

Jan. 2010



# SERVICE MANUAL ADDENDUM

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## UR-FR6000 UR-FR6100

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[MAIN UNIT]

| REF NO. | PARTS NO.  | DESCRIPTION            | M. | H/V LOCATION |
|---------|------------|------------------------|----|--------------|
| DS1     | 5040002961 | S.LED SML-A12MT T86J   | B  | 96/1.1       |
| DS2     | 5040002961 | S.LED SML-A12MT T86J   | B  | 126/1.1      |
| DS3     | 5040003000 | S.LED SML-A12UT-T86    | B  | 111/1.1      |
| EP1     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 129.1/48.4   |
| EP2     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 117.2/48.4   |
| EP3     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 32.4/81.6    |
| EP4     | 6910016330 | S.BEA MMZ1005S 601CT-S | B  | 30.4/60.5    |
| EP5     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 39/74.5      |
| EP6     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 37.8/109     |
| EP7     | 6910016330 | S.BEA MMZ1005S 601CT-S | B  | 40.7/36.7    |
| EP8     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 94.5/48.8    |
| EP9     | 6910016330 | S.BEA MMZ1005S 601CT-S | T  | 48.8/39.3    |
| EP10    | 6910011560 | BEA HF70BB4.5X5X1.6    |    |              |
| EP13    | 6910011330 | TER OT-009 M3          |    |              |
| EP14    | 6910011330 | TER OT-009 M3          |    |              |

[CONNECT UNIT]

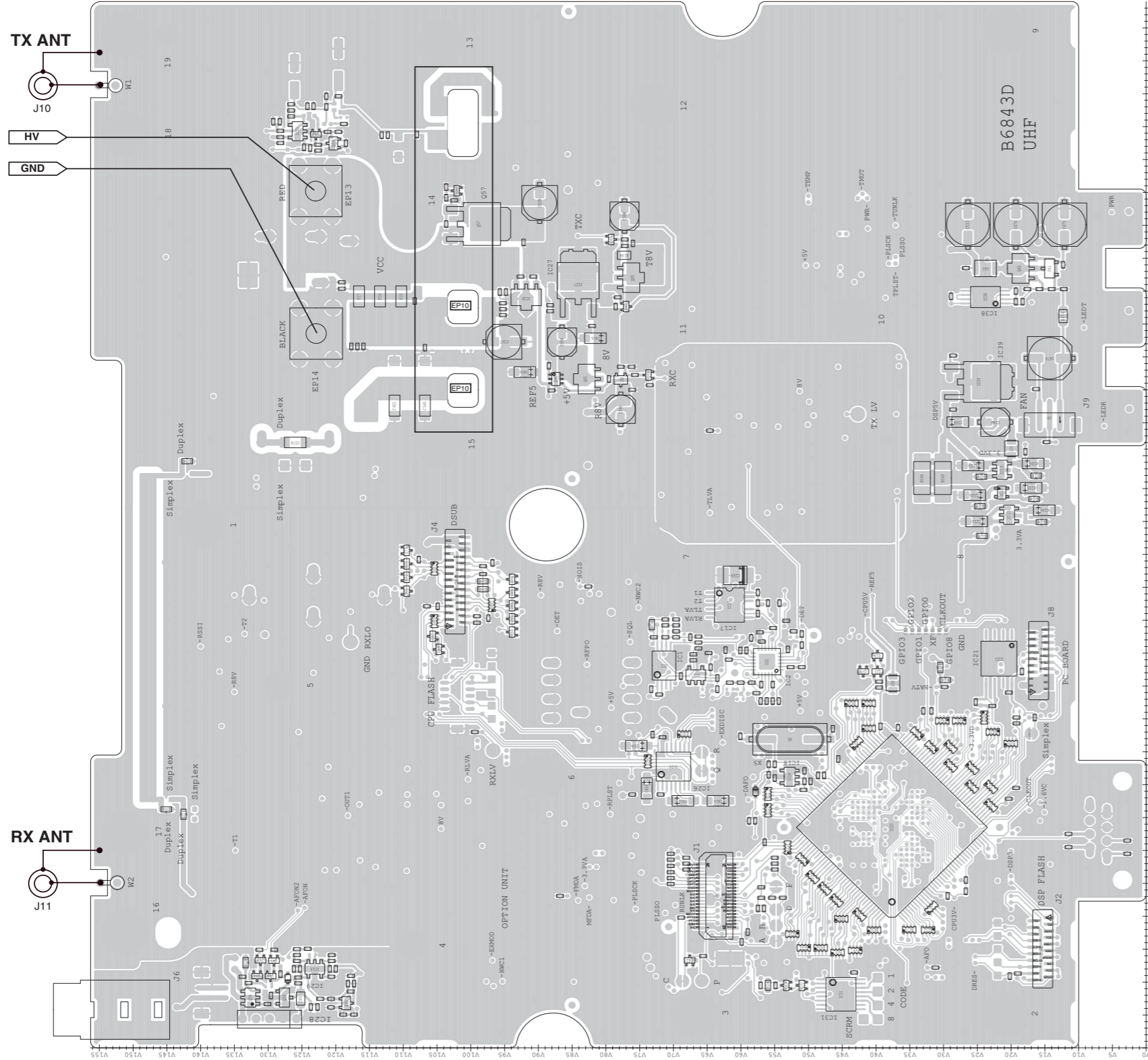
| REF NO. | PARTS NO.  | DESCRIPTION             | M. | H/V LOCATION |
|---------|------------|-------------------------|----|--------------|
| C601    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 13.8/12.4    |
| C602    | 4030017400 | S.CER ECJ0EC1H220J      | T  | 12.2/12.4    |
| C603    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 16.5/12.4    |
| C604    | 4030017400 | S.CER ECJ0EC1H220J      | T  | 15/14.2      |
| C605    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 17.8/13.9    |
| C606    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 19.4/12.4    |
| C607    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 20.5/13.9    |
| C608    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 22.6/12.4    |
| C609    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 25.5/12.4    |
| C610    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 29.7/12.8    |
| C611    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 31/14.1      |
| C612    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 32.4/12.8    |
| C613    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 33.5/14.1    |
| C614    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 35.2/14.1    |
| C615    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 35.7/12.8    |
| C616    | 4030017420 | S.CER ECJ0EC1H470J      | B  | 35.2/15.6    |
| C617    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 37.5/13.5    |
| C618    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 39.3/12.2    |
| C619    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 39.3/13.4    |
| C620    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 41.3/12.6    |
| C621    | 4030017420 | S.CER ECJ0EC1H470J      | T  | 27.4/13.9    |
| J601    | 6510026290 | S.CON IMSA-9631S-28Y921 | B  | 22.8/16.2    |
| J602    | 6510023210 | CON CD6125SA1J0 <CVI>   |    |              |
| S1      | 2260003070 | S.SWI MINISMDC150F/24-2 | B  | 38.9/18      |

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

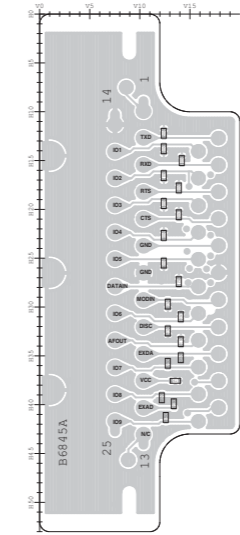
# BOARD LAYOUTS

The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.

• MAIN UNIT  
(TOP VIEW)

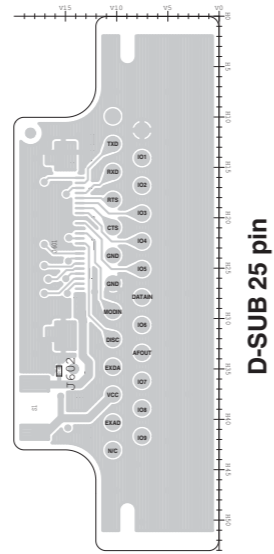


• CONNECT UNIT  
(TOP VIEW)



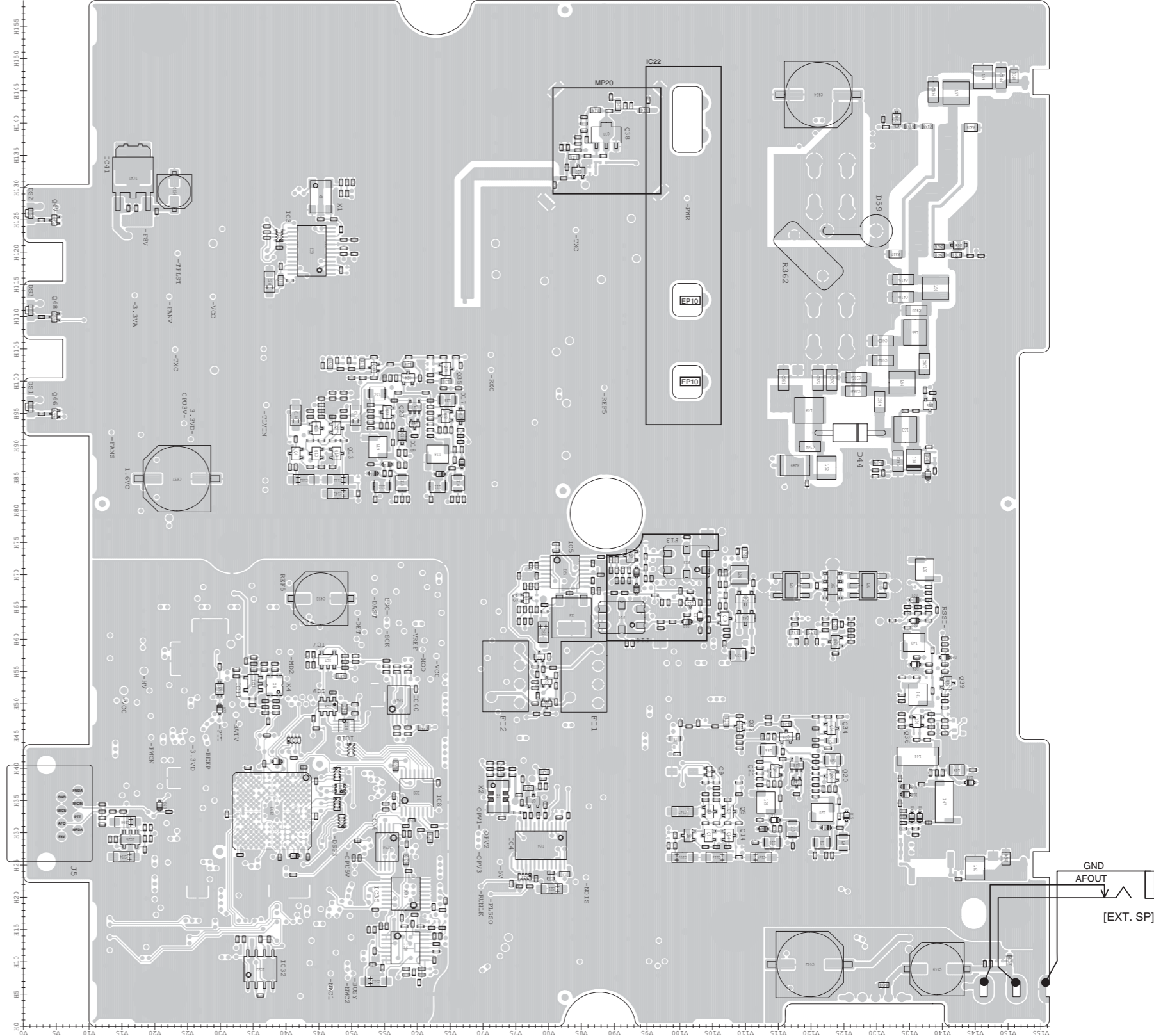
The combination of this side and the bottom side shows the board layout configuration as the actual P.C.Board.

• CONNECT UNIT  
(BOTTOM VIEW)



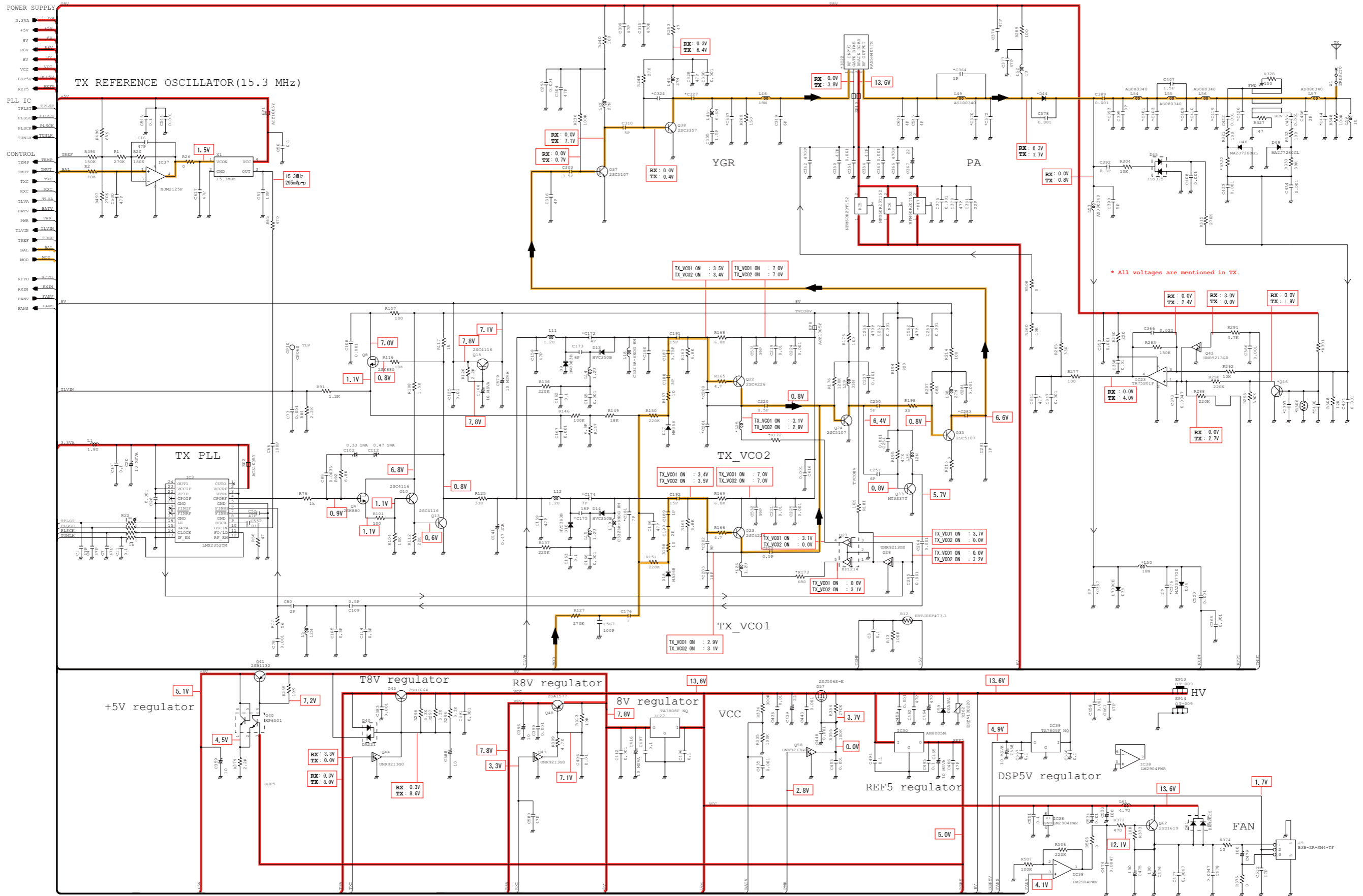
D-SUB 25 pin

• MAIN UNIT  
(BOTTOM VIEW)



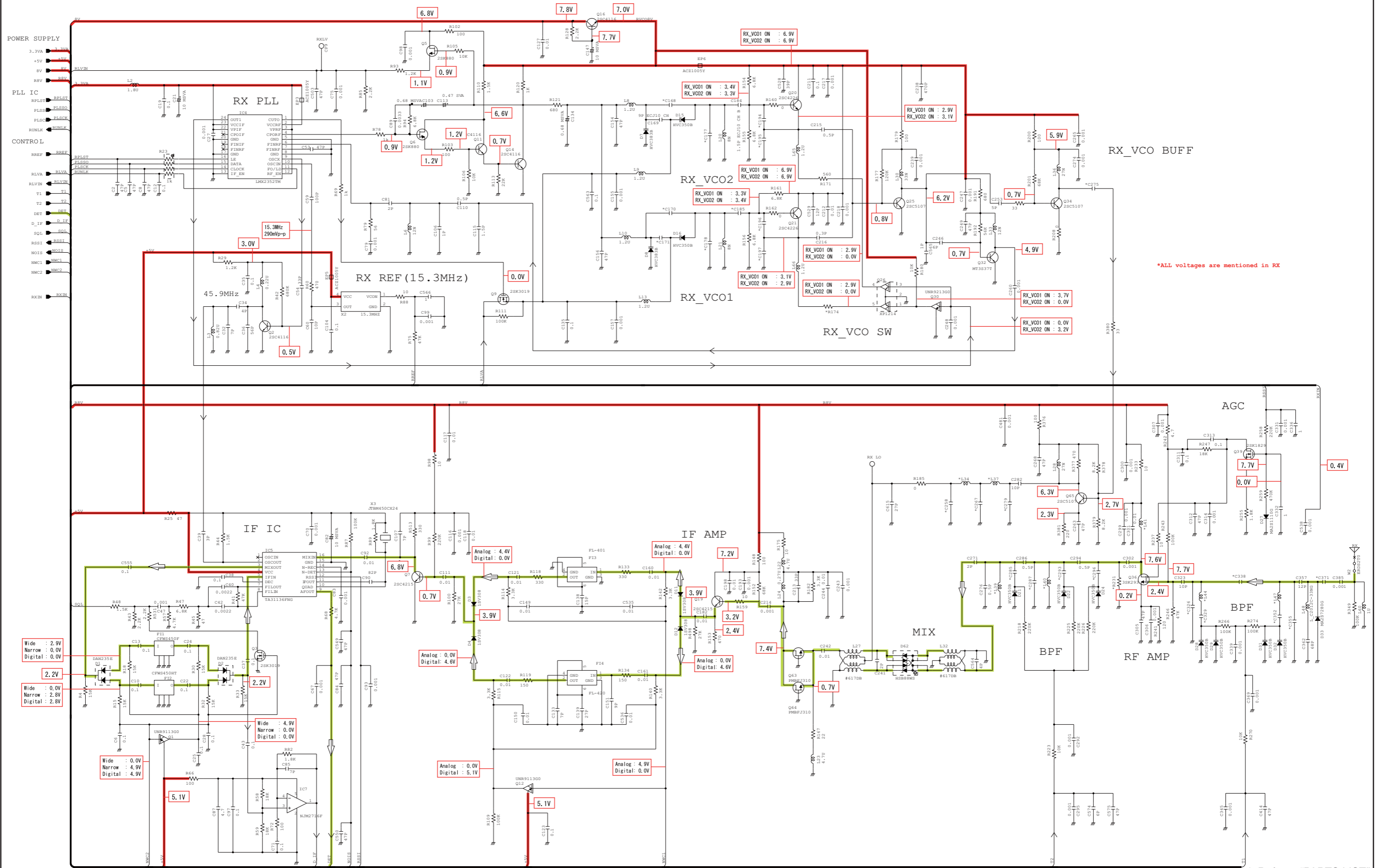
# VOLTAGE DIAGRAM

## MAIN UNIT (1/3)



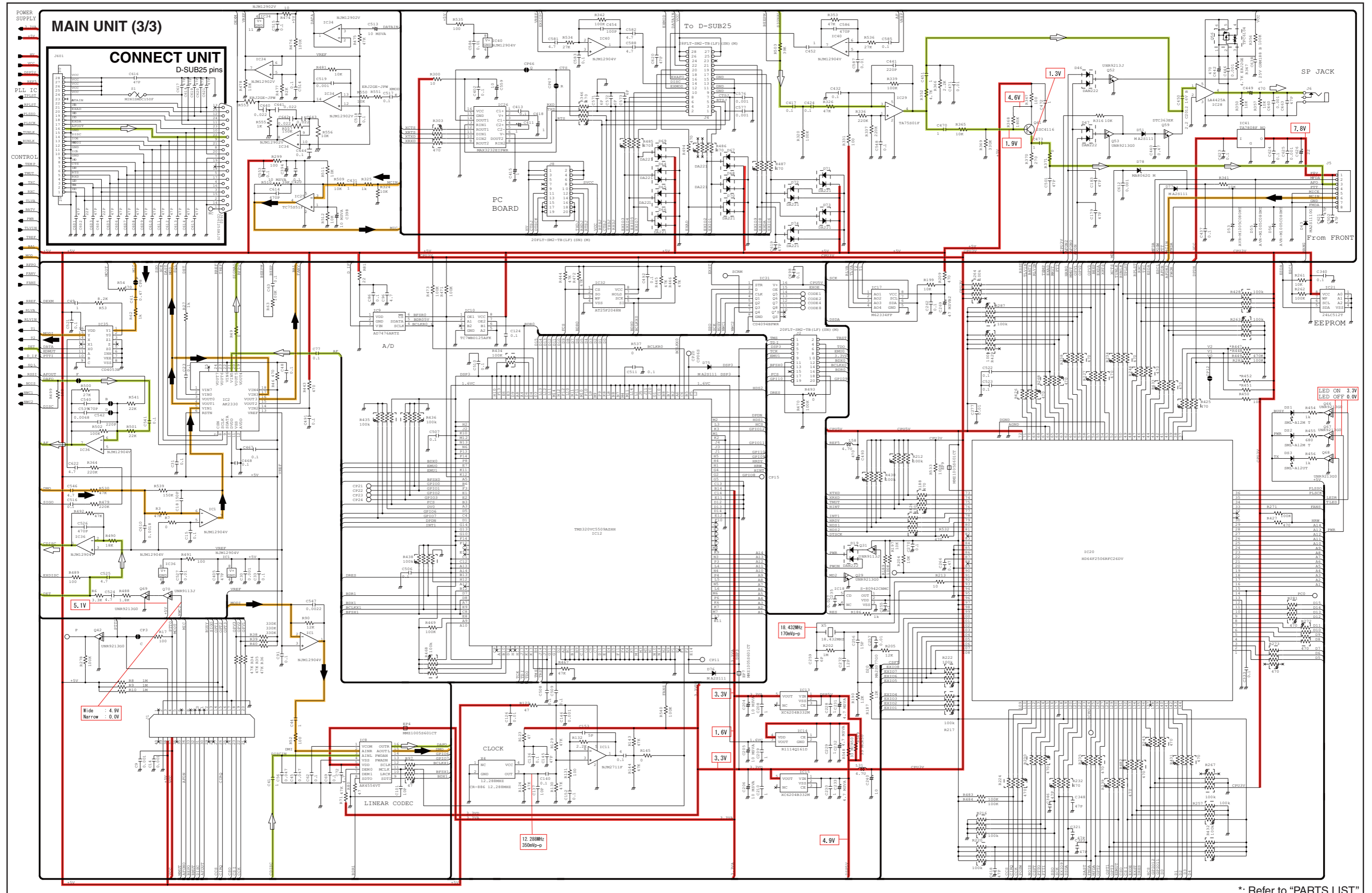
\*; Refer to "PARTS LIST."

# MAIN UNIT (2/3)



\*ALL voltages are mentioned in RX

\*; Refer to "PARTS LIST."



\*; Refer to "PARTS LIST."

Mar. 2009



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[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains part numbers and their specifications for the [MAIN UNIT] section.

[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains part numbers and their specifications for the [MAIN UNIT] section.

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



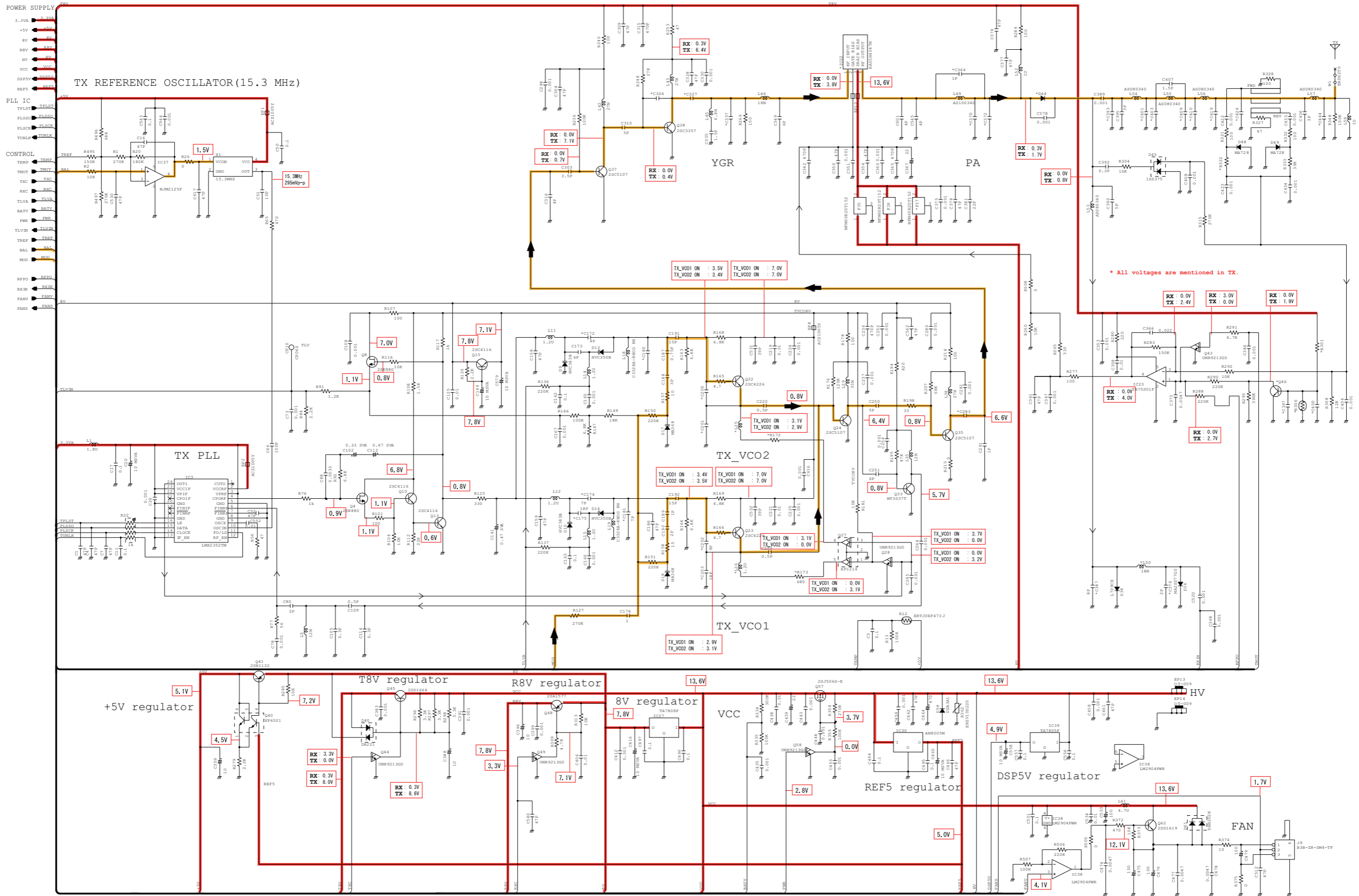






# VOLTAGE DIAGRAM

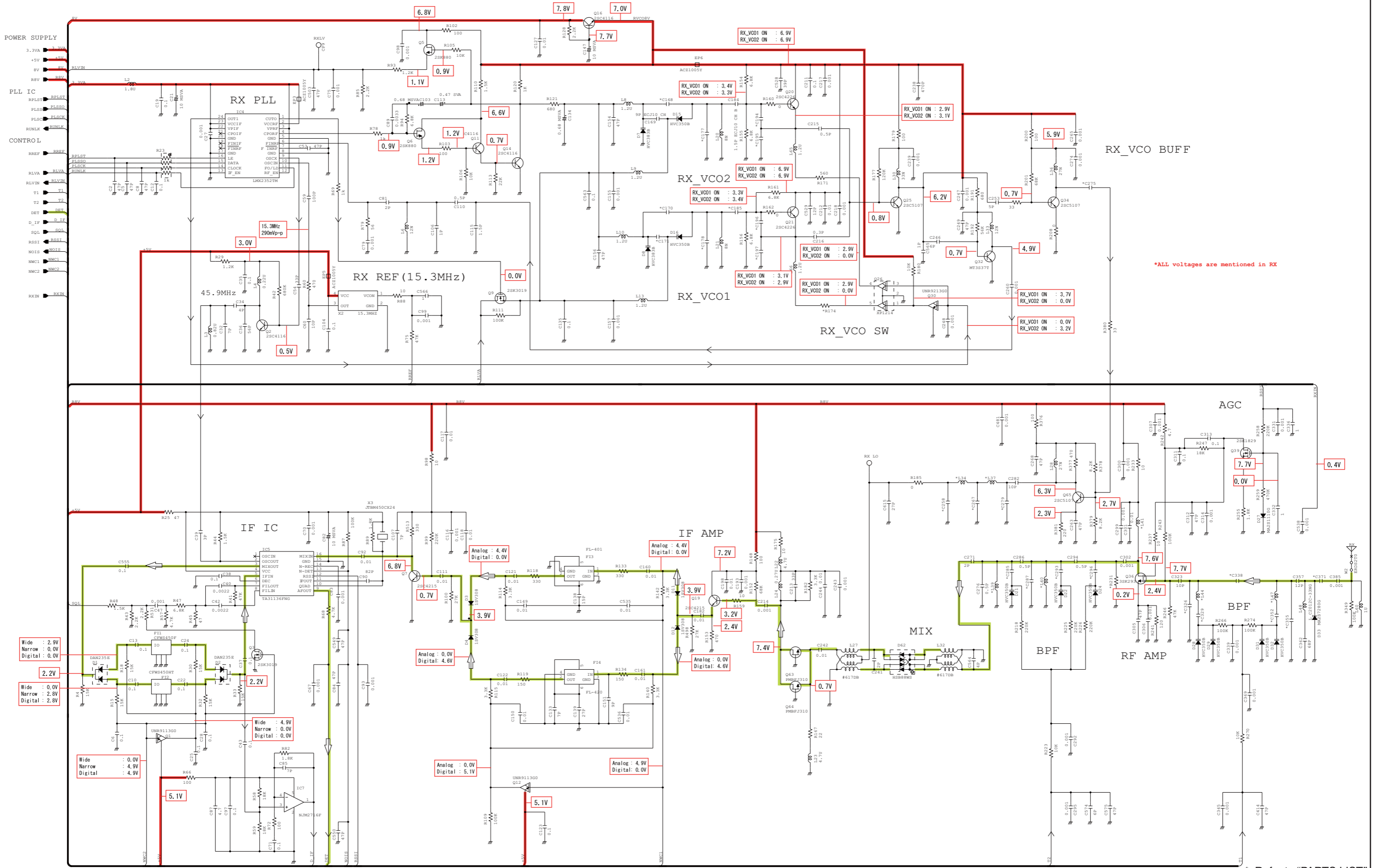
## MAIN UNIT (1/3)



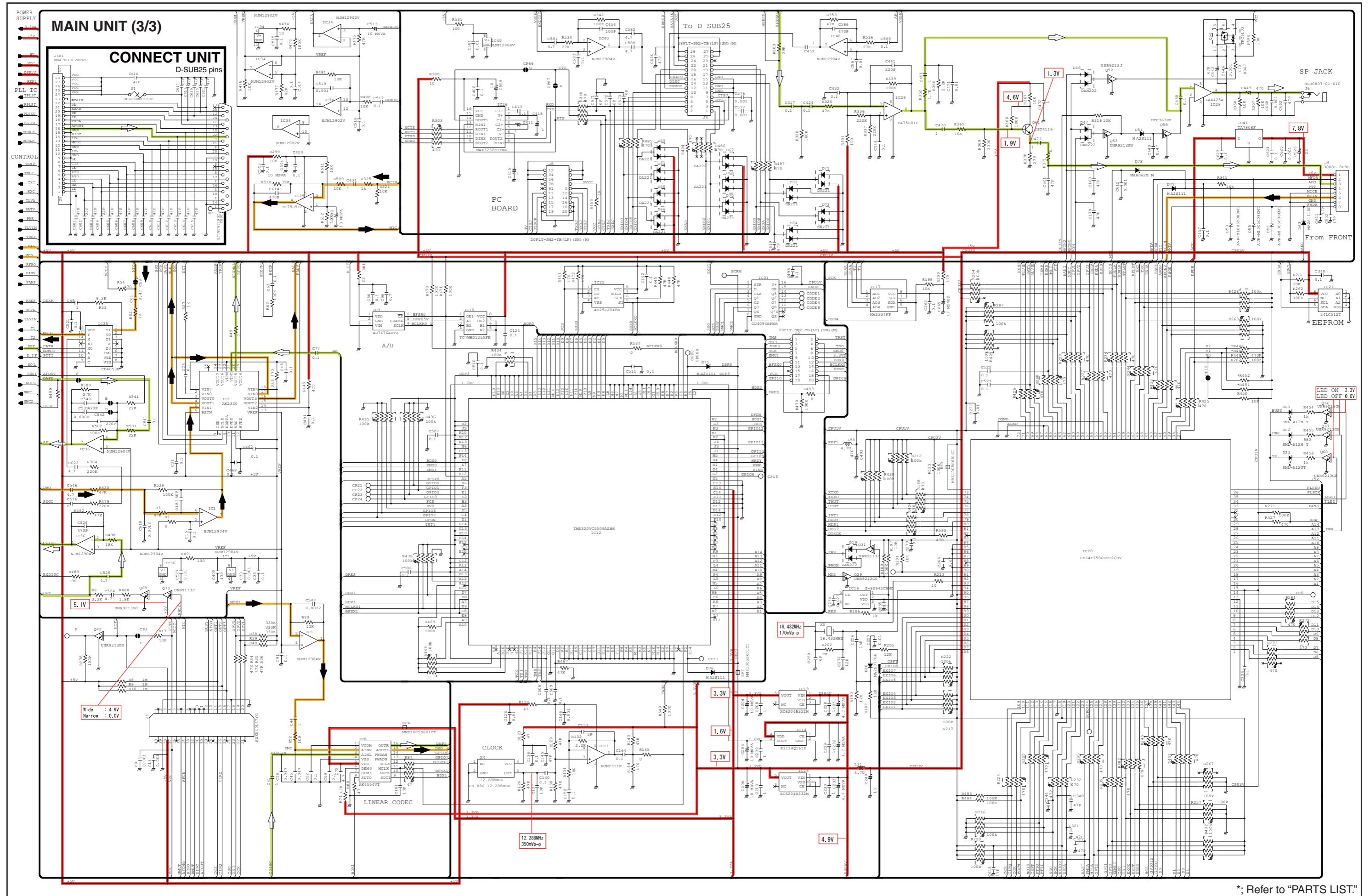
\*; Refer to "PARTS LIST."



# MAIN UNIT (2/3)



\*; Refer to "PARTS LIST."



\*; Refer to "PARTS LIST"

Feb. 2009



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[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Rows include items R151 to R268 with various part numbers and locations.

[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Rows include items R269 to R436 with various part numbers and locations. Includes USA-01, USA-02, and EUR-01 labels.

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











[MAIN UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION                   | M. | H/V LOCATION |
|---------|------------|-------------------------------|----|--------------|
| J4      | 6510023511 | S.CON 28FLT-SM2-TB(LF)(SN)    | T  | 70.8/102     |
| J5      | 6510023110 | CON 3008L-8P8C <KIN>          |    |              |
| J6      | 6450000140 | CON HSJ0807-01-010            |    |              |
| J8      | 6510023092 | S.CON 20FLT-SM2-TB(LF)(SN)(M) | T  | 59.1/15.6    |
| J9      | 6510019371 | S.CON B3B-ZR-SM4-TF(LF)(SN)   | T  | 94.6/14.3    |
| J10     | 6510004910 | CON NR-DS-E 01                |    |              |
| J11     | 6510004910 | CON NR-DS-E 01                |    |              |
| DS1     | 5040002961 | S.LED SML-A12MT T86J          | B  | 96/1.1       |
| DS2     | 5040002961 | S.LED SML-A12MT T86J          | B  | 126/1.1      |
| DS3     | 5040003000 | S.LED SML-A12UT-T86           | B  | 111/1.1      |
| MF1     | 2710000870 | FAN AFB0512HB-7X22 <USE>HK    |    |              |
| W1      | 7120000470 | JUM ERDS2T0                   |    |              |
| W2      | 7120000470 | JUM ERDS2T0                   |    |              |
| W4      | 8900017520 | CAB OPC-1783                  |    |              |
| EP1     | 6910015370 | S.BEA ACZ1005Y-102-T          | B  | 129.1/48.4   |
| EP2     | 6910015370 | S.BEA ACZ1005Y-102-T          | B  | 117.2/48.4   |
| EP3     | 6910015370 | S.BEA ACZ1005Y-102-T          | B  | 32.4/81.6    |
| EP4     | 6910016330 | S.BEA MMZ1005S 601CT-S        | B  | 30.4/60.5    |
| EP5     | 6910015370 | S.BEA ACZ1005Y-102-T          | B  | 39/74.5      |
| EP6     | 6910015370 | S.BEA ACZ1005Y-102-T          | B  | 37.8/109     |
| EP7     | 6910016330 | S.BEA MMZ1005S 601CT-S        | B  | 40.7/36.7    |
| EP8     | 6910015370 | S.BEA ACZ1005Y-102-T          | B  | 94.5/48.8    |
| EP9     | 6910016330 | S.BEA MMZ1005S 601CT-S        | T  | 48.8/39.3    |
| EP10    | 6910011560 | BEA HF70BB4.5X5X1.6           |    |              |
| EP13    | 6910011330 | TER OT-009 M3                 |    |              |
| EP14    | 6910011330 | TER OT-009 M3                 |    |              |

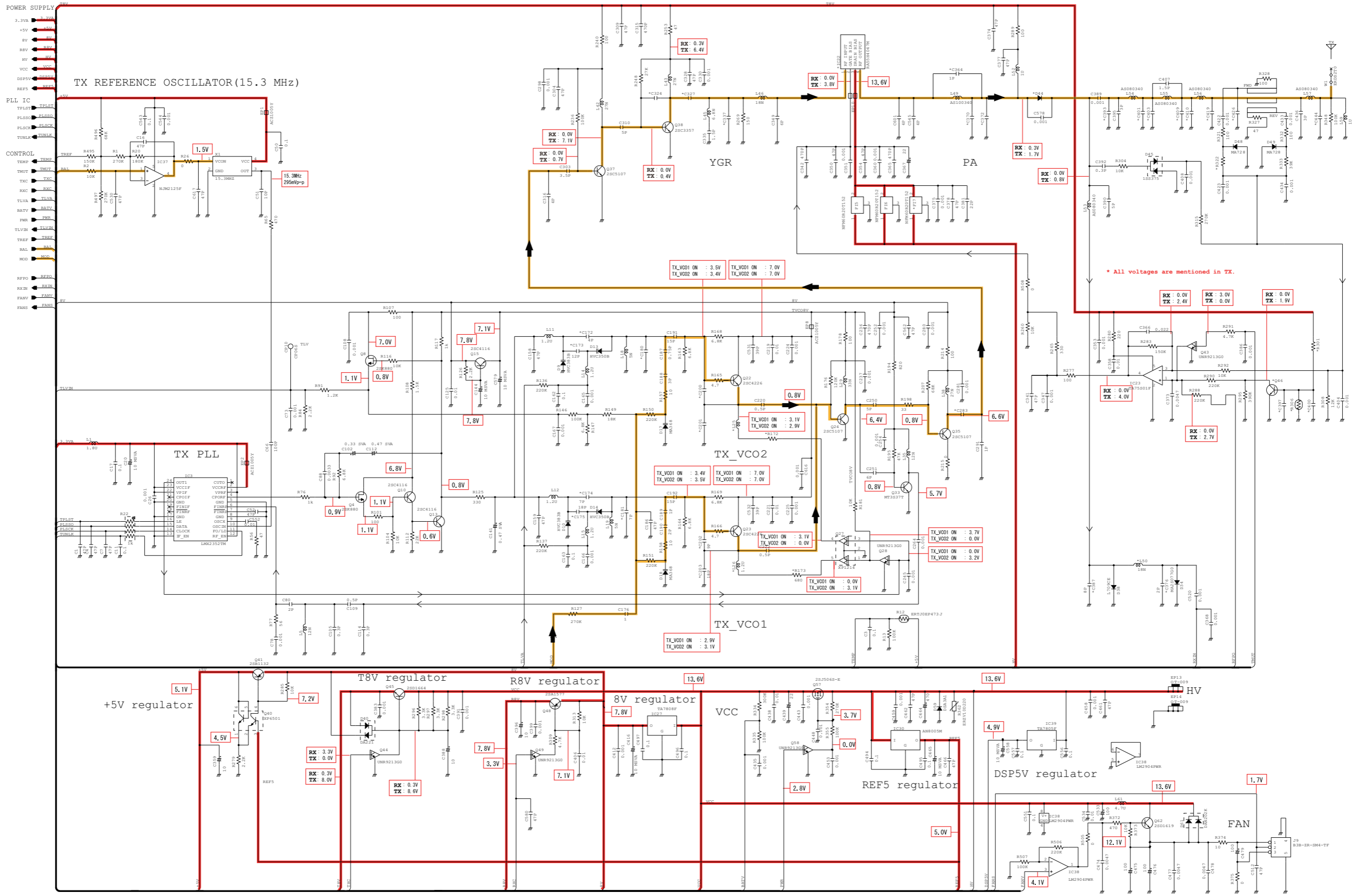
[CONNECT UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION                       | M. | H/V LOCATION |
|---------|------------|-----------------------------------|----|--------------|
| C601    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 13.8/12.4    |
| C602    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 12.2/12.4    |
| C603    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 16.5/12.4    |
| C604    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 15/14.2      |
| C605    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 17.8/13.9    |
| C606    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 19.4/12.4    |
| C607    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 20.5/13.9    |
| C608    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 22.6/12.4    |
| C609    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 25.5/12.4    |
| C610    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 29.7/12.8    |
| C611    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 31/14.1      |
| C612    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 32.4/12.8    |
| C613    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 33.5/14.1    |
| C614    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.2/14.1    |
| C615    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.7/12.8    |
| C616    | 4030017420 | S.CER ECJ0EC1H470J                | B  | 35.2/15.6    |
| C617    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 37.5/13.5    |
| C618    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.3/12.2    |
| C619    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.9/13.4    |
| C620    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 41.3/12.6    |
| C621    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 27.4/13.9    |
| J601    | 6510026290 | S.CON IMSA-9631S-28Y921           | B  | 22.8/16.2    |
| J602    | 6510023210 | CON CD6125SA1J0 <CVI>             |    |              |
| S1      | 2260003070 | S.SWI MINISMDC150F/24-2           | B  | 38.9/18      |
| W601    | 8900017500 | CAB OPC-1852 (P0.5,N28,L90) <TJM> |    |              |

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

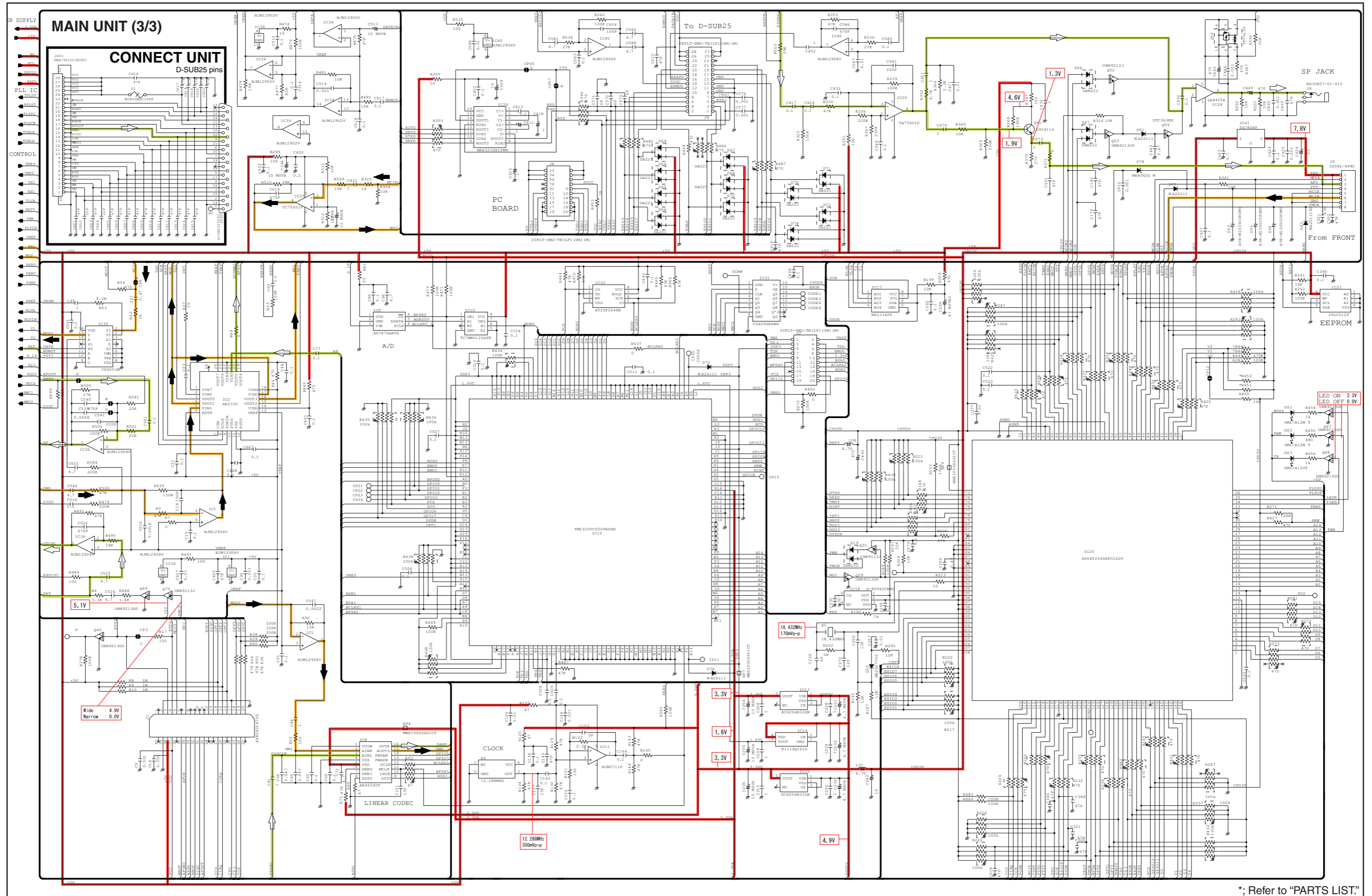
# VOLTAGE DIAGRAM

## MAIN UNIT (1/3)



\*; Refer to "PARTS LIST."





\*; Refer to "PARTS LIST."

Dec. 2008



# SERVICE MANUAL ADDENDUM

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## UR-FR6000 UR-FR6100

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**ADJUSTMENT CHANNEL LISTS**

Clone the adjust channels into the repeater before starting adjustment. Each channel must be assigned [Frequency], [RF PWR], [CH Type], [TX C. Tone] and [W/N] as below.

**• Channel list for [Low band] version**

| CH   | Atr | Inh | Operation Mode | Frequency (MHz) |    |        | Text         | TOT       |             |        |          | Loc | on      | CH Type | Au Res | FM         |     |     |
|------|-----|-----|----------------|-----------------|----|--------|--------------|-----------|-------------|--------|----------|-----|---------|---------|--------|------------|-----|-----|
|      |     |     |                | RX              | TX | Tx Inh |              | Local Mic | Repeat/EPTT | RF PWR | Lock out |     |         |         |        | TX C. Tone | W/N | Com |
| 1-1  | AB  |     | Simplex        | 400.100000      | <- |        | LV L ADJ     |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-2  |     |     | Simplex        | 435.100000      | <- |        | LV H ADJ     |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-3  |     |     | Simplex        | 434.950000      | <- |        | LV L URFY    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-4  |     |     | Simplex        | 469.900000      | <- |        | LV H URFY    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-5  |     |     | Simplex        | 469.900000      | <- |        | TX Freq      |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-6  |     |     | Simplex        | 400.100000      | <- |        | TX PWR H1    |           |             |        |          | H   | Analog  | Tim     |        |            | W   |     |
| 1-7  |     |     | Simplex        | 400.100000      | <- |        | TX PWR L2    |           |             |        |          | L2  | Analog  | Tim     |        |            | W   |     |
| 1-8  |     |     | Simplex        | 400.100000      | <- |        | TX PWR L1    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-9  |     |     | Simplex        | 400.100000      | <- |        | BAL          |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-10 |     |     | Simplex        | 435.100000      | <- |        | BAL Offset   |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-11 |     |     | Simplex        | 400.100000      | <- |        | DG Dev.      |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-12 |     |     | Simplex        | 411.500000      | <- |        | DG Dev. 8    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-13 |     |     | Simplex        | 423.200000      | <- |        | DG Dev. 1    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-14 |     |     | Simplex        | 434.900000      | <- |        | DG Dev. 2    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-15 |     |     | Simplex        | 435.100000      | <- |        | DG Dev. Offs |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-16 |     |     | Simplex        | 446.600000      | <- |        | DG Dev. 3    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-17 |     |     | Simplex        | 458.300000      | <- |        | DG Dev. 4    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-18 |     |     | Simplex        | 469.900000      | <- |        | DG Dev. 5    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-19 |     |     | Simplex        | 400.100000      | <- |        | AN Dev. W    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-20 |     |     | Simplex        | 400.100000      | <- |        | AN Dev. M    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-21 |     |     | Simplex        | 400.100000      | <- |        | AN Dev. N    |           |             |        |          | L1  | Analog  | Tim     |        |            | N   |     |
| 1-22 |     |     | Simplex        | 400.100000      | <- |        | CT/DT Dev.   |           |             |        |          | L1  | Analog  | Tim     | 151.4  |            | W   |     |
| 1-23 |     |     | Simplex        | 435.000000      | <- | i      | BPF C ALL    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-24 |     |     | Simplex        | 400.100000      | <- | i      | BPF L ALL    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-25 |     |     | Simplex        | 469.900000      | <- | i      | BPF H ALL    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-26 |     |     | Simplex        | 400.100000      | <- | i      | RSSI         |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-27 |     |     | Simplex        | 400.100000      | <- | i      | SQL          |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |

**• Channel list for [High band] version**

| CH   | Atr | Inh | Operation Mode | Frequency (MHz) |    |        | Text         | TOT       |             |        |          | Loc | on      | CH Type | Au Res | FM         |     |     |
|------|-----|-----|----------------|-----------------|----|--------|--------------|-----------|-------------|--------|----------|-----|---------|---------|--------|------------|-----|-----|
|      |     |     |                | RX              | TX | Tx Inh |              | Local Mic | Repeat/EPTT | RF PWR | Lock out |     |         |         |        | TX C. Tone | W/N | Com |
| 1-1  | AB  |     | Simplex        | 450.100000      | <- |        | LV L ADJ     |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-2  |     |     | Simplex        | 485.100000      | <- |        | LV H ADJ     |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-3  |     |     | Simplex        | 484.950000      | <- |        | LV L URFY    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-4  |     |     | Simplex        | 519.900000      | <- |        | LV H URFY    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-5  |     |     | Simplex        | 519.900000      | <- |        | TX Freq      |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-6  |     |     | Simplex        | 450.100000      | <- |        | TX PWR H1    |           |             |        |          | H   | Analog  | Tim     |        |            | W   |     |
| 1-7  |     |     | Simplex        | 450.100000      | <- |        | TX PWR L2    |           |             |        |          | L2  | Analog  | Tim     |        |            | W   |     |
| 1-8  |     |     | Simplex        | 450.100000      | <- |        | TX PWR L1    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-9  |     |     | Simplex        | 450.100000      | <- |        | BAL          |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-10 |     |     | Simplex        | 485.100000      | <- |        | BAL Offset   |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-11 |     |     | Simplex        | 450.100000      | <- |        | DG Dev.      |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-12 |     |     | Simplex        | 461.500000      | <- |        | DG Dev. 8    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-13 |     |     | Simplex        | 473.200000      | <- |        | DG Dev. 1    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-14 |     |     | Simplex        | 484.900000      | <- |        | DG Dev. 2    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-15 |     |     | Simplex        | 485.100000      | <- |        | DG Dev. Offs |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-16 |     |     | Simplex        | 496.600000      | <- |        | DG Dev. 3    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-17 |     |     | Simplex        | 508.300000      | <- |        | DG Dev. 4    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-18 |     |     | Simplex        | 519.900000      | <- |        | DG Dev. 5    |           |             |        |          | L1  | Digital | Tim     | ----   | -          | -   |     |
| 1-19 |     |     | Simplex        | 450.100000      | <- |        | AN Dev. W    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-20 |     |     | Simplex        | 450.100000      | <- |        | AN Dev. M    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-21 |     |     | Simplex        | 450.100000      | <- |        | AN Dev. N    |           |             |        |          | L1  | Analog  | Tim     |        |            | N   |     |
| 1-22 |     |     | Simplex        | 450.100000      | <- |        | CT/DT Dev.   |           |             |        |          | L1  | Analog  | Tim     | 151.4  |            | W   |     |
| 1-23 |     |     | Simplex        | 450.100000      | <- | i      | BPF C ALL    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-24 |     |     | Simplex        | 519.900000      | <- | i      | BPF H ALL    |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-25 |     |     | Simplex        | 450.100000      | <- | i      | RSSI         |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |
| 1-26 |     |     | Simplex        | 450.100000      | <- | i      | SQL          |           |             |        |          | L1  | Analog  | Tim     |        |            | W   |     |



**ADJUST UTILITY WINDOW**

| Adjust Utility                    |                     |                                     |                                     |
|-----------------------------------|---------------------|-------------------------------------|-------------------------------------|
| Setting                           |                     |                                     |                                     |
|                                   | CH No.              | 1                                   | Receive Sim                         |
|                                   | RX Freq.            |                                     | 451.10000MHz                        |
|                                   | TX Freq.            |                                     | 452.10000MHz                        |
|                                   | RF Power.           |                                     | Low                                 |
|                                   | W/N                 |                                     | Wide                                |
|                                   | CH Type             |                                     | FX=Digital TX=Digital               |
| Mode setting                      | TX Mode             | 17                                  | Digital FNB                         |
|                                   | RX Mode             | 2                                   | Digital                             |
|                                   | AF Volume           | 0                                   | [-----]                             |
| Adjust                            |                     |                                     |                                     |
| TX output power                   | Power (H)           | 208                                 | [-----]                             |
|                                   | Power (L2)          | 150                                 | [-----]                             |
|                                   | Power (L1)          | 76                                  | [-----]                             |
| Analog deviation                  | MOD (Wide)          | 139                                 | [-----]                             |
|                                   | MOD (Mid)           | 144                                 | [-----]                             |
|                                   | MOD (Narrow)        | 65                                  | [-----]                             |
|                                   | MOD (Digital)       | 105                                 | [-----]                             |
| CTCSS/DTCS deviation              | CTCSS/DTCS          | 137                                 | [-----]                             |
|                                   | S.Tone              | 75                                  | [-----]                             |
| Squelch                           | SQL                 | 50                                  | [---]                               |
| Expert                            |                     |                                     |                                     |
| TX frequency                      | RX REF              | 178                                 | [-----]                             |
|                                   | TX REF              | 126                                 | [-----]                             |
| Lock volatge (Preset)             | RX LVA L            | 80                                  | [-----] [Enter] to Sweep            |
|                                   | RX LVA H            | 62                                  | [-----] [Enter] to Sweep            |
|                                   | TX LVA L            | 166                                 | [-----] [Enter] to Sweep            |
|                                   | TX LVA H            | 105                                 | [-----] [Enter] to Sweep            |
| Lock volatge (Adjustment)         | LV (RX L)           | 36                                  | 0.70V                               |
|                                   | LV (RX H)           | 36                                  | 0.70V                               |
|                                   | LV (TX L)           | 36                                  | 0.70V                               |
|                                   | LV (TX H)           | 36                                  | 0.70V                               |
| S-meter                           | RSSI                | 74                                  | [Enter] to Capture                  |
| Modulation balance                | BAL                 | 174                                 | [-----]                             |
|                                   | BAL Offset (High)   | 0                                   | [-----]                             |
| Modulation balance (High)         | PWR Hi Slant Band 0 | 0                                   | [-----] 399.900000 - 411.599999 MHz |
|                                   | PWR Hi Slant Band 1 | 3                                   | [-----] 411.600000 - 423.299999 MHz |
|                                   | PWR Hi Slant Band 2 | 4                                   | [-----] 423.300000 - 434.999999 MHz |
|                                   | PWR Hi Slant Band 3 | 25                                  | [-----] 435.000000 - 446.699999 MHz |
|                                   | PWR Hi Slant Band 4 | 8                                   | [-----] 446.700000 - 458.399999 MHz |
|                                   | PWR Hi Slant Band 5 | 6                                   | [-----] 458.400000 - 470.099999 MHz |
|                                   | PWR Hi Slant Band 6 | 0                                   | [-----] 470.100000 - 481.799999 MHz |
|                                   | PWR L2 Slant Band 0 | 0                                   | [-----] 399.900000 - 411.599999 MHz |
|                                   | PWR L2 Slant Band 1 | 4                                   | [-----] 411.600000 - 423.299999 MHz |
|                                   | PWR L2 Slant Band 2 | 4                                   | [-----] 423.300000 - 434.999999 MHz |
|                                   | PWR L2 Slant Band 3 | 17                                  | [-----] 435.000000 - 446.699999 MHz |
|                                   | PWR L2 Slant Band 4 | 8                                   | [-----] 446.700000 - 458.399999 MHz |
|                                   | PWR L2 Slant Band 5 | 6                                   | [-----] 458.400000 - 470.099999 MHz |
|                                   | PWR L2 Slant Band 6 | 0                                   | [-----] 470.100000 - 481.799999 MHz |
|                                   | PWR L1 Slant Band 0 | 0                                   | [-----] 399.900000 - 411.599999 MHz |
|                                   | PWR L1 Slant Band 1 | 0                                   | [-----] 411.600000 - 423.299999 MHz |
|                                   | PWR L1 Slant Band 2 | 2                                   | [-----] 423.300000 - 434.999999 MHz |
|                                   | PWR L1 Slant Band 3 | 14                                  | [-----] 435.000000 - 446.699999 MHz |
| PWR L1 Slant Band 4               | 6                   | [-----] 446.700000 - 458.399999 MHz |                                     |
| PWR L1 Slant Band 5               | 4                   | [-----] 458.400000 - 470.099999 MHz |                                     |
| PWR L1 Slant Band 6               | 0                   | [-----] 470.100000 - 481.799999 MHz |                                     |
| Digital deviation                 | MOD Slant Band 0    | 0                                   | [-----] 399.900000 - 411.599999 MHz |
|                                   | MOD Slant Band 1    | -9                                  | [-----] 411.600000 - 423.299999 MHz |
|                                   | MOD Slant Band 2    | -13                                 | [-----] 423.300000 - 434.999999 MHz |
|                                   | MOD Slant Band 3    | -2                                  | [-----] 435.000000 - 446.699999 MHz |
|                                   | MOD Slant Band 4    | -5                                  | [-----] 446.700000 - 458.399999 MHz |
|                                   | MOD Slant Band 5    | 2                                   | [-----] 458.400000 - 470.099999 MHz |
|                                   | MOD Slant Band 6    | 0                                   | [-----] 470.100000 - 481.799999 MHz |
|                                   | MOD Offset (High)   | 0                                   | [-----]                             |
| Receive sensitivity (Band center) | BPF C ALL           |                                     | [Enter] to Sweep                    |
|                                   | BPF T1 C            | 4                                   | [-----] [Enter] to Sweep            |
|                                   | BPF T2 C            | 25                                  | [-----] [Enter] to Sweep            |
| *Receive sensitivity (Band low)   | BPF L ALL           |                                     | [Enter] to Sweep                    |
|                                   | BPF T1 L            | 80                                  | [-----] [Enter] to Sweep            |
|                                   | BPF T2 L            | 45                                  | [-----] [Enter] to Sweep            |
| Receive sensitivity (Band high)   | BPF H ALL           |                                     | [Enter] to Sweep                    |
|                                   | BPF T1 H            | 69                                  | [-----] [Enter] to Sweep            |
|                                   | BPF T2 H            | 53                                  | [-----] [Enter] to Sweep            |

\*[Low band] only

### 6-3 TRANSMIT ADJUSTMENT (continued)

- 1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT   | ADJUSTMENT CONDITION | OPERATION   | ADJUSTMENT ITEM  | VALUE                         |
|--|----------------------|---|--|-------------------------------|
| <b>ANALOG DEVIATION</b><br><b>-Preparation-</b>      | 1                    | –   | • Set the item [TX Mode] to "1."   | [TX Mode] "1"                 |
|  | 2                    | • Connect a Modulation Analyzer to the TX antenna connector through an attenuator.  | • Set the Modulation Analyzer as;<br>HPF : OFF<br>LPF : 20 kHz<br>De-emphasis : OFF<br>Detector : (P-P)/2                | – –                           |
|  | 3                    | • Connect an Audio Generator to the MIC line through the JIG cable.                 | • Set the Audio Generator as;<br>Modulation : 1 kHz<br>Level : 40 mV rms<br>Wave form : Sine wave                        | – –                           |
| <b>-Adjust-</b><br><b>(Wide)</b>                     | 4                    | • CH. : 1-10<br>• Transmitting  | 1) Adjust the deviation using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value. | [MOD (Wide)] ±4.05–4.15 kHz   |
| <b>(Middle)</b><br><[FR6100] only>                   | 5                    | • CH. : 1-11<br>• [Wide Band Width] : "Middle" (see the page 6-4)<br>• Transmitting |  | [MOD (Middle)] ±3.15–3.25 kHz |
| <b>(Narrow)</b>                                      | 6                    | • CH. : 1-12<br>• Transmitting  |  | [MOD (Narrow)] ±2.05–2.15 kHz |
| <b>CTCSS/DTCSS DEVIATION</b><br><b>-Preparation-</b> | 1                    | –   | • Set the item [TX Mode] to "3."   | [TX Mode] "3"                 |
| <b>-Adjust-</b>                                      | 2                    | • CH. : 1-19<br>• Transmitting  | 1) Adjust the deviation using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value. | [CTCSS] ±0.68–0.72 kHz        |

### 6-4 RECEIVE ADJUSTMENT

- 1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT   | ADJUSTMENT CONDITION | OPERATION  | ADJUSTMENT ITEM/POINT   | VALUE         |
|--|----------------------|--|---|---------------|
| <b>RECEIVE SENSITIVITY</b><br><b>-Preparation-</b>                         | 1                    | –  | • Set the item [RX Mode] to "1."  | [RX Mode] "1" |
|  | 2                    | • Connect an SSG to the RX antenna connector.      | • SSG common setting;<br>Level : +20 dB <sub>μ</sub><br>Modulation : 1 kHz<br>Deviation : 3.5 kHz                                       | – –           |
| <b>-Adjustment-</b><br><b>(Band center)</b>                                | 3                    | • CH. : 1-23 [Low]<br>: 1-23 [High]<br>• Receiving | 1) Set the SSG as;<br>Frequency : 435.000 MHz [Low]<br>450.100 MHz [High]<br>2) Select the item [BPF C ALL], then push the [ENTER] key. | [BPF C ALL]   |
| <b>-Adjustment-</b><br><b>(Band center)</b><br>For [Low band] version only | 4                    | • CH. : 1-24 [Low] only<br>• Receiving             | 1) Set the SSG as;<br>Frequency : 400.100 MHz [Low]<br>2) Select the item [BPF L ALL], then push the [ENTER] key.                       | [BPF L ALL]   |
| <b>-Adjustment-</b><br><b>(Band high)</b>                                  | 5                    | • CH. : 1-22 [Low]<br>: 1-24 [High]<br>• Receiving | 1) Set the SSG as;<br>Frequency : 469.900 MHz [Low]<br>519.900 MHz [High]<br>2) Select the item [BPF H ALL], then push the [ENTER] key. | [BPF H ALL]   |

**6-4 RECEIVE ADJUSTMENT (continued)**

1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT                             | ADJUSTMENT CONDITION  | OPERATION   | ADJUSTMENT ITEM/POINT   | VALUE                  |                        |
|--|---|---|---|------------------------|------------------------|
| <b>S-METER</b><br><b>-Preparation-</b> | <b>NOTE:</b> "RECEIVE SENSITIVITY" MUST be adjusted before "S-METER." When "RECEIVE SENSITIVITY" is re-adjusted, "S-METER" MUST be re-adjusted too. |   |   |                        |                        |
|  | 1   | <ul style="list-style-type: none"> <li>Connect an SSG to the RX antenna connector.</li> </ul>           | <ul style="list-style-type: none"> <li>Set the SSG as;<br/>                     Frequency : 400.100 MHz [Low band]<br/>                     450.100 MHz [High band]<br/>                     Modulation : 1 kHz<br/>                     Deviation : 3.5 kHz</li> </ul>   | -                      | -                      |
| <b>-Adjust-</b><br><b>(S3 level)</b>   | 2   | <ul style="list-style-type: none"> <li>CH. : 1-26 [Low]<br/>: 1-25 [High]</li> <li>Receiving</li> </ul> | 1) Set the SSG as;<br>Level : +23 dB <sub>μ</sub><br>2) Select the item <b>[RSSI S3 Level]</b> , then push the [ENTER] key to store the adjust value.   | <b>[RSSI S3 Level]</b> | (Automatic adjustment) |
| <b>(S1 level)</b>                      | 3   | <ul style="list-style-type: none"> <li>CH. : 1-26 [Low]<br/>: 1-25 [High]</li> <li>Receiving</li> </ul> | 1) Set the SSG as;<br>Level : -7 dB <sub>μ</sub><br>2) Select the item <b>[RSSI S1 Level]</b> , then push the [ENTER] key, to store the adjust value.   | <b>[RSSI S1 Level]</b> | (Automatic adjustment) |
| <b>SQUELCH</b><br><b>-Preparation-</b> | 1   | -   | <ul style="list-style-type: none"> <li>Set the item <b>[SQL Level]</b> to "2."</li> </ul>   | <b>[SQL Level]</b>     | "2"                    |
|  | 2   | <ul style="list-style-type: none"> <li>Connect an SSG to the RX antenna connector.</li> </ul>           | <ul style="list-style-type: none"> <li>Set the SSG as;<br/>                     Frequency : 400.100 MHz [Low band]<br/>                     450.100 MHz [High band]<br/>                     Modulation : 1 kHz<br/>                     Deviation : 3.5 kHz<br/>                     Level : -14 dB<sub>μ</sub></li> </ul> | -                      | -                      |
| <b>-Adjust-</b>                        | 2   | <ul style="list-style-type: none"> <li>CH. : 1-27 [Low]<br/>: 1-26 [High]</li> <li>Receiving</li> </ul> | 1) Decrease the adjustment value <b>[SQL]</b> to close the squelch once, then increase the value to open the squelch.<br>2) Select the item <b>[SQL]</b> , then push the [ENTER] key to store the adjust value.   | <b>[SQL]</b>           | (Automatic adjustment) |









[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains rows C152 to C194 with detailed component information.

[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains rows C194 to C282 with detailed component information.

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







**[MAIN UNIT]**

| REF NO. | ORDER NO.  | DESCRIPTION            | M. | H/V LOCATION |
|---------|------------|------------------------|----|--------------|
| W2      | 7120000470 | JUM ERDS2T0            |    |              |
| W4      | 8900017520 | CAB OPC-1783           |    |              |
| EP1     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 129.1/48.4   |
| EP2     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 117.2/48.4   |
| EP3     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 32.4/81.6    |
| EP4     | 6910016330 | S.BEA MMZ1005S 601CT-S | B  | 30.4/60.5    |
| EP5     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 39/74.5      |
| EP6     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 37.8/109     |
| EP7     | 6910016330 | S.BEA MMZ1005S 601CT-S | B  | 40.7/36.7    |
| EP8     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 94.5/48.8    |
| EP9     | 6910016330 | S.BEA MMZ1005S 601CT-S | T  | 48.8/39.3    |
| EP10    | 6910011560 | BEA HF70BB4.5X5X1.6    |    |              |
| EP13    | 6910011330 | TER OT-009 M3          |    |              |
| EP14    | 6910011330 | TER OT-009 M3          |    |              |

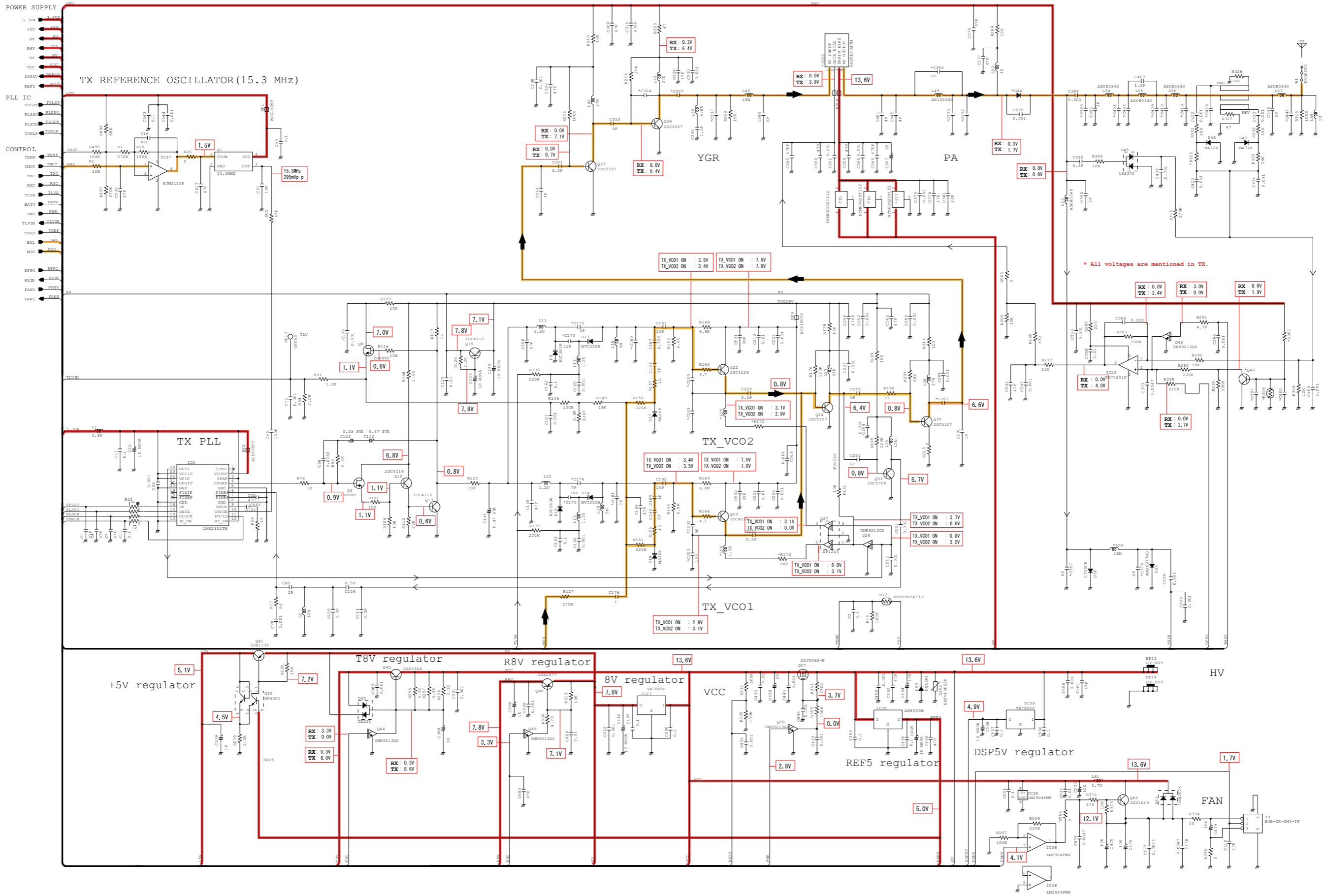
**[CONNECT UNIT]**

| REF NO. | ORDER NO.  | DESCRIPTION                       | M. | H/V LOCATION |
|---------|------------|-----------------------------------|----|--------------|
| C601    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 13.8/12.4    |
| C602    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 12.2/12.4    |
| C603    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 16.5/12.4    |
| C604    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 15/14.2      |
| C605    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 17.8/13.9    |
| C606    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 19.4/12.4    |
| C607    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 20.5/13.9    |
| C608    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 22.6/12.4    |
| C609    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 25.5/12.4    |
| C610    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 29.7/12.8    |
| C611    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 31/14.1      |
| C612    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 32.4/12.8    |
| C613    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 33.5/14.1    |
| C614    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.2/14.1    |
| C615    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.7/12.8    |
| C616    | 4030017420 | S.CER ECJ0EC1H470J                | B  | 35.2/15.6    |
| C617    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 37.5/13.5    |
| C618    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.3/12.2    |
| C619    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.9/13.4    |
| C620    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 41.3/12.6    |
| C621    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 27.4/13.9    |
| J601    | 6510026290 | S.CON IMSA-9631S-28Y921           | B  | 22.8/16.2    |
| J602    | 6510023210 | CON CD6125SA1J0 <CVI>             |    |              |
| S1      | 2260003070 | S.SWI MINISMDC150F/24-2           | B  | 38.9/18      |
| W601    | 8900017500 | CAB OPC-1852 (P0.5,N28,L90) <TJM> |    |              |

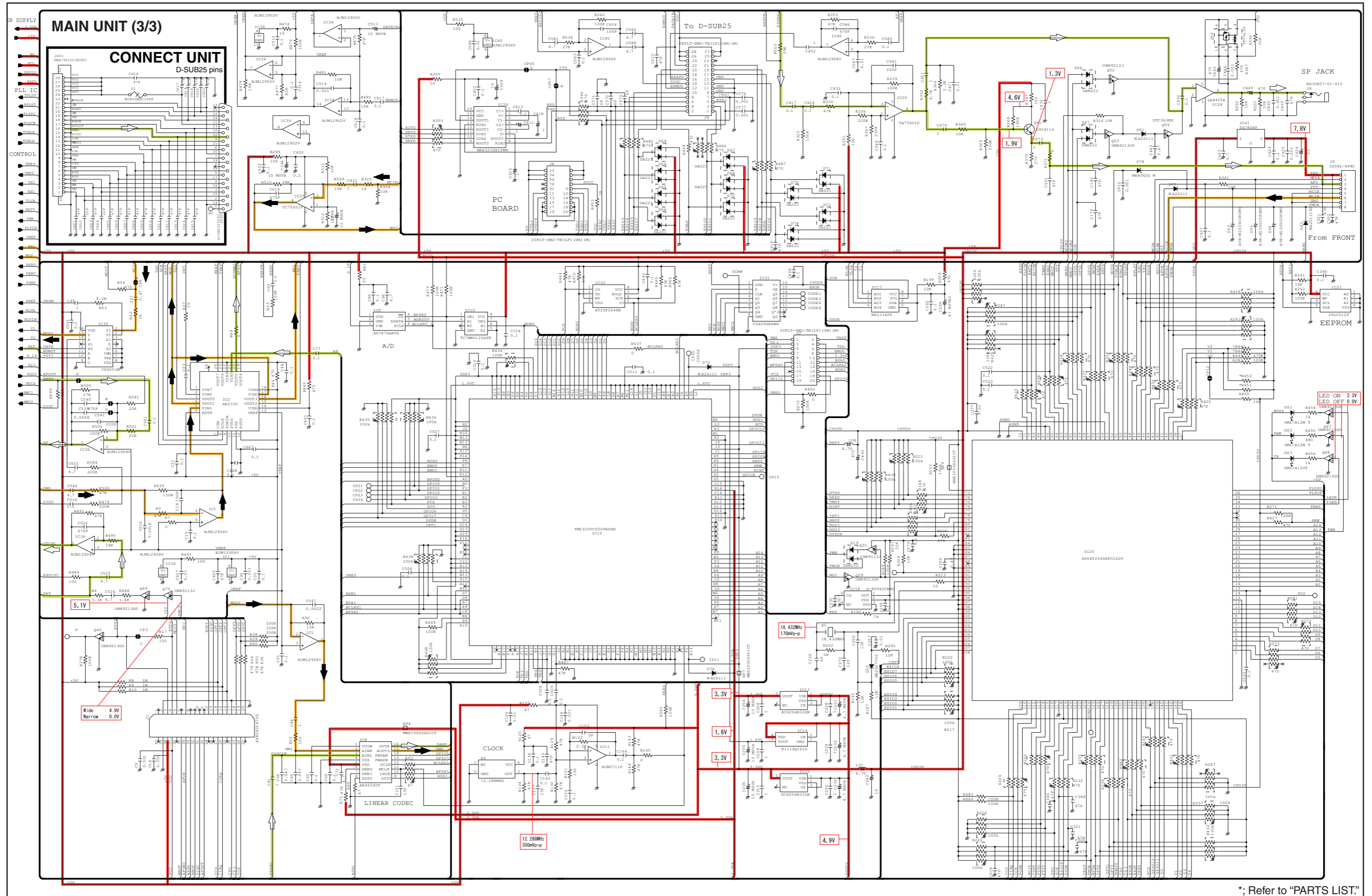
M.=Mounted side (T: Mounted on the Top side, B: Mounted on the Bottom side)  
S.=Surface mount

# VOLTAGE DIAGRAM

## MAIN UNIT (1/3)







\*; Refer to "PARTS LIST."

Dec. 2008



# SERVICE MANUAL ADDENDUM

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## UR-FR6000 UR-FR6100

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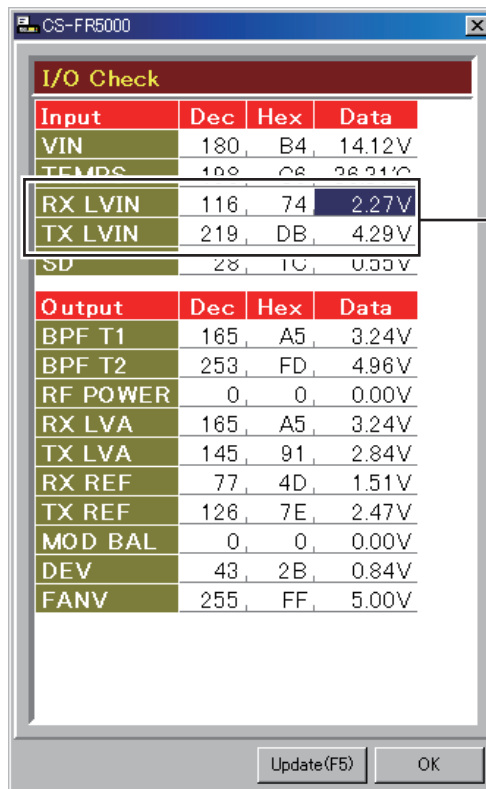
|                        |     |
|------------------------|-----|
| REPLACEMENT PAGE ..... | 6-6 |
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| VOLTAGE DIAGRAM .....  | 9   |

### 6-2 FREQUENCY ADJUSTMENT

- 1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT                        | ADJUSTMENT CONDITION | OPERATION                     | ADJUSTMENT ITEM  | VALUE   |
|-----------------------------------|----------------------|-------------------------------|--|---|
| PLL LOCK VOLTAGE<br>-Preparation- | 1                    | -                             | [LV (RX L)]<br>[LV (RX H)]<br>[LV (TX L)]<br>[LV (TX H)] | 36 [0.70V]<br>(for each item)                             |
| -Adjust-RX<br>(Band low)          | 2                    | • CH. : 1-1<br>• Receiving    | [RX LVA L]   | (Automatic adjustment)                                    |
| RX<br>(Band high)                 | 3                    | • CH. : 1-2<br>• Receiving    | [RX LVA H]   |   |
| TX<br>(Band low)                  | 4                    | • CH. : 1-1<br>• Transmitting | [TX LVA L]   |   |
| TX<br>(Band high)                 | 5                    | • CH. : 1-2<br>• Transmitting | [TX LVA H]   |   |
| LOCK VOLTAGE VERIFY               | 1                    | • CH. : 1-3<br>• Receiving    | [RX LIVIN]<br>(I/O Check window)                         | 3.0–4.3 V<br>(Verify)                                     |
| RX<br>(Band low)                  | 2                    | • CH. : 1-4<br>• Receiving    |  | 3.0–4.0 V<br>(Verify)                                     |
| RX<br>(Band high)                 | 3                    | • CH. : 1-3<br>• Transmitting | [TX LIVIN]<br>(I/O Check window)                         | 2.7–4.2 V<br>(Verify)                                     |
| TX<br>(Band low)                  | 4                    | • CH. : 1-4<br>• Transmitting |  |   |
| TX FREQUENCY                      | 1                    | -                             | [TX Mode]  | "1"   |
|                                   | 2                    | • CH. : 1-5<br>• Transmitting | [TX REF]   | 469.9000 MHz<br>[Low band]<br>519.9000 MHz<br>[High band] |

• I/O CHECK WINDOW



Lock voltage verify















[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains a list of components with their respective part numbers, descriptions, and locations.

[MAIN UNIT]

Table with columns: REF NO., ORDER NO., DESCRIPTION, M., H/V LOCATION. Contains a list of components with their respective part numbers, descriptions, and locations.

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S.=Surface mount

**[MAIN UNIT]**

| REF NO. | ORDER NO.  | DESCRIPTION            | M. | H/V LOCATION |
|---------|------------|------------------------|----|--------------|
| W1      | 7120000470 | JUM ERDS2T0            |    |              |
| W2      | 7120000470 | JUM ERDS2T0            |    |              |
| W4      | 8900017520 | CAB OPC-1783           |    |              |
| EP1     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 129.1/48.4   |
| EP2     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 117.2/48.4   |
| EP3     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 32.4/81.6    |
| EP4     | 6910016330 | S.BEA MMZ1005S 601CT-S | B  | 30.4/60.5    |
| EP5     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 39/74.5      |
| EP6     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 37.8/109     |
| EP7     | 6910016330 | S.BEA MMZ1005S 601CT-S | B  | 40.7/36.7    |
| EP8     | 6910015370 | S.BEA ACZ1005Y-102-T   | B  | 94.5/48.8    |
| EP9     | 6910016330 | S.BEA MMZ1005S 601CT-S | T  | 48.8/39.3    |
| EP10    | 6910011560 | BEA HF70BB4.5X5X1.6    |    |              |
| EP13    | 6910011330 | TER OT-009 M3          |    |              |
| EP14    | 6910011330 | TER OT-009 M3          |    |              |

**[CONNECT UNIT]**

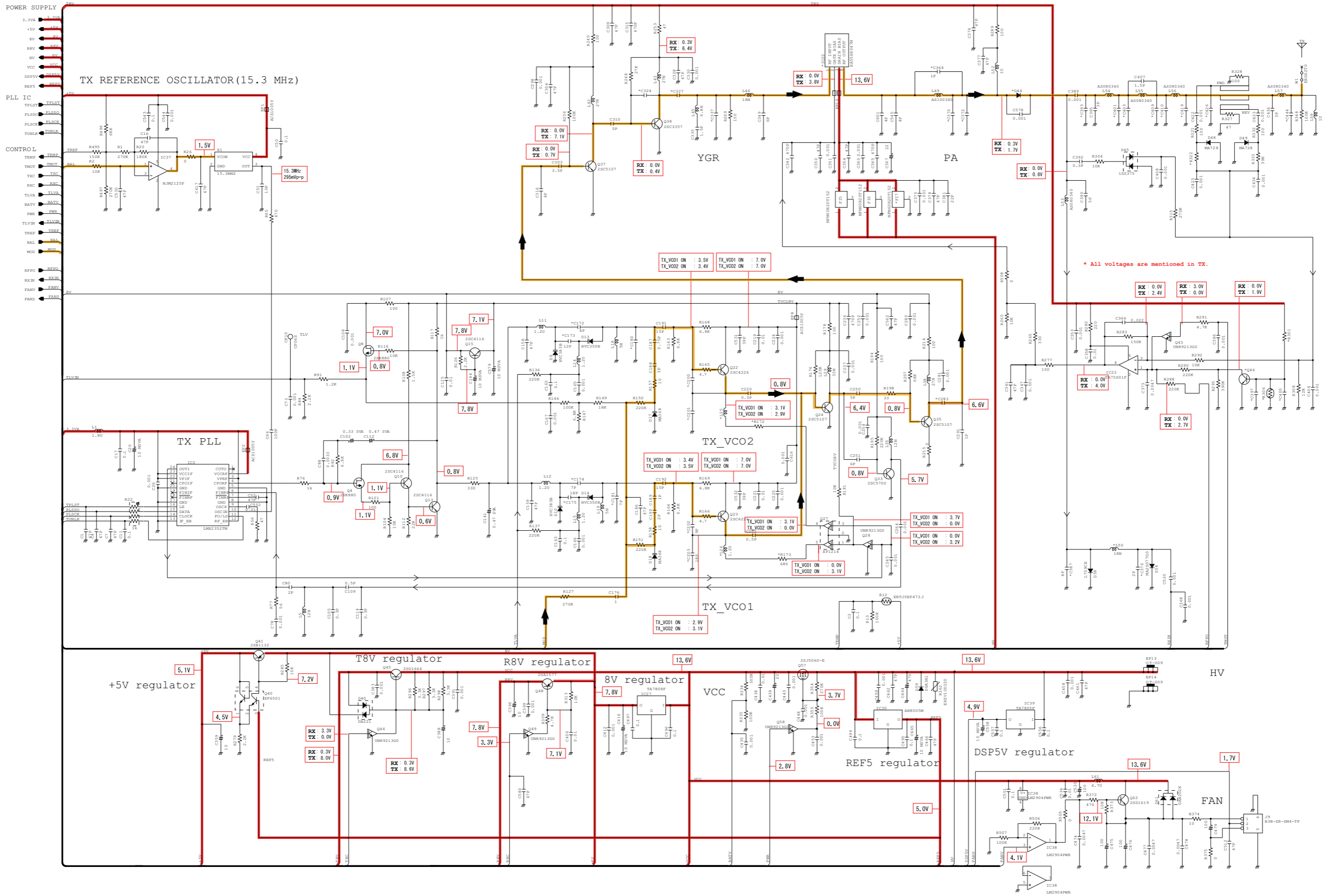
| REF NO. | ORDER NO.  | DESCRIPTION                       | M. | H/V LOCATION |
|---------|------------|-----------------------------------|----|--------------|
| C601    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 13.8/12.4    |
| C602    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 12.2/12.4    |
| C603    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 16.5/12.4    |
| C604    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 15/14.2      |
| C605    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 17.8/13.9    |
| C606    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 19.4/12.4    |
| C607    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 20.5/13.9    |
| C608    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 22.6/12.4    |
| C609    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 25.5/12.4    |
| C610    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 29.7/12.8    |
| C611    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 31/14.1      |
| C612    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 32.4/12.8    |
| C613    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 33.5/14.1    |
| C614    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.2/14.1    |
| C615    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.7/12.8    |
| C616    | 4030017420 | S.CER ECJ0EC1H470J                | B  | 35.2/15.6    |
| C617    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 37.5/13.5    |
| C618    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.3/12.2    |
| C619    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.9/13.4    |
| C620    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 41.3/12.6    |
| C621    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 27.4/13.9    |
| J601    | 6510026290 | S.CON IMSA-9631S-28Y921           | B  | 22.8/16.2    |
| J602    | 6510023210 | CON CD6125SA1J0 <CVI>             |    |              |
| S1      | 2260003070 | S.SWI MINISMDC150F/24-2           | B  | 38.9/18      |
| W601    | 8900017500 | CAB OPC-1852 (P0.5,N28,L90) <TJM> |    |              |

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



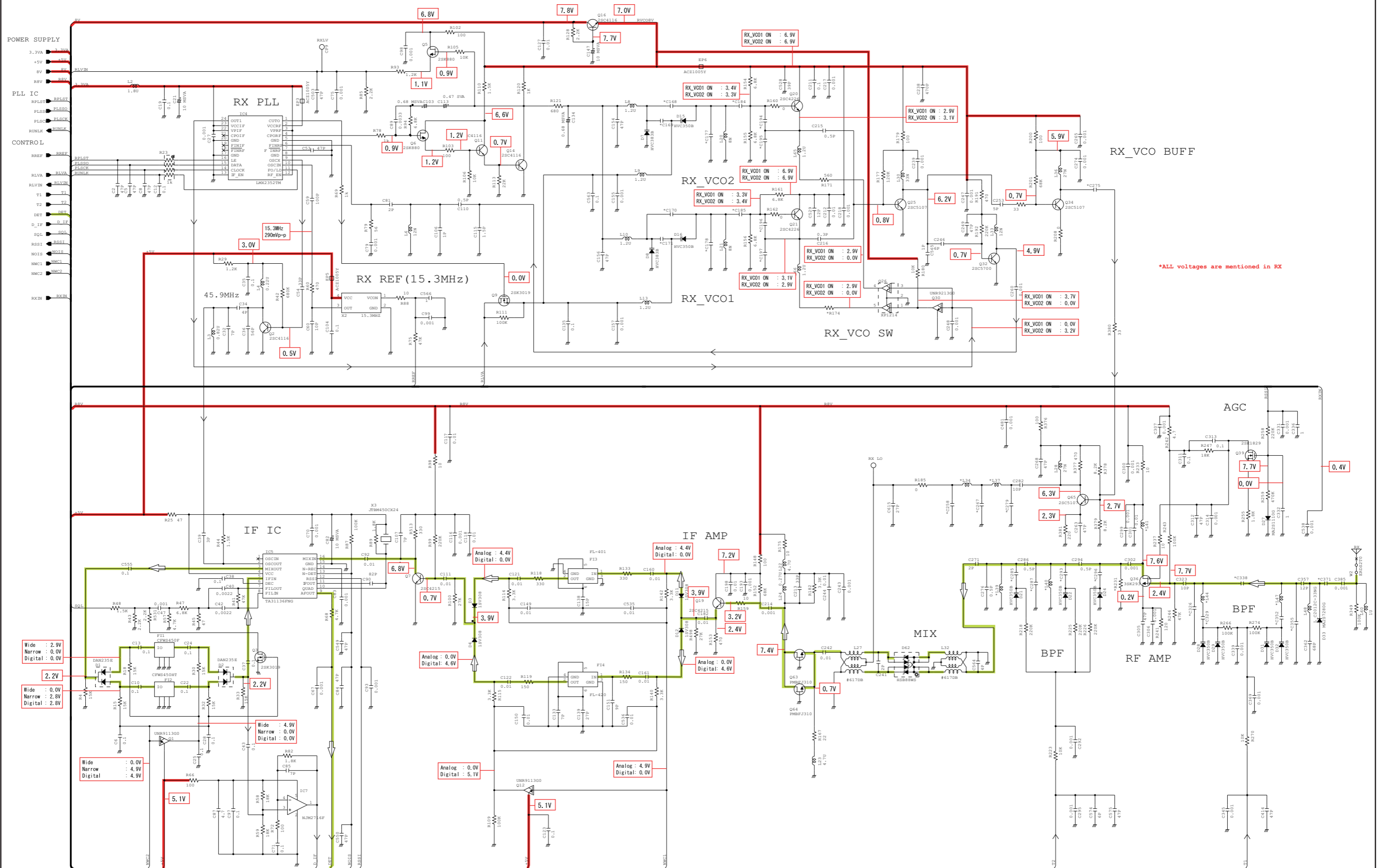
# VOLTAGE DIAGRAM

## MAIN UNIT (1/3)



\*; Refer to "PARTS LIST."

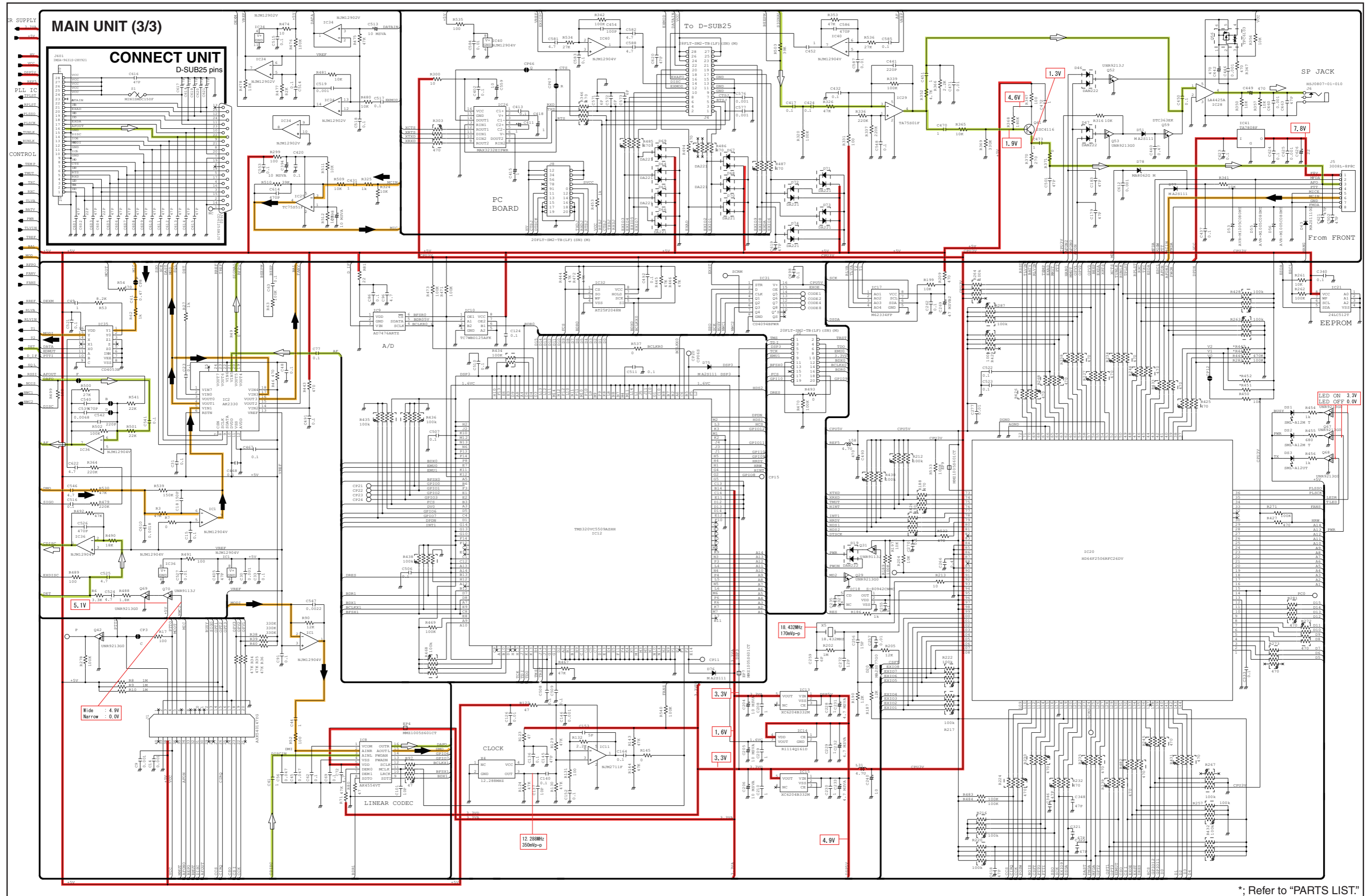
MAIN UNIT (2/3)



\*ALL voltages are mentioned in RX

- Wide : 2.9V  
Narrow : 0.0V  
Digital : 0.0V
- Wide : 0.0V  
Narrow : 2.8V  
Digital : 2.8V
- Wide : 4.9V  
Narrow : 0.0V  
Digital : 0.0V
- Wide : 0.0V  
Narrow : 4.9V  
Digital : 4.9V

\*; Refer to "PARTS LIST."



\*; Refer to "PARTS LIST."



# SERVICE MANUAL

CHANNEL EXTENSION MODULE  
**UR-FR6000**  
**UR-FR6100**

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S-14506XZ-C1  
May. 2008

## INTRODUCTION

This service manual describes the latest service information for the **UR-FR6000** UHF DIGITAL REPEATER at the time of publication.

| MODEL     | VERSION | FREQUENCY RANGE           | CH. SPACING        |
|-----------|---------|---------------------------|--------------------|
| UR-FR6000 | USA-01  | 400–470 MHz               | 6.25/12.5/25.0 kHz |
|           | EXP-01  | (Low band)                | 12.5/25.0 kHz      |
|           | USA-02  | 450–520 MHz               | 6.25/12.5/25.0 kHz |
|           | EXP-02  | (High band)               | 12.5/25.0 kHz      |
| UR-FR6100 | EUR-01  | 400–470 MHz<br>(Low band) | 12.5/20.0/25.0 kHz |

### UNIT ABBREVIATIONS:

M=MAIN UNIT  
CN=CONNECT UNIT

## CAUTION

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

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

**DO NOT** reverse the polarities of the power supply when connecting the repeater.

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

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



## ORDERING PARTS

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

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

### <ORDER EXAMPLE>

1110003491 S.IC TA31136FNG UR-FR6000 MAIN UNIT 2 pieces  
8820001210 Screw 2438 screw UR-FR6000 Top cover 10 pieces

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

## REPAIR NOTES

1. Make sure the problem is internal before disassembling the repeater.
2. **DO NOT** open the repeater until the repeater 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 repeater is defective.
6. **DO NOT** transmit power into a Standard Signal Generator or a Sweep Generator.
7. **ALWAYS** connect a 50 dB to 60 dB attenuator between the repeater and a Deviation Meter or Spectrum Analyzer when using such test equipment.
8. **READ** the instructions of test equipment thoroughly before connecting a test equipment to the repeater.

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# SECTION 1

# SPECIFICATIONS

| ■ GENERAL                            | [UR-FR6000]  | [UR-FR6100]                      |
|--------------------------------------|--|----------------------------------|
| • Frequency coverage                 | 400–470 MHz [USA-01], [EXP-01]<br>450–520 MHz [USA-02], [EXP-02] | 400–470 MHz                      |
| • Conventional channels              | max. 32 ch   |                                  |
| • Type of emission                   | Wide 16K0F3E   | Middle 14K0F3E<br>Narrow 8K50F3E |
|                                      | –  |                                  |
|                                      | Narrow 11K0F3E/11K0F7E/11K0F7D/11K0F7W                           |                                  |
|                                      | Digital 4K00F1E/4K00F1D/4K00F3E                                  |                                  |
| • Antenna impedance                  | 50 Ω (Nominal)   |                                  |
| • Operating temperature range        | –22°F to +140°F (–30°C to +60°C)                                 | –25°C to +55°C                   |
| • Power supply requirement (nominal) | 13.6 V DC (Negative ground)                                      | 13.2 V DC (Negative ground)      |
| • Current drain (Approx.)            | Receiving 500 mA (stand-by), 1900 mA (max. audio)                | Transmitting 7.0 A (at 25 W)     |
|                                      | Transmitting 15.0 A (at 50 W)                                    |                                  |
| • Weight (Approx.)                   | 4 lb <sup>27</sup> / <sub>32</sub> oz.                           | 2.2 kg                           |

| ■ TRANSMITTER                               | [UR-FR6000]   | [UR-FR6100]                        |
|---|---|------------------------------------|
| • Output power                              | 50 W  | 25 W                               |
| • Modulation                                | Variable reactance frequency modulation   |                                    |
| • Max. permissible deviation                | ±5.0 kHz (Wide)   | ±4.0 kHz (Middle)                  |
|   | –   |                                    |
|   | ±2.5 kHz (Narrow)   |                                    |
| • Frequency stability                       | ±0.5 ppm  | ±0.5 kHz                           |
| • Spurious emissions                        | 80 dB typ.  | 0.25 μW (≤1 GHz), 1.00 μW (>1 GHz) |
| • Adjacent channel power                    | Wide 73 dB typ.   | Wide 73 dB min.                    |
|   | –   | Middle 73 dB min.                  |
|   | Narrow 67 dB typ.   | Narrow 65 dB min.                  |
|   | Digital 65 dB typ.  | Digital 60 dB min.                 |
| • Audio harmonic distortion                 | 1% typ. (at AF 1 kHz 40% deviation)   |                                    |
| • Audio frequency response                  | +2 dB to –8 dB of 6 dB/oct. Wide/Middle from 300 Hz–3000 Hz<br>Narrow from 300 Hz–2550 Hz |                                    |
| • FM Hum and noise (300 Hz–3000 Hz, 750 us) | Wide 50 dB typ.<br>Narrow 45 dB typ.  |                                    |
| • Intermodulation attenuation               | –   | 40 dB min.                         |

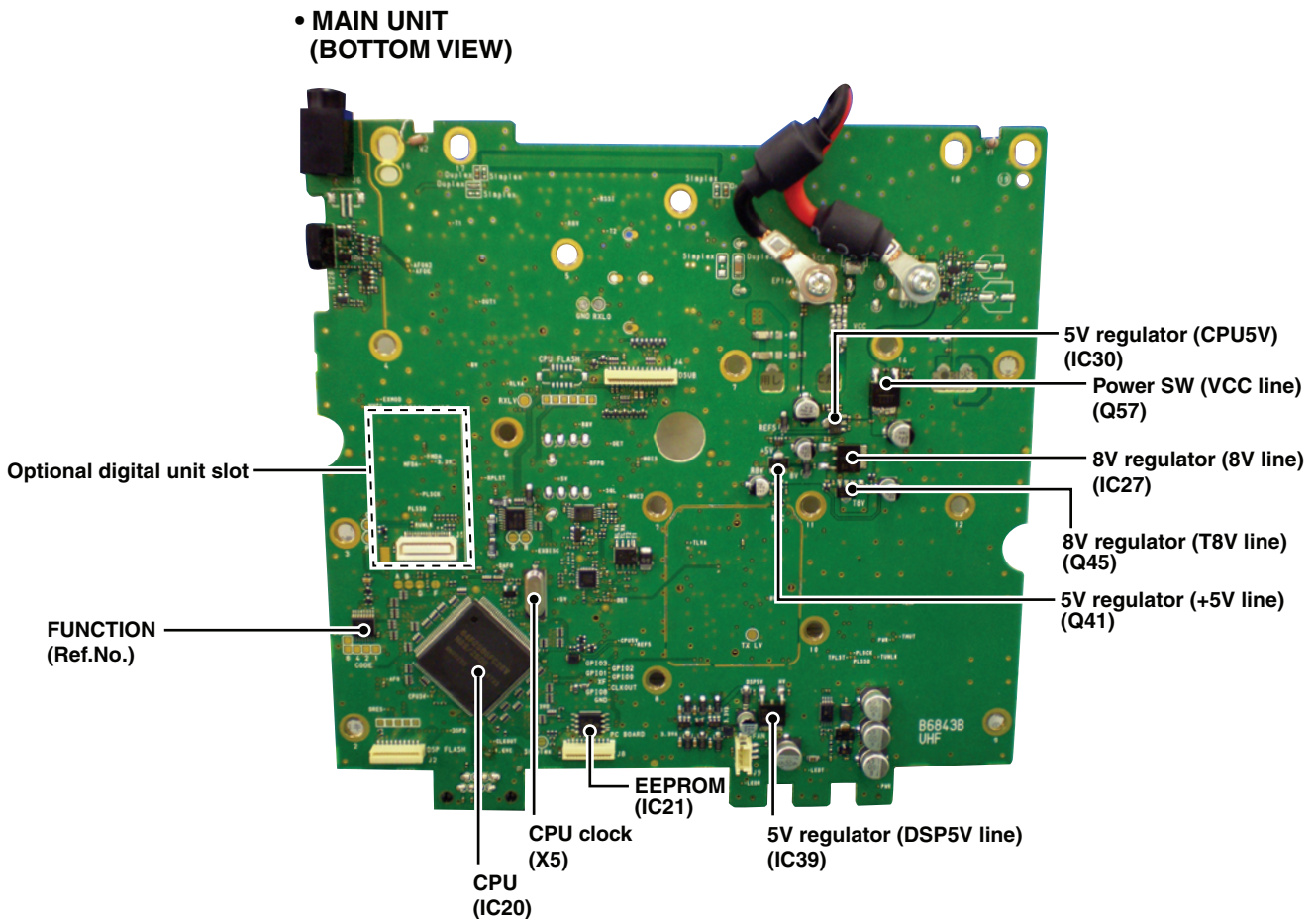
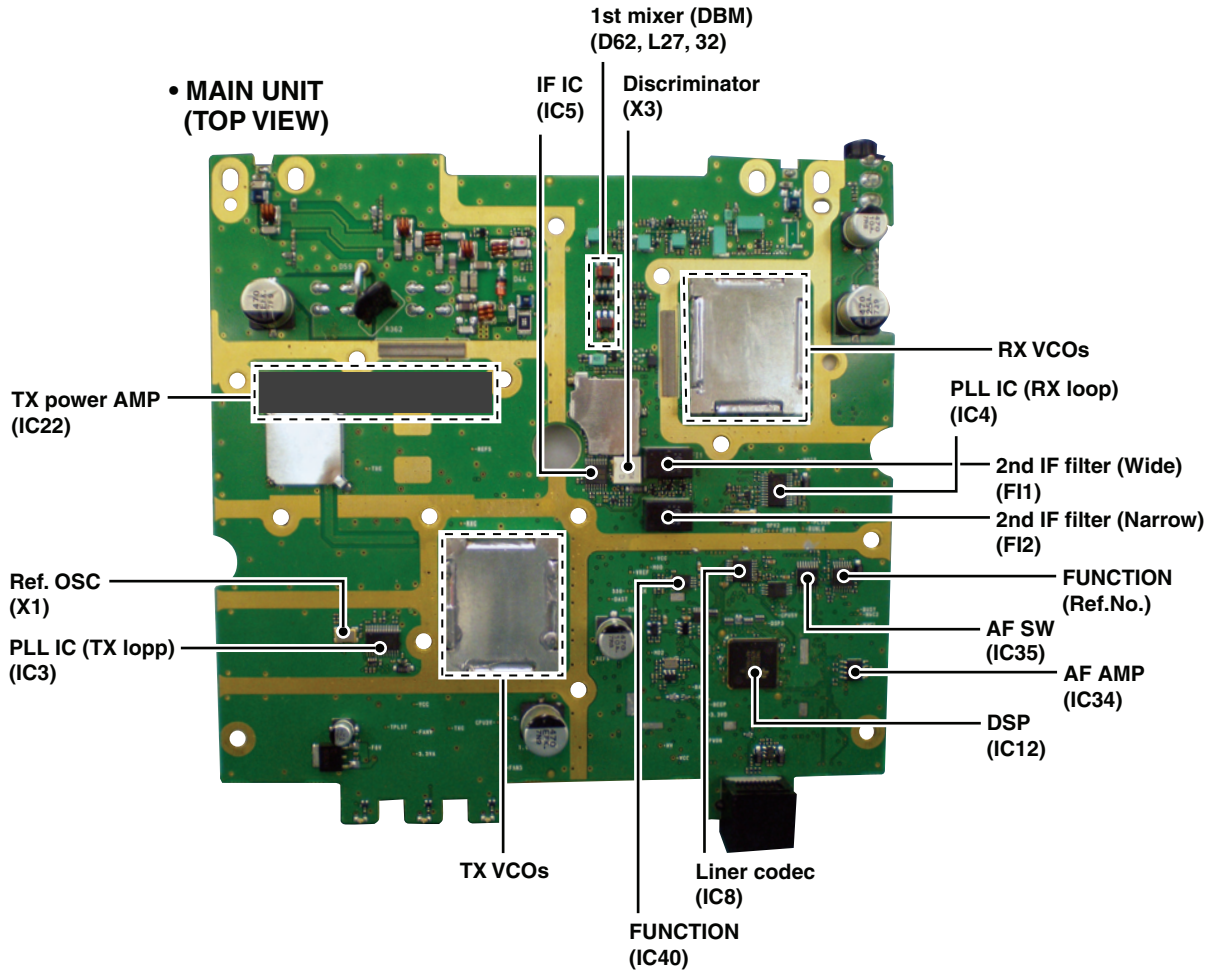
| ■ RECEIVER  | [UR-FR6000]                                     | [UR-FR6100]  |
|---|---|--|
| • Receive system  | Double-conversion superheterodyne system        |  |
| • Intermediate frequencies  | 1st IF: 46.35 MHz, 2nd IF: 450 kHz              |  |
| • Sensitivity   | Wide/Narrow<br>0.25 $\mu$ V typ. at 12 dB SINAD | Wide/Middle/Narrow<br>–10 dB $\mu$ max. at 12 dB SINAD |
|   | Digital<br>0.25 $\mu$ V typ. at 5% BER          | Digital<br>0 dB $\mu$ V emf max. at 1% BER (PN9)       |
| • Squelch sensitivity<br>(at threshold)                           | Wide/Narrow<br>0.25 $\mu$ V typ.                | Wide/Middle/Narrow<br>0.25 $\mu$ V typ.                |
| • Adjacent channel selectivity                                    | Wide 78 dB typ.                                 | Wide 70 dB min.  |
|   | –   | Middle 70 dB min.                                      |
|   | Narrow 56 dB typ.                               | Narrow 60 dB min.                                      |
|   | Digital 63 dB typ.                              | Digital 45 dB min.                                     |
| • Spurious response   | Wide/Narrow 70 dB                               | Wide/Middle/Narrow 70 dB min.                          |
|   | Digital 65 dB $\mu$ V emf                       | Digital 70 dB $\mu$ V emf min.                         |
| • Intermodulation   | Wide 70 dB min.                                 |  |
|   | –   | Middle 70 dB min.                                      |
|   | Narrow 70 dB min.                               |  |
|   | Digital 71 dB $\mu$ V emf min.                  |  |
| • Hum and noise   | Wide 50 dB typ.                                 | Wide 45 dB min.  |
|   | –   | Middle 43 dB min.                                      |
|   | Narrow 45 dB typ.                               | Narrow 40 dB min.                                      |
|   | Digital 55 dB typ.                              | Digital 55 dB min.                                     |
| • Audio output power<br>(at 5% distortion with a 4 $\Omega$ load) | 4.0 W typ.                                      | 3.5 W min.   |
| • Audio output impedance  | 4 $\Omega$                                      |  |

Specifications are measured in accordance with TIA-603-B (for Wide and Narrow) or EN 301 166 (Digital) for UR-FR6000.

Specifications are measured in accordance with EN 300 086 (for Wide, Middle and Narrow) or EN 301 166 (Digital) for UR-FR6100.

**All stated specifications are subject to change without notice or obligation.**



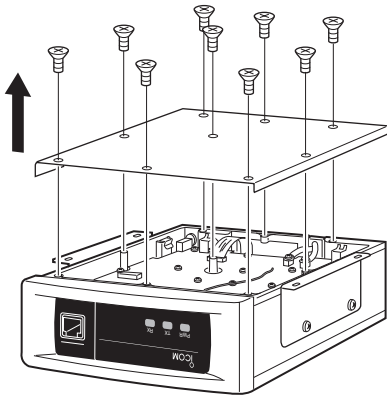


# SECTION 3 DISASSEMBLY INSTRUCTION

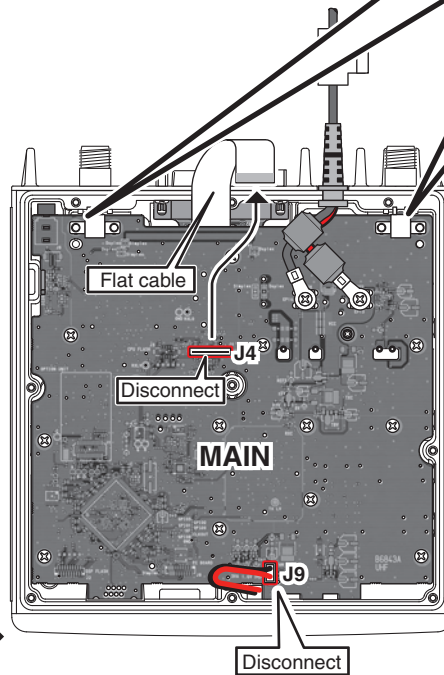
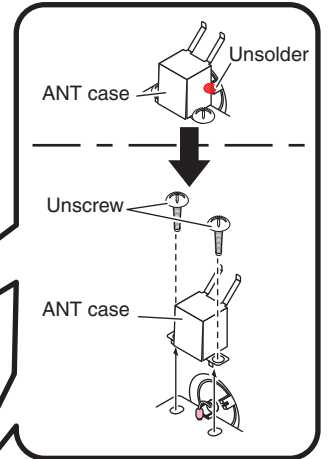
## • Removing the MAIN UNIT

① Unscrew 9 screws, and remove the cover.

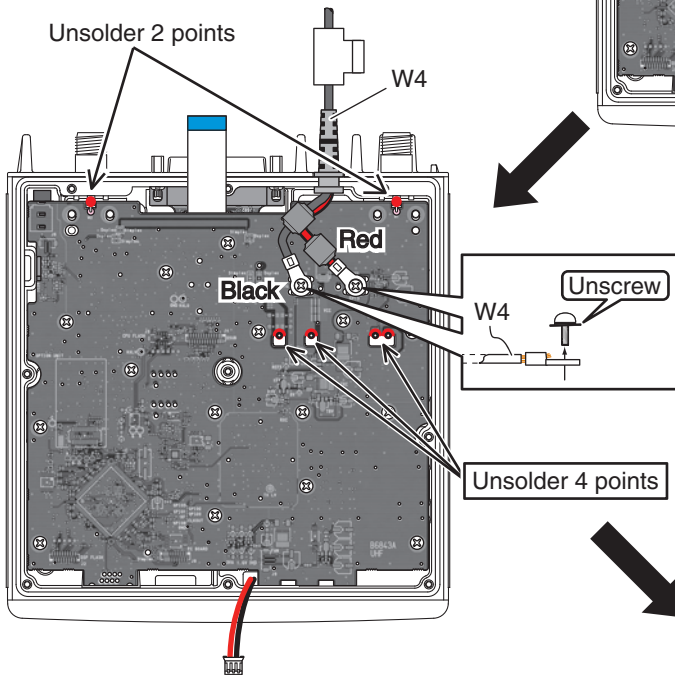
(If you are going to install an optional unit, see page 4-1 for the installation.)



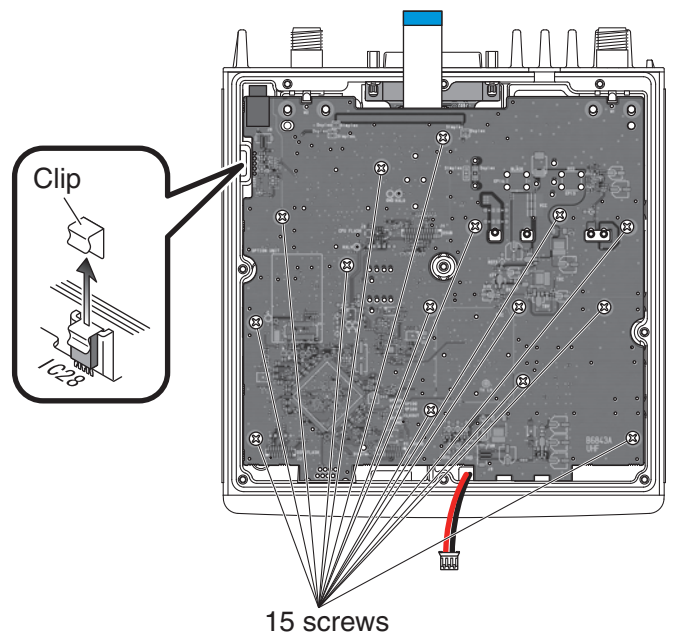
- ② Unsolder 2 points at the ANT cases.
- ③ Unscrew 4 screws from the ANT cases, and remove them.
- ④ Disconnect the flat cable from J4 and the speaker cable from J9.



- ⑤ Unsolder 2 points at the bottom of ANT connectors.
- ⑥ Unsolder 4 points at the PA module leads.
- ⑦ Unscrew 2 screws from W4.



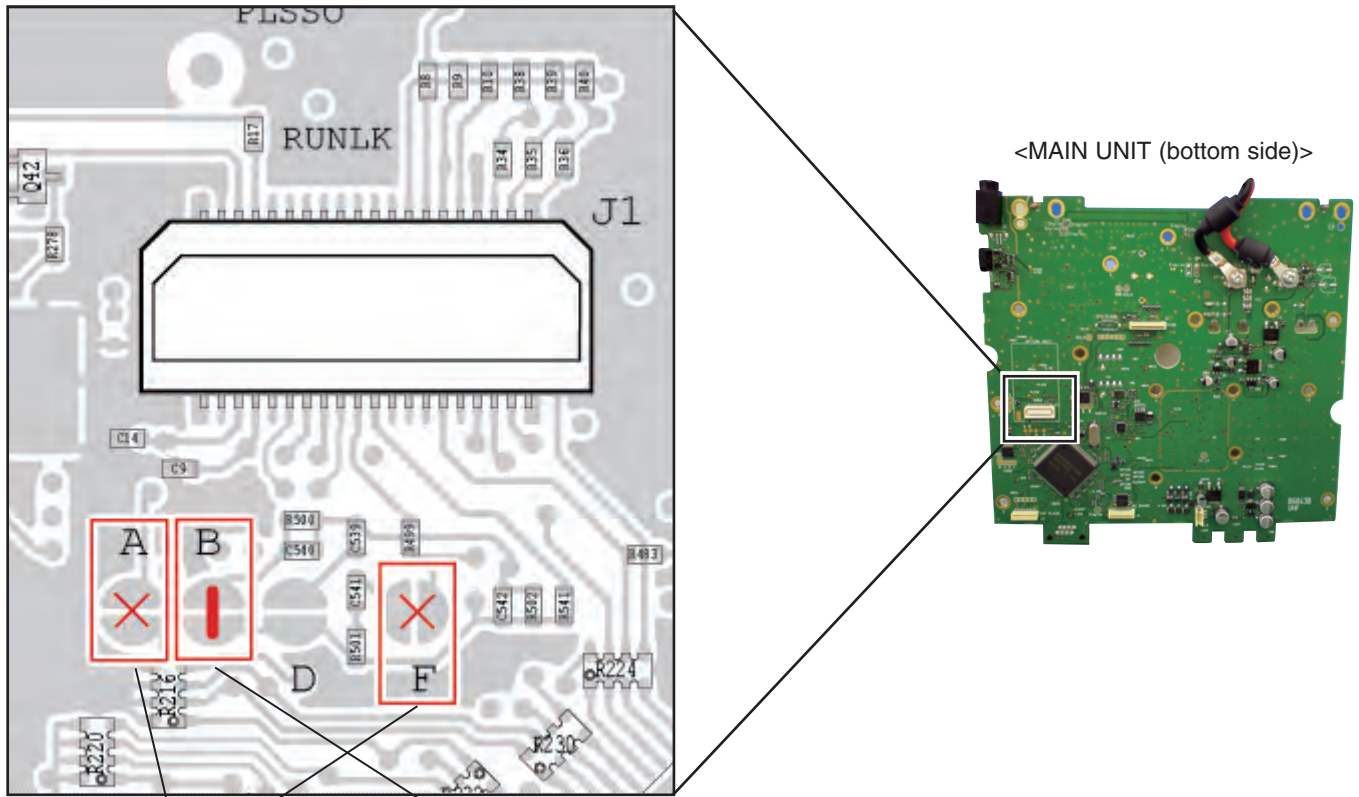
- ⑧ Remove the clip from the side of chassis.
- ⑨ Unscrew 15 screws from the MAIN UNIT, then take off the MAIN UNIT PCB from the chassis.



# SECTION 4 OPTIONAL UNIT INSTALLATION

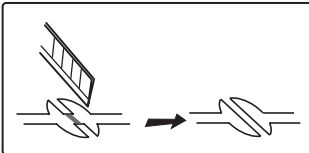
Install UT-109R or UT-110R as follows.

- ① Disassembly the repeater until the MAIN UNIT is exposed. (see the page 3-1)
- ② Modify the patterns on the MAIN UNIT as below.

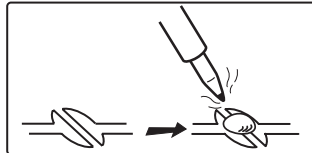


<MAIN UNIT (bottom side)>

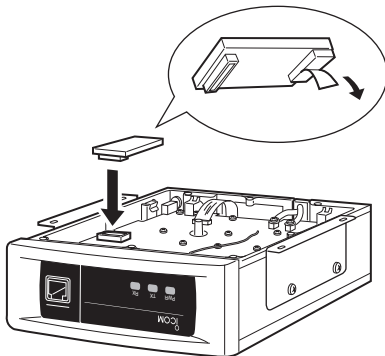
**A and F; Cut the pattern**



**B; Short the pattern**



- ③ Remove the protective paper of optional unit, and install it to the J1 as below.



- ④ Replace the cover, screws, etc. to recover the whole assembly.

**NOTE: When uninstalling the scrambler unit**

Be sure to recover the disconnected or connected points, otherwise no TX modulation or AF output is available.

## 5-1 TRANSMITTER CIRCUITS

### TX PLL CIRCUIT

TX PLL IC (IC3) outputs resulting signal of phase-comparison of REF signal (15.3 MHz) and feedback OSC signal from TX VCO. The phase-difference signal is passed through the active loop filter (Q4, 10, 13) and applied to the TX VCO. The voltage of TX LV is adjusted to appropriate one. The OSC signal of TX VCO is FM-modulated by applied modulation signals.

### TX VCO CIRCUITS

There are 2 VCOs; VCO for band LOW (Q23, D10, 14, L19) and band HIGH (Q22, D9, 13, L18), and these VCO (=OSC freq.) are switched by the VCO SW (Q27, 28). The OSC frequencies of these VCO are adjusted (=Locked) by the TX LV signal (Lock Voltage). The modulation signals applied to the Variable Capacitor (VD; D17 or D18) vary the capacitor reactance of it for FM modulation. The output signals of these VCOs are applied to the power AMP circuits via buffers (Q24, 35).

A portion of these output signals are passed through the doubler (Q33) to extract 2nd harmonics, then applied to the PLL IC (IC3) via the LPF.

### YGR/PA CIRCUITS

The output signals from TX VCOs are amplified by pre-AMPs (Q37, 38), the amplified the PA module (IC22) to obtain required TX power. The power-amplified TX signals are passed through the ANT SW (D44) and LPF (for harmonics removal) then applied to the TX ANT.

### APC CIRCUIT

D45, D48 and D49 detect the TX power and the detected voltage are applied to the IC23 of APC circuit. Comparing the detected voltage (in proportion to TX power) and power setting voltage (as a reference voltage), IC23 adjusts the bias (pin 2: VGG) of PA module to control the TX power.

### MODULATION CIRCUITS

The audio signals from the Microphone (MIC signals) are applied to the MIC AMP (IC25). The amplified MIC signals are passed through the SW IC (IC35) which signal selects the source of MIC signals from J5 (from MIC) and from D-SUB connector (DEXM).

The MIC signals from the SW IC are amplified by an AMP (IC1) then applied to the LINEAR CODEC IC (IC8) where the MIC signals are converted in to the digital signals. The converted digital signals are processed (pre-emphasis, limit, etc.) by the DSP (IC12), then recovered to the analog audio signals. The AF signals are amplified by IC1 and level-adjusted by Ele.VR (IC2), then applied to the TX VCO and TCXO (X1) as the modulation signals.

### SIGNALING (ENCODE)

The Continuous Tone (CTCSS/DTCS), Single Tone (5-Tone/DTMF/CW\_ID) signals are encoded in the DSP (IC12), and mixed with MIC signals, level-adjusted by Ele. VR (IC2), then applied to the TX VCO and TCXO (X1) for modulation.

## 5-2 RECEIVER CIRCUITS

### RX PLL CIRCUIT

The RX PLL IC (IC4) outputs resulting signal of phase-comparison of REF signal from the TCXO (X2: 15.3 MHz) and feedback OSC signal from RX VCO. The phase-difference signal is passed through the active loop filter (Q6, 11, 14) and applied to the RX VCO. The voltage of RX LV (lock voltage) is adjusted to appropriate one by "RX LVA" signal.

A portion of reference frequency signal from the TCXO (X2: 15.3 MHz) is passed through the tripler (Q2) to extract 3rd harmonics, then applied to the IF IC (IC5).

### RX VCO

There are 2 VCOs; VCO for band LOW (Q21, D8, 16, L21) and band HIGH (Q20, D7, 15, L20), and these VCO (=OSC freq.) are switched by the VCO SW (Q26, 30). The OSC frequencies of these VCO are adjusted (=Locked) by the RX LV signal (Lock Voltage). The output signals of these VCOs are applied to the 1st mixer (L27, 32, D62) via buffers (Q25, 34) and LO AMP (Q65).

A portion of these output signals are passed through the buffer (Q25) doubler (Q32) to extract 2nd harmonics, then applied to the PLL IC (IC4) via the LPF.

### RF BPF CIRCUITS

RX signals from the RX ANT connector (J11) are passed through the 1st stage of BPF (D28, 29, 31, 32, L44, 47) then amplified by the RF AMP (Q36). The amplified RX signals are passed through the 2nd stage of BPF to remove unwanted signals for good image response then applied to the 1st mixer (L27, 32, D62).

Being mixed with 1st LO from the RX VCO, the RX signals are converted into the 46.35 MHz 1st IF signal. The 1st and 2nd stage of the BPF are tune to the pass band frequency by applying the tracking voltage "T1" and "T2" from the DAC (IC17). The gain of low noise RF AMP (Q36) is controlled by the AGC circuit (Q39, D27) according to the RX signal strength.

## **IF FILTER/IF AMP CIRCUITS**

The 1st IF signal from the 1st mixer (L27, 32, D62) is amplified by the post AMP (Q63, 64) and 1st stage of IF AMP (Q7) then filtered by crystal filter (F13 or F14), and then applied to the IF IC (IC5).

The crystal filters (F13 or F14) are switched by the "NWC 1" signal from the CPU (IC20) according to the RX mode; Wide (Middle), Narrow and Digital.

### **<ANALOG RX>**

Being mixed with the 2nd LO, the 1st IF signal is converted into the 450 kHz 2nd IF signal then detected by the internal quadrature detector (X3 as a discriminator) to demodulate. The demodulated AF signals are amplified by the AF AMP (IC36), and applied to the LINER CODEC (IC8). The AF signals are converted into the digital signal then processed by the DSP (IC12) then recovered to the analog audio signals.

The ceramic filters (F11 or F12) are switched by the "NWC2" signal from the CPU (IC20) according to the RX mode; Wide (Middle), Narrow and Digital.

### **<DIGITAL RX>**

The 450 kHz 2nd IF signal is amplified by IC7 then applied to the DSP (IC12) via ADC (IC9) and digital demodulated. The processed digital signal is converted into the analog audio signal by the LINEAR CODEC (IC8).

## **AF AMPLIFIER CIRCUITS**

The AF signals from the LINEAR CODEC are amplified by the AF AMP (IC36) and level-adjusted by DAC (IC2), then applied to IC28 via IC29 to be power-amplified.

## **SIGNALING (DECODE)**

The Continuous Tone (CTCSS/DTCS), Single Tone (5-Tone/DTMF/CW\_ID) signals in the demodulated AF signals are decoded in the DSP (IC8).

## **5-3 OTHER CIRCUITS**

### **POWER SUPPLY**

The power supply is switched by Q57 (ON/OFF). 5V (REF5) from the regulator (IC30) is passed through L58 to supply to CPU. The 5V also supplies to other sections of the repeater via Q41 as "+5V."

8V from the regulator (IC27) are supplies to various circuits, and also supplies to TX circuits as "T8V" and RX circuits as "8V."

5V from the regulator (IC39) supplies DSP as "DSP5" and supplies logic circuits; CPU, DSP, etc. via regulators (IC13, 14, 15).

The regulator "F8V" (IC41) provides the supply for FRONT UNIT.

### **COMPANDER**

The compander in the DSP (IC12) compresses the amplitude of MIC signals in TX, and expands in RX to provide high quality recovered sounds.

### **LED**

DS1 (BUSY), DS2(PWR) and DS3 (TX) indicate the repeater's status: Power ON, T/RX and Cloning.

## 5-4 CPU (M: IC20) PORT ALLOCATION

| Pin No. | LINE NAME   | DESCRIPTION  | IN/OUT | CONDITION   |
|---------|-------------|--|--------|---|
| 140-144 | D0-D4       | DSP data bus line.                                 | I/O    | -   |
| 1-11    | D5-D15      | DSP data bus line.                                 | I/O    | -   |
| 15-28   | A1-A14      | DSP data bus line.                                 | I/O    | -   |
| 29      | HRW         | DSP data line.                                     | I/O    | -   |
| 32      | FANS        | Cooling fan (CH: MF1) rotation detect.             | I      | "H"=While the cooling fan is rotating.                    |
| 33      | TLED        | TX indicator LED control signal.                   | O      | "H"=TX  |
| 34      | LEDR        | RX indicator LED control signal.                   | O      | "H"=Squelch open.   |
| 35      | PLSCK       | PLL (M: IC4) serial clock.                         | O      | -   |
| 36      | PLSSO       | PLL (M:IC4) serial data.                           | O      | -   |
| 41      | PWON        | Power line "VCC" control signal.                   | O      | "H"=Power ON.   |
| 42      | AFON2       | AF power AMP. (M: IC28) control signal.            | O      | "H"=AF power AMP ON.                                      |
| 43      | AFON        | AF output select signal.                           | O      | "H"=AF signals are output from the [ACCESSORY CONNECTOR]. |
| 44      | ESCL        | Serial clock to the EEPROM (M: IC21).              | O      | -   |
| 45      | ESDA        | Serial data to the EEPROM (M: IC21).               | O      | -   |
| 46      | TXC         | TX power line "T8V" control signal.                | O      | "H"=TX  |
| 47      | RXC         | RX power line "R8V" control signal.                | O      | "H"=RX  |
| 48      | RPLST       | RX PLL (M: IC4) strobe.                            | O      | -   |
| 49      | TPLST       | TX PLL (M: IC3) strobe.                            | O      | -   |
| 50      | RUNLK       | RX PLL (M: IC4) unlock signal.                     | I      | "L"=Unlocked  |
| 51      | TUNLK       | TX PLL (M: IC3) unlock signal.                     | I      | "L"=Unlocked  |
| 52      | XCTS        | Serial data from the RS-232 line driver (M: IC26). | I      | -   |
| 53      | XRTS        | Serial data to the RS-232 line driver (M: IC26).   | O      | -   |
| 55      | EXDA        | External D/A port.                                 | O      | -   |
| 56      | BEEP        | Beep sounds (square waves).                        | O      | -   |
| 57-59   | OPV3-OPV1   | Optional unit detect.                              | I      | -   |
| 60      | MMUT        | MIC mute signal to the installed optional unit.    | O      | "H"=MIC mute  |
| 61      | HANG        | Microphone hang-up detect.                         | I      | "L"=Hang-up   |
| 62      | PTT         | [PTT] key input. (pull up)                         | I      | -   |
| 63      | RMUT        | RX mute signal to the installed optional unit.     | O      | "H"=RX mute   |
| 64      | EXAD        | External A/D port.                                 | I      | -   |
| 65      | TEMP        | Temperature detect.                                | I      | -   |
| 68      | RLVIN       | RX PLL lock voltage.                               | I      | -   |
| 69      | BATV        | Voltage monitor (divided voltage of "VCC").        | I      | -   |
| 70      | TLVIN       | TX PLL lock voltage.                               | I      | -   |
| 71      | RSSI        | RSSI signal from the IF IC (M: 5).                 | I      | -   |
| 74      | XTXD        | External data to the RS-232 driver (M: IC26).      | O      | -   |
| 75      | XRXD        | External data from the RS-232 driver (M: IC26).    | I      | -   |
| 76      | TMUT        | TX mute signal.                                    | O      | "H"=TX mute   |
| 77      | HINT        | DSP IC control signal.                             | O      | -   |
| 78      | INT1        | DSP IC control signal.                             | O      | -   |
| 79      | HRDY        | DSP IC control signal.                             | O      | -   |
| 81      | HDS1        | DSP IC control signal.                             | O      | -   |
| 82      | HDS2        | DSP IC control signal.                             | O      | -   |
| 100     | RES         | CPU reset signal from the reset IC (F: IC501).     | O      | -   |
| 101-108 | EXIO1-EXIO8 | External data bus line.                            | I/O    | +5 V pull-up  |
| 112     | POSW        | [PWR] key input. (pull-up)                         | I      | -   |
| 113     | NOIS        | Noise detect.                                      | I      | "H"=RX signal is absent (squelch close).                  |
| 114     | CSFT        | Clock frequency shift signal.                      | O      | -   |
| 119     | SSO         | Serial data to the seri-para converter (M: IC31).  | O      | -   |
| 120     | SCK         | Clock signal to the seri-para converter (M: IC31). | O      | -   |
| 121     | EXIO9       | External data bus line.                            | I/O    | +5 V pull-up  |
| 122     | DSDA        | Serial data to the DAC (M: IC17).                  | O      | -   |

**3-4 CPU (M: IC20) PORT ALLOCATION (continued)**

| Pin No. | LINE NAME | DESCRIPTION  | IN/OUT | CONDITION |
|---------|-----------|--|--------|-----------|
| 123     | DAST      | Strobe to the DAC (M: IC2).                                | O      | -         |
| 125     | FMDA      | Data from the FRONT CPU (F: IC502).                        | I      | -         |
| 126     | MFDA      | Data to the FRONT CPU (F: IC502).                          | O      | -         |
| 127     | OPT2      | Port for optional unit.                                    | O      | -         |
| 128     | OPT1      | Port for optional unit.                                    | I      | -         |
| 129     | OPT3      | Port for optional unit.                                    | I      | -         |
| 131     | CSO       | Port for optional unit.                                    | O      | -         |
| 132     | CSI       | Port for optional unit.                                    | I      | -         |
| 133     | EXOE      | Output enable signal to the seri-para converter (M: IC31). | O      | -         |
| 134     | EXST      | Strobe to the seri-para converter (M: IC31).               | O      | -         |
| 135     | DRES      | Reset signal to the DSP IC (M: IC12).                      | O      | -         |
| 136     | HCS       | DSP data line.   | I/O    | -         |
| 138     | GPIO2     | DSP data line.   | I/O    | -         |
| 139     | GPIO1     | DSP data line.   | I/O    | -         |

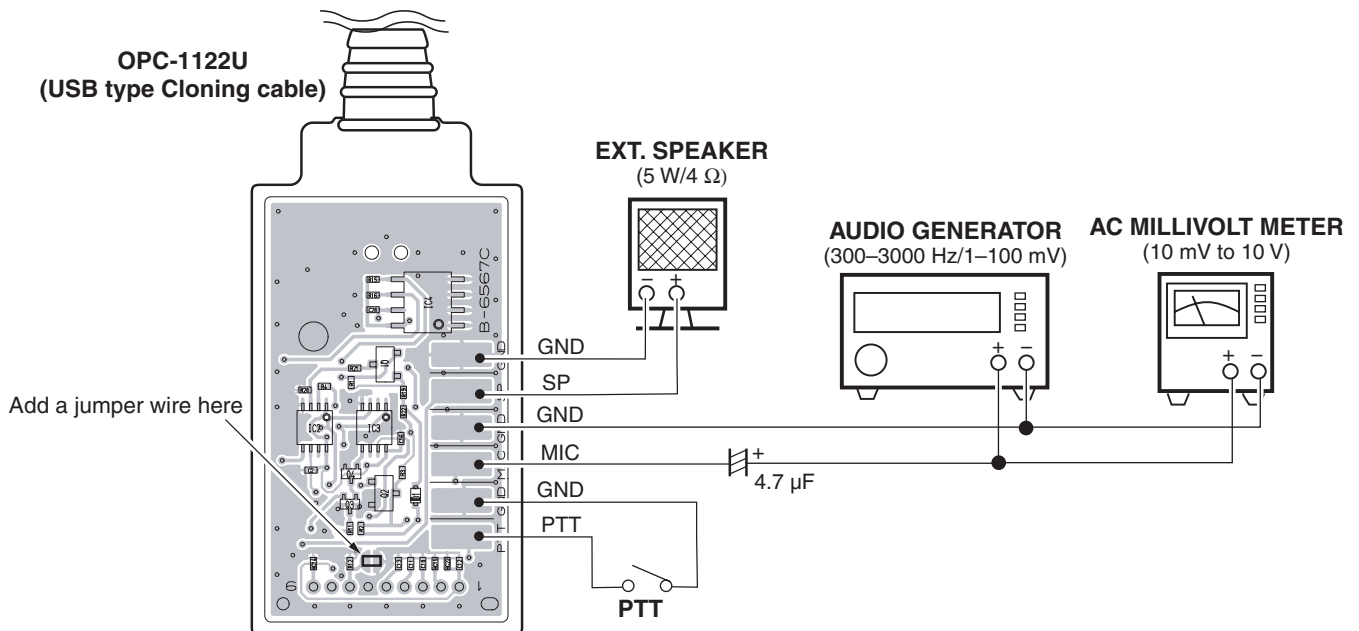
# SECTION 6 ADJUSTMENT PROCEDURE

## 6-1 PREPARATION

### REQUIRED EQUIPMENTS

| EQUIPMENT                           | SPECIFICATION  | EQUIPMENT                       | SPECIFICATION  |
|-------------------------------------|--|---------------------------------|--|
| Adjustment Software                 | "CS-FR5000" (Revision 1.0 or later)  | JIG cable                       | Modified OPC-1122U (USB type)<br>(see the illust below)  |
| Power Supply                        | Output voltage : 13.6 V DC<br>[UR-FR6000]<br>13.2 V DC<br>[UR-FR6100]<br>Current capacity : More than 20 A<br>[UR-FR6000]<br>More than 10 A<br>[UR-FR6100] | Attenuator                      | Power attenuation : 40 dB<br>Capacity : More than 60 W<br>[UR-FR6000]<br>More than 30 W<br>[UR-FR6100] |
| RF Power Meter<br>(terminated type) | Measuring range : 1–60 W<br>[UR-FR6000]<br>1–30 W<br>[UR-FR6100]<br>Frequency range : 100–600 MHz<br>Impedance : 50 Ω<br>SWR : Less than 1.2 : 1           | Standard Signal Generator (SSG) | Frequency range : 0.1–600 MHz<br>Output level : 0.1 mV to 32 mV<br>(–127 to –17 dBm)                   |
|                                     |  | Audio Generator                 | Frequency range : 300–3000 Hz<br>Output level : 1–500 mV   |
| Frequency Counter                   | Frequency range : 0.1–600 MHz<br>Frequency accuracy : ±1 ppm or better<br>Input level : Less than 1 mW   | AC Millivoltmeter               | Measuring range : 10 mV to 10 V  |
|                                     |  | Oscilloscope                    | Frequency range : DC–20 MHz<br>Measuring range : 0.01–20 V   |
| Modulation Analyzer                 | Frequency range : 30–600 MHz<br>Measuring range : 0 to ±10 kHz   | External Speaker                | Input impedance : 4 Ω<br>Capacity : More than 5 W  |

### JIG CABLE



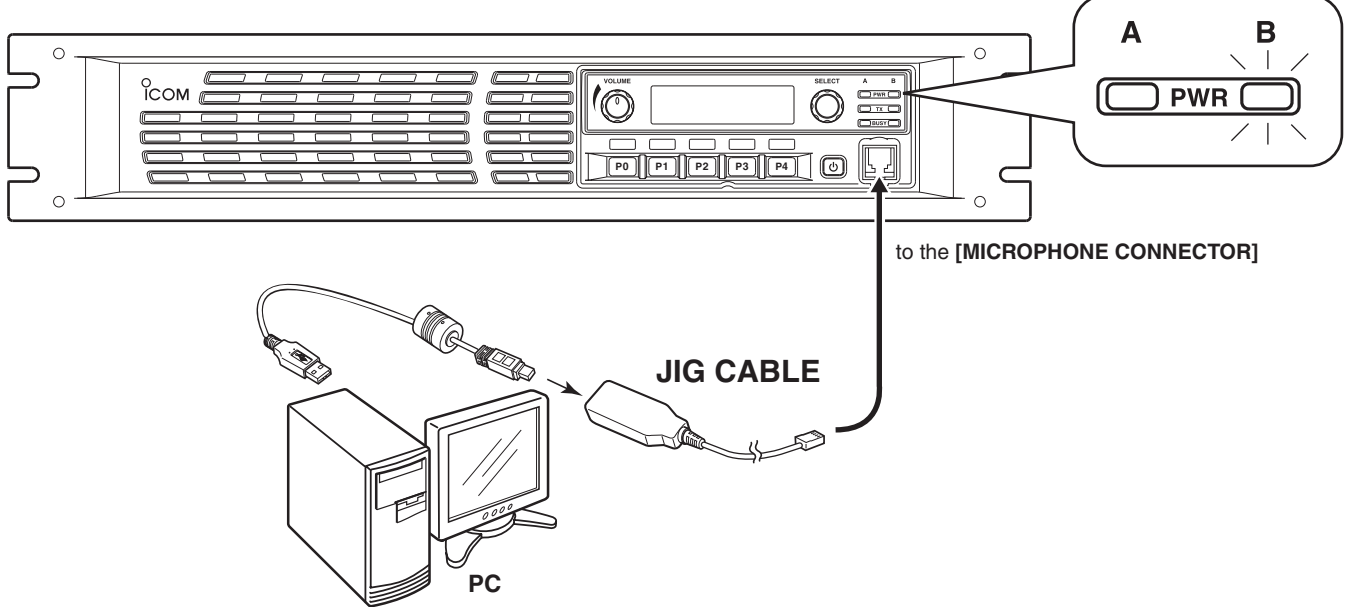


## CONNECTION

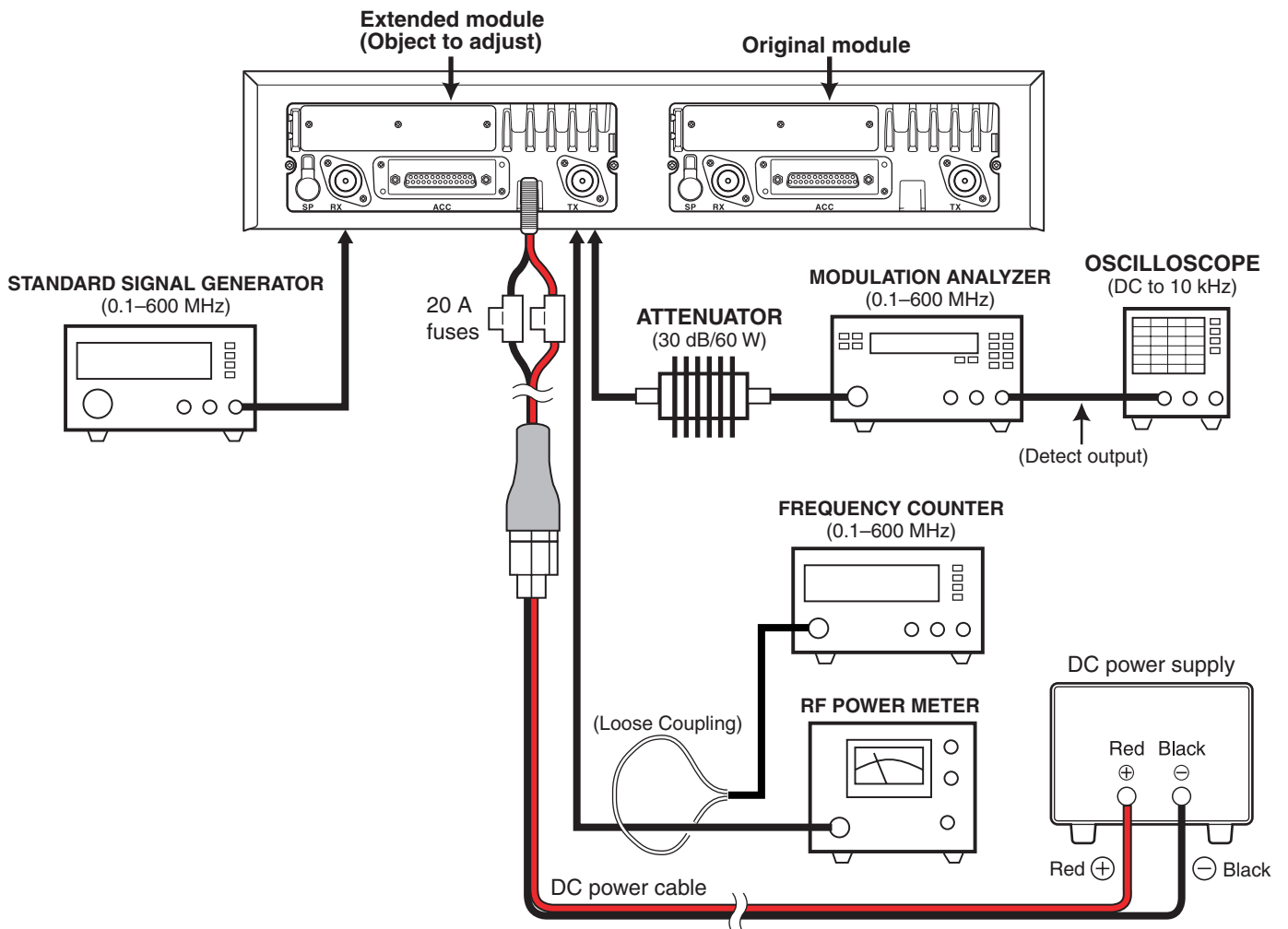
**NOTE:** Installing your UR-FR6000/UR-FR6100 into an IC-FR6000/IC-FR6100 is necessary for adjustment.

### FRONT VIEW

Turn the extended module's power ON  
(see the IC-FR6000/IC-FR6100 Instruction Manual)



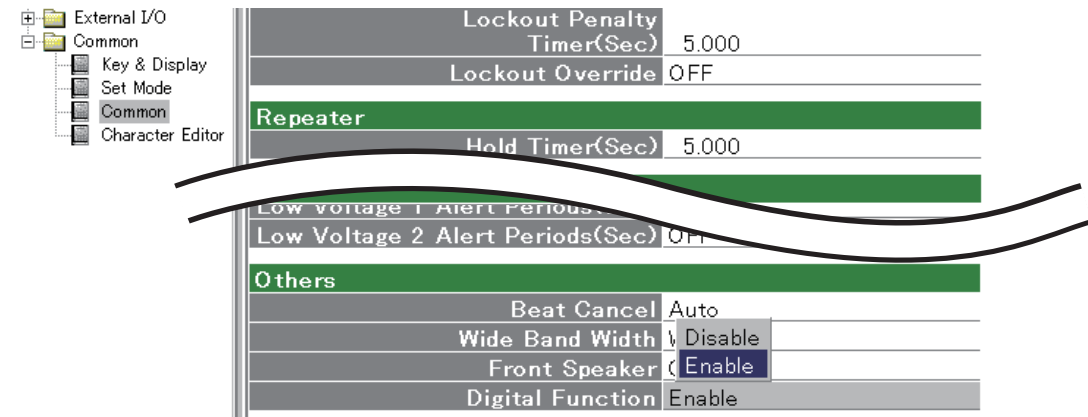
### REAR VIEW




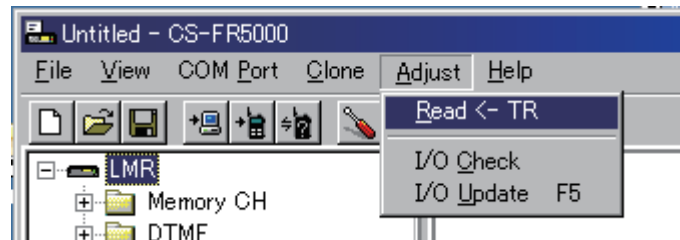


## WHOLE PROCEDURE OF THE ADJUSTMENT

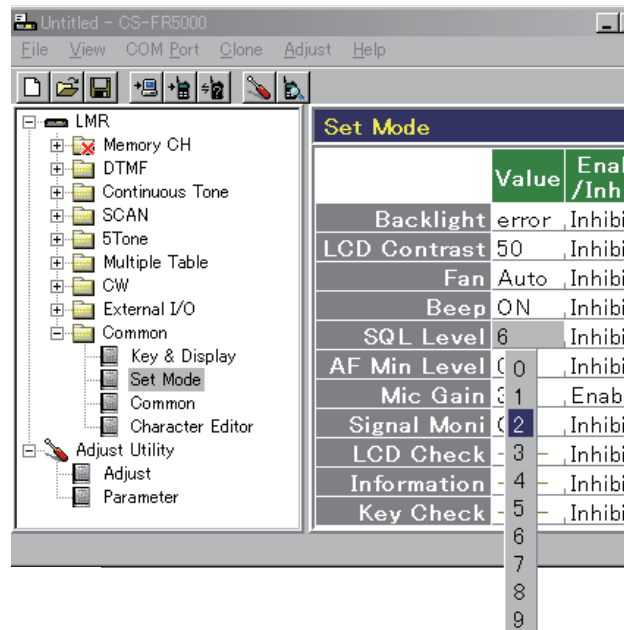
- ① Connect the repeater and PC with the JIG cable (see the page 6-2).
- ② Turn the repeater power ON.
- ③ Boot up 'CS-FR5000.'
- ④ Set the [Digital Function] to "Enable."



- ④ Click  or [Read ← TR] in the [Adjust] menu, then the "Adjust Utility" window (see the page 6-5) appears.

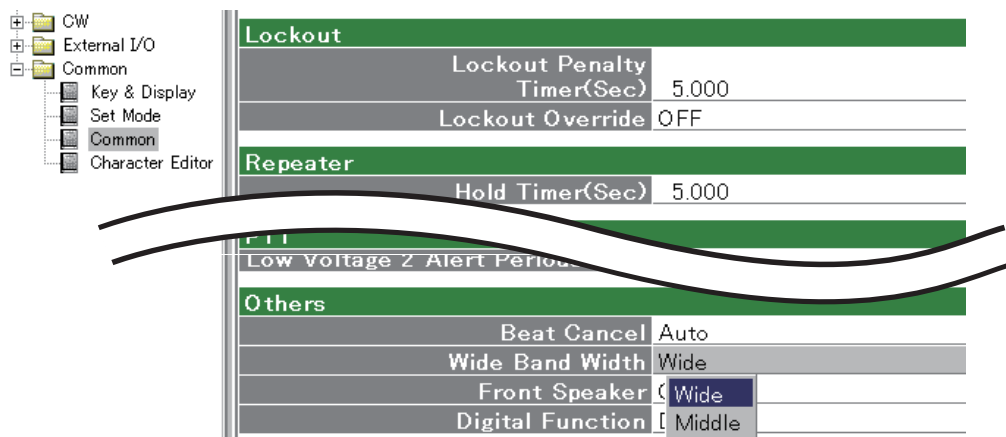


- ⑤ Set or modify adjustment values as specified in the guidances on the pages 6-6 to 6-9.



### \*For [UR-FR6100]:

Set the [Wide Band Width] to "Middle" when adjust "ANALOG DEVIATION" in Middle mode.



# ADJUST UTILITY WINDOW

| Adjust Utility                      |                                     |                                     |                                     |                           |
|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|---------------------------|
| Setting                             |                                     |                                     |                                     |                           |
|                                     | CH No.                              | 1                                   | Receive Sim                         |                           |
|                                     | RX Freq.                            |                                     | 451.10000MHz                        |                           |
|                                     | TX Freq.                            |                                     | 452.10000MHz                        |                           |
|                                     | RF Power.                           |                                     | Low                                 |                           |
|                                     | W/N                                 |                                     | Wide                                |                           |
|                                     | CH Type                             |                                     | RX=Digital TX=Digital               |                           |
| Mode setting                        | TX Mode                             | 17                                  | Digital PNB                         |                           |
|                                     | RX Mode                             | 2                                   | Digital                             |                           |
|                                     | AF Volume                           | 0                                   | [-----]                             |                           |
| Adjust                              |                                     |                                     |                                     |                           |
| TX output power                     | Power (H)                           | 208                                 | [-----]                             |                           |
|                                     | Power (L2)                          | 150                                 | [-----]                             |                           |
|                                     | Power (L1)                          | 76                                  | [-----]                             |                           |
| Analog deviation                    | MOD (Wide)                          | 139                                 | [-----]                             |                           |
|                                     | MOD (Mid)                           | 144                                 | [-----]                             |                           |
|                                     | MOD (Narrow)                        | 65                                  | [-----]                             |                           |
|                                     | MOD (Digital)                       | 105                                 | [-----]                             |                           |
| CTCSS/DTCS deviation                | CTCSS/DTCS                          | 137                                 | [-----]                             |                           |
|                                     | S.Tone                              | 75                                  | [-----]                             |                           |
| Squelch                             | SQL                                 | 50                                  | [---]                               |                           |
| Expert                              |                                     |                                     |                                     |                           |
| TX frequency                        | RX REF                              | 178                                 | [-----]                             |                           |
|                                     | TX REF                              | 126                                 | [-----]                             |                           |
| Lock volatge (Preset)               | RX LVA L                            | 80                                  | [-----] [Enter] to Sweep            |                           |
|                                     | RX LVA H                            | 62                                  | [-----] [Enter] to Sweep            |                           |
|                                     | TX LVA L                            | 166                                 | [-----] [Enter] to Sweep            |                           |
|                                     | TX LVA H                            | 105                                 | [-----] [Enter] to Sweep            |                           |
| Lock volatge (Adjustment)           | LV (RX L)                           | 36                                  | 0.70V                               |                           |
|                                     | LV (RX H)                           | 36                                  | 0.70V                               |                           |
|                                     | LV (TX L)                           | 36                                  | 0.70V                               |                           |
|                                     | LV (TX H)                           | 36                                  | 0.70V                               |                           |
| S-meter                             | RSSI                                | 74                                  | [Enter] to Capture                  |                           |
| Modulation balance                  | BAL                                 | 174                                 | [-----]                             |                           |
|                                     | BAL Offset (High)                   | 0                                   | [-----]                             |                           |
| Modulation balance (High)           | PWR Hi Slant Band 0                 | 0                                   | [-----] 399.900000 - 411.599999 MHz |                           |
|                                     | PWR Hi Slant Band 1                 | 3                                   | [-----] 411.600000 - 423.299999 MHz |                           |
|                                     | PWR Hi Slant Band 2                 | 4                                   | [-----] 423.300000 - 434.999999 MHz |                           |
|                                     | PWR Hi Slant Band 3                 | 25                                  | [-----] 435.000000 - 446.699999 MHz |                           |
|                                     | PWR Hi Slant Band 4                 | 8                                   | [-----] 446.700000 - 458.399999 MHz |                           |
|                                     | PWR Hi Slant Band 5                 | 6                                   | [-----] 458.400000 - 470.099999 MHz |                           |
|                                     | PWR Hi Slant Band 6                 | 0                                   | [-----] 470.100000 - 481.799999 MHz |                           |
|                                     | PWR L2 Slant Band 0                 | 0                                   | [-----] 399.900000 - 411.599999 MHz |                           |
|                                     | PWR L2 Slant Band 1                 | 4                                   | [-----] 411.600000 - 423.299999 MHz |                           |
|                                     | PWR L2 Slant Band 2                 | 4                                   | [-----] 423.300000 - 434.999999 MHz |                           |
|                                     | PWR L2 Slant Band 3                 | 17                                  | [-----] 435.000000 - 446.699999 MHz |                           |
|                                     | PWR L2 Slant Band 4                 | 8                                   | [-----] 446.700000 - 458.399999 MHz |                           |
|                                     | PWR L2 Slant Band 5                 | 6                                   | [-----] 458.400000 - 470.099999 MHz |                           |
|                                     | PWR L2 Slant Band 6                 | 0                                   | [-----] 470.100000 - 481.799999 MHz |                           |
|                                     | PWR L1 Slant Band 0                 | 0                                   | [-----] 399.900000 - 411.599999 MHz |                           |
|                                     | PWR L1 Slant Band 1                 | 0                                   | [-----] 411.600000 - 423.299999 MHz |                           |
|                                     | PWR L1 Slant Band 2                 | 2                                   | [-----] 423.300000 - 434.999999 MHz |                           |
|                                     | PWR L1 Slant Band 3                 | 14                                  | [-----] 435.000000 - 446.699999 MHz |                           |
| PWR L1 Slant Band 4                 | 6                                   | [-----] 446.700000 - 458.399999 MHz |                                     |                           |
| PWR L1 Slant Band 5                 | 4                                   | [-----] 458.400000 - 470.099999 MHz |                                     |                           |
| PWR L1 Slant Band 6                 | 0                                   | [-----] 470.100000 - 481.799999 MHz |                                     |                           |
| Digital deviation                   | MOD Slant Band 0                    | 0                                   | [-----] 399.900000 - 411.599999 MHz |                           |
|                                     | MOD Slant Band 1                    | -9                                  | [-----] 411.600000 - 423.299999 MHz |                           |
|                                     | MOD Slant Band 2                    | -13                                 | [-----] 423.300000 - 434.999999 MHz |                           |
|                                     | MOD Slant Band 3                    | -2                                  | [-----] 435.000000 - 446.699999 MHz |                           |
|                                     | MOD Slant Band 4                    | -5                                  | [-----] 446.700000 - 458.399999 MHz |                           |
|                                     | MOD Slant Band 5                    | 2                                   | [-----] 458.400000 - 470.099999 MHz |                           |
|                                     | MOD Slant Band 6                    | 0                                   | [-----] 470.100000 - 481.799999 MHz |                           |
|                                     | MOD Offset (High)                   | 0                                   | [-----]                             |                           |
| *2Receive sensitivity (Band center) | BPF C ALL                           |                                     | [Enter] to Sweep                    |                           |
|                                     | *1Receive sensitivity preset        | BPF T1 C                            | 4 [-----] [Enter] to Sweep          |                           |
|                                     | *1Receive sensitivity (Band center) | BPF T2 C                            | 25                                  | [#-----] [Enter] to Sweep |
|                                     |                                     | BPF L ALL                           |                                     | [Enter] to Sweep          |
|                                     | Receive sensitivity (Band high)     | BPF T1 L                            | 80                                  | [-----] [Enter] to Sweep  |
|                                     |                                     | BPF T2 L                            | 45                                  | [---] [Enter] to Sweep    |
|                                     |                                     | BPF H ALL                           |                                     | [Enter] to Sweep          |
|                                     |                                     | BPF T1 H                            | 69                                  | [-----] [Enter] to Sweep  |
| BPF T2 H                            |                                     | 53                                  | [-----] [Enter] to Sweep            |                           |

\*1[Low band] only  
\*2[High band] only

## 6-2 FREQUENCY ADJUSTMENT

- 1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.
- 2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT                        | ADJUSTMENT CONDITION | OPERATION                     | ADJUSTMENT ITEM  | VALUE   |
|-----------------------------------|----------------------|-------------------------------|--|---|
| PLL LOCK VOLTAGE<br>-Preparation- | 1                    | –                             | [LV (RX L)]<br>[LV (RX H)]<br>[LV (TX L)]<br>[LV (TX H)] | 36 [0.70V]<br>(for each item)                             |
| -Adjust-RX<br>(Band low)          | 2                    | • CH. : 1-1<br>• Receiving    | [RX LVA L]   | (Automatic adjustment)                                    |
| RX<br>(Band high)                 | 3                    | • CH. : 1-2<br>• Receiving    | [RX LVA H]   |   |
| TX<br>(Band low)                  | 4                    | • CH. : 1-1<br>• Transmitting | [TX LVA L]   |   |
| TX<br>(Band high)                 | 5                    | • CH. : 1-2<br>• Transmitting | [TX LVA H]   |   |
| LOCK VOLTAGE VERIFY               | 1                    | • CH. : 1-3<br>• Receiving    | [RX LIVIN]<br>(I/O Check window)                         | 3.0–4.3 V<br>(Verify)                                     |
| RX<br>(Band low)                  |                      |                               |  |   |
| RX<br>(Band high)                 | 2                    | • CH. : 1-4<br>• Receiving    |  | 3.0–4.0 V<br>(Verify)                                     |
| TX<br>(Band low)                  | 3                    | • CH. : 1-3<br>• Transmitting | [TX LIVIN]<br>(I/O Check window)                         | 2.7–4.0 V<br>(Verify)                                     |
| TX<br>(Band high)                 | 4                    | • CH. : 1-4<br>• Transmitting |  | 3.0–4.2 V<br>(Verify)                                     |
| TX FREQUENCY                      | 1                    | –                             | [TX Mode]  | "1"   |
|                                   | 2                    | • CH. : 1-5<br>• Transmitting | [TX REF]   | 469.9000 MHz<br>[Low band]<br>519.9000 MHz<br>[High band] |

### • I/O CHECK WINDOW

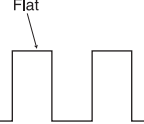
| I/O Check |     |     |         |
|-----------|-----|-----|---------|
| Input     | Dec | Hex | Data    |
| VIN       | 180 | B4  | 14.12V  |
| TEMPS     | 108 | 06  | 28.21°C |
| RX LVIN   | 116 | 74  | 2.27V   |
| TX LVIN   | 219 | DB  | 4.29V   |
| SD        | 28  | 1C  | 0.55V   |
| Output    |     |     |         |
|           | Dec | Hex | Data    |
| BPF T1    | 165 | A5  | 3.24V   |
| BPF T2    | 253 | FD  | 4.96V   |
| RF POWER  | 0   | 0   | 0.00V   |
| RX LVA    | 165 | A5  | 3.24V   |
| TX LVA    | 145 | 91  | 2.84V   |
| RX REF    | 77  | 4D  | 1.51V   |
| TX REF    | 126 | 7E  | 2.47V   |
| MOD BAL   | 0   | 0   | 0.00V   |
| DEV       | 43  | 2B  | 0.84V   |
| FANV      | 255 | FF  | 5.00V   |

Lock voltage verify

## 6-3 TRANSMIT ADJUSTMENT

1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT                                 | ADJUSTMENT CONDITION | OPERATION  | ADJUSTMENT ITEM  | VALUE               |   |
|--|----------------------|--|--|---------------------|---|
| <b>TX Output Power</b><br>-Preparation-    | 1                    | –  | –  | –                   |   |
| -Adjust-<br>(Hi Power)                     | 2                    | • CH. : 1-6<br>• Transmitting  | 1) Adjust the TX output power using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value. | [Power(Hi)]         | 50 W<br>[UR-FR6000]<br>25 W<br>[UR-FR6100]  |
| (L2 Power)                                 | 3                    | • CH. : 1-7<br>• Transmitting  |  | [Power(L2)]         | 25 W<br>[UR-FR6000]<br>10 W<br>[UR-FR6100]  |
| (L1 Power)                                 | 4                    | • CH. : 1-8<br>• Transmitting  |  | [Power(L1)]         | 5 W<br>[UR-FR6000]<br>2.5 W<br>[UR-FR6100]  |
| <b>MODULATION BALANCE</b><br>-Preparation- | 1                    | • Connect a Modulation Analyzer to the TX antenna connector through an attenuator. | • Set the Modulation Analyzer as;<br>HPF : OFF<br>LPF : 20 kHz<br>De-emphasis : OFF<br>Detector : (P-P)/2                      | –                   | –   |
|  | 2                    | • Connect an Audio Generator to the MIC line through the JIG cable.                | • Set the Audio Generator as;<br>Modulation : 1 kHz<br>Level : 40 mV rms<br>Wave form : Sine wave                              | –                   | –   |
|  | 3                    | –  | • Set the item [TX Mode] to "2."   | [TX Mode]           | "2"   |
| -Adjust-<br>(VCO 1)                        | 4                    | • CH. : 1-9<br>• Transmitting  | 1) Adjust the wave form using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value.       | [BAL]               | (square wave form)  |
| (VCO 2)                                    | 5                    | • CH. : 1-10<br>• Transmitting   |  | [BAL Offset (High)] |  |
| <b>DIGITAL DEVIATION</b><br>-Preparation-  | 1                    | –  | • Set the item [TX Mode] to "16."  | [TX Mode]           | "16"  |
|  | 2                    | • Connect a Modulation Analyzer to the TX antenna connector through an attenuator. | • Set the Modulation Analyzer as;<br>HPF : OFF<br>LPF : 20 kHz<br>De-emphasis : OFF<br>Detector : (P-P)/2                      | –                   | –   |
| -Adjust-<br>(Band 1)                       | 3                    | • CH. : 1-11<br>• Transmitting   | 1) Adjust the deviation using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value.       | [MOD (Digital)]     | ±1.39–1.43 kHz  |
| (Band 2)                                   | 4                    | • CH. : 1-12<br>• Transmitting   |  | [MOD Slant Band 0]  |   |
| (Band 3)                                   | 5                    | • CH. : 1-13<br>• Transmitting   |  | [MOD Slant Band 1]  |   |
| (Band 4)                                   | 6                    | • CH. : 1-14<br>• Transmitting   |  | [MOD Slant Band 2]  |   |
| (Band 5)                                   | 7                    | • CH. : 1-15<br>• Transmitting   |  | [MOD Offset (High)] |   |
| (Band 6)                                   | 8                    | • CH. : 1-16<br>• Transmitting   |  | [MOD Slant Band 3]  |   |
| (Band 7)                                   | 9                    | • CH. : 1-17<br>• Transmitting   |  | [MOD Slant Band 4]  |   |
| (Band 8)                                   | 10                   | • CH. : 1-18<br>• Transmitting   |  | [MOD Slant Band 5]  |   |

### 6-3 TRANSMIT ADJUSTMENT (continued)

1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT                                    | ADJUSTMENT CONDITION | OPERATION   | ADJUSTMENT ITEM  | VALUE                         |
|---|----------------------|---|--|-------------------------------|
| <b>ANALOG DEVIATION</b><br>-Preparation-      | 1                    | –   | • Set the item [TX Mode] to "1."   | [TX Mode] "1"                 |
|   | 2                    | • Connect a Modulation Analyzer to the TX antenna connector through an attenuator.  | • Set the Modulation Analyzer as;<br>HPF : OFF<br>LPF : 20 kHz<br>De-emphasis : OFF<br>Detector : (P-P)/2                | – –                           |
|   | 3                    | • Connect an Audio Generator to the MIC line through the JIG cable.                 | • Set the Audio Generator as;<br>Modulation : 1 kHz<br>Level : 40 mV rms<br>Wave form : Sine wave                        | – –                           |
| -Adjust-<br>(Wide)                            | 4                    | • CH. : 1-10<br>• Transmitting  | 1) Adjust the deviation using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value. | [MOD (Wide)] ±4.05–4.15 kHz   |
| (Middle)<br><[UR-FR6100] only>                | 5                    | • CH. : 1-11<br>• [Wide Band Width] : "Middle" (see the page 6-4)<br>• Transmitting |  | [MOD (Middle)] ±3.15–3.25 kHz |
| (Narrow)                                      | 6                    | • CH. : 1-12<br>• Transmitting  |  | [MOD (Narrow)] ±2.05–2.15 kHz |
| <b>CTCSS/DTCSS DEVIATION</b><br>-Preparation- | 1                    | –   | • Set the item [TX Mode] to "3."   | [TX Mode] "3"                 |
| -Adjust-                                      | 2                    | • CH. : 1-19<br>• Transmitting  | 1) Adjust the deviation using [←] / [→] keys of the PC's keyboard.<br>2) Push the [ENTER] key to store the adjust value. | [CTCSS] ±0.68–0.72 kHz        |

### 6-4 RECEIVE ADJUSTMENT

1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT   | ADJUSTMENT CONDITION | OPERATION                                     | ADJUSTMENT ITEM/POINT  | VALUE                  |
|--|----------------------|---|--|------------------------|
| <b>RECEIVE SENSITIVITY</b><br>-Preparation-          | 1                    | –   | • Set the item [RX Mode] to "1."   | [RX Mode] "1"          |
|  | 2                    | • Connect an SSG to the RX antenna connector. | • Set the SSG as;<br>Frequency : 400.100 MHz [UR-FR6000]<br>450.100 MHz [UR-FR6100]<br>Level : +20 dB $\mu$<br>Modulation : 1 kHz<br>Deviation : 3.5 kHz | – –                    |
| -Adjust-<br>(Band center)<br>For [Low band] version  | 3                    | • CH. : 1-20<br>• Receiving                   | 1) Set the item [BPFT1 C] to "10."<br>2) Select the item [BPF T2 C], then push the [ENTER] key.  | [BPFT1 C] "10"         |
| -Adjust-<br>(Band center)<br>For [High band] version |                      |   | [BPF T2 C]   | (Automatic adjustment) |
| (Band high)  | 4                    | • CH. : 1-21<br>• Receiving                   | • Select the item [BPF C ALL], then push the [ENTER] key.  |                        |
|  |                      |   | • Select the item [BPF H ALL], then push the [ENTER] key.  | [BPF H ALL]            |

**6-4 RECEIVE ADJUSTMENT (continued)**

1) Select an adjustment item using cursor or [↑] / [↓] keys of the PC's keyboard.

2) Set or modify the adjustment value as specified using [←] / [→] keys of the PC's keyboard, then push the [ENTER] key.

| ADJUSTMENT                             | ADJUSTMENT CONDITION  | OPERATION   | ADJUSTMENT ITEM/POINT   | VALUE                  |                        |
|--|---|---|---|------------------------|------------------------|
| <b>S-METER</b><br><b>-Preparation-</b> | <b>NOTE:</b> "RECEIVE SENSITIVITY" MUST be adjusted before "S-METER." When "RECEIVE SENSITIVITY" is re-adjusted, "S-METER" MUST be re-adjusted too. |   |   |                        |                        |
|  | 1   | <ul style="list-style-type: none"> <li>• Connect an SSG to the RX antenna connector.</li> </ul> | <ul style="list-style-type: none"> <li>• Set the SSG as;<br/>                     Frequency : 400.100 MHz [Low band]<br/>                     450.100 MHz [High band]<br/>                     Modulation : 1 kHz<br/>                     Deviation : 3.5 kHz</li> </ul>   | -                      | -                      |
| <b>-Adjust-</b><br><b>(S3 level)</b>   | 2   | <ul style="list-style-type: none"> <li>• CH. : 1-22</li> <li>• Receiving</li> </ul>             | 1) Set the SSG as;<br>Level : +23 dB $\mu$<br>2) Select the item <b>[RSSI S3 Level]</b> , then push the [ENTER] key to store the adjust value.  | <b>[RSSI S3 Level]</b> | (Automatic adjustment) |
| <b>(S1 level)</b>                      | 3   | <ul style="list-style-type: none"> <li>• CH. : 1-22</li> <li>• Receiving</li> </ul>             | 1) Set the SSG as;<br>Level : -7 dB $\mu$<br>2) Select the item <b>[RSSI S1 Level]</b> , then push the [ENTER] key, to store the adjust value.  | <b>[RSSI S1 Level]</b> | (Automatic adjustment) |
| <b>SQUELCH</b><br><b>-Preparation-</b> | 1   | -   | <ul style="list-style-type: none"> <li>• Set the item <b>[SQL Level]</b> to "2."</li> </ul>   | <b>[SQL Level]</b>     | "2"                    |
|  | 2   | <ul style="list-style-type: none"> <li>• Connect an SSG to the RX antenna connector.</li> </ul> | <ul style="list-style-type: none"> <li>• Set the SSG as;<br/>                     Frequency : 400.100 MHz [Low band]<br/>                     450.100 MHz [High band]<br/>                     Modulation : 1 kHz<br/>                     Deviation : 3.5 kHz<br/>                     Level : -14 dB<math>\mu</math></li> </ul> | -                      | -                      |
| <b>-Adjust-</b>                        | 2   | <ul style="list-style-type: none"> <li>• CH. : 1-23</li> <li>• Receiving</li> </ul>             | 1) Decrease the adjustment value <b>[SQL]</b> to close the squelch once, then increase the value to open the squelch.<br>2) Select the item <b>[SQL]</b> , then push the [ENTER] key to store the adjust value.   | <b>[SQL]</b>           | (Automatic adjustment) |















**[MAIN UNIT]**

| REF NO. | ORDER NO.  | DESCRIPTION                | M. | H/V LOCATION |
|---------|------------|----------------------------|----|--------------|
| DS1     | 5040002961 | S.LED SML-A12MT T86J       | B  | 96/1.1       |
| DS2     | 5040002961 | S.LED SML-A12MT T86J       | B  | 126/1.1      |
| DS3     | 5040003000 | S.LED SML-A12UT-T86        | B  | 111/1.1      |
| MF1     | 2710000870 | FAN AFB0512HB-7X22 <USE>HK |    |              |
| W1      | 7120000470 | JMP ERDS2T0                |    |              |
| W2      | 7120000470 | JMP ERDS2T0                |    |              |
| W4      | 8900017520 | CBL OPC-1783               |    |              |
| EP1     | 6910015370 | S.BEA ACZ1005Y-102-T       | B  | 129.1/48.4   |
| EP2     | 6910015370 | S.BEA ACZ1005Y-102-T       | B  | 117.2/48.4   |
| EP3     | 6910015370 | S.BEA ACZ1005Y-102-T       | B  | 32.4/81.6    |
| EP4     | 6910016330 | S.BEA MMZ1005S 601CT-S     | B  | 30.4/60.5    |
| EP5     | 6910015370 | S.BEA ACZ1005Y-102-T       | B  | 39/74.5      |
| EP6     | 6910015370 | S.BEA ACZ1005Y-102-T       | B  | 37.8/109     |
| EP7     | 6910016330 | S.BEA MMZ1005S 601CT-S     | B  | 40.7/36.7    |
| EP8     | 6910015370 | S.BEA ACZ1005Y-102-T       | B  | 94.5/48.8    |
| EP9     | 6910016330 | S.BEA MMZ1005S 601CT-S     | T  | 48.8/39.3    |
| EP10    | 6910011560 | BEA HF70BB4.5X5X1.6        |    |              |
| EP11    | 6910010280 | BEA HF70BB9.5X10.4X4.9     |    |              |
| EP12    | 6910010280 | BEA HF70BB9.5X10.4X4.9     |    |              |
| EP13    | 6910011330 | TER OT-009 M3              |    |              |
| EP14    | 6910011330 | TER OT-009 M3              |    |              |

**[CONNECT UNIT]**

| REF NO. | ORDER NO.  | DESCRIPTION                       | M. | H/V LOCATION |
|---------|------------|-----------------------------------|----|--------------|
| C601    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 13.8/12.4    |
| C602    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 12.2/12.4    |
| C603    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 16.5/12.4    |
| C604    | 4030017400 | S.CER ECJ0EC1H220J                | T  | 15/14.2      |
| C605    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 17.8/13.9    |
| C606    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 19.4/12.4    |
| C607    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 20.5/13.9    |
| C608    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 22.6/12.4    |
| C609    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 25.5/12.4    |
| C610    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 29.7/12.8    |
| C611    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 31/14.1      |
| C612    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 32.4/12.8    |
| C613    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 33.5/14.1    |
| C614    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.2/14.1    |
| C615    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 35.7/12.8    |
| C616    | 4030017420 | S.CER ECJ0EC1H470J                | B  | 35.2/15.6    |
| C617    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 37.5/13.5    |
| C618    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.3/12.2    |
| C619    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 39.9/13.4    |
| C620    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 41.3/12.6    |
| C621    | 4030017420 | S.CER ECJ0EC1H470J                | T  | 27.4/13.9    |
| J601    | 6510026290 | S.CNR IMSA-9631S-28Y921           | B  | 22.8/16.2    |
| J602    | 6510023210 | CNR CD6125SA1J0 <CVI>             |    |              |
| S1      | 2260003070 | S.SW MINISMDC150F/24-2            | B  | 38.9/18      |
| W601    | 8900017500 | CBL OPC-1852 (P0.5,N28,L90) <TJM> |    |              |

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

# SECTION 8

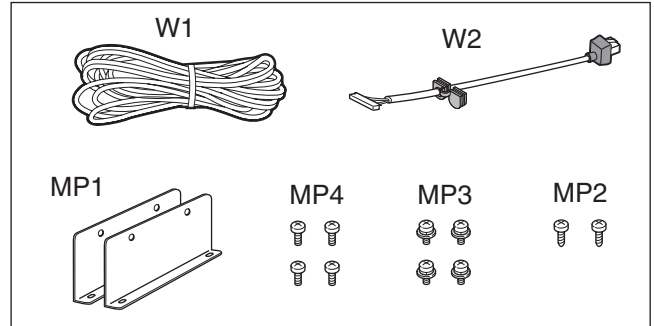
# MECHANICAL PARTS

## [MAIN UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION                 | QTY. |
|---------|------------|-----------------------------|------|
| J1*     | 6510025220 | AXK540145J                  | 1    |
| J2*     | 6510023091 | 20FLT-SM2-TB (LF) (SN)      | 1    |
| J4*     | 6510023511 | 28FLT-SM2-TB (LF) (SN)      | 1    |
| J5      | 6510023110 | 3008L-8P8C                  | 1    |
| J6      | 6450000140 | HSJ0807-01-010              | 1    |
| J8*     | 6510023091 | 20FLT-SM2-TB (LF) (SN)      | 1    |
| J9*     | 6510019371 | B3B-ZR-SM4-TF (LF) (SN)     | 1    |
| J10     | 6510004910 | NR-DSE-01                   | 1    |
| J11     | 6510004910 | NR-DSE-01                   | 1    |
| MF1     | 2710000870 | AFB0512HB-F00               | 1    |
| W1      | 7120000470 | ERDS2T0                     | 1    |
| W2      | 7120000470 | ERDS2T0                     | 1    |
| W4      | 8900017520 | OPC-1783                    | 1    |
| EP10*   | 6910011560 | HF70BB4.5X5X1.6             | 2    |
| EP11*   | 6910010280 | HF70BB9.5X10.4X4.9          | 1    |
| EP12*   | 6910010280 | HF70BB9.5X10.4X4.9          | 1    |
| EP13    | 6910011330 | OT-009 M3                   | 1    |
| EP14    | 6910011330 | OT-009 M3                   | 1    |
| MP1     | 8510018070 | 2979 VCO CASE               | 1    |
| MP2     | 8510018060 | 2979 VCO COVER              | 1    |
| MP3     | 8510018070 | 2979 VCO CASE               | 1    |
| MP4     | 8510018060 | 2979 VCO COVER              | 1    |
| MP5     | 8210024440 | 3063 SUB M-PANEL            | 1    |
| MP6     | 8310070880 | 3063 S-LED PLATE            | 1    |
| MP7     | 8930073920 | 3063 SP COVER               | 1    |
| MP8     | 8010020980 | 3063 CHASSIS                | 1    |
| MP9     | 8110009360 | 3063 SU-COVER               | 1    |
| MP10    | 8110009370 | 3063 SL-COVER               | 1    |
| MP11    | 8930074300 | 3063 PC PLATE               | 1    |
| MP12    | 8930074180 | O-RING (BR)                 | 1    |
| MP13    | 8930075020 | 3063 B-PACKING              | 1    |
| MP14    | 8930075030 | 3063 C-PACKING              | 1    |
| MP15    | 8930073930 | 3063 SP RUBBER              | 1    |
| MP16    | 8930058990 | SHIELD SPONGE (V)           | 1    |
| MP17    | 8930062160 | HIMELON SHEET (CL)          | 1    |
| MP18    | 8930070921 | 2979 D-SUB PLATE-1          | 1    |
| MP19    | 8930058990 | SHIELD SPONGE (V)           | 1    |
| MP20*   | 8510015660 | 2681 F-SHIELD PLATE         | 1    |
| MP21    | 8930048550 | 2177 CLIP                   | 1    |
| MP23    | 8930075080 | DUST CAP HR25F              | 1    |
| MP24    | 8810009611 | SCREW M2.6X6 ZK3            | 8    |
| MP25    | 8810009611 | SCREW M2.6X6 ZK3            | 9    |
| MP26    | 8810010780 | SCREW BT B0 3X20NI-ZK3 (BT) | 4    |
| MP27    | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 19   |
| MP28    | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 2    |
| MP29    | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 1    |
| MP30    | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 2    |
| MP31    | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 3    |
| MP32    | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 4    |
| MP33*   | 8510018780 | 3063 ANT CASE               | 2    |
| MP35    | 8810003361 | SETSCREW (C) 3X6 ZC3        | 2    |
| MP37    | 8510018790 | 3063 VCO SHIELD             | 1    |
| MP38*   | 8510018820 | 3063 SHIELD PLATE           | 1    |

## [ACCESSORIES]

| REF NO. | ORDER NO.  | DESCRIPTION                 | QTY. |
|---------|------------|-----------------------------|------|
| W1      | 8900017530 | OPC-1784                    | 1    |
| W2      | 8900017540 | OPC-1785                    | 1    |
| MP1     | 8930073980 | 3063 ANGLE                  | 2    |
| MP2     | 8810008661 | SCREW BT B0 3X8 NI-ZC3 (BT) | 2    |
| MP3     | 8810003361 | SETSCREW (C) 3X6 ZC3        | 4    |
| MP4     | 8810008451 | SCREW BiH M4X8 ZK3          | 4    |



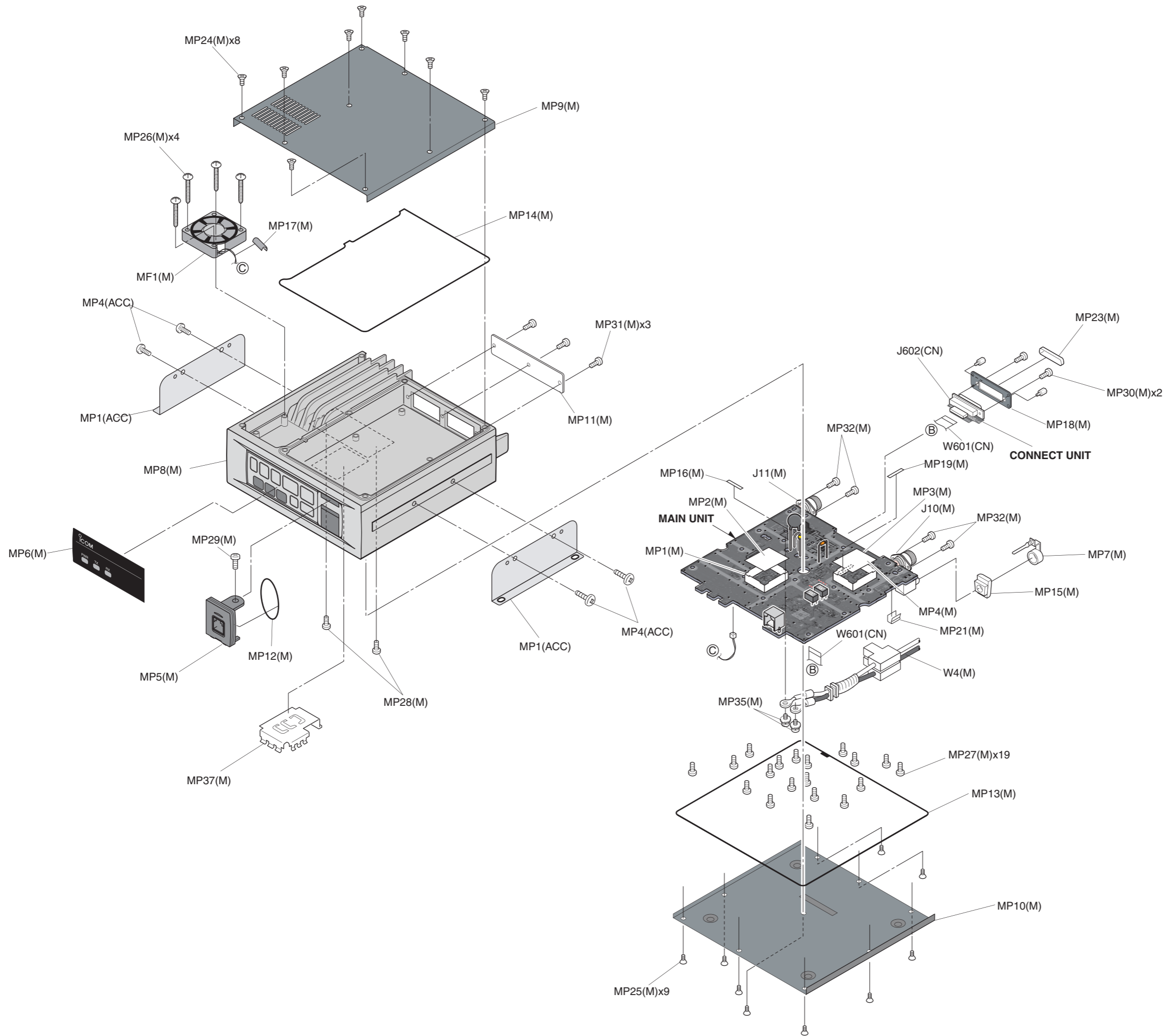
## [CONNECT UNIT]

| REF NO. | ORDER NO.  | DESCRIPTION       | QTY. |
|---------|------------|-------------------|------|
| J601*   | 6510026290 | IMSA-9631S-28Y921 | 1    |
| J602    | 6510023210 | CD6125SA1J0       | 1    |
| S1*     | 2260003070 | MINISMDC150F/24   | 1    |
| W601    | 8900017500 | OPC-1852          | 1    |

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

**Screw abbreviations** A, B0, BT: Self-tapping PH: Pan head ZK: Black NI-ZU: Nickel-Zinc SUS: Stainless



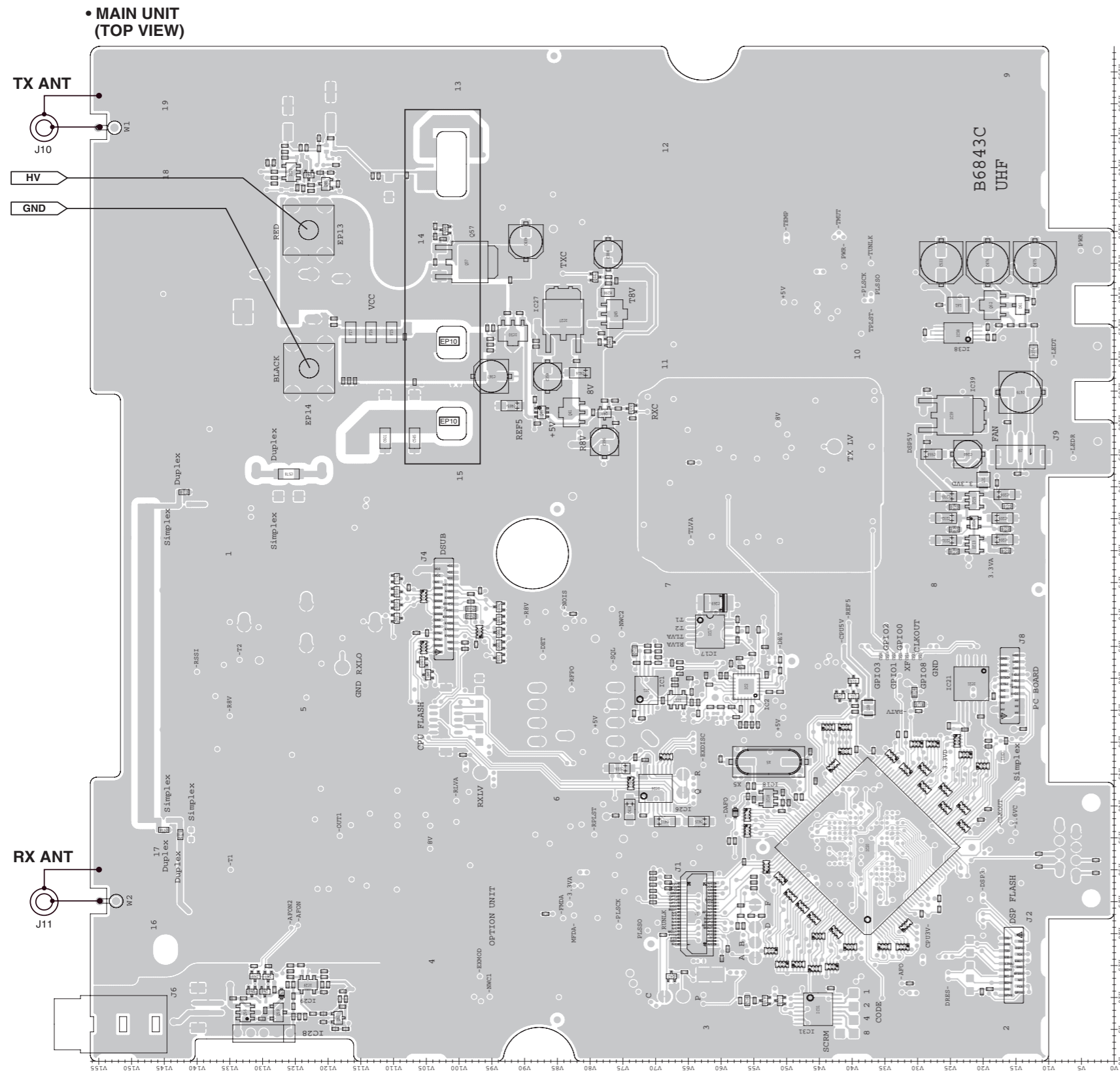


**Unit abbreviations;**  
 (C) : CHASSIS PARTS  
 (F) : FRONT UNIT  
 (M) : MAIN UNIT  
 (CN) : CONNECTOR UNIT  
 (ACC) : ACCESSORY

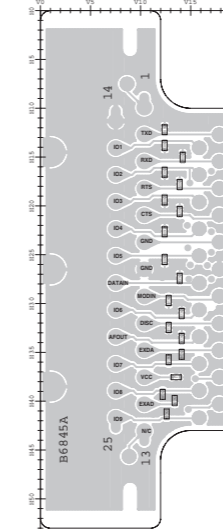
# SECTION 9

# BOARD LAYOUTS

The combination of this side and the bottom side shows the board layout in the same configuration as the actual P.C.Board.



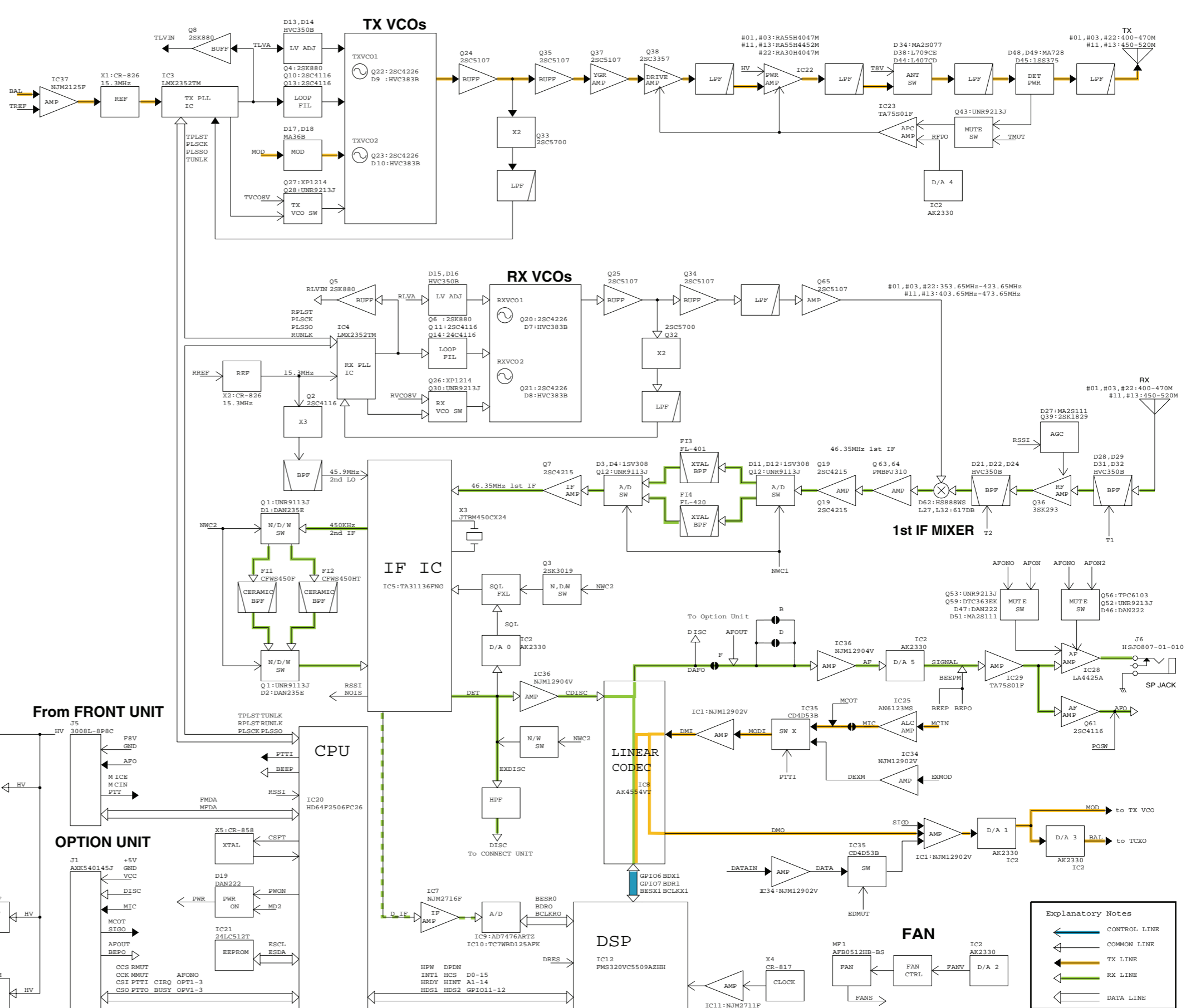
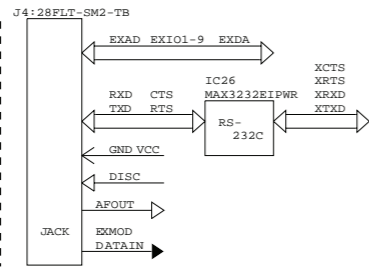
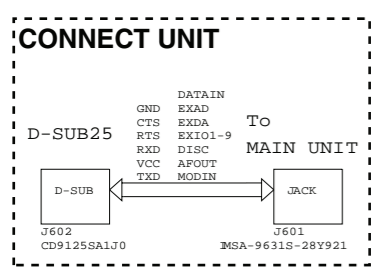
• CONNECT UNIT (TOP VIEW)



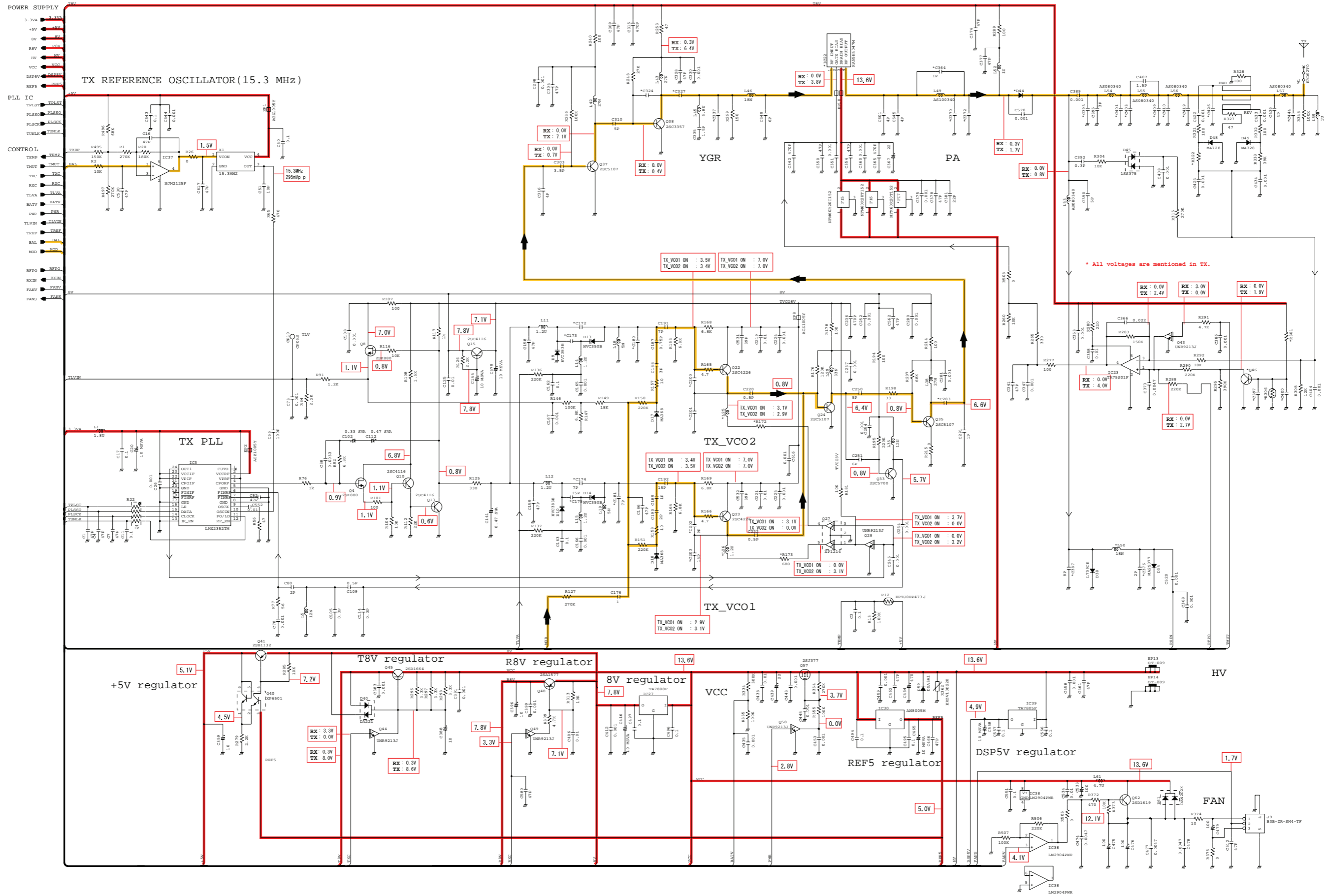


# SECTION 10

# BLOCK DIAGRAM



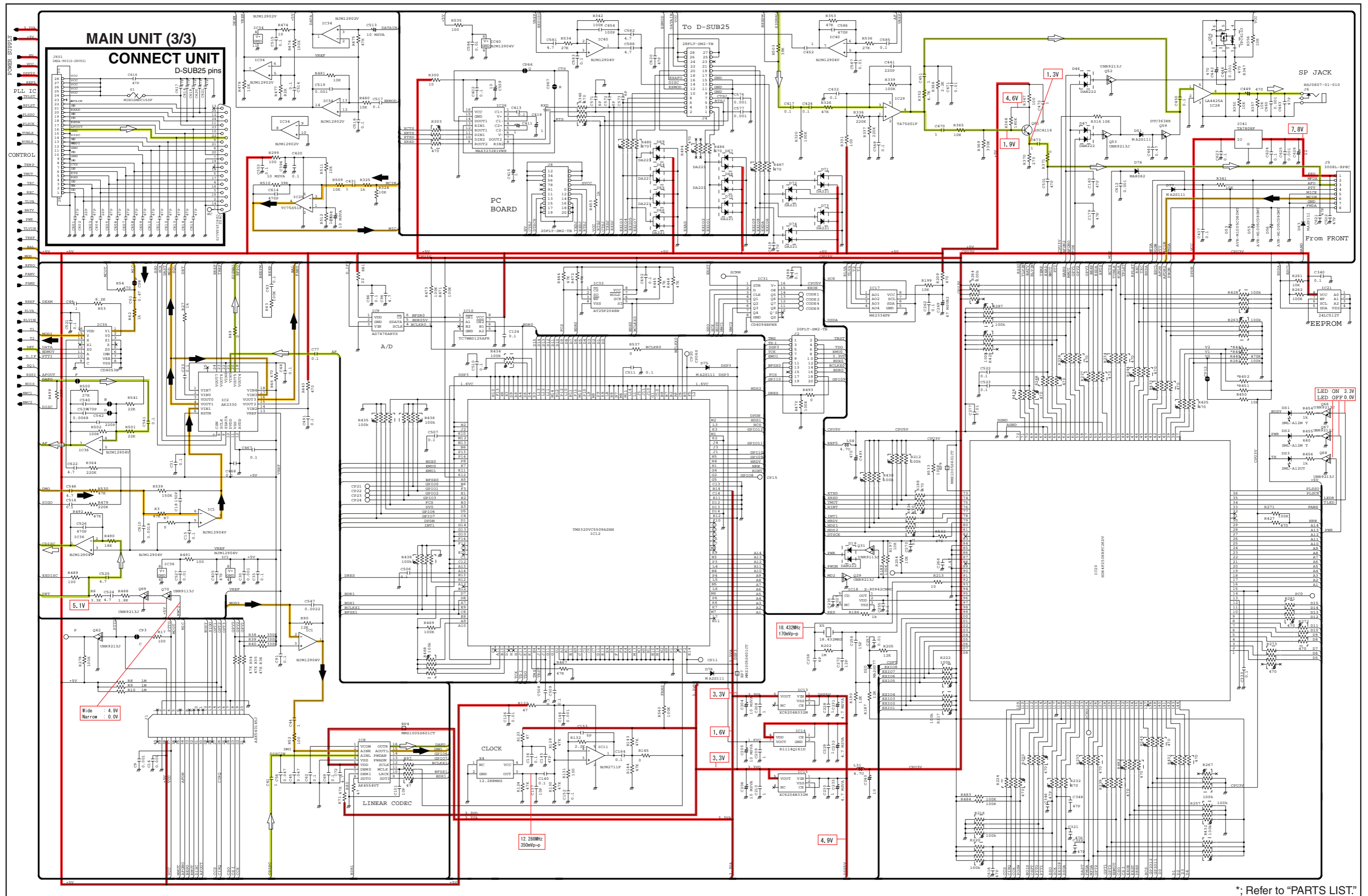
MAIN UNIT (1/3)



\* All voltages are mentioned in TX.

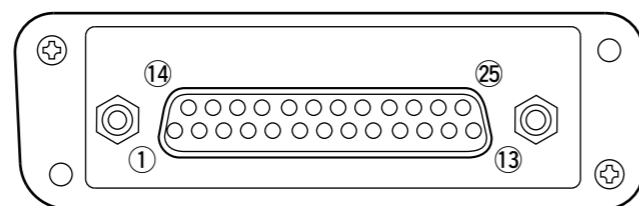
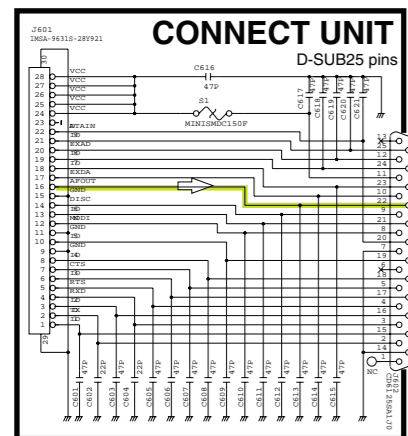
\*; Refer to "PARTS LIST."





\*; Refer to "PARTS LIST"

• ACCESSORY CONNECTOR (CONNECT UNIT) INFORMATION



| Pin No. | Pin Name  | Description  | Specification                 |
|---------|-----------|--|-------------------------------|
| 1       | NC        | No connection  | —                             |
| 2       | TXD       | Output terminal for serial communication data.   | —                             |
| 3       | RXD       | Input terminal for serial communication data.  | —                             |
| 4       | RTS       | Output terminal for request-to-send data.  | —                             |
| 5       | CTS       | Input terminal for clear-to-send data.   | —                             |
| 6       | NC        | No connection  | —                             |
| 7       | GND       | Serial/digital signal ground   | —                             |
| 8       | MOD IN    | Modulator input from an external terminal unit.  | Input level: 300 mV rms       |
| 9       | DISC OUT  | Output terminal for AF signals from the AF detector circuit.<br>Output level is fixed, regardless of [AF] control. | Output level: 300 mV rms      |
| 10      | EXT. D/A  | The desired function can be assigned.*<br>(Default: Null)  | —                             |
| 11      | VCC       | 13.6 V DC output   | Output current: Less than 1 A |
| 12      | EXT. A/D  | Customize A/D input (Not used)   | —                             |
| 13      | NC        | No connection  | —                             |
| 14      | GND       | Ground   | —                             |
| 15      | EXT./O 15 | The desired function can be assigned.*<br>(Default: Null)  | +5 V pull up, Active=L        |
| 16      | EXT./O 16 | The desired function can be assigned.*<br>(Default: P0 Monitor Output)   | +5 V pull up, Active=L        |
| 17      | EXT./O 17 | The desired function can be assigned.*<br>(Default: Busy Output)   | +5 V pull up, Active=L        |
| 18      | EXT./O 18 | The desired function can be assigned.*<br>(Default: Null)  | +5 V pull up, Active=L        |
| 19      | EXT./O 19 | The desired function can be assigned.*<br>(Default: EPTT Input)  | +5 V pull up, Active=L        |
| 20      | DATA IN   | Input terminal for data.   | —                             |
| 21      | EXT./O 21 | The desired function can be assigned.*<br>(Default: Analog Audible Output)   | +5 V pull up, Active=L        |
| 22      | AF OUT    | The AF detector Output.  | —                             |
| 23      | EXT./O 23 | The desired function can be assigned.*<br>(Default: Mic Mute Output)   | +5 V pull up, Active=L        |
| 24      | EXT./O 24 | The desired function can be assigned.*<br>(Default: Null)  | +5 V pull up, Active=L        |
| 25      | EXT./O 25 | The desired function can be assigned.*<br>(Default: Mic Hanger Output)   | +5 V pull up, Active=L        |

\* The desired function can be assigned using the optional CS-FR5000 CLONING SOFTWARE. Ask your dealer for details.



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