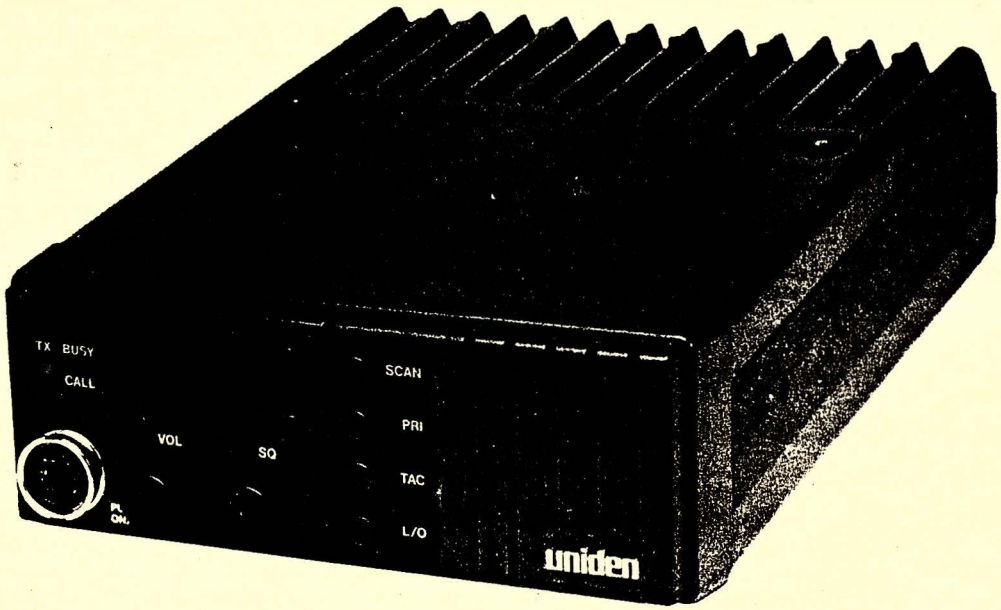
uniden®

SMH 400D

150 to 174 MHz



uniden®
UNIDEN AMERICA CORPORATION
Cellular Communications Division
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Fort Worth, TX 76155
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CC SM 38
Revision 1

SERVICE MANUAL

Safety Information

Through the provisions of the Occupational Safety and Heath Act of 1970 (OSHA), the United States Department of Labor has established an electromagnetic safety standard which applies to the use of two-way radio equipment. The proper use of this transceiver will result in exposure below OSHA limit.

The following precautions shall be observed:

WARNING

DO NOT operate the transmitter of any radio equipment with the antenna touching, or close to the eyes, face, or exposed body parts.

DO NOT operate the transmitter of any radio equipment unless all the Radio Frequency (RF) connectors are secure and any open connectors are properly terminated.

DO NOT operate the transmitter of any radio equipment near electrical blasting caps or in an explosive atmosphere.

DO NOT let children operate any transmitter-equipped radio equipment.

Have your radio equipment installed and serviced by a qualified technician.

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Specifications

The SMH 400D meets or exceeds the following specifications:

General	
Available Channels:	36
Frequency Range:	
150 MHz to 174 MHz	
Power Source:	13.6 VDC (negative ground only)
Size:	2.05"H x 5.5"W x 7.5"D (52mm x 140mm x 190mm)
Weight:	5.0 lb. (2.3 kg)
Current Drain @ 13.6 VDC:	
TX:	8.0 A
RX:	1.0 A
SQ:	600 mA
Operating Temperature Range:	-30° C to +60° C
Channel Spacing:	30 kHz
Channel Resolution:	5.0 kHz
Frequency Control:	Synthesized PLL
Frequency Resolution:	5 kHz

Transmitter	Conforms to EIA RS-152-B
RF Output (variable to 50%):	40 W
Operating Bandwidth without Degradation:	24 MHz
Frequency Stability:	±0.0005%
Modulation:	16KOF3E
Spurious and Harmonics:	-70 dB
FM Hum and Noise:	-45 dB
Modulation Frequency Response:	+1,-3 dB from 300 to 3000 Hz
Audio Distortion:	3%THD @ 1000Hz, ±3 kHz

Receiver	Conforms to EIA RS-204-C
Modulation Acceptance:	7.5 kHz
Operating Bandwidth without Degradation:	24 MHz
Sensitivity:	
20 dB Quieting:	0.35 µV
12 dB Sinad:	0.25 µV
Squelch:	0.15 µV
Selectivity:	-75 dB
Intermodulation Rejection:	-70 dB
Frequency Stability:	± 0.0005%
Spurious Response:	-70 dB
Image (greater than):	-80 dB
Audio Output:	5 W @ 4Ω, 10% THD

This equipment conforms to MIL-STD-810D for rain, salt fog, dust, vibration, and shock.

Specifications are subject to change without notice.

Introduction

Scope of Manual

This service manual is intended for use by experienced technicians familiar with similar types of equipment. The manual contains all service information required for the equipment described and is current as of the printing date. Changes that occur after the printing date are incorporated by Service Manual Revisions. The revisions are added to the manual as engineering changes are incorporated into the equipment.

Technical Support

Technical Assistance and information is available from the Technical Support Group during normal work days between the hours of 8:00 A.M. and 5:00 P.M. Central Time. You may reach the Technical Support Group by writing to:

UNIDEN AMERICA CORPORATION
Commercial Communications Division
Technical Support
4700 Amon Carter Boulevard
Fort Worth, Texas 76155

Or by telephone:
1-800-445-5017

Licensing

Before using your transceiver, it must be properly licensed by the Federal Communications Commission (FCC) and properly installed. Your Uniden Dealer will be able to help you with any or all of these requirements and will be there to help you with all your future communications needs.

Replacement Parts

Replacement parts are available through the Uniden Parts and Service Division located in Indianapolis, Indiana. When ordering replacement parts, please use the complete identification number of the part. If the identification number is not known, the order should contain the Part Symbol Number, the Unit Model Number, and a description of the part so that the part may be properly identified. Parts orders may be placed by writing to:

UNIDEN AMERICA CORPORATION
Parts and Service Division
Commercial Communications Department
8707 North by Northeast Blvd.
P.O. Box 501368
Indianapolis, IN 46250

or by telephone: 1-317-842-2483
or by FAX: 1-317-323-2641

Ordering Additional Manuals

To order additional copies of this Service Manual, CC SM 38, Revision 1, send order to:

UNIDEN AMERICA CORPORATION
Parts and Service Division
Commercial Communications Department
8707 North by Northeast Blvd.
P.O. Box 501368
Indianapolis, IN 46250

or by telephone: 1-317-842-2483
or by FAX: 1-317-323-2641

Installation

Planning the Installation

The SMH 400D radio can perform reliably if you install all the parts properly. A bad installation may result in adverse vehicle operation. Before you start installation make sure that you have all of the parts, tools, and test equipment used in the installation. Also make sure that all the parts operate properly and that you have thoroughly planned the mounting locations. If you do this, you can avoid problems and save time. Remember that planning is the key to a good installation.

Adverse Vehicle Operation

The installation of radio equipment in certain vehicles may adversely affect vehicle operations, such as:

- Engine performance
- Driver information systems
- Anti-skid braking systems
- Electrical charging systems
- Entertainment systems

Uniden America Corporation is not responsible for the cost to protect the vehicle from adverse operations following the installation of radio equipment.

Unpacking

Carefully unpack the SMH 400D radio and make sure that you have all of the following:

- Transceiver mounting bracket
- Transceiver
- Microphone hang-up bracket
- Microphone
- Power cable with fuse holder
- Antenna
- Operator's Guide (Read carefully and save)

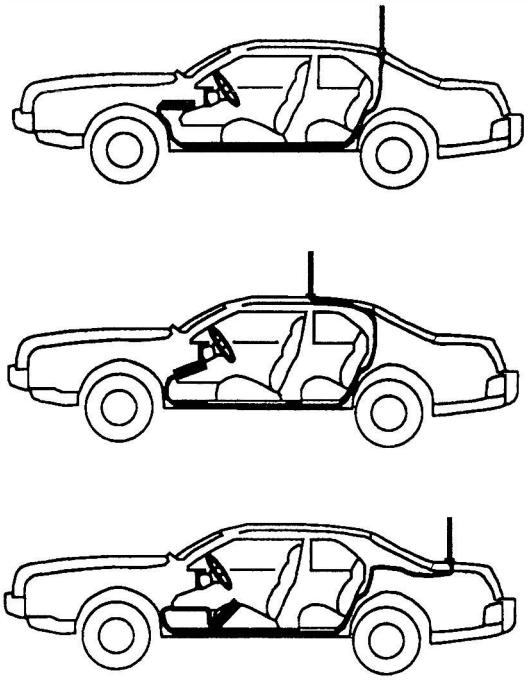
If any radio equipment is missing or damaged, notify the distributor.

Operational Tests

Before you install the transceiver in a vehicle, make sure that it operates properly. All Uniden transceivers are factory tested and are in working order when shipped; however, shipping may affect the unit's alignment. Perform an operating test with all parts connected that are used in the final installation. Check the transmitter's output power, frequency, and deviation; the receiver's sensitivity, squelch operation, audio power, and distortion; and CTCSS. Do not install any part that has a problem. Correct any problems before installing the transceiver.

Transceiver and Antenna Mounting Locations

The transceiver, and the antenna can be installed in a number of places on the vehicle. The following illustrations show possible locations for each of these components.



When you plan the location of the components, keep the following precautions in mind to make installation easier and to make sure that the installed parts and the vehicle work properly:

- Plan the locations of the components so that they will not interfere with the driver's vision or operation of the vehicle.
- Plan the locations of the components so that all controls and displays can be viewed and easily accessed by the operator.
- Avoid unnecessary disturbing of the vehicle's electrical system.
- Use existing passages in the dashboard, trunk, and floor to avoid excessive drilling.
- When you drill holes, be careful not to damage other components of the vehicle.
- When you route wiring or cables through holes or other locations with sharp edges, be careful not to damage the insulation. After you route the wiring or cables through these locations, seat the wiring or cables with a grommet or other means to avoid future insulation damage due to normal vibration and use.
- Avoid locations that may involve moving parts, such as seat or window mechanisms.
- Avoid locations that may expose the parts to moisture.

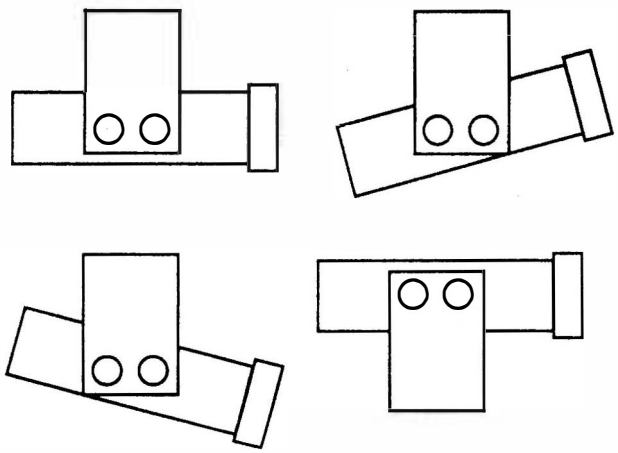
Installing the Transceiver

The SMH 400D transceiver is small enough to fit almost anywhere. You can install it under the dash, seat, or in any other convenient location. Plan the location for mounting the transceiver so that all controls and displays can be viewed and easily accessed by the operator, but the location does not obstruct the driver's vision. The antenna cable, power cord, and the external speaker wiring connect at the rear of the radio. The radio can be mounted in any position on any suitable surface without affecting performance. The mounting bracket can be used to mount the radio above or below the mounting surface. Keep the following in mind when you install the transceiver:

- Make sure that air can circulate around the transceiver and that nothing is placed directly on top of it.
- Check all moving seat parts and doors to avoid contact with cables or connectors.
- Allow ample room to access connectors.

To install the transceiver:

1. Securely mount the transceiver mounting bracket to a structural member of the vehicle, using the hardware provided.
2. Slide the transceiver into the mounting bracket and tighten the knurled knobs until they secure the transceiver to the mounting bracket.



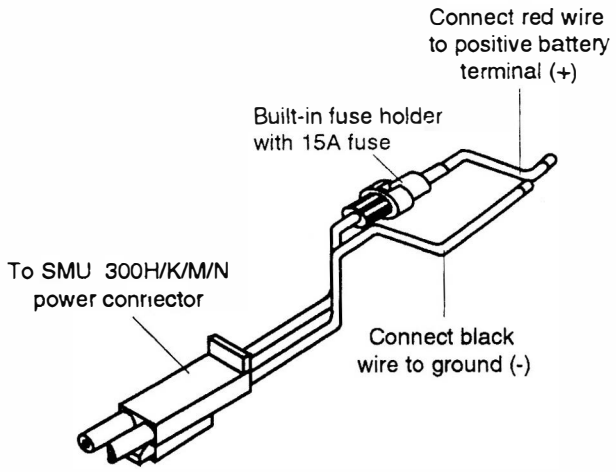
Installing the Antenna

Each vehicle model and body style reacts differently to radio frequency energy. How you install the antenna can effect the range and quality of communications.

Before you mount an antenna on a vehicle, use a magnetic mount antenna to check the proposed antenna location for any undesired effects on the vehicle. After you check the proposed antenna location for problems, mount the antenna used in the final installation according to the manufacturer's instructions. The permanent body mount antenna or the magnetic mount antenna has the best performance when mounted in the center of the roof or rear deck lid. The glass mount antenna has the best performance when mounted in the center of the upper edge of the rear window, side window, or windshield.

After you mount the antenna, route the antenna cable through channels in the vehicle's body and as far as possible from the electrical system. This reduces the amount of RF energy that may leak into the electrical system. When you route the antenna coaxial cable through holes or other locations with sharp edges, be careful not to damage the insulation. After you route the cable through these locations, seat the cable with a grommet or other means to avoid future insulation damage due to normal vibration and use. Make sure that the coaxial antenna cable is protected from moisture, moving parts, and passengers. Connect the antenna cable to the antenna jack on the transceiver.

Refer to the antenna manufacturer's instructions for antenna tuning. This adjustment must be done with the antenna and the radio installed and connected. The antenna has the best performance if its voltage standing wave ratio (VSWR) is kept as small as possible on all transmit channels. Do not exceed a VSWR of 1.5:1.



Connecting the Power

This radio is designed to operate on a 13.6 VDC, 10 ampere power source, with a negative ground. Connect the power cables directly to the battery terminals. Install the inline fuse holder as close as possible to the positive terminal of the battery. Before you connect the power cable to the transceiver, make sure that all of its fuses are properly installed. Connect the wires in the power cable as follows:

- Red wire to positive terminal of battery.
- Black wire to negative terminal of battery.

If the transceiver is not mounted in the dash area, route the power cable to the door sills and along the door sills to the dash area. From the dash area, route the power cable through the fire wall into the engine compartment and then to the battery. If the power cables must cross to the other side of the vehicle, route the cables to the front of the engine compartment and then cross over to the battery. When you route the power cable through holes or other locations with sharp edges, be careful not to damage the insulation. After you route the power cable through these locations, seat the power cable with a grommet or other means to avoid future insulation damage due to normal vibration and use. Make sure that the power cable is

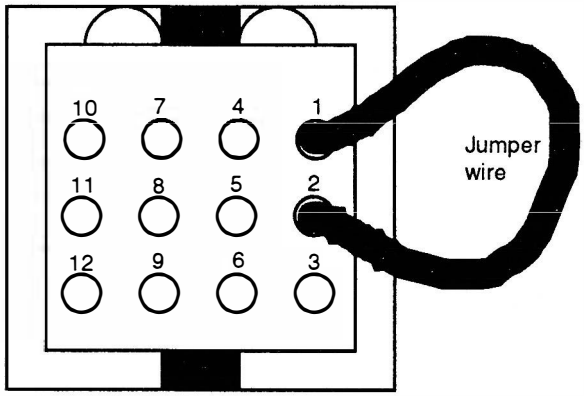
protected from moisture, moving parts, passengers, and engine heat in the engine compartment.

Microphone

Do not use a preamplified microphone with this radio. The audio portion of this radio is adequate; preamplification is not necessary. Mount the microphone hang-up bracket within reach of the microphone cord. If the radio operates with CTCSS, make sure that the microphone hang-up bracket is electrically grounded. Connect the microphone to the microphone jack at the front of the radio.

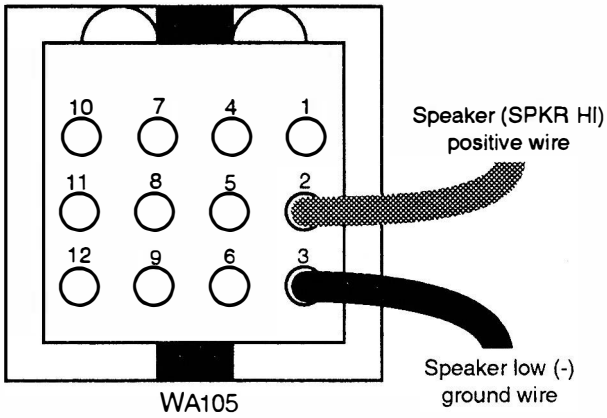
Built-in or External Speaker

If an external speaker is not used, make sure that a jumper wire connects pins 1 and 2 of the speaker jumper plug. Place the speaker jumper plug in the accessory socket at the rear of the radio.



WA105

If an external speaker is used, make sure that you have the speaker properly connected to the speaker jumper plug. Make sure that you have the speaker's positive wire connected to pin 1 of the speaker jumper plug jumper and the speaker's negative wire connected to pin 2 of the speaker jumper plug. The external speaker may be mounted at any convenient location in the vehicle. Plan the location of the external speaker so that it does not obstruct the driver's vision. Protect the external speaker from moisture, moving parts, and passengers. Place the speaker jumper plug in the accessory socket at the rear of the radio.



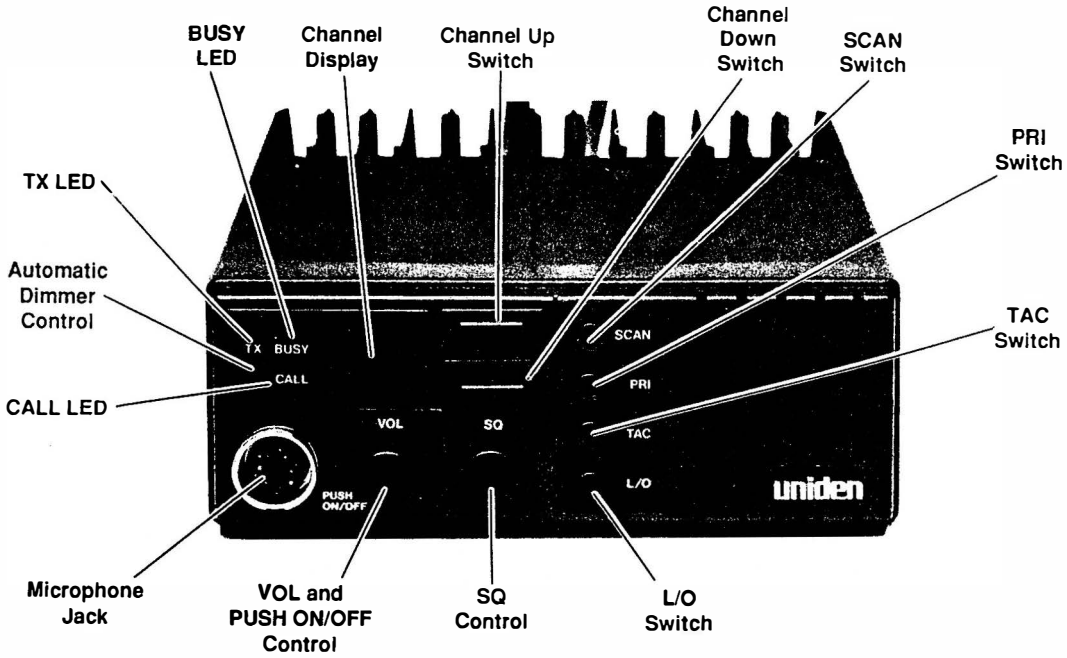
WA105

Troubleshooting Installation Problems

If any problem appears following installation, determine the cause of the problem and correct it before operating the vehicle. Some possible sources of problems are:

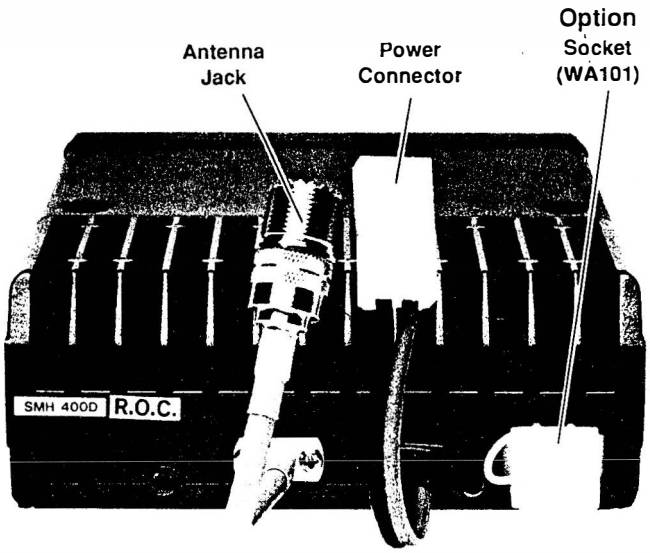
- Power cable connected to points other than battery.
- Antenna location.
- Poor shielding or connections on the wiring or cables.
- Transceiver wiring located too close to the vehicle's electrical system.

Controls and Indicators



On/Off Volume Control (PUSH ON/OFF and VOL)	Press this control to switch the radio's power on or off. Rotate this control clockwise to increase the volume or counterclockwise to decrease the volume.
Microphone Jack	DIN 5-pin connector. Use only supplied microphone or approved option for optimum communications.
Call Indicator (CALL)	This yellow LED lights and remains on when your radio receives a frequency with the proper CTCSS tone or DCS code. Press the PTT switch to turn off the Call LED.
Automatic Dimmer Control	This control adjusts the intensity of the radio's indicators. If the ambient light level increases, the intensity of the radio's indicators increases. If the ambient light level decreases, the intensity of the radio's indicators decreases. This control calls for no operator adjustments.
Transmit Indicator (TX)	This red indicator lights when you press the PPT switch and shows that the radio is transmitting.
Busy Indicator (BUSY)	This yellow indicator lights if a carrier is present on the receive channel. This shows transmit activity on the channel by another radio.
Channel Display	This green LED display shows the current channel number.
Channel Up/Channel Down Switches	Press the Channel Up Switch to increment the channel number shown in the Channel Display. Press the Channel Down Switch to decrement the channel number shown in the Channel Display.
Scanner Switch (SCAN)	Press this switch to turn the scan feature on or off. Leave the scan feature on if you want to monitor the transmit activity of other radios. When you remove the microphone hang-up button from ground, the scan feature pauses. When you ground the microphone hang-up button, the scan feature resumes.

Receive Priority Switch (PRI)	Press this switch to turn the receiver's priority channel feature on or off. With priority on, the scan feature looks at the priority channel every 5 milliseconds.
Talk-Around-Channel Switch (TAC)	Press this switch to turn the talk-around channel (TAC) feature on or off. With TAC on, radio communication does not need a repeater station.
Lockout Switch (L/O)	Press this switch to change the lockout status of the channel shown in the channel display. If you press this switch and the channel display flashes, the current channel is locked out (ignored) by the scan feature. If you press this switch and the channel display glows steadily, the displayed channel returns to the scan sequence. If you turn the radio off or remove its power supply, the radio retains the lockout settings.
Squelch Control (SQ)	Rotate this control clockwise to increase or counterclockwise to decrease the squelch sensitivity of the receiver. When you first switch the radio on, rotate this control fully clockwise. Adjust the volume to a comfortable level. Rotate the squelch control counterclockwise until all background noise disappears.



Antenna Jack	Connects the radio with the antenna.
Option Socket	Connects the radio with an optional external speaker.
Power Connector	For 13.8 VDC supply (positive polarity only).

Operating Instructions

1. Press the On/Off Volume Control to switch the radio on.

2. Adjust the volume to a comfortable level by rotating the On/Off Volume Control clockwise to increase the volume or counterclockwise to decrease the volume.

3. Press the Channel Up Switch or the Channel Down Switch until the channel you want appears in the Channel Display.

4. Rotate the Squelch Control fully clockwise.

5. Rotate the Squelch Control counterclockwise until all background noise disappears. For the best operation, leave the Squelch Control in this position. Continuing to rotate the Squelch Control counterclockwise, results in decreased receiver sensitivity.

6. Do the following if you want to use the scan feature:

   a. Press the Priority Switch if you want to set the priority feature on.

   b. Use the Channel Up Switch and the Channel Down Switch to choose a channel. Press the Lockout Switch to lock the channel out of the scan sequence.

   c. Press the Scan Switch to start the scan feature.

7. Before you transmit, listen for any messages on the channel.

8. When there is no activity on the channel, press the PTT (Push-to-Talk) switch and begin transmitting. The Transmit Indicator will light. For the best transmission, hold the microphone about two inches in front of your mouth. Speak clearly and in a normal conversational voice.

9. When you finish speaking, immediately release the PTT switch and listen for a reply.

Description

The SMH 400D radio is a microprocessor-controlled VHF mobile business radio with 36-programmable receive channels and 36-programmable transmit channels. The SMH 400D radio produces a rated RF (radio frequency) power output of 40 to 45 watts at the antenna connector. It operates in the frequency range of 150 MHz to 174 MHz

The SMH 400D radio has the following built-in features:

- 38-EIA CTCSS (Continuous Tone-Control Squelch System) tones
- 104-DCS (Digital Coded Squelch) codes
- Talk-Around-Channel
- 1-Scan Priority channel
- 36-Scan Lockout Channels
- Selectable Scan Dwell Time
- Selectable Dropout Delay Time
- Time-Out Timer
- 36-programmable receive channels
- 36-programmable transmit channels.

For the operator to use these features, you must program the SMH 400D radio with the AMX 500C PROM Programmer.

Theory of Operation

To better understand the theory of operation of the SMH 400D refer to the block diagram (page 17) and appropriate schematic diagrams (beginning on page 29).

Phase Locked Loop

The Phase Locked Loop consists of IC403 (PLL IC), IC402 (the prescaler), Q401 (the active low pass filter), IC401 (the voltage controlled oscillator, X401 (the reference crystal), and a microprocessor programming circuit.

The PLL IC (IC403) has a programmable reference counter, and programmable "N" and "A" counters. The counters are programmed serially through a common data input (pin 10) and latched into the appropriate counter latch, according to the last data bit (control bit) entered. The PLL IC has the logic circuitry to control an external dualmodulus prescaler.

The prescaler (IC402) has a dividing ratio of 64 or 65 which is determined by the modulus control output from IC403, pin 12. A 12.8 MHz crystal, X401, is connected to pins 1 and 2 of the PLL IC (IC403) to form the reference oscillator. This reference frequency is then divided by 1024, to produce a 12.5 kHz reference frequency. This 12.5 kHz reference frequency is internally applied to the phase detector section of IC403, and to pin 13 of IC403. The phase detector compares the divided VCO frequency to the reference frequency and issues an error signal which forces the VCO frequency higher or lower until a lock condition occurs.

In the receive mode the VCO (IC401) oscillates 45.1 MHz above the receive channel frequency. In the transmit mode the VCO (IC401) oscillates on the transmitting frequency. The VCO frequency is shifted by the data sent from the microprocessor each time the PTT is pressed. The output of the VCO (IC401) is buffered by Q205 before being fed to the prescaler (IC402) and used as the injection frequency for the receiver and transmitter.

The signal from the prescaler is fed to the "A" and "N" counters (IC403, pin 8.) The output of these counters is fed to the phase detector and compared to the reference signal. The phase detector output, pins 15 and 16 of IC403, is connected to the active lowpass filter, Q401. The output of Q401 controls the VCO frequency.

When the PLL is outoflock, pin 7 of IC403 pulses low, turning Q204 OFF; this in turn, inhibits the transmitter by turning Q202 OFF and removing the supply voltage to Q203, the TX amplifier.

The 12.800 MHz crystal (X401) is temperature compensated by a thermistor (TH401) and a heater (Q407). As the ambient temperature drops below -51 C the resistance of the thermistor (TH401) increases, causing Q405 to draw more current and Q406 to supply more current to Q407, thereby heating the crystal and thus maintaining the frequency stability. All other components that may have an effect on the frequency stability have been selected to have a minimal change with temperature.

Speech Amplifier

The output of the dynamic microphone is amplified by the speech amplifier, Q206 and Q207. The amplified speech is then fed to the speech limiter, IC201 1/2, and the active lowpass filter IC201 2/2. This low pass filter attenuates the frequencies between 3 kHz and 20 kHz by a factor of

at least 60 Log10 (F/3) dB, and frequencies above 20 kHz by at least 50 dB. Transistor Q208 clamps the output of the speech amplifier to ground during the receive mode.

Frequency Modulator

The output of the speech amplifier is fed to the modulator inside the VCO and through the modulation limit control (VR202) varactor diode, D402. Varactor diode D402 modulates the reference crystal. The VCO is frequency modulated by the audio signal that is applied to it. This modulated RF signal is then applied to the VCO buffer, Q411, before being used as the transmit frequency or the first receive injection frequency.

RF Power Amplifier

The signal, at the proper transmit frequency and containing modulation, is fed to Q201, Q203, and Q205 which operate as RF amplifiers to provide sufficient drive level to the RF power amplifier. Transistors Q301, Q302, and Q303 form the RF power amplifier which increases the output power to 30 watts. The signal then passes through a tunedoutput circuit to transform the collector impedance of Q303 to 50 ohms. The signal is applied to a solid state transmit/receive switch, D301, followed by a lowpass filter that suppresses transmitter harmonics.

Power Controls

The ALC (Automatic Level Control) circuit consists of IC 301, Q306, Q307, and VR301. The ALC monitors the transmitter's forward power and controls the collector current to Q301 to maintain 30 watts of output power under varying load conditions.

Receiver RF Section

The receive signal is directed to the triple-tuned helical resonator FL101 by the solid state transmit/receive switch D301. The input of the receiver is overload protected by diodes D801 and D802. The signal is then amplified by Q101 and passed through a triple-tuned helical resonator, FL102, to the first mixer.

The first mixer is composed of Q102 and L108. The receive VCO frequency is buffered by Q103 and filtered by FL103 before being fed to the gate of Q102 and mixed with the received signal to produce the first I.F. of 45.1 MHz.

First and Second I.F.

The output of the first mixer, at L108 is passed through a 45.1 MHz crystal filter, FL105 and tuned inductor L110, to obtain the desired selectivity. The signal is then amplified by Q105 and filtered again by FL106 and F112 to improve the selectivity. The I.F. signal is then applied to pin 7 of IC101. This integrated circuit contains the second mixer and second local oscillator. A 44,645 MHz crystal, X101, is connected to pins 1 and 3 of IC101 to complete the second local oscillator. The output of the second mixer, is passed through two 455 kHz ceramic filters, FL107 and FL108, then applied to the amplifiers, limiter and quadrature detector of IC101. The recovered audio is available at pins 10 and 11 of IC101.

Squelch Gate

The unmuted audio from IC101 pin 10 is amplified by the noise amplifier, Q106, then fed to the squelch control, VR752, through the limit control, VR102, to the active highpass filter, IC103 2/2. The active highpass filter, IC103 2/2, allows the high frequency "rush" noise to pass. This noise

is rectified by D120 and D121, thus charging C160. In the absence of a carrier, C160 will remain charged keeping the output of IC103 1/2 low. When a RF carrier is present, the "rush" noise is reduced, thus allowing C160 to discharge through R121, causing the output of IC103 2/2 to go high. This high is fed to the microprocessor IC601 pin 40. The microprocessor sends mute data to IC101 pin 9 from pin 41 of IC601 through an inverter Q613.

Receiver Audio

The mute controlled audio signal from IC101 pin 11 is fed to active high pass filter IC102. The output of IC102 is fed to the audio power amplifier IC105 through the limit control, VR102, and the volume control, VR751. The audio power amplifier, IC105, amplifies the recovered audio to a level sufficient to drive the speaker. In the squelched mode the output of IC102 is clamped to ground by Q107.

TX, BUSY, CALL, and DISPLAY LEDs

The TX LED (D703) is activated by the microprocessor pin 56 through an inverter, Q615, when the PTT closure is received on pin 63 of IC601. The anode of D703 is connected to the emitter of Q701, dimmer circuit.

The BUSY LED (D705) is activated by the microprocessor pin 55 through an inverter Q616 when a busy indication is received on pin 40 of IC601. The anode of D705 is connected to the emitter of Q701, the dimmer circuit.

The CALL LED (D702) is activated by the microprocessor pin 60 through an inverter Q618 when a correct CTCSS tone or TwoTone is decoded by the microprocessor. The anode of D702 is connected to the emitter of Q701, dimmer circuit.

The DISPLAY LED (D701) receives data from microprocessor pin 54 which is loaded into two shift registers, IC752 and IC752. The clock signal for the shift registers is provided by the IC602 pin 52. During the time that the data is being loaded into the shift registers the STB line pin 53 is held low; thus, preventing the LED from flashing with the data stream. The anode of D701 is connected to the emitter of Q701, the dimmer circuit.

LED Dimmer Control

When the ambient light dims, the resistance of the CDS cell (Y701) increases reducing the current supplied to the base of Q701; thus, reducing the emitter voltage of Q701 causing the LEDs to dim.

Microprocessor

The microprocessor IC601 controls many of the transmit and receive functions of the transceiver. These functions include such items as channel selection, scan, audio muting, transmit keying, CTCSS and DCS encode/decode. The microprocessor also provides programming data for AMX 533 TwoTone option, if installed.

The microprocessor operates according to the instructions that are stored in its internal 4K x 8 byte ROM. This ROM is an integral part of the microprocessor chip and is maskprogrammed when the microprocessor is manufactured. In addition to the internal ROM, there is an external 256 x 8 bit E2PROM (IC603) which stores the information that is unique to the individual radio system, such as channel number and frequency, DCS or CTCSS codes, scan, priority channel, busy channel lockout, and timeout timer. The SMU 300 is field programmable using the AMX 500C, PROM Writer.

The operating speed of the microprocessor is determined by the crystal (X601) connected between pins 29 and 30 of IC601. The Xin port (IC601, pin 29) is the input to the internal oscillator, and the Xout port (IC601, pin 30) is the output of the oscillator which also provides the feedback to maintain oscillation. The oscillator frequency is divided into signals that become the microprocessor timing signals. A timing signal is output when serial data transfer takes place, for use as external synchronous timing.

The microprocessor has 57 I/O lines for use as input/output lines for data and control. These lines are broken up into six 8-bit and one 4-bit data ports and five control ports.

When the microprocessor sends data to the PLL, it is sent as synchronous serial data from IC601, pin 10 with clock pulses sent from IC601, pin 9. The PLL (IC403) receives reference counter data (16 bits of data followed by pulsing the enable line high, IC601, pin 57), followed by the "N" and "A" counter data (20 bits of data followed by pulsing the enable line high.) When the microprocessor sends data to the DISPLAY LED it is sent as synchronous serial data from IC601, pin 54 with clock pulses sent from IC601, pin 52. While data is being sent to the DISPLAY LED the IC601, pin 53 is held low, thus preventing the LEDs from flashing with the data stream. Each time the channel is changed, or the PushToTalk button is pressed, the microprocessor reads data from the E2PROM, and sends data to the PLL and LEDs.

The microprocessor is reset each time that power is applied to the unit, or when the voltage drops below the operating voltage of the microprocessor. When the operating voltage falls below 5 volts, Q608 starts conducting, thereby pulling the reset line low. As the voltage increases to the 5-volt level, Q608 stops conducting, pulling the reset line high, thus resetting the microprocessor.

Factory EEPROM Test Settings

When the SMH 400D is shipped from the factory, its EEPROM is programmed with the following EEPROM test settings:

Channel	Frequency (MHz) TX	Frequency (MHz) RX	Tone TX	Tone RX	Digital Squelch Mode	TAC
1	161.000	160.050	none	none	none	No
2	150.500	150.055	none	none	none	No
3	173.500	173.950	none	none	none	No
4	161.000	160.050	167.9 Hz	167.9 Hz	CTCSS	Yes
5	161.000	160.050	172.0 Hz	172.0 Hz	DCS	Yes
6	161.000	162.000	none	none	none	Yes
7	none	160.080	none	none	none	Yes
8	none	160.100	none	none	none	Yes
9	none	160.120	none	none	none	Yes
10	none	160.140	none	none	none	Yes
11	none	160.160	none	none	none	Yes
12	none	160.180	none	none	none	Yes
13	none	160.200	none	none	none	Yes
14	none	160.220	none	none	none	Yes
15	none	160.240	none	none	none	Yes
16	none	160.260	none	none	none	Yes
17	none	160.280	none	none	none	Yes
18	none	160.300	none	none	none	Yes
19	none	160.320	none	none	none	Yes
20	none	160.340	none	none	none	Yes

Time-Out Timer:	Not programmed	Busy Channel Lockout:	Not programmed
Priority Scan Channel:	2	Scan Dwell Time:	200 ms
		Dropout Delay Time:	3 seconds

Note: Any new data that is programmed into the EEPROM of the SMH 400D replaces the data that was previously programmed into the EEPROM. Some or all of the original factory test settings may have been replaced with the customer's data.

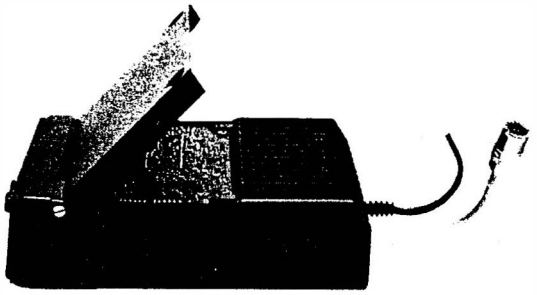
Exploded Mechanical View Parts List

Symbol	Part No.	Part Description
1	FCSY182386Z	Chassis
2	GCMF182387Z	Front Panel
3	GCMZ482388Z	Display Plate
4	GETC481501Z	Handle
5	GMSC480407Z	Mounting Screw
6	GNBP382389Z	Black Push Button
7	GNBP482390Z	Gray Push Button
8	GNBY482391Z	Knob
9	HCMB382393Z	Bottom Case
10	HCMT382394Z	Top Case
11	HHDE481579Z	IC Holder
12	HHDE482508Z	IC Holder
13	HHDS482396Z	Speaker Holder
14	HMHG482163Z	Microphone Hanger
15	HSDP382399Z	Shield Plate
16	HSDP382400Z	Shield Plate
17	HSDP482423Z	Shield Plate
18	HSDP482424A	Shield Plate
19	HTML481938Z	Earth Plate
20	HTML482425Z	Antenna Lug
21	HTML482455Z	Earth Lug
22	JDPA481900Z	Brand Badge
23	KDPT482433Z	Control Plate
24	LHDL409940Z	LED Holder
25	LHDL416362Z	LED Holder
26	LHDL482426Z	LED Holder
27	PLBF482449Z	ID Label
28	TSTD0200001	Knob Spring Plate
29	HCLR481788Z	Spacer
30	PLBZ411978Z	R.O.C Label
31	PLBZ482450Z	Model Number Label
32	RCUN482435Z	Spacer
33	SSCW103006N	M3X6 NI Pan Head Screw
34	SSCW103008N	M3X8 NI Pan Head Screw
35	SSCW133005N	M3X5 NI Flat Head Screw
36	SSCW193006B	M3X6 BNI Bind Head Screw
37	SSCW193006N	M3X6 NI Bind Head Screw
38	SSCW803010N	D3X10 NI P.Tight Bind Head Screw
39	HTML482567Z	Toucher
40	HSDP482575Z	Shield Plate
41	SSCW193004N	M3X4 NI Bind Head Screw
42	SSCW803008N	D3X8 NI P. Tight Bind Head Screw
101	HBCT382392Z	Mounting Bracket
102	SSCW235025N	D5X25 NI Tapping Pan Head Screw
103	SSCW293508N	D3.5X8 NI Tapping Round Head Screw
104	SSCW490050N	D5 NI Flat Washer
105	SSCW530035N	D3.5 NI Lock Washer
106	SSCW540050N	D5 NI Star Washer

Assembly/Disassembly

Top Cover Removal

1. Remove two top cover retaining screws.
2. Lift the top cover from the radio.

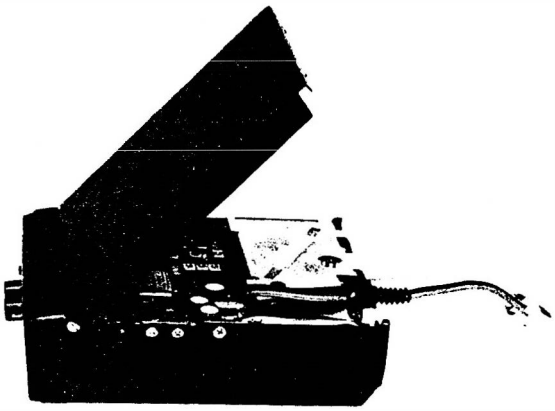


Top Cover Replacement

1. Align the tabs on the top cover with the slots on the radio and firmly press the top cover onto the radio.
2. Hold the top cover in place while you install and tighten the top cover retaining screws.

Bottom Cover Removal

1. Remove the two bottom cover retaining screws.
2. Lift the bottom cover from the radio.

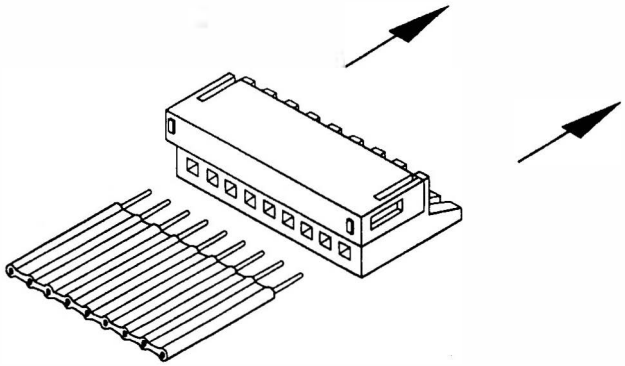


Bottom Cover Replacement

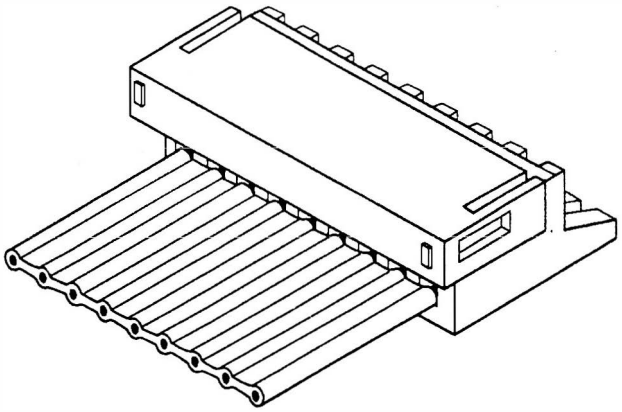
1. Align the tabs on the bottom cover with the slots on the radio and firmly press the bottom cover onto the radio.
2. Hold the bottom cover in place while you install and tighten the bottom cover retaining screws.

Removing and Replacing the Logic Board Ribbon Cables

Use caution when you remove or replace the ribbon cables that attach to J602, J605, and J606. Slide the sleeve on the top of the connector away from the ribbon cable to release the ribbon cable.



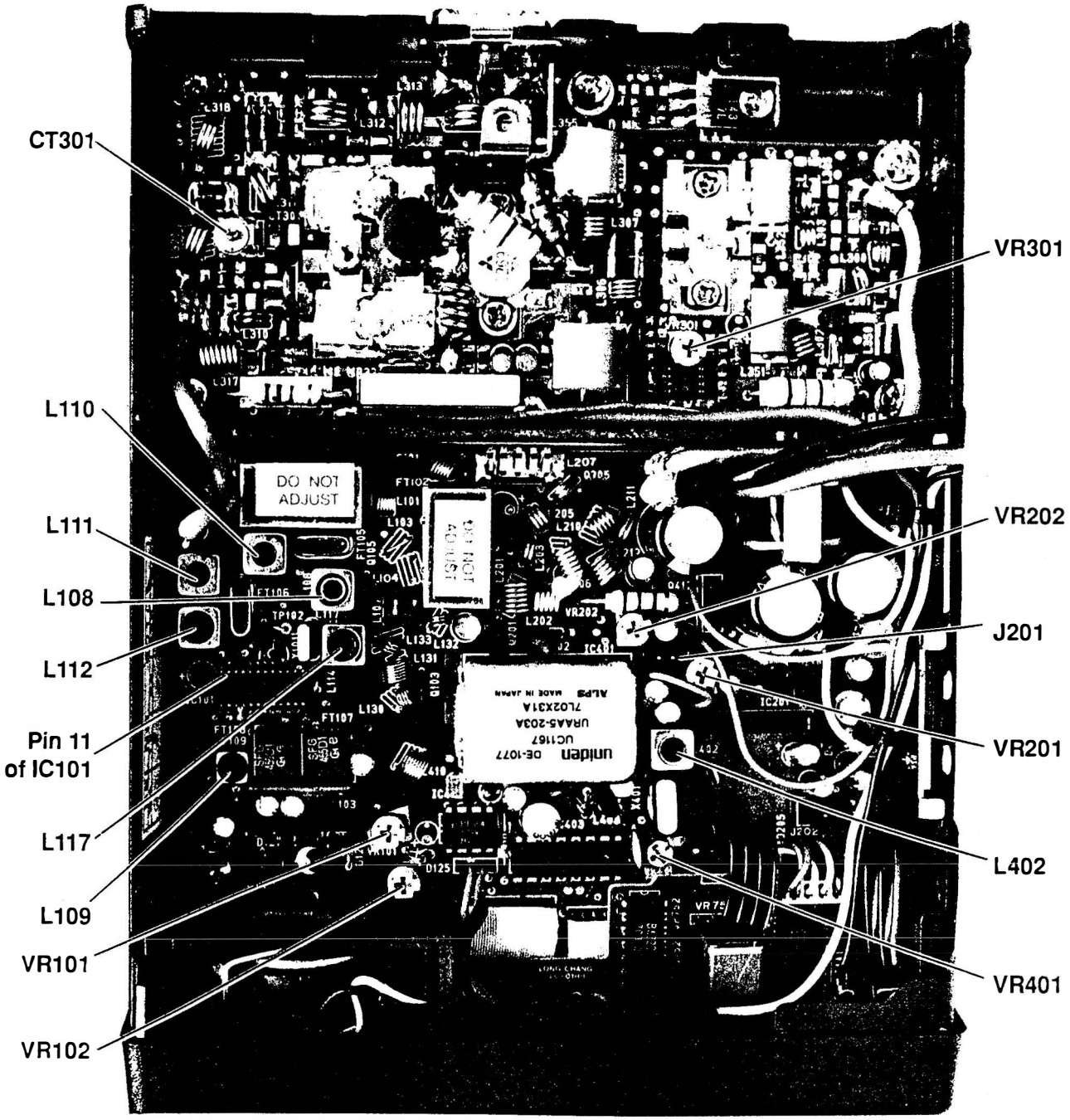
The sleeve should also be in this position when you replace the ribbon cable. When the ribbon cable is correctly inserted in the connector, slide the sleeve on the top of the connector towards the ribbon cable to lock it in place.



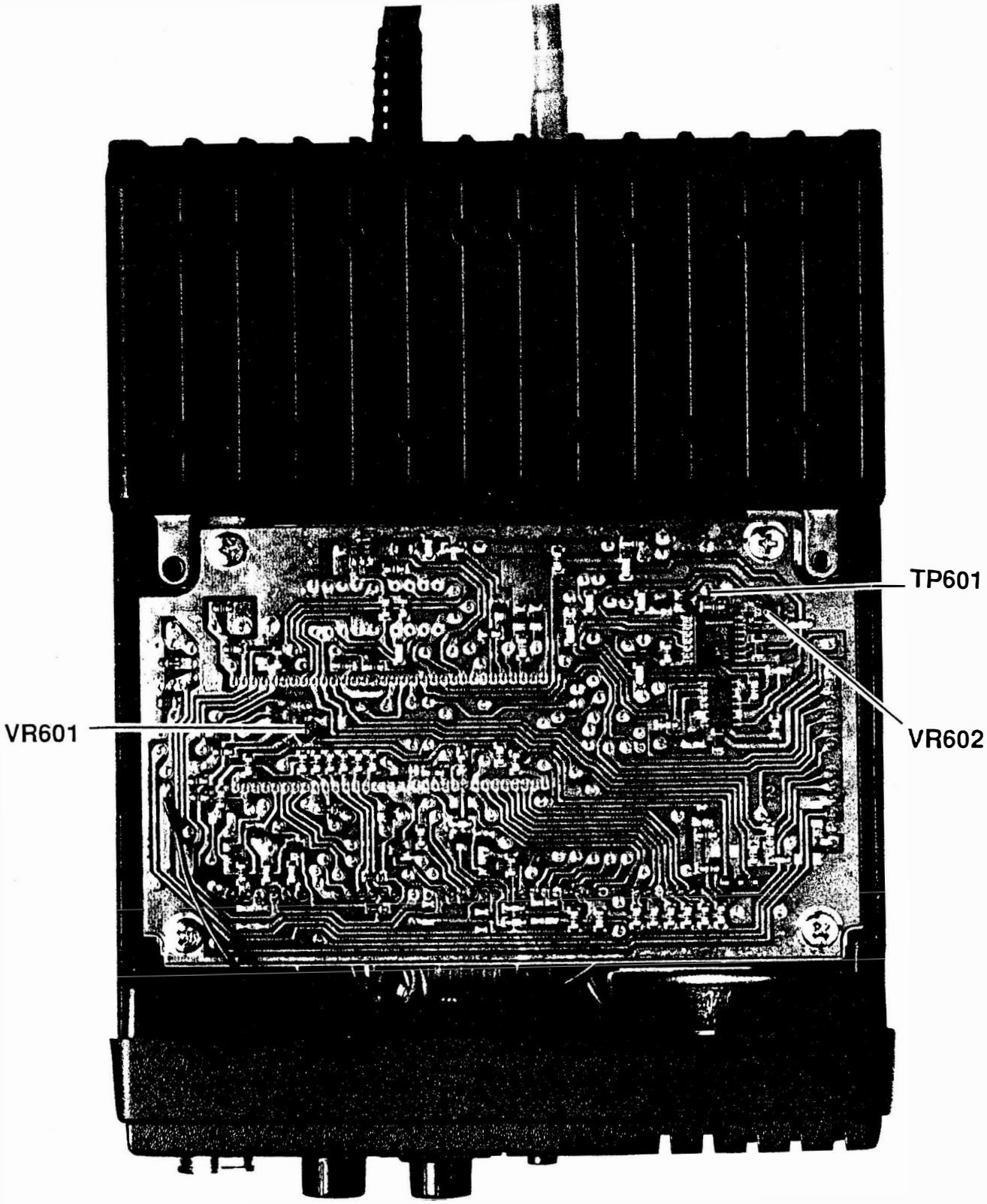
Alignment Procedures

Transmitter Alignment

Step	Channel	Adjust	Remarks
1			a. Connect frequency counter, deviation meter, RF power meter, and RF dummy load to antenna jack. b. Connect +13.6 VDC power supply to radio's power cord.
2			Turn radio ON.
3			Turn squelch control (SQ) fully clockwise to squelch receiver
4			Set VR201, VR202, and VR601 to middle position.
		Note: Always use a non-metallic adjustment tool to make adjustments.	
5	2	VR301 and CT301	Remove RF power amplifier PCB shield. Key transmitter and Power Control adjust VR301 for 42 watt reading on power meter.
6	3	CT301	Key transmitter and adjust CT301 for maximum reading on power meter.
7	2	VR301	Key transmitter and adjust VR301 for 42 watt reading on power Power Control meter.
8	1	VR301 Power Control	Key transmitter and verify that reading on power meter **does not** exceed 50 watts. Adjust VR301 if necessary. Typical power meter readings for channels 1, 2, and 3 should be: Channel 1 = 48 watts Channel 2 = 42 watts Channel 3 = 38 watts
9	2	L402 Reference Ocillator	Key transmitter and adjust L402 for 150.505 MHz (±200 Hz) reading on frequency counter.
10	3	VR401 CTCSS Deviation	Key transmitter and adjust VR401 for 173.500 MHz (±200 Hz) reading on frequency counter.
11			a. Connect frequency counter, deviation meter, and RF dummy load to antenna jack. b. Connect AF signal generator to either pin of J201 with 2.7 k Ω resistor.
12	2	VR202 Voice Deviation	Set AF signal generator to 1 kHz at 1 Vrms. Key transmitter and adjust VR202 for 2 kHz reading on deviation meter.
13	4	VR601 CTCSS Deviation	Key transmitter and adjust VR601 for 750 Hz (± 50 Hz) reading on deviation meter.
14	1	VR201 Total Deviation	Set AF signal generator to 1 kHz tone with 30 mVrms level. Input this signal to audio input of microphone jack. Key transmitter and adjust VR201 for 4.7 k Hz reading on deviation meter.



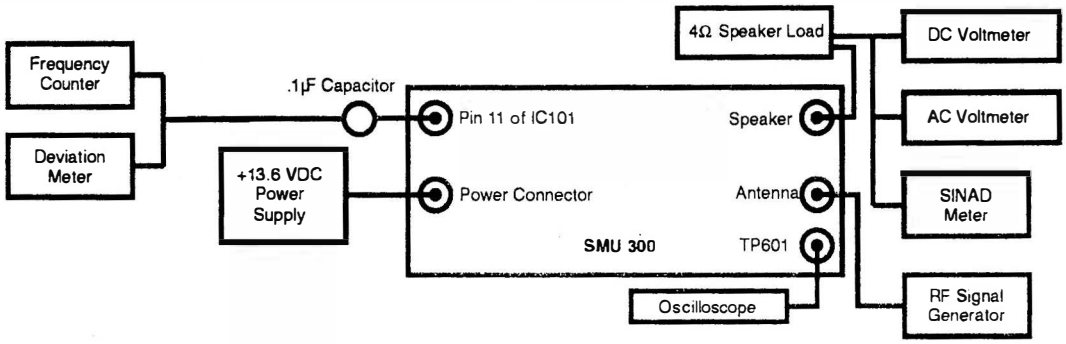
Main Power and Amplifier PCB Alignment Points



Logic Board Alignment Points

Receiver Alignment

Step	Channel	Adjust	Remarks
1			a. Connect RF signal generator to antenna jack. b. Connect +13.6 VDC power supply to radio's power cord.



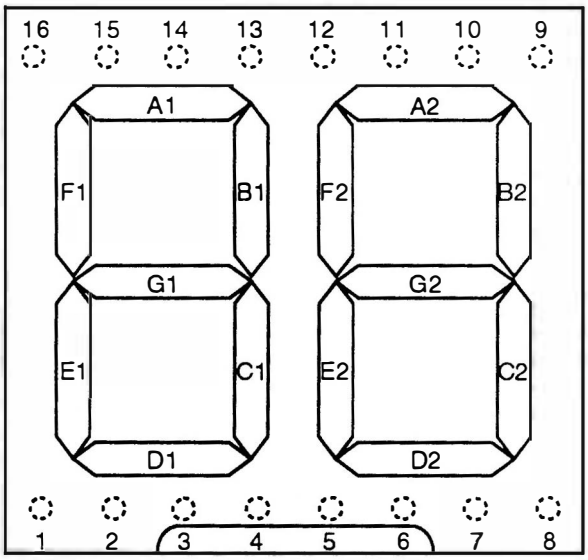
Standard Signal Generator Settings

Frequency = 160.050 MHz Modulation Deviation = 3.0 kHz
Modulation = 1 kHz TONE Signal Level = 1 mVrms

2			Set VR101 to midpoint.
3			Turn VR102 fully counterclockwise.
4			Place 8 Ω load between pins 2 and 3 of WA101. **Note:** *Do not key the transmitter.*
5	1	L117 2nd Local Oscillator	Use frequency counter or spectrum analyzer to verify second local oscillator frequency at TP102. If you use frequency counter, couple probe with a 0.1 μ F capacitor. If you use spectrum analyzer, hold sniffer probe near TP102. Adjust L117 for 44.645 MHz (±50 Hz) reading.
6	1	L109 FM Quadrature Detector	Set the RF signal generator to the standard signal generator settings. Adjust L109 for 2.6 VDC (±0.5 VDC) reading at pin 11 of IC102.
7	1	L112, L127 Matching Coils	Set RF signal generator to standard signal generator settings. Connect SINAD meter to 8 Ω load connecting pins 2 and 3 of WA101. Adjust volume control until you get reading on SINAD meter. Decrease signal level until SINAD meter has reading between 12 dB and 6 dB. Adjust L127 and L112 for best reading on SINAD meter. You may need to increase or decrease signal level as you adjust L127 and L112.
8	1	VR101 Audio Level	Increase signal level to 1 mVrms. Connect AC voltmeter to 8 load connecting pins 2 and 3 of WA101. Set volume control at maximum and adjust VR101 for 5 VAC (±0.5 VAC) reading.
9	1	VR102 Squelch Level	Set RF signal generator to standard signal generator settings. Set squelch and volume controls to their midpoints. Decrease signal level to 0.2 μ V and adjust VR102 so that audio just squelches. Repeat this step until squelch opens at 0.2 μ V
10	4	VR602	Set RF signal generator to 160.050 MHz with 167.9 Hz tone deviated to 750 Hz and level of 1 mVrms. Adjust VR602 for about 1 V peak-to-peak reading on oscilloscope.

Semiconductor Pinouts

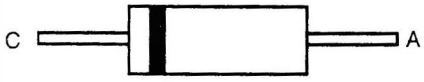
Diodes



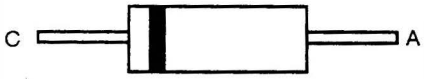
Pin	Connection
1	C1 cathode
2	E1 cathode
3	D1 cathode
4	Digit 1 common anode
5	Digit 2 common anode
6	D2 cathode
7	E2 cathode
8	C2 cathode
9	G2 cathode
10	A2 cathode
11	F2 cathode
12	B2 cathode
13	B1 cathode
14	F1 cathode
15	A1 cathode
16	G1 cathode

LDG202A

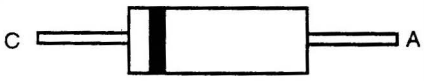
1N4003



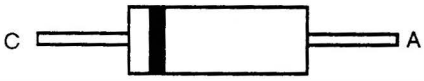
1N5401



1N60P

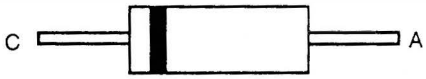


1S1555



1SS88

HSK120TR



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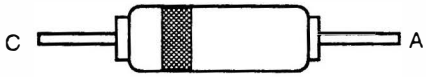
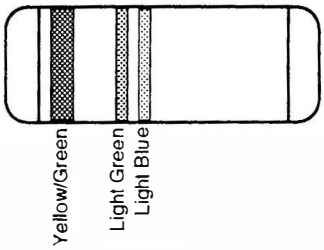
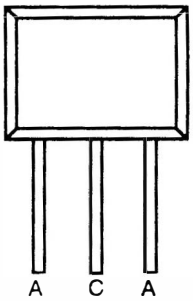


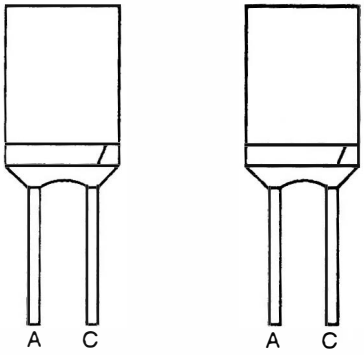
HZ9C2



HZK6CTR

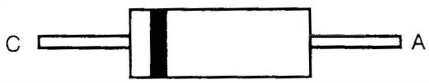


KV1330



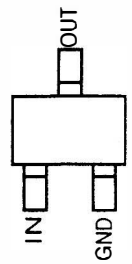
GL8HY7 **GL8PR7**

MI308



MI407

Integrated Circuits



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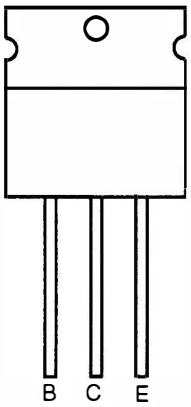

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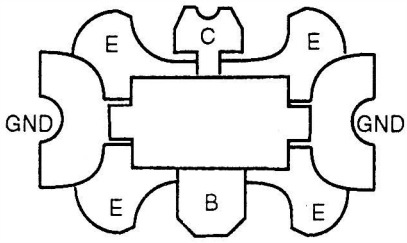

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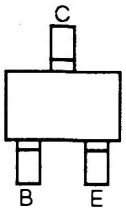

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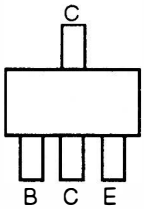

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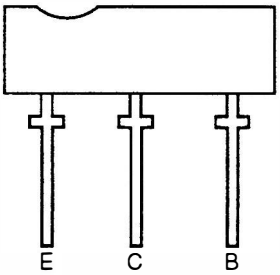

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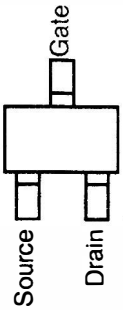

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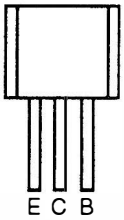

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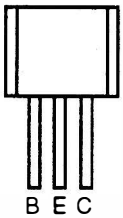

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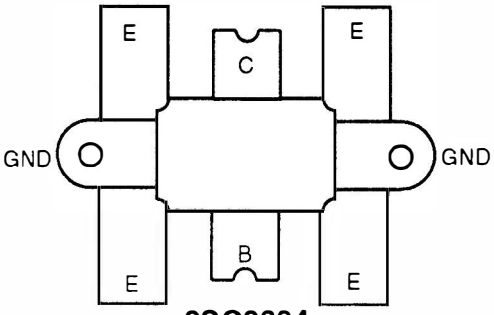

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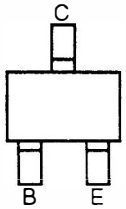

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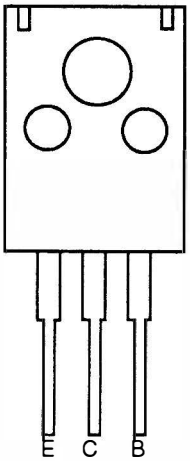

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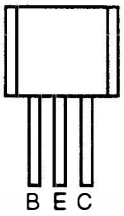

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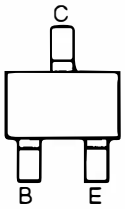

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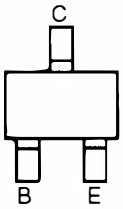

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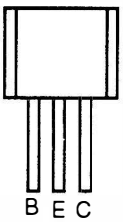

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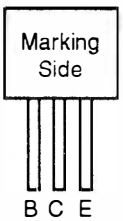

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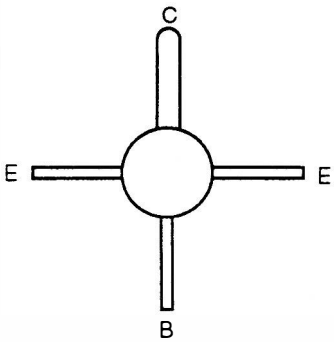
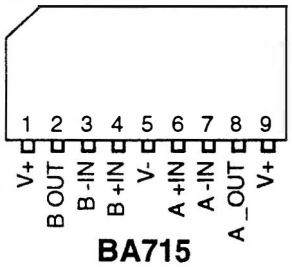


MRF553

Integrated Circuits (continued)



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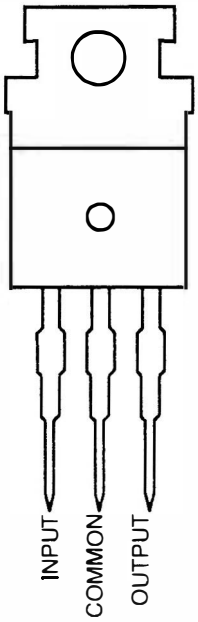

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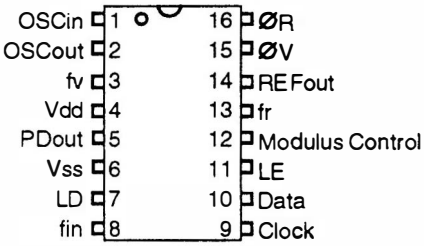

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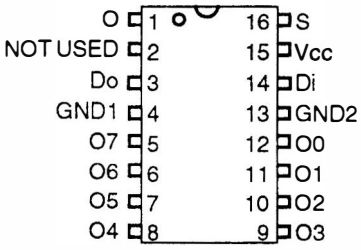

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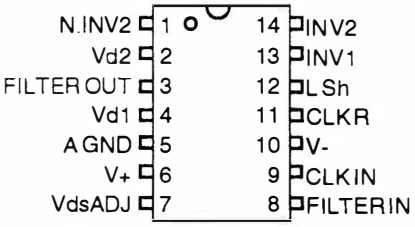

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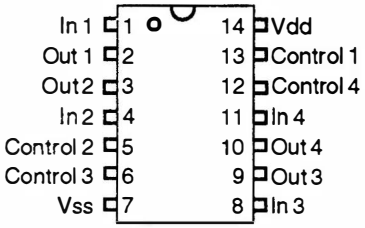

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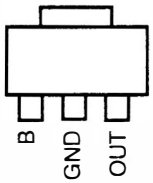

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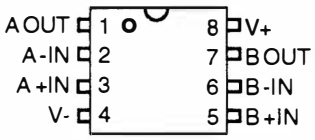

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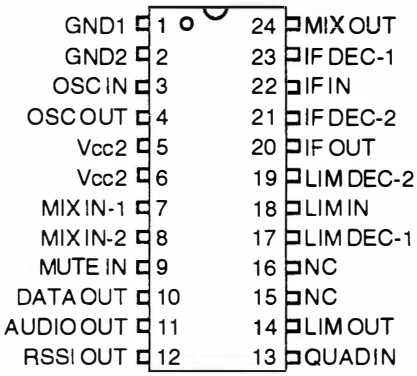

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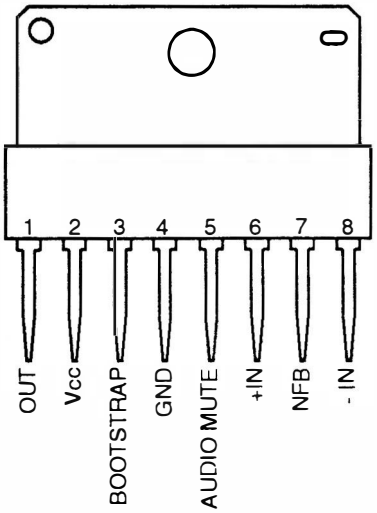

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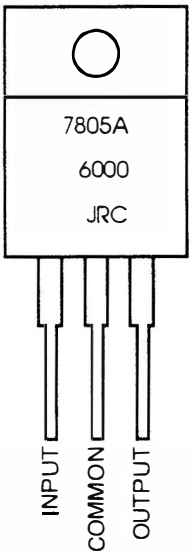

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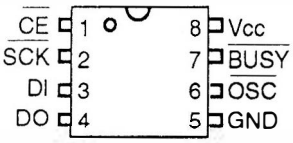

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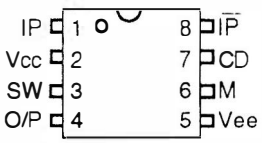
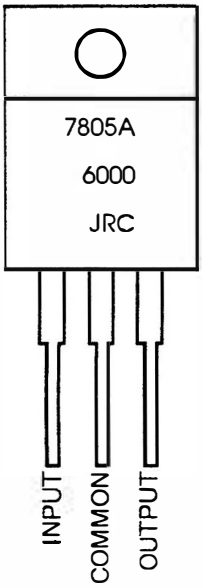


MB504P

Transistors



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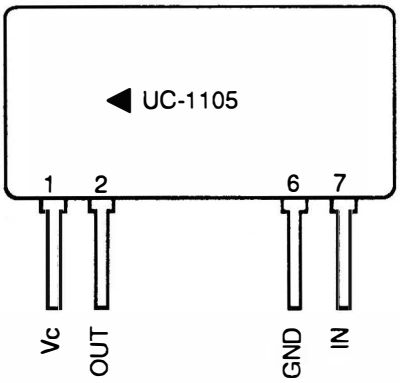

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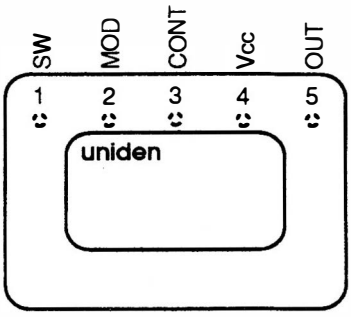

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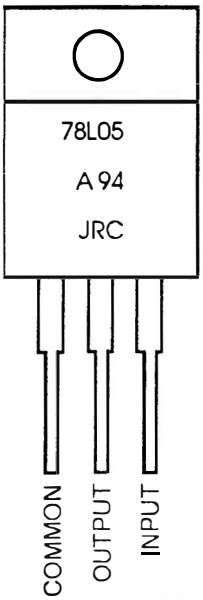

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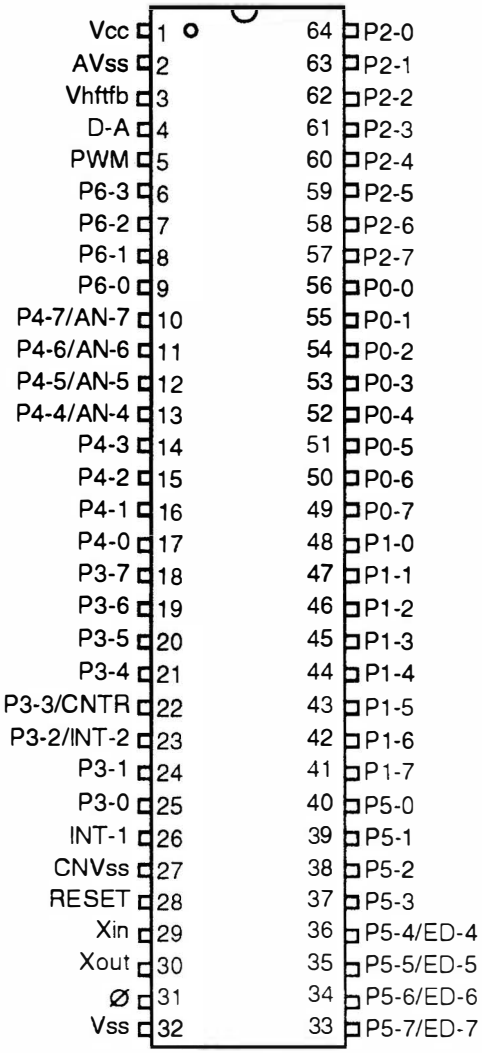


UC1153

Complete Parts List

Cables

Symbol	Part Number	Description	Board Number(s)
FC103	BWFY0800656	WF-080 5.5- 65-K	
FC105	BWFY0830706	WF-083 5.5- 70- K	
FC107	BWFY2170601	WF-217 5- 60- 3	
FC108	BWFY2060601	WF-206 3- 60- 5	
FC110	BWFY0810456	WF-081 5.5- 45- K	
WD001	BWZY0653001	WZ-653	
WD101	BWZY0665001	WZ-665 65 W/P	
WD102	BWZY0682001	WZ-682	

Capacitors

Capacitors

AS = Al Solid
CC = Chip Capacitor
CD = Ceramic Disk
CG = Ceramic Gimmick
EL = Electrolytic
SD = Semi-Conductor
MF = Mylar Film
TT = Tantalum
TC = Tantalum Chip
CT = Trimmer
FT = Feed Thru
MC = Mica Chip

The first code indicates the tolerance of the capacitor:

C = ±0.25 PF
D = ±0.5 PF
F = ±1
G = ±2%
J = ±5%
K = ±10%
M = ±20%
Z = +80% -20%

The second code indicates the variation of capacitance with temperature:

YA = ±5%
YB = ±10%
YD = +20% -30%
YE = +20% -50%
YF = +30% -38% (-25°C to +85°C)
ZF = 30% -80% (10°C TO 70°C)
CH = ±60% ppm/°C
RH = 220% ppm/°C
CJ = ±120 ppm/°C
TH = -470 ppm/°C ±60 ppm/°C
UJ = -750 ppm/°C ±120 ppm/°C
SL = +350 ppm/°C to -1000 ppm/°C

Resistors

CF = Carbon Film
RC = Chip Resistor
RM = Micro Resistor

Symbol	Part Number	Description	Board Number(s)
C101	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C103	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C104	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C105	BCVM811204Z	CC 12PF 50V J CH C-140	PD-308AC
C107	BCVL812704Z	CC 27PF 50V J SL C-140	PD-308AC
C109	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C110	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C111	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C112	BCVM811204Z	CC 12PF 50V J CH C-140	PD-308AC
C113	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C115	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C117	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C118	BCVL814704Z	CC 47PF 50V J SL C-140	PD-308AC
C120	BCXE814725Z	CC 0.0047 µF 50V K C(B)	PD-308AC
C121	BCVP811015Z	CC 100PF 50V K B C-140	PD-308AC
C122	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C123	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C125	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C126	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C127	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C128	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C130	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C131	BCVM811004Z	CC 10PF 50V J CH C-140	PD-308AC
C132	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C133	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC

Symbol	Part Number	Description	Board Number(s)
C135	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C136	BCSB663386Z	TT 0.33 µF 35V M C-089	PD-308AC
C137	BCER311006Z	EL 10 µF 16V M C-095	PD-308AC
C140	BCKB813915Z	CD 390PF 50V K YB(B)	PD-308AC
C141	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C142	BCKB812715Z	CD 270PF 50V K YB(B)	PD-308AC
C143	BCXE814725Z	CC 0.0047 µF 50V K C(B)	PD-308AC
C145	BCER311016Z	EL 100 µF 16V M C-095	PD-308AC
C146	BCEF313306Z	EL 33 µF 16V M C-059	PD-308AC
C147	BCAZ511026Z	EL 1000 µF 25V M C-156	PD-308AC
C148	BCGC511045Z	SD 0.1 µF 25V K	PD-308AC
C150	BCVM812091Z	CC 2PF 50V C CH C-140	PD-308AC
C153	BCVL812704Z	CC 27PF 50V J SL C-140	PD-308AC
C155	BCVL813304Z	CC 33PF 50V J SL C-140	PD-308AC
C156	BCVP814715Z	CC 470PF 50V K B C-140	PD-308AC
C157	BCER514796Z	EL 4.7 µF 25V M C-095	PD-308AC
C158	BCER812286Z	EL 0.22 µF 50V M C-095	PD-308AC
C160	BCSB661086Z	TT 0.1 µF 35V M C-089	PD-308AC
C161	BCER811096Z	EL 1 µF 50V M C-095	PD-308AC
C162	BCGC513325Z	SD 0.0033 µF 25V K	PD-308AC
C163	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C166	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C170	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C171	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C172	BCXE814735Z	CC 0.047 µF 50V K C(B)	PD-308AC
C173	BCSH311096Z	TC 1 µF 16V M C-122	PD-308AC
C201	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C217	BCXE813335Z	CC 0.033 µF 50V K C(B)	PD-308AC
C218	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C220	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C221	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C222	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C223	BCER811096Z	EL 1 µF 50V M C-095	PD-308AC
C225	BCXE813335Z	CC 0.033 µF 50V K C(B)	PD-308AC
C226	BCER311006Z	EL 10 µF 16V M C-095	PD-308AC
C227	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C228	BCVP813315Z	CC 330PF 50V K B C-140	PD-308AC
C230	BCXE814735Z	CC 0.047 µF 50V K C(B)	PD-308AC
C231	BCER811096Z	EL 1 µF 50V M C-095	PD-308AC
C232	BCER311006Z	EL 10 µF 16V M C-095	PD-308AC
C235	BCVM813091Z	CC 3PF 50V C CH C-140	PD-308AC
C236	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C237	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C238	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C239	BCXJ811025Z	CC 0.001 µF 50V K C(B)	PD-308AC
C240	BCER812296Z	EL 2.2 µF 50V M C-095	PD-308AC
C241	BCVM811804Z	CC 18PF 50V J CH C-140	PD-308AC
C242	BCVM811204Z	CC 12PF 50V J CH C-140	PD-308AC
C243	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C245	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C246	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C250	BCVM811204Z	CC 12PF 50V J CH C-140	PD-308AC
C251	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C253	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C256	BCVM811204Z	CC 12PF 50V J CH C-140	PD-308AC
C257	BCVL814704Z	CC 47PF 50V J SL C-140	PD-308AC
C260	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC

Symbol	Part Number	Description	Board Number(s)
C261	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C262	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C263	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C265	BCAZ314706Z	EL 47 µF 16V M C-156	PD-308AC
C266	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C267	BCSB312296Z	TT 2.2 µF 16V M C-089	PD-308AC
C300	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C301	BCXD813304Z	CC 33PF 50V J CG(CH)	PD-309AB
C302	BCXD815604Z	CC 56PF 50V J CG	PD-309AB
C303	BCXD815604Z	CC 56PF 50V J CG	PD-309AB
C306	BCXD813904Z	CC 39PF 50V J CG	PD-309AB
C307	BCXD811014Z	CC 100PF 50V J CG	PD-309AB
C308	BCXD811014Z	CC 100PF 50V J CG	PD-309AB
C310	BCXD818204Z	CC 82PF 50V J CG	PD-309AB
C311	BCXD816804Z	CC 68PF 50V J CG	PD-309AB
C312	BCXD816804Z	CC 68PF 50V J CG	PD-309AB
C315	BCDD821204Z	CC 12PF 500V J C-073	PD-309AB
C316	BCDD821504Z	CC 15PF 500V J C-073	PD-309AB
C317	BCDD821014Z	CC 100PF 500V J C-073	PD-309AB
C319	BCDD822214Z	CC 220PF 500V J C-073	PD-309AB
C320	BCDD826804Z	CC 68PF 500V J C-073	PD-309AB
C321	BCDD821014Z	CC 100PF 500V J C-073	PD-309AB
C322	BCDD822214Z	CC 220PF 500V J C-073	PD-309AB
C325	BCCG818214Z	CD 820PF 50V J SL	PD-309AB
C326	BCXJ811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C328	BCDD828204Z	CC 82PF 500V J C-073	PD-309AB
C330	BCDD828204Z	CC 82PF 500V J C-073	PD-309AB
C331	BCDD823304Z	CC 33PF 500V J C-073	PD-309AB
C332	BCDD823304Z	CC 33PF 500V J C-073	PD-309AB
C333	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C335	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C336	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C337	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C340	BCDD821204Z	CC 12PF 500V J C-073	PD-309AB
C341	BCDD821204Z	CC 12PF 500V J C-073	PD-309AB
C343	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C345	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C346	BCXE812225Z	CC 0.0022 µF 50V K C(B)	PD-309AB
C347	BCDD821504Z	CC 15PF 500V J C-073	PD-309AB
C350	BCDD823304Z	CC 33PF 500V J C-073	PD-309AB
C352	BCDD823304Z	CC 33PF 500V J C-073	PD-309AB
C355	BCDD821504Z	CC 15PF 500V J C-073	PD-309AB
C357	BCXD811204Z	CC 22PF 50V J CG	PD-309AB
C360	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C361	BCXJ811035Z	CC 0.01 µF 50V K C(B)	PD-309AB
C363	BCXJ811035Z	CC 0.01 µF 50V K C(B)	PD-309AB
C365	BCXJ811035Z	CC 0.01 µF 50V K C(B)	PD-309AB
C367	BCXJ811035Z	CC 0.01 µF 50V K C(B)	PD-309AB
C368	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C370	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C371	BCFE811096Z	EL 1 µF 50V M C-180	PD-309AB
C372	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C373	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C375	BCFE811096Z	EL 1 µF 50V M C-180	PD-309AB
C376	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C377	BCXE811025Z	CC 0.001 µF 50V K C(B)	PD-309AB
C378	BCFE811096Z	EL 1 µF 50V M C-180	PD-309AB

Symbol	Part Number	Description	Board Number(s)
C380	BCXJ811035Z	CC 0.01 µF 50V K C(B)	PD-309AB
C382	BCDH821214Z	MC 120PF 500V J C-189	PD-309AB
C383	BCDH821214Z	MC 120PF 500V J C-189	PD-309AB
C385	BCDH828204Z	MC 82PF 500V J C-189	PD-309AB
C386	BCDH828204Z	MC 82PF 500V J C-189	PD-309AB
C387	BCXD811204Z	CC 12PF 50V J CG	PD-309AB
C401	BCVM813091Z	CC 3PF 50V C CH C-140	PD-308AC
C402	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C403	BCGC511036Z	SD 0.01 µF 25V M	PD-308AC
C405	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C407	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C410	BCGC511036Z	SD 0.01 µF 25V M	PD-308AC
C412	BCVM811504Z	CC 15PF 50V J CH C-140	PD-308AC
C413	BCSB312296Z	TT 2.2 µF 16V M C-089	PD-308AC
C417	BCVP811015Z	CC 100PF 50V K B C-140	PD-308AC
C418	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C420	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C421	BCVP811015Z	CC 100PF 50V K B C-140	PD-308AC
C422	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-308AC
C425	BCVP811015Z	CC 100PF 50V K B C-140	PD-308AC
C426	BCVP811015Z	CC 100PF 50V K B C-140	PD-308AC
C427	BCCU811814Z	CD 180PF 50V J UJ	PD-308AC
C428	BCXP816804Z	CC 68PF 50V J UJ	PD-308AC
C430	BCXP813092Z	CC 3PF 50V D UJ	PD-308AC
C431	BCXP813314Z	CC 330PF 50V J UJ	PD-308AC
C432	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C433	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C435	BCER902206Z	EL 22 µF 6.3V M C-095	PD-308AC
C436	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C437	BCAZ511026Z	EL 1000 µF 25V M C-156	PD-308AC
C438	BCXE811035Z	CC 0.01 µF 50V K C(B)	PD-308AC
C440	BCAZ511026Z	EL 1000 µF 25V M C-156	PD-308AC
C443	BCER111016Z	EL 100 µF 10V M C-095	PD-308AC
C445	BCER511006Z	EL 10 µF 25V M C-095	PD-308AC
C447	BCER311006Z	EL 10 µF 16V M C-095	PD-308AC
C448	BCER511006Z	EL 10 µF 25V M C-095	PD-308AC
C450	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-308AC
C451	BCER811096Z	EL 1 µF 50V M C-095	PD-308AC
C452	BCER111016Z	EL 100 µF 10V M C-095	PD-308AC
C453	BCER311006Z	EL 10 µF 16V M C-095	PD-308AC
C455	BCXS511045Z	CC 0.1 µF 25V K B	PD-308AC
C456	BCSB664786Z	TT 0.47 µF 35V M C-089	PD-308AC
C460	BCSH311096Z	TC 1 µF 16V M C-122	PD-308AC
C601	BCZY0128001	CM CZ-128 0.068F 5.5V	PD-304AC
C602	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-304AC
C603	BCER511006Z	EL 10 µF 25V M C-095	PD-304AC
C605	BCER511006Z	EL 10 µF 25V M C-095	PD-304AC
C606	BCVQ311036Z	CC 0.01 µF 16V M Y C-140	PD-304AC
C607	BCER312206Z	EL 22 µF 16V M C-095	PD-304AC
C608	BCER812296Z	EL 2.2 µF 50V M C-095	PD-304AC
C610	BCER812296Z	EL 2.2 µF 50V M C-095	PD-304AC
C611	BCXS511045Z	CC 0.1 µF 25V K B	PD-304AC
C612	BCXD813904Z	CC 39PF 50V J CG	PD-304AC
C613	BCXD813904Z	CC 39PF 50V J CG	PD-304AC
C615	BCER811086Z	EL 0.1 µF 50V M C-095	PD-304AC
C617	BCXS511045Z	CC 0.1 µF 25V K B	PD-304AC
C618	BCVP811025Z	CC 0.001 µF 50V K B C-140	PD-304AC

Symbol	Part Number	Description	Board Number(s)
C620	BCER811086Z	EL 0.1 µF 50V M C-095	PD-304AC
C625	BCXS511045Z	CC 0.1 µF 25V K B	PD-304AC
C626	BCER312206Z	EL 22µF 16V M C-095	PD-304AC
C627	BCXS511045Z	CC 0.1µF 25V K B	PD-304AC
C630	BCCG811515Z	CD 150PF 50V K SL	PD-304AC
C701	BCXJ811025Z	CC 0.001µF 50V K C(B)	PD-305AB
CT301	BCTY0072200	CT-072 20P	PD-309AB

Connectors

Symbol	Part Number	Description	Board Number(s)
J101	BJKY0281001	JK-281	PD-308AC
J102	BJKY0281001	JK-281	PD-308AC
J201	BJKY0276002	JK-276 5267-02A	PD-308AC
J202	BJKY0276002	JK-276 5267-02A	PD-308AC
J501	BWZY0664001	WZ-664 240	
J601	BJKY0414006	JK-414 6P	PD-304AC
J602	BJKY0421006	JK-421 6P	PD-304AC
J603	BJKY0414006	JK-414 6P	PD-304AC
J605	BJKY0436007	JK-436 7P	PD-304AC
J606	BJKY0436008	JK-436 8P	PD-304AC
J607	BJKY0039002	JK-039 3022-2A	PD-304AC
J608	BJKY0039003	JK-039 3022-3A	PD-304AC
J610	BJKY0039005	JK-039 3022-5A	PD-304AC
J611	BJKY0039006	JK-039 3022-06A	PD-304AC
J701	BJKY0420001	JK-420	PD-305AB
SK601	BSKY0047064	SK-047 DICS-64C 64P	PD-304AC

Crystals

Symbol	Part Number	Description	Board Number(s)
X101	BQXY0271001	QX-271 44.645 MHz	PD-308AC
X401	BQXY0158002	QX-158 12.800 MHz	PD-308AC
X601	BQXY0281002	QX-281 4.1904 MHz	PD-304AC

Diodes

Symbol	Part Number	Description	Board Number(s)
D120	BDAY0001002	1N60 P	PD-308AC
D121	BDAY0001002	1N60 P	PD-308AC
D122	BDAY0001002	1N60 P	PD-308AC
D123	BDAY0393001	HSK120TR	PD-308AC
D125	BDAY0181001	1S1555	PD-308AC
D128	BDAY0393001	HSK120TR	PD-308AC
D202	BDAY0181001	1S1555	PD-308AC
D205	BDAY0269052	HZ9C2	PD-308AC
D301	BDAY0271001	MI407	PD-309AB
D302	BDAY0271001	MI407	PD-309AB
D303	BDAY0292001	MI-308	PD-309AB
D304	BDAY0292001	MI-308	PD-309AB
D305	BDAY0292001	MI-308	PD-309AB
D307	BDAY0393001	HSK120TR	PD-309AB
D401	BDAY0269048	HZ7A-3 ZENER	PD-308AC
D402	BDAY0281001	KV1330	PD-308AC
D403	BDAY0393001	HSK120TR	PD-308AC
D405	BDAY0245001	1N5401	PD-308AC
D406	BDAY0393001	HSK120TR	PD-308AC
D420	BDAY0133001	1N4003	PD-308AC
D601	BDAY0393001	HSK120TR	PD-304AC

Symbol	Part Number	Description	Board Number(s)
D602	BDAY0393001	HSK120TR	PD-304AC
D603	BDAY0393001	HSK120TR	PD-304AC
D605	BDAY0393001	HSK120TR	PD-304AC
D608	BDAY0208001	1SS88	PD-304AC
D701	BDAY0154001	LDG-202A LED	PD-305AB
D702	BDAY0450001	GL-8PR7 LED	PD-305AB
D703	BDAY0451001	GL-8HY7 LED	PD-305AB
D705	BDAY0451001	GL-8HY7 LED	PD-305AB
D707	BDAY0432004	HZK6C	PD-305AB
D708	BDAY0432004	HZK6C	PD-305AB
D709	BDAY0432004	HZK6C	PD-305AB
D711	BDAY0432004	HZK6C	PD-305AB
D713	BDAY0432004	HZK6C	PD-305AB

Filters

Symbol	Part Number	Description	Board Number(s)
FT101	BFLY0253001	FL-253 TMX240A	PD-308AC
FT102	BFLY0253001	FL-253 TMX240A	PD-308AC
FT105	BFLY0248001	FL-248 UMF-271	PD-308AC
FT106	BFLY0248001	FL-248 UMF-271	PD-308AC
FT107	BFLY0266001	FL-266 SFG455D	PD-308AC
FT108	BFLY0266001	FL-266 SFG455D	PD-308AC

Inductors

Symbol	Part Number	Description	Board Number(s)
L101	BLEY0328001	LE-328 D4 5 1/2T	PD-308AC
L102	BLEY0328001	LE-328 D4 5 1/2T	PD-308AC
L109	BLFY0072001	LF-072 5PLC-1055Z	PD-308AC
L110	BLBY0446001	LB-446 199KC-14360Y	PD-308AC
L111	BLBY0454001	LB-454 199KC-14479Y	PD-308AC
L112	BLBY0624001	LB-624 199KC-15097ZW	PD-308AC
L114	BLZY0051478	LZ-051 SP0305-R47M 0.47 µH	PD-308AC
L117	BLBY0232001	LB-232 113KN-6546Z	PD-308AC
L118	BLZY0051101	LZ-051 SP0305-101K 100 µH	PD-308AC
L120	BLZY0051101	LZ-051 SP0305-101K 100 µH	PD-308AC
L121	BLZY0016471	LZ-016 SL0609-471K 470 µH	PD-308AC
L125	BLZY0050108	LZ-050 0.1 µH	PD-308AC
L126	BLDY0236001	LD-236 159SNSF-1372	PD-308AC
L127	BLBY0654001	LB-654 292DC-3714CTM	PD-308AC
L130	BLEY0167001	LE-167 C-7935 D3 2 1/2T	PD-308AC
L131	BLEY0328001	LE-328 D4 5 1/2T	PD-308AC
L132	BLEY0255001	LE-255 D2.8 2 1/2T	PD-308AC
L133	BLEY0255001	LE-255 D2.8 2 1/2T	PD-308AC
L201	BLEY0150001	LE-150 C-7929 D4.0 5 1/2T	PD-308AC
L202	BLEY0149001	LE-149 C-7930 D4.0 4 1/2T	PD-308AC
L203	BLEY0191001	LE-191 D3.0 1 1/2T	PD-308AC
L204	BLDY0218001	LD-218	PD-308AC
L205	BLEY0203001	LE-203 D3.0 2 1/2T	PD-308AC
L206	BLEY0181001	LE-181 D3.0 5 1/2T	PD-308AC
L207	BLEY0191001	LE-191 D3.0 1 1/2T	PD-308AC
L210	BLEY0180001	LE-180 D3.0 4 1/2T	PD-308AC
L211	BLEY0191001	LE-191 D3.0 1 1/2T	PD-308AC
L212	BLEY0149001	LE-149 C-7930 D4.0 4 1/2T	PD-308AC
L300	BLEY0203001	LE-203 D3.0 2 1/2T	PD-309AB
L301	BLEY0351001	LE-351 D3.6 1/2T	PD-309AB
L302	BLEY0230001	LE-230 D3.0 3 1/2T	PD-309AB

Symbol	Part Number	Description	Board Number(s)
L303	BLEY0203001	LE-203 D3.0 2 1/2T	PD-309AB
L305	BLEY0191001	LE-191 D3.0 1 1/2T	PD-309AB
L306	BLEY0230001	LE-230 D3.0 3 1/2T	PD-309AB
L307	BLEY0230001	LE-230 D3.0 3 1/2T	PD-309AB
L308	BLEY0216001	LE-216 D6.0 1/2T	PD-309AB
L310	BLEY0236001	LE-236 D2.8 1 1/2T	PD-309AB
L311	BLEY0186001	LE-186 D6.0 1 1/2T	PD-309AB
L312	BLEY0300001	LE-300 D6 2 1/2T	PD-309AB
L313	BLEY0185001	LE-185 D6.4 2 1/2T	PD-309AB
L315	BLEY0300001	LE-300 D6 2 1/2T	PD-309AB
L316	BLEY0368001	LE-368	PD-309AB
L317	BLEY0358001	LE-358 D4.0 0.8 6 1/2T	PD-309AB
L318	BLEY0271001	LE-271 D6.0 2 1/2T	PD-309AB
L320	BLEY0271001	LE-271 D6.0 2 1/2T	PD-309AB
L350	BLDY0218001	LD-218	PD-309AB
L351	BLDY0221001	LD-221	PD-309AB
L352	BLDY0221001	LD-221	PD-309AB
L353	BLDY0222001	LD-222	PD-309AB
L355	BLDY0222001	LD-222	PD-309AB
L402	BLBY0144001	LB-144 113CN-6499Z	PD-308AC
L410	BLEY0328001	LE-328 D4 5 1/2T	PD-308AC

Integrated Circuits

Symbol	Part Number	Description	Board Number(s)
IC101	BDEY0947001	IC CXA1003AM	PD-308AC
IC102	BDEY0802001	IC UC1105	PD-308AC
IC103	BDEY1195001	IC NJM4560S	PD-308AC
IC105	BDEY0157001	IC MB3712	PD-308AC
IC201	BDEY0464001	IC BA715	PD-308AC
IC301	BDEY0703001	IC NJM2904M	PD-309AB
IC401	BDEY1077001	IC UC-1167	PD-308AC
IC402	BDEY0462001	IC MB504P	PD-308AC
IC403	BDEY0674002	IC MB87006A	PD-308AC
IC405	BDEY0397001	IC NJM7808A	PD-308AC
IC406	BDEY0481001	IC HA17805W	PD-308AC
IC601	BDEY1061001	IC UC1153	PD-304AC
IC602	BDEY1059001	IC MF6CWM-50	PD-304AC
IC603	BDEY1060001	IC CXK1013P	PD-304AC
IC605	BDEY1063001	IC BU4066BF	PD-304AC
IC606	BDEY0088001	IC NJM78L05A	PD-304AC
IC607	BDEY1083001	IC M51951AML	PD-304AC
IC751	BDEY0485001	IC BA820	PD-306AA
IC752	BDEY0485001	IC BA820	PD-306AA

Miscellaneous

Symbol	Part Number	Description	Board Number(s)
F501	BFSY0014150	FS-014 15A	
SP501	BSPY0174001	SP-174 EAS-45P36SA-T	
T401	BTFY0157001	TF-157	PD-308AC
TH301	BDFY0054001	513CT-4	PD-309AB
TH401	BDFY0012001	TD5-C310D2-H	PD-308AC
TH402	BDFY0036001	TD5-C215DA2	PD-308AC
WA101	CZDZ071403Z	Accessory jack	
WA105	CZDZ071378Z	Accessory plug	
Y701	BYYY0401001	YY-401 P722-5R	PD-305AB
YW502	BYYY0047001	YY-047	

Printed Circuit Boards

Symbol	Part Number	Description	Board Number(s)
PC101	BPDY0308ACZ	Main PCB	PD-308AC
PC301	BPDY0309ABZ	Power Amplifier PCB	PD-309AB
PC601	BPDY0304ACZ	Logic PCB	PD-304AC
PC701	BPDY0305ABZ	Control PCB	PD-305AB
PC751	BPDY0306AAZ	Logic PCB	PD-306AA

Resistors

Description Codes

RC 100Ω1/16W **J**

❶ ❷

❶ Type
MF = Metal Film
RC = Resistor Chip
RT = Trimmer Resistor
RV = Variable Resistor

❷ Tolerance
F = ± 1%
J = ± 5%
K = ± 10%

Symbol	Part Number	Description	Board Number(s)
R101	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-308AC
R102	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-308AC
R103	BRFD181204Z	RC 12 Ω 1/8W J	PD-308AC
R105	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R107	BRFD183324Z	RC 3.3K Ω 1/8W J	PD-308AC
R108	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R109	BRFD183314Z	RC 330 Ω 1/8W J	PD-308AC
R110	BRFD181524Z	RC 1.5K Ω 1/8W J	PD-308AC
R111	BRFD185604Z	RC 56 Ω 1/8W J	PD-308AC
R112	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-308AC
R113	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R114	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R115	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R116	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-308AC
R117	BRFD183344Z	RC 330K Ω 1/8W J	PD-308AC
R118	BRFD181524Z	RC 1.5K Ω 1/8W J	PD-308AC
R120	BRFD181524Z	RC 1.5K Ω 1/8W J	PD-308AC
R121	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R122	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R123	BRFD181044Z	RC 100K Ω 1/8W J	PD-308AC
R125	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R126	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R127	BRFD182734Z	RC 27K Ω 1/8W J	PD-308AC
R128	BRFD182744Z	RC 270K Ω 1/8W J	PD-308AC
R129	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R130	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-308AC
R131	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-308AC
R132	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R133	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R134	BRFT182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R135	BRFD183324Z	RC 3.3K Ω 1/8W J	PD-308AC
R136	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-308AC
R137	BRFD185614Z	RC 560 Ω 1/8W J	PD-308AC
R138	BRFD181524Z	RC 1.5K Ω 1/8W J	PD-308AC
R139	BRFD183944Z	RC 390K Ω 1/8W J	PD-308AC
R140	BRFT611024Z	CF 1K Ω 1/6W J	PD-308AC
R141	BRFD181094Z	RC 1 Ω 1/8W J	PD-308AC
R143	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R146	BRFD184744Z	RC 470K Ω 1/8W J	PD-308AC
R147	BRFD183924Z	RC 3.9K Ω 1/8W J	PD-308AC
R150	BRZY0021001	RZ-021 JC2A	PD-308AC

Symbol	Part Number	Description	Board Number(s)
R151	BRZY0021001	RZ-021 JC2A	PD-308AC
R152	BRZY0021001	RC RZ-021 JC2A	PD-308AC
R155	BRFD185604Z	RC 56 Ω 1/8W J	PD-308AC
R156	BRFD182234Z	RC 22K Ω 1/8W J	PD-308AC
R157	BRFD186804Z	RC 68 Ω 1/8W J	PD-308AC
R158	BRFD183314Z	RC 330 Ω 1/8W J	PD-308AC
R160	BRFD182734Z	RC 27K Ω 1/8W J	PD-308AC
R170	BRFD182244Z	RC 220K Ω 1/8W J	PD-308AC
R171	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R201	BRFD188294Z	RC 8.2 Ω 1/8W J	PD-308AC
R202	BRFD188294Z	RC 8.2 Ω 1/8W J	PD-308AC
R203	BRFD188294Z	RC 8.2 Ω 1/8W J	PD-308AC
R204	BRFD181814Z	RC 180 Ω 1/8W J	PD-308AC
R205	BRSJ021504Z	MF 15 Ω 2WS J	PD-308AC
R206	BRFD184734Z	RC 47K Ω 1/8W J	PD-308AC
R207	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-308AC
R211	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R212	BRFD183344Z	RC 330K Ω 1/8W J	PD-308AC
R213	BRFD182714Z	RC 270 Ω 1/8W J	PD-308AC
R215	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R216	BRFD183944Z	RC 390K Ω 1/8W J	PD-308AC
R217	BRFD182214Z	RC 220 Ω 1/8W J	PD-308AC
R218	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R220	BRFD183334Z	RC 33K Ω 1/8W J	PD-308AC
R221	BRFD183934Z	RC 39K Ω 1/8W J	PD-308AC
R222	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R223	BRFD186834Z	RC 68K Ω 1/8W J	PD-308AC
R224	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R225	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R226	BRFD181234Z	RC 12K Ω 1/8W J	PD-308AC
R227	BRFD181234Z	RC 12K Ω 1/8W J	PD-308AC
R228	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-308AC
R230	BRZY0021001	RZ-021 JC2A	PD-308AC
R231	BRFD186824Z	RC 6.8K Ω 1/8W J	PD-308AC
R232	BRFD184744Z	RC 470K Ω 1/8W J	PD-308AC
R233	BRUB611034Z	CF 10K Ω 1/6W J	PD-308AC
R234	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-308AC
R240	BRFD184724Z	RC 4.7K Ω 1/8W J	PD-308AC
R241	BRFD181224Z	RC 1.2K Ω 1/8W J	PD-308AC
R242	BRFD186804Z	RC 68 Ω 1/8W J	PD-308AC
R243	BRFD185694Z	RC 5.6 Ω 1/8W J	PD-308AC
R245	BRFD181824Z	RC 1.8K Ω 1/8W J	PD-308AC
R246	BRFD182214Z	RC 220 Ω 1/8W J	PD-308AC
R247	BRFD181504Z	RC 15 Ω 1/8W J	PD-308AC
R248	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R250	BRFD186804Z	RC 68 Ω 1/8W J	PD-308AC
R251	BRFD181224Z	RC 1.2K Ω 1/8W J	PD-308AC
R253	BRZY0021001	RZ-021 JC2A	PD-308AC
R254	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R255	BRFD183334Z	RC 33K Ω 1/8W J	PD-308AC
R256	BRFD183324Z	RC 3.3K Ω 1/8W J	PD-308AC
R260	BRZY0021001	RZ-021 JC2A	PD-308AC
R270	BRFD181514Z	RC 150 Ω 1/8W J	PD-308AC
R271	BRZY0021001	RC RZ-021 JC2A	PD-308AC
R272	BRFD184734Z	RC 47K Ω 1/8W J	PD-308AC
R300	BRFC188294Z	RC 8.2 Ω 1/8W J	PD-309AB
R301	BRFC188294Z	RC 8.2 Ω 1/8W J	PD-309AB

Symbol	Part Number	Description	Board Number(s)
R303	BRFC182204Z	RC 22 Ω 1/8W J	PD-309AB
R305	BRFC185604Z	RC 56 Ω 1/8W J	PD-309AB
R306	BRFC185604Z	RC 56 Ω 1/8W J	PD-309AB
R307	BRFT185604Z	RC 56 Ω 1/8W J	PD-309AB
R308	BRFT185604Z	RC 56 Ω 1/8W J	PD-309AB
R310	BRFC011034Z	RC 10K Ω 1/10W J	PD-309AB
R311	BRFC011034Z	RC 10K Ω 1/10W J	PD-309AB
R312	BRFC011034Z	RC 10K Ω 1/10W J	PD-309AB
R313	BRFC012224Z	RC 2.2K Ω 1/10W J	PD-309AB
R320	BRZY0031001	RZ-031 0.1X2 2W J	PD-309AB
R321	BRFC011034Z	RC 10K Ω 1/10W J	PD-309AB
R322	BRFC012224Z	RC 2.2K Ω 1/10W J	PD-309AB
R323	BRFC011024Z	RC 1K Ω 1/10W J	PD-309AB
R325	BRFC011524Z	RC 1.5K Ω 1/10W J	PD-309AB
R326	BRFC014744Z	RC 470K Ω 1/10W J	PD-309AB
R327	BRFC181034Z	RC 10K Ω 1/8W J	PD-309AB
R328	BRFC012214Z	RC 220 Ω 1/10W J	PD-309AB
R330	BRSJ021014Z	MF 100 Ω 2WS J	PD-309AB
R331	BRSJ031504Z	MF 15 Ω 3WS J	PD-309AB
R332	BRSJ034704Z	MF 47 Ω 3WS J	PD-309AB
R333	BRSJ002204Z	MF 22 Ω 1WS J	PD-309AB
R401	BRZY0021001	RZ-021 JC2A	PD-308AC
R402	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R403	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R404	BRUB613904Z	CF 39 Ω 1/6W J	PD-308AC
R405	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R406	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R407	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R408	BRFD182224Z	RC 2.2K Ω 1/8W J	PD-308AC
R409	BRFD183934Z	RC 39K Ω 1/8W J	PD-308AC
R410	BRFD184734Z	RC 47K Ω 1/8W J	PD-308AC
R411	BRFD184734Z	RC 47K Ω 1/8W J	PD-308AC
R412	BRFD184724Z	RC 4.7K Ω 1/8W J	PD-308AC
R413	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R414	BRFD183934Z	RC 39K Ω 1/8W J	PD-308AC
R415	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-308AC
R417	BRFD181824Z	RC 1.8K Ω 1/8W J	PD-308AC
R418	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R419	BRFD184714Z	RC 470 Ω 1/8W J	PD-308AC
R420	BRFD181814Z	RC 180 Ω 1/8W J	PD-308AC
R422	BRFD186824Z	RC 6.8K Ω 1/8W J	PD-308AC
R423	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R425	BRFD181014Z	RC 100 Ω 1/8W J	PD-308AC
R426	BRFD181534Z	RC 15K Ω 1/8W J	PD-308AC
R427	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-308AC
R428	BRFD183324Z	RC 3.3K Ω 1/8W J	PD-308AC
R430	BRFD188224Z	RC 8.2K Ω 1/8W J	PD-308AC
R431	BRFD182734Z	RC 27K Ω 1/8W J	PD-308AC
R432	BRFD181524Z	RC 1.5K Ω 1/8W J	PD-308AC
R433	BRFD183924Z	RC 3.9K Ω 1/8W J	PD-308AC
R435	BRFD185634Z	RC 56K Ω 1/8W J	PD-308AC
R436	BRFD181834Z	RC 18K Ω 1/8W J	PD-308AC
R437	BRUB183394Z	CF 3.3 Ω 1/8W J	PD-308AC
R438	BRSJ023914Z	MF 390 Ω 2WS J	PD-308AC
R441	BRZY0021001	RZ-021 JC2A	PD-308AC
R442	BRZY0021001	RZ-021 JC2A	PD-308AC
R445	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC

Symbol	Part Number	Description	Board Number(s)
R447	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R450	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R451	BRFD181044Z	RC 100K Ω 1/8W J	PD-308AC
R452	BRFD181034Z	RC 10K Ω 1/8W J	PD-308AC
R453	BRFD181024Z	RC 1K Ω 1/8W J	PD-308AC
R455	BRFT615624Z	CF 5.6K Ω 1/6W J	PD-308AC
R456	BRUB611834Z	CF 18K Ω 1/6W J	PD-308AC
R460	BRUB611044Z	CF 100K Ω 1/6W J	PD-308AC
R601	BRFD181004Z	RC 10 Ω 1/8W J	PD-304AC
R602	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R603	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R605	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R606	BRFD185624Z	RC 5.6K Ω 1/8W J	PD-304AC
R609	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R610	BRFD184714Z	RC 470 Ω 1/8W J	PD-304AC
R611	BRFD181024Z	RC 1K Ω 1/8W J	PD-304AC
R612	BRFD184714Z	RC 470 Ω 1/8W J	PD-304AC
R613	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R615	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R616	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R617	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R618	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R620	BRFD183334Z	RC 33K Ω 1/8W J	PD-304AC
R621	BRFD181024Z	RC 1K Ω 1/8W J	PD-304AC
R622	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R623	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R625	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R626	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R627	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R628	BRFD182724Z	RC 2.7K Ω 1/8W J	PD-304AC
R630	BRFD184734Z	RC 47K Ω 1/8W J	PD-304AC
R631	BRFD184734Z	RC 47K Ω 1/8W J	PD-304AC
R632	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R633	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R635	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R636	BRFD181044Z	RC 100K Ω 1/8W J	PD-304AC
R637	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R638	BRFD181024Z	RC 1K Ω 1/8W J	PD-304AC
R640	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R641	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R642	BRFD181044Z	RC 100K Ω 1/8W J	PD-304AC
R643	BRFD181044Z	RC 100K Ω 1/8W J	PD-304AC
R645	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R646	BRUB611034Z	CF 10K Ω 1/6W J	PD-304AC
R647	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R650	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R651	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R652	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R653	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R656	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R657	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R658	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R660	BRZY0021001	RC RZ-021 JC2A	PD-304AC
R661	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R662	BRFT611034Z	RC 10K Ω 1/6W J	PD-304AC
R663	BRFD181244Z	RC 120K Ω 1/8W J	PD-304AC
R664	BRFT611034Z	RC 10K Ω 1/6W J	PD-304AC

Symbol	Part Number	Description	Board Number(s)
R665	BRFD181244Z	RC 120K Ω 1/8W J	PD-304AC
R666	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R667	BRFD181054Z	RC 1M Ω 1/8W J	PD-304AC
R668	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R670	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R673	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R675	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R679	BRFD181034Z	RC 10K Ω 1/8W J	PD-304AC
R680	BRZY0021001	RZ-021 JC2A	PD-304AC
R681	BRZY0021001	RZ-021 JC2A	PD-304AC
R682	BRZY0021001	RZ-021 JC2A	PD-304AC
R685	BRZY0021001	RZ-021 JC2A	PD-304AC
R686	BRZY0021001	RZ-021 JC2A	PD-304AC
R687	BRZY0021001	RZ-021 JC2A	PD-304AC
R688	BRZY0021001	RZ-021 JC2A	PD-304AC
R689	BRZY0021001	RZ-021 JC2A	PD-304AC
R690	BRZY0021001	RZ-021 JC2A	PD-304AC
R691	BRZY0021001	RZ-021 JC2A	PD-304AC
R692	BRZY0021001	RZ-021 JC2A	PD-304AC
R701	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R702	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R703	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R705	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R706	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R707	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R708	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R710	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R711	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R712	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R713	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R715	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R716	BRFC013914Z	RC 390 Ω 1/10W J	PD-305AB
R717	BRFC012234Z	RC 22K Ω 1/10W J	PD-305AB
R718	BRFC014734Z	RC 47K Ω 1/10W J	PD-305AB
R720	BRFC012794Z	RC 2.7 Ω 1/10W J	PD-305AB
R721	BRFC012794Z	RC 2.7 Ω 1/10W J	PD-305AB
RR301	BHAY0115001	HA-115 R:ARRAY	PD-309AB

Switches

Symbol	Part Number	Description	Board Number(s)
S701	BSWY0610001	SW-610 SKHHPQ	PD-305AB
S702	BSWY0610001	SW-610 SKHHPQ	PD-305AB
S703	BSWY0549001	SW-549 PXG22-01	PD-305AB
S705	BSWY0549001	SW-549 PXG22-01	PD-305AB
S706	BSWY0549001	SW-549 PXG22-01	PD-305AB
S707	BSWY0629001	SW-629	PD-305AB

Transistors

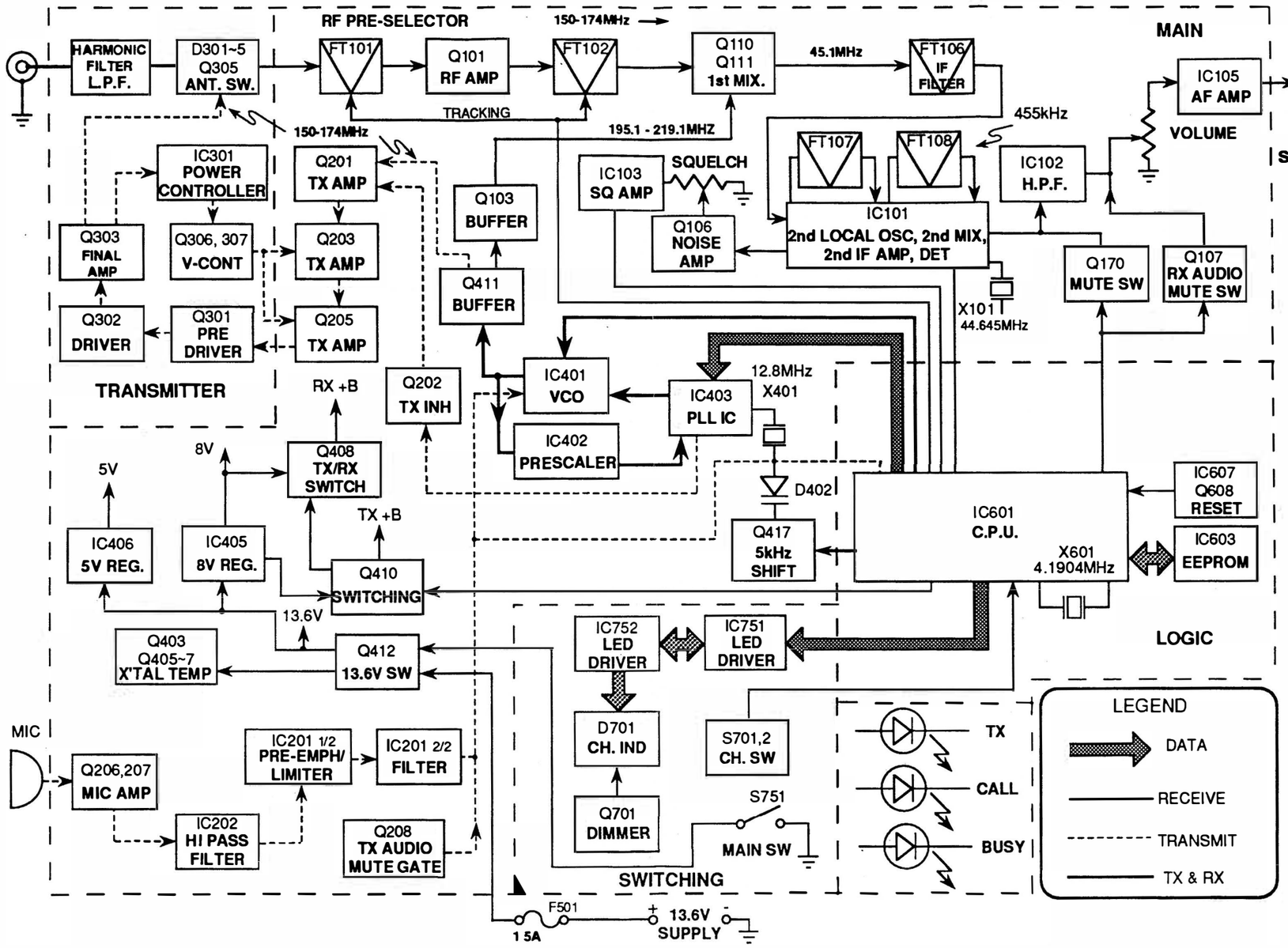
Symbol	Part Number	Description	Board Number(s)
Q101	BDBC2026111	DB-323 2SC2026-L	PD-308AC
Q102	BDCB0302124	DC-025 2SK302-Y	PD-308AC
Q103	BDBC3337000	DB-387 2SC3337	PD-308AC
Q106	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q107	BDBD1048723	DB-435 2SD1048X-6	PD-308AC
Q110	BDBC2026111	DB-323 2SC2026-L	PD-308AC
Q111	BDBC2026111	DB-323 2SC2026-L	PD-308AC
Q170	BDBD1048723	DB-435 2SD1048X-6	PD-308AC
Q201	BDBC2026111	DB-323 2SC2026-L	PD-308AC
Q202	BDBA0950124	DB-010 2SA950-Y	PD-308AC
Q203	BDBC2407101	DB-325 2SC2407-A	PD-308AC
Q204	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q205	BDBC2538000	DB-339 2SC2538	PD-308AC
Q206	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q207	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q208	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q210	BDBA1162124	DB-036 2SA1162-Y	PD-308AC
Q301	BDBZ0579001	DB-579 MRF553	PD-309AB
Q302	BDBC2539000	DB-713 2SC2539	PD-309AB
Q303	BDBC2694000	DB-712 2SC2694	PD-309AB
Q305	BDBA1204124	DB-045 2SA1204-Y	PD-309AB
Q306	BDBB1143119	DB-128 2SB1143-T	PD-309AB
Q307	BDBC2712124	DB-381 2SC2712-Y	PD-309AB
Q403	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q405	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q406	BDBA1162124	DB-036 2SA1162-Y	PD-308AC
Q407	BDBB0891116	DB-116 2SB891-Q	PD-308AC
Q408	BDBA0950124	DB-010 2SA950-Y	PD-308AC
Q410	BDBA0950124	DB-010 2SA950-Y	PD-308AC
Q411	BDBC2714114	DB-718 2SC2714-O	PD-308AC
Q412	BDBB1143119	DB-128 2SB1143-T	PD-308AC
Q415	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q417	BDBC2712124	DB-381 2SC2712-Y	PD-308AC
Q601	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q602	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q603	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q604	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q605	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q606	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q607	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q608	BDBC2712124	DB-381 2SC2712-Y	PD-304AC
Q610	BDBC2712124	DB-381 2SC2712-Y	PD-304AC
Q611	BDBA1162124	DB-036 2SA1162-Y	PD-304AC
Q612	BDBC2712124	DB-381 2SC2712-Y	PD-304AC
Q613	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q615	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q616	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q618	BDBZ0532001	DB-532 DTC144EK	PD-304AC
Q701	BDBC2673116	DB-391 2SC2673-Q	PD-305AB

Variable Resistors

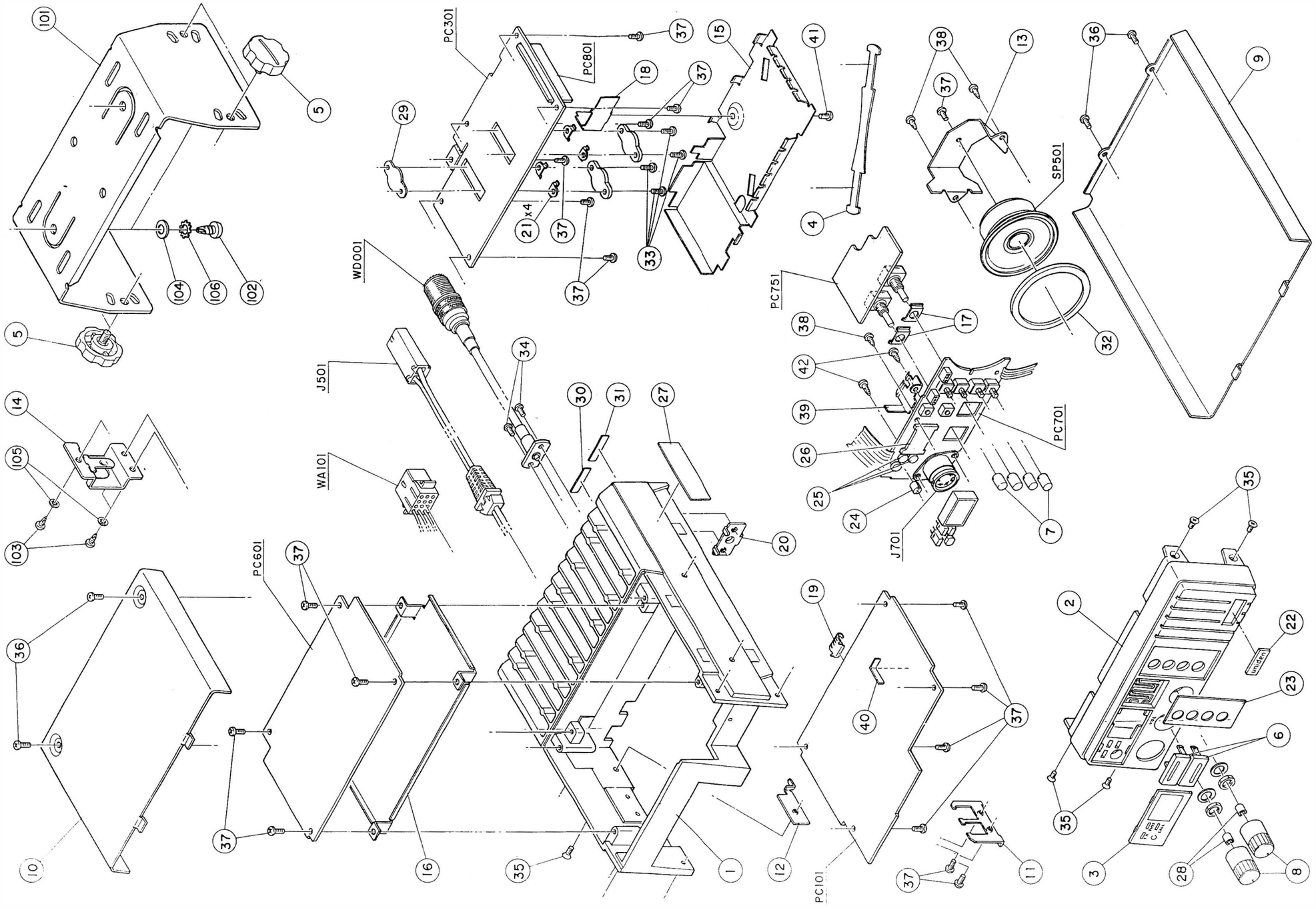
Symbol	Part Number	Description	Board Number(s)
VR101	BRTY0528103	RT-528 10KB Ω	PD-308AC
VR102	BRTY0528472	RT-528 4.7KB Ω	PD-308AC
VR201	BRTY0528103	RT-528 10KB Ω	PD-308AC
VR202	BRTY0528224	RT-528 220KB Ω	PD-308AC
VR301	BRTY0528474	RT-528 470KB Ω	PD-309AB
VR401	BRTY0527223	RT-527 HO521A115 22K Ω	PD-308AC
VR601	BRTY0531103	RT-531 TMC4K 10KB Ω	PD-304AC
VR602	BRTY0531474	RT-531 470KB Ω	PD-304AC
VR751	BRVY0674001	RV-674 10KA Ω	PD-306AA
VR752	BRVY0673001	RV-673 10KB Ω	PD-306AA

Warranty

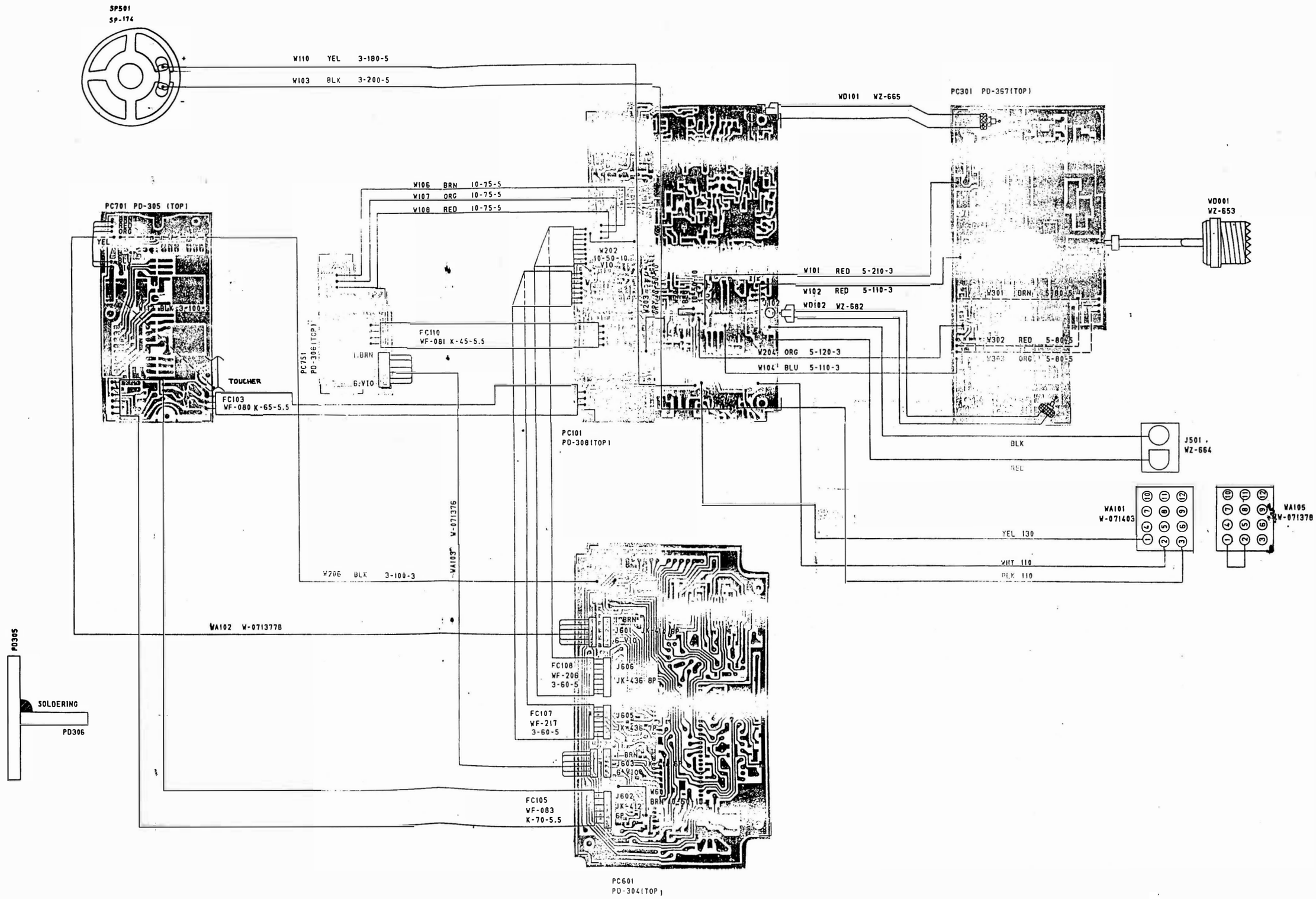
Consult your Uniden Commercial Communications Pricing Information for details about the warranty for this unit.



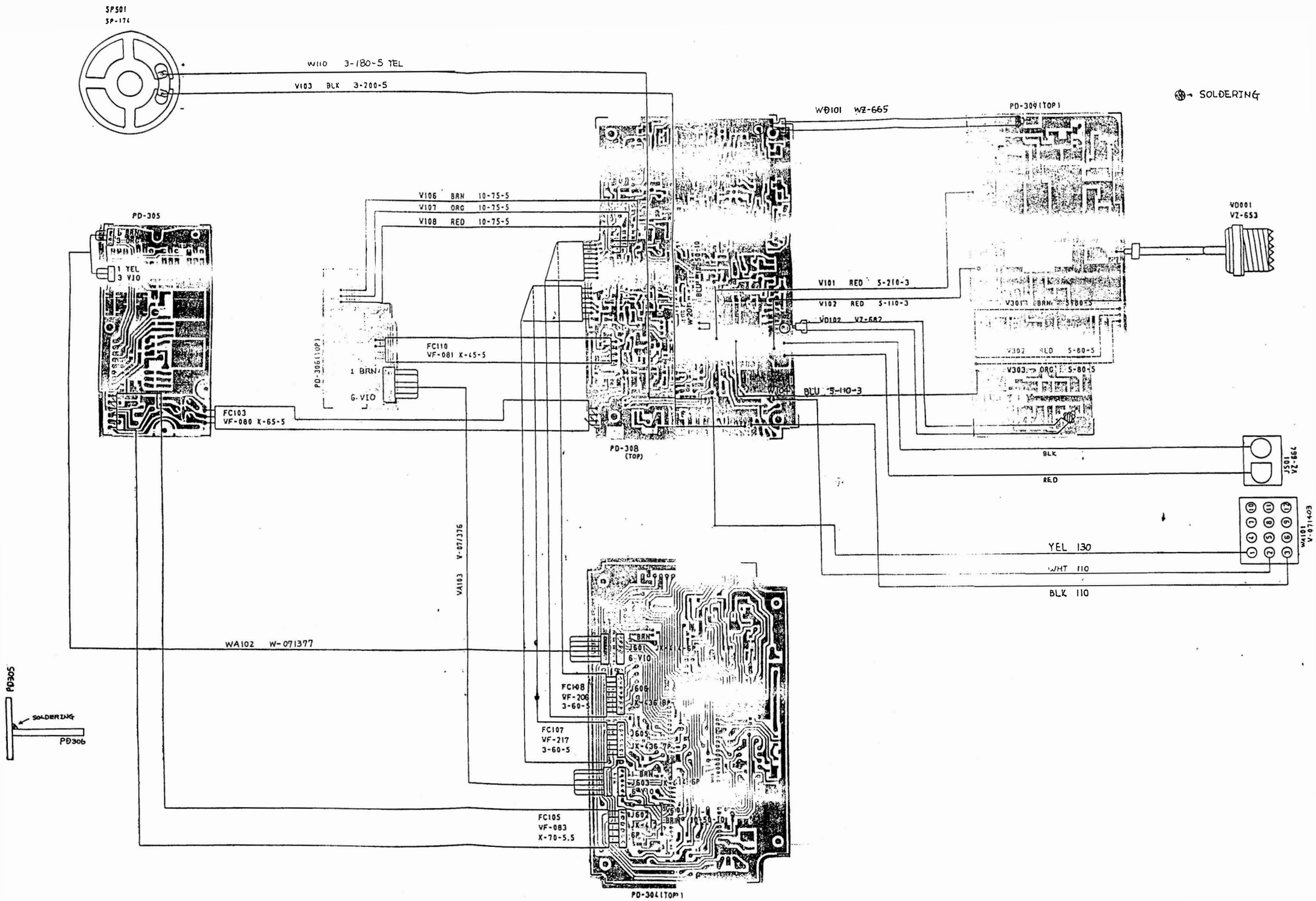
SMH 400D
Block Diagram



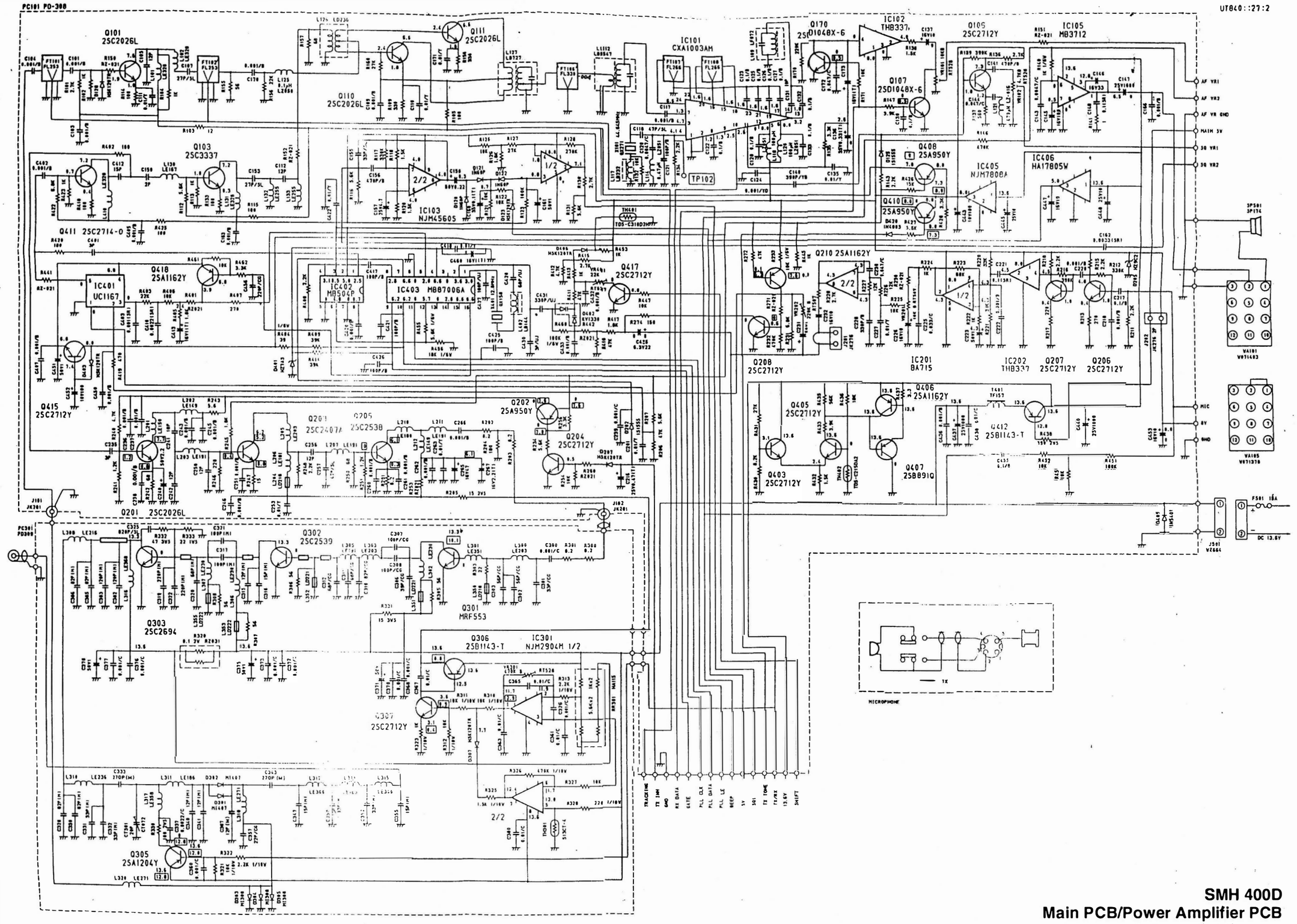
SMH 400D
Exploded Mechanical View



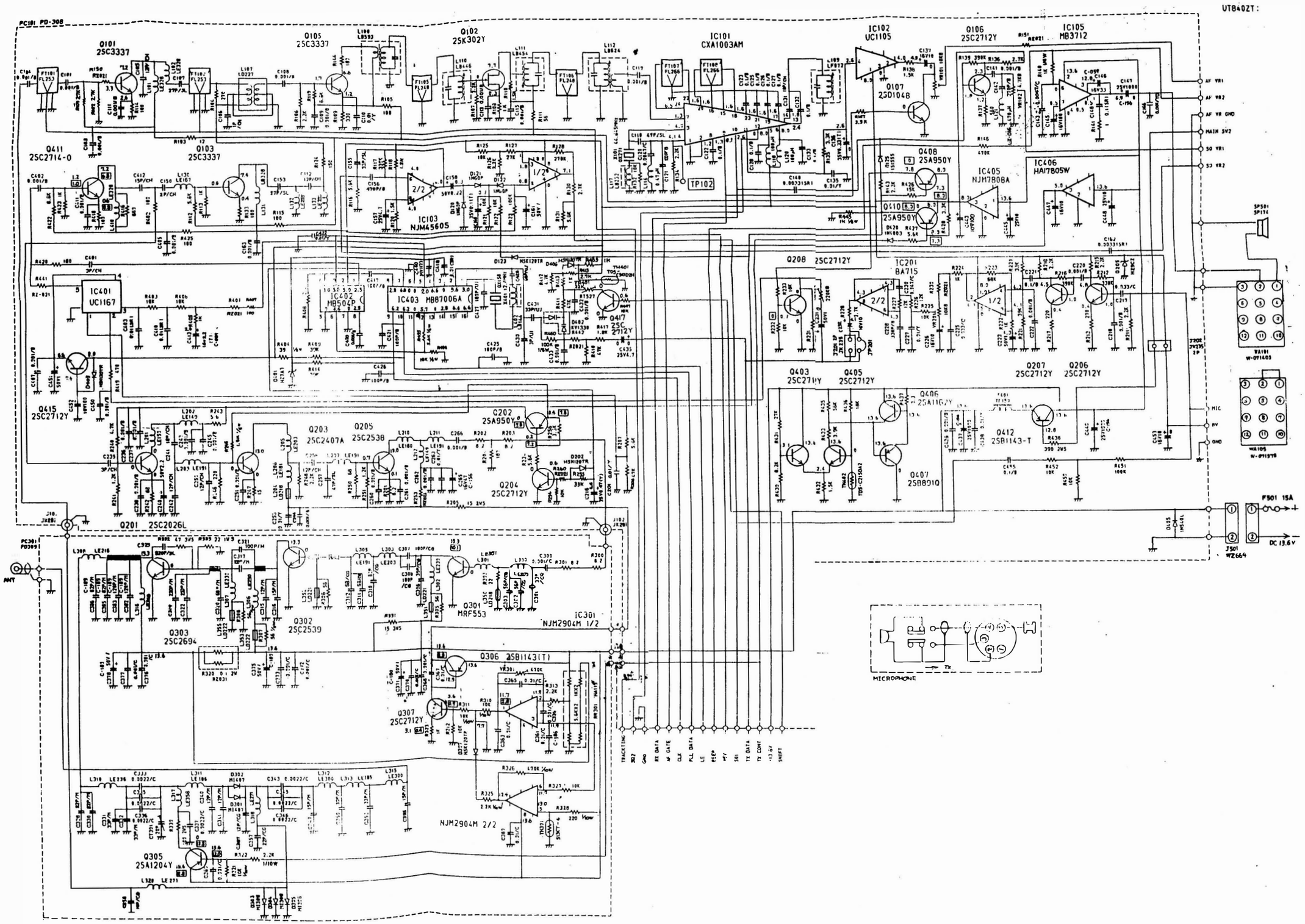
SMH 400D
Wiring Diagram



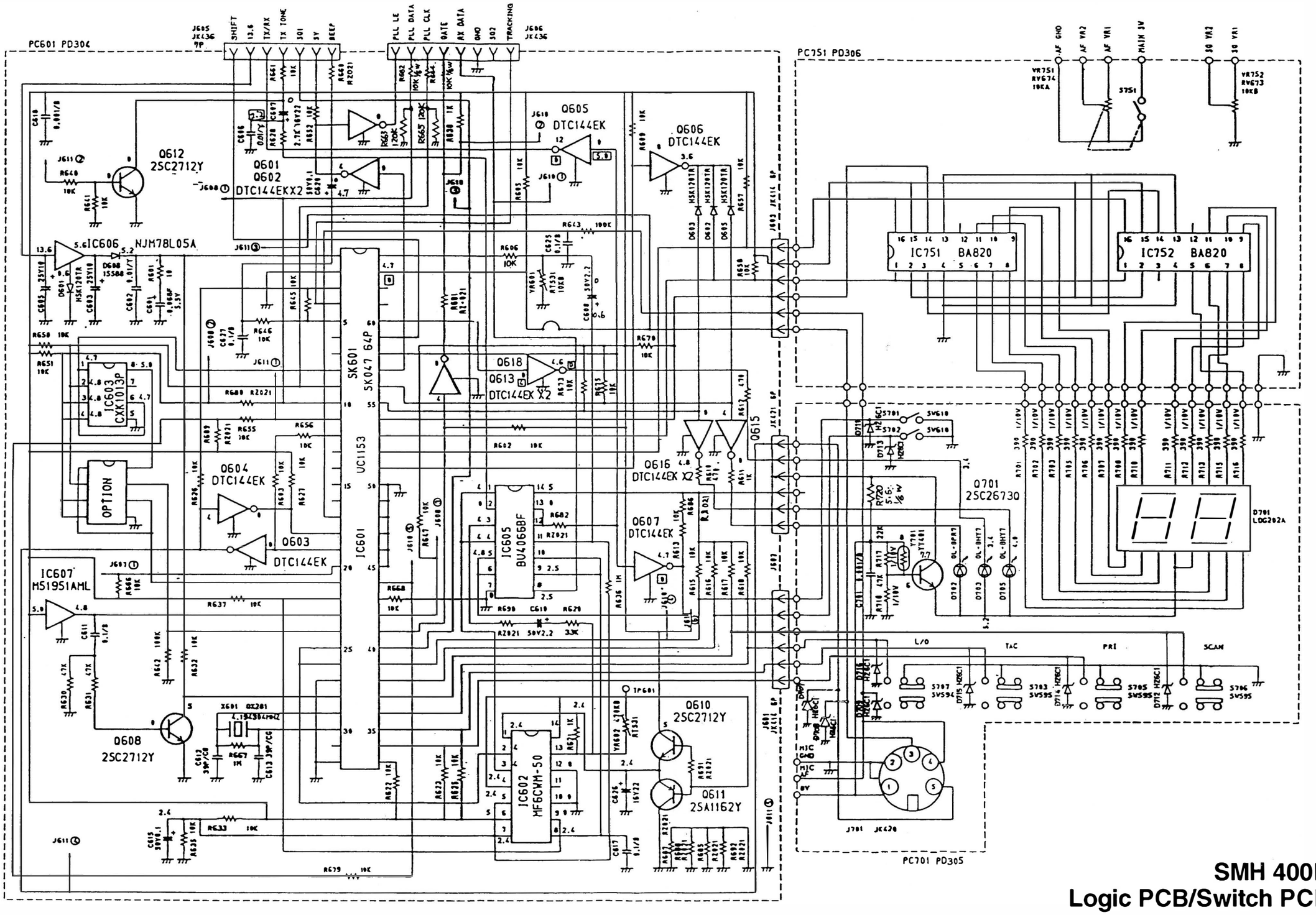
SMH 400D (Earlier Versions)
Wiring Diagram



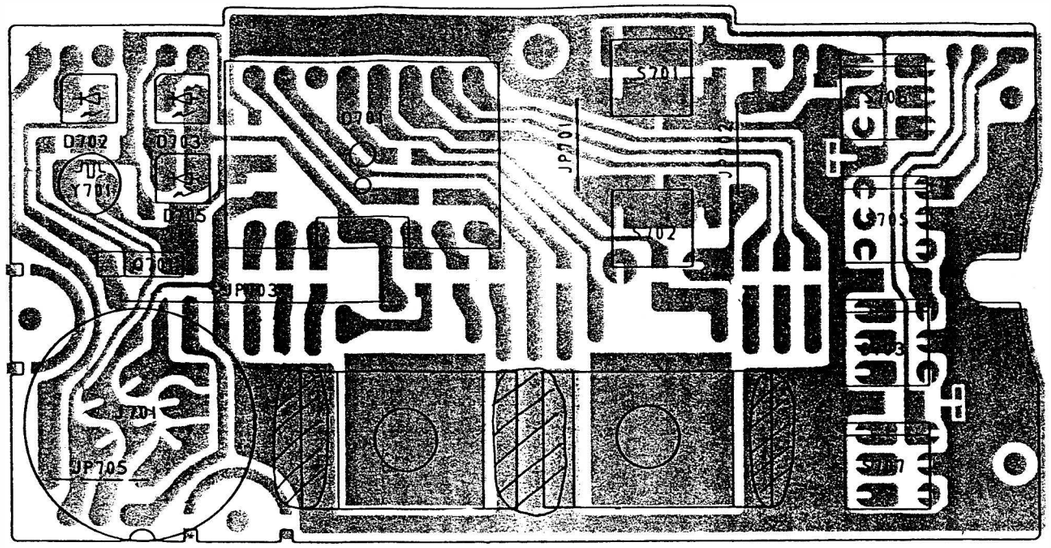
SMH 400D
Main PCB/Power Amplifier PCB
Schematic Diagram



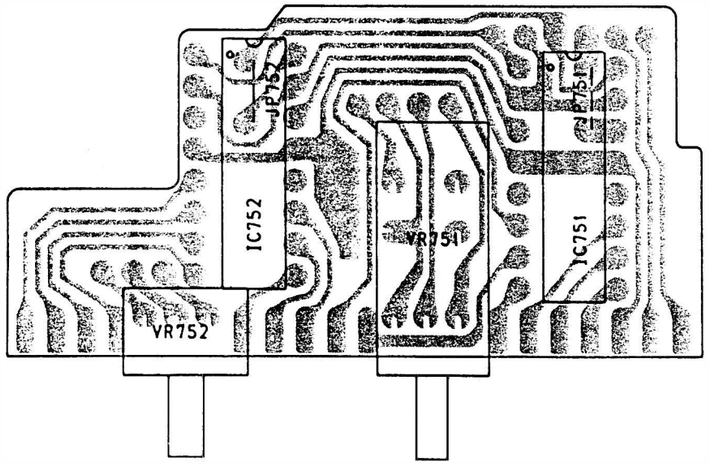
SMH 400D (Earlier Versions)
Main PCB/Power Amplifier PCB
Schematic Diagram



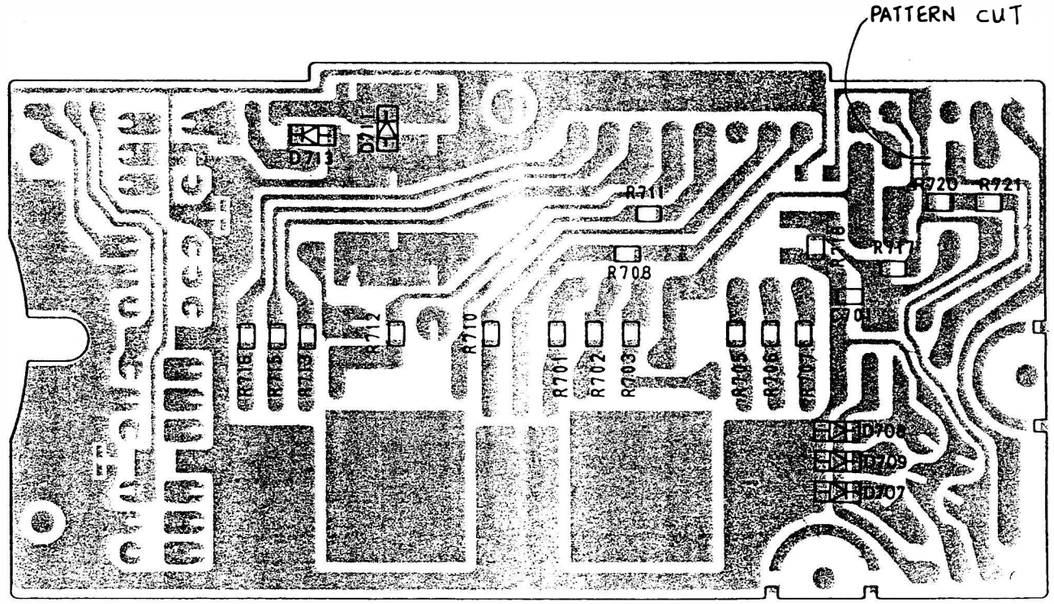
SMH 400D
Logic PCB/Switch PCB
Schematic Diagram



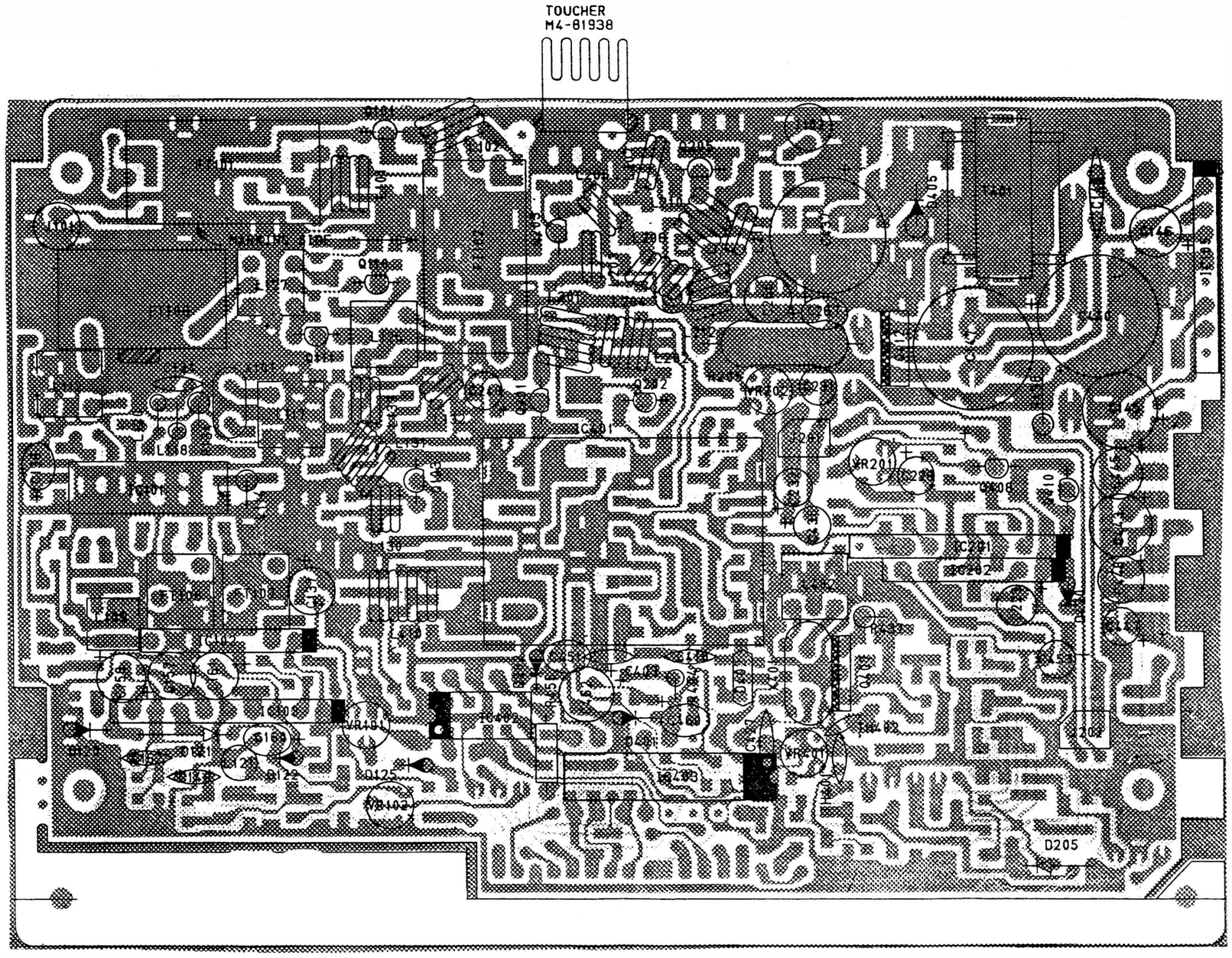
SMH 400D
Front PCB (PD-305AB)
Component Side



SMH 400D
Switch PCB (PD-306AA)
Component Side

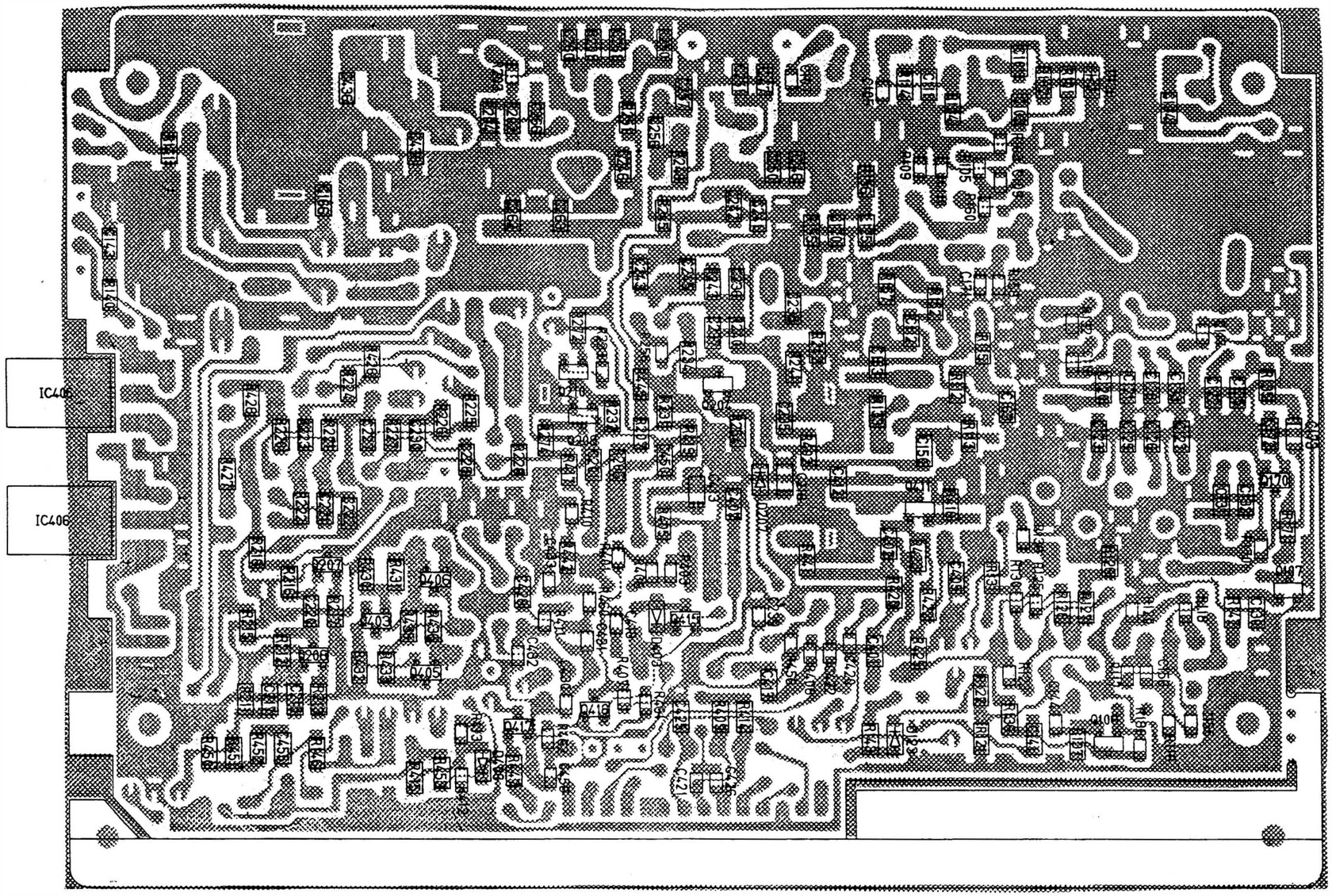


SMH 400D
Front PCB (PD-305AB)
Solder Side



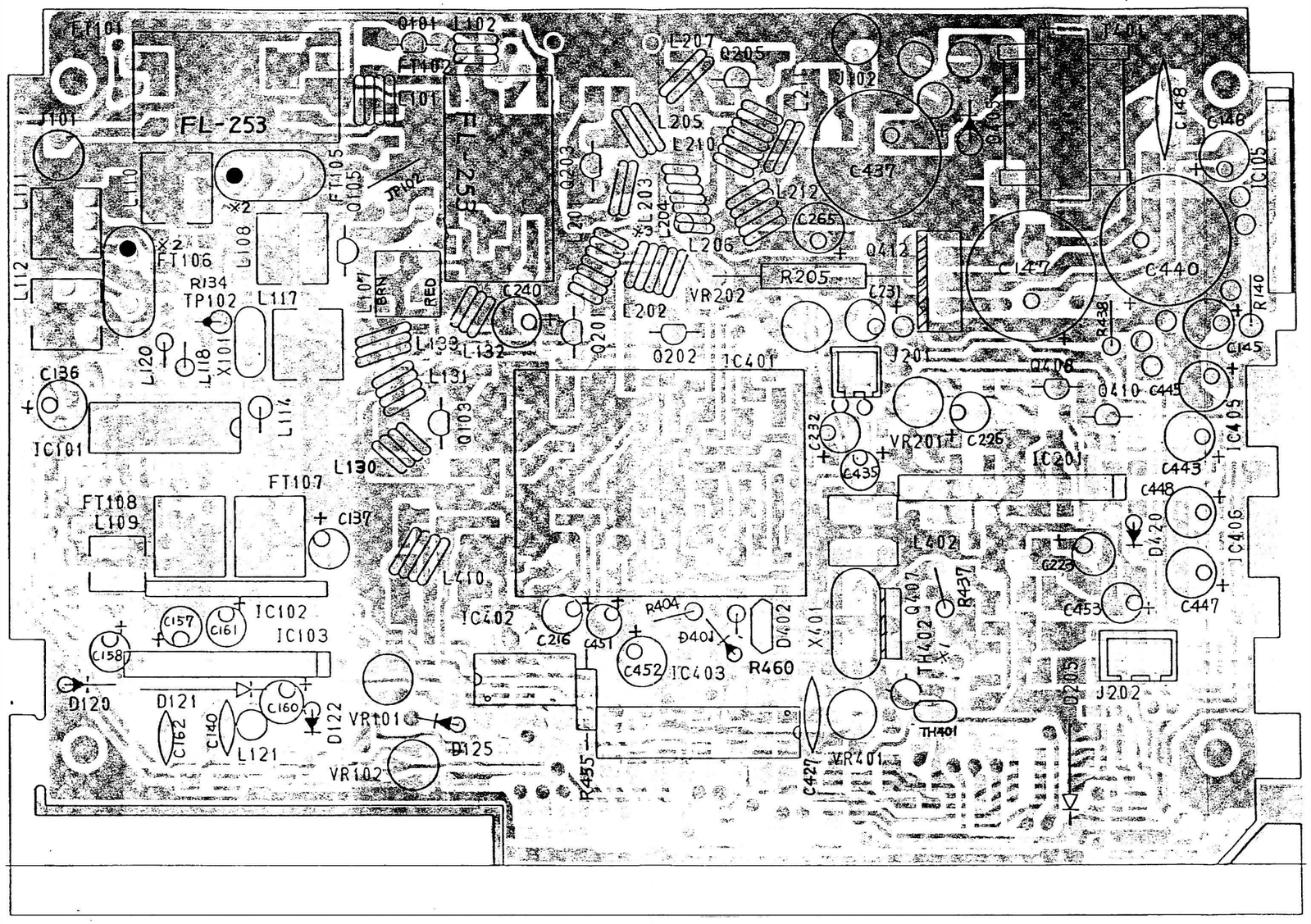
☐ Component Side
☐ Solder Side

SMH 400D
Main PCB (PD-308BA)
Component Side



SMH 400D
Main PCB (PD-308BA)
Solder Side

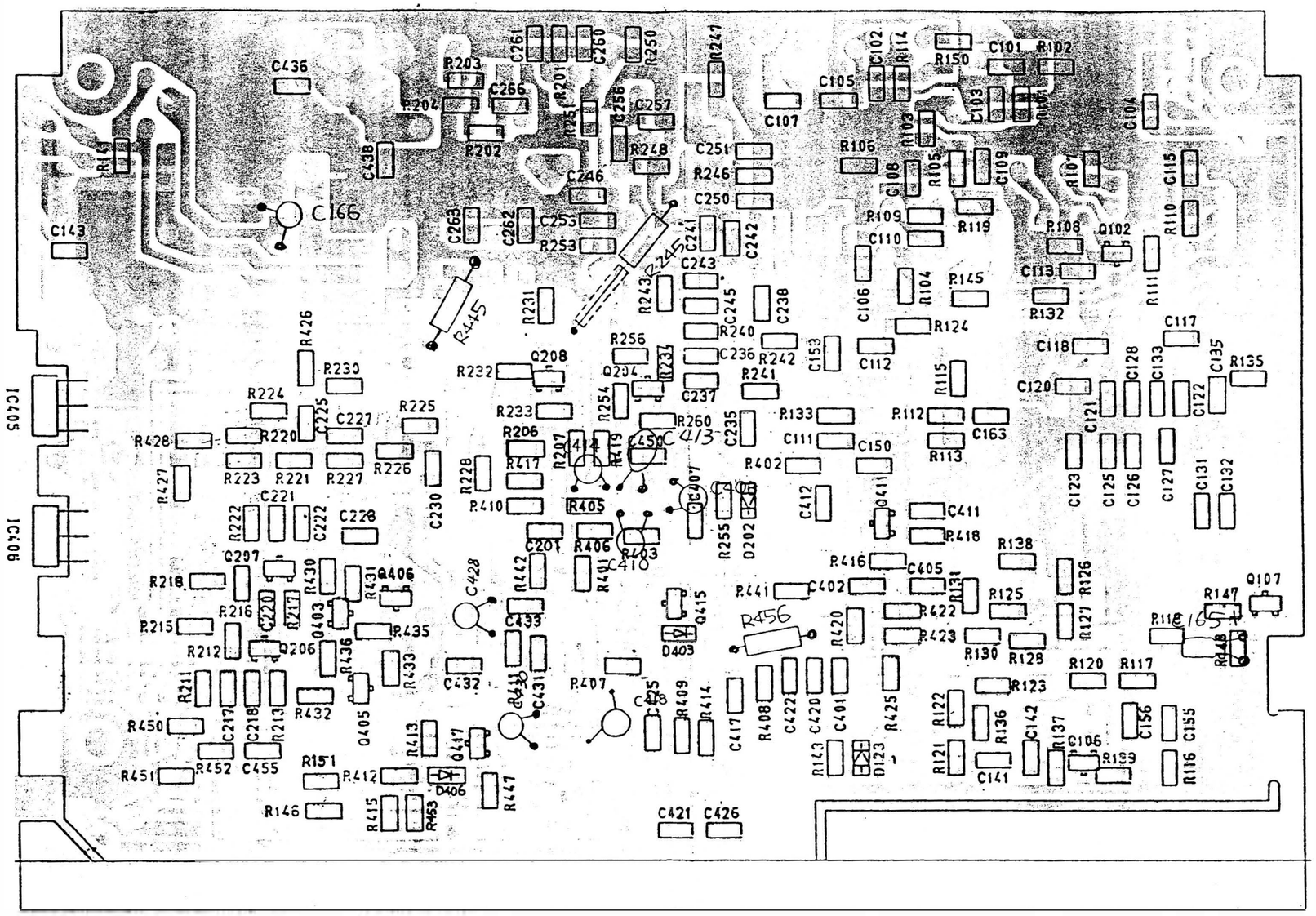
☐ Component Side
☐ Solder Side



☐ Component Side
☐ Solder Side

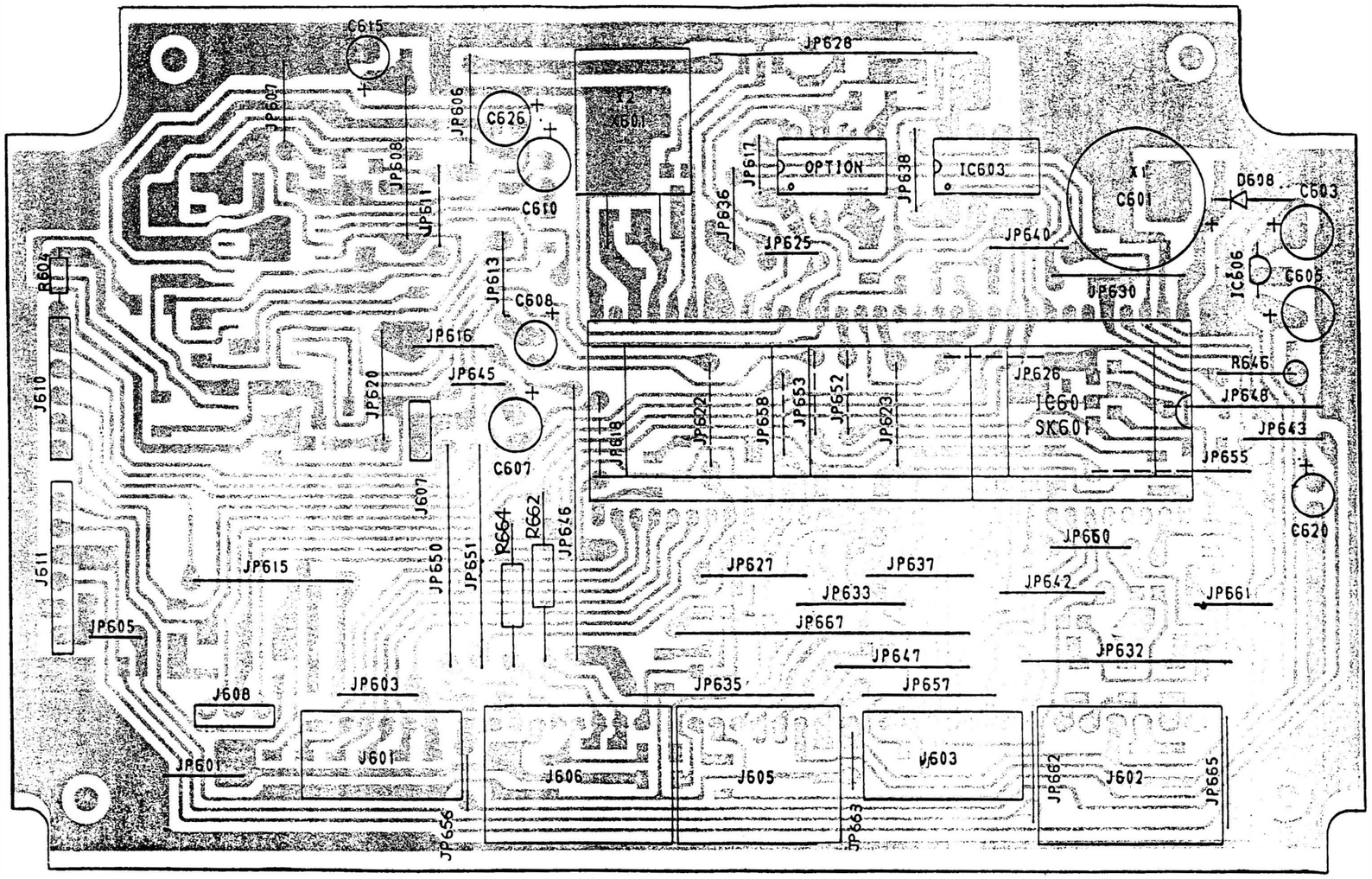
SMH 400D (Earlier Version)
Main PCB (PD-308AA)
Component Side

PC101 PD-308AA (BOTTOM VIEW)

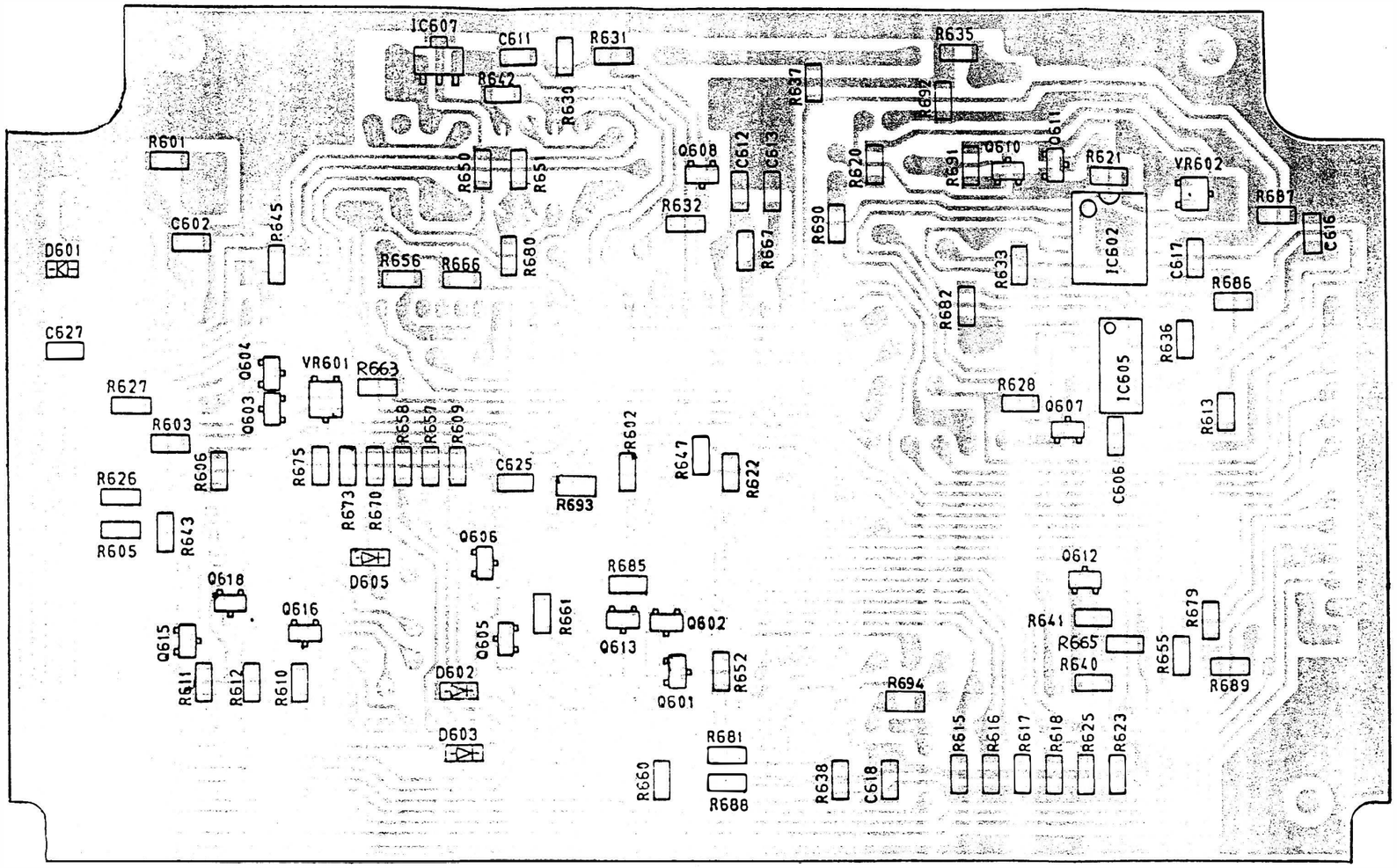


SMH 400D (Earlier Version)
Main PCB (PD-308AA)
Solder Side

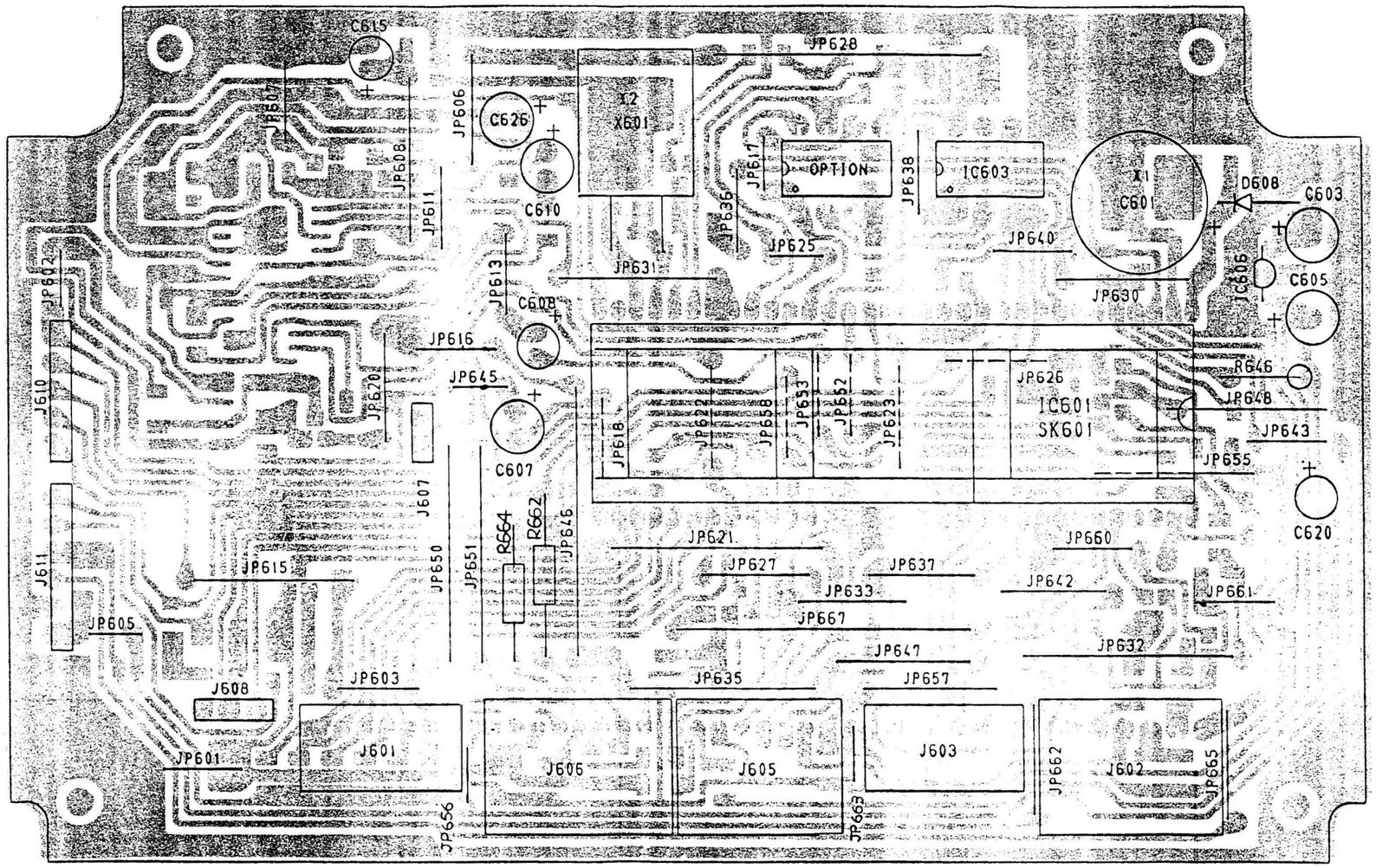
☐ Component Side
☐ Solder Side



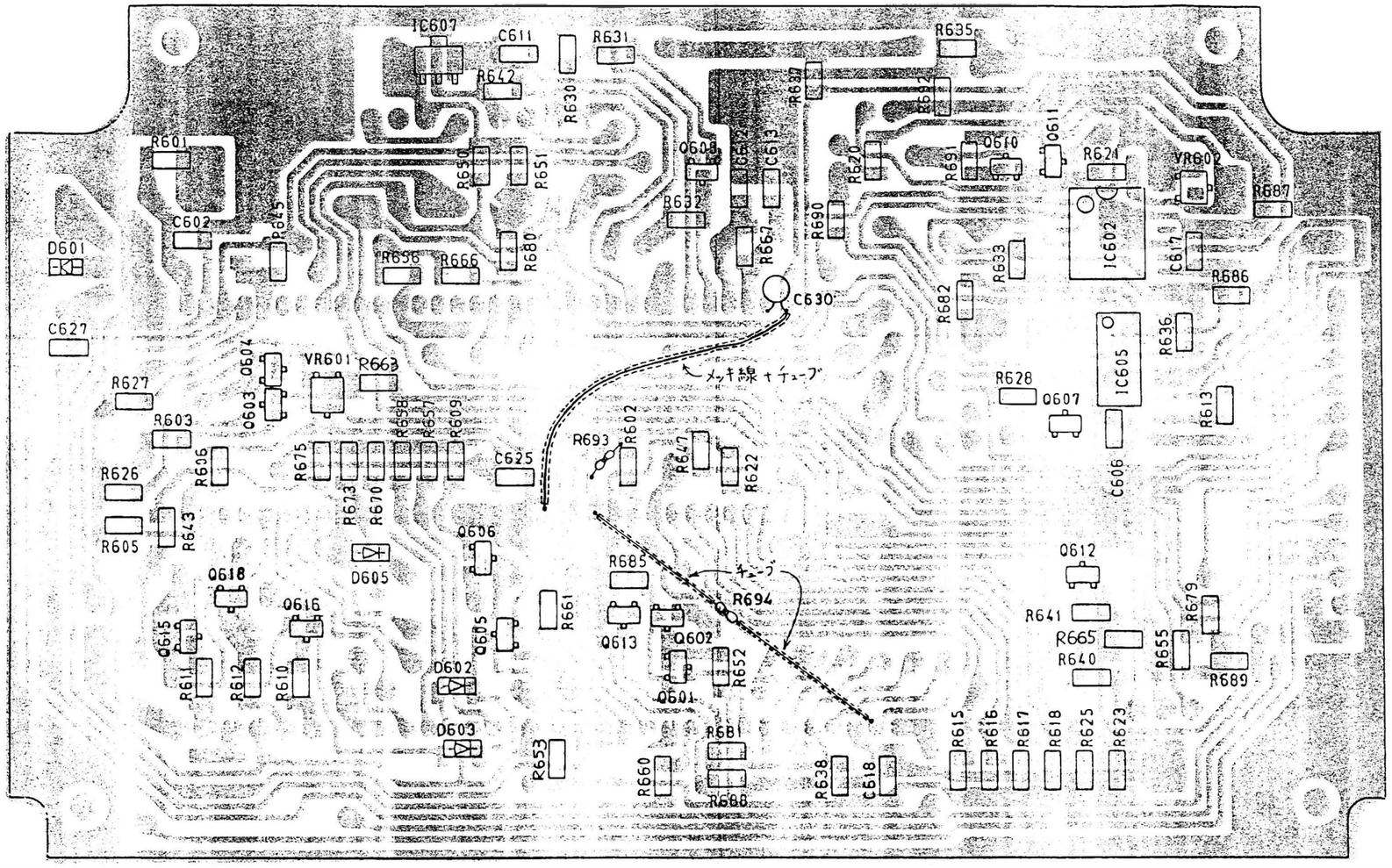
SMH 400D
Logic PCB (PD-304AD)
Component Side



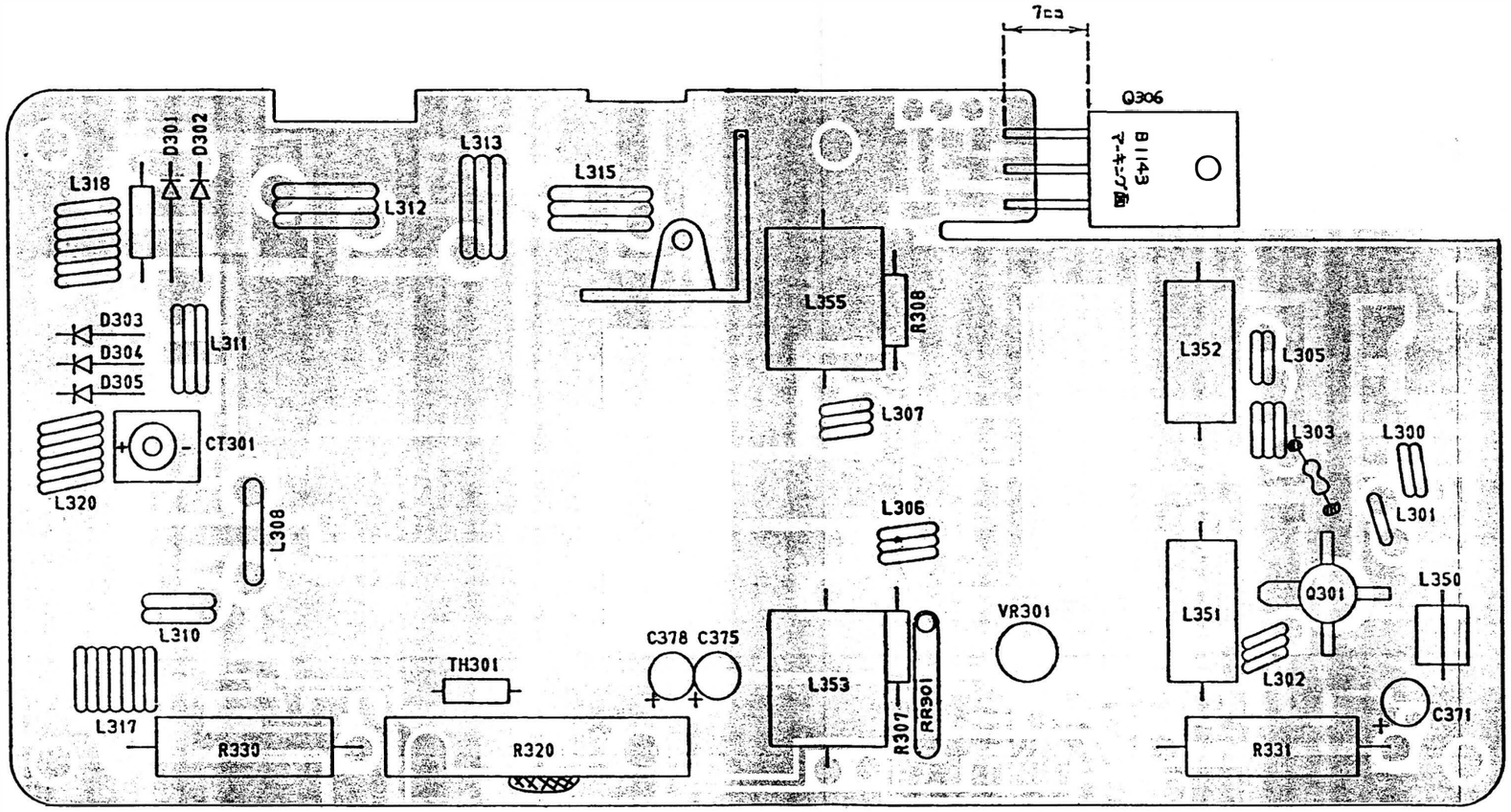
SMH 400D
Logic PCB (PD-304AD)
Solder Side



SMH 400D (Earlier Version)
Logic PCB (PD-304AC)
Component Side

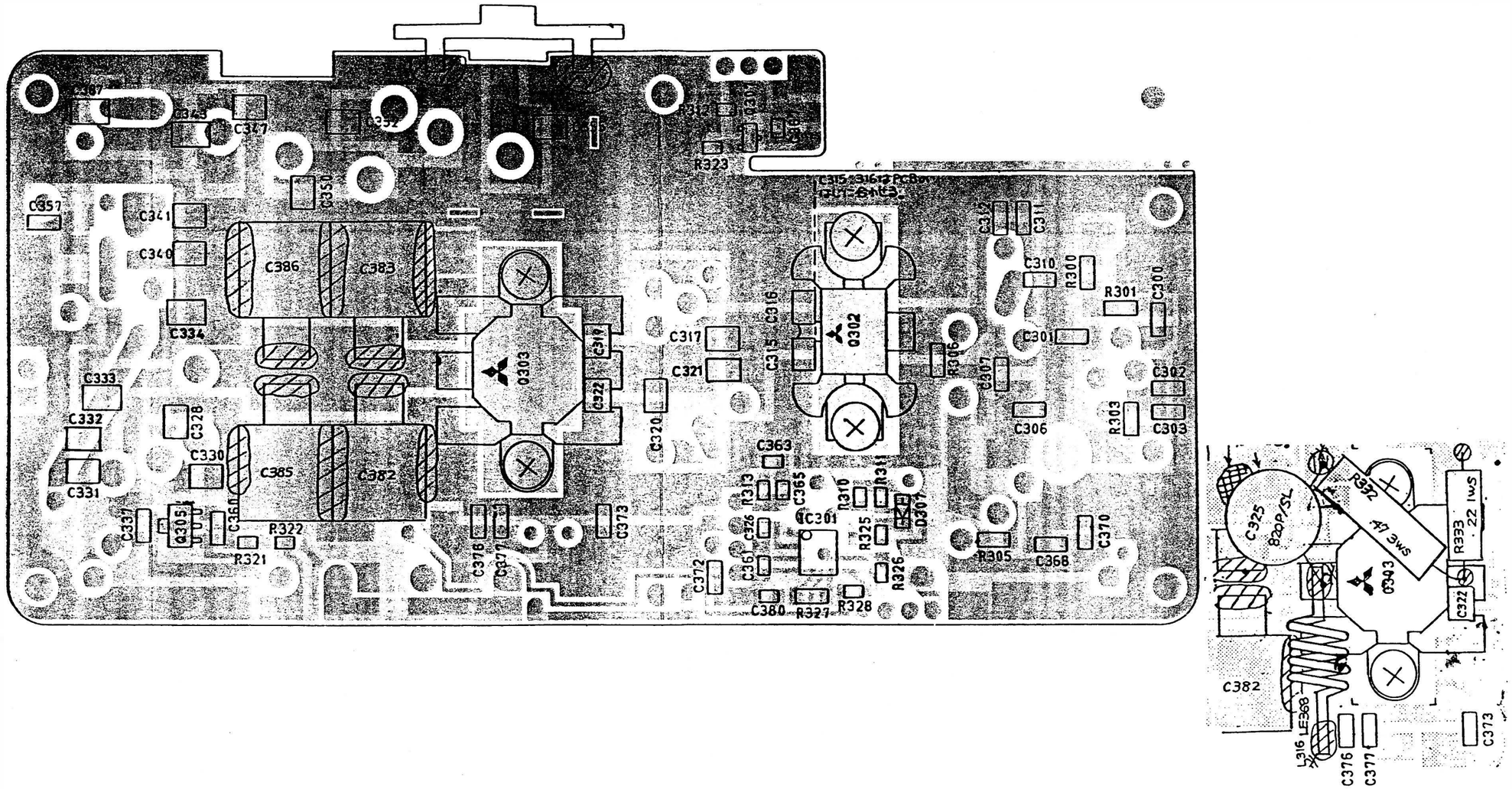


SMH 400D (Earlier Version)
Logic PCB (PD-304AC)
Solder Side



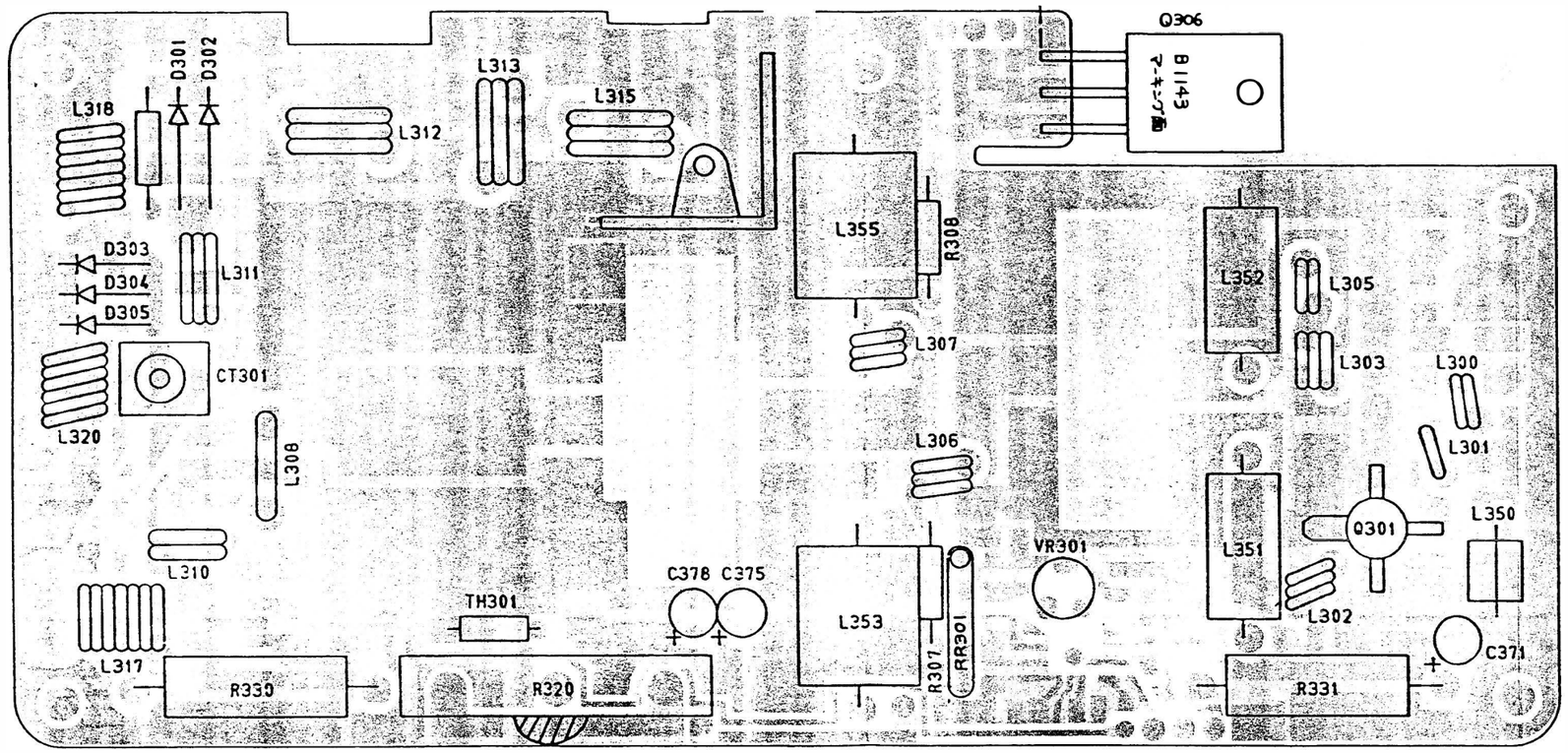
☐ Component Side
☐ Solder Side

SMH 400D
Power Amplifier PCB (PD-309AC)
Component Location - Component Side



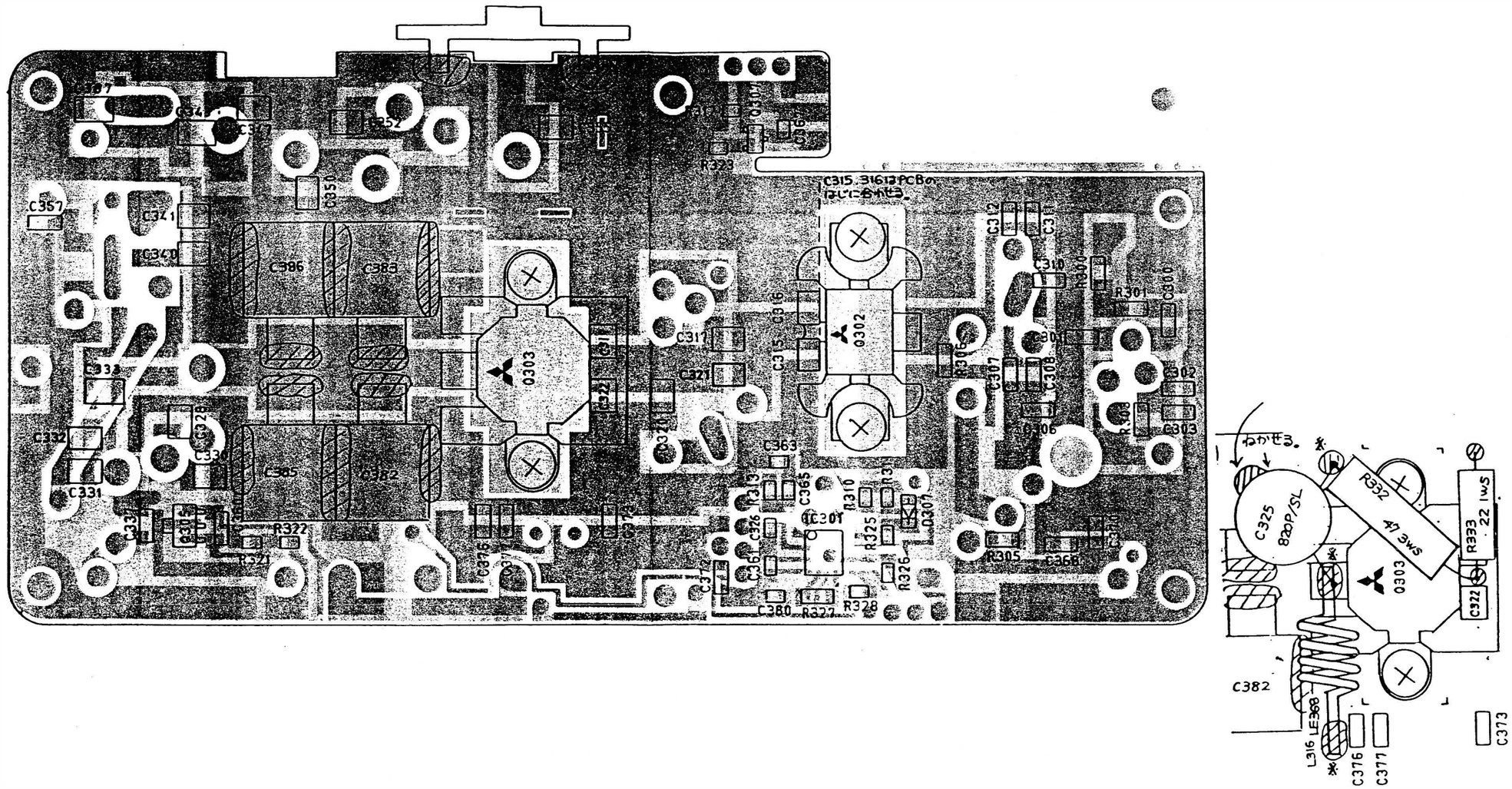
SMH 400D
Power Amplifier PCB (PD-309AC)
Chip Location - Component Side

☐ Component Side
☐ Solder Side



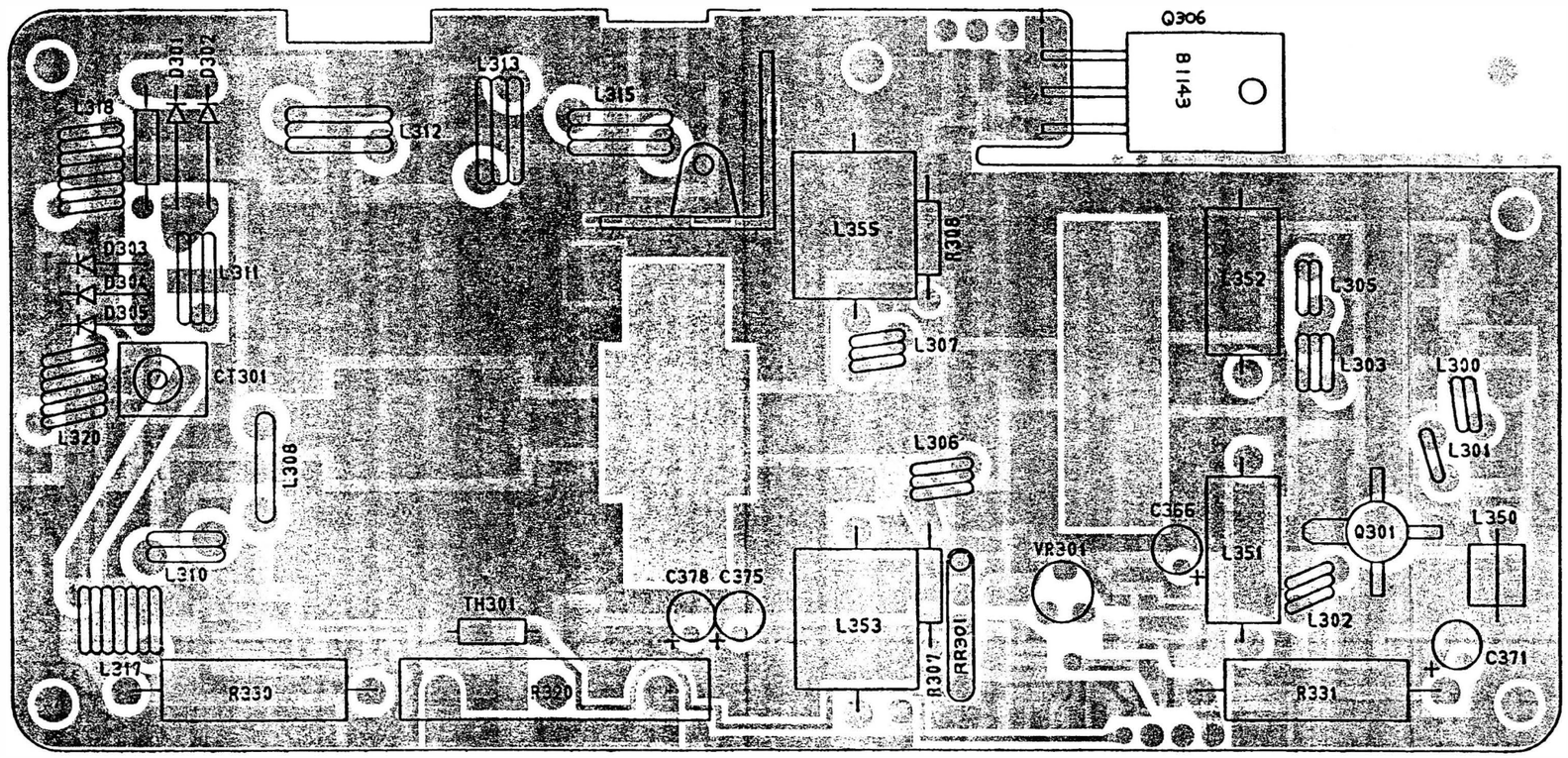
☐ Component Side
☐ Solder Side

SMH 400D (Earlier Version)
Power Amplifier PCB (PD-309AB)
Component Location - Component Side



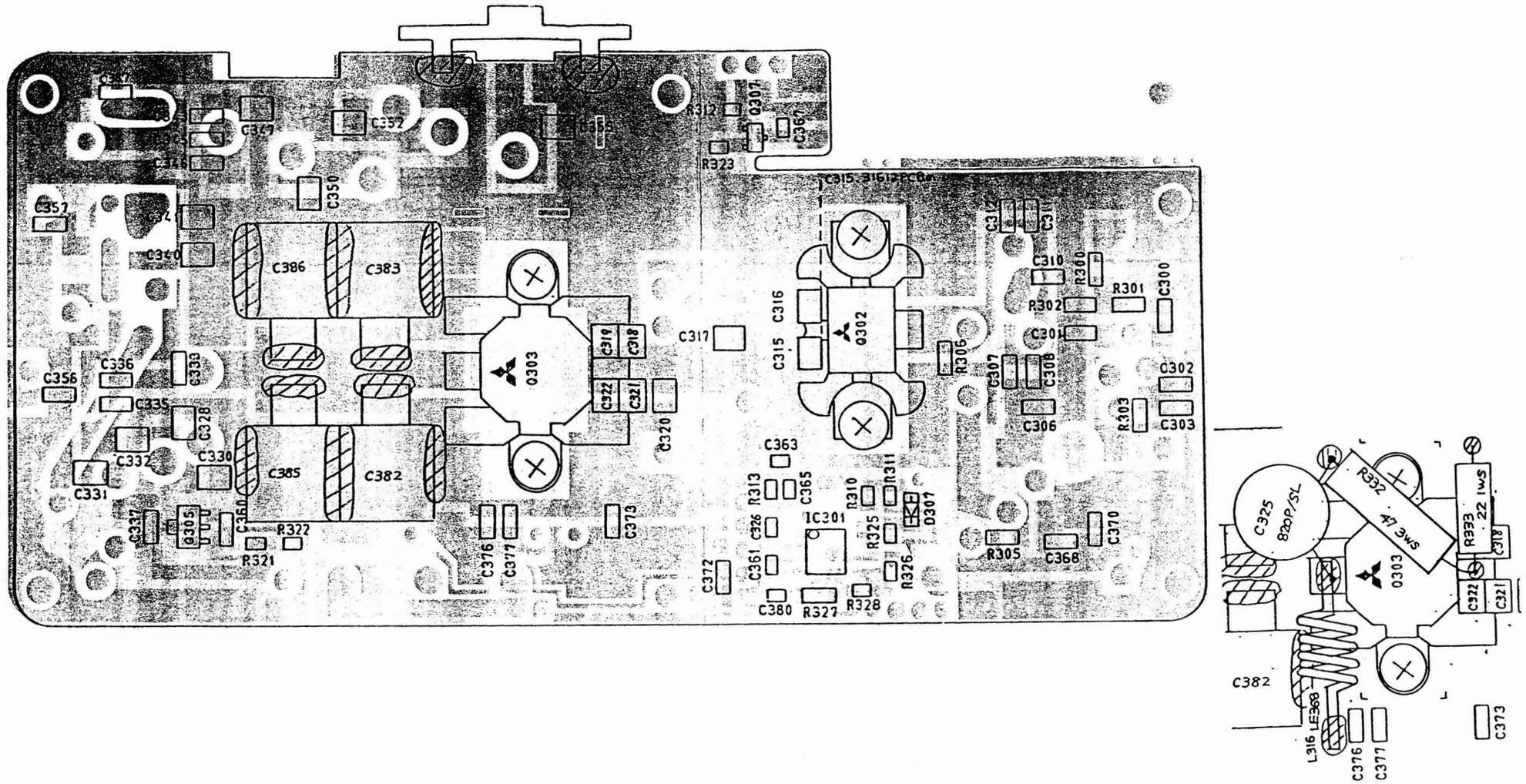
SMH 400D (Earlier Version)
Power Amplifier PCB (PD-309AB)
Chip Location - Component Side

☐ Component Side
▒ Solder Side



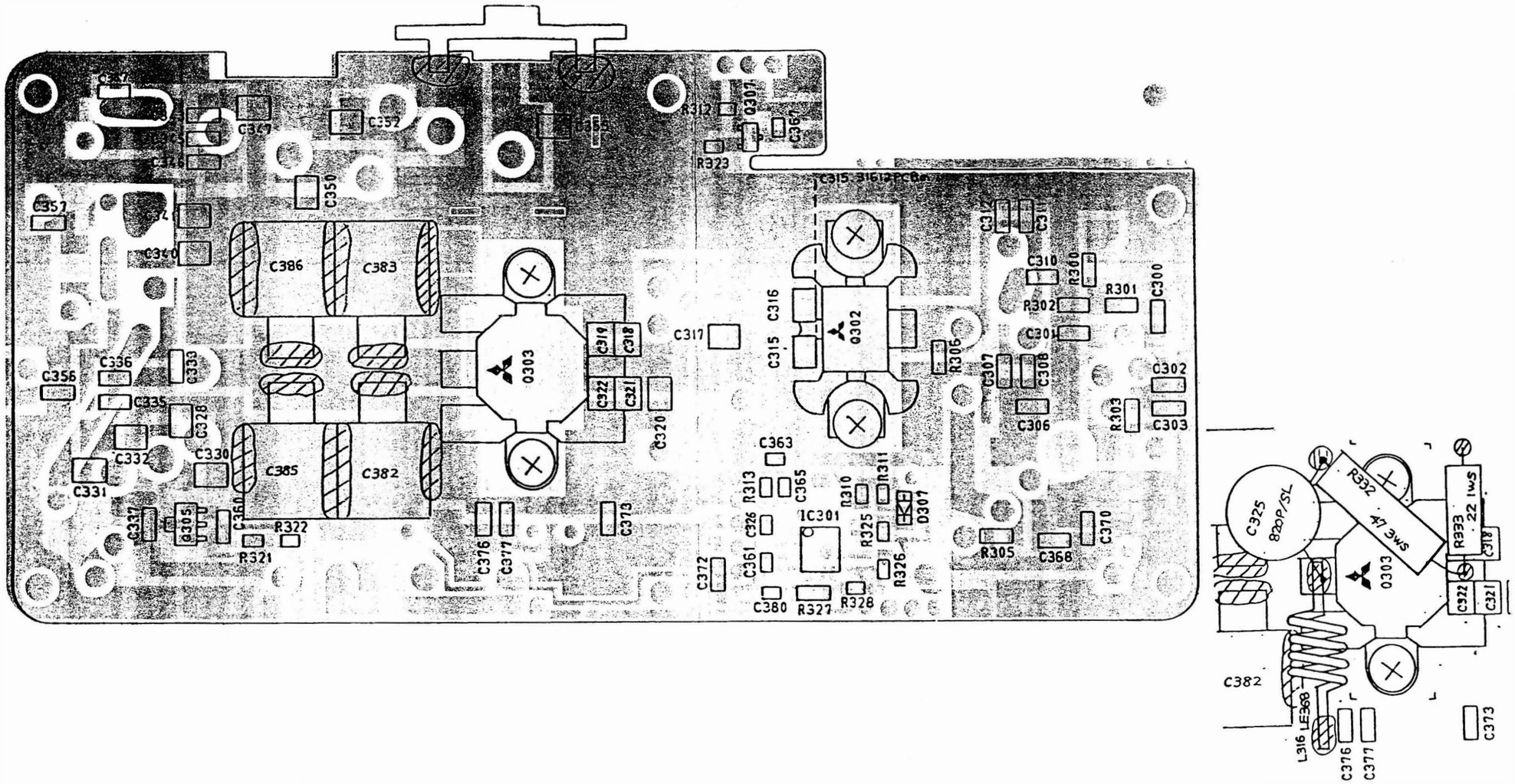
Component Side
Solder Side

SMH 400D (Earlier Version)
Power Amplifier PCB (PD-309AA)
Component Location - Component Side



SMH 400D (Earlier Version)
Power Amplifier PCB (PD-309AA)
Chip Location - Component Side

☐ Component Side
☐ Solder Side



SMH 400D (Earlier Version)
Power Amplifier PCB (PD-309AA)
Chip Location - Component Side

☐ Component Side
☐ Solder Side

Este manual foi doado por PY2WFG Wilson
para ser scaneado e disponibilizado
GRATUITAMENTE a toda a comunidade

Scaneado em cores, 300 DPI (é o maximo que minha maquina faz, nao me batam) em uma copiadora Lexmark X864de, imagens tratadas com o programa IRFANVIEW e pdf gerado com o Adobe Acrobat XI Pro, usando Clearscan

Eu scaneio, trato e disponibilizo manuais gratuitamente meramente pelo prazer de faze-lo. Caso voce queira ajudar com manuais, insumos e ate mesmo uma merrequinha pra ajudar na conta de luz e na manutenção da maquina, entre em contato pelo email alexandre.tabajara@gmail.com (tambem é pix)

Obrigado a todos que ajudaram ate aqui

Os sites onde esses scans podem ser encontrados:
- www.bama.org
- http://tabajara-labs.blogspot.com
- http://tabalabs.com.br/esquemateca
- https://datassette.org/

ATENÇÃO: AS PAGINAS EM BRANCO ESTAO EXATAMENTE COMO NO MANUAL. O OBJETIVO DE MANTE-LAS É VOCE PODER IMPRIMIR UM MANUAL IDENTICO AO ORIGINAL. NAO ESTÁ FALTANDO PAGINA NENHUMA NO MANUAL

Distribuição **GRATUITA**. Respeite o meu trabalho.
São Paulo, Agosto de 2021

(Normalmente eu faço manuais de otima qualidade. Esse aqui ta bem marromenos. Infelizmente a fonte é a xerox de um manual. Mas como nao ha informacao nenhuma desse radio na net ate hoje, preferi fazer um scan marromenos a deixar de documentar o aparelho. Me desculpem!)