT



(obverse view of "mixed-component" side)



(obverse view of "chip-only" side)



MC12017P (Q401)

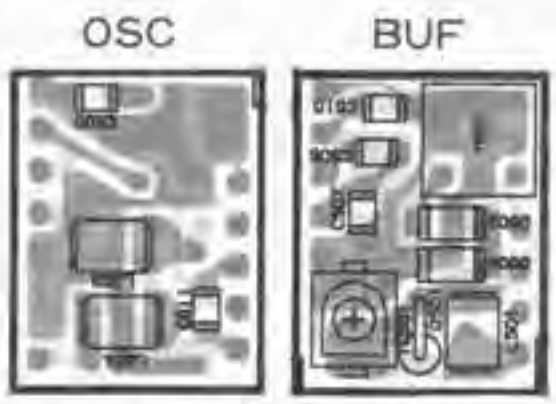
JLC1007P (Q402)

■

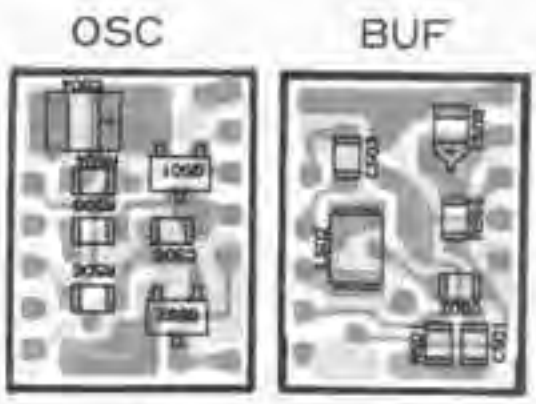
	XF401	R406	R407
A1, A2, D, E2, A3 TYPE	10.240MHZ	15KΩ	1.5KΩ
B, C2 TYPE	12.800MHZ	4.7KΩ	1KΩ

NOTE:
RESISTER VALUES ARE IN Ω, 1/10W ;
CAPACITOR VALUES ARE IN μF, 50V ;
(T) CAPACITOR VALUES ARE TANTALUM ;
INDUCTOR VALUES ARE IN H
UNLESS OTHERWISE NOTED.

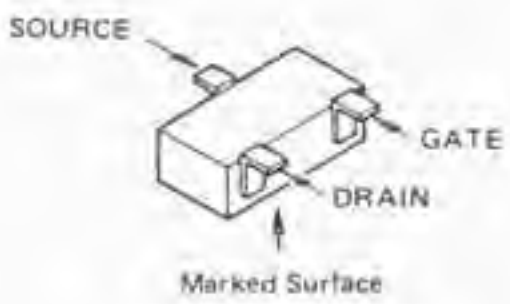
VCO UNIT



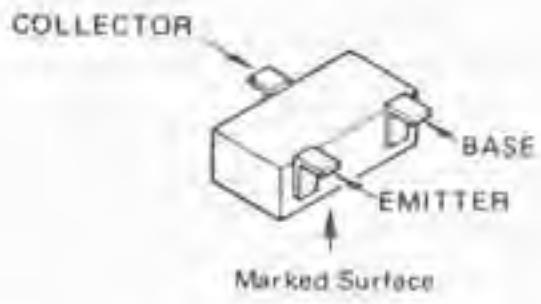
(obverse view of "top" side)



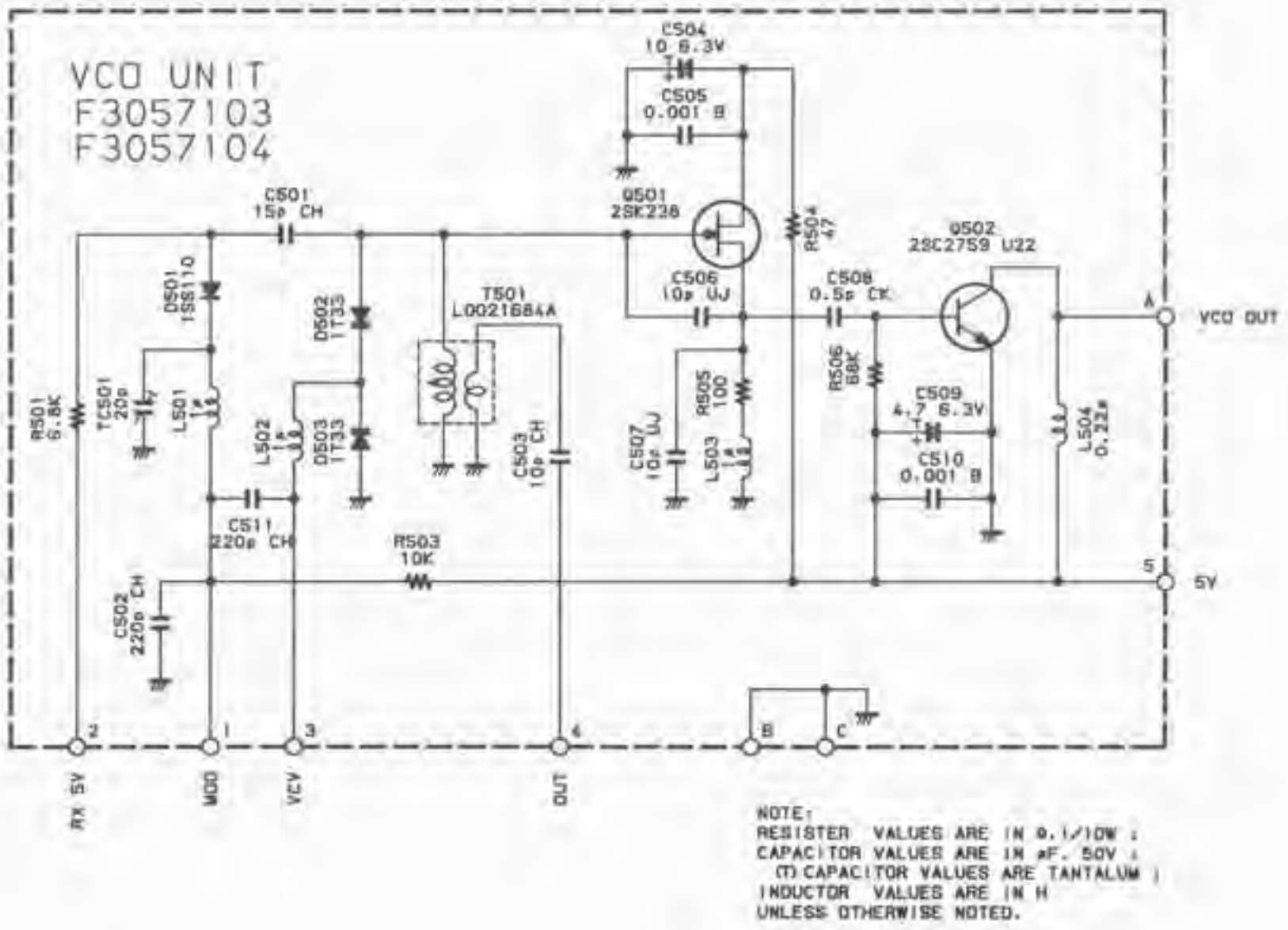
(obverse view of "bottom" side)



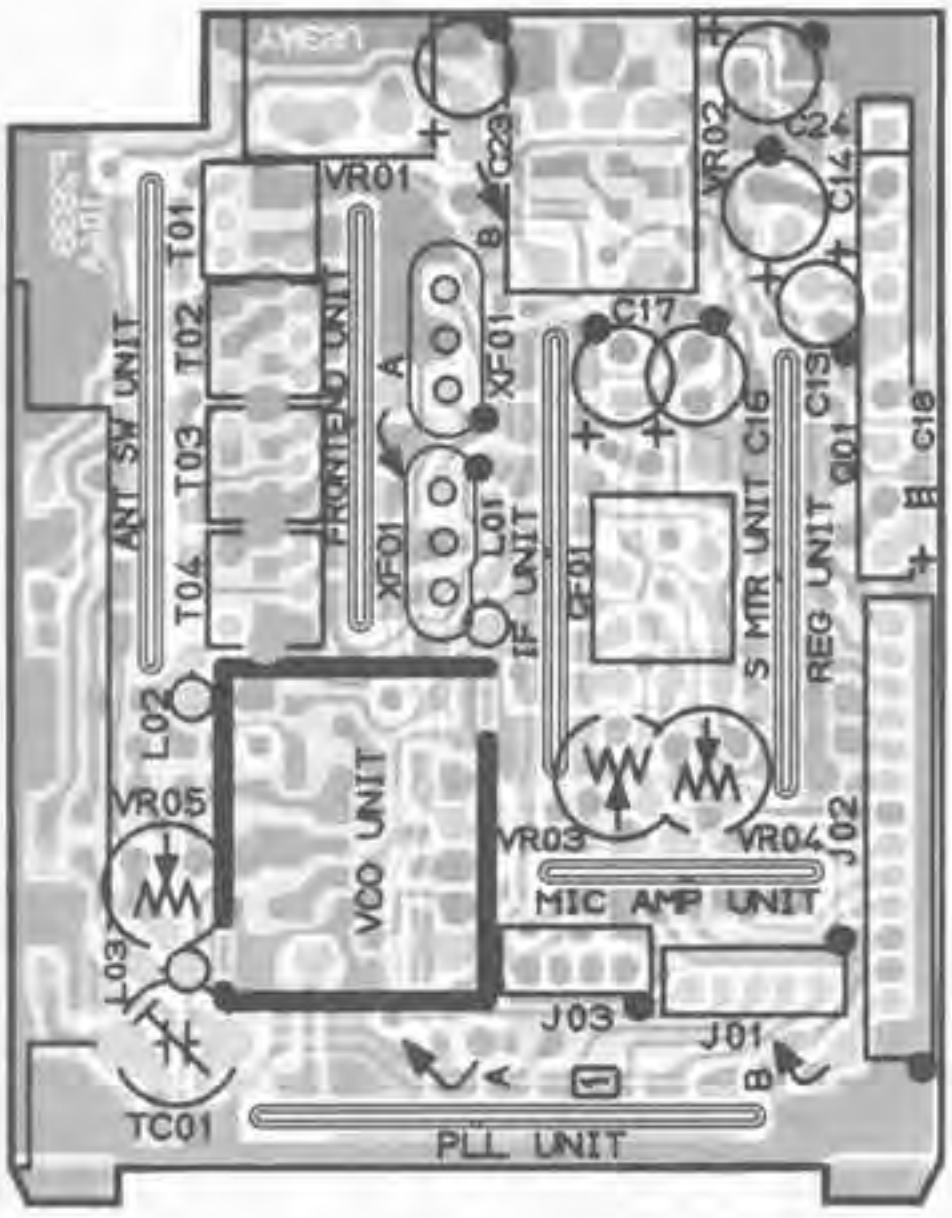
2SK238 (K17) : (Q501)



2SC2759 (U22) : (Q502)

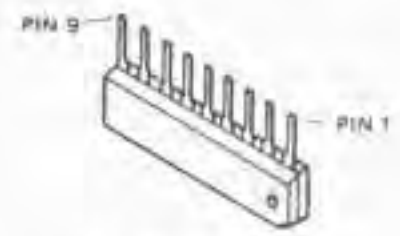


MOTHER BOARD

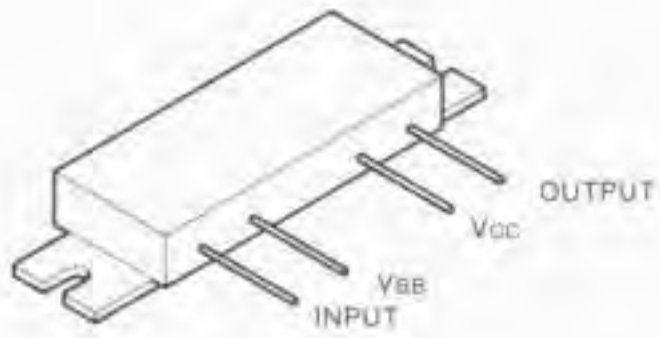


(obverse view of "component" side)

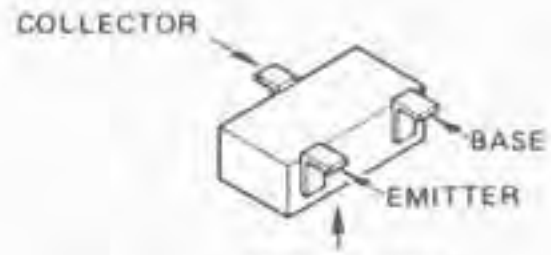
(reverse view of "chip-only" side)



LA4145 (0101)

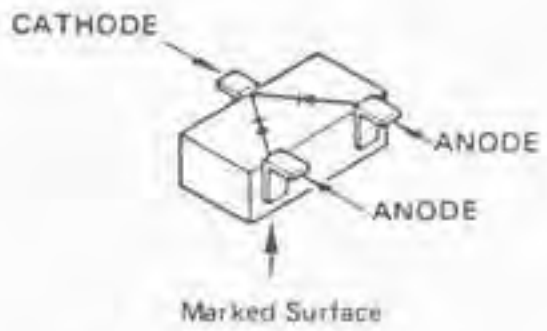


M57796MA (0107)



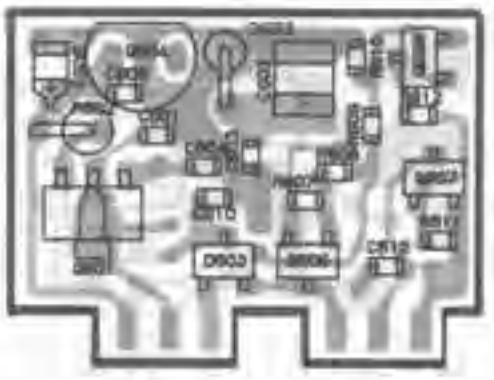
2SA1162GR (SG) : (Q102)
2SC2712GR (LG) : (Q103)
2SC3356 (R22) : (Q105)
FA1A4M (L33) : (Q104)

2SC2954 (Q106)



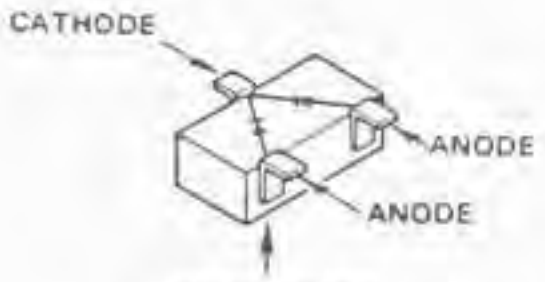
1SS184 (B3) : (D101)

REG UNIT

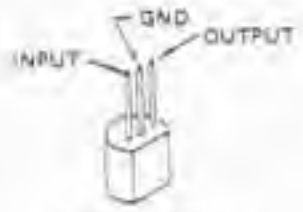


(obverse view of "top" side)

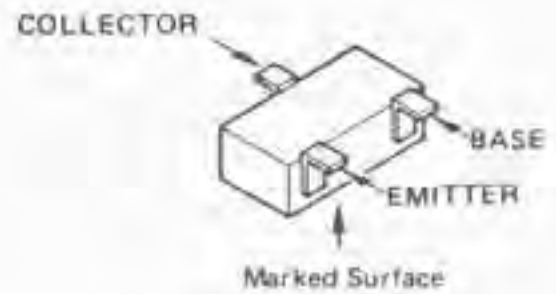
(obverse view of "bottom" side)



1SS184 (B3) : (D603)



LM2931AZ-5.0
(Q604)

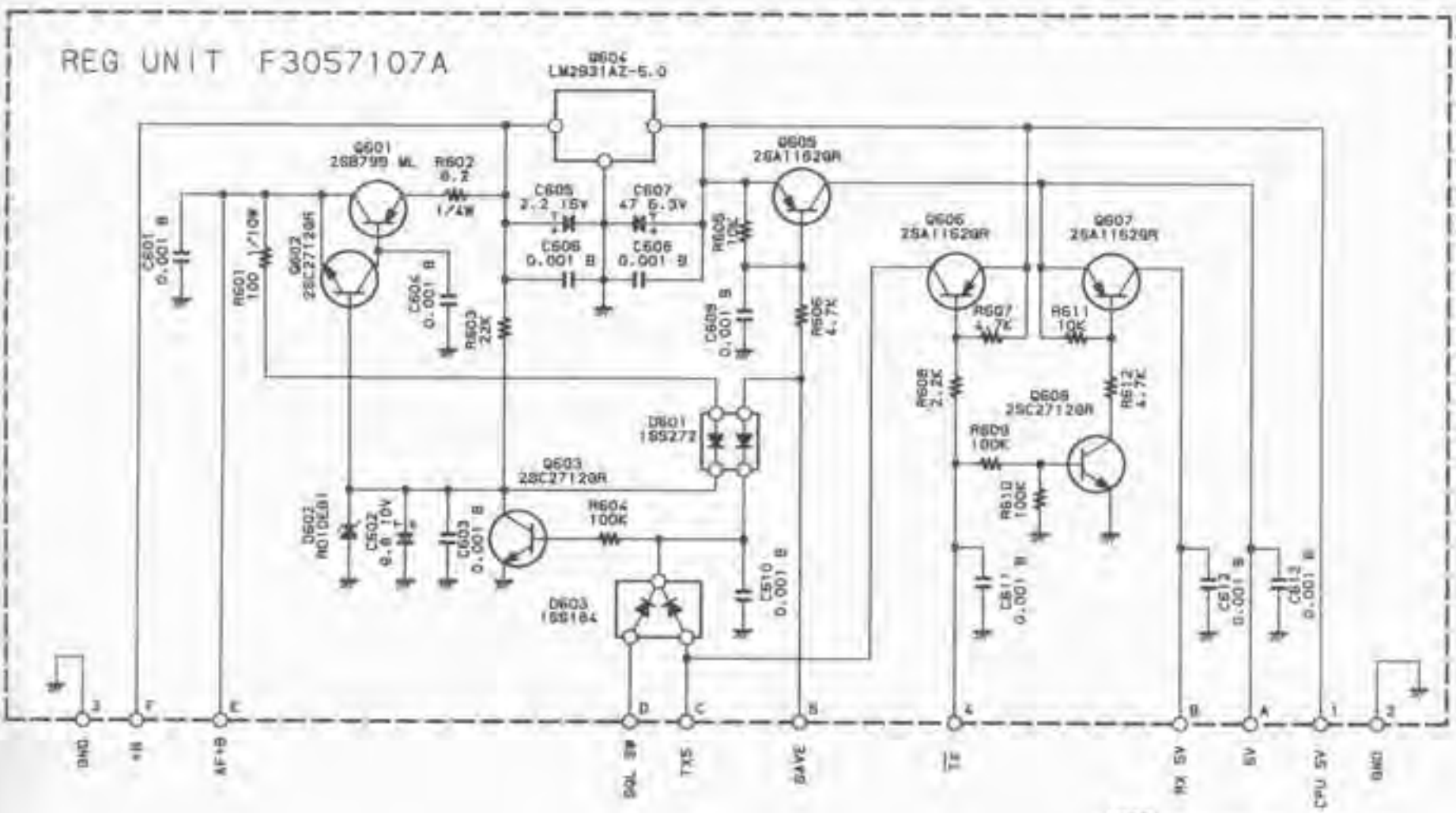


2SA1162GR (SG)
(Q605,606,607)

2SC2712GR (LG)
(Q602,603,608)

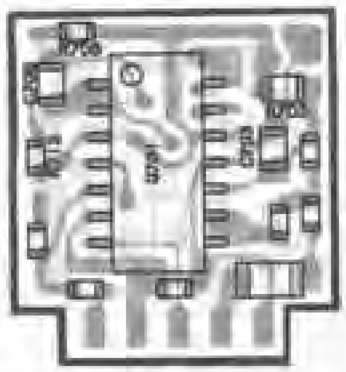
2SB799 (Q601)

1SS272 (A1) : (D601)

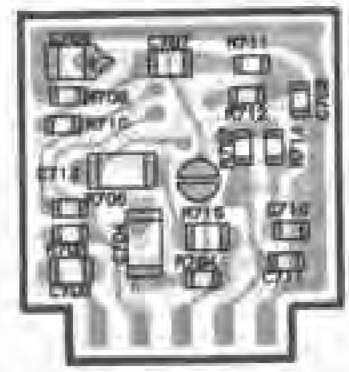


NOTE:
RESISTER VALUES ARE IN Ω, 1/16W ;
CAPACITOR VALUES ARE IN μF, 50V ;
(T) CAPACITOR VALUES ARE TANTALUM ;
INDUCTOR VALUES ARE IN H
UNLESS OTHERWISE NOTED.

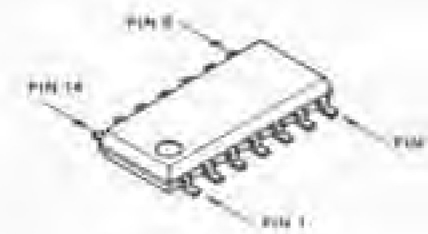
MIC AMP UNIT



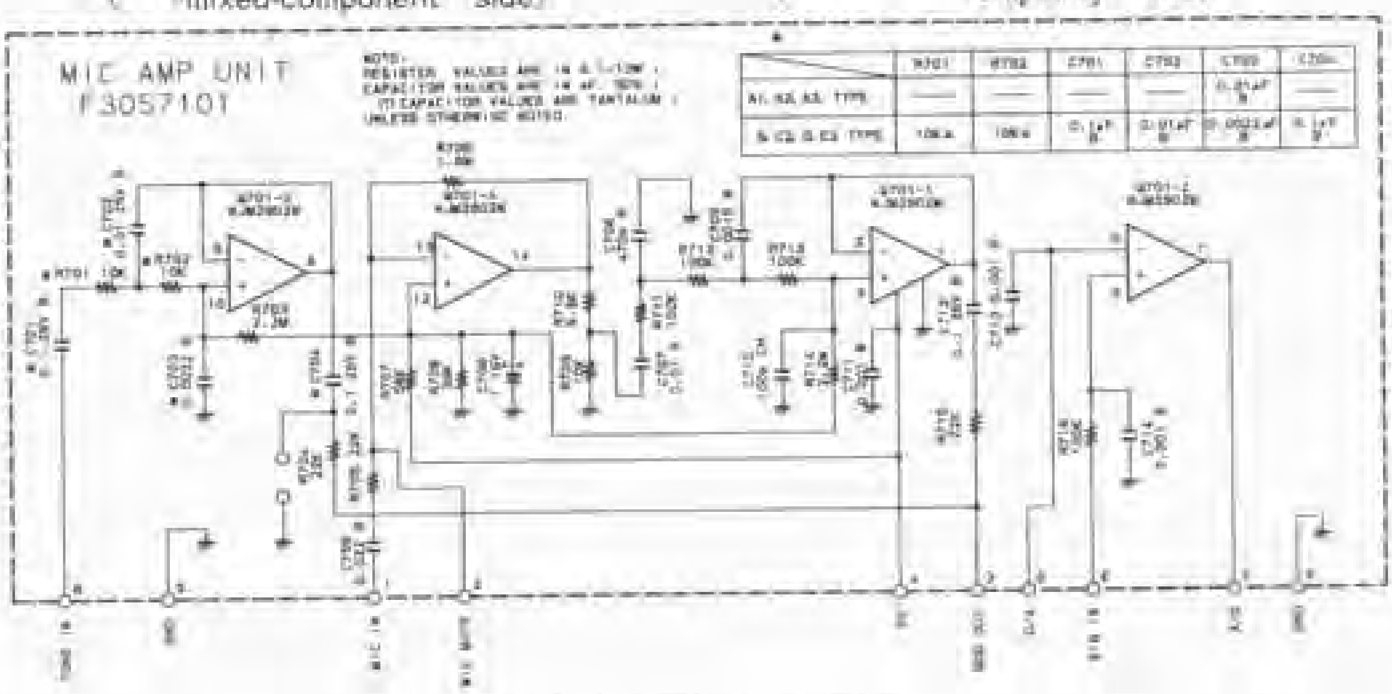
(obverse view of "mixed-component" side)



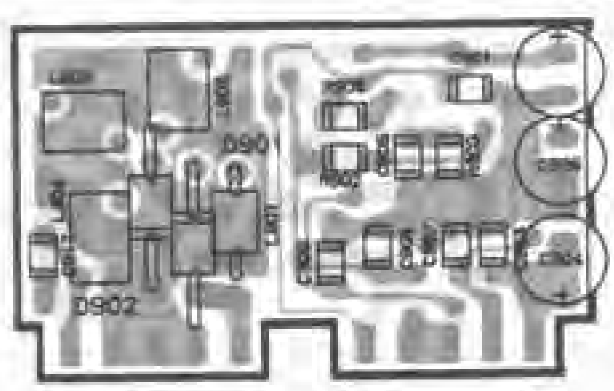
(obverse view of "chip-only" side)



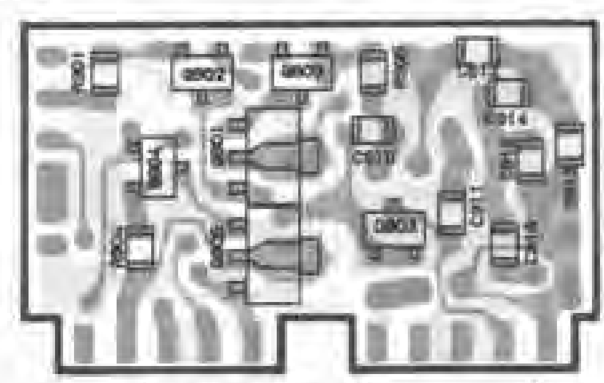
NJM2902M (Q701)



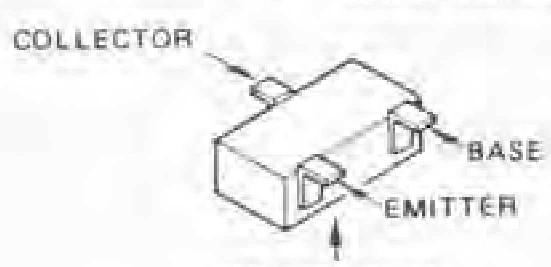
ANT SW UNIT



(obverse view of "mixed-component" side)

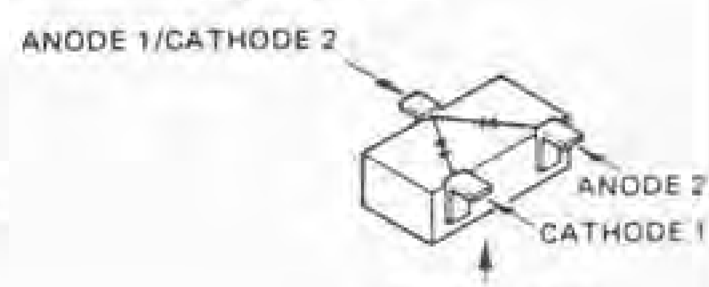


(obverse view of "chip-only" side)

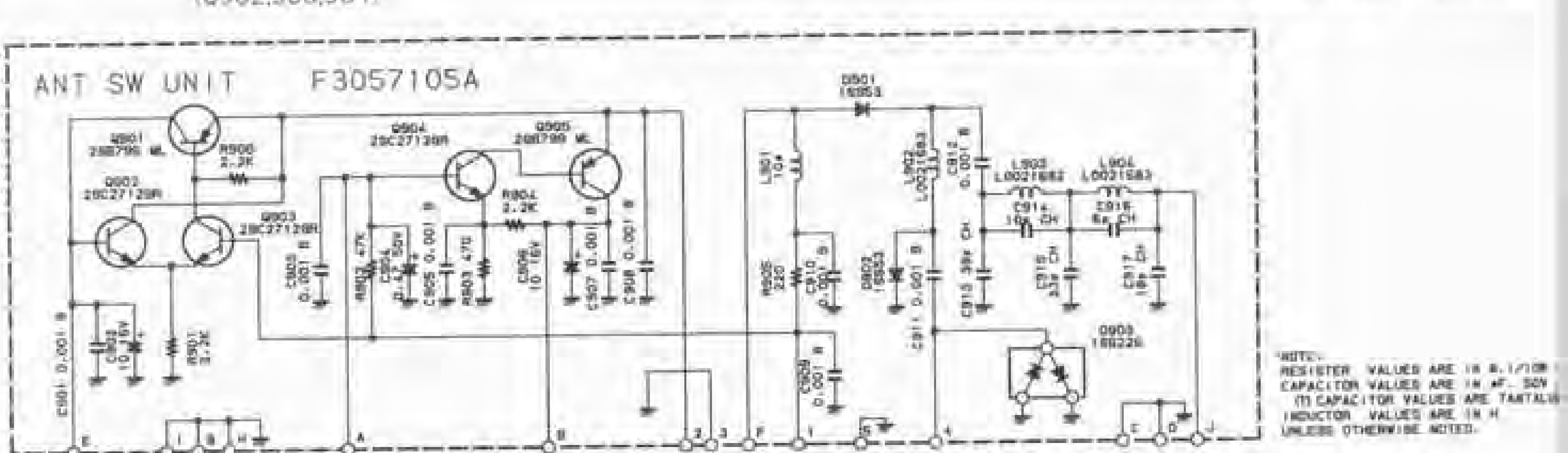


2SC2712GR (LG)
(Q902,903,904)

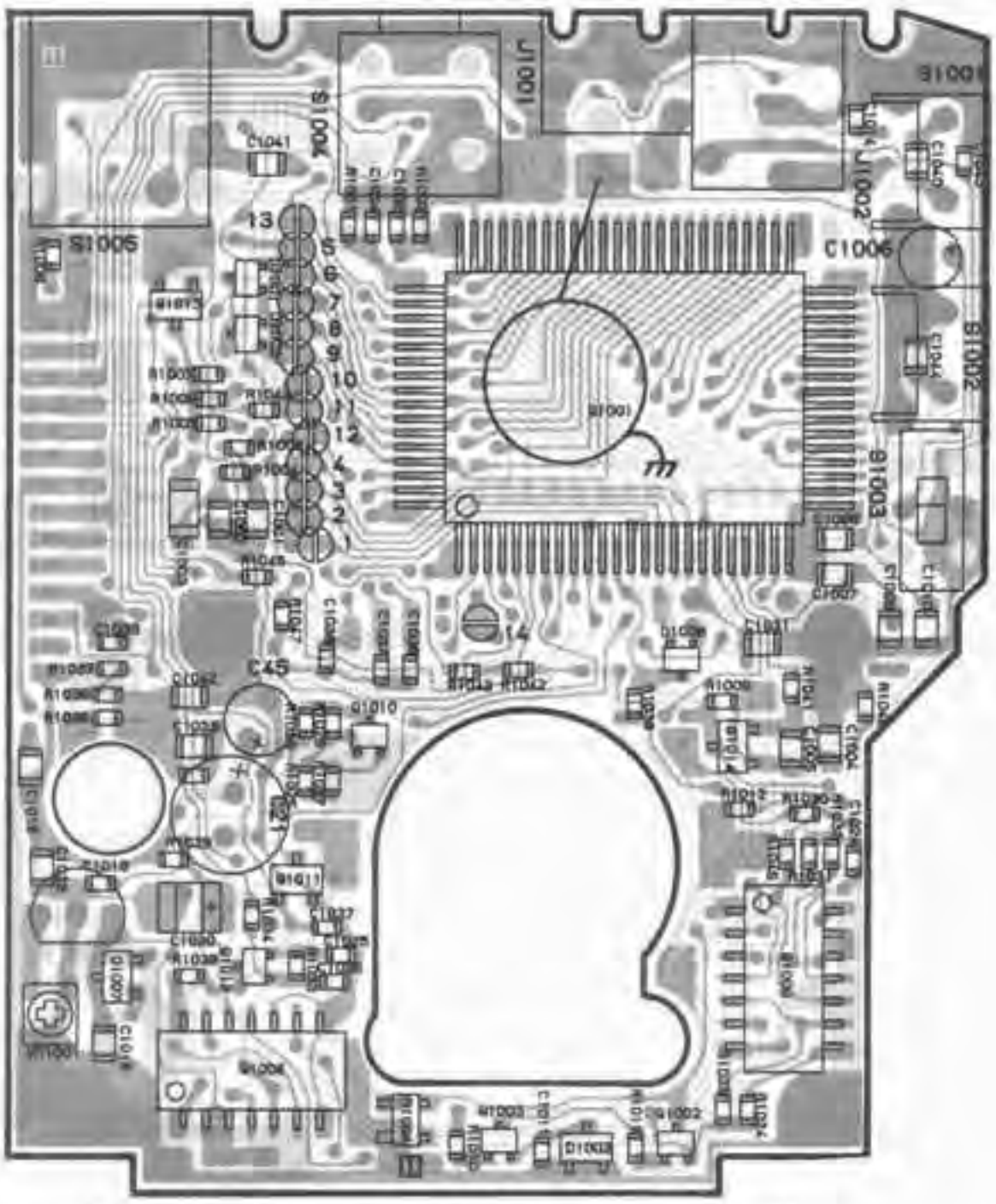
2SB799 (Q901,905)



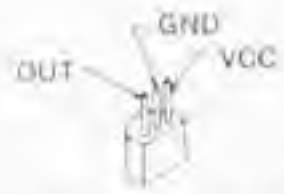
1SS226 (C3) (D903)



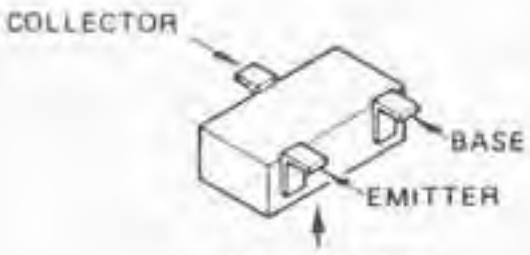
CNTL UNIT



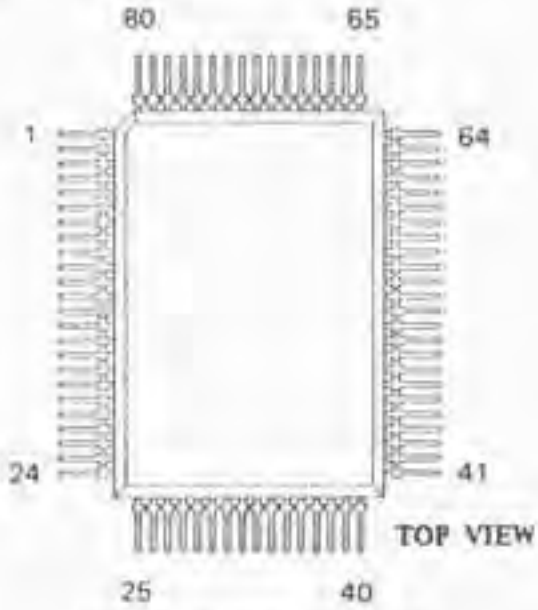
(obverse view of "mixed-component" side)



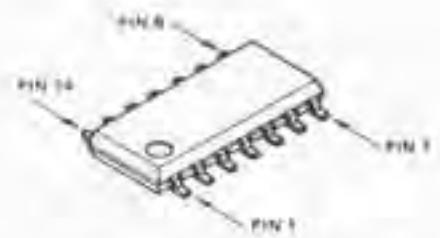
PST5230 (Q1007)



2SA1586Y (SY) : (Q1002,Q1012)
2SC4116GR (LG) : (Q1003,Q1004 Q1005,Q1006 Q1010)
FA1A4M (L33) : (Q1011,Q1013)
2SC1623 (L6) : (Q1014)

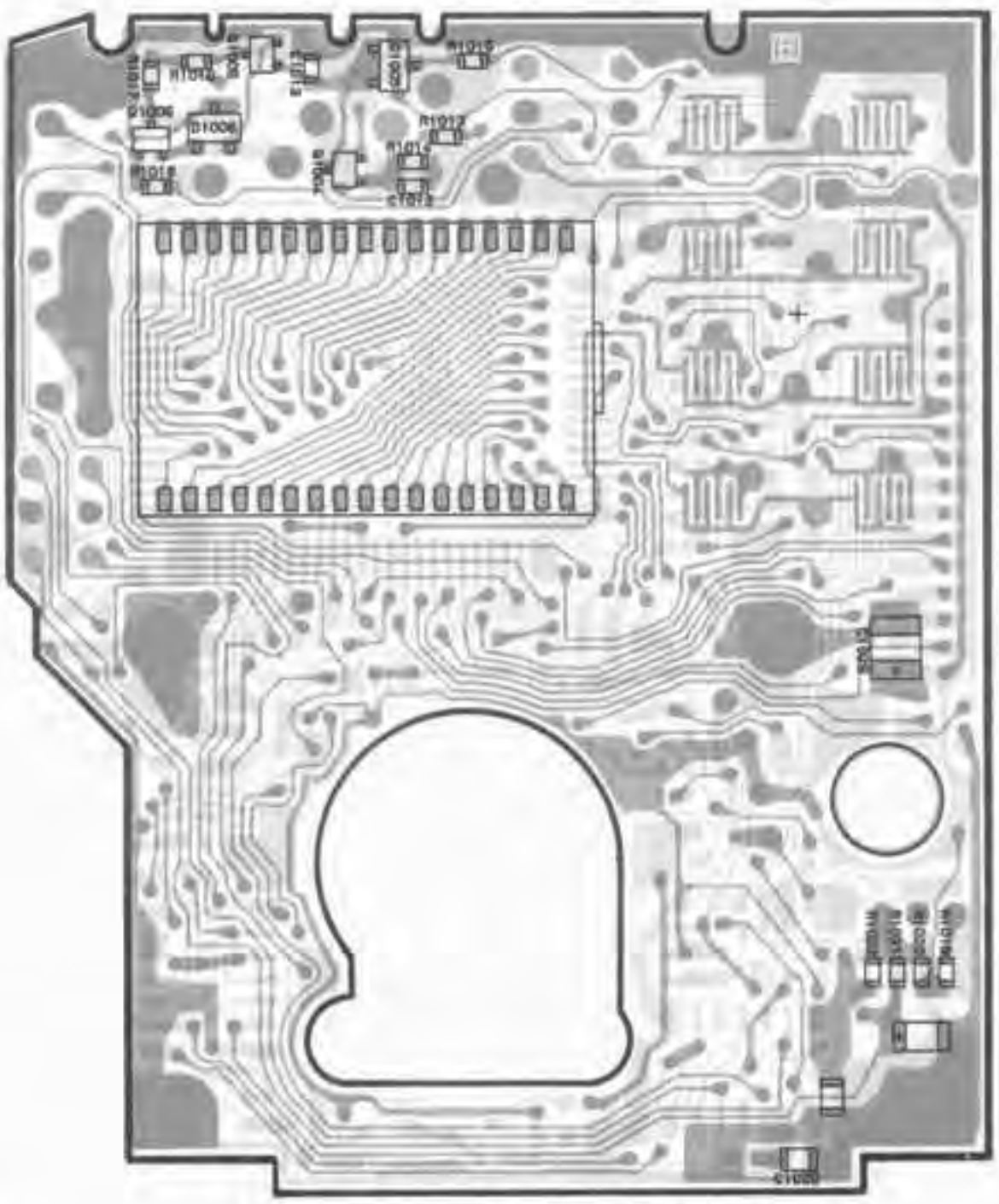


HD613901A78 (Q1001)

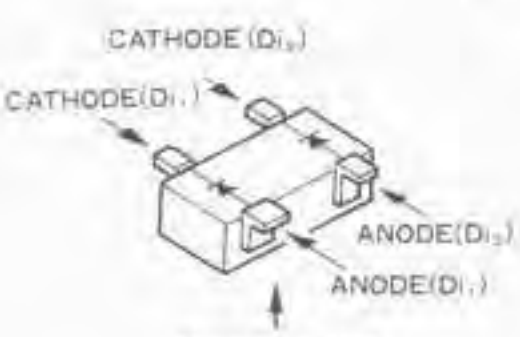


μPD4066BG (Q1008)
μPD4001BG (Q1009)

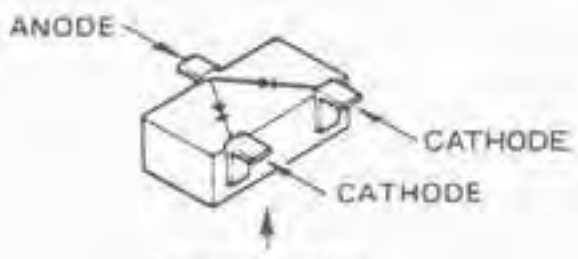
CNTL UNIT



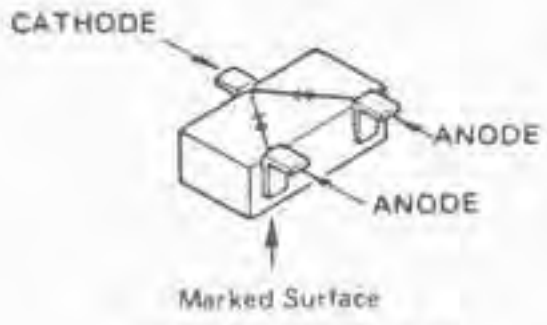
(obverse view of "chip-only" side)



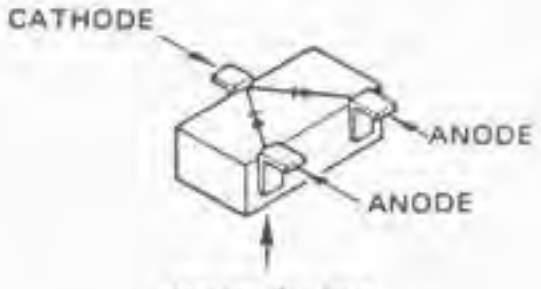
1SS319 (A4) : (D1004)



1SS300 (A3) : (D1001,1002)

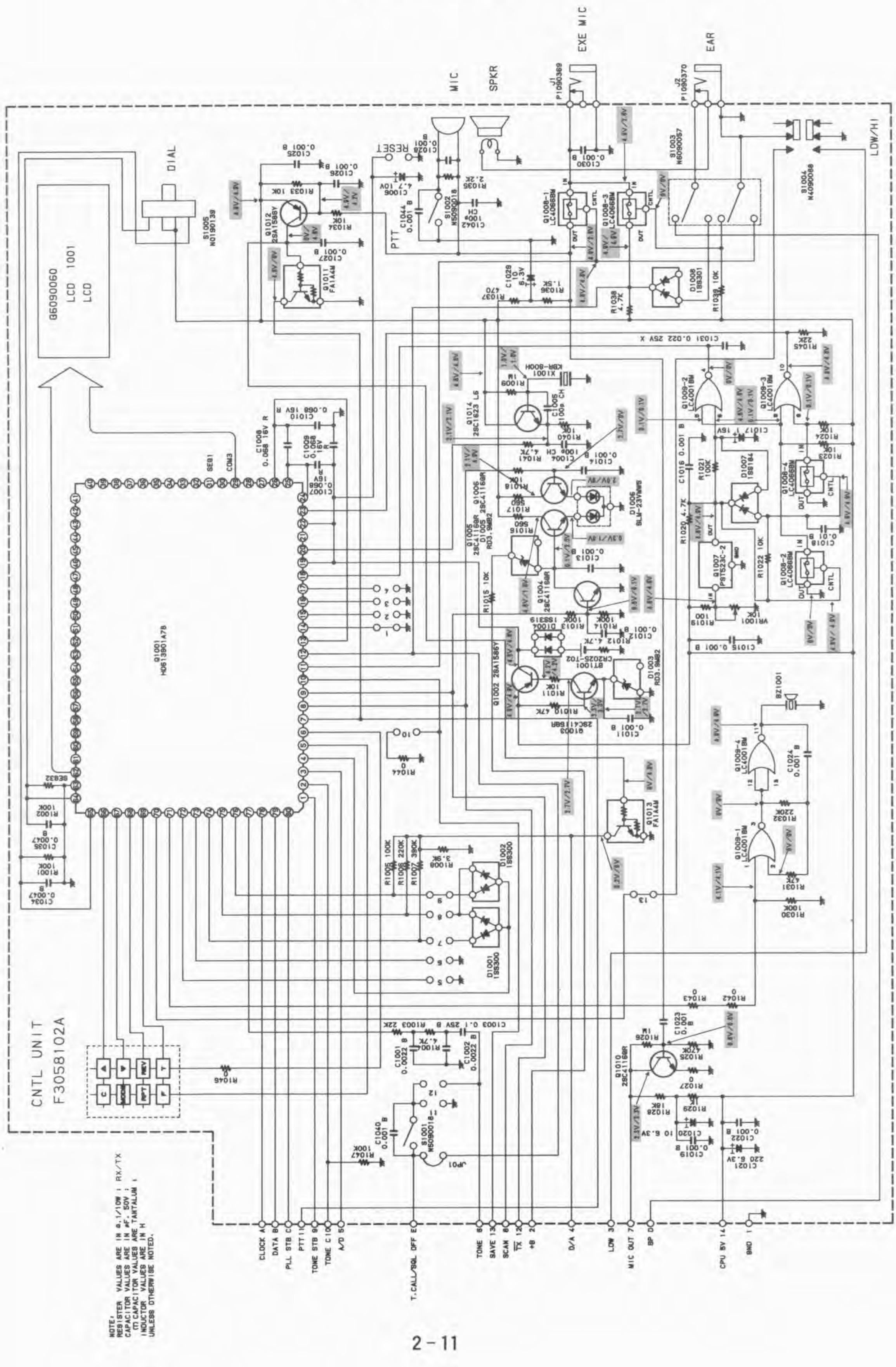


1SS301 (B3) : (D1008)



1SS184 (B3) : (D1007)
SLM-23VMW (D1006)
(LED)

CNTL UNIT



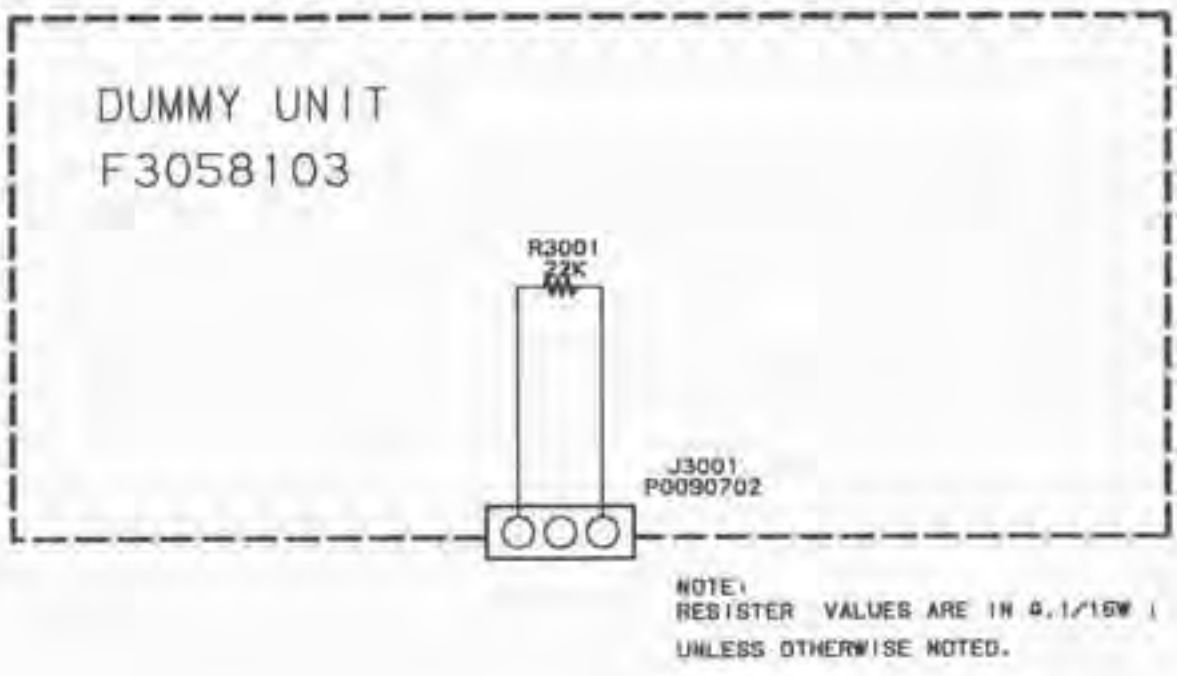
CNTL UNIT
F3058102A

NOTE;
RESISTER VALUES ARE IN Ω,1/10W : RX/TX
CAPACITOR VALUES ARE IN μF, 50V ;
(T) CAPACITOR VALUES ARE TANTALUM :
INDUCTOR VALUES ARE IN H
UNLESS OTHERWISE NOTED.

DUMMY UNIT

(obverse view of "connector" side)

(obverse view of "chip-only" side)



NOTE:
RESISTER VALUES ARE IN Ω, 1/15W ±
UNLESS OTHERWISE NOTED.

ALIGNMENT

The FT-23R has been aligned by highly-skilled technicians at the factory, and is designed so that no further alignment should ever be required. However, in the unlikely event of a component failure, realignment may be necessary. All component replacement and service should be performed only by an authorized Yaesu representative, or the warranty policy may be voided.

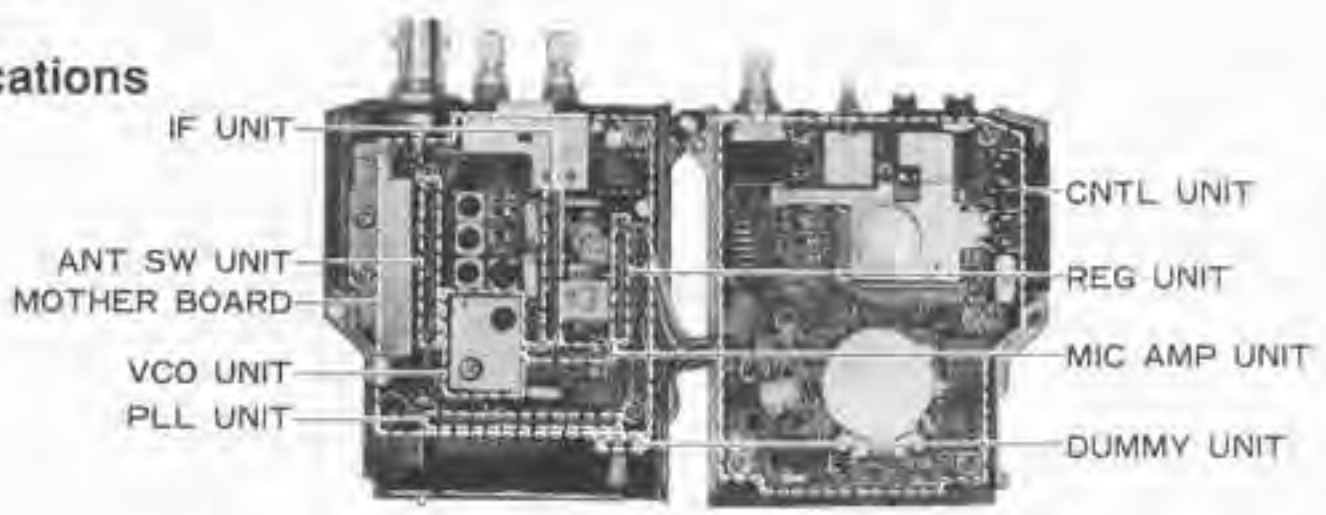
Required Test Equipment

- RF Signal Generator with calibrated output level at 150 MHz
- Spectrum Analyzer
- RF Sampling Coupler
- Oscilloscope
- AF Millivoltmeter
- Deviation Meter
- SINAD Meter
- Inline Wattmeter with 5% accuracy at 150 MHz
- Regulated DC Power Supply adjustable from 10 to 15V, 2A
- 50-Ω Non-reactive Dummy Load: 10W at 150 MHz
- Frequency Counter: ±0.2ppm accuracy at 150 MHz
- AF Signal Generator
- DC Voltmeter: high impedance
- External Loudspeaker or 8-Ω load resistor.

Case Disassembly

- Make sure the transceiver is off. Remove the hard or soft case, if used, and remove the battery pack.
- Remove the four screws affixing the battery spring plate on the bottom of the transceiver, and carefully remove the plate.
- Pull off the knobs, and remove the four screws affixing the top panel. Remove the panel and rubber gasket under it.
- Remove the two screws affixing the front and rear halves of the case, and gently separate the halves, using care not to stress the interconnecting wires.

Board Locations



PLL & Transmitter

Set up the test equipment as shown below for transmitter alignment. Adjust the supply voltage to 12.0V for all steps except Transmitter Output Power.

PLL VCV (Varactor Control Voltage)

(1) Connect the DC voltmeter between C417 on the PLL Unit and chassis ground.

(2) Set the transceiver to 144.00 MHz. Key the transmitter and adjust transformer T501 on the VCO Buffer Unit for 11.5 ± 0.05 V DC on the voltmeter.

(3) While receiving on 144.00 MHz, adjust trimmer TC501 on the VCO Unit for 0.8 ± 0.05 V DC.

(4) Tune the transceiver to the high band edge and confirm the correct high-end VCV for the transceiver version being aligned, in both transmit and receive, as follows:

Version	High Band Edge	Tx VCV	Rx VCV
A, C & E	148.000 MHz	< 1.6 V	< 1.3 V
B & D	146.000 MHz	<1.5 V	< 1.2 V

Transmitter Output Power

(1) Tune the transceiver to band center (145 or 146 MHz), and select high power output (LOW switch not depressed).

(2) Increase the supply voltage to 12.5 V, and then adjust VR2005 on the Mother Board for peak output power on the wattmeter (at least 5 watts with less than 1.5 A supply current).

(3) Now press the LOW button, and adjust VR2005 (again), this time for 0.5 ± 0.1 watt.

PLL Reference Frequency

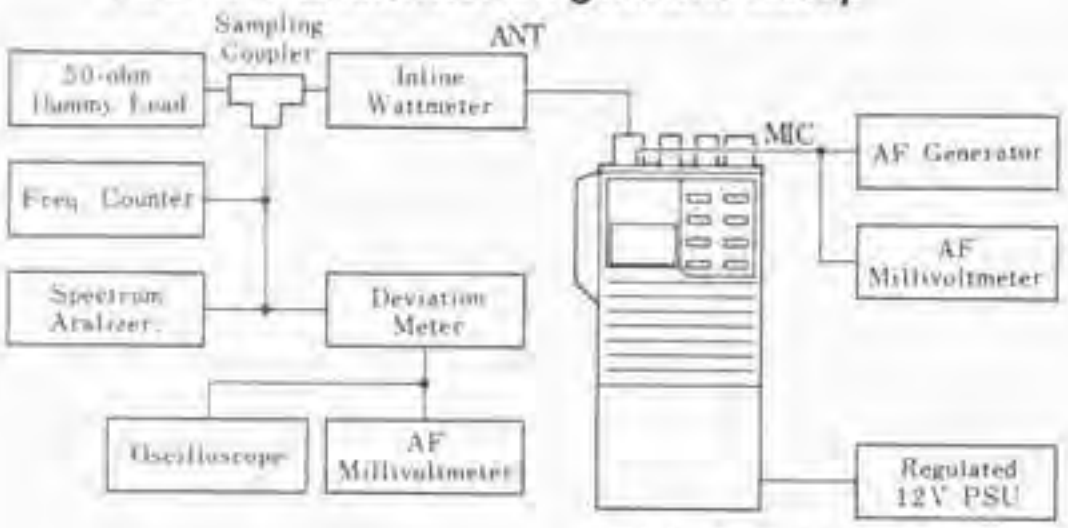
With the transceiver tuned to band center (145 or 146 MHz), adjust TC401 on the PLL Unit, if necessary, so the display frequency matches the frequency counter when transmitting.

Modulation Level

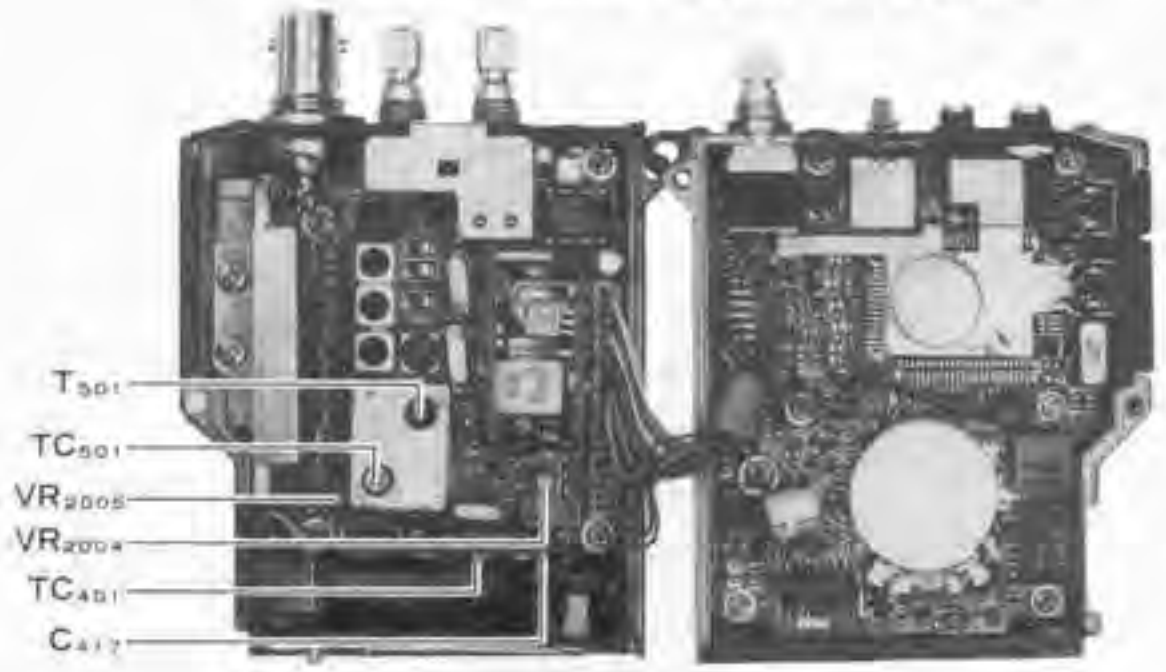
(1) With the transceiver tuned to band center (145 or 146 MHz), adjust the AF generator for 25-mV output at 1 kHz to the MIC jack.

(2) Adjust VR2004 on the Mother Board for ± 4.8-kHz deviation on the deviation meter.

PLL & Transmitter Alignment Setup



PLL & Transmitter Alignment Points



Receiver

Set up the test equipment as shown below for receiver alignment.

(1) With the transceiver and the RF signal generator both tuned to band center (145 or 146 MHz), set the generator for ±3.5 kHz deviation of 1-kHz tone modulation, and set the output level for 40 dBμ at the antenna jack.

(2) Preset VR2003 on the Mother Board fully clockwise.

(3) Adjust T2001 through T2005 on the Mother Board for maximum S-meter indication, reducing the generator level if more than 4 bargraph segments turn on.

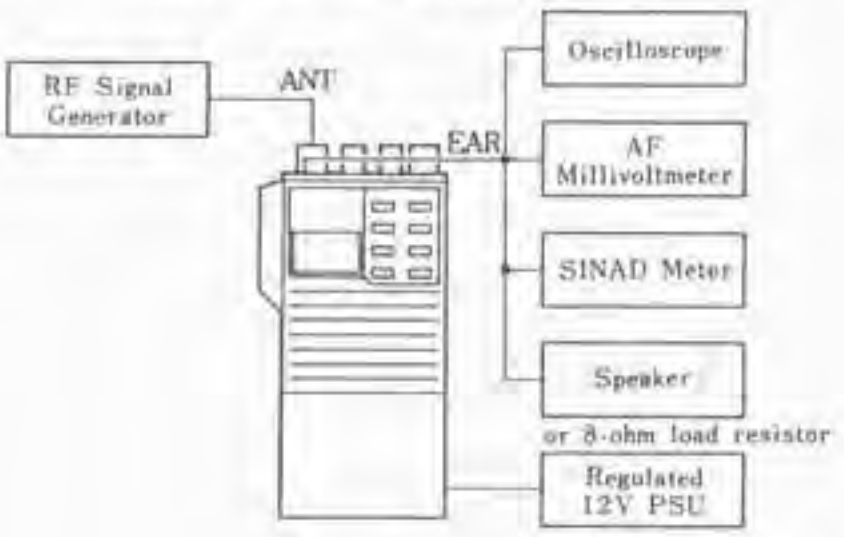
(4) After adjusting the transformers, generator level should be 0.2 μV or less for 12dB SINAD.

(5) Reduce the RF injection from the signal generator to 20 dBμ.

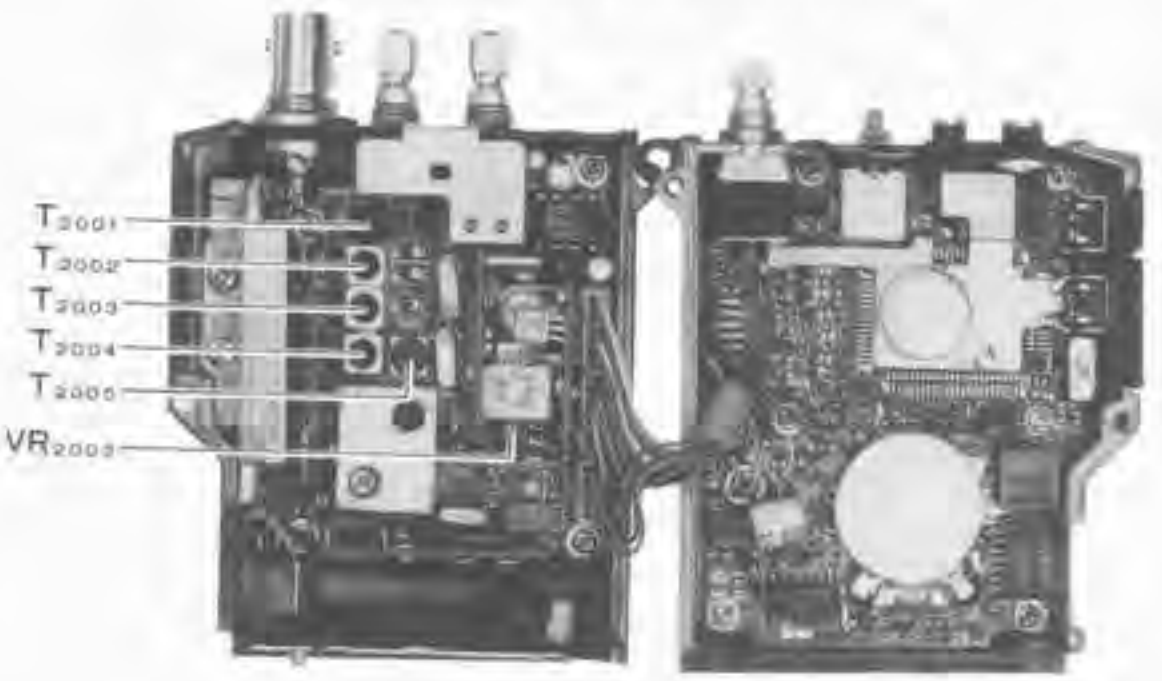
(6) Adjust VR2003 on the Mother Board so that all bargraph segments are just turned on.

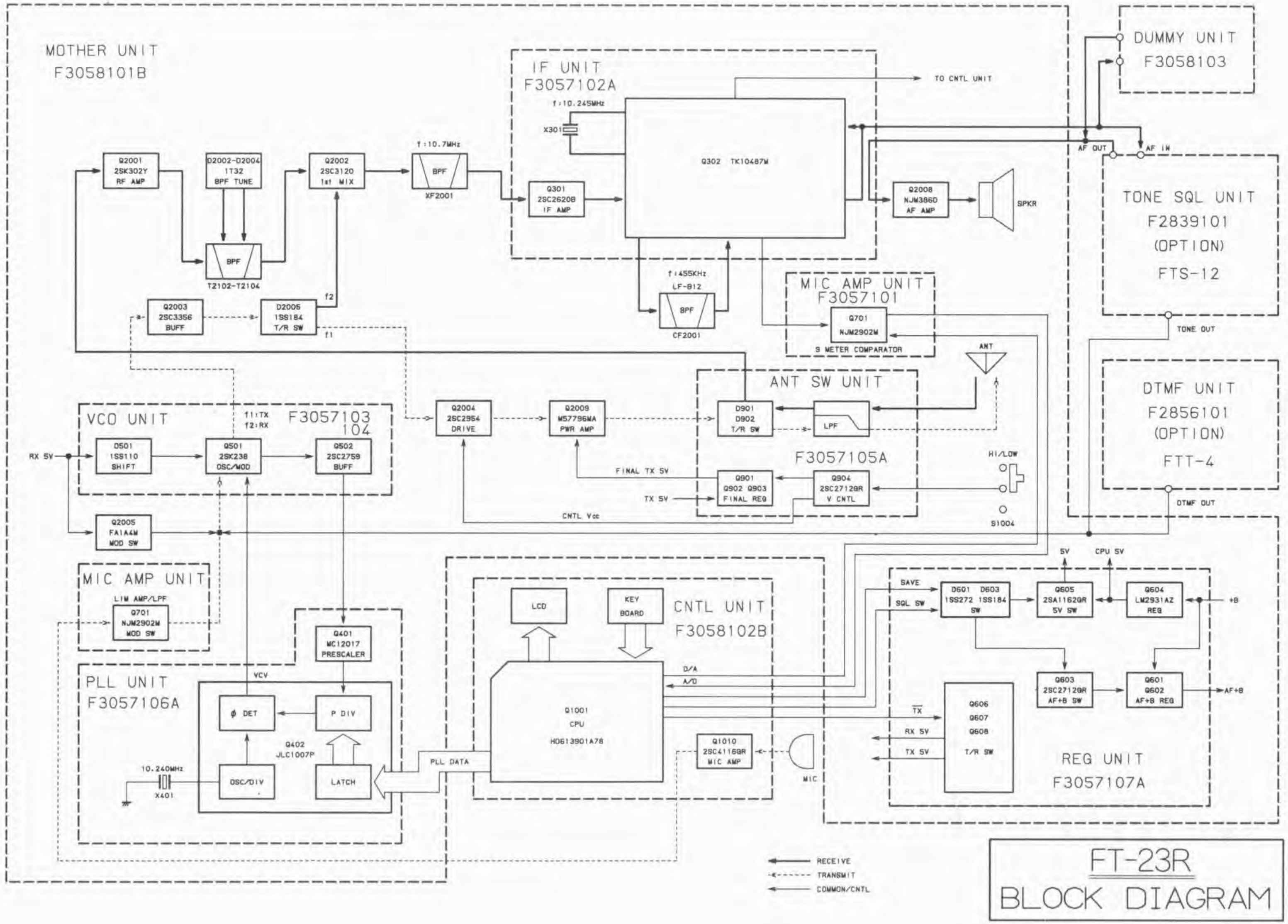
(7) Reduce the generator output so that only 2 segments are on, and confirm that the injection level is 5 dBμ or less.

Receiver Alignment Setup



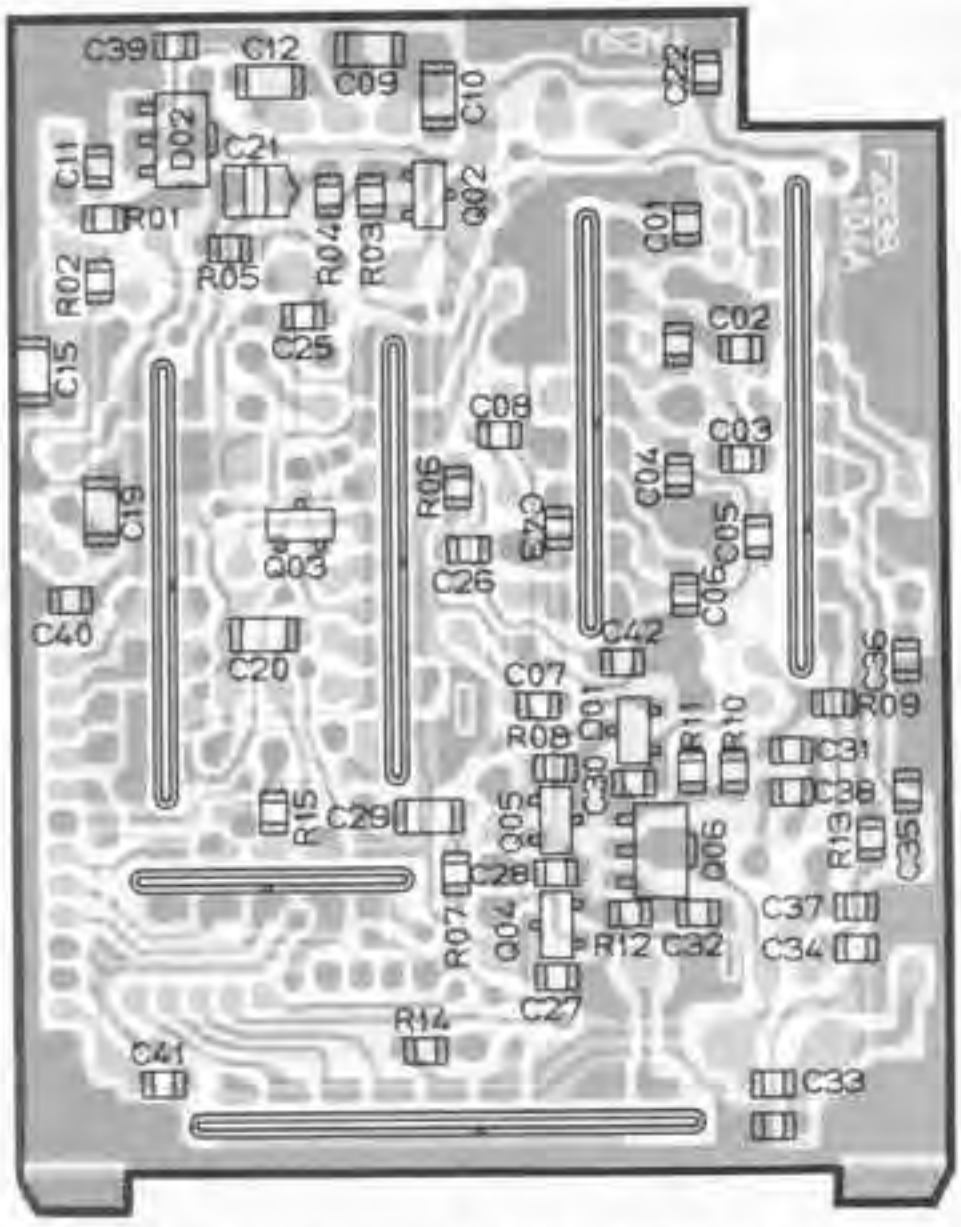
Receiver Alignment Points



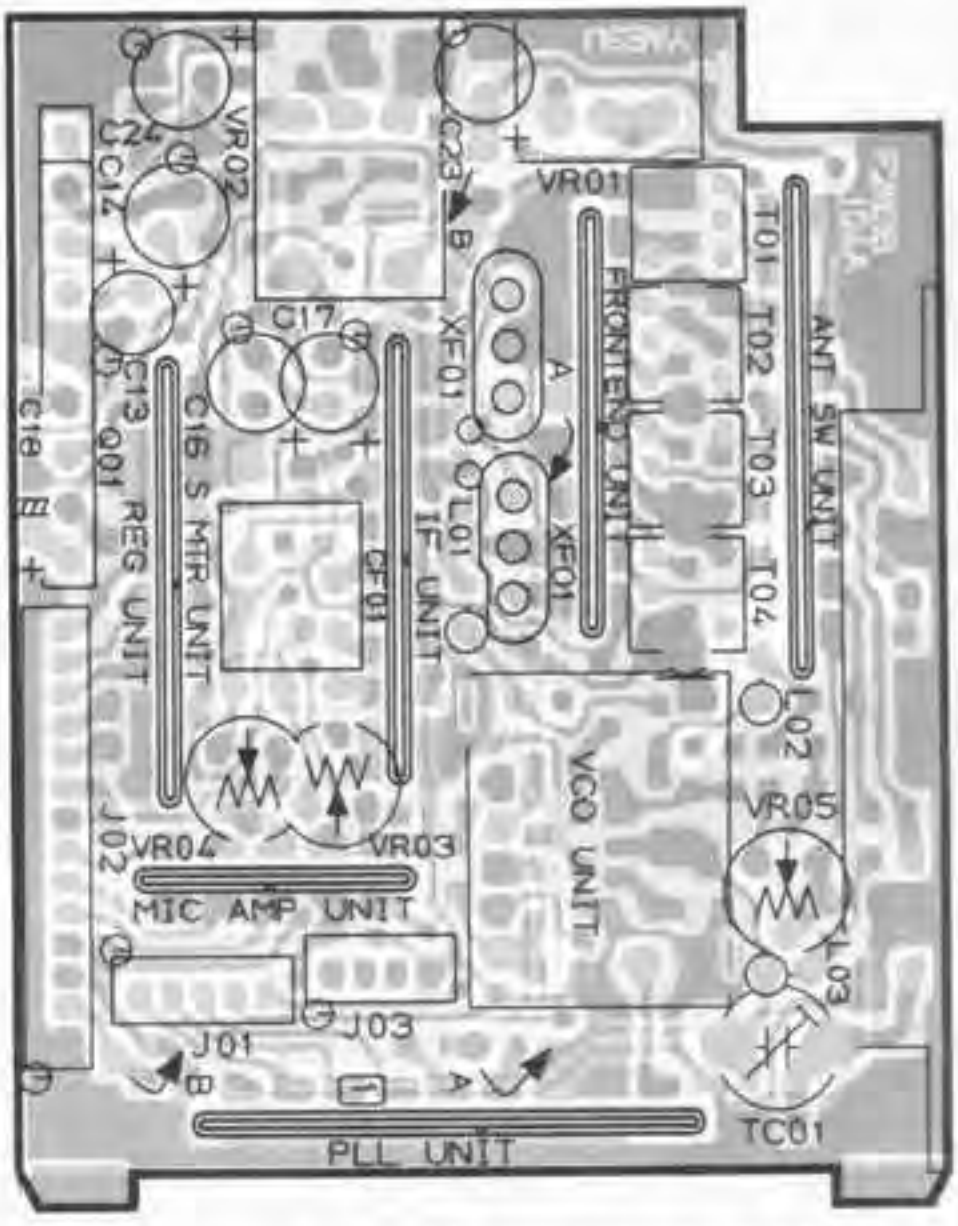


FT-23R
BLOCK DIAGRAM

MOTHER BOARD



(obverse view of "chip-only" side)



(reverse view of "component" side)

CHIP SEMICONDUCTOR CROSS-REFFERENCE

PART LOCATION NO.	ORIGINAL	REPLACEMENT		
	NOMENCLATURE (MARKING) AND PART NUMBER	NOMENCLATURE (MARKING) AND PART NUMBER		
Q102,605,606,607,1002,1012	2SA1162GR(SG) G3111620G	2SA812F/G(M6/M7) G3108120F/G	2SA1052C/D(MC/MD) G3110520C/D	2SA1179F/G(M6/M7) G3111790F/G
Q103,602,603,608,801,802,902,903,904,1003,1004,1005,1006,1010	2SC2712GR/BL(LG/LL) G3327120G/B	2SC1623F/G(L6/L7) G3316230F/G	2SC2462C/D(LC/LD) G3324620D/D	2SC2812F/G(L6/L7) G3328120F/G
Q701	M5224FP G1090726	LA6324M G1090559		
D1001,1002	1SS181(A3) G2070001	MC2836(A4) G2070024	DCA015TA(A4) G2070014	
D603,1007,1008	1SS184(B3) G2070009	MC2838(A6) G2070018	DCB015TA(A6) G20700021	

※ Semiconductors not listed above may be replaced only with original types.

*** IF UNIT ***

	CA0009001	P.C.B. W/COMP.				
	E3349100	P.C.B. W/O COMP.				
C 0301	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0302	K22174808	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 0303	K22174211	CHIP CAP.	GRM39CH100D50PT	10pF	50V	CH
C 0304	K22174229	CHIP CAP.	GRM39CH560J50PT	56pF	50V	CH
C 0305	K22174237	CHIP CAP.	GRM39CH121J50PT	120pF	50V	CH
C 0306	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0307	K22120805	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 0308	K22174824	CHIP CAP.	GRM40B103M50PT	0.010uF	50V	B
C 0309	K78060082	CHIP TANTALUM CAP.	F950J475MAAFTQ2	4.7uF	6.3V	
C 0310	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0311	K22174235	CHIP CAP.	GRM39CH151J50PT	150pF	50V	CH
C 0312	K22120805	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 0313	K22174243	CHIP CAP.	GRM39CH221J50PT	220pF	50V	CH
C 0314	K22174243	CHIP CAP.	GRM39CH221J50PT	220pF	50V	CH
C 0315	K22120805	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 0316	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0317	K22120805	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 0318	K22120805	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
CD0301	H7900180	CERAMIC DISC.	CDB455C7			
D 0301	G2070032	DIODE	1SS226 TE85R			
D 0302	G2070032	DIODE	1SS226 TE85R			
D 0303	G2070008	DIODE	1SS184 TE85R			
L 0301	L1090018	COIL	32CS J0068-102M-P	1uH		
Q 0301	G3320207B	TRANSISTOR	2SC2620QBTR			
Q 0302	G1081100	IC	MC3372ML			
Q 0303	G3070031	TRANSISTOR	DTC124EK T97			
Q 0304	G3327130G	TRANSISTOR	2SC2713GR TE85R			
R 0301	J24185222	CHIP RES.	RMC1/16 222JATP	2.2K	1/16W	
R 0302	J24185224	CHIP RES.	RMC1/16 224JATP	220K	1/16W	
R 0303	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	
R 0304	J24185471	CHIP RES.	RMC1/16 471JATP	470	1/16W	
R 0305	J24185101	CHIP RES.	RMC1/16 101JATP	100	1/16W	
R 0306	J24185221	CHIP RES.	RMC1/16 221JATP	220	1/16W	
R 0307	J24185223	CHIP RES.	RMC1/16 223JATP	22K	1/16W	
R 0308	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	
R 0309	J24185182	CHIP RES.	RMC1/16 182JATP	1.8K	1/16W	
R 0310	J24185102	CHIP RES.	RMC1/16 102JATP	1K	1/16W	
R 0311	J24185152	CHIP RES.	RMC1/16 152JATP	1.5K	1/16W	
R 0312	J24185182	CHIP RES.	RMC1/16 182JATP	1.8K	1/16W	
R 0313	J24185473	CHIP RES.	RMC1/16T 473J	47K	1/16W	
R 0314	J24185182	CHIP RES.	RMC1/16 182JATP	1.8K	1/16W	
R 0315	J24185561	CHIP RES.	RMC1/16 561JATP	560	1/16W	
R 0316	J24185332	CHIP RES.	RMC1/16 332JATP	3.3K	1/16W	
R 0317	J24185332	CHIP RES.	RMC1/16 332JATP	3.3K	1/16W	
R 0318	J24185102	CHIP RES.	RMC1/16 102JATP	1K	1/16W	
R 0319	J24185332	CHIP RES.	RMC1/16 332JATP	3.3K	1/16W	
R 0320	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	
R 0321	J24185392	CHIP RES.	RMC1/16 392JATP	3.9K	1/16W	
R 0322	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
TH0301	G0090053	THERMISTOR	[illegible]			
X 0301	H0102773	X'TAL	UM-1 44.545MHz			

PARTS LIST

*** MOTHER BOARD UNIT ***

[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP A1)	
[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP A2)	
[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP A2)	
[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP B)	
[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP C2)	
[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP D)	
[illegible]	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP E)	
[illegible]	P.C.B. W/O COMP.	

C 2001	[illegible]	CHIP CAP.	GRM40CJ030C50PT	3pF	50V	CJ
C 2002	[illegible]	CHIP CAP.	GRM39B103K25PT	0.01uF	25V	B
C 2003	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2004	[illegible]	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2005	[illegible]	CHIP CAP.	GRM40CK020C50PT	2pF	50V	CK
C 2006	[illegible]	CHIP CAP.	GRM40CK220C50PT	22pF	50V	CK
C 2008	[illegible]	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2009	[illegible]	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2010	[illegible]	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2011	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2012	[illegible]	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 2013	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2014	[illegible]	CHIP CAP.	GRM40CK010C50PT	1pF	50V	CK
C 2015	[illegible]	CHIP CAP.	GRM40CH560J50PT	56pF	50V	CH
C 2017	[illegible]	CHIP CAP.	GRM40B103K50PT	0.01uF	50V	B
C 2018	[illegible]	CHIP CAP.	GRM39B103K25PT	0.01uF	25V	B
C 2019	[illegible]	CHIP CAP.	GRM40CH050C50PT	5pF	50V	CH
C 2020	[illegible]	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 2022	[illegible]	CHIP CAP.	GRM40B683M16PT	0.068uF	16V	B
C 2023	[illegible]	AL. ELECTRO. CAP.	RCZ-6R47M5	47uF	6V	
C 2024	[illegible]	AL. ELECTRO. CAP.	RCJ-1EY4R7M5	4.7uF	16V	
C 2025	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2026	[illegible]	AL. ELECTRO. CAP.	10YB-100(M)CC	100uF	10V	
C 2027	[illegible]	CHIP CAP.	GRM40BB683M16PT	0.068uF	16V	B
C 2028	[illegible]	TANTALUM CAP.	DNJA470M15	47uF	10V	
C 2029	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2030	[illegible]	AL. ELECTRO. CAP.	RCJ-1EY100M5	10uF	16V	
C 2031	[illegible]	AL. ELECTRO. CAP.	RCJ-1EY101M5	100uF	16V	
C 2032	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2033	[illegible]	CHIP TANTALUM CAP.	F951A335M5AAF192	3.3uF	6.3V	
C 2034	[illegible]	CHIP CAP.	GRM42-6R473K25PT	0.047uF	50V	B
C 2035	[illegible]	CHIP CAP.	GRM40CH270J50PT	27pF	50V	CH
C 2038	[illegible]	CHIP CAP.	GRM40B102K50PT	0.001uF	50V	B
C 2037	[illegible]	CHIP CAP.	GRM39B103K25PT	0.01uF	25V	B
C 2038	[illegible]	CHIP CAP.	GRM39B103K25PT	0.01uF	25V	B
C 2039	[illegible]	CHIP CAP.	GRM40CH270J50PT	27pF	50V	CH
C 2040	[illegible]	CHIP CAP.	GRM40CH100D50PT	10pF	50V	CH
C 2041	[illegible]	CHIP CAP.	GRM39CH101J50PT	100pF	50V	CH
C 2043	[illegible]	CHIP CAP.	GRM40B102K50PT	0.001uF	50V	B
C 2044	[illegible]	CHIP CAP.	GRM40B102K50PT	0.001uF	50V	B
C 2045	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2046	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 2047	[illegible]	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B

*** VCO UNIT ***

	CF1562001	P.C.B. W/COMP.				
	F2037103	P.C.B. W/O COMP.				
	F3057104	P.C.B. W/O COMP.				
C 0501	K22170215	CHIP CAP.	GRM40CH151J50PT	150pF	50V	CH
C 0502	K22170243	CHIP CAP.	GRM40CH221J50PT	220pF	50V	CH
C 0503	K22170211	CHIP CAP.	GRM40CH100D50PT	10pF	50V	CH
C 0504	K76080002	CHIP TANTALUM CAP.	F950J106KTAAFQ2	10uF	6.3V	
C 0505	K22170005	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0506	K22170311	CHIP CAP.	GRM40UJ100D50PT	10pF	50V	UJ
C 0507	K22170311	CHIP CAP.	GRM40UJ100D50PT	10pF	50V	UJ
C 0508	K22170201	CHIP CAP.	GRM40CK050C50PT	0.5pF	50V	CK
C 0509	K76040002	CHIP TANTALUM CAP.	F950J475KSAAFQ2	4.7uF	6.3V	
C 0510	K22170005	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0511	K22170243	CHIP CAP.	GRM40CH221J50PT	220pF	50V	CH
D 0501	G2090287	DIODE	1SS119			
D 0502	G2074069	DIODE	1T32-E7			
D 0503	G2070060	DIODE	1T32-E7			
L 0501	L1690019	COIL	J2CS 3R0LR-1X0M-P	1uH		
L 0502	L1690018	COIL	J2CS 3R0LB-1R0M-P	1uH		
L 0503	L1690018	COIL	J2CS 3R0LB-1R0M-P	1uH		
L 0504	L1690025	COIL	J2CS 3R0NB-R22M-P	0.22uH		
Q 0501	G30023076	FET	2SK236-T2B K1J			
Q 0502	G3027097N	TRANSISTOR	2SC2759 TE85-L22			
R 0501	J24205062	CHIP RES.	RMC1/10 682J	6.8K	1/10W	
R 0502	J24205103	CHIP RES.	RMC1/10F 103J	10K	1/10W	
R 0504	J24205470	CHIP RES.	RMC1/10 470J	47	1/10W	
R 0505	J24205101	CHIP RES.	RMC1/10F 101J	100	1/10W	
R 0506	J24205683	CHIP RES.	RMC1/10 683J	68K	1/10W	
T 0501	L0021684A	COIL	W12-K9013			
TC0501	K91000351	TRIMMER CAP.	TZB-JA020E12A	20pF		
	RP1130390	TERMINAL		2Pin		

*** REG UNIT ***

	AA0011001	P.C.B. W/COMP.				
	F2B5110TA	P.C.B. W/O COMP.				
C 0601	K2Z174B00	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0602	K7B100003	CHIP TANTALUM CAP.	F951A685MTAAFJQ2	6.8uF	6.3V	
C 0603	K2Z174A09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0604	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0605	K7B120002	CHIP TANTALUM CAP.	F961C225KSAAFJQ2	2.2uF	6.3V	
C 0606	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0607	K7B6B0013	CHIP TANTALUM CAP.	F950J476KPCAFT	47uF	6.3V	
C 0608	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0609	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0610	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0611	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0612	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
C 0613	K2Z174B09	CHIP CAP.	GRM39B102K50PT	0.001uF	50V	B
D 0601	G2074018	DIODE	1SS272 TE85R			
D 0602	G2B9B103	DIODE	8B10EB1			
D 0603	G2070009	DIODE	1SS314 TE85R			
Q 0601	G2307697L	TRANSISTOR	2SB709-T2PL			
Q 0602	G2327127G	TRANSISTOR	2SC2712GR TE85R			
Q 0603	G2327127G	TRANSISTOR	2SC2712GR TE85R			
Q 0604	G1006786	IC	LM2931AZ-5.0			
Q 0605	G2311627G	TRANSISTOR	2SA1162GR TE85R			
Q 0606	G2311627G	TRANSISTOR	2SA1162GR TE85R			
Q 0607	G2311627G	TRANSISTOR	2SA1162GR TE85R			
Q 0608	G2327127G	TRANSISTOR	2SC2712GR TE85R			
R 0601	J2B2E510J	CHIP RES.	RMC 1/10T 101J	100	1/10W	
R 0602	J0Z245622	CARBON FILM RES.	RS14GJB82 0.2	0.2	1/4W	
R 0603	J2A1B5223	CHIP RES.	RMC1/16 223JATP	22K	1/16W	
R 0604	J2A1B5104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R 0605	J2A1B5103	CHIP RES.	RMC1/16 103JATP	10K	1/16W	
R 0606	J2A1B5472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W	
R 0607	J2A1B5473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	
R 0608	J2A1B5222	CHIP RES.	RMC1/16 222JATP	2.2K	1/16W	
R 0609	J2A1B5104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R 0610	J2A1B5104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R 0611	J2A1B5103	CHIP RES.	RMC1/16 103JATP	10K	1/16W	
R 0612	J2A1B5472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W	

*** CONTROL UNIT ***

	C50847002	P.C.B. W/COMP.(TYP A)]
	C50847003	P.C.B. W/COMP.(TYP AZ)
	C50847001	P.C.B. W/COMP.(TYP A2)
	C50847005	P.C.B. W/COMP.(TYP B)
	C50847006	P.C.B. W/COMP.(TYP C2)
	C50847007	P.C.B. W/COMP.(TYP D)
	C50847008	P.C.B. W/COMP.(TYP E2)
	F30581V20	P.C.B. W/O COMP.

BT1002	Q0000366	LITHIUM BATTERY	CR2025-T02			
BZ1001	8A290005	BUZZER	KPS-6K25B07			
C 1001	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP B
C 1002	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP C2
C 1003	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP A
C 1004	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP E2
C 1005	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP E
C 1006	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP C2
C 1007	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP D
C 1008	K2217B009	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V K	TYP E2
C 1009	K2214B009	CHIP CAP.	GRM42-6B104K25PT	0.1uF	25V B	
C 1010	K2217B023	CHIP CAP.	GRM40CH101J50PT	100pF	50V CH	
C 1011	K2217B023	CHIP CAP.	GRM40CH101J50PT	100pF	50V CH	
C 1012	K7B467B75	TANTALUM CHIP CAP.	D61A6E2M1S	1.7uF	10V	
C 1013	K2212B005	CHIP CAP.	GRM40B683M16PT	0.068uF	16V K	
C 1014	K2212B005	CHIP CAP.	GRM40B683M16PT	0.068uF	16V K	
C 1015	K2212B005	CHIP CAP.	GRM40B683M16PT	0.068uF	16V K	
C 1016	K2212B005	CHIP CAP.	GRM40B683M16PT	0.068uF	16V K	
C 1017	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1018	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1019	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1020	K2217B005	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1021	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1022	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1023	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1024	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1025	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1026	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1027	K2217A009	CHIP CAP.	GRM39B102M50PT	0.001uF	50V K	
C 1028	K1047B105	CERAMIC CAP.	0510YB103K50	0.01uF	50V B	
C 1029	K7B5B0003	TANTALUM CHIP CAP.	F930J106MTAAF1W2	10uF	6.3V	
C 1030	K2217B002	CHIP CAP.	GRM40B102M50PT	0.001uF	50V K	
C 1031	K2217B021	CHIP CAP.	GRM40B223M50PT	0.022uF	50V K	
C 1034	K2217A617	CHIP CAP.	GRM39B472M50PT	0.0047uF	50V K	
C 1035	K2217A617	CHIP CAP.	GRM39B472M50PT	0.0047uF	50V K	
C 1040	K2217B005	CHIP CAP.	GRM40B102M50PT	0.001uF	50V K	
C 1042	K2217B235	CHIP CAP.	GRM40CH101J50PT	100pF	50V CH	
C 1044	K2217B005	CHIP CAP.	GRM40B102M50PT	0.001uF	50V K	
CR1001	K1503A00	CERAMIC OSC.	KBR-8.00B			
D 1001	G2207C04	DIODE	1SS180 TE85R			

R 0713	J24105104	CHIP RES.	ERCJ/16 104J47F	100K	1/16W
R 0714	J24105225	CHIP RES.	ERCJ/16 2252ATF	2.2M	1/16W
R 0715	J24205223	CHIP RES.	ERCJ/10 223J	22K	1/10W
R 0716	J24105104	CHIP RES.	ERCJ/16 104JATD	100K	1/16W

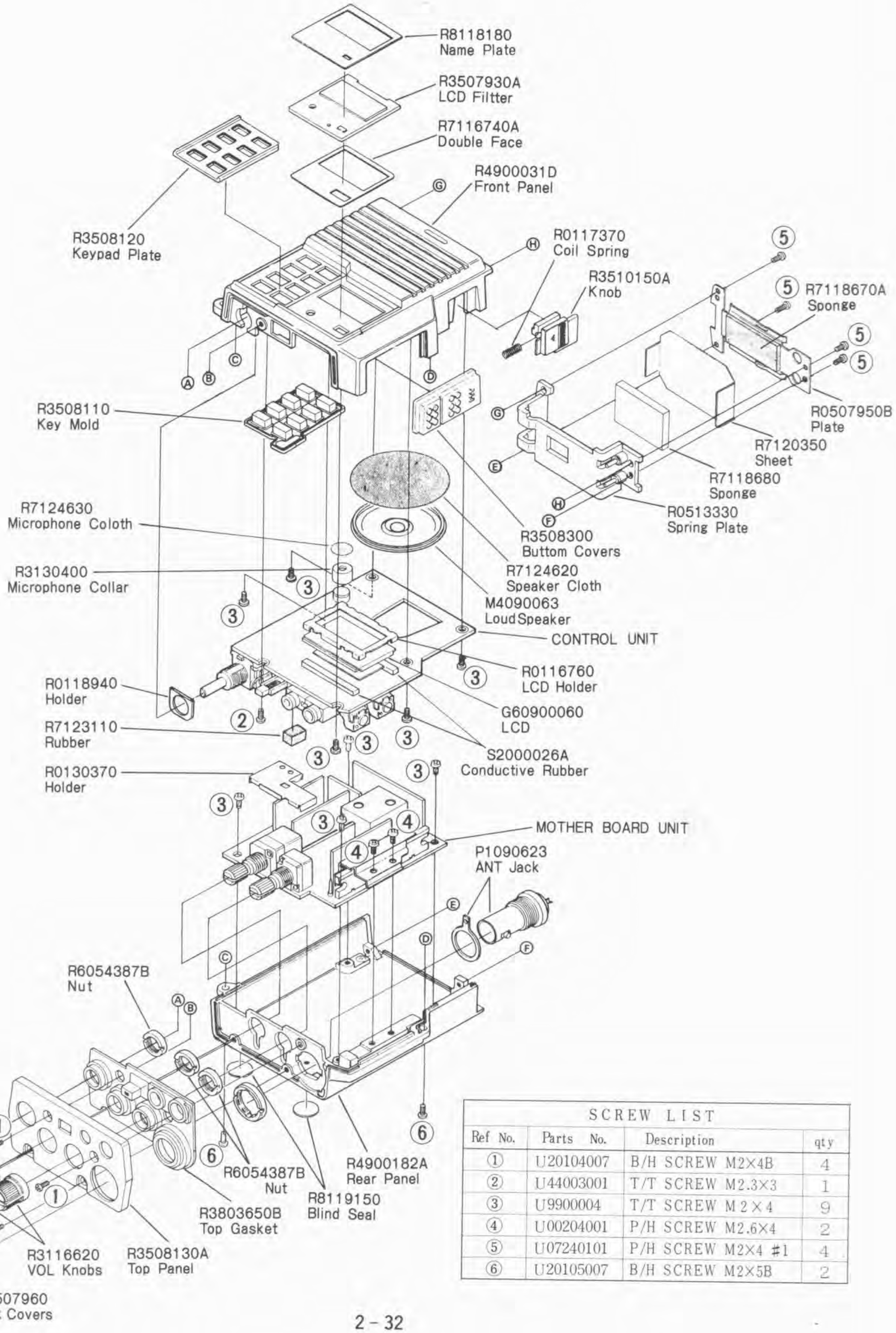
R 1006	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1009	RZ4105105	CHIP RES.	RMC1/16	105JATP	1M	1/16W
R 1010	RZ4105473	CHIP RES.	RMC1/16	473JATP	47K	1/16W
R 1011	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1012	RZ4105472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1013	RZ4105104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1014	RZ4105104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1015	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1016	RZ4105561	CHIP RES.	RMC1/16	561JATP	560	1/16W
R 1017	RZ4105561	CHIP RES.	RMC1/16	561JATP	560	1/16W
R 1018	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1019	RZ4105101	CHIP RES.	RMC1/16	101JATP	100	1/16W
R 1020	RZ4105472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1021	RZ4105104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1022	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1023	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1024	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1025	RZ4105474	CHIP RES.	RMC1/16	474JATP	470K	1/16W
R 1026	RZ4105105	CHIP RES.	RMC1/16	105JATP	1M	1/16W
R 1027	RZ4105000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1028	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1029	RZ4105102	CHIP RES.	RMC1/16	102JATP	1K	1/16W
R 1030	RZ4105104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1031	RZ4105472	CHIP RES.	RMC1/16	472JATP	47K	1/16W
R 1032	RZ4105224	CHIP RES.	RMC1/16	224JATP	220K	1/16W
R 1033	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1034	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1035	RZ4105222	CHIP RES.	RMC1/16	222JATP	2.2K	1/16W
R 1036	RZ4105152	CHIP RES.	RMC1/16	152JATP	1.5K	1/16W
R 1037	RZ4105471	CHIP RES.	RMC1/16	471JATP	470	1/16W
R 1038	RZ4105472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1039	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1040	RZ4105103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1041	RZ4105472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1042	RZ4105000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1043	RZ4105000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1044	RZ4105000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1045	RZ4105223	CHIP RES.	RMC1/16	223JATP	22K	1/16W
R 1048	RZ4105000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1047	RZ4105104	CHIP RES.	RMC1/16	104JATP	100K	1/16W

S 1001	N5090010	TACT SWITCH	KHB-15951
S 1002	N5090010	TACT SWITCH	KHB-15951
S 1003	N6090057	SLIDE SWITCH	SSSS22
S 1004	N4090084	PUSH SWITCH	SPJ022% F1A
S 1005	N9190134	ROTARY SWITCH	SRRM11G178
X 1001	R7800100	CERAMIC OSC.	[illegible]
	R8110080	SEAL	
	R7132740	MYLAR	
	R7132750	MYLAR	
	R8130380	SHIELD PLATE	
	R7074930	DOUBLE FACE ADHESIVE	
	R7108650	DOUBLE FACE ADHESIVE	

*** DUMMY UNIT ***

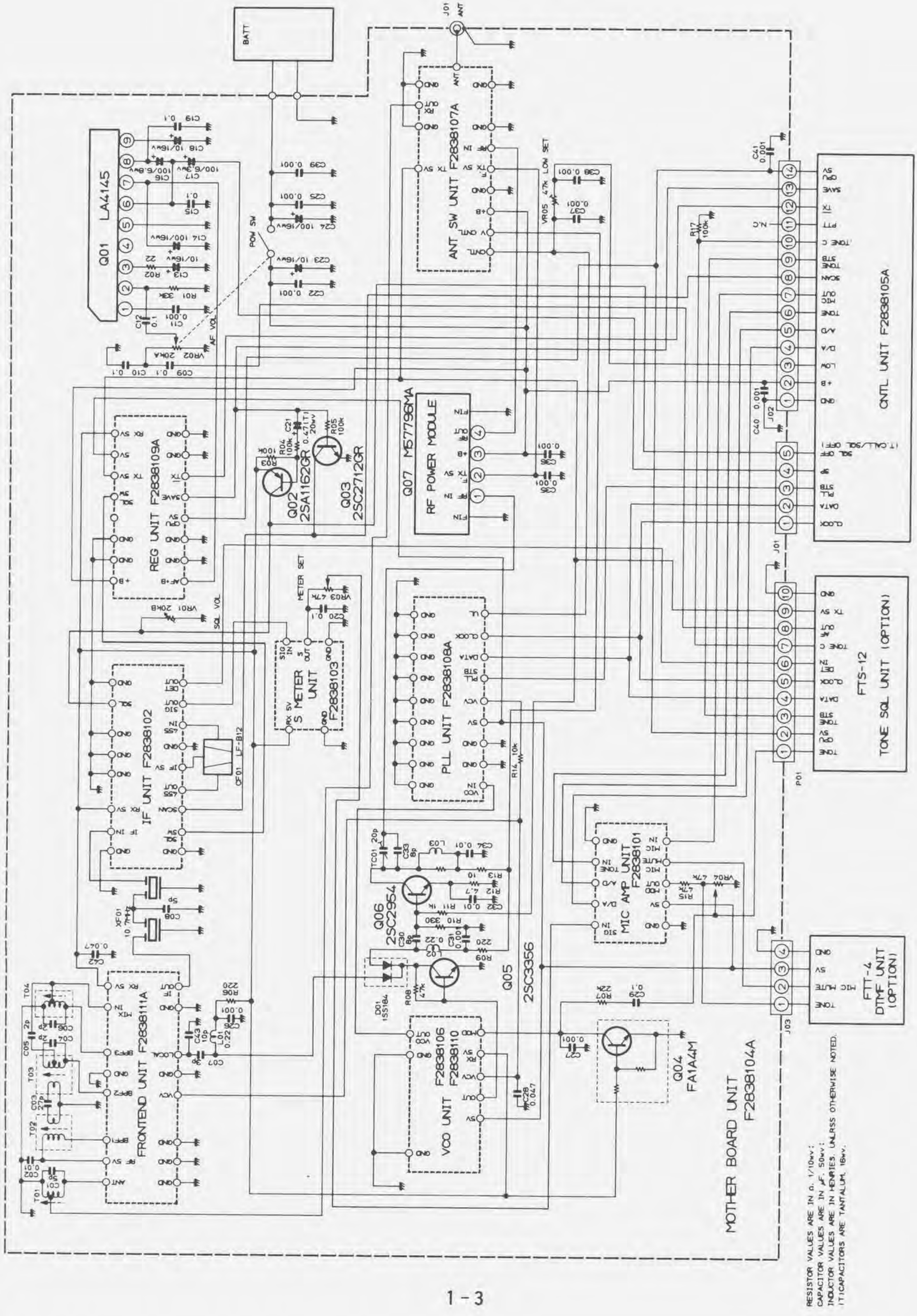
	C0805S001	P.C.B. W/COMP.		
	K3059103	P.C.B. W/O COMP.		
P 3001	70890702	CONNECTOR	02308-1-03Z003-T	
R 3001	J24185223	CHIP RES.	RNC1/16 223JATP	22K

EXPLODED VIEW



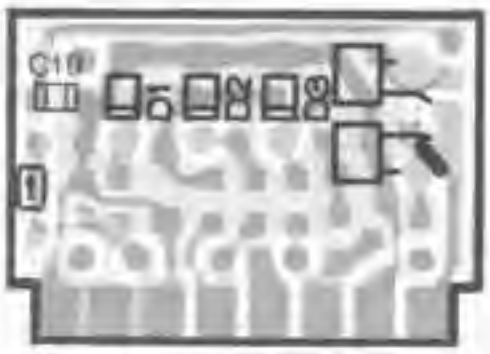
SCREW LIST			
Ref No.	Parts No.	Description	qty
①	U20104007	B/H SCREW M2×4B	4
②	U44003001	T/T SCREW M2.3×3	1
③	U9900004	T/T SCREW M2×4	9
④	U00204001	P/H SCREW M2.6×4	2
⑤	U07240101	P/H SCREW M2×4 #1	4
⑥	U20105007	B/H SCREW M2×5B	2

MOTHER BOARD

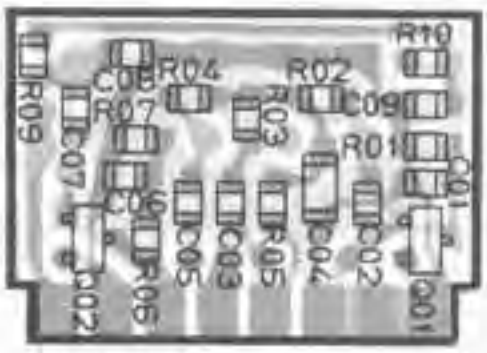


RESISTOR VALUES ARE IN Ω, 1/10WV;
CAPACITOR VALUES ARE IN μF, 50WV;
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.
!T!CAPACITORS ARE TANTALUM, 16WV.

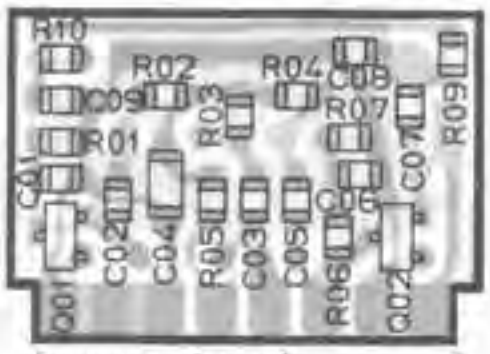
FRONTEND UNIT



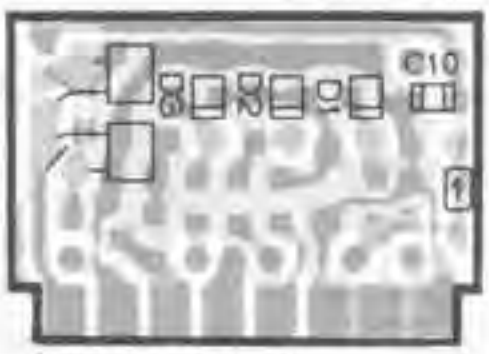
(obverse view of "diode" side)



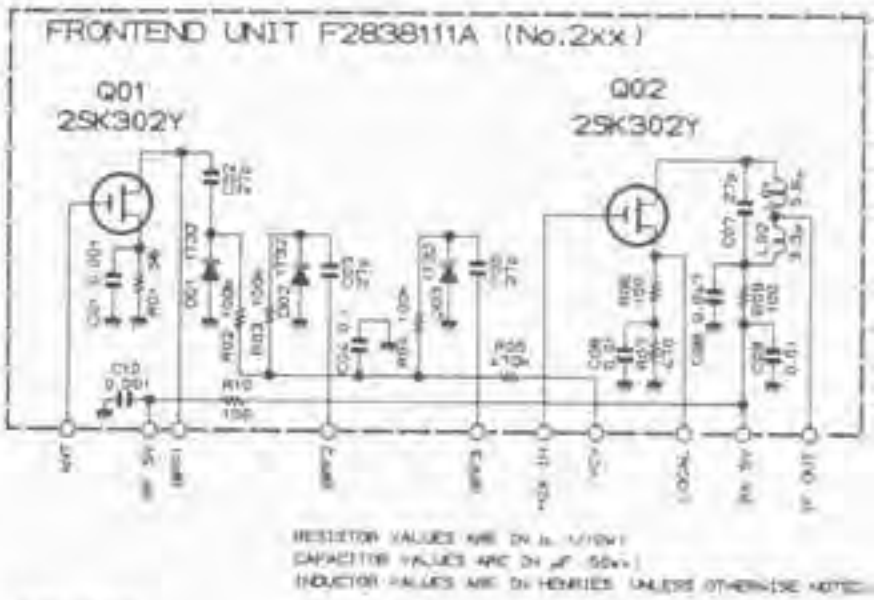
(obverse view of "FET" side)

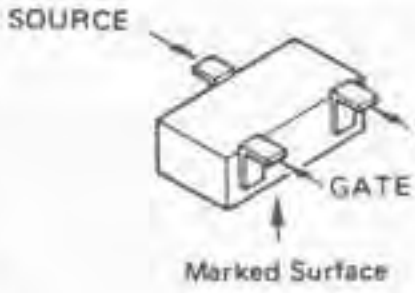


(reverse view of "FET" side)



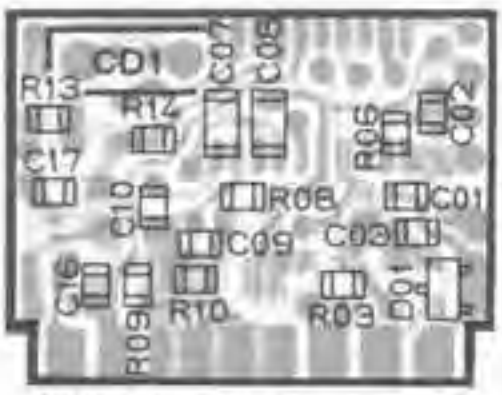
(reverse view of "diode" side)



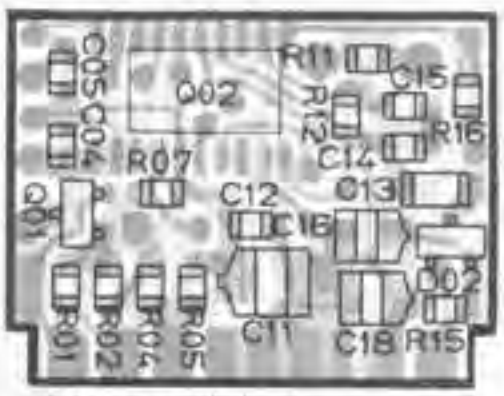


2SK302Y (TY)
(Q201,202)

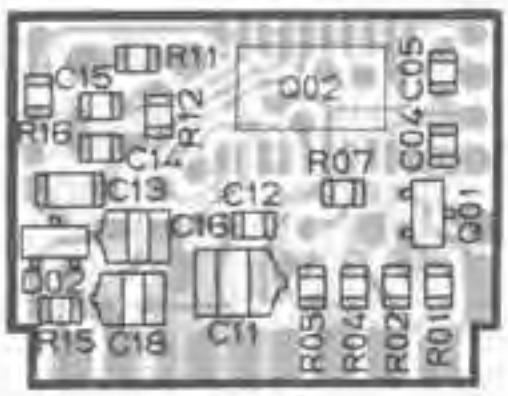
IF UNIT



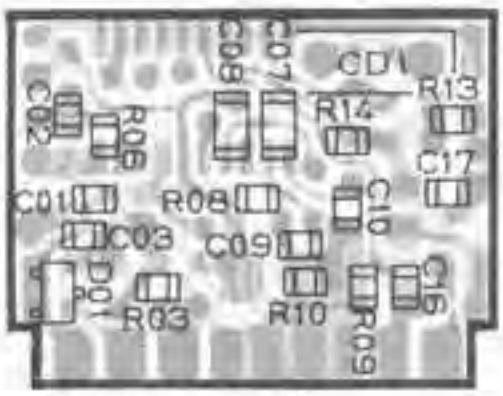
(obverse view of "mixed-component" side)



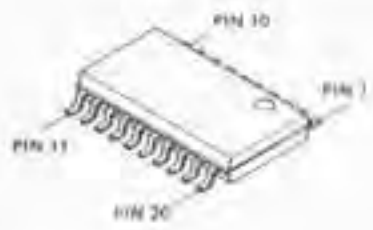
(obverse view of "chip-only" side)



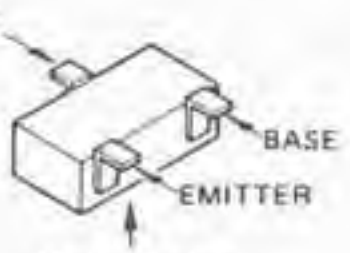
(reverse view of "chip-only" side)



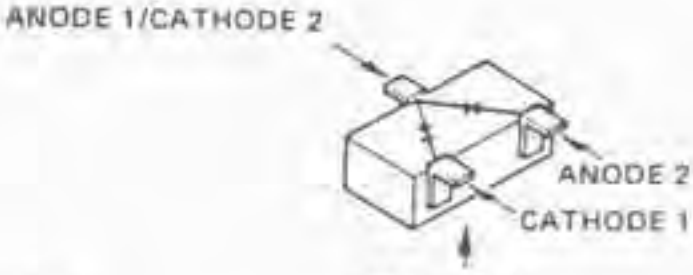
(reverse view of "mixed-component" side)



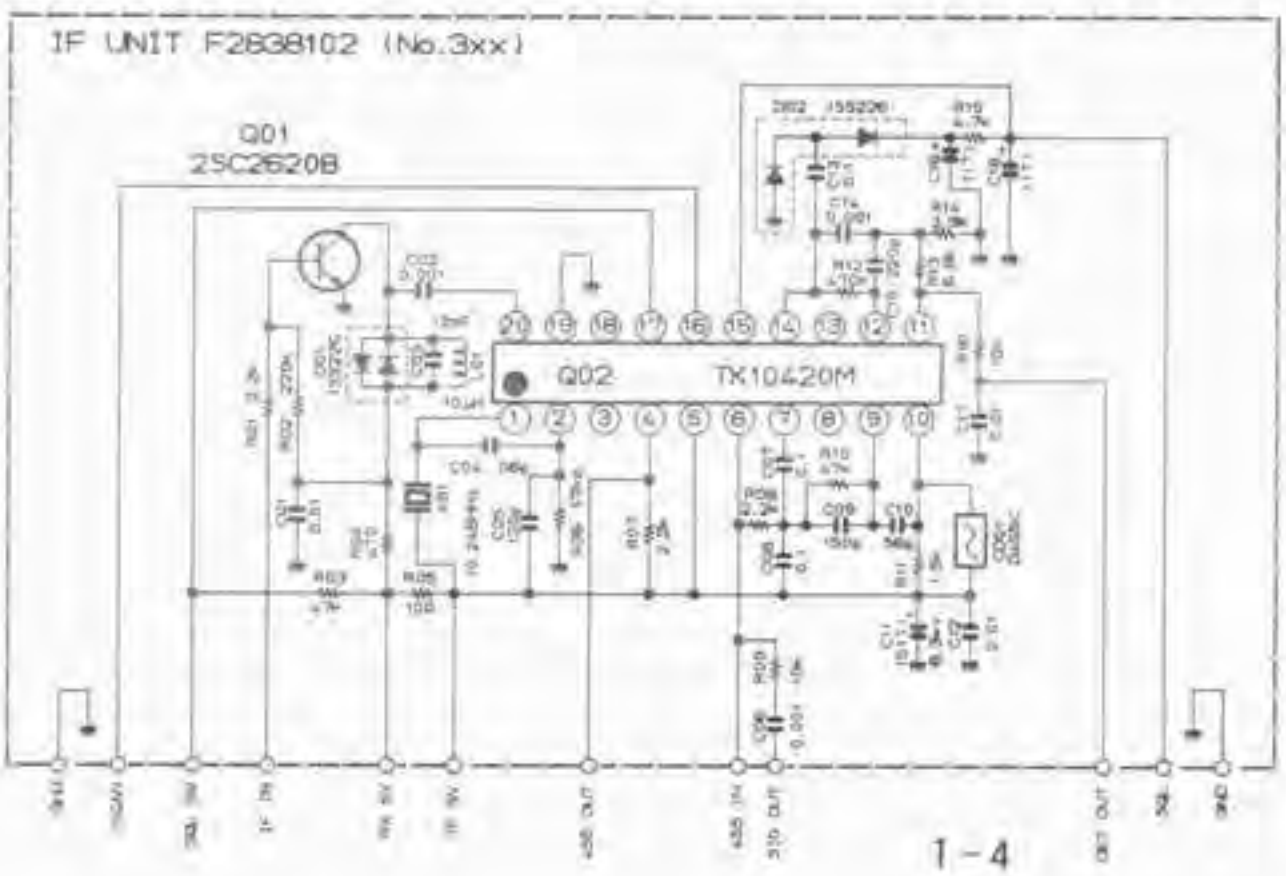
TK10420M (Q302)



2SC2620B (QB)
(Q301)

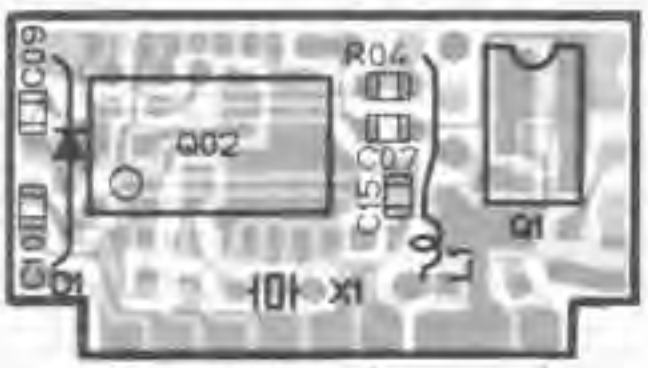


1SS226 (03)
(D301,302)

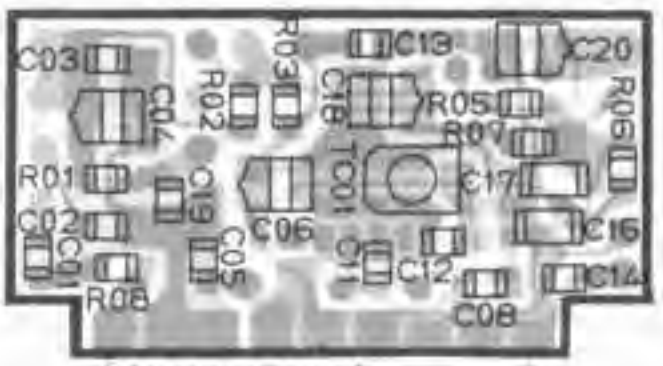


RESISTOR VALUES ARE IN Ω, 1/10W
CAPACITOR VALUES ARE IN μF, 50V
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED
(T) CAPACITORS ARE TANTALUM, 10V

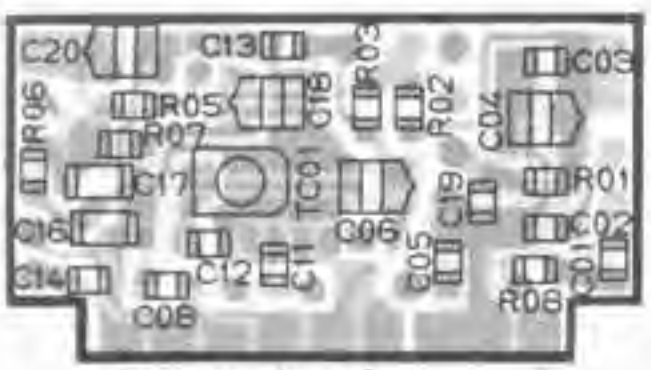
PLL UNIT



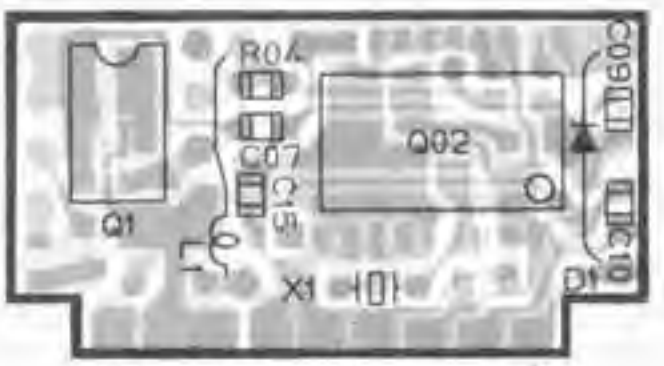
(obverse view of "mixed-component" side)



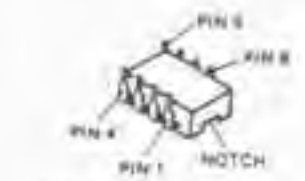
(obverse view of "chip-only" side)



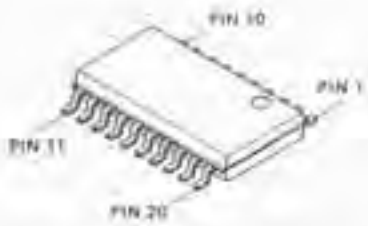
(reverse view of "chip-only" side)



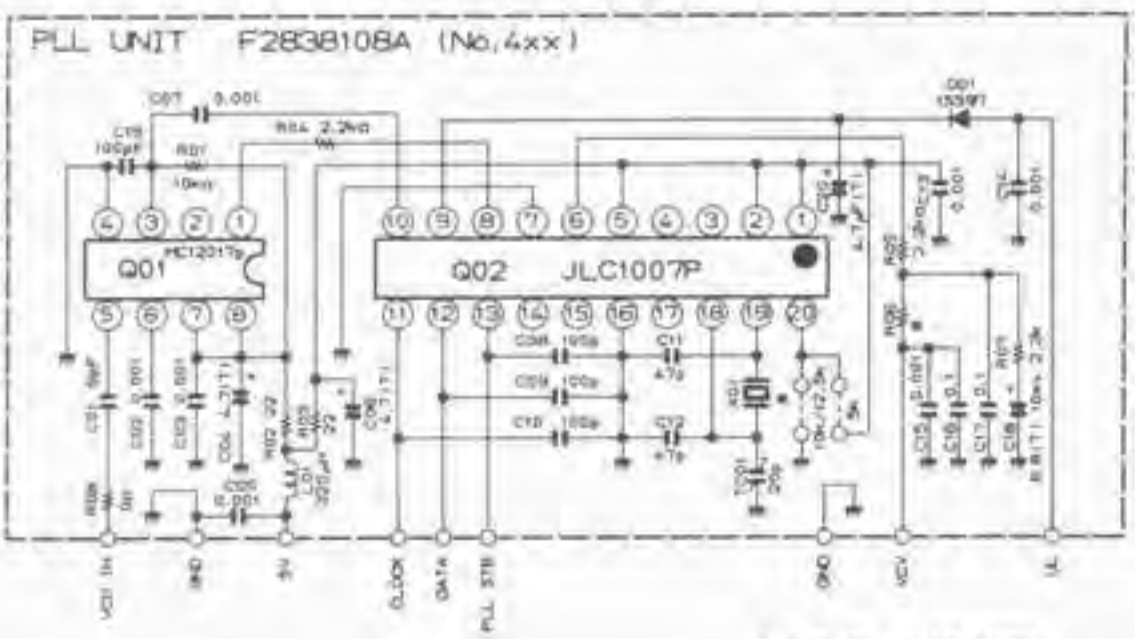
(reverse view of "mixed-component" side)



MC12017P (0401)



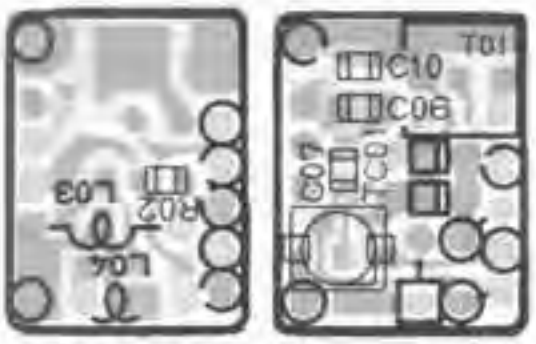
JLC1007P (0402)



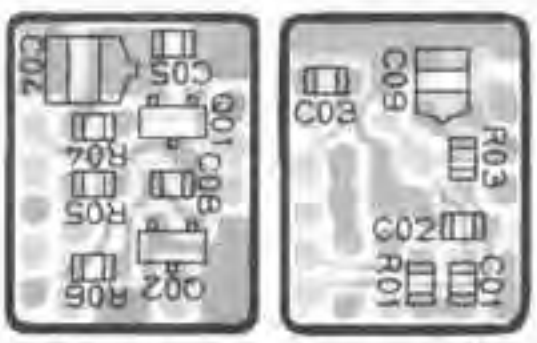
R0A	15kHz+5kHz 10kHz+10kHz STEP 6.7kHz+12.5kHz STEP
×01	10.24MHz+5kHz STEP 12.8MHz+12.5kHz STEP

RESISTOR VALUES ARE IN Ω, 1/10W
CAPACITOR VALUES ARE IN μF, 50V
INDUCTOR VALUES ARE IN HENRIES UNLESS OTHERWISE NOTED
(T) CAPACITORS ARE TANTALUM, 6.3V

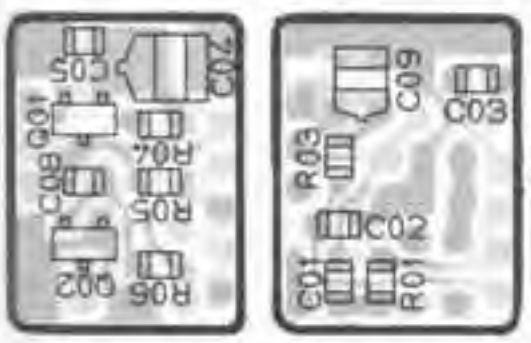
VCO UNIT



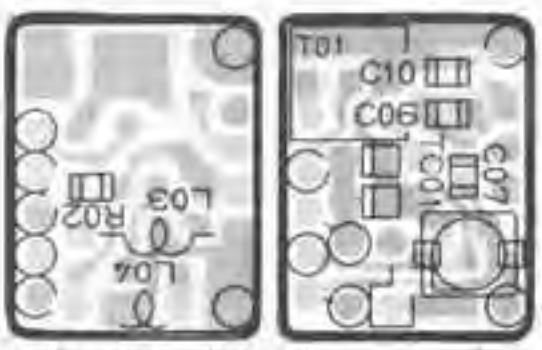
(obverse view of "mixed-component" side)



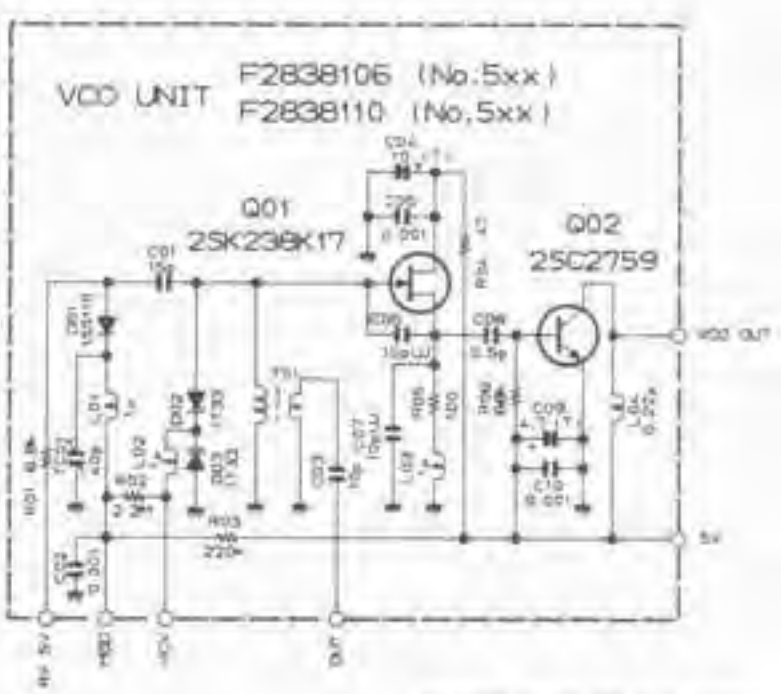
(obverse view of "chip-only" side)



(reverse view of "chip-only" side)

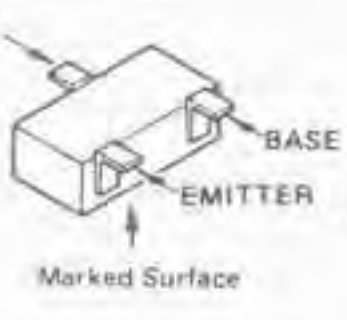


(reverse view of "mixed-component" side)



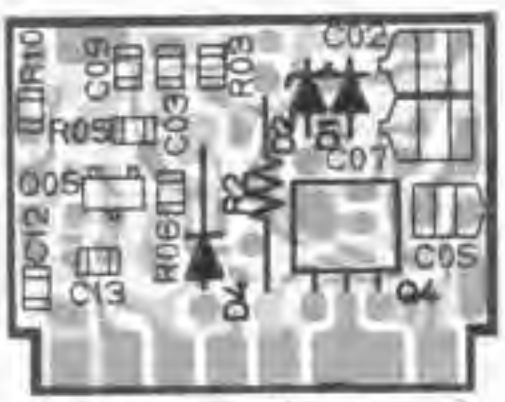
RESISTOR VALUES ARE IN Ω, 1/10W
CAPACITOR VALUES ARE IN μF, 50V
UNLESS OTHERWISE NOTED
(T) CAPACITORS ARE TANTALUM, 6.3V

2SK238 (K17) : (Q501)

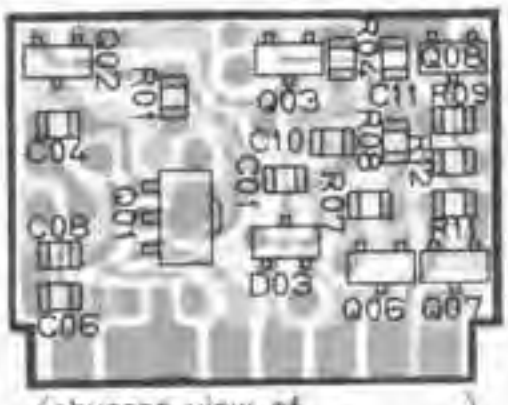


2SC2759 (U22) : (Q502)

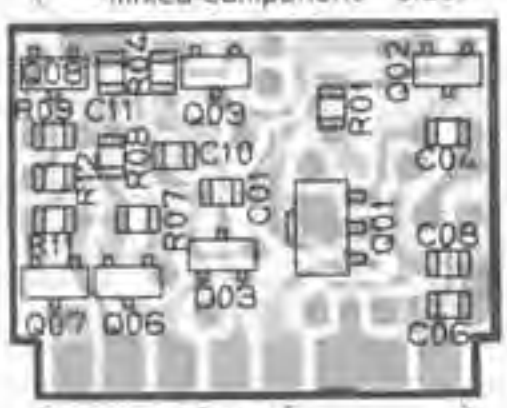
REG UNIT



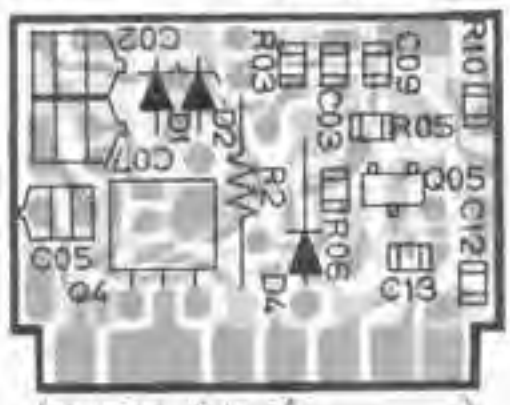
(obverse view of "mixed-component" side)



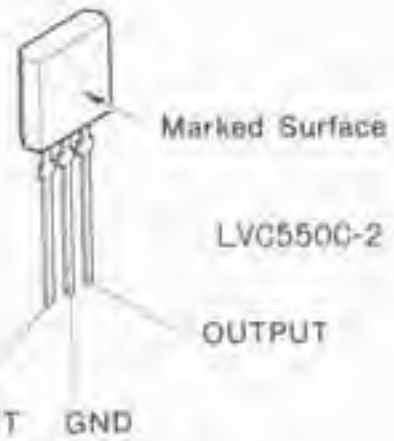
(obverse view of "chip-only" side)

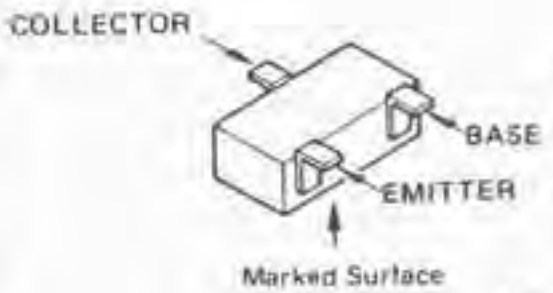


(reverse view of "chip-only" side)



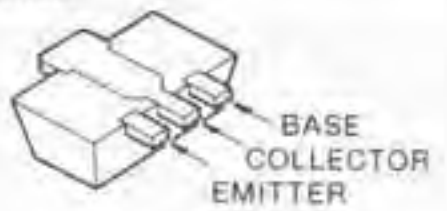
(reverse view of "mixed-component" side)



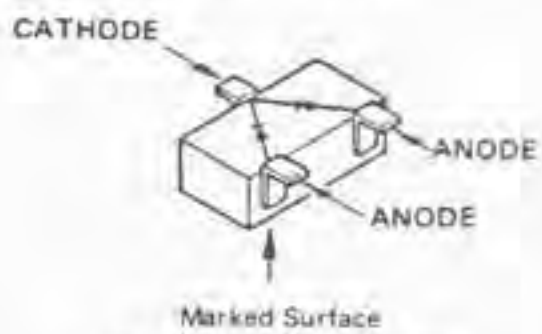


2SA1162GR (SG) (Q605,606,607)

2SC2712GR (LG) (Q602,603,608)



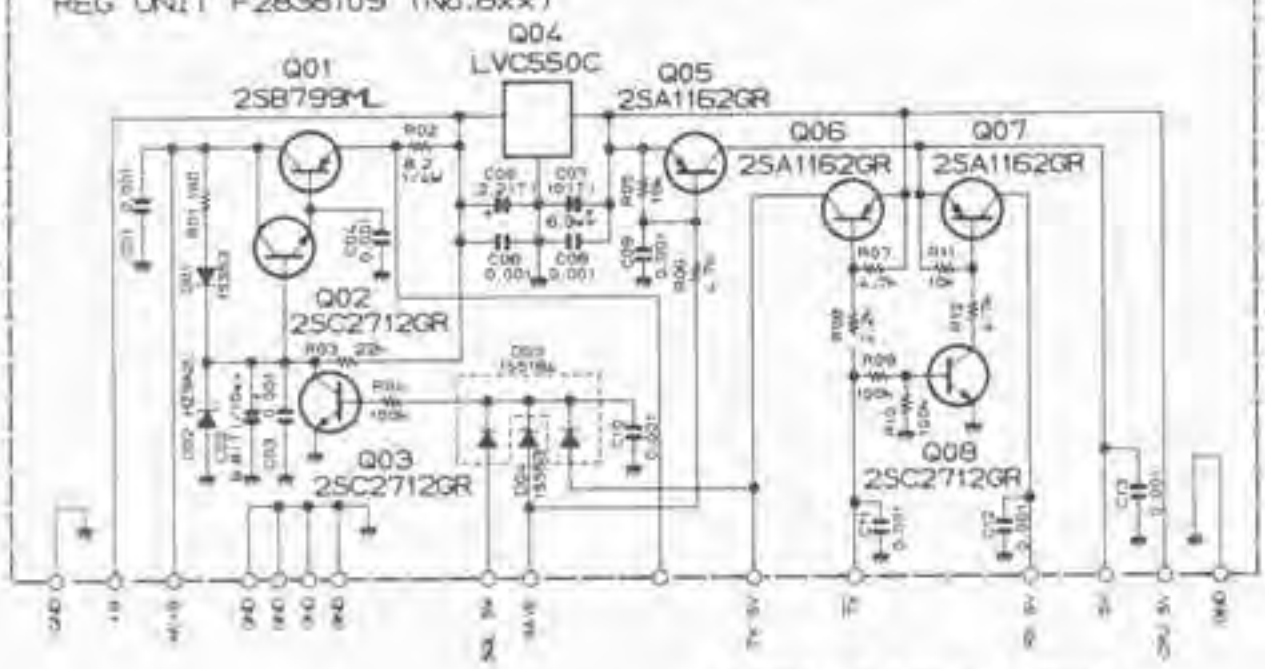
2SB799 (Q601)



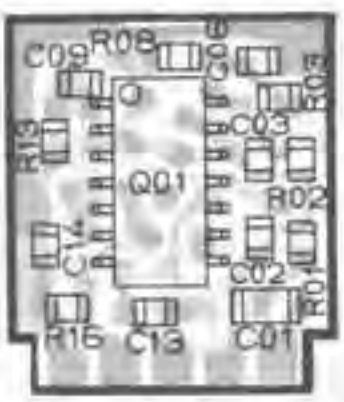
1SS184 (B3) : (D603)

REGISTOR VALUES ARE IN Ω, 1/10W(
CAPACITOR VALUES ARE IN μF, 50V(
UNLESS OTHERWISE NOTED.
(T) CAPACITORS ARE TANTALUM 10V(

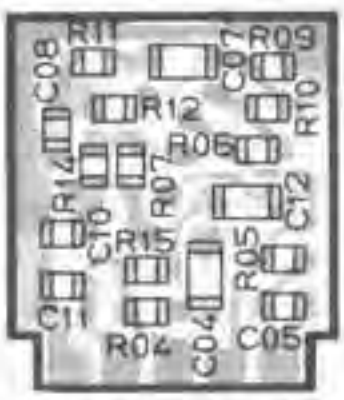
REG UNIT F2838109 (No.6xx)



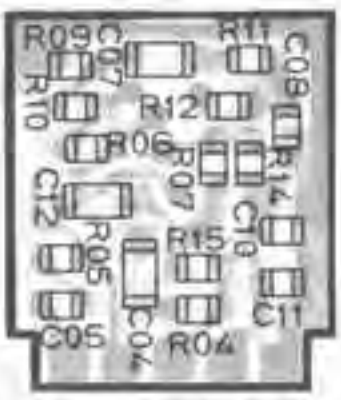
MIC AMP UNIT



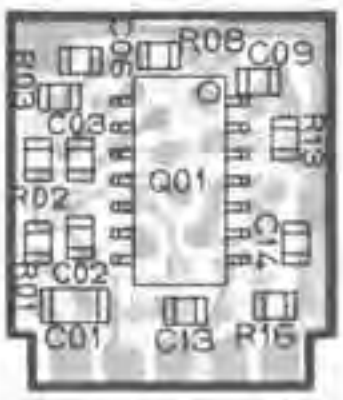
(obverse view of "IC" side)



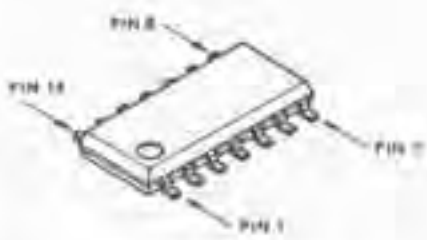
(reverse view of "C-R" side)



(obverse view of "C-R" side)

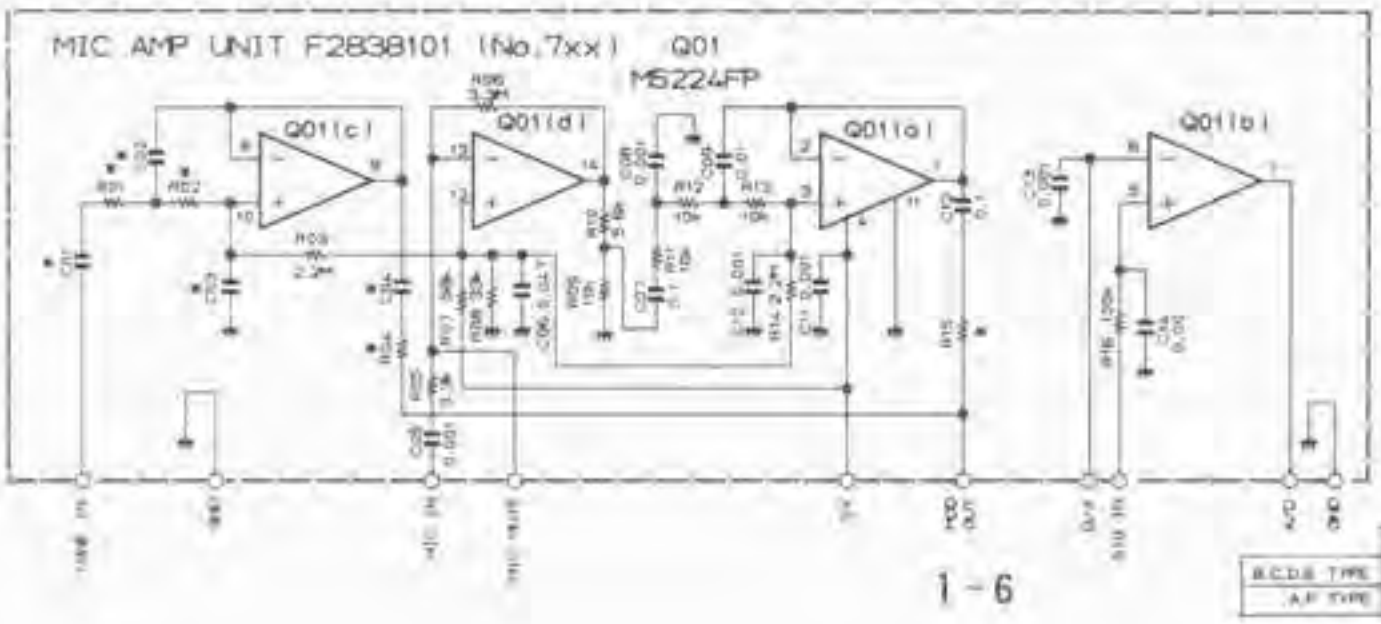


(reverse view of "IC" side)



M5224FP (Q701)

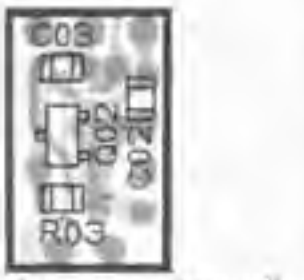
MIC AMP UNIT F2838101 (No.7xx) Q01



RESISTOR VALUES ARE IN Ω, 1/10W(
CAPACITOR VALUES ARE IN μF, 50V(
UNLESS OTHERWISE NOTED.

	C01	C02	C03	C04	R01	R02	R14	R15
B.C.D.S. TYPE	0.1	0.01	0.0122	0.1	12k	18k	22k	22k
A.F. TYPE	—	—	0.01	—	—	—	—	33k

S METER UNIT

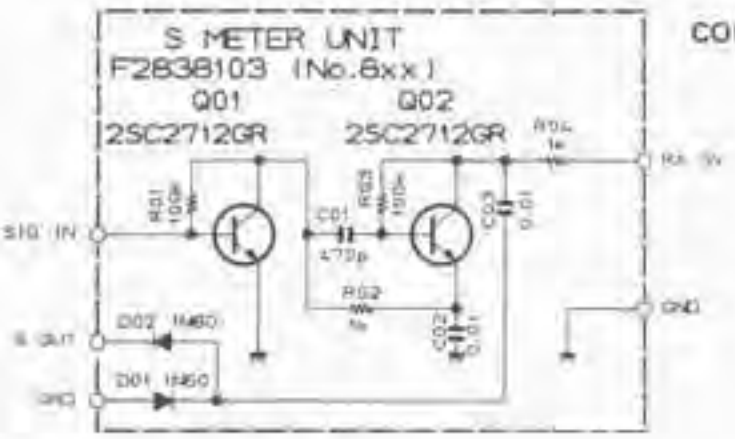


(obverse view of "top" side)

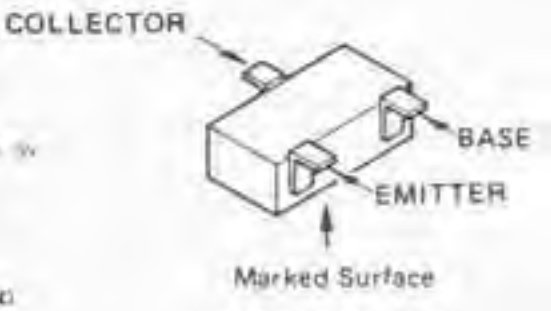
(obverse view of "bottom" side)

(reverse view of "bottom" side)

(reverse view of "top" side)

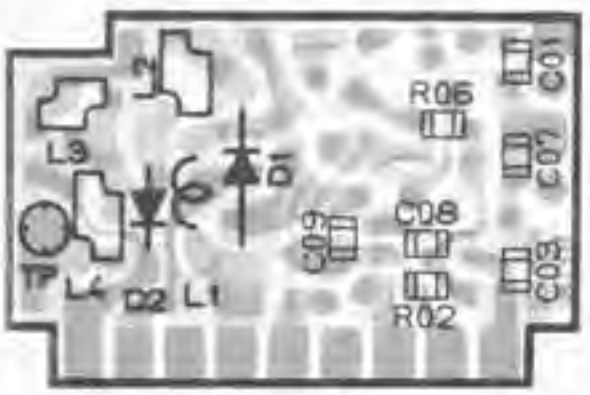


RESISTOR VALUES ARE IN Ω, 1/10W.
CAPACITOR VALUES ARE IN μF, 50V.
UNLESS OTHERWISE NOTED.

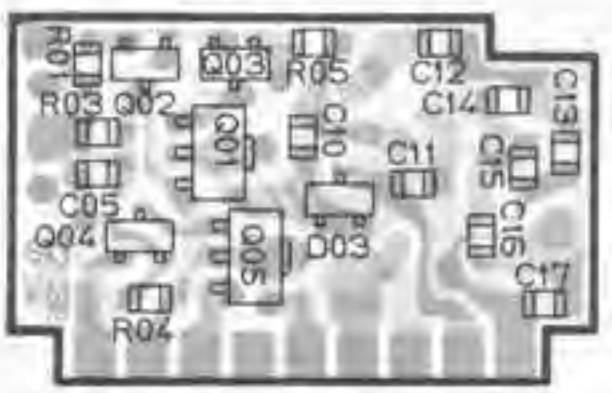


2SC2712GR (LG)
(Q801,802)

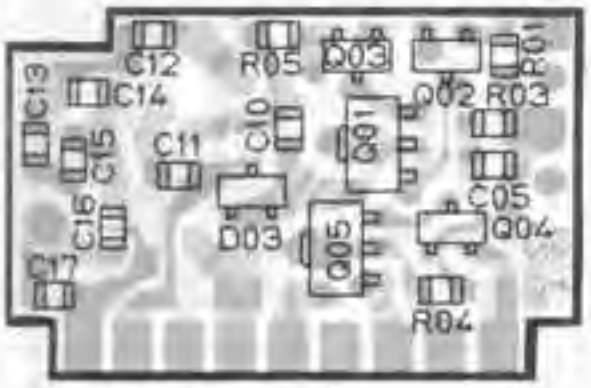
ANT SW UNIT



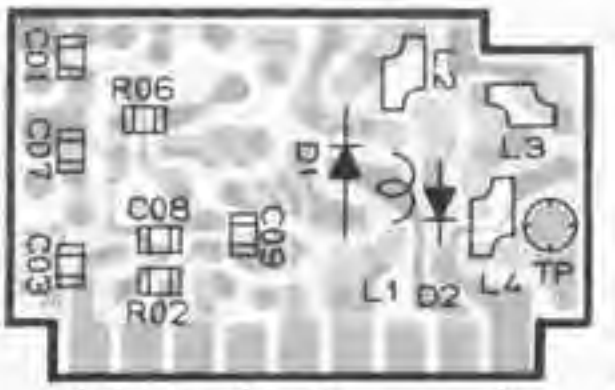
(obverse view of "mixed-component" side)



(obverse view of "chip-only" side)

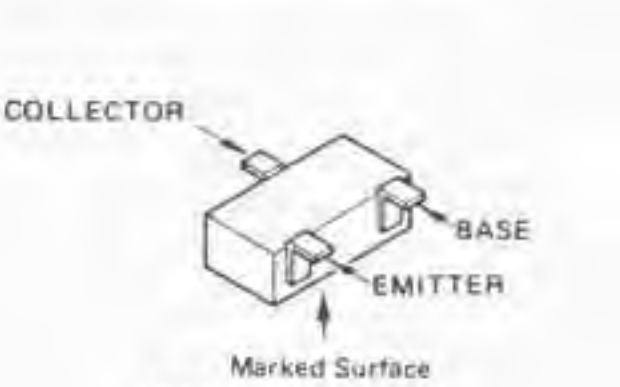


(reverse view of "chip-only" side)

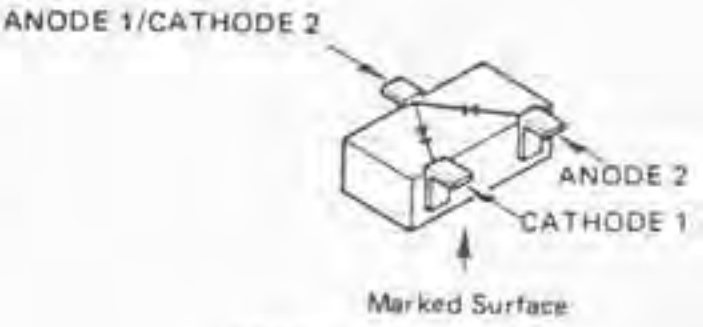


(reverse view of "mixed-component" side)

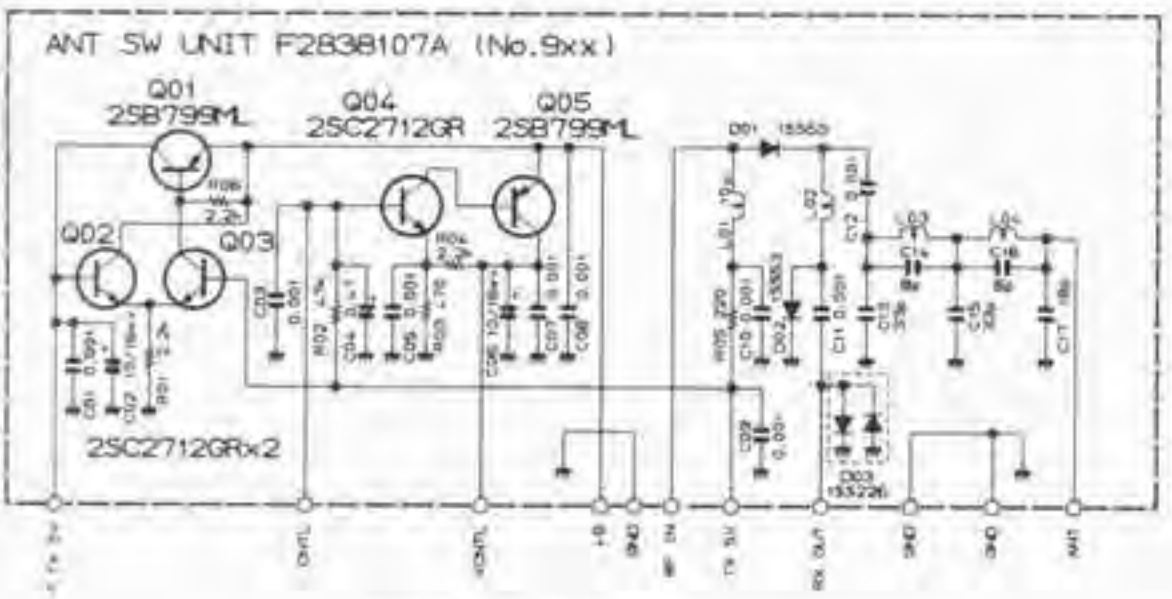
2SB799 (Q901,905)



2SC2712GR (LG)
(Q902,903,904)



1SS226 (C3) : (D903)



RESISTOR VALUES ARE IN Ω, 1/10W.
CAPACITOR VALUES ARE IN μF, 50V.
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.

E2900900(310E-DK)