


SM-12DN4KA
DATA DISPLAY MONITOR

SAMSUNG ELECTRON DEVICES CO., LTD.

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				SM-12DN4KA	012-12-901 132509-001
				MODEL	SED P/N CUSTOMER P/N
MONITOR PART NUMBER					

DATE	Apr. 15, 1981	 SAMSUNG ELECTRON DEVICES CO., LTD. COMPUTER DIVISION
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DESIGN	W. S. SHIN. <i>SHIN W. S.</i>	TITLE
CHECK	S. H. JEONG <i>[Signature]</i>	12" MONITOR ENGINEERING SPECIFICATION
APPD.	D. JO <i>[Signature]</i>	DOCUMENT NUMBER
		REVISION
		L012-12-901
		DEVICE: SM-12DN4KA
		CUSTOMER CODE: LS-001
		SPEC. NO: F-018
		SHEET i OF ii

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SECTION I. SPECIFICATIONS

A. Cathode Ray Tube (12 ZB)

- 1. Size : 12 inch diagonal.
- 2. Deflection angle : 90°
- 3. Glass area : 74 square inches.
- 4. Implosion protection : Tension band with mounting lugs.
- 5. Phosphor : P4
- 6. Anode voltage : Approx. 11.5KV
- 7. Display size : 8.3/8"(H) x 5.3/4"(V)
- 8. Face : Direct etched.

B. Electrical characteristics

- 1. Video : TTL positive going pulse(4.0Vp-p+1.5V)
 Input impedance: More than 3.3Kohms shunted by 60PF.
 Rise and fall time: 35nano-seconds or less.
 Video bandwidth: 18MHZ
- 2. Horizontal : TTL positive going pulse(4.0Vp-p+1.5V)
 Input impedance : More than 470ohms shunted by 40PF.
 pulse width: 22 to 30 micro-seconds at 16.2KHZ
 18 to 24 micro-seconds at 19.2KHZ
 Scan frequency: 19.2± 0.5KHZ
 16.2± 0.5KHZ by changing a jumper(JPR1B to JPR1C)
 Retrace time: Approx. 7.5micro- seconds.
- 3. Vertical : TTL negative going pulse(4.0Vp-p+1.5V)
 input impedance : More than 3.3Kohms shunted by 40PF
 pulse width: 5 to 1000 micro-seconds.
 Scan frequency : 47 to 63 HZ
 Retrace time : 926 micro-seconds.

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4. Power : 15VDC_{+0.2V}/0.8AMP or less nominal

* Note : Refer to timing chart figure 1.

C. Picture quality

1. Resolution : 900TV lines at center.
800TV lines at corners at 40 footlambert.

2. Geometric distortion: The outside dots of all outside rows and columns shall fall within the area defined by the space between the two rectangles shown in FIG 6. This alignment shall fulfill the Pincushioning, barreling, parallelogram and trapezoidal distortion requirements of the monitor display area.

3. Horizontal linearity: Less than 10% for adjacent characters.
Less than 20% for any two characters on the entire display field.

4. Vertical linearity : Same as for horizontal linearity.

5. Display capability : 80 characters per row. 24 rows.

D. Controls

1. Brightness : Internal.

2. Contrast : External (User will supply external control volume and wire)

3. Vertical hold : Internal.

4. Vertical height : Internal.

5. Vertical linearity : Internal.

6. Horizontal width : Internal.

7. Horizontal linearity: Internal.

8. Focus-static : Internal.

E. Environmental

1. Operating temperature: +5°C through +55°C

2. Storage temperature : -35°C through +60°C

F. Weight

1. Kit form : Approx. 4 Kg

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G. Input signal connection

1	Ground(H.D return, power return)
2	Not Applicable
3	.....	Not Applicable
4	.....	Not Applicable
5	.....	ARC ground.
6	.....	Horizontal input.
7	.....	15V DC.
8	.....	Video input.
9	.....	Vertical input.
10	.....	Ground(V.D return, video return)

H. Input connector

Board edge connector

- * Viking # 2VK 10S/1-2
- * Amphenol # 225-21031-101
- * Hirose # CR8E-20DA-3.96E
- * Or equivalent

I. Others

All components are capable of meeting UL, CSA and DHEW requirement.

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SECTION II . SERVICE INFORMATION

A. ADJUSTMENTS

1. BRIGHTNESS

Normally, the monitor will be used to display alphanumeric or other black and white information. Moreover, the video polarity is usually white characters on a black background.

The internal brightness control should be adjusted at a point where the white raster is just extinguished. The CRT will then be at its cutoff point, and a maximum contrast ratio can be obtained when a video signal is applied.

2. VIDEO CONTRAST

Q201 is designed to operate linearly where a +2.5V signal is applied to its base. This control, or a fixed resistor, should be adjusted for a typical signal level of +2.5V peak-to-peak when measured at the video input terminal of the printed circuit board edge connector.

In all cases, the output DC impedance of the video signal source must be 500ohms, or less.

3. VERTICAL ADJUSTMENTS

There is a slight interaction among the vertical frequency, height, and linearity controls. A change in the height of the picture may affect linearity.

- a. Set the vertical-hold control, R302 near the mechanical center of its rotation.
- b. Adjust the vertical linearity control, R306 for best vertical linearity.
- c. Adjust the vertical height control, R304 for desired height
- d. Readjust the vertical hold control, R302 until the picture "locks" on vertical sync.
- e. Recheck height and linearity, and readjust if necessary.
- f. Slight readjustment of vertical hold control, R302, may be required if the picture "rolls" up or down after a power OFF/ON sequence.

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4. HORIZONTAL ADJUSTMENTS

Raster width is affected by a combination of the DC power supply, horizontal width coil L402 and the horizontal linearity coil L403.

a. Horizontal linearity.

When character width variation is observed in characters of one row, turn the core of adjustor L403 so that character widths should become uniform.

b. Horizontal width.

Adjust horizontal width by turning the core of L402 with a plastic hexdriver for the desired width.

c. Readjust horizontal linearity and width coil, for proper width.

d. Observe final horizontal linearity and width, and touch up either adjustment if needed.

The raster should be properly locked and centered when the horizontal drive signal adjustments (described in steps a-d above) have been completed.

5. DEFLECTION YOKE ASSEMBLY ADJUSTMENTS

a. Raster centering

If the raster is not properly centered, it may be repositioned by rotating the ring magnets behind the deflection yoke.

The ring magnets should not be used to offset the raster from its nominal center position because it would degrade the resolution of the display.

If the picture is tilted, rotate the entire yoke.

b. Geometric corrections

The magnets on the yoke assembly shall be polarized so as to provide adjustment of pin-cushion, barreling and other geometric deformities by simply rotating the magnets until the desired display is achieved. Readjust if necessary.

6. FOCUS ADJUSTMENT

Although the focus control, R508, does not have a large effect on focus because of the CRT gun-assembly construction. It provides some adjustment for maintaining the best overall display focus.

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SECTION III. TROUBLESHOOTING FOR RESPECTIVE SYMPTOMS

A. No Raster

1. Turn the internal brightness control clockwise fully.

If raster appears : Good

If raster does not appear : No good. To next check.

2. Is CRT heater on?

It is not on : Check CRT, heater voltage, power supply circuit and CRT socket for normality.

It is on : Proceed to next check item.

3. Check high voltage by high-voltage voltmeter.

High voltage is not obtained :

Check of flyback transformer T402. Check of collector pulse of Q404. check of base pulse of Q404, check of collector and base waveforms of Q403, check of input HD.

High voltage is obtained : To next check item.

4. Check respective CRT electrode voltages for normality with a multi-tester.

G2 : 350V - 450V

G4 : -100V - +400V

G1 : -100V - +20V

K : 0 - +50V

When voltages of G2 and G4 are not obtained :

Check of CR501, CR503, C501, C503, R501, R503, R505, R507
R508, R509, and T402.

Voltage of G1 is not obtained :

Check of CR502, CR503, C502, C503, C504, R502, R506, R510
R511, E502 and T402.

Voltage of K is not obtained :

Check of CR502, C502, R204, R206, E501, and T402

Voltages of G2, G4, G1, and K are normal :

CRT is faulty Replace CRT.

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B. Only one raster line appears in horizontal direction.

Check of deflection yoke vertical coil

When deflection yoke vertical coil is shorted or opened. deflection yoke is faulty and should be replaced. When 30-50 OHMS, the coil is good.

C. Only one raster line appears in vertical direction

Wire breakdown or deflection yoke horizontal coil or L402, L403, or C413 open.

D. Raster is deformed abnormally.

Rare shorting of deflection yoke coil, replace deflection yoke.

E. Raster runs abnormally as if winding or excessive picture fluctuation is caused.

Check by measurement that ripples of power supply is less than 10mV p-p. when ripples are normal, check to determine whether there is any such source that causes alternating magnetic field near the unit.

F. When power is turned off, spot remains.

Check C502, C503, and CRT for deterioration.

G. Brightness range is abnormal.

Deterioration of CR503, C503, or CRT, Check of voltage of G2. Check of heater voltage. Check of Q201, and E501. check of R203, R204, R205, and check of CR502, and C502

H. Raster size is small and picture is abnormally bright (high voltage is abnormally high.)

Check of C409, and C410. Check of T402

I. Vertical synchronization is not achieved.

Check of VD. Check of C301, C302, CR301, R301, R302, and U301

J. Raster position is deviated relative to CRT face.

Turn deflection yoke centering magnet so that raster should be positioned at center.

K. Picture or characters do not appear. contrast is unachievable.

Check of Q201 and associated components. Check of input signal. Check of CRT.

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L. Picture or characters are displayed but inclined.

Untighten clamp screw on deflection yoke. Rectify the inclination by turning the entire deflection yoke.

M. Fine noises appear is the picture and characters shiver.

Check high-voltage portion for leakage.
Check connectors for complete contact.
Check FBT for wire breakdown.

N. It takes long for picture to appear (more than 15 seconds.)

Service life of CRT has reached. Replace CRT.

O. Sync noise not related with input data appears in picture.

Check grounding wire for poor contact. VIDEO grounding for incompleteness, input signal for normality, and power supply return for incompleteness.

P. Picture appears and disappears alternately.

Check of input signal. Check of card edge connector. Check of video circuit for poor soldering. Check of CRT socket.

Q. Horizontal linearity is not achieved.

Check of L403. C413. and Q404

R. Vertical linearity is not achieved.

Check of R305, R306. R307. C304. C305. and U301

S. Focusing is not achievable.

Check of voltages G2 and G4. Readjustment of R508.
Check of high voltage. Check of CR501, R501, C501, R503, and R509
When all above items are normal. CRT is faulty and should be replaced.

Note : Refer to voltage waveforms(Figure 1.)

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SECTION IV FIGURES

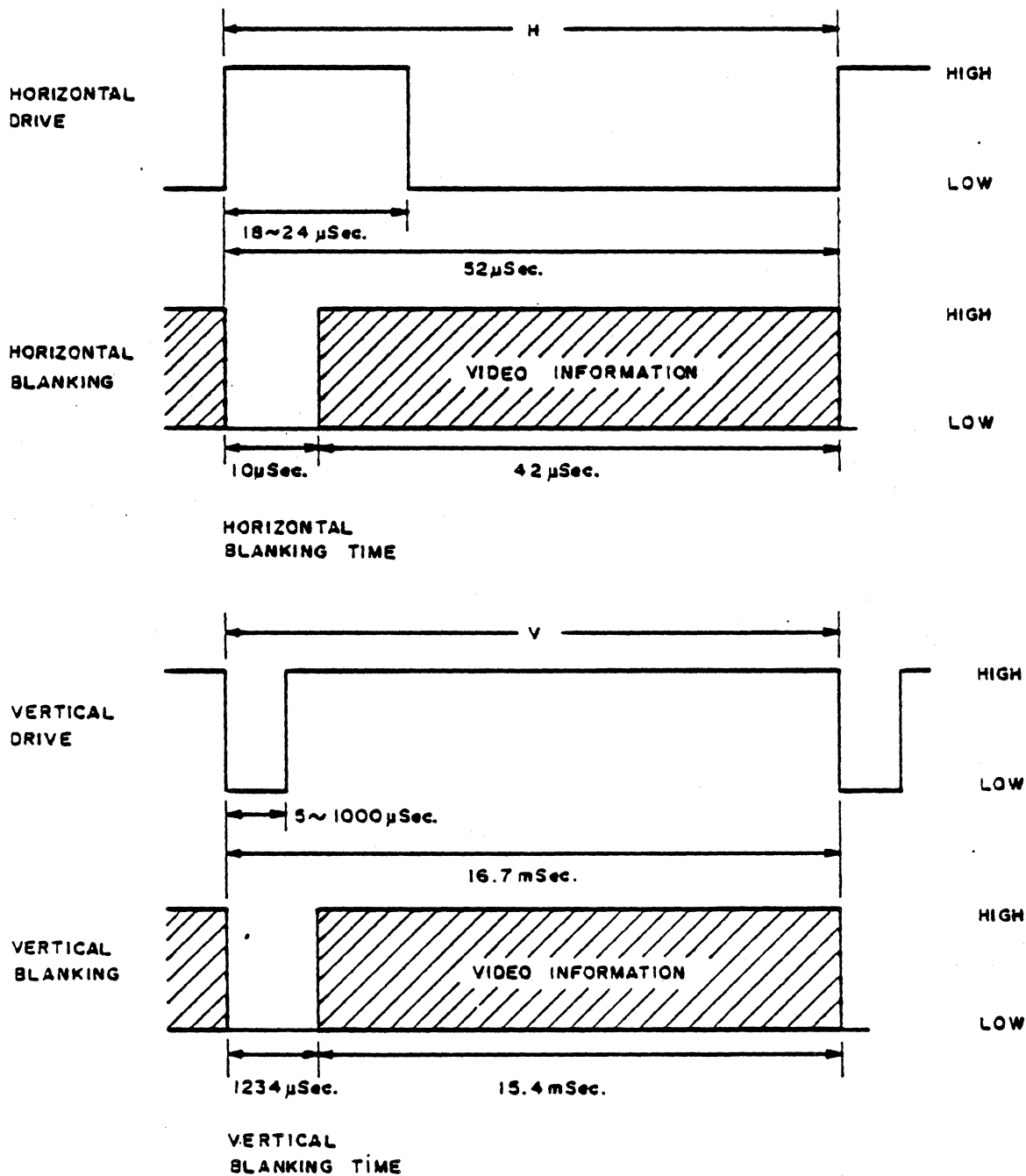
TIMING CHART

AT HORIZONTAL DIRECT DRIVE

H = 19200 Hz

V = 60 Hz

V RETRACE TIME = 926 μ Sec.

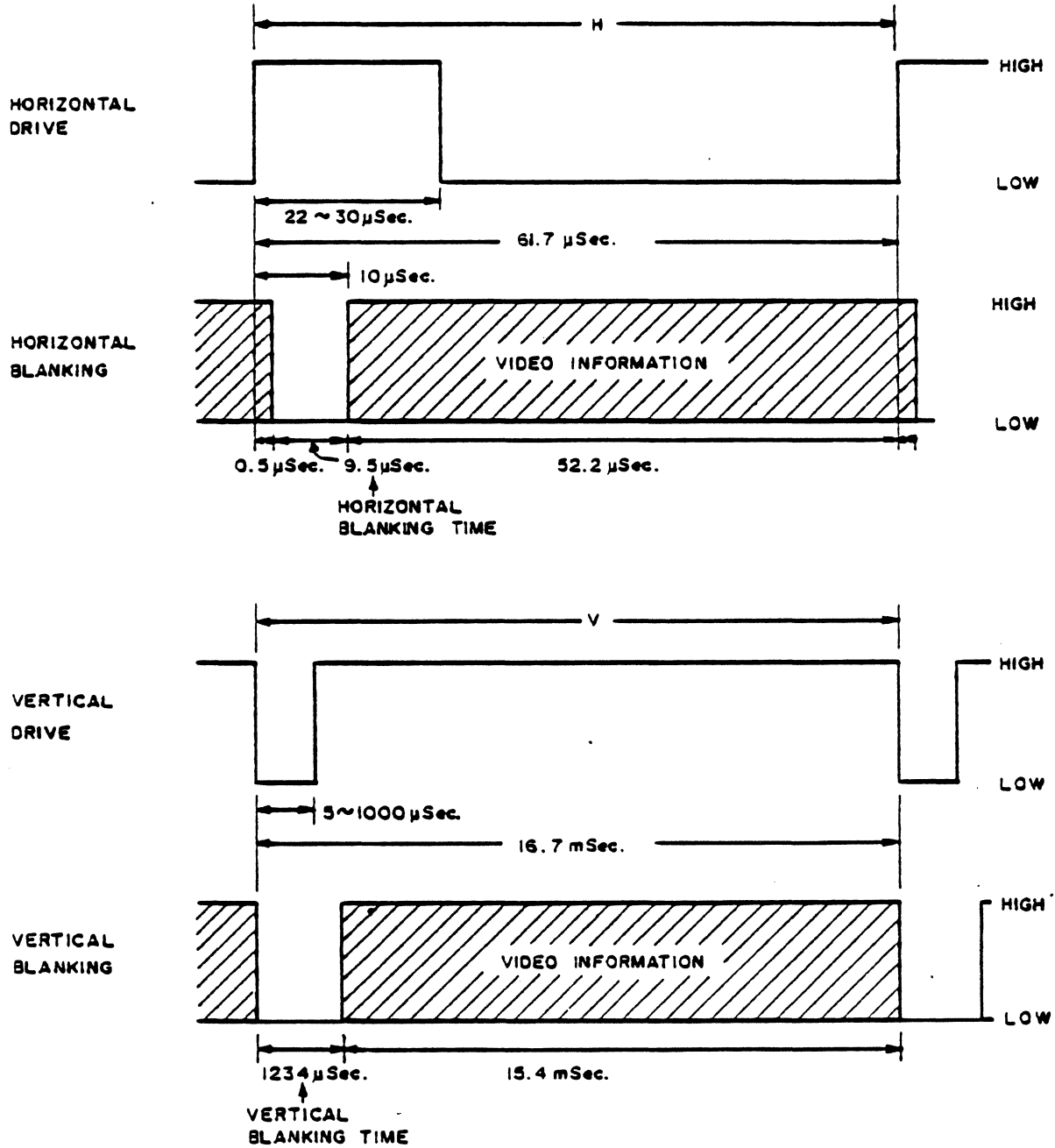


(FIG.1)

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TIMING CHART

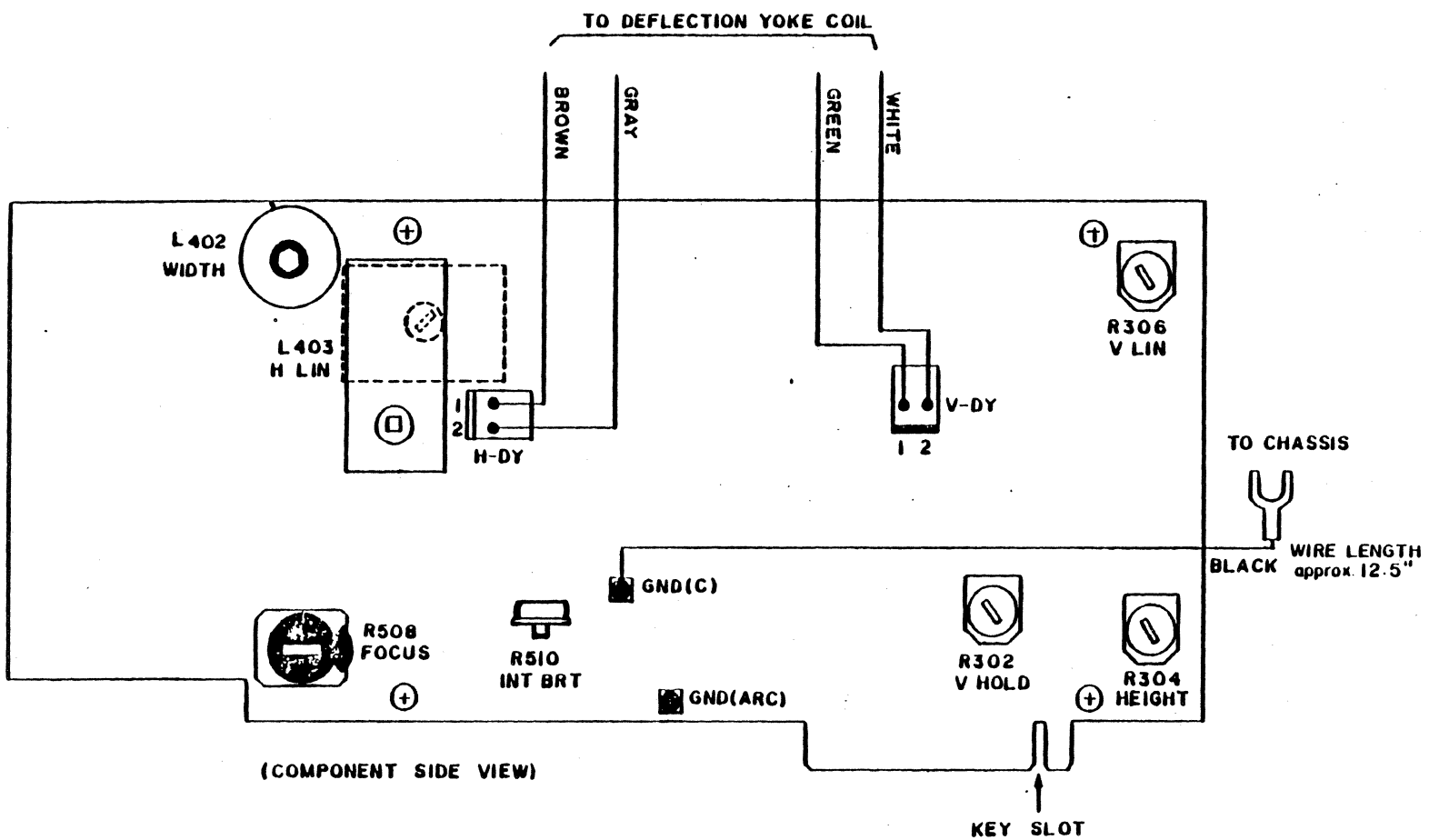
AT HORIZONTAL DIRECT DRIVE
 $H = 16200 \text{ Hz}$
 $V = 60 \text{ Hz}$
 $V \text{ RETRACE TIME} = 926 \mu\text{Sec.}$



(FIG. 2)

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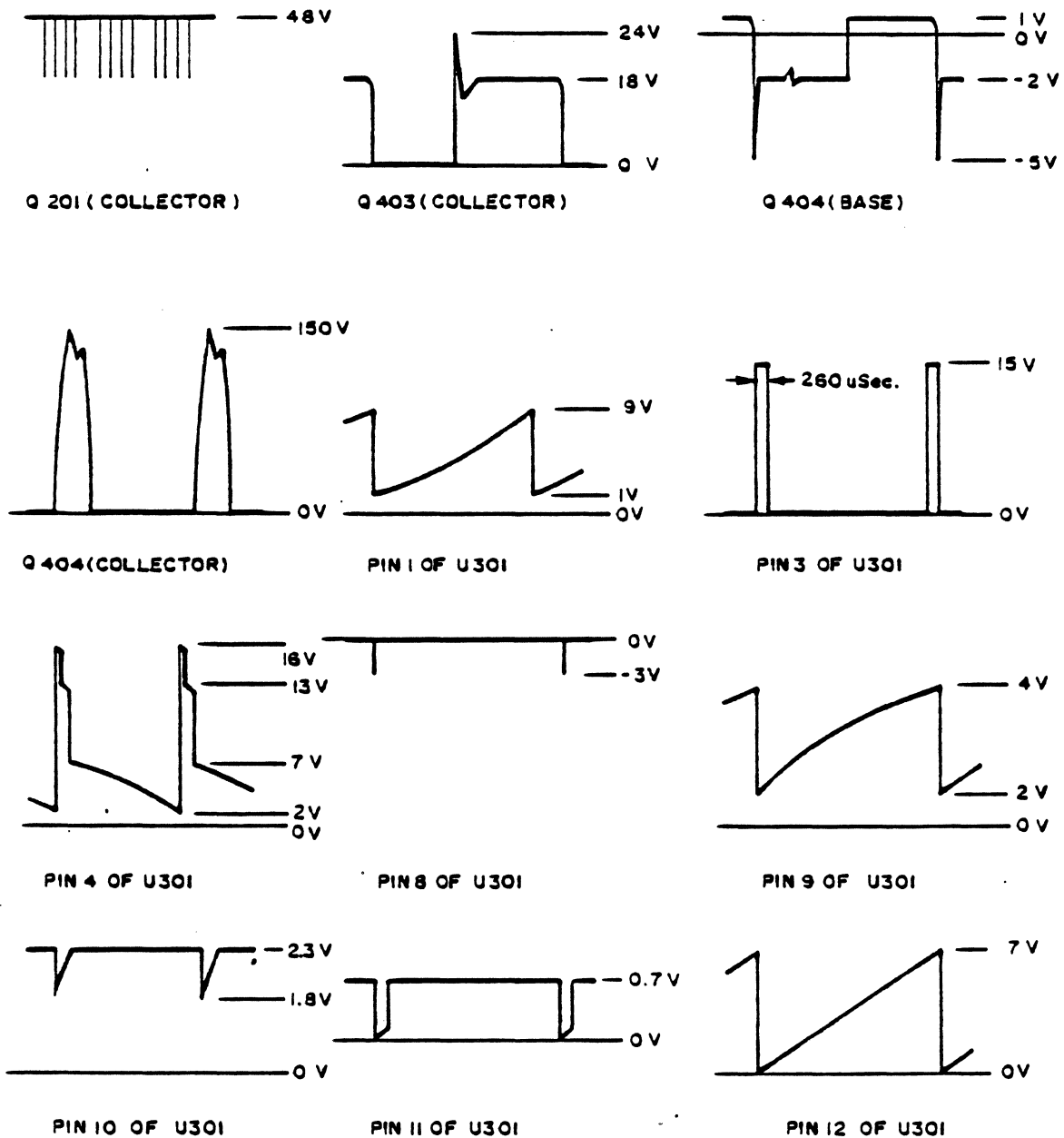
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ADJUSTORS, CONNECTORS & CABLING LOCATIONS

(FIG. 3)

VOLTAGE WAVEFORMS

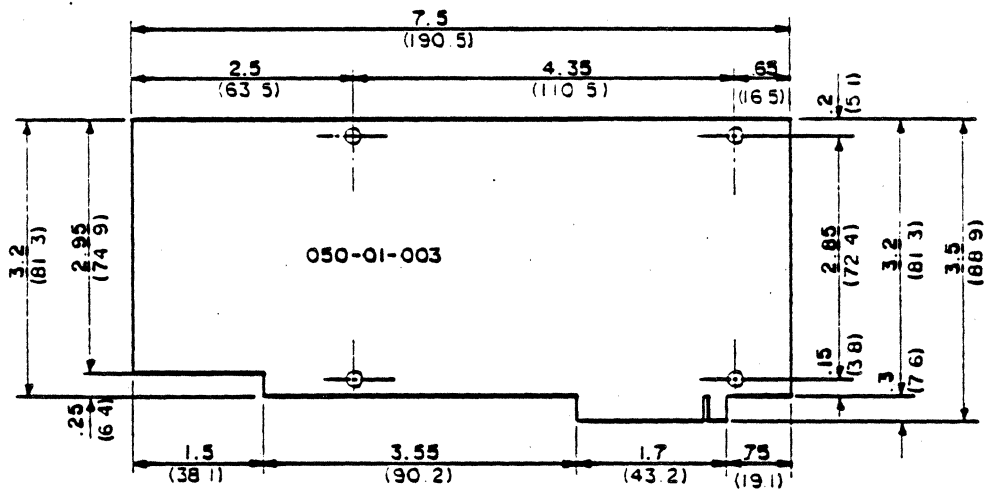


(FIG. 4)

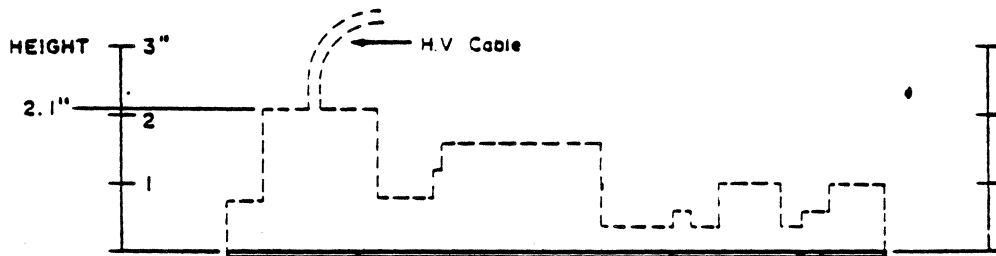
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PC BOARD ASSY DIMENSIONS

INCH
(mm)



(COMPONENT SIDE VIEW)

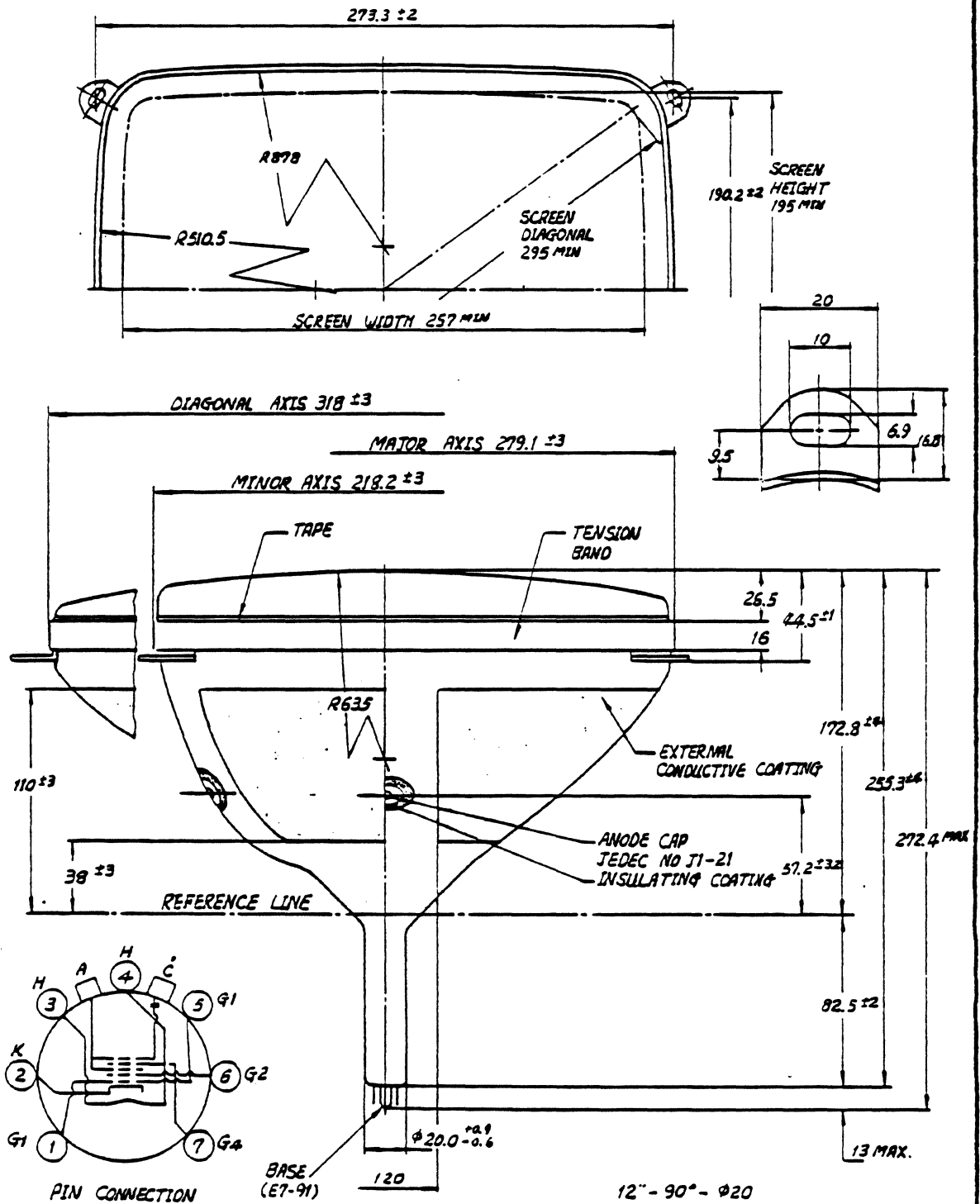


(FRONT SIDE VIEW)

(FIG. 5)

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Mechanical Outline. MECHANICAL DIMENSION Dimension in MM.

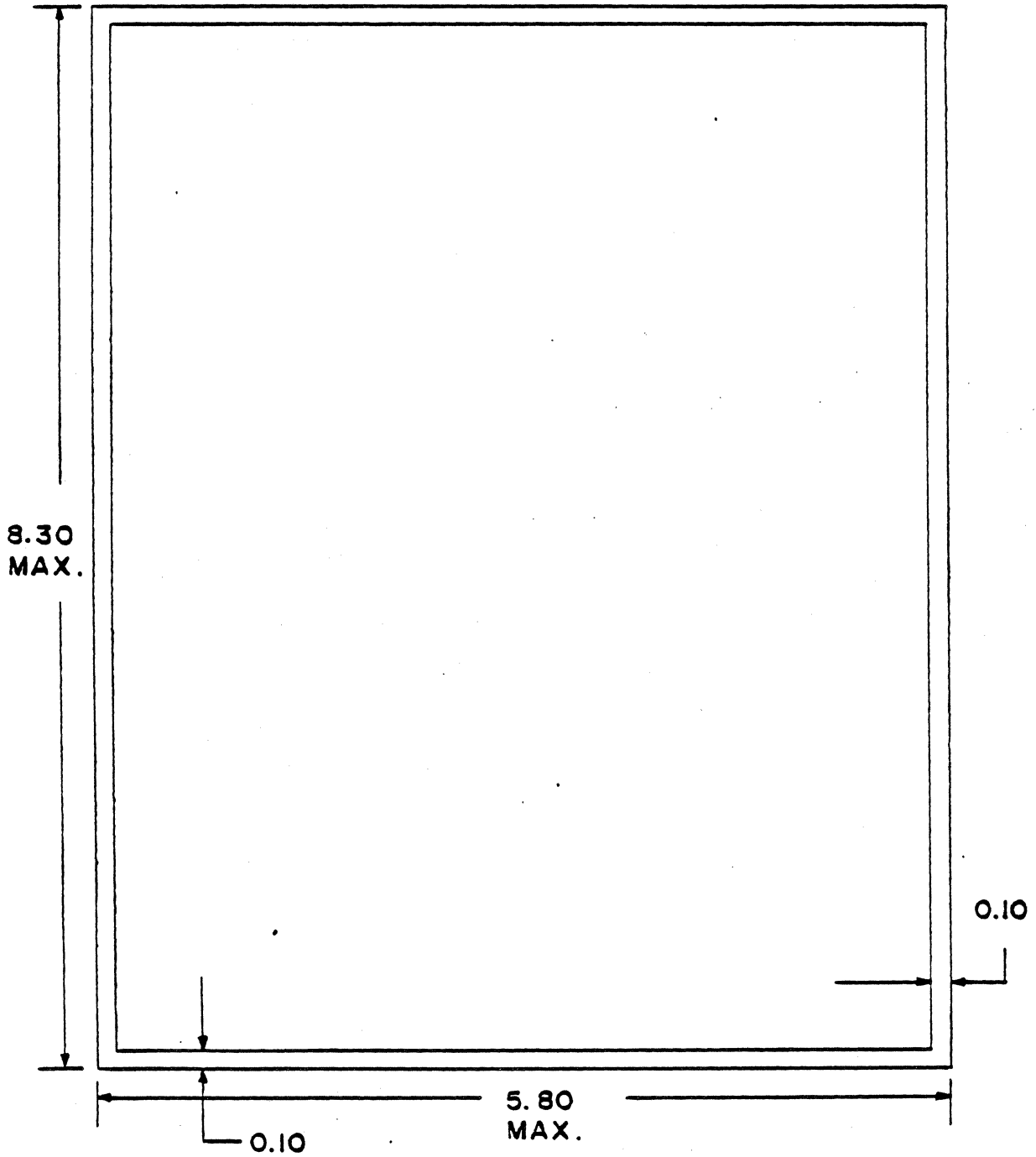


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(FIG. 6)

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12" MONITOR DISPLAY AREA



(FIG. 7)

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PART NUMBER	DESCRIPTION	QTY	LOCATION
916030	Monitor control board assy SAMSUNG. (when ordering this board, please note if board is for the ADM32 or not, The MCB for the 32 must have an extra long cable to monitor installed.)	1	see breakdown
919020	TUBE, std crt Samsung	1	
919018	TUBE, Green crt, Samsung		
919019	YOKE Assy, Samsung	1	
902525	Magnet, ring type (for yoke)	A/R	

THE ABOVE PARTS ARE FOR THE SAMSUNG MONITOR ASSY ONLY!

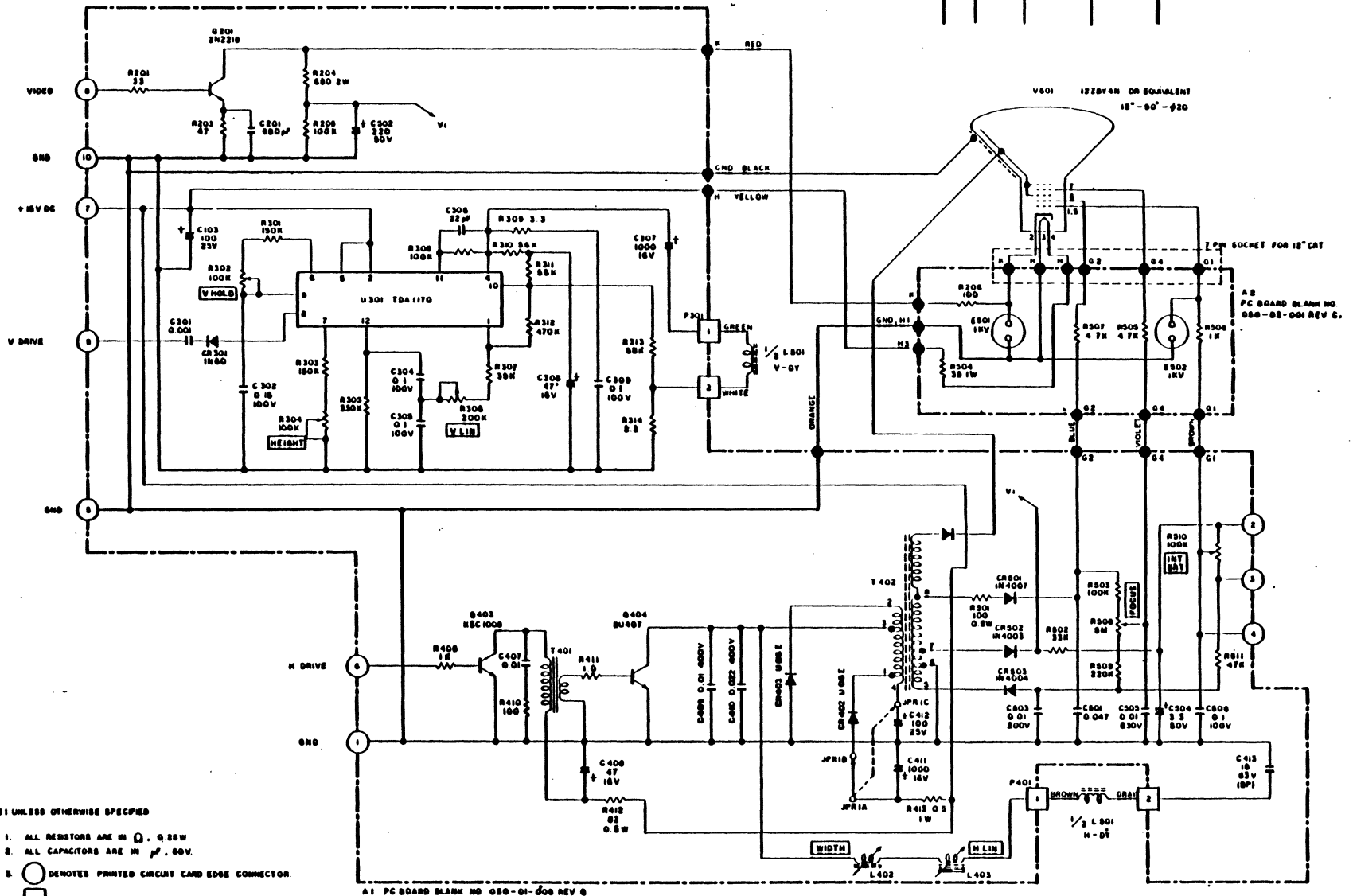
132509-003	Monitor Assy, white (std) Samsung
132509-004	Monitor Assy, Green Samsung

PART NUMBER	DESCRIPTION	QTY	LOCATION
905355	Cap 100uf 25V Electro	2	C103,412
905045	Cap 680pf 50V Ceramic	1	C201
905435	Cap 0.001uf 50V mylar	1	C301
905434	Cap 0.15uf 100V mylar	1	C302
805022	Cap 0.1uf 100V mylar	4	C304, 305, 306, 309
905046	Cap 22pf 50V Ceramic	1	C306
905308	Cap 1000uf 16V Electro	2	C307,411
905365	Cap 47uf 16V Electro	2	C308,408
905436	Cap 0.01uf 100V Mylar	1	C407
905716	Cap 0.01uf 400V Poly	1	C409
905717	Cap 0.022uf 400V poly	1	C410
905366	Cap 16uf 63V bi-polar	1	C413
905718	Cap 0.047uf 630V poly	1	C501
905367	Cap 220uf 50V Electro	1	C502
905437	Cap 0.01uf 200V mylar	1	C503
905368	Cap 3.3uf 50V electro	1	C504
905719	Cap 0.01uf 630V poly	1	C505
908033	Diode 1N60FM Germanium	1	CR301
908528	Diode U06E Silicon	2	CR402,403
808022	Diode 1N4007 Silicon	1	CR501
908034	Diode 1N4003 Silicon	1	CR502
908011	Diode 1N4004 Silicon	1	CR503
917039	Coil, Horiz width HW-160	1	L402
917040	Coil, Horiz Linearity DL-284	1	L403
910030	Trans 2N2219	1	Q201
910530	Trans KCS1008	1	Q403
910510	Trans BU407	1	Q404
913025	IC TDA1170	1	U301
916029	Flyback Transf. output TMF-110	1	T402
916988	Transformer, Horiz Drive	1	T401

ASSY 916030 cont. MONITOR CONTROL BOARD ASSY, SAMSUNG

PART NUMBER		DESCRIPTION	QTY	LOCATION
128533-330	FS	Res 33 ohm 5% $\frac{1}{4}$ w	1	R201
128533-470	FS	Res 47 ohm 5% $\frac{1}{4}$ w	1	R203
903719		Res 680 ohm 5% $\frac{1}{4}$ w	1	R204
128533-104	FS	Res 100K ohm 5% $\frac{1}{4}$ w	2	R308, 205
128533-101	FS	Res 100 ohm 5% $\frac{1}{4}$ w	5	R206, 408, 410, 501, 503
128533-154	FS	Res 150K ohm 5% $\frac{1}{4}$ w	2	R301, 303
901036		Res 100K ohm 20% 1w VAR	2	R302, 304
903050		Res 330K ohm 5% $\frac{1}{4}$ w carb straight	1	R305
901037		Res 200K ohm 20% 1w VAR	1	R306
128533-393	FS	Res 39K ohm 5% $\frac{1}{4}$ w	1	R307
903044		Res 3.3 ohm 5% $\frac{1}{4}$ w	1	R309
903033		Res 56K ohm 5% $\frac{1}{4}$ w	2	R310, 311
903051		Res 470K ohm 5% $\frac{1}{4}$ w carb straight	1	R312
128533-683	FS	Res 68K ohm 5% $\frac{1}{4}$ w	1	R313
903052		Res 2.2 ohm 5% $\frac{1}{4}$ w	1	R314
903053		Res 1 ohm 5% $\frac{1}{4}$ w	1	R411
903559		Res 82 ohm 5% $\frac{1}{2}$ w	1	R412
903613		Res 0.5 ohm 5% 1w metal oxide	1	R413
128533-333	FS	Res 33K ohm 5% $\frac{1}{4}$ w	1	R502
901038		Res 5M ohm 20% 5w VAR	1	R508
128533-224	FS	Res 220K ohm 5% $\frac{1}{4}$ w	1	R509
901035		Res 100K ohm 20% 2w VAR	1	R510
128533-473	FS	Res 47K ohm 5% $\frac{1}{4}$ w	1	R511
129472-390		Res 39 ohm 5% 1w metal oxide	1	R504
128533-472	FS	Res 4.7K ohm 5% $\frac{1}{4}$ w	2	R505, 507
128533-102	FS	Res 1K ohm 5% $\frac{1}{4}$ w	1	R506

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- NOTES: UNLESS OTHERWISE SPECIFIED
1. ALL RESISTORS ARE IN Ω , k , OR M
 2. ALL CAPACITORS ARE IN μF , pF , OR V
 3. \bigcirc DENOTES PRINTED CIRCUIT BOARD EDGE CONNECTOR
 4. \square DENOTES HOUSING CONNECTOR
 5. \bullet DIRECT

A1 PC BOARD BLANK NO 080-01-008 REV 0

DATE	APR 9, 1967	DRA	DESIGN	CHECK	APPD	SCHEMATIC 15" MONITOR SM-12DN4KA	
REV							
SAMSUNG ELECTRON DEVICES CO. LTD. COMPUTER DIVISION						SCALE NONE	DRAWING NO. 20-02-010

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