



# SERVICE MANUAL

VHF/UHF TRANSCEIVER

## **ID-50A** **ID-50E**

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S-16003XZ-C1  
August 2023

Icom Inc.

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## INTRODUCTION

We will supply spare units for the ID-50A/ID-50E described in this service manual.

Accordingly, this service manual focuses on the spare units that can be supplied, consumable parts and parts that are considered necessary in case of physical damage, instead of those on the individual electronic parts list.

This service manual describes the latest technical information for the ID-50A/ID-50E VHF/UHF TRANSCEIVER at the time of publication.

Model	Version	Version number
ID-50E	EUR-01	#12
ID-50A	USA-01	#15

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

## SERVICE CAUTION

**NEVER** connect the DUT to an AC outlet or to a DC power supply that outputs more than the specified voltage. This will ruin the DUT.

**DO NOT** reverse the polarity of the DC power cable when directly applying power to the DUT/circuit.

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

## ORDERING PARTS

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

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

### <ORDER EXAMPLE>

1560002420	RD01MUS2B-T513	ID-50A	MAIN UNIT	3 pieces
8930102610	3867 C-BUTTON	ID-50A	CHASSIS	1 piece



ID-50A

## REPAIR NOTES

1. Make sure that the problem is internal before disassembling the DUT.
2. **DO NOT** open the DUT until the DUT is disconnected from its power source.
3. **DO NOT** short any circuits or electronic parts.
4. **DO NOT** keep power ON for a long time when the DUT is defective.
5. **NEVER** transmit power into a Standard Signal Generator or a Sweep Generator. Otherwise the RF power may damage them.
6. **ALWAYS** connect a 30 dB to 40 dB attenuator between the DUT and such test equipment.
7. **READ** the instructions of the test equipment thoroughly before connecting it to the DUT.

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### ■ GENERAL

- Frequency coverage (unit: MHz):
  - USA version
    - [A band] Receive: 108.000 ~ 174.000 (Guaranteed only 144 ~ 148 MHz)  
375.000 ~ 479.000 (Guaranteed only 440 ~ 450 MHz)
    - Transmit: 144.000 ~ 148.000  
430.000 ~ 450.000 (Guaranteed only 440 ~ 450 MHz)
    - [B band] Receive: 137.000 ~ 174.000 (Guaranteed only 144 ~ 148 MHz)  
375.000 ~ 479.000 (Guaranteed only 440 ~ 450 MHz)
    - Transmit: 144.000 ~ 148.000  
430.000 ~ 450.000 (Guaranteed only 440 ~ 450 MHz)
    - [BC band (WFM)] Receive: 88.000 ~ 108.000
  - EUR version
    - [A band] Receive: 108.000 ~ 174.000 (Guaranteed only 144 ~ 146 MHz)  
375.000 ~ 479.000 (Guaranteed only 430 ~ 440 MHz)
    - Transmit: 144.000 ~ 146.000  
430.000 ~ 440.000
    - [B band] Receive: 137.000 ~ 174.000 (Guaranteed only 144 ~ 146 MHz)  
375.000 ~ 479.000 (Guaranteed only 430 ~ 440 MHz)
    - Transmit: 144.000 ~ 146.000  
430.000 ~ 440.000
    - [BC band (WFM)] Receive: 76.000 ~ 108.000
- Modes: FM/FM-N (F2D/F3E), AM/AM-N (A3E)\*, DV (F7W)  
\* RX only
- Number of Memory channels: 500 channels (in 100 groups)
- Number of Skip channels: 100 channels
- Number of FM Radio memory channels: 500 channels
- Number of Program Scan Edges: 25 pairs
- Number of Call channels: 4 channels (2 channels × 2 bands)
- Number of repeater memories: 2500 (in 50 groups)
- Number of GPS memories: 300
- Usable temperature range: -20°C ~ +60°C, -4°F ~ +140°F
- Tuning steps: 5, 6.25, 8.33\*, 10, 12.5, 15, 20, 25, 30, 50, 100, 125, and 200 kHz  
\* For only 108.000 MHz ~ 136.991 MHz
- Frequency stability: ±2.5 ppm (-20°C ~ +60°C, -4°F ~ +140°F)
- Power supply: 10.0 ~ 16.0 V DC for external DC power  
7.4 V DC specified Icom's battery pack  
5.5 V DC specified Icom's battery case
- Current drain (at 7.4 V DC):
  - Transmit (at 5 W) 2.5 A or less
  - Receive (Maximum output, 8 Ω load)
    - FM/FM-N 400 mA or less
    - DV 450 mA or less
- Antenna connector: SMA (50 Ω)
- Dimensions: 58.0 (W) × 111.0 (H) × 33.0 (D) mm,  
(projections not included) 2.3 (W) × 4.4 (H) × 1.3 (D) inches
- Weight (approximate): 300 g, 10.6 oz (Including battery pack and antenna)

### ■ TRANSMITTER

- Modulation system:
  - FM/FM-N Variable reactance frequency modulation
  - DV GMSK reactance frequency modulation
- Output power (at 7.4 V DC): High: 5.0 W, Mid: 2.5 W, Low2: 1.0 W, Low1: 0.5 W, S-Low: 0.1 W
- Maximum frequency deviation:
  - FM ±5.0 kHz or less
  - FM-N ±2.5 kHz or less
- Spurious emissions: -60 dBc or less at High/Mid  
-13 dBm or less at Low2/Low1/S-Low
- Microphone impedance: 2.2 kΩ

## RECEIVER

- Receive system: Double Conversion Superheterodyne
- Intermediate frequencies:
  - A band 1st IF 58.05 MHz, 2nd IF 450 kHz
  - B band 1st IF 57.15 MHz, 2nd IF 450 kHz
- Sensitivity:
  - Ham band
    - FM/FM-N 0.18  $\mu$ V (PD) or less (at 12 dB SINAD)
    - DV 0.2  $\mu$ V (PD) or less (at 1% BER)

Outside Ham band

Band	Frequency range (MHz)	FM/FM-N/WFM*1 (12 dB SINAD)	AM/AM-N*2 (10dB S/N)
BC band	76.000 ~ 108.000	1 $\mu$ V (PD) or less	–
A band	108.000 ~ 136.991	–	1 $\mu$ V (PD) or less
	137.000 ~ 142.000	0.18 $\mu$ V (PD) or less	1 $\mu$ V (PD) or less
	142.005 ~ 148.000	0.18 $\mu$ V (PD) or less	–
	148.005 ~ 174.000	0.32 $\mu$ V (PD) or less	–
	375.000 ~ 399.995	0.5 $\mu$ V (PD) or less	–
	400.000 ~ 479.000	0.32 $\mu$ V (PD) or less	–
B band	137.000 ~ 148.000	0.18 $\mu$ V (PD) or less	–
	148.005 ~ 174.000	0.32 $\mu$ V (PD) or less	–
	375.000 ~ 399.995	0.5 $\mu$ V (PD) or less	–
	400.000 ~ 479.000	0.32 $\mu$ V (PD) or less	–

\*1 “WFM” is for only BC band. “FM” and “FM-N” are for only A/B band.

\*2 “AM and AM-N” are for only 108.000 MHz ~ 143.995 MHz.

- Audio output power:
  - Internal speaker 0.75 W or more at 10% distortion into the 8  $\Omega$  load
  - External speaker 0.2 W or more at 10% distortion into an 8  $\Omega$  load
- Selectivity:
  - FM 55 dB or more
  - FM-N/DV 50 dB or more
- Spurious and image rejection ratio: 60 dB or more
- Squelch Sensitivity:
  - Ham band 0.18  $\mu$ V (PD) or less (threshold)
  - Outside Ham band

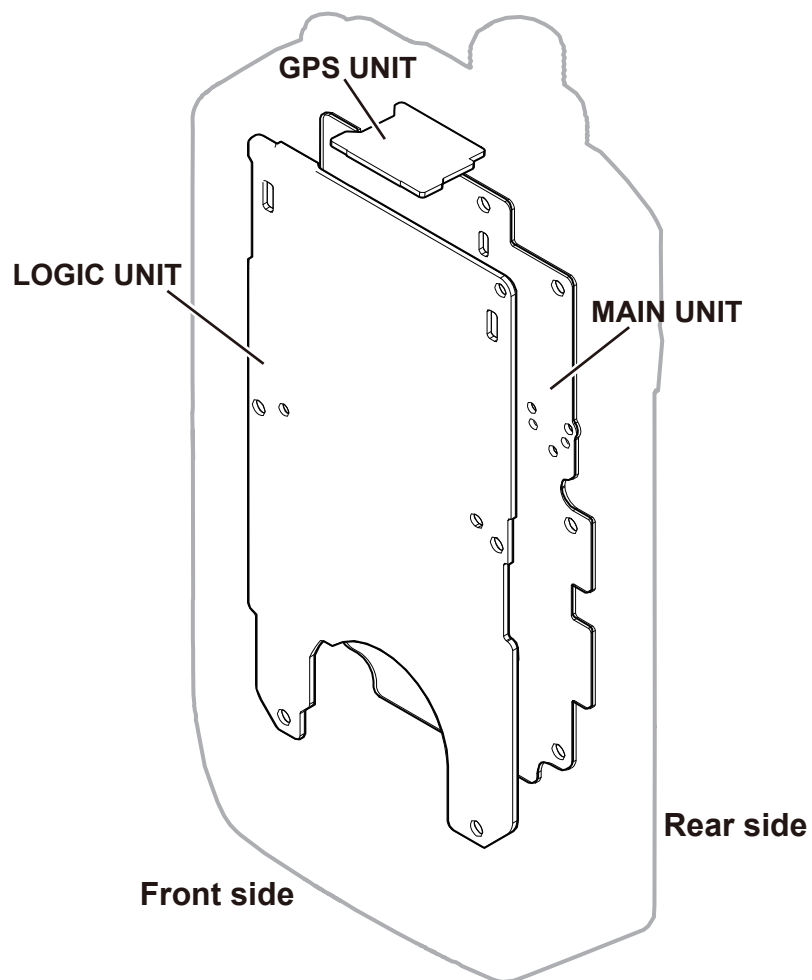
Band	Frequency range (MHz)	FM/FM-N/WFM*1	AM/AM-N*2
BC band	76.000 ~ 108.000	1.8 $\mu$ V (PD) or less	–
A band	108.000 ~ 136.991	–	1 $\mu$ V (PD) or less
	137.000 ~ 142.000	0.32 $\mu$ V (PD) or less	1 $\mu$ V (PD) or less
	142.005 ~ 148.000	0.32 $\mu$ V (PD) or less	–
	148.005 ~ 174.000	0.32 $\mu$ V (PD) or less	–
	375.000 ~ 399.995	0.32 $\mu$ V (PD) or less	–
	400.000 ~ 479.000	0.32 $\mu$ V (PD) or less	–
B band	137.000 ~ 148.000	0.32 $\mu$ V (PD) or less	–
	148.005 ~ 174.000	0.32 $\mu$ V (PD) or less	–
	375.000 ~ 399.995	0.32 $\mu$ V (PD) or less	–
	400.000 ~ 479.000	0.32 $\mu$ V (PD) or less	–

\*1 “WFM” is for only BC band. “FM” and “FM-N” are for only A/B band.

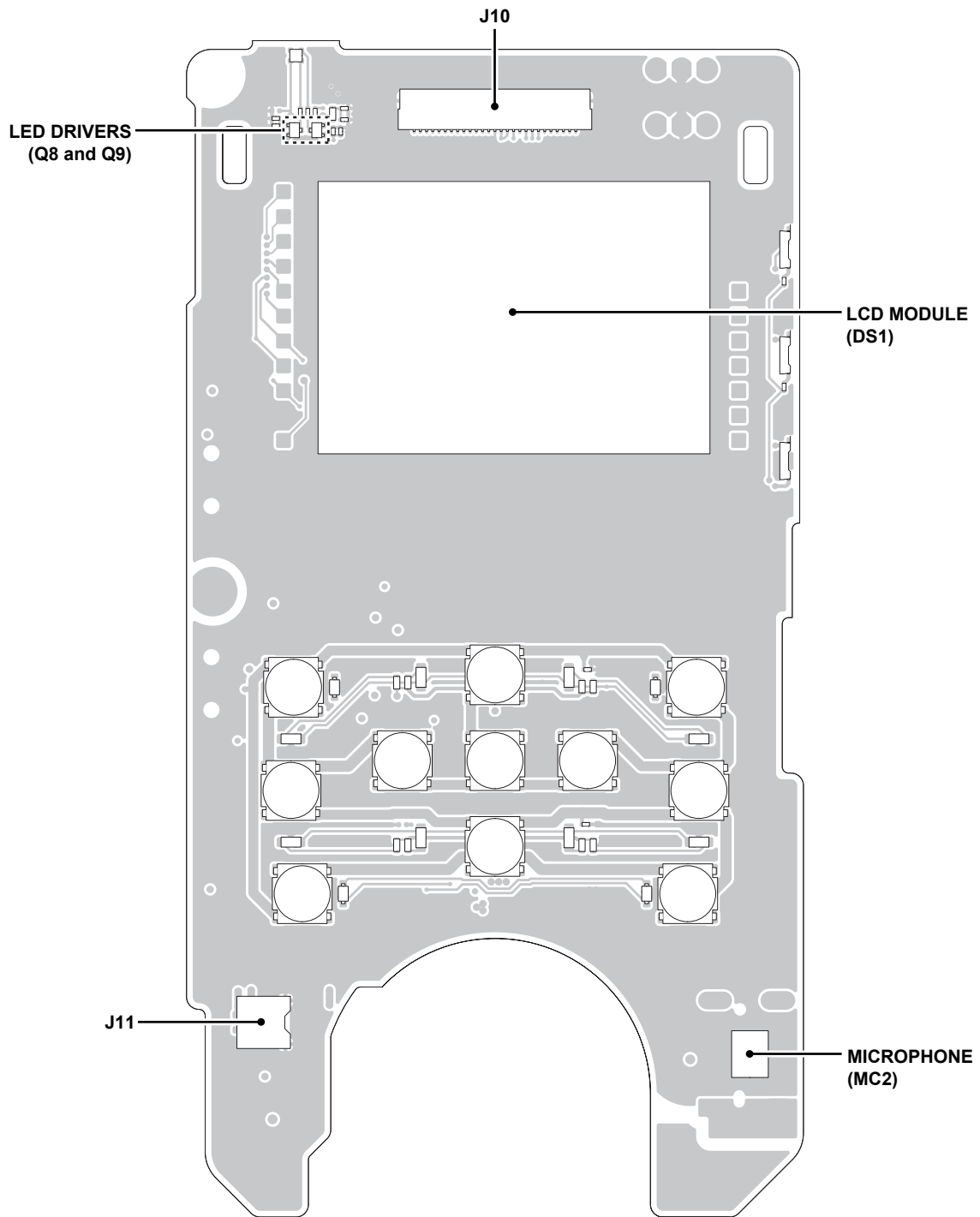
\*2 “AM and AM-N” are for only 108.000 MHz ~ 143.995 MHz.

① All stated specifications are typical and subject to change without notice or obligation.

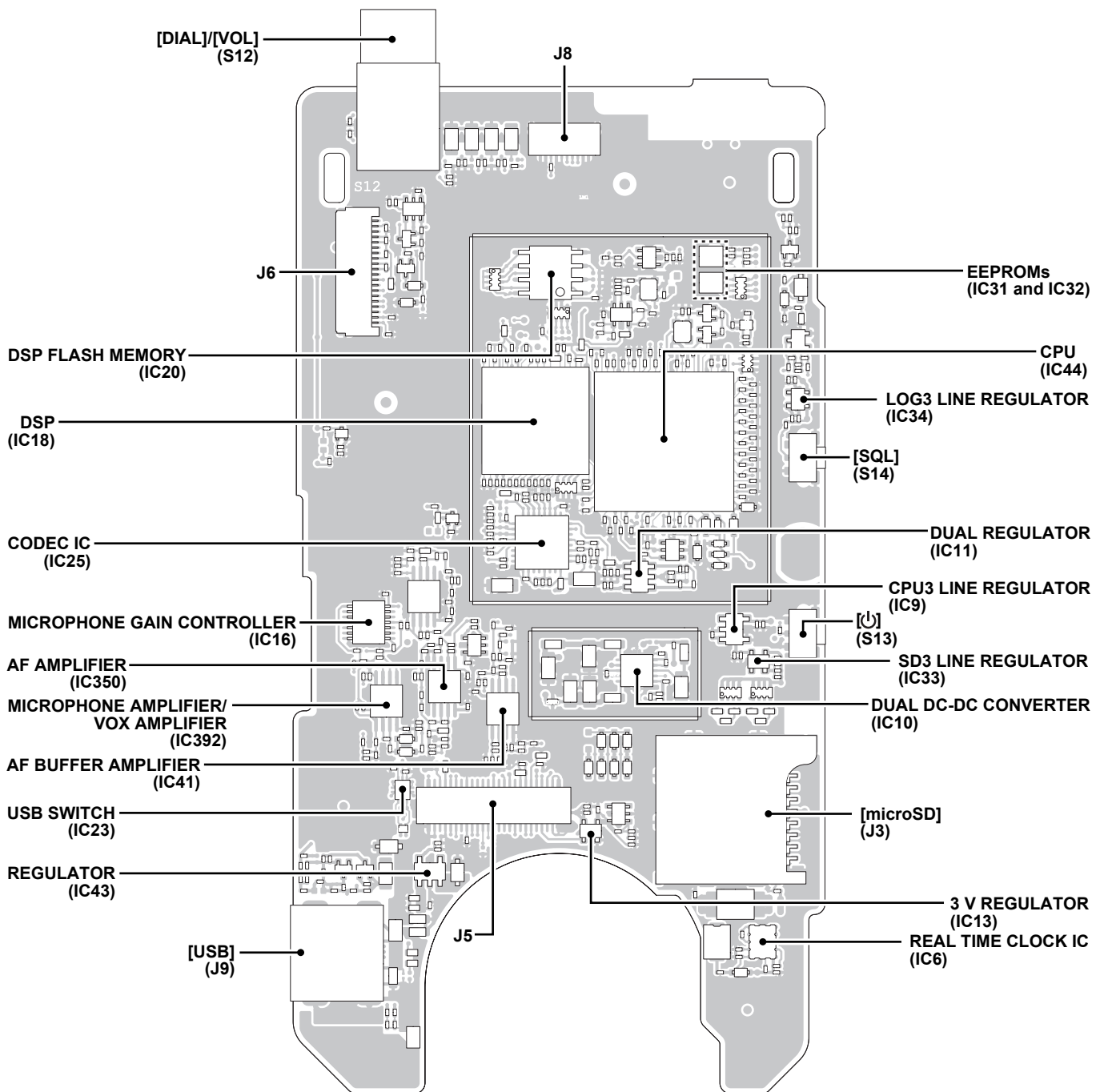
- **Transparent view**



• LOGIC UNIT (Top View)

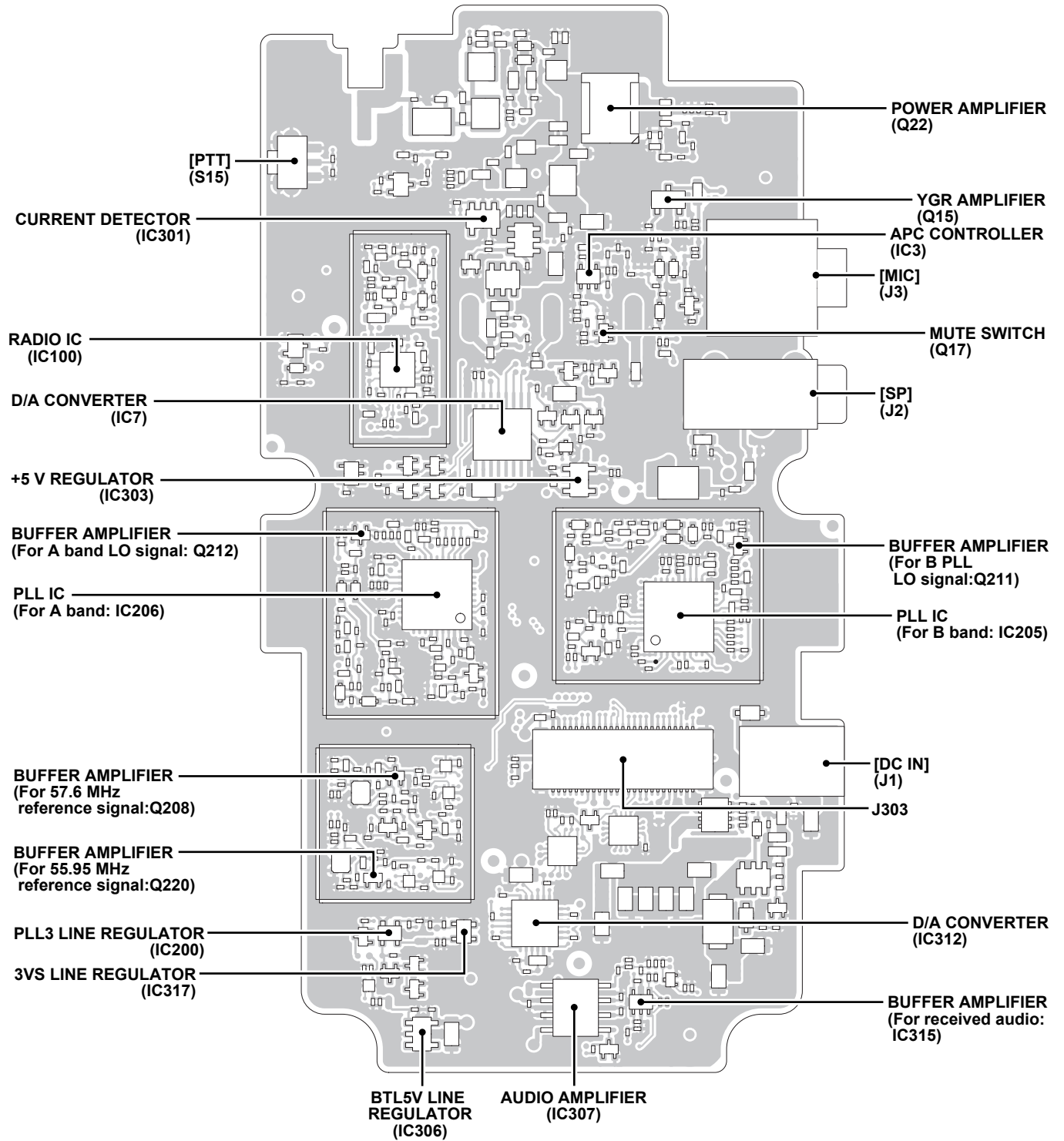


• LOGIC UNIT (Bottom View)

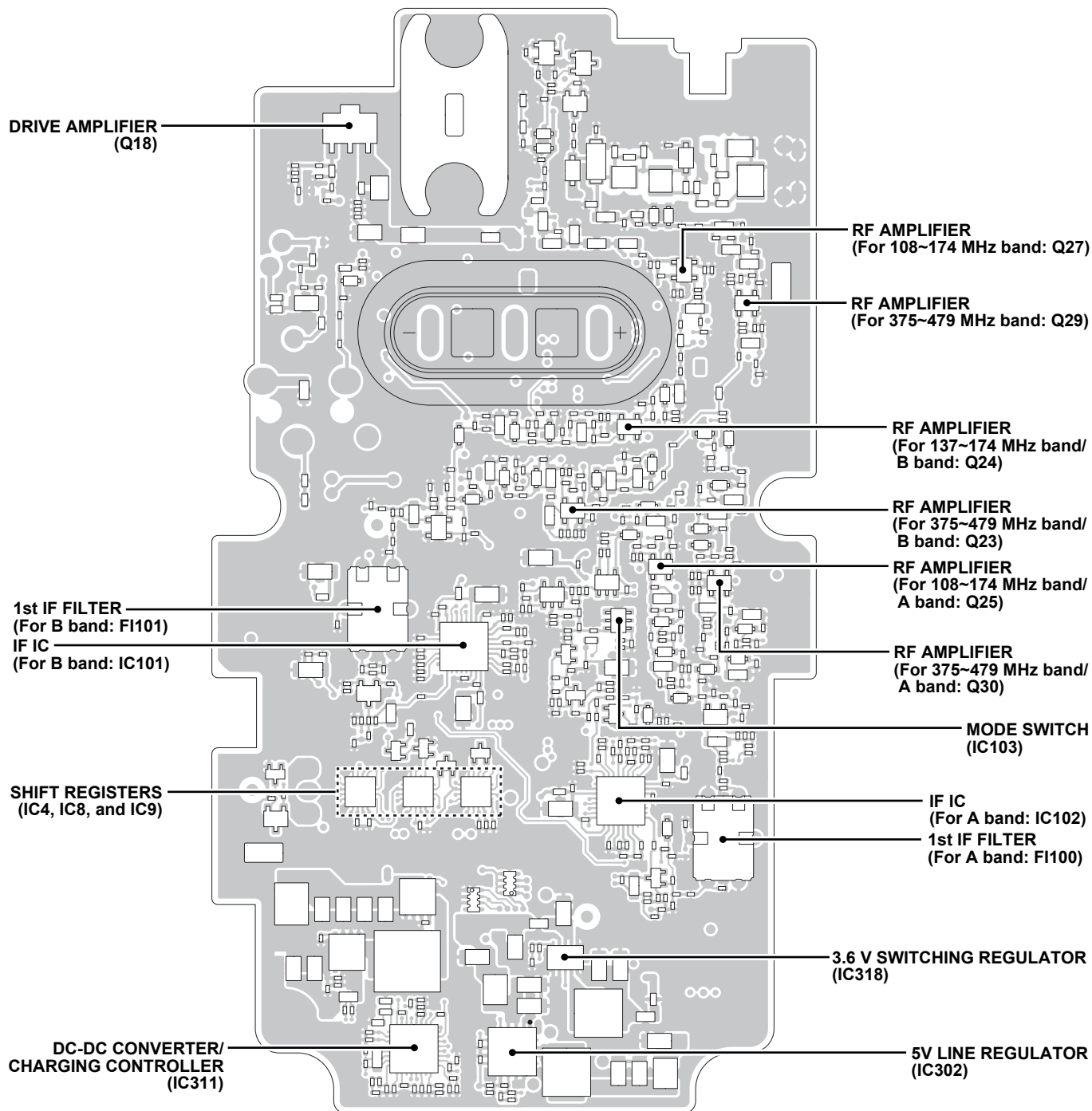




• MAIN UNIT (Top View)



• MAIN UNIT (Bottom View)



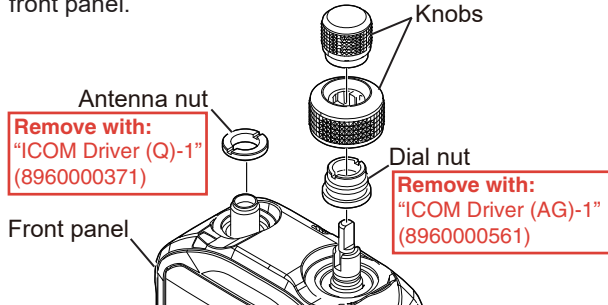
# SECTION 3 DISASSEMBLY INSTRUCTION

**Before disassembling:**

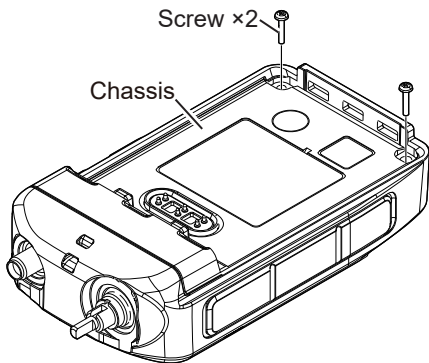
REMOVE the microSD card if inserted. Otherwise the front panel and chassis cannot be separated.  
See ID-50A/ID-50E BASIC INSTRUCTIONS for the removal details.

## 1. REMOVING THE LOGIC UNIT

- 1) Remove 2 knobs, dial nut, and antenna nut from the front panel.

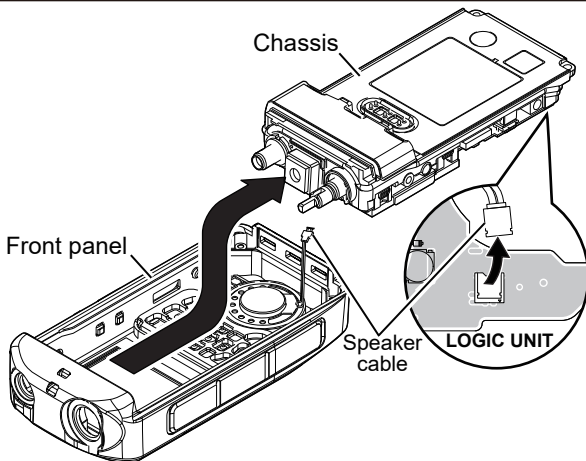


- 2) Remove 2 screws from the bottom side of the chassis.

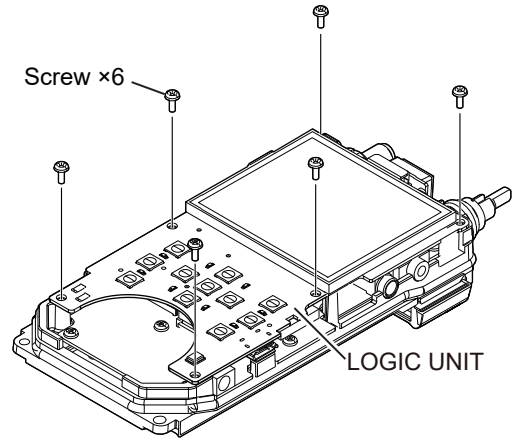


- 3) Separate the chassis from the front panel and disconnect the speaker cable from the LOGIC UNIT, then remove the chassis from the front panel.

**BE CAREFUL** when you separate the chassis from the front panel. Otherwise the **speaker cable** and the connector may be damaged.

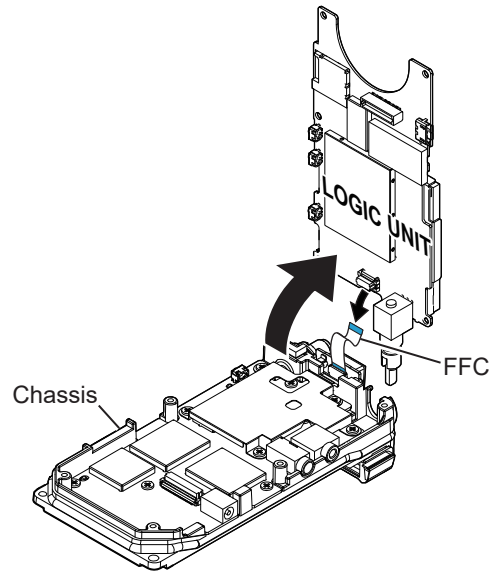


- 4) Remove the 6 screws from the LOGIC UNIT.



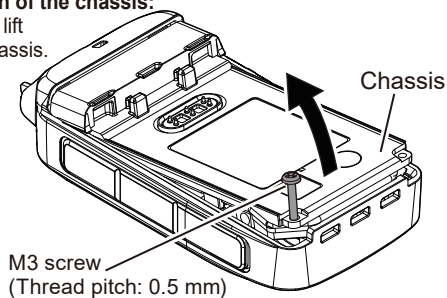
- 5) Separate the LOGIC UNIT from the chassis by lifting it up in the direction of the arrow, then disconnect the FFC from the LOGIC UNIT.

**BE CAREFUL** not to damage the FFC when separating the LOGIC UNIT from the chassis.



**For easy separation of the chassis:**

Use an M3 screw to lift the bottom of the chassis.

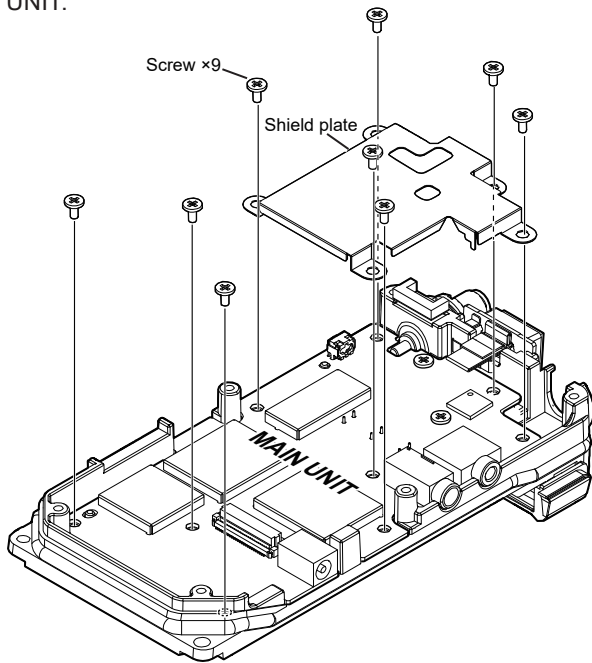


The M3 screws are commercially available.  
When ordering parts, the following parts are recommended.  
"PH M3×16 SUS" (8810000620)

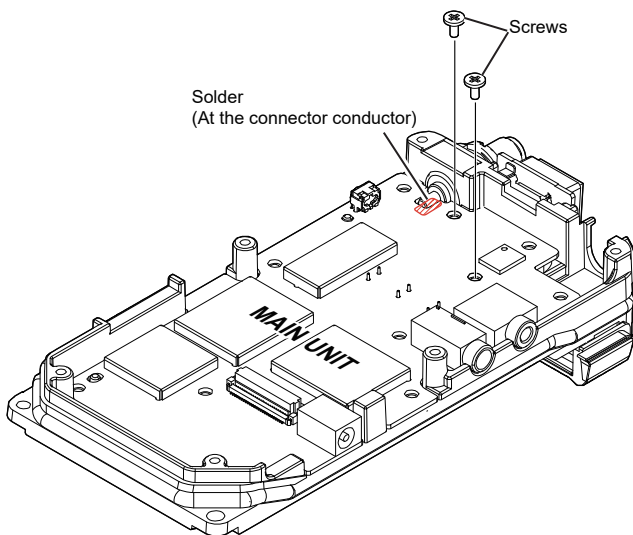
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## 2. REMOVING THE MAIN UNIT

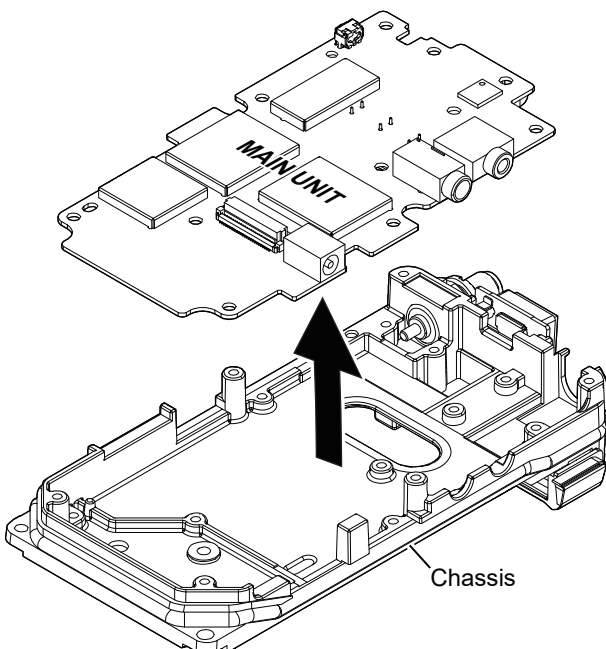
- 1) Remove the 9 screws and the shield plate from the MAIN UNIT.



- 2) Remove the 2 screws and a solder from the MAIN UNIT.



- 3) Remove the MAIN UNIT from the chassis.



# SECTION 4

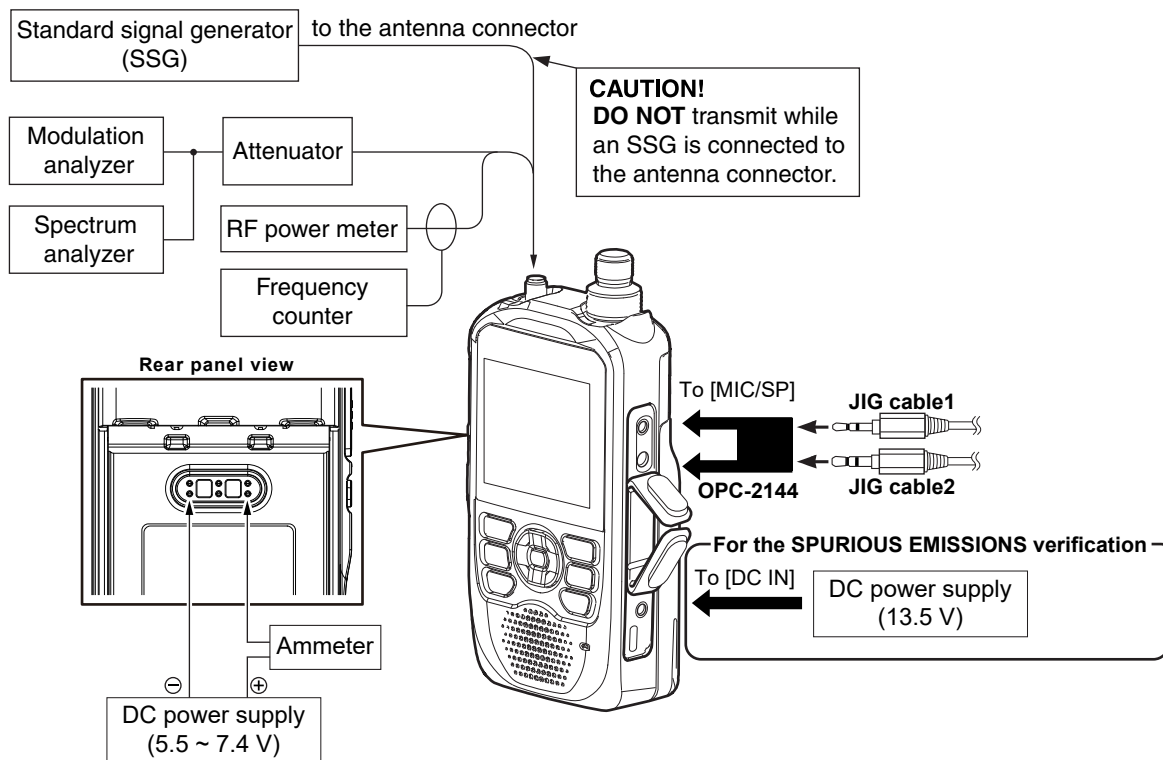
# ADJUSTMENT PROCEDURE

## 4-1 PREPARATION

### ■ REQUIRED EQUIPMENT

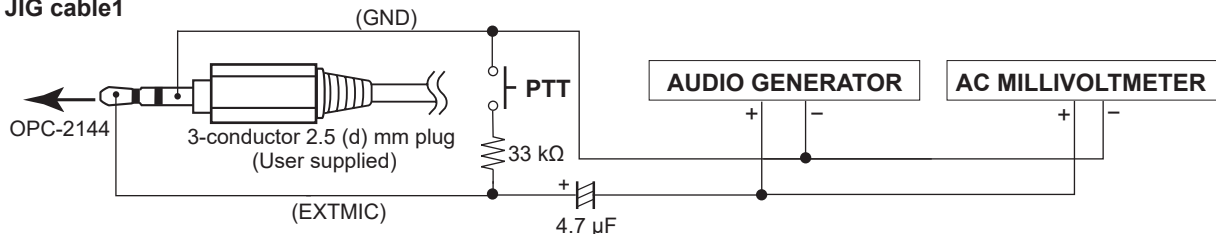
EQUIPMENT	GRADE AND RANGE	EQUIPMENT	GRADE AND RANGE
DC power supply	Output voltage: 5.5 ~ 13.5 V Rated output current: 3 A or more	JIG cable 1 and JIG cable 2	Modified 3-conductor plugs (See the illustration shown below.)
AC millivoltmeter	Measuring range: 1 mV to 10 V	Adapter cable	OPC-2144
RF power meter (50 Ω terminated)	Measuring range: 0.1~10 W Frequency range: 100 ~ 300 MHz	Modulation analyzer	Frequency range: Up to 500 MHz Measuring range: 0 to ±10 kHz
Audio generator (AG)	Frequency range: Up to 3000 Hz Output level: 1 ~ 500 mV	Frequency counter	Frequency range: Up to 500 MHz Measuring accuracy: ±1 ppm or better
Attenuator	Power attenuation: 40 dB Rated input power: 10 W or more	Standard signal generator (SSG)	Frequency range: Up to 500 MHz Output level: -20 dBμV ~ 90 dBμV (-127 dBm ~ -17 dBm)
Ammeter	Measuring range: 10 mA ~ 3 A	Distortion meter	Measuring accuracy: 3% or less at 1 kHz Input level: 10 mV to 10 V
External speaker	Rated input power: 1 W or more Input impedance: 8 Ω	Spectrum analyzer	Measuring range: Up to 3 GHz

### ■ CONNECTIONS

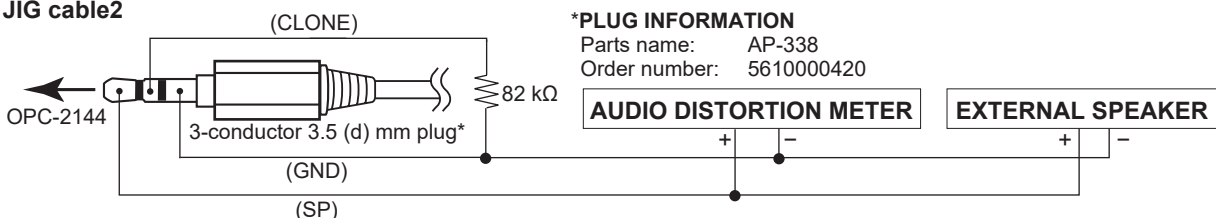


### ■ JIG CABLES

#### • JIG cable1



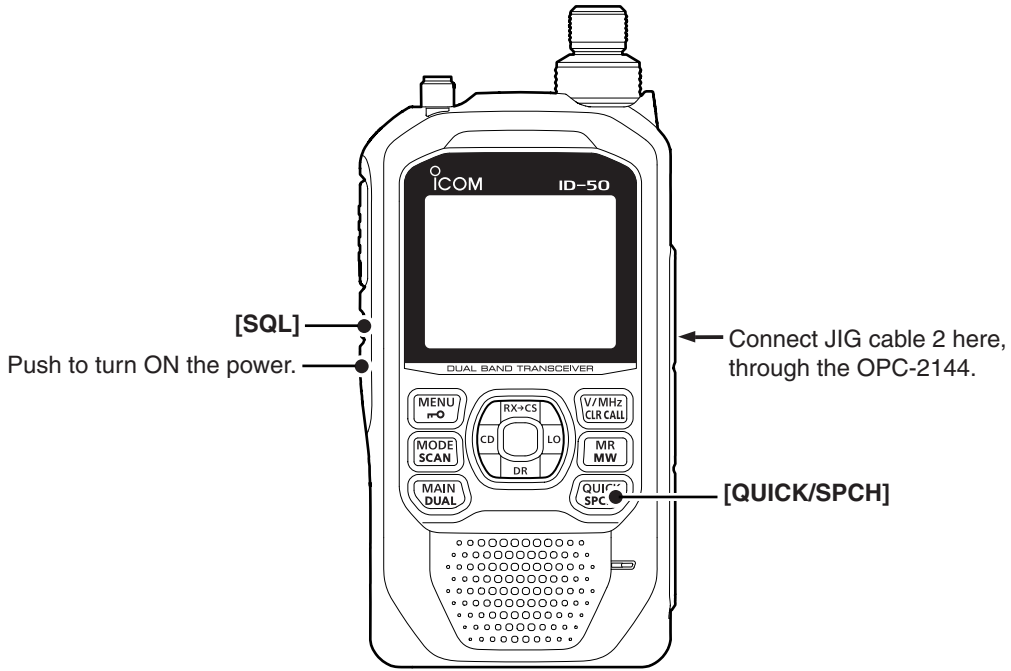
#### • JIG cable2



**\*PLUG INFORMATION**  
Parts name: AP-338  
Order number: 5610000420

### ■ ENTERING THE ADJUSTMENT MODE

- 1) Connect the OPC-2144 to [MIC/SP].
- 2) Connect JIG cable 2 to the 3.5mm jack of the OPC-2144.
- 3) While holding down [SQL] and [QUICK/SPCH], turn ON the power.

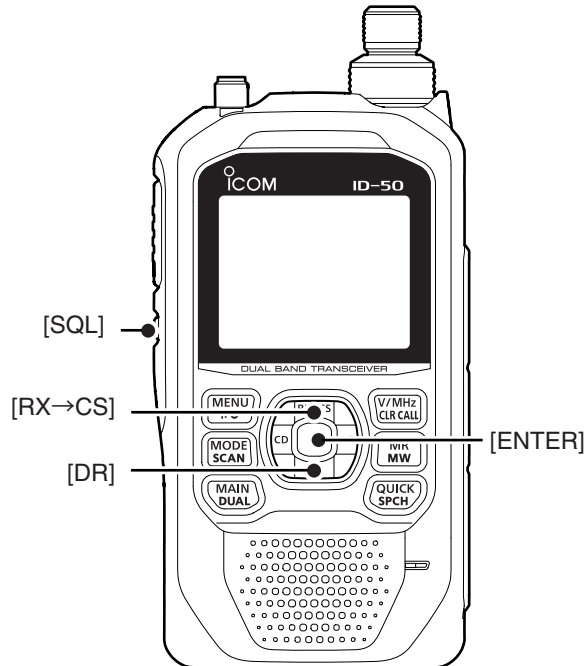


### ■ KEY ASSIGNMENTS FOR THE ADJUSTMENT MODE

- Push [RX→CS] to select the next adjustment item, push [DR] to select the previous adjustment item.
- Rotate [DIAL] to adjust the value of the item.
- Push [ENTER] to start the automatic adjustment, or store the adjusted value.

### ■ QUITTING THE ADJUSTMENT MODE

- 1) Turn OFF the power, and then remove the JIG cable 2 from the 3.5mm jack of the OPC-2144.
- 2) Turn ON the power.



## 4-2 FREQUENCY ADJUSTMENTS

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
REFERENCE FREQUENCY	1 • Adjustment item: REF1 • Adjustment frequency: 435.000 <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000	• Connect the RF power meter to the antenna connector. • Loosely couple the frequency counter to the antenna connector. • While transmitting, adjust the frequency using [DIAL], and then push [ENTER] to store the adjustment value.	Displayed frequency (Within ±200 Hz)
	2 • Adjustment item: REF2 • Adjustment frequency: 432.000 <b>Except for [USA]:</b> 432.000 <b>For only [USA]:</b> 442.000		

## 4-3 TRANSMIT ADJUSTMENTS

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
IDLING ADJUSTMENT ~Drive amplifier~ -At 5.5 V- (VHF)	1 • Adjustment item: ID5 • Adjustment frequency: 145.000 <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000	• Connect the ammeter between the DC power supply and the DUT. • Connect the RF power meter to the antenna connector. • While transmitting, set the DC power supply voltage to 5.5 V. • Set the item [ID5] to "00." • While transmitting, adjust the idling current using [DIAL], and then push [ENTER] to store the adjustment value.	20 mA (Within ±5 mA)
	(UHF)		
~Power amplifier~ (VHF)	3 • Adjustment item: IP5 • Adjustment frequency: 145.000 <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000	• Set the item [IP5] to "00." • While transmitting, adjust the idling current using [DIAL], and then push [ENTER] to store the adjustment value.	100 mA (Within ±20 mA)
	(UHF)		

Continued on the next page...

### 4-3 TRANSMIT ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE	
<b>IDLING ADJUSTMENT</b> ~Drive amplifier~ -At 7.4 V- (VHF) (High Power) ----- (Mid Power) ----- (Low2 Power) ----- (Low1 Power) ----- (S-Low Power) ----- (UHF) (High Power) ----- (Mid Power) ----- (Low2 Power)	5	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000	• Connect the ammeter between the DC power supply and the DUT. • Connect the RF power meter to the antenna connector. • While transmitting, set the DC power supply voltage to 7.4 V. • Set the item [ID7] to "00." • While transmitting, adjust the idling current using [DIAL], and then push [ENTER] to store the adjustment value.	100 mA (Within ±10 mA)
	6	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		
	7	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		20 mA (Within ±5 mA)
	8	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		
	9	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		
	10	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		100 mA (Within ±10 mA)
	11	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		20 mA (Within ±5 mA)
	12	• Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		20 mA (Within ±5 mA)

Continued on the next page...



### 4-3 TRANSMIT ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
<b>IDLING ADJUSTMENT</b> ~Drive amplifier~ -At 7.4 V- (UHF) (Low1 Power)	13 • Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000	<ul style="list-style-type: none"> <li>• Connect the ammeter between the DC power supply and the DUT.</li> <li>• Connect the RF power meter to the antenna connector.</li> <li>• While transmitting, set the DC power supply voltage to 7.4 V.</li> <li>• Set the item [ID7] to "00."</li> <li>• While transmitting, adjust the idling current using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	20 mA (Within ±5 mA)
(S-Low Power)	14 • Adjustment item: ID7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		
~Power amplifier~ -At 7.4 V- (VHF) (High Power)	15 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000	<ul style="list-style-type: none"> <li>• Set the item [IP7] to "00."</li> <li>• While transmitting, adjust the idling current using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	200 mA (Within ±20 mA)
(Mid Power)	16 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		
(Low2 Power)	17 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		100 mA (Within ±20 mA)
(Low1 Power)	18 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		
(S-Low Power)	19 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 145.000 <b>For only [USA]:</b> 146.000		
(UHF) (High Power)	20 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		
(Mid Power)	21 • Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		100 mA (Within ±20 mA)

Continued on the next page...

### 4-3 TRANSMIT ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE	
<b>IDLING ADJUSTMENT</b> ~Power amplifier~ -At 7.4 V- (UHF) (Low2 Power) ----- (Low1 Power) ----- (S-Low Power)	22	• Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000	• Connect the ammeter between the DC power supply and the DUT. • Connect the RF power meter to the antenna connector. • While transmitting, set the DC power supply voltage to 7.4 V. • Set the item [IP7] to "00." • While transmitting, adjust the idling current using [DIAL], and then push [ENTER] to store the adjustment value.	100 mA (Within ±20 mA)
	23	• Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		
	24	• Adjustment item: IP7 • Adjustment frequency: <b>Except for [USA]:</b> 435.000 <b>For only [USA]:</b> 445.000		
<b>TRANSMIT OUTPUT POWER</b> -At 5.5 V- (VHF) (Band low) ----- (Band High) ----- (UHF) (Band low) ----- (Band High) ----- -At 7.4 V- (High power) (VHF) (Band low) ----- (Band High)	1	• Adjustment item: PO5 • Adjustment frequency: 144.000	• Connect the RF power meter to the antenna connector. • While transmitting, set the DC power supply voltage to 5.5 V. • While transmitting, adjust the TX output power using [DIAL], and then push [ENTER] to store the adjustment value.	0.1 W (Within ±0.02 W)
	2	• Adjustment item: PO5 • Adjustment frequency: <b>Except for [USA]:</b> 146.000 <b>For only [USA]:</b> 148.000		
	3	• Adjustment item: PO5 • Adjustment frequency: <b>Except for [USA]:</b> 430.000 <b>For only [USA]:</b> 440.000		
	4	• Adjustment item: PO5 • Adjustment frequency: <b>Except for [USA]:</b> 440.000 <b>For only [USA]:</b> 450.000		
	5	• Adjustment item: PO7 • Adjustment frequency: 144.000		
	6	• Adjustment item: PO7 • Adjustment frequency: <b>Except for [USA]:</b> 146.000 <b>For only [USA]:</b> 148.000		
		• While transmitting, set the DC power supply voltage to 7.4 V. • While transmitting, adjust the TX output power using [DIAL], and then push [ENTER] to store the adjustment value.	5.0 W (Within ±0.2 W)	

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### 4-3 TRANSMIT ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE	
<b>TRANSMIT OUTPUT POWER</b> <b>-At 7.4 V-</b> <b>(High power)</b> <b>(UHF)</b> <b>(Band low)</b> <hr/> <b>(Band High)</b> <hr/> <b>(Mid power)</b> <b>(VHF)</b> <b>(Band low)</b> <hr/> <b>(Band High)</b> <hr/> <b>(UHF)</b> <b>(Band low)</b> <hr/> <b>(Band High)</b> <hr/> <b>(Low2 power)</b> <b>(VHF)</b> <b>(Band low)</b> <hr/> <b>(Band High)</b> <hr/> <b>(UHF)</b> <b>(Band low)</b> <hr/> <b>(Band High)</b>	7	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 430.000  <b>For only [USA]:</b> 440.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the RF power meter to the antenna connector.</li> <li>While transmitting, set the DC power supply voltage to 7.4 V.</li> <li>While transmitting, adjust the TX output power using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	5.0 W (Within ±0.2 W)
	8	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 440.000  <b>For only [USA]:</b> 450.000</li> </ul>		
	9	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency: 144.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the RF power meter to the antenna connector.</li> <li>While transmitting, set the DC power supply voltage to 7.4 V.</li> <li>While transmitting, adjust the TX output power using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	2.5 W (Within ±0.2 W)
	10	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 146.000  <b>For only [USA]:</b> 148.000</li> </ul>		
	11	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 430.000  <b>For only [USA]:</b> 440.000</li> </ul>		
	12	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 440.000  <b>For only [USA]:</b> 450.000</li> </ul>		
	13	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency: 144.000</li> </ul>		
	14	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 146.000  <b>For only [USA]:</b> 148.000</li> </ul>		
	15	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 430.000  <b>For only [USA]:</b> 440.000</li> </ul>		
	16	<ul style="list-style-type: none"> <li>Adjustment item: PO7</li> <li>Adjustment frequency:  <b>Except for [USA]:</b> 440.000  <b>For only [USA]:</b> 450.000</li> </ul>		
			1.0 W (Within ±0.1 W)	

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### 4-3 TRANSMIT ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
<b>TRANSMIT OUTPUT POWER</b> <b>-At 7.4 V-</b> <b>(Low1 power)</b> <b>(VHF)</b> <b>(Band low)</b>	17 • Adjustment item: PO7 • Adjustment frequency: 144.000	<ul style="list-style-type: none"> <li>• Connect the RF power meter to the antenna connector.</li> <li>• While transmitting, set the DC power supply voltage to 7.4 V.</li> <li>• While transmitting, adjust the TX output power using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	0.5 W (Within ±0.1 W)
<b>(Band High)</b>	18 • Adjustment item: PO7 • Adjustment frequency: 146.000 <b>Except for [USA]:</b> 148.000 <b>For only [USA]:</b> 148.000		
<b>(UHF)</b> <b>(Band low)</b>	19 • Adjustment item: PO7 • Adjustment frequency: 430.000 <b>Except for [USA]:</b> 440.000 <b>For only [USA]:</b> 440.000		
<b>(Band High)</b>	20 • Adjustment item: PO7 • Adjustment frequency: 440.000 <b>Except for [USA]:</b> 450.000 <b>For only [USA]:</b> 450.000		
<b>(S-Low power)</b> <b>(VHF)</b> <b>(Band low)</b>	21 • Adjustment item: PO7 • Adjustment frequency: 144.000		0.1 W (Within ±0.02 W)
<b>(Band High)</b>	22 • Adjustment item: PO7 • Adjustment frequency: 146.000 <b>Except for [USA]:</b> 148.000 <b>For only [USA]:</b> 148.000		
<b>(UHF)</b> <b>(Band low)</b>	23 • Adjustment item: PO7 • Adjustment frequency: 430.000 <b>Except for [USA]:</b> 440.000 <b>For only [USA]:</b> 440.000		
<b>(Band High)</b>	24 • Adjustment item: PO7 • Adjustment frequency: 440.000 <b>Except for [USA]:</b> 450.000 <b>For only [USA]:</b> 450.000		

## 4-4 DEVIATION ADJUSTMENTS

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT		DUT'S CONDITION	OPERATION	VALUE
FM DEVIATION (VHF)	1	<ul style="list-style-type: none"> <li>Adjustment item: MFM</li> <li>Adjustment frequency: 144.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to:                             <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>Connect the audio generator with the AC millivoltmeter to microphone connector, through the JIG cable 1, and set it to:                             <ul style="list-style-type: none"> <li>Frequency: 1 kHz</li> <li>Level: 90 mVrms</li> </ul> </li> <li>While transmitting, adjust the deviation using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	4.2 kHz (Within ±0.1 kHz)
	(UHF)	<ul style="list-style-type: none"> <li>Adjustment item: MFM</li> <li>Adjustment frequency: 430.000</li> <li><b>Except for [USA]:</b> 430.000</li> <li><b>For only [USA]:</b> 440.000</li> </ul>		
DV DEVIATION (VHF)	1	<ul style="list-style-type: none"> <li>Adjustment item: MDV</li> <li>Adjustment frequency: 144.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to:                             <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>No audio signal is applied to [MIC].</li> <li>While transmitting, adjust the deviation using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	1.05 kHz (Within ±0.1 kHz)
	(UHF)	<ul style="list-style-type: none"> <li>Adjustment item: MDV</li> <li>Adjustment frequency: 430.000</li> <li><b>Except for [USA]:</b> 430.000</li> <li><b>For only [USA]:</b> 440.000</li> </ul>		
DTCS DEVIATION (VHF)	1	<ul style="list-style-type: none"> <li>Adjustment item: MDT</li> <li>Adjustment frequency: 145.000</li> <li><b>Except for [USA]:</b> 145.000</li> <li><b>For only [USA]:</b> 146.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to:                             <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>No audio signal is applied to [MIC].</li> <li>While transmitting, adjust the deviation using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	0.75 kHz (Within ±0.05 kHz)
	(UHF)	<ul style="list-style-type: none"> <li>Adjustment item: MDT</li> <li>Adjustment frequency: 435.000</li> <li><b>Except for [USA]:</b> 435.000</li> <li><b>For only [USA]:</b> 445.000</li> </ul>		
CTCSS DEVIATION (VHF)	1	<ul style="list-style-type: none"> <li>Adjustment item: MCT</li> <li>Adjustment frequency: 145.000</li> <li><b>Except for [USA]:</b> 145.000</li> <li><b>For only [USA]:</b> 146.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to:                             <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>No audio signal is applied to [MIC].</li> <li>While transmitting, adjust the deviation using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	0.75 kHz (Within ±0.05 kHz)
	(UHF)	<ul style="list-style-type: none"> <li>Adjustment item: MCT</li> <li>Adjustment frequency: 435.000</li> <li><b>Except for [USA]:</b> 435.000</li> <li><b>For only [USA]:</b> 445.000</li> </ul>		

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#### 4-4 DEVIATION ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR], and then set the adjustment value as specified using [DIAL].

ADJUSTMENT		DUT'S CONDITION	OPERATION	VALUE
DTMF DEVIATION (VHF)	1	<ul style="list-style-type: none"> <li>Adjustment item: MDM</li> <li>Adjustment frequency: 145.000</li> <li><b>Except for [USA]:</b> 145.000</li> <li><b>For only [USA]:</b> 146.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to:                             <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>No audio signal is applied to [MIC].</li> <li>While transmitting, adjust the deviation using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	3.5 kHz (Within ±0.1 kHz)
	(UHF)	2		
For only ID-50E: EUROPEAN-TONE (VHF)	1	<ul style="list-style-type: none"> <li>Adjustment item: MET</li> <li>Adjustment frequency: 145.000</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to:                             <ul style="list-style-type: none"> <li>HPF: OFF</li> <li>LPF: 20 kHz</li> <li>De-emphasis: OFF</li> <li>Detector: (P-P)/2</li> </ul> </li> <li>No audio signal is applied to [MIC].</li> <li>While transmitting, adjust the deviation using [DIAL], and then push [ENTER] to store the adjustment value.</li> </ul>	3.5 kHz (Within ±0.1 kHz)
	(UHF)	2		

## 4-5 RECEIVE ADJUSTMENTS

Select an adjustment item using [RX→CS]/[DR].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
<b>RECEIVE SENSITIVITY</b> <b>-137.0 ~ 174.0 MHz-</b> <b>(Band low)</b>	<b>1 For A band</b> • Adjustment item: BPL • Adjustment frequency: 137.020 • Mode: FM	• Connect the SSG to the antenna connector, and set it to: Frequency: Displayed on the DUT's LCD. Level: 0 dBμ (PD) (-107 dBm) Modulation: OFF	Push [ENTER]. (Automatic adjustment)
	<b>2 For B band</b> • Adjustment item: BPL • Adjustment frequency: 137.020 • Mode: FM		
----- <b>(Band center)</b>	<b>3 For A band</b> • Adjustment item: BPM • Adjustment frequency: <b>Except for [USA]:</b> 145.020 <b>For only [USA]:</b> 146.020 • Mode: FM		
	<b>4 For B band</b> • Adjustment item: BPM • Adjustment frequency: <b>Except for [USA]:</b> 145.020 <b>For only [USA]:</b> 146.020 • Mode: FM		
----- <b>(Band High)</b>	<b>5 For A band</b> • Adjustment item: BPH • Adjustment frequency: 173.980 • Mode: FM		
	<b>6 For B band</b> • Adjustment item: BPH • Adjustment frequency: 173.980 • Mode: FM		
----- <b>-375.0 ~ 479.0 MHz-</b> <b>(Band low)</b>	<b>7 For A band</b> • Adjustment item: BPL • Adjustment frequency: 375.020 • Mode: FM		
	<b>8 For B band</b> • Adjustment item: BPL • Adjustment frequency: 375.020 • Mode: FM		

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## 4-5 RECEIVE ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR].

ADJUSTMENT		DUT'S CONDITION	OPERATION	VALUE
RECEIVE SENSITIVITY -375.0 ~ 479.0 MHz- (Band center)	9	<b>For A band</b> • Adjustment item: BPM • Adjustment frequency: <b>Except for [USA]:</b> 435.020 <b>For only [USA]:</b> 445.020 • Mode: FM	• Connect the SSG to the antenna connector, and set it to: Frequency: Displayed on the DUT's LCD. Level: 0 dBμ (PD) (-107 dBm) Modulation: OFF	Push [ENTER]. (Automatic adjustment)
	10	<b>For B band</b> • Adjustment item: BPM • Adjustment frequency: <b>Except for [USA]:</b> 435.020 <b>For only [USA]:</b> 445.020 • Mode: FM		
(Band High)	11	<b>For A band</b> • Adjustment item: BPH • Adjustment frequency: 478.980 • Mode: FM		
	12	<b>For B band</b> • Adjustment item: BPH • Adjustment frequency: 478.980 • Mode: FM		
-108.0 ~ 142.0 MHz- (Band low)	13	• Adjustment item: BPL • Adjustment frequency: 108.020 • Mode: AM		
(Band Center)	14	• Adjustment item: BPM • Adjustment frequency: 127.020 • Mode: AM		

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## 4-5 RECEIVE ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE	
<b>S-METER</b> <b>-76.0 ~ 108.0MHz-</b>	<b>NOTE:</b> Before adjusting, "RECEIVE SENSITIVITY" must be adjusted. When "RECEIVE SENSITIVITY" is adjusted, "S-METER" and "SQUELCH" must also be re-adjusted.		Push [ENTER]. (Automatic adjustment)	
	1	<ul style="list-style-type: none"> <li>• Adjustment item: SC0</li> <li>• Adjustment frequency: 87.500</li> <li>• Mode: WFM</li> </ul>		<ul style="list-style-type: none"> <li>• Connect the SSG to the antenna connector, and set it to: Frequency: Displayed on the DUT's LCD.</li> <li>Level: +2 dBμ (PD) (−105 dBm)</li> <li>Modulation: OFF</li> </ul>
	2	<ul style="list-style-type: none"> <li>• Adjustment item: SC3</li> <li>• Adjustment frequency: 87.500</li> <li>• Mode: WFM</li> </ul>		<ul style="list-style-type: none"> <li>• Set the SSG to: Level: +6 dBμ (PD) (−101 dBm)</li> </ul>
3	<ul style="list-style-type: none"> <li>• Adjustment item: SCF</li> <li>• Adjustment frequency: 87.500</li> <li>• Mode: WFM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Level: +17 dBμ (PD) (−90 dBm)</li> </ul>		
<b>-108.0 ~ 142.0MHz-</b>	4	<ul style="list-style-type: none"> <li>• Adjustment item: SC0</li> <li>• Adjustment frequency: 127.020</li> <li>• Mode: AM</li> </ul>		<ul style="list-style-type: none"> <li>• Set the SSG to: Frequency: Displayed on the DUT's LCD.</li> <li>Level: −10 dBμ (PD) (−117 dBm)</li> </ul>
	5	<ul style="list-style-type: none"> <li>• Adjustment item: SC3</li> <li>• Adjustment frequency: 127.020</li> <li>• Mode: AM</li> </ul>		<ul style="list-style-type: none"> <li>• Set the SSG to: Level: −6 dBμ (PD) (−113 dBm)</li> </ul>
	6	<ul style="list-style-type: none"> <li>• Adjustment item: SCF</li> <li>• Adjustment frequency: 127.020</li> <li>• Mode: AM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Level: +5 dBμ (PD) (−102 dBm)</li> </ul>	
<b>-137.0 ~ 174.0MHz-</b>	7	<b>For A band</b> <ul style="list-style-type: none"> <li>• Adjustment item: SC0</li> <li>• Adjustment frequency: 145.020 <b>Except for [USA]:</b> 146.020 <b>For only [USA]:</b> 146.020</li> <li>• Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Frequency: Displayed on the DUT's LCD.</li> <li>Level: −10 dBμ (PD) (−117 dBm)</li> </ul>	
	8	<b>For B band</b> <ul style="list-style-type: none"> <li>• Adjustment item: SC0</li> <li>• Adjustment frequency: 145.020 <b>Except for [USA]:</b> 146.020 <b>For only [USA]:</b> 146.020</li> <li>• Mode: FM</li> </ul>		

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## 4-5 RECEIVE ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
<b>S-METER</b> <b>-137.0 ~ 174.0MHz-</b>	9 <b>For A band</b> • Adjustment item: SC3 • Adjustment frequency: <b>Except for [USA]:</b> 145.020 <b>For only [USA]:</b> 146.020 • Mode: FM	• Connect the SSG to the antenna connector, and set it to: Frequency: Displayed on the DUT's LCD. Level: -6 dBμ (PD) (-113 dBm) Modulation: OFF	Push [ENTER]. (Automatic adjustment)
	10 <b>For B band</b> • Adjustment item: SC3 • Adjustment frequency: <b>Except for [USA]:</b> 145.020 <b>For only [USA]:</b> 146.020 • Mode: FM		
	11 <b>For A band</b> • Adjustment item: SCF • Adjustment frequency: <b>Except for [USA]:</b> 145.020 <b>For only [USA]:</b> 146.020 • Mode: FM	• Set the SSG to: Level: +5 dBμ (PD) (-102 dBm)	
	12 <b>For B band</b> • Adjustment item: SCF • Adjustment frequency: <b>Except for [USA]:</b> 145.020 <b>For only [USA]:</b> 146.020 • Mode: FM		
<b>-375.0 ~ 479.0MHz-</b>	13 <b>For A band</b> • Adjustment item: S3 • Adjustment frequency: <b>Except for [USA]:</b> 435.020 <b>For only [USA]:</b> 445.020 • Mode: FM	• Set the SSG to: Frequency: Displayed on the DUT's LCD. Level: -6 dBμ (PD) (-113 dBm)	
	14 <b>For B band</b> • Adjustment item: S3 • Adjustment frequency: <b>Except for [USA]:</b> 435.020 <b>For only [USA]:</b> 445.020 • Mode: FM		

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## 4-5 RECEIVE ADJUSTMENTS (CONTINUED)

Select an adjustment item using [RX→CS]/[DR].

ADJUSTMENT	DUT'S CONDITION	OPERATION	VALUE
<b>SQUELCH</b> -76.0 ~ 108.0MHz-	<b>NOTE:</b> Before adjusting, "RECEIVE SENSITIVITY" must be adjusted. When "RECEIVE SENSITIVITY" is adjusted, "S-METER" and "SQUELCH" must also be re-adjusted.		Push [ENTER]. (Automatic adjustment)
	1	<ul style="list-style-type: none"> <li>• Adjustment item: WSQ</li> <li>• Adjustment frequency: 87.500</li> <li>• Mode: WFM</li> </ul>	
<b>-108.0 ~ 142.0MHz-</b>	2	<ul style="list-style-type: none"> <li>• Adjustment item: NSQL</li> <li>• Adjustment frequency: 127.020</li> <li>• Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Level: -26 dBμ (PD) (-133 dBm) Modulation: 1 kHz Deviation : 3.5 kHz</li> </ul>
	3	<ul style="list-style-type: none"> <li>• Adjustment item: NSQL</li> <li>• Adjustment frequency: 127.020</li> <li>• Mode: AM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Level: -23 dBμ (PD) (-130 dBm)</li> </ul>
<b>-137.0 ~ 174.0MHz-</b>	4	<b>For A band</b> <ul style="list-style-type: none"> <li>• Adjustment item: NSQL</li> <li>• Adjustment frequency:     <b>Except for [USA]:</b> 145.020     <b>For only [USA]:</b> 146.020</li> <li>• Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Frequency: Displayed on the DUT's LCD. Level: -26 dBμ (PD) (-133 dBm)</li> </ul>
	5	<b>For B band</b> <ul style="list-style-type: none"> <li>• Adjustment item: NSQL</li> <li>• Adjustment frequency:     <b>Except for [USA]:</b> 145.020     <b>For only [USA]:</b> 146.020</li> <li>• Mode: FM</li> </ul>	
<b>-375.0 ~ 479.0MHz-</b>	6	<b>For A band</b> <ul style="list-style-type: none"> <li>• Adjustment item: NSQL</li> <li>• Adjustment frequency:     <b>Except for [USA]:</b> 435.020     <b>For only [USA]:</b> 445.020</li> <li>• Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>• Set the SSG to: Frequency: Displayed on the DUT's LCD.</li> </ul>
	7	<b>For B band</b> <ul style="list-style-type: none"> <li>• Adjustment item: NSQL</li> <li>• Adjustment frequency:     <b>Except for [USA]:</b> 435.020     <b>For only [USA]:</b> 445.020</li> <li>• Mode: FM</li> </ul>	

## 4-6 FREQUENCY VERIFICATIONS

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

VERIFICATION	DUT'S CONDITION	OPERATION	VALUE
REFERENCE FREQUENCY -VHF-	1 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • Transmit power: High	• Connect the RF power meter to the antenna connector. • Loosely couple the frequency counter to the antenna connector.	<b>Except for [USA]:</b> 145.099500 ~ 145.100500 MHz <b>For only [USA]:</b> 146.099500 ~ 146.100500 MHz
-UHF-	2 • Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz • Mode: FM • Transmit power: High		<b>Except for [USA]:</b> 435.099500 ~ 435.100500 MHz <b>For only [USA]:</b> 445.099500 ~ 445.100500 MHz

## 4-7 TRANSMIT VERIFICATIONS

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

VERIFICATION	DUT'S CONDITION	OPERATION	VALUE
TRANSMIT POWER (HI power) -VHF-	1 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • Transmit power: High	• Connect the RF power meter to the antenna connector.	4.9 ~ 5.1 W
-UHF-	2 • Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz • Mode: FM • Transmit power: High		
(MID power) -VHF-	3 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • Transmit power: MID		2.0 ~ 3.0 W
-UHF-	4 • Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz • Mode: FM • Transmit power: MID		
(Low2 power) -VHF-	5 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • Transmit power: Low2		0.8 ~ 1.2 W
-UHF-	6 • Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz • Mode: FM • Transmit power: Low2		
(Low1 power) -VHF-	7 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • Transmit power: Low1		0.3 ~ 0.7 W
-UHF-	8 • Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz • Mode: FM • Transmit power: Low1		

Continued on the next page...

## 4-7 TRANSMIT VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

VERIFICATION		DUT'S CONDITION	OPERATION	VALUE
TRANSMIT POWER (S-Low power) -VHF-	9	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: S-Low</li> </ul>	<ul style="list-style-type: none"> <li>Connect the RF power meter to the antenna connector.</li> </ul>	50 ~ 150 mW
	-UHF-	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: S-Low</li> </ul>		
TRANSMIT CURRENT -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>	<ul style="list-style-type: none"> <li>Connect the RF power meter to the antenna connector.</li> <li>Connect the ammeter between the DC power supply and the DUT.</li> </ul>	2.5 A or less
	-UHF-	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>		
FM DEVIATION -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to: HPF: OFF LPF: 20 kHz De-emphasis: OFF Detector: (P-P)/2</li> <li>Connect the audio generator with the AC millivoltmeter to the microphone connector, through the JIG cable 1, and set it to: Frequency: 1 kHz Level: Set to the level so that the modulation analyzer shows <math>\pm 3.5</math> kHz.</li> </ul>	6.4 ~ 12.7 mVrms (Audio generator output level)
	-UHF-	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>		
DV DEVIATION -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: DV</li> <li>Transmit power: High</li> </ul>	<ul style="list-style-type: none"> <li>Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to: HPF: OFF LPF: 20 kHz De-emphasis: OFF Detector: (P-P)/2</li> <li>No audio is applied to the microphone connector.</li> </ul>	$\pm 1.7$ kHz or less
	-UHF-	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: DV</li> <li>Transmit power: High</li> </ul>		

## 4-7 TRANSMIT VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

VERIFICATION	DUT'S CONDITION	OPERATION	VALUE
<b>TX SIGNAL-TO- NOISE RATIO</b> <b>-VHF-</b>	1 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • Transmit power: High	• Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to: HPF: OFF LPF: 20 kHz De-emphasis: OFF Detector: (P-P)/2	34 dB or more
<b>-UHF-</b>	2 • Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz • Mode: FM • Transmit power: High	• Connect the audio generator with the AC millivoltmeter to microphone connector, through the JIG cable 1, and set it to: Frequency: 1 kHz Level: Set to the level so that the modulation analyzer shows $\pm 1.75$ kHz. • Toggle the audio generator output ON and OFF.	
<b>TONE DEVIATION</b> <b>-CTCSS-</b>	1 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • CTCSS tone: 88.5 Hz • Transmit power: High	• Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to: HPF: OFF LPF: 20 kHz De-emphasis: OFF Detector: (P-P)/2	$\pm 0.5 \sim 1.0$ kHz
<b>-DTCS-</b>	2 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • DTCS code: 023 • Transmit power: High	• No audio is applied to the microphone connector.	
<b>-DTMF-</b>	3 • Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz • Mode: FM • DTMF code: A • Transmit power: High		$\pm 3.0 \sim 4.0$ kHz
<b>For only ID-50E:</b> <b>-European tone-</b>	4 • Frequency: 145.100 MHz • Mode: FM • European tone: ON (1750 Hz) • Transmit power: High	• Connect the modulation analyzer to the antenna connector, through the attenuator, and set it to: HPF: OFF LPF: 20 kHz De-emphasis: OFF Detector: (P-P)/2 • No audio is applied to the microphone connector.	$\pm 3.0 \sim 4.0$ kHz

## 4-7 TRANSMIT VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

VERIFICATION		DUT'S CONDITION	OPERATION	VALUE		
SPURIOUS EMISSIONS (at 7.4 V) -VHF- (HI power)	1	<ul style="list-style-type: none"> <li>Frequency:  <b>Except for [USA]:</b> 145.100 MHz  <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>	<ul style="list-style-type: none"> <li>Connect the spectrum analyzer to the antenna connector, through the attenuator.</li> </ul>	At least 60 dBc		
	(MID power)	<ul style="list-style-type: none"> <li>Transmit power: MID</li> </ul>				
	(Low2 power)	<ul style="list-style-type: none"> <li>Transmit power: Low2</li> </ul>			-13 dBm or less	
	(Low1 power)	<ul style="list-style-type: none"> <li>Transmit power: Low1</li> </ul>				
	(S-Low power)	<ul style="list-style-type: none"> <li>Transmit power: S-Low</li> </ul>				
-UHF- (HI power)	6	<ul style="list-style-type: none"> <li>Frequency:  <b>Except for [USA]:</b> 435.100 MHz  <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>		<ul style="list-style-type: none"> <li>Connect the power supply to [DC-IN], and while transmitting set the output voltage to: Voltage: 13.5 V</li> <li>Connect the spectrum analyzer to the antenna connector, through the attenuator.</li> </ul>	At least 60 dBc	
	(MID power)	<ul style="list-style-type: none"> <li>Transmit power: MID</li> </ul>				
	(Low2 power)	<ul style="list-style-type: none"> <li>Transmit power: Low2</li> </ul>				-13 dBm or less
	(Low1 power)	<ul style="list-style-type: none"> <li>Transmit power: Low1</li> </ul>				
	(S-Low power)	<ul style="list-style-type: none"> <li>Transmit power: S-Low</li> </ul>				
SPURIOUS EMISSIONS (at 13.5 V) -VHF-	1	<ul style="list-style-type: none"> <li>Frequency:  <b>Except for [USA]:</b> 145.100 MHz  <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>	<ul style="list-style-type: none"> <li>Connect the power supply to [DC-IN], and while transmitting set the output voltage to: Voltage: 13.5 V</li> <li>Connect the spectrum analyzer to the antenna connector, through the attenuator.</li> </ul>		At least 60 dBc	
	-UHF-	<ul style="list-style-type: none"> <li>Frequency:  <b>Except for [USA]:</b> 435.100 MHz  <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Transmit power: High</li> </ul>				



## 4-8 RECEIVE VERIFICATIONS

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

Unless otherwise noted, the verifications must be performed on both A and B bands.

VERIFICATION		DUT'S CONDITION	OPERATION	VALUE
FM RECEIVE SENSITIVITY -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "OPEN"</li> </ul>	<ul style="list-style-type: none"> <li>Connect the distortion meter with the external speaker to the JIG cable 2.</li> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz Level: Set to the level so that the distortion meter shows 12 dB SINAD. Modulation: 1 kHz Deviation: ±3.5 kHz</li> </ul>	-15 dBμ (PD) (-122 dBm) or less
	-UHF-	2	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "OPEN"</li> </ul>	
For only A band: AM RECEIVE SENSITIVITY	1	<ul style="list-style-type: none"> <li>Frequency: 127.500 MHz</li> <li>Mode: AM</li> <li>Squelch: "OPEN"</li> </ul>	<ul style="list-style-type: none"> <li>Connect the distortion meter with the external speaker to the JIG cable 2.</li> <li>Connect the SSG to the antenna connector, and set it to: Frequency: 127.500 MHz Level: Set to the level so that the distortion meter shows 10 dB S/N ratio. Modulation: 1 kHz Deviation: 30%</li> </ul>	0 dBμ (PD) (-107 dBm) or less
FM RADIO SENSITIVITY	1	<ul style="list-style-type: none"> <li>Frequency: 92.1 MHz</li> <li>Mode: "FM RADIO"</li> <li>Squelch: "OPEN"</li> </ul>	<ul style="list-style-type: none"> <li>Enter the FM Radio mode.</li> <li>Connect the distortion meter with the external speaker to the JIG cable 2.</li> <li>Connect the SSG to the antenna connector, and set it to: Frequency: 92.1 MHz Level: Set to the level so that the distortion meter shows 12 dB SINAD. Modulation: 1 kHz Deviation: ±52.5 kHz</li> </ul>	0 dBμ (PD) (-107 dBm) or less

## 4-8 RECEIVE VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

Unless otherwise noted, the verifications must be performed on both A and B bands.

VERIFICATION		DUT'S CONDITION	OPERATION	VALUE
FM SQUELCH THRESHOLD LEVEL -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "AUTO"</li> </ul>	<ul style="list-style-type: none"> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Level: -15 dB<math>\mu</math> (PD) (-122 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: <math>\pm</math>3.5 kHz</li> </ul>	Squelch opens.
	-UHF-	2	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "AUTO"</li> </ul>	
FM SQUELCH TIGHT LEVEL -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "LEVEL9"</li> </ul>	<ul style="list-style-type: none"> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Level: 10 dB<math>\mu</math> (PD) (-97 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: <math>\pm</math>3.5 kHz</li> </ul>	Squelch opens.
	-UHF-	2	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "LEVEL9"</li> </ul>	
For only A band: AM SQUELCH (THRESHOLD LEVEL)	1	<ul style="list-style-type: none"> <li>Frequency: 127.500 MHz</li> <li>Mode: AM</li> <li>Squelch: "AUTO"</li> </ul>	<ul style="list-style-type: none"> <li>Connect the SSG to the antenna connector, and set it to: Frequency: 127.500 MHz</li> <li>Level: 0 dB<math>\mu</math> (PD) (-107 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: 30%</li> </ul>	Squelch opens.
	(TIGHT LEVEL)	2	<ul style="list-style-type: none"> <li>Frequency: 127.500 MHz</li> <li>Mode: AM</li> <li>Squelch: "LEVEL9"</li> </ul>	
FM RADIO SQUELCH (THRESHOLD LEVEL)	1	<ul style="list-style-type: none"> <li>Frequency: 92.1 MHz</li> <li>Mode: "FM RADIO"</li> <li>Squelch: "AUTO"</li> </ul>	<ul style="list-style-type: none"> <li>Enter the FM Radio mode.</li> <li>Connect the SSG to the antenna connector, and set it to: Frequency: 92.100 MHz</li> <li>Level: 5 dB<math>\mu</math> (PD) (-102 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: <math>\pm</math>52.5 kHz</li> </ul>	Squelch opens.
	(TIGHT LEVEL)	2	<ul style="list-style-type: none"> <li>Frequency: 92.1 MHz</li> <li>Mode: "FM RADIO"</li> <li>Squelch: "LEVEL3"</li> </ul>	

## 4-8 RECEIVE VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

Unless otherwise noted, the verifications must be performed on both A and B bands.

VERIFICATION	DUT'S CONDITION	OPERATION	VALUE	
RX SIGNAL-TO-NOISE RATIO (FM Narrow) -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM-N</li> <li>Squelch: "OPEN"</li> </ul>	<ul style="list-style-type: none"> <li>Connect the AC millivoltmeter with the external speaker to [SP].</li> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz Level: 60 dB<math>\mu</math> (PD) (–47 dBm) Modulation: 1 kHz Deviation: <math>\pm</math>1.75 kHz</li> <li>Toggle the SSG modulation ON and OFF.</li> </ul>	34 dB or more
	-UHF-	2	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM-N</li> <li>Squelch: "OPEN"</li> </ul>	
For only A band: RX SIGNAL-TO-NOISE RATIO (AM Narrow)	3	<ul style="list-style-type: none"> <li>Frequency: 127.500 MHz</li> <li>Mode: AM-N</li> <li>Squelch: "OPEN"</li> </ul>	<ul style="list-style-type: none"> <li>Set the SSG to: Frequency: 127.500 MHz Deviation: 30%</li> <li>Toggle the SSG modulation ON and OFF.</li> </ul>	
S-METER -VHF-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz Level: –1 dB<math>\mu</math> (PD) (–108 dBm) Modulation: 1 kHz Deviation: <math>\pm</math>3.5 kHz</li> </ul>	S-meter shows: "■■■■■■■■■■" (5 dots or more)
	2		<ul style="list-style-type: none"> <li>Set the SSG to: Level: –11 dB<math>\mu</math> (PD) (–118 dBm)</li> </ul>	S-meter shows: "■■■■■■■■■■" (4 dots or less)
-UHF-	3	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>Set the SSG to: Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz Level: –1 dB<math>\mu</math> (PD) (–108 dBm)</li> </ul>	S-meter shows: "■■■■■■■■■■" (5 dots or more)
	4		<ul style="list-style-type: none"> <li>Set the SSG to: Level: –11 dB<math>\mu</math> (PD) (–118 dBm)</li> </ul>	S-meter shows: "■■■■■■■■■■" (4 dots or less)

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## 4-8 RECEIVE VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

Unless otherwise noted, the verifications must be performed on both A and B bands.

VERIFICATION		DUT'S CONDITION	OPERATION	VALUE
<b>-FM RADIO-</b>	5	<ul style="list-style-type: none"> <li>Frequency: 92.100 MHz</li> <li>Mode: "FM RADIO"</li> </ul>	<ul style="list-style-type: none"> <li>Enter the FM Radio mode.</li> <li>Connect the distortion meter with the external speaker to the JIG cable.</li> <li>Connect the SSG to the antenna connector, and set it to:                             <ul style="list-style-type: none"> <li>Frequency: 92.1 MHz</li> <li>Level: 11 dB<math>\mu</math> (PD) (-96 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: <math>\pm</math>52.5 kHz</li> </ul> </li> </ul>	S-meter shows: "■■■■■■■■■■" (5 dots or more)
	6		<ul style="list-style-type: none"> <li>Set the SSG to:                             <ul style="list-style-type: none"> <li>Level: 1 dB<math>\mu</math> (PD) (-106 dBm)</li> </ul> </li> </ul>	S-meter shows: "■■■■■■■■■■" (4 dots or less)
<b>AUDIO OUTPUT POWER</b>	1	<ul style="list-style-type: none"> <li>Frequency:                             <ul style="list-style-type: none"> <li><b>Except for [USA]:</b> 145.100 MHz</li> <li><b>For only [USA]:</b> 146.100 MHz</li> </ul> </li> <li>Mode: FM</li> </ul>	<ul style="list-style-type: none"> <li>Connect the distortion meter with the external speaker to the JIG cable 2.</li> <li>Connect the SSG to the antenna connector, and set it to:                             <ul style="list-style-type: none"> <li>Frequency:                                     <ul style="list-style-type: none"> <li><b>Except for [USA]:</b> 145.100 MHz</li> <li><b>For only [USA]:</b> 146.100 MHz</li> </ul> </li> <li>Level: 60 dB<math>\mu</math> (PD) (-47 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: <math>\pm</math>3.5 kHz</li> </ul> </li> <li>Set [VOL] to the point where the distortion meter shows 10% distortion.</li> </ul>	1.26 Vrms or more (0.2 W at an 8 $\Omega$ load)
<b>(FM RADIO)</b>	2	<ul style="list-style-type: none"> <li>Frequency: 92.100 MHz</li> <li>Mode: "FM RADIO"</li> </ul>	<ul style="list-style-type: none"> <li>Enter the FM Radio mode.</li> <li>Set the SSG to:                             <ul style="list-style-type: none"> <li>Frequency: 92.1 MHz</li> <li>Deviation: <math>\pm</math>52.5 kHz</li> </ul> </li> </ul>	

## 4-8 RECEIVE VERIFICATIONS (CONTINUED)

Verifications must be done in the Normal mode. Before starting the verifications, exit from the Adjustment mode.

Unless otherwise noted, the verifications must be performed on both A and B bands.

VERIFICATION		DUT'S CONDITION	OPERATION	VALUE
RX FLOWING CURRENT -At maximum audio output-	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Mode: FM</li> <li>Squelch: "OPEN"</li> <li>GPS: OFF</li> </ul>	<ul style="list-style-type: none"> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 435.100 MHz <b>For only [USA]:</b> 445.100 MHz</li> <li>Level: 60 dB<math>\mu</math> (PD) (-47 dBm)</li> <li>Modulation: 1 kHz</li> <li>Deviation: <math>\pm</math>3.5 kHz</li> <li>Set the audio output level to the maximum.</li> </ul>	400 mA or less
	-At stand-by-	2	<ul style="list-style-type: none"> <li>Frequency: Any</li> <li>Mode: Any</li> </ul>	<ul style="list-style-type: none"> <li>Disconnect the SSG and the JIG cables.</li> <li>Verify that the squelch is closed.</li> </ul>
TONE SQUELCH	1	<ul style="list-style-type: none"> <li>Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Mode: FM</li> <li>CTCSS tone: 88.5 Hz</li> </ul>	<ul style="list-style-type: none"> <li>Connect the SSG to the antenna connector, and set it to: Frequency: <b>Except for [USA]:</b> 145.100 MHz <b>For only [USA]:</b> 146.100 MHz</li> <li>Level: 60 dB<math>\mu</math> (PD) (-47 dBm)</li> <li>Modulation: 88.5 Hz</li> <li>Deviation: <math>\pm</math>0.75 kHz</li> </ul>	Squelch opens.
	2		<ul style="list-style-type: none"> <li>Set the SSG to: Modulation: None</li> </ul>	Squelch closes.
For only ID-50A: WEATHER ALERT	1	<ul style="list-style-type: none"> <li>Channel: "WX-01"</li> <li>Mode: "Weather Channel"</li> </ul>	<ul style="list-style-type: none"> <li>Enter the Weather Channel mode.</li> <li>Connect the SSG to the antenna connector, and set it to: Frequency: 161.650 MHz</li> <li>Level: 0 dB<math>\mu</math> (PD) (-107 dBm)</li> <li>Modulation: 1050 Hz</li> <li>Deviation: <math>\pm</math>3.5 kHz</li> </ul>	Alert beeps sound.

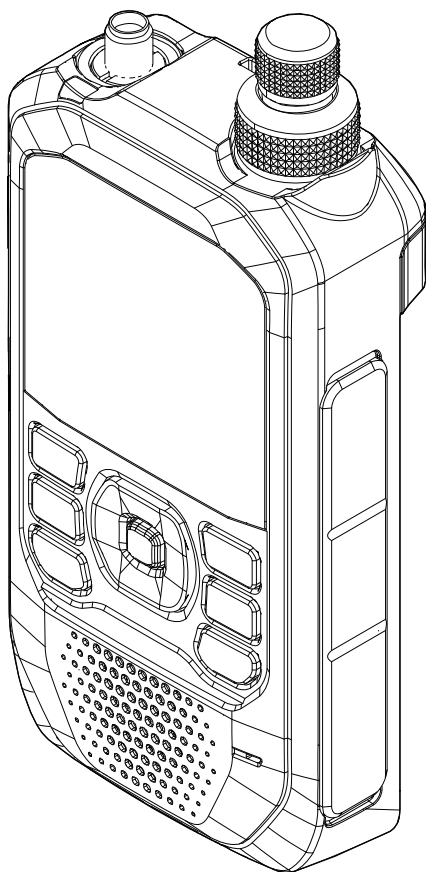
## SECTION 5 SPARE PARTS AND UNITS

### ■ ASSEMBLED UNIT SET

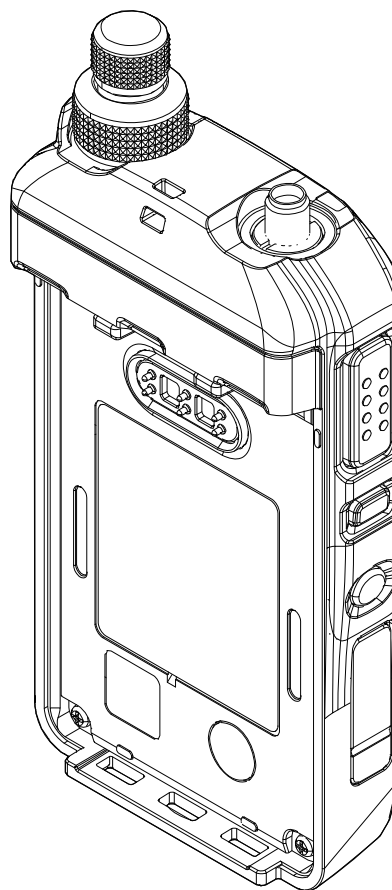
Spare unit name	Order number	Applicable versions	Remarks
C ID-50E #12 UNITSET	0343891201	[#12]	ID-50E
C ID-50A #15 UNITSET	0343891501	[#15]	ID-50A

The set is completely assembled and adjusted.  
Accessories not included.

<Front view>

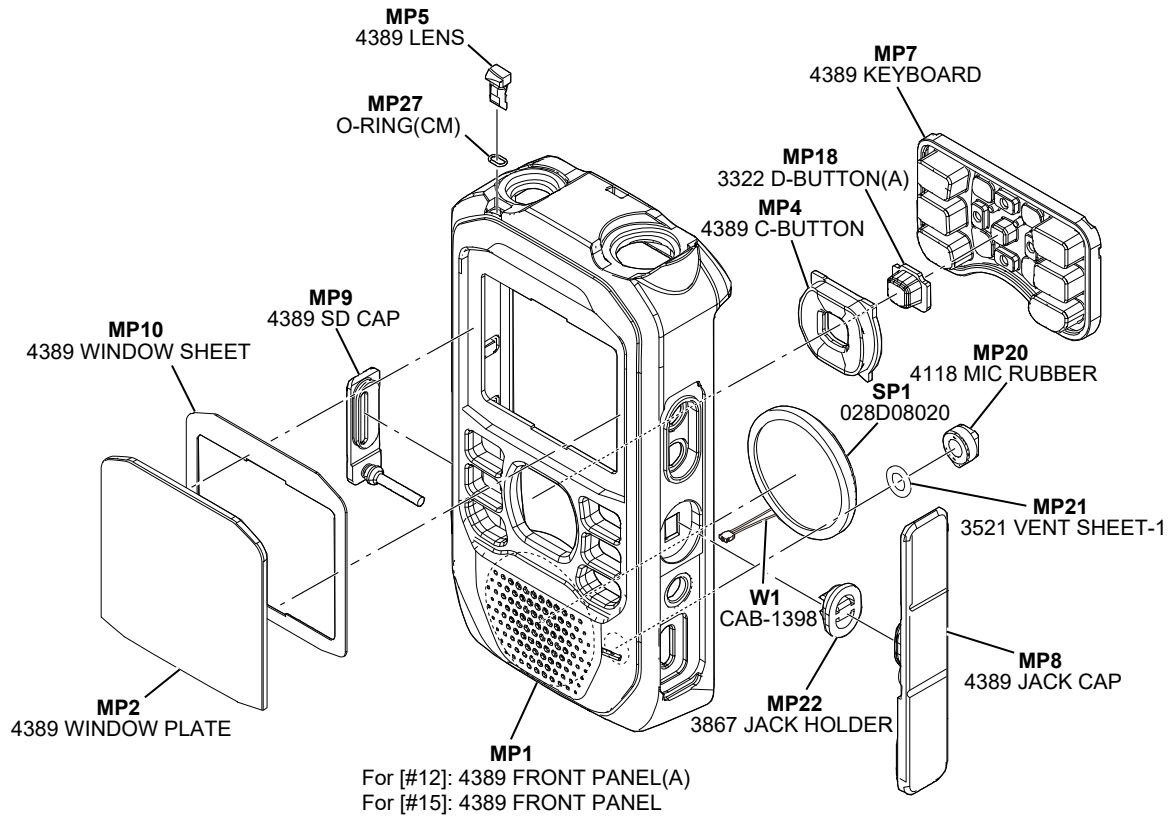


<Back view>



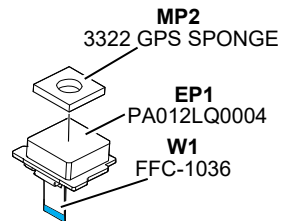
## ■ ASSEMBLED FRONT UNIT

Spare unit name	Order number	Applicable versions	Remarks
C ID-50E #12 F-PANEL	0343891202	[#12]	<b>DIGITAL</b> is printed on the front panel.
C ID-50A #15 F-PANEL	0343891502	[#15]	<b>D-STAR</b> is printed on the front panel.



## ■ ASSEMBLED GPS UNIT

Spare unit name	Order number	Applicable versions	Remarks
C ID-50E #12 GPS	0343891203	All	-



**NOTE:** The parts that are not listed, see SECTION 8 MECHANICAL PARTS for details.

■ SPARE PARTS INFORMATION

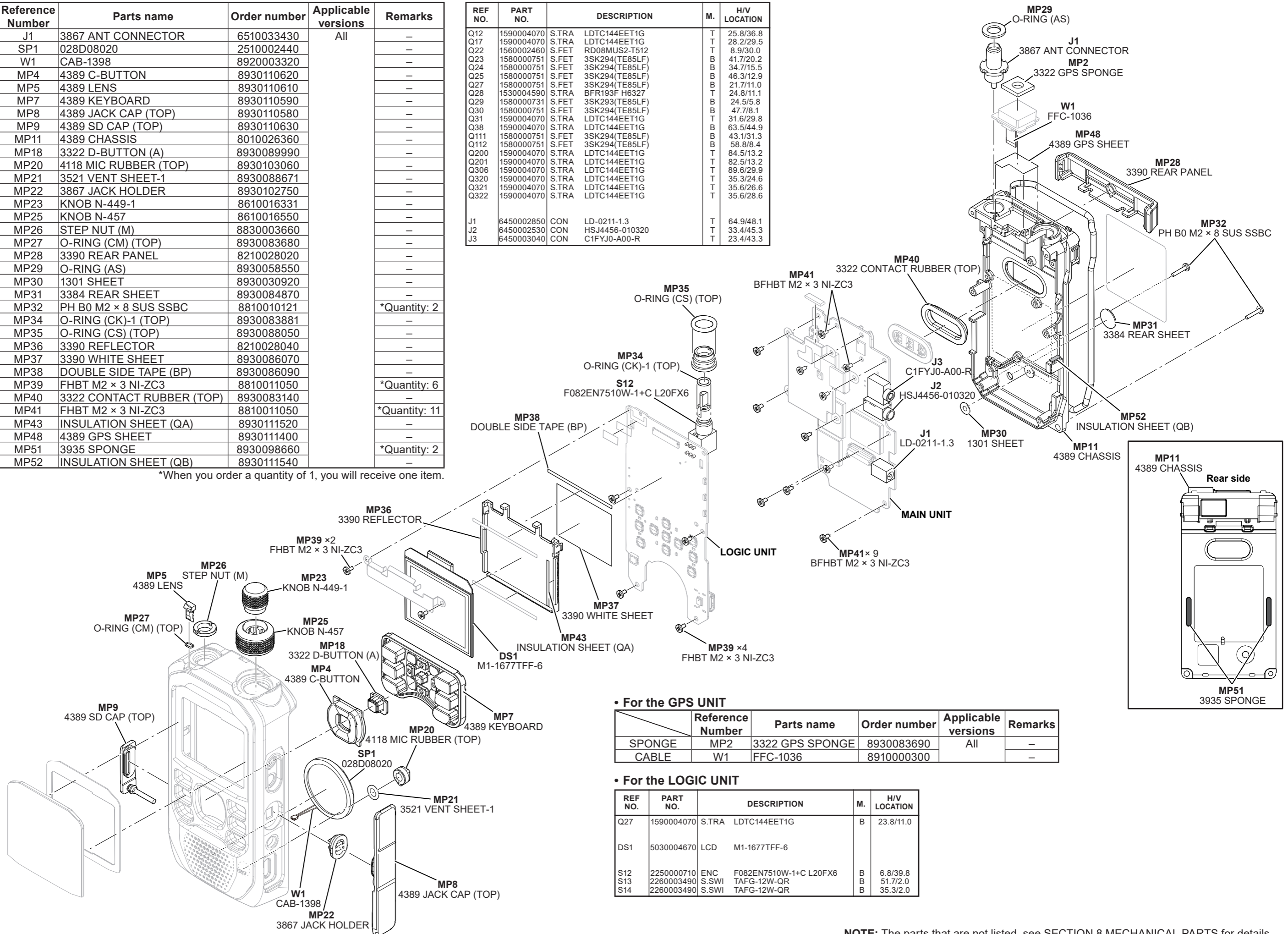
• For the CHASSIS and LOGIC UNITS

	Reference Number	Parts name	Order number	Applicable versions	Remarks
CONNECTOR	J1	3867 ANT CONNECTOR	6510033430	All	—
SPEAKER	SP1	028D08020	2510002440	—	—
CABLE	W1	CAB-1398	8920003320	—	—
KEY	MP4	4389 C-BUTTON	8930110620	—	—
LENS	MP5	4389 LENS	8930110610	—	—
KEY	MP7	4389 KEYBOARD	8930110590	—	—
CAP	MP8	4389 JACK CAP (TOP)	8930110580	—	—
CAP	MP9	4389 SD CAP (TOP)	8930110630	—	—
CHASSIS	MP11	4389 CHASSIS	8010026360	—	—
KEY	MP18	3322 D-BUTTON (A)	8930089990	—	—
SEAL	MP20	4118 MIC RUBBER (TOP)	8930103060	—	—
SHEET	MP21	3521 VENT SHEET-1	8930088671	—	—
HOLDER	MP22	3867 JACK HOLDER	8930102750	—	—
KNOB	MP23	KNOB N-449-1	8610016331	—	—
KNOB	MP25	KNOB N-457	8610016550	—	—
NUT	MP26	STEP NUT (M)	8830003660	—	—
SEAL	MP27	O-RING (CM) (TOP)	8930083680	—	—
PANEL	MP28	3390 REAR PANEL	8210028020	—	—
SEAL	MP29	O-RING (AS)	8930058550	—	—
SHEET	MP30	1301 SHEET	8930030920	—	—
SHEET	MP31	3384 REAR SHEET	8930084870	—	—
SCREW	MP32	PH B0 M2 × 8 SUS SSBC	8810010121	—	*Quantity: 2
SEAL	MP34	O-RING (CK)-1 (TOP)	8930083881	—	—
SEAL	MP35	O-RING (CS) (TOP)	8930088050	—	—
REFLECTOR	MP36	3390 REFLECTOR	8210028040	—	—
SHEET	MP37	3390 WHITE SHEET	8930086070	—	—
TAPE	MP38	DOUBLE SIDE TAPE (BP)	8930086090	—	—
SCREW	MP39	FHBT M2 × 3 NI-ZC3	8810011050	—	*Quantity: 6
SEAL	MP40	3322 CONTACT RUBBER (TOP)	8930083140	—	—
SCREW	MP41	FHBT M2 × 3 NI-ZC3	8810011050	—	*Quantity: 11
SHEET	MP43	INSULATION SHEET (QA)	8930111520	—	—
SHEET	MP48	4389 GPS SHEET	8930111400	—	—
SPONGE	MP51	3935 SPONGE	8930098660	—	*Quantity: 2
SHEET	MP52	INSULATION SHEET (QB)	8930111540	—	—

\*When you order a quantity of 1, you will receive one item.

• For the MAIN UNIT

REF NO.	PART NO.	DESCRIPTION	M.	H/V LOCATION
Q12	1590004070	S.TRA LDTC144EET1G	T	25.8/36.8
Q17	1590004070	S.TRA LDTC144EET1G	T	28.2/29.5
Q22	1560002460	S.FET RD08MUS2-T512	T	8.9/30.0
Q23	1580000751	S.FET 3SK294(TE85LF)	B	41.7/20.2
Q24	1580000751	S.FET 3SK294(TE85LF)	B	34.7/15.5
Q25	1580000751	S.FET 3SK294(TE85LF)	B	46.3/12.9
Q27	1580000751	S.FET 3SK294(TE85LF)	B	21.7/11.0
Q28	1530004590	S.TRA BFR193F H6327	T	24.8/11.1
Q29	1580000731	S.FET 3SK293(TE85LF)	B	24.5/5.8
Q30	1580000751	S.FET 3SK294(TE85LF)	B	47.7/8.1
Q31	1590004070	S.TRA LDTC144EET1G	T	31.6/29.8
Q38	1590004070	S.TRA LDTC144EET1G	B	63.5/44.9
Q111	1580000751	S.FET 3SK294(TE85LF)	B	43.1/31.3
Q112	1580000751	S.FET 3SK294(TE85LF)	B	58.8/8.4
Q200	1590004070	S.TRA LDTC144EET1G	T	84.5/13.2
Q201	1590004070	S.TRA LDTC144EET1G	T	82.5/13.2
Q306	1590004070	S.TRA LDTC144EET1G	T	89.6/29.9
Q320	1590004070	S.TRA LDTC144EET1G	T	35.3/24.6
Q321	1590004070	S.TRA LDTC144EET1G	T	35.6/26.6
Q322	1590004070	S.TRA LDTC144EET1G	T	35.6/28.6
J1	6450002850	CON LD-0211-1.3	T	64.9/48.1
J2	6450002530	CON HSJ4456-010320	T	33.4/45.3
J3	6450003040	CON C1FYJ0-A00-R	T	23.4/43.3



• For the GPS UNIT

	Reference Number	Parts name	Order number	Applicable versions	Remarks
SPONGE	MP2	3322 GPS SPONGE	8930083690	All	—
CABLE	W1	FFC-1036	8910000300	—	—

• For the LOGIC UNIT

REF NO.	PART NO.	DESCRIPTION	M.	H/V LOCATION
Q27	1590004070	S.TRA LDTC144EET1G	B	23.8/11.0
DS1	5030004670	LCD M1-1677TFF-6	—	—
S12	2250000710	ENC F082EN7510W-1+C L20FX6	B	6.8/39.8
S13	2260003490	S.SWI TAFG-12W-QR	B	51.7/2.0
S14	2260003490	S.SWI TAFG-12W-QR	B	35.3/2.0

NOTE: The parts that are not listed, see SECTION 8 MECHANICAL PARTS for details.



# SECTION 6

# MECHANICAL PARTS

## [CHASSIS UNIT]

REF NO.	PART NO.	DESCRIPTION	QTY.
J1	6510033430	3867 ANT CONNECTOR	1
SP1	2510002440	028D08020	1
W1	8920003320	CAB-1398	1
MP1	8210037230	4389 FRONT PANEL (A) ASSEMBLY	1
	8210037240	4389 FRONT PANEL ASSEMBLY	1
MP2	8310107300	4389 WINDOW PLATE	1
MP4	8930110620	4389 C-BUTTON	1
MP5	8930110610	4389 LENS	1
MP7	8930110590	4389 KEYBOARD	1
MP8	8930110580	4389 JACK CAP (TOP)	1
MP9	8930110630	4389 SD CAP (TOP)	1
MP10	8930110640	4389 WINDOW SHEET	1
MP11	8010026360	4389 CHASSIS	1
MP12	8930085930	3390 MAIN SEAL	1
MP13	8510024350	4389 LCD PLATE	1
MP18	8930089990	3322 D-BUTTON (A)	1
MP20	8930103060	4118 MIC RUBBER (TOP)	1
MP21	8930088671	3521 VENT SHEET-1	1
MP22	8930102750	3867 JACK HOLDER	1
MP23	8610016331	KNOB N-449-1	1
MP25	8610016550	KNOB N-457	1
MP26	8830003660	STEP NUT (M)	1
MP27	8930083680	O-RING (CM) (TOP)	1
MP28	8210028020	3390 REAR PANEL	1
MP29	8930058550	O-RING (AS)	1
MP30	8930030920	1301 SHEET	1
MP31	8930084870	3384 REAR SHEET	1
MP32	8810010121	PH B0 M2 × 8 SUS SSBC	2
MP33	8830003673	VR NUT (AC)-3	1
MP34	8930083881	O-RING (CK)-1 (TOP)	1
MP35	8930088050	O-RING (CS) (TOP)	11
MP36	8210028040	3390 REFLECTOR	1
MP37	8930086070	3390 WHITE SHEET	1
MP38	8930086090	DOUBLE SIDE TAPE (BP)	3
MP39	8810011050	BT No.O M2 × 3 NI-ZC3	6
MP40	8930083140	3322 CONTACT RUBBER (TOP)	1
MP41	8810011050	BT No.O M2 × 3 NI-ZC3	11)
MP43	8930111520	INSULATION SHEET (QA)	1
MP44	8510024360	4389 SHIELD PLATE	1
MP45	8930085102	SHIELD SPONGE (CW)-2	1
MP46	8930105920	FERRITE SHEET (CC)	1
MP47	8930109550	FERRITE SHEET (CJ)	1
MP48	8930111400	4389 GPS SHEET	1
MP51	8930098660	3935 SPONGE	2
MP52	8930111540	INSULATION SHEET (QB)	1
MP54	8930084711	FERRITE SHEET(AH)-1	1
MP55	8930075180	FERRITE SHEET(X)	1

## [MAIN UNIT]

REF NO.	PART NO.	DESCRIPTION	QTY.
J1	6450002850	LD-0211-1.3	1
J2	6450002530	HSJ4456-010320	1
J3	6450003040	C1FYJ0-A00-R	1
J303*	6510033110	50RF-JMCS-G-1-TF (N) (LF) (SN)	1
S15*	2260003810	TAFG1-12WQR	1
MP1*	8410003500	4389 PA HEATSINK	1
MP3*	8510022970	3867 RF CASE	1
MP5*	8510017841	OG-321610GK	1
MP6*	8510017841	OG-321610GK	1
MP200*	8510022930	3867 SHIELD CASE	1
MP201*	8510022940	3867 VCO CASE	1
MP202*	8510022940	3867 VCO CASE	1
MP300	8950007850	3322 CONTACT SPRING	1

## [LOGIC UNIT]

REF NO.	PART NO.	DESCRIPTION	QTY.
J3*	6510028170	SDHL-8BNS-K-363-A0-ETB (HF)	1
J5*	6510031130	50P5.0-JMCS-G-TF (N)	1
J6*	6510031140	20FHA-SM1-GAN-ETB (HF)	1
J8*	6510032540	20542-010E-01	1
J9*	6510033720	DX07S024JA1R1300	1
J10*	6510028080	27FHSY-RSM1-GAN-TB (LF) (SN)	1
J11*	6510031400	BM02B-ACHSS-GAN-ETF (LF) (SN)	1
DS1	5030004670	M1-1677TFF-6	1
MC2*	7700003280	SPU0410HR5H-PB-7	1
S1*	2260003600	SKRBAAE010	1
S2*	2260003600	SKRBAAE010	1
S3*	2260003600	SKRBAAE010	1
S4*	2260003600	SKRBAAE010	1
S5*	2260003600	SKRBAAE010	1
S6*	2260003600	SKRBAAE010	1
S7*	2260003600	SKRBAAE010	1
S8*	2260003600	SKRBAAE010	1
S9*	2260003600	SKRBAAE010	1
S10*	2260003600	SKRBAAE010	1
S11*	2260003600	SKRBAAE010	1
S12	2250000710	F082EN7510W-1+C L20FX6	1
S13*	2260003490	TAFG-12W-QR	1
S14*	2260003490	TAFG-12W-QR	1
MP1*	8510022910	3867 CPU CASE	1
MP2*	8510022920	3867 DC-DC CASE	1
MP3	8510023350	3867 CPU COVER	1
MP4	8930088240	INSULATION SHEET(NC)	1
MP5	8930088240	INSULATION SHEET(NC)	1

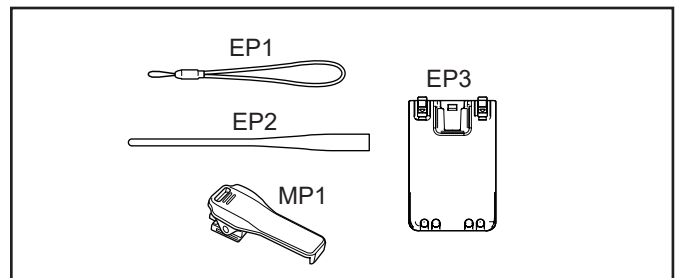
## [GPS UNIT]

REF NO.	PART NO.	DESCRIPTION	QTY.
J3*	6510032540	20542-010E-01	1
W1	8910000300	FFC-1036 (P0.5N10L30)	1
EP1	3310005440	PA012LQ0004	1
MP1*	8510024370	4389 GPS PLATE	1
MP2	8930083690	3322 GPS SPONGE	1

## [SUPPLIED ACCESSORIES]

REF NO.	PART NO.	DESCRIPTION	QTY.
EP1	6910028081	BLACK NYLON STRAP-1	1
EP2	3310002150	FA-S270C	1
EP3	-	BP-272†	1
MP1	-	MB-127	1

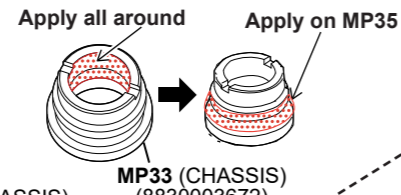
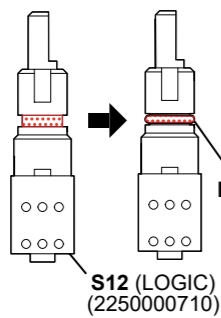
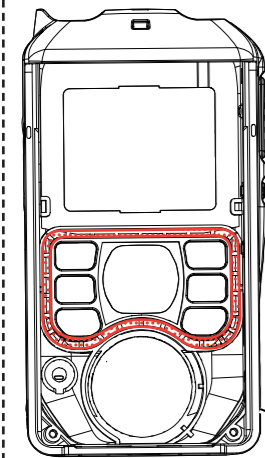
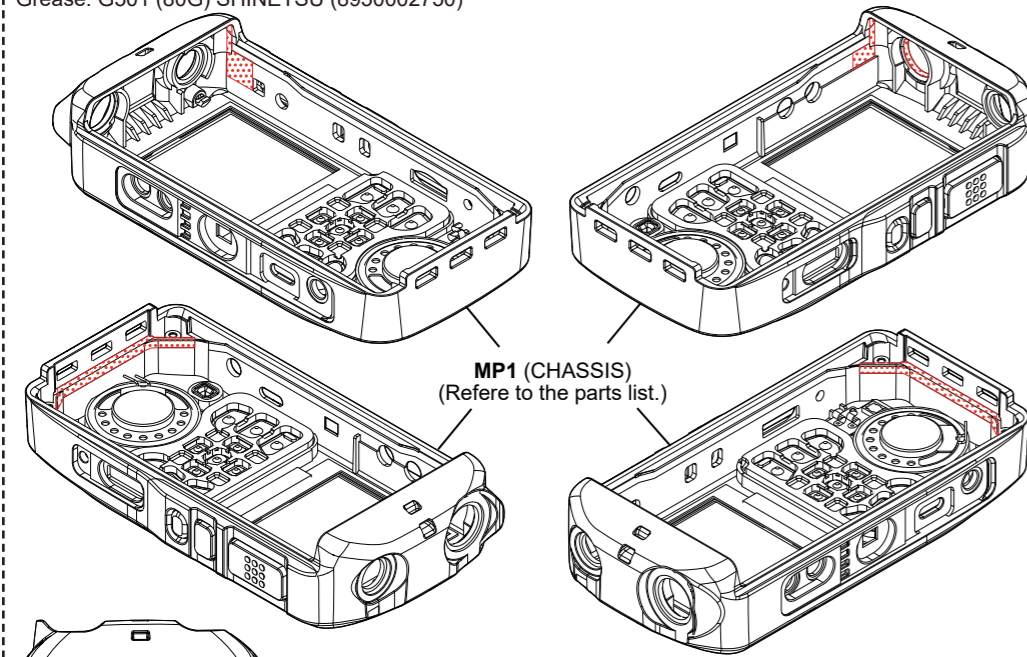
†Sold as an option.



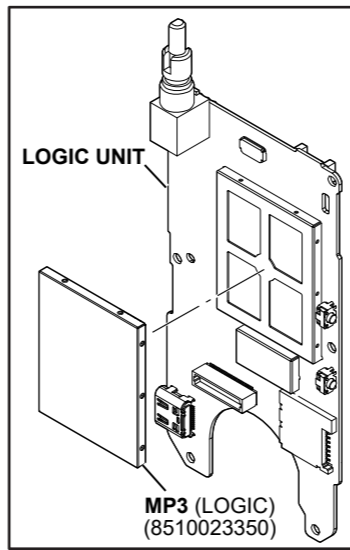
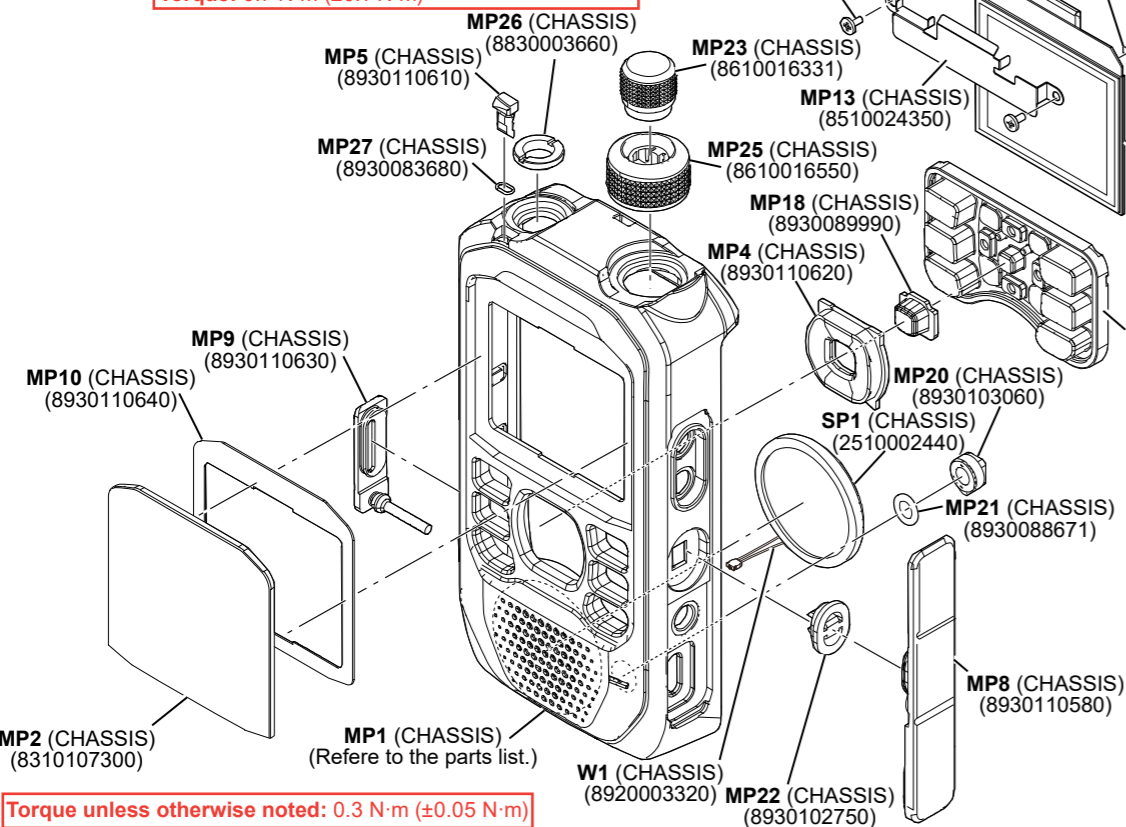
\*: Refer to "BOARD LAYOUTS" for the location.

Screw abbreviations A, B0, BT: Self-tapping PH: Pan head BS: Brass NI: Nickel ZU: Zinc SUS: Stainless

Apply the grease to the following area (■).  
Grease: G501 (80G) SHINETSU (8950002750)

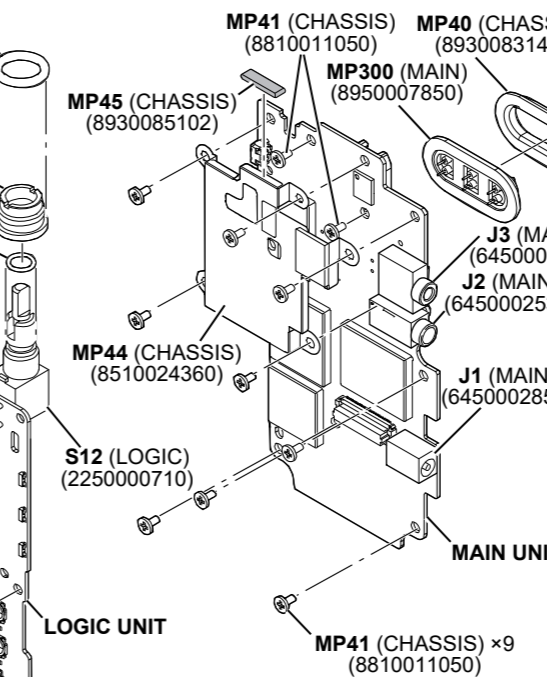
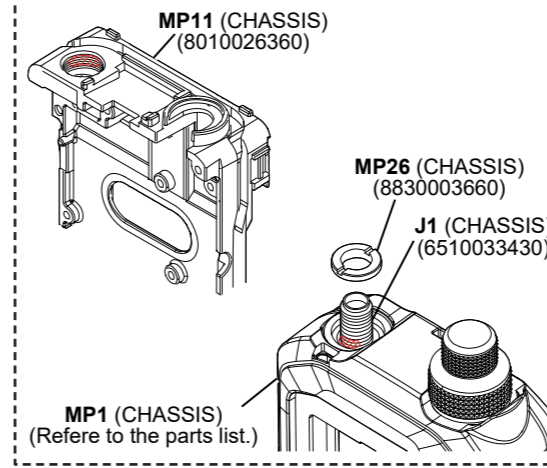


Tighten with: ICOM DRIVER(Q)-1 (8960000371)  
Torque: 0.7 N·m (±0.1 N·m)

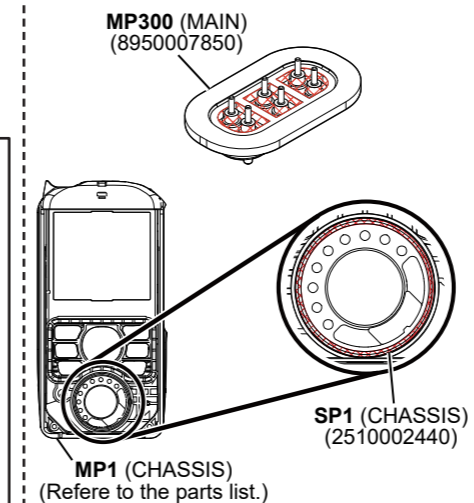


Tighten with: ICOM DRIVER(Q)-1 (8960000371)  
Torque: 0.5 N·m (±0.07 N·m)

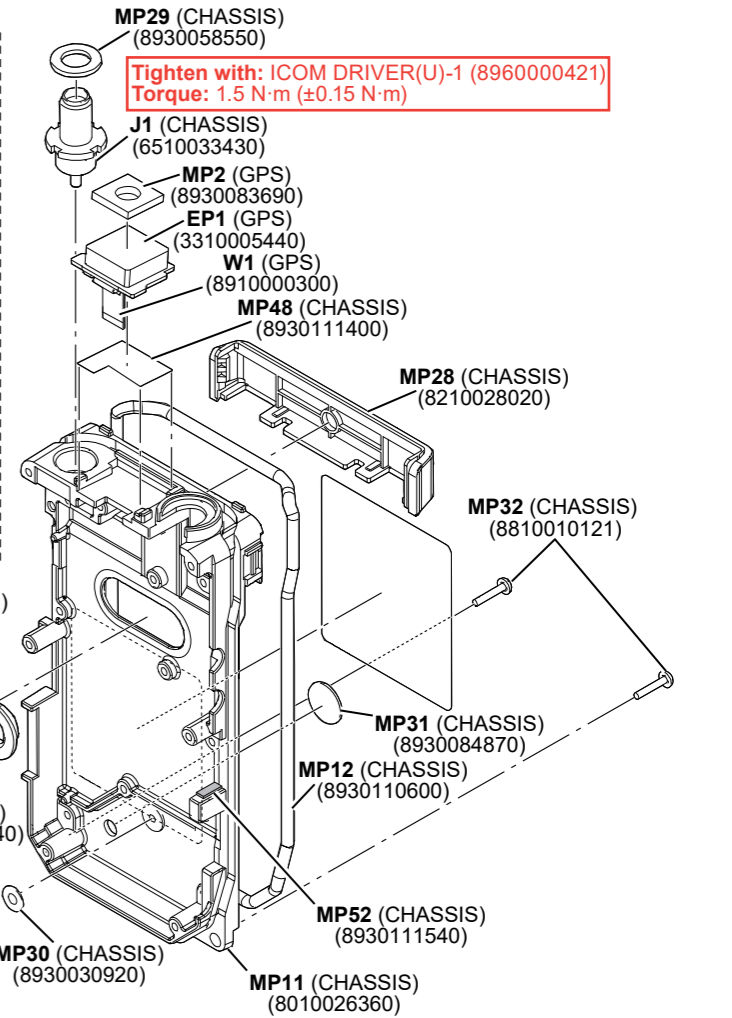
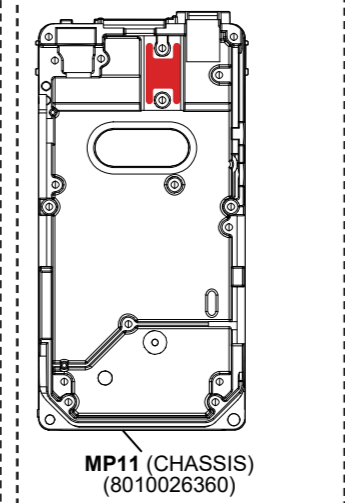
Apply the glue to the following area (■).  
Thread-locking fluid type: 638-250ML (8950007110)



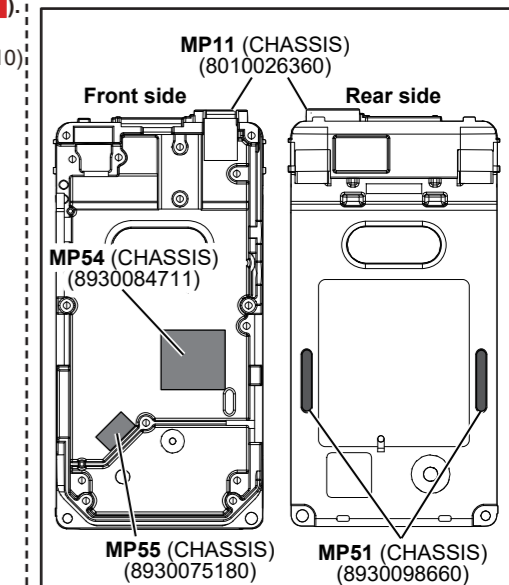
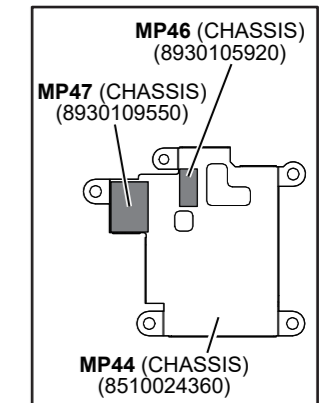
Apply the glue to the following area (■).  
Glue: Bond (SL320W) KONISHI (8950009140)



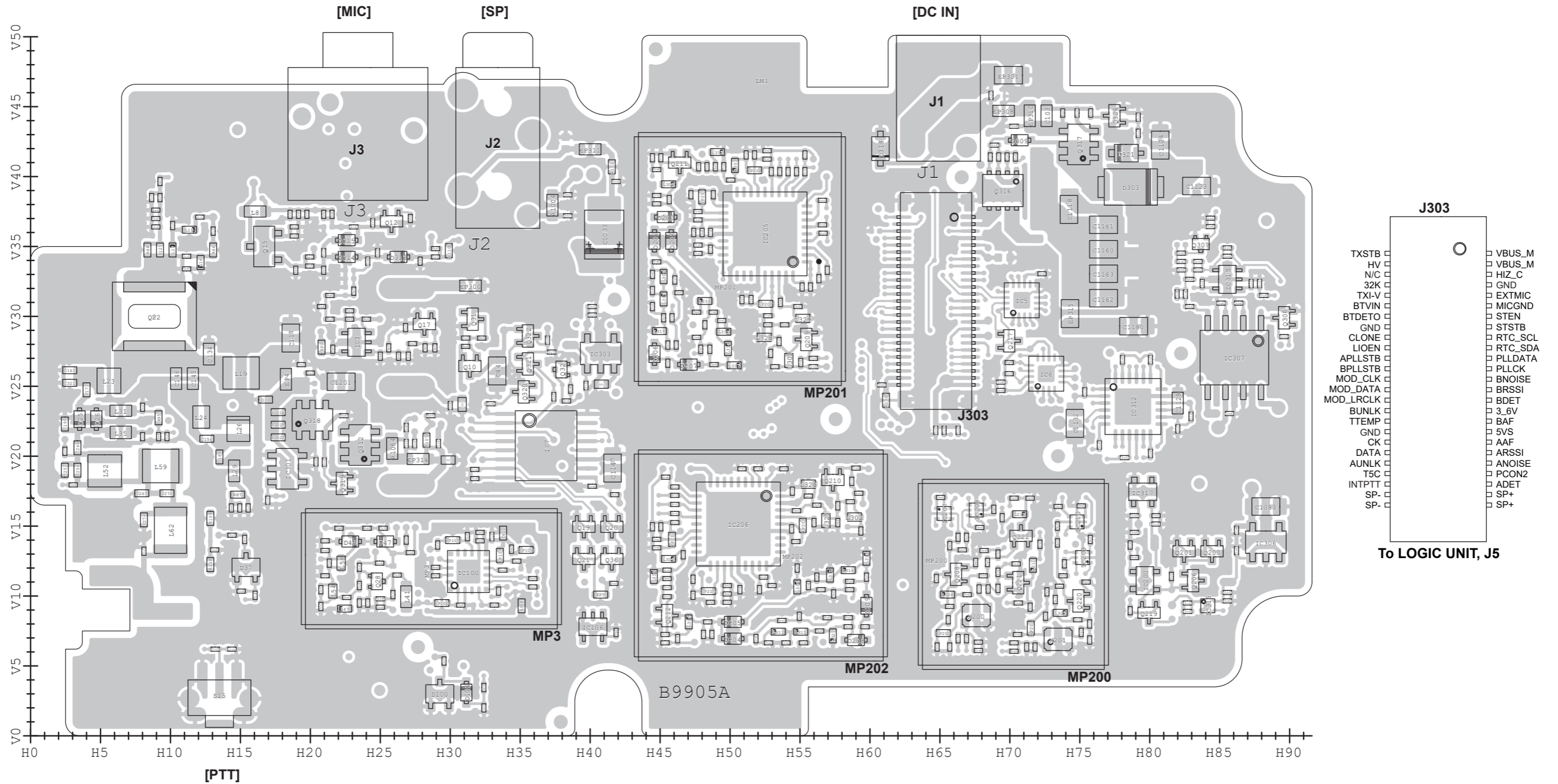
Apply the compound to the following area (■).  
Thermal Compound: G747 SHINETSU (8950005610)



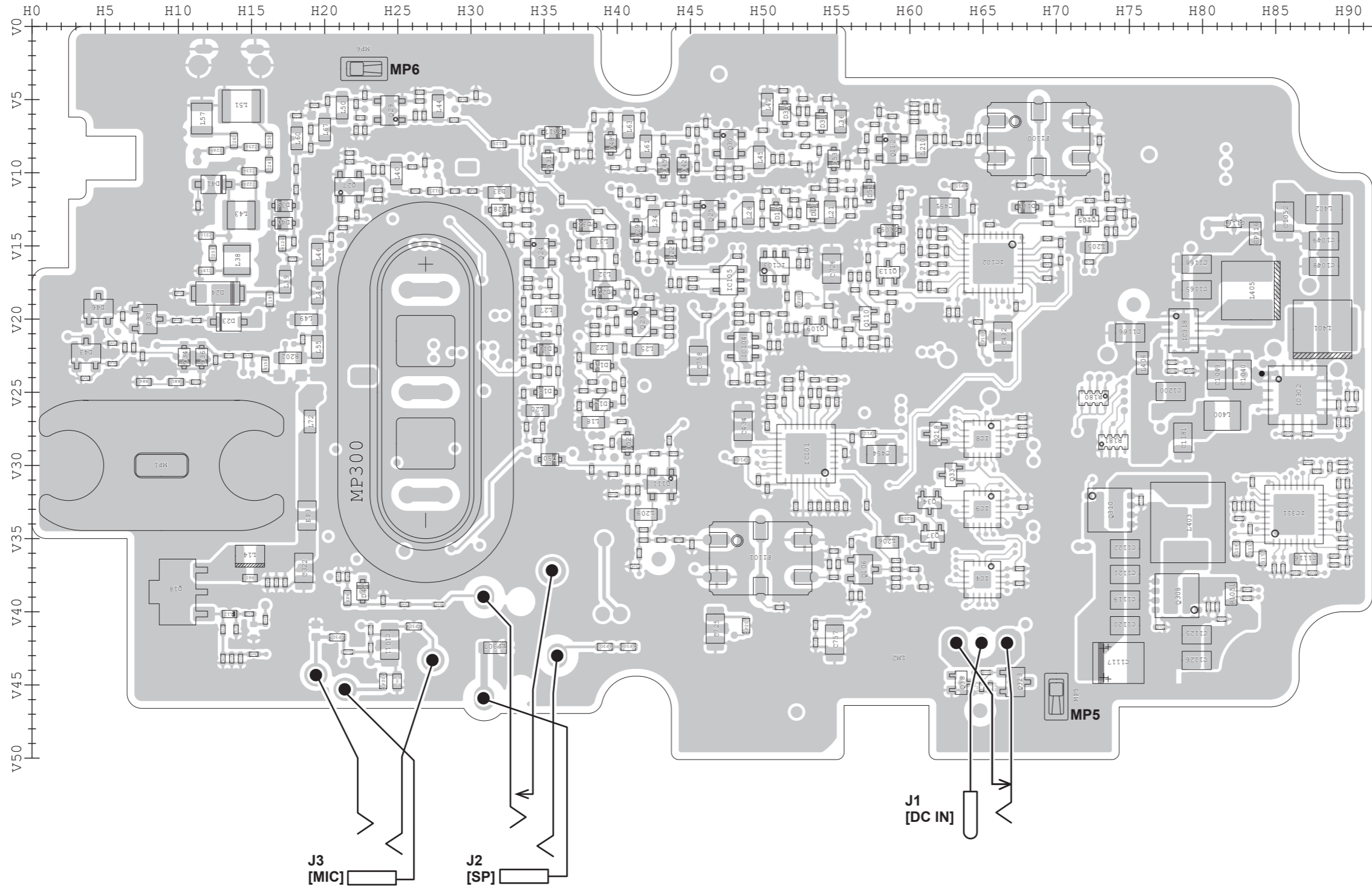
Tighten with: ICOM DRIVER(U)-1 (8960000421)  
Torque: 1.5 N·m (±0.15 N·m)



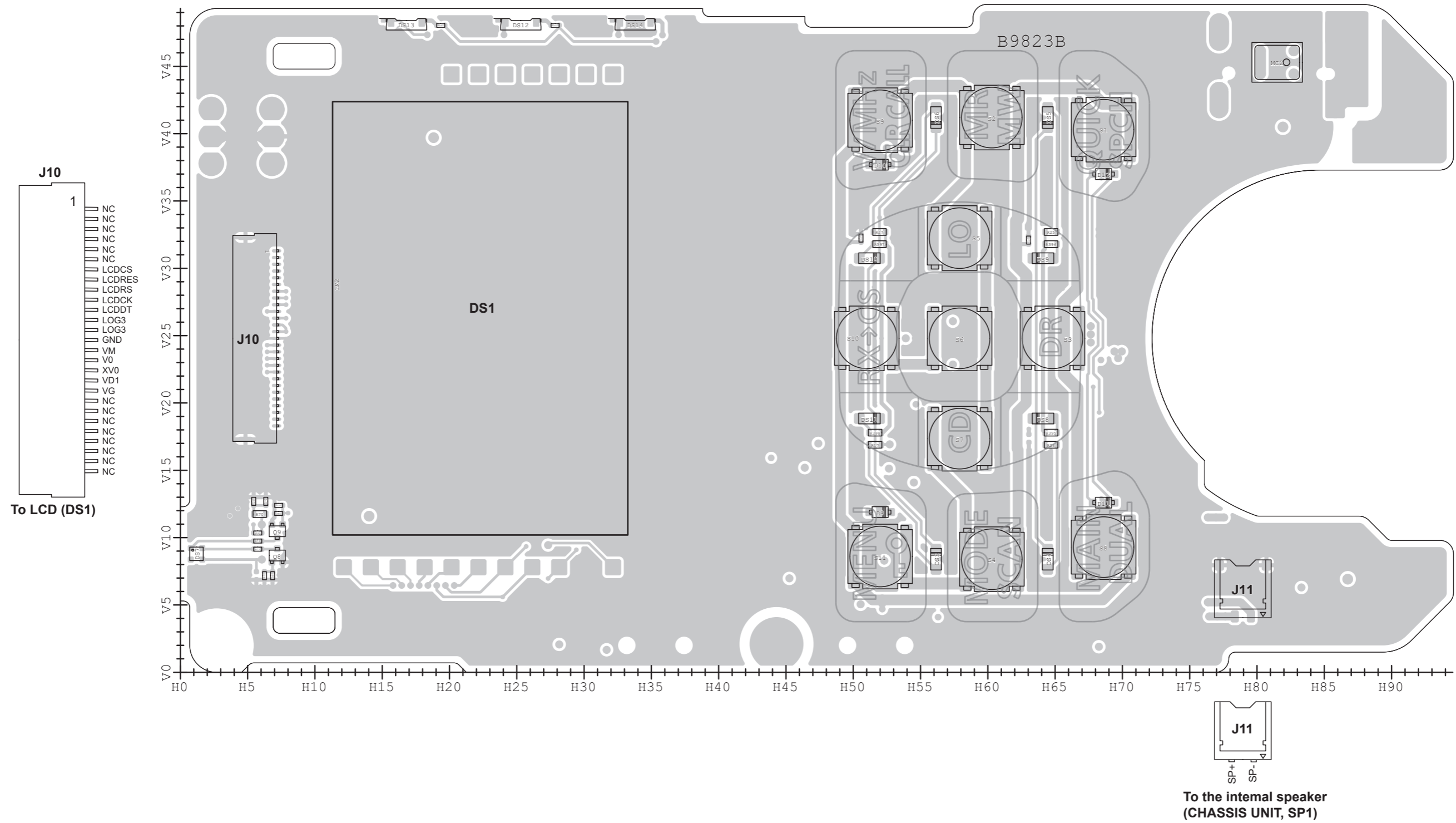
• MAIN UNIT (B-9905A: Top view)



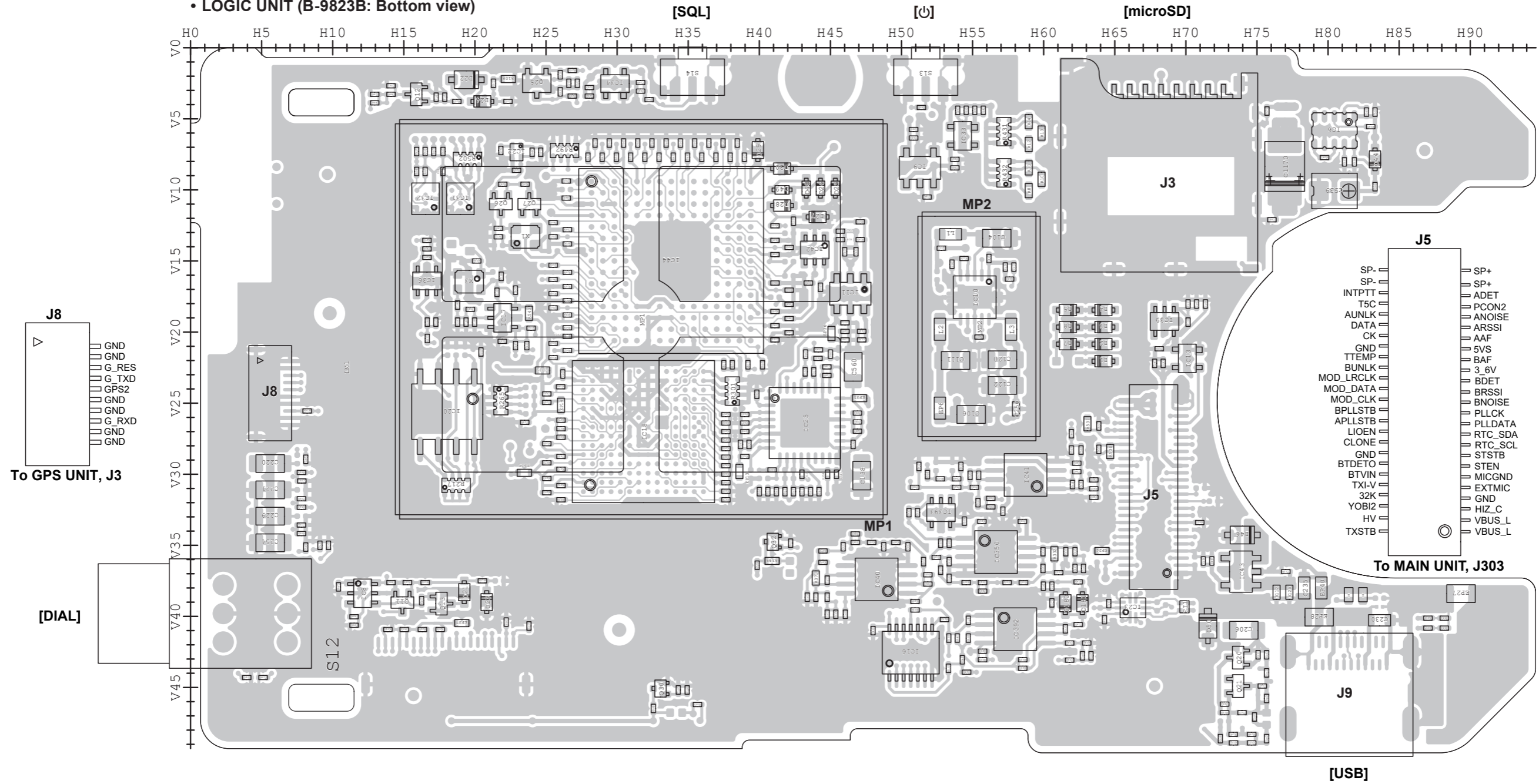
• MAIN UNIT (B-9905A: Bottom view)



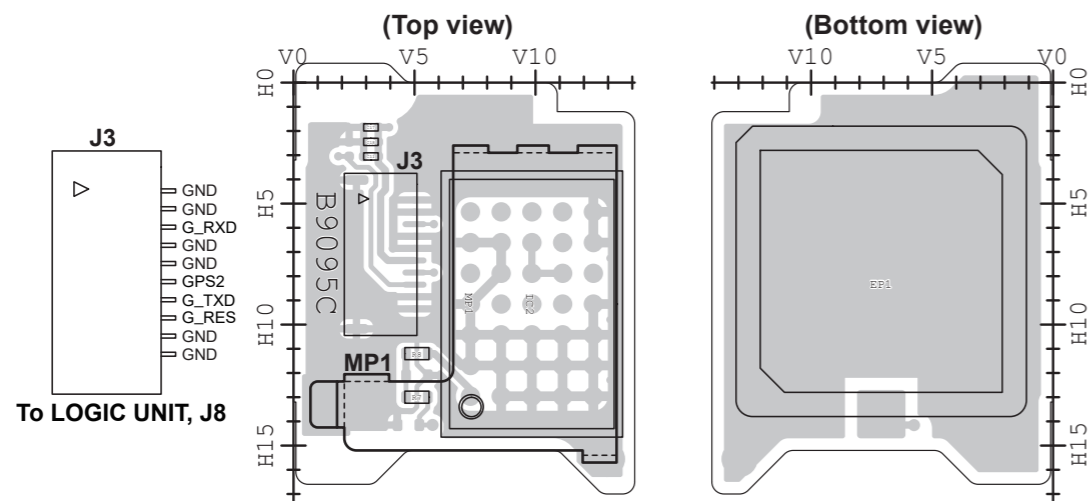
• LOGIC UNIT (B-9823B: Top view)



• LOGIC UNIT (B-9823B: Bottom view)



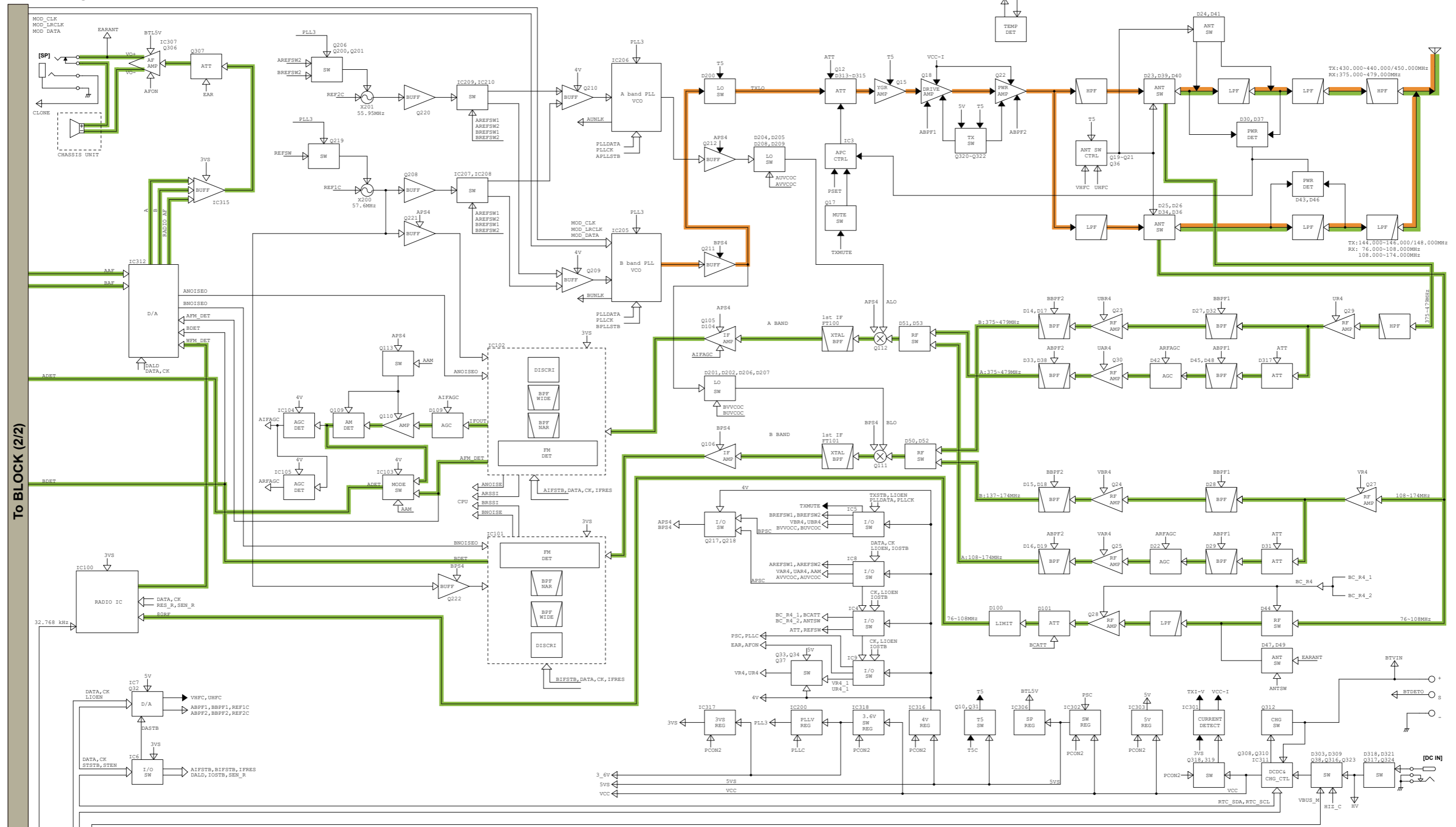
• GPS UNIT (B-9095C)



NOTE: Some parts may not be mounted on the PCB, depending on the transceiver version.

• BLOCK (1/2)

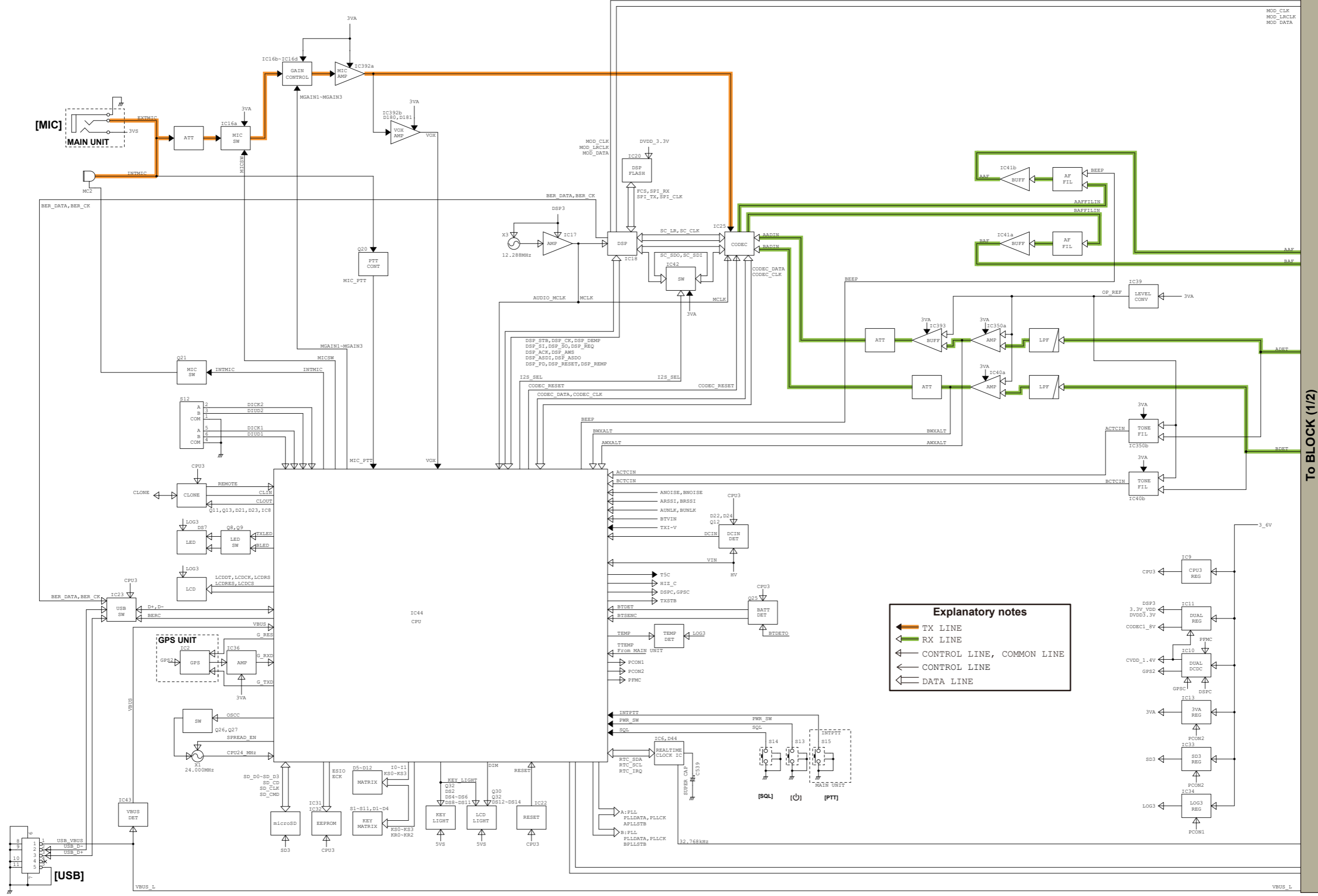
MAIN UNIT



**Explanatory notes**

- ← TX LINE
- ← RX LINE
- ← CONTROL LINE, COMMON LINE
- ← CONTROL LINE
- ← DATA LINE

To BLOCK (1/2)

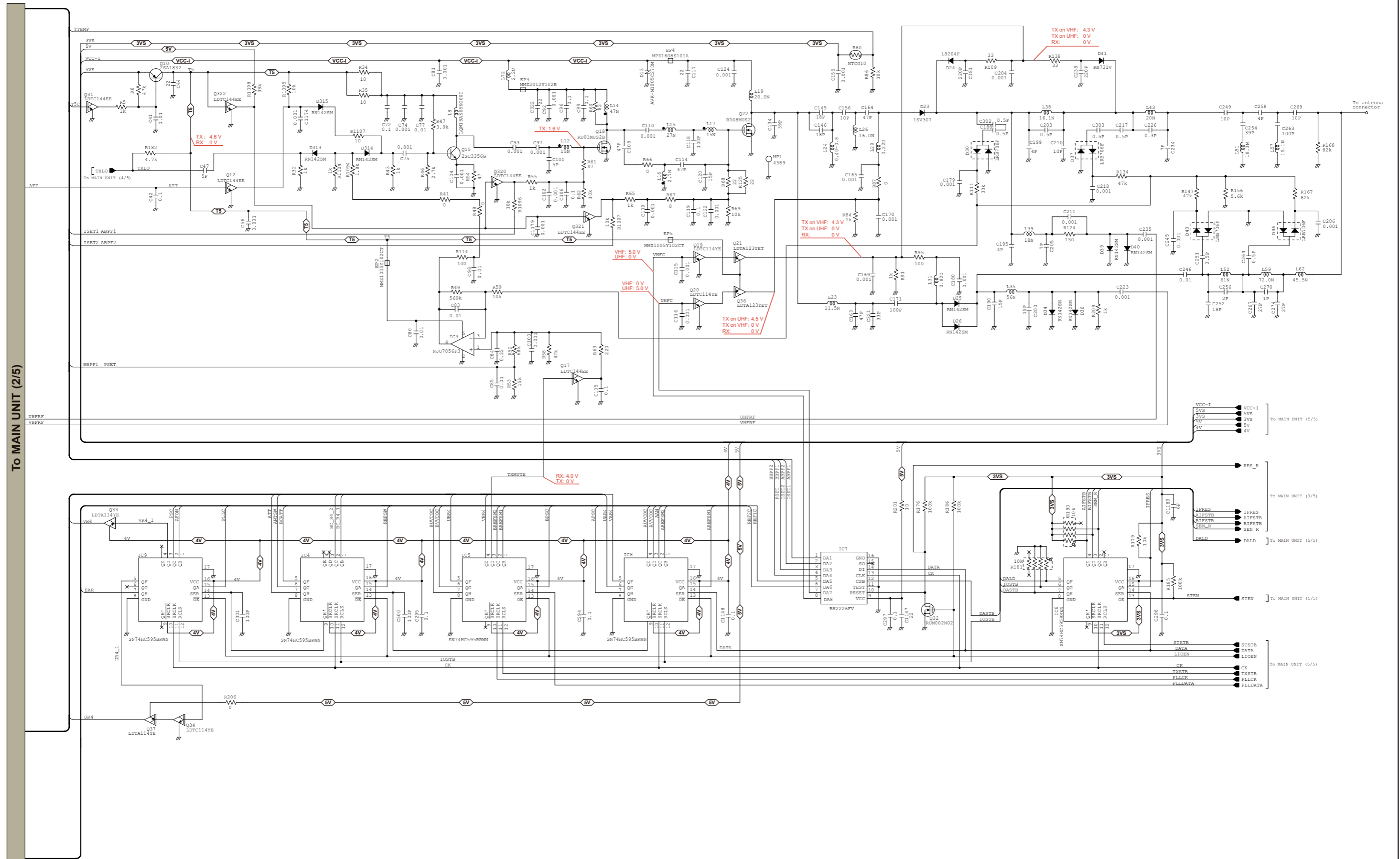


**Explanatory notes**

- ← TX LINE
- ← RX LINE
- ← CONTROL LINE, COMMON LINE
- ← CONTROL LINE
- ← DATA LINE



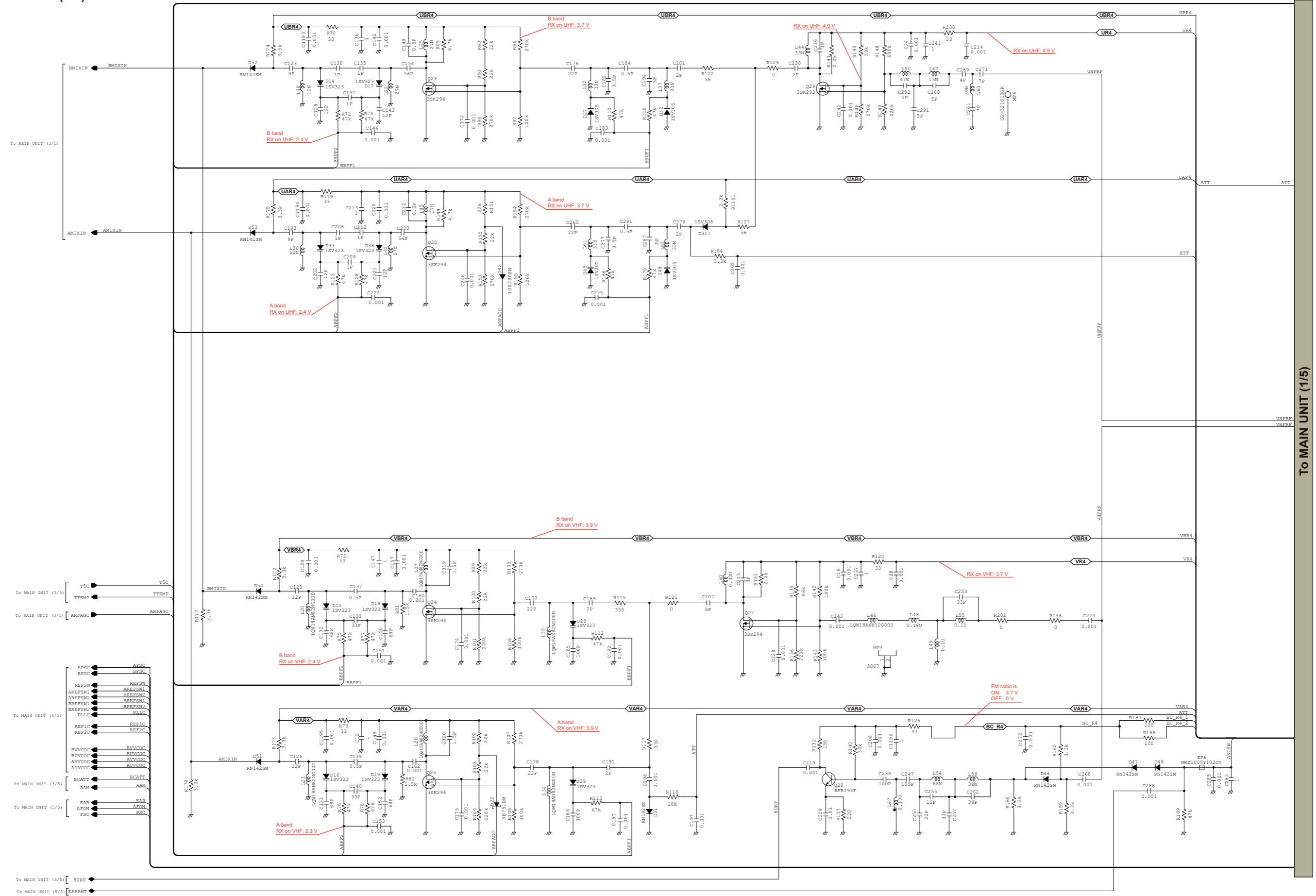
• MAIN UNIT (1/5)



To MAIN UNIT (2/5)

\*Refer to the PARTS LIST for the value and name of component.

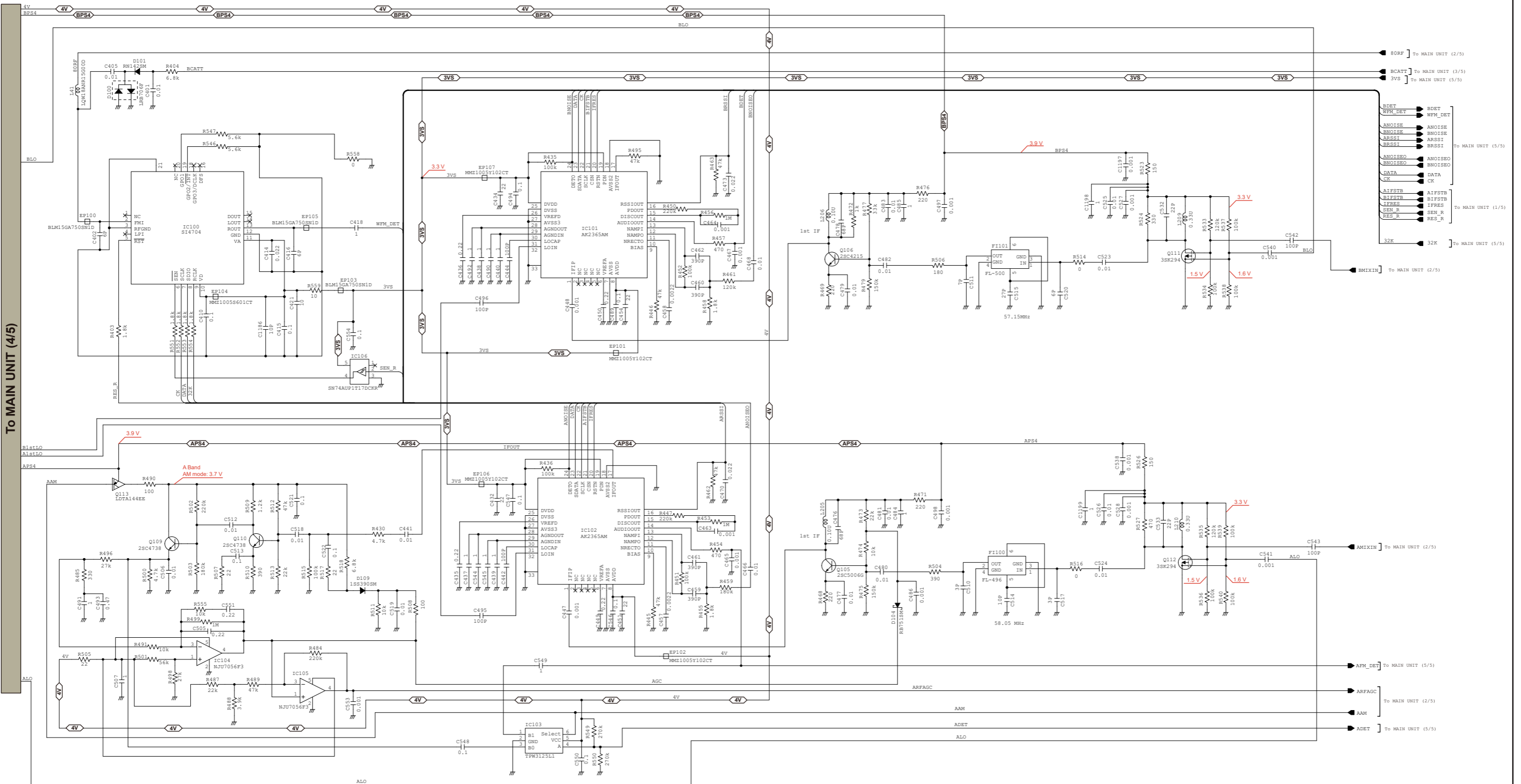
• MAIN UNIT (2/5)



To MAIN UNIT (1/5)

\*Refer to the PARTS LIST for the value and name of component.

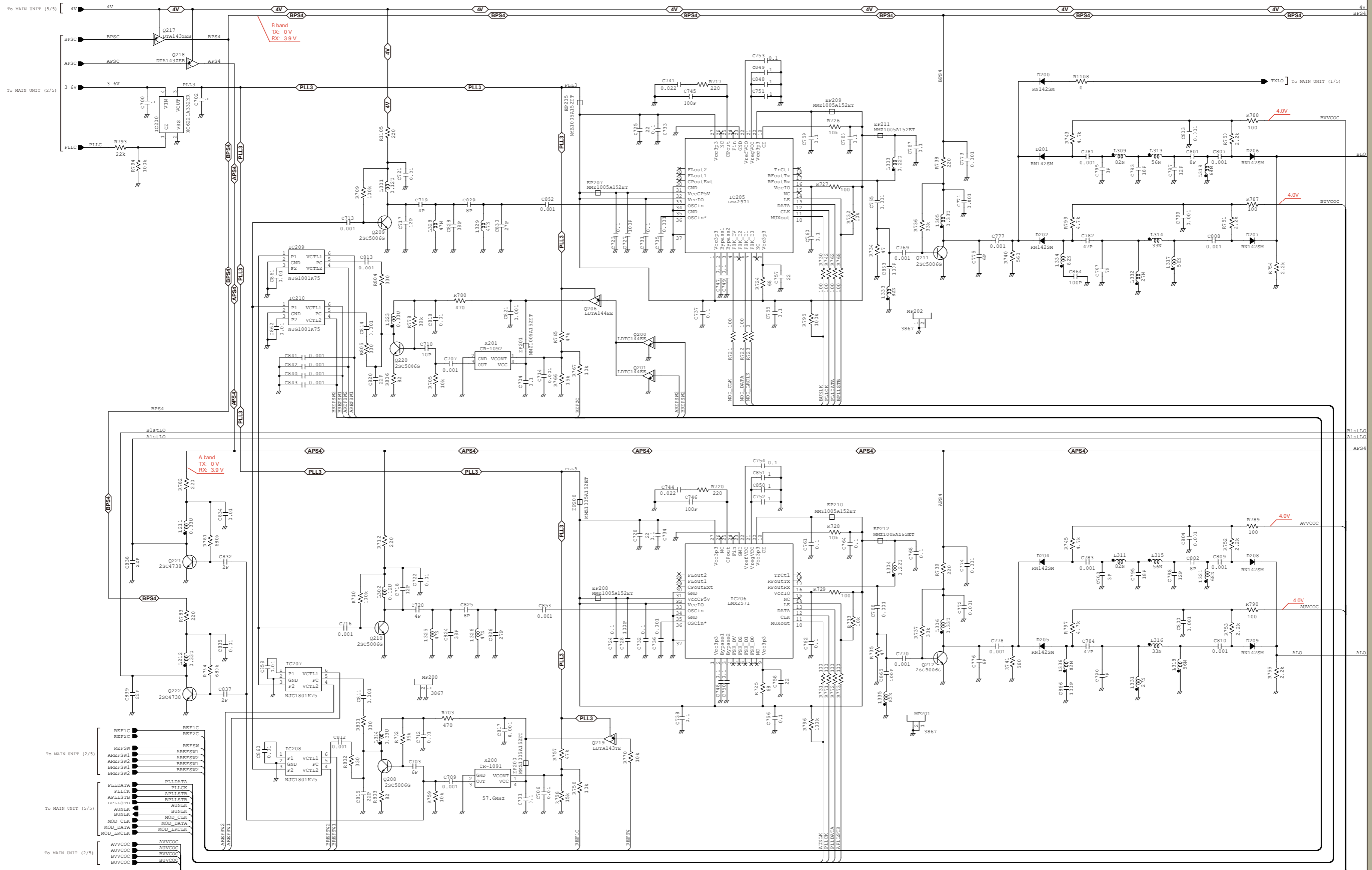
• MAIN UNIT (3/5)



To MAIN UNIT (4/5)

\*Refer to the PARTS LIST for the value and name of component.

• MAIN UNIT (4/5)

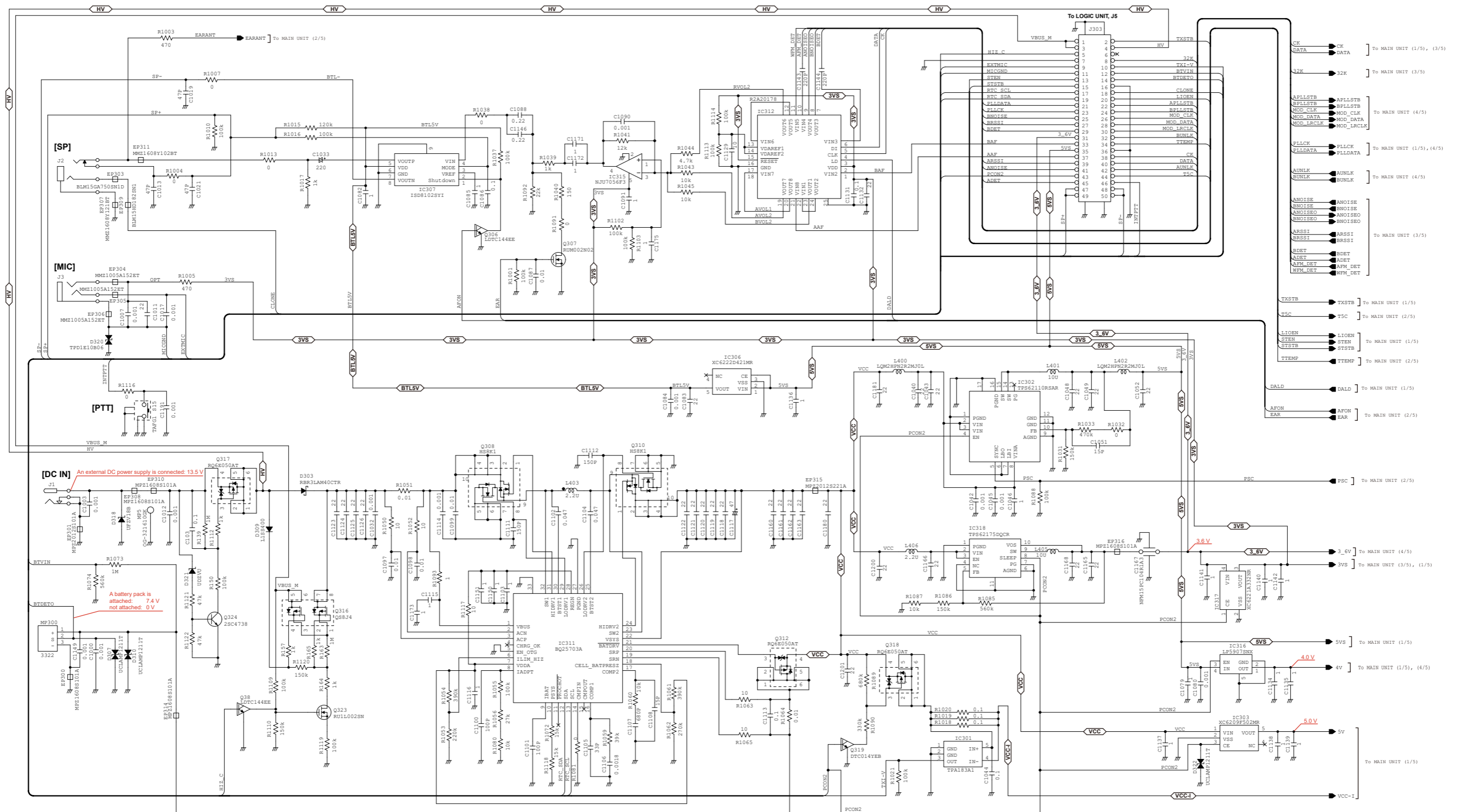


TO MAIN UNIT (3/5)

- REF1C REF1C
- REF2C REF2C
- REFSW1 REFSW1
- AREFSW2 AREFSW2
- BREFSW1 BREFSW1
- BREFSW2 BREFSW2
- PLLDATA PLLDATA
- PLLCK PLLCK
- APLLSTB APLLSTB
- BPLLSTB BPLLSTB
- AUNLK AUNLK
- BUNLK BUNLK
- MOD\_CLK MOD\_CLK
- MOD\_DATA MOD\_DATA
- MOD\_LRCLK MOD\_LRCLK
- AVVCCO AVVCCO
- AVVCCO AVVCCO
- BVVCCO BVVCCO
- BVVCCO BVVCCO

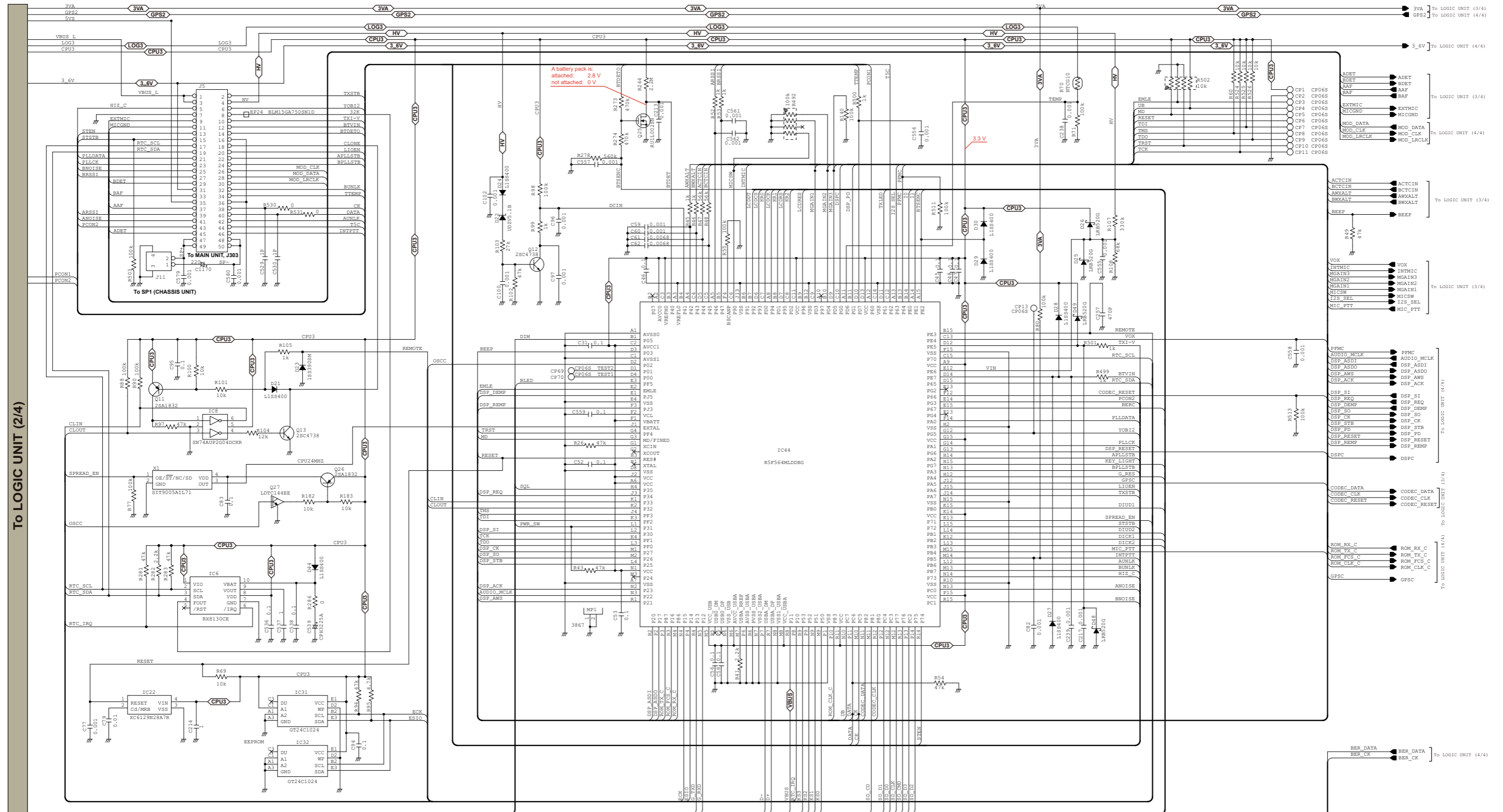
\*Refer to the PARTS LIST for the value and name of component.

• MAIN UNIT (5/5)



\*Refer to the PARTS LIST for the value and name of component.

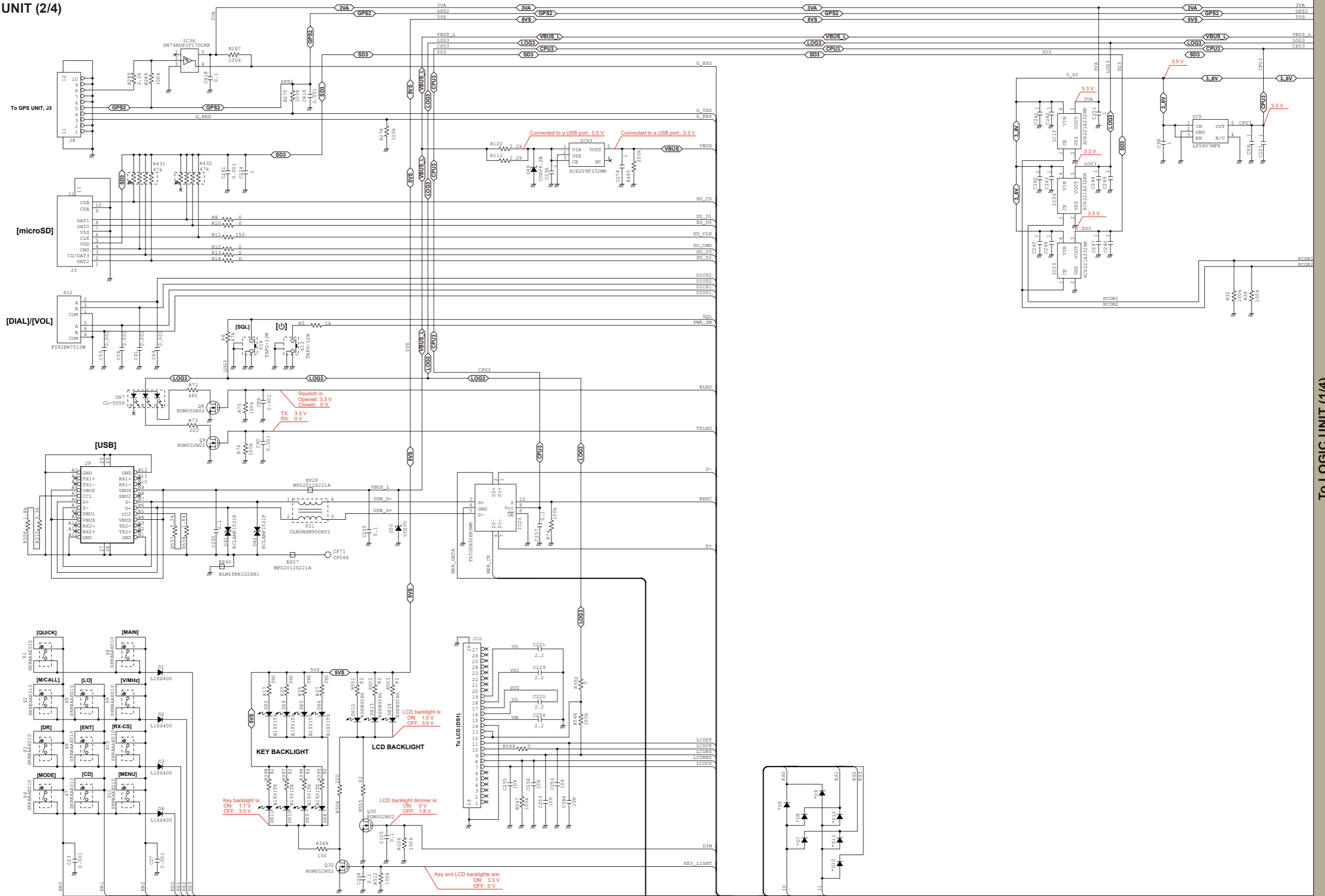
• LOGIC UNIT (1/4)



To LOGIC UNIT (2/4)

\*Refer to the PARTS LIST for the value and name of component.

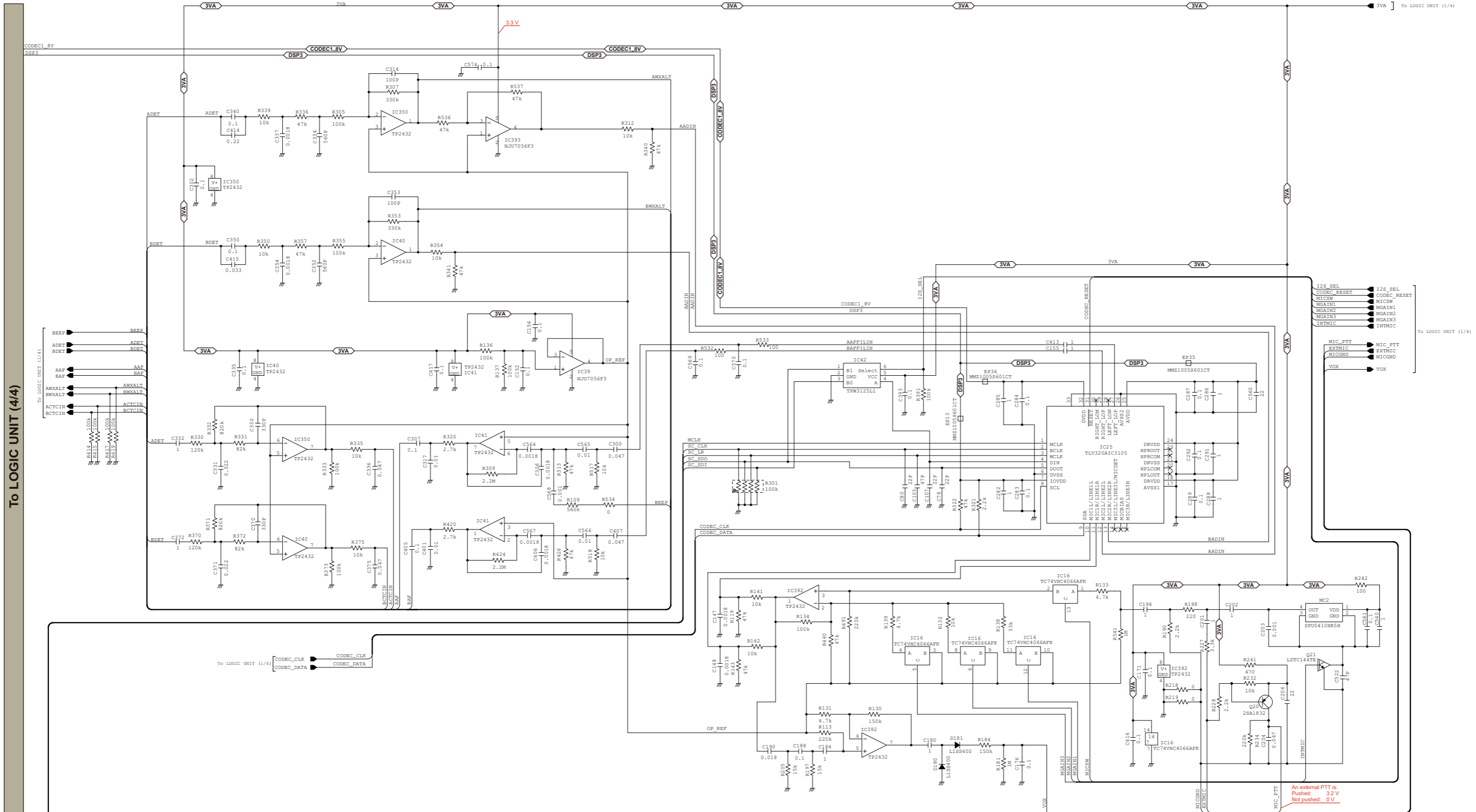
• LOGIC UNIT (2/4)



To LOGIC UNIT (1/4)

\*Refer to the PARTS LIST for the value and name of component.

• LOGIC UNIT (3/4)



To LOGIC UNIT (4/4)

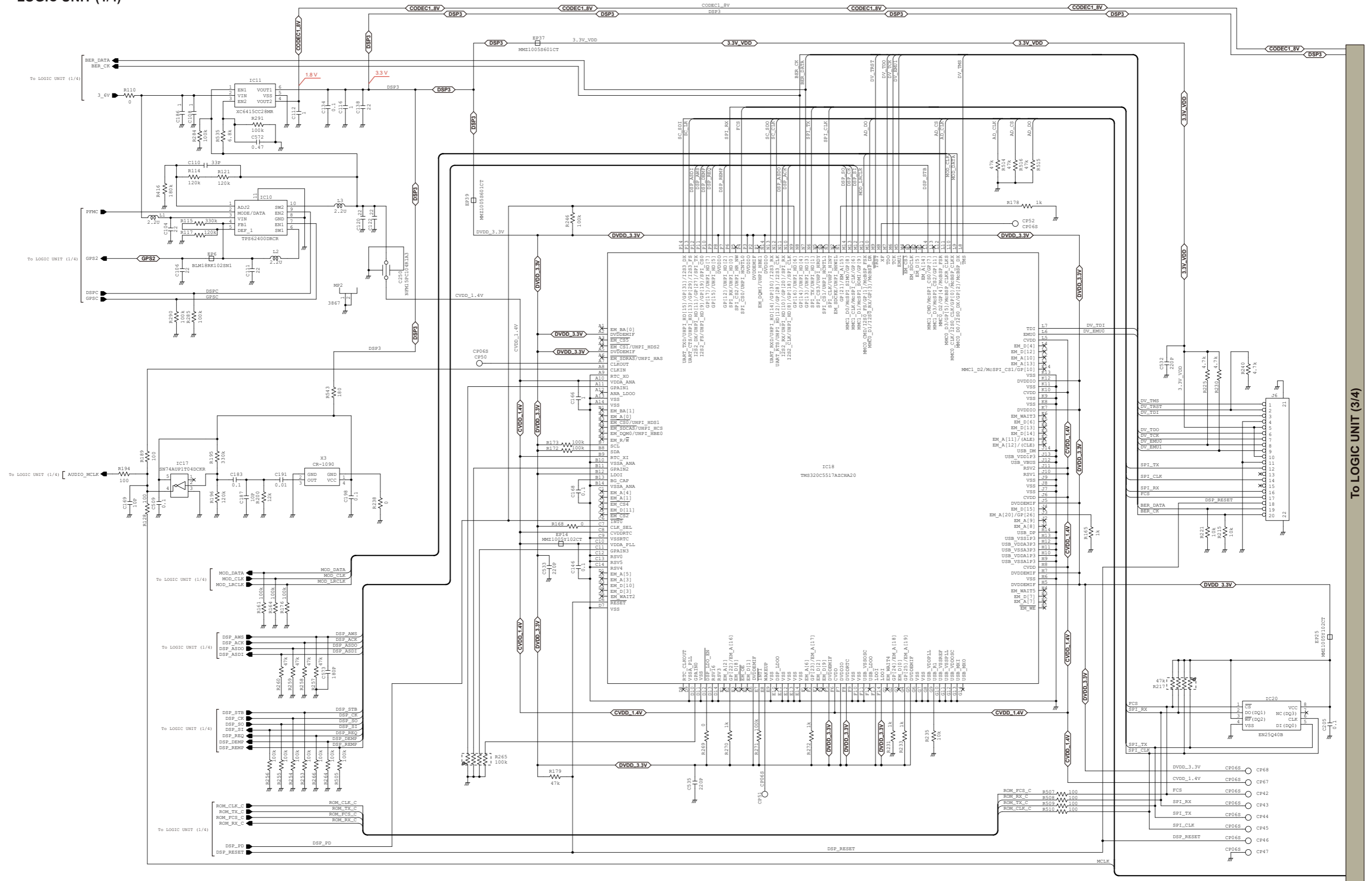
To LOGIC UNIT (1/4)

An external PTT is:  
Pushed: 3.2V  
Not pushed: 0V

\*Refer to the PARTS LIST for the value and name of component.



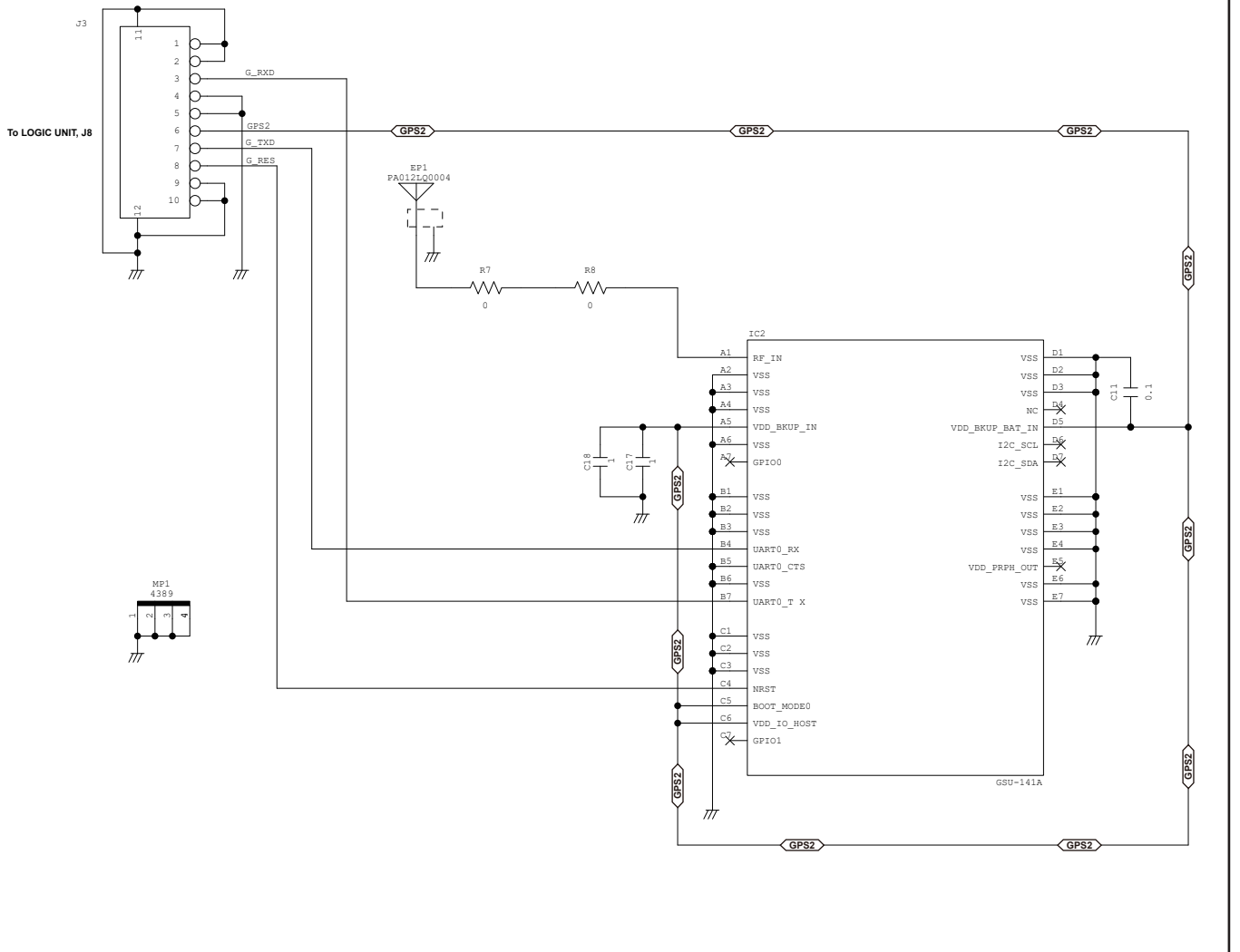
• LOGIC UNIT (4/4)



To LOGIC UNIT (3/4)

\*Refer to the PARTS LIST for the value and name of component.

• GPS UNIT



\*Refer to the PARTS LIST for the value and name of component.

If you have any inquiries regarding service, contact your distributor. The contact number or E-mail address of your distributor can be found on our website.

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