19" RASTER MONITOR TYPE C

instruction manual supplement

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800-621-1253
In Illinois call 800-572-1324

Williams ELECTRONICS, INC.
3401 N. California Avenue
Chicago, Illinois 60618
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WARNINGS

The chassis and heat sinks are connected to ground. When measuring voltages, connect the negative terminal of the measuring instrument to the chassis.

- **X-RAYS**
  This monitor is designed for minimum X-radiation. A special safety circuit guarantees that even in the event of failure, radiation will never exceed 0.5mR/h. For this reason NEVER alter the CRT circuit in any way.

- **EHV**
  This monitor contains high voltages capable of delivering LETHAL amounts of energy. Avoid harm to the operator; follow precautions set down for the servicing of EHV equipment.

- **CRT**
  The cathode-ray tube is a high-vacuum component and its surfaces are subjected to strong exterior pressure. Take care not to knock or scratch the tube as this could cause its implosion, resulting in personal injury and property damage. Installation personnel must use safety glasses and clothing protective against flying splinters.

- **SHOCK**
  To prevent the possibility of electrical discharges do not expose the monitor to rain or humidity.

X-RAY PROTECTION

(patent no. 91830158.4)

This monitor incorporates a special circuit to eliminate radiation exceeding the legal limit of 0.5mR/h.

A 200V reference voltage (taken from the secondary of the flyback transformer) is fed via a resistive voltage divider to the gate of an SCR. Should component failure cause the EHV to rise above 26.5kV the reference voltage will increase sufficiently to fire the SCR. The SCR then shunts horizontal oscillator Vcc to ground through a current-limiting resistor, thus preventing generation of EHV. The SCR circuit will shut off EHV before it rises to 27kV. At this point, X-radiation is only 0.15mR/h. The horizontal oscillator is disabled until the breakdown has been repaired and the supply reset.
SETUP PROCEDURE

INSTRUMENTS REQUIRED
• Digital multimeter with input impedance of 10M • Oscilloscope with a bandwidth of 10MHz•10/1 probe attenuator

Turn on the monitor and let the circuitry heat up for about 5 minutes. Then adjust the controls for an acceptable image. Next align the chassis according to the following instructions.

☐ POWER SUPPLY WITHOUT SIGNAL
Variable resistor RV 12 adjusts the supply voltage and requires adjustment only following repair. Proceed as follows:
   a) turn brightness grid control all the way counterclockwise.
   b) connect digital voltmeter to SP20 and adjust RV12 to obtain 115VDC.

CAUTION: Voltages greater or less than nominal impair the functioning of the monitor.

☐ RGB INPUT LEVELS [signal: color bars]
Turn RV10 brightness control up all the way; checking voltage at R27, R28, R31, adjust input control RV1/RV2/RV3 [contrast] to obtain 0.6Vpp for each color.

☐ RGB VIDEO OUTPUT [signal: color bars]
   — Adjust RV5, RV7 and R/9 on neckboard to obtain a black level of 140VDC at KG, KR and KB.
   — Adjust RV4, RV6, RV8 for a gain of 50Vpp at KG, KR and KB.
   — Adjust RV10 [Input brightness] for a black level of 160VDC at KG, KR and KB.
   — Adjust G2 to obtain CRT cutoff.

☐ WHITE BALANCE (no signal)
With RV10 adjusted to make a white background visible, correct the gray by means of RV5, RV7 and RV9.

☐ HORIZONTAL OSCILLATOR [signal: crosshatch]
Jumper TP7 to TP8. Adjust RV13 to obtain maximum horizontal stability. Then remove the jumper.

☐ VERTICAL OSCILLATOR [signal: crosshatch]
Adjust RV15 to obtain a slight downward rollover of the image. Then turn back slowly to eliminate rollover.

☐ FOCUS [signal: crosshatch]
Adjust focus grid control for clearest picture.
PERFORMANCE AND OPERATING DATA

1) PRIMARY [HV] VOLTAGE SUPPLY
VOLTAGE .................................................. 98VAC  130VAC
FREQUENCY .............................................. 44Hz  65Hz

WARNING: SHOCK HAZARD! Apply supply voltage ONLY through an isolation transformer with 1.5A capability.

2) EHV
for 19" models .............................................. 22.5kV  25.5kV
NOTE: conditions for above:
1 [beam] = 0mA
DC supply voltage = 1.15VDC

3) CONNECTOR CA

<table>
<thead>
<tr>
<th>PIN</th>
<th>DESCRIPTION</th>
<th>IMPEDANCE</th>
<th>SIGNAL RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>red input</td>
<td>1k nom.</td>
<td>0 to 4V</td>
</tr>
<tr>
<td>2</td>
<td>green input</td>
<td>1k nom.</td>
<td>0 to 4V</td>
</tr>
<tr>
<td>3</td>
<td>blue input</td>
<td>1k nom.</td>
<td>0 to 4V</td>
</tr>
<tr>
<td>4</td>
<td>ground</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>vertical sync pulse</td>
<td>10k nom.</td>
<td>1.5V to 4V</td>
</tr>
<tr>
<td>6</td>
<td>horizontal sync pulse</td>
<td>10k nom.</td>
<td>1.5V to 4V</td>
</tr>
</tbody>
</table>

4) SERVICE SETUP CONTROLS

INTERFACE BOARD
RV 12  supply voltage adjustment—should be set for 115VDC
RV 10  brightness control
RV 1/2/3  contrast

DEFLECTION BOARD
RV 13  horizontal hold
RV 14  horizontal phase
RV 23  vertical shift
RV 17  vertical linearity
RV 15  vertical hold
RV 16  vertical height
B  4  horizontal linearity coil
B  5  horizontal width coil

FLYBACK TRANSFORMER
— G2—brightness control (preset)
— G3—focus control

NECKBOARD
video drive [gain] controls—RV4 [blue], RV6 [green], RV8 [red]
CRT cutoff [black level] controls—RV5 [blue], RV7 [green], RV9 [red]
STATIC CONVERGENCE RINGS

RED AND BLUE STATICS
GREEN STATICS
PURITY RINGS

WAVEFORMS

1. 50V/div 10μS/div
   Blue video drive
   (will vary with input*)

2. 500mV/div 10μS/div
   Flyback pulse H-AFC**
   (reference pulses)

3. 1V/div 10μS/div
   Horizontal trigger pulse

4. 10Vpp/div 5mS/div
   Vertical sweep

5. 200Vpp/div 40μS H-sweep

6. 200Vpp/div 10μS/div
   50μS H-sweep
   (monitors for games with
   Williams system)

*shown: 7-step gray bars
**H = horizontal
AFC = automatic frequency control
HORIZONTAL COMBINATION I.C. PHILIPS TDA 2593

BLOCK DIAGRAM

RATINGS
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage
at pin 1 (voltage source) \( V_{1-16} \) max. 13.2 V
at pin 2 \( V_{2-16} \) max. 18 V

Voltages
Pin 4 \( V_{4-16} \) max. 13.2 V
Pin 9 \( \pm V_{9-16} \) max. 6 V
Pin 10 \( \pm V_{10-16} \) max. 6 V
Pin 11 \( V_{11-16} \) max. 13.2 V

Currents
Pins 2 and 3 (peak value) \( I_{2M-13M} \) max. 400 mA
Pin 4 \( I_4 \) max. 1 mA
Pin 6 \( \pm I_6 \) max. 10 mA
Pin 7 \( - I_7 \) max. 10 mA
Pin 11 \( I_{11} \) max. 2 mA
Total power dissipation \( P_{tot} \) max. 800 mW
Storage temperature \( T_{stg} \) -25 to +125 °C
Operating ambient temperature \( T_{amb} \) -20 to +70 °C

CHARACTERISTICS at \( V_{VI-16} = 12V; T_{amb} = 25 \) °C

Sync separator
Input switching voltage \( V_{9-16} \) typ. 0.8 V
Input keying current \( I_g \) 5 to 100 \( \mu A \)
Input leakage current at \( V_{9-16} - 5V \) \( I_g \) \( < \) 1 \( \mu A \)
Input switching current \( I_g \) \( \leq \) 5 \( \mu A \)
Switch-off current \( I_g \) \( < \) 100 \( \mu A \)
typ. 150 \( \mu A \)

Input signal (peak-to-peak value) \( V_{9-16} \) [p-p] 1 to 7 V
### DE DEFLECTION

<table>
<thead>
<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
<th>REF. NO.</th>
<th>QTY.</th>
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### RESISTORS

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### CAPACITORS

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### INDUCTORS

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### MISCELLANEOUS PARTS

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### IE INTERFACE

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</tbody>
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**DE DEFLECTION code 62001590**

**IE INTERFACE code 62001500**
### PARTS LIST

#### MISCELLANEOUS PARTS
- 27900010: Ferris beads 8 mm
- 34030004: Test terminal
- 34023395: AMP connector 8D 5406-1/2/1
- 34025103: MOLDEX connector 3190-03
- 34025106: MOLDEX connector 3190-06
- 50142910: Printed circuit interface

#### NE C.R.T. BASE
- Code 62001580

### ALUMINUM HEAT SINK ASSEMBLY
- Code 62000613

<table>
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<tr>
<th>CODE</th>
<th>DESCRIPTION</th>
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<tr>
<td>20430200</td>
<td>transistor BU 206 A</td>
<td>TR 17</td>
<td>1</td>
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<tr>
<td>22621000</td>
<td>wirewound resistor 15 W 10% 10 kΩ</td>
<td>R 98</td>
<td>1</td>
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<tr>
<td>34020111</td>
<td>socket for transistor TO3</td>
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<td>1</td>
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<tr>
<td>40202010</td>
<td>self-tapping screw 2.9 x 10 TCC</td>
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<td>40202014</td>
<td>self-tapping screw 2.9 x 14 TCC</td>
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<td>40202070</td>
<td>washer 3.2 x 6</td>
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<td>50110050</td>
<td>heat sink</td>
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<tr>
<td>60420180</td>
<td>mica insulator for TO3/2000 V</td>
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<td>1</td>
</tr>
</tbody>
</table>

#### SEMICONDUCTORS
- 20100000: diode 1N4148
- 20400022: transistor BC 547 B
- 20420050: transistor BF 871

#### RESISTORS
- 21527000: res. 1/2 W 5% 100 kΩ
- 21527001: res. 1/2 W 5% 500 kΩ
- 21527002: res. 1/2 W 5% 10 MΩ
- 21527003: res. 1/2 W 5% 1 MΩ
- 21527004: metal oxide res. 2 W 5% 33 kΩ
- 23014073: resistor 20 MΩ, 5% 33 kΩ

#### CAPACITORS
- 24321000: electrolytic capacitor 15 W 35 μF 16 V
- 24321001: electrolytic capacitor 15 W 5 μF 250 V
- 25041000: ceramic capacitor 100 pF 10 kΩ 50 V
- 26510070: ceramic capacitor 10 μF 50 V
- 26510060: ceramic capacitor 50 μF 100 V

#### MISCELLANEOUS PARTS
- 50110030: diode 1N4148
- 27800010: Ferris beads 8 mm
- 34020004: terminal AMP Fast-on M 73508/2
- 50214290: socket printed circuit

### VERTICAL ALUMINUM HEAT SINK ASSEMBLY
- Code 62001390

<table>
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<th>DESCRIPTION</th>
<th>REF. NO.</th>
<th>QTY</th>
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<td>20620080</td>
<td>integrated circuit MA 7812</td>
<td>IC 4</td>
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<td>20620270</td>
<td>integrated circuit TCA 2653 A</td>
<td>IC 3</td>
<td>1</td>
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<td>40200650</td>
<td>self-tapping screw 5/36 x 5 TCC</td>
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<tr>
<td>50111530</td>
<td>aluminum heat sink</td>
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### POWER UNIT HEAT SINK ASSEMBLY
- Code 62001510

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<tr>
<td>20430330</td>
<td>transistor HAN 20430430</td>
<td>TR 9</td>
<td>1</td>
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<tr>
<td>34020201</td>
<td>socket for transistor TO3</td>
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<td>40020910</td>
<td>self-tapping screw 2.9 x 14 TCC</td>
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<td>40020914</td>
<td>self-tapping screw 2.9 x 14 TCC</td>
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<td>heat sink 205 MO 32</td>
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<td>50210210</td>
<td>mica insulator for TO3/500 V</td>
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