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TEKTRONIX®

**DC 505
UNIVERSAL
COUNTER/TIMER**

INSTRUCTION MANUAL

Tektronix, Inc.
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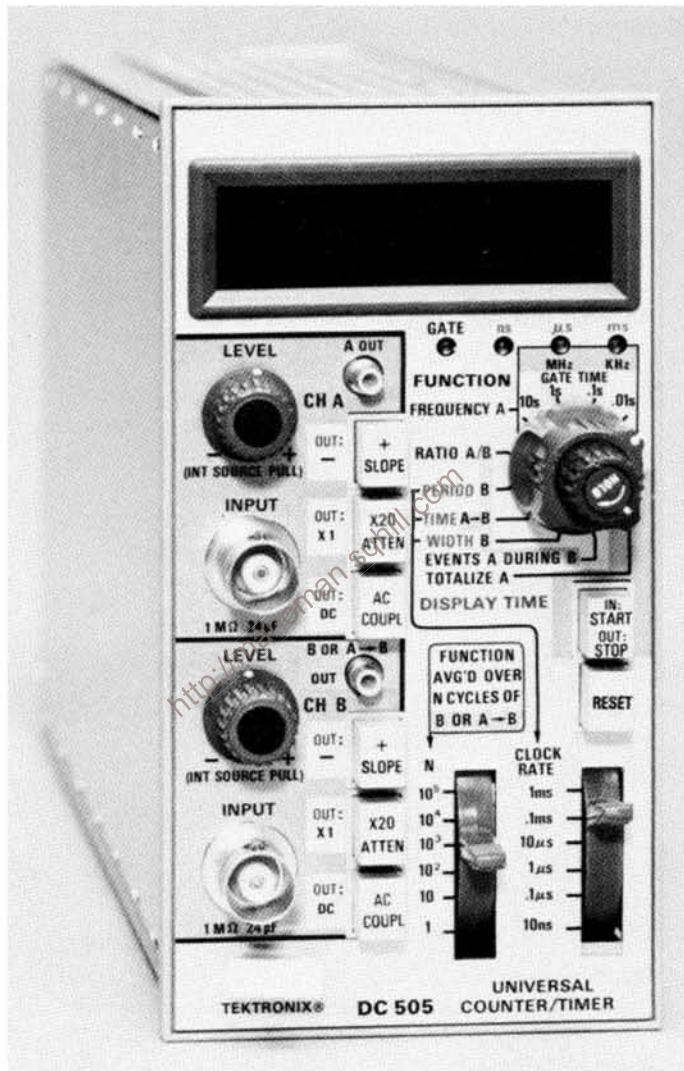
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DC 505

OPERATING INSTRUCTIONS

INTRODUCTION

The DC 505 Universal Counter/Timer has seven measurement functions: frequency counting, finding frequency ratios, period timing, interval timing, width timing, electronic event counting, and manual event counting.

The DC 505 has two input channels (A & B), each having bnc inputs and separate triggering level, attenuators, and coupling mode controls. Both input channels have the same 225 MHz capability. Seven-segment light-emitting diode arrays (LED's) provide a seven-digit visual numerical display. The decimal point is automatically positioned and the leading zeros (to the left of the most significant digit or decimal point) are blanked. Digit overflow is indicated by a flashing display.

Signals to be counted/timed can be applied to either or both channel A or channel B front-panel bnc connector or

to the rear interface connector. The DC 505 is designed to operate in a TM 500-Series Power Module.

The DC 505 can be ordered equipped with a temperature-compensated, 5 MHz crystal oscillator to obtain a highly stable and precise internal time base. This option includes a divide-by-five IC counter to produce the 1 MHz clock.

Installation

The DC 505 is calibrated and ready to use as received. Referring to Fig. 1-1, install the counter and turn on the Power Module. Note that installing any plug-in into a live Power Module could cause arcing at the contact interface, thus reducing useful contact life; however, no internal circuit damage will result.

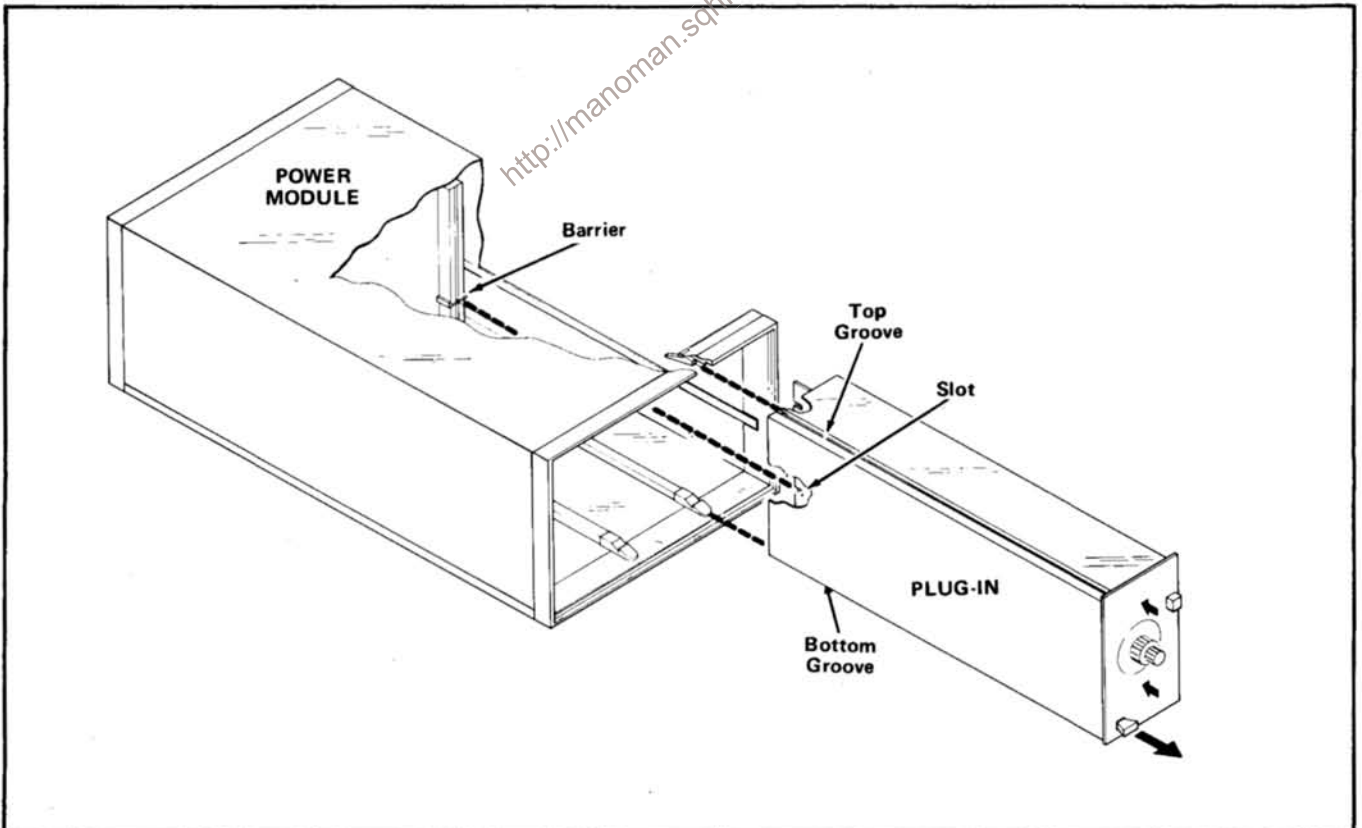


Fig. 1-1. Plug-in installation/removal.

OPERATIONAL CHECK

Controls and Connectors

Pull out the tab labeled "Controls, Connectors, and Rear Connector Pin Assignments" (at the rear of the manual) to expose the front panel illustration. Review the functions of the controls, connectors, and indicators before continuing with the operational checks.

Display Tests

With no signal applied, test the DC 505's readout displays and switching logic. The following checks will test most of the counter's major circuits and ensure its readiness to make measurements. If any malfunctions are detected, first refer to the Adjustment Procedure in the service section of this manual, then the System Maintenance Section of the Power Module manual.

Readout Segment Test. Press the RESET button to check the seven character segments of each digit. A row of 8's should be displayed. This check of the display devices and drivers can be done at any time.

FREQ A Displays. Using the FUNCTION switch, select a FREQ A GATE TIME of .01 s. Check the decimal point location, leading zero suppression, and units indicators according to Table 1-1. The decimal point and units indicator lights in any setting should not change when either the N switch or CLOCK RATE switch positions are changed.

TABLE 1-1

GATE TIME	Unit Indicators	Decimal Point
.01 s	MHz	.0000
.1 s	MHz	.00000
1 s	kHz	.000
10 s	kHz	.0000

With the DISPLAY TIME control in the full ccw position, observe that the GATE indicator flashes rapidly for short GATE TIMES and more slowly for longer GATE TIMES. Using a short GATE TIME, rotate the DISPLAY TIME control slowly cw. Observe that the GATE light will stay off for a longer and longer time, until the control clicks into the HOLD detent position, holding off the GATE indefinitely. Return the DISPLAY TIME control to the ccw position.

RATIO A/B and EVENTS A DURING B DISPLAYS. Set the FUNCTION switch to RATIO A/B and the N switch to 10^5 . Check the readout displays according to Table 1-2. Set the FUNCTION switch to EVENTS A DURING B and the N switch to 10^5 . Again check the readout displays using Table 1-2. (Changing the CLOCK RATE switch should have no effect on the decimal point appearing in the readout display in either of these FUNCTION switch settings.)

TABLE 1-2

N Switch	Decimal Point
10^5	.00000
10^4	.0000
10^3	.000
10^2	.00
10	.0
1	0

The GATE and units indicators should remain off.

PERIOD B, TIME A—B and WIDTH B Displays. Set the FUNCTION Switch to PERIOD B, the CLOCK RATE Switch to 10 ns and the N switch to 10^5 . Check the readout display according to Table 1-3.

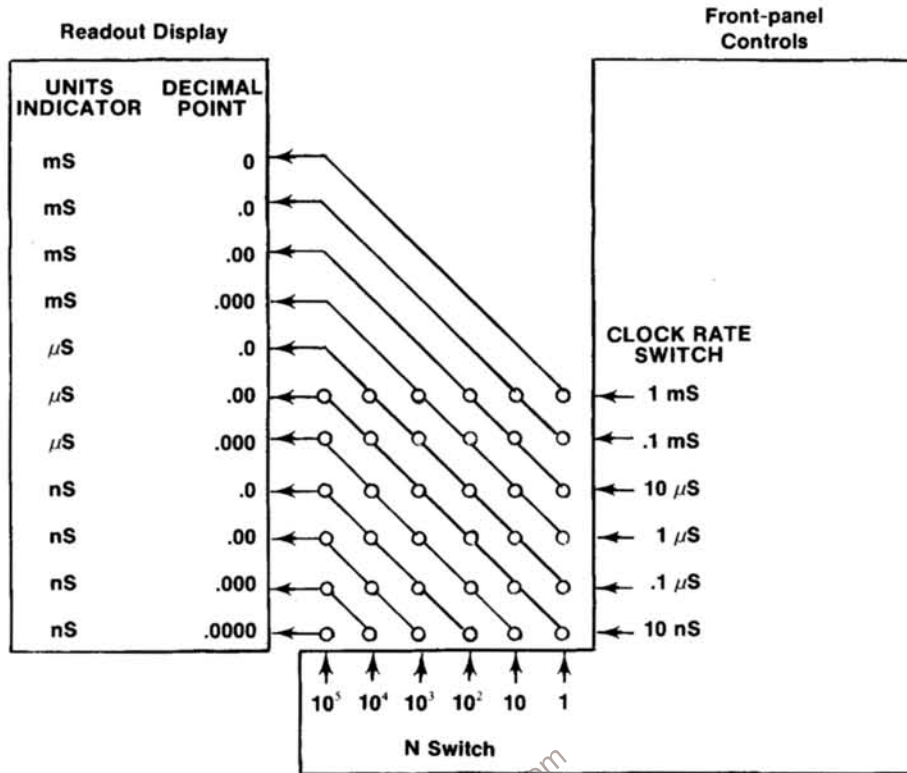
Change the FUNCTION switch to TIME A—B. Retain the same settings on the CLOCK RATE and N switches. Check the readout displays according to Table 1-3.

Change the FUNCTION switch to WIDTH B and make the same check of the readout displays using Table 1-3.

NOTE

Table 1-3 and the diagram are drawn as an aid to trouble-shooting if the decimal points and units indicators are non-functioning or incorrect in any of the time interval measurement settings. See Theory of Operation, Decimal Point and Parameter Selection.

Table 1-3



TOTALIZE A Display. Set the FUNCTION switch to TOTALIZE A. Observe a zero at the right of the readout display. The GATE light should turn on when the IN START OUT STOP button is pushed in, and turn off when button is released. The units indicators and decimal points should remain off.

Change to - SLOPE. Push the RESET button. Check that the GATE light turns on when CH B LEVEL control knob is turned from ccw to cw. The light should remain on when the knob is turned back to ccw. The GATE light turns off on the next turn from ccw to cw of the LEVEL control knob.

CHANNEL A SLOPE. With the FUNCTION control set to TOTALIZE A, CH A to + SLOPE, depress IN START OUT STOP button. Turn the CH A LEVEL control knob fully cw. Readout display should increase one count each time the knob is turned from cw to ccw (past centered LEVEL position). Verify that the count does not increase when the knob is turned from ccw to cw.

Channels A & B

The channel A & B input circuits, with the exception of the attenuators, can be checked in a no-signal-input condition by generating pseudo-triggers with the LEVEL controls.

Change to -SLOPE. Push the RESET button to clear the display. Readout should now increase one count each time the CH A LEVEL control is turned from ccw to cw. Turning the LEVEL control from cw to ccw should not increment the display.

Select + SLOPE for one channel and - SLOPE for the other channel. Set FUNCTION to TIME A-B, CLOCK RATE switch to 1 ms and N switch to 1. Rotate CH A LEVEL back and forth through its selected slope until the GATE light turns on. Rotate CH B LEVEL back and forth through its selected slope until the GATE light turns off. The resultant display is the time interval between these two trigger events.

CHANNEL B SLOPE. Set FUNCTION control switch to PERIOD B, CH B to + SLOPE, N (averaging factor) control to 1. Push the RESET button. Check that the GATE Light turns on when the CH B LEVEL control knob is turned from the cw to the ccw position. Turning the knob back to cw should have no effect on the GATE Light. Another turn from cw to ccw turns the light off.

If the GATE Light cannot be turned on or off with this method, consult the Service section of the manual for troubleshooting aids.

RATIO A/B Check

Connect an approximately 1 to 5 MHz signal from a signal source, for example the SG 503, into the input of both CH A and CH B using a Dual Input Coupler (Tektronix Part No. 067-0525-00). Set the FUNCTION control switch to RATIO A/B, + SLOPE on both channels. Check the readout display according to Table 1-4.

Change both channels to - SLOPE and make the same check of the readout display using Table 1-4.

TABLE 1-4

N Switch	Decimal Point (± 1 count)
10 ⁵	1.00000
10 ⁴	1.0000
10 ³	1.000
10 ²	1.00
10	1.0
1	1

INPUT CONSIDERATIONS

Input Sources

The switch concentric with the LEVEL control of each channel selects either the front-panel bnc connector (external), or the rear interface connector (Internal) pins; Channel A via pin 16A, and Channel B via pin 17B.

The External inputs present high impedances of approximately 1 MΩ, paralleled by about 24 pF. The Internal input circuits present nominal 50 Ω impedances to match typical coaxial cable signal connections.

Input Coupling

Front Panel pushbuttons select ac (Capacitive) or dc (Direct) coupling for each channel's input signal. This coupling takes place after the signals arrive from the selected source and before they are passed on to the attenuators of each channel.

Attenuators and Maximum Input Volts

The front-panel pushbutton, when out, provides no attenuation to the input signal (X1). In this mode, the maximum safe input voltage is 50 V (dc + peak ac), up to the frequency limit of each channel. With the X20 attenuator selected, the maximum safe input voltage is 250 V (dc + peak ac) at 1 kHz or less.

Sensitivity and Frequency Range

CH A and CH B will respond to signal amplitude of at least 50 mV rms sinewave, times attenuation, to 150 MHz, and 100 mV rms sinewave, times attenuation, from 150 MHz to 225 MHz.

Depending on the coupling mode selected, the low frequency limit for each channel is either 0 Hz (dc-coupled) or 10 Hz (ac-coupled).

Slope and LEVEL

A front-panel pushbutton for each channel determines whether the trigger circuits will respond to either positive- or negative-going transitions of each input signal.

The LEVEL control for each channel allows the operator to move the hysteresis window of the trigger circuit to an optimum level on the input signal to ensure stable triggering. See Fig. 1-2. The LEVEL control adjusts over ±2.0 V of the input signal in the X1 attenuation position.

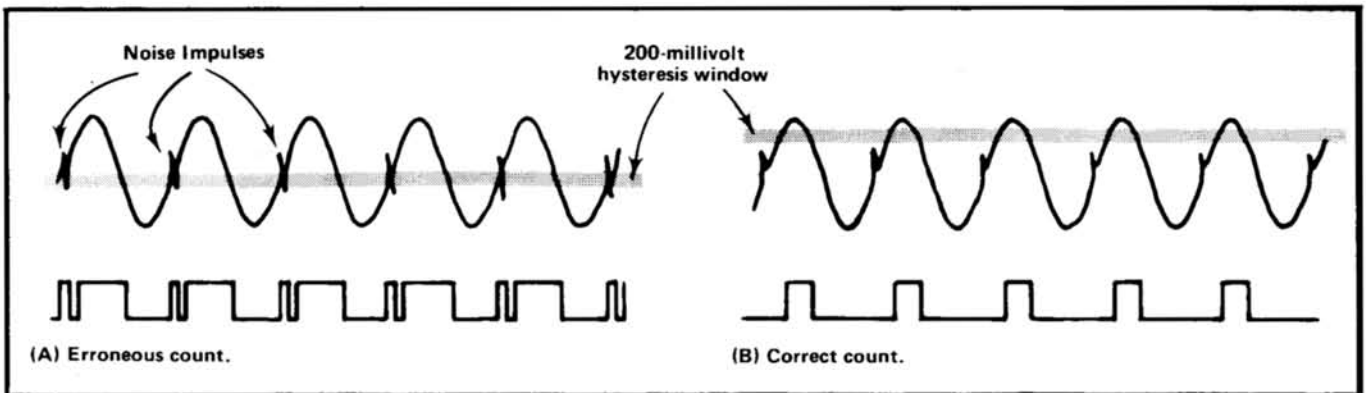


Fig. 1-2. Triggering circuit responses to improper (A) and proper (B) LEVEL settings.

FREQUENCY MEASUREMENTS

FREQUENCY A

To measure and display the frequency of a signal up to 225 MHz, set the FUNCTION switch to one of the shorter GATE TIMES bracketed under the heading of FREQUENCY A. Make sure the LEVEL control is pushed in and connect the signal to the CH A INPUT. Set the DISPLAY TIME control ccw.

Triggering

The CH A LEVEL, Slope, Coupling, and attenuator controls all affect the ability to make a measurement. In general, the trigger controls are similar to oscilloscope controls, except that the end result is not a stable waveform graphic display, but a stable digital frequency display.

Coupling and Slope. Use ac-coupling for most frequency measurements to avoid re-adjusting the LEVEL control for changing dc levels. The repetitive nature of the signals makes Slope selection insignificant.

Attenuators and LEVEL. Signals less than 3 V peak-to-peak, should not be attenuated. For higher amplitude signals, select the attenuation factor such that the attenuated signal falls into the range of 150 mV to 4 V peak-to-peak. The LEVEL control must be varied for a stable reading. It will not be touchy unless the signal amplitude and frequency are close to (or perhaps beyond) the specified limits.

A signal that looks stable on an oscilloscope may still show jitter when measured with 7-digit resolution. If the count varies from reading to reading, it is probably due to jitter in the signal source. If the count changes unreasonably, the DC 505 is not being triggered properly, either because the controls are not set right or the signal is beyond the counter's capabilities.

For frequency measurements, all CH B trigger settings have no effect. "N" or "CLOCK RATE" settings are irrelevant.

Measurement Intervals

To adjust the trigger controls, choose a short GATE TIME such as .1 s or .01 s. This gives rapid feedback via the display as to whether the counter is being triggered or not. If it is, numbers will appear in the display. (If the frequency is below 100 Hz, numbers may not appear during the shortest gate times. For such low frequencies, a PERIOD measurement is better suited.)

Final selection of GATE TIME depends on the frequency being measured, desired resolution, and willingness of the operator to wait for a measurement. Using short gate times, higher frequencies may be measured, but at the expense of the greater resolution capabilities of the longer gate times.

Resolution. A 10 s GATE TIME means the operator must wait 10 seconds for a measurement to be made and displayed. It is the only way to get best possible resolution and accuracy for signals below 1 MHz. Even then, a 10 second count will display fewer than the available 7 digits.

Overflow. Through intentional use of "overflow" displays, it is possible to improve the resolution of the counter. Choose a GATE TIME that displays the most significant number of the measurement as far to the left as possible. Note the numbers displayed to the right of the decimal. Move the decimal point to the left by choosing longer GATE TIMES until the desired resolution is achieved. The display will flash when the most significant number overflows the last storage register. The relationship between GATE TIME, measured frequency, displayed digits, and overflow is shown in Table 1-5.

TABLE 1-5

GATE TIME	>100 MHz	10 MHz to 100 MHz	1 MHz to 10 MHz	<1 MHz
.01 s	7 digits	6 digits	5 digits	4 digits
.1 s	Overflow	7 digits	6 digits	5 digits
1 s	Overflow	Overflow	7 digits	6 digits
10 s	Overflow	Overflow	Overflow	7 digits

Measurement Rate

Once a stable measurement is obtained, the rate at which measurements are made can be controlled by the DISPLAY TIME control. Turning the control cw holds off the gate and stores the display for a longer time before a new measurement is made and displayed. DISPLAY TIME and GATE TIME together complete a measurement-display cycle.

The DISPLAY TIME control is uncalibrated and variable from about 0.1 s at the ccw end to about 10 s at the cw end. At the cw end, there is a detent position called HOLD. In HOLD, the last count taken will be stored and displayed for an indefinite time. A new count and display may be initiated by pushing the RESET button, turning the DISPLAY TIME control ccw, or changing to another GATE TIME.

RATIO MEASUREMENTS

In the RATIO A/B mode, the frequency of the signal applied to CH A is divided by the frequency of the signal applied to CH B, and the resultant ratio is displayed. Note that the normal "frequency" mode is basically a ratio mode, in which the ratio of the unknown signal to the internal clock is displayed. (Decade scaling of the internal clock and decimal point positioning normalizes the display relative to kHz or MHz units.)

Triggering

The operation of CH A and CH B trigger controls is the same as for frequency and period measurement. In fact, since both channels must be triggered to obtain a display, it may be desirable to set the trigger controls independently. This may be accomplished as follows:

1) Go to the FREQUENCY A mode and adjust the CH A trigger controls for a normal frequency measurement.

2) Go to the PERIOD B mode and adjust the CH B trigger controls for a normal period measurement.

3) Leaving CH A and CH B trigger controls as they were, go the RATIO A/B mode. The correct ratio should be displayed.

Resolution

The N switch may now be operated to select maximum resolution. For most measurements, the smallest value of "N" that produces a useful number of digits will be best.

PERIOD MEASUREMENTS

Gating

Period measurement is provided in universal counter/timers primarily to overcome a basic limitation of counters, i.e., the long time required to make a high resolution high accuracy measurement of low frequency signals. For example, a 1 kHz signal requires 1,000 seconds of GATE TIME to accumulate a million counts. However, in only one second, a 1 kHz signal can gate a count of one million clock pulses from a 1 MHz clock.

Simply stated, the PERIOD B mode reverses the functions of signal and clock as compared to the FREQUENCY A mode. In FREQUENCY A, the gate is held open for some number of clock pulses while signal events are counted, then displayed. In PERIOD B, the gate is held open for some number of signal events (N), while clock pulses are counted, then displayed.

Averaging

Resolution and accuracy is improved by averaging the signal value over a large number of signal events. This increases the total time to take a measurement, i.e., similar to selecting a longer GATE TIME in the FREQUENCY A mode. The best resolution possible for period measurements is 0.1 ps.

Low Frequencies

Period measurements of signals below 10 Hz, and particularly in the lowest decade from 0.1 Hz to 1.0 Hz, become rather sensitive to wave shape and amplitude. Since it is desirable for the signal to pass through the trigger, hysteresis abruptly, square waves are preferred. Wave shapes other than square-waves can be measured accurately at the very low end and if the input amplitude is kept high so that the trigger input is driven hard.

TIME INTERVAL MEASUREMENTS

The TIME A → B mode measures and displays the elapsed time interval between the triggering of CH A and the subsequent triggering of CH B.

The most common application is to measure the width (duration) of a pulse, using opposite triggering slopes for each channel. Refer to the width Measurements for measurement instructions.

Time Interval Averaging

Time interval averaging provides an economical method of greatly increasing the accuracy and resolution of time interval measurements on repetitive signals. The basis of time interval averaging is the statistical reduction of the ± 1 count error. If the ± 1 count error is truly random, then as more intervals are averaged, the measurement will tend to approach the true value of the time interval. For time interval averaging to work, the time interval being measured must be repetitive and have a repetition frequency that is non-synchronous to the counter interval clock rate.

Time interval averaging should be used whenever the ± 1 count error from a repetitive single time interval measurement significantly degrades the accuracy or resolution of the measurement. When using averaging, the inherent instrument noise will limit the resolution of the measurement, as will the period of the interval clock rate chosen.

The accuracy of the time interval averaging measurement can be determined by using the following formula:

TIME A-B and WIDTH B measurements with resolutions less than the minimum clock rate time of 10 ns

$$\left(\text{fractional part only of } \left| 1 - \frac{\text{freq of clock}}{\text{freq into CH B}} \right| \right) \sqrt{N} > 10^2$$

(for 100 ps resolution)

Single-Shot Using HOLD

Single-shot time intervals can be measured by putting the DISPLAY TIME control in HOLD. This will lock out both channels after CH A and CH B have been triggered, respectively. Pushing RESET clears the display and re-arms the trigger channels for another measurement.

WIDTH MEASUREMENTS

The WIDTH B mode measures and displays the elapsed time interval between the selected starting slope polarity of the duration to be measured and its opposite polarity ending slope.

Fig. 1-3 and the following procedure illustrates accurately setting the gate duration of the RG 501 Ramp Generator to 5 ms.

- 1) Apply the RG 501 gate (the triggering event) to CH B. Set CH B to trigger on the + SLOPE.

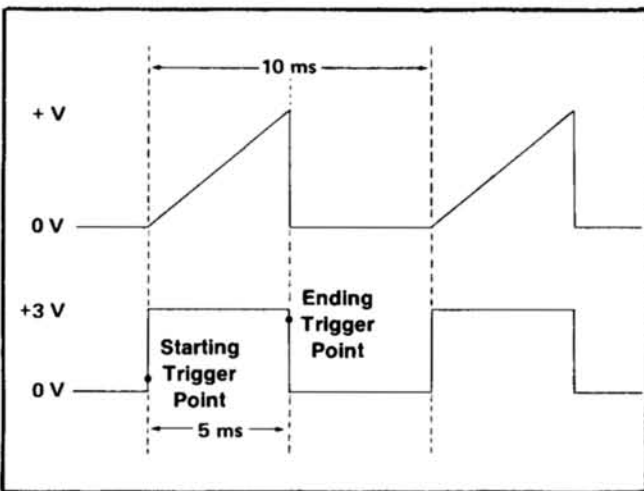


Fig. 1-3. Triggering for a pulse duration measurement (Signal source, RG 501 Ramp Generator).

- 2) Set the FUNCTION switch to WIDTH B and adjust CH B LEVEL for a stable display. Select a CLOCK RATE that will give adequate resolution. (For this measurement a CLOCK RATE of $1 \mu\text{s}$ will give three-decimal-place resolution.)

- 3) When the RG 501 gate goes positive, CH B is triggered and the DC 505 gate opens, allowing internal clock pulses to be counted. When the RG 501 gate starts to return to zero, CH B is again triggered, the DC 505 gate closes, and the accumulated count of clock pulses is displayed.

- 4) If the count is off the desired time interval, the operator can adjust the RG 501 controls until the required accuracy is achieved.

Time Interval Averaging

The discussion on averaging for Time Interval Measurements applies equally well to width measurements.

Single-Shot Using HOLD

Single-shot time intervals can be measured by putting the DISPLAY TIME control in HOLD. This will lock out the channel after it has been triggered. Pushing RESET clears the display and re-arms the trigger channels for another measurement.

EVENT MEASUREMENTS

In the EVENTS A DURING B mode, signal events applied to CH A INPUT are counted and the accumulated total is displayed for the time that the signal applied to CH B INPUT causes channel B to be triggered high and the counter/timer gate opened. This mode is similar to the TOTALIZE A mode.

The following procedure can be used to make a measurement like that shown in Fig. 1-4.

1. Apply the events to be counted to CH A. Set the FUNCTION switch to FREQUENCY A and CH A slope switch to + SLOPE. Adjust the CH A LEVEL for a stable frequency display.
2. Apply the counter/timer gate open control signal to CH B. Set the FUNCTION switch to PERIOD B and CH B slope switch to + SLOPE. Adjust the CH B LEVEL for a stable period display.
3. Set the FUNCTION switch to EVENTS A DURING B.
4. When the CH B signal excursion occurs, CH B is triggered and the DC 505 gate opens, allowing the CH A pulses to be counted.

Averaging

Averaging provides an economical method of increasing the accuracy and resolution of repetitive event interval measurements. The basis of averaging is the statistical reduction of the ± 1 count error. If the ± 1 count error is truly random, then as more intervals are averaged, the measurement will tend to approach the true value of the event interval. For averaging to work the event interval being measured must be repetitive.

Event interval averaging should be used whenever the ± 1 count error from a repetitive single event interval measurement significantly degrades the accuracy or resolution of the measurement. When using averaging the inherent instrument noise will limit the resolution of the measurement.

The accuracy of the event interval averaging measurement can be determined by using the following formula:

$$\left(\frac{\text{fractional part only of } \left| 1 - \frac{\text{freq into CH A}}{\text{freq into CH B}} \right|}{1} \right) \sqrt{N} > \text{fractional resolution required}$$

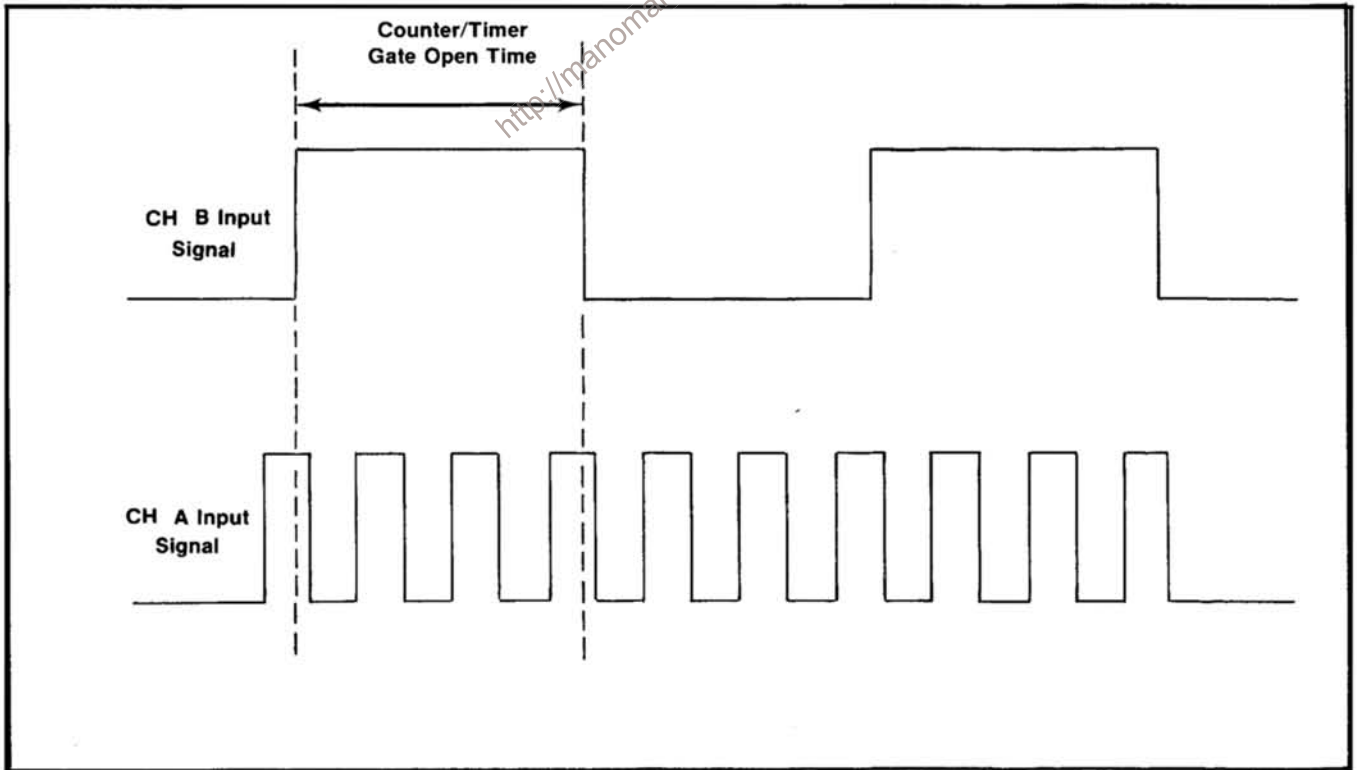


Fig. 1-4. Illustration depicting CH A pulses and portion of CH A pulses being counted during the counter/timer gate open time (controlled by CH B signal).

TOTALIZING

Purpose

In the TOTALIZE A mode, signal events applied to CH A INPUT are counted and the accumulated total is displayed during the time the IN START OUT STOP button is pushed in. This mode is a manual analog of the frequency mode. Its main application is to accumulate a count of relatively slow and irregular events.

Operation

Apply the signal to CH A and set the trigger controls the same as for frequency measurement.

Starting the Count. Press the IN START OUT STOP button in and adjust the CH A LEVEL control until a count begins to advance. The accumulated count is displayed in

whole numbers. Only the CH A trigger controls, the RESET button, and the IN START OUT STOP button affect the display.

Stopping the Count. If the IN START OUT STOP button is released and no other controls are operated, the last total will continue to be displayed. No more incoming events will be added to the total.

Restarting and Resetting. When the IN START OUT STOP is again depressed, incoming events will advance the displayed total. Resetting the count to zero can be done at any time by pressing the RESET button.

FUNCTIONS AVAILABLE AT REAR CONNECTOR

Customizing the Interface

Unassigned pins are available at the rear connector for routing signals to and from the DC 505 for specialized applications (see Rear Connector Pin Assignments in Section 2). One or more compartments of a multi-plug-in Power Module can be wired with barriers installed to provide specific functions between compartments. See Power Module instruction manual for additional information.

Control Lines

These lines allow the user to externally command the DC 505 to certain operating conditions.

A Reset input line, which doubles as an output signal line, clears the counter to zero when a low is applied to it. An input line to disable the flashing overflow display also doubles as an output signal line during overflow. The internal scan clock can be shut off by the Internal Scan Clock Disable line, while using an external scan clock. The IN START OUT STOP signal is also addressable via the interface lines.

Signal Lines

These lines provide for signal input to each channel, status and clock signal outputs, BCD data outputs, and external scan clock inputs.

The Reset, Time-Slot Zero (TSO), Data Good, and Overflow lines report the status of the DC 505. BCD data lines report the count in an 8-4-2-1, serial-by-digit method.

As long as the Internal Scan Clock Disable line remains high, the Internal Scan Clock output signal is available. When the Disable line is pulled down, the Internal Scan Clock line becomes an input line for an External Scan Clock signal.

The DC 505's internal 1 MHz Clock signal is brought to the interface for possible synchronous applications. (An internal switch allows this same line to be used for external 1 MHz Clock input.)

ELECTRICAL CHARACTERISTICS

Performance Conditions

The electrical characteristics are valid only if the DC 505 has been calibrated at an ambient temperature between +20°C and +30°C and is operating at an ambient temperature between 0°C and +50°C, unless otherwise noted.

TABLE 1-6
Channels A and B Input

Characteristics	Performance Requirements	Supplemental Information
Frequency Range DC Coupled	0 Hz to 225 MHz	
AC Coupled	10 Hz to 225 MHz	
Sensitivity	50 mV rms sine-wave times attenuation to 150 MHz 100 MV rms sine-wave times attenuation from 150 MHz to 225 MHz	Sine-wave used for measurement
Impedance	1 MΩ paralleled by approxi- mately 24 pF	
Maximum Safe Voltage X1 Attenuation	50 V (dc + peak ac) up to frequency limit of each channel	
X20 Attenuation	250 V (dc + peak ac) at 1 kHz or less	
Trigger Level Range	-2 V times attenuation to +2 times attenuation	
Signal Source	Internal (rear connector inter- face) or external (front panel bnc)	Selected by pushing in or pulling out front panel LEVEL control
Slope	Either + or -	

TABLE 1-7

Display Resolution and Accuracy

Characteristics	Performance Requirements	Supplemental Information
FREQ A Accuracy	$\pm 1 \text{ count} \pm \text{time base accuracy}$	Signal to noise ratio at inputs must be $\geq 40 \text{ dB}$
RATIO A/B Accuracy	$\pm 1 \text{ count of FREQ A} \pm \text{trigger jitter error of channel B (see note 1)}$ + $\frac{\text{Frequency into A}}{10^x}$	
PERIOD B Accuracy	$\pm 1 \text{ count} \pm \text{time base accuracy}$ $\pm \text{trigger jitter error of count B (see note 1)} + 1 \text{ count (applies to 10 ns clock rate only)}$	
Resolution	0.1 ps	
TIME A-B Accuracy	$\pm 1 \text{ count} \pm \text{time base accuracy}$ $\pm \text{trigger jitter error of channel A (see note 1)}$ $\pm \text{trigger jitter error of channel B (see note 1)}$ $\pm \text{channel delay match error of 2 ns}$ $\pm \text{triggering level difference}$ $\frac{(\text{chA} - \text{chB})}{dV/dt (\text{chA}) - dV/dt (\text{chB})}$ + $\left(\frac{10 \text{ ns}}{\text{Volt}} \right) \left(\begin{array}{l} \text{B input step volts to} \\ \text{LEVEL setting of B} \\ - \\ \text{A input step volts to} \\ \text{LEVEL setting of A} \end{array} \right)$ + Note 3 condition satisfied	TIME A-B best absolute accuracy with averaging is 3 ns Pulse widths minimum into channel A and B (for TIME A-B) is 5 ns
Resolution (Practical Limit)	100 ps	

TABLE 1-7 (cont)

Characteristics	Performance Requirements	Supplemental Information
WIDTH B	± 1 count \pm time base accuracy + (trigger jitter error \pm Hysteresis error) see Note 2 $+ \left(\frac{10 \text{ ns}}{\text{Volt}} \right) \left(\begin{array}{l} \text{LEVEL setting of} \\ \text{B to pulse height} \\ \text{Baseline to LEVEL} \end{array} \right)$ Refer to Fig. 1-5 - setting of B + Note 3 condition satisfied	WIDTH B best absolute accuracy with averaging is 1.5 ns
Resolution (Practical Limit)	100 ps	
EVENTS A DURING B Accuracy	± 1 count of FREQUENCY A + (trigger jitter error of channel B \pm Hysteresis error) see note 2 $+ \left(\begin{array}{l} \text{Frequency of} \\ \text{events into A} \end{array} \right) \left(\frac{10 \text{ ns}}{\text{Volts}} \right)$ $\left(\begin{array}{l} \text{LEVEL setting of B} \\ \text{to pulse height} \\ \text{Baseline to LEVEL} \end{array} \right)$ Refer to Fig. 1-5 setting of B +Note 3 condition satisfied	

NOTES

1. Trigger jitter error = $\left(\frac{.01 \text{ V}}{\text{dV/dt of triggering edge}} \right) /N$

2. Hysteresis error \pm Trigger jitter error =

$$\frac{.1 \text{ V}}{\text{dV/dt of stop edge}} \pm \left(\frac{0.1 \text{ V}}{\text{dV/dt of start edge}} \right) /N$$

N is averaging factor
 dV/dt is limited to a maximum of 0.2 V/2 ns by the amplifier risetimes

TABLE 1-7 (cont)

3. Accuracies with averaging are dependent upon the laws of statistics in the following two cases:

(A) TIME A→B and WIDTH B measurements with resolutions less than the minimum clock rate time of 10 ns.

$$\left(\text{fractional part only of } \left| 1 - \frac{\text{freq of clock}}{\text{freq into CH B}} \right| \sqrt{N} > 10^2 \right)$$

(for 100 ps resolution)

(B) EVENTS A DURING B measurements with fractional (between zero and one) resolutions.

$$\frac{\left(\text{fractional part only of } \left| 1 - \frac{\text{freq into CH A}}{\text{freq into CH B}} \right| \sqrt{N} > 1 \right)}{\text{fractional resolution required}}$$

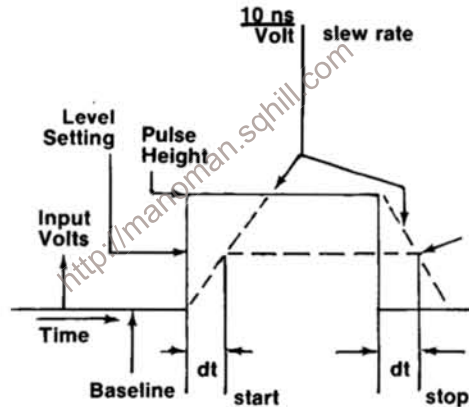


TABLE 1-8
Internal Time Base

Characteristics	Performance Requirements		Supplemental Information
	Standard	Option 1	
Crystal Frequency	1 MHz	5 MHz	
Stability (0°C to +50°C) After 1/2 Hour Warm-up	1 part or less in 10 ⁵	Within 5 parts in 10 ⁷	
Long-Term Drift	1 part or less in 10 ⁵ per month	1 part or less in 10 ⁷ per month	
Accuracy	Adjustable to with- in 1 part in 10 ⁷	Adjustable to with- in 5 parts in 10 ⁹	

TABLE 1-9

Display

Characteristics	Performance Requirements	Supplemental Information
Display Time		Variable from about 0.1 s to about 10 s. Detent position at cw position of DISPLAY TIME knob provides a HOLD mode.
Reset		Pushing the front-panel RESET push-button, or grounding pin 26A of the interface connector, resets the counter to zero and totally lights the display (except for the decimal points) for a lamp test.

TABLE 1-10

Outputs

Characteristics	Performance Requirements	Supplemental Information
A OUT		Shaped output, after trigger level and slope selection, of the signal into channel A INPUT connector. output represents the display information for FREQUENCY A, RATIO A/B, and TOTALIZE A modes
Logic Levels 0	Approximately -0.1 V into open circuit	
1	Approximately $+0.1$ V into open circuit	
Propagation Delay from Channel A INPUT to A OUT	Approximately 15 ns	50 Ω reverse terminated.
B or A-B OUT		Shaped output after trigger level and slope selection of either the Channel B signal or the A-B signal. This output represents the continuous signal used in generating the display gating for the RATIO A/B, PERIOD B, TIME A-B, WIDTH B and EVENTS A DURING B modes
Logic Levels 0	Approximately -0.1 V into open circuit	
1	Approximately $+0.1$ V into open circuit	
Propagation Delay from Channel Inputs to B or A-B OUT	Approximately 15 ns	50 Ω reverse terminated.

TABLE 1-11

Environmental

Characteristics	Performance Requirements	Supplemental Information
Temperature		
Operating	0°C to +50°C	Air circulation is required from +40°C to +50°C
Storage	-40°C to +75°C	
Altitude		
Operating	To 15,000 feet	
Storage	To 50,000 feet	
Vibration		
Operating and Non-Operating	With the instrument complete and operating, vibration frequency swept from 10 to 50 to 10 Hz at 1 minute per sweep. Vibrate 15 minutes in each of the three major axes at 0.015" total displacement. Hold 3 minutes at any major resonance, or if none, at 50 Hz. Total time, 54 minutes.	
Shock		
Operating and Non-operating	30 g's, 1/2 sine, 11 ms duration, 2 shocks in each direction along 3 major axes, for a total of 12 shocks	

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THEORY OF OPERATION

INPUT AND TRIGGER

AC/DC Selection, Attenuators, And Coupling, CH A & (B)

Channels A and (B) are identical with regard to the amplifiers. The input signal, applied through front-panel INPUT connector J210 (J100), first passes through front-panel push-button switch S215A (S105A) to select ac or dc. X1 or X20 attenuation is selected by front-panel push-button switch S215B (S105B). X20 ATTEN is a frequency-compensated voltage divider, composed of resistor R220 (R110) and Capacitor C222 (C112).

The input signal is coupled to the input field effect transistor, FET Q235A (Q125A) which acts as a source follower. The RC protection circuitry, consisting of capacitor C232 (C122) in parallel with resistor R232 (R122), transmits the signal to reverse-biased diode CR232 (CR122) at the gate of the input FET's.

Input Amplifier, Signal Shaping, Slope Selection And Output

The source follower, Q235A (Q125A), couples the signal to the base of an emitter follower, Q240 (Q130), that drives a complimentary cascode amplifier, Q242 and Q270 (Q132 and Q160).

Adjustment of the LEVEL control at the base of Q270 (Q160) changes the bias on that transistor selecting which portion of the input signal will trigger the DC 505. Resistors R264 and R265 (R154 and R155) ganged around the LEVEL control, R260 (R150), in conjunction with resistors R262 and R258 (R152 and R148) from either end represent a reverse S-Curve. This allows good sensitivity at the center with a wide dynamic range, in excess of 20 to 1, necessary for the X20 attenuation. The diode, CR264 (CR154), between the center arm of the LEVEL control and the resistor, R268 (R158), at the base of Q270 (Q160) provides first-order temperature compensation.

The collector of Q270 (Q160) is the output of the trigger amplifier which has a gain of approximately 5. This is coupled through emitter follower Q275 (Q165) to a Schmitt Trigger, Q280 and Q282 (Q170 and Q172). The output of this signal shaper, the collector of Q282 (Q172), is ECL compatible and drives the slope selection gate, U190B (U190C). The SLOPE switch, S295 (S185), selects the triggering slope by allowing either a high or a low to drive the exclusive OR slope selection gate.

The shaped signal from both channels is transmitted to the TIME A-B circuitry and the signal selection circuitry. The signal from channel A couples into U200D to provide shaped output at pin 15 of U200D, which drives resistor R305, R308 to ground and resistor R307 to -10 V, for output to the front panel, A OUT J310. The signal from Channel B is coupled through additional gates in the Signal Selection circuitry to exclusive OR gate, U190A, to provide shaped output at pin 2 of U190A. This drives resistor R202, R204 to ground and R205 to -10 V, for output to the front panel, B or A-B OUT J205. Both OUTPUTS are centered around approximately 0 volts with ≈ 0.25 volt drive from 50 Ω .

Signal Selection

The output from pin 2 of U195A or pin 3 of U200B, a hard wire or ECL combination, is either the shaped signal from Channel A or the Time Select from the front panel. The Time Select ranges from 10 ns to 1 ms determined by the CLOCK RATE switch. This signal is transferred to the gate arming device, U342, in the 10⁰ DCU (Decade Counting Units) Circuit.

The output from pin 14 of U195C or pin 2 of U200A is either the shaped signal from Channel B or the A-B signal from the output, pin 13 and pin 2 of U315B and A, of the TIME A-B circuitry. This signal is transmitted to the Gate and Control Logic Generator circuitry.

Time A—B

The TIME A—B circuitry consists primarily of dual D-type positive-edge-triggered flip-flops, U315A and U315B. These flip-flops hold off Channel B until after a positive-going signal from Channel A into the clock input, pin 6,

toggles the first D edge-trigger, which arms the second D edge-trigger. A positive-going signal is thus allowed into clock input, pin 11, to cause a stop signal. To ensure that A is ready to start, a CLEAR signal comes into pin 15 and pin 5 of U315 so that each TIME A—B measurement always starts with A, after the previous measurement.

AVERAGING AND CONTROL

Averaging Divider

The Averaging Divider averages over 1 to 10^3 cycles of B or A—B selected by the N switch on the front panel. To ensure proper gating of averaged pulses in width or period mode, the output of the Width or Period Selection, pin 3 of U340B and pin 15 of U340D is used to activate the Averaging Divider.

For example, in producing a gate for Period measurement, the positive-edge transition from B or A—B is supplied to pin 5 of U340A, coupled through to pin 2 of U340A, and from pin 7 to pin 3 of U340B into pin 9 of U400. This first signal edge, low to high, is ignored by U400 since pin 5 of U400 is held high, because of the signal from pin 3 of U390.

The B or A—B signal supplied to the Width or Period Selection circuitry is coupled into pin 9 of U390. This toggles U390, a fast D-type, positive-edge-triggered ECL device, causing three events. First, the signal from pin 3 of U390 is transferred to pin 13 to enable U495D. Second, this same signal (from pin 3 of U390) transmits a low to the SET inputs of the first (10^0) averaging divider (pin 5 of U400, U410A, and U360A, and pin 12 of U410B) enabling it to count subsequent edges. Third, a pulse is coupled through Q420 from pin 2 of U390 to pin 14 of U455. The averaging dividers, U455, U450, U445, and U440 (used as decade counters) are initially set to nines. The pulse from Q420 causes the dividers to change states to zero's, which starts the main GATE through the gating circuitry, via pin 11 of U597C.

In averaging over 10^1 to 10^3 , the next negative going edge into pin 14 of U455 causes U455 to change states at pins 1 and 12. This information is transferred to U495D. Edges from pin 11 of U455 cause U450 to change states at pins 1 and 12, and from U450 through U445 and U440 in the same way, producing the necessary averages to affect the GATE. Averages from 10^0 to 10^3 are selected by the N switch (S950) on the front panel, which determines the divider in use.

The propagation delay of all the dividers is transmitted through U495D both at the start and at the stop of the GATE, except for an average of one. The stop edge from pin 9 of U495D is coupled across U500C, pin 13 to pin 14, and fed to the input, pin 4 of U500A. If an average of just 1 (10^0) is required, the stop edge comes from pin 3 of U400 coupled through U495B into pin 4 of U500A.

For PERIOD averaging, the first positive edge opens the GATE, and 10 or 100 or 1,000 positive pulses later, the GATE closes. The settings of the FUNCTION switch (S195) that measure width, include TIME A—B and EVENTS A DURING B as well as WIDTH B. For width measurements the GATE opens on the first positive edge and closes on the selected negative edge following. The selection, made at the front panel by the N switch, (S950) may be the first negative edge following if 10^0 is chose, or 10 negative edges later for 10^1 , or 100 later for 10^2 , etc.

Gate And Control Logic Generator

The GATE generator uses the averaged signal from the averaging dividers to generate the gating for timing measurements that goes to the first Decade Counting Unit (DCU). The signal at pin 9 of U495 is transferred through to the GATE generator, U590, and then through the rest of the gating circuitry to pin 11 of U342.

The very fast counting capability of the DC 505 requires synchronization of the GATE pulse. This is necessary due to the propagation delay of the Averaging Divider, which varies with the amount averaged. U597, U500 and U495 are the signal paths in the synchronization circuitry.

The GATE open or start pulse originates as a result of a signal from B or A—B Select. (The same signal that supplies the input to the Width or Period Selection gates.) A positive-going edge into pin 9 enables U390 causing a pulse to be coupled across Q420, through the Averaging Dividers to U495C, whose output is pin 9. This pulse is

transferred from pin 11 of U597C through to pin 6 of U500B, coupled across Q535 to the clock inputs, pins 1 and 13 of the GATE generator, U590A and U590B. This negative-going edge at the clock inputs causes the output at pin 9 to go high. The high transferred to the base of Q506 appears at pin 4 of U495A.

When pin 4 of U495A goes low, the initial start pulse of the GATE (whose output is pin 14 of U597C into pin 11 of U500B) turns off, thus allowing a stop pulse to come from pin 4 of U500A through U495C into pin 9 of U500B. The stop pulse is generated from pin 9 of U495D through U500C, from pin 13 to pin 14, into the input, pin 4 of U500A. If an average of 1 (10^0) is selected, the stop pulse comes from pin 3 of U400. The signal at pin 6, the output of U500B, produces a negative-going edge coupled into the clock inputs of U590 to close or stop the GATE. A negative-going edge into the clock inputs both starts and stops the GATE. After a start and stop of one GATE, another GATE pulse will not occur until the DISPLAY TIME control and U580A and U580B reset the GATE generator, U590.

With the DC 505's averaging capability in measuring widths, it is necessary, in addition to turning a master GATE on and off, to arm and disarm the display counter. In taking N averages of the width of N pulses, the information transferred into the display must be from that portion of the waveform which represents only the width or duration of the pulse. The input width signal is nanded with the main GATE to get a pulsating gate through pins 4, 5 and 6 to pin 3 of U345A which arms and disarms U342.

The DC 505 will make a single shot period measurement as small as 30 or 40 ns. However, for a period consisting of a very narrow pulse, perhaps 2 to 3 ns, it is necessary to ensure that the gate which arms and disarms U342 will occur once, even though the displayed reading would not be meaningful. For input signals longer than 30 or 40 ns, the time interval of the main GATE coming from U590 to the display is accurate in absolute value to within 10 ns.

For a very narrow pulse, 2 or 3 ns, pin 3 of U400 will go from low to high on the step edge of the narrow pulse and will be coupled through to pin 4 of U500A before the GATE open signal can get to pin 5 of U500A. If pin 4 of U500A is already low when the GATE starts through pin 5 of U500A (the GATE start level coupled across Q506 from U590), then pin 2 of U500A will go low as soon as the GATE starts, causing pin 14 of U495C to go high. Resistor, R512 between pin 14 of U495C and pin 9 of U500B and capacitor, C526 to ground causes a 2.5 ns time delay, slowing the signal to pin 9 until after the GATE start signal from pin 14 U597C has been disabled via pin 2 of U495A to pin 10 of U597C. This ensures that a double pulse will occur at pins 1 and 13 of U590. The total cycle from GATE

start to GATE stop takes 30 to 40 ns minimum. This is the factor that limits the accuracy of single-shot measurements less than 30 or 40 ns. Width or Period measurements longer than 40 ns (single-shot) are accurate to within 10 ns, due to gating errors.

The .01 s to 10 s logic for the GATE time in FREQUENCY A comes via the $1\ \mu\text{s}$ to 10 s line to pin 9 of U587C. This signal is coupled to pin 7 of U597B, and is transferred to pin 10 of U500B, which in turn is coupled to pins 1 and 13 of U590. This signal path both starts and stops the GATE in FREQUENCY A.

Manual GATE operation is used in TOTALIZE A operated through the front panel switch to pin 10 of U590B for that Function only.

Phase Lock Loop

The Phase Lock Loop is used to generate higher frequencies from one stable low-frequency source. Basically, the phase detector compares the phase of two 1 MHz signals. The first is generated by the internal clock; the second is the output of the 100 MHz voltage controlled oscillator (VCO), divided by 100. If the two signals differ in phase, an error voltage is generated and applied across a varactor diode to the VCO. This corrects the output of the VCO in the direction required for decreasing the phase difference until lock is achieved, at which time the VCO will continue to track the internal clock signal.

The output, pin 3 of U875, of the voltage controlled oscillator is a 100 MHz signal, which is first divided by 10 through U835 and U845. The second divide by 10 in U855 produces a 1 MHz signal at its output, pin 8, which is fed to pin 3 of the Phase Detector, U856. The internal clock supplies a 1 MHz reference signal to pin 1 of U856A. Loop lock-up occurs when the negative transitions of both the reference input at pin 1 and the feedback input at pin 3 coincide. If the input signal at pin 3 lags or leads the reference signal at pin 1, the phase detector, U856, generates an error voltage through the filter/amplifier (FET follower Q865A and amplifier, pin 9 to pin 8 of U856C) that is proportional to the phase difference of the input signals. This voltage is applied to the cathode of the varactor diode, (CR870) in the tank circuit, providing a voltage variable input. The variable capacitance of the varactor produces a frequency change correcting the 100 MHz voltage controlled oscillator (VCO) output.

COUNTERS, DISPLAY MULTIPLEXING, TIME BASE AND PARAMETER SELECTION

10⁰-10⁶ Decade Counting Units (DCU) And Display Latches

The 10⁰ to 10⁶ DCU are cascaded divide by 10 counters. The count is transferred to a storage register, which displays the results, leaving the counting circuits free to make new measurements. The display accumulates data coming into Channel A when measuring FREQUENCY A, RATIO A/B, EVENTS A DURING B, or TOTALIZE A. It accumulates CLOCK RATE pulses when measuring PERIOD B, TIME A-B, and WIDTH B.

The GATE control circuit drives the 10⁰ decade counting unit (DCU). It also includes an arming mechanism, which is necessary in statistical averaging for time interval measurement. The GATE arming for display accumulation is U342, a very fast D-type edge-triggered ECL device. The first decade counter (10⁰) located on the Trigger (Secondary) circuit board is composed of U350 which divides by 2, and a ring counter, U355A, U355B and U360B, which divides by 5. The outputs are not BCD coded on this circuit board. The 10⁰ DCU supplies four lines via interconnecting cable to the Main Board. These are decoded from ECL to TTL levels by four transistors, Q640, Q655, Q660 and Q670, which in turn drive U655 and U657 gates to derive a BCD code for the first display latch, U652. This storage register provides the least significant digit (LSD), which is the first digit on the right in the display. The signal on the fourth line (24) is converted to a TTL level and transferred into pin 14 of U675 to advance the next decade counting unit (10¹ DCU). Its corresponding storage register is U676. The 10² DCU, U678 is latched by U679. The rest of the display dividing and subsequent latching and displaying takes place in U700, a P-channel MOS four-decade synchronous counter. The signal from pin 11 of U678 is transferred to U700 through transistor, Q680, which creates 1 μ s pulses that are required for compatibility with the MOS IC, U700.

To ensure that the MOS divider, U700, accumulates and displays information properly, inputs to pins 5, 6 and 7 must arrive with a special timing and sequence. A negative edge at the Count Input (pin 7) must follow a Transfer Input signal (pin 5) by at least 1 μ s. A Reset Input (pin 6) must follow this Count Input by at least 1 μ s. This prevents transfer of invalid data.

Negative-edge transition at the Count Input (pin 7) increment the counter. For correct operation of 250 kHz maximum frequency into U700, the waveform at pin 7 must be low for 1 μ s and high for 3 μ s for a total of 4 μ s. Transistor Q680 and its associated circuitry modify the signal from pin 11 of U678 to provide the maximum count rate.

When the Transfer Input (pin 5) is low, data in the decade counters is transferred to the internal storage latches. The signal into pin 5 must be at least 2.5 μ s in duration. Two stretchers provide 10 μ s and 100 μ s extended latch pulses. The 10 μ s latch pulse is supplied to pin 5 of U700 by pin 11 of U625D. At least 1 μ s after a latch into pin 5 (the Transfer Input) and at least 1 μ s prior to a Reset signal into pin 6, an extra pulse into pin 7 (Count Input) is required. Transistor Q690 which responds to the end of the latch edge into pin 5 (Transfer Input), provides the one additional delayed Count Input to pin 7 before the Reset pulse. Thus, when the Transfer Input (pin 5) goes high and the next negative transition at the Count Input (pin 7) occurs, the Transfer command is terminated.

The 100 μ s stretcher (which holds off the Reset), generated by the MOS Interfacing Circuitry, proceeds from pin 4 of U630B. The Reset signal couples across U620A to pin 6 of U700. The resetting at pin 6 of U700 guarantees that 1) the BCD information sent to the display from pins 10 through 13 of U700 will start at the Most Significant Digit (MSD) and 2) the display dividers in U700 are set to zeros. Resetting of U700 occurs only when Time Slots 1 through 4 are not being displayed. When the output information from U700 is being displayed, pin 1 of U620A is held low which disables the signal from pin 3 of U620A into pin 6 of U700. Resetting via pin 3 of U620A is also disabled when the GATE is open, via the LATCH and CLEAR signals to pin 12 of U620D and pin 3 of U610A, respectively.

The signal at pin 2 of U620A, shaped by RC network R632 and C632, resets the 10⁰, 10¹ and 10² DCU's. The shaped signal transmitted to pin 2 of both U675 (10¹) and U678 (10²) is also transferred to the Trigger Circuit Board to reset the 10⁰ DCU.

Time Slot Generator

Time Slot generation is derived from the scan clock, U715C and U650F, which operate as an oscillator. The binary outputs from the divide by 8 counter, three cascaded divide by two devices U750A, U750B and U720B, are transferred to serial information in U755, the Time Slot Decoder. U755 provides 8 output lines or time slots.

U700, the MOS four-decade counter with latches and multiplexing circuitry, generates the four most significant digit information displayed by the first four time slots (1 through 4). The Scan Input (pin 9) drives the internal counter, routing one decade count at a time to the outputs. The decoders are scanned from MSD (most significant digit) to LSD (least significant digit). The second set of four time slots display the remaining three digits (5, 6 and 7) and a time slot 0 (used for referencing) which is not displayed. The three digits, 5, 6 and 7, are derived from the discrete latches, U652, U676 and U679 respectively.

The first four pulses coupled through U715B and U650A into pin 9 of U700 advance the BCD outputs from MSD to LSD. A grounded emitter transistor, Q704, is turned on when the first four time slots are activated, enabling the transistors that are driven from the outputs of U700. (Output pin 10 drives Q703 and pins 11, 12 and 13 drive Q702, Q701 and Q700 in that order.) The divide by 8 counter (U750A, U750B and U720B) causes a high for four counts, which transmits the first four pulses (1 through 4) into pin 9 of U700. The next 4 counts (5, 6, 7 and 0) present a low at pin 9 and no pulses are received. Thus, during time slots 5, 6, 7 and 0, the latched BCD information from U652, U676 and U679 can be displayed, since Q704 is turned off.

Overflow Indication Circuit

When the decade counters have counted, 9,999,999, the counters are full. At the next count, the signal from U700 (pin 8) coupled across transistor Q718 is the clock input for U720A (pin 3). The signal is transferred across U720A and U610B producing a high at pin 8 turning off diodes CR726 and CR725. This supplies a high at the input of U715A which starts the multivibrator causing the LED display to flash.

Time Base And Clock Rate Divider

A precise one-megahertz clock provides the reference for operation of the gate-generating and time-counting circuits. The output of crystal oscillator Y900 is adjustable by C905 to exactly one megahertz. The four parts of U900 form a shaper-buffer stage to produce square-wave clock pulses and to isolate the oscillator from the 1 MHz output line.

Optional 1 MHz Clock

An optional 1 MHz clock is available, using a very stable 5 MHz crystal oscillator and a divide-by-five counter. This combination is shown on the schematic as Y901 and U901.

Time Base

The time base integrated circuit U895 operates at 1 MHz as determined by the signal supplied by the 1 MHz clock and buffer circuitry to the external input (pin 3). If an external clock is to be used, then the internally located Oscillator Int/Ext switch S900 is set to EXT and the external clock signal is connected to pin 14A of the plug-in connector. The 1 MHz oscillator signal is decade divided-by U895 to produce the 1 μ s to 10 μ s output selected from the CLOCK RATE switch or the GATE signal for the counter. The division factor for the GATE signal is selected by placing the appropriate voltage levels on pins 12 through 14 of U895.

U895 dividers for the GATE control are reset to all nines for FREQUENCY A operation, after the GATE signal has occurred, by applying a positive level to pin 6 of U895. This reset allows the DC 505 counting cycle to restart immediately following a manual RESET or a clear pulse. If the U895 dividers were not reset to all nines, the delay before the next count could begin would be equivalent to one gate-time interval.

The output from pin 1 of U895 is synchronized with the driving 1 MHz standard through U765B to reduce the jitter of U895. The 1 μ s to 10 μ s output (pin 9 of U765B) proceeds to the CLOCK RATE selection circuitry.

Decimal Point And Parameter Selection

Time Interval Modes. When the FUNCTION switch is set to any of the time interval measurement settings, PERIOD B, TIME A-B, or WIDTH B, the proper display of decimal point and parameter light selection is determined by a transistor matrix. U922B, U922A, and U920A, B, C and D are the TTL gates used in interfacing to the transistor matrix. The emitters of the transistors in the matrix define one axis along which the averaging factor is transmitted. The bases of the transistors constitute the axis that determine the CLOCK RATE selection. The resultant combination is diagonally cross-coupled collectors. Certain combinations of decimal points and parameters are common. The XYZ transistor matrix turns on these combinations through diode pairs. Table 1-3 in the Operating Instructions section describes which decimal points and parameters are turned on for the different combinations of CLOCK RATE and averaging factor (N).

Troubleshooting Aid

The Main circuit board has been designed so that the transistor matrix can be used as a troubleshooting aid. For example, if the N (averaging) switch (S950) is set at 10^3 (3) and the CLOCK RATE switch (S895) to $1 \mu\text{s}$, then according to Table 1-3, the decimal point appearing in the readout display should be placed at the .000 position. The μs units indicator light should be on.

If the decimal point or correct parameter light does not function because of a faulty transistor, it can be found very easily. Find the N (averaging) Switch (S950) logic diagram on the schematic for the Main circuit board. Start at the 10^3 (3) line and trace back along the signal path. Note that the signal is derived from column 3 of the transistor matrix.

The signal paths from the TTL interfacing gates to the transistor matrix are marked with the same units as the front panel CLOCK RATE switch. Observe that the fourth row down is marked $1 \mu\text{s}$, indicating that the transistor controlling the correct parameter light and decimal point is in the 4th row.

Therefore, the faulty transistor is at the intersection of the 3rd column and 4th row. Orient the DC 505 so that the nomenclature etched on the circuit board can be read correctly. The transistors are laid out on the circuit board the same way the schematic (and Table 1-3) is drawn.

Frequency Modes. With the FUNCTION switch set to any of the FREQUENCY A positions, the decimal point placement and parameter lights are controlled by U925A, B, C and D.

RATIO A/B, EVENTS A DURING B MODES. Five transistors, Q975, Q978, Q981, Q984 and Q987 control decimal point and parameter selection from the N (averaging) switch for RATIO A/B and EVENTS A DURING B settings of the FUNCTION switch. There is no parameter or decimal point placement in TOTALIZE A mode.

DISPLAY AND POWER SUPPLIES

Seven-Segment Decoder And Driver, Display And Parameter LED's

U780 is a BCD-to-seven-segment decoder. It accepts the BCD output of the latches, then allows pull down current to the appropriate cathodes of the enabled LED's to display the correct number. The display LED's are DS820, DS815, DS810, DS806, DS800, DS796 and DS790. When looking at the front panel of the DC 505, DS820 controls the numerical digit displayed at the far left. Each LED unit has seven segments, arranged so that a combination of lighted segments forms a number. When all of the segments are lighted, an "8" is formed.

Leading Zero Suppression

Decoder driver U780 also has a zero-blanking feature that allows suppression of the zeros leading the most significant digit (MSD) in the display. At the non-displayed, referencing time slot, TS-0, a low is applied to the direct-clear input, pin 1, of U765A, the zero-suppression storage register. This sets U765A to the zero-suppress state (high at pin 6), allowing the Ripple-Blanking Input (RBI, pin 5) of U780 to be low. When the output of U755 resets to the MSD (TS-1), the RBI of U780,

remains low for a few nanoseconds due to propagation delays, which allows the first digit to arrive from the latches while RBI is low. If this first digit being decoded is a zero, the output to the display LED will be inhibited and the Ripple Blanking Output (RBO pin 4) will be low. If the digit is not a zero, the outputs are enabled and RBO goes high. The RBO is applied to the pin 2 input of U765A and is transferred to the output when the next scan-clock transition occurs. Thus if the first digit is a zero, pin 5 of U780 is held low, inhibiting the output until the first non-zero digit comes through the decoder. When the first non-zero digit arrives, the outputs of U780 are enabled and the digit is displayed. Also, the RBO output at pin 4 is set high, removing the RBI from pin 5 and allowing all succeeding digits to be displayed through the TS-7 sequence.

When the scan gets past a decimal point in the display, or if the display overflows, any zeros arriving at the decoder are displayed. The last digit (LSD) to the right is always displayed as follows: TS-7 is applied through negative output NOR gate U625C. It is then applied to the direct-set input of U765A as a low. This holds pin 5 of U780 high, preventing zero-blanking during the TS-7, time slot.

The location of the decimal point in the display is determined by the FUNCTION, CLOCK RATE, and N (Averaging) switches. The proper information is applied via the decimal logic to NAND gates U760A, U760B, U760C and U760D. Time slot lines TS-3 through TS-6 enable these NAND gates in sequence, setting U765A to the non-blank state at the appropriate time. In the case where the counter overflows, the high output from U610B or Q725 is applied to pin 11 of U630E setting pin 4 of U765A to the non-blank state.

When the front-panel RESET button is pushed, $\overline{\text{RESET}}$ goes low, overriding the output of U765A, applying the non-blank and lamp-test functions to the decoder. This causes all seven segments in the display LED's to be turned on.

The reset circuitry provides an automatic reset by grounding the $\overline{\text{RESET}}$ line for a short time after instrument turn-on. The FUNCTION switch also provides a method of automatic reset by grounding the $\overline{\text{RESET}}$ line between

switch detent positions. The automatic reset ensures that the readout has been cleared before the next measurement. The automatic reset can be seen by noting that the display goes to all eights (all LED segments lit) in between switch detent positions.

Regulated Power Supplies

The DC 505 operating power is obtained from the power module mainframe, then rectified, filtered and regulated to provide stable supplies of +15 volts, +5 volts, and -10 volts. The +15 volt supply, whose active device is U10, provides the reference for the remaining supplies. Its output is set to exactly +15 volts by adjustment of R17.

Integrated circuit U30 regulates the +5 volt supply, and transistors Q65, Q68 and Q80 regulate the -10 volt supply. The series-pass transistors for these supplies are located in the mainframe, where they can be provided the proper heat dissipation.

<http://manoman.sghill.com>

ELECTRICAL REPLACEABLE PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

X000 Part first added at this serial number

00X Part removed after this serial number

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

ACTR	ACTUATOR	PLSTC	PLASTIC
ASSY	ASSEMBLY	QTZ	QUARTZ
CAP	CAPACITOR	RECP	RECEPTACLE
CER	CERAMIC	RES	RESISTOR
CKT	CIRCUIT	RF	RADIO FREQUENCY
COMP	COMPOSITION	SEL	SELECTED
CONN	CONNECTOR	SEMICOND	SEMICONDUCTOR
ELCTLT	ELECTROLYTIC	SENS	SENSITIVE
ELEC	ELECTRICAL	SEP	SEPARATELY
FXD	FIXED	VAR	VARIABLE
INCAND	INCANDESCENT	WW	WIREWOUND
LED	LIGHT EMITTING DIODE	XFMR	TRANSFORMER
NONWIR	NON WIREWOUND	XTAL	CRYSTAL

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00853	Sangamo Electric Co., S. Carolina Div.	P. O. Box 128	Pickens, SC 29671
01121	Allen-Bradley Co.	1201 2nd St. South	Milwaukee, WI 53204
01295	Texas Instruments, Inc., Components Group	P. O. Box 5012	Dallas, TX 75222
03877	Transitron Electronic Corp.	168-186 Albion St.	Wakefield, MA 01880
04713	Motorola, Inc., Semiconductor Products Div.	5005 E. McDowell Rd.	Phoenix, AZ 85008
07263	Fairchild Semiconductor, A Div. of Fairchild Camera and Instrument Corp.	464 Ellis St.	Mountain View, CA 94040
07910	Teledyne Semiconductor	12515 Chadron Ave.	Hawthorne, CA 90250
08806	General Electric Co., Miniature Lamp Products Dept.	Nela PK.	Cleveland, OH 44112
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
25403	Amperex Electronic Corp., Semiconductor and Microcircuits Div.	Providence Pike	Slatersville, RI 02876
27014	National Semi-Conductor Corp.	2900 San Ysidro Way	Santa Clara, CA 95051
34553	Amperex Electronic Corp., Component Div.	35 Hoffman Ave.	Happauge, NY 11787
50088	Mostek Corp.	1400 Upfield Dr.	Carrollton, TX 75006
50579	Litronix Inc.	19000 Homestead Rd.	Cupertino, CA 95014
56289	Sprague Electric Co.		North Adams, MA 01247
71034	Bliley Electric Co.	2545 W. Grandview Blvd.	Erie, PA 16512
71400	Bussman Mfg., Division of McGraw Edison Co.	2536 W. University St.	St. Louis, MO 63107
72982	Erie Technological Products, Inc.	644 W. 12th St.	Erie, PA 16512
73138	Beckman Instruments, Inc., Helipot Div.	2500 Harbor Blvd.	Fullerton, CA 92634
74970	Johnson, E. F., Co.	299 10th Ave. S. W.	Waseca, MN 56093
75042	TRW Electronic Components, IRC Fixed Resistors, Philadelphia Division	401 N. Broad St.	Philadelphia, PA 19108
80009	Tektronix, Inc.	P.O. Box 500	Beaverton, OR 97005
81483	International Rectifier Corp.	9220 Sunset Blvd.	Los Angeles, CA 90069
90201	Mallory Capacitor Co., Div. of P. R. Mallory Co., Inc.	3029 E. Washington St.	Indianapolis, IN 46206
98291	Sealectro Corp.	225 Hoyt	Mamaroneck, NY 10544

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
A1	670-2887-00		CKT BOARD ASSY:MAIN	80009	670-2887-00
A1	670-3416-00		CKT BOARD ASSY:MAIN OPTION 1	80009	670-3416-00
A2	670-2889-00		CKT BOARD ASSY:TRIGGER	80009	670-2889-00
A3	670-2888-00		CKT BOARD ASSY:DISPLAY	80009	670-2888-00
C17	281-0523-00		CAP., FXD, CER DI:100PF, +/-20PF, 350V	72982	301-000U2M0101M
C20	290-0529-00		CAP., FXD, ELCTLT:47UF, 20%, 20V	56289	196D476X0020LA3
C25	290-0687-00		CAP., FXD, ELCTLT:150UF, +50-10%, 250V	56289	89D551
C26	290-0687-00		CAP., FXD, ELCTLT:150UF, +50-10%, 250V	56289	89D551
C35	281-0623-00		CAP., FXD, CER DI:650PF, 5%, 500V	72982	301-000Y5D0651J
C40	290-0529-00		CAP., FXD, ELCTLT:47UF, 20%, 20V	56289	196D476X0020LA3
C50	290-0662-00		CAP., FXD, ELCTLT:220UF, 20%, 10V	90201	TDC227M010DL
C55	290-0517-00		CAP., FXD, ELCTLT:6.8UF, 20%, 35V	56289	196D685X0035KA1
C60	290-0527-00		CAP., FXD, ELCTLT:15UF, 20%, 20V	90201	TDC156M020FL
C65	283-0000-00		CAP., FXD, CER DI:0.001UF, +100-0%, 500V	72982	831-516E102P
C75	290-0524-00		CAP., FXD, ELCTLT:4.7UF, 20%, 10V	90201	TDC475M010EL
C80	281-0523-00		CAP., FXD, CER DI:100PF, +/-20PF, 350V	72982	301-000U2M0101M
C104	283-0003-00		CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-547E103Z
C110	281-0504-00		CAP., FXD, CER DI:10PF, +/-1PF, 500V	72982	301-000COG0100F
C112	281-0517-00		CAP., FXD, CER DI:39PF, +/-3.9PF, 500V	72982	308-000COG0390K
C122	283-0079-00		CAP., FXD, CER DI:0.01UF, 20%, 250V	72982	8151B202C103M
C125	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C127	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C135	281-0184-00		CAP., VAR, PLSTC:2-18PF, 500VDC	34553	2222-809-05003
C136	281-0564-00		CAP., FXD, CER DI:24PF, 5%, 500V	72982	301-000COG0240J
C158	290-0535-00		CAP., FXD, ELCTLT:33UF, 20%, 10V	56289	196D336X0010KA1
C160	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C180	283-0003-00		CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-547E103Z
C185	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C190	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C194	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C195	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C200	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C214	283-0003-00		CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-547E103Z
C220	281-0504-00		CAP., FXD, CER DI:10PF, +/-1PF, 500V	72982	301-000COG0100F
C222	281-0517-00		CAP., FXD, CER DI:39PF, +/-3.9PF, 500V	72982	308-000COG0390K
C232	283-0079-00		CAP., FXD, CER DI:0.01UF, 20%, 250V	72982	8151B202C103M
C235	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C245	281-0184-00		CAP., VAR, PLSTC:2-18PF, 500VDC	34553	2222-809-05003
C246	281-0564-00		CAP., FXD, CER DI:24PF, 5%, 500V	72982	301-000COG0240J
C268	290-0535-00		CAP., FXD, ELCTLT:33UF, 20%, 10V	56289	196D336X0010KA1
C270	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C290	283-0003-00		CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-547E103Z
C295	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C330	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C332	281-0612-00		CAP., FXD, CER DI:5.6PF, +/-10.5PF, 500V	72982	374-001COH05690
C342	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C345	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C350	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C372	283-0003-00		CAP., FXD, CER DI:0.01UF, +80-20%, 150V	72982	855-547E103Z
C384	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C388	281-0605-00		CAP., FXD, CER DI:200PF, 10%, 500V	72982	301-000Y5D0201K
C390	283-0023-00		CAP., FXD, CER DI:0.1UF, +80-20%, 10V	56289	20C374
C395	281-0638-00		CAP., FXD, CER DI:240PF, 5%, 500V	72982	301-000Z5D0241J

Electrical Parts List—DC 505

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
C400	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C425	281-0605-00		CAP., FXD, CER DI:200PF,10%,500V	72982	301-000Y5D0201K
C485	290-0536-00		CAP., FXD, ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C490	283-0660-00		CAP., FXD, MICA D:510PF,2%,500V	00853	D155F511G0
C515	283-0023-00		CAP., FXD, CER DI:0.1UF,+80-20%,10V	56289	20C374
C526	283-0641-00		CAP., FXD, MICA D:180PF,1%,100V	00853	D151E181F0
C532	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E10Z
C537	281-0628-00		CAP., FXD, CER DI:15PF,5%,600V	72982	301-000C0G0150G
C540	290-0536-00		CAP., FXD, ELCTLT:10UF,20%,25V	90201	TDC106M025FL
C543	283-0111-00		CAP., FXD, CER DI:0.1UF,20%,50V	72982	8131N075651104M
C545	290-0534-00		CAP., FXD, ELCTLT:1UF,20%,35V	56289	196D105X0035HA1
C560	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C562	283-0000-00		CAP., FXD, CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C565	283-0000-00		CAP., FXD, CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C598	283-0198-00		CAP., FXD, CER DI:0.22UF,20%,50V	72982	8131N075651224M
C620	283-0000-00		CAP., FXD, CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C625	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C630	283-0198-00		CAP., FXD, CER DI:0.22UF,20%,50V	72982	8131N075651224M
C632	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C664	283-0111-00		CAP., FXD, CER DI:0.1UF,20%,50V	72982	8131N075651104M
C666	283-0023-00		CAP., FXD, CER DI:0.1UF	56289	20C374
C668	281-0637-00		CAP., FXD, CER DI:91PF,5%,500V	72982	301-000Z5D0910J
C680	283-0000-00		CAP., FXD, CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C681	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C684	283-0047-00		CAP., FXD, CER DI:270PF,+/-5%,500V	72982	861-518B271J
C685	281-0549-00		CAP., FXD, CER DI:68PF,10%,500V	72982	301-000U2J0680K
C690	283-0111-00		CAP., FXD, CER DI:0.1UF,20%,50V	72982	8131N075651104M
C692	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C697	283-0028-00		CAP., FXD, CER DI:0.0022UF,20%,50V	56289	19C606
C710	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C722	283-0341-00		CAP., FXD, CER DI:0.047UF,10%,100V	72982	8131N145W5R473K
C730	290-0535-00		CAP., FXD, ELCTLT:33UF,20%,10V	56289	196D336X0010KA1
C732	290-0535-00		CAP., FXD, ELCTLT:33UF,20%,10V	56289	196D336X0010KA1
C744	283-0111-00		CAP., FXD, CER DI:0.1UF,20%,50V	72982	8131N075651104M
C746	283-0111-00		CAP., FXD, CER DI:0.1UF,20%,50V	72982	8131N075651104M
C755	283-0058-00		CAP., FXD, CER DI:0.027UF,10%,100V	72982	8131N147W5R273K
C757	281-0523-00		CAP., FXD, CER DI:100PF,+/-20PF,350V	72982	301-000U2M0101M
C865	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C866	281-0524-00		CAP., FXD, CER DI:150PF,+/-30PF,500V	72982	301-000X5U0151M
C870	283-0000-00		CAP., FXD, CER DI:0.001UF,+100-0%,500V	72982	831-516E102P
C872	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C875	283-0003-00		CAP., FXD, CER DI:0.01UF,+80-20%,150V	72982	855-547E103Z
C891	281-0519-00		CAP., FXD, CER DI:47PF,+/-4.7PF,500V	72982	308-000C0G0470K
C904	281-0739-00 ¹		CAP., FXD, CER DI:18PF,5%,500V	72982	301-000T2H180J
C905	281-0166-00 ¹		CAP., VAR, AIR DI:1.9-15.7PF,250V	74970	187-0109-005
C906	281-0504-00 ¹		CAP., FXD, CER DI:10PF,+/-1PF,500V	72982	301-000C0G0100F
CR25	152-0198-00		SEMICONV DEVICE:SILICON,200V,3A	04713	1N4721
CR26	152-0198-00		SEMICONV DEVICE:SILICON,200V,3A	04713	1N4721
CR68	152-0141-02		SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR122	152-0141-02		SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR154	152-0141-02		SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR185	152-0141-02		SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR195	152-0141-02		SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR232	152-0141-02		SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152

¹Standard only.

Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR264	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR295	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR320	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR330	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR332	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR384	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR435	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR440	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR445	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR450	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR455	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR460	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR494	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR512	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR545	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR554	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR555	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR570	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR580	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR587	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR588	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR595	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR610	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR612	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR614	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR615	152-0008-00			SEMICON D DEVICE:GERMANIUM, 75V, 60MA	03877	T12G
CR625	152-0008-00			SEMICON D DEVICE:GERMANIUM, 75V, 60MA	03877	T12G
CR630	152-0008-00			SEMICON D DEVICE:GERMANIUM, 75V, 60MA	03877	T12G
CR646	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR647	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR680	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR684	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR685	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR690	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR692	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR697	152-0008-00			SEMICON D DEVICE:GERMANIUM, 75V, 60MA	03877	T12G
CR725	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR726	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR850	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR870	152-0269-00			SEMICON D DEVICE:SILICON, VAR VCAP., 4V, 33PF	25403	1N3182
CR875	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR876	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR895	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR896	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR912	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR914	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR935	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR936	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR937	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR940	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR941	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR942	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152
CR943	152-0141-02			SEMICON D DEVICE:SILICON, 30V, 150MA	07910	1N4152

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Name & Description	Mfr Code	Mfr Part Number
CR944	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR946	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR947	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR948	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR950	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR951	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR952	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR954	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR955	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR957	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR958	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR960	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR961	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR963	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR964	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR966	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR967	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR969	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR970	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR972	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR973	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR975	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR976	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
CR978	152-0141-02			SEMICONV DEVICE:SILICON,30V,150MA	07910	1N4152
DS790	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS796	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS800	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS806	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS810	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS815	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS820	150-1002-00			LAMP,LED,RDDOUT:NUMERICAL DISPLAY	50579	DL8L
DS825	150-1004-00			LAMP,LED:RED,2.5V,15MA	08806	SSL-12
DS826	150-1004-00			LAMP,LED:RED,2.5V,15MA	08806	SSL-12
DS827	150-1004-00			LAMP,LED:RED,2.5V,15MA	08806	SSL-12
DS828	150-1004-00			LAMP,LED:RED,2.5V,15MA	08806	SSL-12
F25	159-0017-00			FUSE,CARTRIDGE:3AG,4A,250V,FAST BLOW	71400	MTH4
J100	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE	24931	28JR200-1
J205	131-0938-00			CONNECTOR,RCPT:BNC MALE	98291	051-043-0349
J210	131-0955-00			CONNECTOR,RCPT,:BNC,FEMALE	24931	28JR200-1
J310	131-0938-00			CONNECTOR,RCPT:BNC MALE	98291	051-043-0349
L25	108-0551-00			COIL,RF:14UH	80009	108-0551-00
L50	108-0337-00			COIL,RF:25UH	80009	108-0337-00
L55	108-0422-00			COIL,RF:80UH	80009	108-0422-00
L185	108-0181-01			COIL,RF:0.2UH	80009	108-0181-01
L295	108-0181-01			COIL,RF:0.2UH	80009	108-0181-01
L332	108-0509-00			COIL,RF:2.5UH	80009	108-0509-00
L870	108-0420-00			COIL,RF:60NH	80009	108-0420-00
Q42	151-0515-01			TRANSISTOR:50V,8A	04713	2N4441
Q65	151-0342-00			TRANSISTOR:SILICON,PNP	07263	2N4249
Q68	151-0342-00			TRANSISTOR:SILICON,PNP	07263	2N4249
Q80	151-0190-01			TRANSISTOR:SILICON,NPN	07910	TE23652

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
Q125A,B	151-1042-00		SEMICON DVC SE:MATCHED PAIR FET	80009	151-1042-00
Q130	151-0438-00		TRANSISTOR:SILICON,SEL FROM SPS6927	80009	151-0438-00
Q132	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q160	151-0438-00		TRANSISTOR:SILICON,SEL FROM SPS6927	80009	151-0438-00
Q165	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q170	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q172	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q195	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q235A,B	151-1042-00		SEMICON DVC SE:MATCHED PAIR FET	80009	151-1042-00
Q240	151-0438-00		TRANSISTOR:SILICON,SEL FROM SPS6927	80009	151-0438-00
Q242	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q270	151-0438-00		TRANSISTOR:SILICON,SEL FROM SPS6927	80009	151-0438-00
Q275	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q280	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q282	151-0427-00		TRANSISTOR:SILICON,NPN	80009	151-0427-00
Q330	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q385	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q420	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q430	151-0190-01		TRANSISTOR:SILICON,NPN	07910	TE23652
Q435	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q440	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q445	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q450	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q455	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q480	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q485	151-0504-00		TRANSISTOR:SILICON,N-CHAN,UNIUNCTION	04713	2N4851
Q490	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q506	151-0367-00		TRANSISTOR:SILICON,NPN,SEL FROM 3571TP	80009	151-0367-00
Q515	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q535	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q540	151-0503-00		TRANSISTOR:SCR,30V,8A	04713	2N5060
Q550	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q565	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q570	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q575	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q595	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q598	151-0190-01		TRANSISTOR:SILICON,NPN	07910	TE23652
Q615	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q640	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q655	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q660	151-0342-00		TRANSISTOR:SILICON,PNP	07263	2N4249
Q670	151-0220-00		TRANSISTOR:SILICON,PNP	80009	151-0220-00
Q680	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q690	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q700	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q701	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q702	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q703	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q704	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q718	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q725	151-0341-00		TRANSISTOR:SILICON,NPN	07263	2N3565
Q790	151-0301-00		TRANSISTOR:SILICON,PNP	04713	2N2907A
Q796	151-0301-00		TRANSISTOR:SILICON,PNP	04713	2N2907A

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Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
Q800	151-0301-00		TRANSISTOR: SILICON, PNP	04713	2N2907A
Q806	151-0301-00		TRANSISTOR: SILICON, PNP	04713	2N2907A
Q810	151-0301-00		TRANSISTOR: SILICON, PNP	04713	2N2907A
Q815	151-0301-00		TRANSISTOR: SILICON, PNP	04713	2N2907A
Q820	151-0301-00		TRANSISTOR: SILICON, PNP	04713	2N2907A
Q825	151-0342-00		TRANSISTOR: SILICON, PNP	07263	2N4249
Q850	151-0220-00		TRANSISTOR: SILICON, PNP	80009	151-0220-00
Q854	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q865A, B	151-1042-00		SEMICON DVC SE: MATCHED PAIR FET	80009	151-1042-00
Q885	151-0342-00		TRANSISTOR: SILICON, PNP	07263	2N4249
Q930	151-0341-00		TRANSISTOR: SILICON, NPN	07263	2N3565
Q935	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q936	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q937	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q938	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q939	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q940	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q941	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q942	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q943	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q944	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q945	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q946	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q947	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q948	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q949	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q950	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q951	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q952	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q953	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q954	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q955	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q956	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q957	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q958	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q959	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q960	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q961	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q962	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q963	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q964	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q965	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q966	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q967	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q968	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q969	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q970	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q975	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q976	151-0342-00		TRANSISTOR: SILICON, PNP	07263	2N4249
Q978	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q979	151-0342-00		TRANSISTOR: SILICON, PNP	07263	2N4249
Q981	151-0190-01		TRANSISTOR: SILICON, NPN	07910	TE23652
Q982	151-0342-00		TRANSISTOR: SILICON, PNP	07263	2N4249

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr Code	Mfr Part Number
		Eff	Dscont			
Q984	151-0190-01			TRANSISTOR:SILICON,NPN	07910	TE23652
Q985	151-0342-00			TRANSISTOR:SILICON,PNP	07263	2N4249
Q987	151-0190-01			TRANSISTOR:SILICON,NPN	07910	TE23652
Q989	151-0342-00			TRANSISTOR:SILICON,PNP	07263	2N4249
R10	305-0560-00			RES.,FXD,COMP:56 OHM,5%,2W	01121	HB5605
R12	315-0152-00			RES.,FXD,COMP:1.5K OHM,5%,0.25W	01121	CB1525
R14	307-0107-00			RES.,FXD,COMP:5.6 OHM,5%,0.25W	01121	CB56G5
R16	315-0332-00			RES.,FXD,COMP:3.3K OHM,5%,0.25W	01121	CB3325
R17	311-1563-00			RES.,VAR,NONWIR:1K OHM,20%,0.50W	73138	91A-10000M
R18	315-0302-00			RES.,FXD,COMP:3K OHM,5%,0.25W	01121	CB3025
R30	321-0260-00			RES.,FXD,FILM:4.99K OHM,1%,0.125W	75042	CEATO-4991F
R31	321-0233-00			RES.,FXD,FILM:2.61K OHM,1%,0.125W	75042	CEATO-2611F
R35	315-0162-00			RES.,FXD,COMP:1.6K OHM,5%,0.25W	01121	CB1625
R40	308-0701-00			RES.,FXD,WW:0.12 OHM,5%,2W	75042	BWH-R1200J
R42	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R55	301-0101-00			RES.,FXD,COMP:100 OHM,5%,0.50W	01121	EB1015
R60	307-0093-00			RES.,FXD,COMP:1.2 OHM,5%,0.50W	01121	EB12G5
R62	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R68	322-0215-00			RES.,FXD,FILM:1.69K OHM,1%,0.25W	75042	CEBT0-1691F
R72	315-0272-00			RES.,FXD,COMP:2.7K OHM,5%,0.25W	01121	CB2725
R75	315-0272-00			RES.,FXD,COMP:2.7K OHM,5%,0.25W	01121	CB2725
R78	315-0512-00			RES.,FXD,COMP:5.1K OHM,5%,0.25W	01121	CB5125
R80	315-0203-00			RES.,FXD,COMP:20K OHM,5%,0.25W	01121	CB2035
R85	322-0194-00			RES.,FXD,FILM:1.02K OHM,1%,0.25W	75042	CEBT0-1021F
R100	315-0510-00			RES.,FXD,COMP:51 OHM,5%,0.25W	01121	CB5105
R102	315-0240-00			RES.,FXD,COMP:24 OHM,5%,0.25W	01121	CB2405
R104	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R110	322-0622-01			RES.,FXD,FILM:950K OHM,0.5%,0.25	75042	CEBT0-9503D
R112	315-0510-00			RES.,FXD,COMP:51 OHM,5%,0.25W	01121	CB5105
R115	321-0360-00			RES.,FXD,FILM:54.9K OHM,1%,0.125W	75042	CEATO-5492F
R120	321-0481-00			RES.,FXD,FILM:1M OHM,1%,0.125W	75042	CEATO-1004F
R122	315-0103-00			RES.,FXD,COMP:10K OHM,5%,0.25W	01121	CB1035
R125	315-0100-00			RES.,FXD,COMP:10 OHM,5%,0.25W	01121	CB1005
R130	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R132	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R136	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R138	315-0301-00			RES.,FXD,COMP:300 OHM,5%,0.25W	01121	CB3015
R142	315-0510-00			RES.,FXD,COMP:51 OHM,5%,0.25W	01121	CB5105
R145	311-1567-00			RES.,VAR,NONWIR:100 OHM,20%,0.50W	73138	91A-100ROM
R148	315-0750-00			RES.,FXD,COMP:75 OHM,5%,0.25W	01121	CB7505
R150 ¹	311-1645-00			RES.,VAR,NONWIR:PNL,1K OHM,1W,W/SW	01121	11M959
R152	315-0750-00			RES.,FXD,COMP:75 OHM,5%,0.25W	01121	CB7505
R154	315-0241-00			RES.,FXD,COMP:240 OHM,5%,0.25W	01121	CB2415
R155	315-0241-00			RES.,FXD,COMP:240 OHM,5%,0.25W	01121	CB2415
R157	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R158	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R160	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R162	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R165	315-0101-00			RES.,FXD,COMP:100 OHM,5%,0.25W	01121	CB1015
R168	315-0102-00			RES.,FXD,COMP:1K OHM,5%,0.25W	01121	CB1025
R170	315-0471-00			RES.,FXD,COMP:470 OHM,5%,0.25W	01121	CB4715
R174	315-0511-00			RES.,FXD,COMP:510 OHM,5%,0.25W	01121	CB5115
R178	315-0390-00			RES.,FXD,COMP:39 OHM,5%,0.25W	01121	CB3905

¹Furnished as a unit with S100.

Electrical Parts List—DC 505

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R180	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R185	315-0151-00			RES., FXD, COMP: 150 OHM, 5%, 0.25W	01121	CB1515
R188	315-0152-00			RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R190	315-0271-00			RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R195	315-0273-00			RES., FXD, COMP: 27K OHM, 5%, 0.25W	01121	CB2735
R200	315-0241-00			RES., FXD, COMP: 240 OHM, 5%, 0.25W	01121	CB2415
R202	315-0181-00			RES., FXD, COMP: 180 OHM, 5%, 0.25W	01121	CB1815
R204	315-0820-00			RES., FXD, COMP: 82 OHM, 5%, 0.25W	01121	CB8205
R205	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R210	315-0510-00			RES., FXD, COMP: 51 OHM, 5%, 0.25W	01121	CB5105
R212	315-0240-00			RES., FXD, COMP: 24 OHM, 5%, 0.25W	01121	CB2405
R214	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R220	322-0622-01			RES., FXD, FILM: 950K OHM, 0.5%, 0.25	75042	CEBT0-9503D
R222	315-0510-00			RES., FXD, COMP: 51 OHM, 5%, 0.25W	01121	CB5105
R225	321-0360-00			RES., FXD, FILM: 54.9K OHM, 1%, 0.125W	75042	CEAT0-5492F
R230	321-0481-00			RES., FXD, FILM: 1M OHM, 1%, 0.125W	75042	CEAT0-1004F
R232	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R235	315-0100-00			RES., FXD, COMP: 10 OHM, 5%, 0.25W	01121	CB1005
R240	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R242	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R246	315-0101-00			RES., FXD, COMP: 100 OHM, 5%, 0.25W	01121	CB1015
R248	315-0301-00			RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R252	315-0510-00			RES., FXD, COMP: 51 OHM, 5%, 0.25W	01121	CB5105
R255	311-1567-00			RES., VAR, NONWIR: 100 OHM, 20%, 0.50W	73138	91A-100ROM
R258	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R260 ¹	311-1645-00			RES., VAR, NONWIR: PNL, 1K OHM, 1W, W/SW	01121	11M959
R262	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R264	315-0241-00			RES., FXD, COMP: 240 OHM, 5%, 0.25W	01121	CB2415
R265	315-0241-00			RES., FXD, COMP: 240 OHM, 5%, 0.25W	01121	CB2415
R267	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R268	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R270	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R272	315-0101-00			RES., FXD, COMP: 100 OHM, 5%, 0.25W	01121	CB1015
R275	315-0101-00			RES., FXD, COMP: 100 OHM, 5%, 0.25W	01121	CB1015
R278	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R280	315-0471-00			RES., FXD, COMP: 470 OHM, 5%, 0.25W	01121	CB4715
R284	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R288	315-0390-00			RES., FXD, COMP: 39 OHM, 5%, 0.25W	01121	CB3905
R290	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R295	315-0151-00			RES., FXD, COMP: 150 OHM, 5%, 0.25W	01121	CB1515
R298	315-0152-00			RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R300	315-0271-00			RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R305	315-0181-00			RES., FXD, COMP: 180 OHM, 5%, 0.25W	01121	CB1815
R307	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R308	315-0820-00			RES., FXD, COMP: 82 OHM, 5%, 0.25W	01121	CB8205
R315	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R317	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R320	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R324	315-0751-00			RES., FXD, COMP: 750 OHM, 5%, 0.25W	01121	CB7515
R326	315-0561-00			RES., FXD, COMP: 560 OHM, 5%, 0.25W	01121	CB5615
R330	315-0273-00			RES., FXD, COMP: 27K OHM, 5%, 0.25W	01121	CB2735
R332	315-0101-00			RES., FXD, COMP: 100 OHM, 5%, 0.25W	01121	CB1015
R335	315-0241-00			RES., FXD, COMP: 240 OHM, 5%, 0.25W	01121	CB2415
R340	315-0221-00			RES., FXD, COMP: 220 OHM, 5%, 0.25W	01121	CB2215

¹ Furnished as a unit with S210.

Ckt No.	Tektronix		Serial/Model No.		Name & Description	Mfr	
	Part No.	Eff	Dscont	Code		Mfr Part Number	
R342	315-0391-00				RES., FXD, COMP: 390 OHM, 5%, 0.25W	01121	CB3915
R345	315-0391-00				RES., FXD, COMP: 390 OHM, 5%, 0.25W	01121	CB3915
R347	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R349	315-0750-00				RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R352	315-0821-00				RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R354	315-0181-00				RES., FXD, COMP: 180 OHM, 5%, 0.25W	01121	CB1815
R356	315-0821-00				RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R358	315-0750-00				RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R360	315-0821-00				RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R362	315-0271-00				RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R364	315-0750-00				RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R366	315-0511-00				RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R368	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R372	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R380	315-0271-00				RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R382	315-0271-00				RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R384	315-0273-00				RES., FXD, COMP: 27K OHM, 5%, 0.25W	01121	CB2735
R388	315-0510-00				RES., FXD, COMP: 51 OHM, 5%, 0.25W	01121	CB5105
R390	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R392	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R394	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R395	315-0240-00				RES., FXD, COMP: 24 OHM, 5%, 0.25W	01121	CB2405
R400	315-0201-00				RES., FXD, COMP: 200 OHM, 5%, 0.25W	01121	CB2015
R402	315-0301-00				RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R406	315-0181-00				RES., FXD, COMP: 180 OHM, 5%, 0.25W	01121	CB1815
R408	315-0271-00				RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R410	315-0821-00				RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R412	315-0821-00				RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R415	315-0511-00				RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R416	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R418	315-0301-00				RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R420	315-0512-00				RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R422	315-0101-00				RES., FXD, COMP: 100 OHM, 5%, 0.25W	01121	CB1015
R425	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R426	315-0103-00				RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R430	315-0101-00				RES., FXD, COMP: 100 OHM, 5%, 0.25W	01121	CB1015
R435	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R436	315-0512-00				RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R440	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R441	315-0512-00				RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R445	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R446	315-0512-00				RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R450	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R451	315-0512-00				RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R455	315-0152-00				RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R456	315-0512-00				RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R458	315-0242-00				RES., FXD, COMP: 2.4K OHM, 5%, 0.25W	01121	CB2425
R460	315-0102-00				RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R465	315-0241-00				RES., FXD, COMP: 240 OHM, 5%, 0.25W	01121	CB2415
R468	315-0821-00				RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R470	315-0271-00				RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R475 ¹	311-1431-00				RES., VAR, NONWIR: 500K OHM, 10%, 0.25W, W/SW	01121	JS-8032
R478	315-0511-00				RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115

¹Furnished as a unit with S475.

Electrical Parts List—DC 505

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
R479	315-0621-00		RES., FXD, COMP:620 OHM, 5%, 0.25W	01121	CB6215
R482	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R484	315-0512-00		RES., FXD, COMP:5.1K OHM, 5%, 0.25W	01121	CB5125
R487	315-0100-00		RES., FXD, COMP:10 OHM, 5%, 0.25W	01121	CB1005
R490	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R492	315-0511-00		RES., FXD, COMP:510 OHM, 5%, 0.25W	01121	CB5115
R494	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R495	315-0512-00		RES., FXD, COMP:5.1K OHM, 5%, 0.25W	01121	CB5125
R497	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R500	315-0511-00		RES., FXD, COMP:510 OHM, 5%, 0.25W	01121	CB5115
R504	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R506	315-0301-00		RES., FXD, COMP:300 OHM, 5%, 0.25W	01121	CB3015
R508	315-0201-00		RES., FXD, COMP:200 OHM, 5%, 0.25W	01121	CB2015
R510	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R512	315-0100-00		RES., FXD, COMP:10 OHM, 5%, 0.25W	01121	CB1005
R515	315-0273-00		RES., FXD, COMP:27K OHM, 5%, 0.25W	01121	CB2735
R518	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R520	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R524	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R526	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R530	315-0911-00		RES., FXD, COMP:910 OHM, 5%, 0.25W	01121	CB9115
R532	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R535	315-0300-00		RES., FXD, COMP:30 OHM, 5%, 0.25W	01121	CB3005
R537	315-0101-00		RES., FXD, COMP:100 OHM, 5%, 0.25W	01121	CB1015
R540	315-0184-00		RES., FXD, COMP:180K OHM, 5%, 0.25W	01121	CB1845
R542	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R543	315-0511-00		RES., FXD, COMP:510 OHM, 5%, 0.25W	01121	CB5115
R545	315-0512-00		RES., FXD, COMP:5.1K OHM, 5%, 0.25W	01121	CB5125
R547	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R550	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R554	315-0103-00		RES., FXD, COMP:10K OHM, 5%, 0.25W	01121	CB1035
R560	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R565	315-0361-00		RES., FXD, COMP:360 OHM, 5%, 0.25W	01121	CB3615
R570	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R574	315-0103-00		RES., FXD, COMP:10K OHM, 5%, 0.25W	01121	CB1035
R580	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R582	315-0511-00		RES., FXD, COMP:510 OHM, 5%, 0.25W	01121	CB5115
R590	315-0512-00		RES., FXD, COMP:5.1K OHM, 5%, 0.25W	01121	CB5125
R592	315-0512-00		RES., FXD, COMP:5.1K OHM, 5%, 0.25W	01121	CB5125
R595	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R596	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R598	315-0473-00		RES., FXD, COMP:47K OHM, 5%, 0.25W	01121	CB4735
R605	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R606	315-0102-00		RES., FXD, COMP:1K OHM, 5%, 0.25W	01121	CB1025
R615	315-0183-00		RES., FXD, COMP:18K OHM, 5%, 0.25W	01121	CB1835
R622	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R623	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R625	315-0511-00		RES., FXD, COMP:510 OHM, 5%, 0.25W	01121	CB5115
R628	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R629	315-0202-00		RES., FXD, COMP:2K OHM, 5%, 0.25W	01121	CB2025
R632	315-0101-00		RES., FXD, COMP:100 OHM, 5%, 0.25W	01121	CB1015
R635	315-0512-00		RES., FXD, COMP:5.1K OHM, 5%, 0.25W	01121	CB5125
R637	315-0241-00		RES., FXD, COMP:240 OHM, 5%, 0.25W	01121	CB2415

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R640	315-0471-00			RES., FXD, COMP: 470 OHM, 5%, 0.25W	01121	CB4711
R642	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R644	315-0302-00			RES., FXD, COMP: 3K OHM, 5%, 0.25W	01121	CB3025
R647	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R655	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R656	315-0302-00			RES., FXD, COMP: 3K OHM, 5%, 0.25W	01121	CB3025
R660	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R662	315-0302-00			RES., FXD, COMP: 3K OHM, 5%, 0.25W	01121	CB3025
R664	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R666	315-0561-00			RES., FXD, COMP: 560 OHM, 5%, 0.25W	01121	CB5611
R668	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R670	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R672	315-0302-00			RES., FXD, COMP: 3K OHM, 5%, 0.25W	01121	CB3025
R680	315-0510-00			RES., FXD, COMP: 51 OHM, 5%, 0.25W	01121	CB5105
R684	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R687	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R690	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R692	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R695	315-0511-00			RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R697	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R699	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R704	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R710	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R712	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R714	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R718	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R720	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R722	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R724	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R726	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R730	315-0242-00			RES., FXD, COMP: 2.4K OHM, 5%, 0.25W	01121	CB2425
R732	315-0242-00			RES., FXD, COMP: 2.4K OHM, 5%, 0.25W	01121	CB2425
R735	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R740	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R742	315-0242-00			RES., FXD, COMP: 2.4K OHM, 5%, 0.25W	01121	CB2425
R744	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R746	315-0242-00			RES., FXD, COMP: 2.4K OHM, 5%, 0.25W	01121	CB2425
R755	315-0201-00			RES., FXD, COMP: 200 OHM, 5%, 0.25W	01121	CB2015
R757	315-0751-00			RES., FXD, COMP: 750 OHM, 5%, 0.25W	01121	CB7515
R765	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R768	315-0152-00			RES., FXD, COMP: 1.5K OHM, 5%, 0.25W	01121	CB1525
R770	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R774	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R775	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R776	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R777	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R780	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R781	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R782	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R783	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R784	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R785	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R786	315-0750-00			RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505

Electrical Parts List—DC 505

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
R790	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R791	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R793	315-0750-00		RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R794	315-0750-00		RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R796	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R797	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R800	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R801	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R803	315-0750-00		RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R804	315-0750-00		RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R806	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R807	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R810	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R811	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R813	315-0750-00		RES., FXD, COMP: 75 OHM, 5%, 0.25W	01121	CB7505
R815	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R816	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R820	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R821	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R825	315-0511-00		RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R830	315-0511-00		RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R835	315-0821-00		RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R837	315-0821-00		RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R839	315-0821-00		RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R842	315-0821-00		RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R844	315-0821-00		RES., FXD, COMP: 820 OHM, 5%, 0.25W	01121	CB8215
R847	315-0201-00		RES., FXD, COMP: 200 OHM, 5%, 0.25W	01121	CB2015
R850	315-0202-00		RES., FXD, COMP: 2K OHM, 5%, 0.25W	01121	CB2025
R854	315-0391-00		RES., FXD, COMP: 390 OHM, 5%, 0.25W	01121	CB3915
R856	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R860	315-0243-00		RES., FXD, COMP: 24K OHM, 5%, 0.25W	01121	CB2435
R862	315-0103-00		RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R863	315-0103-00		RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R865	315-0133-00		RES., FXD, COMP: 13K OHM, 5%, 0.25W	01121	CB1335
R867	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R870	315-0910-00		RES., FXD, COMP: 91 OHM, 5%, 0.25W	01121	CB9105
R872	315-0511-00		RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R875	315-0622-00		RES., FXD, COMP: 6.2K OHM, 5%, 0.25W	01121	CB6225
R876	315-0331-00		RES., FXD, COMP: 330 OHM, 5%, 0.25W	01121	CB3315
R880	315-0511-00		RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R881	315-0621-00		RES., FXD, COMP: 620 OHM, 5%, 0.25W	01121	CB6215
R883	315-0122-00		RES., FXD, COMP: 1.2K OHM, 5%, 0.25W	01121	CB1225
R885	315-0511-00		RES., FXD, COMP: 510 OHM, 5%, 0.25W	01121	CB5115
R887	315-0512-00		RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R890	315-0512-00		RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R891	315-0332-00		RES., FXD, COMP: 3.3K OHM, 5%, 0.25W	01121	CB3325
R895	315-0102-00		RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R897	315-0201-00		RES., FXD, COMP: 200 OHM, 5%, 0.25W	01121	CB2015
R900 ¹	315-0301-00		RES., FXD, COMP: 300 OHM, 5%, 0.25W	01121	CB3015
R902 ¹	315-0271-00		RES., FXD, COMP: 270 OHM, 5%, 0.25W	01121	CB2715
R906 ¹	315-0181-00		RES., FXD, COMP: 180 OHM, 5%, 0.25W	01121	CB1815
R910 ¹	315-0242-00		RES., FXD, COMP: 2.4K OHM, 5%, 0.25W	01121	CB2425
R912	315-0512-00		RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125

¹Standard only.

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
R914	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R916	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R918	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R919	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R920	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R922	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R923	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R924	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R925	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R926	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R927	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R930	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R935	315-0512-00			RES., FXD, COMP: 5.1K OHM, 5%, 0.25W	01121	CB5125
R975	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R976	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R977	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R978	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R979	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R980	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R981	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R982	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R983	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R984	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R985	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R986	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R987	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
R988	315-0102-00			RES., FXD, COMP: 1K OHM, 5%, 0.25W	01121	CB1025
R989	315-0103-00			RES., FXD, COMP: 10K OHM, 5%, 0.25W	01121	CB1035
R990	315-0203-00			RES., FXD, COMP: 20K OHM, 5%, 0.25W	01121	CB2035
S100 ¹	311-1645-00			RES., VAR, NONWIR: PNL, 1K OHM, 1W, W/SW	01121	11M959
S105	260-1466-00			SWITCH, PUSH: SLOPE	80009	260-1446-00
S185	260-1445-00			SWITCH, PUSH:	80009	260-1445-00
S195	263-1016-00			ACTR, ASSY: CAM SW, TIMING	80009	263-1016-00
S215	260-1466-00			SWITCH, PUSH: SLOPE	80009	260-1466-00
S210 ²	311-1645-00			RES., VAR, NONWIR: PNL, 1K OHM, 1W, W/SW	01121	11M959
S295	260-1445-00			SWITCH, PUSH:	80009	260-1445-00
S475 ³	311-1431-00			RES., VAR, NONWIR: 500K OHM, 10%, 0.25W, W/SW	01121	JS-8032
S545						
S575	260-1465-00			SWITCH, PUSH: START STOP RESET	80009	260-1465-00
S895	105-0587-00			ACTR ASSY, SL SW:	80009	105-0587-00
S900	260-0723-00			SWITCH, SLIDE: DPDT, 0.5A, 125VAC	80009	260-0723-00
S950	105-0587-00			ACTR ASSY, SL SW:	80009	105-0587-00
U10	156-0071-00			MICROCIRCUIT, LI: VOLTAGE REGULATOR	07263	723DC
U30	156-0071-00			MICROCIRCUIT, LI: VOLTAGE REGULATOR	07263	723DC
U190	156-0353-00			MICROCIRCUIT, DI: TPL 2-INPUT EXCL OR GATE	04713	MC1672L
U195	156-0205-00			MICROCIRCUIT, DI: QUAD 2-INPUT NOR GATE	04713	MC10102L
U200	156-0226-00			MICROCIRCUIT, DI: QUAD 2-INPUT NOR GATE	04713	MC1662L
U315	156-0230-00			MICROCIRCUIT, DI: DUAL D MA-SLAVE FLIP-FLOP	04713	MC10131L
U340	156-0226-00			MICROCIRCUIT, DI: QUAD 2-INPUT NOR GATE	04713	MC1662L
U342	156-0228-00			MICROCIRCUIT, DI: MASTER SLAVE TYPE D F-F	04713	MC1670L
U345	156-0282-00			MICROCIRCUIT, DI: DUAL 4-INPUT OR NOR GATE	04713	MC16602
U350	156-0228-00			MICROCIRCUIT, DI: MASTER SLAVE TYPE D F-F	04713	MC1670L

¹Furnished as a unit with R150.
²Furnished as a unit with R260.
³Furnished as a unit with R475.

Electrical Parts List—DC 505

Ckt No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Name & Description	Mfr Code	Mfr Part Number
U355	156-0230-00		MICROCIRCUIT,DI:DUAL D MA-SLAVE FLIP-FLOP	04713	MC10131L
U360	156-0230-00		MICROCIRCUIT,DI:DUAL D MA-SLAVE FLIP-FLOP	04713	MC10131L
U390	156-0228-00		MICROCIRCUIT,DI:MASTER SLAVE TYPE D F-F	04713	MC1670L
U400	156-0228-00		MICROCIRCUIT,DI:MASTER SLAVE TYPE D F-F	04713	MC1670L
U410	156-0230-00		MICROCIRCUIT,DI:DUAL D MA-SLAVE FLIP-FLOP	04713	MC10131L
U435	156-0042-00		MICROCIRCUIT,DI:J-K M/S FLIP-FLOP	01295	SN7476N
U440	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U445	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U450	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U455	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U495	156-0205-00		MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE	04713	MC10102L
U497	156-0205-00		MICROCIRCUIT,DI:QUAD 2-INPUT NOR GATE	04713	MC10102L
U500	156-0182-00		MICROCIRCUIT,DI:ECL 10K, INPUT GATE	04713	MC10105
U580	156-0174-00		MICROCIRCUIT,DI:DUAL J-K MA SLAVE FLIP-FLOP	01295	SN74111N
U585	156-0150-00		MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BUFF	01295	SN7437N
U587	156-0030-00		MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U590	156-0118-00		MICROCIRCUIT,DI:J-K MASTER-SLAVE FLIP-FLOP	01295	SN74S112N
U610	156-0041-00		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U620	156-0030-00		MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U625	156-0460-00		MICROCIRCUIT,DI:QUAD 2-INPUT OPEN COLL OUT	01295	SN7409N
U630	156-0058-00		MICROCIRCUIT,DI:HEX INVERTER	04713	MC7404P
U650	156-0058-00		MICROCIRCUIT,DI:HEX INVERTER	04713	MC7404P
U652	156-0398-00		MICROCIRCUIT,DI:QUAD LCH W/TRI-STATE OUTPUT	27014	DM8551N
U655	156-0323-00		MICROCIRCUIT,DI:HEX. INVERTER	01295	SN74S04N
U657	156-0030-00		MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U675	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U676	156-0398-00		MICROCIRCUIT,DI:QUAD LCH W/TRI-STATE OUTPUT	27014	DM8551N
U678	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U679	156-0398-00		MICROCIRCUIT,DI:QUAD LCH W/TRI-STATE OUTPUT	27014	DM8551N
U700	156-0409-00		MICROCIRCUIT,DI:4-DIGIT DEC CTR/DISP DCDR	50088	MK5007P
U715	156-0057-00		MICROCIRCUIT,DI:QUAD 2-INPUT NAND GATE	07263	U6A740159X
U720	156-0041-00		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U750	156-0041-00		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U755	156-0111-00		MICROCIRCUIT,DI:BCD TO DECIMAL DCDR/DRV	01295	SN74145N
U760	156-0171-00		MICROCIRCUIT,LI:QUAD 2-INPUT POS OR GATE	01295	SN7432N
U765	156-0041-00		MICROCIRCUIT,DI:DUAL D-TYPE FLIP-FLOP	27014	DM7474N
U780	156-0128-00		MICROCIRCUIT,DI:SGL BCD TO 7-SEG DCDR/DRV	01295	SN7447AN
U835	156-0230-00		MICROCIRCUIT,DI:DUAL D MA-SLAVE FLIP-FLOP	04713	MC10131L
U845	156-0230-00		MICROCIRCUIT,DI:DUAL D MA-SLAVE FLIP-FLOP	04713	MC10131L
U855	156-0395-00		MICROCIRCUIT,DI:DECADE COUNTER	01295	SN7490AN
U856	156-0124-00		MICROCIRCUIT,DI:SGL FREQ/PHASE DETECTOR	04713	MC4044P
U875	156-0266-00		MICROCIRCUIT,LI:EMITTER COUPLED OSCILLATOR	04713	MC1648P
U880	156-0047-00		MICROCIRCUIT,DI:3-INPUT NAND GATE	01295	SN7410N
U895	156-0410-00		MICROCIRCUIT,DI:COUNTER TIME BASE	50088	MK5009P
U900 ¹	156-0030-00		MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND GATE	01295	SN7400N
U901 ²	156-0395-00		MICROCIRCUIT,DI:QUAD LCH W/TRI-STATE OUTPUT	01295	SN7498AN
U920	156-0043-00		MICROCIRCUIT DI:2-INPUT NOR GATE	01295	SN7402N
U922	156-0178-00		MICROCIRCUIT,DI:TRIPLE 3-INPUT NOR GATE	01295	SN7427N
U925	156-0150-00		MICROCIRCUIT,DI:QUAD 2-INPUT POS NAND BUFF	01295	SN7437N
VR42	152-0227-00		SEMICONV DEVICE:ZENER,0.4W,6.2V,5%	81483	69-6585
VR55	152-0226-00		SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	81483	69-6584
VR170	152-0226-00		SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	81483	69-6584
VR180	152-0226-00		SEMICONV DEVICE:ZENER,0.4W,5.1V,5%	81483	69-6584

¹Standard only.

²Option 1 only.

Ckt No.	Tektronix Part No.	Serial/Model No.		Name & Description	Mfr	
		Eff	Dscont		Code	Mfr Part Number
VR280	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	81483	69-6584
VR290	152-0226-00			SEMICOND DEVICE:ZENER,0.4W,5.1V,5%	81483	69-6584
Y900 ¹	158-0079-00			XTAL UNIT,QTZ:1 MHZ,+/-0.001%	80009	158-0079-00
Y901 ²	119-0503-00			OSCILLATOR,RF:XTAL CONT;5 MTZ ADJ 15V INPUT	71034	TCC0-26LF-10A

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¹Standard only.
²Option 1 only.

OPTION INFORMATION

Your instrument may be equipped with one or more options. This section describes those options, or directs the reader to where the option is documented.

Diagram will be found on diagram  5

Adjustment procedure will be found on Adjustments foldout page.

Electrical components will be found in Electrical Parts List.

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SERVICE INFORMATION

SYMBOLS AND REFERENCE DESIGNATORS

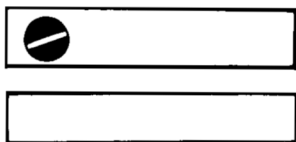
Electrical components shown on the diagrams are in the following units unless noted otherwise:

- Capacitors = Values one or greater are in picofarads (pF).
Values less than one are in microfarads (μ F).
- Resistors = Ohms (Ω)

Symbols used on the diagrams are based on ANSI Y32.2 – 1970.

Logic symbology is based on MIL-STD-806B in terms of positive logic. Logic symbols depict the logic function performed and may differ from the manufacturer's data.

The following special symbols are used on the diagrams:



External Screwdriver adjustment.

External control or connector.



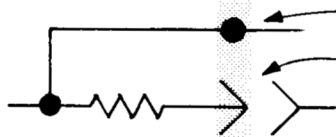
Clockwise control rotation in direction of arrow.



Refer to diagram number indicated in diamond.



Refer to waveform number indicated in hexagon.



Connection soldered to circuit board.

Connection made to circuit board with interconnecting pin.

Blue tint encloses components located on circuit board.

P/O circuit board

TABLE 3-1 INPUT-OUTPUT ASSIGNMENTS FOR PLUG-IN REAR INTERFACE CONNECTOR

Remarks	Output or Input	Pin B		Pin A	Output or Input	Remarks
		28	Mea- sure- ment Bar- rier Slot	28		
		27		27	Internal Scan Clock Disable	
	Manual Start-Stop	26*		26	Reset	
	Internal Scan Clock Out	25*		25	Time Slot Zero (TSO)	
		24*		24		
	Overflow Signal	23*		23		
		22*		*22		
	BCD Output, 2	21*		*21		
	Serial-by-Digit 8	20		20	4 BCD Output	
	Data Good	19		19	1 Serial-by-Digit	
		18		18		
		17		17		
		16		16		
		15		15		
		14		14	Ext Clock Input	
	25 VAC winding	13		13	25 VAC winding	
	+33.5 V filtered DC	12		12	+33.5 V filtered DC	
	Collector Lead of PNP Series-Pass	11		11	Base Lead of PNP Series-Pass	
	Transformer shield lead	10		10	Emitter Lead of PNP Series-Pass	
	±33.5 V common return	9*	*9	±33.5 V common return		
	-33.5 V filtered dc	8	8	-33.5 V filtered dc		
	Collector Lead of NPN Series-Pass	7*	*7	Emitter Lead of NPN Series-Pass		
	No connection	6	*6	Base Lead of NPN Series-Pass		
	17.5 VAC winding	5	5	17.5 VAC winding		
	+11.5 V common return	4*	*4	+11.5 V common return		
	+11.5 V common return	3*	*3	+11.5 V common return		
	+11.5 V filtered DC	2*	*2	+11.5 V filtered DC		
	25 VAC winding	1*	*1	25 VAC winding		
		B		A		

Assignments listed for pins 1A-13A and 1B-13B are available in all power modules; however only those pins marked with an asterisk (*) are used by the DC505.

CONTROLS & CONNECTORS

Display Readout

LED readout, seven 7-segment digits with automatically placed decimal point. The leading zeroes are suppressed unless an overflow is indicated.

A OUT Connector

BSM connector that provides a shaped ≈ 0.2 V output signal derived from the output of the channel A shaper circuit. The signal is high during the duration of the triggering window for the A input signal.

LEVEL Control

Selects the amplitude point on the input signal at which the triggering window is placed. Also selects signal input source. Pulled out selects the rear connector input. Pushed in selects the front-panel BNC connector input.

Trigger Slope Pushbutton

A push-push switch which selects the slope of the input signal on which triggering will occur.

Attenuation Pushbuttons

Self-canceling button selects X1, or X20 attenuation of the input signal.

INPUT Connector

BNC connector for signal input.

Input Coupling Pushbutton

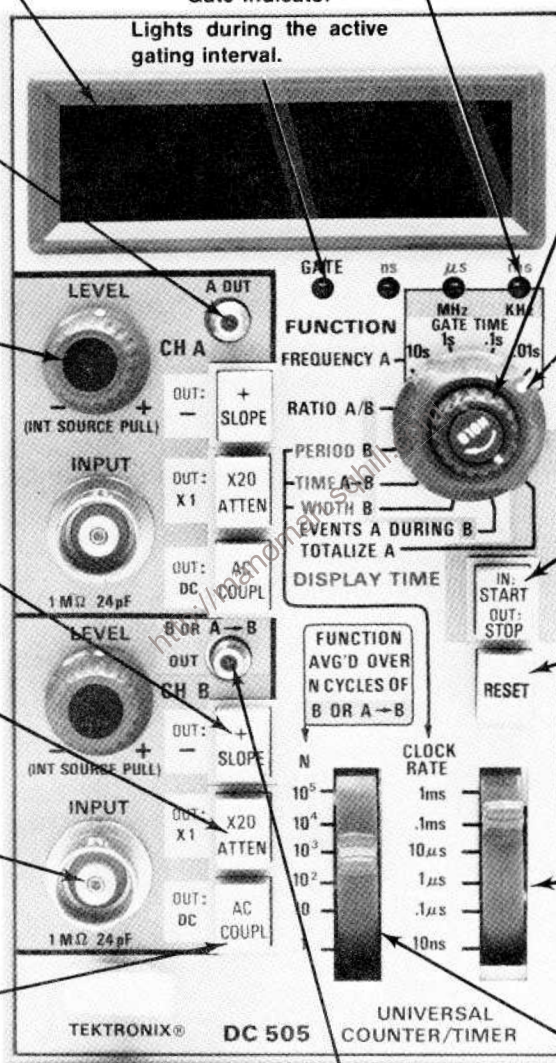
A push-push switch which selects whether the input signal is AC or DC coupled into the attenuators.

Units Indicators

LED indicates that displayed number is MHz (10^6), or kHz (10^3) if in FREQ A modes, or ns (10^{-9}), μ s (10^{-6}), or ms (10^{-3}), if in a time mode. In the RATIO A/B, EVENTS A DURING B and TOTALIZE A modes, no units are indicated.

Gate Indicator

Lights during the active gating interval.



B or A-B OUT Connector

BSM connector which provides a shaped ≈ 0.2 V output signal derived from the output of the channel B shaper and FUNCTION circuit for the RATIO A/B, PERIOD B, WIDTH B, and EVENTS A DURING B modes of the FUNCTION switch. The shaped ≈ 0.2 V output signal for the TIME -B of the FUNCTION switch is derived from the output of the time A-B circuit. The signal is high during the duration of the triggering window for the B input signal in the RATIO A/B, PERIOD B, WIDTH B, and EVENTS DURING B modes. In the TIME A-B mode, the signal is high from the selected slope of the A input signal to the selected slope of the B input signal.

DISPLAY TIME Control

Variable control concentric with FUNCTION switch sets the length of time the reading will be displayed after the count is made and before the next measurement is taken. Display time can be varied from 0.1 s (ccw) to about 10 seconds (cw). HOLD position (detent) provides continuous display until reset by pressing the RESET button.

FUNCTION Switch

Selects measurement or time counting modes for counter. Also selects the gate (measurement) interval in the four FREQ A positions.

Manual Gate Pushbutton

Push-push switch operable when TOTALIZE A is selected by the FUNCTION switch. Button in starts the measurement interval gate; button out terminates the gate.

RESET Pushbutton

Momentary pushbutton which manually resets (acts as a master reset) and provides a segment check of the 7 readout digits.

CLOCK RATE Switch

Selects the rate in the PERIOD B, TIME A-B, and WIDTH B modes of the FUNCTION switch at which pulses will be counted, when the gate is opened by the input signal(s).

FUNCTION AVG'D Switch

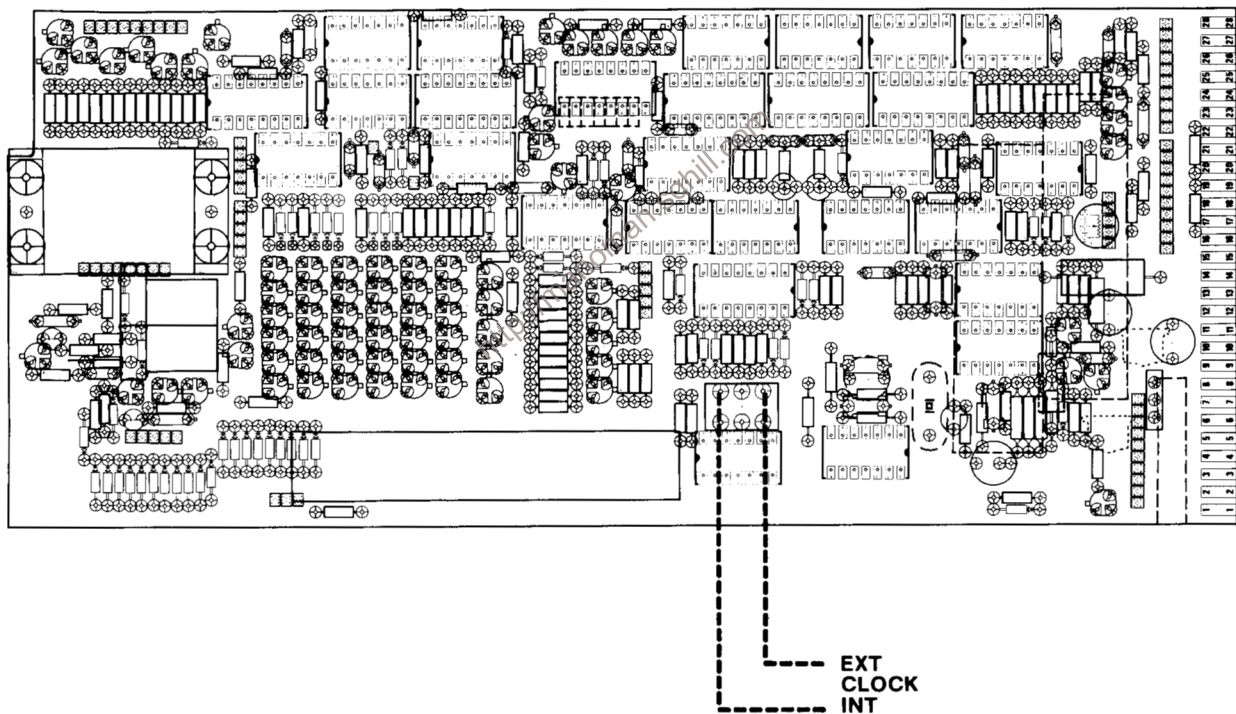
Selects the number of measurements to be averaged in the RATIO A/B PERIOD B, TIME A-B, WIDTH B and EVENTS A DURING B modes of the FUNCTION switch.

INT-EXT Clock Selection Switch

When facing front of DC 505, the slide switch mounted on the Main (right) Circuit Board should be in the forward position (towards front of instrument) to select internal clock. Slide switch back (towards rear of instrument) when external clock input is desired.

CONTROLS

DC 505



DC 505

Adjustment is generally required after a repair has been made, or after long time intervals in which normal aging of components may affect instrument accuracy.

To assure instrument accuracy, check the adjustments every 1,000 hours, for standard model DC 505 and every 2,000 hours for Option 1.

Before complete calibration, thoroughly clean and inspect this instrument as outlined in the service section of the Power Module manual. The Power Module manual also contains information for general maintenance of this instrument, including preventive maintenance, component identification and replacement, etc.

Services Available

Tektronix, Inc. provides complete instrument repair and adjustment at local Field Service Centers and at the Factory Service Center. Contact your local Tektronix Field Office or representative for further information.

Test Equipment

1. Correctly functioning TM 500-Series Power Module.

2. DC Voltmeter. Voltage range -10 V to $+15\text{ V}$; Input impedance 20 k ohms/volt . For example, a Triplet 630 NA multimeter or DM 501 Digital Voltmeter (operates in a TM 500-Series Power Module).

3. 1 MHz Frequency Standard. Accuracy of the DC 505 is determined by the accuracy of the standard used. For best accuracy, standard should be traceable to NBS.

4. Constant Amplitude Signal Generator. Variable output frequency of $< 1\text{ MHz}$ to $> 3\text{ MHz}$ and output amplitude of 150 mV p-p . For example a SG 503 (operates in a TM 500-Series Power Module).

5. Pulse Generator, minimum bandwidth 225 MHz. For example a PG 502 (operates in a TM 500-Series Power Module).

6. High Frequency Test Oscilloscope. Must have a minimum bandpass of 225 MHz with minimum vertical sensitivity of 0.1 V/div . For example, a Tektronix 485 oscilloscope; or a Tektronix 7904 oscilloscope with 7B51 Horizontal Time Base and a 7A16 or 7A18 Vertical Amplifier plug ins, or with 7S11 Sampling Vertical, S-2 Sampling Head and 7T11 Sampling Horizontal plug-ins.

7. Plug-In Extension. Tektronix Calibration Fixture.

8. Seaelectro to bnc adapter Cable (furnished with DC 505, Tektronix Part No. 012-0532-02).

9. (2) $50\ \Omega$ bnc Cables, Tektronix Part No. 012-0057-01.

10. $50\ \Omega$ bnc 10X Attenuator, Tektronix Part No. 011-0059-02.

11. $50\ \Omega$ Termination, Tektronix Part No. 011-0049-01.

12. Tektronix 6057 100X Probe, Tektronix Part No. 010-6057-03.

Procedure

NOTE

The performance of this instrument can be checked at any temperature within the 0°C to $+50^{\circ}\text{C}$ range. Make any adjustment at a temperature between $+20^{\circ}\text{C}$ and $+30^{\circ}\text{C}$ ($+68^{\circ}\text{F}$ and $+86^{\circ}\text{F}$).

The DC 505 can be operated either fully installed in a TM 500-Series Power Module or connected to a plug-in extender. Adjustments are made using the extender.

1. Power Supply Checks and Adjustment

Connect the voltmeter between the $+15\text{ volt}$ test point, TP1 and ground. Adjust R17 for a reading of $+15\text{ volts}$. Then check the $+5\text{ volt}$, TP2 and -10 volt , TP3 supplies to be within 5%.

ADJUSTMENTS

2. Phase Lock Voltage Check and Adjustment

Connect the voltmeter between the junction of R870 and the cathode of the varactor diode, CR870, and ground. Check that the voltage reading is within 2.2 to 2.9 volts. Adjust the spacing of coil L870 to obtain a reading of 2.6 volts. Disconnect test equipment.

3. Time Base Frequency Check and Adjustments

Connect the 1 MHz Frequency Standard to the INPUT of CH A. Set FREQUENCY A GATE time to 1 s. For Option 1 use 10 s.

When viewing from front panel, clock adjustment is mounted on the back of the right circuit board. It can be reached through the hole in the left circuit board. For the standard model DC 505, the adjustment is an air trimmer capacitor. For Option 1, the adjustment is made by removing the slotted plug from the optional crystal oven to gain access to interior adjusting slug. Screw off cap and adjust Clock with a plastic screw driver.

For the standard DC 505 adjust clock timing capacitor C905 through small hole in left circuit board until 100.0000 is displayed in the readout.

Adjust variable resistor R255 until the readout displays 3 MHz. Zeros will show in the readout when the value of the resistance is wrong. Disconnect test equipment.

b. CHANNEL B. Connect Output of constant amplitude sine wave generator (see CHANNEL A—SLOPE Selection) to CH B INPUT of DC 505. Select 3 MHz, 150 mV p-p sine wave. Set FUNCTION control switch to PERIOD B. Set CH B to X1 ATTEN; ac coupled; + SLOPE; N switch to 10^2 ; CLOCK RATE switch to $1 \mu\text{s}$. Center dot on LEVEL control knob. Adjust variable resistor R145 until GATE light flashes. Disconnect test equipment.

5. CHANNEL A & B Frequency Response

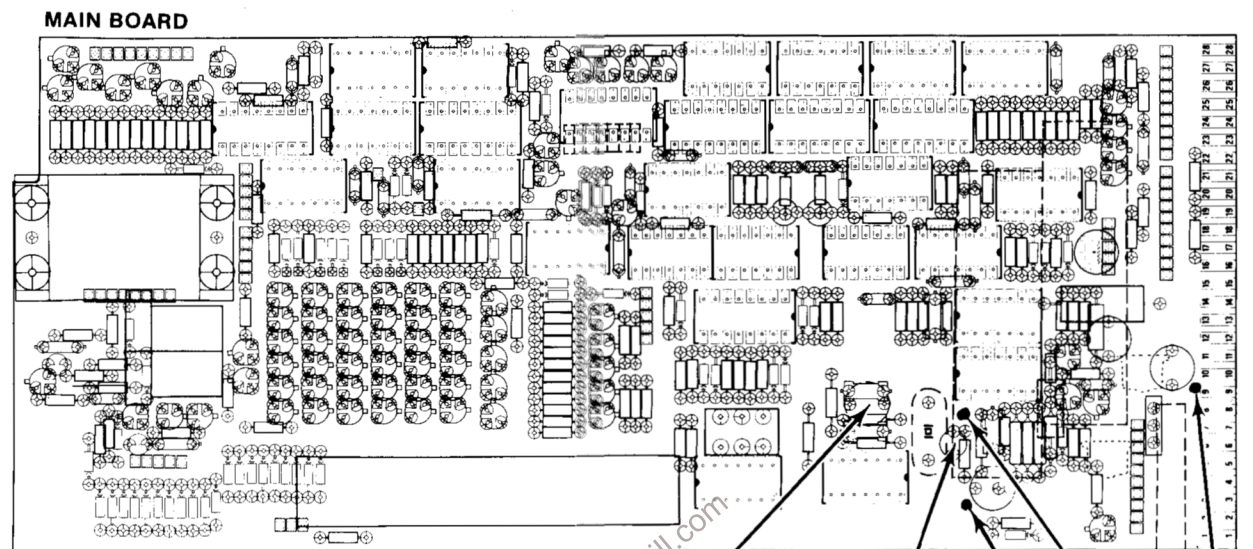
First check CH A, then repeat steps for CH B. A signal from a pulse generator is needed and this pulse must be verified on an oscilloscope first for amplitude and rep rate.

Connect the output of a 250 MHz pulse generator (PG 502 or equivalent) with a 50 Ω cable, a X10 attenuator and a 50 Ω terminator to the vertical input of the test oscilloscope. Set the test oscilloscope vertical sensitivity for 0.1 V/div. Connect the Trig Out of the PG 502 to the External Trigger In of the test oscilloscope's time base and set the sweep rate to 10 ns/div.

Adjust the output amplitude of the pulse generator for +2 and -2 divisions of vertical deflection. (+0.2 V and -0.2 V for a total of 0.4 V displayed.)

Disconnect pulse generator output from vertical input of the test oscilloscope and connect to the CH A INPUT of the DC 505. Connect a P6057 test probe to test oscilloscope vertical input. Connect probe to TP7 (TP8 for CH B) and attach ground clip of the probe to the ground pin of nearest bnc connector on the circuit board. Adjust C245 (C135 for CH B) for best rise time with minimum ringing.

Remove the 10X attenuator. Depress the X20 ATTEN button on the DC 505. Pulse waveform should now have one-half the previous amplitude, with the same rise time and ringing.



STANDARD
CLOCK TIMING
CAPACITOR C905
(Mounted on back)

OPTION 1
5 MHz CLOCK
ADJUST Y901
(Mounted on back)

T.P.1
+15V

T.P.2
+5V

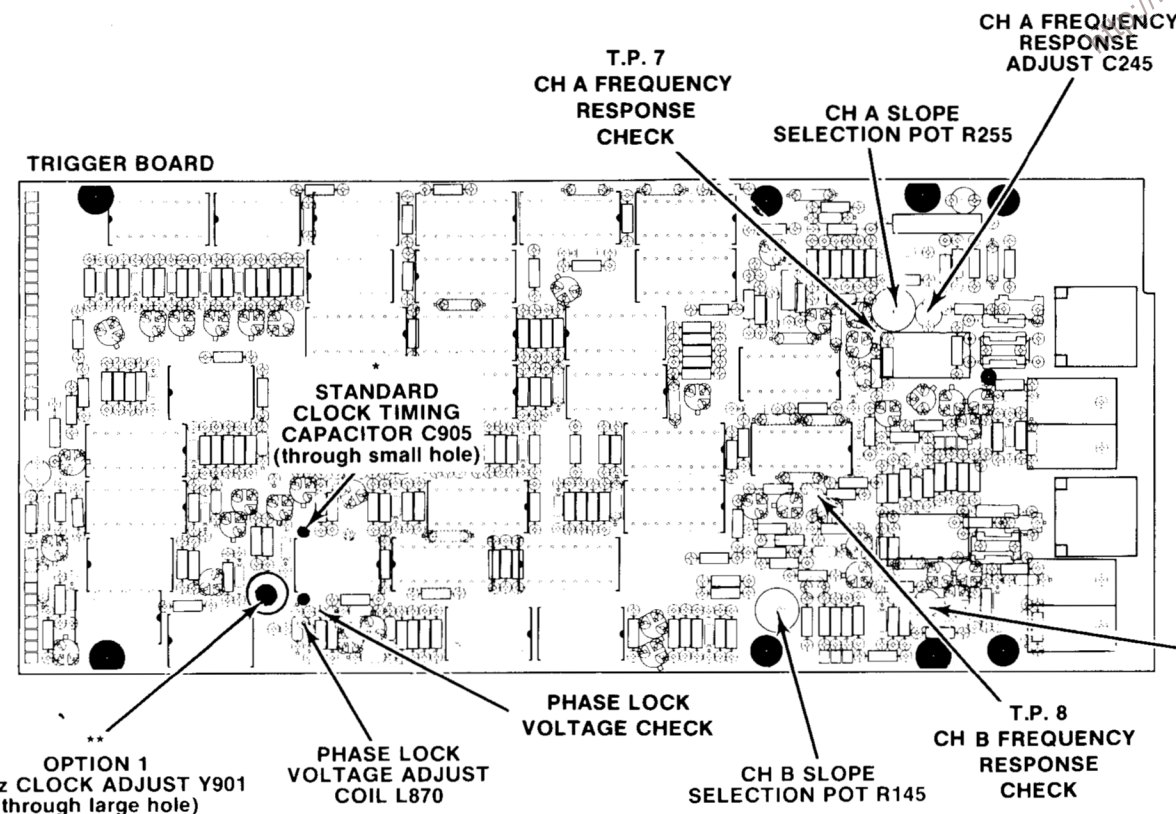
T.P.3
-10V

For Option 1, adjust Y901 through large hole in left circuit board until 000.0000 appears in the display. Since this is over range for the DC 505, the "1" is off screen and the displayed zeros will flash.

4. Slope Selection

a. CHANNEL A. Connect the Output of a low frequency sine-wave source generating at least 1 MHz, for example the SG 503, to the CH A INPUT of the DC 505. Select a 3 MHz, 150 mV p-p sine wave. Set the FUNCTION control of the DC 505 to FREQUENCY A, 0.1 s. Set CH A to X1 ATTEN; ac coupled; + SLOPE. Center dot of LEVEL control knob.

CH B FREQUENCY
RESPONSE ADJUST
C135



T.P. 7
CH A FREQUENCY
RESPONSE
CHECK

CH A SLOPE
SELECTION POT R255

CH A FREQUENCY
RESPONSE
ADJUST C245

STANDARD
CLOCK TIMING
CAPACITOR C905
(through small hole)

PHASE LOCK
VOLTAGE CHECK

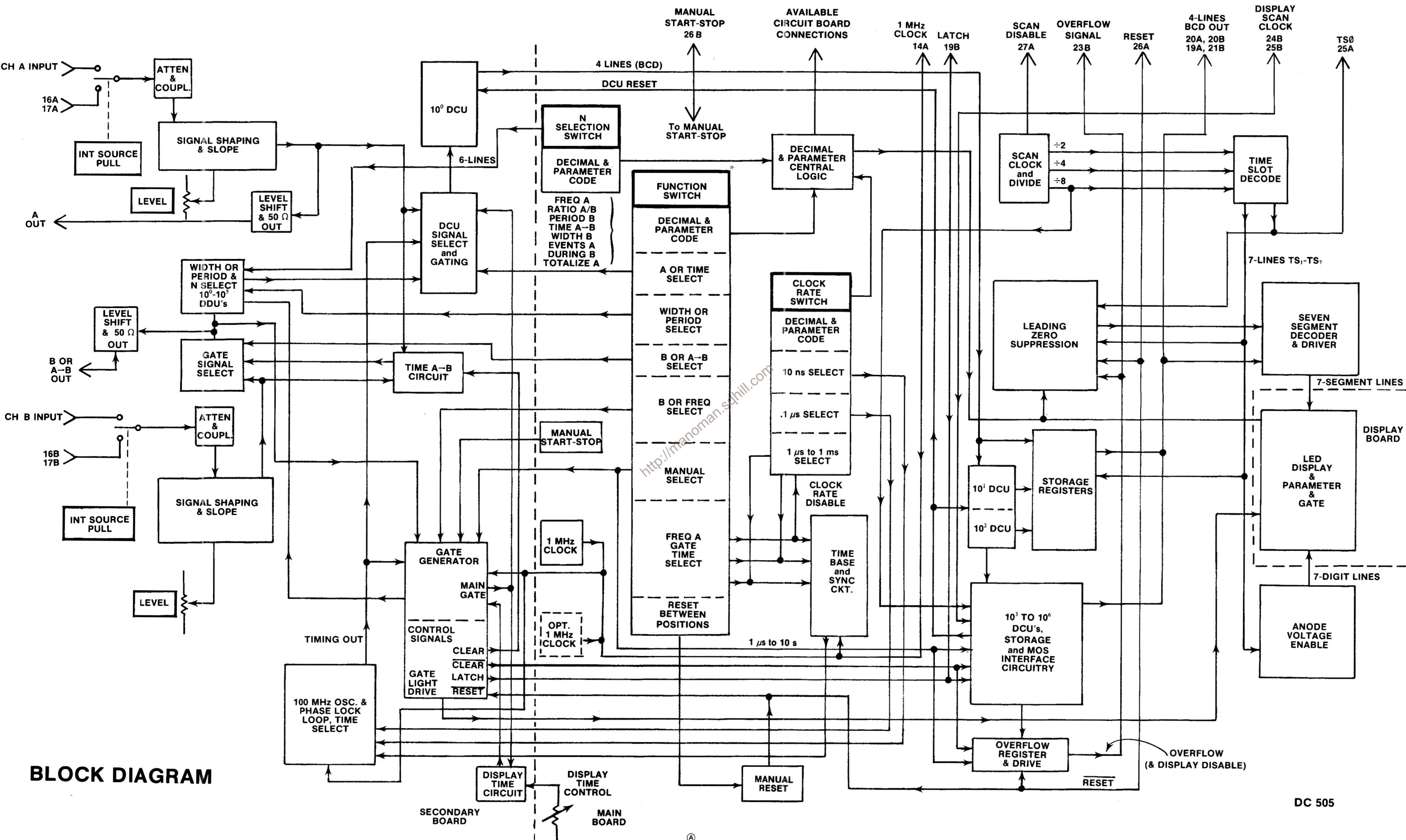
PHASE LOCK
VOLTAGE ADJUST
COIL L870

OPTION 1
5 MHz CLOCK ADJUST Y901
(through large hole)

CH B SLOPE
SELECTION POT R145

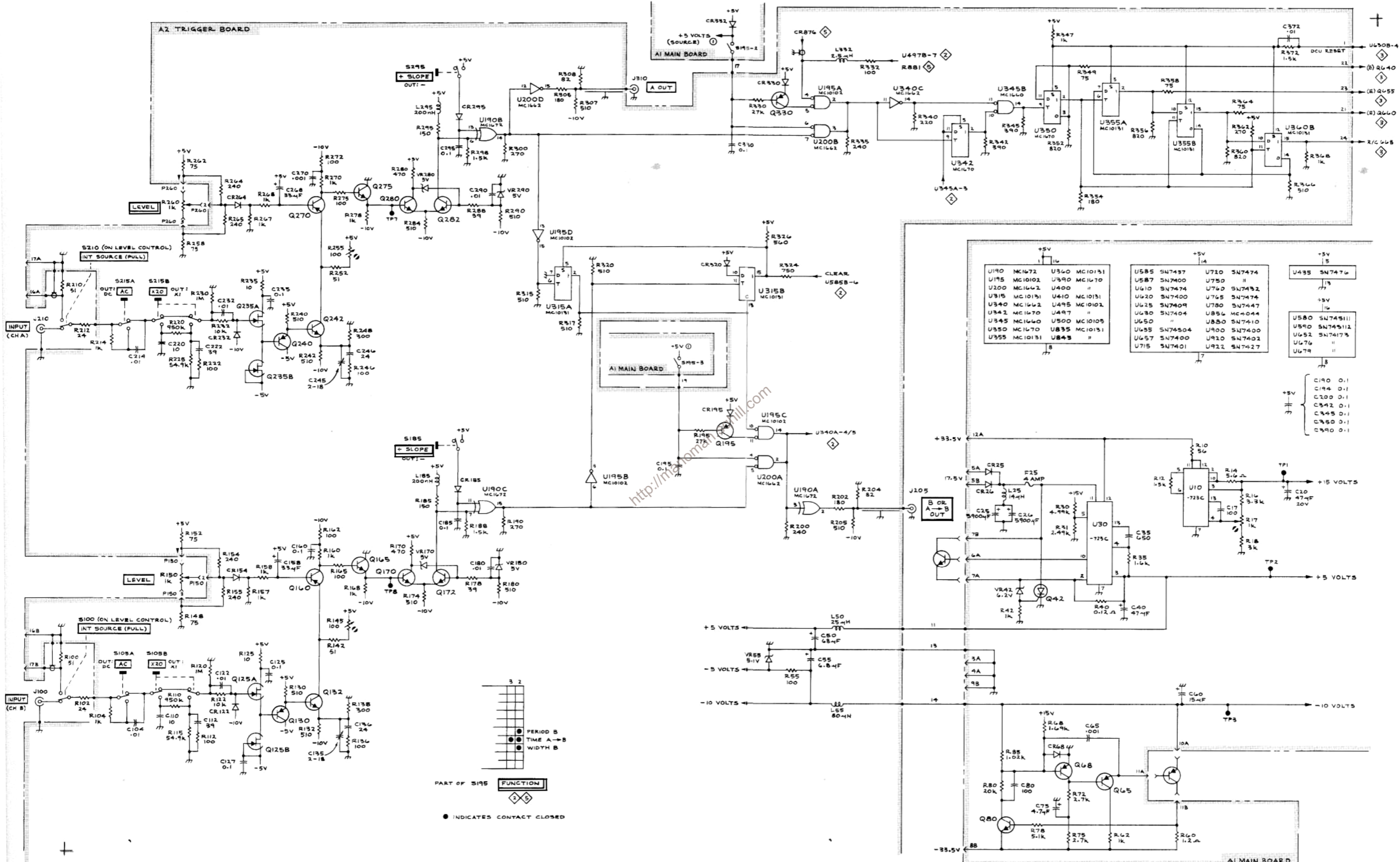
T.P. 8
CH B FREQUENCY
RESPONSE
CHECK

CH B FREQUENCY
RESPONSE ADJUST
C135



BLOCK DIAGRAM

CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C50	A4	CR320	F4	Q598	A5	R265	J4	R440	B2	R880	B4
C55	J1	CR330	J2	Q850	G6	R267	J4	R441	B2	R881	B5
C104	K5	CR332	K3	Q854	G6	R268	J4	R445	C2	R885	C5
C110	K5	CR384	F2	Q865	D6	R270	I3	R446	C2	R887	B5
C112	K4	CR435	A2	Q885	C5	R272	J4	R450	B2		
C122	K5	CR440	B2			R275	I3	R451	B2	S100	L4
C125	J5	CR445	C2	R55	J2	R278	I2	R455	C2	S105A	K6
C127	J5	CR450	B2	R100	L5	R280	J2	R456	C2	S105B	K5
C135	J5	CR455	C2	R102	L5	R284	I2	R458	A2	S185	J5
C136	J5	CR460	E4	R104	K6	R288	I2	R460	F4	S210	L2
C158	I5	CR494	F4	R110	K5	R290	I1	R465	F2	S215A	K4
C160	I4	CR512	D4	R112	K4	R295	I2	R468	F3	S215B	K3
C180	I5	CR513	E4	R115	K4	R298	I2	R470	H3	S295	J3
C185	I3	CR580	C4	R120	K5	R300	H3	R478	H4		
C190	I3	CR587	B3	R122	K5	R305	I2	R479	H5	U190	I3
C194	G2	CR588	B4	R125	K5	R307	I2	R482	D4	U195	G2
C195	I4	CR595	A5	R130	J5	R308	H2	R484	C5	U200	I4
C200	H3	CR850	H6	R132	I5	R315	H3	R487	C4	U315	G4
C214	K4	CR870	D6	R136	J6	R317	H5	R490	C4	U340	G2
C220	K3	CR875	C5	R138	I5	R320	F4	R492	C4	U342	F1
C222	K2	CR876	C5	R142	I5	R324	F4	R494	F4	U345	E1
C232	K3			R145	H5	R326	G4	R495	F3	U350	E2
C235	K4	J205	K4	R148	J6	R330	H1	R497	G4	U355	D2
C245	J2	J310	K2	R150	L4	R335	H2	R500	G4	U360	D3
C246	K2			R152	I5	R340	E1	R504	F4	U390	G1
C268	I3	L50	A4	R154	I5	R342	G1	R506	D4	U400	E2
C270	J4	L55	J1	R155	J5	R345	F2	R508	F4	U410	E3
C290	I1	L185	H5	R157	J5	R347	C3	R510	G4	U435	B1
C295	I2	L295	I2	R158	I5	R349	E3	R512	H4	U440	C1
C330	I1	L332	H2	R160	I5	R352	E2	R515	E4	U445	D1
C332	H4	L870	D5	R162	I4	R354	D4	R518	F4	U450	D2
C342	F1			R165	J5	R356	C3	R520	E4	U455	C3
C345	E2	Q125	J5	R168	J5	R358	B3	R524	D4	U495	G3
C350	E2	Q130	J5	R170	I4	R360	B3	R526	F5	U497	G4
C372	C3	Q132	I5	R174	H5	R362	D4	R530	D4	U500	E4
C384	F3	Q160	I5	R178	H5	R364	B3	R532	D4	U580	B4
C388	F1	Q165	I4	R180	I5	R366	D4	R535	D4	U585	B5
C390	G1	Q170	I4	R185	H4	R368	B3	R537	D4	U587	C6
C395	D1	Q172	H4	R188	H2	R372	C3	R580	A3	U590	B4
C400	F2	Q195	H3	R190	I3	R380	F3	R582	C4	U835	E5
C425	A4	Q235	J3	R195	H3	R382	F2	R590	A3	U845	F5
C485	C4	Q240	J3	R200	E1	R384	F2	R592	C4	U855	F6
C490	C4	Q242	J3	R202	J4	R388	D1	R595	A5	U856	E6
C515	G4	Q270	J3	R204	J4	R390	H6	R596	A4	U875	D5
C526	E5	Q275	I3	R205	J4	R392	H6	R598	A6	U880	B5
C532	C4	Q280	I2	R210	L3	R394	H1	R835	D4		
C537	B4	Q282	I2	R212	L3	R395	D1	R837	D5	VR55	J2
C598	A5	Q330	H2	R214	K4	R400	F2	R839	F5	VR170	H4
C620	J3	Q385	F2	R220	K3	R402	F2	R842	F5	VR180	I5
C685	C4	Q420	C2	R222	J2	R406	E4	R844	E5	VR280	I2
C865	D6	Q430	A4	R225	K2	R408	E4	R847	G6	VR290	I1
C866	D6	Q435	B2	R232	K3	R410	E4	R850	H6		
C870	D6	Q440	B2	R235	K4	R412	E4	R854	H6		
C872	D5	Q445	C2	R240	J3	R415	E4	R856	G6		
C875	C4	Q450	B2	R242	J3	R416	C2	R860	E6		
		Q455	C2	R246	K2	R418	D2	R862	E6		
CR122	K5	Q480	C4	R248	J2	R420	A3	R863	E6		
CR154	J5	Q485	C4	R252	J3	R422	C2	R865	E6		
CR185	I4	Q490	C4	R255	J2	R425	A4	R867	D6		
CR195	H3	Q506	D4	R258	J4	R426	A4	R870	D6		
CR232	K4	Q515	E4	R260	L2	R430	C3	R872	D5		
CR264	J4	Q535	D4	R262	J4	R435	B2	R875	C5		
CR295	I3	Q595	A6	R264	J4	R436	B2	R876	B5		



CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC	CKT NO	GRID LOC
C17	J4	CR960	B6	Q953	C4	R629	J4	R891	J3	U900	I5
C20	K5	CR961	B6	Q954	D4	R632	L2	R895	H4	U901	H5
C35	K5	CR963	C6	Q955	D4	R635	K3	R897	H4	U920	H3
C40	M4	CR964	C6	Q956	D4	R637	I1	R900	I5	U922	G3
C60	L4	CR966	C5	Q957	E4	R640	L2	R902	I5	U925	F3
C65	L4	CR967	C5	Q958	E4	R642	K2	R906	I5		
C75	J5	CR969	C5	Q959	C4	R644	K2	R910	I5	VR42	K5
C80	K4	CR970	C5	Q960	D4	R647	G4	R912	H4		
C543	B5	CR972	C5	Q961	D4	R655	K2	R914	H4		
C545	B5	CR973	C5	Q962	D4	R656	K2	R916	H5		
C565	B5	CR975	D5	Q963	E4	R660	K2	R918	H5		
C630	J4	CR976	D5	Q964	E4	R662	K2	R919	H4		
C632	K1	CR978	D5	Q965	C3	R664	L2	R920	H4		
C664	L1			Q966	D3	R666	L2	R922	E3		
C668	L1	L25	L6	Q967	D3	R668	L1	R923	E3		
C680	G2			Q968	D3	R670	K2	R924	E3		
C681	H2	Q42	L5	Q969	E3	R672	L2	R927	F3		
C684	G3	Q65	L5	Q970	E3	R680	G2	R930	C4		
C697	F3	Q68	L5	Q975	F5	R684	G3	R935	F4		
C710	I2	Q80	L4	Q976	G5	R687	G2	R975	F5		
C722	L2	Q540	A4	Q978	F4	R690	F4	R976	G5		
C730	I3	Q550	B5	Q979	G4	R692	D2	R977	F5		
C732	I3	Q565	B5	Q981	F4	R695	F2	R978	F5		
C744	I2	Q570	C5	Q982	G4	R697	F3	R979	G5		
C746	K2	Q575	L6	Q984	F4	R704	G1	R980	F4		
C755	D1	Q615	C4	Q985	G4	R710	K3	R981	F4		
C757	D1	Q640	L2	Q987	F4	R712	K3	R982	G5		
C891	K3	Q655	L2	Q989	G4	R714	H2	R983	F4		
C904	J4	Q660	L2			R718	D2	R984	F4		
C906	J5	Q670	L2	R10	L4	R720	E1	R985	G4		
		Q680	G3	R12	J4	R722	L1	R986	F4		
CR68	K5	Q690	F2	R14	J4	R724	F2	R987	F4		
CR545	B5	Q700	G1	R16	L4	R726	F1	R988	F5		
CR554	B4	Q701	G1	R17	L3	R730	I2	R989	G4		
CR555	B4	Q702	G1	R18	K4	R732	H2	R990	F4		
CR570	K6	Q703	F1	R30	K5	R735	I2				
CR610	K3	Q704	F1	R31	K5	R740	K2	S195	B3		
CR612	K3	Q718	F2	R35	K5	R742	J2	S475	E3		
CR614	L3	Q725	F2	R42	K5	R744	J2	S545	B4		
CR615	I4	Q790	A1	R60	L4	R746	H2	S575	B4		
CR625	E2	Q796	A1	R62	L4	R755	D1	S895	F6		
CR630	I4	Q800	A1	R68	K5	R757	C1	S900	H5		
CR646	H4	Q806	B1	R72	L5	R765	C1				
CR647	I2	Q810	B1	R75	L5	R768	E3	U10	K4		
CR680	G3	Q815	B1	R78	L4	R770	G1	U30	K4		
CR684	G3	Q820	C1	R80	K4	R774	M3	U610	E1		
CR685	G2	Q825	C1	R85	K5	R775	L3	U620	J3		
CR690	D3	Q930	C4	R475	E3	R776	M2	U625	E2		
CR692	E2	Q935	C5	R540	A4	R777	L3	U630	I3		
CR697	F3	Q936	D5	R542	B4	R790	A2	U650	H2		
CR725	F2	Q937	D5	R543	A5	R791	A2	U652	J2		
CR726	F1	Q938	D5	R545	D6	R793	B4	U655	J1		
CR895	I4	Q939	E5	R547	B5	R794	C3	U657	K1		
CR896	I4	Q940	E5	R550	B5	R796	A2	U675	I1		
CR912	H4	Q941	C4	R554	B4	R797	A2	U676	I2		
CR914	H4	Q942	D4	R560	A4	R800	B2	U678	H1		
CR935	F3	Q943	D4	R565	B5	R801	B2	U679	H2		
CR943	F3	Q944	D4	R570	C5	R806	B2	U700	E2		
CR947	A5	Q945	E4	R574	K6	R807	B2	U715	J2		
CR948	B6	Q946	E4	R605	I4	R810	B2	U720	D1		
CR950	B6	Q947	C4	R606	I4	R811	B2	U750	D2		
CR951	B6	Q948	D4	R615	C4	R815	B2	U755	C2		
CR954	B6	Q949	D4	R622	E3	R816	B2	U760	D2		
CR955	B6	Q950	D4	R623	E3	R820	C2	U765	K2		
CR957	B6	Q951	E4	R625	E2	R821	B2	U780	G2		
CR958	B6	Q952	E4	R628	J4	R890	J3	U895	H4		

CKT NO	GRID LOC
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C25	C4
C26	B3
C540	M4
C560	M4
C562	M3
C625	I2
C690	J2
C692	J2
C905	D5

CR25	B4
CR26	B5
CR936	I3
CR937	J3
CR940	I3
CR941	J3
CR942	J3
CR944	J3
CR946	K3
CR952	J3

MAIN BOARD (BACK)

F25	A5
-----	----

R40	C5
R699	I2
R780	H2
R781	G2
R782	G2
R783	G2
R784	G2
R785	G2
R786	G2
R803	J3
R804	K3
R813	J3
R925	I3
R926	I3

S950	I5
------	----

Y901	D5
Y901	E5

DS790	E7
DS796	D7
DS800	D7
DS806	D7
DS810	C7
DS815	C7
DS820	C7
DS825	D8
DS826	D8
DS827	E8
DS828	E8

DISPLAY BOARD

R825	D8
R830	D8

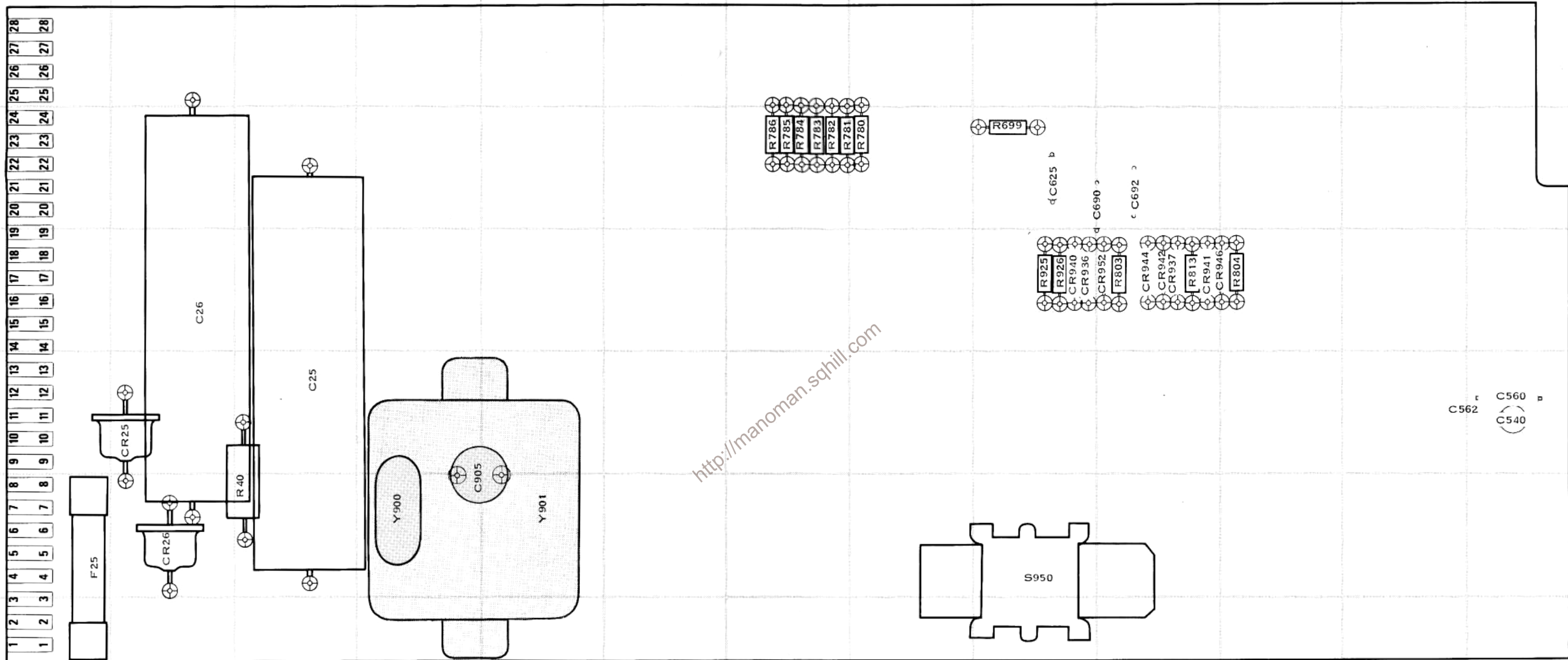
INSTALL FOR OPTION 1 ONLY

REMOVE FOR OPTION 1

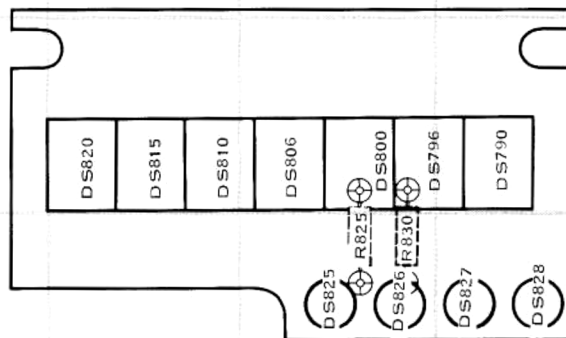
PARTS LOCATION GRID

DC 505

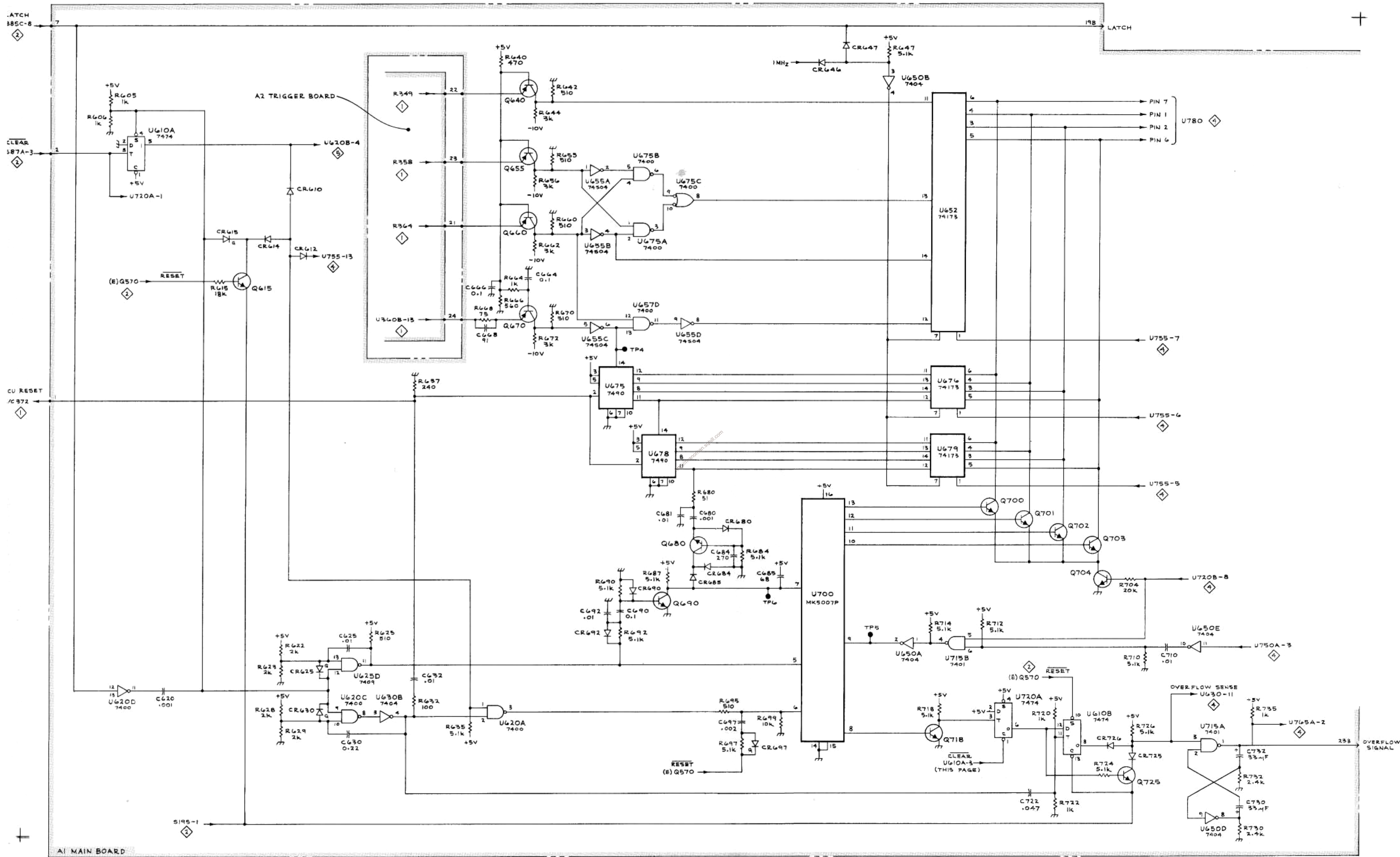
BACK OF MAIN BOARD

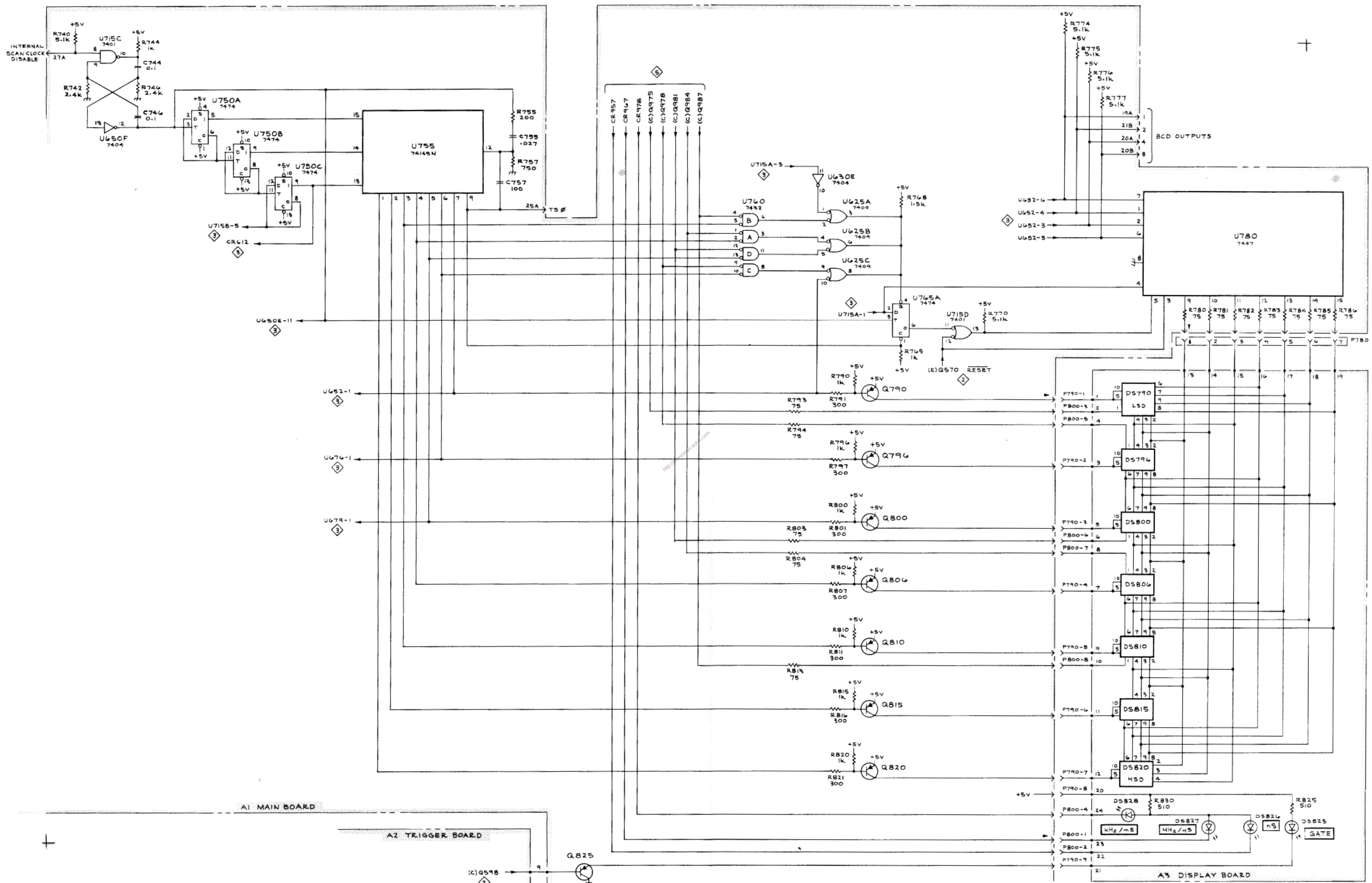


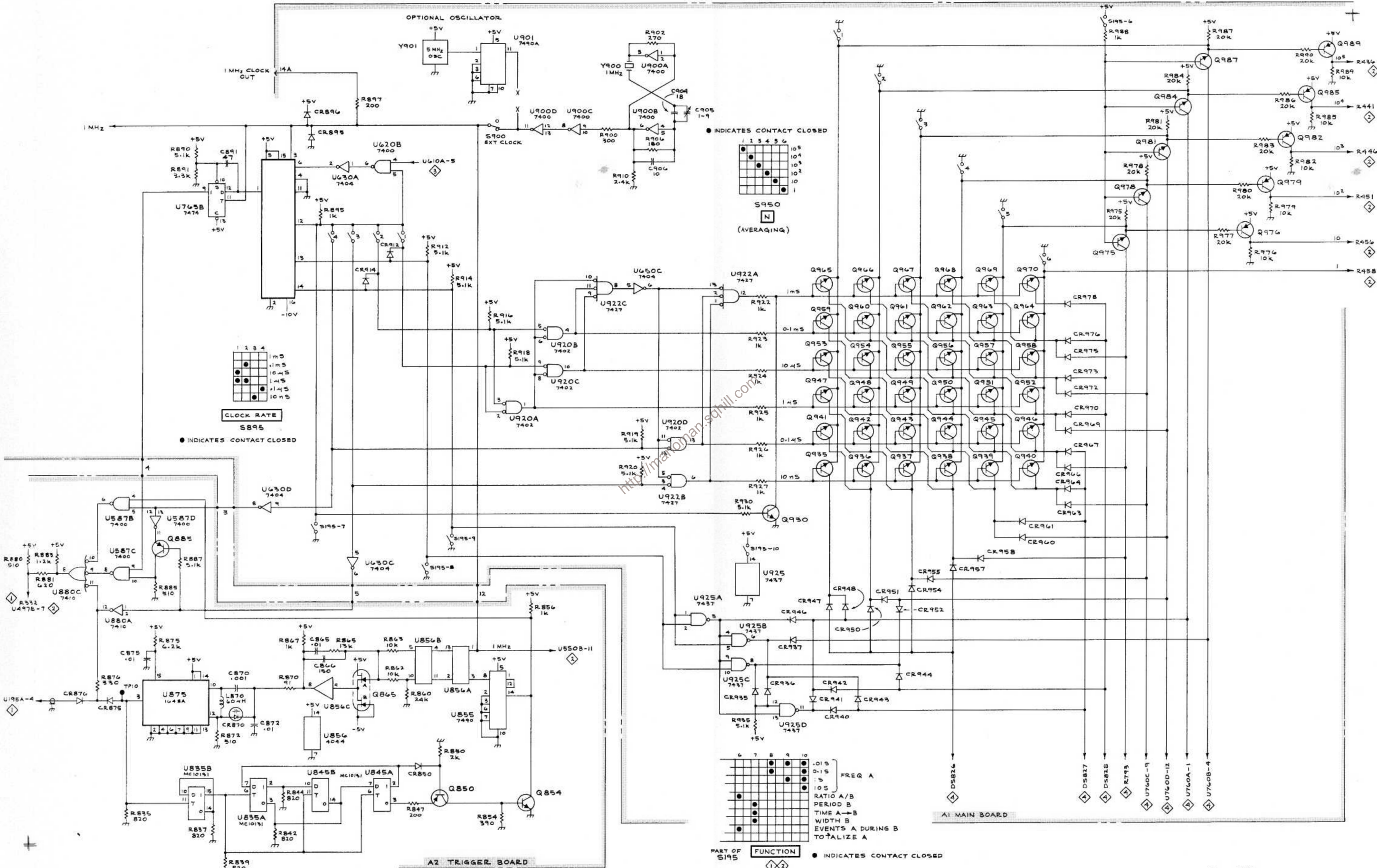
DISPLAY BOARD



<http://manoman.sghill.com>







MECHANICAL REPLACEABLE PARTS LIST

PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

SPECIAL NOTES AND SYMBOLS

- X000 Part first added at this serial number
 00X Part removed after this serial number

FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column.

1	2	3	4	5	<i>Name & Description</i>
					<i>Assembly and/or Component</i>
					<i>Attaching parts for Assembly and/or Component</i>
					---*---
					<i>Detail Part of Assembly and/or Component</i>
					<i>Attaching parts for Detail Part</i>
					---*---
					<i>Parts of Detail Part</i>
					<i>Attaching parts for Parts of Detail Part</i>
					---*---

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation. The separation symbol ---*--- indicates the end of attaching parts.

Attaching parts must be purchased separately, unless otherwise specified.

ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

ABBREVIATIONS

"	INCH	FLH	FLAT HEAD	PWR	POWER
#	NUMBER SIZE	FLTR	FILTER	RCPT	RECEPTACLE
ACTR	ACTUATOR	FR	FRAME or FRONT	RES	RESISTOR
ADPTR	ADAPTER	FSTNR	FASTENER	RDG	RIGID
ALIGN	ALIGNMENT	FT	FOOT	RLF	RELIEF
AL	ALUMINUM	FXD	FIXED	RTNR	RETAINER
ASSEM	ASSEMBLED	GSKT	GASKET	SCH	SOCKET HEAD
ASSY	ASSEMBLY	HDL	HANDLE	SCOPE	OSCILLOSCOPE
ATTEN	ATTENUATOR	HEX	HEXAGON	SCR	SCREW
AWG	AMERICAN WIRE GAGE	HEX HD	HEXAGONAL HEAD	SE	SINGLE END
BD	BOARD	HEX SOC	HEXAGONAL SOCKET	SECT	SECTION
BRKT	BRACKET	HLCPS	HELICAL COMPRESSION	SEMICON	SEMICONDUCTOR
BRS	BRASS	HLEXT	HELICAL EXTENSION	SHLD	SHIELD
BRZ	BRONZE	HV	HIGH VOLTAGE	SHLDR	SHOULDERED
BSHG	BUSHING	IC	INTEGRATED CIRCUIT	SKT	SOCKET
CAB	CABINET	ID	INSIDE DIAMETER	SL	SLIDE
CAP	CAPACITOR	IDENT	IDENTIFICATION	SLFLKG	SELF-LOCKING
CER	CERAMIC	IMPLR	IMPELLER	SLVVG	SLEEVING
CHAS	CHASSIS	IN	INCH	SPR	SPRING
CKT	CIRCUIT	INCAND	INCANDESCENT	SQ	SQUARE
COMP	COMPOSITION	INSUL	INSULATOR	SST	STAINLESS STEEL
CONN	CONNECTOR	INTL	INTERNAL	STL	STEEL
COV	COVER	LPHLDR	LAMPHOLDER	SW	SWITCH
CPLG	COUPLING	MACH	MACHINE	T	TUBE
CRT	CATHODE RAY TUBE	MECH	MECHANICAL	TERM	TERMINAL
DEG	DEGREE	MTG	MOUNTING	THD	THREAD
DWR	DRAWER	NIP	NIPPLE	THK	THICK
ELCTRN	ELECTRON	NON WIRE	NOT WIRE WOUND	TNSN	TENSION
ELEC	ELECTRICAL	OBD	ORDER BY DESCRIPTION	TPG	TAPPING
ELCTLT	ELECTROLYTIC	OD	OUTSIDE DIAMETER	TRH	TRUSS HEAD
ELEM	ELEMENT	OVH	OVAL HEAD	V	VOLTAGE
EPL	ELECTRICAL PARTS LIST	PH BRZ	PHOSPHOR BRONZE	VAR	VARIABLE
EQPT	EQUIPMENT	PL	PLAIN or PLATE	W/	WITH
EXT	EXTERNAL	PLSTC	PLASTIC	WSHR	WASHER
FIL	FILLISTER HEAD	PN	PART NUMBER	XFMR	TRANSFORMER
FLEX	FLEXIBLE	PNH	PAN HEAD	XSTR	TRANSISTOR

CROSS INDEX MFR. CODE NUMBER TO MANUFACTURER

MFR.CODE	MANUFACTURER	ADDRESS	CITY,STATE,ZIP
00779	AMP, Inc.	P. O. Box 3608	Harrisburg, PA 17105
01295	Texas Instruments, Inc., Components Group	P. O. Box 5012	Dallas, TX 75222
08261	Spectra-Strip Corp.	7100 Lampson Ave.	Garden Grove, CA 92642
12360	Albany Products Co., Div. of Pneumo Dynamics Corp.	351 Connecticut Ave.	South Norwalk, CT 06856
15912	Ansley Electronics Corp., A Sub of Thomas and Betts Corp.	2828 N. Figueroa At.	Los Angeles, CA 90065
22526	Berg Electronics, Inc.	Youk Expressway	New Cumberland, PA 17070
23499	Gavitt Wire and Cable, Division of Amerace Esna Corp.	455 N. Quince St.	Escondido, CA 92025
24931	Specialty Connector Co., Inc.	3560 Madison Ave.	Indianapolis, IN 46227
45722	USM Corp., Parker-Kalon Fastener Div.	1 PeeRay Drive	Clifton, NJ 07014
71034	Bliley Electric Co.	2545 W. Grandview Blvd.	Erie, PA 16512
73743	Fischer Special Mfg. Co.	446 Morgan St.	Cincinnati, OH 45206
74445	Holo-Krome Co.	31 Brook St. West	Hartford, CT 06110
77250	Pheoll Manufacturing Co., Division of Allied Products Corp.	5700 W. Roosevelt Rd.	Chicago, IL 60650
78189	Illinois Tool Works, Inc. Shakeproof Division	St. Charles Road	Elgin, IL 60126
78471	Tilley Mfg. Co.	900 Industrial Rd.	San Carlos, CA 94070
79136	Waldes, Kohinoor, Inc.	47-16 Austel Place	Long Island City, NY 11101
79807	Wrought Washer Mfg. Co.	2100 S. O Bay St.	Milwaukee, WI 53207
80009	Tektronix, Inc.	P. O. Box 500	Beaverton, OR 97005
83385	Central Screw Co.	2530 Crescent Dr.	Broadview, IL 60153
97464	Industrial Retaining Ring Co.	57 Cordier St.	Irvington, NJ 07111
98291	Sealectro Corp.	225 Hoyt	Mamaroneck, NY 10544

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff Dscont	Qty	Name & Description					Mfr Code	Mfr Part Number	
				1	2	3	4	5			
1-1	337-1399-04		2	SHLD,ELECTRICAL:SIDE					80009	337-1399-04	
-2	366-1031-05		1	KNOB:RED,CAL					80009	366-1031-05	
	-----		-	. KNOB INCLUDES:							
	213-0153-00		1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD	
-3	366-1170-01		1	KNOB:GRAY,4 SIDED W/SETSCREW					80009	366-1170-01	
	-----		-	. KNOB INCLUDES:							
	213-0153-00		2	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD	
-4	366-0494-00		2	KNOB:GRAY					80009	366-0494-00	
	-----		-	. EACH KNOB INCLUDES:							
	213-0153-00		1	. SETSCREW:5-40 X 0.125 INCH,HEX SOC STL					74445	OBD	
-5	366-1422-01		1	KNOB:LATCH					80009	366-1422-01	
				(ATTACHING PARTS)							
-6	214-1840-00		1	PIN,KNOB SECRG:					80009	214-1840-00	
				- - - * - - -							
-7	-----		-	RES.,VAR:(SEE R150 & R260 EPL)							
				(ATTACHING PARTS FOR EACH)							
-8	210-0583-00		1	NUT,PLAIN,HEX:6-32 X 1 INCH FILH,STL					73743	2X20319-402	
-9	210-0940-00		1	WASHER,FLAT:0.25 ID X 0.375 INCH OD,STL					79807	OBD	
				- - - * - - -							
-10	131-0955-00		2	CONNECTOR,RCPT,:BNC,FEMALE W/HARDWARE					24931	28JR200-1	
				(ATTACHING PARTS FOR EACH)							
-11	210-0255-00		1	TERMINAL,LUG:0.391" ID INT TOOTH					80009	210-0255-00	
				- - - * - - -							
-12	358-0029-00		1	BSHG,MACH.THD:HEX,0.375-32 X 0.438"LONG					80009	358-0029-00	
				(ATTACHING PARTS)							
-13	220-0495-00		1	NUT,PLAIN,HEX:0.375-32 X 0.438 CD PL STL					73743	OBD	
-14	210-0978-00		1	WASHER,FLAT:0.375 ID X 0.50 INCH OD STL					78471	OBD	
				- - - * - - -							
-15	333-1774-00		1	PANEL,FRONT:					80009	333-1774-00	
-16	331-0314-00		1	WINDOW READOUT:					80009	331-0314-00	
-17	426-0916-00		1	FR,READOUT:					80009	426-0916-00	
-18	426-0681-00		8	FR,PUSH BUTTON:GRAY PLASTIC					80009	426-0681-00	
-19	214-1513-01		1	LCH,PLUG-IN RET:					80009	214-1513-01	
				(ATTACHING PARTS)							
-20	213-0254-00		1	SCR,TPG,THD CTG:2-56X0.25"100 DEG,FLH STL					45722	OBD	
				- - - * - - -							
-21	337-1872-00		1	SHIELD,ELEC:SUBPANEL					80009	337-1872-00	
-22	-----		1	CKT BOARD ASSY:DISPLAY(SEE A3 EPL)							
				(ATTACHING PARTS)							
-23	211-0004-00		2	SCREW,MACHINE:3-48 X 0.125 PH STL					77250	OBD	
				- - - * - - -							
	-----		-	. CKT BOARD ASSY INCLUDES:							
-24	-----		4	. LAMP,LED:(SEE DS825,DS826,DS827 & DS828)							
-25	136-0252-00		8	. CONTACT,ELEC:0.145 INCH LONG					00779	2-330808-7	
-26	386-2671-00		1	SUBPANEL,FRONT:PLASTIC					80009	386-2671-00	
				(ATTACHING PARTS)							
-27	213-0229-00		2	SCR,TPG,THD FOR:6-20 X 0.375 100 DEG,FLH STL					83385	OBD	
-28	213-0227-00		2	SCR,TPG,THD FOR:6-32 X 0.50 100 DEG,FLH ST					83385	OBD	
				- - - * - - -							
-29	366-1257-28		2	PUSH BUTTON:GRAY--+SLOPE					80009	366-1257-28	
-30	366-1489-66		2	PUSHBUTTON:GRAY-X20 ATTEN					80009	366-1489-66	
-31	366-1257-27		2	PUSHBUTTON:GRAY-AC COUPL					80009	366-1257-27	
-32	337-1897-00		1	SHIELD,ELEC:					80009	337-1897-00	
				(ATTACHING PARTS)							
-33	211-0503-00		4	SCREW,MACHINE:6-32 X 0.188 INCH,PNH STL					83385	OBD	
-34	384-0519-00		2	ROD,SPACING:HEX 0.250 X 0.562					80009	384-0519-00	
-35	210-0407-00		3	NUT,PLAIN,HEX.:6-32 X 0.25 INCH,BRS					73743	3038-0228-402	
-36	211-0511-00		3	SCREW,MACHINE:6-32 X 0.50 INCH,PNH STL					83385	OBD	
-37	166-0031-00		3	SPACER,SLV:0.18 ID X 0.25 OD X 0.25 LG AL					80009	166-0031-00	
				- - - * - - -							

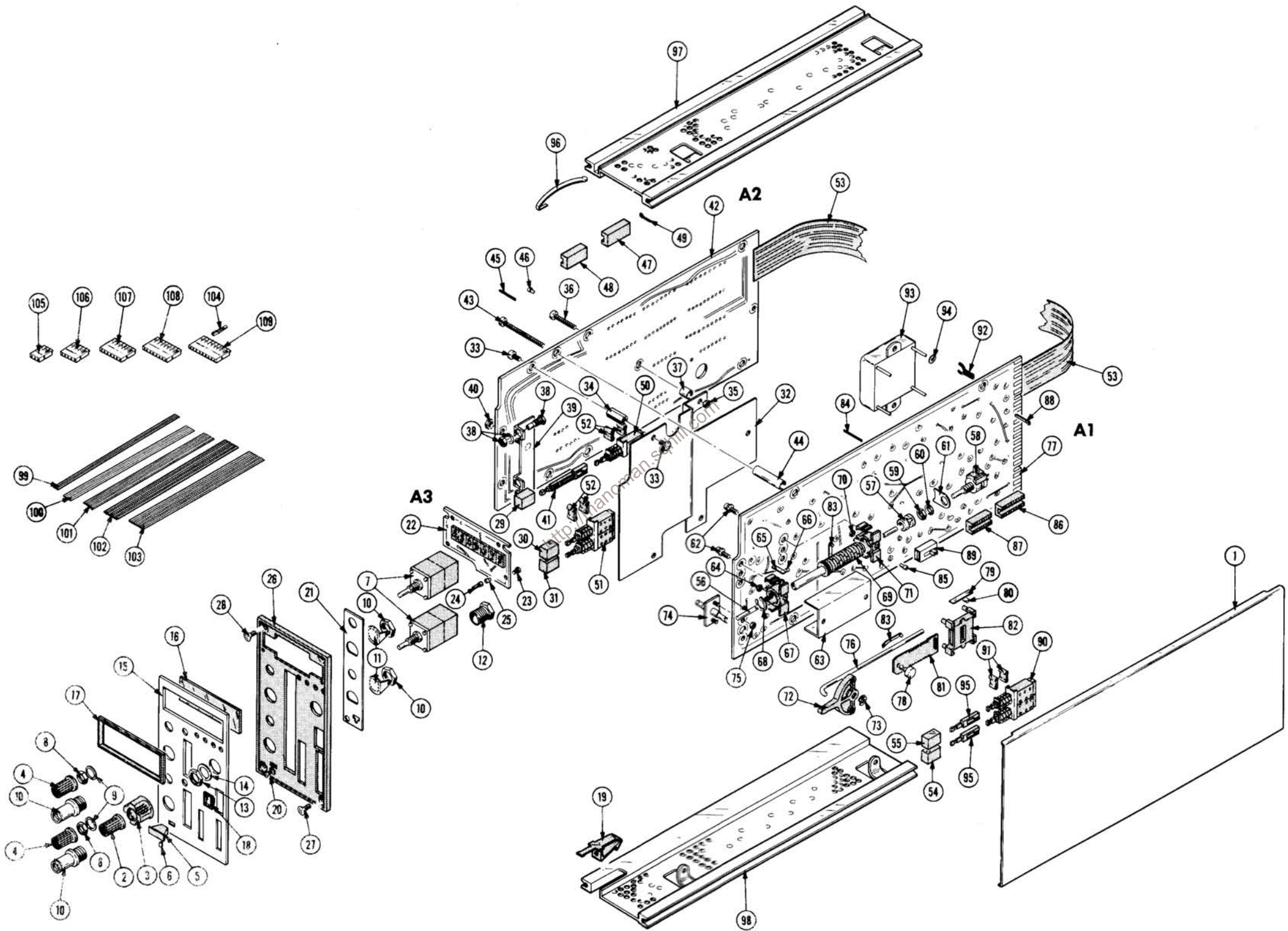
Mechanical Parts List—DC 505

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-38	131-0938-00			2						CONN,RCPT:COAX MALE CRT COUNT W/HARDWARE	98291	051-043-0349
-39	407-1352-00			1						BRACKET,CKT BD: (ATTACHING PARTS)	80009	407-1352-00
-40	210-0586-00			2						NUT,PLAIN,EXT W:4-40 X 0.25 INCH,STL - - - * - - -	78189	OBD
-41	384-1099-00			2						EXTENSION SHAFT:PUSHBUTTON,1.54 INCH LONG	80009	384-1099-00
-42	-----			1						CKT BOARD ASSY:TRIGGER(SEE A2 EPL) (ATTACHING PARTS)		
-43	213-0336-00			4						SCR,TPG,THD FOR:6-32 X 1.25 INCH,PNH STL	83385	OBD
-44	361-0516-00			4						SPACER,SLEEVE:0.189 OD X 0.986"LONG BRS - - - * - - -	80009	361-0516-00
	-----			-						. CKT BOARD ASSY INCLUDES:		
-45	131-0608-00			6						. CONTACT,ELEC:0.365 INCH LONG	22526	47357
-46	136-0252-04			222						. CONTACT,ELEC:0.188 INCH LONG	22526	75060
-47	136-0260-02			13						. SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
-48	136-0269-02			10						. SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-49	214-0579-00			3						. TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-50	260-1445-00			2						. SWITCH,PUSH:DC OFFSET	80009	260-1445-00
-51	260-1466-00			2						. SWITCH,PUSH:SLOPE	80009	260-1466-00
-52	361-0384-00			12						. SPACER,PB SW:0.133 INCH LONG	80009	361-0384-00
-53	175-1405-00			3						CABLE,ELEC:FLAT,10 COND.,2 INCHES LONG	15912	.100F401S2A10
-54	366-1257-30			1						PUSH BUTTON:GRAY--RESET	80009	366-1257-30
-55	366-1402-64			1						PUSHBUTTON:GRAY "IN START OUT"	80009	366-1402-64
	672-0418-00 ¹			1						CKT BOARD ASSY:	80009	672-0418-00
	672-0442-00 ²			1						CKT BOARD ASSY:	80009	672-0442-00
	-----			-						. CKT BOARD ASSY INCLUDES:		
-56	384-0461-00			1						. EXT,SHAFT:3.51 " LONG X 0.125 OD,SST	80009	384-0461-00
-57	376-0051-01			1						. CPLG,SHAFT,FLEX:FOR 0.125 INCH - . . COUPLER INCLUDES:	80009	376-0051-01
	213-0048-00			4						. SETSCREW:4-40 X 0.125 INCH HEX SOC STL	74445	OBD
-58	-----			-						. RES.,VARIABLE:(SEE R475 EPL) (ATTACHING PARTS)		
-59	210-0583-00			1						. NUT,PLAIN,HEX:0.25-32 X 0.31, 2 INCHES,BRS	73743	2X20319-402
-60	210-0046-00			1						. WASHER,LOCK:INTL,0.26 ID X 0.40" OD,STL - - - * - - -	78189	1214-05-00-0541C
-61	407-0579-00			1						. BRKT,RES.MTG:	80009	407-0579-00
	263-1016-00			1						ACTUATOR ASSY:CAM SWITCH (ATTACHING PARTS)	80009	263-1016-00
-62	211-0116-00			4						. SCR,ASSEM WSHR:4-40 X 0.312 INCH,PNH BRS - - - * - - -	83385	OBD
	-----			-						. . ACTUATOR ASSY INCLUDES:		
-63	200-1332-00			1						. COVER:CAM SW	80009	200-1332-00
-64	210-0406-00			2						. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-65	214-1704-01			2						. SPRING,FLAT:CAM SW DETENT,0.008 INCH THK	80009	214-1704-01
-66	214-1127-00			2						. ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00
-67	401-0155-00			1						. BEARING,CAM SW:FRONT (ATTACHING PARTS)	80009	401-0155-00
-68	354-0219-00			1						. RING,RETAINING:FOR 0.25 INCH SHAFT - - - * - - -	79136	5103-25-MD-R
-69	105-0516-00			1						. ACTUATOR,CAM SW:	80009	105-0516-00
-70	210-0406-00			2						. NUT,PLAIN,HEX.:4-40 X 0.188 INCH,BRS	73743	2X12161-402
-71	401-0156-00			1						. BEARING,CAM SW:REAR	80009	401-0156-00
-72	214-1962-00			2						. LEVEL,SLIDE SW: (ATTACHING PARTS FOR EACH)	80009	214-1962-00
-73	354-0165-00			1						. RING,RETAINING: - - - * - - -	97464	1000-15
-74	386-2709-00			1						. PLATE,LEVER MTG: (ATTACHING PARTS)	80009	386-2709-00
-75	210-0405-00			2						. NUT,PLAIN,HEX.:2-56 X 0.188 INCH,BRS	73743	2X12157-402
	210-0001-00			2						. WASHER,LOCK:INTL,0.092 ID X 0.18"OD STL	78189	1202-00-00-0541C
	210-1008-00			2						. WASHER,FLAT:0.09 ID X 0.188" OD,BRS - - - * - - -	12360	OBD
-76	384-1242-00			1						. EXTENSION SHAFT:REAR	80009	384-1242-00

¹Standard only.
²Option 1 only.

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscont	Qty	1	2	3	4	5	Name & Description	Mfr Code	Mfr Part Number
1-	384-1160-01			1	.	.	.	.	.	EXTENSION SHAFT:FRONT	80009	384-1160-01
-77	-----			1	.	.	.	.	.	CKT BOARD ASSY:MAIN(SEE A1 EPL)		
	-----			-	.	.	.	.	.	CKT BOARD ASSY INCLUDES:		
	105-0587-00			2	.	.	.	.	.	ACTUATOR ASSY:SLIDE SWITCH	80009	105-0587-00
	-----			-	.	.	.	.	.	EACH ACTUATOR ASSY INCLUDES:		
-78	376-0156-00			1	.	.	.	.	.	COUPLER,SHAFT:SLIDE SW	80009	376-0156-00
-79	214-1126-01			2	.	.	.	.	.	SPRING,FLAT:GREEN COLORED	80009	214-1126-01
-80	214-1127-00			2	.	.	.	.	.	ROLLER,DETENT:0.125 DIA X 0.125 INCH L	80009	214-1127-00
-81	105-0504-00			1	.	.	.	.	.	ACTUATOR,SLIDE:	80009	105-0504-00
-82	351-0355-00			1	.	.	.	.	.	GUIDE,SW SLIDE:	80009	351-0355-00
-83	131-0604-00			20	.	.	.	.	.	CONTACT,ELEC:0.025 SQ X 0.365 INCH LONG	80009	131-0604-00
-84	131-0608-00			39	.	.	.	.	.	CONTACT,ELEC:0.365 INCH LONG	22526	47357
-85	136-0252-04			128	.	.	.	.	.	CONTACT,ELEC:0.188 INCH LONG	22526	75060
-86	136-0260-02			7	.	.	.	.	.	SOCKET,PLUG-IN:16 CONTACT,LOW CLEARANCE	01295	C931602
-87	136-0269-02 ¹			21	.	.	.	.	.	SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
	136-0269-02 ²			20	.	.	.	.	.	SOCKET,PLUG-IN:14 CONTACT,LOW CLEARANCE	01295	C931402
-88	214-0579-00 ¹			3	.	.	.	.	.	TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
	214-0579-00 ²			6	.	.	.	.	.	TERM.,TEST PT:0.40 INCH LONG	80009	214-0579-00
-89	260-0723-00			1	.	.	.	.	.	SWITCH,SLIDE:DPDT,0.5A,125VAC	80009	260-0723-00
-90	260-1465-00			1	.	.	.	.	.	SWITCH,PUSH:START-STOP-RESET	80009	260-1465-00
-91	361-0382-00			4	.	.	.	.	.	SPACER,PB SW:BROWN,0.275 INCH LONG	80009	361-0382-00
-92	344-0154-00			2	.	.	.	.	.	CLIP,ELECTRICAL:FOR 0.25 INCH DIA FUSE	80009	344-0154-00
-93	119-0503-00 ²			1	.	.	.	.	.	OSC,RF:XTAL CONT,5 MHZ ADJ,15 INPUT (ATTACHING PARTS)	71034	TCC0-26LF-10A
-94	210-1014-00 ²			4	.	.	.	.	.	WASHER,NONMETAL:0.094IDX0.312ODX0.020" THK	80009	210-1014-00
					-	-	-	-	-	* - - - -		
-95	384-1136-00			2	.	.	.	.	.	EXTENSION,SHAFT:0.95 INCH LONG	80009	384-1136-00
-96	214-1061-00			1	.	.	.	.	.	SPRING,GROUND:FLAT	80009	214-1061-00
-97	426-0725-05			1	.	.	.	.	.	FR SECT,PLUG-IN:TOP	80009	426-0725-05
-98	426-0724-07			1	.	.	.	.	.	FR SECT,PLUG-IN:BOTTOM	80009	426-0724-07
-99	175-0826-00			FT	.	.	.	.	.	WIRE,ELECTRICAL:3 WIRE RIBBON 0.67 FT.	08261	TEK-175-0826-00
-100	175-0828-00			FT	.	.	.	.	.	WIRE,ELECTRICAL:5 WIRE RIBBON 0.917 FT.	23499	TEK-175-0828-00
-101	175-0830-00			FT	.	.	.	.	.	WIRE,ELECTRICAL:7 WIRE RIBBON 0.583 FT.	08261	TEK-175-0830-00
-102	175-0831-00			FT	.	.	.	.	.	WIRE,ELECTRICAL:8 WIRE RIBBON 0.438 FT.	08261	TEK-165-0831-00
-103	175-0832-00			FT	.	.	.	.	.	WIRE,ELECTRICAL:9 WIRE RIBBON 0.292 FT.	23499	TEK-165-0832-00
-104	131-0707-00			39	.	.	.	.	.	CONTACT,ELEC:0.48"L,22-26 AWG WIRE	22526	47439
-105	352-0161-04			1	.	.	.	.	.	HOLDER,TERM.CON:3 WIRE YELLOW	80009	352-0161-04
	352-0161-05			1	.	.	.	.	.	HOLDER,TERM.CON:3 WIRE GREEN	80009	352-0161-05
-106	352-0163-05			1	.	.	.	.	.	HOLDER,TERM.CON:3 WIRE GREEN	80009	352-0161-05
-107	352-0165-07			1	.	.	.	.	.	HOLDER,TERM.CON:7 WIRE,VIOLET	80009	352-0165-07
-108	352-0166-08			1	.	.	.	.	.	HOLDER,TERM.CON:8 WIRE,GRAY	80009	352-0167-09
-109	352-0167-09			1	.	.	.	.	.	HOLDER,TERM.CON:9 WIRE,WHITE	80009	352-0167-09

¹Standard only.
²Option 1 only.



ACCESSORIES

Fig. & Index No.	Tektronix Part No.	Serial/Model No. Eff	No. Dscont	Qty						Name & Description	Mfr Code	Mfr Part Number	
					1	2	3	4	5				
2-	012-0532-00			1						CABLE ASSY,RF:03.5 F LONG	80009	012-0532-00	
	070-1665-00			1						MANUAL,TECH:INSTRUCTION	80009	070-1665-00	

<http://manoman.sghill.com>

REPACKAGING

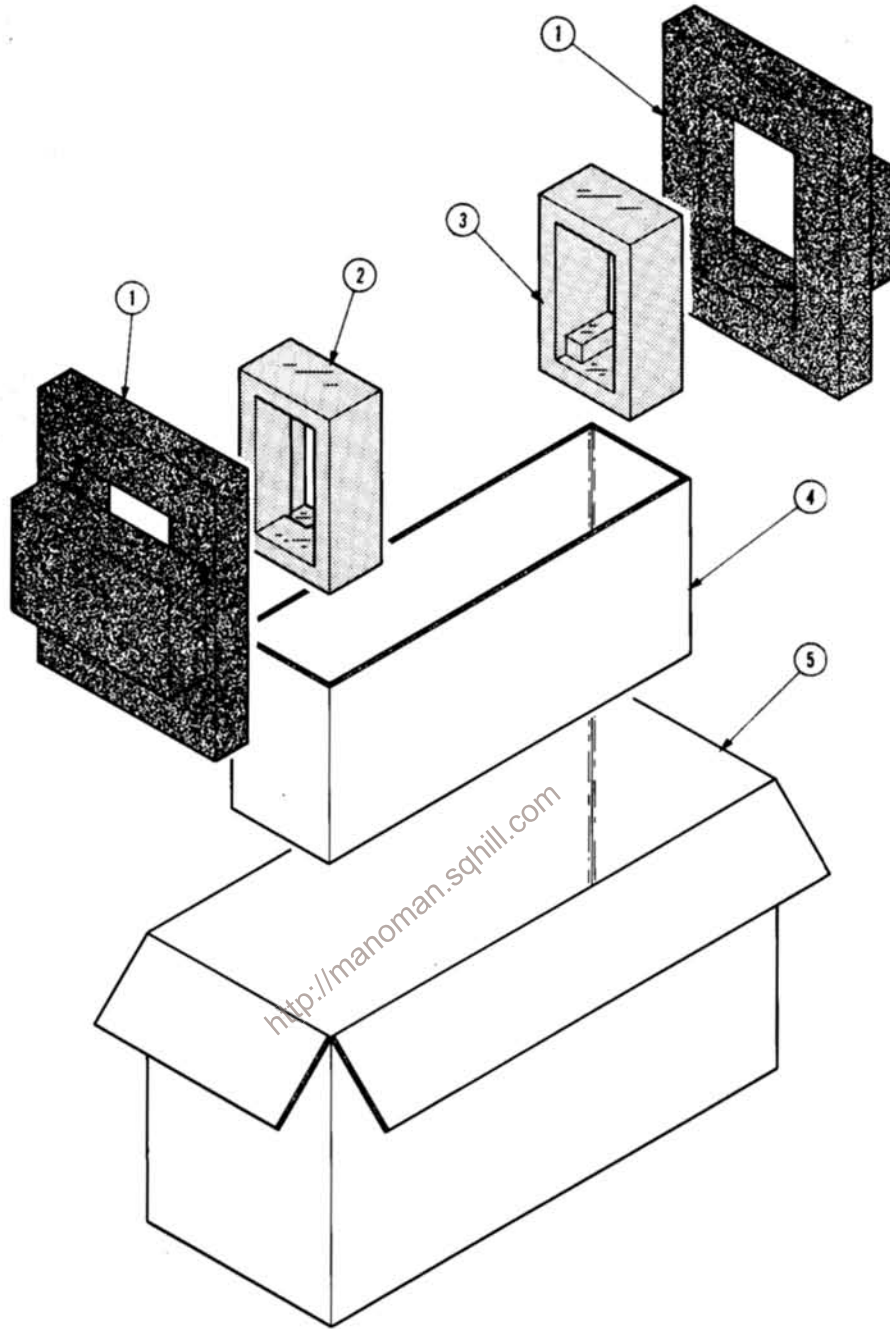


Fig. &

Index No.	Tektronix Part No.	Serial/Model No. Eff	Dscnt	Qty						Name & Description	Mfr Code	Mfr Part Number
					1	2	3	4	5			
2-	065-0151-00			1						1 CARTON ASSEMBLY	80009	065-0151-00
	-----			-						CARTON ASSEMBLY INCLUDES:		
-1	004-0282-00			2						FRAME:PLASTIC FOAM	80009	004-0282-00
-2	004-0243-00			1						PAD,CUSHIONING:FRONT	80009	004-0243-00
-3	004-0242-00			1						PAD,CUSHIONING:REAR	80009	004-0242-00
-4	004-1093-00			1						PAD,CUSHIONING:13.375 x 3.25 x 5.625"	80009	004-1093-00
-5	004-0612-00			1						CARTON:16.50 x 6.625 x 9.125 INCHES	80009	004-0612-00

MANUAL CHANGE INFORMATION

PRODUCT DC 505
EFF SN B010100-up

CHANGE REFERENCE C1/874
DATE 8-26-74

CHANGE:	DESCRIPTION
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Pilot Changes #8, #9, & #10

ELECTRICAL PARTS LIST AND SCHEMATIC CHANGES

CHANGE TO:

Q670	151-0438-00	TRANSISTOR: SILICON, PNP	SPS6927
R55	301-0820-00	RES., FXD, COMP: 82 OHM, 5%, 0.50W	
R515	315-0393-00	RES., FXD, COMP: 39K OHM, 5%, 0.25W	

ADD:

CR513	152-0141-02	SEMICOND DEVICE: SILICON, 30V, 150MA	1N4152
CR515	152-0141-02	SEMICOND DEVICE: SILICON, 30V, 150MA	1N4152

DIAGRAM 2 GATE & CONTROL LOGIC, AVERAGING DIVIDER, RESET

