



SERVICE MANUAL

144 MHz FM TRANSCEIVER

IC-T21A

IC-T21E

IC-S21A

IC-S21E

INTRODUCTION

This service manual describes the latest service information for the **IC-T21A/E, IC-S21A/E** 144 MHz FM TRANSCEIVER at the time of publication.

7 versions of the **IC-T21A/E** and 6 versions of the **IC-S21A/E** have been designed. This service manual covers each version.

MODEL	VERSION NO.	VERSION	SYMBOL
IC-T21A	#05	U.S.A.	USA
	#07	Australia	AUS
	#09	Asia	SEA
IC-T21E	#04	Europe	EUR
	#06	Taiwan	TPE
	#08	Denmark	DEN
	#14	Italy	ITA
IC-S21A	#05	U.S.A.	USA
	#07	Australia	AUS
	#09	Asia	SEA
IC-S21E	#04	Europe	EUR
	#06	Taiwan	TPE
	#14	Italy	ITA

To upgrade quality, any electrical or mechanical parts and internal circuits are subject to change without notice or obligation.

DANGER

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>

1150003370 IC SC-1257 IC-T21A 1F UNIT 5 pieces
8810004370 Screw PH B0 M2 x 10 ZK IC-T21A Rear panel 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 tuning 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—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.

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SECTION 1 SPECIFICATIONS

GENERAL

- Frequency coverage

MODEL	VERSION	FREQUENCY COVERAGE
IC-T21A	U.S.A.	144-148 MHz (TX); 144-148, 440-450 MHz (RX)
	Australia	144-148 MHz (TX); 144-148, 430-440 MHz (RX)
	Asia	144-148 MHz (TX); 138-174, 430-440 MHz (RX)
IC-T21E	Europe	144-146 MHz (TX); 144-146, 430-440 MHz (RX)
	Taiwan	145-146 MHz (TX); 145-146, 430-432 MHz (RX)
	Denmark	144-146 MHz (TX); 144-146, 432-438 MHz (RX)
	Italy	144-148 MHz (TX); 138-174, 430-440 MHz (RX)
IC-S21A	U.S.A.	144-148 MHz (TX/RX)
	Australia	144-148 MHz (TX/RX)
	Asia	144-148 MHz (TX); 138-174 (RX)
IC-T21E	Europe	144-146 MHz (TX); 144-146, 430-440 MHz (RX)
	Taiwan	145-146 MHz (TX/RX)
	Italy	144-148 MHz (TX); 138-174 (RX)

- Mode : FM (F3E)
- Tuning steps : 5, 10, 12.5, 15, 20, 25, 30 or 50 kHz
- Number of memory channels : 100 plus 12 scan edge, 1 call, 1 repeat memory channels
- Antenna impedance : 50 Ω (unbalanced)
- Usable battery packs/case : BP-151, BP-152, BP-153, 4 dry cell batteries with BP-159
- External DC power : 4-16 V DC (negative ground)
- Current drain (at 13.5 V, typical) :

Transmit	HIGH	1.8 A
	LOW 1	1.0 A
	E LOW	90 mA
Receive	Power saved	8 mA (average)
	Rated audio output	160 mA

- Usable temperature range : -10°C to $+60^{\circ}\text{C}$ ($+14^{\circ}\text{F}$ to $+140^{\circ}\text{F}$)
- Frequency stability : ± 10 ppm (at 0°C to $+50^{\circ}\text{C}$; $+32^{\circ}\text{F}$ to $+122^{\circ}\text{F}$)
- Dimensions (with BP-151) : 54(W) \times 111(H) \times 35.5(D) mm
(Projections not included) 2.1(W) \times 4.4(H) \times 1.4(D) in
- Weight (with BP-151) : 315 g (11.1 oz)

TRANSMITTER

- Output power (at 13.5 V) : 6 W (HIGH), 4 W (LOW 3), 1.4 W (LOW 2), 1.0 (LOW 1), 15 mW (E LOW)
- Modulation system : Variable reactance frequency modulation
- Max. frequency deviation* : ± 5.0 kHz
- Spurious emissions* : Less than -60 dB (HIGH), Less than -40 dB (E LOW)
- Microphone impedance : 2 k Ω

RECEIVER

- Receive system : Double-conversion superheterodyne
- Intermediate frequency : 1st 30.85 MHz
2nd 455 kHz
- Sensitivity* (for 12 dB SINAD) : Less than 0.16 μV for VHF; Less than 0.22 μV for UHF (IC-T21A/E only)
- Squelch sensitivity (threshold) : Less than 0.13 μV
- Selectivity : More than 15 kHz/ -6 dB
Less than 30 kHz/ -60 dB
- Spurious response rejection ratio* : More than 60 dB
(Except half of image frequency)
- Audio output power* (at 13.5 V) : More than 300 mW (at 10% distortion with an 8 Ω load)
- Audio output impedance : 8 Ω

*Specifications guaranteed at a transceiver temperature of 25°C ($+77^{\circ}\text{F}$).
All stated specifications are subject to change without notice or obligation.

SECTION 2 DISASSEMBLY INSTRUCTIONS

Fig. 1 Removing the front panel

1. Remove 2 screws (A), 2 screws (B) and 2 screws (C), to open the front panel.

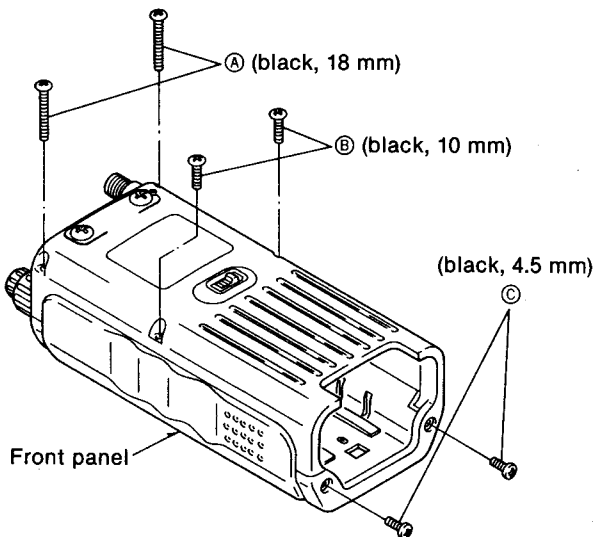


Fig. 2 Removing the 3F unit

1. Remove 2 screws (D), and disconnect J3.
2. Unplug J1 to remove the 3F unit.

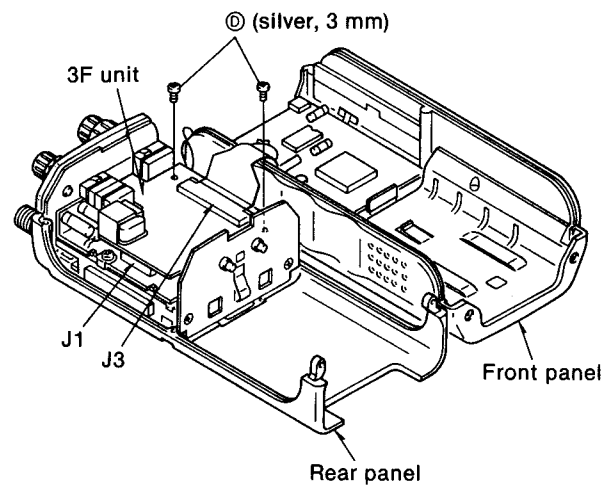


Fig. 3 Removing the 2F unit

1. Remove 1 screws (E) and SW lug.
2. Remove 2 stand-offs (F), then unplug J1 to remove the 2F unit.

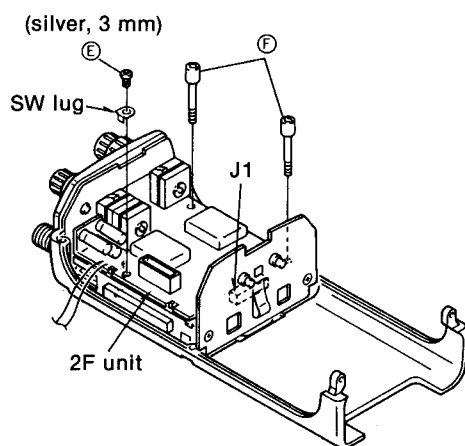
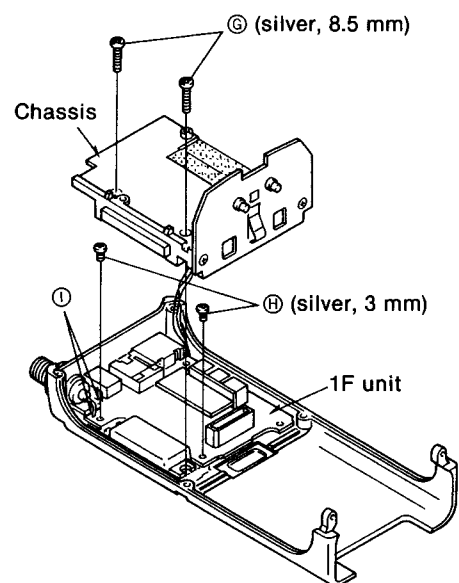


Fig. 4 Removing the 1F unit

1. Remove 2 screws (G), to remove the chassis.
2. Remove 2 screws (H), and unsolder 2 points (I) to remove the 1F unit.



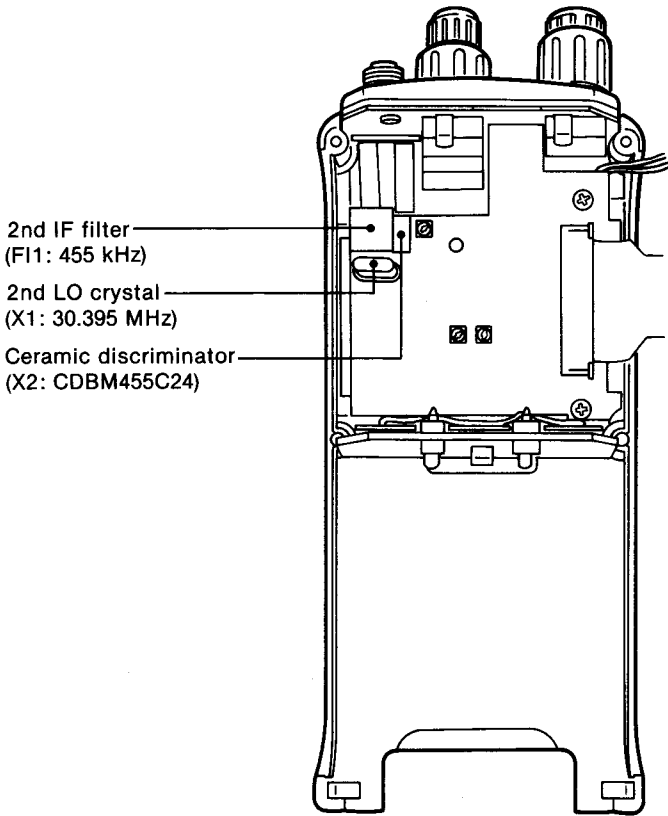
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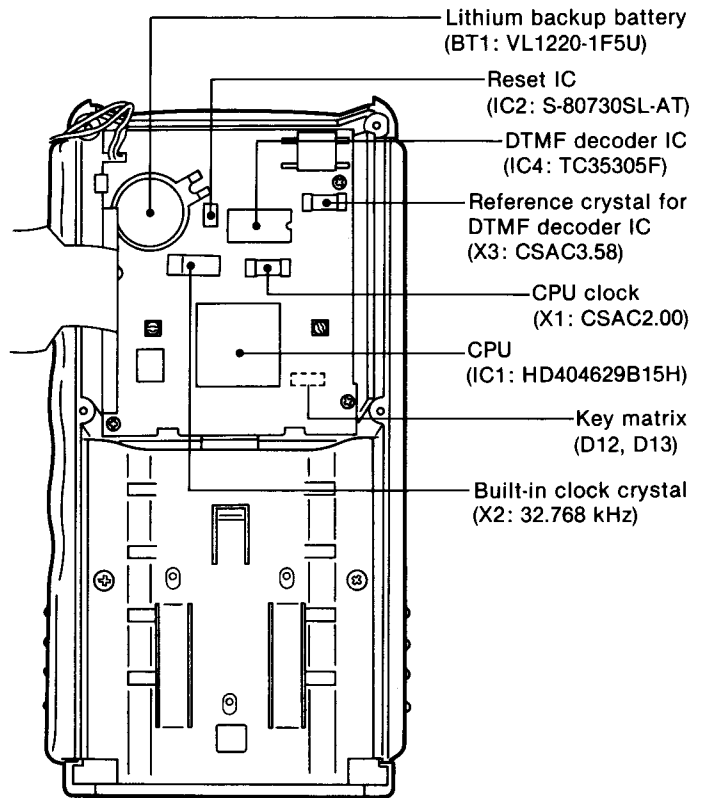
SECTION 3 INSIDE DESCRIPTIONS

3-1 IC-T21A/E

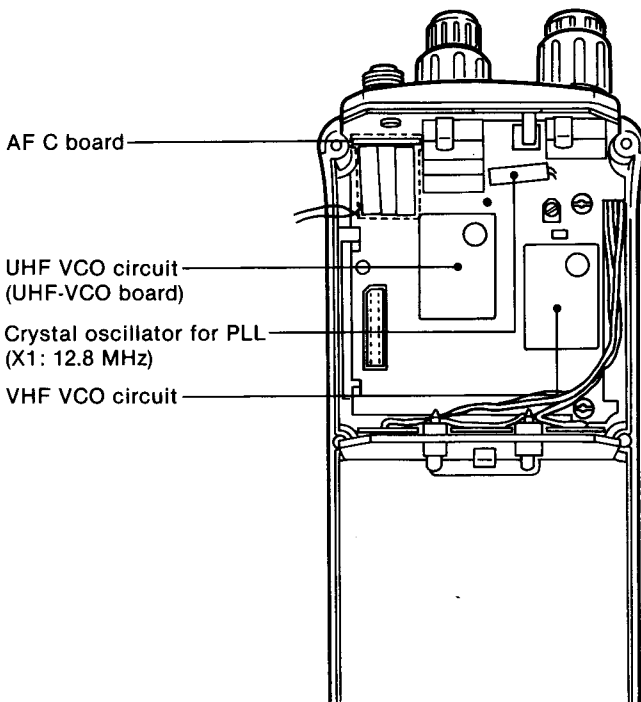
• 3F UNIT



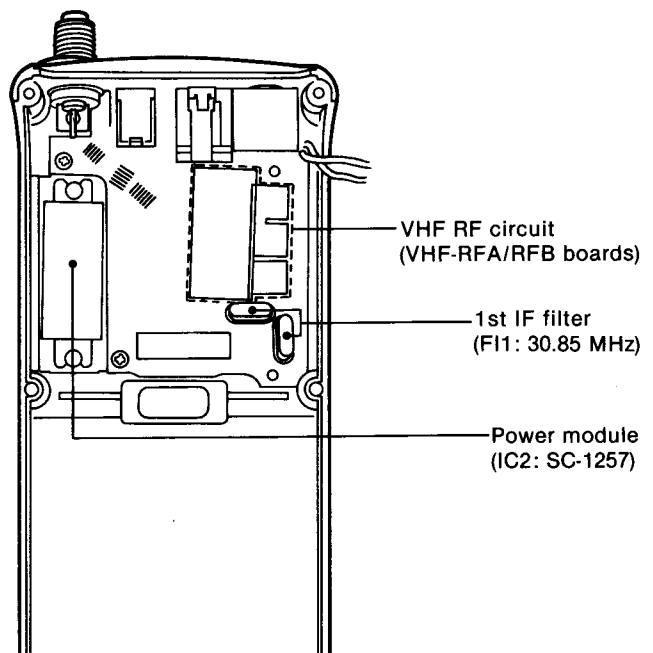
• LOGIC UNIT



• 2F UNIT



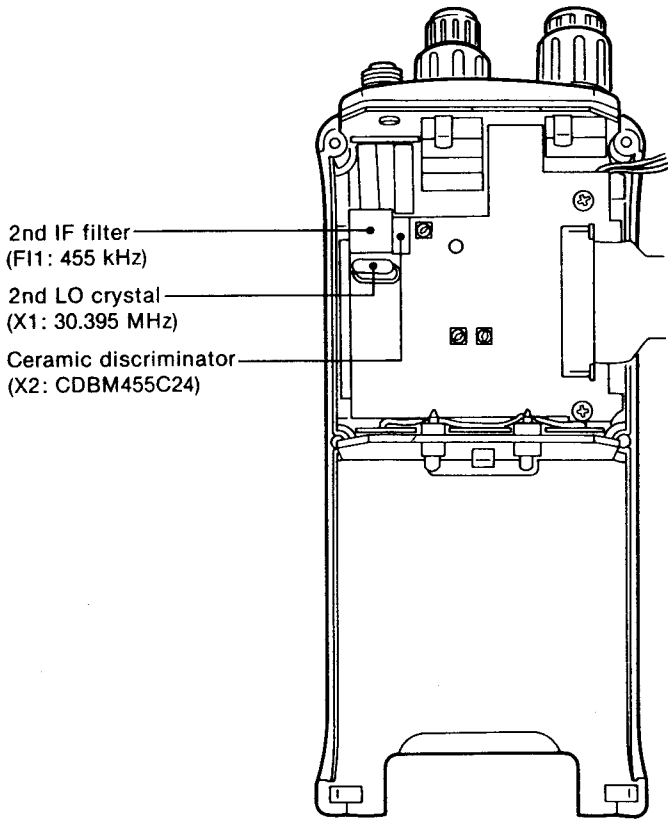
• 1F UNIT



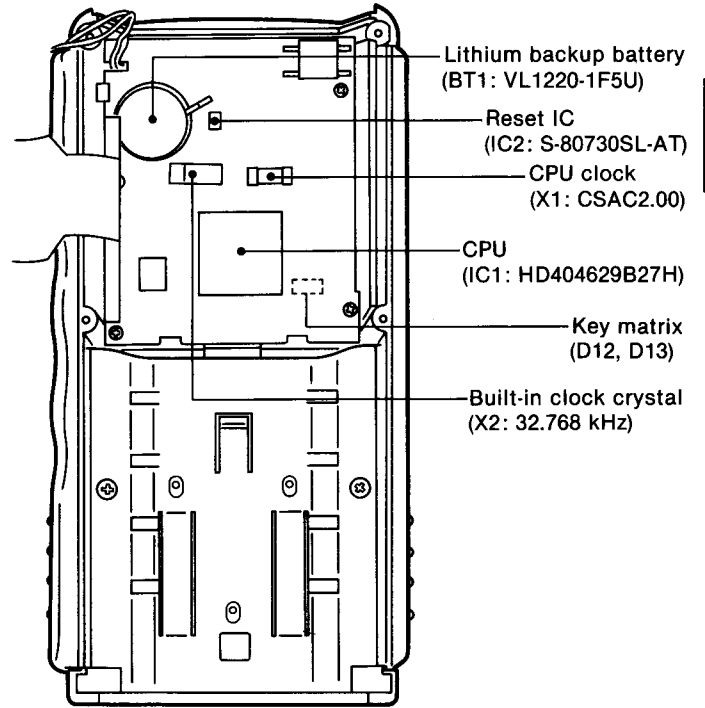
T21

3-2 IC-S21A/E

• 3F UNIT

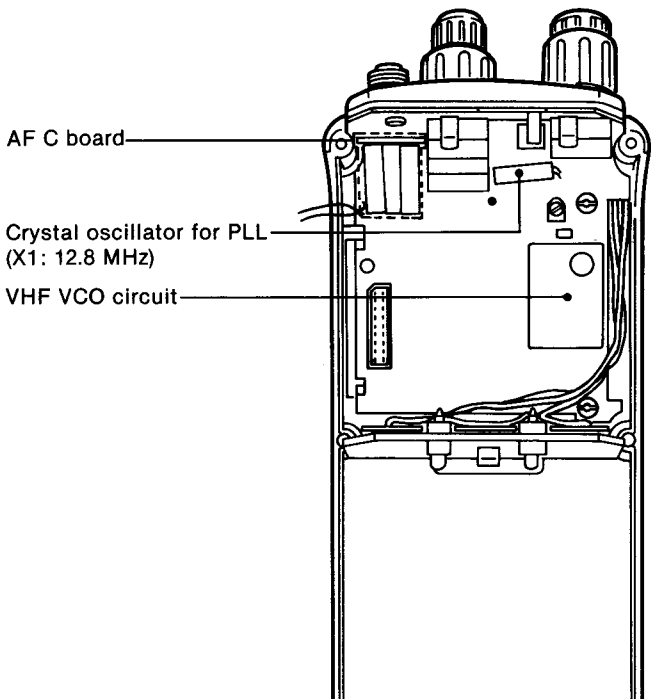


• LOGIC UNIT

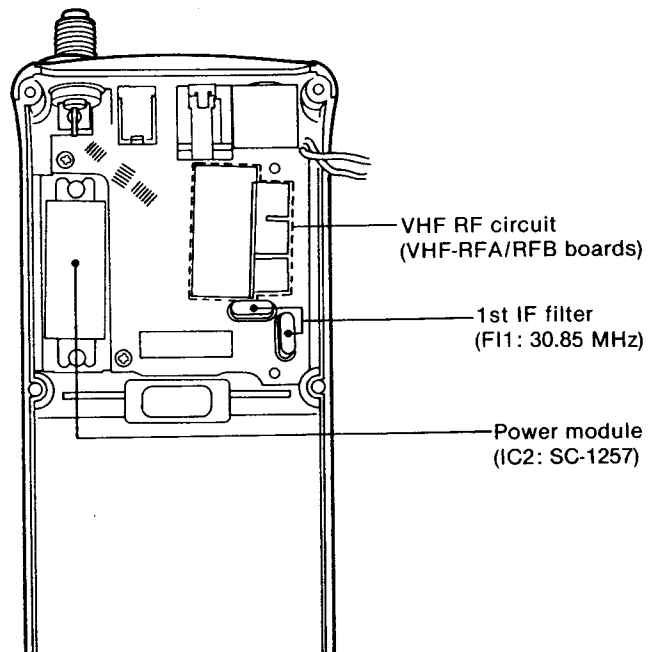


S21

• 2F UNIT



• 1F UNIT



SECTION 4 CIRCUIT DESCRIPTION

4-1 RECEIVER CIRCUITS

4-1-1 DUPLEXER CIRCUIT (1F UNIT) [IC-T21A/E only]

The IC-T21A/E has a duplexer (low-pass and high-pass filters) on the first stage from the antenna connector to separate the signals into VHF and UHF signals. The low-pass filter (L1-L3, C1-C5) for VHF signals and high-pass filter (C12-C16, L6, L7) for UHF signals. The separated signals are applied to each RF circuit.

4-1-2 VHF ANTENNA SWITCHING CIRCUIT (1F UNIT)

The antenna switching circuit functions as a low-pass filter while receiving and a resonator circuit while transmitting. The circuit does not allow transmit signals to enter receiver circuits.

Received signals pass through a low-pass filter to suppress out-of-band signals. The filtered signals are applied to the two-stage $\lambda/4$ type antenna switching circuit (D1, D20, D2, D12), and then to the VHF-RFA board.

4-1-3 VHF RF CIRCUIT (VHF-RFA/RFB BOARDS)

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

The signals from the antenna switching circuit pass through a band-pass filter (L1, D2) and are then applied to the RF amplifier (Q1, Q2). The amplified signals enter a two-stage band-pass filter (L2, L3, D4, D5, C12, C14, C16) to suppress unwanted signals. The filtered signals are applied to the VHF 1st mixer circuit on the 1F unit.

D2, D4 and D5 employ varactor diodes that track the band-pass filters and are controlled by the PLL lock voltage. The voltage is current amplified at Q13 on the 2F unit and is then applied to the varactor diodes. These diodes tune the center frequency of an RF passband for wide bandwidth receiving and good image response rejection.

4-1-4 VHF 1ST MIXER AND IF CIRCUITS (1F UNIT)

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

The signals from the VHF RF circuit are mixed at Q7 with the 1st LO signal coming from the 2F unit to produce a 30.85 MHz 1st IF signal. After passing through the matching circuit (L15), the 1st IF signal is applied to a pair of crystal filters (F11) to suppress out-of-band signals. The filtered signal is applied to a 1st IF amplifier (Q18), and then to the 3F unit through the 2F unit.

4-1-5 UHF RF CIRCUIT (1F UNIT) [IC-T21A/E only]

Received signals are divided between VHF signals and UHF signals at the duplexer.

The UHF signals are passed through a low-pass filter (L8, L9, C17-C19) to suppress out-of-band signals. The signals are then amplified at the RF amplifiers (Q1, Q2) and pass through a band-pass filter. The filtered signals are amplified at Q22, and applied to the UHF 1st mixer circuit.

4-1-6 UHF 1ST MIXER AND IF CIRCUITS (1F UNIT) [IC-T21A/E only]

The signals from the UHF RF circuit are mixed at Q21 with the 1st LO signal coming from the 2F unit to produce a 30.85 MHz 1st IF signal. The 1st IF signal is applied to a pair of crystal filters (F11) to suppress out-of-band signals. The filtered signal is applied to a 1st IF amplifier (Q18), and then to the 3F unit through the 2F unit.

4-1-7 2ND IF AND DEMODULATOR CIRCUITS (3F UNIT)

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

The 1st IF signal from the 1F unit is applied to the 2nd mixer section of IC1 (pin 16), and is mixed with the 2nd LO signal to be converted to a 455 kHz 2nd IF signal.

IC1 contains the 2nd mixer, local oscillator, limiter amplifier, quadrature detector and S-meter circuits. The local oscillator section and X1 generate 30.395 MHz for the 2nd LO signal.

The 2nd IF signal from the 2nd mixer (IC1, pin 3) passes through the ceramic filter (F11) where unwanted signals are suppressed. It is then amplified at the limiter amplifier section (IC1, pin 5) and applied to the quadrature detector section (IC1, pin 10 and ceramic discriminator X2) to demodulate the 2nd IF signal into AF signals.

AF signals output from IC1 (pin 9) are applied to the de-emphasis circuit (R10, C14). This de-emphasis circuit is an integrated circuit with frequency characteristics of -6 dB/octave. The resulting signals are applied to the AF amplifier (through BPF, AF mute switch, VOL), DTMF decoder (IC-T21A/E only) and TSQL unit (U.S.A. version only or optional UT-81).

• 2ND IF AND DEMODULATOR CIRCUITS

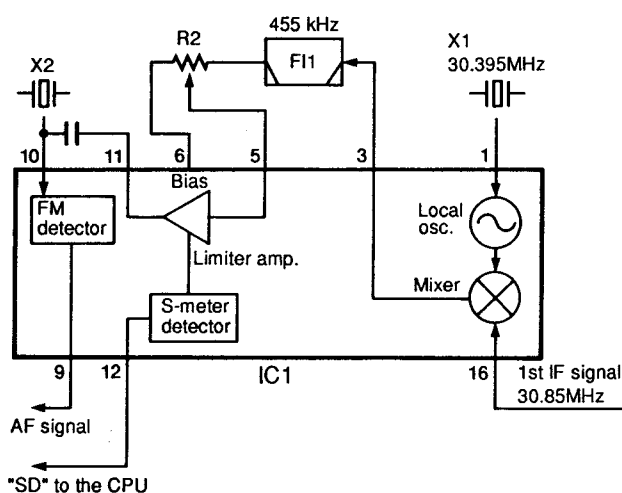


Fig. 1

4-1-8 AF AMP CIRCUIT (2F AND 3F UNITS)

The AF amplifier circuit, including an AF mute switch, amplifies the demodulated signal to drive a speaker.

AF signals are applied to Q5 and Q6 on the 3F unit. Q5 is an active filter that functions as a high-pass filter to suppress subaudible tone signals for tone squelch operation. Q6 is also an active filter that functions as a low-pass filter to suppress higher noise signals.

The filtered signal is applied to the [VOL] control (R15) on the 2F unit via the AF mute switch (IC3) on the 3F unit. When the squelch is closed, IC3 cuts the AF signal. The AF signal is power-amplified at the AF power amplifier (IC1) on the 2F unit to drive the speaker.

The voltage regulator (2F unit Q4, Q5) supplies power to the AF power amplifier. The AFON signal from the data expander (2F unit IC2) controls Q5 to reduce the current drain while the squelch is closed.

4-1-9 NOISE SQUELCH CIRCUIT (3F UNIT)

A noise squelch circuit cuts off AF signals when no RF signal is received. By detecting noise components in the AF signal, the squelch circuit switches the AF mute switch.

Some of the noise components in the AF signal from IC1 (pin 9) is applied to IC1 (pin 8) via C57. The [SQL] control (R15) on the 2F unit adjusts the pin 8 input level.

IC1 (pin 13) outputs the squelch signal. The signal is then applied to the CPU (IC1, pin 24) on the LOGIC unit through the BUSY signal line and the CPU outputs the RMUTE and BUSY LED signals.

The RMUTE signal activates the AF mute switch (IC3) to cut the AF signal. The BUSY LED signal is applied to Q9 on the LOGIC unit, turning OFF the RX indicator.

4-2 TRANSMITTER CIRCUITS

4-2-1 MICROPHONE AMPLIFIER (3F UNIT)

The microphone amplifier circuit amplifies audio signals with +6 dB/octave pre-emphasis from the microphone to a level needed for the modulation circuit.

The AF signals from the built-in condenser microphone, or from the [MIC] jack, are applied to IC9 (pin 16), and are pre-emphasized to +6 dB/octave. IC9 functions as the microphone amplifier and limiter.

The output signals from IC9 (pin 8) pass through the frequency deviation pot (R46) and are applied to the modulation circuit on the 2F unit.

4-2-2 MODULATION CIRCUIT (2F UNIT)

The modulation circuit modulates the VCO oscillating signal (RF signal) using the microphone audio signals.

The "MOD" signal changes the reactance of a varactor diode (D3) to modulate the oscillated signal at the VHF VCO circuit (Q14, Q15). The VCO output is buffer-amplified at Q17 and Q18, and is then applied to the transmit/receive switching circuit (D6, D7) on the 1F unit.

4-2-3 DRIVE AMPLIFIER (1F UNIT)

The drive amplifier circuit amplifies the VCO oscillating signal to the needed level at the power amplifier.

The signal from the transmit/receive switching circuit (D7) is amplified at the pre-drive amplifier (Q10) and is then re-amplified at the drive amplifier (Q11) to obtain approx. 15 mW.

An RF signal from the drive amplifier (Q11) passes through the output miser switching circuit (D8) and is then applied to the RF power amplifier.

When E LOW (output miser) is selected, the output of the drive amplifier (Q11) bypasses the RF power amplifier through D8-D10. The signal is passed through the π -filter, low-pass filter, and is then applied to the antenna connector. At this time, a half of the antenna switching circuit (D2) activates to prevent the output power from entering the receiver circuit.

4-2-4 RF POWER AMPLIFIER (1F UNIT)

IC2 is a power module which provides more than 6 W of output power with a 13.5 V DC power source.

An RF signal from the drive amplifier (Q11) is applied to IC2 (terminal PI). The amplified signal is output from terminal PO, and applied to the antenna connector through the APC detector, antenna switching circuit (D12) and low-pass filter.

4-2-5 APC CIRCUIT (1F UNIT)

The APC circuit protects the power module (IC2) from a mismatched output load and selects HIGH, LOW 3, LOW 2 or LOW 1 output power.

The output power level from the power module (IC2) is detected at the APC detector (L20, C56, C57, D13, D14). When antenna impedance is matched at 50 Ω , the detected level is at the minimum. However, when antenna impedance is mismatched, the detected voltage is higher than when matched.

When the antenna impedance is mismatched, the base voltage of Q15 (R41 side) is higher than the other base voltage of Q15 (R40 side, APC reference voltage). Q15 (R40 side) decreases the collector voltage of Q16. Collector current of Q16 is used at the power module (IC2) as VGG. Hence, when the antenna impedance is mismatched, the output power is decreased. A thermistor (R37) controls the base voltage of Q15 (R40 side, APC reference voltage) to reduce the output power when the temperature is increased.

The output power setting, except for E LOW, uses the APC circuit. The "PCON" voltage from the CPU (LOGIC unit IC1) shifts the reference voltage, selecting the four output power levels (HIGH, LOW 3, LOW 2 or LOW 1).

• APC CIRCUIT

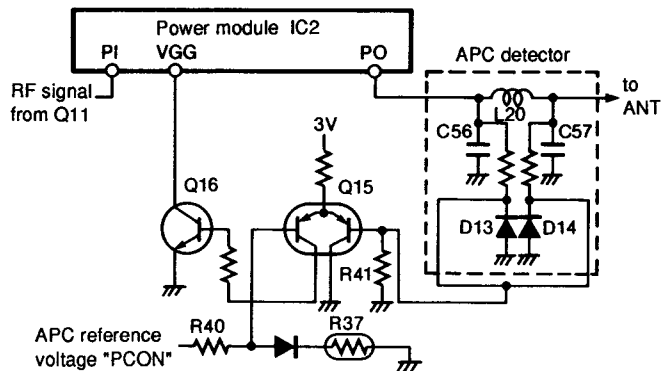


Fig. 2

4-3 PLL CIRCUITS

4-3-1 GENERAL (2F UNIT)

PLL circuits provide stable oscillation of the transmit frequency and the receive local frequency. The PLL circuit compares the phase of divided VCO frequency to the PLL reference signal. The PLL output frequency is controlled by a crystal oscillator and the divided ratio of the programmable divider.

The PLL circuit, using a one-chip PLL IC (IC3) that contains a dual modulus prescaler, a programmable divider, a phase detector and a charge pump, directly generates the transmit frequency and receive 1st LO frequency with a VCO. The PLL IC sets the divided ratio based on serial data from the CPU (LOGIC unit IC1) and compares the phases of a VCO signal and the PLL reference signal. The PLL IC detects the off-phase components and output them from pin 13 (from pin 8 for the IC-T21A/E UHF VCO).

4-3-2 REFERENCE OSCILLATOR CIRCUIT (2F UNIT)

12.8 MHz reference frequency is oscillated at the crystal oscillator (X1), and is input to IC3 (pin 15). The reference frequency is divided by 2560 to obtain 5 kHz (PLL reference signal).

4-3-3 VHF VCO CIRCUIT (2F UNIT)

VHF VCO circuit (Q14, Q15) generates the transmit frequency and the receive 1st LO frequency. The frequency shift signal "VSHIFT" from the data expander (IC2 pin 14) turns Q8 and D2 ON or OFF to switch the VCO frequency between transmitting and receiving.

The VCO generated signal is buffer-amplified at Q17, and is then applied to the transmit/receive switching circuit (1F unit D6, D7) through buffer circuit (Q18). The signal from Q17 is also applied to the programmable divider (IC3 pin 19) through buffer circuit (Q16).

4-3-4 UHF VCO CIRCUIT (UHF-VCO BOARD) [IC-T21A/E only]

UHF VCO circuit (Q1, Q2) generates the receive 1st LO frequency.

Output signal from the UHF-VCO board is buffer-amplified at Q10 on the 2F unit, and is then applied the UHF 1st mixer (1F unit Q21) through buffer circuit (2F unit Q11, Q12). The signal from Q10 is also applied to the programmable divider (IC3 pin 2) through buffer circuit (2F unit Q9).

4-3-5 PROGRAMMABLE DIVIDER AND PHASE DETECTOR CIRCUITS (2F UNIT)

The programmable divider in PLL IC (IC3) shifts the dividing ratio, depending on the operating frequency, with a prescaler and determines the VCO oscillating frequency.

The phase detector in PLL IC detects the off-phase components of the VCO frequency using the PLL reference signal (5 kHz) and outputs the out-of-phase signal (pulse signal) from pin 13 (for VHF) and pin 8 (for UHF).

4-3-6 LOOP FILTER CIRCUIT (2F UNIT)

The out-of-phase signal from IC3 (pins 13, 8) is converted to DC voltage by the lag-lead loop filter (R33, R34, C33, C34 for VHF; R18, R19, C12, C13 for UHF).

The converted DC voltage (PLL lock voltage) is applied to VCO circuits to control the oscillation. Q13 provides VHF RF circuit (band-pass filters on the VHF-RFA/RFB boards) tuning.

• PLL CIRCUIT

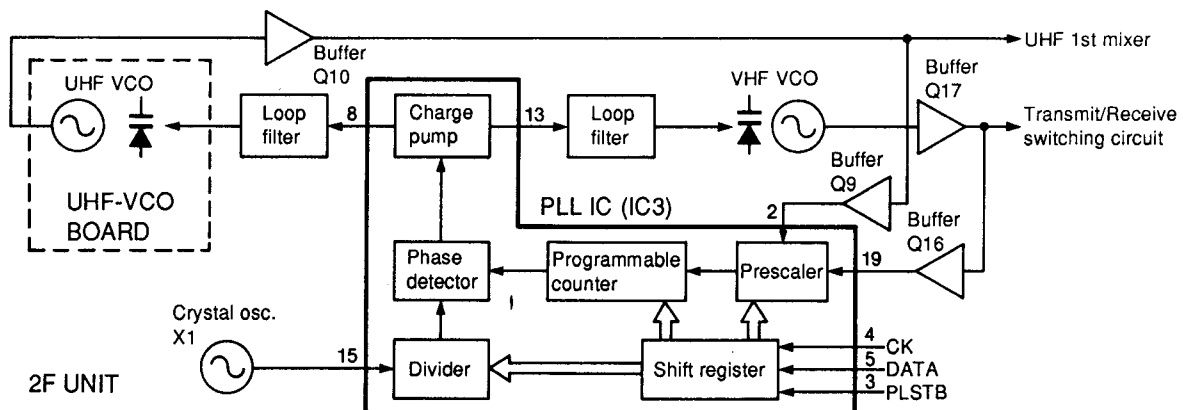


Fig. 3

4-4 POWER SUPPLY CIRCUITS

4-4-1 VOLTAGE LINES

LINE	DESCRIPTION
Vcc	The attached battery pack voltage or external DC power voltage.
+3	Continuous 3 V converted from the Vcc line at IC4 on the 3F unit. This voltage is supplied even when the power is turned OFF.
+3M	+3 V controlled by "PSC" and "SEND" signal lines. This voltage is supplied while the power saver is OFF or during transmitting. This voltage is converted from the Vcc line at Q11 and Q12 on the 3F unit using IC4 output as the reference voltage.
+3C	Common 3 V controlled by the CPU. This voltage is supplied during power ON. This voltage is converted from the Vcc line at Q6 and Q7 on the LOGIC unit.
+3S	+3 V controlled by "PSC" signal line. This voltage is supplied while the power saver is OFF. This voltage is converted from the Vcc line at Q9 and Q10 on the 3F unit using the AND gate (IC6) output as the reference voltage.
R +3	Receive 3 V controlled by "PSC" and "RCON" signal lines. This voltage is supplied while receiving and the power saver is OFF. This voltage is converted from the Vcc line at Q7 and Q8 on the 3F unit using the AND gate (IC7) output as the reference voltage.
3V	Transmit 3 V controlled by "TMUTE" signal line. This voltage is supplied during transmitting. This voltage is converted from the Vcc line at Q14 and Q13 on the 1F unit using "T3C" from the 3F unit as the reference voltage.
5V	+5 V converted from the +3M line at IC4 on the 2F unit.

4-4-2 CPU POWER SUPPLY CIRCUIT (LOGIC UNIT)

When no external power source is applied and the battery pack is discharged, voltage is applied to the CPU (IC1, pin 97) from the lithium backup battery (BT1) installed in the transceiver to keep the CPU on stand-by.

4-4-3 CHARGING CIRCUIT (PRT UNIT)

Current from the [DC13.5V] jack is applied to the constant current circuit (Q3, R2) through Q1 to charge an attached battery pack.

When a battery pack is attached, the current through D1 charges the attached battery pack. The charging current is determined by the battery pack internal resistance.

4-5 CPU PORT ALLOCATIONS

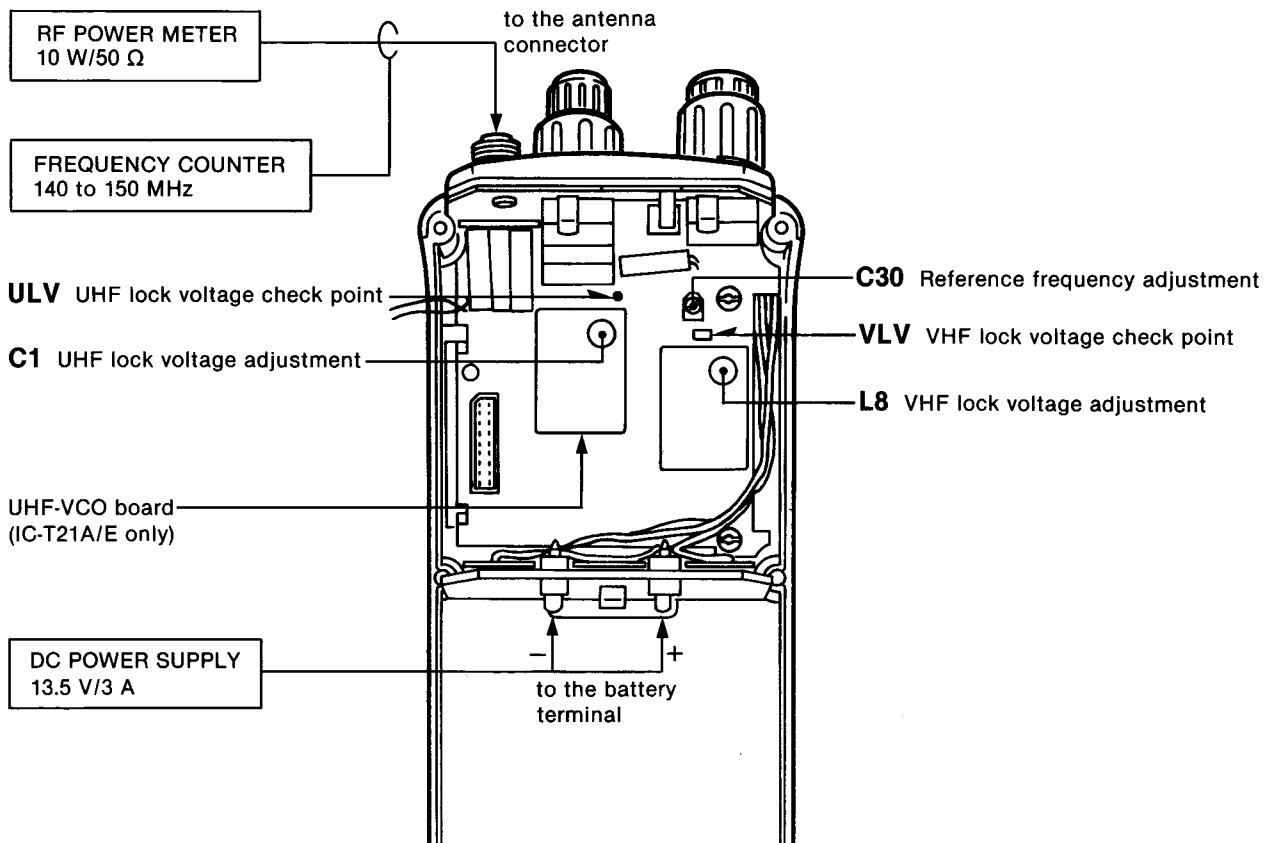
PIN NO.	PORT NAME	DESCRIPTION
1	AVCC	DC voltage input port
2	REMOTE	DATA input port from an optional HM-75
3	SD	S-meter level input port
4	BATT	Battery divided voltage input port
5	UL	PLL unlock signal input "LOW" when unlocked
8, 9	OSC1, OSC2	CPU clock oscillator terminals
10		Reset signal input port
11, 12	X1, X2	Oscillator terminals for clock indication
15	LIGHT O	Outputs LCD backlight control signal "LOW" for lighting
16	BUSYLED	Outputs RX LED control signal "LOW" for lighting
17	CE	Outputs DTMF enable signal
18	PD	Outputs DTMF standby signal
19	PSC	Outputs power save control signal
20	SEND	Outputs TX/RX switching signal "LOW" for transmission
22	TMUTE	Outputs transmit mute signal "HIGH" for mute
23	RMUTE	Outputs receive mute signal "HIGH" for mute
24	BUSY	Receive busy signal input port "LOW" when busy
25	INT0	[POWER] switch input port "LOW" when the switch is pushed
27-29	D CK, D UP, D DN	Used for tuning dial input ports
30	BEEP	Outputs beep tone signal
31	TONE	Outputs 1750 Hz tone call signal
34	KS0 (IOSTB)	Outputs a strobe signal for I/O expander IC (2F unit IC2) via IC5 (pins 9, 8)
35	KS1 (CK)	Outputs a clock signal via IC5 (pins 13, 11)
36	KS2 (PLSTB)	Outputs a strobe signal for PLL IC (2F unit IC3) via IC5 (pins 5, 6)
37	KS3 (DATA)	Outputs serial data for PLL IC, I/O expander, etc.
38	PTT	PTT switch input port "LOW" when the switch is pushed
39	FUNC	[FUNC] switch input port "LOW" when the switch is pushed
40	MONI	[MONI] switch input port "LOW" when the switch is pushed
41	LIGHTSW	[LIGHT] switch input port "LOW" when the switch is pushed
42-46	KR0-KR4	Key matrix input ports
47	DV	DTMF decoder input port "HIGH" when detecting a signal
48	TSQL	Tone squelch decoder input port "LOW" when detecting a signal
50, 51	POW1, POW2	Output selecting signal for transmit power
52-96	-	Used for driving the LCD
98, 99	DTMFC, DTMFR	Outputs DTMF signal

SECTION 5 ADJUSTMENT PROCEDURES


5-1 PLL ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
VHF LOCK VOLTAGE	1 <ul style="list-style-type: none"> • Displayed frequency: 145.00 MHz • Receiving or transmitting 	2F	Connect the digital multimeter or oscilloscope to VLV.	1.5 V (Set the voltage according to which has the lower voltage condition: transmit or receive.)	2F	L8
UHF LOCK VOLTAGE (IC-T21A/E only)	1 <ul style="list-style-type: none"> • Displayed frequency: 440.00 MHz (EUR, USA, AUS, SEA, ITA) 432.00 MHz (TPE, DEN) • Receiving 	2F	Connect the digital multimeter or oscilloscope to ULV.	1.7 V (EUR, USA, AUS, SEA, ITA) 1.5 V (TPE, DEN)	UHF-VCO BOARD	C1
REFERENCE FREQUENCY	1 <ul style="list-style-type: none"> • Displayed frequency: 145.00 MHz • Connect the RF power meter or a 50 Ω dummy load to the antenna connector. • Transmitting 	2F	Loosely couple the frequency counter to the antenna connector.	145.0000 MHz	2F	C30

• 2F UNIT

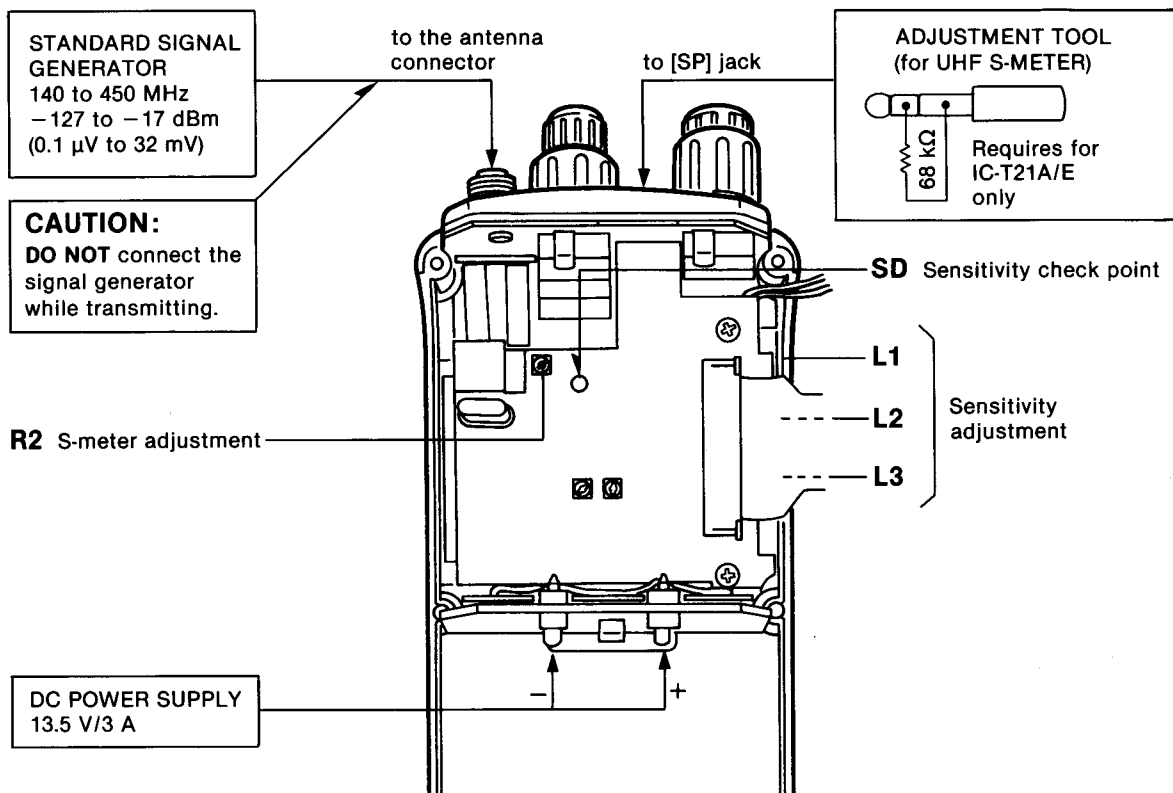


5-2 RECEIVER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
SENSITIVITY	1 <ul style="list-style-type: none"> • Displayed frequency: 145.00 MHz • [SQL] control : Max. CCW • Connect the SSG to the antenna connector and set as: <ul style="list-style-type: none"> Level : 0.32 μV^* (-117 dBm) Modulation: 1 kHz Deviation : ± 3.5 kHz • Receiving 	3F	Connect the DC voltmeter to SD.	Maximum	VHF-RFB BOARD	Adjust in sequence L1, L2, L3
S-METER	1 <ul style="list-style-type: none"> • Displayed frequency: 145.02 MHz • Connect the SSG to the antenna connector and set as: <ul style="list-style-type: none"> Level : 0.50 μV^* (-113 dBm) Modulation: 1 kHz Deviation : ± 3.5 kHz • Receiving 	Function display	S/R/F indicator	3 dots (S2) 	3F	R2
UHF S-METER (IC-T21A/E only)	1 <ul style="list-style-type: none"> • Operating frequency: <ul style="list-style-type: none"> 440.00 MHz (EUR, USA, AUS, SEA, ITA) 432.00 MHz (TPE, DEN) • Connect the SSG to the antenna connector and set as: <ul style="list-style-type: none"> Level : 0.50 μV^* (-113 dBm) Modulation: 1 kHz Deviation : ± 3.5 kHz • Connect a resistor (68 kΩ) to [MIC] connector as following diagram. • Receiving 	Push [FUNC] and [MONI] switches simultaneously. (UHF S-meter is adjusted automatically.)				

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

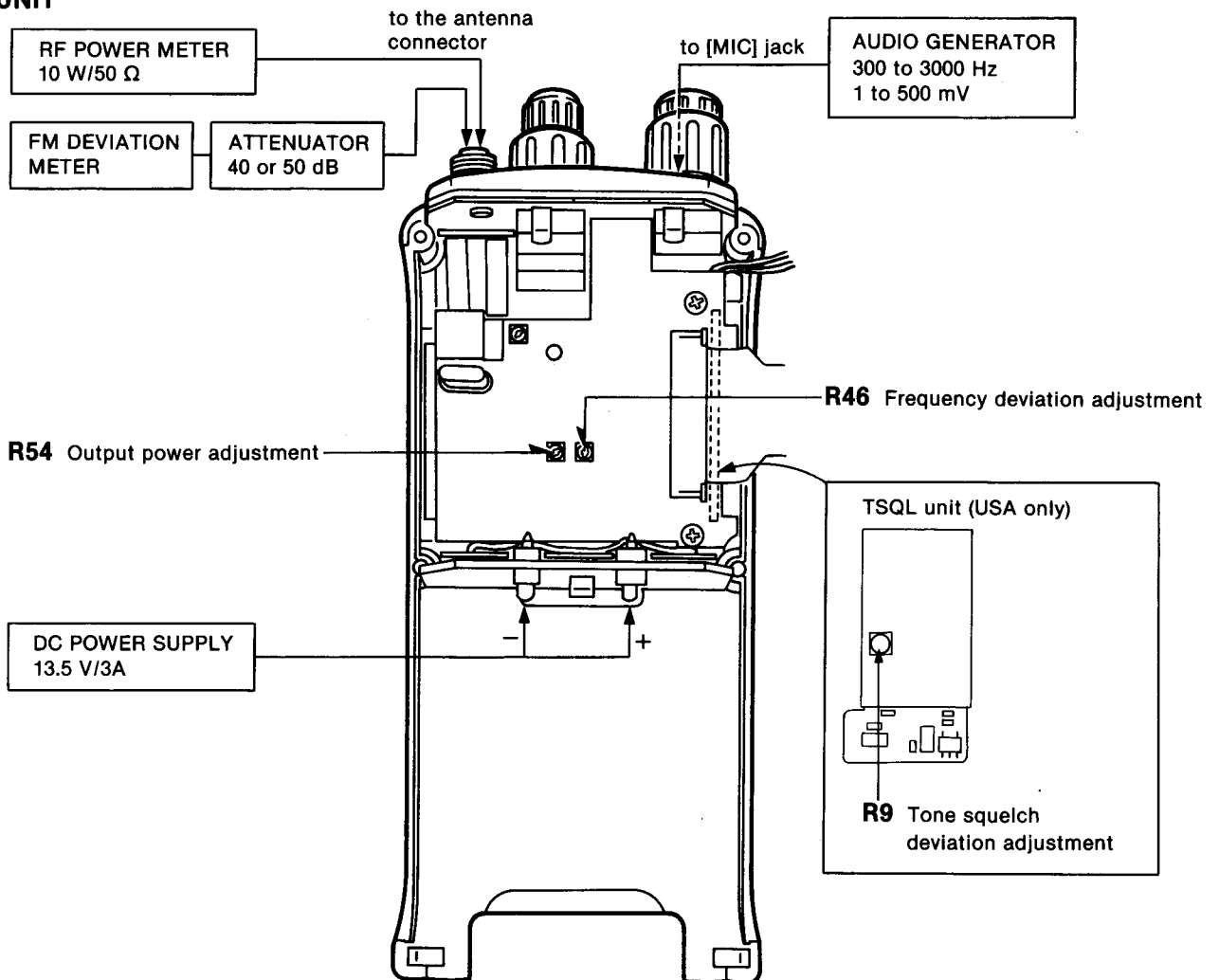
• 3F UNIT



5-3 TRANSMITTER ADJUSTMENT

ADJUSTMENT	ADJUSTMENT CONDITIONS	MEASUREMENT		VALUE	ADJUSTMENT POINT	
		UNIT	LOCATION		UNIT	ADJUST
OUTPUT POWER	1 <ul style="list-style-type: none"> • Displayed frequency: 145.00 MHz • Output power : HIGH • Transmitting 	Top panel	Connect the RF power meter to the antenna connector.	6.0 W	3F	R54
FREQUENCY DEVIATION	1 <ul style="list-style-type: none"> • Displayed frequency: 145.00 MHz • Output power : HIGH • Connect the audio generator to the [MIC] jack and set as: 170 mV/1.0 kHz (USA version) 85 mV/1.0 kHz (All other versions) • Set the FM deviation meter as: HPF : OFF LPF : 20 kHz De-emphasis: OFF Detector : (P-P)/2 • Simplex • Transmitting 	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	± 4.3 kHz	3F	R46
TONE SQUELCH (USA only)	1 <ul style="list-style-type: none"> • Displayed frequency: 145.00 MHz • Tone encoder : ON • Tone frequency : 88.5 Hz • Transmitting 	Top panel	Connect the FM deviation meter to the antenna connector via the attenuator.	0.75 kHz	TSQL	R9

• 3F UNIT



SECTION 6 PARTS LIST

[LOGIC UNIT] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140004190	S.IC	HD404629B15H
IC2	1110003380	S.IC	S-80730SL-AT-T1
IC3	1130003920	S.IC	TC4S69F (TE85R)
IC4	1130007200	S.IC	TC35305F(TP2)
IC5	1120002440	S.IC	TC74AC08FS(EL)
IC6	1190000260	S.IC	24LC08BTI/SN
Q1	1590001470	S.TRANSISTOR	UN9213(TX)
Q2	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q4	1590001840	S.TRANSISTOR	XN4601(TX)
Q6	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q7	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q8	1510000880	S.TRANSISTOR	2SA1622-6-TR
Q9	1590001830	S.TRANSISTOR	XN1117(TX)
Q10	1590001140	S.TRANSISTOR	UN9210(TX)
Q13	1590001130	S.TRANSISTOR	UN9110(TX)
Q14	1590001950	S.TRANSISTOR	UN9217(TX)
D1	1750000260	S.DIODE	1SS352 (TPH3)
D2	1750000260	S.DIODE	1SS352 (TPH3)
D3	1750000130	S.DIODE	DA204U T107
D4	1750000260	S.DIODE	1SS352 (TPH3)
D5	1790000820	S.DIODE	MA132K(TX)
D6	1790001200	S.DIODE	MA6S121(TX)
D7	1790001200	S.DIODE	MA6S121(TX)
D9	1790001200	S.DIODE	MA6S121(TX)
D10	1750000260	S.DIODE	1SS352 (TPH3)
D11	1750000260	S.DIODE	1SS352 (TPH3)
D12	1790000820	S.DIODE	MA132K(TX) (USA, TPE)
	1790000830	S.DIODE	MA132HK(TX) (EUR, AUS)
	1790000850	S.DIODE	MA132WK(TX) (DEN, SEA)
D13	1790000820	S.DIODE	MA132K(TX) (USA, AUS, SEA, ITA)
D14	1750000260	S.DIODE	1SS352 (TPH3)
D15	1790000820	S.DIODE	MA132K(TX)
D16	1790000860	S.DIODE	MA133(TX)
D17	1750000340	S.DIODE	1SS357 (TPHR3)
X1	6060000520	S.CERAMIC	CSAC2.00MGC200-TC
X2	60500008760	XTAL	CR-462 32.768KHz
X3	6060000150	S.CERAMIC	CSAC3.58MGC300CD
R1	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R2	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R3	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R4	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R5	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R6	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R7	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R9	7410000610	S.ARRAY	EXB-V4V 153JV (15 kΩ)
R10	7310003600	S.TRIMMER	EVM-1XSX50 B54 (503)
R11	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R12	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R13	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R14	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R15	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R16	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R17	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R18	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R19	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R21	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R22	7410000750	S.ARRAY	EXB-V4V 104JV (100 kΩ)
R23	7410000750	S.ARRAY	EXB-V4V 104JV (100 kΩ)
R24	7410000800	S.ARRAY	EXB-V8V 103JV (10 kΩ)
R25	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R26	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)

[LOGIC UNIT] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
R27	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R28	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R29	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
			(EUR, DEN, ITA)
R30	7310003600	S.TRIMMER	EVM-1XSX50 B54 (503)
			(EUR, DEN, ITA)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
			(EUR, DEN, ITA)
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R40	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R42	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R43	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R44	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R45	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R46	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R47	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R48	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R49	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R50	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R51	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R52	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R53	7030003880	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R54	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R55	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R56	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C1	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C2	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C3	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C4	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C5	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C6	4030007100	S.CERAMIC	C1608 CH 1H 560J-T-A
C7	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C8	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C9	4550006320	S.TANTALUM	ECST0JY475R
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C12	4550006220	S.TANTALUM	TEMSVA 0J 156M-8L
C13	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C14	4550006400	S.TANTALUM	ECST0JP225R
C21	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C23	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C24	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C25	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C27	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C28	4030010070	S.CERAMIC	C1608 X7S 1C 104K-T-A
C29	4550006150	S.TANTALUM	ECST1CY105R
C30	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C31	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C33	4030008560	S.CERAMIC	C1608 CH 1H 300J-T-A
C34	4030008560	S.CERAMIC	C1608 CH 1H 300J-T-A
SP1	2510000580	SPEAKER	EAS-2P104D
BT1	3020000240	LITHIUM	VL1220-1F5U
DS1	5030000970	LCD	LD-B5666J (E-5848)
DS2	5040001110	S.LED	SLM-23VMWS T97B
DS3	5040001790	S.LED	CL-170G-CD-T
DS4	5040001790	S.LED	CL-170G-CD-T
S1	2230000900	S.SWITCH	JPM1990-2013R [POWER]
S2	2260001680	S.SWITCH	SKQDPB
S3	2260001680	S.SWITCH	SKQDPB

S.=Surface mount

[3F UNIT] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003490	S.IC	TA31136FN(D,EL)
IC2	1130004200	S.IC	TC4S86F (TE85R)
IC3	1130004200	S.IC	TC4S86F (TE85R)
IC4	1110003480	S.IC	S-81330HG-KB-T1
IC5	1130004170	S.IC	TC4S01F (TE85R)
IC6	1130003760	S.IC	TC4S81F (TE85R)
IC7	1130003760	S.IC	TC4S81F (TE85R)
IC8	1130003760	S.IC	TC4S81F (TE85R)
IC9	1110003410	S.IC	μPC5023GR-043-GJG-T2
Q1	1590001920	S.TRANSISTOR	UN911F(TX)
Q2	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q3	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q4	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q5	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q6	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q7	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q8	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q9	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q10	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q11	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q12	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q13	1590001860	S.TRANSISTOR	UN9215(TX)
Q14	1590001130	S.TRANSISTOR	UN9110(TX)
Q15	1590001140	S.TRANSISTOR	UN9210(TX)
D1	1750000260	S.DIODE	1SS352 (TPH3)
D2	1750000260	S.DIODE	1SS352 (TPH3)
D3	1750000260	S.DIODE	1SS352 (TPH3)
F11	2020000980	CERAMIC	KBF-455PS-15A2C
X1	6050008920	XTAL	CR-457 UM-5 30.395160MHZ
X2	6070000130	DISCRI	CDBM455C24
R1	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R2	7310003740	S.TRIMMER	EVM-1XSX50 BE3 (222)
R3	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R4	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R5	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R6	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R7	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R8	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R9	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R10	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R11	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R12	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R13	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R14	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R15	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R16	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R17	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R18	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R19	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R20	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R21	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R22	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R23	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R24	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R25	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R26	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R27	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R28	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R29	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R30	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R32	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R33	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R34	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R36	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)

[3F UNIT] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
R37	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ) (USA)
	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ) (EUR, TPE, AUS, DEN, SEA, ITA)
R38	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R40	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R41	7030003690	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R42	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ) (USA, TPE, SEA, AUS)
	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ) (EUR, DEN, ITA)
R43	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ) (USA, TPE, SEA, AUS)
	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ) (EUR, DEN, ITA)
R44	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ) (USA, TPE, SEA, AUS)
	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ) (EUR, DEN, ITA)
R45	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R46	7310003630	S.TRIMMER	EVM-1XSX50 BQ4 (473)
R54	7310003580	S.TRIMMER	EVM-1XSX50 B15 (104)
R55	7030003800	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R57	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R58	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R59	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C1	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C2	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C3	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C5	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C6	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C7	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C8	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C11	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C12	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C13	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C14	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C15	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C16	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C17	4550006170	S.TANTALUM	ECST1AY225R
C18	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C19	4550006140	S.TANTALUM	ECST1EY474R
C20	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C21	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C22	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C23	4030008470	S.CERAMIC	C1608 JB 1H 272K-T-A
C24	4030009580	S.CERAMIC	C1608 JB 1H 681K-T-A
C25	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C26	4550006170	S.TANTALUM	ECST1AY225R
C27	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C28	4550006170	S.TANTALUM	ECST1AY225R
C29	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C30	4550006170	S.TANTALUM	ECST1AY225R
C31	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C32	4550006320	S.TANTALUM	ECST0JY475R
C33	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C34	4550006200	S.TANTALUM	ECST0JY106R
C35	4550006150	S.TANTALUM	ECST1CY105R
C36	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C37	4030008940	S.CERAMIC	C2012 JB 1C 683K-T-A
C38	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C39	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A (USA)
	4030008860	S.CERAMIC	C1608 JB 1C 153K-T-A (EUR, TPE, AUS, DEN, SEA, ITA)
C40	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C41	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C42	4550006300	S.TANTALUM	ECST1AY475R
C43	4550006200	S.TANTALUM	ECST0JY106R

S.=Surface mount

T21

[3F UNIT] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
C44	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C45	4550006150	S.TANTALUM	ECST1CY105R
C47	4550006150	S.TANTALUM	ECST1CY105R
C48	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A (USA, TPE, SEA, AUS)
	4030006880	S.CERAMIC	C1608 JB 1H 472K-T-A (EUR, DEN, ITA)
C49	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A (USA, TPE, SEA, AUS)
	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A (EUR, DEN, ITA)
C50	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A (USA, TPE, SEA, AUS)
	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A (EUR, DEN, ITA)
C51	4030009970	S.CERAMIC	C1608 JB 1H 182K-T-A
C52	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C53	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C54	4030008830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C55	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C56	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C57	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C58	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
J1	6510016040	S.CONNECTOR	52357-2490
J2	6510016150	S.CONNECTOR	53309-1091
J3	6510014450	S.CONNECTOR	52204-2990
EP1	0910039826	PCB	B 3953F

[UHF-VCO BOARD] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q2	1530002920	S.TRANSISTOR	2SC4226-T2 R25
D1	1720000370	S.VARICAP	HVU350TRF
D2	1720000370	S.VARICAP	HVU350TRF
L1	6200001520	S.COIL	MLF2012D R82K-T
L2	6200002320	S.COIL	LQN 1A 8N8J04
R1	7030003240	S.RESISTOR	ERJ3GEYJ 220 V (22 Ω)
R2	7030003330	S.RESISTOR	ERJ3GEYJ 121 V (120 Ω)
R3	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R4	7030003330	S.RESISTOR	ERJ3GEYJ 121 V (120 Ω)
R5	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C1	4610001880	S.TRIMMER	CTZ3E-03A-W1
C2	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A
C3	4030006920	S.CERAMIC	C1608 CH 1H 010C-T-A
C4	4030006920	S.CERAMIC	C1608 CH 1H 010C-T-A
C5	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C6	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C7	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C8	4030006910	S.CERAMIC	C1608 CH 1H 0R5C-T-A
J1	6910008020	CONNECTOR	IPS-1323
J2	6910008020	CONNECTOR	IPS-1323
J3	6910008020	CONNECTOR	IPS-1323
EP1	0910039812	PCB	B 3922B

[16KEY UNIT] (IC-T21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1790000990	S.ZENER	MA8051-H(TX)
C1	1730002320	S.ZENER	MA8051-M(TX)
C101	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
MC101	7700001570	MICROPHONE	KUF3323-010010
EP3	0910039923	FPC	B 3969C

[PRT UNIT] (IC-T21A/E, IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q2	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q3	1590001930	S.TRANSISTOR	IMX2 T108
Q4	1590001730	S.TRANSISTOR	UN9113(TX)*
D1	1750000130	S.DIODE	DA204U T107
D2	1790001030	S.DIODE	SB30-03P-TD
D3	1790000840	S.DIODE	MA132WA(TX)
R1	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R2	7030000080	S.RESISTOR	MCR10EZHZ 3.3 Ω (3R3)
C1	4030008830	S.CERAMIC	C1608 JF 1C 104Z-T-A
C2	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C3	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C5	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C6	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
W1	7030003860	S.JUMPER	ERJ3GE JPW V
EP1	0910039862	PCB	B 3971B

[AF C BOARD] (IC-T21A/E, IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
C1	4510005610	ELECTROLITIC	ECA 0JG 101X
C2	4510005610	ELECTROLITIC	ECA 0JG 101X
C3	4510005610	ELECTROLITIC	ECA 0JG 101X
EP1	0910039851	PCB	B 3966A

[VHF-RFA BOARD] (IC-T21A/E, IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
Q1	1530003170	S.TRANSISTOR	2SC4863-4-TR
Q2	1530002560	S.TRANSISTOR	2SC4403-3-TR
D1	1790000620	S.DIODE	MA77(TW)
D2	1720000370	S.VARICAP	HVU350TRF
D3	1790000620	S.DIODE	MA77(TW)
D4	1720000370	S.VARICAP	HVU350TRF
D5	1720000370	S.VARICAP	HVU350TRF
D6	1790000620	S.DIODE	MA77(TW)
D7	1790000980	S.DIODE	MA742(TX)
R1	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R2	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R3	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)

S.=Surface mount

[VHF-RFA BOARD] (IC-T21A/E, IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
R4	7030003260	S.RESISTOR	ERJ3GEYJ 330 V (33 Ω)
R5	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 kΩ)
R6	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R7	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R8	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R9	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R10	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R11	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R12	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C1	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C2	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C3	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C4	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C5	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C6	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C7	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C8	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030007000	S.CERAMIC	C1608 CH 1H 090D-T-A
C12	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C13	4030006900	S.CERAMIC	C1608 CH 1H 050C-T-A
C14	4030009570	S.CERAMIC	C1608 CH 1H 0R3B-T-A
C15	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C16	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C17	4030007020	S.CERAMIC	C1608 CH 1H 120J-T-A
EP1	6910003420	LEADFRAM	AR1.27-0.7-12.3
EP2	0910039783	PCB	B 3919C

[TSQL UNIT] (USA version only)

REF. NO.	ORDER NO.	DESCRIPTION	
C5	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C6	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C7	4550006320	S.TANTALUM	ECST0JY475R
C8	4550006150	S.TANTALUM	ECST1CY105R
C9	4550006150	S.TANTALUM	ECST1CY105R
C10	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C11	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C12	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C13	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C14	4030007090	S.CERAMIC	C1608 CH 1H 470J-T-A
C15	4550006150	S.TANTALUM	ECST1CY105R
J1	6510016380	S.CONNECTOR	52465-1091
EP1	0910040052	PCB	B 3979B

[LOGIC UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1140004140	S.IC	HD404629B27H
IC2	1110003380	S.IC	S-80730SL-AT-T1
IC3	1130003920	S.IC	TC4S69F (TE85R)
IC5	1120002440	S.IC	TC74AC08FS(EL)
IC6	1190000260	S.IC	24LC08BTI/SN
Q1	1590001470	S.TRANSISTOR	UN9213(TX)
Q2	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q4	1590001840	S.TRANSISTOR	XN4601(TX)
Q6	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q7	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q8	1510000880	S.TRANSISTOR	2SA1622-6-TR
Q9	1590001830	S.TRANSISTOR	XN1117(TX)
Q10	1590001140	S.TRANSISTOR	UN9210(TX)
Q13	1590001130	S.TRANSISTOR	UN9110(TX)
D1	1750000260	S.DIODE	1SS352 (TPH3)
D2	1750000260	S.DIODE	1SS352 (TPH3)
D3	1750000130	S.DIODE	DA204U T107
D4	1750000260	S.DIODE	1SS352 (TPH3)
D5	1790000820	S.DIODE	MA132K(TX)
D7	1790001200	S.DIODE	MA6S121(TX)
D9	1790001200	S.DIODE	MA6S121(TX)
D10	1750000260	S.DIODE	1SS352 (TPH3)
D11	1750000260	S.DIODE	1SS352 (TPH3)
D12	1790000820	S.DIODE	MA132K(TX) (USA, TPE)
	1790000830	S.DIODE	MA132HK(TX) (EUR, AUS)
	1790000850	S.DIODE	MA132WK(TX) (SEA)
D13	1790000820	S.DIODE	MA132K(TX) (USA, AUS, SEA, ITA)
D14	1750000260	S.DIODE	1SS352 (TPH3)
D15	1790000820	S.DIODE	MA132K(TX)
D17	1750000340	S.DIODE	1SS357 (TPHR3)
X1	6060000520	S.CERAMIC	CSAC2.00MGC200-TC
X2	6050008760	XTAL	CR-462 32.768KHz
R1	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R2	7030003670	S.RESISTOR	ERJ3GEYJ 823 V (82 kΩ)
R3	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R4	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R5	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R6	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R7	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R13	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)

[VHF-RFB BOARD] (IC-T21A/E, IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
L1	6150003120	COIL	LS-321
L2	6150003120	COIL	LS-321
L3	6150003430	COIL	LS-378
EP1	0910039793	PCB	B 3920C

[TSQL UNIT] (USA version only)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1130003920	S.IC	TC4S69F (TE85R)
IC2	1130007220	S.IC	AK2341-T
X1	6050008720	XTAL	CR-446 AT-38 3.6864MHz
R1	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)
R2	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R3	7030003580	S.RESISTOR	ERJ3GEYJ 153 V (15 kΩ)
R4	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R5	7030003730	S.RESISTOR	ERJ3GEYJ 274 V (270 kΩ)
R6	7030003530	S.RESISTOR	ERJ3GEYJ 562 V (5.6 kΩ)
R7	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
R8	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R9	7310003600	S.TRIMMER	EVM-1XSX50 B54 (503)
R10	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R11	7030003700	S.RESISTOR	ERJ3GEYJ 154 V (150 kΩ)
R12	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R13	7030003770	S.RESISTOR	ERJ3GEYJ 564 V (560 kΩ)
R14	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 kΩ)
C1	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C2	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C3	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C4	4550006200	S.TANTALUM	ECST0JY106R

S.=Surface mount

[LOGIC UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
R14	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R15	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R16	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 k Ω)
R17	7030003410	S.RESISTOR	ERJ3GEYJ 561 V (560 Ω)
R18	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 k Ω)
R19	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R21	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
R22	7410000750	S.ARRAY	EXB-V4V 104JV (100 k Ω)
R23	7410000750	S.ARRAY	EXB-V4V 104JV (100 k Ω)
R24	7410000800	S.ARRAY	EXB-V8V 103JV (10 k Ω)
R25	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R26	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R27	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R28	7030003340	S.RESISTOR	ERJ3GEYJ 151 V (150 Ω)
R29	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 k Ω)
R30	7310003600	S.TRIMMER	EVM-1XSX50 B54 (503) (EUR, ITA)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω) (EUR, ITA)
R38	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R39	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R40	7030003620	S.RESISTOR	ERJ3GEYJ 333 V (33 k Ω)
R42	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R43	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R44	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R45	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 k Ω)
R46	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R47	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R48	7030003640	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R49	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 M Ω)
R50	7030003600	S.RESISTOR	ERJ3GEYJ 223 V (22 k Ω)
R51	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 k Ω)
R52	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
R53	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 k Ω)
R55	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 k Ω)
R56	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 k Ω)
C1	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C2	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C3	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C4	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C5	4030007060	S.CERAMIC	C1608 CH 1H 270J-T-A
C6	4030007100	S.CERAMIC	C1608 CH 1H 580J-T-A
C7	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C8	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C9	4550006320	S.TANTALUM	ECST0JY475R
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C12	4550006220	S.TANTALUM	TEMSVA 0J 156M-8L
C13	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C14	4550006400	S.TANTALUM	ECST0JP225R
C21	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C23	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C24	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C25	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C29	4550006150	S.TANTALUM	ECST1CY105R
C30	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C31	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C32	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
SP1	2510000580	SPEAKER	EAS-2P104D
BT1	3020000240	LITHIUM	VL1220-1F5U
S1	2230000900	S.SWITCH	JPM1990-2013R [POWER]
S2	2260001680	S.SWITCH	SKQDPB
S3	2260001680	S.SWITCH	SKQDPB
S4	2260001680	S.SWITCH	SKQDPB
S201	2260001680	S.SWITCH	SKQDPB

[LOGIC UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
EP2	0910042060	PCB	B 4184 (LOGIC)
EP5	0910039944	FPC	B 3972D (Flexible cable LOGIC-3F)
EP6	8930030370	LCD CONTACT	SRCN-1388 SG
EP204	0910039931	FPC	B 3970A (PTT)
DS1	5030001110	LCD	LD-BU5717J (E-5848-1)
DS2	5040001110	S.LED	SLM-23VMWS T97B
DS3	5040001790	S.LED	CL-170G-CD-T
DS4	5040001790	S.LED	CL-170G-CD-T

[1F UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003370	S.IC	μ PC2748T-E3
IC2	1150001370	IC	SC-1257
Q1	1530002940	S.TRANSISTOR	2SC4228-T2 R44
Q4	1590001680	S.TRANSISTOR	XP1110(TX)
Q5	1590001680	S.TRANSISTOR	XP1110(TX)
Q6	1590001140	S.TRANSISTOR	UN9210(TX)
Q7	1560000550	S.FET	2SK882-Y (TE85R)
Q8	1590001670	S.TRANSISTOR	XP4316(TX)
Q9	1590001850	S.TRANSISTOR	UN9116(TX)
Q10	1530002570	S.TRANSISTOR	2SC4405-3-TR
Q11	1530003170	S.TRANSISTOR	2SC4863-4-TR
Q12	1590001960	S.TRANSISTOR	XP4311(TX)
Q13	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q14	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q15	1590001160	S.TRANSISTOR	XP1401-(TX).AB
Q16	1530003000	S.TRANSISTOR	2SC4117-BL (TE85R)
Q17	1540000350	S.TRANSISTOR	2SD2216-S(TX)
Q18	1530002600	S.TRANSISTOR	2SC4215-O (TE85R)
Q20	1590001130	S.TRANSISTOR	UN9110(TX)
Q21	1530002560	S.TRANSISTOR	2SC4403-3-TR
D1	1790000620	S.DIODE	MA77(TW)
D2	1790000620	S.DIODE	MA77(TW)
D6	1790000620	S.DIODE	MA77(TW)
D7	1790000620	S.DIODE	MA77(TW)
D8	1750000380	S.DIODE	1SS364(TE85L)
D9	1790000620	S.DIODE	MA77(TW)
D10	1790000620	S.DIODE	MA77(TW)
D12	1790000620	S.DIODE	MA77(TW)
D13	1720000360	S.DIODE	HSU88TRF
D14	1720000360	S.DIODE	HSU88TRF
D15	1750000260	S.DIODE	1SS352 (TPH3)
D16	1750000260	S.DIODE	1SS352 (TPH3)
D17	1790001030	S.DIODE	SB30-03P-TD
D18	1750000260	S.DIODE	1SS352 (TPH3)
D19	1750000260	S.DIODE	1SS352 (TPH3)
D20	1790000620	S.DIODE	MA77(TW)
D26	1750000260	S.DIODE	1SS352 (TPH3)
F11	2010001610	MONOLITH	FL-202 UM-5 30.850MHz
L1	6110002070	COIL	LA-227
L2	6110002120	COIL	LA-228
L3	6110002120	COIL	LA-228
L4	6200002670	S.COIL	LL2012-F47NK
L5	6200002670	S.COIL	LL2012-F47NK
L6	6200002460	S.COIL	LL2012-F18NK
L7	6200002460	S.COIL	LL2012-F18NK
L8	6200002440	S.COIL	LL2012-F10NK
L9	6200002460	S.COIL	LL2012-F18NK
L11	6200002450	S.COIL	LL2012-F15NK
L15	6200000860	S.COIL	LQH 3N 1R8M
L16	6200001630	S.COIL	ELJNC R10K-F

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S.=Surface mount

[2F UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110002810	S.IC	NJM2070M-T1
IC2	1150001100	S.IC	M66321GP-30AD
IC3	1130007480	S.IC	μ PD3140GS-E1 (DS5)
IC4	1180000850	S.IC	RH5RC501A-T1
Q1	1510000880	S.TRANSISTOR	2SA1622-6-TR
Q2	1590001470	S.TRANSISTOR	UN9213(TX)
Q4	1520000650	S.TRANSISTOR	2SB1201-S-TR
Q5	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q6	1590001130	S.TRANSISTOR	UN9110(TX)
Q8	1590001140	S.TRANSISTOR	UN9210(TX)
Q13	1560000540	S.FET	2SK880-Y (TE85R)
Q14	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q15	1530002920	S.TRANSISTOR	2SC4226-T2 R25
Q16	1530002560	S.TRANSISTOR	2SC4403-3-TR
Q17	1530002560	S.TRANSISTOR	2SC4403-3-TR
Q18	1530002560	S.TRANSISTOR	2SC4403-3-TR
Q19	1590001970	S.TRANSISTOR	UN921E(TX)
Q20	1590001970	S.TRANSISTOR	UN921E(TX)
Q21	1590001970	S.TRANSISTOR	UN921E(TX)
Q22	1590001910	S.TRANSISTOR	UN911D(TX)
Q23	1590001910	S.TRANSISTOR	UN911D(TX)
D1	1790000660	S.DIODE	MA728(TW)
D2	1790000620	S.DIODE	MA77(TW)
D3	1720000370	S.VARICAP	HVU350TRF
X1	6050008730	XTAL	CR-456 CA-303H 12.8 MHZ
L5	6190000690	S.COIL	S152111
L6	6200003620	S.COIL	LQH 3C 331K04
L7	6200001520	S.COIL	MLF2012D R82K-T
L8	6110003000	COIL	LA-486
L9	6200002520	S.COIL	ELJNC R18K-F
L10	6200003300	S.COIL	ELJNC R22K-F
L11	6200003620	S.COIL	LQH 3C 331K04
R1	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R2	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R3	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R4	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R5	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R6	7030003490	S.RESISTOR	ERJ3GEYJ 272 V (2.7 kΩ)
R7	7030003200	S.RESISTOR	ERJ3GEYJ 100 V (10 Ω)
R10	7030003570	S.RESISTOR	ERJ3GEYJ 123 V (12 kΩ)
R11	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R12	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R13	7030003450	S.RESISTOR	ERJ3GEYJ 122 V (1.2 kΩ)
R14	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R15	7210002330	VARIABLE	TP96D0014F10K 10KA [VOL/SQL]
R16	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R32	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R33	7030003470	S.RESISTOR	ERJ3GEYJ 182 V (1.8 kΩ)
R34	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R35	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R36	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R37	7030003720	S.RESISTOR	ERJ3GEYJ 224 V (220 kΩ)
R38	7030003280	S.RESISTOR	ERJ3GEYJ 470 V (47 Ω)
R39	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R40	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R41	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R42	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R43	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R44	7030003310	S.RESISTOR	ERJ3GEYJ 820 V (82 Ω)
R45	7030003360	S.RESISTOR	ERJ3GEYJ 221 V (220 Ω)
R46	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R47	7030003330	S.RESISTOR	ERJ3GEYJ 121 V (120 Ω)
R48	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R49	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)
R50	7030003220	S.RESISTOR	ERJ3GEYJ 150 V (15 Ω)

[2F UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
R51	7030003650	S.RESISTOR	ERJ3GEYJ 563 V (56 kΩ)
R52	7030003330	S.RESISTOR	ERJ3GEYJ 121 V (120 Ω)
R53	7030003610	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ)
R54	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R55	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R56	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R57	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R58	7030003760	S.RESISTOR	ERJ3GEYJ 474 V (470 kΩ)
R60	7030003380	S.RESISTOR	ERJ3GEYJ 331 V (330 Ω)
C1	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C2	4550006150	S.TANTALUM	ECST1CY105R
C3	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C4	4550006160	S.TANTALUM	ECST1CY155R
C5	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C6	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C7	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C9	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C11	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C26	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C27	4550006110	S.TANTALUM	TEMSVB2 0J 336M8L
C28	4550006220	S.TANTALUM	TEMSVA 0J 156M-8L
C29	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C30	4610001910	S.TRIMMER	CTZ3E-10A-W1
C31	4030007010	S.CERAMIC	C1608 CH 1H 100D-T-A
C32	4030007070	S.CERAMIC	C1608 CH 1H 330J-T-A
C33	4550006380	S.TANTALUM	ECST1AY225KR
C34	4550000530	S.TANTALUM	TESVA 1V 104M1-8L
C35	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C36	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C37	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C38	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C39	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C40	4030006920	S.CERAMIC	C1608 CH 1H 010C-T-A
C41	4030006920	S.CERAMIC	C1608 CH 1H 010C-T-A
C42	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C43	4030006920	S.CERAMIC	C1608 CH 1H 010C-T-A
C44	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C45	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C46	4030006930	S.CERAMIC	C1608 CH 1H 020C-T-A
C47	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C48	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C49	4030007050	S.CERAMIC	C1608 CH 1H 220J-T-A
C50	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C51	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C52	4030006940	S.CERAMIC	C1608 CH 1H 030C-T-A
C53	4030006970	S.CERAMIC	C1608 CH 1H 060D-T-A
C54	4550006110	S.TANTALUM	TEMSVB2 0J 336M8L
C55	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C56	4550006340	S.TANTALUM	ECST1AY335R
C57	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C58	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C59	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C60	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C61	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C62	4550006220	S.TANTALUM	TEMSVA 0J 156M-8L
C63	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C64	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
W1	7030003860	S.JUMPER	ERJ3GE JPW V
W3	7030003860	S.JUMPER	ERJ3GE JPW V
W4	7030003860	S.JUMPER	ERJ3GE JPW V
J1	6510016050	S.CONNECTOR	52357-2690
J2	6510016080	S.CONNECTOR	53281-2490
S1	7600000160	ENCODER	TP90N00E2014F [DIAL]
EP1	0910042011	PCB	B 4167A (2F)
EP2	0910042171	PCB	B 3964A (VOL/SQL)
EP3	0910042181	PCB	B 3965A (DIAL)

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S.=Surface mount

[3F UNIT] (IC-S21A/E)

[3F UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
IC1	1110003490	S.IC	TA31136FN(D,EL)
IC2	1130004200	S.IC	TC4S66F (TE85R)
IC3	1130004200	S.IC	TC4S66F (TE85R)
IC4	1110003480	S.IC	S-81330HG-KB-T1
IC5	1130004170	S.IC	TC4S01F (TE85R)
IC6	1130003760	S.IC	TC4S81F (TE85R)
IC7	1130003760	S.IC	TC4S81F (TE85R)
IC8	1130003760	S.IC	TC4S81F (TE85R)
IC9	1110003410	S.IC	μPC5023GR-043-GJG-T2
Q1	1590001920	S.TRANSISTOR	UN911F(TX)
Q2	1590001170	S.TRANSISTOR	XP1501-(TX).AB
Q3	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q4	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q5	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q6	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q7	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q8	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q9	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q10	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q11	1520000460	S.TRANSISTOR	2SB1132 T100 R
Q12	1530003180	S.TRANSISTOR	2SC4211-7-TR
Q13	1590001860	S.TRANSISTOR	UN9215(TX)
Q14	1590001130	S.TRANSISTOR	UN9110(TX)
Q15	1590001140	S.TRANSISTOR	UN9210(TX)
D1	1750000260	S.DIODE	1SS352 (TPH3)
D2	1750000260	S.DIODE	1SS352 (TPH3)
D3	1750000260	S.DIODE	1SS352 (TPH3)
F11	2020000980	CERAMIC	KBF-455PS-15A2C
X1	6050009100	XTAL	CR-484 UM-5 30.395MHZ
X2	6070000130	DISCRI	CDBM455C24
R1	7030003510	S.RESISTOR	ERJ3GEYJ 392 V (3.9 kΩ)
R2	7310003740	S.TRIMMER	EVM-1XSX50 BE3 (222)
R3	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R4	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R5	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R6	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R7	7030003500	S.RESISTOR	ERJ3GEYJ 332 V (3.3 kΩ)
R8	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R9	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R10	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R11	7030003460	S.RESISTOR	ERJ3GEYJ 152 V (1.5 kΩ)
R12	7030003640	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ)
R13	7030003660	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R14	7030003350	S.RESISTOR	ERJ3GEYJ 181 V (180 Ω)
R15	7030003440	S.RESISTOR	ERJ3GEYJ 102 V (1 kΩ)
R16	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R17	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R18	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R19	7030003800	S.RESISTOR	ERJ3GEYJ 105 V (1 MΩ)
R20	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R21	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)
R22	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ)
R23	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R24	7030003750	S.RESISTOR	ERJ3GEYJ 394 V (390 kΩ)
R25	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R26	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R27	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R28	7030003630	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ)
R29	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R30	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R31	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R32	7030003560	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
R33	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R34	7030003680	S.RESISTOR	ERJ3GEYJ 104 V (100 kΩ)
R36	7030003550	S.RESISTOR	ERJ3GEYJ 822 V (8.2 kΩ)

REF. NO.	ORDER NO.	DESCRIPTION	
R37	7030003810	S.RESISTOR	ERJ3GEYJ 273 V (27 kΩ) (EUR, AUS, SEA, ITA, TPE)
	7030003850	S.RESISTOR	ERJ3GEYJ 583 V (56 kΩ) (USA)
R38	7030003710	S.RESISTOR	ERJ3GEYJ 184 V (180 kΩ)
R40	7030003410	S.RESISTOR	ERJ3GEYJ 581 V (580 Ω)
R41	7030003890	S.RESISTOR	ERJ3GEYJ 124 V (120 kΩ)
R42	7030003830	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ) (USA, AUS, SEA, TPE)
	7030003590	S.RESISTOR	ERJ3GEYJ 183 V (18 kΩ) (EUR, ITA)
R43	7030003830	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ) (USA, AUS, SEA, TPE)
	7030003840	S.RESISTOR	ERJ3GEYJ 473 V (47 kΩ) (EUR, ITA)
R44	7030003830	S.RESISTOR	ERJ3GEYJ 393 V (39 kΩ) (USA, AUS, SEA, TPE)
	7030003850	S.RESISTOR	ERJ3GEYJ 583 V (56 kΩ) (EUR, ITA)
R45	7030003880	S.RESISTOR	ERJ3GEYJ 683 V (68 kΩ)
R46	7310003830	S.TRIMMER	EVM-1XSX50 BQ4 (473)
R54	7310003580	S.TRIMMER	EVM-1XSX50 B15 (104)
R55	7030003520	S.RESISTOR	ERJ3GEYJ 472 V (4.7 kΩ)
R57	7030003400	S.RESISTOR	ERJ3GEYJ 471 V (470 Ω)
R58	7030003740	S.RESISTOR	ERJ3GEYJ 334 V (330 kΩ)
R59	7030003580	S.RESISTOR	ERJ3GEYJ 103 V (10 kΩ)
C1	4030006980	S.CERAMIC	C1608 CH 1H 070D-T-A
C2	4030007030	S.CERAMIC	C1608 CH 1H 150J-T-A
C3	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C4	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C5	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C6	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C7	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C8	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C9	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C10	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C11	4030007130	S.CERAMIC	C1608 CH 1H 101J-T-A
C12	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C13	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C14	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C15	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C16	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C17	4550006170	S.TANTALUM	ECST1AY225R
C18	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C19	4550006140	S.TANTALUM	ECST1EY474R
C20	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C21	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C22	4030006900	S.CERAMIC	C1608 JB 1E 103K-T-A
C23	4030008470	S.CERAMIC	C1608 JB 1H 272K-T-A
C24	4030009580	S.CERAMIC	C1608 JB 1H 681K-T-A
C25	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C26	4550006170	S.TANTALUM	ECST1AY225R
C27	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C28	4550006170	S.TANTALUM	ECST1AY225R
C29	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C30	4550006170	S.TANTALUM	ECST1AY225R
C31	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C32	4550006320	S.TANTALUM	ECST0JY475R
C33	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A
C34	4550006200	S.TANTALUM	ECST0JY106R
C35	4550006150	S.TANTALUM	ECST1CY105R
C36	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C37	4030008940	S.CERAMIC	C2012 JB 1C 683K-T-A
C38	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C39	4030008900	S.CERAMIC	C1608 JB 1E 103K-T-A (USA)
	4030008880	S.CERAMIC	C1608 JB 1C 153K-T-A (EUR, AUS, SEA, ITA, TPE)
C40	4030007150	S.CERAMIC	C1608 CH 1H 151J-T-A
C41	4030008920	S.CERAMIC	C1608 JB 1C 473K-T-A
C42	4550008300	S.TANTALUM	ECST1AY475R
C43	4550008200	S.TANTALUM	ECST0JY106R
C44	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
C45	4550006150	S.TANTALUM	ECST1CY105R

S.=Surface mount

[3F UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
C47	4550006150	S.TANTALUM	ECST1CY105R
C48	4030006870	S.CERAMIC	C1608 JB 1H 222K-T-A (USA, AUS, SEA, TPE)
	4030006880	S.CERAMIC	C1608 JB 1H 102K-T-A (EUR, ITA)
C49	4030008770	S.CERAMIC	C1608 JB 1H 562K-T-A (USA, AUS, SEA, TPE)
	4030009970	S.CERAMIC	C1608 JB 1H 182K-T-A (EUR, ITA)
C50	4030007140	S.CERAMIC	C1608 CH 1H 121J-T-A (USA, AUS, SEA, TPE)
	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A (EUR, ITA)
C51	4030009970	S.CERAMIC	C1608 JB 1H 182K-T-A
C52	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C53	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C54	4030008630	S.CERAMIC	C1608 JF 1C 104Z-T-A
C55	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C56	4030008960	S.CERAMIC	C2012 JB 1C 104K-T-A
C57	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
C58	4030006860	S.CERAMIC	C1608 JB 1H 102K-T-A
J1	6510016040	S.CONNECTOR	52357-2490
J2	6510016150	S.CONNECTOR	53309-1091
J3	6510014450	S.CONNECTOR	52204-2990
EP1	0910042020	PCB	B 4168

[MIC UNIT] (IC-S21A/E)

REF. NO.	ORDER NO.	DESCRIPTION	
D1	1790000990	S.ZENER	MA8051-H(TX)
C101	4030006850	S.CERAMIC	C1608 JB 1H 471K-T-A
EP3	0910042140	FPC	B 4172

S21

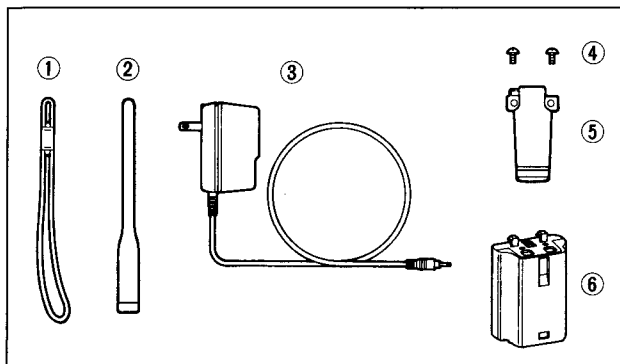
SECTION 7 MECHANICAL PARTS

• CHASSIS PARTS

LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.	LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8210010230	1454 front panel (A) (IC-S21A)	1	②⑥	8930029021	1388 PW button-1 [POWER]	1
	8210010240	1454 front panel (B) (IC-S21E)		②⑦	8930029010	1388 top seal	1
②	8930030800	1454 MIC holder (IC-S21A/E only)	1	②⑧	8930028960	1388 top plate	1
③	8210009530	1388 front panel (A) (IC-T21A)	1	②⑨	8930030510	1388 top shield	1
	8210009540	1388 front panel (B) (IC-T21E)		③⑩	8930030690	1388 SW lug	1
④	8930028920	1388 10-key (IC-T21A/E only)	1	③①	8810005860	Screw PH No. 0 M2 × 3 NI	5
⑤	2510000580	Speaker EAS-2P104D	1	③②	8930029200	Stand-off (E)	2
⑥	8930028930	1388 3-button (IC-T21A/E)	1	③③	8810007930	Screw PH No. 0 M2.6 × 8.5 NI	2
	8930031200	1388 3-button (A) (IC-S21A/E)		③④	8950003300	Electrical tape No. 1245 20 × 13	1
⑦	0910039931	Flexible cable B 3970A (PTT)	1	③⑤	8010014730	1388 chassis	1
⑧	8930028980	1388 SW holder	1	③⑥	8930029881	1388 module shield-1	1
⑨	8930029901	1388 SW sheet-1	1	③⑦	8930028910	1388 release button	1
⑩	8810006550	Screw PH B0 No. 0-3 M1.4 × 3 NI	5	③⑧	8930029370	Spring (R)	1
⑪	8930028970	1388 LCD rubber	1	③⑨	8930029890	1388 PRT shield	1
⑫	8930028950	1388 LCD holder	1	④⑩	8860000880	E-ring M1.2	2
⑬	5030000970	LCD LD-B5666J (IC-T21A/E)	1	④①	8930028900	1388 contact base	1
	5030001110	LCD LD-BU5717J (IC-S21A/E)		④②	8930029380	Spring (S)	2
⑭	8930030370	LCD contact SRCN-1388 SG	2	④③	8930028990	1388 contact pin	2
⑮	8210009000	1388 reflector	1	④④	8930029000	1388 contact spring	1
⑯	7700001570	Microphone KUF3323-010010	1	④⑤	8810007940	Screw FFH No. 0 M2 × 4.5 ZK	5
⑰	0910039944	Flexible cable B 3972D (LOGIC-3F)	1	④⑥	8830000880	VR nut (I)	1
⑱	8810001710	Screw PH B0 No. 0-3 M1.4 × 3.5 ZK	4	④⑦	8930029870	1388 ANT lug	1
⑲	8930028890	1388 10-key holder	1	④⑧	6510016180	Connector SMA-R203 [ANT]	1
⑳	8810007920	Screw FFH PT No. 0 M2 × 6 ZK	2	④⑨	8210008980	1388 rear panel	1
㉑	8610008720	Knob N205 [VOL]	1	⑤⑩	8930029090	1388 jack cover	1
㉒	8610008710	Knob N204 [SQL]	1	⑤①	8010014982	Hole bushing (B)-2	2
㉓	8610008700	Knob N203 [DIAL]	1	⑤②	8810007910	Screw PH B0 M2 × 18 ZK	2
㉔	8830000790	VR nut (H)	2	⑤③	8810004370	Screw PH B0 M2 × 10 ZK	2
㉕	8210008990	1388 top panel	1				

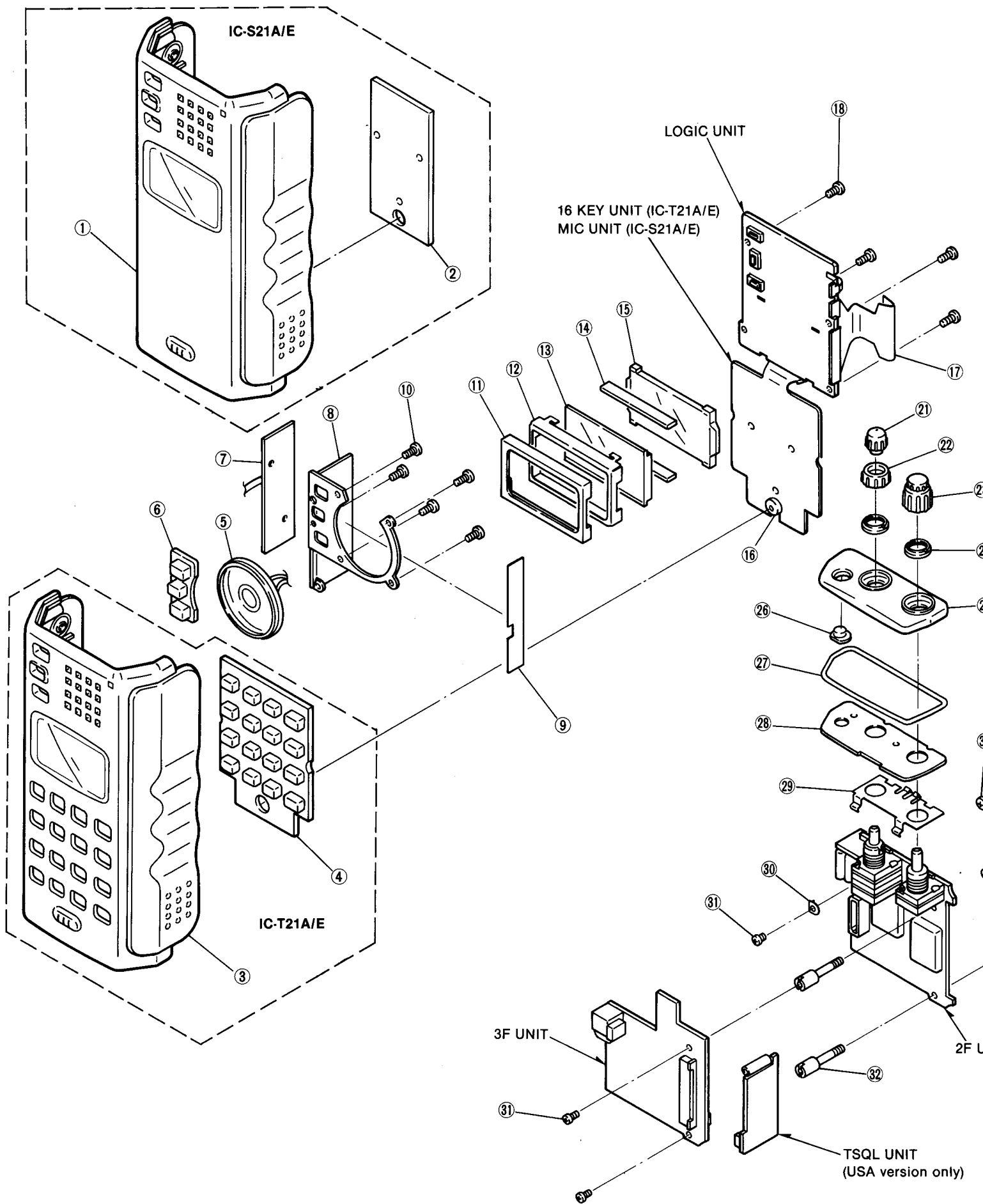
Screw abbreviations B0: Self-tapping PH: Pan head FFH: Flat filister head NI: Nickel ZK: Black

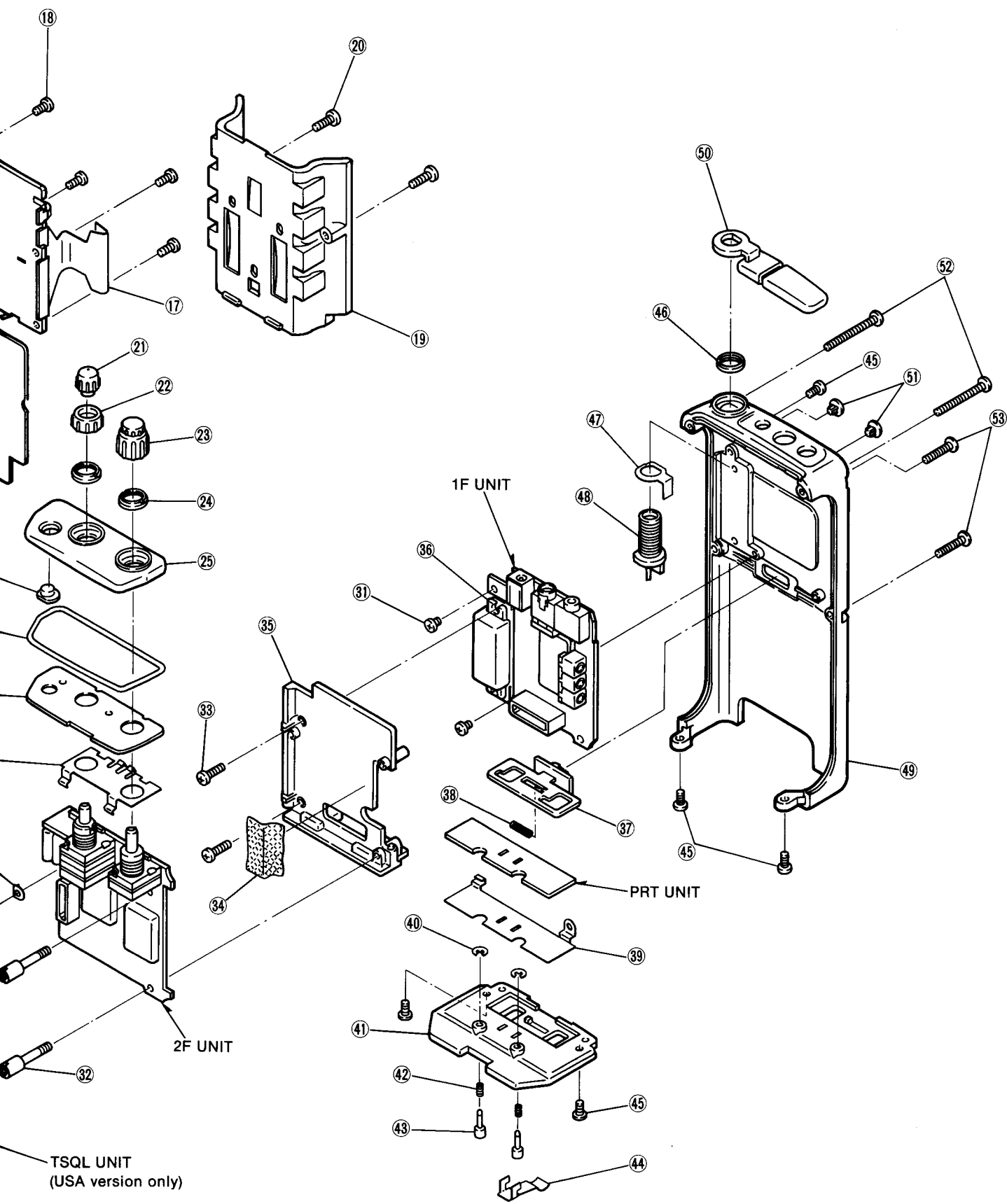
• ACCESSORIES



LABEL NUMBER	ORDER NO.	DESCRIPTION	QTY.
①	8010015080	Handstrap	1
②	Optional product	FA-S270A ANTENNA	1
③	Optional product	BC-74D WALL CHARGER (EUR, DEN, ITA)	1
		BC-74V WALL CHARGER (AUS)	
		BC-74A WALL CHARGER (USA)	
④	8810005730	Screw BuH M3 × 3 ZK BS	2
⑤	8930028940	1388 belt clip	1
⑥	Optional product	BP-151 BATTERY PACK (EUR, USA, AUS, DEN, ITA)	1
		BP-159 BATTERY CASE (TPE, SEA)	

Screw abbreviations BuH: Button head BS: Brass ZK: Black

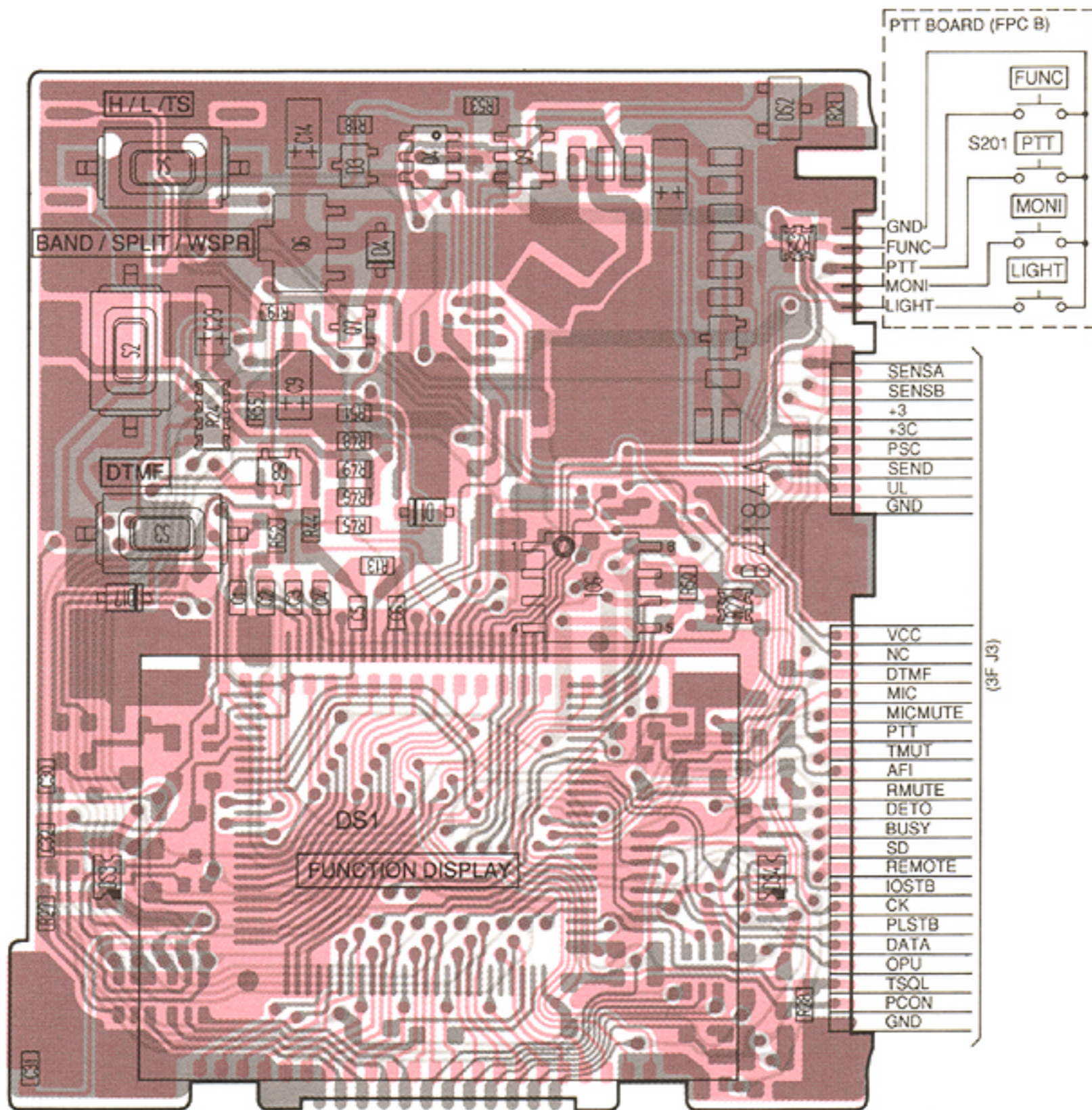




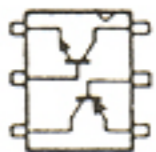
SECTION 8 BOARD LAYOUTS

IC-T21A/E 8-1 LOGIC UNIT • LOGIC UNIT

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

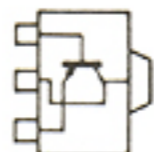


XN4601
(Symbol: 5C)



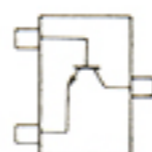
Q4

2SB1132 R
(Symbol: BARR)



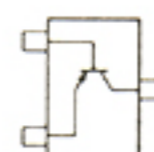
Q6

2SC4211 7
(Symbol: L7)



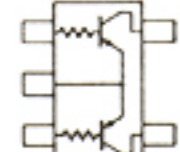
Q7

2SA1622 6
(Symbol: M6)



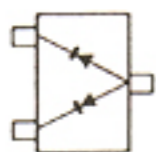
Q8

XN1117
(Symbol: OL)



Q9

DA204U
(Symbol: K)

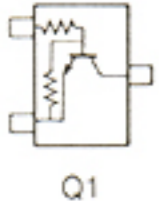


D3

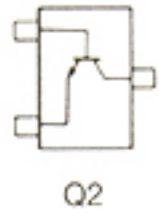
• LOGIC UNIT

T21

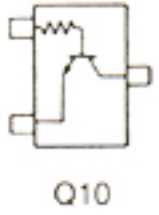
UN9213
(Symbol: 8C)



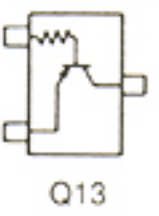
2SC4211 7
(Symbol: L7)



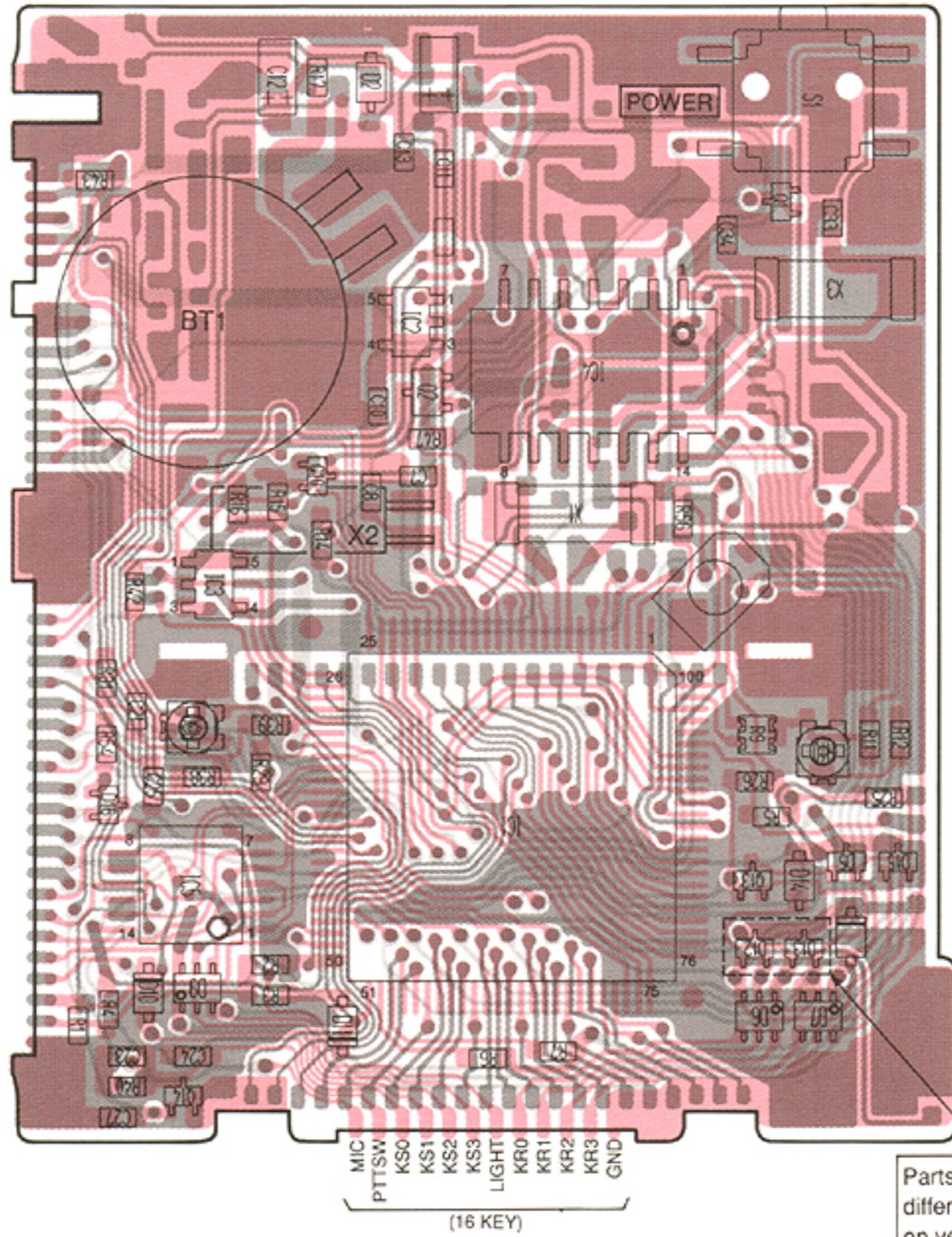
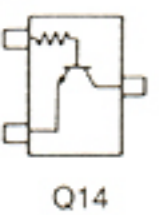
UN9210
(Symbol: 8L)



UN9110
(Symbol: 6L)

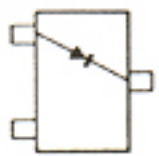


UN9217
(Symbol: 8H)



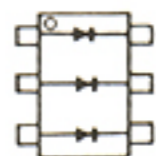
Parts locations differ depending on version. See below for details.

MA132K
(Symbol: M1)



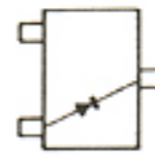
D5, D12 (USA, TPE),
D13 (USA, AUS, SEA,
ITA), D15

MA6S121
(Symbol: M2D)



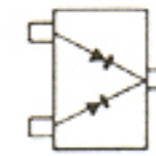
D6, D7, D9

MA132HK
(Symbol: M3N)



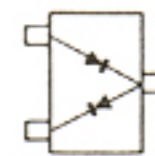
D12 (EUR, AUS)

MA132WK
(Symbol: MU)

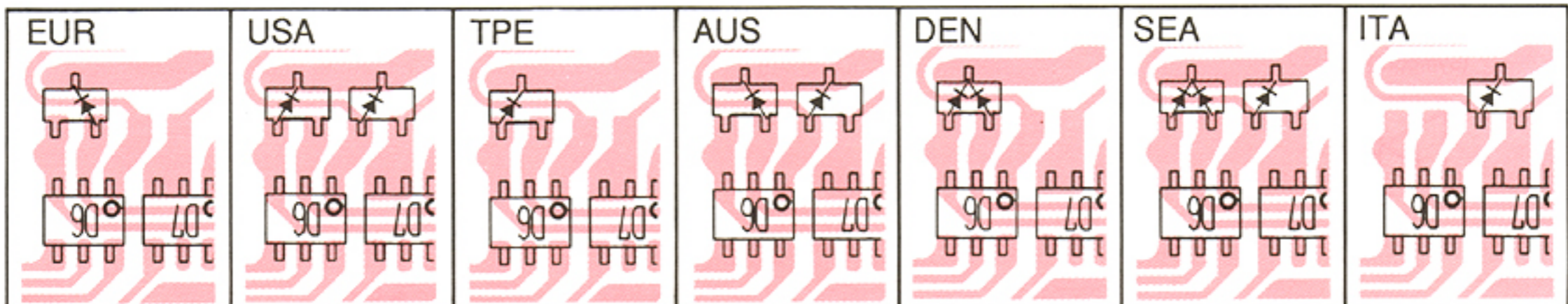


D12 (DEN, SEA)

MA133
(Symbol: MP)

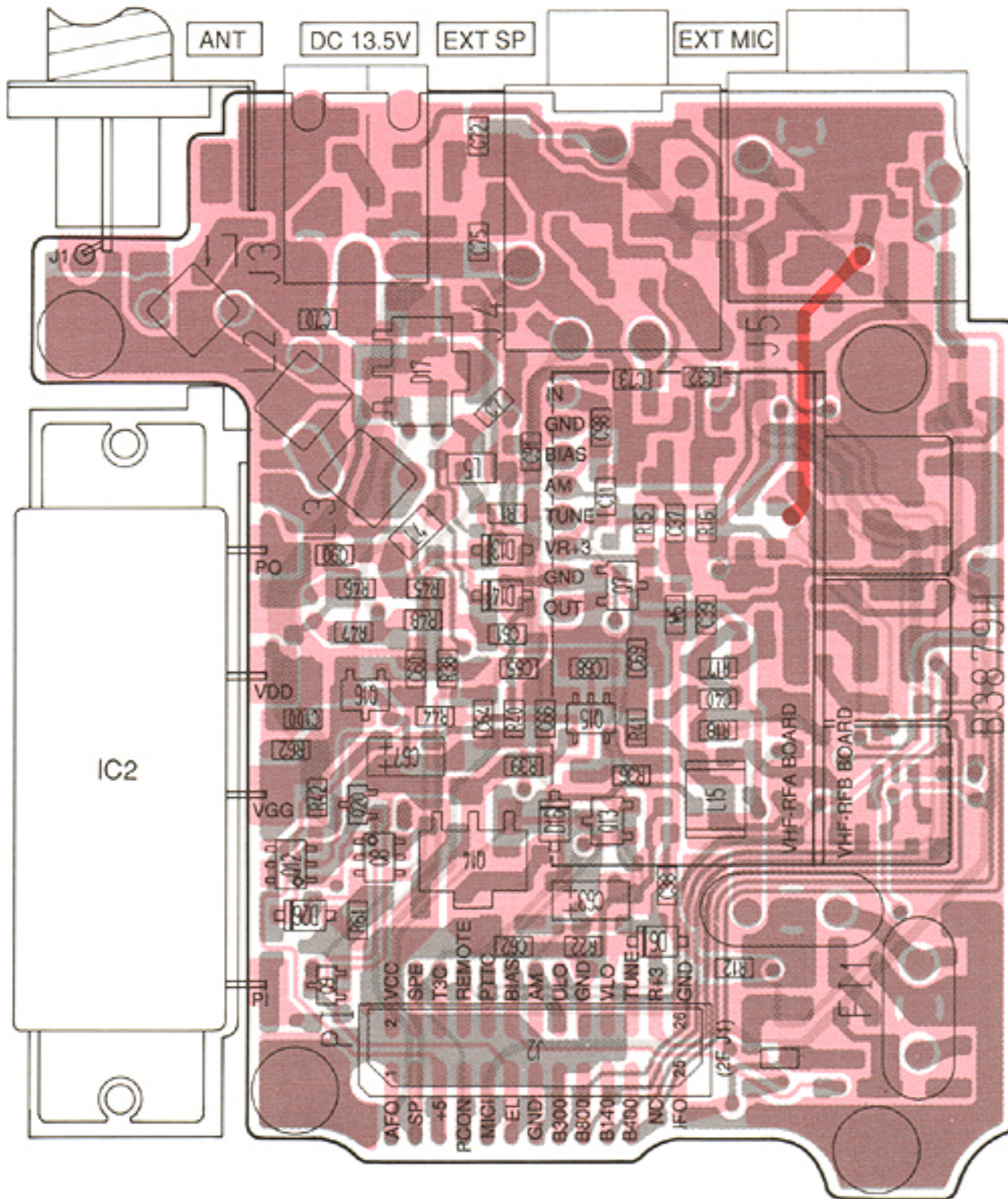


D16

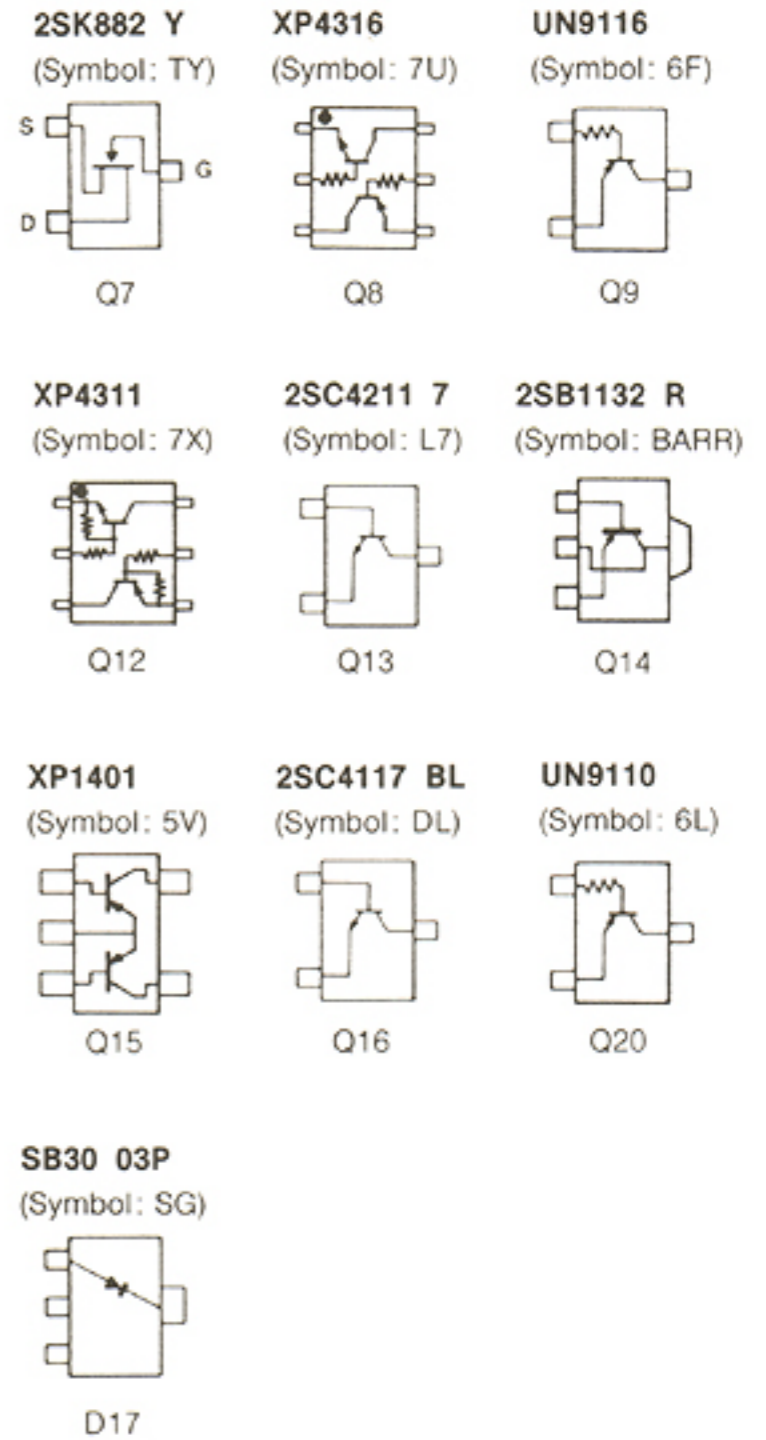


8-2 1F AND 2F UNITS

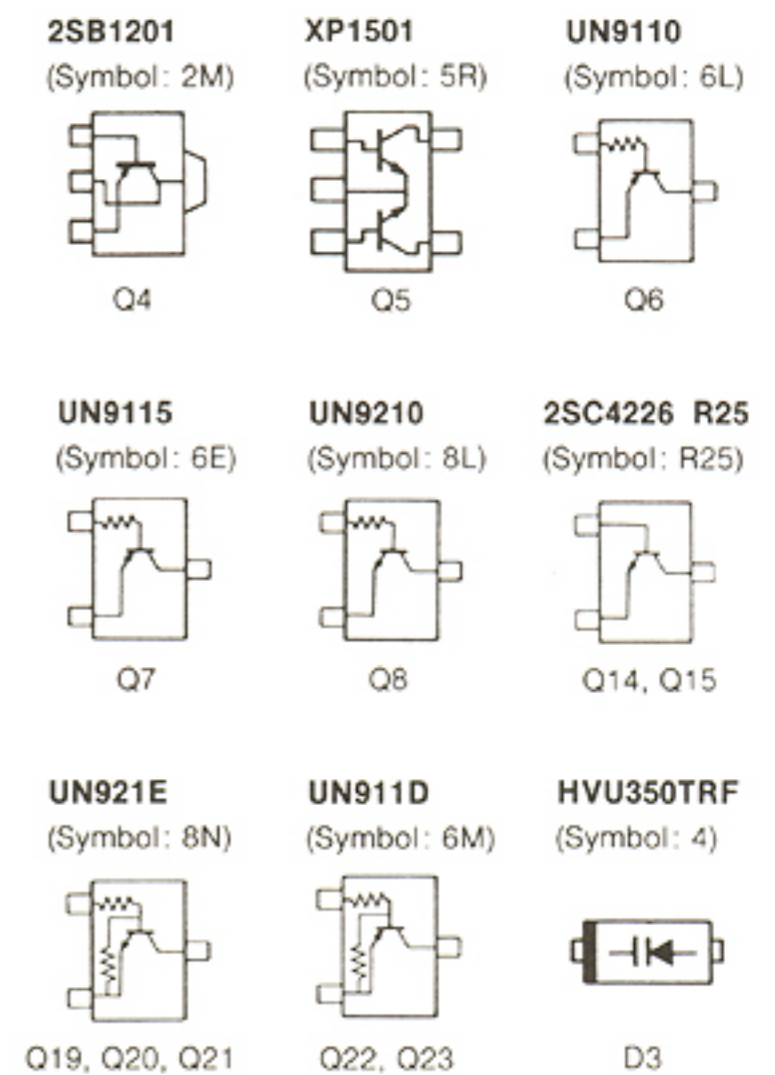
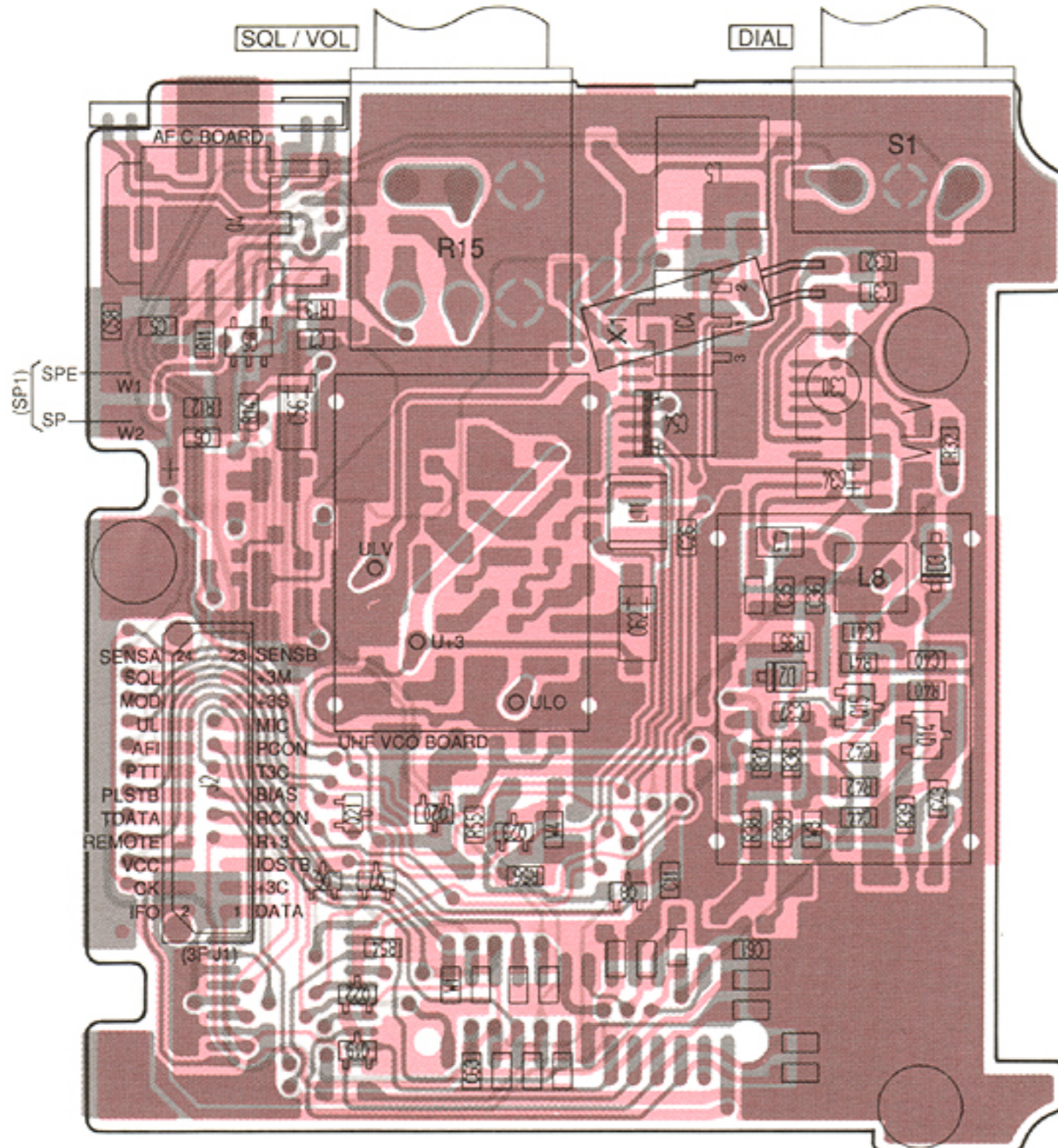
• 1F UNIT



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

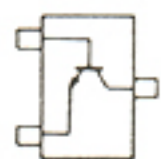


• 2F UNIT



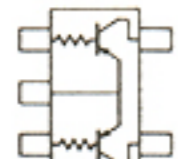
• 1F UNIT

2SC4228 R44
(Symbol: R44)



Q1, Q2, Q3, Q22

XP1110
(Symbol: AD)



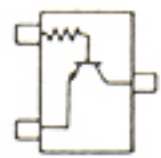
Q4

XP1114
(Symbol: 7Q)



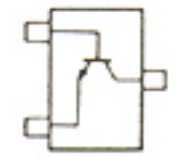
Q5

UN9210
(Symbol: 8L)



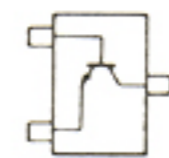
Q6

2SC4863 4
(Symbol: FN4)



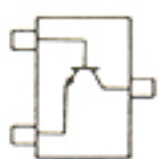
Q11

2SC4405 3
(Symbol: OY3)



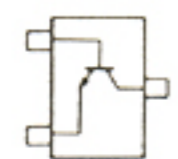
Q10

2SD2216
(Symbol: 5)



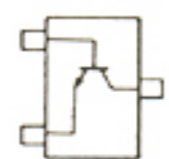
Q17

2SC4215 0
(Symbol: Q0)



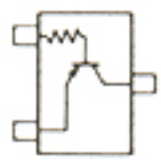
Q18

2SC4403 3
(Symbol: LY3)



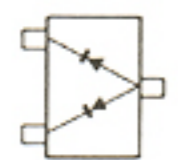
Q21

UN9110
(Symbol: 6L)



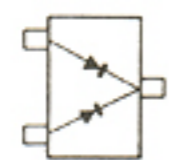
Q23

MA132WA
(Symbol: M0)

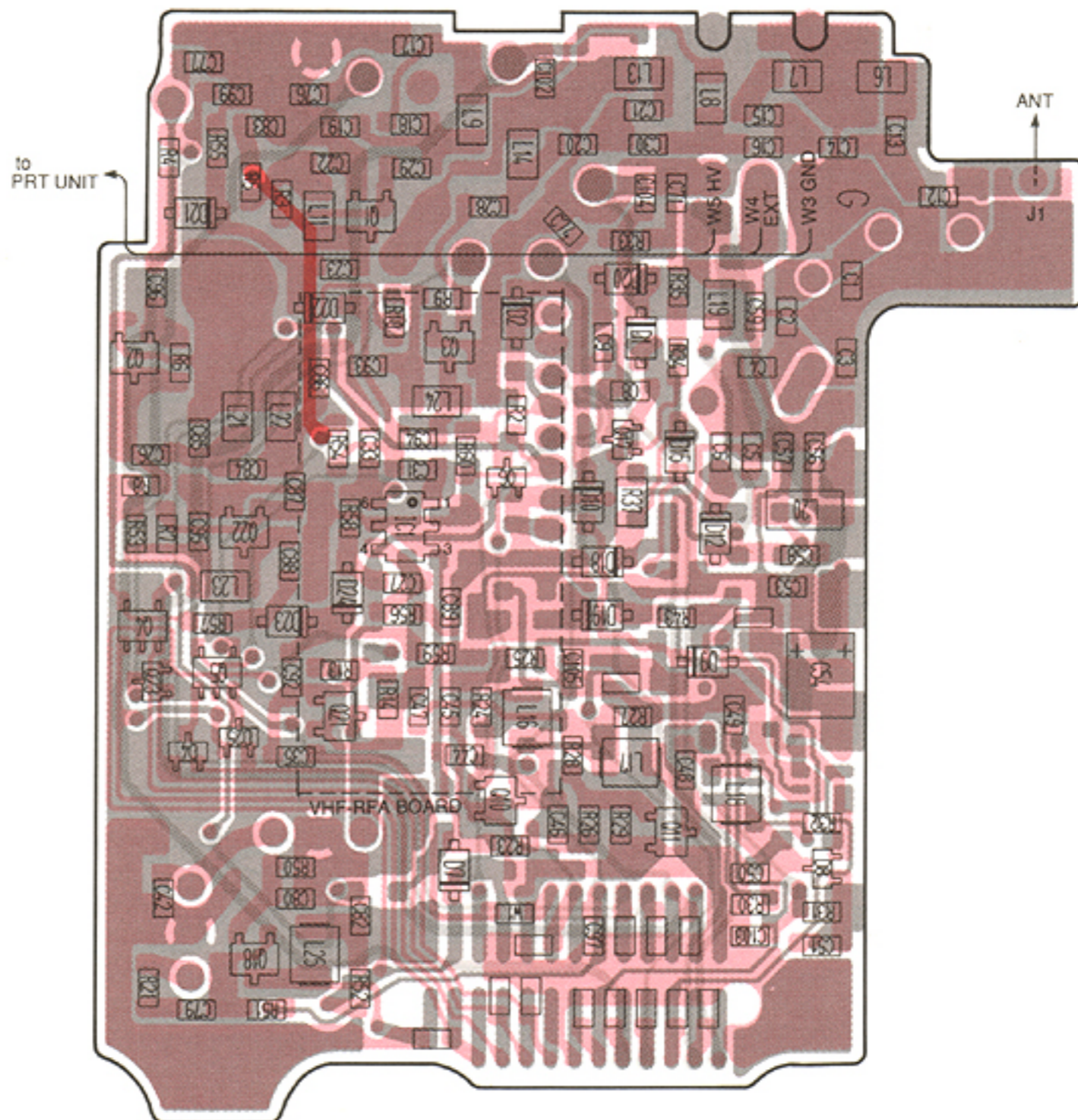


D4, D25

1SS364
(Symbol: BF)

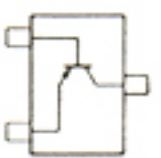


D8



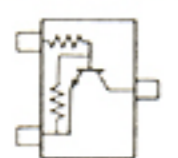
• 2F UNIT

2SA1622 6
(Symbol: M6)



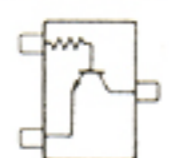
Q1

UN9213
(Symbol: 8C)



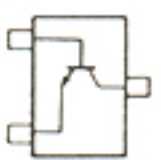
Q2

UN9210
(Symbol: 8L)



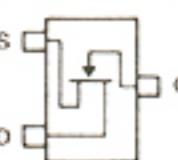
Q3

2SC4863 4
(Symbol: FN4)



Q9, Q10, Q11, Q12

2SK880 Y
(Symbol: XY)

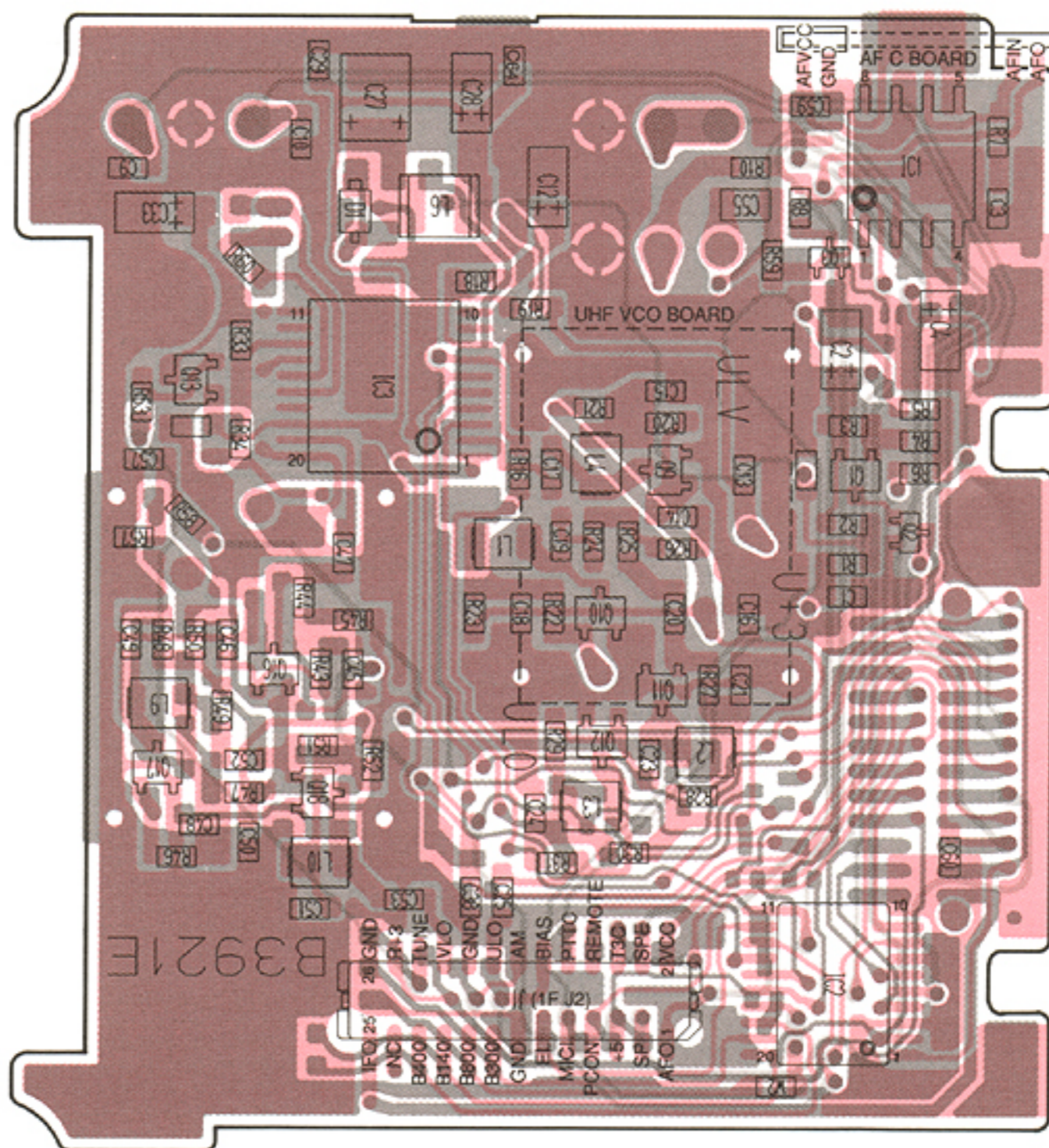


Q13

2SC4403 3
(Symbol: LY3)



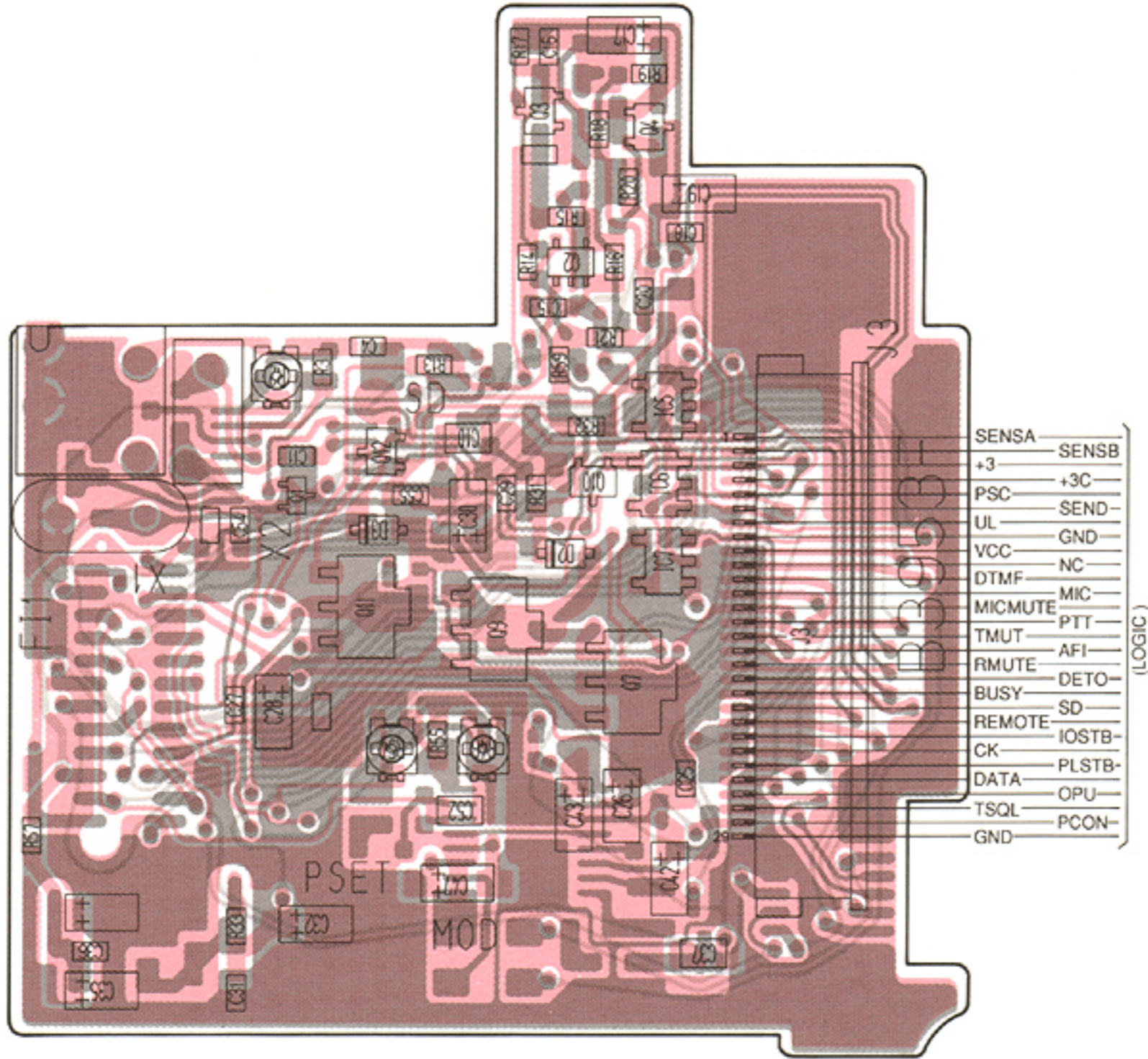
Q16, Q17, Q18



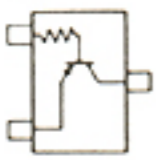
8-3 3F UNIT AND UHF-VCO BOARD

• 3F UNIT

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



UN911F
(Symbol: 6O)



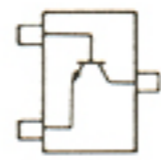
Q1

XP1501
(Symbol: 5R)



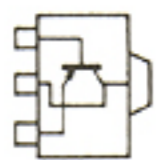
Q2

2SC4211 7
(Symbol: L7)



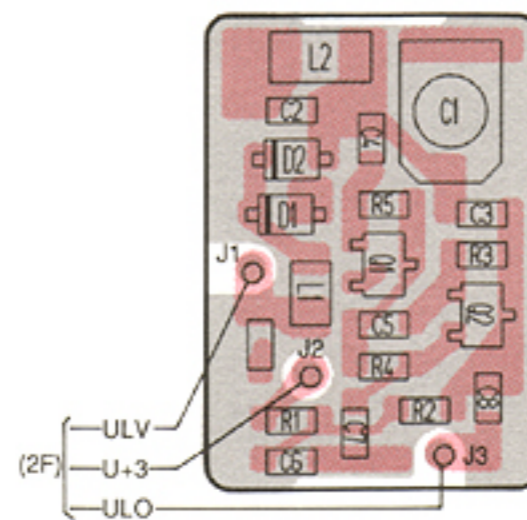
Q3, Q4, Q10, Q12

2SB1132 R
(Symbol: BARR)

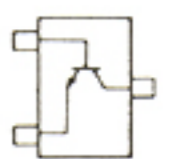


Q7, Q9, Q11

• UHF-VCO BOARD

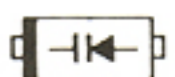


2SC4226 R25
(Symbol: R25)



Q1, Q2

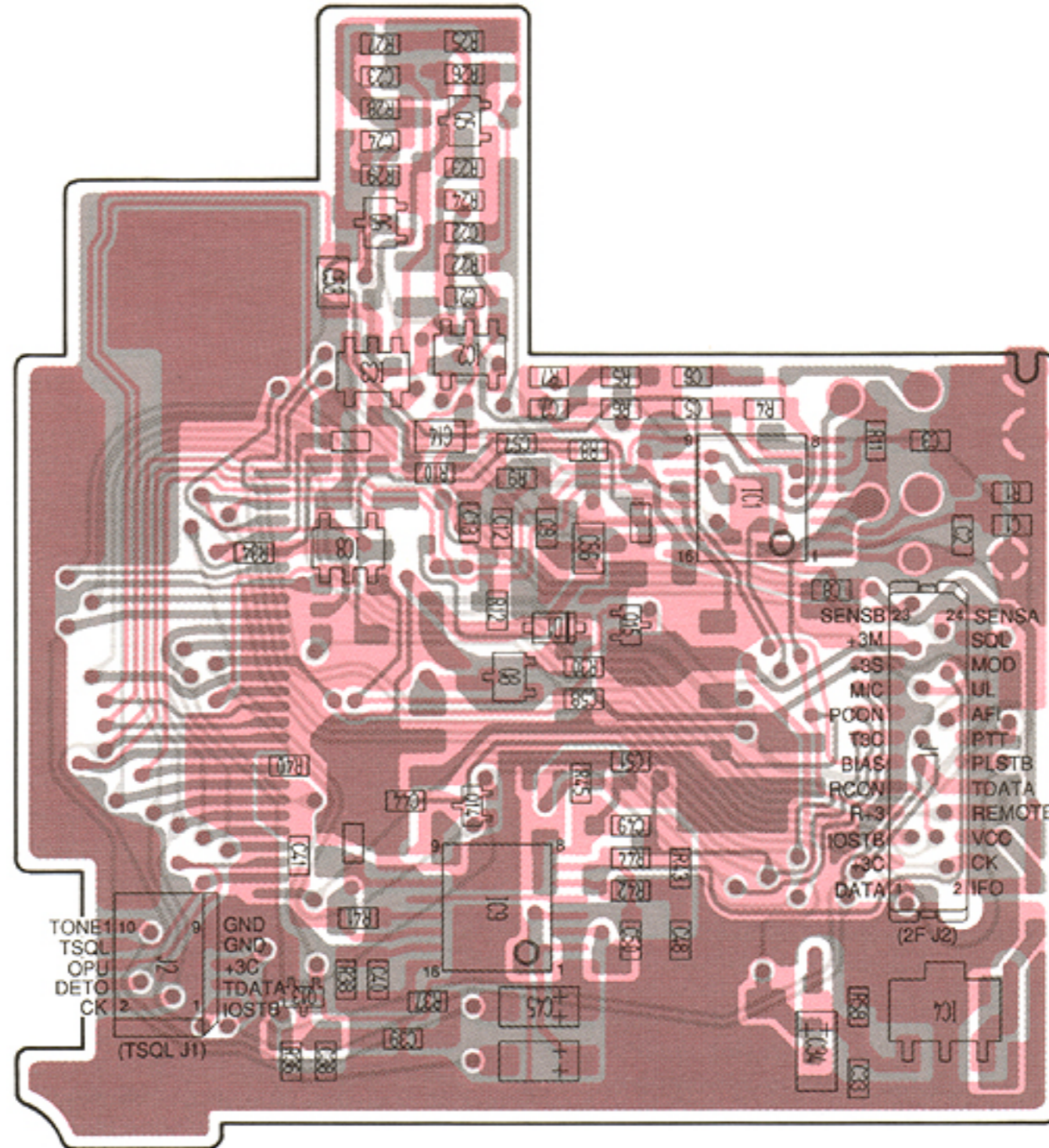
HVU350TRF
(Symbol: 4)



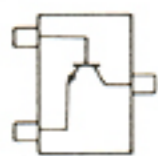
D1, D2

• 3F UNIT

T21

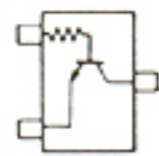


2SC4211 7
(Symbol: L7)



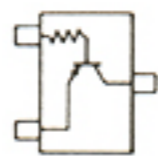
Q5, Q6, Q8

UN9215
(Symbol: 8E)



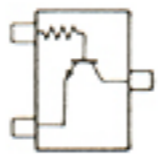
Q13

UN9110
(Symbol: 6L)



Q14

UN9210
(Symbol: 8L)



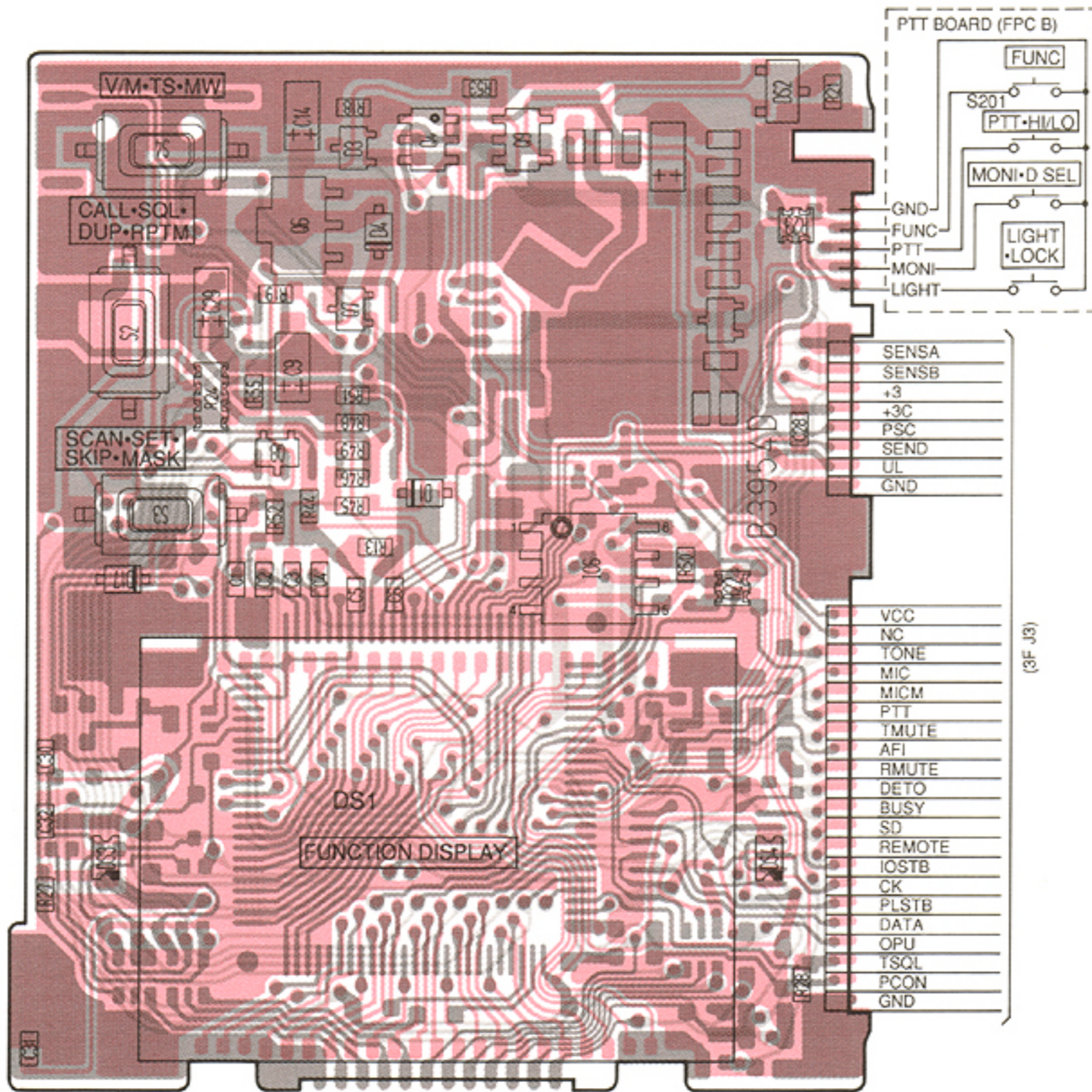
Q15

■ IC-S21A/E

8-4 LOGIC UNIT

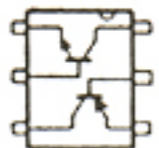
• LOGIC UNIT

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



S21

XN4601
(Symbol: 5C)



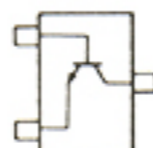
Q4

2SB1132 R
(Symbol: BARR)



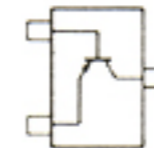
Q6

2SC4211 7
(Symbol: L7)



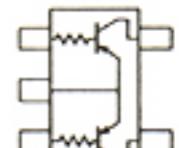
Q7

2SA1622 6
(Symbol: M6)



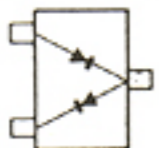
Q8

XN1117
(Symbol: OL)



Q9

DA204U
(Symbol: K)

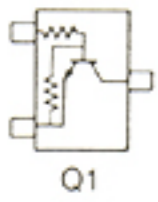


D3

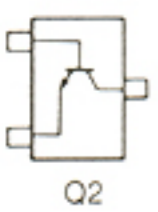
• LOGIC UNIT

S21

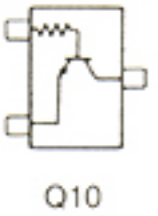
UN9213
(Symbol: 8C)



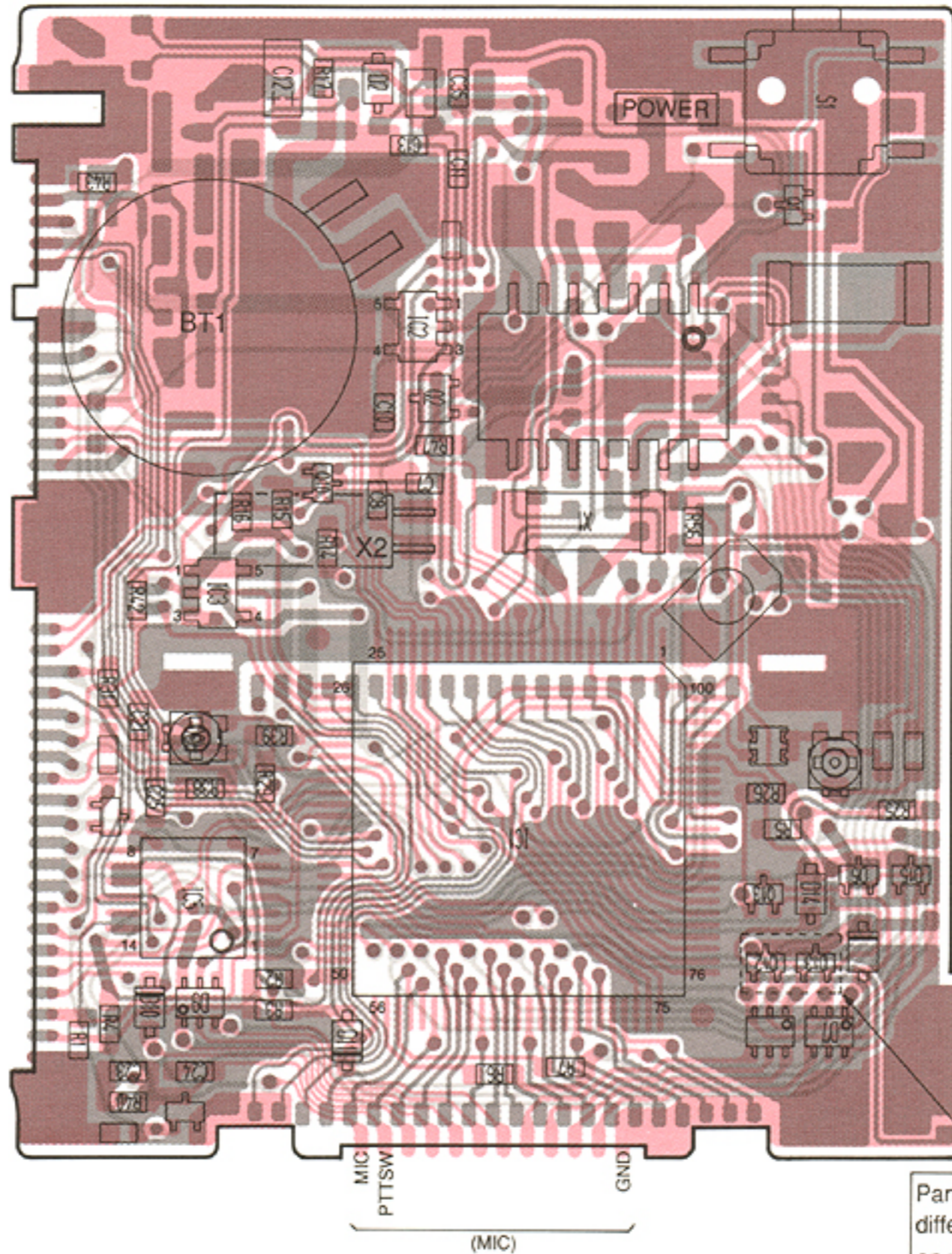
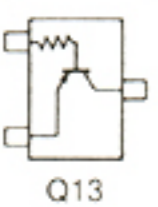
2SC4211 7
(Symbol: L7)



UN9210
(Symbol: 8L)

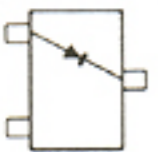


UN9110
(Symbol: 6L)



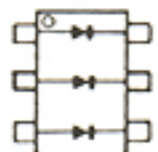
Parts locations differ depending on version. See below for details.

MA132K
(Symbol: M1)



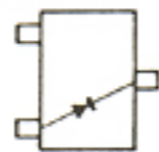
D5, D12 (USA, TPE),
D13 (USA, AUS, SEA,
ITA), D15

MA6S121
(Symbol: M2D)



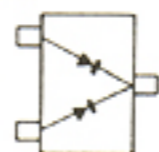
D7, D9

MA132HK
(Symbol: M3N)

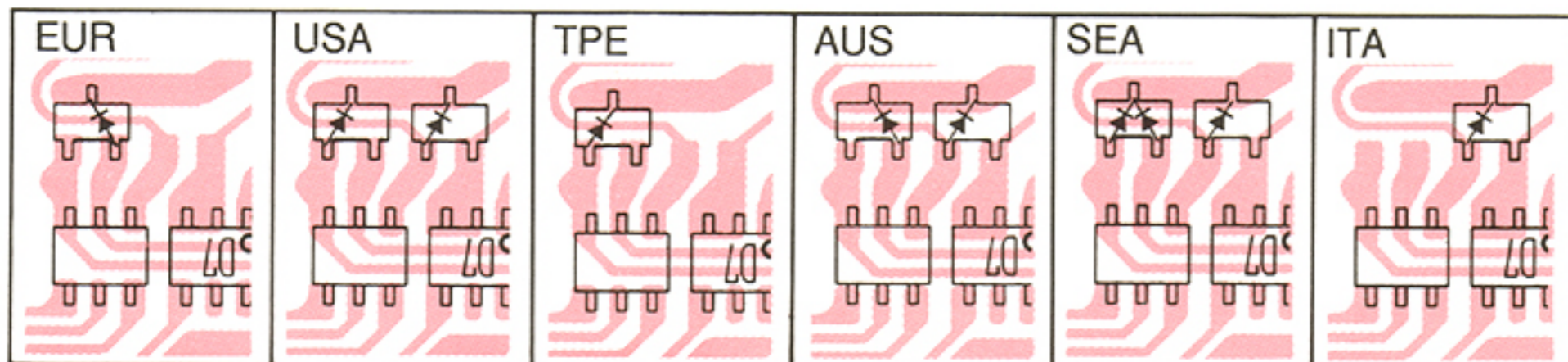


D12 (EUR, AUS)

MA132WK
(Symbol: MU)



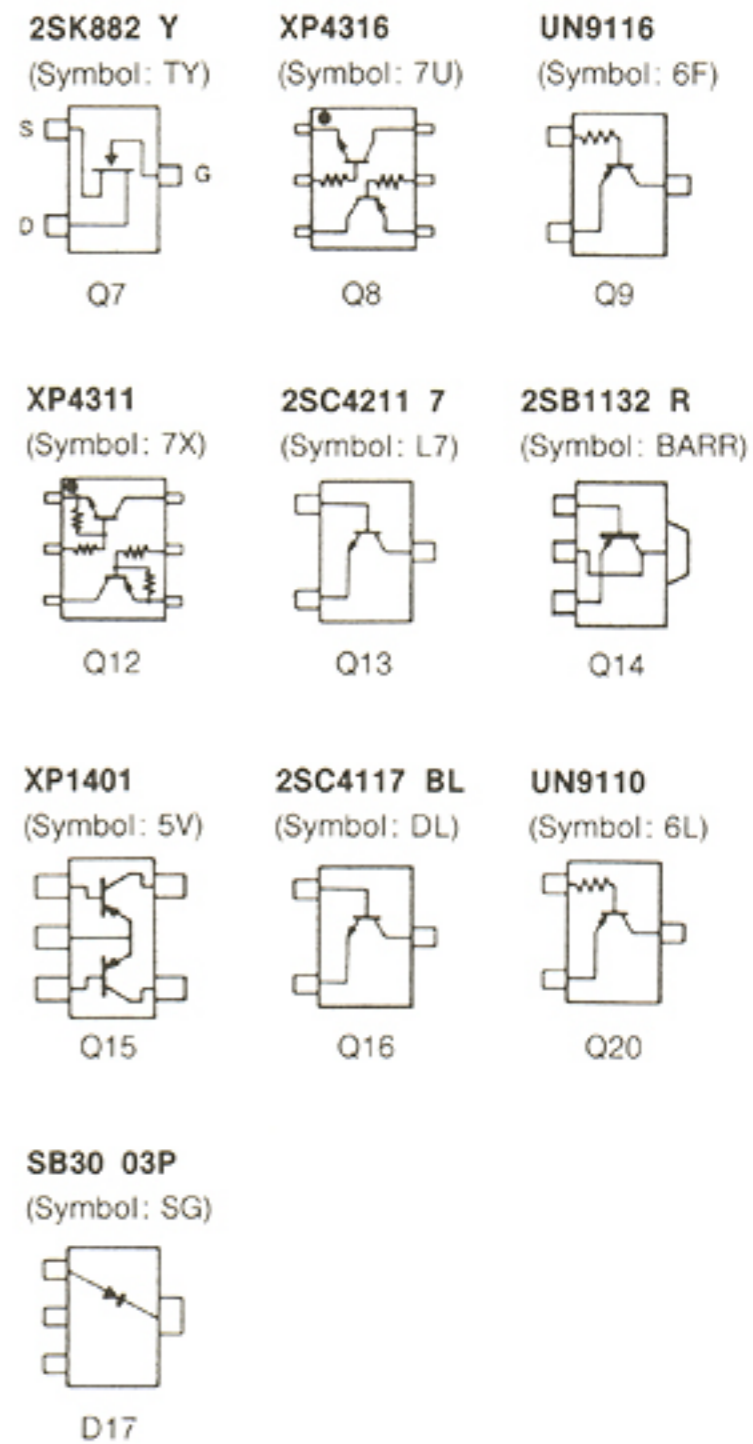
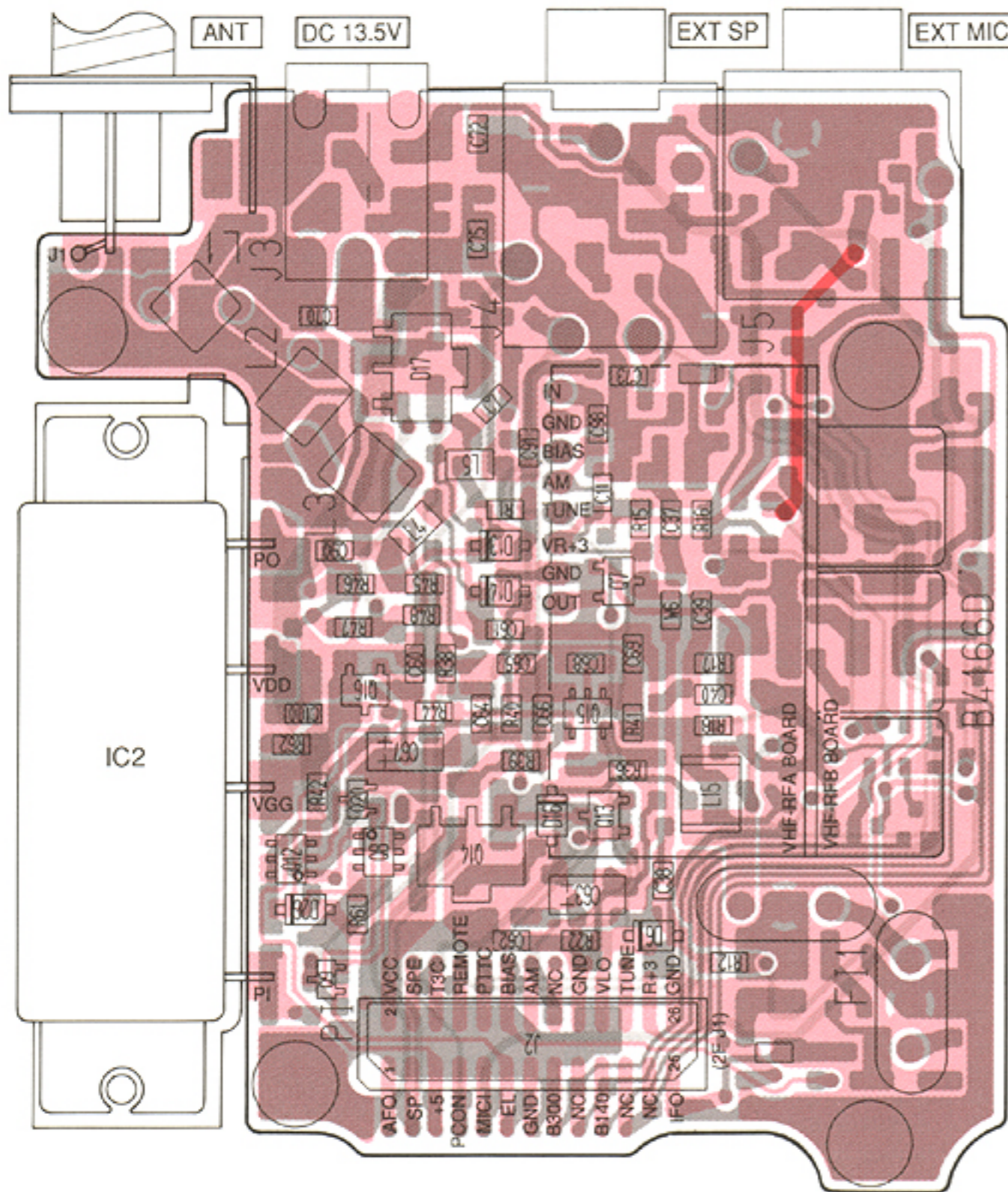
D12 (SEA)



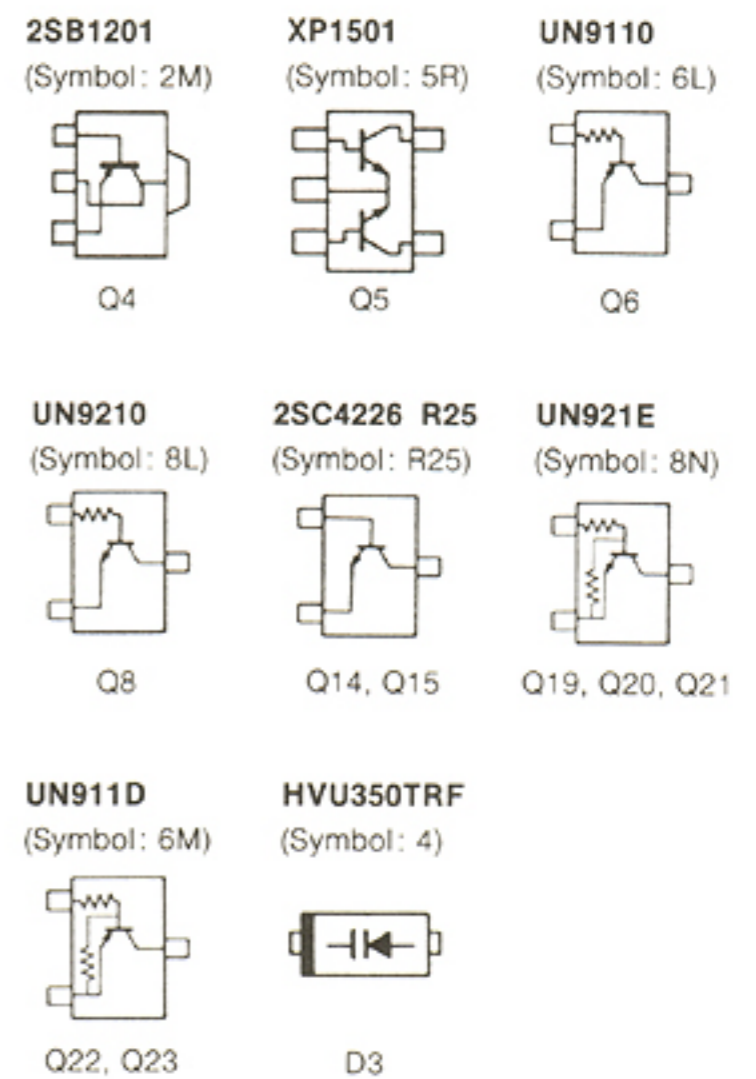
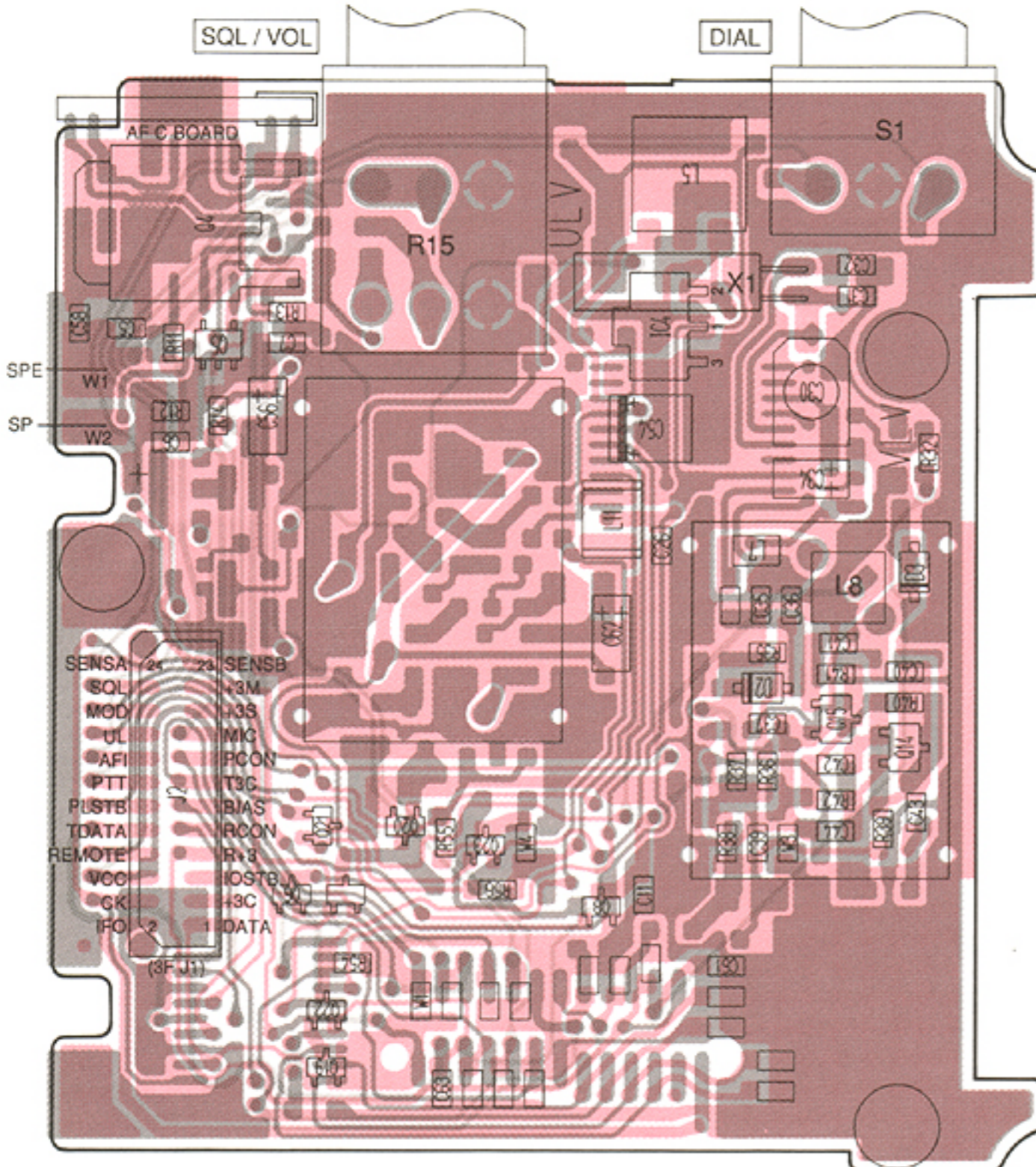
8-5 1F AND 2F UNITS

• 1F UNIT

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



• 2F UNIT



S21

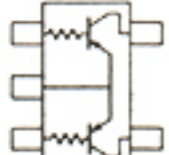
• 1F UNIT

2SC4228 R44
(Symbol: R44)



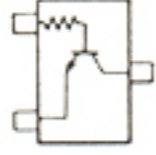
Q1

XP1110
(Symbol: AD)



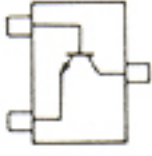
Q4, Q5

UN9210
(Symbol: 8L)



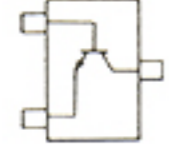
Q6

2SC4863 4
(Symbol: FN4)



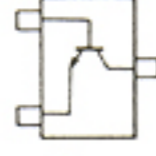
Q11

2SC4405 3
(Symbol: OY3)



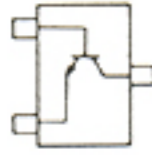
Q10

2SD2216
(Symbol: 5)



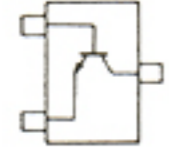
Q17

2SC4215 0
(Symbol: Q0)



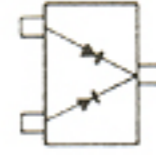
Q18

2SC4403 3
(Symbol: LY3)

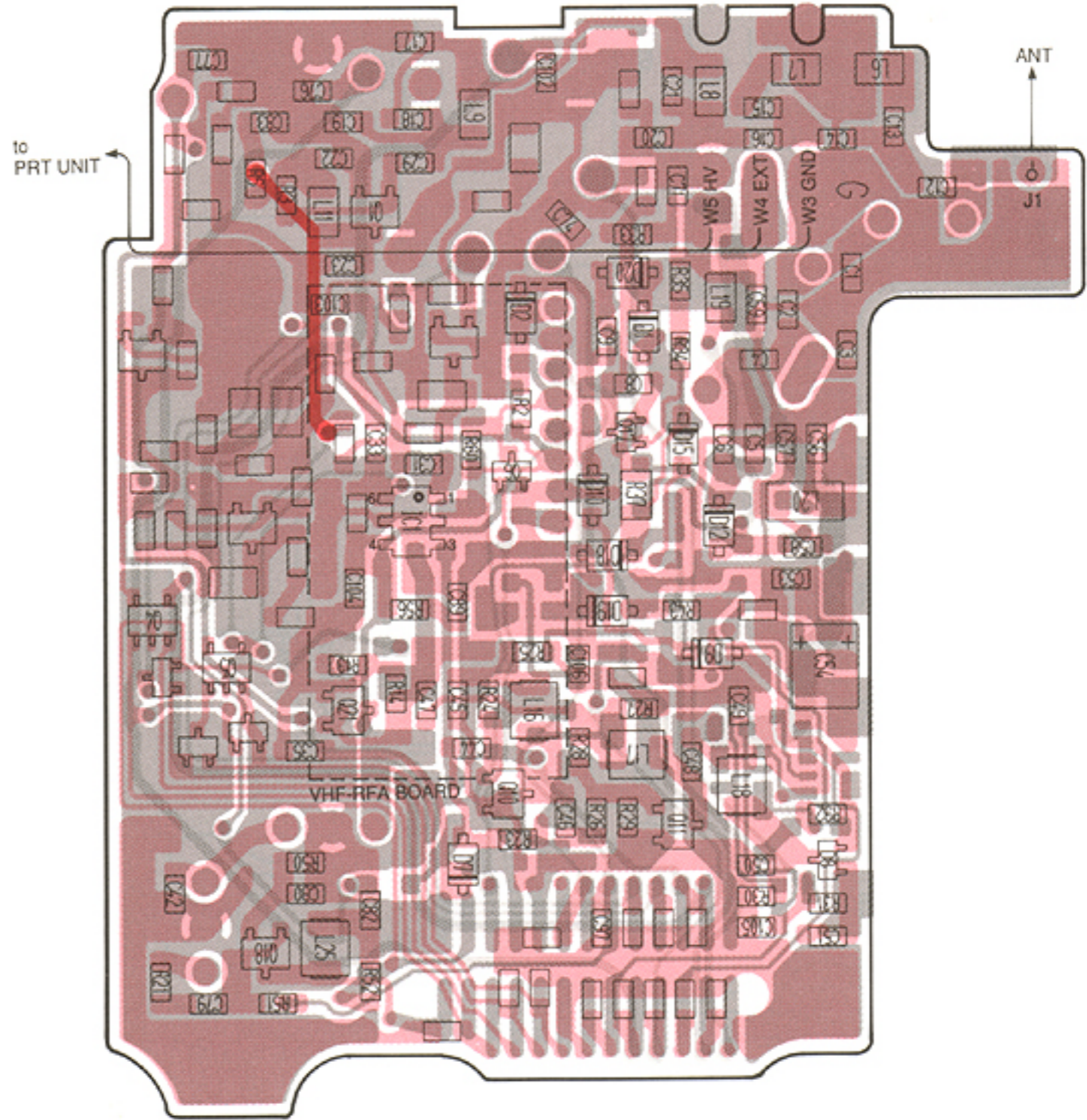


Q21

1SS364
(Symbol: BF)

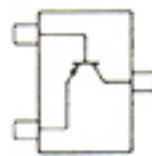


D8



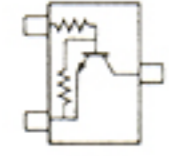
• 2F UNIT

2SA1622 6
(Symbol: M6)



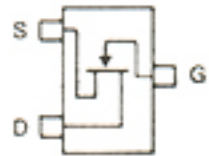
Q1

UN9213
(Symbol: 8C)



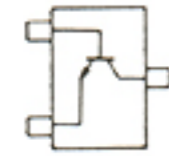
Q2

2SK880 Y
(Symbol: XY)

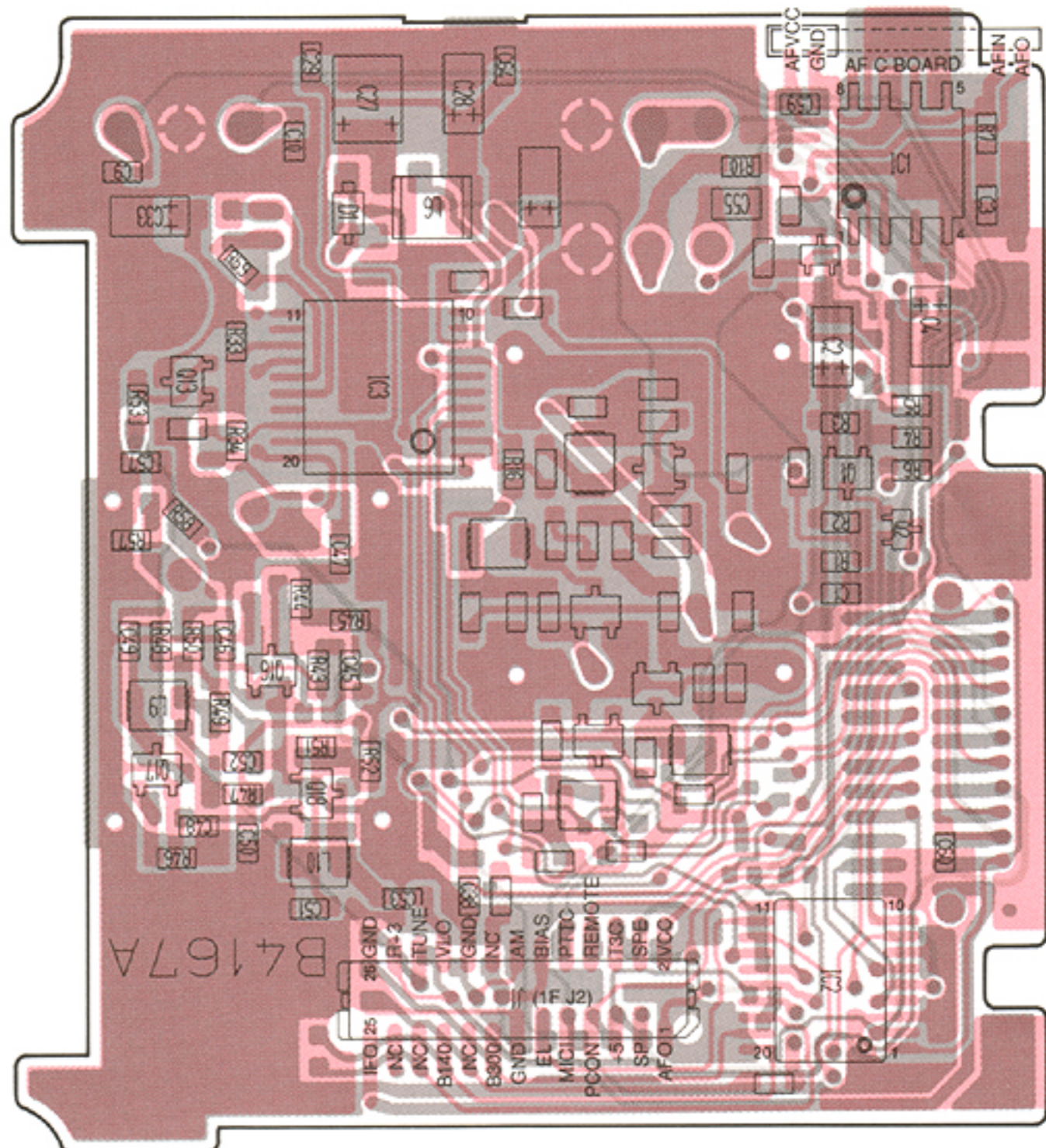


Q13

2SC4403 3
(Symbol: LY3)



Q16, Q17, Q18

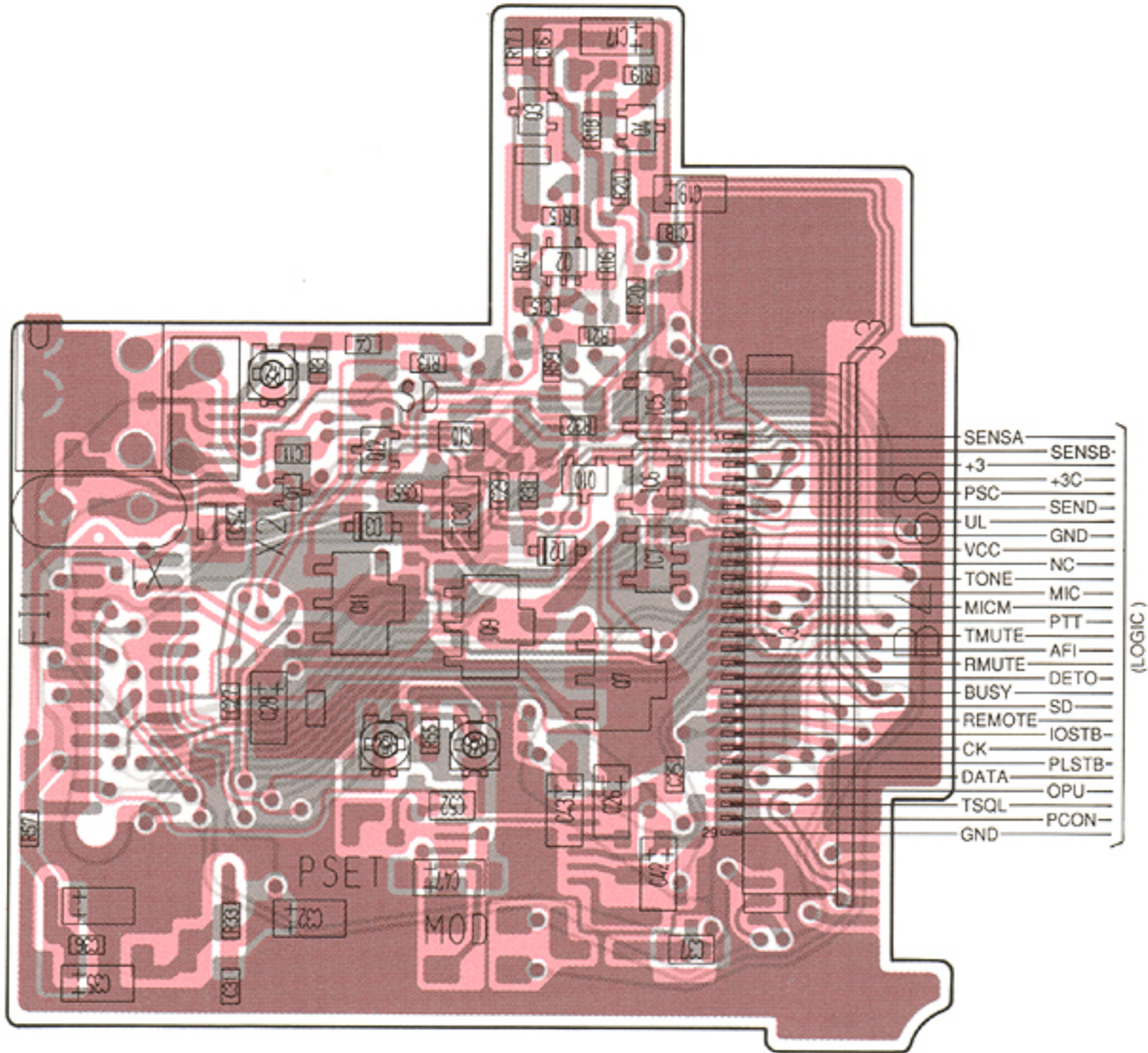


S21

8-6 3F UNIT

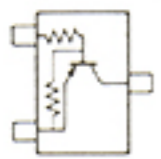
• 3F UNIT

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



S21

UN911F
(Symbol: 6O)



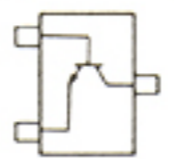
Q1

XP1501
(Symbol: 5R)



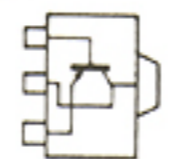
Q2

2SC4211 7
(Symbol: L7)



Q3, Q4, Q10, Q12

2SB1132 R
(Symbol: BARR)



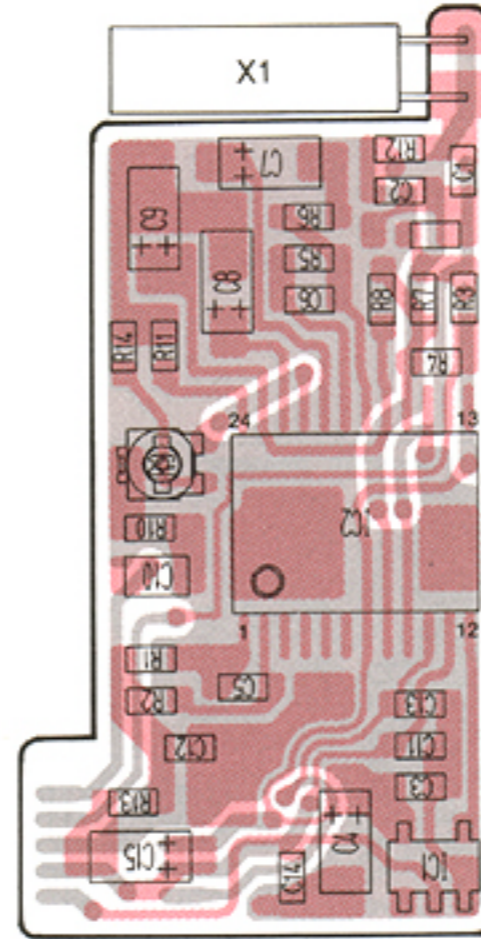
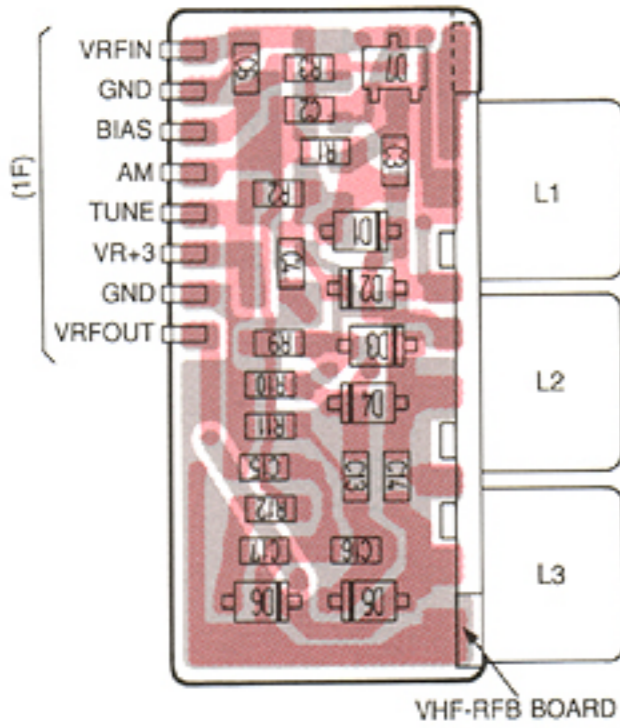
Q7, Q9, Q11

COMMON

8-7 COMMON BOARDS AND UNITS

• VHF-RFA BOARD

• TSQL UNIT (USA version only)



T21

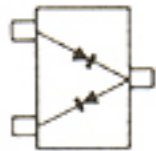
S21

HVU350TRF
(Symbol: 4)



D2, D4, D5

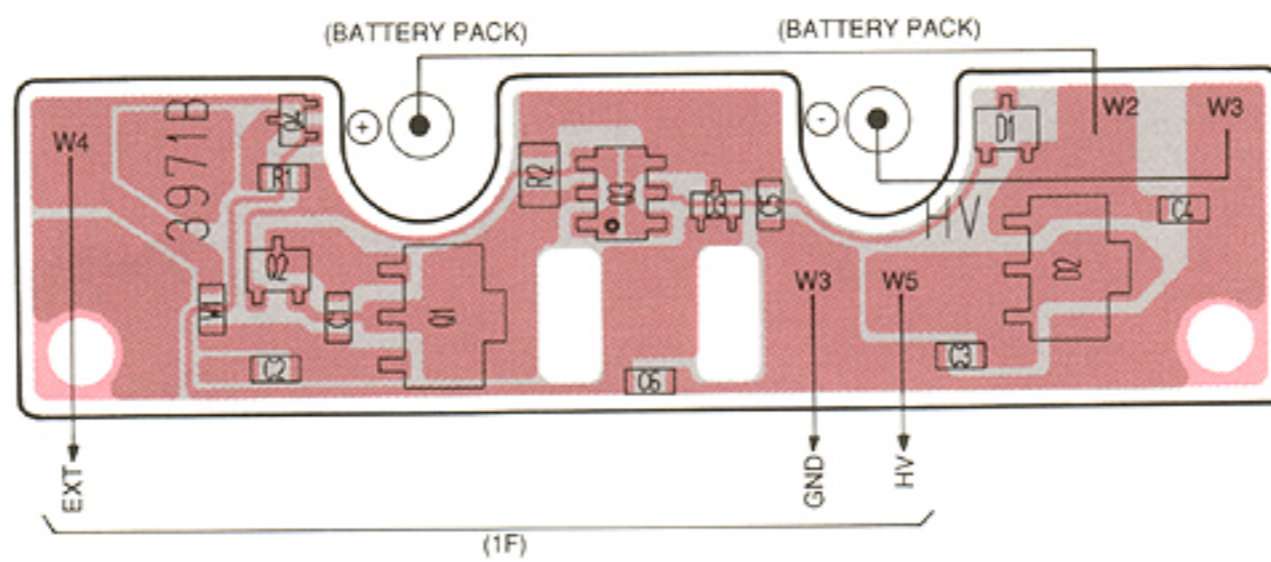
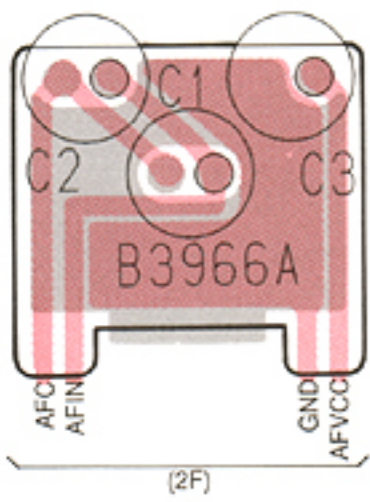
MA742
(Symbol: M1U)



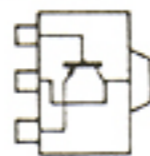
D7

• AFC BOARD

• PRT UNIT

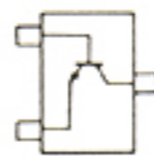


2SB1132 R
(Symbol: BARR)



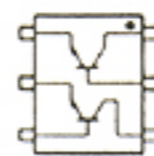
Q1

2SC4211 7
(Symbol: L7)



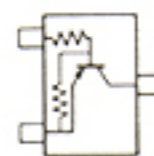
Q2

IMX2
(Symbol: X2)



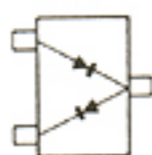
Q3

UN9113
(Symbol: 6C)



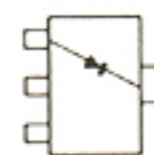
Q4

DA204U
(Symbol: K)



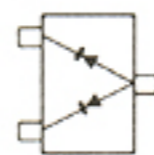
D1

SB30 03P
(Symbol: SG)



D2

MA132WA
(Symbol: MO)

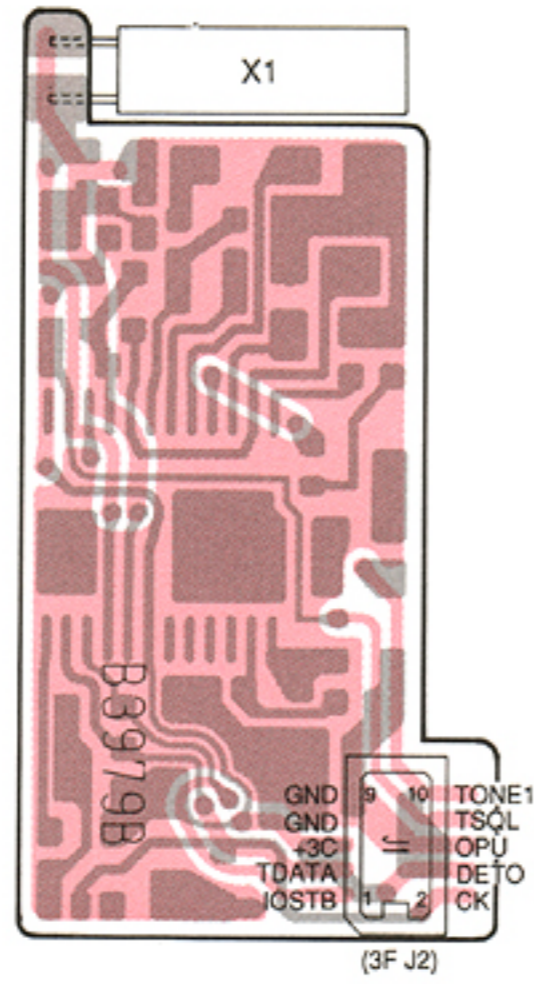


D3

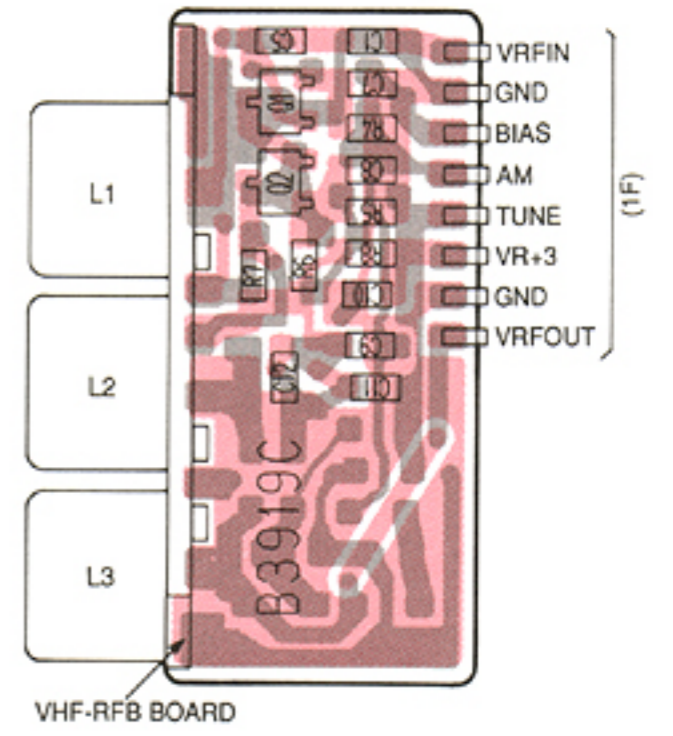
T21

S21

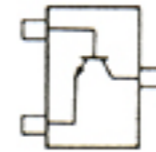
• TSQL UNIT (USA version only)



• VHF-RFA BOARD

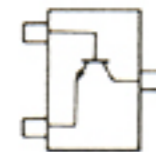


2SC4863 4 TR
(Symbol: FN4)



Q1

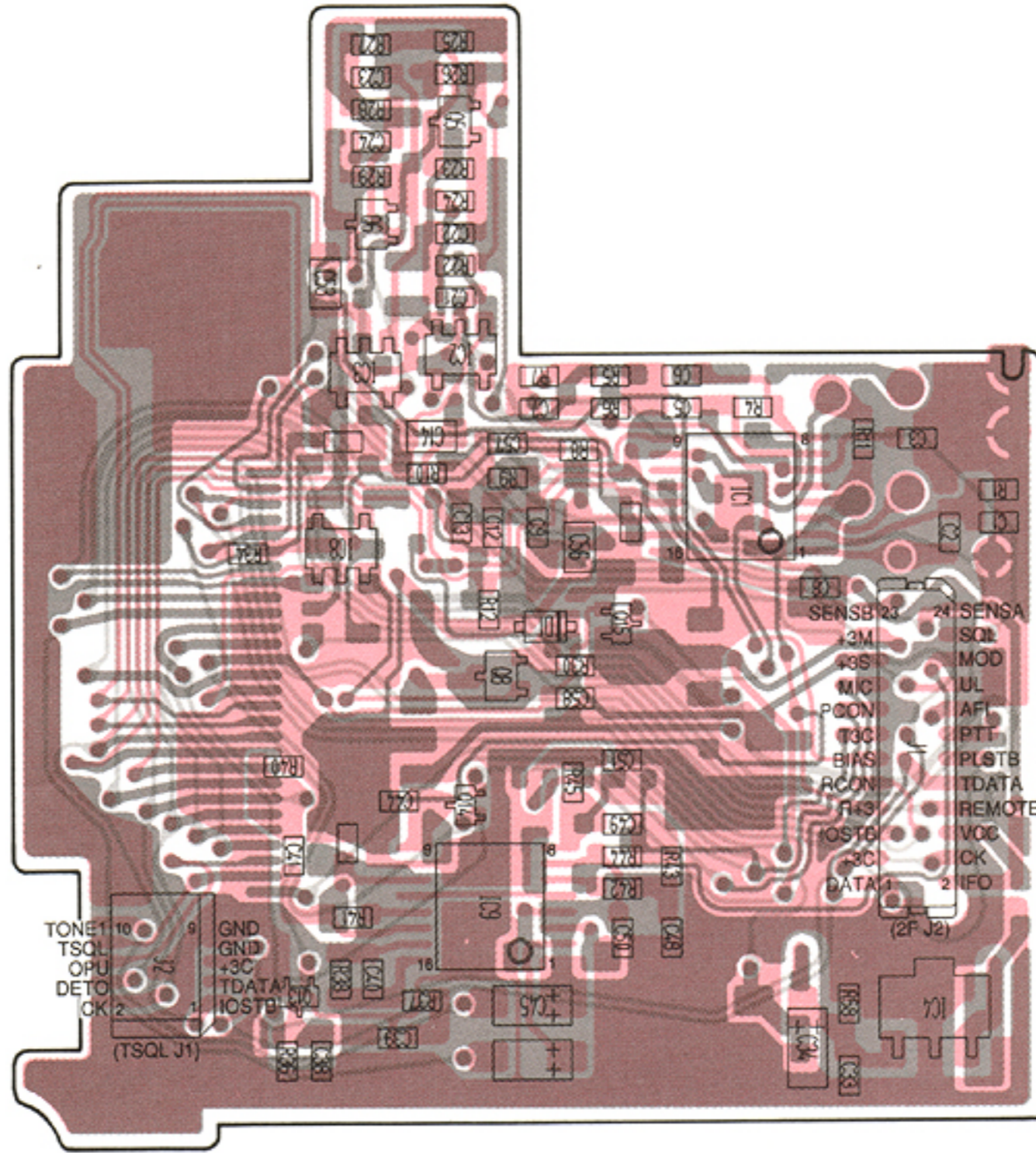
2SC4403 3
(Symbol: LY3)



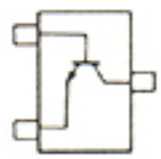
Q2

• 3F UNIT

S21

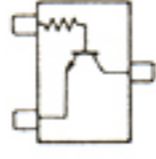


2SC4211 7
(Symbol: L7)



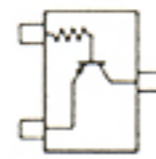
Q5, Q6, Q8

UN9215
(Symbol: 8E)



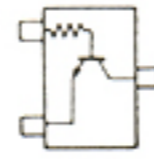
Q13

UN9110
(Symbol: 6L)



Q14

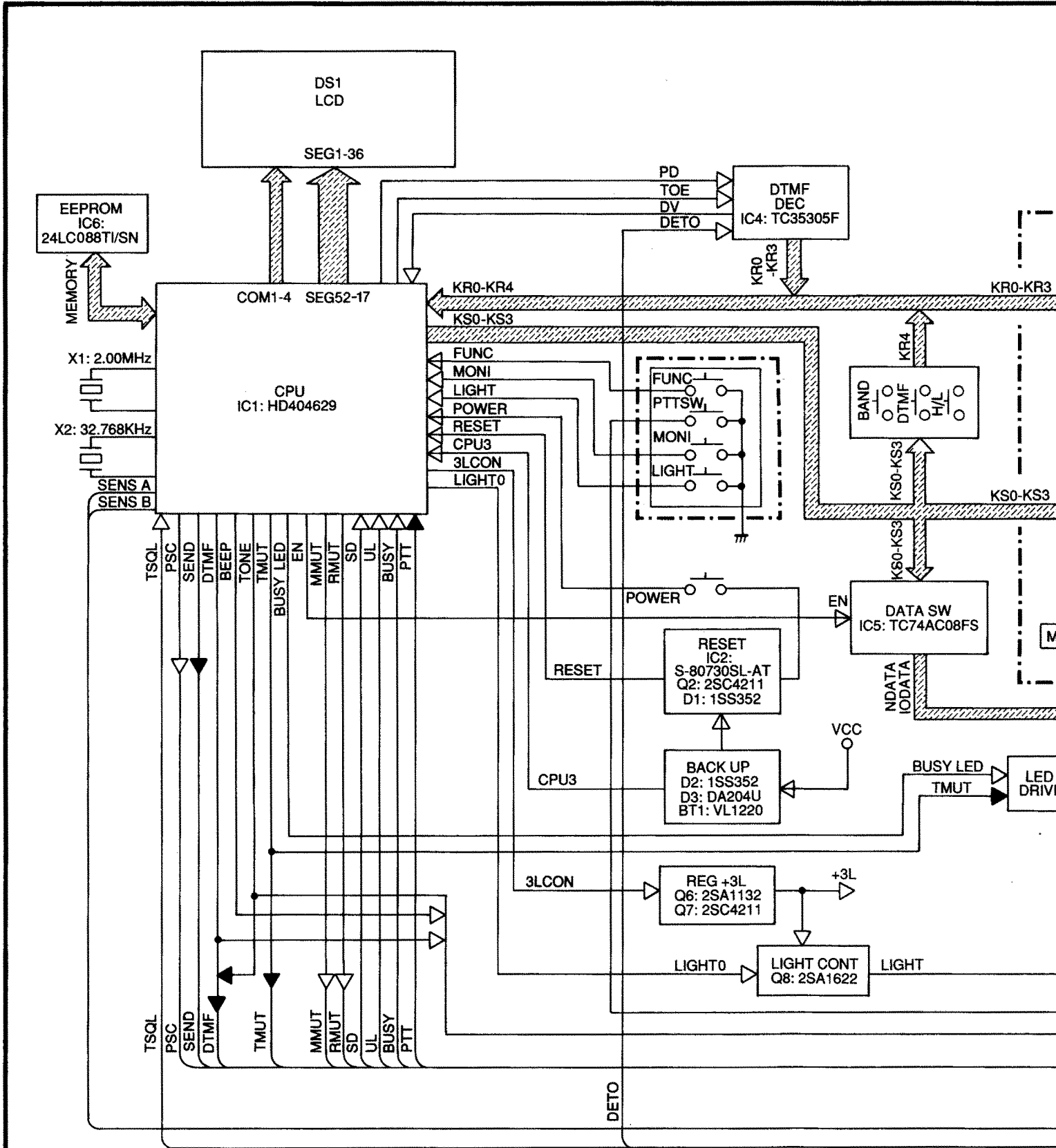
UN9210
(Symbol: 8L)



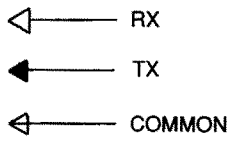
Q15

SECTION 9 BLOCK DIAGRAMS

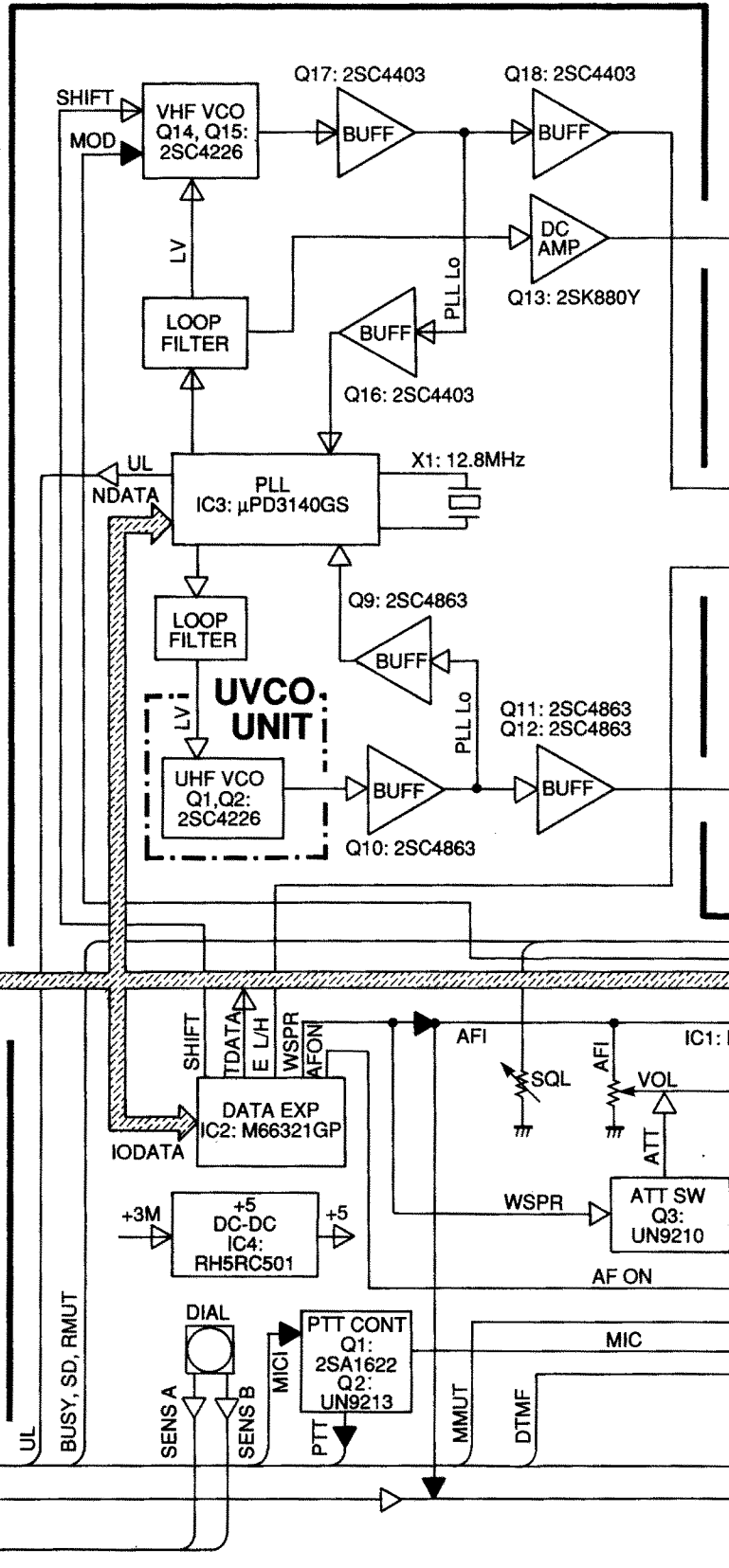
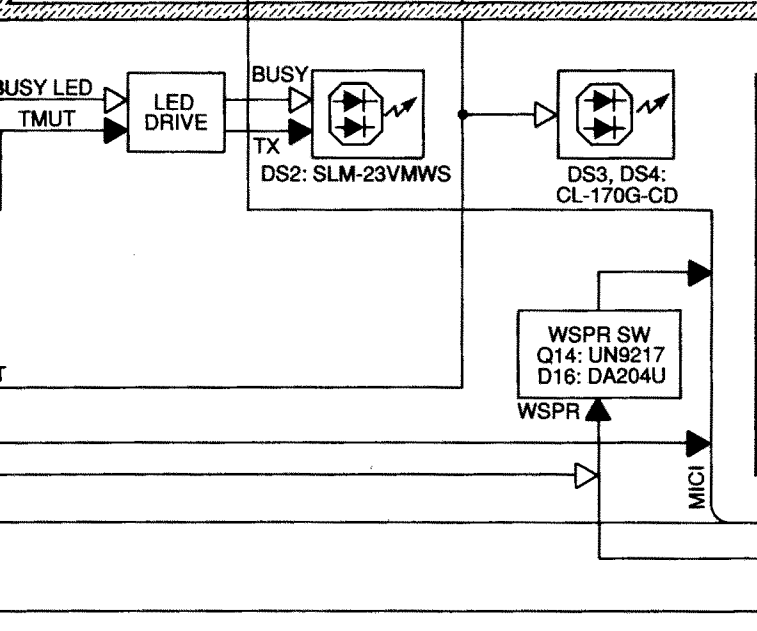
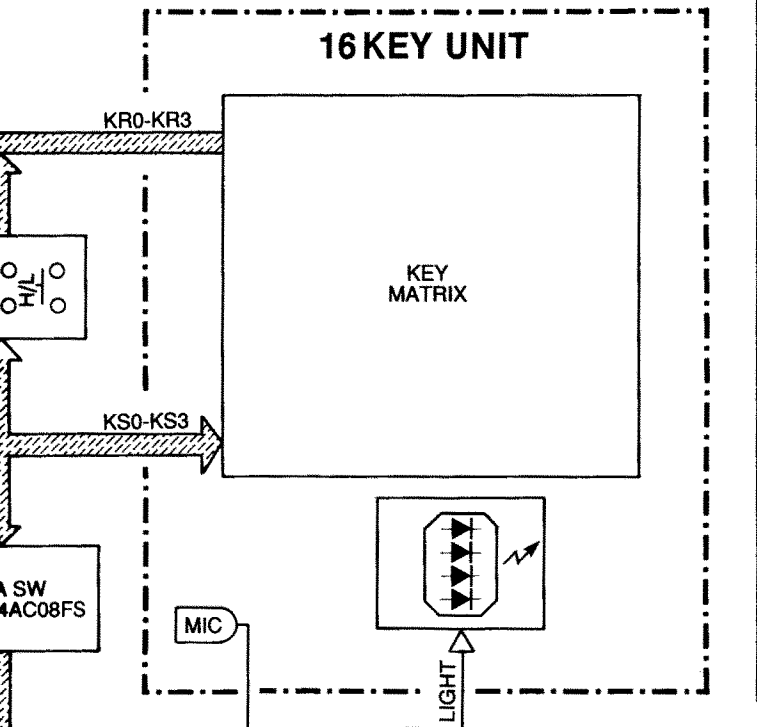
9-1 IC-T21A/E



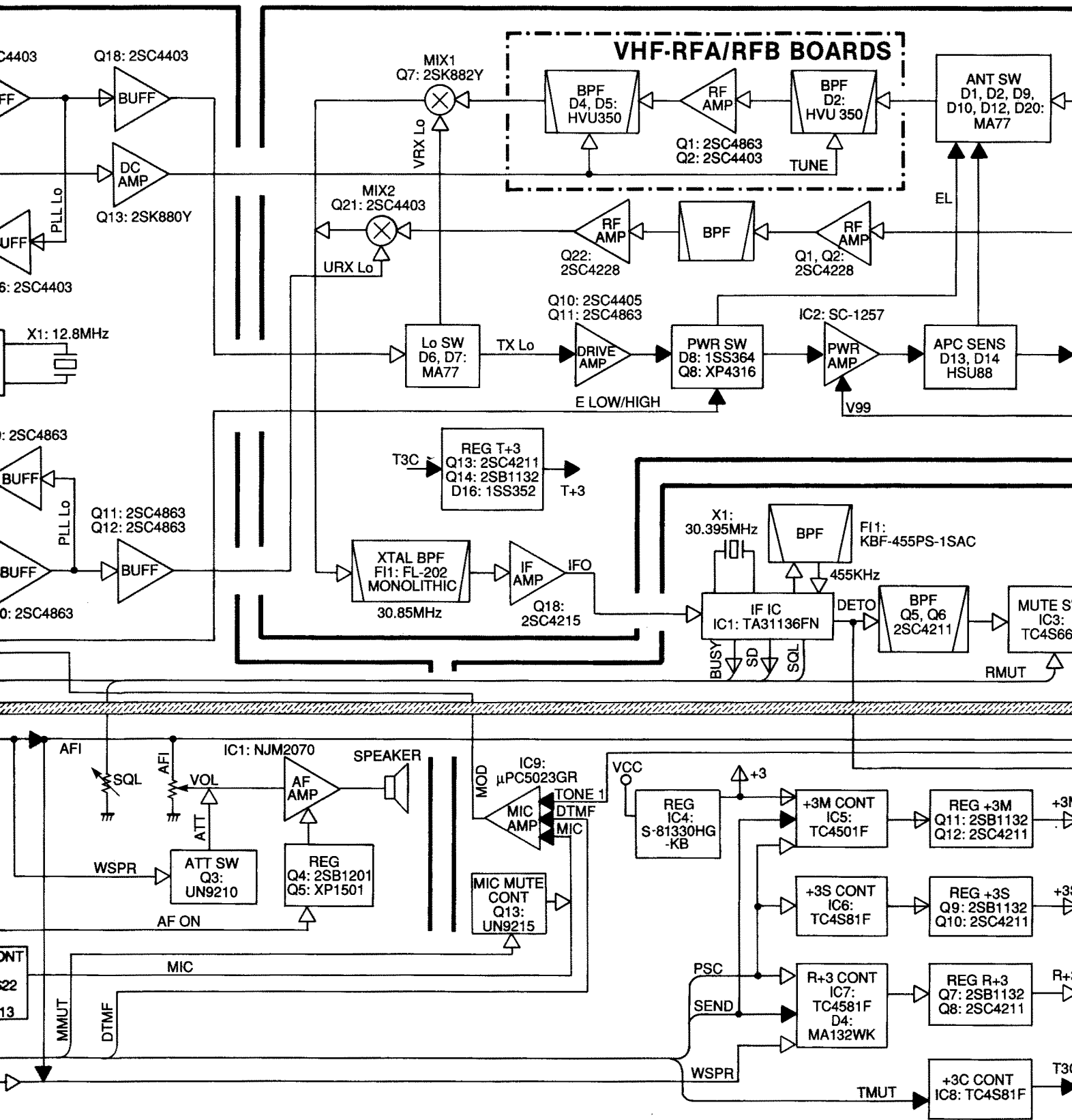
LOGIC UNIT



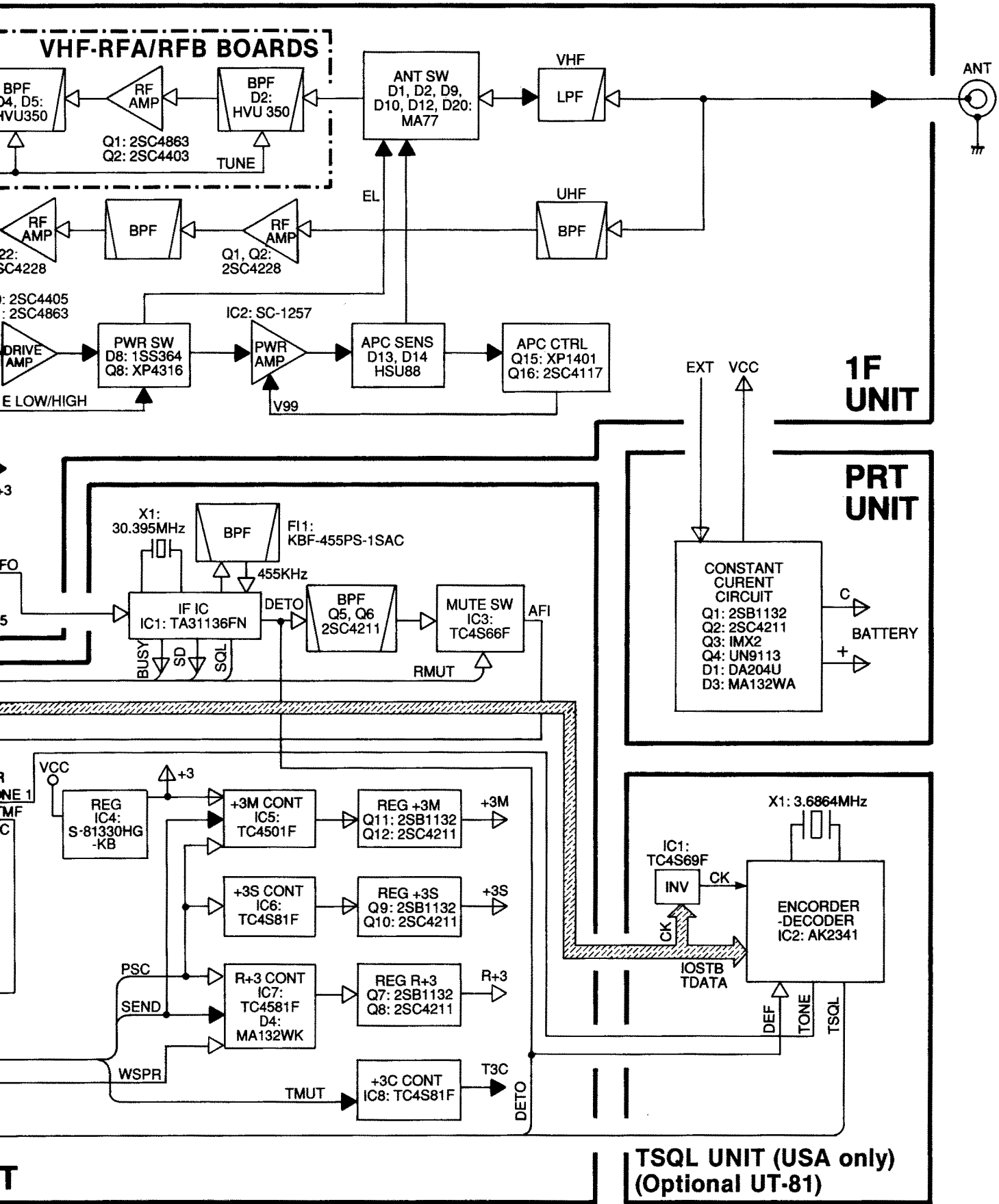
16 KEY UNIT



2F UNIT

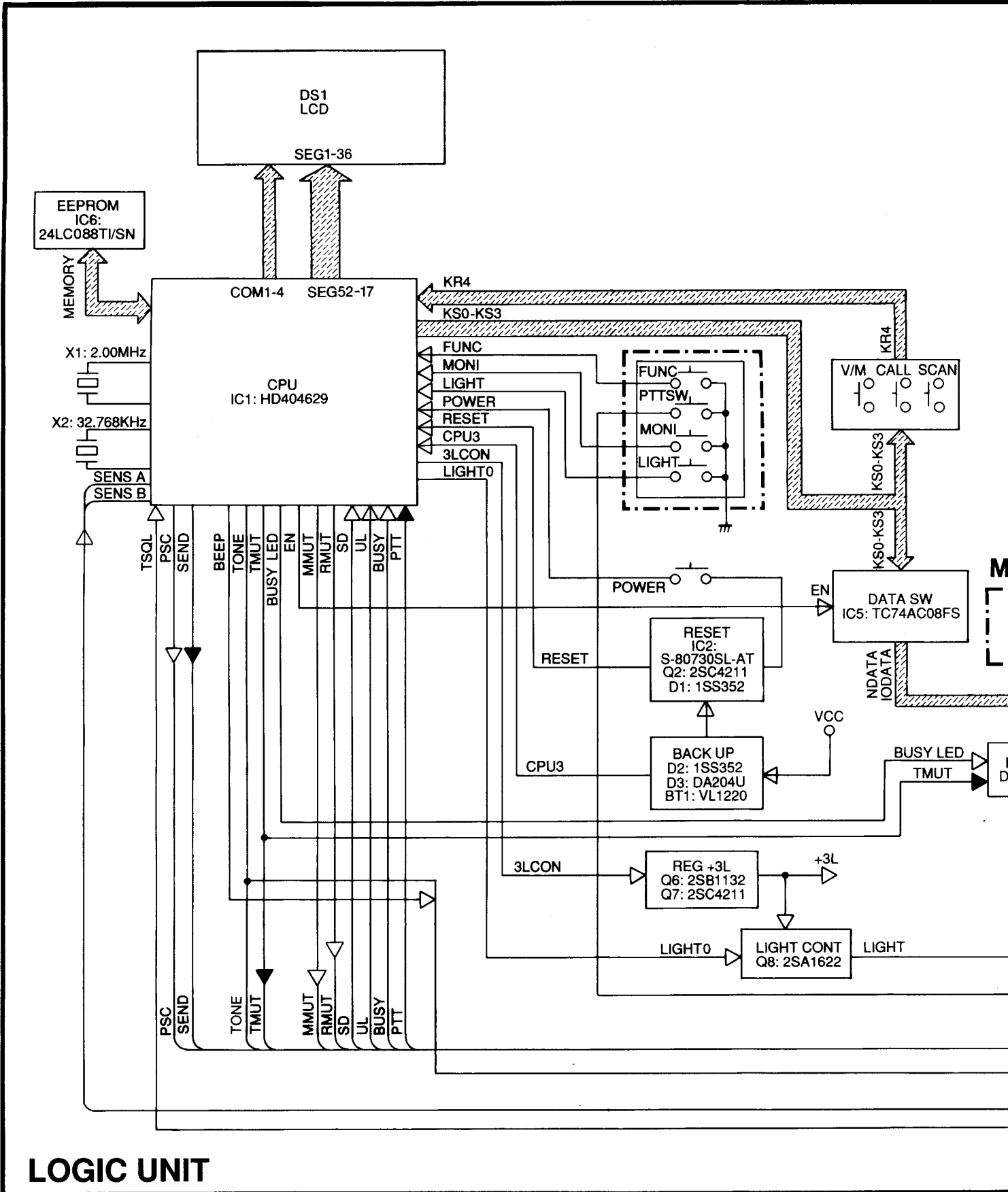


3F UNIT

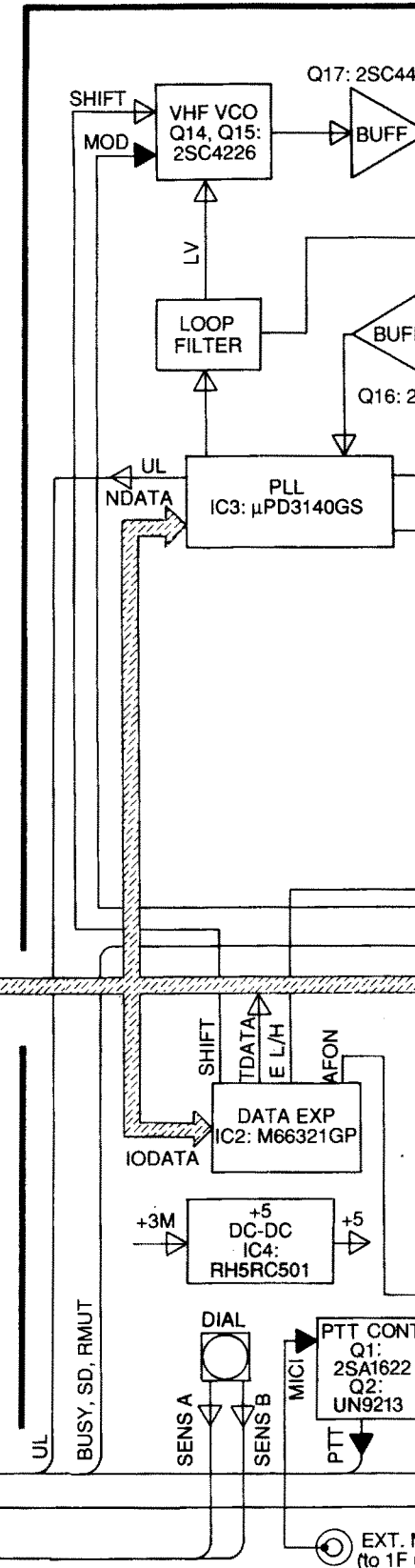
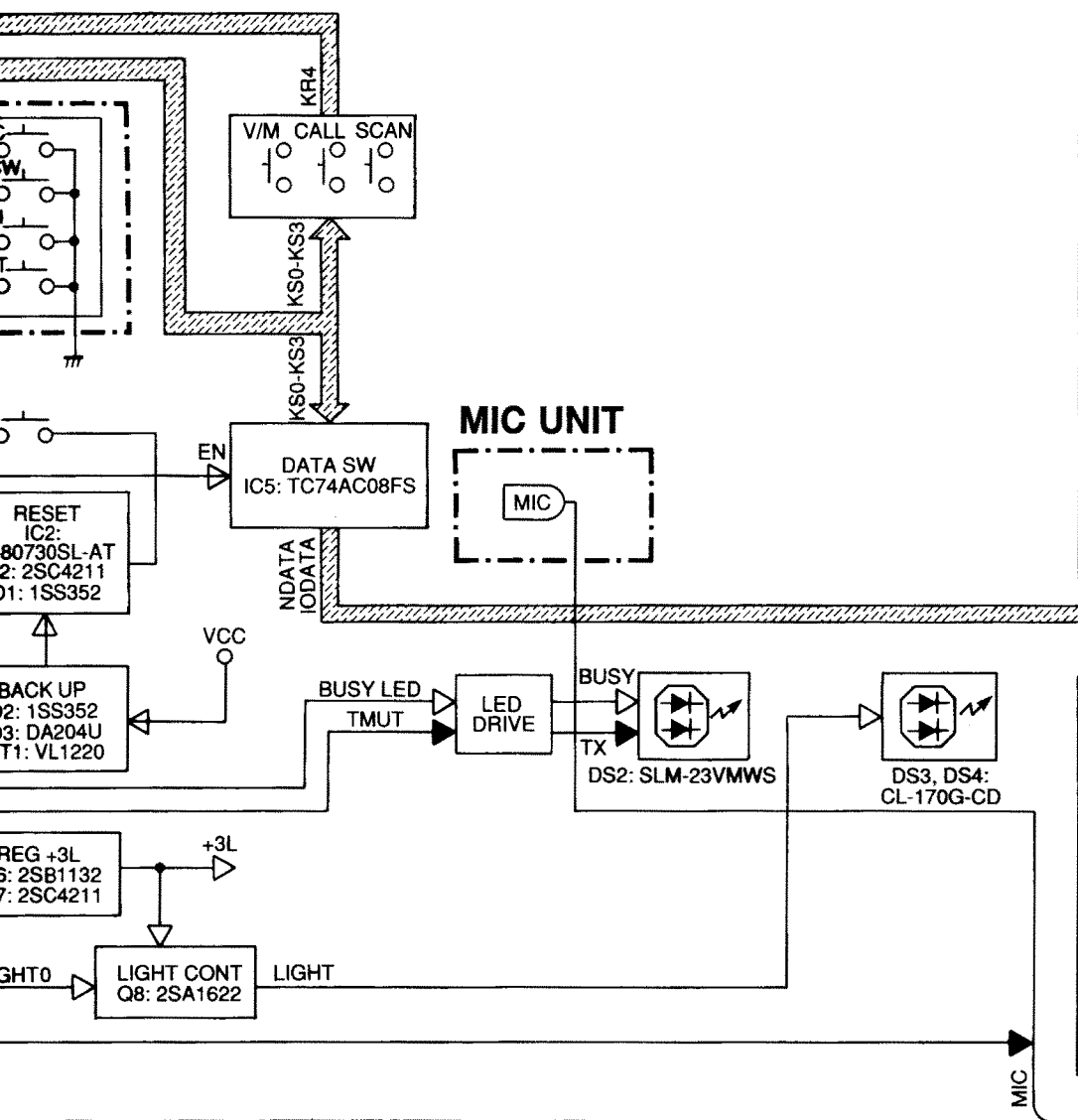
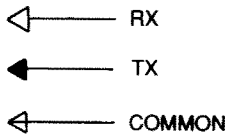


9-2 IC-S21A/E

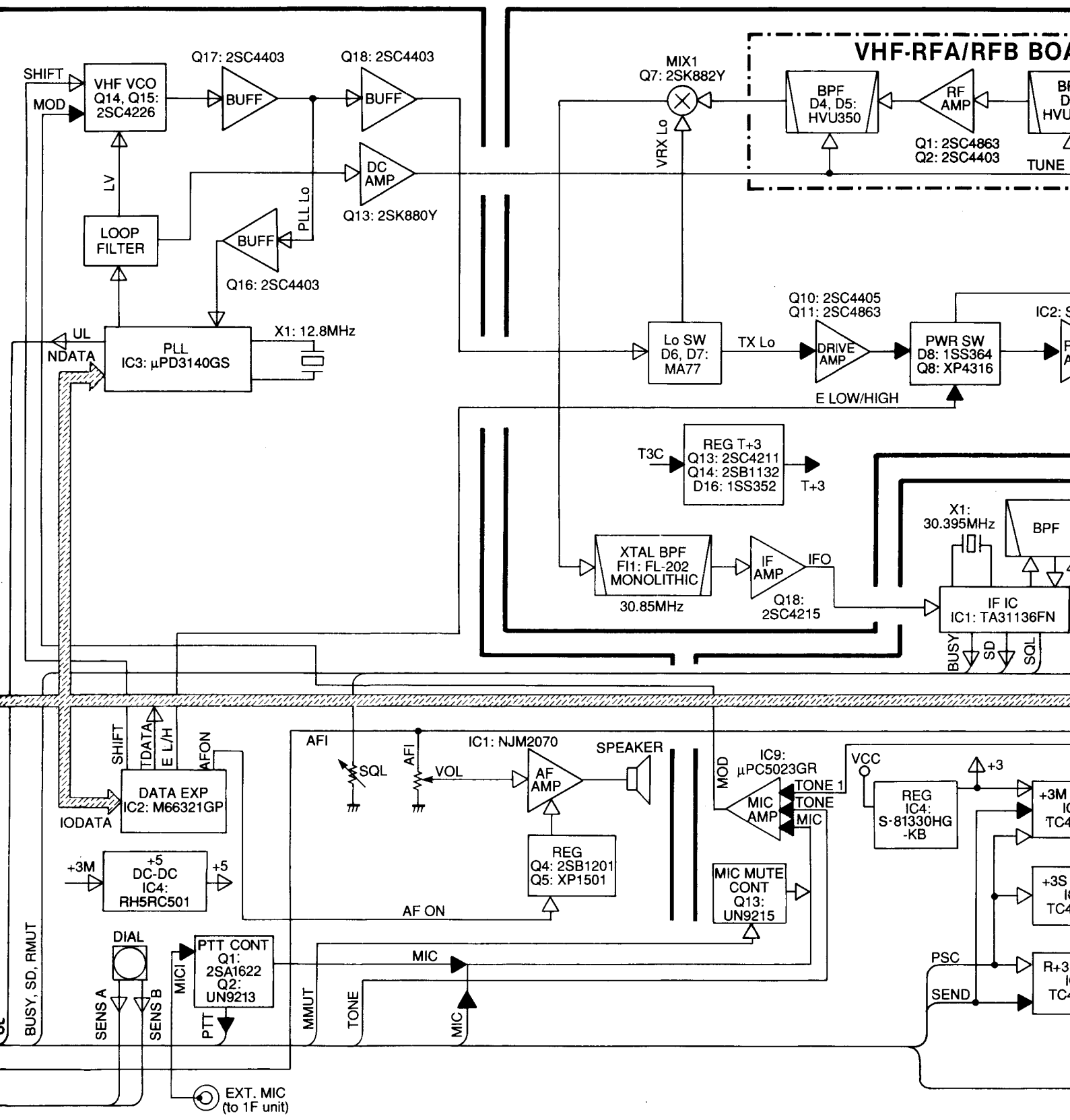
S21



LOGIC UNIT

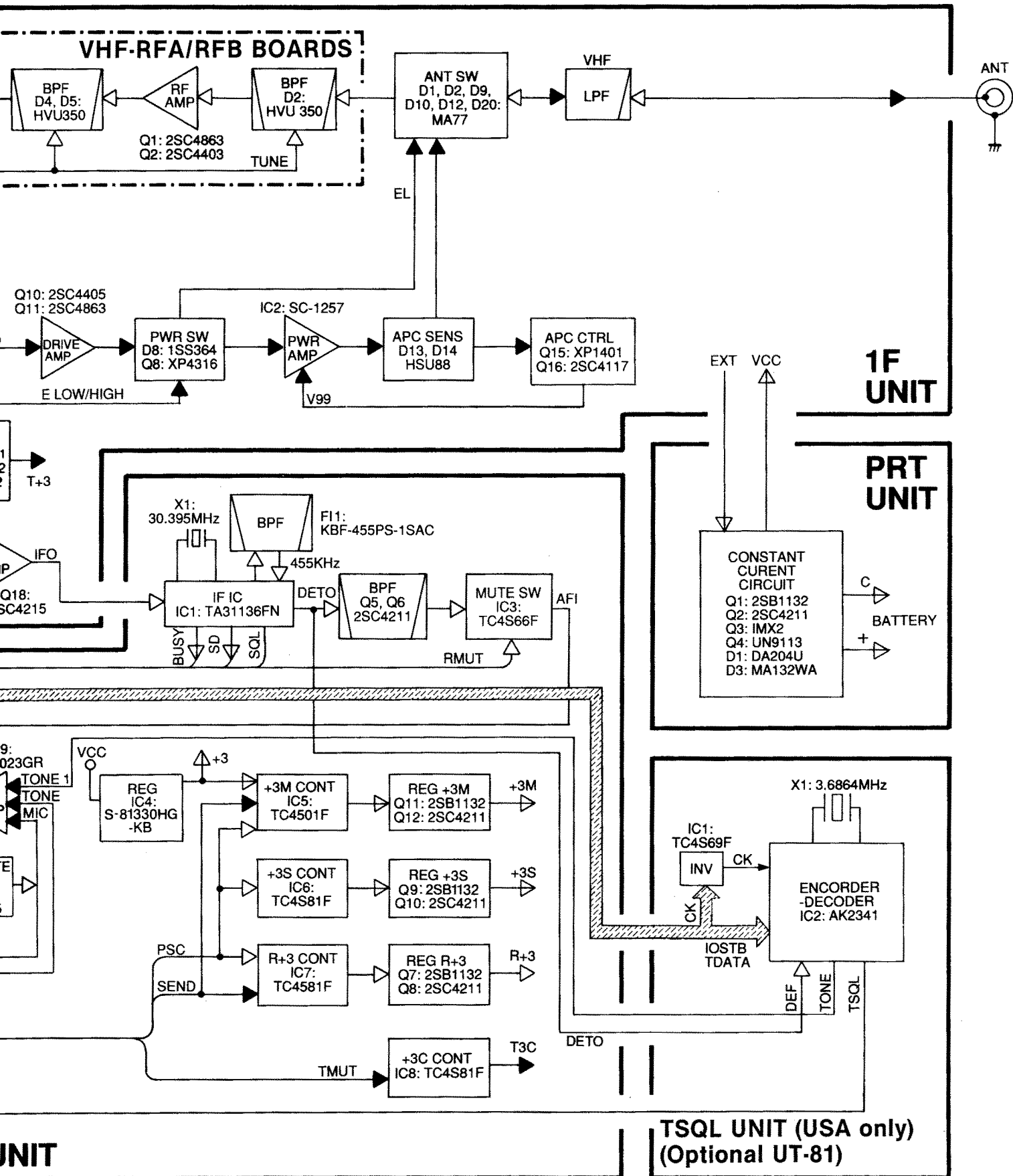


2F UNIT



2F UNIT

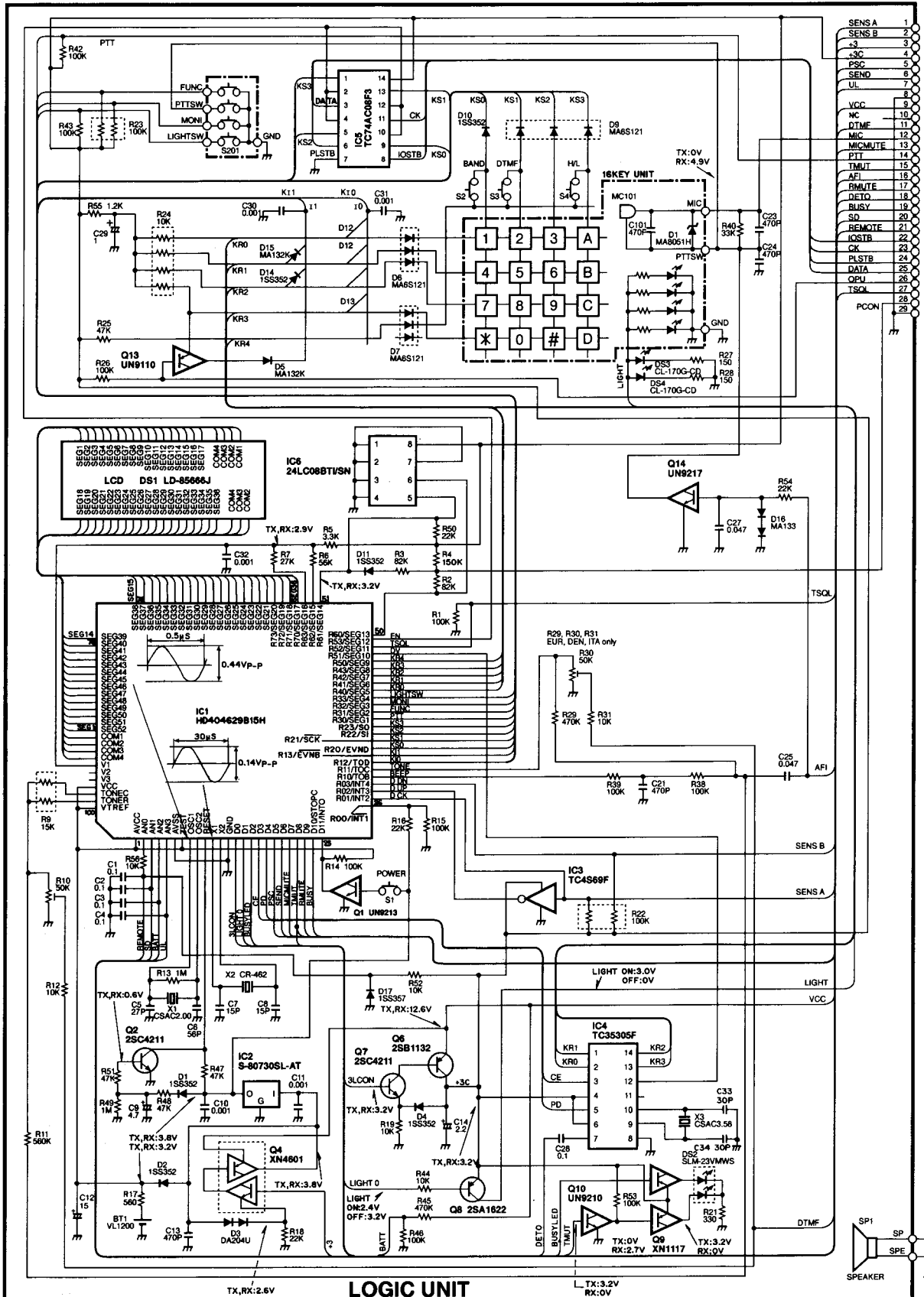
3F UNIT

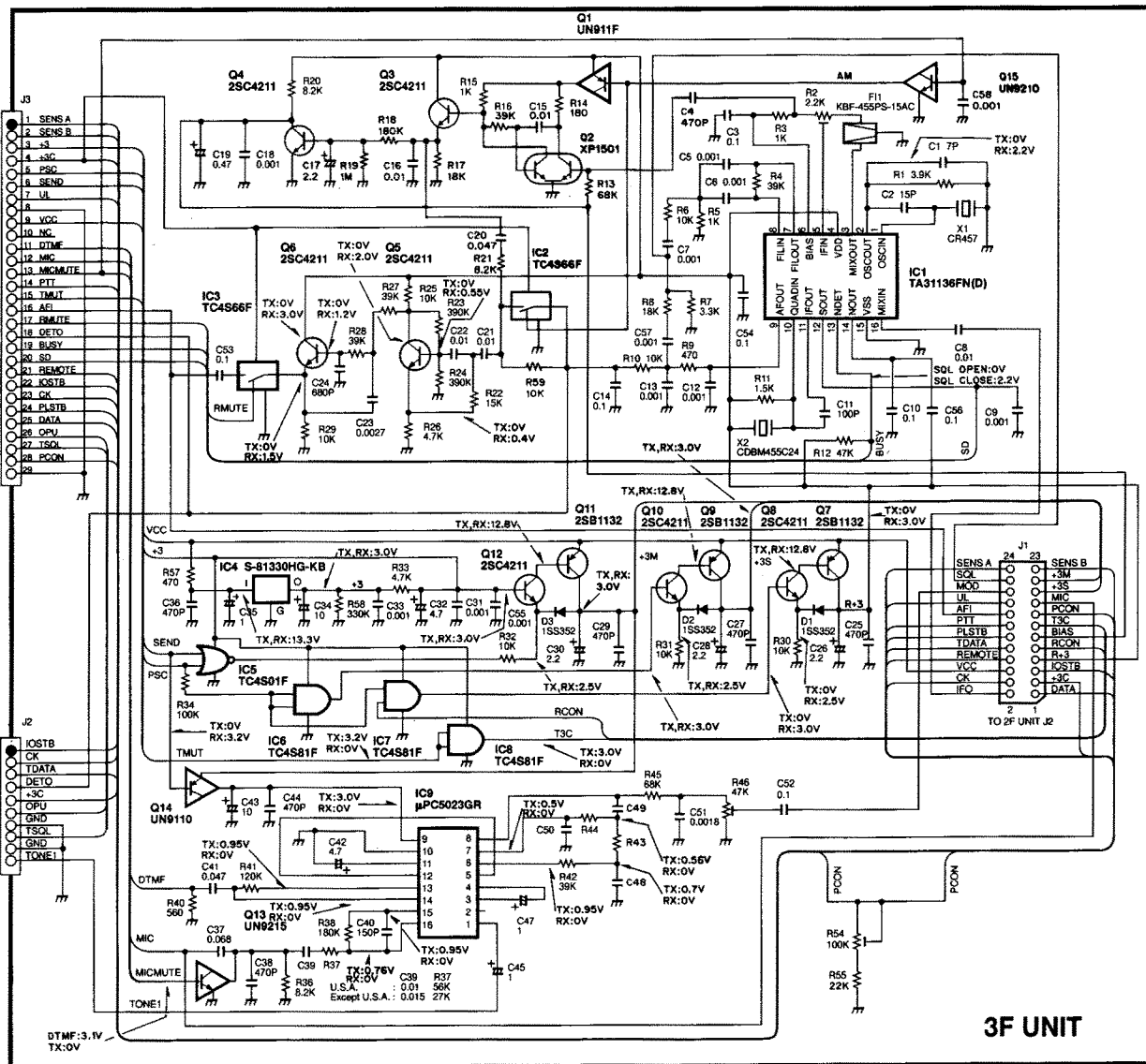


SECTION 10 VOLTAGE DIAGRAMS

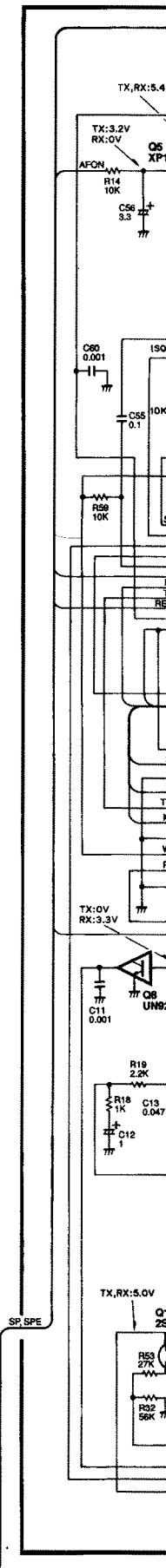
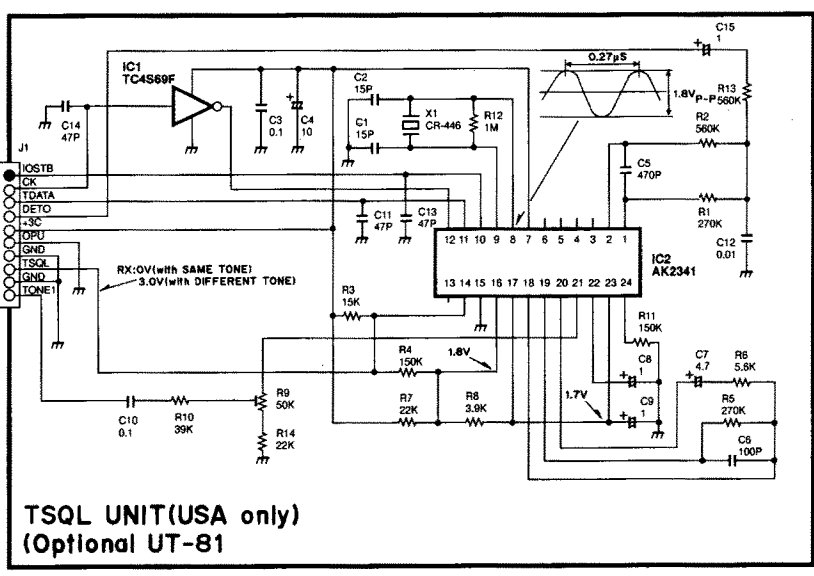
10-1 IC-T21A/E

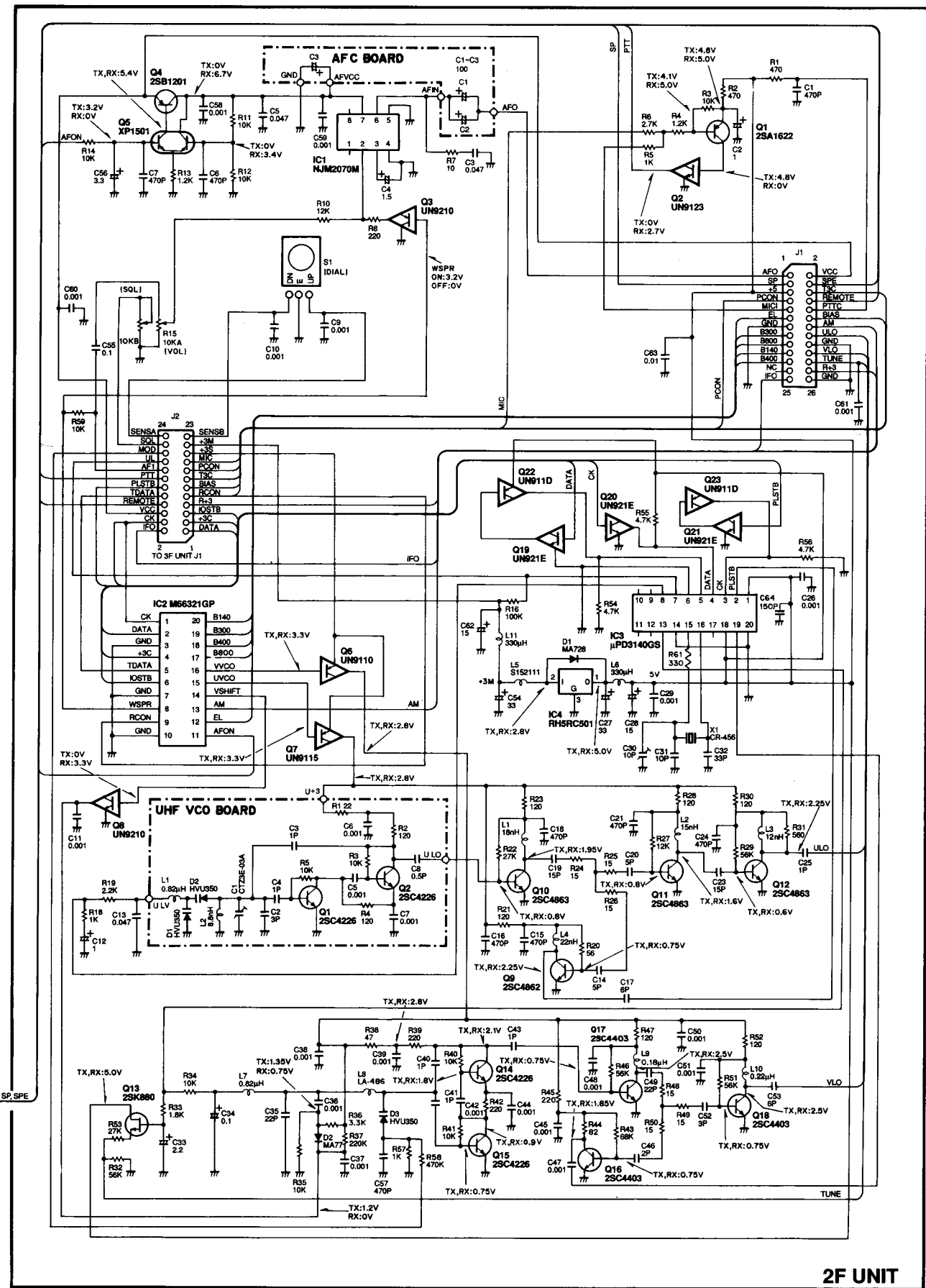
- EUR 10
 - KR0 D12 MA132HK
 - KR1
 - KR2
 - KR3
- U.S.A. 10
 - KR0 D12 MA132K
 - KR1
 - KR2 D13 MA132K
 - KR3
- TPE 10
 - KR0 D12 MA132K
 - KR1
 - KR2
 - KR3
- AUS 10
 - KR0 D12 MA132HK
 - KR1
 - KR2 D13 MA132K
 - KR3
- DEN 10
 - KR0 D12 MA132WK
 - KR1
 - KR2
 - KR3
- SEA 10
 - KR0 D12 MA132WK
 - KR1
 - KR2 D13 MA132K
 - KR3
- ITA 10
 - KR0 D13 MA132K
 - KR1
 - KR2
 - KR3





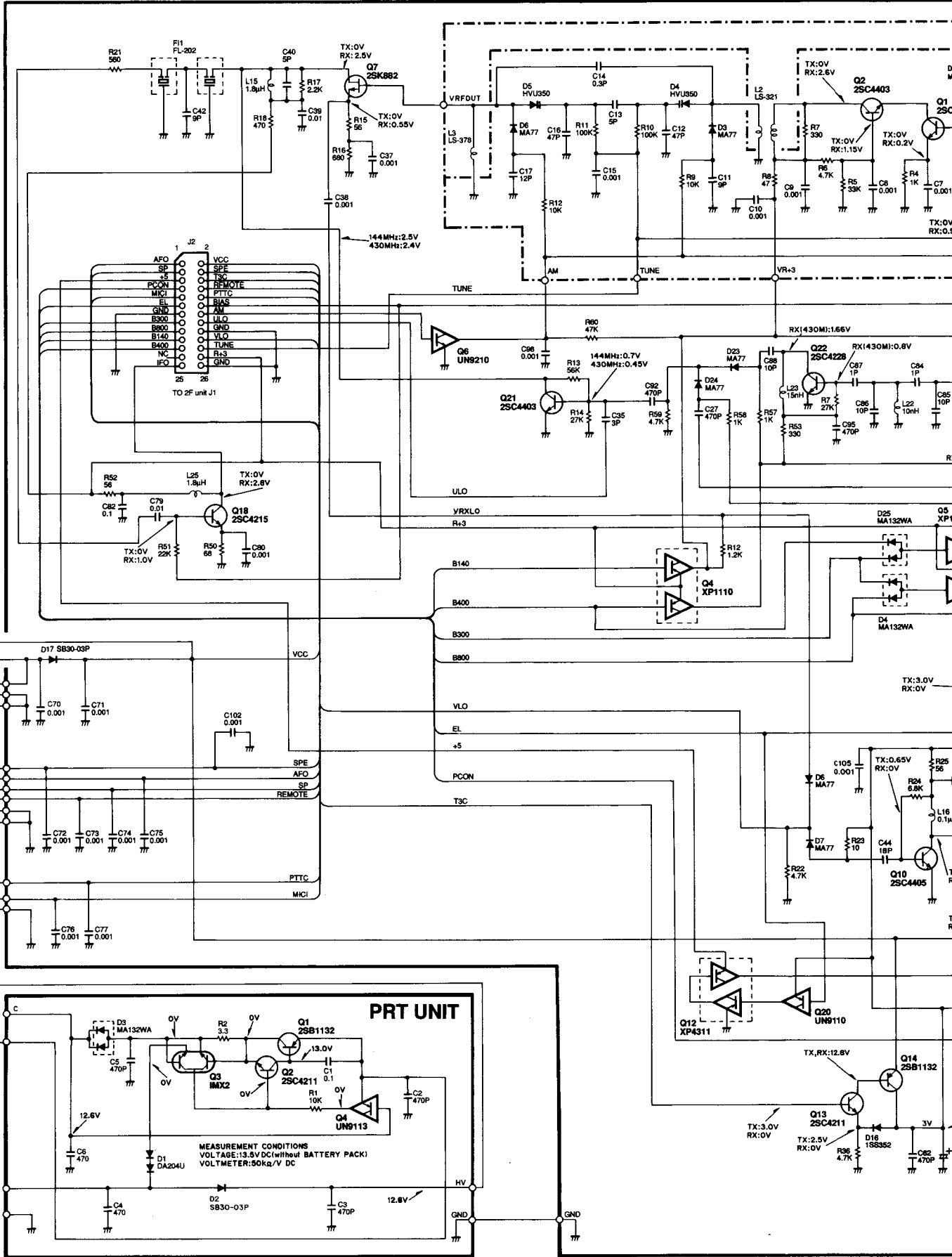
R42	R43	R44	C48	C49	C50
18K	39K	39K	0.0022	0.0018	120P
EUR, DEN, ITA	39K	47K	0.0047	0.0056	470P





2F UNIT



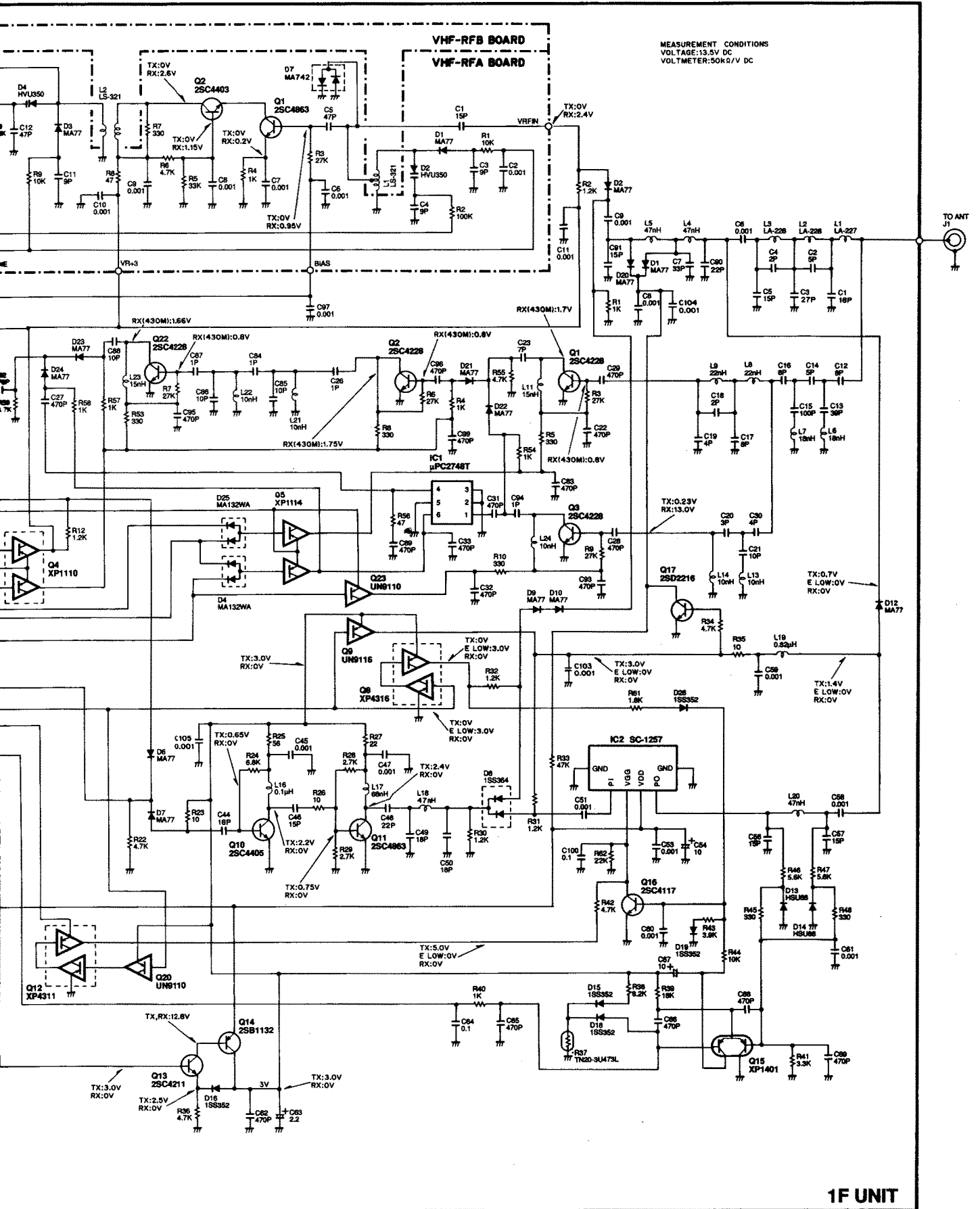


PRT UNIT

MEASUREMENT CONDITIONS
 VOLTAGE: 13.5V DC (without BATTERY PACK)
 VOLTMETER: 50ka/V DC

TO BATTERY PACK

UNIT



10-2 IC-S21A/E

S21

IC-S21E
EUR
IO
KR0
D12 MA132HK
KR1
KR2
KR3

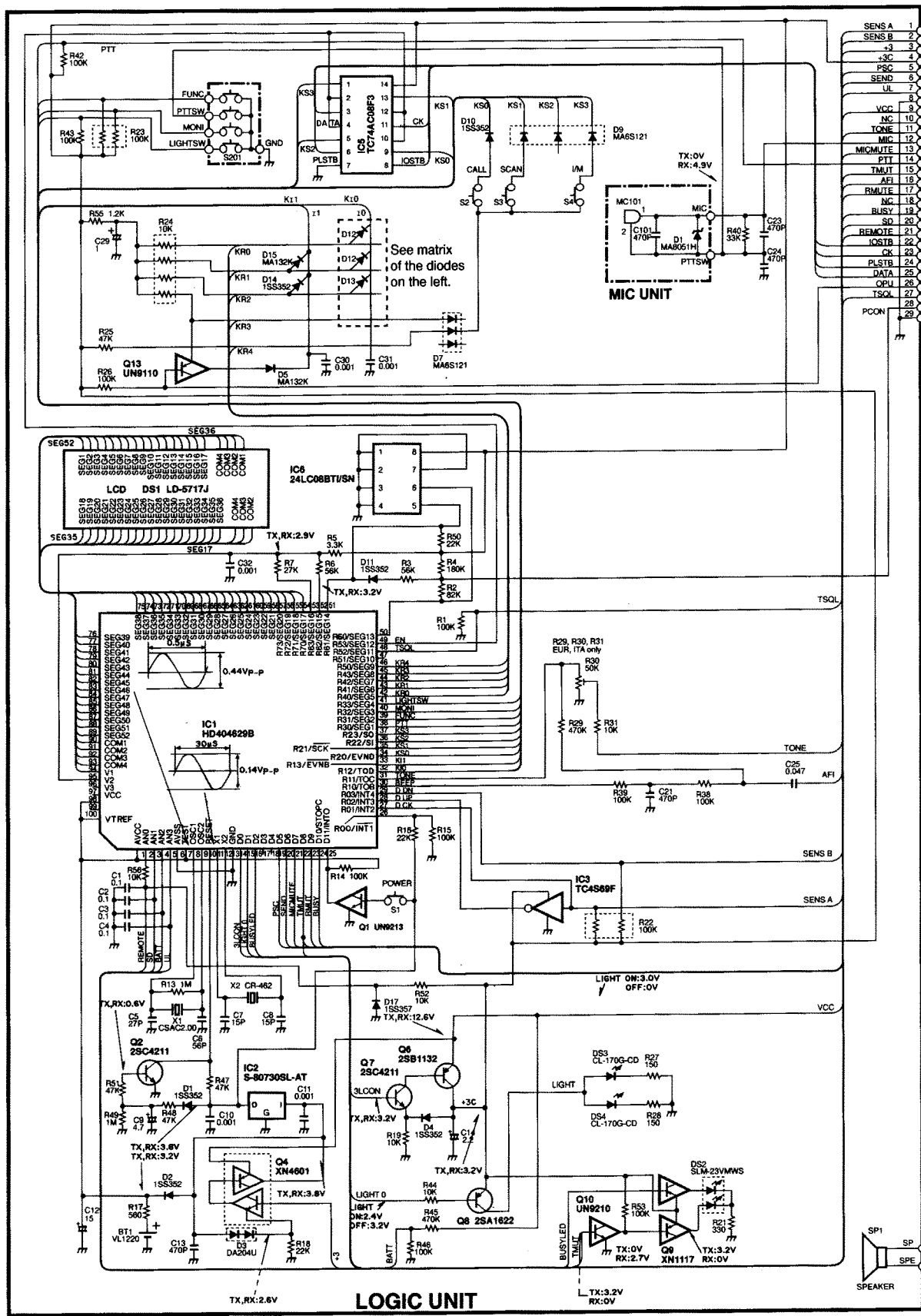
IC-S21A
U.S.A.
IO
KR0
D12 MA132K
KR1
KR2
D13 MA132K
KR3

IC-S21E
TPE
IO
KR0
D12 MA132K
KR1
KR2
KR3

IC-S21A
AUS
IO
KR0
D12 MA132HK
KR1
KR2
D13 MA132K
KR3

IC-S21A
SEA
IO
KR0
D12 MA132WK
KR1
D13 MA132K
KR2
KR3

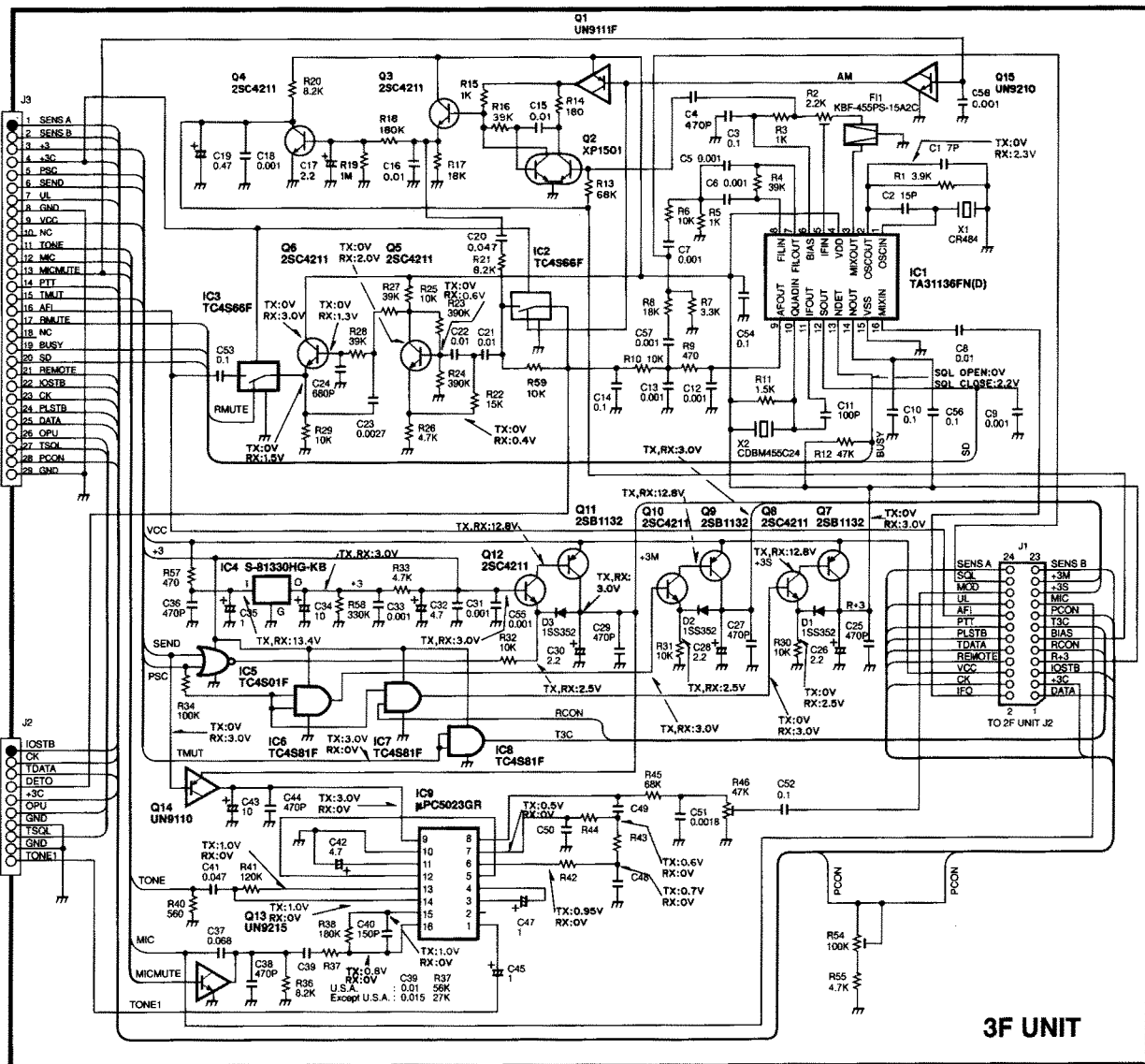
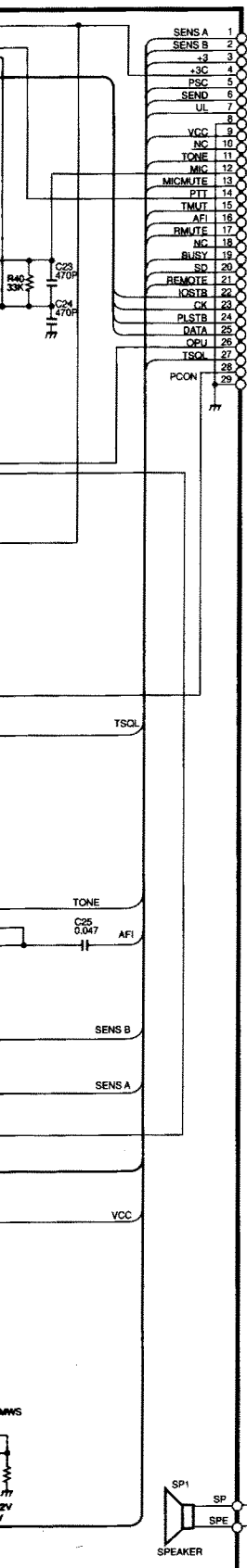
IC-S21E
ITA
IO
KR0
KR1
D13 MA132K
KR2
KR3



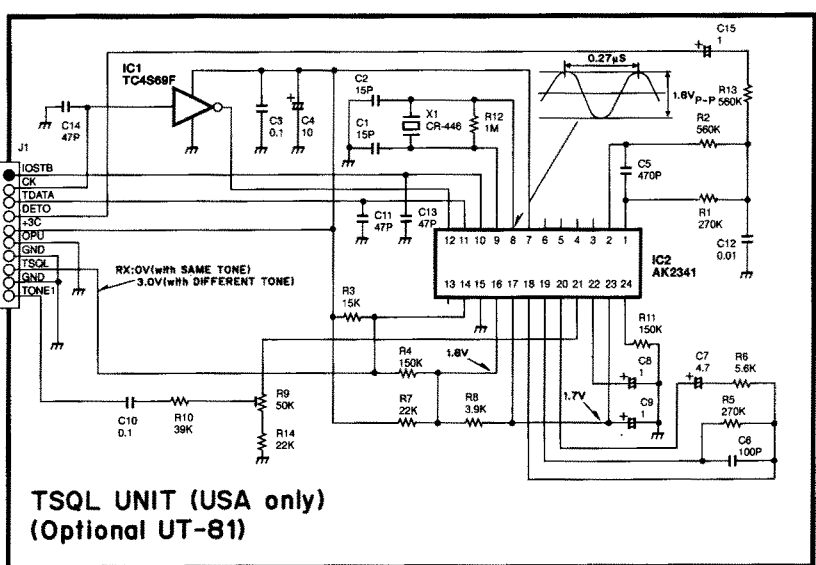
- SENS A 1
- SENS B 2
- +3 3
- +3C 4
- PSC 5
- SEND 6
- UL 7
- 8
- VCC 9
- INC 10
- TOPE 11
- MIC 12
- MICMUTE 13
- PTT 14
- TMUT 15
- AFI 16
- RMUTE 17
- INC 18
- BUSY 19
- SD 20
- REMOTE 21
- IOSTB 22
- CK 23
- PLSTB 24
- DATA 25
- OPU 26
- TSOL 27
- 28
- 29
- PCON 29

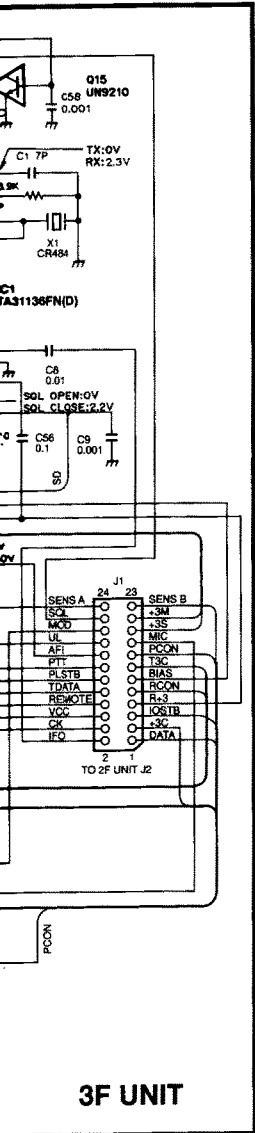
See matrix of the diodes on the left.

LOGIC UNIT

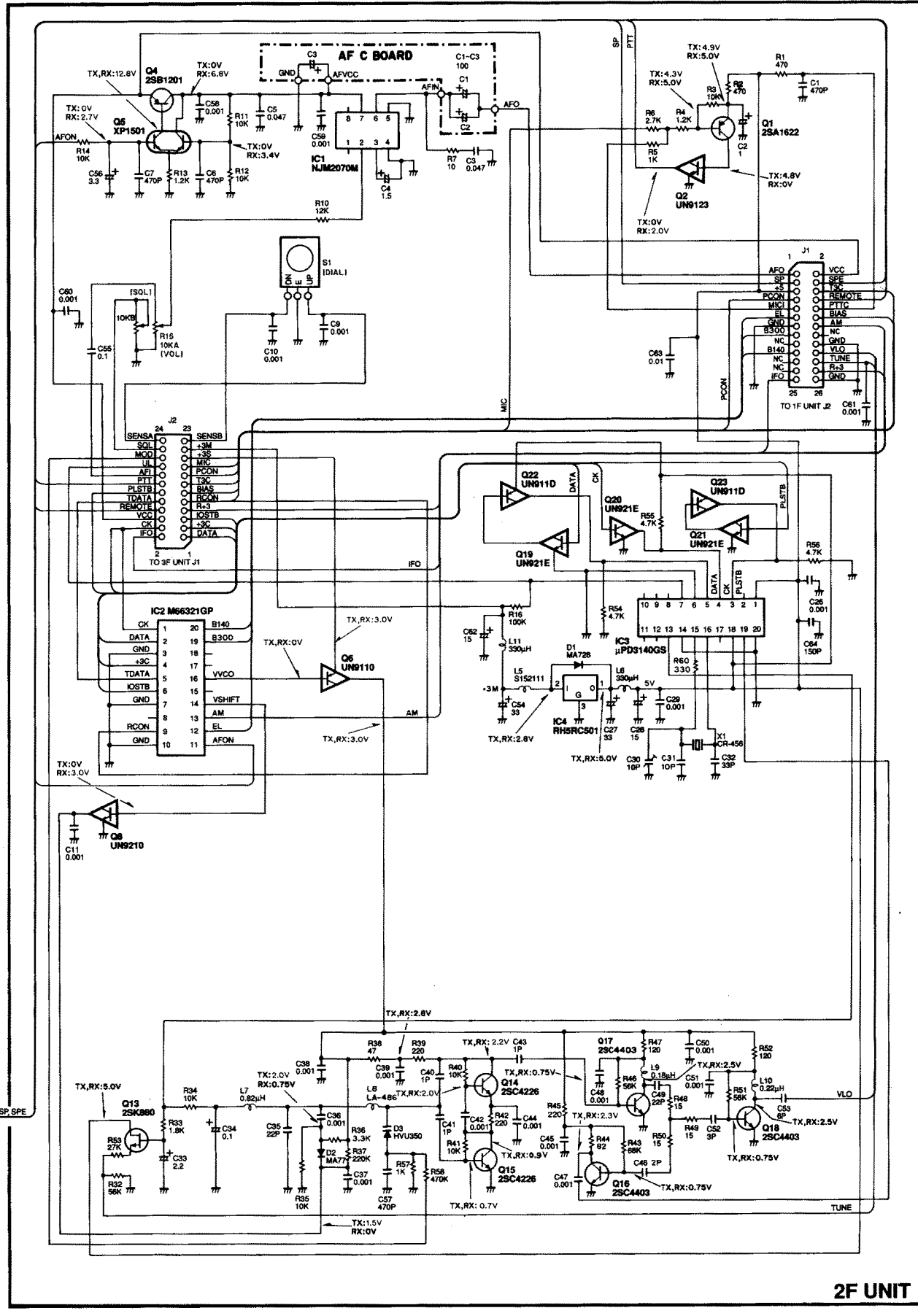


R42	R43	R44	C48	C49	C50
USA, TPE, AUS, SEA :	18K	39K	0.0022	0.0018	120P
EUR, ITA :	39K	47K	0.0047	0.0056	470P

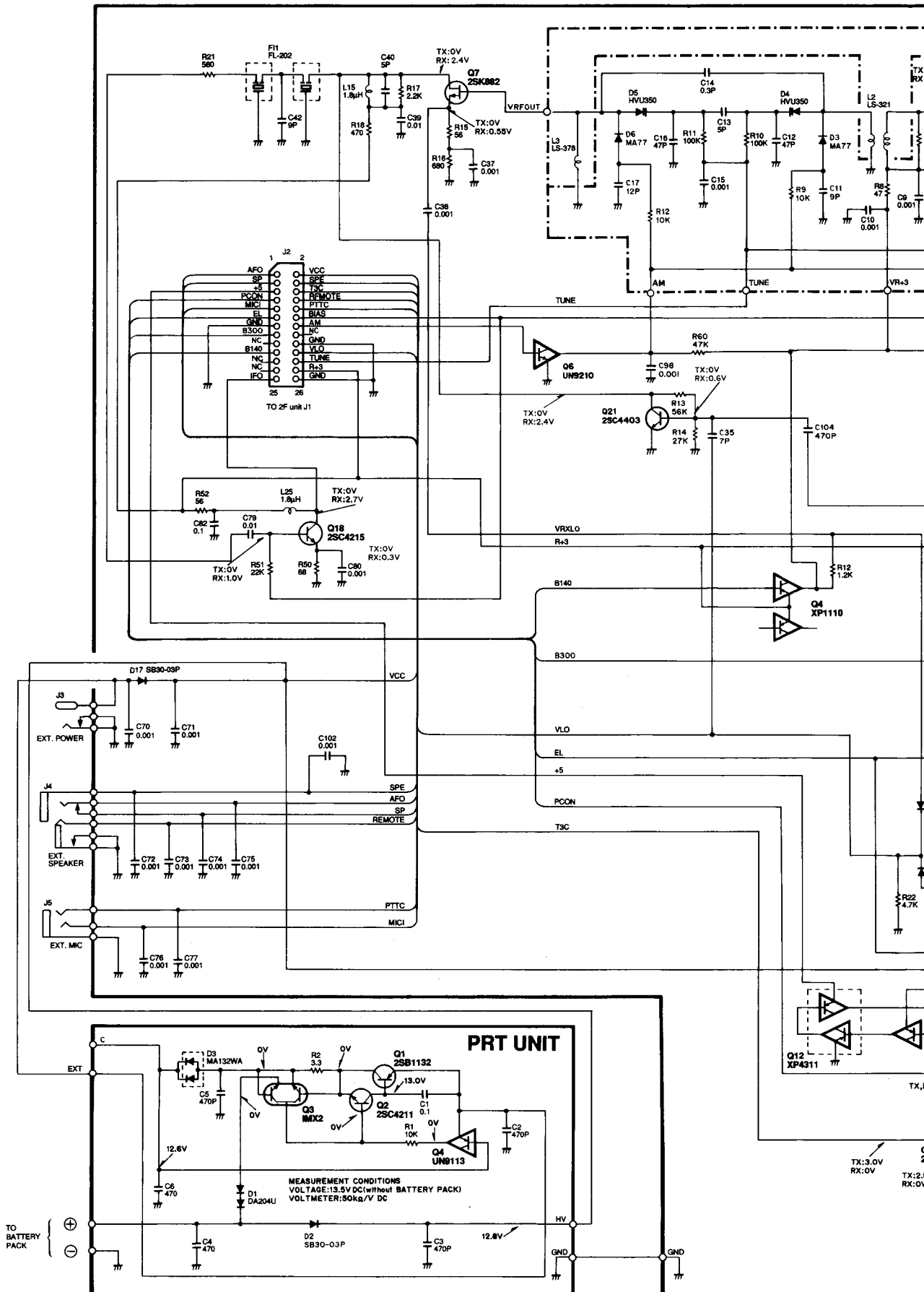
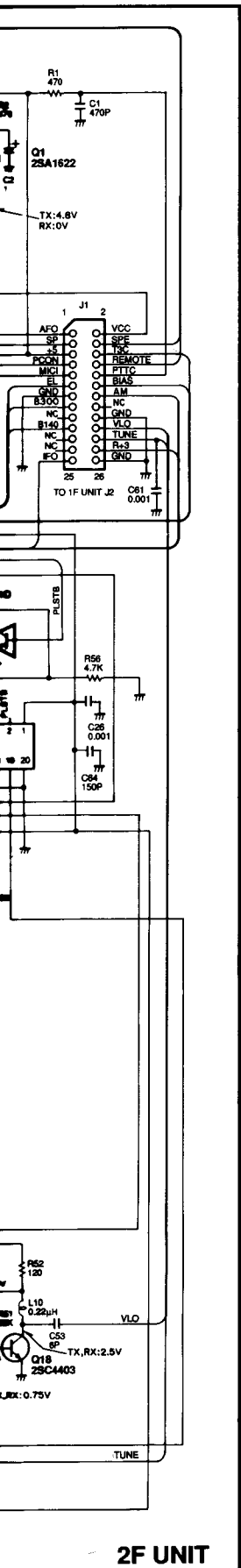


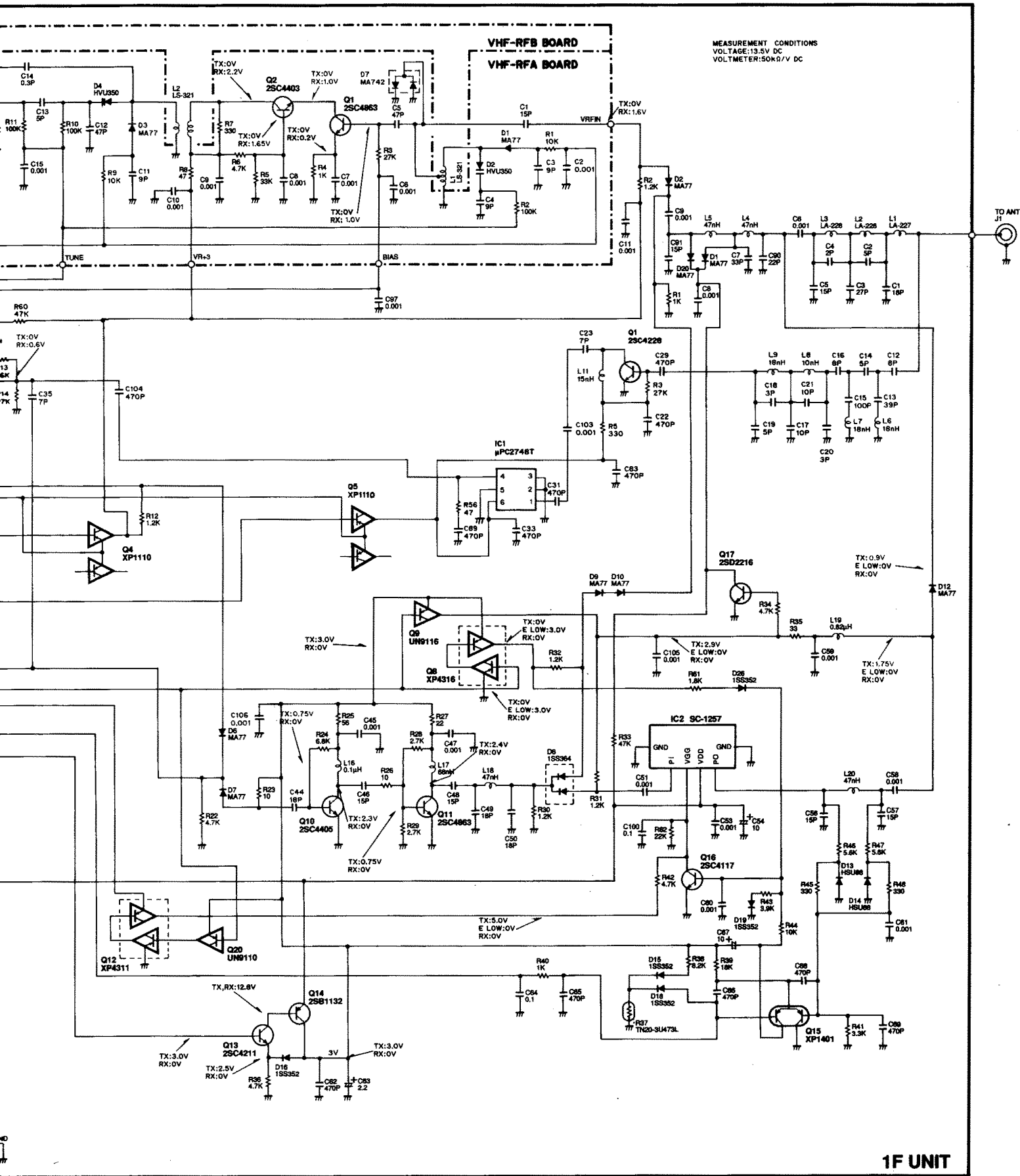


C50
120P
470P



2F UNIT





MEASUREMENT CONDITIONS
 VOLTAGE: 13.5V DC
 VOLTMETER: 50KΩ/V DC

1F UNIT

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