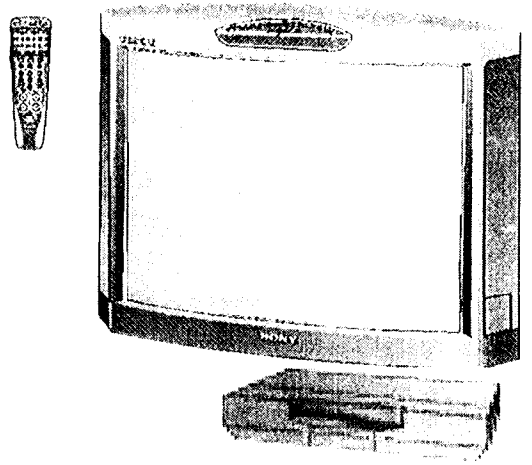
SONY ®

Training Manual

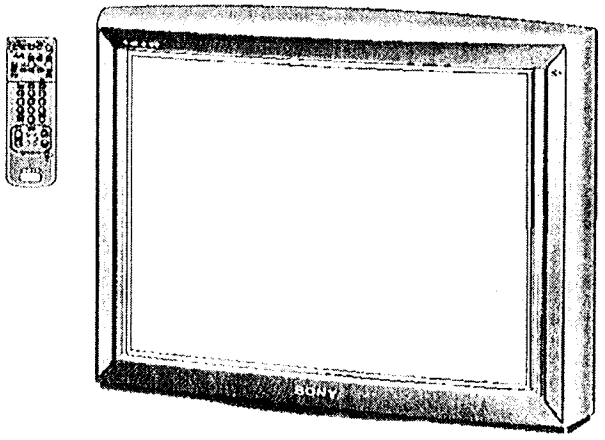
AA-1A Chassis

KV-27XBR45, KV-32XBR45,
KV-32XBR85



DA-1 Chassis

KV-32XBR100



Circuit Description and Troubleshooting

Course CTV-22

Table of Contents

AA-1A Chassis Overview

The AA-1A chassis is basically an AA-1 chassis with additional features and circuit/component changes that execute the new features. This chassis is used in the KV27XBR45, and KV32XBR45 models. The following are the main features and circuit/component changes in the new AA-1A chassis:

1. New Tuning-Micon IC101 on the M board -- CXP85332A-033S.
2. New Non Volatile Memory IC102 on the M board -- 24C04AI.
3. New CCD IC150 on the M board -- Z8622812PSC.
4. The 32" models use a Dark-tinted CRT.
5. Picture and Picture/Picture In Picture feature using new SDA9189X IC3206 and IC3209 on the PA board.
6. New Y/C/Sync signal processing IC301 on the M board -- CXA1477AS.

Tuning Micon IC. CXP85332A-033S.
This new IC, in addition to standard system control operations, provides the following features:

- Two program palettes. One is preprogramed and the other is user programmable, thereby allowing the user to customise the program palette.
- Set-up feature that can be activated and programmed with front panel buttons.
- OSD can be displayed in English, French and Spanish.
- Channel Guide.

Some of the specifications of this IC are noteworthy. For example, it contains an 8Bit CPU, 40K ROM, 576bytes RAM and OSD capability of 12x18 dot, 21 characters by 12 lines, and double scan jitter eliminating circuit.

4K Non Volatile Memory IC. 24C04AI.
The AA-1 chassis uses a 2K NVM IC. A 4K NVM is used in the AA-1A chassis because of the additional features it has. The AA-1A chassis features are determined by the content of five registers in the non-volatile memory labeled ID0, ID1, ID2, ID3 and ID4.

Closed Caption Display (CCD) and Extended Data Service (XDS). Z8622812PSC
This new IC, in addition to decoding CCD, decodes XDS. XDS, as CCD, is transmitted on line 21; it contains the networks' name and call letters, program name, program length, program type, time into the program, and program description.

Line 21 data is displayed in nine modes: CC1-CC4, TXT1-TXT4 and XDS.

Dark Tinted CRT. (32' models).
This new picture tube installed in 32" models, provides more contrast and a sharper picture.

Picture and Picture/Picture in Picture. SDA9189X.
Picture and Picture is the presentation of two full motion pictures side by side on the screen. On a 27" screen, each picture is 12" diagonally, while on a 32" screen each picture is 15" diagonally. The main picture sound is heard on the speakers, while the sub picture sound is heard on the head-phones. PIP size is selectable. The choices are 1/16, 1/9 and 1/4 size. In addition, up to nine preset TV channels can be viewed simultaneously before making a selection.

Y/C/Sync Signal Processing. CXA1477AS.
This new IC processes luminance, color sync, RGB interface, auto cut OFF and deflection compensation. In addition, it allows up to twenty three picture adjustments which results in a better picture. These adjustments are only accessible in the service mode.

In this section of the course we will accomplish the following:

- A review of the power supply.
- Discuss 'video processing', paying particular attention to PIP and P&P operations.
- Audio processing.
- Troubleshooting suggestions for the circuits presented.

Power Supply Block

The power supply of the AA-1A chassis can be divided into four main sections:

1. Standby 5V.
2. Main Power from which all other operational voltages are developed.
3. Degaussing circuit.
4. Protection circuit.

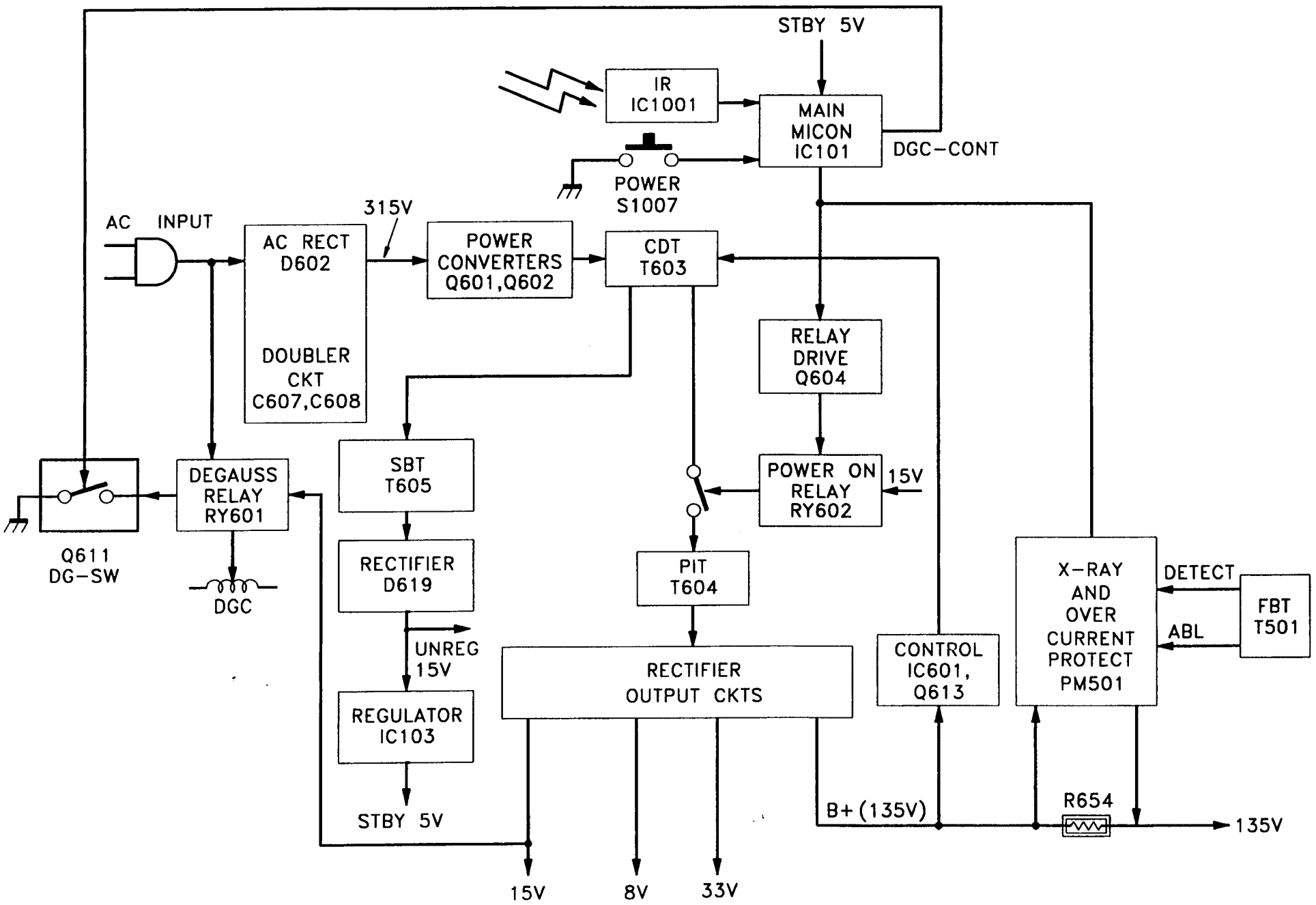
Standby 5V is developed when AC is applied to the unit. The switching action of the Power Converter Transistors Q601 and Q602, together with Constant Drive Transformer T603, generate a 55kHz drive signal. This signal is coupled to Standby Transformer T605 and D619. Here 15V is developed and applied to regulator IC602 that outputs the Standby 5V. Standby voltage is used to power the Tuning Micon IC101, Memory IC102, IR Sensor IC1001 and Antenna Switch Q415 -- Q418.

Main Power. When the unit is turned ON, the Main Micon closes Relay RY602 via Relay Drive Q604. Drive pulses from CDT T603 are coupled to Power Input Transformer T604 which in turn generates the pulses necessary for producing the 135V, 8V, 15V, and 33V supplies. Most of the other voltages used in the set are produced from these voltages.

Voltage Regulation. This is accomplished by monitoring the 135V line with IC601. Voltage fluctuations on the 135V line are fed back to CDT T603 to vary the frequency of the Converter Block. This regulates the voltages developed off the Power Input Transformer T604.

Degaussing Circuit. This circuit consists of the Degaussing relay RY601, the Degaussing coil, Thermistor (THP601) not shown, and Degaussing switch Q611. At turn ON the Main Micon IC101 closes Q611 and activates the degaussing coil for about four seconds. The detailed operation of this circuit will be discussed later.

Protection Circuit. Over current and over voltage protection are provided by Protect Module PM501. This circuit monitors the 135V line for excessive voltage and current increases. It also monitors high voltage and ABL fluctuation via feedback pulses from the flyback transformer T501. Should PM501 sense abnormal changes on any of these lines it switches Power Relay RY602 OFF, via Relay Drive Q604, causing the set to shut down.



POWER SUPPLY BLOCK

Standby Power

The Standby Power circuit is activated when AC is applied to the set. D602, C607 and C608 produce 315VDC from the applied AC. As the voltage from D602 begins to increase, the oscillator consisting primarily of Q601, Q602, Constant Drive Transformer T603, C609 , C611, C612 and C610 begins to oscillate The frequency stabilizes at 55kHz in the Standby mode. As it oscillates, pulsating current in the primary winding of CDT T603/pins 3 and 4, are coupled to the primary winding of SBT T605/pins 5 and 3. The pulses induced into the secondary windings of T605 as a result of the pulsating current in the primary winding, are rectified by D619 to produce the Standby 14.5V. This voltage is sent to the following circuits:

- Soft Start Circuit IC610.
- Power Relay RY602 via D636.
- 5V Reg/Standby IC103. (M Board)

5V Reg/Standby IC103 drops the 14.5V to Standby 5V. Standby 5V is used to power the Main Micon IC101, and Memory IC102 on the M board. It also powers the IR Sensor on the HB board and the Antenna Switch Q415--Q418 on the U board. IC602 also provides initial reset for Main Micon IC101.

Troubleshooting.

The set will be dead if the Standby circuit is defective. The following steps should help isolate the problem quickly.

1. Check for 315Vdc at the collector of Q601 (measured from Hot Ground). If missing, check F601, and R607.
2. If OK, check for unregulated 14.5V at D619 Cathode, and for 5V at Reg/Reset IC103 pin 5 on the M board. If either is missing, troubleshoot the respective circuits.
3. If F601 is open, suspect D602. If R607 is also open, suspect shorted Q601 and Q602. Also check diodes D603 and D605.

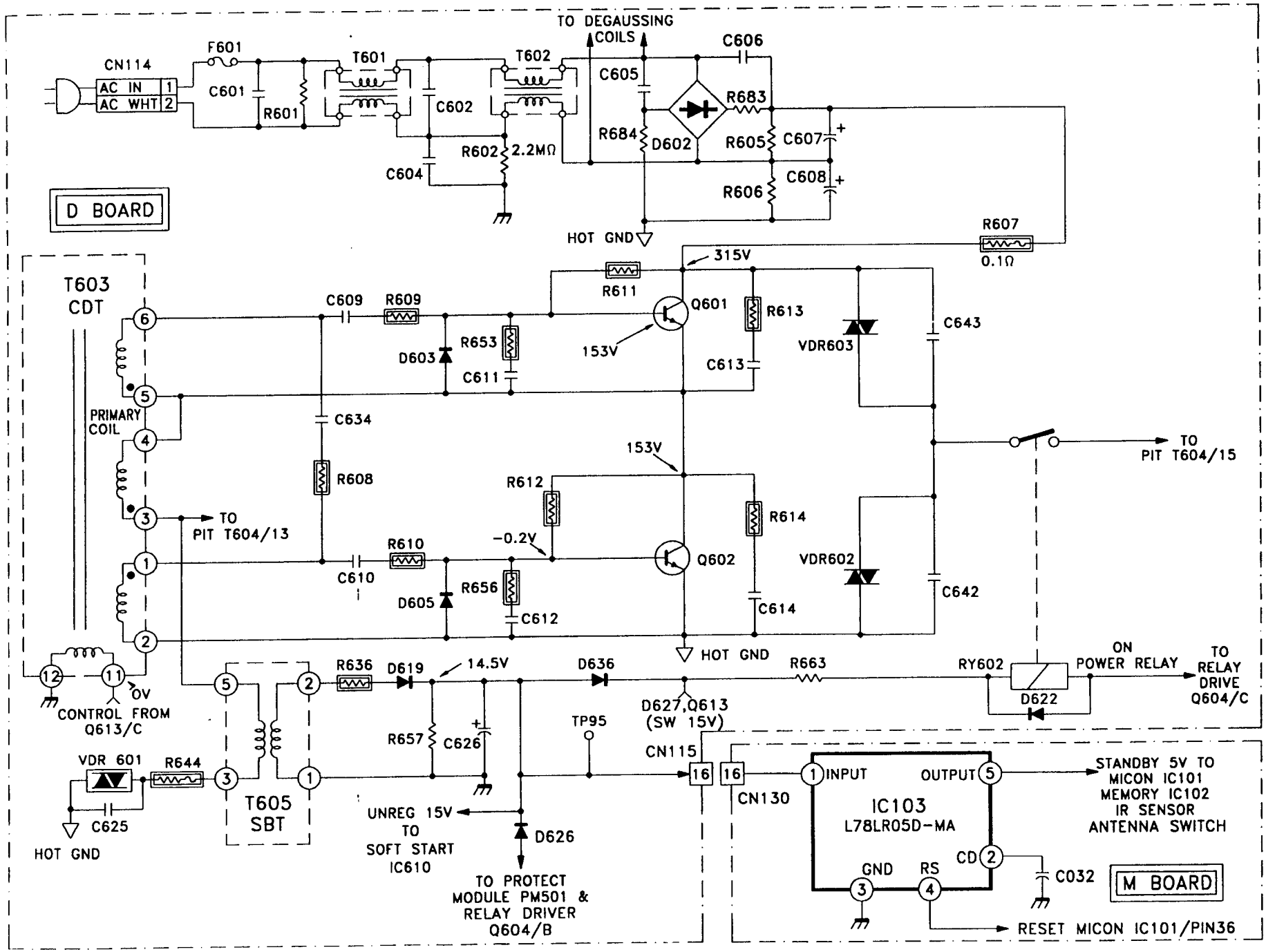
Make the necessary repairs and proceed to do the following:

- Connect the set to an isolation transformer and variac. **Variac OFF!**
- Connect an oscilloscope to Q601/Emitter.
- Set the variac input voltage to 0Vac. Now turn the variac ON and slowly increase the input AC voltage while observing the variac's current meter for any abnormal indications. Compare the current meter and scope readings to that of the following table.

If a current overload condition is detected, suspect T603 or T605.

AC Input	Switching Frequency	Volts P-P	Current
20V	69kHz	60	<0.1A
40V	63kHz	120	<0.1A
60V	58.6kHz	175	<0.1A
65V	58kHZ	175	<0.1A
85V	61kHz	240	1.7A

Between an input of 65Vac and 85Vac, the power relay chatters and the set switches ON/OFF. Above 85Vac the set stays ON.



STANDBY POWER

Power On

The main power supply uses the same switching circuits described in the Standby Power Supply section. The main power supply consists of the Constant Drive Transformer (CDT) T603, Power Converter Transistors Q601 and Q602, and Power Input Transformer (PIT) T604.

Operation

To turn power ON, the Micon IC101, responds to a LOW from the Power ON switch S1007, or SIRCS data from the Sircs Sensor IC1001 pin 1. IC101 pin 4 outputs a HIGH (5Vdc) through R009, CN131, R632, D628, R639 to produce 0.7Vdc at the base of relay drive Q604. Q604 turns ON causing current to flow from the Standby 15V source to energize Relay RY602 and close its contacts.

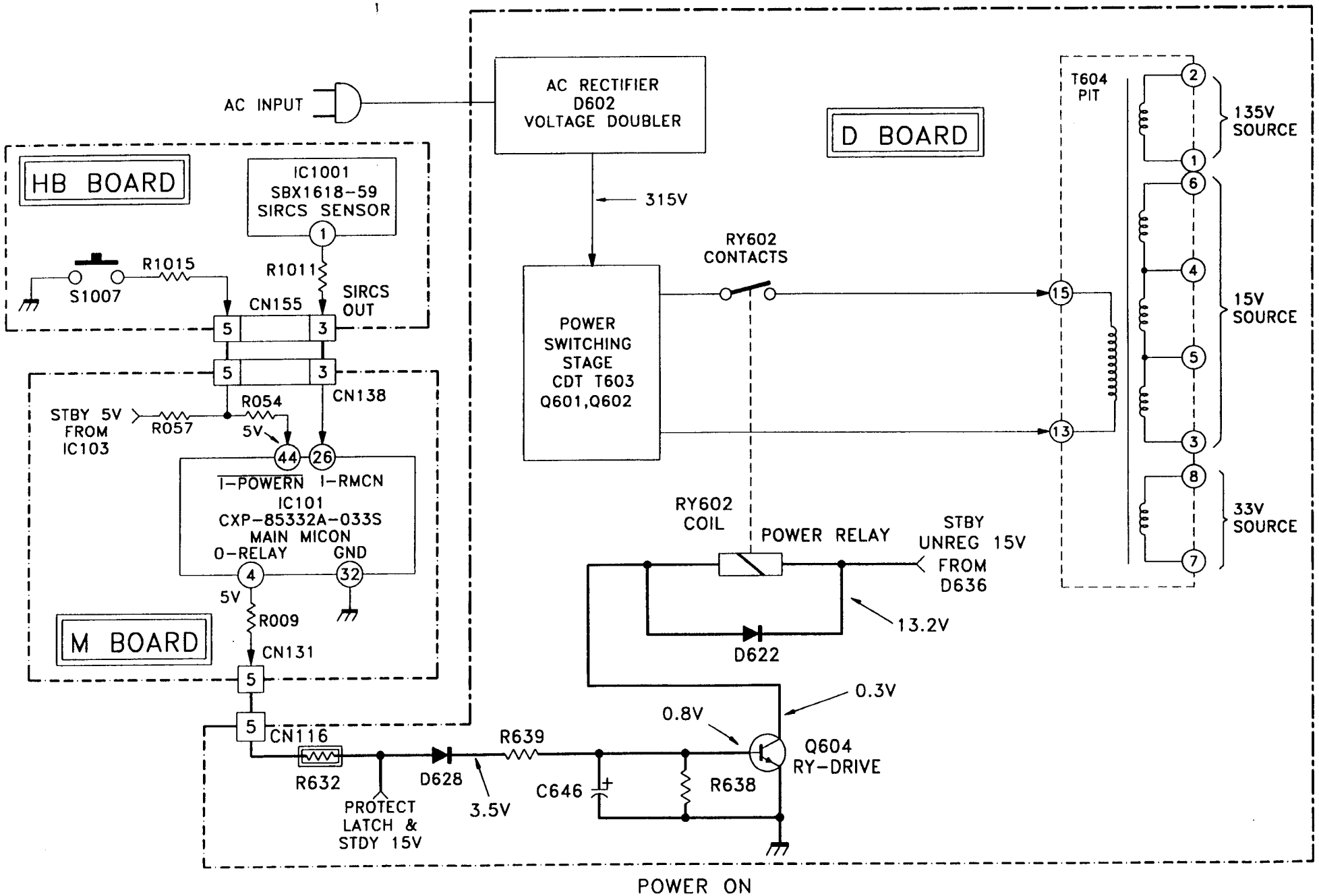
When the relay contacts close, current flows from the power switching stage comprised of CDT T603, and Power Converter Transistors Q601 and Q602, to the Power Input Transformer T604/pins 13 and 15. Current flow in the PIT primary windings induces current flow into its secondary, where the 135V, 15V and 33V are developed.

Troubleshooting

The unit will not turn ON if there is a problem in this circuit. First verify that the Standby voltages are present. If they are present, perform the following checks.

1. Monitor Q604/B for 0.7V when the Power button is pushed. **If the 0.7V is absent**, check CN116/pin5 for 5V. If missing, check Micon IC101. If present, troubleshoot D628, Q604 and their support components.
2. **If the 0.7V is present** at Q604/B, check for an open junction in Q604. Verify that unregulated 15 V is reaching RY602, and check the coil for continuity.
3. If the rasping sound of the high voltage is heard for and instant after the power button is pushed, then fades away as the set shuts down, troubleshoot the protect circuits as outlined in that section.

Note that if Power Relay RY602 cannot be switched OFF for any reason, **high voltage will always be present.** The set will operate normally when it is turned ON. However, when it is turned OFF video will be removed and the screen will remain black.


AC INPUT
AC RECTIFIER
D602
VOLTAGE DOUBLER
D BOARD
HB BOARD
IC1001
SBX1618-59
SIRCS SENSOR
315V
T604
PIT
135V
SOURCE
15V
SOURCE
33V
SOURCE
RY602
CONTACTS
R1015
S1007
R1011
SIRCS
OUT
CN155
POWER
SWITCHING
STAGE
CDT T603
Q601,Q602
CN138
R054
STBY 5V
FROM
IC103
R057
5V
I-POWERN
I-RMCN
IC101
CXP-85332A-033S
MAIN MICON
O-RELAY
GND
RY602
COIL
POWER RELAY
STBY
UNREG 15V
FROM
D636
13.2V
D622
M BOARD
R009
CN131
0.3V
0.8V
CN116
R639
Q604
RY-DRIVE
R632
D628
C646
R638
PROTECT
LATCH &
STDY 15V
3.5V

POWER ON

Degaussing

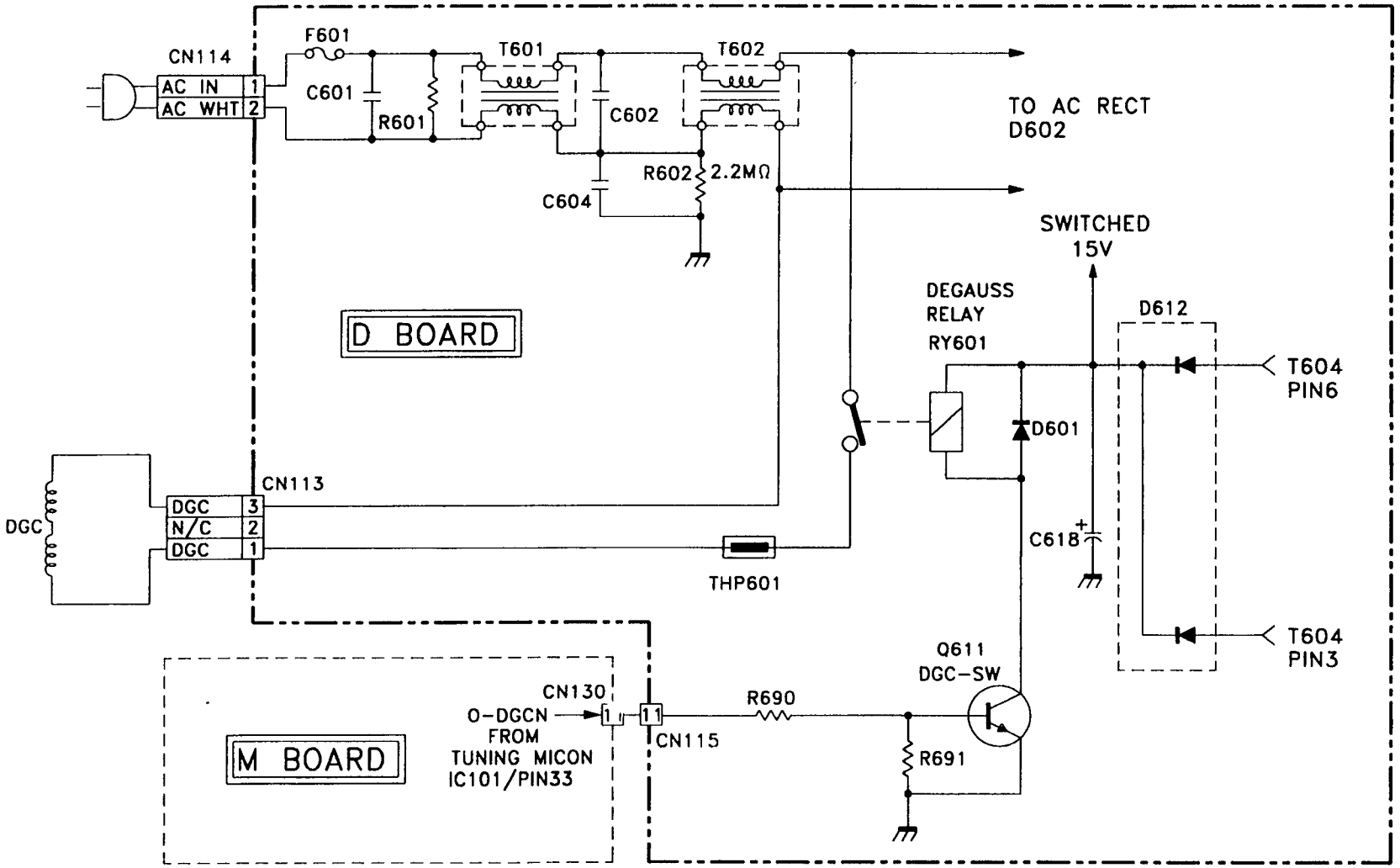
The Degaussing Coils are connected to the input AC line via Relay RY601 and Thermistor THP601. When the set is turned ON, Tuning Micon IC101/pin 33 on the M board, is held HIGH for four seconds. This HIGH turns Q611 ON and completes the ground return path for Degauss Relay RY601. The 15V on the other side of RY601 is developed off D612 and T604 only when the unit is turned ON.

With the relay now closed AC flows through the degausssing coils and thermister THP601. After four seconds Micon IC101 switches Q611 OFF and degaussing is disabled.

The thermistor is used to gradually reduce current flow in the degaussing coils. Within one second after current is applied, the resistance of the thermister begins to increase. This gradual resistance increase, gradually decreases the current through the coils as the CRT is demagnetized. After the four seconds turn OFF time of the relay, the thermister is at its maximum resistance and degaussing is completed.

Troubleshooting

If the degaussing circuit is open, or RY601 is not activated, the CRT will function properly and the picture may be fine for quite a long time before color problems begin to show. It is rare that the coil opens. This problem is usually caused by a defective thermistor, relay or Q611. However, if the circuit is ON continually, a multicolored pattern will remain on the screen. A shorted DGC-SW Q611 is the prime suspect for such a problem.


CN114
AC IN 1
AC WHT 2
F601
C601
R601
T601
T602
C602
C604
R602 2.2MΩ
TO AC RECT
D602
SWITCHED
15V
DEGAUSS
RELAY
RY601
D612
T604
PIN6
D601
C618
T604
PIN3
D BOARD
CN113
DGC
DGC 3
N/C 2
DGC 1
THP601
Q611
DGC-SW
CN130
O-DGCN
FROM
TUNING MICON
IC101/PIN33
M BOARD
CN115
R690
R691

DEGAUSSING

Regulation and Soft Start Circuits

Regulation

The power supply regulation circuit compensates for fluctuations in the input AC voltage, and fluctuations on the 135V supply. Regulation is accomplished by varying the effeciency of the Control Drive Transformer and the Power Input Transformer in the following manner:

- 14.4V are produced at IC601/pin 4 from the 135V line input at pin 1. This voltage will vary inversely with respect to the 135V line. As it varies, it controls the conduction of Q613 which is in the current path of the control winding of CDT T603/pins 11 and 12. Therefore the current in the control winding varies in step with fluctuations on the 135V supply.

- A rise in the 135V line will cause the voltage at IC601/pin 4 to decrease. This will increase the current through T603 control winding and decrease the transformer's inductance. As a result, the oscillator's frequency increases. The Power Converter Oscillator Q601 and Q602, drives PIT T604 via the winding between pins 13 and 15. The increased frequency of the oscillator will decrease the efficiency of PIT T604, causing all voltages developed off T604 secondary windings to lower.
- A reduction of the 135V because of increased load has the opposite effect.

The frequency of the Converter Oscillator with a white screen is 70kHz. With a black screen it is 78kHz.

Soft Start

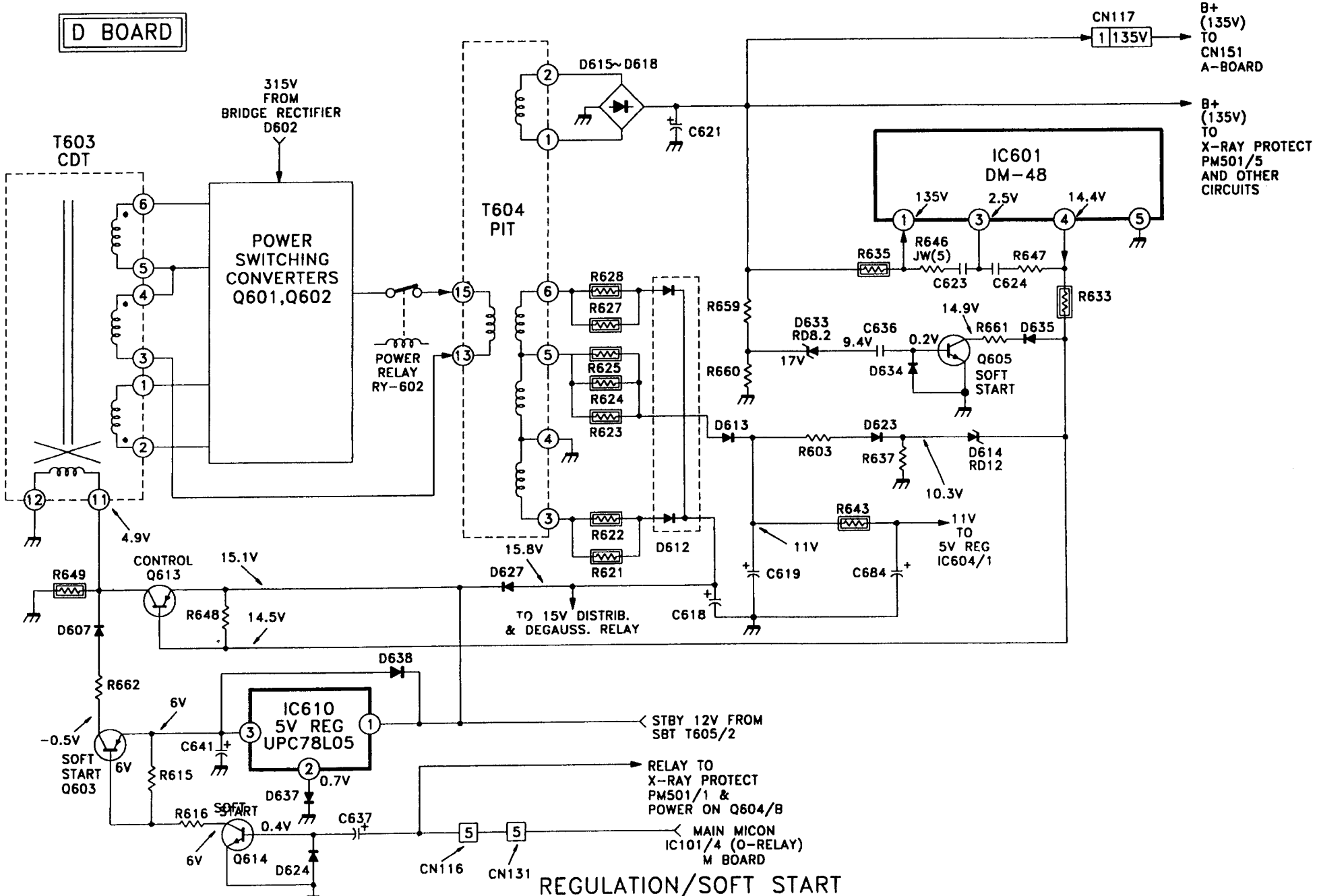
The soft start circuits reduce the initial current surge, through the power switching converter transistors, as the filter capacitors in the PIT's secondary charge up at power ON. They also prevent false triggering by the protection circuits when power is turned ON.

Q603, Q605, Q613, Q614, IC610 C636 and C637 comprise the main components of the soft start circuits. When power is turned ON, the Micon ICIOI pin 4, outputs 5V (O- RELAY) to C637 at the base of the Soft Start Transistor Q614. Q614 turns ON for the period determined by the time constant of C637 and the Q614 base to emitter junction resistance. Q614 turns Q603 ON and allows current to flow from chassis ground through CDT T603/pins 12 and 11, to 5V Regulator IC610/pin 3.

The current flow through T603 control winding decreases its inductunce. Therefore the oscillator frequency rises and the startup secondary voltages will be reduced considerably during this time. As C637 continues to charge, Q614 and Q603 conduct less and less until shut-OFF. This causes less current to flow through the CDT control winding and decreases the oscillator's frequency. This causes the PIT T604 to increase the voltages developed from its secondaries.

In addition to the above soft start operation, soft start is also executed by Q605 and accompanying components. Q605 is used to hold down IC601/pin 4 output which controls the conduction of Q613, until all supply voltages are up to operational levels.

As the 135V begins to rise at turn ON, it turns ON D633 which charges C636. As C636 charges, it turns Q605 ON and mutes the regulation control line via D635. During this time the voltages developed off PIT T604 are increasing to their normal levels. As C636 charges, Q605 shuts OFF and the control line rises to about 14.4V to maintain the supply voltages off T604 at their normal operational levels.



REGULATION/SOFT START

Troubleshooting

The power supply and power regulation circuits, function in a closed loop manner to maintain regulation. As a result, troubleshooting power supply shutdown problems or regulation problems can be difficult. The steps outlined below will allow you to perform basic power supply checks, and confirm hold-down voltage operation by temporarily defeating the regulation control loop:

1. Open the voltage regulation control loop by unsoldering T603/pin 11 from the circuit. Solder the cathode end of a 1A rectifier diode to T603/pin 11.
2. Connect the other end of the diode to a variable DC power supply source. Then set the external power supply voltage to 5.2V. **Note:** This voltage must be set to 5.2Vdc to allow the set to turn ON and prevent shutdown at power ON.
3. Plug the set into a variac and isolation transformer combination, and set the AC input line voltage to 79Vac.
4. Turn the set ON. If the switching power supply is working the TV should power up.
5. Set the external power supply voltage to 5.6V. Slowly raise the AC line voltage to 117Vac while observing the voltage at CN117/pin 1 (measured from chassis ground). **DO NOT ALLOW THIS VOLTAGE TO GO ABOVE 135V.**
6. Slowly raise the external input DC supply voltage while observing the voltage at CN117 pin 1. The voltage should now decrease.

7. Slowly lower the external input DC supply voltage while observing the voltage at CN117/pin 1. The voltage should now increase.

X-Ray Protection Quick Check: Lower the external supply voltage and observe the voltage at CN117/pin 1. It should rise to approximately 137V when the raster disappears. Remember, this is an approximate check and is not intended to replace the procedure outlined in the service manual.

With the regulation control loop opened, you will be able to perform voltage checks in the regulation stage while preventing the set from going into shutdown.

B+ (135V) output voltage when T603/pin 11 is fixed at 5.6V	
Input AC Voltage	**B+ (135V Line)**
80Vac	82Vdc
90Vac	92Vdc
100Vac	106Vdc
110Vac	120Vdc
120Vac	134Vdc

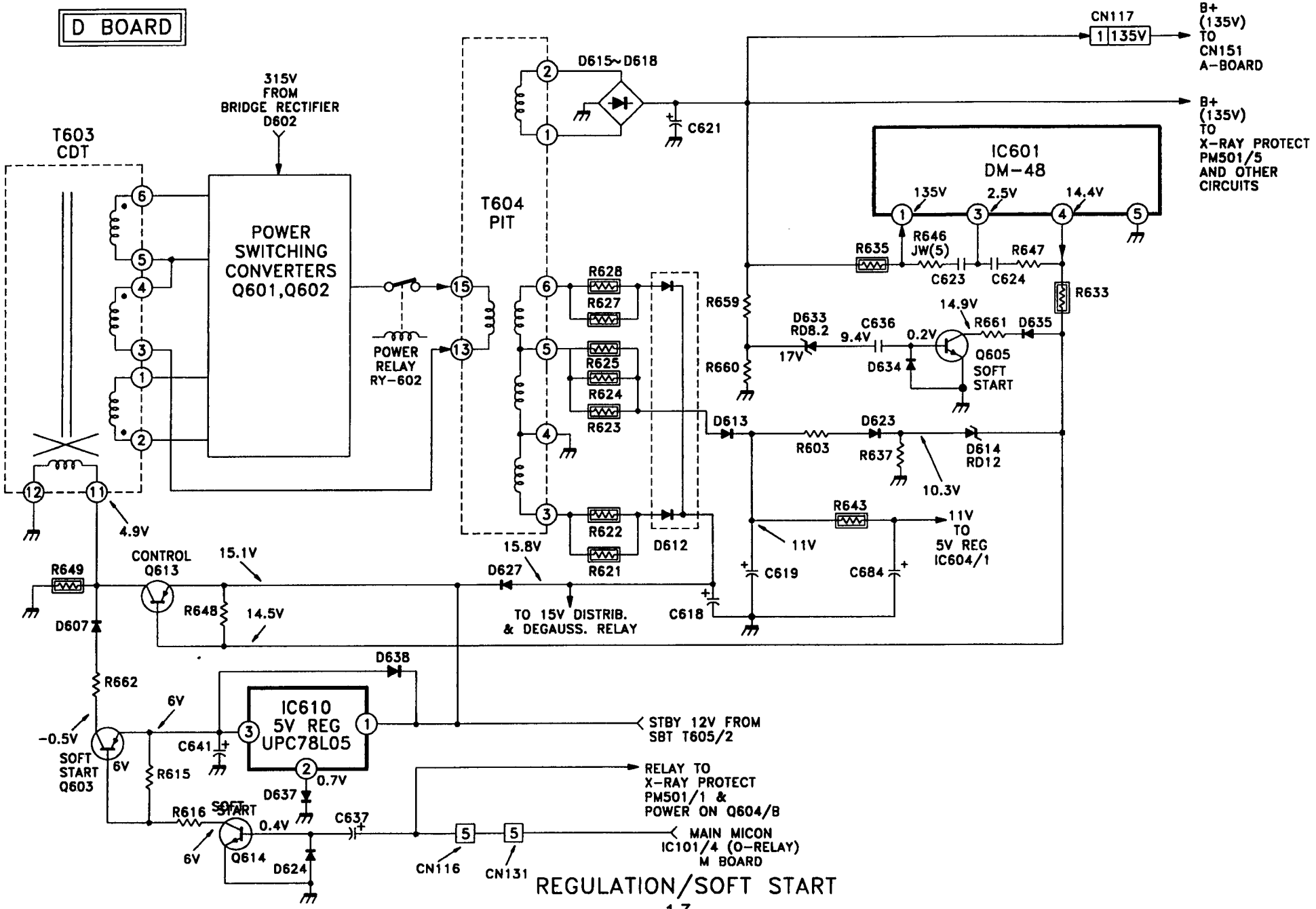
Please note that if the output voltage rises to 135V when 40Vac is applied, suspect an open winding between pins 11 and 12 of T603.

Another effective method to check the power supply is as follows:

1. Plug the set into a variac and isolation transformer combination. AC set to 0V.
2. Connect 15Vdc to 5V Regulator IC610/pin 1. (D Board). The Power Relay RY602 should engage.
3. Slowly increase the AC supply and monitor the 135V supply off the cathode of D618. Also connect a scope to H. Out Transistor Q591/C, (Time base 10usec/100Vper div) and monitor the signal there. The following should be observed as AC is slowly increased:

AC	DC at D618/Cathode
10	14.3
15	17.8
20	21
25	66.6
30	66.6
35	80

The signals on the collector of Q591 should appear very noisy (harmonics) until the AC input reaches 35V. At 35Vac the normal H. Out signal appears at 600Vp-p and the raster flashes ON/OFF. If the harmonics remain at this point, suspect a short in the horizontal output circuit. The set should begin to operate nomally as the AC supply is increased.


D BOARD
315V
FROM
BRIDGE RECTIFIER
D602
T603
CDT
POWER
SWITCHING
CONVERTERS
Q601,Q602
POWER
RELAY
RY-602
T604
PIT
D615~D618
C621
CN117
1 135V
B+
(135V)
TO
CN151
A-BOARD
B+
(135V)
TO
X-RAY PROTECT
PM501/5
AND OTHER
CIRCUITS
IC601
DM-48
135V
2.5V
14.4V
R635
R646
JW(5)
R647
C623
C624
R633
R659
R660
14.9V
D633
RD8.2
17V
C636
9.4V
0.2V
R661
D635
D634
Q605
SOFT
START
R628
R627
R625
R624
R623
R622
R621
D612
D613
R603
D623
R637
D614
RD12
10.3V
R643
11V
TO
5V REG
IC604/1
C619
C684
C618
4.9V
15.8V
D627
TO 15V DISTRIB.
& DEGAUSS. RELAY
CONTROL
Q613
15.1V
R649
R648
14.5V
D607
D638
R662
6V
-0.5V
SOFT
START
Q603
6V
IC610
5V REG
UPC78L05
STBY 12V FROM
SBT T605/2
C641
R615
0.7V
D637
R616
SOFT START
0.4V
C637
6V
Q614
D624
RELAY TO
X-RAY PROTECT
PM501/1 &
POWER ON Q604/8
MAIN MICON
IC101/4 (O-RELAY)
M BOARD
CN116
CN131
REGULATION/SOFT START
13

Protect Circuit

The x-ray and over current protect circuit provide protection from X-radiation emissions, from abnormal high voltage current, and from power supply current overloads. To do so, PM501 monitors

- The high voltage sample from FBT T501/pin6. (122V)
- The picture tube anode current (ABL).
- The 135V power supply line current.

If for any reason these circuits exceed a predetermined level, PM501 shuts OFF the set.

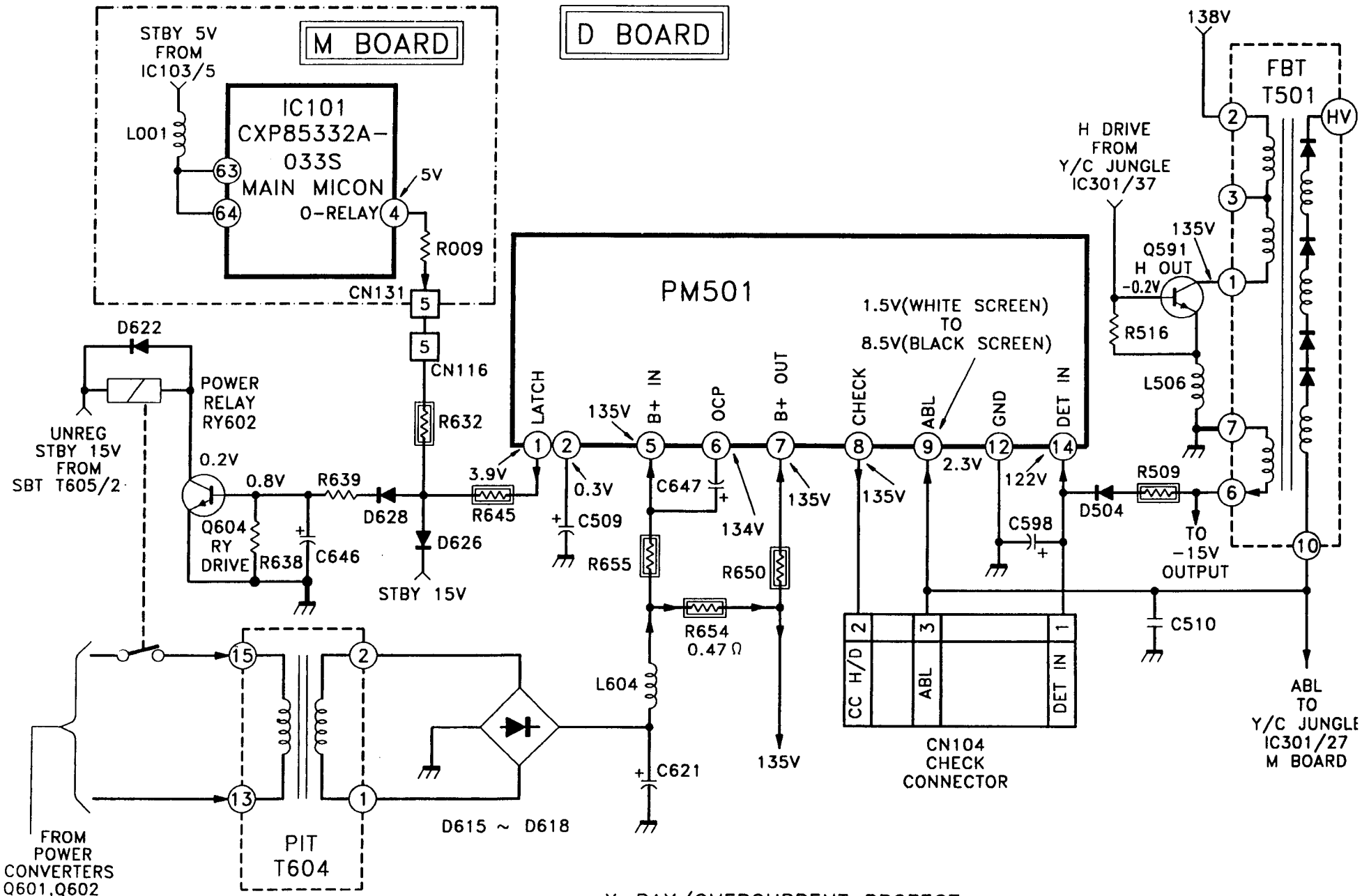
Operation

PM501 is the shutdown protect circuit. B+ to the PM501 protect module is applied from the rectified 135Vdc line to pin-5 to bias this stage. To sense high voltage, a scan derived voltage from the flyback T501/pin 6 and D504 is applied to PM501/pin 14. (This voltage is normally 120V - 122V). The voltage from T501/pin 10 is coupled to internal comparators, which set the high voltage threshold level to trigger shutdown. In the event that conditions in the flyback transformer cause an excessive high voltage increase, the scan derive voltage will also increase and cause PM501/pin 1 will go LOW (0Vdc). With pin 1 LOW the following occurs:

- The relay drive output from Micon IC101/pin 4, is shunted to ground through R632, R645 and the internal PM501/pin 1 latch circuits.
- This causes the voltage at the junction of R645, R632 and D628 to fall to 1.1V. As a result, Relay Drive Q604 base voltage goes to 0.3V and it shuts OFF. Relay RY602 opens, and all power, except standby power, is disabled.
- Because the Standby 5V continues to supply power to Micon IC101, the Relay Drive voltage sources the internal latch circuits of PM501. Power shutdown is held until the set is turned OFF, or AC is removed and reapplied.

The picture tube anode current, (ABL), output from the flyback transformer T501/pin 10, is monitored at PM501/pin 9. Normally, as the anode current through the flyback increases (high picture brightness), the voltage output from T501/pin 10 becomes more negative. The voltage from T501/pin 10 is coupled to internal comparators that set the ABL threshold level to trigger shutdown. In the event that the ABL voltage falls below 1.5V as a result of excess beam current, PM501/pin 1 will go LOW (0Vdc), and shut down is executed as described earlier.

The 135Vdc line current is sensed through resistor R654, R655 and R650 connected to PM501/pins 5 and 7. A current overload in the 135Vdc supply line will increase the current flow through R654. This will generate a voltage drop across PM501/pins 5 and 7. The voltage drop is coupled to internal comparators, which set the over current threshold level to trigger shutdown. As a result, PM501/pin 1 will go LOW (0Vdc), and shut down is executed as described before.



X-RAY/OVERCURRENT PROTECT

Troubleshooting

WARNING! The set's chassis ground is isolated from the AC line. However, the power supply's input stage is at high AC potentials. You must use an isolation transformer prior to doing any type of troubleshooting. This will prevent injury to yourself, and damage to the set. Before replacing any parts, you must remove power and use the normal shielding measures to protect the electrostatically sensitive components.

Identifying a shut down condition.
A shut down condition is identified when the power button is pushed and the rasping sound of the high voltage is heard for an instant before it fades away.

As mentioned earlier, shutdown can be triggered from defects in either of three circuits:
1. High-Voltage.
2. ABL.
3. Over current on the 135V line.

The task is to identify which circuit triggered shutdown. The following procedure should help identify the defective circuit:

1. Check the resistance between H. Out Transistor Q591/Collector and ground. This should be over 35Meg Ohms when the meter's probe is first applied, and begin to reduce slowly as the capacitors on the 135V line discharge. A substantially lower reading indicates a defect in the H. Out Transistor circuit. Leaky or shorted components here will increase the current on the 135V supply. Check the following components: H. Out Q591, Damper Diodes D506 D507 and D508, C515, C517, C518, C519, C520, C521 and C528. If these check OK proceed to the next step.

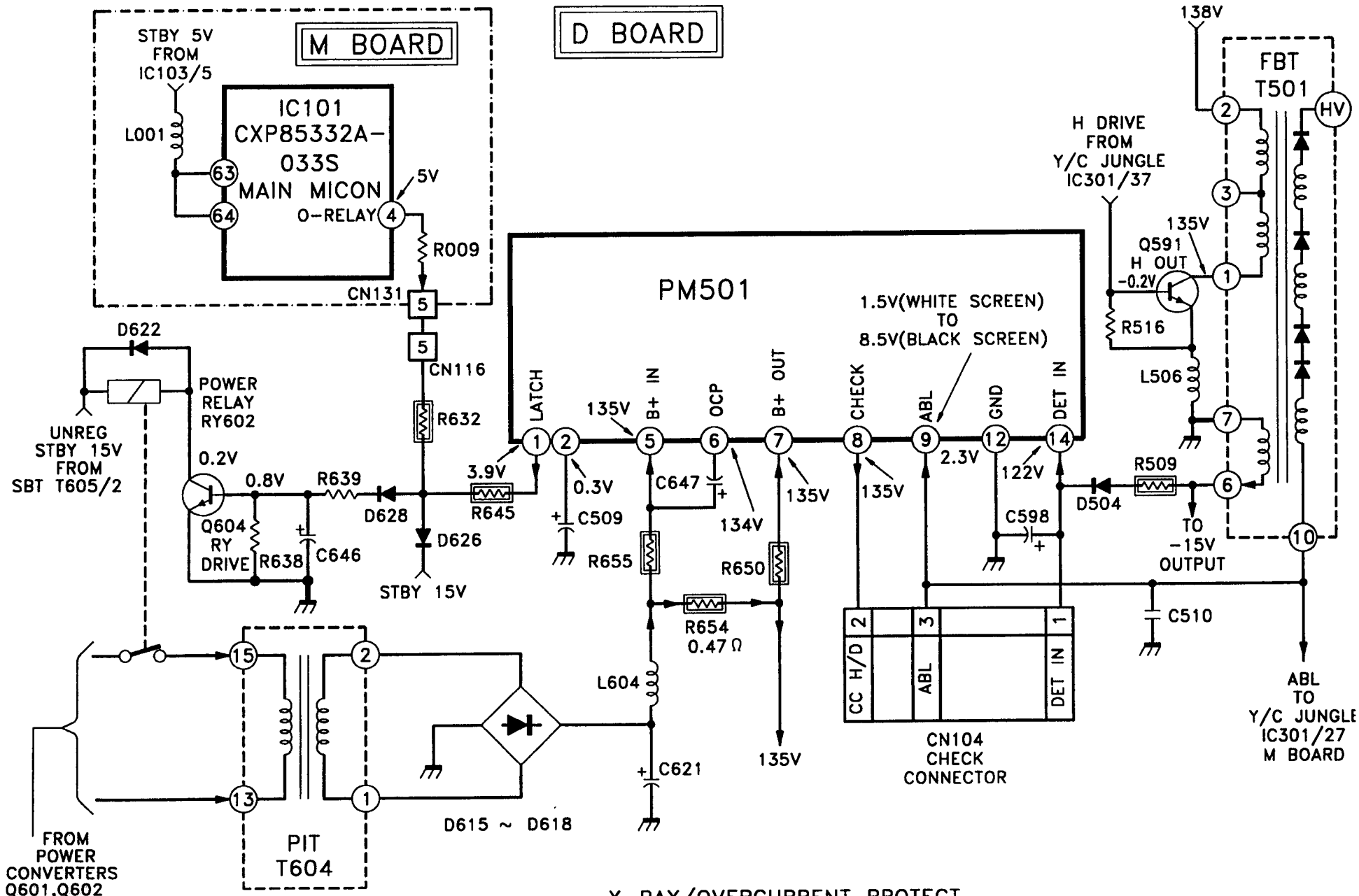
2. Open the voltage regulation control loop by unsoldering T603/pin 11 from the circuit. Solder the cathode end of a 1Amp rectifier diode to T603/pin 11. Connect the other end of the diode to a variable DC power supply source. Then set the external power supply voltage to 5.2V.

3. Plug the set into a variac and isolation transformer combination, and set the AC input line voltage to 79Vac.

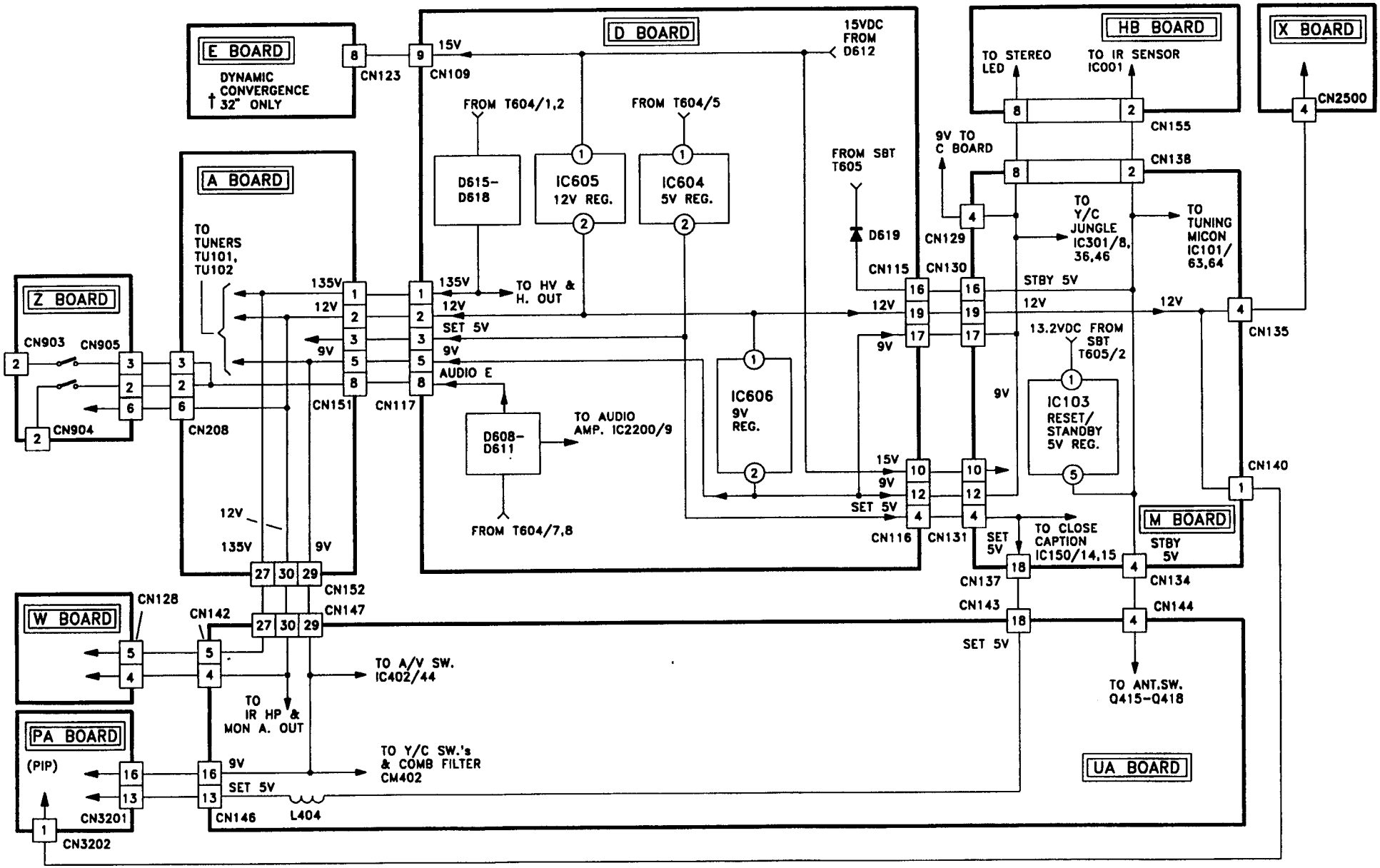
4. Place the scope's probe on H. Out Q591/Collector and turn the set ON. The TV should power up. Increase the external supply to 5.5V. Observe the waveform on Q591/Collector. It should be the standard horizontal output signal, distorted with harmonics. As the AC voltage is slowly increased the harmonics should dissappear. If this does not occur, there is a problem in the flyback/high voltage block. (Shorted windings or diodes).

5. If the waveforms remain normal as the AC is increased, suspect a problem in the ABL circuit. Check as follows:
- Set the AC input at a level that does not trigger shutdown.
- Measure the voltage at FBT T501/pin 10. This voltage should not fall lower than 1.5V with a bright screen and should not rise to more than 8.5V with a black screen.

6. Switch the set OFF and disconnect the C Board from the CRT. Turn the set back ON with 117Vac applied. If the set remains ON, suspect a defective CRT or C Board circuit.



X-RAY/OVERCURRENT PROTECT



POWER DISTRIBUTION

Main Video Process Block

There are two video processing signal paths in the AA1-A chassis.

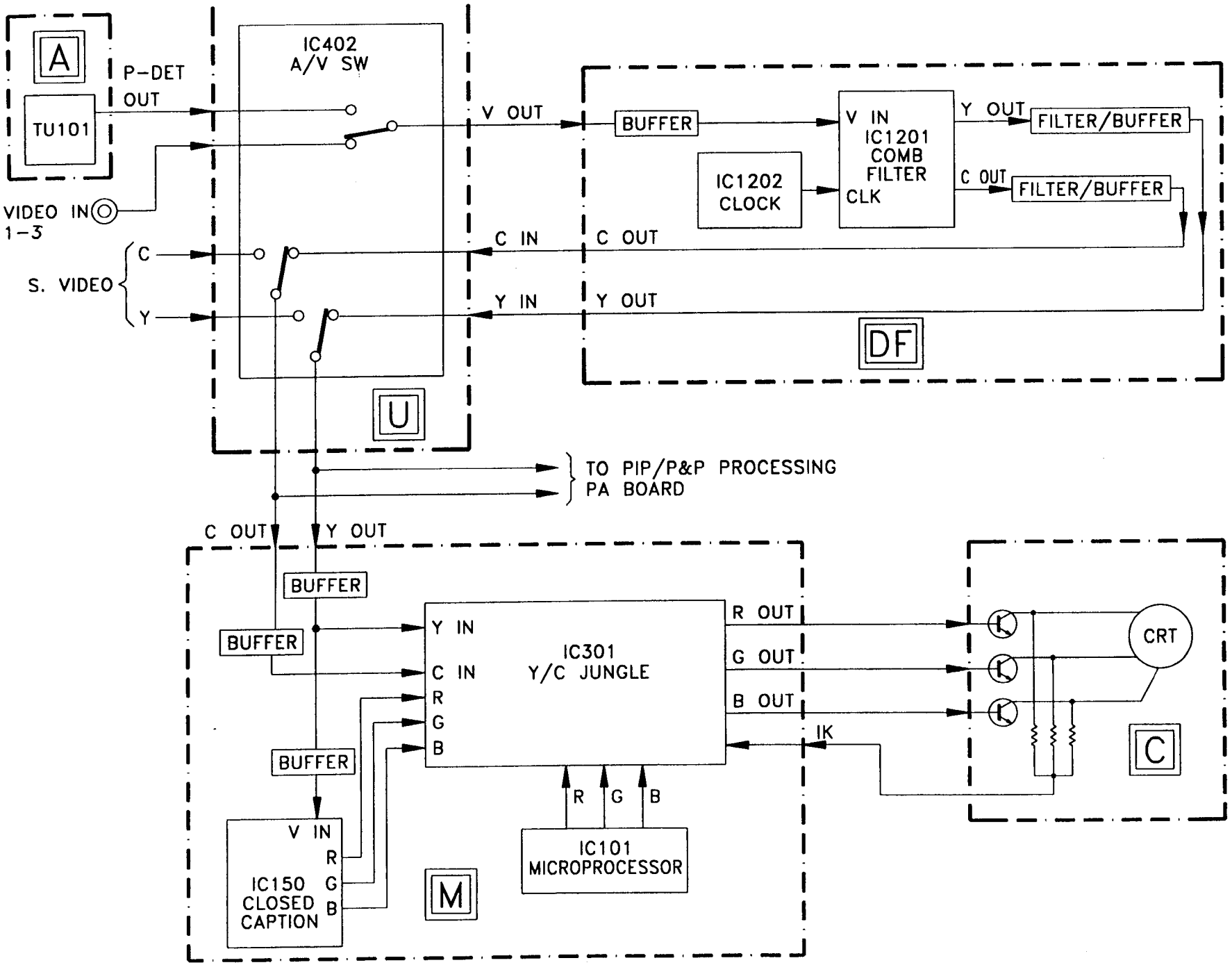
1. The Main Video, or Parent Video processing path.
2. The Sub Video, or Child Video processing path.

The main picture can originate from the Main tuner, any of the three Composite Video inputs and the S.Video input. A/V Switch IC402 on the UA board, selects the input and sends it on to the next processing stage. Composite video signals from the tuner, and video-in lines are routed to the comb filter on the DF board. S.Video signals are sent directly to the Y/C Jungle IC301on the M board.

On the DF board, composite video is separated into its Y and C components, that are filtered and buffered, then returned to the Switcher UA board. Here they are switched to the Y/C Jungle IC301. Y is also sent to the Closed Caption IC150 which extracts the Closed Caption (CC) and Extended Data Service (XDS) data from line 21 of field 2.

In the Y/C Jungle IC, closed-caption display from IC150, and on-screen display from Micon IC101 are added to the video signal. The video signal leaves the Y/C Jungle IC as RGB, and is sent to the C board to drive the CRT. The IK line feeds back a signal to the Y/C Jungle, indicating the CRT cathode current.

The sub video processing path, after it leaves A/V Switch IC402, is through the PIP and P&P processing circuits. This will be covered in the PIP and P&P processing section.



MAIN VIDEO PROCESS BLOCK

Main Video Processing - 1 (Switching)

A/V Switch IC402 on the UA board receives and switches all video and audio input to the set to their appropriate outputs. Composite video from the main tuner (P.Det. Out) is buffered by Q401 and is coupled to IC402/pin 47. Composite video from Video-In 1--3 are at pins 1, 7 and 13 respectively. Finally, S.Video is input at pins 3 (Y) and 5 (C). All input video signals are routed to V. Out at pin 40, and coupled to the Monitor Out terminal. The signals are also sent to the comb filter circuit on the DF board.

On the DF board, the composite video Y and C components are separated and returned to IC402/pins 35 and 37 on the UA board. IC402 switches the signals to C. Out and Y. Out at pins 45 and 43 respectively.

When an S.Video signal is present at Video-In 1, IC402 switches the Y and C components at pins 5 and 3 directly to C. Out at pin 45, and Y. Out at pin 43. However, within IC402 both signals are combined to form a composite video signal that exits at pin 40, and is routed through the comb filter circuits on the DF board. This signal is returned to IC401/pins 35 and 37, but is not used.

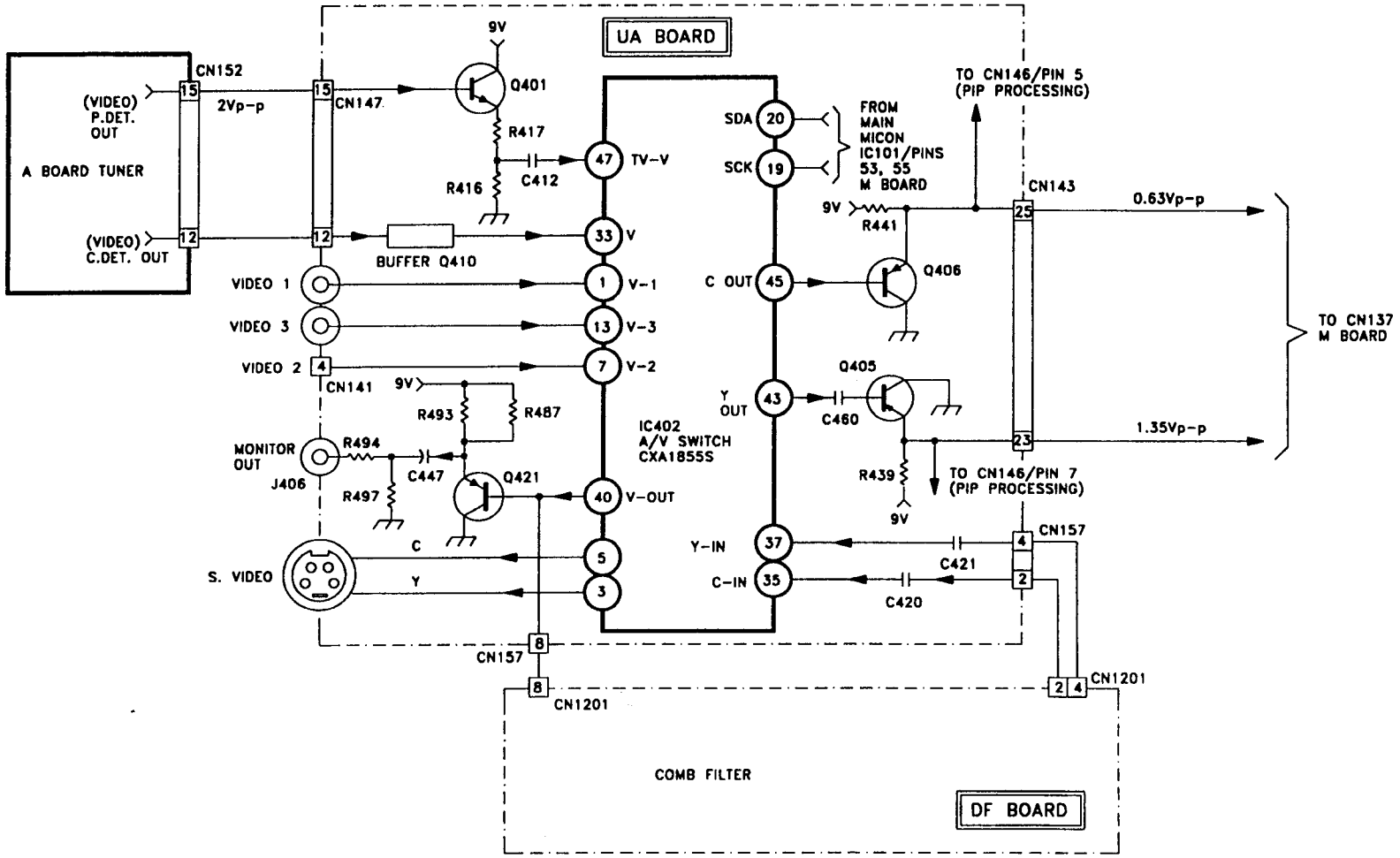
Color and luminance signals at pins 45 and 43 are sent on to the Y/C Jungle IC301 on the M board via CN143/pin 25 and 23, and to the PIP/P&P processing circuits on the PA board.

Troubleshooting

If the comb filter is suspected as being the cause of a "no video" problem, a very quick "Go/No go" test is to input an S video signal at the video-1 terminal. If the video returns, then the Switcher and other video processing circuits are probably OK. Suspect a defective Comb Filter.

If the signal does not return, signal trace and troubleshoot the video processing circuits.

Ensure that A/V Switch IC402 is operating properly by connecting a monitor to the Monitor Out terminal and checking for a video signal each time one of the video-in lines is selected.



'MAIN VIDEO' PROCESSING-1

Main Video Processing - 2

This is the final stage of processing before the video is sent to the Video Amps on the C board that drive the CRT. Color and luminance signals from the UA board are buffered by Q307 and Q308 respectively, and are applied to Y/C Jungle IC301/pin 3 and 1. Luminance is also sent to Closed Caption IC150/pin 11 via Q151, and to H and V Sync Seperators in the Y/C Jungle/pins 42 and 43 via Sync Buffer Q315. H Sync and Y Sync are necessary for the timing of the Y/C Jungle IC301.

Micon IC101 and Memory IC102 together generate and store all the preset 'On Screen Display' and customized 'On Screen Display'. On Screen data is transferred from Micon IC101/pin 47--49 (RGB) to the Y/C Jungle IC301/pins 19--21. The necessary blanking for each letter is sent from Micon IC101/pin 51 to the Y/C Jungle IC301/pin 10.

When Menu is selected, the On Screen Display menu is presented on a dark background. Also, when a selection is made from the menu, some of the On Screen data are highlighted with a darker background. This background is generated by a series of blanking pulses at pin 52 of Micon IC101.

Micon IC101/pin 16 generates the pulses that blank the screen when the blocked channel feature is activated.

Closed Caption IC150 receives Y from Buffer Q308 via Buffer Q151 at pin 11. The closed caption and XDS data on line 21 are demodulated and converted to RGB signals that are sent on to Y/C Jungle IC301/pins 16, 17 and 18. The blanking pulses that create the areas on which the closed caption data and XDS data are displayed, are generated from pin 3 (Box), and sent to Y/C Jungle IC301/pin 10.

Within the Y/C Jungle IC, Closed Caption Display, XDS data and all On Screen Display are combined with the RGB signals. This occurs only after the Y/C Jungle IC receives instruction data from Micon IC101 on the I^2C Bus at pin 48 to do so. The clock signal accompanying this data is at pin 47. RGB video signals exit at pins 22--24.

After these signals are buffered by Q316--Q318, they are sent to the C board to drive the CRT.

Troubleshooting

Problems that may be associated with this circuit are:

1. No video. Video OK at Monitor Out terminal.
2. Video OK but a problem with On Screen Display, Closed Caption Display or XDS Display.

Troubleshooting this section relies heavily on voltage, signal tracing and waveform checks.

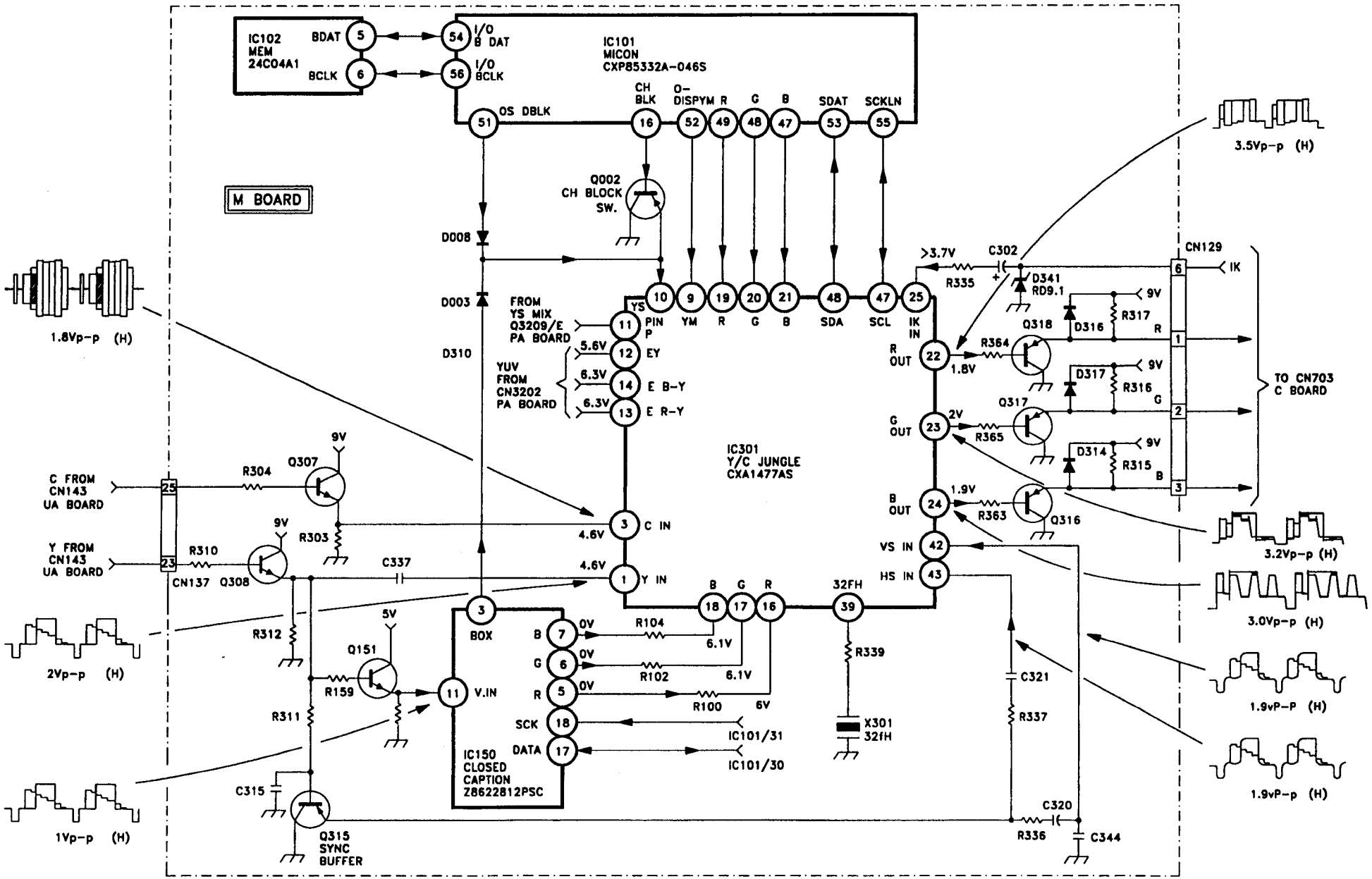
No Video. Verify that C and Y signals are at IC301/pins 3 and 1. If missing, troubleshoot the UA board and the Comb Filter on the DF board. If present,

- Verify Vcc at pin 36, 46, 8.
- Check for 0V at pin 11(PINP). If this pin measures a positive voltage, the screen is blanked.
- Troubleshoot Automatic Cathode Bias circuit. (Following section).

Video OK, but no 'On Screen' Display.

- If only the closed caption or XDS Display is missing, suspect a defective IC150.
- Check YS In, (IC301/pin 10).

It is hardly likely that Micon IC101 is defective, because it is performing all other functions.



MAIN VIDEO PROCESSING-2

CRT Drive and IK Detect (AKB)

The CRT Drive and IK Detect circuit (AKB) are shown in the diagram below. The Green and Blue Drive and IK Detect circuits, are represented in blocks because they operate exactly as the Red Drive and IK Detect circuits shown. The purpose of the IK Detect circuits is to provide Automatic Cathode Bias (AKB) to the CRT. This is accomplished in the following manner:

IK Reference pulses are 63.5us pulses generated by an IK Reference timing generator within Y/C Jungle IC301. They are output on lines 25, 26 and 27 after the vertical blanking interval, at pins 22 (R), 23 (G), and 24 (B) respectively, together with the RGB signals. They measure approximately 1Vp-p.

R signals from the RGB input to the C board CN703/pin 1, are coupled to Video Amp Q712/Base. R-Out transistor Q711, a common base amplifier, has its emitter connected to the collector of Q712, therefore the amplified Red signals with the IK pulse, appear at its collector to drive the CRT red cathode. The video signal is now 120Vp-p, and the IK pulse 30Vp-p. This signal is attenuated to 4.5Vp-p (IK at 0.75Vp-p) at the collector of Q771. R770 is common to the three IK Detect circuits, therefore the Red, Green and Blue signals and their IK pulses are dropped across this resistor.

The combined Red,Green and Blue video signals with their IK pulses are fed back via Q770 to Y/C JungleIC301/pin 25 on the M Board. As a result, 5Vdc or more are developed across C302 at pin 25 as the picture brightness varies. The three feed back IK Reference pulses are also detected since each one occurs at a specific time after the vertical blanking interval. If there is no signal input to the set, the voltage at Y/C Jungle IC301/pin 25 is 3.7V. This voltage results from only the feed back IK Detect Reference pulses across C302, and is considered the reference voltage level. The screen is blanked at this voltage level. In order to produce a picture, the IK voltage at pin 25 must be above 3.7V.

As the average Red, Green and Blue brightness levels for each field vary, Y/C Jungle IC301 will identify which cathode bias should be adjusted (based on the level of the feedback pulses at pin 25), and change the IK reference pulse's level for the specific cathode. In so doing the cathode bias is automatically adjusted.

Troubleshooting

Problems in the IK Detect circuits usually show up as **NO RASTER, SOUND OK.**

First verify the operation of the video section, and the Y/C Jungle IC301 in the following manner:

- Check CN703/pins 1, 2 and 3. Each pin should have a 1Vp-p IK pulse on it. Troubleshoot the cathode drive circuits of the one that measure more than 1Vp-p.
- If all the IK pulses measure above 2.5Vp-p, check for an open filament circuit.
- If no pulses are found at these pins, suspect a defective Y/C Jungle IC301.
- The operation of the video section and the Y/C Jungle IC301 can also be verified by connecting an external 5Vdc source to Y/C Jungle IC301/pin25. This should produce a picture if the video circuits are operational. If it does not, check CN703/pins 1, 2 and 3 (C board) for 2Vp-p video signals.
- If a relatively normal picture appears on the screen when the external 5V is applied, remove the 5V supply. One of the following should occur:

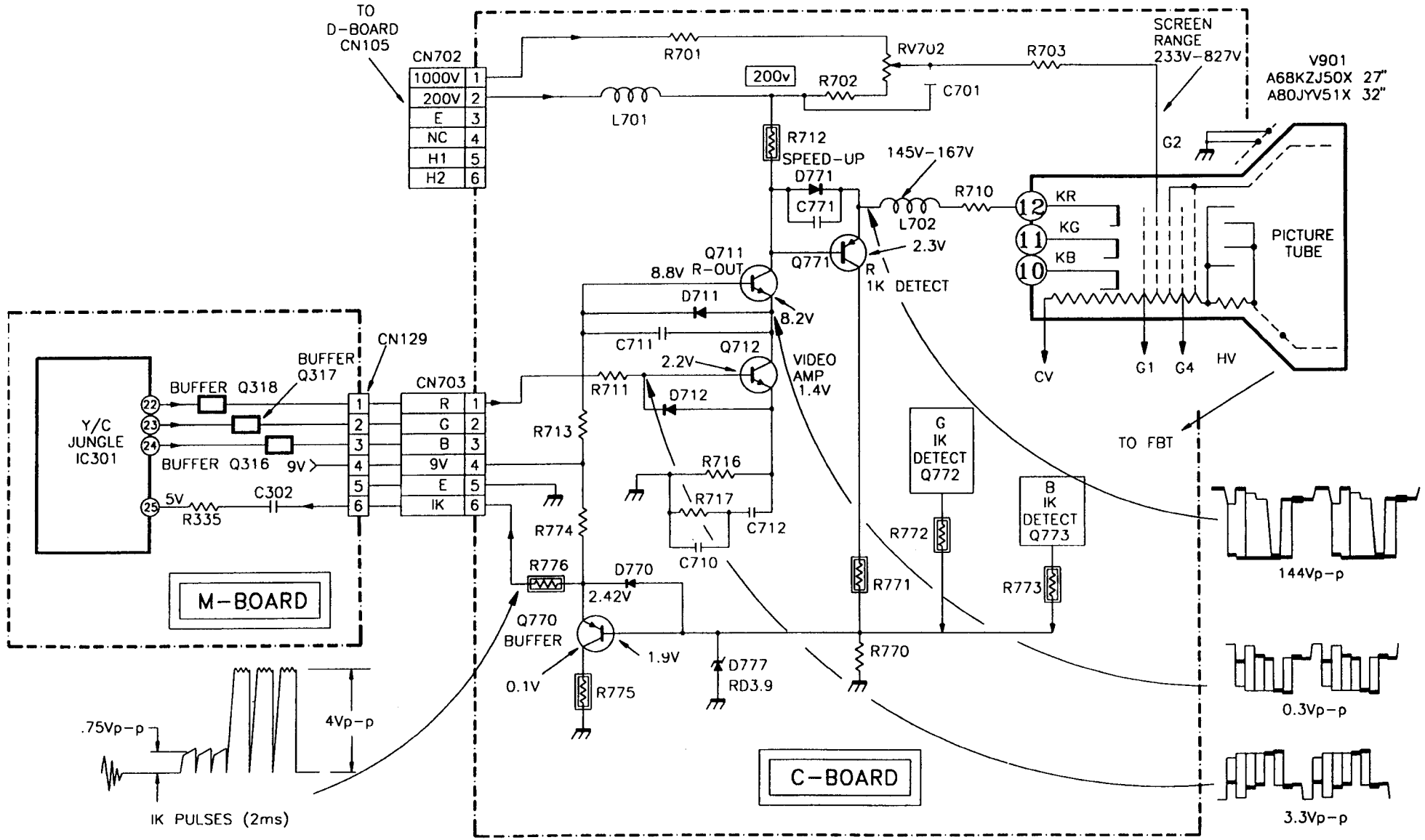
1. The screen would go blank again, or
2. The picture would remain, but the white balance would make a drastic change with one color being dominant.

In the first case, troubleshoot the components between IC301/pin 25 and R770 on the C board. Feedback IK pulses and RGB signals are not reaching IC301/pin 25.

In the second case, troubleshoot the IK Detect circuit of the dominant color. A check of the video signal of the dominant color at CN703/pins 1-3, will reveal that it's IK Reference pulse has risen to 3Vp-p. Normally it is 0.9Vp-p.

Some other possibilities for a 'No raster' problem are:

- No datacommunication between the Y/C Jungle IC301 and Micon IC101.



AUTOMATIC CATHODE BIAS