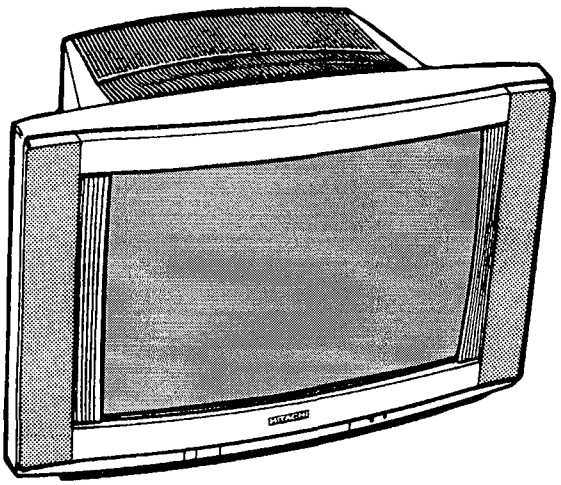
HITACHI

C2146TN
C2546TN
C2846TN

SERVICE MANUAL

CAUTION:
Before servicing this chassis, it is important that the service technician read the "Safety Precautions" and "Product Safety Notices" in this service manual



TECHNICAL SPECIFICATIONS

TV Standard ..... 625 line standards

Channel coverage ..... UHF channels

Aerial input impedance ..... 75 ohm unbalanced

Intermediate frequencies
- I.F. Luminance ..... 39.5 MHz
- I.F. Sound ..... 33 5 MHz
- I F. Chrominance ..... 35.07 MHz
- F.M. Sound ..... 6 MHz
- NICAM Carrier ..... 6.552 MHz

Colour sub-carrier ..... 4.43 MHz

Programme Selectors ..... Channel UP/DOWN buttons with 60 programme remote control

Power Consumption
- C2146TN ..... 72 W
- C2546TN ..... 103 W
- C2846TN ..... 105 W

Picture Tube
- C2146TN ..... 51 cm Type
- C2546TN ..... 59 cm Type
- C2846TN ..... 66 cm Type

Mains voltage ..... 240 V 50 Hz

Fuse ..... T3.15A Type

Focusing ..... Electro static

Dimensions:	C2146TN	C2546TN	C2846TN
Width	614 mm	700 mm	768 mm
Height	466 mm	520 mm	576 mm
Depth	485 mm	466 mm	503 mm
Weight	21 kg	27.75 kg	33.25 kg

Since this manual contains the basic circuits, the values of the parts and specifications are subject to be altered for improvement.

1995

SAFETY PRECAUTIONS

WARNING: The following precautions should be observed.

1. Do not install, remove, or handle the picture tube in any manner unless shatter proof goggles are worn. People not so equipped should be kept away while picture tubes are handled. Keep the picture tube away from the body while handling.
2. When service is required, an isolation transformer should be inserted between the power line and the receiver before any service is performed on the chassis.
3. When replacing the chassis in the cabinet, ensure all the protective devices are put back in place, such as barriers, non-metallic knobs, adjustment or compartment covers or shields, isolation resistors/capacitors, etc.
4. When service is required, observe the original lead dressing. Extra precaution should be taken to ensure correct lead dressing in the high voltage circuitry area. Particularly note the R.G.B. lead dressing. Ensure they are dressed well away from the horizontal scan and F.B.T. circuitry.
5. Always use the manufacturer's replacement component. Always replace original spacers and maintain lead lengths. Especially critical components are indicated thus ⚠ on the parts list and should not be replaced by other makes. Furthermore, where a short circuit has occurred, replace those components that indicate evidence of overheating.
6. Before returning a serviced receiver to the customer, the service technician must thoroughly test the unit to be certain that it is completely safe to operate without danger of electrical shock, and be sure that no protective device built into the instrument by the manufacturer has become defective, or inadvertently damaged during servicing.

   Therefore, the following checks are recommended for the continued protection of the customers and service technicians.

INSULATION

Insulation resistance should not be less than 10MΩ at 500V DC between the mains poles and any accessible metal parts.

Also, no flashover or breakdown should occur during the dielectric strength test, applying 3kV AC or 4.25kV DC for two seconds between the main poles and accessible metal parts.

HIGH VOLTAGE

High voltage should always be kept at the rated value of the chassis and no higher. Operating at higher voltages may cause a failure of the picture tube or high voltage supply, and also, under certain circumstances could produce X-radiation levels moderately in excess of design levels. The high voltage must not, under any circumstances, exceed 27kV on the chassis.

X-RADIATION

TUBES: The primary source of X-radiation in this receiver is the picture tube. The tube utilised for the above mentioned function in this chassis is specially constructed to limit X-radiation.

For continued X-radiation protection, replace tube with the same type as the original HITACHI approved type.

PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in HITACHI television receivers have special safety related characteristics. These characteristics are often not evident from visual inspection, nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified by marking with a ⚠ on the schematics and the replacement parts list contained in this service manual.

The use of a substitute replacement component which does not have the same safety characteristics as the HITACHI recommended replacement one, shown in the parts list of this service manual, may create electrical shock, fire, X-radiation, or other hazards.

Product Safety is continuously under review, and new instructions are issued from time to time. For the latest information, always consult the current HITACHI service manual. A subscription to, or additional copies of HITACHI service manuals, may be obtained at a nominal charge from your HITACHI SALES CORPORATION.

TUBE DISCHARGE

The line output stage can develop voltages in excess of 25kV; if the E.H.T. cap is required to be removed, discharge the anode to chassis via a high value resistor, prior to its removal from the tube.

CIRCUIT DESCRIPTION

The tuner used on this chassis is powered by the chassis supplies of +5v, +12v, and +33v, and covers the UHF range of frequencies.

When the tuning operation is performed, the data and clock outputs from pins 40 and 41 of IC001 are applied to pins 4 and 5 of the tuner, and will initiate a search.

When a broadcast is obtained, pin 39 of IC001 obtains an "IDENT" signal from pin 4 of IC201, which causes the clock and data commands to cease, thereby halting the search routine.

The balanced I.F. from the tuner is then applied to CP201 and CP4051.

Audio Stages:

The I.F. signal from the tuner is input to the filter CP4051. This is a parallel sound saw filter. The output from this is applied to pins 1 and 2 of IC4051.

The signal is passed through an internal A.G.C controlled 3 stage amplifier, to the detector stage of the I.C.

The characteristics of the A.G.C. stage are determined by the value of C4053 on pin 19.

The signal is limited and phase shifted by the tuned circuit of L4051 etc., connected to pins 16 and 17. This produces a reference signal which is used for intercarrier detection.

The charge current produced on the loop filter connected to pin 6, creates a phase offset current. This is compensated for by VR4051, connected to pin 4 of the I.C.

The detected intercarrier emerges from pin 13, and is amplified by Q4051

The amplified signal is then applied to MF4052, and pin 29 of IC4201.

The 6MHz carrier is passed through MF4052 to pin 11 of IC4051. It is demodulated, output from pin 9, then applied to pin 7 of IC4201.

IC4201 performs NICAM decoding, and outputs the left and right audio signals from pins 15 and 8.

From initial switch on, pin 47 of IC4201 is held "Low" by the output from pin 19 of IC001 until that I.C. has completed its power up sequence.

The operation of IC4201 is controlled by the clock and data commands input at pins 49 and 50, in conjunction with the oscillator X4201 connected between pins 39 and 40.

The left and right audio outputs from pin 15 and 8 are filtered by R4205, R4204, C4210, and R4202, R4203, C4206.

They are then input to pins 34 and 35 of IC1401 via the amplifiers Q1320 and Q1321.

IC1401 is a multiple switching I.C , controlled by the clock and data signals from IC001. These are input at pins 32 and 33 of the I.C.

The left and right audio signals emerge from pins 23 and 22 of IC1401, and are then input to pins 3 and 5 of IC402, which is the sound control and output I.C.

The audio signals emerge from pins 9 and 24 of IC402. They are then input to pins 10 and 23, and applied to internal stages, which work in conjunction with the clock and data commands fed to pins 16 and 17 to operate the bass, treble, and balance control, and also perform the sound effects available, such as pseudo stereo and wide stereo etc.

The processed signals are then output from pins 15 and 18, and applied to pins 1 and 5 of IC4450 for further amplification.

The values of R4471/R4472 and R4473/R4474 control the gain of the signals output from pins 8 and 10, which are then applied to the speakers

The values of R4464/C4472 and R4465/C4471, which are also connected to pins 8 and 10, provide stability at high frequency under load conditions.

IC4450 is powered from the +28v supply applied to pin 9 via Q4454 stage.

This supply is monitored by Q4452 stage.

Should a short circuit exist on pin 9 of IC4450, the emitter voltage of Q4454 will fall. This reduces the base voltage supplied to Q4452, which as a result of this voltage drop will turn on.

The voltage appearing at the collector is then applied to the gate of Q704 on the power supply and deflection panel, turning it on. As a result, the +5v, 8v, 12v and +28v supplies are removed, providing protection until the short circuit is isolated.

How these supplies are removed is described in more detail during the circuit description of the deflection stages.

Should the load conditions of IC4450 suddenly increase, the +28v supply can drop in value.

If this falls below +22v, the voltage supplied to the junction of R967/R969 (via ZD957 on the power and deflection panel) will disappear.

As a result the base voltage of Q954 will drop.

This transistor controls the regulation of the power supply, and will consequently increase the power supply drives to compensate for the fall in the +28v supply due to the increased load conditions.

Under no signal conditions, or during the "SEARCH" mode, or when the "mute" command is received, the clock and data commands input to pins 16 and 17 of IC402, cause the output stages of the I.C. to be muted.

EXTERNAL INPUT/OUTPUTS:

The left and right audio signals can also be output to external equipment via the two scart sockets AV1 or AV2.

The left and right audio signals input to pins 35 and 34 of IC1401 are made available from pins 16 and 17. They are then input to pins 1 and 3 of AV1, and can be output to external equipment connected to this socket.

The left and right audio signals applied to pins 3 and 5 of IC402 are made available at pins 26 and 7. These signals are applied to pins 1 and 3 of AV2 socket for output to external equipment.

When external audio equipment is connected to one of the scart sockets for input, the left and right audio signals emerge via pins 6 and 2 of the chosen scart socket.

The audio signals from AV1 will be applied to pins 10 and 11 of IC1401, and the audio signals from AV2 will be input at pins 2 and 4.

The selected outputs are made available at pins 22 and 23, then processed by IC402 etc. as explained previously.

Audio inputs fed via the Phono sockets are applied to pins 13 and 14 of IC1401, then, due to the switching configuration for Phono socket selection, they will be output from pins 22 and 23.

If the Phono sockets are used to input audio from equipment connected to the S-VHS socket, the switching configuration of IC1401 changes. The audio signals are then input to pins 6 and 8 of IC1401 and output from pins 22 and 23 for further processing.

The switching selection of IC1401 is determined by the clock and data command signals at pins 32 and 33.

When one of the scart sockets is used, a "High" is applied to pin 34 or pin 38 of IC001 from pin 8 of the relevant socket, and when the S-VHS socket is used, a "Low" is

applied to pin 36 of IC001. As a result, the clock and data outputs from pins 41 and 40 of the I.C. change accordingly.

This change is applied to pins 32 and 33 of IC1401, thereby altering the internal switching of the I.C. to suit the required inputs.

If the external equipment does not have an equivalent scart socket, the external mode must be selected using the remote control handset. This will then change the clock and data signals output from IC001, so that the internal switching operates as required.

LUMINANCE STAGES:

The I.F. signal from the tuner is applied via the filter CP201, to pins 45 and 46 of IC201. These pins supply an internal amplifier consisting of three stages, whose gain is controlled by the A.G.C. circuit. The response speed of this A.G.C. stage is determined by C205 connected to pin 48.

The output from the amplifier stage is fed to the video detector of the I.C.

The picture carrier is limited and phase shifted by the tank circuitry of L202 etc., connected between pin 2 and 3 of the I.C.

This produces a reference frequency which is utilised for synchronous video detection.

An RF A.G.C. voltage is made available at pin 47 of IC201, the starting level of which is determined by the voltage applied to pin 49, which in turn is fixed by the setting of VR202. This A.G C. voltage is then fed to the tuner via R107 to control its gain accordingly.

The composite video finally emerges at pin 7 of IC201, and is input to pin 13 via Q502 and the phase correction circuit of Q302. The luminance component is then extracted and added to the RGB matrix circuits of the I.C., where it is controlled by the brightness, contrast, sharpness and blanking stages.

The voltages that control the sharpness, contrast and brightness are obtained from pins 1, 2, and 3 of IC001, then applied to pins 14, 25 and 17 of IC201.

An automatic beam current circuit is employed on this chassis.

Should the beam current start to rise, the voltage at pin 4 of the flyback transformer will fall. This fall is applied to the cathodes of D730/D731 via Q731 stage and as a result the voltage levels on the contrast and brightness pins are reduced, thereby correcting the original rise in beam current.

CHROMINANCE CIRCUIT:

IC201 is designed to demodulate PAL and SECAM colour systems.

For the U.K., only the PAL colour signal is demodulated The chrominance component is extracted internally from the composite video input at pin 13. The demodulated colour signals are output from pins 30 and 31 as the R-y and B-y signals.

These are input to pins 14 and 16 of IC501, which is a switch capacitor delay line. These inputs are clamped, then fed via a buffer stage to internal delay lines, which are driven by a clock signal of 3MHz to obtain a delay period of 64u Seconds. This internal clock is generated from a 6MHz voltage controlled oscillator, and line locked by the sandcastle pulse input at pin 5. Low pass filters included after the delay line stages suppress the clock signals.

The undelayed and the delayed signals are then added, with the resulting R-y and B-y signals being output from pins 11 and 12 via an internal buffer stage.

These R-y and B-y signals are then input to IC201 at pins 28 and 29. IC201 contains clamping circuits, and a DC colour saturation control, the level of which is set by the voltage applied to pin 26. This voltage originates from pin 4 of IC001. The signals are then applied to a MATRIX circuit, and finally emerge from pins 18, 19 and 20 as the blue, green, and red signals.

They are then applied to the C.R.T. base for display.

EXTERNAL INPUT/OUTPUTS:

The composite video at the emitter of Q502 is fed via C315/R306 to pin 19 of scart 1. It can then be output to equipment connected to that scart for display.

The video at the emitter of Q502 is also divided by the resistor network R505/R506, then input to pin 36 of IC1401.

Due to the switching configuration of IC1401, this video is output from pin 30, then fed via Q1310, C314/R308, to pin 19 of scart 2 for display by external equipment.

The video output from pin 30 is also input to pin 24 of IC1401, then output from pin 19. This signal is applied to the teletext panel via Q1399 for decoding of the teletext signals.

External video signals input from VCRs etc., are applied to pin 12 of IC1401 from scart 1, or to pin 3 from scart 2, or pin 15 from the Phono socket.

The switching configuration of IC1401 causes the selected video input to be output from pin 19.

It is then input to pin 15 of IC201 for processing via Q1399, R1397 and R1398.

Inputs fed via the S-VHS socket have separate luminance and chrominance signals.

These are applied to pins 7 and 9 of IC1401 respectively. The luminance is output from pin 19 of IC1401, then input to pin 15 of IC201, whilst the chrominance is output from pin 21 of IC1401, then input to pin 16 of IC201.

To be able to process the T.V. signals, external signals, and S-VHS signals, IC201 has a 3 level switching voltage applied to pin 16. This will be "Low" for T.V. operation, approximately 3v7 for inputs via the S-VHS socket, and approximately 7v5 for scart inputs.

How this voltage is obtained will be described later in the signal and control circuit description.

S-VHS equipment can also be connected to this T.V via the AV2 socket. In this case, the luminance is input to pin 3 of IC1401, and the chrominance signal is input to pin 5.

These inputs will be made available at pins 19 and 21 of IC1401, then processed as previously described.

However, in order to obtain the correct switching configuration of IC1401 for S-VHS inputs fed via scart 2, the on-screen menu for S-VHS inputs must be selected and set correctly (see operating guide)

When R G.B. equipment such as computers are connected to AV1 scart socket, the red, green, and blue inputs, are applied directly to pins 22, 23 and 24 of IC201.

A fast blanking signal from pin 16 of the scart socket is applied to pin 21 of IC201, changing the operation of the I.C., so that only the external red, green and blue signals emerge from pins 20, 19 and 18.

DEFLECTION CIRCUITS:

IC201 provides sync. separation, a horizontal oscillator and output stage, plus a vertical count-down and output stage.

Horizontal Stages:

The composite video signal from pin 7 of IC201 is input to pin 13 via C302. This input is applied to the internal sync. separator stages of the I.C.

An internal phase detector stage is provided with a sawtooth waveform, which is generated from the line pulse input to pin 38. The phase detector then compares this sawtooth waveform to the sync. pulse. Should any frequency drift occur, a corrective output will be applied to the horizontal oscillator stage, thereby maintaining the desired phase relationship.

The components connected to pin 40 form a filter network for the phase detector, and VR701 connected to pin 39 via R702 provides manual phase control. The horizontal output emerges at pin 37, and is applied to the line drive transistor Q701. T702 couples the output of Q701 to the line output transistor Q702.

Both these transistors are powered by the 150v supply (110v for 2146 models).

A line pulse available at pin 6 of the flyback transformer (pin 1 on 2146 models) is rectified by D702, smoothed by C718, and provides approximately +200v to drive the output transistors Q801, Q802, Q803 on the C.R.T base.

Under certain fault conditions, i.e. increased H.T. supply, low line oscillator frequency, or reduced value of the tuning capacitor C706, an excess of E.H.T. could be developed. To prevent this happening, the rectified voltage of D702 is fed via potential divider network R718/R719, and applied to ZD701. Should the E.H.T. rise excessively, the threshold of the zener will be exceeded, and a voltage is applied to the gate of Q704 via R717, turning it on. This effectively removes the drive to Q952, which then turns off. As a result both Q951 and Q950 will also turn off, effectively removing the +12v, +8v, and +5v supplies. Consequently, the deflection stages of IC201 are shut down, thereby preventing further E.H.T. generation until the fault is removed.

Excessive beam current can also occur under certain fault conditions, so this is prevented in the following manner.

The H.T. current to the horizontal output stages is measured by R705. Should the current rise, the resulting voltage drop across R705 will cause Q703 to be turned on, and a voltage is then applied to the gate of Q704 via R708, R717. This will then prevent further E.H.T. generation as described earlier.

Vertical Stages:

The internal vertical sync. of IC201 is obtained from the composite video signal applied to pin 13. It is then fed to a triggered vertical divider stage, which counts down the horizontal frequency to obtain the required vertical frequency. This eliminates the need for a conventional oscillator circuit, and has the advantage that no external frequency adjustment is required.

C601, connected to pin 42 of IC201 facilitates ramp generation, producing the required sawtooth.

The vertical output from pin 43 of IC201 is applied to pin 4 of IC601 via R604. The components D601 and C605, connected between pins 3 and 7, determine the flyback generation time, and the vertical output to drive the deflection coils is made available from pin 2.

A supply of +25v is required for IC601. This is obtained from pin 5 of the flyback transformer (pin 6 on 2146 models), rectified by D701 and smoothed by C716.

The deflection current that occurs at the junction of R609/C609, is added to the feedback from R607/C608 etc, and the result is applied to pin 41 of IC201. The values of R607 and C608 determine the linearity, whilst VR601 sets the vertical size.

Pin Cushion Correction Circuit

The sawtooth signal at the junction of C608/VR601 is applied to Q751 base via R753.

A parabola signal is then made available at the collector of Q751. Pin cushion amplitude, i.e. gain control, is governed by VR751, with VR752 controlling horizontal size.

Q752, Q753 and Q754, provide further amplification of the signal, and the output at Q754 collector is applied via L751 to the modulation circuitry of D707, C707 etc., thereby correcting the EAST-WEST scan.

The voltage from pin 4 of the flyback transformer is applied to the base of Q753 via R776. This provides geometric correction for any beam current changes that occur.

POWER SUPPLY CIRCUIT:

The power supply is a self oscillating supply, with variable frequency and pulse width.

The A.C. supply is rectified by D901 - D904, and produces approximately 300v to power Q903. Current flowing through R901/R902 causes Q903 to initially turn on. Secondary voltages are then induced in T901, and a feedback voltage obtained via D906, L903 etc., is applied to the base of Q903, thereby maintaining the transistor's operation.

The circuit self-oscillates at a frequency determined by the inductance of the transformer, the A.C. mains voltage, and the load conditions etc. The transistor Q902 is held at negative potential to ensure a good turn off response of Q903 stage. D907 and D908, connected across the base and emitter of Q903, offer protection to Q901/Q902 stages should Q903 become short circuit..

The secondary voltage induced in T901 winding 11/14, is rectified by D950, and produces the H.T. voltage of 152v (110v on 2146 models). This is smoothed by C953.

Winding 9/14 produces approximately 15v via D951, which is smoothed by C954. This 15v is then applied to Q950 and IC950 stages. Q950 stage is a 12v regulator, which provides the +12v chassis supply and the header voltage for IC951 and IC952. These produce the +8v and +5v chassis supplies respectively.

IC950 produces the +5v standby supply required by IC001. The rectified voltage from D952 is smoothed by C967. It is then fed to Q4454, providing the 28v required by the audio output stage IC4450 H.T. regulation is controlled by Q954 stage. The base voltage of Q954 is set to a pre-determined level by the resistor network R950, VR950 and R953. During normal operation R954 is effectively out of circuit due to Q953 being turned on. The emitter of Q954 is held at approximately 6v2 by ZD950 Should the H.T. level rise, the base voltage will become more positive than the emitter, and this difference is amplified by the transistor, then applied to opto-coupler IC901. The output produced from IC901 is applied to the transistor network Q901/Q902. This stage governs the on-time of Q903, controlling the H.T. level, and hence maintaining H.T. regulation.

ZD951 offers protection to the H.T. circuits should the H.T. level rise excessively.

Q955 offers protection to the +12v, +8v, +5v supply, and the +5v standby supply during short circuit conditions.

Should any of these supplies go short circuit, the base of Q955 will be pulled low via the relevant diode/resistor network, i.e. D959/R960 for the +12v supply, and D961/R962 for the +5v supply.

As a result Q955 turns on, applying a voltage to the gate of thyristor Q704 via R717. Q704 then turns on, and effectively removes the drive applied to Q952, causing the +12v, +8v and +5v supplies to disappear as previously described. The chassis will then be in the standby lockup mode.

N.B. Once the fault is cleared, the T.V must be switched on using the ON/OFF switch to reset the chassis and remove the standby lockup mode.

When the standby command is transmitted from the handset, pin 17 of IC001 becomes "High". This is applied to Q011 base, turning the transistor on. A "Low" is then applied to the base of Q952 via R975, R972, turning the transistor off.

As a result Q951 will become non-operational.

Consequently, the +12v and +8v chassis supplies are removed, and the deflection stages of IC201 are shut down. E.H.T. generation will then cease until the standby command is removed.

Also, due to Q952 turning off, a voltage will be applied to Q4454 base via R956/ZD958 and R4477, turning that transistor off. In this way, the +28v supply to IC4450 is also

removed during standby, therefore preventing any noise output from being generated

Finally, during standby, the voltage to the base of Q953 is removed, and the transistor turns off. As a result, R954 is added to the potential divider network at the base of Q954. This alters the drive to opto-coupler IC901, and the result is to reduce the H.T. voltage during the no-load conditions created in standby.

SIGNAL AND CONTROL CIRCUIT:

The remote control receiving unit U001, contains an infra red amplifier. This is powered by the +5v supply fed via R058. The signal output from pin 3 of U001 is then applied to pin 35 of IC001 via R059

This I.C. controls channel selection, customer control adjustments, on-screen displays, search tuning, teletext selection, and also implements the switching of IC1401 to select internal or external signals for further processing

IC002 is the memory I.C., which stores the data relating to the above functions, then transfers that information to IC001 when required.

Both of these I.Cs. are powered by the +5v standby supply. X001, C018 and C019, connected between pins 31 and 32, supply IC001 with a basic clock frequency, which controls all operating functions of the I.C.

From switch on IC001 must be initially reset; this is performed by IC004.

As the +5v begins to rise from switch on, the output pin of IC004 is held "Low". This "Low" is applied to pin 33 of IC001, thus resetting the I C. Once the +5v has almost reached its potential, the "Low" is removed from IC004, and pin 33 of IC001 will become "High" via R057, thereby releasing the reset condition.

When the T.V. is switched on, pin 17 of IC001 outputs a "Low". This is applied to Q011, turning the transistor off A "High" is then applied to Q952 on the power supply panel via R097, R975, and R972.

This turns the transistor on, applying a "Low" to ZD958/R956, thereby turning on Q951. Consequently, Q950 is then turned on, producing the +12v chassis supply at its emitter. From this +12v, the +8v and +5v supplies required to operate the chassis are made available via IC951 and IC952.

When a search command is received, the clock and data output from pins 41 and 40 of IC001 will cause the tuner to initiate the search routine.

Once a signal has been located, pin 4 of IC201 outputs a "High". This is applied to pin 39 of IC001 and causes the I.C. to halt the search routine. IC001 will then monitor the AFC input at pin 13 to obtain the optimum signal.

The sharpness, contrast, brightness, and colour, levels can only be adjusted using the handset. These adjustments produce variable outputs from pins 1, 2, 3, and 4 of IC001.

The volume control can also be adjusted by the handset or the + and - buttons on the front of the T.V

These adjustments will alter the volume level of IC402 via the clock and data commands output from pins 41 and 40 of IC001.

When the standby mode is implemented, the output from pin 18 of IC001 will become "Low". This causes the light emitting diode LED1 to turn on, thereby indicating that the standby mode is in operation.

During switch on, the outputs from pins 19 and 20 of IC001 both go "Low". The "Low" from pin 19 performs the reset operations for IC4201 (NICAM processor) and IC2202 (TELETEXT data control). The "Low" from pin 20 is applied to Q4455 via R4467, turning it off. As a result, Q4453 turns on and pulls pin 3 of IC4450 "Low" via R4469. This effectively mutes the output stages of IC4450 until the power supply has stabilised, at which time the "Low" outputs from pins 19 and 20 are removed.

The clock and data commands required to operate the various I.Cs. of this television are output from pins 41 and 40 of IC001.

The red, green and blue outputs for the on-screen displays, are made available from pins 22, 23, and 24 respectively. The components L003, C016, and C017 connected between pins 28 and 29, decide the oscillating frequency of the display, whilst the horizontal and vertical inputs at pins 26 and 27, determine the actual position that the display appears on the screen.

When a command requiring an on-screen display is received, a "High" will be output from pin 25. This is applied to pin 21 of IC201 via Q004 stage, and blanks out a portion of the picture. The on-screen display information is inserted into this portion, thus creating a clear display.

When the standby command is received by IC001, the "Low" at pin 17 will be removed. A "High" is then applied to Q011 base via R040, turning the transistor on

The collector is then pulled "Low", and consequently, Q952 on the power supply will be turned off

As a result, both Q951 and Q950 will turn off, thereby removing the +5v, +8v and +12v supplies. This shuts down the deflection timebase stages, placing the TV into its standby condition.

During standby, IC001 still remains operational due to the +5v standby supply obtained via IC950, which is applied to pin 42 of IC001 This supply is only removed when the chassis is switched off.

Should an interruption occur in the mains supply, IC001 will need to be reset. To do this, the +8v of the power supply is monitored at pin 37 of IC001. Should this level fall below 1v25, the I.C. will automatically implement a reset.

The outputs from pins 6 and 8 determine the voltage level at pin 16 of IC201, which in turn governs the type of signal processed, i.e. internal RF signals, or external Audio/Video signals input from the scart sockets etc

When T.V broadcasts are received, pin 6 of IC001 will output a "High", whilst pin 8 remains "Low". As a result, Q001 turns hard on and applies a "Low" to pin 16 of IC201. Under this condition, the I.C. will processes the signals supplied from the tuner.

When one of the scart sockets are used for inputs, a "High" will be applied to pins 34 or 38 of IC001.

When this happens, pin 6 and pin 8 are both held "Low". Q001 and Q002 will then turn off, and the voltage at pin 16 of IC201 will rise to approximately 7v5 via R302. Under this condition, the I.C. will process only the signals supplied from the relevant scart socket.

When S-VHS equipment is connected into the socket on the front of the T.V., pin 36 of IC001 will be pulled "Low" via R034. As a result, pin 6 of IC001 remains "Low", but pin 8 outputs a "High". Q002 will then turn hard on, effectively creating a potential divider network of R027/R302. This produces approximately 3v7 at pin 16 of IC201. Under this condition, IC201 will process the separate luminance and chrominance signals input to pins 15 and 16.

Should S-VHS signals be required for input via AV2 scart socket, this has to be selected from the on-screen menu display When this is done, pin 6 will become "Low" and pin 8 "High", providing approximately 3v7 at pin 16 of IC201 as previously explained

Should equipment which does not have an equivalent scart socket be connected to one of the T.V scarts using a modified connection lead, then the external input button on the handset has to be pressed. When this happens, "High" outputs from pins 5 and 7 of IC001 will be applied to pin 21 of IC201 to blank out the T.V. signal and output only the required external signal.

Teletext circuit:

All the teletext operations are controlled by three I.Cs. The basic operation of these are as follows:-

IC2201 .....Decoder IC2202.....Text Data control IC2203.....Memory

The clock and data commands from IC001 are input to pins 7 and 8 of IC2202, then processed into teletext clock and data control signals. These are output from pins 16 and 17, then input to IC2201 at pins 24 and 25 to activate the various teletext operations.

IC2202 is a microprocessor, and therefore has to be reset from switch on.

On initial switch on, pin 19 of IC001 will momentarily go "Low". This is applied to Q2205 and the transistor remains turned off. As a result, pin 9 of IC2202 becomes "High" via R2213, and the I.C. is reset.

X2202 connected between pins 18 and 19 is the oscillator required for correct operation. The I.C. is powered from the +5v text supply, which originates from the +5v chassis supply fed via L2202.

IC2203 is the memory I.C., which stores the favourite pages requested by the customer, and outputs them when required.

IC2201 decodes the teletext information from the video signal input at pin 9. The clock and data inputs at pins 24 and 25 control the various modes of operation, with the required 27MHz oscillator being obtained by X2201 etc. connected between pins 2 and 3.

R2203 and R2204 set the voltage level at pin 19. This determines the contrast level of the teletext display.

The teletext outputs are obtained from pins 16, 17 and 18.

During teletext output, a blanking signal is obtained from pin 20. This is input to pin 21 of IC201 via Q2201, and blanks out the T.V. signal, so that only the teletext information is displayed.

A portion of the vertical deflection is input to pin 22 of IC2201 via Q2203 stage. This provides the interlace signal, which effectively prevents any jitter occurring on the teletext display.

Both IC2201 and IC2203 are also powered by the +5v text supply obtained via L2202.

PICTURE AND CONTROL ADJUSTMENTS

AGC Adjustment:

1. Switch T.V. on and allow to warm up for at least two minutes.
2. Receive a signal with a level of -47dBm.
3. Connect a voltmeter to the AGC terminal of tuner, i.e. +ve leg of C105.
4. Adjust VR202 until meter reads 8v0 +/- 0v1.

HT Adjustment:

1. Switch T.V. on, receive Philips circle test pattern, and set contrast and brightness levels to maximum.
2. Connect a voltmeter between the +ve leg of C955 and Ground.
3. Adjust VR950 so that meter reads as follows:-

   2146 models 110v ± 0v2

   25/2846 models 152v ± 0v2

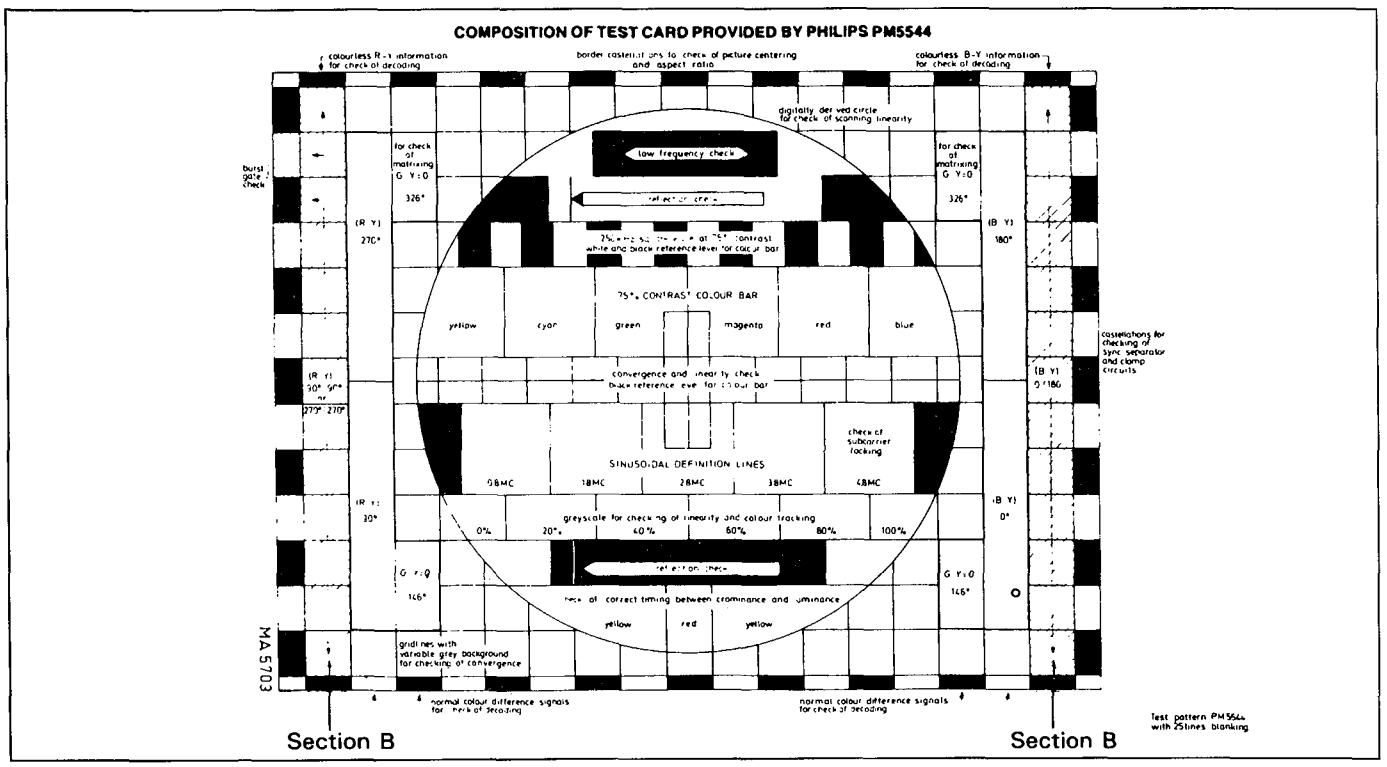
Horizontal Phase/Vertical amplitude/Horizontal amplitude:

1. Receive Philips circle test pattern.
2. Set brightness and contrast levels to maximum.
3. Adjust VR701 to centralise circle pattern.
4. Connect the flying lead (E602) to the pin which achieves the best vertical centre position.
5. Adjust VR601 to obtain the required vertical height.
6. Return brightness and contrast levels to their previous levels.
7. Adjust VR751 so that the vertical lines at each side of the screen are as straight as possible.
8. Adjust VR752 until the castellations at each side of the screen just disappear.

   N.B. Steps 7 and 8 do not apply to 2146 models.

Focus Adjustment:

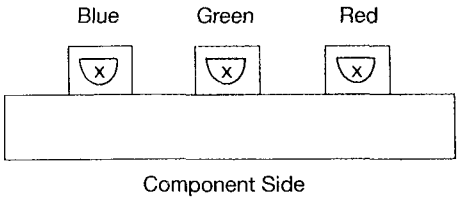
1. Receive Philips circle test pattern setting colour level to minimum, and contrast and brightness levels to maximum.
2. Adjust contrast so that the first two bars of the colour bar display become black.
3. Adjust brightness so that the 3rd and 4th bars of the grey scale bar display are the same colour black as in step 2.
4. Adjust the focus control (upper control on flyback transformer) to obtain the best overall focus.



CUT OFF AND SCREEN ADJUSTMENT

PREPARATION:

(i) Preset the red, green and blue background controls on the C.R.T. base to the positions shown. (Approximately mid. point).

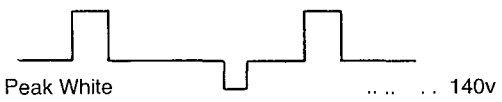


(ii) Set the customer controls as follows:- Contrast = 0
Colour = 0
Brightness = middle of scale

(iii) Receive horizontal white line, or red raster pattern from a Philips pattern generator.

METHOD:

1 Adjust screen control (lower control on the flyback transformer) until the horizontal line is just visible and its colour can be seen.
2 Do not touch the background control of the colour that is most prominent on the screen, but adjust the other two background controls until a reasonable white line is obtained.
3. Connect an oscilloscope probe to each of the R.G.B. cathodes in turn and leave connected to the one with the highest level.
4 Set customer brightness so that the cathode value is no greater than 140v as shown below.



5. Disconnect oscilloscope, and set screen control so that the white horizontal line is just visible once more

WHITE BALANCE

PREPARATION.

(i) Set the customer controls as follows.- Contrast = 0
Colour = 0

(ii) Receive the white raster pattern.

(iii) Obtain and set up a combined colour analyser and light meter, e.g. MINOLTA CA100

METHOD:

1 Adjust brightness customer control so that the light output from the white raster reads Y = 1 → 2 cdm^{-2} on the light meter.

2. Next adjust the red and blue background controls to obtain the colour chromaticity co-ordinates of

x = 283 y = 299.

The above co-ordinates represent a colour temperature of 9300k

PROTECTION CHECKS

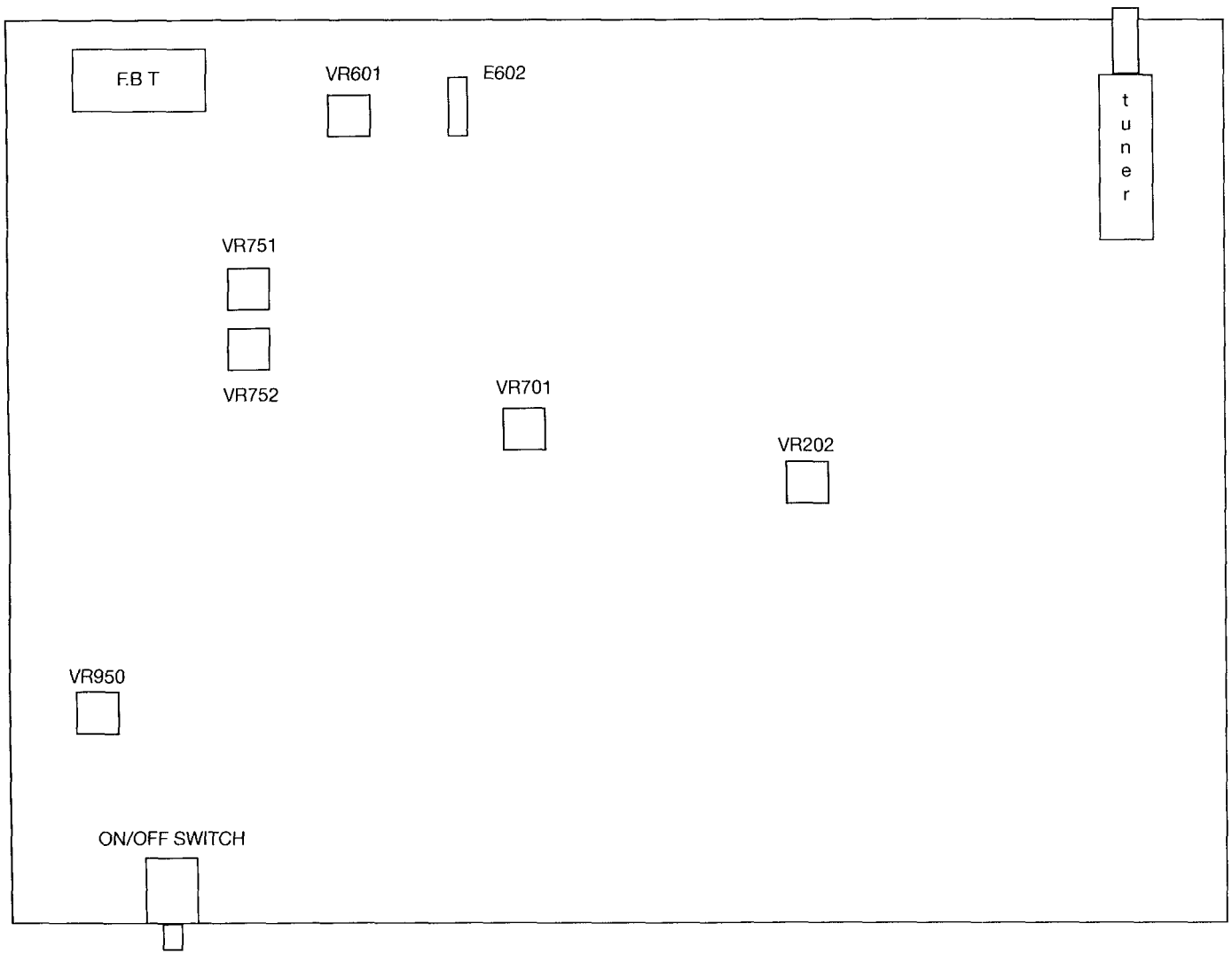
High Voltage Limit Check:

1. Switch T.V. on and set contrast and brightness levels to maximum.
2. Connect a 470K resistor in parallel with R718/R718A and ensure that picture and sound disappear instantly.
3. Switch T.V. off, remove resistor, and wait 10 - 15 seconds.
4. Switch T.V. on again, check that normal operation is resumed, then return contrast and brightness levels to their original levels.

Anode/Focus s/c Check:

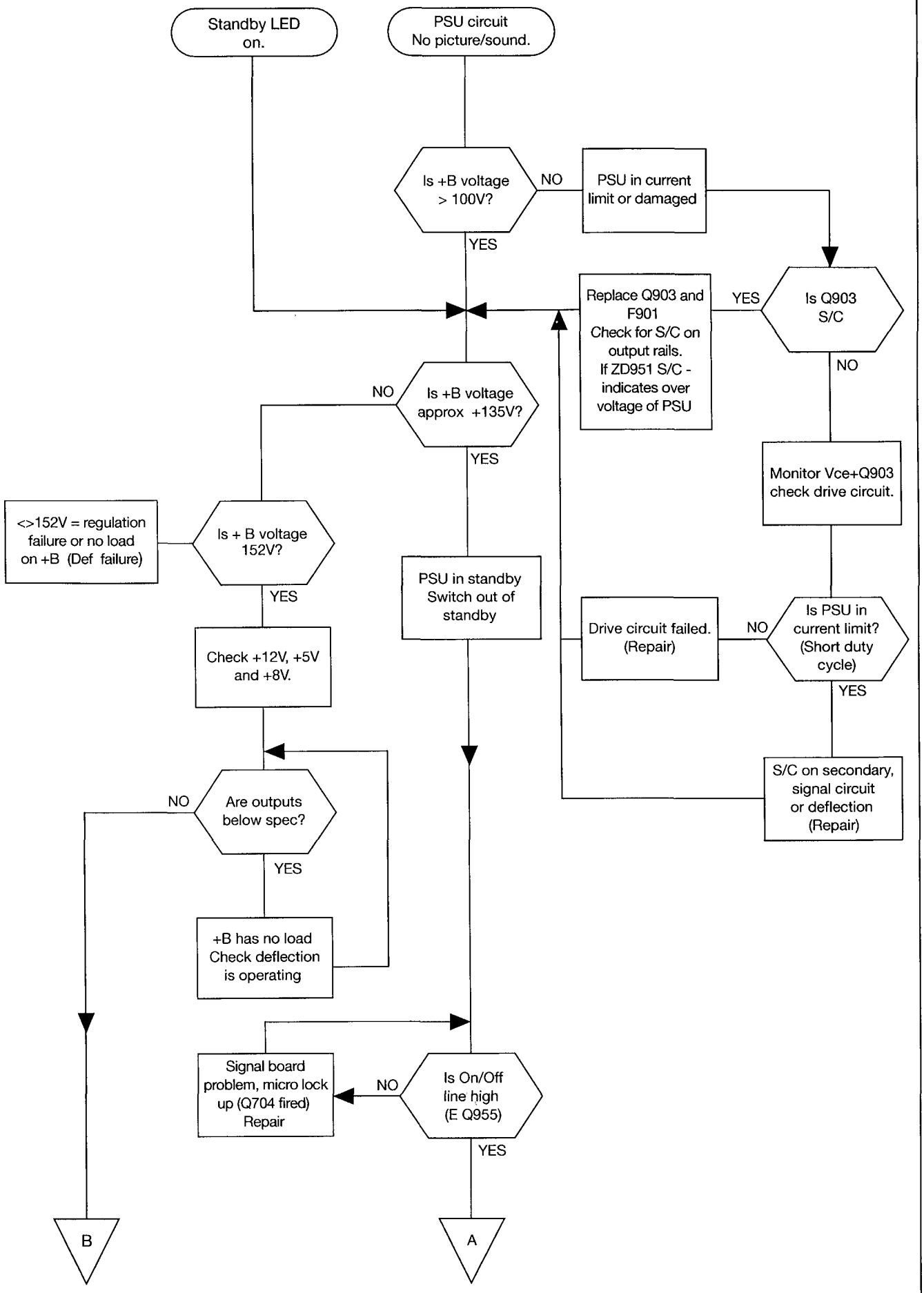
1. Switch T.V. on and set contrast and brightness levels to maximum.
2. Connect a 270R (20 - 30 Watt) resistor from pin 9 of the flyback transformer to ground.
   N.B. Use a 390R resistor for 2546/2846 models.
3. Check that picture and sound disappear instantly.
4. Switch T.V. off, remove resistor, and wait 10 - 15 seconds.
5. Switch TV on again, and check that normal operation is resumed, then return contrast and brightness levels to their original levels.

POSITION OF ADJUSTMENT CONTROLS



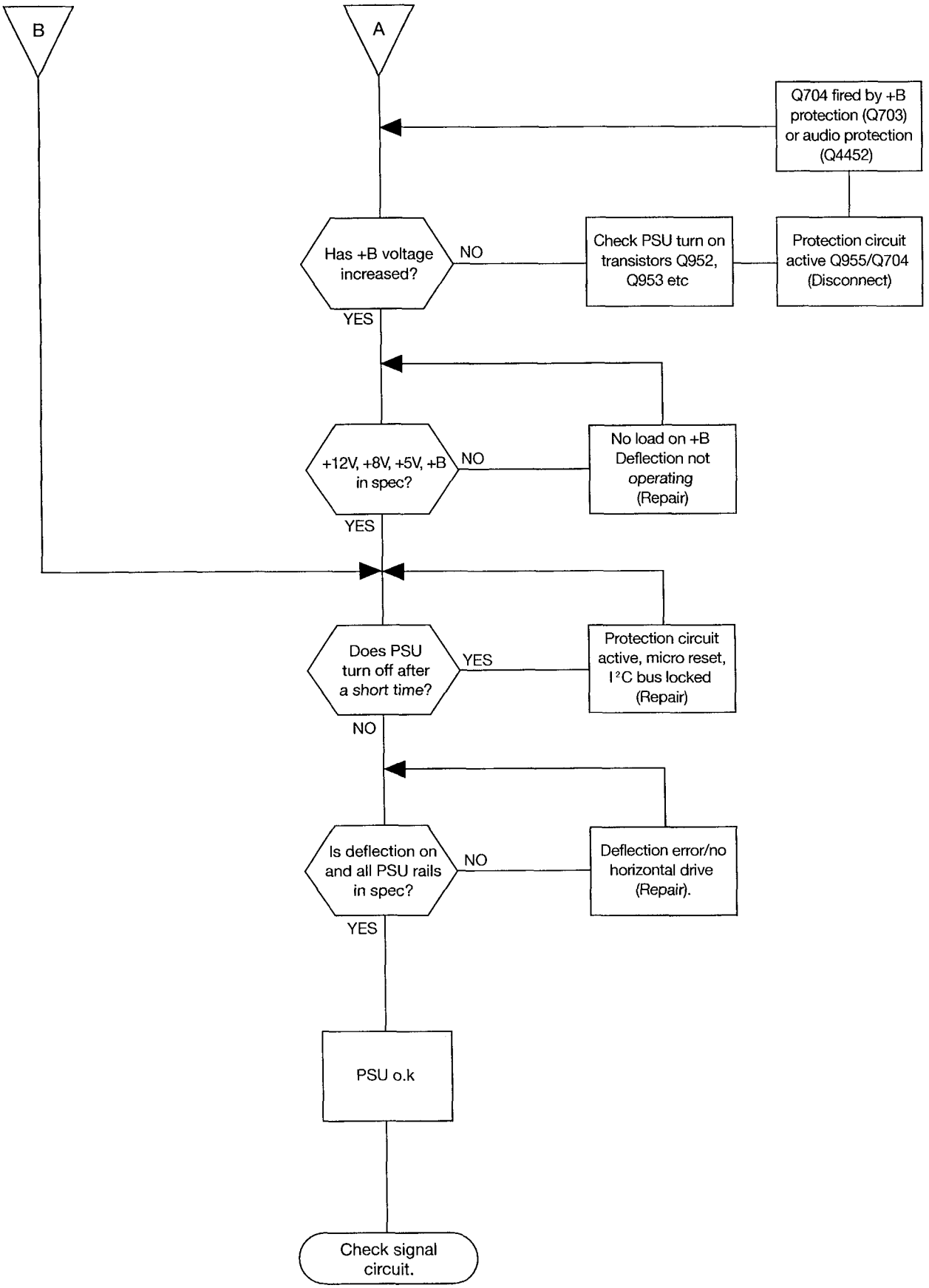
DIAGNOSTIC FLOW CHART

POWER SUPPLY



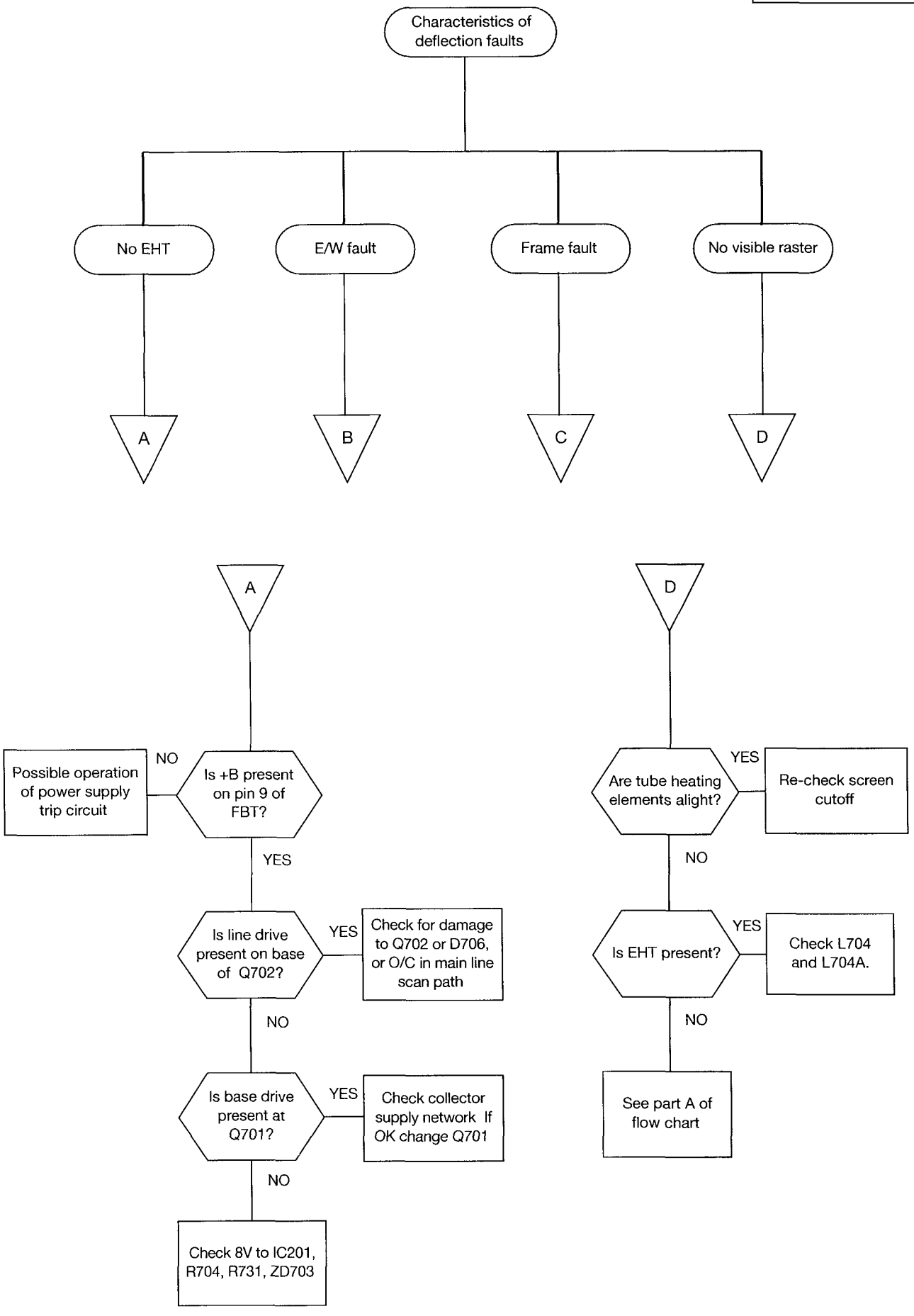
DIAGNOSTIC FLOW CHART

POWER SUPPLY



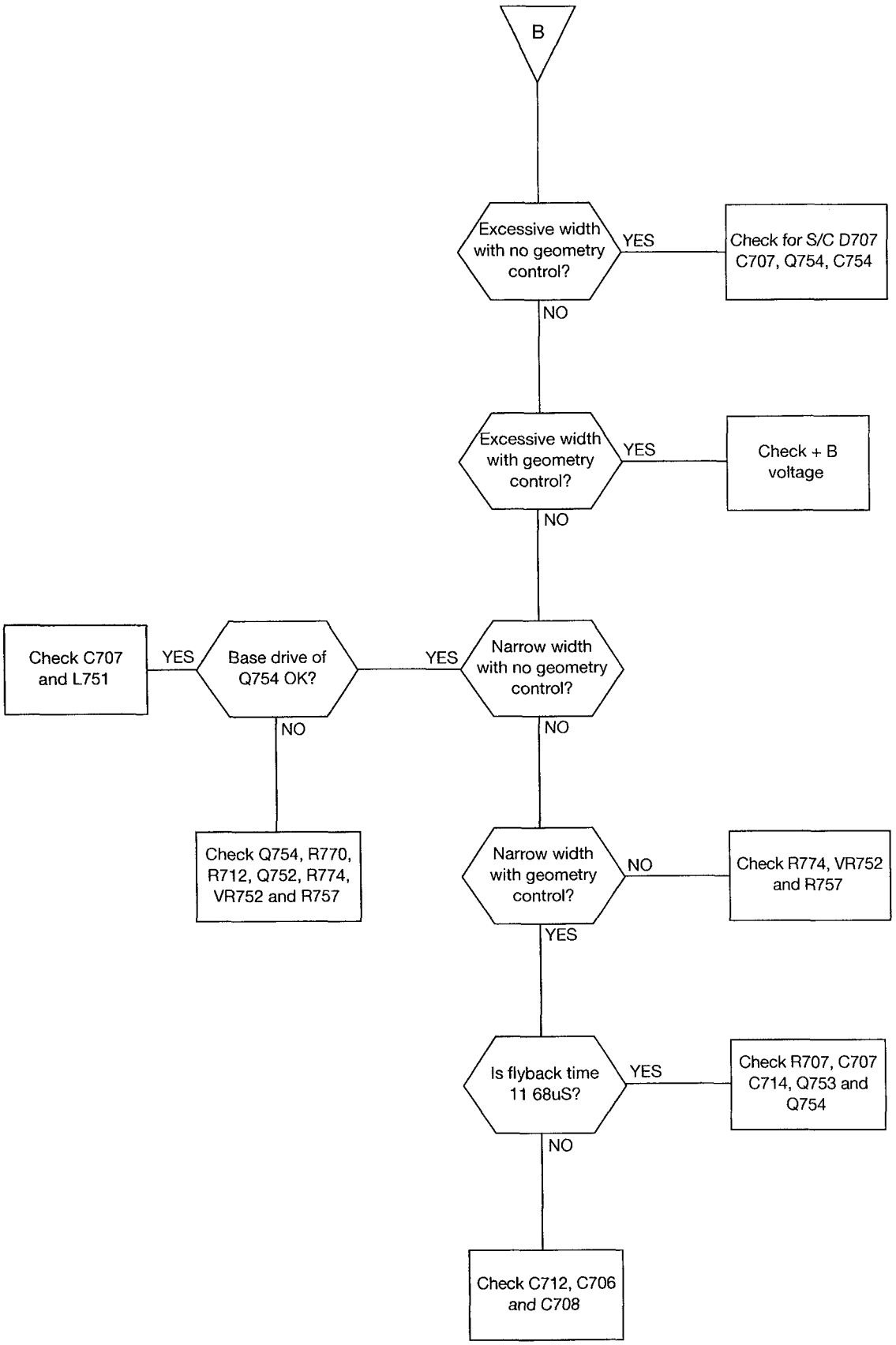
DIAGNOSTIC FLOW CHART

DEFLECTION



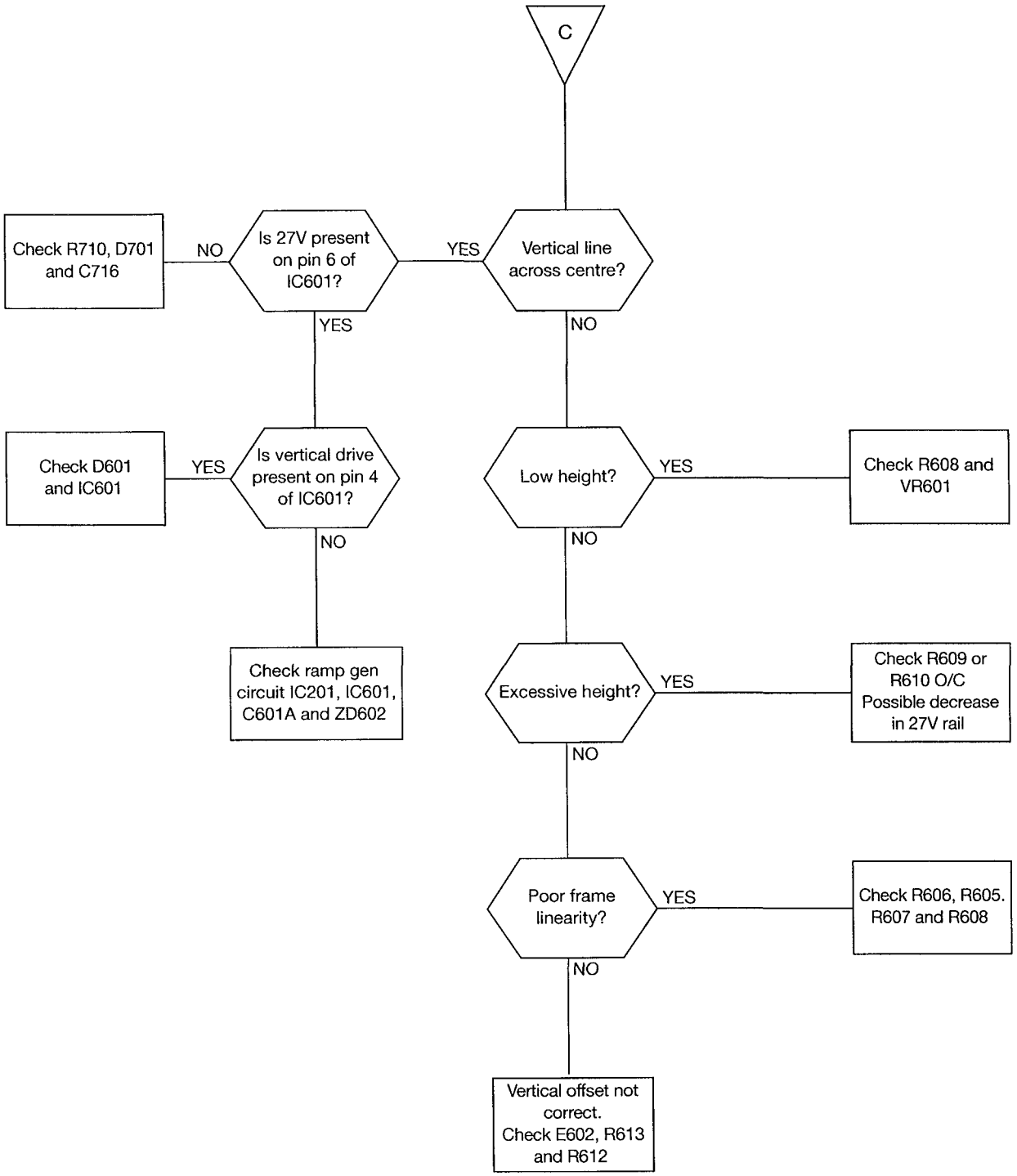
DIAGNOSTIC FLOW CHART

DEFLECTION



DIAGNOSTIC FLOW CHART

DEFLECTION



VOLTAGE MEASUREMENTS

IC001 TMP47C1637N			
PIN	VOLTAGE	PIN	VOLTAGE
1	0V–5V0 (Sharpness)	22	0V
2	0V–5V0 (Contrast)	23	0V
3	0V–5V0 (Brightness)	24	0V
4	0V–5V0 (Colour)	25	0V
5	0V	26	4V0
6	5V0 (0V Scart/S-VHS inputs)	27	4V9
7	0V	28	4V5
8	0V (5V0 S-VHS socket inputs)	29	4V5
9	0V (5V0 PROG –)	30	0V
10	not used	31	2V1
11	not used	32	2V3
12	not used	33	5V1
13	3V1	34	0V (5V8 Scart 1 input)
14	0V (5V0 PROG +)	35	4V8
15	0V (5V0 VOL +)	36	5V0 (0V4 S-VHS socket input)
16	0V (5V0 VOL –)	37	4V7
17	0V (4V2 Standby)	38	0V (5V8 Scart 2 input)
18	3V9 (0V Standby)	39	4V8 (0V3 no sigs)
19	4V6	40	3V2
20	2V9	41	3V7
21	0V	42	5V0

IC002 ST24C04			
PIN	VOLTAGE	PIN	VOLTAGE
1	0V	5	3V2
2	0V	6	3V5
3	0V	7	0V
4	0V	8	5V0

IC004 TDA9860	
PIN	VOLTAGE
1	5V1
2	0V
3	5V1

IC201 TDA8361			
PIN	VOLTAGE	PIN	VOLTAGE
1	3V0	27	5V9
2	5V8	28	3V9
3	5V8	29	3V9
4	6V6 (0V1 no signals)	30	1V5
5	0V	31	1V5
6	not used	32	1V7
7	2V9	33	4V4
8	1V7	34	2V8
9	0V	35	2V0
10	7V8	36	0V1
11	0V	37	1V3
12	3V2	38	1V1
13	4V0	39	3V4
14	1V5–4V7 (Sharpness)	40	3V7
15	3V7	41	2V5
16	0V (7V7 scart/3V7 S-VHS)	42	2V6
17	0V9–2V5 (Brightness)	43	0V9
18	1V9	44	5V4
19	1V9	45	4V0
20	1V9	46	4V0
21	0V1	47	9V1
22	3V5	48	3V9
23	3V5	49	0V6
24	3V5	50	3V5
25	0V4–3V2 (Contrast)	51	5V1
26	0V6–6V1 (Colour)	52	6V6

IC402 TDA9860							
PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE
1	not used	9	3V9	17	3V0	25	0V
2	not used	10	3V9	18	3V9	26	3V9
3	3V9	11	3V9	19	3V9	27	3V9
4	7V8	12	3V9	20	not used	28	not used
5	3V9	13	not used	21	3V9	29	3V9
6	7V8	14	3V9	22	3V9	30	not used
7	3V9	15	3V9	23	3V9	31	not used
8	0V	16	3V5	24	3V9	32	not used

IC501 TDA4665			
PIN	VOLTAGE	PIN	VOLTAGE
1	5V6	9	5V6
2	not used	10	0V
3	0V	11	3V1
4	0V	12	3V1
5	1V1	13	not used
6	not used	14	1V3
7	not used	15	not used
8	0V	16	1V4

IC901 CNX82A			
PIN	VOLTAGE	PIN	VOLTAGE
1	125V (78V2)	4	–4V3 (0V)
2	124V3 (77V8)	5	0V2
3	not used	6	not used

() = Standby

NOTE: Pins 4 and 5 are measured using isolated Earth of power supply i.e. the leg of FB902

IC601 TA8427K			
PIN	VOLTAGE	PIN	VOLTAGE
1	0V	5	0V8
2	13V8	6	26V3
3	26V3	7	1V0
4	0V9		

IC950 7805	
PIN	VOLTAGE
1	14V5
2	0V
3	5V0

IC951 MC7808CT	
PIN	VOLTAGE
1	12V
2	0V
3	7V9

IC952 7805	
PIN	VOLTAGE
1	9V7
2	0V
3	5V0

IC1401 TA8777N							
PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE
1	11V8	10	6V8	19	2V6	28	6V5
2	6V9	11	6V8	20	0V	29	7V8
3	6V5	12	6V5	21	0V1	30	4V0
4	6V9	13	6V8	22	5V6	31	0V
5	6V5	14	6V8	23	5V6	32	3V5
6	6V8	15	6V5	24	4V1	33	3V0
7	6V5	16	5V6	25	not used	34	6V8
8	6V8	17	5V6	26	0V	35	6V8
9	6V5	18	0V	27	4V4	36	6V5

IC2201 SAA5281							
PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE
1	2V3	14	5V0	27	not used	40	not used
2	3V5	15	0V	28	not used	41	not used
3	0V	16	0V (0V2)	29	not used	42	not used
4	0V	17	0V (0V2)	30	not used	43	not used
5	0V	18	0V (0V2)	31	not used	44	not used
6	4V8	19	0V9 (0V8)	32	not used	45	not used
7	not used	20	0V (1V8)	33	not used	46	not used
8	2V1	21	not used	34	not used	47	not used
9	2V2	22	0V2 (2V6)	35	not used	48	not used
10	2V5	23	not used	36	not used	49	not used
11	5V0	24	4V2	37	not used	50	not used
12	0V	25	4V1	38	not used	51	not used
13	not used	26	0V	39	0V	52	5V0

() = teletext

IC2202 P83C654FBP							
PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE
1	not used	11	not used	21	0V	31	5V0
2	not used	12	0V	22	0V	32	0V
3	0V	13	not used	23	0V	33	0V
4	not used	14	not used	24	0V	34	0V
5	0V	15	not used	25	0V	35	0V
6	0V	16	4V1	26	0V	36	0V
7	3V5	17	4V2	27	0V	37	0V
8	3V0	18	2V2	28	0V	38	0V
9	0V	19	2V0	29	not used	39	0V
10	0V	20	0V	30	not used	40	5V0

IC2203 ST24C01			
PIN	VOLTAGE	PIN	VOLTAGE
1	0V	5	4V1
2	0V	6	4V2
3	0V	7	0V
4	0V	8	5V0

IC4051 TDA9802			
PIN	VOLTAGE	PIN	VOLTAGE
1	3V3 0V1*	11	2V6
2	3V3	12	not used
3	0V3	13	1V8 3V0*
4	0V2	14	0V9
5	3V1	15	5V9
6	2V4	16	2V8
7	not used	17	2V8
8	7V9	18	0V
9	2V0	19	3V2
10	1V6	20	7V6

* = no signals

IC4201 SAA7283ZP							
PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE	PIN	VOLTAGE
1	not used	14	not used	27	2V3	40	3V5
2	not used	15	2V5	28	2V4	41	2V6
3	4V9	16	2V5	29	2V4	42	0V
4	0V	17	not used	30	2V5	43	2V8
5	2V5	18	0V	31	not used	44	0V
6	not used	19	0V	32	2V0	45	not used
7	2V5	20	2V4	33	2V4	46	4V9
8	2V5	21	2V4	34	2V4	47	4V6
9	not used	22	not used	35	2V4	48	2V8
10	not used	23	2V4	36	4V9	49	3V5
11	2V5	24	0V	37	0V	50	4V9
12	0V	25	not used	38	not used	51	not used
13	not used	26	4V9	39	0V5	52	not used

IC4450 TDA7263			
PIN	VOLTAGE	PIN	VOLTAGE
1	1V7	7	0V
2	1V7	8	13V2 – 14V3 (volume)
3	15V8	9	29V5
4	1V7	10	13V2 – 14V3 (volume)
5	1V7	11	0V
6	0V		

	Q001	Q002	Q004	Q011
E	0V	0V	0V1	0V
B	5V0 0V scart/S-VHS	0V 5V0 S-VHS	0V	0V (4V2)
C	0V 7V7 scart/3V7 S-VHS	0V 7V7 scart	5V0	3V3 (0V1)

() = standby

	Q012	Q302	Q501	Q502	Q701	Q702
E	0V	1V7	11V9	2V3	0V	0V
B	0V4	2V3	12V	3V1	0V4	0V
C	5V0	6V2	0V	8V0	26V8	152V *

* 110V 2146

	Q703		Q704	Q731	Q751	Q752	Q753
E	152V*	A	0V2	3V5	0V	6V3	0V5
B	152V*	G	0V	0V2	0V6	5V7	1V1
C	0V	K	14V5	0V	4V4	1V1	12V

* 110V 2146

	Q754	Q756	Q801	Q802	Q803	Q811
E	0V	5V4	11V0	10V9	11V0	0V5
B	0V6	6V1	11V5	11V5	11V5	2V0
C	0V1	9V7	140V	138V	140V	11V0

	Q812	Q813	Q901	Q902	Q903
E	0V5	0V5	–4V3	0V	0V
B	2V0	2V0	–4V0	0V2	0V
C	11V0	11V0	–2V5	–2V2	320V

NOTE: measure Q901-Q903 from isolated Earth i.e. leg of FB902

	Q950	Q951	Q952	Q953	Q954	Q955
E	12V0	14V5	0V	0V	6V3	3V3
B	12V9	13V7	0V7	0V7	6V9	3V3
C	14V5	14V4	0V1	0V1	124V3	0V

	Q1310	Q1320	Q1321	Q1399	Q2201	Q2203
E	5V1	0V8	0V8	2V5	0V1	0V2 (2V6)
B	4V4	1V4	1V4	3V1	0V2 (1V8)	0V9 (2V5)
C	0V	7V5	7V5	11V9	5V0	0V1 (7V1)

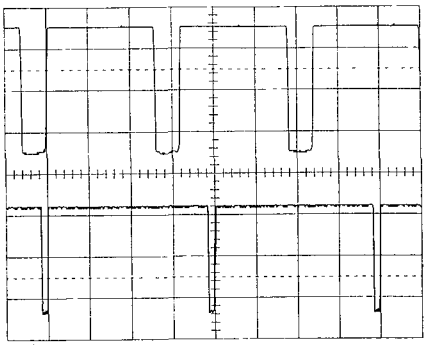
() = teletext

	Q2205	Q4051	Q4452	Q4453	Q4454	Q4455
E	0V	1V2	29V4	0V	29V4	0V
B	4V6	1V8	29V3	0V	28V7	0V7
C	0V	8V3	0V1	15V9	29V3	0V

WAVEFORMS

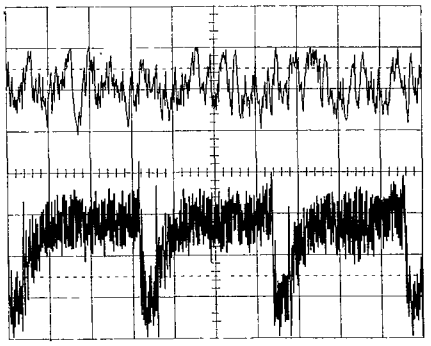
IC001 pin 26
6v0 p.p.
at 20µ sec

IC001 pin 27
5v0 p.p.
at 5m sec



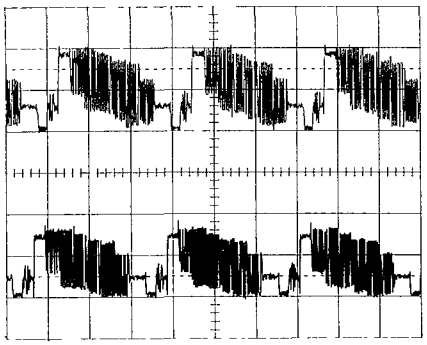
IC201 pin 1
4v0 p.p.
at 20µ sec

IC201 pin 5
42 mV p.p.
at 20µ sec

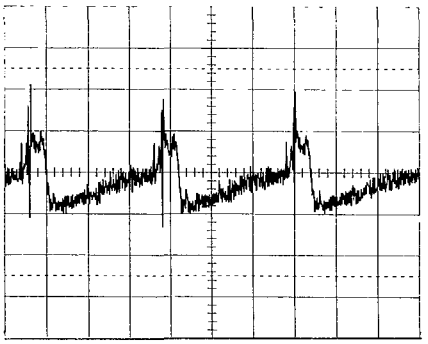


IC201 pin 7
2v0 p.p.
at 20µ sec

IC201 pin 13
1v8 p p.
at 20µ sec



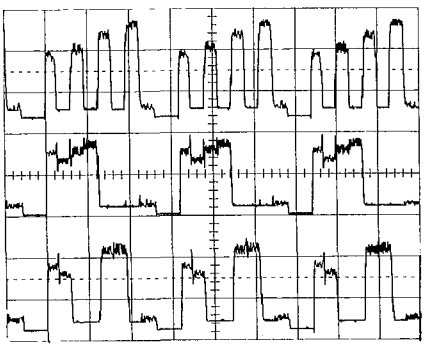
IC201 pin 16
170mV p.p.
at 20µ sec



IC201 pin 18
4v8 p p.
at 20µ sec

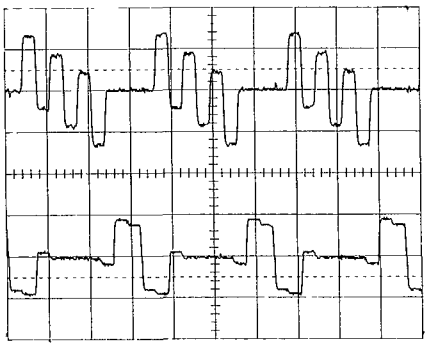
IC201 pin 19
4v0 p.p.
at 20µ sec

IC201 pin 20
4v4 p.p.
at 20µ sec



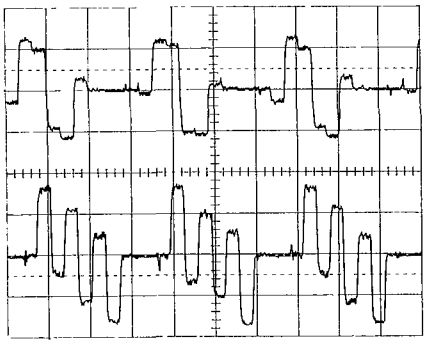
IC201 pin 28
1v4 p.p.
at 20µ sec

IC201 pin 29
0v9 p.p
at 20µ sec



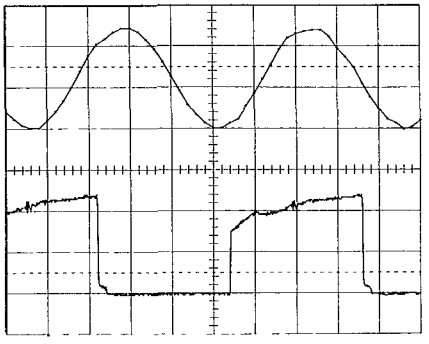
IC201 pin 30
0v5 p.p.
at 20µ sec

IC201 pin 31
0v68 p.p.
at 20µ sec



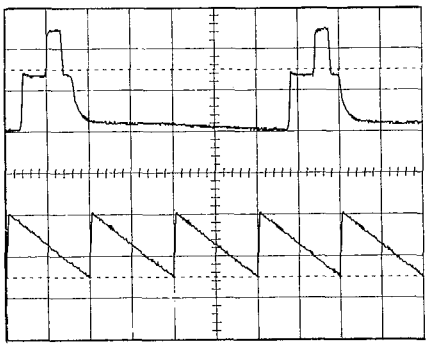
IC201 pin 32
0v24 p p
at 50µ sec

IC201 pin 37
2v4 p.p.
at 10µ sec



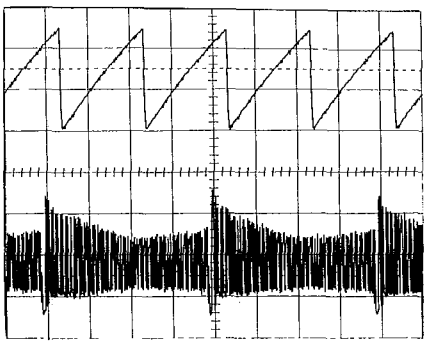
IC201 pin 38
5v0 p.p.
at 10µ sec

IC201 pin 41
0v75 p.p.
at 10m sec



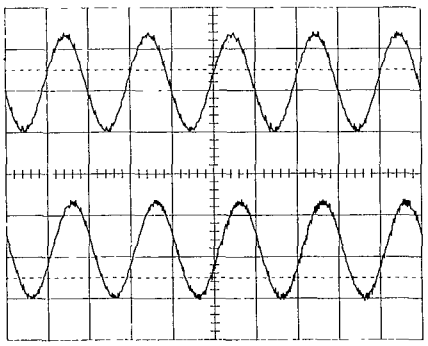
IC201 pin 42
1v25 p.p.
at 10m sec

IC201 pin 43
3v0 p.p.
at 5m sec



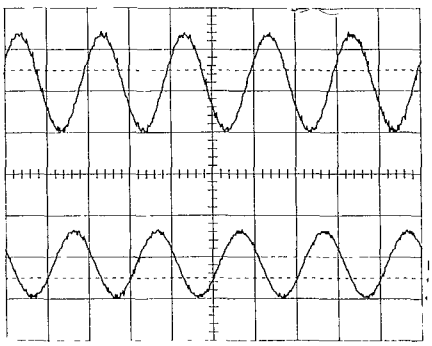
IC402 pins 3/5
1v2 p.p.
at 0 5m sec

IC402 pins 7/26
1v2 p.p.
at 0.5m sec



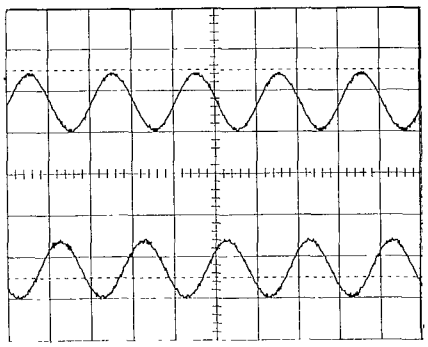
IC402 pins 9/24
1v2 p p.
at 0 5m sec

IC402 pins 10/23
0v8 p.p.
at 0.5m sec

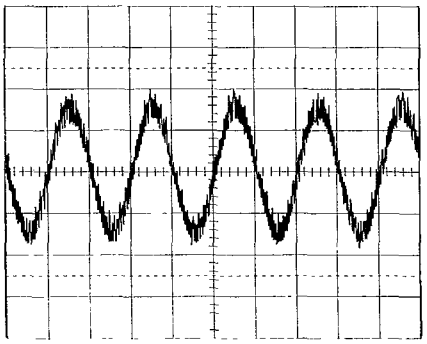


IC402 pin 15
0v7 p.p
at 0.5m sec

IC402 pin 18
0v7 p p
at 0.5m sec

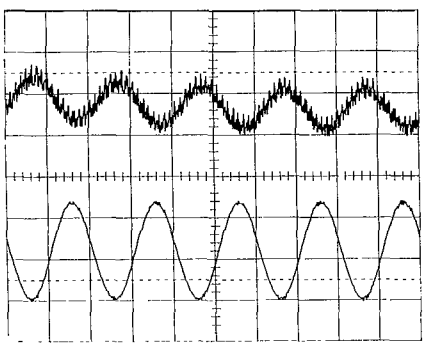


IC451 pins 7/8
0v76 p p.
at 5m sec



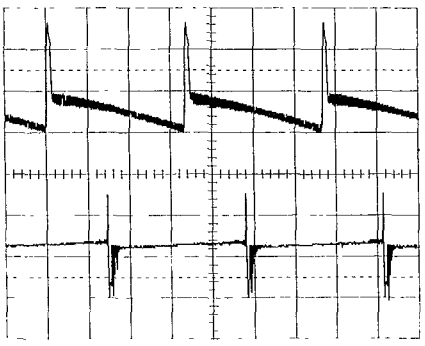
IC451 pins 9/10
0v8 p.p.
at 0.5m sec

IC451 pins 11/12
1v2 p.p.
at 0 5m sec

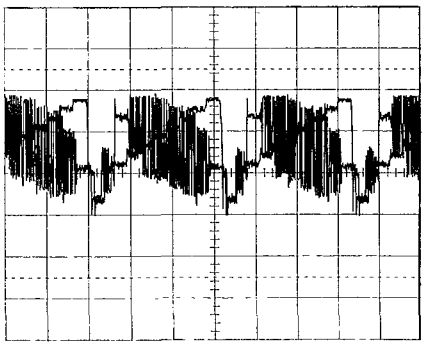


IC601 pin 2
52v p.p.
at 5m sec

IC601 pin 4
2v65 p.p.
at 5m sec

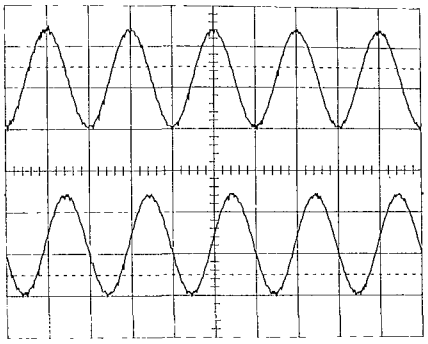


IC1401 pins 19/30
2v9 p.p.
at 20μ sec

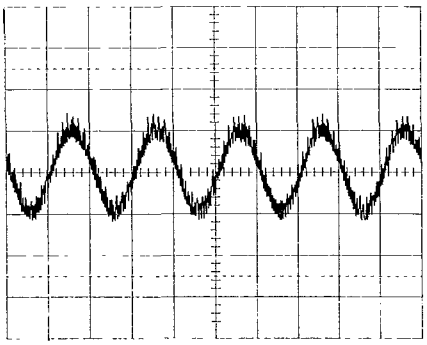


IC1401 pins 22/23
1v2 p p.
at 0.5m sec

IC1401 pins 34/35
1v2 p.p.
at 0.5m sec



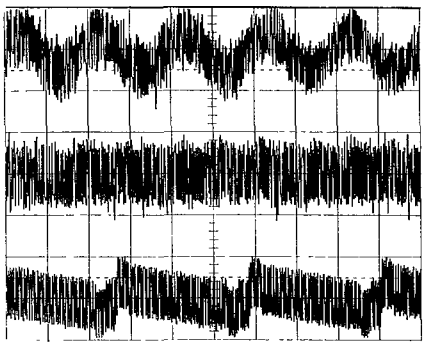
IC4001 pin 6
48mV p.p
at 0 5m sec



IC4051 pin 9
2v4 p.p
at 0 5m sec

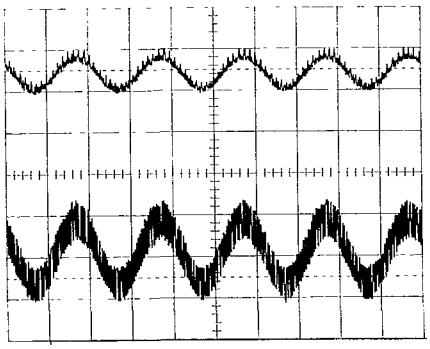
IC4051 pin 11
20mV p.p.
at 20μ sec

IC4051 pin 13
2v0 p p.
at 20μ sec



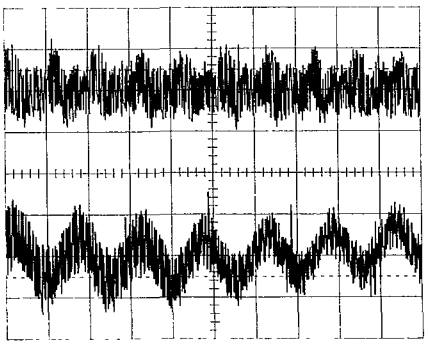
IC4051 pins 7/16
0v5 p.p.
at 0 5m sec

IC4051 pins 8/15
1v2 p.p.
at 0 5m sec



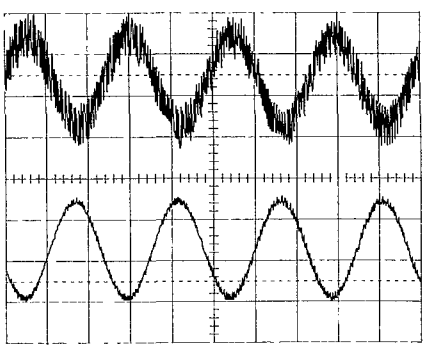
IC4201 pin 28
22mV p.p.
at 5m sec

IC4201 pin 29
0.56v p.p.
at 10m sec



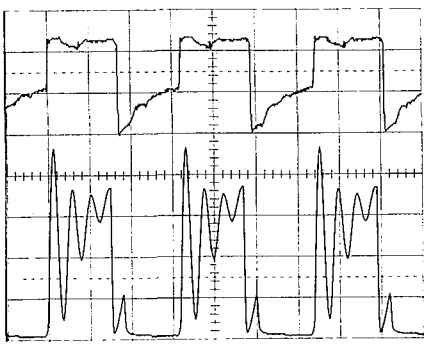
IC4450 pins 1/5
0v32 p.p.
at 1m sec

IC4450 pins 8/10
1v3 p.p.
at 1m sec

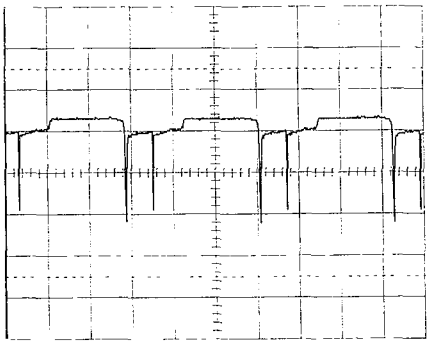


Q701 base
1v2 p.p.
at 20μ sec

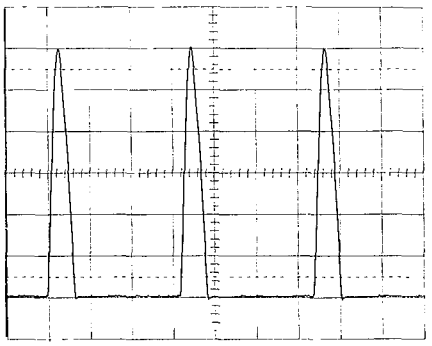
Q701 collector
92v p.p.
at 20μ sec



Q702 base
12v p.p.
at 20μ sec

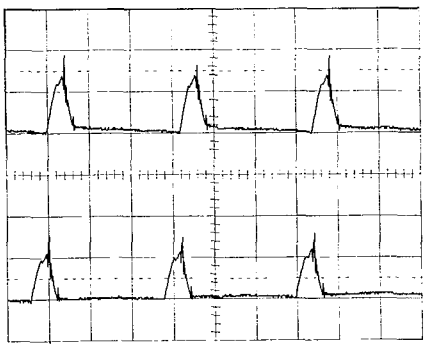


Q702 collector
1.2kv p.p.
at 20μ sec



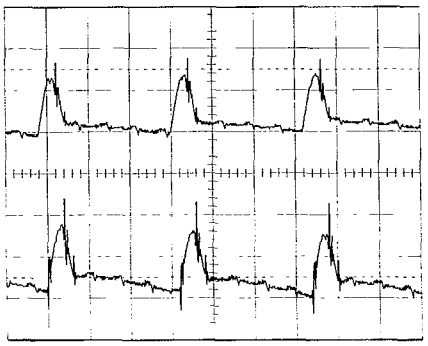
Q751 base
0v9 p.p.
at 20μ sec

Q751 collector
0v8 p p.
at 20μ sec

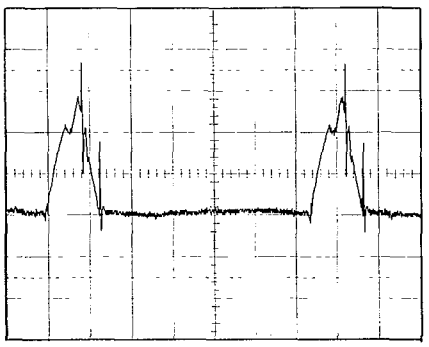


Q752 base
0v4 p.p.
at 20μ sec

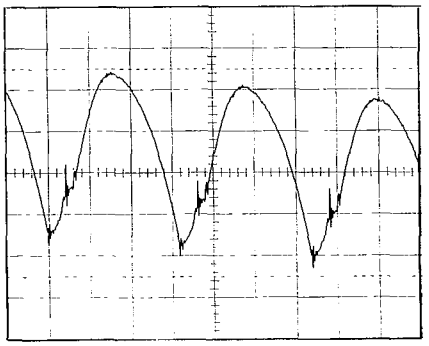
Q752 collector
0v52 p.p.
at 20μ sec



Q753 emitter
0v4 p p.
at 10μ sec



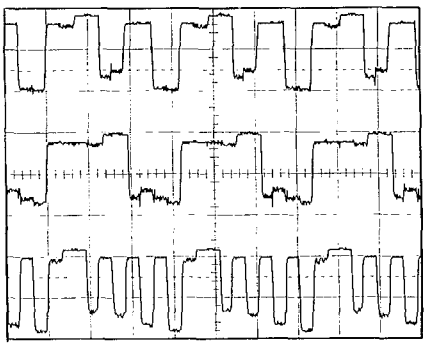
Q754 collector
2v3 p p
at 20μ sec

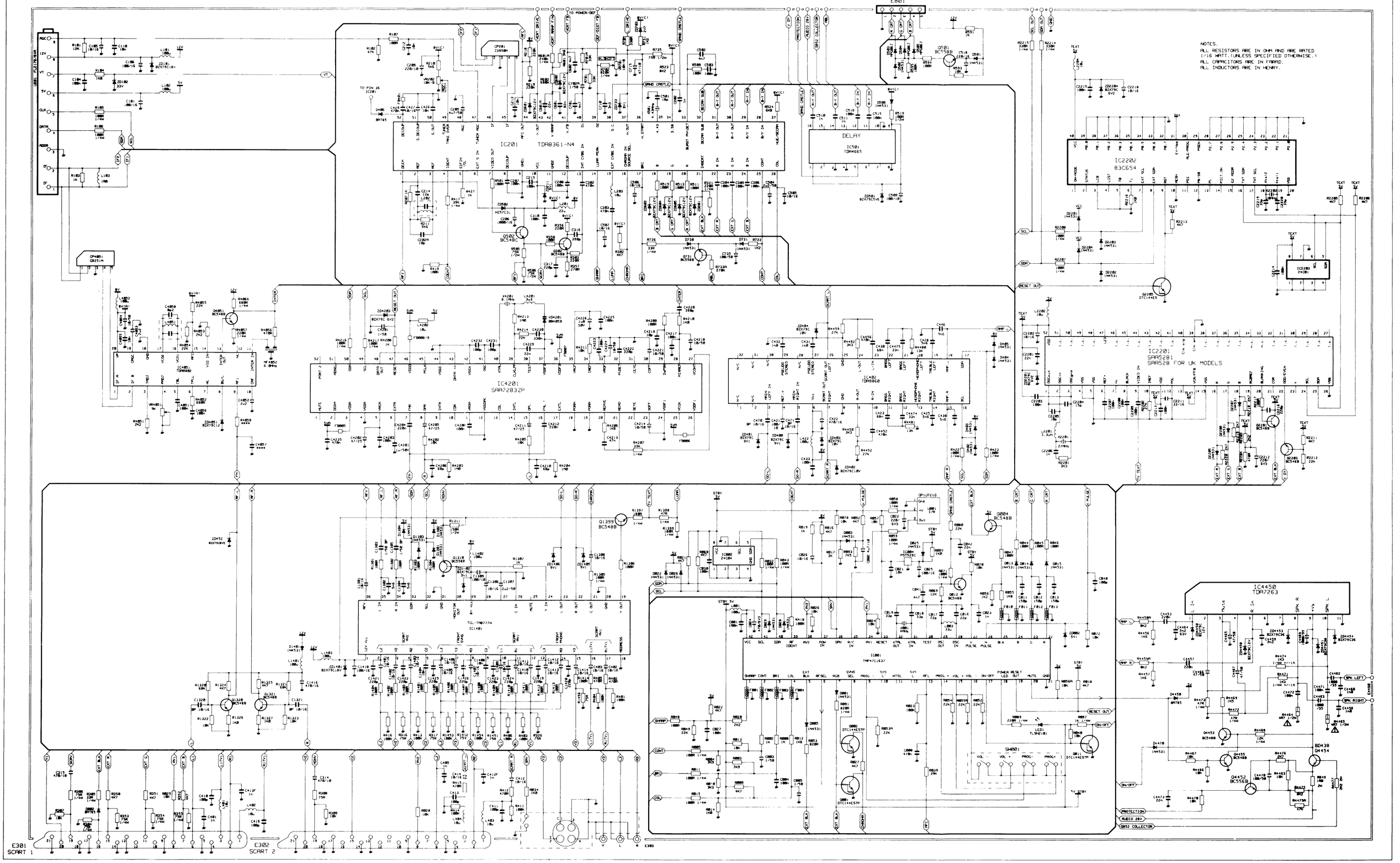


Q801 collector
90v p.p.
at 20µ sec

Q802 collector
90v p.p.
at 20µ sec

Q803 collector
100v p.p.
at 20µ sec





SIGNAL AND CONTROL CIRCUIT

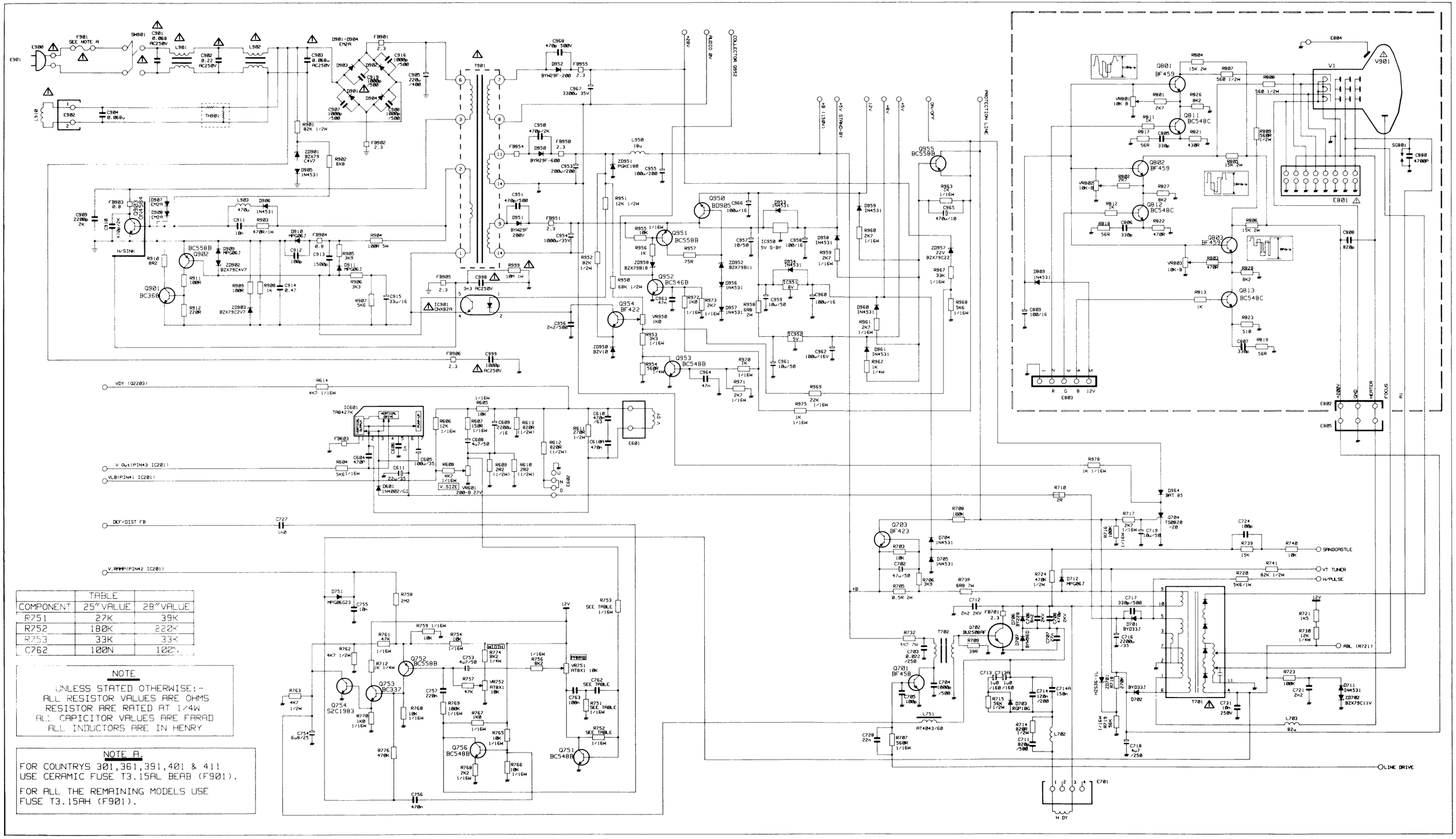


TABLE		
COMPONENT	25" VALUE	28" VALUE
R751	27K	39K
R752	180K	220K
R753	33K	33K
C762	100N	100N

NOTE

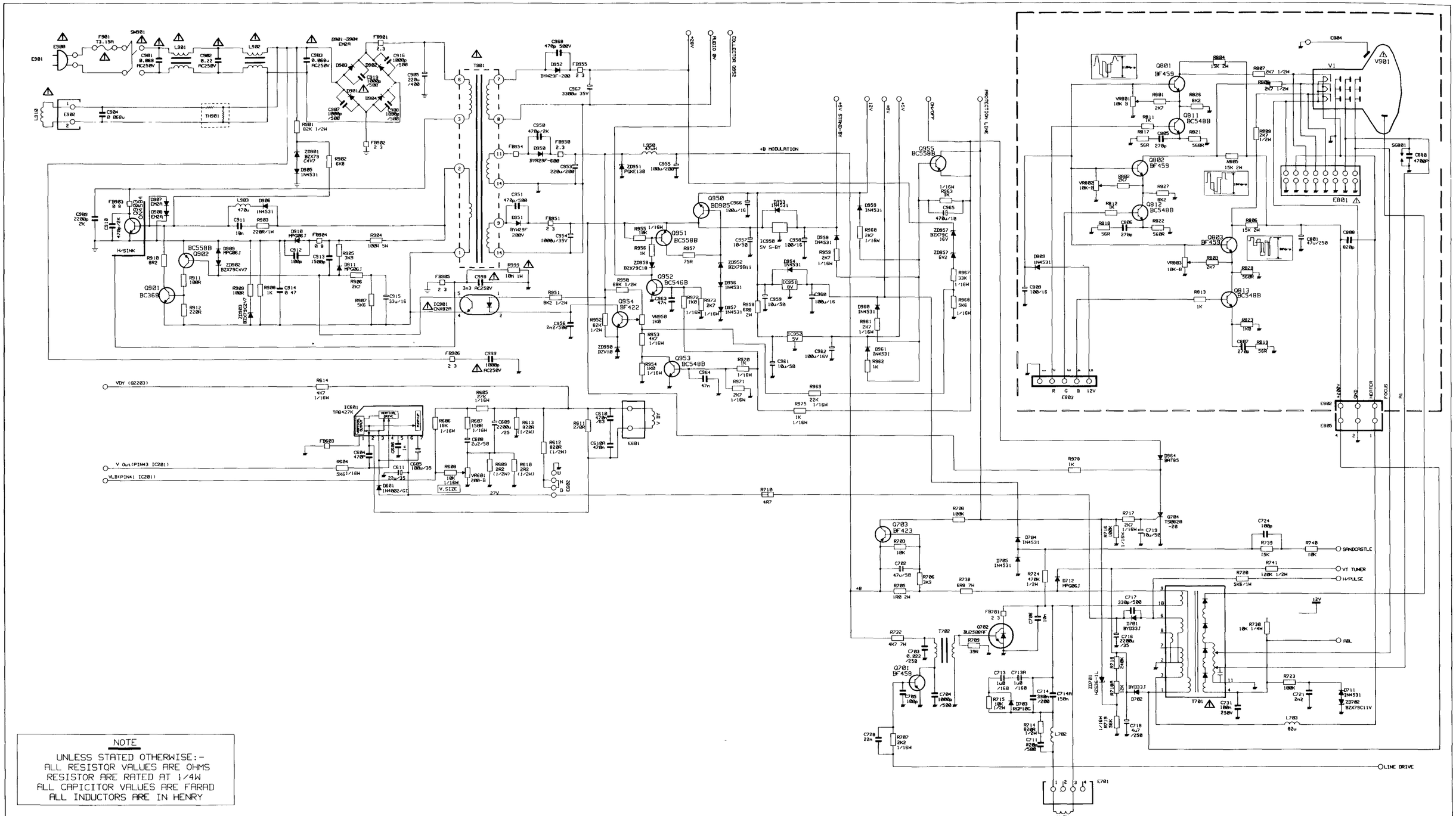
UNLESS STATED OTHERWISE:-
ALL RESISTOR VALUES ARE OHMS
RESISTOR ARE RATED AT 1/4W
ALL CAPICITOR VALUES ARE FARAD
ALL INDUCTORS ARE IN HENRY

NOTE A.

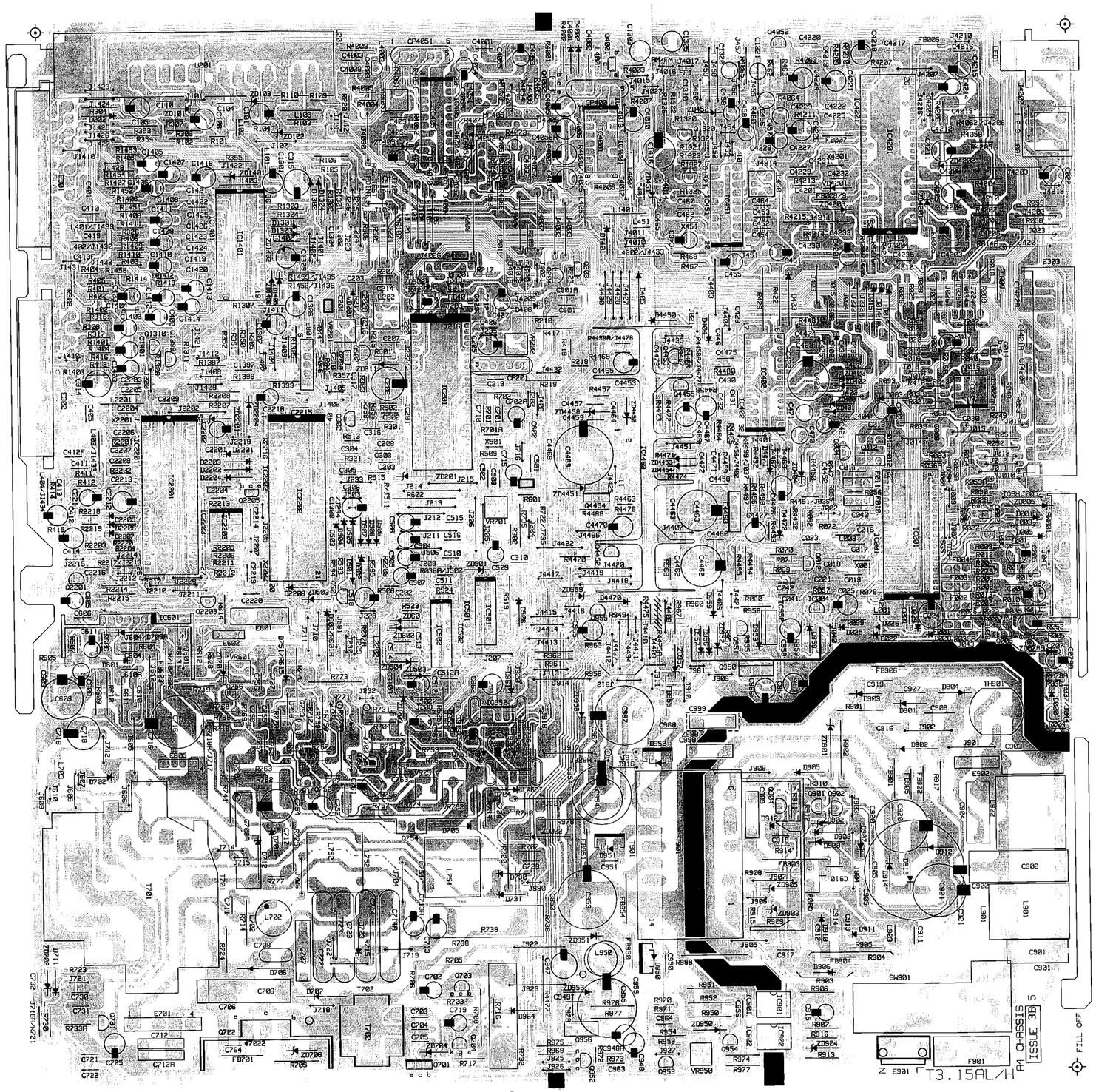
FOR COUNTRYS 301,361,391,401 & 411
USE CERAMIC FUSE T3.15AL BEAB (F901).

FOR ALL THE REMAINING MODELS USE
FUSE T3.15AH (F901).

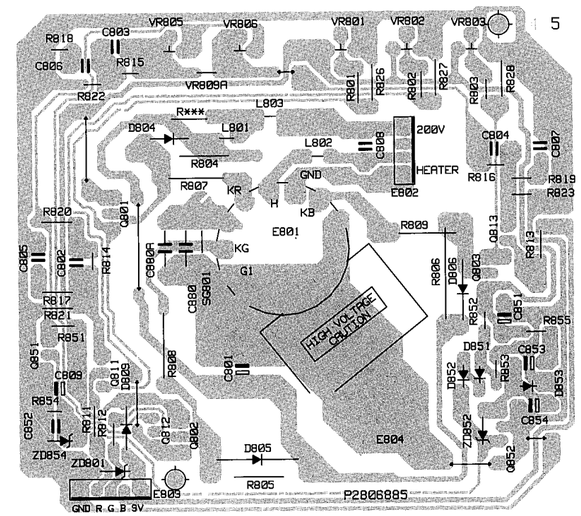
POWER SUPPLY AND DEFLECTION CIRCUIT
(C25/2846TN)



POWER SUPPLY AND DEFLECTION CIRCUIT
(C2146TN)



PRINTED CIRCUIT BOARD
(Component Side)



C.R.T. BASE P.C.B.
(Print Side)

PRESENTATION PARTS

CRT Type A51EAL55X10 C2146TN	T154010
CRT Type A59EAK71X01 C2546TN	2471301
CRT Type A66EAK71X01 C2846TN	T166017
⚠ Cabinet Back C2146TN	X263185
C2546TN	X240335
C2846TN	X263346
Cabinet Front Frame C2146TN	A781391
C2546TN	A781301
C2846TN	A781211
Control Door	X263331
HITACHI Badge C2146TN	X640251
C25/2846TN	X640261
I.R. LENS (Cabinet)	X425071
⚠ Mains Lead	E846629
Mains Switch Knob	X321101
Operating Guide	X830948
Quick Guide	X830947
Remote Control Handset CLE902A	X100041
Stand assembly C2146TN	X711368
C2546TN	X711360
C2846TN	X711358

MISCELLANEOUS PARTS

⚠ CRT Socket	2698351
⚠ Degaussing Coil C2146TN	L130036
C2546TN	2274361
C2846TN	2274362
⚠ Fuse Type T3.15AL	E882368
Fuse Holder	2721792
Phono Sockets/S-VHS Socket Block	2673821
⚠ ON/OFF Switch	2633391
21 Pin Scart Socket	E826923
Speakers 8 Ohm 10 Watts	E511122
Touch Button Block (SW001)	E139408

PRODUCT SAFETY NOTE: Components marked with a ⚠ have special characteristics important to safety. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE of this service manual. Don't degrade the safety of this receiver through improper servicing

Resistor Abbreviation	Type
CF	Carbon Film
MO	Metal Oxide
FF	Fusible Film
VR	Variable Control
MF	Metal Film
WW	Wire Wound

Capacitor Abbreviation	Type
C	Ceramic
PF	Plastic Film
FT	Feed Through
MPO	Met.Polyester
MPS	Mica/Polystyrene
MP	Metallised paper
TA	Tantalum

N.B. The parts marked * in the following parts list are unique to C2546TN and C2846TN models.

Ref No.	Part No.	Value	Type	%Tol	Wattage
R002	0700041M	1K0	CF	5	1/16
R003	0700063M	47K	CF	5	1/16
R004	0700048M	3K9	CF	5	1/16
R005	R120330	100R	CF	5	1/4
R008	0700036M	470R	CF	5	1/16
R009	0700049M	4K7	CF	5	1/16
R010	0700042M	1K2	CF	5	1/16
R011	R120330	100R	CF	5	1/4
R012	0700044M	1K8	CF	5	1/16
R013	0700054M	10K	CF	5	1/16
R014	0700041M	1K0	CF	5	1/16
R014A	0700038M	680R	CF	5	1/16
R015	R120330	100R	CF	5	1/4
R016	0700049M	4K7	CF	5	1/16
R016A	0700033M	270R	CF	5	1/16
R017	0187076M	3K0	CF	5	1/16
R018	0700049M	4K7	CF	5	1/16
R019	0700041M	1K0	CF	5	1/16
R020	0700045M	2K2	CF	5	1/16
R021	0700049M	4K7	CF	5	1/16
R022	0700049M	4K7	CF	5	1/16
R023	0700067M	100K	CF	5	1/16
R024	0700054M	10K	CF	5	1/16
R025	0700054M	10K	CF	5	1/16
R026	0700054M	10K	CF	5	1/16
R027	0700049M	4K7	CF	5	1/16
R028	0700054M	10K	CF	5	1/16
R032	0700027M	100R	CF	5	1/16
R034	0700041M	1K0	CF	5	1/16
R039	0700062M	39K	CF	5	1/16
R040	0700054M	10K	CF	5	1/16
R043	0700027M	100R	CF	5	1/16
R044	0700036M	470R	CF	5	1/16
R045	0700036M	470R	CF	5	1/16
R046	0700036M	470R	CF	5	1/16
R047	0700027M	100R	CF	5	1/16
R048	0700027M	100R	CF	5	1/16
R049	0700058M	22K	CF	5	1/16
R052	0700058M	22K	CF	5	1/16
R053	0700039M	820R	CF	5	1/16
R053A	0700058M	22K	CF	5	1/16
R054	0700058M	22K	CF	5	1/16
R055	0700044M	1K8	CF	5	1/16
R055A	0700058M	22K	CF	5	1/16
R056	0700042M	1K2	CF	5	1/16
R056A	0700054M	10K	CF	5	1/16
R057	0700054M	10K	CF	5	1/16
R058	R120330	100R	CF	5	1/4
R059	R120330	100R	CF	5	1/4
R068	0700049M	4K7	CF	5	1/16
R069	0700055M	12K	CF	5	1/16
R070	0700054M	10K	CF	5	1/16
R071	R120330	100R	CF	5	1/4
R072	0700054M	10K	CF	5	1/16
R078	0700054M	10K	CF	5	1/16
R080	0700058M	22K	CF	5	1/16
R089	R222330	2K2	CF	5	1/4
R091	R822330	8K2	CF	5	1/4
R092	0700049M	4K7	CF	5	1/16
R093	0187086M	7K5	CF	5	1/16
R097	R130330	1K0	CF	5	1/4
R099	0700041M	1K0	CF	5	1/16

Ref No.	Part No.	Value	Type	%Tol	Wattage
R101	0700055M	12K	CF	5	1/16
R102	0700063M	47K	CF	5	1/16
R103	0700041M	1K0	CF	5	1/16
R104	0700041M	1K0	CF	5	1/16
R105	R120330	100R	CF	5	1/4
R106	R120330	100R	CF	5	1/4
R107	0700027M	100R	CF	5	1/16
VR202	0160215R	10K	VR	A G C ADJUST	
R207	0700041M	1K0	CF	5	1/16
R209	0700054M	10K	CF	5	1/16
R210	0700051M	5K6	CF	5	1/16
R211	0700051M	5K6	CF	5	1/16
R218	0700072M	220K	CF	5	1/16
R219	0700072M	220K	CF	5	1/16
R301	0700033M	270R	CF	5	1/16
R302	0700049M	4K7	CF	5	1/16
R303	0700027M	100R	CF	5	1/16
R304	R715330	75R	CF	5	1/4
R305	R313330	33R	CF	5	1/4
R306	R715330	75R	CF	5	1/4
R307	0700054M	10K	CF	5	1/16
R308	0187038M	75R	CF	5	1/16
R309	0700054M	10K	CF	5	1/16
R316	0187038M	75R	CF	5	1/16
R317	0187038M	75R	CF	5	1/16
R321	R222330	2K2	CF	5	1/4
R326	0187038M	75R	CF	5	1/16
R350	0700043M	1K5	CF	5	1/16
R351	0700043M	1K5	CF	5	1/16
R352	0700043M	1K5	CF	5	1/16
R353	R715330	75R	CF	5	1/4
R354	R715330	75R	CF	5	1/4
R355	R715330	75R	CF	5	1/4
R356	0700032M	220R	CF	5	1/16
R357	0700033M	270R	CF	5	1/16
R358	0700027M	100R	CF	5	1/16
R401	0700067M	100K	CF	5	1/16
R402	0700036M	470R	CF	5	1/16
R403	0700067M	100K	CF	5	1/16
R404	0700067M	100K	CF	5	1/16
R405	0700036M	470R	CF	5	1/16
R406	0700067M	100K	CF	5	1/16
R411	0700067M	100K	CF	5	1/16
R412	0700036M	470R	CF	5	1/16
R413	0700067M	100K	CF	5	1/16
R414	0700067M	100K	CF	5	1/16
R415	0700036M	470R	CF	5	1/16
R416	0700067M	100K	CF	5	1/16
R417	R349330	39K	CF	5	1/4
R418	0700027M	100R	CF	5	1/16
R419	0700067M	100K	CF	5	1/16
R422	R120330	100R	CF	5	1/4
R423	R120330	100R	CF	5	1/4
R427	0700041M	1K0	CF	5	1/16
R501	0700027M	100R	CF	5	1/16
R505	R715319	75R	CF	5	1/2
R506	R715319	75R	CF	5	1/2
R509	0700067M	100K	CF	5	1/16
R511	0700041M	1K0	CF	5	1/16
R513	0700041M	1K0	CF	5	1/16
R515	0700041M	1K0	CF	5	1/16
R519	R120319	100R	CF	5	1/2

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Ref No.	Part No.	Value	Type	%Tol	Wattage
R523	0700053M	8K2	CF	5	1/16
R524	0700052M	6K8	CF	5	1/16
R593	0700054M	10K	CF	5	1/16
R594	0700027M	100R	CF	5	1/16
R595	0700067M	100K	CF	5	1/16
VR601	0160421R	200R	VR	HEIGHT ADJUST	
R601	0700051M	5K6	CF	5	1/16
*R601A	R254330	240K	CF	5	1/4
R602	0179557M	680K	MF	5	1/8
R604	0700051M	5K6	CF	5	1/16
R605	0700059M	27K	CF	5	1/16
*R605	0700054M	10K	CF	5	1/16
R606	0700057M	18K	CF	5	1/16
*R606	0700055M	12K	CF	5	1/16
R607	0700029M	150R	CF	5	1/16
R608	0700054M	10K	CF	5	1/16
*R608	0700049M	4K7	CF	5	1/16
R609	0113684M	2R2	CF	5	1/2
R610	0113684M	2R2	CF	5	1/2
R611	R227319	270R	CF	5	1/2
R612	R822319	820R	CF	5	1/2
R613	R822319	820R	CF	5	1/2
R614	0700049M	4K7	CF	5	1/16
R615	R150330	100K	CF	5	1/4
VR701	0160215R	VR	10K	VR	HORIZ SHIFT
R701	0700061M	33K	CF	5	1/16
R701A	0700061M	33K	CF	5	1/16
R702	0179558M	820K	MF	5	1/8
R703	R140330	10K	CF	5	1/4
R704	0700034M	330R	CF	5	1/16
R705	R100549	1R0	MO	5	2
*R705	R000505	0R5	MO	5	7
R706	R339330	3K9	CF	5	1/4
R707	0700045M	2K2	CF	5	1/16
*R707	0700037M	560R	CF	5	1/16
R708	R150721	100K	MF	1	1/4
R709	R319330	39R	CF	5	1/4
⚠ R710	R407551	4R7	FF	5	1/2
⚠ *R710	R200551	2R0	FF	5	1/2
*R712	R130330	1K0	CF	5	1/4
R714	R822319	820R	CF	5	1/2
R715	R140319	10K	CF	5	1/2
*R715	R546319	56K	CF	5	1/2
R716	0700067M	100K	CF	5	1/16
R717	0700046M	2K7	CF	5	1/16
R718	R254721	240K	MF	1	1/4
*R718	R257721	270K	MF	1	1/4
R718A	R142721	12K	MF	1	1/4 (C2146TN only)
R719	0119649M	56K	MF	5	1/8
R720	0110163M	5K6	MO	5	1
*R721	0700043M	1K5	CF	5	1/16
R722	0700038M	680R	CF	5	1/16
*R722	0700032M	220R	CF	5	1/16
R723	R150730	100K	MF	2	1/4
R724	R457714	470K	MF	5	1/2
R730	R140330	10K	CF	5	1/4
*R730	R142330	12K	CF	5	1/4
R731	0700042M	1K2	CF	5	1/16
R732	0140933S	4K7	MO	5	7
R733A	R447330	47K	CF	5	1/4
*R733A	0700073M	270K	CF	5	1/16
R735	0113722M	75R	CF	5	1/2
R736	R313330	33R	CF	5	1/4
R738	0147630	6R8	WW	5	7
R739	R145330	15K	CF	5	1/4
R740	R140330	10K	CF	5	1/4
R741	R842319	82K	CF	5	1/2
*VR751	0160215R	10K	VR	PIN CUSHION ADJUST	
*R751	0700059M	27K	CF	5	1/16
*R751	0700062M	39K	CF	5	1/16 (C2846TN only)
*VR752	0160215R	10K	VR	HORIZ SIZE	
*R752	0700070M	180K	CF	5	1/16
*R752	0700072M	220K	CF	5	1/16 (C2846TN only)
*R753	0700061M	33K	CF	5	1/16
*R754	0700054M	10K	CF	5	1/16

Ref No.	Part No.	Value	Type	%Tol	Wattage
*R756	0700053M	8K2	CF	5	1/16
*R757	0700063M	47K	CF	5	1/16
*R758	0179561M	2M2	MF	5	1/8
*R759	0700054M	10K	CF	5	1/16
*R760	0700054M	10K	CF	5	1/16
*R761	0700063M	47K	CF	5	1/16
*R762	R437319	4K7	CF	5	1/2
*R763	R437319	4K7	CF	5	1/2
*R765	0700054M	10K	CF	5	1/16
*R766	0700054M	10K	CF	5	1/16
*R767	0700041M	1K0	CF	5	1/16
*R768	0700045M	2K2	CF	5	1/16
*R769	0700067M	100K	CF	5	1/16
*R770	0700041M	1K0	CF	5	1/16
*R773	0179563M	3M3	MF	5	1/8
*R774	R832330	8K2	CF	5	1/4
*R776	R457330	470K	CF	5	1/4
R801	0700046M	2K7	CF	5	1/16
VR801	0160225R	10K	VR	RED BACKGROUND	
R802	0700046M	2K7	CF	5	1/16
VR802	0160225R	10K	VR	GREEN BACKGROUND	
R803	0700046M	2K7	CF	5	1/16
VR803	0160225R	10K	VR	BLUE BACKGROUND	
R804	0110273S	15K	MO	5	2
R805	0110273S	15K	MO	5	2
R806	0110273S	15K	MO	5	2
R807	R526319	560R	CF	5	1/2
R808	R526319	560R	CF	5	1/2
R809	R526319	560R	CF	5	1/2
R811	0700041M	1K0	CF	5	1/16
R812	0700041M	1K0	CF	5	1/16
R813	0700041M	1K0	CF	5	1/16
R817	0700024M	56R	CF	5	1/16
R818	0700024M	56R	CF	5	1/16
R819	0700024M	56R	CF	5	1/16
R821	0700034M	330R	CF	5	1/16
R822	0700034M	330R	CF	5	1/16
R823	0700034M	330R	CF	5	1/16
*R826	0700053M	8K2	CF	5	1/16
*R827	0700053M	8K2	CF	5	1/16
*R828	0700053M	8K2	CF	5	1/16
R901	R842731	82K	MF	2	1/2
R902	R638330	6K8	CF	5	1/4
R903	0110129M	220R	MO	5	1
*R903	0110137M	470R	MO	5	1
R904	R110856	100R	WW	5	5
R905	R339330	3K9	CF	5	1/4
R906	R237330	2K7	CF	5	1/16
*R906	R333330	3K3	CF	5	1/4
R907	R536330	5K6	CF	5	1/4
R908	R130330	1K0	CF	5	1/4
R909	R120330	100R	CF	5	1/4
R910	0114015M	8R2	CF	5	1/4
R911	R120330	100R	CF	5	1/4
R912	R222330	220R	CF	5	1/4
R949	R100549	1R0	MO	5	2
R950	R648319	68K	CF	5	1/2
VR950	0160211R	1K0	VR	H T ADJUST.	
R951	R832731	8K2	MF	2	1/2
*R951	R142319	12K	CF	5	1/2
R952	R842319	82K	CF	5	1/2
R953	0187082M	5K1	CF	5	1/16
*R953	0700047M	3K3	CF	5	1/16
R954	0700041M	1K0	CF	5	1/16
*R954	R526330	560R	CF	5	1/4
R955	0700054M	10K	CF	5	1/16
R956	R130730	1K0	MF	2	1/4
R957	R715330	75R	CF	5	1/4
R958	R608566	6R8	MO	5	3
R959	0700046M	2K7	CF	5	1/16
R960	0700046M	2K7	CF	5	1/16
R961	0700046M	2K7	CF	5	1/16
R962	R130330	1K0	CF	5	1/4
R963	0700041M	1K0	CF	5	1/16
R967	0700061M	33K	CF	5	1/16
R968	0700051M	5K6	CF	5	1/16
R969	0700058M	22K	CF	5	1/16
R970	0700041M	1K0	CF	5	1/16

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Ref No.	Part No.	Value	Type	%Tol	Wattage
R971	0700046M	2K7	CF	5	1/16
R972	0700041M	1K0	CF	5	1/16
R973	0700046M	2K7	CF	5	1/16
R975	0700041M	1K0	CF	5	1/16
R978	0700041M	1K0	CF	5	1/16
⚠ R999	R170727	10M	MF	5	1
R1301	0700027M	100R	CF	5	1/16
R1302	0700027M	100R	CF	5	1/16
R1303	R120330	100R	CF	5	1/4
R1304	R120330	100R	CF	5	1/4
R1305	R120330	100R	CF	5	1/4
R1306	0700027M	100R	CF	5	1/16
R1307	0700041M	1K0	CF	5	1/16
R1311	R125319	150R	CF	5	1/2
R1320	0700065M	68K	CF	5	1/16
R1321	0700065M	68K	CF	5	1/16
R1322	0700054M	10K	CF	5	1/16
R1323	0700054M	10K	CF	5	1/16
R1324	0700049M	4K7	CF	5	1/16
R1325	0700049M	4K7	CF	5	1/16
R1326	0700041M	1K0	CF	5	1/16
R1327	0700041M	1K0	CF	5	1/16
R1397	R128330	180R	CF	5	1/4
R1398	R417330	47R	CF	5	1/4
R1399	R128330	180R	CF	5	1/4
R1401-14	0700027M	100R	CF	5	1/16
R1451	0187038M	75R	CF	5	1/16
R1452	0187038M	75R	CF	5	1/16
R1453	0700067M	100K	CF	5	1/16
R1454	0700067M	100K	CF	5	1/16
R1456	0187038M	75R	CF	5	1/16
R2201	0700047M	3K3	CF	5	1/16
R2202	0700059M	27K	CF	5	1/16
R2203	0700046M	2K7	CF	5	1/16
R2204	0700037M	560R	CF	5	1/16
R2205	0700049M	4K7	CF	5	1/16
R2206	0700049M	4K7	CF	5	1/16
R2207	R120330	100R	CF	5	1/4
R2208	R120330	100R	CF	5	1/4
R2209	0700041M	1K0	CF	5	1/16
R2211	0700049M	4K7	CF	5	1/16
R2212	0700058M	22K	CF	5	1/16
R2213	0700049M	4K7	CF	5	1/16
R2214	R323330	330R	CF	5	1/4
R2215	R323330	330R	CF	5	1/4
R2216	0700041M	1K0	CF	5	1/16
R2217	0700027M	100R	CF	5	1/16
R4051	0700045M	2K2	CF	5	1/16
VR4051	0160214R	5K0	VR	I F PHASE ADJUST	
R4042	0700038M	680R	CF	5	1/16
R4053	0700045M	2K2	CF	5	1/16
R4054	0700058M	22K	CF	5	1/16
R4055	0700058M	22K	CF	5	1/16
R4056	0700036M	470R	CF	5	1/16
R4057	R222330	220R	CF	5	1/16
R4058	0700041M	1K0	CF	5	1/16
R4059	0700049M	4K7	CF	5	1/16
R4066	R628330	680R	CF	5	1/4
R4202	0700054M	10K	CF	5	1/16
R4203	R160330	1M0	CF	5	1/4
R4204	R160330	1M0	CF	5	1/4
R4205	0700054M	10K	CF	5	1/16
R4206	0700044M	1K8	CF	5	1/16
R4207	0700061M	33K	CF	5	1/16
R4208	0700041M	1K0	CF	5	1/16
R4209	0700027M	100R	CF	5	1/16
R4210	0700041M	1K0	CF	5	1/16
R4211	0700054M	10K	CF	5	1/16
R4213	R160330	1M0	CF	5	1/4
R4214	0700058M	22K	CF	5	1/16
R4216	R120330	100R	CF	5	1/4
R4217	R120330	100R	CF	5	1/4
R4450	0700047M	3K3	CF	5	1/16
R4452	0700059M	27K	CF	5	1/16
R4456	0187070M	1K6	CF	5	1/16
R4457	0187070M	1K6	CF	5	1/16
R4458A	0700053M	8K2	CF	5	1/16
R4459	0700059M	27K	CF	5	1/16

Ref No.	Part No.	Value	Type	%Tol	Wattage
R4459A	0700053M	8K2	CF	5	1/16
R4463	0700054M	10K	CF	5	1/16
⚠ R4464	R407551	4R7	FF	5	1/2
⚠ R4465	R407551	4R7	FF	5	1/2
R4466	0700054M	10K	CF	5	1/16
R4467	0700054M	10K	CF	5	1/16
R4468	R142330	12K	CF	5	1/4
R4469	0700043M	1K5	CF	5	1/16
R4470	R140330	10K	CF	5	1/4
R4471	R130721	1K0	MF	1	1/4
*R4471	R133721	1K3	MF	1	1/4
R4472	R417330	47R	CF	5	1/4
R4473	R417330	47R	CF	5	1/4
R4474	R130721	1K0	MF	1	1/4
*R4474	R133721	1K3	MF	1	1/4
R4475	0700053M	8K2	CF	5	1/16
R4475A	0700063M	47K	CF	5	1/16
R4476	0700046M	2K7	CF	5	1/16
R4477	0110253S	2K2	MF	5	2
R4480	0187092M	13K	CF	5	1/16
R4481	0187092M	13K	CF	5	1/16
R4492	0700047M	3K3	CF	5	1/16

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Ref No.	Part No.	Value	Type	%Tol	Voltage
C001	0880057R	100n	PF	10	50
C002	0800009R	4u7	EL	-	25
C003	0800003R	1u0	EL	-	50
C004	0880057R	100n	PF	10	50
C005	0800003R	1u0	EL	-	50
C008	C457715	470n	MPO	10	63
C011	0890076R	150p	C	10	50
C012	0890076R	150p	C	10	50
C013	0890076R	150p	C	10	50
C016	0890065R	22p	C	5	50
C017	0890065R	22p	C	5	50
C018	0890121R	33p	C	5	50
C019	0890121R	33p	C	5	50
C021	0880044R	10n	PF	10	50
C022	0800056R	220u	EL	-	6.3
C023	0880031R	1n0	PF	10	50
C024	0800072R	470u	EL	-	6 3
C025	0800049R	100u	EL	-	16
C026	0800015R	10u	EL	-	16
C027	0880057R	100n	PF	10	50
C030	0880057R	100n	PF	10	50
C040	0890074R	100p	C	5	50
C041	C437877	4n7	C	10	25
C042	C242877	22n	C	10	25
C101	0800049R	100u	EL	-	16
C104	0880057R	100n	PF	10	50
C105	0800015R	10u	EL	-	16
C106	0800049R	100u	EL	-	16
C110	0880044R	10n	PF	10	50
C202	C130877	1n0	C	10	25
C202A	0890114R	10p	C	-	50
C205	0800012R	4u7	EL	-	50
C206	0800082N	1000u	EL	-	16
C207	0880057R	100n	PF	10	50
C208	0880057R	100n	PF	10	50
C212	0890101R	10n	C	-	50
C213	0890101R	10n	C	-	50
C214	0890115R	12p	C	5	50
C215	0880057R	100n	PF	10	50
C302	C457715	470n	MPO	10	63
C303	C457715	470n	MPO	10	63
C304	0880057R	100n	PF	10	50
C305	0880057R	100n	PF	10	50
C306	0880057R	100n	PF	10	50
C310	0880057R	100n	PF	10	50
C314	0800073R	470u	EL	-	10
C315	0800073R	470u	EL	-	10
C316	0890084R	560p	C	10	50
C317	0890078R	220p	C	10	50
C401	C130715	1n0	MPO	10	63
C402	0800015R	10u	EL	-	16
C403	0800015R	10u	EL	-	16
C405	0244139R	1n0	C	10	50
C410	0890074R	100p	C	5	50
C411	0890074R	100p	C	5	50
C412	0800015R	10u	EL	-	16
C412F	0244139R	1n0	C	10	50
C413	0890074R	100p	C	5	50
C413F	C130715	1n0	MPO	10	63
C414	0800015R	10u	EL	-	16
C419	0890074R	100p	C	5	50
C421	0800048R	100u	EL	-	10
C422	0800074R	470u	EL	-	16
C423	0880055R	68n	PF	10	50
C425	0880041R	5n6	PF	10	50
C426	0880044R	10n	PF	10	50
C427	0800015R	10u	EL	-	16
C428	0880041R	5n6	PF	10	50
C429	C457715	470n	MPO	10	63
C430	0880055R	68n	PF	10	50
C431	0890087R	1n0	C	-	50
C432	0890087R	1n0	C	-	50
C433	0880057R	100n	PF	10	50
C438	0880041R	5n6	PF	10	50
C446	0880041R	5n6	PF	10	50
C470	0284638R	10u	EL	-	16
C471	0284638R	10u	EL	-	16
C501	0890117R	18p	C	5	50

Ref No.	Part No.	Value	Type	%Tol	Voltage
C502	0880039R	4n7	PF	10	50
C503	0880057R	100n	PF	10	50
C504	0800005R	2u2	EL	-	50
C505	0800015R	10u	EL	-	16
C506	0800015R	10u	EL	-	16
C507	0800015R	10u	EL	-	16
C509	0800048R	100u	EL	-	10
C510	0890087R	1n0	C	-	50
C511	0890087R	1n0	C	-	50
C515	0880057R	100n	PF	10	50
C516	0880057R	100n	PF	10	50
C518	0800015R	10u	EL	-	16
*C518	0800049R	100u	EL	-	16
C601	C842715	82n	MPO	10	63
C601A	C242877	22n	C	10	25
C602	0880039R	4n7	PF	10	50
C604	0890083R	470p	C	10	50
C605	0800328R	100u	EL	-	35
C606	0244139R	1n0	C	10	50
C608	0800005R	2u2	EL	-	50
*C608	0800012R	4u7	EL	-	50
C609	0800087F	2200u	EL	-	16
C610	C457715	470n	MPO	10	63
C610A	C457715	470n	MPO	10	63
C611	0800025R	22u	EL	-	31.5
C701	0880039R	4n7	PF	10	50
C702	0800044R	47u	EL	-	50
C702A	0800003R	1u0	EL	-	50
C703	0250511R	22n	PF	10	50
C704	0244501R	1n0	C	10	500
C705	0890074R	100p	C	5	50
C706	0262441	10n	C	2	1600
*C706	0262435F	8n2	C	2	1800
*C707	0299995F	27n	PF	5	630
*C708	0244202C	470p	C	10	2000
C710	0880037R	3n3	PF	10	50
C711	0243512R	820p	C	10	500
*C712	0244215C	2n2	C	10	2000
C713	0253952R	1u0	EL	-	160
C713A	0253952R	1u0	EL	-	160
C714	0299933C	390n	PF	10	200
*C714	0299927F	120n	PF	10	200
C714A	0299928F	150n	PF	10	200
C715	0800039R	47u	EL	-	10
C716	0253934C	2200u	EL	-	31 5
C717	0243507R	330p	C	10	500
C718	0253971N	4u7	EL	-	250
C719	0800018R	10u	EL	-	50
C721	0880035R	2n2	PF	10	50
C724	0248054R	100p	C	5	50
C725	0800074R	470u	EL	-	16
*C725	0800053R	100u	EL	-	50
*C727	0244139R	1n0	C	10	50
C728	0880048R	22n	PF	10	50
C731	0279693R	100n	PF	10	100
*C753	0800009R	4u7	EL	-	25
*C754	0259472N	6u8	EL	-	25
*C755	0880044R	10n	PF	10	50
*C756	C457715	470n	MPO	10	63
*C757	0276721R	220n	PF	5	50
*C758	0276721R	220n	PF	5	50
*C762	0276717R	100n	PF	5	50
*C763	0276717R	100n	PF	5	50
C805	0890083R	470p	C	10	50
C806	0890083R	470p	C	10	50
C807	0890083R	470p	C	10	50
C808	0243512R	820p	C	10	500
C809	0800049R	100u	EL	-	16
⚠ C880	0245612	4n7	C	10	1000
⚠ C901	C648751	68n	PF	20	250AC
⚠ C902	0262774N	220n	PF	20	250AC
⚠ C903	C648751	68n	PF	20	250AC
C904	C648727C	68n	MPO	10	630
C905	C001544	220u	EL	-	400
C907	0244501R	1n0	C	10	500
C908	0244501R	1n0	C	10	500
C909	0244215R	2n2	C	10	2000
C910	0246353F	470p	C	10	2000

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Ref No.	Part No.	Value	Type	%Tol	Voltage
C911	0880044R	10n	PF	10	50
C912	0890074R	100p	C	5	50
C913	0880033R	1n5	PF	10	50
C914	C457715	470n	MPO	10	63
C915	0800032R	33u	EL	-	16
C916	0244501R	1n0	C	10	500
C919	0244501R	1n0	C	10	500
C950	0246353R	470p	C	10	2000
C951	0243509R	470p	C	10	500
C953	0259431F	220u	EL	-	200
C954	0800084F	1000u	EL	-	31 5
C955	0253491F	100u	EL	-	200
C956	0244505R	2n2	C	10	500
C957	0800018R	10u	EL	-	50
C958	0800049R	100u	EL	-	16
C959	0800018R	10u	EL	-	50
C960	0800049R	100u	EL	-	16
C961	0800018R	10u	EL	-	50
C962	0800049R	100u	EL	-	16
C963	0880053R	47n	PF	10	50
C964	0880053R	47n	PF	10	50
C965	0800073R	470u	EL	-	10
C966	0800049R	100u	EL	-	16
C967	0253935C	3300u	EL	-	35
C968	0243509R	470p	C	5	500
⚠ C998	0247975C	3n3	C	-	250AC
⚠ C999	0249498C	1n0	C	-	250AC
C1301	0800015R	10u	EL	-	16
C1302	0880033R	1n5	PF	10	50
C1303	0284623R	1u0	EL	-	50
C1304	0880033R	1n5	PF	10	50
C1305	0284623R	1u0	EL	-	50
C1306	0800015R	10u	EL	-	16
C1307	0800005R	2u2	EL	-	50
C1308	0800015R	10u	EL	-	16
C1309	0800048R	100u	EL	-	10
C1320	0284638R	10u	EL	-	16
C1321	0284638R	10u	EL	-	16
C1397	0890078R	220p	C	10	50
C1401	0800015R	10u	EL	-	16
C1402	0800015R	10u	EL	-	16
C1403	0800015R	10u	EL	-	16
C1404	0880044R	10n	PF	10	50
C1405	0800015R	10u	EL	-	16
C1406	0800015R	10u	EL	-	16
C1407	0800015R	10u	EL	-	16
C1408	0880044R	10n	PF	10	50
C1409-14	0800015R	10u	EL	-	16
C1416	0800074R	470u	EL	-	16
C1418	0800049R	100u	EL	-	16
C1419-26	0890078R	220p	C	10	50
C2201	0880048R	22n	PF	10	50
C2202	0800015R	10u	EL	-	16
C2203	0880057R	100n	PF	10	50
C2204	0890063R	15p	C	5	50
C2205	C110182	10p	C	2	50
C2206	0880031R	1n0	PF	10	50
C2207	0880057R	100n	PF	10	50
C2208	0880057R	100n	PF	10	50
C2209	0880057R	100n	PF	10	50
C2211	0800032R	33u	EL	-	16
C2212	0800056R	220u	EL	-	6 3
C2213	0880057R	100n	PF	10	50
C2214	0880057R	100n	PF	10	50
C2215	0880057R	100n	PF	10	50
C2216	0890078R	220p	C	10	50
C2218	0800015R	10u	EL	-	16
C2219	0890121R	33p	C	5	50
C2220	0890121R	33p	C	5	50
C4010	0800023R	22u	EL	-	16
C4051	0880057R	100n	PF	10	50
C4052	0800005R	2u2	EL	-	50
C4053	0800005R	2u2	EL	-	50
C4054	0800018R	10u	EL	-	50
C4055	0880044R	10n	PF	10	50
C4056	0880057R	100n	PF	10	50
C4057	0880053R	47n	PF	10	50
C4058	C802182	8p2	C	2	50

Ref No.	Part No.	Value	Type	%Tol	Voltage
C4201	0800003R	1u0	EL	-	50
C4202	0800042R	47u	EL	-	25
C4203	0880057R	100n	PF	10	50
C4204	0880062R	220n	PF	10	50
C4205	0800042R	47u	EL	-	25
C4206	0890072R	68p	C	5	50
C4208	0880057R	100n	PF	10	50
C4210	0890072R	68p	C	5	50
C4211	0800042R	47u	EL	-	25
C4212	0880062R	220n	PF	10	50
C4213	0880053R	47n	PF	10	50
C4214	0800018R	10u	EL	-	50
C4217	0880057R	100n	PF	10	50
C4218	0800018R	10u	EL	-	16
C4219	C110182	10p	C	2	50
C4220	0890082R	390p	C	10	50
C4221	0800018R	10u	EL	-	50
C4222	0248692R	220p	C	5	50
C4223	0880057R	100n	PF	10	50
C4224	0800018R	10u	EL	-	50
C4225	0880057R	100n	PF	10	50
C4226	0800003R	1u0	EL	-	50
C4229	0880048R	22n	PF	10	50
C4230	C353715	330n	MPO	10	63
C4231	0890074R	100p	C	5	50
C4232	0890074R	100p	C	5	50
C4235	0880066R	470n	PF	5	50
C4452	0880066R	470n	PF	5	50
C4453	C252715	220n	MPO	10	63
C4456	0880066R	470n	PF	5	50
C4457	C252715	220n	MPO	10	63
C4458	0880031R	1n0	PF	10	50
C4459	0880035R	2n2	PF	10	50
C4460	0880031R	1n0	PF	10	50
C4462	0800084N	1000u	EL	-	31 5
C4463	0800084N	1000u	EL	-	31 5
C4464	0880035R	2n2	PF	10	50
C4465	0800044R	47u	EL	-	50
C4466	0800044R	47u	EL	-	50
C4467	0800044R	47u	EL	-	50
C4469	0800084N	1000u	EL	-	31 5
C4470	0800053R	100u	EL	-	50
C4471	0880057R	100n	PF	10	50
C4472	0880057R	100n	PF	10	50
C4473	0880048R	22n	PF	10	50
C4474	0880051R	33n	PF	10	50
C4475	0880051R	33n	PF	10	50

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Ref No.	Part No.	Description
IC001	T900644	TMP47C1637N
IC002	E730045	ST24C04
IC004	2009401R	PST529C
IC201	T900623	TDA8361-N4
IC402	2020002	TDA9860
IC501	T900598	TDA4662
IC601	2003951	TA8427K
IC901	2917782	CNX82A
IC950	T900345	5V REGULATOR
IC951	T900606	MC7808CT
IC952	T900345	5V REGULATOR
IC1401	2004651	TA8777N
IC2201	T900605	SAA5281
IC2202	T900615	P83C654FBP
IC2203	E730044	ST24C01
IC4051	T900602	TDA9800
IC4201	T900596	SAA7283ZP
IC4450	2020011	TDA7263
Q001	2326873R	DTC144EST
Q002	2326873R	DTC144EST
Q004	T631275	BC548B
Q011	2326873R	DTC144EST
Q012	T631275	BC548B
Q203A	2326873R	DTC144EST
Q302	T631286	BC548C
Q501	T631276	BC558B
Q502	T631275	BC548B
Q701	T633142	BF458
Q702	2315161	BU2508DF
*Q702	2315451	BU2508AF
Q703	T633138	BF423
Q704	T732013	TS0820
Q731	T631276	BC558B
*Q751	T631275	BC548B
*Q752	T631276	BC558B
*Q753	T631247	BC337
*Q754	2323432	2SC1983
*Q756	T631275	BC548B
Q801	T633137	BF459
Q802	T633137	BF459
Q803	T633137	BF459
Q811	T631286	BC548C
Q812	T631286	BC548C
Q813	T631286	BC548C
Q901	T631291	BC368
Q902	T631276	BC558B
Q903	2314791	BUT12AF
Q950	T636065	BD905F1
Q951	T631276	BC558B
Q952	T631265	BC546B
Q953	T631275	BC548B
Q954	T633133	BF422
Q955	T631276	BC558B
Q1310	T631276	BC558B
Q1320	T631275	BC548B
Q1321	T631275	BC548B
Q1399	T631275	BC548B
Q2201	T631275	BC548B
Q2203	T631265	BC546B
Q2205	2326873R	DTC144EST
Q4051	T631275	BC548B
Q4452	T631277	BC556B
Q4453	T631275	BC548B
Q4454	T632084	BD438
Q4455	T631275	BC548B
D001	T547041	TLSH2101 (Standby L E D)
D001	2348921M	IN4531
D002	T531055	BAT85
D003	2348921M	IN4531
D005	2348921M	IN4531
D013	T531055	BAT85
D014	T531055	BAT85
D015	T531055	BAT85
D022	2348921M	IN4531
D025	2348921M	IN4531
D026	2348921M	IN4531
D028	2348921M	IN4531
D029	2348921M	IN4531

Ref No.	Part No.	Description
D402-05	2348921M	IN4531
D406	T531055	BAT85
D501	2348921M	IN4531
D502-05	T431113	BYD33J
D506	2348921M	IN4531
D507	2343963M	MPG06J
D508	2343963M	MPG06J
D509	2343963M	MPG06J
D601	2345001M	IN4002GP
D602	T531053	IN4148
D701	T431113	BYD33J
D702	T431113	BYD33J
D703	2343941M	RGP10G
D704	2348921M	IN4531
D705	2348921M	IN4531
*D706	T431117F	BY228
*D707	T431116F	BYW96D
D711	2348921M	IN4531
D712	2343963M	MPG06J
D730	2348921M	IN4531
D731	2348921M	IN4531
*D751	2343962M	MPG06G
D809	T431113	BYD33J
D901-04	2342711M	EM2A
D905	2348921M	IN4531
D906	2348921M	IN4531
D907	2342711M	EM2A
D908	2342711M	EM2A
D909	2343963M	MPG06J
D910	2343963M	MPG06J
D911	2343963M	MPG06J
D950	2349983C	BYR29F-600
D951	2349991C	BYW29F-200
D952	2349991C	BYW29F-200
D953	2348921M	IN4531
D954	2348921M	IN4531
D956-61	2348921M	IN4531
D964	T531055	BAT85
D1301-04	2348921M	IN4531
D1401	2348921M	IN4531
D2201-08	2348921M	IN4531
VD4201	T532017	BB405B
D4450	T531055	BAT85
D4470	2348921M	IN4531
ZD002	T536174	BZX79C5V1
ZD005	T536179	BZX79C6V2
ZD101	T536173	BZX79C18V
ZD102	T536215	BZX79C33V
ZD201	T536177	BZX79C12V
ZD211	T536184	BZX79C9V1
ZD400	T536184	BZX79C9V1
ZD401	T536184	BZX79C9V1
ZD402	T536176	BZX79C10V
ZD403	T536179	BZX79C6V2
ZD404	T536176	BZX79C10V
ZD501	T536185	BZX79C5V6
ZD502	2339061M	HZS7CIL
ZD601	T536177	BZX79C12V
ZD602	T536177	BZX79C12V
ZD701	2339251M	HZS36-ILT
ZD702	T536183	BZX79C11V
ZD703	T536190	BZX79C2V7
ZD901	T536187	BZX79C4V7
ZD902	T536187	BZX79C4V7
ZD903	T536190	BZX79C2V7
ZD950	T536207	BZV10
ZD951	2344121M	P6KE130A
*ZD951	2344122M	PGKE180AG23
ZD952	T536231	BZX79B11V
ZD957	T536210	BZX79C16V
*ZD957	2342826M	BZX79C22
ZD958	T536235	BZX79B18V
ZD1401	T536173	BZX79C18V
ZD1402	T536184	BZX79C9V1
ZD1405	T536184	BZX79C9V1
ZD1406	T536184	BZX79C9V1
ZD2201	T536179	BZX79C6V2
ZD2204	T536179	BZX79C6V2

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Ref No.	Part No.	Description
ZD4051	T536177	BZX79C12V
ZD4201	T536179	BZX79C6V2
ZD4202	T536225	BZX79B6V2
ZD4203	T536179	BZX79C6V2
ZD4450	T536177	BZX79C12V
ZD4451	T536171	BZX79C36V
ZD4453	T536171	BZX79C36V
ZD4454	T536171	BZX79C36V
ZD4458	T536177	BZX79C12V
L001	2123781R	100uH FILTER COIL
L003	2123109M	33uH AXIAL COIL
L101	2123781R	100uH FILTER COIL
L102	2123781R	100uH FILTER COIL
L103	2122299M	1uH AXIAL COIL
L201	2122244M	22uH AXIAL COIL
L202	2145877U	AFC COIL
L203	2123103M	10uH AXIAL COIL
L401-04	2122943M	10uH AXIAL COIL
L422	2122956M	100uH AXIAL COIL
L451	2123781R	100uH FILTER COIL
L702	2161371C	LINEARITY COIL
L703	JBH00037C	56uH COIL (C2146TN only)
*L751	2220642	FILTER COIL
*L803	JBH00031C	18uH COIL
⚠ L901	2124531	LINE FILTER
⚠ L902	2122694	LINE FILTER
L903	2125593	470uH CHOKE COIL
L950	JBH00036R	47uH COIL
L1401	2122956M	100uH FILTER COIL
L1402	2122956M	100uH FILTER COIL
L1403	2122956M	100uH FILTER COIL
L2201	2123096M	3 3uH AXIAL COIL
L2202	L420130	10uH AXIAL COIL
L2204	2123103M	10uH AXIAL COIL
L4051	L410169	TUNING COIL
L4052	2122956M	100uH FILTER COIL
L4201	2123096M	3 3uH AXIAL COIL
L4202	L420130	10uH AXIAL COIL
⚠ T701	2435066	FLYBACK TRANSFORMER
⚠ *T701	2436795	FLYBACK TRANSFORMER
T702	2260291U	HORIZ DRIVE TRANSFORMER
⚠ T901	L380100	SWITCH MODE TRANSFORMER
⚠ *T901	L380099	SWITCH MODE TRANSFORMER
FILTERS and CRYSTALS etc.		
CP201	E518051	SAW FILTER
CP4051	E518052	SAW FILTER
MF4052	2142784	6MHz TRAP
SG801	2340037	SPARK GAP
X001	2163971	4MHz CRYSTAL
X501	E516048F	4 43MHz CRYSTAL
X2201	E516045F	27MHz CRYSTAL
X2202	2168941	10MHz CRYSTAL
X4201	E516050F	8 192MHz CRYSTAL
TH901	E441045	THERMISTOR
*TH901	E441044	THERMISTOR
U001	2574741	I R AMPLIFIER UNIT
U201	E710041	TUNER

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