

# **FT-23R**

## **TECHNICAL SUPPLEMENT**



**YAESU MUSEN CO., LTD.**

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

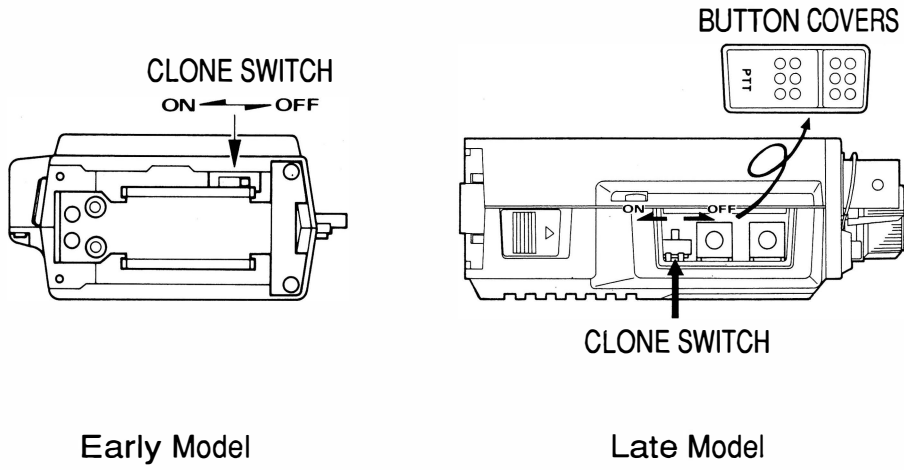
**YAESU U.S.A.**

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.



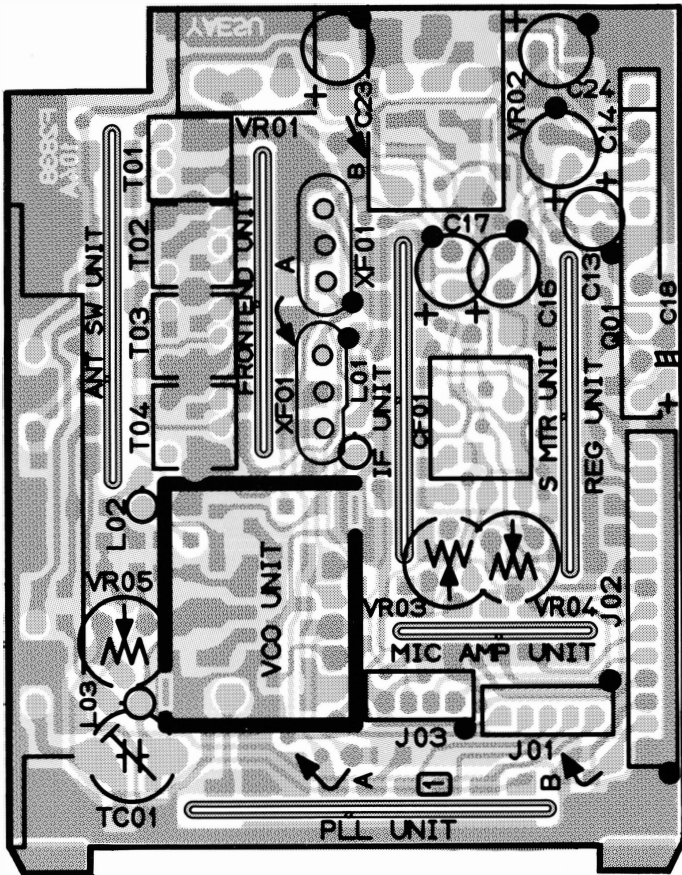
# Early Model FT-23R

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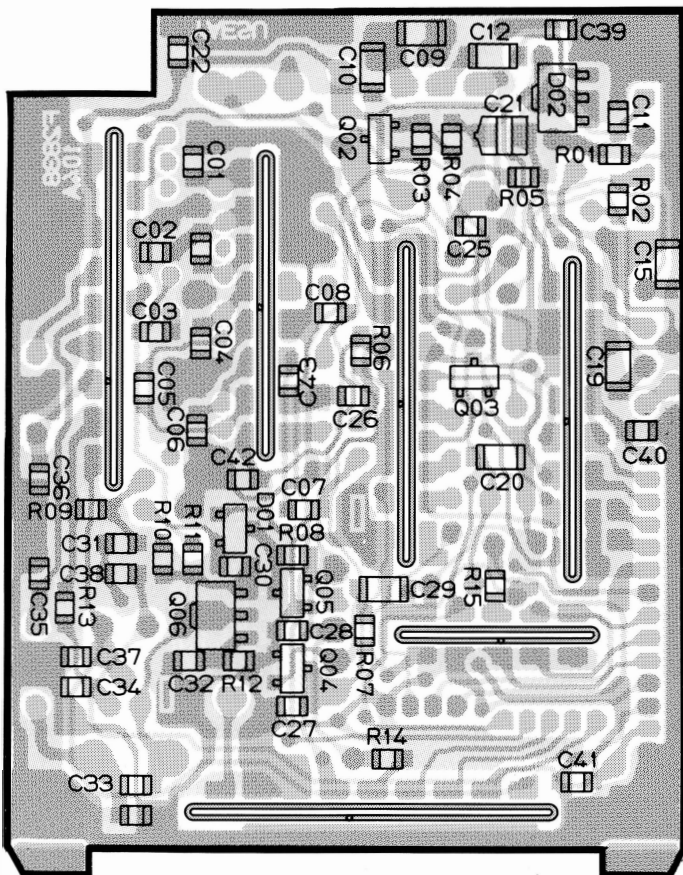
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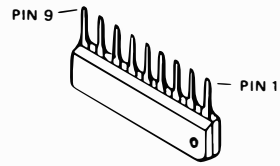
# MOTHER BOARD



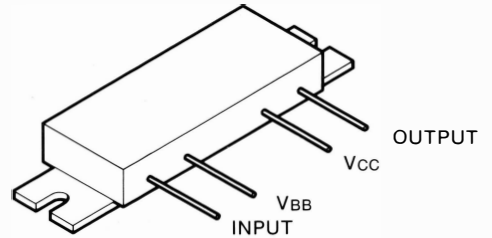
(obverse view of "component" side)



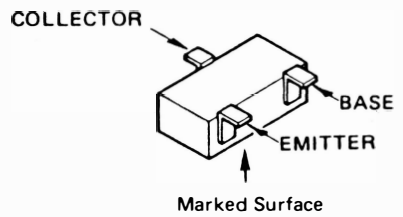
(reverse view of "chip-only" side)



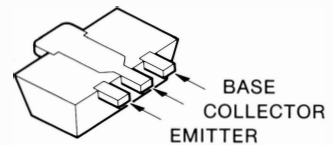
LA4145 (Q101)



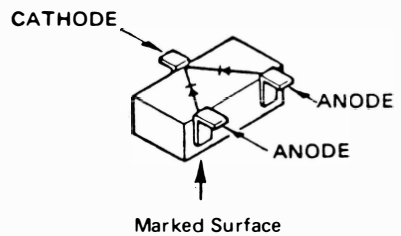
M57796MA (Q107)



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

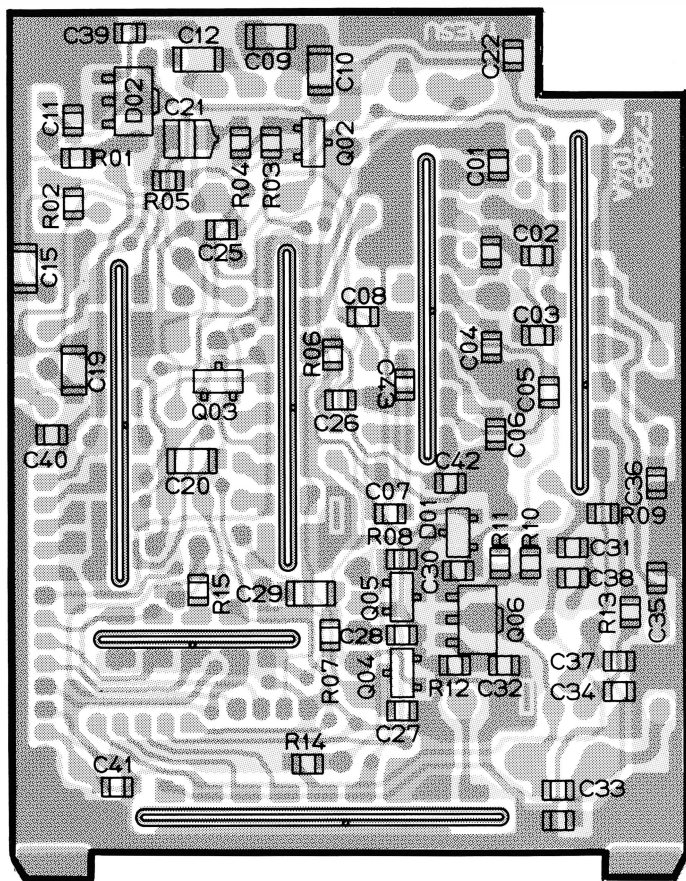


2SC2954 (Q106)

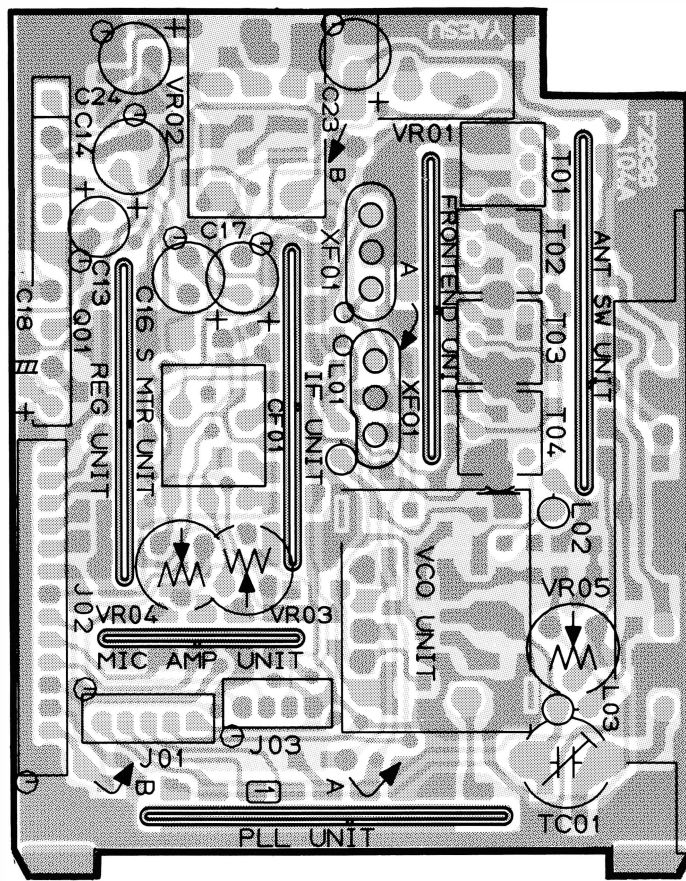


1SS184 (B3) : (D101)

# MOTHER BOARD



(obverse view of "chip-only" side)

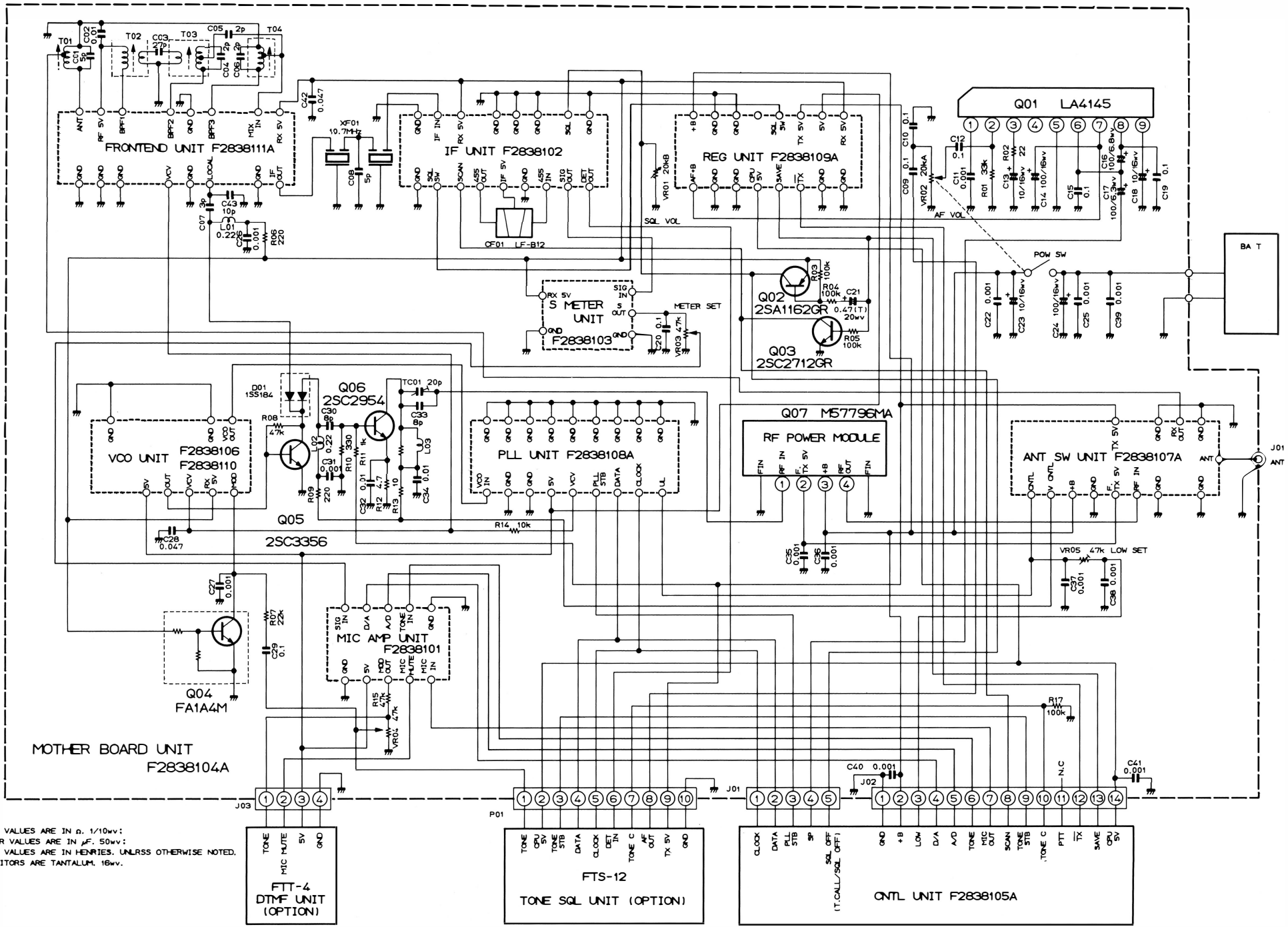


(reverse view of "component" side)

## CHIP SEMICONDUCTOR CROSS-REFERENCE

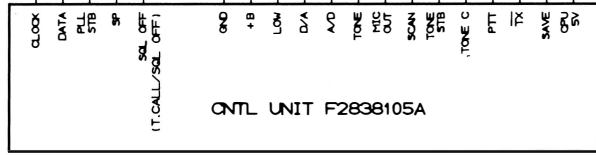
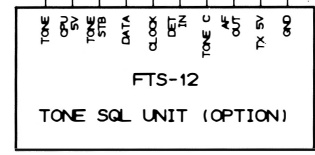
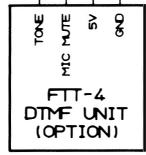
PART LOCATION NO.	ORIGINAL	REPLACEMENT		
	NOMENCLATURE (MARKING) AND PART NUMBER	NOMENCLATURE (MARKING) AND PART NUMBER		
Q102,605,606,607,1002,1012	2SA1162GR(SG) G3111620G	2SA812F/G(M6/M7) G3108120F/G	2SA1052C/D(MC/MD) G3110520C/D	2SA1179F/G(M6/M7) G3111790F/G
Q103,602,603,608,801,802,902,903,904,1003,1004,1005,1006,1010	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.

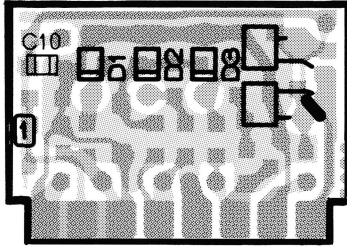


MOTHER BOARD

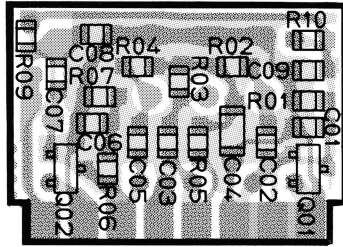
RESISTOR VALUES ARE IN  $\Omega$ , 1/10wv;  
 CAPACITOR VALUES ARE IN  $\mu$ F, 50wv;  
 INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.  
 (T) CAPACITORS ARE TANTALUM, 16wv.



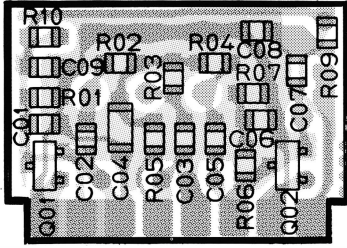
# FRONTEND UNIT



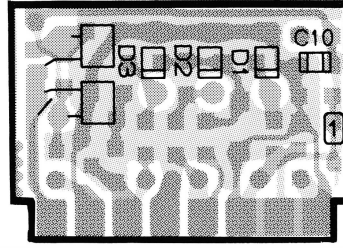
(obverse view of "diode" side)



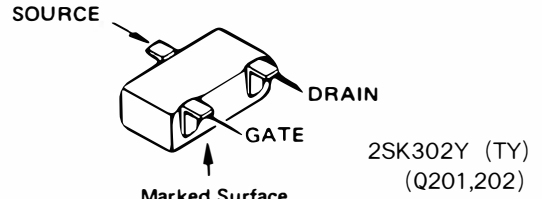
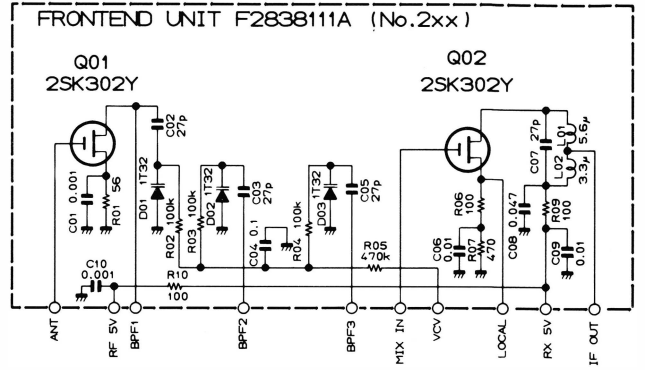
(obverse view of "FET" side)



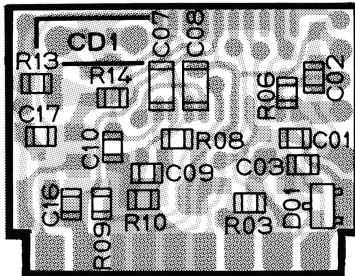
(reverse view of "FET" side)



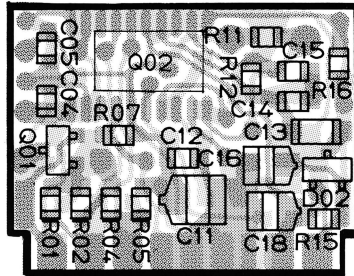
(reverse view of "diode" side)



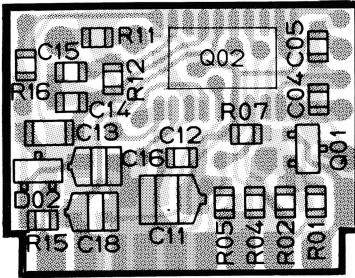
# IF UNIT



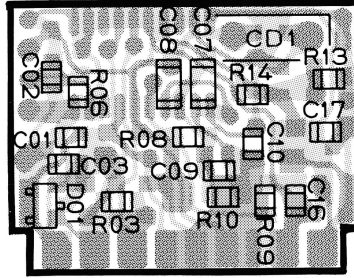
(obverse view of "mixed-component" side)



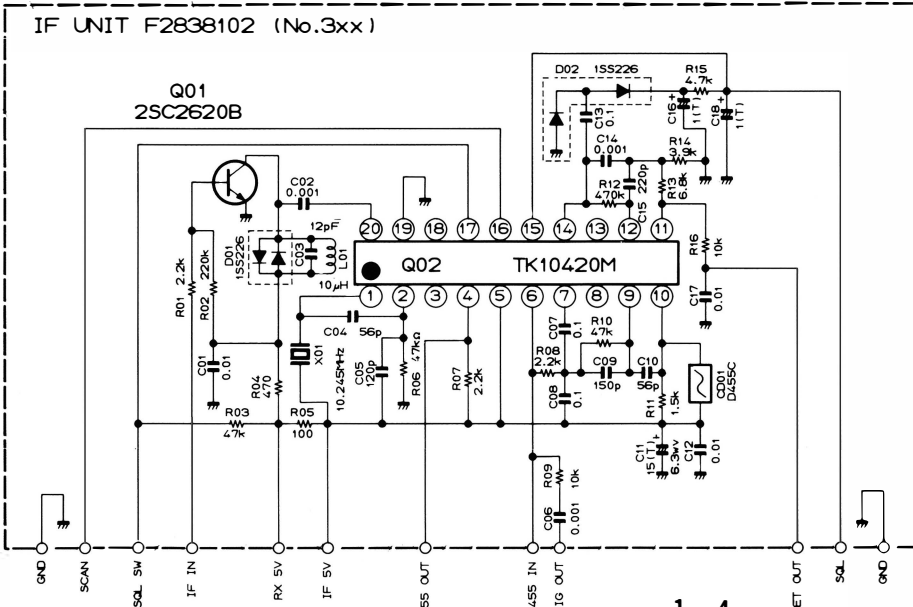
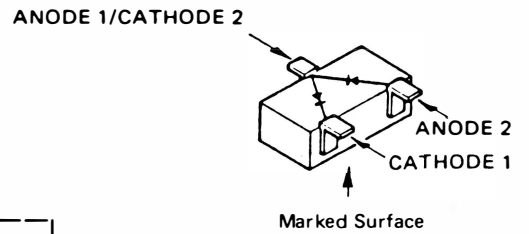
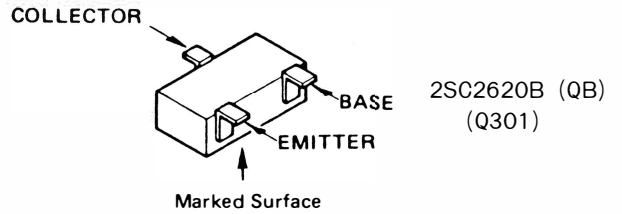
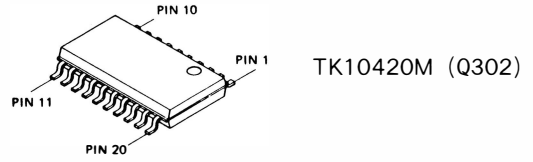
(obverse view of "chip-only" side)



(reverse view of "chip-only" side)

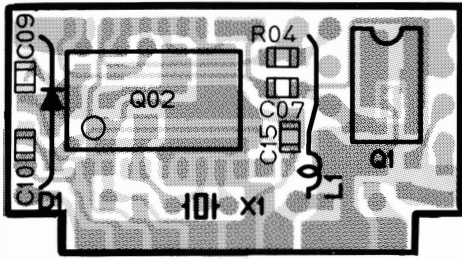


(reverse view of "mixed-component" side)

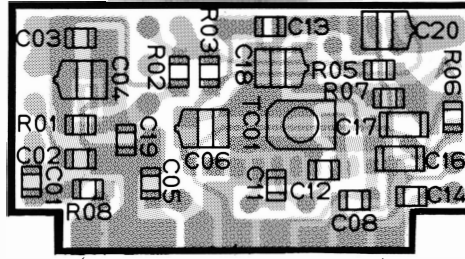




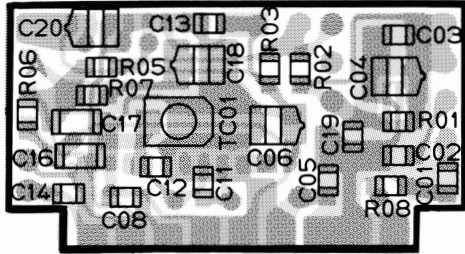
## PLL UNIT



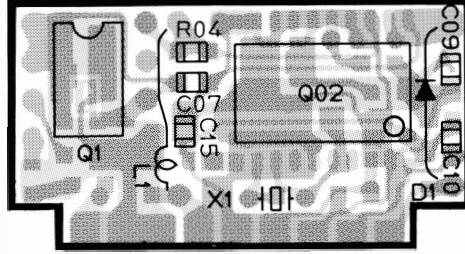
(obverse view of "mixed-component" side)



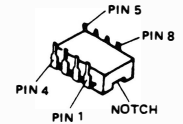
(obverse view of "chip-only" side)



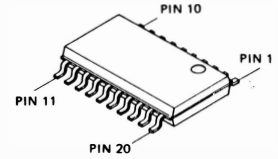
(reverse view of "chip-only" side)



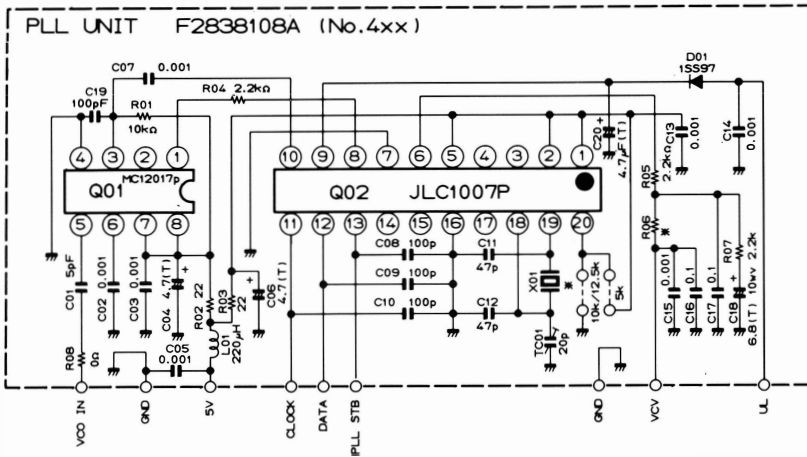
(reverse view of "mixed-component" side)



MC12017P (Q01)



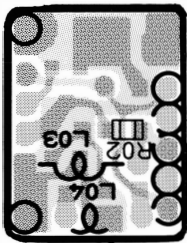
JLC1007P (Q02)



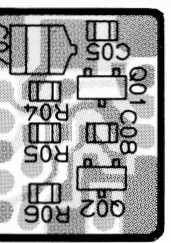
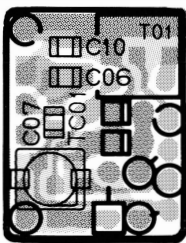
R06	15k $\Omega$ = 5kHz 10k $\Omega$ = 10kHz STEP 4.7k $\Omega$ = 12.5kHz STEP
X01	10.24 $\mu$ H = 5kHz STEP 12.8 $\mu$ H = 12.5kHz STEP

RESISTOR VALUES ARE IN  $\Omega$ , 1/10 $\Omega$ ;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50mV;  
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.  
(T)CAPACITORS ARE TANTALUM, 6.3mV.

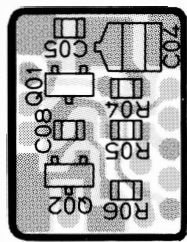
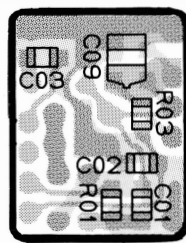
## VCO UNIT



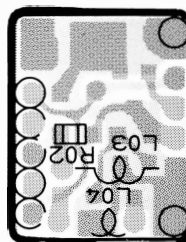
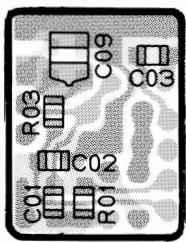
(obverse view of "mixed-component" side)



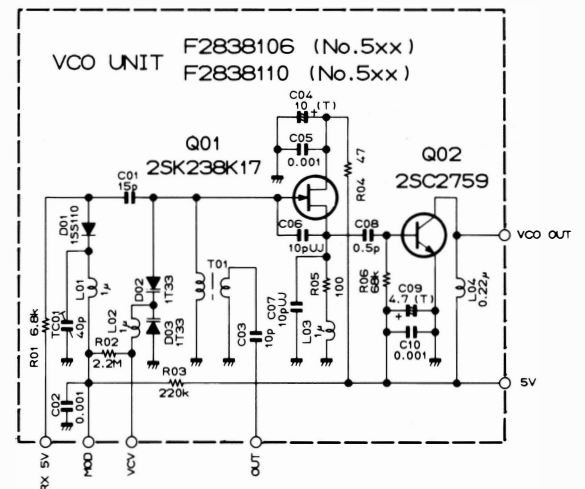
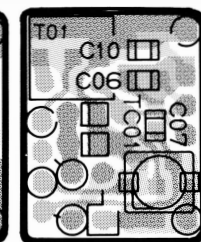
(obverse view of "chip-only" side)



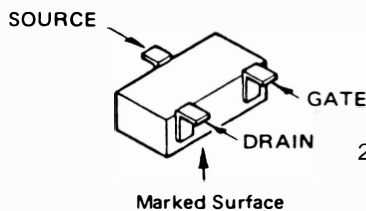
(reverse view of "chip-only" side)



(reverse view of "mixed-component" side)

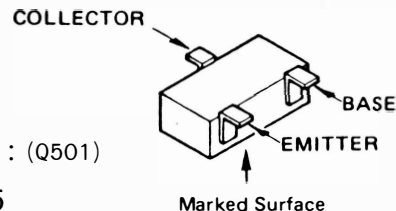


RESISTOR VALUES ARE IN  $\Omega$ , 1/10 $\Omega$ ;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50mV;  
UNLESS OTHERWISE NOTED.  
(T)CAPACITORS ARE TANTALUM, 6.3mV.



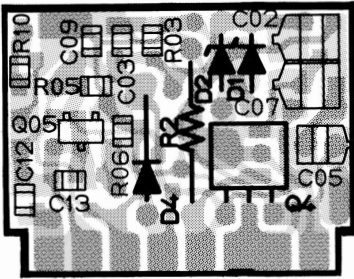
2SK238 (K17) : (Q501)

1 - 5

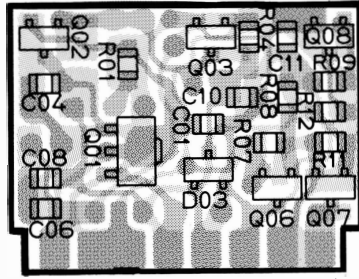


2SC2759 (U22) : (Q502)

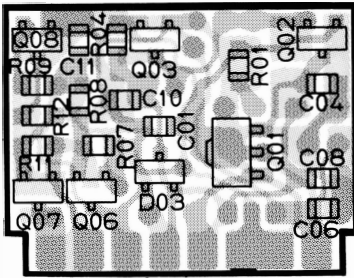
# REG UNIT



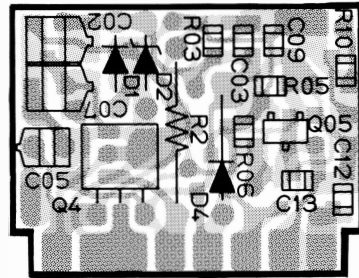
(obverse view of "mixed-component" side)



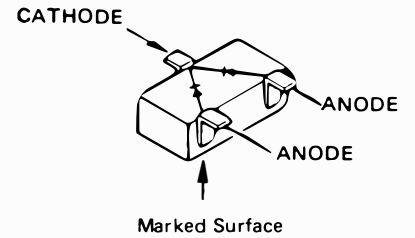
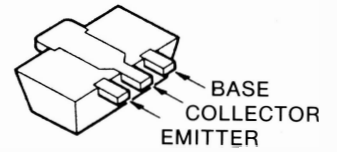
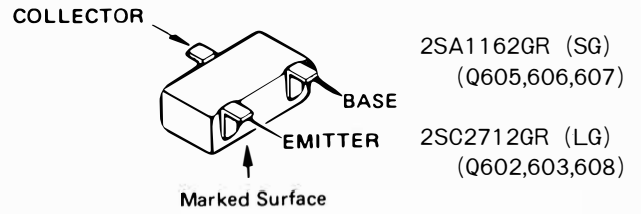
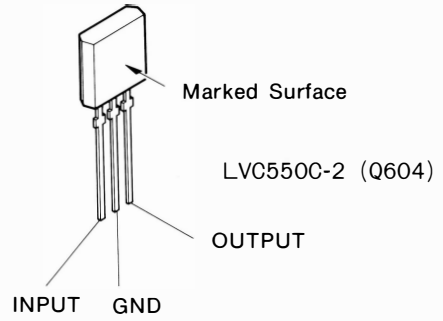
(obverse view of "chip-only" side)



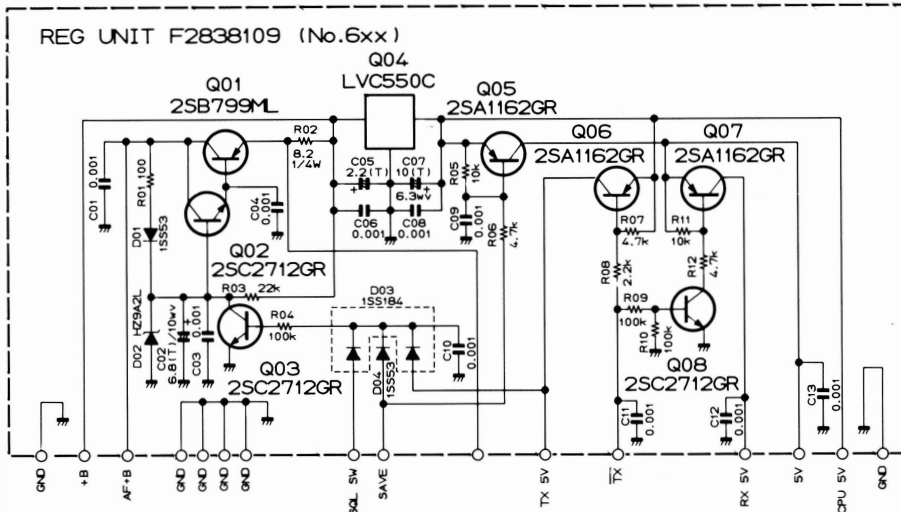
(reverse view of "chip-only" side)



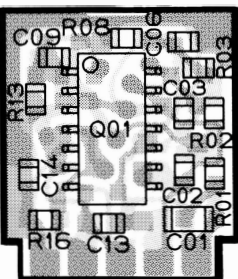
(reverse view of "mixed-component" side)



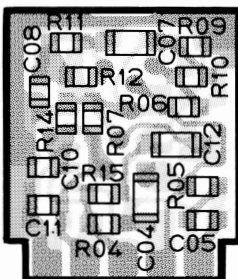
RESISTOR VALUES ARE IN  $\Omega$ , 1/10W;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V;  
UNLESS OTHERWISE NOTED.  
(T) CAPACITORS ARE TANTALUM, 16V.



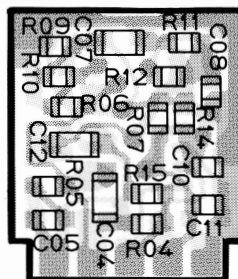
# MIC AMP UNIT



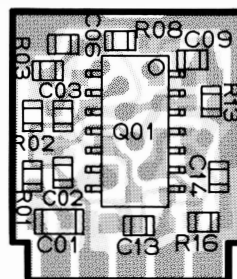
(obverse view of "IC" side)



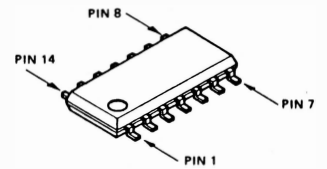
(reverse view of "C-R" side)



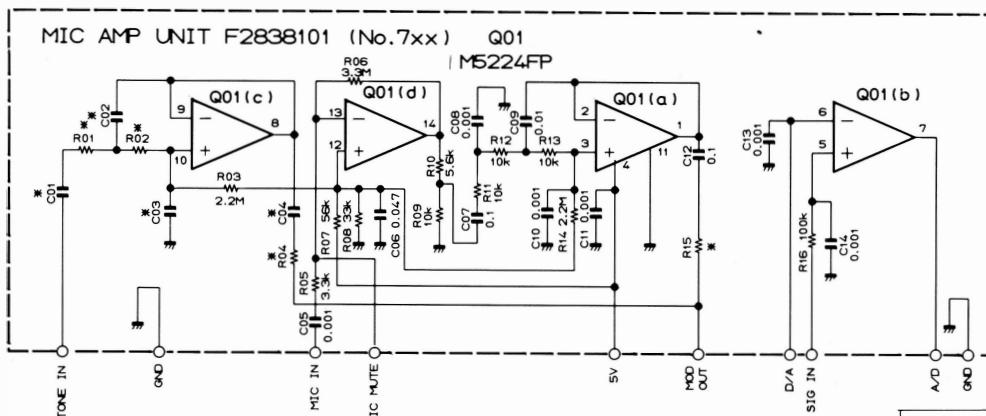
(obverse view of "C-R" side)



(reverse view of "IC" side)



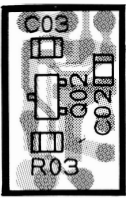
M5224FP (Q701)



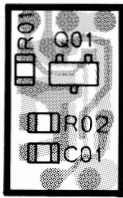
RESISTOR VALUES ARE IN  $\Omega$ , 1/10W;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V;  
UNLESS OTHERWISE NOTED.

	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

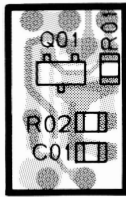
## S METER UNIT



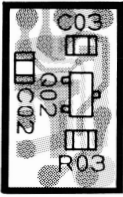
(obverse view of "top" side)



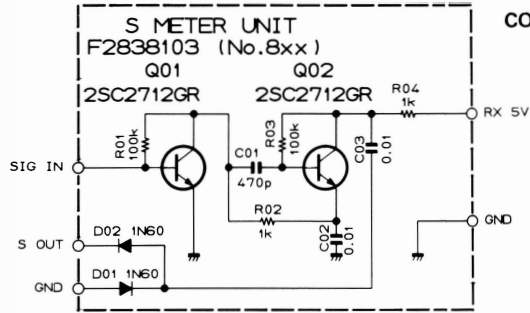
(obverse view of "bottom" side)



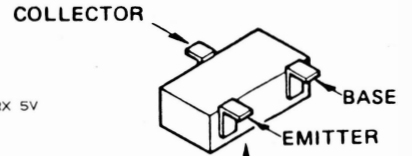
(reverse view of "bottom" side)



(reverse view of "top" side)

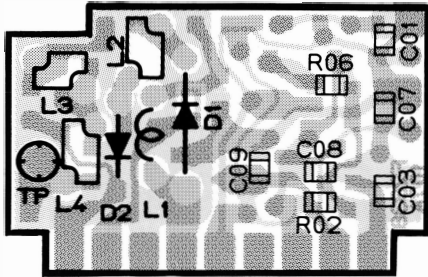


RESISTOR VALUES ARE IN  $\Omega$ , 1/10W;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V;  
UNLESS OTHERWISE NOTED.

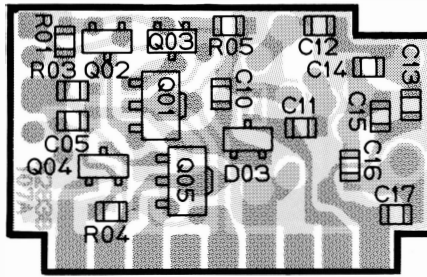


Marked Surface  
2SC2712GR (LG)  
(Q801,802)

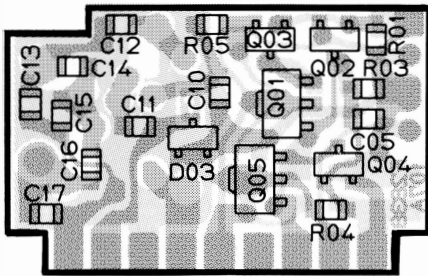
## ANT SW UNIT



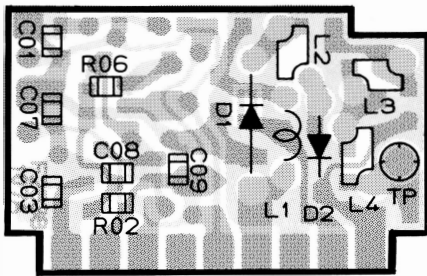
(obverse view of "mixed-component" side)



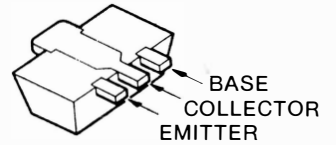
(obverse view of "chip-only" side)



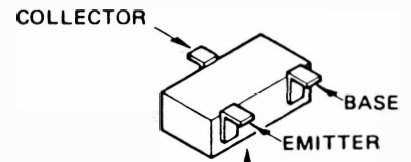
(reverse view of "chip-only" side)



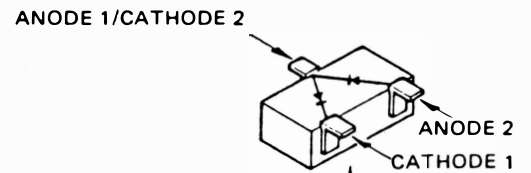
(reverse view of "mixed-component" side)



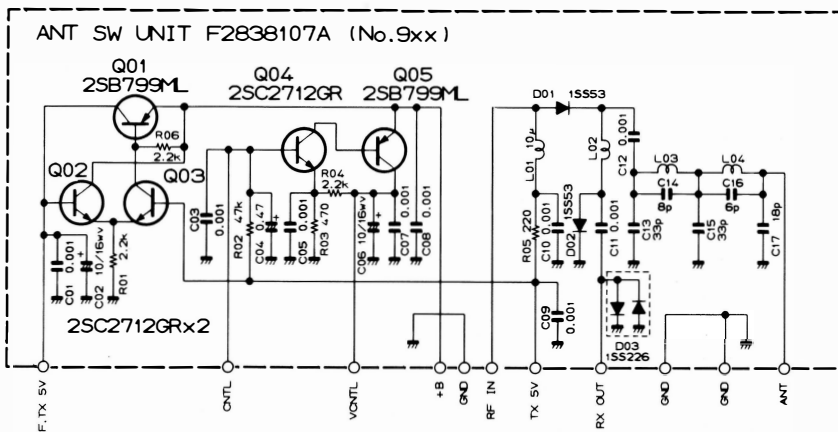
2SB799 (Q901,905)



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

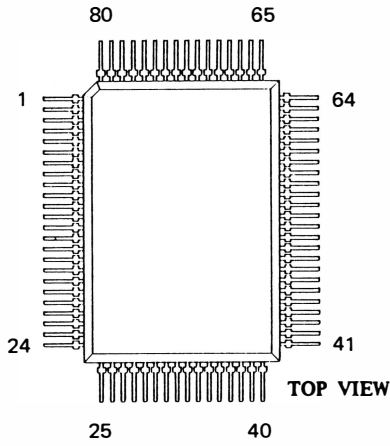


Marked Surface  
1SS226 (C3) : (D903)

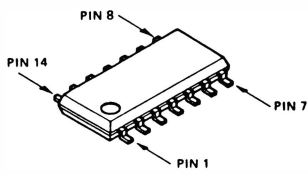


RESISTOR VALUES ARE IN  $\Omega$ , 1/10W;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V;  
INDUCTOR VALUES ARE IN HENRIES, UNLESS OTHERWISE NOTED.

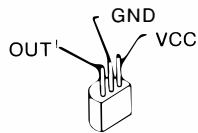
# CNTL UNIT



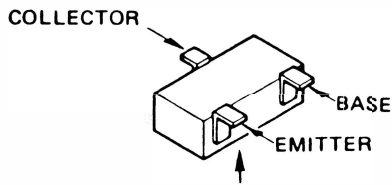
HD613901A51 (Q1001)



$\mu$ PD4066BG (Q1008)  
 $\mu$ PD4001BG (Q1009)

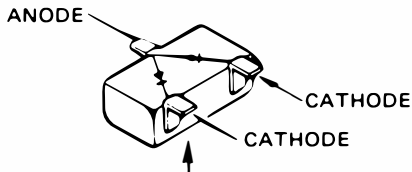


PST523G (Q1007)



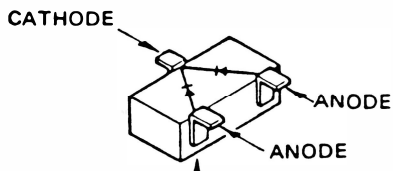
Marked Surface

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



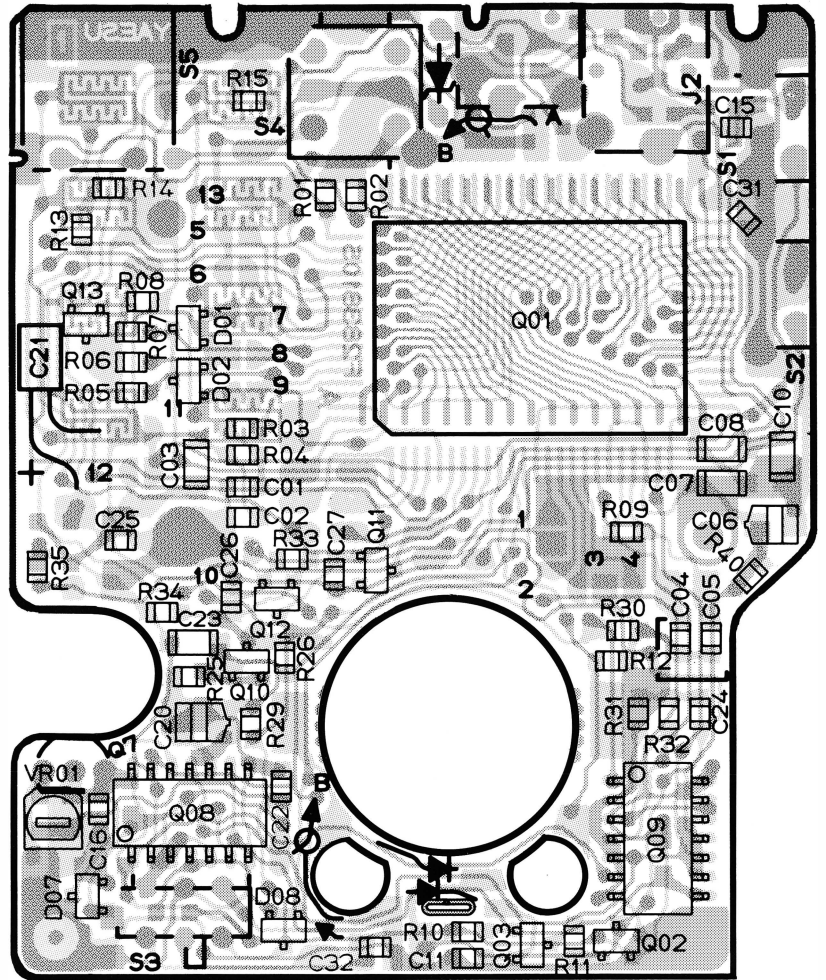
Marked Surface

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

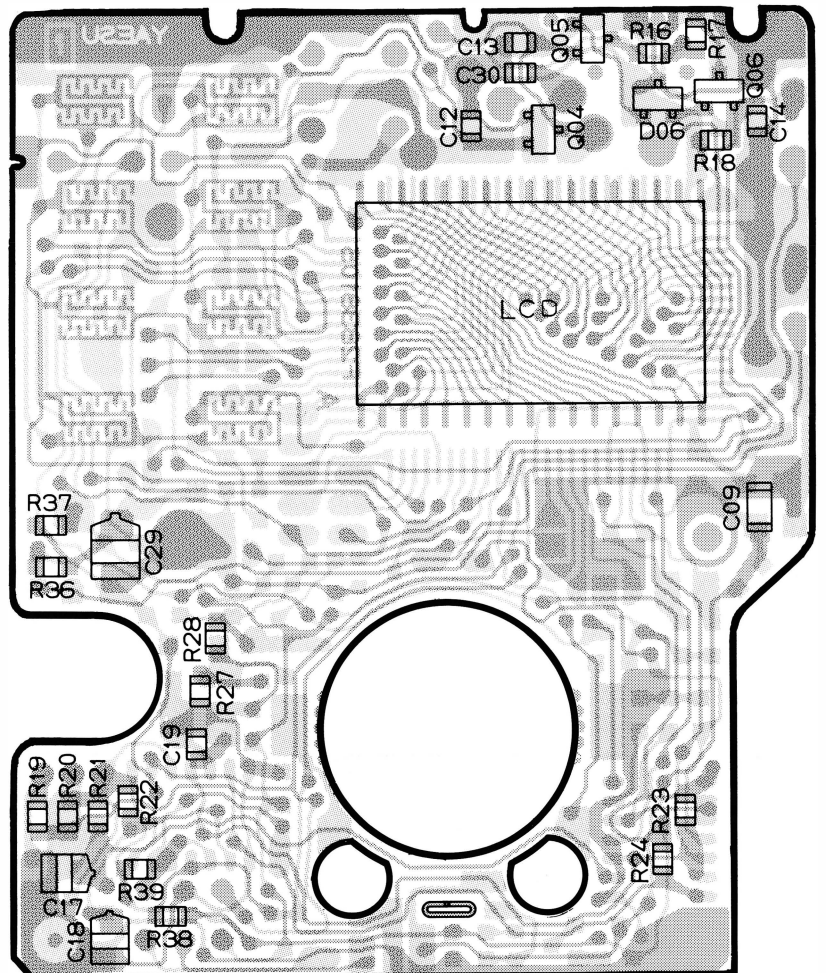


Marked Surface

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

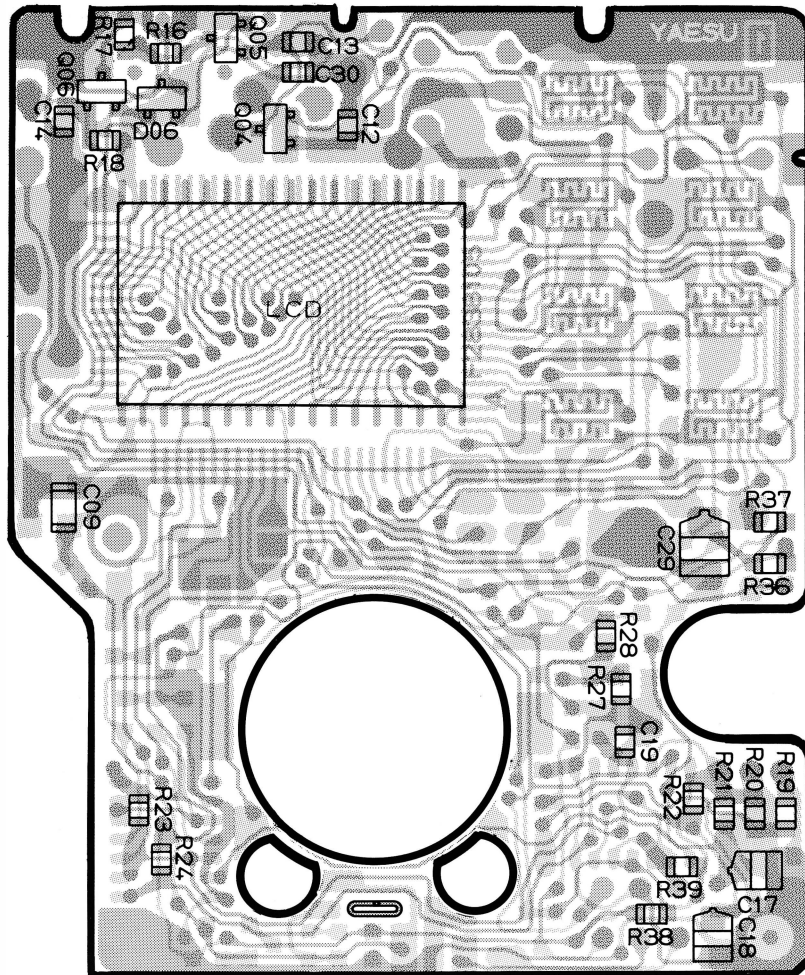


(obverse view of "microprocessor" side)

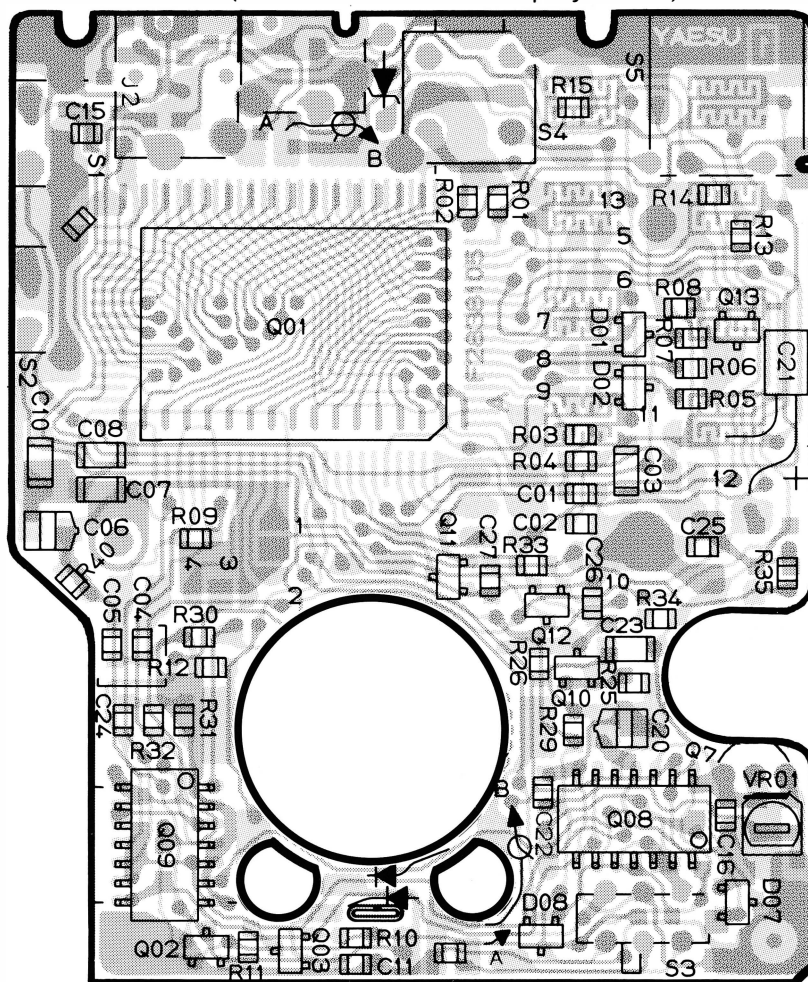


1 - 9 (reverse view of "display" side)

# CNTL UNIT



(obverse view of "display" side)



(reverse view of "microprocessor" side)

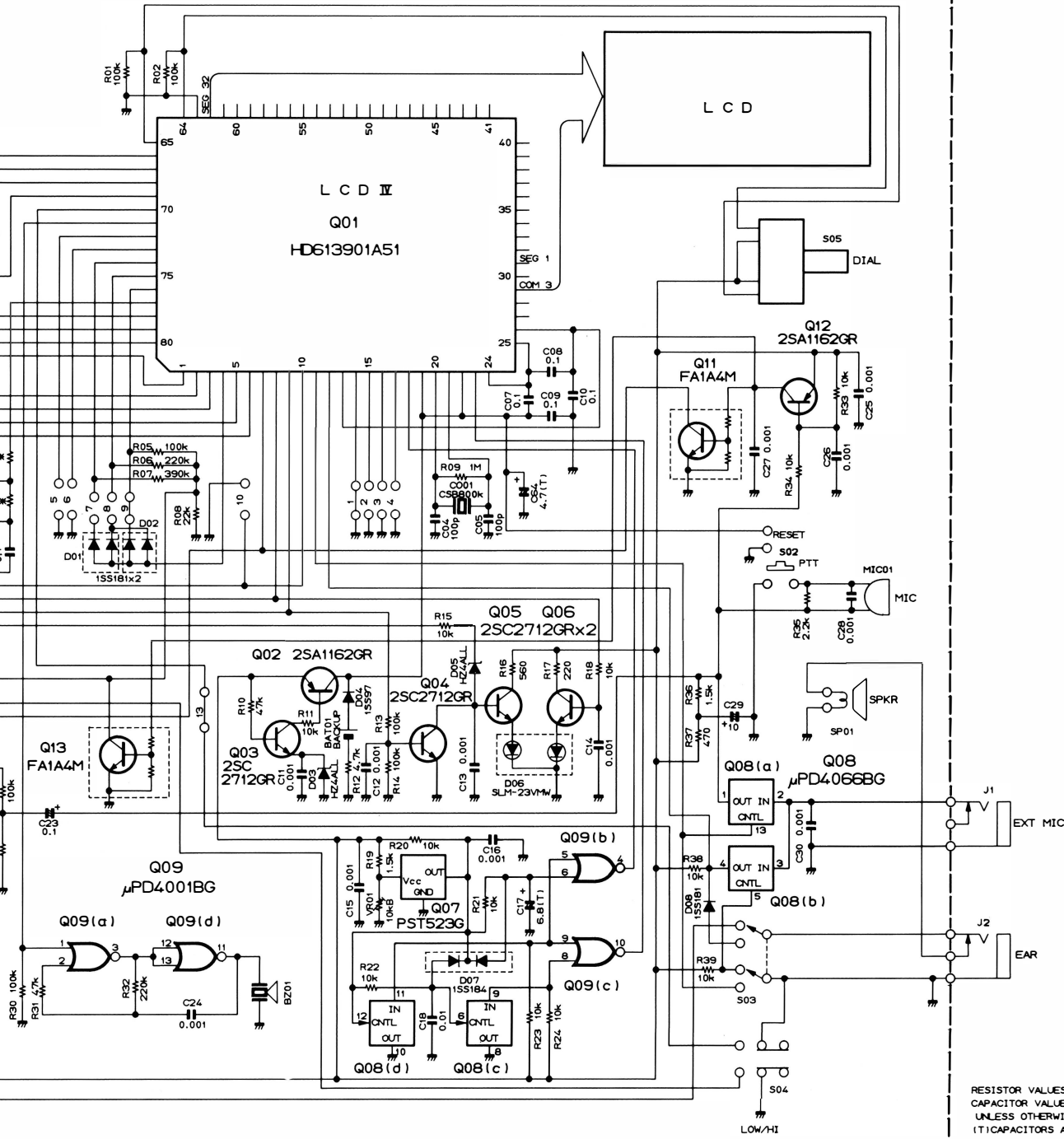
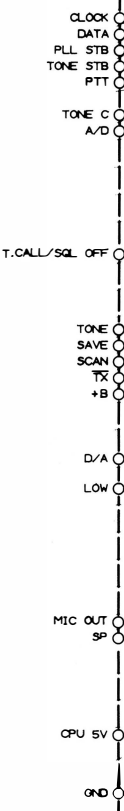
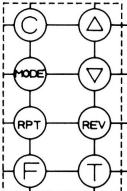
# CNTL UNIT

## CNTL UNIT F2838105A (No.10xx)

0 SHORT X OPEN

	4	7	11	12
A1	X	O	O	X
A2	X	X	O	X
B	O	O	X	O
C	O	O	X	O
D	X	O	X	O
E1	X	X	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



RESISTOR VALUES ARE IN Ω, 1/10W;  
CAPACITOR VALUES ARE IN μF, 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

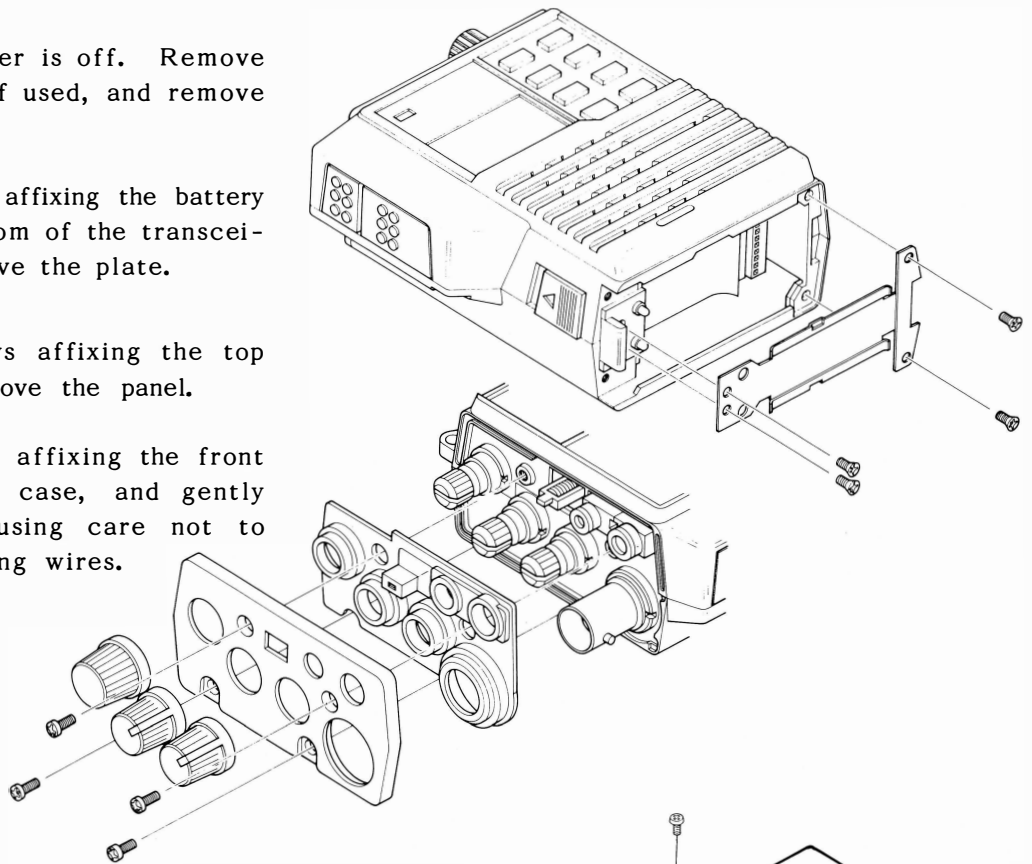
Frequency Counter: 0.2ppm accuracy at 150 MHz

AF Signal Generator

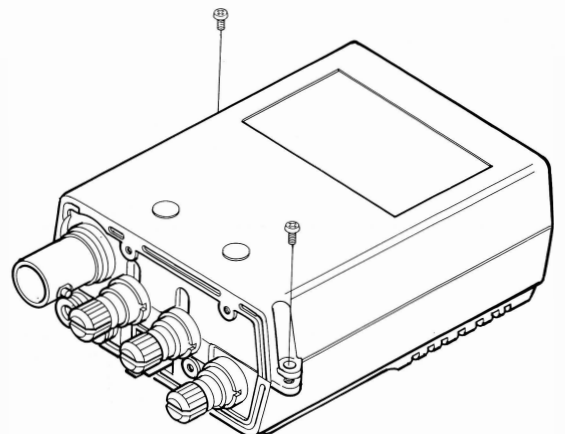
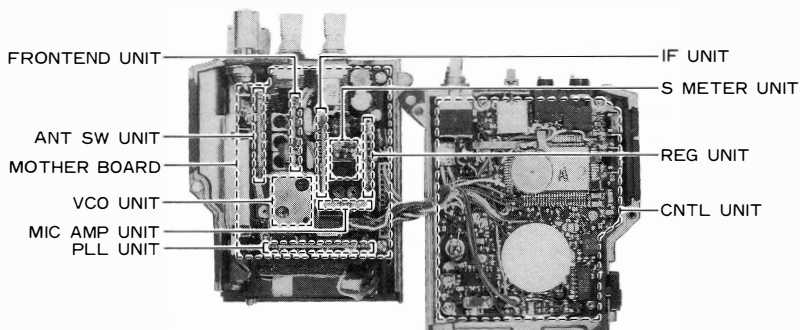
DC Voltmeter: high impedance

## 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

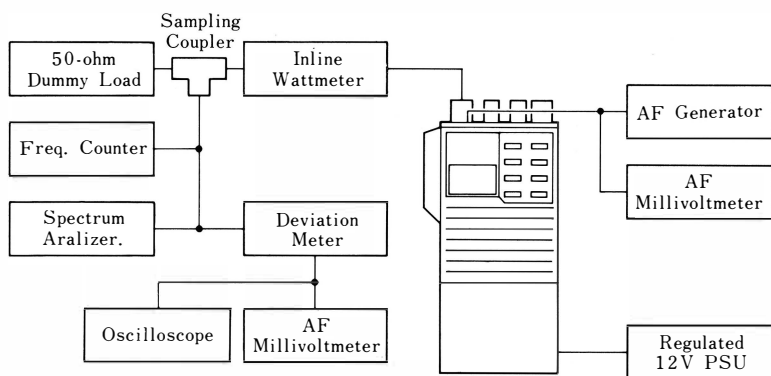
Set up the test equipment as shown in the diagram below for transmitter alignment. Adjust the supply voltage to 12.0V for all steps except Transmitter Output Power alignment (B).

### A. PLL VCV (Varactor Control Voltage)

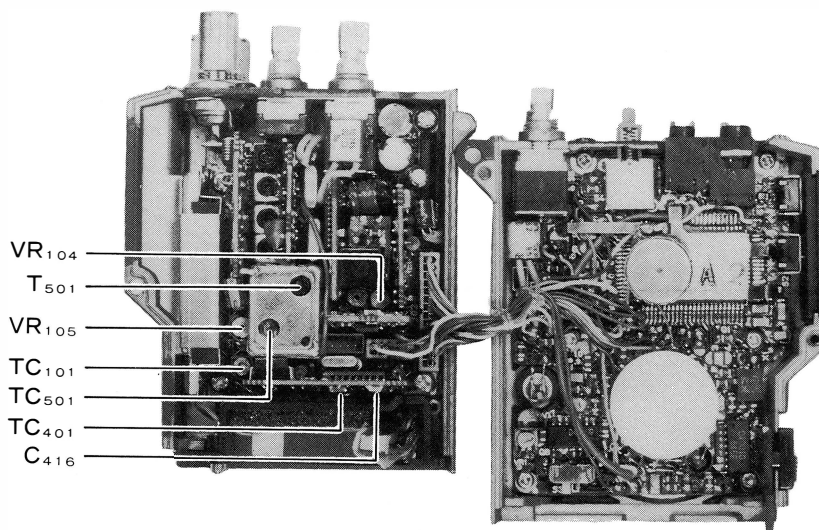
- (1) Connect the DC voltmeter between C416 on the PLL Unit and chassis ground.
- (2) While transmitting on 144.000 MHz adjust transformer T501 on the VCO Unit for  $1.35 \pm 0.05$  VDC.
- (3) While receiving on 144.000 MHz adjust trimmer TC501 on the VCO Unit for  $1.1 \pm 0.05$  VDC.
- (4) Retune the 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  $\pm 4.5$  kHz deviation on the deviation meter.



## II. RECEIVER

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

### A. Sensitivity

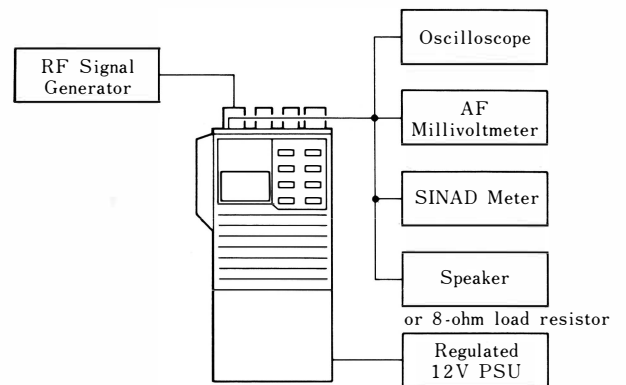
- (1) With the transceiver and RF signal generator both tuned to band center (145 or 146 MHz), set the generator for  $\pm 3.5$  kHz deviation of 1 kHz tone modulation, and set the output level for 40 dBu at the antenna jack.
- (2) Preset VR103 on the Mother Board fully clockwise.
- (3) Adjust T101 through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

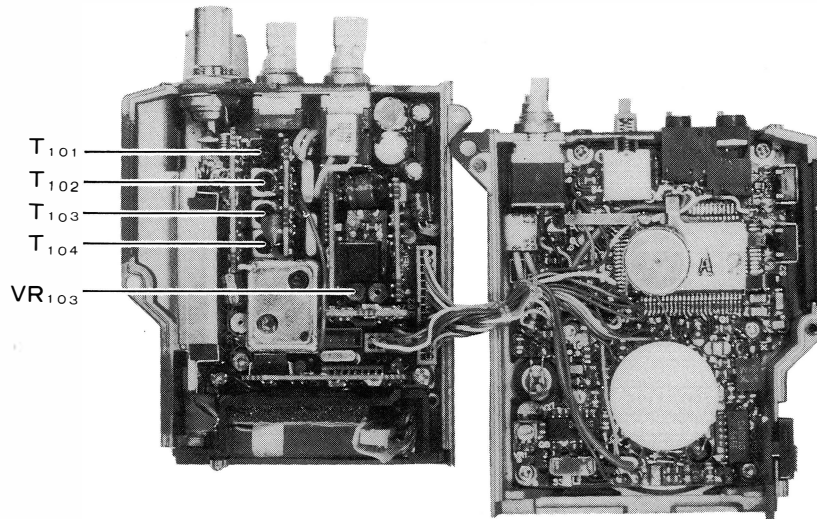
### B. S-meter Sensitivity

- (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			
		<b>CONNECTOR</b>			
J01	P1090541	BNC-RM ANT			CERAMIC FILTER
			CF101	H3900280	LF-B12
		<b>MISCELLANEOUS</b>			
	R3116390	DIAL Knob			<b>RESISTORS</b>
	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			<b>POTENTIOMETERS</b>
			VR101	J60800128	K091K0004-20KB 20kΩ B
			VR102	J60800129	K0911100D-20KA 20kΩ A
			VR103-105	J51776473	RH0411CS4J 47kΩ B
					<b>CAPACITORS</b>
			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)
		IC			
Q101	G1090558	LA4145	C103	K22170221	" " " 27pF " (C2012CH1H270JFA)
			C111,122,125-127 131,135-141	K22170805	" " " 0.001μF B (C2012B1H102MFA)
		PWR-MODULE			
Q107	G1090732	M57796MA	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)
		<b>TRANSISTORS</b>			
Q102	G3111627G	2SA1162GRTE85R	C121	K78130001	Tantalum 20WV 0.47μF (F951D474MRAAF1Q2)
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)
		<b>DIODE</b>			
D101	G2070009	1SS184TE85R Si			
					<b>TRIMMER CAPACITOR</b>
			TC101	K91000149	VCT31E161A 20pF
		<b>CRYSTAL FILTER</b>			
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
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 15 $\mu$ F (F950J156MVCAF1Q2)	TC401	K91000154	TRIMMER CAPACITOR ECR-KN020E11X 20pF
		INDUCTOR			INDUCTORS
L301	L1190344	LAL02KR100K 10 $\mu$ H	L401	L1190311	LAL02NA221K 220 $\mu$ H
PLL UNIT			VCO UNIT		
Symbol No.	Part No.	Name & Description	Symbol No.	Part No.	Name & Description
	F2838108A	Printed Circuit Board		F2838106	Printed Circuit Board
	C028388AA	PCB with Components Model A1,A2,D,E2 5kHz steps			VCO-LC
	C028388AB	" " "		F2838110	" " "
		Model F 10kHz steps			VCO-OSC
	C028388AC	" " "		C028386AF	PCB with Components
		Model B,C2 12.5kHz steps			
					FET
		ICs	Q501	G3802387S	2SK238-K17
Q401	G1090725	MC12017P			
Q402	G1090582	JLC1007P			
					TRANSISTOR
			Q502	G3327597C	2SC2759-T2B U23
		DIODE			
D401	G2090118	1SS97 Schottky			
					DIODES
		CRYSTAL	D501	G2090297	1SS110 Si
			D502,503	G2090271	1T33 Varactor
X401**	H0102771	UM-1 10.240MHz			
X401■	H0102772	UM-1 12.800MHz			
					RESISTORS
			R504	J24205470	RMC 1/10T 470J 1/10W 47 $\Omega$
		RESISTORS	R505	J24205101	" " " 101J " 100 $\Omega$
R408	J24205000	RMC 1/10T 000J 1/10W 0 $\Omega$	R501	J24205682	" " " 682J " 6.8k $\Omega$
R402,403	J24205220	" " " 220J " 22 $\Omega$	R506	J24205683	" " " 683J " 68k $\Omega$
R404,405,407	J24205222	" " " 222J " 2.2k $\Omega$	R503	J24205224	" " " 224J " 220k $\Omega$
R406■	J24205472	" " " 472J " 4.7k $\Omega$	R502	J24205225	" " " 225J " 2.2M $\Omega$
R401,406*	J24205103	" " " 103J " 10k $\Omega$			
R406*	J24205153	" " " 153J " 15k $\Omega$			
					CAPACITORS
			C508	K22170201	Chip Ceramic 50WV 0.5pF CH (C2012CH1HOR5CFA)
C401	K22170206	Chip Ceramic 50WV 5pF CH (C2012CH1H050CFA)	C503	K22170211	" " " 10pF " (C2012CH1H100DFA)
C411,412	K22170227	" " " 47pF " (C2012CH1H470JFA)	C506,507	K22170311	" " " " UJ (C2012UJ1H100DFA)
C408-410,419	K22170235	" " " 100pF " (C2012CH1H101JFA)	C501	K22170215	" " " 15pF CH (C2012CH1H150JFA)
C402,403,405,407 413-415	K22170805	" " " 0.001 $\mu$ F B (C2012B1H102MFA)	C502,505,510	K22170805	" " " 0.001 $\mu$ F B (C2012B1H102MFA)
C416,417	K22141904	" " " 25WV 0.1 $\mu$ F D (C3216D1E104MFA)	C509	K78080002	Chip Tantalum 6.3WV 4.7 $\mu$ F (F950J475MSAAF1Q2)
C404,406,420	K78080002	Chip Tantalum 6.3WV 4.7 $\mu$ F (F950J475MSAAF1Q2)	C504	K78080003	" " " 10 $\mu$ F (F950J106MTAAF1Q2)
C418	K78100003	" " " 10WV 6.8 $\mu$ F (F951A685MTAAF1Q2)			

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

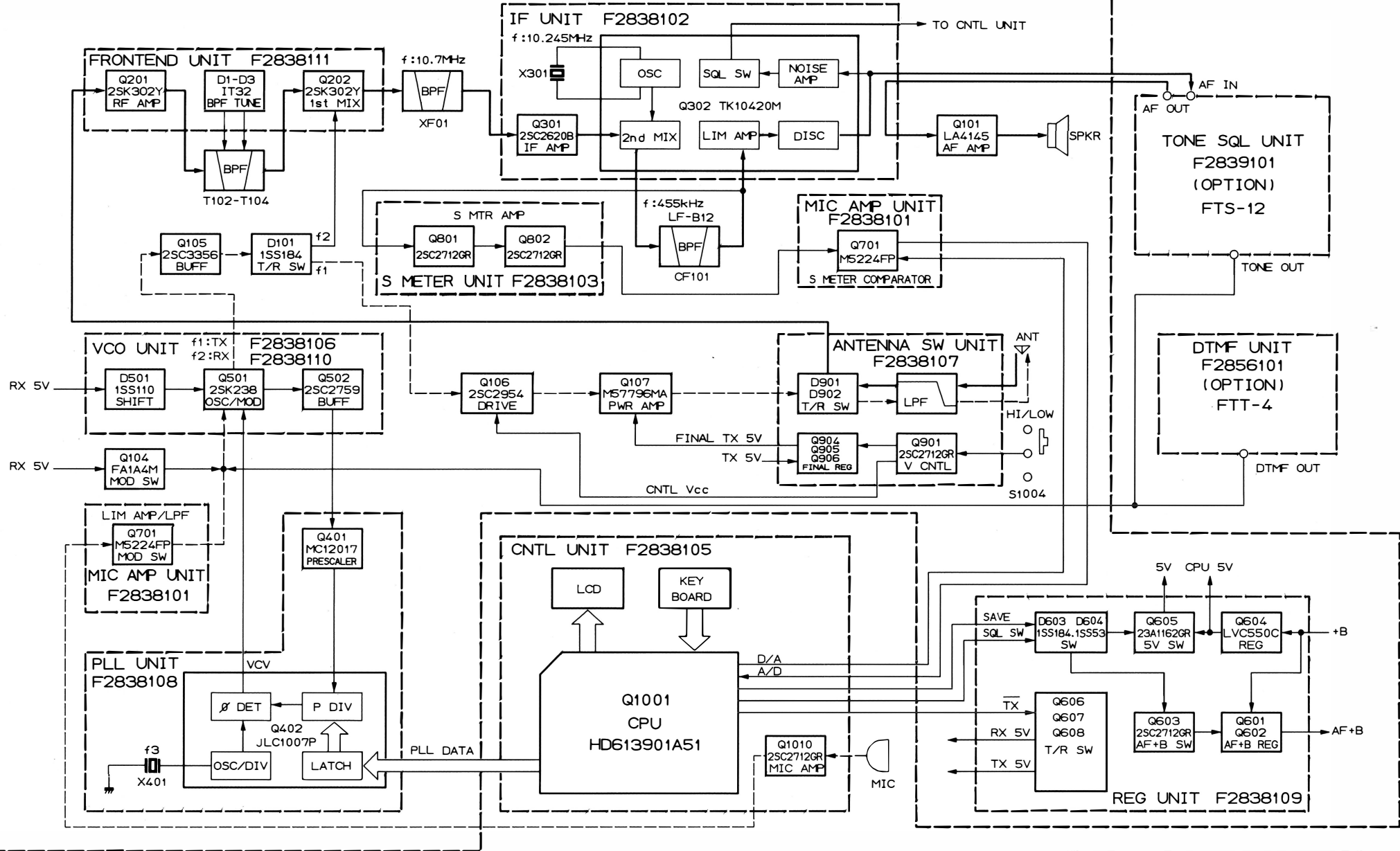
TC501	K91000152	TRIMMER CAPACITOR ECR-JA040G12X	C602	K78100003	Chip Tantalum 10WV 6.8 $\mu$ F (F951A685MTAAF1Q2)
			C607	K78080003	" " 6.3WV 10 $\mu$ F (F950J106MTAAF1Q2)
		INDUCTORS			
L501-503	L1190283	LAL02NA1R0M 1 $\mu$ H			
L504	L1190342	LAL02KRR22M 0.22 $\mu$ H			
			MIC AMP UNIT		
			Symbol No.	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		
REG UNIT			R705	J24205332	RMC 1/10T332J1/10W3.3k $\Omega$
Symbol No.	Part No.	Name & Description	R710	J24205562	" " 562J " 5.6k $\Omega$
	F2838109A	Printed Circuit Board	R701*,702*,709	J24205103	" " 103J " 10k $\Omega$
	C028389AA	PCB with Components	711-713		
			R704*,715	J24205223	" " 223J " 22k $\Omega$
			R708	J24205333	" " 333J " 33k $\Omega$
			R707	J24205563	" " 563J " 56k $\Omega$
		IC	R716	J24205104	" " 104J " 100k $\Omega$
Q604	G1090736	LVC550C-2	R703,714	J24205225	" " 225J " 2.2M $\Omega$
			R706	J24205335	" " 335J " 3.3M $\Omega$
			TRANSISTORS		
Q601	G3207997L	2SB799ML			CAPACITORS
Q602,603,608	G3327127G	2SC2712GRTE85R	C705,708,710,711	K22170805	Chip Ceramic 50WV 0.001 $\mu$ F B (C2012B1H102MFA)
Q605-607	G3111627G	2SA1162GRTE85R	713,714	K22170809	" " " 0.0022 $\mu$ F " (C2012B1H220MFA)
			C703*	K22170817	" " " 0.01 $\mu$ F B (C2012B1H103MFA)
		DIODES	C702*,703*,709	K22170817	" " " 0.01 $\mu$ F B (C2012B1H103MFA)
D601,604	G2090027	1SS53 Si	C706	K22171008	" " " 0.047 $\mu$ F " (C2012B1H473ZFA)
D602	G2090183	HZ9A2L Zener	C701*,704*,707	K22141904	" " " 0.1 $\mu$ F D (C3216D1E104MFA)
D603	G2070009	1SS184TE85R Si	712		
			RESISTORS		
R602	J01245829	Carbon film 1/4W 8.2 $\Omega$ TJ			
R601	J24205101	RMC 1/10T101J 1/10W 100 $\Omega$			
R608	J24205222	" " 222J " 2.2k $\Omega$			
R606,607,612	J24205472	" " 472J " 4.7k $\Omega$	S METER UNIT		
R605,611	J24205103	" " 103J " 10k $\Omega$	Symbol No.	Part No.	Name & Description
R603	J24205223	" " 223J " 22k $\Omega$		F2838103	Printed Circuit Board
R604,609,610	J24205104	" " 104J " 100k $\Omega$		C028383AA	PCB with Components
			TRANSISTORS		
C601,603,604	K22170805	Chip Ceramic 50WV 0.001 $\mu$ F B (2012B1H102MFA)	Q801,802	G3327127G	2SC2712GRTE85R
606,608-613					
C605	K78120002	Chip Tantalum 16WV 2.2 $\mu$ F (F951C225MSAAF1Q2)			

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

		<b>DIODES</b>			<b>INDUCTORS</b>
D801,802	G2090029	1N60 Ge	L901	L1190344	LAL02KR100K 10μH
			L902, L904	L0021683	
			L903	L0021682	
		<b>RESISTORS</b>			
R802	J24205102	RMC 1/10T102J 1kΩ			
R804	J01245102	Carbon film 1/4W 1kΩ			<b>TERMINAL POSTS</b>
R801,803	J24205104	RMC 1/10T104J 100kΩ	TP901	Q5000016	TP-E/MS-60124
		<b>CAPACITORS</b>			
C801	K22170801	Chip Ceramic 50WV 470pF B (C2012B1H471MFA)	<b>CNTL UNIT</b>		
C802,803	K22170817	" " " 0.01μF " (C2012B1H103MFA)	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
		<b>ANT SW UNIT</b>			
					<b>ICs</b>
			Q1001	G1090741	HD613901A51
			Q1007	G1090752	PST523G
Q901,905	G3207997L	2SB799ML	Q1008	G1090602	μPD4066BG
Q902-904	G3327127G	2SC2712GRTE85R	Q1009	G1090601	μPD4001BG
		<b>DIODES</b>			<b>TRANSISTORS</b>
D901,902	G2090027	1SS53 Si	Q1002,1012	G3111627G	2SA1162GRTE85R
D903	G2070007	1SS226TE85R "	Q1003-1006,1010	G3327127G	2SC2712GRTE85R
			Q1011,1013	G3070001	FA1A4M
		<b>RESISTORS</b>			
R905	J24205221	RMC 1/10T221J 1/10W 220Ω			<b>DIODES</b>
R903	J24205471	" " 471J " 470Ω	D1001,1002,1008	G2070001	1SS181TE85R Si
R901,904,906	J24205222	" " 222J " 2.2kΩ	D1003,1005	G2090334	HZ4ALL Zener
R902	J24205473	" " 473J " 47kΩ	D1004	G2090118	1SS97 Schottky
			D1006	G2070028	SLM-23VMW T-97 LED
			D1007	G2070009	1SS184TE85R Si
		<b>CAPACITORS</b>			
C916	K22170207	Chip Ceramic 50WV 6pF CH (C2012CH1H060DFA)	<b>LIQUID CRYSTAL DISPLAY</b>		
C914	K22170209	" " " 8pF " (C2012CH1H080DFA)	DS1001	G6090060	LR-541C
C917	K22170217	" " " 18pF " (C2012CH1H180JFA)			
C913,915	K22170223	" " " 33pF " (C2012CH1H330JFA)	X1001	H7900270	<b>CERAMIC RESONATOR</b> CSB800K
C901,903,905 907-912	K22170805	" " " 0.001μF B (C2012B1H102MFA)			
C904	K40179033	Electrolytic " 0.47μF (RC3-50VR47M)			
C902,906	K40129052	" 16WV 10μF (RC3-16V100M)			



MOTHER BOARD UNIT F2838104



	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

1-20



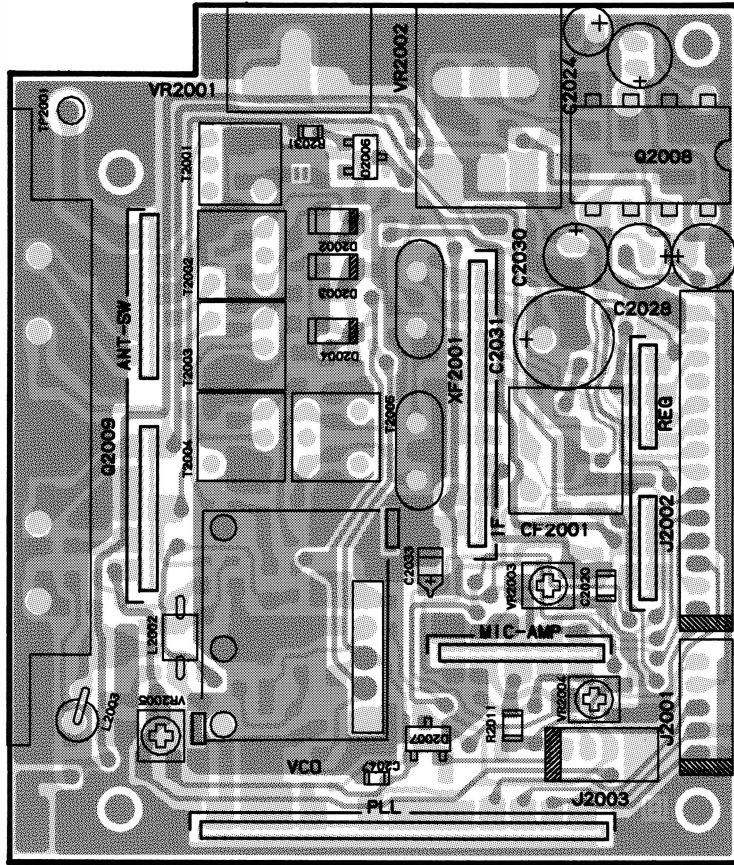
# Late Model FT-23R

## CONTENTS

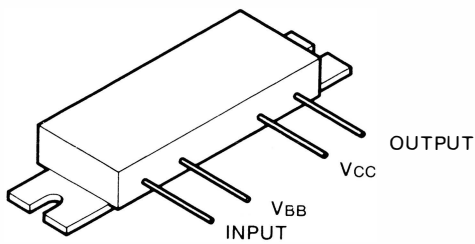
MOTHER BOARD	2-1
IF UNIT	2-4
PLL UNIT	2-5
VCO UNIT	2-6
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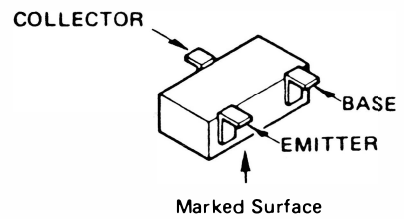
# MOTHER BOARD



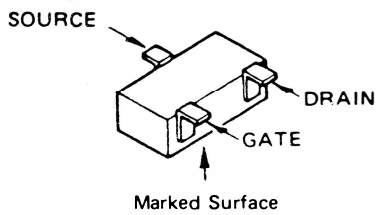
(obverse view of "mixed-component" side)



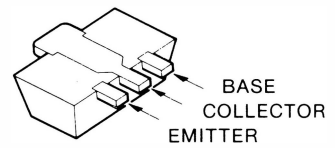
M57796MA (Q2009)



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

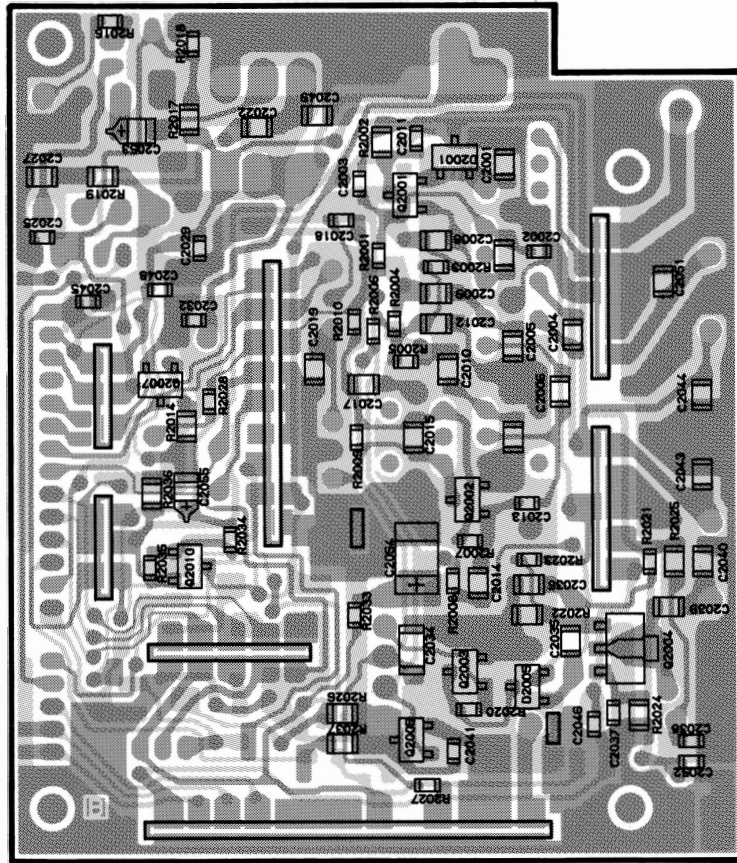


2SK302Y (TY) : (Q2001)

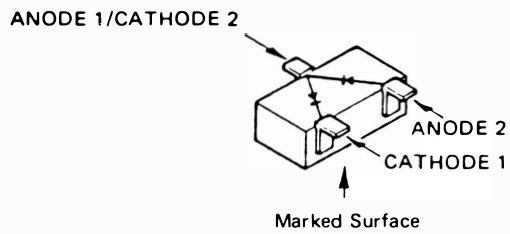


2SC2954 (QK) : (2004)

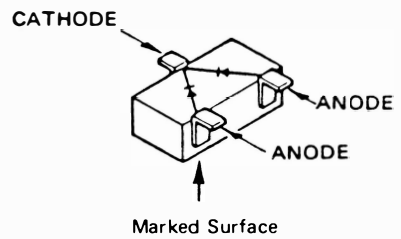
# MOTHER BOARD



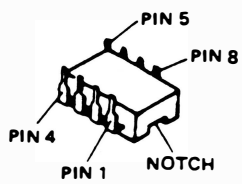
(obverse view of "chip-only" side)



1SS226 (C3) : (D2001,D2007)



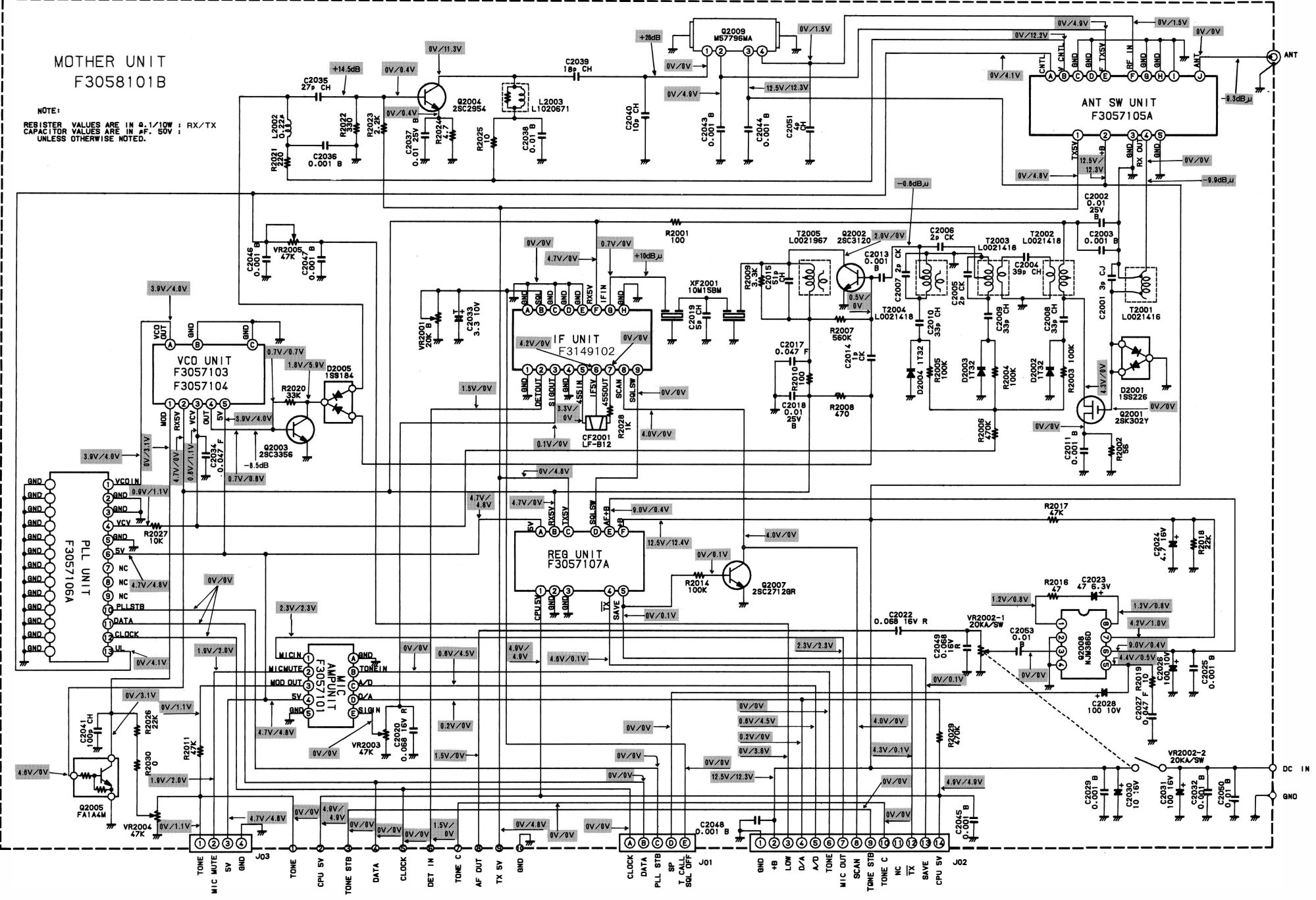
1SS184 (B3) : (D2005)



NJM386D (Q2008)

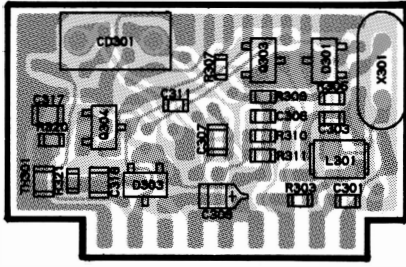
MOTHER UNIT  
F3058101B

NOTE:  
RESISTOR VALUES ARE IN  $\Omega$ , 1/10W; RX/TX  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V;  
UNLESS OTHERWISE NOTED.

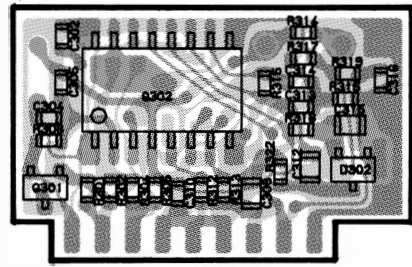


MOTHER BOARD

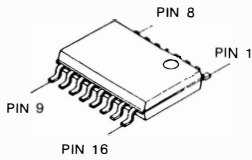
# IF UNIT



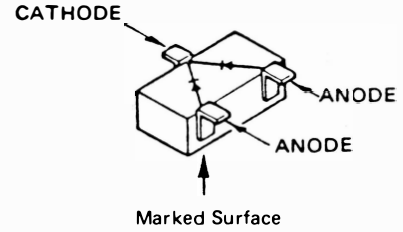
(obverse view of "mixed-component" side)



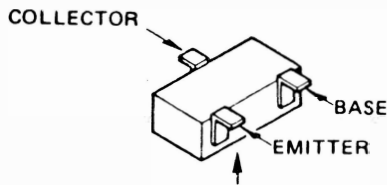
(obverse view of "chip-only" side)



MC3372ML (Q302)



1SS184 (B3) : (D303)

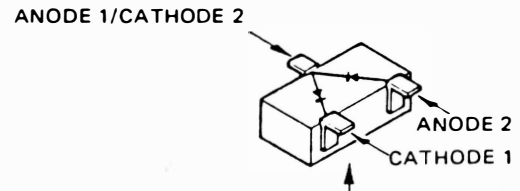


Marked Surface

2SC2620B (QB)  
(Q301)

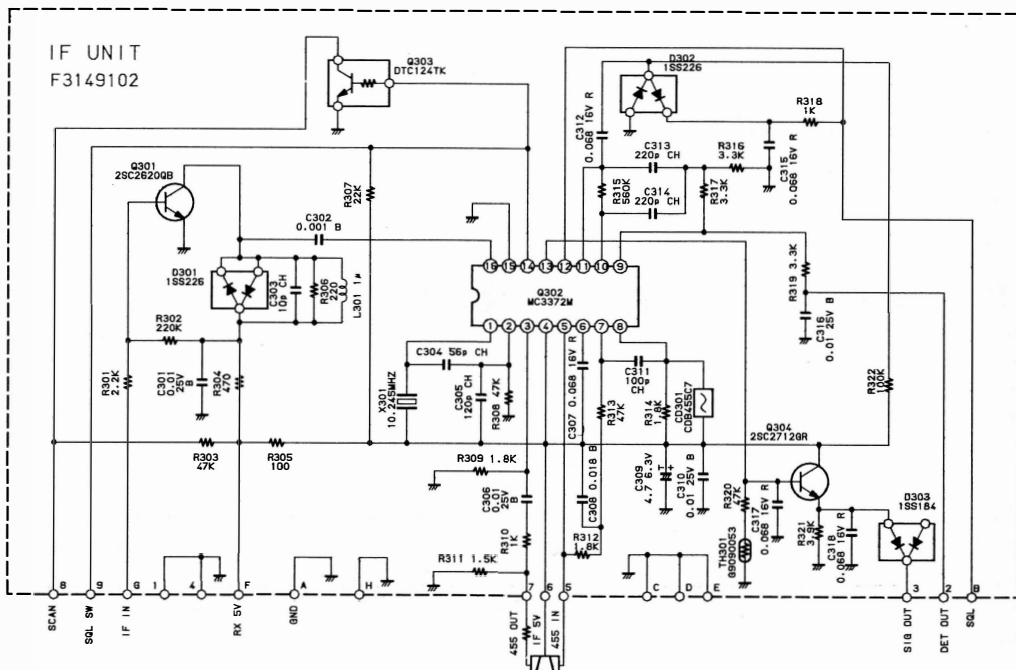
2SC2712GR (LG)  
(Q304)

DTC124TK (O5)  
(Q303)

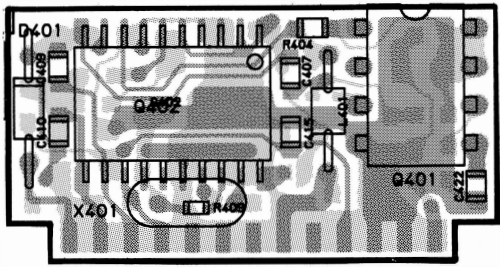


Marked Surface

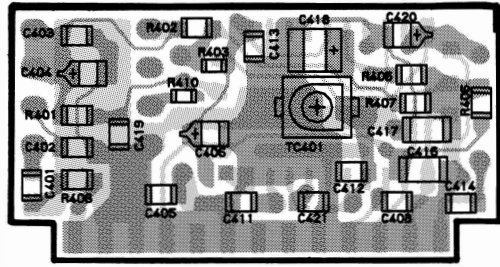
1SS226 (C3)  
(D301,302)



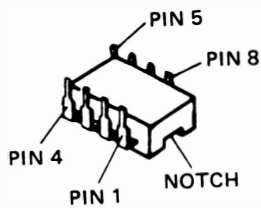
# PLL UNIT



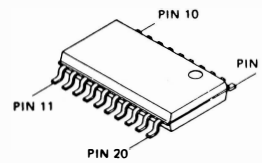
(obverse view of "mixed-component" side)



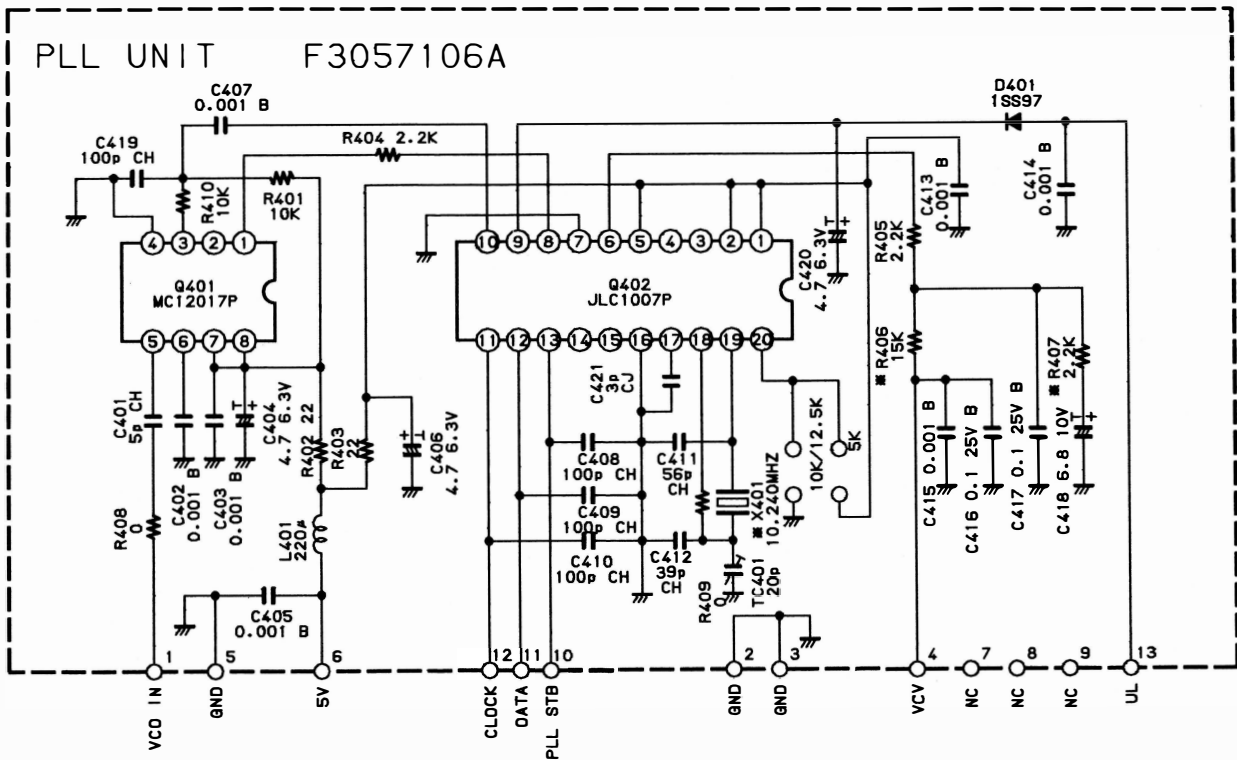
(obverse view of "chip-only" side)



MC12017P (Q401)



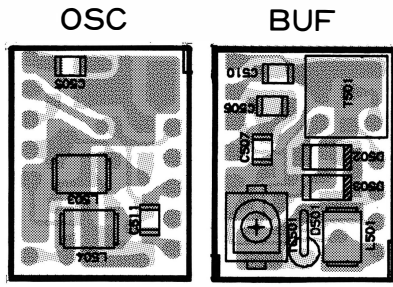
JLC1007P (Q402)



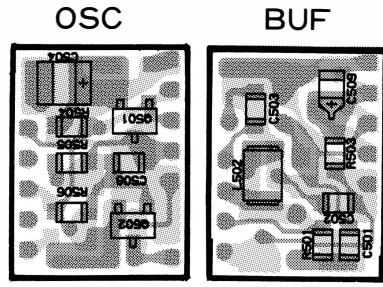
	XF401	R406	R407
A1, A2, D, E2, A3 TYPE	10.240MHZ	15K $\Omega$	1.5K $\Omega$
B, C2 TYPE	12.800MHZ	4.7K $\Omega$	1K $\Omega$

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

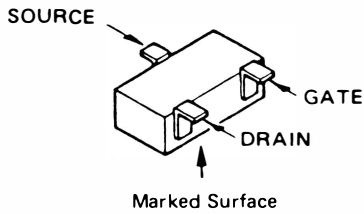
# VCO UNIT



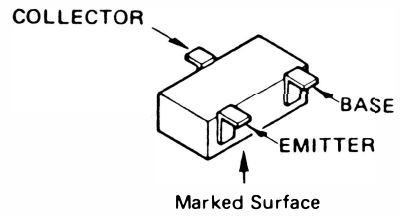
(obverse view of "top" side)



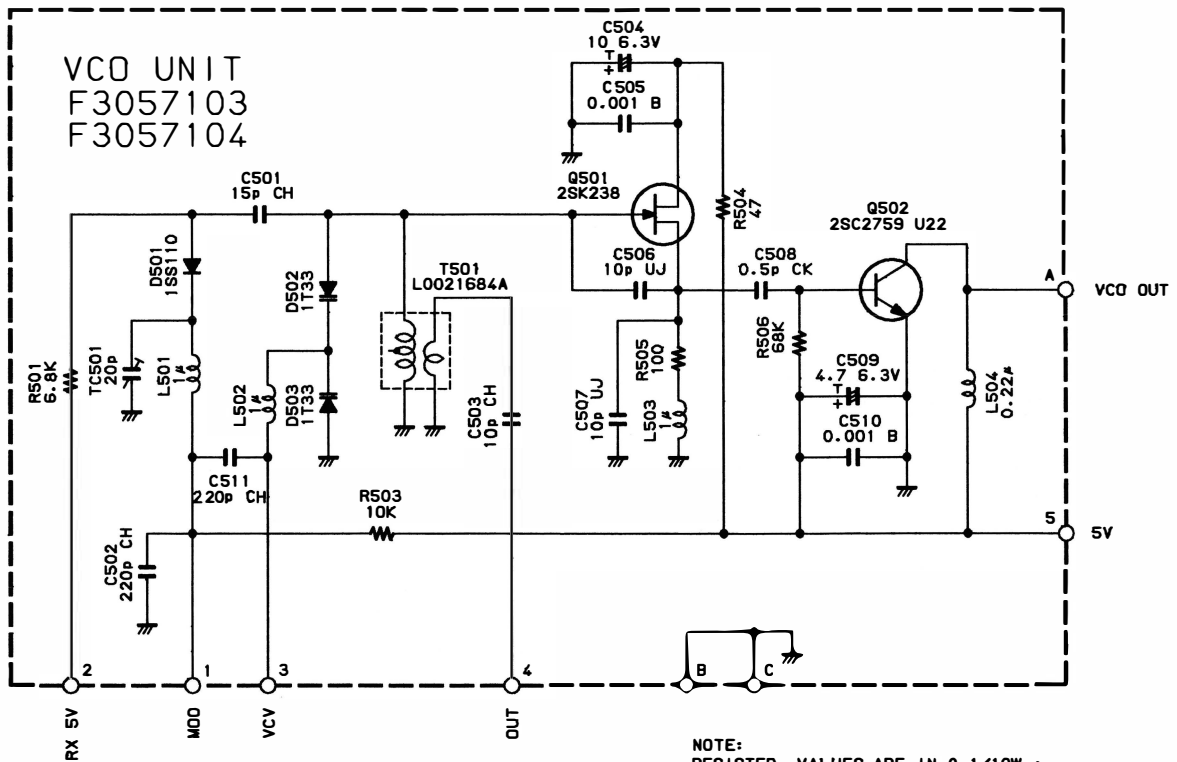
(obverse view of "bottom" side)



2SK238 (K17) : (Q501)



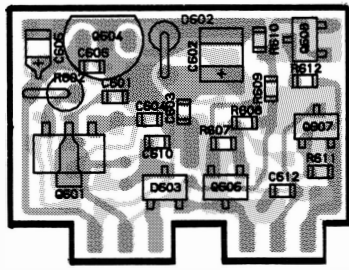
2SC2759 (U22) : (Q502)



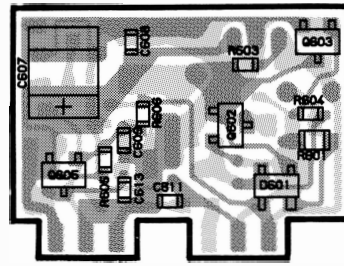
NOTE:  
 RESISTOR VALUES ARE IN  $\Omega$ , 1/10W ;  
 CAPACITOR VALUES ARE IN  $\mu$ F, 50V ;  
 (T) CAPACITOR VALUES ARE TANTALUM ;  
 INDUCTOR VALUES ARE IN H  
 UNLESS OTHERWISE NOTED.



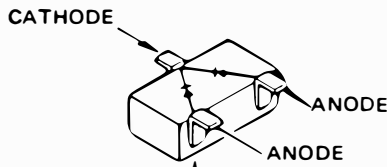
# REG UNIT



(obverse view of "top" side)

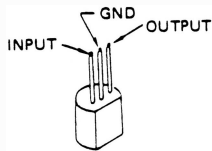


(obverse view of "bottom" side)

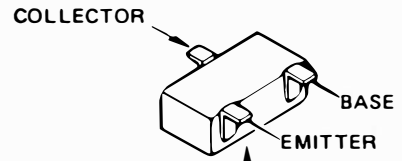


Marked Surface

1SS184 (B3) : (D603)

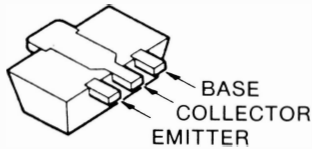


LM2931AZ-5.0  
(Q604)

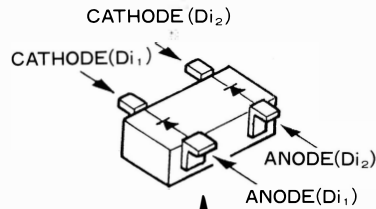


Marked Surface

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



2SB799 (Q601)

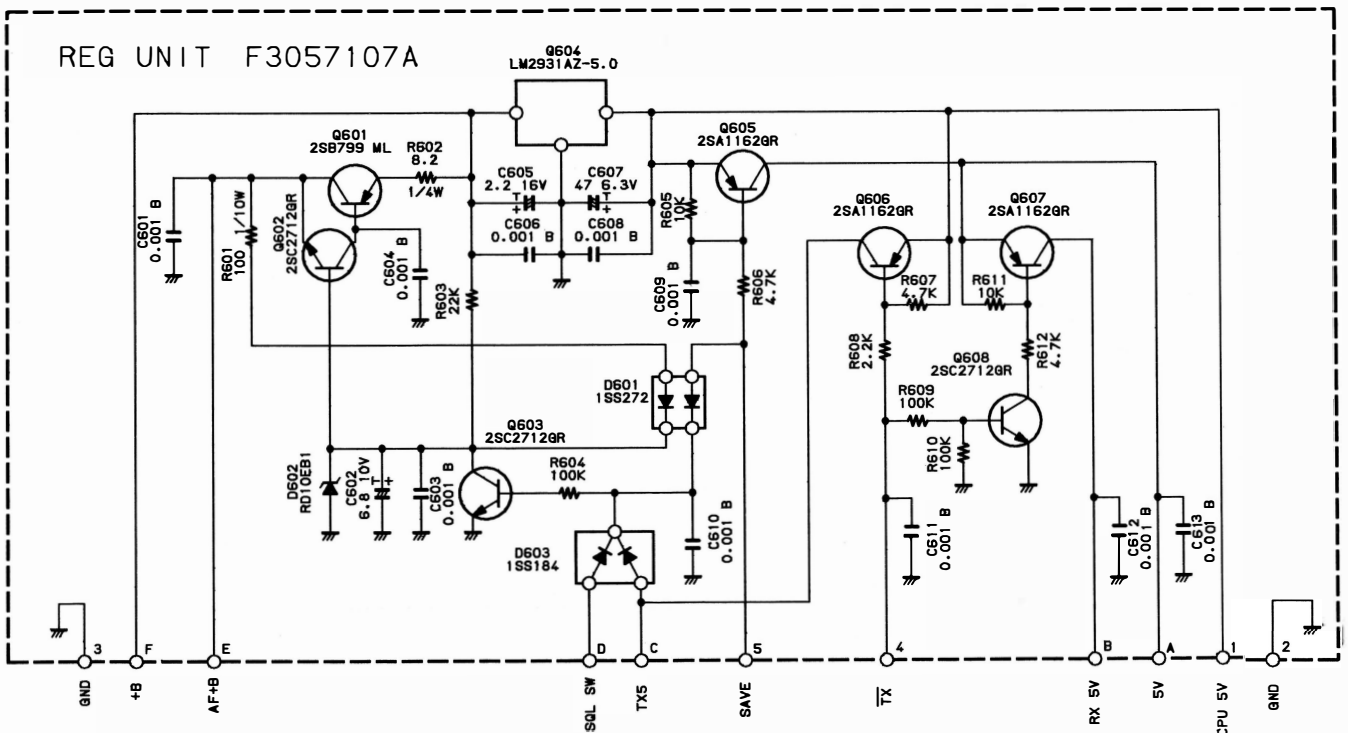


Marked Surface

1SS272 (A1) : (D601)

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

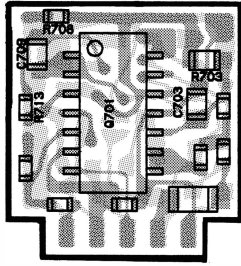
## REG UNIT F3057107A



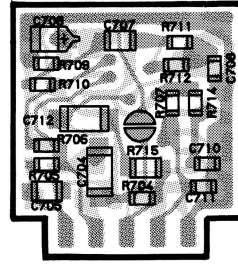
### NOTE:

RESISTOR VALUES ARE IN  $\Omega$ , 1/16W ;  
CAPACITOR VALUES ARE IN  $\mu$ F, 50V ;  
(T) CAPACITOR VALUES ARE TANTALUM ;  
INDUCTOR VALUES ARE IN H  
UNLESS OTHERWISE NOTED.

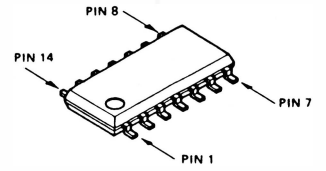
# MIC AMP UNIT



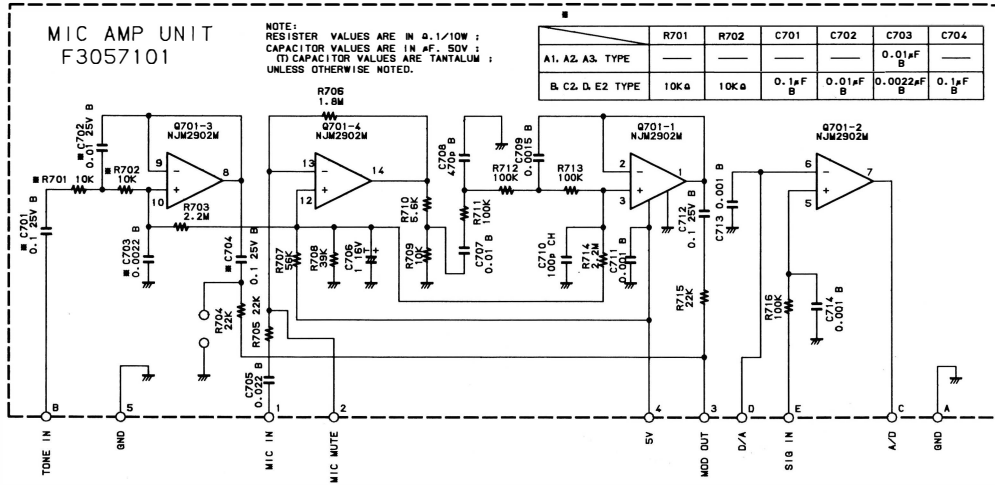
(obverse view of "mixed-component" side)



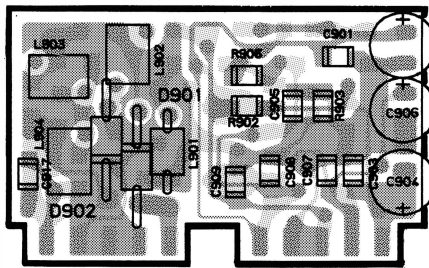
(obverse view of "chip-only" side)



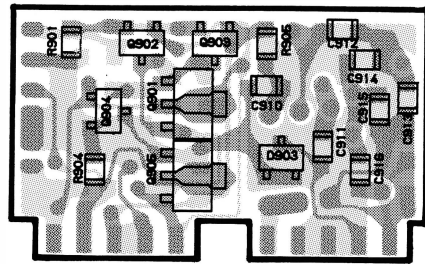
NJM2902M (Q701)



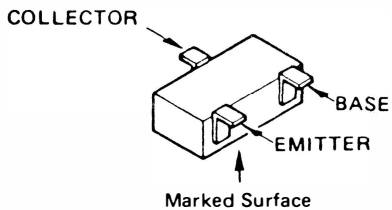
# ANT SW UNIT



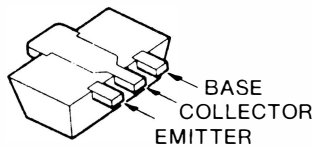
(obverse view of "mixed-component" side)



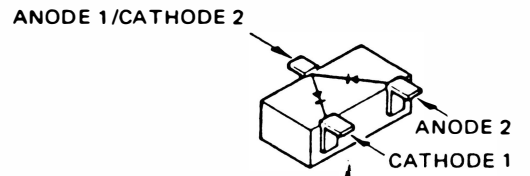
(obverse view of "chip-only" side)



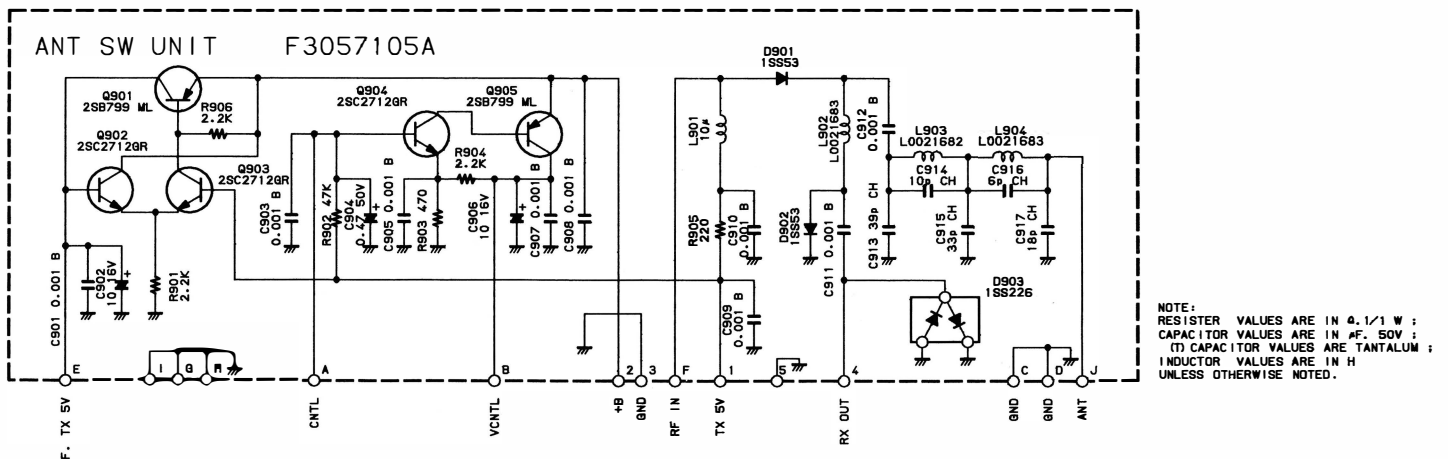
2SC2712GR (LG)  
(Q902,903,904)



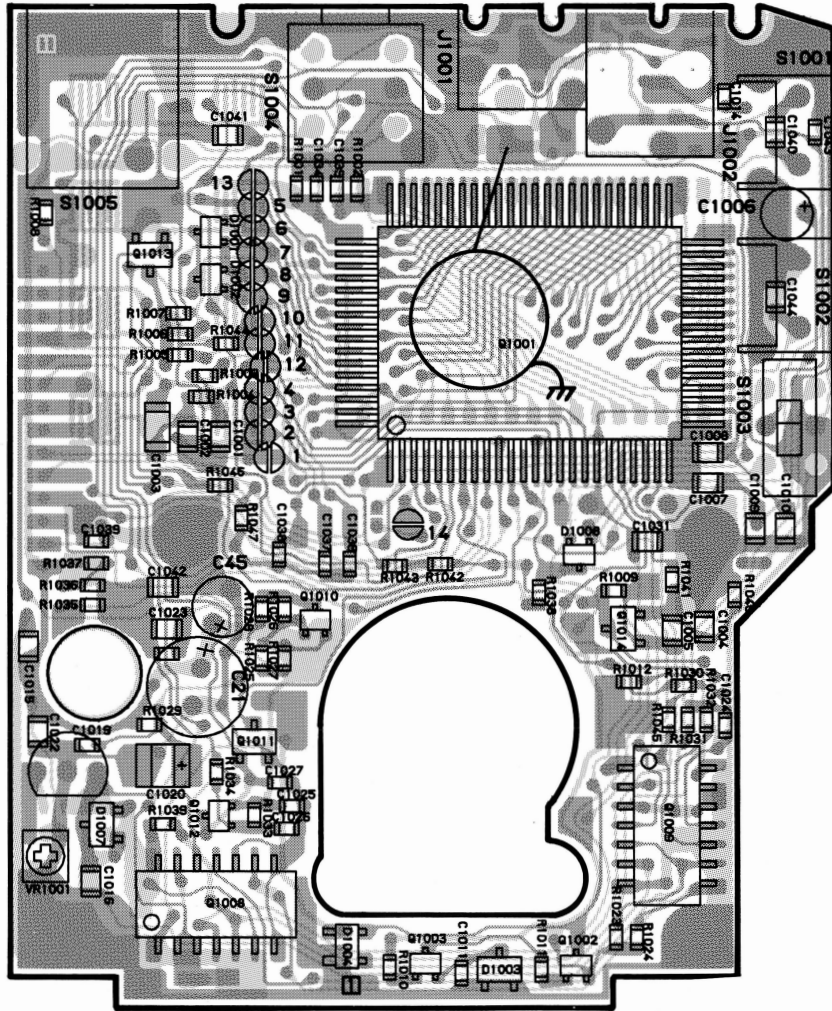
2SB799 (Q901,905)



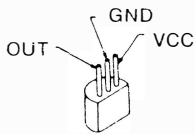
1SS226 (C3) : (D903)



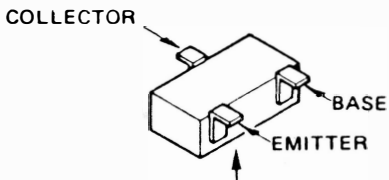
# CNTL UNIT



(obverse view of "mixed-component" side)

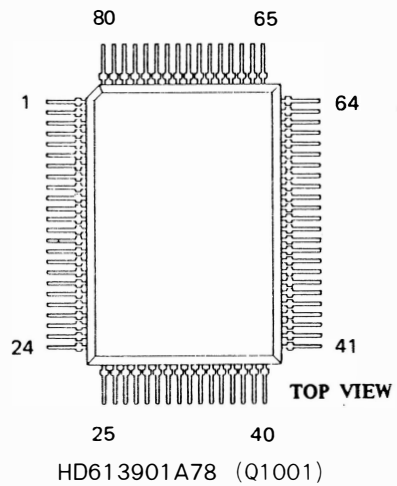


PST523G (Q1007)

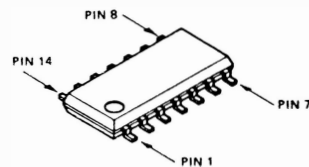


Marked Surface

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

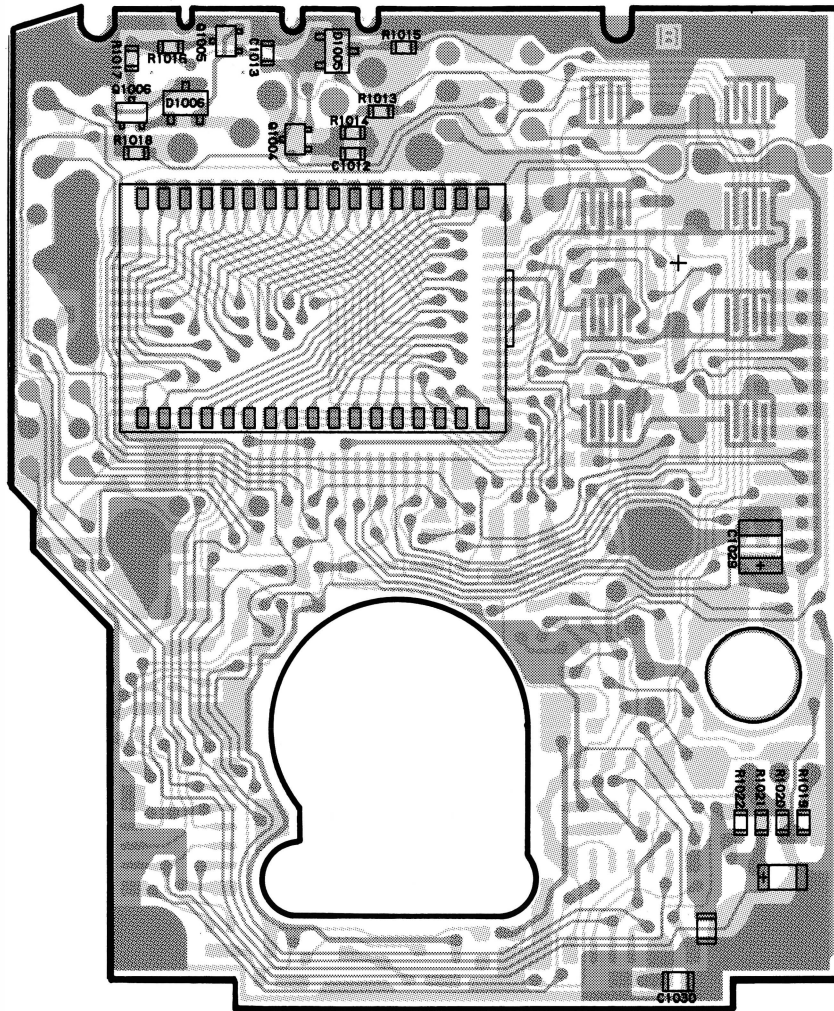


HD613901A78 (Q1001)

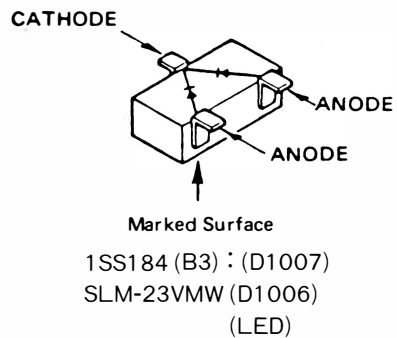
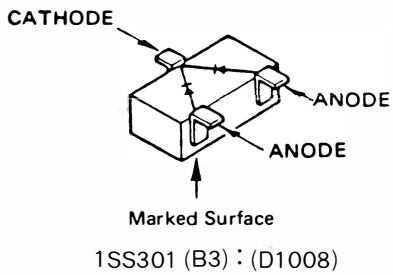
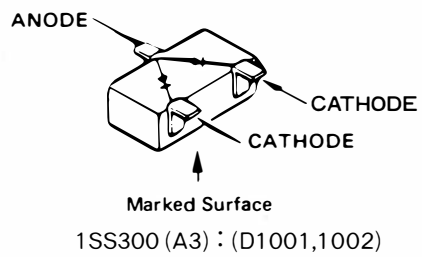
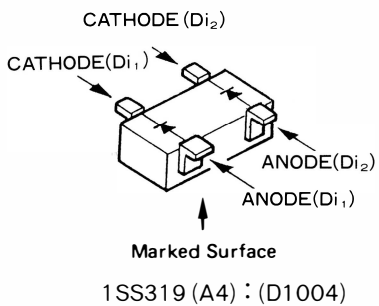


μPD4066BG (Q1008)  
μPD4001BG (Q1009)

# CNTL UNIT

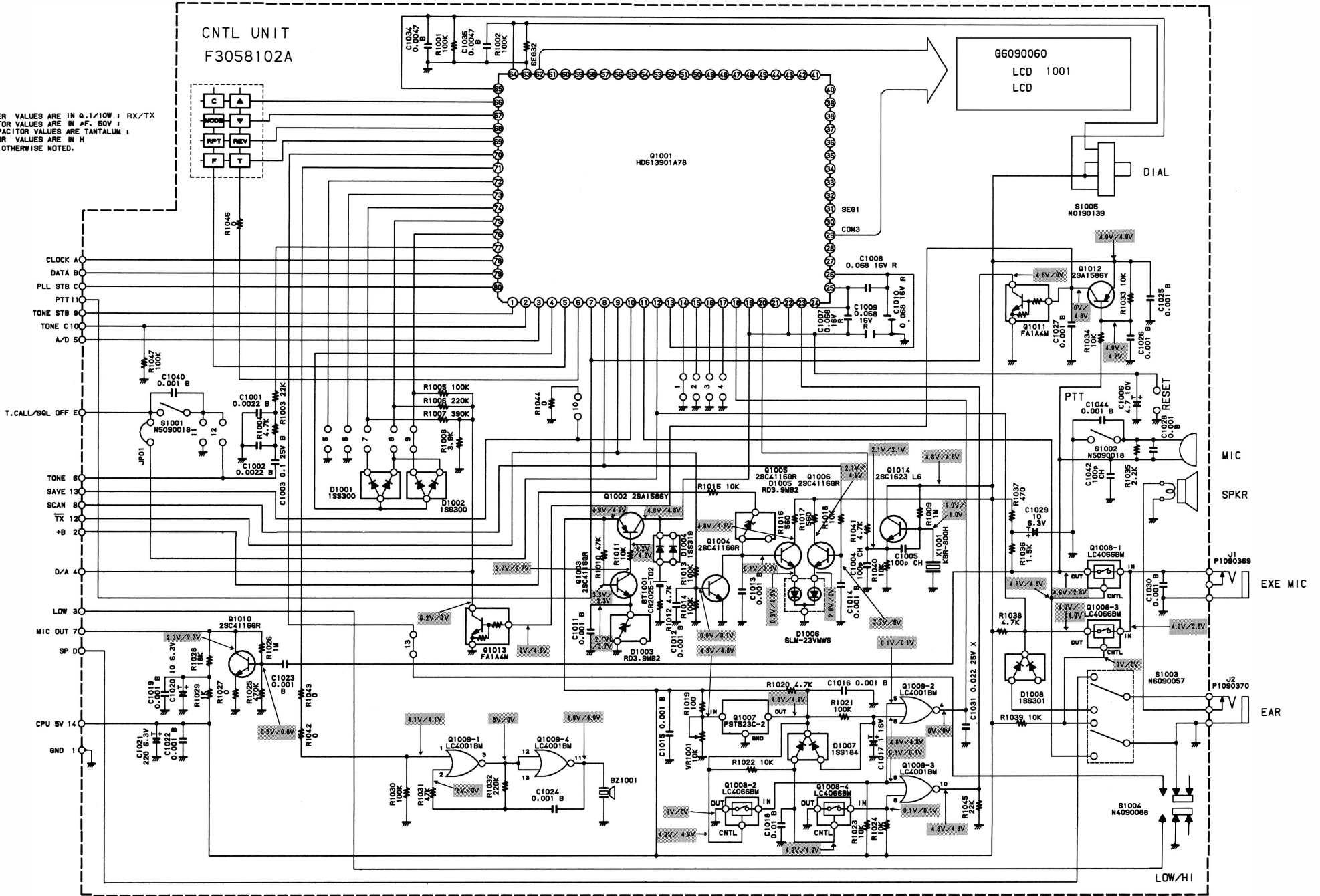


(obverse view of "chip-only" side)



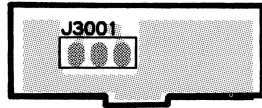
CNTL UNIT  
F3058102A

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

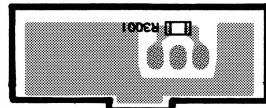


CNTL UNIT

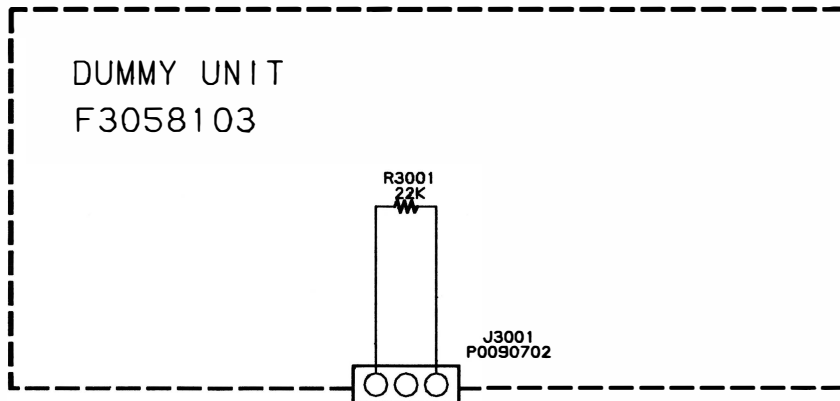
# DUMMY UNIT



(obverse view of  
"connector" side)



(obverse view of  
"chip-only" side)



NOTE:  
RESISTOR VALUES ARE IN  $\Omega$ , 1/16W ;  
UNLESS OTHERWISE NOTED.

## ALIGNMENT

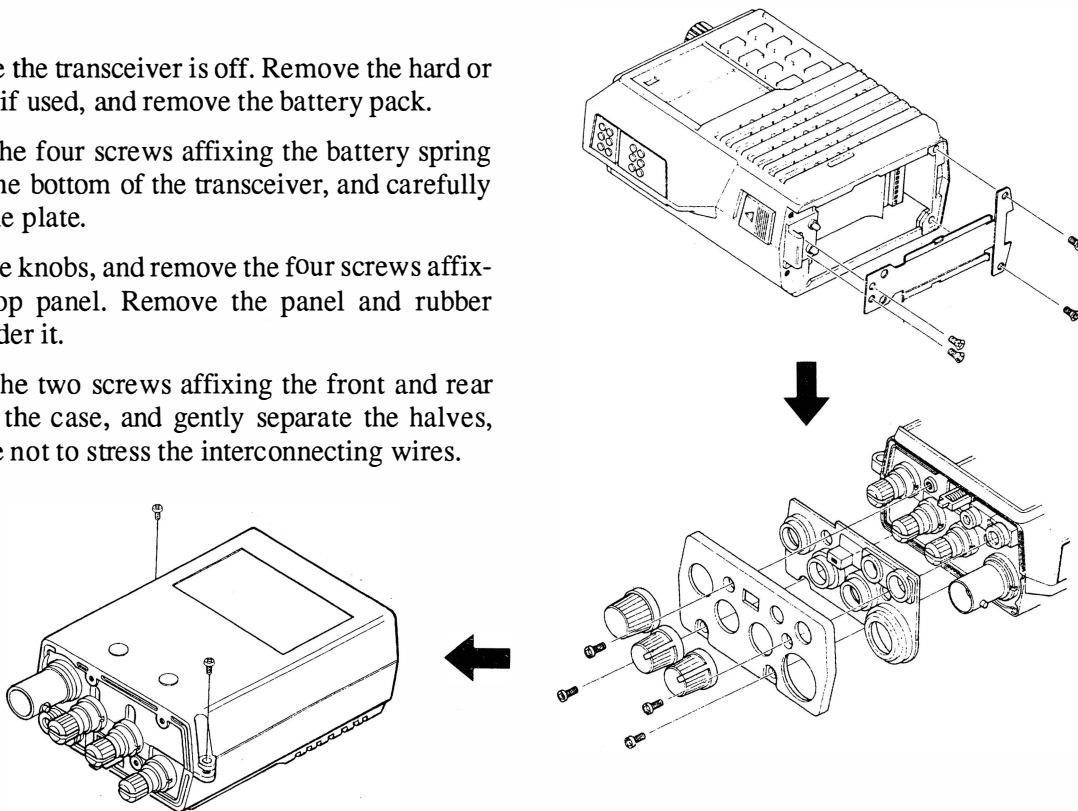
The FT-23R has been aligned by highly-skilled technicians at the factory, and is designed so that no further alignment should ever be required. However, in the unlikely event of a component failure, realignment may be necessary. All component replacement and service should be performed only by an authorized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

### *Required Test Equipment*

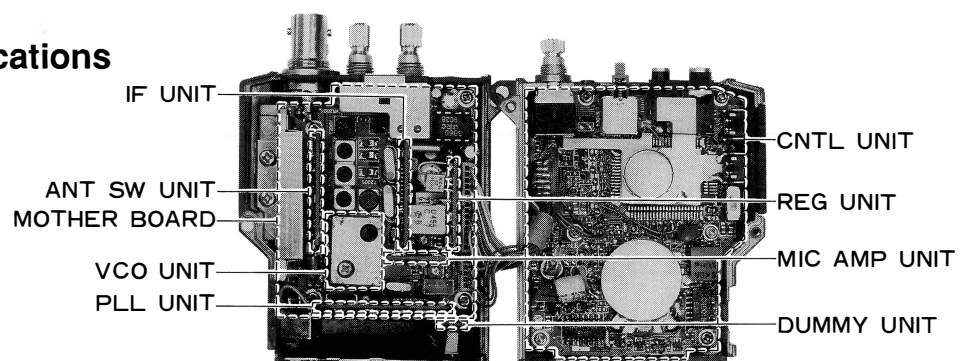
- RF Signal Generator with calibrated output level at 150 MHz
- Spectrum Analyzer
- RF Sampling Coupler
- Oscilloscope
- AF Millivoltmeter
- Deviation Meter
- SINAD Meter
- Inline Wattmeter with 5% accuracy at 150 MHz
- Regulated DC Power Supply adjustable from 10 to 15V, 2A
- 50-Ω Non-reactive Dummy Load: 10W at 150 MHz
- Frequency Counter:  $\pm 0.2$ 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  $11.5 \pm 0.05$  V DC on the voltmeter.
- (3) While receiving on 144.00 MHz, adjust trimmer TC501 on the VCO Unit for  $0.8 \pm 0.05$  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  $0.5 \pm 0.1$  watt.

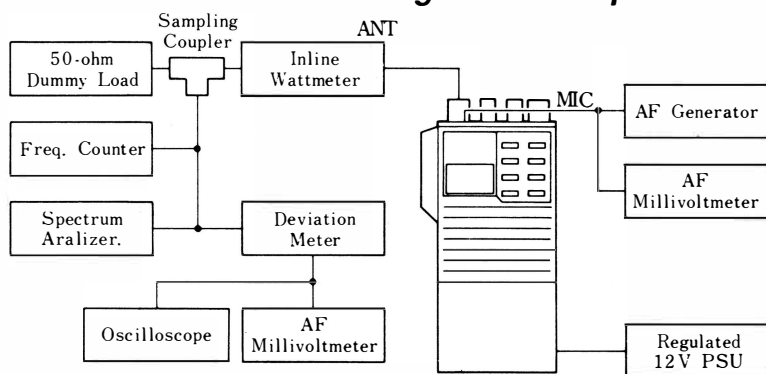
## PLL Reference Frequency

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.

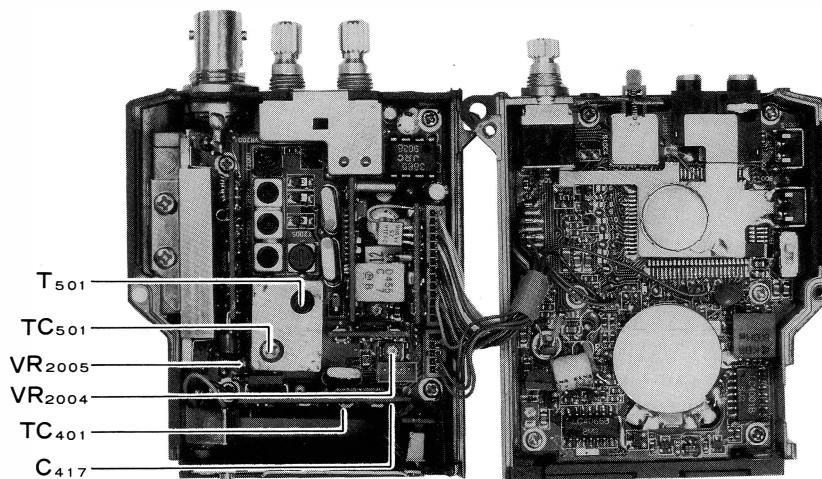
## Modulation Level

- (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  $\pm 4.8$ -kHz deviation on the deviation meter.

## PLL & Transmitter Alignment Setup



## PLL & Transmitter Alignment Points





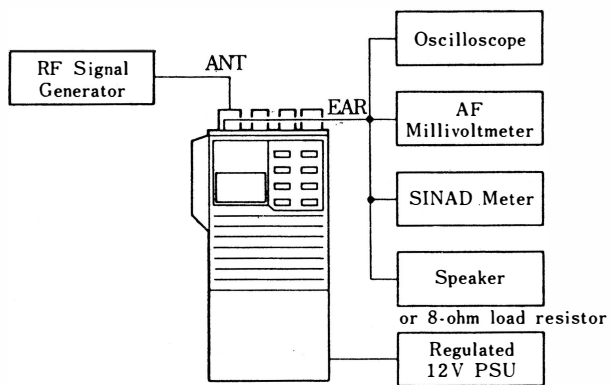
## Receiver

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

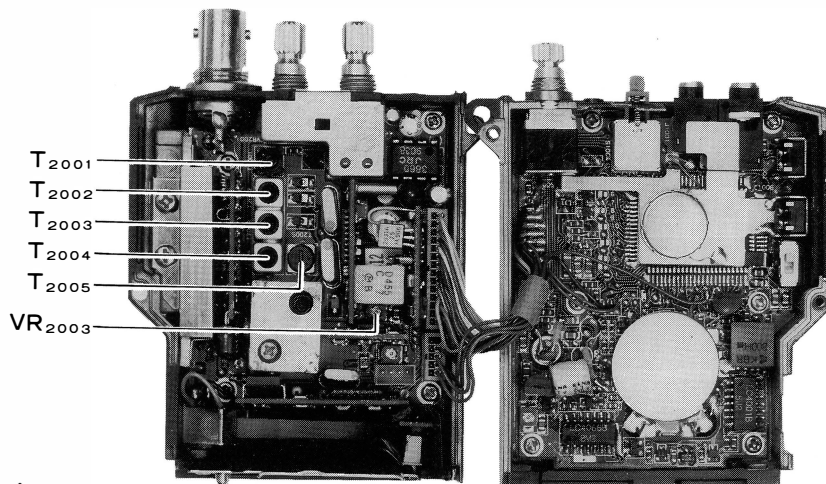
- (1) With the transceiver and the RF signal generator both tuned to band center (145 or 146 MHz), set the generator for  $\pm 3.5$  kHz deviation of 1-kHz tone modulation, and set the output level for 40 dB $\mu$  at the antenna jack.
- (2) Preset VR2003 on the Mother Board fully clockwise.

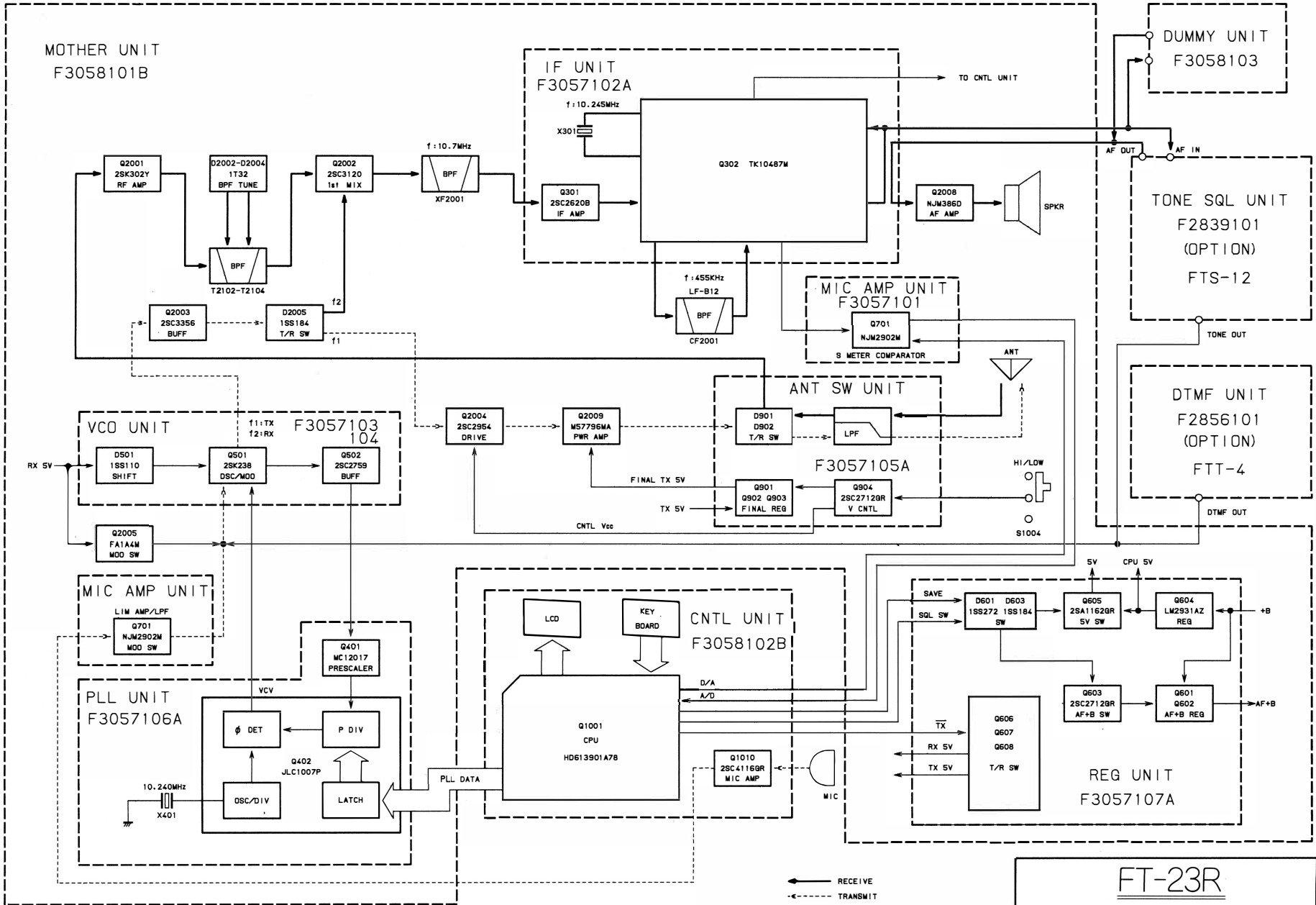
- (3) Adjust T2001 through T2005 on the Mother Board for maximum S-meter indication, reducing the generator level if more than 4 bargraph segments turn on.
- (4) After adjusting the transformers, generator level should be 0.2  $\mu$ V or less for 12dB SINAD.
- (5) Reduce the RF injection from the signal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

### Receiver Alignment Setup



### Receiver Alignment Points





**FT-23R**  
BLOCK DIAGRAM

← RECEIVE  
 ←--- TRANSMIT  
 ←--- COMMON/CNTL

# 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)

CS0851006 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)

F3058101B P.C.B. W/O COMP.

C 2001	K22170204	CHIP CAP.	GRM40CJ030C50PT	3pF	50V	CJ
C 2002	K22144802	CHIP CAP.	GRM39B103M25PT	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.	GRM40CK020C50PT	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	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 2013	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2014	K22170202	CHIP CAP.	GRM40CK010C50PT	1pF	50V	CK
C 2015	K22170229	CHIP CAP.	GRM40CH560J50PT	56pF	50V	CH
C 2017	K22170817	CHIP CAP.	GRM40B103M50PT	0.01uF	50V	B
C 2018	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 2019	K22170206	CHIP CAP.	GRM40CH050C50PT	5pF	50V	CH
C 2020	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 2022	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 2023	K40089023	AL. ELECTRO. CAP.	RC2-6V470MS	47uF	6V	
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.	10VB-100(M)CC	100uF	10V	
C 2027	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 2028	K70107476	TANTALUM CAP.	DN1A470MIS	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.	RC2-16V101MS	100uF	16V	
C 2032	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2033	K78100002	CHIP TANTALUM CAP.	F951A335MSAAF1Q2	3.3uF	6.3V	
C 2034	K22141808	CHIP CAP.	GRM42-6B473M25PT	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	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 2038	K22144802	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	K22174235	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	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B

C 2048	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B
C 2049	K22120805	CHIP CAP.	GRM40B102M50PT	0.068uF	50V	R
C 2050	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 2051	K22170205	CHIP CAP.	GRM40CH040C50PT	4pF	50V	CH
C 2053	K78140012	CHIP TANTALUM CAP.	F951E474MRAAQ2	0.47uF	25V	B
C 2054	K78080015	CHIP TANTALUM CAP.	F950J226MWAFF1Q2	22uF	6.3V	
C 2055	K78140012	CHIP TANTALUM CAP.	F951E474MRAAQ2	0.47uF	25V	B
CF2001	H3900280	CERAMIC FILTER	LF-B12			
D 2001	G2070003	DIODE	1SS226 TE85R			
D 2002	G2070035	DIODE	1T32-T8			
D 2003	G2070035	DIODE	1T32-T8			
D 2004	G2070035	DIODE	1T32-T8			
D 2005	G2070009	DIODE	1SS184 TE85R			
D 2007	G2070003	DIODE	1SS226 TE85R			
D 2008	G2015550	DIODE	1S1555			
D 2009	G2015550	DIODE	1S1555			
D 2010	G2090027	DIODE	1SS53			
J2001	P0090599					
J2002	P0090601					
J2003	P0090598					
L 2002	L1190342	M.RFC	LAL02KRR22M	0.22uH		
L 2003	L1020671	RFC	L1020671			
Q 2001	G3803027Y	FET	2SK302-Y TE85R			
Q 2002	G3331207	TRANSISTOR	2SC3120 TE85R			
Q 2003	G3333567	TRANSISTOR	2SC3356-T2B			
Q 2004	G3329547	TRANSISTOR	2SC2954-T2			
Q 2005	G3070001	TRANSISTOR	FA1A4M-T2B			
Q 2007	G3327127G	TRANSISTOR	2SC2712GR TE85R			
Q 2008	G1090920	IC	NJM386D			
Q 2009	G1090732	IC	M57796MA			
Q 2010	G3111627G	TRANSISTOR	2SA1162GR TE85R			
R 2001	J24185101	CHIP RES.	RMC1/16 101JATP	100	1/16W	
R 2002	J24205560	CHIP RES.	RMC1/10T 560J	56	1/10W	
R 2003	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R 2004	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R 2005	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R 2006	J24185474	CHIP RES.	RMC1/16 474JATP	470K	1/16W	
R 2007	J24185564	CHIP RES.	RMC1/16 564JATP	560K	1/16W	
R 2008	J24185471	CHIP RES.	RMC1/16 471JATP	470	1/16W	
R 2009	J24185332	CHIP RES.	RMC1/16 332JATP	3.3K	1/16W	
R 2010	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W	
R 2011	J24205473	CHIP RES.	RMC1/10 473J	47K	1/10W	
R 2014	J24205104	CHIP RES.	RMC1/10T 104J	100K	1/10W	
R 2016	J24185470	CHIP RES.	RMC1/16 470JATP	47	1/16W	
R 2017	J24205473	CHIP RES.	RMC1/10 473J	47K	1/10W	
R 2018	J24205223	CHIP RES.	RMC1/10 223J	22K	1/10W	
R 2019	J24205100	CHIP RES.	RMC1/10T 100J	10	1/10W	
R 2020	J24185333	CHIP RES.	RMC1/16 333JATP	33K	1/16W	
R 2021	J24185221	CHIP RES.	RMC1/16 221JATP	220	1/16W	
R 2022	J24205331	CHIP RES.	RMC1/10 331J	330	1/10W	
R 2023	J24185222	CHIP RES.	RMC1/16 222JATP	2.2K	1/16W	
R 2024	J24205479	CHIP RES.	RMC1/10T 4R7J	4.7	1/10W	
R 2025	J24185100	CHIP RES.	RMC1/16 100JATP	10	1/16W	
R 2026	J24205223	CHIP RES.	RMC1/10 223J	22K	1/10W	

R 2027	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W
R 2028	J24185102	CHIP RES.	RMC1/16 102JATP	1K	1/16W
R 2033	J24185101	CHIP RES.	RMC1/16T 101JATP	100	1/16W
R 2034	J24185104	CHIP RES.	RMC1/16T 104JATP	100K	1/16W
R 2035	J24185104	CHIP RES.	RMC1/16T 104JATP	100K	1/16W
R 2036	J24205335	CHIP RES.	RMC1/10T 335J	3.3M	1/10W
R 2037	J24205153	CHIP RES.	RMC1/10T 153J	15K	1/10W

T 2001	L0021416	COIL	L0021416		
T 2002	L0021418	COIL	L0021418		
T 2003	L0021418	COIL	L0021418		
T 2004	L0021418	COIL	L0021418		
T 2005	L0021967	COIL	L0021967		

TP2001 Q5000016 TERMINAL

VR2001	J60800132	POT.	RK0971110	20K	B
VR2002	J60800155	POT.	RK0971111	20KA/SW	
VR2003	J51778473	POT.	RH03AYAS4X	47K	
VR2004	J51778473	POT.	RH03AYAS4X	47K	
VR2005	J51778473	POT.	RH03AYAS4X	47K	

XF2001 H1102114 X' TAL FILTER 10M15BM

R0132850 FITTING  
R0130370 HOLDER  
R0513320 SHIELD PLATE  
R0130350 SHIELD CASE  
R0130360 SHIELD COVER  
T9205766 WIRE-ASSY

\*\*\* IF UNIT \*\*\*

	CA0007001	P.C.B. W/COMP.				
	F3149100	P.C.B. W/O COMP.				
C 0301	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0302	K22174809	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.	GRM40R683M16PT	0.068uF	16V	R
C 0308	K22170820	CHIP CAP.	GRM40B183M50PT	0.018uF	50V	B
C 0309	K78080002	CHIP TANTALUM CAP.	F950J475MSAAF1Q2	4.7uF	6.3V	
C 0310	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0311	K22174235	CHIP CAP.	GRM39CH101J50PT	100pF	50V	CH
C 0312	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 0313	K22174243	CHIP CAP.	GRM39CH221J50PT	220pF	50V	CH
C 0314	K22174243	CHIP CAP.	GRM39CH221J50PT	220pF	50V	CH
C 0315	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 0316	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B
C 0317	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
C 0318	K22120805	CHIP CAP.	GRM40R683M16PT	0.068uF	16V	R
CD0301	H7900180	CERAMIC DISC.	CDB455C7			
D 0301	G2070003	DIODE	1SS226 TE85R			
D 0302	G2070003	DIODE	1SS226 TE85R			
D 0303	G2070009	DIODE	1SS184 TE85R			
L 0301	L1690016	COIL	32CS 380KB-1R0M=P	1uH		
Q 0301	G3326207B	TRANSISTOR	2SC2620QBTR			
Q 0302	G1091108	IC	MC3372ML			
Q 0303	G3070031	TRANSISTOR	DTC124TK T97			
Q 0304	G3327127G	TRANSISTOR	2SC2712GR 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	J24185473	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	J24185682	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	J24205182	CHIP RES.	RMC1/16 182JATP	1.8K	1/16W	
R 0313	J24205473	CHIP RES.	RMC1/10T 473J	47K	1/10W	
R 0314	J24185182	CHIP RES.	RMC1/16 182JATP	1.8K	1/16W	
R 0315	J24185564	CHIP RES.	RMC1/16 564JATP	560K	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	G9090053	THERMISTER	157-252-53006TP			
X 0301	H0102773	X'TAL	UM-1 10.245MHZ			

\*\*\* PLL UNIT \*\*\*

CA0010002 P.C.B. W/COMP.(TYP A1)  
 CA0010003 P.C.B. W/COMP.(TYP A2)  
 CA0010004 P.C.B. W/COMP.(TYP A3)  
 CA0010005 P.C.B. W/COMP.(TYP B)  
 CA0010006 P.C.B. W/COMP.(TYP C2)  
 CA0010007 P.C.B. W/COMP.(TYP D)  
 CA0010008 P.C.B. W/COMP.(TYP E2)  
 F3057106A P.C.B. W/O COMP.

C 0401	K22170206	CHIP CAP.	GRM40CH050C50PT	5pF	50V	CH
C 0402	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0403	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0404	K78080002	CHIP TANTALUM CAP.	F950J475MSAAF1Q2	4.7uF	6.3V	
C 0405	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0406	K78080002	CHIP TANTALUM CAP.	F950J475MSAAF1Q2	4.7uF	6.3V	
C 0407	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0408	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF	50V	CH
C 0409	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF	50V	CH
C 0410	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF	50V	CH
C 0411	K22170229	CHIP CAP.	GRM40CH560J50PT	56pF	50V	CH
C 0412	K22170225	CHIP CAP.	GRM40CH390J50PT	39pF	50V	CH
C 0413	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0414	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0415	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0416	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B
C 0417	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B
C 0418	K78100003	CHIP TANTALUM CAP.	F951A685MTAAF1Q2	6.8uF	6.3V	
C 0419	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF	50V	CH
C 0420	K78080002	CHIP TANTALUM CAP.	F950J475MSAAF1Q2	4.7uF	6.3V	
C 0421	K22170204	CHIP CAP.	GRM40CJ030C50PT	3pF	50V	CJ
D 0401	G2090118	DIODE	1SS97			
L 0401	L1190311	M.RFC	LAL02NA221K	220uH		
Q 0401	G1090725	IC	MC12017P			
Q 0402	G1090582	IC	JLC1007P (MARKING MC145156)			
R 0401	J24205103	CHIP RES.	RMC1/10T 103J	10K	1/10W	
R 0402	J24205220	CHIP RES.	RMC1/10T 220J	22	1/10W	
R 0403	J24185220	CHIP RES.	RMC1/16 220JATP	22	1/16W	
R 0404	J24205222	CHIP RES.	RMC1/10 222J	2.2K	1/10W	
R 0405	J24205222	CHIP RES.	RMC1/10 222J	2.2K	1/10W	
R 0406	J24205153	CHIP RES.	RMC1/10 153J	15K	1/10W	TYP A1
R 0406	J24205153	CHIP RES.	RMC1/10 153J	15K	1/10W	TYP A2
R 0406	J24205153	CHIP RES.	RMC1/10 153J	15K	1/10W	TYP D
R 0406	J24205153	CHIP RES.	RMC1/10 153J	15K	1/10W	TYP E2
R 0406	J24205153	CHIP RES.	RMC1/10 153J	15K	1/10W	TYP A3
R 0406	J24205472	CHIP RES.	RMC1/10 472J	4.7K	1/10W	TYP B
R 0406	J24205472	CHIP RES.	RMC1/10 472J	4.7K	1/10W	TYP C2
R 0407	J24205152	CHIP RES.	RMC1/10 152J	1.5K	1/10W	TYP A1
R 0407	J24205152	CHIP RES.	RMC1/10 152J	1.5K	1/10W	TYP A2
R 0407	J24205152	CHIP RES.	RMC1/10 152J	1.5K	1/10W	TYP D
R 0407	J24205152	CHIP RES.	RMC1/10 152J	1.5K	1/10W	TYP E2
R 0407	J24205152	CHIP RES.	RMC1/10 152J	1.5K	1/10W	TYP A3
R 0407	J24205102	CHIP RES.	RMC1/10T 102J	1K	1/10W	TYP B
R 0407	J24205102	CHIP RES.	RMC1/10T 102J	1K	1/10W	TYP C2
R 0408	J24205000	CHIP RES.	RMC1/10T 000J	0	1/10W	
R 0409	J24185000	CHIP RES.	RMC1/16 000JATP	0	1/16W	

R 0410	J24185102	CHIP RES.	RMC1/16 102JATP	1K	1/16W
TC0401	K91000151	TRIMMER CAP.	ECR-JA020E12X	20pF	
X 0401	H0102771	X' TAL	UM-1 10.240MHz		TYP A1
X 0401	H0102771	X' TAL	UM-1 10.240MHz		TYP A2
X 0401	H0102771	X' TAL	UM-1 10.240MHz		TYP A3
X 0401	H0102772	X' TAL	UM-1 12.800MHz		TYP B
X 0401	H0102772	X' TAL	UM-1 12.800MHz		TYP C2
X 0401	H0102771	X' TAL	UM-1 10.240MHz		TYP D
X 0401	H0102771	X' TAL	UM-1 10.240MHz		TYP E2



\*\*\* 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	220pF	50V	CH
C 0503	K22170211	CHIP CAP.	GRM40CH100D50PT	10pF	50V	CH
C 0504	K78080003	CHIP TANTALUM CAP.	F950J106MTAAF1Q2	10uF	6.3V	
C 0505	K22170805	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.	GRM40CK0R5C50PT	0.5pF	50V	CK
C 0509	K78080002	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	G2090297	DIODE	1SS110			
D 0502	G2070040	DIODE	1T33-T7			
D 0503	G2070040	DIODE	1T33-T7			
L 0501	L1690016	COIL	32CS 380LB-1ROM=P	1uH		
L 0502	L1690016	COIL	32CS 380LB-1ROM=P	1uH		
L 0503	L1690016	COIL	32CS 380LB-1ROM=P	1uH		
L 0504	L1690025	COIL	32CS 380NB-R22M=P	0.22uH		
Q 0501	G3802387S	FET	2SK238-T2B K17			
Q 0502	G3327597B	TRANSISTOR	2SC2759 T2B-U22			
R 0501	J24205682	CHIP RES.	RMC1/10 682J	6.8K	1/10W	
R 0503	J24205103	CHIP RES.	RMC1/10T 103J	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	J24205683	CHIP RES.	RMC1/10 683J	68K	1/10W	
T 0501	L0021684A	COIL	R12-E991X			
TC0501	K91000151	TRIMMER CAP.	ECR-JA020E12X	20p		
	R0130390	TERMINAL		2pcs		

\*\*\* REG UNIT \*\*\*

CA0011001	P.C.B. W/COMP.				
F3057107A	P.C.B. W/O COMP.				
C 0601	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0602	K78100003	CHIP TANTALUM CAP.	F951A685MTAAF1Q2	6.8uF	6.3V
C 0603	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0604	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0605	K78120002	CHIP TANTALUM CAP.	F951C225MSAAF1Q2	2.2uF	6.3V
C 0606	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0607	K78080013	CHIP TANTALUM CAP.	F950J476MFCAF1	47uF	6.3V
C 0608	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0609	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0610	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0611	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0612	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
C 0613	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V B
D 0601	G2070048	DIODE	1SS272 TE85R		
D 0602	G2090153	DIODE	RD10EB1		
D 0603	G2070009	DIODE	1SS184 TE85R		
Q 0601	G3207997L	TRANSISTOR	2SB799-T2ML		
Q 0602	G3327127G	TRANSISTOR	2SC2712GR TE85R		
Q 0603	G3327127G	TRANSISTOR	2SC2712GR TE85R		
Q 0604	G1090785	IC	LM2931AZ-5.0		
Q 0605	G3111627G	TRANSISTOR	2SA1162GR TE85R		
Q 0606	G3111627G	TRANSISTOR	2SA1162GR TE85R		
Q 0607	G3111627G	TRANSISTOR	2SA1162GR TE85R		
Q 0608	G3327127G	TRANSISTOR	2SC2712GR TE85R		
R 0601	J24205101	CHIP RES.	RMC 1/10T 101J	100	1/10W
R 0602	J02245829	CARBON FILM RES.	RD14SJ8R2 8.2	8.2	1/4W
R 0603	J24185223	CHIP RES.	RMC1/16 223JATP	22K	1/16W
R 0604	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W
R 0605	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W
R 0606	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W
R 0607	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W
R 0608	J24185222	CHIP RES.	RMC1/16 222JATP	2.2K	1/16W
R 0609	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W
R 0610	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W
R 0611	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W
R 0612	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W

\*\*\* MIC AMP UNIT \*\*\*

CA0008002 P.C.B. W/COMP.(TYP A1)  
 CA0008003 P.C.B. W/COMP.(TYP A2)  
 CA0008004 P.C.B. W/COMP.(TYP A3)  
 CA0008005 P.C.B. W/COMP.(TYP B)  
 CA0008006 P.C.B. W/COMP.(TYP C2)  
 CA0008007 P.C.B. W/COMP.(TYP D)  
 CA0008008 P.C.B. W/COMP.(TYP E2)  
 F3057101 P.C.B. W/O COMP.

C 0701	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP B
C 0701	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP C2
C 0701	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP D
C 0701	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP E2
C 0702	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B	TYP B
C 0702	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B	TYP C2
C 0702	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B	TYP D
C 0702	K22144802	CHIP CAP.	GRM39B103M25PT	0.01uF	25V	B	TYP E2
C 0703	K22170817	CHIP CAP.	GRM40B103M50PT	0.01uF	50V	B	TYP A1
C 0703	K22170817	CHIP CAP.	GRM40B103M50PT	0.01uF	50V	B	TYP A2
C 0703	K22170817	CHIP CAP.	GRM40B103M50PT	0.01uF	50V	B	TYP A3
C 0703	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP B
C 0703	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP C2
C 0703	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP D
C 0703	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP E2
C 0704	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP B
C 0704	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP C2
C 0704	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP D
C 0704	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	TYP E2
C 0705	K22170821	CHIP CAP.	GRM40B223M50PT	0.022uF	50V	B	
C 0706	K78120013	CHIP TANTALUM CAP.	F951C105MRAAF1Q2	1uF	6.3V		
C 0707	K22170817	CHIP CAP.	GRM40B103M50PT	0.01uF	50V	B	
C 0708	K22174805	CHIP CAP.	GRM39B471M50PT	470pF	50V	B	
C 0709	K22170807	CHIP CAP.	GRM40B152M50PT	0.001uF	50V	B	
C 0710	K22174235	CHIP CAP.	GRM39CH101J50PT	100pF	50V	CH	
C 0711	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 0712	K22141809	CHIP CAP.	GRM42-6B104M25PT	0.1uF	25V	B	
C 0713	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 0714	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	

Q 0701 G1090908 IC NJM2902M

R 0701	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP B
R 0701	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP C2
R 0701	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP D
R 0701	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP E2
R 0702	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP B
R 0702	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP C2
R 0702	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP D
R 0702	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		TYP E2
R 0703	J24205225	CHIP RES.	RMC1/10 225J	2.2M	1/10W		
R 0704	J24185223	CHIP RES.	RMC1/16 223JATP	22K	1/16W		
R 0705	J24185223	CHIP RES.	RMC1/16 223JATP	22K	1/16W		
R 0706	J24185185	CHIP RES.	RMC1/16 185JATP	1.8M	1/16W		
R 0707	J24185563	CHIP RES.	RMC1/16 563JATP	56K	1/16W		
R 0708	J24185393	CHIP RES.	RMC1/16 393JATP	39K	1/16W		
R 0709	J24185103	CHIP RES.	RMC1/16 103JATP	10K	1/16W		
R 0710	J24185562	CHIP RES.	RMC1/16 562JATP	5.6K	1/16W		
R 0711	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W		
R 0712	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W		

R 0713	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 0714	J24185225	CHIP RES.	RMC1/16	225JATP	2.2M	1/16W
R 0715	J24205223	CHIP RES.	RMC1/10	223J	22K	1/10W
R 0716	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W

\*\*\* ANTENNA SW UNIT \*\*\*

CA0005001 P.C.B. W/COMP.  
 F3057105A P.C.B. W/O COMP.

C 0901	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0902	K40129052	AL. ELECTRO. CAP.	RC3-16V100M	10uF	16V	
C 0903	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0904	K40179033	AL. ELECTRO. CAP.	RC3-50VR47M	0.47	50V	
C 0905	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0906	K40129052	AL. ELECTRO. CAP.	RC3-16V100M	10uF	16V	
C 0907	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0908	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0909	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0910	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0911	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0912	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B
C 0913	K22170223	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 0914	K22170213	CHIP CAP.	GRM40CH120D50PT	12pF	50V	CH
C 0915	K22170223	CHIP CAP.	GRM40CH330J50PT	33pF	50V	CH
C 0916	K22170207	CHIP CAP.	GRM40CH060D50PT	6pF	50V	CH
C 0917	K22170217	CHIP CAP.	GRM40CH180J50PT	18pF	50V	CH
D 0901	G2090027	DIODE	1SS53			
D 0902	G2090027	DIODE	1SS53			
D 0903	G2070003	DIODE	1SS226 TE85R			
L 0901	L1190344	M.RFC	LAL02KR100K	10uH		
L 0902	L0021683	COIL	L0021683			
L 0903	L0021682	COIL	L0021682			
L 0904	L0021683	COIL	L0021683			
Q 0901	G3207997L	TRANSISTOR	2SB799-T2ML			
Q 0902	G3327127G	TRANSISTOR	2SC2712GR TE85R			
Q 0903	G3327127G	TRANSISTOR	2SC2712GR TE85R			
Q 0904	G3327127G	TRANSISTOR	2SC2712GR TE85R			
Q 0905	G3207997L	TRANSISTOR	2SB799-T2ML			
R 0901	J24205222	CHIP RES.	RMC1/10 222J	2.2K		
R 0902	J24205473	CHIP RES.	RMC1/10 473J	47K		
R 0903	J24205471	CHIP RES.	RMC1/10 471J	470		
R 0904	J24205222	CHIP RES.	RMC1/10 222J	2.2K		
R 0905	J24205221	CHIP RES.	RMC1/10 221J	220		
R 0906	J24205222	CHIP RES.	RMC1/10 222J	2.2K		

\*\*\* CONTROL UNIT \*\*\*

	CS0847002	P.C.B. W/COMP.(TYP A1)					
	CS0847003	P.C.B. W/COMP.(TYP A2)					
	CS0847004	P.C.B. W/COMP.(TYP A3)					
	CS0847005	P.C.B. W/COMP.(TYP B)					
	CS0847006	P.C.B. W/COMP.(TYP C2)					
	CS0847007	P.C.B. W/COMP.(TYP D)					
	CS0847008	P.C.B. W/COMP.(TYP E2)					
	F3058102B	P.C.B. W/O COMP.					
BT1001	Q9000366	LITHIUM BATTERY	CR2025-T02				
BZ1001	M4290005	BUZZER	EFB-RE25D07				
C 1001	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP B
C 1001	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP C2
C 1001	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP D
C 1001	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP E2
C 1002	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP B
C 1002	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP C2
C 1002	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP D
C 1002	K22170809	CHIP CAP.	GRM40B222M50PT	0.0022uF	50V	B	TYP E2
C 1003	K22141809	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	K70107475	TANTALUM CHIP CAP.	DN1A4R7M1S	4.7uF	10V	B	
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.	GRM39B102M50PT	0.001uF	50V	B	
C 1012	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1013	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1014	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1015	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C 1016	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C 1017	K78120009	TANTALUM CHIP CAP.	TESVA1C105M1-8R	1uF	16V	B	
C 1018	K22170817	CHIP CAP.	GRM40B103M50PT	0.01uF	50V	B	
C 1019	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1020	K78080003	TANTALUM CHIP CAP.	F950J106MTAAF1Q2	10uF	6.3V	B	
C 1021	K40089010	AL. ELECTRO. CAP.	RC2-6V221M	220uF	6.3V	B	
C 1022	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C 1023	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C 1024	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1025	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1026	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1027	K22174809	CHIP CAP.	GRM39B102M50PT	0.001uF	50V	B	
C 1028	K10176102	CERAMIC CAP.	DD104B102K50	0.001uF	50V	B	
C 1029	K78080003	TANTALUM CHIP CAP.	F950J106MTAAF1Q2	10uF	6.3V	B	
C 1030	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C 1031	K22170821	CHIP CAP.	GRM40B223M50PT	0.022uF	50V	B	
C 1034	K22174817	CHIP CAP.	GRM39B472M50PT	0.0047uF	50V	B	
C 1035	K22174817	CHIP CAP.	GRM39B472M50PT	0.0047uF	50V	B	
C 1040	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C 1042	K22170235	CHIP CAP.	GRM40CH101J50PT	100pF	50V	CH	
C 1044	K22170805	CHIP CAP.	GRM40B102M50PT	0.001uF	50V	B	
C01001	H7900400	CERAMIC OSC.	KBR-800H				
D 1001	G2070084	DIODE	1SS300 TE85R				

D	1002	G2070084	DIODE	1SS300 TE85R			
D	1003	G2070106	DIODE	RD3.9MB2-T2B			
D	1004	G2070080	DIODE	1SS319 TE85R			
D	1005	G2070106	DIODE	RD3.9MB2-T2B			
D	1006	G2070096	LED	SLM-23VMWS T-97B			
D	1007	G2070009	DIODE	1SS184 TE85R			
D	1008	G2070086	DIODE	1SS301 TE85R			
D	1009	G2015550	DIODE	1SS1555			TYP A3
J	1001	P1090369	CONNECTOR	HSJ0838-01-010			
J	1002	P1090370	CONNECTOR	HSJ0836-01-010			
P	1001	T9205768	WIRE-ASSY				TYP A1
P	1001	T9205768	WIRE-ASSY				TYP A2
P	1001	T9205768	WIRE-ASSY				TYP A3
P	1001	T9205767	WIRE-ASSY				TYP B
P	1001	T9205767	WIRE-ASSY				TYP C2
P	1001	T9205767	WIRE-ASSY				TYP D
P	1001	T9205767	WIRE-ASSY				TYP E2
P	1002	T9205770	WIRE-ASSY				TYP A1
P	1002	T9205770	WIRE-ASSY				TYP A2
P	1002	T9205770	WIRE-ASSY				TYP A3
P	1002	T9205769	WIRE-ASSY				TYP B
P	1002	T9205769	WIRE-ASSY				TYP C2
P	1002	T9205769	WIRE-ASSY				TYP D
P	1002	T9205769	WIRE-ASSY				TYP E2
Q	1001	G1090767	IC	HD613901A78			TYP A1
Q	1001	G1090767	IC	HD613901A78			TYP A2
Q	1001	G1090775	IC	HD613901A83			TYP A3
Q	1001	G1090767	IC	HD613901A78			TYP B
Q	1001	G1090767	IC	HD613901A78			TYP C2
Q	1001	G1090767	IC	HD613901A78			TYP D
Q	1001	G1090767	IC	HD613901A78			TYP E2
Q	1002	G3115867Y	TRANSISTOR	2SA1586Y TE85R			
Q	1003	G3341167G	TRANSISTOR	2SC4116GR TE85R			
Q	1004	G3341167G	TRANSISTOR	2SC4116GR TE85R			
Q	1005	G3341167G	TRANSISTOR	2SC4116GR TE85R			
Q	1006	G3341167G	TRANSISTOR	2SC4116GR TE85R			
Q	1007	G1090812	IC	PST523G			
Q	1008	G1090772	IC	LC4066BM			
Q	1009	G1090771	IC	LC4001BM			
Q	1010	G3341167G	TRANSISTOR	2SC4116GR TE85R			
Q	1011	G3070001	TRANSISTOR	FA1A4M-T2B			
Q	1012	G3115867Y	TRANSISTOR	2SA1586Y TE85R			
Q	1013	G3070001	TRANSISTOR	FA1A4M-T2B			
Q	1014	G3316237F	TRANSISTOR	2SC1623-T2BL6			
R	1001	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R	1002	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R	1003	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	TYP B
R	1003	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	TYP C2
R	1003	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	TYP D
R	1003	J24185473	CHIP RES.	RMC1/16 473JATP	47K	1/16W	TYP E2
R	1004	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W	TYP B
R	1004	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W	TYP C2
R	1004	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W	TYP D
R	1004	J24185472	CHIP RES.	RMC1/16 472JATP	4.7K	1/16W	TYP E2
R	1005	J24185104	CHIP RES.	RMC1/16 104JATP	100K	1/16W	
R	1006	J24185224	CHIP RES.	RMC1/16 224JATP	220K	1/16W	
R	1007	J24185394	CHIP RES.	RMC1/16 394JATP	390K	1/16W	

R 1008	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1009	J24185105	CHIP RES.	RMC1/16	105JATP	1M	1/16W
R 1010	J24185473	CHIP RES.	RMC1/16	473JATP	47K	1/16W
R 1011	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1012	J24185472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1013	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1014	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1015	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1016	J24185561	CHIP RES.	RMC1/16	561JATP	560	1/16W
R 1017	J24185561	CHIP RES.	RMC1/16	561JATP	560	1/16W
R 1018	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1019	J24185101	CHIP RES.	RMC1/16	101JATP	100	1/16W
R 1020	J24185472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1021	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1022	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1023	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1024	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1025	J24185474	CHIP RES.	RMC1/16	474JATP	470K	1/16W
R 1026	J24185105	CHIP RES.	RMC1/16	105JATP	1M	1/16W
R 1027	J24185000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1028	J24185183	CHIP RES.	RMC1/16	183JATP	18K	1/16W
R 1029	J24185102	CHIP RES.	RMC1/16	102JATP	1K	1/16W
R 1030	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W
R 1031	J24185473	CHIP RES.	RMC1/16	473JATP	47K	1/16W
R 1032	J24185224	CHIP RES.	RMC1/16	224JATP	220K	1/16W
R 1033	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1034	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1035	J24185222	CHIP RES.	RMC1/16	222JATP	2.2K	1/16W
R 1036	J24185152	CHIP RES.	RMC1/16	152JATP	1.5K	1/16W
R 1037	J24185471	CHIP RES.	RMC1/16	471JATP	470	1/16W
R 1038	J24185472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1039	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1040	J24185103	CHIP RES.	RMC1/16	103JATP	10K	1/16W
R 1041	J24185472	CHIP RES.	RMC1/16	472JATP	4.7K	1/16W
R 1042	J24185000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1043	J24185000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1044	J24185000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1045	J24185223	CHIP RES.	RMC1/16	223JATP	22K	1/16W
R 1046	J24185000	CHIP RES.	RMC1/16	000JATP	0	1/16W
R 1047	J24185104	CHIP RES.	RMC1/16	104JATP	100K	1/16W

S 1001	N5090018	TACT SWITCH	KHH-15951			
S 1002	N5090018	TACT SWITCH	KHH-15951			
S 1003	N6090057	SLIDE SWITCH	SSSS22			
S 1004	N4090088	PUSH SWITCH	SPJ622N FI9			
S 1005	N0190139	ROTARY SWITCH	SRBM1L017B			

X 1001	H7900400	CERAMIC OSC.	KBR-800H			
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R8118690	SEAL					
R7132740	MYLAR					
R7132750	MYLAR					
R0130380	SHIELD PLATE					
R7074930	DOUBLE FACE ADHESIVE					
R7109650	DOUBLE FACE ADHESIVE					



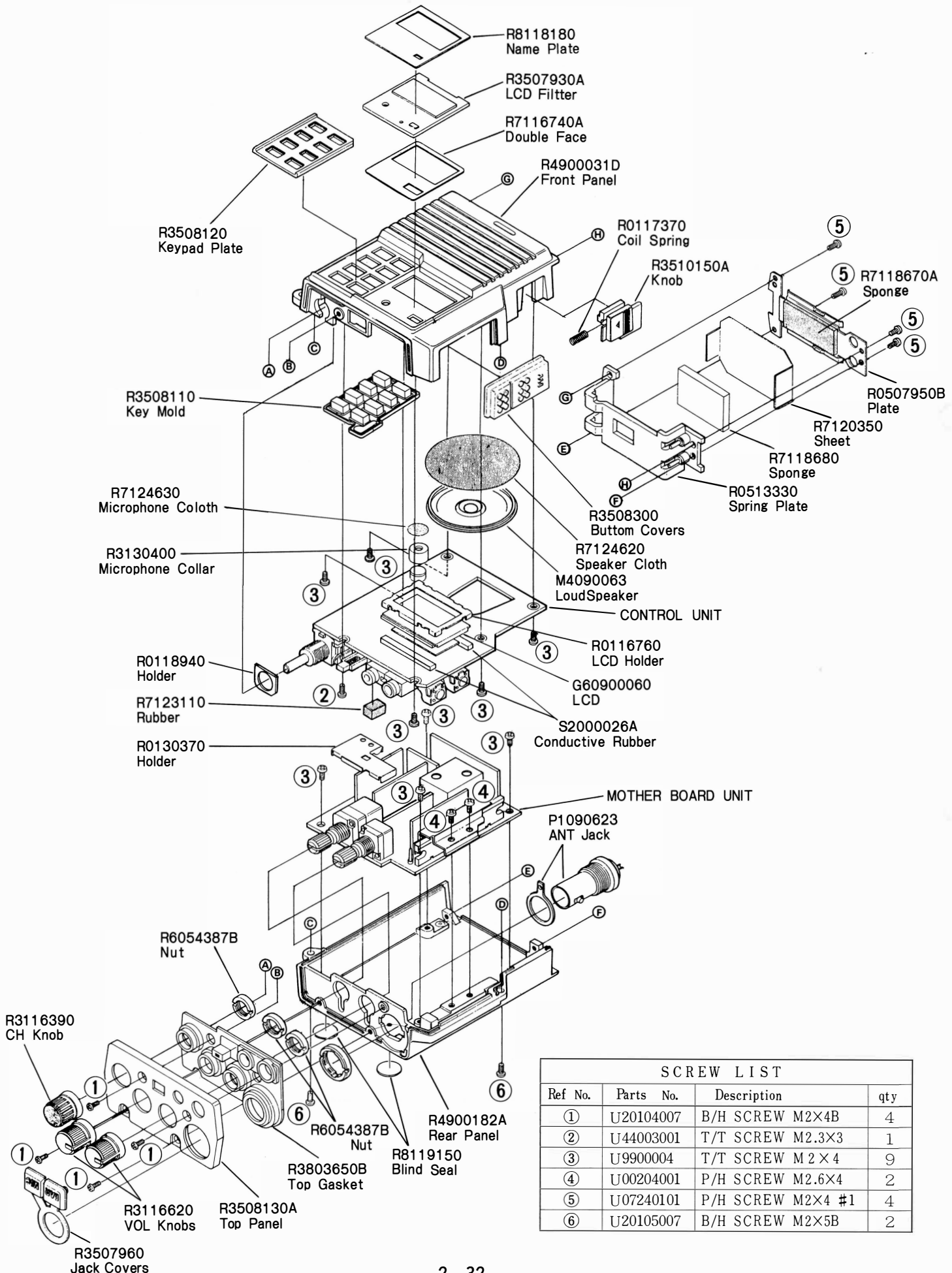
\*\*\* DUMMY UNIT \*\*\*

CS0853001 P.C.B. W/COMP.  
F3058103 P.C.B. W/O COMP.

P 3001 P0090702 CONNECTOR 9230B-1-03Z003-T

R 3001 J24185223 CHIP RES. RMC1/16 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

Este manual foi doado por Bernardo Charnis da empresa  
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insumos e ate mesmo uma merrequinha pra ajudar na conta de luz  
e na manutenção da maquina, entre em contato pelo email  
alexandre.tabajara@gmail.com (tambem é pix)

Obrigado a todos que ajudaram ate aqui

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- <http://tabajara-labs.blogspot.com>
- <http://tabalabs.com.br/esquemateca>
- <https://datassette.org/>

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COMO NO MANUAL. O OBJETIVO DE MANTE-LAS É VOCE  
PODER IMPRIMIR UM MANUAL IDENTICO AO ORIGINAL.  
NAO ESTÁ FALTANDO PAGINA NENHUMA NO MANUAL

Distribuição **GRATUITA**. Respeite o meu trabalho.

São Paulo, 1 de agosto de 2021



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