# Service Manual

# WR-2

## FM RDS/AM PLL SYNTHESIZED RECEIVER

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# SPECIFICATION
# FM. ELECTRICAL PERFORMANCE

| Model: WR-2(CE) | Brand: SANGEAN | | Temp: 25 ℃ | R. H. : 75 % | | Date:2005/5/20 | | |
|---|---|---|---|---|---|---|---|---|
| Test Item | Condition | | | Value | | Test No. | | Unit |
| | Input | Output | freq | Nom. | Lim. | 1. | 2. | |
| Tuning Range | | S/N=6dB | Min | 87.5 | ±0.1 | | | MHz |
| | | S/N=6dB | Max | 108 | ±0.1 | | | |
| Intermediate freq. | | S/N=6dB | | 10.7 | ±0.1 | | | MHz |
| Max. Sensitivity | | S/N=6dB | 90 | 6 | 12 | | | dBμ |
| | | | 98 | 6 | 12 | | | |
| | | | 106 | 6 | 12 | | | |
| Usable Sensitivity | | S/N=30dB | 90 | 12 | 22 | | | dBμ |
| | | | 98 | 12 | 22 | | | |
| | | | 106 | 12 | 22 | | | |
| Image Rejection | 127.4MHz | R.O. | 106 | 32 | 26 | | | dB |
| I.F. Rejection | 10.7MHz | S/N=6dB | 90MHz | 60 | 50 | | | dB |
| 3db Limiting(1mV) | | Rated output | 98MHz | 10 | 16 | | | dBμ |
| Min. output | 60dBμ | | 98MHz | 0.5 | 3 | | | mv |
| Auto Tuning Stop Sens. | | | 98MHz | 20 | 26 | | | dBμ |
| Current consumption | 60dBμ | | 98MHz | 320 | *400 | | | mA |
| Spurious rejection | 103.35MHz | | 98MHz | 90 | 50 | | | dB |
| S/N Ratio | 60dBμ | DIN Audio | 98MHz | 50 | 40 | | | dB |
| Am. suppression | 60dBμ | | 98MHz | 46 | 30 | | | dB |
| Mod 75kHz **Output Power 100Hz | Speaker8Ω | 10% THD | 98MHz | 7 | 6 | | | W |
| | Load 32Ω | | | 5+5 | 2+2 | | | mW |
| T.H.D. (45KHz dev.) | | R.O. | 98MHz | 0.2 | 1 | | | % |
| Over load capacity | | 10% THD | 98MHz | | >106 | | | dBμ |
| Audio Fidelity(1K=0dB) (W/Pre-emphasis)50uS 100/1K 10K/1K | VR=MAX | 100 | LOW | 8 | 6 | | | dB |
| | | 10K | HIGH | 8 | 6 | | | |
| | VR=5mW | 100 | LOW | 10 | 8 | | | dB |
| | | 10K | HIGH | 8 | 6 | | | |
| Supply Voltage: AC 230V/50Hz | R.O：50mW | Load: 8 Ohm | | Modulation: Dev.22.5kHz @400Hz | | | | |
| Remark: ( )首件產品 ( )客戶抽測 ( )成品 ( )例行抽測 ( )業務樣品 ( )半成品 ( )新機種 ( )工程變更 | | | | Approved by | | Released/Tested by | | |

* Current consumption at light on and position is max

# SPECIFICATION
# FM. ELECTRICAL PERFORMANCE

| Model: WR-2(USA) | Brand: SANGEAN | | Temp: 25 ℃ | R. H. : 75 % | Date: 2005/5/20 | | | |
|---|---|---|---|---|---|---|---|---|
| Test Item | Condition | | | Value | | Test No. | | Unit |
| | Input | Output | freq | Nom. | Lim. | 1. | 2. | |
| Tuning Range | | S/N=6dB | Min | 87.5 | ±0.1 | | | MHz |
| | | S/N=6dB | Max | 108 | ±0.1 | | | |
| Intermediate freq. | | S/N=6dB | | 10.7 | ±0.1 | | | MHz |
| Max. Sensitivity | | S/N=6dB | 90 | 6 | 12 | | | dBμ |
| | | | 98 | 6 | 12 | | | |
| | | | 106 | 6 | 12 | | | |
| Usable Sensitivity | | S/N=30dB | 90 | 12 | 22 | | | dBμ |
| | | | 98 | 12 | 22 | | | |
| | | | 106 | 12 | 22 | | | |
| Image Rejection | 127.4MHz | R.O. | 106 | 32 | 26 | | | dB |
| I.F. Rejection | 10.7MHz | S/N=6dB | 90MHz | 60 | 50 | | | dB |
| 3db Limiting(1mV) | | Rated output | 98MHz | 10 | 16 | | | dBμ |
| Min. output | 60dBμ | | 98MHz | 0.5 | 3 | | | mv |
| Auto Tuning Stop Sens. | | | 98.1MHz | 20 | 26 | | | dBμ |
| Current consumption | 60dBμ | | 98MHz | 320 | *400 | | | mA |
| Spurious rejection | 103.35MHz | | 98MHz | 90 | 50 | | | dB |
| S/N Ratio | 60dBμ | DIN Audio | 98MHz | 50 | 40 | | | dB |
| Am. suppression | 60dBμ | | 98MHz | 46 | 30 | | | dB |
| Mod 75kHz **Output Power 100Hz | Speaker8Ω | 10% THD | 98MHz | 7 | 6 | | | W |
| | Load 32Ω | | | 5+5 | 2+2 | | | mW |
| T.H.D. (45KHz dev.) | | R.O. | 98MHz | 0.2 | 1 | | | % |
| Over load capacity | | 10% THD | 98MHz | | >106 | | | dBμ |
| Audio Fidelity(1K=0dB) (W/Pre-emphasis)75uS 100/1K 10K/1K | VR=MAX | 100 | LOW | 7 | 5 | | | dB |
| | | 10K | HIGH | 8 | 6 | | | |
| | VR=5mW | 100 | LOW | 8 | 6 | | | dB |
| | | 10K | HIGH | 8 | 6 | | | |
| Supply Voltage: AC 120V/60Hz | R.O：50mW | Load: 8 Ohm | | Modulation: Dev.22.5kHz @400Hz | | | | |
| Remark: ( )首件產品 ( )客戶抽測 ( )成品 ( )例行抽測 ( )業務樣品 ( )半成品 ( )新機種 ( )工程變更 | | | | Approved by | | Released/Tested by | | |

# SPECIFICATION
# MW ELECTRICAL PERFORMANCE

| Model: WR-2(CE) | Brand: SANGEAN | | Temp: 25 ℃ | | R. H. : 75 % | | Date:2005/5/20 | | |
|---|---|---|---|---|---|---|---|---|---|
| Test Item | Condition | | | Value | | Test No. | | Unit |
| | Input | Output | Freq. | Nom. | Lim. | 1. | 2. | |
| Tuning Range | | S/N=6dB | Min. | 522 | ±1 | | | kHz |
| | | S/N=6dB | Max. | 1629 | ±1 | | | |
| Intermediate freq. | | S/N=6dB | | 450 | ±1 | | | kHz |
| Max. Sensitivity | | S/N=6dB | 603 kHz | 44 | 54 | | | dBμ/m |
| | | | 999 kHz | 42 | 54 | | | |
| | | | 1404kHz | 40 | 48 | | | |
| Usable Sensitivity | | S/N=20dB | 603 kHz | 54 | 60 | | | dBμ/m |
| | | | 999 kHz | 52 | 60 | | | |
| | | | 1404kHz | 48 | 56 | | | |
| Image Rejection | | S/N=6dB | 1404kHz | 36 | 30 | | | dB |
| I. F. Rejection (450KHz) | | S/N=6dB | 603 kHz | 60 | 50 | | | dB |
| Selectivity(±10KHz) | | S/N=6dB | 1404kHz | 26 | 20 | | | dB |
| Bandwidth(-6dB) | | S/N=6dB | 999kHz | 7 | +-3 | | | KHz |
| T. H. D. ( 5mV ) | | R.O | | 2 | 4 | | | % |
| Auto Tuning Stop Sens. | | | | 59 | 66 | | | dBμ/m |
| S/N Ratio | (RF 5mV) | | | | 32 | | | dB |
| Current Consumption | | R.O | | 320 | *400 | | | mA |
| Audio fidelity (-6dB) | 1K=0dB | | | | 100 | | | Hz |
| | | | | | 2 | | | KHz |
| **Output power Mod 80% at 100Hz | 94dBμ/m | 10%THD | | | 5 | | | W |
| Over Load Capacity | 80% | 10%THD | | 100 | >90 | | | dBμ/m |
| A. G. C. F. O. M. | 100dBμ/m | | | 50 | 40 | | | dB |
| Whistle Modulation(5mV/M) | 74dBμ/m | | 2IF/3IF | | <15 | | | % |
| Supply Voltage: AC 230 V/50Hz | R.O：50mW | Load: 8 Ohm | | Modulation: Dev.30% @400Hz | | | | |
| Remark:<br>( )首件產品 ( )客戶抽測<br>( )成品 ( )例行抽測 ( )業務樣品<br>( )半成品 ( )新機種 ( )工程變更 | | | | Approved by | | Released/Tested by | | |

# SPECIFICATION
# MW ELECTRICAL PERFORMANCE

| Model: WR-2(UK) | Brand: SANGEAN | Temp: 25 ℃ | R. H. : 75 % | Date:2005/5/20 |
|---|---|---|---|---|

| Test Item | Condition | | | Value | | Test No. | | Unit |
|---|---|---|---|---|---|---|---|---|
| | Input | Output | Freq. | Nom. | Lim. | 1. | 2. | |
| Tuning Range | | S/N=6dB | Min. | 522 | ±1 | | | kHz |
| | | S/N=6dB | Max. | 1629 | ±1 | | | kHz |
| Intermediate freq. | | S/N=6dB | | 450 | ±1 | | | kHz |
| Max. Sensitivity | | S/N=6dB | 603 kHz | 44 | 54 | | | dBμ/m |
| | | | 999 kHz | 42 | 54 | | | dBμ/m |
| | | | 1404kHz | 40 | 48 | | | dBμ/m |
| Usable Sensitivity | | S/N=20dB | 603 kHz | 54 | 60 | | | dBμ/m |
| | | | 999 kHz | 52 | 60 | | | dBμ/m |
| | | | 1404kHz | 48 | 56 | | | dBμ/m |
| Image Rejection | | S/N=6dB | 1404kHz | 36 | 30 | | | dB |
| I. F. Rejection (450KHz) | | S/N=6dB | 603 kHz | 55 | 40 | | | dB |
| Selectivity(±10KHz) | | S/N=6dB | 1404kHz | 26 | 20 | | | dB |
| Bandwidth(-6dB) | | S/N=6dB | 999kHz | 7 | +-3 | | | KHz |
| T. H. D. ( 5mV ) | | R.O | | 2 | 4 | | | % |
| Auto Tuning Stop Sens. | | | | 59 | 66 | | | dBμ/m |
| S/N Ratio | (RF 5mV) | | | | 32 | | | dB |
| Current Consumption | | R.O | | 320 | *400 | | | mA |
| Audio fidelity (-6dB) | 1K=0dB | | | | 100 | | | Hz |
| | | | | | 2 | | | KHz |
| **Output power Mod 80% at 100Hz | 94dBμ/m | 10%THD | | | 5 | | | W |
| Over Load Capacity | 80% | 10%THD | | 100 | >90 | | | dBμ/m |
| A. G. C. F. O. M. | 100dBμ/m | | | 50 | 40 | | | dB |
| Whistle Modulation(5mV/M) | 74dBμ/m | | 2IF/3IF | | <15 | | | % |

| Supply Voltage: AC 230 V/50Hz | R.O：50mW | Load: 8 Ohm | Modulation: Dev.30% @400Hz |
|---|---|---|---|

| Remark: | Approved by | Released/Tested by |
|---|---|---|
| ( )首件產品 ( )客戶抽測<br>( )成品 ( )例行抽測 ( )業務樣品<br>( )半成品 ( )新機種 ( )工程變更 | | |

# SPECIFICATION
# AUX-IN ELECTRICAL PERFORMANCE

| Model: WR-2(ALL) | Brand: ALL | Temp: 25 ℃ | R. H. : 75 % | Date: 2005/3/30 |
|---|---|---|---|---|

| Test Item | Condition | | | Value | | Test No. | | Unit |
|---|---|---|---|---|---|---|---|---|
| | Input | Output | Freq. | Nom. | Lim. | 1. | 2. | |
| Output Power | AUX IN=0.5V/100Hz THD=10% | | | 8 | 6 | | | W |
| AUX IN Dynamic Range | Output=R.0 (ATT=0) THD=1% AUX IN=100Hz | | | 3 | 1 | | | Vrms |
| I/S (Input Sensitivity) | AUX IX=100Hz, ATT=0 OUT=7W Volume=MAX | | | 180 | ±30 | | | mV |
| DISTORTION | AUX IN =I/S 1KHz OUT=R.O | | | 0.07 | 0.3 | | | % |
| MIN OUTPUT | AUX IN =I/S 1KHz Volume=MIN | | | 0.7 | 2 | | | mV |
| S/N RATIO | AUX IN =I/S 1KHz&GND OUT=R.O | | | 62 | 50 | | | dB |
| Frequency Response | AUX IN=0.5V/1KHz OUT=50mW=0dB | | 100 | 8 | 6 | | | dB |
| | | | 10K | 6 | 4 | | | |
| REC OUT LEVEL (REC OUT IMPD=47K) | AUX IN =I/S 1KHz | | | 230 | ±30 | | | mV |
| | FM DEV=22.5K@1KHz | | | 120 | ±30 | | | |
| AUX ATT | AUX=I/S 1KHz ATT0=0dB | | ATT1 | -3.5 | -3 | | | dB |
| | | | ATT2 | -7 | -6 | | | |
| | | | ATT3 | -10.5 | -9 | | | |
| BASS/TREBLE CONTROL | AUX_IN=I/S 1KHz Output=R.0=0dB BASS@100Hz Treble@10KHz | | BASS -7 ~ +7 | -10~+10 | -8~+8 | | | dB |

| Remark: | | Approved by | Released/Tested by |
|---|---|---|---|
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# SPECIFICATION
# MW ELECTRICAL PERFORMANCE

| Model: WR-2(USA) | Brand: SANGEAN | | Temp: 25 ℃ | | R. H. : 75 % | | Date: 2005/5/20 | | |
|---|---|---|---|---|---|---|---|---|---|
| Test Item | Condition | | | Value | | Test No. | | Unit |
| | Input | Output | Freq. | Nom. | Lim. | 1. | 2. | |
| Tuning Range | | S/N=6dB | Min. | 520 | ±1 | | | kHz |
| | | S/N=6dB | Max. | 1710 | ±1 | | | kHz |
| Intermediate freq. | | S/N=6dB | | 450 | ±1 | | | kHz |
| Max. Sensitivity | | S/N=6dB | 600 kHz | 44 | 54 | | | dBμ/m |
| | | | 1000 kHz | 42 | 54 | | | |
| | | | 1400kHz | 40 | 48 | | | |
| Usable Sensitivity | | S/N=20dB | 600 kHz | 54 | 60 | | | dBμ/m |
| | | | 1000 kHz | 52 | 60 | | | |
| | | | 1400kHz | 48 | 56 | | | |
| Image Rejection | | S/N=6dB | 1400kHz | 36 | 30 | | | dB |
| I. F. Rejection (450KHz) | | S/N=6dB | 600 kHz | 60 | 50 | | | dB |
| Selectivity(±10KHz) | | S/N=6dB | 1400kHz | 26 | 20 | | | dB |
| Bandwidth(-6dB) | | S/N=6dB | 1000kHz | 7 | +-3 | | | KHz |
| T. H. D. ( 5mV ) | | R.O | | 2 | 4 | | | % |
| Auto Tuning Stop Sens. | | | | 59 | 66 | | | dBμ/m |
| S/N Ratio | (RF 5mV) | | | | 32 | | | dB |
| Current Consumption | | R.O | | 320 | 400 | | | mA |
| Audio fidelity (-6dB) | 1K=0dB | | | | 100 | | | Hz |
| | | | | | 2 | | | KHz |
| **Output power Mod 80% at 100Hz | 94dBμ/m | 10%THD | | | 5 | | | W |
| Over Load Capacity | 80% | 10%THD | | 100 | >90 | | | dBμ/m |
| A. G. C. F. O. M. | 100dBμ/m | | | 50 | 40 | | | dB |
| Whistle Modulation(5mV/M) | 74dBμ/m | | 2IF/3IF | | <15 | | | % |
| EXT ANT Sens | | S/N=20dB | 1400kHz | 19 | 26 | | | dBμ/m |
| Supply Voltage: AC 120 V/60Hz | R.O：50mW | | Load: 8 Ohm | Modulation: Dev.30% @400Hz | | | | |
| Remark:<br>( )首件產品 ( )客戶抽測<br>( )成品 ( )例行抽測 ( )業務樣品<br>( )半成品 ( )新機種 ( )工程變更 | | | | Approved by | | Released/Tested by | | |

# SPECIFICATION
# LW ELECTRICAL PERFORMANCE

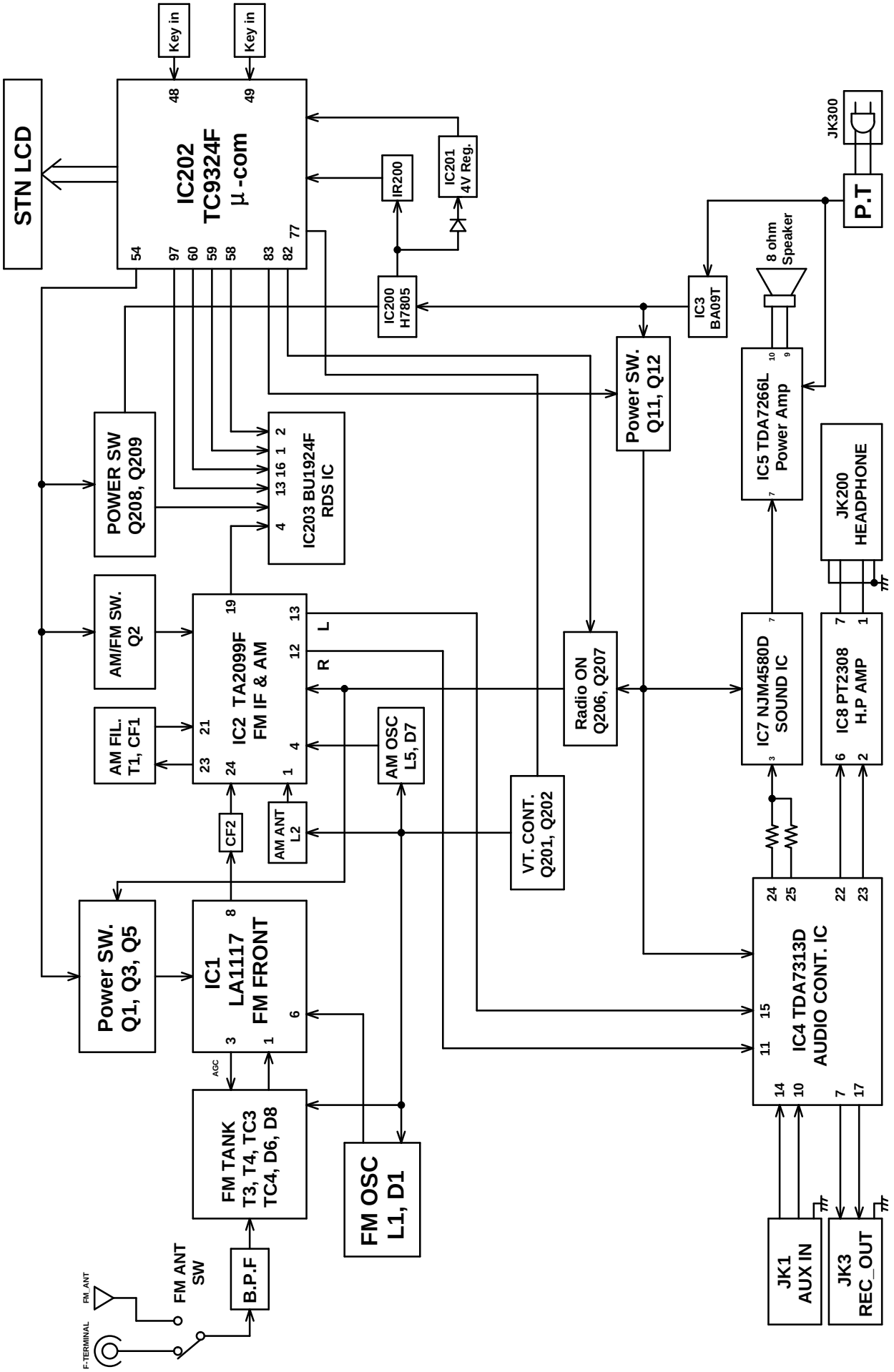
| Model: WR-2(UK) | Brand: ROBERTS | Temp: 25 ℃ | R. H. : 75 % | Date:2005/3/14 |
|---|---|---|---|---|

| Test Item | Condition | | | Value | | Test No. | | Unit |
|---|---|---|---|---|---|---|---|---|
| | Input | Output | Freq. | Nom. | Lim. | 1. | 2. | |
| Tuning Range | | S/N=6dB | Min. | 153 | ±3 | | | KHz |
| | | S/N=6dB | Max. | 279 | ±3 | | | KHz |
| Intermediate freq. | | S/N=6dB | Min | 450 | ±3 | | | KHz |
| Max. Sensitivity | | S/N=6dB | 162KHz | | 68 | | | dBμ/m |
| | | | 225KHz | | 66 | | | |
| | | | 270KHz | | 64 | | | |
| Usable Sensitivity | | S/N=20dB | 162KHz | 62 | 68 | | | dBμ/m |
| | | | 225KHz | 60 | 66 | | | |
| | | | 270KHz | 60 | 66 | | | |
| Image Rejection | | S/N=6dB | 270KHz | 30 | 24 | | | dB |
| I. F. Rejection | | S/N=6dB | 162KHz | 60 | 50 | | | dB |
| Selectivity(±10KHz) | | S/N=6dB | 270KHz | 26 | 20 | | | dB |
| Bandwidth (-6dB) | | S/N=6dB | 225KHz | 6 | 4-9 | | | KHz |
| T. H. D. | 100dB 30 % | | | 3 | 5 | | | % |
| S/N Ratio (5mV) | 74dBu/m | | | 32 | 26 | | | dB |
| **Output power Mod 80% | 94dBu/m | 10%T.H.D | | | 5 | | | W |

| Supply Voltage: AC 230 V | R.O：50mW | Load: 8 Ohm | Modulation: Dev.30% @400Hz |
|---|---|---|---|

| Remark: | Approved by | Released/Tested by |
|---|---|---|
| ( )首件產品 ( )客戶抽測<br>( )成品 ( )例行抽測 ( )業務樣品<br>( )半成品 ( )新機種 ( )工程變更 | | |

# BLOCK DIAGRAM



# ALIGNMENT INSTRUCTIONS

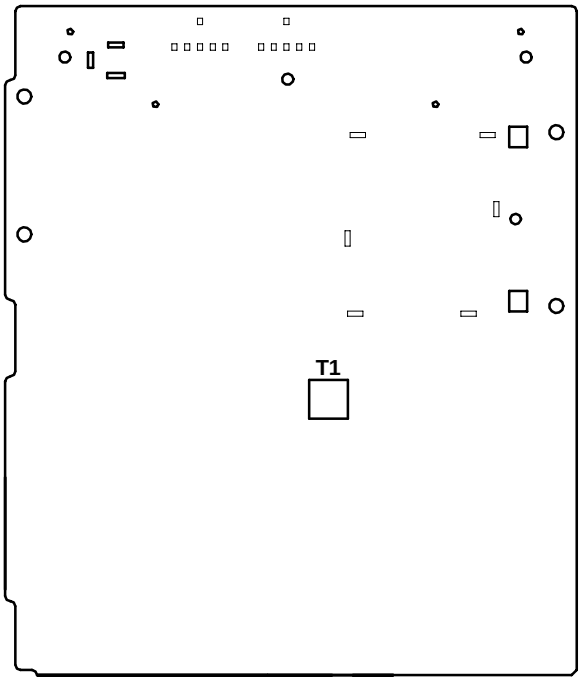
**1. ALIGNMENT FOR AM/LW IF**

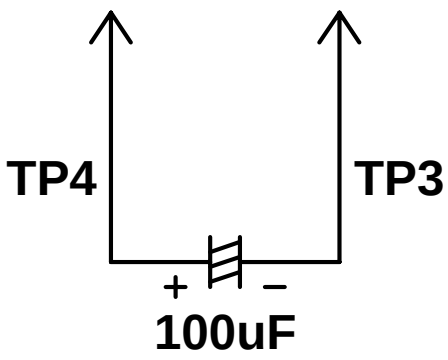
a. Required Instruments:
AM IF Sweep Generator with scope

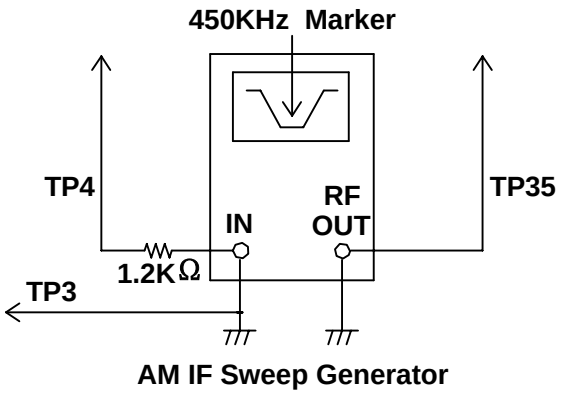
b. Alignment Procedure

| Mode | Adjustment | Procedure |
|---|---|---|
| AM | T1 | (1) Press the power button to turn on the radio.<br>(2) Connect the input terminal of AM IF sweep generator in series with a resistor of 1.2k ohm to the TP3 and TP4.<br>(3) Connect the RF output terminal of AM IF sweep generator to another test point TP35.<br>(4) Adjust T1 to have a max. output with a marker frequency of 450 kHz on the sweep scope. |

c. Instrument Connection



## 2. ALIGNMENT FOR AM/LW TUNING VOLTAGE RANGE

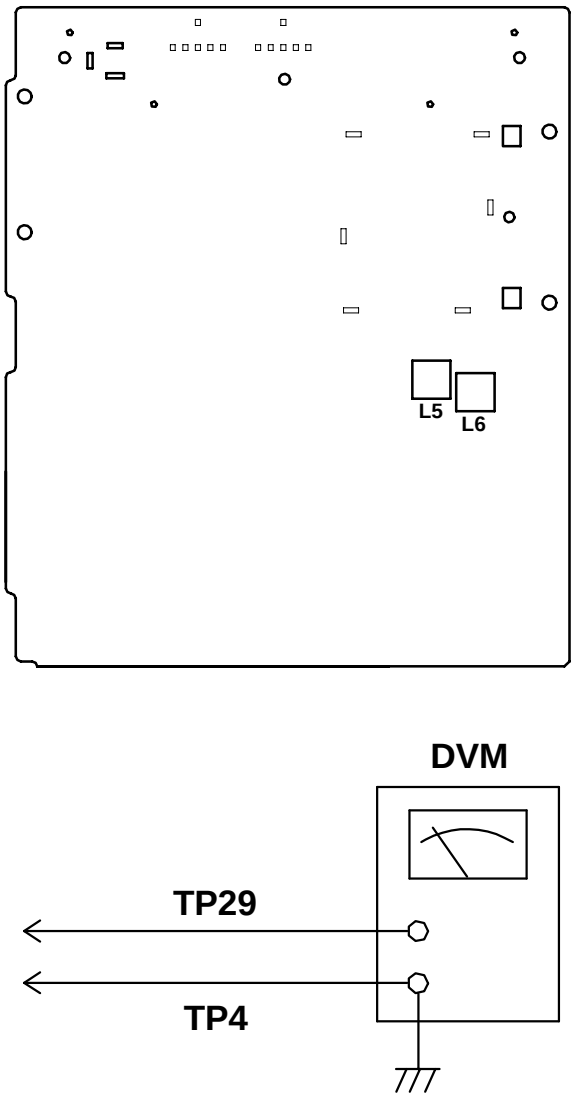
a. Required Instruments:
DVM

b. Alignment Procedure

| Mode | Adjustment | Procedure |
|---|---|---|
| AM | L5 | (1) Turn on the radio.<br>(2) Connect the probe of DVM to the test point TP29 and TP4.<br>(3) Tune the AM frequency to 522 kHz.<br>(4) Adjust L5 to have a reading of 1.2V ±0.04V. |

| Mode | Adjustment | Procedure |
|---|---|---|
| LW | L6 | (1) Turn on the radio.<br>(2) Connect the probe of DVM to the test point TP29 and TP4.<br>(3) Tune the LW frequency to 153 kHz.<br>(4) Adjust L6 to have a reading of 1.2V ±0.04V. |

c. Instrument Connection



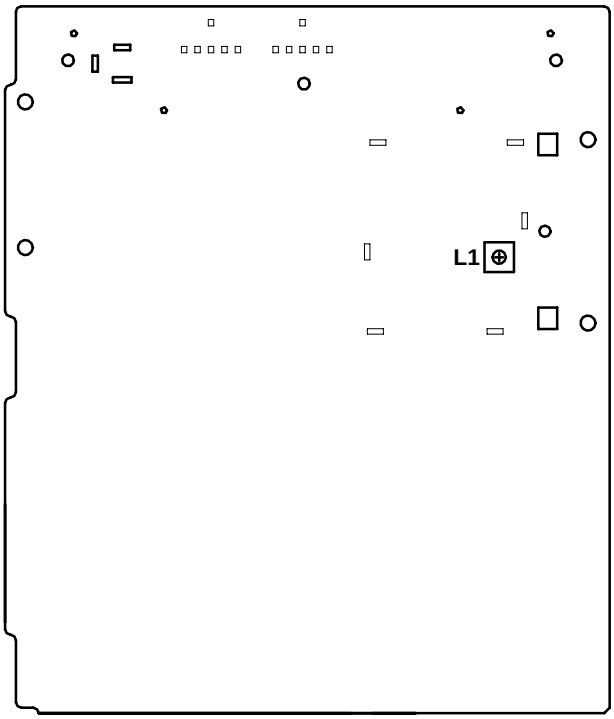
**3. ALIGNMENT FOR FM TUNING VOLTAGE**

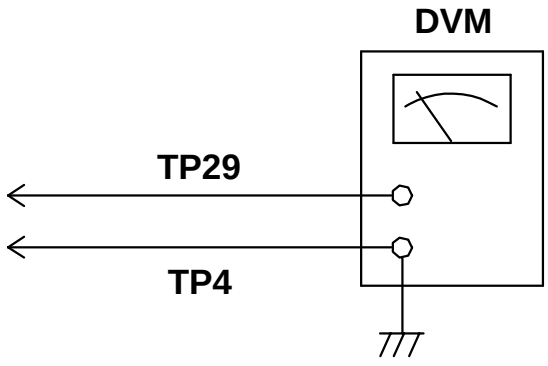
a. Required Instruments
DVM

b. Alignment Procedure

| Mode | Adjustment | Procedure |
|---|---|---|
| FM | L1 | (1) Turn on the radio.<br>(2) Connect the probe of DVM to the TP29 and TP4.<br>(3) Tune the FM frequency to 108MHz.<br>(4) Adjust L1 to have a reading of 7.2V ±0.3V. |

c. Instrument Connection



**WR-2L**
**4. ALIGNMENT FOR AM/LW SENSITIVITY**

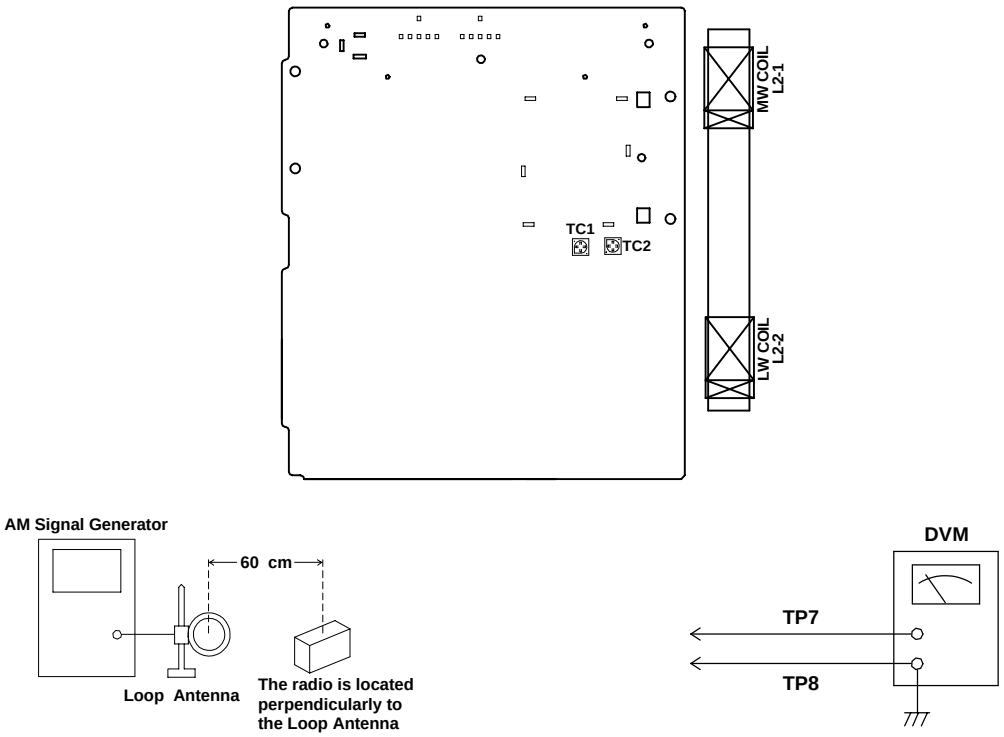
a. Required Instruments
AM Signal Generator
SSVM

b. Alignment Procedure

| Mode | Adjustment | Procedure |
|---|---|---|
| AM | TC1<br>L2-1 | (1) Turn on the radio.<br>(2) Connect a SSVM to the speaker TP7 and TP8 terminals.<br>(3) Connect an AM signal generator together with standard loop dummy antenna and feed 30% modulated signal to the AM ferrite bar antenna L2.<br>(4) Tune the generator frequency to 1404 kHz.<br>(5) Tune the AM frequency to 1404 kHz and adjust TC1 to have a max. reading on SSVM.<br>(6) Return the generator frequency to 603 kHz.<br>(7) Tune the AM frequency to 603 kHz and adjust L2-1 to have a max. reading on SSVM.<br>(8) Repeat (4) to (7) as necessary to minimize tracking error. |

| Mode | Adjustment | Procedure |
|---|---|---|
| LW | TC2<br>L2-2 | (1) Turn on the radio.<br>(2) Connect a SSVM to the speaker TP7 and TP8 terminals.<br>(3) Connect an AM signal generator together with standard loop dummy antenna and feed 30% modulated signal to the AM ferrite bar antenna L2.<br>(4) Tune the generator frequency to 270 kHz.<br>(5) Tune the AM frequency to 270 kHz and adjust TC2 to have a max. reading on SSVM.<br>(6) Return the generator frequency to 162 kHz.<br>(7) Tune the AM frequency to 162 kHz and adjust L2-2 to have a max. reading on SSVM.<br>(8) Repeat (4) to (7) as necessary to minimize tracking error. |

c. Instrument Connection



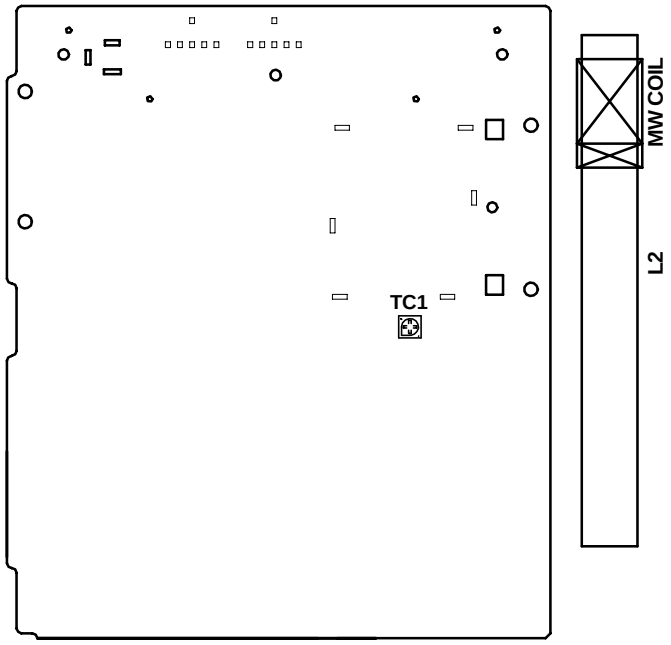
**WR-2**
**4-1. ALIGNMENT FOR AM SENSITIVITY**

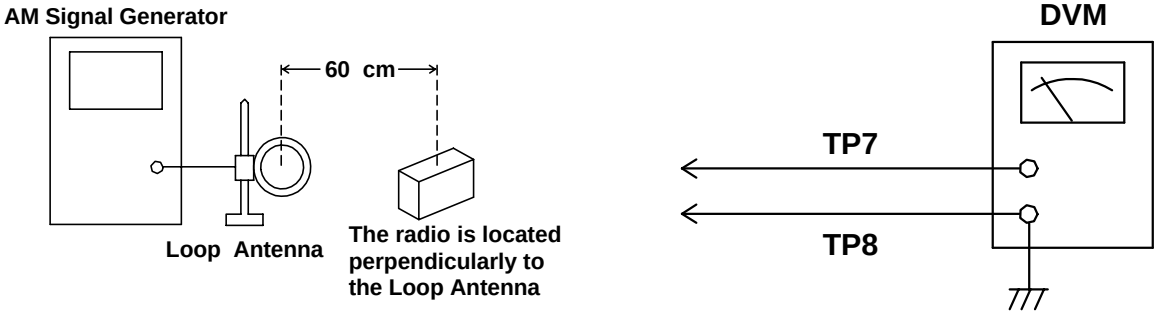
a. Required Instruments
AM Signal Generator
SSVM

b. Alignment Procedure

| Mode | Adjustment | Procedure |
|---|---|---|
| AM | TC1<br>L2 | (1) Turn on the radio.<br>(2) Connect a SSVM to the speaker TP7 and TP8 terminals.<br>(3) Connect an AM signal generator together with standard loop dummy antenna and feed 30% modulated signal to the AM ferrite bar antenna L2.<br>(4) Tune the generator frequency to 1404 kHz.<br>(5) Tune the AM frequency to 1404 kHz and adjust TC1 to have a max. reading on SSVM.<br>(6) Return the generator frequency to 603 kHz.<br>(7) Tune the AM frequency to 603 kHz and adjust L2 to have a max. reading on SSVM.<br>(8) Repeat (4) to (7) as necessary to minimize tracking error. |

c. Instrument Connection



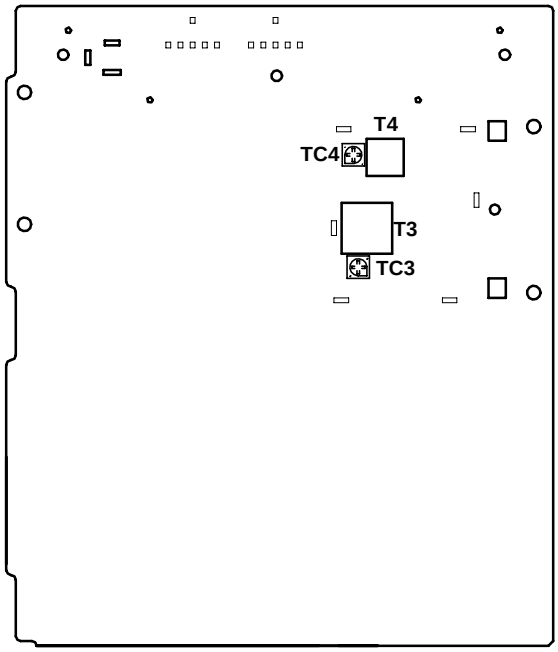
## 5. ALIGNMENT FOR FM TUNING SENSITIVITY

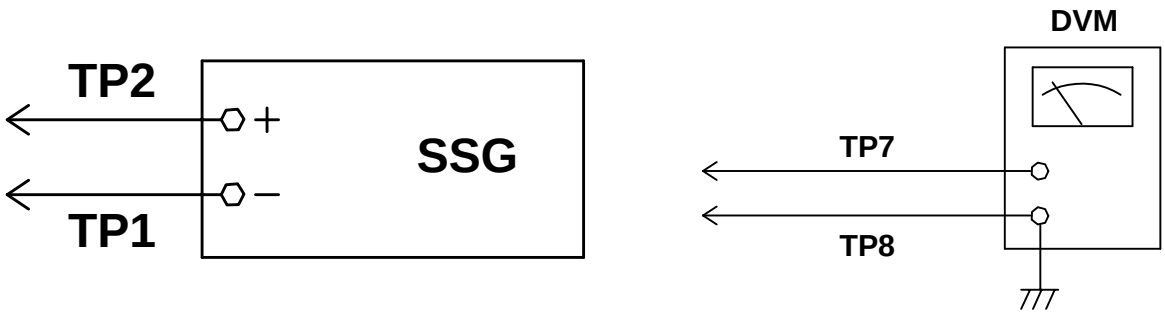
a. Required Instruments
FM Signal Generator
SSVM

b. Alignment Procedure

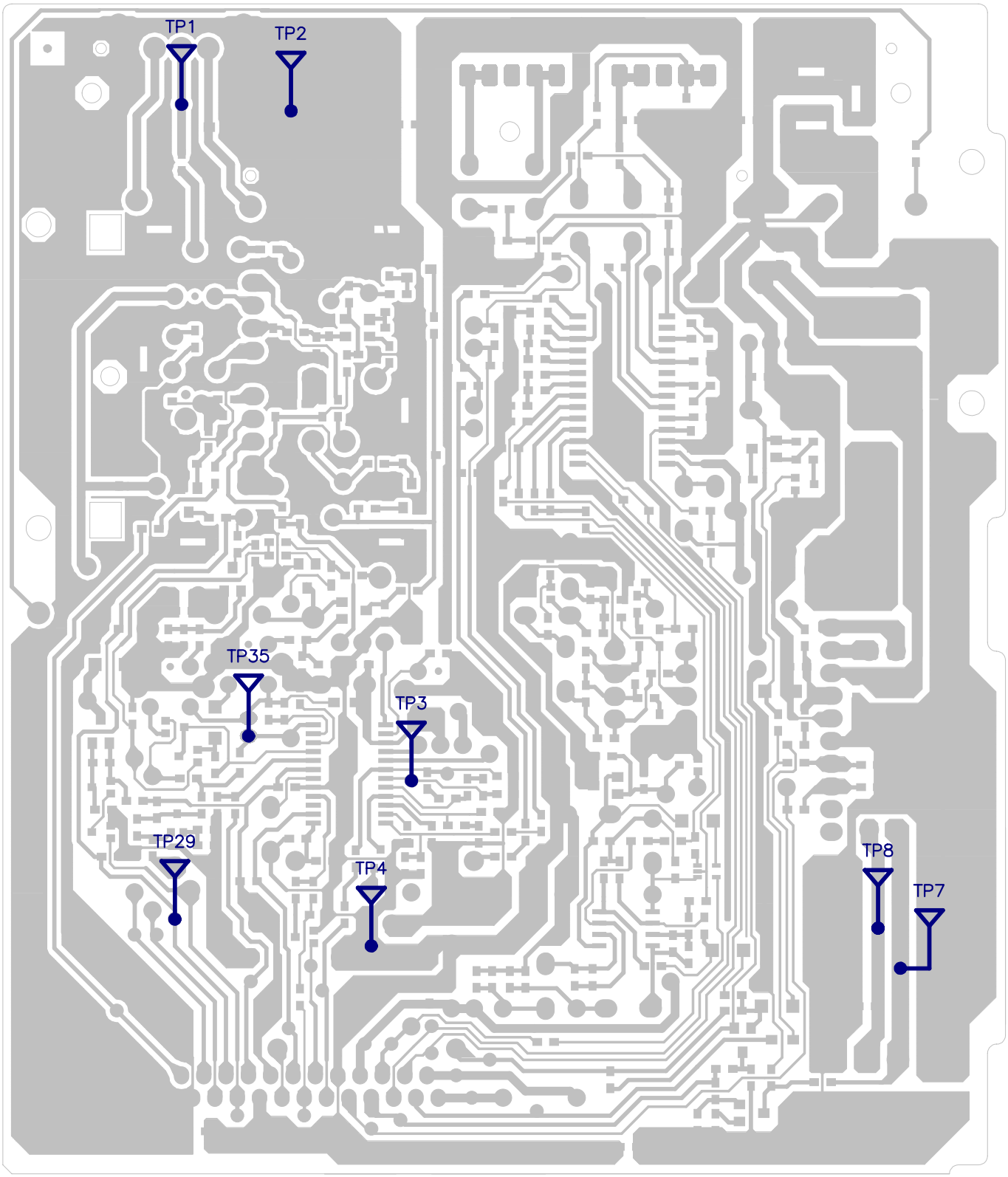
| Mode | Adjustment | Procedure |
|---|---|---|
| FM | T3<br>T4<br>TC3<br>TC4 | (1) Turn on radio.<br>(2) Connect a SSVM to speaker TP7 and TP8.<br>(3) Connect a FM signal generator to TP1 and TP2.<br>(4) Set the signal generator to 22.5 kHz deviation with 1 kHz modulation.<br>(5) Always tune the generator frequency to exactly same as the radio band frequency before adjustment.<br>(6) Tune the FM frequency to 106MHz and adjust TC3 & TC4 to have a max. audio output.<br>(7) Tune the FM frequency to 90MHz and adjust TC3 & TC4 to have a max. audio output.<br>(8) Repeat (6) to (7) as necessary to minimize tracking error. |

c. Instrument Connection

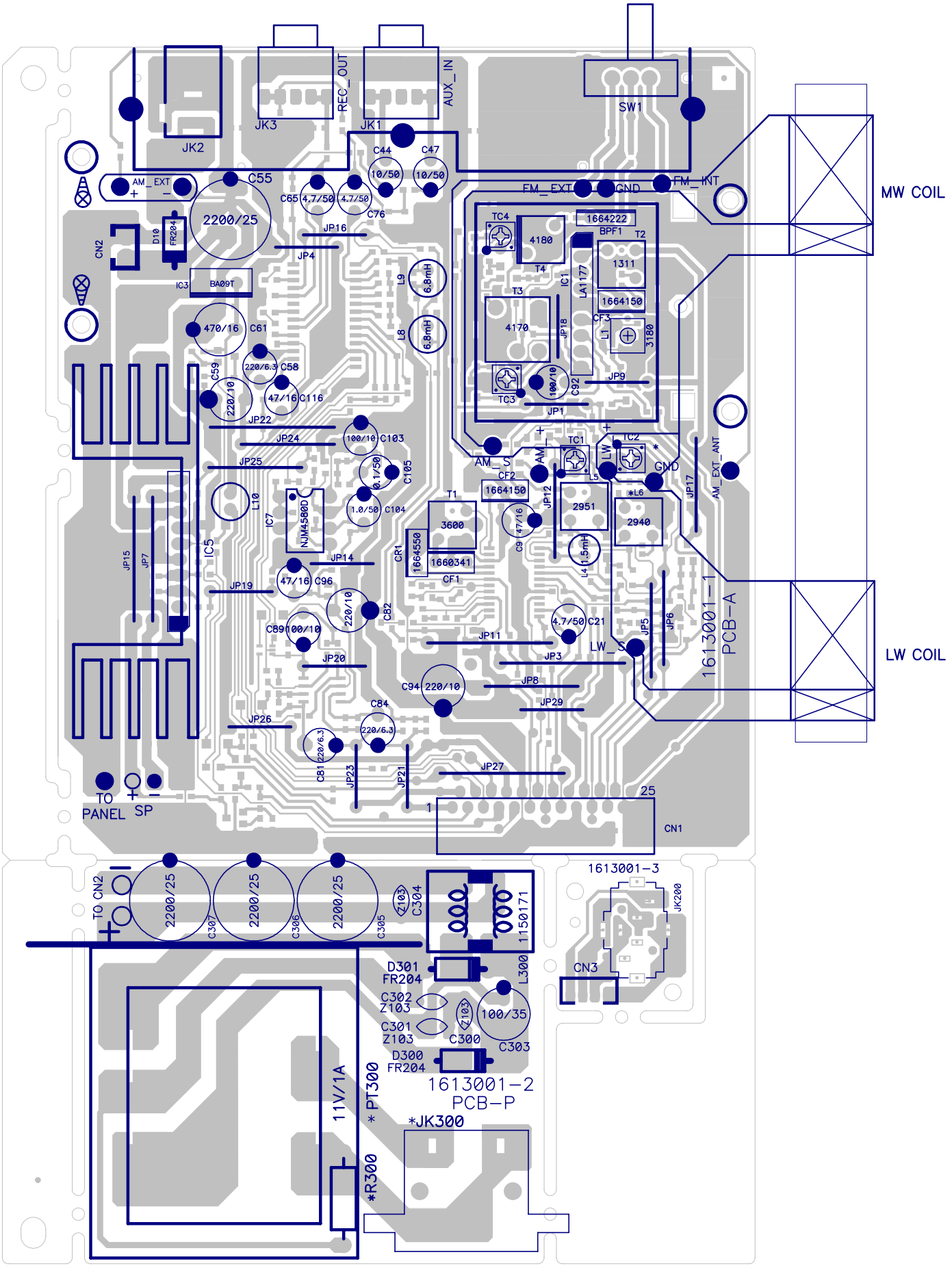


# TEST POINTS DIAGRAM



# MAIN PCB TOP VIEW



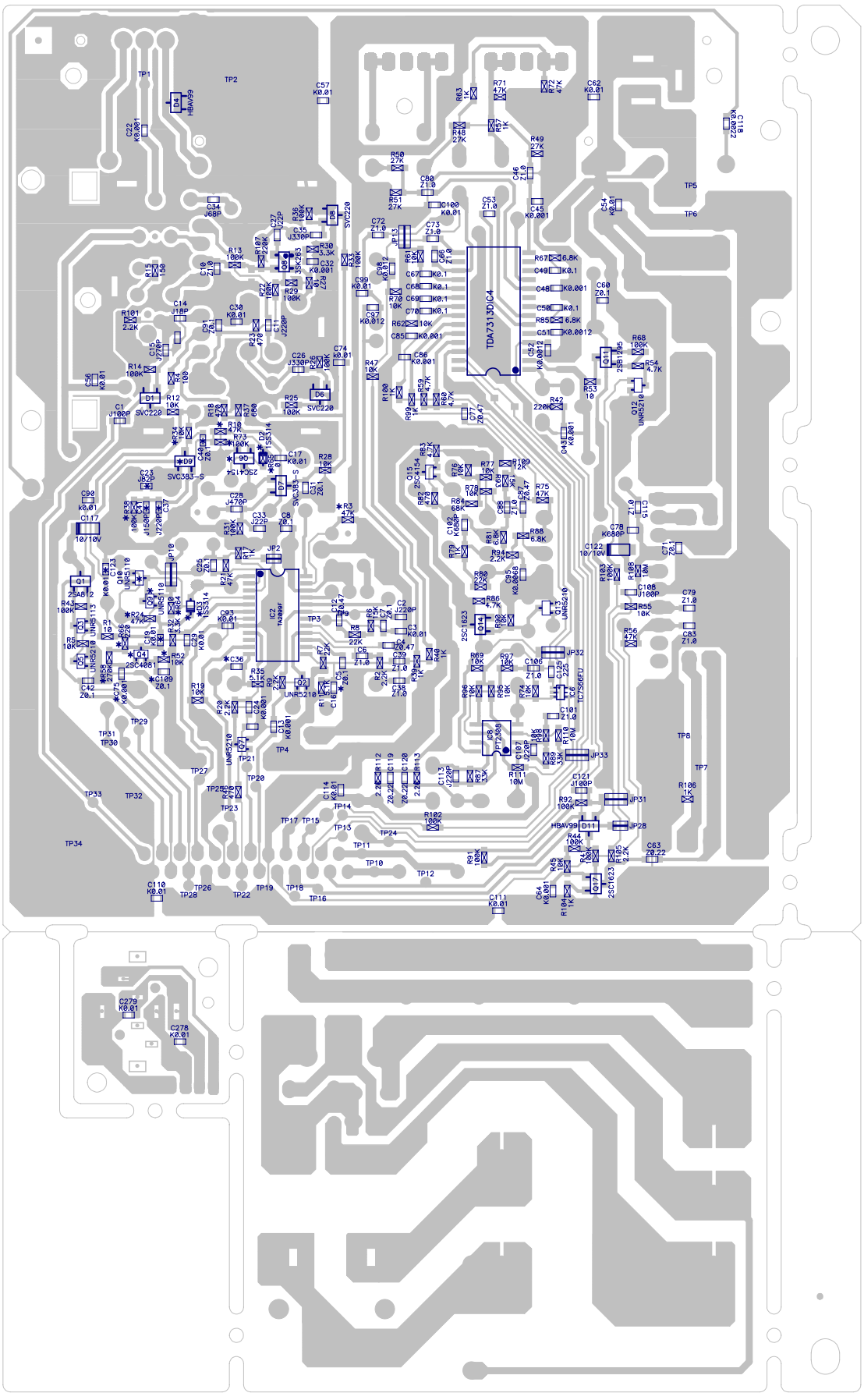

*

| | L2 | L6 | TC2 |
|---|---|---|---|
| ROBERTE | 1111270 | V | V |
| EUROPE | 1111260 | | |
| USA | 1111260 | | |
| TAIWAN | 1111260 | | |

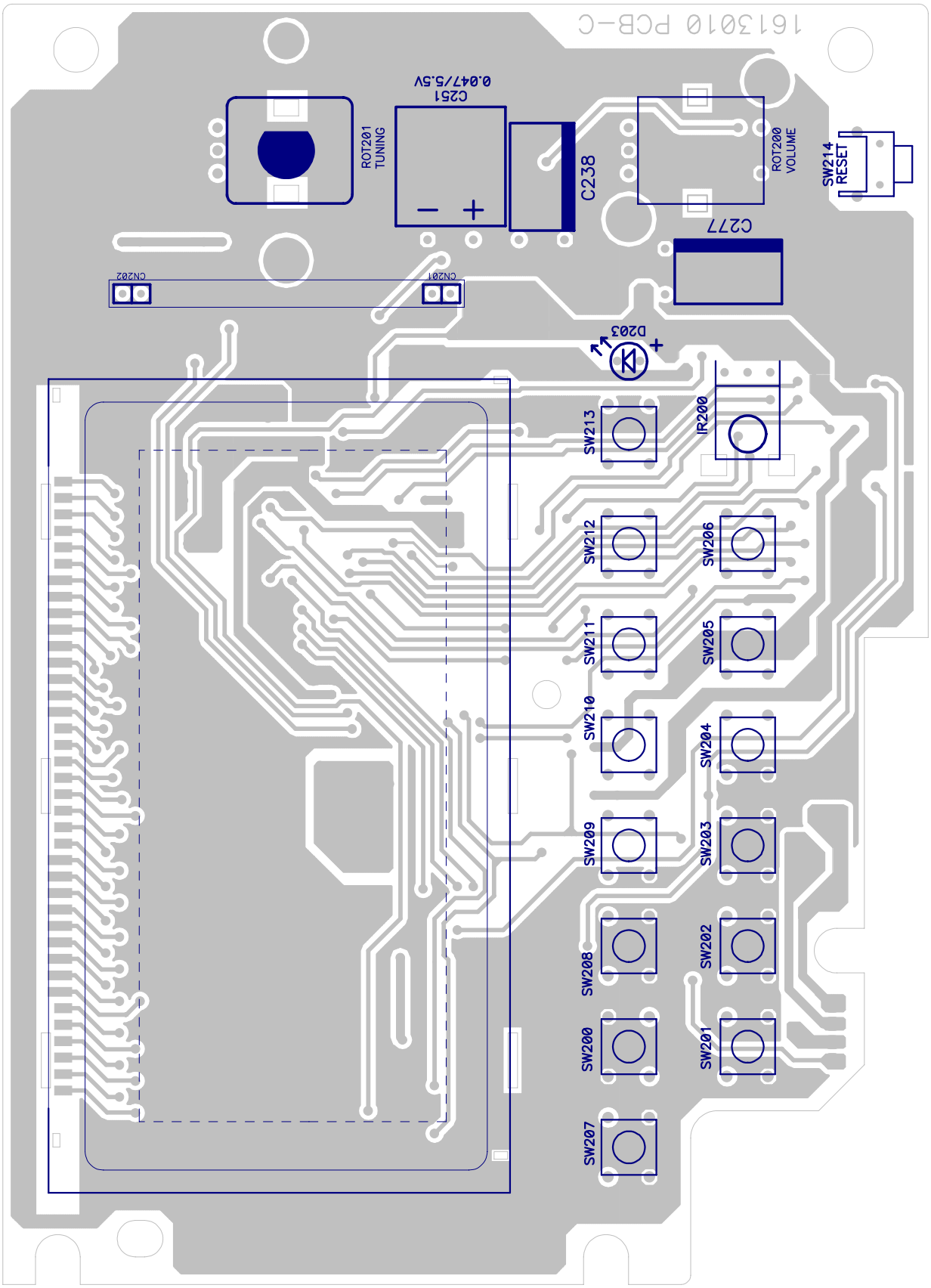
# MAIN PCB BOTTOM VIEW

| | R3 | R10 | R24 | R34 | R38 | R52 | R58 | R64 | R65 | R66 | R73 | C19 | C23 | C37 | C40 | C41 | C75 | D2 | D3 | D9 | Q4 | Q6 | Q9 | Q10 | C16,C36 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROBERTE | 100K | V | V | V | V | V | V | | | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | K0.01 |
| EUROPE | 47K | | | | | | | V | V | | | | | | | | | | | | | | | | K0.01 |
| USA | 47K | | | | | V | V | V | V | V | | V | | | | | V | V | | | | V | | | K0.018 |
| TAIWAN | 47K | | | | | | | V | V | | | | | | | | | | | | | | | | K0.018 |

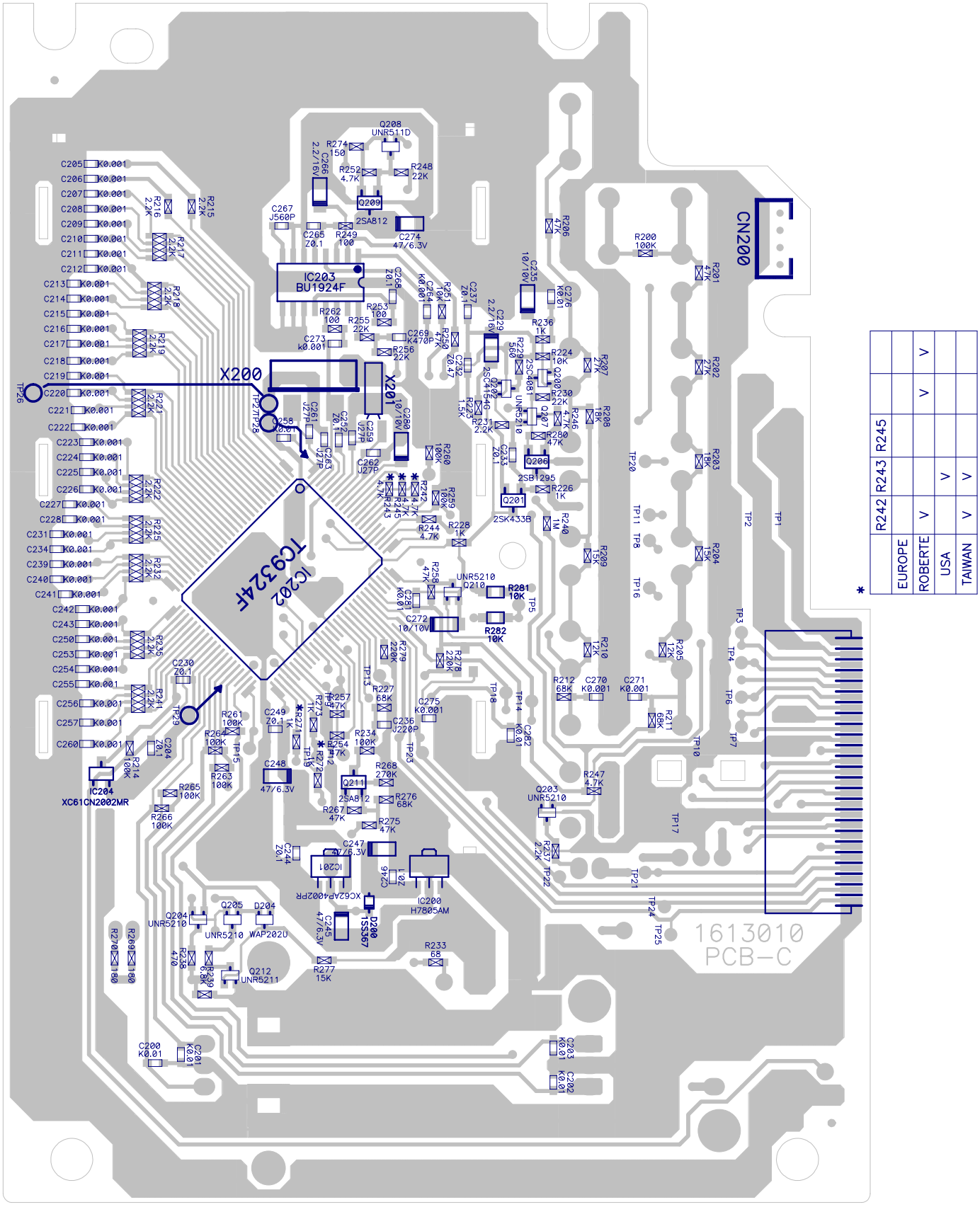
*



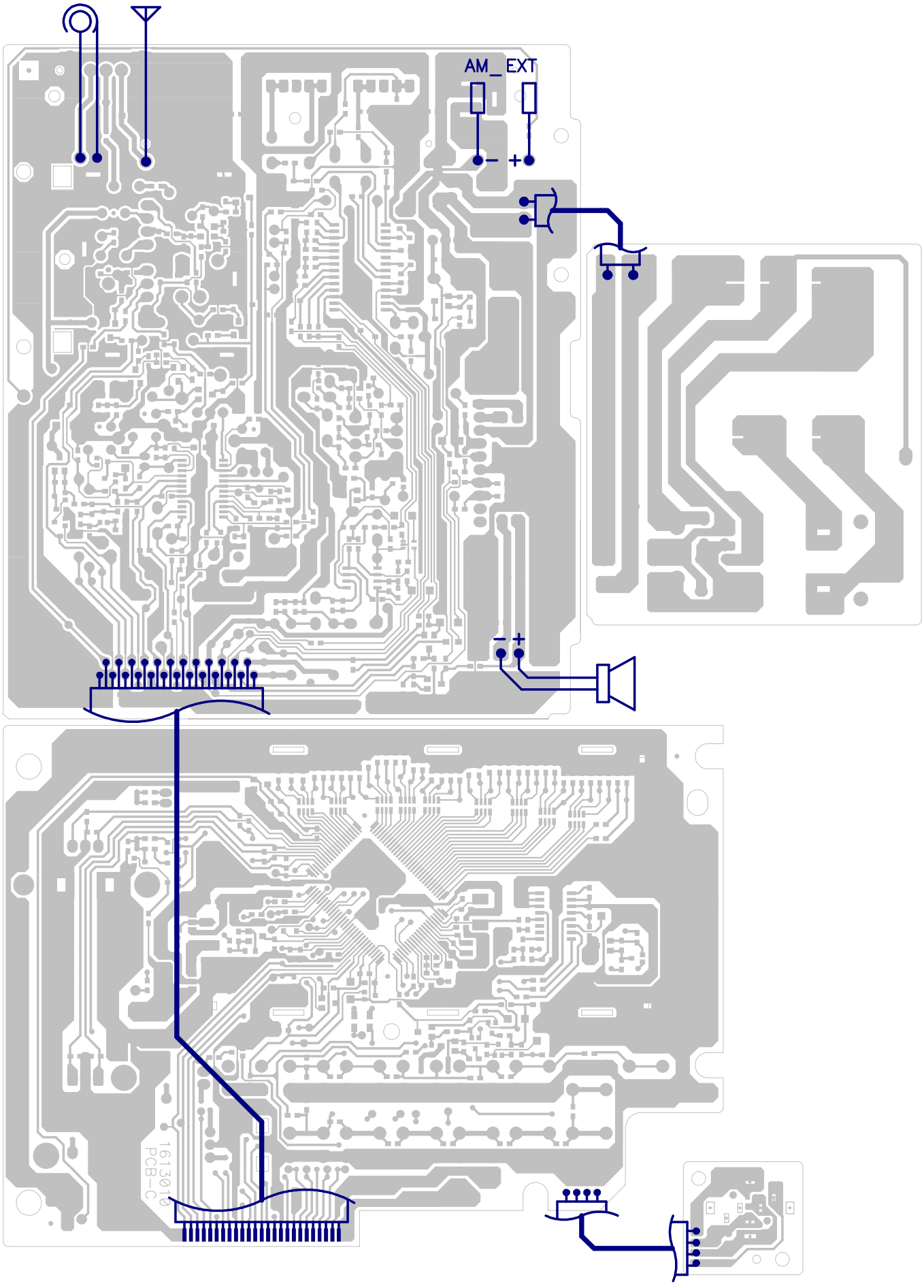
# CONTROL PCB TOP VIEW



# CONTROL PCB BOTTOM VIEW

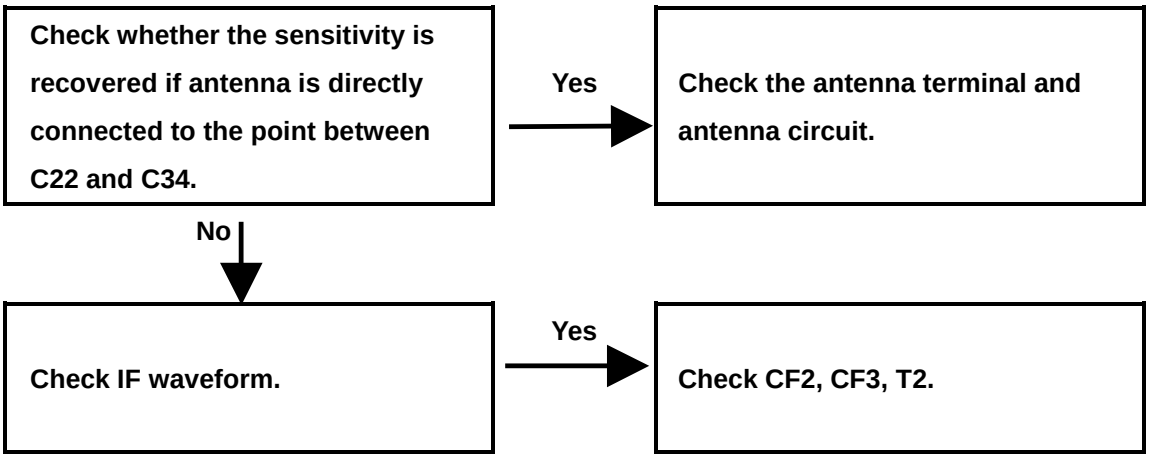


# WIRING DIAGRAM

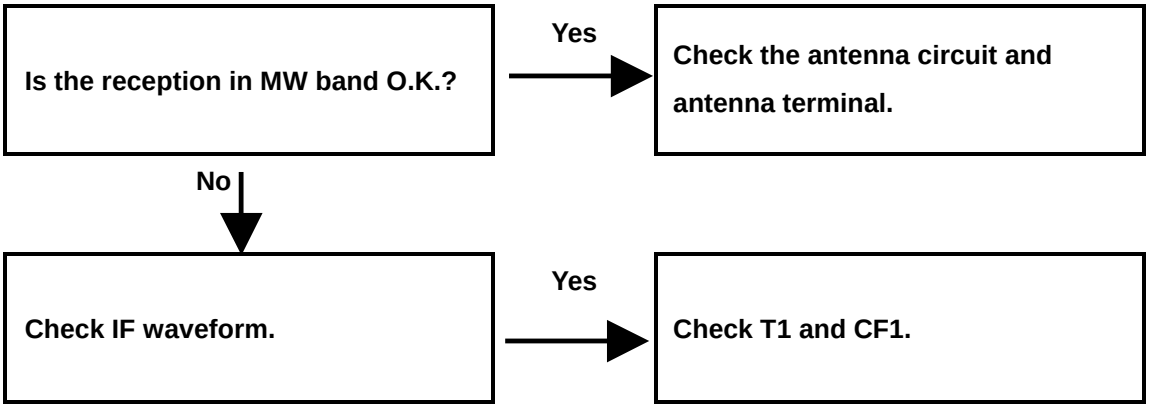


# TROUBLESHOOTING FLOW CHART

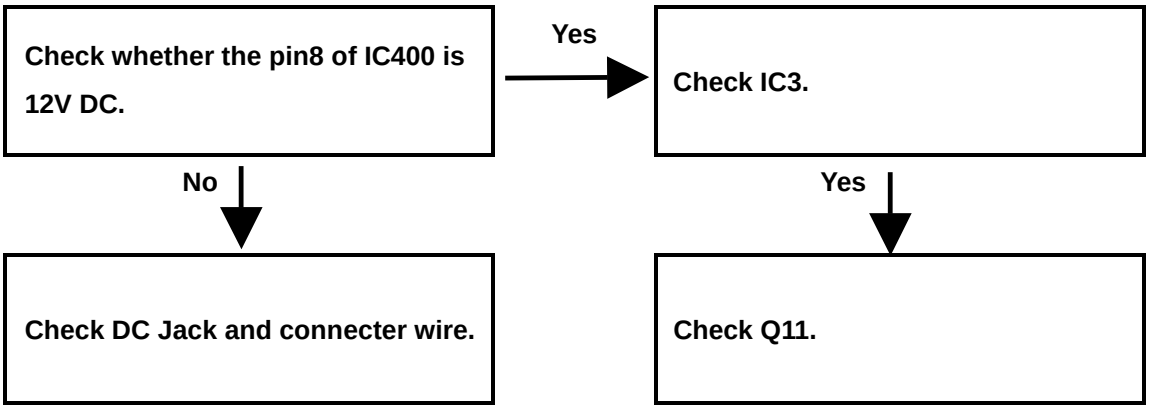
**( 1 ) Weak sensitivity on FM mode**




**( 2 ) Weak sensitivity in AM band**




**( 3 ) Power can not be turned on**



# ELECTRICAL PARTS LIST

**WR-2**

| PART NO | DESCRIPTION | Q'TY | REMARK |
|---|---|---|---|
| 1000730 | CH LSI TC9324FG-012 | 1 | IC 202, |
| 1011322 | CH IC XC62AP4002PR | 1 | IC 201, |
| 1012720 | IC LA1177 | 1 | IC 1, |
| 1013230 | CH IC TC7S66FU | 1 | IC 6, |
| 1013331 | CH IC TA2099F | 1 | IC 2, |
| 1013540 | IC TDA7266L | 1 | IC 5, |
| 1013660 | IC NJM4580D | 1 | IC 7, |
| 1013710 | CH IC H7805AMSOT-89 | 1 | IC 200, |
| 1013890 | CH IC PT2308 8PIN SO-P | 1 | IC 8, |
| 1013970 | CH IC TDA7313ND SO28 | 1 | IC 4, |
| 1013990 | CH IC BU1924F | 1 | IC 203, |
| 1014011 | CH IC XC61CN2002MR SOT23 | 1 | IC 204, |
| 1014210 | IC REG.BA09T TO-220FP | 1 | IC 3, |
| 1020230 | CH TR 2SA812 M6 | 3 | Q 1,209,211, |
| 1020241 | CH TR 2SC1623(L7) | 2 | Q 14,17, |
| 1021070 | CH TR 2SB1295-6-TB | 2 | Q 11,206, |
| 1022220 | CH TR 2SC4081R | 1 | Q 200, |
| 1022272 | CH TR 2SC4154-G | 2 | Q 15,202, |
| 1026123 | CH TR UNR5113 | 1 | Q 3, |
| 102612D | CH TR UNR511D | 1 | Q 208, |
| 1026130 | CH TR UNR5210 | 10 | Q 2,5,7,12,13,203-205, 207,210, |
| 1026131 | CH TR UNR5211 | 1 | Q 212, |
| 1030100 | CH FET 2SK433B KB | 1 | Q 201, |
| 1030181 | CH FET 3SK263-RJ5 | 1 | Q 8, |
| 1041220 | CH DIODE 1SS367 | 1 | D 200, |
| 1041241TA | DIODE FR204-T | 3 | D 10,300,301, |
| 1043140 | CH VARICAP SVC383-S | 1 | D 7, |
| 1043180 | CH VARICAP SVC220 | 3 | D 1,6,8, |
| 1046071-A | CH DIODE WAP202U | 1 | D 204, |
| 1046180 | CH DIODE HBAV99 | 2 | D 4,11, |
| 1062190-A | LED BLU 3φHL30ABC2EA02 | 1 | D 203, |
| 1062201-A | CH LED WHT HG-SS0335WFZ | 4 | D 500-503, |
| 1111260-A | BAR ANT & COIL 1260 | 1 | L 2, |
| 1121312 | ADJ. COIL 1312 | 1 | T 2, |
| 1122951 | ADJ. COIL 2951 | 1 | L 5, |
| 1123181-A | ADJ. COIL 3181 | 1 | L 1, |
| 1123600 | ADJ. COIL 3600 | 1 | T 1, |
| 1124170 | ADJ.COIL 4170 | 1 | T 3, |
| 1124180-A | ADJ. COIL 4180 | 1 | T 4, |
| 1133800 | FIXED COIL 120µH | 1 | L 10, |
| 1135104K | FIXED COIL 1.5mHK P=2mm | 1 | L 4, |
| 1135903-S | FIXED COIL 6.8mHJ PVC-S | 2 | L 8,9, |
| 1150171-A | TOROID COIL 0.6mH | 1 | L 300, |
| 1210271 | TC 10P 4.5mm WHT | 2 | TC 3,4, |
| 1210281 | TC 20P 4.5mm RED | 1 | TC 1, |
| 1600661 | LCD WR-2 SZ5307-TG-E | 1 | LCD200, |
| 1613001 | PCB A WR-2 | 1 | |
| 1613010 | PCB C WR-2 | 1 | |
| 1613120 | PCB D WR-2 | 1 | |
| 1620732 | SP.3" 8Ω 7W | 1 | SP |
| 1631520 | SLIDE SW.1P2C | 1 | SW 1, |
| 1631632 | TACK SW.130±30gf 5mm | 14 | SW 200-213, |
| 1631640 | TACT SW SFKHHL W1734 | 1 | SW 214, |
| 1640160 | JACK H.P. TC38-66-05 | 1 | JK 3, |
| 1640170 | JACK H.P. TC38-66-04 | 1 | JK 1, |
| 1640200 | JACK HP | 1 | JK 200, |

# ELECTRICAL PARTS LIST

**WR-2**

| PART NO | DESCRIPTION | Q'TY | REMARK |
|---|---|---|---|
| 1646040 | AC SOCKET HJC-037P | 1 | JK 300, |
| 1647110 | JACK DC HTJ-020-04AZ | 1 | JK 2, |
| 1650290 | X'TAL 4.332MHz | 1 | X 200, |
| 1650530 | X'TAL 75K +10 -20PPM 2x6 | 1 | X 201, |
| 1660341-A | FILTER PFWLF450KS2A-A0 | 1 | CF 1, |
| 1664150-A | FILTER SFELF10M7HA00-B0 | 2 | CF 2,3, |
| 1664222-A | FIL GFMB7-C2-LF 88-108M | 1 | BPF1, |
| 1664550-A | DISCRI CDALF10M7GA082-B0 | 1 | CR 1, |
| 1701004 | CNT BASE 2x4P | 1 | CN 3, |
| 170134Q | CNT BASE 1.25x25P-R | 1 | CN 1, |
| 1701382-A | PIN HEADER 2x2P-S PbF | 2 | CN 201,202, |
| 1702010 | CNT BASE 2.5x2P | 1 | CN 2, |
| 1704871 | W/ASS'Y 60(2+4P) | 1 | HP WIRE |
| 1704881 | W/SPK 130(6+2P)R/B | 1 | SP WIRE |
| 1704940-A | W/ASS'Y 140x1P WHT | 1 | GND WIRE |
| 1720340 | TRANS.230V DC:11V/1A | 1 | PT 300, |
| 1730110 | ROTARY ENCODE | 1 | ROT200, |
| 1730150 | ROT.ENCO.DC11B2020415-SG | 1 | ROT201, |
| 1740030 | IR RECIVER PNA4612M00LB | 1 | IR 200, |
| 1900430 | F FEMALE BULKHEAD | 1 | |
| 2149120 | ANT TERMINAL PIN | 3 | P 1-3, |
| 2200150 | 6φ GRN LABEL FTZ | 2 | |
| 4110364CT | CC 103Z 50V F | 4 | C 300,301,302,304, |
| 441046PT1 | EL 104M 50V 5x11 | 1 | C 105, |
| 441056PT1 | EL 105M 50V 5x11 | 1 | C 104, |
| 444756PT1 | EL 475M 50V 5x11 | 3 | C 21,65,76, |
| 441066PT1 | EL 106M 50V 5x11 | 2 | C 44,47, |
| 444763PT1 | EL 476M 16V 5x11 | 3 | C 9,96,116, |
| 441072PT1 | EL 107M 10V 5x11 | 3 | C 89,92,103, |
| 441075KT1 | EL 107M 35V 8x11.5 | 1 | C 303, |
| 442271PT1 | EL 227M 6.3V 5x11 | 3 | C 58,81,84, |
| 442272KT1 | EL 227M 10V 6.3x11 | 5 | C 59,82,94,238,277, |
| 444773KT1 | EL 477M 16V 8x11.5 | 1 | C 61, |
| 4900023S | EL 228M 25V 13x25 105℃S | 4 | C 55,305-307, |
| 4947370 | SUP/C 473Z5.5V9.5x10.5-H | 1 | C 251, |
| 4B22532 | CH TA 225M16V 3.2x1.6 | 2 | C 229,266, |
| 4B10625 | CH TA 106M 10V 3216 | 5 | C 117,122,235,272,280, |
| 4B47612 | CH TA 476M 6.3V 3.2x1.6 | 4 | C 245,247,248,274, |
| 5010101 | CH CC 101J 50V NPO-C | 3 | C 1,108,121, |
| 5010261 | CH CC 102K 50V X7R-C | 53 | C 13,22,24,32,43,45,48 ,64,85,86,205-228, 231,234,239-243,250, 253-257,260,264,270, 271,273,275, |
| 5010361 | CH CC 103K 50V X7R-C | 28 | C 3,16,17,29,30,36,54, 56,57,62,74,90,93,99 ,100,110,111,114,200 -203,258,276,278,279 ,281,282, |
| 5010446 | CH CC 104Z 25V F-C | 19 | C 5,7,8,25,31,42,60,71 ,91,204,230,233,237, 244,246,249,252,265, 268, |
| 5010451 | CH CC 104K 16V R-C | 6 | C 49,50,67-70, |
| 5010557 | CH CC 105Z 10V F-C | 16 | C 6,10,38,39,46,53,66, 72,73,79,80,83,88, 101,106,115, |

# ELECTRICAL PARTS LIST

**WR-2**

| PART NO | DESCRIPTION | Q'TY | REMARK |
|---|---|---|---|
| 5012261 | CH CC 122K 50V X7R-C | 2 | C 51,52, |
| 5012361 | CH CC 123K 50V X7R-C | 2 | C 97,98, |
| 5018001 | CH CC 180J 50V NPO-C | 1 | C 14, |
| 5022001 | CH CC 220J 50V NPO-C | 2 | C 27,33, |
| 5022101 | CH CC 221J 50V NPO-C | 5 | C 2,11,107,113,236, |
| 5022446 | CH CC 224Z 25V Y5V-C | 3 | C 63,119,120, |
| 5022557 | CH CC 225Z 10V Y5V-C | 1 | C 125, |
| 5027001 | CH CC 270J 50V NPO-C | 4 | C 259,261-263, |
| 5027101 | CH CC 271J 50V NPO-C | 1 | C 15, |
| 5033101 | CH CC 331J 50V NPO-C | 2 | C 26,35, |
| 5047101 | CH CC 471J 50V NPO-C | 1 | C 28, |
| 5047161 | CH CC 471K 50V X7R-C | 1 | C 269, |
| 5047472 | CH CC 474Z 16V Y5V-C | 5 | C 4,12,77,87,232, |
| 5056101 | CH CC 561J 50V NPO-C | 1 | C 267, |
| 5068001 | CH CC 680J 50V NPO-C | 1 | C 34, |
| 5068161 | CH CC 681K 50V X7R-C | 2 | C 78,102, |
| 5068261 | CH CC 682K 50V X7R-C | 1 | C 95, |
| 6100112 | CH RD 1/16W 10J-C | 3 | R 1,27,53, |
| 6100122 | CH RD 1/16W 68J-C | 1 | R 233, |
| 6100124 | CH RD 1/16W 100J-C | 4 | R 4,249,253,262, |
| 6100126 | CH RD 1/16W 150J-C | 2 | R 15,274, |
| 6100127 | CH RD 1/16W 180J-C | 2 | R 269,270, |
| 6100132 | CH RD 1/16W 470J-C | 5 | R 18,23,46,82,238, |
| 6100133 | CH RD 1/16W 560J-C | 1 | R 229, |
| 6100134 | CH RD 1/16W 680J-C | 1 | R 37, |
| 6100136 | CH RD 1/16W 1KJ-C | 14 | R 17,39,40,57,63,79,99 ,100,104,106,226,228 ,236,273, |
| 6100138 | CH RD 1/16W 1.5KJ-C | 1 | R 223, |
| 6100140 | CH RD 1/16W 2.2KJ-C | 12 | R 2,9,20,94,101,105, 112,113,215,216,231, 237, |
| 6100142 | CH RD 1/16W 3.3KJ-C | 2 | R 30,32, |
| 6100144 | CH RD 1/16W 4.7KJ-C | 9 | R 54,59,60,83,86,244, 246,247,252, |
| 6100146 | CH RD 1/16W 6.8KJ-C | 5 | R 67,81,85,88,239, |
| 6100148 | CH RD 1/16W 10KJ-C | 22 | R 5,12,19,28,47,45,55, 61,62,69,70,74,76,77 ,78,90,95-98,224,251 |
| 6100149 | CH RD 1/16W 12KJ-C | 3 | R 109,205,210, |
| 610014E | CH RD 1/16W 5.1KJ-C | 2 | R 11,35, |
| 6100150 | CH RD 1/16W 15KJ-C | 5 | R 6,93,204,209,277, |
| 6100151 | CH RD 1/16W 18KJ-C | 2 | R 203,208, |
| 6100152 | CH RD 1/16W 22KJ-C | 7 | R 7,8,80,230,248,255, 256, |
| 6100153 | CH RD 1/16W 27KJ-C | 6 | R 48-51,202,207, |
| 6100154 | CH RD 1/16W 33KJ-C | 2 | R 87,89, |
| 6100156 | CH RD 1/16W 47KJ-C | 14 | R 3,21,56,71,72,75,201 ,206,250,254,257,258 ,275,280, |
| 6100158 | CH RD 1/16W 68KJ-C | 5 | R 84,211,212,227,276, |
| 6100159 | CH RD 1/16W 82KJ-C | 1 | R 267, |
| 6100160 | CH RD 1/16W 100KJ-C | 27 | R 13,14,22,25,26,29,31 ,33,36,41,43,44,68, 91,92,102,103,200, 214,234,259-261,263- 266, |

# ELECTRICAL PARTS LIST

**WR-2**

| PART NO | DESCRIPTION | Q'TY | REMARK |
|---|---|---|---|
| 6100164 | CH RD 1/16W 220KJ-C | 4 | R 42,107,278,279, |
| 6100165 | CH RD 1/16W 270KJ-C | 1 | R 268, |
| 6100172 | CH RD 1/16W 1MJ-C | 1 | R 240, |
| 6100184 | CH RD 1/16W 10MJ-C | 3 | R 108,110,111, |
| 6100194 | CH RD 1/16W OJ-C | 3 | R 64,65,500, |
| 6110194 | CH JUMP OJ-B | 5 | JP 10,13,31-33, |
| 6160148 | CH RD 1/10W 10KJ-A | 2 | R 281,282, |
| 6160194 | CH RD 1/10W OJ-A | 2 | JP 2,28, |
| 6500440 | CH RP 2.2KJx4-C | 9 | R 217-219,221,222,225, 232,235,241, |
| 8000040 | W/JUMP 10(10)0.6mm | 12 | JP 1,4,9,14,16,18-21,23 ,26,29, |
| 8000061 | W/JUMP 20(10)0.6mm | 6 | JP 3,7,11,15,22,27, |
| 8000090 | W/JUMP 15(10)0.6mm | 5 | JP 8,12,17,24,25, |
| 8040020 | W/PVC 1200(6+TU)BLK | 1 | FM_INT ANT WIRE |
| 82902N5 | WRAP WIRE 30(1.5+1.5)BLU | 1 | |
| 82905N5 | WRAP WIRE 45(1.5+1.5)BLU | 1 | |
| 84818M9 | FFC/25 110(2.5+4)P=1.25 | 1 | FFC WIRE |
| 8592050 | W/ASS'Y 160(P2+6) | 1 | POWER WIRE |
| 8600120 | W/SHIELD 60(5+5) | 1 | F_TERMINAL WIRE |

# MECHANICAL PARTS LIST

**WR-2**

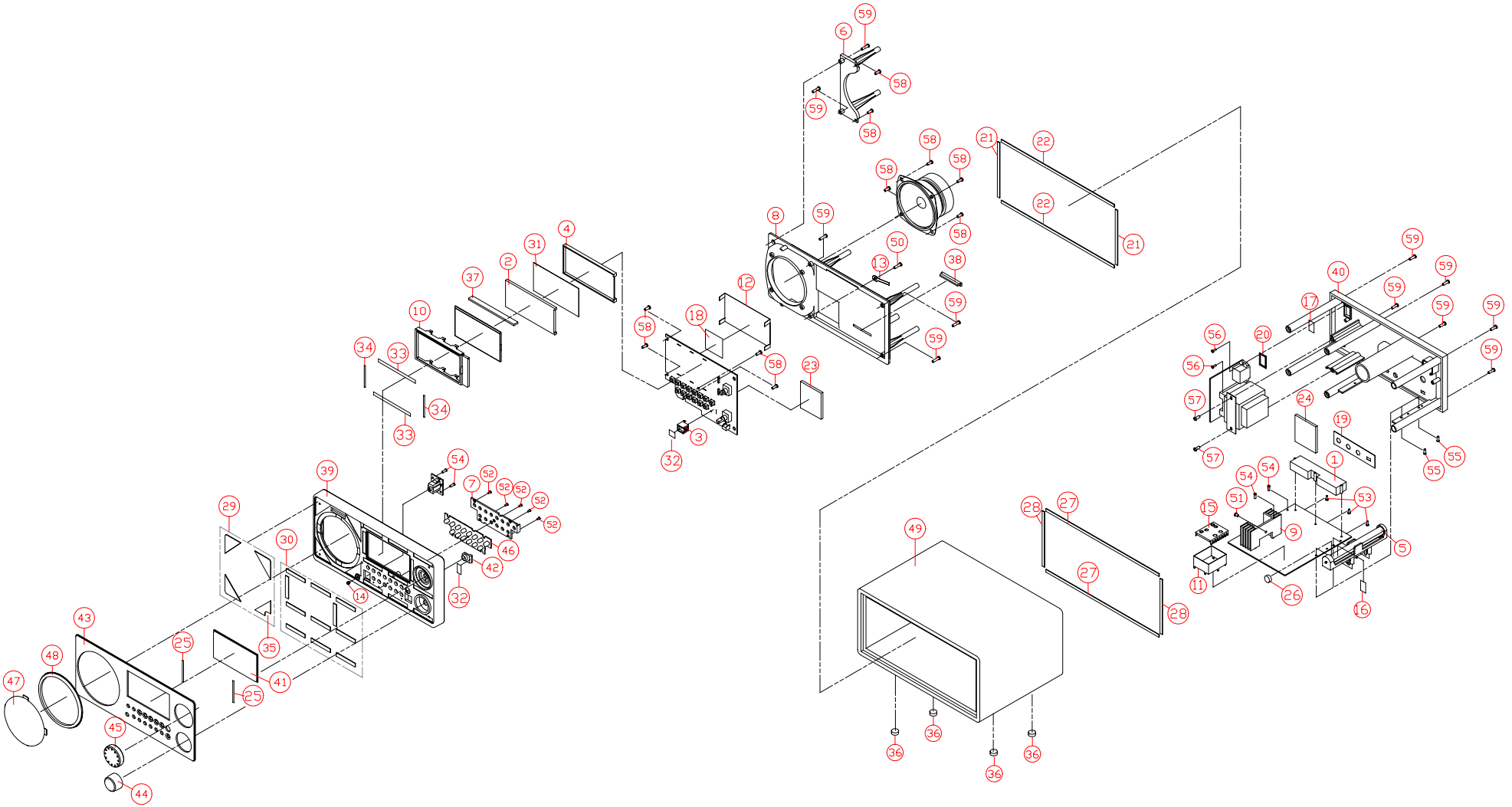
| Ref no | PART NO. | DESCRIPTION | Q'TY | DWG NO. | REMARK |
|---|---|---|---|---|---|
| 1 | 20K6040 | PHONE JACK HOLDER | 1 | A3-WR1-25A | |
| 2 | 20M7000 | LCD LIGHT LENS | 1 | A4-WR2-12A | |
| 3 | 20M7010 | IR HOLDER | 1 | A4-WR2-16A | |
| 4 | 20M7020 | LENS HOLDER | 1 | A3-WR2-17A | |
| 5 | 20M7030 | BAR ANT HOLDER | 1 | A3-WR2-18A | |
| 6 | 20M7040 | BOSS HOLDER | 1 | A3-WR2-19A | |
| 7 | 20M7050 | KEY PAD | 1 | A3-WR2-20A | |
| 8 | 20M7060 | CHASSIS | 1 | A1-WR2-09A | |
| 9 | 21K6000 | HEAT SINK | 1 | A4-WR1-24A | |
| 10 | 21M7000 | LCD HOLDER | 1 | A3-WR2-05A | |
| 11 | 21M7011 | SHIELD CASE | 1 | A4-WR2-07A | |
| 12 | 21M7030 | SHIELD PLATE | 1 | A4-WR2-30A | |
| 13 | 21M7040 | TEMINAL PLATE | 1 | A4-WR2-31A | |
| 14 | 21M7050 | SPRING | 1 | A4-WR2-32A | |
| 15 | 21M7060 | SHIELD CASE COVER | 1 | A4-WR2-33A | |
| 16 | 2256000 | P.C.B. HEMELON | 1 | A4-066-1313 | |
| 17 | 2273030 | HEMELON SPACER | 1 | A4-606-1690 | |
| 18 | 22M7050 | SHIELD SHEET | 1 | A4-WR2-38A | |
| 19 | 23K6000 | PHONE JACK SPONGE | 1 | A4-WR1-02A | |
| 20 | 23K6010 | AC JACK SPONGE | 1 | A4-WR1-03A | |
| 21 | 23K6020 | WOOD CASE SPONGE(R/L | 2 | A4-WR1-04A | |
| 22 | 23K6030 | WOOD CASE SPONGE(U/D | 2 | A4-WR1-05A | |
| 23 | 23K6040 | PCB SPONGE | 1 | A4-WR1-35A | |
| 24 | 23K6110 | SPONGE | 1 | A4-WR1-48A | |
| 25 | 23K7010 | DOUBLE TAPE | 2 | A4-WR1-51A | LCD LENSx2 |
| 26 | 23M5000 | BAR ANT SPONGE | 1 | A4-M5-13 | |
| 27 | 23M7000 | EVA SPACER 227x4 | 2 | A4-WR2-24A | |
| 28 | 23M7010 | EVA SPACER 107x4 | 2 | A4-WR2-25A | |
| 29 | 23M7030 | DOUBLE TAPE | 3 | A4-WR2-22A | |
| 30 | 23M7040 | DOUBLE TAPE 35x5 | 11 | A4-WR2-23A | |
| 31 | 23M7050 | LCD LIGHT MYLAR | 1 | A4-WR2-27A | |
| 32 | 23M7060 | DOUBLE TAPE | 2 | A4-WR2-29A | POWER KNOB LENSx1<br>IR HOLDERx1 |
| 33 | 23M7070 | EVA 88x4 | 2 | A4-WR2-34A | |
| 34 | 23M7080 | EVA 48x2.5 | 2 | A4-WR2-35A | |
| 35 | 23M7090 | DOUBLE TAPE | 1 | A4-WR2-37A | |
| 36 | 24K6000 | FOOT RUBBER | 4 | | |
| 37 | 24M7000 | CONDUCT RUBBER | 1 | A4-WR2-06A | |
| 38 | 24M7010 | RUBBER SPACER | 1 | A4-WR2-26A | |
| 39 | 301M701 | FRONT CABINET | 1 | A1-WR2-08A | |
| 40 | 303M701 | BACK COVER | 1 | A1-WR1-21A/22A | |
| 41 | 305M701 | LCD LENS | 1 | A4-WR2-11A | |
| 42 | 306M701 | POWER KNOB LENS | 1 | A4-WR2-15A | |
| 43 | 309M701 | FRONT PANEL | 1 | A2-WR2-01A | |
| 44 | 311M701 | VOLUME KNOB | 1 | A4-WR2-14A | |
| 45 | 312M701 | TUNING KNOB | 1 | A4-WR2-13A | |
| 46 | 313M701 | FUNCTION KEY | 1 | A3-WR2-03A | |
| 47 | 343M701 | SPEAKER GRILL | 1 | A3-WR2-02A | |
| 48 | 344M701 | SPEAKER RING | 1 | A3-WR2-10A | |
| 49 | 372M701 | WOOD CASE | 1 | A1-WR2-36A | |
| 50 | 9002152 | SCREW JMB M2.6x15(NI) | 1 | | CHASSISx1 |
| 51 | 9003042 | SCREW JMP 3x4 (NI) | 1 | | HEAT SINKx1 |
| 52 | 9090011 | M1.7 SCREW | 5 | | KEY PADx5 |
| 53 | 9101082 | SCREW PTP 2x8(NI) | 3 | | JACK HOLDERx3 |
| 54 | 9102062 | SCREW PTP 2.6x6(NI) | 4 | | PHONE JACK PCBx2<br>耳機PCBx2 |

# MECHANICAL PARTS LIST

**WR-2**

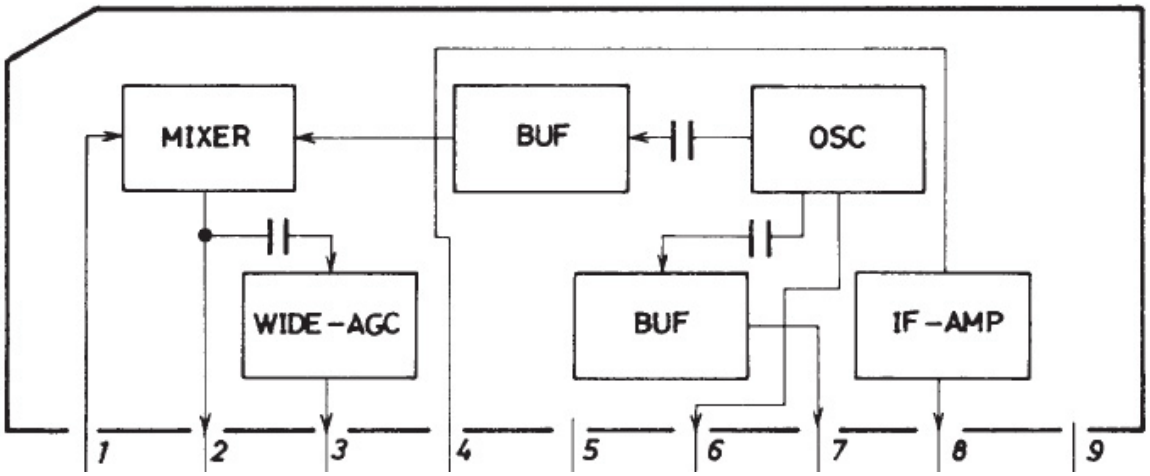
| Ref no | PART NO. | DESCRIPTION | Q'TY | DWG NO. | REMARK |
|---|---|---|---|---|---|
| 55 | 9102122 | SCREW PTP 2.6x12(NI) | 2 | | PHONE JACK PCBx2 |
| 56 | 9103102 | SCREW PTP 3X10(NI) | 2 | | AC JACKx2 |
| 57 | 9153082 | SCREW PTPW 3x8(NI) | 2 | | TRANSx2 |
| 58 | 9163082 | SCREW PTB 3.0x8(NI) | 10 | | SPEAKERx4/C PCBx4<br>BOSS HOLDERx2 |
| 59 | 9163142 | SCREW PTB M3x14(NI) | 11 | | BOSS HOLDERx2<br>CHASSISx3<br>BACK COVERx6 |

# EXPLODED VIEWS

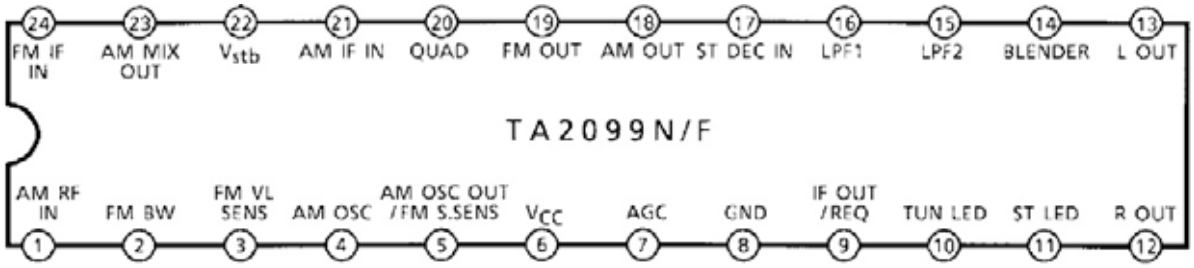


# IC CIRCUIT BLOCK DIAGRAM

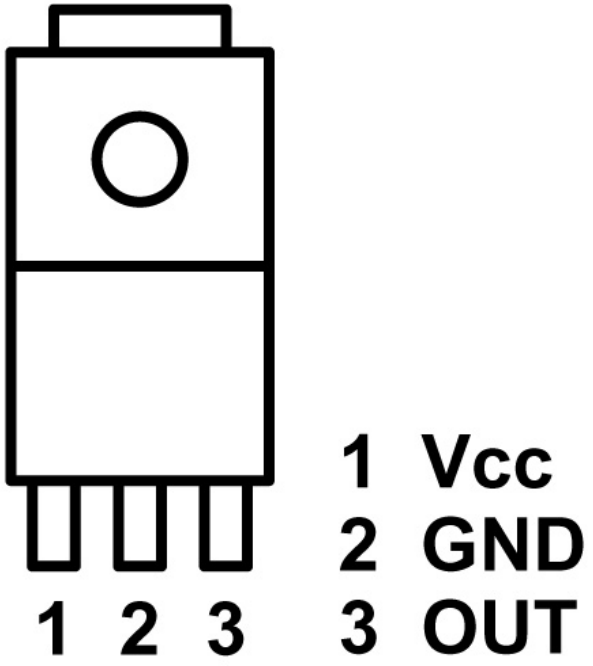
## 1. IC1 – LA1177



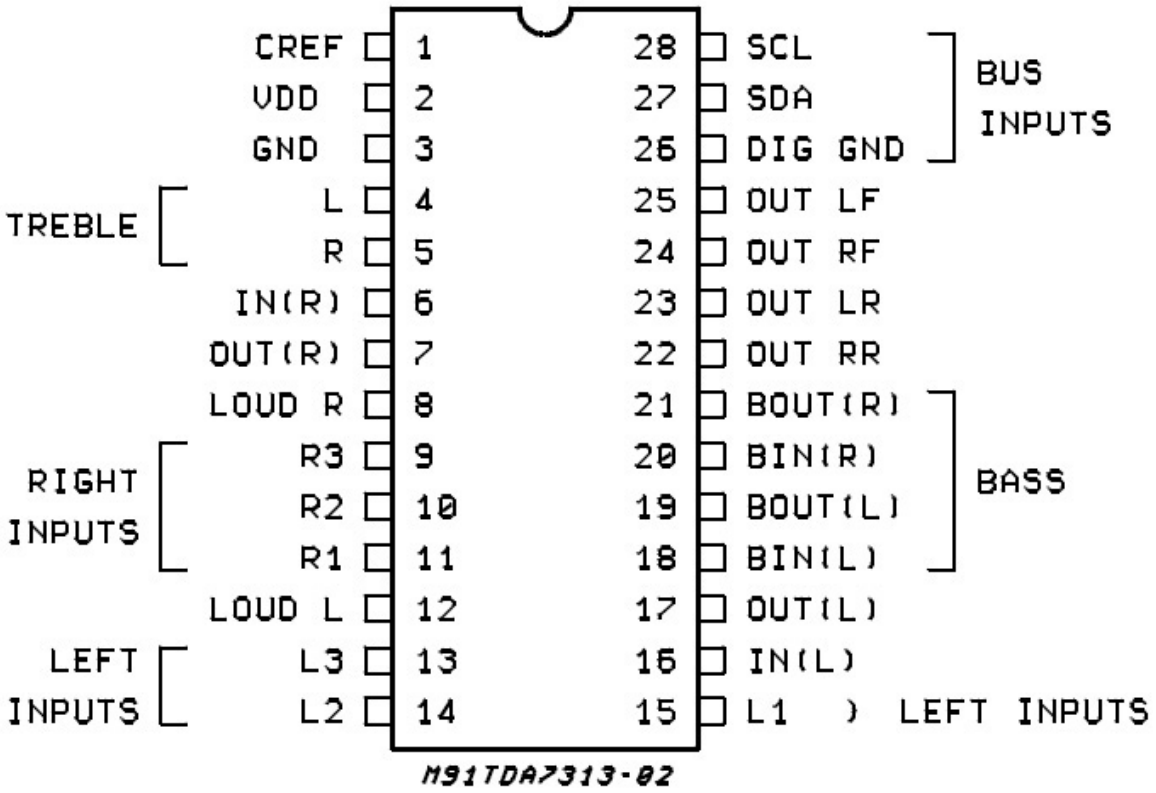

## 2. IC2 – TA2099F



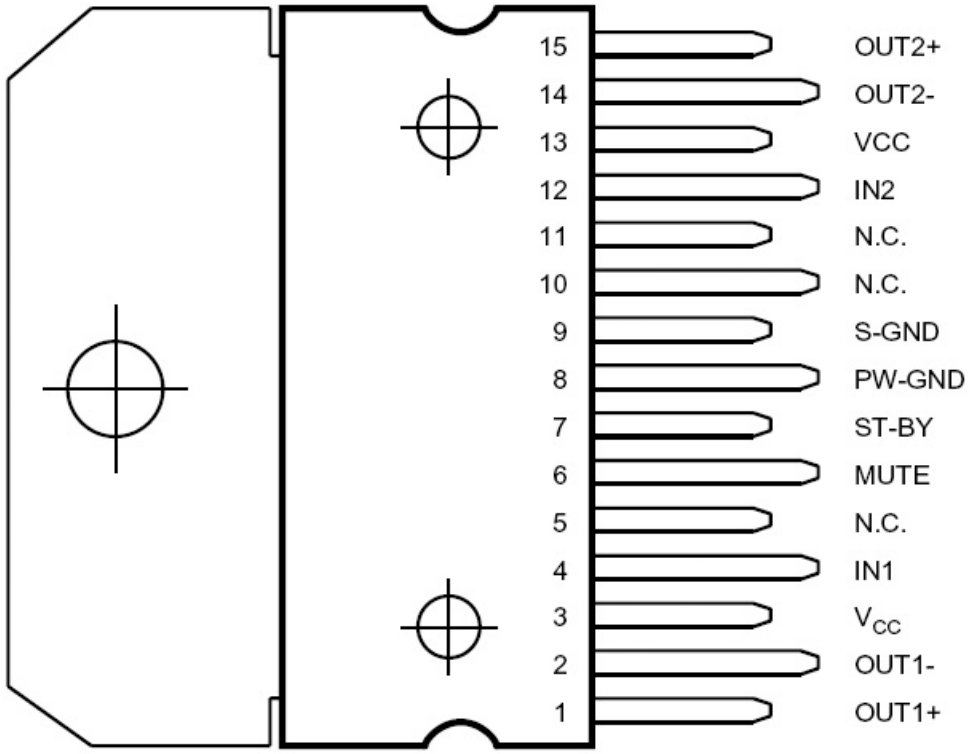
## 3. IC3 – BA09T




## 4. IC4 – TDA7313D

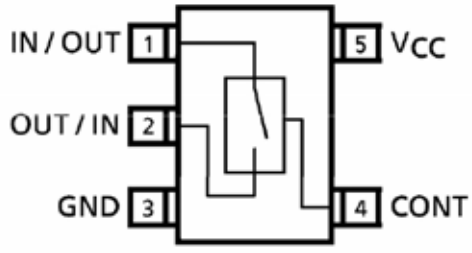


## 5. IC5 – TDA7266L




## 6. IC6 – TC7S66FU

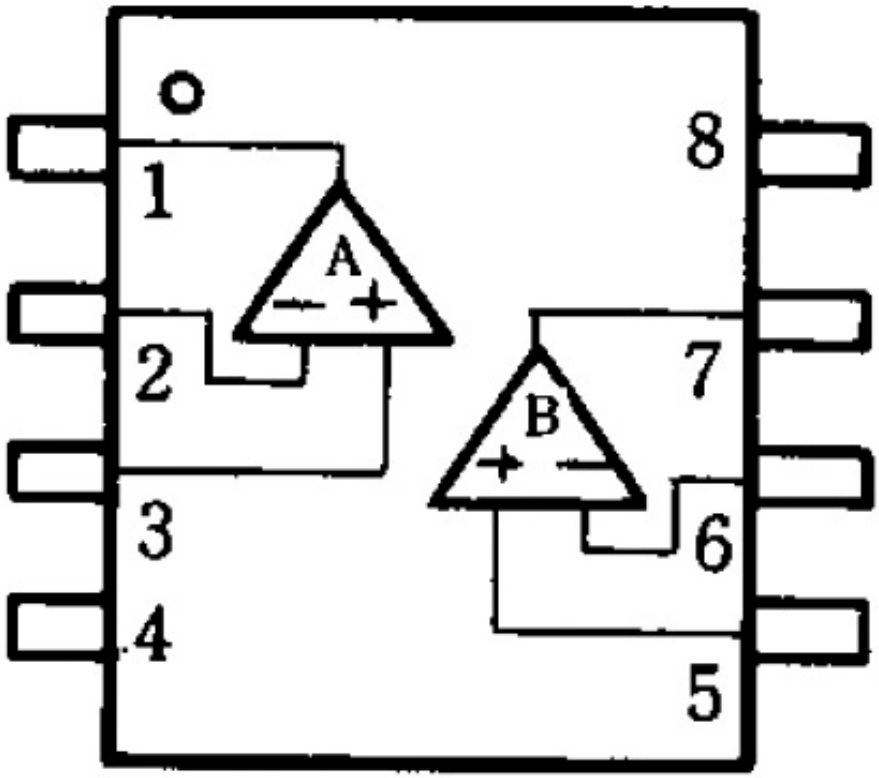
**PIN ASSIGNMENT** (TOP VIEW)



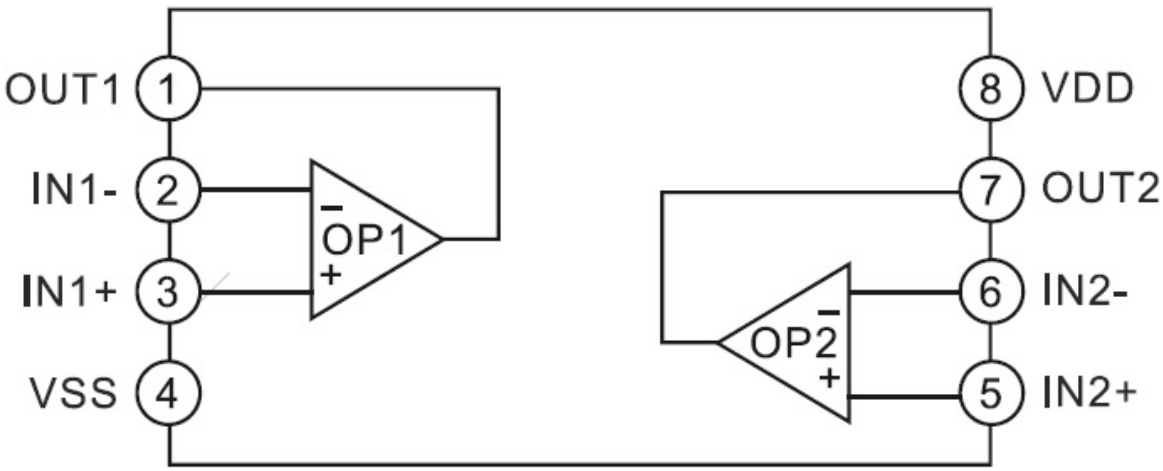

**TRUTH TABLE**

| CONTROL | SWITCH FUNCTION |
|---|---|
| H | ON |
| L | OFF |

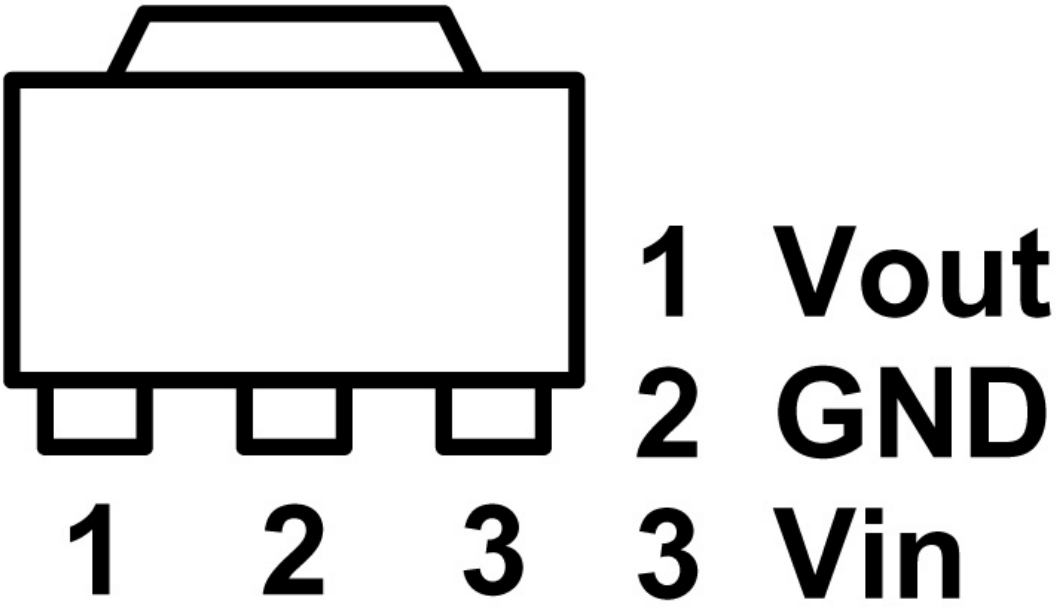
## 7. IC7 – NJM4580D



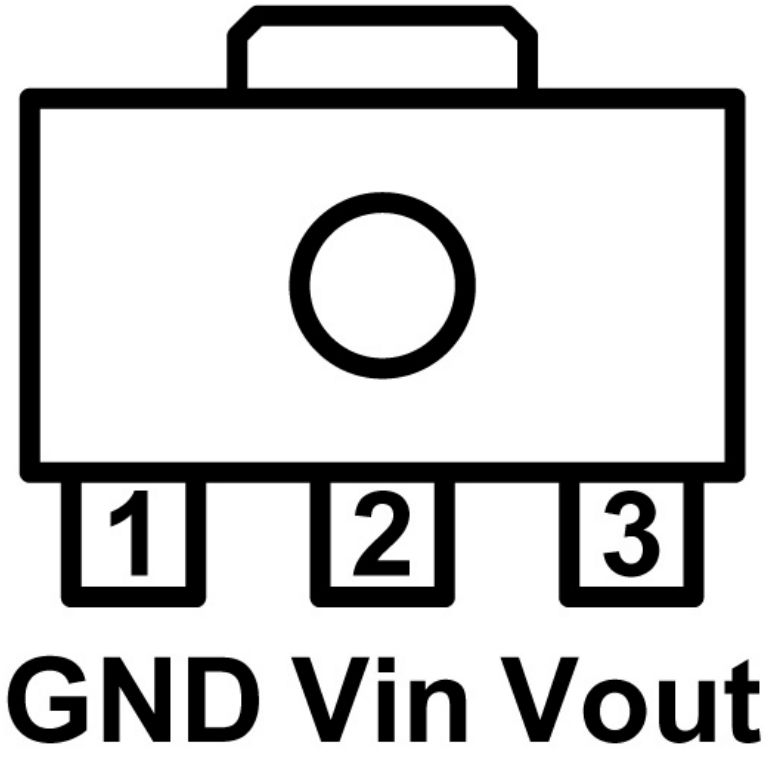

## 8. IC8 – PT2308



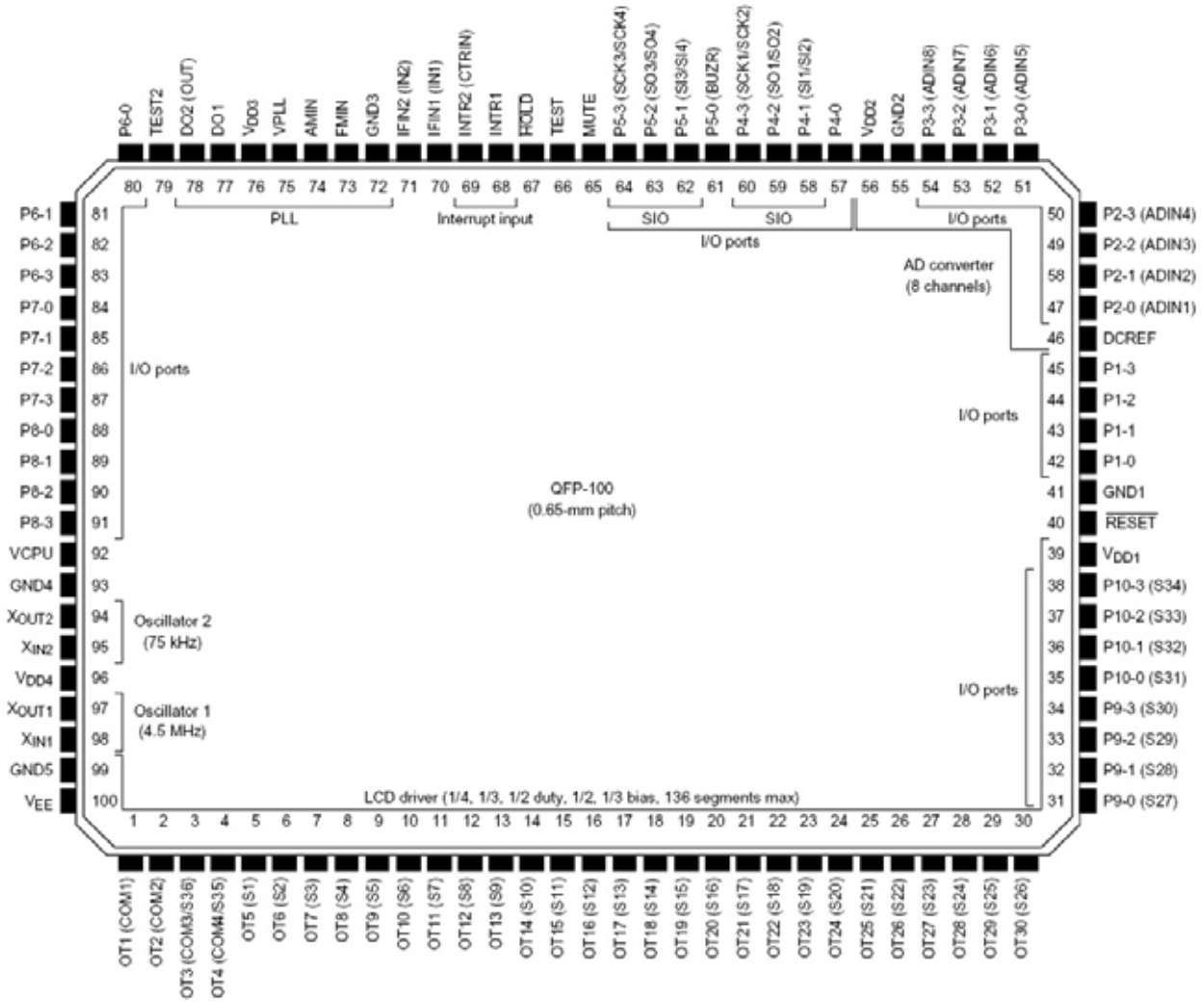
## 9. IC200 – H7805AM



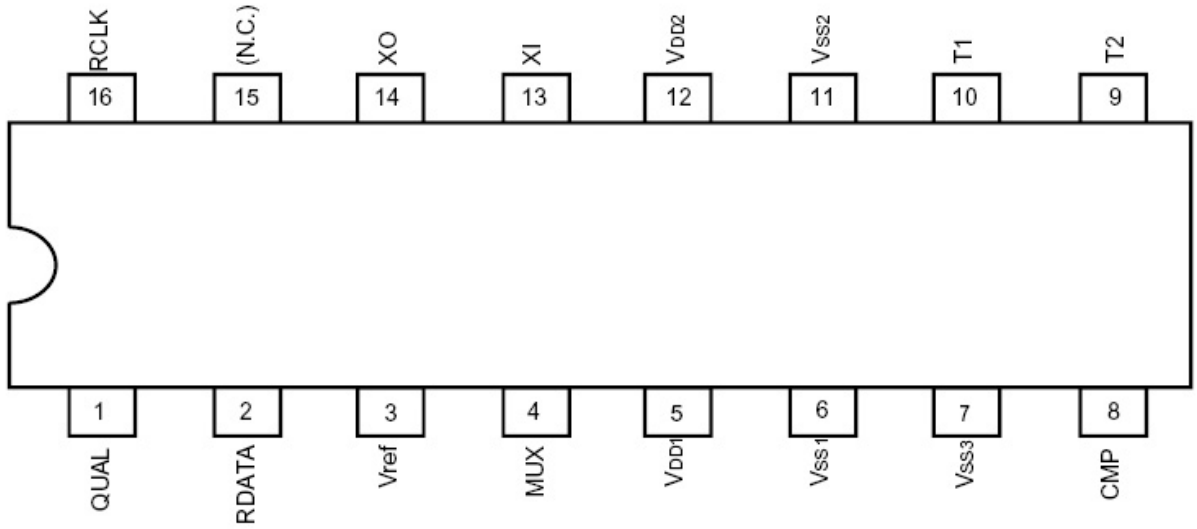

## 10. IC201 – XC62AP4002



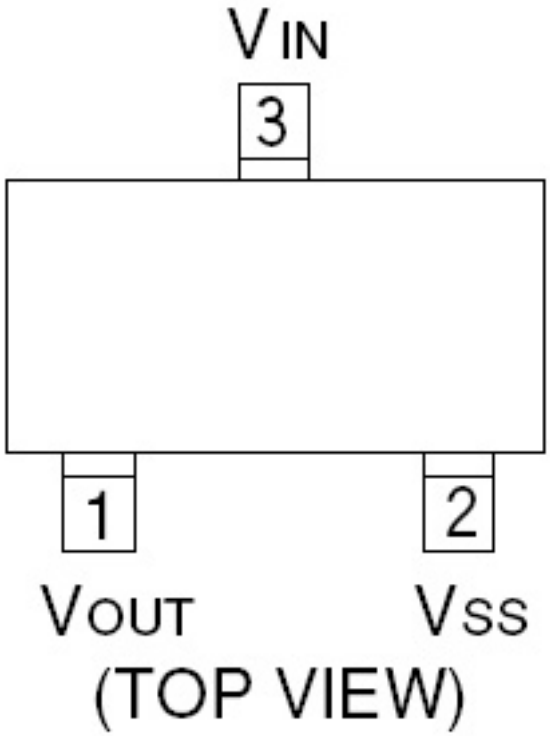
## 11. IC202 – TC9324F



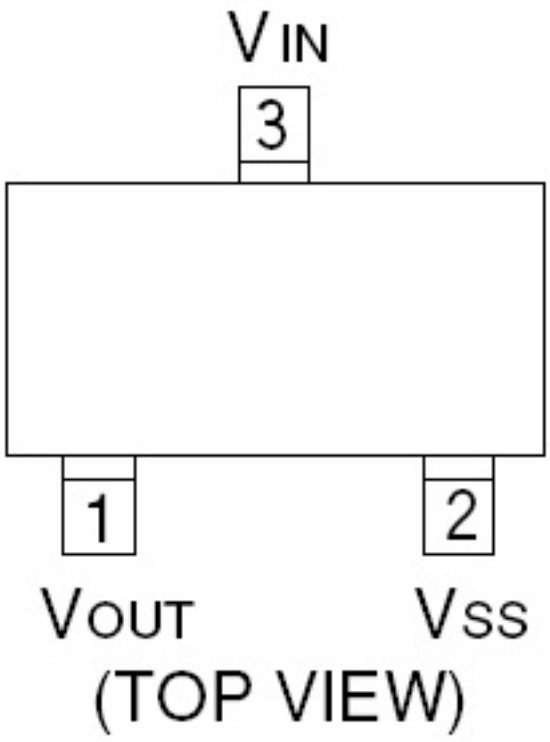
## 12. IC203 – BU1924F




## 13. IC204 – XC61CN2002MR



## 14. IC205 – XC61CN3502MR



# IC AND TRANSISTOR VOLTAGE CHART

**IC1 – LA1177**

| PIN | FM |
|---|---|
| **1** | 2.9 |
| **2** | 8.5 |
| **3** | 8.2 |
| **4** | 2.2 |
| **5** | 0 |
| **6** | 5.2 |
| **7** | 1.7 |
| **8** | 3.6 |
| **9** | 8.5 |

**IC2 – TA2099F**

| PIN | FM | AM | PIN | FM | AM |
|---|---|---|---|---|---|
| **1** | 2.0 | 2.0 | **13** | 1.3 | 1.3 |
| **2** | 1.9 | 2.0 | **14** | 0.7 | 0 |
| **3** | 0.3 | 0.3 | **15** | 7.4 | 1.5 |
| **4** | 1.5 | 2.0 | **16** | 7.5 | 0 |
| **5** | 1.4 | 1.0 | **17** | 1.3 | 1.2 |
| **6** | 8.9 | 9.0 | **18** | 1.2 | 1.7 |
| **7** | 1.2 | 1.6 | **19** | 1.5 | 2.1 |
| **8** | 0 | 0 | **20** | 1.9 | 2.2 |
| **9** | 1.8 | 1.8 | **21** | 2.0 | 2.0 |
| **10** | 0 | 0 | **22** | 2.0 | 2.0 |
| **11** | 7.4 | 7.4 | **23** | 8.9 | 9.0 |
| **12** | 1.3 | 1.3 | **24** | 2.0 | 2.0 |

**IC3 – BA09T**

| PIN | FM |
|---|---|
| **1** | 11.17 |
| **2** | 0 |
| **3** | 9.08 |

**IC4 – TDA7313D**

| PIN | FM | PIN | FM |
|---|---|---|---|
| **1** | 4.5 | **15** | 4.5 |
| **2** | 8.9 | **16** | 4.5 |
| **3** | 0 | **17** | 4.5 |
| **4** | 4.5 | **18** | 4.5 |
| **5** | 4.5 | **19** | 4.5 |
| **6** | 4.5 | **20** | 4.5 |
| **7** | 4.5 | **21** | 4.5 |
| **8** | 4.5 | **22** | 3.5 |
| **9** | 4.5 | **23** | 4.5 |
| **10** | 4.5 | **24** | 4.5 |
| **11** | 4.5 | **25** | 4.5 |
| **12** | 4.5 | **26** | 0 |
| **13** | 4.5 | **27** | 4.1 |
| **14** | 4.5 | **28** | 4.1 |

**IC5 – TDA7266L**

| PIN | FM |
|---|---|
| **1** | 0 |
| **2** | 0 |
| **3** | 4.0 |
| **4** | 3.6 |
| **5** | 0 |
| **6** | 0 |
| **7** | 1.6 |
| **8** | 11 |
| **9** | 5.4 |
| **10** | 5.5 |

**IC6 – TC7S66FU**

| PIN | ST | MO |
|---|---|---|
| **1** | 1.8 | 1.8 |
| **2** | 1.8 | 1.8 |
| **3** | 0 | 0 |
| **4** | 1.8 | 0.3 |
| **5** | 1.1 | 1.1 |

**IC7 – NJM4580D**

| PIN | FM |
|---|---|
| **1** | 0 |
| **2** | 4.5 |
| **3** | 4.5 |
| **4** | 4.5 |
| **5** | 9.0 |
| **6** | 4.5 |
| **7** | 4.5 |
| **8** | 4.5 |

**IC8 – PT2308**

| PIN | FM |
|---|---|
| **1** | 2.7 |
| **2** | 2.7 |
| **3** | 2.7 |
| **4** | 0 |
| **5** | 2.7 |
| **6** | 2.7 |
| **7** | 2.7 |
| **8** | 5.4 |

**IC200 – H7805AM**

| PIN | FM |
|---|---|
| **1** | 5.0 |
| **2** | 0 |
| **3** | 8.9 |

**IC201 – XC62AP4002**

| PIN | FM |
|---|---|
| **1** | 0 |
| **2** | 4.8 |
| **3** | 4.0 |

**IC202 – TC9324F**

| PIN | FM | MW | LW | AUX | OFF |
|---|---|---|---|---|---|
| **1** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **2** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **3** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **4** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **5** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **6** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **7** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **8** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **9** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **10** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **11** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **12** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **13** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **14** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **15** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **16** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **17** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **18** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **19** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **20** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **21** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **22** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **23** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **24** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **25** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **26** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **27** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **28** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **29** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **30** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **31** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **32** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **33** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **34** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

| PIN | FM | MW | LW | AUX | OFF |
|---|---|---|---|---|---|
| **35** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **36** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **37** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **38** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| **39** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **40** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **41** | 0 | 0 | 0 | 0 | 0 |
| **42** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **43** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **44** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **45** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **46** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **47** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **48** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **49** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **50** | 0 | 0 | 0 | 0 | 4.0 |
| **51** | 0 | 0 | 0 | 0 | 4.0 |
| **52** | 0 | 4.0 | 4.0 | 0 | 4.0 |
| **53** | 4.0 | 0 | 4.0 | 0 | 4.0 |
| **54** | 4.0 | 4.0 | 0 | 0 | 0 |
| **55** | 0 | 0 | 0 | 0 | 0 |
| **56** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **57** | 0 | 0 | 0 | 0 | 0 |
| **58** | 0 | 0 | 0 | 0 | 0.5 |
| **59** | 0 | 0 | 0 | 0 | 0.2 |
| **60** | 0 | 0 | 0 | 0 | 2.2 |
| **61** | 0 | 0 | 0 | 0 | 0 |
| **62** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **63** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **64** | 4.0 | 0 | 0 | 4.0 | 0 |
| **65** | 4.1 | 4.0 | 0 | 4.0 | 4.1 |
| **66** | 0 | 0 | 4.0 | 0 | 0 |
| **67** | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 |
| **68** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |

| PIN | FM | MW | LW | AUX | OFF |
|---|---|---|---|---|---|
| **69** | 4.0 | 4.0 | 4.0 | 4.0 | 4.1 |
| **70** | 1.8 | 0 | 0 | 0 | 1.8 |
| **71** | 0 | 0 | 0 | 0 | 0 |
| **72** | 0 | 0 | 0 | 0 | 0 |
| **73** | 0 | 0 | 0 | 0 | 1.7 |
| **74** | 1.7 | 1.7 | 0 | 0 | 0 |
| **75** | 3.6 | 3.6 | 4.0 | 4.0 | 3.6 |
| **76** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **77** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| **78** | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 |
| **79** | 0 | 0 | 0 | 0 | 0 |
| **80** | 0 | 0 | 4.0 | 4.0 | 0 |
| **81** | 0 | 0 | 0 | 0 | 0 |
| **82** | 4.0 | 4.0 | 4.0 | 0 | 0 |
| **83** | 4.0 | 4.0 | 4.0 | 4.0 | 0 |
| **84** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **85** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **86** | 0 | 0 | 0 | 0 | 0 |
| **87** | 0 | 0 | 0 | 0 | 0 |
| **88** | 0 | 0 | 0 | 0 | 0 |
| **89** | 0 | 0 | 0 | 0 | 0 |
| **90** | 0 | 0 | 0 | 0 | 0 |
| **91** | 0 | 0 | 0 | 0 | 0 |
| **92** | 2.1 | 2.1 | 2.1 | 2.8 | 2.8 |
| **93** | 0 | 0 | 0 | 0 | 0 |
| **94** | 1.5 | 1.4 | 1.4 | 1.4 | 1.4 |
| **95** | 1.0 | 1.1 | 1.1 | 1.1 | 1.1 |
| **96** | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 |
| **97** | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| **98** | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 |
| **99** | 0 | 0 | 0 | 0 | 0 |
| **100** | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |

**IC203 – BU1924F**

| PIN | FM |
|---|---|
| **1** | 0 |
| **2** | 0 |
| **3** | 2.16 |
| **4** | 2.13 |
| **5** | 4.0 |
| **6** | 0.1 |
| **7** | 0.1 |
| **8** | 2.15 |
| **9** | 0.1 |
| **10** | 0.1 |
| **11** | 0.1 |
| **12** | 4.31 |
| **13** | 1.6 |
| **14** | 2.13 |
| **15** | 0 |
| **16** | 2.2 |

**IC204 – XC61CN2002MR**

| PIN | FM |
|---|---|
| **1** | 4.1 |
| **2** | 0.1 |
| **3** | 4.0 |

**IR200 – PNA4312M**

| PIN | FM |
|---|---|
| **VCC** | 5.0 |
| **GND** | 0 |
| **OUT** | 4.0 |

**Transistor**

| | | FM |
|---|---|---|
| Q8 | S | 3.2 |
| | G1 | 8.1 |
| | G2 | 5.06 |
| | D | 4.22 |
| Q11 | E | 9.1 |
| | B | 8.4 |
| | C | 9.1 |
| Q12 | E | 0 |
| | B | 1.6 |
| | C | 0.2 |
| Q13 | E | 0 |
| | B | 4.0 |
| | C | 0.1 |
| Q14 | E | 1.1 |
| | B | 0.1 |
| | C | 8.9 |
| Q15 | E | 3.8 |
| | B | 4.4 |
| | C | 9.0 |
| Q200 | E | 8.3 |
| | B | 8.9 |
| | C | 8.9 |
| Q201 | S | 0.2 |
| | G | 8.7 |
| | D | 0.6 |
| Q202 | E | 0 |
| | B | 0.6 |
| | C | 3.2 |

| | | FM | AM |
|---|---|---|---|
| Q1 | E | 8.6 | 9.0 |
| | B | 7.9 | 9.0 |
| | C | 8.5 | 2.0 |
| Q2 | E | 0 | 0 |
| | B | 0.1 | 3.6 |
| | C | 7.5 | 0 |
| Q3 | E | 8.6 | 9 |
| | B | 8.6 | 0 |
| | C | 7.88 | 9.0 |
| Q4 | E | 7.3 | 7.3 |
| | B | 7.7 | 7.8 |
| | C | 8.8 | 8.8 |
| Q5 | E | 0 | 0 |
| | B | 0.1 | 3.9 |
| | C | 8.6 | 0.6 |
| Q7 | E | 0 | 0 |
| | B | 0 | 0 |
| | C | 2.0 | 1.8 |

| | | OFF | FM |
|---|---|---|---|
| Q203 | E | 0 | 0 |
| | B | 3.6 | 0 |
| | C | 0.1 | 9 |
| Q206 | E | 9.0 | 8.9 |
| | B | 9.0 | 8.2 |
| | C | 0.2 | 8.9 |
| Q207 | E | 0 | 0 |
| | B | 4.0 | 0 |
| | C | 0.1 | 9 |

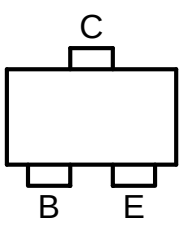
| | | MO | ST |
|---|---|---|---|
| Q207 | E | 0 | 0 |
| | B | 7.4 | 0 |
| | C | 0 | 4 |

| | | FM | AM | OFF |
|---|---|---|---|---|
| Q208 | E | 4.5 | 5.0 | 5.0 |
| | B | 4.1 | 4.0 | 0 |
| | C | 3.8 | 4.9 | 5.0 |
| Q209 | E | 4.5 | 5.0 | 5.0 |
| | B | 3.8 | 4.9 | 5.0 |
| | C | 4.3 | 0 | 0 |

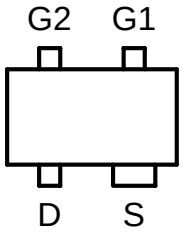
| | | HI | MIN | LOW | OFF |
|---|---|---|---|---|---|
| Q204 | E | 0.1 | 0.1 | 0.1 | 0.1 |
| | B | 4.1 | 4.1 | 0.18 | 0.1 |
| | C | 0.1 | 0.1 | 3.46 | 4.4 |
| Q205 | E | 4.1 | 0.2 | 4.1 | 0.1 |
| | B | 0.1 | 0.1 | 0.1 | 0.1 |
| | C | 0.1 | 2.62 | 0.1 | 0.6 |

# SEMICONDUCTOR LEAD IDENTIFICATIONS

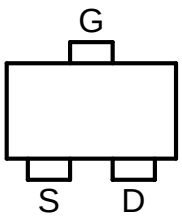
## Transistors



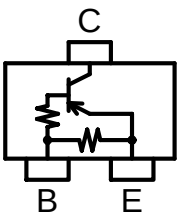

2SA812
2SB1295
2SC1623
2SC4081
2SC4154




3SK263



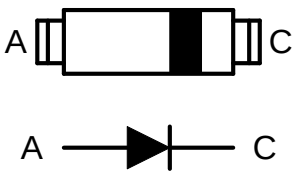

2SK433B



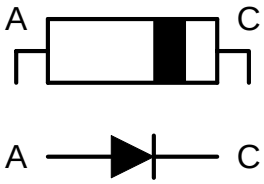

UNR5110
UNR5113
UNR5210
UNR5211

(E:Emitter C:Collector B:Base)

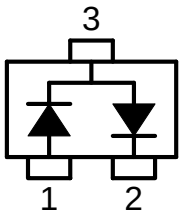
## Diodes



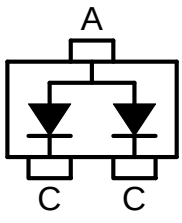

1SS367
1SS314



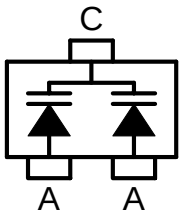

FR204




BAV99



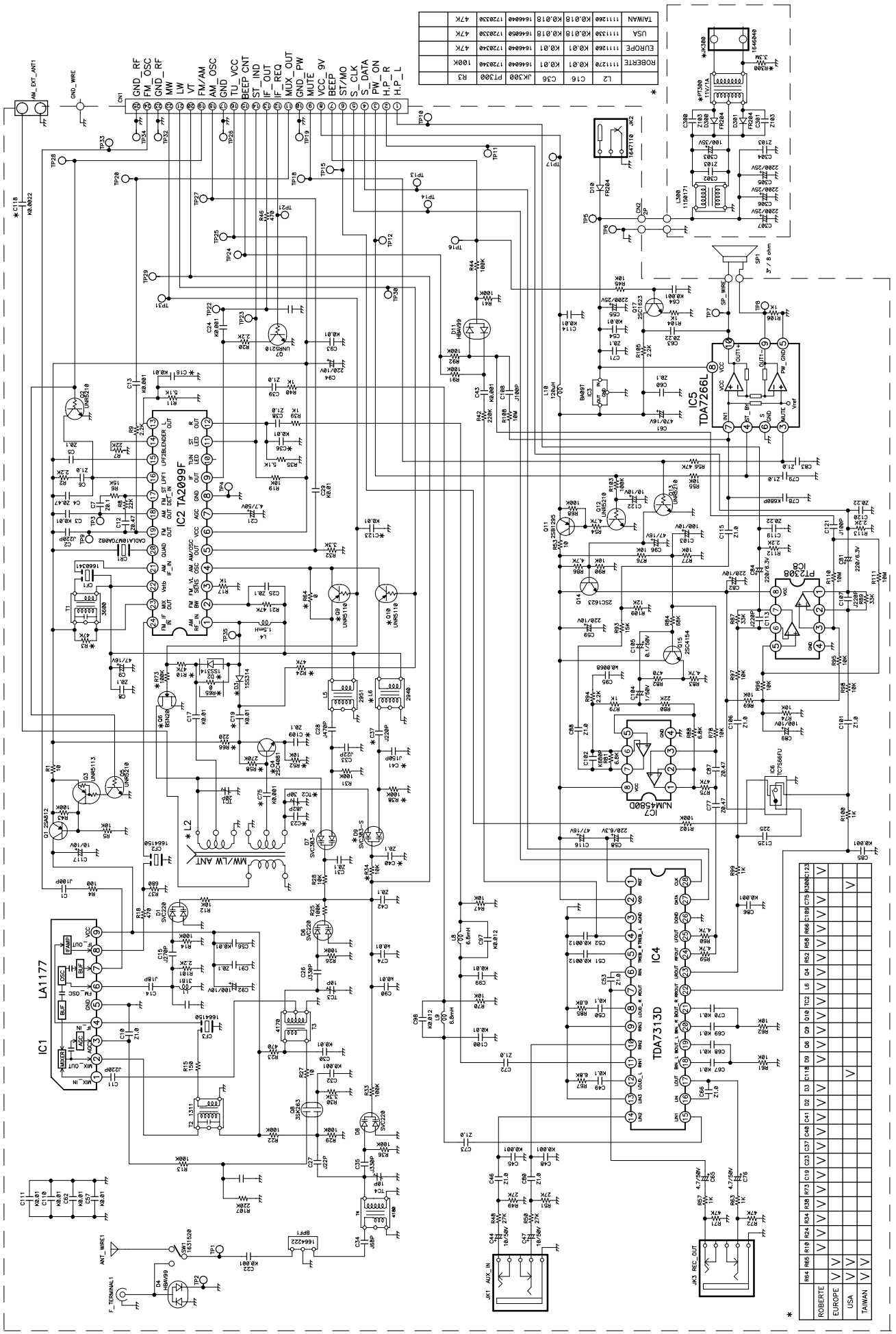

WAP200U




SVC220
SVC383

(A:Anode C:Cathode)

# MAIN SCHEMATIC DIAGRAM




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| TAIWAN | 1111260 | K0.018 | K0.018 | 1646040 | 1720330 | 47K | |
| USA | 1111320 | K0.018 | K0.018 | 1646050 | 1720330 | 47K | |
| EUROPE | 1111260 | K0.01 | K0.01 | 1646040 | 1720340 | 47K | |
| ROBERTE | 1111270 | K0.01 | K0.01 | 1646040 | 1720340 | 100K | |
| | L2 | C16 | C36 | JK300 | PT300 | R3 | |

| | R64 | R65 | R10 | R24 | R34 | R38 | R73 | C19 | C23 | C37 | C40 | C41 | D2 | D3 | C118 | D9 | Q6 | Q9 | Q10 | IC2 | L6 | Q4 | IC3 | C75 | R108 | C123 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROBERTE | | | V | V | V | V | V | V | V | V | V | V | V | V | | V | V | V | V | V | V | V | V | V | V | V |
| EUROPE | V | | | | | | | | | | | | | | | | | | | | | | | | | |
| USA | V | | | | | | | | | | | | | | V | | | | | | | | | | | |
| TAIWAN | V | V | | | | | | | | | | | | | | | | | | | | | | | | |

# CONTROL SCHEMATIC DIAGRAM

