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ENGINEERING SPECIFICATION

FOR

TE2001

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			C.T.CHANG

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TE2001 ENGINEERING SPECIFICATIONS

1.0 SCOPE

This specification defines the performance of TE2001 SVGA color monitor. All parameters within this specification must be met at any line voltage, line frequency and temperature limits specified in this document. If there is any specification which not be specified in this engineering specification then they shall be defined by the product purchase specification. If there is any contradiction between these two specifications, the product purchase specification has precedence over this engineering specification.

2.0 GENERAL REQUIREMENT

2.1 Digital Memory: factory setting mode

The following is factory setting mode:

640 × 400 for 31,5 KHZ/ 70 HZ

640 × 480 for 31.5KHZ/ 60 HZ

800 × 600 for 37.9 KHZ/60 HZ, 48.1 K/70HZ

1024 × 768 Non interlace for 48.3 KHZ/60 HZ,

2.2 Scanning Frequency: 30KHZ TO 48 KHZ for horizontal frequency 43 HZ TO 100 HZ for vertical frequency

2.3 Display Compatibility: IBM VGA adapter and compatible Enhanced VGA display adapters. Super VGA Display adapters

2.4 Display Area: 345 mm × 275 mm ± 5 mm Can be adjust to full screen 404.42 × 303.3 mm.

2.5 Display Brightness: Set raster at cut off by brightness control Set contrast to maximum. * 50 FL Minimum at center (window's 75 x75 mm white block) • 20 FL Minimum at center (by full raster brightness at Max.)

2.6 White Balance: CIE coordinates, x = 0.281, y = 0.311

2.7 Power Input Voltage: AC 90V ~ 264V, 47 HZ ~ 63HZ auto switching.

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2.8 Power Consumption: Less than 120 Watt.

2.9 Degaussing: Automatic degaussing at power on .

2.10 External Control:

2.10.1: Touch Switch Control Function:

Function selection switch, Down switch, Up switch

2.10.2 LED Display :

Contrast, Brightness, V-center, V-size, H-phase, H-size, Pincushion,

2.10.3 Save Adjustment data:

Puch Function SW and Up SW on the same time to save data in memory for each mode.

3.0 REGULATORY REQUIREMENT

3.1 Safety Approvals

The monitor design shall meet the following standards and foreign agencies:

UL Std: UL1950, UL22, UL1410, UL1411

CSA Std: C22.2 No.950-M93, 1-94

TUV Certified: option MPRII: option, CE: option

X-Ray: The monitor shall comply with all application limit and labeling of DHHS Rule 21 Subchapter J for x-ray radiation limits.

4.0 INTERFACE REQUIREMENT:

4.1 Power Input Requirement:

4.1.1: Input: 100 ~ 240 VAC at 50/60 \pm 3 HZ

AC power is supplied directly to the main board.

Harness: optional.

4.1.2: Inrush Current: Including the degaussing current, shall not exceed the 42 A p-p at 240 VAC input.

4.2 Signal Input:

4.2.1: Connectors and Cable:

Standard video input: 15 pin D-sub high-density connector for R. G. B. video, Horizontal and Vertical Synchronization signal.

Harness: Optional

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4.2.2: Video Signal:

- A. Analog input: Red, Green, Blue
- B. Amplitude: 0.7 V p-p
- C. Polarity: Positive, 0.7 V p-p for full intensity and 0 V p-p for black.
- D. Impedance: 75 ohm, $\pm 5\%$ (at 100 KHZ)

4.2.3: Sync Signal

- A. H & V separated TTL level, (positive or negative)
- B. Input impedance: 2k ohm (Min.)

5.0 GENERAL DEFINITION AND TEST CONDITION

Unless otherwise specified, all QA test and test at production line to verify specification must be performed under standard operating condition as following:

5.1 Warm up time:

30 minutes minimum after power on with specified power line voltage and signal applied.

5.2 Direction

- A. CRT neck should face magnetic west for northern hemisphere usage.
- B. Purity convergence ETC shall be complied with this document even if CRT faced east, north, south, with degaussing., no visible impurity can be seen.
- C. Earth Magnetic Field.

The product shall be tested under the following magnetic:

Field:	Vertical	Horizontal
For north hemisphere	35 NT	30 NT
For south hemisphere	-40 NT	30 NT

5.3 Ambient Temperature

20 \pm 10°C, less than 2 °C fluctuation is allowed during testing.

5.4 AC input power:

100 ~ 240 VAC \pm 10%, 50/60 \pm 3 HZ

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5.5 Inspection equipment

- A. Customer pattern generator
- B. Minolta CA100 color analyzer or equivalent.
- C. Klein convergence error measurement gauge CM7AG

Unless otherwise specified, the brightness control must be set at cutoff and contrast control set to 50 FL measure with Center White Block.

6.0 SCREEN DISPLAY & PERFORMANCE SPECIFICATION

6.1 CRT Specification

Cathode Ray Tube to be used is the 20" diagonal 90° deflection, self-convergence, in line, Hybrid block matrix.

- A. Type: 20" , 29.1 mm neck diameter.
- B. Phosphor: P22 (Cd free) medium short
- C. Dot Pitch: 0.78 or .82 mm
- D. Light Transmission: 57% Approx. at center of screen.
- E. Implosion Protection: banded with mounting lugs
- F. Surface: Non-glare polished

6.2 Active Display Area:

Horizontal: 345 mm ± 5.0 mm
Vertical: 275 mm ± 5.0 mm

Factory preset picture size

PRESET SIGNAL	HORIZONTAL (mm)	VERTICAL (mm)
640 × 400 31k /70 HZ	345 ± 5 mm	275 ± 5 mm
640 × 480 31k / 60 HZ	345 ± 5 mm	275 ± 5 mm
800 × 600 37.8k / 60HZ	345 ± 5 mm	275 ± 5 mm
800 × 600 48.1k/ 72 HZ	345 ± 5 mm	275 ± 5 mm

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1024× 768

345 ± 5 mm

275 ± 5 mm

48.3 KHZ/ 60 HZ

6.3 Picture Centering

Horizontal Centering: ≤ 4.0 mm

Vertical Centering: ≤ 4.0 mm

6.4 Trapezoid Distortion

Horizontal: ≤ 3 %

Vertical: ≤ 3 %

6.5 Geometric Distortion:

Top: ≤ 2 %

Left & Right: ≤ 2 %

6.6 Tilt: ≤ 3.5 mm

6.7 Parallelogram distortion: ≤ 4.5 mm

6.8 Side barrel and pincushion:

Pincushion: ≤ 2.0 %

Barrel: ≤ 2.0 %

6.9 Top & bottom barrel, pincushion

Pincushion: ≤ 2 %

Barrel: $\leq 2\%$

6.10 Linearity:

Horizontal: ≤ 10 %

Vertical: ≤ 7 %

6.11 Centering drift Vs operating temperature:

Horizontal: ≤ 4 mm

Vertical: ≤ 3 mm

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- 6.12 Vertical and horizontal centering control range:
Horizontal: ≥ 10 mm each side
Vertical: ≥ 10 mm each side
- 6.12 Size control range:
Shall be able to reach full screen size by horizontal and vertical size control.
- 6.13 Size variation:
A. Deviation of brightness (1FL to full beam): ≤ 4 mm
B. Deviation of contrast (minimum to maximum): $\leq 2\%$
C. Deviation of temperature: $\leq 2\%$
D. Deviation of line voltage: $\leq 2\%$
- 6.14 Jitter
Jitter shall not be seen at 45 cm distance from screen face.
- 6.15 Chromaticity
Color temperature and color tracking test:
A: The color temperature of cut off raster is set automatically as X_o , Y_o of item B.
B: Set white block pattern on the CRT center. Adjust the contrast to Maximum, the color temperature on white block are:
 $X_o = 0.281 \pm 0.015$
 $Y_o = 0.311 \pm 0.015$
C: Contrast tracking:
Turning contrast from 20 FL to 50 FL, the color temperature must be:
 $X_c = X_o \pm 0.015$
 $Y_c = Y_o \pm 0.015$
- 6.16 Contrast Control Range:
The ratio of the Max. to Min. video amplitude on cathode shall no less than 6 db.
- 6.17 Video Bandwidth: ≥ 30 MHZ (-3db)

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6.18 Focus:

Use crosshatch pattern set contrast at maximum and brightness at cut off, all lines and dots shall be visible.

6.19 Convergence errors:

Center ≤ 0.3 mm

Within 270 mm circle ≤ 0.3 mm

Other locations ≤ 1.0 mm

6.20 Purity

No perceptible impurity over the entire visible area when test by full white, red, green, blue after self degauss of power on.

Degaussing must be performed again when change CRT face to another direction. (You may turn off power and turn on again after 30 minutes, to redo an auto degaussing).

6.21 Retrace time:

Horizontal: ≤ 5.0 us

Vertical: ≤ 900 us

6.22 Luminance uniformity:

Compare the luminance out on four corners to the center of CRT by full white pattern, the luminance uniformity shall be better than 60 %.

6.23 Arc over protection

The whole monitor shall be protected from Arcing damage.

6.24 Ringing

No any visible ringing can be seen through active video area.

6.25 Automatic brightness limit:

The monitor shall incorporate automatic brightness or contrast limiting function

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6.26 Acoustic noise

Less than 32 db at 2 feet far on the top and 3 feet far from other sides.

6.27 Power management

H SYNC	V SYNC	VIDEO	STATE	POWER CONSUMPTION	RECOVER TIME	LED COLOR	POWER W
ON	ON	ON	ON	≤120W	N/A	ORANGE	ON
OFF	ON	OFF	STAND BY	≤10 W	3 Sec.	GREEN	ON
ON	OFF	OFF	SUSPEND	≤10 W	3 Sec.	GREEN	ON
OFF	ON	OFF	SLEEP	≤10 W	3 Sec.	GREEN	ON
-	-	OFF	OFF	0W	-	OFF	OFF

7.0 ENVIRONMENT REQUIREMENTS

The monitor shall be operated reliably within the following operating condition and may be safely stored within the non-operating condition.

7.1 Temperature

Operating: 0° C to 40° C
Storage: -40° C to 70° C

7.2 Humidity

Operating: 10 to 90 % non condensing
Storage: 10 to 90 % non condensing

7.3 Altitude:

Operating: Up to 10000 feet sea level
Storage: Up to 35000 feet sea level

7.4 Power line transient

Voltage: +/- 1 KV (operating)
Pulse width: 50, 100, 400, 800 ns
Test Points: A-FG, B-FG
Pulse Phase: 0 ~ 360 degrees
Test period: 1 minute

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7.5 Electrostatic Discharge:

The units shall withstand the following criteria high voltage discharge:

Condition

1. Capacitance: 150 PF
2. Resistance: 330 ohms
3. Voltage: +/- 6kv (operating)
+/- 10 KV (no physical damage)
4. Times: 50 Discharges

7.6 Power Line Surge Test

No Physical damage in the following condition

Condition

1. Pulse: 1.2/50 us
2. Voltage: Between line and ground +/- 2KV
Between line and line +/- 1KV
- 3 Times: 5 times for each +/-

8.0 MECHANICAL PERFORMANCE & TRANSPORTATION

8.1 Vibration test

8.1.1 Vibration Resistance (operating)

Sinusoidal vibration pulse at 5 – 100 HZ logarithmic sweep

Frequency: 5~ 100 HZ

Force: 0.25 G

Time: 10 minutes

(1 minute for each cycle in each direction x, y, z)

8.1.2 Vibration (Non-operating, packaged)

Frequency: 5 ~ 100 HZ

Force: 1.2 G

Time: 20 minutes

(1 minute for each cycle in each direction x, y, z)

Vibration will be exercise at some resonance frequencies across the frequency range, and the duration of endurance is 10 minutes. After repeating on all axes, no electrical or mechanical damage shall occur.

8.2 Mechanical shock

8.2.1 Non operating

½ sine wave at 20 G for 11 milliseconds on 3 successive shocks in each direction of the three axes (18 shocks total).

No electrical or mechanical damage shall occur.

Test shall use rope without elasticity.

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8.2.2 Operating

Three successive shocks with $\frac{1}{2}$ sine wave at 5G for 11 milliseconds in each of three axes (18 shock total).

No electrical or mechanical damage shall occur.

Test shall use rope without elasticity.

8.3 Drop test of packaged unit

The packaged unit shall not sustain any damage when expose to one drop of 18 inches onto one corner, three adjacent edges, and six faces of the package.

Top face: 60.9 cm height.

Other face: 60.9 cm height

Drop sequence

1. Bottom side
2. Corner in contact with the bottom, right, and rear sides.
3. Edge where the bottom and the right side are in contact with each other.
4. Edge where the front and the right side are in contact with other.
5. Edge where the front and the bottom side are in contact with each other.
6. Corner in contact with the bottom front and left sides.
7. Left side
8. Front side
9. Rear side
10. Top side

The impulse shall be measure at the package exterior.

Upon the end of the test, no sign of damage, scratches, looseness of screws or the like parts fallen off , removed connectors.

Or the like, printed foil flutings, of any other faults and operational abnormalities shall be observed.

9.0 RELIABILITY AND SERVICEABILITY

9.1 MTBF (mean time between failure)

MTBF except CRT: 30000 HRS

(Base on calculation by MIL-HDBK-217 F, and at 90 % confidence level. Parts count prediction)

CRT lifetime: 10000 Hrs.

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9.2 MTTR (mean time to repair)

The MTTR is about 30 minutes.

10.0 PHYSICAL SPECIFICATION

10.1 Overall dimension (Telco standard frame)

Height: 375 mm

Width: 525 mm

Depth: 450 mm

10.2 Weight: (Telco standard frame, without touch screen, control board)

Net weight: 40 lb

Gross weight: 45 lb

10.3 Frame

A. Material: metal chassis

B. Color: tint

10.4 Packaging

10.4.1 Carton Dimension

Height: 442 mm

Width: 538 mm

Depth: 531 mm

10.4.2 Shipping weight: 45 lb

10.5 Final setting condition for shipping

Power: off

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APPENDIX A: PIN ASSIGNMENT OF VIDEO CONNECTOR

PART A: MONITOR INTERFACE SIGNAL DEFINITION FOR VGA MONITOR

1. Red
2. Green
3. Blue
4. Digital ground
5. N/C or ground
6. Red return
7. Green return
8. Blue return
9. N/C
10. Digital ground
11. Digital Ground
12. SDA
13. H Sync.
14. V Sync.
15. SCL

Digital ground used for Sync. Signals and overall shield only.

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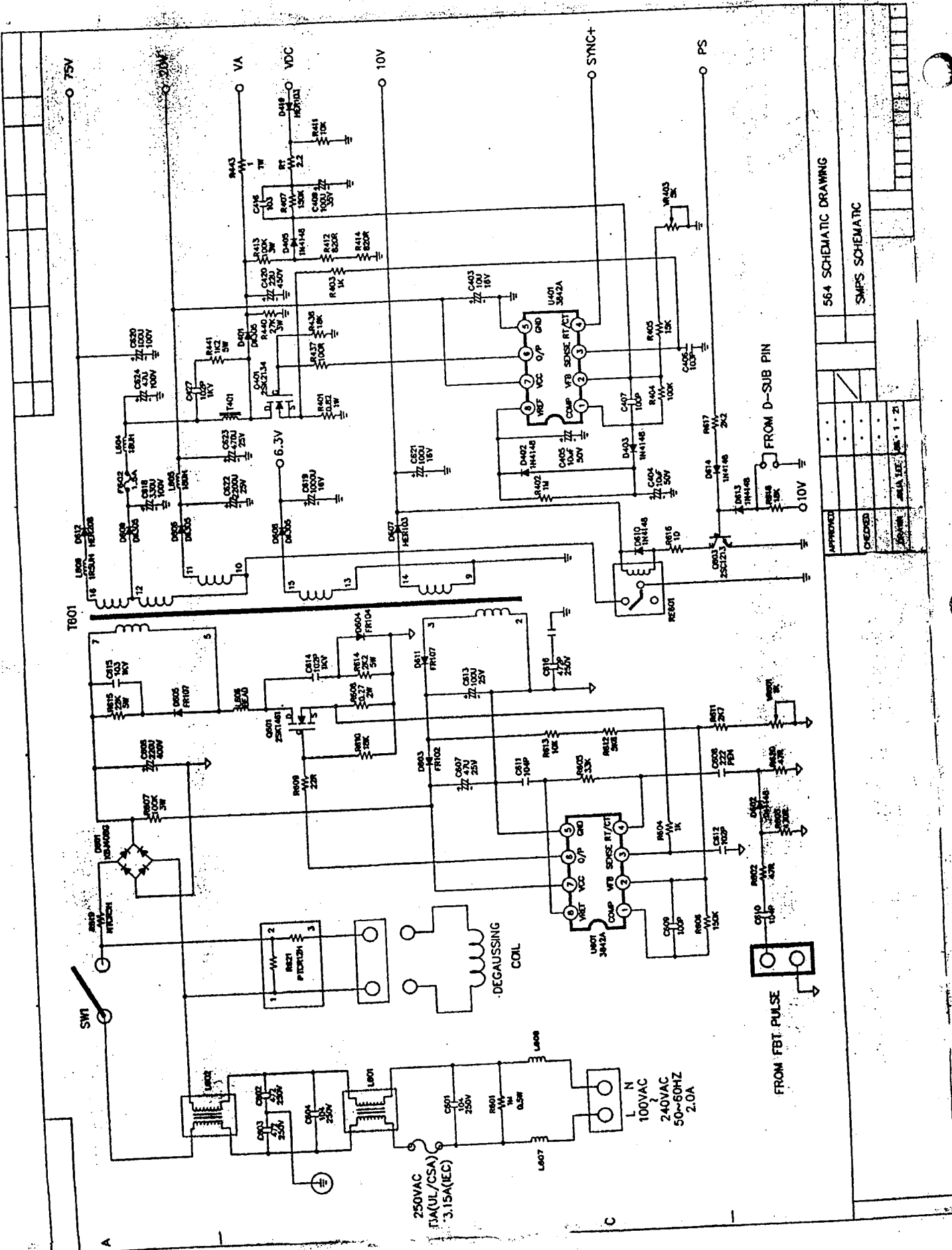
APPENDIX B: MOUNTOR INTERFACE TIMING

SIGNAL	RESOLUTION	H. FREQ. (HZ)	V. FREQ. (HZ)	SYNC. POLARITY H	SYNC. POLARITY V
1	640 × 480	31.5K	70.1	NEGATIVE	POSITIVE
2	640 × 480	31.5K	59.9	NEGATIVE	NEGATIVE
3	800 × 600	35.2K	56	POSITIVE	POSITIVE
4	800 × 600	37.9K	60	POSITIVE	POSITIVE
5	800 × 600	48.1K	72	POSITIVE	POSITIVE
6	1024 × 768	48.4K	60	NEGATIVE	NEGATIVE

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TIMING CHART (FOR REFERENCE)

SYNC	SIGNAL	1 640 × 480	2 640 × 480	3 800 × 600	4 800 × 600
	DOT CLOCK (MHZ)	25.175	25.175	40.000	49.95
	H FREQUENCY (KHZ)	31.469	31.469	37.879	46.875
	V. FREQUENCY (HZ)	70	59.9	60.3	75
H	CELL SIZE (DOT)				
	TOTAL (CHR/DOT)	800	800	1056	1056
	(US)	31.778	31.778	26.400	21.333
	DISP (CHR/ DOT)	640	640	800	800
	(US)	25.422	25.422	20.000	16.162
	FONT (DOT)	17	15	40	16
	(US)	0.675	0.596	1.000	0.323
	SYNC. PULSE (DOT)	64	96	128	80
(US)	2.542	3.813	3.200	1.616	
BACK (DOT)	79	49	88	160	
(US)	3.138	1.946	2.200	3.232	
V	TOTAL (H)	449	525	628	625
	DISP (H)	400	480	600	600
	FONT (H)	13	6	1	1
	SYNC. PULSE (H)	2	2	4	3
	BACK (H)	34	37	23	21
	INTERLACE	NON	NON	NON	NON
	POLARITY	NEG./ POS	NEG. / NEG.	POS / POS	NEG / NEG
	COMPOSITE SYNC.	-	-	-	

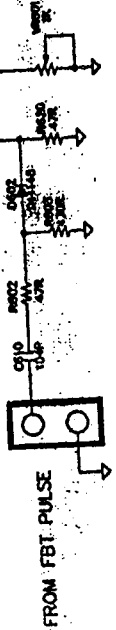


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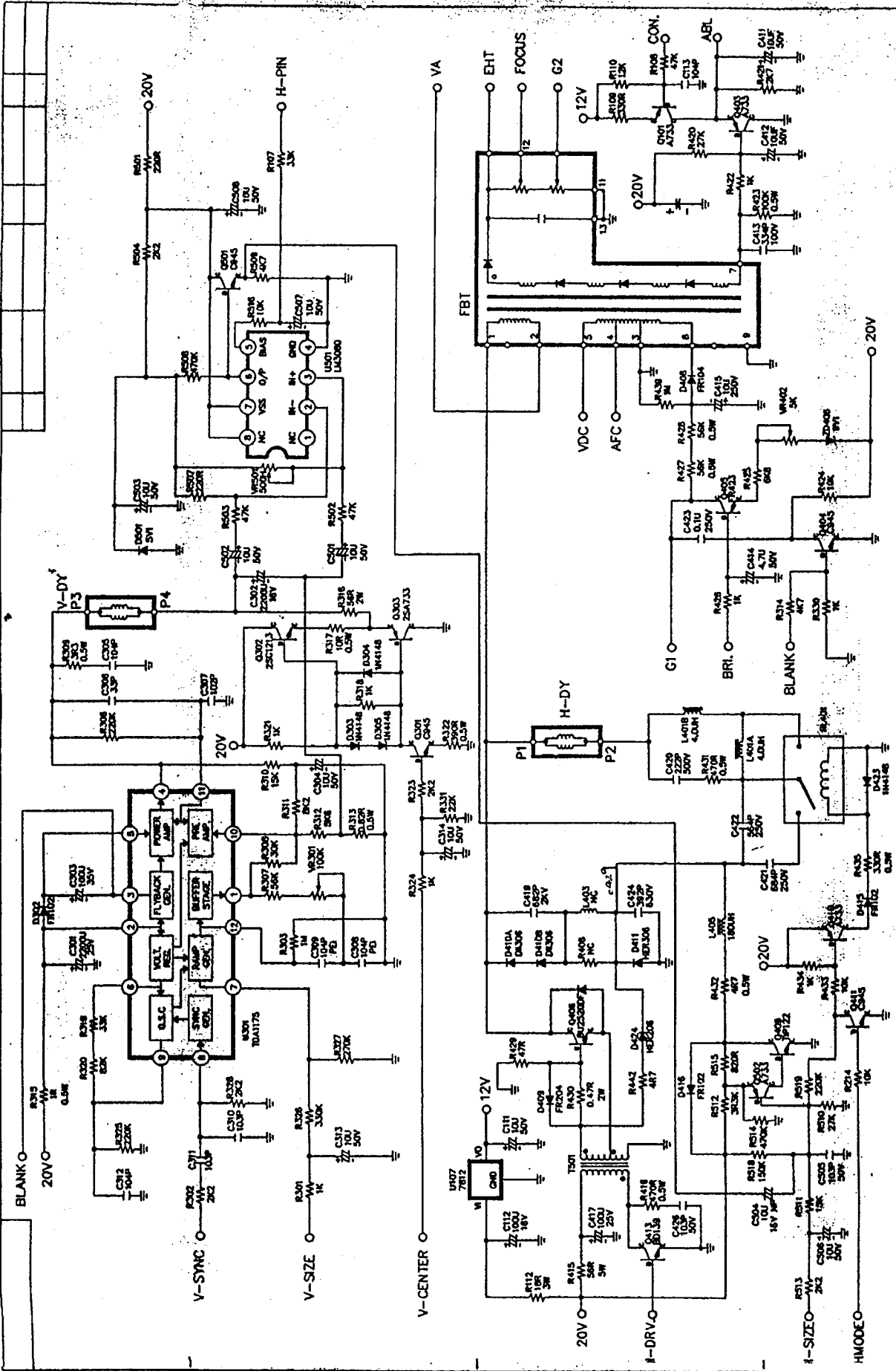
SMPS SCHEMATIC

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DESIGNED
DATE
NO.

FROM FBT PULSE

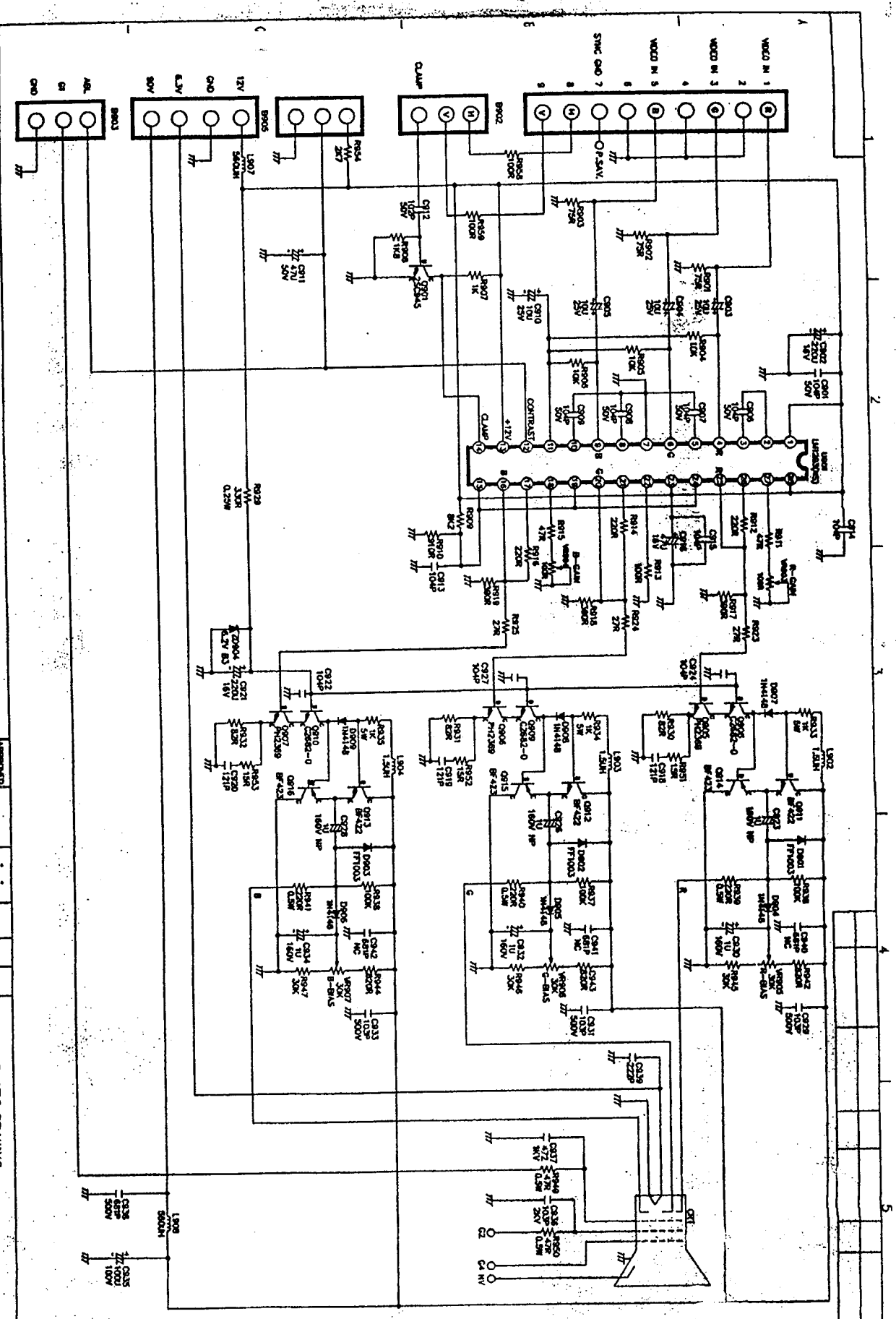


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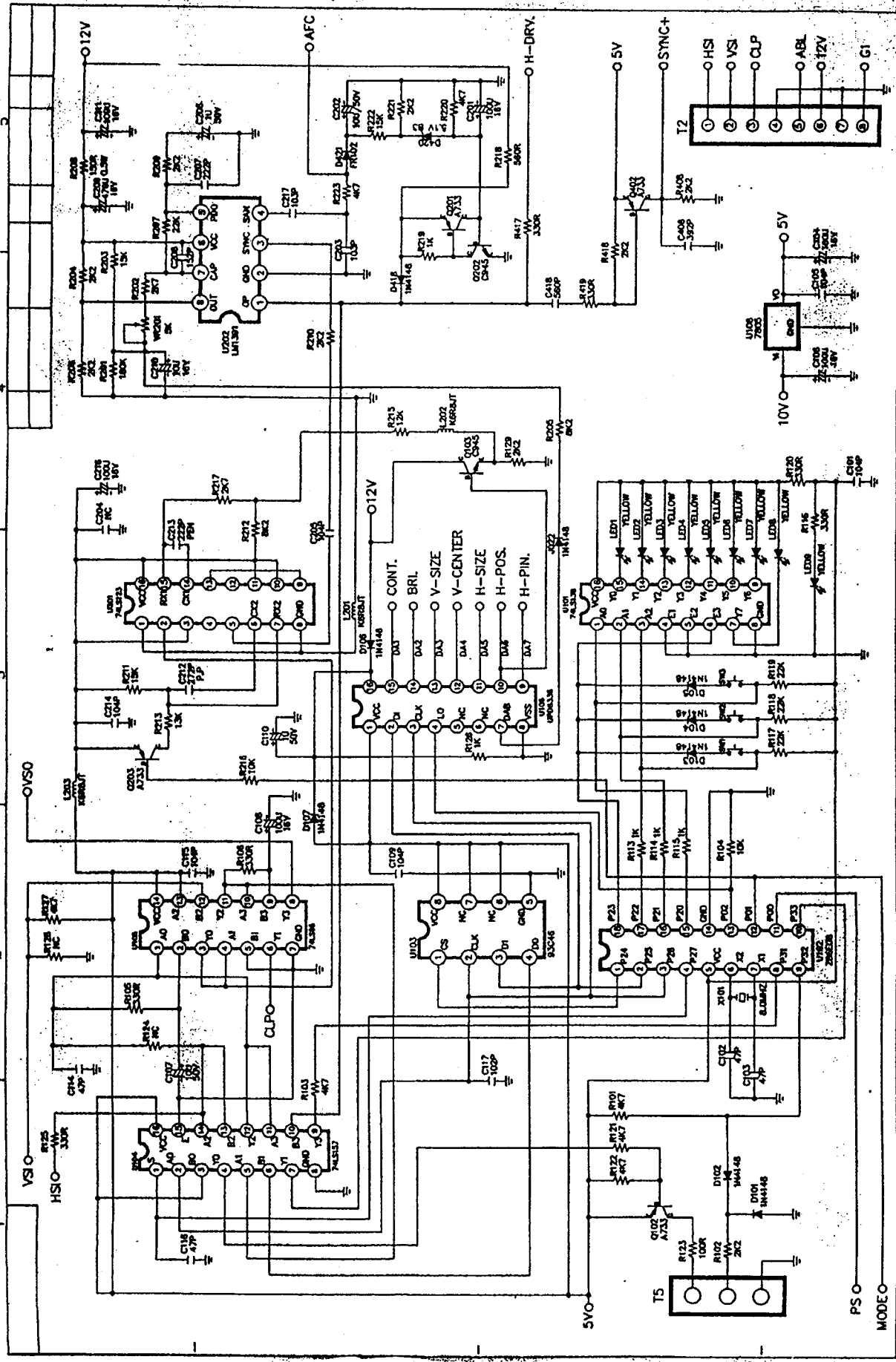
564 SCHEMATIC DRAWING
DEFLECTION

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DRAWN	WALLEN
DATE	SEP. 7. 54

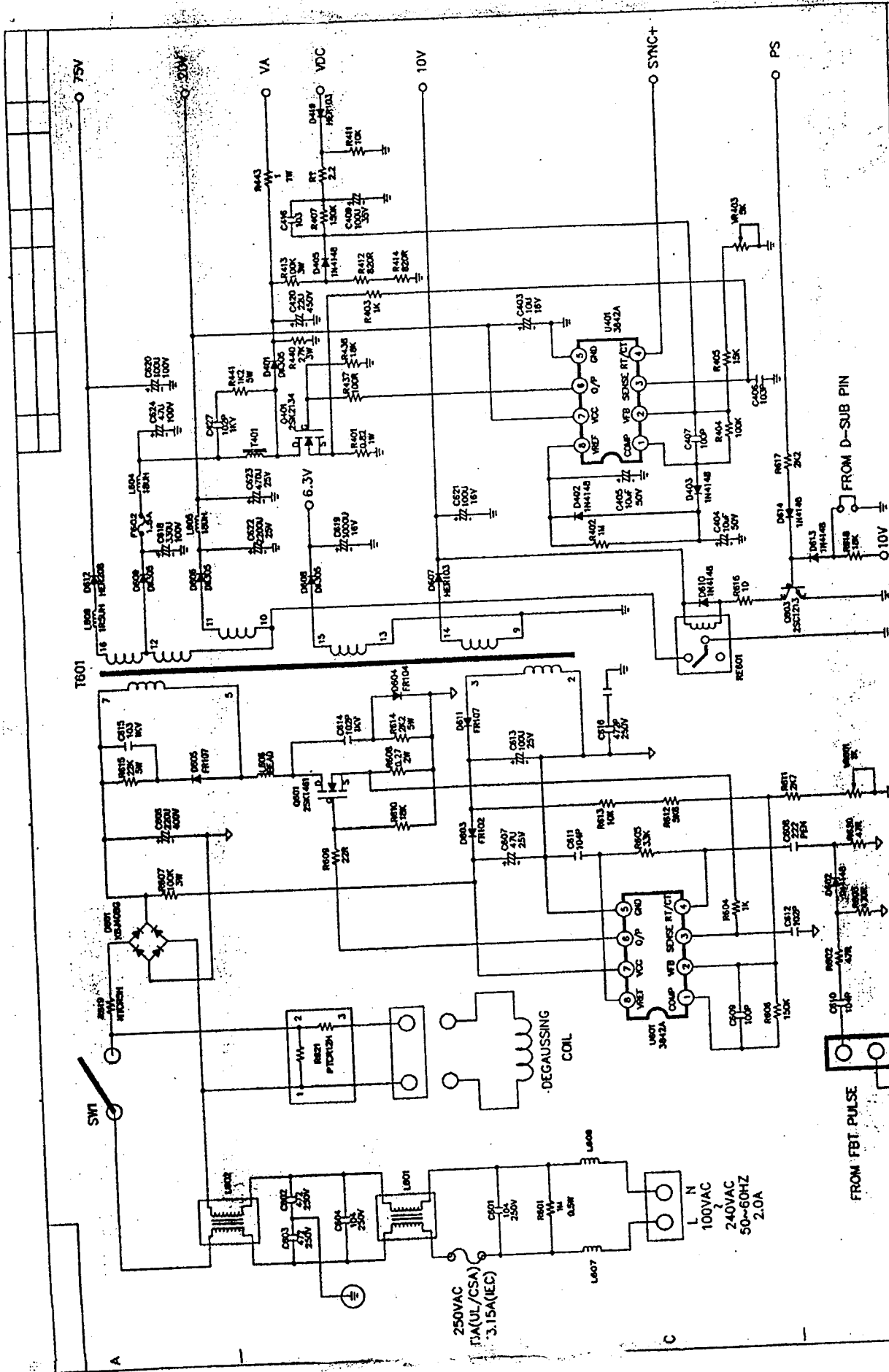


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CHECKED	DATE	BY
DESIGNED	DATE	BY

564 SCHEMATIC DRAWING
CRT & VIDEO CIRCUIT



564 SCHEMATIC DRAWING	
MICRO PROCESS	
APPROVED	
CHECKED	
DRAWN	JANA LEE
	REV - 2 - 3



564 SCHEMATIC DRAWING

564PS SCHEMATIC

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FROM D-SUB PIN

FROM FB I PULSE

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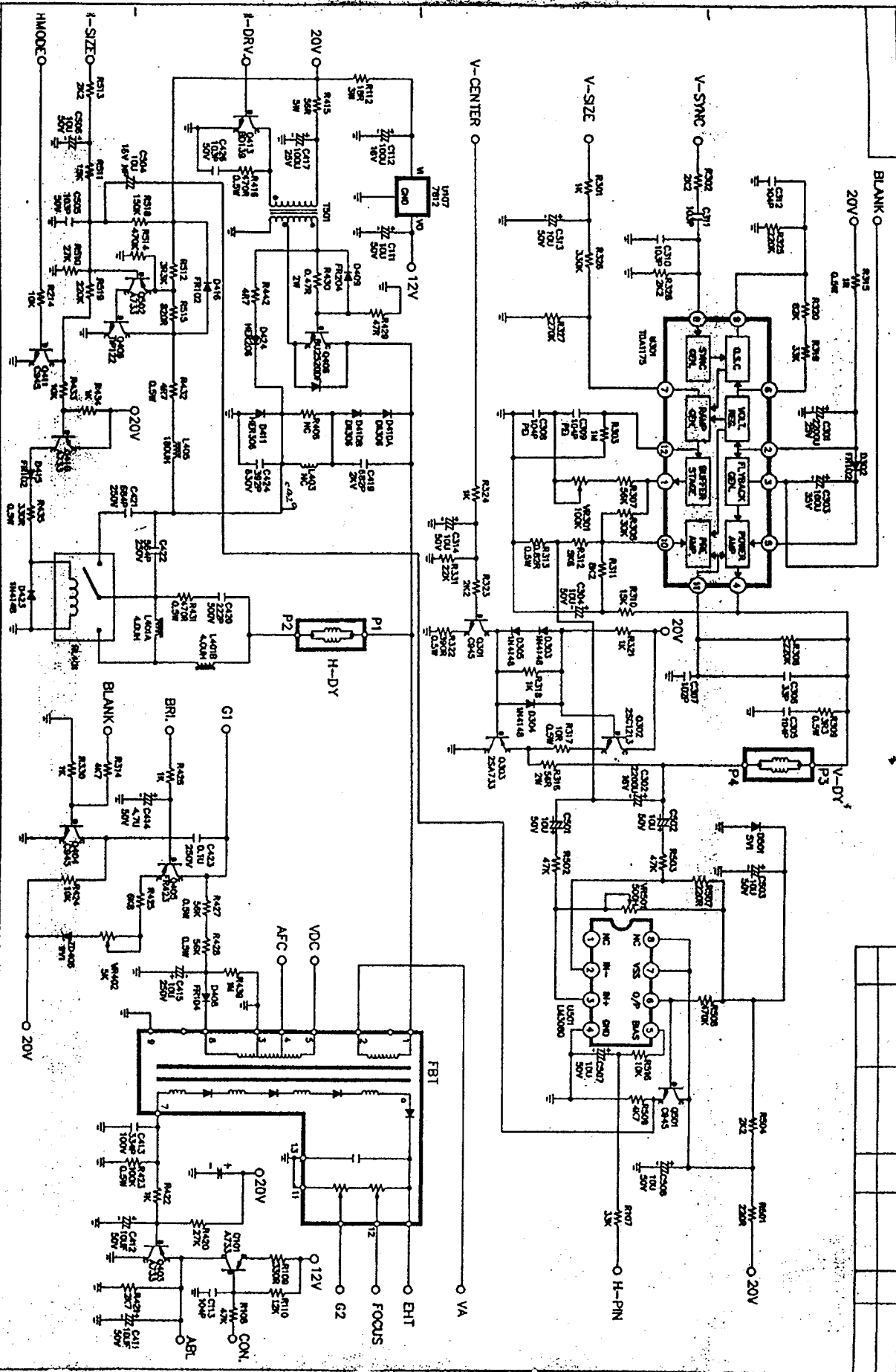
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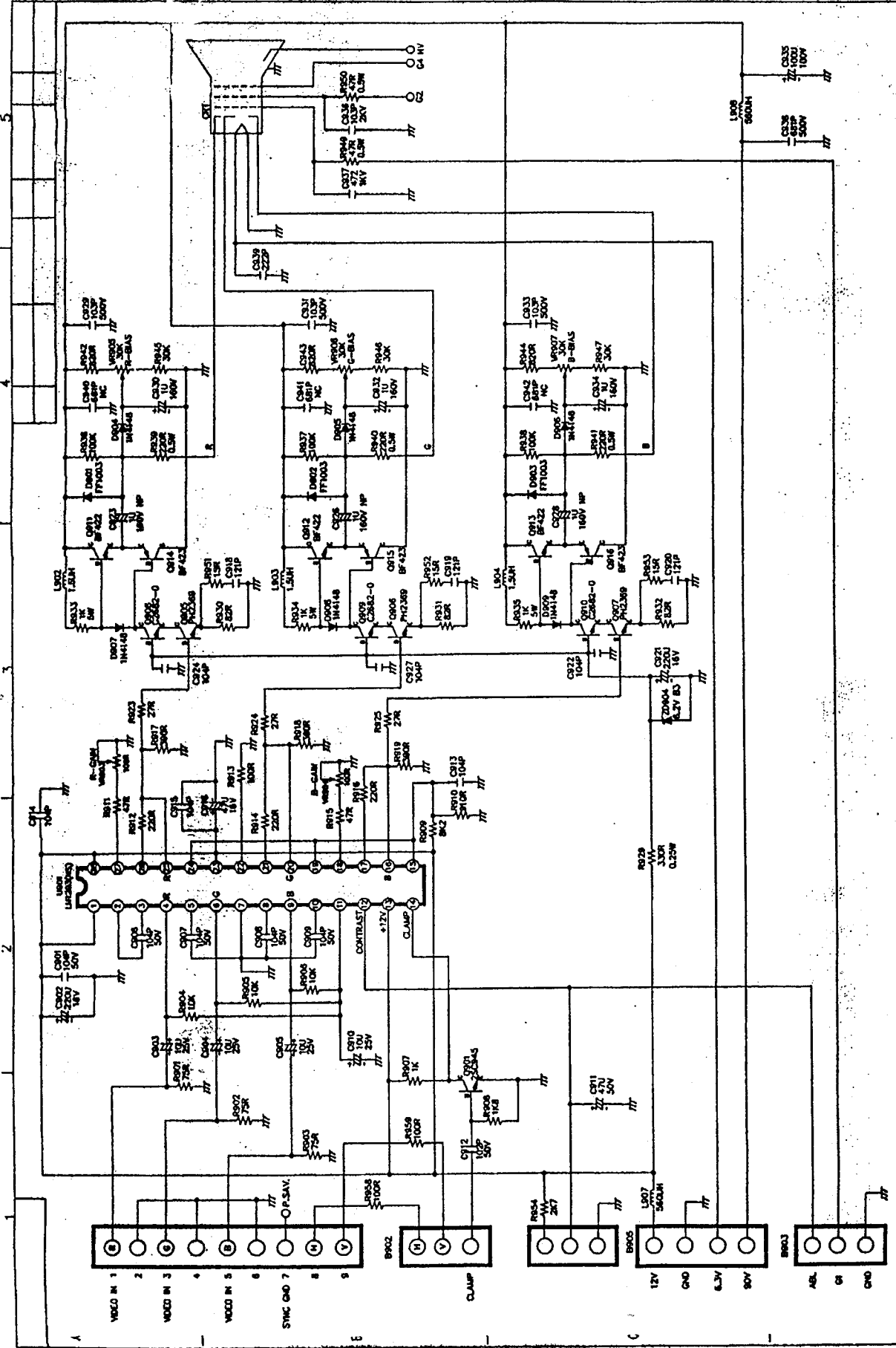
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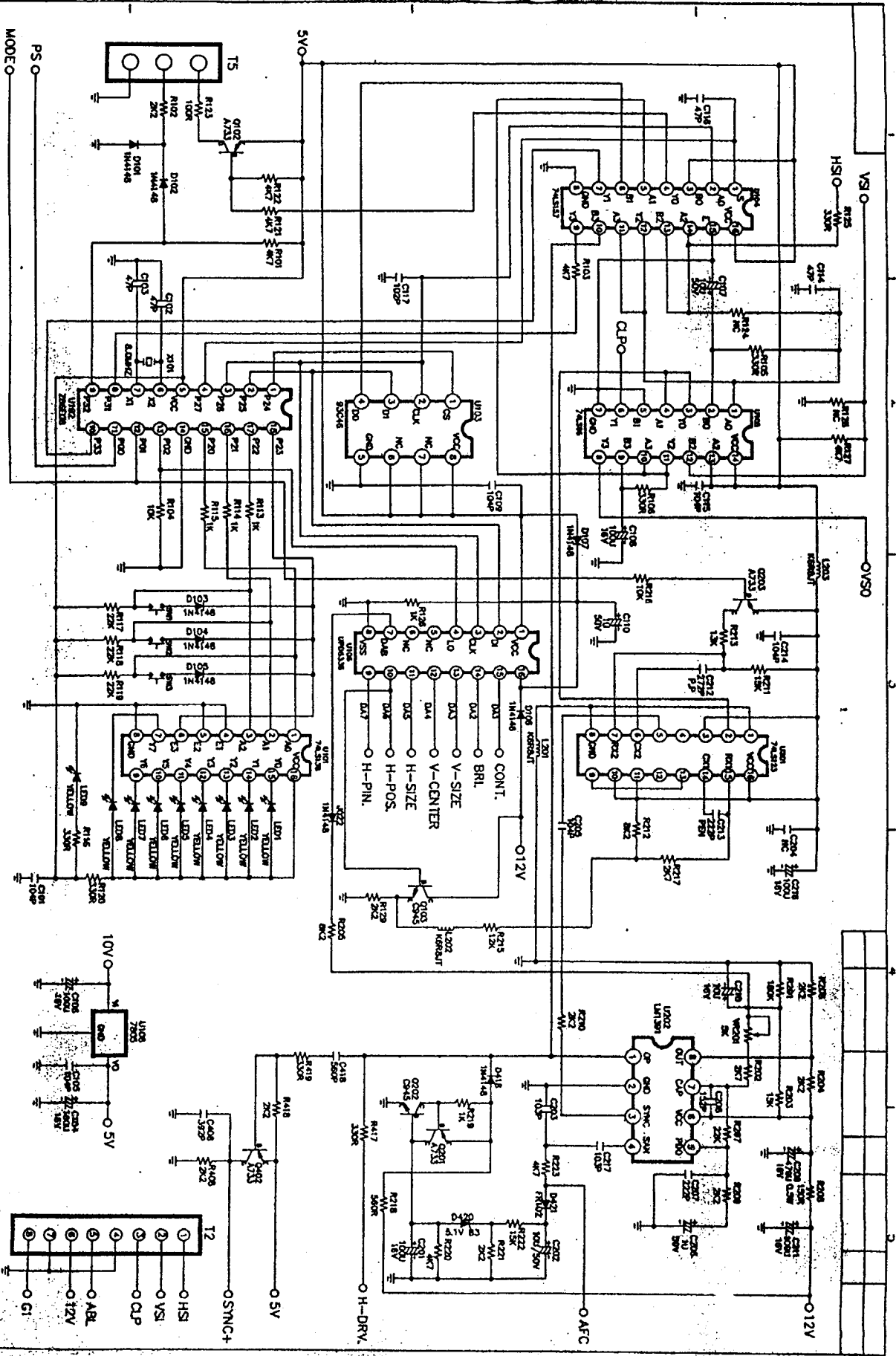
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DEFLECTION	



564 SCHEMATIC DRAWING

CRT & VIDEO CIRCUIT

APPROVED	
CHECKED	
DESIGNED	
DATE	SEP 2 4



564 SCHEMATIC DRAWING

MICRO PROCESS

APPROVED	
CHECKED	
DRAWN	JAM JET
	86-2-3