

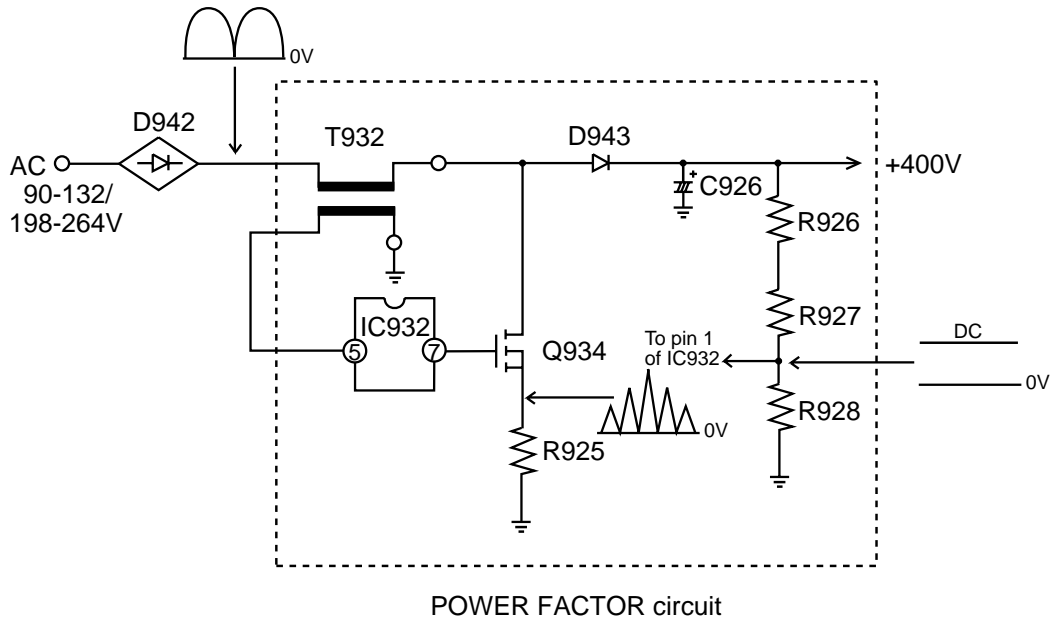
4. CIRCUIT DESCRIPTION

4-1. POWER FACTOR circuit

- The full-wave rectified voltage waveform from D942 and smoothed voltage waveform from C926 are multiplied and compared to , the voltage waveform from current detect resistor R925 of Q934. Q934 is turned off when , exceeds • , and is turned on when , is 0V. The above repetition is to change input current to substantially sinusoidal waveform and it corrects harmonic distortion. The switching frequency is not constant as Q934 is turned on or off by monitoring input voltage and load current. Therefore, this circuit is not synchronized with the MAIN POWER circuit.

Switching frequency is minimum when input voltage is low and load current is maximum, in other words, the switching frequency is maximum when input voltage is high and load current is minimum. (Switching frequency is approx. 20-250kHz)

This circuit is operated by the voltage supplied to IC932 from the SUB POWER circuit so that it is not activated at power management state.

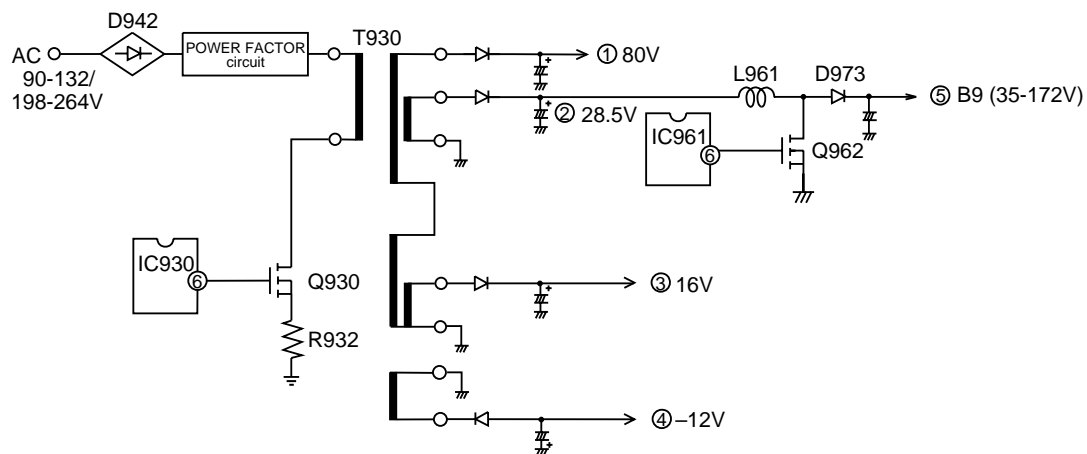


4-2. MAIN POWER circuit

400V is supplied to this circuit from the POWER FACTOR circuit. This circuit is fly-back type circuit which includes IC930 controls PWM (Pulse Width Modulation) CONTROL circuit. The T930 secondary provides the following DC voltages:

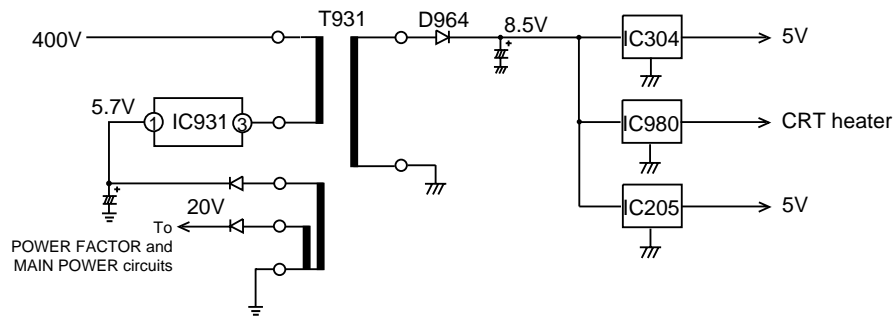
- 80V line: Supplied to the DBF (Dynamic Beam Focus), HIGH VOLTAGE OUTPUT CONTROL, and the CUT-OFF CONTROL circuits and the VIDEO OUTPUT IC as power source.
- , 28.5V line: Supplied to the HORIZONTAL DEFLECTION OUTPUT (Variable B voltage control) and the HORIZONTAL DRIVE circuits as power source.
- f 16V line: Supplied to the VERTICAL OUTPUT, HORIZONTAL/VERTICAL DEFLECTION CONTROL, HIGH VOLTAGE OUTPUT CONTROL, VIDEO SIGNAL PROCESSING and CRT CORRECTION circuits as power source.
- „ -12V line: Supplied to the VERTICAL DEFLECTION OUTPUT and the CRT CORRECTION circuits as power source.
- ... B9 voltage: The 28.5V line is pressured up to B9 voltage by the PWM CONTROL circuit which includes (35-172V) IC961 and Q962. The voltage from the D973 cathode is supplied to the HORIZONTAL DEFLECTION OUTPUT and the HIGH VOLTAGE OUTPUT circuits as power source.

This circuit is controlled by the voltage supplied from the SUB POWER circuit and it is not activated at power management state. Therefore, no secondary provides the DC voltages.



4-3. SUB POWER circuit

IC931 included in this circuit consists of the POWER MOS-FET and the CONTROL circuits and modulates the pulse width. The current fed back from pin 9 of T931 is input to the control terminal of IC931. The T931 primary provides the DC voltage (approx. 20V) to the POWER FACTOR and the MAIN POWER circuits as power source. The T931 secondary provides the DC voltage (approx. 8.5V). Divided 8.5V line is regulated to 5V by IC304 and supplied to the MAIN MICROPROCESSOR (IC301), IC350, VIDEO SIGNAL SWITCHING (IC101), DDC (IC102) and TEMPERATURE SENSOR, regulated to 6.3V by IC980 and supplied to the CRT heater voltage, also regulated to 5V by IC205 and supplied to the VIDEO AMPLIFIER (IC201), OSD CONTROL (IC203) and D/A CONVERTER (IC211) as power source. The voltage at pin 1 of IC931 is 5.7V generally. This circuit is not synchronized with MAIN POWER circuit as the oscillation frequency is fixed to approx. 100kHz.



4-4. PROTECTION circuit

To prevent damage to the monitor, X-ray radiation etc., the POWER FACTOR and the MAIN POWER circuits stop in the following cases:

- +16V line: The voltage exceeds 23V.
- +8.5V line: The voltage exceeds 15V.
- +400V line: The voltage exceeds 460V.
- Variable B voltage line: The voltage exceeds 200V.
- X-ray protection circuit: The voltage exceeds 30kV.
- Arc limit circuit: The beam current exceeds 2.9mA.

4-5. DISPLAY POWER MANAGEMENT circuits

(1) Stand-by / Suspend state:

When receiving no video signal and no horizontal or vertical sync signal for 6 seconds, pin 29 of IC301 turns to 0V from 5V. PC930 is turned on to stop power supply to the POWER FACTOR and the MAIN POWER circuits. The power consumption is 10W or less.

(2) Active-off state:

When receiving no video signal and no horizontal and vertical sync signals for 6 seconds, pin 29 of IC301 turns to 0V from 5V. Also, pin 26 of IC301 turns to 0V from 5V so that Q980 is turned on. The output from IC980 stops and the heater voltage is turned off. The power consumption is 5W or less.

4-6. DEGAUSS circuit

As K930 is turned on when the power on, the degauss current flows through degauss coil and PR930 to degauss the CRT. After approx. 6 seconds from power on, K930 is turned off automatically. As for manual degauss by the adjustment item of Degauss, the degauss is performed in the same way.

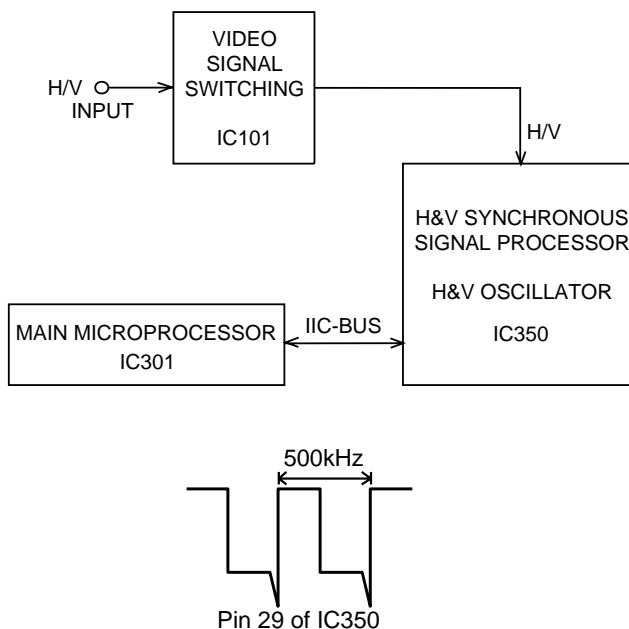
4-7. SIGNAL PROCESSING circuit

Input signal from D-SUB or BNC connector is converted to the waveform by IC101. The input signal is applied to pin 17 of IC101 from the MAIN MICROPROCESSOR (IC301) and then switched to D-SUB when pin 17 of IC101 is "HIGH" level (5V), or to BNC when pin 17 of IC101 is "LOW" level (0V). When only one of the two signal inputs is connected to the signal source, the one connected is automatically selected. When both of the signal inputs are connected to the signal source, the latest one connected just before power off is selected. The adjustment item of Signal Select also selects D-SUB or BNC. The selected input signal is converted to the waveform by IC101. The sync signal is input to IC350 and the video signal is input to IC201.

4-8. SYNC SIGNAL PROCESSING circuit

The input sync signal to IC350 is processed inside IC350 as follows:

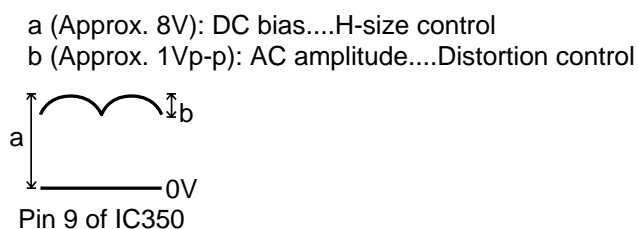
- Detect the input sync signal presence
 - , Discriminate the input sync signal type: Separate / Composite / Sync On Green
 - f* Discriminate the sync polarity: Positive / Negative
 - „ Count the frequency
- 500kHz clock signal supplied to pin 29 of IC350 counts the frequency. The frequency is sent to the MAIN MICROPROCESSOR (IC301) to store • - „ in the E²PROM as a read data.



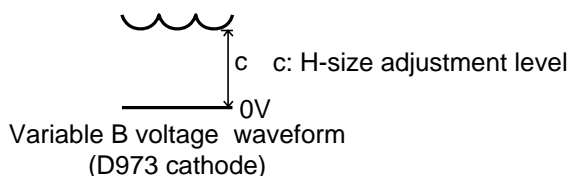
4-9. CONTROL SYSTEM circuits

4-9-1. H-SIZE and DISTORTION CORRECTION CONTROL

The parabolic wave output from pin 9 of IC350 is adjusted and converted to the waveform by IC503 and then input to pin 2 of IC961.

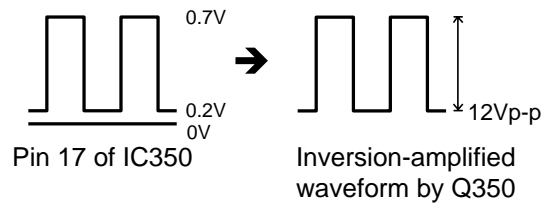


The parabolic wave input to pin 2 of IC961 is added to the PWM waveform from pin 6 of IC961. The V-parabolic wave modulates the variable B voltage to perform distortion correction.



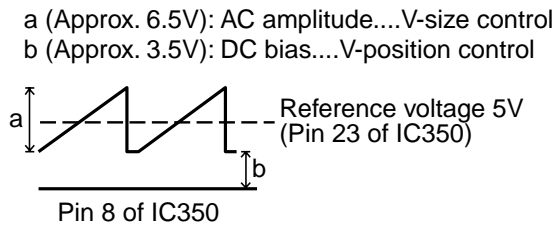
4-9-2. HORIZONTAL OSCILLATION

A drive pulse output from pin 17 of IC350 is amplified by Q350 and then applied to Q504 gate of the DRIVE circuit.



4-9-3. VERTICAL OSCILLATION

The sawtooth-wave is output from pin 8 of IC350 and applied to the VERTICAL DEFLECTION OUTPUT circuit.



4-10. HIGH VOLTAGE OUTPUT CONTROL circuit

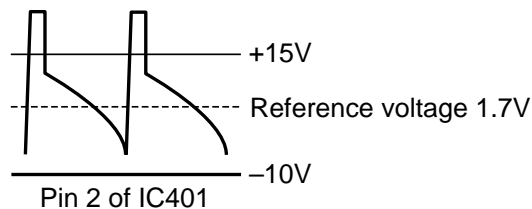
The AFC waveform is output from pin 6 of L501 and applied to IC501. The duty-controlled voltage waveform is output from pin 1 of IC501 and amplified by Q521 and then applied to T501. The applied voltage is amplified by T501 and supplied to the CRT as anode voltage.

4-11. HORIZONTAL DEFLECTION OUTPUT circuit

The drive pulse is output from pin 17 of IC350 and amplified by Q350. The drive pulse is supplied to Q503 base via HORIZONTAL DEFLECTION circuit and current-amplified.

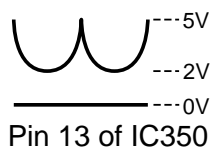
4-12. VERTICAL DEFLECTION OUTPUT circuit

The sawtooth wave from pin 8 of IC350 is supplied to pin 5 of IC401 and amplified, and then supplied to the vertical DY as sawtooth wave current. Vertical deflection is performed by the magnetic field generated when supplying the current to the vertical DY.



4-13. DYNAMIC BEAM FOCUS circuit

The H-parabolic wave from pin 13 of IC350 is amplified by 18 times by Q518 and Q519 respectively. The amplified parabolic wave is pressured up to 500vp-p by T503 and combined with V-parabolic wave and then added to pin 13 of T501.



V-parabolic wave from pin 12 of IC350 is amplified by Q520 and combined with H-parabolic wave.



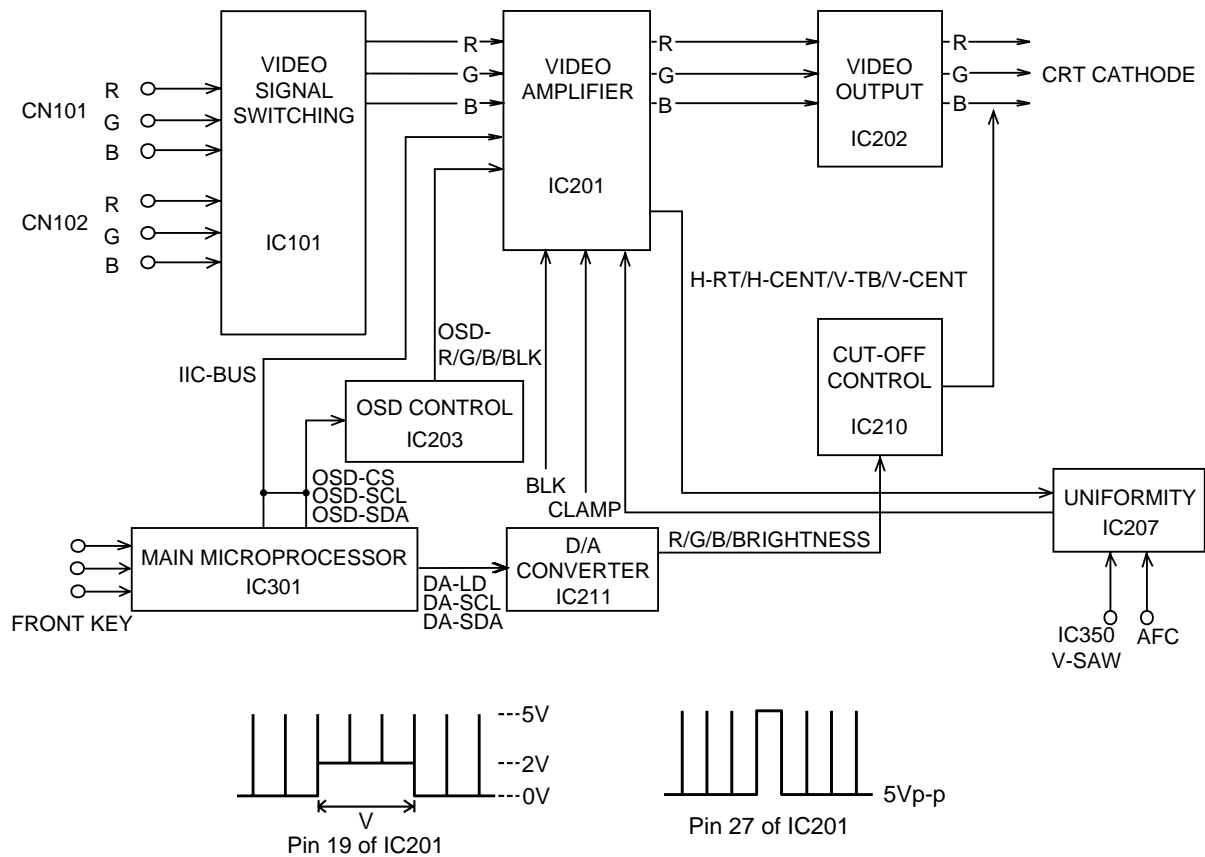
4-14. SWITCHING SIGNAL circuit (CS SWITCHING POINTS)

Each switching point performs horizontal linear and distortion correction as follows:

fH (kHz)	IC301 output pin								
	CS1 (Pin 55)	CS2 (Pin 56)	CS3 (Pin 57)	CS4 (Pin 58)	CS5 (Pin 59)	CS6 (Pin 60)	DRIVE (Pin 3)	H-LIN1 (Pin 1)	H-LIN2 (Pin 2)
29.5 - 34.0	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW	LOW
34.1 - 36.5	LOW	HIGH	LOW	HIGH	HIGH	HIGH	LOW	LOW	LOW
36.6 - 41.0	LOW	HIGH	LOW	HIGH	HIGH	HIGH	LOW	LOW	LOW
41.1 - 45.0	HIGH	LOW	LOW	LOW	HIGH	LOW	LOW	LOW	LOW
45.1 - 49.0	HIGH	LOW	LOW	HIGH	HIGH	HIGH	HIGH	HIGH	LOW
49.1 - 52.0	HIGH	LOW	HIGH	LOW	HIGH	HIGH	HIGH	HIGH	LOW
52.1 - 59.0	HIGH	LOW	HIGH	LOW	HIGH	HIGH	HIGH	HIGH	LOW
59.1 - 62.0	HIGH	HIGH	LOW	LOW	LOW	HIGH	HIGH	HIGH	LOW
62.1 - 66.0	HIGH	HIGH	LOW	LOW	HIGH	HIGH	HIGH	HIGH	LOW
66.1 - 73.0	HIGH	HIGH	LOW	HIGH	LOW	HIGH	HIGH	HIGH	LOW
73.1 - 82.0	HIGH	HIGH	HIGH	LOW	LOW	LOW	HIGH	HIGH	LOW
82.1 - 89.0	HIGH	HIGH	HIGH	LOW	HIGH	LOW	HIGH	HIGH	LOW
89.1 - 97.0	HIGH	HIGH	HIGH	HIGH	LOW	LOW	HIGH	HIGH	HIGH
97.1 - 115.0	HIGH	HIGH	HIGH	HIGH	HIGH	LOW	HIGH	HIGH	HIGH
115.1 - 131.0	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH	HIGH

4-15. VIDEO and ON SCREEN DISPLAY CONTROL circuits

The video signal from CN101 or CN102 is terminated to 75W. The video signal is switched to D-SUB or BNC by the VIDEO SIGNAL SWITCHING circuit that is controlled by the MAIN MICROPROCESSOR (IC301). The adjustment item of Signal Select selects D-SUB or BNC. The selected video signal is amplified by IC201. The OSD signal from IC203 is combined with the video signal by IC201. The OSD signal is controlled by the MAIN MICROPROCESSOR. The V-sawtooth wave from pin 8 of IC350, the AFC pulse wave and H-RT/H-CENT/V-TB/V-CENT signals from IC201 are combined by IC207 and then supplied to IC201 to correct UNIFORMITY. The combined signal adds H/V blanking signal and is applied to IC202. Then the video signal is amplified to approx. 50Vp-p by IC202, and then fed to the respective CRT cathodes, KR, KG, and KB.



4-16. RED, GREEN, BLUE CUT-OFF and BRIGHTNESS CONTROL circuits

The DC voltages (0-5V) from pins 9, 10, 11 and 12 of IC211 are amplified by IC210, Q2R2, Q2G2 and Q2B2 respectively. The respective amplified voltages control the DC voltage level of CRT cathode by automatic adjustments of RED, GREEN, BLUE CUT-OFF and BRIGHTNESS.

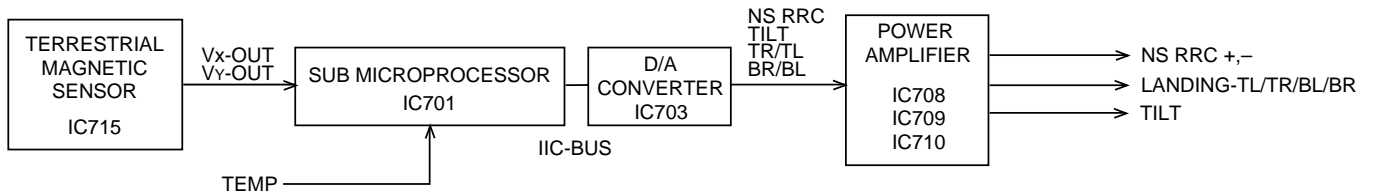
4-17. LANDING CORRECTION circuit

This circuit detects the followings to correct LANDING discoloration.

- Magnetic field.....TERRESTRIAL MAGNETIC SENSOR (IC715) detects the magnetic field.
- SWITCH ON DRIFT.....TH801 detects surrounding temperature. Thermistor attached to the funnel detects the temperature of funnel.
- Surrounding temperature.....TH801 detects surrounding temperature.

When the above condition is changed, the SUB MICROPROCESSOR (IC701) informs the change to the D/A CONVERTER (IC703). The output signal from IC703 is amplified by IC704, IC706 and IC707 to correct LANDING discoloration automatically by the coils N-S RRC, TL, TR, BL and BR.

The LANDING correction also can be performed with the front buttons.



4-18. CONVERGENCE CORRECTION circuit

The H-sync signal generated by the AFC pulse wave, the V-sync signal generated by the V-sawtooth wave and the control signal from the MAIN MICROPROCESSOR (IC301) are applied to IC702 and then 4H/4V/6H-dynamic convergence correction signals are generated as follows:

- 4H: The 4H-dynamic convergence correction signal and the 4H-static convergence correction signal are amplified by IC705 and then output from pin 6 of IC705.
- 4V: The 4V-dynamic convergence correction signal and the 4V-static convergence correction signal are amplified by IC705 and then output from pin 1 of IC705.
- 6H: The 6H-dynamic convergence correction signal is combined with the H-sawtooth wave by IC704 and combined with the V-parabolic wave by IC707. The combined signal is amplified by IC706 and then output from pin 3 of IC706.

