FRG-8800

SERVICE MANUAL

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CONTENTS

GENERAL

This manual is intended to serve as a supplement to the FRG-8800 Operating Manual. Detailed information regarding functions, specifications, most options and operation has been provided in the Operating Manual, and is not reprinted herein. Therefore, this supplement is not intended to serve as an independent reference, but to be used in conjunction with the information provided in the Operating Manual.

The FRG-8800 is designed to perform properly for many years without any need for internal adjustment. However, the complexity of the circuitry is such that tampering with the internal adjustments or components will void any warranty and may seriously degrade performance, and cause serious damage. Therefore, aside from the scan stop switch setting procedure described in the Operating Manual, we recommend that the FRG-8800 and FRV-8800 be referred to an authorized Yaesu agent for service or modification, if required.

While we believe the technical information in this manual is correct, Yaesu assumes no liability for damage that may occur as a result of typographical or other errors that may be present. Your cooperation in pointing out any inconsistencies in the technical information would be appreciated, however, Yaesu Musen reserves the right to make changes in the circuitry of this receiver, in the interest of technological improvement, without notification of the owners.

CAT SYSTEM PROGRAMMING ADDENDA

Operating Manual Erratum

The second paragraph on page 29 of the Operating Manual is in error with respect to the polarity of the TTL signal levels. It should read, "(0V = "SPACE" and +5V = "MARK")" for serial data to the FRG-8800.

CAT Function Diagram

The diagram on the next page shows the internal control line switching that occurs when the EXT CNTL ON and OFF commands are issued. Note the disabling of the front panel frequency, mode and clock/timer controls when the CAT system is active.

CAT Test Program

A listing of a test program for the FRG-8800 CAT System is shown at the right. If it is to be used for operation (beyond simple testing), the Frequency and Mode set routines in lines 3010 and 4010 must be changed. This program is for the NEC PC-8201 portable computer and FIF-232C CAT Interface Unit, but should be useable on other computers with appropriate modification to line 110. Refer to the CAT System Command Chart on page 30 of the Operating Manual for details of the command codes.

Line 110 initializes the RS-232C serial communications port for 4800 baud, no parity, 8 data bits, 2 stop bits and no protocol. This port initialization is performed by the data within the quotes, and will most likely be different for other computers. Check the computer manual for the correct instructions under the OPEN command, or the serial I/O procedure.

Lines 120 — 210 print a simple command menu on the display, and accept keyed input to cause jumps to the subroutine for each CAT command. Of course as the user adds functions to the program, some of these primitive commands are strung together in the subroutine calls, and might be removed from the menu.

Lines 1000 — 1030 activate the CAT System. Line 1010 assigns the values for the Instruction Bytes, and the subroutine call in Line 1020 sends the command. This command must be sent before sending any other commands. The FRG-8800 POWER switch does not need to be turned on when this command is sent, since the cpu in the receiver is always monitoring for this command while power is connected. The function of this command is merely to inform the cpu in the receiver that other CAT commands will follow (internal serial I/O initialization); and no visible changes in receiver operation will occur, although the front panel tuning controls will be disabled and timer on/off functions suspended until the EXT CNTL OFF command is sent, at which time suspended functions resume as before.

Lines 2000 — 2030 send the command to turn on the receiver. Note that the values of the bytes to be sent are assigned decimal values equal to the hexadecimal codes that must be sent. The CHR$ function in Line 10010 will convert the decimal values into binary when sent. Actually, this command and the power off command duplicate the functions of the internal on/off timer in the receiver; not the POWER switch. The difference between these functions is that the POWER switch does not affect the state of the REMOTE jacks on the rear panel, while the on/off timer and these CAT commands do. This is important only if another external device, such as a tape recorder, is controlled via the REMOTE connections. If the internal timer is already in its "on" state, the command will have no effect. The CAT power on/off functions override the internal timer functions while the CAT System is active (EXT CNTL ON).

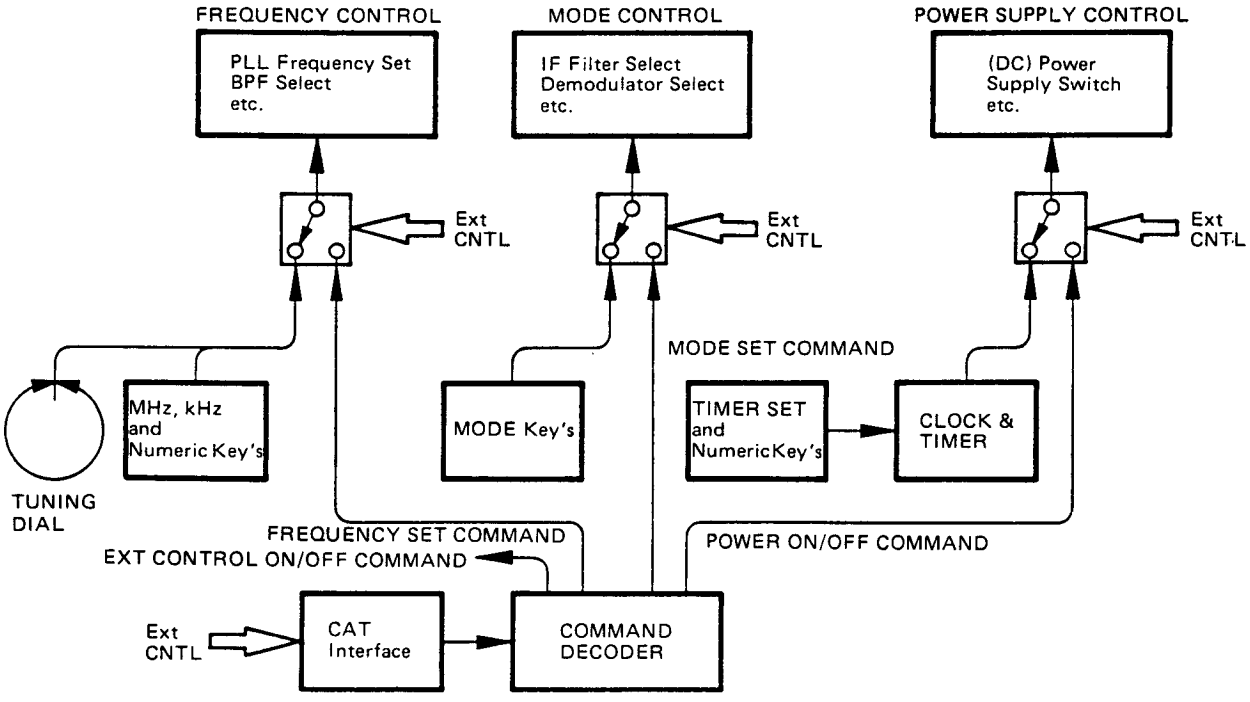
Lines 3000 — 3050 set the receiver frequency to 12.3456 MHz (strictly for testing purposes). This routine must be changed to make a useful program. Line 3010 assigns the frequency to Data Bytes X(1) through X(4), including decimal to hex conversion. Obviously the decimal integers in this line should be replaced with variables input from the keyboard or other routines. See further comments below.

Lines 4000 — 4040 set the receiving mode to USB. This routine must also be expanded to

FRG-8800
CAT TEST PROGRAM

```
100 REM INIT
110 OPEN "COM:7N82NN" FOR OUTPUT AS #1
120 PRINT"1--EXT CNTL ON
130 PRINT"2--POWER ON
140 PRINT"3--FREQUENCY SET
150 PRINT"4--MODE SET
160 PRINT"5--POWER OFF
170 PRINT"6--EXT CNTL OFF
180 PRINT:INPUT"WHICH ";A
190 IF A<1 OR A>6 THEN 180
200 ON A GOSUB 1000,2000,3000,4000,5000,6000
210 GOTO 120
1000 REM EXT CNTL ON
1010 X(4)=0:X(5)=0
1020 GOSUB 10000
1030 RETURN
2000 REM POWER ON
2010 X(4)=254:X(5)=128:REM 254="&HFE",128="&H80"
2020 GOSUB 10000
2030 RETURN
3000 REM FREQUENCY SET
3010 X(4)=1:X(3)=2*16+3:X(2)=4*16+5:X(1)=6*16
3020 REM 12.3456 MHZ
3030 X(5)=1
3040 GOSUB 10000
3050 RETURN
4000 REM MODE SET
4010 X(4)=2:X(5)=128
4020 REM X(4)=2 --> USB
4030 GOSUB 10000
4040 RETURN
5000 REM POWER OFF
5010 X(4)=255:X(5)=128
5020 GOSUB 10000
5030 RETURN
6000 REM EXT CNTL OFF
6010 X(4)=128:X(5)=0
6020 GOSUB 10000
6030 RETURN
10000 REM OUTPUT TO FRG-8800
10010 PRINT #1,CHR$(X(1));CHR$(X(2));CHR$(X(3));CHR$(X(4));CHR$(X(5));
10020 RETURN
```

CAT FUNCTION DIAGRAM



include other modes for a practical control program; for example with a sub-menu listing the modes on the screen first.

Lines 5000 — 5030 turn the receiver power off (the CAT System is still operational). Note that the REMOTE jacks on the rear panel are also switched when this command is sent: its function duplicates that of the internal receiver timer off function.

Lines 6000 — 6030 shut off external control by the CAT System, re-enabling the front panel controls and on/off timer settings. This command may be sent regardless of whether the receiver is switched on or off at the time: it will resume whatever state it was in prior to the previous sending of the EXT CNTL ON command.

Lines 10000 — 10020 send each 5-byte command to the receiver in the right order. The decimal values assigned to X() will be converted into serial binary form by the computer before sending to the receiver.

To use this program as a starting point for a control program, first key it in, with the appropriate adjustments to Line 110, and ensure that it runs. Then replace lines 3010 and 3020 with a routine to input (and optionally display) frequency digits from the keyboard.

Similarly, replace lines 4010 and 4020 with a routine to display the possible modes and accept keyboard input which results in the correct value being assigned to byte X(4).

Once your new frequency and mode routines are running correctly, try adding scanning (by incrementing the frequency digits and looping through the Frequency Set routine), and memories (by storing frequency and mode data in an array).

If your computer includes a real-time clock you can make use of the power on/off commands, for linking to various memories, so that your favorite stations will be selected at different times. If you have a propagation program you might link it in so that the optimum frequency bands for the time of day and season are selected.

S-Meter Signal Interfacing

As mentioned in the Operating Manual, certain CAT Interface Units include an A/D (analog-to-digital) converter, which provides the computer with a numerical representation of the signal strength. Including this in your programming allows automatic scan start and stop routines, and automatic selection of the strongest signal among a number of different frequencies.

If the interface that you are using does not include an A/D converter, we suggest using one of the many single-chip devices available for this purpose. In most cases the easiest approach is an 8-bit parallel converter which can be connected directly to data bus, enabled by the desired I/O address, I/O request and the read line from the computer cpu. The S-meter output at pin 5 of the CAT jack ranges from zero volts when receiving no signal signal to approximately 2.5 volts when the S-meter reads full scale. Use a converter with high-impedance (>100k) input, or include a buffer. Using a parallel converter in this way allows signal strength sampling from BASIC with the INP command.

Squelch Interfacing

The BUSY control signal at pin 6 of the CAT jack is a simple TTL-level on/off signal, which can be read by the computer without conversion. However, it is necessary to connect this pin to a TTL sensing port on the computer, such as a joystick port. The BUSY pin will be at high level when the squelch is open, and low when closed, which level depends on the setting of the front panel SQL control (which is not disabled during CAT control). This can certainly be implemented easier than the S-meter signal, but provides less information for programming. It is very useful, however, when the FRV-8800 VHF Converter is installed, for scanner programs.

DC-DC CONVERTER EFFICIENCY IMPROVEMENT FOR THE FRG-8800

The switching circuit in the DC-DC converter on the REG Unit in the early FRG-8800 (prior to production lot 3) may draw enough current in some sets to overheat coil L01. This modification increases the efficiency of the converter and thus reduces the load on the coil. Sets with serial numbers above XX030000 do not require this modification.

(1) Disconnect the power cord and remove a backup battery from the compartment in the rear panel.

(2) Remove the two screws affixing the carrying handle, and remove the handle.

(3) Remove the lower two screws from the left side and two screws from the bottom of the case, and remove the bottom cover.

(4) Referring to Figure 2, remove the five screws affixing the REG Unit, to allow access to the solder side of the Unit.

(5) Remove 0.047uF ceramic capacitor C3011, and replace it with a 0.022uF, 50WV Mylar type.

(6) Remove type 2SD882 transistor Q3004, and install a type 2SD880Y in its place. Note that the packaging and pinout of these two types are different, as shown in Figure 3.

(7) Replace the REG Unit and its five screws, and then the bottom cover, handle and screws removed in steps (2) and (3). Replace the backup battery and the power cord.

The modification is now complete.

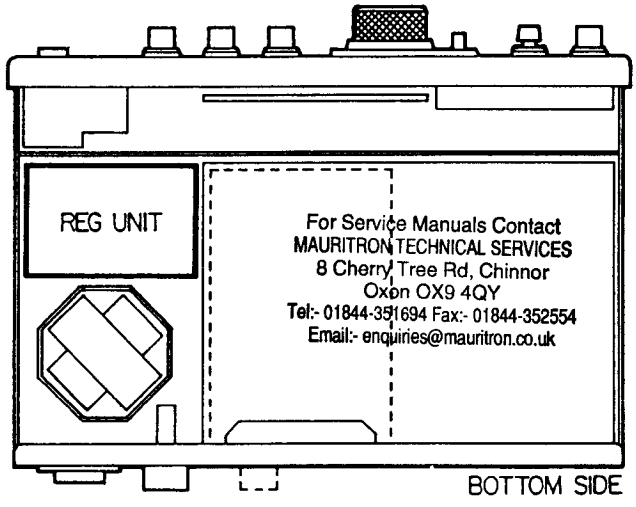


Figure 1

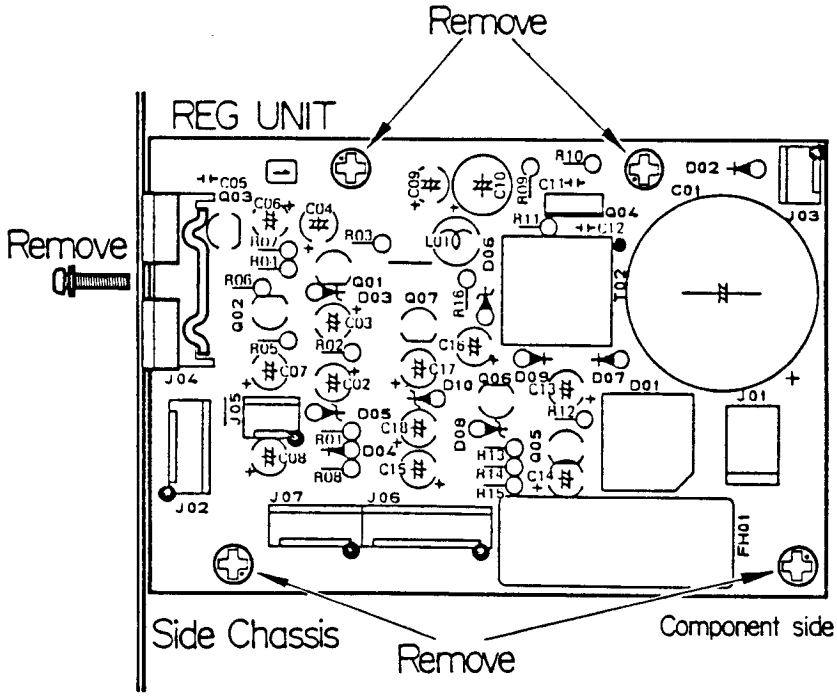


Figure 2

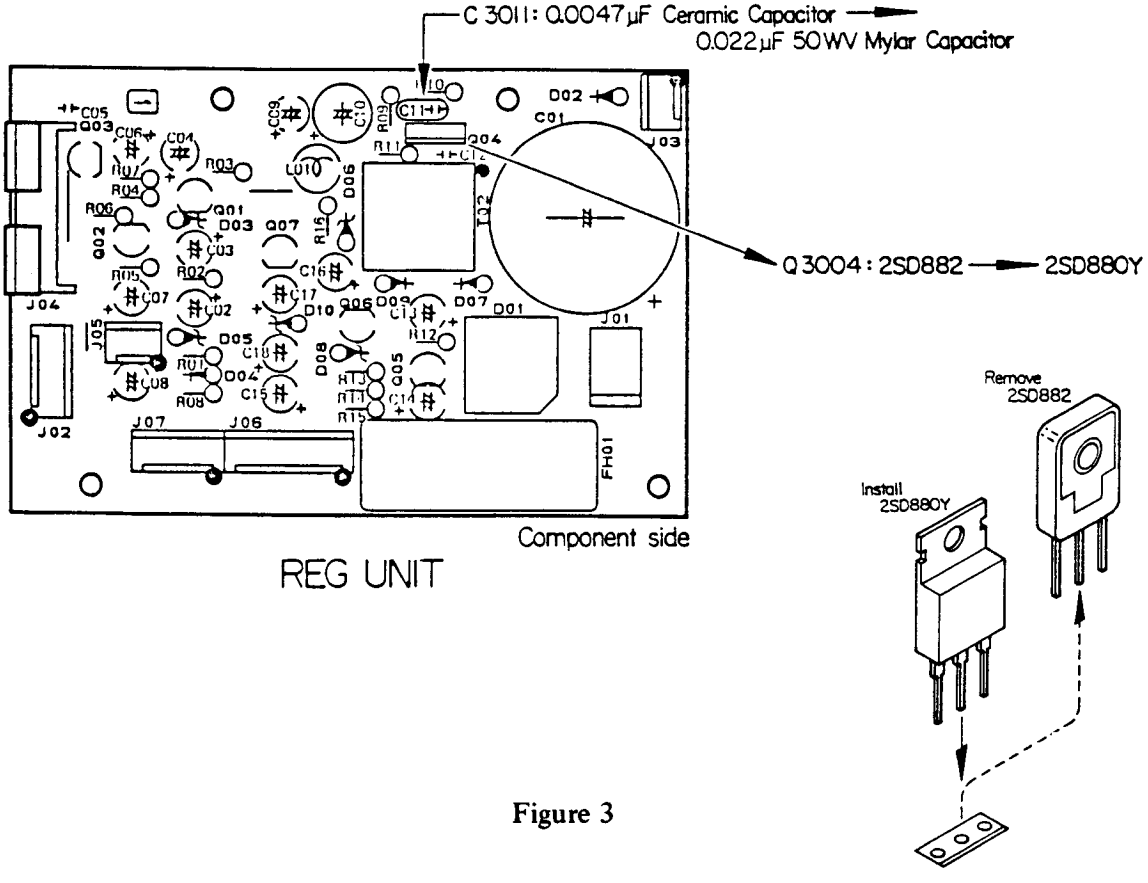


Figure 3

FM WIDE MODIFICATION KIT

This kit enables the wideband (broadcast) FM mode in the FRG-8800. This mode is required for reception of FM broadcast signals which transmit within the frequency range of the receiver (118 to 174 MHz when the FRV-8800 is installed). In most countries this kit is not required, since FM broadcasting is outside of the receiver frequency range.

Parts contained in kit no. D3000378:
FM Unit C02680A and three Locking Spacers S3000041

(1) Remove the AC power cord plug from the AC jack, and remove a backup battery from the battery compartment in the rear panel. Remove the FRV-8800 Converter, if installed.

Referring to Figure 1, remove the two screws affixing the carrying handle on the right side of the case, and remove the handle. Remove the two screws from the left side, and two screws from the bottom of the case, and remove the bottom cover.

(2) Locate the place to mount the FM board, on the Main Unit on the underside of the chassis (Figure 2). Now referring to Figure 3, install the three locking spacers in the mounting holes on the Main Unit. Align white connector P9001 on the FM Unit with J1009 on the Main Unit, and press the connectors together. The locking spacers must pass through the holes in the FM Unit as it is pressed into place until locked.

(3) Installation is now complete. Replace the bottom cover and carrying handle, and the screws removed in step (1). Reinstall the FRV-8800, and replace the backup battery and cover, and the AC power cord.

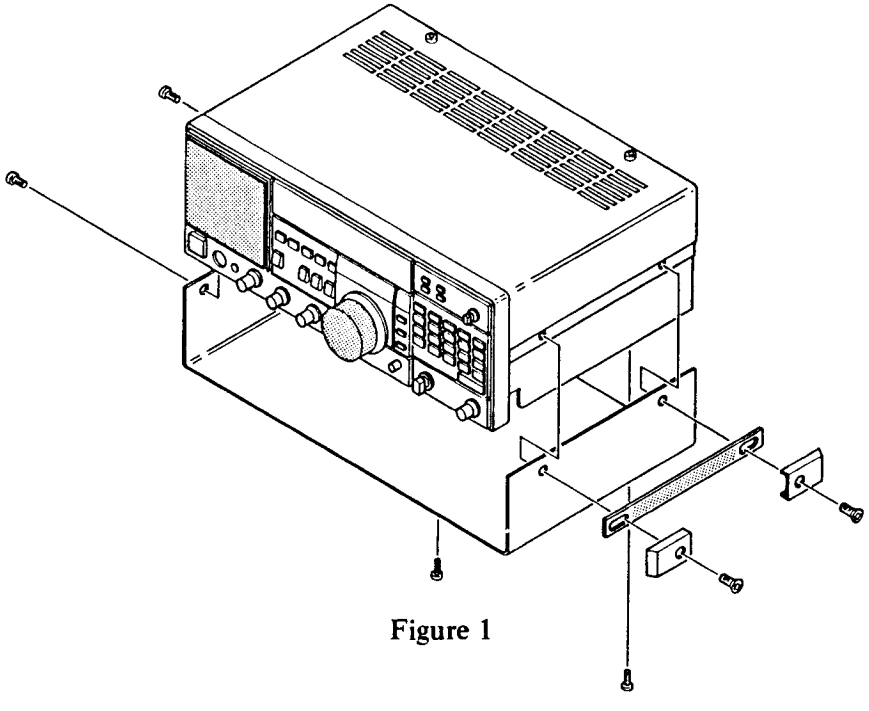


Figure 1

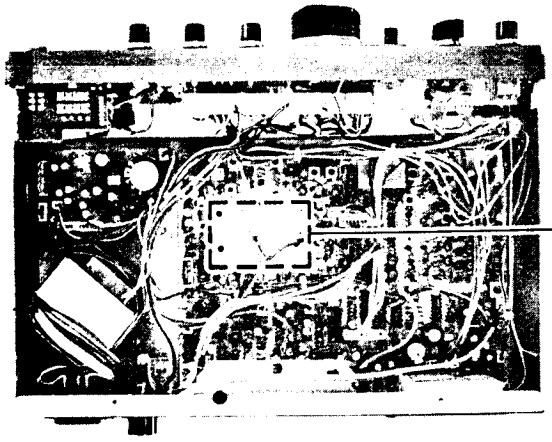
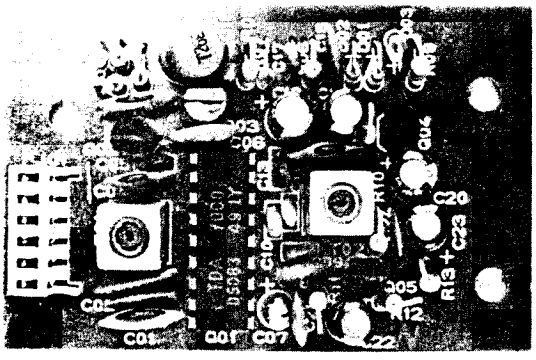


Figure 2



FM UNIT

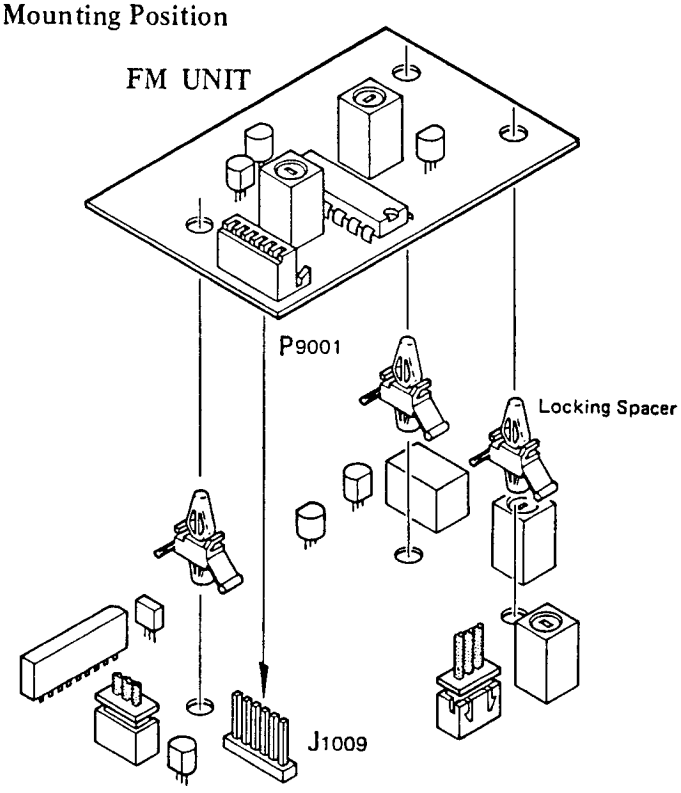
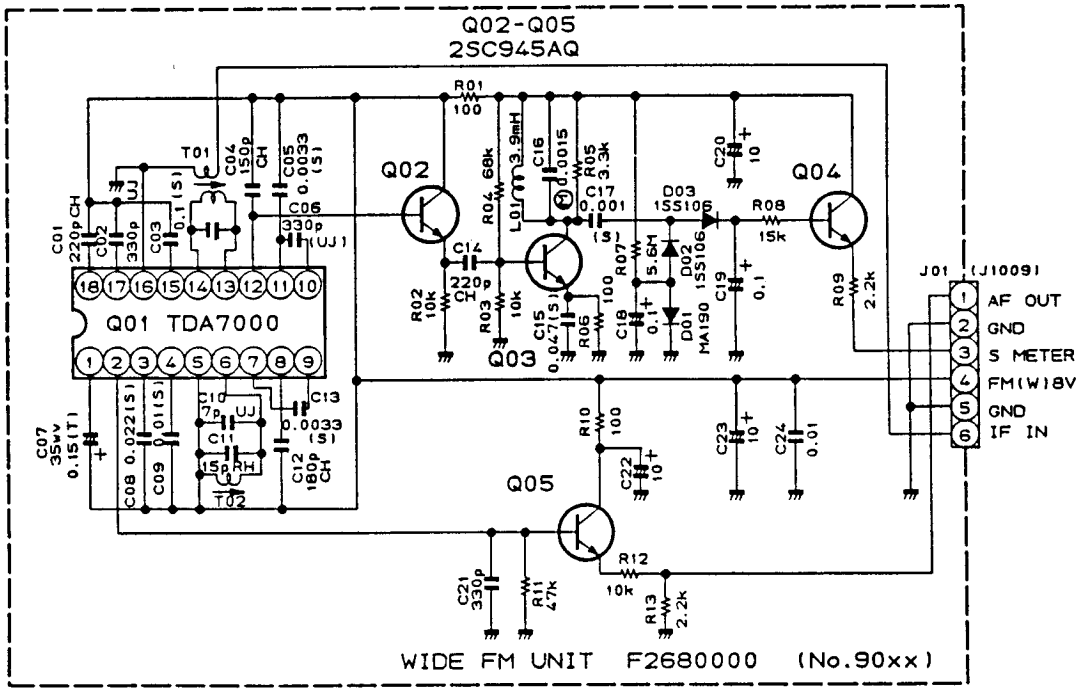


Figure 3



DC MODIFICATION KIT

This simple kit allows the FRG-8800 to be operated from an external source of 13.8 volts DC (±10%). Current requirements are approximately 1 Amp when the receiver is on, and 17 mA in clock/timer standby, so be sure that the DC source used is capable of providing this current.

(1) Remove the AC power cord plug from the AC jack, and remove a backup battery from the battery compartment in the rear panel.

(2) Remove the two screws affixing the carrying handle on the right side of the case, and remove the handle.

(3) Remove the two screws from the left side, and two screws from the bottom of the case, and remove the bottom cover.

(4) Remove the small plastic cover from the rear panel to expose the DC Jack cutout, as shown in Figure 1.

(5) Install the DC Jack assembly as shown in Figure 2.

(6) Insert plug P5 into Jack J3003 on the REG Unit, as shown in Figure 3.

(7) Replace the bottom cover and carrying handle, replacing the six screws removed in steps (2) and (3). Also replace the backup battery and cover.

(8) The DC power cord should be wired as shown in Figure 4. Be careful to ensure correct polarity.

The modification is now complete.

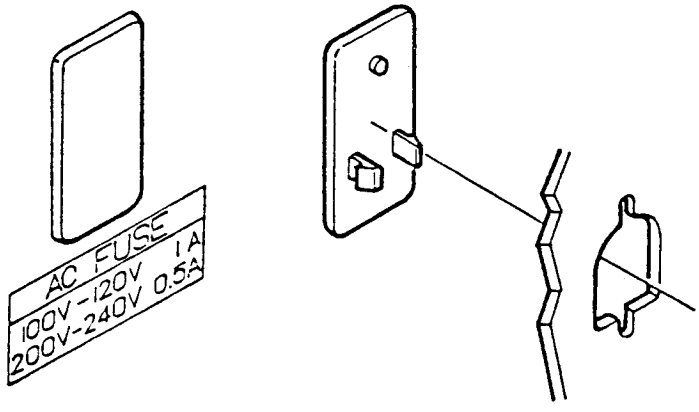


Figure 1

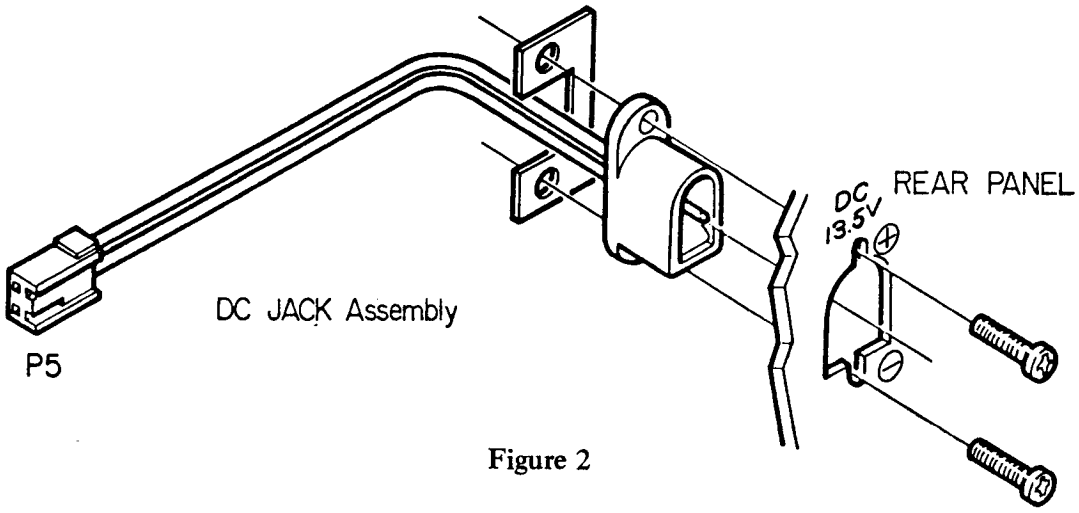


Figure 2

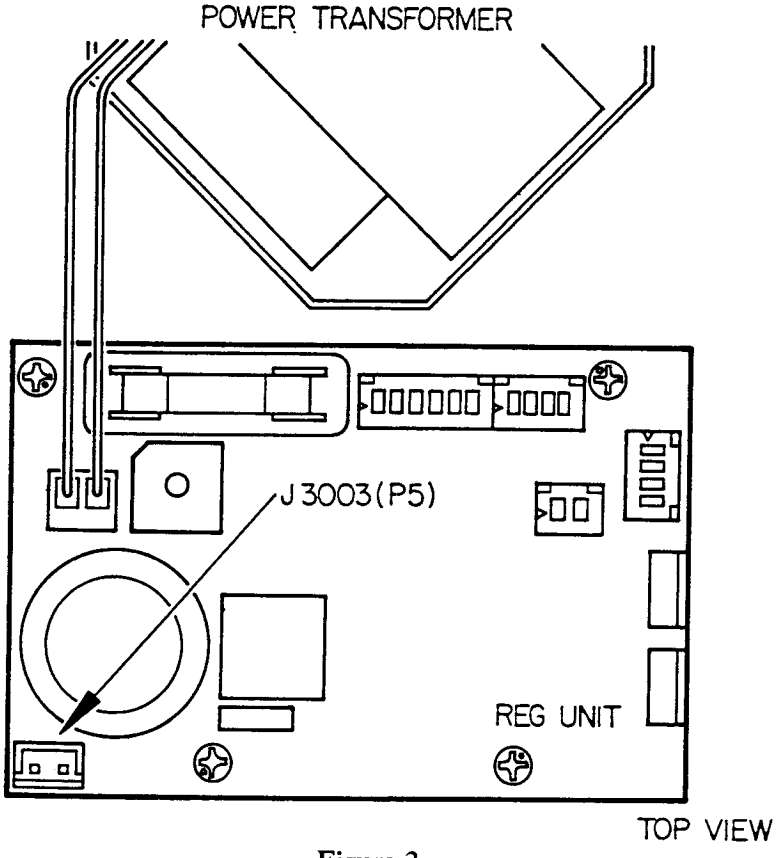


Figure 3

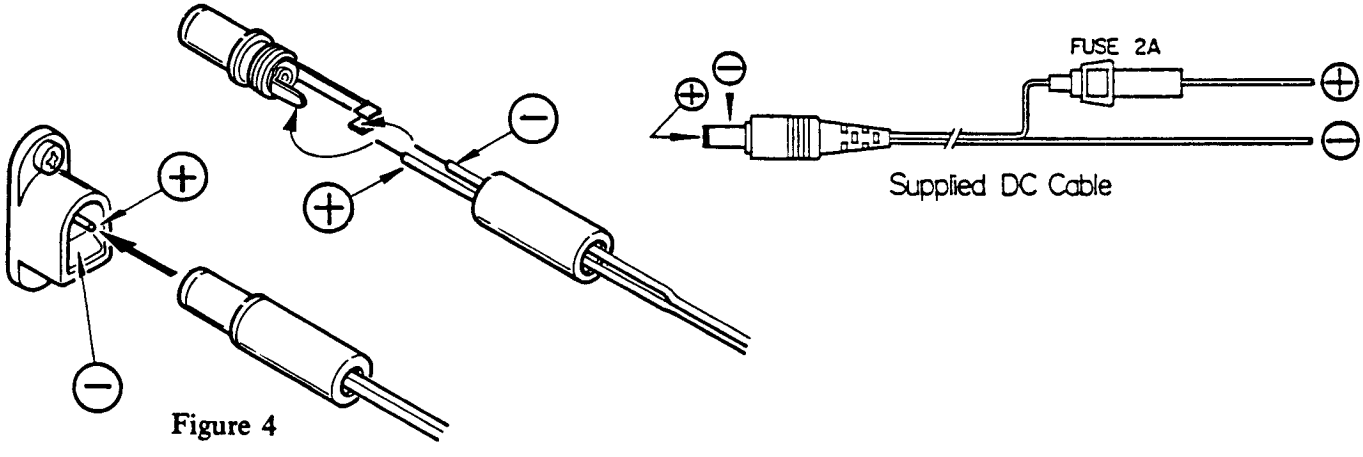


Figure 4

CIRCUIT DESCRIPTION

This description, together with the block diagram, is intended to provide a general understanding of the electrical functions of the circuits in the FRG-8800. Such an understanding is necessary for trouble-shooting the receiver. Refer to the schematic diagrams and parts list for specific component and wiring details.

Front-end Stages

The antenna terminals and jacks are connected to the ANT Unit, where the BC terminal connects through a 9:1 impedance transformer to the HF/BC and HF coaxial lines. Surge protector D01 (ERZ-D03DS331) removes high voltage electrostatic impulses that might otherwise damage components in the front-end. The signal is then delivered to the Main Unit, where it is impedance-transformed and then filtered by one of eight bandpass filters to suppress intermodulation from signals on other bands. The correct bandpass filter for the operating frequency is selected by BCD control signals from the PLL Unit, decoded by Q09 (MC14028BCP) and switched by one of Q01 through Q08 (2SC2785JF). The resulting signal is then lowpass filtered to further suppress the 1st IF, before RF amplification by FET Q67 (2SK125).

The amplified RF signal is next applied through an impedance matching transformer to 1st mixer Q10 (ND487C2-3R), a balanced diode ring, along with the first local oscillator signal (47.205 – 77.055 MHz) which has been lowpass filtered, amplified and buffered by Q12, Q13 (2SC1923-O) and Q11 (2SC3355) after delivery from the PLL Unit. The 47.055 MHz 1st IF product of the first mixer is passed through monolithic crystal filter XF01, where other mixer products are stripped away. During VHF operation with the optional FRV-8800 the front end of the FRG-8800 is bypassed, and the VHF local signal is delivered from Q12 via buffer Q14 (2SC458B) to the VHF Unit. IF input from the VHF Unit is then selected by Q18 and Q19 (2SC458BTZ) and diodes D17 – D20 (MA190) for filtering by XF01.

IF Stages

The filtered 1st IF signal is amplified by Q20 (3SK73GR) and applied to balanced 2nd mixer Q21/Q22 (3SK73GR x 2), which also receives the 46.6 MHz 2nd local signal from the PLL Unit. A portion of the 455 kHz product of the 2nd mixer is buffered by Q23 (2SC458BTZ) and delivered to the PLL Unit for FM detection (when this mode is selected), or for noise blanker amplification. For other modes, the 455 kHz IF signal is passed through ceramic filter CF01 (20 MHz BW), where other mixer products are stripped away, and then through noise blanker gate D24/D25 (MA150 x 2) to one of final IF filters CF02 (6 kHz BW) for AM, or CF03 (2.7 kHz) for SSB or CW.

Final IF amplification is provided by Q25, Q26 (both 3SK73GR) and Q27 (3SK74L) before detection. A portion of the IF signal is buffered by Q28 (2SC458BTZ) and detected by D36/D37 (1SS106 x 2), the output of which serves both as the detected AM signal and AGC. For AM, the audio product of the detector is buffered by Q40 (2SC458BTZ) and passed through mode selector and audio mute switches Q38 and Q50 (both 4066B) to the audio amplifiers.

For SSB and CW modes the amplified IF is applied to the product detector consisting of D32 – D35 (all 1SS106), which also receives the BFO signals for either LSB and CW from oscillator Q43 or USB from oscillator Q45 (Q43 – Q46 are all 2SC458BTZ). The DC mode signals select the proper oscillator via switches Q44 (LSB/CW) and Q46 (USB).

The audio product from the product detector is buffered by Q41 (2SC458BTZ) and applied to one-half of audio filter op amp Q39 (AN6551), which functions as a lowpass filter for audio above 3 kHz when in LSB/USB and CW wide. In CW narrow the DC mode signals select the other half of Q39, which serves as a narrow filter centered around 800 Hz. The output of the selected filter is applied to the audio amplifiers.

For FM narrow, the 455 kHz IF signal sampled at the output of the 2nd mixer is delivered to the PLL Unit for amplification by Q49/Q50 and Q51/Q52 (all 2SC458BTZ), and then returned to the Main Unit, where it is buffered by Q32 (2SC458BTZ) and passed through ceramic filter CF04 (±7.5 kHz). The filtered IF has amplitude variations removed by limiter amp Q33 (uPC577H), so that only frequency variations in the IF produce audio at FM discriminator CD01/D38/D39 (455-D and 1SS106 x 2). Audio output from the discriminator is buffered by Q34 and Q35 (both 2SC458BTZ) and passed via switches Q38 and Q50 to the audio amplifiers when the FM narrow mode is selected.

The narrow FM discriminator output is also sampled by deviation center comparator Q36 (AN6551) to provide squelch control when FM signals are tuned precisely. The FM squelch signal is derived from another sample of the discriminator output, filtered so that only high-frequency noise remains. This noise, which is present at the discriminator output when no signal is being received, is buffered by Q51 (2SC458BTZ) and passed through the front panel SQL control, amplified by Q47 and Q48 (both 2SC458BTZ), and rectified by D43/D45 (MA190 x 2) to provide a DC voltage. This squelch voltage switches Q49 (2SC458BTZ), which in turn is ANDed with the center-signal mentioned above, by one section of switch Q50, and then ORed with the squelch signal for other modes, mentioned below, to provide a "busy channel" control signal for the scanning system, and also to mute the audio amplifiers when no signal is being received (and the squelch function is in use).

When the optional FM wide Unit is installed, the 47 MHz output from the 1st mixer is delivered to the FM wide Unit installed on the Main Unit. Wideband FM audio from the optional unit is then returned through switches Q38 and Q50 to the audio stages.

Noise Blanker, AGC and S-Meter

In the AM, SSB and CW modes, when the noise blanker is on, the 2nd IF signal amplified by Q51/52 on the PLL Unit, mentioned above in the FM narrow mode, pass the signal on through Q53 (2SC458BTZ), also on the PLL Unit. The signal is detected by D30/D31 (both 1SS106), passed through the NB wide/narrow selector switch on the rear panel, then further amplified by Q54 and fed back to amplifiers Q49/Q50 and Q51/Q52, thus controlling their gain. The response time of this loop is selected by the rear panel switch so that noise pulses detected at D30/D31 produce a strong DC pulse for the duration of each RF noise pulse, and this DC blanking signal (labelled "NB G") is returned to noise blanking gate controller Q24 (2SC458BTZ) on the Main Unit. Q24 switches noise gate D24/D25 (MA150 x 2) off during the noise pulse, preventing the 2nd IF signal from reaching the narrow IF filters while the noise pulse is present.

Receiver AGC is provided for all modes, derived from the output of AM/AGC detector D36/D37, mentioned previously in connection with AM audio detection. A sample of this detector output is amplified by Q29 (2SC458BTZ), and fed back to 2nd IF amplifiers Q25 and Q26, and through the front panel ATT control to 1st IF amplifier Q20. This signal is also provided to the optional FRV-8800 VHF Converter, when used.

DC voltage for S-meter indication is provided from the AGC mentioned above, after further amplification by Q30 (2SC458BTZ) and Q31 (2SA733AP). A sample of the amplified AGC output of Q30 is taken by Q58 (2SA733AP) to drive AM/SSB/CW Squelch switches Q56 and Q57 (both 2SC458BTZ), the switching signal from which is handled as mentioned previously in the FM narrow paragraphs.

Audio Amplifiers

The low level audio signal for the selected mode is passed via switch IC Q50 (when not muted by the squelch control lines) to audio preamplifiers Q64 and Q65 (both 2SC458BTZ). The output from Q65 is then passed through the AF GAIN control on the front panel to audio amplifier IC Q66 (uPC575C2), and the amplified audio delivered to the headphone or speaker. A 0dB sample of the output from Q65 at 600 ohms impedance is also delivered to the LINE OUT jack on the rear panel.

Local Signal Generation

The 1st local signal is generated by dual PLL synthesis under control of cpu Q65 (HD63A05) on the PLL Unit. In the main loop, one of VCOs Q15 – Q18 (all 2SK192AGR) is activated by the cpu via switches Q19 – Q22 (all 2SC458BTZ) according to the frequency of operation, as indicated in the VCO Chart. The output of the selected VCO is buffered by Q12, Q13 (both 2SC1923-O) and Q11 (2SC2026) and lowpass-filtered before being delivered to the Main Unit, as described previously.

A sample of the VCO output, after buffering by Q13, is buffered by Q14 (2SC1923-O) and applied to Loop 1 mixer Q10 (uPC1037H), which is also fed the Loop 1 PLL local signal, derived from Loop 2 as described later, to produce the Loop 1 PLL IF between 5.15 and 22.975 MHz. This mixer product is lowpass-filtered and then buffered by Q55 and Q56 (both 2SC1923-O), before being fed to programmable divider/phase detector IC Q57 (MN6147), which is also fed a 4.5 MHz reference signal, described later, and divider programming data from the cpu. The divider section of Q57 divides the PLL IF by the programming data so as to produce a 4.5 MHz signal, which is then applied to the phase detector section for phase comparison with the 4.5 MHz reference. Any detected phase difference produces a pulsed DC output, which is lowpass-filtered and amplified by op amp Q23 (AN6552), and applied to the varactors in the selected VCO to cause the VCO oscillating frequency to be phase-locked to the 4.5MHz reference.

The PLL local signal for Loop 1 is the product of either Loop 1 Local Mixer Q48 (uPC1037), or the product of the output of this mixer further mixed with an 18 MHz crystal reference signal, at mixer Q01 (uPC1037), according to the band of operation (see the VCO Chart). The 18 MHz crystal reference is generated at Q03/X01 (2SC458BTZ), and buffered by Q02 (2SC458BTZ) for the above mixing. The 4.5 MHz reference signal mentioned above is also derived from Q03/X01, after buffering by Q04 and Q05 (both 2SC458BTZ), and dividing by four at Q34 (SN74LS107N).

Loop 1 Local Mixer Q48 receives a 46.6 MHz PLL Local signal from crystal oscillator Q46/X02 (2SC458BTZ), after buffering by Q47 (2SC1923-O). The 46.6 MHz oscillator signal from Q46/X02 is also buffered by Q45 (2SC1923-O) and delivered to the Main Unit as the 2nd Local. Q48 also receives a lowpass-filtered signal derived from Loop 2 VCO Q39 (2SC458BTZ), buffered by Q36 (2SC458BTZ) and divided by 10 at prescaler Q35 (HD10551) before the filtering.

A sample of the signal from Loop 2 VCO Q39 is buffered by Q37/Q38 (2SC1923-O x 2), and applied to Loop 2 programmable divider/phase detector IC Q59 (MN6147). Q59 also receives the same divider programming signals as mentioned for Loop 1, from the cpu, and a 4.5 kHz reference signal from crystal X03, which is shifted by the FINE control on the front panel and R250 – R255 (for 25 kHz tuning steps) at the cpu, via Q61 (AN6552). The DC pulses resulting from phase difference between the VCO and reference signals is lowpass filtered by Q40 – Q42 (all 2SC1815BL) and fed back to varactor D29 in the Loop 2 VCO circuit, to lock the VCO to crystal X03.

Miscellaneous Control Logic

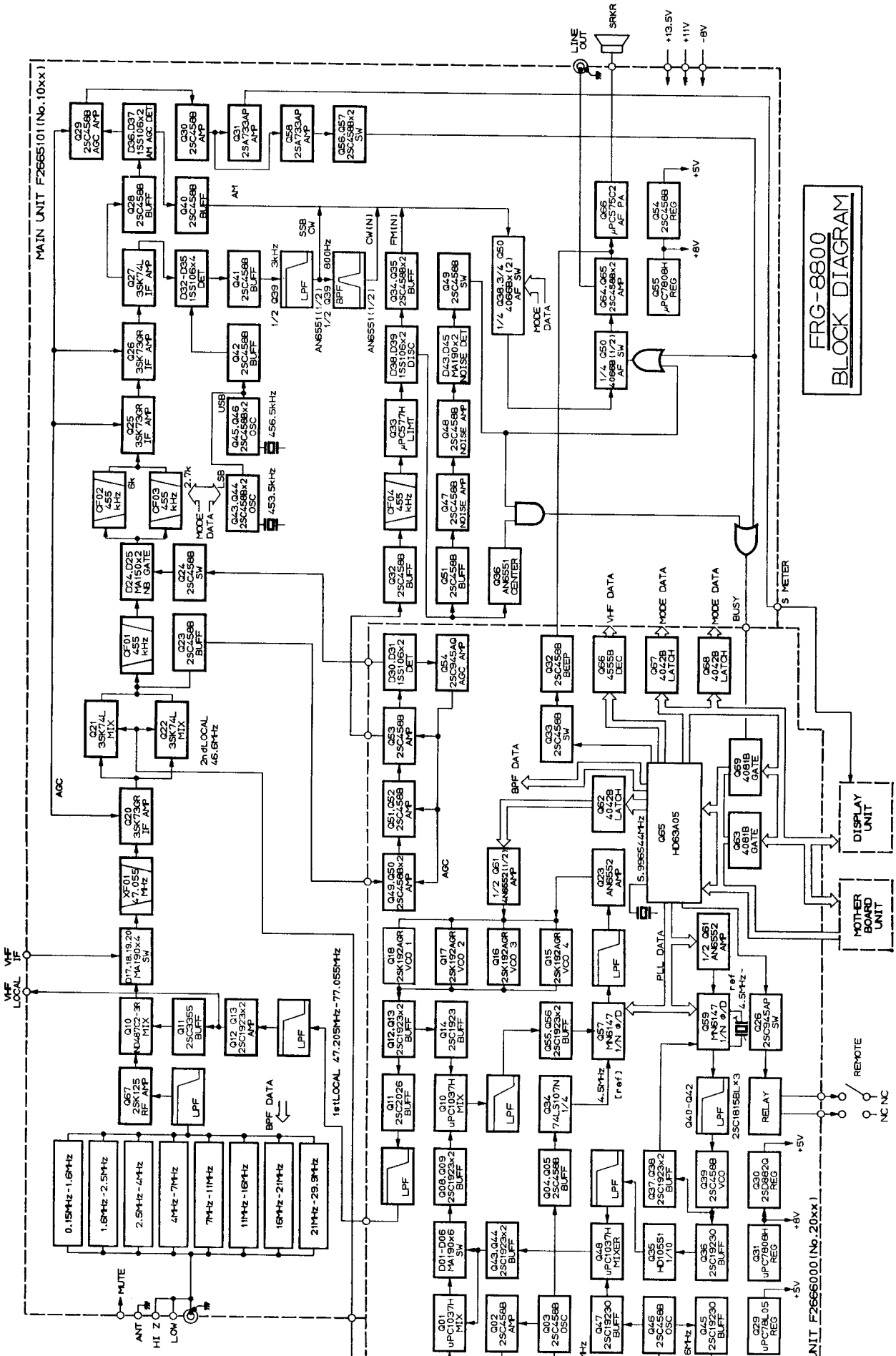
Band selection for the Loop 1 Local Signal is provided from the cpu by switch driver Q06/Q07 (2SC458BTZ x 2) and diodes D01 – D06. Also, in addition to the Loop VCV control (locking) signal, the VCOs in Loop 1 receive a preset signal at a second set of varactors, from the cpu. This preset signal is developed in a 3-bit DAC using R226 – R228 at Q62 (MC14042BCP), and buffered by one half of Q61 before application to the Loop 1 VCOs.

Whenever either Loop becomes unlocked, an unlock line, controlled by Q58 (2SA733AP, for Loop 1), and Q60 (2SA733AP, for Loop 2), signals the cpu via Q69, which then mutes the receiver audio and blinks the display until the PLLs resume lock.

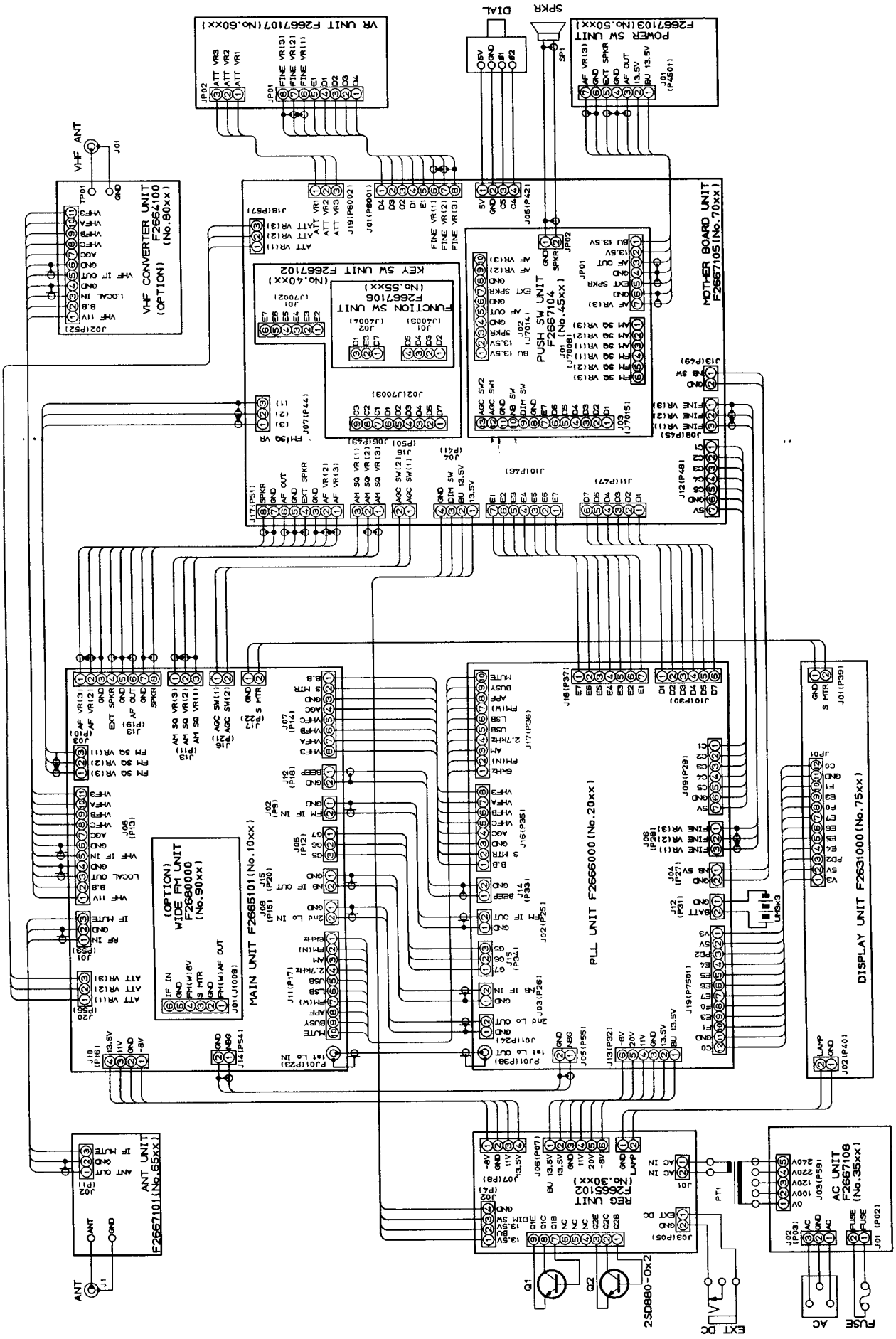
The cpu provides mode selection data to the Main Unit via latches Q67 and Q68 (both MC14042BCP), and band selection data to the optional VHF Converter via decoder Q66 (MC14555BCP). Q68 and Q69 both handle other gating functions for scanning.

VCO CHART

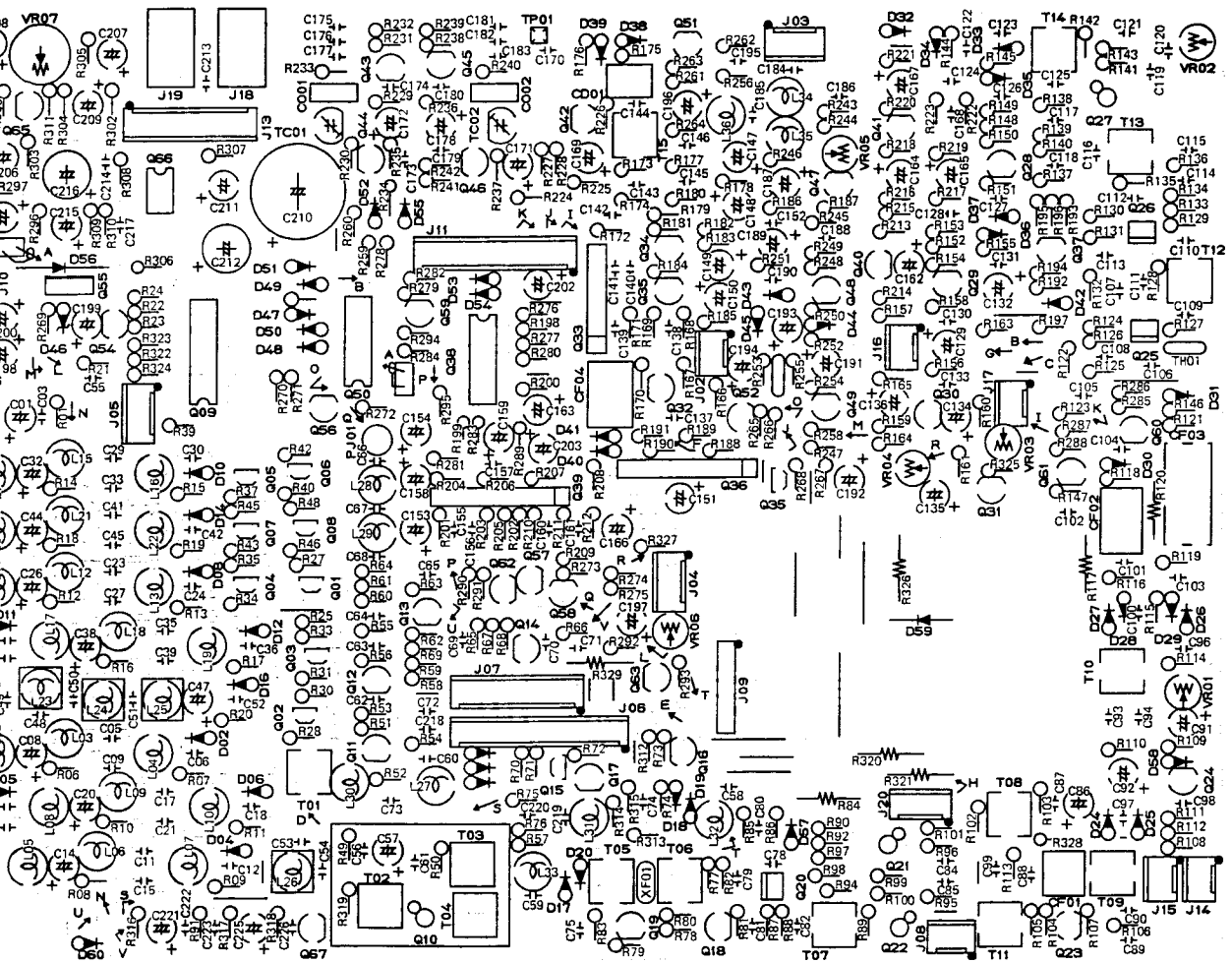
Receiving Frequency	VCO	OSC Frequency	PLL Loop 1 Local Frequency	PLL Loop 1 IF Frequency	PLL Loop 2 VCO, IF Frequency
HF 0.15–5.999975 MHz	Q18	47.205–53.054975 MHz	42.055–42.079975 MHz	5.15–10.975 MHz	45.45–45.20025 MH
HF 6.00–13.999975 MHz	Q17	53.055–61.054975 MHz	42.055–42.079975 MHz	11.00–18.975 MHz	45.45–45.20025 MH
VHF 118.00–119.999975 MHz		59.055–61.054975 MHz		17.00–18.975 MHz	
,, 136.00–138.999975 MHz		58.055–61.054975 MHz		16.00–18.975 MHz	
,, 155.00–157.999975 MHz		58.055–61.054975 MHz		16.00–18.975 MHz	
HF 14.00–17.999975 MHz	Q16	61.055–65.054975 MHz	42.055–42.079975 MHz	19.00–22.975 MHz	45.45–45.20025 MH
,, 18.00–21.999975 MHz		65.055–69.054975 MHz	60.055–60.079975 MHz	5.00–8.975 MHz	
VHF 120.00–123.999975 MHz		61.055–65.054975 MHz	42.055–42.079975 MHz	19.00–22.975 MHz	
,, 124.00–127.999975 MHz		65.055–69.054975 MHz	60.055–60.079975 MHz	5.00–8.975 MHz	
,, 139.00–142.999975 MHz		61.055–65.054975 MHz	42.055–42.079975 MHz	19.00–22.975 MHz	
,, 143.00–146.999975 MHz		65.055–69.054975 MHz	60.055–60.079975 MHz	5.00–8.975 MHz	
,, 158.00–161.999975 MHz		61.055–65.054975 MHz	42.055–42.079975 MHz	19.00–22.975 MHz	
,, 162.00–165.999975 MHz		65.055–69.054975 MHz	60.055–60.079975 MHz	5.00–8.975 MHz	
HF 22.00–29.999975 MHz	Q15	69.055–77.054975 MHz	60.055–60.079975 MHz	9.00–16.975 MHz	45.45–45.20025 MH
VHF 128.00–135.999975 MHz					
,, 147.00–154.999975 MHz					
,, 166.00–173.999975 MHz					



FRG-8800 CONNECTION DIAGRAM



MAIN UNIT PARTS LAYOUT



(Viewed from component side)

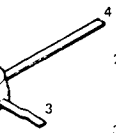
VOLTAGE CHART (DC VOLTS)

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	REMARKS
1009	4.7	0	0	0	0	0	0	0	0	0	0	4.7	0	0	0	4.8	10MHz
1033	0 (5.1)	0 (1.7)	0 (1.7)	0 (0)	0 (7.6)	0 (2.7)	0 (6.8)										(FM)
1036	7.9	−6.6	0.1	0	−8	−0.2	0.1	−6.6	7.9								
1038	2.2	2.3	2.3	2.3	0	0	0	2.1	2.3	2.3	2.3	5	0	5			
1039	7.6	3.7	3.7	3.3	0	3.4	3.7	3.7	7.6								
1050	2.2	2.3	2.3	2.3	3.9	0	0	0	0	0	4.5	0	0	5			
1055	IN 10.5	OUT 8	GND 0														
1066	1.7	14.3	13.6	7.6	6.4	14.5	0	1.8									

VOLTAGE CHART (DC VOLTS)

Q	E(S)	C(D)	B(G1)	(G2)	REMARKS
1001	0	10.5	0		
1002	0	10.5	0		
1003	0	10.5	0		
1004	0	0	0.7		10MHz
1005	0	10.5	0		
1006	0	10.5	0		
1007	0	10.5	0		
1008	0	10.5	0		
1011	3.6	6.8	4.4		
1012	7.2	10.5	7.3		
1013	3.4	7.3	4.1		
1014	2.4	8.8	3.1		
1015	0	0	0.6		
1016	9.8	10.5	9.8		
1017	0	10.6	0		
1018	0	7.3	0		
1019	0	0	0.6		
1020	0.7	9.4	2.0	1.9	
1021	0.6	10.2	0.4	1.8	
1022	0.6	10.2	0.4	1.8	
1023	3.6	9	4.3		
1024	0	4.8	0		
1025	2.1	9.7	2	1.2	
1026	2.3	9.7	2	1.2	
1027	2.8	10.4	2	3.8	
1028	2.3	7.7	2.9		
1029	3.5	1.3	−3.9		
1030	3	7.9	1.3		
1031	3.3	0	2.4		
1032	3.1	6.3	3.8		FM-N
1034	1.2	5.6	1.8		"
1035	5	7.3	5.6		"
1037	2.4	2.4	1.8		
1040	2.5	7.8	3.5		
1041	2.3	7.8	2.9		
1042	3.3	6.8	3.9		
1043	4 (3.6)	7.5 (7.3)	4.3 (4.1)		(LSB)
1044	0 (0)	4 (0)	0 (0.7)		"
1045	4 (3.7)	7.5 (7.3)	4.3 (4.1)		(USB)
1046	0 (0)	4 (0)	0 (0.7)		(")
1047	0 (1)	0 (4.5)	0 (1.6)		(FM-N)
1048	0 (1)	0 (5)	0 (1.6)		(")
1049	0 (0)	0 (4.8)	0 (0)		(")
1051	0 (3.6)	0 (7.2)	0 (3.4)		(")
1052	7.9 (7.9)	0 (7.8)	7.8 (7.1)		(")
1053	0 (0)	7.7 (0)	0 (0.7)		(")
1054	4.9	8	5.5		
1056	0	4.3	0		BUSY
1057	0	0	0.7		"
1058	3.5	0.7	1.6		"
1059	0	4.3	0		
1060	0	10.2	0		AM
1061	0	0	0.7		"
1062	0 (0)	7.7 (0)	0 (0.7)		(FM-W)
1063	7.9 (7.9)	0 (0)	7.7 (7.7)		(")
1064	1.5	3.7	2.2		
1065	3	9.2	3.7		

MAIN UNIT PARTS LAYOUT



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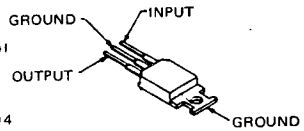
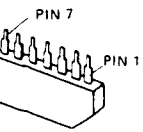


μPC7808H



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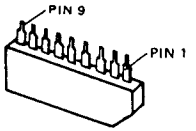
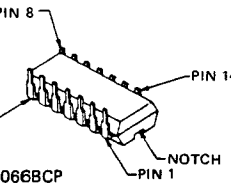
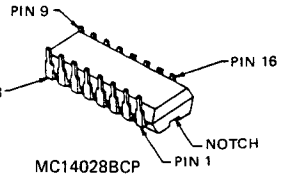


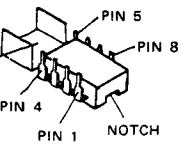
AN6551



066BCP



MC14028BCP



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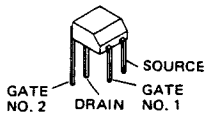

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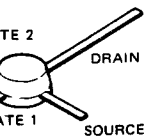
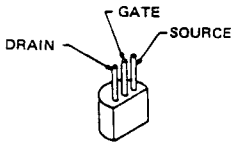
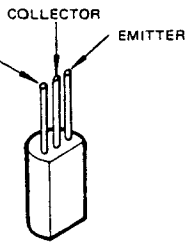


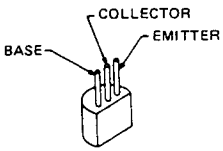
3SK74L



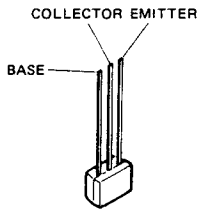
2SK125



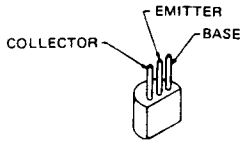
2SA1193K



2SA733AP
2SC458B
2SC1923

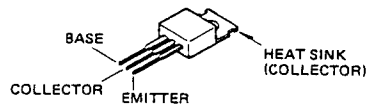


2SC2785JF



2SC3355

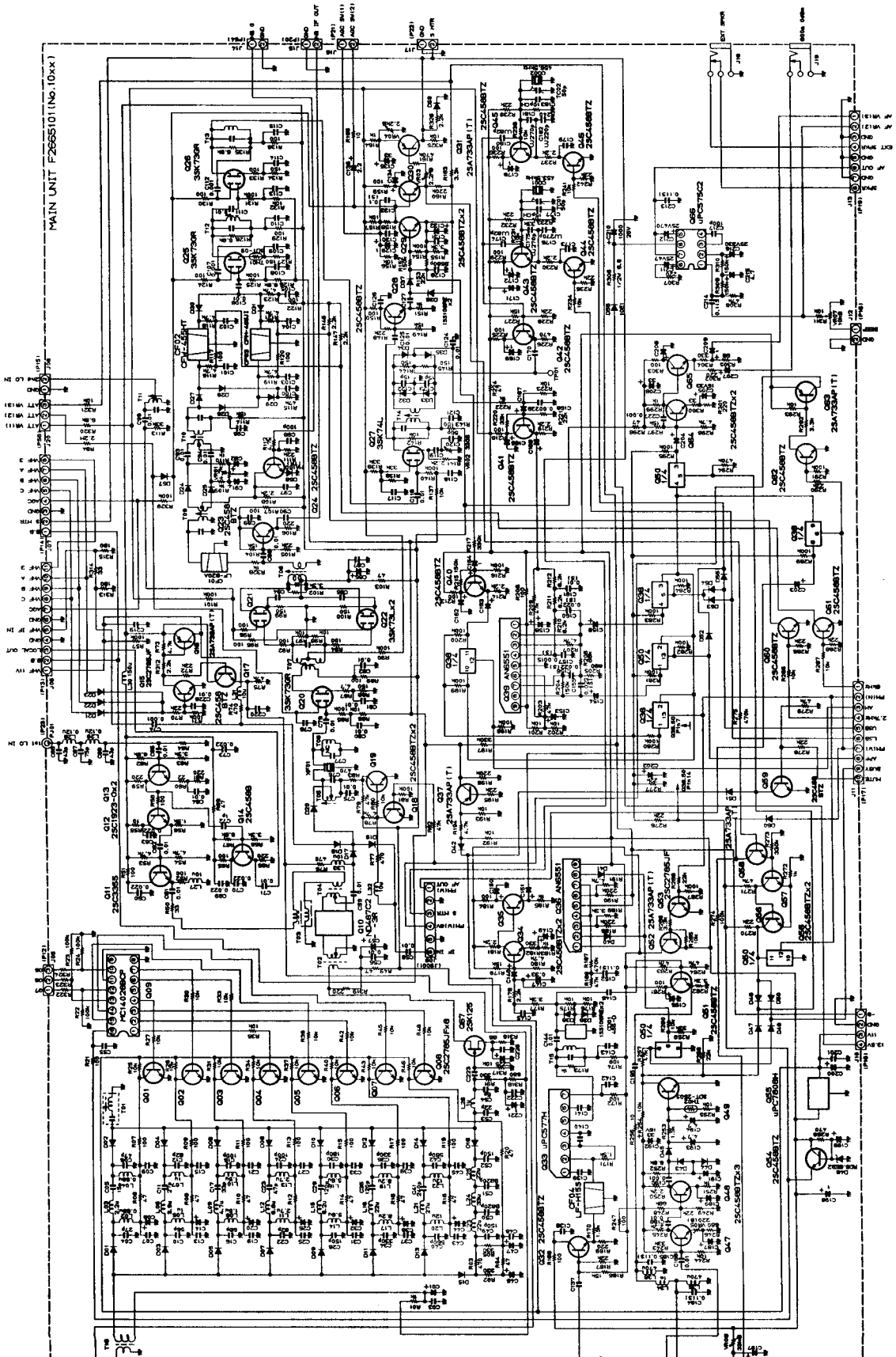
(MAIN CHASSIS)



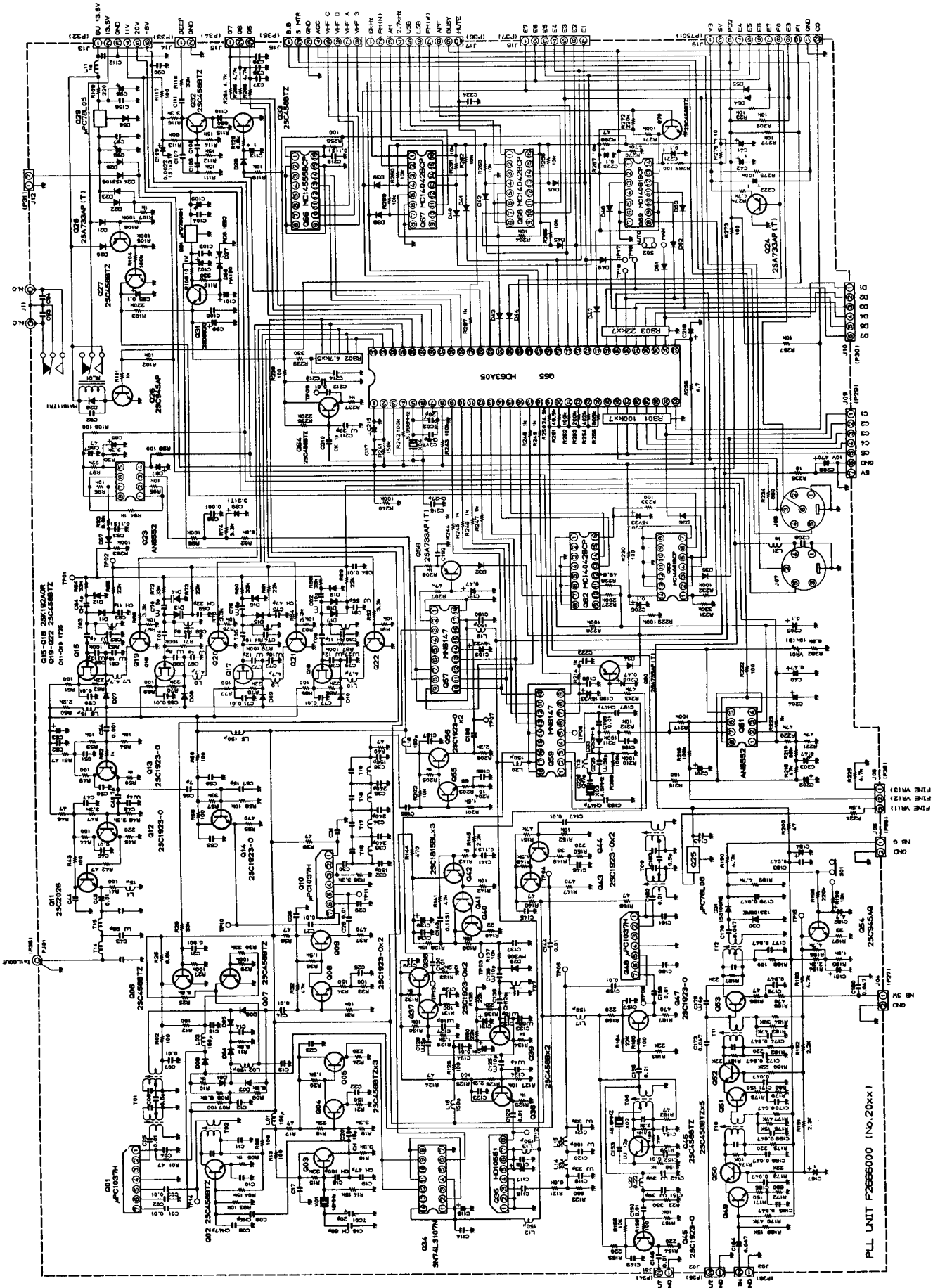
2SD8800

(Viewed from solder side)

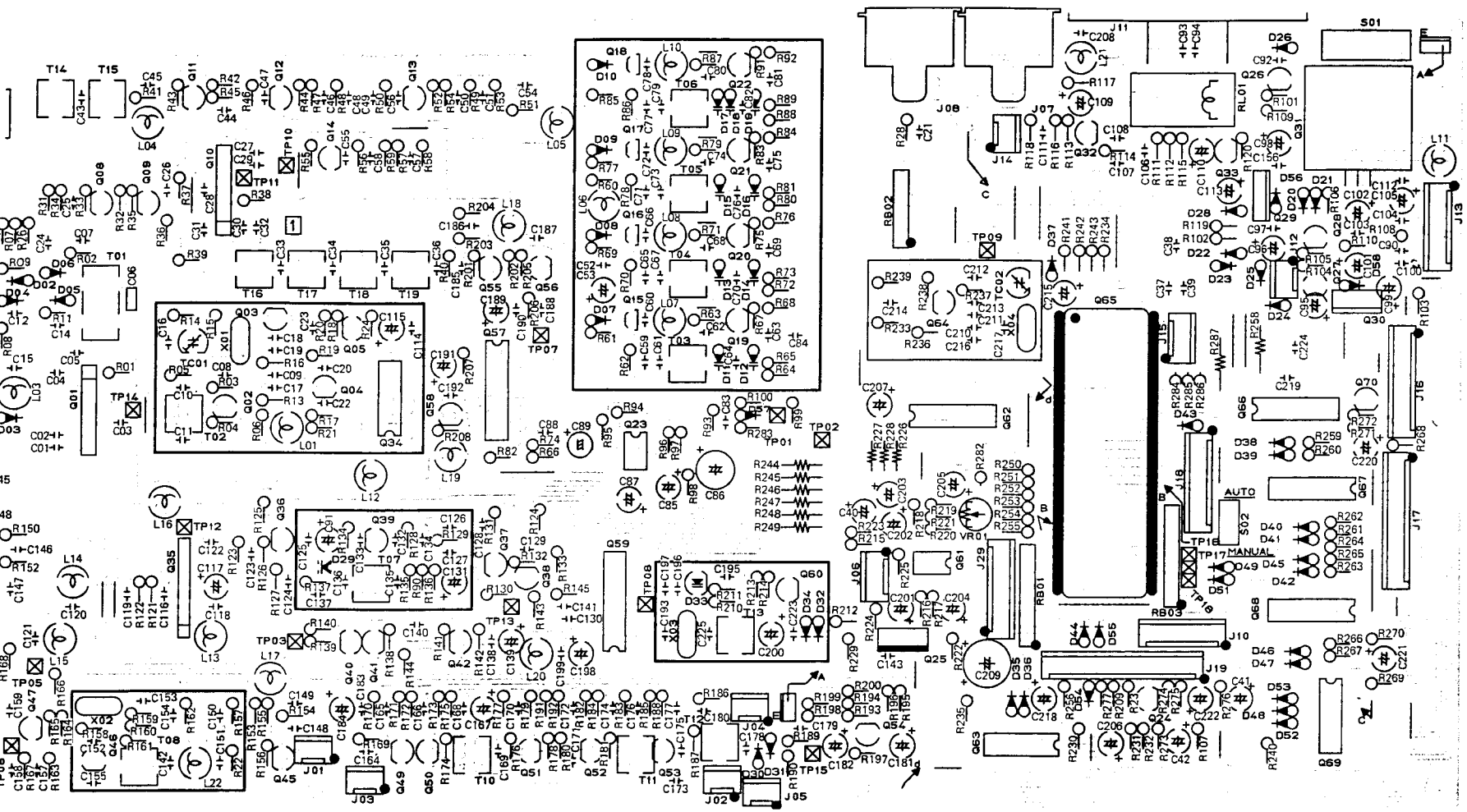
MAIN UNIT CIRCUIT DIAGRAM



PLL UNIT CIRCUIT DIAGRAM



PLL UNIT PARTS LAYOUT



(Viewed from component side)

VOLTAGE CHART

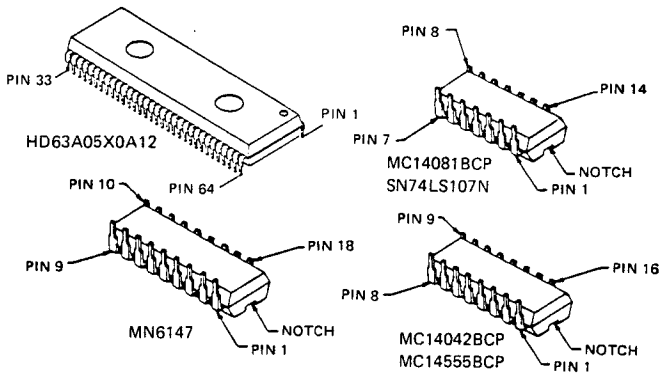
(DC VOLTS)

Q	E(S)	C(D)	B(G)	REMARKS
2	7.5	2.9		
7	7.6	3		
3	2.2	0.8		
2	7.1	2.8		
	3.8	0		
	0.7	0		
4	4.7	1.1		
	7.3	4.7		
5	4.9	2.3		
3	5.3	3		
9	7.2	3.6		
9	7.3	1.6		

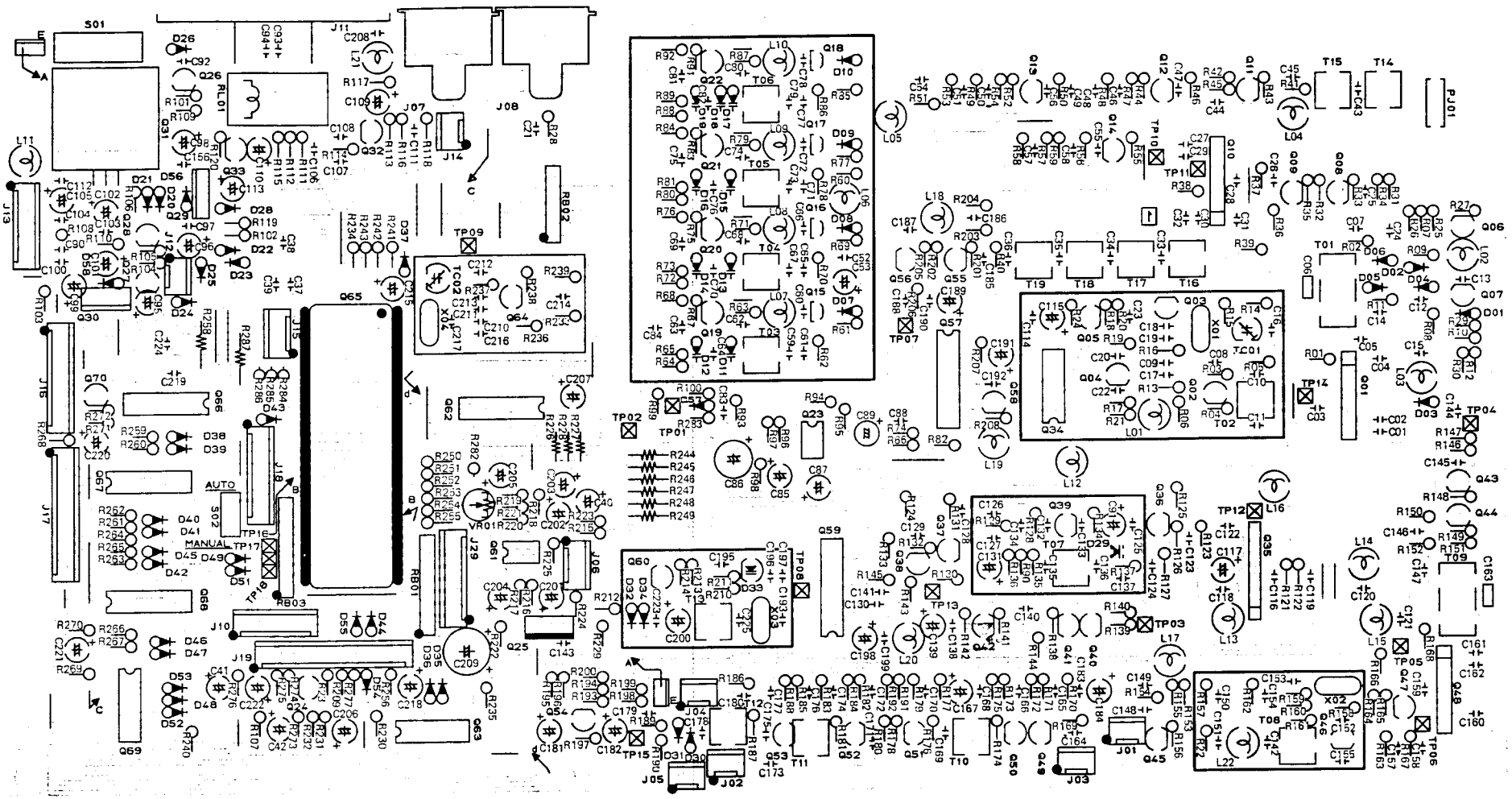
Q	E(S)	C(D)	B(G)	REMARKS
2015	6.7	7.7	3	22MHz
2016	6.7	7.7	3	14MHz
2017	7.2	0	0	6MHz
2018	7.7	6.7	3	150kHz
2019	0	6.7	0	10MHz
2020	0	6.7	0	10MHz
2021	0	0	0.7	10MHz
2022	0	6.7	0	10MHz
2024	0.6	0	0	
2026	0	14.6	0	
2027	0	3.5	0	
2028	14.2	0	14.2	
2030	5.1	6.4	5.7	

Q	E(S)	C(D)	B(G)	REMARKS
2032	1.1	4.9	1.7	
2033	0	0	0	
2036	1.5	7.5	2.2	
2037	0.2	5	0.9	
2038	3.8	7.5	4.5	
2039	2.5	7.4	2.9	
2040	0	5.5	0.5	
2041	0.5	5.5	0.9	
2042	0.9	7.7	1.5	
2043	4	7.3	4.8	
2044	0.4	4.8	1.1	
2045	1.8	5.6	2.6	
2046	1.7	7.7	2.3	

Q	E(S)	C(D)	B(G)	REMARKS
2047	2.2	6.7	2.9	
2049	1.7	2.3	2.3	
2050	2.3	9.8	2.8	
2051	1.7	2.4	2.3	
2052	2.4	9.8	2.9	
2053	1.5	10.2	1.9	NB OFF
2054	0	3.6	0	
2055	0.2	4.4	0.9	
2056	4.2	7.8	4.4	
2058	5	0	4.5	
2060	5	0	5	
2064	1.8	4.9	2.1	
2070	0	0	0.6	



PLL UNIT PARTS LAYOUT

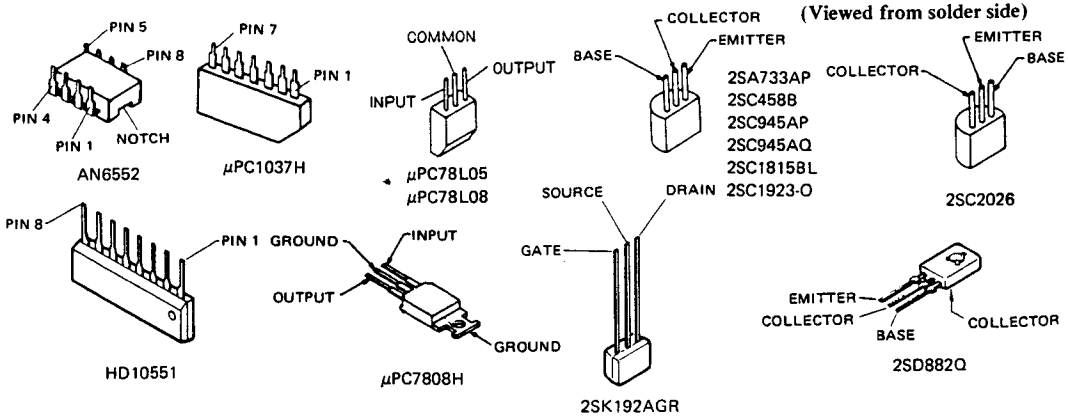


VOLTAGE CHART

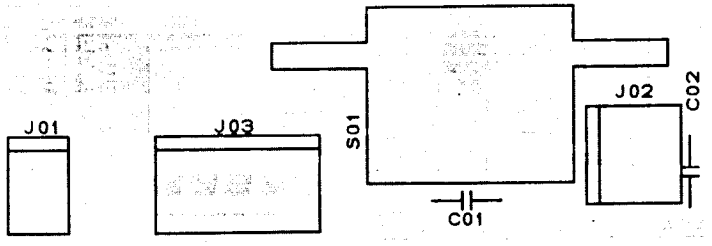
(DC VOLTS)

Q	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	REMARKS
2001	7	6.1	5.6	0	3.1	3.1	3.1												
2010	7	6.1	5.4	0	3.1	3.1	3.1												
2023	2.3	2.3	2.3	−7.8	2.5	2.5	4.5	19.5											
2025	IN 10.4	OUT 8	GND 0																
2029	IN 10.8	OUT 5.8	GND 0.8																
2031	IN 10.4	OUT 8	GND 0																
2034	5	2	2	5	1.5	1.5	0	2	2.8	1.3	2	2.8	1.3	5					
2035	0	0	2.1	0	4.7	4.7	4.7	3.6											
2048	7	6.1	5.6	0	3.1	3.1	3.1												
2057	0	4.9	1.6	2.2	2.5	2.5	4.9	2.3	0	0	0	0	0	5	0.5	1.5	5	0	
2059	0	5	1.2	1.8	2.4	2.4	5	1.5	0	0	0	0	0	5	0.5	1.5	5	5	
2061	10.2	2.9	2.7	−7.8	0	0	−4.9	19.5											
2062	0	0	5	0	4.9	0	0	0	5	0	5	0	4.9	0	5	5			
2063	3.3	2.7	2.7	2.7	2.7	3.5	0	0	0	0	0	0	0	5					
2066	4.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4.9			
2067	4.7	0	0	1.1	4.9	0	1.9	0	4.9	0	0	4.9	1.4	1.9	4.9	4.9			
2068	0	0	0	3	4.9	0	0.7	0	5	0	0	5	0.7	0.7	5	5			
2069	3.8	0.7	0	0	0	0	0	0	0.7	0	0	0.7	0	5					

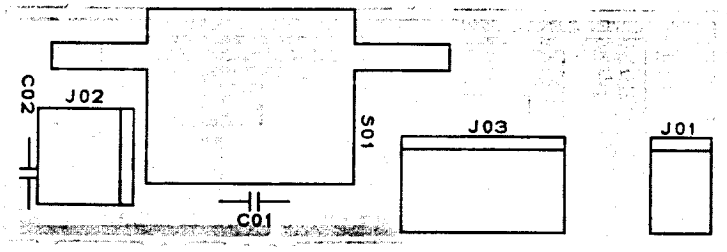
(Viewed from solder side)



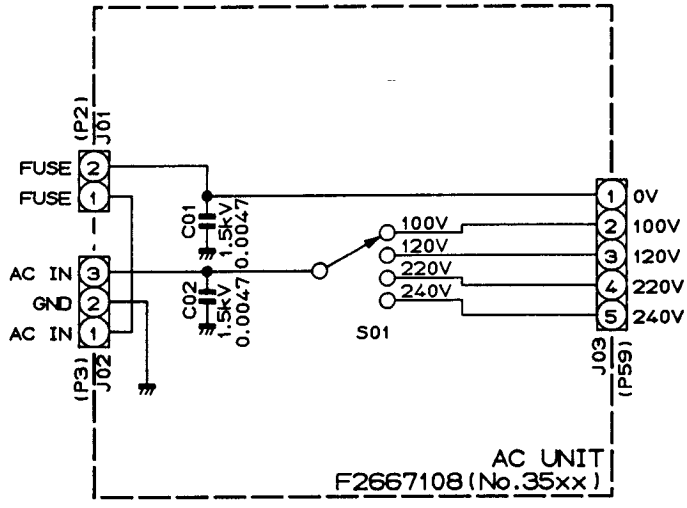
AC UNIT PARTS LAYOUT



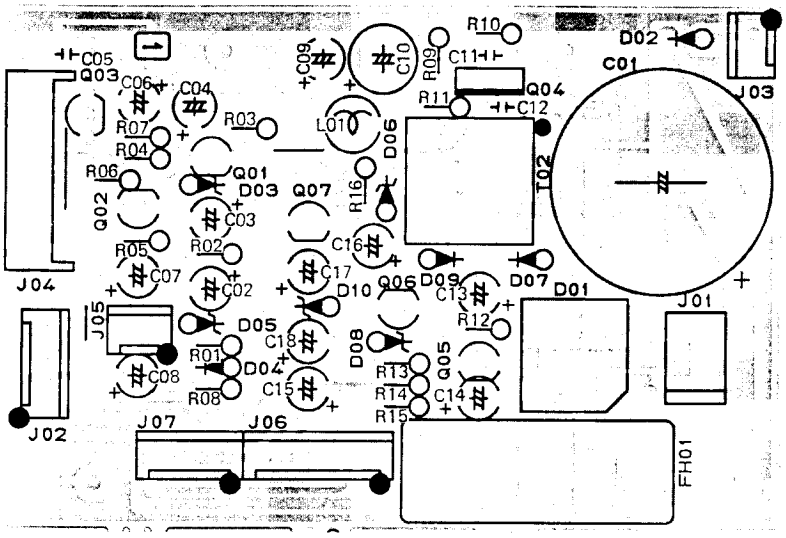
(Viewed from component side)



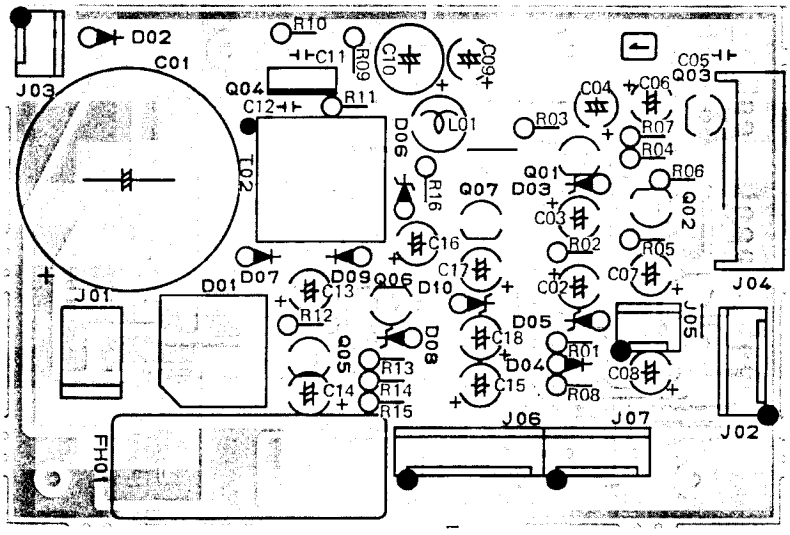
(Viewed from solder side)



REG UNIT PARTS LAYOUT



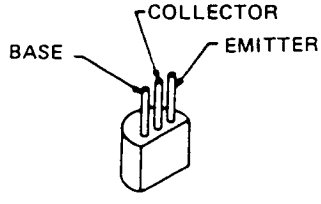
(Viewed from component side)



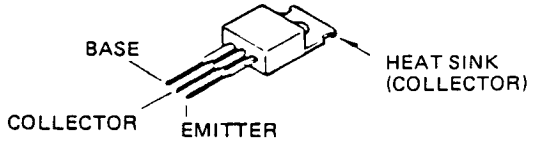
(Viewed from solder side)

VOLTAGE CHART (DC VOLTS)

	E	C	B
3001	3.6	15	4.3
3002	3.6	12	4.3
3003	11.3	15.4	12
3004	0	15	−1.2
3005	19.6	26	20.3
3006	17.2	20.4	18.7
3007	−8	−10.6	−8.6

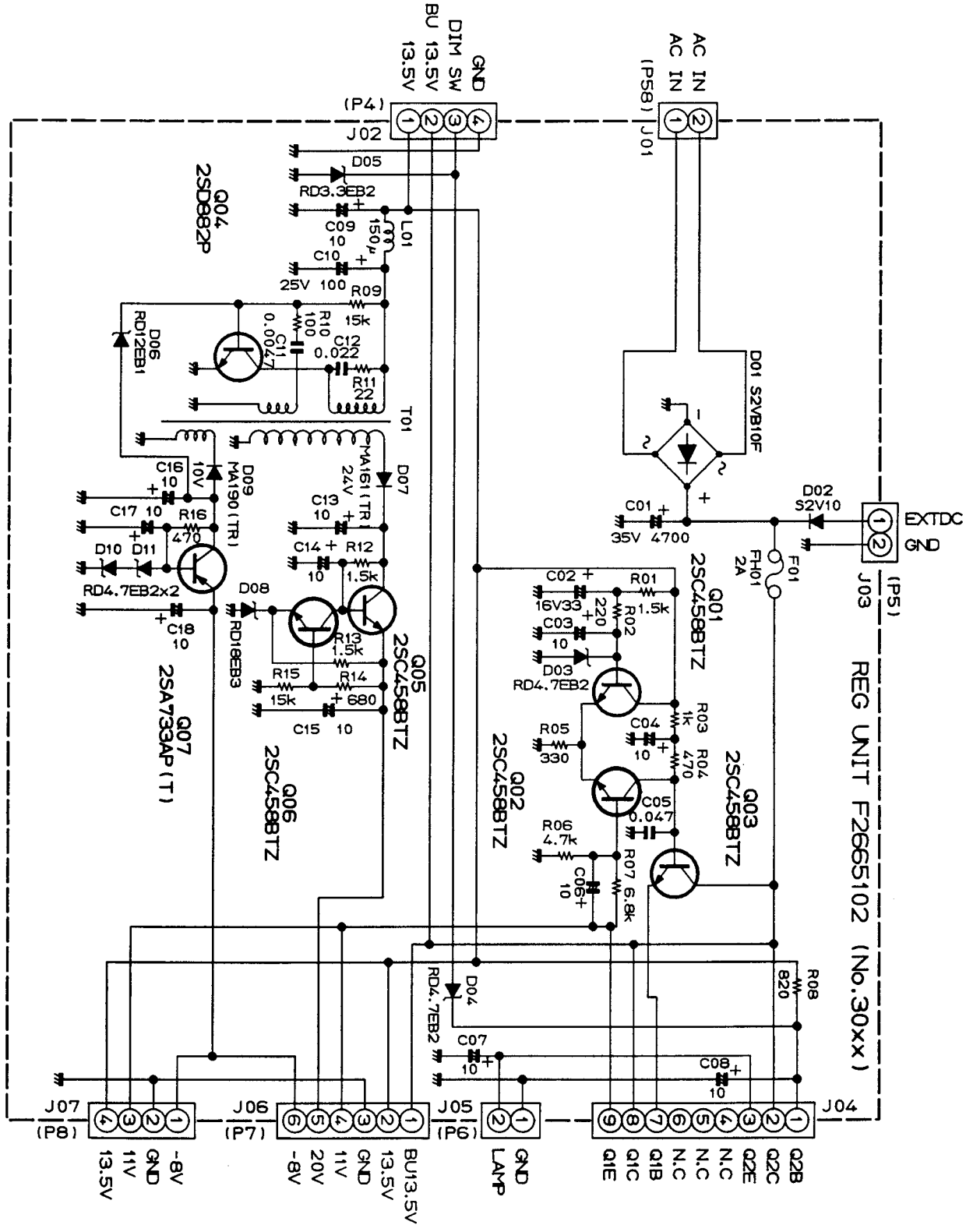


2SA733AP
2SC458BTZ

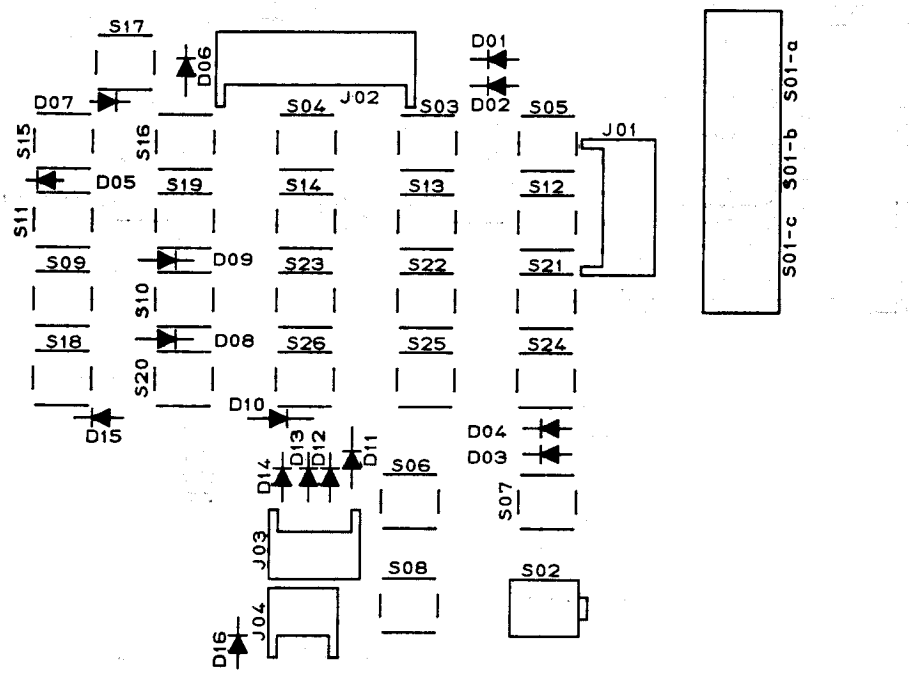


2SD882P

REG UNIT CIRCUIT DIAGRAM



KEY SWITCH UNIT PARTS LAYOUT



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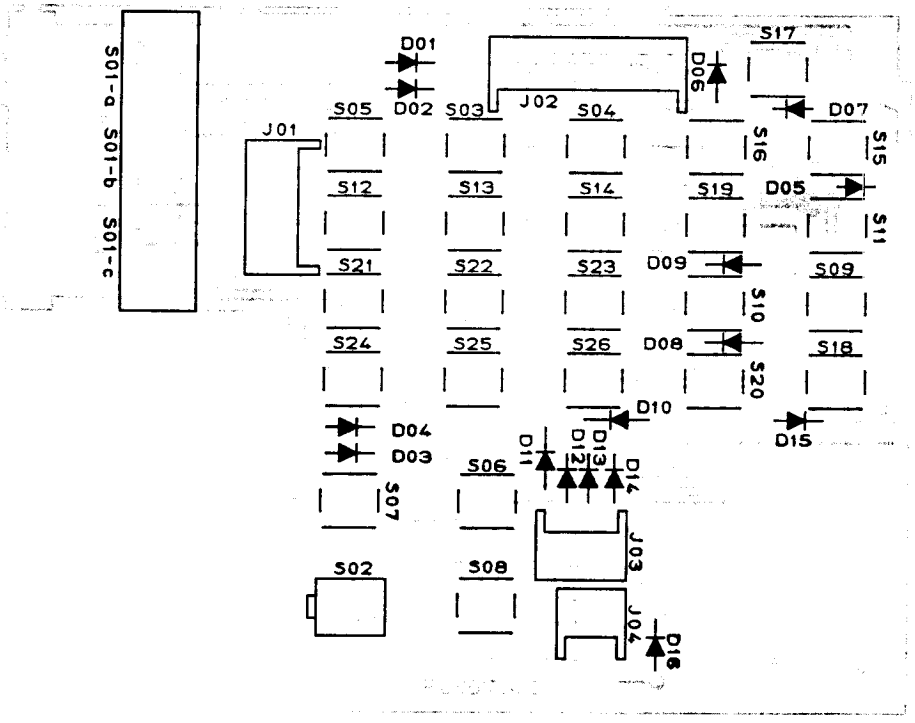
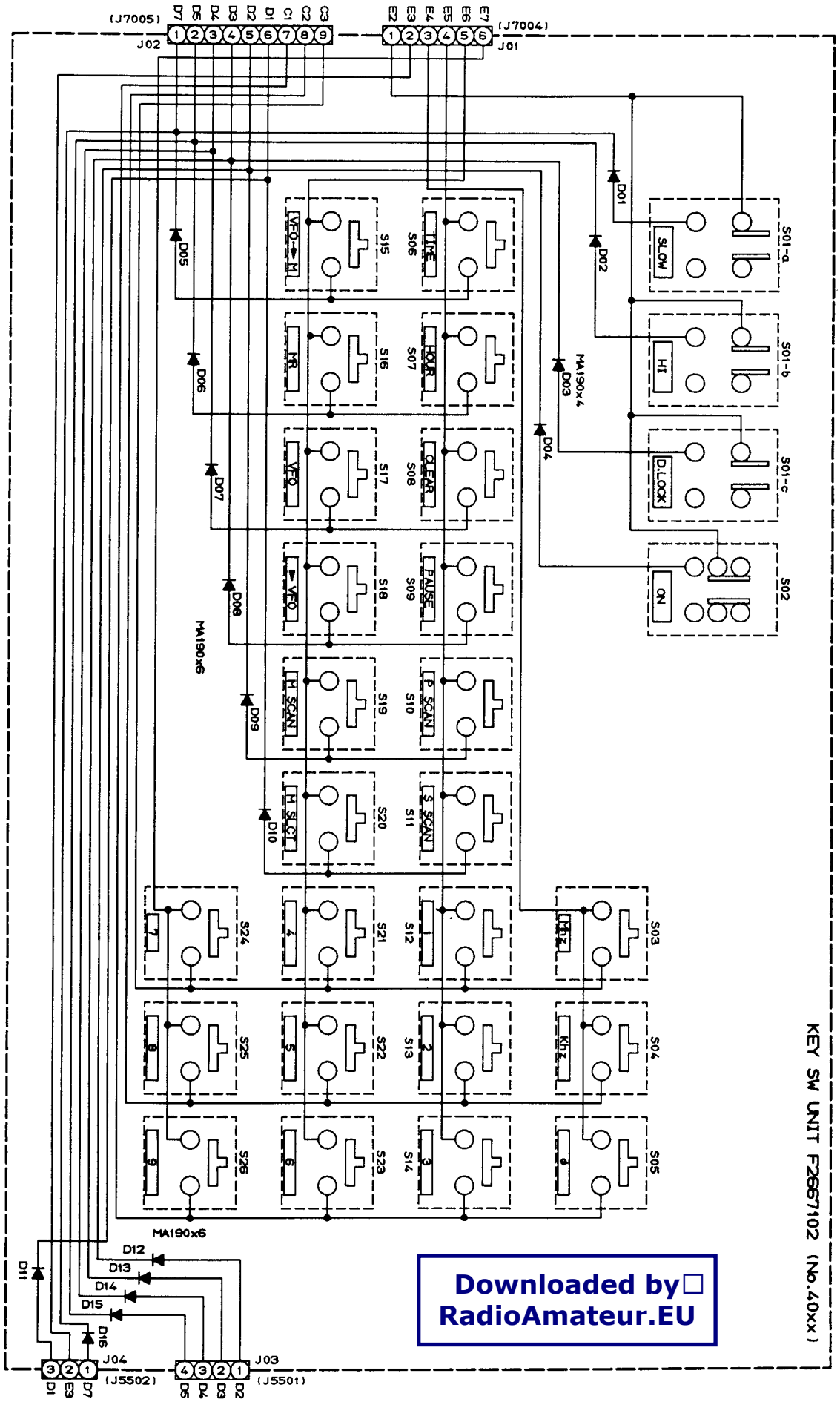
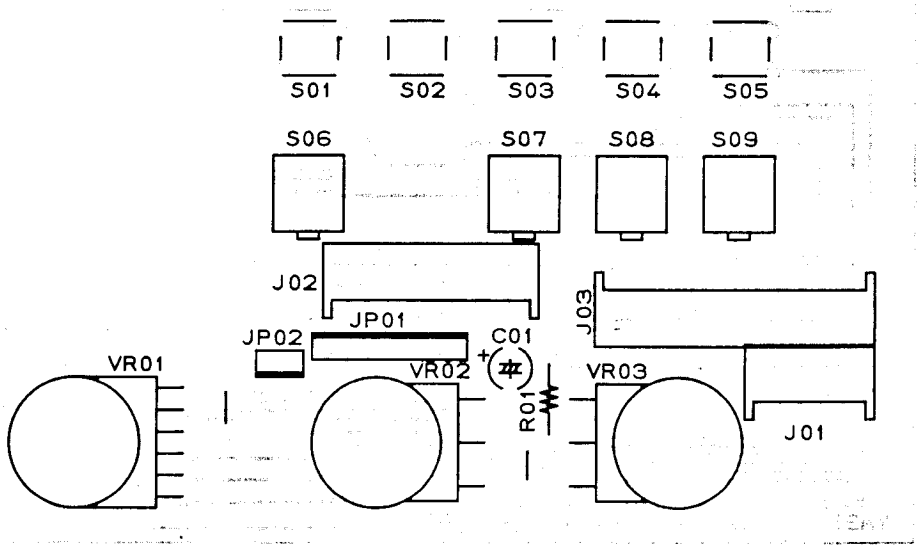


(Viewed from solder side)

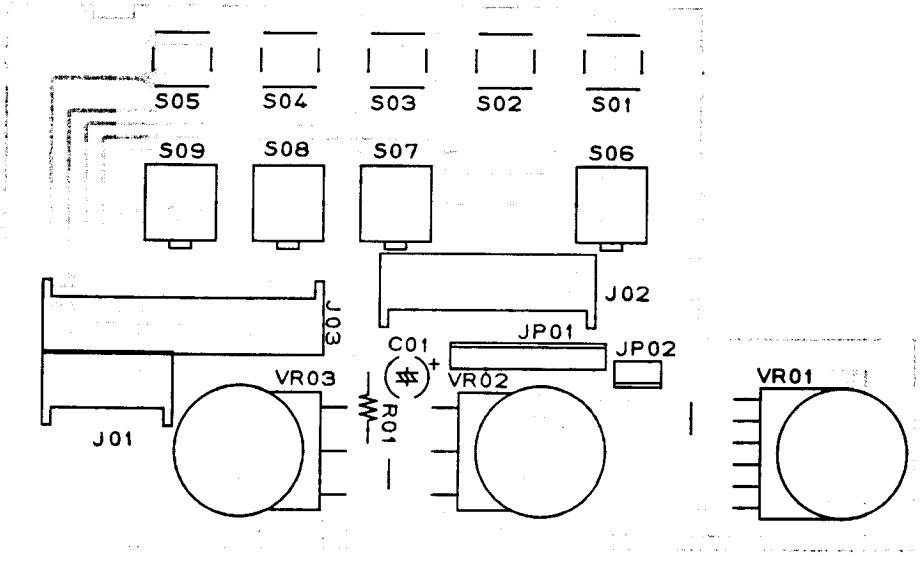
KEY SW UNIT CIRCUIT DIAGRAM



PUSH SWITCH UNIT PARTS LAYOUT

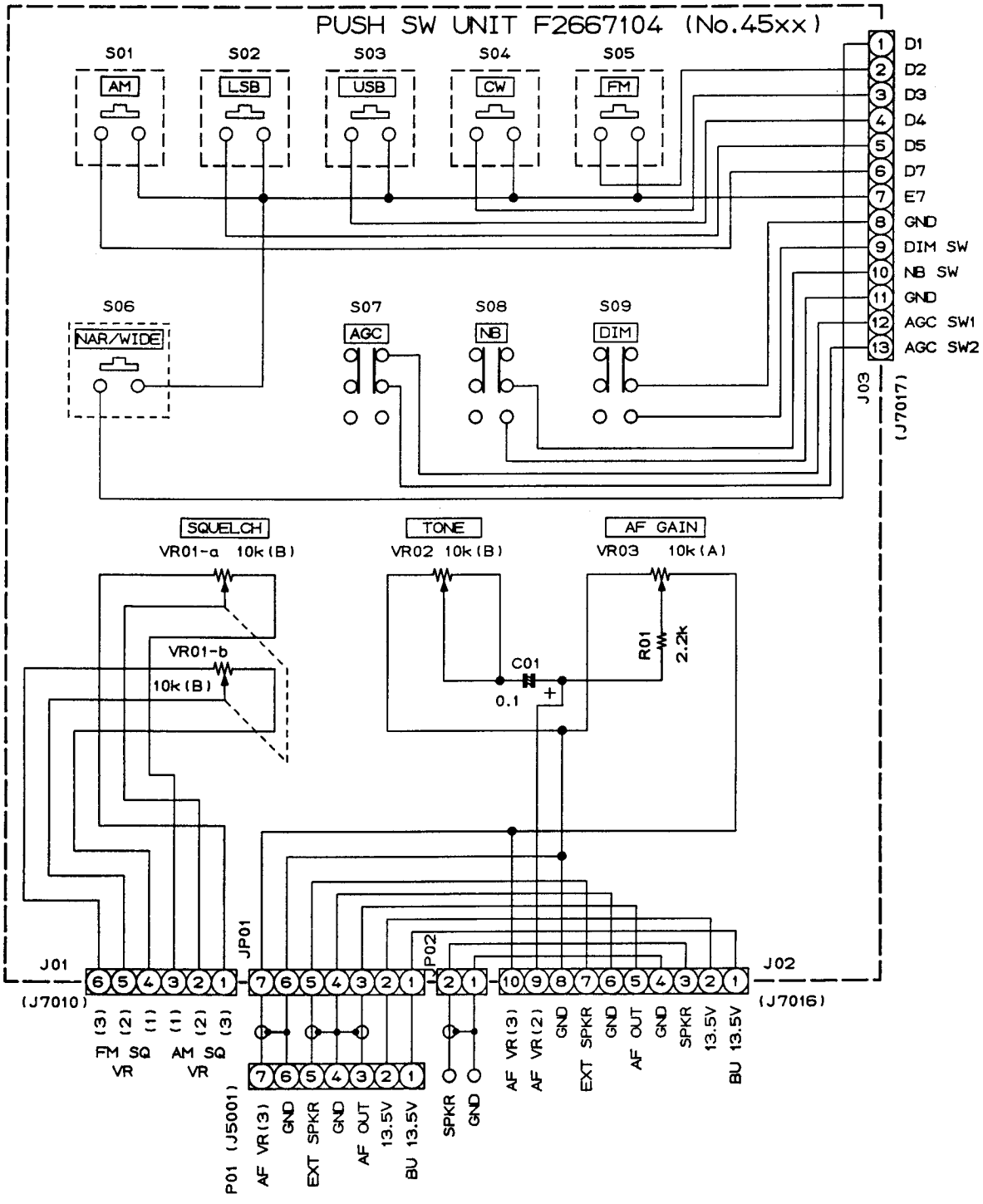


(Viewed from component side)

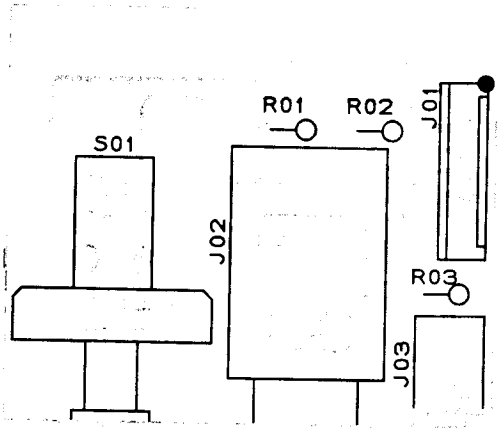


(Viewed from solder side)

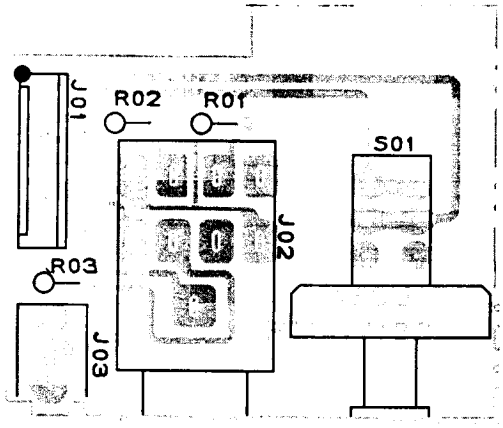
PUSH SW UNIT CIRCUIT DIAGRAM



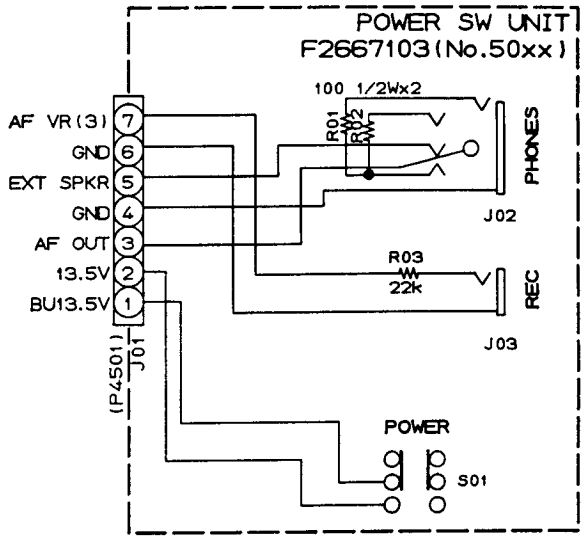
POWER SWITCH UNIT PARTS LAYOUT



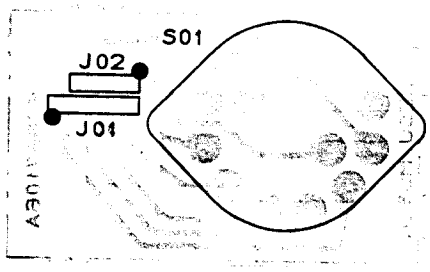
(Viewed from component side)



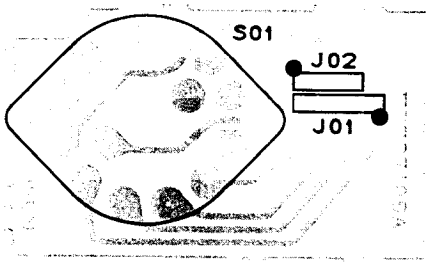
(Viewed from solder side)



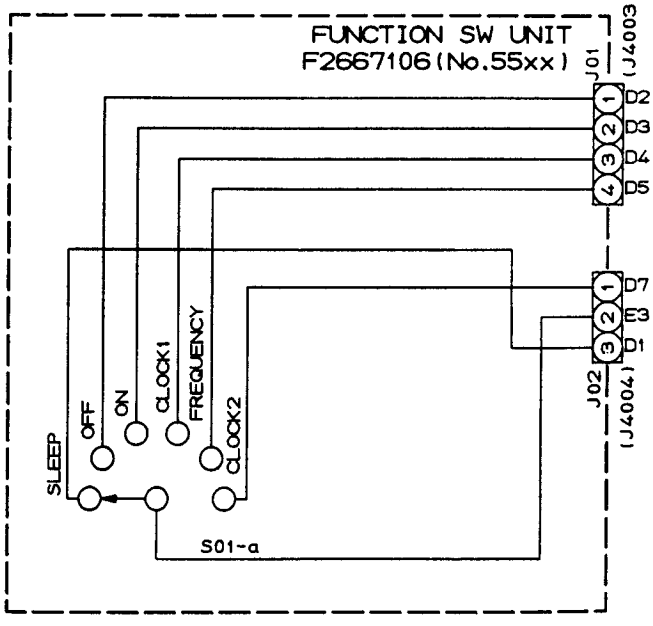
FUNCTION SWITCH UNIT PARTS LAYOUT



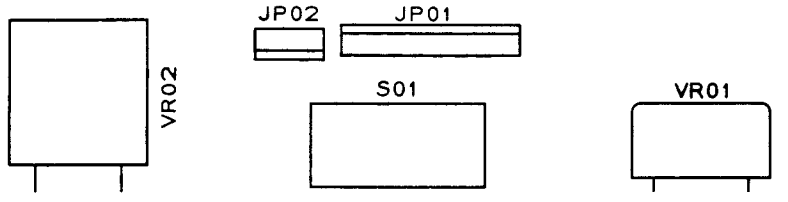
(Viewed from component side)



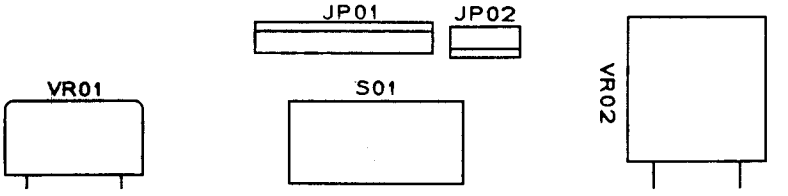
(Viewed from solder side)



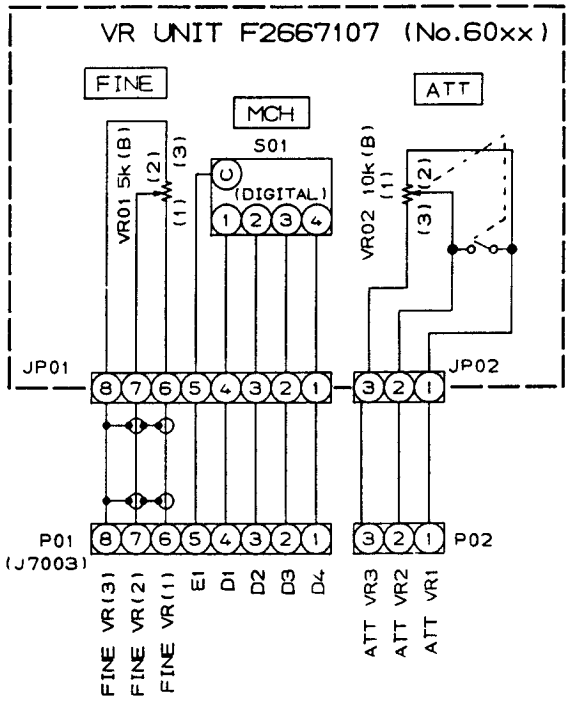
VR UNIT PARTS LAYOUT



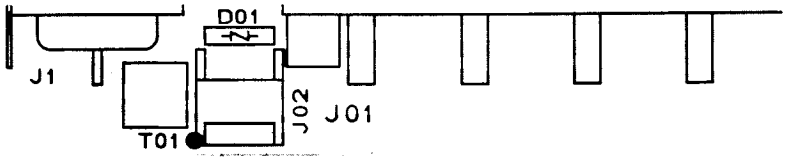
(Viewed from component side)



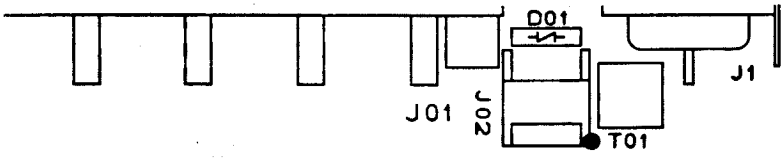
(Viewed from solder side)



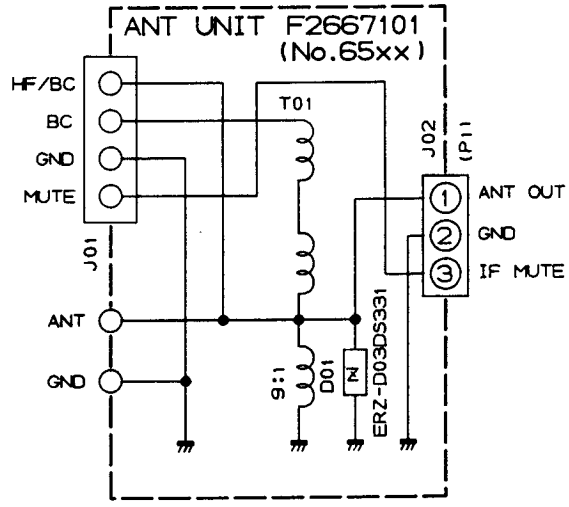
ANT UNIT PARTS LAYOUT



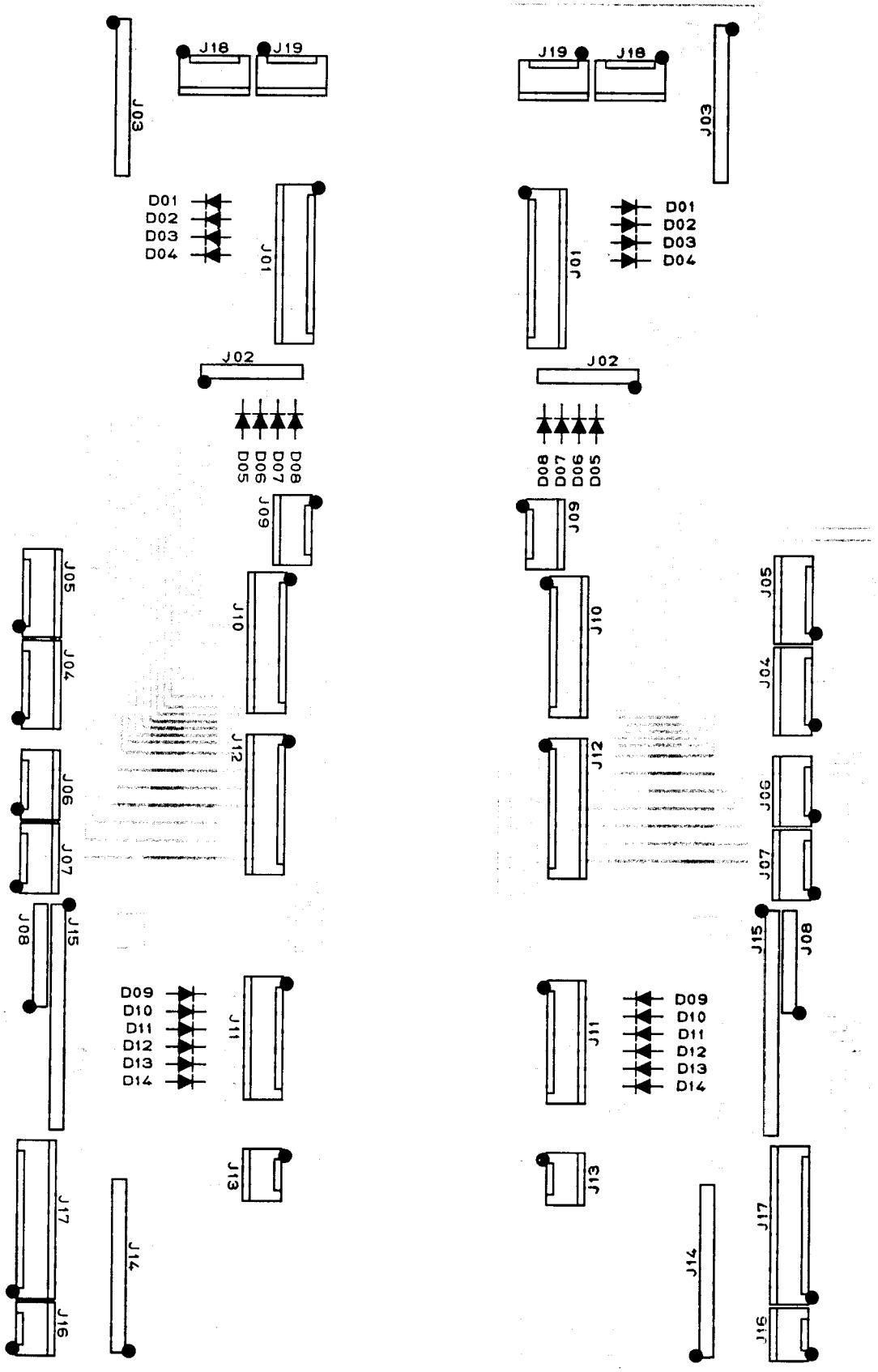
(Viewed from component side)



(Viewed from solder side)



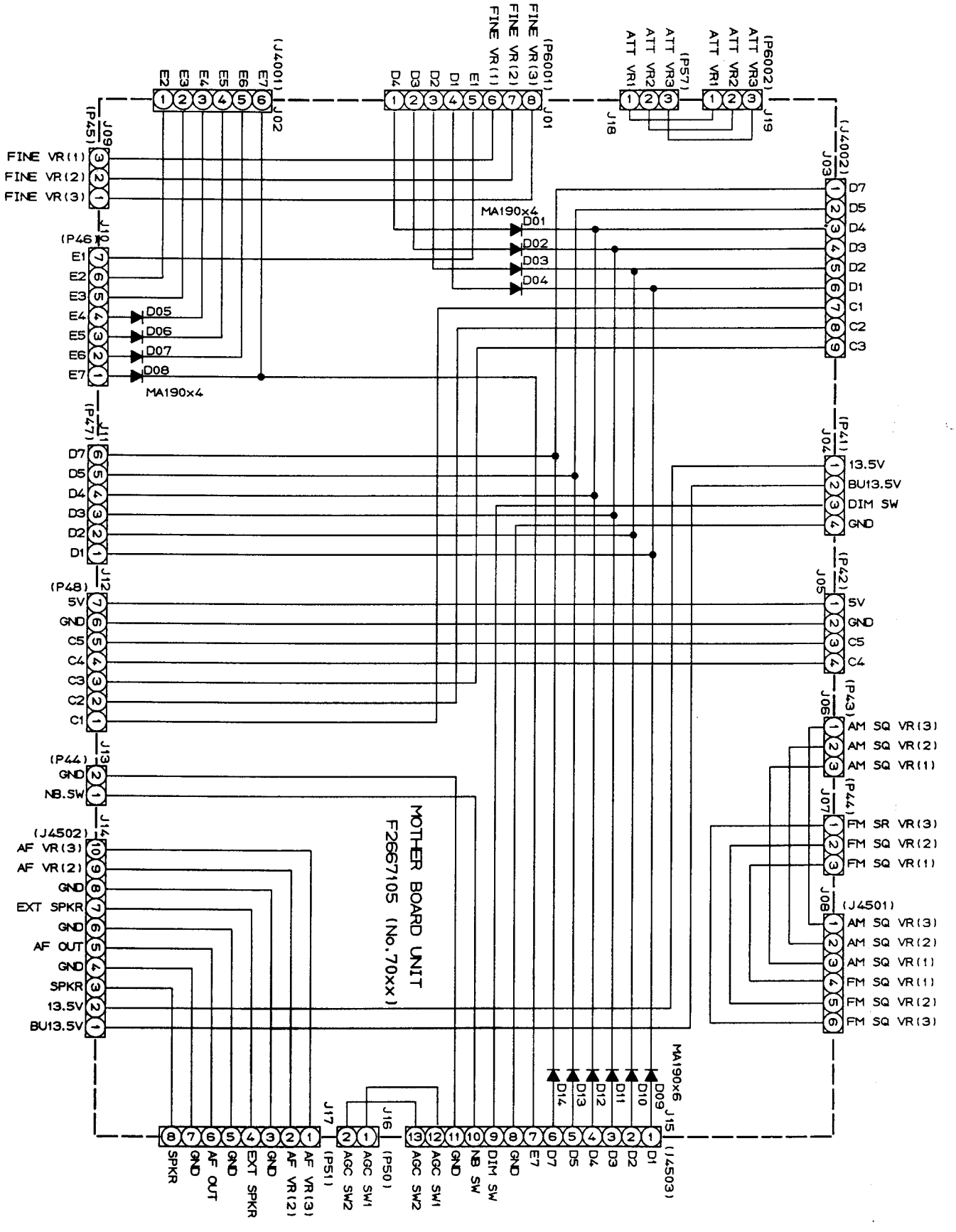
MOTHER BOARD UNIT PARTS LAYOUT



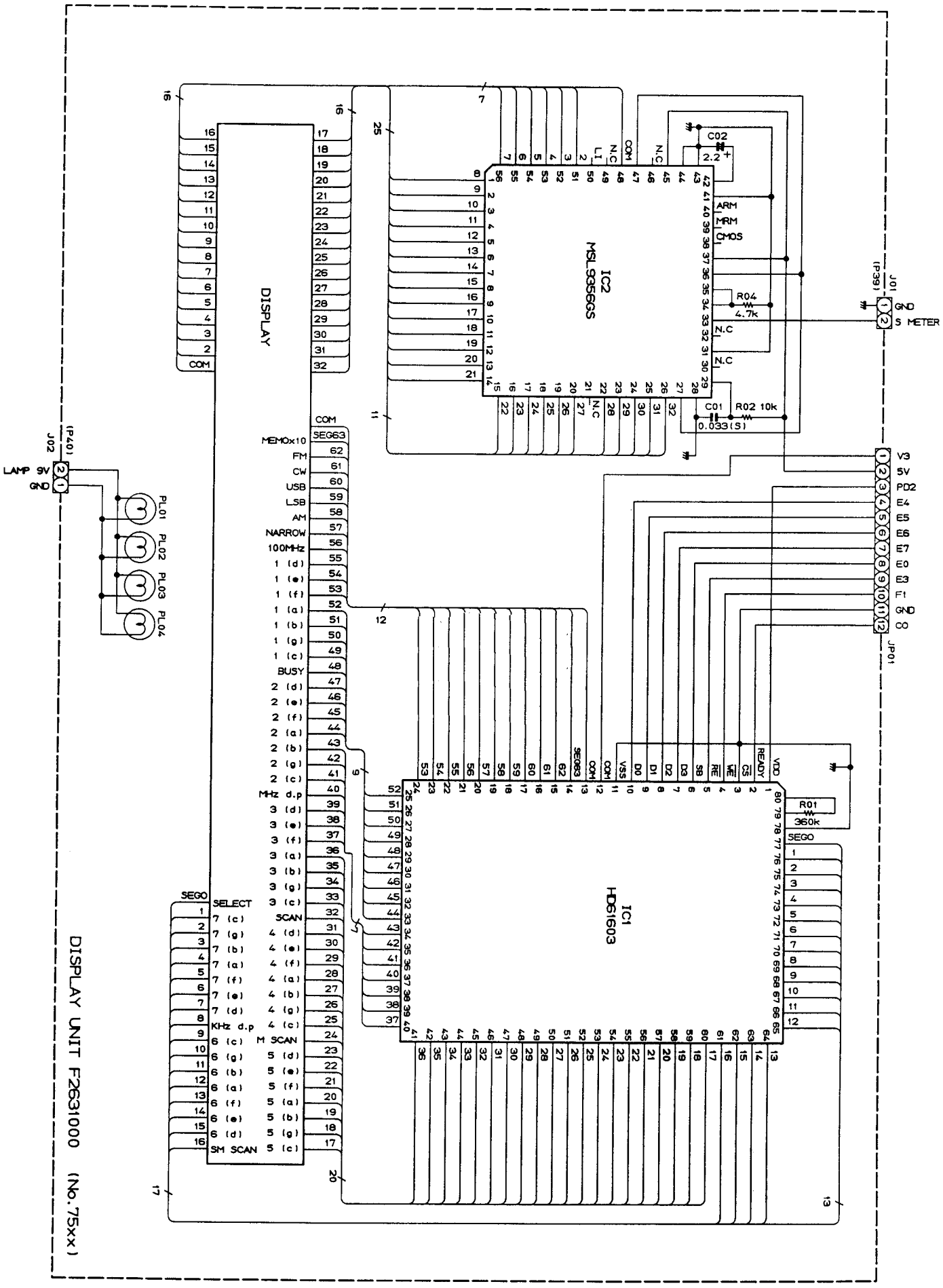
(Viewed from component side)

(Viewed from solder side)

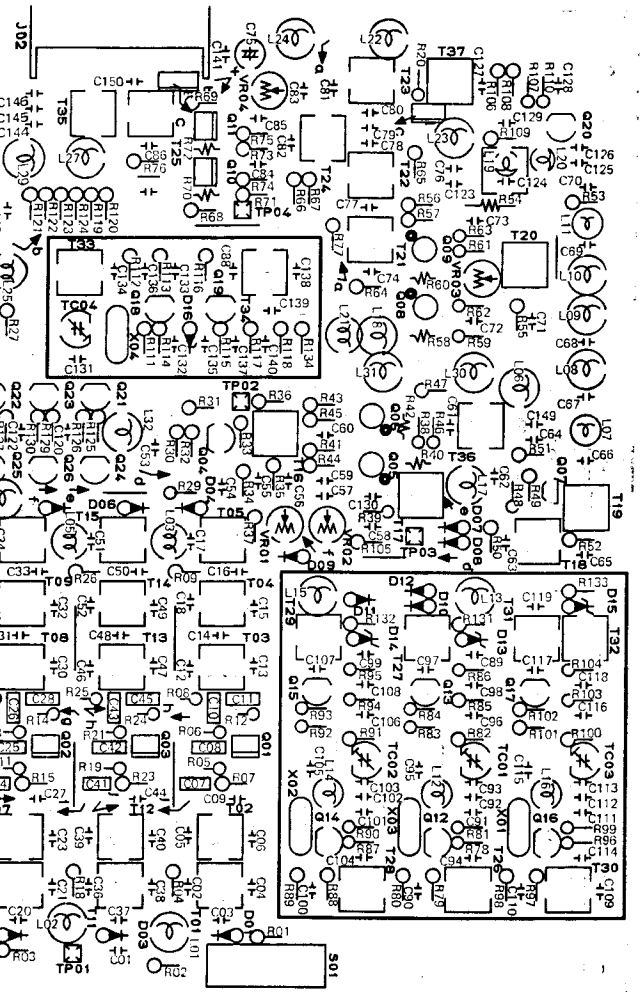
MOTHER BOARD UNIT CIRCUIT DIAGRAM



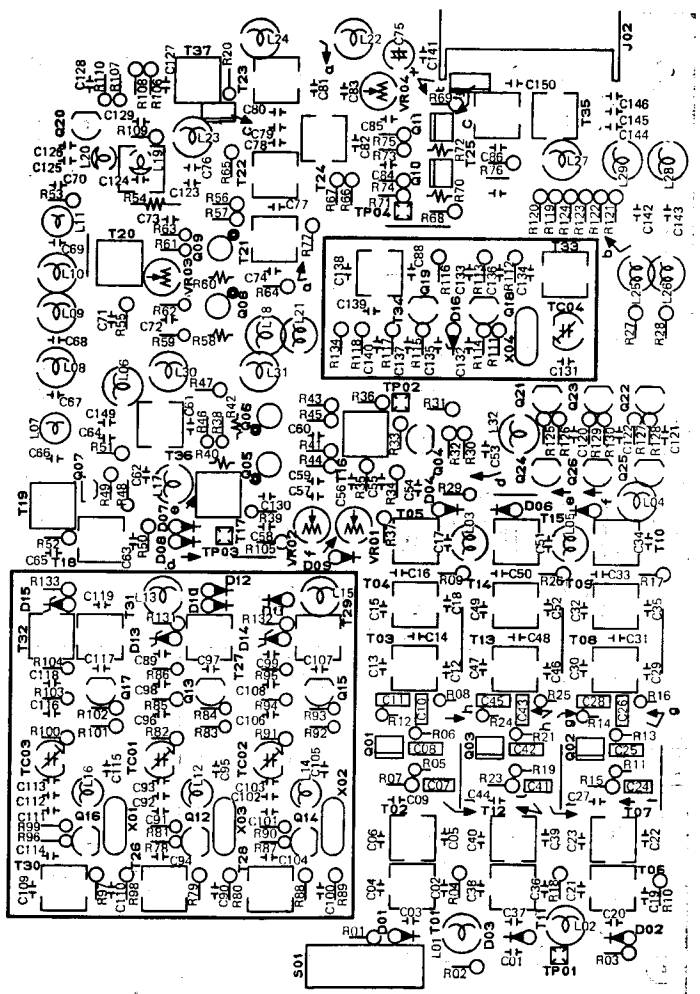
DISPLAY UNIT CIRCUIT DIAGRAM



FRV-8800 VHF CONVERTER
PARTS LAYOUT



(Viewed from component side)

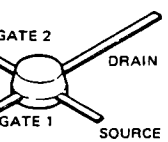


(Viewed from solder side)

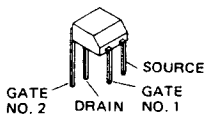
VOLTAGE CHART (DC VOLTS)

	E(S)	C(D)	B(G1)	(G2)	REMARKS
Q8001	2.3	8.4	2.0		A
Q8002	2.3	8.4	2.0		B
Q8003	2.3	8.4	2.0		C
Q8004	4.9	8.4	5.6	–	
Q8005	1.5	9.0	0.95	1.5	
Q8006	1.5	9.0	0.95	1.5	
Q8007	3.5	8.8	4.2	–	
Q8008	1.5	8.9	1.9	1.5	
Q8009	1.6	8.9	1.9	1.6	
Q8010	1.8	9.0	1.5	2.2	
Q8011	1.8	9.0	1.6	2.2	
Q8012	1.9	7.5	2.6	–	A
Q8013	1.7	6.8	2.4	–	A
Q8014	1.9	7.5	2.6	–	B
Q8015	1.7	6.8	2.4	–	B
Q8016	1.9	7.5	2.6	–	C
Q8017	1.7	6.8	2.4	–	C
Q8018	1.4	8.0	2.0	–	
Q8019	1.8	7.5	2.5	–	
Q8020	1.5	5.5	2.2	–	
Q8021	0 (0)	0 (9.5)	0.7 (0)	–	B (A, C)
Q8022	0 (0)	0 (9.5)	0.7 (0)	–	A (B, C)
Q8023	0 (0)	0 (9.5)	0.7 (0)	–	C (A, B)
Q8024	8.8 (9.3)	9.4 (0)	9.7	–	B (A, C)
Q8025	8.8 (9.3)	9.4 (0)	9.7	–	A (B, C)
Q8026	8.8 (9.3)	9.4 (0)	9.7	–	C (A, B)

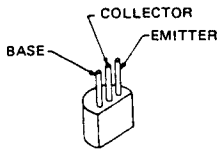
A 118 – 135.999.9 MHz
B 136 – 154.999.9 MHz
C 155 – 173.999.9 MHz



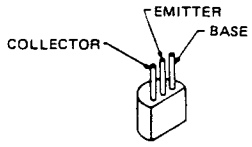
3SK74L



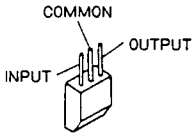
3SK73GR



2SA733AP
2SC458B
2SC535B
2SC1923-O

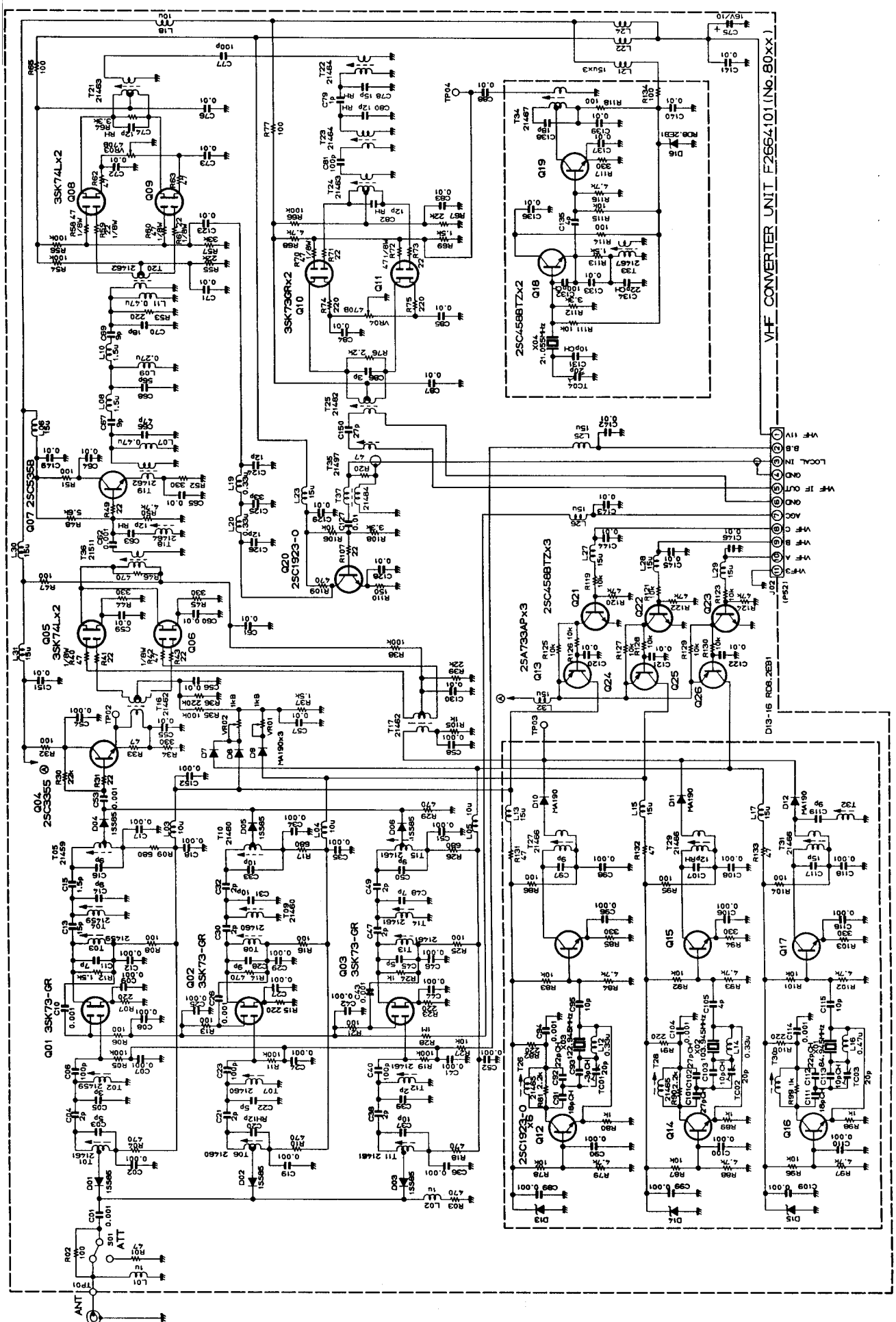


2SC3355



μPC78L08

FRV-8800 VHF CONVERTER CIRCUIT DIAGRAM



The high reliability of the components and robot assembly used for the FRG-8800 make it unlikely that repair or realignment will be required after it has left the factory. However, if damage does occur and some parts subsequently be replaced, realignment may be required afterwards. In the event of a sudden problem during normal operation, do not attempt realignment. Such problems are usually caused by the failure of a component, which must located and replaced before realignment is attempted.

Because of the complex digital control circuitry in this receiver we recommend that servicing be attempted only by authorized Yaesu service technicians who are experienced with the circuitry and fully equipped for repair and alignment. Therefore, if a fault is suspected, contact the dealer from whom the receiver was purchased for instructions regarding repair. Authorized Yaesu service technicians make all realignments and complete performance checks to ensure compliance with factory specifications after replacing any faulty components.

Those who do undertake any of the following alignments are cautioned to proceed at their own risk. Yaesu must reserve the right to change circuits and alignment procedures in the interest of improved performance, without notifying owners.

Under no circumstances should any alignment be attempted unless the normal function and operation of the receiver are clearly understood, the cause of the malfunction clearly pinpointed and any faulty components replaced, and the need for realignment determined to be absolutely necessary.

The following test equipment (and thorough familiarity with its correct use) is necessary for complete realignment. Correction of problems caused by misalignment resulting from use of improper test equipment is not covered under the warranty policy.

Alignment Equipment

Volt-Ohm-Ammeter (50-kilohm/V DC, 10-kilohm/V AC impedance)

AF millivoltmeter

RF standard signal generator (SSG)
0.1 to 174 MHz, with calibrated level and modulation (see note below)

RF voltmeter (VTVM or equiv.)

SINAD meter (SINADDER)

Frequency counter (0.02 ppm, 6-digit)

Oscilloscope (for sweep generator & signal tracing)

Linear Detector

VHF sweep generator

Spectrum analyzer (HP-141T or equiv.)

Note : SSG levels referred to in the alignment procedure are based on 0dBu=0.5uV at 50 ohms.

Alignment Precautions

Correct alignment requires that the ambient temperature be the same as that of the receiver and test equipment, and that this temperature be held constant between 20° and 30 °C (68° to 86 °F). When the receiver is brought into the shop it should be allowed at least 2 hours for thermal equalization before alignment.

Alignments must not be made unless the oscillator shields and circuit boards are firmly affixed in place. Also, the frequency counter must be thoroughly warmed up before beginning. Perform the steps in the order given - Part 1 and then Part 2, which covers some of the same circuits as Part 1.

I. PLL Unit, Part 1

All of the following adjustments on the PLL Unit should be performed, since they are interactive. Turn the receiver on and allow it to warm up for 30 minutes. Press the SLOW button next to the tuning knob, and set the M CH selector to channel 1. Set the FINE control to the 12 o'clock position.

A. 2nd Local Oscillator, Course Adjust

Connect the RF voltmeter to test pin TP2006 and adjust T2008 for maximum RF voltage on the meter (130±70 mVrms).

B. 2nd Loop, Reference Osc Frequency

(1) Tune the receiver to 10.000.0 MHz, connect the frequency counter to TP2008 and adjust T2013 for 562.500 kHz ±10 Hz on the counter. Set the M CH selector to ch 1, and press the VFO–M key.

(2) Using the keypad, enter 2, 9, [MHz], 9, 9, 9 and [kHz]. Then turn the main knob clockwise so that the display shows 29.999.9, and adjust VR2001 for 562.379 kHz ±10 Hz on the counter. Set the M CH selector to 2, and press VFO–M.

C. 2nd Loop, VCV

(1) Connect the DC voltmeter (10V range) between TP2003 and ground. Recall ch1 (10 MHz) and adjust T2007 for 5.0V on the meter.

(2) Recall ch2 and check for 2.0 to 3.2V on the meter.

D. 2nd Loop Oscillator Frequency

(1) Connect the frequency counter to TP2005 and recall ch1 (10 MHz). Adjust T2013 for 4.545 MHz ±10Hz on the counter.

(2) Recall ch2 and adjust VR2001 for 4.520025 MHz ±10 Hz on the counter.

(3) Connect the RF voltmeter to TP2013 and check for 500 ±100 mVrms. Also check for 85 ±15 mVrms at TP2012.

E. 2nd Loop Bandpass Filter

Connect the RF voltmeter to TP2004, recall ch1, and adjust T2009 for 85 ±25 mVrms on the meter.

F. 2nd Local Oscillator Frequency

Connect the frequency counter to TP2004 and with ch1 recalled, adjust T2008 for 42.055 MHz ±100 Hz.

Check that the voltage at TP2006 is within ±3 dB of the level set in part "A" above.

G. 1st Loop Reference Oscillator

(1) Connect the RF voltmeter to TP2014 and adjust the core of T2002 for peak RF on the meter (95 ±25 mVrms).

(2) Connect the frequency counter to TP2014 and adjust TC2001 for 18.0000 MHz ±20 Hz.

(3) Connect the RF voltmeter to pin 9 of Q2034 and check for 1.6 ±0.2 Vrms.

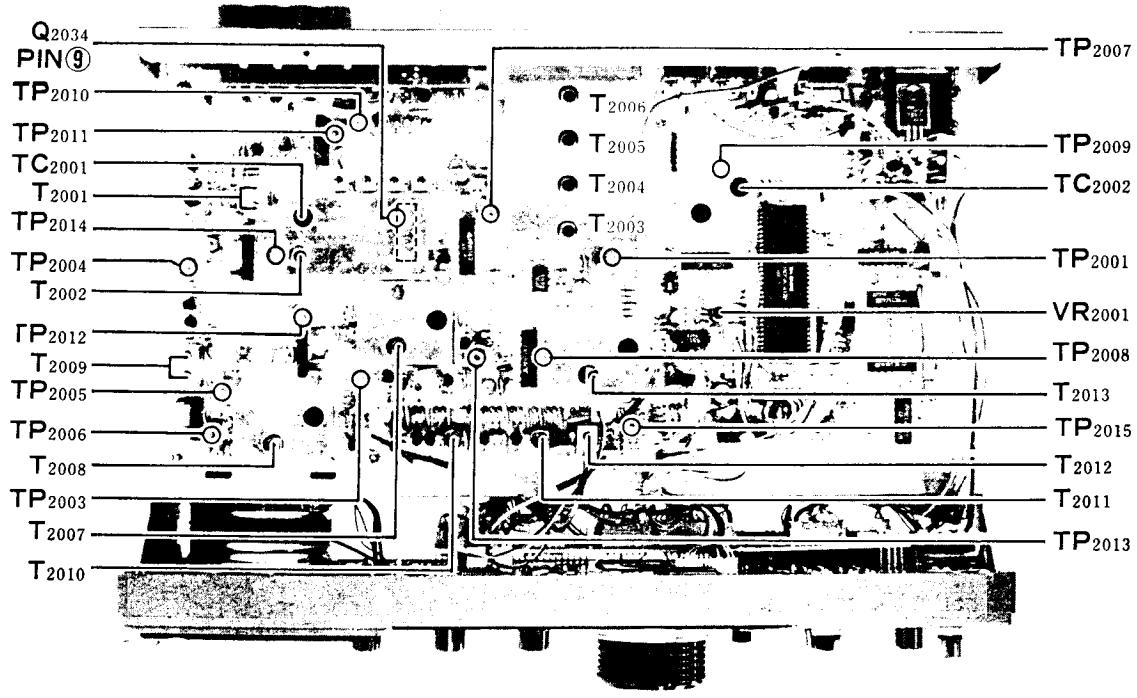
H. 1st Loop Bandpass Filter

Connect the RF voltmeter to TP2011, and with ch1 recalled, check for 95 ±25 mV. Now recall ch2 and adjust T2001 for maximum voltage (130 ±30 mVrms).

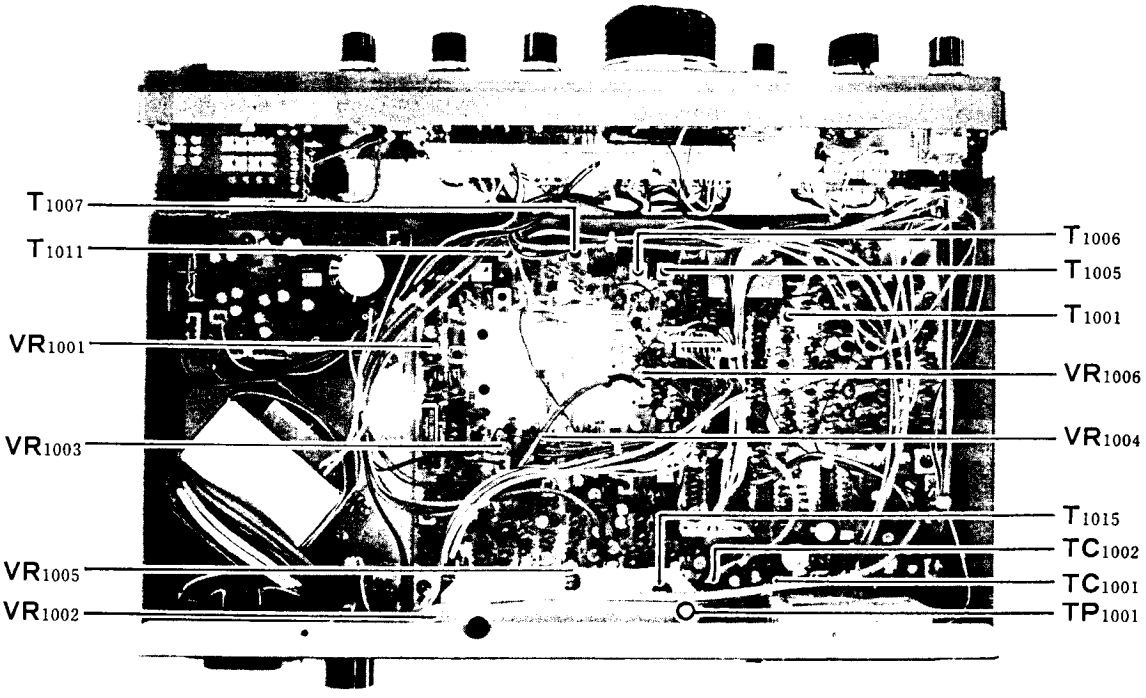
I. 1st Loop VCV

Connect the DC voltmeter (20V scale) to TP2001, and adjust the indicated transformers with the receiver (VFO) tuned to the following frequencies, for 14 ±0.2V on the meter.

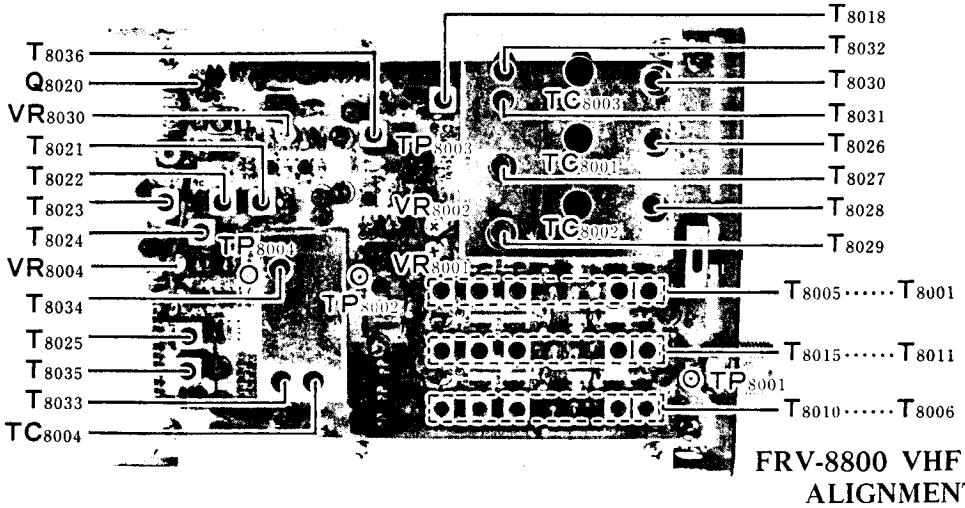
VFO Freq	Adjust
5.999.0	T2006
13.999.0	T2005
21.999.0	T2004
29.999.0	T2003



PLL UNIT ALIGNMENT POINTS (TOP VIEW)



MAIN UNIT ALIGNMENT POINTS (BOTTOM VIEW)



FRV-8800 VHF CONVERTER ALIGNMENT POINTS

J. 1st Local Level (All-band check)

Connect a 50-ohm termination to PJ2001, and check for 0 dBm ±4 dB at this point. Check that the VCV at TP2001 ranges from 16V down to 1V. Then check that the local signal level at TP2010 is within ±40 mV of 160 mVrms.

K. 1st Loop IF Output Level (check)

Connect the RF voltmeter to TP2007. Tune the transceiver to 17.9990 MHz and check for 550 ±100 mVrms. Then tune to 18.0000 MHz and check for 850 ±150 mVrms.

L. Clock Oscillator

(1) Connect the frequency counter to TP2009 and adjust TC2002 for 5.996544 MHz on the counter.

(2) Connect the RF voltmeter to TP2009 and check for 55 ±15 mVrms.

II. Main Unit, Part 1

A. Carrier Frequency

(1) Connect the frequency counter to TP1001. Press the LSB mode button and adjust trimmer TC1001 for 453.5 kHz ±50 Hz.

(2) Press the USB button and adjust TC1002 for 456.5 kHz ±50 Hz.

(3) Check TP1001 with the RF voltmeter for 550 ±150 mVrms.

B. IF Trap

Tune the receiver to 29.999 MHz, LSB mode, and connect the SSG to the LO-Z ANT jack. Set the SSG for 100dB output at 47.055 MHz, which should produce a 1.5 kHz beat in the receiver. Adjust T1001 for minimum tone level and S-meter indication.

C. IF Signal Path

(1) With the SSG connected to the LO-Z ANT jack, set for 0 dBu output and tune the SSG and receiver (in LSB mode) to 11.010 MHz. Connect the AF millivoltmeter across the speaker terminals, and adjust T1005, T1006, T1007 and T1011 for peak on the S-meter (adjusting SSG level to keep readings on scale).

(2) Retune the receiver and SSG to 29.460 MHz, FM mode. Set the SSG for standard deviation (±3.5 kHz deviation of a 1 kHz tone), and connect the SINADDER across the speaker terminals. Readjust T1005 and T1006 for maximum SINAD.

D. S-Meter Calibration

(1) Set up the SSG and AF millivoltmeter as in step C.(1) above. Reduce the SSG level to nil, and preset VR1004 for an indication of S3 (with no signal at the ANT jack).

(2) Return the SSG level to 0dB, and adjust VR1002 just to the threshold of movement at S3.

(3) Increase the SSG level to 6dB and adjust VR1004 so that the S-meter now shows just S1.

(4) Increase the SSG level to 100dB and adjust VR1003 so that all segments of the meter are just on.

E. SSB and AM Squelch

With the receiver tuned to 11.010 MHz, LSB mode, and no connections to the ANT jacks, set the SQL control to the 10 o'clock position and adjust VR1006 so that the receiver just squelches off the noise.

III. PLL Unit, Part 2

A. Noise Blanker Coupling

Connect the DC voltmeter to TP2015 and the SSG to the LO-Z ANT jack. Set the SSG to the receiving frequency, and adjust the output level to the point where the voltage at TP2015 just begins to drop. Adjust T2010, T2011 and T2012 for minimum indication on the voltmeter.

IV. Main Unit, Part 2

A. FM Detector

With the SSG connected to the ANT jack, connect the SINADDER across the speaker terminals, and set the SSG for standard deviation output at 0 dBu. Tune the SSG and receiver to 29.000 MHz, FM mode, and adjust T1015 for maximum SINAD.

B. FM Squelch

With the receiver tuned to 29.000 MHz, remove any connections from the ANT jack, and set the SQL control to the 10 o'clock position. Adjust VR1005 so that the noise is just squelched.

C. Noise Blanker Balance

Note: This step requires a noise pulse generator to simulate ignition and "woodpecker" noise.

Tune the receiver to 10.010 MHz, LSB or USB mode, and set the NB NAR/WIDE switch on the rear panel to the NAR position. Connect the noise source to the ANT jack and press the NB button to activate the noise blanker. Adjust the ATT control so that the S-meter indicates S-3 to -5, and then adjust VR1001 for minimum indication on the S-meter.

V. FRV-8800 VHF Converter

A. 1st Local Oscillator

(1) Connect the RF voltmeter to TP8003 and adjust the following transformers at the indicated dial frequencies, for peak indication on the voltmeter;

118.000 MHz	T8030, T8031
136.000 MHz	T8028, T8029
155.000 MHz	T8026, T8027

(2) Connect the frequency counter to TP8003 and adjust the following trimmers at the indicated dial frequencies, for the counter displays (±200 Hz) shown here;

Rcvr freq	Adjust	Counter
118.000 MHz	TC8003	84.945 MHz
136.000 MHz	TC8002	103.945 MHz
155.000 MHz	TC8001	122.945 MHz

B. 2nd Local Input Level Check

Connect the RF voltmeter to the collector of Q8020 and check for approx 800 mVrms.

C. 3rd Local Oscillator Frequency

(1) Connect the RF voltmeter to TP8004 and adjust T8033 and T8034 for maximum voltage on the meter.

(2) Connect the frequency counter to TP8004 and adjust TC8004 for 21.0550 MHz ±20 Hz on the counter.

D. RF Bandpass Filters

Remove pin 5 of connector P52 (coax) to disable the AGC during this procedure.

(1) Connect the output of the sweep generator to TP8001, and connect the oscilloscope through the linear detector to TP8002.

(2) Tune the receiver to 118.000 MHz, set the sweep generator center frequency to 127 MHz, and adjust T8011 – T8015 for the passband waveform shown in Figure 1.

(3) Tune the receiver to 136.000 MHz, set the sweep generator center frequency to 145 MHz, and adjust T8006 – T8010 for the passband waveform shown in Figure 2.

(4) Tune the receiver to 155.000 MHz, set the sweep generator center frequency to 164 MHz, and adjust T8001 – T8005 for the passband waveform shown in Figure 3.

(5) Remove the test equipment and replace pin 5 of P52.

E. 1st Mixer

For the first four of the following steps, connect the SSG to the VHF ANT jack, and tune the SSG and receiver to 118.000 MHz, USB mode. Adjust the SSG output level (with no modulation) for an indication of S3 on the S-meter, and readjust as necessary during alignment.

(1) Adjust T8036 for peak S-meter indication.

(2) Adjust VR8002 (1st Mixer Bias adj. 1) for peak S-meter indication.

(3) Adjust T8021 – T8024 (2nd mixer output) for peak S-meter indication.

(4) Adjust T8025 and T8035 (3rd mixer output) for peak S-meter indication.

(5) Retune the receiver and SSG to 136.000 MHz, and adjust the SSG level so that the S-meter just begins to indicate signal. Then adjust VR8001 (1st Mixer Bias adj. 2) for peak S-meter indication.

F. IF Trap

With the SSG connected to the VHF ANT jack, tune the receiver to 136.000 MHz, USB mode, and tune the SSG to 129.945 MHz. Set the SSG output level to 30 dB, with no modulation. Adjust T8018 for minimum S-meter indication and beat level.

G. Local Signal Harmonic Trap

With the SSG setup as in the previous step, tune the receiver to 124.890 MHz and adjust T8032 for minimum S-meter indication.

H. Mixer Balance

(1) Tune the receiver to 146.000 MHz and adjust VR8003 (2nd Mixer Balance) for minimum beat level on the internal spurious signal.

(2) Tune the receiver to 118.081 MHz and adjust VR8004 (3rd Mixer Balance) for minimum beat level on the internal spurious signal.

I. Converter Gain

Tune the receiver and SSG (connected to the VHF ANT jack) to 144.000 MHz, and set the SSG level to 0 dB. Adjust T8024 to the point where the S-meter just begins to indicate the signal.

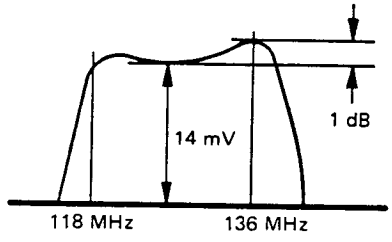


Figure 1

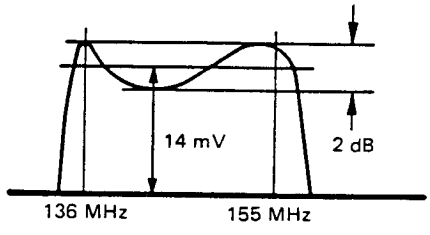


Figure 2

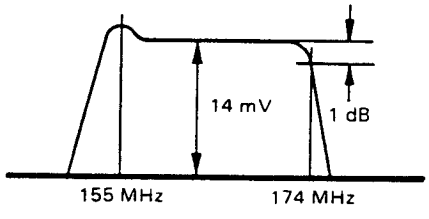


Figure 3

PARTS LIST

MAIN CHASSIS

Symbol No.	Part No.	Description
		TRANSISTORS
Q1,2	G34088000	2SD8800
		THERMAL CONDUCTOR
	Q9000192	T0-220
		RECEPTACLE
J1	P1090194	FM-MR-M2 (ANT)
J2	P0090094	PA-125 (AC)
J3	P0090119	5004 (DC) JA Model
		FUSE HOLDER
FH1	P2000012	SN2059
		SPEAKER
SP1	M4090068	SE-92BY-CUT
		POWER TRANSFORMER
PT1	L3030112	
		ROTARY ENCODER
	Q9000249	Z99-W-09
		BATTERY HOLDER
	Q9000096	
		FUSE
F1	Q0000002	1A 100–117 VAC
F1	Q0000001	0.5A 200–234 VAC
		CONNECTION PLUG (w/WIRE)
P1,53	T9204929	XHP-03
P2	T9204934	5239-02
P3	T9204935	5239-03
P4,41	T9204928	XHP-04
P5	T9204901	XHP-02
P6,40	T9204927	XHP-02
P7,32	T9204926	XHP-06
P8,16	T9204925	XHP-04
P9,25	T9204924	XHP-02
P10,44	T9204923	XHP-03
P11,43	T9204922	XHP-03
P12,34	T9204921	XHP-03
P13,52	T9204920	XHP-11
P14,35	T9204919	XHP-08
P15,24	T9204918	XHP-02
P17,36	T9204917	XHP-10
P18,33	T9204916	XHP-02
P19,51	T9204913	XHP-08
P20,26	T9204915	XHP-02
P21,50	T9204914	XHP-02
P22,39	T9204912	XHP-02
P23,38	T9313201	TMP-15DP
P27,49	T9204911	XHP-02
P28,45	T9204910	XHP-03
P29,48	T9204909	XHP-07
P30,47	T9204908	XHP-06
P31	T9204907	XHP-02/Battery snap
P37,46	T9204906	XHP-07
P42	T9204905	XHP-04
P54,55	T9204903	XHP-02
P56,57	T9204904	XHP-03
		KNOBS
	R3107690	MAIN Dial
	R3101020B	FT-14UK Display Selector
	R3085851	FT-18XK AF GAIN, ATT etc.
	R3500310A	FT-18VF M CH
	R3101121	9φ FINE
	R3107720	10X05 MODE, NUMERIC KEY etc.
	R3107721	" M SELECT, MR KEY etc.
	R3107722	" MHz KEY
	R3107723	" kHz KEY
	R3107730	" D. LOCK, FAST, SLOW KEY
	R3107731	" TIMER ON, CLEAR KEY
	R3107740	24X05 VFO KEY
	R3065301	POWER KEY
	R3100850A	NAR/WIDE, AGC KEY etc.
	R3086890A	PLASTIC FOOT
	R3086900B	" STAND
	S4000027	FOOT (REAR)

MAIN UNIT

Symbol No.	Part No.	Description
	F2665101	Printed Circuit Board
	C026651A	PCB with components
		ICs
Q1009	G1090088	MC14028BCP
Q1033	G1090072	μPC577H
Q1036,1039	G1090248	AN6551
Q1038,1050	G1090257	MC14066BCP
Q1055	G1090294	μPC7808H
Q1066	G1090073	μPC575C2
Q1010	G2090135	ND487C2-3R
		FETs
Q1020,1025,1026	G4800730G	3SK73GR
Q1021,1022,1027	G4800740L	3SK74L
Q1067	G3801250	2SK125
		TRANSISTORS
Q1016,1031,1037, 1052,1063	G3107331P	2SA733AP
Q1058	G3111930K	2SA1193K
Q1014, 1017–1019, 1023,1024, 1028–1030, 1032,1034,1035, 1040–1049	G3304580B	2SC458B

Q1051,1054,1056, 1057, 1059–1062, 1064,1065	G3304580B	2SC458B					
Q1012,1013	G331923-O	2SC1923					
Q1011	G3333550	2SC3355					
Q1001–1008, 1015,1053	G3327850J	2SC2785JF					
		DIODES					
D1001–1023, 1026–1031, 1040–1045, 1047–1055, 1057,1060,1061	G2090237	Si	MA190				
D1024,1025,1058	G2090313	〃	MA150				
D1032	G2090244	Schottky	1SS106				
D1056	G2090306	Si	10E1				
D1046	G2090156	Zener	RD5.6EB2				
D1059	G9090005	Varistor	MV103				
		CRYSTAL					
X1001	H0102668	UM-1	46.145MHz				
		CRYSTAL FILTER					
XF1001	H1102090	47M15AU					
		CERAMIC FILTERS					
CF1001	H3900071	LF-B20					
CF1002	H3900377	LF-H6SC					
CF1003	H3900376	LF-C3					
CF1004	H3900204	LF-H15S					
		CERAMIC RESONATORS					
CO1001	H7900240	R453.5C					
CO1002	H7900250	R456.5C					
		CERAMIC DISCRIMINATOR					
CD1001	H7900010	455D					
		THERMISTORS					
TH1001	G9090022	SDT-09					
TH1002	G9090001	SDT-250S					
		RESISTORS					
R1087	J02245479	Carbon film	1/4W	4.7Ω	SJ		
R1036	J01275689	〃	〃	1/2W	6.8Ω	TJ	
R1055,1165,1256	J02245100	〃	〃	1/4W	10Ω	SJ	
R1060	J02245220	〃	〃	〃	22Ω	〃	
R1050,1300,1314	J02245330	〃	〃	〃	33Ω	〃	
R1004,1006,1008, 1010,1012,1014, 1016,1018,1020, 1049,1064,1069, 1103,1224,1296	J02245470	〃	〃	〃	47Ω	〃	
R1305,1318	J02245680	〃	〃	〃	68Ω	〃	
R1117,1120	J01245101	〃	〃	〃	100Ω	TJ	
R1007,1009,1011, 1013,1015,1017, 1019,1021,1051, 1052,1058,1065, 1089,1092, 1094–1096, 1107,1122,1124	J02245101	〃	〃	〃	100Ω	SJ	
R1129,1130,1133, 1136,1143,1150, 1159,1168,1172, 1174,1184,1208, 1213,1218,1225, 1229,1236,1247, 1261,1303	J02245101	Carbon film	1/4W	100Ω	SJ		
R1088,1099,1100, 1127,1134,1144, 1145	J02245151	〃	〃	〃	150Ω	〃	
R1313,1315	J02245181	〃	〃	〃	180Ω	〃	
R1001,1059,1061, 1066,1106,1169, 1301,1302,1307, 1319	J02245221	〃	〃	〃	220Ω	〃	
R1002,1005,1091, 1182,1304	J02245331	〃	〃	〃	330Ω	〃	
R1003,1074,1076, 1077,1083,1226, 1269	J02245471	〃	〃	〃	470Ω	〃	
R1205,1246,1316	J02245681	〃	〃	〃	680Ω	〃	
R1109,1110,1151, 1164,1173,1183, 1185,1222,1251, 1272,1299,1328	J02245102	〃	〃	〃	1kΩ	〃	
R1056,1170,1171, 1253	J02245152	〃	〃	〃	1.5kΩ	〃	
R1108,1141,1146, 1147,1178,1181, 1214,1219,1230, 1237,1245,1250, 1312	J02245222	〃	〃	〃	2.2kΩ	〃	
R1326	J01245222	〃	〃	〃	2.2kΩ	TJ	
R1063,1068,1102, 1155,1163,1177, 1189,1262,1266, 1292,1298	J02245332	〃	〃	〃	3.3kΩ	SJ	
R1053,1054,1073, 1078,1112,1116, 1118,1119,1121, 1123,1180,1191, 1193,1194,1207, 1322–1324	J02245472	〃	〃	〃	4.7kΩ	〃	
R1062,1067,1126, 1128,1135,1252	J02245682	〃	〃	〃	6.8kΩ	〃	
R1320	J01245682	〃	〃	〃	6.8kΩ	TJ	
R1210–1212	J02245822	〃	〃	〃	8.2kΩ	SJ	
R1025,1027,1028, 1030,1031, 1033–1035, 1037,1039,1040, 1042,1043,1045, 1046,1048,1080, 1086,1097,1098, 1132,1137,1142, 1156,1157,1175, 1176,1192,1193, 1201,1202,1223, 1231,1234,1238, 1241,1244,1254, 1255,1260,1265, 1285,1287,1293, 1311,1317,1325, 1327	J02245103	〃	〃	〃	10kΩ	〃	
R1321	J01245103	〃	〃	〃	10kΩ	TJ	
R1104,1114,1149, 1166,1179,1227, 1297	J02245153	〃	〃	〃	15kΩ	SJ	
R1070,1072,1105, 1111,1148,1153, 1167,1195,1221, 1228,1232,1235, 1239,1242,1249, 1258,1268,1270	J02245223	〃	〃	〃	22kΩ	〃	

R1276–1278, 1286,1288,1290	J02245223	Carbon film 1/4W 22kΩ SJ		C1022	K00175820	" " 82pF " (DD104SL820J50)
R1113,1138,1139, 1220,1233,1240, 1243,1259	J02245333	" " " 33kΩ "		C1174,1180	K06175820	" " 82pF UJ (DD106UJ820J50)
R1075,1079,1082, 1115,1186,1203, 1209,1257,1263, 1264,1271,1279, 1308	J02245473	" " " 47kΩ "		C1018,1024,1098, 1217,1230	K00175101	" " 100pF SL (DD105SL101J50)
				C1029,1035	K00175121	" " 120pF " (DD105SL121J50)
				C1010,1012	K00175121	" " 120pF " (DD104SL121J50)
R1206,1248	J02245683	" " " 68kΩ "		C1028,1049,1052	K00175151	" " 150pF " (DD106SL151J50)
R1022–1024, 1057,1071,1081, 1085,1090,1101, 1125,1131,1140, 1154, 1198–1200, 1216,1267,1274, 1280–1284, 1289,1291,1295, 1329	J02245104	" " " 100kΩ "		C1030	K00175181	" " 180pF " (DD106SL181J50)
				C1176,1182	K06175221	" " 220pF UJ (DD109UJ221J50)
				C1041	K00179020	" " 240pF SL (DD107SL241J50)
R1152,1204,1215, 1309,1310	J02245154	" " " 150kΩ "		C1175,1181	K06175271	" " 270pF UJ (DD109UJ270J50)
R1188,1190,1196	J02245224	" " " 220kΩ "		C1034,1036	K00175331	" " 330pF SL (DD107SL331J50)
R1197,1273,1217	J02245334	" " " 330kΩ "		C1040,1042	K00175561	" " 560pF " (DD109SL561J50)
R1161,1187,1275, 1294	J02245474	" " " 470kΩ "		C1128	K10176681	" " 680pF B (DD104B681J50)
R1158	J02245155	" " " 1.5MΩ "		C1050,1051	K10176821	" " 820pF " (DD104B821J50)
R1084,1160	J01245225	" " " 2.2MΩ TJ		C1074,1107,1112, 1190,1229	K10176102	" " 0.001μF " (DD104B102K50)
		POTENTIOMETERS		C1168	K10176222	" " 0.0022μF " (DD106B222K50)
VR1002	J51745331	H0651A004-330B 330ΩB		C1056,1058,1059, 1061,1062,1064, 1065,1071,1075, 1079–1082, 1088,1093,1094, 1099,1106,1111, 1116,1124,1125, 1144,1186,1188, 1228	K13179008	" " 0.01μF F (DD106F103Z50)
VR1005	J51745102	H0651A007-1KB 1kΩB				
VR1004	J51745222	H0651A009-2.2KB 2.2kΩB				
VR1001	J51745472	H0651A011-4.7KB 4.7kΩB				
VR1007	J51757103	H1053C013-10KB 10kΩB				
VR1006	J51745333	H0651A016-33KB 33kΩB				
VR1003	J51745225	H0651A027-2.2MB 2.2MΩB				
				C1060,1063,1069, 1070,1073	K13179010	" " 0.022μF " (DD108F223Z50)
		CAPACITORS		C1003,1007,1009, 1013,1015,1019, 1021,1025,1027, 1031,1033,1037, 1039,1043,1045, 1048,1055,1078, 1084,1085,1087, 1089,1090,1096, 1097, 1100–1105, 1108–1110, 1113–1115, 1117–1119, 1121,1126,1127, 1130,1131, 1137–1143, 1145,1146,1170, 1173,1179,1195, 1201,1219,1220, 1222,1223,1226	K13179009	" " 0.047μF " (DD110F473Z50)
C1072	K00172010	Ceramic 50WV 1pF SL (D104SL010C50)				
C1053	K00173060	" " 6pF " (DD104SL060D50)				
C1013	K00175120	" " 12pF " (DD104SL120J50)				
C1005,1122,1123	K00175150	" " 15pF SL (DD104SL150J50)				
C1053	K00175220	" " 22pF " (DD104SL220J50)				
C1004,1011	K00175270	" " 27pF " (DD104SL270J50)				
C1017	K00175330	" " 33pF " (DD104SL330J50)				
C1066,1068	K00179009	" " 43pF " (DD104SL430J50)				
C1006,1023	K00175470	" " 47pF " (DD104SL470J50)		C1157	K19149003	Semicondcutor Ceramic 25WV 0.0015μF (UAT04X152K-L05AE)
C1120	K02175560	" " 56pF CH (DD106CH560J50)		C1161	K19149013	" " 0.01μF (UAT05X103K-L05AE)
C1016	K00175680	" " 68pF SL (DD104SL680J50)		C1155,1156,1160	K19149017	" " 0.022μF (UAT06X223K-L45AE)
C1067	K00175750	Ceramic 50WV 75pF SL (DD104SL750J50)		C1133,1152,1184, 1185,1213,1214	K19149025	" " 0.1μF (UAT10X104K-L45AE)

C1147	K40179027	Electrolytic 50WV 0.33μF (50RER33)
C1057,1129,1164, 1167,1169,1172, 1178,1198,1209, 1221	K40179013	" " 1μF (50RE1)
C1136	K40179009	" " 2.2μF (50RE2R2)
C1193,1194,1215	K40179012	" " 4.7μF (50RE4R7)
C1001,1008,1014, 1020,1026,1032, 1038,1044,1046, 1047,1086,1091, 1092,1132, 1148–1151, 1153,1154,1158, 1159,1162,1163, 1165,1166,1171, 1187,1189,1191, 1196,1197,1199, 1200, 1202–1204, 1206–1208,1225	K40179014	" " 10μF (50RE10)
C1135,1192,1205	K40129008	" 16WV 33μF (16RE33)
C1211	K40149022	" 25WV 47μF (25RE47)
C1216	K40149010	" " 330μF (25RE330)
C1212	K40149002	" " 470μF (25RE470)
C1210	K40149005	" " 1000μF (25RE1000)
		TRIMMER CAPACITORS
TC1001,1002	K91000117	CTZ51H 70pF
		INDUCTORS
L1002,1004	L1190004	FL4HR68M 0.68μH
L1003	L1190155	LHL06NA2R2M 2.2μH
L1005,1007	L1190071	FL4HR47M 0.47μH
L1006	L1190158	LHL06NA3R9K 3.9μH
L1008,1010	L1190153	LHL06NA1R5M 1.5μH
L1006,1009	L1190159	LHL06NA4R7K 4.7μH
L1011,1013	L1190156	LHL06NA2R7M 2.7μH
L1012	L1190161	LHL06NA6R8K 6.8μH
L1014,1016	L1190160	LHL06NA5R6K 5.6μH
L1015,1017,1019	L1190162	LHL06NA8R2K 8.2μH
L1018,1023,1025	L1190167	LHL06NA220K 22μH
L1020,1022	L1190164	LHL06NA120K 12μH
L1021	L1190168	LHL06NA270K 27μH
L1024	L1190169	LHL06NA330K 33μH
L1026	L1190151	LHL06NA1R0M 1μH
L1027	L1190014	FL4H-100K 10μH
L1028,1029	L0190028	RF3855R12K 0.12μH
L1030	L1190177	LHL06NA151K 150μH
L1031–1033	L1190163	LHL06NA100K 10μH
L1034	L1190187	LHL06NA102K 1mH
L1035,1036	L1190183	LHL06NA471K 470μH
	L9190016	Coil Shield Case 7x7
	L9190019	" " " 10x10
		TRANSFORMERS
T1001	L0021478A	
T1002	L0021488	
T1003	L0021524	
T1004,1016	L0021351	
T1005	L0021477	
T1006	L0021481A	
T1007	L0021482A	
T1008	L0021476	
T1009,1010	L0020861	
T1011	L0021503A	
T1012,1013,1015	L0021473A	
T1014	L0190002	
		CONNECTORS
J1001,1003–1005, 1020	P0090192	B3B-XHA
J1002,1008,1012, 1014–1017	P0090191	B2B-XHA
J1006	P0090200	B11B-XHA
J1007,1013	P0090197	B8B-XHA
J1009	P0090473	3022-06B
J1010	P0090193	B4B-XHA
J1011	P0090199	B10B-XHA
J1018,1019	P1090350	S-G8035
J1020	P0090192	TMP-JV
		TERMINAL POST
TP1001	Q5000016	TP-E
	R0107880A	Shield Case
	R0107890	Shield Cover
	R0108560	Shield Plate

PLL UNIT

Symbol No.	Part No.	Description
	F2666000	Printed Circuit Board
	C026660A	PCB with components
		ICs
Q2001,2010,2048	G1090101	μPC1037H
Q2023,2061	G1090246	AN6552
Q2025	G1090080	μPC78L08
Q2029	G1090084	μPC78L05
Q2031	G1090294	μPC7808H
Q2034	G1090451	SN74LS107N
Q2035	G1090296	HD10551
Q2057,2059	G1090634	MN6147
Q2062,2067,2068	G1090051	MC14042BCP
Q2063,2069	G1090053	MC14081BCP
Q2065	G1090635	HD63A05X0A12
Q2066	G1090309	MC14555BCP
		FETs
Q2015–2018	G3801921G	2SK192AGR
		TRANSISTORS
Q2024,2028,2058, 2060	G3107331P	2SA733AP

Q2002–2007, 2019–2022, 2027,2032,2033, 2039,2046, 2049–2053, 2064,2070	G3304580B	2SC458B
Q2026	G3309451P	2SC945AP
Q2054	G3309451Q	2SC945AQ
Q2040–2042	G3318150B	2SC1815BL
Q2008,2009, 2012–2014, 2036–2038, 2043–2045, 2047,2055,2056	G3319230O	2SC1923O
Q2011	G3320260	2SC2026
Q2030	G3408820Q	2SD882Q
		DIODES
D2001–2010, 2020–2023, 2025,2028,2032, 2034–2049, 2051–2059	G2090237	Si MA190
D2011–2019	G2090107	Varactor 1T25
D2024,2030,2031	G2090244	Schottky 1SS106
D2026	G2090239	Si MA161
D2027	G2090152	Zener RD5.1EB2
D2029	G2090222	Varactor MV306
D2033	G2090180	〃 FC53M5
		CRYSTALS
X2001	H0102638	HC-18/U3P 18MHz
X2002	H0102639	〃 46.6MHz
X2003	H0102640	〃 4.5MHz
X2004	H0102641	〃 5.996MHz
		RESISTORS
R2108	J20306100	Metallic film 1W 10Ω
R2250	J20249224	〃 〃 1/4W 24.9kΩ 1%
R2228,2251	J20249002	〃 〃 〃 49.9kΩ 〃
R2226,2252	J20249045	〃 〃 〃 100kΩ 〃
R2227,2253	J20249211	〃 〃 〃 200kΩ 〃
R2254	J20249210	〃 〃 〃 402kΩ 〃
R2255	J20249223	〃 〃 〃 806kΩ 〃
R2256	J02245479	Carbon film 1/4W 4.7Ω SJ
R2204,2235,2268, 2276	J02245100	〃 〃 〃 10Ω 〃
R2140	J02245220	〃 〃 〃 22Ω 〃
R2149,2197	J02245330	〃 〃 〃 33Ω 〃
R2001,2017,2036, 2039,2040,2042, 2046,2051,2124, 2146,2162,2168, 2185,2200,2278	J02245470	〃 〃 〃 47Ω 〃
R2203	J02245680	〃 〃 〃 68Ω 〃
R2258	J01245101	〃 〃 〃 100Ω TJ
R2002,2006,2007, 2012,2013,2021, 2033,2041,2043, 2044,2049,2056, 2059,2061,2069, 2077,2085,2099, 2100,2117,2125, 2128,2131,2156, 2165,2188,2215, 2222,2230,2238, 2269,2273	J02245101	〃 〃 〃 100Ω SJ
R2024,2034,2171	J02245151	〃 〃 〃 150Ω 〃
R2022,2178	J02245151	Carbon film 1/4W 150Ω SJ
R2045,2109,2150, 2153,2154,2166, 2175,2182	J02245221	〃 〃 〃 220Ω 〃
R2110,2239	J02245331	〃 〃 〃 330Ω 〃
R2037,2055,2144, 2147,2167,2186	J02245471	〃 〃 〃 470Ω 〃
R2115,2122,2172, 2179,2234	J02245681	〃 〃 〃 680Ω 〃
R2244–2249,2287	J01245102	〃 〃 〃 1kΩ TJ
R2005,2010,2050, 2052,2094,2101, 2107,2123,2132, 2134,2143,2158, 2205,2208,2214, 2223,2233,2237	J02245102	〃 〃 〃 1kΩ SJ
R2020,2035,2129, 2148,2195,2201, 2224	J02245152	〃 〃 〃 1.5kΩ 〃
R2060,2133,2145, 2161,2191,2192, 2194,2206	J02245222	〃 〃 〃 2.2kΩ 〃
R2016,2019,2038, 2047,2048,2068, 2074,2076,2084, 2092,2098,2116, 2282	J02245332	〃 〃 〃 3.3kΩ 〃
R2189,2190,2193, 2196,2225,2274, 2284–2286	J02245472	〃 〃 〃 4.7kΩ 〃
R2008,2009,2011, 2025,2026,2082, 2093,2120,2121	J02245682	〃 〃 〃 6.8kΩ 〃
R2003,2023,2031, 2053,2054,2058, 2067,2075,2083, 2091,2095,2096, 2102,2119,2127, 2130,2137,2139, 2142,2152,2155, 2157,2159,2160, 2199,2202,2209, 2212,2257, 2259–2267,2277	J02245103	〃 〃 〃 10kΩ 〃
R2004,2014,2111, 2112,2114,2138, 2169,2176	J02245153	〃 〃 〃 15kΩ 〃
R2015,2018,2062, 2065,2070,2073, 2078,2081,2086, 2089,2090,2097, 2126,2135,2136, 2163,2164,2173, 2174,2180,2181, 2187	J02245223	〃 〃 〃 22kΩ 〃
R2028,2030,2057, 2064,2072,2080, 2088,2118,2184	J02245333	〃 〃 〃 33kΩ 〃
R2032,2141,2151, 2170,2177,2183, 2207,2213,2218, 2220,2221	J02245473	〃 〃 〃 47kΩ 〃
R2113,2219	J02245683	〃 〃 〃 68kΩ 〃
R2027,2029,2063, 2066,2071,2079, 2087, 2104–2106, 2210,2211,2216, 2217,2229,2232, 2240,2242,2243	J02245104	〃 〃 〃 100kΩ 〃

R2271,2275,2283	J02245104	Carbon film 1/4W 100kΩ SJ	C2217	K06179006	" " 30pF UJ (DD104UJ300J50)
R2288	J01215104	" " 1/8W 100kΩ TJ	C2119,2121,2211	K06175330	" " 33pF " (DD104UJ330J50)
R2241	J02245154	" " 1/4W 150kΩ SJ	C2075	K02179014	" " 36pF CH (DD105-257CH360J50)
R2103,2198,2236, 2272	J02245224	" " " 220kΩ "	C2142,2151	K06175390	" " 39pF UJ (DD104UJ390J50)
R2231	J02245334	" " " 330kΩ "	C2008,2019,2075, 2193,2197	K02175470	" " 47pF CH (DD106CH470J50)
R2270	J02245474	" " " 470kΩ "	C2081	K06179009	" " 56pF UJ (DD105UJ560J50)
			C2016	K02175560	" " 56pF CH (DD107CH560J50)
		RESISTOR BLOCKS	C2043,2133	K06175680	" " 68pF " (DD105-257UJ680J50)
RB2001	J40900033	EXB-P87 104K 100kΩx7	C2120	K06175101	" " 100pF UJ (DD106UJ101J50)
RB2002	J40900031	EXB-P85 472 4.7kΩx5	C2018	K02175101	" " 100pF CH (DD107CH101J50)
RB2003	J40900007	RK1/16B7R 22K 22kΩx7	C2032,2036	K00175151	" " 150pF SL (DD106SL151J50)
			C2033–2035	K00179020	" " 240pF " (DD107SL241J50)
		POTENTIOMETER	C2021,2054,2088	K12171102	" " 0.001μF E (DD104E102P50)
VR2001	J51739203	EVM-G0GA01B24 20kΩB	C2001,2003,2005, 2007,2024,2027, 2028,2045,2046, 2059,2065,2071, 2077,2084,2122, 2130,2134,2144, 2147,2148,2150, 2152,2155,2158, 2159,2162,2196, 2212	K13179008	" " 0.01μF F (DD106F103Z50)
		CAPACITORS			
C2006,2163	K00179001	Ceramic 50WV 0.5pF SL (DD104SL0R5C50)			
C2210	K02179001	" " 1pF CH (DD104CK010C50)			
C2048,2062,2067, 2124,2175	K06172040	" " 4pF UJ (DD104UJ040C50)			
C2009,2064	K02172040	" " 4pF CH (DD104CH040C50)			
C2126	K06172050	" " 5pF UJ (DD104UJ050C50)			
C2070	K06173060	" " 6pF " (DD104UJ060D50)			
C2226	K02172070	" " 7pF CH (DD104CH070D50)			
C2049,2056	K00173070	" " 7pF SL (DD104SL070D50)			
C2066,2076	K06173080	" " 8pF UJ (DD104UJ080D50)			
C2068	K05173080	" " 8pF RH (DD104RH080D50)			
C2061,2082,2125, 2127,2136	K06173100	" " 10pF UJ (DD104UJ100D50)	C2002,2004, 2010–2015, 2017,2022,2023, 2025,2026, 2029–2031, 2037–2039, 2044,2047, 2050–2052, 2055,2058,2090, 2092–2094, 2097,2100,2103, 2104,2111,2112, 2114,2116,2118, 2123,2128,2129, 2137,2138,2143, 2145,2146,2149, 2154,2157,2160, 2161, 2185–2188, 2190,2192,2195, 2199,2208,2213, 2214,2223,2224	K13179010	" " 0.022μF " (DD108F223Z50)
C2074	K05173100	" " 10pF RH (DD104RH100D50)			
C2063	K02173100	" " 10pF CH (DD104CH100D50)			
C2080	K05179027	" " 11pF RH (DD104RH110J50)			
C2135	K02175120	" " 12pF CH (DD104CH120J50)			
C2060,2072,2078, 2153	K06175120	" " 12pF UJ (DD104UJ120J50)			
C2020	K02175150	" " 15pF CH (DD104CH150J50)	C2164–2166, 2168–2174, 2176–2180,2183	K13179009	" " 0.047μF " (DD110F473Z50)
C2057	K00175150	" " 15pF SL (DD104SL150J50)	C2106–2108	K19149005	Semiconductor Ceramic 25WV 0.0022μF (UAT04X222K-L05AE)
C2073,2132	K06175180	" " 18pF UJ (DD104UJ180J50)			
C2069,2217	K02175180	" " 18pF CH (DD104CH180J50)	C2083,2140,2141, 2219	K19149025	" " 0.1μF (UAT10X104K-L45AE)
	K02179009	" " 22pF " (DD104CH220J50)	C2089	K70107335	Tantalum 10WV 3.3μF (CS15E1A3R3M)
C2079	K06175270	" " 27pF UJ (DD104UJ270J50)	C2095,2205,2206, 2220,2221	K40179016	Electrolytic 50WV 0.1μF (50RE0R1)
C2216	K02175270	Ceramic 50WV 27pF CH (DD105CH270J50)	C2040,2191,2200, 2203	K40179010	" " 0.47μF (50RE-R47)

C2042,2113,2167, 2215,2222	K40179013	Electrolytic 50WV 1μF (50RE1)
C2182	K40179012	" " 4.7μF (50RE4R7)
C2041,2053,2085, 2087,2091,2096, 2098,2099,2101, 2102,2105,2109, 2110,2115,2117, 2131,2139,2181, 2184,2201,2202, 2204,2218	K40179014	" " 10μF (50RE10)
C2189,2198	K40129008	" 16WV 33μF (16RE33)
C2086	K40179018	" 50WV 47μF (50RE47)
C2207	K40089001	" 6.3WV 100μF (6.3RE100)
C2209	K40109004	" 10WV 470μF (10RE470)
		TRIMMER CAPACITORS
TC2001	K91000093	CTZ51F 30pF
TC2002	K91000086	CTZ51E 20pF
		INDUCTORS
L2001–2003, 2005,2012,2013, 2016–2020	L1190177	LHL06NA151K 150μH
L2004,2006	L1190165	LHL06NA150K 15μH
L2007–2010	L1190159	LHL06NA4R7K 4.7μH
L2021	L1190187	LHL06NA102K 1mH
L2014,2015	L1190169	LHL06NA330K 33μH
L2022	L0190031	RF3855R22K 0.22μH
		TRANSFORMERS
T2001	L0021470	
T2002	L0021472	
T2003,2004	L0021486	
T2005,2006	L0021485	
T2007	L0021487	
T2008	L0021475B	
T2009	L0021471	
T2010,2011	L0190002	
T2012	L0021474	
T2013	L0021483A	
T2014,2015	L0021498	
T2016	L0021499	
T2017	L0021500	
T2018	L0021501	
T2019	L0021502	
		CONNECTORS
J2001–2005, 2012,2014	P0090191	B2B-XHA
J2006,2015	P0090192	B3B-XHA
J2009,2018	P0090196	B7B-XHA
J2010,2013	P0090195	B6B-XHA
J2016	P0090197	B8B-XHA
J2017	P0090199	B10B-XHA
J2019	P0090201	B12B-XHA
J2007	P1090422	TCS4450-01-1111
J2008	P1090423	TCS4460-01-1111
J2011	P1090424	UA-0016-03
PJ2001	P1090255	TMP-JA

		TERMINAL POSTS
	Q5000016	TP-E
	Q5000026	TP-F
		RELAY
RL2001	M1190046	AG2033
		SWITCHES
S2001	N6090053	HSW0273
S2002	N6090008	SSS012
	R0019510A	Heat sink
	R0107800A	Shield Case
	R0107810	" Cover
	R0107820A	" Plate
	R0107830A	" Case
	R0107840	" Cover
	R0107850A	" Plate
	R0107860A	" Case
	R0107870	" Cover
	R0108660	" Plate
	R0108670	" "

REG UNIT

Symbol No.	Part No.	Description
	F2665102	Printed Circuit Board
	C026652A	PCB with components
		TRANSISTORS
Q3007	G3107331P	2SA733AP
Q3001–3003, 3005,3006	G3304580B	2SC458B
Q3004	G3408800Y	2SD880Y
		DIODES
D3001	G2090157	Si S2VB10F
D3002	G2090159	" S2V10
D3003,3004,3010, 3011	G2090158	Zener RD4.7EB2
D3005	G2090201	" RD3.3EB2
D3006	G2090150	" RD12EB1
D3007	G2090239	Si MA161
D3008	G2090311	Zener RD18EB3
D3009	G2090237	Si MA190
		RESISTORS
R3011	J02245220	Carbon film 1/4W 22Ω SJ
R3010	J02245101	" " " 100Ω "
R3002	J02245221	" " " 220Ω "
R3005	J02245331	" " " 330Ω "
R3004,3016	J02245471	" " " 470Ω "
R3014	J02245681	" " " 680Ω "
R3008	J02245821	" " " 820Ω "
R3003	J02245102	" " " 1kΩ "
R3001,3012,3013	J02245152	" " " 1.5kΩ "

R3006	J02245472	Carbon film 1/4W 4.7kΩ SJ
R3007	J02245682	" " " 6.8kΩ "
R3009	J00245103	" " " 10kΩ "
R3015	J02245153	" " " 15kΩ "
		CAPACITORS
	K13179014	Ceramic 50WV 0.0047μF F (DD104F472Z50)
C3012	K13179010	" " 0.022μF " (DD108F223Z50)
C3005	K13179009	" " 0.047μF " (DD110F473Z50)
C3003,3004, 3006–3009, 3013–3018	K40179014	Electrolytic " 10μF (50RE10)
C3002	K40129008	" 16WV 33μF (16RE33)
C3010	K40149003	" 25WV 100μF (25RE100)
C3001	K40169018	" 35WV 4700μF (RPE-35V472M)
C3011	K50177223	Mylar 50WV 0.022μF (50F2U223M)
		INDUCTOR
L3001	L1190177	LHL06NA151K 150μH
		TRANSFORMER
T3001	L3030113	MPS-162
		FUSE HOLDER
FH3001	P2000003	F3265
		FUSE
F3001	Q0000003	2A
		CONNECTORS
J3001	P0090355	5273-02A
J3002,3007	P0000193	B4B-XHA
J3003,3005	P0000191	B2B-XHA
J3004	P1000251	3024-09CH
J3006	P0000195	B6B-XHA

AC UNIT

Symbol No.	Part No.	Description
	F2665108	Printed Circuit Board
	C026658A	PCB with components
		CAPACITORS
C3501,3502	K12329002	Ceramic 1.5KV 0.0047μF (ECK-DAL472PE)
		VOLTAGE SELECT SWITCH
S3501	N7090032	HXW0244-01-070

		CONNECTORS
P3501	P0090355	5273-02A
P3502	P0090237	5273-03A
P3503	P0090266	5273-05A
	R0108650	Holder

KEY SWITCH UNIT

Symbol No.	Part No.	Description
	F2667102	Printed Circuit Board
	C026672A	PCB with components
		DIODES
D4001–4016	G2090237	Si MA190
		SWITCHES
S4001	N4090095	SUV30A
S4002	N4090085	SPH221A
S4003–4026	N5090023	KHH10912
		CONNECTORS
J4001	P1090142	5124-06BH
J4002	P1090141	5124-09BH
J4003	P1090426	5124-04BH
J4004	P1090425	5124-03BH
	R0107900	HOLDER

PUSH SWITCH UNIT

Symbol No.	Part No.	Description
	F2667104	Printed Circuit Board
	C026674A	PCB with components
		RESISTOR
R4501	J01245222	Carbon film 1/4W 2.2kΩ
		POTENTIOMETERS
VR4501	J61800017	K162Y0Z01-10KBx2 10kΩBx2
VR4502	J60800115	K161M0Z0A-10KB 10kΩB
VR4503	J60800114	K161M0Z0A-10KA 10kΩA
		CAPACITORS
C4501	K40179002	Electrolytic 50WV 0.1μF (ECE-A1HK0R1)
		SWITCHES
S4501–4505	N5090023	KHH10912 MODES
S4506	N4090094	SPH222A NAR/WIDE

S4507–4509	N4090085	SPH221A AGC,NB,DIM
		CONNECTORS
J4501	P1090142	5124-06BH
J4502	P1090429	5124-10BH
J4503	P1090432	5124-13BH
JP4501/P4501 (w/wire)	T9204931	5395-07/XHP-07
JP4502 (")	T9204930	5395-02

POWER SWITCH UNIT

Symbol No.	Part No.	Description
	F2667103	Printed Circuit Board
	C026673A	PCB with components
		RESISTORS
R5001,5002	J01275101	Carbon film 1/2W 100Ω TJ
R5003	J02245223	" " 1/4W 22kΩ SJ
		SWITCH
S5001	N4090096	SUF12
		CONNECTORS
J5001	P0090196	B7B-XHA
J5002	P1090351	S-G4617 (PHONES)
J5003	P1090350	S-G8035 (REC)

FUNCTION SWITCH UNIT

Symbol No.	Part No.	Description
	F2667106	Printed Circuit Board
	C026676A	PCB with components
		SWITCH
S5501	N0190127	MSB-26BP
		CONNECTORS
J5501	P0090432	5040-04M
J5502	P0090431	5040-03M

VR UNIT

Symbol No.	Part No.	Description
	F2667107	Printed Circuit Board
	C026677A	PCB with components

		POTENTIOMETER
VR6001	J60800116	K1611008AE 5KB 5kΩB
VR6002	J60800117	K161110DTE-5M1112-10KB 10kΩB
		SWITCH
S6001	N0190128	SRS101C
		CONNECTORS
JP6001/P6001 (w/wire)	T9204933	5395-08/XHP-08
JP6002/P6002 (")	T9204932	5395-03/XHP-03
	R0107910A	HOLDER

ANT UNIT

Symbol No.	Part No.	Description
	F2667101	Printed Circuit Board
	C026671A	PCB with components
		SURGE ABSORBER
D6501	Q9000292	ERZ-D03DS331
		TRANSFORMER
T6501	L0021350	
		CONNECTORS
J6501	Q9000294	UG-0020 #05
J6502	P0090204	S3B-XHA
		TERMINAL POSTS
	Q5000026	TP-F

MOTHER BOARD UNIT

Symbol No.	Part No.	Description
	F2667105	Printed Circuit Board
	C026675A	PCB with components
		DIODES
D7001–7014	G2090237	Si MA190
		CONNECTORS
J7001,7017	P0090197	B8B-XHA
J7002,7008	P0090452	5040-06T
J7003	P0090455	5040-09T
J7004,7005	P0090193	B4B-XHA
J7006,7007,7009, 7018,7019	P0090192	B3B-XHA

J7010,7012	P0090196	B7B-XHA
J7011	P0090195	B6B-XHA
J7013,7016	P0090191	B2B-XHA
J7014	P0090456	5040-10T
J7015	P0090459	5040-13T

DISPLAY UNIT

Symbol No.	Part No.	Description
	Q9000295	LCD ASSY
		LCD DRIVER
Q7501	G1090618	HD61603
		CONNECTOR
	T9204902	5295-12 (w/wire)
	R3504430	DIFFUSOR

ACCESSORIES

Symbol No.	Part No.	Description
		AC CORD
	T9013280	2 wire 2 prong plug
	T9013282	3 wire, 3 prong UL plug
	T9013285	3 wire, 2 prong EU plug
	T9013283	3 wire, 3 prong Australia plug
		SPARE FUSE
	Q0000002	1A (100–117 VAC)
	Q0000001	0.5A (200–234 VAC)
	Q0000003	2A (DC)
	R3086910B	PLASTIC STAND (H)

FRV-8800 VHF CONVERTER UNIT (D3000378)

Symbol No.	Part No.	Description
	F2664100	Printed Circuit Board
		IC
Q8027	G1090080	μPC78L08
		FETs
Q8001–8003, 8010,8011	G4800730G	3SK73GR
Q8005,8006	G4800740L	3SK74L
		TRANSISTORS
Q8024–8026	G3107331P	2SA733AP
Q8018,8019, 8021–8023	G3304580B	2SC458B
Q8007	G3305350B	2SC535B
Q8012–8017	G3319230O	2SC1923-O
Q8004	G3333550	2SC3355
		DIODES
D8001–8006	G2090312	Si 1SS85
D8007–8012	G2090237	" MA190
D8013–8016	G2090192	Zener RD7.5EB3
		CRYSTALS
X8001	H0102612	HC-18/U3P 84.945MHz
X8002	H0102613	" 103.945MHz
X8003	H0102614	" 122.945MHz
X8004	H0102615	HC-18/U 21.055MHz
		RESISTORS
R8031,8041,8043, 8049,8071,8073, 8107	J02245220	Carbon film 1/4W 22Ω SJ
R8059,8061	J01215220	" " 1/8W 22Ω TJ
R8001,8020,8033, 8062,8063, 8131–8134	J02245470	" " 1/4W 47Ω SJ
R8040	J01245470	" " " 47Ω TJ
R8042,8058,8060, 8070,8072	J01215470	" " 1/8W 47Ω "
R8002,8006,8008, 8013,8016,8021, 8025,8032,8047, 8051,8065,8077, 8086,8095,8104, 8114,8118	J02245101	" " 1/4W 100Ω SJ
R8110	J02245151	" " " 150Ω "
R8007,8015,8023, 8053,8074,8075, 8082,8091,8100	J02245221	" " " 220Ω "
R8034,8044,8045, 8052,8085,8094, 8103,8117	J02245331	" " " 330Ω "
R8003,8004,8010, 8014,8018,8029, 8046,8109	J02245471	" " " 470Ω "
R8009,8017,8026	J02245681	" " " 680Ω "
R8024,8080,8089, 8098,8099,8105	J02245102	" " " 1kΩ "
R8012,8037,8069, 8113	J02245152	" " " 1.5kΩ "
R8076,8081,8090	J02245222	" " " 2.2kΩ "
R8064,8108,8112	J02245332	" " " 3.3kΩ "
R8050,8068,8079, 8084,8088,8093, 8097,8102,8116	J02245472	" " " 4.7kΩ "
R8048	J02245562	" " " 5.6kΩ "
R8027,8078,8083, 8087,8092,8096, 8101,8106,8111, 8115,8119,8121, 8123,8125–8130	J02245103	" " " 10kΩ "
R8030,8039,8055, 8067	J02245223	" " " 22kΩ "
R8057	J02245333	" " " 33kΩ "
R8120,8122,8124	J02245473	" " " 47kΩ "

R8054	J01245104	Carbon film 1/4W 100kΩ TJ	C8132	K02175101	Ceramic 50WV 100pF CH (DD107CH101J50V)
R8005,8011,8019, 8035,8038,8056, 8066	J02245104	" " " 100kΩ SJ	C8001,8002, 8007–8010, 8012, 8017–8019, 8024–8027, 8029, 8034–8036, 8041–8044, 8046, 8051–8054, 8058,8062,8089, 8090,8094,8096, 8098–8100, 8104,8106, 8108–8110,8114, 8116,8118,8152	K12171102	" " 0.001μF E (DD104E102P50V)
R8036	J02245224	" " " 220kΩ "			
R8028	J02245105	" " " 1MΩ "			
		POTENTIOMETER			
VR8003,8004	J51745471	H0651A005-470B 470ΩB			
VR8001,8002	J51745103	H0651A013-10KB 10kΩB			
		CAPACITORS			
C8079	K00172010	Ceramic 50WV 1pF SL (DD104SL010C50)	C8055–8057, 8059–8061, 8064,8065, 8071–8073, 8076, 8083–8085, 8087,8088, 8120–8123, 8127–8130, 8133,8136,8137, 8139–8146, 8149–8151	K13179008	" " 0.01μF (DD106F103Z50V)
C8013,8015	K00172159	" " 1.5pF " (DD104SL1R5C50)			
C8004,8021,8030, 8032,8038,8039, 8047,8049	K00172020	" " 2pF " (DD104SL020C50)			
C8003,8086	K00172030	" " 3pF " (DD104SL030C50)			
C8105,8135	K00172040	" " 4pF " (DD104SL040C50)	C8075	K40179014	Electrolytic 50WV 10μF (50RE10)
C8003,8022,8045	K00172050	" " 5pF " (DD104SL050C50)			
C8011,8048	K00173070	" " 7pF " (DD104SL070D50)			
					TRIMMER CAPACITORS
C8014,8016,8028, 8050,8067,8069, 8097,8119	K00173090	" " 9pF " (DD104SL090D50)	TC8001–8004	K91000086	CTZ51E117 20pF
C8031,8033,8037, 8095,8115	K00173100	" " 10pF " (DD104SL100D50)			**INDUCTORS**
			L8001,8002	L1190151	LHL06NA1R0M 1μH
C8102,8103	K02173100	" " 10pF CH (DD104CH100D50)	L8003–8005,8018	L1190163	LHL06NA100K 10μH
			L8006,8013,8015, 8017,8021–8032	L1190165	LHL06NA150K 15μH
C8124,8126	K00175120	" " 12pF SL (DD104SL120J50)	L8007,8011,8016	L1190071	FL4H-R47M 0.47μH
C8020,8063,8074, 8080,8082,8107	K05175120	" " 12pF RH (DD104RH120J50)	L8008,8010	L1190153	LHL06NA1R5M 1.5μH
			L8009	L1190032	RF3855R27K 0.27μH
C8117	K00175150	" " 15pF SL (DD104SL150J50)	L8012,8014,8019, 8020	L1190109	FL3H-R33M 0.33μH
C8078	K05175150	" " 15pF RH (DD104RH150J50)			
C8070,8138	K00175180	" " 18pF SL (DD104SL180J50)			**TRANSFORMERS**
			T8001,8011–8015	L0021461	
C8091,8111	K02175180	" " 18pF CH (DD104CH180J50)	T8002–8005,8032	L0021459	
			T8006–8010	L0021460	
C8092,8112,8113, 8131,8134	K02179009	" " 22pF " (DD104CH220J50)	T8016,8017,8019, 8020	L0021462	
C8150	K00175270	" " 27pF SL (DD104SL270J50)	T8018,8022,8023	L0021464	
			T8021,8024	L0021463	
C8101,8102	K02175270	" " 27pF CH (DD105-257CH270J50)	T8025	L0021482	
			T8026,8028	L0021465	
C8125	K02175330	" " 33pF SL (DD104SL330J50)	T8027,8029–8031	L0021466	
			T8033,8034	L0021467	
C8093	K02179015	" " 43pF CH (DD106CH430J50)	T8035	L0021497	
			T8036	L0021511	
C8066	K00175470	" " 47pF SL (DD104SL470J50V)	T8037	L0021484	
C8068	K00175560	" " 56pF " (DD104SL560J50V)			
					CONNECTORS
C8006,8023,8040, 8077,8081	K00175101	" " 100pF " (DD105SL101J50V)	J8001	P1090194	FM-MR-M2
			J8002	P0090212	S11B-XHA

		SWITCH			
S8001	N6090053	HSW0273			
		TERMINAL POSTS			
	Q5000026	TP-F			
	L9190016	Coil Shield Case			