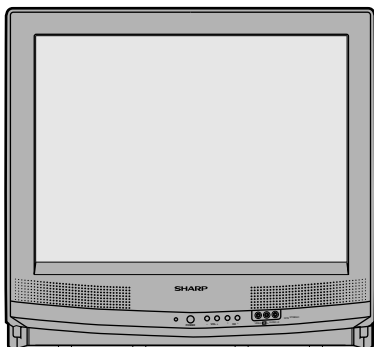


# SHARP SERVICE MANUAL

S77B620J-S100



## COLOR TELEVISION

Chassis No. SN-70

# 20J-S100/S100S

# CJ20S10

## MODELS

# 21MJ50

In the interests of user-safety (Required by safety regulations in some countries ) the set should be restored to its original condition and only parts identical to those specified should be used.

### ELECTRICAL SPECIFICATIONS

POWER INPUT ..... 120 V AC 60 Hz  
 POWER RATING ..... 93W  
 PICTURE SIZE ..... 1240cm<sup>2</sup>(192sq inch)  
 CONVERGENCE ..... Magnetic  
 SWEEP DEFLECTION ..... Magnetic  
 FOCUS ..... Hi-Bi-Potential Electrostatic  
 INTERMEDIATE FREQUENCIES  
 Picture IF Carrier Frequency ..... 45.75 MHz  
 Sound IF Carrier Frequency ..... 41.25 MHz  
 Color Sub-Carrier Frequency ..... 42.17 MHz  
 (Nominal)

SPEAKER  
 SIZE ..... 8cm(Round)  
 VOICE COIL IMPEDANCE ..... 8ohm at 400 Hz  
 ANTENNA INPUT IMPEDANCE  
 VHF/UHF ..... 75 ohm Unbalanced  
 TUNING RANGES  
 VHF-Channels ..... 2thru 13  
 UHF-Channels ..... 14thru 69  
 CATV Channels ..... 1thru 125  
 USA: (EIA, Channel Plan)

AUDIO POWER  
 OUTPUT RATING 1.3+1.3W (at 10% distortion & dual ch operate)

*Specifications are subject to change without prior notice.*

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## SHARP ELECTRONICS CORPORATION

Service Headquarters: Sharp Plaza, Mahwah, New Jersey 07430-2135

## SHARP ELECTRONICS OF CANADA LTD.

335 Britannia Road East Mississauga, Ontario L4Z 1W9 Canada

## SHARP CORPORATION

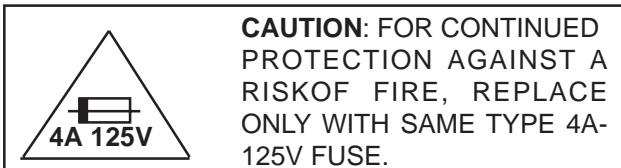
## IMPORTANT SERVICE SAFETY PRECAUTION

- Service work should be performed only by qualified service technicians who are thoroughly familiar with all safety checks and servicing guidelines which follow:

### WARNING

1. For continued safety, no modification of any circuit should be attempted.
2. Disconnect AC power before servicing.
3. Semiconductor heat sinks are potential shock hazards when the chassis is operating.
4. The chassis in this receiver has two ground systems which are separated by insulation material. The non-isolated (hot) ground system is for the B+ voltage regulator circuit and the horizontal output circuit. The isolated ground system is for the low B+ DC voltages and the secondary circuit of the high voltage transformer.

To prevent electrical shock use an isolation transformer between the line cord and power receptacle, when servicing this chassis.



### SERVICING OF HIGH VOLTAGE SYSTEM AND PICTURE TUBE

**When servicing the high voltage system, remove the static charge by connecting a 10k ohm resistor in series with an insulated wire (such as a test probe) between the picture tube ground and the anode lead. (AC line cord should be disconnected from AC outlet.)**

1. Picture tube in this receiver employs integral implosion protection.
2. Replace with tube of the same type number for continued safety.
3. Do not lift picture tube by the neck.
4. Handle the picture tube only when wearing shatterproof goggles and after discharging the high voltage anode completely.

### X-RADIATION AND HIGH VOLTAGE LIMITS

1. Be sure all service personnel are aware of the procedures and instructions covering X-radiation. The only potential source of X-ray in current solid state TV receivers is the picture tube. However, the picture tube does not emit measurable X-Ray radiation if the high voltage is as specified in the "High Voltage Check" instructions.

It is only when high voltage is excessive that X-radiation is capable of penetrating the shell of the picture tube including the lead in glass material. The important precaution is to keep the high voltage below the maximum level specified.

2. It is essential that service personnel have available at all times an accurate high voltage meter. The calibration of this meter should be checked periodically.
3. High voltage should always be kept at the rated value –no higher. Operation at higher voltages may cause a failure of the picture tube or high voltage circuitry and; also under certain conditions, may produce radiation that exceeds specifications.
4. When the high voltage regulator is operating properly there is no possibility of an X-radiation problem. Every time a color chassis is serviced, the brightness should be tested while monitoring the high voltage with a meter to be certain that the high voltage does not exceed the specified value and that it is regulating correctly.
5. Do not use a picture tube other than that specified or make unrecommended circuit modifications to the high voltage circuitry.
6. When trouble shooting and taking test measurements on a receiver with excessive high voltage, avoid being unnecessarily close to the receiver. Do not operate the receiver longer than is necessary to locate the cause of excessive voltage.

# IMPORTANT SERVICE SAFETY PRECAUTION

(Continued)

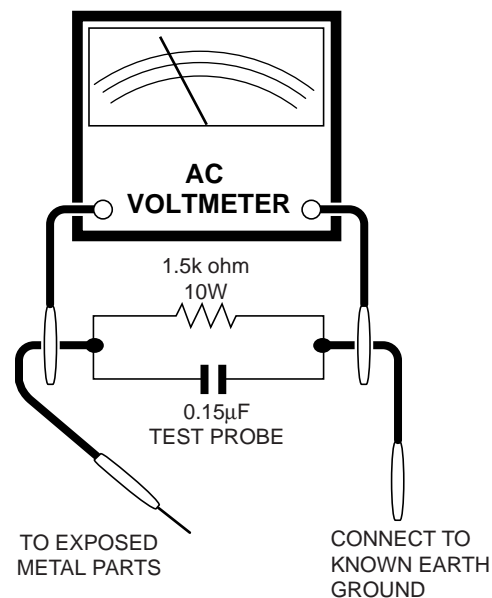
## BEFORE RETURNING RECEIVER

### (Fire & Shock Hazard)

Before returning the receiver to the user, perform the following safety checks.

1. Inspect all lead dress to make certain that leads are not pinched or that hardware is not lodged between the chassis and other metal parts in the receiver.
2. Inspect all protective devices such as non-metallic control knobs, insulating materials, cabinet backs, adjustment and compartment covers or shields, isolation resistor-capacity networks, mechanical insulators, etc.
3. To be sure that no shock hazard exists, check for leakage current in the following manner.
  - Plug the AC cord directly into a 120 volt AC outlet, (Do not use an isolation transformer for this test).
  - Using to clip leads, connect a 1.5k ohm, 10 watt resistor paralleled by a 0.15 $\mu$ F capacitor in series with all exposed metal cabinet parts and a known earth ground, such as electrical conduit or electrical ground connected to earth ground.
  - Use an AC voltmeter having with 5000 ohm per volt, or higher, sensitivity to measure the AC voltage drop across the resistor.

- Connect the resistor connection to all exposed metal parts having a return to the chassis (antenna, metal cabinet, screw heads, knobs and control shafts, escutcheon, etc.) and measure the AC voltage drop across the resistor. All check must be repeated with the AC line cord plug connection reversed. (IF necessary, a non-polarized adapter plug must be used only for the purpose of completing these check.) Any current measured must not exceed 0.5 milliamp. Any measurements not within the limits outlined above are indicative of a potential shock hazard and corrective action must be taken before returning the instrument to the customer.



## SAFETY NOTICE

Many electrical and mechanical parts in television receivers have special safety-related characteristics. These characteristics are often not evident from visual inspection, nor can protection afforded by them be necessarily increased by using replacement components rated for higher voltage, wattage, etc.

Replacement parts which have special safety characteristics are identified in this manual; electrical components having such features are identified by "⚠" and shaded areas in the Replacement Parts Lists and Schematic Diagrams.

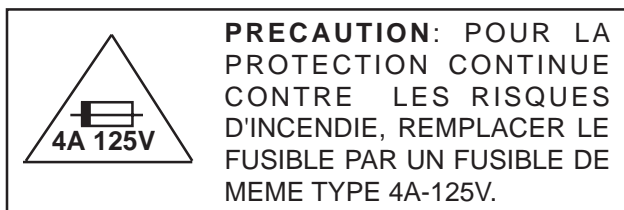
For continued protection, replacement parts must be identical to those used in the original circuit. The use of substitute replacement parts which do not have the same safety characteristics as the factory recommended replacement parts shown in this service manual, may create shock, fire, X-radiation or other hazards.

## PRECAUTIONS A PRENDRE LORS DE LA REPARATION

- Ne peut effectuer la réparation qu' un technicien spécialisé qui s'est parfaitement accoutumé à toute vérification de sécurité et aux conseils suivants.

### AVERTISSEMENT

1. N'entreprendre aucune modification de tout circuit. C'est dangereux.
2. Débrancher le récepteur avant toute réparation.
3. Les déversoirs thermiques à semi-conducteurs peuvent présenter un danger de choc électrique lorsque le récepteur est en marche.
4. Le châssis de ce récepteur possède deux systèmes de masse qui sont séparées par du matériel d'isolation. Le système de masse non-isolée (sous tension) est pour le circuit du régulateur de tension + B et le circuit de sortie horizontale. Le système de masse isolée est pour les tensions DC + B basses et le circuit secondaire du transformateur haute tension. Pour éviter tout risque d'électrocution lors de l'entretien de ce châssis, utiliser un transformateur d'isolation entre le cordon de ligne et la prise de courant.



### REPARATION DU SYSTEME A HAUTE TENSION ET DU TUBE-IMAGE

**Lors de la réparation de ce système, supprimer la charge statique en branchant une résistance de 10 kΩ en série avec un fil isolé (comme une sonde d'essai) entre la mise à la terre du tube-image et le fil d'anode. (Le cordon d'alimentation doit être retiré de la prise murale.)**

1. Le tube image dans ce récepteur emploie une protection intégrée contre l'implosion.
2. Par mesure de sécurité, changer le tube-image pour un tube du même numéro de type.
3. Ne pas lever le tube-image par son col.
4. Ne manipuler le tube-image qu'en portant des lunettes incassables et qu'après avoir déchargé totalement la haute tension.

### LIMITES DES RADIATIONS X ET DE LA HAUTE TENSION

1. Tout le personnel réparateur doit être instruit des instructions et procédés relatifs aux radiations X. Le tube-image, seule source de rayons X dans les téléviseurs transistorisés, n'émet pourtant pas de rayons mesurables si la haute tension est maintenue à un niveau préconisé dans la section "Vérification de la haute tension". C'est seulement quand la haute tension est excessive que les rayons X peuvent entrer dans l'enveloppe du tube-image y compris le conducteur de verre. Il est important de maintenir la haute tension en-dessous du niveau spécifié.
2. Il est essentiel que le réparateur ait sous la main un voltmètre à haute tension qui doit être périodiquement étalonné.
3. La haute tension doit toujours être maintenue à la valeur de régime -et pas plus haute. L'opération à des tensions plus élevées peut entraîner une panne du tube-image ou du circuit à haute tension et, dans certaines conditions, peut entraîner une radiation dépassant les niveaux prescrits.
4. Quand le régulateur à haute tension fonctionne correctement, il n'y a aucun problème de radiation X. Chaque fois qu'un châssis couleurs est réparé, la luminosité doit être examinée tout en contrôlant la haute tension à l'aide d'un voltmètre pour s'assurer que la haute tension ne dépasse pas la valeur spécifiée et qu'elle soit correctement réglée.
5. Ne pas utiliser un tube-image autre que celui spécifié et ne pas effectuer de modifications déconseillées du circuit à haute tension.
6. Lors de la recherche des pannes et des mesures d'essai sur un récepteur qui présente une haute tension excessive, éviter de s'approcher inutilement du récepteur. Ne pas faire fonctionner le récepteur plus longtemps que nécessaire pour localiser la cause de la tension excessive.

# PRECAUTIONS A PRENDRE LORS DE LA REPARATION

(Suite)

## VERIFICATIONS CONTRE L'INCEN-DIE ET LE CHOC ELECTRIQUE

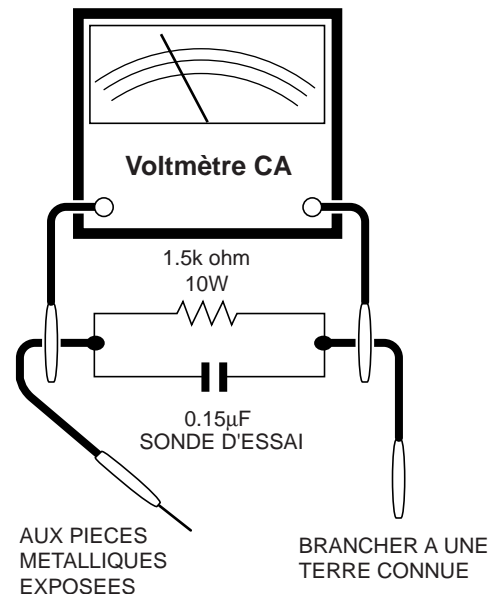
Avant de rendre le récepteur à l'utilisateur, effectuer les vérifications suivantes.

1. Inspecter tous les faisceaux de câbles pour s'assurer que les fils ne soient pas pincés ou qu'un outil ne soit pas placé entre le châssis et les autres pièces métalliques du récepteur.
2. Inspecter tous les dispositifs de protection comme les boutons de commande non-métalliques, les isolants, le dos du coffret, les couvercles ou blindages de réglage et de compartiment, les réseaux de résistance-capacité, les isolateurs mécaniques, etc.
3. S'assurer qu'il n'y ait pas de danger d'électrocution en vérifiant la fuite de courant, de la façon suivante:
  - Brancher le cordon d'alimentation directement à une prise de courant de 120V. (Ne pas utiliser de transformateur d'isolation pour cet essai).
  - A l'aide de deux fils à pinces, brancher une résistance de 1,5 k $\Omega$  10 watts en parallèle avec un condensateur de 0,15 $\mu$ F en série avec toutes les pièces métalliques exposées du coffret et une terre connue comme une conduite électrique ou une prise de terre branchée à la terre.
  - Utiliser un voltmètre CA d'une sensibilité d'au moins 5000 $\Omega$ /V pour mesurer la chute de tension en travers de la résistance.

- Toucher avec la sonde d'essai les pièces métalliques exposées qui présentent une voie de retour au châssis (antenne, coffret métallique, tête des vis, arbres de commande et des boutons, écusson, etc.) et mesurer la chute de tension CA en-travers de la résistance. Toutes les vérifications doivent être refaites après avoir inversé la fiche du cordon d'alimentation. (Si nécessaire, une prise d'adpatation non polarisée peut être utilisée dans le but de terminer ces vérifications.)

Tous les courants mesurés ne doivent pas dépasser 0,5 mA.

Dans le cas contraire, il y a une possibilité de choc électrique qui doit être supprimée avant de rendre le récepteur au client.



## AVIS POUR LA SECURITE

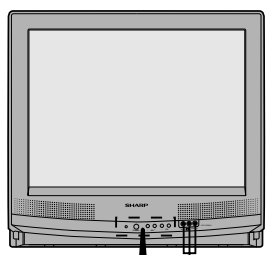
De nombreuses pièces, électriques et mécaniques, dans les téléviseurs présentent des caractéristiques spéciales relatives à la sécurité, qui ne sont souvent pas évidentes à vue. Le degré de protection ne peut pas être nécessairement augmentée en utilisant des pièces de remplacement étalonnées pour haute tension, puissance, etc.

Les pièces de remplacement qui présentent ces caractéristiques sont identifiées dans ce manuel; les pièces électriques qui présentent ces particularités sont

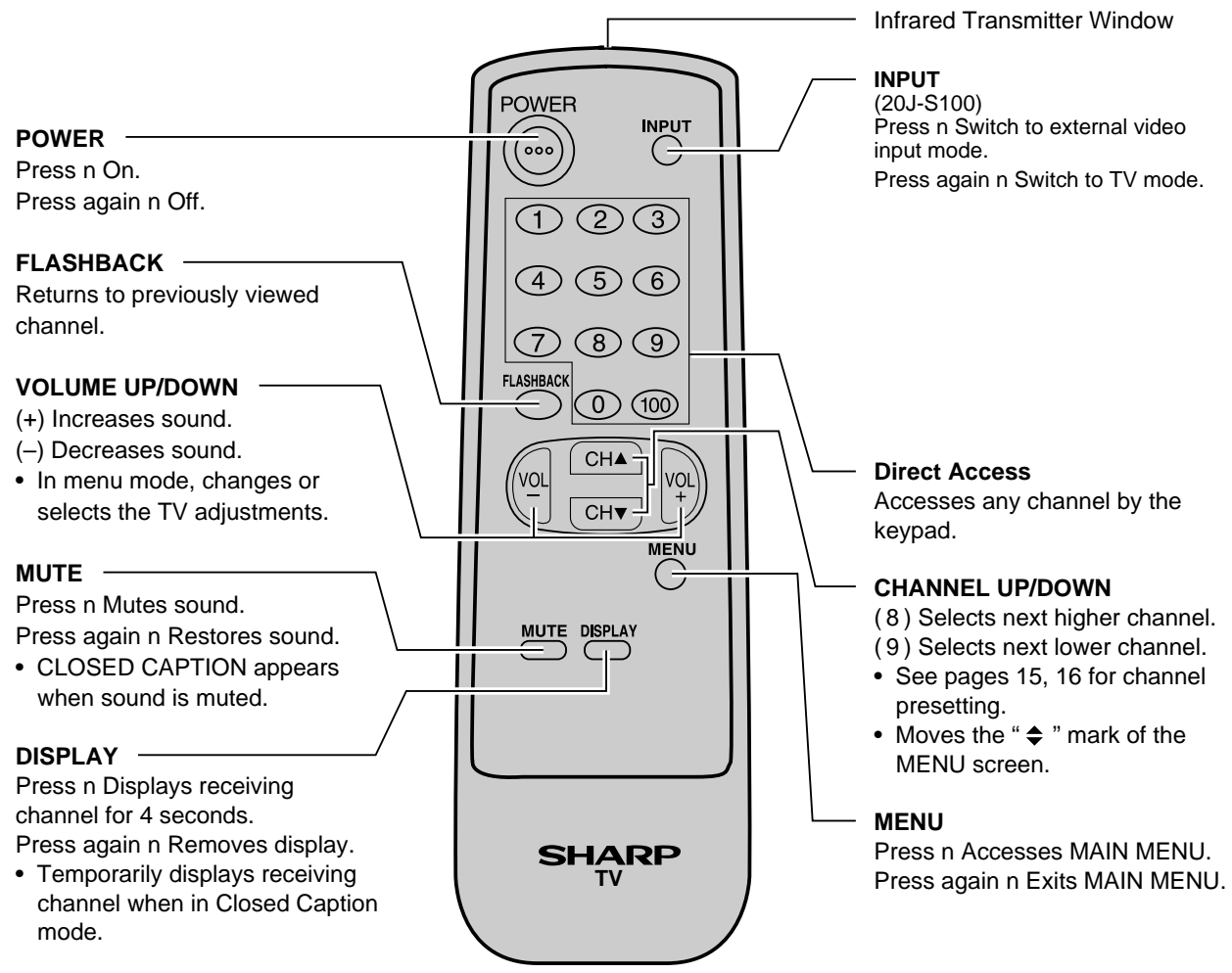
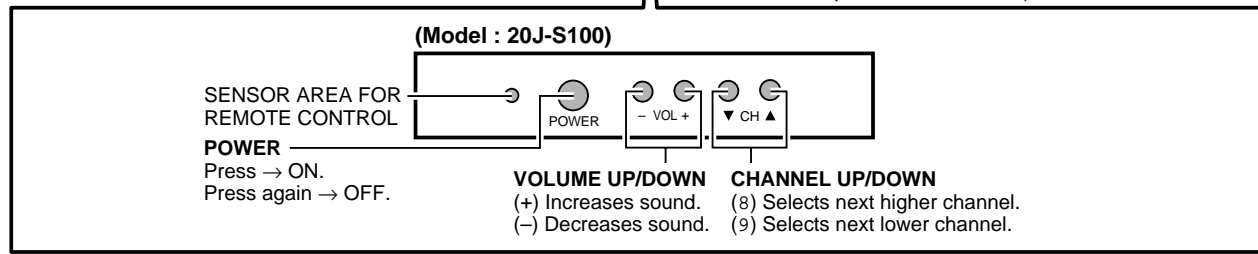
identifiées par la marque "  $\triangle$  " et hachurées dans la liste des pièces de remplacement et les diagrammes schématiques.

Pour assurer la protection, ces pièces doivent être identiques à celles utilisées dans le circuit d'origine. L'utilisation de pièces qui n'ont pas les mêmes caractéristiques que les pièces recommandées par l'usine, indiquées dans ce manuel, peut provoquer des électrocutions, incendies, radiations X ou autres accidents.

# LOCATION OF USER'S CONTROL



**VIDEO/AUDIO IN TERMINALS**  
(25J-S100: VIDEO/AUDIO terminals are also provided on the rear.)



# INSTALLATION AND SERVICE INSTRUCTIONS

- Note:** (1) When performing any adjustments to resistor controls and transformers use non-metallic screwdriver or TV alignment tools.
- (2) Before performing adjustment, TV set must be on at least 15 minutes.

## CIRCUIT PROTECTION

The receiver is protected by a 4.0A fuse (F701), mounted on PWB-A, wired into one side of the AC line input.

## X-RADIATION PROTECTOR CIRCUIT TEST

**1. After service has been performed on the horizontal deflection system, high voltage system, B + system, test the X-Radiation protection circuit to ascertain proper operation as follows:**

- 1) Apply 120V AC using a variac transformer for accurate input voltage.
- 2) Allow for warm up and adjust all customer controls for normal picture and sound.
- 3) Select a local channel.
- 4) Connect a digital voltmeter to TP653 and make sure that the voltmeter reads  $21.5 \pm 1.5V$ .
- 5) Apply external 26.8V DC at TP653 by using an external DC supply, TV must be shut off.
- 6) To reset the protector, unplug the AC cord and make a short circuit between TP651 and TP652. Now make sure that normal picture appears on the screen.
- 7) If the operation of the horizontal oscillator does not stop in step 5, the circuit must be repaired before the set is returned to the customer.

## HIGH VOLTAGE CHECK

**High voltage is not adjustable but must be checked to verify that the receiver is operating within safe and efficient design limitations as specified checks should be as follows:**

1. Connect an accurate high voltage meter between ground and anode of picture tube.
2. Operate receiver for at least 15 minutes at 120V AC line voltage, with strong air signal or properly tuned in test signal.
3. Set service mode on (See next page.), Service No.S19 and Bus data "01" (Y-mute on).
4. The voltage should be approximately 26.5kV (at zero beam).

If a correct reading cannot be obtained, check circuitry for malfunctioning components. After the voltage test, make Y-mute off (normal mode).

For adjustments of this model, the bus data is converted to various analog signals by the D-A converter circuit.  
Note: There are still a few analog adjustments in this series such as focus and master screen voltage.

Follow the steps below whenever service adjustment is required. See Figure "B" to determine if service adjustments are required.

### 1. Service mode -

Before putting unit into the service mode, check, that customer adjustments are in the normal mode. use the reset function in the video adjust menu to ensure customer controls are in their

### 2. Service number selection

Once in the service mode, press the channel up or channel down button on the remote transmitter or at the set. the service adjustment number will vary in increments of one, from "S01" to M05.

Select the item you wish to adjust.

### 3. Data number selection

Press the volume up or down button to adjust the data number.

### To enter the service mode .

While Pressing the Vol-up and Ch- up buttons at once, plug the AC cord into a wall socket. Now the TV set is switched on and enters the service mode.

To exit the service mode, shut the television off by pressing the power button.

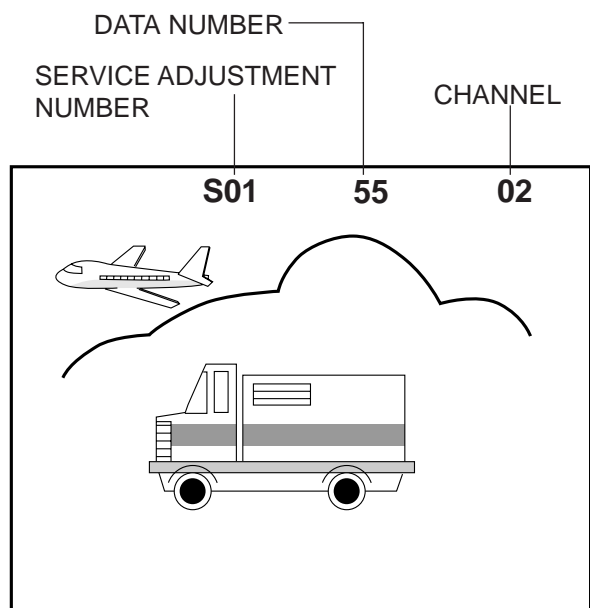


Figure B.

### Vertical-size adjustment

1. Have unit receive a good local channel.
2. Enter the service mode and select service adjustment "S09".
3. While observing the top and bottom of the screen, adjust "S09" data value to proper vertical size .

### Vertical phase adjustment

1. Enter the service mode and select service adjustment "S06".
  2. Adjust data value to "00"~"03" so that picture is approximate center.
- Note: This must be set "00"~"03" when adjust another data retrace line will be appear.

### "Horizontal position adjustment

1. Have unit receive a good local channel.
2. Enter the service mode and select service adjustment "S07".
3. Adjust "S07" data value so that picture is centered.



SERVICE NUMBER	ADJUSTMENT ITEM	DATA		ADJUSTMENT CONTENTS
		INITIAL VALUE	RANGE	
S01	PICTURE	55	00-7F	Must be set to "24"
S02	TINT	46	00-7F	
S03	COLOR	32	00-7F	
S04	BRIGHTNESS	40	00-7F	
S05	SHARPNESS	28	00-3F	
S06	VERTICAL PHASE	00	00-07	
S07	HORIZONTAL PHASE	12	00-1F	
S08	RF-AGC	2A	00-3F	
S09	VERTICAL AMP	20	00-3F	
S10	VCO	2C	00-7F	
S11	R CUT-OFF	00	00-FF	
S12	G CUT -OFF	00	00-FF	
S13	B CUT-OFF	00	00-FF	
S14	G GAIN	7F	00-FF	
S15	B GAIN	7F	00-FF	
S16	TRAP(3.58MHz)	00	00 or 01	Must be set to "00"
S17	BALANCE	20	00-3F	Must be set to "20"
S18	C.C.POSITION	18	00-7F	00=NORMAL, 01=no "Y, 03=NO VERTICAL"
S19	Y-MUTE	00	00,01,03	
OP	OPTION (Set to each mode )		00-7E	
M01	MTS LEVEL	0A	00-FF	Must be set to "9"
M02	STEREO-VCO	20	00-3F	
M03	FILTER	1C	00-3F	
M04	LOW SEPARATION	20	00-3F	
M05	HIGH SEPARATION	1B	00-3F	

Table - A

Holding down both the CH UP/DOWN keys on the TV set at service mode for more then 2 seconds will automatically write the above initial values into IC2101.

PART REPLACED	ADJUSTMENT		NOTES
	NECESSARY	UNNECESSARY	
IC2001		X	Data is stored in IC2101.
IC201	X		The adjustment is needed to compensate for characteristics of parts including IC201.
IC2101	X		Holding down both the CH UP/DOWN keys on the TV set at service mode for more than 2 seconds will automatically write the above initial values into IC2101.
CRT	X		Adjust items related to picture tube only.
IC3001	X		Adjust items related to MTS only <b>(M01~M05)</b> .

Table - B

## ■ adjustment

### VCO Adjustment

1. Connect a digital voltmeter between pin (44) of IC201 and ground.
2. Select a good local channel.
3. Enter the service mode. select adjustment "S10".
4. Adjust the data so that digital voltmeter should read 2.2V
5. Adjustment is complete, remove the volt-meter, return to "normal" mode.

### RF AGC Adjustment

1. Have unit receive a good local channel.
2. Enter the service mode and select service adjustment "S08".
3. Set the data value to point where no noise or beat appears.
4. Select another channel to confirm that no noise or beat appears.

NOTE 1: You will have to come out of the service mode to select another channel.

NOTE 2: Setting the data to "00" will produce a black raster.

### Screen adjustment

1. Connect a digital voltmeter between TP852 and TP853 on the CRT socket PWB.

Note: These test points may not be provided.

Then connect the voltmeter to both ends of R852 located near Q852 on the foil side.

2. Select a good local channel.
3. Enter the service mode and select service adjustment "S03" and set the data value to "00" to set the color level to minimum. (Record original data code under adjustment "S03" before changing) You may skip this step if you selected a B/W picture or monoscope pattern.
4. Select service adjustment "S19" and adjust the data value to "01" this turn off the luminance signal (Y-mute).
5. Select service adjustment "S04" and adjust data value to obtain 0.17 volts on the digital voltmeter.
6. Adjust the master screen control until raster darkens to the point where raster is barely seen.
7. Adjust service adjustments "S11" red, "S12" green and "S13" blue to obtain a good grey scale with normal whites at low brightness level.
8. Select service adjustment "S19" and reset data to "00".  
Select service adjustment "S03" and reset data to obtain normal color level.
9. Remove digital voltmeter.  
Reset master screen control to obtain normal brightness range.

### White balance adjustment

1. Have unit receive a good local channel.
2. Enter the service mode. select service adjustment "S03" and set to "00" ( minimum color). "S03" does not have to be adjusted if you selected a B/W picture or monoscope pattern.
3. Alternately adjust service adjustment data of "S14" and "S15" until a good grey scale with normal whites is obtained.
4. Select service adjustment "S03" and adjust data to obtain normal color level.

### Sub-picture adjustment

1. Have unit receive a good local channel.
2. Make sure the customer picture control is set to maximum.
3. Enter the service mode and select service adjustment "S01".
4. Adjust the data value to achieve normal contrast range.

### Sub-Tint Adjustment

1. Have unit receive a good local channel.
2. Set customer tint control to center of its range.
3. Enter the service mode and select service adjustment "S02".
4. Adjust "S02" data value to obtain normal flesh tones.

### Sub-color adjustment

1. Have unit receive a good local channel.
2. Make sure the customer color control is set to center position .
3. Enter the service mode and select service adjustment "S03".
4. Adjust "S03" data value to obtain normal color level.

### Sub-brightness adjustment

1. Have unit receive a good local channel.
2. Make sure the customer brightness control is set to center position.
3. Enter the service mode and select service adjustment "S04".
4. Adjust "S04" data value to obtain normal brightness level.

### Caption position adjustment (horizontal)

1. Have unit receive a good local channel.
2. Enter the service mode and select service adjustment "S18".
3. A black text box appears on the screen (see Figure C).
4. Adjust "S18" data value so that text box is positioned in the center of the screen.

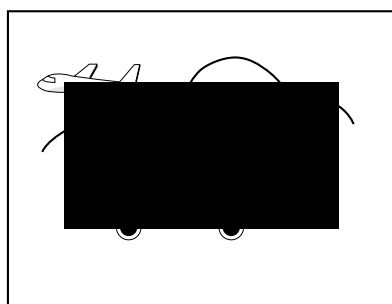


Figure C.

### 3.58MHz trap adjustment

1. Have unit receive a good local channel.
2. Enter the service mode and select service adjustment "S16".
3. This is a two position adjustment, "00" is ON, "01" is OFF.
4. Adjust data value to "00" for normal viewing.

### Sharpness and Audio balance adjustments

1. Have unit receive a good local channel.
2. Enter the service mode and select "S05" for sharpness and "S17" for balance.
  - Sharpness adjustments
3. Adjust data value to "24" (center of data range) for sharpness adjustment.
  - Audio balance adjustments
4. Adjust data value to "20" (center of data range) for Audio balance adjustment.
5. Receive the following composite stereo signal 2. Stereo signal :30% modulation, left channel only, noise reduction on, 3kHz.
6. Enter the service mode and select the service adjustment "M05".
7. Adjust the data until the AC voltage reading of the rms voltmeter is minimum.
8. Take the above steps 1 thru 8 again for fine adjustment.

### MTS level adjustment

1. Feed the following monaural signal to pin (14) of IC3001.  
Monaural signal: 300Hz, 245mVrms
2. Connect the rms voltmeter to pin (39) of IC3001.
3. Enter the service mode and select the service adjustment "M01".
4. Adjust the data so that the rms voltmeter should take the reading below. Spec: 490 ±10mVrms.

### Stereo VCO adjustment

1. Keep the unit in no-signal state.
2. Connect the frequency counter to pin (39) of IC3001.
3. Connect a capacitor (100µ F, 50V) in between positive (+) side of C3005 and ground.
4. Enter the service mode and select the service adjustment "M02".
5. Adjust the data so that frequency counter should take the reading below. Spec: 62.94 ±0.75kHz

### Filter adjustment

1. Feed the following stereo pilot signal to pin (14) of IC3001. Stereo pilot signal: 9.4kHz, 600mVrms.
2. Enter the service mode and select the service adjustment "M03".
3. Adjust the data at the point where "OK" appears on the screen. The "OK" represents the approximate center of the adjustable range of the data.

### Separation Adjustment

1. Connect the rms voltmeter to pin (39) of IC3001.
2. Receive the following composite stereo signal 1. Composite stereo signal: 30% modulation, left channel only, noise reduction on, 300Hz.
3. Enter the service mode and select the service adjustment "M04".
4. Adjust the data until the AC voltage reading of the rms voltmeter is minimum.

## DESCRIPTION OF SCHEMATIC DIAGRAM

### NOTE:

1. The unit of resistance "ohm" is omitted (K:1000 ohms, M:1 Meg ohm).
2. All resistors are 1/8 watt, unless otherwise noted.
3. All capacitors are  $\mu F$ , unless otherwise noted P:  $\mu\mu F$ .
4. (G) indicates  $\pm 2\%$  tolerance may be used.
5.  $\perp$  indicates line isolated ground.
6.  $\downarrow$  indicates hot ground.

### VOLTAGE MEASUREMENT CONDITIONS:

1. All DC voltages are measured with DVM connected between points indicated and chassis ground, line voltage set at 120V AC and all controls set for normal picture unless otherwise indicated.
2. All voltages measured with 1000 $\mu$  V B & W or Color signal.

### WAVEFORM MEASUREMENT CONDITIONS:

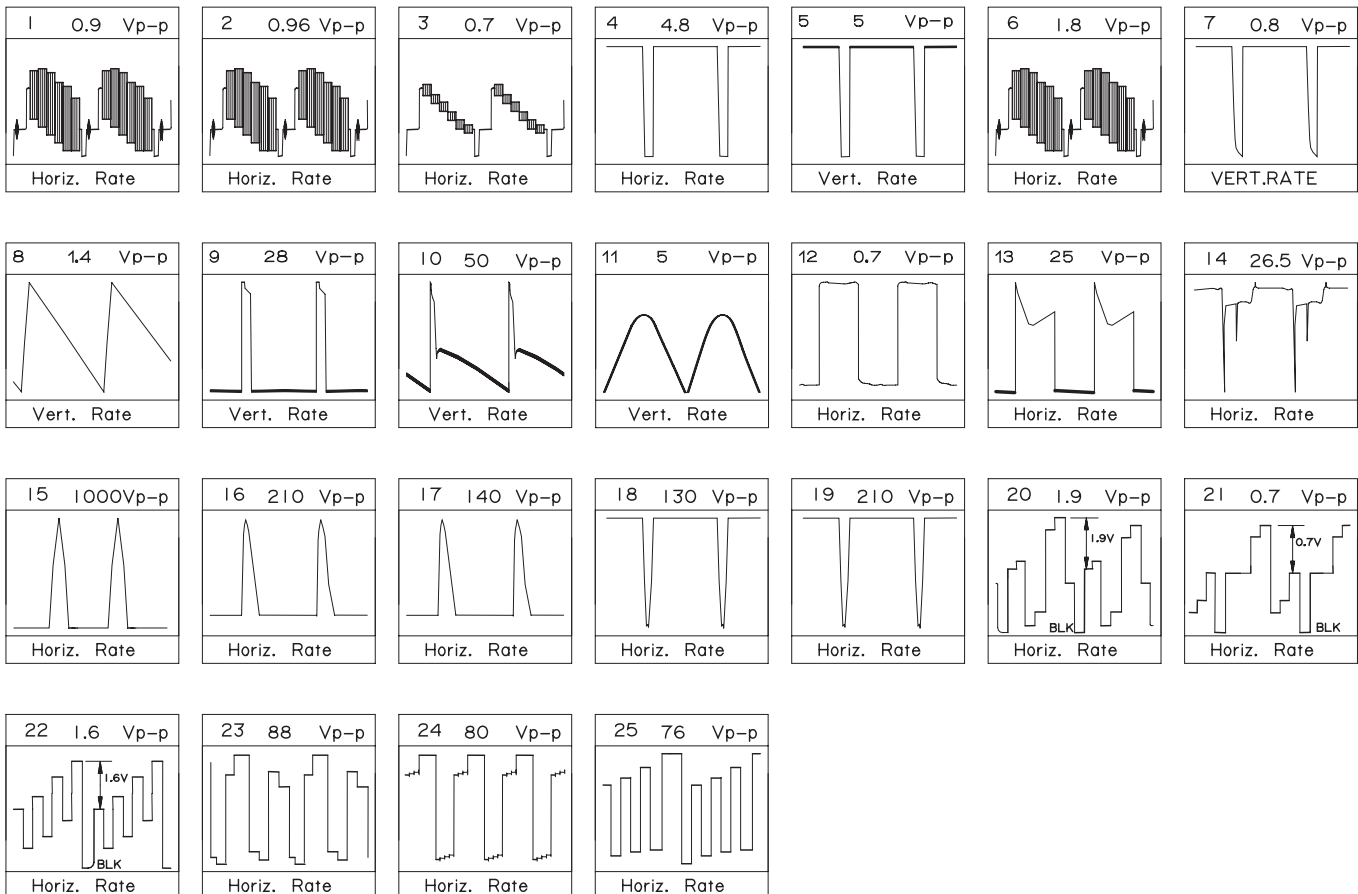
1. Photographs taken on a standard gated color bar signal, the tint setting adjusted for proper color. The wave shapes at the red, green and blue cathodes of the picture tube depend on the tint, color level and picture control.
2.  $\odot$  indicates waveform check points (See chart, waveforms are measured from point indicated to chassis ground.)

$\triangle$  AND SHADED (  ) COMPONENTS = SAFETY RELATED PARTS.  
 $\blacktriangle$  MARK= X-RAY RELATED PARTS.

DRGANNES MARQUES  $\triangle$  ET HACHRES (  ):  
 PIECES RELATIVES A LA SECURITE.  
 MARQUE  $\blacktriangle$  : PIECS RELATIVE AUX RAYONS X.

This circuit diagram is a standard one, printed circuits may be subject to change for product improvement without prior notice.

## WAVE FORMS



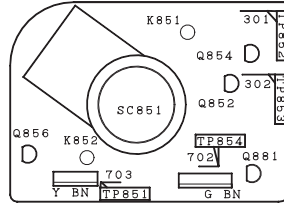
# CHASSIS LAYOUT

H

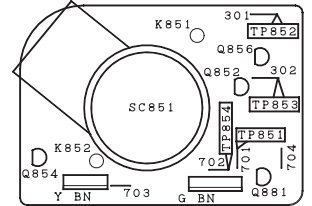
MODEL 20J-S100  
MODEL 20J-S100S  
MODEL CJ20S10  
MODEL 21MJ50

MODEL 20J-S100S ONLY

PWB-B



PWB-B



G

F

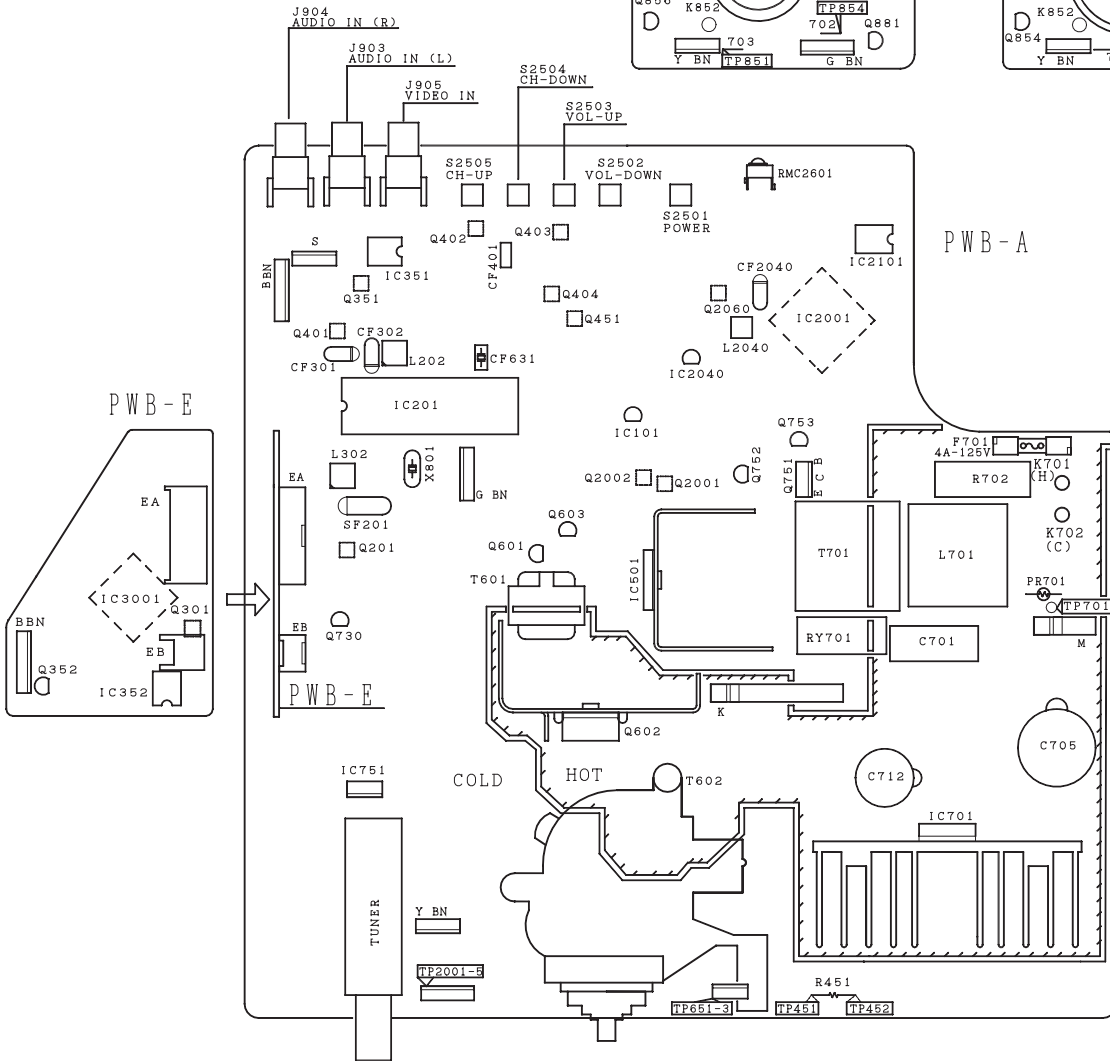
E

D

C

B

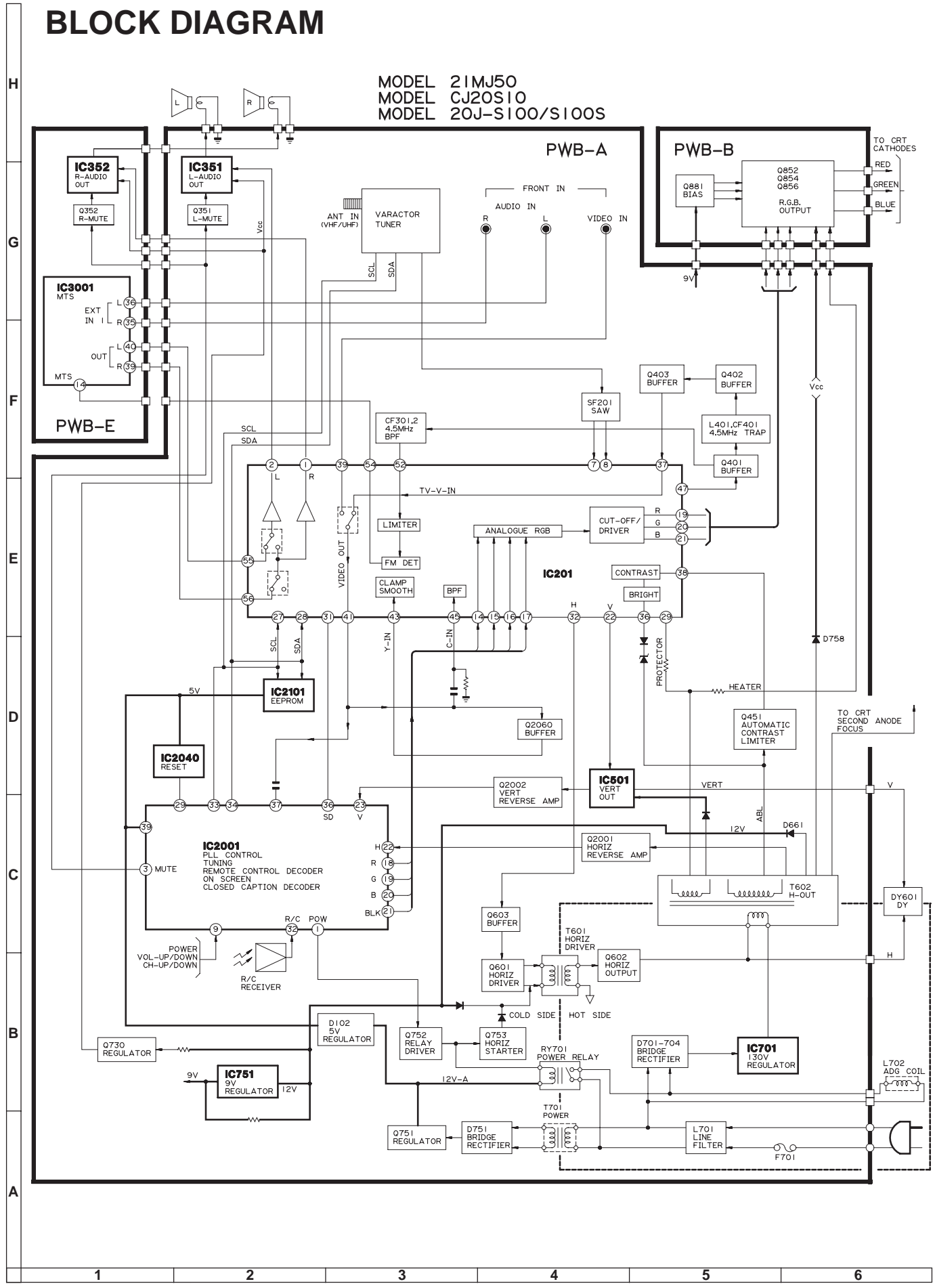
A



1 2 3 4 5 6

# BLOCK DIAGRAM

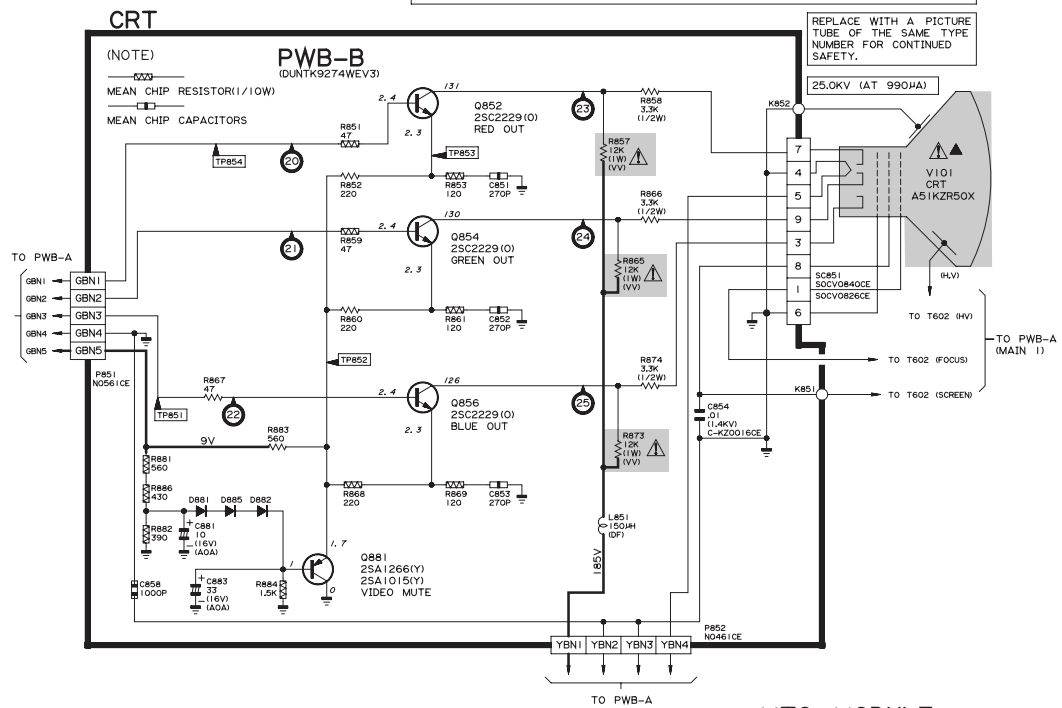
MODEL 21MJ50  
MODEL CJ20S10  
MODEL 20J-S100/S100S



# SCHEMATIC DIAGRAM :CRT Unit

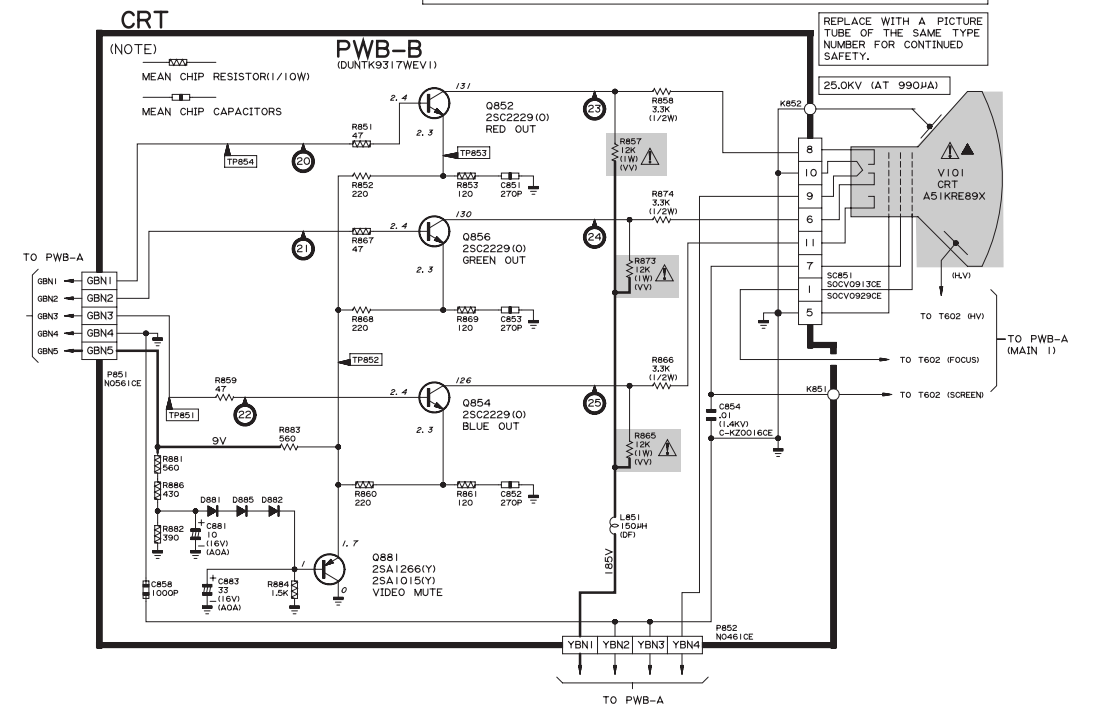
MODEL 20J-S100  
MODEL CJ20S10  
MODEL 21MJ50

NOTE: 1. THE UNIT OF RESISTANCE "OHM" IS OMITTED  
(K=1000 OHMS, M=MEG OHMS).  
2. ALL RESISTORS ARE 1/8WATT, UNLESS OTHERWISE NOTED.  
3. ALL CAPACITORS ARE  $\mu$ F, UNLESS OTHERWISE NOTED ( $\mu$ M=).  
AND SHADED ( ) COMPONENTS = SAFETY RELATED PARTS.  
▲ MARK = X-RAY RELATED PARTS.  
NOTE: ALL DIODES ARE "1SS119" "DX0045GE" OR "DX0446CE" UNLESS OTHERWISE SPECIFIED.

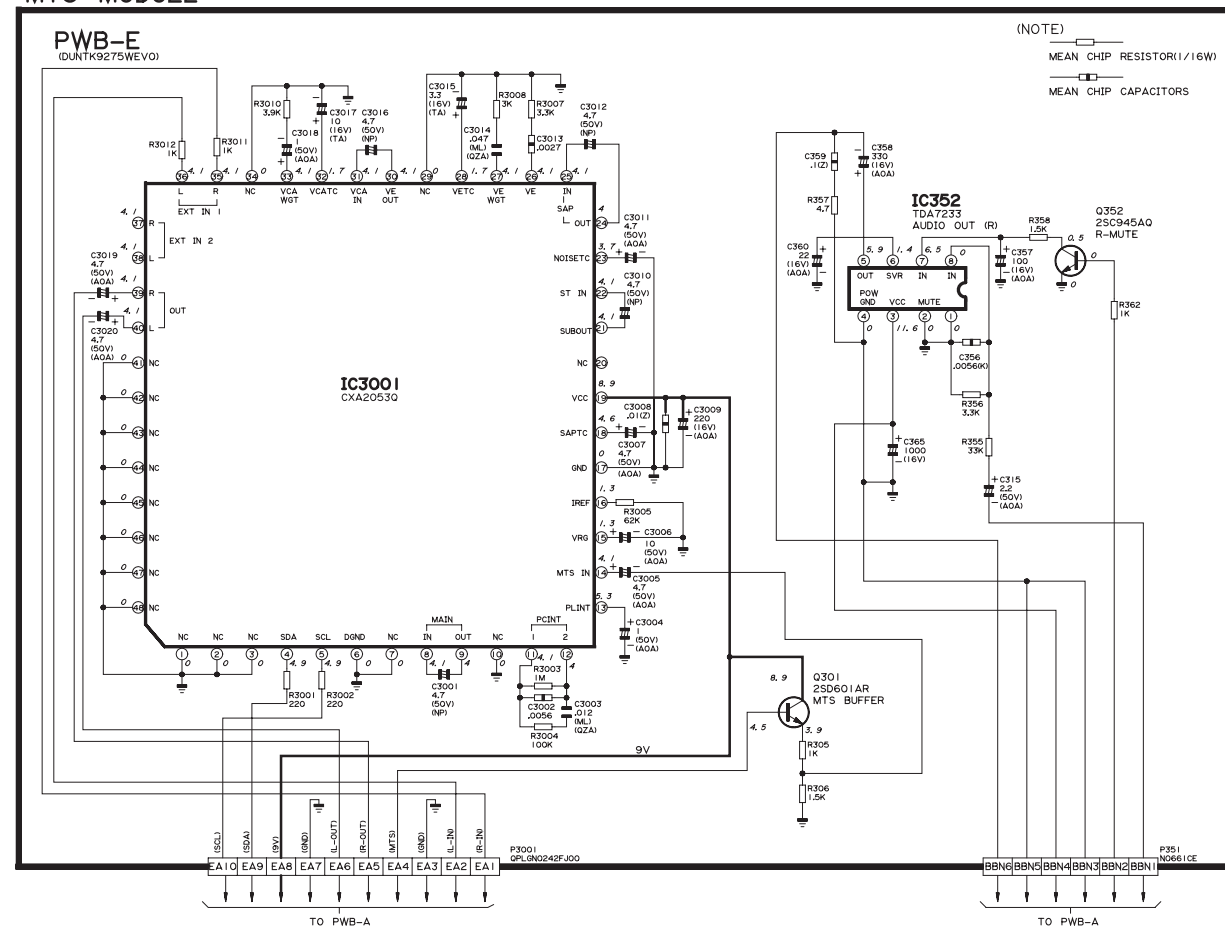


MODEL 20J-S100S

NOTE: 1. THE UNIT OF RESISTANCE "OHM" IS OMITTED  
(K=1000 OHMS, M=MEG OHMS).  
2. ALL RESISTORS ARE 1/8WATT, UNLESS OTHERWISE NOTED.  
3. ALL CAPACITORS ARE  $\mu$ F, UNLESS OTHERWISE NOTED ( $\mu$ M=).  
AND SHADED ( ) COMPONENTS = SAFETY RELATED PARTS.  
▲ MARK = X-RAY RELATED PARTS.  
NOTE: ALL DIODES ARE "1SS119" "DX0045GE" OR "DX0446CE" UNLESS OTHERWISE SPECIFIED.



## MTS MODULE



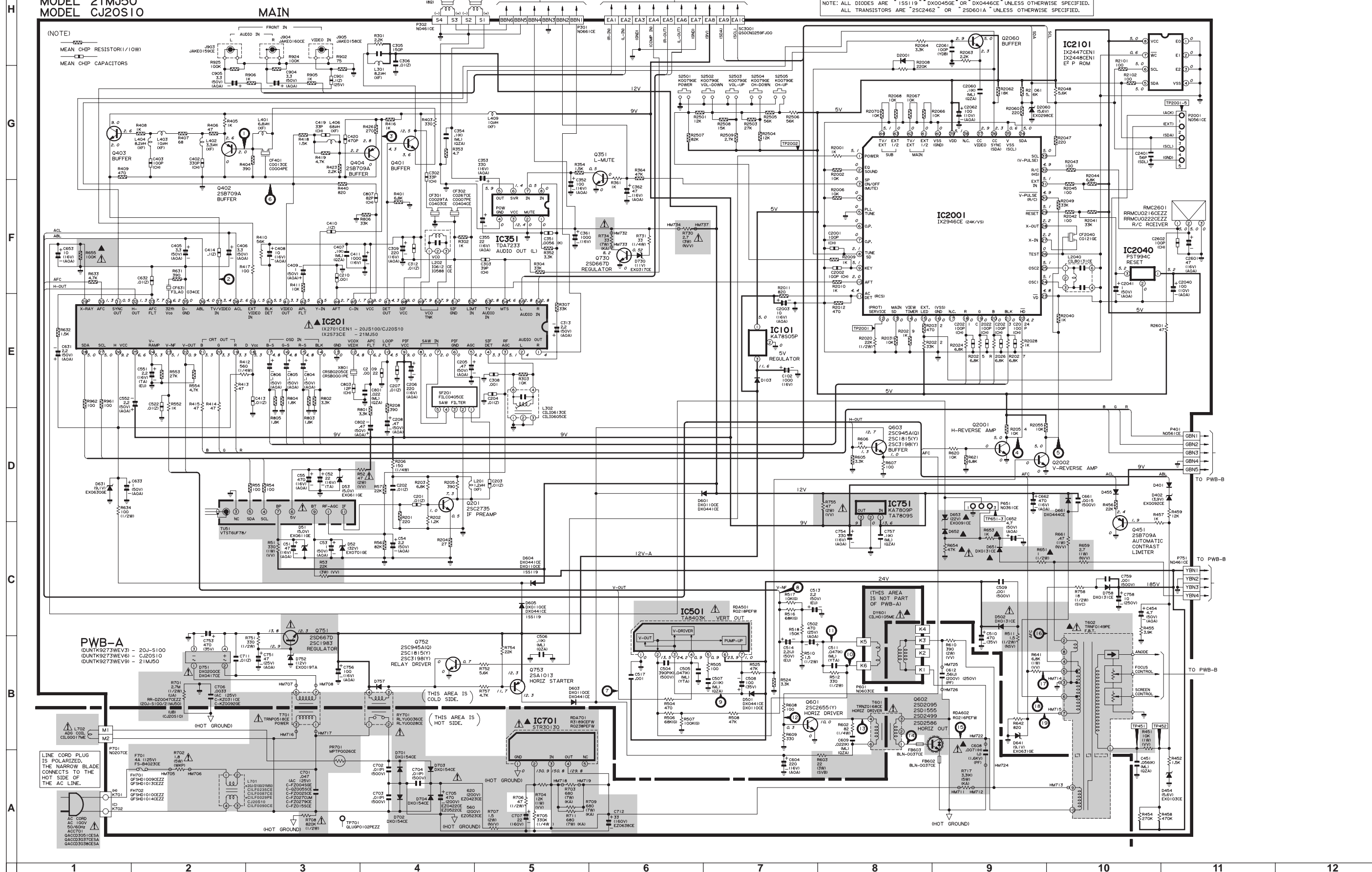
# SCHEMATIC DIAGRAM: MAIN Unit: 20J-S100, 21MJ50, CJ20S10

MODEL 20J-S100  
MODEL 21MJ50  
MODEL CJ20S10

AND SHADED ( ) COMPONENTS = SAFETY RELATED PARTS.  
▲ MARK = X-RAY RELATED PARTS.

NOTE: 1. THE UNIT OF RESISTANCE "OHM" IS OMITTED  
K=1000 OHMS, M=MEG OHMS  
2. ALL RESISTORS ARE 1/8WATT, UNLESS OTHERWISE NOTED.  
3. ALL CAPACITORS ARE µF, UNLESS OTHERWISE NOTED (µ=µF).

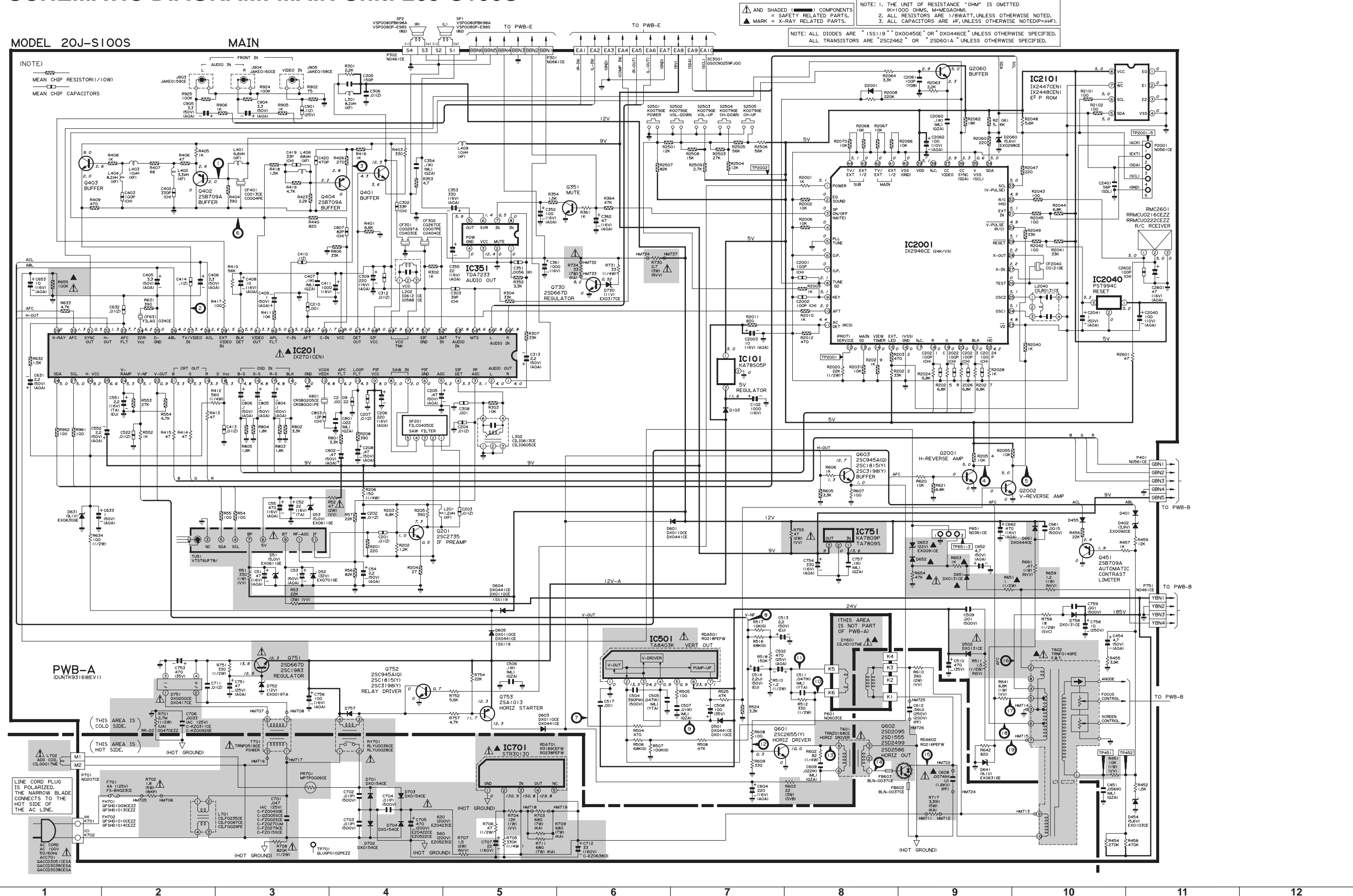
NOTE: ALL DIODES ARE "1S119" "DX0045GE" OR "DX0446GE" UNLESS OTHERWISE SPECIFIED.  
ALL TRANSISTORS ARE "2SC2462" OR "2SD601A" UNLESS OTHERWISE SPECIFIED.



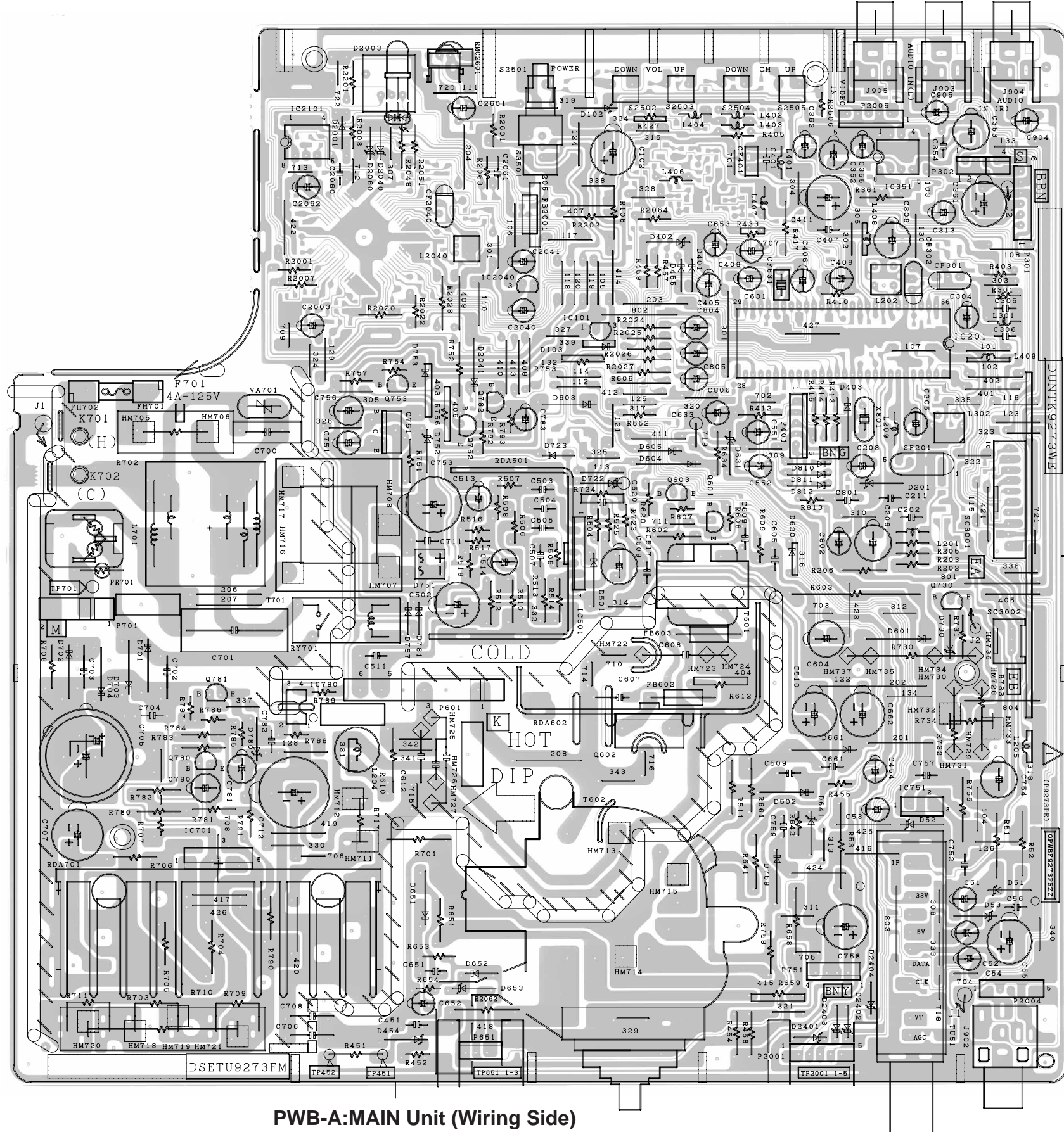
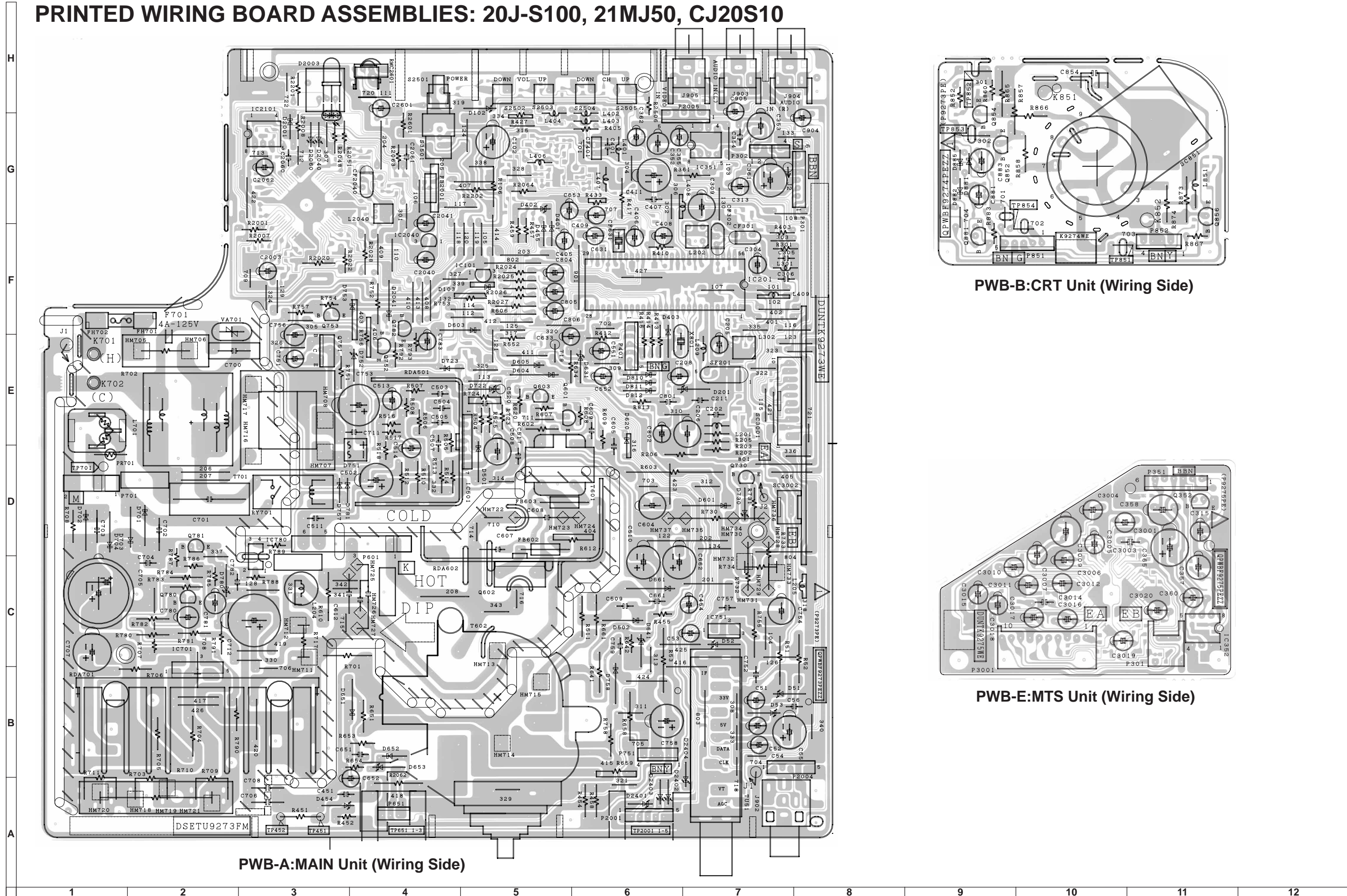


# SCHEMATIC DIAGRAM: MAIN Unit: 20J-S100S

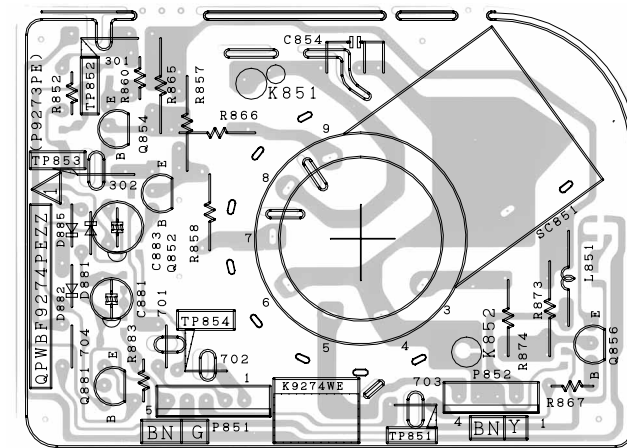
H  
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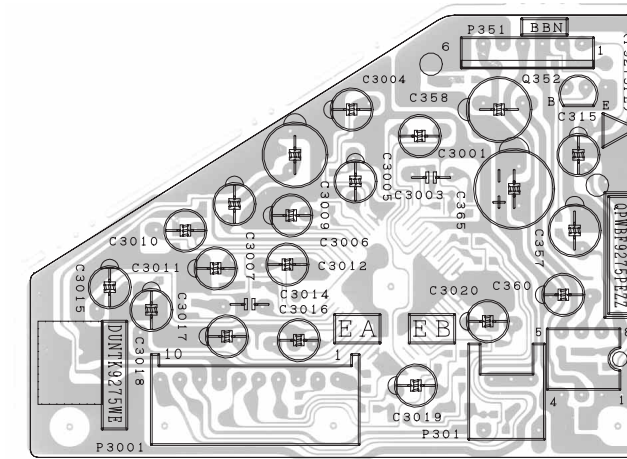
# PRINTED WIRING BOARD ASSEMBLIES: 20J-S100, 21MJ50, CJ20S10



**PWB-A:MAIN Unit (Wiring Side)**



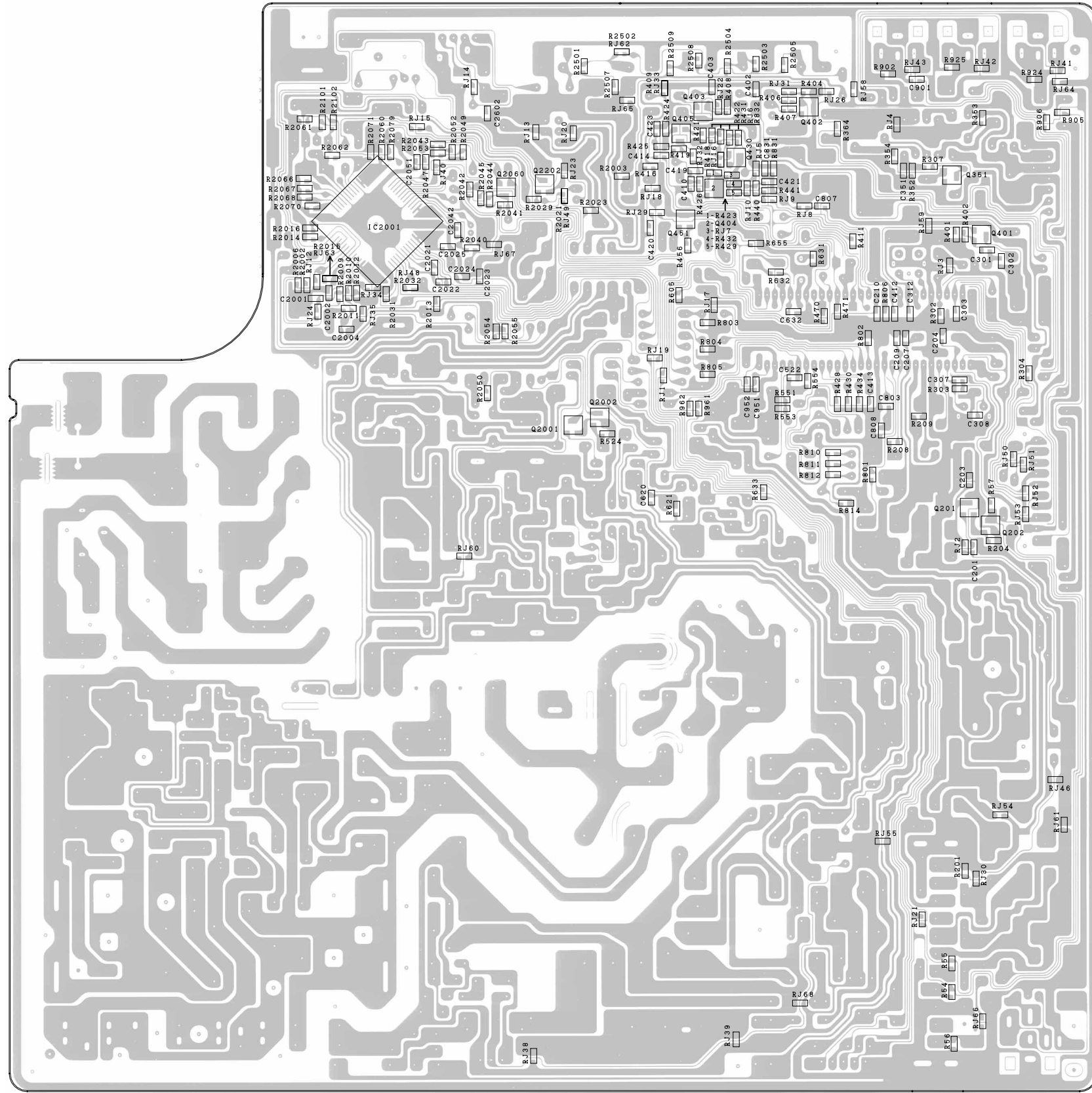
**PWB-B: CRT Unit (Wiring Side)**



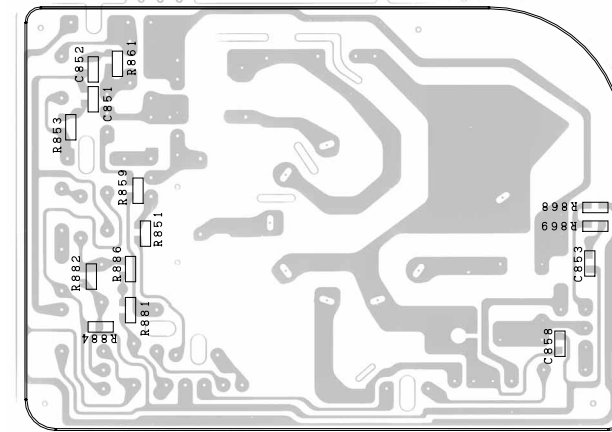
**PWB-E: MTS Unit (Wiring Side)**

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E  
D  
C  
B  
A

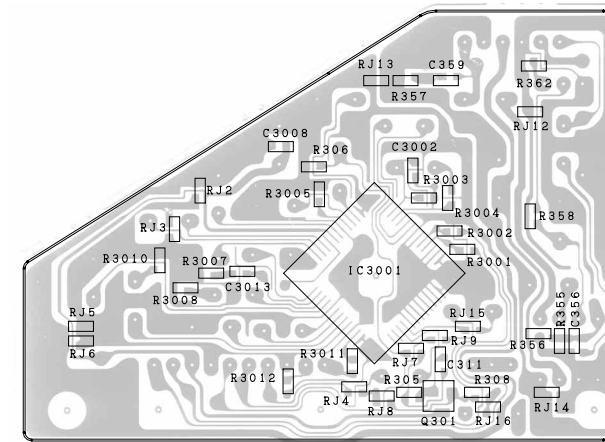
1 2 3 4 5 6 7 8 9 10 11 12



**PWB-A:MAIN Unit (Chip Parts Side)**

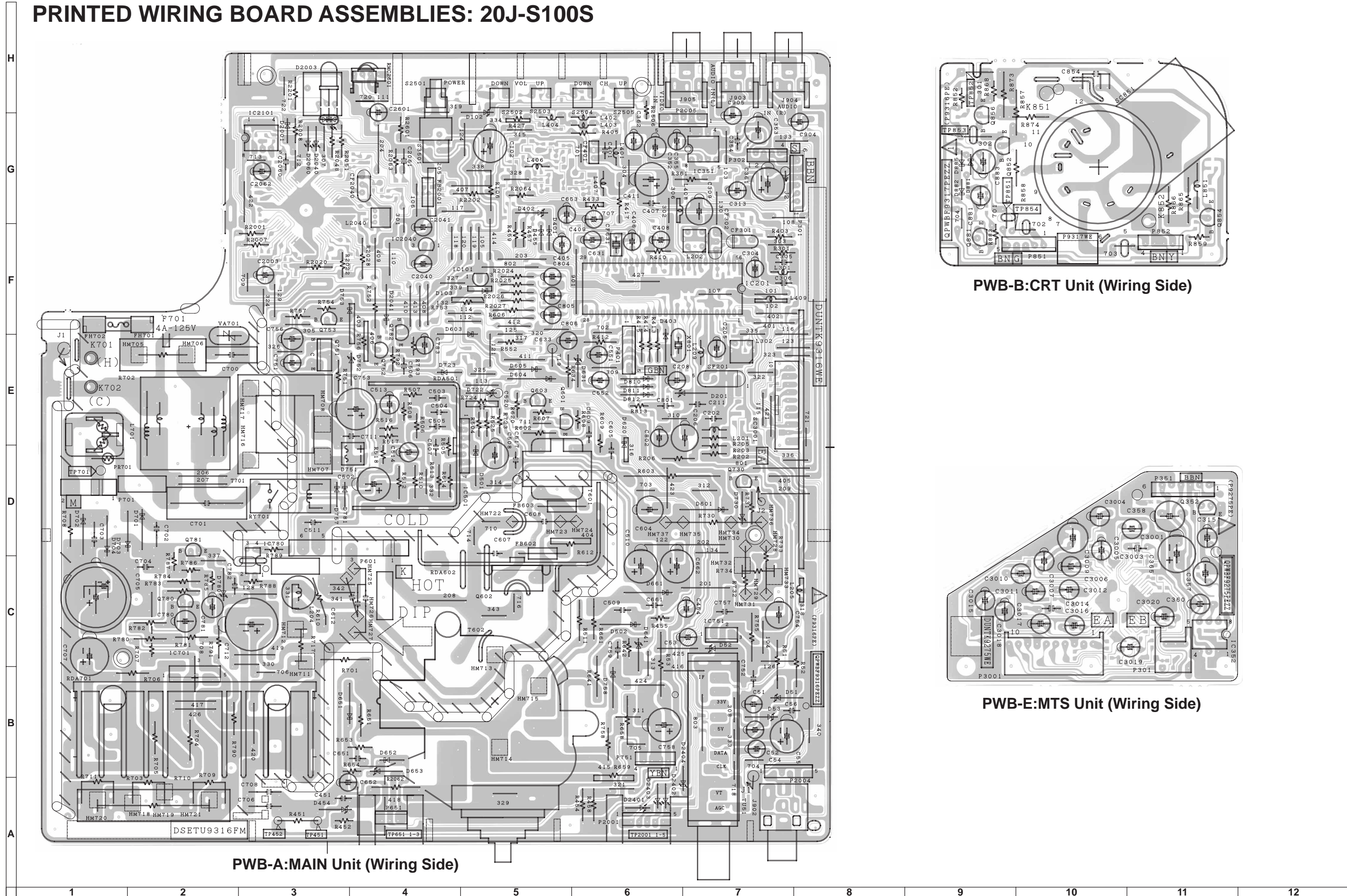


**PWB-B:CRT Unit (Chip Parts Side)**



**PWB-E:MTS Unit (Chip Parts Side)**

PRINTED WIRING BOARD ASSEMBLIES: 20J-S100S



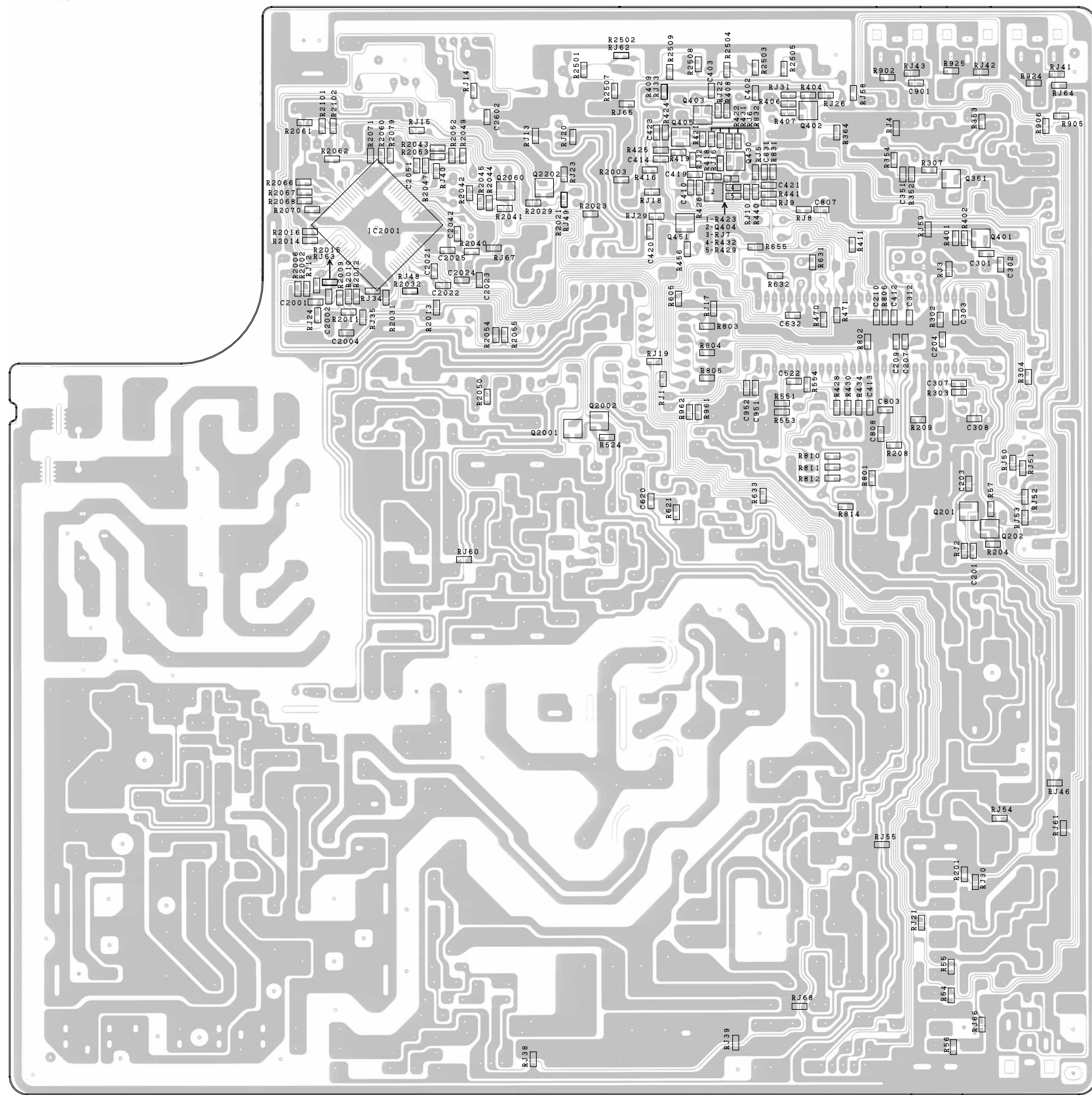
PWB-A:MAIN Unit (Wiring Side)

PWB-B:CRT Unit (Wiring Side)

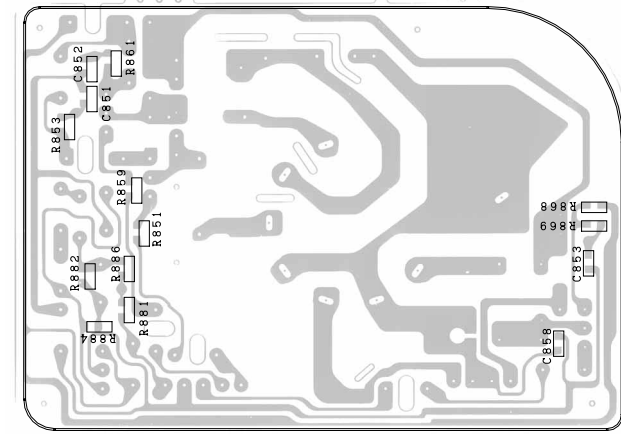
PWB-E:MTS Unit (Wiring Side)

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A

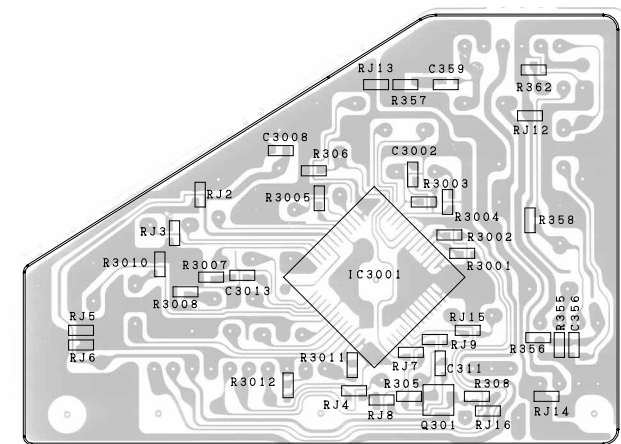
1 2 3 4 5 6 7 8 9 10 11 12



PWB-A:MAIN Unit (Chip Parts Side)



PWB-B:CRT Unit (Chip Parts Side)



PWB-E:MTS Unit (Chip Parts Side)



Ref. No.	Part No.	★	Description	Code	Ref. No.	Part No.	★	Description	Code
<b>DUNTK9273WEV3/V6/V9</b>									
<b>DUNTK9316WEV1 MAIN UNIT</b>									
C202	VCKYPA1HF103Z	J	0.01 50V Ceramic	AA	C552	VCEA0A1HW225M	J	2.2 50V EL.	AB
C203	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA	C604	VCEA0A1CW227M	J	220 16V EL.	AC
C204	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA	▲▲ C608	VCFPPD3CA712H	J	7100p 1.6kV M-Poly.	AE
C205	VCEA0A1HW474M	J	0.47 50V EL.	AB				(20J-S100/21MJ50/CJ20S10)	
C206	VCEA0A1CW227M	J	220 16V EL.	AC	▲▲ C608	VCFPPD3CA742H	J	7400p 1.6kV M-Poly.	AF
C207	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA				(20J-S100S)	
C208	VCEA0A1HW474M	J	0.47 50V EL.	AB	C609	RC-QZA223TAYK	J	0.022 50V Mylar	AB
C209	VCKYCY1HB222K	J	2200p 50V Ceramic	AA	C612	VCFPPJ2EB564J	J	0.56 250V M-Poly.	—
C210	VCKYCY1HB102K	J	1000p 50V Ceramic	AA	C631	VCEA0A1HW225M	J	2.2 50V EL.	AB
C302	VCCCCY1HH330J	J	33p 50V Ceramic	AA	C632	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA
C303	VCCCCY1HH390J	J	39p 50V Ceramic	AA	C633	VCEA0A1HW105M	J	1.0 50V EL.	AB
C305	VCKYPA1HB151K	J	150p 50V Ceramic	AA	C652	VCEA0A1HW475M	J	4.7 50V EL.	AB
C306	VCKYPA1HF103Z	J	0.01 50V Ceramic	AA	C653	VCEA0A1CW106M	J	10 16V EL.	AB
C308	VCKYCY1HB102K	J	1000p 50V Ceramic	AA	C661	VCKYPA2HB152K	J	1500p 500V Ceramic	AA
C309	VCEA0A1CW227M	J	220 16V EL.	AC	C662	VCEA0A1CW477M	J	470 16V EL.	AC
C312	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA	▲ C701	RC-FZ004SGEZZ	J	0.47 AC125V Plastic	AE
C313	VCEA0A1HW225M	J	2.2 50V EL.	AB		or RC-QZ005SCEZZ			
C351	VCKYCY1HB562K	J	5600p 50V Ceramic	AA		or RC-FZ002SCEZZ			
C352	VCEA0A1CW107M	J	100 16V EL.	AC		or RC-FZ027CUMZZ			
C353	VCEA0A1CW337M	J	330 16V EL.	AC		or RC-FZ0279CEZZ			
C354	RC-QZA104TAYK	J	0.1 50V Mylar	AB		or RC-FZ015SCEZZ			
C355	VCEA0A1CW226M	J	22 16V EL.	AB	C702	VCKYPB2HE103P	J	0.01 500V Ceramic	AB
C361	VCEAGA1CW108M	J	1000 16V EL.	AD	C703	VCKYPB2HE103P	J	0.01 500V Ceramic	AB
C362	VCEA0A1CW476M	J	47 16V EL.	AB	C704	VCKYPB2HE103P	J	0.01 500V Ceramic	AB
C402	VCCCCY1HH331J	J	330p 50V Ceramic	AA	▲ C705	RC-EZ0422CEZZ	J	470 200V EL.	AN
C403	VCCCCY1HH101J	J	100p 50V Ceramic	AA		or RC-EZ0522CEZZ			AN
C405	VCEA0A1HW335M	J	3.3 50V EL.	AB		or RC-EZ0423CEZZ	620	200V EL.	
C406	VCEA0A1HW335M	J	3.3 50V EL.	AB		or RC-EZ0523CEZZ	560	200V EL.	
C407	RC-QZA104TAYK	J	0.1 50V Mylar	AB	▲ C706	RC-KZ0311CEZZ	J	0.0033 AC125V Ceramic	AC
C408	VCEA0A1CW106M	J	10 16V EL.	AB		or RC-KZ0092GEZZ			AD
C409	VCEA0A1HW105M	J	1.0 50V EL.	AB	▲ C707	VCEAGA2CW226M	J	22 160V EL.	AD
C410	VCKYCY1EF104Z	J	0.1 25V Ceramic	AA	C711	VCKYPA1HF103Z	J	0.01 50V Ceramic	AA
C411	VCEAGA1CW108M	J	1000 16V EL.	AD	C712	RC-EZ0638CEZZ	J	33 160V EL.	AG
C413	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA	C751	VCEA0A1CW476M	J	47 16V EL.	—
C414	VCKYCY1EF104Z	J	0.1 25V Ceramic	AA	C753	VCEAGA1VW477M	J	470 35V EL.	AD
C419	VCCCCY1HH330J	J	33p 50V Ceramic	AA	C754	VCEA0A1CW337M	J	330 16V EL.	AC
C420	VCCCCY1HH471J	J	470p 50V Ceramic	AA	C756	VCEA0A1CW107M	J	100 16V EL.	AC
C451	RC-QZA563TAYK	J	0.056 50V Mylar	AB	C757	RC-QZA104TAYK	J	0.1 50V Mylar	AB
C454	VCEA0A1HW475M	J	4.7 50V EL.	AB	▲ C758	VCEAGA2EW106M	J	10 250V EL.	AC
C502	VCEA0A1EW477M	J	470 25V EL.	AD	C759	VCKYPA2HB102K	J	1000p 500V Ceramic	AA
C504	VCKYPA2HB391K	J	390p 500V Ceramic	AA	C801	RC-QZA223TAYK	J	0.022 50V Mylar	AB
C505	VCQYTA1HM473K	J	0.047 50V Mylar	AB	C802	VCEA0A1HW474M	J	0.47 50V EL.	AB
C506	RC-QZA104TAYK	J	0.1 50V Mylar	AB	C803	VCCCCY1HH120J	J	12p 50V Ceramic	AA
C507	RC-QZA103TAYK	J	0.1 50V Mylar	AA	C804	VCEA0A1HW104M	J	0.1 50V EL.	AB
C508	VCEAGA1VW107M	J	100 35V EL.	AC	C805	VCEA0A1HW104M	J	0.1 50V EL.	AB
C509	VCKYPA2HB102K	J	1000p 500V Ceramic	AA	C806	VCEA0A1HW104M	J	0.1 50V EL.	AB
C510	VCEAGA1VW477M	J	470 35V EL.	AD	C807	VCCCCY1HH820J	J	82p 50V Ceramic	AA
C511	VCQYTA1HM473K	J	0.047 50V Mylar	AB	C901	VCKYCY1EF104Z	J	0.1 25V Ceramic	AA
C513	VCEACA1HC225M	J	2.2 50V EL.	AC	C904	VCEA0A1HW335M	J	3.3 50V EL.	AB
C514	VCEACA1HC225J	J	2.2 50V EL.	AC	C905	VCEA0A1HW335M	J	3.3 50V EL.	AB
C517	VCKYPA1HB102K	J	1000p 50V Ceramic	AA	C2001	VCCCCY1HH101J	J	100p 50V Ceramic	AA
C522	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA	C2002	VCCCCY1HH101J	J	100p 50V Ceramic	AA
C551	VCSATA1CE225K	J	2.2 16V Tantalum	AB	C2003	VCEA0A1CW106M	J	10 16V EL.	AB
					C2021	VCCCCY1HH101J	J	100p 50V Ceramic	AA
					C2022	VCCCCY1HH101J	J	100p 50V Ceramic	AA
					C2023	VCCCCY1HH101J	J	100p 50V Ceramic	AA

Ref. No.	Part No.	★	Description	Code
<b>DUNTK9273WEV3/V6/V9</b>				
<b>DUNTK9316WEV1 MAIN UNIT</b>				
C2024	VCCCCY1HH101J	J	100p 50V Ceramic	AA
C2040	VCEA0A1AW107M	J	100 10V EL.	AB
C2041	VCEA0A1HW105M	J	1.0 50V EL.	AB
C2060	RC-QZA104TAYK	J	0.1 50V Mylar	AB
C2061	VCKYD41HB101K	J	100p 50V Ceramic	AA
C2062	VCEA0A1AW107M	J	100 10V EL.	AB
C2401	VCCSD41HL560J	J	56p 50V Ceramic	AA
C2601	VCEA0A1CW476M	J	47 16V EL.	AB
C2602	VCCCCY1HH101J	J	100p 50V Ceramic	AA

**RESISTORS**

(M-Ox: Metal Oxide, M-Film: Metal Film)

RJ1	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ5	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ6	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ7	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ9	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ10	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ12	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ13	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ14	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ15	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ17	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ18	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ19	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ20	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ21	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ24	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ26	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ29	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ30	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ32	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ35	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ40	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ49	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ50	VRN-MD2AL000J	J	0 0.1W M-Film	AA
△ RJ51	VRN-MD2AL000J	J	0 0.1W M-Film	AA
△ RJ52	VRN-MD2AL000J	J	0 0.1W M-Film	AA
△ RJ53	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ55	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ59	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ62	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ63	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ64	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ66	VRN-MD2AL000J	J	0 0.1W M-Film	AA
RJ68	VRN-MD2AL000J	J	0 0.1W M-Film	AA
△ R51	VRS-VV3AB331J	J	330 1W M-Ox.	AA
△ R52	VRS-VV3DB470J	J	47 2W M-Ox.	AA
△ R53	VRS-VV3LB223J	J	22k 3.0W M-Ox.	AB
R54	VRN-MD2AL101J	J	100 0.1W M-Film	AA
R55	VRN-MD2AL101J	J	100 0.1W M-Film	AA
R56	VRN-MD2AL823J	J	82k 0.1W M-Film	AA
R57	VRN-MD2AL223J	J	22k 0.1W M-Film	AA

Ref. No.	Part No.	★	Description	Code
R201	VRN-MD2AL221J	J	220 0.1W M-Film	AA
R202	VRD-RA2BE122J	J	1.2k 1/8W Carbon	AA
R203	VRD-RA2BE682J	J	6.8k 1/8W Carbon	AA
R204	VRN-MD2AL270J	J	27 0.1W M-Film	AA
R205	VRD-RA2BE391J	J	390 1/8W Carbon	AA
R206	VRD-RA2EE151J	J	150 1/4W Carbon	AA
R208	VRN-MD2AL391J	J	390 0.1W M-Film	AA
R301	VRD-RA2BE222J	J	2.2k 1/8W Carbon	AA
R302	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
R303	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R304	VRN-MD2AL333J	J	33k 0.1W M-Film	AA
R307	VRN-MD2AL333J	J	33k 0.1W M-Film	AA
R352	VRN-MD2AL332J	J	3.3k 0.1W M-Film	AA
R353	VRN-MD2AL4R7J	J	4.7 0.1W M-Film	AA
R354	VRN-MD2AL152J	J	1.5k 0.1W M-Film	AA
R361	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA
R364	VRN-MD2AL473J	J	47k 0.1W M-Film	AA
R401	VRN-MD2AL682J	J	6.8k 0.1W M-Film	AA
R403	VRD-RA2BE331J	J	330 1/8W Carbon	AA
R404	VRN-MD2AL391J	J	390 0.1W M-Film	AA
R405	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA
R406	VRN-MD2AL470J	J	47 0.1W M-Film	AA
R407	VRN-MD2AL680J	J	68 0.1W M-Film	AA
R408	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
R409	VRN-MD2AL471J	J	470 0.1W M-Film	AA
R410	VRD-RA2BE563J	J	56k 1/8W Carbon	AA
R411	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R412	VRD-RA2EE561J	J	560 1/4W Carbon	AA
R413	VRD-RA2BE470J	J	47 1/8W Carbon	AA
R414	VRD-RA2BE470J	J	47 1/8W Carbon	AA
R415	VRD-RA2BE470J	J	47 1/8W Carbon	AA
R416	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
R417	VRD-RA2BE101J	J	100 1/8W Carbon	AA
R418	VRN-MD2AL152J	J	1.5k 0.1W M-Film	AA
R419	VRN-MD2AL472J	J	4.7k 0.1W M-Film	AA
R423	VRN-MD2AL222J	J	2.2k 0.1W M-Film	AA
R426	VRN-MD2AL271J	J	270 0.1W M-Film	AA
R440	VRN-MD2AL821J	J	820 0.1W M-Film	AA
△ R451	VRS-VV3AB103J	J	10k 1W M-Ox.	AA
R452	VRD-RA2BE152J	J	1.5k 1/8W Carbon	AA
R454	VRD-RA2BE274J	J	270k 1/8W Carbon	AA
R455	VRD-RA2BE392J	J	3.9k 1/8W Carbon	AA
R456	VRN-MD2AL223J	J	22k 0.1W M-Film	
R457	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA
R458	VRD-RA2BE474J	J	470k 1/8W Carbon	AA
R459	VRD-RA2BE123J	J	12k 1/8W Carbon	AA
R504	VRD-RA2BE471J	J	470 1/8W Carbon	AA
R505	VRD-RA2BE101J	J	100 1/8W Carbon	AA
R506	VRD-RA2BE683G	J	68k 1/8W Carbon	AA
R507	VRD-RA2BE104G	J	100k 1/8W Carbon	AA
R508	VRD-RA2BE473J	J	47k 1/8W Carbon	AA
R510	VRD-RM2HD1R5J	J	1.5 1/2W Carbon	AA
			(20J-S100/21MJ50/CJ20S10)	
R510	VRD-RM2HD1R2J	J	1.2 1/2W Carbon	AA
			(20J-S100S)	
△ R511	VRN-SV2HB1R5J	J	1.5 1/2W M-Film	AA



Ref. No.	Part No.	★	Description	Code	Ref. No.	Part No.	★	Description	Code
<b>DUNTK9273WEV3/V6/V9</b>					<b>DUNTK9316WEV1 MAIN UNIT</b>				
R512	VRD-RM2HD331J	J	330 1/2W Carbon	AA	△ R758	VRN-SV2HC180J	J 18	1/2W M-Ox.	AA
R516	VRD-RA2BE683G	J	68k 1/8W Carbon	AA	R801	VRN-MD2AL332J	J	3.3k 0.1W M-Film	AA
R517	VRD-RA2BE103G	J	10k 1/8W Carbon	AA	R802	VRN-MD2AL332J	J	3.3k 0.1W M-Film	AA
R518	VRD-RA2BE154J	J	150k 1/8W Carbon	AA	R803	VRN-MD2AL182J	J	1.8k 0.1W M-Film	AA
R524	VRN-MD2AL332J	J	3.3k 0.1W M-Film	AA	R804	VRN-MD2AL182J	J	1.8k 0.1W M-Film	AA
R525	VRD-RA2BE473J	J	47k 1/8W Carbon	AA	R805	VRN-MD2AL182J	J	1.8k 0.1W M-Film	AA
R552	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA	R806	VRN-MD2AL333J	J	33k 0.1W M-Film	AA
R553	VRN-MD2AL273J	J	27k 0.1W M-Film	AA	R902	VRN-MD2AL750J	J	75 0.1W M-Film	AA
R554	VRN-MD2AL472J	J	4.7k 0.1W M-Film	AA	R905	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
R602	VRD-RA2EE820J	J	82 1/4W Carbon	AA	R906	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
△ R603	VRS-SV3LB220J	J	22 3.0W M-Ox.	AB	R924	VRN-MD2AL104J	J	100k 0.1W M-Film	AA
R605	VRN-MD2AL332J	J	3.3k 0.1W M-Film	AA	R925	VRN-MD2AL104J	J	100k 0.1W M-Film	AA
R606	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA	R961	VRN-MD2AL101J	J	100 0.1W M-Film	AA
R607	VRD-RA2BE101J	J	100 1/8W Carbon	AA	R962	VRN-MD2AL101J	J	100 0.1W M-Film	AA
R608	VRD-RA2BE101J	J	100 1/8W Carbon	AA	R2001	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA
R609	VRD-RA2BE331J	J	330 1/8W Carbon	AA	R2002	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R610	VRS-VV3DB391J	J	390 2W M-Ox.	AA	R2006	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R620	VRD-RA2BE103J	J	10k 1/8W Carbon	AA	R2008	VRD-RA2BE224J	J	220k 1/8W Carbon	AA
R621	VRN-MD2AL682J	J	6.8k 0.1W M-Film	AA	R2009	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
R631	VRN-MD2AL391J	J	390 0.1W M-Film	AA	R2010	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
R632	VRN-MD2AL152J	J	1.5k 0.1W M-Film	AA	R2011	VRN-MD2AL821J	J	820 0.1W M-Film	AA
R633	VRN-MD2AL472J	J	4.7k 0.1W M-Film	AA	R2012	VRN-MD2AL471J	J	470 0.1W M-Film	AA
R634	VRD-RM2HD101J	J	100 1/2W Carbon	AA	R2020	VRD-RM2HD223J	J	22k 1/2W Carbon	AA
R641	VRS-VV3AB682J	J	6.8k 1W M-Ox.	AA	R2022	VRD-RA2BE333J	J	33k 1/8W Carbon	AA
R642	VRD-RA2BE821J	J	820 1/8W Carbon	AA	R2024	VRD-RA2BE682J	J	6.8k 1/8W Carbon	AA
▲△ R651	VRD-RM2HD1R0J	J	1.0 1/2W Carbon	AA	R2025	VRD-RA2BE682J	J	6.8k 1/8W Carbon	AA
▲△ R653	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA	R2026	VRD-RA2BE682J	J	6.8k 1/8W Carbon	AA
▲△ R654	VRD-RA2BE473J	J	47k 1/8W Carbon	AA	R2027	VRD-RA2BE682J	J	6.8k 1/8W Carbon	AA
▲△ R655	VRN-MD2AL104J	J	100k 0.1W M-Film	AA	R2028	VRD-RA2BE102J	J	1.0k 1/8W Carbon	AA
△ R659	VRN-VV3AB2R7J	J	2.7 1W M-Film	AA	R2029	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
△ R661	VRN-VV3ABR47J	J	0.47 1W M-Film	AA	R2031	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
△ R701	VRC-UA2HG275K	J	2.7M 1/2W Solid	AA	R2032	VRN-MD2AL471J	J	470 0.1W M-Film	AA
	or RR-DZ0047CEZZ		(20J-S100/S100S/21MJ50)		R2040	VRN-MD2AL102J	J	1.0k 0.1W M-Film	AA
△ R701	VRC-UB2HG275K		2.7M 1/2W Solid	AA	R2041	VRN-MD2AL333J	J	33k 0.1W M-Film	AA
			(CJ20S10)		R2042	VRN-MD2AL101J	J	100 0.1W M-Film	AA
△ R702	VRW-KP3HC1R8K	J	1.8 5W Cement	AC	R2043	VRN-MD2AL101J	J	100 0.1W M-Film	AA
△ R703	VRS-KA3NG681J	J	680 7W M-Ox.	AF	R2044	VRN-MD2AL682J	J	6.8k 0.1W M-Film	AA
△ R704	VRS-VV3AB123J	J	12k 1W M-Ox.	AA	R2045	VRN-MD2AL101J	J	100 0.1W M-Film	AA
R705	VRD-RA2EE334J	J	330k 1/4W Carbon	AA	R2047	VRN-MD2AL221J	J	220 0.1W M-Film	AA
R706	VRD-RM2HD470J	J	47 1/2W Carbon	AA	R2048	VRD-RA2BE562J	J	5.6k 1/8W Carbon	AA
△ R707	VRN-VV3DB1R5J	J	1.5 2W M-Film	AB	R2049	VRN-MD2AL333J	J	33k 0.1W M-Film	AA
△ R708	VRD-RM2HD824J	J	820k 1/2W Carbon	AA	R2054	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
△ R709	VRS-KA3NG681J	J	680 7W M-Ox.	AF	R2055	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
△ R711	VRS-KA3NG681J	J	680 7W M-Ox.	AF	R2060	VRN-MD2AL221J	J	220 0.1W M-Film	AA
△ R717	VRS-KA3HG3R3K	J	3.3 5W M-Ox.	AD	R2061	VRN-MD2AL562J	J	5.6k 0.1W M-Film	AA
△ R730	VRN-VV3LB2R7J	J	2.7 3W M-Film	AB	R2062	VRN-MD2AL183J	J	18k 0.1W M-Film	AA
R731	VRD-RA2EE330J	J	33 1/4W Carbon	AA	R2063	VRD-RA2BE222J	J	2.2k 1/8W Carbon	AA
△ R734	VRS-KA3NG330J	J	33 7W M-Ox.	AE	R2064	VRD-RA2BE332J	J	3.3k 1/8W Carbon	AA
R751	VRD-RM2HD331J	J	330 1/2W Carbon	AA	R2066	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R752	VRD-RA2BE562J	J	5.6k 1/8W Carbon	AA	R2067	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R754	VRD-RA2BE223J	J	22k 1/8W Carbon	AA	R2068	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
△ R755	VRS-VV3DB470J	J	47 2W M-Ox.	AA	R2070	VRN-MD2AL103J	J	10k 0.1W M-Film	AA
R757	VRD-RA2BE472J	J	4.7k 1/8W Carbon	AA	R2101	VRN-MD2AL101J	J	100 0.1W M-Film	AA
					R2102	VRN-MD2AL101J	J	100 0.1W M-Film	AA
					R2501	VRN-MD2AL123J	J	12k 0.1W M-Film	AA
					R2503	VRN-MD2AL273J	J	27k 0.1W M-Film	AA

Ref. No.	Part No.	★	Description	Code
<b>DUNTK9273WEV3/V6/V9 DUNTK9316WEV1 MAIN UNIT</b>				
R2504	VRN-MD2AL123J	J	12k 0.1W M-Film	AA
R2505	VRN-MD2AL563J	J	56k 0.1W M-Film	AA
R2506	VRD-RA2BE563J	J	56k 1/8W Carbon	AA
R2507	VRN-MD2AL823J	J	82k 0.1W M-Film	AA
R2508	VRN-MD2AL153J	J	15k 0.1W M-Film	AA
R2509	VRN-MD2AL272J	J	2.7k 0.1W M-Film	AA
R2601	VRD-RA2BE470J	J	47 1/8W Carbon	AA

**SWITCHES**

S2501	QSW-K0079GEZZ	J	Power	AB
S2502	QSW-K0079GEZZ	J	Vol.-Down	AB
S2503	QSW-K0079GEZZ	J	Vol.-Up	AB
S2504	QSW-K0079GEZZ	J	Ch.-Down	AB
S2505	QSW-K0079GEZZ	J	Ch.-Up	AB

**MISCELLANEOUS PARTS**

△ RY701	RRLYU0036CEZZ	J	Relay	AM
	or RRLYU0028CEZZ			AK
△ F701	QFS-B4023CEZZ	J	Fuse	AC
FB602	RBLN-0037CEZZ	J	Balun	AB
FB603	RBLN-0037CEZZ	J	Balun	AB
FH701	QFSDH1013CEZZ	J	Fuse Holder	AC
	or QFSDH1009CEZZ			
FH702	QFSDH1014CEZZ	J	Fuse Holder	AC
	or QFSDH1010CEZZ			
J903	QJAKE0159CEZZ	J	Jack	AF
J904	QJAKE0160CEZZ	J	Jack	AF
J905	QJAKE0158CEZZ	J	Jack	AF
P301	QPLGN0661CEZZ	J	Plug	AD
P302	QPLGN0461CEZZ	J	Plug	AB
P401	QPLGN0561CEZZ	J	Plug	AB
P601	QPLGN0603CEZZ	J	Plug	AB
P651	QPLGN0361CEZZ	J	Plug	AB
P701	QPLGN0207CEZZ	J	Plug	AA
P751	QPLGN0461CEZZ	J	Plug	AB
P2001	QPLGN0561CEZZ	J	Plug	AB
SC3001	QSOCN0259FJ00	J	Socket	AE
RMC2601	RRMCU0222CEZZ	J	Remote Receiver	AL
RDA501	PRDAR0218PEFW	M	Heat Sink	AD
RDA602	PRDAR0216PEFW	M	Heat Sink	AE
RDA701	PRDAR0238PEFW	M	Heat Sink	AN
TP701	QLUGP0102PEZZ	M	Lug	AA
	PZETM0016CEZZ	J	Insulator	AB
	LHLDW1002PEZZ	M	Holder	AB

Ref. No.	Part No.	★	Description	Code
<b>DUNTK9274WEV3 DUNTK9274WEV3 CRT UNIT</b>				
<b>TRANSISTORS</b>				
Q852	VS2SC2229O/1E	J	2SC2229 (O)	AD
Q854	VS2SC2229O/1E	J	2SC2229 (O)	AD
Q856	VS2SC2229O/1E	J	2SC2229 (O)	AD
Q881	VS2SA1266-Y-1	J	2SA1266 (Y)	AA
	or VS2SA1015Y/-1			

**DIODES AND COIL**

D881	VHD1SS119//1	J	Diode	AB
D882	VHD1SS119//1	J	Diode	AB
D885	VHD1SS119//1	J	Diode	AB
L851	VP-DF151K0000	J	Peaking 150µH	AB

**CAPACITORS**

(EL: Electrolytic, M-Poly.: Metalized Polypro Film)

C851	VCCCCY1HH271J	J	270p 50V Ceramic	AA
C852	VCCCCY1HH271J	J	270p 50V Ceramic	AA
C853	VCCCCY1HH271J	J	270p 50V Ceramic	AA
C854	RC-KZ0016CEZZ	J	0.1 1.4kV Ceramic	AC
C858	VCKYCY1HB102K	J	1000p 50V Ceramic	AA
C881	VCEA0A1CW106M	J	10 16V EL.	AB
C883	VCEA0A1CW336M	J	33 16V EL.	AB

**RESISTORS**

(M-Ox: Metal Oxide, M-Film: Metal Film)

R851	VRN-MD2AL470J	J	47 0.1W M-Film	AA
R852	VRD-RA2BE221J	J	220 1/8W Carbon	AA
R853	VRN-MD2AL121J	J	120 0.1W M-Film	AA
△ R857	VRS-VV3AB123J	J	12k 1W M-Ox.	AA
R858	VRD-RM2HD332J	J	3.3k 1/2W Carbon	AA
R859	VRN-MD2AL470J	J	47 0.1W M-Film	AA
			(20J-S100/21MJ50/CJ20S10)	
R859	VRD-RA2BE470J	J	47 1/8W Carbon	AA
			(20J-S100S)	
R860	VRD-RA2BE221J	J	220 1/8W Carbon	AA
			(20J-S100/21MJ50/CJ20S10)	
R860	VRN-MD2AL221J	J	220 0.1W M-Film	AA
			(20J-S100S)	
R861	VRN-MD2AL121J	J	120 0.1W M-Film	AA
△ R865	VRS-VV3AB123J	J	12k 1W M-Ox.	AA
R866	VRD-RM2HD332J	J	3.3k 1/2W Carbon	AA
R867	VRD-RA2BE470J	J	47 1/8W Carbon	AA
			(20J-S100/21MJ50/CJ20S10)	
R867	VRN-MD2AL470J	J	47 0.1W M-Film	AA
			(20J-S100S)	
R868	VRN-MD2AL221J	J	220 0.1W M-Film	AA
			(20J-S100/21MJ50/CJ20S10)	
R868	VRD-RA2BE221J	J	220 1/8W Carbon	AA
			(20J-S100S)	
R869	VRN-MD2AL121J	J	120 0.1W M-Film	AA
△ R873	VRS-VV3AB123J	J	12k 1W M-Ox.	AA
R874	VRD-RM2HD332J	J	3.3k 1/2W Carbon	AA
R881	VRN-MD2AL561J	J	560 0.1W M-Film	AA

Ref. No.	Part No.	★	Description	Code
<b>DUNTK9274WEV3</b>				
<b>DUNTK9274WEV3 CRT UNIT</b>				
R882	VRN-MD2AL391J	J	390 0.1W M-Film	AA
R883	VRD-RA2BE561J	J	560 1/8W Carbon	AA
R884	VRN-MD2AL152J	J	1.5k 0.1W M-Film	AA
R886	VRN-MD2AL431J	J	430 0.1W M-Film	AA

**MISCELLANEOUS PARTS**

P851	QPLGN0561CEZZ	J	Plug	AB
P852	QPLGN0461CEZZ	J	Plug	AB
SC851	QSOCV0840CEZZ	J	Socket	AK
or	QSOCV0826CEZZ		(20J-S100/21MJ50/ CJ20S10)	AK
SC851	QSOCV0913CEZZ	J	Socket (20J-S100S)	AK
or	QSOCV0929CEZZ			AM

**DUNTK9275WEV5**  
**MTS UNIT**

**INTEGRATED CIRCUITS**

IC352	VHiTDA7233/-1	J	TDA7233	AF
IC3001	VHiCXA2053Q/-1	J	CXA2053Q/	AX

**TRANSISTORS**

Q301	VS2SD601AR/-1	J		AC
Q352	VS2SC945AQ/-1	J		AB

**CAPACITORS**

(EL: Electrolytic, M-Poly.: Metalized Polypro Film)

C315	VCEA0A1HW225M	J	2.2 50V EL.	AB
C356	VCKYCY1HB562K	J	5600p 50V Ceramic	AA
C357	VCEA0A1CW107M	J	100 16V EL.	AC
C358	VCEA0A1CW337M	J	330 16V EL.	AC
C359	VCKYCY1EF104Z	J	0.1 25V Ceramic	AA
C360	VCEA0A1CW226M	J	22 16V EL.	AB
C365	VCEAGA1CW108M	J	1000 16V EL.	AD
C3001	VCE9GA1HW475M	J	4.7 50V EL.	AB
C3002	VCKYCY1HB562K	J	5600p 50V Ceramic	AA
C3003	RC-QZA123TAYK	J	0.012 50V Mylar	AB
C3004	VCEA0A1HW105M	J	1.0 50V EL.	AB
C3005	VCEA0A1HW475M	J	4.7 50V EL.	AB
C3006	VCEA0A1HW106M	J	10 50V EL.	AB
C3007	VCEA0A1HW475M	J	4.7 50V EL.	AB
C3008	VCKYCY1HF103Z	J	0.01 50V Ceramic	AA
C3009	VCEA0A1CW227M	J	220 16V EL.	AC
C3010	VCE9GA1HW475M	J	4.7 50V EL.	AB
C3011	VCEA0A1HW475M	J	4.7 50V EL.	AB
C3012	VCE9GA1HW475M	J	4.7 50V EL.	AB
C3013	VCKYCY1HB272K	J	2700p 50V Ceramic	AA

Ref. No.	Part No.	★	Description	Code
C3014	RC-QZA473TAYK	J	0.047 50V Mylar	AB
C3015	VCSATA1CE335K	J	3.3 16V Tantalum	AC
C3016	VCE9GA1HW475M	J	4.7 50V EL.	AB
C3017	VCSATA1CE106K	J	10 16V Tantalum	AD
C3018	VCEA0A1HW105M	J	1.0 50V EL.	AB
C3019	VCEA0A1HW475M	J	4.7 50V EL.	AB
C3020	VCEA0A1HW475M	J	4.7 50V EL.	AB

**RESISTORS**

(M-Ox: Metal Oxide, M-Film: Metal Film)

RJ2	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ3	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ4	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ6	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ7	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ8	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ9	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ12	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
RJ15	VRS-CY1JF000J	J	0 1/16W M-Ox.	AA
R305	VRS-CY1JF102J	J	1k 1/16W M-Ox.	AA
R306	VRS-CY1JF152J	J	1.5k 1/16W M-Ox.	AA
R355	VRS-CY1JF333J	J	33k 1/16W M-Ox.	AA
R356	VRS-CY1JF332J	J	3.3k 1/16W M-Ox.	AA
R357	VRS-CY1JF4R7J	J	4.7 1/16W M-Ox.	AA
R358	VRS-CY1JF152J	J	1.5k 1/16W M-Ox.	AA
R362	VRS-CY1JF102J	J	1k 1/16W M-Ox.	AA
R3001	VRS-CY1JF221J	J	220 1/16W M-Ox.	AA
R3002	VRS-CY1JF221J	J	220 1/16W M-Ox.	AA
R3003	VRS-CY1JF105J	J	1M 1/16W M-Ox.	AA
R3004	VRS-CY1JF104J	J	100k 1/16W M-Ox.	AA
R3005	VRS-CY1JF623J	J	62k 1/16W M-Ox.	AA
R3007	VRS-CY1JF332J	J	3.3k 1/16W M-Ox.	AA
R3008	VRS-CY1JF302J	J	3k 1/16W M-Ox.	AA
R3010	VRS-CY1JF392J	J	3.9k 1/16W M-Ox.	AA
R3011	VRS-CY1JF102J	J	1k 1/16W M-Ox.	AA
R3012	VRS-CY1JF102J	J	1k 1/16W M-Ox.	AA

**MISCELLANEOUS PARTS**

P351	QPLGN0661CEZZ	J	Plug	AD
P3001	QPLGN0242FJ00	J	Plug	AE

Ref. No.	Part No.	★	Description	Code
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### CABINET PARTS

1	CCABA1279MES0	M	Cabinet Complete Ass'y	BC
1-1	-	-	Cabinet Front	—
1-2	GCOVA1034MEKA	M	Cover for R/C	AC
1-3	HBDGB3009MESA	M	Badge "SHARP"	AC
1-4	JBTN-1098MEKA	M	Button, Power, Ch/Vol-up/down	AD
2	GCABB1126MEKA	M	Cabinet, Rear	AX

### MESCELLANEOUS PARTS

SP1	VSP0080PBK98A	M	Speaker, 2pcs used	—
SP2	VSP0080PBK98A	M	Speaker	—
△ ACC701	QACCD3051CESA	M	AC Cord	AK
	or QACCD3037CESA		AC Cord	
	or QACCD3038CESA		AC Cord	
	QCNW-2110PEZZ	R	Connecting Cord	—
	QCNW-2111PEZZ	R	Connecting Cord	—
	QCNW-2116PEZZ	R	Connecting Cord	—
	QCNW-2150PEZZ	R	Connecting Cord	—

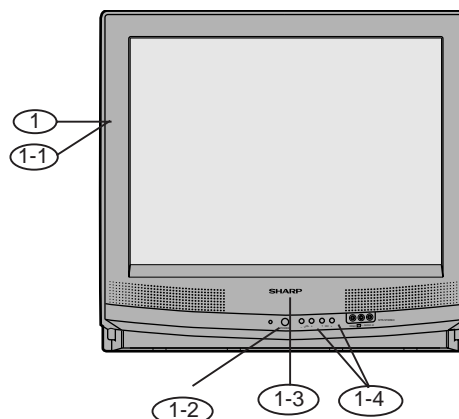
### SUPPLIED ACCESSORIES

RRMCG1324CESA	M	Infrared R/C (20J-S100/S100S/21MJ50)	AQ
RRMCG1339CESA	M	Infrared R/C (CJ20S10)	—
TGAN-1006MEZZ	M	Guarantee Card (20J-S100/100S)	AA
TiNS-6033MEZZ	M	Operation Manual (20J-S100/100S)	AC
TiNS-6083MEZZ	M	Operation Manual (CJ20S10)	AE
TiNS-6087MEZZ	M	Operation Manual (21MJ50)	AE

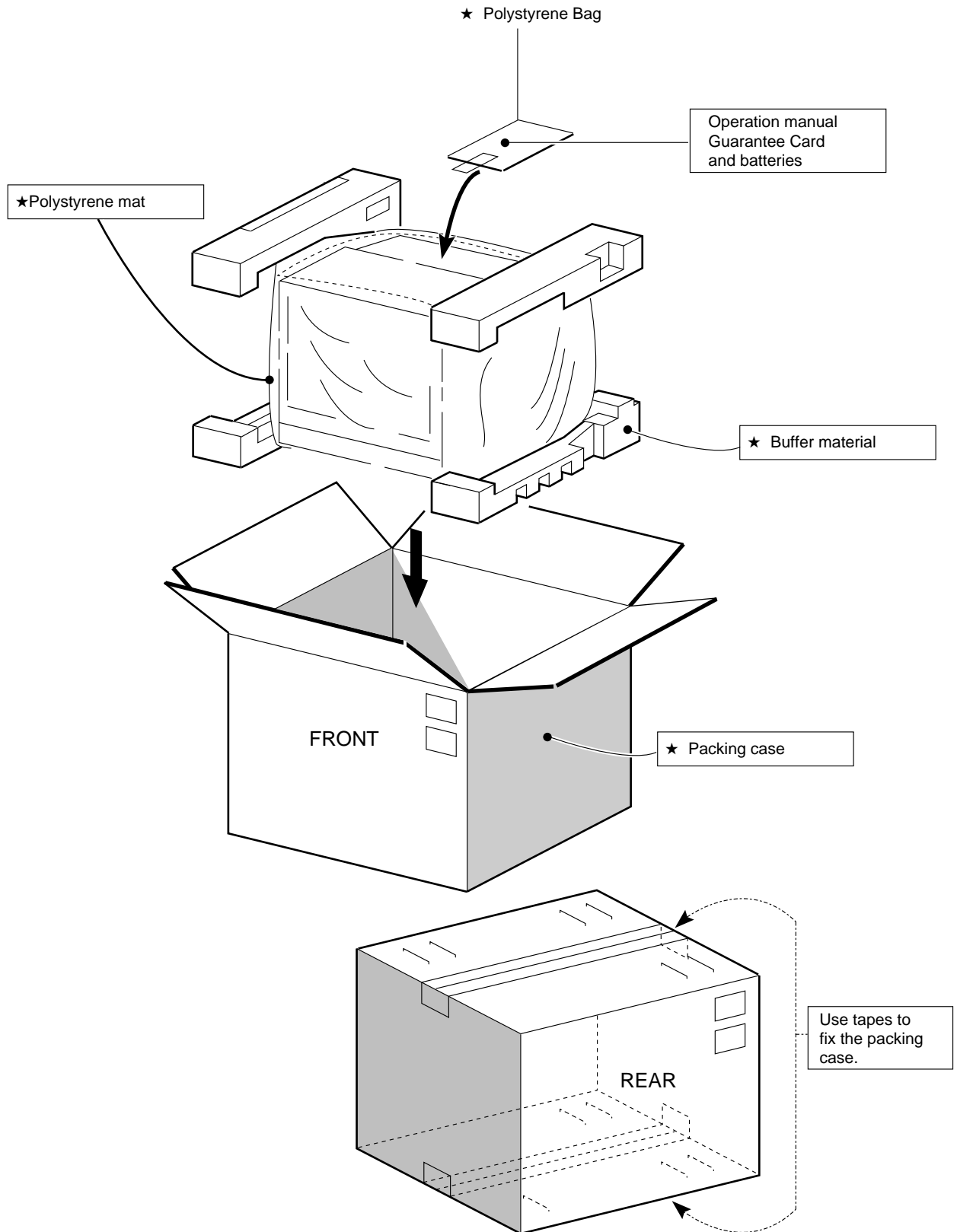
### PACKING PARTS

SPAKC0573MEZZ	M	Packing Case (20J-S100/100S/CJ20S10)	—
SPAKC0579MEZZ	M	Packing Case (21MJ50)	—
SPAKP0023MEZZ	M	Polyethylene Sack	—
SPAKX0167MEZZ	M	Buffer Material	—
SSAKA0004MEZZ	M	Polyethylene Sack	—

Ref. No.	Part No.	★	Description	Code
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# PACKING OF THE SET



**SHARP**