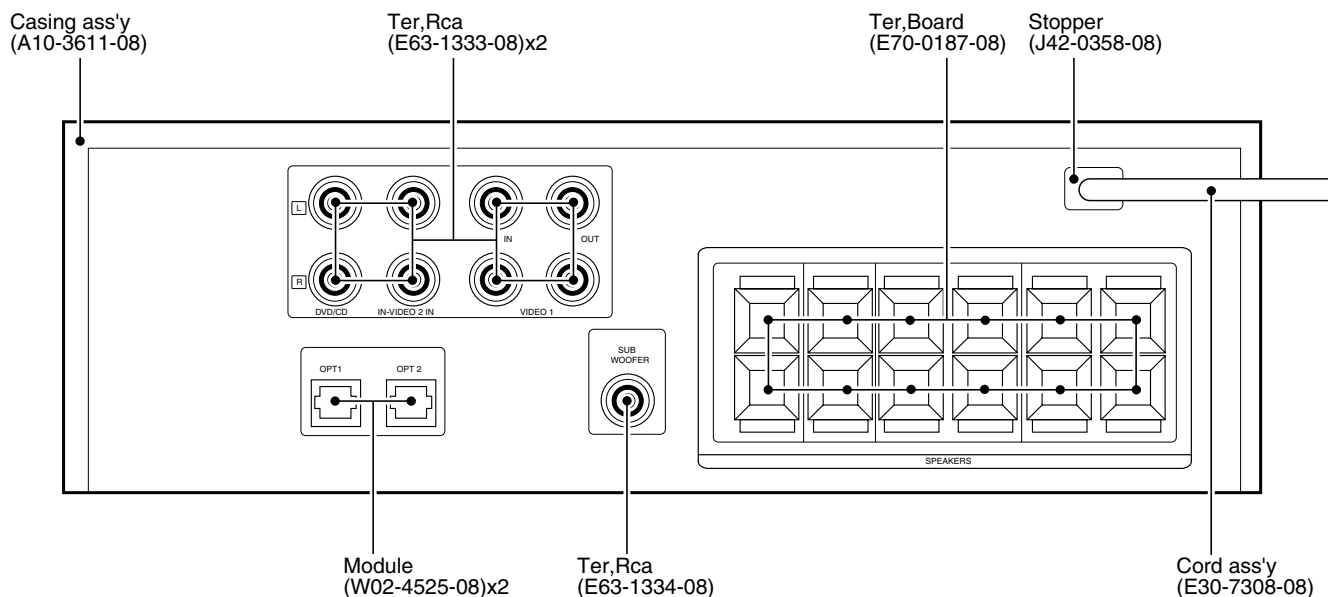
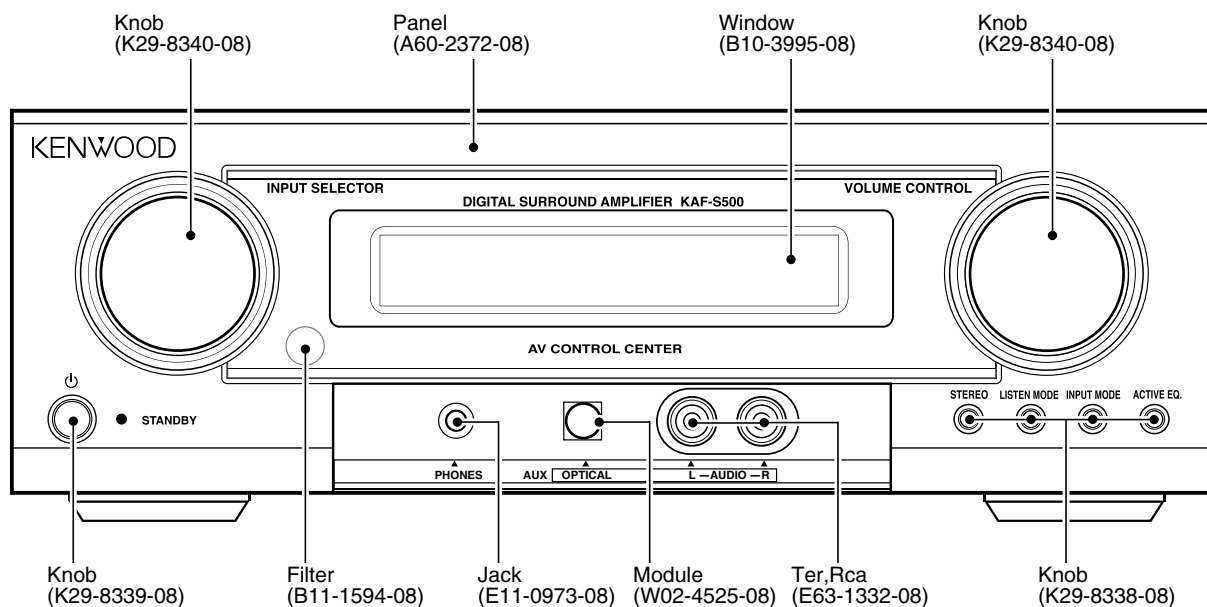


# KAF-S500

## SERVICE MANUAL

(HTB-S500DV)



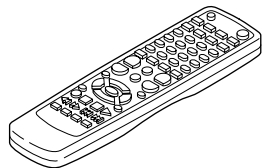
**Caution** : No connection of ground line if disassemble the unit. Please connect the ground line on rear panel, PCBs, Chassis and some others.

# KAF-S500

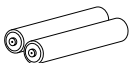
## ACCESSORIES / CAUTIONS

### Accessories

Remote control unit (1)  
(A70-1644-08)



Batteries (R03/AAA) (2)



| SYSTEM     | AMPLIFIER | DVD PLAYER | SPEAKERS |
|------------|-----------|------------|----------|
| HTB-S500DV | KAF-S500  | DVF-S500   | KSW-S500 |

### Cautions

#### Resetting the Microcomputer

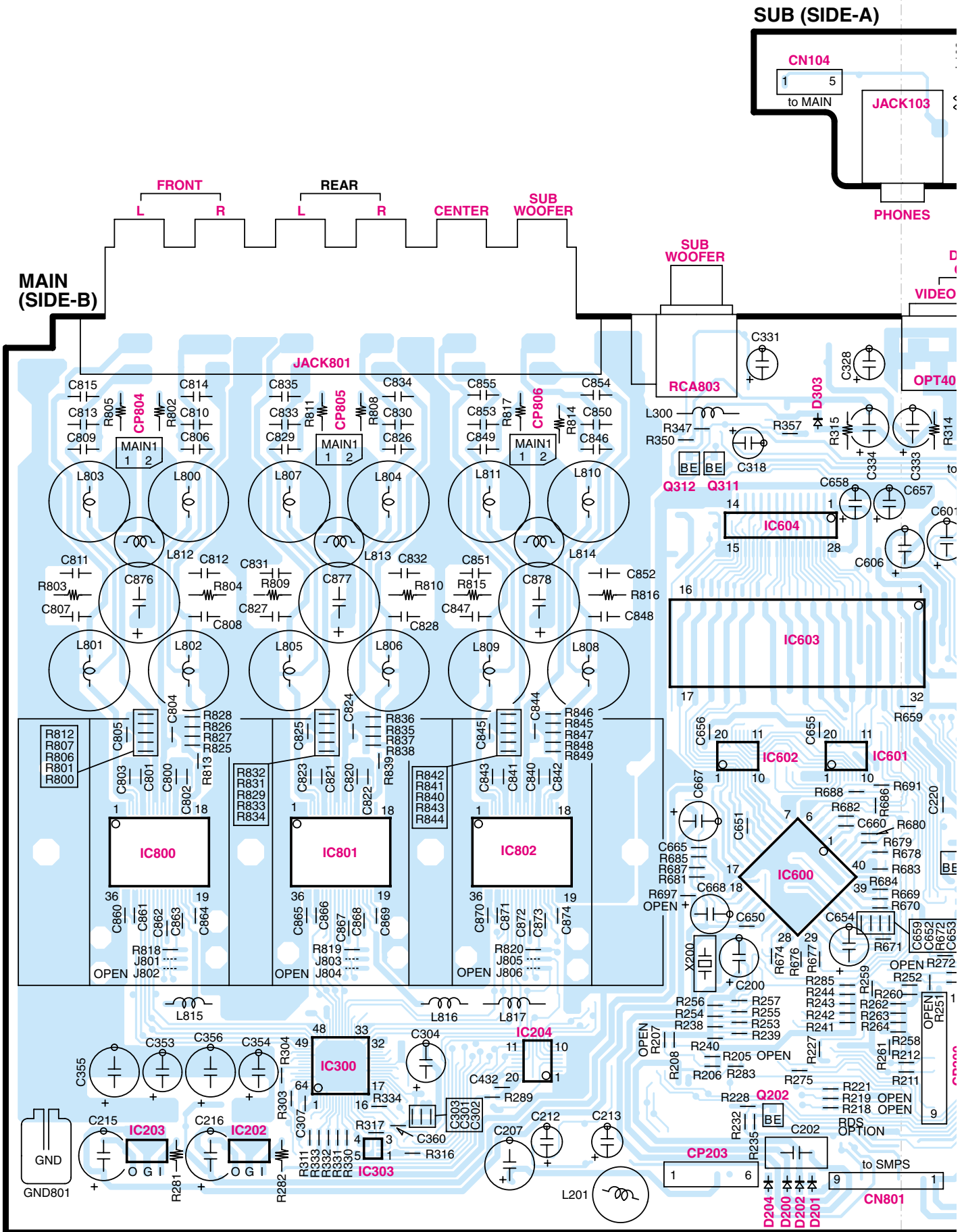
The microcomputer may malfunction (unit cannot be operated, or shows an erroneous display) if the power cord is unplugged while the power is ON, or due to some other external factor. If this happens, execute the following procedure to reset the microcomputer and return the unit to its normal operating condition.

**Unplug the power cord after turn the POWER key OFF. Then, while holding down the POWER key, plug the power cord.**

- Please note that resetting the microcomputer will clear the contents of the memory and returns the unit to the state it was in when it left the factory.



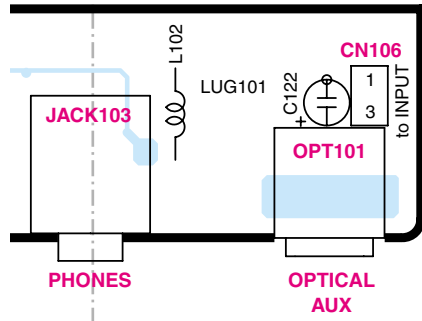
# PC BOARD



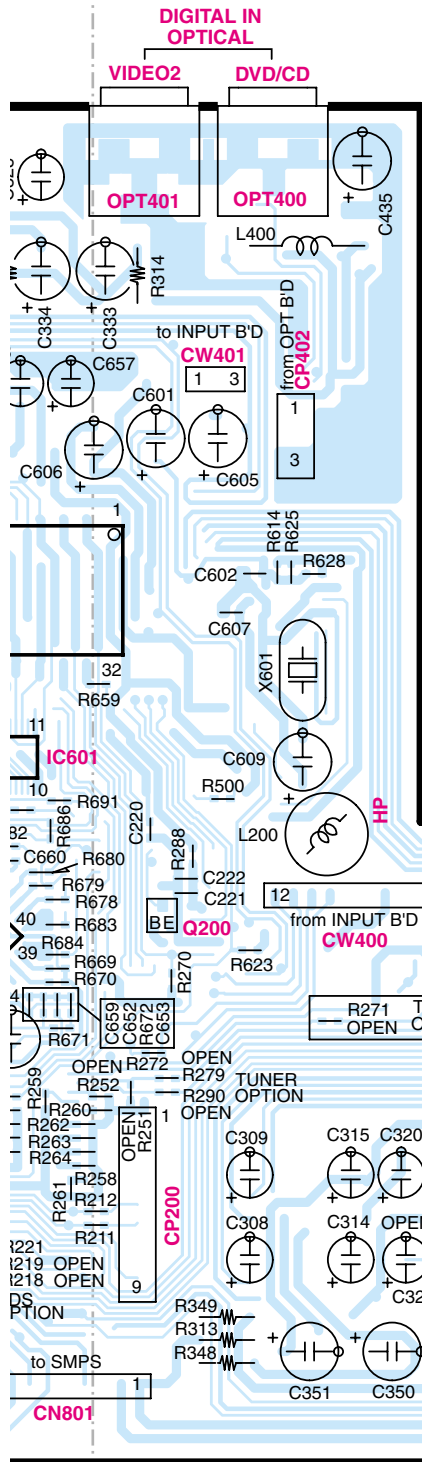
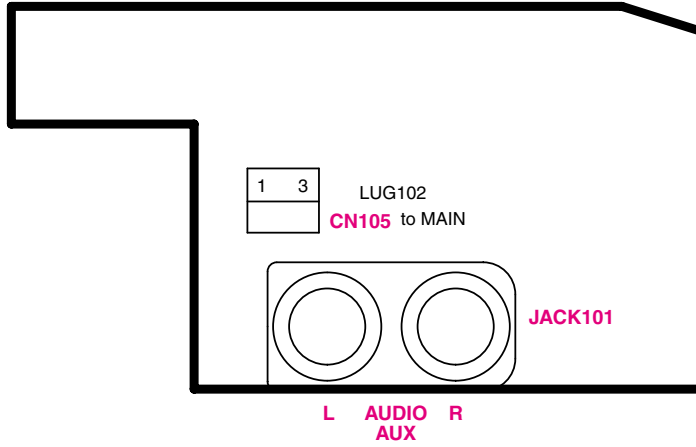
Refer to the schematic diagram for the value of resistors and capacitors.

# PC BOARD

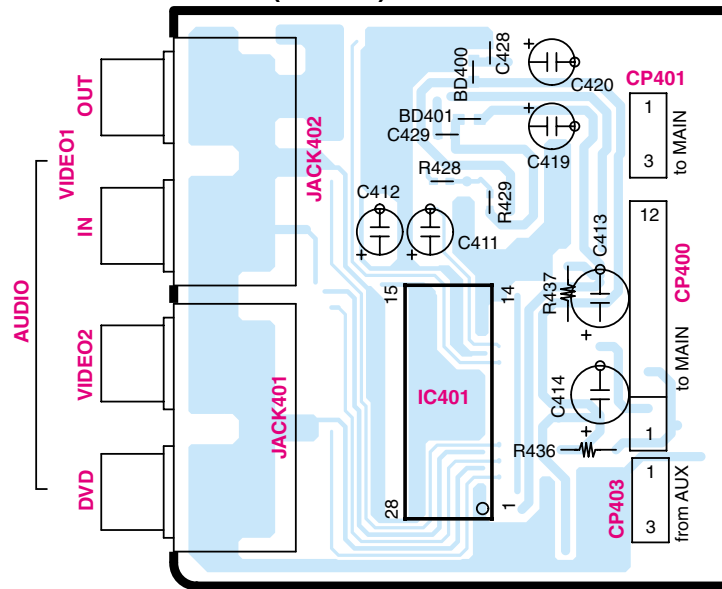
:-A)



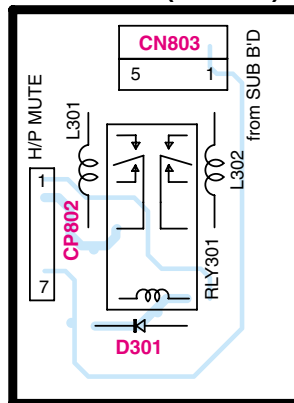
AUX (SIDE-B)



INPUT (SIDE-B)



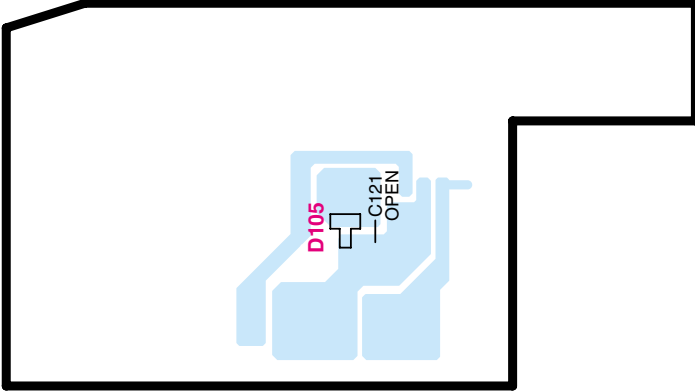
H/P MUTE (SIDE-B)



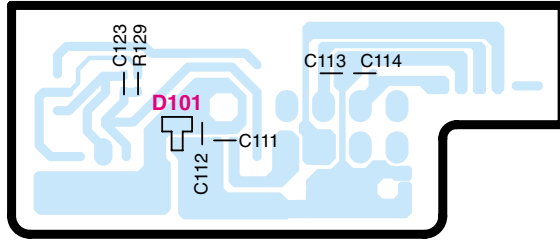
Refer to the schematic diagram for the value of resistors and capacitors.

# PC BOARD

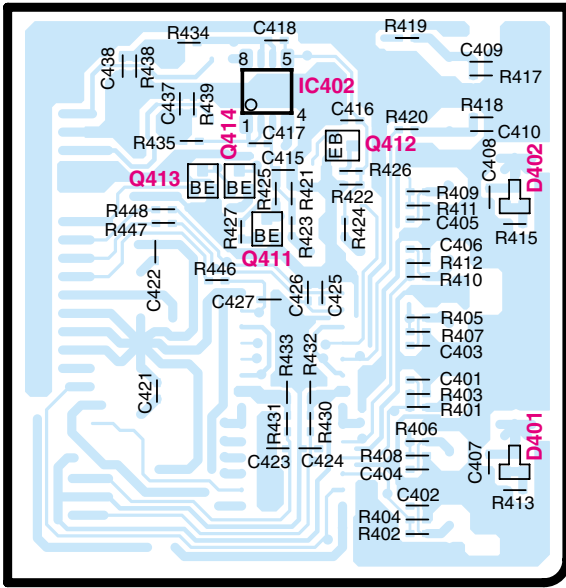
## AUX (SIDE-B)



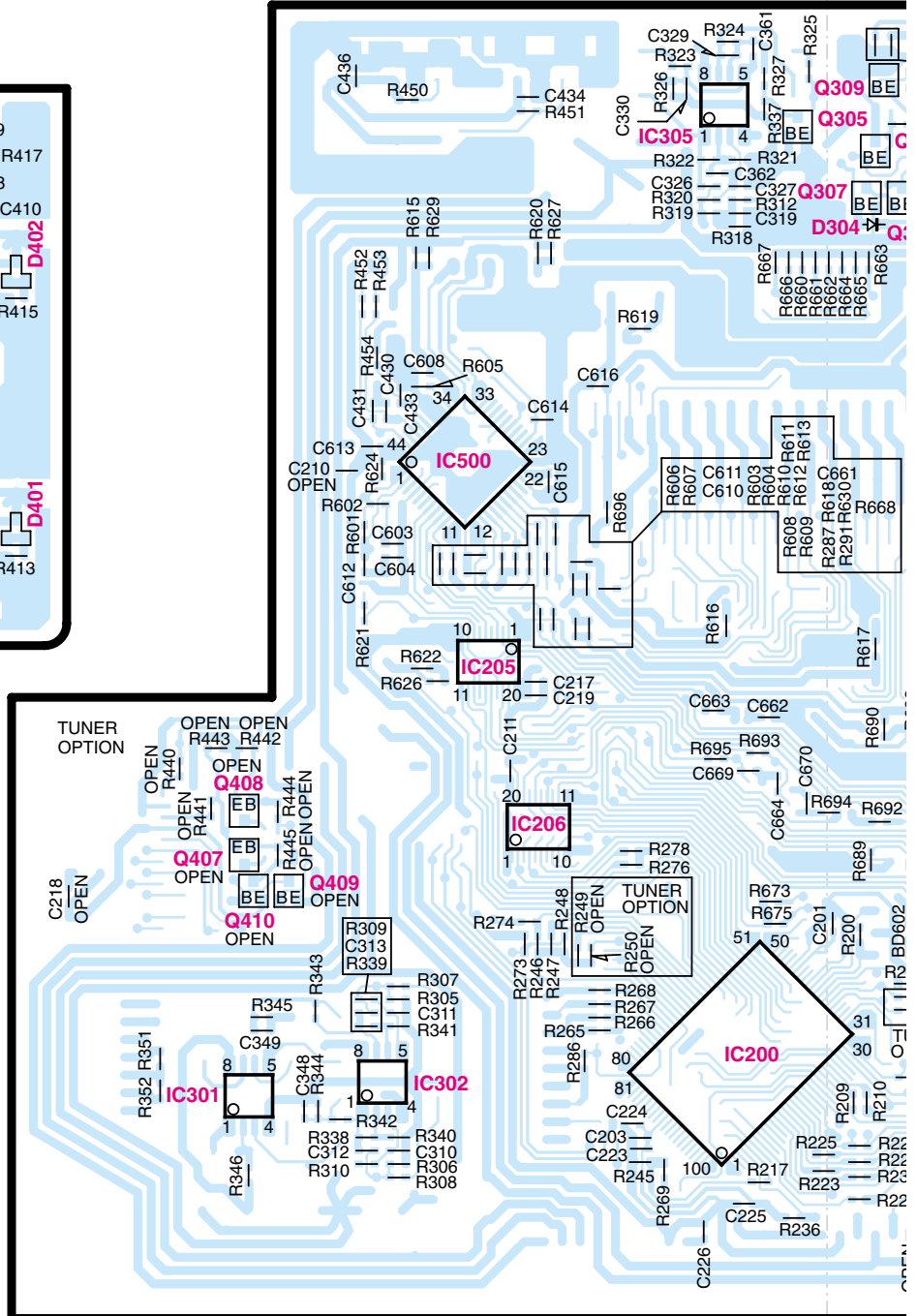
## SUB (SIDE-B)



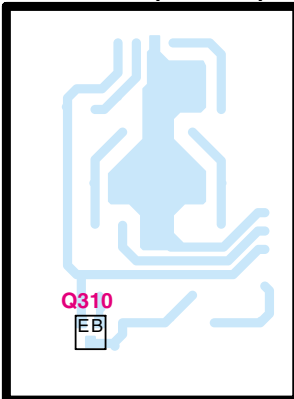
## INPUT (SIDE-B)



## MAIN (SIDE-B)



## H/P MUTE (SIDE-B)

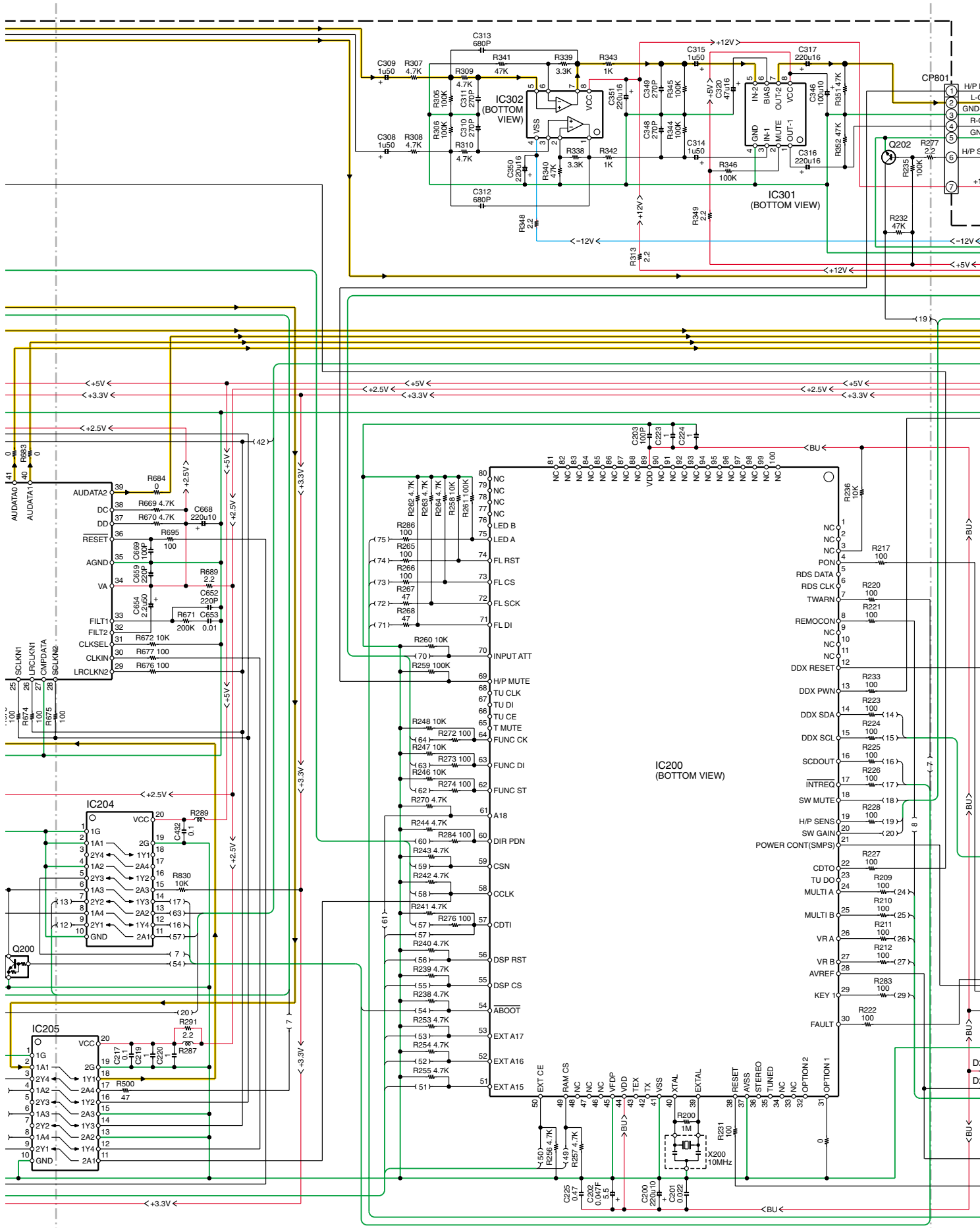




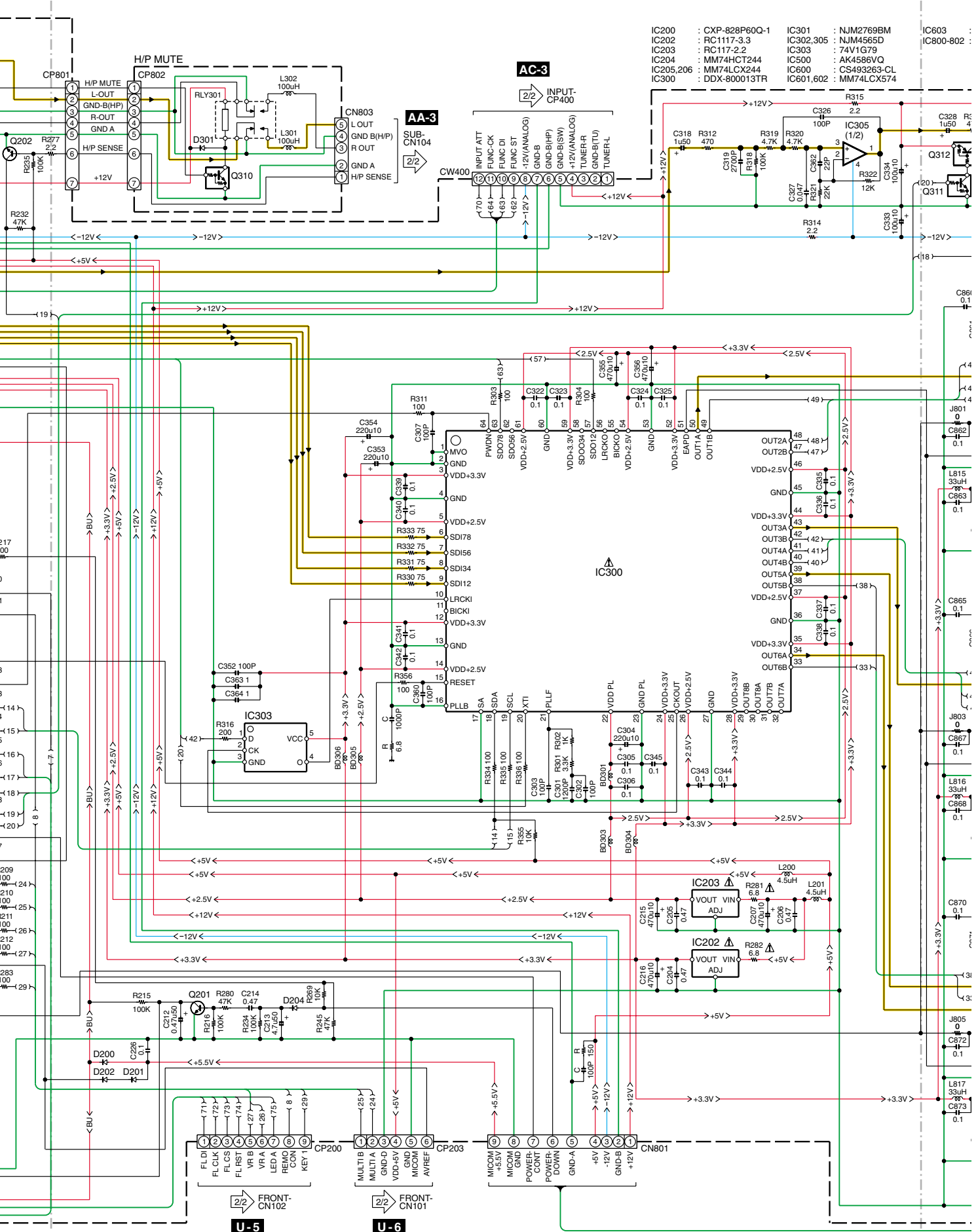




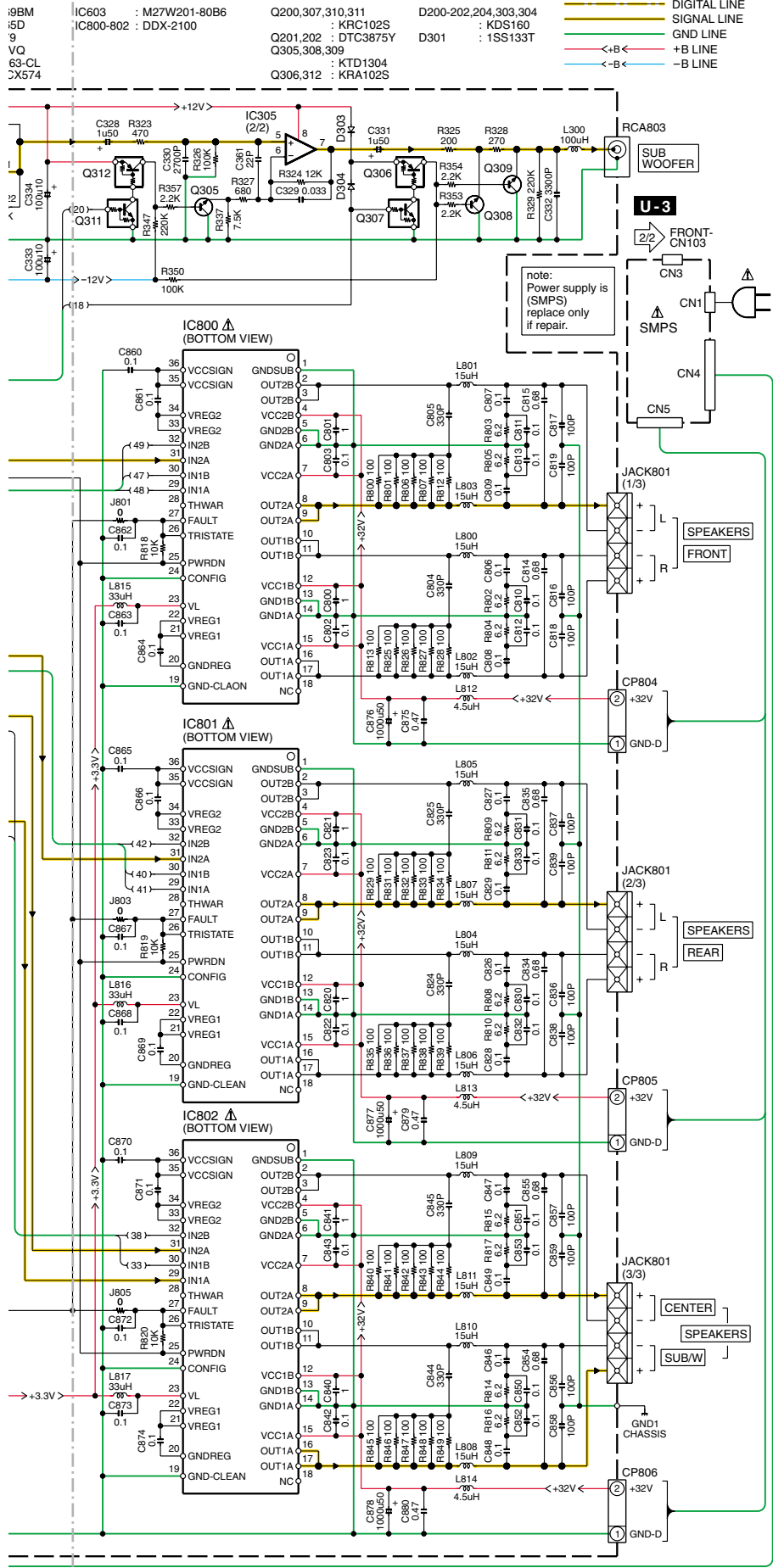
# KAF-S500



# KAF-S500



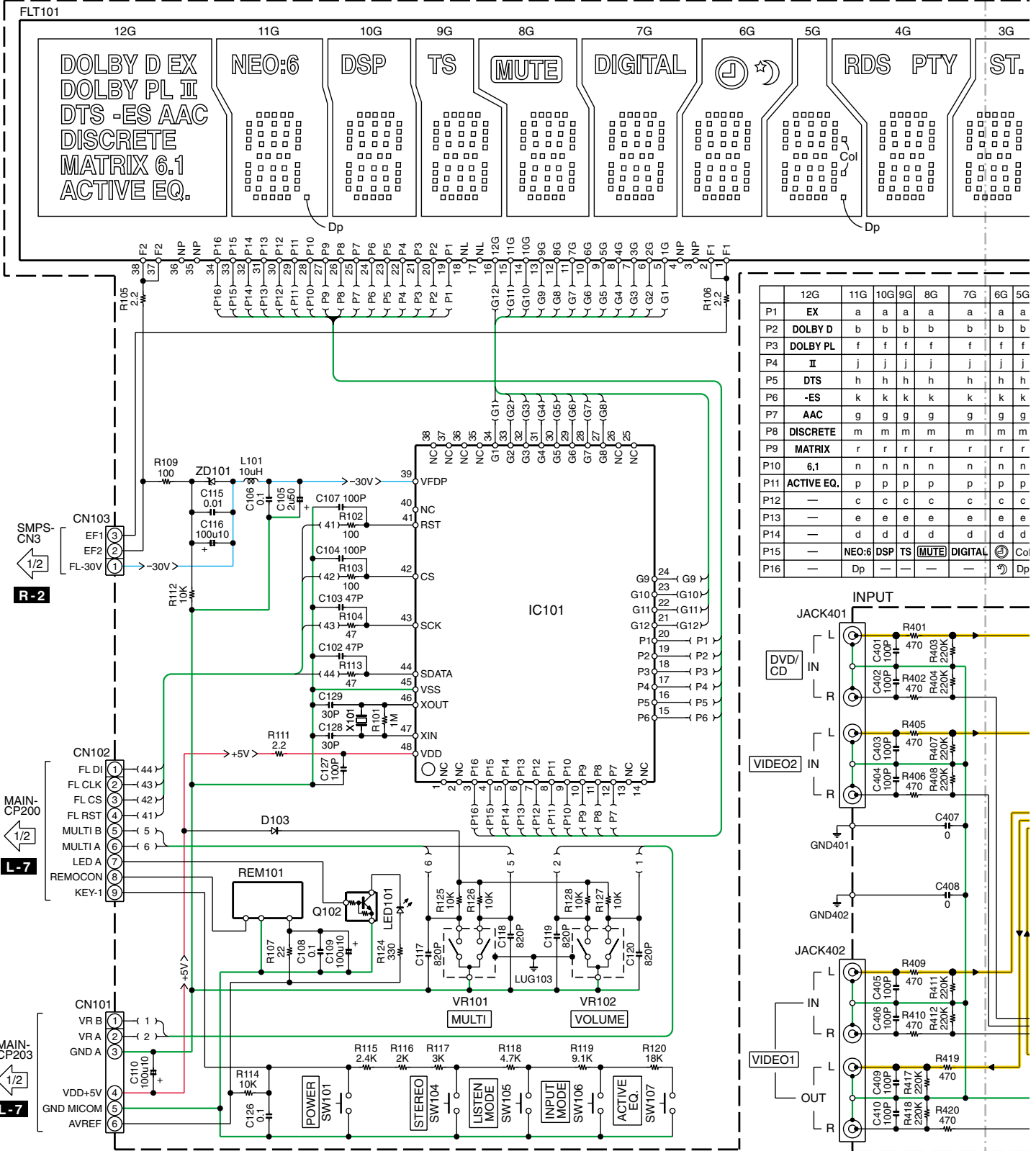
|           |                 |           |               |           |   |
|-----------|-----------------|-----------|---------------|-----------|---|
| IC200     | : CXP-828P60Q-1 | IC301     | : NUM2769BM   | IC603     | : |
| IC202     | : RC1117-3.3    | IC302,305 | : NUM4565D    | IC800-802 | : |
| IC203     | : RC1117-2.2    | IC303     | : 74V1G79     |           |   |
| IC204     | : MM74HCT244    | IC500     | : AK4586VQ    |           |   |
| IC205,206 | : MM74LXC244    | IC600     | : C5493263-CL |           |   |
| IC300     | : DDX-800013TR  | IC601,602 | : MM74LXC574  |           |   |



KAF-S500 (1/2)

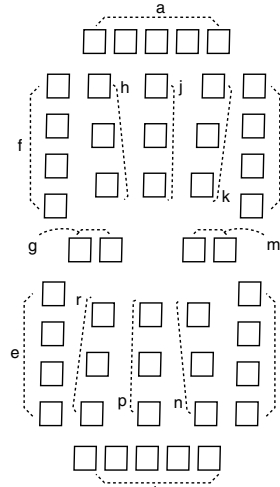
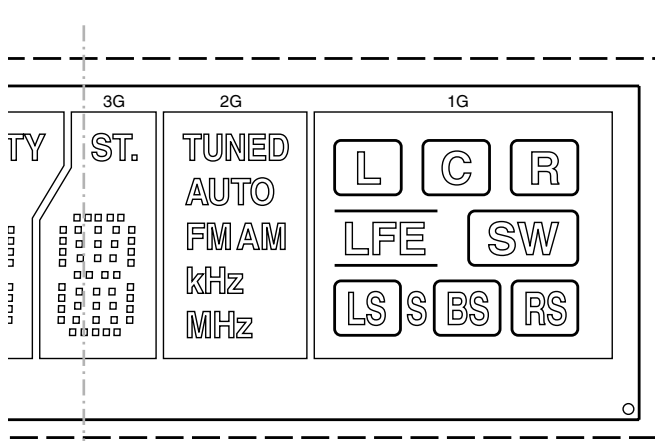
# KAF-S500

FRONT

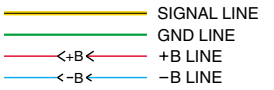


**CAUTION:** For continued safety, replace safety critical components only with manufacturer's recommended parts (refer to parts list).  $\Delta$  indicates safety critical components. For continued protection against risk of fire, replace only with same type and rating fuse(s). To reduce the risk of electric shock, leakage-current or resistance measurements shall be carried out (exposed parts are acceptably insulated from the supply circuit) before the appliance is returned to the customer.

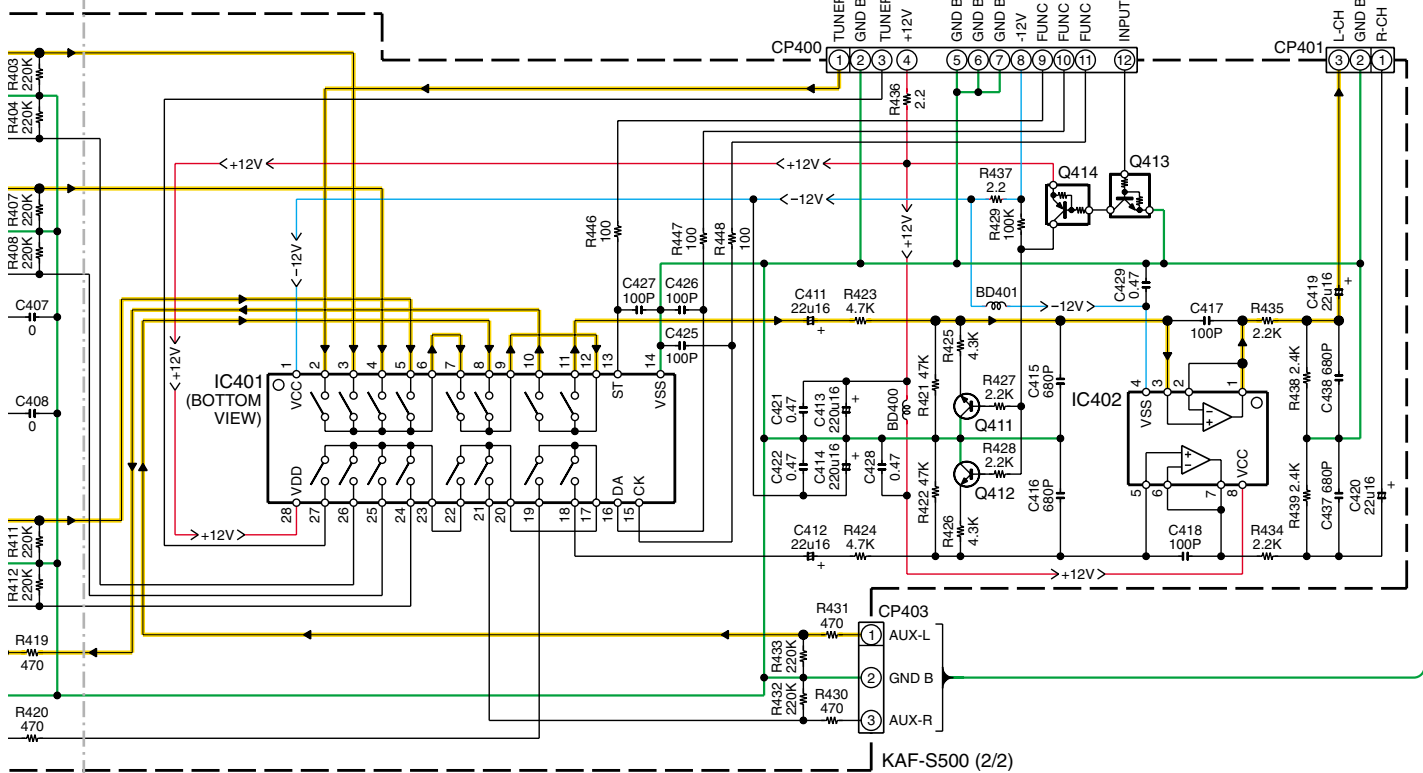
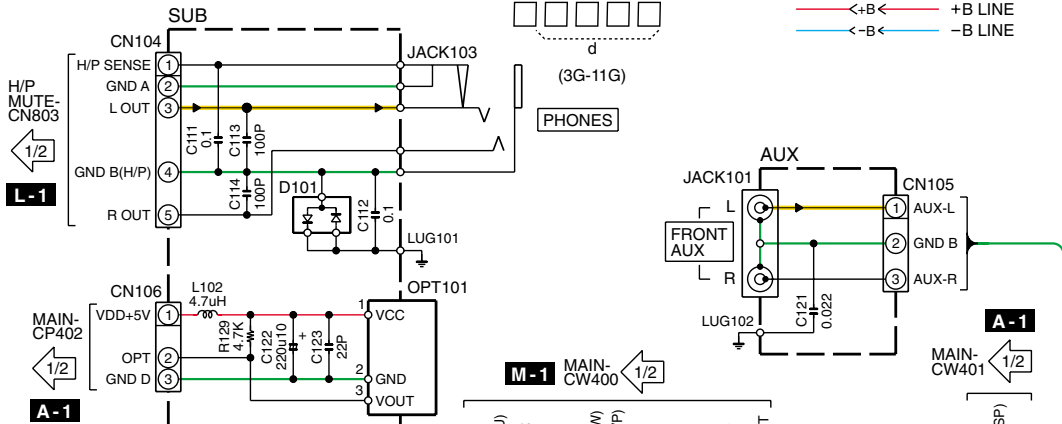
# KAF-S500



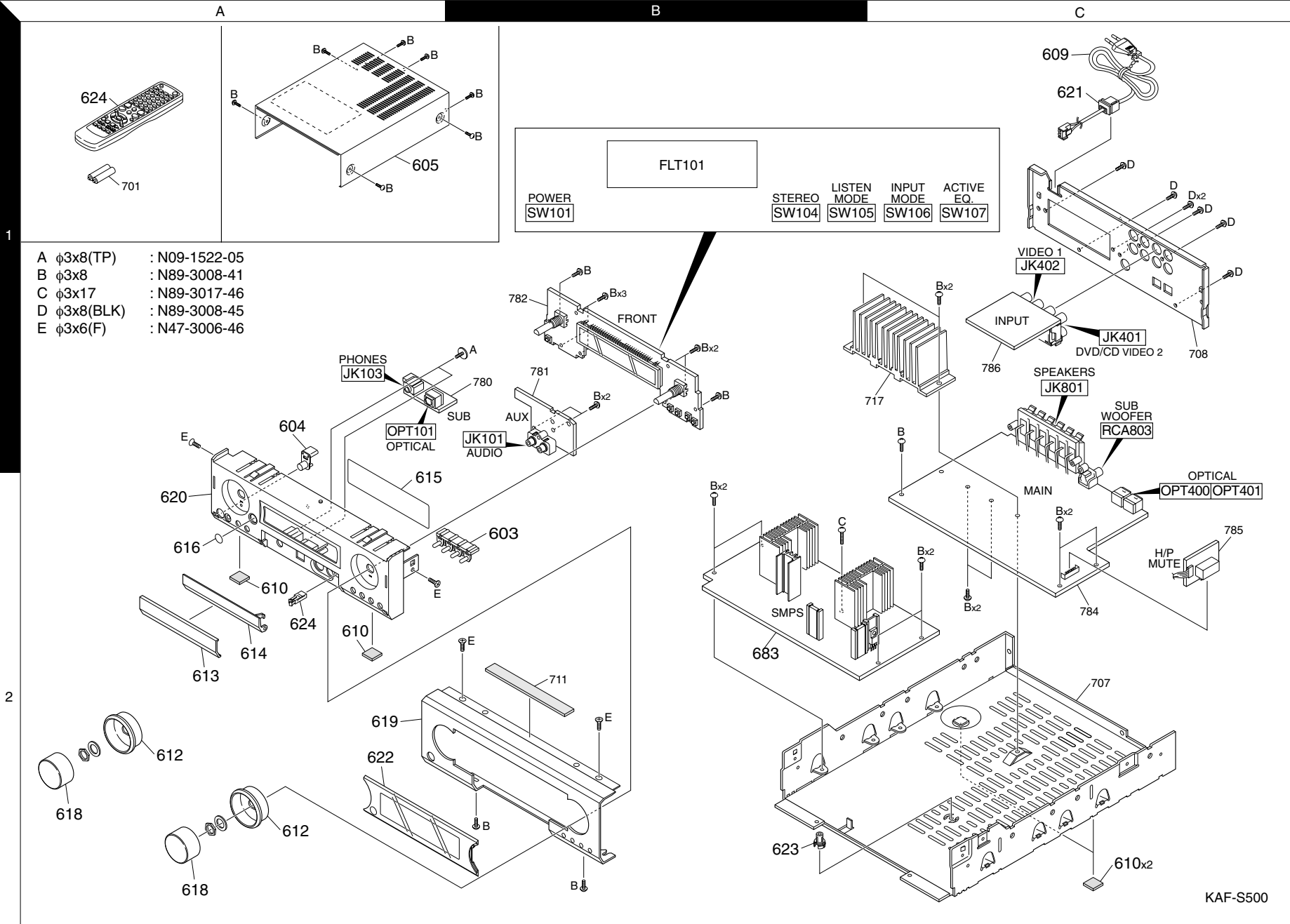
- IC101 : NJU3426FP1
- IC401 : NJU7313AL
- IC402 : NJM4565MD
- Q102,413 : KRC102S
- Q411,412 : KTD1304
- Q414 : KRA102S
- D101 : KDS226ST1
- D103 : KDS160
- ZD101 : MTZ6.8B
- LED101 : B30-2633-08



|         |    |     |    |     |      |    |      |
|---------|----|-----|----|-----|------|----|------|
| G       | 7G | 6G  | 5G | 4G  | 3G   | 2G | 1G   |
| a       | a  | a   | a  | a   | a    | -  | R    |
| b       | b  | b   | b  | b   | b    | -  | (R)  |
| f       | f  | f   | f  | f   | f    | -  | C    |
| j       | j  | j   | j  | j   | j    | -  | (C)  |
| h       | h  | h   | h  | h   | h    | -  | L    |
| k       | k  | k   | k  | k   | k    | -  | (L)  |
| g       | g  | g   | g  | g   | g    | -  | SW   |
| m       | m  | m   | m  | m   | m    | -  | (SW) |
| r       | r  | r   | r  | r   | r    | -  | LFE  |
| n       | n  | n   | n  | n   | n    | -  | RS   |
| p       | p  | p   | p  | p   | p    | -  | (RS) |
| c       | c  | c   | c  | c   | c    | -  | AUTO |
| e       | e  | e   | e  | e   | e    | -  | BS   |
| d       | d  | d   | d  | d   | d    | -  | AM   |
| -       | -  | -   | -  | -   | -    | -  | S    |
| DIGITAL | Co | RDS | ST | kHz | LS   | -  | -    |
| -       | Dp | PTY | -  | MHz | (LS) | -  | -    |



The DC voltage is an actual reading measured with a high impedance type voltmeter with no signal input. The measurement value may vary depending on the measuring instruments used or on the product.



- A  $\phi$ 3x8(TP) : N09-1522-05
- B  $\phi$ 3x8 : N89-3008-41
- C  $\phi$ 3x17 : N89-3017-46
- D  $\phi$ 3x8(BLK) : N89-3008-45
- E  $\phi$ 3x6(F) : N47-3006-46

Parts with exploded numbers larger than 700 are not supplied.

\* New Parts  
Parts without **Parts No.** are not supplied.  
Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.  
Teile ohne **Parts No.** werden nicht geliefert.

1

| Ref. No               | Address | New Parts | Parts No.     | Description   | Destination    | Remarks |
|-----------------------|---------|-----------|---------------|---------------|----------------|---------|
| <b>KAF-S500</b>       |         |           |               |               |                |         |
| -                     |         | *         | B60-5392-08   | INSTRUCTION M | 5707047420130  |         |
| -                     |         | *         | H10-7913-08   | CUSHION,SNOW  | 6230210774000  |         |
| -                     |         | *         | H50-4856-08   | BOX,GIFT      | 6007210570010  |         |
| 603                   | 2B      | *         | K29-8338-08   | KNOB          | 5097212121000Z |         |
| 604                   | 1A      | *         | K29-8339-08   | KNOB          | 5097212131000Z |         |
| 605                   | 1A      | *         | A10-3611-08   | CASING ASSY   | 1018MM0301030  |         |
| 609                   | 1C      | *         | E30-7308-08   | CORD ASSY     | L068000000130  |         |
| 610                   | 2A,2C   | *         | G11-2926-08   | CUSHION       | 4050210875000  |         |
| 612                   | 2A      | *         | B07-2684-08   | DECORATION    | 5127210411000Z |         |
| 613                   | 2A      | *         | A52-1002-08   | DOOR          | 5047210338010  |         |
| 614                   | 2A      | *         | A13-3225-08   | DOOR FRAME    | 5047210341000  |         |
| 615                   | 2A      | *         | B11-1593-08   | FILTER        | 5200210142000  |         |
| 616                   | 2A      | *         | B11-1594-08   | FILTER        | 5200210152000  |         |
| 618                   | 2A      | *         | K29-8340-08   | KNOB          | 5087210038000Z |         |
| 619                   | 2A      | *         | A60-2372-08   | PANEL         | 3067211328000  |         |
| 620                   | 2A      | *         | A22-1894-08   | PANEL         | 3067211331000  |         |
| 621                   | 1C      | *         | J42-0358-08   | STOPPER       | 4380040172010  |         |
| 622                   | 2A      | *         | B10-3995-08   | WINDOW        | 5077211023000  |         |
| 623                   | 2B      | *         | J19-6161-08   | SPACER        | 4300040561010  |         |
| 624                   | 1A      | *         | A70-1644-08   | REMOCON       | E940633800000  |         |
| 683                   | 2B      | *         | W02-4531-08   | POWER SUPPLY  | 8208000190010  |         |
| A                     |         |           | N09-1522-05   | SCREW         | 1500001456010  |         |
| B                     |         |           | N89-3008-41   | SCREW         | B020030084B10  |         |
| <b>ELECTRIC PARTS</b> |         |           |               |               |                |         |
| LED101                |         |           | B30-2633-08   | LED           | K500032000100  |         |
| C102,103              |         |           | CC73GCH1H470J | CHIP C        | 47PF J         |         |
| C104                  |         |           | CC73GCH1H101J | CHIP C        | 100PF J        |         |
| C105                  |         |           | CE04LW1H220M  | ELECTRO       | 22UF 50WV      |         |
| C106                  |         |           | CK73GB1H104Z  | CHIP C        | 0.10UF Z       |         |
| C107                  |         |           | CC73GCH1H101J | CHIP C        | 100PF J        |         |
| C108                  |         |           | CK73GB1H104Z  | CHIP C        | 0.10UF Z       |         |
| C109,110              |         |           | CE04LW1A101M  | ELECTRO       | 100UF 10WV     |         |
| C111,112              |         |           | CK73GB1H104K  | CHIP C        | 0.10UF K       |         |
| C113,114              |         |           | CC73GCH1H101J | CHIP C        | 100PF J        |         |
| C115                  |         |           | CK73GB1H103K  | CHIP C        | 0.010UF K      |         |
| C116                  |         |           | CE04LW1A101M  | ELECTRO       | 100UF 10WV     |         |
| C117-120              |         |           | CK73GB1H821K  | CHIP C        | 820PF K        |         |
| C121                  |         |           | CK73GB1E223K  | CHIP C        | 0.022UF K      |         |
| C122                  |         |           | CE04LW1A221M  | ELECTRO       | 220UF 10WV     |         |
| C123                  |         |           | CC73GCH1H220J | CHIP C        | 22PF J         |         |
| C126                  |         |           | CK73GB1H104Z  | CHIP C        | 0.10UF Z       |         |
| C127                  |         |           | CC73GCH1H101J | CHIP C        | 100PF J        |         |
| C128,129              |         |           | CC73GCH1H300J | CHIP C        | 30PF J         |         |
| C200                  |         |           | CE04LW1A221M  | ELECTRO       | 220UF 10WV     |         |
| C201                  |         |           | CK73GB1E223K  | CHIP C        | 0.022UF K      |         |
| C202                  |         | *         | C90-5800-08   | BACKUP C      | 0.047F 5.5V    |         |
| C203                  |         |           | CC73GCH1H101J | CHIP C        | 100PF J        |         |
| C204-206              |         |           | CK73GB1A474K  | CHIP C        | 0.47UF K       |         |
| C207                  |         |           | CE04LW1A471M  | ELECTRO       | 470UF 10WV     |         |
| C211                  |         |           | CK73GB1H104K  | CHIP C        | 0.10UF K       |         |
| C212                  |         |           | CE04LW1HR47M  | ELECTRO       | 0.47UF 50WV    |         |
| C213                  |         |           | CE04LW1H4R7M  | ELECTRO       | 4.7UF 50WV     |         |

L: Scandinavia K: USA P: Canada R: Mexico C: China I: Malaysia  
Y: PX(Far East, Hawaii) T: England E: Europe G: Germany V: China (Shanghai)  
Y: AAFES(Europe) X: Australia Q: Russia H: Korea M: Other Areas Δ indicates safety critical components.

\* New Parts  
Parts without **Parts No.** are not supplied.  
Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.  
Teile ohne **Parts No.** werden nicht geliefert.

2

| Ref. No  | Address | New Parts | Parts No.     | Description | Destination | Remarks |
|----------|---------|-----------|---------------|-------------|-------------|---------|
| C214     |         |           | CK73GB1A474K  | CHIP C      | 0.47UF K    |         |
| C215,216 |         |           | CE04LW1A471M  | ELECTRO     | 470UF 10WV  |         |
| C217     |         |           | CK73GB1H104K  | CHIP C      | 0.10UF K    |         |
| C219-224 |         |           | CK73GB1H105Z  | CHIP C      | 1.0UF Z     |         |
| C225     |         |           | CK73GB1A474K  | CHIP C      | 0.47UF K    |         |
| C226     |         |           | CK73GB1H104K  | CHIP C      | 0.10UF K    |         |
| C301     |         |           | CK73GB1H122K  | CHIP C      | 1200PF K    |         |
| C302,303 |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C304     |         |           | CE04LW1A221M  | ELECTRO     | 220UF 10WV  |         |
| C305,306 |         |           | CK73GB1H104K  | CHIP C      | 0.10UF K    |         |
| C307     |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C308,309 |         |           | CE04LW1H010M  | ELECTRO     | 1.0UF 50WV  |         |
| C310,311 |         |           | CC73GCH1H271J | CHIP C      | 270PF J     |         |
| C312,313 |         |           | CK73GB1H681K  | CHIP C      | 680PF K     |         |
| C314,315 |         |           | CE04LW1H010M  | ELECTRO     | 1.0UF 50WV  |         |
| C316,317 |         |           | CE04LW1C221M  | ELECTRO     | 220UF 16WV  |         |
| C318     |         |           | CE04LW1H010M  | ELECTRO     | 1.0UF 50WV  |         |
| C319     |         |           | CK73GB1H272K  | CHIP C      | 2700PF K    |         |
| C320     |         |           | CE04LW1C470M  | ELECTRO     | 47UF 16WV   |         |
| C322-325 |         |           | CK73GB1H104K  | CHIP C      | 0.10UF K    |         |
| C326     |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C327     |         |           | CK73GB1H473K  | CHIP C      | 0.047UF K   |         |
| C328     |         |           | CE04LW1H010M  | ELECTRO     | 1.0UF 50WV  |         |
| C329     |         |           | CK73GB1H333K  | CHIP C      | 0.033UF K   |         |
| C330     |         |           | CK73GB1H272K  | CHIP C      | 2700PF K    |         |
| C331     |         |           | CE04LW1H010M  | ELECTRO     | 1.0UF 50WV  |         |
| C332     |         |           | CK73GB1H332K  | CHIP C      | 3300PF K    |         |
| C333,334 |         |           | CE04LW1A101M  | ELECTRO     | 100UF 10WV  |         |
| C335-345 |         |           | CK73GB1H104K  | CHIP C      | 0.10UF K    |         |
| C346     |         |           | CE04LW1A101M  | ELECTRO     | 100UF 10WV  |         |
| C348,349 |         |           | CC73GCH1H271J | CHIP C      | 270PF J     |         |
| C350,351 |         |           | CE04LW1C221M  | ELECTRO     | 220UF 16WV  |         |
| C352     |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C353,354 |         |           | CE04LW1A221M  | ELECTRO     | 220UF 10WV  |         |
| C355,356 |         |           | CE04LW1A471M  | ELECTRO     | 470UF 10WV  |         |
| C360     |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C361,362 |         |           | CC73GCH1H220J | CHIP C      | 22PF J      |         |
| C363,364 |         |           | CK73GB1H105Z  | CHIP C      | 1.0UF Z     |         |
| C401-406 |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C407,408 |         |           | RK73GB1J000J  | CHIP R      | 0.0 J 1/16W |         |
| C409,410 |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C411,412 |         |           | CE04LW1C220M  | ELECTRO     | 22UF 16WV   |         |
| C413,414 |         |           | CE04LW1C221M  | ELECTRO     | 220UF 16WV  |         |
| C415,416 |         |           | CK73GB1H681K  | CHIP C      | 680PF K     |         |
| C417,418 |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C419,420 |         |           | CE04LW1C220M  | ELECTRO     | 22UF 16WV   |         |
| C421,422 |         |           | CK73GB1A474K  | CHIP C      | 0.47UF K    |         |
| C425-427 |         |           | CC73GCH1H101J | CHIP C      | 100PF J     |         |
| C428,429 |         |           | CK73GB1A474K  | CHIP C      | 0.47UF K    |         |
| C430,431 |         |           | CC73GCH1H120J | CHIP C      | 12PF J      |         |
| C432     |         |           | CK73GB1H104K  | CHIP C      | 0.10UF K    |         |
| C433     |         |           | CC73GCH1H120J | CHIP C      | 12PF J      |         |
| C434     |         |           | CK73GB1E223K  | CHIP C      | 0.022UF K   |         |
| C435     |         |           | CE04LW1A221M  | ELECTRO     | 220UF 10WV  |         |
| C436     |         |           | CK73GB1E223K  | CHIP C      | 0.022UF K   |         |

L: Scandinavia K: USA P: Canada R: Mexico C: China I: Malaysia  
Y: PX(Far East, Hawaii) T: England E: Europe G: Germany V: China (Shanghai)  
Y: AAFES(Europe) X: Australia Q: Russia H: Korea M: Other Areas Δ indicates safety critical components.

PARTS LIST

KAF-S500

\* New Parts

Parts without **Parts No.** are not supplied.Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.Teile ohne **Parts No.** werden nicht geliefert.

③

| Ref. No     | Add-ress | New Parts | Parts No.     | Description                  | Desti-nation | Re-marks |
|-------------|----------|-----------|---------------|------------------------------|--------------|----------|
| C437,438    |          |           | CK73GB1H681K  | CHIP C 680PF K               |              |          |
| C601        |          |           | CE04LW1A221M  | ELECTRO 220UF 10WV           |              |          |
| C602        |          |           | CC73GCH1H101J | CHIP C 100PF J               |              |          |
| C603,604    |          |           | CC73GCH1H200J | CHIP C 20PF J                |              |          |
| C605,606    |          |           | CE04LW1A221M  | ELECTRO 220UF 10WV           |              |          |
| C607,608    |          |           | CC73GCH1H101J | CHIP C 100PF J               |              |          |
| C609        |          |           | CE04LW1A221M  | ELECTRO 220UF 10WV           |              |          |
| C610,611    |          |           | CC73GCH1H470J | CHIP C 47PF J                |              |          |
| C612,613    |          |           | CK73GB1H102K  | CHIP C 1000PF K              |              |          |
| C614,615    |          |           | CC73GCH1H101J | CHIP C 100PF J               |              |          |
| C616        |          |           | CC73GCH1H221J | CHIP C 220PF J               |              |          |
| C650,651    |          |           | CK73GB1H104K  | CHIP C 0.10UF K              |              |          |
| C652        |          |           | CC73GCH1H221J | CHIP C 220PF J               |              |          |
| C653        |          |           | CK73GB1H103K  | CHIP C 0.010UF K             |              |          |
| C654        |          |           | CE04LW1H2R2M  | ELECTRO 2.2UF 50WV           |              |          |
| C655,656    |          |           | CK73GB1H104K  | CHIP C 0.10UF K              |              |          |
| C657,658    |          |           | CE04LW1V100M  | ELECTRO 10UF 35WV            |              |          |
| C659-661    |          |           | CC73GCH1H221J | CHIP C 220PF J               |              |          |
| C662-665    |          |           | CC73GCH1H470J | CHIP C 47PF J                |              |          |
| C667,668    |          |           | CE04LW1A221M  | ELECTRO 220UF 10WV           |              |          |
| C669,670    |          |           | CC73GCH1H101J | CHIP C 100PF J               |              |          |
| C800,801    |          |           | CK73GB1H105Z  | CHIP C 1.0UF Z               |              |          |
| C802,803    |          |           | CK73GB1H104K  | CHIP C 0.10UF K              |              |          |
| C804,805    |          |           | CC73GCH1H331J | CHIP C 330PF J               |              |          |
| C806-813    |          | *         | C91-1658-08   | FILM C 0.1UF 63WV            |              |          |
| C814,815    |          | *         | C91-1659-08   | FILM C 0.68UF 63WV           |              |          |
| C816-819    |          |           | CC73GCH1H221J | CHIP C 220PF J               |              |          |
| C820,821    |          |           | CK73GB1H105Z  | CHIP C 1.0UF Z               |              |          |
| C822,823    |          |           | CK73GB1H104K  | CHIP C 0.10UF K              |              |          |
| C824,825    |          |           | CC73GCH1H331J | CHIP C 330PF J               |              |          |
| C826-833    |          | *         | C91-1658-08   | FILM C 0.1UF 63WV            |              |          |
| C834,835    |          | *         | C91-1659-08   | FILM C 0.68UF 63WV           |              |          |
| C836-839    |          |           | CC73GCH1H221J | CHIP C 220PF J               |              |          |
| C840,841    |          |           | CK73GB1H105Z  | CHIP C 1.0UF Z               |              |          |
| C842,843    |          |           | CK73GB1H104K  | CHIP C 0.10UF K              |              |          |
| C844,845    |          |           | CC73GCH1H331J | CHIP C 330PF J               |              |          |
| C846-853    |          | *         | C91-1658-08   | FILM C 0.1UF 63WV            |              |          |
| C854,855    |          | *         | C91-1659-08   | FILM C 0.68UF 63WV           |              |          |
| C856-859    |          |           | CC73GCH1H221J | CHIP C 220PF J               |              |          |
| C860-874    |          |           | CK73GB1H104K  | CHIP C 0.10UF K              |              |          |
| C875        |          |           | CK73GB1A474K  | CHIP C 0.47UF K              |              |          |
| C876-878    |          |           | CE04LW1H102M  | ELECTRO 1000UF 50WV          |              |          |
| C879,880    |          |           | CK73GB1A474K  | CHIP C 0.47UF K              |              |          |
| JACK101     |          | *         | E63-1332-08   | TER,RCA,2PIN G601200950010   |              |          |
| JACK103     |          | *         | E11-0973-08   | JACK,D3.5 G401035130020      |              |          |
| JACK401,402 |          | *         | E63-1333-08   | TER,RCA,4PIN G602405B01000   |              |          |
| JACK801     |          | *         | E70-0187-08   | TER,BOARD PUSH G5901201C0600 |              |          |
| RCA803      |          | *         | E63-1334-08   | TER,RCA,1PIN G600107A00000   |              |          |
| BD301       |          |           | L92-0523-08   | BEAD,COIL CHIP 7611010000020 |              |          |
| BD303-306   |          |           | L92-0523-08   | BEAD,COIL CHIP 7611010000020 |              |          |
| BD400,401   |          |           | L92-0523-08   | BEAD,COIL CHIP 7611010000020 |              |          |
| BD602       |          |           | L92-0523-08   | BEAD,COIL CHIP 7611010000020 |              |          |
| FLT101      |          | *         | HNA-12SM54T   | DISPLAY,FLT K530125400010    |              |          |
| L101        |          |           | L33-0574-08   | COIL,FILTER D330100700520    |              |          |

L : Scandinavia K : USA P : Canada R : Mexico C : China I : Malaysia  
 Y : PX(Far East, Hawaii) T : England E : Europe G : Germany V : China (Shanghai)  
 Y : AAFES(Europe) X : Australia Q : Russia H : Korea M : Other Areas Δ indicates safety critical components.

\* New Parts

Parts without **Parts No.** are not supplied.Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.Teile ohne **Parts No.** werden nicht geliefert.

④

| Ref. No   | Add-ress | New Parts | Parts No.    | Description                 | Desti-nation | Re-marks |
|-----------|----------|-----------|--------------|-----------------------------|--------------|----------|
| L102      |          | *         | L33-1670-08  | COIL,FILTER D3304R7001020   |              |          |
| L200,201  |          | *         | L39-1628-08  | COIL,SPRING D380015000150   |              |          |
| L300-302  |          | *         | L33-1671-08  | COIL,FILTER D330101001020   |              |          |
| L400      |          | *         | L33-1670-08  | COIL,FILTER D3304R7001020   |              |          |
| L800-811  |          | *         | L39-1629-08  | COIL,CHOKE D300780000010    |              |          |
| L812-814  |          | *         | L39-1628-08  | COIL,SPRING D380015000150   |              |          |
| L815-L817 |          |           | L40-3301-17  | COIL,FILTER D330330700520   |              |          |
| X101      |          | *         | L78-0767-08  | RESONATOR,CERAE830200000050 |              |          |
| X200      |          |           | L78-0294-05  | RESONATOR,CERAE830100000050 |              |          |
| X601      |          | *         | L77-2426-08  | CRYSTAL E80024R576010       |              |          |
| J801      |          |           | RK73GB1J000J | CHIP R 0.0 J 1/16W          |              |          |
| J803      |          |           | RK73GB1J000J | CHIP R 0.0 J 1/16W          |              |          |
| J805      |          |           | RK73GB1J000J | CHIP R 0.0 J 1/16W          |              |          |
| R101      |          |           | RK73GB1J105J | CHIP R 1.0M J 1/16W         |              |          |
| R102,103  |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R104      |          |           | RK73GB1J470J | CHIP R 47 J 1/16W           |              |          |
| R105      |          |           | RK73GB1J2R2J | CHIP R 2.2 J 1/16W          |              |          |
| R111      |          |           | RK73GB1J2R2J | CHIP R 2.2 J 1/16W          |              |          |
| R113      |          |           | RK73GB1J470J | CHIP R 47 J 1/16W           |              |          |
| R114      |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R115      |          |           | RK73GB1J242J | CHIP R 2.4K J 1/16W         |              |          |
| R116      |          |           | RK73GB1J202J | CHIP R 2.0K J 1/16W         |              |          |
| R117      |          |           | RK73GB1J302J | CHIP R 3.0K J 1/16W         |              |          |
| R118      |          |           | RK73GB1J472J | CHIP R 4.7K J 1/16W         |              |          |
| R119      |          |           | RK73GB1J912J | CHIP R 9.1K J 1/16W         |              |          |
| R120      |          |           | RK73GB1J183J | CHIP R 18K J 1/16W          |              |          |
| R124      |          |           | RK73GB1J331J | CHIP R 330 J 1/16W          |              |          |
| R125-128  |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R129      |          |           | RK73GB1J472J | CHIP R 4.7K J 1/16W         |              |          |
| R200      |          |           | RK73GB1J105J | CHIP R 1.0M J 1/16W         |              |          |
| R207,208  |          |           | RK73GB1J000J | CHIP R 0.0 J 1/16W          |              |          |
| R209-212  |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R215,216  |          |           | RK73GB1J104J | CHIP R 100K J 1/16W         |              |          |
| R217      |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R220-228  |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R231      |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R232      |          |           | RK73GB1J473J | CHIP R 47K J 1/16W          |              |          |
| R233      |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R234,235  |          |           | RK73GB1J104J | CHIP R 100K J 1/16W         |              |          |
| R236      |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R238-244  |          |           | RK73GB1J472J | CHIP R 4.7K J 1/16W         |              |          |
| R245      |          |           | RK73GB1J473J | CHIP R 47K J 1/16W          |              |          |
| R246-248  |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R253-257  |          |           | RK73GB1J472J | CHIP R 4.7K J 1/16W         |              |          |
| R258      |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R259      |          |           | RK73GB1J104J | CHIP R 100K J 1/16W         |              |          |
| R260      |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R261      |          |           | RK73GB1J104J | CHIP R 100K J 1/16W         |              |          |
| R262-264  |          |           | RK73GB1J472J | CHIP R 4.7K J 1/16W         |              |          |
| R265,266  |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R267,268  |          |           | RK73GB1J470J | CHIP R 47 J 1/16W           |              |          |
| R269      |          |           | RK73GB1J103J | CHIP R 10K J 1/16W          |              |          |
| R270      |          |           | RK73GB1J472J | CHIP R 4.7K J 1/16W         |              |          |
| R272-274  |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |
| R276      |          |           | RK73GB1J101J | CHIP R 100 J 1/16W          |              |          |

L : Scandinavia K : USA P : Canada R : Mexico C : China I : Malaysia  
 Y : PX(Far East, Hawaii) T : England E : Europe G : Germany V : China (Shanghai)  
 Y : AAFES(Europe) X : Australia Q : Russia H : Korea M : Other Areas Δ indicates safety critical components.



\* New Parts  
 Parts without **Parts No.** are not supplied.  
 Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.  
 Teile ohne **Parts No.** werden nicht geliefert.

5

| Ref. No  | Add-ress | New Parts | Parts No.    | Description   | Desti-nation | Re-marks |
|----------|----------|-----------|--------------|---------------|--------------|----------|
| R277     |          |           | RK73GB1J2R2J | CHIP R        | 2.2          | J 1/16W  |
| R278     |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R280     |          |           | RK73GB1J473J | CHIP R        | 47K          | J 1/16W  |
| R281,282 |          |           | RN14BK2C6R2J | RN            | 6.2          | J 1/6W   |
| R283     |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R285,286 |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R287-289 |          |           | L92-0523-08  | BEAD,COIL CHI | P            |          |
| R301     |          |           | RK73GB1J332J | CHIP R        | 3.3K         | J 1/16W  |
| R302-304 |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R305,306 |          |           | RK73GB1J104J | CHIP R        | 100K         | J 1/16W  |
| R307-310 |          |           | RK73GB1J472J | CHIP R        | 4.7K         | J 1/16W  |
| R311     |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R312     |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R316     |          |           | RK73GB1J201J | CHIP R        | 200          | J 1/16W  |
| R317     |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R318     |          |           | RK73GB1J104J | CHIP R        | 100K         | J 1/16W  |
| R319,320 |          |           | RK73GB1J472J | CHIP R        | 4.7K         | J 1/16W  |
| R321     |          |           | RK73GB1J222J | CHIP R        | 2.2K         | J 1/16W  |
| R322     |          |           | RK73GB1J123J | CHIP R        | 12K          | J 1/16W  |
| R323     |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R324     |          |           | RK73GB1J123J | CHIP R        | 12K          | J 1/16W  |
| R325     |          |           | RK73GB1J201J | CHIP R        | 200          | J 1/16W  |
| R326     |          |           | RK73GB1J104J | CHIP R        | 100K         | J 1/16W  |
| R327     |          |           | RK73GB1J681J | CHIP R        | 680          | J 1/16W  |
| R328     |          |           | RK73GB1J271J | CHIP R        | 270          | J 1/16W  |
| R329     |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |
| R330-333 |          |           | RK73GB1J000J | CHIP R        | 0.0          | J 1/16W  |
| R334-336 |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R337     |          |           | RK73GB1J752J | CHIP R        | 7.5K         | J 1/16W  |
| R338,339 |          |           | RK73GB1J332J | CHIP R        | 3.3K         | J 1/16W  |
| R340,341 |          |           | RK73GB1J473J | CHIP R        | 47K          | J 1/16W  |
| R342,343 |          |           | RK73GB1J102J | CHIP R        | 1.0K         | J 1/16W  |
| R344-346 |          |           | RK73GB1J104J | CHIP R        | 100K         | J 1/16W  |
| R347     |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |
| R350     |          |           | RK73GB1J104J | CHIP R        | 100K         | J 1/16W  |
| R351,352 |          |           | RK73GB1J473J | CHIP R        | 47K          | J 1/16W  |
| R353,354 |          |           | RK73GB1J222J | CHIP R        | 2.2K         | J 1/16W  |
| R355     |          |           | RK73GB1J103J | CHIP R        | 10K          | J 1/16W  |
| R356     |          |           | RK73GB1J101J | CHIP R        | 100          | J 1/16W  |
| R357     |          |           | RK73GB1J222J | CHIP R        | 2.2K         | J 1/16W  |
| R401,402 |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R403,404 |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |
| R405,406 |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R407,408 |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |
| R409,410 |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R411,412 |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |
| R417,418 |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |
| R419,420 |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R421,422 |          |           | RK73GB1J473J | CHIP R        | 47K          | J 1/16W  |
| R423,424 |          |           | RK73GB1J472J | CHIP R        | 4.7K         | J 1/16W  |
| R425,426 |          |           | RK73GB1J432J | CHIP R        | 4.3K         | J 1/16W  |
| R427,428 |          |           | RK73GB1J222J | CHIP R        | 2.2K         | J 1/16W  |
| R429     |          |           | RK73GB1J104J | CHIP R        | 100K         | J 1/16W  |
| R430,431 |          |           | RK73GB1J471J | CHIP R        | 470          | J 1/16W  |
| R432,433 |          |           | RK73GB1J224J | CHIP R        | 220K         | J 1/16W  |

L : Scandinavia K : USA P : Canada R : Mexico C : China I : Malaysia  
 Y : PX(Far East, Hawaii) T : England E : Europe G : Germany V : China (Shanghai)  
 Y : AAFES(Europe) X : Australia Q : Russia H : Korea M : Other Areas Δ indicates safety critical components.

\* New Parts  
 Parts without **Parts No.** are not supplied.  
 Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.  
 Teile ohne **Parts No.** werden nicht geliefert.

6

| Ref. No   | Add-ress | New Parts | Parts No.    | Description | Desti-nation  | Re-marks |
|-----------|----------|-----------|--------------|-------------|---------------|----------|
| R434,435  |          |           | RK73GB1J222J | CHIP R      | 2.2K          | J 1/16W  |
| R438,439  |          |           | RK73GB1J242J | CHIP R      | 2.4K          | J 1/16W  |
| R446-448  |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R450,451  |          |           | RK73GB1J472J | CHIP R      | 4.7K          | J 1/16W  |
| R452-454  |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R500      |          |           | RK73GB1J470J | CHIP R      | 47            | J 1/16W  |
| R601      |          |           | RK73GB1J105J | CHIP R      | 1.0M          | J 1/16W  |
| R602      |          |           | RK73GB1J560J | CHIP R      | 56            | J 1/16W  |
| R603,604  |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R605      |          |           | RK73GB1J183J | CHIP R      | 18K           | J 1/16W  |
| R606      |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R607      |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R608-613  |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R614-620  |          |           | RK73GB1J2R2J | CHIP R      | 2.2           | J 1/16W  |
| R621      |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R622      |          |           | RK73GB1J2R2J | CHIP R      | 2.2           | J 1/16W  |
| R623      |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R624      |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R625-630  |          |           | RK73GB1J2R2J | CHIP R      | 2.2           | J 1/16W  |
| R659      |          |           | RK73GB1J221J | CHIP R      | 220           | J 1/16W  |
| R660-667  |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R668      |          |           | RK73GB1J332J | CHIP R      | 3.3K          | J 1/16W  |
| R669,670  |          |           | RK73GB1J472J | CHIP R      | 4.7K          | J 1/16W  |
| R671      |          |           | RK73GB1J204J | CHIP R      | 200K          | J 1/16W  |
| R672      |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R673-676  |          |           | RK73GB1J101J | CHIP R      | 100           | J 1/16W  |
| R678      |          |           | RK73GB1J000J | CHIP R      | 0.0           | J 1/16W  |
| R681      |          |           | RK73GB1J332J | CHIP R      | 3.3K          | J 1/16W  |
| R682-684  |          |           | RK73GB1J000J | CHIP R      | 0.0           | J 1/16W  |
| R685,686  |          |           | RK73GB1J332J | CHIP R      | 3.3K          | J 1/16W  |
| R687      |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R688      |          |           | RK73GB1J331J | CHIP R      | 330           | J 1/16W  |
| R689,690  |          |           | RK73GB1J2R2J | CHIP R      | 2.2           | J 1/16W  |
| R691-693  |          |           | RK73GB1J331J | CHIP R      | 330           | J 1/16W  |
| R696      |          |           | RK73GB1J122J | CHIP R      | 1.2K          | J 1/16W  |
| R802-805  |          |           | RN14BK2C6R2J | RN          | 6.2           | J 1/6W   |
| R808-811  |          |           | RN14BK2C6R2J | RN          | 6.2           | J 1/6W   |
| R814-817  |          |           | RN14BK2C6R2J | RN          | 6.2           | J 1/6W   |
| R818-820  |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| R830      |          |           | RK73GB1J103J | CHIP R      | 10K           | J 1/16W  |
| VR101     |          | *         | T99-0690-08  | SW,ENCODER  | G121121200010 |          |
| VR102     |          | *         | T99-0691-08  | SW,ENCODER  | G121122400010 |          |
| RLY301    |          | *         | S76-0140-08  | RELAY       | G680120202020 |          |
| SW101     |          | *         | S70-0105-08  | SW,TACT     | G180000270010 |          |
| SW104-107 |          | *         | S70-0105-08  | SW,TACT     | G180000270010 |          |
| D101      |          |           | KDS226ST1    | D,SWITING   | K005022600020 |          |
| D103      |          |           | KDS160       | D,SWITING   | K005016000010 |          |
| D200-202  |          |           | KDS160       | D,SWITING   | K005016000010 |          |
| D204      |          |           | KDS160       | D,SWITING   | K005016000010 |          |
| D301      |          |           | 1S5133T      | D,SWITING   | K000013300520 |          |
| D303,304  |          |           | KDS160       | D,SWITING   | K005016000010 |          |
| IC101     |          | *         | NJU3426FP1   | IC          | J127342600010 |          |
| IC200     |          | *         | CXP828P60Q-1 | IC          | J020828601010 |          |
| IC202     |          | *         | RC1117-3.3   | IC          | J126111733020 |          |

Δ

L : Scandinavia K : USA P : Canada R : Mexico C : China I : Malaysia  
 Y : PX(Far East, Hawaii) T : England E : Europe G : Germany V : China (Shanghai)  
 Y : AAFES(Europe) X : Australia Q : Russia H : Korea M : Other Areas Δ indicates safety critical components.

PARTS LIST

KAF-S500

\* New Parts  
 Parts without **Parts No.** are not supplied.  
 Les articles non mentionnés dans le **Parts No.** ne sont pas fournis.  
 Teile ohne **Parts No.** werden nicht geliefert.

7

| Ref. No     | Add-ress | New Parts | Parts No.    | Description       | Desti-nation  | Re-marks |
|-------------|----------|-----------|--------------|-------------------|---------------|----------|
| Δ IC203     |          | *         | RC1117-2.5   | IC                | J126111725020 |          |
| IC204       |          | *         | MM74HCT244   | IC                | J040742440190 |          |
| IC205,206   |          | *         | MM74LCX244   | IC                | J040742440180 |          |
| Δ IC300     |          | *         | DDX800013TR  | IC                | J085800000010 |          |
| IC301       |          | *         | NJM2769BM    | IC                | J122276900010 |          |
| IC302       |          |           | NJM4565MD    | IC(OP AMP X2)     | J121456500040 |          |
| IC303       |          | *         | 74V1G79      | IC                | J040741790010 |          |
| IC305       |          |           | NJM4565MD    | IC(OP AMP X2)     | J121456500040 |          |
| IC401       |          |           | NJU7313AL    | IC(ANALOG SWITCH) | 40731300010   |          |
| IC402       |          |           | NJM4565MD    | IC(OP AMP X2)     | J121456500040 |          |
| IC500       |          | *         | AK4586VQ     | IC                | J080458600010 |          |
| IC600       |          | *         | CS493263-CL  | IC                | J080493290020 |          |
| IC601,602   |          | *         | MM74LCX574   | IC                | J040745740060 |          |
| IC603       |          | *         | M27W201-80B6 | IC                | J000274010010 |          |
| Δ IC800-802 |          | *         | DDX-2100     | IC                | J122210000010 |          |
| OPT101      |          | *         | W02-4525-08  | MODULE            | E100151300030 |          |
| OPT400,1    |          | *         | W02-4525-08  | MODULE            | E100151300030 |          |
| Q102        |          |           | KRC102S      | TRANSISTOR        | J522010200210 |          |
| Q200        |          |           | KRC102S      | TRANSISTOR        | J522010200210 |          |
| Q201,202    |          |           | KTC3875Y     | TRANSISTOR        | J5223875Y0210 |          |
| Q305        |          |           | KTD1304      | TRANSISTOR        | J5031304Y0050 |          |
| Q306        |          |           | KRA102S      | TRANSISTOR        | J520010200210 |          |
| Q307        |          |           | KRC102S      | TRANSISTOR        | J522010200210 |          |
| Q308,309    |          |           | KTD1304      | TRANSISTOR        | J5031304Y0050 |          |
| Q310,311    |          |           | KRC102S      | TRANSISTOR        | J522010200210 |          |
| Q312        |          |           | KRA102S      | TRANSISTOR        | J520010200210 |          |
| Q411,412    |          |           | KTD1304      | TRANSISTOR        | J5031304Y0050 |          |
| Q413        |          |           | KRC102S      | TRANSISTOR        | J522010200210 |          |
| Q414        |          |           | KRA102S      | TRANSISTOR        | J520010200210 |          |
| ZD101       |          |           | MTZJ6.8B     | ZENER DIODE       | K06006R844520 |          |

L : Scandinavia    K : USA    P : Canada    R : Mexico    C : China    I : Malaysia  
 Y : PX(Far East, Hawaii)    T : England    E : Europe    G : Germany    V : China (Shanghai)  
 Y : AAFES(Europe)    X : Australia    Q : Russia    H : Korea    M : Other Areas    Δ indicates safety critical components.

# KAF-S500

## SPECIFICATIONS

### KAF-S500

#### AUDIO section

Rated power output during STEREO operation

50 watts per channel minimum RMS, both channels driven, at 6  $\Omega$  from 20Hz to 18kHz with no more than 10% total harmonic distortion.

Rated power output during SURROUND operation

FRONT (1 kHz, 10 % T.H.D. at 6  $\Omega$  ) .....50 W + 50 W

CENTER (1 kHz, 10 % T.H.D. at 6  $\Omega$  ) .....50 W

SURROUND (1 kHz, 10 % T.H.D. at 6  $\Omega$  ) 50 W + 50 W

SUBWOOFER / BACK SURROUND

(1 kHz, 10 % T.H.D. at 6  $\Omega$  ) .....50W

Input sensitivity / impedance

(DVD/CD, VIDEO 1, VIDEO 2, FRONT AUX)

.....270 mV / 200 k $\Omega$

#### DIGITAL AUDIO section

Sampling frequency.....32 kHz, 44.1 kHz, 48 kHz, 96 kHz

Input level / wave length

Optical .....(-15 dBm ~ -24 dBm), 660 nm  $\pm$ 30 nm

#### GENERAL

Power consumption .....90 W

Standby Power consumption .....1.5 W

Dimensions.....W: 220 mm (8-11/16")

H: 78 mm (3-1/16")

D: 329 mm (12-15/16")

Weight (Net) .....3.0 kg (6.6 lb)

### KSW-S500

#### [FRONT SPEAKERS]

Type .....Acoustic Air Suspension

Magnetically shielded .....JEITA standard

Tweeter.....2.5 cm(1") x 1 Dome

Woofer .....5 cm(2") x 1 Cone

Impedance.....8  $\Omega$

Frequency Response .....140 Hz ~ 40,000 Hz

Sensitivity.....78 dB

Crossover Frequency.....8 kHz

Rated Input Power .....25 W

Max. Input Power.....50 W

Dimensions(with Grille).....W : 77 mm (3-1/16")

H : 140 mm (5-1/2")

D : 114 mm (4-1/2")

Weight (Net) .....0.6 kg (1.3 lb)/piece

#### [CENTER SPEAKER]

Type .....Acoustic Air Suspension

Magnetically shielded .....JEITA standard

Tweeter.....2.5 cm(1") x 1 Dome

Woofer .....5 cm(2") x 2 Cone

Impedance.....8  $\Omega$

Frequency Response .....130 Hz ~ 40,000 Hz

Sensitivity.....80 dB

Crossover Frequency.....8 kHz

Rated Input Power .....25 W

Max. Input Power.....50 W

Dimensions(with Grille).....W : 210 mm (8-1/4")

H : 77 mm (3-1/16")

D : 114 mm (4-1/2")

Weight (Net) .....0.9 kg (2.0 lb)

#### [SURROUND SPEAKERS]

Type .....Acoustic Air Suspension

Magnetically shielded .....JEITA standard

Full Range .....5 cm(2") x 1 Cone

Impedance.....8  $\Omega$

Frequency Response .....140 Hz ~ 20,000 Hz

Sensitivity.....78 dB

Rated Input Power .....25 W

Max. Input Power.....50 W

Dimensions(with Grille).....W : 77 mm (3-1/16")

H : 140 mm (5-1/2")

D : 114 mm (4-1/2")

Weight (Net) .....0.6 kg (1.3 lb)/piece

#### [SUBWOOFER SPEAKER]

Type .....Bass Reflection

Magnetically shielded .....JEITA standard

Woofer.....16 cm(6-1/2") x 1 Cone

Impedance.....8  $\Omega$

Frequency Response .....43 Hz ~ 150 Hz

Sensitivity.....82 dB

Rated Input Power .....25 W

Max. Input Power.....50 W

Dimensions(with Grille).....W : 220 mm (8-11/16")

H : 300 mm (11-13/16")

D : 287 mm (11-5/16")

Weight (Net) .....4.9 kg (10.8 lb)

#### Notes

1. KENWOOD follows a policy of continuous advancements in development. For this reason specifications may be changed without notice.
2. The full performance may not be exhibited in an extremely cold location (under a water-freezing temperature).