

FT-23R

TECHNICAL SUPPLEMENT



YAESU MUSEN CO., LTD.

C.P.O. BOX 1500, TOKYO, JAPAN

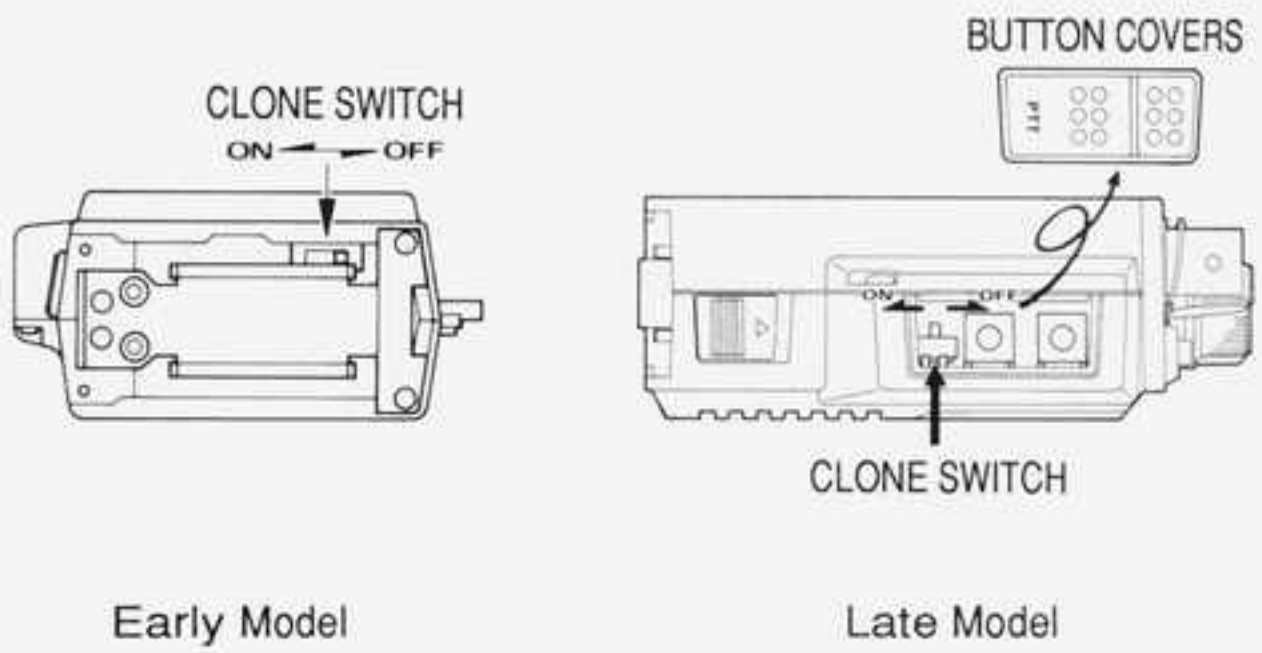
YAESU U.S.A.

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

YAESU EUROPE B.V.

Snipweg 3. 1118AA Schiphol, The Netherlands

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



Early Model

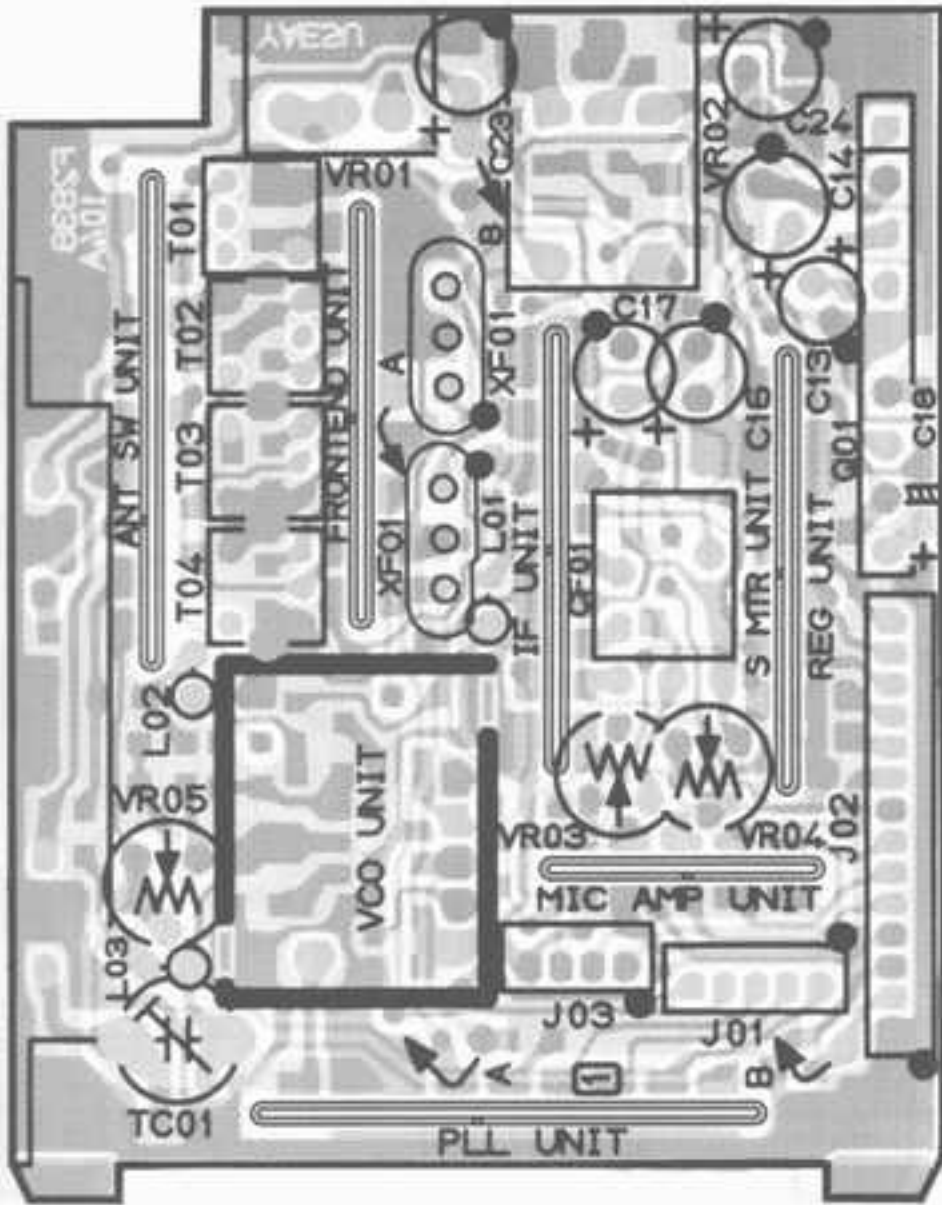
Late Model

Early Model FT-23R

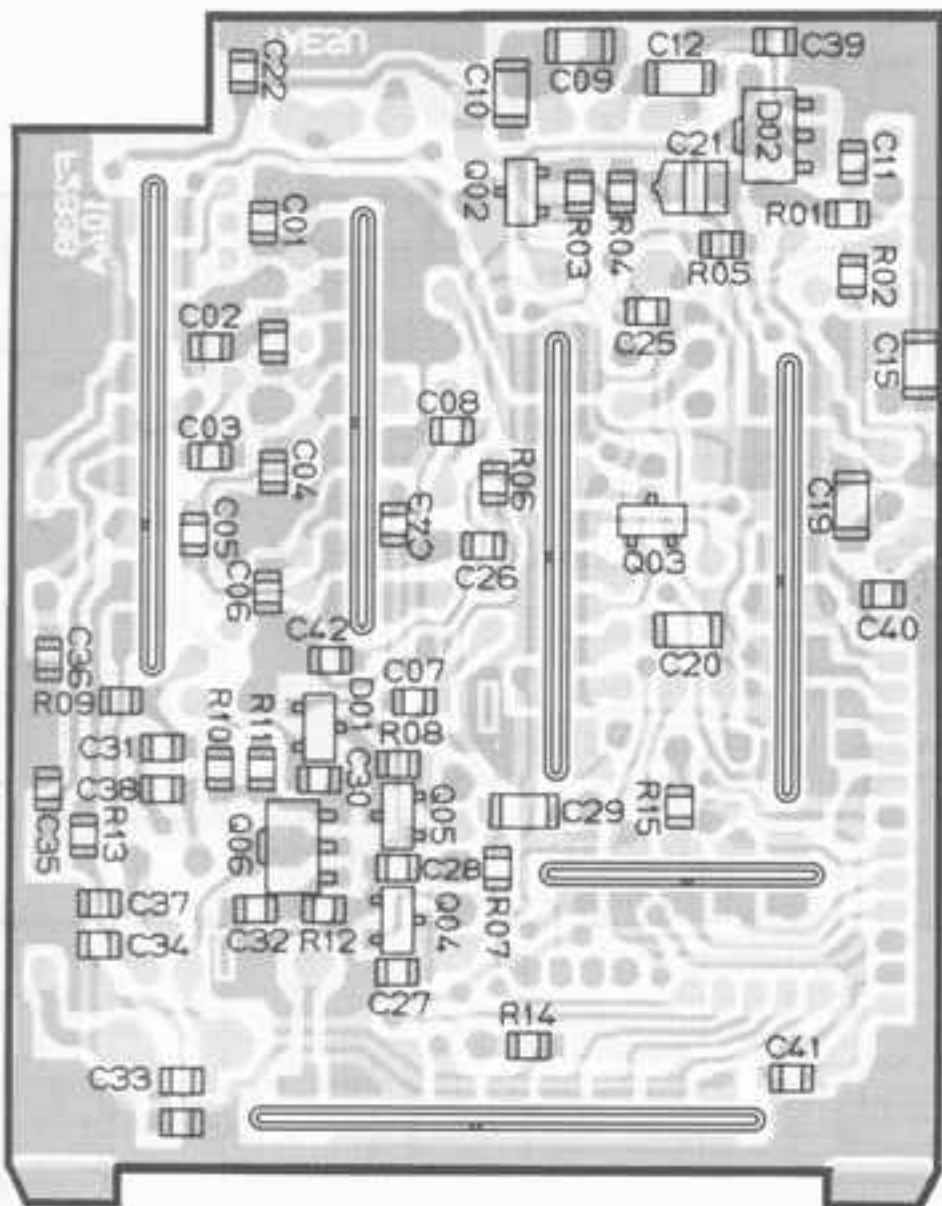
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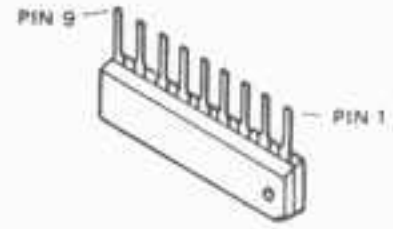
MOTHER BOARD



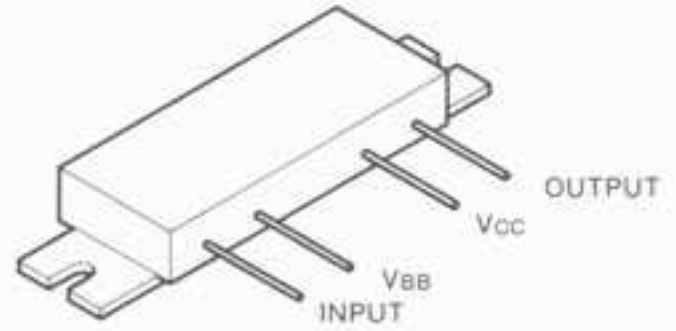
(obverse view of "component" side)



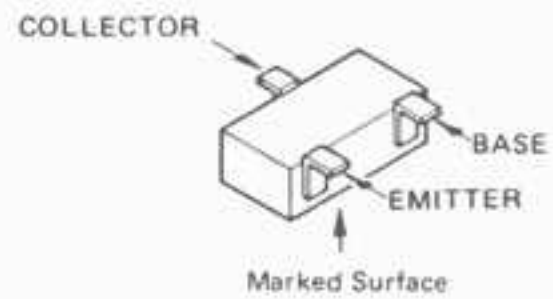
(reverse view of "chip-only" side)



LA4145 (Q101)



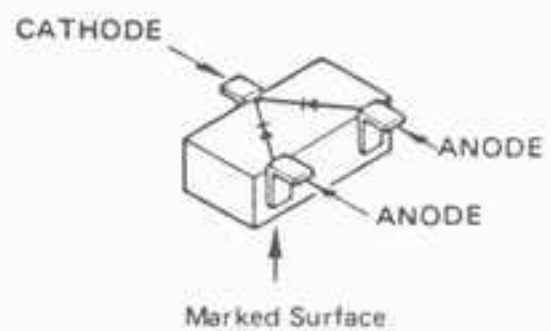
M57796MA (Q107)



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

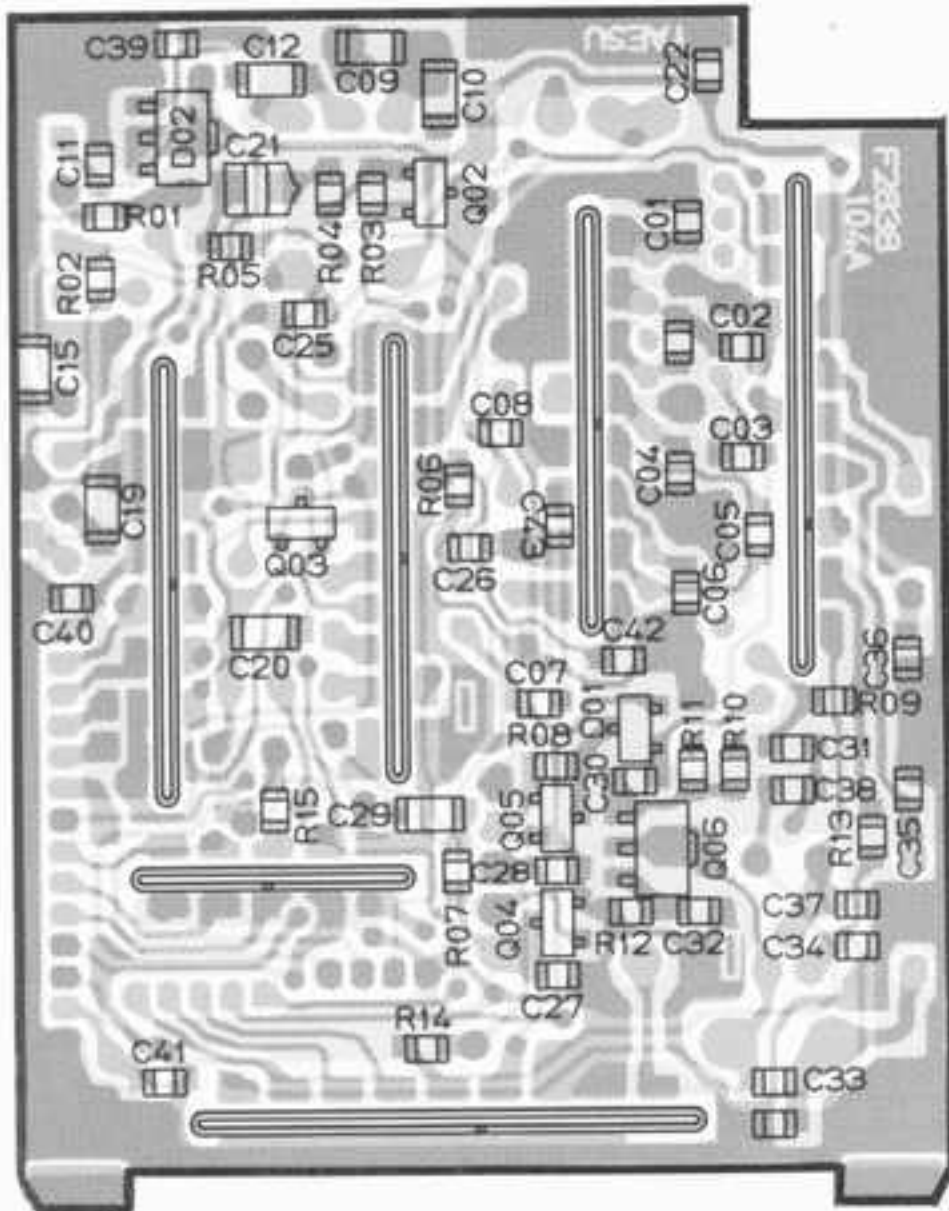


2SC2954 (Q106)

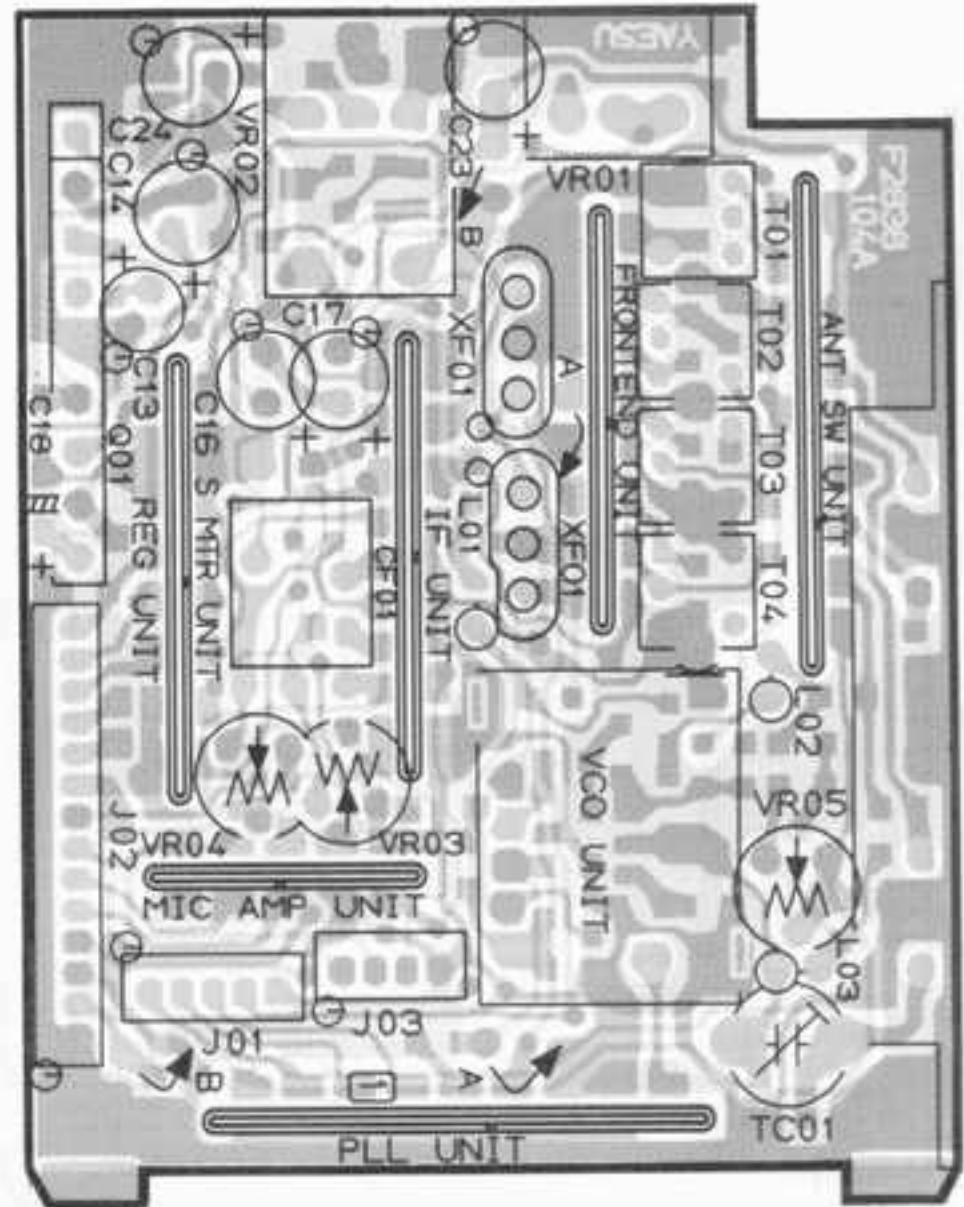


1SS184 (B3) : (D101)

MOTHER BOARD



(obverse view of "chip-only" side)



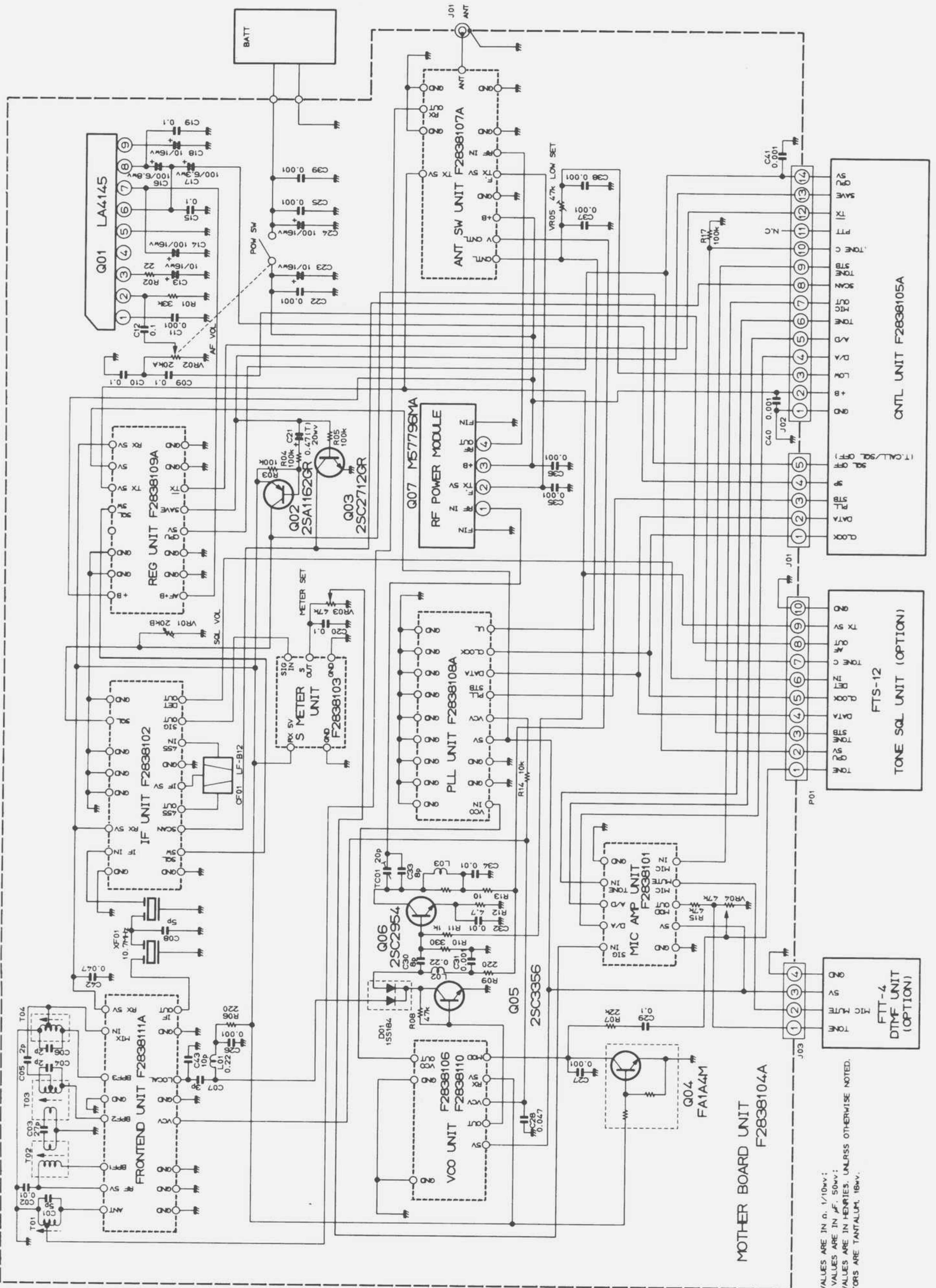
(reverse view of "component" side)

CHIP SEMICONDUCTOR CROSS-REFERENCE

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	

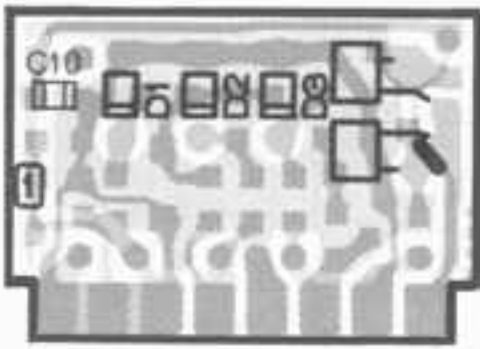
* Semiconductors not listed above may be replaced only with original types.

MOTHER BOARD

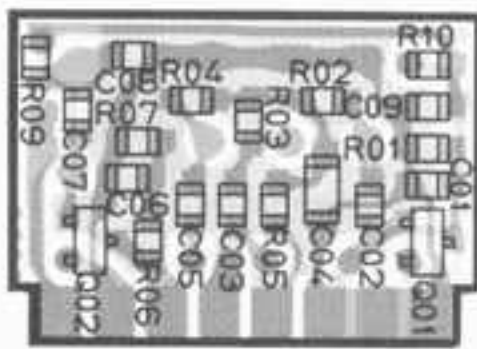


RESISTOR VALUES ARE IN Ω , 1/10WV;
 CAPACITOR VALUES ARE IN μ F, 50VV;
 INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.
 (T) CAPACITORS ARE TANTALUM, 16WV.

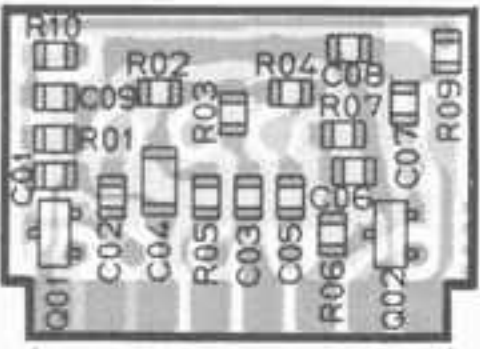
FRONTEND UNIT



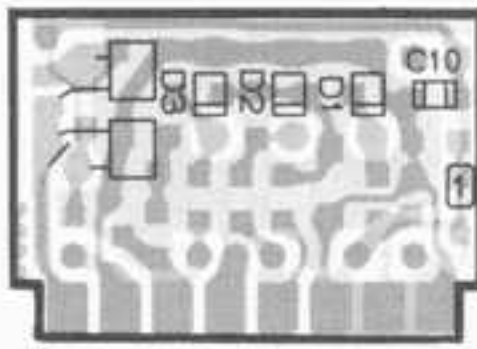
(obverse view of "diode" side)



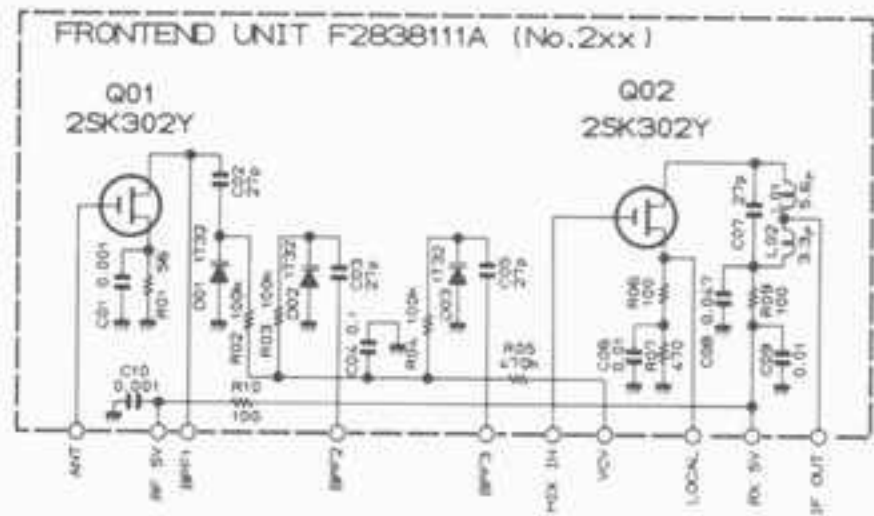
(obverse view of "FET" side)



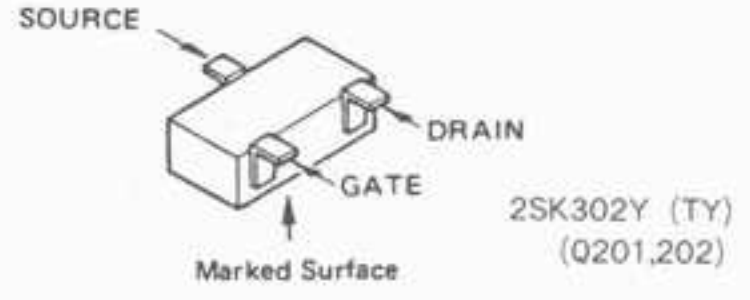
(reverse view of "FET" side)



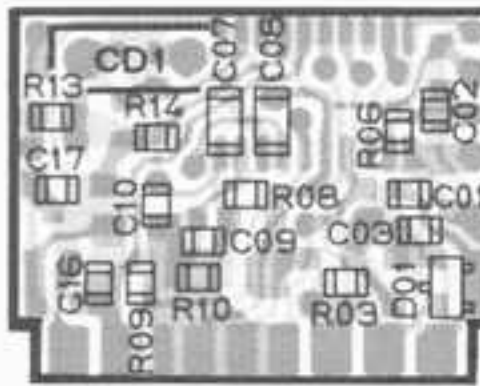
(reverse view of "diode" side)



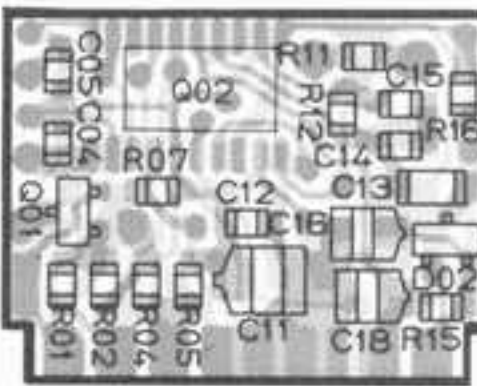
RESISTOR VALUES ARE IN Ω, 1/10W
CAPACITOR VALUES ARE IN μF, 50V
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.



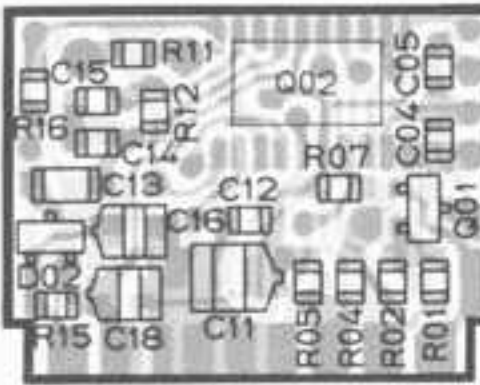
IF UNIT



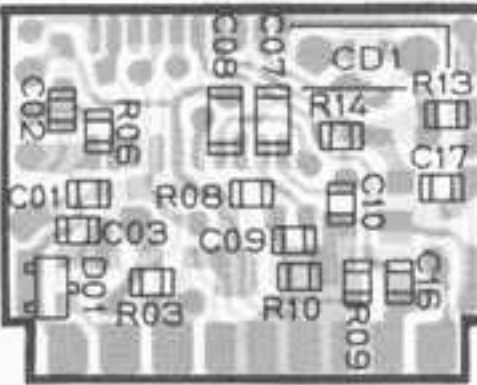
(obverse view of "mixed-component" side)



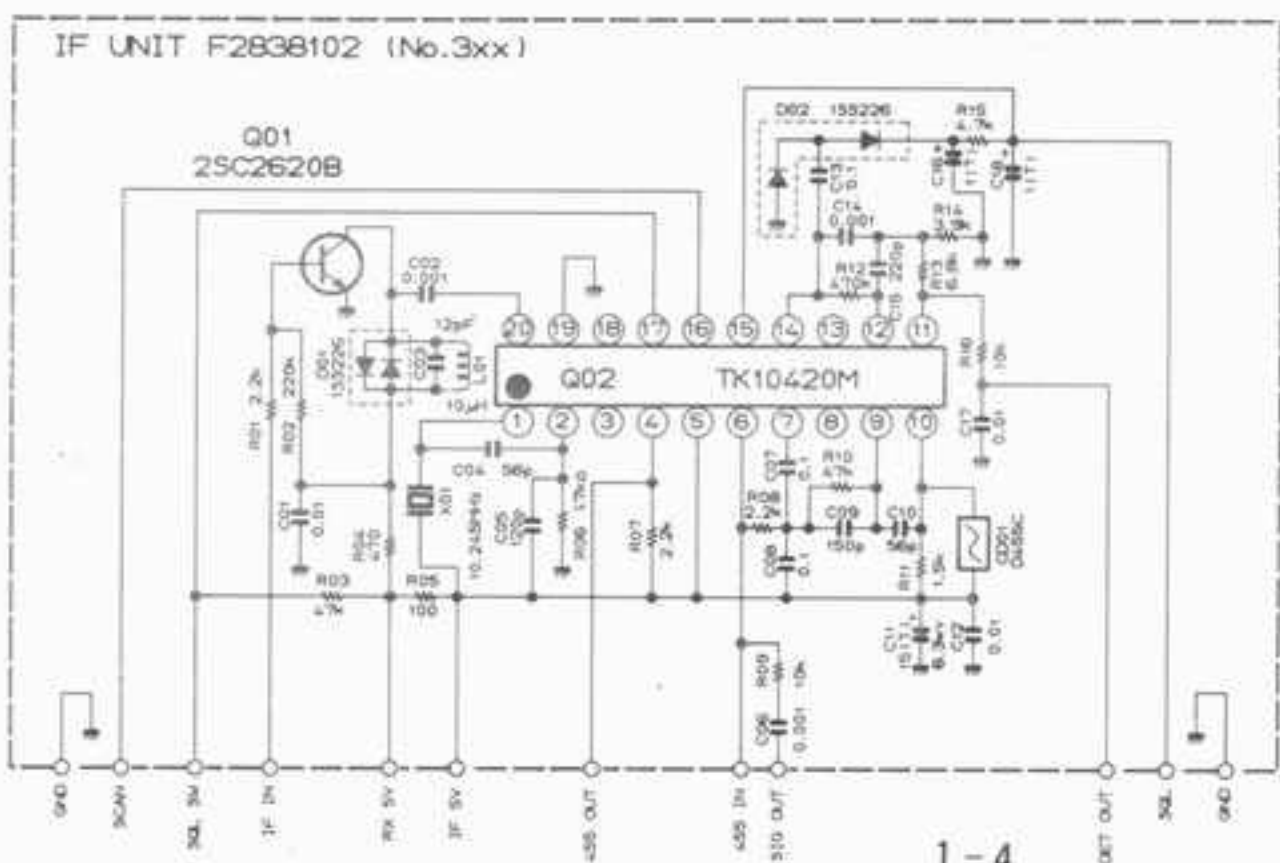
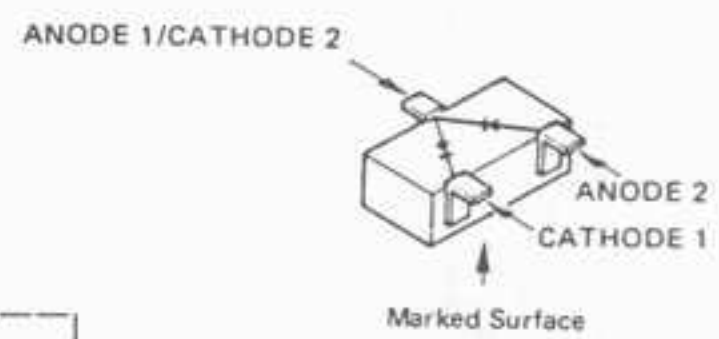
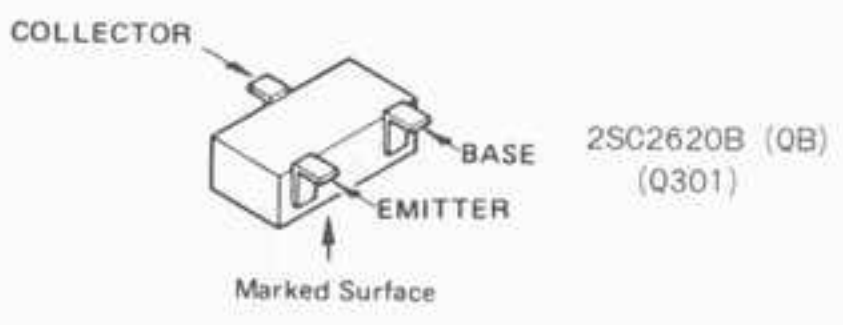
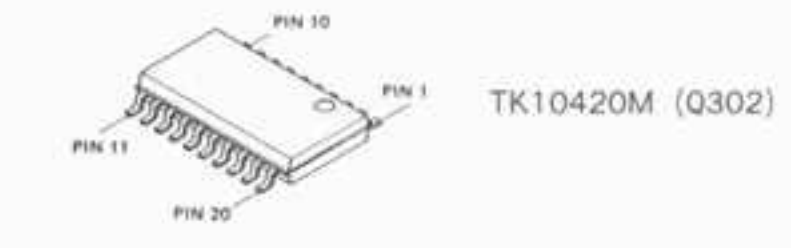
(obverse view of "chip-only" side)



(reverse view of "chip-only" side)

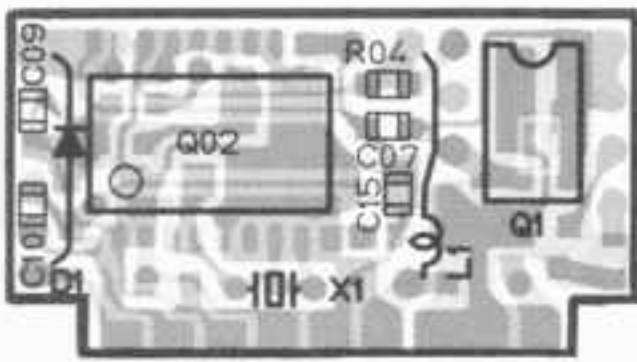


(reverse view of "mixed-component" side)

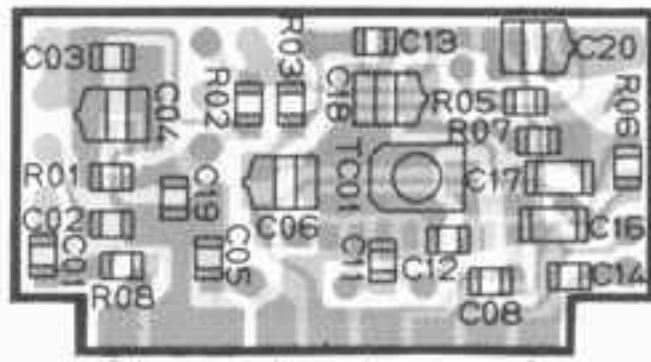


RESISTOR VALUES ARE IN Ω, 1/10W
CAPACITOR VALUES ARE IN μF, 50V
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.
(T)CAPACITORS ARE TANTALUM, 10V.

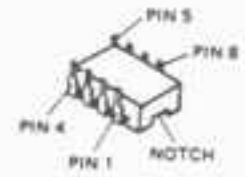
PLL UNIT



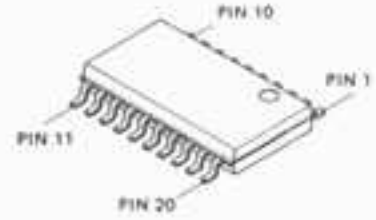
(obverse view of "mixed-component" side)



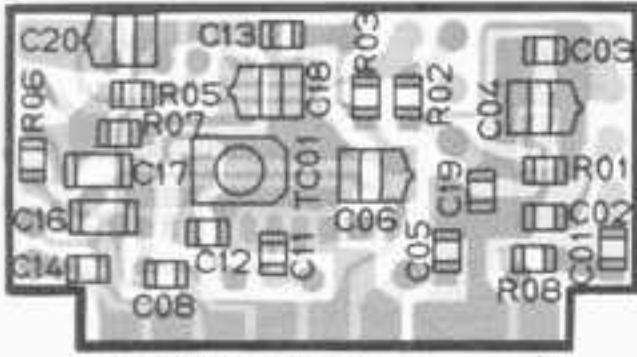
(obverse view of "chip-only" side)



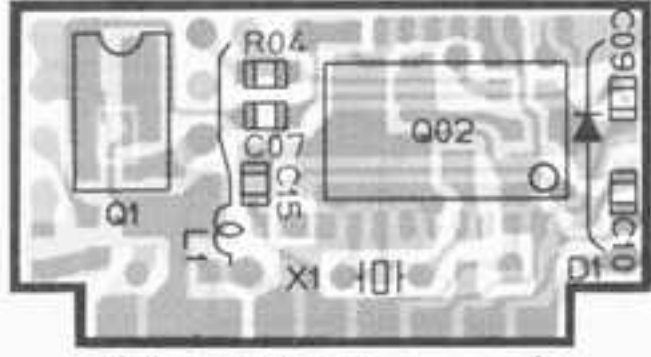
MC12017P (Q401)



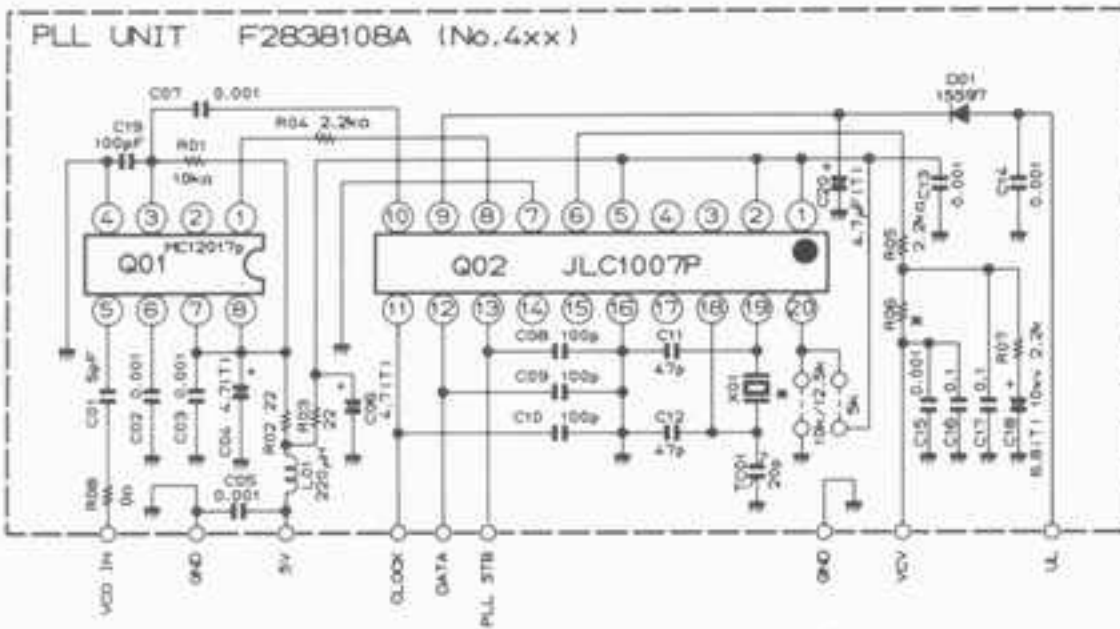
JLC1007P (Q402)



(reverse view of "chip-only" side)



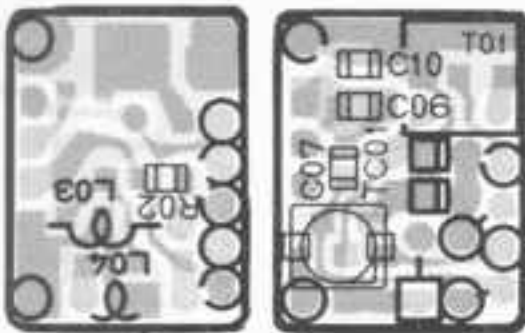
(reverse view of "mixed-component" side)



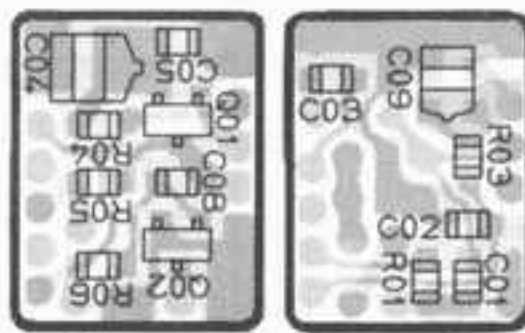
R06	15k \pm 5% 10k \pm 10% STEP 4.7k \pm 12.5% STEP
X01	10.24MHz \pm 5% STEP 12.8MHz \pm 12.5% STEP

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

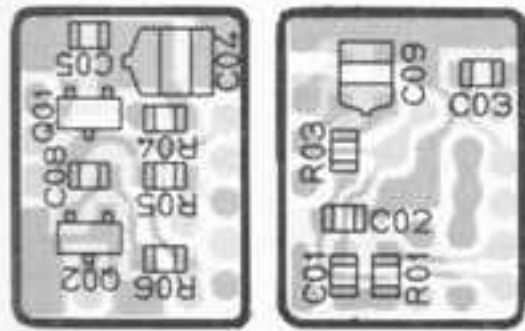
VCO UNIT



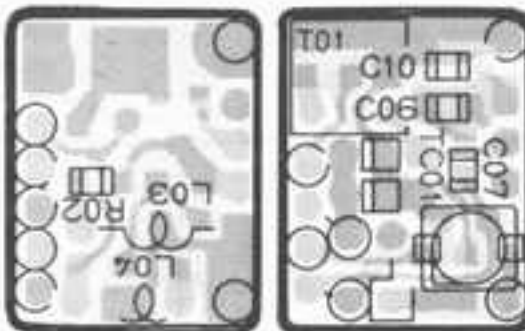
(obverse view of "mixed-component" side)



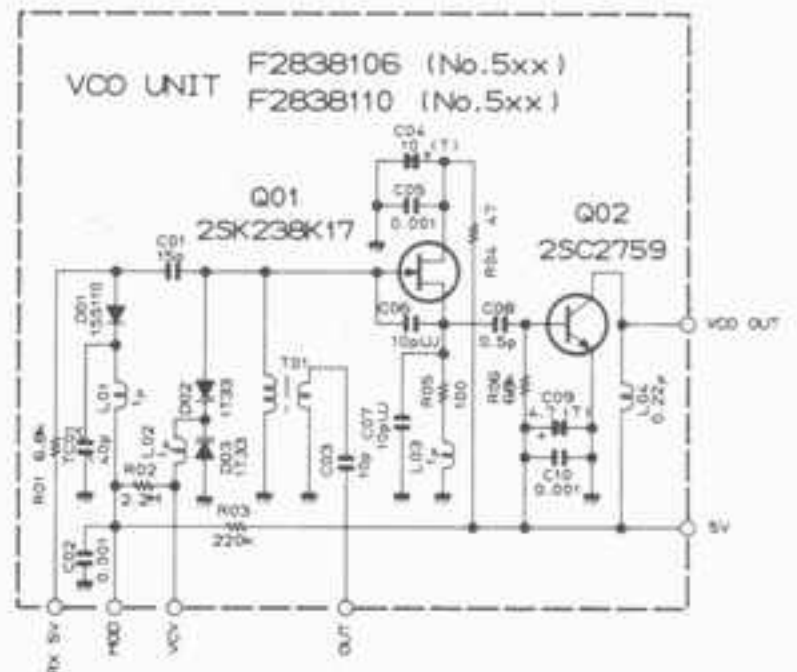
(obverse view of "chip-only" side)



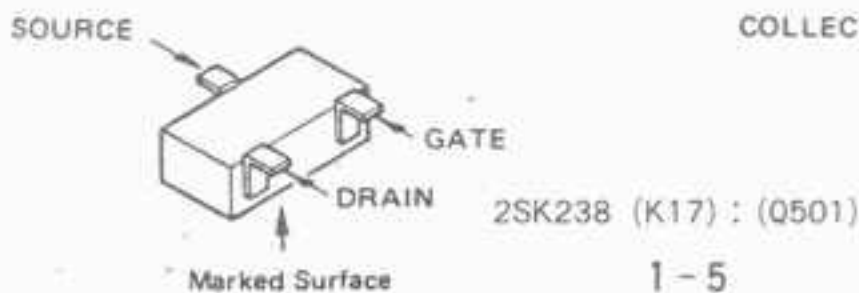
(reverse view of "chip-only" side)



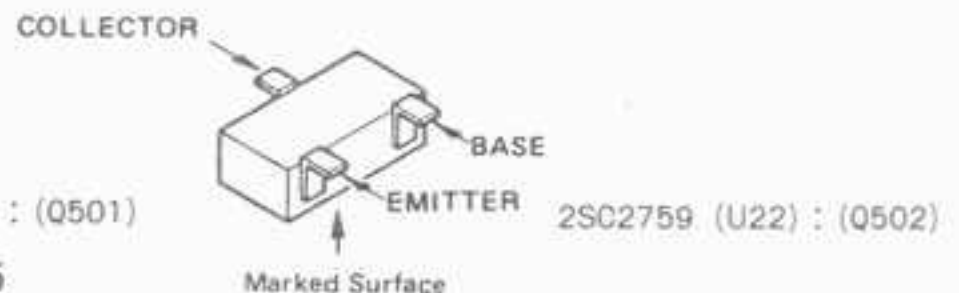
(reverse view of "mixed-component" side)



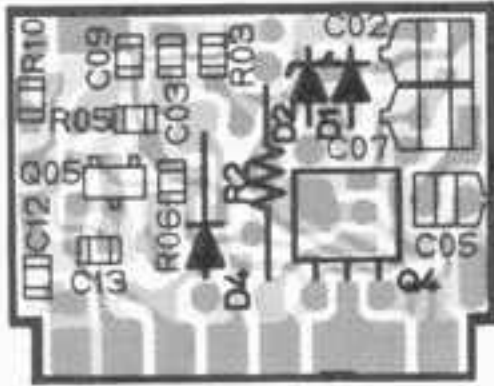
RESISTOR VALUES ARE IN Ω , 1/10W;
CAPACITOR VALUES ARE IN μ F, 50V;
UNLESS OTHERWISE NOTED.
(T) CAPACITORS ARE TANTALUM, 6.3V.



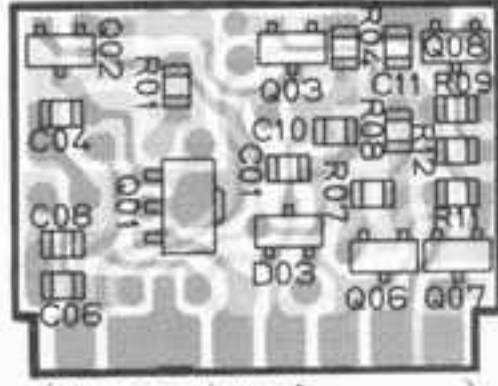
1 - 5



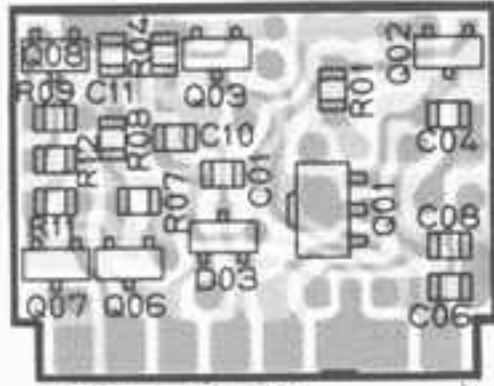
REG UNIT



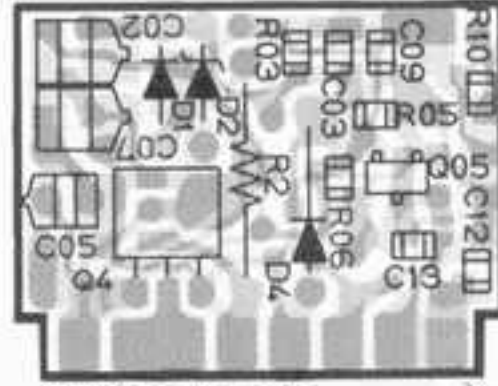
(obverse view of "mixed-component" side)



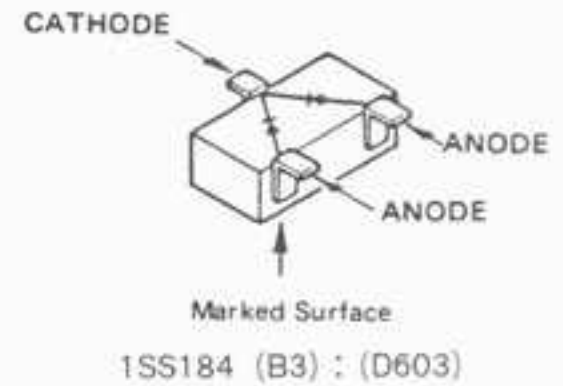
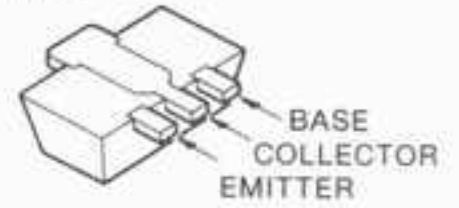
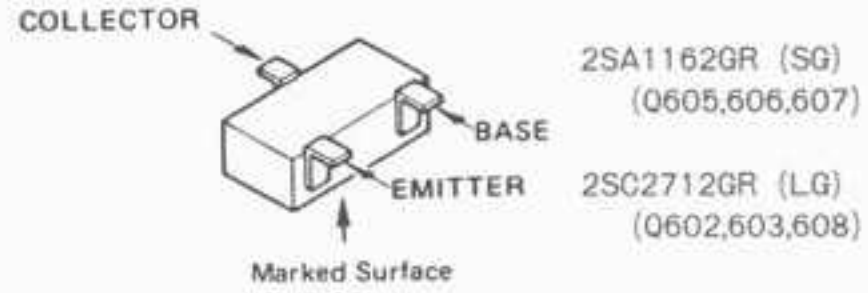
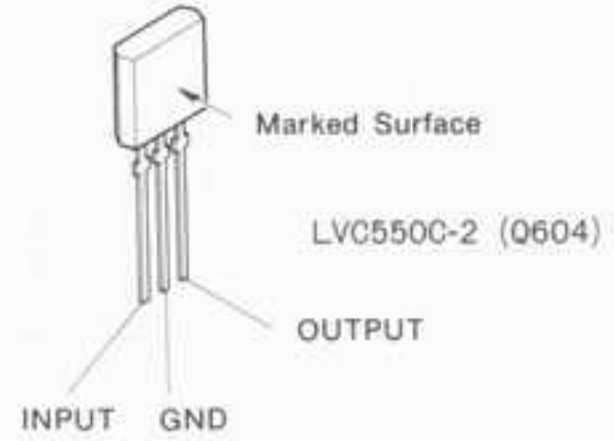
(obverse view of "chip-only" side)



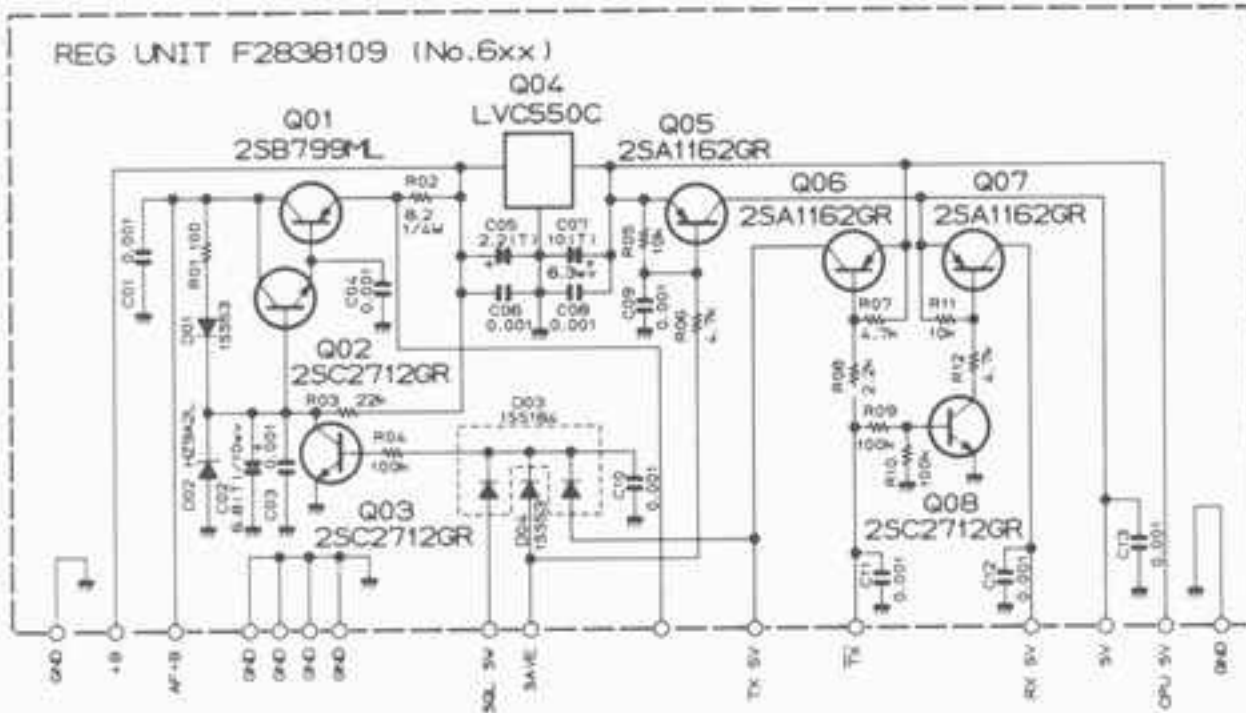
(reverse view of "chip-only" side)



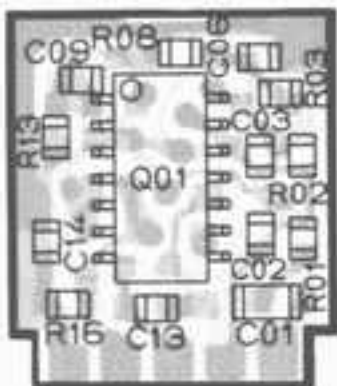
(reverse view of "mixed-component" side)



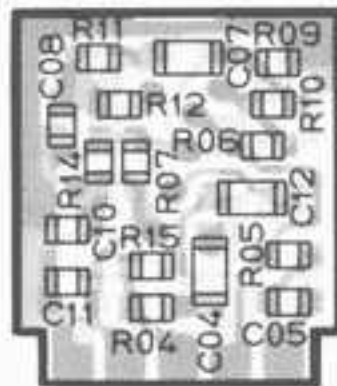
RESISTOR VALUES ARE IN Ω, 1/10W;
CAPACITOR VALUES ARE IN μF, 50V;
UNLESS OTHERWISE NOTED.
(T) CAPACITORS ARE TANTALUM, 10V.



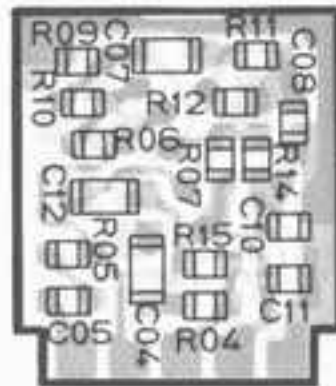
MIC AMP UNIT



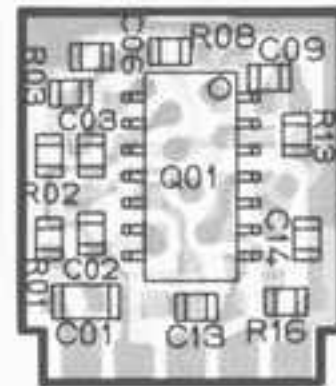
(obverse view of "-IC" side)



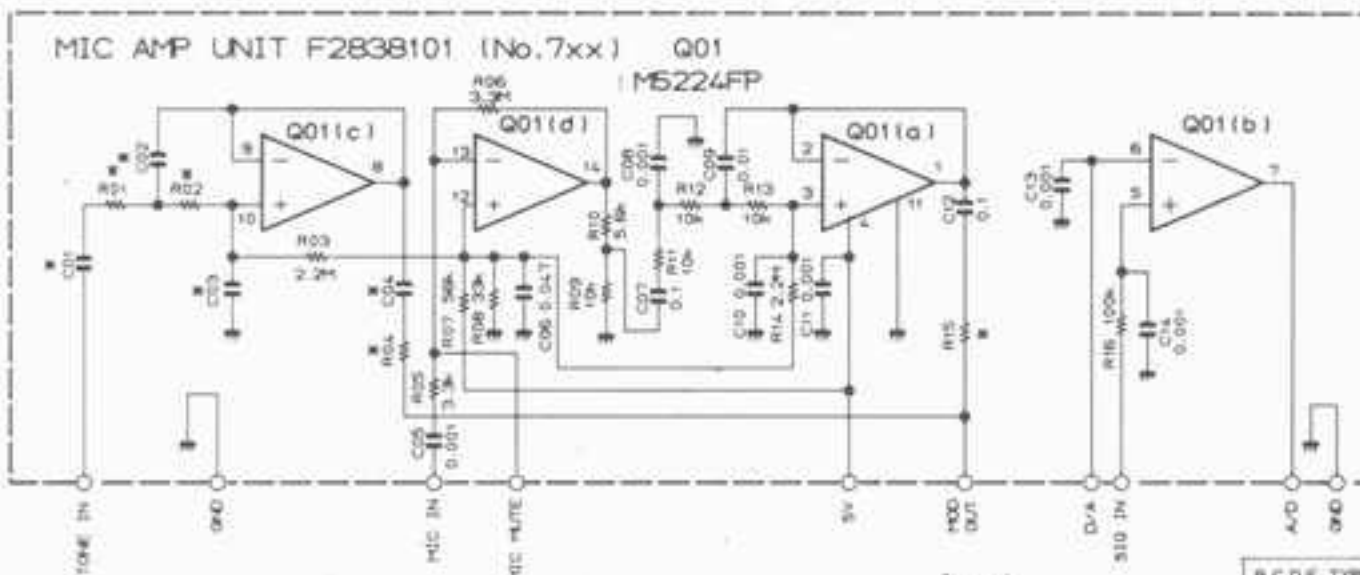
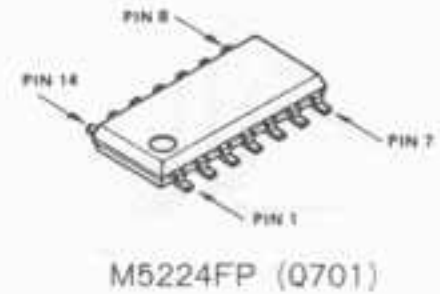
(reverse view of "-C-R" side)



(obverse view of "-C-R" side)



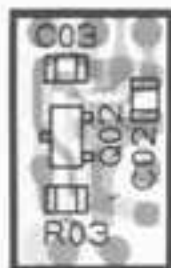
(reverse view of "-IC" side)



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CAPACITOR VALUES ARE IN μF, 50V;
UNLESS OTHERWISE NOTED.

	C01	C02	C03	C04	R01	R02	R04	R15
B.C.D.E TYPE	0.1	0.01	0.0022	0.1	10k	10k	22k	22k
A.F TYPE	—	—	0.01	—	—	—	—	22k

S METER UNIT



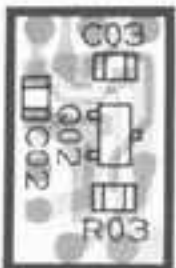
(obverse view of "top" side)



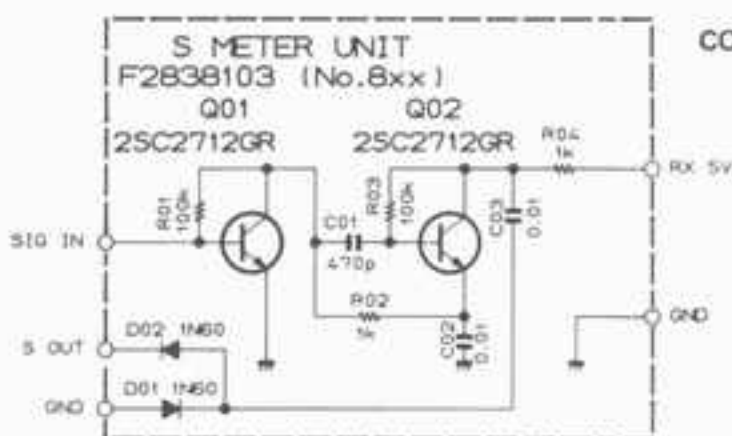
(obverse view of "bottom" side)



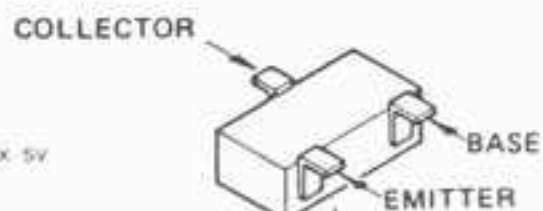
(reverse view of "bottom" side)



(reverse view of "top" side)

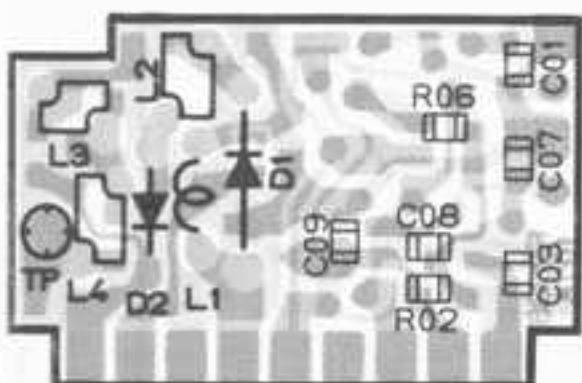


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UNLESS OTHERWISE NOTED.

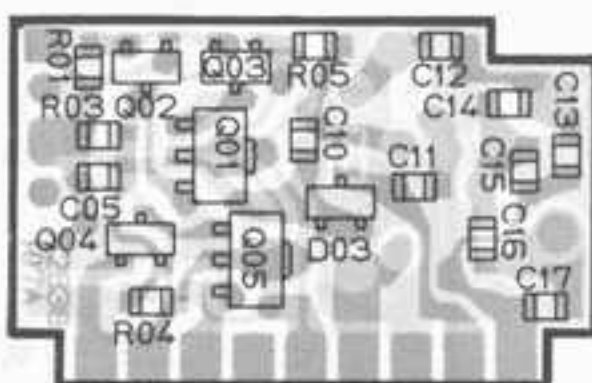


Marked Surface
2SC2712GR (LG)
(0801,802)

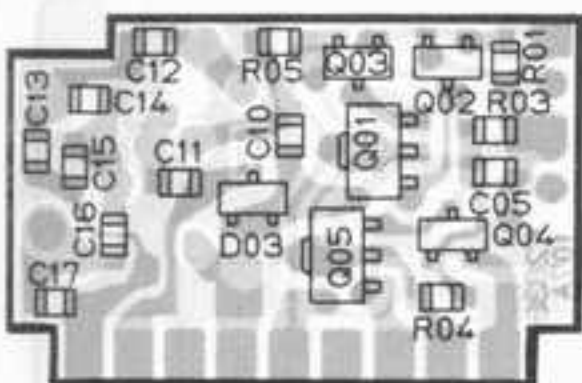
ANT SW UNIT



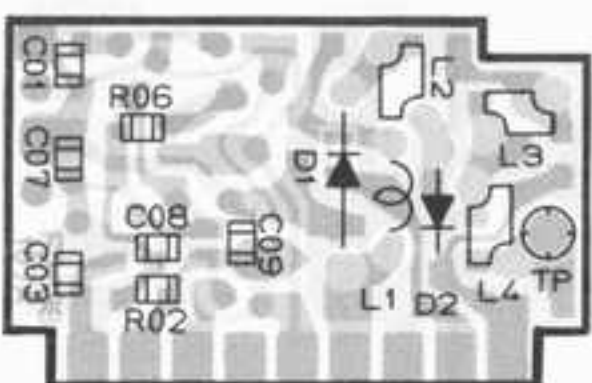
(obverse view of "mixed-component" side)



(obverse view of "chip-only" side)



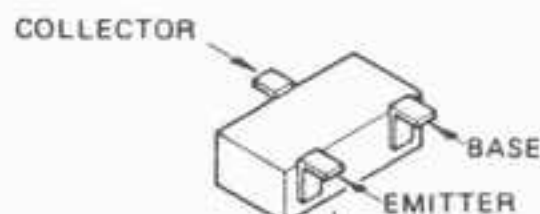
(reverse view of "chip-only" side)



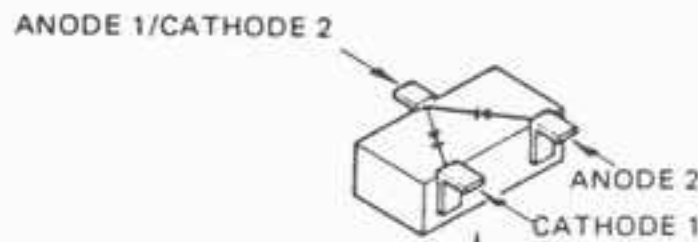
(reverse view of "mixed-component" side)



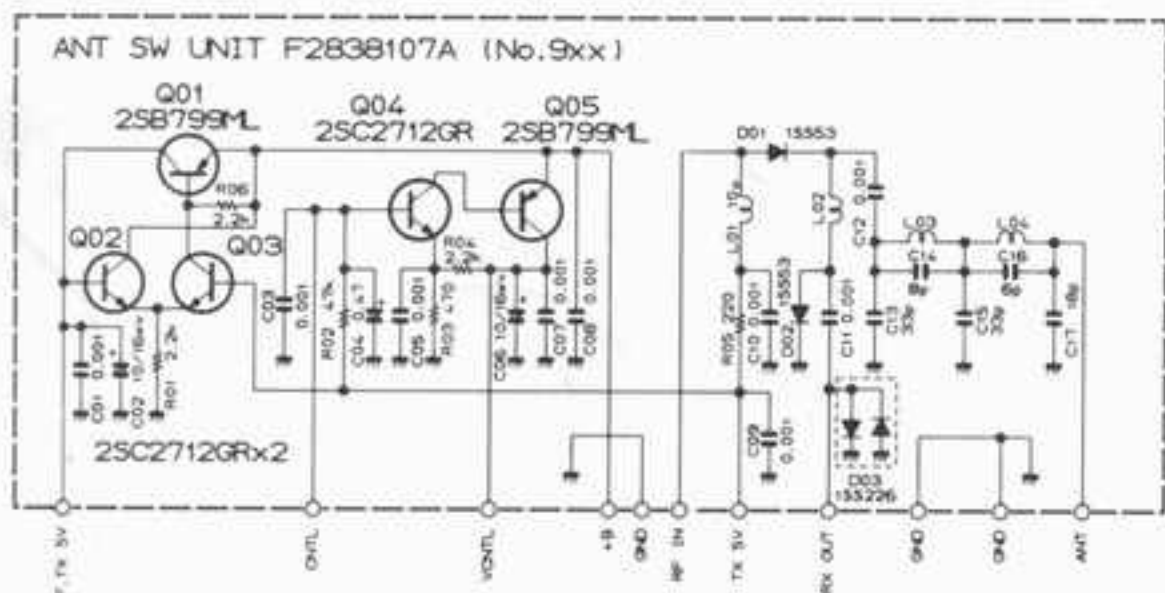
2SB799 (0901,905)



Marked Surface
2SC2712GR (LG)
(0902,903,904)

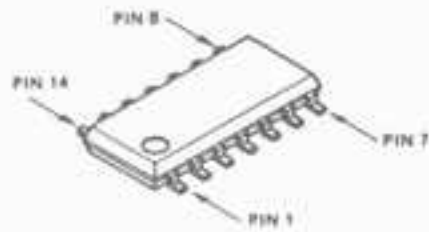
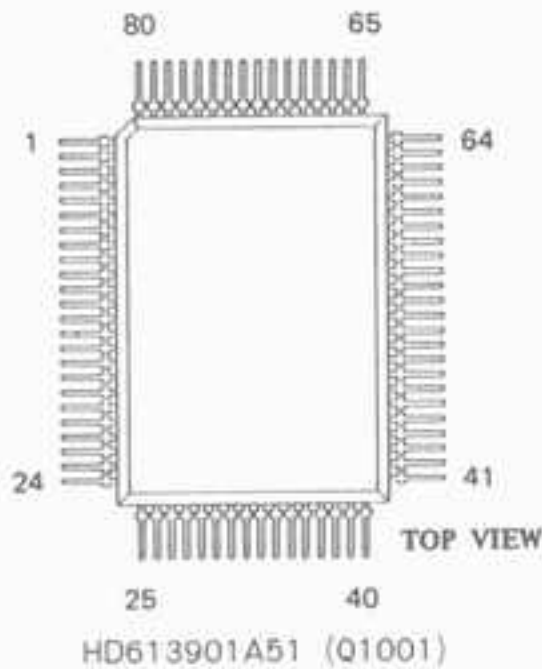


Marked Surface
1SS226 (C3) : (D903)

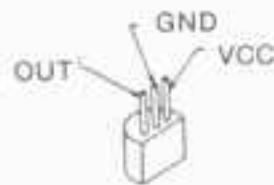


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CAPACITOR VALUES ARE IN μ F, 50V;
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.

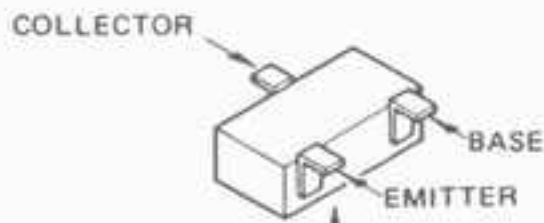
CNTL UNIT



μ PD4066BG (Q1008)
 μ PD4001BG (Q1009)



PST523G (Q1007)



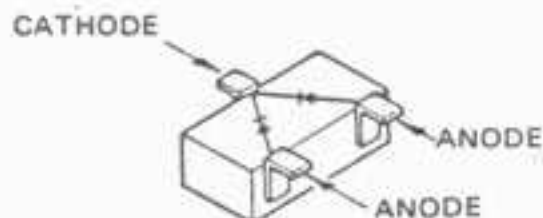
Marked Surface

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



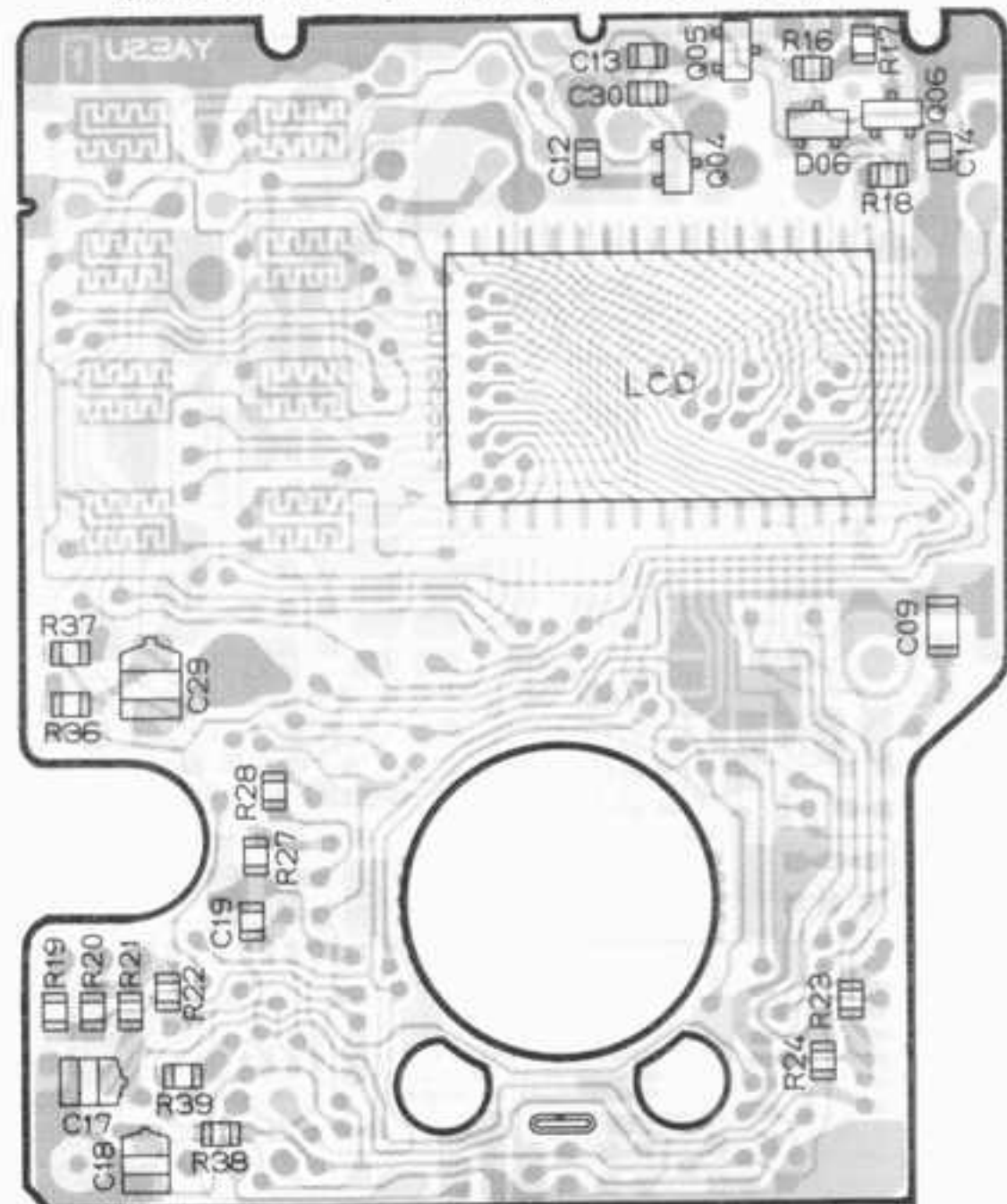
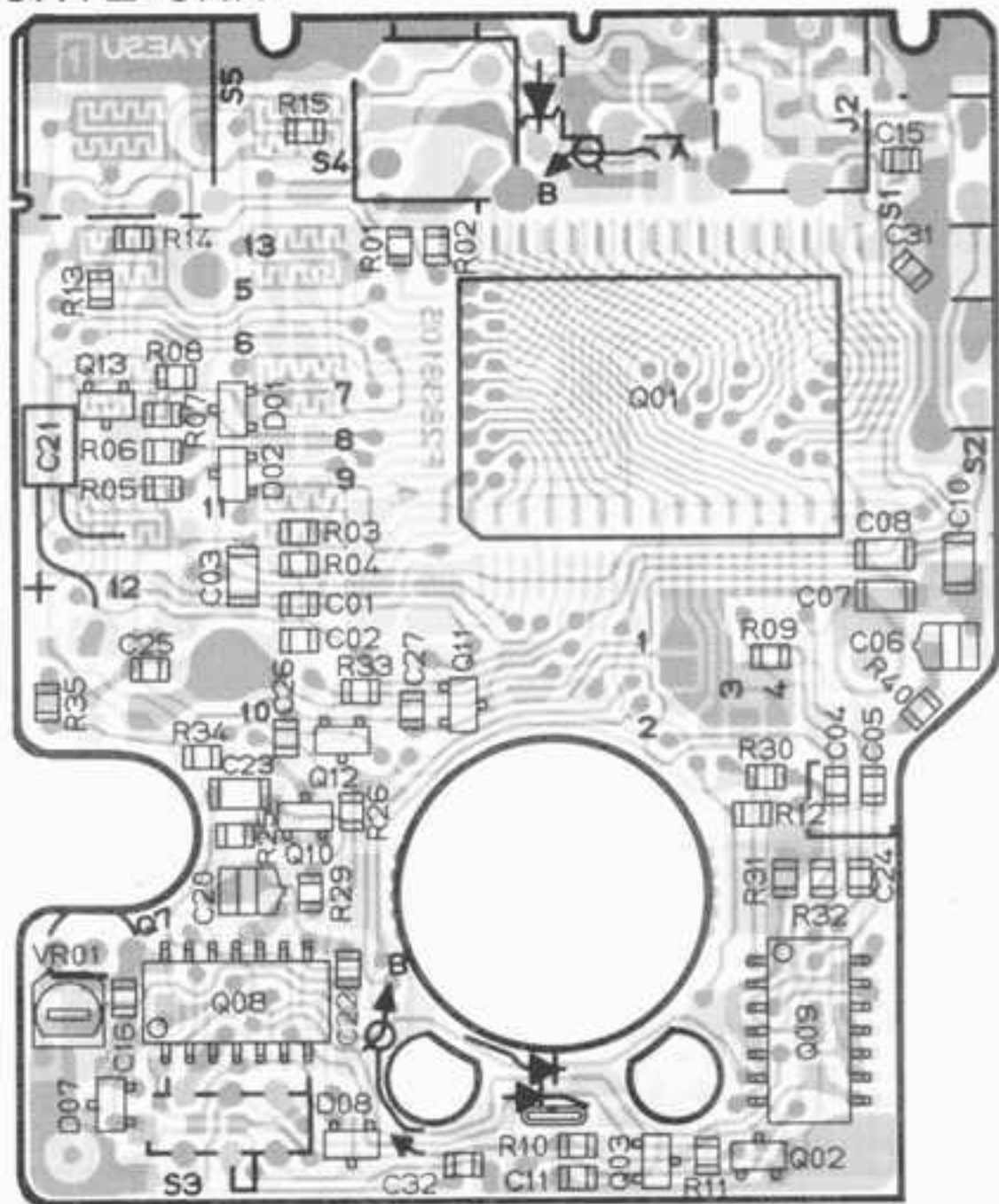
Marked Surface

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

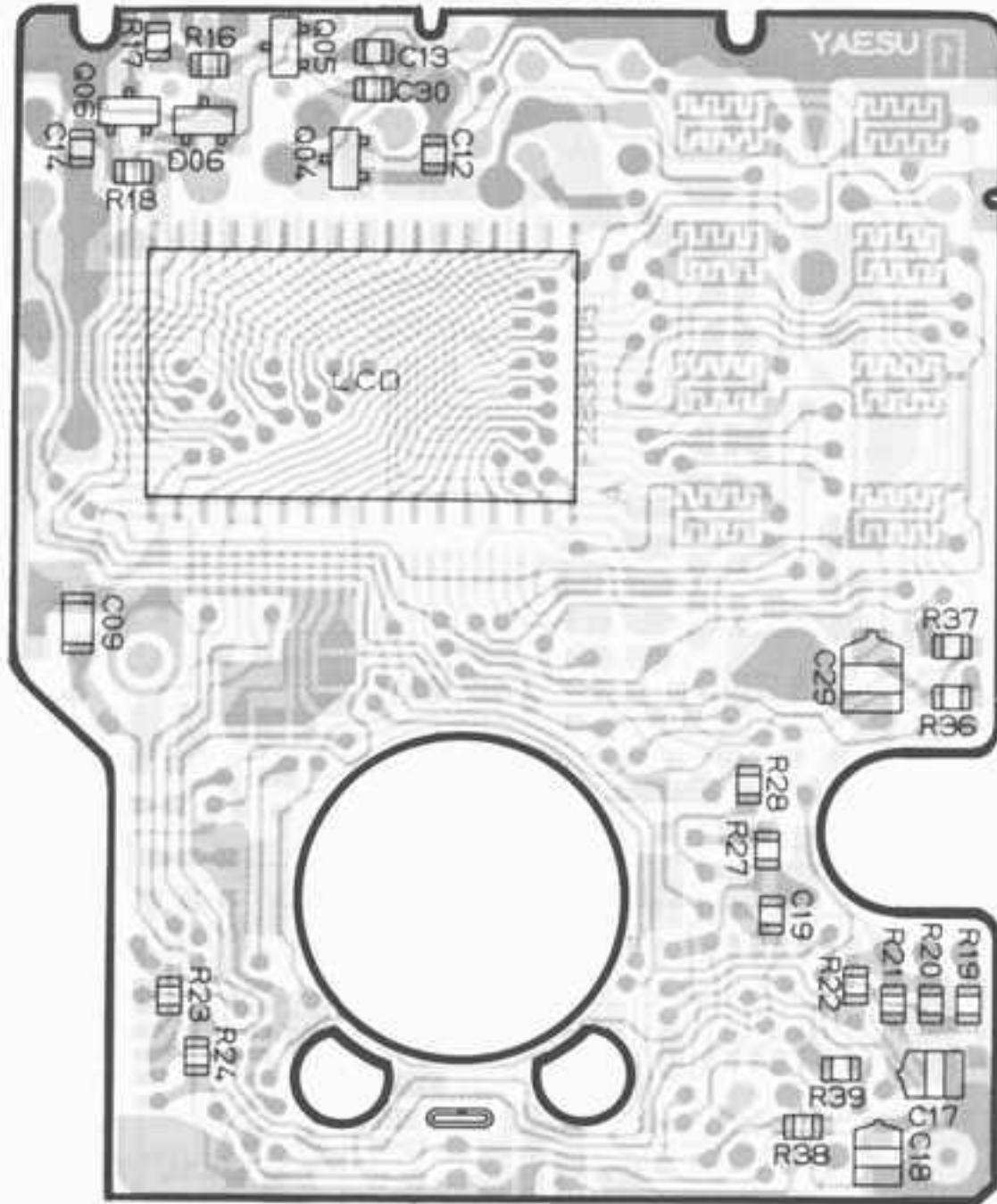


Marked Surface

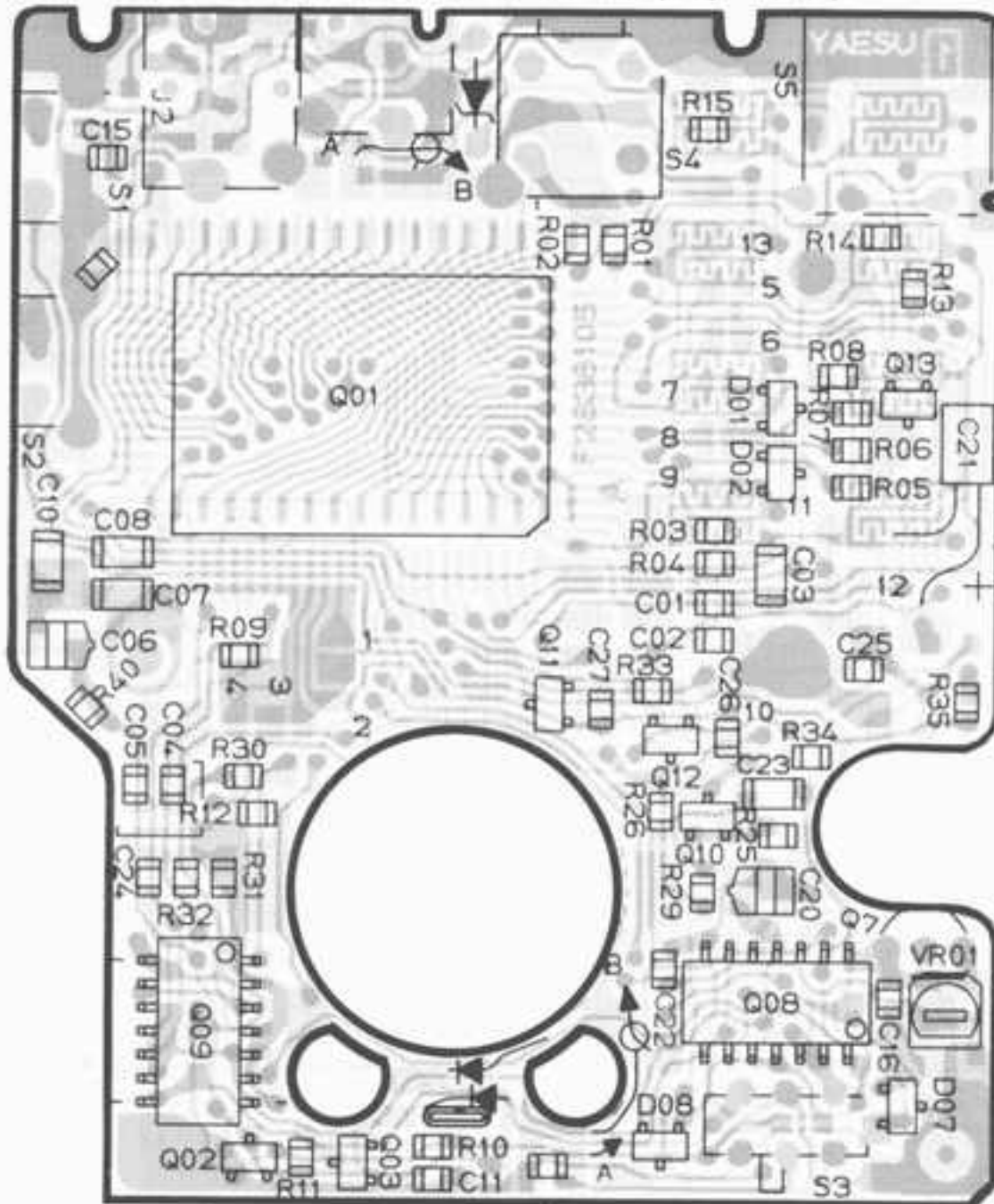
1SS184 (B3) : (D1007)
SLM-23VMW (D1006)
(LED)



CNTL UNIT

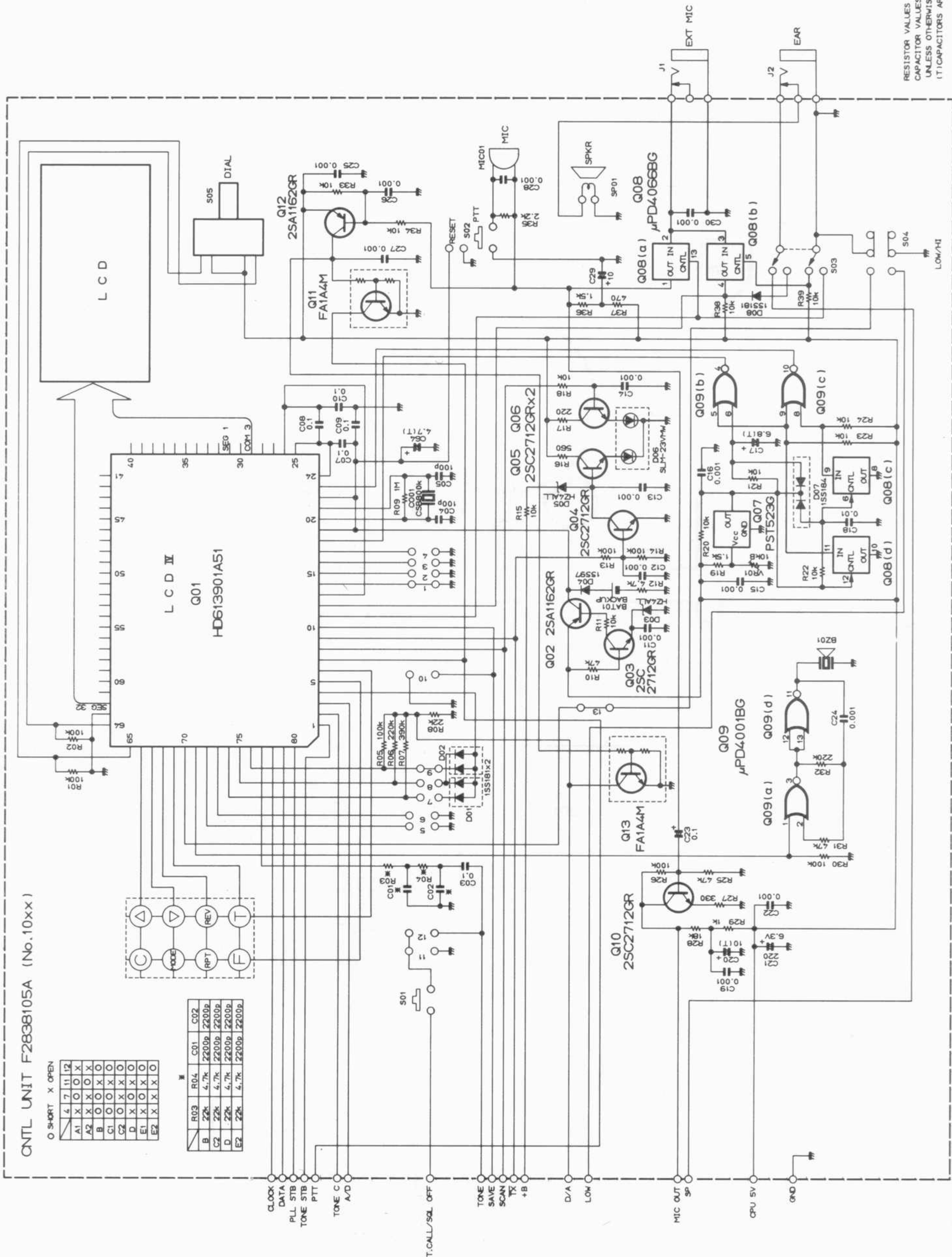


(obverse view of "display" side)



(reverse view of "microprocessor" side)

CNTL UNIT



RESISTOR VALUES ARE IN Ω , 1/10W;
 CAPACITOR VALUES ARE IN μ F, 50V;
 UNLESS OTHERWISE NOTED.
 (T) CAPACITORS ARE TANTALUM, 16V.

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

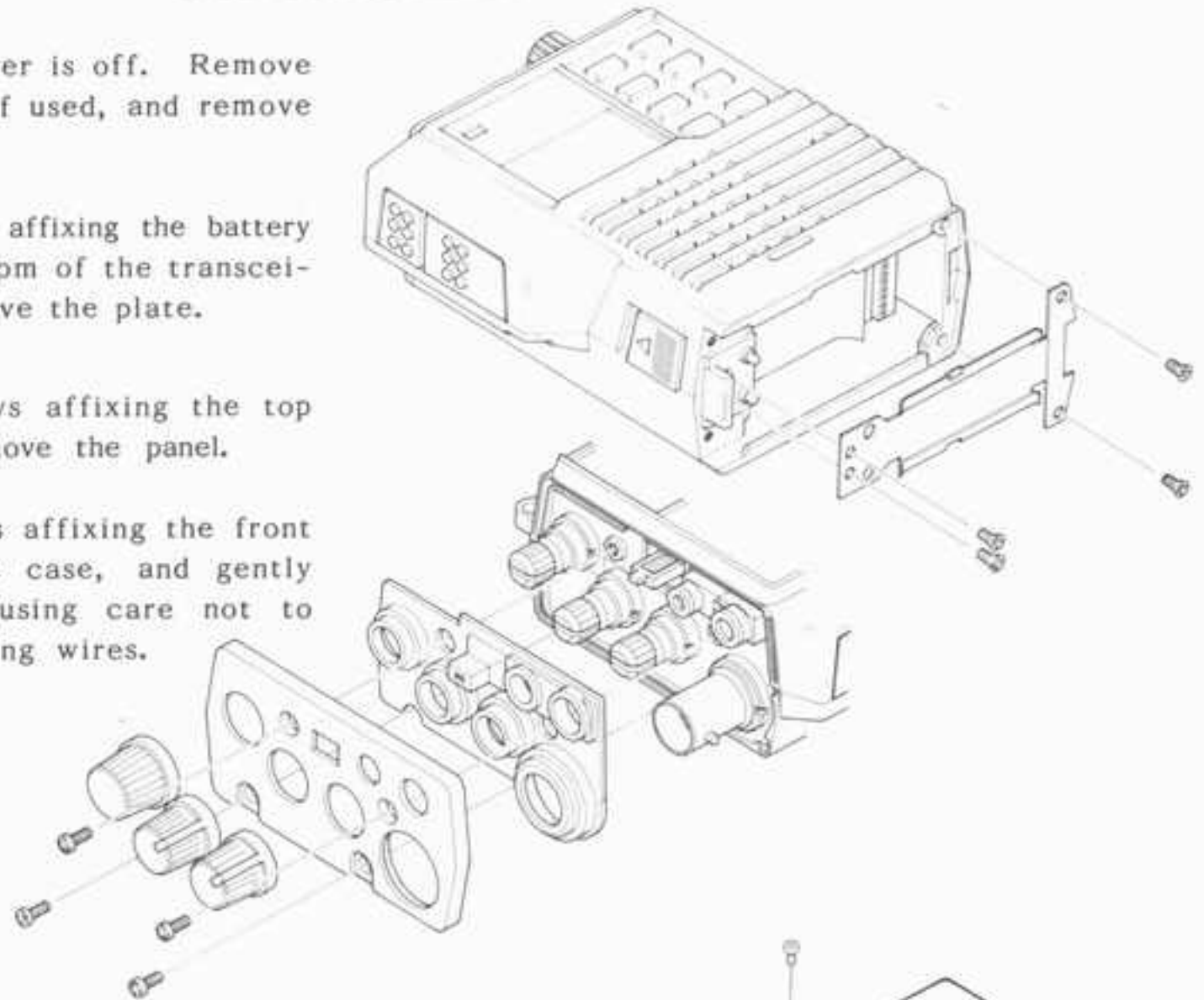
Frequency Counter: 0.2ppm accuracy at 150 MHz

AF Signal Generator

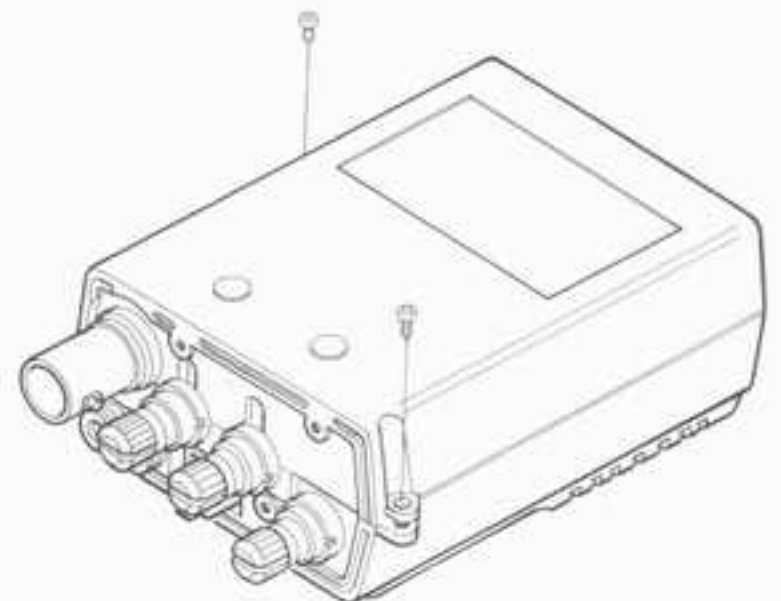
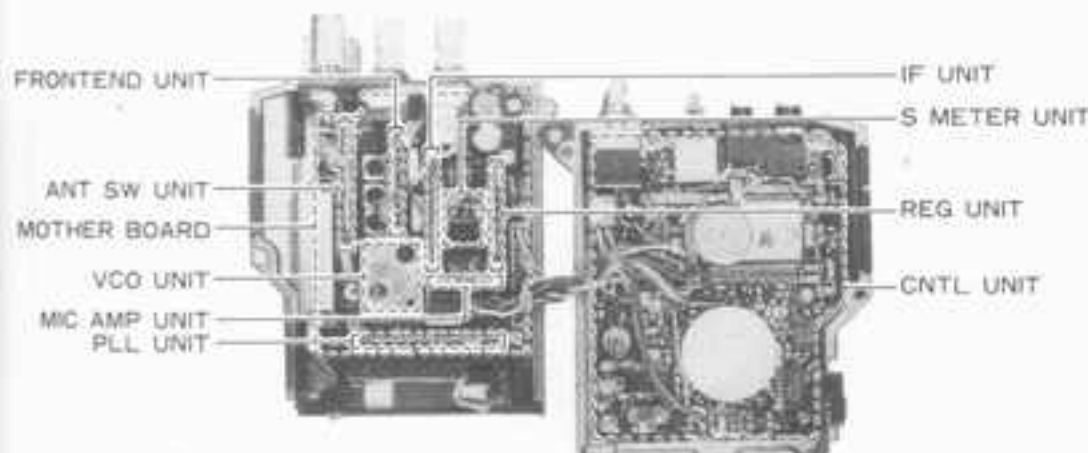
DC Voltmeter: high impedance

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

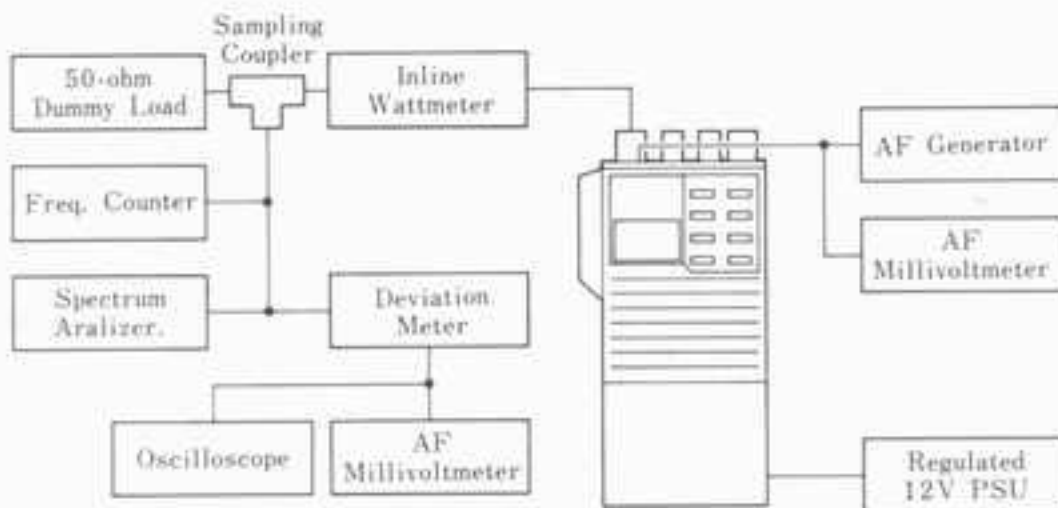
Set up the test equipment as shown in the diagram below for transmitter alignment. Adjust the supply voltage to 12.0V for all steps except Transmitter Output Power alignment (B).

A. PLL VCV (Varactor Control Voltage)

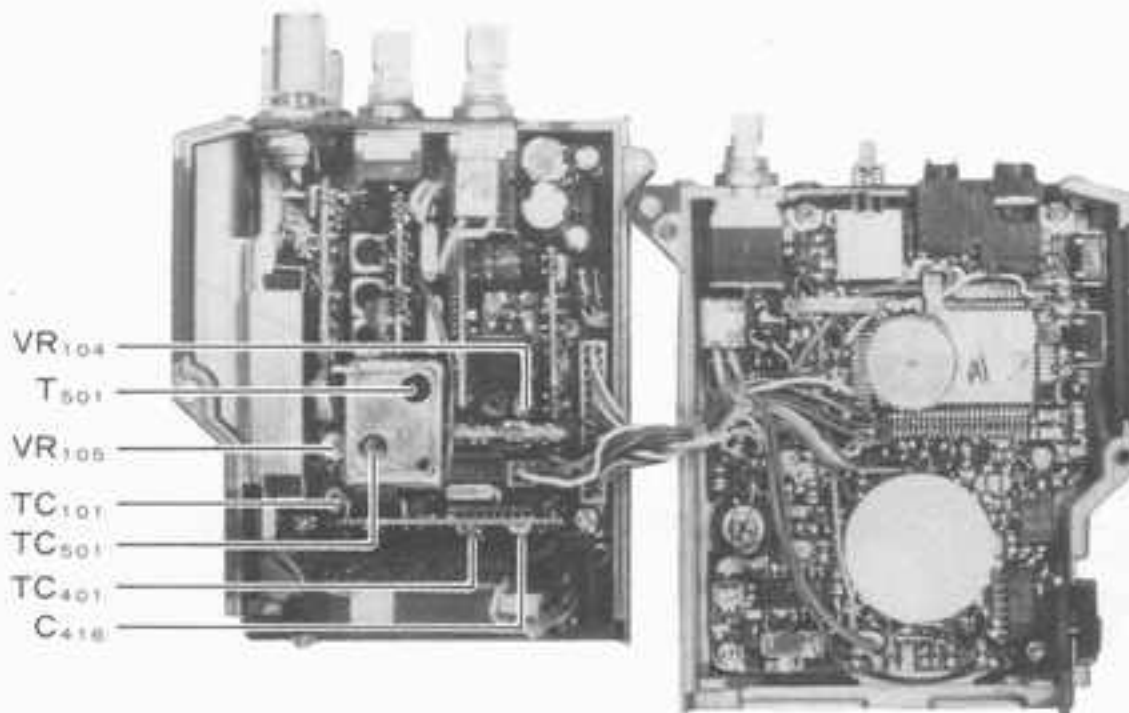
- (1) Connect the DC voltmeter between C416 on the PLL Unit and chassis ground.
- (2) While transmitting on 144.000 MHz adjust transformer T501 on the VCO Unit for 1.35 ± 0.05 VDC.
- (3) While receiving on 144.000 MHz adjust trimmer TC501 on the VCO Unit for 1.1 ± 0.05 VDC.
- (4) Retune the transceiver 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



PLL & TRANSMITTER ALIGNMENT POINTS



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.

II. RECEIVER

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

A. Sensitivity

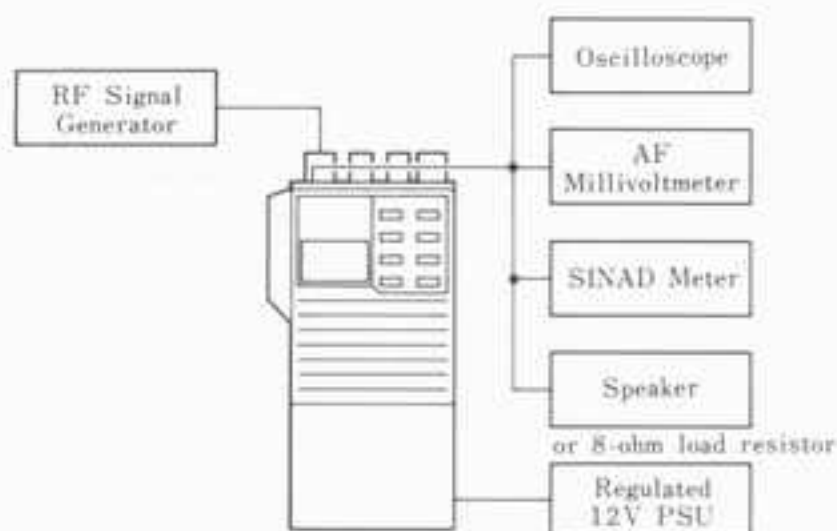
- (1) With the transceiver and RF signal generator both tuned to band center (145 or 146 MHz), set the generator for ± 3.5 kHz deviation of 1 kHz tone modulation, and set the output level for 40 dBu at the antenna jack.
- (2) Preset VR103 on the Mother Board fully clockwise.
- (3) Adjust T101 through 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 μ V or less for 12dB SINAD. Perform the following adjustment next.

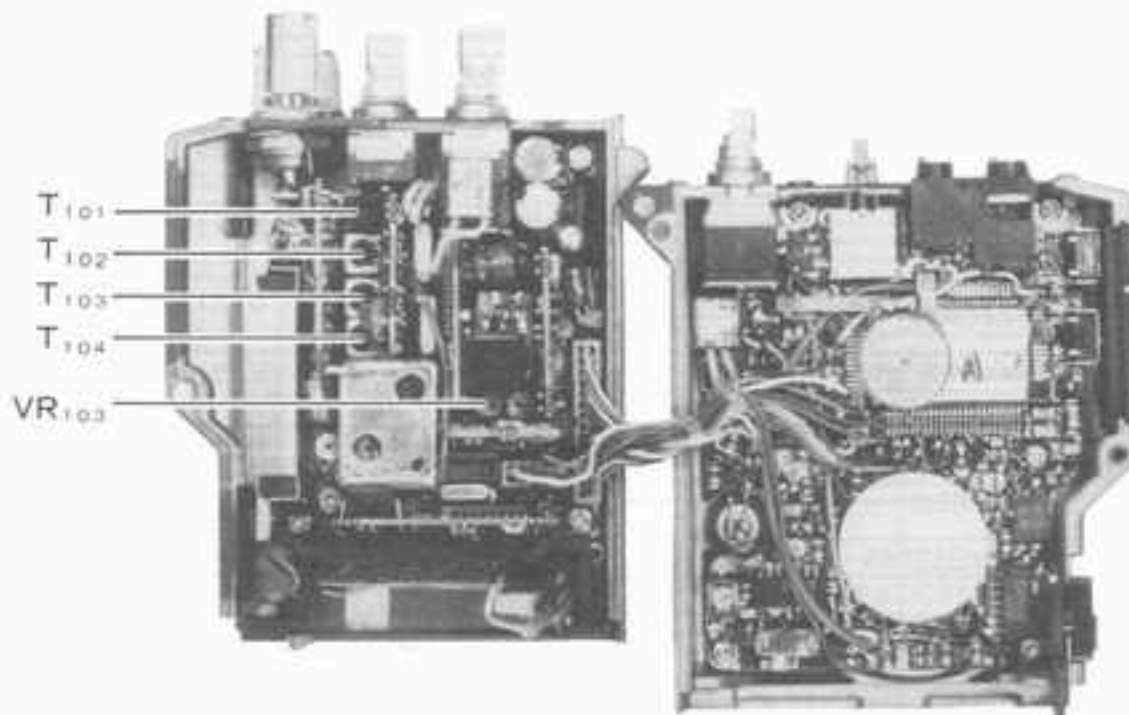
B. S-meter Sensitivity

- (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			CERAMIC FILTER
			CF101	H3900280	LF-B12
		MISCELLANEOUS			
	R3116390	DIAL Knob			RESISTORS
	R3116620	VOL,SQL Knobs	R112	J24205479	RMC 1/10T4R7J 1/10W 4.7Ω
	R3508300	PTT Button Cover	R113	J24205100	" " 100J " 10Ω
	R3508310	UNLOCK Lever	R102	J24205220	" " 220J " 22Ω
	R0117370	Coil Spring	R106,109	J24205221	" " 221J " 220Ω
	R0507950B	Battery Spring Plate	R110	J24205331	" " 331J " 330Ω
	R3503650A	Top Panel Gasket	R111	J24205102	" " 102J " 1kΩ
	R3507960	Jack Seal Gasket	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
MOTHER BOARD					
Symbol No.	Part No.	Name & Description			
	F2838104A	Printed Circuit Board			
	C028384AA	PCB with Components			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)
Q101	G1090558	LA4145	C103	K22170221	" " " 27pF " (C2012CH1H270JFA)
			C111,122,125-127 131,135-141	K22170805	" " " 0.001μF B (C2012B1H102MFA)
		PWR-MODULE	C102,132,134	K22170817	" " " 0.01μF " (C2012B1H103MFA)
Q107	G1090732	M57796MA	C128,142	K22171008	" " " 0.047μF F (C2012F1H473ZFA)
			C109,110,112,115 119,120,129	K22141904	" " " 25WV 0.1μF D (C3216D1E104MFA)
		TRANSISTORS	C121	K78130001	Tantalum 20WV 0.47μF (F951D474MRAAF1Q2)
Q102	G3111627G	2SA1162GRTE85R			
Q103	G3327127G	2SC2712GRTE85R			
Q104	G3070001	FA1A4M	C113,118,123	K40129052	Electrolytic 16WV 10μF (RC3-16V100M)
Q105	G3333567	2SC3356-T2B			
Q106	G3329547	2SC2954-T2B	C114,124	K40129038	" " 16WV 100μF (RC2-16V101M)
			C116,117	K40089020	" " 6.3WV 100μF (RC3-6V101M)
		DIODE			
D101	G2070009	1SS184TE85R SI			
					TRIMMER CAPACITOR
			TC101	K91000149	VCT31E161A 20pF
		CRYSTAL FILTER			
XF101	H1102114	10M15BM 10.7MHz			

TRANSFORMERS			IF UNIT		
Symbol No.	Part No.	Name & Description	Symbol No.	Part No.	Name & Description
T101	L0021416	145MHz			
T102-104	L0021418	"		F2838102	Printed Circuit Board
				C028382AA	PCB with Components
INDUCTORS					
L101,102	L1190275	LAL02NAR22M 0.22μH			IC
L103	L1020671		Q302	G1090698	TK10420M
CONNECTORS					TRANSISTOR
J101	P0090599	IL-Y-5P-S15T2-EF	Q301	G3326207B	2SC2620QBTR
J102	P0090601	IL-Y-14P-S15T2-EF			
J103	P0090598	IL-Y-4P-S15T2-EF			
P101(with wire)	T9205436				
					DIODES
			D301,302	G2070007	1SS226TE85L Si
FRONT END UNIT					CRYSTAL
Symbol No.	Part No.	Name & Description	X301	H0102773	UM-1 10.245MHz
	F2838111A	Printed Circuit Board			
	C02838BAA	PCB with Components			
					CERAMIC DISCRIMINATOR
			CD301	H7900260	D455C
FETS					
Q201,202	G3803027Y	2SK302YTE85R			
					RESISTORS
			R305	J24205101	RMC 1/10T101J 1/10W100Ω
			R304	J20205471	" " 471J " 470Ω
D201-203	G2090248	1T32 Varactor	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
R201	J24205560	RMC 1/10T 560J 1/10W 56Ω	R309,316	J24205103	" " 103J " 10kΩ
R206,209,210	J24205101	" " 101J " 100Ω	R303,310	J24205473	" " 473J " 47kΩ
R207	J24205471	" " 471J " 470Ω	R306	J24205823	" " 823J " 82kΩ
R202-204	J24205104	" " 104J " 100kΩ	R302	J24205224	" " 224J " 220kΩ
R205	J24205474	" " 474J " 470kΩ	R312	J24205474	" " 474J " 470kΩ
CAPACITORS					CAPACITORS
C202,203,205,207	K22170221	Chip Ceramic 50WV 27pF CH (C2012CH1H270JFA)	C303	K22170213	Chip Ceramic 50WV 12pF CH (C2012CH1H120JFA)
C201,210	K22170805	" " " 0.001μF B (C2012B1H102MFA)	C304,310	K22170229	" " " 56pF " (C2012CH1H560JFA)
C206,209	K22170817	" " " 0.01μF " (C2012B1H103MFA)	C305	K22170237	" " " 120pF " (C2012CH1H121JFA)
C208	K22171008	" " " 0.047μF F (C2012F1H473ZFA)	C309	K22170239	" " " 150pF " (C2012CH1H151JFA)
C204	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)	C315	K22170243	" " " 220pF " (C2012CH1H221JFA)
			C302,306,314	K22170805	" " " 0.001μF B (C2012B1H102MFA)
			C301,312,317	K22170817	" " " 0.01μF " (C2012B1H103MFA)
INDUCTORS					
L201	L1190292	LAL02NA5R6K 5.6μH	C307,308,313	K22141904	" " 25V 0.1μF D (C3216D1E104MFA)
L202	L1190289	LAL02NA3R3K 3.3μH			
			C316,318	K78120013	Chip Tantalum 10WV 1μF (F951C105MRAAF1Q2)

C311	K78080004	Chip Tantalum 6.3W 15μF (F950J156MVCAF1Q2)	TC401	K91000154	TRIMMER CAPACITOR ECR-KN020E11X 20pF
		INDUCTOR			INDUCTORS
L301	L1190344	LAL02KR100K 10μH	L401	L1190311	LAL02NA221K 220μH
PLL UNIT					
Symbol No. Part No. Name & Description			VCO UNIT		
	F2838108A	Printed Circuit Board	Symbol No.	Part No.	Name & Description
	C028388AA	PCB with Components Model A1,A2,D,E2 5kHz steps		F2838106	Printed Circuit Board VCO-LC
	C028388AB	" " " Model F 10kHz steps		F2838110	" " "
	C028388AC	" " " Model B,C2 12.5kHz steps		C028386AF	VCO-OSC PCB with Components
		ICs	Q501	G3802387S	FET 2SK238-K17
Q401	G1090725	MC12017P			
Q402	G1090582	JLC1007P			
					TRANSISTOR
			Q502	G3327597C	2SC2759-T2B U23
		DIODE			
D401	G2090118	1SS97 Schottky			
					DIODES
			D501	G2090297	1SS110 Si
			D502,503	G2090271	1T33 Varactor
		CRYSTAL			
X401**	H0102771	UM-1 10.240MHz			
X401■	H0102772	UM-1 12.800MHz			
					RESISTORS
			R504	J24205470	RMC 1/10T 470J 1/10W 47Ω
		RESISTORS	R505	J24205101	" " 101J " 100Ω
R408	J24205000	RMC 1/10T 000J 1/10W 0Ω	R501	J24205682	" " 682J " 6.8kΩ
R402,403	J24205220	" " 220J " 22Ω	R506	J24205683	" " 683J " 68kΩ
R404,405,407	J24205222	" " 222J " 2.2kΩ	R503	J24205224	" " 224J " 220kΩ
R406■	J24205472	" " 472J " 4.7kΩ	R502	J24205225	" " 225J " 2.2MΩ
R401,406*	J24205103	" " 103J " 10kΩ			
R406*	J24205153	" " 153J " 15kΩ			
					CAPACITORS
			C508	K22170201	Chip Ceramic 50WV 0.5pF CH (C2012CH1HOR5CFA)
		CAPACITORS	C503	K22170211	" " " 10pF " (C2012CH1H100DFA)
C401	K22170206	Chip Ceramic 50WV 5pF CH (C2012CH1H050CFA)	C506,507	K22170311	" " " " UJ (C2012UJ1H100DFA)
C411,412	K22170227	" " " 47pF " (C2012CH1H470JFA)	C501	K22170215	" " " 15pF CH (C2012CH1H150JFA)
C408-410,419	K22170235	" " " 100pF " (C2012CH1H101JFA)	C502,505,510	K22170805	" " " 0.001μF B (C2012B1H102MFA)
C402,403,405,407 413-415	K22170805	" " " 0.001μF B (C2012B1H102MFA)	C509	K78080002	Chip Tantalum 6.3WV 4.7μF (F950J475MSAAF1Q2)
C416,417	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)	C504	K78080003	" " " 10μF (F950J106MTAAF1Q2)
C404,406,420	K78080002	Chip Tantalum 6.3WV 4.7μF (F950J475MSAAF1Q2)			
C418	K78100003	" " 10WV 6.8μF (F951A685MTAAF1Q2)			

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

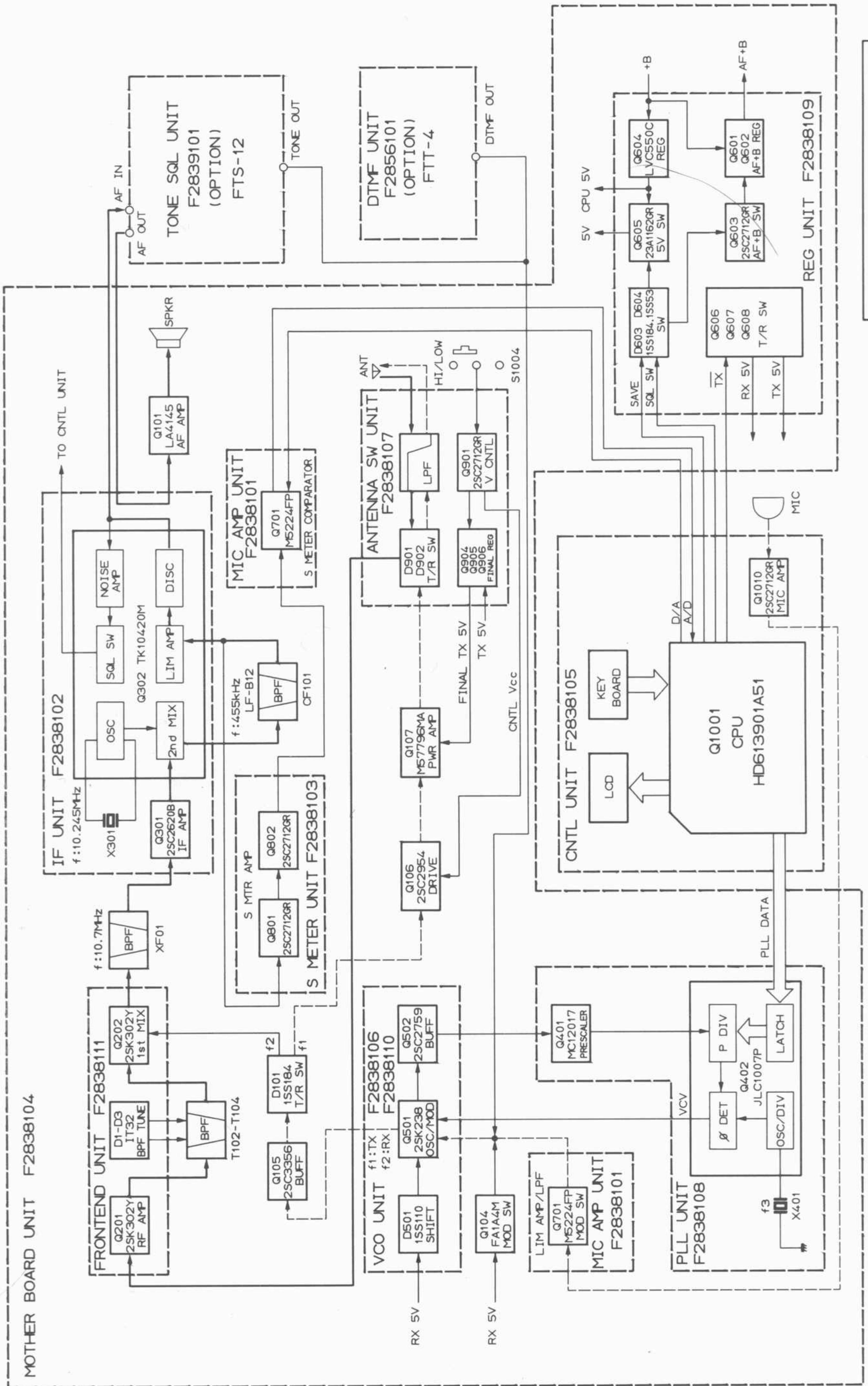
		TRIMMER CAPACITOR			
TC501	K91000152	ECR-JA040G12X	C602	K78100003	Chip Tantalum 10WV 6.8 μ F (F951A685MTAAF1Q2)
			C607	K78080003	" " 6.3WV 10 μ F (F950J106MTAAF1Q2)
		INDUCTORS			
L501-503	L1190283	LAL02NA1R0M 1 μ H			
L504	L1190342	LAL02KRR22M 0.22 μ H			
			MIC AMP UNIT		
			Symbol No.	Part No.	Name & Description
		TRANSFORMER		F2838101	Printed Circuit Board
T501	L0021684A	R12-E991X 150MHz		C028381AA	PCB with Components Model A1,A2,F
				C028381AB	" " " Model B,C2,D,E2
		TEST POINTS			
TP	Q5000082	IPS-1091-01			
					IC
	R0116640	SHIELD CASE	Q701	G1090726	M5224FP
	R0117100	SHIELD TOP			
					RESISTORS
			R705	J24205332	RMC 1/10T332J1/10W3.3k Ω
			R710	J24205562	" " 562J " 5.6k Ω
			R701*,702*,709 711-713	J24205103	" " 103J " 10k Ω
			R704*,715	J24205223	" " 223J " 22k Ω
			R708	J24205333	" " 333J " 33k Ω
			R707	J24205563	" " 563J " 56k Ω
		IC	R716	J24205104	" " 104J " 100k Ω
Q604	G1090736	LVC550C-2	R703,714	J24205225	" " 225J " 2.2M Ω
			R706	J24205335	" " 335J " 3.3M Ω
		TRANSISTORS			
Q601	G3207997L	2SB799ML			CAPACITORS
Q602,603,608	G3327127G	2SC2712GRTE85R	C705,708,710,711 713,714	K22170805	Chip Ceramic 50WV 0.001 μ F B (C2012B1H102MFA)
Q605-607	G3111627G	2SA1162GRTE85R	C703*	K22170809	" " " 0.0022 μ F " (C2012B1H220MFA)
			C702*,703*,709	K22170817	" " " 0.01 μ F B (C2012B1H103MFA)
		DIODES	C706	K22171008	" " " 0.047 μ F " (C2012B1H473ZFA)
D601,604	G2090027	1SS53 Si	C701*,704*,707 712	K22141904	" " " 0.1 μ F D (C3216D1E104MFA)
D602	G2090183	HZ9A2L Zener			
D603	G2070009	1SS184TE85R Si			
					RESISTORS
R602	J01245829	Carbon film 1/4W 8.2 Ω TJ			
R601	J24205101	RMC 1/10T101J 1/10W 100 Ω			
R608	J24205222	" " 222J " 2.2k Ω			
R606,607,612	J24205472	" " 472J " 4.7k Ω			
R605,611	J24205103	" " 103J " 10k Ω			
R603	J24205223	" " 223J " 22k Ω			
R604,609,610	J24205104	" " 104J " 100k Ω			
					TRANSISTORS
C601,603,604 606,608-613	K22170805	Chip Ceramic 50WV 0.001 μ F B (2012B1H102MFA)	Q801,802	G3327127G	2SC2712GRTE85R
C605	K78120002	Chip Tantalum 16WV 2.2 μ F (F951C225MSAAF1Q2)			

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

		DIODES				INDUCTORS																			
D801,802	G2090029	1N60	Ge	L901	L1190344	LAL02KR100K 10μH																			
				L902, L904	L0021683																				
				L903	L0021682																				
		RESISTORS																							
R802	J24205102	RMC 1/10T102J	1kΩ																						
R804	J01245102	Carbon film 1/4W	1kΩ			TERMINAL POSTS																			
R801,803	J24205104	RMC 1/10T104J	100kΩ	TP901	Q5000016	TP-E/MS-60124																			
		CAPACITORS																							
C801	K22170801	Chip Ceramic 50WV 470pF B	(C2012B1H471MFA)	<table border="1"> <thead> <tr> <th colspan="3">CNTL UNIT</th> </tr> <tr> <th>Symbol No.</th> <th>Part No.</th> <th>Name & Description</th> </tr> </thead> <tbody> <tr> <td></td> <td>F2838105A</td> <td>Printed Circuit Board</td> </tr> <tr> <td></td> <td>C028385AA</td> <td>PCB with Components Model F</td> </tr> <tr> <td></td> <td>C028385AB</td> <td>" " " Model A1, A2</td> </tr> <tr> <td></td> <td>C028385AC</td> <td>" " " Model B, C2, D, E2 w/o BAT1001</td> </tr> </tbody> </table>				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
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																							
C802,803	K22170817	" " " 0.01μF "	(C2012B1H103MFA)																						
ANT SW UNIT																									
Symbol No.	Part No.	Name & Description																							
	F2838107A	Printed Circuit Board																							
	C028387AA	PCB with Components																							
							ICs																		
				Q1001	G1090741	HD613901A51																			
				Q1007	G1090752	PST523G																			
Q901,905	G3207997L	2SB799ML		Q1008	G1090602	μPD4066BG																			
Q902-904	G3327127G	2SC2712GRTE85R		Q1009	G1090601	μPD4001BG																			
		DIODES					TRANSISTORS																		
D901,902	G2090027	1SS53	Si	Q1002,1012	G3111627G	2SA1162GRTE85R																			
D903	G2070007	1SS226TE85R	"	Q1003-1006,1010	G3327127G	2SC2712GRTE85R																			
				Q1011,1013	G3070001	FA1A4M																			
		RESISTORS					DIODES																		
R905	J24205221	RMC 1/10T221J	1/10W 220Ω	D1001,1002,1008	G2070001	1SS181TE85R	Si																		
R903	J24205471	" " 471J	" 470Ω	D1003,1005	G2090334	HZ4ALL	Zener																		
R901,904,906	J24205222	" " 222J	" 2.2kΩ	D1004	G2090118	1SS97	Schottky																		
R902	J24205473	" " 473J	" 47kΩ	D1006	G2070028	SLM-23VMW T-97 LED																			
				D1007	G2070009	1SS184TE85R	Si																		
		CAPACITORS					LIQUID CRYSTAL DISPLAY																		
C916	K22170207	Chip Ceramic 50WV 6pF CH	(C2012CH1H060DFA)																						
C914	K22170209	" " " 8pF "	(C2012CH1H080DFA)	DS1001	G6090060	LR-541C																			
C917	K22170217	" " " 18pF "	(C2012CH1H180JFA)																						
C913,915	K22170223	" " " 33pF "	(C2012CH1H330JFA)				CERAMIC RESONATOR																		
C901,903,905 907-912	K22170805	" " " 0.001μF B	(C2012B1H102MFA)	X1001	H7900270	CSB800K																			
C904	K40179033	Electrolytic " 0.47μF	(RC3-50VR47M)																						
C902,906	K40129052	" 16WV 10μF	(RC3-16V100M)																						

		RESISTORS			SPEAKER
R1017	J24205221	RMC 1/10T221J 1/10W 220Ω	SP1001	M4090063	T036S13Y2611
R1027	J24205331	" " 331J " 330Ω			
R1037	J24205471	" " 471J " 470Ω			
R1016	J24205561	" " 561J " 560Ω			
R1029	J24205102	" " 102J " 1kΩ			MIC
R1019, 1036	J24205152	" " 152J " 1.5kΩ	MIC1001	M3290008	EM-78CYE
R1035	J24205222	" " 222J " 2.2kΩ			
R1004*,1012,1020 1038	J24205472	" " 472J " 4.7kΩ			
R1011, 1015,1018 1021-1024,1033 1034,1039	J24205103	" " 103J " 10kΩ	S1001,1002	N5090018	SWITCHES KHH15951 SQL, OFF*, BURST*, PTT
R1028	J24205183	" " 183J " 18kΩ	S1003	N6090063	SSSS22050A
R1003*,1008	J24205223	" " 223J " 22kΩ	S1004	N4090088	SPJ622N09 HI/LO
R1010,1025,1031	J24205473	" " 473J " 47kΩ	S1005	N0190139	SRBMIL066 DIAL
R1001,1002,1005 1013,1014,1026 1030	J24205104	" " 104J " 100kΩ			
R1006,1032	J24205224	" " 224J " 220kΩ			CONNECTORS
R1007	J24205394	" " 394J " 390kΩ	J1001	P1090369	HSJ0838-01-010 MIC
R1009	J24205105	" " 105J " 1MΩ	J1002	P1090370	HSJ0836-01-010 EAR
		POTENTIOMETER			LITHIUM BATTERY
VR1001	J51771103	RVG4F03103-TG 10kΩ	BAT1001	Q9000366	CR2025
					RUBBER CONDUCTOR
				S2000026	24.3x1.8x1 SS
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)	ACCESSORIES*		
C1001,1002	K22170809	Chip Ceramic " 0.0022μF " (C2012B1H222MFA)	Symbol No.	Part No.	Name & Description
C1018	K22170817	" " " 0.01μF " (C2012B1H103MFA)		Q3000049	ANTENNA YHA-16
C1003,1007-1010 1023	K22141904	" " 25WV 0.1μF D (C3216D1E104MFA)		S6000098	HAND STRAP
C1006	K78080002	" " 6.3WV 4.7μF (F950J475MSAAF1Q2)			
C1017	K78100003	" " 10WV 6.8μF (F951A685MTAAF1Q2)			BATTERY PACK*
C1020,1029	K78080003	" " 6.3WV 10μF (F950J106MTAAF1Q2)		D3000493	FNB-10
C1021	K40089010	Electrolytic " 220μF (RC2-6V221M)			
					VINYL SOFT CASE*
				D3000477	CSC-23 u/w FNB-10
				D3000504	CSC-25 u/w FNB-10, FTT-4
		CONNECTORS			
P1001*	T9205433				* Optional same models
P1001*	T9205434				
P1002*	T9205432				
P1002*	T9205435A				
		BUZZER			
BZ1001	M4290001	EFBRE-25D02			

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



MOTHER BOARD UNIT F2838104

FT-23R
BLOCK DIAGRAM

RECEIVE
TRANSMIT
COMMON/CNTL

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

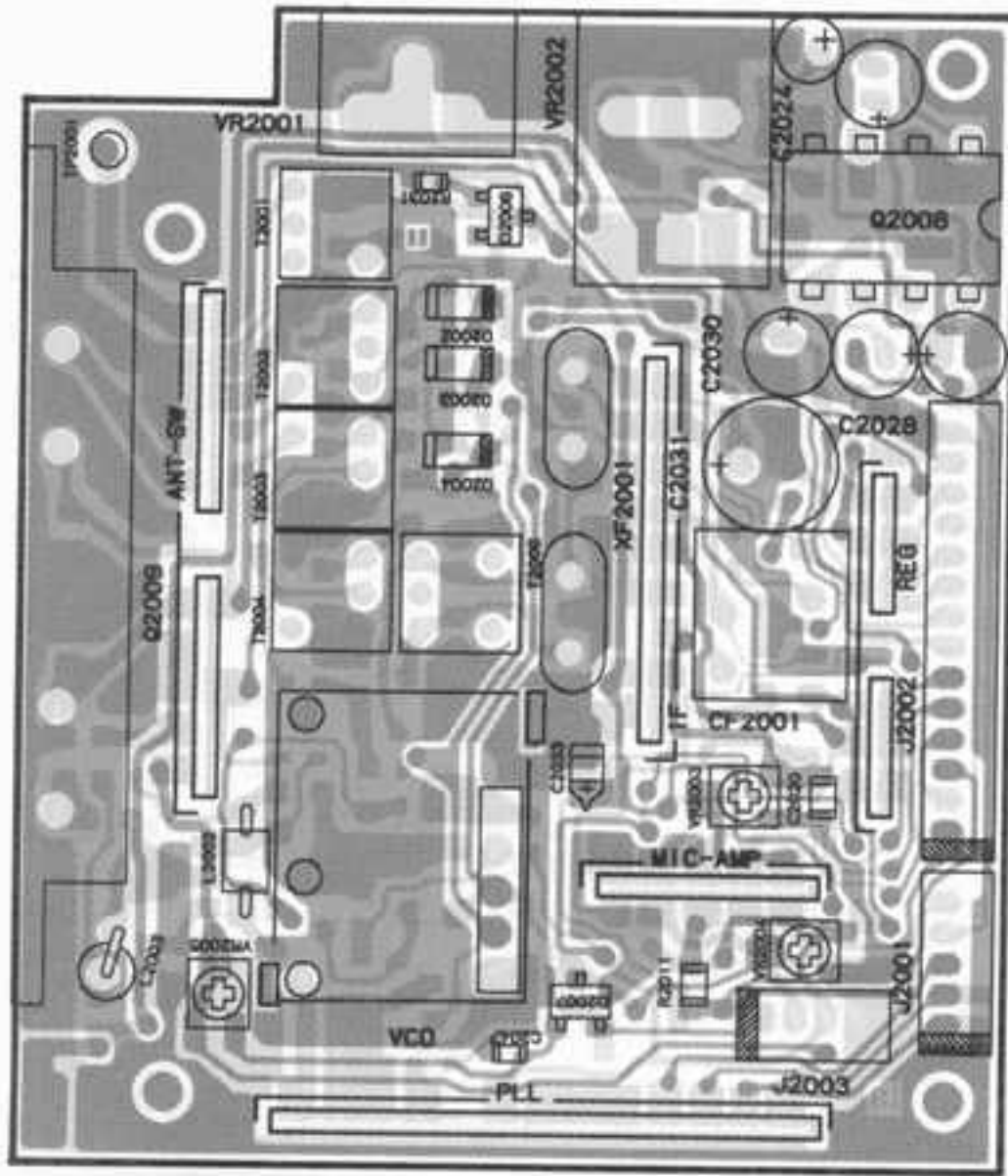
A1,C1,G1	A2,C2,E2	B,D
f1	144-148MHz	140-160MHz
f2	133.3-137.3MHz	129.3-149.3MHz
		133.3-135.3MHz

Late Model FT-23R

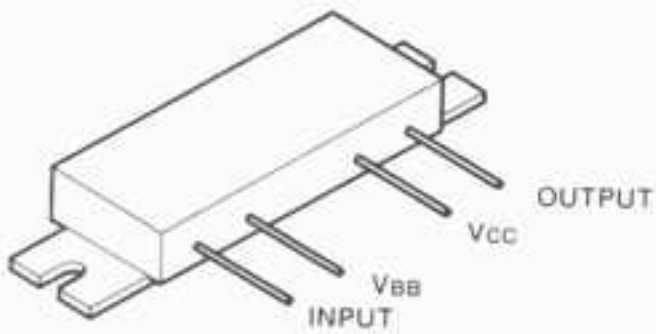
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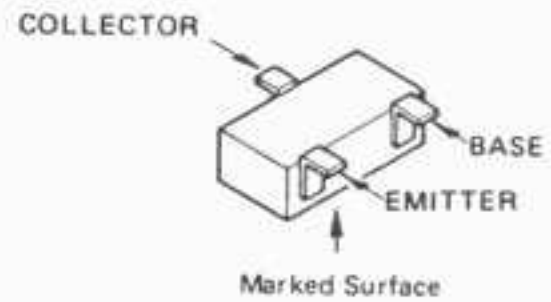
MOTHER BOARD



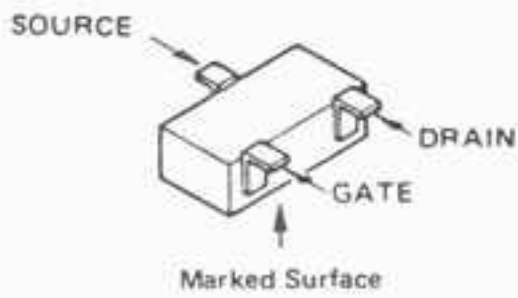
(obverse view of "mixed-component" side)



M57796MA (Q2009)



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

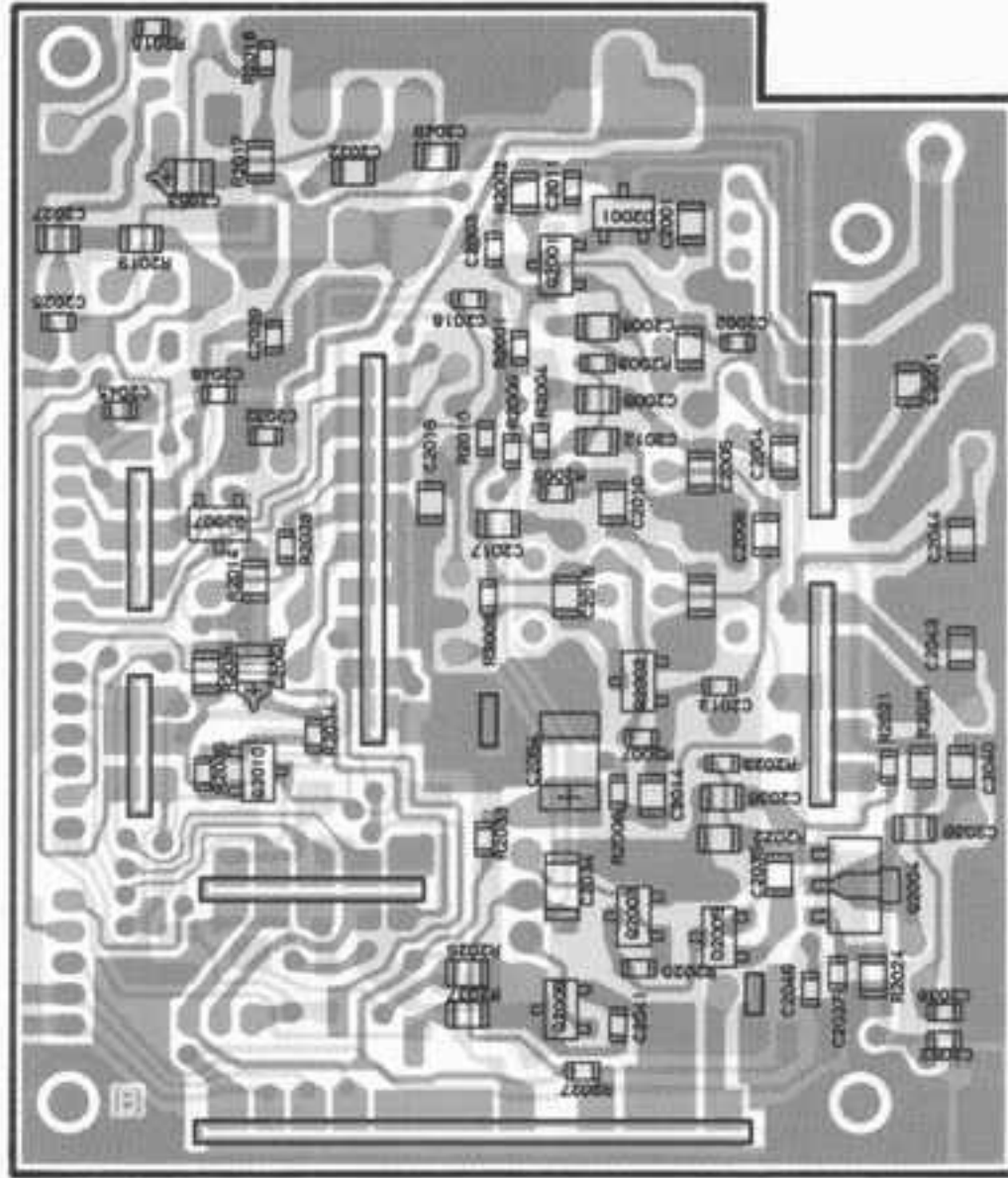


2SK302Y (TY) : (Q2001)

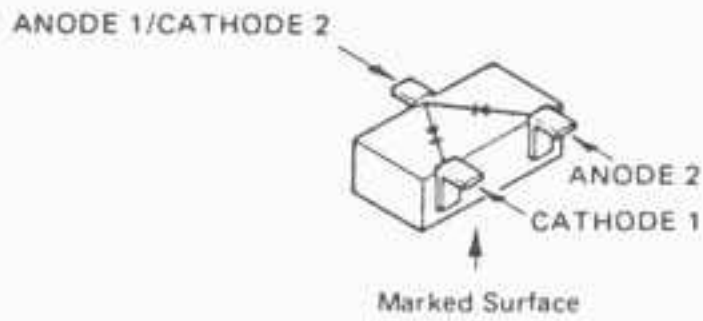


2SC2954 (OK) : (2004)

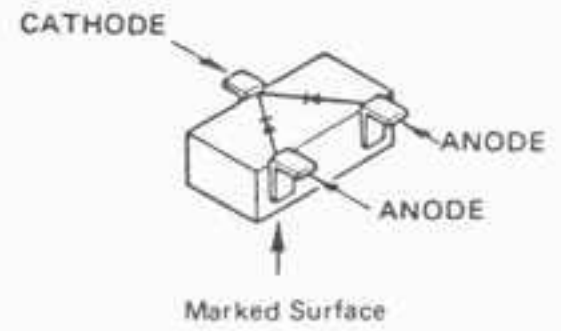
MOTHER BOARD



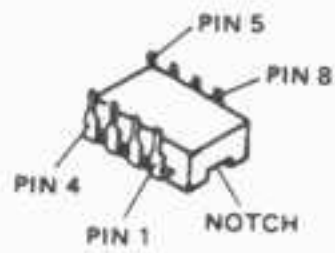
(obverse view of "chip-only" side)



1SS226 (C3) : (D2001,D2007)

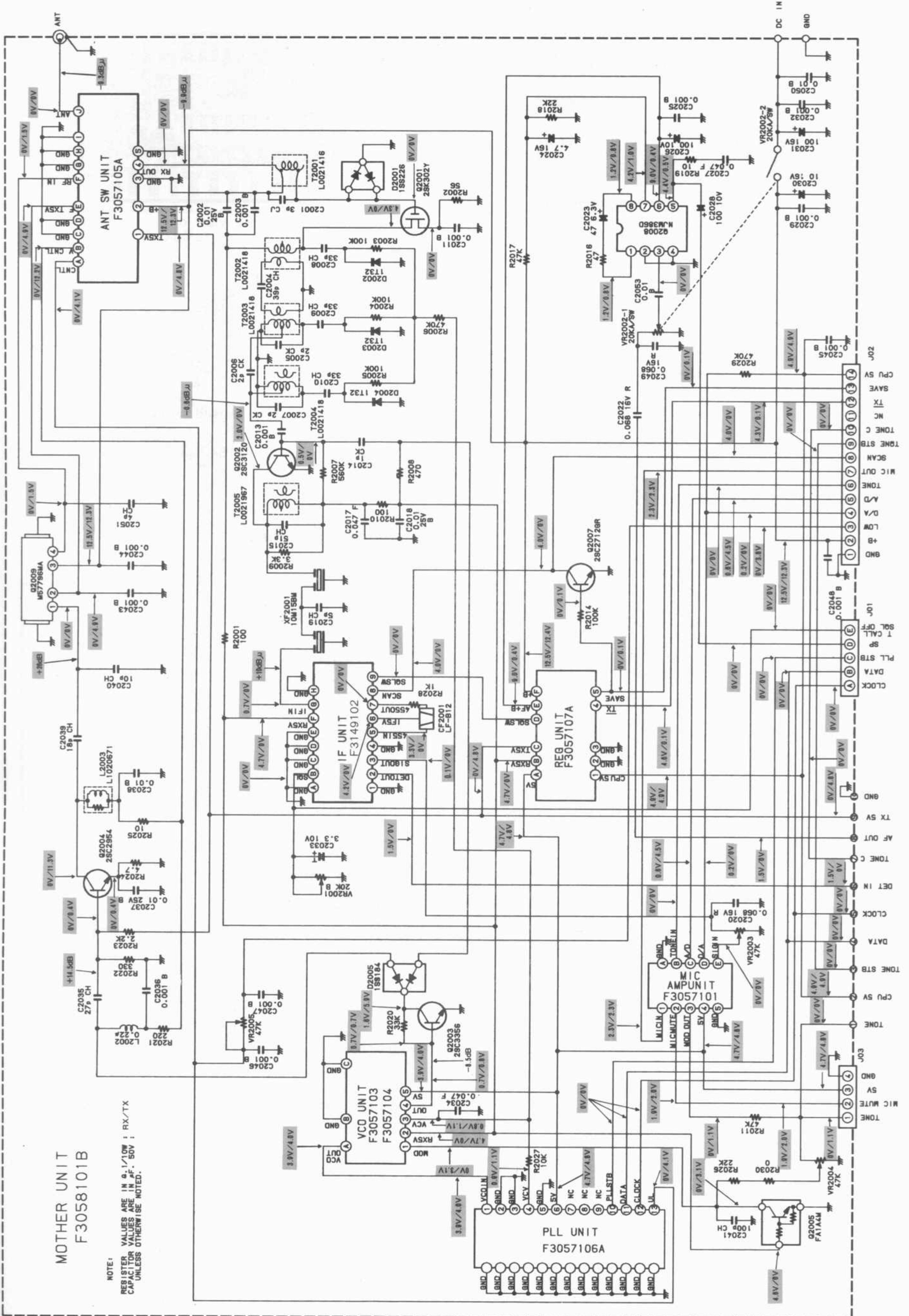


1SS184 (B3) : (D2005)

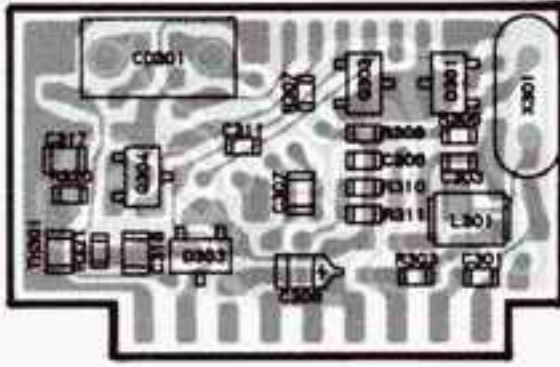


NJM386D (Q2008)

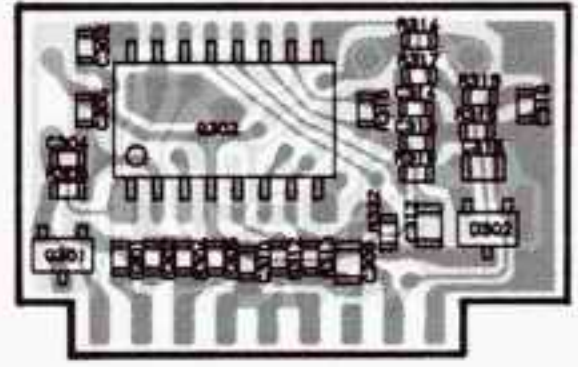
MOTHER BOARD



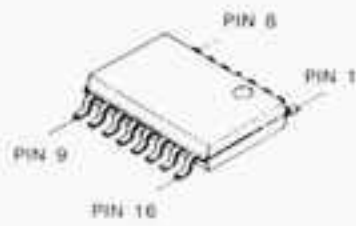
IF UNIT



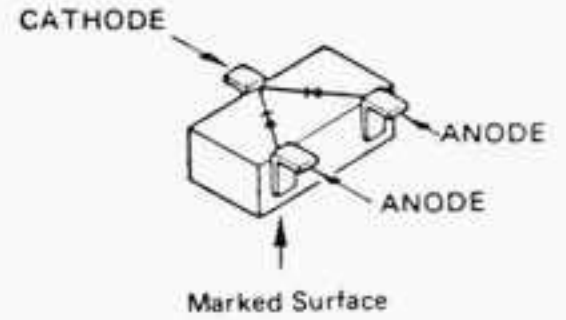
(obverse view of "mixed-component" side)



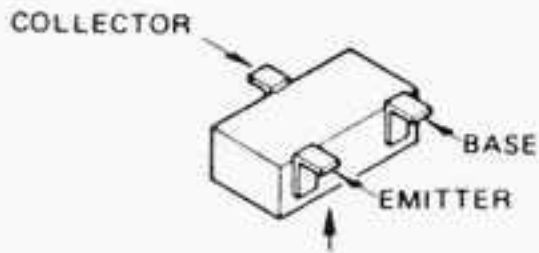
(obverse view of "chip-only" side)



MC3372ML (Q302)

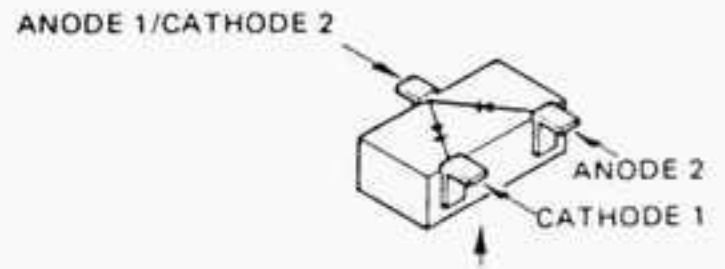


1SS184 (B3) : (D303)



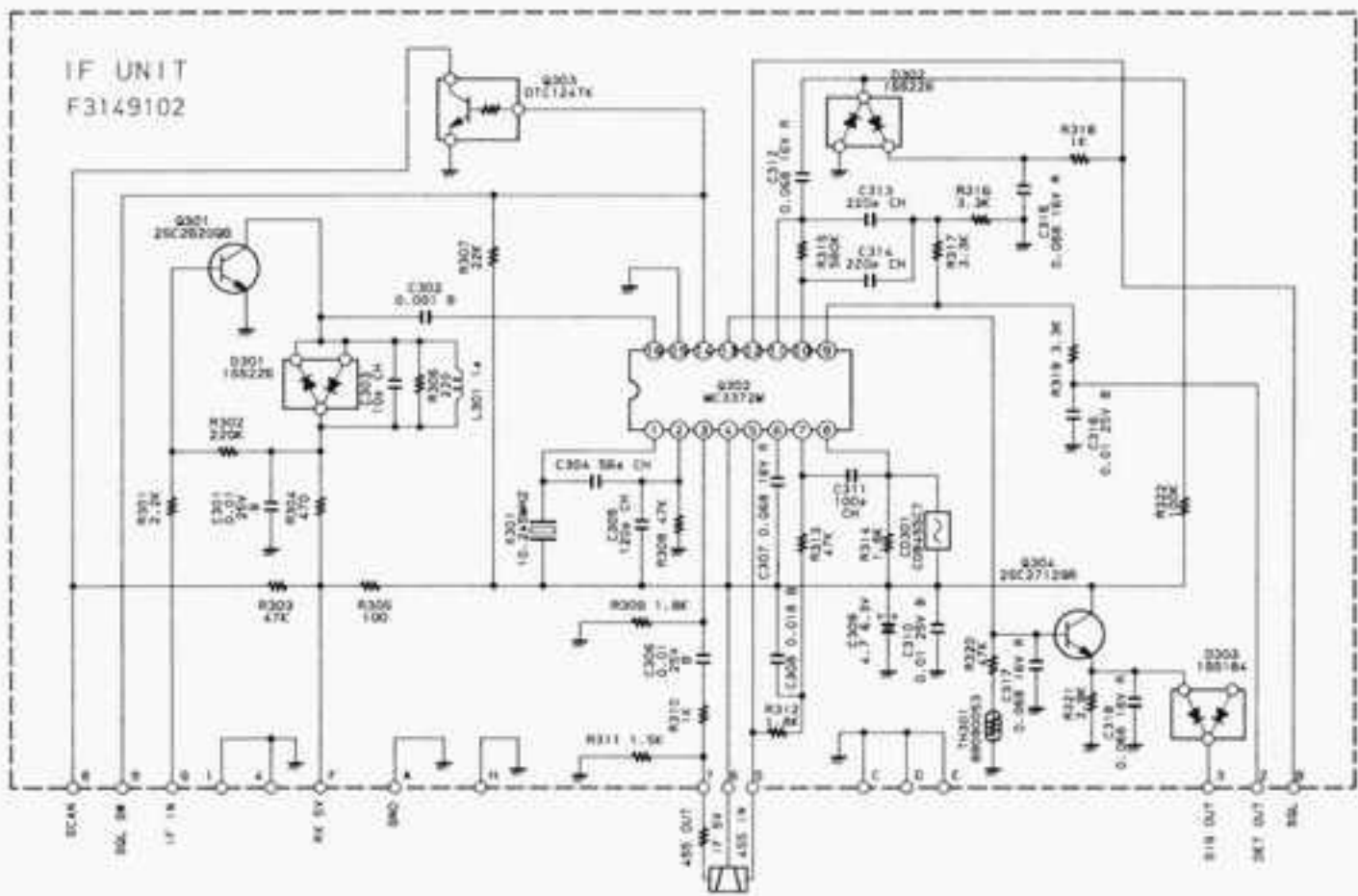
Marked Surface

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

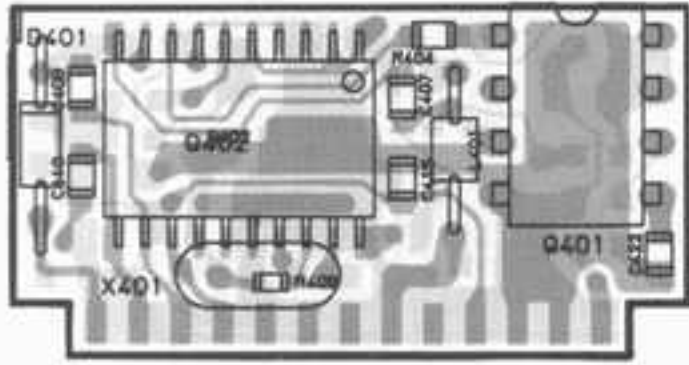


Marked Surface

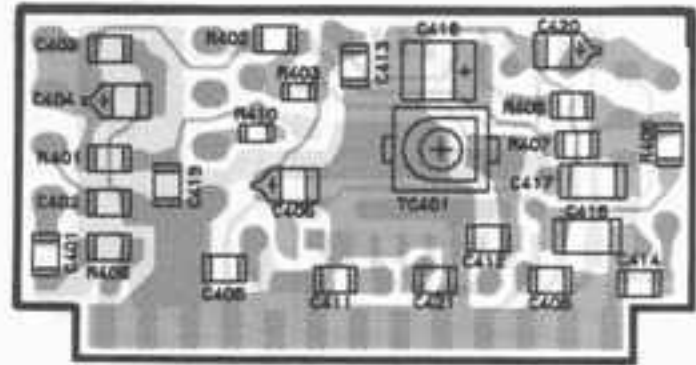
- 1SS226 (C3)
(D301,302)



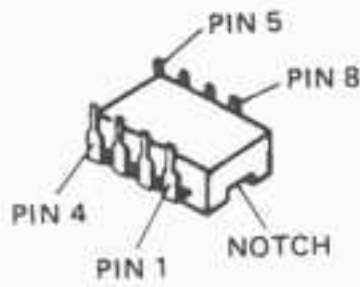
PLL UNIT



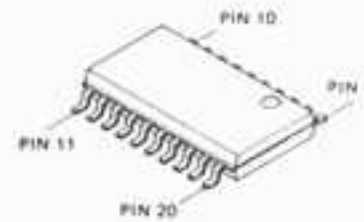
(obverse view of "mixed-component" side)



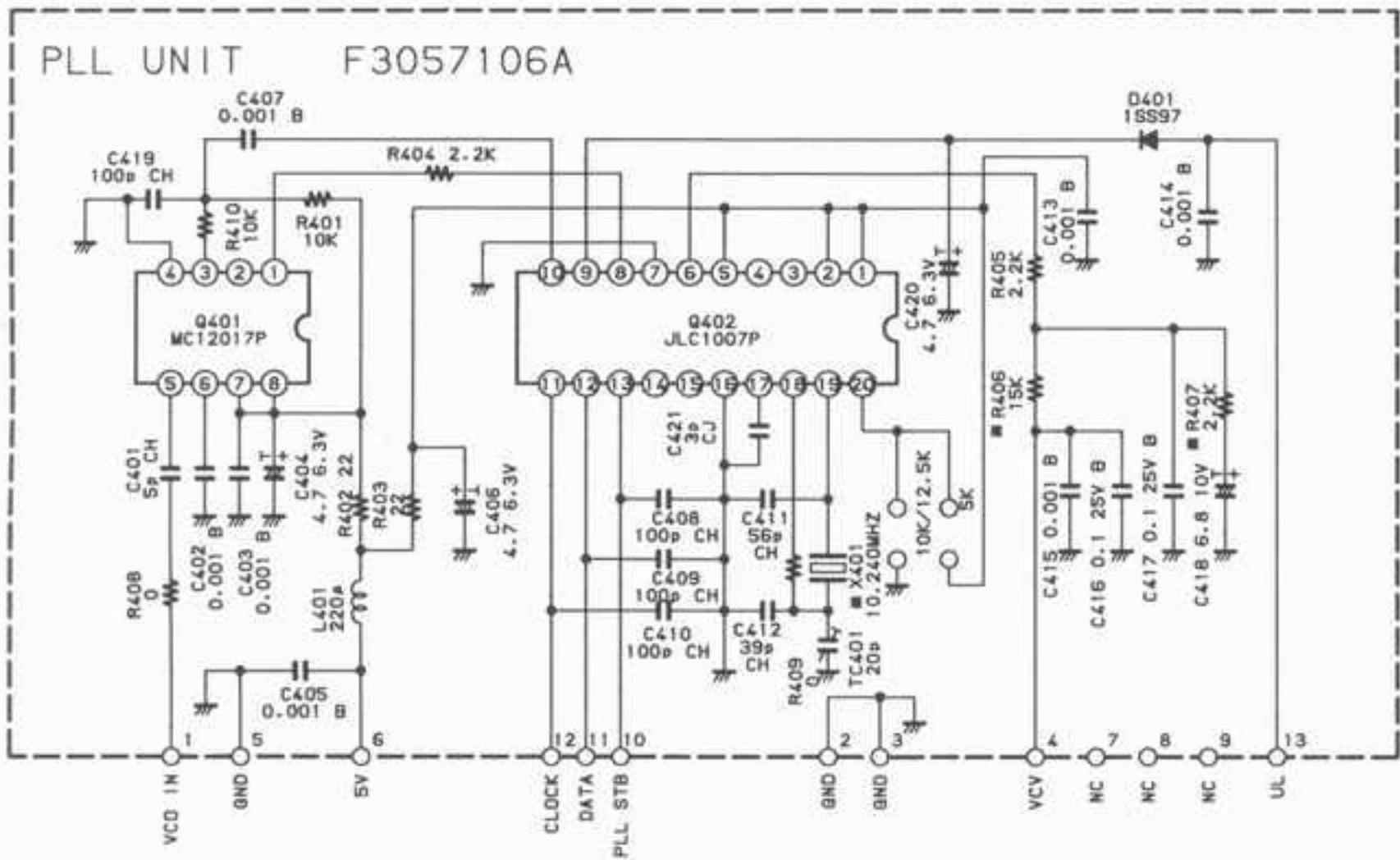
(obverse view of "chip-only" side)



MC12017P (Q401)



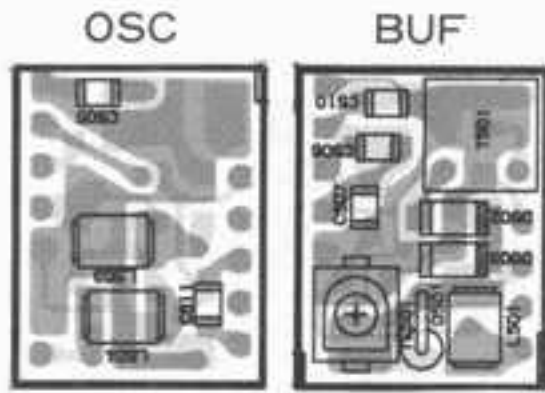
JLC1007P (Q402)



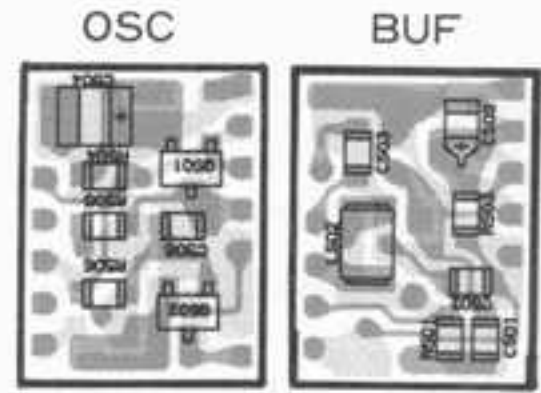
	XF401	R406	R407
A1, A2, D, E2, A3 TYPE	10.240MHZ	15K Ω	1.5K Ω
B, C2 TYPE	12.800MHZ	4.7K Ω	1K Ω

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

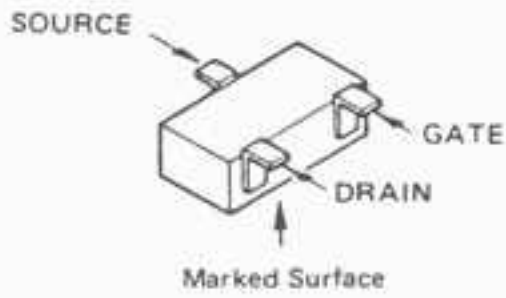
VCO UNIT



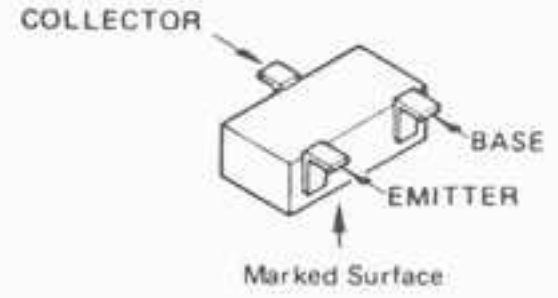
(obverse view of "top" side)



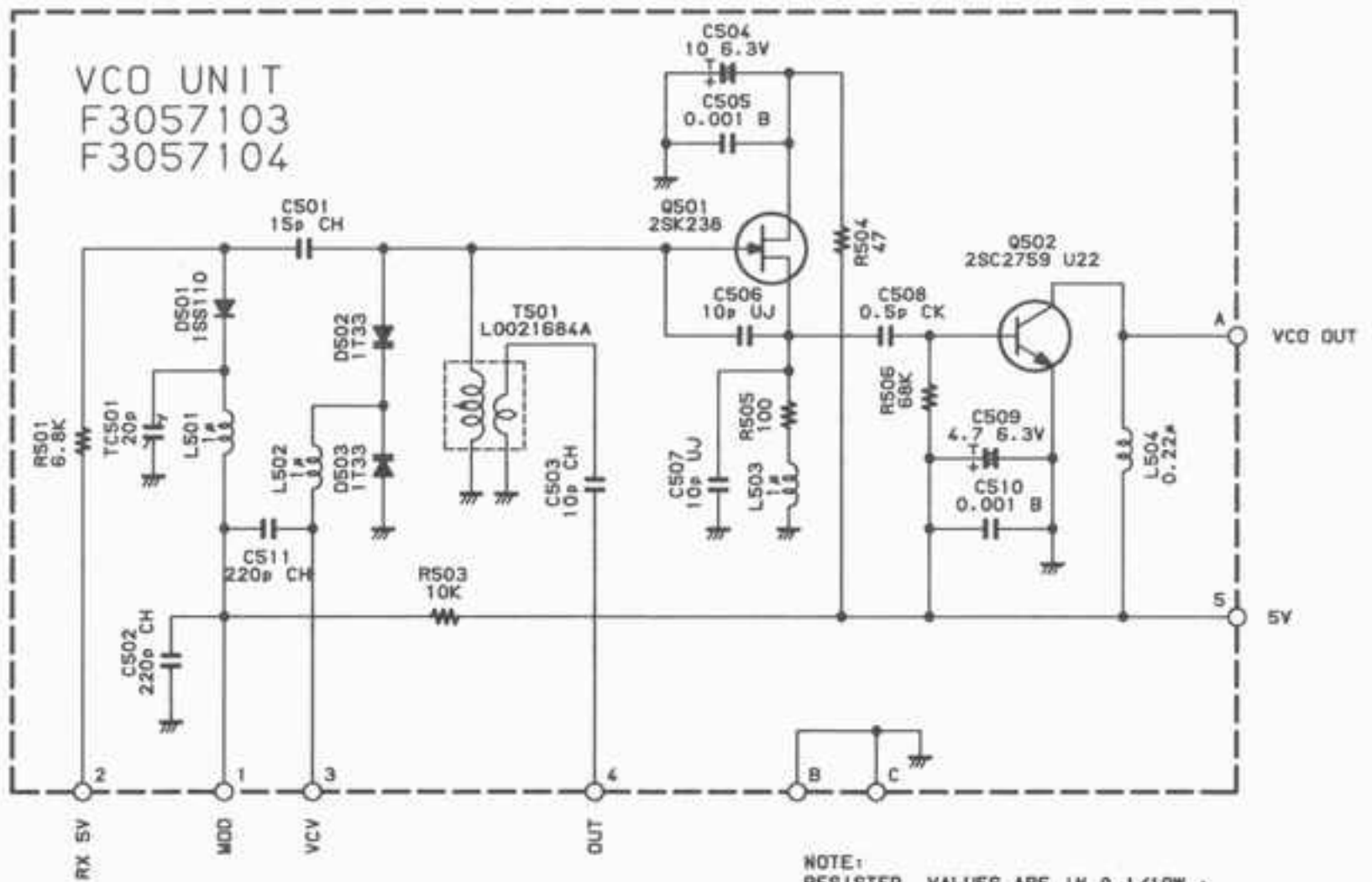
(obverse view of "bottom" side)



2SK238 (K17) : (Q501)

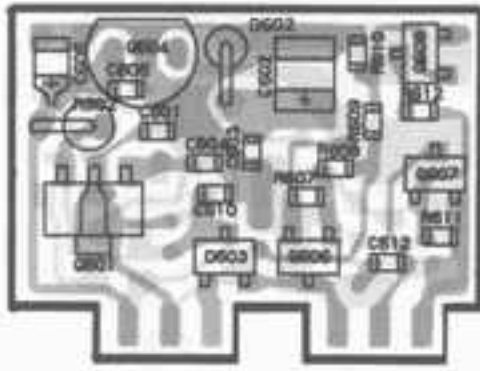


2SC2759 (U22) : (Q502)

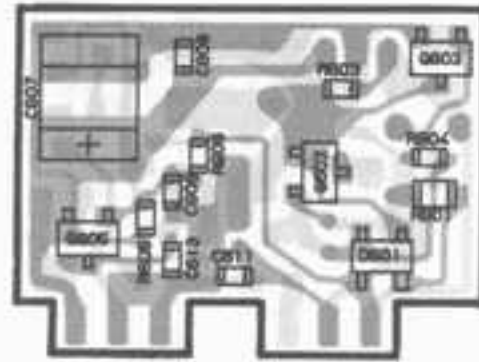


NOTE:
 RESISTOR VALUES ARE IN Ω , 1/10W ;
 CAPACITOR VALUES ARE IN μ F, 50V ;
 (T) CAPACITOR VALUES ARE TANTALUM ;
 INDUCTOR VALUES ARE IN H
 UNLESS OTHERWISE NOTED.

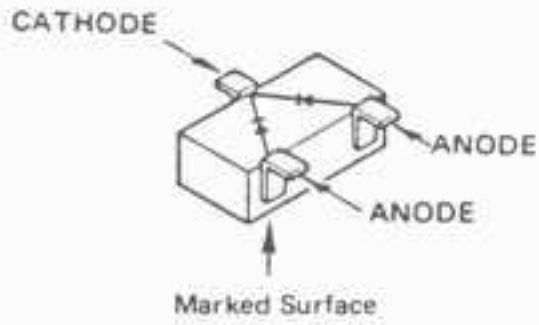
REG UNIT



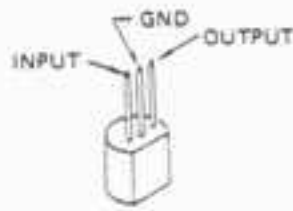
(obverse view of "top" side)



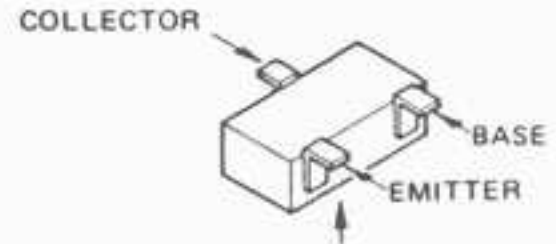
(obverse view of "bottom" side)



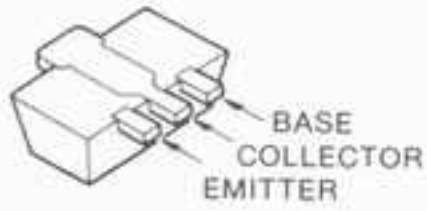
1SS184 (B3) : (D603)



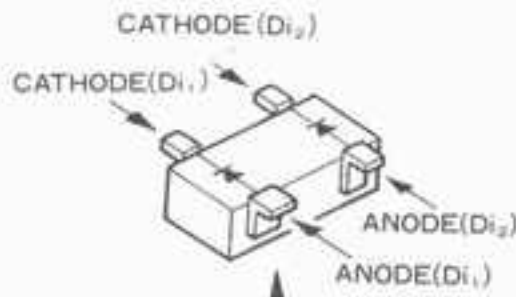
LM2931AZ-5.0 (Q604)



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



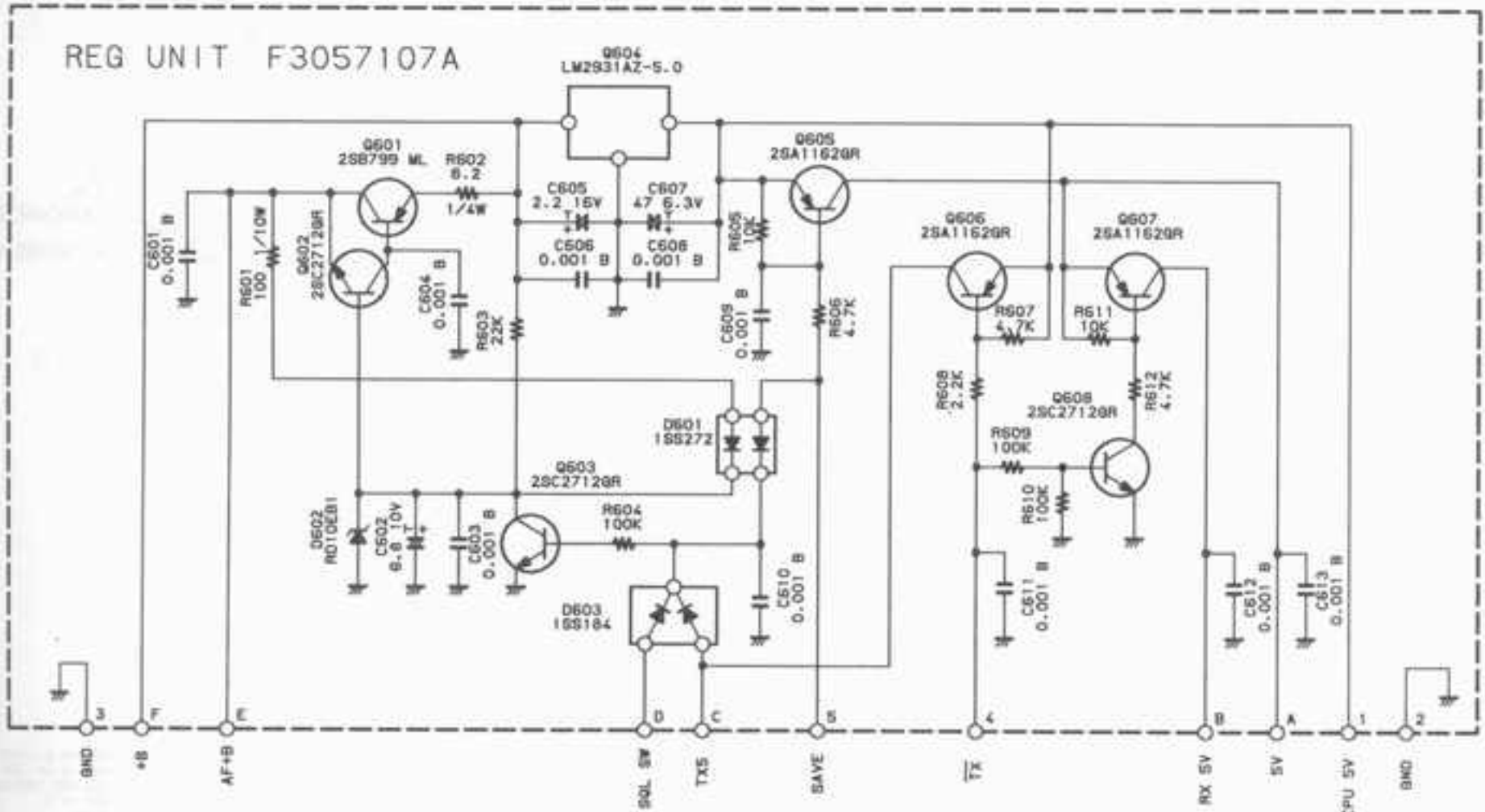
2SB799 (Q601)



1SS272 (A1) : (D601)

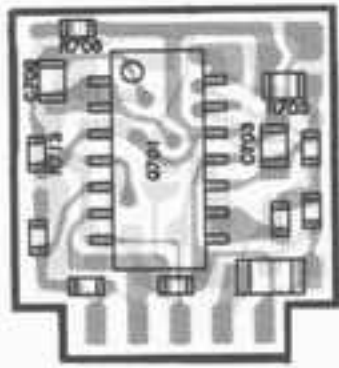
2SC2712GR (LG) (Q602,603,608)

REG UNIT F3057107A

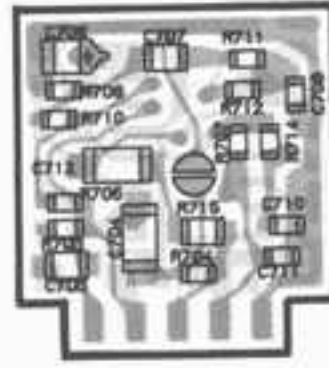


NOTE:
RESISTOR VALUES ARE IN Ω , 1/10W ;
CAPACITOR VALUES ARE IN μ F, 50V ;
(T) CAPACITOR VALUES ARE TANTALUM ;
INDUCTOR VALUES ARE IN H
UNLESS OTHERWISE NOTED.

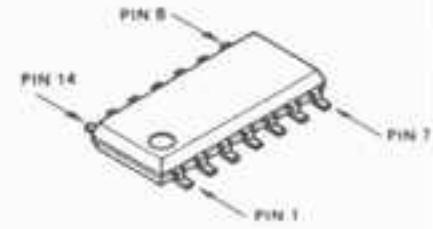
MIC AMP UNIT



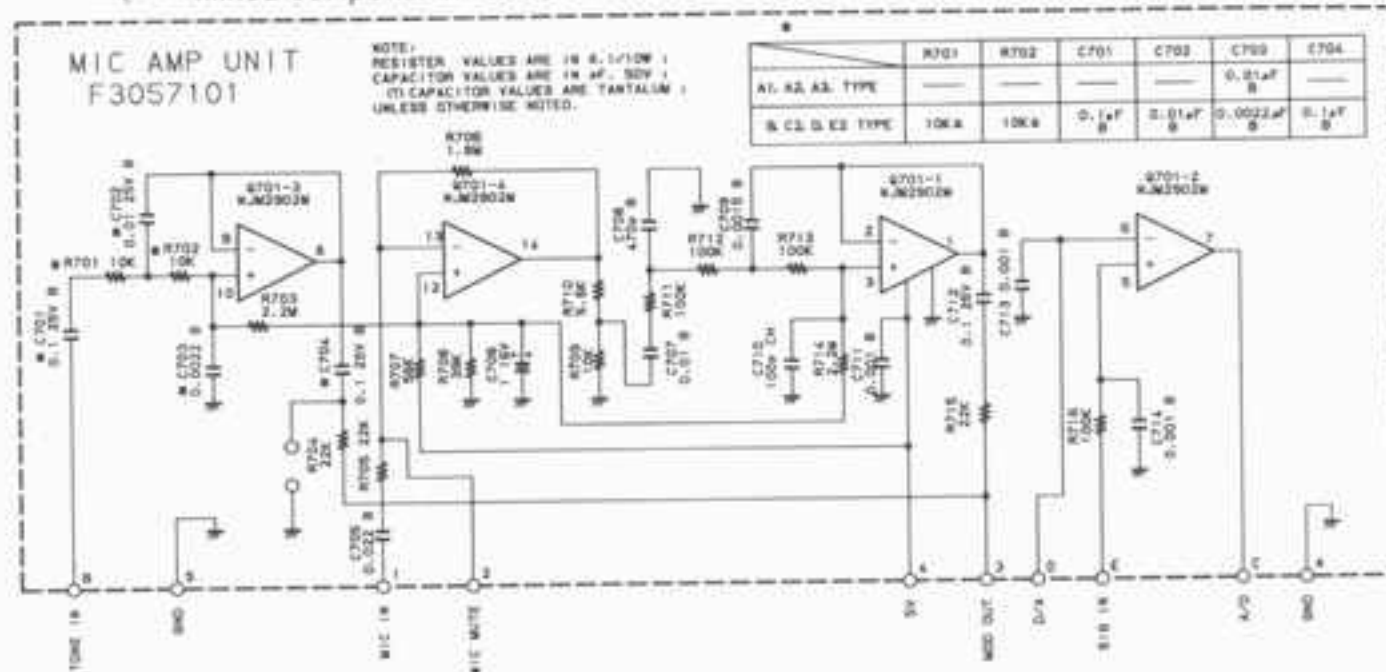
(obverse view of "mixed-component" side)



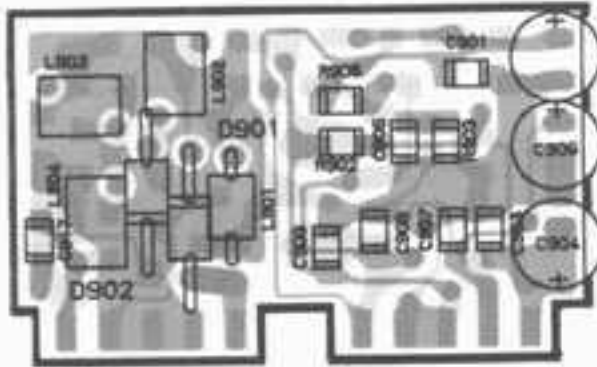
(obverse view of "chip-only" side)



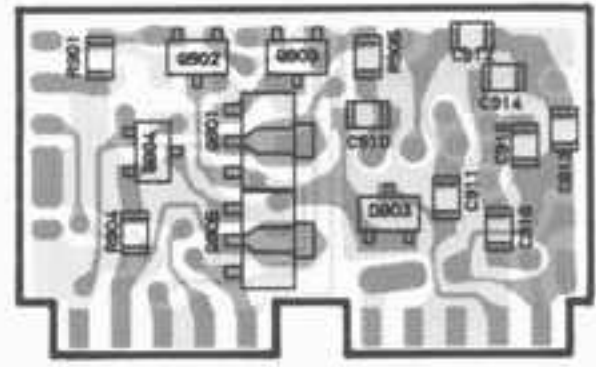
NJM2902M (Q701)



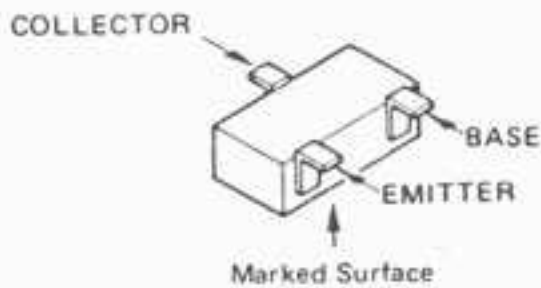
ANT SW UNIT



(obverse view of "mixed-component" side)



(obverse view of "chip-only" side)



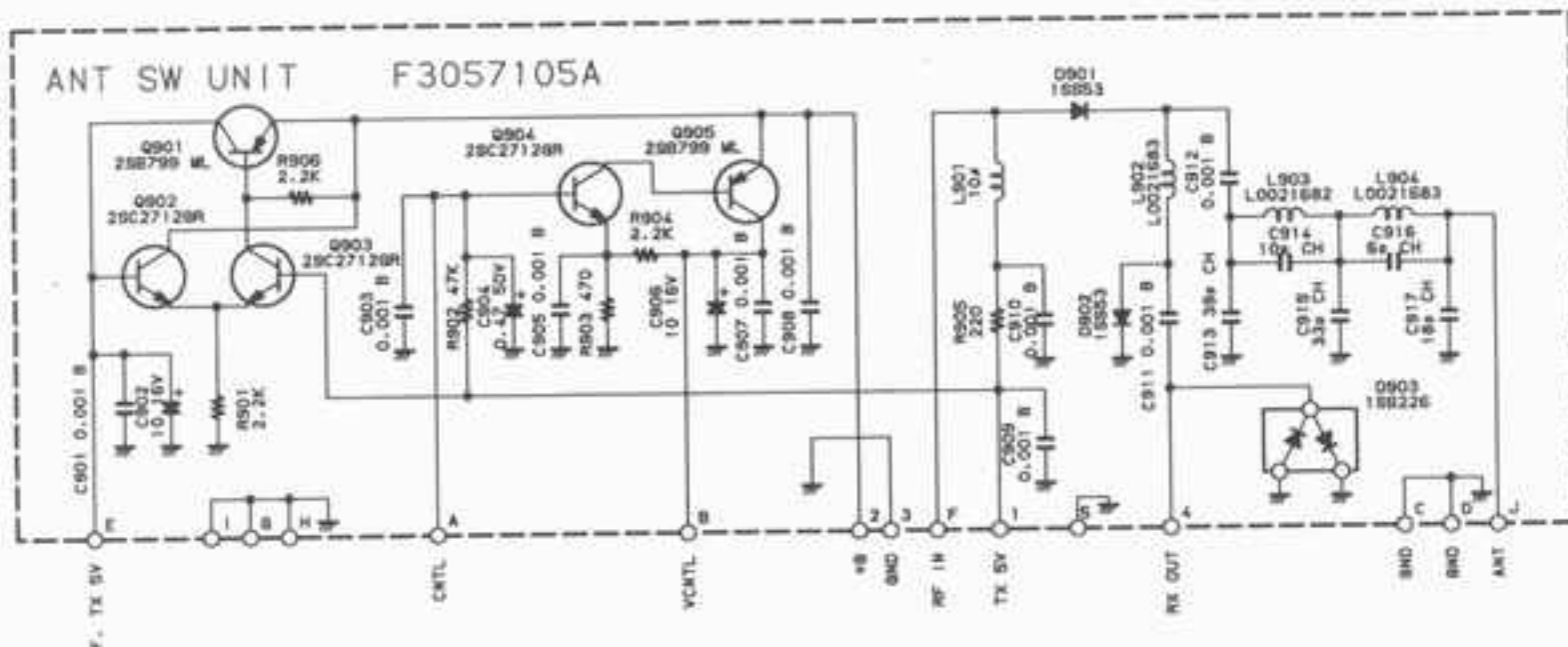
25C2712GR (LQ)
(Q902,903,904)



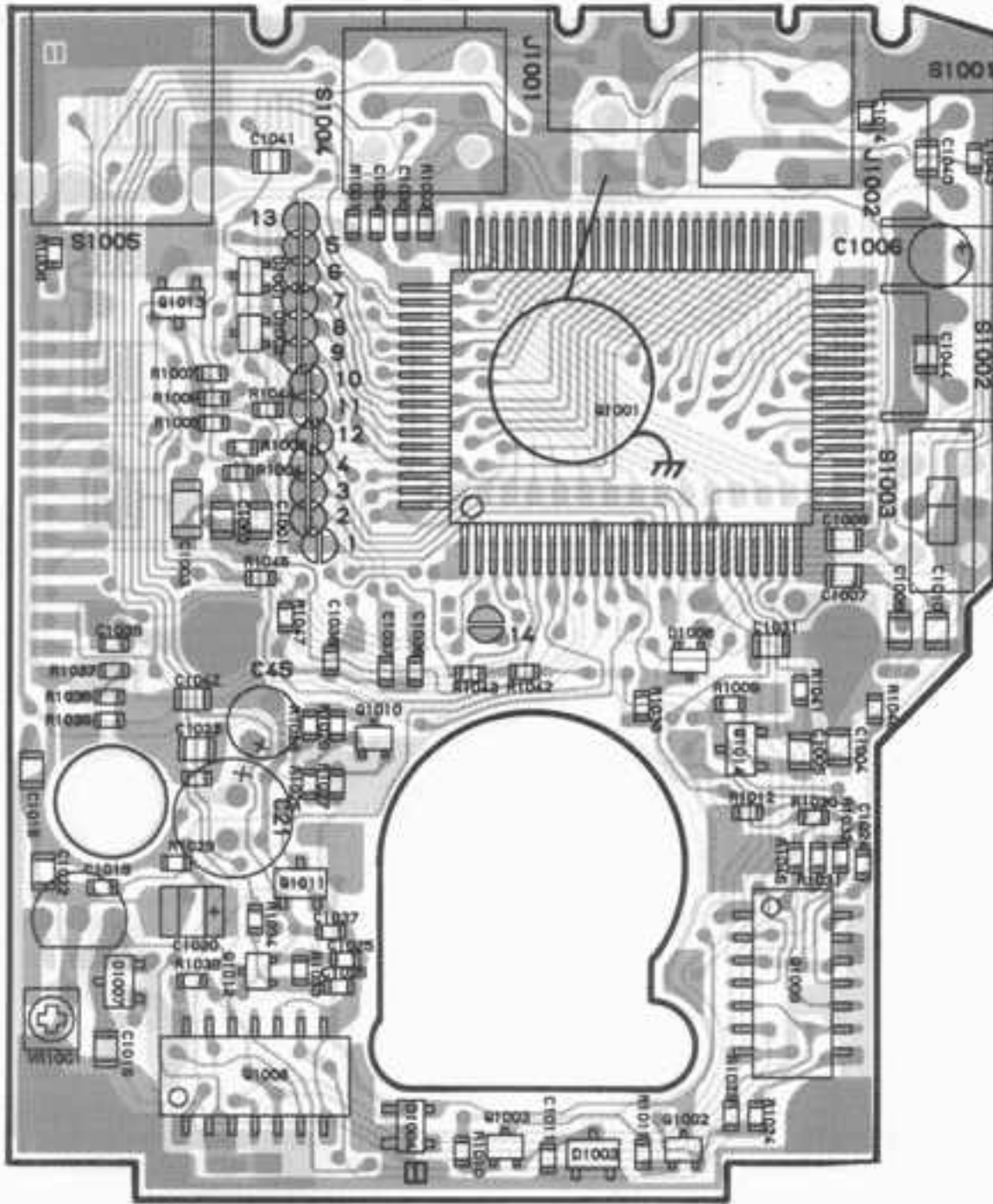
25B799 (Q901,905)



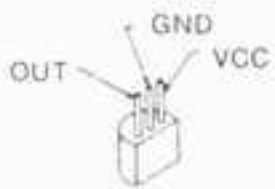
1SS226 (C3) : (D903)



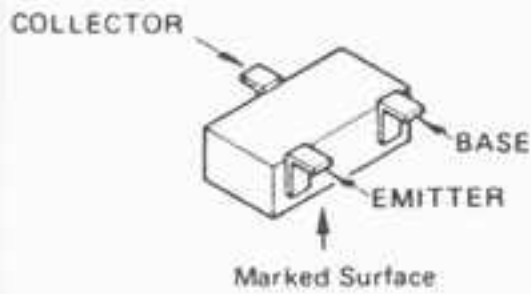
CNTL UNIT



(obverse view of "mixed-component" side)



PST523G (Q1007)

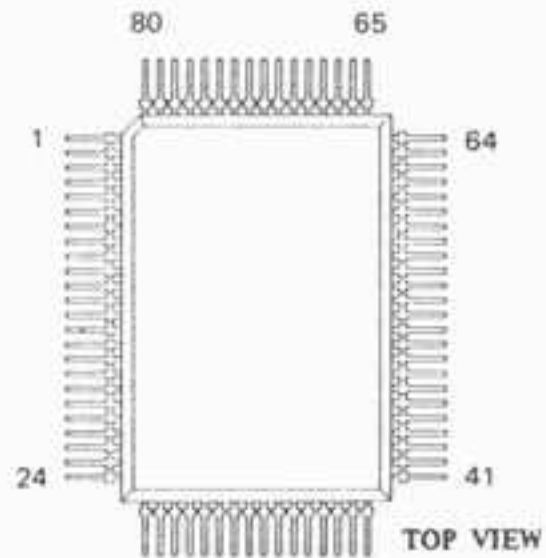


2SA1586Y (SY) : (Q1002, Q1012)

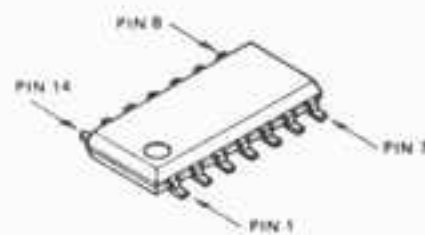
2SC4116GR (LG) : (Q1003, Q1004)
 (Q1005, Q1006)
 Q1010

FA1A4M (L33) : (Q1011, Q1013)

2SC1623 ((L6)) : (Q1014)



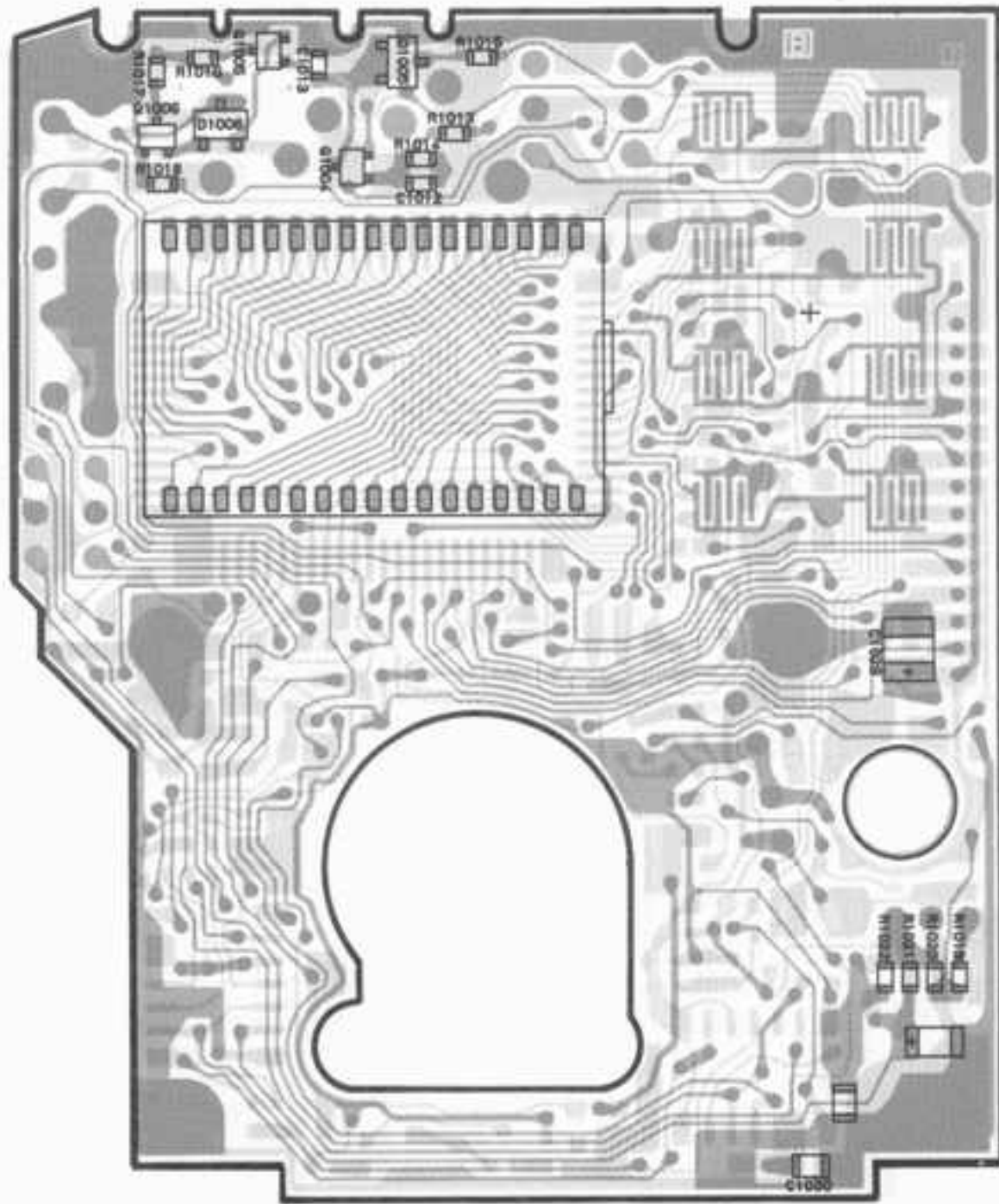
HD613901A78 (Q1001)



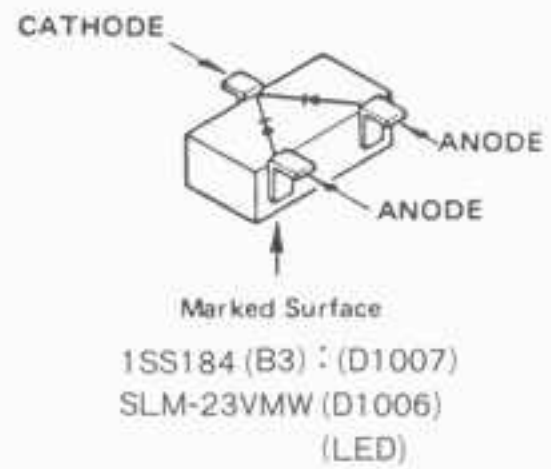
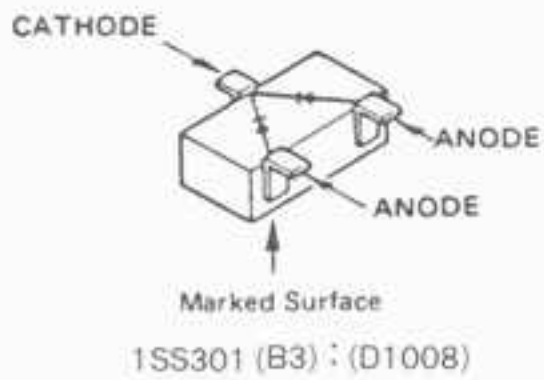
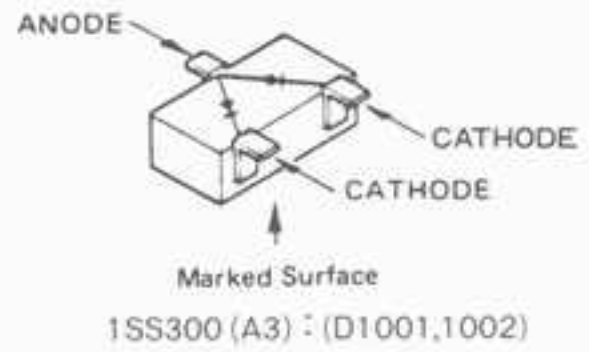
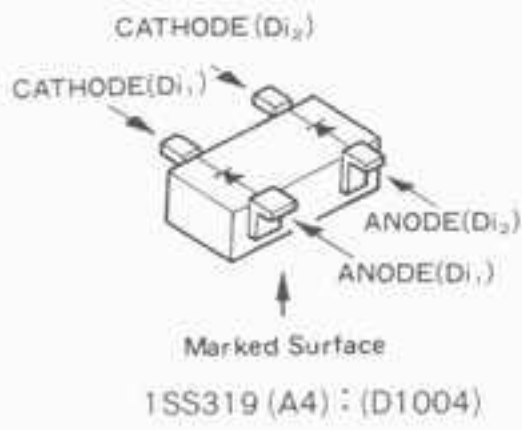
μPD4066BG (Q1008)

μPD4001BG (Q1009)

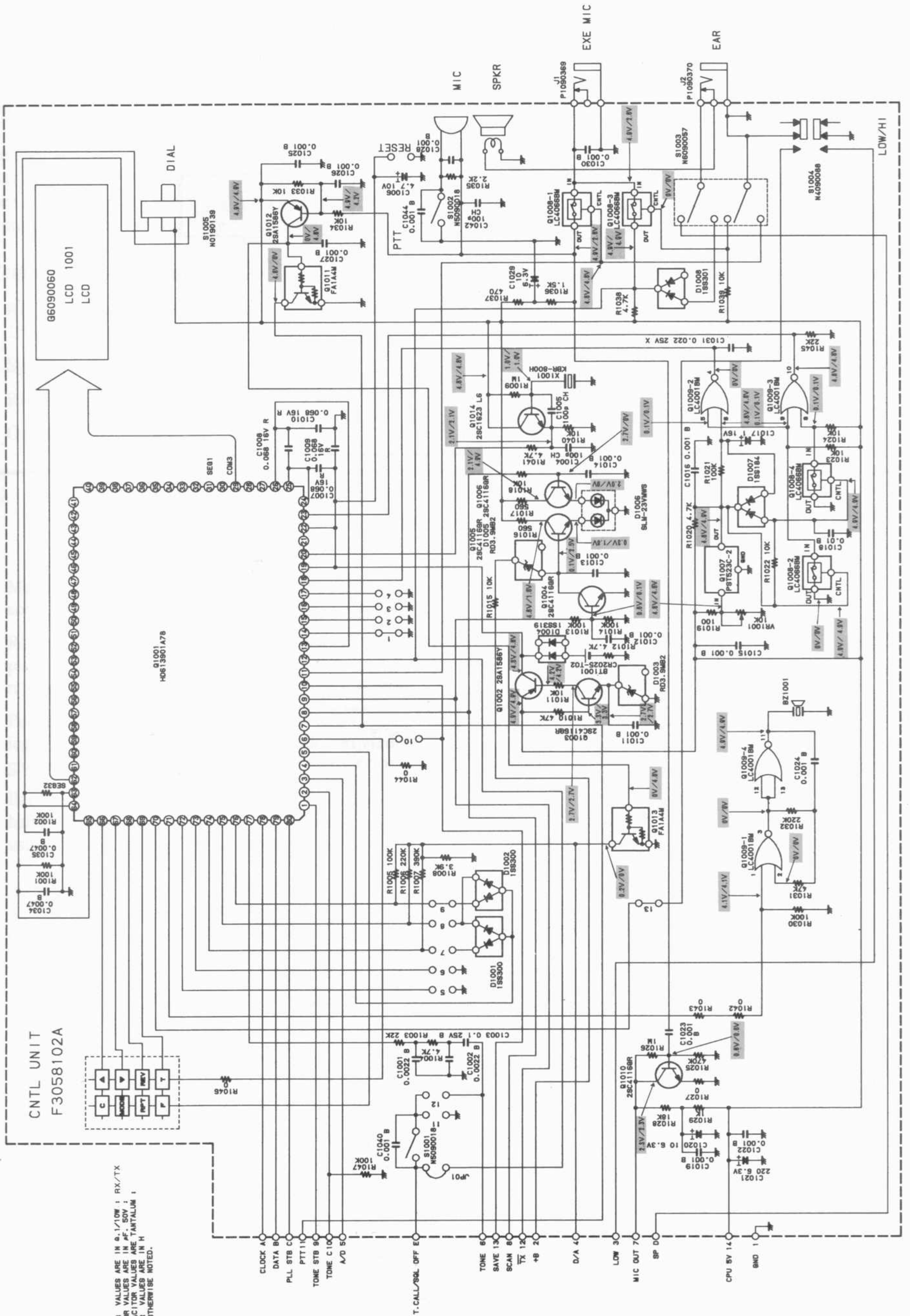
CNTL UNIT



(obverse view of "chip-only" side)



CNTL UNIT



NOTE:
RESISTOR VALUES ARE IN Ω, 1/10W, 1 RX/TX
CAPACITOR VALUES ARE IN μF, 50V
INDUCTOR VALUES ARE IN H
UNLESS OTHERWISE NOTED.

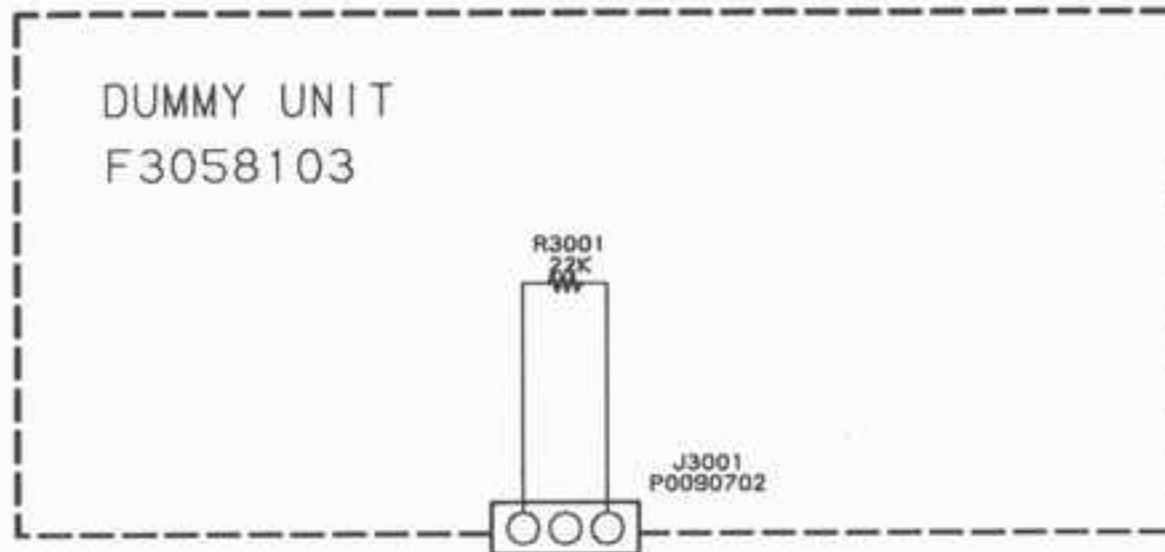
DUMMY UNIT



(obverse view of
"connector" side)



(obverse view of
"chip-only" side)



NOTE:
RESISTOR VALUES ARE IN 0.1/16W ;
UNLESS OTHERWISE NOTED.

ALIGNMENT

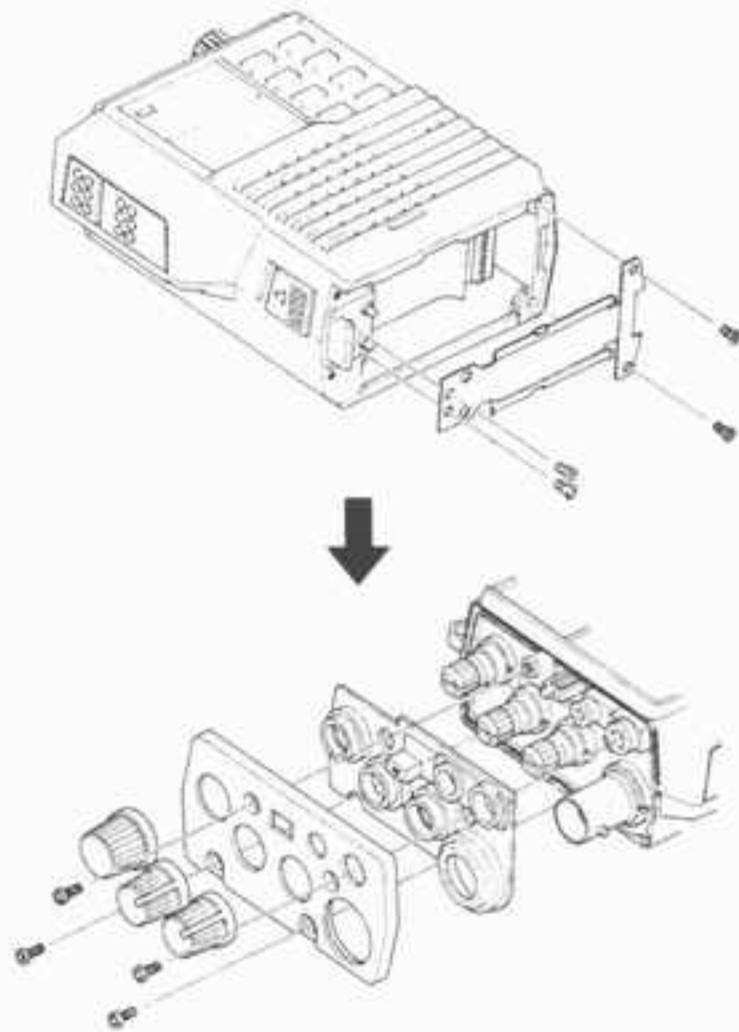
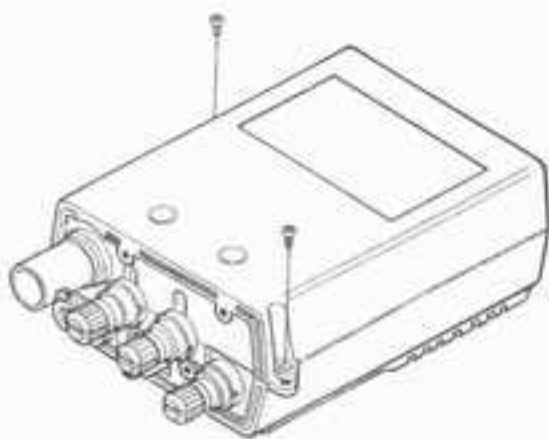
The FT-23R has been aligned by highly-skilled technicians at the factory, and is designed so that no further alignment should ever be required. However, in the unlikely event of a component failure, realignment may be necessary. All component replacement and service should be performed only by an authorized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

Required Test Equipment

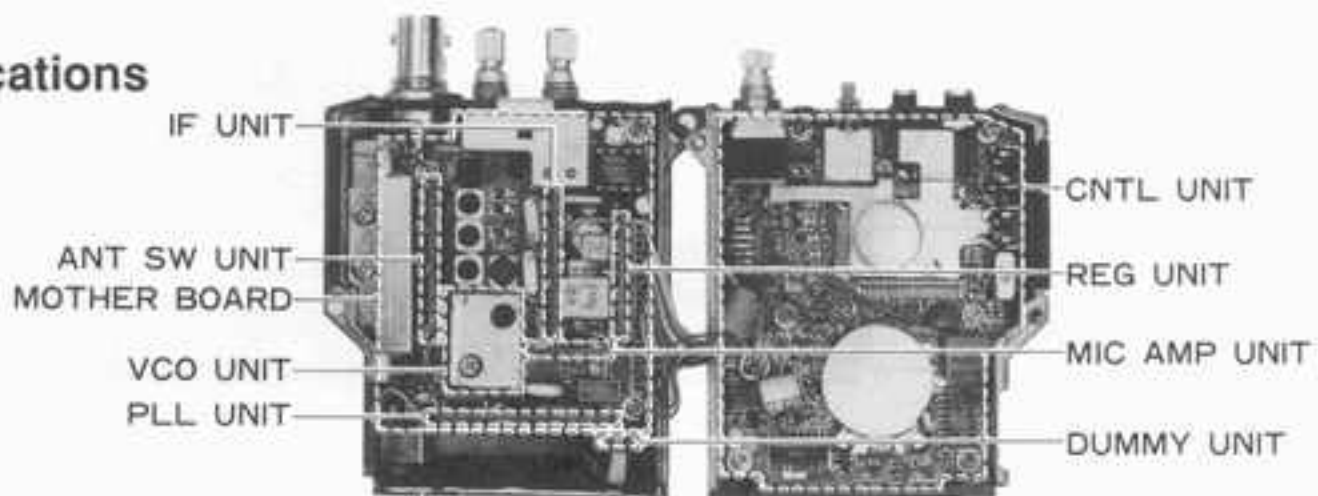
- RF Signal Generator with calibrated output level at 150 MHz
- Spectrum Analyzer
- RF Sampling Coupler
- Oscilloscope
- AF Millivoltmeter
- Deviation Meter
- SINAD Meter
- Inline Wattmeter with 5% accuracy at 150 MHz
- Regulated DC Power Supply adjustable from 10 to 15V, 2A
- 50- Ω Non-reactive Dummy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

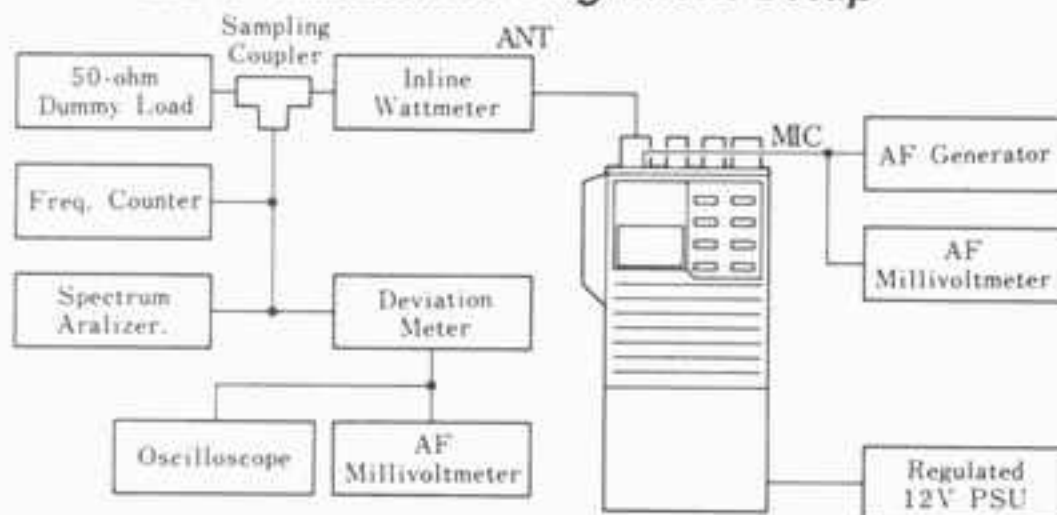
PLL Reference Frequency

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.

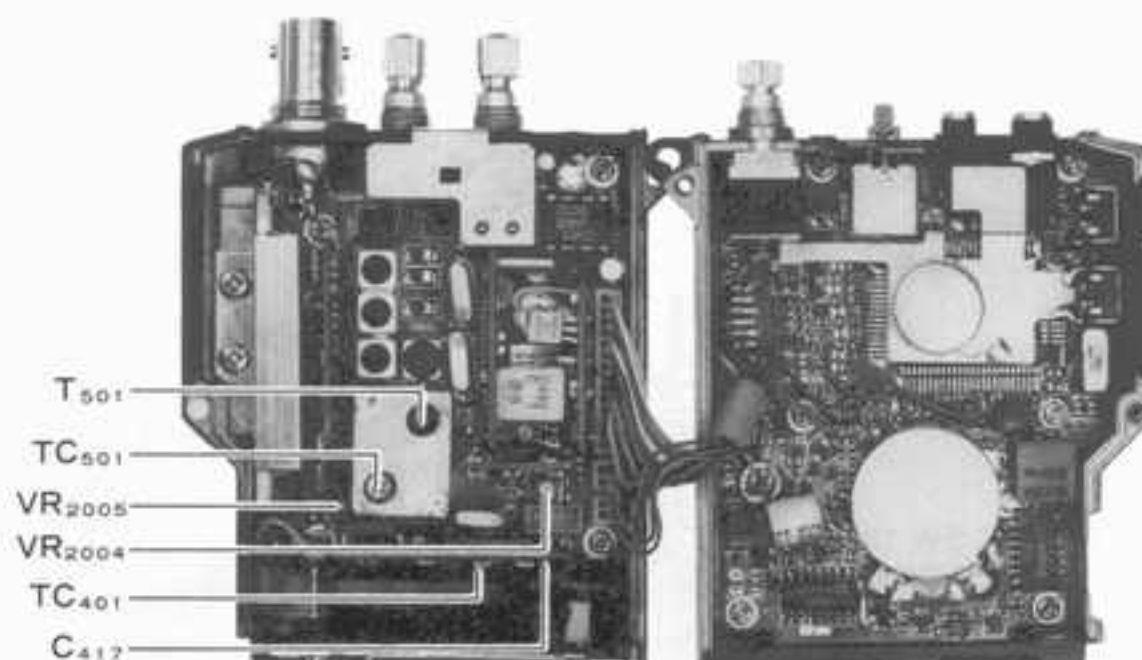
Modulation Level

- (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



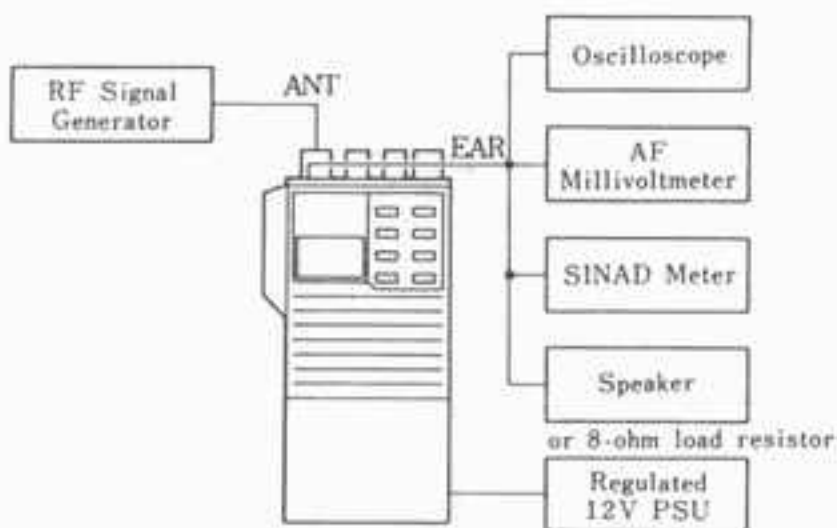
Receiver

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

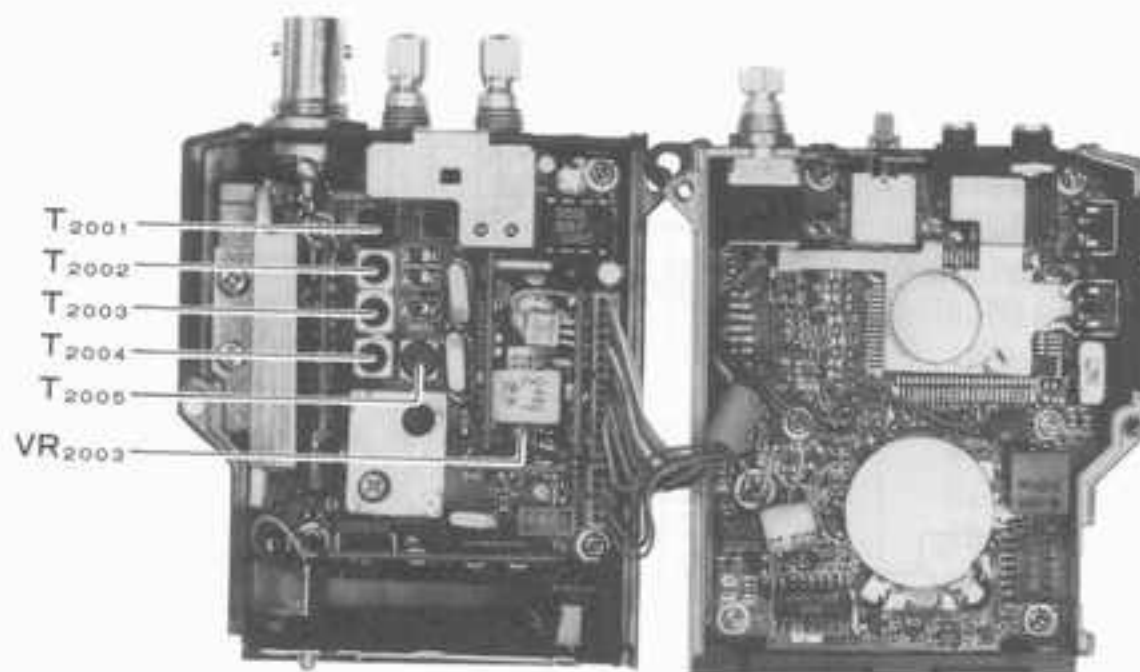
- (1) With the transceiver and the RF signal generator both tuned to band center (145 or 146 MHz), set the generator for ± 3.5 kHz deviation of 1-kHz tone modulation, and set the output level for 40 dB μ at the antenna jack.
- (2) Preset VR2003 on the Mother Board fully clockwise.

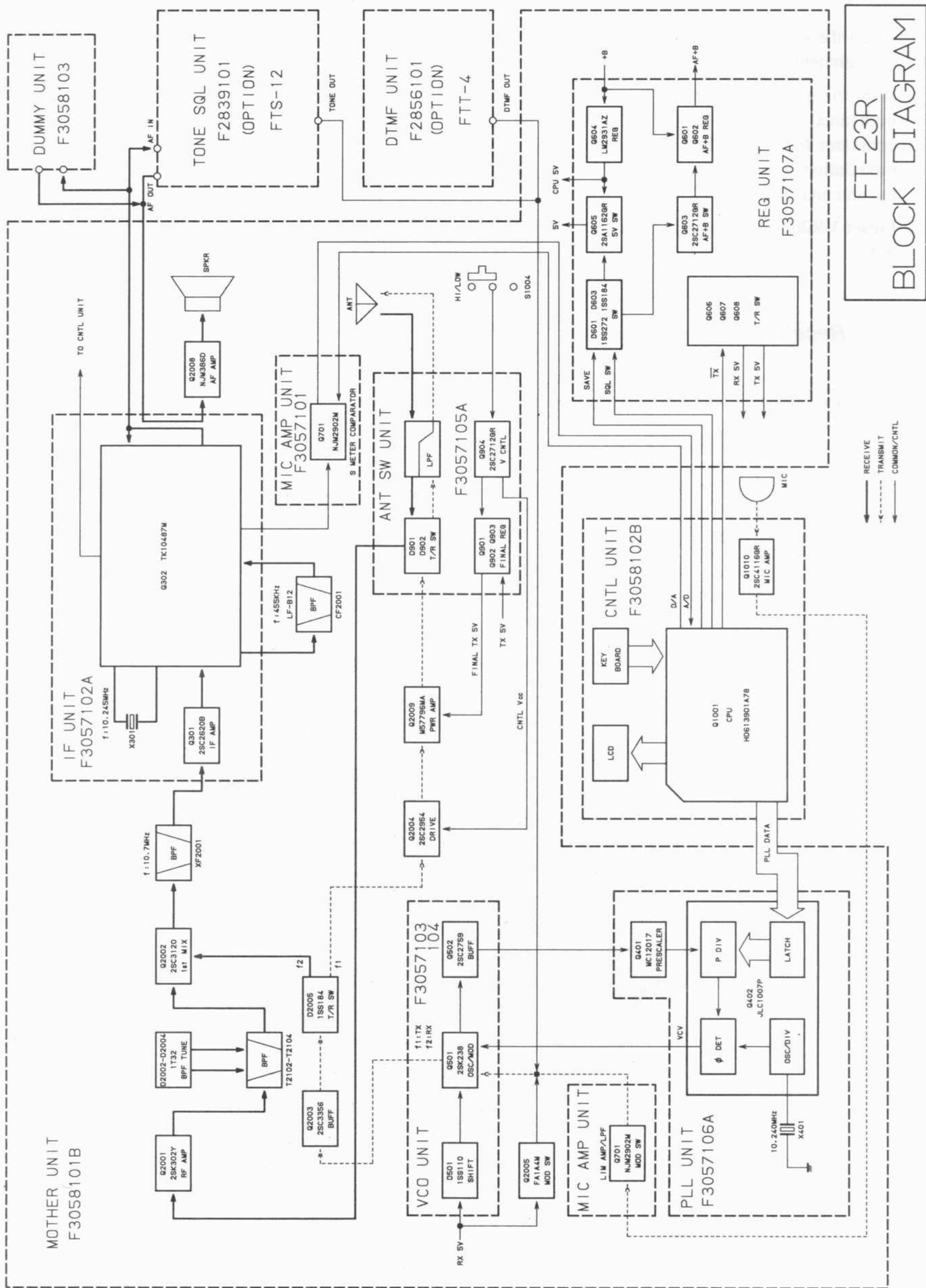
- (3) Adjust T2001 through T2005 on the Mother Board for maximum S-meter indication, reducing the generator level if more than 4 bargraph segments turn on.
- (4) After adjusting the transformers, generator level should be 0.2 μ V or less for 12dB SINAD.
- (5) Reduce the RF injection from the signal generator to 20 dB μ .
- (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 dB μ or less.

Receiver Alignment Setup



Receiver Alignment Points





FT-23R
BLOCK DIAGRAM

PARTS LIST

*** MOTHER BOARD UNIT ***

CS0851002	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP A1)
CS0851003	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP A2)
CS0851004	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP A3)
CS0851005	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP B)
CS8851006	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP C2)
CS0851007	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP D)
CS0851008	P.C.B. W/COMP./MIC AMP/IF/VCO/ ANT SW/PLL/REG UNITS(TYP E2)
F30581018	P.C.B. W/O COMP.

C 2001	K22170204	CHIP CAP.	GRM40CJ030C50PT	3pF	50V	CJ
C 2002	K22144602	CHIP CAP.	GRM39B102M25PT	0.01uF	25V	B
C 2003	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2004	K22170223	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2005	K22170203	CHIP CAP.	GRM40CK020C30PT	2pF	50V	CK
C 2006	K22170203	CHIP CAP.	GRM40CK020C50PT	2pF	50V	CK
C 2008	K22170223	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2009	K22170223	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2010	K22170223	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 2011	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2012	K22126805	CHIP CAP.	GRM408H3M16PT	0.068uF	16V	H
C 2013	K22174609	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2014	K22170202	CHIP CAP.	GRM40CK010C50PT	1pF	50V	CK
C 2015	K22170229	CHIP CAP.	GRM40CH360J50PT	56pF	50V	CH
C 2017	K22170817	CHIP CAP.	GRM40B102M50PT	0.01uF	50V	B
C 2018	K22144602	CHIP CAP.	GRM39B102M25PT	0.01uF	25V	B
C 2019	K22170205	CHIP CAP.	GRM40CH050C50PT	5pF	50V	CH
C 2020	K22126805	CHIP CAP.	GRM408E68M16PT	0.068uF	16V	E
C 2022	K22126805	CHIP CAP.	GRM408E68M16PT	0.068uF	16V	E
C 2023	K40089023	AL. ELECTRO. CAP.	RC2-5V470MS	47uF	5V	
C 2024	K40129059	AL. ELECTRO. CAP.	RC3-16V4R7MS	4.7uF	16V	
C 2025	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2026	K40109026	AL. ELECTRO. CAP.	10V8-100(M)CC	100uF	10V	
C 2027	K22126805	CHIP CAP.	GRM408E68M16PT	0.068uF	16V	E
C 2028	K70107476	TANTALUM CAP.	9N1A470M15	47uF	10V	
C 2029	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2030	K40129052	AL. ELECTRO. CAP.	RC3-16V100M	10uF	16V	
C 2031	K40129038	AL. ELECTRO. CAP.	RC2-10V101MS	100uF	16V	
C 2032	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2033	K76100002	CHIP TANTALUM CAP.	F951A335MSAAE1Q2	3.3uF	6.3V	
C 2034	K22141808	CHIP CAP.	GRM42-88473M25PT	0.047uF	50V	B
C 2035	K22170221	CHIP CAP.	GRM40CH270J50PT	27pF	50V	CH
C 2036	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 2037	K22144602	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 2038	K22144602	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 2039	K22170221	CHIP CAP.	GRM40CH270J50PT	27pF	50V	CH
C 2040	K22170211	CHIP CAP.	GRM40CH100D50PT	10pF	50V	CH
C 2041	K22174230	CHIP CAP.	GRM39CH101J50PT	100pF	50V	CH
C 2043	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 2044	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 2045	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2046	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2047	K22174609	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B

*** IF UNIT ***

C40007001 P.C.B. W/COMP.
F3149100 P.C.B. W/O COMP.

C 0301	K22144803	CHIP CAP.	GRM398103M25PT	0.01uF	25V	B
C 0302	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF	50V	B
C 0303	K22174211	CHIP CAP.	GRM39CH100050PT	10pF	50V	CH
C 0304	K22174229	CHIP CAP.	GRM39CH500J50PT	56pF	50V	CH
C 0305	K22174227	CHIP CAP.	GRM39CH121J50PT	120pF	50V	CH
C 0306	K22144882	CHIP CAP.	GRM398103M25PT	0.01uF	25V	B
C 0307	K22120805	CHIP CAP.	GRM40863M16PT	0.068uF	16V	E
C 0308	K22170820	CHIP CAP.	GRM408183M50PT	0.018uF	50V	B
C 0309	K786800002	CHIP TANTALUM CAP.	F950J475MSAAF1Q2	4.7uF	6.3V	
C 0310	K22144882	CHIP CAP.	GRM398103M25PT	0.01uF	25V	B
C 0311	K22174235	CHIP CAP.	GRM39CH101J50PT	100pF	50V	CH
C 0312	K22120805	CHIP CAP.	GRM40863M16PT	0.068uF	16V	E
C 0313	K22174243	CHIP CAP.	GRM39CH221J50PT	220pF	50V	CH
C 0314	K22174243	CHIP CAP.	GRM39CH221J50PT	220pF	50V	CH
C 0315	K22120805	CHIP CAP.	GRM40863M16PT	0.068uF	16V	E
C 0316	K22144882	CHIP CAP.	GRM398103M25PT	0.01uF	25V	B
C 0317	K22120805	CHIP CAP.	GRM40863M16PT	0.068uF	16V	E
C 0318	K22120805	CHIP CAP.	GRM40863M16PT	0.068uF	16V	E

C00301 87900180 CERAMIC DISC.

C08455C7

D 0301	G2870003	DIODE
D 0302	G2870003	DIODE
D 0303	G2870009	DIODE

1S5226	TE55V
1S5226	TE55E
1S5184	TE55K

L 0301 L1898018 COIL

32CS 3888-1EDM>P full

Q 0301	G33262078	TRANSISTOR
Q 0302	G1091308	IC
Q 0303	G3070031	TRANSISTOR
Q 0304	G33271270	TRANSISTOR

2SC2620QBT
MC3372M1
DT124TK T97
2SC2712G TE55K

R 0301	J24185222	CHIP RES.	RMC1/10 222JATP	2.2K	1/16W
R 0302	J24185224	CHIP RES.	RMC1/10 224JATP	220K	1/16W
R 0303	J24185473	CHIP RES.	RMC1/10 473JATP	47K	1/16W
R 0304	J24185471	CHIP RES.	RMC1/10 471JATP	470	1/16W
R 0305	J24185101	CHIP RES.	RMC1/10 101JATP	100	1/16W
R 0306	J24185473	CHIP RES.	RMC1/10 221JATP	220	1/16W
R 0307	J24185223	CHIP RES.	RMC1/10 223JATP	22K	1/16W
R 0308	J24185473	CHIP RES.	RMC1/10 473JATP	47K	1/16W
R 0309	J24185682	CHIP RES.	RMC1/10 182JATP	1.8K	1/16W
R 0310	J24185102	CHIP RES.	RMC1/10 102JATP	1K	1/16W
R 0311	J24185152	CHIP RES.	RMC1/10 152JATP	1.5K	1/16W
R 0312	J24205182	CHIP RES.	RMC1/10 182JATP	1.8K	1/16W
R 0313	J24205473	CHIP RES.	RMC1/10T 473J	47K	1/16W
R 0314	J24185382	CHIP RES.	RMC1/10 182JATP	1.8K	1/16W
R 0315	J24185584	CHIP RES.	RMC1/10 584JATP	580K	1/16W
R 0316	J24185332	CHIP RES.	RMC1/10 332JATP	3.3K	1/16W
R 0317	J24185332	CHIP RES.	RMC1/10 332JATP	3.3K	1/16W
R 0318	J24185302	CHIP RES.	RMC1/10 302JATP	3K	1/16W
R 0319	J24185332	CHIP RES.	RMC1/10 332JATP	3.3K	1/16W
R 0320	J24185473	CHIP RES.	RMC1/10 473JATP	47K	1/16W
R 0321	J24185382	CHIP RES.	RMC1/10 382JATP	3.8K	1/16W
R 0322	J24185104	CHIP RES.	RMC1/10 104JATP	100K	1/16W

TH0301 G8498053 THERMISTOR

157-252-53008TF

X 0301 H0182773 X-TAL

OM-1 10.245MHZ

*** VCO UNIT ***

	CP1992001	P.C.B. W/COMP.				
	F3057103	P.C.B. W/O COMP.				
	F3057104	P.C.B. W/O COMP.				
C	0501	K22170215	CHIP CAP.	GRM40CH150J50PT	15pF	50V CH
C	0502	K22170243	CHIP CAP.	GRM40CH221J50PT	225pF	50V CH
C	0503	K22170211	CHIP CAP.	GRM40CH1000S0PT	10pF	50V CH
C	0504	K76080000	CHIP TANTALUM CAP.	F950J105MTAAF1Q2	10uF	6.3V
C	0505	K22170885	CHIP CAP.	GRM40B102M50PT	0.001uF	50V B
C	0506	K22170311	CHIP CAP.	GRM40UJ1000S0PT	10pF	50V UJ
C	0507	K22170311	CHIP CAP.	GRM40UJ1000S0PT	10pF	50V UJ
C	0508	K22170201	CHIP CAP.	GRM40CK085C50PT	0.5pF	50V CK
C	0509	K76080000	CHIP TANTALUM CAP.	F950J475MSAAF1Q2	4.7uF	6.3V
C	0510	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V B
C	0511	K22170243	CHIP CAP.	GRM40CH221J50PT	220pF	50V CH
D	0501	G2090287	DIODE	1S5110		
D	0502	G2070040	DIODE	1T33-T7		
D	0503	G2070040	DIODE	1T33-T7		
L	0501	L1690016	COIL	32CS 380LB-180M=P	1uH	
L	0502	L1690016	COIL	32CS 380LB-180M=P	1uH	
L	0503	L1690016	COIL	32CS 380LB-180M=P	1uH	
L	0504	L1690025	COIL	32CS 380NB-R22M=P	0.22uH	
Q	0501	G30223675	FET	2SK238-T28-K17		
Q	0502	G33275979	TRANSISTOR	2SC0759 T2B-L22		
R	0501	J24205682	CHIP RES.	RMC1/10 68J	6.6K	1/10W
R	0502	J24205103	CHIP RES.	RMC1/10T 10J	10K	1/10W
R	0504	J24205470	CHIP RES.	RMC1/10 470J	47	1/10W
R	0505	J24205101	CHIP RES.	RMC1/10T 101J	100	1/10W
R	0506	J24205682	CHIP RES.	RMC1/10 68J	68K	1/10W
T	0501	L0021684A	COIL	K12-E991X		
TC	0501	K91000151	TRIMMER CAP.	ECK-JA020E12X	50p	
		RD130390	TERMINAL		20cm	

*** RES UNIT ***

C40011001 P.C.B. W/COMP.
 F3057107A P.C.B. W/O COMP.

C 0601	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0602	K76100002	CHIP TANTALUM CAP.	F951A895MTAAF1Q2	6.8uF	6.3V	Ø
C 0603	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0604	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0605	K76100002	CHIP TANTALUM CAP.	F951C225MSAAF1Q2	2.2uF	6.3V	Ø
C 0606	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0607	K76080013	CHIP TANTALUM CAP.	F950J476MPCAF1	47uF	6.3V	Ø
C 0608	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0609	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0610	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0611	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0612	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø
C 0613	K22174809	CHIP CAP.	GRN398102M50PT	0.001uF	50V	Ø

D 0601	G2970048	DIODE	1SS272	TE65R		
D 0602	G2980153	DIODE	8010ER1			
D 0603	G2970009	DIODE	1SS18A	TE65R		

Q 0601	G3207997L	TRANSISTOR	258799-12ML			
Q 0602	G3227127G	TRANSISTOR	25C2712GR	TE65R		
Q 0603	G3227127G	TRANSISTOR	25C2712GR	TE65R		
Q 0604	G1090785	IC	LN2931AZ-5.0			
Q 0605	G3111627G	TRANSISTOR	25A1162GR	TE65R		
Q 0606	G3111627G	TRANSISTOR	25A1162GR	TE65R		
Q 0607	G3111627G	TRANSISTOR	25A1162GR	TE65R		
Q 0608	G3227127G	TRANSISTOR	25C2712GR	TE65R		

R 0601	J24185101	CHIP RES.	RNC 1/10T 101J	100		1/10W
R 0602	J0224582R	CARBON FILM RES.	ED145JHR2	8.2		1/4W
R 0603	J24185223	CHIP RES.	RNC1/16 223JATP	22K		1/10W
R 0604	J24185104	CHIP RES.	RNC1/16 104JATP	100K		1/10W
R 0605	J24185103	CHIP RES.	RNC1/16 103JATP	10K		1/10W
R 0606	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K		1/10W
R 0607	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K		1/10W
R 0608	J24185222	CHIP RES.	RNC1/16 222JATP	2.2K		1/10W
R 0609	J24185104	CHIP RES.	RNC1/16 104JATP	100K		1/10W
R 0610	J24185104	CHIP RES.	RNC1/16 104JATP	100K		1/10W
R 0611	J24185103	CHIP RES.	RNC1/16 103JATP	10K		1/10W
R 0612	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K		1/10W

*** CONTROL UNIT ***

C50847002 P.C.B. W/COMP.(TYP A1)
 C50847003 P.C.B. W/COMP.(TYP A2)
 C50847004 P.C.B. W/COMP.(TYP A3)
 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)
 F30581028 P.C.B. W/O COMP.

BT1001	Q3000386	LITHIUM BATTERY	CR2025-T02		
BZ1001	M290005	BUZZER	EF8-RS25007		
C 1001	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP B
C 1001	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP C2
C 1001	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP D
C 1001	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP E2
C 1002	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP B
C 1002	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP C2
C 1002	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP D
C 1002	K22170889	CHIP CAP.	GRM40B222M50PT	0.0022uF 50V	B TYP E2
C 1003	K22141899	CHIP CAP.	GRM42-6B104M25PT	0.1uF 25V	B
C 1004	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF 50V	CH
C 1005	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF 50V	CH
C 1006	K70487475	TANTALUM CHIP CAP.	DN1A4E2M1S	4.7uF 10V	
C 1007	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF 16V	R
C 1008	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF 16V	R
C 1009	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF 16V	R
C 1010	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF 16V	R
C 1011	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1012	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1013	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1014	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1015	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
C 1016	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
C 1017	K78120009	TANTALUM CHIP CAP.	TESVA1C105M1-6R	1uF 16V	
C 1018	K22170817	CHIP CAP.	GRM40R103M50PT	0.01uF 50V	B
C 1019	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1020	K78088003	TANTALUM CHIP CAP.	F950J106TAAF1Q2	10uF 6.3V	
C 1021	K40069010	AL. ELECTRO. CAP.	K12-6V221H	220uF 6.3V	
C 1022	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
C 1023	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
C 1024	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1025	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1026	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1027	K22174809	CHIP CAP.	GRM398102M50PT	0.001uF 50V	B
C 1028	K18176102	CERAMIC CAP.	D0104B102K30	0.001uF 50V	B
C 1029	K78080003	TANTALUM CHIP CAP.	F950J106TAAF1Q2	10uF 6.3V	
C 1030	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
C 1031	K22170821	CHIP CAP.	GRM40B222M50PT	0.002uF 50V	B
C 1034	K22174617	CHIP CAP.	GRM398472M50PT	0.0047uF 50V	B
C 1035	K22174617	CHIP CAP.	GRM398472M50PT	0.0047uF 50V	B
C 1040	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
C 1042	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF 50V	CH
C 1044	K22170805	CHIP CAP.	GRM40R102M50PT	0.001uF 50V	B
CO1001	W7805400	CERAMIC OSC.	KEE-800H		
D 1001	G2070084	DIODE	1SS300 T668R		

R 0713	J24185104	CHIP RES.	EMC1/16 104JATP	100K	1/16W
R 0714	J24185225	CHIP RES.	EMC1/16 225JATP	2.2K	1/16W
R 0715	J24205223	CHIP RES.	EMC1/16 223J	22K	1/16W
R 0716	J24185104	CHIP RES.	EMC1/16 104JATP	100K	1/16W

R 1008	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1009	J24185105	CHIP RES.	RNC1/16 105JATP	1K	1/16W
R 1010	J24185472	CHIP RES.	RNC1/16 472JATP	47K	1/16W
R 1011	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1012	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K	1/16W
R 1013	J24185104	CHIP RES.	RNC1/16 104JATP	100K	1/16W
R 1014	J24185104	CHIP RES.	RNC1/16 104JATP	100K	1/16W
R 1015	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1016	J24185561	CHIP RES.	RNC1/16 561JATP	560	1/16W
R 1017	J24185561	CHIP RES.	RNC1/16 561JATP	560	1/16W
R 1018	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1019	J24185101	CHIP RES.	RNC1/16 101JATP	100	1/16W
R 1020	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K	1/16W
R 1021	J24185104	CHIP RES.	RNC1/16 104JATP	100K	1/16W
R 1022	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1023	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1024	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1025	J24185474	CHIP RES.	RNC1/16 474JATP	470K	1/16W
R 1026	J24185105	CHIP RES.	RNC1/16 105JATP	1K	1/16W
R 1027	J24185000	CHIP RES.	RNC1/16 000JATP	0	1/16W
R 1028	J24185183	CHIP RES.	RNC1/16 183JATP	18K	1/16W
R 1029	J24185102	CHIP RES.	RNC1/16 102JATP	1K	1/16W
R 1030	J24185104	CHIP RES.	RNC1/16 104JATP	100K	1/16W
R 1031	J24185473	CHIP RES.	RNC1/16 473JATP	47K	1/16W
R 1032	J24185224	CHIP RES.	RNC1/16 224JATP	220K	1/16W
R 1033	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1034	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1035	J24185222	CHIP RES.	RNC1/16 222JATP	2.2K	1/16W
R 1036	J24185152	CHIP RES.	RNC1/16 152JATP	1.5K	1/16W
R 1037	J24185471	CHIP RES.	RNC1/16 471JATP	470	1/16W
R 1038	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K	1/16W
R 1039	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1040	J24185103	CHIP RES.	RNC1/16 103JATP	10K	1/16W
R 1041	J24185472	CHIP RES.	RNC1/16 472JATP	4.7K	1/16W
R 1042	J24185000	CHIP RES.	RNC1/16 000JATP	0	1/16W
R 1043	J24185000	CHIP RES.	RNC1/16 000JATP	0	1/16W
R 1044	J24185000	CHIP RES.	RNC1/16 000JATP	0	1/16W
R 1045	J24185223	CHIP RES.	RNC1/16 223JATP	22K	1/16W
R 1046	J24185000	CHIP RES.	RNC1/16 000JATP	0	1/16W
R 1047	J24185104	CHIP RES.	RNC1/16 104JATP	100K	1/16W

S 1001	N0090018	TACT SWITCH
S 1002	N0090018	TACT SWITCH
S 1003	N0090057	SLIDE SWITCH
S 1004	N4090088	PUSH SWITCH
S 1005	N0190139	ROTARY SWITCH

KHH-15951

KHH-15951

SSSS22

SPJ022K F19

SR0M1L0178

X 1001	H7900400	CERAMIC OSC.
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R98-6088

R0118880 SEAL

R7132740 MYLAR

R7132750 MYLAR

R0130380 SHIELD PLATE

R7074930 DOUBLE FACE ADHESIVE

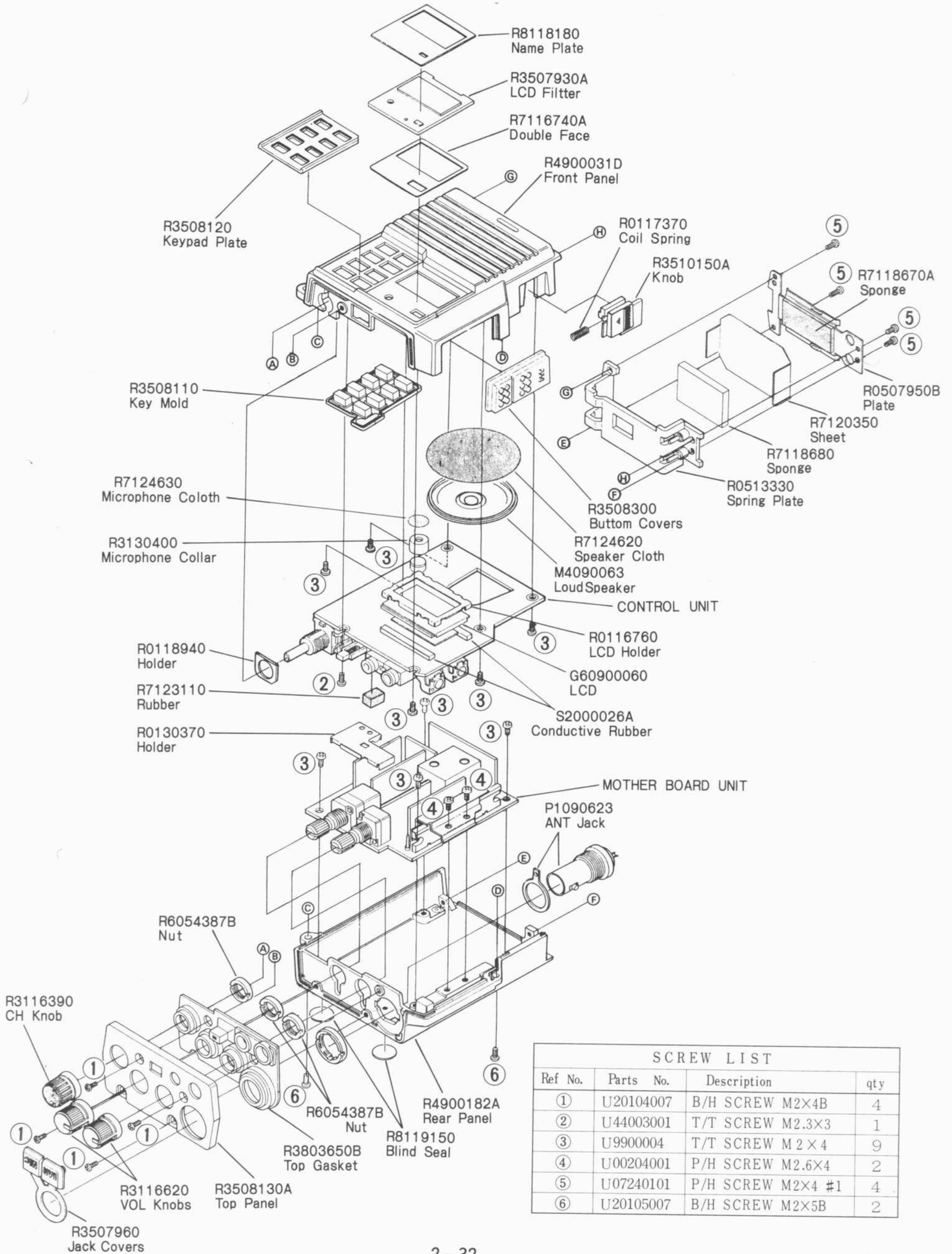
R7108650 DOUBLE FACE ADHESIVE

*** DUMMY UNIT ***

C50853001 P.C.S. W/COMP.
F3858103 P.C.S. W/O COMP.

P 3001	P0890702	CONNECTOR	92308-1-032003-T	
B 3001	J24185223	CRIP RES.	ENC1/16 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 M 2 × 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



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