TYPE

765 SERIES OSCILLOSCOPE

Instruction Manual

Serial No. _____

DUMONT
OSCILLOSCOPE LABORATORIES, INC.
40 FAIRFIELD PLACE WEST CALDWELL, NEW JERSEY 07006

Part No. 6704-0895

CONTENTS

The product described in this instruction book was formerly manufactured by the Instrumentation Division of Fairchild Camera and Instrument Corporation. It is now manufactured by DUMONT OSCILLOSCOPE LABORATORIES, INC. All references to Fairchild, and Fairchild part numbers should be interpreted as DUMONT.

DUMONT
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SECTION 1
TECHNICAL SUMMARY

1-1. INTRODUCTION

The Du Mont Type 765 Family of Oscilloscopes consists of an Indicator Unit and any two of a number of available plug-in modules. The Indicator Unit contains the power supplies, a cathode-ray tube with associated circuitry, and an internal amplitude calibrator.

The plug-in modules take the place of the vertical and horizontal deflection systems of a conventional oscilloscope, and their outputs are connected directly to the deflection plates of the cathode-ray tube.

All plug-ins in the 7600 Series are primarily designed for use in the Y cavity of the Type 765 family, while plug-ins in the 7400 Series may be used universally in all the oscilloscopes. The plug-in modules may be selected to give these Du Mont oscilloscopes a degree and type of performance demanded of them by the particular application for which they are to be used.

Section 2 of this manual describes the operation and maintenance of the Indicator units with the modules inserted.

Section 3 of this manual contains the circuit description, trouble-shooting instructions and calibrating procedures for the Indicator units alone.

Section 4 of this manual contains instructions for performance assurance tests to ascertain proper operation and calibration of the Indicator.

Separate manuals are provided for each of the plug-in units. If desired, these manuals may be inserted into the same binder supplied with your Indicator unit.

A Parts List and Schematic diagrams, are located at the rear of each of the manuals.

1-2. LIST OF RECOMMENDED ACCESSORIES

Type or Part Number	Description
	ATTENUATOR PROBES
	(10:1 terminated in BNC type connector)
4290	10M, 10 pf; 4-ft. cable
4298	10M, 14 pf; 8-ft. cable
4299	10M, 12 pf; 6-ft. cable
	COLOR FILTERS
4800 5861	Amber for P7 screen
4800 5862	Blue for P11 or P7 screen
4800 5863	Green for P1, P2 & P31 screen
4800 6101	Neutral, circularly polarized
4501 0452	Anti-parallax scale
	TABLES & RACK SLIDE
2601-A	Movable table, non-adjustable shelf
2602	Movable table, adjustable shelf
4270	Scope traveler, collapsible
7085	Slide drawer (for rack-mounted unit)
	TERMINAL ADAPTERS
7084	Male BNC type connector to Type C female adapter, UG-635/U
7080	Scope binding post to BNC adapter
	TERMINATING RESISTOR
4285	50-ohm, 2-watt, Type C connector
	VIEWING ACCESSORY
276-C	Viewing Hood
	CAMERAS
450/450A 453/453A	Oscilloscope-Record Cameras with suitable accessories
	CABLE ASSEMBLY
4294	Extension cable for remote operation of the plug-in from the oscilloscope
	OPERATIONAL ACCESSORY KIT
4296	Complete kit contains:

Qty.	Type	Description
1	276-C	Viewing Hood
2	4285	50-ohm termination
1	4290	Probe
		Terminal Adapters
2	4287	Right angle; UG-306A/U
2	UG-636/U	C male to BNC female
2	UG-1090/U	BNC to plug tip (banana)

INTERNAL NO PARALLAX GRATICULE KITS

7060 — For 765/765M/766/767 Oscilloscopes

CRT Type	Internal Graticule
K2257P- K2258P-	illuminated (white) black

7061 — For 765H/765MH/766H/767H Oscilloscopes

CRT Type	Internal Graticule
KC2316P- KC2317P-	illuminated (white) black

A schematic of the above kits is shown on the overall high-voltage schematic at the end of the Instruction Manual.

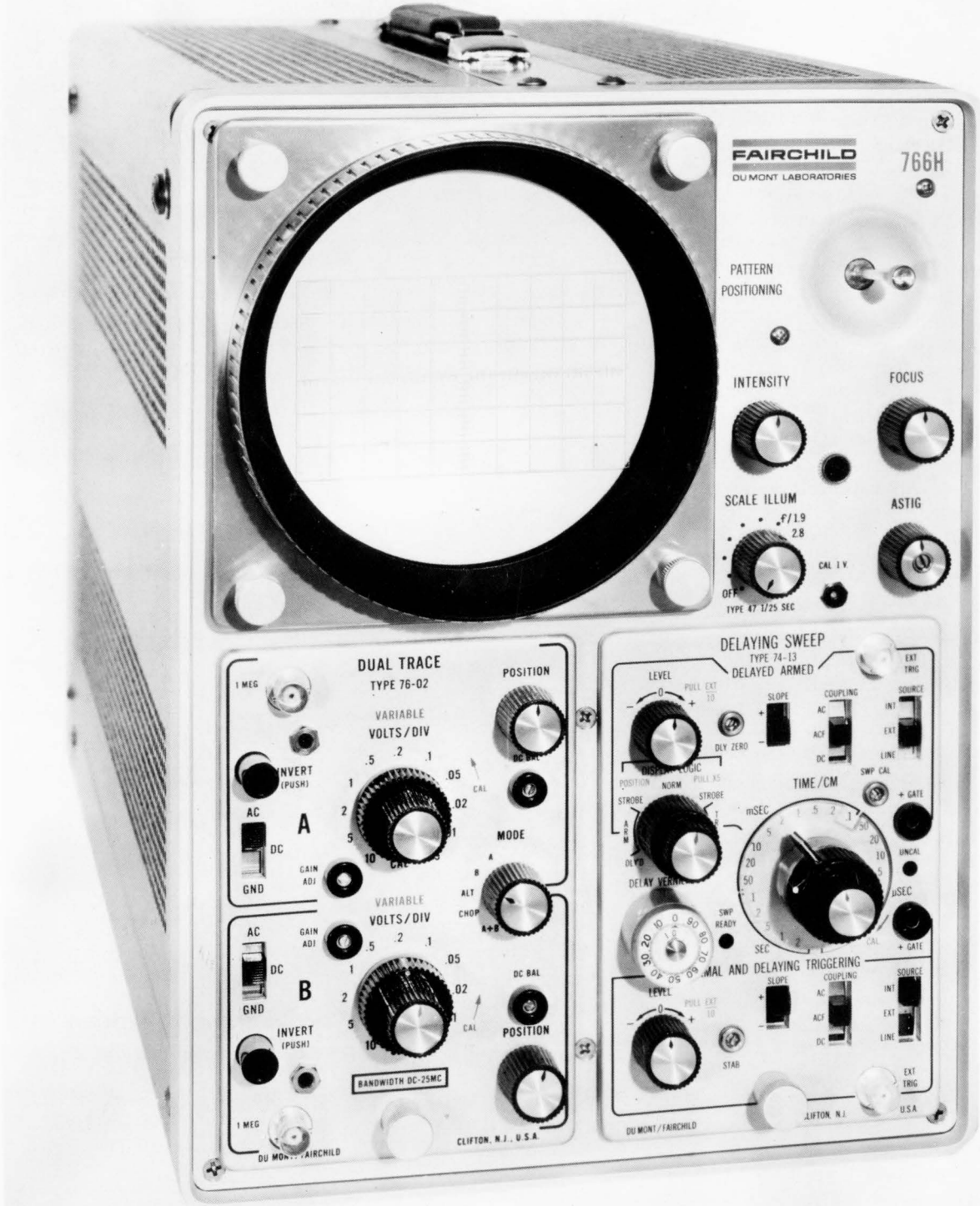


FIGURE 1-1. FAIRCHILD TYPE 766H TRANSISTORIZED OSCILLOSCOPE

TABLE 1-1
TECHNICAL SUMMARY

TYPE 765 FAMILY OF INDICATORS

CATHODE-RAY TUBE DATA

Type 765 Series (765/765M/766/767)	Type K2130P-2/B single beam, electrostatic focus and deflection cathode-ray tube is normally supplied. The tube features high-deflection sensitivities, high-writing rate, and a pattern electrode to minimize pattern distortion. Beam gating electrodes are provided to cut off the beam independent of grid Number 1.
Type 765 High-Voltage Series (765H, 765MH, 766H, 767H)	Type KC2321P-2/B signal beam frame grid electrostatic focus and deflection, cathode-ray tube is normally supplied. Other features are identical to the Type K2130P CRT listed above.
Optional Phosphors	P1 phosphor for visual use; P7 phosphor for long persistence low frequency or transient observation; P11 phosphor for photographic use; and P2 phosphor for combination visual and photographic use. All other phosphors available on special order.
Aluminization	All tubes are aluminized for maximum light output and to prevent screen charge distortions.
Over-all Accelerating Potential	
765 series	5000 volts
765H series	13,000 volts
Bezel	Light-proof bezel provides firm mount for an oscilloscope camera and permits ready interchange of filters and scales.
CRT Scale	Engraved edge-lit scale and appropriate color filter over face of tube. Scale illumination control varies illumination level from zero to intensity adequate for photographic recording. Internal no parallax graticule is optional; white scale may be edge lit for photographic recording.
Display Area	6 cm by 10 cm
Pattern Positioning (Type 766/766H only)	A single lever control (joystick) permits positioning of the display in the horizontal and vertical direction, for registration of the pattern with the scale.
CRT Direct Input (X Axis)	Deflection Factor: from 10 volts/cm to 14 volts/cm (horizontal)
CRT Direct Input (Y Axis)	Deflection Factor: from 5.2 volts/cm to 7.2 volts/cm (vertical)
CRT Direct Input (Z Axis) (766/766H/767/767H only)	Negative pulse to grid of CRT blanks trace. 25 volts are required into an impedance of approximately 1 megohm coupled via 0.01 μf capacitor to dim trace.

TABLE 1-1. TECHNICAL SUMMARY (Continued)

VOLTAGE CALIBRATOR

Amplitude	Cal. 1V, peak-to-peak square wave signal available at pin jack on front panel of Main Frame (±2½% maximum, ±1% nominal); fast rise and fall time permits adjustment of attenuator probe.
Frequency	Locked to power-line frequency. This waveform may be used to calibrate the time axis wherever the power-line frequency is a controlled standard.
Access to Plug-ins	The same 1-volt calibrator signal is inserted directly into the input stage of the amplifier plug-in via the attenuator switches to aid in standardizing gain.

POWER SUPPLY

Power Requirements	
Line Voltage	From 105 to 125 volts or from 210 to 250 volts at 60-cycle line.
Line Frequency	Operation from 48 through 1000 cycles; line voltage excursion is reduced at extremes of frequency range and where power line distortion exceeds 5%.
Power	From 150 to 230 watts depending on the plug-in used.
DC Power Supplies	All supplies including the critical tube heaters are electronically regulated.

ENVIRONMENTAL SPECIFICATIONS

	765M/765MH	765/766/767 765H/766H/767H
Temperature Range		
Operating	−30°C to +50°C	0°C to +50°C
Storage	−40°C to +85°C	−40°C to +85°C

Note: 765M/765MH; A 200-watt thermostatically controlled standby heater is incorporated for low temperature operation.

Altitude Range ..... Sea level to 15,000 feet

PHYSICAL CHARACTERISTICS (Main Frame)

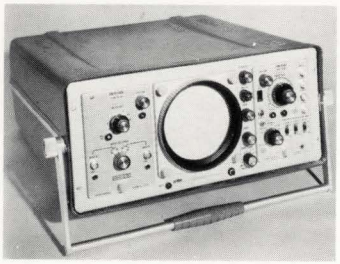
	Portable Models 765-	Bench Models 766-	Rack-Mounted Model 767-
Height	8¼″	13¾″	7″
Width	17¾″	9¾″	19″
Depth	24″	20⅝″	20″*
Weight	18 lbs.	27 lbs.	27 lbs.
Carrying Case	9 lbs.	.....	.....
Shipping Weight	37 lbs.	37 lbs.	37 lbs.

NOTE: A minimum of 2″ clearance must be maintained for the rack-mounted model to assure adequate cooling. Do not subject the unit to the hot exhaust air of adjacent equipment.

*Behind panel. With mounting brackets reversed — 18¾ inches.

Type 766 Bench Model

Type 767 Rack Model



Type 765 PortaScope

Type 765 PortaScope with complete Carrying Case

SECTION 2
OPERATING INSTRUCTIONS

2-1. INTRODUCTION

This section of the Instruction Manual describes the operation and maintenance of the Indicator Unit with the Plug-in modules inserted. Operation of the Indicator Unit with the plug-in modules inserted, is much the same as that of a conventional Du Mont oscilloscope with corresponding vertical and horizontal deflection systems. Full operating instructions for each of the plug-in modules are contained in the manual which accompanies it.

2-2. PRELIMINARY INFORMATION

The Indicator Unit contains a low-voltage power supply, a high-voltage power supply and cathode-ray tube circuitry, and a voltage calibrator.

The low-voltage power supply provides regulated and unregulated voltages for application throughout the instrument. The cathode-ray tube circuitry provides the necessary controls and adjustments for presenting a sharp display of the desired intensity for displaying the signals applied to the deflection plates by the plug-in modules.

The voltage calibrator yields a 1-volt peak-to-peak fast rise and fall time square wave signal for use in normalizing the gain of the plug-in amplifier modules and for setting the timing of the time-base plug-in module wherever the power-line frequency is a controlled standard.

2-3. POWER REQUIREMENTS

The line transformer in this oscilloscope can be set for either 115-volt or 230-volt operation; a plate on the rear of the instrument specifies the voltage for which your instrument is set. If the instrucment is set for 115-volt operation, it will operate properly at any line voltage between 105 and 125 volts at 60 cycles. If it is set for 230-volt operation, it will operate properly at any line voltage between 210 and 250 volts at 60 cycles. Line voltages beyond the limit specified may cause the power supplies to go out of regulation. Power-line voltage excursion will be more limited over the permissible power-line frequency range of 48 to 1000 cycles. Harmonic distortion should not exceed 5%.

If desired, this instrument can be converted from 115-volt operation to 230-volt operation, or vice versa, by merely setting the 115V/230V Selector switch to the desired voltage. Refer to the low-voltage schematic drawing to ascertain the proper fuse to use when instrument is connected to either the 115-volt or 230-volt line.

CAUTION

Do *not operate* the oscilloscope on 230-volt mains with the 115V/230V Selector switch set to 115 volts. The fuses may not protect the transistors and diodes from this improper application of double-line voltage.

Although primarily designed to operate at a line frequency between 50 and 60 cycles, this instrument can be operated at any line frequency from 48 cycles to 1000 cycles. However, slightly higher line voltages are required at the higher frequencies.

2-4. OPERATING INSTRUCTIONS

Any of the plug-in modules may be inserted in either of the cavities in the front of the instrument. The module on the right controls the horizontal deflection of the beam and the module on the left controls the vertical deflection of the beam. Thus, it is possible to change from a horizontal time sweep to a vertical time sweep merely by changing the position of a time-base module. However, there is no provision for coupling an unblanking pulse from the left hand module to the cathode-ray tube, so when a vertical sweep is used, the trace is not blanked between sweeps. X-Y operation is obtained by using amplifier modules in both oscilloscope cavities. (The right-hand cavity is often referred to in the plug-in manuals as the "X-Axis" cavity; the left-hand cavity is referred to as the "Y-Axis" cavity.) The procedure for making the adjustment on each plug-in is described in its individual manual.

Intensity modulation of the CRT beam is possible through the Z INPUT connector at the rear of the oscilloscope.

To remove a plug-in from the Main Frame, simply unscrew the knurled thumbscrew at center bottom of unit and pull it free of the Main Frame. The plug-in unit is provided with a powerline interlock jumper on its connector, hence all power is automatically disconnected whenever a plug-in is removed.

When you change a module from one cavity of the Indicator Unit to the other, you must adjust the gain of the plug-in unit to allow for the difference in vertical and horizontal sensitivity of the cathode-ray tube. This is accomplished by means of the GAIN ADJ or SWP CAL front-panel screwdriver controls on the plug-in modules and permits normalization of the plug-ins to any Main Frame.

2-5. REMOVAL AND REPLACEMENT OF PARTS

If it is necessary to order a replacement component from the factory, always give the Type Number and

Serial Number of the instrument. Before ordering parts for in-warranty replacement or purchasing them for out-of-warranty replacement, be sure to consult the Parts List in this manual. The Parts List gives the values, tolerances, ratings, and Du Mont part number for all electrical components used in the instrument. This will help to expedite service. Identification of replaceable components are shown in Section 3, Figures 3-2 through 3-5.

The procedure for replacing most parts in this instrument is obvious, therefore specific instructions for their removal are not required.

2-6. CATHODE-RAY TUBE REPLACEMENT

To remove the cathode-ray tube, first remove the covers, disconnect the tube socket and the four leads connected at the neck of the tube. Remove the bezel and loosen the tube clamp at the base of the CRT. Pull the cathode-ray tube straight out through the front panel. Be careful no to bend or break the neck pins on the CRT as the tube is removed. Install the new cathode-ray tube by the reverse of the foregoing procedure. Be sure to align the scale to the CRT trace and scan aperture.

After the cathode-ray tube has been replaced, it may be necessary to recalibrate. Special attention should be given to recalibration of the time-base sweep rates and to the amplifier sensitivities.

2-7. SERVICING HINTS (Figure 2-1)

This portion of the Instruction Manual is intended to facilitate isolation of trouble occurring within the Main Frame or to one of the plug-in modules.

If the trouble is isolated to one of the plug-in units, refer to the appropriate module manual for further information. If the trouble is confined to the Main Frame, refer to Section 3 of this manual for a list of Test Equipment required and for more detailed information.

In the event of improper equipment performance, the following suggestions are recommended:

1. Remove the side covers and inspect for faulty components. Check the fuses in each power supply buss. Measure the voltages at the test points in the Main Frame. If all the above are within specifications, the problem will most likely be in the plug-ins. It is suggested that other plug-ins known to be operating properly be inserted on a substitution basis. The faulty plug-in is thereby isolated and may now be given remedial attention. Refer to Figure 2-1 for an over-all functional block diagram of the system.

2. Whenever an apparent trouble is pin-pointed, make sure that it is not caused by improper setting of the panel controls. For instance, if the TRIGGER SOURCE, SLOPE, or SOURCE controls are improperly set on the Time-Base Plug-in, then apparent triggering problems are manifested.

3. When using accessory probes or adapters, be sure the trouble is *not* originating in the accessory, before suspecting the oscilloscope itself.

4. When it has been determined that a specific trouble exists and has been localized to a given circuit within a given unit, then make a visual inspection of that circuit. Many troubles, such as loose wires, scorched parts, may be exposed by this method. Obviously, you should find and eliminate the cause of charred resistors or over-stressed capacitors before replacing damaged component.

5. Localizing the trouble is made easier by use of an oscilloscope to check waveforms. Use a high impedance probe while trouble shooting.

6. Sometimes it may be necessary to move the plug-in unit from one cavity to the other in order to gain access to the particular part of the circuit that requires checking. A Du Mont Type 4294 Extension Cable Accessory is available and permits the plug-in unit to be operated while extended through the front or side of the oscilloscope.

2-8. TROUBLE SHOOTING INFORMATION

Frequently, many oscilloscope ailments may be discovered through an erroneous display on the screen or by the conspicuous absence of a display. The information in the paragraphs to follow will pin-point this information according to the symptoms presented to the operator.

a. A Naked Screen

If the operator is not able to obtain a trace or spot on the screen, substitute other plug-ins known to be operating properly. Adjust the INTENSITY control and observe the screen for a spot on trace. If the screen remains blanked, the trouble is confined to the Indicator or Main Frame Unit. Refer to Section 3 of this Instruction Manual for diagnostic and remedial procedures.

b. Insufficient Deflection

If the horizontal or vertical deflection signal cannot be set to the proper value with the front-panel screwdriver controls, GAIN ADJ or SWP CAL on the plug-ins, then check the output of the low-voltage regulated supplies at Test Points, TP1001 through TP1004, located on the Main Frame. The high-voltage Test Point is TP2001, also located on the Main Frame chassis. If these voltages check out alright, the trouble resides in one of the plug-ins. If there is insufficient vertical deflection, it is in the left-hand module; if there is insufficient horizontal deflection, it is in the right-hand module. Refer to the appropriate plug-in module Instruction Manual for further information.

c. Improper Sweep Timing

A front-panel screwdriver control, SWP CAL, is provided on the Time Base Plug-in to permit normalization of this module to any main frame. If this control does not have sufficient range, then check the output

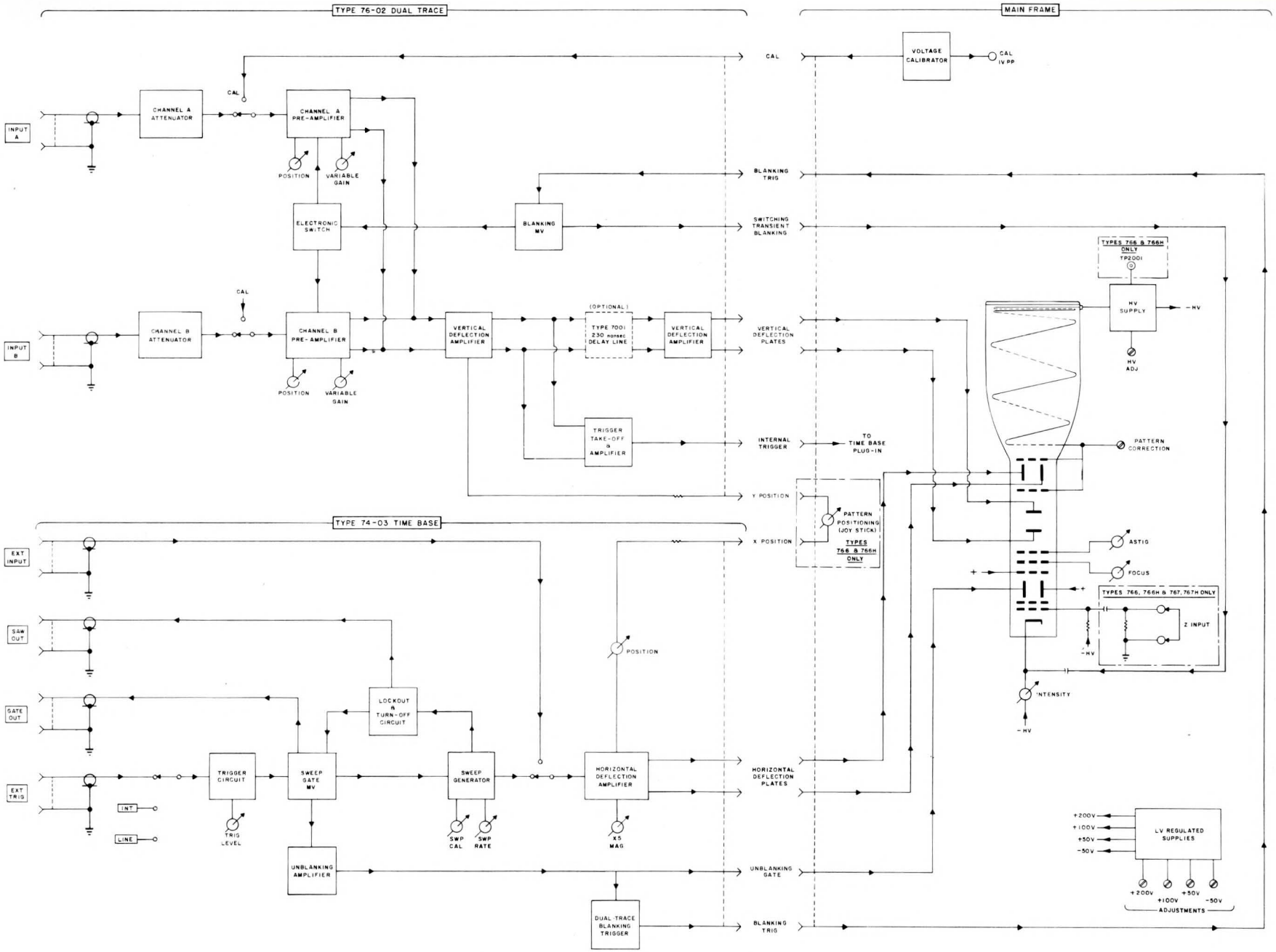


FIGURE 2-1. OVER-ALL BLOCK DIAGRAM

of the regulated supplies at the Test Points, TP1001 through TP1004, for the low voltages, and at TP2001 for the high voltage. If these voltages are normal, the trouble is in the Time Base Plug-in itself. If one or more of these regulated voltages are not as specified, then check out the plug-in as described in the preceding paragraph.

d. Improper Triggering

If external and line triggering modes are satisfactory, but the internal triggering mode is not, then the trouble may reside in the trigger take-off circuit of the Y Plug-in amplifietr that the operator is using. However, if improper triggering cannot be obtained from any of the triggering sources, the trouble probably resides in the Time Base Plug-in itself. Refer to the Time Base Plug-in Instruction Manual for more information.

e. Waveform Distortion

If the display under observation is distorted, but there is no other manifestation of trouble such as insufficient deflection, improper sweep rate etc., then the problem is confined to the plug-in which is amplifying the distorted signal.

2-9. PREVENTIVE MAINTENANCE

This unit is a stable instrument that will provide many hours of trouble-free operation. However, to insure the reliability of measurements, we suggest that you recalibrate the instruments after each 500 hours of operation or every six months if used intermittently. Also, the calibration of a unit should always be checked and adjusted as necessary after the repair or replacement of any component in the unit. The complete adjustment procedure for the Main Frame is given in Section 3 of this Instruction Manual. The internal calibrator or a more precise standard may be employed to set the front-panel screwdriver GAIN ADJ or SWP CAL controls on the plug-ins. Refer to the appropriate plug-in Instruction Manual for calibration procedures for these modules.

The proper procedure for testing and calibrating this instrument is with both plug-ins inserted. When performing a complete calibration, the Main Frame should be checked first, then the Y Plug-ins, and finally the Time Base Plug-in. Either or both of the plug-in units can be calibrated separately, however, the regulated power supplies in the Main Frame should always be checked before calibrating any part of the instrument.

SECTION 3
MAINTENANCE AND RECALIBRATION

3-1. INTRODUCTION

This section of the Instruction Manual contains the circuit description, trouble-shooting instructions, and calibrating procedures for the Main Frame or Indicator Unit alone.

3-2. CIRCUIT DESCRIPTION FOR LOW-VOLTAGE REGULATED SUPPLIES (Figure 3-1)

a. Power Transformer

Plate and heater power for this instrument is provided by a single power transformer, T1001. The primary is wound with two equal 115-volt windings that can be switched either in parallel for 115-volt operation, or in series for 230-volt operation via the 115V/230V Selector switch, S101. The secondary contains four separate windings which provide power to the regulated supplies and two separate heater windings.

b. Regulated Supplies

Four regulated and three unregulated supplies are provided with output as shown in Figure 3-1, Functional Block Diagram of the Power Supply. All of the regulated supplies are of the constant-output voltage series-passing type. The basic reference for all of the regulated supplies is the fixed drop across V101. This gas diode, V101, maintains a constant voltage drop of about 85 volts across itself within a broad current range.

This constant drop or reference voltage source is applied across a divider consisting of R1039, R1041, and R1042. A portion of this fixed voltage is tapped by the —50V ADJ potentiometer, R1041, and is applied to the base of Q114 which subsequently establishes the reference level for the —50V regulated supply. Potentiometer, R1041 is adjusted so that the output is precisely —50 volts. The minus 50-volt output is also the voltage reference source for the other low-voltage regulated supplies. Thus, voltage adjustments are always made in the sequence starting with the —50-volt supply and ending with the +200-volt supply.

Since the operation of the low-voltage regulated supplies are identical, only the +50-volt supply is described. CR1005 and CR1006 are connected in a conventional full-wave rectifier circuit. The rectified output is capacitively filtered by C1012 and C1013 and shunted by resistor R1027 and applied to the voltage regulator.

Operation of the regulator is as follows: assume the output voltage tends to decrease. This will lower the base voltage of the error detector dc amplifier, Q112, and raise the base voltage of emitter follower, Q111. The increase in voltage at the emitter of Q111 is applied to the base of the series-passing transistor, Q113. The resultant increase in voltage at the emitter of Q113 is such as to return the output voltage to its proper value.

A fail-safe circuit has been provided for the series-passing transistors to protect them against transient overload. In the event there is a short circuit, zener diode CR1013 comes into play to preserve the transistors. This diode will start to conduct before the breakdown voltage of series-passing transistor, Q113, is exceeded, and shunt the excess current around the transistor. F104 protects the zener diode from damage due to excessive currents.

c. Voltage Calibrator

The power-line frequency voltage from T1001 is applied to the base of the voltage calibrator, Q118, through limiting resistor, R1051. Negative and positive voltage excursions will drive the transistor into and out of conduction at the line-frequency rate. The resulting square wave is applied to a voltage divider consisting of R1052, R1053, and R1054. The attenuated calibrator output of one volt peak-to-peak is coupled to the amplifier plug-in when the VOLTS/DIV switch is set to CAL. The plus 100-volt supply and the saturation voltage of the transistor will determine the peak-to-peak voltage excursion of the calibrator waveform.

3-3. CRT CIRCUIT

a. CRT Beam Control Circuits

The INTENSITY control, R2016, part of the negative high-voltage divider, is used to vary the cathode-ray tube grid voltage to adjust the beam current. The FOCUS control, R2014, varies the voltage at the focusing anode to set the second cross-over point right at the screen of the cathode-ray tube. The ASTIGmatism control, R2022, is provided to vary the voltage at the astigmatism anode to focus the spot in both axes simultaneously. The PATTERN CORRection service adjustment, R2021, is set to vary the field the cathode-ray beam encounters as it emerges from the deflection system to control the linearity at the extremes of deflection.

b. High-Voltage Power Supply

Accelerating voltages for the cathode-ray tube are obtained by rectifying a 60 Kc high voltage produced by a vacuum-tube oscillator. V202 is the oscillator tube connected as a Hartley oscillator with the primary of

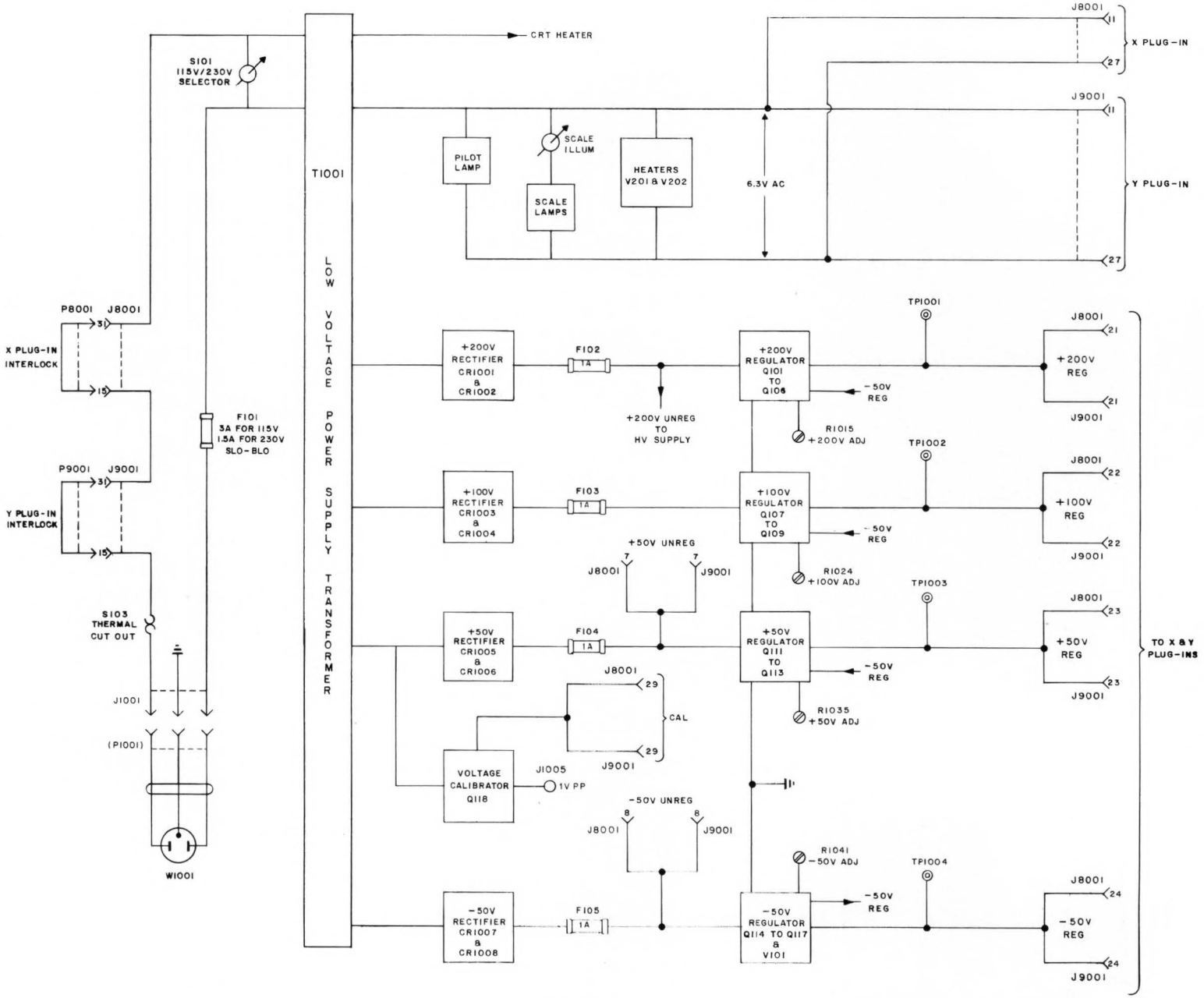


FIGURE 3-1. MAIN FRAME LV POWER SUPPLY FUNCTIONAL BLOCK DIAGRAM

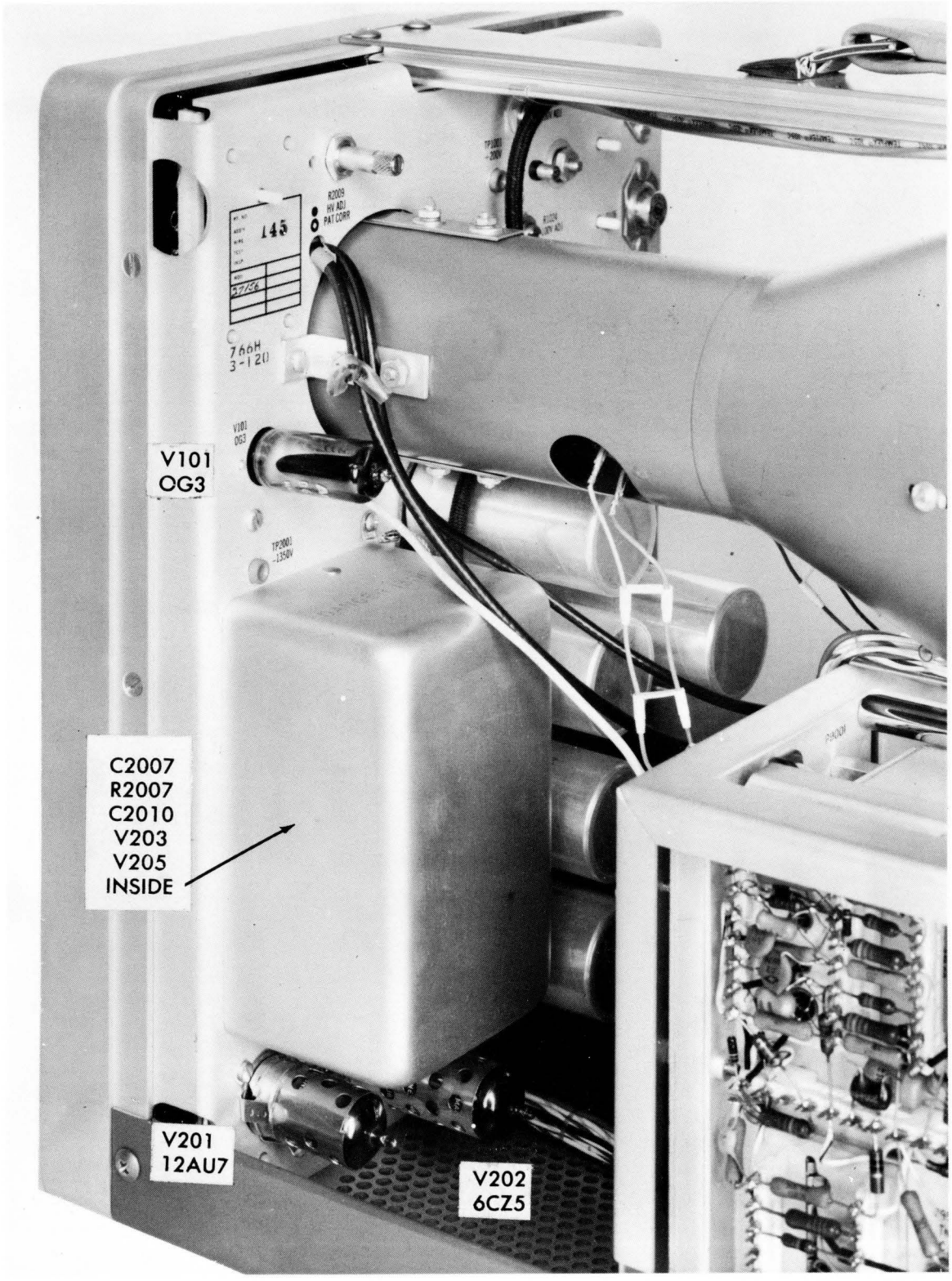


FIGURE 3-2. IDENTIFICATION OF REPLACEABLE PARTS (LEFT SIDE VIEW)

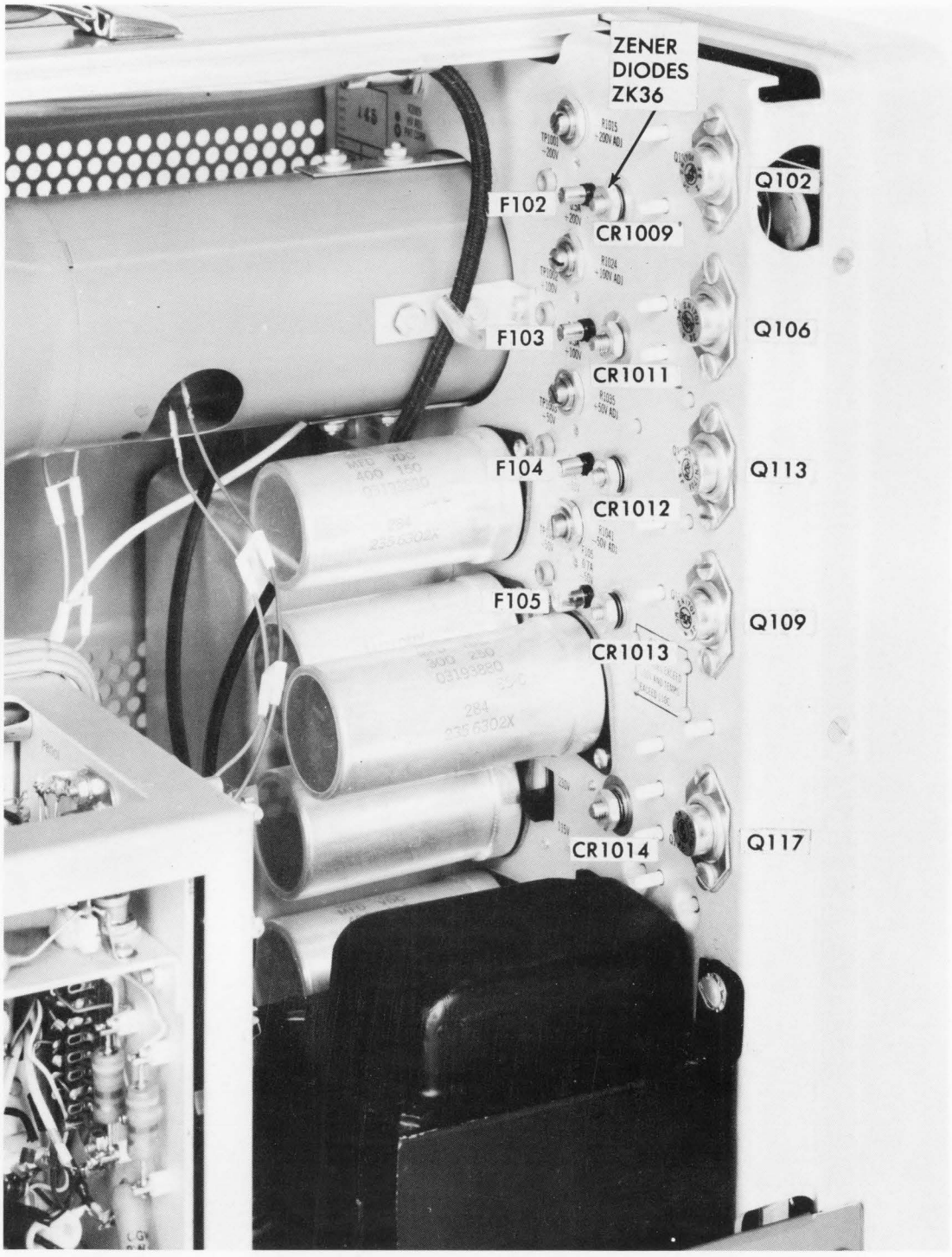


FIGURE 3-3. IDENTIFICATION OF REPLACEABLE PARTS (RIGHT SIDE VIEW)

transformer, T2001, as the tapped inductor, and C2006 as the capacitor.

The output of the oscillator is stepped up by T2001 and applied to a conventional rectifier and subsequently applied to the post-deflection accelerator of the cathode-ray tube.

The negative high-voltage supply is derived from a tap on transformer T2001 which is connected to a half-wave rectifier, CR2001. The rectified output of —1350 volts to —1440 volts is capacitively filtered by C2008, C2009, and C2011 and provides the necessary operating potentials for the proper intensity and focusing of the cathode-ray tube.

Regulation of the high-voltage negative supply is accomplished by sampling a portion of the rectified output and applying a correction signal back through V201 to the screen grid of V202. This action changes the amplitude of oscillations of V202 and T2001 in such a manner as to restore the high voltage output to its preset level. Potentiometer R2009, HV ADJ, is provided to preset the output of the high-voltage supply to its proper level.

3-4. CIRCUIT TROUBLE SHOOTING

General maintenance and trouble shooting information will be found in Section 2 of this Instruction Manual. In the following discussion it is assumed that the operator has read that information and has definitely isolated a trouble to the Indicator Unit by the procedures described there.

The first step in trouble shooting the Indicator Unit is to measure the power-supply voltages at Test Points TP1001 through TP1004 located on the Main Frame. If all of the voltages are not as indicated, the trouble is in the low-voltage power supply or the power source. To check these, refer to the paragraph entitled "Trouble Shooting the Power Supply." If all these voltages are proper, the trouble resides in the cathode-ray tube circuit. In this instance, refer to the paragraph entitled "Trouble Shooting the Cathode-Ray Tube Circuit."

3-5. LOCATION OF REPLACEABLE COMPONENTS

Identifications of all replaceable components, including those mounted on assembly boards are shown in Figures 3-2 through 3-5.

Since the production of this instrument, some of the parts may have been superseded by improved components. In such cases, the part numbers of these new components will not be listed in your Parts List. However, if you order a part from Du Mont, and it has been superseded by an improved component, the new part will be shipped in place of the part ordered. Your local Du Mont representative has knowledge of these changes and may call you if a change in your purchase order is necessary.

It is the aim of the Du Mont organization to make available the most reliable commercial oscilloscopes within the state of the art and to provide services which will help the user to rapidly restore any Du Mont equipment to its specified performance. Your local Du Mont field representative maintains a limited number of spare parts or the factory may be asked to air-ship replacement parts.

3-6. TROUBLE SHOOTING THE POWER SUPPLY

WARNING

WHEN THE PANELS ARE REMOVED FROM THE INSTRUMENT FOR SERVICING, EXERCISE CAUTION WHILE THE POWER IS ON. The lower-voltage busses are potentially more dangerous than the cathode-ray tube. potential because of the high-current capabilities and large filter capacitors employed in these supplies. When you reach into the instrument with one hand while it is turned on, do not grasp the metal frame with the other hand. If possible, stand on an insulated floor and use insulated tools. It is advisable to ground the third lead in the power cord whenever the instrument is in use.

As an aid in trouble-shooting the power supply, refer to the functional block diagram, Figure 3-2 and to the low-voltage power supply schematic.

1. If the instrument fails to operate, including the pilot light, check the source of power and determine that the power cord is firmly in place. Then check the fuse at the rear of the instrument.

NOTE: Disconnect the power cord when working on the transformer T1001 and associated circuits.

If the fuse is blown, replace it with one of the proper value and reconnect the line cord. If the new fuse blows, immediately check the power transformer for shorted primary or secondary windings. Shorted rectifiers in the secondary circuit will also blow the line fuse F101. Check for an open primary winding of T1001 if the line fuse is good.

2. A thermal cutout switch is incorporated in this unit. If the instrument has been working but has just stopped, it may have overheated and tripped the thermal cutout switch. The thermal cutout switch will reset itself when the interior temperature of the instrument drops to a safe value. Possible causes of overheating are: restriction of air circulation and high ambient temperature.

3. If the line voltage is within the specified limits, and one of the regulated power-supply output voltages is not correct, check that particular regulator circuit. Each of the regulated supplies is fused separately. These fuses should be checked and replaced if necessary with a new fuse of the proper value.

NOTE: Always check the regulated voltages starting with the —50-volt supply and ending with the +200-volt supply.

When the circuit ailment has been confined to a particular regulator, then one may trouble-shoot within this circuit to locate the defective component(s). The description of the circuit involved may prove useful when diagnosing circuit ailments.

4. If none of the regulated voltages are correct, then the trouble probably resides in the —50-volt regulated supply since this voltage serves as a reference level for the other three regulated circuits.

One cause of insufficient output voltage is low unregulated dc voltage which might be caused by an open or shorted rectifier diode. These diodes are identified on Figure 3-5 and are:

CR1007 & CR1008 for the —50V regulated supply
CR1005 & CR1006 for the +50V regulated supply
CR1003 & CR1004 for the +100V regulated supply
CR1001 & CR1002 for the +200V regulated supply

5. If there is excessive ripple on any of the unregulated supplies, replace the filter capacitor(s). These capacitors are identified on Figure 3-5 and are:

C1018 for the —50V regulated supply
C1012 & C1013 for the +50V regulated supply
C1006 for the +100V regulated supply
C1001 for the +200V regulated supply

3-7. TROUBLE SHOOTING THE CRT CIRCUIT

The intensity, focus, geometry, and calibration of the cathode-ray tube display depend on proper operation of the high-voltage supply. To isolate this trouble, remove the rear cover from the Main Frame and high voltage cover, and observe if the filaments of the high-voltage rectifiers are glowing. If they are, measure the voltage at Test Point, TP2001. This voltage reading should be between —1350 and —1440 volts with respect to ground. Also, measure the voltages at other points in the circuit for which typical values are given on the high-voltage power supply schematic. If all of these voltages check out correctly, then the trouble may reside with the cathode-ray tube itself which should be checked.

If the filaments of the high-voltage rectifiers are not glowing, then measure the voltage at the grid of the high-voltage oscillator, V202. It should measure about —25 volts, and if it does, the high-voltage oscillator is working and the trouble may reside with the high-voltage rectifiers or the secondary winding of T2001.

However, if the voltage at the grid of the high-voltage oscillator, V202, is significantly less than —25 volts, then this stage is not operating properly. There are certain checks that should be made before replacing V202 to prevent possible damage to the replacement tube. First, measure the plate voltage of V202; it should measure about +218 volts. If the plate voltage of V202 checks out OK, then measure the resistance of the primary and secondary windings of T2001.

The resistance across the primary winding should measure around 5 ohms. Measure the resistance of the secondary winding from the plate of V203 to ground; it should measure around 175 ohms. If the resistance and voltage checks are correct, then replace V201 and V202.

If the low-voltage power supply is operating normally, but no spot or trace is visible on the screen, then the trouble might be a defective cathode-ray tube, a defect in the CRT circuitry including the high-voltage supply, an unbalanced condition in either of the plug-in modules, or a defective unblanking circuit.

NOTE: To obtain a spot or trace on the screen, the cathode-ray tube must be unblanked.

Refer to the appropriate plug-in module Instruction Manual for further information.

3-8. TEST EQUIPMENT REQUIRED FOR SERVICE ADJUSTMENTS

a. Introduction

The adjustments outlined in the following paragraphs are based on the test procedure followed at the factory. All adjustments should be made at mid-line voltage, 115/230V ±2%. To set up the Indicator Unit for calibration, insert an amplifier plug-in and a time base plug-in into the main frame. These plug-in modules are signal sources for the Main Frame and must be fully tested and certified units. No testing will be performed on the plug-ins for calibration of the Indicator.

b. Test Equipment Required (Equivalent may be substituted)

Type	Description
Volt-ohmmeter	Simpson Model 260 with polarity-reversing switch and tip leads; 20,000 ohms/volt sensitivity
Oscilloscope	Du Mont Type 403B with anti-parallax scale (scale #4501 0131)
Attenuator Probe	Du Mont Type 4290; 10:1 and terminated in BNC type connector; 10 megohms, 10 pf input
High-voltage Meter	Sensitive Research Model DCH-1
Autotransformer	Du Mont Type 2165 Line Control Unit; Powerstate, Variac, etc.
Digital Voltmeter	John Fluke Model 801B; 0.1 to 500 volts
AC Voltmeter	Weston Model 433
Standard Amplitude Calibrator	Ballantine Type 420
LC Meter	Tektronix Type 130

3-9. ADJUSTING THE LOW-VOLTAGE POWER SUPPLIES

Connect the autotransformer to a suitable power source and connect the oscilloscope to the output of this transformer. Turn on the instrument and set the output for the nominal operating voltage of the oscil-

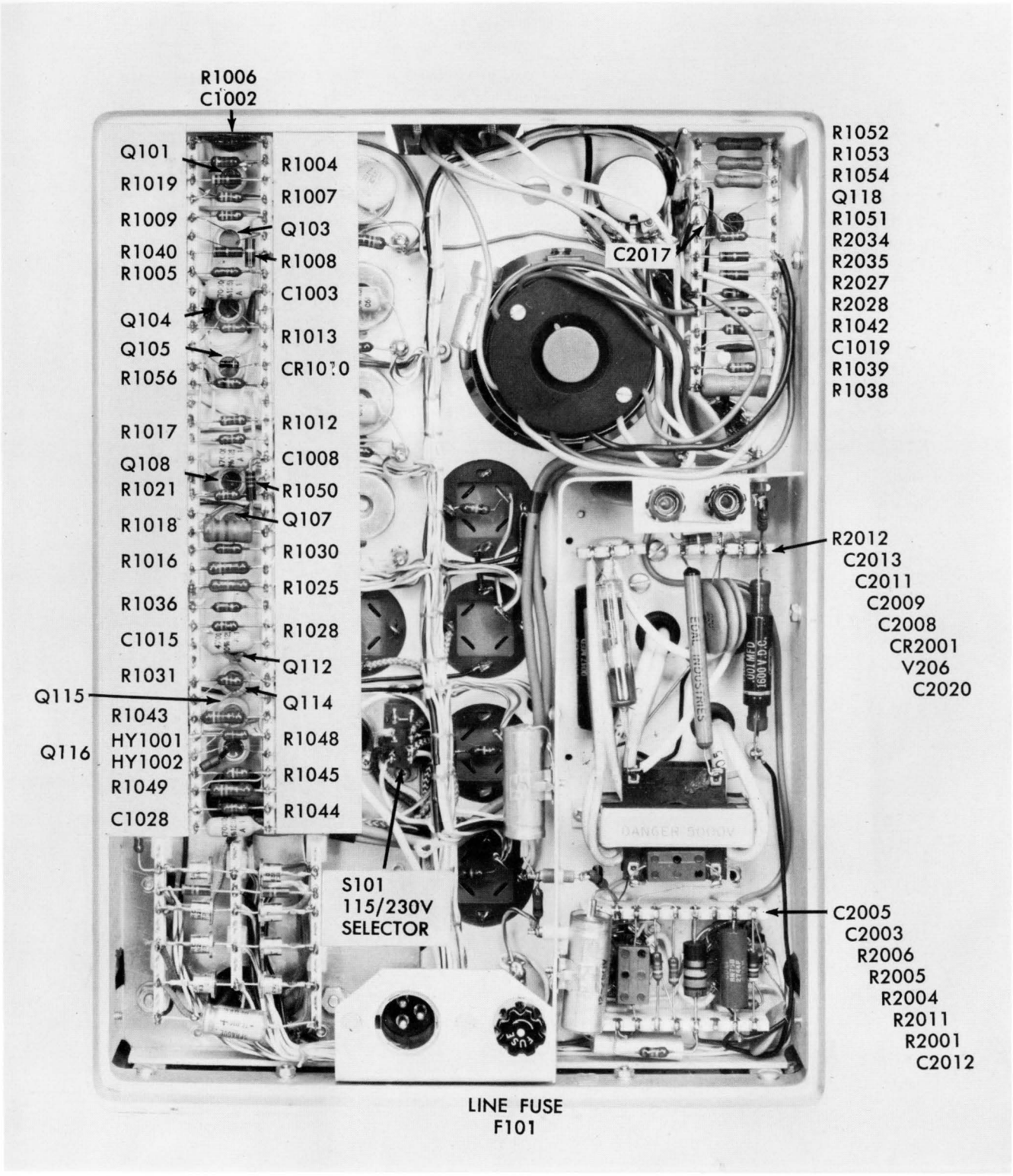


FIGURE 3-4. IDENTIFICATION OF REPLACEABLE COMPONENTS ON REAR CHASSIS

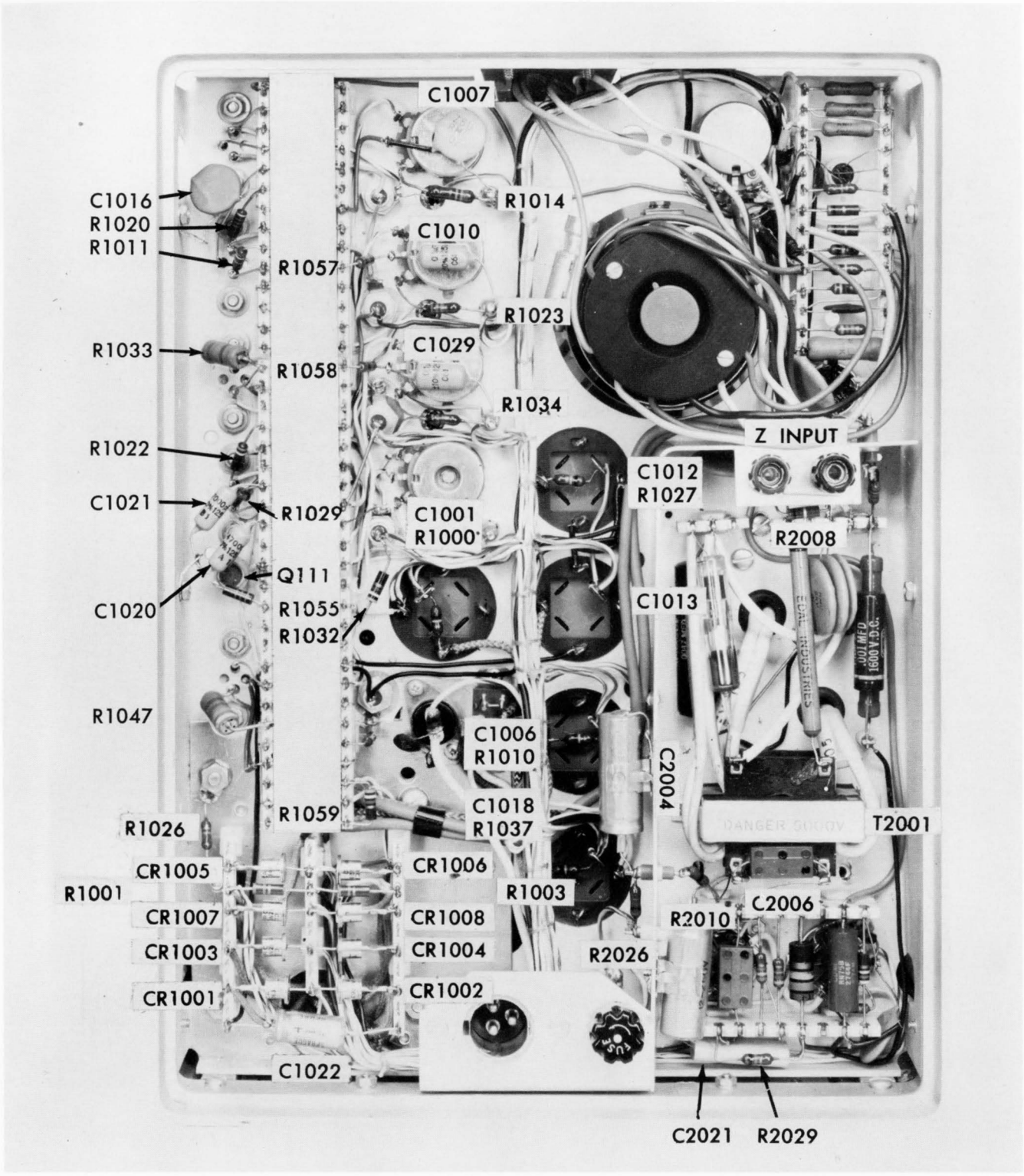


FIGURE 3-5. IDENTIFICATION OF REPLACEABLE COMPONENTS ON REAR CHASSIS

loscope (115V for 115-volt operation or 230V for 230-volt operation). Allow the instrument to warm up for about 10 minutes.

NOTE: Do not adjust the —50-volt supply unless one or more of the supplies is actually out of tolerance or unless a complete calibration of the instrument is desired.

Use a John Fluke Voltmeter and adjust or check the supplies in the sequence and at the Test Points listed.

Regulated Supply	Tolerance	Test Point	Service Adjustment	
—50V	±10 mv	TP1004	R1041	—50V ADJ
+50V	±20 mv	TP1003	R1035	+50V ADJ
+100V	±20 mv	TP1002	R1024	+100V ADJ
+200V	±30 mv	TP1001	R1015	+200V ADJ

Vary the autotransformer output voltage between 105 and 125 volts and check to see that all regulated supplies stay within ±1% except the +200-volt supply which is ±1.5%. For 230-volt operation, vary the autotransformer output between 210 and 250 volts and check to see that all voltages stay within the above tolerance.

3-10. HIGH-VOLTAGE ADJUSTMENT

Use Sensitive Research High-Voltage Meter and Probe with caution.

1. Adjust R2009 (HV ADJ) for —1350V ±15 volts.

3-11. CRT ADJUSTMENT

a. Graticule External to CRT

To align the trace to the graticule, proceed as follows:

1. Use recurrent sweep with no signal applied to vertical channel.
2. Center trace and rotate CRT to match scale.
3. Tighten CRT clamp.

To align the graticule to the scan, proceed as follows:

1. Apply line-frequency hum to Y INPUT and adjust oscilloscope for full-screen deflection.
2. Slow sweep rate to 50 ms/cm. Note full raster display on screen.
3. Adjust eccentric cam to assure full 6-centimeter coverage of scale and vertical CRT scan.

b. Graticule Internal to CRT

1. Where the graticule is internal to the CRT, align the tube so that the horizontal center line is perpendicular to the left side of the frame, using a suitable fixture. Clamp CRT.
2. Use recurrent sweep with no signal applied to the vertical channel.
3. Center trace and adjust R2022R until trace is parallel to horizontal lines of scale.

c. Pattern Correction ADJ

1. Set Y VOLTS/DIV switch to CAL and SWEEP

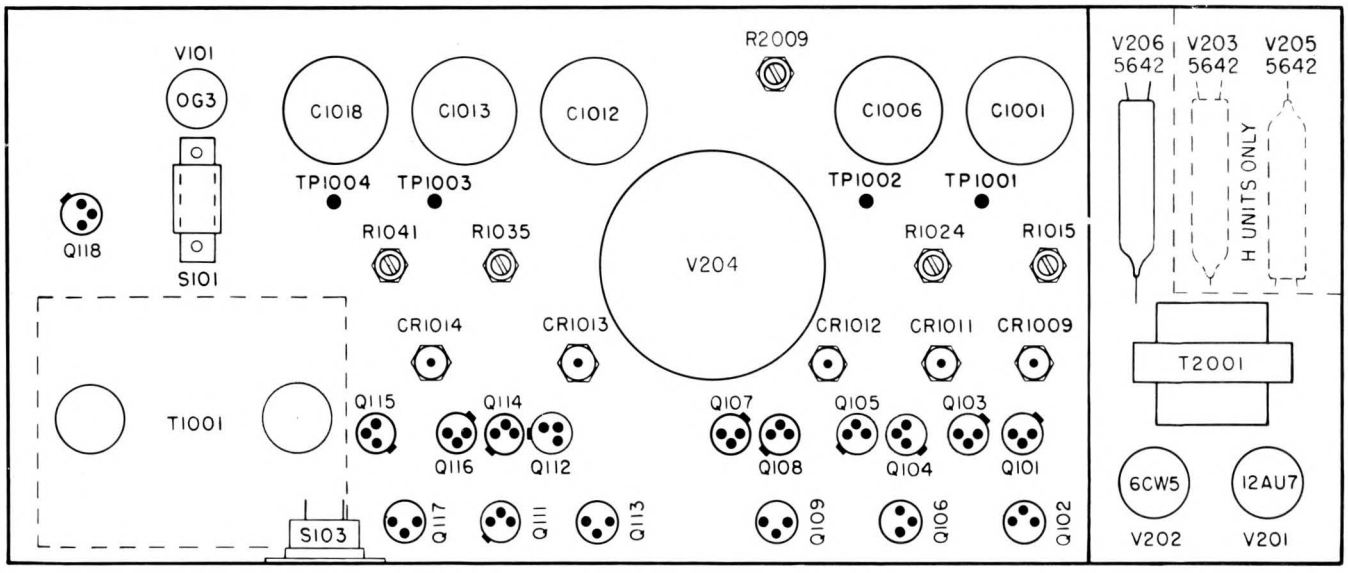


FIGURE 3-6. LOCATION OF COMPONENTS FOR RACK AND PORTASCOPE MODELS (REAR VIEW)

RATE switch to 5 MS/CM. Note steady square wave pattern on screen.

2. Set PATTERN CORRECTION control, R2021, until the vertical and horizontal lines at the 6 x 10 cm edges are optimally straight.

NOTE: The display should fall within a 6 x 10 cm and a 5.75 x 9.75 cm rectangular frame.

3-12. SETTING MAIN FRAME CAPACITY (C1031 & C1032)

a. Regular Method

If fully tested and certified Plug-in modules are not available, then proceed as follows:

1. Obtain a capacity meter with a "Guard Voltage" (which eliminates the effects of other capacitances from the measurements) similar to Tektronix Type 130 LC Meter, or equivalent.

2. Remove the Y-Plug-in module.

3. Connect the "Guard Voltage" of the LC Meter to J9001-1 and measure the capacity to ground of J9001-17. Note this measurement as "A".

4. Connect the "Guard Voltage" of the LC Meter to J9001-17 and measure the capacity to ground of J9001-1. Note this measurement as "B".

5. Remove the Guard Voltage from J9001-17 and ground J9001-17.

6. Measure the capacity from J9001-1 to ground. Note this measurement as "C".

7. Then $\frac{A + B}{2} + 2(C-B) = 6.3$ pf for the Y side. If not, adjust C1031 until this condition is obtained.

8. Reinstall the Y Plug-in module and remove the X Plug-in module.

9. Repeat steps 3 through 6 using J8001-1 and J8001-17.

10. The relationship of the parameters in step 7 should equal 7.8 pf for the X side; if they do not, adjust C1032 until this condition is obtained.

b. Alternate Method

If fully tested and certified X and Y Plug-in modules are available, then the Main Frame trimmers may be adjusted as follows:

1. Install the X and Y Plug-in modules in their respective cavities.

2. Apply a fast-rise pulse from a Tektronix Type 107 Square Wave Generator or equivalent to Y INPUT and set VOLTS/DIV switch to 5.

3. Adjust Pulse Generator for 5 centimeters of vertical deflection.

4. Adjust C1031 for overshoot of 2 mm or less.

5. Interchange the X and Y Plug-in modules (X inserted into Y side and vice versa).

6. The fast-rise signal is again applied to Y INPUT (which is now in the X cavity).

7. Adjust the oscilloscope for 2 centimeters of deflection.

8. Adjust C1032 for optimum pulse response.

SECTION 4
PERFORMANCE ASSURANCE TEST

4-1. MAINTENANCE CHECK TO ASSURE PERFORMANCE

The test described in the paragraphs to follow should be performed by Instrument Test Departments and Maintenance Laboratories to certify proper performance of this instrument. These tests are divided into sections for simplification and to assist those test groups where complete checking is not mandatory, or where all test equipment is not available. Refer to Section 3, paragraph 3-8 for list of test equipment required.

NOTE

If this oscilloscope is checked by a receiving inspection laboratory, the tests outlined below are recommended to certify performance. This oscilloscope has been thoroughly tested and aged at the factory. Nevertheless, rough shipment, extreme environments, or long idle periods may necessitate minor adjustments of the controls. Hence it is suggested that the certifying engineer try the recommended adjustments not only for recentering the controls, but also to ascertain their range and to familiarize himself with this precision instrument. If, after performing all the tests outlined below, the instrument will not perform to specification, the assistance of the local Du Mont Field Engineering representative should be requested.

4-2. CHECKING THE POWER SUPPLY

1. Check the line fuse, F101, for proper value: 3 amperes for 115-volt operation; 1.5 amperes for 230-volt operation.

2. Check fuses of the regulated supplies for proper value:

Regulated Supply	Symbol	Fuse Rating
—50 volts	F105	0.7 ampere
+50 volts	F104	1 ampere
+100 volts	F103	1 ampere
+200 volts	F102	1 ampere

3. Examine the instrument for charred or mechanically damaged components. Correct all defects.

4. Apply power to the instrument through a variable voltage source (Variac, or an equivalent). Set the line voltage to 115 volts. (Double this value for 230-volt operation.)

5. Set up the oscilloscope to obtain six cycles of the calibrator signal.

6. Allow 20 minutes for warmup before making any adjustments.

7. Lower the line voltage until the display starts to drift, or becomes erratic. The line voltage must be less than 105 volts at 60 cycles (210 volts for 230-volt operation). If instability is noted before the lower limit of the line voltage is reached, check operation of the low-voltage regulated power supplies as outlined in Section 3 of this Instruction Manual.

NOTE: Always check the regulated voltages starting with the —50-volt supply and ending with the +200-volt supply.

8. Raise the line voltage to 125 volts (250 volts for 230-volt operation). The display should remain stable and must not be erratic. If instability is noted before the upper limit of the line voltage is reached, check operation of the low-voltage power supplies.

9. Reset the line voltage to 115 volts (230 volts for 230-volt operation).

4-3. CHECK RIPPLE OF LOW-VOLTAGE SUPPLIES

1. Use a Type 403B Test Oscilloscope with a Type 4290 Probe.

2. Ground all chassis to power-line ground.

3. Set the oscilloscope for ac coupled input and set Y sensitivity to 0.5 mv/cm.

4. Use AUTO triggering with line sync and set SWEEP RATE switch to 5 MS/CM.

5. Measure the amount of 120-cycle ripple at the output of each power supply as listed below. (For line frequencies other than 60 cycles, the ripple will be twice the line frequency.)

Regulated Supply	Ripple Voltage	Test Point
—50 volts	10 millivolts p-p max	TP 1004
+50 volts	20 millivolts p-p max	TP1003
+100 volts	30 millivolts p-p max	TP1002
+200 volts	65 millivolts p-p max	TP1001

4-4. CALIBRATOR CHECK

a. Waveshape Check

1. Adjust the Type 403B Oscilloscope for a sensitivity of 20 mv/cm and connect the Y INPUT to the CAL pin jack on the front panel of the Main Frame via the Type 4290 Attenuator Probe.

2. Observe a 1 volt (5 cm) peak-to-peak, 60-cycle square wave; rise time to be less than 20 μsec. Tilt and ringing should be less than 5% (50 mv or 2.5 mm).

b. Amplitude Accuracy (Optional Test)

NOTE: This check is not required on every oscilloscope.

1. Precisely calibrate the Type 403B Oscilloscope with the Ballantine Type 420 Calibrator. The oscilloscope is set up with the Type 4290 Probe at a sensitivity of 20 mv/cm.

2. Set the Ballantine Calibrator for a frequency of 1 Kc at an output of 1 volt peak.

3. Adjust oscilloscope for a 5-centimeter vertical bar.

4. Transfer the Probe from the Ballantine Calibrator to the 1-volt pin jack. Note Calibrator amplitude to be 4.9 to 5.1 cm (1 volt $\pm 2\%$). Avoid errors by using the anti-parallax scale.

4-5. CHECKING CRT GEOMETRY ADJUSTMENT

Set Y VOLTS/DIV switch to CAL and SWEEP RATE switch to 5 MS/CM. Note the steady square wave pattern on the screen. The display should fall within a 6 x 10 centimeter and a 5.75 x 9.75 centimeter frame. Refer to the paragraph entitled "CRT Adjustments," in Section 3 of this Instruction Manual for further details.

4-6. CRT ADJUSTMENT

a. Graticule External to CRT

To align the trace to the graticule, proceed as follows:

1. Use recurrent sweep with no signal applied to vertical channel.

2. Center trace and rotate CRT to match scale.

3. Tighten CRT clamp.

To align the graticule to the scan, proceed as follows:

1. Apply line-frequency hum to Y INPUT and adjust oscilloscope for full-screen deflection.

2. Slow sweep rate to 50 ms/cm. Note full raster display on screen.

3. Adjust eccentric cam to assure full 6-centimeter coverage of scale and vertical CRT scan.

b. Graticule Internal to CRT

1. Where the graticule is internal to the CRT, align the tube so that the horizontal center line is perpendicular to the left side of the frame, using a suitable fixture. Clamp CRT.

2. Use recurrent sweep with no signal applied to the vertical channel.

3. Center trace and adjust R2022R until trace is parallel to horizontal lines of scale.

c. Pattern Correction ADJ

1. Set Y VOLTS/DIV switch to CAL and SWEEP RATE switch to 5 MS/CM. Note steady square wave pattern on screen.

2. Set PATTERN CORRECTION control, R2021, until the vertical and horizontal lines at the 6 x 10 cm edges are optimally straight.

NOTE: The display should fall within a 6 x 10 cm and a 5.75 x 9.75 cm rectangular frame.

SECTION 5

ELECTRICAL PARTS LIST AND SCHEMATICS FOR TYPE 765- FAMILY OF OSCILLOSCOPES

NOTE

The following Parts List is common to the Types 765/765M/765H/765MH/766/766H/767/767H.

Parts peculiar to a particular instrument are listed separately at the end of the Parts List. These parts are indicated by an * in the main Parts List.

CAPACITORS

Notes: 1. All capacitators are fixed, ceramic, and 150V unless otherwise specified; pf denotes picofarads.
2. GMV denotes Guaranteed Minimum Value.

Symbol	Part Number	Description	Recommended Vendor Code	Type
C1000	0319 1060	0.01 µf, +60 −40%	CRL	DDM
C1001	0319 3880	electrolytic, 300 µf, +100 −10%, 250V	MAL	FP
C1002	0319 1060	0.01 µf, +60 −40%	CRL	DDM
C1003	0326 7840	plastic, 0.047 µf, ±10%, 125V	AMX	C296AA
C1004	0327 1890	electrolytic, 25 µf, +100 −10%	MAL	TCW
C1005	0319 1050	0.02 µf, +60 −40%	CRL	DDM
C1006	0319 3890	electrolytic, 400 µf, +150 −10%	MAL	FP
C1007	0326 4660	0.02 µf, GMV, 500V	ERC	
C1008	0326 7840	plastic, 0.047 µf, ±10%, 125V	AMX	C296AA
C1009	0327 1890	electrolytic, 25 µf, +100 −10%	MAL	TCW
C1010	0326 7860	plastic, 0.1 µf, ±10% 125V	AMX	C296AA
C1011	0319 1050	0.02 µf, +60 −40%	CRL	DDM
C1012 & C1013	0319 3890	electrolytic, 400 µf, +150 −10%	MAL	FP
C1014	0319 1060	0.01 µf, +60 −40%	CRL	DDM
C1015	0326 7840	plastic, 0.047 µf, ±10%, 125V	AMX	C296AA
C1016	0326 4660	0.02 µf, GMV, 500V	ERC	
C1017	0319 1050	0.02 µf, +60 −40%	CRL	DDM
C1018	0319 3890	electrolytic, 400 µf, +150 −10%	MAL	FP
C1019	0326 4640	0.01 µf, GMV, 500V	ERC	
C1020	0326 7840	plastic, 0.047 µf, ±10%, 125V	AMX	C296AA
C1021	0326 7840	plastic, 0.047 µf, ±10%, 125V	AMX	C296AA
C1022	0326 7600	electrolytic, 100 µf, +100 −10%, 12V	SPG	Series "Littl-Lytic"
C1023	0327 1890	electrolytic, 25 µf, +100 −10%	MAL	TCW
C1024	0319 1050	0.02 µf, +60 −40%	CRL	DDM
C1025	0327 1890	electrolytic, 25 µf, +100 −10%	MAL	TCW
C1026 & C1027	0326 4620	5000 pf, GMV	ERC	
C1028	0326 7840	plastic, 0.047 µf, ±10%, 125V	AMX	C296AA
C1029	0326 8760	plastic, 0.1 µf, ±10%, 125V	AMX	C296AA
C1030	0319 1060	0.01 µf, +60 −40%	CRL	DDM
C1032	0319 1251	variable, 0.4-2.5 pf, 350V	ABD	
C1033	0319 1060	0.01 µf, +60 −40%	CRL	DDM
C2002	0326 4550	2000 pf, GMV, 500V	ERC	
C2003	0316 8790	mica, 510 pf, ±20%, 1000V	EMC	VCM-20-B
C2004 & C2005	0318 4670	electrolytic, 12 µf, +250 −10%, 250V	CDE	BBR-
C2006	0316 8790	mica, 510 pf, ±20%, 1000V	EMC	VCM-20-B
*C2007				
C2008 & C2009	0316 4930	0.01 µf, +100 −0%, 2000V	RMC	2 KV
*C2010				
C2011	0316 4930	0.01 µf, +100 −0%, 2000V	RMC	2 KV
C2012	0326 6320	0.01 µf, ±10%, 200V	GUD	No. 355C
C2013	0326 9350	paper, 1000 pf, ±10%, 1600V	SPG	73P "Black Beauty"
C2014	0316 4930	0.01 µf, +100 −0%, 2000V	RMC	2 KV
C2015	0327 1740	0.0496 µf, +80 −20%, 200V	ERC	Weecon Ceramicons, Style4865
C2016	0316 4930	0.01 µf, +100 −0%, 2000V	RMC	2 KV
*C2017				
C2018 & C2019	0326 4620	5000 pf, GMV, 500V	ERC	
*C2020				
C2021	0318 3710	plastic, 0.1 µf, ±20% 400V	GUD	No. 338E
C2022	0326 4640	0.01 µf, GMV, 500V	ERC	

SEMICONDUCTORS

CR1001 & CR1002	2600 6670	diode, silicon, 1N1763	RCA	
CR1003 to CR1008	2600 6810	diode, 1N2861	RCA	
CR1009	2600 7560	diode, ZK36	ITT	Part No. ZK36
CR1010	2600 6910	diode, FD841	FCI	FD841
CR1011 to CR1014	2600 7560	diode, ZK36	ITT	Part No. ZK36
CR2001	2600 2711	rectifier, selenium, metallic	ABD	

LAMPS

*DS1001 E1001 & E1002	1200 1310	incandescent, miniature bayonet, .150 ampere, 6.3V, #47	GE	#47

FUSES

F101	1100 5210*	3 amperes, slow-blow, 115-volt operation	BUS	MDX3

Symbol	Part Number	Description	Recommended Vendor Code	Type
F101	1100 5270*	1.5 amperes, slow-blow, 230-volt operation	BUS	MDX1½
F102 & F103	1100 7680	1 ampere	LFI	Cat. #272 or 273
F104	1100 7680	1 ampere	LFI	Cat. #272
F105	1100 7680	1 ampere	LFI	Cat. #272 or 273
*F1201				

*Depending on sales order

HEATER ELEMENTS

*HR1201 to HR1206				

HYBRID COILS

HY1001 & HY1002	0903 7410	Bead, ferroxcube	FER	

ELECTRICAL CONNECTORS

*J1001				
J1005	0903 7410	Jack tip, 1 volt peak-to-peak	UCN	Part #118930
*J2001				
*J2002				
J8001 & J9001	0905 7360	receptacle, female, 32 contacts	APH	26-190-32
*P9001				

TRANSISTORS

Q101	2600 7470	DU #10A	FCI	
	2600 7450	alternate 2N1711		
Q102	2600 7580	2N1701	RCA	2N1701
Q103	2600 7470	DU #10A	FCI	
	2600 7450	alternate 2N1711		
Q104	2600 7270	DU #6A	FCI	
	2600 7250	alternate 2N1893		
Q105	2600 7460	DU #10	FCI	
	2600 7450	alternate 2N1711		
Q106	2600 7580	2N1701	RCA	2N1701
Q107	2600 7470	DU #10A	FCI	
	2600 7450	alternate 2N1711		
Q108	2600 7280	DU #6B	FCI	
	2600 7250	alternate 2N1893		
Q109	2600 7580	2N1701	RCA	2N1701
Q111	2600 7470	DU #10A	FCI	
	2600 7450	alternate 2N1711		
Q112	2600 7280	DU #6B	FCI	
	2600 7250	alternate 2N1893		
Q113	2600 7580	2N1701	RCA	2N1701
Q114	2600 7460	DU #10	FCI	
	2600 7400	alternate 2N1711		
Q115	2600 7470	DU #10A	FCI	
	2600 7450	alternate 2N1711		
Q116	2600 7480	DU #10B	FCI	
	2600 7450	alternate 2N1711		
Q117	2600 7580	2N1701	RCA	2N1701
Q118	2600 7210	DU #5	FCI	
	2600 7200	2N697		

RESISTORS

Note: All resistors are fixed, film, ±5%, and ½W. Values are in ohms unless otherwise specified, K = thousand, M= million

R1000	0234 8690	100K	CGW	C-20
R1001	0203 2370	composition, 150, ±20%	ALB	EB
R1002	0107 2343	variable, wire wound, 50, ±10% (SCALE ILLUM)	ABD	
R1003	0203 2370	composition, 150, ±20%	ALB	EB
R1004	0234 8370	4.7K	CGW	C-20
R1005	0234 8490	15K	CGW	C-20
R1006	0234 8380	5.1K	CGW	C-20
R1007	0234 8590	39K	CGW	C-20
R1008	0203 0480	composition, 1K	ALB	EB
R1009	0234 8590	39K	CGW	C-20
R1010	0234 8690	100K	CGW	C-20
R1011	0203 1720	composition, 39, ±10%	ALB	EB
R1012	0234 8670	82K	CGW	C-20
R1013	0234 8480	13K	CGW	C-20
R1014	0235 2480	13K, ±2%, 1W	CGW	C-32
R1015	0109 1770	variable, wire wound, 4K, ±10% (+200V ADJ)	CTS	AW
R1016	0235 2540	24K, ±2%, 1W	CGW	C-32
R1017	0234 8620	51K	CGW	C-20
R1018	0239 1363	560, 2W	ABD	
R1019	0234 8100	360	CGW	C-20
R1020	0234 8130	470	CGW	C-20
R1021	0234 8540	24K	CGW	C-20
R1022	0203 1720	composition, 390, ±10%	ALB	EB
R1023	0234 8400	6.2K	CGW	C-20
R1024	0109 1770	variable, wire wound, 4K, ±10% (+100V ADJ)	CTS	AW
R1025	0235 2490	15K, ±2%, 1W	CGW	C-32
R1026	0234 8490	15K	CGW	C-20
R1027	0234 8690	100K	CGW	C-20
R1028	0234 8540	24K	CGW	C-20
R1029	0234 8100	360	CGW	C-20
R1030	0234 8030	180	CGW	C-20
R1031	0234 8540	24K	CGW	C-20
R1032	0203 1720	composition, 390, ±10%	ALB	EB
R1033	0230 2680	150, ±10%, 7W	CGW	LPI-7
R1034	0234 8400	6.2K	CGW	C-20
R1035	0109 1770	variable, wire wound, 4K, ±10% (+50V ADJ)	CTS	AW
R1036	0234 8420	7.5K	CGW	C-20
R1037	0234 8690	100K	CGW	C-20
R1038	0228 4020	11K, 3W	CGW	LPI-3
R1039	0234 8340	3.6K	CGW	C-20
R1040	0203 2140	composition, 1.2M, ±10%	ALB	EB
R1041	0109 1760	variable, wire wound, 1K, (−50V ADJ)	CTS	AW
R1042	0234 8350	3.9K	CGW	C-20
R1043	0234 9200	4.3K, 1W	CGW	C-32
R1044 & R1045	0234 8540	24K	CGW	C-20
R1046	0234 8030	180	CGW	C-20
R1047	0239 1359	430, 2W	ABD	
R1048	0234 8170	680	CGW	C-20
R1049	0234 9200	4.3K, 1W	CGW	C-20
R1050	0203 0420	composition, 560	ALB	EB
R1051	0234 8490	15K	CGW	C-20
R1052	0236 7380	59K, ±1%	CGW	N-20
R1053	0236 6810	15K, ±1%	CGW	N-20
R1054	0236 5560	750, ±1%	CGW	N-20
R1055	0203 0420	composition, 560	ALB	EB
R1056	0234 8450	10K	CGW	C-20
R1057 & R1058	0234 7970	100	CGW	C-20
R1059	0203 1720	composition, 390, ±10%	ALB	EB
R2001	0203 1120	composition, 470K	ALB	EB
R2002 & R2003	0234 7900	51	CGW	C-20
*R2004				
R2005	0234 8670	82K	CGW	C-20
R2006	0234 8300	2.4K	CGW	C-20
R2007	0203 2700	composition, 3M, ±10%	ALB	EB
R2008	0234 8520	20K	CGW	C-20
R2009 F,R	0109 1910	variable, composition, 500K/100K, ±20%, ¼W (PATTERN CORR/HV ADJ	CTS	C2-45
R2010	0234 7970	100	CGW	C-20
R2011	0229 3630	2.74M, ±1%, 1W	TEX	CDM1
R2012	0229 8020	17M, ±1%, 2W	TEX	CD2R
R2013	0203 7340	composition, 3.9M, 2W	ALB	HB
R2014	0108 0750	variable, composition, 2.5M, ±20% (FOCUS)	CLS	Series 37
R2015	0203 2130	composition, 1M, ±10%	ALB	EB
R2016	0109 0070	variable, composition, 500K, 1W (INTENSITY)	CLS	Series 53C
R2017	0203 0850	composition, 36K	ALB	EB
R2018	0234 8690	100K	CGW	C-20
R2019	0203 2150	composition, 1.5M, ±10%	ALB	EB

Symbol	Part Number	Description	Recommended Vendor Code	Type
R2021	0203 2170	Composition, 2.2M, ±10%	ALB	EB
R2022	0109 0020	variable, composition, 500K, ±20%, ¼W (ASTIG)	CTS	Series 45 (Comm.)
R2023	0203 2130	composition, 1M, ±10%	ALB	EB
R2026	0234 7970	100	CGW	C-20
R2027 & R2028	0234 8690	100K	CGW	C-20
R2029	0234 8210	1K	CGW	C-20
*R2030				
*R2031				
R2032	0234 8340	3.6K	CGW	C-20
R2033	0234 8360	4.3K	CGW	C-20
*R2034 & R2035				

SWITCHES

S101	0503 1330	slide	STC	SS-50
S102 (R1002)	(0107 2342)	part of R1002 (POWER)		
S103	2800 3050	thermostatic (THERMAL CUT-OUT)	KXM	MC10-5
*S1201				

TRANSFORMERS

*T1001				
T2001	2001 3731	High-voltage power supply	ABD	

TEST JACKS

TP1001	0905 8450	jack, tip, red (+200V)	EFJ	Series 105
TP1002	0905 8450	jack, tip, red (+100V)	EFJ	Series 105
TP1003	0905 8450	jack, tip, red (+50V)	EFJ	Series 105
TP1004	0905 8450	jack, tip, red (—50V)	EFJ	Series 105
*TP2001				

ELECTRON TUBES

V101	2500 9270	OG3/85A2	AMX	OG3/85A2
V201	2501 1610	ECC82/12AU7	AMX	ECC82/ 12AU7
V202	2501 2400	6CW5/EL86	AMX	
V203	2500 5740	5642	EIA	
*V204				
*V205 & V206				

CABLE

W1001	5030 1390	assembly		

TYPE 765

C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0326 7760	Capacitor, fixed, ceramic, 470 pf. ±20%, 6000V	RMC	DISCAPS
C2020	0319 4600	Capacitor, fixed, paper, 0.0047 µf, ±10%, 6000V	SPG	184P
DS1001	1201 1280	Lamp, incandescent, miniature, 2-pin, 0.15 ampere, 6.3V	GE	No. 12
J1001	0904 4235	Power line input receptacle	ABD	
P9001	0904 4212	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1407	Resistor, fixed, film, 27K ohms, ±5%, 2W	ABD	
T1001	2001 3782	Power transformer	ABD	
V204	2501 3120*	Electron tube, K2130P1 (REG)	ABD	
	2501 3130*	Electron tube, K2130P2/G (REG)		
	2501 3140*	Electron tube, K2130P2/B (REG)		
	2051 3150*	Electron tube, K2130P7 (REG)		
	2501 3160*	Electron tube, K2130P11 (REG)		
	2501 3170*	Electron tube, K2130P31 (REG)		
	2501 3180*	Electron tube, K2130P1 (MET)		
	2501 3190*	Electron tube, K2130P2/G (MET)		
	2501 3200*	Electron tube, K2130P2/B (MET)		
	2501 3210*	Electron tube, K2130P7 (MET)		
	2501 3220*	Electron tube, K2130P11 (MET)		
	2501 3230*	Electron tube, K2130P31 (MET)		

*Depending on sales order.

TYPE 765M

C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0326 7760	Capacitor, fixed, ceramic, 470 pf, ±20%, 6000V	RMC	DISCAPS
C2020	0319 4600	Capacitor, fixed, paper, 0.0047 µf, ±10%, 6000V	SPG	184P
DS1001	1201 1280	Lamp, incandescent, miniature, 2-pin, 0.15 ampere, 6.3V	GE	No. 12
F1201	1100 5280	Fuse, 2 amperes, slow-blow	LFI	
HR1201 to HR1206	6900 2511	Heater strip	ABD	
J1001	0904 4235	Power line input receptacle	ABD	
P9001	0904 4212	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1407	Resistor, fixed, film, 27K ohms, ±5%, 2W	ABD	
S1201	0503 2400	Thermostatic switch, 6 amperes, 125 volts ac	EMW	2200-1
T1001	2001 3782	Power transformer	ABD	
V204	2501 3120*	Electron tube, K2130P1 (REG)	ABD	
	2501 3130*	Electron tube, K2130P2/G (REG)		
	2501 3140*	Electron tube, K2130P2/B (REG)		
	2051 3150*	Electron tube, K2130P7 (REG)		
	2501 3160*	Electron tube, K2130P11 (REG)		
	2501 3170*	Electron tube, K2130P31 (REG)		
	2501 3180*	Electron tube, K2130P1 (MET)		
	2501 3190*	Electron tube, K2130P2/G (MET)		
	2501 3200*	Electron tube, K2130P2/B (MET)		
	2501 3210*	Electron tube, K2130P7 (MET)		
	2501 3220*	Electron tube, K2130P11 (MET)		
	2501 3230*	Electron tube, K2130P31 (MET)		

*Depending on sales order.

TYPE 765H

C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0319 4510	Capacitor, fixed, paper, #470 pf, ±10%, 12,500V	SPG	184P-4710100
C2010	0327 1900	Capacitor, fixed, mylar-kraft, 250 pf. ±10%, 12,500V	CDE	PKM 125T25
C2017	0326 4620	Capacitor, fixed, ceramic, 5000 pf, GMV, 500V	ERC	
DS1001	1201 1280	Lamp, incandescent, miniature, 2-pin, 0.15 ampere, 6.3V	GE	No. 12
J1001	0904 4235	Power line input receptacle	ABD	
P9001	0904 4312	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1405	Resistor, fixed, film, 22K ohms, ±5%, 2W	ABD	
R2005	0234 8600	Resistor, fixed, film, 43K ohms, ±5%, ½W	CGW	C-20
R2034	0203 1110	Resistor, fixed, composition, 430K ohms, ±5%, ½W	ALB	EB
T1001	2001 3782	Power transformer	ABD	
V204	2501 3710*	Electron tube, KC2321P1 (MET)	ABD	
	2501 3720*	Electron tube, KC2321P2/G (MET)		
	2501 3730*	Electron tube, KC2321P2/B (MET)		
	2501 3740*	Electron tube, KC2321P7 (MET)		
	2501 3750*	Electron tube, KC2321P11 (MET)		
	2501 3760*	Electron tube, KC2321P31 (MET)		
V205 & V206	2500 5740	Electron tube, 5642	EIA	

*Depending on sales order.

TYPE 765MH

Symbol	Part Number	Description	Recommended Vendor Code	Type
C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0319 4510	Capacitor, fixed, paper, 470 pf, ±10%, 10,000V	SPG	184P-4710100
C2010	0327 1900	Capacitor, fixed, mylar-kraft, 250 pf, ±10%, 12,500V	CDE	PKM125T25
C2017	0326 4620	Capacitor, fixed, ceramic, 5000 pf, GMV, 500V	ERC	
DS1001	1201 1280	Lamp, incandescent, miniature, 2-pin, 0.15 ampere, 6.3V	GE	No. 12
F1201	1100 5280	Fuse, 2 amperes, slow-blow	LFI	
HR1201 to HR1206	6900 2511	Heater strip	ABD	
J1001	0904 4235	Power line input receptacle	ABD	
P9001	0904 4312	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1405	Resistor, fixed, film, 22K ohms, ±5%, 2W	ABD	
R2005	0234 8600	Resistor, fixed, film, 43K ohms, ±5%, ½W	CGW	C-20
R2034	0203 1110	Resistor, fixed, composition, 430K ohms, ±5%, ½W	ALB	EB
S1201	0503 2400	Thermostatic switch, 6 amperes, 125 volts ac	EMW	2200-1
T1001	2001 3782	Power transformer	ABD	
V204	2501 3710*	Euectron tube, K2321P1 (MET)	ABD	
	2501 3720*	Electron tube, KC2321P2/G (MET)		
	2501 3730*	Electron tube, KC2321P2/B (MET)		
	2501 3740*	Electron tube, KC2321P7 (MET)		
	2501 3750*	Electron tube, KC2321P11 (MET)		
	2501 3760*	Electron tube, KC2321P31 (MET)		
		*Depending on sales order.		
V205 & V206	2500 5740	Electron tube, 5642	EIA	

TYPE 766

Symbol	Part Number	Description	Recommended Vendor Code	Type
C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0326 7760	Capacitor, fixed, ceramic, 470 pf, ±20%, 6000V	RMC	DISCAPS
C2020	0319 4600	Capacitor, fixed, paper, 0.0047 µf, ±10%, 6000V	SPG	184P
DS1001	1201 1280	Lamp, incandescent, miniature, 2-pin, 0.15 ampere, 6.3V	GE	No. 12
J1001	0904 4237	Power line input receptacle	ABD	
J2001	5101 7830	Binding post, green	GRY	Series 29
J2002	5101 7800	Binding post, black	GRY	Series 29
P9001	0904 4211	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1407	Resistor, fixed, film, 27K ohms, ±5%, 2W	ABD	
R2023	0203 2130	Composition, 1M, ±10%	ALB	EB
R2030	0107 2631	Resistor, variable, composition, 30K ohms, ±20%. ½W (Y POS)	ABD	
R2031	0107 2631	Resistor, variable, composition, 30K ohms, ±20%, ½W (X POS)	ABD	
T1001	2001 3783	Power transformer	ABD	
TP2001	0905 8450	Jack tip, red (—1350V)	EFJ	Series 105
V204	2501 3120*	Electron tube, K2130P1 (REG)	ABD	
	2501 3130*	Electron tube, K2130P2/G (REG)		
	2501 3140*	Electron tube, K2130P2/B (REG)		
	2051 3150*	Electron tube, K2130P7 (REG)		
	2501 3160*	Electron tube, K2130P11 (REG)		
	2501 3170*	Electron tube, K2130P31 (REG)		
	2501 3180*	Electron tube, K2130P1 (MET)		
	2501 3190*	Electron tube, K2130P2/G (MET)		
	2501 3200*	Electron tube, K2130P2/B (MET)		
	2501 3210*	Electron tube, K2130P7 (MET)		
	2501 3220*	Electron tube, K2130P11 (MET)		
	2501 3230*	Electron tube, K2130P31 (MET)		

*Depending on sales order.

TYPE 766H

Symbol	Part Number	Description	Recommended Vendor Code	Type
C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0319 4510	Capacitor, fixed, paper, 470 pf, ±10%, 10,000V	SPG	184P-710100
C2010	0327 1900	Capacitor, fixed mylar-kraft, 250 pf, ±10%, 12,500V	CDE	PKM125T25
C2017	0326 4620	Capacitor, fixed, ceramic, 5000 pf, GMV, 500V	ERC	
DS1001	1201 1280	Lamp, incandescent, miniature, 2-pin, 0.15 ampere, 6.3V	GE	No. 12
J1001	0904 4237	Power lin input receptacle	ABD	
J2001	5101 7800	Binding post, green	GRY	Series 29
J2002	5101 7800	Binding post, black	GRY	Series 29
P9001	0904 4311	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1405	Resistor, fixed, film, 22K ohms, ±5%, 2W	ABD	
R2005	0234 8600	Resistor, fixed, film, 43K ohms, ±5%, ½W	CGW	C-20
R2023	0203 2130	Composition, 1M, ±10%	ALB	EB
R2030	0107 2631	Resistor, variable, composition, 30K ohms, ±20%, ½W (Y POS)	ABD	
R2031	0107 2631	Resistor, variable, composition, 30K ohms, ±20%, ½W X POS)	ABD	
R2034	0203 1110	Resistor, fixed, composition, 430K ohms, ±5%, ½W	ALB	EB 05
T1001	2001 3783	Power transformer	ABD	
TP2001	0905 8450	Jack tip, red (—1350V)	EFJ	Series 105
V204	2501 3710*	Electron tube, KC2321P1 (MET)	ABD	
	2501 3720*	Electron tube, KC2321P2/G (MET)		
	2501 3730*	Electron tube, KC2321P2/B (MET)		
	2501 3740*	Electron tube, KC2321P7 (MET)		
	2501 3750*	Electron tube, KC2321P11 (MET)		
	2501 3760*	Electron tube, KC2321P32 (MET)		
		*Depending on sales order.		
V205 & V206	2500 5740	Electron tube, 5642	EIA	

TYPE 767

Symbol	Part Number	Description	Recommended Vendor Code	Type
C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0326 7760	Capacitor, fixed, ceramic, 470 pf, ±20%, 6000V	RMC	DISCAPS
C2020	0319 4600	Capacitor, fixed, paper, 0.0047 µf, ±10%, 6000V	SPG	184P
DS1001	1201 2340	Lamp assembly	DRK	Part #121-7
J1001	0904 4236	Power line input receptacle	ABD	
J2001	0905 6710	Jack tip, green	JHN	108
J2002	0905 6700	Jack tip, black	JHN	108
P9001	0904 4212	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1407	Resistor, fixed, film, 27K ohms. ±5%. 2W	ABD	
R2023	0203 2130	Composition, 1M, ±10%	ALB	EB
T1001	2001 3782	Power transformer		
V204	2501 3120*	Electron tube, K2130P1 (REG)	ABD	
	2501 3130*	Electron tube, K2130P2/G (REG)		
	2501 3140*	Electron tube, K2130P2/B (REG)		
	2051 3150*	Electron tube, K2130P7 (REG)		
	2501 3160*	Electron tube, K2130P11 (REG)		
	2501 3170*	Electron tube, K2130P31 (REG)		
	2501 3180*	Electron tube, K2130P1 (MET)		
	2501 3190*	Electron tube, K2130P2/G (MET)		
	2501 3200*	Electron tube, K2130P2/B (MET)		
	2501 3210*	Electron tube, K2130P7 (MET)		
	2501 3220*	Electron tube, K2130P11 (MET)		
	2501 3230*	Electron tube, K2130P31 (MET)		

*Depending on sales order.

TYPE 767H

Symbol	Part Number	Description	Recommended Vendor Code	Type
C2003	0316 8830	Capacitor, fixed, mica, 1000 pf, ±20%, 1000V	EMC	VCM-20-B
C2007	0319 4510	Capacitor, fixed, paper, 470 pf, ±10%, 10,000V	SPG	184P 4710100
C2010	0327 1900	Capacitor, fixed, mylar-kraft, 250 pf, ±10%, 12,500V	CDE	PKM125T25
C2017	0326 4620	Capacitor, fixed, ceramic, 5000 pf, GMV, 500V	ERC	
DS1001	1201 2340	Lamp assembly	DRK	Part #121-7
J1001	0904 4236	Power line input receptacle	ABD	
J2001	0905 6710	Jack tip, green	JHN	108
J2002	0905 6700	Jack tip, black	JHN	108
P9001	0904 4312	High-voltage connector assembly	ABD	
R2000	0203 1890	Resistor, fixed, composition, 10K ohms, ±10%, ½W	ALB	EB
R2004	0239 1405	Resistor, fixed, film, 22K ohms, ±5%, 2W	ABD	
R2005	0234 8600	Resistor, fixed, film, 43K ohms, ±5%, ½W	CGW	C-20
R2023	0203 2130	Composition, 1M, ±10%	ALB	EB
R2034	0203 1110	Resistor, fixed, composition, 430K ohms, ±5%, ½W	ALB	EB
T1001	2001 3782	Power transformer	ABD	
V204	2501 3710*	Electron tube, KC2321P1 (MET)	ABD	
	2501 3720*	Electron tube, KC2321P2/G (MET)		
	2501 3730*	Electron tube, KC2321P2/B (MET)		
	2501 3740*	Electron tube, KC2321P7 (MET)		
	2501 3750*	Electron tube, KC2321P11 (MET)		
	2501 3760*	Electron tube, KC2321P31 (MET)		
		*Depending on sales order.		
V205 & V206	2500 5740	Electron tube, 5642	EIA	

TYPE 7010 SPARE PARTS KIT
FOR
TYPE 765- FAMILY OF OSCILLOSCOPES

CAPACITORS

Qty.	Part Number	Description
1	0300 3040	variable, ceramic, 3-12 pf, 500V
1	0300 7790	variable, ceramic, 1.5-7 pf, 500V
1	0319 1281	variable, 0.65-3.2 pf
1	0326 8650	variable, ceramic, 4-30 pf, 500V
1	0326 9480	variable, air, 9-35 pf, 100V

ADAPTER CONNECTOR

1	0905 9000	3-prong female socket to a 2-prong male plug

FUSES

5	1100 5210	3 amperes
5	1100 5270	1.5 amperes
5	1100 7680	1 ampere

TRANSFORMER

1	2001 3731	high voltage

ELECTRON TUBES

1	2500 5740	5642
1	2500 9270	OG3/85A2
1	2501 1610	ECC82/12AU7
1	2501 2400	6CW5/EL86
1	2501 3390	6CW4
1	2501 3400	7895
1	2501 3430	7586

SEMICONDUCTORS

Qty.	Part Number	Description
1	2600 2711	rectifier, selenium, metallic
1	2600 6670	IN1763/IN1169
2	2600 6810	IN2861
1	2600 6820	FD281
4	2600 6910	FD841
1	2600 6990	IN752
1	2600 7560	ZK36
1	2600 8020	FDG3091
1	2600 7010	transistor, DU #1
2	2600 7020	transistor, DU #1A
1	2600 7030	transistor, DU #1B
3	2600 7060	transistor, DU #2
2	2600 7070	transistor, DU #2A
2	2600 7080	transistor, DU #2B
1	2600 7160	transistor, DU #4
1	2600 7170	transistor, DU #4A
1	2600 7180	transistor, DU #4B
1	2600 7260	transistor, DU #6
1	2600 7270	transistor, DU #6A
1	2600 7280	transistor, DU #6B
1	2600 7370	transistor, DU #8A/2N699B
1	2600 7470	transistor, DU #10A
2	2600 7580	transistor, 2N1701
3	2600 7700	transistor, DU #12A

CABLE

1	5030 1390	assembly
1	6802 7400	plastic case
AR	7502 7540	grease

LIST OF RECOMMENDED VENDORS

CODE	NAME
ABD	Allen B. Du Mont Laboratories
AER	Aerovox Corporation
AHH	Arrow-Hart & Hegeman Electric Company
ALB	Allen-Bradley Company
ALC	Allied Control
ALCO	Alco Electronics Products
ALD	Alden Products Company
AMA	Amaton Electronic Hardware
AMP	Amp Inc.
AMR	Amperite Company, Inc.
AMX	Amperex Electronic Products, Inc.
APC	American Phenolic Corporation
APH	Amphenol Electronics Corporation
ARC	Arco-Elemenco
AST	Astron Corporation
BUS	Bussman Mfg. Co.
CAN	Cannon Electric Company
CBS	CBS-Hytron Division of CBS
CGW	Corning Glass Works
CH	Cutler-Hammer, Inc.
CHC	Chester Cable Corporation
CHM	Chatham Electronics
CLS	Clarostat Mfg. Co., Inc.
CDE	Cornell-Dubilier Electric Corporation
COC	Continental Carbon
CPC	C. P. Clare & Company
CRL	Centralab, Division of Globe-Union Inc.
CST	Chicago Standard Transformer
CTC	Cambridge Thermionic Corp.
CTS	Chicago Telephone Supply Corporation
DAG	Dage Electric Company, Inc.
DAL	Dale Products, Inc.
DLC	Dialight Corporation
DRK	Drake Mfg. Co.
EBY	Hugh M. Eby, Inc.
EIA	Any manufacturer meeting EIA standards
ELC	Electra Mfg. Company
ELD	Eldema Corporation
ELM	Elmenco
EMC	Electro Motive Mfg. Company
EMW	Elmwood Sensors, Inc.
ERC	Erie Resistor Corporation
ESX	Essex Electronics
FCI	Fairchild Camera and Instrument Corporation
FER	Ferroxcube Corporation of America
GDE	Good-All Electric Mfg. Co.
GE	General Electric Company
GRC	General Radio Company
GRY	Grayhill, Inc.
GUD	The Gudeman Company
HOP	Hopkins Engineering Company
HWP	Hewlett-Packard Company
IRC	International Resistance Company
IRP	International Rectifier Corporation
ITT	ITT Components Division
JEF	Jeffers Electronics, Inc.
JHN	E. F. Johnson Company
JWM	J. W. Miller Co.
KUL	Kulka Electric Mfg. Co. Inc.
KXM	Klixon Metals and Control Corporation
LFI	Littlefuse, Inc.
MAL	P. R. Mallory & Company, Inc.
MIC	Micamold Electronics Mfg. Corporation
MIL	Miller Electric Company
MOT	Motorola Semiconductor Products, Inc.
MUC	Mucon Corporation
MUT	The Muter Company
NYT	New York Transformer Company, Inc.
OAK	Oak Mfg. Company
PHC	Philco Corporation
PHI	Philips Electronic Tube Division
PLS	Plastoid Corporation
POT	Potter & Brumfield, Inc.
PRC	Precision Resistor Co., Inc.
PYR	Pyramid Electric Company
RCA	Radio Corporation of America
RMC	Radio Materials Corporation
ROY	Royal Electric Corp., Inc.
RTN	Rotron Mfg. Company
SIG	Signalite Inc.
SLT	Sealectro Corporation
SOL	Solitron Devices, Inc.
SPG	Sprague Electric Company
STC	Stackpole Carbon Company
STW	Standard Winding Company
SUM	Summit Coil Company
SYL	Sylvania Electric Products, Inc.
SYN	Synstronic Instruments, Inc.
TEC	Transistor Electronics Corporation
TEX	Texas Instruments, Inc.
THC	Thermol Control, Inc.
TOR	Torrington Mfg. Company
TRS	Tresco, Inc.
TRU	Tru-Ohm Products
TUG	Tung-Sol Electric Inc.
UCN	Ucinite Co.
VIC	The Victoreen Instrument Company
WDL	Ward Leonard Electric Company
WES	Weston Electrical Instrument Corporation
WYN	Welwyn International Inc.

DU MONT

INSTRUMENT WARRANTY AND SERVICE NOTICE

WARRANTY

Allen B. Du Mont Laboratories warrants that each new Cathode-ray Oscilloscope, Automotive Test Equipment, and other Electronic or Electrical Test or Measuring Equipment (hereinafter referred to as "Instrument") manufactured or sold by it, is free from defects in material or workmanship under normal use and service for a period of one year from the date of its sale to the first purchaser for use. If, upon examination by Du Mont, the Instrument is determined to be defective in workmanship or material, Du Mont will, subject to the conditions set forth below, either repair the defective part or replace it with a new part. Du Mont shall not be liable for any delay or failure to furnish a replacement part resulting directly or indirectly from any governmental restriction, priority or allocation or any other governmental regulatory order or action, nor shall Du Mont be liable for damages by reason of the failure of the Instrument to perform properly or for any consequential damages. This warranty does not apply to any Instrument that has been subject to negligence, accident, misuse or improper installation or operation or that in any way has been tampered with, altered or repaired by any person other than an authorized Du Mont service organization or an employee thereof, or to any Instrument whose serial number has been altered, defaced or removed, or to any Instrument purchased within, and thereafter removed beyond, the continental limits of the United States.

This warranty shall, at Du Mont's option, become void unless registration thereof is promptly effected as provided below. This warranty is in lieu of all other warranties, expressed or implied, and no one is authorized to assume any liability on behalf Du Mont or impose any obligation upon it in c tion with the sale of any Instrument, o stated above.

REGISTERING THE WARRAN

To register this warranty, th registration card must be prop mailed to the Instrument Service mediately upon receipt of the equip. information is necessary. BOTH THE BER AND THE SERIAL NUMBER O IN-STRUMENT MUST BE GIVEN ON TH CARD. Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time and to furnish merchandise in accordance with current specifications without incurring any liability to modify equipment previously sold, or to supply new equipment in accordance with earlier specifications excepting under the classification of special apparatus.

SERVICE

In order to insure service under our warranty, the enclosed warranty service card must be properly filled out and returned to the factory. In all cases where service or adjustment is requested, please first contact the factory or authorized depot, giving complete information concerning the nature of the failure and describing the manner in which the equipment was used when failure occurred. THE TYPE NUMBER AND SERIAL NUMBER of the equipment must also be given. In this way, much time can be saved and unnecessary inconvenience often avoided. When writing to the factory in this respect, address:

ALLEN B. DU MONT LABORATORIES
Divisions of Fairchild Camera and Instrument Corporation
Industrial Electronics Division
750 Bloomfield Avenue, Clifton, New Jersey

The Instrument Service Department will then send to the custom written procedure for disposition and ship ctions. All equipment should be packe in accordance with this proce- d n tags should be attached to

DUMONT
OSCILLOSCOPE LABORATORIES, INC.
40 FAIRFIELD PLACE
WEST CALDWELL, NEW JERSEY 07006

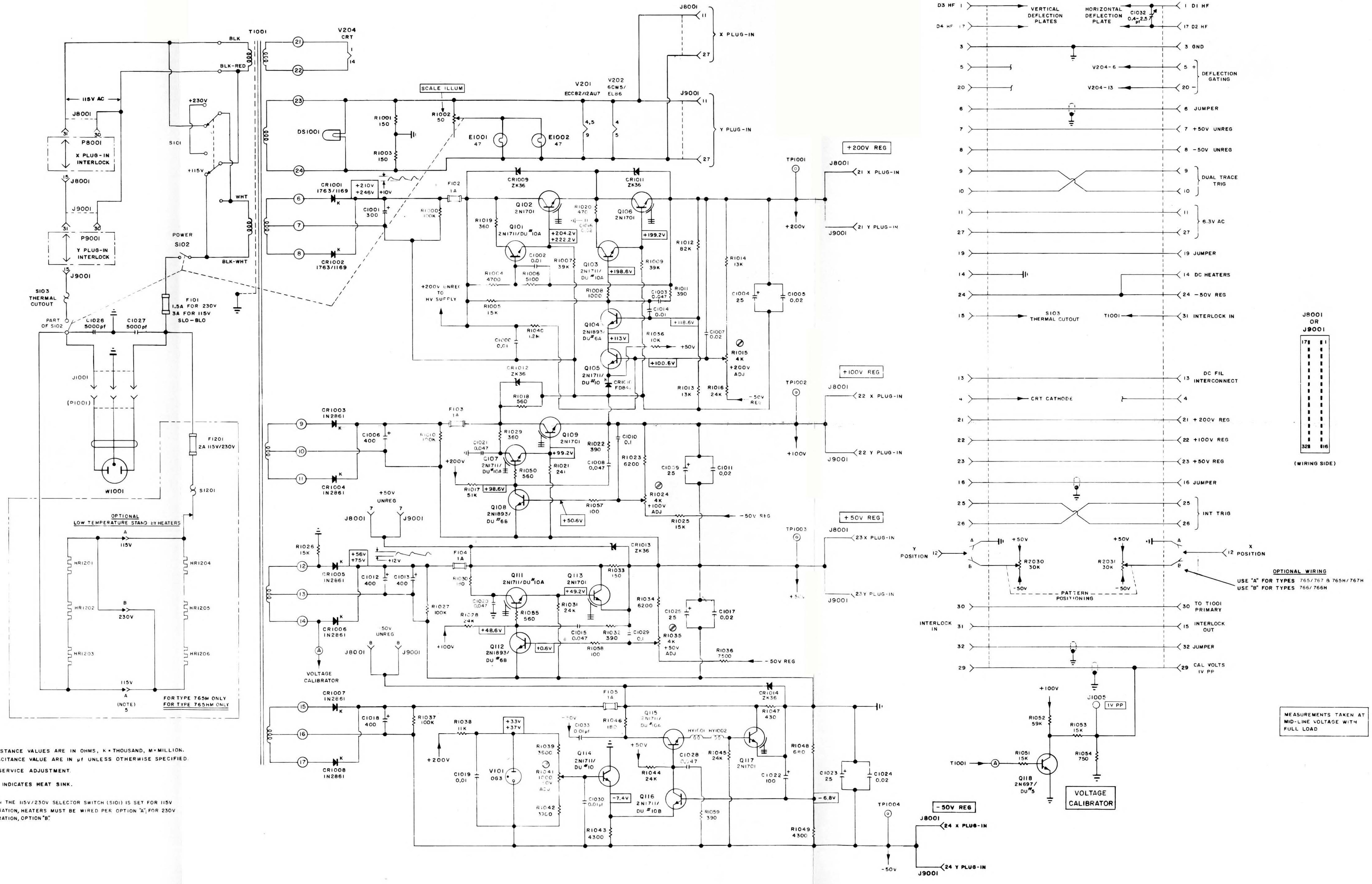
a replacement component s give the Type number and ne Instrument. Before ordering arranty replacement or purchasing -of-warranty replacement, be sure to con- Parts List in the Instruction Manual. The s List gives the values, tolerances, ratings, and Du Mont part number for all electrical components used in the Instrument. This will help to expedite service.

ALLEN B. DU MONT LABORATORIES
Divisions of Fairchild Camera and Instrument Corporation
Industrial Electronics Division
750 Bloomfield Avenue, Clifton, New Jersey

PATENT NOTICE

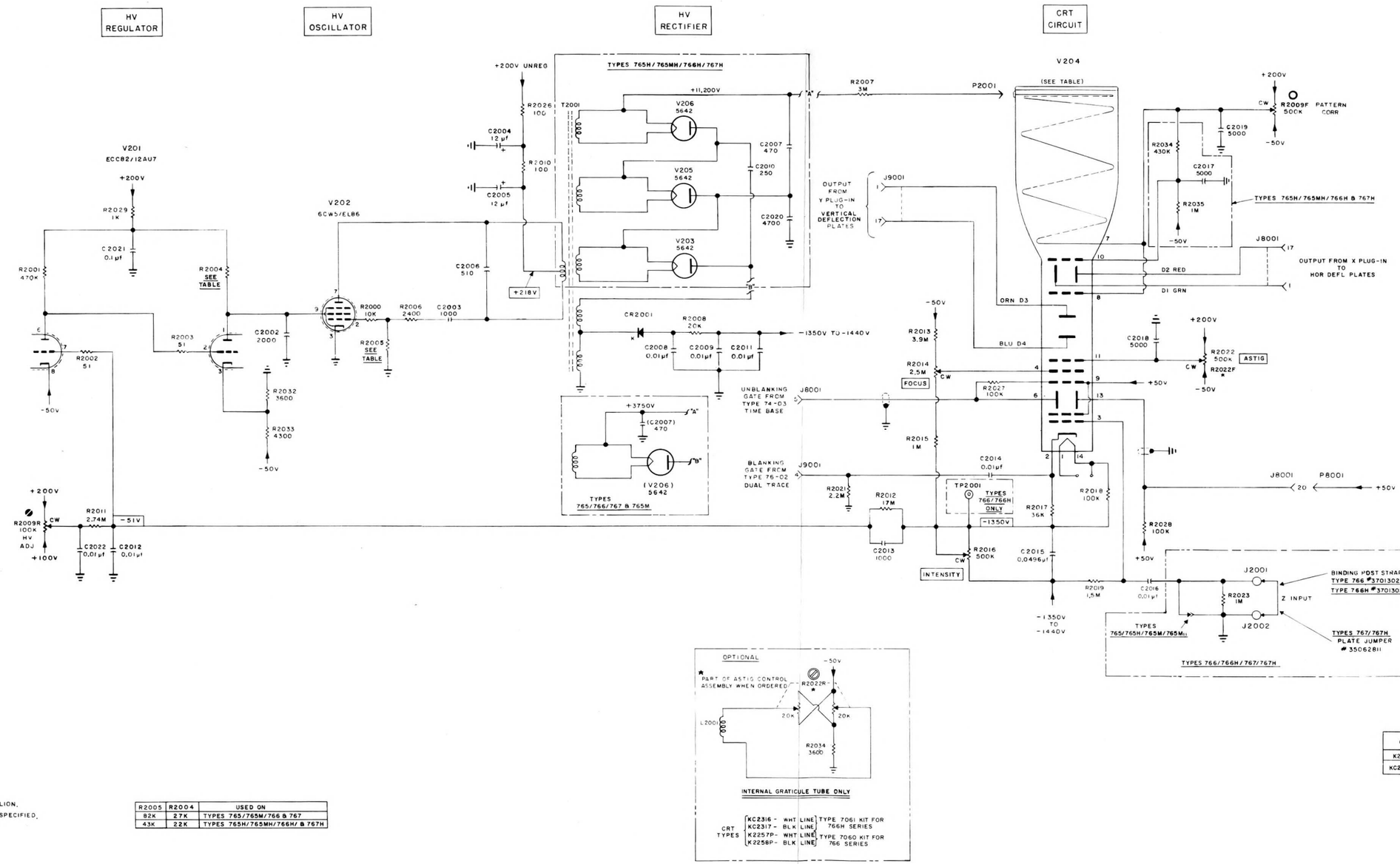
Manufactured under one or more U. S. Patents owned or controlled by Allen B. Du Mont Laboratories, Divisions of Fairchild Camera and Instrument Corporation, 750 Bloomfield Avenue, Clifton, New Jersey, U.S.A. Patent Numbers supplied upon request.

LV SUPPLY AND CONNECTOR



NOTES
1. RESISTANCE VALUES ARE IN OHMS, K = THOUSAND, M = MILLION.
2. CAPACITANCE VALUE ARE IN μf UNLESS OTHERWISE SPECIFIED.
3. ⊘ SERVICE ADJUSTMENT.
4. INDICATES HEAT SINK.
5. WHEN THE 115V/230V SELECTOR SWITCH (S101) IS SET FOR 115V OPERATION, HEATERS MUST BE WIRED PER OPTION "A"; FOR 230V OPERATION, OPTION "B".

SHEET 1 OF 2



NOTES
1. RESISTANCE VALUES ARE IN OHMS, K=THOUSAND, M=MILLION.
2. CAPACITANCE VALUES ARE IN pf UNLESS OTHERWISE SPECIFIED.
3. ⊘ SERVICE ADJUSTMENT.

R2005	R2004	USED ON
82K	27K	TYPES 765/765M/766 & 767
43K	22K	TYPES 765H/765MH/766H/ & 767H

CRT	TYPES USED ON
K2130P-	765/766/767 & 765M
KC2321P-	765H/765MH/766H & 767H

SUPPLEMENT

FOR

TYPE 766H MOD 102 OSCILLOSCOPE
(Reference Manual #6704 0895)

This Supplement is issued to provide a DC Offset control for balancing the Type 76-08 Dual Trace Plug-in when the latter unit is set up in the ADDED mode.

A. ADJUSTMENT OF A ± B DC OFFSET POT R1071

When the A ± B DC OFFSET potentiometer is properly adjusted, there will be no depositioning of the trace when the MODE switch is set to the ADDED position. To properly adjust, proceed as follows:

1. Set up Time Base Plug-in for automatic triggering to obtain a reference trace on the screen.

2. Set MODE switch to CH 1 and position trace to screen center with CH 1 POSITION control.

3. Set MODE switch to CH 2 and position trace to screen center with CH 2 POSITION control.

4. Set MODE switch to ADDED. Measure the number of graticule divisions the trace has shifted or is offset from screen center.

5. Set MODE switch to ALT. Using Channels 1 and 2 POSITION controls, position the trace to the opposite side of screen center by the exact displacement that was noted in step 4. For example, if the trace was offset from screen center by 1-1/2 divisions, then position the trace 1-1/2 divisions below screen center.

6. Set the A ± B DC OFFSET pot R1071 to bring the trace to screen center.

7. Rotate the MODE switch throughout its range. There should be no depositioning of the trace. Repeat preceding steps if necessary to achieve this condition.

B. ELECTRICAL PARTS LIST

	Symbol		Part Number	Description
Change	J1005	from	0904 4381	Jack tip, black
		to	0905 7610	BNC Connector
Change	W1001	from	5030 1390	Cable Assembly
		to	5030 1890	Cable Assembly
Add	R1071		0109 1410	Resistor, variable, composition, 50K ohms, ±20%
Delete	R1055 & R1056		0107 2631	Resistor, variable, composition, 30K ohms, ±20%, 1/2W
Add	----		0905 8950	Type 7080 Adapter Connector

C. SCHEMATIC CHANGES

Revise schematic as indicated in sketch below.