

MODEL 1062

OSCILLOSCOPE

SERIALS PREFIXED 146

DUMONT

40 FAIRFIELD PLACE, WEST CALDWELL, N.J.

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NOTE

This manual is applicable to all 1062's whose serial number prefix is as indicated above. Any 1062's whose prefixes are different from the above have had changes which are covered by the appropriate addendums attached to the rear of this manual. The prefix of the last addendum should agree with the prefix of the 1062.

PART NO. 6704-9751

General Information

1-1. DESCRIPTION

1-1a. The model 1062 is a high frequency, high performance, portable oscilloscope. It is suited for use in design, testing, and service of high frequency, analog, or digital circuits. Its 5.8 ns rise time allows the viewing of very fast phenomena. A unique trigger system allows a vertical display in the alternate mode with composite triggering, such that separation of the traces produces no trace flicker due to loss of synchronism.

1-1b. The model 1062 features all solid state circuit design (except for the CRT) including FET input amplifiers and micro logic vertical mode switching.

1-1c. The vertical channels with 60 MHz bandwidth capability can be viewed individually or together in an alternate or chopped mode as well as an added mode. Trigger selection allows composite, channel 1, or channel 2 only triggering.

1-1d. The horizontal section features a main and a delayed sweep as well as an external 4 MHz horizontal port. With the X10 horizontal expansion, a sweep time of 10 ns per cm is achievable.

1-1e. External intensity modulation is available through a rear panel connector and has a rise time of approximately 70 ns.

1-1f. An internal 1 KHz square wave generator with output levels of 60 mv and 600 mv is available for scope and probe calibration.

1-2. CATHODE-RAY TUBE

1-2a. The CRT features an internal 8 x 10 cm graticule to eliminate parallax problems. An accelerating potential of 12 kV provides a very high writing rate for viewing low duty cycle signals.

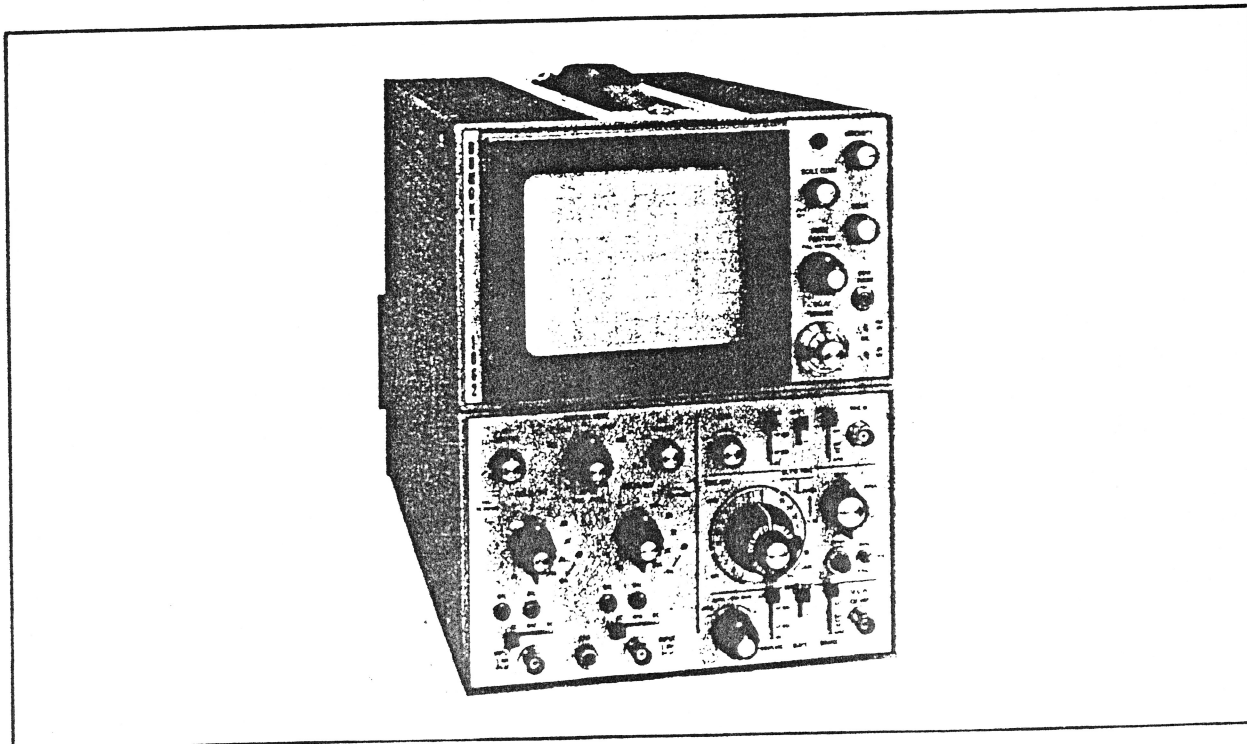


Figure 1-1. Model 1062

Notes

1062 SPECIFICATIONS

VERTICAL DEFLECTION SYSTEM

Deflection Factor: 5 millivolts/division to 10 volts/division in 11 calibrated steps for each channel.
Deflection Accuracy: Within $\pm 3\%$ of indicated deflection with VARIABLE control fully clockwise.
Variable Deflection Factor: Uncalibrated deflection factor at least 2.5 times the VOLTS/DIV switch indication. This provides a maximum uncalibrated deflection factor of 25 volts/division in the 10 volts position.

Frequency Response: (Measured with 25 ohms source impedance) (not more than 30% down)

5 mV to 10 V/DIV DC to 60 MHz
Added (5 mV to 10 V/DIV) DC to 60 MHz

Input R_c Characteristics: 1 megohm $\pm 2\%$, paralleled by 25 pF ± 1 pF

Max Input Voltage: AC coupled 600 volts (DC + peak AC);
DC coupled 300 volts (DC + peak AC)

Input Coupling Modes: AC or DC, selected by front panel switch

AC Low Frequency Response: Typically 30% down at 4 Hz, AC GND DC switch set to AC

Vertical Display Modes: Channel 1 only
Channel 2 only
Dual Trace, alternate between channels
Dual Trace, chopped between channels
Added algebraically

Chopped Repetition Rate: Repetition rate of approximately 500 KHz

Common Mode Rejection Ratio: Greater than 20:1 at 2 MHz, input signal less than ten times VOLTS/DIV

Position Range: Approximately three screen diameters

Polarity Inversion: Signal on Channel 1 or Channel 2 can be inverted

Vertical Drift: At 5 mV, not more than 1 mV over five hour period; after 15 minutes warm-up

TRIGGERING (Main and Delayed Sweep)

Source: Internal from displayed channel or from Channel 1

External
External divide by 10
Internal from AC line

Coupling: AC
AC low frequency reject
AC high frequency reject
DC

Mode: Channel 1 only, Channel 2 only or display

Slope: Sweep can be triggered from positive-going or negative-going portion of trigger signal

Internal Trigger Sensitivity:

AC	0.5 div of deflection, minimum, 4 Hz to 50 MHz
LF REJ	0.5 div of deflection, minimum, 30 KHz to 50 MHz
HF REJ	0.5 div of deflection, minimum, 4 Hz to 50 KHz
DC	0.5 div of deflection, minimum, DC to 50 MHz

External Trigger Sensitivity:

AC	50 millivolts, peak-to-peak, minimum, 4 Hz to 60 MHz
LF REJ	50 millivolts, peak-to-peak, minimum, 30 KHz to 60 MHz
HF REJ	50 millivolts, peak-to-peak, minimum, 4 Hz to 50 KHz
DC	50 millivolts, peak-to-peak, minimum, DC to 60 MHz

Auto Triggering: (Main Sweep Only) Provides normal triggering above approximately 20 Hz and produces free-running sweep in absence of trigger signal

Single Sweep: Triggering capability same as normal trigger

Display Jitter: Less than 1 nanosecond at 10 nanoseconds/DIV

Maximum Input Voltage: 300 volts (DC + peak AC) X1 positions: 600 volts (DC + peak AC) in EXT/10 position

External Trigger

Input R_c Characteristics: Approximately 1 megohm paralleled by 30 pF

Level Control Range: ± 1.5 volts, EXT 1X
 ± 15 volts, EXT $\div 10$

HORIZONTAL DEFLECTION SYSTEM (Main and Delayed Generator)

Sweep Rates:

Main	0.1 microsecond/division to 1 second/division in 23 calibrated steps
Delayed	0.1 microsecond/division to 1 second/division in 23 calibrated steps

Sweep Accuracy:

1 SEC/DIV to 0.1 SEC/DIV — Within $\pm 3\%$ of indicated sweep rate

Variable Sweep Rate: Uncalibrated sweep rate to 2.5 times the TIME/DIV indication

1062 SPECIFICATIONS (Continued)

SWEEP MAGNIFIER

Sweep Magnification: Each sweep rate can be increased 10 times the indicated sweep rate by horizontally expanding the center division of display (fastest sweep 10 ns/cm)

Magnified Sweep Accuracy: $\pm 2\%$ tolerance added to specified sweep accuracy

SWEEP DELAY

Calibrated Delay Time Range: Continuous from 10 seconds to 0.1 microseconds

Incremental Delay Accuracy: $\pm 0.3\%$

Delay Time Jitter: Less than 1 part in 20,000 of 10 times main TIME/DIV switch setting

EXTERNAL HORIZONTAL AMPLIFIER

Input: EXT horizontal connector

Deflection Factor: Unmagnified — X1 Horizontal Gain

Variable 120 mV/cm to 1.2 V/cm

X10 Horizontal Gain

Variable 12 mV/cm to 120 mV/cm

$\div 10$ External Horizontal

Variable 1.2 V/cm to 12 V/cm

Frequency Response: DC to 4 MHz, not more than 30% down, trig coupling in DC position

Input R_c Characteristics: Approximately 1 megohm, paralleled by 30 pF

CALIBRATOR

Waveshape: Square wave, duty cycle 50% $\pm 5\%$

Polarity: Positive-going with baseline at zero volts.

Output Voltage: 0.6 V or .06V peak-to-peak $\pm 1\%$

Repetition Rate: 1 KHz, approximately

Rise Time: Less than 1 microsecond

Z AXIS INPUT

Sensitivity: 2 volts peak-to-peak signal produces noticeable intensity modulation

Rise Time: 70 ns

Input Resistance: Approximately 5 K ohms

Input Coupling: DC coupled

Polarity of Operation: + input decreases intensity

Maximum Input Voltage: 20 V combined (DC + peak AC)

POWER SUPPLY

Voltage Requirements:

115 Volt Range 105 to 125 V

230 Volt Range 209 to 255 V

Line Frequency: 48 to 400 Hz

Power Consumption: 75 watts maximum

CATHODE-RAY TUBE (CRT)

Phosphor: P31 standard; others available on special order

Accelerating Potential: 12 kV

Graticule Type: Internal

Area: 8 cm vertical by 10 cm horizontal

Illumination: Variable edge lighting

MECHANICAL CHARACTERISTICS

Overall Dimensions:

(measured at max. points) 8¼" x 11½" x 21-7/32" without cover

Net Weight: 30 lbs. approximately

Temperature:

Operating 0°C to + 55°C

Non-Operating -20°C to + 75°C

Operation

2-1. INITIAL INSPECTION

2-1a. Check instrument for any damage due to shipping immediately after receipt. Check for dents or broken parts and for scratched surfaces.

2-1b. Electrical check is outlined in Section 4.

2-2. CLAIMS

2-2a. If any physical damage or electrical specification problems occur in the initial inspection as outlined above, notify the nearest DUMONT Sales/Service office immediately.

2-3. REPACKAGING FOR SHIPMENT

It is mandatory that when shipping an instrument to any Dumont sales/service office, the original packing materials or equivalent be used to re-package the instrument. Equivalent packing includes (1) a double-walled, heavy duty corrugated cardboard container (2) soft paper surrounding the instrument to protect it from minor abrasions (3) some type of shock-absorbing material to surround the instrument.

It is also important to very clearly indicate on a tag attached to instrument, what the failure mechanism is.

2-4. PREPARATION FOR USE

2-4a. The model 1062 will operate on 115 Volt AC or 230 Volt AC $\pm 10\%$, single phase, 50 to 400 Hz power source. The power source must be able to supply 100 Watts.

2-4b. BEFORE CONNECTING THE INSTRUMENT TO A POWER SOURCE, check that the 115/230 V AC slide switch (52) is set to the correct nominal line voltage. The instrument comes equipped with a 2 aSB fuse for 115 Volt AC operation. If the nominal line voltage is 230 Volt AC, replace the 2 aSB fuse with a 1 aSB fuse.

2-4c. The model 1062 oscilloscope is convection cooled. It is important, therefore, that nothing disturb the air circulation when operated in an ambient environment 0 to 55°C.

2-5. EXTERNAL CONTROLS

NOTE: Throughout this manual references to the external controls will appear in capital letters followed by the reference number listed in Paragraphs 2-5a. and 2-5b.

2-5a. Front Panel (refer to Fig. 2-1)

1. CH1 IN — Input Connector for CH1.
3. CALIBRATE — Adjust CH1 gain for calibration.
4. BALANCE — Adjust CH1 DC balance.
5. AC-GND-DC — Selects input coupling mode to CH1.
6. VOLTS/DIVISION — Sets CH1 sensitivity.
7. VERNIER — When rotated provides continuous gain control of CH1. When pulled, inverts CH1 signal.
8. CH1 POSITION — Adjusts vertical position of the CH1 trace.
9. VERTICAL MODE — Selects vertical mode.
 - a. CH1 — Selects CH1 only.
 - b. CH2 — Selects CH2 only.
 - c. CHOP — Selects CH1 and CH2 alternately at a 500 KHz rate.
 - d. ALTERNATE — Selects CH1 and CH2 alternately, alternating with each sweep.
 - e. ADD — Adds CH1 and CH2 together.
10. TRIGGER MODE — Selects triggering from CH1 ONLY CH2 ONLY or from both CH1 and CH2 in the DISPLAY mode.
11. CH2 POSITION — Adjusts vertical position of CH2 trace.
12. VOLTS/DIVISION — Sets CH2 sensitivity.
13. VERNIER — When rotated provides continuous gain control of CH2. When pulled, inverts CH2 signal.
14. AC-GND-DC — Selects input coupling mode to CH2.
16. CALIBRATE — Adjusts CH2 gain.
17. BALANCE — Adjusts CH2 DC balance.

18. CH2 IN — Input connector for CH2.
19. LEVEL/HORIZONTAL GAIN — with horizontal mode (29) not in EXTERNAL HORIZONTAL mode, controls the trigger level of the main sweep trigger. With HORIZONTAL MODE (29) in EXTERNAL HORIZONTAL mode, provides continuous control of horizontal amplifier gain.
20. STABILITY — Provides Vernier adjustment of hold-off time to improve high frequency synchronization.
21. COUPLING — Determines coupling mode to trigger input circuits except when HORIZONTAL MODE (29) is in the EXTERNAL HORIZONTAL position. In EXTERNAL HORIZONTAL it determines the coupling mode to the horizontal amplifier.
 - a. DC — DC couples input.
 - b. HIGH FREQUENCY REJECT — Rejects high frequencies (above 30 KHz).
 - c. LOW FREQUENCY REJECT — Rejects low frequencies (below 50 KHz).
 - d. AC — AC Couples input.
22. SLOPE — Selects on which slope, + or —, the main sweep triggers.
23. SOURCE — Selects trigger source when HORIZONTAL MODE (29) not in EXTERNAL HORIZONTAL mode. When HORIZONTAL MODE (29) in EXTERNAL HORIZONTAL, selects either an external signal or the line signal for horizontal deflection.
 - a. INTERNAL — Internal signal from CH1 and/or CH2 pre-amplifier.
 - b. EXTERNAL — External signal from TRIGGER-IN (24) jack.
 - c. EXTERNAL/10 — Attenuates external input signal by 10.
 - d. LINE — Signal from power line for line sweeping or line synchronizing.
24. TRIGGER-IN/EXTERNAL HORIZONTAL — Input for an external signal to be used for triggering or for horizontal deflection depending on position of HORIZONTAL MODE (29) control.
25. SWEEP MODE
 - a. AUTO — Allows main sweep to free-run or to be triggered from an input whose repetition rate is greater than 20 Hz.
 - b. TRIGGER — Sweep will be triggered only if a signal is present.
 - c. SINGLE — Allows only one triggered sweep to occur when sweep circuit is armed by REARM (26) control.
26. REARM — Indicates condition of main sweep. When lit, main sweep ready for triggering. Used mostly in conjunction with SINGLE sweep function of SWEEP MODE (25) control.
- 27A. MAIN SWEEP TIME — Indicates horizontal calibration in time/div of main sweep with vernier in CAL position.
- 27B. DELAYED SWEEP TIME — Indicates horizontal calibration of delayed sweep in time/div with vernier in CAL position.
28. VERNIER — Provides continuous adjustment of TIME/div (27A) when HORIZONTAL MODE (29) is in NORM, and continuous adjustment of Time/div (27B) when HORIZONTAL MODE (29) is in INTEN or DELAYED.
29. HORIZONTAL MODE — Selects the mode in which the horizontal section operates.
 - a. NORMAL — This mode allows only the main sweep to function.
 - b. INTENSIFIED — This allows the main sweep to have an intensified area, the start and duration of which are controlled by the DELAY VERNIER (35) and DELAYED SWEEP TIME (27B) controls respectively. Delayed sweep triggering in this mode is automatic.
 - c. DELAYED — The entire horizontal trace is the intensified area referred to in b above.
 - d. DELAYED TRIGGERED INTENSIFIED — Same as b above, except that in this case the DELAY VERNIER (35) arms the delayed sweep. The delayed sweep is triggered depending upon the delayed trigger controls (30, 31, 32, 33, 34).
 - e. DELAYED TRIGGER DELAYED — The entire horizontal trace is the intensified area referred to in d above.
 - f. EXTERNAL HORIZONTAL — Disables all trigger and sweep functions and sets up the horizontal amplifier for external signals depending on controls (19, 21, 23, 24).
30. TRIGGER-IN — Input for externally triggering delayed sweep.
31. SOURCE — Selects delayed sweep trigger source.
 - a. INTERNAL — Uses internal signals from vertical pre-amplifiers for triggering.
 - b. EXTERNAL — Uses signals from TRIGGER-IN (30) for triggering.
 - c. EXTERNAL/10 — Divides external input signals by 10.
 - d. LINE — Selects the power line signal for triggering.
32. SLOPE — Selects on which slope, + or —, the delay sweep triggers.
33. COUPLING — Determines coupling mode to delay trigger input circuits, in a manner similar to COUPLING (21) control.
34. LEVEL — Selects level at which delayed triggering occurs.
35. DELAYED VERNIER — Establishes the time at which the delayed sweep starts when the HORIZONTAL MODE (29) control is in the INTENSIFIED or DELAYED position, and the time at which the delayed sweep is armed for triggering when the HORIZONTAL MODE (29) control is in the DELAYED TRIGGER INTENSIFIED or DELAYED TRIGGER DELAYED position.

- 36. HORIZONTAL POSITION — Provides coarse control of horizontal position of the trace.
- 37. VERNIER/X10 — When rotated provides vernier control of the horizontal position. When pulled provides an increase in horizontal gain of 10 times.
- 38. FOCUS — Focuses trace.
- 39. INTENSITY — Provides continuous intensity control of trace.
- 40. SCALE ILLUMINATION/ON-OFF — Applies power to instrument and provides variable intensity to graticule.
- 41. BEAM FINDER — Overrides intensity, vertical position and horizontal position, and restricts beam position to lie within the graticule.
- 42. CALIBRATOR 600 mv — 1 KHz square wave, 600 mv, p-p.
- 43. CALIBRATOR 60 mv — 1 KHz square wave, 60 mv, p-p.

2-5b. Rear Panel (refer to fig. 2-2)

- 45. Z INPUT — For use in externally controlling intensity of the trace.
- 46. INTENSITY LIMIT — Adjusts maximum trace intensity.
- 47. ASTIGMATISM ADJUST — Adjusts astigmatism CRT spot.
- 48. PATTERN ADJUST — Adjusts CRT pattern to rectangular.
- 49. TRACE ALIGNMENT — Aligns CRT trace to the graticule.
- 50. MAIN SWEEP LENGTH —
 - a. Full — Main sweep ends itself.
 - b. Delayed ends main — Delayed sweep ends main sweep.
- 51. LINE FUSE.
- 52. 115/230 — Selects nominal line voltage.
- 53. LINE INPUT CONNECTOR.

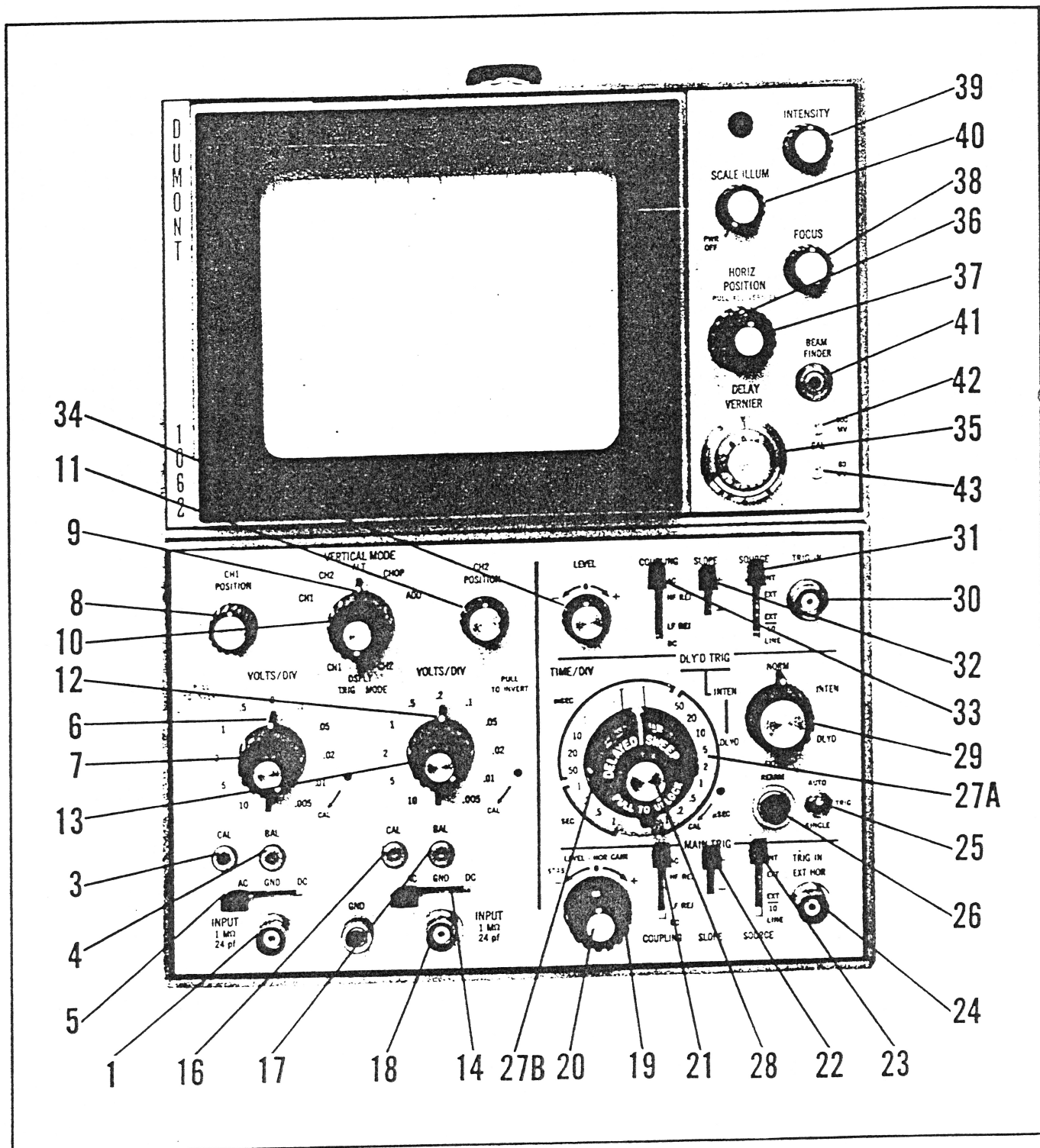


Figure 2-1. 1062 Front Panel Controls

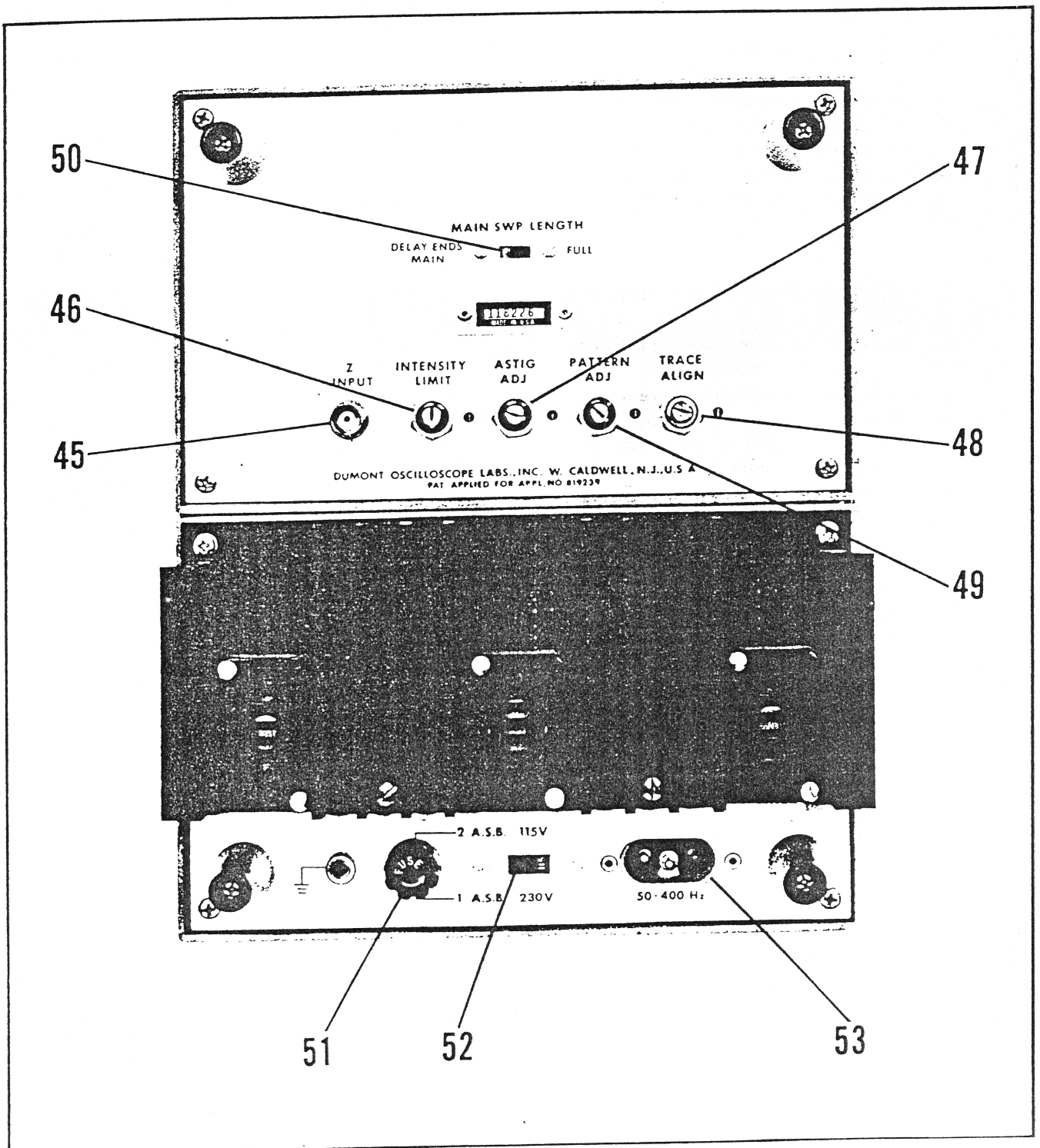


Figure 2-2. 1062 Rear Panel Controls

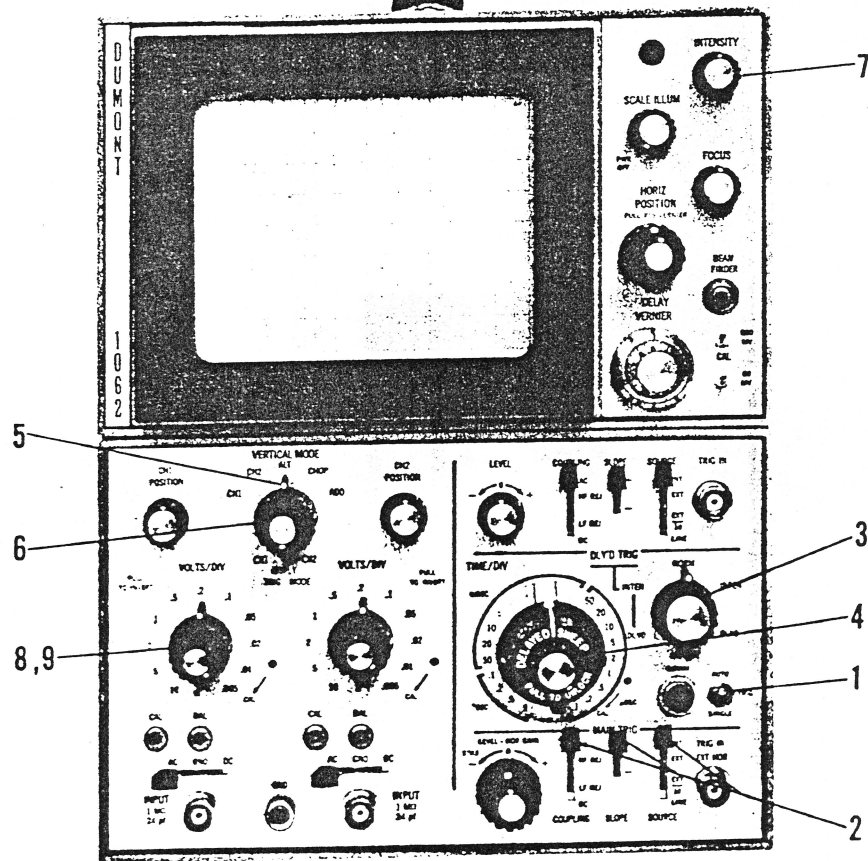
2-6. TYPICAL SET-UP PROCEDURE

2-6a. Figures 2-3 through 2-6 describe the steps necessary to initiate typical modes of operation available with the model 1062 oscilloscope.

CAUTION

Before connecting any signals to the 1062 it is necessary to observe the limitations of 300 Volts peak for the CH1 (1), CH2 (18), TRIGGER-IN (24), and TRIGGER-IN (30) connectors. Also a maximum of 20 Volts peak on the Z INPUT (45).

1. Connect signals to CH1 (1) and/or CH2 (18) connectors.
2. Figures 2-3 through 2-6 describe various modes of operation, however, all use internal triggering only. Trigger modes other than internal can be utilized by connecting the trigger source to either TRIGGER-IN (24), or TRIGGER-IN (30) connectors, depending upon whether the main or delayed sweep is to be triggered. Refer to section 2, paragraph 2-5, for a description of the trigger controls.



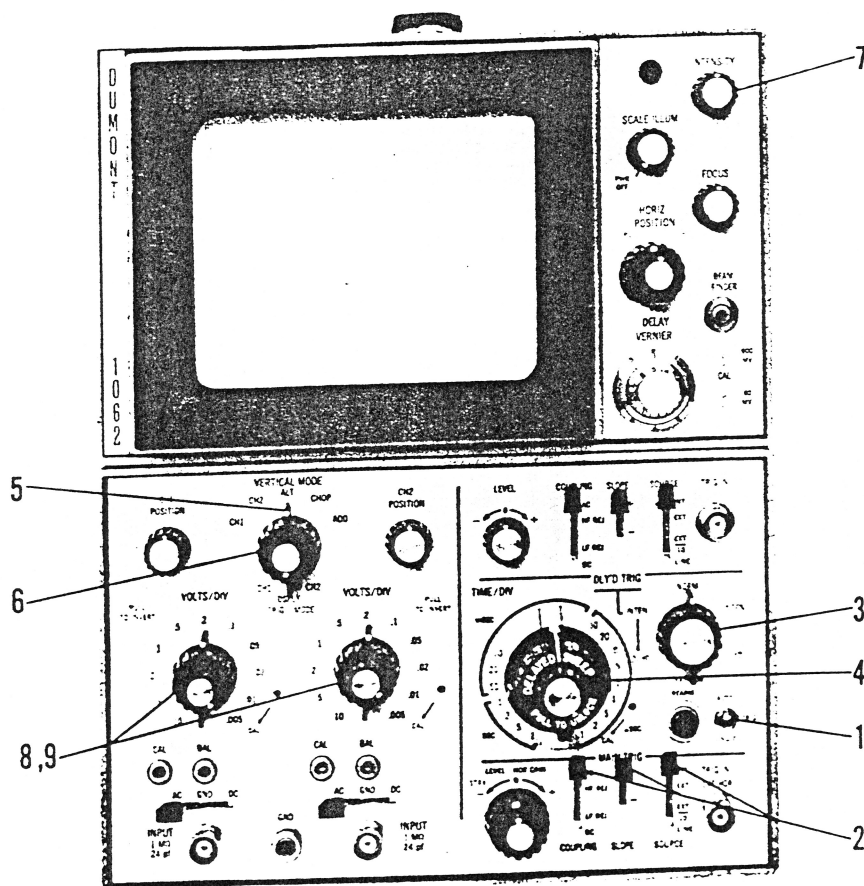
Set front panel controls to:

1. SWEEP MODE (25) – AUTO.
2. All lever switches in main trigger section – up.
3. HORIZONTAL MODE (29) – NORMAL.
4. VERNIER (28) – CAL.
5. VERTICAL MODE (9) – CH1.
6. TRIGGER MODE (10) – DSPLY.
7. INTENSITY (39) – $\frac{3}{4}$ full on.
8. GAIN VERNIER (7) – CAL.

At this time a trace should be on the screen. If not, depress BEAM FINDER (41) and adjust CH1 POSITION (8) and HORIZONTAL POSITION (36) to center the trace. Release BEAM FINDER (41) and adjust INTENSITY (39) to desired brightness. With signal connected to CH1 (1), adjust AC-GND-DC (5) VOLTS/DIVISION (6), CH1 POSITION (8), LEVEL (19), and TIME/DIVISION (27A) to give the desired display.

To utilize CH2 connect signal to CH2 (18) and repeat the above for CH2 controls, and place VERTICAL MODE (10) to CH2.

Figure 2-3. Normal Sweep Single Channel Operation



Set front panel controls to:

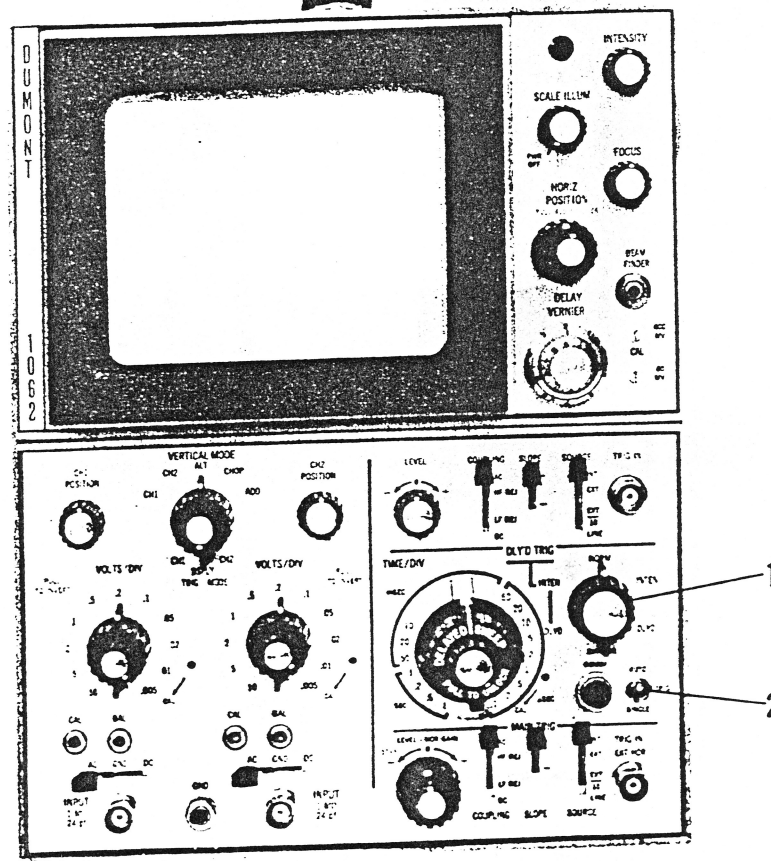
1. SWEEP MODE (25) – AUTO.
2. All switches in main trigger section – up.
3. HORIZONTAL MODE (29) – NORMAL.
4. VERNIER (28) – CAL.
5. VERTICAL MODE (9) – CH1.
6. TRIGGER MODE (10) – DSPLY.
7. INTENSITY (39) – $\frac{3}{4}$ full on.
8. GAIN VERNIER (7 & 13) – CAL.

At this time a trace should be on the screen. If not, depress BEAM FINDER (41) and adjust CH1 POSITION (8) and HORIZONTAL POSITION (36) to center the trace. Release BEAM FINDER (41) and adjust INTENSITY (39) to desired brightness. The two methods of dual channel operation possible are chopped and alternate. In the alternate

mode, the sweep alternates with each trace between CH1 and CH2. In this mode there is an option to trigger the sweep from CH1 only CH2 only or from CH1 when viewing CH1, and from CH2 when viewing CH2. To obtain this mode set VERTICAL MODE (9) to ALTERNATE and TRIGGER MODE (10) to CH1 or COMPOSITE as desired.

In the chopped mode a 500 KHz signal switches between CH1 and CH2. In this mode it is necessary to trigger from CH1 only or CH2 only, and this mode is obtained by setting the VERTICAL MODE (9) to CHOPPED and TRIGGER MODE (10) to CH1 or CH2. In either of the above modes, adjust the AC-GND-DC (5 & 14), VOLTS/DIVISION (6 & 12), CH1 POSITION (8), CH2 POSITION (11), LEVEL (19), and TIME/DIVISION (27A) to give the desired display.

Figure 2-4. Normal Sweep Dual Channel Operation



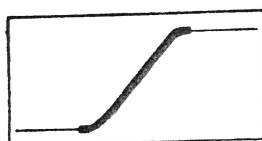
Refer to Figures 2-3 and 2-4 for vertical display, information and settings.

The two modes of delayed sweep possible are non-triggered and triggered delayed sweep. The non-triggered delayed sweep is initiated by setting:

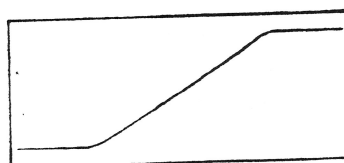
1. HORIZONTAL MODE (29) — INTENSIFIED.
2. SWEEP MODE (25) — AUTO.

The display at this time should be a trace of normal intensity for the first part of the trace followed by an intensified portion. The length of the intensified portion is controlled by the TIME/DIVISION (27B) switch, and the start of it is controlled by the DELAY VERNIER (35) control. Setting the HORIZONTAL Mode (29) to the DELAYED Position causes the intensified portion of the trace to be displayed as the full trace. The sequence below shows this.

INTEN



DLYD



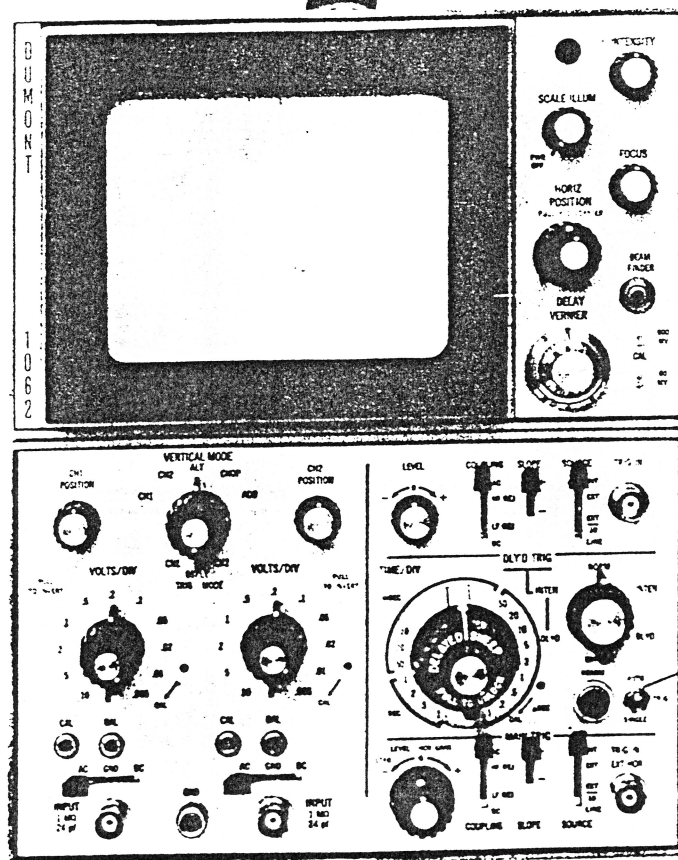
The triggered delayed sweep is similar to the non-triggered mode with the exception that the DELAY VERNIER (35) arms the delayed sweep for triggering, the triggering being set by the SOURCE (31), SLOPE (32), COUPLING (33), LEVEL (34), and TRIGGER-IN (30) controls. The triggered intensified delayed sweep mode is obtained by setting:

1. HORIZONTAL MODE (29) — DELAYED TRIGGER INTENSIFIED.
2. SWEEP MODE (25) — AUTO.

The triggered delayed mode is obtained by setting:

1. HORIZONTAL MODE (29) — DELAYED TRIGGERED DELAYED.
2. SWEEP MODE (25) — AUTO.

Figure 2-5. Single or Dual Channel Delayed Sweep Operation



Refer to Figures 2-3 and 2-4 for vertical display, information and setting.

The single sweep mode allows the sweep to be triggered once by the trigger signal. It is initiated by setting:

1. SWEEP MODE (25) — SINGLE.

With no trigger signal present, depress REARM (26) control. The sweep is now armed for triggering. A trigger from any source, internal, external, or line will cause one sweep to occur.

Figure 2-6. Single Sweep Operation