ICOM

SERVICE MANUAL

VHF AIR BAND TRANSCEIVER

IC-A200

S-14227MZ-C1
Apr. 2006

Icom Inc.

INTRODUCTION

This service manual describes the latest service information for the following transceivers at the time of publication.

MODEL	VERSION NO.	VERSION	SYMBOL
IC-A200	#01	U.S.A.	USA
IC-A200F	#02	France	FRA
IC-A200	#03	United Kingdom	UK
	#04	Germany	FRG
	#05	Australia	AUS

CAUTION

NEVER connect the transceiver to an AC outlet or to a DC power supply that uses more than 16 V. This will ruin the transceiver.

DO NOT expose the transceiver to rain, snow or any liquids.

DO NOT reverse the polarities of the power supply when connecting the transceiver.

DO NOT apply an RF signal of more than 20 dBm (100 mW) to the antenna connector. This could damage the transceiver's front end.

ORDERING PARTS

Be sure to include the following four points when ordering replacement parts:

1. 10-digit order numbers
2. Component part number and name
3. Equipment model name and unit name
4. Quantity required

<**SAMPLE ORDER**>

1120002170	IC	M5223FP	IC-A200	MAIN UNIT	5 pieces
8810006840	Screw	FH M2.6×4	IC-A200	Top cover	10 pieces

Addresses are provided on the inside back cover for your convenience.

REPAIR NOTES

1. Make sure a problem is internal before disassembling the transceiver.
2. **DO NOT** open the transceiver until the transceiver is disconnected from its power source.
3. **DO NOT** force any of the variable components. Turn them slowly and smoothly.
4. **DO NOT** short any circuits or electronic parts. An insulated turning tool **MUST** be used for all adjustments.
5. **DO NOT** keep power ON for a long time when the transceiver is defective.
6. **DO NOT** transmit power into a signal generator or a sweep generator.
7. **ALWAYS** connect a 40 dB or 50 dB attenuator between the transceiver and a deviation meter or spectrum analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting equipment to the transceiver.

TABLE OF CONTENTS

SECTION 1 SPECIFICATIONS

■GENERAL

- Frequency range : 118.000–136.975 MHz
- Mode : AM (6K00A3E)
- Tuning steps : 25 kHz, 50 kHz or 1 MHz
- Number of memory channels : 9
- Frequency stability : ±0.0015% (–20°C to +55°C)
- Antenna impedance : 50 Ω
- Power supply requirement : 13.75 V DC ±15% (negative ground)
- Current drain (at 13.8 V DC) :

Transmit		2.6 A
Receive	Max. audio output	600 mA
	Squelched	320 mA

- Usable temperature range : –20°C to +55°C; –4°F to +131°F
- Dimensions : 160 (W)×34 (H)×271 (D) mm; 6.3 (W)×1.3 (H)×10.7 (D) in (Projections not included)
- Weight (approx.) : 1.1 kg; 2.4 lb

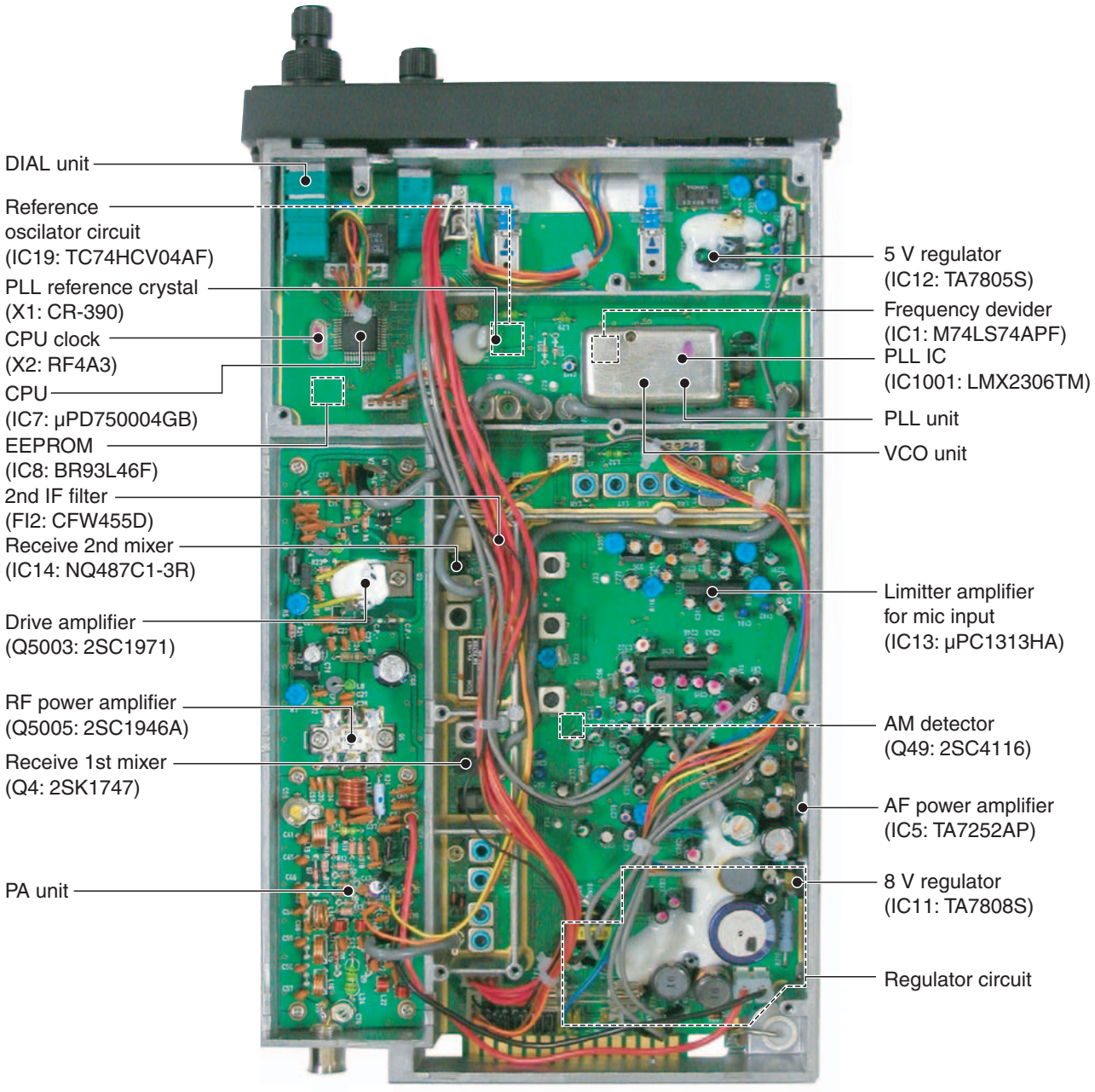
■TRANSMITTER

- Output power (at 13.8 V DC) : 7 W (Carrier power)
- Modulation : 70% (Max 98%)
- Microphone impedance : 600 Ω
- Modulation system : Low level modulation
- Spurious emissions : Less than –60 dB

■RECEIVER

- Receive system : Double-conversion superheterodyne
- Sensitivity : 2 µV for 6 dB S/N (with 1 kHz, 30% modulation)
- Spurious rejection : 70 dB
- Selectivity : ±8 kHz/6 dB (min.)
  ±17 kHz/40 dB
  ±22 kHz/60 dB
- Intermediate frequencies : 1st 32.455 MHz
  2nd 455 kHz
- Audio output power : 5 W with a 4 Ω load
  60 mW with a 500 Ω load

SECTION 2 INSIDE VIEWS



SECTION 3 CIRCUIT DESCRIPTION

3-1 RECEIVER CIRCUITS

3-1-1 ANTENNA SWITCHING CIRCUIT (PA UNIT)

The antenna switching circuit functions as a low-pass filter while transmitting and as a resonator circuit while receiving.

Received signals enter the PA unit from the antenna connector and pass through the low-pass filter (C54–C57, C66, L14–L16), the antenna switching circuit (D7–D9) and the bandpass filter (C71–C75, L21–L23). The signals are then applied to the MAIN unit.

3-1-2 RF CIRCUIT (MAIN UNIT)

The RF circuit amplifies signal within the range of frequency coverage and filters out-of-band signal.

The signals from the PA unit pass through the attenuator circuit (D6, D7). The attenuation level is controlled by AGC voltages. The signals are passed through a bandpass filter and are then amplified at the RF amplifier (Q1). The amplified signals are passed through a bandpass filter again and are then applied to the 1st mixer circuit (Q4).

The bandpass filters employ tuned-type filters using varactor diodes (D1–D4) with PLL lock voltages to suppress the out-of-band signals (especially FM broad band signals) and to obtain high image response rejection.

AGC voltage is applied to Q1 as the bias voltage to obtain wide range characteristics of signal strength.

3-1-3 1st MIXER AND 1st IF CIRCUITS (MAIN UNIT)

The 1st mixer circuit converts the received signals to a fixed frequency of the 1st IF signal using a PLL output frequency. By changing the PLL frequency, only the desired frequency will be passed through a crystal filter located at the next stage of the 1st mixer.

The signals from the bandpass filter are mixed with a 1st LO signals from D25 at the 1st mixer (Q4) to produce a 32.455 MHz 1st IF signal. The 1st IF signal passes through the crystal filter (FI1) and is then applied to the IF amplifier (Q6).

3-1-4 2nd MIXER AND 2nd IF CIRCUITS (MAIN UNIT)

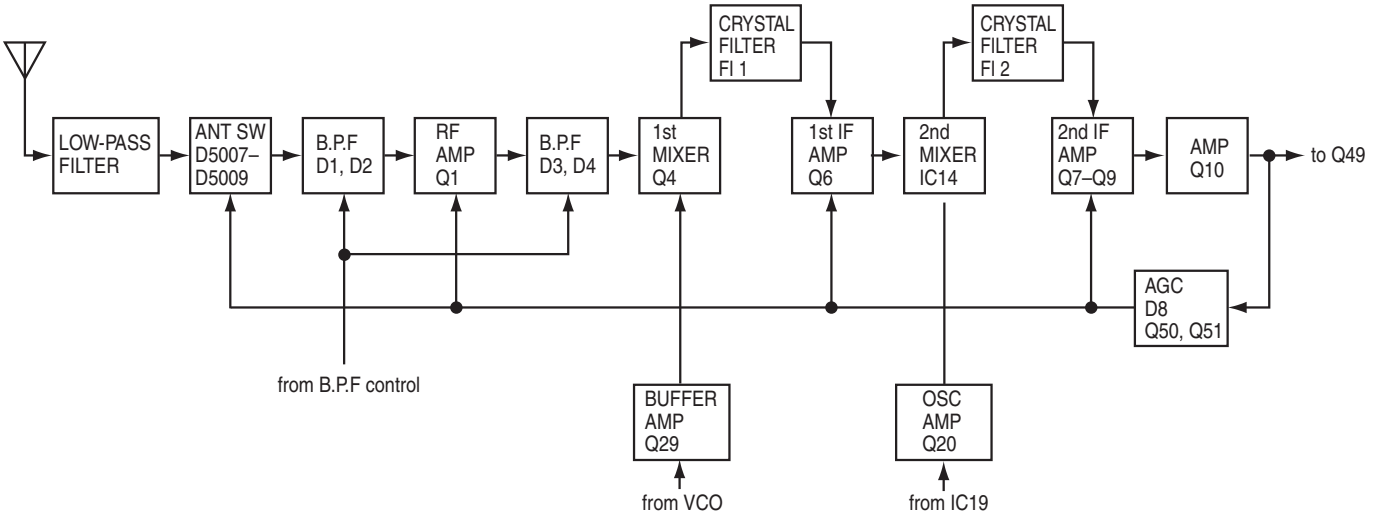
The 2nd mixer circuit converts the 1st IF signal to a 455 kHz 2nd IF signal. A double superheterodyne system (which converts the received signal twice) improves the image rejection ratio and obtains stable receiver gain.

The 1st IF signal from the 1st IF amplifier (Q6), is applied to the 2nd mixer (IC14) and mixed with a 32.000 MHz 2nd LO signal from Q20 to be converted to a 455 kHz of signals. The 2nd LO signal is commonly used with the PLL reference oscillator.

The 2nd IF signal is applied to an IF filter (F12) to suppress out-of-band signals. The 2nd IF signal is amplified at the IF amplifiers (Q7–Q10) and is then applied to the AM detector circuit (Q49).

The thermistor (R33) is used for Q9 bias voltage to obtain stable amplifier gain during temperature fluctuations.

RECEIVER CIRCUIT BLOCK DIAGRAM



3-1-5 AM DETECTOR CIRCUIT (MAIN UNIT)

The AM detector circuit demodulates the 2nd IF signal to AF signals.

The 2nd IF signal from Q10 is detected at the AM detector (Q49) for conversion to AF signals. A PN junction construction inside Q49 is used for AM detection to obtain low output impedance. High frequency components are removed by capacitors (C239, C241, C242) and passed AF signals are applied to the AF circuits.

3-1-6 AF CIRCUIT (MAIN UNIT)

The AF signals are passed through the active low-pass filter (Q13) and are amplified at the limiter amplifier (IC16, pin 2). The amplified signals from IC16 (pin 3) pass through the volume control (R89) on the front panel and are then applied to the AF preamplifier (IC17, pin 3).

The limiter amplifier (IC16) has an ALC limiter circuit that maintains the audio level even when receiving shallow or deeply modulated signals. The AF signal level is detected at D40 and is fed back to IC16 (pin 4) to control the amplifier gain.

The amplified signals from the AF preamplifier (IC17) are passed though the active low-pass filter (Q39) and the speaker switch (Q38) and are then applied to the AF power amplifier (IC5). IC5 amplifies the signals to a level needed to drive a 4 Ω external speaker.

3-1-7 SQUELCH CIRCUIT (MAIN UNIT)

The squelch circuit cuts out AF signals when receiving no modulated signal. When no voice modulation is included in the signal, the squelch circuit cuts out the AF signal by comparing voice audio and noise audio components in the AF detected signals.

The AF detected signals from Q49 are separately applied to the active low-pass filter (IC3b) and active high-pass filter (IC3a) to amplify voice components (lower than approx. 3 kHz) and noise components (higher than approx. 4 kHz) respectively. Both outputs are applied to the comparator (IC4a). When noise components are larger than audio components, the comparator outputs "HIGH" to turn Q14 ON. Hence Q14 grounds the audio detected line and the AF signal is cut out.

3-1-8 AGC CIRCUIT (MAIN UNIT)

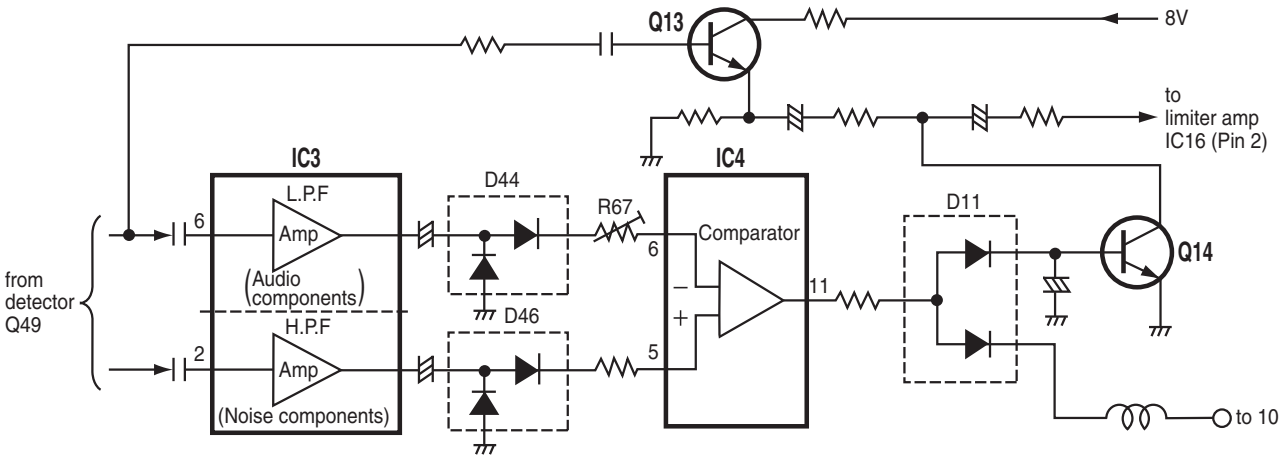
The AGC (Automatic Gain Control) circuit reduces RF and IF amplifier gain and activates the RF attenuator (D6, D7) by decreasing the bias voltage to prevent distortion from strong signals.

The signal from the 2nd IF amplifier (Q10) is detected at D8, and applied to the base of Q50. When receiving a strong signal, Q50 is turned ON to decrease the bias voltage.

Minus voltages are applied to the emitter of Q50 to operate the AGC at low signal levels. The PLL reference oscillation frequency (32.00 MHz) is rectified by the detector (D20, D21, C116, C117) to obtain minus voltages (–4.5 V approx.).

The AGC release time is determined by C49 and R310. Q51 activates for strong signals.

SQUELCH CIRCUIT



3-2 TRANSMITTER CIRCUITS

3-2-1 MIC AMPLIFIER CIRCUIT (MAIN UNIT)

The mic amplifier circuit amplifies the mic audio with the limiter circuit to a level needed for the AM modulator.

Mic audio signals pass through the mic switch (Q4) and are then applied to the limiter amplifier (IC13, pin 2). The mic switch cuts out the mic audio signal while receiving.

IC13 has an ALC limiter circuit that controls the amplifier gain to prevent signal distortion. A portion of the output signals from IC13 (pin 3) is detected by D18 and its detected voltages feed back to IC13 (pin 4) to control the gain.

The output signals from IC13 (pin 3) pass through the active low-pass filter (Q47) to cut out components higher than 2.5 kHz and are then amplified at the mic amplifier (Q40). The signals are then applied to the AM modulator (Q36, Q31).

3-2-2 MODULATOR CIRCUIT (MAIN UNIT)

The modulator circuit controls the collector voltage of the transmitter linear amplifier to obtain amplitude modulation.

The modulator circuit consists of a current amplifier and a linear amplifier. Amplified audio signals are applied to the current amplifier (Q36) which controls the collector voltage of the linear amplifier (Q31). The LO signal is amplified at Q31 with variable voltage related to the mic input level so that the LO signal level is varied as an AM modulation.

3-2-3 LOCAL SIGNAL AMPLIFIER CIRCUIT (MAIN UNIT)

The LO signal (118.00–136.975 MHz) is obtained by mixing the PLL output frequency (150.00–168.975 MHz) and reference oscillator signal (32.00 MHz).

The PLL output and the reference oscillator signals are amplified at Q29 and Q20 respectively and are then applied to the transmitter mixer circuit (IC15). The mixed signal is passed through the transmitter bandpass filter to re move the out-of-band signals. Q30 is a buffer amplifier to compensate for bandpass filter attenuation.

The passed signal is modulated at Q31 and amplified at Q44. The attenuator-type ALC control circuit (D33, D34, R356) reduces the signal level when a mismatched load occurs.

3-2-4 DRIVE AND POWER AMPLIFIERS (PA UNIT)

The signal from the MAIN unit is amplified at 3 amplifiers, the pre-driver (Q5001), the driver (Q5003) and the final amplifier (Q5005) in the PA unit to obtain the stable 7 W output power.

The amplified signal passes thorough the matching circuit (C34, C35, C59–C61), the ALC detector circuit (L13, D3–D6), the antenna switching circuit (D7), and the low-pass filter (L14–L16, C54–C57, C66). The signal is then applied to the antenna connector.

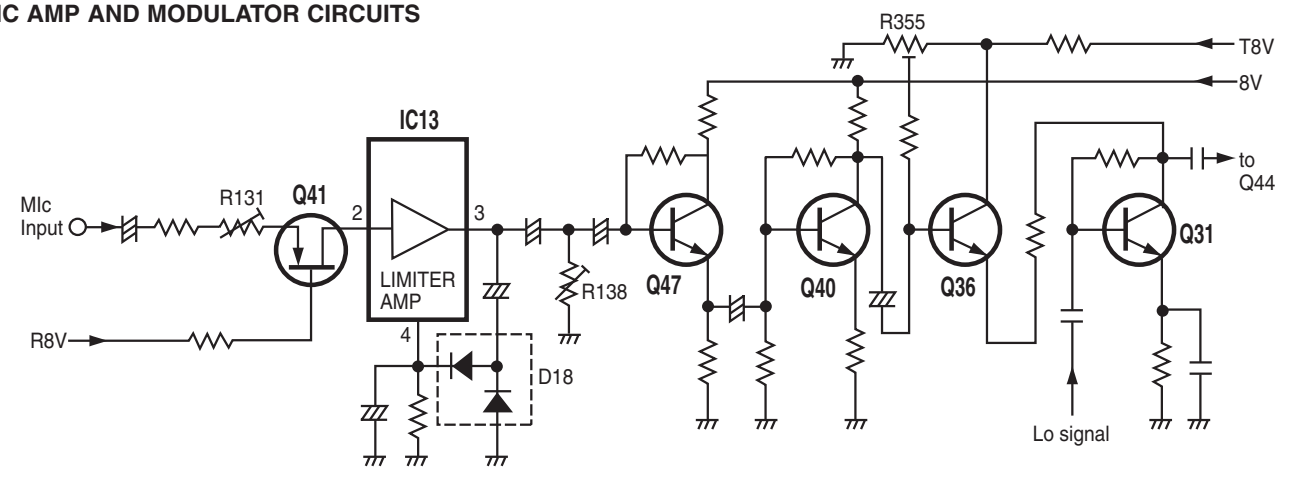
3-2-5 ALC CIRCUIT (MAIN AND PA UNITS)

The RF ALC circuit protects the final amplifier (Q5005) from a mismatched output load.

A portion of the output power from the final amplifier (Q5005) is detected at the ALC detector (D5003–D5005) on the PA unit. This detected voltage is set at a minimum value when the output load is correct. However, when mismatching occurs the detected voltage is increased.

The detected voltage is applied to the MAIN unit as an ALC signal. The comparator (IC18) in the MAIN unit compares the difference between the detected voltage (pin 5) and reference voltage (pin 6). The comparator outputs "HIGH" when mismatching occurs. The output current flows through the attenuator-type ALC circuit (D33, D34, R356) to change the attenuation ratio and to decrease the RF signal level.

MIC AMP AND MODULATOR CIRCUITS



3-3 PLL CIRCUITS

3-3-1 GENERAL (PLL UNIT)

The PLL circuit steadily oscillates the transmit and receive local frequencies while comparing the phase of the divided VCO frequency and reference frequency. Therefore, the PLL output frequency is controlled by the divided ratio (N-data) of the programmable divider.

The oscillated signal in the VCO circuit is divided by N-data at a programmable, divider and is phase detected with the reference frequency at a phase comparator. The detected signal (pulse-type signal) is rectified by a loop filter and converted to DC voltage (PLL lock voltage). This voltage is applied to varactor diodes in .the VCO unit to control the oscillating frequency. Hence, this loop provides a variable and stable oscillating frequency.

IC2001 includes the prescaler, programmable divider, phase comparator, etc. in one chip.

3-3-2 REFERENCE OSCILLATOR CIRCUIT (MAIN UNIT)

The reference frequency oscillator oscillates at a stable 32.000 MHz which is used for the PLL reference frequency, receive and transmit LO frequency. AGC minus voltages are used to detect this frequency.

The reference frequency (32.000 MHz) is generated by the oscillator circuit of IC19 and X1. The reference frequency is divided by 4 at IC1 and is then applied to the PLL board. The frequency is divided again in PLL IC (IC2001) by 1/320 to obtain the PLL reference frequency of 25 kHz.

3-3-3 VCO CIRCUIT (VCO UNIT)

The VCO circuits oscillate the PLL output frequency by controlling varactor diodes (D2001–D2003).

The VCO circuits (Q2004) employs a clap oscillator circuit. The signal generated at the VCO is buffer-amplified at Q2001 or Q2002. The amplified signals are used for a receive/transmit LO signal as PLL output (OUT2) or used for a feedback signal (OUT1) to the PLL circuit.

3-3-4 PHASE DETECTOR CIRCUITS (PLL UNIT)

The phase-detector circuit detects the out-of-phase components of the VCO frequency using a stable reference frequency.

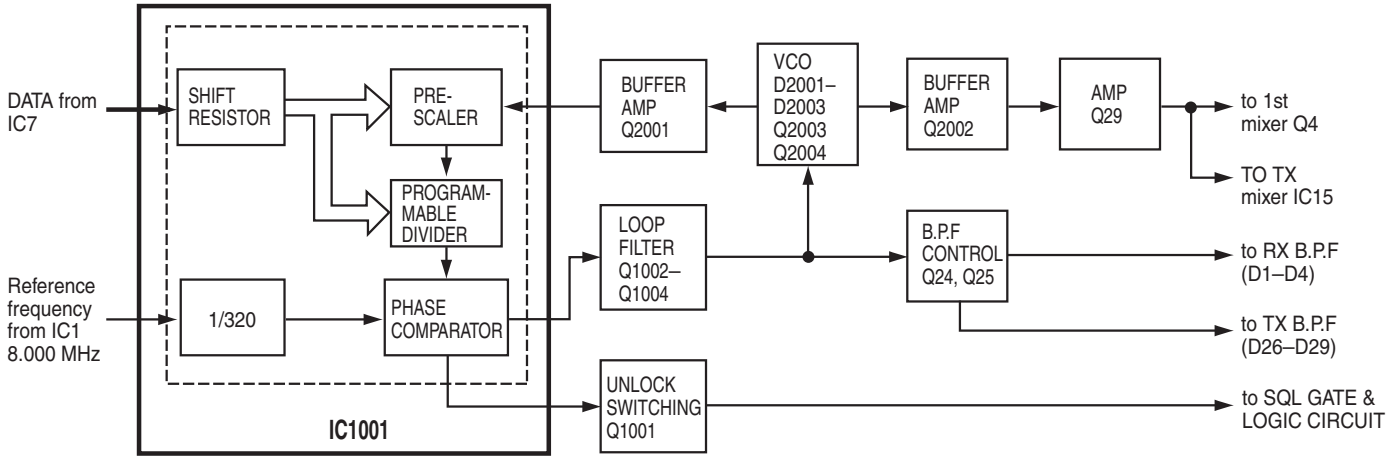
The PLL IC (IC1001) contains a prescaler, programmable divider, high-speed phase detector and shift register. The oscillated signal comes from the VCO board and enters IC1001 (pin 11). Then, it is divided at the prescaler and divided again at the programmable divider. The divided signal is applied to a phase detector to compare it with a reference frequency (25 kHz). The detected signal exits IC1001 (pin 7).

3-3-5 LOOP FILTER CIRCUIT

An active loop filter circuit is adopted for this PLL circuit to convert the phase-detected signal to DC voltage (PLL lock voltage) and to obtain needed levels to control the VCO circuit.

The active loop filter (Q1002–Q1004) converts the phase-detected signal (pulse-type signal) to DC voltage (PLL lock voltage) to control the VCO oscillating signal. The PLL lock voltage changes the reactance of varactor diodes in the VCO circuit.

PLL VCO CIRCUIT



3-4 VOLTAGE LINES

LINE	DESCRIPTION
Vcc	A voltage line from the external DC power connector.
T8V	Used for the transmitter circuit. Produced by the T8V regulator (Q34, Q35, D32) and controlled by the T/R switching circuit (IC10a–IC10c).
R8V	Used for the receiver circuit. Produced by the R8V regulator (Q32, Q33, D30).
8V	A common 8 V line from the 8V regulator (IC11).
5V	A common 5 V line from the 5V regulator (IC12).
–4.5V	Used for the AGC circuit. Produced at D20, D21 by detecting the reference oscillation signal.

3-5 CPU PORT ALLOCATIONS

Pin No.	Port No.	Description
1	P72	Input port for the frequency exchange switch.
2	P71	Input port for the channel switch.
3	P70	Input port for tuning step selection LOW: 25 kHz HIGH: 50 kHz
4, 5	P63, P62	Input ports for the large tuning control. P63: MHz down P62: MHz up
6, 7	P61, P60	Input ports for the small tuning control. P61: kHz down P60: kHz up
15	P41	Outputs the protect register enable signal.
16	P40	Outputs the program enable signal.
20	RESET	When receiving the reset signal "HIGH" to "LOW", the CPU starts its operation.
21	X1	Oscillator input port for the CPU clock frequency.
22	X2	Oscillator output port connected in parallel with the X1 port.
23	P33	Outputs the chip select signal to IC8.
24	P32	Outputs the serial clock to IC8.
25	P31	Serial data output to IC8.
26	P30	Serial data input from IC8.
27	P81	Input port for a remote exchange switch.
28	P80	Input port for a remote channel switch.
30	SO	Outputs PLL serial data.
31	SCK	Outputs serial clock to the PLL.
40	P23	Outputs beep tones.
41	P22	Outputs a PLL strobe signal.
42	P21	Outputs the chip enable signal to an LCD driver.
43	P20	Outputs an inhibit signal to an LCD driver.
44	P73	Input port for PTT control.

SECTION 4 MEMORY PROTECTION

To prevent accidental changes, required memory channels can be specified as protect channels. The contents of protect channels **CANNOT** be changed by a user.

4-1 MEMORY PROTECTION PROGRAMMING

NOTE: DO NOT push and hold [◀▶] in steps 4), 7) and 9), or other functions are activated.

1) Before setting or cancelling, extract the transceiver from the mounting rack and open the top cover. Then connect appropriate connector to the transceiver for operation.

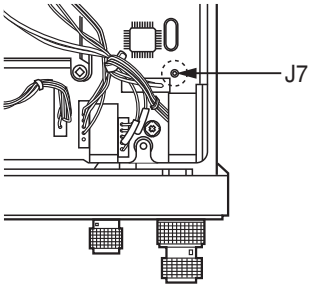
2) Push and hold [CH] until the memory channel number blinks.

3) Rotate the large or small tuning knob to select a memory channel to be programmed as a protect channel.

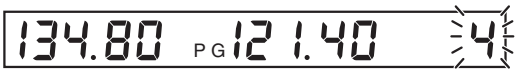
4) Push [◀▶].
   • Frequency content or " – – – – " blinks.

5) Rotate the large and small tuning knobs to select a desired frequency.

6) Ground the memory protection pin (J7 on the MAIN UNIT).

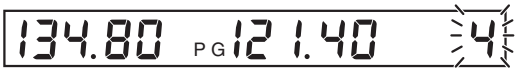


7) Push [◀▶].



8) Unground the memory protection pin.
   • The memory channel is now programmed as a protect channel.

9) Confirm that the frequency content **DOES NOT** blink even when [◀▶] is pushed.



4-2 MEMORY PROTECTION CANCELLING

NOTE: DO NOT push and hold [◀▶] in steps 4), 6) and 7), or other functions are activated.

1) Push and hold [CH] until the memory channel number blinks.

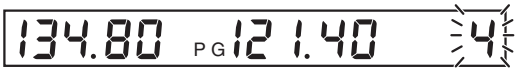
2) Rotate the large or small tuning knob to select a protect channel to be cancelled.

3) Ground the memory protection pin as shown in the diagram at left below.

4) Push [◀▶].
   • Frequency content blinks.

5) Unground the memory protection pin.

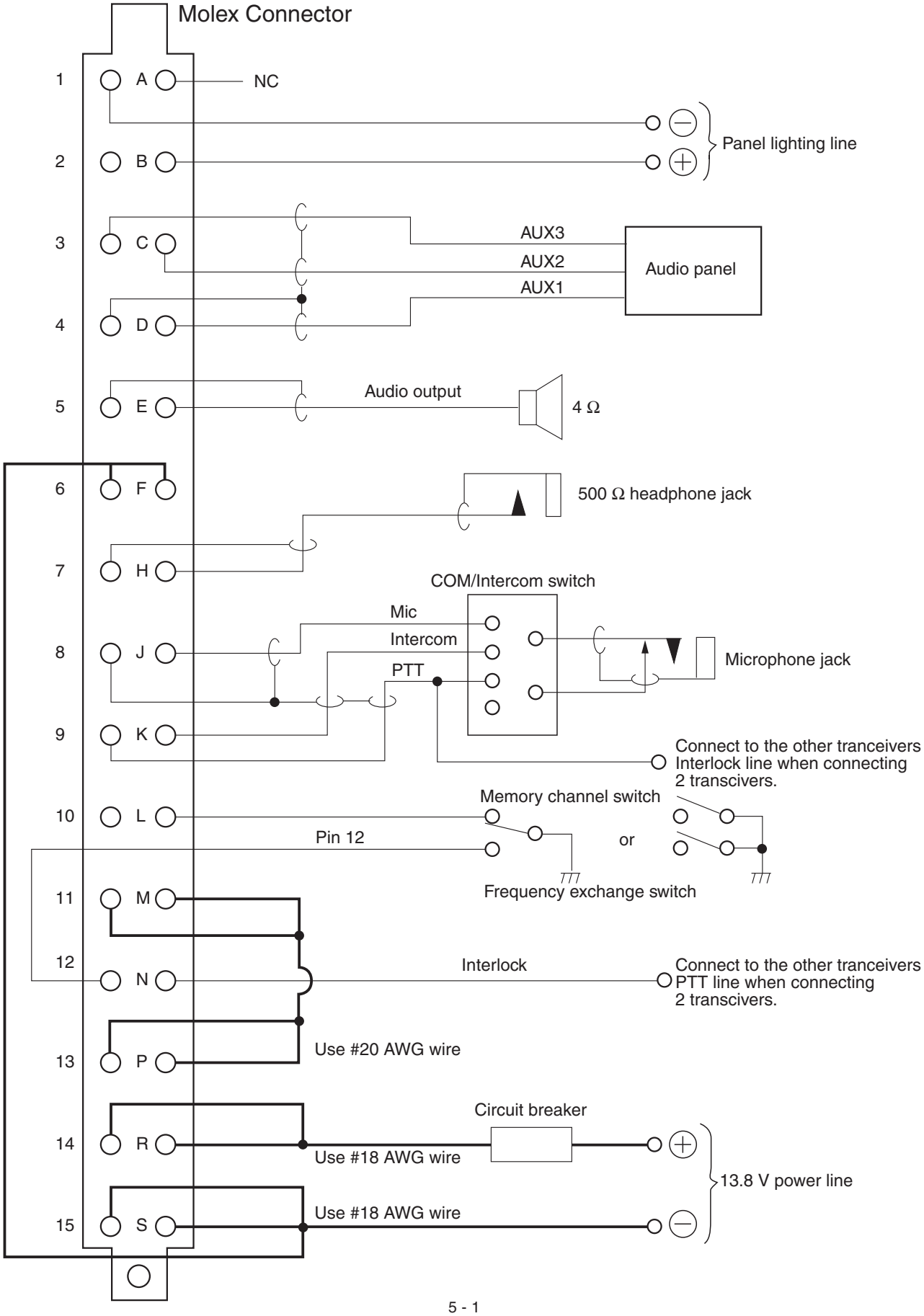
6) Push [◀▶].
   • The memory protection is now cancelled.



7) Confirm that the frequency content blinks when [◀▶] is pushed.

SECTION 5 CONNECTIONS

5-1 WIRING CONNECTION



■AUDIO WIRING

Use #24 AWG wires for connectors.

■MEMORY CHANNEL AND FREQUENCY EXCHANGE SWITCHES

For the memory channel switch and frequency exchange switch, use a 2-position rocker switch or 2 separate momentary push switches.

■POWER CABLE WIRING

Use 2 pairs of #18 AWG wires for power and power grounding wiring.

- **Circuit breaker**
  To prevent physical damage, a 10 A circuit breaker **MUST** be installed in the aircraft. Mount the circuit breaker in the aircraft breaker panel or instrument panel to ensure easy access during flight.
- **Ground**
  The transceiver power ground is the airframe ground.
- **jumpers**
  Pins 11, M, P, 13 **MUST** be jumped together with AWG #20 wires or thicker.

■TRANSMIT/RECEIVE INTERLOCK WIRING

When 2 transceivers are installed and both communication antennas are top mounted, pin N **MUST** be connected to pin 9 of each another transceiver.

■INTERNAL FUSE

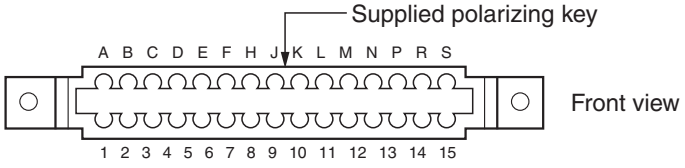
The IC-A200 has a 5 A internal fuse. If the power does not turn ON, open the top cover and check the fuse.

■DIMMER SELECTION

Connect pin B to the Instrument panel lighting line.

When the instrument panel lighting switch is placed to dimmer position, the transceiver backlighting is reduced to half brightness.

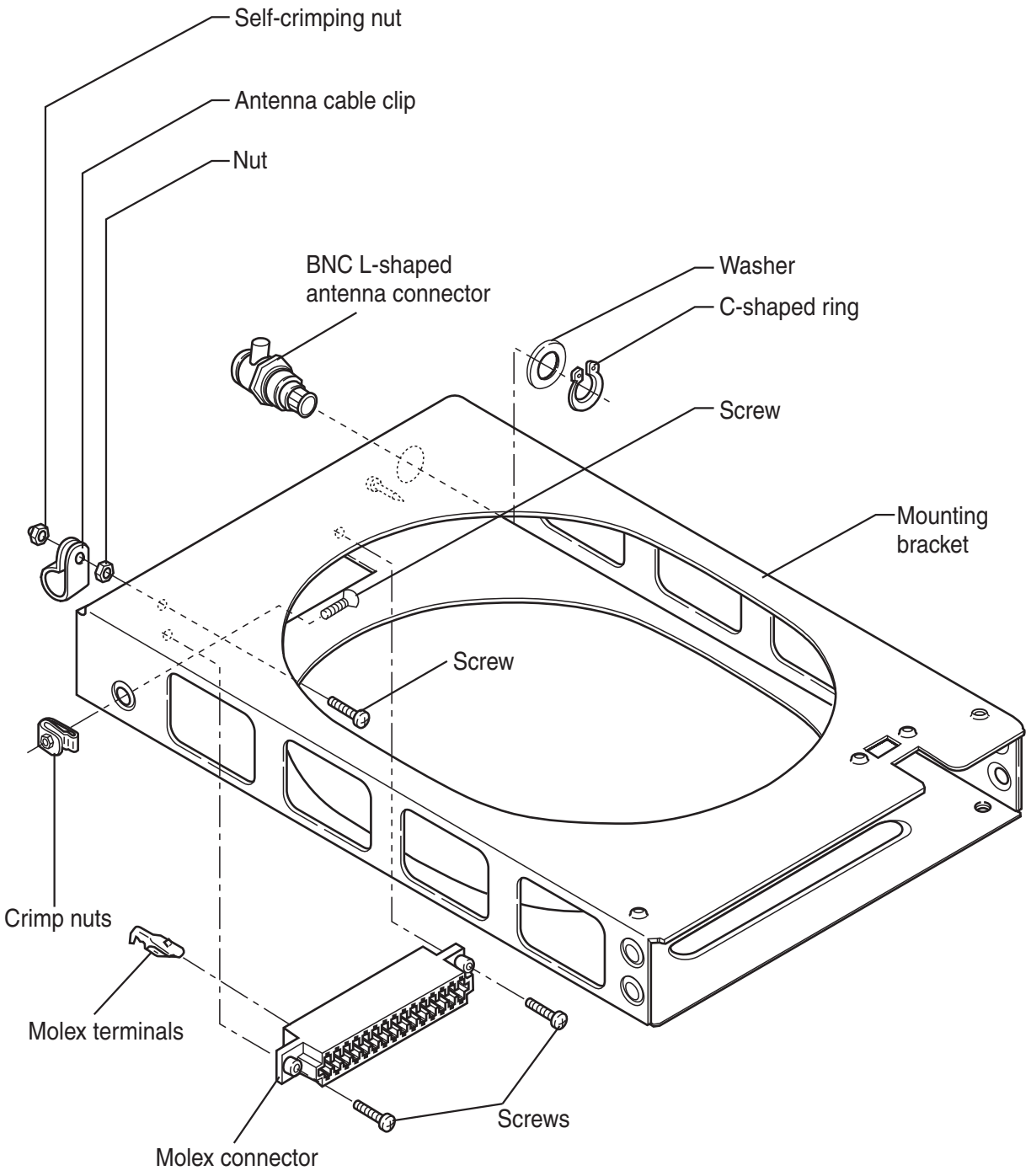
5-2 MOLEX CONNECTOR



A	No connection	**1**	Ground for pin B
B	+14 V lighting (input)	**2**	Detected audio (output)
C	Auxiliary audio 2 (input)	**3**	Auxiliary audio 3 (input)
D	Auxiliary audio 1 (input)	**4**	Ground for pins D, C, 3
E	4 Ω audio (output)	**5**	Ground for pin E
F	Power ground	**6**	Power ground
H	500 Ω audio (output)	**7**	Ground for pin H
J	Comm microphone (input)	**8**	Ground for pins J, K, 9
K	Intercom microphone (input)	**9**	PTT*
L	Memory channel switch*	**10**	Squelch cancel*
M	+ 13.8 V power (input)	**11**	+13.8 V power (input)
N	Transmit/receive interlock	**12**	Frequency exchange switch*
P	Switched aircraft power (output)	**13**	Switched aircraft power (output)
R	Aircraft (input)	**14**	Aircraft power (input)
S	Power ground	**15**	Power ground

*Ground to activate.

5-3 RACK MOUNT ASSEMBLY



SECTION 6 ADJUSTMENT PROCEDURES

6-1 PREPARATION BEFORE SERVICING

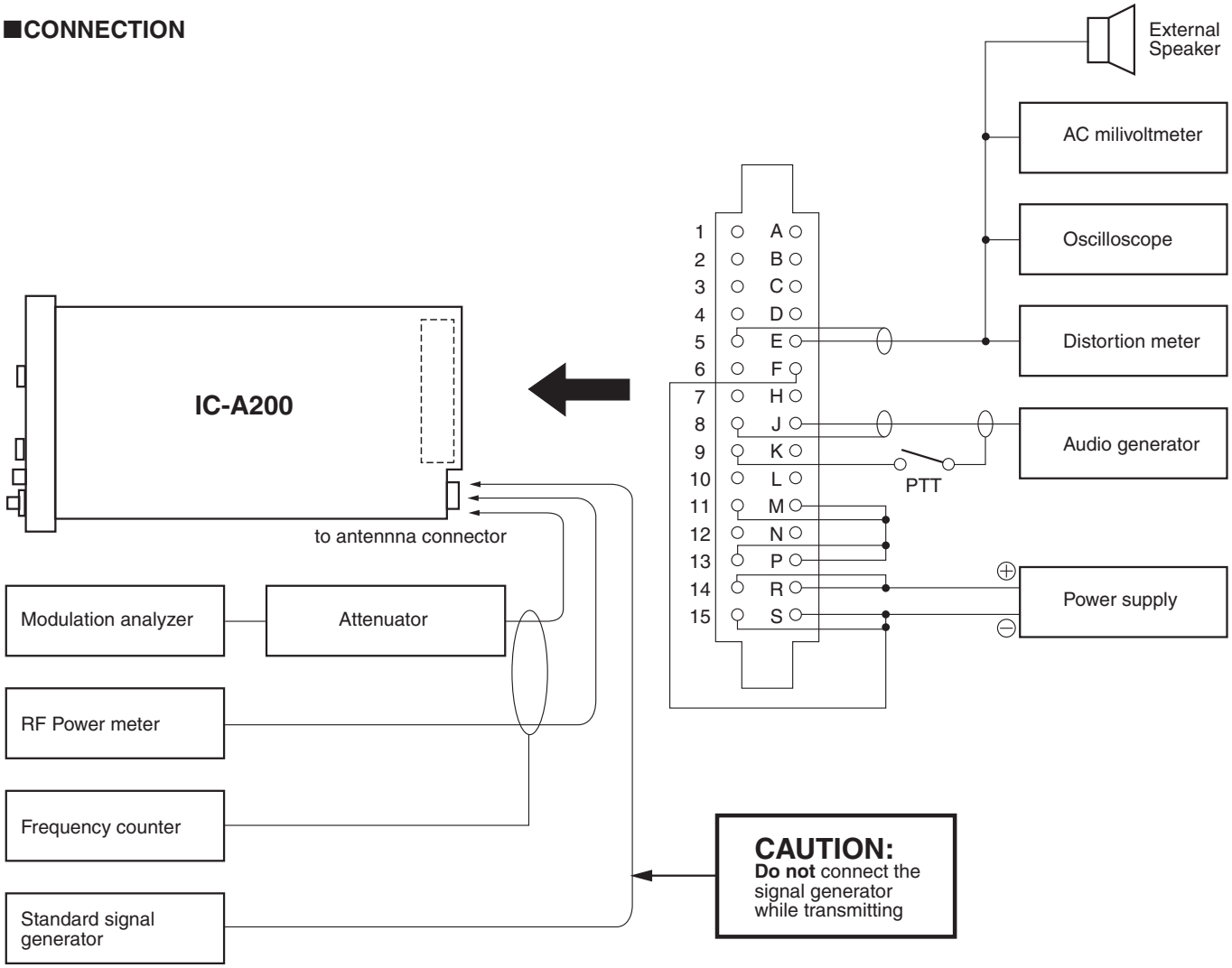
■REQUIRED TEST EQUIPMENTS

EQUIPMENT	GRADE AND RANGE	
DC power supply	Output voltage Current capacity	: 13.2 V DC : 2 A or more
RF power meter	Measuring range Frequency range Impedance SWR	: 1–10W : 100–180 MHz : 500 : Less than 1.2:1
Frequency counter	Frequency range Frequency accuracy Sensitivity	: 0.1–180 MHz : ±1 ppm or better : 100 mV or better
Standard signal generator (SSG)	Frequency range Output Level	: 0.1–180 MHz : 0.1 µV–32 mV (–127 to –17 dBm)
Distortion meter	Frequency range Measuring range	: 1 kHz ±10 Hz : 1–20%

EQUIPMENT	GRADE AND RANGE	
Oscilloscope	Frequency range	: DC–20 MHz
DC voltmeter	Input impedance	: 50 kΩ/DC or better
AC millivoltmeter	Measuring range	: 10 mV to 10 V
External speaker	Impedance	: 8 Ω
Ammeter	Measuring range	: 200 mA
Audio generator (AG)	Frequency range Output level	: 200–2000 Hz : 1–200 mV
Attenuator	Power attenuation Capacity	: 40 or 50 dB : 10 W or more
Modulation analyzer	Frequency minimum Measuring range	: 180 MHz : 0–100%

CW: clockwise CCW: counterclockwise CP: check point

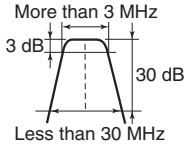
■CONNECTION



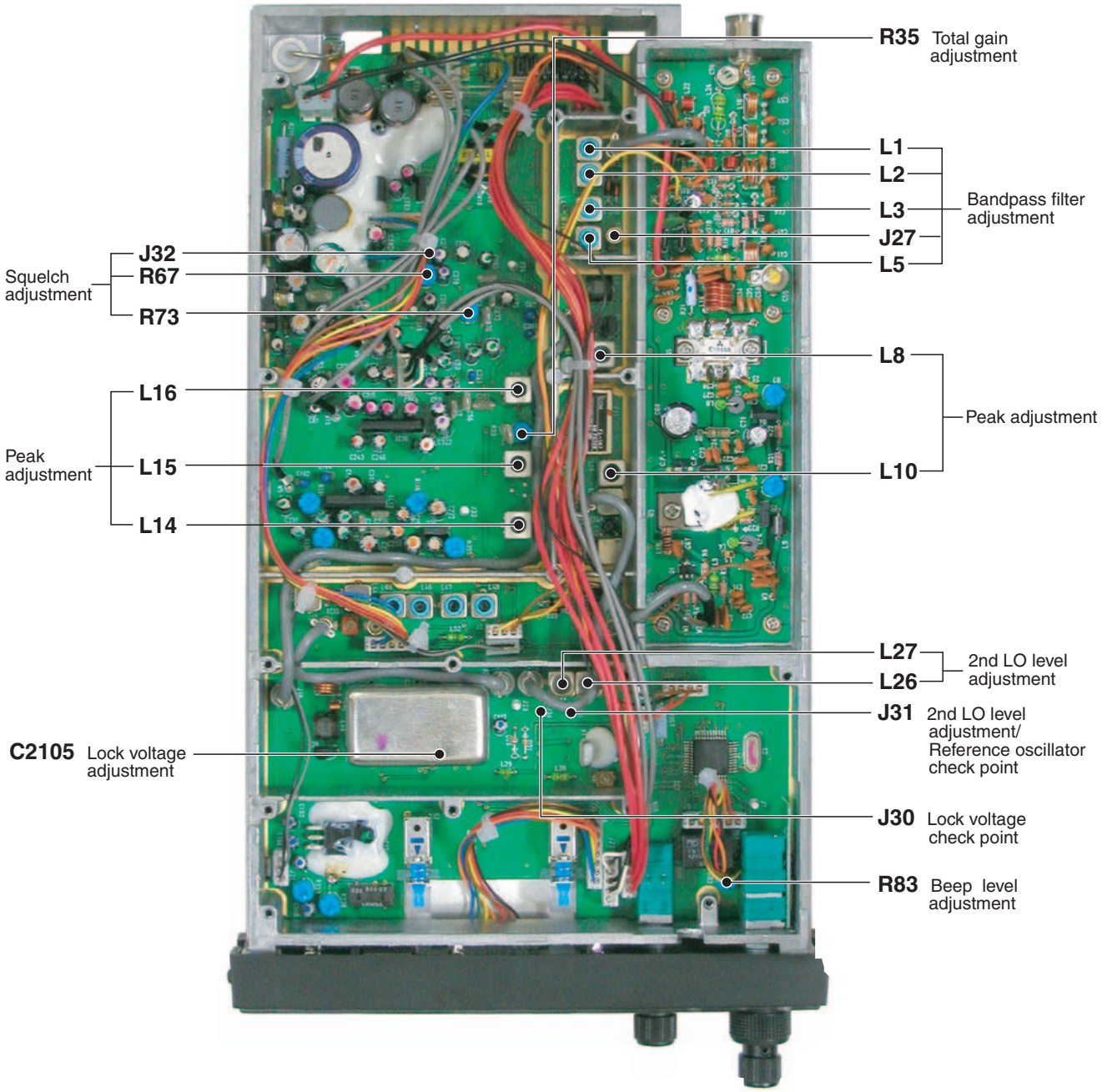
6-2 PLL ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
REFERENCE OSCILLATOR	1	• Frequency display: 118.000 MHz • Receiving	MAIN	Connect the frequency counter to J31.	32.000000 MHz	MAIN	C199
LOCK VOLTAGE	1	• Frequency display: 118.000 MHz • Receiving	MAIN	Connect the DC voltmeter to J30.	2 V ±0.1 V	VCO	C2015
	2	• Frequency display: 136.975 MHz			More than 5 V		Verify

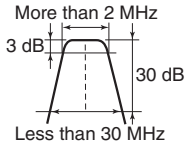
6-3 RECEIVER ADJUSTMENT

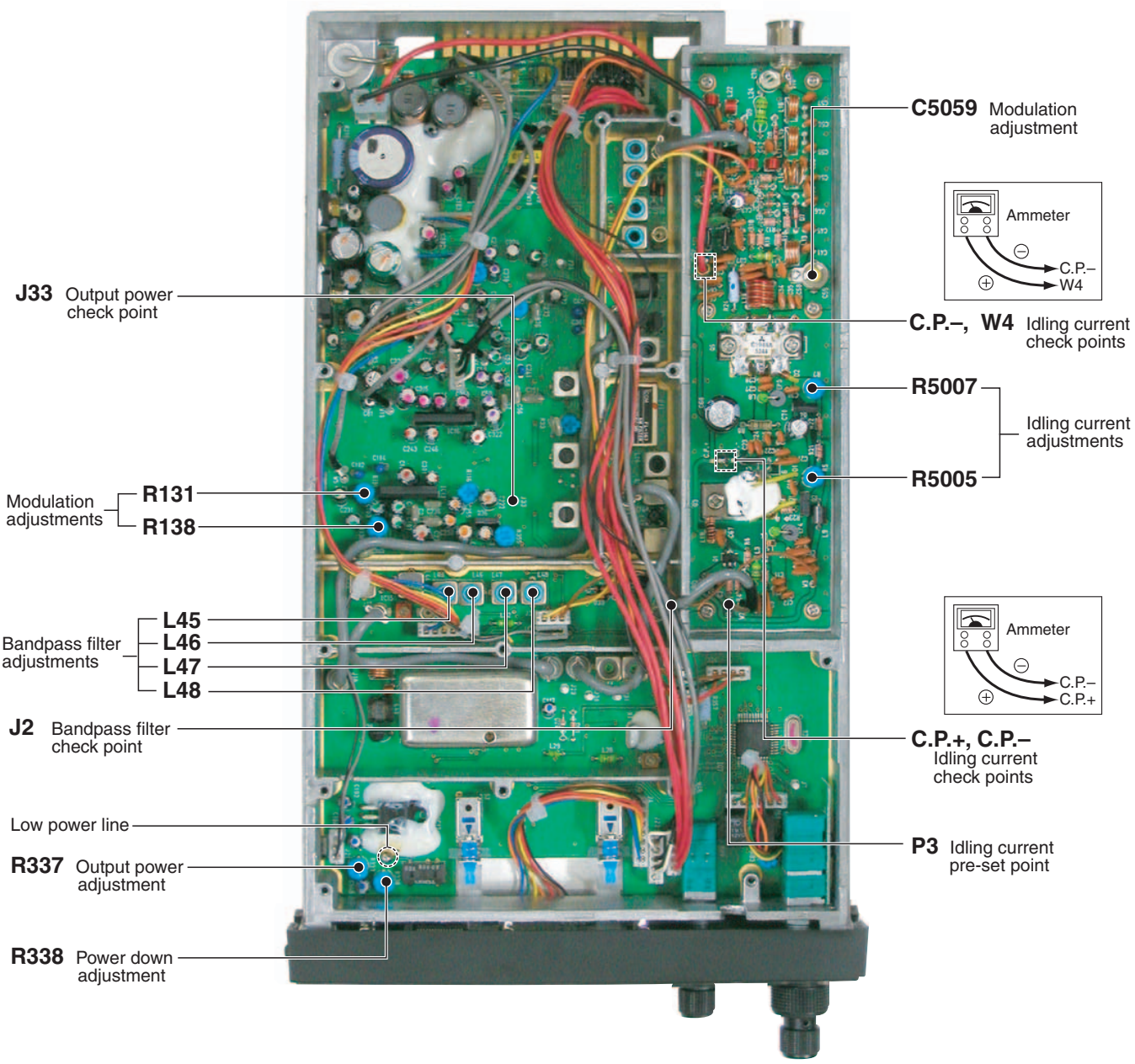
ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
2nd LO LEVEL	1	• Frequency display: 118.000 MHz • Receiving	MAIN	Connect the RF voltmeter to J31.	Maximum level (more than –3 dBm)	MAIN	L26, L27
BANDPASS FILTER	1	• Frequency display: 118.000 MHz • J13: disconnected • Connect the RF sweep generator to J1 and set as: Center frequency : 118.025 MHz Sweep band width: ±10 MHz • Receiving	MAIN	Connect the spectrum analyzer to J27.	Set the band width as follows. 	MAIN	L1, L2, L3, L5
		NOTE: After adjustment, connect the J13.					
PEAK	1	• Frequency display: 118.000 MHz • Connect the SSG to the antenna connector and set as: Modulation : 1 kHz 30% Level : 1.0 µV *(–107 dBm) • R35: Max. Counterclockwise • R73: Max. Clockwise • Squelch: Open (Pull OUT the volume control.) • Receiving	Rear panel	Connect the AC millivoltmeter to the AF output terminal with a 4 Ω load.	Maximum level	MAIN	L16, L15, L14, L10, L8
TOTAL GAIN	1	• Frequency display: 118.000 MHz • Connect the SSG to the antenna connector and set as: Modulation : 1 kHz 30% Level : 1 mV *(–47 dBm) • Receiving	Rear panel	Connect the AC millivoltmeter to the AF output terminal with a 4 Ω load.	0 dB on the meter	Front Panel	Volume control
	2	• Apply no signal to the antenna connector.			Adjust R35 to a point where the noise level is 8 dB down.	MAIN	R35
SQUELCH	1	• Frequency display: 118.000 MHz • R67: Max. Counterclockwise • Receiving	MAIN	Connect the DC voltmeter to J32.	2.5 V ±0.1 V	MAIN	R73
	2	• Connect the SSG to the antenna connector and set as: Modulation : 1 kHz 30% Level : 1.0 µV *(–107 dBm) • Squelch: Close (Push IN the volume control.)	Rear Panel	Connect a speaker to the AF output termianl.	Squelch just opens.		R67
BEEP	1	• Push the frequency exchange switch.	Rear panel	Connect a speaker to the AF output termianl.	Desired level	MAIN	R83

*This output level of standard signal generator (SSG) is indicated as SSG's open circuit.


R35 Total gain adjustment
L1
L2
L3
J27
L5
Bandpass filter adjustment
J32
R67
R73
Squelch adjustment
L8
L10
Peak adjustment
L16
L15
L14
Peak adjustment
L27
L26
2nd LO level adjustment
J31 2nd LO level adjustment/ Reference oscillator check point
J30 Lock voltage check point
R83 Beep level adjustment
C2105 Lock voltage adjustment

6-4 TRANSMITTER ADJUSTMENT

ADJUSTMENT		ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
			UNIT	LOCATION		UNIT	ADJUST
IDLING CURRENT	1	• Disconnect P3 • Unsolder C.P. + and C.P. –. • Frequency display : 127.000 MHz • Transmitting	PA	Connect the DC ammeter (1 A) to point between C.P.+ and C.P.–.	150 mA	PA	R5005
		NOTE: After adjustment, re-solder between C.P. + and C.P. –.					
	2	• Unsolder C.P. – and W4.	PA	Connect the DC ammeter (1 A) to point between C.P.– and W4.	200 mA	PA	R5007
		NOTE: After adjustment, re-solder between C.P. – and W4 and connect the P3.					
BANDPASS FILTER	1	• Frequency display : 118.000 MHz • Connect the RF sweep generator to J28 and set as : Center frequency : 118.025 MHz Sweep band width : ±10 MHz • Transmitting	MAIN	Connect the spectrum analyzer to J2.	Set the band width as follows. 	MAIN	L45, L46, L47, L48
OUTPUT POWER	1	• Frequency display: 118.025 MHz • Transmitting	MAIN	Connect the DC voltmeter to J33.	3.2 V ±0.1 V	MAIN	R355
	2	• Frequency display: 136.975 MHz	Pear panel	Connect the RF power meter to the antenna conector.	7.5 W		R337
		NOTE: If the output power is less than 7.5 W in step 2, adjust R337 again so that the output power is 7.5 W on both 118.025 MHz and 1136.975 MHz.					
MODULATION	1	• Frequency display: 127.500 MHz • R131, R138: Center • Connect the audio generator to the mic input terminal and set as: Level : 300 mV Frequency : 1 kHz • Transmitting	Rear panel	Connect the modulation analizer to the antenna connector.	80% ($\frac{P\text{-}P}{2}$)	MAIN	R138
	2	• Set the audio generator as: Level: 30 mV			35% ($\frac{P\text{-}P}{2}$)		R131
	3	• Frequency display : 136.975 MHz • Set the audio generator as: Level: 300 mV			Minimum distortion level	PA	C5059
	4	• Frequency display : 118.025 MHz			More than 75% ($\frac{P\text{-}P}{2}$) on each frequency	MAIN	Verify
	5	• Frequency display : 127.500 MHz					
	6	• Frequency display : 136.975 MHz					
POWER DOWN	1	• Frequency display : 136.975 MHz • Unsolder low power line • Apply no signal to the mic input termianl. • Transmitting	Rear penal	Connect the RF power meter to the antenna conector.	3.5 W	MAIN	R338
	2	• Frequency display : 118.025 MHz			More than 3 W		Verify
	3	• Frequency display : 127.500 MHz					
		NOTE: After adjustment, re-solder low power line.					


C5059 Modulation adjustment
Ammeter
C.P.–
W4
J33 Output power check point
C.P.–, W4 Idling current check points
R5007
Idling current adjustments
R5005
Modulation adjustments
R131
R138
L45
L46
L47
L48
Bandpass filter adjustments
Ammeter
C.P.–
C.P.+
J2 Bandpass filter check point
C.P.+, C.P.–
Idling current check points
Low power line
R337 Output power adjustment
P3 Idling current pre-set point
R338 Power down adjustment

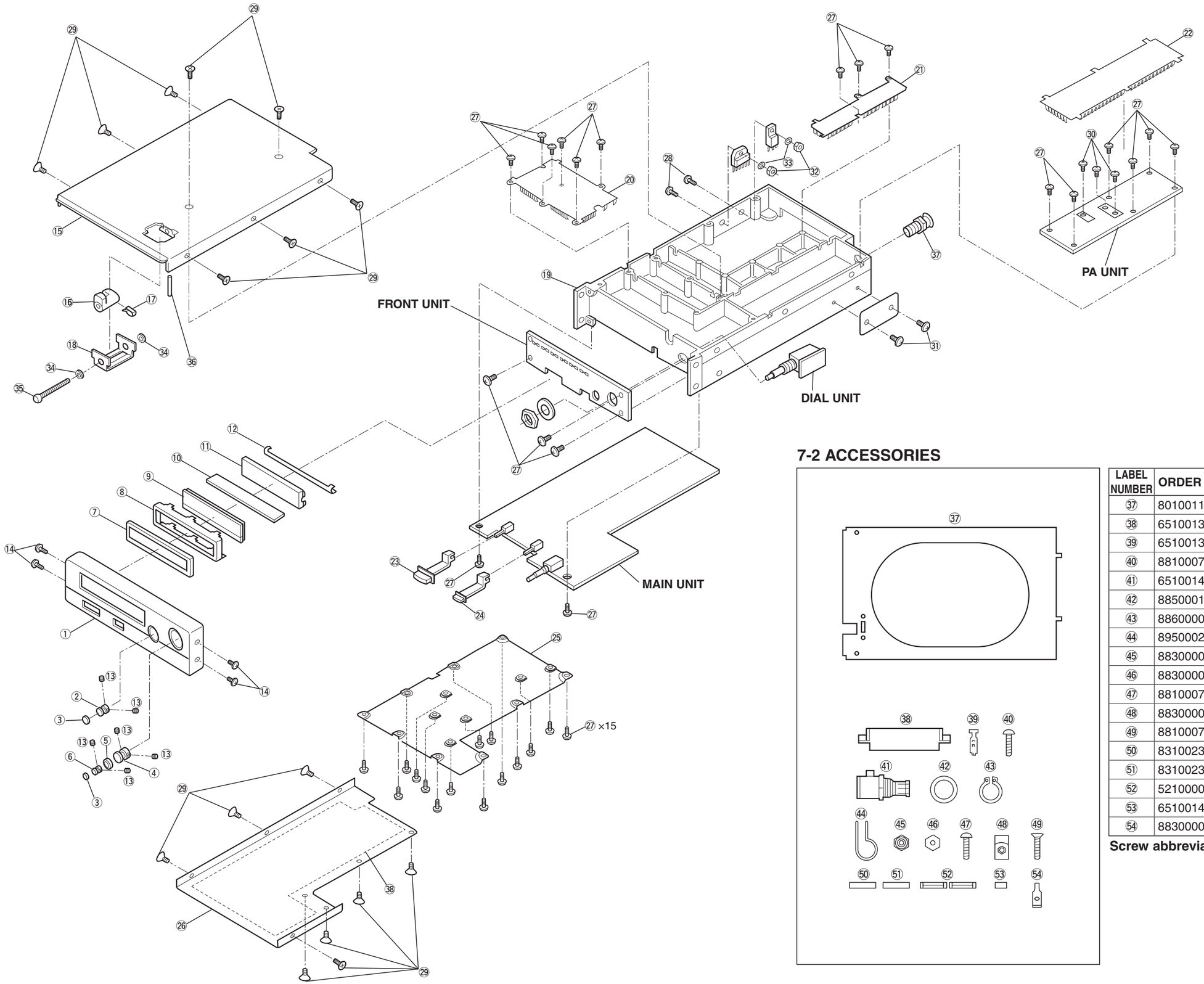
SECTION 7 MECHANICAL PARTS AND DISASSEMBLY

7-1 MECHANICAL PARTS

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210006550	867 Front panel	1
②	8610007601	Knob N174(A)-1	1
③	8010001170	Knob cover for N174/(A)	2
④	8610007613	Knob N175-3	1
⑤	8010011600	Knob cover for N175	1
⑥	8610007591	Knob N174-1	1
⑦	8930022090	867 LCD rubber	1
⑧	8930022470	LCD holder	1
⑨	5030000731	LCD FSD-10394AAH-1	1
⑩	8930023170	LCD contact SRCN-867W	1
⑪	8010011750	867 Reflector	1
⑫	8930023260	867 Mask plate	1
⑬	8810003520	Hexagon socket set-screw M3 × 3	6
⑭	8810006831	Screw PH M2.6 × 4 SUS	4
⑮	8110004542	867 T cover-2	1
⑯	8930022571	867 stopper	1
⑰	8930024080	867 spring	1
⑱	8930022461	867 stopper plate-1	1
⑲	8010011763	867 chassis-3	1

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
⑳	8930022671	867 F shield plate	1
㉑	8930022660	867 R shield plate	1
㉒	8010011710	867 PA cover	1
㉓	8610007630	Knob K182	1
㉔	8610007620	Knob K181	1
㉕	8930022681	867 B shield plate	1
㉖	8110004551	867 B cover	1
㉗	8810006810	Screw PH M2.6 × 6	35
㉘	8810000590	Screw PH M3 × 8	2
㉙	8810006840	Screw FH M2.6 × 4 SUS	16
㉚	8810006370	Set-screw (A)	3
㉛	8810005380	Screw M2 × 3 Ni	2
㉜	8830000101	Nut M3 ZC3	2
㉝	8850000371	Spring washer M3 ZC3	2
㉞	8850000690	Flat washer M3 (3 × 7× 0.5)	2
㉟	8820000691	867 cup screw-1	1
㊱	8860000740	Spring pin M 1.2 × 6 SUS	1
㊲	6510014210	Connector BNC-BJ	1
㊳	8930023720	867 Insulation sheet_	1

Screw abbreviations PH: Pan head FH: Flat head Ni: Nickel ZK: Black



7-2 ACCESSORIES

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
㊲	8010011621	867 bracket	1
㊳	6510013840	Connector 4338-15	1
㊴	6510013850	Pin 4366-GL	30
㊵	8810007070	Screw Bind UNC No. 4 × 12.7	2
㊶	6510014200	Connector BNC-LP	1
㊷	8850001210	ICOM washer (V)	1
㊸	8860000720	C ring-S	1
㊹	8950002550	Nylon clip SL-9N	1
㊺	8830000740	Nut UNC No. 6	1
㊻	8830000750	Nylon nut UNC No. 6	1
㊼	8810007080	Screw BiH UNC No. 6 × 12.7	1
㊽	8830000760	Climp nut UNC No. 6	6
㊾	8810007060	Screw FH UNC No. 6 × 12.7	6
㊿	8310023870	867 O.P label	1
(51)	8310023880	867 O.P label (A)	1
(52)	5210000061	Fuse FGB 5A	2
(53)	6510014430	DS-6532	1
(54)	8830000770	Speed nut UNC No.6	4

Screw abbreviations FH: Flat head BiH: Bind head

SECTION 8 PARTS LIST

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
IC5	1110002550	IC	TA7252AP	
IC6	1120002900	S.IC	M5223AFP	
IC7	1140009120	S.IC	µPD750004GB-F10-3BS-MTX	
IC8	1130012670	S.IC	BR93L46F	
IC9	1110005711	S.IC	S-80842CLUA-B63 G	
IC10	1130011190	S.IC	BU4011BF	
IC11	1110002030	IC	TA7808S	
IC12	1110002020	IC	TA7805S	
IC13	1110002440	IC	µPC1313HA	
IC14	1790000050	IC	ND487C1-3R	
IC15	1790000050	IC	ND487C1-3R	
IC16	1110002440	IC	µPC1313HA	
Q4	1560000620	FET	2SK937	except [USA]
	1560000630	FET	2SK1747	[USA]
Q5	1560000620	FET	2SK937	
Q6	1560000431	S.FET	2SK302 GR F	
Q7	1560000271	S.FET	2SK302 Y F	
Q8	1560000431	S.FET	2SK302 GR F	
Q9	1560000431	S.FET	2SK302 GR F	
Q10	1530002691	S.TR	2SC4116 GR F	
Q11	1530002691	S.TR	2SC4116 GR F	
Q13	1530002691	S.TR	2SC4116 GR F	
Q14	1530002551	S.TR	2SC3326 B F	
Q17	1510000501	S.TR	2SA1162 GR F	
Q20	1530002601	S.TR	2SC4215 O F	
Q24	1530002691	S.TR	2SC4116 GR F	
Q25	1510000501	S.TR	2SA1162 GR F	
Q29	1530000811	TR	2SC2053-101	
Q33	1540000150	TR	2SD1225M R	
Q35	1540000150	TR	2SD1225M R	
Q36	1540000150	TR	2SD1225M R	
Q44	1530000811	TR	2SC2053-101	
D6	1710001081	DIO	L308CCB	
D7	1710001081	DIO	L308CCB	
D8	1790000690	S.DIO	HSM88ASR	
D11	1160000050	S.DIO	DAP202U	
D19	1790001280	S.DIO	MA111	
D20	1790001780	DIO	MA700	
D21	1790001780	DIO	MA700	
D33	1710001081	DIO	L308CCB	
D34	1710001081	DIO	L308CCB	
D35	1730000521	ZEN	RD20E-AZ B2	
FI1	2010001380	FIL	32M20B (FL-167)	
FI2	2020000690	CER	CFW455D	[USA]
	2020001070	CER	CFWLA455KDFA-B0	except [USA]
FI3	2040000480	FIL	TU08M	
FI4	2040000480	FIL	TU08M	
FI5	2040000480	FIL	TU08M	
FI6	2040000480	FIL	TU08M	
FI7	2040000480	FIL	TU08M	
X1	6050007970	XTL	CR-390 (32.00000 MHz)	[USA]
	6050007971	XTL	CR-390A (32.0000 MHz)	except [USA]
X2	6050003110	XTL	RF-4A3 FAC NKD (4.194304M)	
L1	6150003820	COL	LS-440	
L2	6150003820	COL	LS-440	
L3	6150003820	COL	LS-440	
L4	6180000900	COL	LAL 03NA 101K	
L5	6150003820	COL	LS-440	
L6	6140001200	COL	LR-145	
L7	6180000830	COL	LAL 03NA 3R3K	
L8	6150004270	COL	LS-483A (C-14924)	
L9	6180001510	COL	LAL 02NA 101K	
L10	6150000991	COL	LS-424	
L11	6140002060	COL	LR-225 (RIB3X6.5X3 3A6)	
L12	6140002060	COL	LR-225 (RIB3X6.5X3 3A6)	
L13	6180001510	COL	LAL 02NA 101K	
L14	6150005370	COL	LS-238A	
L15	6150005370	COL	LS-238A	
L16	6150005370	COL	LS-238A	
L19	2040000490	COL	EXC-ELDR25C	
L20	6170000140	COL	LW-15	
L26	6150003340	COL	LS-366	
L27	6150003340	COL	LS-366	
L28	6180000900	COL	LAL 03NA 101K	
L29	6180001510	COL	LAL 02NA 101K	

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
L40	6140001200	COL	LR-145
L41	6110002000	COL	LA-226
L42	6110001670	COL	LA-253
L43	6140002060	COL	LR-225 (RIB3X6.5X3 3A6)
L44	6140002060	COL	LR-225 (RIB3X6.5X3 3A6)
L45	6150003820	COL	LS-440
L46	6150003820	COL	LS-440
L47	6150003820	COL	LS-440
L48	6150003820	COL	LS-440
L52	6180000880	COL	LAL 03NA 100K
L53	6180000880	COL	LAL 03NA 100K
L57	2040000490	COL	EXC-ELDR25C
L58	2040000490	COL	EXC-ELDR25C
L59	2040000490	COL	EXC-ELDR25C
L60	2040000490	COL	EXC-ELDR25C
L61	2040000490	COL	EXC-ELDR25C
L62	2040000490	COL	EXC-ELDR25C
L63	2040000490	COL	EXC-ELDR25C
L65	2040000490	COL	EXC-ELDR25C
L66	6170000150	COL	LW-16
L67	6170000150	COL	LW-16
R1	7030003680	S.RES	100K ERJ3GE
R2	7030003680	S.RES	100K ERJ3GE
R3	7030003560	S.RES	10K ERJ3GE
R4	7030003320	S.RES	100 ERJ3GE
R5	7030003280	S.RES	47 ERJ3GE
R6	7030003280	S.RES	47 ERJ3GE
R7	7030003320	S.RES	100 ERJ3GE
R8	7030003320	S.RES	100 ERJ3GE
R9	7030003680	S.RES	100K ERJ3GE
R10	7030003680	S.RES	100K ERJ3GE
R11	7030003560	S.RES	10K ERJ3GE
R12	7030003400	S.RES	470 ERJ3GE
R13	7030003400	S.RES	470 ERJ3GE
R14	7030003490	S.RES	2.7K ERJ3GE
R16	7030003560	S.RES	10K ERJ3GE
R17	7030003440	S.RES	1K ERJ3GE
R18	7030003320	S.RES	100 ERJ3GE
R19	7030003520	S.RES	4.7K ERJ3GE
R20	7030003320	S.RES	100 ERJ3GE
R21	7030003270	S.RES	39 ERJ3GE
R22	7030003340	S.RES	150 ERJ3GE
R23	7030003340	S.RES	150 ERJ3GE
R24	7030003560	S.RES	10K ERJ3GE
R25	7030003440	S.RES	1K ERJ3GE
R27	7030003320	S.RES	100 ERJ3GE
R29	7030003460	S.RES	1.5K ERJ3GE
R30	7030003440	S.RES	1K ERJ3GE
R32	7030003320	S.RES	100 ERJ3GE
R33	7510000330	TMR	ERT-D2ZIL 154S
R35	7310000750	TRI	RH0651C14J2WA (103)
R37	7030003320	S.RES	100 ERJ3GE
R38	7030003680	S.RES	100K ERJ3GE
R39	7030003320	S.RES	100 ERJ3GE
R40	7030003660	S.RES	68K ERJ3GE
R41	7030003680	S.RES	100K ERJ3GE
R42	7030003430	S.RES	820 ERJ3GE
R43	7030003620	S.RES	33K ERJ3GE
R45	7030003440	S.RES	1K ERJ3GE
R50	7030003460	S.RES	1.5K ERJ3GE
R51	7030003500	S.RES	3.3K ERJ3GE
R52	7030003320	S.RES	100 ERJ3GE
R53	7030003320	S.RES	100 ERJ3GE
R60	7030003560	S.RES	10K ERJ3GE
R61	7030003320	S.RES	100 ERJ3GE
R62	7030003440	S.RES	1K ERJ3GE
R63	7030003580	S.RES	15K ERJ3GE
R64	7030003600	S.RES	22K ERJ3GE
R65	7030003600	S.RES	22K ERJ3GE
R66	7030003770	S.RES	560K ERJ3GE
R67	7310001680	TRI	RH0621CJ5J2FA
R73	7310001910	TRI	RH0621CJ4J52A
R83	7310000750	TRI	RH0651C14J2WA (103)
R89	7210002160	VAR	RV-270 (RK0971116) 10KB
R90	7030003560	S.RES	10K ERJ3GE
R91	7030003460	S.RES	1.5K ERJ3GE
R100	7030003440	S.RES	1K ERJ3GE
R101	7030003680	S.RES	100K ERJ3GE
R102	7030000370	S.RES	820 MCR10
R103	7030003640	S.RES	47K ERJ3GE
R105	7030003570	S.RES	12K ERJ3GE
R106	7030003520	S.RES	4.7K ERJ3GE
R107	7030003520	S.RES	4.7K ERJ3GE

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R108	7030003540	S.RES	6.8K ERJ3GE
R109	7030003540	S.RES	6.8K ERJ3GE
R110	7030003440	S.RES	1K ERJ3GE
R111	7030003440	S.RES	1K ERJ3GE
R112	7030000080	S.RES	3.3 MCR10
R113	7030000020	S.RES	1 MCR10
R114	7030003600	S.RES	22K ERJ3GE
R115	7030003560	S.RES	10K ERJ3GE
R116	7310000750	TRI	RH0651C14J2WA (103)
R117	7030003400	S.RES	470 ERJ3GE
R118	7030003580	S.RES	15K ERJ3GE
R119	7030003400	S.RES	470 ERJ3GE
R120	7030003580	S.RES	15K ERJ3GE
R121	7030003400	S.RES	470 ERJ3GE
R122	7030003580	S.RES	15K ERJ3GE
R123	7030003670	S.RES	82K ERJ3GE
R124	7030003660	S.RES	68K ERJ3GE
R125	7030003480	S.RES	2.2K ERJ3GE
R126	7030003580	S.RES	15K ERJ3GE
R127	7030003400	S.RES	470 ERJ3GE
R128	7030003320	S.RES	100 ERJ3GE
R129	7030003400	S.RES	470 ERJ3GE
R130	7030003320	S.RES	100 ERJ3GE
R131	7310001090	TRI	RH0621C13J1TA
R138	7310000640	TRI	RH0621CJ3J1GA
R139	7030003660	S.RES	68K ERJ3GE
R140	7030003680	S.RES	100K ERJ3GE
R141	7030003600	S.RES	22K ERJ3GE
R142	7030003500	S.RES	3.3K ERJ3GE
R143	7030003400	S.RES	470 ERJ3GE
R144	7030003800	S.RES	1M ERJ3GE
R147	7030003530	S.RES	5.6K ERJ3GE
R148	7030003440	S.RES	1K ERJ3GE
R149	7030003520	S.RES	4.7K ERJ3GE
R150	7030003320	S.RES	100 ERJ3GE
R152	7030003450	S.RES	1.2K ERJ3GE
R153	7030003320	S.RES	100 ERJ3GE
R154	7030003400	S.RES	470 ERJ3GE
R155	7030003400	S.RES	470 ERJ3GE
R156	7030003440	S.RES	1K ERJ3GE
R163	7030003560	S.RES	10K ERJ3GE
R164	7030003560	S.RES	10K ERJ3GE
R182	7030003450	S.RES	1.2K ERJ3GE
R183	7030003520	S.RES	4.7K ERJ3GE
R184	7030003240	S.RES	22 ERJ3GE
R187	7030003320	S.RES	100 ERJ3GE
R188	7030003440	S.RES	1K ERJ3GE
R189	7030003370	S.RES	270 ERJ3GE
R190	7030003230	S.RES	18 ERJ3GE
R191	7030003370	S.RES	270 ERJ3GE
R192	7030003330	S.RES	120 ERJ3GE
R193	7030003290	S.RES	56 ERJ3GE
R194	7030003330	S.RES	120 ERJ3GE
R195	7030003680	S.RES	100K ERJ3GE
R196	7030003680	S.RES	100K ERJ3GE
R198	7030003320	S.RES	100 ERJ3GE
R199	7030003320	S.RES	100 ERJ3GE
R200	7030003240	S.RES	22 ERJ3GE
R201	7030003680	S.RES	100K ERJ3GE
R202	7030003680	S.RES	100K ERJ3GE
R203	7030003680	S.RES	100K ERJ3GE
R204	7030003500	S.RES	3.3K ERJ3GE
R205	7030003430	S.RES	820 ERJ3GE
R206	7030003220	S.RES	15 ERJ3GE
R207	7030003240	S.RES	22 ERJ3GE
R208	7030003760	S.RES	470K ERJ3GE
R209	7030003560	S.RES	10K ERJ3GE
R210	7030003400	S.RES	470 ERJ3GE
R211	7030003270	S.RES	39 ERJ3GE
R212	7030003760	S.RES	470K ERJ3GE
R213	7030003560	S.RES	10K ERJ3GE
R214	7030003400	S.RES	470 ERJ3GE
R215	7030003270	S.RES	39 ERJ3GE
R216	7070000251	RES	ERX2SJ 4R7 (4.7)
R217	7010004660	RES	R50XJ 15
R218	7030003440	S.RES	1K ERJ3GE
R219	7030003440	S.RES	1K ERJ3GE
R220	7030003440	S.RES	1K ERJ3GE
R221	7030003440	S.RES	1K ERJ3GE
R222	7030003440	S.RES	1K ERJ3GE
R223	7030003640	S.RES	47K ERJ3GE
R224	7030003640	S.RES	47K ERJ3GE
R225	7030003640	S.RES	47K ERJ3GE
R226	7030003640	S.RES	47K ERJ3GE
R227	7030003640	S.RES	47K ERJ3GE
R228	7030003440	S.RES	1K ERJ3GE
R229	7030003440	S.RES	1K ERJ3GE
R230	7030003440	S.RES	1K ERJ3GE
R231	7030003440	S.RES	1K ERJ3GE
R232	7030003640	S.RES	47K ERJ3GE
R233	7030003640	S.RES	47K ERJ3GE

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R234	7030003640	S.RES	47K ERJ3GE
R235	7030003640	S.RES	47K ERJ3GE
R236	7030003640	S.RES	47K ERJ3GE
R237	7030003640	S.RES	47K ERJ3GE
R238	7030003640	S.RES	47K ERJ3GE
R239	7030003640	S.RES	47K ERJ3GE
R240	7030003640	S.RES	47K ERJ3GE
R241	7030003440	S.RES	1K ERJ3GE
R242	7030003440	S.RES	1K ERJ3GE
R243	7030003440	S.RES	1K ERJ3GE
R248	7030003490	S.RES	2.7K ERJ3GE
R249	7030003330	S.RES	120 ERJ3GE
R250	7030003490	S.RES	2.7K ERJ3GE
R254	7030003320	S.RES	100 ERJ3GE
R256	7030003200	S.RES	10 ERJ3GE
R257	7030003440	S.RES	1K ERJ3GE
R259	7030003560	S.RES	10K ERJ3GE
R260	7030003560	S.RES	10K ERJ3GE
R261	7030000260	S.RES	100 MCR10
R265	7030003230	S.RES	18 ERJ3GE
R266	7030003360	S.RES	220 ERJ3GE
R267	7030003370	S.RES	270 ERJ3GE
R270	7030003320	S.RES	100 ERJ3GE
R274	7030003510	S.RES	3.9K ERJ3GE
R275	7030003510	S.RES	3.9K ERJ3GE
R276	7030003320	S.RES	100 ERJ3GE
R277	7030003560	S.RES	10K ERJ3GE
R278	7030003560	S.RES	10K ERJ3GE
R279	7030003450	S.RES	1.2K ERJ3GE
R280	7030003560	S.RES	10K ERJ3GE
R281	7030003560	S.RES	10K ERJ3GE
R282	7030003440	S.RES	1K ERJ3GE
R283	7030003440	S.RES	1K ERJ3GE
R284	7030003640	S.RES	47K ERJ3GE
R285	7030003640	S.RES	47K ERJ3GE
R286	7030003480	S.RES	2.2K ERJ3GE
R287	7030003320	S.RES	100 ERJ3GE
R288	7030003440	S.RES	1K ERJ3GE
R290	7030003560	S.RES	10K ERJ3GE
R291	7030003560	S.RES	10K ERJ3GE
R292	7030003560	S.RES	10K ERJ3GE
R293	7030003480	S.RES	2.2K ERJ3GE
R296	7030003690	S.RES	120K ERJ3GE
R300	7030003320	S.RES	100 ERJ3GE
R307	7030003440	S.RES	1K ERJ3GE
R310	7030003490	S.RES	2.7K ERJ3GE
R311	7030003760	S.RES	470K ERJ3GE
R312	7030000220	S.RES	47 MCR10
R315	7030003320	S.RES	100 ERJ3GE
R320	7030003320	S.RES	100 ERJ3GE
R321	7030003270	S.RES	39 ERJ3GE
R322	7030003270	S.RES	39 ERJ3GE
R323	7030003270	S.RES	39 ERJ3GE
R324	7030003510	S.RES	3.9K ERJ3GE
R325	7030003510	S.RES	3.9K ERJ3GE
R326	7030003510	S.RES	3.9K ERJ3GE
R327	7030003270	S.RES	39 ERJ3GE
R328	7030003270	S.RES	39 ERJ3GE
R329	7030003270	S.RES	39 ERJ3GE
R330	7030003510	S.RES	3.9K ERJ3GE
R331	7030003510	S.RES	3.9K ERJ3GE
R332	7030003510	S.RES	3.9K ERJ3GE
R333	7030003520	S.RES	4.7K ERJ3GE
R334	7030003580	S.RES	15K ERJ3GE
R335	7030003640	S.RES	47K ERJ3GE
R336	7030003440	S.RES	1K ERJ3GE
R337	7310000750	TRI	RH0651C14J2WA (103)
R338	7310000750	TRI	RH0651C14J2WA (103)
R339	7030003560	S.RES	10K ERJ3GE
R340	7030003320	S.RES	100 ERJ3GE
R341	7030003320	S.RES	100 ERJ3GE
R342	7030003440	S.RES	1K ERJ3GE
R343	7030003820	S.RES	1.5M ERJ3GE
R344	7030003640	S.RES	47K ERJ3GE
R345	7030003320	S.RES	100 ERJ3GE
R346	7030003320	S.RES	100 ERJ3GE
R347	7030003520	S.RES	4.7K ERJ3GE
R348	7030003280	S.RES	47 ERJ3GE
R349	7030003280	S.RES	47 ERJ3GE
R350	7030003400	S.RES	470 ERJ3GE
R351	7030003640	S.RES	47K ERJ3GE
R353	7030003510	S.RES	3.9K ERJ3GE
R354	7030003640	S.RES	47K ERJ3GE
R355	7310001250	TRI	RH0621CS3J2NA
R357	7070000511	RES	ERG1SJ 180 (18)
R359	7010000900	RES	R25XJ 8.2
R363	7510000071	TMR	ERT-D2ZHL 503S
R365	7510000240	TMR	ERT-D2ZGL 332S
R366	7030003440	S.RES	1K ERJ3GE
R367	7030003520	S.RES	4.7K ERJ3GE
R368	7030003350	S.RES	180 ERJ3GE

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R369	7030003610	S.RES	27K ERJ3GE
R370	7030003440	S.RES	1K ERJ3GE
R371	7030003480	S.RES	2.2K ERJ3GE
R372	7030003580	S.RES	15K ERJ3GE
R373	7030003440	S.RES	1K ERJ3GE
R374	7030003330	S.RES	120 ERJ3GE
R375	7030003420	S.RES	680 ERJ3GE
C1	4030006860	S.CER	0.001 C1608 B
C2	4030006970	S.CER	6P C1608 CH
C3	4030008570	S.CER	0.75P C1608
C4	4030006590	S.CER	8P C1608
C5	4030006860	S.CER	0.001 C1608 B
C6	4030006860	S.CER	0.001 C1608 B
C7	4030006880	S.CER	0.0047 C1608 B
C8	4030006860	S.CER	0.001 C1608 B
C9	4030006860	S.CER	0.001 C1608 B
C10	4030006880	S.CER	0.0047 C1608 B
C11	4030006860	S.CER	0.001 C1608 B
C12	4030008570	S.CER	0.75P C1608
C13	4030006510	S.CER	0.5P C1608
C14	4030006860	S.CER	0.001 C1608 B
C15	4030006860	S.CER	0.001 C1608 B
C16	4030006860	S.CER	0.001 C1608 B
C17	4030006860	S.CER	0.001 C1608 B
C18	4030006860	S.CER	0.001 C1608 B
C19	4030006670	S.CER	27P C1608
C20	4030006880	S.CER	0.0047 C1608 B
C21	4030006880	S.CER	0.0047 C1608 B
C22	4030006550	S.CER	4P C1608
C23	4030006880	S.CER	0.0047 C1608 B
C24	4030006880	S.CER	0.0047 C1608 B
C25	4030006710	S.CER	47P C1608
C27	4030006850	S.CER	470P C1608 B
C28	4030008920	S.CER	0.047 C1608 16V B
C29	4030006860	S.CER	0.001 C1608 B
C30	4030011600	S.CER	0.1 C1608 16V B
C32	4030008920	S.CER	0.047 C1608 16V B
C33	4030006860	S.CER	0.001 C1608 B
C34	4030011600	S.CER	0.1 C1608 16V B
C36	4030008920	S.CER	0.047 C1608 16V B
C37	4030006900	S.CER	0.01 C1608 25V B
C38	4030008920	S.CER	0.047 C1608 16V B
C39	4030011600	S.CER	0.1 C1608 16V B
C41	4030006710	S.CER	47P C1608
C42	4030011600	S.CER	0.1 C1608 16V B
C44	4030011600	S.CER	0.1 C1608 16V B
C47	4030006880	S.CER	0.0047 C1608 B
C49	4550002030	TAN	DN 1A 220M
C50	4510003820	ELE	50 ME R22 SWB
C52	4510003790	ELE	16 ME 10 SWB
C53	4510003840	ELE	50 ME 1 SWB
C56	4310000400	MLR	50 F2D 223J
C57	4310000570	MLR	50 F2D 222J
C58	4510003790	ELE	16 ME 10 SWB
C59	4510003800	ELE	25 ME 4R7 SWB
C60	4510003820	ELE	50 ME R22 SWB
C72	4510003810	ELE	50 ME R1 SWB
C73	4510003840	ELE	50 ME 1 SWB
C77	4510005120	ELE	16 ME 47 HC
C81	4510003820	ELE	50 ME R22 SWB
C82	4310000400	MLR	50 F2D 223J
C83	4310000570	MLR	50 F2D 222J
C85	4510003840	ELE	50 ME 1 SWB
C86	4510005040	ELE	25 ME 1000 HC
C87	4510005000	ELE	16 ME 220 HC
C88	4510004320	ELE	25 ME 47 SWB
C89	4510004320	ELE	25 ME 47 SWB
C90	4510008470	ELE	10 ME 1000 CX
C91	4310000480	MLR	50 F2D 104J
C95	4510003790	ELE	16 ME 10 SWB
C97	4510003840	ELE	50 ME 1 SWB
C98	4510003790	ELE	16 ME 10 SWB
C99	4510003830	ELE	50 ME R47 SWB
C101	4510003790	ELE	16 ME 10 SWB
C102	4550000010	TAN	DN 1C 4R7M
C103	4510003840	ELE	50 ME 1 SWB
C104	4550000010	TAN	DN 1C 4R7M
C106	4510003820	ELE	50 ME R22 SWB
C107	4510003840	ELE	50 ME 1 SWB
C108	4510003800	ELE	25 ME 4R7 SWB
C109	4510005110	ELE	16 ME 33 HC
C111	4510005120	ELE	16 ME 47 HC
C117	4510003800	ELE	25 ME 4R7 SWB
C118	4030006850	S.CER	470P C1608 B
C119	4030006850	S.CER	470P C1608 B
C120	4030006880	S.CER	0.0047 C1608 B
C122	4030006580	S.CER	7P C1608
C123	4030006530	S.CER	2P C1608
C124	4030006580	S.CER	7P C1608

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
C125	4030006880	S.CER	0.0047 C1608 B	
C127	4030006880	S.CER	0.0047 C1608 B	
C129	4030006800	S.CER	220P C1608	
C135	4030006880	S.CER	0.0047 C1608 B	
C153	4030006710	S.CER	47P C1608	
C155	4030006880	S.CER	0.0047 C1608 B	
C156	4030006850	S.CER	470P C1608 B	
C157	4030006660	S.CER	22P C1608	
C158	4030006560	S.CER	5P C1608	
C159	4030006630	S.CER	15P C1608	
C160	4030006880	S.CER	0.0047 C1608 B	
C161	4030006540	S.CER	3P C1608	
C162	4030006860	S.CER	0.001 C1608 B	
C163	4030006540	S.CER	3P C1608	
C164	4030008570	S.CER	0.75P C1608	
C166	4030006860	S.CER	0.001 C1608 B	
C167	4030006860	S.CER	0.001 C1608 B	
C168	4030006660	S.CER	22P C1608	
C169	4030006860	S.CER	0.001 C1608 B	
C170	4030006860	S.CER	0.001 C1608 B	
C171	4030006880	S.CER	0.0047 C1608 B	
C172	4030008570	S.CER	0.75P C1608	
C173	4030006540	S.CER	3P C1608	
C174	4030006860	S.CER	0.001 C1608 B	
C175	4030006860	S.CER	0.001 C1608 B	
C176	4030006610	S.CER	10P C1608	
C179	4030006860	S.CER	0.001 C1608 B	
C180	4030006890	S.CER	0.01 C1608 F	
C181	4030006860	S.CER	0.001 C1608 B	
C182	4030008650	S.CER	0.0033 C1608 B	
C183	4510003790	ELE	16 ME 10 SWB	
C185	4510003790	ELE	16 ME 10 SWB	
C187	4510005190	ELE	ECEA1ESS222	
C189	4510004330	ELE	35 ME 10 SWB	
C190	4510003790	ELE	16 ME 10 SWB	
C193	4510003790	ELE	16 ME 10 SWB	
C194	4510003790	ELE	16 ME 10 SWB	
C205	4610002020	TRI	ECR-HA020D41	
C218	4510005140	ELE	25 ME 100 HC	
C222	4510005120	ELE	16 ME 47 HC	
C223	4510004320	ELE	25 ME 47 SWB	
C224	4510003790	ELE	16 ME 10 SWB	
C230	4510003790	ELE	16 ME 10 SWB	
C231	4510003820	ELE	50 ME R22 SWB	
C234	4310000580	MLR	50 F2D 272J	
C235	4310000400	MLR	50 F2D 223J	
C236	4310000570	MLR	50 F2D 222J	
C237	4510004990	ELE	16 ME 100 HC	
C238	4510003840	ELE	50 ME 1 SWB	
C240	4510003790	ELE	16 ME 10 SWB	
C241	4550000390	TAN	DN 1V R22M	except [USA] only
C243	4510003790	ELE	16 ME 10 SWB	
C244	4510003810	ELE	50 ME R1 SWB	
C246	4510003800	ELE	25 ME 4R7 SWB	
C247	4510003800	ELE	25 ME 4R7 SWB	
C249	4510005120	ELE	16 ME 47 HC	
C250	4510003800	ELE	25 ME 4R7 SWB	
C251	4310000440	MLR	50 F2D 473J	
C253	4020000980	CYR	UP050 B 104K-NA-CZ	[Others]
	4040000260	BAR	UZE 08X 104M	[USA]
C254	4510003830	ELE	50 ME R47 SWB	
C255	4510003810	ELE	50 ME R1 SWB	
C272	4510005020	ELE	50 ME R1 SWN	
C273	4310000400	MLR	50 F2D 223J	
C274	4510005020	ELE	50 ME R1 SWN	
C275	4510003800	ELE	25 ME 4R7 SWB	
C276	4310000570	MLR	50 F2D 222J	
C277	4310000570	MLR	50 F2D 222J	
C278	4510003790	ELE	16 ME 10 SWB	
C280	4510003830	ELE	50 ME R47 SWB	
C291	4510003790	ELE	16 ME 10 SWB	
C292	4510003790	ELE	16 ME 10 SWB	
C293	4510003790	ELE	16 ME 10 SWB	
C300	4550000360	TAN	DN 1V R47M	
C301	4510003790	ELE	16 ME 10 SWB	
C302	4510005150	ELE	50 ME 10 HC	
C308	4510003820	ELE	50 ME R22 SWB	
C309	4510003830	ELE	50 ME R47 SWB	
C313	4510003820	ELE	50 ME R22 SWB	
C314	4510004910	ELE	16 ME 10 SWN	
C315	4510003790	ELE	16 ME 10 SWB	
C317	4010000520	CER	DD107-601 B 472K 50V	[USA] only
C322	4510005120	ELE	16 ME 47 HC	
RL1	6330001510	RLY	TB1-160	
J1	6510007020	CNR	TMP-J01X-V6	
J2	6510007020	CNR	TMP-J01X-V6	
J3	6510003390	CNR	B03B-EH-S	

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[MAIN UNIT]

REF NO.	ORDER NO.	DESCRIPTION		
J4	6510003430	CNR	B07B-EH-S	
J5	6510003420	CNR	B06B-EH-S	
J6	6510010020	CNR	RTB-1.5-2F	
J7	6910001040	CNR	IPS-1136	
J13	6510007020	CNR	TMP-J01X-V6	
J14	6510007020	CNR	TMP-J01X-V6	
J15	6510007020	CNR	TMP-J01X-V6	
J21	6510003390	CNR	B03B-EH-S	
J22	6510003400	CNR	B04B-EH-S	
J23	6510003410	CNR	B05B-EH-S	
J24	6510003400	CNR	B04B-EH-S	
J26	6510003420	CNR	B06B-EH-S	
J27	6510007020	CNR	TMP-J01X-V6	
J28	6510007020	CNR	TMP-J01X-V6	
J29	6910001040	CNR	IPS-1136	
J30	6910001040	CNR	IPS-1136	
J31	6910001040	CNR	IPS-1136	
J32	6910001040	CNR	IPS-1136	
J33	6910001040	CNR	IPS-1136	
J34	6910001040	CNR	IPS-1136	except [USA] only
F1	5210000061	FUS	FGB 5A PBF (FGB0 125V)	
F2	5220000020	HOL	S-N5051	
DS1	5080000190	LMP	HRS-3110A	
DS2	5080000190	LMP	HRS-3110A	
S1	2230000130	SW	SPPJ22588A	
S2	2230000130	SW	SPPJ22588A	
S3	6910006800	TML	OHD-5D 60B	except [USA]
	6910006840	SW	TR-60B50	[USA]
T1	5910000740	TSM	12T03	
W11	7120000380	JMP	JPW 01 R-01	[USA], [FRG] only
W46	7120000490	JMP	ERD25T0	except [USA] only

[PLL UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
IC1001	1130009230	S.IC	LMX2306TM
Q1001	1510000620	S.TR	2SA1576 S
Q1002	1560000540	S.FET	2SK880 Y
Q1003	1530002050	S.TR	2SC3661 TA
Q1004	1530002050	S.TR	2SC3661 TA
D1001	1790001280	S.DIO	MA111
L1001	6200000970	S.COIL	NL322522T 100K 10U
R1001	7030000380	S.RES	1K MCR10
R1002	7030000380	S.RES	1K MCR10
R1003	7030000380	S.RES	1K MCR10
R1004	7030000220	S.RES	47 MCR10
R1005	7030000540	S.RES	22K MCR10
R1006	7030000530	S.RES	18K MCR10
R1007	7030000260	S.RES	100 MCR10
R1008	7030000380	S.RES	1K MCR10
R1009	7030000350	S.RES	560 MCR10
R1011	7030000500	S.RES	10K MCR10
R1012	7030000380	S.RES	1K MCR10
R1013	7030000380	S.RES	1K MCR10
R1014	7030000380	S.RES	1K MCR10
R1015	7030000380	S.RES	1K MCR10
R1016	7030000560	S.RES	33K MCR10
R1017	7030000140	S.RES	10 MCR10
C1001	4030004740	S.CER	0.0047 C2012 B
C1002	4030004740	S.CER	0.0047 C2012 B
C1003	4030004740	S.CER	0.0047 C2012 B
C1004	4030004760	S.CER	0.1 C2012 25V F
C1005	4550004010	S.TAN	1 10V MSVA2
C1006	4550004010	S.TAN	1 10V MSVA2

[PLL UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
C1007	4030004720	S.CER	0.001 C2012 B
C1008	4510008490	S.ELE	10 16V EEE-S A
C1009	4550000560	S.TAN	0.33 35V SVA
C1010	4030004710	S.CER	470P C2012 B
C1011	4030004760	S.CER	0.1 C2012 25V F
C1012	4030004740	S.CER	0.0047 C2012 B
C1016	4030004710	S.CER	470P C2012 B
J1001	6510000770	S.TAN	3022-04A
J1002	6510004900	CNTR	3022-05A

[VCO UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
Q2001	1530002031	S.TR	2SC3772 3 E
Q2002	1530002022	S.TR	2SC3770 3 E
Q2003	1530002022	S.TR	2SC3770 3 E
Q2004	1560000341	S.FET	2SK210 Y F
D2001	1720000320	S.VAR	1T32
D2002	1720000320	S.VAR	1T32
D2003	1720000320	S.VAR	1T32
L2001	6200001470	S.COIL	NL322522T R12J-3 0.12U
L2002	6200001470	S.COIL	NL322522T R12J-3 0.12U
L2003	6200000910	S.COIL	LQN2A 82NM 82N
L2004	6200000910	S.COIL	LQN2A 82NM 82N
L2005	6200003330	S.COIL	NL322522T 1R0J-3 1U
L2006	6130002581	COIL	LB-282-LF
L2007	6200003320	S.COIL	NL322522T 3R3J-3 3.3U
L2008	6200001830	S.COIL	NL322522T 100J 10U
R2001	7030000260	S.RES	100 MCR10
R2002	7030000460	S.RES	4.7K MCR10
R2003	7030000360	S.RES	680 MCR10
R2004	7030000260	S.RES	100 MCR10
R2005	7030000460	S.RES	4.7K MCR10
R2006	7030000360	S.RES	680 MCR10
R2007	7030000160	S.RES	15 MCR10
R2008	7030000160	S.RES	15 MCR10
R2009	7030000470	S.RES	5.6K MCR10
R2010	7030000220	S.RES	47 MCR10
R2011	7030000280	S.RES	150 MCR10
R2012	7030000390	S.RES	1.2K MCR10
R2013	7030000260	S.RES	100 MCR10
R2014	7030000250	S.RES	82 MCR10
R2015	7030000620	S.RES	100K MCR10
R2016	7030000620	S.RES	100K MCR10
R2017	7030000380	S.RES	1K MCR10
R2018	7030000380	S.RES	1K MCR10
C2001	4010006210	CER	47P 50V HE
C2002	4030004710	S.CER	470P C2012 B
C2003	4030004520	S.CER	22P C2012
C2004	4010006210	CER	47P 50V HE
C2005	4030004710	S.CER	470P C2012 B
C2006	4030004520	S.CER	22P C2012
C2007	4030004500	S.CER	18P C2012
C2009	4030004740	S.CER	0.0047 C2012 B
C2010	4030004380	S.CER	1P C2012
C2011	4030004740	S.CER	0.0047 C2012 B
C2012	4030004810	S.CER	4P C2012 CH
C2013	4030004820	S.CER	5P C2012 CH
C2014	4030004900	S.CER	18P C2012 CH
C2015	4610001270	S.TRI	ECR-JA010A12W 10P
C2016	4030004740	S.CER	0.0047 C2012 B
C2017	4030004740	S.CER	0.0047 C2012 B
J2001	6510005210	CNR	3022-03A

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[DIAL UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
S3001	2260001620	SW	SW-133 (RK09720HM)

[FRONT UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R4003	7310000650	TRI	RH0621CN3J0SA
DS4001	5030000731	LCD	FSD-10394AAH-1
DS4002	5080000260	LMP	HRS-7152A=L21
DS4003	5080000260	LMP	HRS-7152A=L21
DS4004	5080000260	LMP	HRS-7152A=L21
DS4005	5080000260	LMP	HRS-7152A=L21
DS4006	5080000260	LMP	HRS-7152A=L21
DS4007	5080000260	LMP	HRS-7152A=L21
EP4002	8930023170	LCT	SRCN-867W

[PA UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
Q5002	1540000650	TR	2SD1858TV2 R
Q5003	1530000791	TR	2SC1971-01
Q5004	1540000650	TR	2SD1858TV2 R
Q5005	1530002950	TR	2SC1946A
D5001	1790000720	DIO	MA29W-B
D5002	1790000720	DIO	MA29W-B
D5003	1790001780	DIO	MA700
D5004	1790001780	DIO	MA700
D5005	1790001780	DIO	MA700
D5006	1790001780	DIO	MA700
D5007	1710001081	DIO	L308CCB
D5008	1710001081	DIO	L308CCB
D5009	1710001081	DIO	L308CCB
L5001	2040000490	COL	EXC-ELDR25C
L5002	2040000490	COL	EXC-ELDR25C
L5003	6180000730	COL	LAL 03NA R47M
L5004	6180000810	COL	LAL 03NA 2R2M
L5005	6110001990	COL	LA-223
L5006	6140002450	COL	LR-283
L5008	6180000810	COL	LAL 03NA 2R2M
L5009	6910000670	COL	BL01RN1A1D2B (BL01RN1-A62)
L5010	6110002620	COL	LA-458
L5011	6180000840	COL	LAL 03NA 3R9K
L5013	6110001680	COL	LA-254
L5014	6110001740	COL	LA-263
L5015	6110001740	COL	LA-263
L5016	6110001670	COL	LA-253
L5017	6110001550	COL	LA-235
L5018	6110001550	COL	LA-235
L5019	6140002220	COL	LR-270 (TR6X3X2 3A9)
L5020	2040000490	COL	EXC-ELDR25C
L5021	6110001540	COL	LA-234
L5022	6110001550	COL	LA-235
L5023	6110001550	COL	LA-235
R5001	7010004190	RES	R20J 1 k
R5002	7010004250	RES	R20J 3.3 k
R5003	7010004110	RES	R20J 220
R5004	7010003990	RES	R20J 22
R5005	7310000640	TRI	RH0621CJ3J1GA
R5006	7010004030	RES	R20J 47
R5007	7310000640	TRI	RH0621CJ3J1GA
R5008	7010001030	RES	R25XJ 100
R5010	7010004270	RES	R20J 4.7 k
R5011	7010004270	RES	R20J 4.7 k
R5012	7010004270	RES	R20J 4.7 k
R5013	7010004270	RES	R20J 4.7 k
R5014	7010004270	RES	R20J 4.7 k
R5015	7010004270	RES	R20J 4.7 k
R5018	7010004130	RES	R20J 330
R5019	7010004130	RES	R20J 330

[PA UNIT]

REF NO.	ORDER NO.	DESCRIPTION	
R5021	7010004070	RES	R20J 100
R5022	7010004110	RES	R20J 220
R5023	7010004070	RES	R20J 100
R5024	7070000210	RES	CRH100X R-02J 47
C5001	4010006280	CER	HE50SJ SL 101J 50V
C5002	4010006060	CER	HE40SJ SL 100D 50V
C5004	4010006880	CER	HE50SJ YB 102K 50V
C5008	4010006330	CER	HE70SJ SL 221J 50V
C5009	4010006900	CER	HE80SJ YB 472K 50V
C5010	4010006210	CER	HE40SJ SL 470J 50V
C5011	4010006230	CER	HE40SJ SL 560J 50V
C5012	4010006170	CER	HE40SJ SL 330J 50V
C5015	4010006290	CER	HE50SJ SL 121J 50V
C5016	4010000410	CER	DD107 SL 331J 50V
C5018	4010006880	CER	HE50SJ YB 102K 50V
C5021	4010006900	CER	HE80SJ YB 472K 50V
C5022	4010006290	CER	HE50SJ SL 121J 50V
C5023	4010006230	CER	HE40SJ SL 560J 50V
C5024	4010006280	CER	HE50SJ SL 101J 50V
C5025	4010006250	CER	HE40SJ SL 680J 50V
C5026	4010006130	CER	HE40SJ SL 220J 50V
C5027	4010006290	CER	HE50SJ SL 121J 50V
C5028	4010006230	CER	HE40SJ SL 560J 50V
C5030	4010006880	CER	HE50SJ YB 102K 50V
C5032	4010006290	CER	HE50SJ SL 121J 50V
C5033	4010006900	CER	HE80SJ YB 472K 50V
C5034	4010006290	CER	HE50SJ SL 121J 50V
C5035	4010006290	CER	HE50SJ SL 121J 50V
C5036	4010006330	CER	HE70SJ SL 221J 50V
C5037	4010006900	CER	HE80SJ YB 472K 50V
C5038	4510005500	ELE	16 ME 10 HC
C5039	4010006880	CER	HE50SJ YB 102K 50V
C5040	4010006330	CER	HE70SJ SL 221J 50V
C5041	4010006110	CER	HE40SJ SL 180J 50V
C5042	4010006880	CER	HE50SJ YB 102K 50V
C5043	4010006880	CER	HE50SJ YB 102K 50V
C5044	4010006330	CER	HE70SJ SL 221J 50V
C5045	4010006180	CER	HE40SJ SL 360J 50V
C5046	4010006080	CER	HE40SJ SL 120J 50V
C5047	4010006070	CER	HE40SJ SL 110J 50V
C5048	4010006130	CER	HE40SJ SL 220J 50V
C5049	4010006880	CER	HE50SJ YB 102K 50V
C5053	4010006880	CER	HE50SJ YB 102K 50V
C5054	4010006100	CER	HE40SJ SL 150J 50V
C5055	4010006190	CER	HE40SJ SL 390J 50V
C5056	4010006170	CER	HE40SJ SL 330J 50V
C5057	4010006100	CER	HE40SJ SL 150J 50V
C5058	4010006100	CER	HE40SJ SL 150J 50V
C5059	4610001580	TRI	CVD30-41 30P
C5060	4010006290	CER	HE50SJ SL 121J 50V
C5061	4010006290	CER	HE50SJ SL 121J 50V
C5062	4010006900	CER	HE80SJ YB 472K 50V
C5063	4010006330	CER	HE70SJ SL 221J 50V
C5064	4010006900	CER	HE80SJ YB 472K 50V
C5065	4010006330	CER	HE70SJ SL 221J 50V
C5066	4010006060	CER	HE40SJ SL 100D 50V
C5067	4010006290	CER	HE50SJ SL 121J 50V
C5068	4510004600	ELE	16 MV 1000 HC
C5070	4510005090	ELE	6.3 ME 470 HC
C5071	4010006130	CER	HE40SJ SL 220J 50V
C5072	4010006240	CER	HE40SJ SL 620J 50V
C5073	4010006130	CER	HE40SJ SL 220J 50V
C5074	4010006290	CER	HE50SJ SL 121J 50V
C5075	4010006210	CER	HE40SJ SL 470J 50V
C5076	4010006880	CER	HE50SJ YB 102K 50V
W5010	7120000490	JMP	ERD25T0
EP5002	9036505001	TUB	IRRAX 0.7 (d) L=15 mm
EP5003	9036505001	TUB	IRRAX 0.7 (d) L=15 mm
EP5004	6910000600	BEA	FSRH050050RN000B (FSOH050RN)
EP5005	6910000600	BEA	FSRH050050RN000B (FSOH050RN)

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

[CHASSIS PARTS]

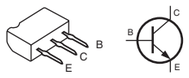
REF NO.	ORDER NO.	DESCRIPTION	
D6001	1710000010	DIO	15CD11
J6001	6510014210	CNR	BNC-BJ

M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)
S.=Surface mount

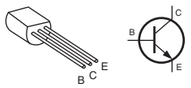
SECTION 9 BOARD LAYOUTS

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

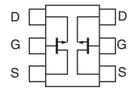
2SD1858R
Q33, Q35, Q36



2SC2053
Q29, Q44



2SK1747
Q4



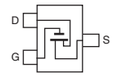
9-1 MAIN UNIT (TOP VIEW)

Power ground
Aircraft power (input)
Switched aircraft power (output)
Transmit/receive interlock
+13.8 V power (input)
Memory channel switch
Intercom micro-phone (input)
Comm micro-phone (input)
500Ω audio (output)
Power ground
4Ω audio (output)
Auxiliary audio 1 (input)
Auxiliary audio 2 (input)
+14 V lighting (input)
No connection

The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.

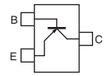
MAIN UNIT (BOTTOM VIEW)

2SK302GR
Q1, Q7, Q8
Q9, Q30



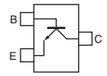
Symbol: TG

2SA1162GR
Q2, Q17, Q25



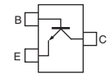
Symbol: SG

2SC4116GR
Q10, Q11, Q13, Q24,
Q32, Q34, Q39, Q40,
Q45, Q47, Q49, Q50, Q51



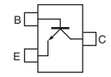
Symbol: LG

2SC3326B
Q14



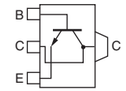
Symbol: CCB

2SC4215 O
Q20



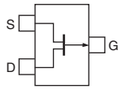
Symbol: QO

2SC3357
Q31



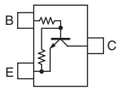
Symbol: RK

2SJ106GR
Q38, Q41



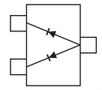
Symbol: VG

DTC114EU
Q3



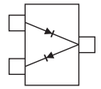
Symbol: 24

DAP202U
D11



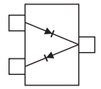
Symbol: P

HSM88ASK
D8, D44, D46



Symbol: C1

DA204U
D30, D32, D42



Symbol: K

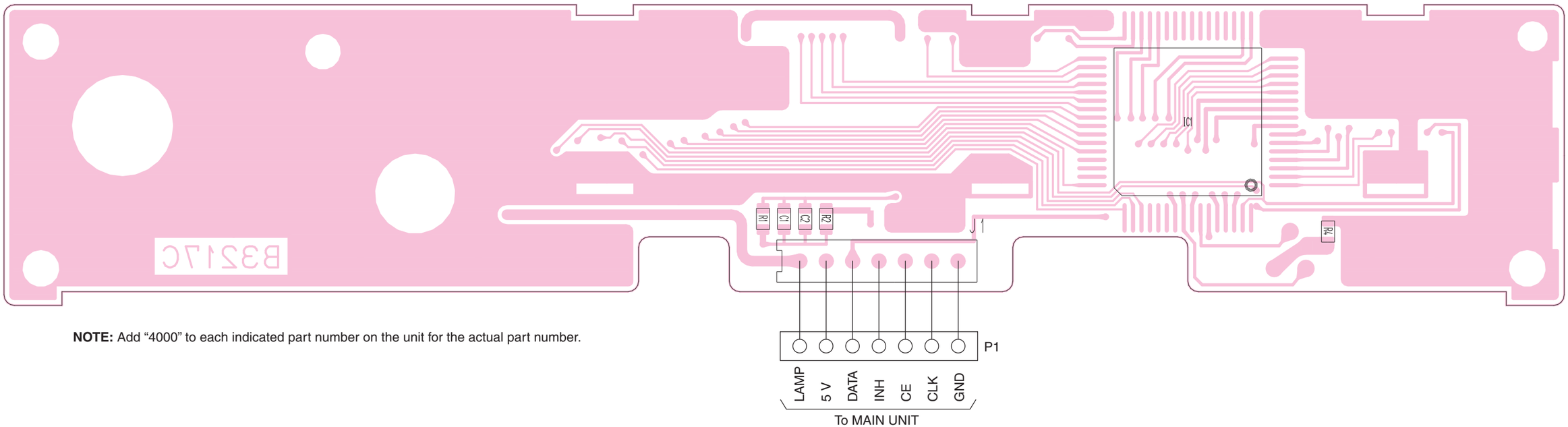
1SV237
D25

Symbol: BB

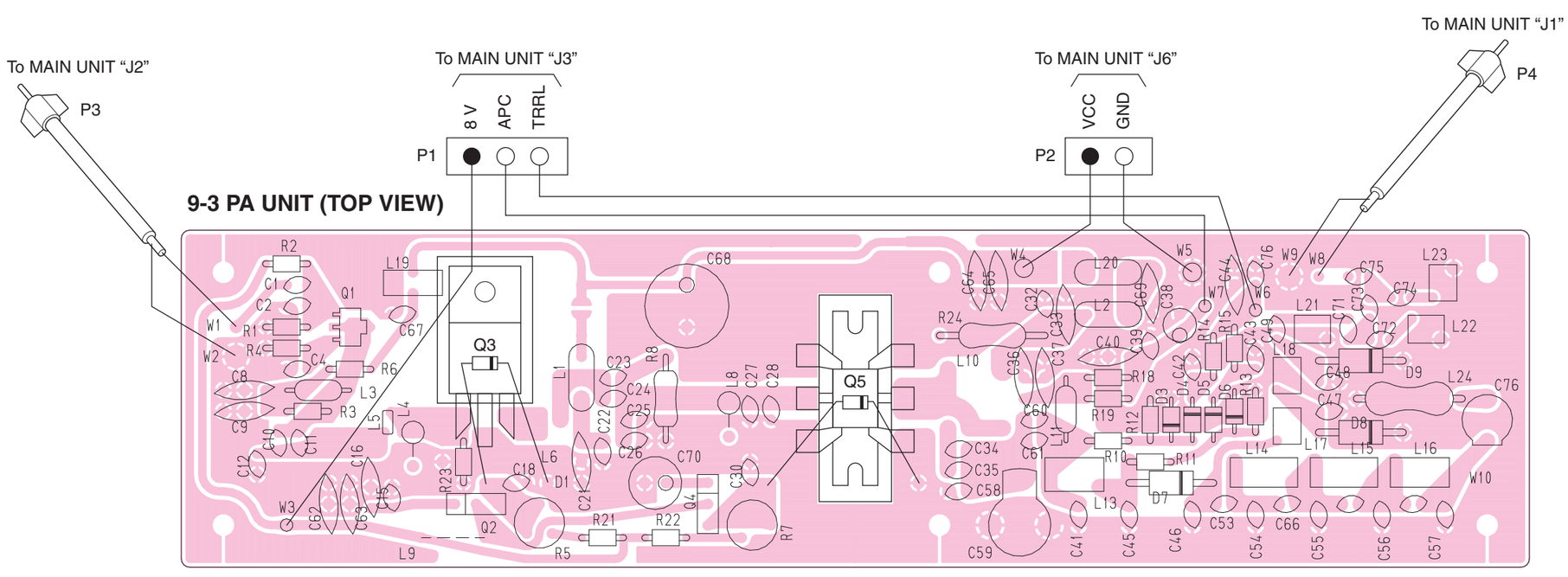
Power ground
Aircraft power (input)
Switched aircraft power (output)
Frequency exchange switch
+13.8 V power (input)
Squelch cancel
PTT
Ground for pins J.K. 9
Ground for pin H
Power ground
Ground for pin E
Ground for pins D.C. 3
Auxiliary audio 3 (input)
Detected audio (output)
Ground for pin B

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

9-2 FRONT UNIT (TOP VIEW)



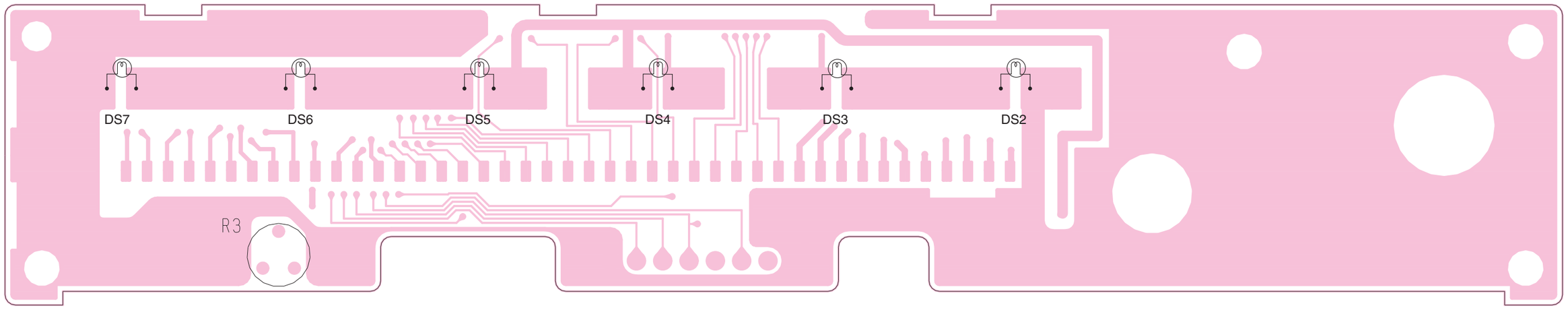
NOTE: Add “4000” to each indicated part number on the unit for the actual part number.



NOTE: Add “5000” to each indicated part number on the unit for the actual part number.

The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.

FRONT UNIT (BOTTOM VIEW)

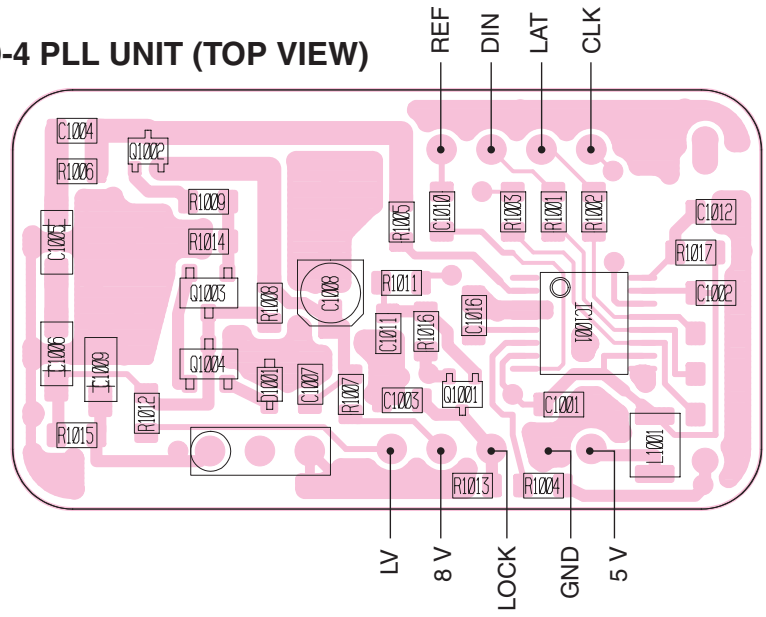


NOTE: Add “4000” to each indicated part number on the unit for the actual part number.

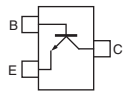
PA UNIT (BOTTOM VIEW)

The combination of this page and the next page shows the unit layout in the same configuration as the actual P.C. Board.

9-4 PLL UNIT (TOP VIEW)

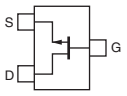


2SC4116GR
Q1001



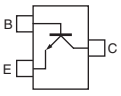
Symbol: LG

2SK880Y
Q1002



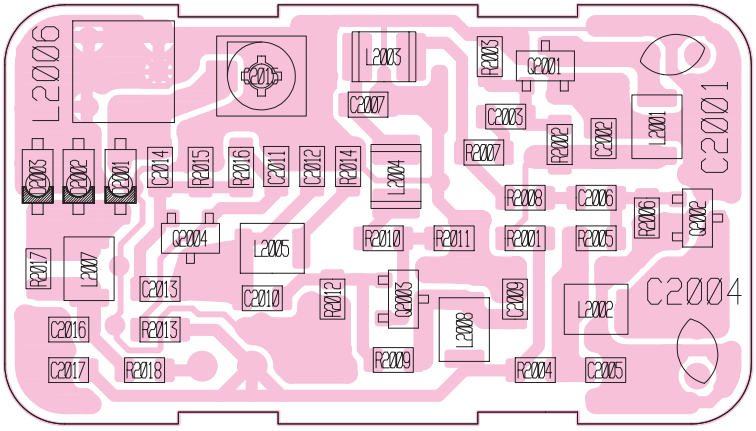
Symbol: XY

2SC3661TA
Q1003, Q1004

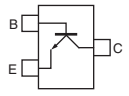


Symbol: SG

9-5 VCO UNIT (TOP VIEW)

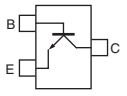


2SC3772 TA
Q2001



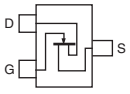
Symbol: LY3

2SC3770 3TA
Q2002, Q2003



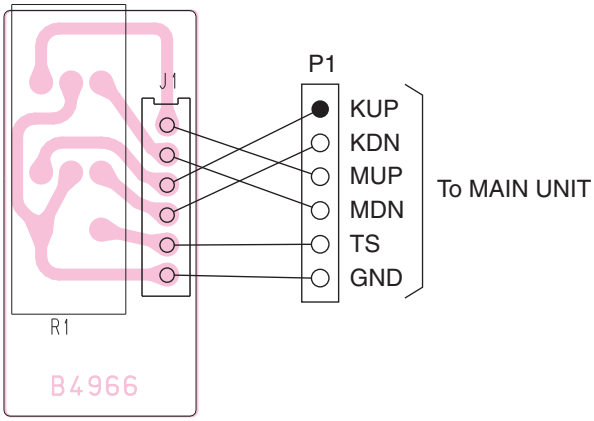
Symbol: JY3

2SK210Y
Q2004



Symbol: YY

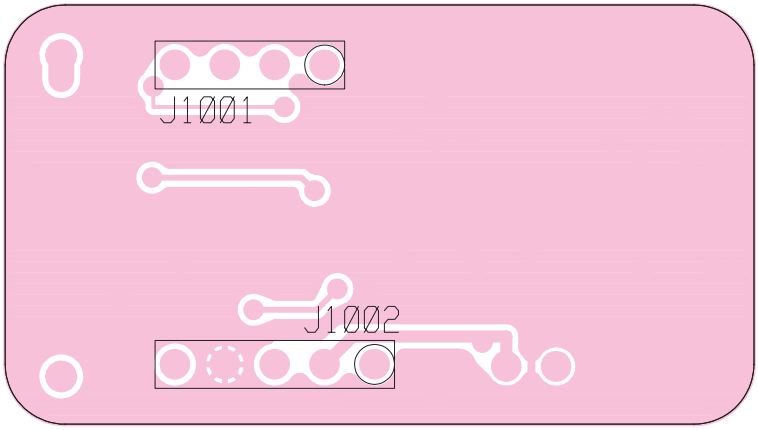
9-6 DIAL UNIT (TOP VIEW)



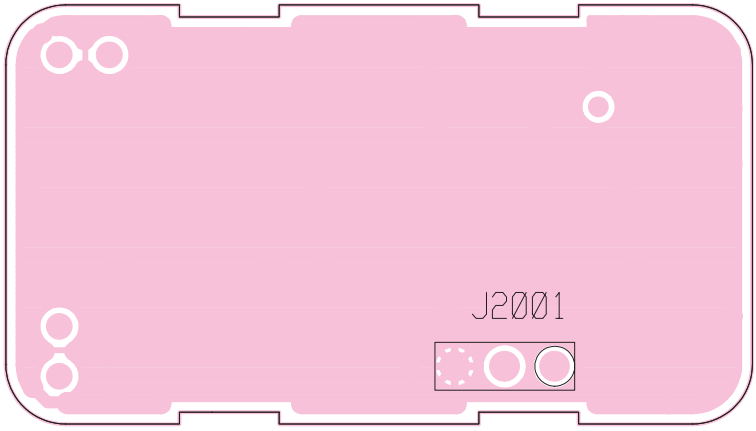
NOTE: Add “3000” to each indicated part number on the unit for the actual part number.

The combination of this page and the previous page shows the unit layout in the same configuration as the actual P.C. Board.

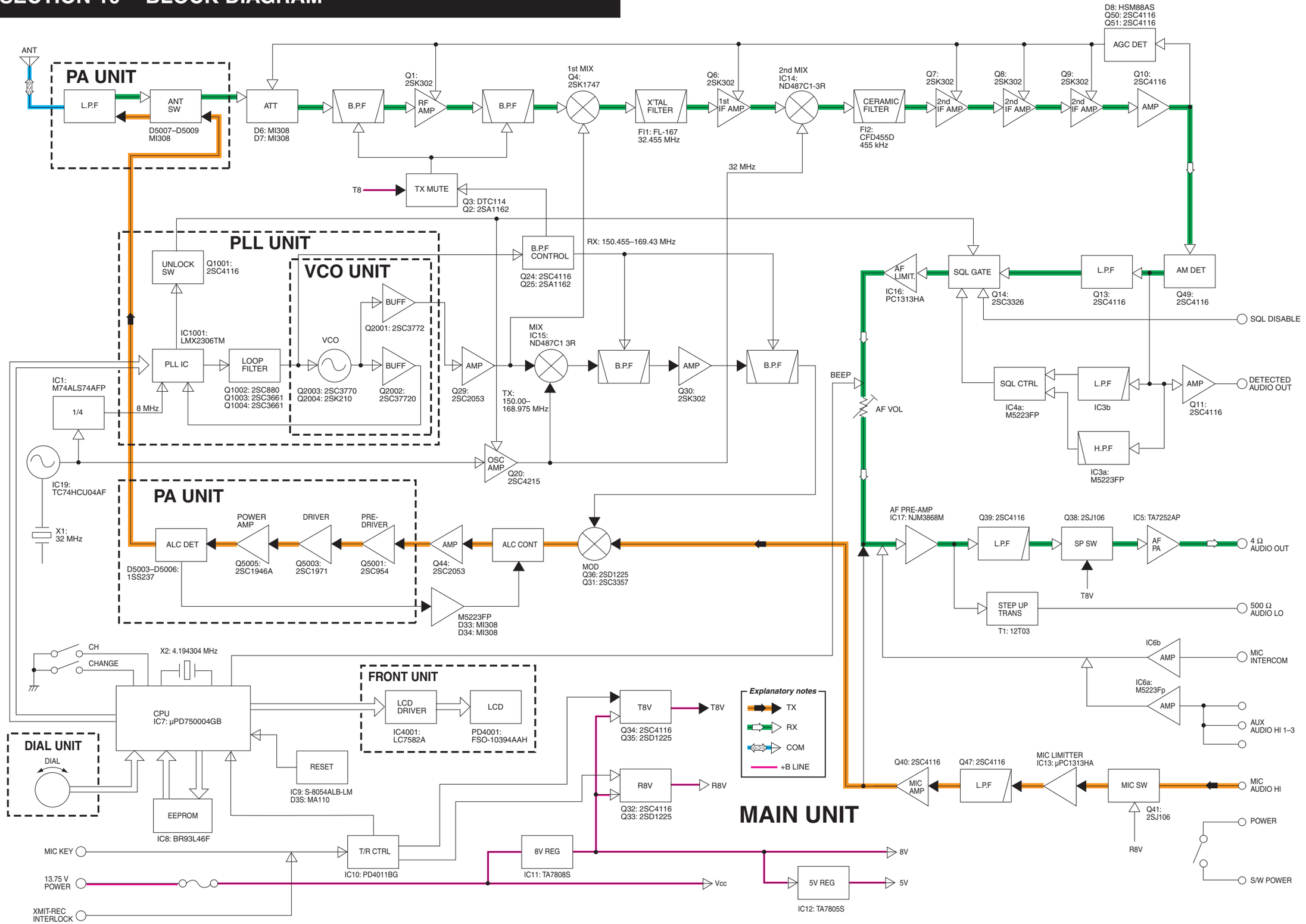
PLL UNIT (BOTTOM VIEW)



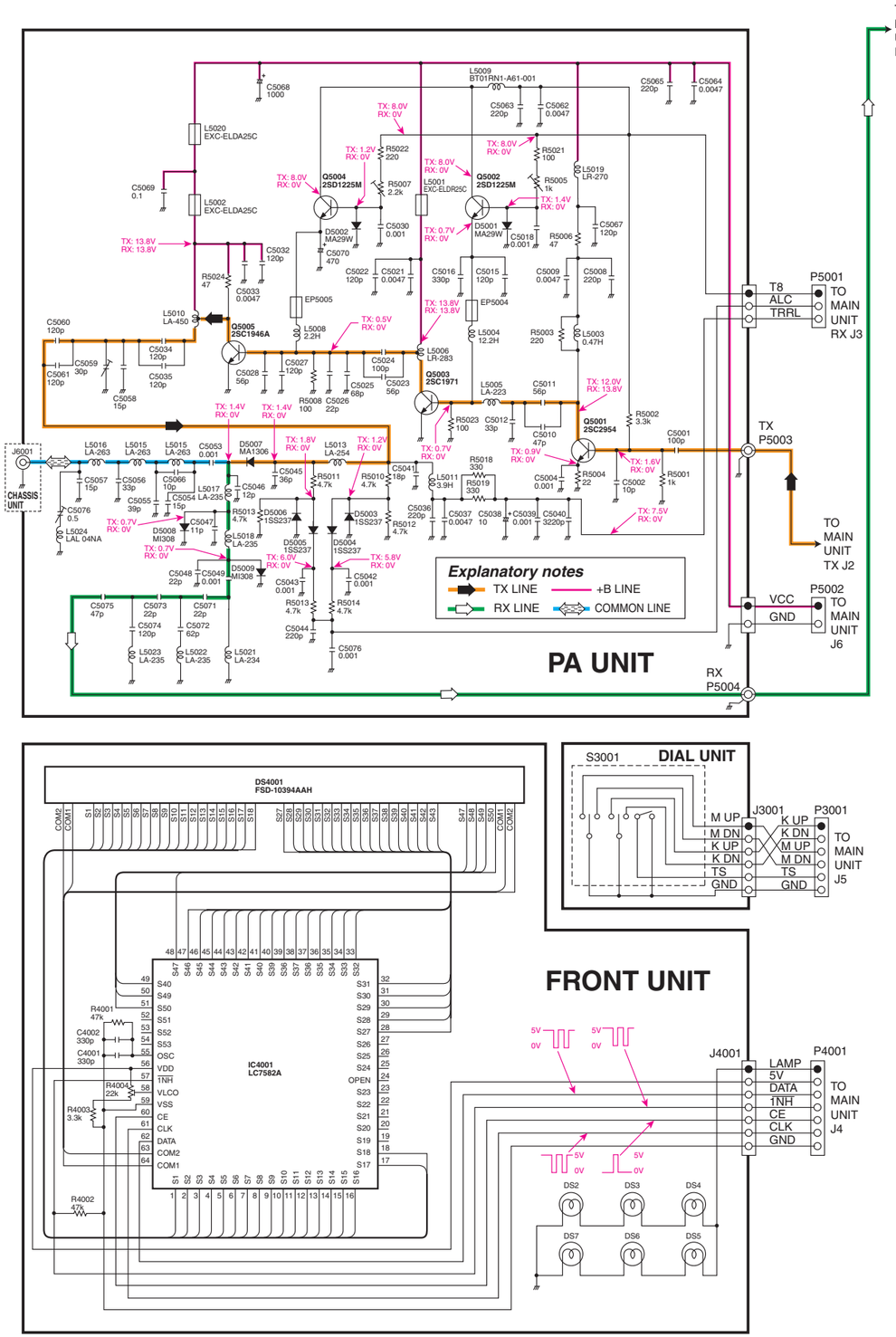
VCO UNIT (BOTTOM VIEW)

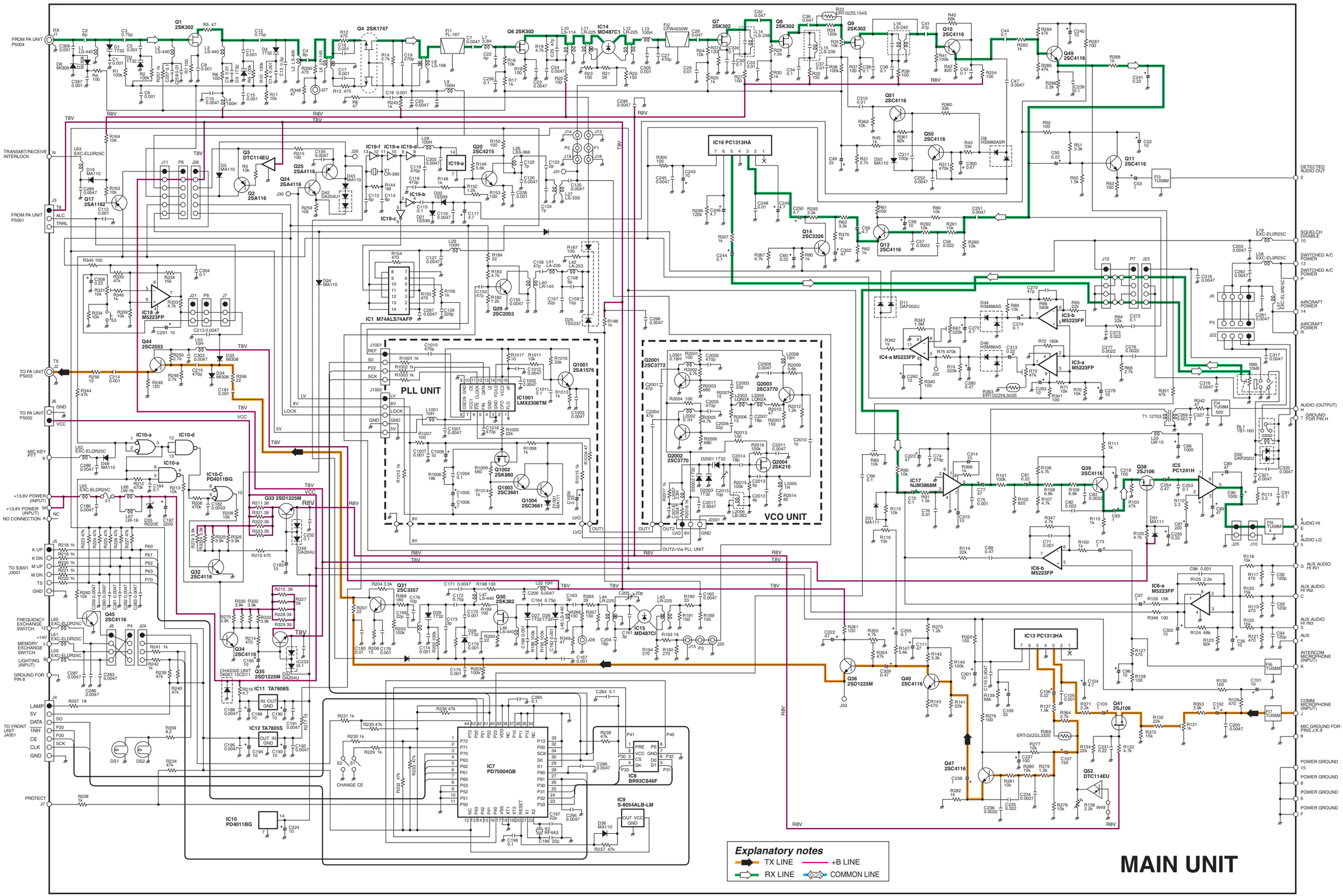


SECTION 10 BLOCK DIAGRAM



SECTION 11 VOLTAGE DIAGRAM




PLL UNIT
VCO UNIT
MAIN UNIT
IC1 M74ALS74AFP
IC7 PD75004GB
IC8 BR93CS46F
IC9 S-8054ALB-LM
IC10 PD4011BG
IC11 TA7808S
IC12 TA7805S
IC13 PC1313HA
IC15 MD487CI
IC16 PC1313HA
IC17 NJM3868M
IC18 M5223FP
IC3-a M5223FP
IC3-b M5223FP
IC4-a M5223FP
IC5 PC1241H
IC6-a M5223FP
IC6-b M5223FP
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