

Errata

Title & Document Type: 8015A Pulse Generator Operating and Service Manual

Manual Part Number: 08015-90008

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HP References in this Manual

This manual may contain references to HP or Hewlett-Packard. Please note that Hewlett-Packard's former test and measurement, semiconductor products and chemical analysis businesses are now part of Agilent Technologies. We have made no changes to this manual copy. The HP XXXX referred to in this document is now the Agilent XXXX. For example, model number HP8648A is now model number Agilent 8648A.

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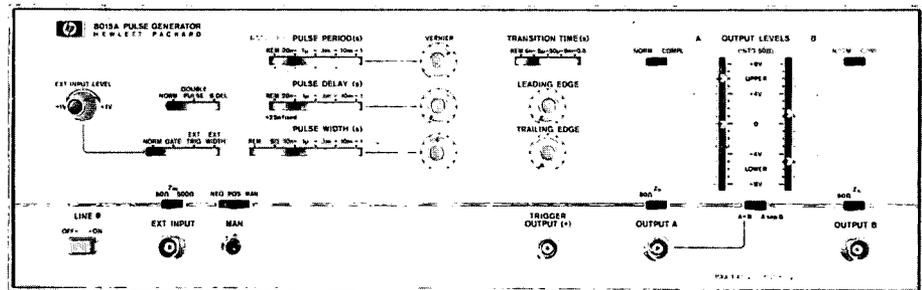
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OPERATING AND SERVICE MANUAL

8015A PULSE GENERATOR



SUPERSEDES:
none**HP MODEL 8015A PULSE GENERATOR**

Serial Number 2027G02890 and below

PROTECTION AGAINST DAMAGE OF THE POWER LAMP

On instruments with Serial Numbers 2027G02890 and below, if it is necessary to replace the Power Lamp A21 DS1 (P/N 2140-0346) connect a 40.2 Ohm resistor in series with the new lamp. This modification reduces the voltage across the powerlamp to approx. 4VDC improving the lifetime.

New Part: Reference Designator for this resistor is A21 R26 and the hp part number is 0698-3262.

Procedure: If an instrument with SN mentioned above is in for service or repair, check if this modification has to be performed.
To do this, solder the resistor and the Power lamp together and solder the parts to the Switch Board A21 as shown in Figure 1.
Figure 2 shows where they are located in Service Sheet 7 of the Operating & Service Manual.

Record the modification in your Operating & Service Manual.

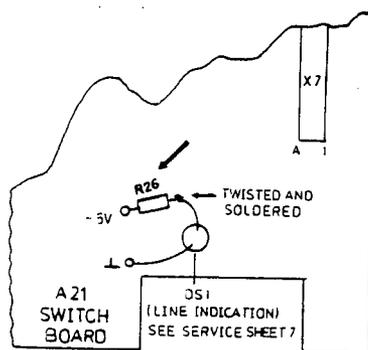


FIGURE 1 P/O A21 9D AY SWITCH
ON SERVICE SHEET 6

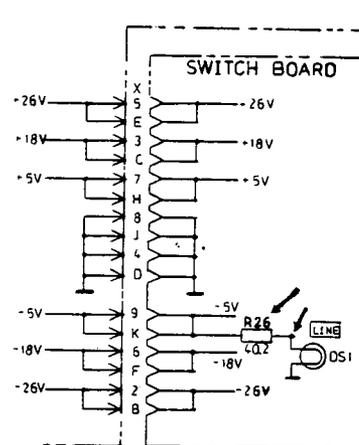


FIGURE 2 P/O SERVICE SHEET 7

MI/cz/WO

5/84-B1



FOR MORE INFORMATION, CALL YOUR LOCAL HP SALES OR SERVICE OFFICE or East (201) 265-5000 • Midwest (312) 255-9800 • South (404) 955-1500 • West (213) 970-7500 or (415) 968-9200 OR WRITE, Hewlett-Packard, 1820 Embarcadero, Palo Alto, California 94303. IN EUROPE, CALL YOUR LOCAL HP SALES OR SERVICE OFFICE OR WRITE, Hewlett-Packard S.A., 7, rue du Bois-du-Lan Case Postale 365 CH 1217 Meyrin 1 - Geneva, Switzerland. IN JAPAN, Yokogawa-Hewlett-Packard Ltd., 1-27-15, Yabe Sagamiara City, Kanagawa Prefecture, Japan 229.

OPERATING AND SERVICE MANUAL
8015A
PULSE GENERATOR
(Including Options 001, 002, 003, 004, 005 and 006)

For instruments with serial numbers

1538 G 00926 on

For instruments with lower serial numbers, refer to Section 8 and the yellow backdating pages.

For higher serial numbers, refer to the Manual Change sheets supplied with the instrument.

Options are described in Section 7 and on the blue pages (or pages printed in blue).

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SAFETY CONSIDERATIONS

GENERAL – This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

OPERATION – BEFORE APPLYING POWER comply with the installation section. Additionally, the following shall be observed:

Any interruption of the protective (grounding) conductor (inside or outside the instrument) or disconnecting the protective earth terminal is likely to make this instrument dangerous. Intentional interruption is prohibited.

Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

Adjustments described in the manual are performed with power supplied to the instrument while protective covers are removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible, and when inevitable, should be carried out only by a skilled person who is aware of the hazard involved.

Capacitors inside the instrument may still be charged even if the instrument has been disconnected from its source of supply.

SAFETY SYMBOLS



The apparatus will be marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect the apparatus against damage.



Indicates dangerous voltages.



Earth terminal (sometimes used in manual to indicate circuit common connected to grounded chassis).

WARNING

The **WARNING** sign denotes a hazard. It calls attention to a procedure, practice or the like, which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a **WARNING** sign until the indicated conditions are fully understood and met.

CAUTION

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure, practice, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the equipment. Do not proceed beyond a **CAUTION** sign until the indicated conditions are fully understood and met.

1-1 GENERAL

1-2 The model 8015A is a 50 MHz pulse generator which features dual outputs each capable of delivering pulses up to 16V in amplitude. When the outputs are combined (A + B mode), up to 30V is available. Great care has been taken to ensure that 8015A is easy to use — the front panel layout is clear and unambiguous. Controls are positioned so that parameters are easily identified and invalid combinations of parameters can be avoided.

1-3 Delay, double pulse and square wave modes of operation are available. Another feature of the 8015A is the B DEL mode where channel B output is delayed with respect to channel A output. This can be combined with A + B mode so that complex and 3-level waveforms can be synthesized. Also, the external input has a threshold level variable between +1V and -1V with 50 Ω input impedance and variable between +10V and -10V with 500 Ω input impedance. A push-button permits manual simulation of input signals for all external modes of operation.

1-4 The standard model 8015A has four trigger modes of operation: NORM (internal), GATE, EXT TRIG and EXT WIDTH.

NORM: in this mode all pulse parameters are defined by

the front panel controls and no external signal source is required.

GATE: an externally applied signal source enables and disables the internal repetition rate generator. Gating is synchronous; the first pulse is initiated by the start of the gate signal and the last pulse is always complete even if the gate signal ends during generation.

All pulse parameters, other than the duration of the gate, are defined by the front panel controls. A synchronous trigger output is available for the duration of the pulses.

EXT TRIG: pulse rate and trigger output frequency are defined by the frequency of an externally derived signal source. All other pulse parameters are varied by the front panel controls.

EXT WIDTH: pulse rate and width are defined by the frequency and width of an applied signal. The frequency of the trigger output pulses can be varied independent of the pulse output frequency.

1-5 OPTIONAL VERSIONS

1-6 Refer to Specifications and Section 7.

Table 1-1. Specifications

PULSE CHARACTERISTICS

Transition times: minimum to 0.5s in four ranges. Minimum transition times dependent on source and load impedances (see table). Ranges common for leading and trailing edge transition times within each range up to maximum ratios of 100:1 or 1:100.

Linearity: for transition times > 30 ns, maximum deviation from a straight line between the 10% and 90% points is less than 5% of pulse amplitude.

Overshoot and ringing: $\pm 5\%$ of pulse amplitude, possibly increasing to $< \pm 10\%$ at minimum amplitude.

Preshoot: $< 5\%$ of pulse amplitude.

Pulse top perturbations: droop $< 5\%$ of pulse amplitude.

Pulse width: < 10 ns to 1s in four ranges. Vernier provides continuous adjustment within each range.

Width jitter: $< 0.1\% + 50$ ps for any width setting.

Table 1-1. Specifications continued.

Maximum duty cycle: > 75% from 1 Hz to 1 MHz, decreasing to ≥ 50% at 50 MHz (can be increased to 100% by switching to complementary output). Square wave; 50%, ± 5% from 1 Hz to 1 MHz, ±15% at 25MHz (internal modes only).

Pulse delay: 20ns (+25ns fixed) to 1s, with respect to trigger output in four ranges. Vernier provides continuous adjustment within each range.

Delay jitter: < 0.1% + 50ps for any delay setting.

Pulse output: two outputs with separate normal/complement and source impedance switches and individual controls for adjustment of pulse upper and lower level. Outputs can be combined (A+B) to provide greater output current capability (see table) and pulse is available at output A with no load on output B. In combined mode, level and normal/complement controls of channel B disabled (except in A+B with B DEL), pulse controlled by Channel A controls. In combined mode with B DEL, level and normal/complement controls of both channels enabled to provide independent control of first and second pulses.

MODE	SOURCE IMPEDANCE	LOAD IMPEDANCE	TRANSITION TIMES	UPPER LEVEL VOLTAGE (V _{UL})	LOWER LEVEL VOLTAGE (V _{LL})	UPPER LEVEL CURRENT (I _{UL})	LOWER LEVEL CURRENT (I _{LL})	V _{UL} - V _{LL} MAX MIN	I _{UL} - I _{LL} MAX MIN	Max. Rep. Rate
A sep B ↓	50Ω/30pF	50Ω	< 6ns - 0.5s	+8V to -7V	+7V to -8V			8V 1V		50 MHz
	1kΩ/30pF	50Ω	< 8ns - 0.5s	+16V to -14V	+14V to -16V			16V 2V		50 MHz
	1kΩ/30pF		< 8ns - 0.5s	Depends on load	Depends on load	+320mA to -280mA	+280mA to -320mA		320mA 40mA	40 MHz
A + B ↓	50Ω/30pF	50Ω	< 15ns - 0.5s	+16V to -14V	+14V to -16V			16V 2V		20 MHz
	1kΩ/30pF	50Ω	< 15ns - 0.5s	+16V to -12V	+12V to -16V			30V 4V		20 MHz
	1kΩ/30pF		< 15ns - 0.5s	Depends on load	Depends on load	+640mA to -560mA	+560mA to -640mA		640mA 80mA	20 MHz

* 6ns at 8V, may increase to 6.5ns at 4V.

Maximum output: upper level internally limited to +16V maximum, lower level internally limited to -16V.

Maximum input: ± 7V with 50Ω input impedance, ± 25V with 500Ω input impedance.

REPETITION RATE AND TRIGGER

Repetition rate: 1 Hz to 50 MHz in four ranges (maximum repetition rate depends on output configuration, see table). Vernier provides continuous adjustment within each range.

Period jitter: < 0.1% + 50ps for any repetition rate setting.

Square Wave: 0.5 Hz to 25 MHz.

Double pulse: 25 MHz max. (simulates 50 MHz).

Spacing between pulses defined by delay controls.

B Delay: 20 MHz max. Channel B pulse delayed with respect to channel A pulse. Spacing between pulses defined by delay controls.

Trigger output: dc coupled, 50Ω (typ.) source impedance, delivering ≥ 1V across 50Ω load.

Trigger pulse width: 9ns ± 5ns

EXTERNALLY CONTROLLED OPERATION

External Input

Input impedance: 50Ω ± 10% or 500Ω ± 10%, switch selectable, dc-coupled.

Trigger polarity: positive or negative slope selectable.

Threshold level: continuously adjustable from +1V to -1V with 50Ω input impedance or from +10V to -10V with 500Ω input impedance.

Sensitivity: 50Ω input impedance, sinewaves 1V peak-to-peak, pulses ± 0.5V; 500Ω input impedance, sinewaves 10V peak-to-peak, pulses ± 5V.

Manual: front panel push-button for manually generating input signals.

External Triggering

Repetition rate: 0 to 50 MHz.

Delay: < 50ns between trigger input and trigger output.

Trigger source: external signal or manual.

External width: output pulse width and rate determined by width and rate of drive signal. Drive signal source: external signal or manual. Repetition rate generator provides independent trigger output.

Table 1-1. Specifications (cont'd)

Synchronous gating: gating signal turns on repetition rate. First pulse occurs after start of gate signal, time between start of gate and first pulse defined by delay controls. Last pulse is always completed even if gate ends during generation of last pulse. Gate signal source: external signal or manual. Max. pulse rate: 40 MHz.

Burst mode (optional): preselected number of pulses generated on receipt of trigger signal. Trigger source: external signal or manual. Number of pulses: 1 to 9999. Repetition rate: 0 to 40 MHz. Minimum time between bursts: 200ns. Min. time between trigger input and first pulse: 100ns.

GENERAL

Operating temperature range: 0°C to 55°C.

Power: 100V, 120V, 220V or 240V, +5%, -10%, 48 to 440 Hz. 180VA maximum.

Weight: net 11 kg (24.26lbs), shipping 12kg (26.46 lbs)

Dimensions: 426 mm wide, 145 mm high, 380 mm deep, (16 3/4 ins. x 5 11/16 ins. x 15 ins).

Accessories provided: fuses, power cord and Operating and Service manual.

OPTIONS

001: single channel version.

002: pulse burst option.

003: remote control option.

004: direct access to output amplifiers.

005: TTL output.

006: upper-level tracking.

Refer to Section 7 for specifications of the above options.

907: front handles.

908: rack flanges.

909: rack flange with front handle.

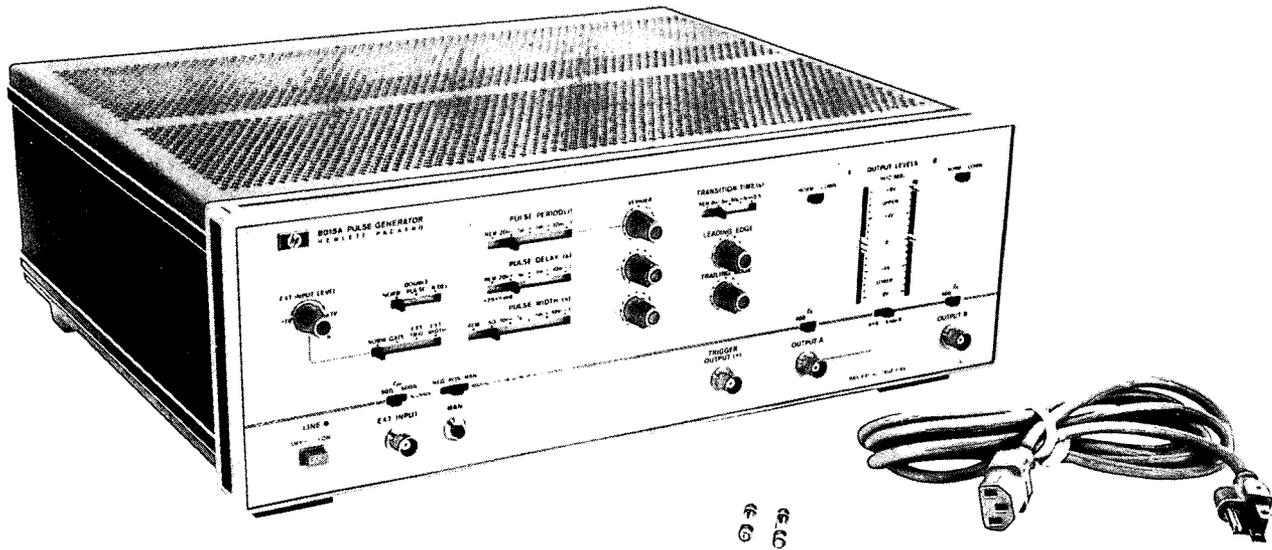
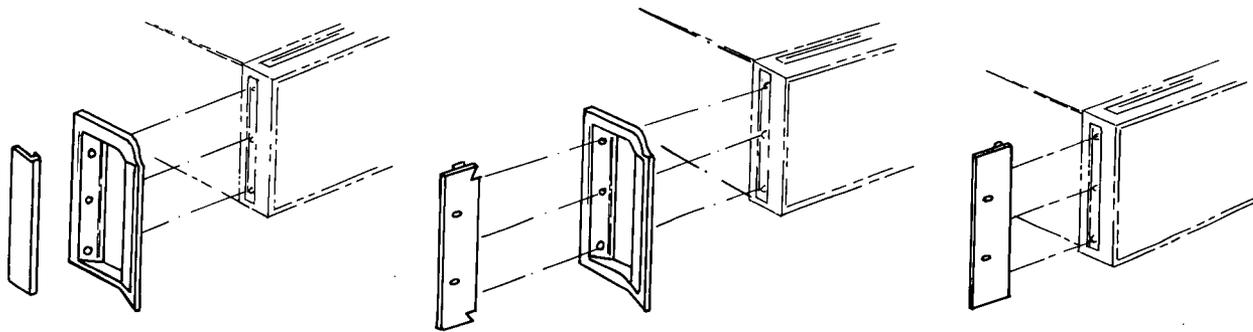


Figure 2-1. 8015A and supplied Accessories



Front handle
Order Option 907
Kit 5061-0089

Rack flange with front handle
Order Option 909
Kit 5061-0083

Rack flange
Order Option 908
Kit 5061-0077

Figure 2-2. Available Accessories

2-1 GENERAL**2-2 Initial Inspection**

2-3 Inspect the instrument and accessories for physical damage, and if damage is evident, refer to paragraph 2-19 for the recommended claim procedure and repacking information.

WARNING

To avoid the possibility of injury or death, the following precautions must be followed before the instrument is switched on:

- If this instrument is to be energized via an autotransformer for voltage reduction, make sure that the common terminal is connected to the earthed pole of the power source.
- The power cable plug shall only be inserted into a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor (grounding).
- Before switching on the instrument, the protective earth terminal of the instrument must be connected to a protective conductor of the power cord.
- The safety check in Table 5-12 shall be executed.

2-4 Accessories

2-5 The following accessories are supplied with the standard instrument (Figure 2-1):

	HP Part Number
1A fuse (for 220/240V operation)	2110-0007
2A fuse (for 110/120V operation)	2110-0303
Power cord	see Figure 2-3
Operating and Service Manual	

An additional manual is delivered if option 910 is ordered at the same time.

Handles and rack mounting flanges are delivered with the instrument only if the appropriate option (Figure 2-2) is ordered at the same time. For retrospective fitting order kit number shown.

2-6 Power Cords

2-7 The power cord delivered with the 8015A will be one of those illustrated in Figure 2-3.

2-8 INSTALLATION**2-9 Power Cord**

2-10 The 3-wire power cable supplied with the 8015A, when connected to the appropriate power out-

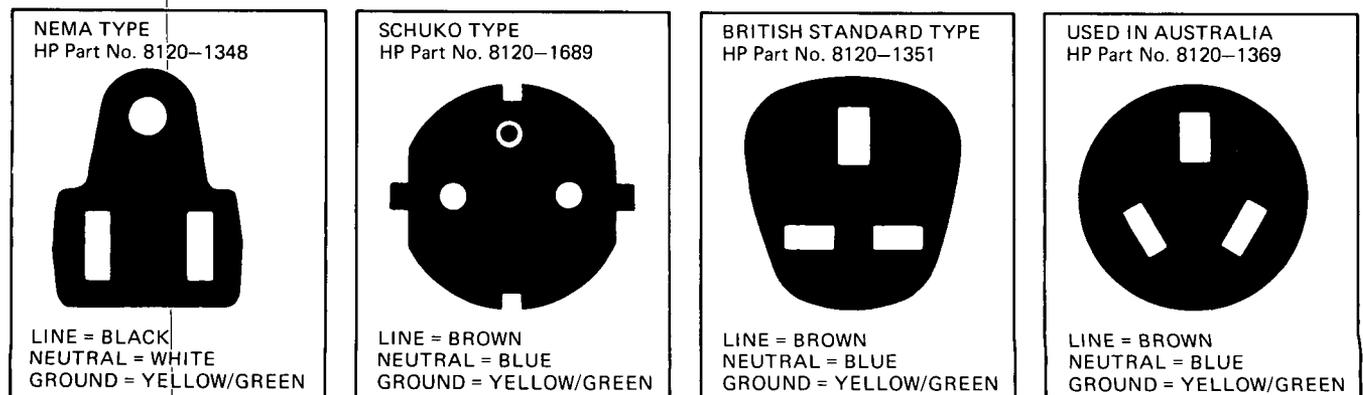


Figure 2-3. Power Cords

let, grounds the instrument cabinet and panels. To preserve this safety feature when operating the instrument from an outlet without a ground connection, use an appropriate adapter and connect the ground lead (green/yellow) to an external ground.

2-11 If the plug on the cable does not fit your power outlet, then cut the cable at the plug end and connect a suitable plug. The plug should meet local safety requirement and include the following features:

- Minimum current rating of 2A
- Ground connection
- Cable clamp

The colour coding used in the cable will depend on the cable supplied (see Figure 2-3).

2-12 Power Source requirements

2-13 The model 8015A will operate from nominal ac line supplies of 100V, 120V, 220V or 240V (-10%, +5%) at 48 Hz to 66 Hz. Two switches on the rear panel allow one of the four voltages to be selected.

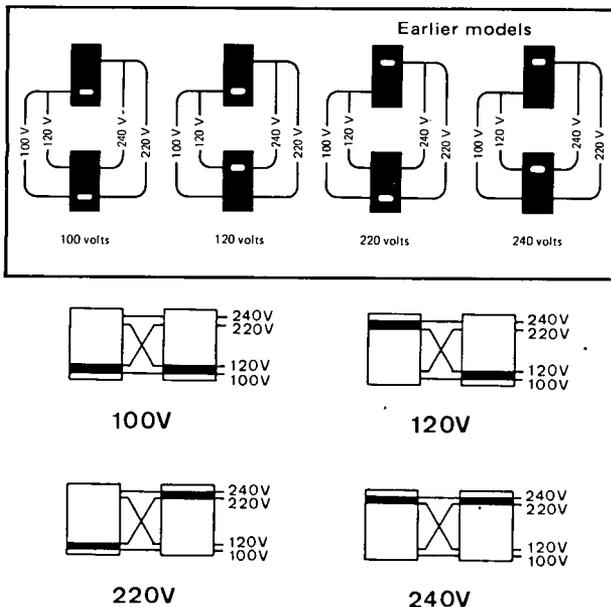


Figure 2-4. Switch Settings for the various Nominal Powerline Voltages

CAUTION

Before applying power to the instrument, check on the rear panel that the 8015A is set in accordance with local supply conditions.

2-14 To check the power requirements proceed as follows:

- Remove the fuse and check its value:
for 220V/240V operation 1A
for 100V/120V option 2A
- Check that the line selector switch positions corresponds to the local supply voltage. If they do not correspond use a screwdriver to change the switch positions.
- Insert the correct fuse into the fuseholder.
- Connect the power cable to the rear connector.

2-15 Temperature Requirements

2-16 The model 8015A operates within specifications when the ambient temperature is between 0°C (32°F) and 50°C (122°F). The instrument may be stored between -40°C (-40°F) and 75°C (167°F).

2-17 RACK MOUNTING

2-18 Figure 2-2 shows the possible handle/rack-mounting configurations. If handle are fitted and subsequently need to be removed, the plastic trim must first be taken off as shown in Figure 2-5.

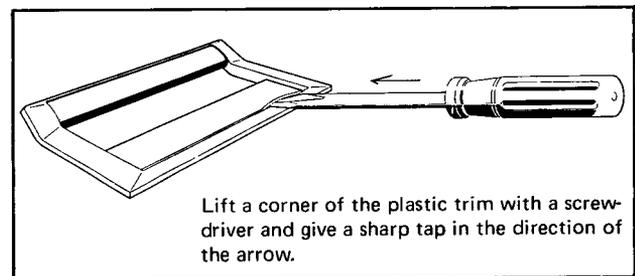


Figure 2-5. Removing Plastic Trim

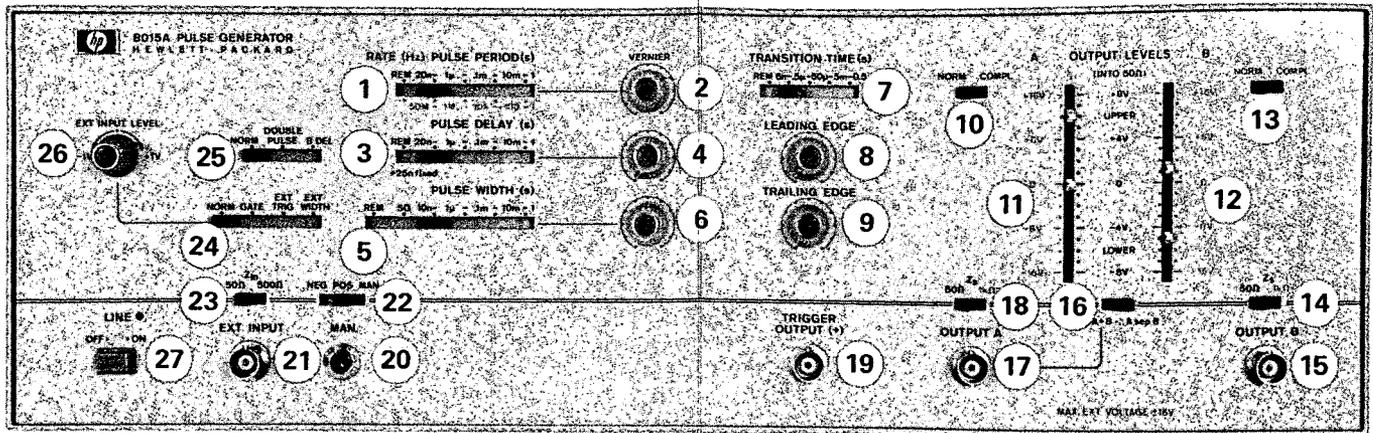
2-19 CLAIMS AND REPACKAGING

2-20 Claims for Damage

2-21 If physical damage is evident or if the instrument does not meet specification when received, notify the carrier and the nearest Hewlett-Packard Sales/Service Office. The Sales/Service Office will arrange for repair or replacement of the unit without waiting for settlement of the claim against the carrier.

**2-22 Repackaging for Shipment
 and Storage**

2-23 If the instrument is to be shipped to a Hewlett-Packard Sales/Service Office, attach a tag showing owner, address, model and serial number, and the repair required. The original shipping carton and packaging material may be re-usable but the Hewlett-Packard Sales/Service Office will also provide information and recommendations on materials to be used if the original packing is not available or re-usable.



1 RATE switch: for selecting the range of pulse rate in the NORM, GATE and BURST mode.

2 Rate VERNIER: for continuous adjustment of the repetition rate between the limits of the range selected. Clockwise rotation increases the pulse period (i.e. reduces the rate). In the EXT WIDTH mode the rate controls define the frequency of the trigger output pulses only.

3 PULSE DELAY switch: selects the range of pulse delay with respect to trigger output in NORM, GATE and EXT TRIG modes. Selects the range of delay of second pulse with respect to first in DOUBLE PULSE. Selects the range of delay of output B with respect to output A in the B DEL mode.

4 Pulse Delay VERNIER: for continuous adjustment of pulse delay between the limits of the range selected. Clockwise rotation increases the delay.

5 PULSE WIDTH switch: for selecting the range of pulse width and square wave in the NORM, GATE, EXT TRIG and BURST modes.

6 Pulse Width VERNIER: for continuous adjustment of pulse width between the limits of the range selected (not square wave).

7 TRANSITION TIME switch: for selecting the range of leading and trailing edge transition times.

8 & 9 LEADING EDGE and TRAILING EDGE verniers: for continuous adjustment of transition times between the limits of the range selected.

10 NORM-COMP switch: for selecting normal pulses (leading edge is positive transition) or their complement (leading edge is negative transition) from output A.

11 OUTPUT LEVELS - A: two sliders for setting output pulse levels. Scaling depends on output configuration (A+B/A sep B and internal and external impedances. See operation instructions).

12 OUTPUT LEVELS - B: same as A above.

13 NORM-COMP switch: same as 10.

14 Zs - 50Ω/1kΩ switch: for selecting source impedance of output B (affects scaling of OUTPUT LEVEL - B sliders. See operation instructions).

15 OUTPUT B: BNC connector.

16 A + B/A sep B switch: for selecting separate or combined outputs. When outputs combined (A+B) use output A only. Also, see operation instructions.

17 OUTPUT A: BNC connector.

18 Zs - 50Ω/1kΩ switch: for selecting source impedance of output A (affects scaling of OUTPUT LEVEL - A sliders. See operation instructions).

19 TRIGGER OUTPUT (+): BNC connector. Positive trigger pulses present in all modes.

20 MAN push-button: for generating external trigger signals when in the GATE, EXT TRIG and EXT WIDTH modes. Effective only when NEG-POS-MAN switch 22 is in the MAN position.

21 EXT INPUT connector: DC coupled input to which external triggering/gating signals are applied. Input impedance either 50Ω or 500Ω with corresponding maximum input levels of ± 7V or ± 25V respectively.

22 NEG-POS-MAN switch: for selecting the polarity/slope and/or source of external trigger signals. In the POS (slope/polarity) and NEG (slope/polarity) positions, signals are applied to EXT INPUT connector 21.

23 Z_{IN} 50Ω/500Ω switch: selects input impedance of EXT INPUT.

24 NORM, GATE, EXT TRIG and EXT WIDTH switch: for selecting mode of operation of 8015A.

25 NORM, DOUBLE PULSE, B DEL switch: in DOUBLE PULSE 8015A delivers two pulses/trigger output - one in phase with the trigger and one delayed by delay control. In B DEL, the pulse defined by channel A output controls occurs immediately after the trigger output while the pulse defined by channel B output controls occurs after the time set on the delay controls.

26 EXT INPUT LEVEL control: defines the threshold level of the external input over a range of +1V to -1V (Z_{IN} - 50Ω) or +10V to -10V (Z_{IN} - 500Ω).

27 LINE ON-OFF: press-for-on-press-for-off switch.

Figure 3-1. Front Panel Controls and Connectors

3-1 SWITCH-ON

3-2 To protect the device under test, the levels at the outputs rise gradually to the set levels when the LINE button is pressed on. When switching off, the levels decay slowly. For this reason, at least 8 seconds should be allowed between switching off and switching on again (see also §4-58).

CAUTION

If instrument serial number is 1538 G 00685 or below, connect device under test AFTER switching on, disconnect device BEFORE switching off (see Section 8, Change 1).

3-3 TRIGGER MODES

3-4 Control (24) selects one of the following modes:

- | | |
|-----------|--|
| NORM | where the rep rate is generated internally, |
| GATE | where an external signal enables the internal rep rate generator, |
| EXT | where the rep rate is determined by an external signal, |
| EXT WIDTH | where rep rate and pulse width are determined by an external signal. |

3-5 Internal (normal) Mode

3-6 When the mode control (24) is set to NORM, the internal rep rate generator runs continuously at a rate set by controls (1) and (2). A positive output pulse is available at connector (19) and an output pulse (whose shape depends on the setting of controls (3) to (9) as shown in Figure 3-2) appears at the channel A and channel B outlets (17), (15). Output levels and format are described later.

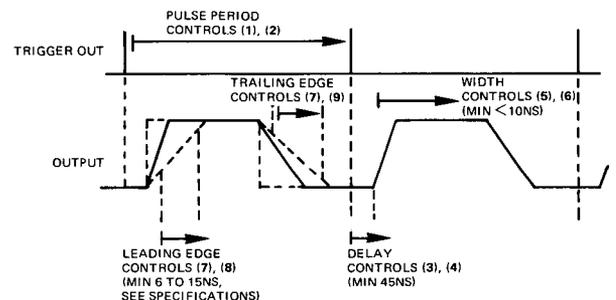


Figure 3-2. Pulse Generation in the Normal (internal) Mode

3-7 External Modes

3-8 Operation in all external modes is initiated by a signal applied to connector (21). The trigger point on the input signal is selected by controls (22), (23) and (26) which, as shown in Figure 3-3, can be adjusted so that the trigger point is immune to baseline noise and pulse top ringing.

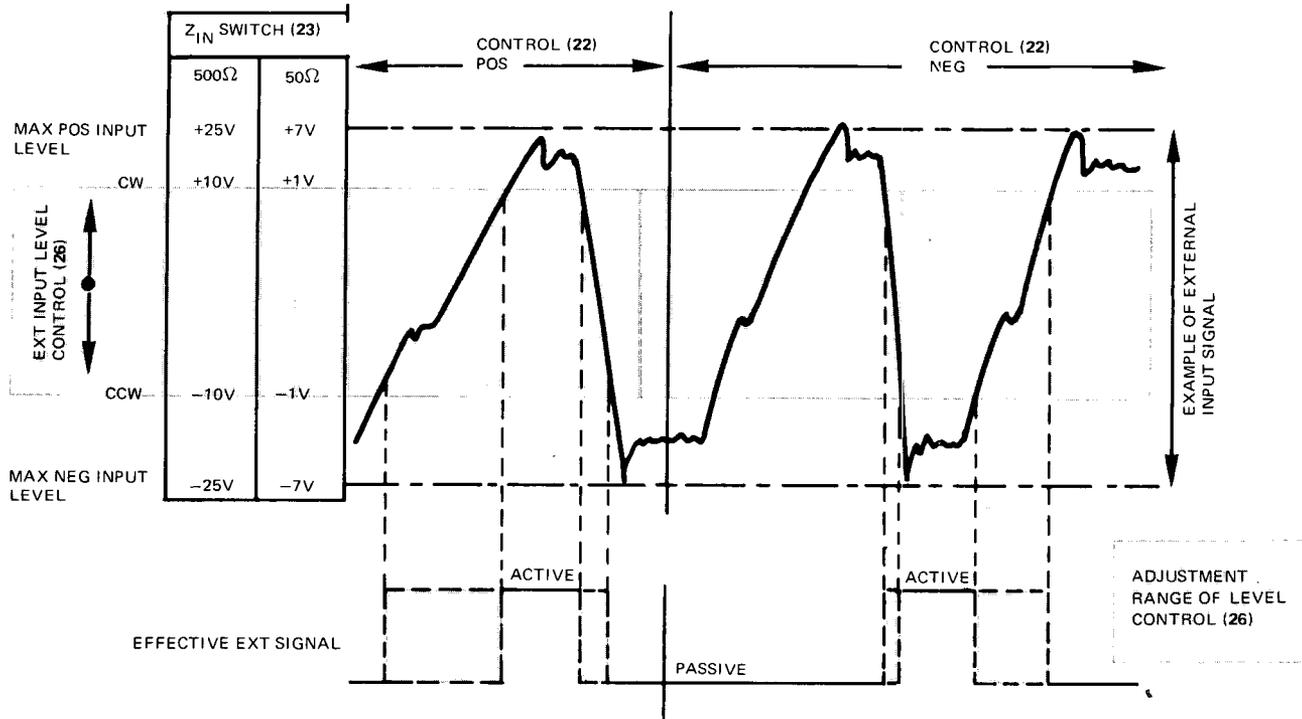


Figure 3-3. External Input Signal Processing

When the control (22) is set to MAN, the external modes can be driven manually by pressing the MAN button (20) (button released corresponds to the 'passive' condition).

3-9 Gate Mode

3-10 In this mode, the internal rep rate generator only runs when the external signal is active. In other respects, operation is the same as in the NORM (internal) mode.

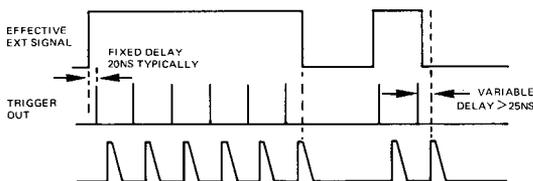


Figure 3-4. Gate Mode

Note that the last pulse is always complete, even if the external signal returns to passive during the pulse itself; indeed, an output pulse can occur completely outside the gate if the pulse delay is long enough.

3-11 External Trigger Mode

3-12 Here, the internal rep rate generator is inoperative and the output rate is that of the external signal. In other respects, operation is the same as in the NORM (internal) mode.

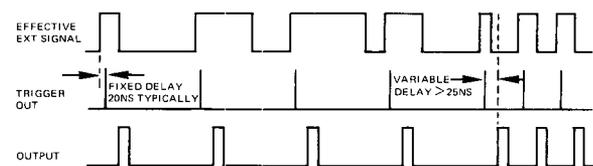


Figure 3-5. External Trigger Mode

3-13 External Width Mode

3-14 Both rate and width of the output pulse are determined directly by the external signal in the EXT WIDTH mode. The internal rep rate generator provides an entirely independent signal source at the TRIG OUT connector (19); this may be switched off by setting the WIDTH switch (5) to SQ. Transition times can be set with controls (7) to (9) as in the NORM (internal) mode.

NOTE: With 8015A rate in fastest range, jitter may increase. (set rate to slower position.)

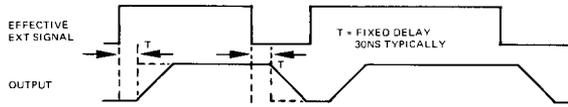


Figure 3-6. External Width Mode.

3-15 PULSE MODES

3-16 Control (25) selects: NORM (the normal pulse mode tacitly assumed in the foregoing), DOUBLE PULSE or B DEL (channel B delayed with respect to channel A). Additionally, a square wave mode can be selected using control (5).

3-17 Double Pulse Mode

3-18 The double pulse mode provides two pulses: the first follows the TRIG OUT pulse by a small, fixed delay; the second is spaced from the first by the amount set on the delay controls (3), (4). The pulses are non-overlapping. Note that the max pulse rate is 50MHz, equivalent to a max rep rate of 25MHz.

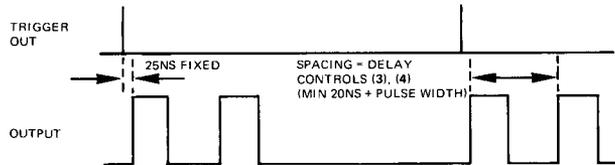


Figure 3-7. Double Pulse Mode

3-19 B Delay Mode

3-20 Here, the pulses of the double pulse mode are steered so that the first pulse is delivered by channel A the second by channel B. Note that the max rep rate is 20MHz.

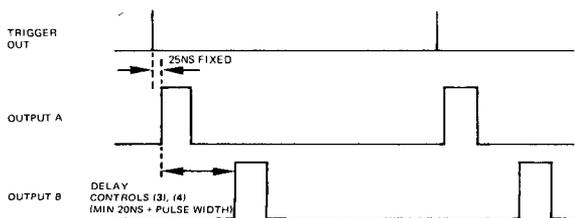


Figure 3-8. Delay Mode

3-21 Square Wave Mode

3-22 In this mode, the TRIG OUT rate is divided by 2, alternate trigger pulses putting the output level high and low. Note that, when combined with gate mode, the level between pulse trains will depend on whether the number of trigger pulses within the gate is even or odd. Transition times are variable, max frequency is half max trigger rate, i. e., 25MHz.

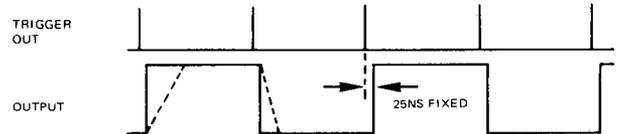


Figure 3-9. Square Wave Mode

3-23 OUTPUT CONTROLS

3-24 Pulse amplitude and baseline are controlled by means of upper and lower level controls.

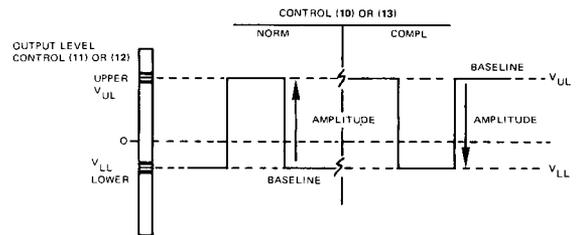


Figure 3-10. Level Controls

Note. The output amplifiers are current sources and should normally be terminated, internally or externally, by 50Ω.

3-25 A sep B Operation

3-26 In A sep B (control (16)), the pulse levels in the two channels are independently variable. The pulse timing, however, is identical.

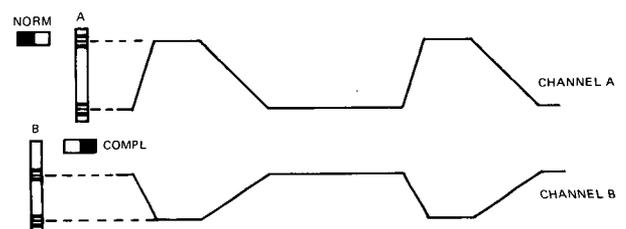


Figure 3-11. A sep B Operation

As shown in the following table, a maximum pulse amplitude of 8V is available if the source impedance (Z_S switch (18), (14)) and load impedance are both 50Ω whereas 16V can be obtained if one of them is $1k\Omega$:

Table 3-1. Maximum A sep B Levels

Z_S setting	Load	Max amplitude	V_{UL}		V_{LL}	
			Max	Min	Max	Min
50Ω	50Ω	8	+8	-7	+7	-8
50Ω	1k	16	+16	-14	+14	-16
1k	50Ω	16	+16	-14	+14	-16

For small capacitive loads ($<20pF$), the 50Ω termination should be located at the load. For larger capacitances, reflections are absorbed better by using the internal 50Ω load of the 8015A.

3-27 A + B Operation

3-28 By setting the control (16) to A + B, levels of twice the value set on the A OUTPUT LEVELS control are available at OUTPUT A. Ensure that OUTPUT B is disconnected.

Channel B OUTPUT LEVELS and COMPL switch are inoperative. Source impedance can be set to 50Ω by setting either or both Z_S switches to 50Ω . For a $1k\Omega$ source impedance, BOTH switches must be set to $1k\Omega$. As shown in the following table, a maximum amplitude of 16V is realized if source and load are each 50Ω whereas 30V can be obtained if one of them is $1k\Omega$.

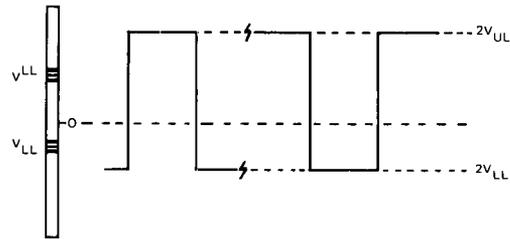


Figure 3-12. A + B Operation

Table 3-2. Maximum A + B Levels

Z_S setting	Load	Max amplitude	V_{UL}		V_{LL}	
			Max	Min	Max	Min
50Ω	50Ω	16	+16	-14	+14	-16
50Ω	1k	30	+16	-12	+12	-16
1k	50Ω	30	+16	-12	+12	-16

3-29 A + B with B DEL Operation

3-30 By setting the control (16) to A + B and control (25) to B DEL, 3-level signals are generated at OUTPUT A. The amplitude of the undelayed pulse is determined by the difference between the level settings of channel A; the delayed pulse's amplitude by the level settings of channel B. The baseline represents the algebraic sum of the A and B baselines, where the baseline is V_{UL} in complement and V_{LL} in normal operation. Load considerations and voltages are as for A sep B operation. OUTPUT B should not be connected.

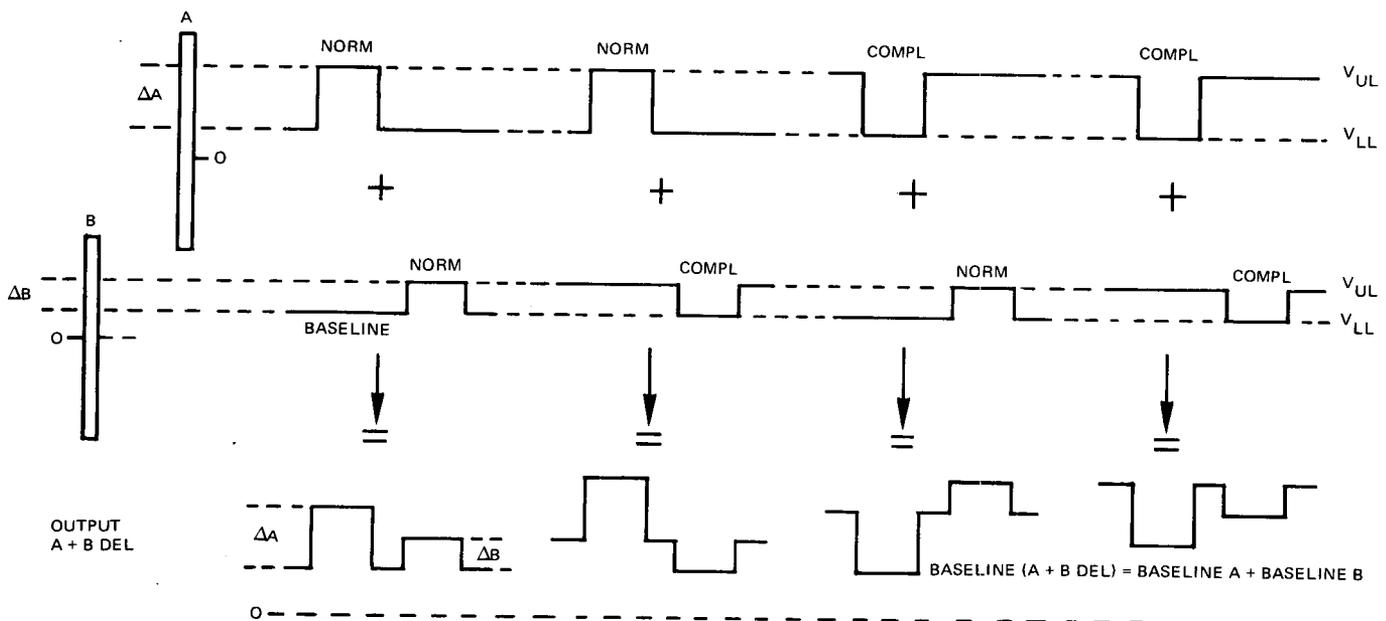


Figure 3-13. The Synthesis of 3-level Signals

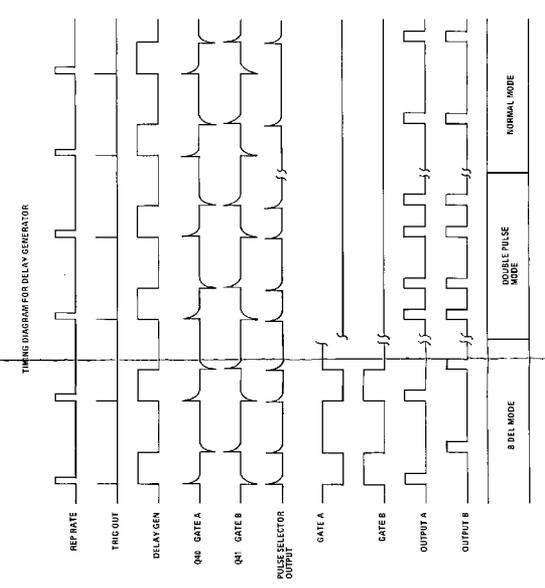
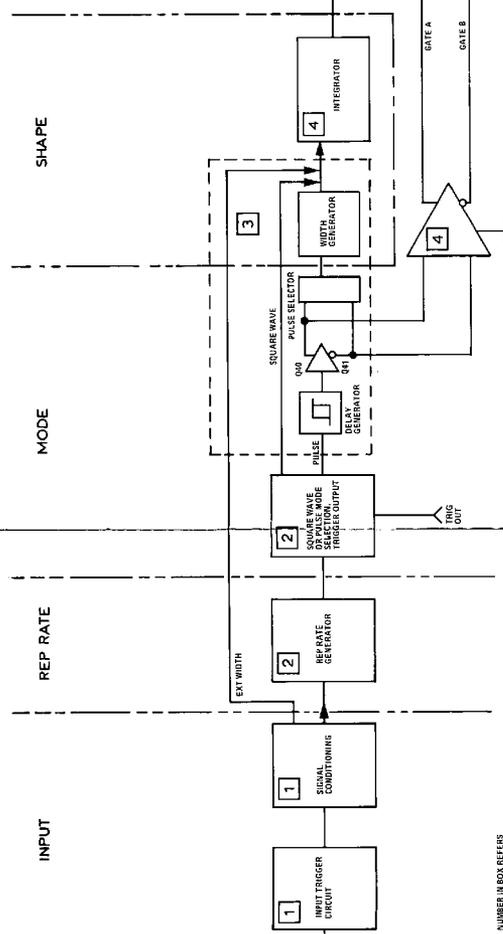
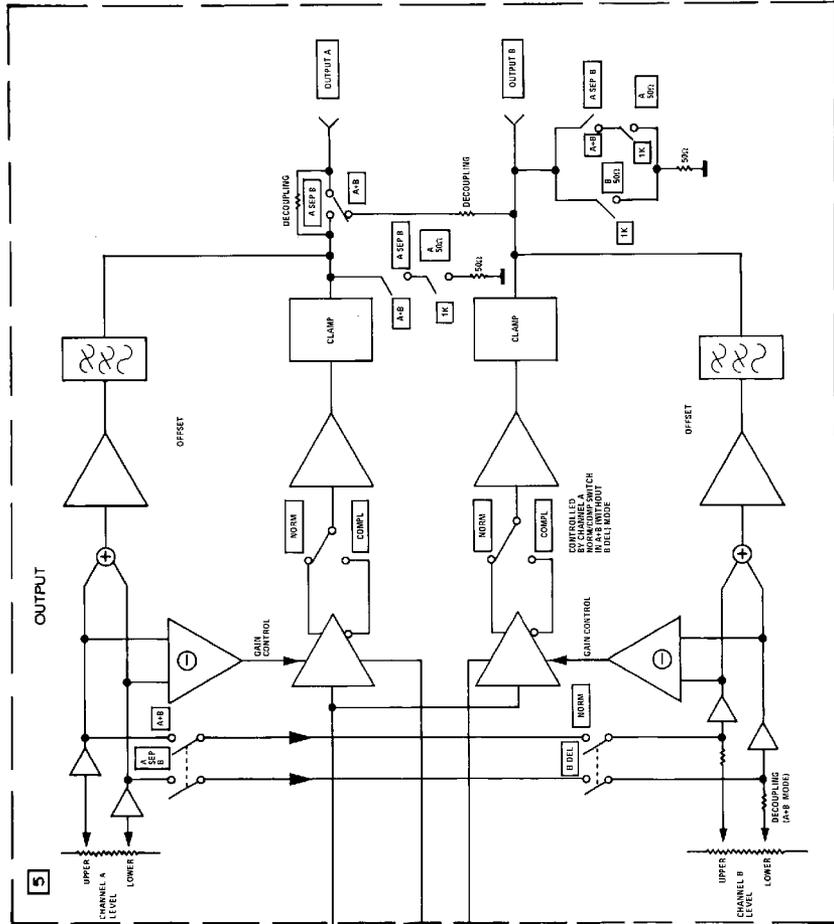


Figure 4-1. Block Diagram

PRINCIPLES OF OPERATION

4-1 INTRODUCTION

4-2 As figure 4-1 illustrates, the 8015A can be separated into a number of sections: Input Trigger, Signal Conditioning (i. e. defining what the purpose of the external signal is – gating, trigger or external width drive), Repetition Rate Generator, Square/Pulse mode selection, Burst mode (if fitted), Delay, Width and Integrator circuits. The output section covers all the time-independent characteristics such as amplitude and output format.

4-3 GENERAL PRINCIPLES OF OPERATION (fig. 4-1)

4-4 The pulse repetition rate is generated either internally or by an external source. When generated internally by the repetition rate generator the pulse train can be gated by an external signal which is used to turn the Repetition Rate Generator on and off.

4-5 When the repetition rate is derived externally, the signal (either applied to EXT INPUT or derived by pressing the MAN button) can be used to drive the Repetition Rate Generator or, in the EXT WIDTH mode, to drive the Integrator. In the latter case the external signal defines not only the frequency but also the pulse width. In all the external (GATE, EXT TRIG, EXT WIDTH and BURST) modes the Signal Conditioning circuits define the purpose and destination of the external signal.

4-6 In the Square Wave/Pulse Selection circuit, the Repetition Rate Generator output is applied to either a flip-flop or the Delay Generator. In the square wave mode the pulses drive the flip-flop which in turn drives the Integrator (i. e. in the square wave mode delay and width are not variable parameters). The trigger output is also derived from the flip-flop. In the pulse mode (i. e. when the pulse width is defined by the Width Integrator and not by a flip-flop) the rate signal by-passes the flip-flop and is applied to the Delay Generator. The trigger output is also derived from the rate signal.

4-7 The functions of the Delay and Width Generators are fairly obvious and these circuits are described in detail later in the theory of operation. However, because of its affect on later circuits, the function of the Delay Generator in the B DEL (B output delayed with respect to A) mode is described here. In the B DEL mode the Delay Generator produces two pulses – one in phase with the rate signal and another delayed with respect to the rate signal. While this would normally result in two output pulses per trigger (as in Double Pulse), this is not the case in the B DEL mode. This is because the signal Gate B turns off Channel B Amplifier after the delay, and the Gate A signal turns off the A Channel Amplifier during the delay.

4-8 The integrator is a variable time constant device which modifies the transition time of incoming pulses and applies the result simultaneously to channel A and Channel B output stage. The output stages are described later in the theory of operation.

4-9 DETAILED DESCRIPTION

4-10 Input trigger circuits (Service Sheet 1)

4-11 An Input Impedance Selector circuit ($Z_{IN} = 50\Omega/500\Omega$) is followed by a Bridge Limiter which limits signal amplitude to $\pm 1.5V$ maximum. The amplitude limited signal is compared at a differential comparator with the output from the EXT INPUT LEVEL vernier. This defines the threshold level. The output (inverted or non-inverted) to be used is determined by the Comparator Output Selector (S4A, CR5 & CR6) and applied, via the Common Base stage (Q4), to the Signal Conditioning Circuits. If MAN triggering is selected, the comparator is disabled and trigger pulses occur only when the MAN button is pressed. The Inverter (Q3) is cut off when the MAN button is pressed and turned on when it is released.

4-12 Signal Conditioning circuit (Service Sheet 1)

4-13 The Signal Conditioning Circuit is controlled from the mode switch S5A, and, under this control, defines the purpose and destination of external signals — if applied. The mode switch controls the Transmission Gates Q9, Q10 and Q35 so that:

- a. in the GATE mode, only Q9 is enabled and the external signal is defined as a gating signal which enables and disables the Repetition Rate Generator.
- b. in the EXT TRIG mode, only Q10 is enabled and the external signal is defined as a trigger signal which triggers the Repetition Rate Generator. To create the difference between gating and triggering signals the external signal is differentiated by L1 in EXT TRIG mode.
- c. In the EXT WIDTH mode, only Q35 is enabled so that the external signal is routed to the Width Generator.
- d. In the NORM mode none of the transmission gates are enabled but Common Base stage Q6 conducts to set Schmitt trigger Q7/8 so that input signals have no affect.
- e. in the BURST mode, again, none of the Transmission Gates are enabled but the Common Base Stage Q6 is cut off so that the external signal is applied as START BURST to the BURST BOARD. The BURST mode is enabled from S5A. In the other external modes (GATE, EXT TRIG and EXT WIDTH) although the external signal reaches the BURST BOARD, and appears to be a START BURST signal, it is ignored if the BURST mode is disabled — as is the case.

4-14 Repetition Rate Generator (Service Sheet 2)

4-15 The Repetition Rate Generator consists of a ramp generator (Range Capacitors and Current Source) and a current switch (Q14, Q15). The Current Source draws current from the selected Range Capacitor(s) until the voltage reaches the threshold level of the Switch. When its threshold level is reached, the Switch turns on and supplies the ramp capacitors (and the current source) with current. The voltage rises until the current through the Switch falls below its maintaining level and results in the Switch turning off (the connection of Q14 and Q15 is similar to a Silicon Controlled Rectifier in

which conduction ceases when the current falls below a level sufficient to maintain the device in an 'on' state). This sequence repeats at a rate determined by the value of the Range Capacitor, the current drawn by the Current Source and the threshold voltage of the Switch. The current drawn by the source is varied by the RATE VERNIER (R2) which, via the Threshold Level Control (Q17, Q18), also modifies the threshold level of the Switch. Thus, when the RATE VERNIER is at the lower end of the RATE range selected, the threshold level of the switch is increased (i. e. made more negative) so that the ramp has to reach a more negative potential (and hence takes longer to do so) before the switch turns on.

4-16 In the NORM and EXT WIDTH modes, the Repetition Rate Generator is always running (in the EXT WIDTH mode this is to provide an asynchronous trigger output) as described. In the BURST and GATE modes the Rep Rate Generator runs only when enabled (by high level at I/P) by the gating or ENABLE signals from the signal conditioning Circuit or the BURST BOARD respectively. In the EXT TRIG mode, the Rep Rate Generator is disabled (mode switch S5B applies -18V to the switch) and the Switch is driven by the external trigger signal from the signal conditioning circuit. The output from the Rep Rate Generator is via a Common Base Stage (Q16) and differentiator (L2). The signal is ac coupled to the Square/Pulse Mode selector circuits.

4-17 Square/Pulse Selection (Service Sheet 2)

4-18 The purpose of this circuit is:

- either
- a. to provide the square wave signal and correct frequency related trigger in the Square Wave mode.
- or
- b. to apply the rate output to the delay generator when not in the Square Wave mode (i. e. when width is defined by the Width Generator) and provide a 1:1 rep rate to trigger output frequency relationship.

4-19 SQUARE WAVE MODE

4-20 In the BURST, NORM, GATE and EXT TRIG modes with SQ (Square Wave) selected, -18V (from WIDTH switch S3C via mode switch S5D and X5 pin 12) is simultaneously applied to Q27 and the flip-flop (Q23, Q24) which the rate signal, from the inverted output of the Phase Splitter (Q26, Q29) consequently

drives. Because the bias on the base of Q27 is negative, its emitter is also negative; this cuts off the Pulse Mode Transmission Gate (Q28). The rate signal is halved in frequency by the Flip-Flop and one output provides the Square Wave signal to the Width Generator (via the Square Wave Buffer Q34) while the other output provides the trigger output via the Square Wave Trigger Buffer (Q25, Q31) and the Trigger Output Buffer (Q30, Q33). The Trigger Transmission Gate (Q32) is disabled in the Square Wave mode.

4-21 When Square wave and EXT WIDTH are selected, Q27 receives $-18V$ from mode switch S5C via X5 pin K, but Q23/24 are disabled because X5 pin 12 no longer carries $-18V$. Thus, when EXT WIDTH and SQ are selected the EXT WIDTH mode is in operation and no trigger output occurs.

4-22 PULSE MODE

4-23 Pulse mode refers to the BURST, NORM, GATE and EXT TRIG modes when the WIDTH switch is in a position other than SQ. Under these conditions, no signal is applied to X5 pin K and 12. Q27 is disabled because the voltage at its base is positive. The emitter of Q27 is slightly less positive and this enables the Pulse Mode Transmission Gate (Q28). The rate signal from the inverted output from Q26 is applied to the Delay Generator via the Pulse Mode Transmission Gate. Also, the Trigger Transmission Gate (Q32) is enabled and the non-inverted output of the Phase Splitter provides the trigger output via Q32 and the Trigger Output Buffer (Q30, Q33).

4-24 When the mode switch is set to EXT WIDTH and the PULSE WIDTH switch is set to a range other than SQ, $-18V$ is applied at X5 pin K from mode switch S5C. This disables the Pulse Mode Transmission Gate (Q28), enables the Square Mode Transmission Gate and disables the Flip-Flop. Thus, no signal goes to the Delay Generator and (because the Flip-Flop is disabled) no square wave output can occur. Because the PULSE WIDTH switch is not in the SQ position, the Trigger Transmission Gate (Q32) is enabled and a trigger output occurs. The trigger output is the same frequency as the rate signal.

4-25 Delay Generator (Service Sheet 3)

4-26 The Delay Generator consists of a ramp generator (Current Source and Range Capacitors), a Schmitt Trigger and a Capacitor Discharge Switch (Q46).

Before a positive pulse from the Square/Pulse Selector Circuit is received, the Schmitt Trigger (Q38, Q39) holds the Capacitor Discharge Switch on so that it draws current from the selected Range Capacitor(s). The voltage Clamp limits the potential to which the capacitors discharge to about $-8V$. When a positive pulse is received from the Square/Pulse Selector the Schmitt Trigger changes state and turns off the Capacitor Discharge Switch. The Range Capacitor(s) now draw(s) current from the Current Source at a linear rate dependent on the resistance of the Delay VERNIER (R3). When the ramp reaches the threshold of the Schmitt Trigger the circuit reverts to its previous state. The output from the Schmitt Trigger is a pulse whose leading edge falls when the signal from the Square/Pulse Select Circuit is received and whose trailing edge rises when the Schmitt is reset. Thus, the width of this pulse equals the delay time. The pulse is then applied to the Phase Splitter. As well as phase splitting, this circuit differentiates so that, from the inverted output, a positive spike is followed by a negative spike; and, from the non-inverted output, a positive spike is followed by a negative spike. The separation of the spikes equals the delay time. These spikes are applied to the Double/Single Pulse Selector Circuit which is controlled by the NORM-DOUBLE PULSE-B DEL switch (S6B). When S6B is switched to NORM, $-18V$ is applied to the Double/Single Pulse Selector (via X5pin14) and only the negative spike from the inverted output of the Phase Splitter has an effect. This spike, the latter of the two (i. e. the delayed) from the Phase Splitter, is inverted by the Double/Single Pulse selector and applied to the Width Generator.

4-27 Width Generator (Service Sheet 3)

4-28 The only difference between the Width and Delay Generators is in their different output stages.

4-29 Integrator (Service Sheet 4)

4-30 The Integrator is a variable time-constant circuit which modifies the transition times of the pulses from the Width Generator.

4-31 On negative input transitions Current Source Q6 draws current (via Q8 of Diff Amp Q7, Q8) from the selected Range Capacitors. When the voltage at the Range Capacitor falls to the potential of the NEGATIVE CLAMP, CR6 conducts and clamps the signal until a positive transition occurs. The current demanded by the current source is now supplied by the Clamp Voltage Source (Neg) — Q11, Q12. The rate of fall of the voltage

at the Range Capacitor is linearly dependent on the value of the capacitor and the current drawn from it. The amount of current drawn is determined by the LEADING EDGE VERNIER.

4-32 While the leading edge transition time is being defined, Current Source Q3 supplies current (via Q4 of Diff Amp Q4, Q5) to the positive Clamp Voltage Source Q9, Q10.

4-33 On positive input transitions Current Source Q3 supplies current (via Q5 of Diff Amp Q4, Q5) to the Range Capacitor. When the voltage rises to the potential of the POSITIVE CLAMP, CR5 conducts and clamps the signal (until the next negative transition). The unwanted current now being supplied by the Current Source is drawn by the Clamp Voltage Source (Pos) - Q9, Q10. The rate of rise of the voltage at the capacitor is linearly dependent on the value of the capacitor and the current supplied to it. The amount of current supplied is determined by the TRAILING EDGE VERNIER.

4-34 While the trailing edge transition time is being defined, Current Source Q6 supplies current (via Q7 of Diff Amp Q7, Q8) to the Negative Clamp Voltage Source Q11, Q12.

4-35 The signal is buffered to the Channel A and Channel B output stages via the Emitter Follower stages Q17, Q18, Q19 and Q20. Q17 and Q18 use Current Sources Q15 and Q16, respectively, as loads.

4-36 Output Stages (Service Sheet 5)

4-37 PULSE AMPLIFIERS

4-38 Each channel comprises three cascaded differential amplifier stages and a cascaded common base output stage. Normal or complement pulses are Selected from the appropriate side of the differential amplifiers by relay K1. At the output of the common base stages are two voltage clamps which restrict the output swing to $\pm 16V$ maximum. Gain control of the amplifier is achieved by the active attenuator stages between each of the differential amplifiers. These attenuators are controlled from the variable current sources (Q19, Q21) which are in turn controlled by the difference between the position of the two sliders of each OUTPUT LEVEL control.

4-39 The attenuators operate on the current-sharing principle of a differential amplifier; i. e., the current flowing in each collector is proportional to the

potential difference between the two bases. The input signal (figure 4-2) controls the share of current I which flows through each input transistor. Similarly, the signal delivered by Q19/21 controls the division of current in U10b/11b and 10c/11c. Suppose an attenuation factor of 2:1 and (for simplicity) $I = 1\text{mA}$. If the INPUT is such that I is shared equally then $I_1 = 0.5\text{mA}$ and $I - I_1 = 0.5\text{mA}$. Also, $I_x = 1/2 (I - I_1) = 0.25\text{mA}$ and $I_x' = 1/2 (I_1) = 0.25\text{mA}$. Now, suppose that the INPUT changes the sharing of current I so that $I_1 = 0.2\text{mA}$ and $I - I_1 = 0.8\text{mA}$, then, $I_x = 0.4\text{mA}$ and $I_x' = 0.1\text{mA}$. In both cases the sum $I_x + I_x' = 0.5\text{mA}$ or $I_x + I_x' = k$ (constant). This is true for all INPUT current sharing and attenuation ratios.

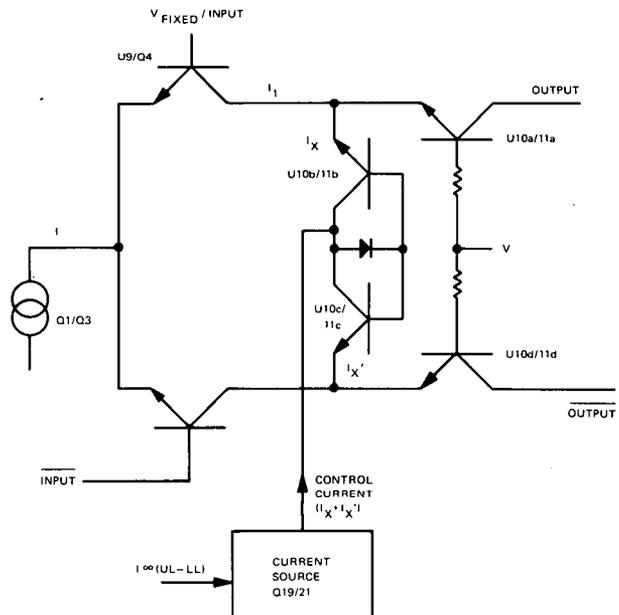


Figure 4-2. Attenuator and Gain Control

4-40 Non linearity due to emitter-bulk resistances and h_{FE} is compensated. In the first current source, by a two-line approximation to the non-linear curve achieved by R114, R115 and CR9. In the second attenuator current source, a five segment approximation is achieved by the diode-resistor arrangement at the input of U3.

4-41 The voltage source Q22 is controlled by a voltage proportional to the difference between the slider positions and shifts the pulses to maintain constant power dissipation of the differential amplifier transistors.

4-42 Because of a slight shift in the mean dc operating point at low duty cycles, an error signal is obtained by filtering the signal. This error signal is used to adjust the offset voltage to compensate for the dc shift.

4-43 A SEP B MODE

4-44 In this configuration relay K1 on Bd Ay Switch (Service Sheet 6) is de-energised and the Channels A and B operate independently and in identical fashion. The NORM-COMP logic enables both NORM-COMP switches so that independent control is available. The source impedance switching circuit enables the source impedances of both channels to be selected independently.

4-45 A + B MODE

4-46 In this configuration OUTPUT A and OUTPUT B are connected together and the A + B/A sep B/B DEL control section does the following:

- a. when A + B is selected without B DEL, the A+B/A sep B/B DEL control energises relay K1 on Bd Ay Switch (Service Sheet 6) so that both A and B channels are controlled by channel A output level sliders. Also, the NORM-COMP LOGIC is instructed to transfer control of NORM-COMP switching of both amplifiers to channel A NORM-COMP switch. Finally, the source impedance switching circuit is instructed to disconnect the channel A internal 50Ω load so that an internal 25Ω load cannot occur. In the A+B mode the source impedance switching circuit is arranged so that, if either one or both of the Zs switches are set to 50Ω, only channel B 50Ω internal load is present. If both Zs switches are set to 1K there is no internal 50Ω load.

- b. when A + B is selected in conjunction with B DEL, relay K1 is de-energised so that individual control of both channels is possible. Similarly, the NORM/COMP LOGIC enables individual control of both NORM-COMP switches. The source impedance switching is the same as for A+B without B DEL.

4-47 B DEL MODE

4-48 In this mode the antiphase outputs from the phase splitter in the Delay Generator drive the B DEL gate amplifier. This amplifier disables Channel B during the first pulse and disables Channel A during the second pulse. Thus, an output pulse occurs first from Channel A and then, after the Delay Time, from Channel B. When B DEL is not selected, the B DEL gate amplifier is disabled.

4-49 Power Supplies (Service Sheet 7)

4-50 POWER SUPPLY INTERDEPENDENCY

4-51 Common regulation is used so that jitter and drift are minimized. The supplies are consequently interdependent as shown in fig. 4-3.

4-52 CURRENT LIMIT CIRCUITS

4-53 Current sensing circuits in each regulator pull the COMP input of U1 (Voltage regulator IC of the

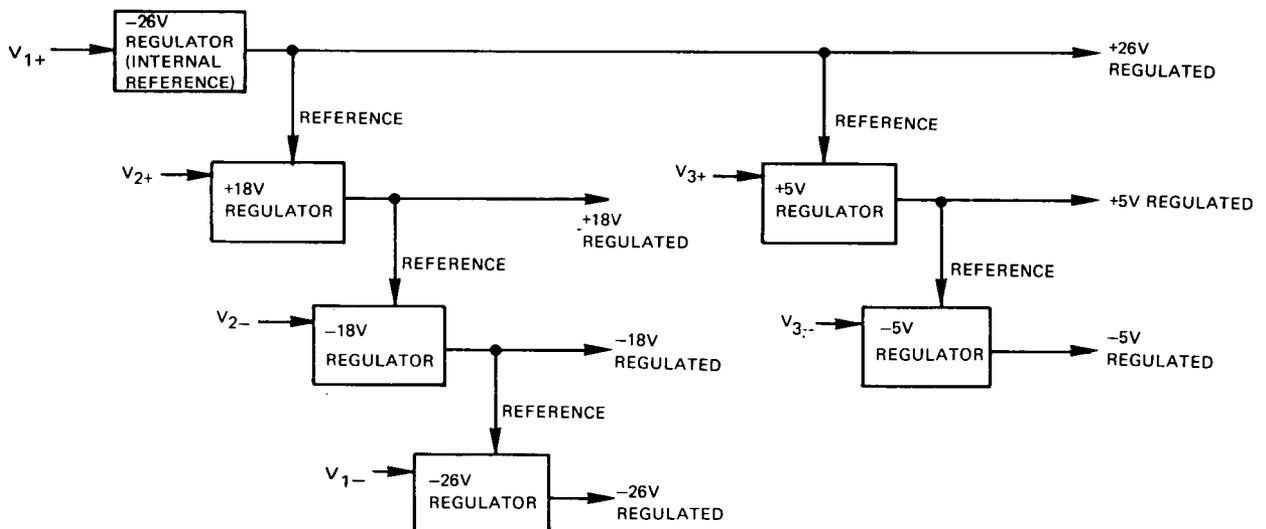


Figure 4-3. Power Supply interdependency

+26V regulator) down in the event of a short circuit. This causes the +26V supply to be pulled down and consequently (because of the interdependency) all other supplies as well. In other words, a short circuit in any supply causes all power supplies to be pulled down; in particular, this safeguards the output amplifier.

4-54 CURRENT FOLDBACK CIRCUITS

4-55 The foldback characteristic of all power supplies is determined by that of the +26V supply. When current sensing pulls the +26V supply down to about +12V, the internal current limit transistor of U1 is forward biased by the voltage at pin 2 and the +26V supply is then pulled down to zero.

4-56 Note that the foldback circuit is effective for about 8 seconds after switching off. This means there should be an interval of at least this time between switching off and switching on.

4-57 CR33 and 34 in the -26V regulator ensure a zero-volt bias on U4 pin 3 during operation of the foldback.

4-58 SWITCH ON/OFF CIRCUIT

4-59 At switch-off, this circuit applies a decay characteristic to U1 so that all power supplies turn off slowly and together.

4-60 The line cycle detector normally holds off the integrator (Q11, C2). When no further negative cycle is detected, the integrator runs down in about 10ms and pulls down the reference voltage applied from U1 pin 6 via R4 and R5 to U1 pin 5.

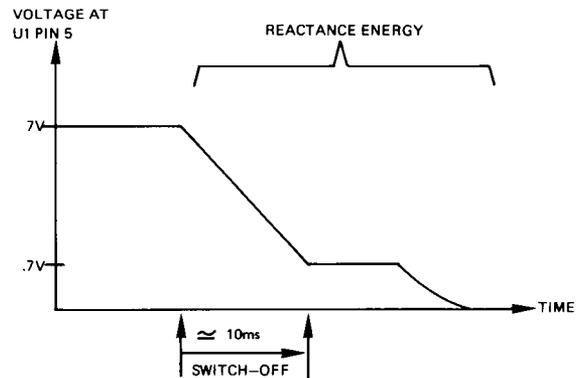


Figure 4-4. Turn-off characteristic

4-61 At switch-on, a slowly-rising voltage at U2 pin 5 is obtained by the time-constant $R4/C7/CR4$ decouples C7 for switch-off, and R7 discharges C7 when instrument is switched off.

4-62 $\pm 5V$ SUPPLY SPEED-UP CIRCUIT

4-63 The $\pm 5V$ supplies are switched on faster than the other supplies so that the relays for the internal 50Ω loads are actuated before the output amplifiers deliver power. Output transients are thus minimized.

4-64 At switch-on, a spike is fed from C22 to the divider R17/18 (the regulator reference point). This results in a step of about +3.7V which turns on the +5V supply which, in turn, turns on the -5V supply.

4-65 CR9 suppresses the negative-going part of the spike and, when turn-on is completed, decouples the reference point from C22. CR10 and R77 discharges C22 when the instrument is switched off.

5-1 GENERAL

5-2 This section contains information on the removal of covers and assemblies, performance verification and recalibration procedures.

WARNING

Before attempting removal of covers, assemblies or components, disconnect the instrument from the ac line supply. It is advisable also to leave the instrument for a few minutes after disconnecting from the line, to enable capacitors to discharge.

CAUTION

The output power of the 8015A can destroy an ordinary 50 termination. Make sure to use either a 50Ω power termination or a 20dB power attenuator with an ordinary termination. If using an attenuator, insert an additional 6dB when operating in the A + B mode.

5-3 REMOVAL OF COVERS

5-4 The top, bottom and side covers can be removed by releasing the captive screw at the rear of each cover and sliding the respective cover to the rear.

5-5 REMOVAL OF ASSEMBLIES

5-6 General

5-7 Remove top, bottom and side covers and the top board retaining strip (MP27, Figure 6-1).

5-8 Power Supply Board — Assembly 4

5-9 Remove connector from the bottom of the board, then ease the board out of the connector on the switch board.

5-10 Burst Board — Assembly 6

5-11 Remove the timing board (Assembly 3) and remove the two screws which hold the timing and burst boards together. Carefully separate the two boards.

5-12 Integrator Board — Assembly 5

5-13 Disconnect the single wire which connects between the integrator and timing boards. Disconnect the two coaxial cables. Disconnect the cable at the switch-board. From underneath, remove the two screws which fix the Integrator to the output amplifier boards. With the instrument inverted, lift the integrator board free from the amplifiers.

5-14 Output Amplifier Board(s) — Assembly 2

5-15 Disconnect the 7 connections to the power transistors and unsolder the wire to the pulse output connector. Remove the integrator board and ease the output amplifier board from its connector on the switch-board.

5-16 PERFORMANCE CHECKS

5-17 Tables 5-2 to 5-12 give the procedures for verifying that the instrument is working to the specifications. Rigid observance of the sequence in which the checks appear is unnecessary.

5-18 INTERNAL CHECKS AND ADJUSTMENTS

5-19 Tables 5-13 to 5-14 give the procedure for bringing a servicable instrument within specifications. These tests must be completed in the order in which they appear. The locations of the adjustment controls are shown in Figure 5-1 at the end of this Section and Tables 5-14, 5-16 and 5-18.

Table 5-1. Test Equipment for Performance Tests

INSTRUMENT	BRIEF SPECIFICATION	RECOMMENDED MODEL
Oscilloscope	Dual Channel, 50 MHz bandwidth, 5mV/div. sensitivity, sweep speeds 0.5 μ s/div. to 2s/div. with sweep delay.	HP 180C with plug-ins 1801A and 1820C
Sampling Oscilloscope	Dual Channel, 1 GHz bandwidth, 2mV/div. sensitivity, sweep speeds 10ps/div. to 50 μ s/div.	HP 180C with plug-in 1810A
Digital Voltmeter	100V range to 4 significant figures. Accuracy $\pm 0.05\%$ ± 1 digit.	HP 3465A
AC Voltmeter	Sensitivity 100 μ V to 300V rms.	HP 3400A
Test Oscillator	Frequency Range 10 Hz to > 200 MHz	HP 3200A
Pulse Generator	Rep. Rate 100 Hz – 20 MHz	HP 8011A

ACCESSORIES

50 Ω co-axial cable terminated with BNC male connectors (4 required)	HP 10100C
BNC Tee (1 male, 2 female)	HP 1250-0781
50 Ω Feed-through (2 required)	HP 11048B
20dB 20 W Power Attenuator	Microline 766-20
6dB Attenuator	HP 8491B Option 006
Connector BNC male to N female	HP 1250-0077
Connector BNC male to N male	HP 1250-0780

PERFORMANCE CHECK

Table 5-2. Repetition Rate Test

PROCEDURE

1. Set up the equipment as shown and set the controls as follows:

8015A:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CCW
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	10n-1μ
VERNIER 6	CCW
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMP 10	NORM
CH A UPPER LEVEL >11	MIN SEPARATION
CH A LOWER LEVEL	
CH B UPPER LEVEL >12	MIN SEPARATION
CH B LOWER LEVEL	
CH B NORM/COMP 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL	-

SPECIFICATION

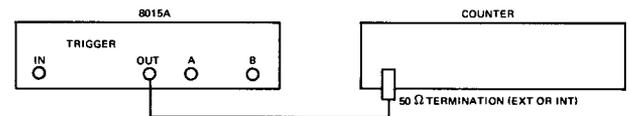
Repetition rate
 1 Hz – 50 MHz in four ranges
 vernier provides continuous adjustment

DESCRIPTION

Checks frequency ranges and manual trigger function

EQUIPMENT

Counter capability ≥ 50 MHz
 Frequency and period measurement



Test Equipment: set counter to corresponding settings to get best resolution

2. Check repetition rate for each setting listed below:

PULSE PERIOD 1	VERNIER 2	RESULT
20n – 1μ	CCW	≥ 50 MHz
20n – 1μ	CW	≤ 1 MHz

PULSE PERIOD 1	VERNIER 2	RESULT
1μ – 0.1 m	CCW	≥ 1 MHz
1μ – 0.1 m	CW	≤ 10 KHz

Set counter to period measurement

0.1 m – 10 m	CCW	≤ 0.1 ms
0.1 m – 10 m	CW	≥ 10 ms
10 m – 1	CCW	≤ 10 ms
10 m – 1	CW	≥ 1 s

- Set function to ext trig and counter to frequency
- Press manual button once: one pulse only must be counted.

PERFORMANCE CHECK

Table 5-3. Pulse Delay Test

PROCEDURE

1. Set up the equipment as shown and set the controls as follows:

8015A:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CW
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	10n-1μ
VERNIER 6	CCW
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL > 11	MIN SEPARATION
CH A LOWER LEVEL	
CH B UPPER LEVEL > 12	MIN SEPARATION
CH B LOWER LEVEL	
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	B-DEL
EXT INPUT LEVEL 26	-

SPECIFICATION

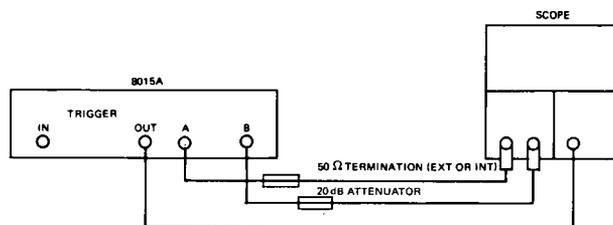
Pulse delay
 20 ns (+25 ns fixed) to 1 s in four ranges
 vernier provides continuous adjustment

DESCRIPTION

Checks delay ranges in B-delay mode

EQUIPMENT

Oscilloscope capability Bandwidth ≥ 50 MHz



Test equipment: Set scope to corresponding settings to get best resolution.

2. Adjust scope controls so that channel A leading edge is coincident with the first line of graticule. Check movement of the channel B pulse leading edge for settings listed below. (**Note:** avoid excessive timing.)
3. Set mode switch to double pulse and repeat with settings of step 2. Measure distance between pulses, should be same as result in B-delay.



PULSE 1 PERIOD	VERNIER 2	PULSE 3 DELAY	VERNIER 4	PULSE 5 WIDTH	VERNIER 6	RESULT
20n-1μ	CW	20n-1μ	CW	10n-1μ	CCW	≥ 1μs
1μ-0.1m	CW	1μ-0.1m	CCW	1μ-0.1m	CCW	≤ 1μs
1μ-0.1m	CW	1μ-0.1m	CW	1μ-0.1m	CCW	≥ 0.1ms
0.1m-10m	CW	0.1m-10m	CCW	0.1m-10m	CCW	≤ 0.1ms
0.1m-10m	CW	0.1m-10m	CW	0.1m-10m	CCW	≥ 10ms
10m-1	CW	10m-1	CCW	10m-1	CCW	≤ 10ms
10m-1	CW	10m-1	CW	10m-1	CCW	≥ 1s

PERFORMANCE CHECK

Table 5-4. Pulse Width Test

PROCEDURE

1. Set up the equipment as shown in Figure A and set controls as follows:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CCW
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	10n-1μ
VERNIER 6	CCW
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL > 11	MIN SEPARATION
CH A LOWER LEVEL > 11	MIN SEPARATION
CH B UPPER LEVEL > 12	MIN SEPARATION
CH B LOWER LEVEL > 12	MIN SEPARATION
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

Test Equipment: Set scope to corresponding ranges and best resolution

2. Set output level for a full screen display. Measure pulse width at 50% of amplitude: $\leq 10\text{ns}$
3. Turn width vernier slowly cw till pulse moves or divides. Measure duty cycle: $> 50\%$
4. Set pulse width to square wave. Measure duty cycle: $50\% \pm 15\%$

5. Set equipment as shown in Figure B and measure pulse width for each of the settings listed below:

PULSE PERIOD	VERNIER	PULSE DELAY	VERNIER	PULSE WIDTH	VERNIER	RESULT
1μ-0.1m	CW	20n-1μ	CCW	10n-1μ	CW	$> 1\mu\text{s}$
1μ-0.1m	CW	20n-1μ	CCW	1μ-0.1m	CCW	$< 1\mu\text{s}$
0.1m-10m	CW	20n-1μ	CCW	1μ-0.1m	CW	$> 0.1\text{ms}$
0.1m-10m	CW	20n-1μ	CCW	0.1m-10m	CCW	$< 0.1\text{ms}$
10m-1	mid pos	20n-1μ	CCW	0.1m-10m	CW	$> 10\text{ms}$
10m-1	CW	20n-1μ	CCW	10m-1	CCW	$< 10\text{ms}$
10m-1	CW	20n-1μ	CCW	10m-1	CW	$> 1\text{s}$

6. Set pulse width to square wave. Measure duty cycle in following ranges:

PULSE PERIOD	VERNIER	RESULT
20n-1μ	cw	
1μ-0.1m	cw to ccw	
0.1m-10m	ccw to cw	$50\% \pm 5\%$
10m-1	cw to ccw	

SPECIFICATION

Pulse Width
 $< 10\text{ns}$ to 1s in four ranges
 vernier provides continuous adjustment

DESCRIPTION

Checks width ranges, square wave and duty cycle

EQUIPMENT

Sampling Oscilloscope $> 1\text{GHz}$
 Oscilloscope $> 50\text{MHz}$

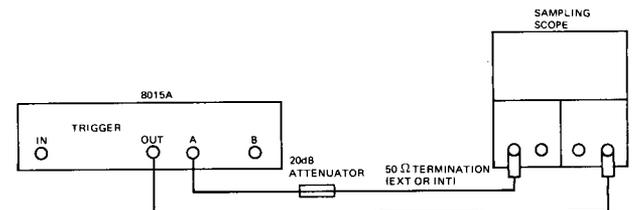


FIGURE A

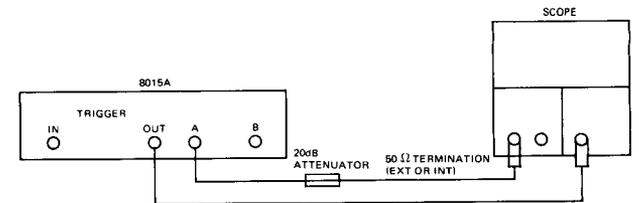


FIGURE B

PERFORMANCE CHECK

Table 5-5. Jitter Test

PROCEDURE

1. Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	1μ-0.1m
VERNIER 2	SEE STEP 2
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	1μ-0.1m
VERNIER 6	CCW
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL >11	MIN SEPARATION
CH A LOWER LEVEL	
CH B UPPER LEVEL >12	MIN SEPARATION
CH B LOWER LEVEL	
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

Test equipment:	Main sweep	0.1ms/div
	Delay sweep	0.1μ/div
	Delay Trigger	AUTO

2. Adjust pulse period vernier to obtain a 0.1ms period.
3. Set mode switch on time base to mixed.
4. Adjust scope delay vernier till leading edge of second pulse is expanded.
5. Measure pulse period jitter < 0.1% + 50ps. Set scope mode switch back to norm.
6. Set pulse period to 0.1m-10m and adjust rate vernier to obtain a 0.4ms period.
7. Set pulse delay to 1μ-0.1m and vernier to 0.1 delay.
8. Set scope mode switch to mixed.
9. Adjust scope delay vernier till leading edge of first pulse is expanded.
10. Measure pulse delay jitter < 0.1% + 50ps. Set scope mode switch back to norm.
11. Set pulse period vernier to obtain a 0.4ms period.
12. Set delay to 20n-1μ vernier ccw.
13. Adjust pulse width vernier to obtain a 0.1ms pulse width.
14. Set scope mode switch to mixed.
15. Adjust scope delay vernier till trailing edge of first pulse is expanded.
16. Measure pulse width jitter < 0.1% + 50ps.

SPECIFICATION

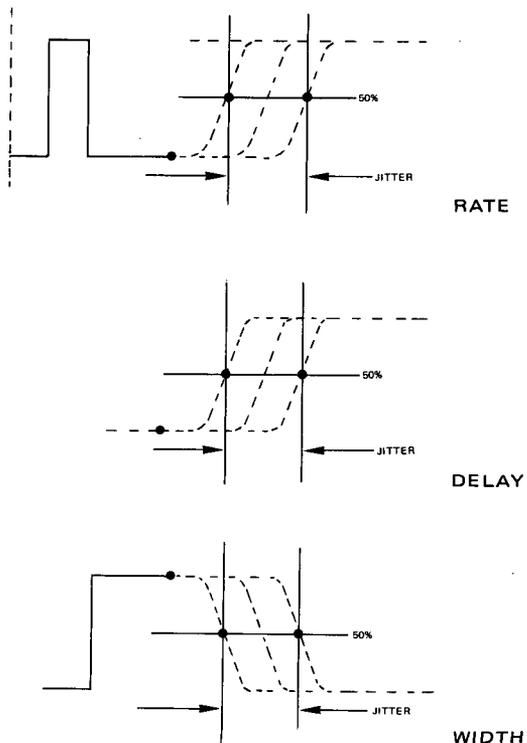
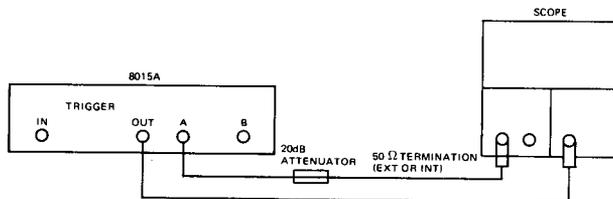
Period Jitter < 0.1% + 50 ps for any rate setting
 Delay Jitter < 0.1% + 50 ps for any delay setting
 Width Jitter < 0.1% + 50 ps for any width setting

DESCRIPTION

Checks period jitter, delay jitter, width jitter.

EQUIPMENT

Oscilloscope > 50 MHz, Main and Delayed sweep
 A sampling oscilloscope with direct and expand can be used instead.



PERFORMANCE CHECK

Table 5-6. External Mode Check (Trigger and Gate)

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	1 μ -0.1m
VERNIER 2	MID-POSITION
PULSE DELAY 3	20n-1 μ
VERNIER 4	CCW
PULSE WIDTH 5	10n-1 μ
VERNIER 6	CW
TRANSITION TIME 7	6n-0.5 μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMP 10	NORM
CH A UPPER LEVEL > 11	MIN SEPARATION
CH A LOWER LEVEL	
CH B UPPER LEVEL > 12	MIN SEPARATION
CH B LOWER LEVEL	
CH B NORM/COMP 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	EXT TRIGGER
EXT INPUT LEVEL 26	MID-POSITION

SPECIFICATION

External Trigger
 Each external pulse (positive and negative slope selectable) will initiate an output pulse.

External Gate
 Each external pulse (positive and negative slope selectable) will initiate and terminate a train of output pulses.

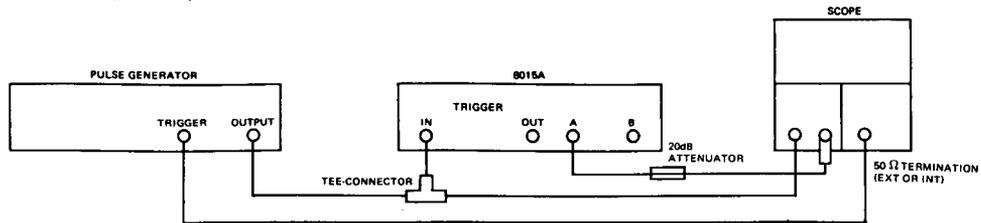
DESCRIPTION

Checks external trigger and external gate using an ext pulse generator.

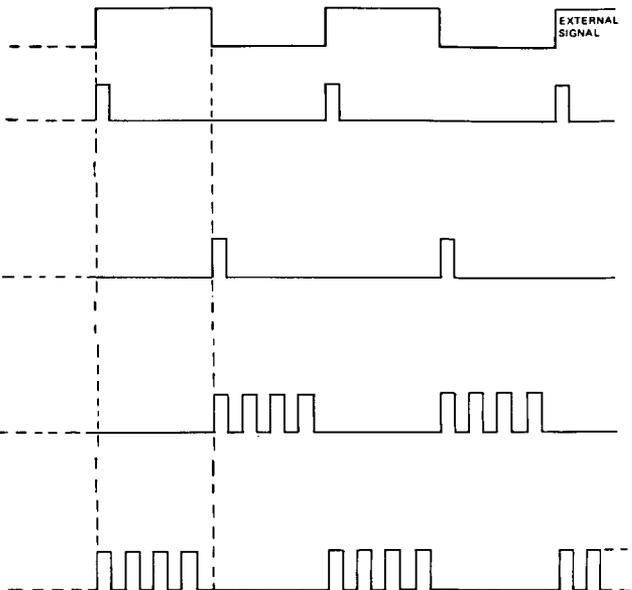
EQUIPMENT

Oscilloscope \geq 50 MHz
 Pulse Generator \geq 20 MHz

Test Equipment: Set Ext Pulse Generator to a square wave frequency of 5 KHz and a 1 V output amplitude.



1. Set scope to obtain about 3 periods on screen.
2. Each positive transition from the external pulse generator should release a pos 8015A pulse.
3. Set trigger input polarity to NEG.
4. Each negative transition from the external pulse generator should release a pos 8015A pulse.
5. Set mode switch to EXT GATE.
6. During each low pulse level, a pulse train should be released.
7. Set trigger input polarity to positive.
8. During each high level of the external pulse, a pulse train should be released.



PERFORMANCE CHECK

Table 5-7. External Mode Check (External Width)

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	1 μ -0.1m
VERNIER 2	MID-POSITION
PULSE DELAY 3	20n-1 μ
VERNIER 4	CCW
PULSE WIDTH 5	10n-1 μ
VERNIER 6	CW
TRANSITION TIME 7	6n-0.5 μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL >11	MIN SEPARATION
CH A LOWER LEVEL	
CH B UPPER LEVEL >12	MIN SEPARATION
CH B LOWER LEVEL	
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	EXT WIDTH
EXT INPUT LEVEL 26	SEE BELOW

SPECIFICATION

External width
 Output pulse width and rate determined by width and rate of drive signal.

NOTE: To avoid excessive jitter, set 8015A rate to a lower range.

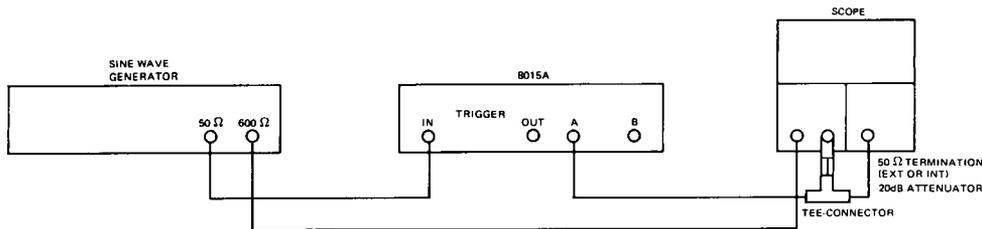
DESCRIPTION

Checks external width by using an external sine wave generator and operating the trigger input level control.

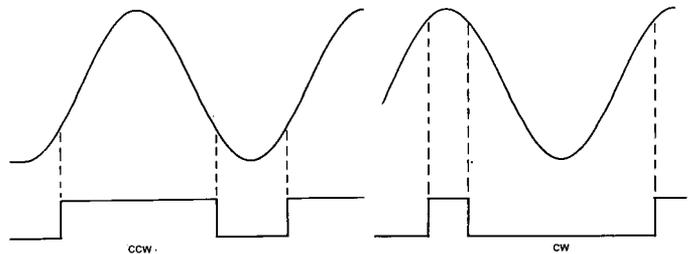
EQUIPMENT

Oscilloscope \geq 50 MHz
 Sine Wave Generator > 10 KHz

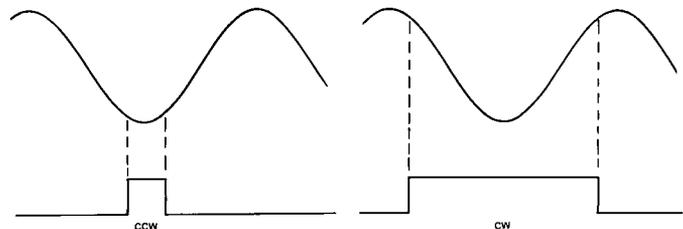
Test Equipment: Set sine wave generator to a frequency of 5 KHz and 1 V rms output amplitude.



1. Set scope to obtain 3 periods on screen.
2. Move the ext trigger input level knob from ccw to cw and observe display:
 During the positive sine wave a positive pulse should appear whose width is adjustable by the trigger input level control.



3. Set trigger polarity to NEG.
4. Repeat step 2.
 During the negative sine wave a positive pulse should appear whose width is adjustable by the trigger input level control.



PERFORMANCE CHECK

Table 5-8. Transition Time Check

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CW
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	SQUARE WAVE
VERNIER 6	-
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL 11	+4V
CH A LOWER LEVEL 11	-4V
CH B UPPER LEVEL 12	+4V
CH B LOWER LEVEL 12	-4V
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

Test Equipment: Adjust sampling scope for full screen display. Measure transition between 10% and 90% of amplitude.

1. Measure leading and trailing edges:
≤ 6ns
2. Set norm/compl to compl and repeat step 1.
3. Set leading and trailing edge vernier cw.
4. Measure leading and trailing edges in norm and compl:
≥ 0.5μs
5. Set Zs switch to 1 KΩ and leading and trailing edge verniers ccw.
6. Readjust sampling scope for a full display.

SPECIFICATION

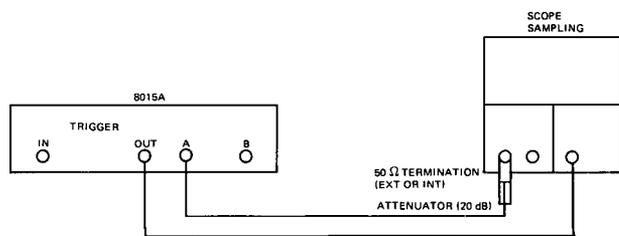
Transition times
6n-0.5s in four ranges. Minimum transition times dependent on source and load impedances.

DESCRIPTION

Checks transition times under several conditions.

EQUIPMENT

Sampling Oscilloscope > 1 GHz
Oscilloscope > 50 MHz



7. Measure leading and trailing edges in norm and compl: ≤ 8ns
8. Set channel summing to A+B and ZS switch to 50 Ω.
9. Readjust sampling scope for a full-screen display.
10. Measure leading and trailing edges in norm and compl: ≤ 15ns
11. Replace sampling scope by a real time scope, connect it in the same way, set it for a full screen display.
12. Set controls as follows and check transition times:

PULSE PERIOD	VERNIER	TRANSITION TIME	LEADING EDGE	TRAILING EDGE
20n-1μ	CW	0.5μ-50μ	CCW	≤ 0.5μs
0.1m-10m	CW	0.5μ-50μ	CW	≥ 50μs
0.1m-10m	CW	50μ-5m	CCW	≤ 50μs
0.1m-10m	CW	50μ-5m	CW	≥ 5ms
10m-1	mid-pos.	5m-0.5	CCW	≤ 5ms
10m-1	CW	5m-0.5	CW	≥ 0.5s

13. Repeat steps 1 to 7 for channel B.

PERFORMANCE CHECK

Table 5-9. Pulse Perturbation

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	20n-1μ
VERNIER 2	MID-POSITION
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	SQUARE WAVE
VERNIER 6	-
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL 11	+4V
CH A LOWER LEVEL 11	-4V
CH B UPPER LEVEL 12	+4V
CH B LOWER LEVEL 12	-4V
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	POS
TRIG INPUT IMPEDANCE 23	50 Ω
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

Test Equipment: set scope for best resolution.

1. Measure overshoot, ringing:
 $\leq \pm 5\%$ ($\pm 10\%$ at min amplitude)
2. Measure preshoot, droop, linearity: $< 5\%$
3. Repeat in compl.
4. Repeat for channel B.

SPECIFICATION

Overshoot and ringing
 $\pm 5\%$ of pulse amplitude possibly increasing $< \pm 10\%$ at minimum amplitude.

Preshoot
 $< 5\%$ of pulse amplitude.

Pulse top perturbation
 droop $< 5\%$ of pulse amplitude.

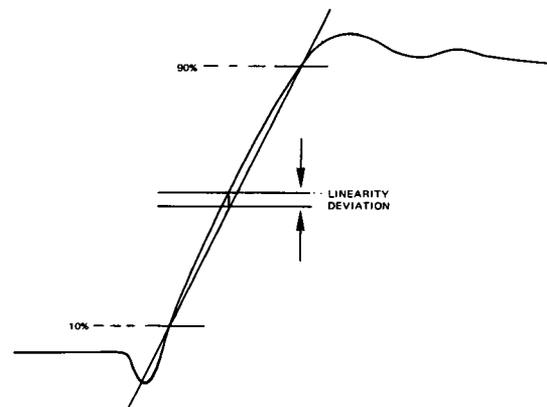
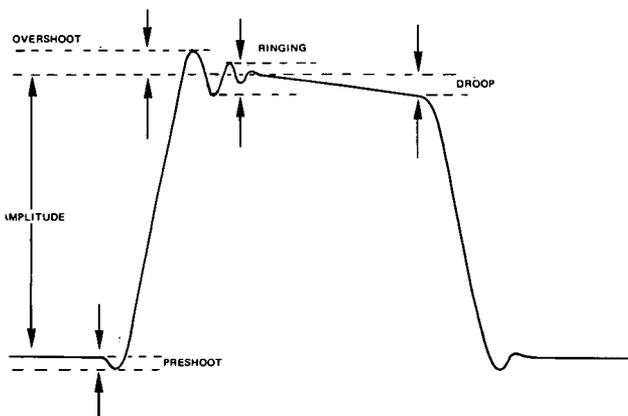
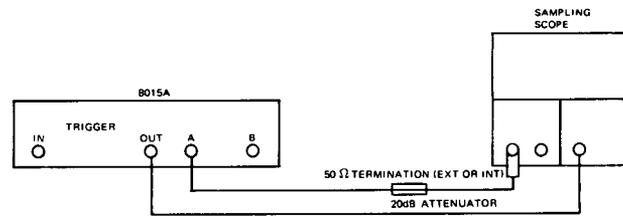
Linearity
 for transition times $> 30\text{ns}$ better than 5% of pulse amplitude.

DESCRIPTION

Checks pulse shape specifications.

EQUIPMENT

Sampling oscilloscope $> 1\text{ GHz}$



PERFORMANCE CHECK

Table 5-10. Pulse Amplitude

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	1 μ -0.1m
VERNIER 2	CW
PULSE DELAY 3	20n-1 μ
VERNIER 4	CCW
PULSE WIDTH 5	SQUARE WAVE
VERNIER 6	-
TRANSITION TIME 7	6n-0.5 μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL 11	SEE BELOW
CH A LOWER LEVEL	SEE BELOW
CH B UPPER LEVEL 12	
CH B LOWER LEVEL	
CH B NORM/COMPL 13	NORM
CH B Zs 14	SEE BELOW
CHANNEL SUMMING 16	A sep B
CH A Zs 18	SEE BELOW
TRIG POLARITY 22	-
TRIG INPUT IMPEDANCE 23	-
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

SPECIFICATION

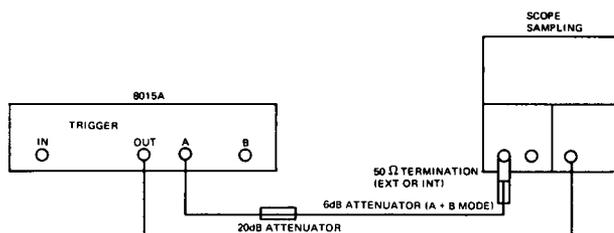
- < 1V to > 8V from int 50 Ω into ext 50 Ω
- < 2V to > 16V from int open (1 K Ω) into ext 50 Ω
- < 2V to > 16V from int 50 Ω into ext 50 Ω (A+B mode)
- < 4V to > 30V from int open (1 K Ω) into ext 50 Ω (A+B mode)

DESCRIPTION

Checks amplitude and offset levels under different load conditions.

EQUIPMENT

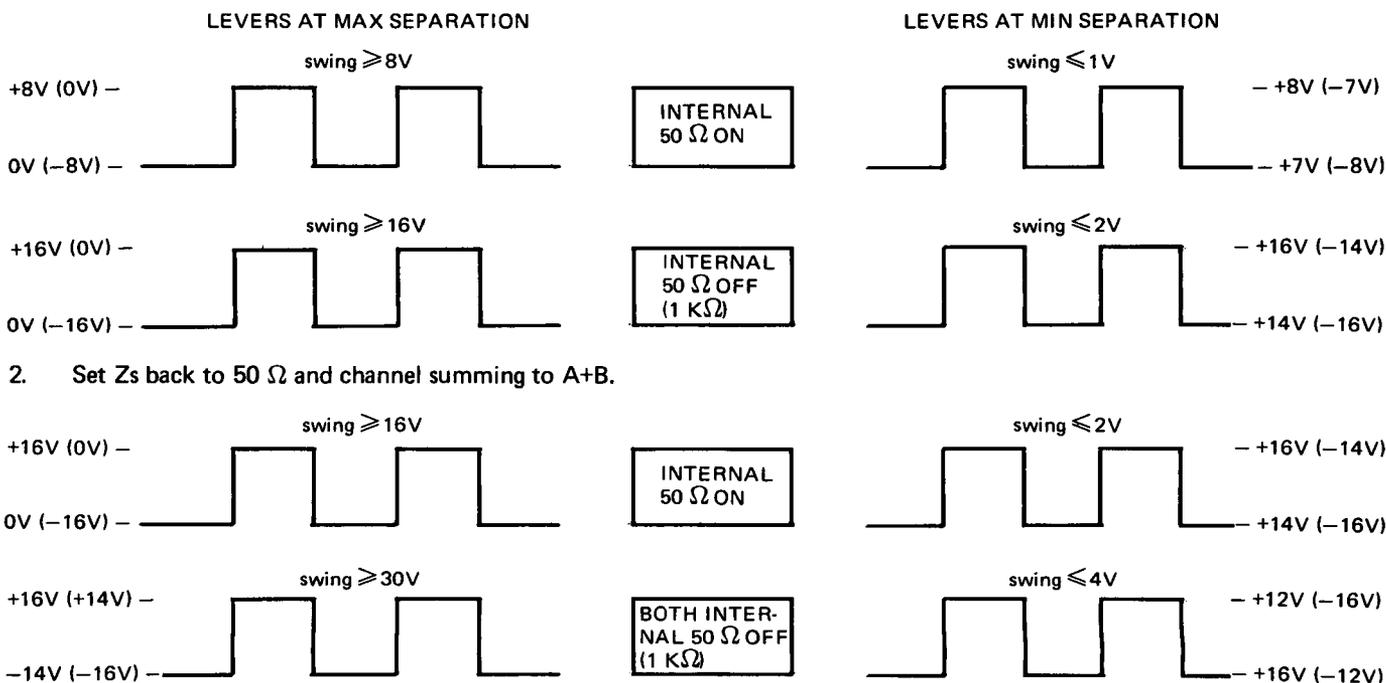
Oscilloscope 50 MHz



Test Equipment: set scope for corresponding setting and best resolution.

NOTE: Excessive current may destroy the 50 Ω load (Power ratio) - use attenuator.

1. Push levers slowly to the upper and lower limit positions and measure swing in all positions shown below. Voltage without brackets: most positive level. Voltage in brackets: most negative voltage.



3. Set Zs switches back to 50 Ω and repeat step 1 for channel B.

PERFORMANCE CHECK

Table 5-11. Trigger Output Test

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CW
DELAY 3	-
VERNIER 4	-
WIDTH 5	10n-1μ
VERNIER 6	CCW
FUNCTION 24	NORM
MODE 25	NORM

SPECIFICATION

Trigger output $\geq 1V$ across 50Ω , $9ns \pm 5ns$

DESCRIPTION

Checks trigger output.

EQUIPMENT

Sampling Oscilloscope $> 1G$ Hz

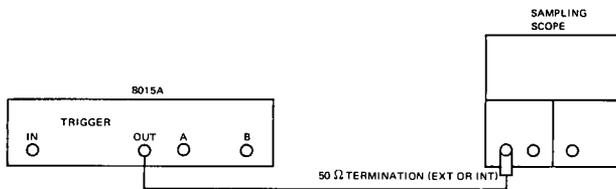


Table 5-12. Safety Check

1. Disconnect power cord from line. Visually inspect interior for any sign of abnormal internally generated heat, such as discolored printed circuit boards or components, damaged insulation, or evidence of arcing. Determine cause and remedy.
2. Check resistance from cabinet to ground pin on power plug with suitable ohmmeter. The reading must be less than one ohm. Flex the power cord while making the measurement to detect any intermittent discontinuity. Check internal ground connections on boards and frame. Also check resistance of any front or rear panel ground terminals marked. \perp
3. Check resistance from cabinet to line and neutral (tied together) with the power switch on and the power source disconnected. The minimum acceptable resistance is two megohms. Replace any component which results in a failure or refer to production Memo or Service Note issued by product division for alternate action.
4. Check line fuse to verify that the proper value is installed.
5. Check that the plastic safety cover for the line fuse is installed.
6. Check that all coaxial and flat cables inside are properly connected. Check that all boards and the heatsink on the chassis are properly connected.
7. Inform Hewlett-Packard (internally, the responsible product division) of any repeated failures in the above tests or any other safety features.

1. Measure trigger pulse amplitude $\geq 1V$
Measure trigger pulse width $9ns \pm 5ns$

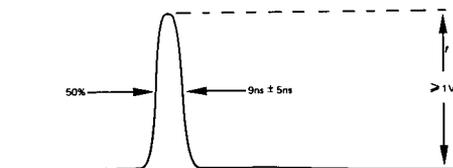


Table 5-12a. Performance Test Record

Hewlett-Packard
 HP MODEL 8015A option
 PULSE GENERATOR
 Serial No.

Tested by

Date

5-2 Repetition Rate Test			
Rate Setting	Vernier	Specific.	Result
20n-1μ	CCW	≥ 50MHz	.....
20n-1μ	CW	≤ 1MHz	.....
1μ-0.1m	CCW	≥ 1MHz	.....
1μ-0.1m	CW	≤ 10KHz	.....
0.1m-10m	CCW	≤ 0.1ms	.....
0.1m-10m	CW	≥ 10ms	.....
10m-1	CCW	≤ 10ms	.....
10m-1	CW	≥ 1s	.....
Man. funktion			<input type="checkbox"/>

5-3 Pulse Delay Test			
Delay Setting	Vernier	Specific.	Result
20n-1μ	CW	≥ 1μs	.....
1μ-0.1m	CCW	≤ 1μs	.....
1μ-0.1m	CW	≥ 0.1ms	.....
0.1m-10m	CCW	≤ 0.1ms	.....
0.1m-10m	CW	≥ 10ms	.....
10m-1	CCW	≤ 10ms	.....
10m-1	CW	≥ 1s	.....

5-4 Pulse Width Test			
Width Setting	Vernier	Specific.	Result
10ns-1μ	CCW	≤ 10ns	.....
Duty Cycle	CCW	50%±15%	.....
10n-1μ	CW	≥ 1μs	.....
1μ-0.1m	CCW	≤ 1μs	.....
1μ-0.1m	CW	≥ 0.1ms	.....
0.1m-10m	CCW	≤ 0.1ms	.....
0.1m-10m	CW	≥ 10ms	.....
10m-1	CCW	≤ 10ms	.....
10m-1	CW	≥ 1s	.....
Duty cycle			
20n-1μ	CW	50%±5%	.....
1μ-0.1m	CW + CCW	50%±5%	.....
0.1m-10m	CCW to CW	50%±5%	.....
10m-1s	CW to CCW	50%±5%	.....

5-5 Jitter Test			
Range	-	Specific.	Result
Rate	-	≤ 0.1%+50ps	.....
Delay	-	≤ 0.1%+50ps	.....
Width	-	≤ 0.1%+50ps	.....

5-6/7 External Mode Check		
Ext. Trigger		<input type="checkbox"/>
POS		<input type="checkbox"/>
NEG		<input type="checkbox"/>
Ext. Gate		<input type="checkbox"/>
POS		<input type="checkbox"/>
NEG		<input type="checkbox"/>
Ext. Width		<input type="checkbox"/>
POS		<input type="checkbox"/>
NEG		<input type="checkbox"/>

5-8 Transition Time Check				
Setting	LE Vernier	TE Vernier	Specif.	Result
6n-0.5μ	CCW	CCW	≤ 6ns	.....
6n-0.5μ	CW	CW	≥ 0.5μ	.....
Zs to 1KΩ				
6n-0.5μ				
NORM	CCW	CCW	≤ 8ns	.....
COMPL	CCW	CCW	≤ 8ns	.....
A+B, Zs 50Ω				
6n-0.5μ				
NORM	CCW	CCW	≤ 15ns	.....
COMPL	CCW	CCW	≤ 15ns	.....
0.5μ-50μ	CCW	CCW	≤ 0.5μs	.....
0.5μ-50μ	CW	CW	≥ 50μs	.....
50μ-5m	CCW	CCW	≤ 50μs	.....
50μ-5m	CW	CW	≥ 5ms	.....
5m-0.5	CCW	CCW	≤ 5ms	.....
5m-0.5	CW	CW	≥ 0.5s	.....

5-9 Pulse Perturbation		
	Specific.	Result A/B
Overshoot, Ringing	≤ ± 5% (±10%)	.....
Preshoot, droop, linearity	< 5 %	.....

5-10 Pulse Amplitude			
Int Zs	Levers (separation)	Swing	Result A/B
50Ω	max	≥ 8V	.....
50Ω	min	≤ 1V	.....
1KΩ	max	≥ 16V	.....
1KΩ	min	≤ 2V	.....
A + B			
50Ω	max	≥ 16V	.....
50Ω	min	≤ 2V	.....
1KΩ (both)	max	≥ 30V	.....
	min	≤ 4V	.....

5-11 Trigger Output Test		
	Specific.	Result
Trigger Output width	9ns±5ns	.....

- 5-12 SAFETY CHECK
- 7-2-1 OPTION 002
- 7-3-2/3/4 OPTION 003
- 7-4-2 OPTION 004
- 7-5-1 OPTION 005
- 7-6-1 OPTION 006

Table 5-13. Test Equipment for Adjustments

INSTRUMENT	BRIEF SPECIFICATION	RECOMMENDED MODEL
Oscilloscope	Dual Channel, 50 MHz bandwidth, 5mV/div. sensitivity, sweep speeds 0.5 μ s/div. to 2s/div. with sweep delay.	HP 180C with plug-ins 1801A and 1820C
Sampling Oscilloscope	Dual Channel, 1 GHz bandwidth, 2mV/div. sensitivity, sweep speeds 10ps/div. to 50 μ s/div.	HP 180C with plug-in 1810A
Digital Voltmeter	100V range to 4 significant figures. Accuracy $\pm 0.05\%$ ± 1 digit.	HP 3465A
AC Voltmeter	Sensitivity 100 μ V to 300V rms.	HP 3400A
Test Oscillator	Frequency Range 10 Hz to > 200 MHz	HP 3200A.
Pulse Generator	Rep. Rate 100 Hz – 20 MHz	HP 8011A

ACCESSORIES

50 Ω co-axial cable terminated with BNC male connectors (4 required)	HP 10100C
BNC Tee (1 male, 2 female)	HP 1250-0781
50 Ω Feed-through (2 required)	HP 11048B
20dB 20 W Power Attenuator	Microline 766-20
Connector BNC male to N female	HP 1250-0077
Connector BNC male to N male	HP 1250-0780

ADJUSTMENTS

Table 5-14. Power Supply

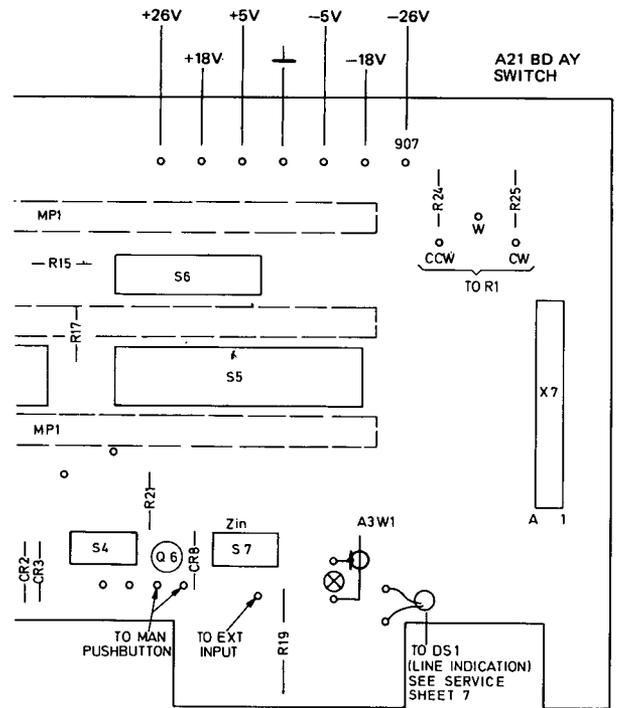
INITIAL CONTROL SETTINGS NOT SIGNIFICANT

Test Equipment: DVM

1. Connect DVM between TP +26V on A21 and chassis
2. Adjust A24 (A4 on earlier instruments)
R12 for: +26V ± 100mV
3. Check following voltages

A21 TP	+18V	+18V ± 100mV
A21 TP	+ 5V	+ 5V ± 50mV
A21 TP	- 5V	- 5V ± 50mV
A21 TP	-18V	-18V ± 100mV
A21 TP	-26V	-26V ± 100mV

The test points are located on A21 (A11, A31 on options) behind front panel.



WARNING

Any interruption of the protective (grounding) conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to make the apparatus dangerous. Intentional interruption is prohibited. Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible and, when inevitable, should be carried out only by a skilled person who is aware of the hazard involved. The opening of covers or removal of parts, except those to which access can be gained by hand, may expose live parts, and also accessible terminals may be live.

Capacitors inside the instrument may still be charged even in the instrument has been disconnected from its source of supply. Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, etc.) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any unintended operation.

ADJUSTMENTS

Table 5-15. Rate, Delay, Width

Refer to Figure 5-1 (page 5-25)
for adjustment locations on A2 and A3.

INITIAL CONTROL SETTINGS

PULSE PERIOD 1	20n-1 μ	CH B Zs 14	50 Ω
VERNIER 2	CCW	CHANNEL SUMMING 16	A sep B
PULSE DELAY 3	20n-1 μ	CH A Zs 18	50 Ω
VERNIER 4	CCW	TRIG POLARITY 22	POS
PULSE WIDTH 5	10n-1 μ	TRIG INPUT IMPEDANCE 23	50 Ω
VERNIER 6	CCW	FUNCTION 24	NORM
TRANSITION TIME 7	6n-0.5 μ	MODE 25	NORM
LEADING EDGE 8	CCW	EXT INPUT LEVEL 26	CENTER
TRAILING EDGE 9	CCW		
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	CENTER		
CH A LOWER LEVEL 11			
CH B UPPER LEVEL 12	CENTER		
CH B LOWER LEVEL 12			
CH B NORM/COMPL 13	NORM		

Test Equipment: Counter
Oscilloscope
Sampling Oscilloscope

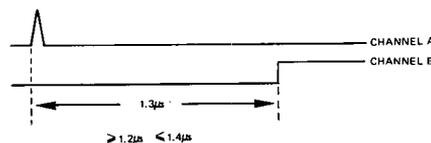
RATE ADJUST

1. Connect trigger output via a 50 Ω termination to a counter.
2. Adjust A3 C20 for: 51.5 MHz \pm 0.2 MHz.

If Option 002 is fitted, A6 must be removed to gain access to the following adjustments.

DELAY ADJUST

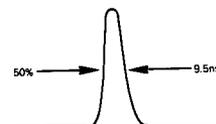
1. Set Rate to 1 μ -0.5m vernier cw, set delay vernier cw Set Width vernier cw.
2. Connect trigger output to a scope (channel B and ext trigger input via T-connector and 50 Ω feedthru load), connect output A to scope channel A.
3. Measure the time between the trigger pulse and the leading edge of the output pulse: $\geq 1.2\mu\text{s} \leq 1.4\mu\text{s}$.
Adjust A3 C39 for 1.3 μs .



WIDTH ADJUST

1. Set rate to 20n-1 μ vernier mid-position.
Set Delay vernier ccw, Width vernier ccw.
2. Connect output A to a sampling oscilloscope, use trigger output for ext scope trigger.
Adjust A3 C46 for 9.5ns.

NOTE: If the first pulse in Ext Gate mode or Burst mode is not satisfactory, a compromise may be necessary (< 10ns > 9ns).



ADJUSTMENTS

Table 5-16. Pulse Level Voltage Adjust

INITIAL CONTROL SETTINGS NOT SIGNIFICANT

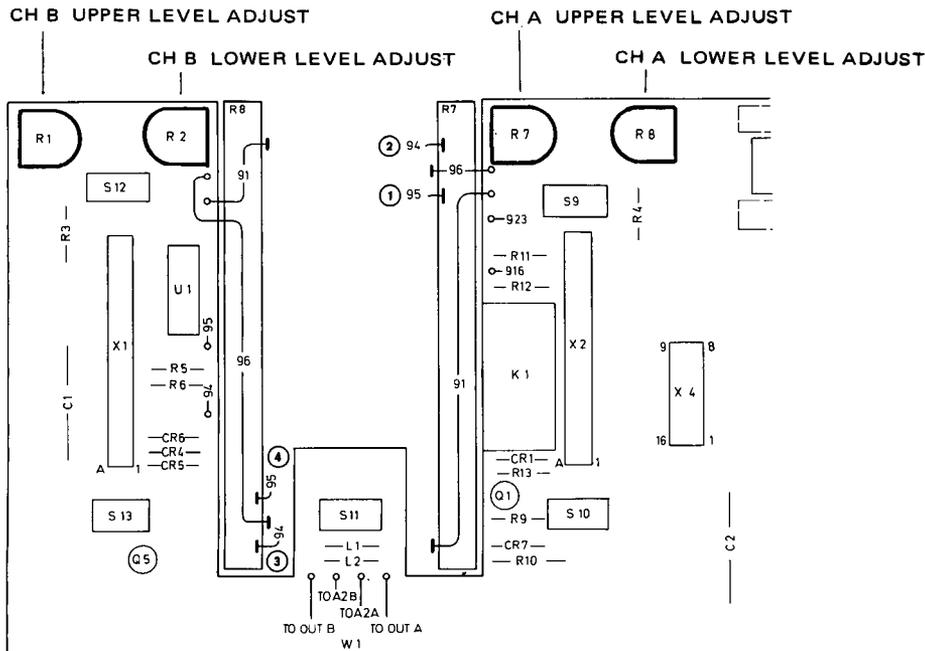
Test Equipment: DVM

This adjustment calibrates the max positive and max negative output pulse levels.

1. Set channel A levers for minimum separation with channel A upper level to max negative position. Connect DVM to 1 and chassis, adjust A21 R8 for-3.70V ± 10mV
2. Set channel A levers for minimum separation with channel A lower level to max positive position. Connect DVM to 2 and chassis, adjust A21 R7 for+3.70V ± 10mV
Repeat steps 1 and 2.
3. Set channel B levers for minimum separation with channel B upper level to max negative position. Connect DVM to 3 and chassis, adjust A21 R2 for-3.70V ± 10mV
4. Set channel 3 levers for minimum separation with channel B lower level to max positive position. Connect DVM to 4 and chassis, adjust A21 R1 for+3.70V ± 10mV
Repeat steps 3 and 4.



A21 BD AY SWITCH 08015 - 66521



ADJUSTMENTS

Table 5-18. Maximum and Minimum Amplitude

INITIAL CONTROL SETTINGS

PULSE PERIOD 1	1 μ -0.1m	CH B NORM/COMPL 13	-
VERNIER 2	CCW	CH B Zs 14	1 K Ω
PULSE DELAY 3	1 μ -0.1m	CHANNEL SUMMING 16	-
VERNIER 4	CCW	CH A Zs 18	1 K Ω
PULSE WIDTH 5	SQ	TRIG POLARITY 22	-
VERNIER 6	-	TRIG INPUT IMPEDANCE 23	-
TRANSITION TIME 7	6n-0.5 μ	FUNCTION 24	NORM
LEADING EDGE 8	CCW	MODE 25	NORM
TRAILING EDGE 9	CCW	EXT INPUT LEVEL 26	-
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	MAX SEPARATION		
CH A LOWER LEVEL 11	SYMETRICAL TO ZERO		
CH B UPPER LEVEL 12	MAX SEPARATION		
CH B LOWER LEVEL 12	SYMETRICAL TO ZERO		

Test Equipment: Oscilloscope

1. Connect output A via a 20 dB power attenuator and a 50 Ω termination to the vertical input of an oscilloscope.
2. Adjust A5 R80 (see opposite) for an amplitude of 16.5V \pm 100mV.
3. Connect output B via a 20 dB power attenuator and a 50 Ω termination to the vertical input of an oscilloscope.
4. Adjust A5 R85 for an amplitude of 16.5V \pm 100mV.
5. Set channel A and B levers for minimum separation around zero.
6. Adjust A2 A R117 (see page 5-25) for a Channel A amplitude of: 1.8V \pm 50mV.
7. Adjust A2 B R117 for a Channel B amplitude of: 1.8V \pm 50mV.

ADJUSTMENTS

Table 5-19. Amplifier Zero-Adjust

INITIAL CONTROL SETTINGS

PULSE PERIOD 1	—	CH B NORM/COMPL 13	—
VERNIER 2	—	CH B Zs 14	—
PULSE DELAY 3	—	CHANNEL SUMMING 16	—
VERNIER 4	—	CH A Zs 18	—
PULSE WIDTH 5	—	TRIG POLARITY 22	—
VERNIER 6	—	TRIG INPUT IMPEDANCE 23	—
TRANSITION TIME 7	—	FUNCTION 24	—
LEADING EDGE 8	—	MODE 25	NORM
TRAILING EDGE 9	—	EXT INPUT LEVEL 26	MID POSITION
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	+ 4V		
CH A LOWER LEVEL 11	- 4V		
CH B UPPER LEVEL 12	+ 4V		
CH B LOWER LEVEL 12	- 4V		

Test Equipment: Short circuit cable
DVM

These adjustments set the amplifier bias for symmetrical operation.

1. Connect a DVM with floating inputs between  (U11 pin 3) and  (U11 pin 14) on channel A board A2A.

NOTE: a logic clip might be necessary to make these connections. Connect A5 TP1 to chassis (see page 5-18).

2. Adjust A2A R9 (page 5-25) for: $0V \pm 50mV$.
Remove chassis connection.
3. Repeat steps 1, 2 on board A2B adjusting A2B R9 and shorting A5 TP2 respectively.

If it is not possible to achieve the above result carry out Table 5-22.

ADJUSTMENTS

Table 5-20. Norm/Compl Adjust

INITIAL CONTROL SETTINGS

PULSE PERIOD 1	1 μ -0.1m	CH B Zs 14	50 Ω
VERNIER 2	CW	CHANNEL SUMMING 16	A sep B
PULSE DELAY 3	20n-1 μ	CH A Zs 18	50 Ω
VERNIER 4	CCW	TRIG POLARITY 22	-
PULSE WIDTH 5	1 μ -0.1m	TRIG INPUT IMPEDANCE 23	-
VERNIER 6	CCW	FUNCTION 24	NORM
TRANSITION TIME 7	6n-0.5 μ	MODE 25	NORM
LEADING EDGE 8	CCW	EXT INPUT LEVEL 26	-
TRAILING EDGE 9	CCW		
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	MAX SYM	Test Equipment:	Short circuit cable
CH A LOWER LEVEL			Digital Voltmeter
CH B UPPER LEVEL 12	MAX SYM		Oscilloscope
CH B LOWER LEVEL			50 Ω Termination
CH B NORM/COMPL 13	NORM		20dB Attenuator

These adjustments equalize norm and compl lower levels.

1. Connect A5 TP1 to GND (see illustration in Table 5-17).
2. Connect a DVM to A2A TP1 (rear side) and chassis (page 5-25).
3. Adjust A2A R60 for 0V \pm 10mV.
4. Remove short-circuit cable and DVM.
5. Connect channel A to oscilloscope.
Set level controls for a symmetrical 4V amplitude signal.
6. Set pulse (in norm mode) to center of display as reference.
7. Switch norm-compl to compl and observe baseline. Adjust A2A R61 for minimum shift (\leq 20mV).
8. Connect channel B to oscilloscope.
9. Repeat step 1 to 7 with A5 TP2 and A2B TP1, R60, R61 respectively.

These adjustments may be verified by performing Table 5-22.

ADJUSTMENTS

Table 5-21. Offset Gain

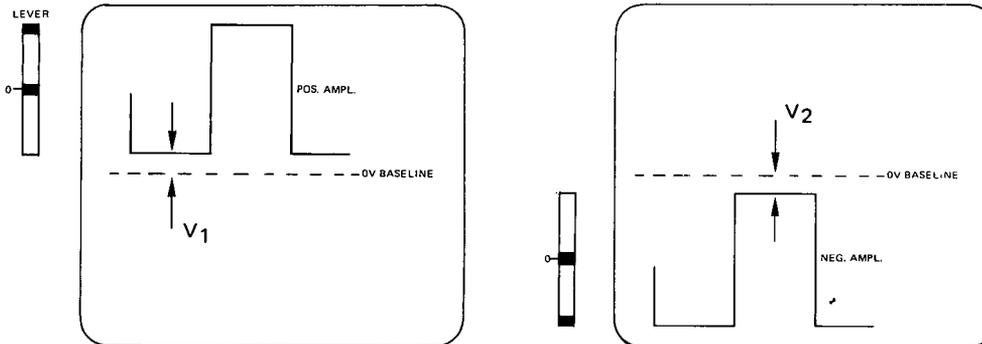
INITIAL CONTROL SETTINGS

PULSE PERIOD 1	$1\mu-0.1m$	CH B NORM/COMPL 13	NORM
VERNIER 2	CW	CH B Zs 14	$50\ \Omega$
PULSE DELAY 3	$20n-1\mu$	CHANNEL SUMMING 16	A sep B
VERNIER 4	CCW	CH A Zs 18	$50\ \Omega$
PULSE WIDTH 5	SQUARE WAVE	TRIG POLARITY 22	-
VERNIER 6	-	TRIG INPUT IMPEDANCE 23	-
TRANSITION TIME 7	$6n-0.5\mu$	FUNCTION 24	-
LEADING EDGE 8	CCW	MODE 25	NORM
TRAILING EDGE 9	CCW	EXT INPUT LEVEL 26	-
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	SEE BELOW		
CH A LOWER LEVEL			
CH B UPPER LEVEL 12			
CH B LOWER LEVEL			

Test Equipment: Oscilloscope
 $50\ \Omega$ Termination
 20dB Attenuator

These adjustments equalize the baseline offsets of the negative and positive output amplifiers.

- Center oscilloscope beam for zero volt reference and apply 8015A channel A to oscilloscope.
- With channel A level controls held at maximum separation, move them repeatedly up and down to the limits shown:



- Adjust A2AR159 (page 5-25) so that the baseline offset voltages V_1 and V_2 are equal.
- Adjust A2AR152 for zero baseline offset. Optimize R159/R152 settings.
- Repeat for channel B.

ADJUSTMENTS

Table 5-22. Pulse Level Adjustments

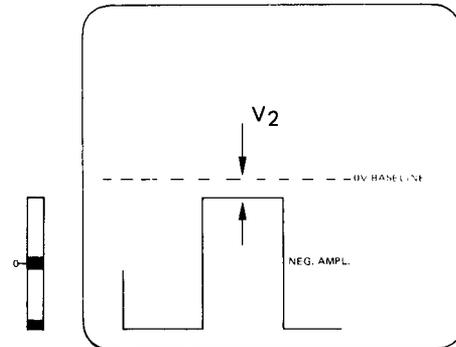
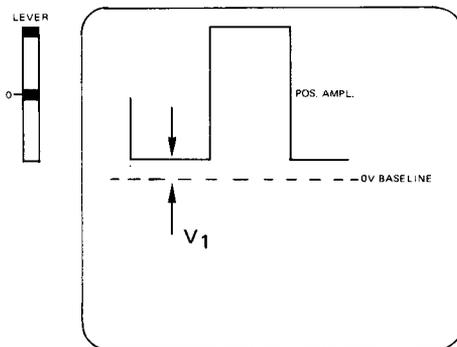
INITIAL CONTROL SETTINGS

PULSE PERIOD 1	1 μ -0.1m	CH B NORM/COMPL 13	NORM
VERNIER 2	CW	CH B Zs 14	50 Ω
PULSE DELAY 3	20n-1 μ	CHANNEL SUMMING 16	A sep B
VERNIER 4	CCW	CH A Zs 18	50 Ω
PULSE WIDTH 5	SQUARE WAVE	TRIG POLARITY 22	-
VERNIER 6	-	TRIG INPUT IMPEDANCE 23	-
TRANSITION TIME 7	6n-0.5 μ	FUNCTION 24	NORM
LEADING EDGE 8	CCW	MODE 25	NORM
TRAILING EDGE 9	CCW	EXT INPUT LEVEL 26	-
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	SEE BELOW		
CH A LOWER LEVEL			
CH B UPPER LEVEL 12	SEE BELOW		
CH B LOWER LEVEL			

Test Equipment: Oscilloscope
50 Ω Termination
20dB Attenuator

These adjustments may be performed instead of Tables 5-19/20/21.

1. Center oscilloscope beam for zero volt reference.
2. Set channel A level controls for max separation with UL max positive.
3. Connect channel A to oscilloscope.
4. Observe display while switching norm/compl.
5. Adjust A2A R9 (page 5-25) for zero change in level when switching norm/compl.
6. Select NORM. Move level controls (max separation) repeatedly up and down from max positive to max negative and back.



7. Adjust A2A R159 for equal and opposite baseline offset voltages ($V_1 = V_2$)
8. Adjust A2A R152 (page 5-25) so that the baseline offset voltages are zero. Optimize R159/R152 settings.
9. Set UL to +4V, LL to zero volts.
10. Adjust low level with A2A R60 to the zero-volt baseline.
11. Switch norm/compl. to compl.
12. Adjust low level with A2A R61 to the zero-volt baseline.
13. Repeat for channel B.

ADJUSTMENTS

Table 5-23. Transition Time, Overshoot

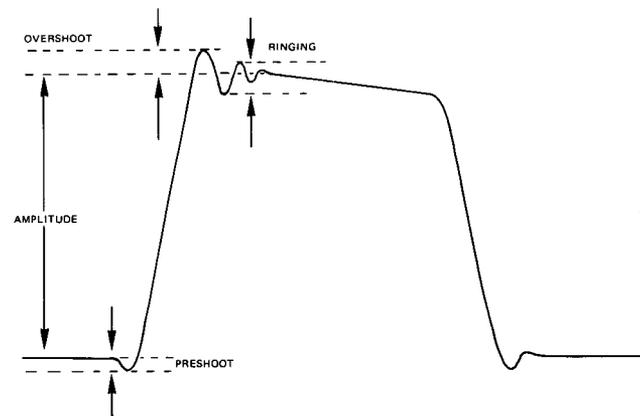
INITIAL CONTROL SETTINGS

PULSE PERIOD 1	20n-1 μ	CH B NORM/COMPL 13	NORM
VERNIER 2	CW	CH B Zs 14	50 Ω
PULSE DELAY 3	20n-1 μ	CHANNEL SUMMING 16	A sep B
VERNIER 4	CCW	CH A Zs 18	50 Ω
PULSE WIDTH 5	SQUARE WAVE	TRIG POLARITY 22	-
VERNIER 6	-	TRIG INPUT IMPEDANCE 23	-
TRANSITION TIME 7	6n-0.5 μ	FUNCTION 24	NORM
LEADING EDGE 8	CCW	MODE 25	NORM
TRAILING EDGE 9	CCW	EXT INPUT LEVEL 26	-
CH A NORM/COMPL 10	NORM		
CH A UPPER LEVEL 11	+4V		
CH A LOWER LEVEL 11	-4V		
CH B UPPER LEVEL 12	+4V		
CH B LOWER LEVEL 12	-4V		

Test Equipment: Sampling Oscilloscope
50 Ω Termination
20dB Attenuator

These adjustments optimize transition and overshoot.

1. Connect channel A to a sampling scope and set scope for best resolution in terms of transition times (10% to 90%).
2. Adjust A2A C22 for a transition time in norm and compl of ≤ 6 ns.
3. Set UL/LL to +4.0V/-4.0V.
4. Measure overshoot, ringing $\leq \pm 5\%$.
5. If necessary, re-adjust A2A C22 for the best compromise between steps 2 and 4.
6. Connect channel B to the sampling scope.
7. Repeat steps 2 to 5 with A2B C22 respectively.



ADJUSTMENTS

Table 5-24. B-Del Baseline Adjust

INITIAL CONTROL SETTINGS

- PULSE PERIOD 1
 - VERNIER 2
 - PULSE DELAY 3
 - VERNIER 4
 - PULSE WIDTH 5
 - VERNIER 6
 - TRANSITION TIME 7
 - LEADING EDGE 8
 - TRAILING EDGE 9
 - CH A NORM/COMPL 10
 - CH A UPPER LEVEL 11
 - CH A LOWER LEVEL 12
 - CH B UPPER LEVEL 13
 - CH B LOWER LEVEL 14
 - CH B Zs 15
 - CHANNEL SUMMING 16
 - CH A Zs 18
 - TRIG POLARITY 22
 - TRIG INPUT IMPEDANCE 23
 - FUNCTION 24
 - MODE 25
 - EXT INPUT LEVEL 26
- Test Equipment:** Oscilloscope
50 Ω Termination
20dB Attenuator

This adjustment equalizes A and B gate levels at the amplifier input.

1. Connect channel A to the scope. Set sensitivity to 100mV/div.
2. Adjust A2A R14 for a minimum baseline step of channel A pulse train.
3. Connect channel B to scope.
4. Adjust A2B R14 for a minimum baseline step of channel B pulse train.

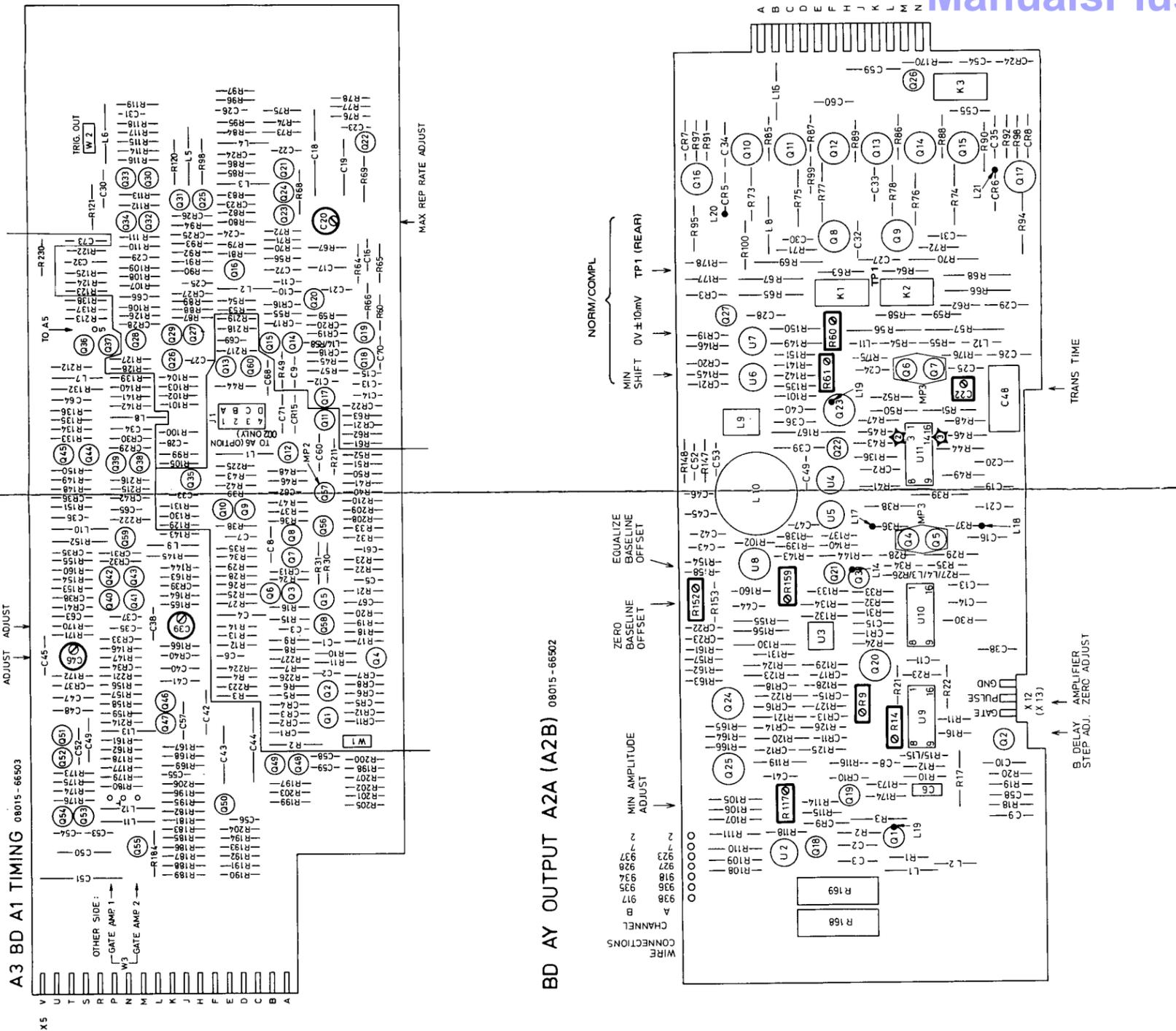
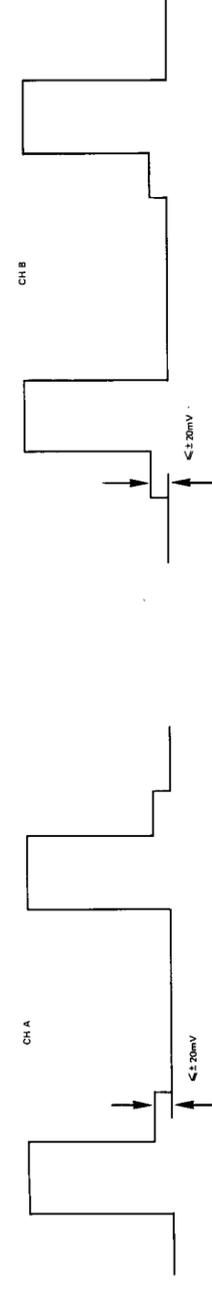


Figure 5-1. Location of A2 and A3 Adjustments

6-1 GENERAL

6-2 This section is organized as follows:

- a. Illustrated parts breakdowns for chassis mounted parts for standard instrument and options.
- b. Chassis mounted parts in alphanumeric order by reference designator.
- c. Electrical assemblies and their components in alphanumeric order by reference designator for the standard instrument.

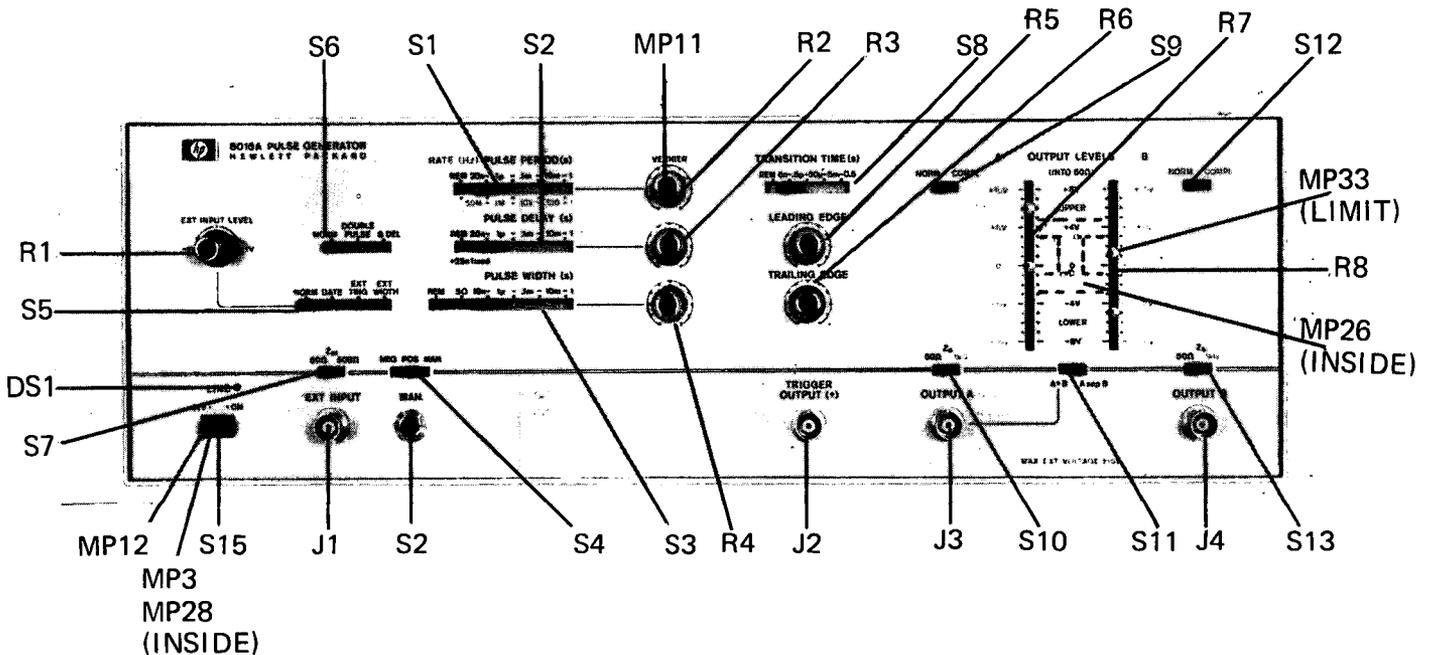
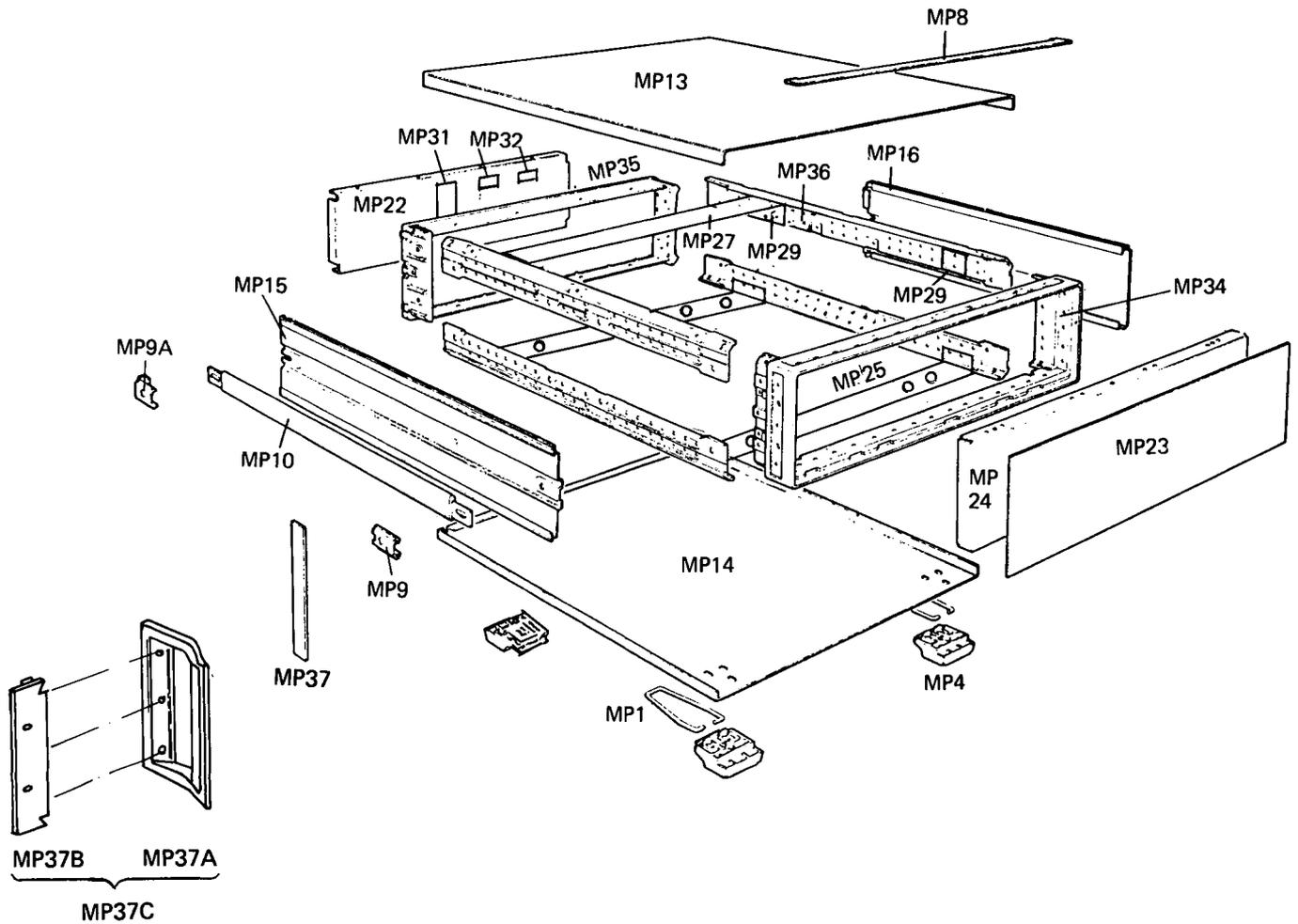
6-3 The information given for each part consists of the following:

- a. The Hewlett-Packard part number.
- b. The total quantity (Qty) in the instrument. This is given only once for each part — at the first appearance of the part in the list.
- c. The description of the part.
- d. A typical manufacturer of the part in a five-digit code.
- e. The manufacturers' part number. The manufacturers' code numbers, names and addresses are listed at the beginning of the parts list (page 6-7) followed by list of abbreviations used in the parts list. Refer to Table 9-1 for the reference designator.

6-4 ORDERING INFORMATION

6-5 To order a part listed in the replaceable parts table, quote the Hewlett-Packard part number, indicate the quantity required, and address the order to the nearest Hewlett-Packard office (list of Sales/Service offices at the rear of the manual).

6-6 To order a part that is not listed in the replaceable parts table, include the instrument model number, instrument serial number, the description and function of the part, and the number of parts required. Address the order to the nearest Hewlett-Packard office.



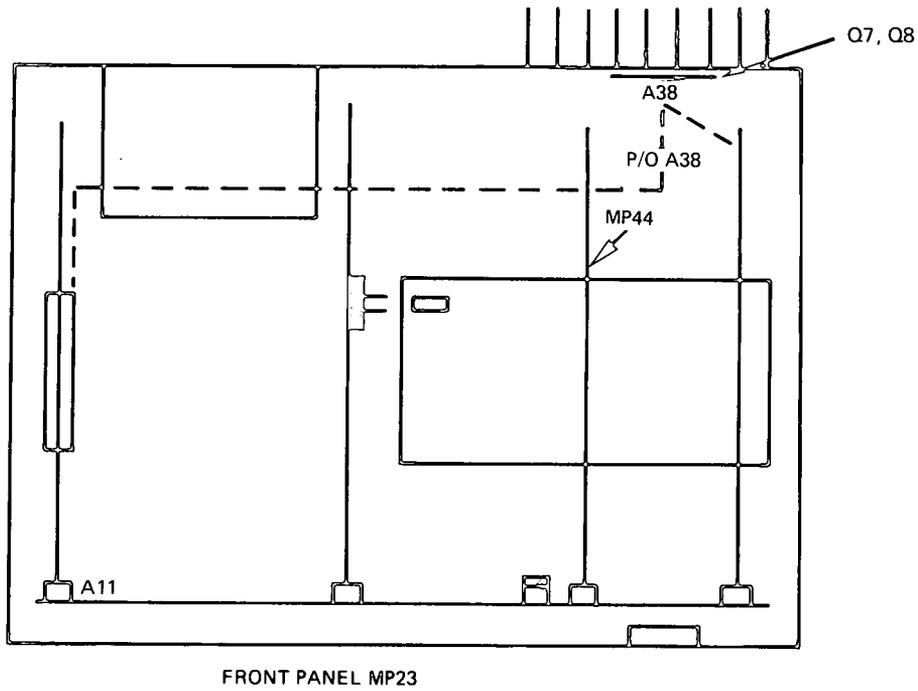


Figure 6-2. Location of changed parts and assemblies for 8015A Option 001

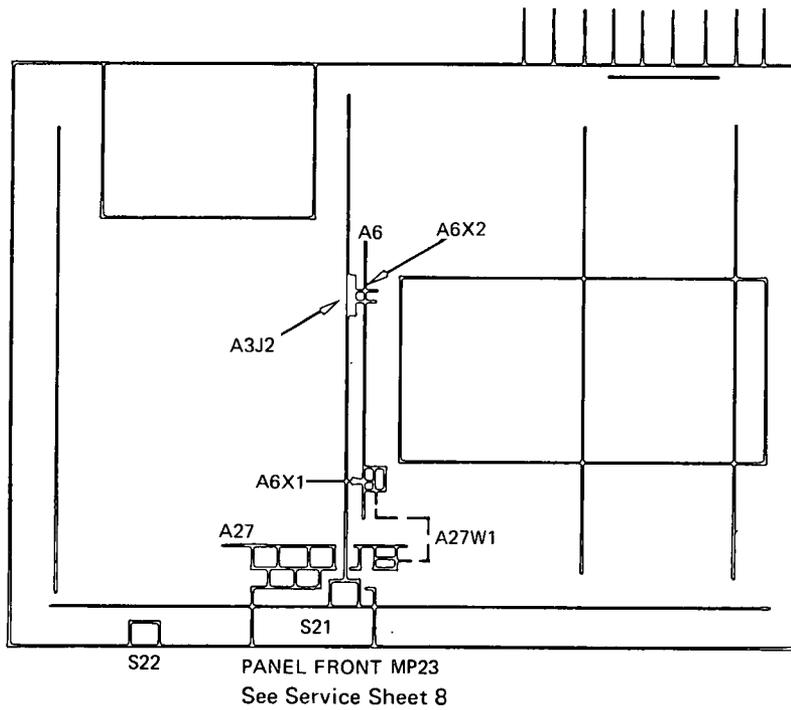


Figure 6-3. Location of additional/changed parts and assemblies for 8015A Option 002.

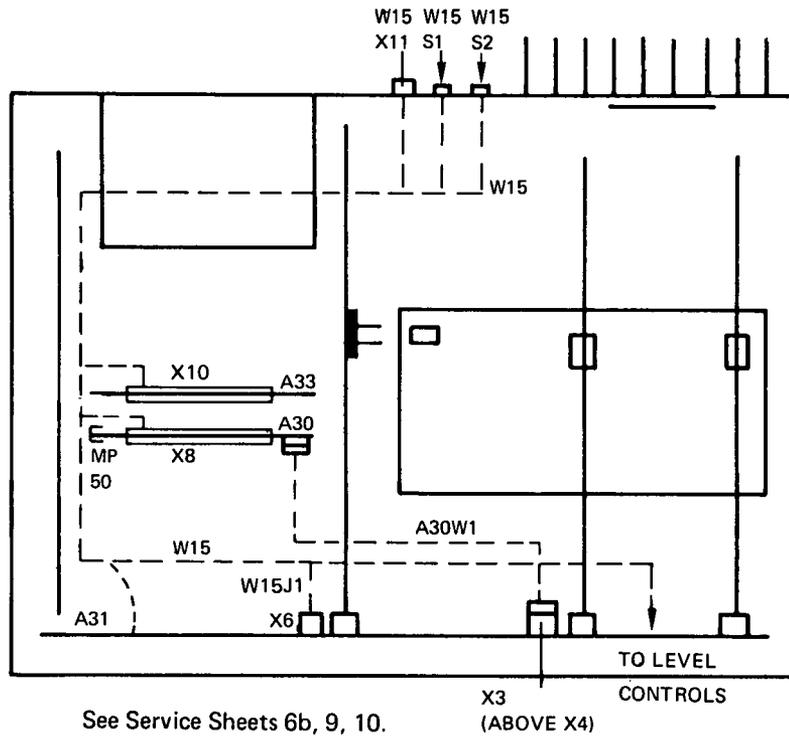


Figure 6-4. Location of additional parts and assemblies for 8015A option 003

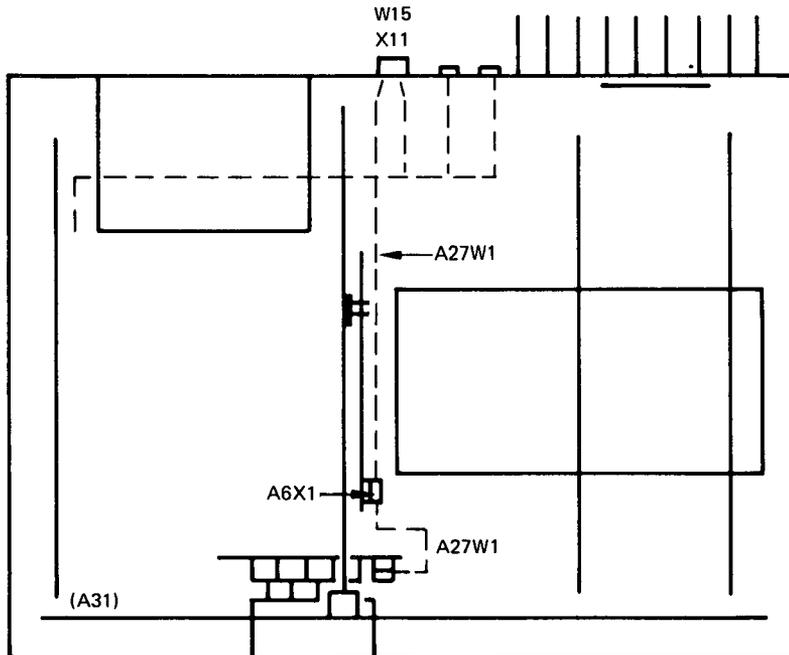
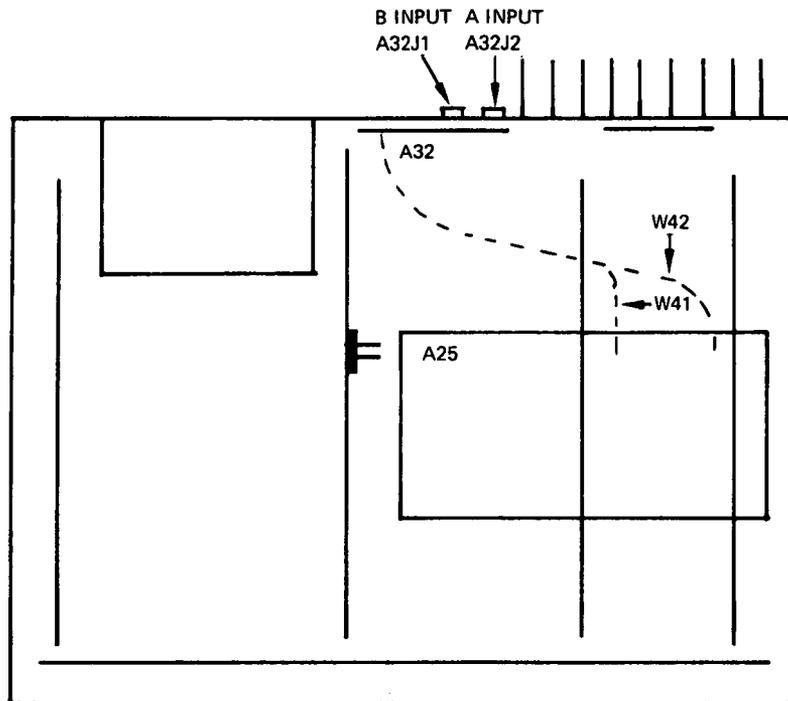
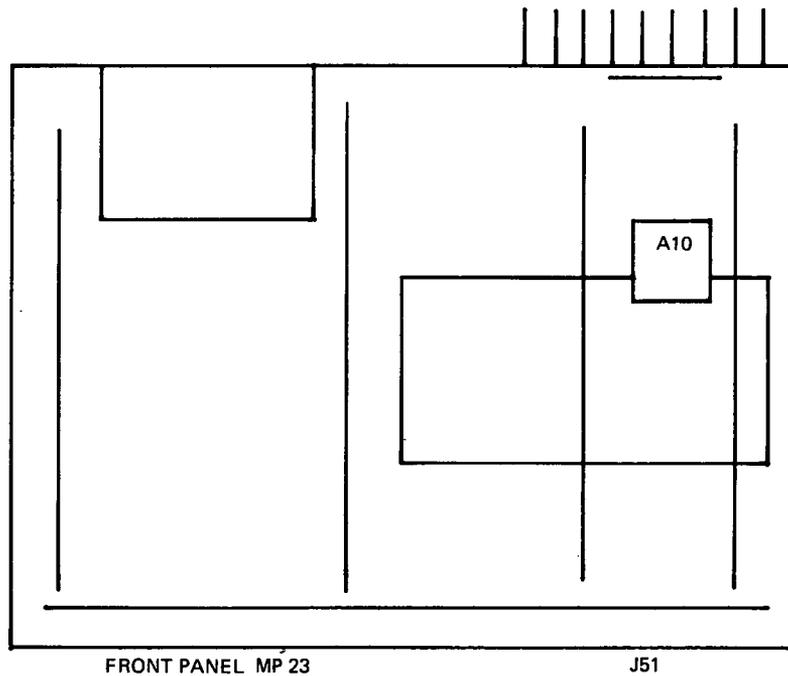


Figure 6-5. Ribbon cable for 8015A option 002 + 003



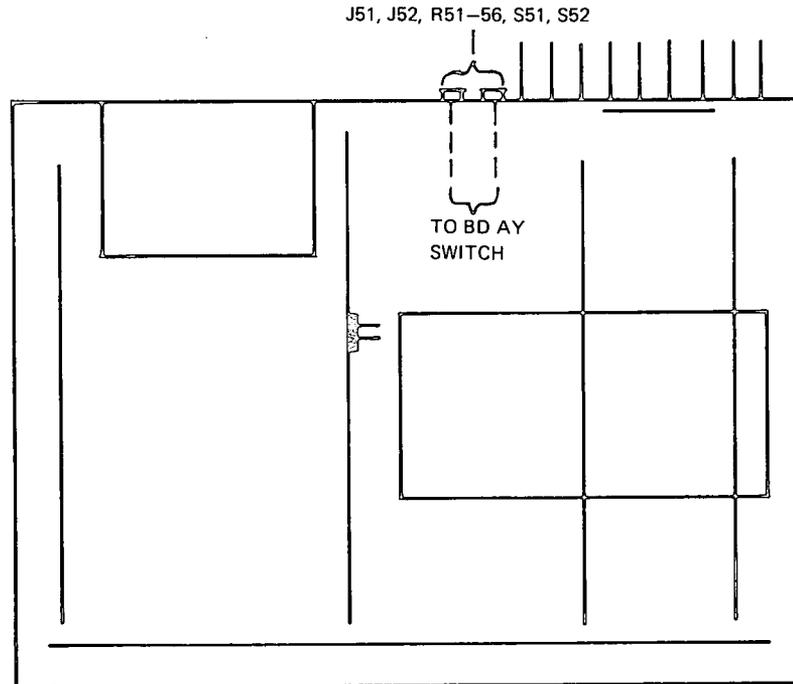
See Service Sheet 4

Figure 6-6. Location of additional/changed parts and assemblies for 8015A Option 004



See Service Sheet 4

Figure 6-7. Location of additional/changed parts and assemblies for 8015A option 005



See Service Sheet 6

Figure 6-8. Location of additional parts for 8015A Option 006

Table 6-1. Manufacturers' Codes

MFR NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
FR003	SDVCOR ELECTRONIQUE	LE VESINET FRANCE	77
FR009	GAM	MEAUX FRANCE	8000
GM032	SIEMENS AG	MUNICH GERMANY	
SM005	CONDENSATEURS FRIBOURG, SA	FRIBOURG, SWITZERLAND	
0002U	UNITRODE COMPUTER PRODUCTS CORP	METHUEN MA	13035
00865	STETTNER-TRUSH INC	CAZENOVIA NY	53212
01121	ALLEN-BRADLEY CO	MILWAUKEE WI	75231
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS TX	12477
02114	FERROXCUBE CORP	SAUGERTIES NY	08876
02735	RCA CORP SOLID STATE DIV	SOMMerville NJ	07981
03888	KOI PYROFILM CORP	WHIPPANY NJ	85008
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	91401
07088	KELVIN ELECTRIC CO	VAN NUYS CA	94040
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	52601
07716	TRW INC BURLINGTON DIV	BURLINGTON IA	03820
12697	CLAROSTAT MFG CO INC	DOVER NH	75247
13103	THERMALLOY CO	DALLAS TX	94040
15818	TELEDYNE SEMICONDUCTOR	MOUNTAIN VIEW CA	27604
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	76067
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	95050
23880	STANFORD APPLIED ENGINEERING INC	SANTA CLARA CA	14070
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	16701
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	95051
27014	NATIONAL SEMICONDUCTOR CORP	SANTA CLARA CA	28401
27167	CORNING GLASS WORKS (WILMINGTON)	WILMINGTON NC	60515
27264	MOLEX PRODUCTS CO	DOWNERS GROVE IL	94304
28480	HEWLETT-PACKARD CO CORPORATE HQ	PALO ALTO CA	92507
32997	BOURNS INC TRIMPGT PROU DIV	RIVERSIDE CA	01247
56289	SPRAGUE ELECTRIC CO	NORTH ADAMS MA	63017
71400	BUSSMAN MFG DIV OF MCGRAW-EDISON CO	ST LOUIS MO	92702
71468	ITT CANNON ELECTRIC CO	SANTA ANA CA	60640
71744	CHICAGO MINIATURE/DRAKE	CHICAGO IL	60007
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	06226
72136	ELECTRO MOTIVE MFG CO INC	WILLIMANTIC CT	92634
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	FULLERTON CA	60016
75915	LITTELFUSE INC	DES PLAINES IL	18974
79727	C-W INDUSTRIES	WARMINSTER PA	60630
82389	SWITCHCRAFT INC	CHICAGO IL	69153
84411	TRW CAPACITOR DIV	OGALLALA NE	63042
90949	AMPHENOL SALES DIV OF BUNKER-RAMO	HAZELWOOD MO	68601
91637	DALE ELECTRONICS INC	COLUMBUS NE	

Table 6-2. Abbreviations for Replaceable Parts List

A	AMPERE(S)	K	KILO (10 ³)	RECT	RECTIFIER(S)
ASSY	ASSEMBLY	KG	KILOGRAM	RF	RADIO FREQUENCY
				RFI	RADIO FREQUENCY INTERFERENCE
BD	BOARD(S)	LB	POUND(S)	RH	ROUND HEAD
BH	BINDER HEAD	LH	LEFT HAND		OR
BP	BANDPASS	LIN	LINEAR TAPER		RIGHT HAND
		LOG	LOGARITHMIC TAPER	RMO	RACK MOUNT ONLY
C	CENTI (10 ⁻²)	LPG	LOW-PASS FILTER(S)	RMS	ROOT MEAN SQUARE
	CERMET	LVR	LEVER	RWV	REVERSE WORKING VOLTAGE
CAR	CARBON				
CC	CARBON COMPOSITION	M	MILLI (10 ⁻³)		
CCW	COUNTERCLOCKWISE	MEG	MEGA (10 ⁶)		
CER	CERAMIC	MET FILM	METAL FILM	S-B	SLOW-BLOW
CMO	CABINET MOUNT ONLY	MET OX	METAL OXIDE	SCR	SILICON CONTROLLED RECTIFIER
COAX	COAXIAL	MFR	MANUFACTURER	SE	SELENIUM
COEF	COEFFICIENT	MINAT	MINIATURE	SEC	SECOND(S)
COMP	COMPOSITION	MOM	MOMENTARY	SECT	SECTION(S)
CONN	CONNECTOR(S)	MTG	MOUNTING	SI	SILICON
CRT	CATHODE-RAY TUBE	MY	MYLAR	SIL	SILVER
CW	CLOCKWISE			SL	SLIDE
				SP	SINGLE POLE
D	DECI (10 ⁻¹)	N	NANO (10 ⁻⁹)	SPL	SPECIAL
DEPC	DEPOSITED CARBON	N/C	NORMALLY CLOSED	ST	SINGLE THROW
DP	DOUBLE POLE	NE	NEON	STD	STANDARD
DT	DOUBLE THROW	N/O	NORMALLY OPEN		
		NOF	NEGATIVE POSITIVE ZERO (ZERO TEMPERATURE COEFFICIENT)		
ELECT	ELECTROLYTIC	NPN	NEGATIVE-POSITIVE-NEGATIVE	TA	TANTALUM
ENCAP	ENCAPSULATED	NSR	NOT SEPARATELY REPLACEABLE	TC	TEMPERATURE COEFFICIENT
EXT	EXTERNAL			TD	TIME DELAY
				TFL	TEFLON
F	FARAD(S),			TGL	TOGGLE
	METAL FILM (FOR RESISTORS)	OBD	ORDER BY DESCRIPTION	THYR	THYRISTOR
FC	CARBON FILM/COMPOSITION	OH	OVAL HEAD	TI	TITANIUM
FET	FIELD-EFFECT TRANSISTOR(S)	OX	OXIDE	TNLDIO	TUNNEL DIODE(S)
FT	TRANSIT FREQUENCY			TOL	TOLERANCE
				TRIM	TRIMMER
FH	FLAT HEAD				
FIL H	FILLISTER HEAD	P	PEAK	U	MICRO (10 ⁻⁶)
FXD	FIXED	PC	PRINTED (ETCHED) CIRCUIT(S)		
		PD	POWER DISSIPATION		
G	GIGA (10 ⁹)	PF	PICOFARADS	V	VOLTS
GE	GERMANIUM	PHL	PHILLIPS	VAR	VARIABLE
GL	GLASS	PIV	PEAK INVERSE VOLTAGE(S)	VDCW	DC WORKING VOLT(S)
GRD	GROUNDED	PNP	POSITIVE-NEGATIVE-POSITIVE		
		P/O	PART OF		
H	HENRY(IES)	PORC	PORCELAIN	W	WATT(S)
HG	MERCURY	POS	POSITION(S)	W/	WITH
HP	HEWLETT-PACKARD	POT	POTENTIOMETER(S)	WIV	WORKING INVERSE VOLTAGE
HZ	HERTZ	P-P	PEAK-TO-PEAK	W/O	WITHOUT
		PRGM	PROGRAM	WVDC	WORKING VOLTAGE
IF	INTERMEDIATE FREQ.	PS	POLYSTYRENE		DIRECT CURRENT
IMPG	IMPREGNATED	PWV	PEAK WORKING VOLTAGE	WW	WIREWOUND
INCD	INCANDESCENT				
INCL	INCLUDE(S)				
INS	INSULATION(ED)				
INT	INTERNAL				

Table 6-3. Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2A	08015-66502	2	BOARD ASSEMBLY, OUTPUT	28480	08015-66502
A2B	08015-66502		BOARD ASSEMBLY, OUTPUT	28480	08015-66502
A3	08015-66503	1	BOARD ASSEMBLY, TIMING	28480	08015-66503
A5	08015-66505	1	BOARD ASSEMBLY, INTEGRATOR	28480	08015-66505
A21	08015-66521	1	BOARD ASSEMBLY, SWITCH	28480	08015-66521
A24	08015-66524	1	BOARD ASSEMBLY, POWER SUPPLY	28480	08015-66524
A28	08015-66528	1	BOARD ASSEMBLY, RESISTOR	28480	08015-66528
C1	0180-1919	2	CAPACITOR-FXD 5000UF+75-10% 45VDC AL	28480	0180-1919
C2	0180-1919		CAPACITOR-FXD 5000UF+75-10% 45VDC AL	28480	0180-1919
C3	0180-1949	2	CAPACITOR-FXD 5500UF+75-10% 40VDC AL	56289	3605526040AC2A
C4	0180-1944		CAPACITOR-FXD 5500UF+75-10% 40VDC AL	56289	3605526040AC2A
DS1	2140-0346	1	LAMP-INCAND T-1 BULB 5V	71744	7210(ANSI 7210)
F1	2110-0007	1	FUSE, 1A 250V SLO-BLO 1.25 X .25 IEC	71400	AGC-1
F1	2110-0303	1	FUSE 2A 250V SLO-BLO 1.25X.25 UL IEC	71400	MDX-2A
F1	2110-0465	1	FUSEHOLDER-EXTR POST UL/IEC .25X1.25FUSE	28480	2110-0465
F1	2110-0467	1	NUT, HEX SINGLE CHAMFER 1/2-28 THREAD	75915	903-070
F1	2110-0470	1	FUSEHOLDER-EXTR POST 20A 200V UL/IEC	75915	345003-010
FL1	9100-3121	1	FILTER-LINE CEE-TERMS	28480	9100-3121
J1	1251-0118	4	CONNECTOR 6-PIN M CIRC K	71468	WK-6-325
J2	1251-0118		CONNECTOR 6-PIN M CIRC K	71468	WK-6-325
J3	1251-0118		CONNECTOR 6-PIN M CIRC K	71468	WK-6-325
J4	1251-0118		CONNECTOR 6-PIN M CIRC K	71468	WK-6-325
MP1	1460-1345	1	WIREFORM 1.34-W 3-LG SST	28480	1460-1345
MP2	5000-8915	1	COVER TRANSFORMER	28480	5000-8915
MP3	5040-1124	1	KNOB PUSHBUTTON POWER	28480	5040-1124
MP4	5040-7201	1	FOOT (STANDARD)	28480	5040-7201
MP8	5040-7202	1	TRIM STRIP TOP	28480	5040-7202
MP9	5040-7219	1	CAP. HANDLE, FRONT	28480	5040-7219
MP9A	5040-7220	1	CAP. HANDLE, REAR	28480	5040-7220
MP10	5060-9802	1	STRAP HANDLE AY	28480	5060-9802
MP11	0370-1005	1	KNOB-BASE-PTR .375 IN JGK SGI-DECAL	28480	0370-1005
MP12	0370-0914	1	BEZEL-PUSHBUTTON KNOB, JADE GREY	28480	0370-0914
MP13	08015-04102	1	COVER, TOP	28480	08015-04102
MP14	08015-04103	1	COVER, BOTTOM	28480	08015-04103
MP15	5060-9935	1	COVER, SIDE	28480	5060-9935
MP16	5060-9910	1	COVER, SIDE	28480	5060-9910
MP19	08015-21103	1	HEAT SINK	28480	08015-21103
MP21	08015-00101	1	DECK, CAPACITOR	28480	08015-00101
MP22	08015-00214	1	PANEL, REAR	28480	08015-00214
MP23	08015-00206	1	PANEL, FRONT	28480	08015-00206
MP24	08015-00207	1	PANEL, SUB	28480	08015-00207
MP25	08015-01201	1	BRACKET, BOARD P.C.	28480	08015-01201
MP26	08015-01202	1	CLAMP, RESISTOR, VAR.	28480	08015-01202
MP27	08015-01203	1	BRACKET, P.C. BOARD	28480	08015-01203
MP28	08015-01205	1	PLATE, MOUNTING	28480	08015-01205
MP29	08015-04105	1	PLATE	28480	08015-04105
MP30	08015-04106	1	COVER, CAPACITOR	28480	08015-04106
MP31	08015-04107	1	LANK, CONNECTOR, HOLE	28480	08015-04107
MP32	08015-04108	1	BLANK, SWITCH, HOLE	28480	08015-04108
MP33	08015-06301	1	PLATE, LIMIT	28480	08015-06301
MP34	5020-8803	1	FRAME, FRONT	28480	5020-8803
MP35	5020-8804	1	FRAME, REAR	28480	5020-8804
MP36	5020-8835	1	CORNER STRUTS	28480	5020-8835
MP37	5001-0439	1	TRIM, FRONT SIDE	28480	5001-0439
MP37A	5061-0089		HANDLE KIT (OPTION 907)		
MP37B	5061-0077		RACK FLANGE KIT (OPTION 908)		
MP37C	5061-0083		RACK FLANGE WITH FRONT HANDLE KIT (OPTION 909)		
Q1	1853-0251	5	TRANSISTOR PNP SI PD=90W FT=2MHZ	28480	1853-0251
Q2	1853-0251		TRANSISTOR PNP SI PD=90W FT=2MHZ	28480	1853-0251
Q3	1853-0251		TRANSISTOR PNP SI PD=90W FT=2MHZ	28480	1853-0251
Q4	1854-0433	5	TRANSISTOR NPN SI PD=90W FT=2MHZ	28480	1854-0433
Q5	1854-0433		TRANSISTOR NPN SI PD=90W FT=2MHZ	28480	1854-0433
Q6	1854-0433		TRANSISTOR NPN SI PD=90W FT=2MHZ	28480	1854-0433
Q7	1854-0433		TRANSISTOR NPN SI PD=90W FT=2MHZ	28480	1854-0433
Q8	1853-0251		TRANSISTOR PNP SI PD=90W FT=2MHZ	28480	1853-0251
Q9	1854-0433		TRANSISTOR NPN SI PD=90W FT=2MHZ	28480	1854-0433
Q10	1853-0251		TRANSISTOR PNP SI PD=90W FT=2MHZ	28480	1853-0251
R1	2100-2290	1	RESISTOR-VAR CONTROL CC 500 10% LIN	12697	382
R2	2100-3081	5	RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R3	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R4	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R5	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M

Replaceable Parts - Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number	
R6	2100-3041	2	RESISTOR-VAR CONTROL CO 5K 1% 10W	12697	SERIES 63M	
R7	5080-0966		RESISTOR, VAR 1K OHM/INCH	28480	5080-0966	
R8	5080-0966		RESISTOR, VAR 1K OHM/INCH	28480	5080-0966	
S2	3101-0126	1	NUT-BEVD FOR 1/4-32 THD BUSHINGS; BRASS	28480	3101-0126	
S2	3101-0124	1	SWITCH-PB SPST NC MOM	82389	962	
S15	3101-1720	1	SWITCH-PB UPDT P-P 4A 250VAC	28480	3101-1720	
S16	3101-1740	2	SWITCH-SL DPDT-NS STD 1.5A 250VAC SLDR	86845	4021.0211	
S17	3101-1740		SWITCH-SL DPDT-NS STD 1.5A 250VAC SLDR	86845	4021.0211	
T1	08015-61101	1	TRANSFORMER, POWER	28480	08015-61101	
W3	08015-61602	1	CABLE ASSEMBLY, POWER	28480	08015-61602	
W4	08015-61609	1	CABLE ASSEMBLY, GATE	28480	08015-61609	
A2	08015-66502	1	BOARD ASSEMBLY, OUTPUT	28480	08015-66502	
A2C2	0160-0174	52	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C3	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C4	0160-4210	12	CAPACITOR-FXD .022UF +20% 50WVDC POLYE	28480	0160-4210	
A2C5	0140-0192		CAPACITOR-FXD 68PF +-5% 300WVDC MICA	72136	DM15E680J0300WV1CR	
A2C9	0160-0174	1	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C10	0160-0174	1	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C11	0160-2265		CAPACITOR-FXD 22PF +-5% 500WVDC CER	28480	0160-2265	
A2C13	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C14	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C15	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C16	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C19	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C20	0160-0174	1	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C21	0160-0174	1	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C22	0121-0105		CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304324 9/35PF N650	
A2C24	0160-4209	17	CAPACITOR-FXD .01UF +-2% 50WVDC POLYE	28480	0160-4209	
A2C25	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209	
A2C26	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C27	0160-2306		1	CAPACITOR-FXD 27PF +-5% 300WVDC MICA	28480	0160-2306
A2C28	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C29	0160-0174	4	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C30	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	93790	RD15F101J3C	
A2C31	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	93790	RD15F101J3C	
A2C32	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C33	0160-0174	1	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C34	0160-0174	3	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C35	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C36	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C38	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	1500336X901082	
A2C39	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	1500336X901082	
A2C40	0160-0174	1	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C41	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C42	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C43	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174	
A2C44	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209	
A2C45	0160-4211	4	CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0160-4211	
A2C46	0160-4211		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0160-4211	
A2C47	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	93790	RD15F101J3C	
A2C48	0160-3720	1	CAPACITOR-FXD .1UF +-10% 160WVDC MET	28480	0160-3720	
A2C49	0160-4209	1	CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209	
A2C52	0160-4210	1	CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210	
A2C53	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210	
A2C54	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209	
A2C55	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209	
A2C56	0160-4211		CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0160-4211	
A2C57	0160-4211	1	CAPACITOR-FXD .047UF +-20% 50WVDC POLYE	28480	0160-4211	
A2C58	0140-0193		CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR	
A2C59	0160-0106		3	CAPACITOR-FXD 60UF+-20% 6VDC TA	56289	1500606X000682
A2C60	0160-0127		1	CAPACITOR-FXD 1UF +-20% 25WVDC CER	28480	0160-0127
A2CR1	1901-0533	6	DIODE-SCHOTTKY	28480	1901-0533	
A2CR2	1901-0533		DIODE-SCHOTTKY	28480	1901-0533	
A2CR3	1901-0040	45	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040	
A2CR4	1901-0620		DIODE-SWITCHING 60V 400MA DO-35	0002U	NDP 258	
A2CR5	1901-0620	2	DIODE-SWITCHING 60V 400MA DO-35	0002U	NDP 250	
A2CR6	1901-0620	1	DIODE-SWITCHING 60V 400MA DO-35	0002U	NDP 250	
A2CR7	1902-0589	2	DIODE-ZNR 10V 2% DO-7 PD=.4W TC=+.066%	28480	1902-0589	
A2CR8	1902-0589		DIODE-ZNR 10V 2% DO-7 PD=.4W TC=+.066%	28480	1902-0589	
A2CR9	1902-3702	1	DIODE-ZNR 2.37V 5% DO-7 PD=.4W TC=-.074%	04713	SZ 10939-2	
A2CR10	1902-3149	1	DIODE-ZNR 9.09V 5% DO-7 PD=.4W TC=+.057%	04713	SZ 10939-170	
A2CR11	1901-0040	1	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040	

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Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2CR12	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR13	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR14	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR15	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR16	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR18	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR19	1901-0033	27	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR20	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR21	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A2CR22	1902-3203	2	DIODE-ZNR 14.7V 5% DO-7 PD=.4W TC=+.057%	04713	SZ 10939-230
A2CR23	1902-3203		DIODE-ZNR 14.7V 5% DO-7 PD=.4W TC=+.057%	04713	SZ 10939-230
A2CR24	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2CR29	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A2K1	0490-0617	2	RELAY-REED IC 250MA 28VDC 5VDC-COIL	28480	0490-0617
A2K2	0490-0617		RELAY-REED IC 250MA 28VDC 5VDC-COIL	28480	0490-0617
A2K3	0490-1079	1	RELAY-REED 1A .5A 100V COUNT 5V-COIL	28480	0490-1079
A2L1	9140-0210	3	COIL-FXD MOLDED RF CHOKE 100UH 5%	24226	15/103
A2L2	08015-86003	3	COIL	28480	08015-86003
A2L3	9100-0346	2	COIL-FXD MOLDED RF CHOKE .75UH 20%	28480	9100-0346
A2L4	9100-0346		COIL-FXD MOLDED RF CHOKE .75UH 20%	28480	9100-0346
A2L5	9140-0210		COIL-FXD MOLDED RF CHOKE 100UH 5%	24226	15/103
A2L9	08015-86001	1	COIL	28480	08015-86001
A2L10	08015-86002	1	COIL	28480	08015-86002
A2L11	08015-86003		COIL	28480	08015-86003
A2L12	08015-86003		COIL	28480	08015-86003
A2L14	9170-0029	9	CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A2L15	9100-2249	2	COIL-FXD MOLDED RF CHOKE .15UH 10%	24226	10/150
A2L16	9140-0210		COIL-FXD MOLDED RF CHOKE 100UH 5%	24226	15/103
A2L17	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A2L18	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A2L19	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A2L20	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A2L21	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A2MP1	08015-21101	1	HEAT SINK	28480	08015-21101
A2MP2	1205-0236	2	INSULATOR-XSTR TO-5 .075-THK	13103	7717-86N RED
A2MP3	1205-0236	1	HEAT-DISSIPATOR DUAL TO-18 PKG	28480	1205-0204
A2MP4	1205-0236	1	ADAPTER-TRANSISTOR CASE TO-5	28480	1205-0236
A2Q1	1854-0330	5	TRANSISTOR NPN SI TO-18 PD=360MW	04713	SS2077
A2Q2	1854-0335	12	TRANSISTOR NPN SI TO-18 PD=200MW	04713	2N5179
A2Q3	1853-0357	30	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A2Q4	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A2Q5	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A2Q6	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A2Q7	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A2Q8	1854-0344	1	TRANSISTOR NPN SI TO-39 PD=700MW	28480	1854-0344
A2Q9	1853-0315	1	TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0315
A2Q10	1853-0312	3	TRANSISTOR PNP SI TO-39 PD=5W FT=500MHZ	28480	1853-0312
A2Q11	1853-0312		TRANSISTOR PNP SI TO-39 PD=5W FT=500MHZ	28480	1853-0312
A2Q12	1853-0312		TRANSISTOR PNP SI TO-39 PD=5W FT=500MHZ	28480	1853-0312
A2Q13	1854-0612	3	TRANSISTOR NPN SI TO-39 PD=3.5W	02735	40608
A2Q14	1854-0612		TRANSISTOR NPN SI TO-39 PD=3.5W	02735	40608
A2Q15	1854-0612		TRANSISTOR NPN SI TO-39 PD=3.5W	02735	40608
A2Q16	1853-0051	1	TRANSISTOR PNP 2N4037 SI TO-5 PD=1W	02735	2N4037
A2Q17	1854-0274	8	TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A2Q18	1854-0367	7	TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A2Q19	1853-0090	10	TSTR:SI PNP	28480	1853-0090
A2Q20	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A2Q21	1853-0090		TSTR:SI PNP	28480	1853-0090
A2Q22	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A2Q23	1853-0012	4	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A2Q24	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A2Q25	1854-0254	1	TRANSISTOR NPN SI TO-5 PD=800MW	28480	1854-0254
A2Q26	1853-0090		TSTR:SI PNP	28480	1853-0090
A2Q27	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A2R1	0757-0421	4	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A2R2	0757-0384	12	RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A2R3	0758-3002	3	RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A2R9	2100-2787	2	RESISTOR, VAR 220 OHM 20% C LIN 0.5W	28480	2100-2787
A2R10	0757-0434	1	RESISTOR 3.65K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3651-F
A2R11	0757-0401	45	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A2R12	0757-0276	5	RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A2R14	2100-2787		RESISTOR, VAR 220 OHM 20% C LIN 0.5W	28480	2100-2787
A2R15	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A2R16	0757-0402	6	RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F

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Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2R17	0757-0382	1	RESISTOR 16.2 1% .125W F TC=0+-100	19701	MF4C1/8-T0-16R2-F
A2R18	0698-3442	2	RESISTOR 237 1% .125W F TC=0+-100	16299	C4-1/8-T0-237R-F
A2R19	0757-0397	1	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A2R20	0698-3437	1	RESISTOR 133 1% .125W F TC=0+-100	16299	C4-1/8-T0-133R-F
A2R21	0757-0384	1	RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A2R22	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A2R23	0757-0280	30	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A2R24	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A2R26	0757-0400	9	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R27	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R28	0757-0346	30	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R29	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R30	0757-0394	14	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A2R31	0757-0417	7	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A2R32	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A2R33	0698-3441	1	RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
A2R34	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A2R35	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A2R36	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R37	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R38	0757-0809	2	RESISTOR 332 1% .5W F TC=0+-100	19701	MF7C1/2-T0-332R-F
A2R39	0757-0809		RESISTOR 332 1% .5W F TC=0+-100	19701	MF7C1/2-T0-332R-F
A2R41	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A2R43	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R44	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R45	0757-0388	10	RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A2R46	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A2R47	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R48	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R49	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A2R50	0698-3431	2	RESISTOR 23.7 1% .125W F TC=0+-100	03888	PME55-1/8-T0-23R7-F
A2R51	0698-3431		RESISTOR 23.7 1% .125W F TC=0+-100	03888	PME55-1/8-T0-23R7-F
A2R52	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R54	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R55	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R56	0698-5031	2	RESISTOR 160 1% .5W F TC=0+-100	24546	NA6
A2R57	0698-5031		RESISTOR 160 1% .5W F TC=0+-100	24546	NA6
A2R58	0757-0437	11	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A2R59	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A2R60	2100-2788	4	RESISTOR, VAR 4.7K OHM 20% C LIN 0.5W	28480	2100-2788
A2R61	2100-2788		RESISTOR, VAR 4.7K OHM 20% C LIN 0.5W	28480	2100-2788
A2R62	0757-0444	8	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A2R63	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R64	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R65	0757-0794	4	RESISTOR 68.1 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-68R1-F
A2R66	0757-0794		RESISTOR 68.1 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-68R1-F
A2R67	0757-0794		RESISTOR 68.1 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-68R1-F
A2R68	0757-0794		RESISTOR 68.1 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-68R1-F
A2R69	0698-6792	2	RESISTOR 37.5 .5% .25W F TC=0+-50	07716	CCA-993
A2R70	0698-6792		RESISTOR 37.5 .5% .25W F TC=0+-50	07716	CCA-993
A2R71	0757-0416	2	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A2R72	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A2R73	0758-0013	9	RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A2R74	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A2R75	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A2R76	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A2R77	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A2R78	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A2R79	0761-0046	6	RESISTOR 110 5% 1W MO TC=0+-200	24546	FP32-1-T00-111-J
A2R80	0761-0046		RESISTOR 110 5% 1W MO TC=0+-200	24546	FP32-1-T00-111-J
A2R81	0761-0046		RESISTOR 110 5% 1W MO TC=0+-200	24546	FP32-1-T00-111-J
A2R82	0761-0046		RESISTOR 110 5% 1W MO TC=0+-200	24546	FP32-1-T00-111-J
A2R83	0761-0046		RESISTOR 110 5% 1W MO TC=0+-200	24546	FP32-1-T00-111-J
A2R84	0761-0046		RESISTOR 110 5% 1W MO TC=0+-200	24546	FP32-1-T00-111-J
A2R85	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R86	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R87	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R88	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R89	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R90	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R91	0757-0415	5	RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A2R92	0757-0415		RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A2R93	0758-0023	3	RESISTOR 240 5% .25W F TC=0+-100	24546	C5-1/4-T0-241-J
A2R94	0758-0023		RESISTOR 240 5% .25W F TC=0+-100	24546	C5-1/4-T0-241-J
A2R95	0811-1202	2	RESISTOR 50 5% 3W PW TC=0+-20	07088	KM-300

Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2R96	0811-1202		RESISTOR 50 5% 3W PW TC=0+-20	07088	KM-300
A2R97	0698-3443	2	RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A2R98	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A2R99	0757-0420	5	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A2R100	0757-0290	3	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A2R101	0757-0426	7	RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A2R102	0757-0273	5	RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A2R105	0757-0461	3	RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R106	0698-3162	2	RESISTOR 46.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4642-F
A2R107	0757-0443	5	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A2R108	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A2R109	0757-0461		RESISTOR 68.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A2R110	0698-3162		RESISTOR 46.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4642-F
A2R111	0758-0030	1	RESISTOR 510 5% .25W F TC=0+-100	24546	C5-1/4-T0-511-J
A2R114	0757-0412	1	RESISTOR 365 1% .125W F TC=0+-100	24546	C4-1/8-T0-365R-F
A2R115	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A2R116	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A2R117	2100-2786	1	RESISTOR, VAR 100 OHM 20% C LIN 0.5W	28480	2100-2786
A2R118	0757-0406	4	RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-T0-182R-F
A2R119	0757-0123	1	RESISTOR 34.8K 1% .125W F TC=0+-100	24546	C5-1/4-T0-3482-F
A2R120	0757-0465	2	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A2R121	0698-3161	1	RESISTOR 38.3K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3832-F
A2R122	0698-3449	2	RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A2R123	0698-3159	2	RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A2R124	0698-3158	8	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A2R125	0698-7357	1	RESISTOR 422K .25% .125W F TC=0+-100	19701	MF4C1/8-T0-4223-C
A2R126	0698-3454	1	RESISTOR 215K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2153-F
A2R127	0698-3242	1	RESISTOR 178K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1783-F
A2R128	0757-0472	2	RESISTOR 200K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2003-F
A2R129	0757-0463	1	RESISTOR 82.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8252-F
A2R130	0758-0011	1	RESISTOR 3.3K 5% .25W F TC=0+-100	24546	C5-1/4-T0-3301-J
A2R131	0757-0407	17	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A2R132	0698-3157	1	RESISTOR 19.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1962-F
A2R133	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A2R134	0757-0284	7	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A2R135	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A2R136	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A2R137	0698-3449		RESISTOR 28.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2872-F
A2R138	0757-0458	3	RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A2R139	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A2R140	0757-0441	1	RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A2R141	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A2R142	0757-0472		RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A2R143	0698-3155	2	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A2R144	0757-0442	27	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R145	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R146	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R147	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A2R148	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A2R149	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R150	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A2R151	0757-0472		RESISTOR 200K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2003-F
A2R152	2100-2788		RESISTOR, VAR 4.7K OHM 20% C LIN 0.5W	28480	2100-2788
A2R153	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A2R154	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A2R155	0698-6960	2	RESISTOR 27K .1% .125W F TC=0+-50	24546	NC55
A2R156	0698-6960		RESISTOR 27K .1% .125W F TC=0+-50	24546	NC55
A2R157	0757-0435	5	RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A2R158	0757-0458		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A2R159	2100-2788		RESISTOR, VAR 4.7K OHM 20% C LIN 0.5W	28480	2100-2788
A2R160	0757-0456		RESISTOR 51.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5112-F
A2R161	0757-0435		RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A2R162	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A2R163	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A2R164	0757-0283	5	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A2R165	0757-0410	4	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A2R166	0757-0410		RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A2R167	0698-3332	1	RESISTOR 80.6 1% .5W F TC=0+-100	24546	NA6
A2R168	0766-0025	2	RESISTOR 101 2% 3W MD TC=0+-250	27167	FP3-3-250-101R-G
A2R169	0766-0025		RESISTOR 101 2% 3W MD TC=0+-250	27167	FP3-3-250-101R-G
A2R170	0757-0456	1	RESISTOR 43.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4322-F
A2R171	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A2R172	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A2R173	0698-4398	1	RESISTOR 86.6 1% .125W F TC=0+-100	16299	C4-1/8-T0-8666-F
A2R174	0698-4460	1	RESISTOR 649 1% .125W F TC=0+-100	24546	C4-1/8-T0-649R-F

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Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2R175	0757-0417		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R176	0757-0417		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A2R177	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A2R178	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A2U2	1826-0043	1	IC MC 1458 OP AMP	28480	1826-0092
A2U3	1826-0043	3	IC LM 307 OP AMP	27014	LM307H
A2U4	1826-0043		IC LM 307 OP AMP	27014	LM307H
A2U5	1826-0043		IC LM 307 OP AMP	27014	LM307H
A2U6	1820-0203	7	IC, AMPL. OPERATIONAL	15818	741CE009
A2U7	1820-0203		IC, AMPL. OPERATIONAL	15818	741CE009
A2U8	1820-0203		IC, AMPL. OPERATIONAL	15818	741CE009
A2U9	1858-0030	3	TRANSISTOR ARRAY, QUAD-HI-FREQ, POWER	28480	1858-0030
A2U10	1858-0030		TRANSISTOR ARRAY, QUAD-HI-FREQ, POWER	28480	1858-0030
A2U11	1858-0030		TRANSISTOR ARRAY, QUAD-HI-FREQ, POWER	28480	1858-0030
A2W1	08015-61607	1	CABLE ASSEMBLY, COAX	28480	08015-61607
A3	08015-66503	1	BOARD ASSEMBLY, TIMING	28480	08015-66503
A3C1	0160-2930	40	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C2	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C3	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C4	0180-0291	3	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A3C5	0160-2197	3	CAPACITOR-FXD 10PF +-5% 300WVDC MICA	28480	0160-2197
A3C6	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C7	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C8	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C9	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C10	0160-2198	1	CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A3C11	0160-2197		CAPACITOR-FXD 10PF +-5% 300WVDC MICA	28480	0160-2197
A3C12	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C13	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C14	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C15	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C16	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C17	0160-3714	1	CAPACITOR-FXD 5600PF +-10% 250WVDC MET	28480	0160-3714
A3C18	0180-0375	3	CAPACITOR-FXD 68UF+-10% 20VDC TA	56289	1500686X9020B2
A3C19	0160-3725	3	CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A3C20	0121-0046	3	CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304322 9/35PF N650
A3C21	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C22	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C23	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C24	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C25	0140-0191	2	CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WV1CR
A3C26	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C27	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C28	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C29	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C30	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C31	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C32	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C33	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C34	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C35	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C36	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C37	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C38	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C39	0121-0046		CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304322 9/35PF N650
A3C40	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C41	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C42	0160-3725	2	CAPACITOR-FXD 6800PF +-5% 250WVDC MET	FR009	CK8-68
A3C43	0160-3725		CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A3C44	0180-0375		CAPACITOR-FXD 68UF+-10% 20VDC TA	56289	1500686X9020B2
A3C45	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C46	0121-0046		CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304322 9/35PF N650
A3C47	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C48	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C49	0160-3725		CAPACITOR-FXD 6800PF +-5% 250WVDC MET	FR009	CK8-68
A3C50	0160-3725		CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A3C51	0180-0375		CAPACITOR-FXD 68UF+-10% 20VDC TA	56289	1500686X9020B2
A3C52	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C53	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C54	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C55	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930

Replaceable Parts – Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3C56	0160-2930	3	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C57	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C58	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C59	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C60	0160-2139		CAPACITOR-FXD 220PF +80-20% 100WVDC CER	28480	0160-2139
A3C61	0160-2197	3	CAPACITOR-FXD 10PF +-5% 300WVDC MICA	28480	0160-2197
A3C62	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C63	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C64	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C65	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C66	0160-0174	3	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C67	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C68	0140-0191		CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J0300WVCR
A3C69	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C70	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A3C71	0160-0174	3	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C72	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3C73	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A3CR1	1901-0040	3	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR6	1901-0040	3	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR11	1902-3139		DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A3CR12	1902-3139		DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A3CR13	1902-0126	13	DIODE-ZNR 2.61V 5% DO-7 PD=.4W TC=-.073%	04713	SZ 10939-14
A3CR15	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR16	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR18	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A3CR19	1901-0040	1	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR20	1910-0022		DIODE-GE 5V 60MA 3.5NS DO-7	28480	1910-0022
A3CR21	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR22	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR23	1902-3104		DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A3CR24	1902-3104	3	DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A3CR25	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR26	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR27	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A3CR28	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR29	1901-0040	2	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR30	1902-0126		DIODE-ZNR 2.61V 5% DO-7 PD=.4W TC=-.073%	04713	SZ 10939-14
A3CR31	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A3CR32	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A3CR33	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR34	1902-3139	2	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A3CR35	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR36	1902-0126		DIODE-ZNR 2.61V 5% DO-7 PD=.4W TC=-.073%	04713	SZ 10939-14
A3CR37	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
A3CR38	1910-0034		DIODE-GE 30V 80MA 8NS DO-7	28480	1910-0034
A3CR39	1901-0040	5	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR40	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
A3CR41	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A3CR42	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A3J1	1251-3488		1	CONNECTOR, P.C. EDGE	28480	1251-3488
A3L1	9100-1614	2	COIL-FXD MOLDED RF CHOKE .82UH 10%	24226	15/820
A3L2	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A3L3	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A3L4	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A3L5	9140-0112		COIL-FXD MOLDED RF CHOKE 4.7UH 10%	24226	15/471
A3L6	9100-1614	1	COIL-FXD MOLDED RF CHOKE .82UH 10%	24226	15/820
A3L7	9100-1612		COIL-FXD MOLDED RF CHOKE .33UH 20%	24226	15/330
A3L8	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A3L9	9140-0179		COIL-FXD MOLDED RF CHOKE 22UH 10%	24226	15/222
A3L10	9140-0179		COIL-FXD MOLDED RF CHOKE 22UH 10%	24226	15/222
A3L11	9100-1611	2	COIL-FXD MOLDED RF CHOKE .22UH 20%	24226	15/220
A3L12	9100-2249		COIL-FXD MOLDED RF CHOKE .15UH 10%	24226	10/150
A3L13	9100-1611		COIL-FXD MOLDED RF CHOKE .22UH 20%	24226	15/220
A3L14	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A3MP57	1200-0185			INSULATOR-XSTR TO-5 .075-THK	13103	7717-86N RED

Replaceable Parts – Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3Q1	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q2	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q3	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q4	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q5	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q6	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q7	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q8	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q9	1854-0019	8	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q10	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q11	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q12	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q13	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q14	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q15	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q16	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q17	1853-0090		TSTR:SI PNP	28480	1853-0090
A3Q18	1853-0090		TSTR:SI PNP	28480	1853-0090
A3Q19	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q20	1854-0215	5	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A3Q21	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A3Q22	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A3Q23	1854-0092	2	TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A3Q24	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A3Q25	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A3Q26	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q27	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q28	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q29	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q30	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A3Q31	1854-0009	2	TRANSISTOR NPN 2N709 SI TO-18 PD=300MW	28480	1854-0009
A3Q32	1854-0009		TRANSISTOR NPN 2N709 SI TO-18 PD=300MW	28480	1854-0009
A3Q33	1853-0034	1	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A3Q34	1205-0037	1	HEAT-DISSIPATOR SGL TO-36 PKG	28480	1205-0037
A3Q35	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	04713	SPS 3611
A3Q36	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1854-0019
A3Q37	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q38	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q39	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q40	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q41	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q42	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q43	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q44	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q45	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q46	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q47	1853-0036	6	TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A3Q48	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A3Q49	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A3Q50	1853-0090		TSTR:SI PNP	28480	1853-0090
A3Q51	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q52	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A3Q53	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A3Q54	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A3Q55	1853-0090		TSTR:SI PNP	28480	1853-0090
A3Q56	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A3Q57	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A3Q58	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A3Q59	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3Q60	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A3R2	0758-0083	1	RESISTOR 62 5% .25W F TC=0+-100	24546	C5-1/4-T0-68R0-J
A3R3	0757-0424	9	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R4	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R5	0757-0424	5	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A3R6	0757-0424		RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A3R7	0757-0424		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3R8	0757-0424		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R9	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R10	0757-0424		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R11	0757-0424		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R12	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R13	0757-0424		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F

Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3R14	6757-0288	1	RESISTOR 9.09K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-9091-F
A3R15	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A3R16	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R17	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R18	6698-3242	5	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A3R19	0757-0410		RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A3R20	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R21	0757-0415		RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A3R22	0757-0408	4	RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A3R23	0757-0414	2	RESISTOR 432 1% .125W F TC=0+-100	24546	C4-1/8-T0-432R-F
A3R24	0757-0409	4	RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A3R25	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R26	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R27	0757-0418	1	RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-T0-619R-F
A3R28	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R29	0757-0274	7	RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R30	0757-0413	2	RESISTOR 392 1% .125W F TC=0+-100	24546	C4-1/8-T0-392R-F
A3R31	0757-0402		RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A3R32	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A3R33	0698-4455	1	RESISTOR 536 1% .125W F TC=0+-100	24546	C4-1/8-T0-536R-F
A3R34	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R35	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R36	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A3R37	0757-0428	5	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A3R38	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R39	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R40	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A3R41	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A3R42	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R43	0757-0406		RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-T0-182R-F
A3R44	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R45	0757-0435		RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A3R46	0757-0404	4	RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A3R47	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A3R48	0757-0413		RESISTOR 392 1% .125W F TC=0+-100	24546	C4-1/8-T0-392R-F
A3R49	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A3R50	0757-0411	4	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A3R51	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3R52	0757-0419	1	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-T0-681R-F
A3R53	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A3R54	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R55	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R56	0757-0404		RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A3R57	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R58	0757-0402		RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A3R59	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R60	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A3R61	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R62	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R63	0757-0439	1	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A3R64	0757-0433	4	RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R65	0757-0438	11	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R66	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R67	0683-1055	9	RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R68	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R69	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R70	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R71	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R72	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R73	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A3R74	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A3R75	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R76	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R77	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A3R78	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R79	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A3R80	0698-3492	10	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R81	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A3R82	0757-0395	1	RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A3R83	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R84	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R85	0757-0427	4	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A3R86	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A3R87	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R88	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F

Replaceable Parts - Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3R69	0757-0290	7	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A3R90	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R91	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R92	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R93	0757-0398	2	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A3R94	0757-0398	2	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A3R95	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R96	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R97	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R98	0757-0414		RESISTOR 432 1% .125W F TC=0+-100	24546	C4-1/8-T0-432R-F
A3R99	0757-0273	2	RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A3R100	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A3R101	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R102	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R103	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A3R104	0757-0430	5	RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A3R105	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A3R106	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R107	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R108	0757-0430		RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A3R109	0757-0274	2	RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R110	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R111	0698-3442		RESISTOR 237 1% .125W F TC=0+-100	16299	C4-1/8-T0-237R-F
A3R112	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R113	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R114	0757-0437	2	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A3R115	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R116	0757-0410		RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A3R117	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A3R118	0757-0430		RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A3R119	0757-0274	2	RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A3R120	0757-0406		RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-T0-182R-F
A3R121	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A3R122	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A3R123	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A3R124	0757-0280	2	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R125	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R126	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R127	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A3R128	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R129	0757-0428	2	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A3R130	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A3R131	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R132	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A3R133	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R134	0757-0394	5	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A3R135	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R136	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R137	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A3R138	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R139	0757-0284	4	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A3R140	0757-0429		RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A3R141	0757-0404		RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A3R142	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A3R143	0757-0393	2	RESISTOR 47.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-475-F
A3R144	0757-0427	2	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A3R145	0758-0002		RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A3R146	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A3R147	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R148	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R149	0757-0404	2	RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A3R150	0757-0429		RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A3R151	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A3R152	0758-0002		RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A3R153	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A3R154	0757-0393	2	RESISTOR 47.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-475-F
A3R155	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A3R156	0757-0421		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A3R157	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R158	0757-0435		RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A3R159	0757-0424	4	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R160	0757-0393		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-365-F
A3R161	0757-0406		RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-T0-182R-F
A3R162	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R163	0757-0393		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-365-F

Replaceable Parts – Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A3R164	0757-0430		RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A3R165	0757-0429		RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A3R166	0757-0390		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-36R5-F
A3R167	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R168	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R169	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R170	0757-0430		RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A3R171	0757-0429		RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A3R172	0757-0390		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-36R5-F
A3R173	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R174	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R175	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A3R176	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R177	0698-3424		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A3R178	0757-0415		RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A3R179	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A3R180	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A3R181	0757-0200	1	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A3R182	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A3R183	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R184	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R185	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R186	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R187	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R188	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R189	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R190	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R191	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A3R192	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A3R193	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A3R194	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R195	0698-4430	1	RESISTOR 1.91K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1911-F
A3R196	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A3R197	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R198	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R199	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R200	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A3R201	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R202	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A3R203	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A3R204	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R205	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R206	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A3R207	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A3R208	0757-0435		RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A3R219	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A3R210	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R211	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A3R212	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R213	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R214	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A3R215	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A3R216	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A3R217	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R218	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R219	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A3R221	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A3R222	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A3R223	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R224	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A3R225	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A3R226	0757-0402		RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-T0-111-F
A3R227	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A3R230	0758-0023		RESISTOR 240 5% .25W F TC=0+-100	24546	C5-1/4-T0-241-J
A3W1	08015-61604	1	CABLE ASSEMBLY, TRIGGER INPUT	28480	08015-61604
A3W2	08015-61605	1	CABLE ASSEMBLY, TRIGGER OUTPUT	28480	08015-61605
A5	08015-66505	1	BOARD ASSEMBLY, INTEGRATOR	28480	08015-66505
A5C1	0160-0098	5	CAPACITOR-FXD 10UF+-20% 20VDC TA	56289	1500107X0020S2
A5C2	0160-3724	2	CAPACITOR-FXD .47UF +-10% 40VDC MET	28480	0160-3724
A5C3	0160-4209		CAPACITOR-FXD .01UF +-20% 50VDC POLYE	28480	0160-4209
A5C4	0160-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A5C5	0160-3724		CAPACITOR-FXD .47UF +-10% 40VDC MET	28480	0160-3724

Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5C6	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C7	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C8	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C11	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C12	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C13	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C14	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C15	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A5C16	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C17	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C18	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A5C19	0160-0600	1	CAPACITOR-FXD 3900PF +-10% 25WVDC MET	28480	0160-0600
A5C20	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C21	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C22	0160-4041	1	CAPACITOR-FXD .39UF +-10% 40WVDC MET	28480	0160-4041
A5C23	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C24	0180-0374	1	CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	1500106X902082
A5C25	0180-1779	1	CAPACITOR-FXD 18UF+-10% 35VDC TA	56289	1500186X9035R2
A5C27	0180-0098		CAPACITOR-FXD 100UF+-20% 2VDC TA	56289	1500107X0020S2
A5C28	0160-2204		CAPACITOR-FXD 100PF +-5% 300WVDC MICA	93790	ROM15F101J3C
A5C29	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C30	0180-0229		CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	1500336X901082
A5C31	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C32	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C35	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C36	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C37	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C38	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C39	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	56289	1500606X000682
A5C40	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C41	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C42	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	56289	1500606X000682
A5C43	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C45	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A5C46	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C100	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C101	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A5C102	0180-0228	1	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	1500226X901582
A5CR1	1902-3105	4	DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A5CR2	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A5CR3	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A5CR4	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A5CR5	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5CR6	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR9	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR10	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR12	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR13	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR14	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR15	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR16	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR18	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR19	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR20	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR21	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR22	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR23	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5CR24	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5CR25	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5CR26	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A5L1	9170-0029		LORE-SHIELDING BEAD	02114	56-590-65A2/4A
A5L2	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A5Q1	1854-0260	2	TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A5Q2	1854-0260		TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A5Q3	1853-0357		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A5Q4	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q5	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q6	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A5Q7	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A5Q8	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A5Q9	1853-0090		TSTR:SI PNP	28480	1853-0090
A5Q10	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307

Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5Q11	1854-0307		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0307
A5Q12	1853-0090		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1853-0090
A5Q13	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A5Q14	1853-0090		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1853-0090
A5Q15	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q16	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A5Q17	5080-1083	2	TRANSISTOR, MATCHED PAIR	28480	5080-1083
A5Q18	5080-1083		TRANSISTOR, MATCHED PAIR	28480	5080-1083
A5Q19	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A5Q20	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q21	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q22	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5R1	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R3	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A5R4	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A5R5	0757-0392	6	RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A5R6	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A5R7	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A5R8	0758-0127	1	RESISTOR 430 5% .25W F TC=0+-100	24546	C5-1/4-T0-431-J
A5R9	0696-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R10	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R11	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R12	0757-0405	2	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A5R13	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A5R14	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R15	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A5R16	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R17	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A5R18	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R19	0757-0467	2	RESISTOR 121K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A5R20	0758-0062	2	RESISTOR 200 5% .25W F TC=0+-100	24546	C5-1/4-T0-201-J
A5R21	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R22	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R23	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A5R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R25	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A5R26	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R27	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A5R28	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R29	0757-0467		RESISTOR 121K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A5R30	0758-0062		RESISTOR 200 5% .25W F TC=0+-100	24546	C5-1/4-T0-201-J
A5R31	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R32	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A5R33	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A5R34	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R35	0757-0449	2	RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A5R36	2100-2800	2	RESVAR CERMET 1000 OHM 20%	28480	2100-2800
A5R37	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R38	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R39	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R40	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A5R41	2100-2800		RESVAR CERMET 1000 OHM 20%	28480	2100-2800
A5R42	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R43	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A5R44	0757-0450	4	RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A5R45	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A5R46	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A5R47	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R48	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A5R49	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A5R50	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A5R51	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R52	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A5R53	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A5R54	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A5R55	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R56	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A5R57	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A5R58	0757-0428		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A5R59	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R60	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A5R61	0698-3153	1	RESISTOR 3.83K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3831-F

Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5R62	0698-3155	2	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A5R63	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A5R64	0758-0024		RESISTOR 100 5% .25W F TC=0+-100	24546	C5-1/4-T0-101-J
A5R65	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R66	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R67	0757-0384	2	RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R68	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A5R69	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A5R70	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A5R71	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5R72	0757-0392	2	RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A5R74	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A5R75	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A5R76	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A5R77	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A5R79	0757-0401	2	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R80	2100-2739		R/VAR 220 OHM	28480	2100-2739
A5R81	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A5R82	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A5R84	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R85	2100-2739	1	R/VAR 220 OHM	28480	2100-2739
A5R88	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A5R89	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A5R90	0758-0068		RESISTOR 910 5% .25W F TC=0+-100	24546	C5-1/4-T0-911-J
A5R91	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A5X12	1251-2675	2	CONNECTOR, P.C. 3-MALE CONTACT	28480	1251-2675
A5X13	1251-2675		CONNECTOR, P.C. 3-MALE CONTACT	28480	1251-2675
A21	08015-66521	1	BOARD ASSEMBLY, SWITCH	28480	08015-66521
A21C1	0180-0097	2	CAPACITOR-FXD 47UF+-10% 35VDC TA	56289	1500476X9035S2
A21C2	0180-0137		CAPACITOR-FXD 100UF+-20% 10VDC TA	56289	1500107X0010R2
A21C3	0180-0098		CAPACITOR-FXD 100UF+-20% 2VDC TA	56289	1500107X0020S2
A21C4	0180-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A21C5	0180-0097		CAPACITOR-FXD 47UF+-10% 35VDC TA	56289	1500476X9035S2
A21C6	0180-0137	1	CAPACITOR-FXD 100UF+-20% 10VDC TA	56289	1500107X0010R2
A21CR1	1901-0040	2	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A21CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A21CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A21CR4	1910-0034		DIODE-GE 30V 80MA 8NS DO-7	28480	1910-0034
A21CR5	1910-0034		DIODE-GE 30V 80MA 8NS DO-7	28480	1910-0034
A21CR6	1910-0034	2	DIODE-GE 30V 80MA 8NS DO-7	28480	1910-0034
A21CR7	1910-0034		DIODE-GE 30V 80MA 8NS DO-7	28480	1910-0034
A21CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A21K1	0490-0730	1	RELAY-REED DPST-NO 18VDC	28480	0490-0730
A21L1	08015-86004	2	L/R ASSEMBLY, COMBINED	28480	08015-86004
A21L2	08015-86004		L/R ASSEMBLY, COMBINED	28480	08015-86004
A21Q1	1854-0329	2	TSTR:SI NPN	28480	1854-0329
A21Q5	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A21Q6	1854-0329		TSTR:SI NPN	28480	1854-0329
A21R1	2100-2795	4	R/VAR CERMET 470 OHM 20%	28480	2100-2795
A21R2	2100-2795		R/VAR CERMET 470 OHM 20%	28480	2100-2795
A21R3	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A21R4	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A21R5	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A21R6	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A21R7	2100-2795		R/VAR CERMET 470 OHM 20%	28480	2100-2795
A21R8	2100-2795		R/VAR CERMET 470 OHM 20%	28480	2100-2795
A21R9	0757-0457		RESISTOR 47.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4752-F
A21R10	0758-0024		RESISTOR 100 5% .25W F TC=0+-100	24546	C5-1/4-T0-101-J
A21R11	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A21R12	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A21R13	0757-0415		RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-T0-475R-F
A21R15	0757-0391		RESISTOR 39.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-39R2-F
A21R17	0757-0389		RESISTOR 33.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-33R2-F
A21R19	0760-0008	1	RESISTOR 470 5% 1W MC TC=0+-200	FR003	C32
A21R21	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A21R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A21R25	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F

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Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A21S1	08015-61903	1	SLIDE ASSEMBLY	28480	08015-61903
	08015-43101	1	GUIDE, SLIDE	28480	08015-43101
	5020-3440	6	SPRING+DETENT	28480	5020-3440
A21S2	08015-61902	3	SLIDE ASSEMBLY	28480	08015-61902
	5020-3440		SPRING+DETENT	28480	5020-3440
	08015-43103	1	GUIDE, SLIDE	28480	08015-43103
A21S3	08015-61901	1	SLIDE ASSEMBLY	28480	08015-61901
	5020-3440		SPRING+DETENT	28480	5020-3440
	08015-43104	1	GUIDE, SLIDE	28480	08015-43104
A21S4	3101-1313	1	SWITCH-SL DPDT-NS MINTR .5A 125VAC/DC PC	79727	G1285-0004
A21S5	5040-1110	1	SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1110
	5620-3440		SPRING+DETENT	28480	5020-3440
A21S6	08015-61902		SLIDE ASSEMBLY	28480	08015-61902
	5020-3440		SPRING+DETENT	28480	5020-3440
A21S7	3101-1596	6	SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A21S8	08015-61904	1	SLIDE ASSEMBLY	28480	08015-61904
	5020-3440		SPRING+DETENT	28480	5020-3440
A21S9	08015-61902		SLIDE ASSEMBLY	28480	08015-61902
A21S9	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A21S10	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A21S11	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A21S12	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A21S13	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A21U1	1820-0054	1	IC SN74 00 N GATE	01295	SN7400N
A21W1	08015-61608	1	CABLE ASSEMBLY, SIGNAL OUTPUT	28480	08015-61608
A21X1	1251-1626	2	CONNECTOR-PC EDGE 12-CONT/ROW 2-ROWS	71785	252-12-30-300
A21X2	1251-1626		CONNECTOR-PC EDGE 12-CONT/ROW 2-ROWS	71785	252-12-30-300
A21X4	1200-0423	1	SOCKET-IC 16-CONT DIP-PKG DIP-SLDR-TERMS	28480	1200-0423
A21X5	1251-2026	1	CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-300
A21X7	1251-2034	1	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	71785	252-10-30-300
A21XU1	1200-0424	1	SOCKET:IC BLK 14 CONTACT	23880	CSA2900-14B
A24	08015-66524	1	BOARD ASSEMBLY, POWER SUPPLY	28480	08015-66524
A24C1	0160-4212	18	CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C2	0160-3721	2	CAPACITOR-FXD .15UF +-10% 160WVDC MET	5W005	8G1PM 5150K
A24C3	0160-0596	1	CAPACITOR-FXD 1000PF +-10% 250WVDC MET	28480	0160-0596
A24C4	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A24C5	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C6	0180-1745	2	CAPACITOR-FXD 1.5UF+-10% 20VDC TA	56289	1500155X9020A2
A24C7	0180-1954	3	CAPACITOR-FXD 4.7UF+-5% 6VDC TA	56289	1500475X5006A2
A24C8	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C9	0160-3721		CAPACITOR-FXD .15UF +-10% 160WVDC MET	5W005	8G1PM 5150K
A24C10	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C11	0180-1745		CAPACITOR-FXD 1.5UF+-10% 20VDC TA	56289	1500155X9020A2
A24C12	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C14	0160-2208	1	CAPACITOR-FXD 330PF +-5% 300WVDC MICA	28480	0160-2208
A24C15	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A24C16	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C17	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C18	0180-2352	2	CAPACITOR-FXD 6000UF+75-10% 15VDC AL	28480	0180-2352
A24C19	0180-2352		CAPACITOR-FXD 6000UF+75-10% 15VDC AL	28480	0180-2352
A24C20	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C21	0180-1954		CAPACITOR-FXD 4.7UF+-5% 6VDC TA	56289	1500475X5006A2
A24C22	0180-0116	1	CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	1500685X9035B2
A24C23	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C24	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C25	0180-1954		CAPACITOR-FXD 4.7UF+-5% 6VDC TA	56289	1500475X5006A2
A24C26	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C27	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C28	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C29	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C30	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C31	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C32	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C33	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C34	0160-4212	2	CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C35	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C36	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212

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Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A24C37	0160-4212		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	28480	0160-4212
A24C40	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C42	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C43	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C44	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24C45	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A24CR1	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A24CR2	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR3	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR4	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR5	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR6	1902-3104		DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A24CR7	1902-3104		DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A24CR8	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR9	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR10	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR11	1901-0460	1	DIODE- STABISTOR 15V 150MA DO-7	28480	1901-0460
A24CR13	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR14	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR15	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR17	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR18	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR19	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR21	1902-3214		DIODE-ZNR 16.2V 2% DO-7 PD=.4W TC=+.066%	04713	SZ 10939-243
A24CR22	1902-3214		DIODE-ZNR 16.2V 2% DO-7 PD=.4W TC=+.066%	04713	SZ 10939-243
A24CR23	1901-0033		DIODE-GEN PRP 150V 200MA DO-7	28480	1901-0033
A24CR24	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR25	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR26	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR28	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR29	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR30	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR31	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR32	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR33	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR34	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A24CR35	1901-0522	12	DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR36	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR37	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR38	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR39	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR40	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR41	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR42	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR43	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR44	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR45	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR46	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A24CR47	1902-3315	1	DIODE-ZNR 39.2V 2% DO-7 PD=.4W TC=+.081%	04713	SZ 10939-354
A24Q1	1854-0477	4	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A24Q2	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A24Q3	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A24Q4	1853-0045	2	TRANSISTOR PNP 2N4036 SI TO-5 PD=1W	02735	2N4036
A24Q5	1853-0045		TRANSISTOR PNP 2N4036 SI TO-5 PD=1W	02735	2N4036
A24Q6	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A24Q7	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A24Q8	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A24Q9	1853-0261	1	TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A24Q10	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A24Q11	1854-0392	1	TRANSISTOR NPN SI PD=310MW FT=50MHZ	28480	1854-0392
A24Q12	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A24Q13	1853-0086	1	TRANSISTOR PNP SI PD=310MW FT=40MHZ	28480	1853-0086
A24R1	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A24R2	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A24R3	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A24R4	0757-0440	1	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A24R5	0757-0283		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A24R6	0757-0453	1	RESISTOR 30.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3012-F
A24R7	0757-0260		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A24R8	0812-0019	3	RESISTOR .33 5% 3W PW TC=0+-90	07088	KM-300
A24R9	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R10	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F

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Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A24R11	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A24R12	2100-3207	1	RESISTOR-TMR 5K 10% C SIDE-ADJ 1-TRN	73138	72-145-0
A24R13	0757-0317	1	RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A24R14	0698-3498	1	RESISTOR 8.66K 1% .125W F TC=0+-100	16299	C4-1/8-T0-866R-F
A24R15	0698-6322	4	RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A24R16	0698-6343	4	RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A24R17	0698-7563	1	RESISTOR 13.3K .5% .125W F TC=0+-50	19701	MF4C1/8-T2-1332-D
A24R18	0698-6835	1	RESISTOR 3.16K .5% .125W F TC=0+-50	24546	NC4-1/8-T2-3161-D
A24R19	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R20	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R21	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A24R22	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R23	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A24R24	0812-0021	2	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A24R25	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R26	0758-0017	2	RESISTOR 1.5K 5% .25W F TC=0+-100	24546	C5-1/4-T0-1501-J
A24R27	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R28	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R29	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R30	0698-6343		RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A24R31	0698-6343		RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A24R32	0812-0021		RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A24R33	0758-0016	2	RESISTOR 300 5% .25W F TC=0+-100	24546	C5-1/4-T0-301-J
A24R34	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R36	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R37	0812-0019		RESISTOR .33 5% 3W PW TC=0+-90	07088	KM-300
A24R38	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R39	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A24R40	0698-4366	1	RESISTOR 19.1 1% .125W F TC=0+-100	03888	PHE55-1/8-T0-19R1-F
A24R42	0758-0017		RESISTOR 1.5K 5% .25W F TC=0+-100	24546	C5-1/4-T0-1501-J
A24R43	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R44	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A24R45	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R46	0757-0437		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A24R47	0698-6343		RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A24R48	0698-6322		RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A24R49	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A24R50	0698-6322		RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A24R51	0698-6322		RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A24R52	0812-0017	1	RESISTOR .25 5% 3W PW TC=0+-90	07088	KM-300
A24R53	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A24R54	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R56	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R57	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R58	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A24R59	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R60	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A24R61	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A24R62	0758-0016		RESISTOR 300 5% .25W F TC=0+-100	24546	C5-1/4-T0-301-J
A24R63	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R64	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A24R65	0812-0019		RESISTOR .33 5% 3W PW TC=0+-90	07088	KM-300
A24R66	0758-0067	1	RESISTOR 750 5% .25W F TC=0+-100	24546	C5-1/4-T0-751-J
A24R67	0698-3156	2	RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A24R68	0757-1094	1	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A24R69	0757-0461		RESISTOR 66.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6812-F
A24R70	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R71	0698-3451	1	RESISTOR 133K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1333-F
A24R72	0698-3159		RESISTOR 26.1K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2612-F
A24R73	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A24R74	0757-0460	1	RESISTOR 61.9K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A24R75	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R76	0698-3154	1	RESISTOR 4.22K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4221-F
A24R77	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A24R78	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A24R79	0698-3453	1	RESISTOR 196K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1963-F
A24R80	0698-3160	2	RESISTOR 31.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3162-F
A24R81	0698-3160		RESISTOR 31.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3162-F
A24R82	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A24R83	0698-3640	1	RESISTOR 1.8K 5% 2W MO TC=0+-200	16299	FP42-2-T0-1801-J
A24U1	1820-0439	1	IC UA 723C V RGLTR	07263	723PC
A24U2	1820-0203		IC, AMPL. OPERATIONAL	15818	741CE009
A24U3	1820-0203		IC, AMPL. OPERATIONAL	15818	741CE009
A24U4	1820-0216	1	IC UA 741 OP AMP	28480	1820-0216
A24U5	1820-0203		IC, AMPL. OPERATIONAL	15818	741CE009

Replaceable Parts — Standard Instruments

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A24U6	1920-0203		IC, AMPL. OPERATIONAL	15818	741CE009
A26	08015-66528	1	BOARD ASSEMBLY, RESISTOR	28480	08015-66528
A26C1	0180-0100	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X9035B2
A26C2	0180-0100		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X9035B2
A28R1	0757-0442	16	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A28R2	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R3	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R4	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R5	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R6	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R7	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R8	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R9	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R10	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R11	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R12	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R13	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R14	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R15	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R16	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28R17	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A28X2	1251-0335	1	CONNECTOR-PC EDGE 24-CONT/ROW 2-ROWS	28480	1251-0335
A28X3	1251-3246	10	CONNECTOR 3-PIN F	27264	09-52-3030
A28X4	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X5	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X6	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X7	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X8	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X9	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X10	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X11	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A28X12	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030

Additional/Changed Replaceable Parts Option 001

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
OPTION 001					
A11	08015-66511	1	BOARD ASSEMBLY, SWITCH (OPT ^01)	28480	08015-66511
A11C1	0180-0097	2	CAPACITOR-FXD 47UF+-10% 35VDC TA	56289	1500476X9035S2
A11C2	0180-0137	2	CAPACITOR-FXD 100UF+-20% 10VDC TA	56289	1500107X0010R2
A11C3	0180-0096	2	CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A11C4	0180-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A11C5	0180-0097		CAPACITOR-FXD 47UF+-10% 35VDC TA	56289	1500476X9035S2
A11C6	0180-0137		CAPACITOR-FXD 100UF+-20% 10VDC TA	56289	1500107X0010R2
A11CR2	1901-0040	3	DIODE-SWITCHING 30V 50MA 2NS 00-35	28480	1901-0040
A11CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS 00-35	28480	1901-0040
A11CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS 00-35	28480	1901-0040
A11MP23	08015-00205	1	PANEL, FRONT	28480	08015-00205
A11MP44	08015-04109	1	BOARD, BLIND	28480	08015-04109
A1106	1854-0329	1	TSTR:SI NPN	28480	1854-0329
A11R1	2100-2795	2	RVAR CERMET 470 OHM 20%	28480	2100-2795
A11R2	2100-2795		RVAR CERMET 470 OHM 20%	28480	2100-2795
A11R3	0757-0284	1	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A11R5	0757-0280	4	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R6	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R15	0757-0391	1	RESISTOR 39.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-39R2-F
A11R17	0757-0389	1	RESISTOR 33.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-33R2-F
A11R19	0760-0008	1	RESISTOR 470 5% 1W MO TC=0+-200	FR003	C32
A11R21	0757-0465	1	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A11R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11R25	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A11S1	08015-61903	1	SLIDE ASSEMBLY	28480	08015-61903
	08015-43101	1	GUIDE, SLIDE	28480	08015-43101
	5020-3440	6	SPRING:DETENT	28480	5020-3440
A11S2	08015-61902	2	SLIDE ASSEMBLY	28480	08015-61902
	5020-3440		SPRING:DETENT	28480	5020-3440
	08015-43103	1	GUIDE, SLIDE	28480	08015-43103
A11S3	08015-61901	1	SLIDE ASSEMBLY	28480	08015-61901
	5020-3440		SPRING:DETENT	28480	5020-3440
	08015-43104	1	GUIDE, SLIDE	28480	08015-43104
A11S4	3101-1313	1	SWITCH-SL DP3T-NS MINTR .5A 125VAC/DC PC	79727	G1285-0004
A11S5	5040-1110	1	SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1110
	5020-3440		SPRING:DETENT	28480	5020-3440
A11S6	08015-61902		SLIDE ASSEMBLY	28480	08015-61902
	5020-3440		SPRING:DETENT	28480	5020-3440
A11S7	3101-1596	3	SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A11S8	08015-61904	1	SLIDE ASSEMBLY	28480	08015-61904
	5020-3440		SPRING:DETENT	28480	5020-3440
A11S12	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A11S13	3101-1596		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	28480	3101-1596
A11X1	1251-1626	2	CONNECTOR-PC EDGE 12-CONT/ROW 2-ROWS	71785	252-12-30-300
A11X2	1251-1626		CONNECTOR-PC EDGE 12-CONT/ROW 2-ROWS	71785	252-12-30-300
A11X5	1251-2026	1	CONNECTOR-PC EDGE 18-CONT/ROW 2-ROWS	71785	252-18-30-300
A11X7	1251-2034	1	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	71785	252-10-30-300
A11X24	1200-0423	1	SOCKET-IC 16-CONT DIP-PKG DIP-SLDR-TERMS	28480	1200-0423
A38	08015-66538	1	BOARD/CABLE ASSEMBLY, RESISTOR	28480	08015-66538
A38	08015-66528	1	BOARD/CABLE ASSEMBLY, RESISTOR	28480	08015-66528
A38C1	0180-0100		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X9035B2
A38C2	0180-0100		CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X9035B2
A38R1	0757-1004		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A38R10	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R11	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R12	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R13	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R14	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R15	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R16	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38R17	0757-1004		RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A38X2	1251-0335	2	CONNECTOR-PC EDGE 24-CONT/ROW 2-ROWS	28480	1251-0335
A38X3	1251-3246	8	CONNECTOR 3-PIN F	27264	09-52-3030
A38X4	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A38X5	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A38X6	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A38X7	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A38X8	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A38X9	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
A38X10	1251-3246		CONNECTOR 3-PIN F	27264	09-52-3030
MP23	08015-00205		PANEL FRONT (OPT 001)	28480	08015-00205
MP44	08015-04109		BOARD BLIND	28480	08015-04109

Additional Replaceable Parts Option 002

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
OPTION 002					
A6	08015-66506	1	BOARD ASSEMBLY, BURST	28480	08015-66506
A6C1	0160-0174	4	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C2	0160-2259	2	CAPACITOR-FXD 12PF +-5% 500WVDC CER	28480	0160-2259
A6C3	0160-2259	2	CAPACITOR-FXD 12PF +-5% 500WVDC CER	28480	0160-2259
A6C4	0160-2930	8	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C5	0160-2930	8	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C6	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C7	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C8	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C9	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C10	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C11	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A6C12	0180-0116	1	CAPACITOR-FXD 6.8UF+-10% 35VDC TA	56289	1500685X9035B2
A6C13	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C14	0140-0190	1	CAPACITOR-FXD 39PF +-5% 300WVDC MICA	72136	DM15E390J0300WV1CR
A6C15	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C16	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C17	0180-0106	1	CAPACITOR-FXD 60UF+-20% 6VDC TA	56289	1500606X000682
A6CR1	1901-0179	11	DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR2	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR3	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR4	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR5	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR6	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR7	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR8	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR9	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR10	1901-0535	2	DIODE-SCHOTTKY	28480	1901-0535
A6CR11	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR12	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A6CR13	1902-0025	1	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A6CR14	1901-0535		DIODE-SCHOTTKY	28480	1901-0535
A6CR15	1901-0040	3	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A6MP3	1200-0474	1	SOCKET; ELEC; IC 14-CONT DIP SLDR TERM	28480	1200-0474
A6Q1	1854-0019	5	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6Q2	1853-0357	3	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q3	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q4	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q5	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6Q6	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6Q7	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6Q8	1854-0345	1	TRANSISTOR NPN 2N5179 SI TO-72 PD=260MW	04713	2N5179
A6Q9	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A6R1	0757-0394	2	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A6R2	0698-3242	1	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A6R3	0757-0388	2	RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A6R4	0757-0388	2	RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A6R5	0698-3442	2	RESISTOR 237 1% .125W F TC=0+-100	16299	C4-1/8-T0-237R-F
A6R6	0757-0417	2	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A6R7	0698-3442		RESISTOR 237 1% .125W F TC=0+-100	16299	C4-1/8-T0-237R-F
A6R8	0757-0410	1	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A6R9	0757-0346	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A6R10	0757-0449	1	RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A6R11	0757-0470	1	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A6R12	0698-3437	1	RESISTOR 133 1% .125W F TC=0+-100	16299	C4-1/8-T0-133R-F
A6R13	0757-0403	1	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A6R14	0757-0407	2	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A6R15	0757-0280	2	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A6R16	0757-0428	1	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A6R17	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A6R18	0757-0420	1	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A6R19	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A6R20	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A6R21	0757-0414	1	RESISTOR 432 1% .125W F TC=0+-100	24546	C4-1/8-T0-432R-F
A6R22	1810-0055	2	NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0055
A6R23	1810-0055		NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0055
A6R24	0698-3153	1	RESISTOR 3.83K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3831-F
A6R25	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F

Additional Replaceable Parts Option 002

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A6R26	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TT-1002-F
A6U1	1820-0070	4	IC SN74 30 N GATE	01295	SN7430N
A6U2	1820-0070	4	IC SN74 30 N GATE	01295	SN7430N
A6U3	1820-0174	6	IC SN74 04 N INV	01295	SN7404N
A6U4	1820-0174	6	IC SN74 04 N INV	01295	SN7404N
A6U5	1820-0282	4	IC SN74 86 N GATE	01295	SN7486N
A6U6	1820-0282	4	IC SN74 86 N GATE	01295	SN7486N
A6U7	1820-0282	4	IC SN74 86 N GATE	01295	SN7486N
A6U8	1820-0282	4	IC SN74 86 N GATE	01295	SN7486N
A6U9	1820-0070	4	IC SN74 30 N GATE	01295	SN7430N
A6U10	1820-0174	4	IC SN74 04 N INV	01295	SN7404N
A6U11	1820-0070	4	IC SN74 30 N GATE	01295	SN7430N
A6U12	1820-0328	1	IC SN74 02 N GATE	01295	SN7402N
A6U13	1820-0174	4	IC SN74 04 N INV	01295	SN7404N
A6U14	1820-0054	3	IC SN74 00 N GATE	01295	SN7400N
A6U15	1820-0546	3	IC SN74 192 N COUNTER	01295	SN74192N
A6U16	1820-0371	1	IC=TTL TRIPLE 3-INPT NAND GATE	01295	SN74H10N
A6U17	1820-0076	1	IC SN74 76 N FLIP-FLOP	01295	SN7476N
A6U18	1820-0629	1	IC SN74S 112 N FLIP-FLOP	01295	SN74S112N
A6U19	1820-0075	1	IC SN74 73 N FLIP-FLOP	01295	SN7473N
A6U20	1820-0054	1	IC SN74 00 N GATE	01295	SN7400N
A6U21	1820-0174	4	IC SN74 04 N INV	01295	SN7404N
A6U22	1820-0546	4	IC SN74 192 N COUNTER	01295	SN74192N
A6U23	1820-0174	4	IC SN74 04 N INV	01295	SN7404N
A6U24	1820-0546	4	IC SN74 192 N COUNTER	01295	SN74192N
A6U25	1820-0054	4	IC SN74 00 N GATE	01295	SN7400N
A6X1	1200-0423	1	SOCKET-IC 16-CONT DIP-PKG DIP-SLDR-TERMS	28480	1200-0423
A6X2	1251-3011	1	CONTACT,PC CONNECTOR,FEMALE, SGL	28480	1251-3011
A27	08015-66527	1	BOARD ASSEMBLY, THUMBWHEEL (OPT 002)	28480	08015-66527
A27	08015-66537	1	BOARD ASSEMBLY, THUMBWHEEL (OPT 002 + 003)	28480	08015-66537
A27CR1	1901-0040	1	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A27CR2	1901-0040	1	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A27Q1	1854-0307	1	TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A27R1	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TT-1002-F
A27R2	0757-0460	2	RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-TT-1002-F
A27W1	5081-1952	1	CABLE, AY RIBBON (OPT 002)	28480	5081-1952
A27W1	5081-1953	1	CABLE, AY RIBBON (OPT 002 + 003)	28480	5081-1953
A27X1	1251-0472	4	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	252-06-30-300
A27X2	1251-0472	4	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	252-06-30-300
A27X3	1251-0472	4	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	252-06-30-300
A27X4	1251-0472	4	CONNECTOR-PC EDGE 6-CONT/ROW 2-ROWS	71785	252-06-30-300
MP23A	08015-00208	1	PANEL, FRONT (OPTION 002)	28480	08015-00208
MP23B	08015-00211	1	PANEL, FRONT (OPTION 002, OPT 005)	28480	08015-00211
S21	3100-0552	1	SWITCH, ROTARY 1 SECT. 8 POSITION	28480	3100-0552
S22	3101-0977	1	SWITCH-PC DPDT NOM .25A 30VAC	82389	976+GOLD PLATE

Additional Replaceable Parts Option 003

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
OPTIGN 003					
A30	08015-66530	1	BOARD ASSEMBLY, DIGITAL CONTROL	28480	08015-66530
A30CR1	1901-0033	21	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR2	1901-0460	3	DIODE- STABISTOR 15V 150MA DO-7	28480	1901-0460
A30CR3	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR4	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR5	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR6	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR7	1901-0460		DIODE- STABISTOR 15V 150MA DO-7	28480	1901-0460
A30CR8	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR9	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR10	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR11	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR12	1901-0460		DIODE- STABISTOR 15V 150MA DO-7	28480	1901-0460
A30CR13	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR14	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR15	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR16	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR17	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR18	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR19	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR20	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR21	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR22	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR23	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR24	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A30CR25	1901-0159	1	DIODE-PWR RECT 400V 750MA DO-41	04713	SR1358-4
A30Q1	1854-0215	18	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q2	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q3	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q4	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q5	1853-0036	18	TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q6	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q7	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q8	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q9	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q10	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q11	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q12	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q13	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q14	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q15	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q16	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q17	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q18	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q19	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q20	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q21	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q22	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q23	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q24	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q25	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q26	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q27	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q28	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A30Q29	1854-0477	6	TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A30Q30	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A30Q31	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q32	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q33	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q34	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q35	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q36	1853-0281	5	TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q37	1853-0281		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A30Q38	1853-0281		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A30Q39	1853-0281		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A30Q40	1853-0036		TRANSISTOR, PNP SI PD=310MW FT=250MHZ	04713	SPS-3612
A30Q41	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A30Q42	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A30Q43	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A30Q44	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611

Additional Replaceable Parts Option 003

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A30R1	0698-3156	12	RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R2	0698-3492	24	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R3	0757-0280	45	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R4	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R5	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R6	0698-3155	6	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A30R7	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R8	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R9	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R10	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R11	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A30R12	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R13	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R14	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R15	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R16	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A30R17	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R18	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R19	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R20	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R21	0757-0439	6	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A30R22	0757-0447	3	RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A30R23	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R25	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R26	0698-3558	11	RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R27	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R28	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R29	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R30	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R31	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R32	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R33	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R34	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R35	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R36	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R37	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R38	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R39	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R40	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R41	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A30R42	0757-0447		RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A30R43	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R44	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R45	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R46	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R47	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R48	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R49	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R50	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R51	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R52	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R53	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R54	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R55	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R56	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R57	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R58	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R59	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R60	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R61	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A30R62	0757-0447		RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A30R63	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R64	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R65	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R66	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R67	0698-4457	1	RESISTOR 576 1% .125W F TC=0+-100	24546	C4-1/8-T0-576R-F
A30R68	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R69	0698-3226	1	RESISTOR 6.49K 1% .125W F TC=0+-100	16299	C4-1/8-T0-6491-F
A30R70	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R71	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R72	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R73	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R74	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R75	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F

Additional Replaceable Parts Option 003

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A30R76	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R77	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R78	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R79	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R80	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R81	0757-0421	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A30R82	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A30R83	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A30R84	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R85	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R86	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R87	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R88	0698-3558		RESISTOR 4.02K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4021-F
A30R89	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A30R90	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A30R91	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A30R92	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A30R93	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R94	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R95	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R96	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R97	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R98	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R99	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R100	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R101	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A30R102	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A30R103	0757-0283	3	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A30U1	1820-0328	4	IC SN74 02 N GATE	01295	SN7402N
A30U2	1820-0328		IC SN74 02 N GATE	01295	SN7402N
A30U3	1820-0328		IC SN74 02 N GATE	01295	SN7402N
A30U4	1820-0328		IC SN74 02 N GATE	01295	SN7402N
A31	08015-66531	1	BOARD ASSEMBLY, SWITCH	28480	08015-66531
A31K2	0490-1079	7	RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A31K3	0490-1079		RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A31Q2	1854-0477		TRANSISTOR NPN 2N2222A SI TO-18 PD=500MW	07263	2N2222A
A31Q3	1853-0261		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A31Q4	1853-0281		TRANSISTOR PNP 2N2907A SI TO-18 PD=400MW	04713	2N2907A
A31R14	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A31R15	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A31R16	0698-3156		RESISTOR 14.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1472-F
A31X6	1251-1626	1	CONNECTOR-PC EDGE 12-CONT/ROW 2-ROWS	71785	252-12-30-300
A31XU3	1200-0424	1	SOCKET-IC BLK 14 CONTACT	23880	CSA2900-14B
A33	08015-66533	1	BOARD ASSEMBLY, ANALOG	28480	08015-66533
A33C1	0150-0121	5	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A33C3	0160-3879	13	CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C4	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A33C7	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A33C8	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A33C9	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C14	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C15	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C18	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C21	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C22	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C26	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C27	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C28	0160-3745	4	CAPACITOR-FXD 470PF +-20% 50WVDC CER	28480	0160-3745
A33C29	0160-3745		CAPACITOR-FXD 470PF +-20% 50WVDC CER	28480	0160-3745
A33C30	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C31	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A33C33	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C34	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C37	0160-3879		CAPACITOR-FXD .01UF +-20% 100WVDC CER	28480	0160-3879
A33C38	0160-3745		CAPACITOR-FXD 470PF +-20% 50WVDC CER	28480	0160-3745
A33C39	0160-3745		CAPACITOR-FXD 470PF +-20% 50WVDC CER	28480	0160-3745
A33CR1	1901-0040	2	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A33CR2	1901-0040	13	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040

Additional Replaceable Parts Option 003

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A33CK6	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR7	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR9	1902-3139		DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A33CR10	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR12	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR13	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR14	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33CR15	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A33K1	0490-1079		RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A33K2	0490-1079		RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A33K3	0490-1079		RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A33K4	0490-1079		RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A33K5	0490-1079		RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A33Q1	1854-0071	6	TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A33Q2	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A33Q3	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A33Q4	1853-0020	5	TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A33Q5	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A33Q6	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A33Q7	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A33Q8	1854-0071		TRANSISTOR NPN SI PD=300MW FT=200MHZ	28480	1854-0071
A33Q9	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A33Q10	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A33Q11	1853-0020		TRANSISTOR PNP SI PD=300MW FT=150MHZ	28480	1853-0020
A33R1	0698-6361	1	RESISTOR 8K .1% .125W F TC=0+-25	24546	NE55
A33R2	0698-6360	1	RESISTOR 10K .1% .125W F TC=0+-25	24546	NE55
A33R3	0698-4442	5	RESISTOR 4.42K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4421-F
A33R4	0757-0442	19	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R5	2100-3351	2	RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-501
A33R6	0757-0281	2	RESISTOR 2.74K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2741-F
A33R7	0698-4428	2	RESISTOR 1.69K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1691-F
A33R8	0698-3484	2	RESISTOR 6.65K 1% .125W F TC=0+-100	16299	C4-1/8-T0-6651-F
A33R9	0757-0465	6	RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A33R10	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A33R11	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A33R12	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A33R13	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A33R14	0757-0433	2	RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A33R15	0757-0438	5	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A33R16	0757-0403	1	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A33R17	2100-3350	1	RESISTOR-TRMR 200 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-201
A33R18	0757-0405	2	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A33R19	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A33R20	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A33R21	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A33R22	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R23	2100-3207	2	RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN	73138	72-145-0
A33R24	0698-3540	2	RESISTOR 15.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1542-F
A33R25	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A33R26	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A33R27	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A33R28	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R29	0698-4508	2	RESISTOR 78.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7872-F
A33R30	0757-0220	1	RESISTOR 715 1% .5W F TC=0+-50	19701	MF7C1/2-T2-715R-F
A33R31	2100-3352	2	RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-102
A33R32	0757-0410	1	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A33R33	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R34	2100-3207		RESISTOR-TRMR 5K 10% C SIDE-ADJ 1-TRN	73138	72-145-0
A33R35	0698-3540		RESISTOR 15.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1542-F
A33R36	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A33R37	0757-0349	1	RESISTOR 22.6K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2262-F
A33R38	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A33R39	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R40	0698-4508		RESISTOR 78.7K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7872-F
A33R41	0757-0158	1	RESISTOR 619 1% .5W F TC=0+-100	19701	MF7C1/2-T0-619R-F
A33R42	2100-3352		RESISTOR-TRMR 1K 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-102
A33R43	0698-4421	1	RESISTOR 249 1% .125W F TC=0+-100	16299	C4-1/8-T0-249R-F
A33R44	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R45	2100-3351		RESISTOR-TRMR 500 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-501
A33R46	0757-0281		RESISTOR 2.74K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2741-F
A33R47	0698-4428		RESISTOR 1.69K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1691-F
A33R48	0698-3484		RESISTOR 6.65K 1% .125W F TC=0+-100	16299	C4-1/8-T0-6651-F
A33R49	0698-3136	4	RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F
A33R50	0698-3136		RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F

Additional Replaceable Parts Option 003

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A33R51	0698-3136		RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F
A33R52	0698-3136		RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1782-F
A33R53	0757-0439		RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A33R54	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A33R55	0698-3512	1	RESISTOR 1.18K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1181-F
A33R56	0698-4392	4	RESISTOR 71.5 1% .125W F TC=0+-100	16299	C4-1/8-T0-71R5-F
A33R57	0757-0398	4	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A33R58	2100-3349	2	RESISTOR-TRMR 100 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-101
A33R59	0698-4392		RESISTOR 71.5 1% .125W F TC=0+-100	16299	C4-1/8-T0-71R5-F
A33R60	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A33R61	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A33R62	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A33R63	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R64	0698-0085	1	RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A33R65	0757-0441	5	RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A33R66	2100-3273	1	RESISTOR-TRMR 2K 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-202
A33R67	0698-3515	2	RESISTOR 5.9K 1% .125W F TC=0+-100	16299	C4-1/8-T0-5901-F
A33R68	0757-0434	1	RESISTOR 3.65K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3651-F
A33R69	0698-3160	1	RESISTOR 31.6K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3162-F
A33R70	0698-3493	2	RESISTOR 4.12K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4121-F
A33R71	0698-3515		RESISTOR 5.9K 1% .125W F TC=0+-100	16299	C4-1/8-T0-5901-F
A33R72	0698-3493		RESISTOR 4.12K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4121-F
A33R73	0698-4469	1	RESISTOR 1.15K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1151-F
A33R74	0698-4392		RESISTOR 71.5 1% .125W F TC=0+-100	16299	C4-1/8-T0-71R5-F
A33R75	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A33R76	2100-3349		RESISTOR-TRMR 100 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-101
A33R77	0698-4392		RESISTOR 71.5 1% .125W F TC=0+-100	16299	C4-1/8-T0-71R5-F
A33R78	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A33R79	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A33R80	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A33R81	0757-0280	4	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A33R82	0698-4442		RESISTOR 4.42K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4421-F
A33R83	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A33R84	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A33R85	0698-4442		RESISTOR 4.42K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4421-F
A33R86	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A33R87	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R88	0757-0449	6	RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A33R89	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R90	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A33R91	0698-4490	2	RESISTOR 29.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2942-F
A33R92	0698-4205	2	RESISTOR 21K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2102-F
A33R93	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R94	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A33R95	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R96	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A33R97	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R98	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R99	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A33R100	0698-4442		RESISTOR 4.42K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4421-F
A33R101	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A33R102	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A33R103	0698-4442		RESISTOR 4.42K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4421-F
A33R104	0757-0441		RESISTOR 8.25K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8251-F
A33R105	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R106	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A33R107	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R108	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A33R109	0698-4490		RESISTOR 29.4K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2942-F
A33R110	0698-4205		RESISTOR 21K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2102-F
A33R111	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R112	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A33R113	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R114	0757-0465		RESISTOR 100K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1003-F
A33R115	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33R116	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A33U1	1826-0043	1	IC LM 307 OP AMP	27014	LM307H
A33U2	1826-0111	8	IC MC 1458 OP AMP	04713	MC1458G
A33U3	1826-0161	1	IC LM 324 OP AMP	27014	LM324N
A33U4	1826-0111		IC MC 1458 OP AMP	04713	MC1458G
A33U5	1826-0111		IC MC 1458 OP AMP	04713	MC1458G
A33U6	1826-0111		IC MC 1458 OP AMP	04713	MC1458G
A33U7	1826-0111		IC MC 1458 OP AMP	04713	MC1458G
A33U8	1826-0111		IC MC 1458 OP AMP	04713	MC1458G
A33U9	1826-0111		IC MC 1458 OP AMP	04713	MC1458G
A33U10	1826-0111		IC MC 1458 OP AMP	04713	MC1458G

Additional Replaceable Parts Option 003

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
MP50	5040-0170	1	GUIDE:PLUG-IN PC BOARD	28480	5040-0170
W15	08015-61612	1	CABLE ASSEMBLY, REMOTE CONTROL	28480	08015-61612
W15J8	1251-0233	2	CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261
W15J10	1251-0233		CONNECTOR-PC EDGE 22-CONT/ROW 2-ROWS	71785	251-22-30-261
W15J11	1251-0087	1	CONNECTOR 50-PIN F MICRO RIBBON	71785	57-40500-375
W15S1	3101-0070	2	SWITCH-SL DPDT-NS MINTR .5A 125VAC/DC	79727	GF-126-0000
W15S2	3101-0070		SWITCH-SL DPDT-NS MINTR .5A 125VAC/DC	79727	GF-126-0000

Additional Replaceable Parts Option 004

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
OPTION 004					
A25	08015-66525	1	BOARD ASSEMBLY, INTEGRATOR	28480	08015-66525
A25	08015-66505	1	BOARD ASSEMBLY, INTEGRATOR	28480	08015-66505
A25C1	0180-0098	2	CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A25C2	0160-3724	3	CAPACITOR-FXD .47UF +-10% 40WVDC MET	28480	0160-3724
A25C3	0160-4209	11	CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C4	0180-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A25C5	0160-3724		CAPACITOR-FXD .47UF +-10% 40WVDC MET	28480	0160-3724
A25C6	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C7	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C8	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C11	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C12	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C13	0160-0174	18	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C14	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C15	0160-2139	2	CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A25C16	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C17	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C18	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A25C19	0160-0600	1	CAPACITOR-FXD 3900PF +-10% 250WVDC MET	28480	0160-0600
A25C20	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C21	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C22	0160-4041	1	CAPACITOR-FXD .39UF +-10% 40WVDC MET	28480	0160-4041
A25C23	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C24	0180-0374	1	CAPACITOR-FXD 10UF+-10% 20VDC TA	56289	1500106X9020B2
A25C25	0180-1779	1	CAPACITOR-FXD 18UF+-10% 35VDC TA	56289	1500186X9035R2
A25C27	0180-0098		CAPACITOR-FXD 100UF+-20% 20VDC TA	56289	1500107X0020S2
A25C28	0160-2204	1	CAPACITOR-FXD 100PF +-5% 300WVDC MICA	93790	RDM15F101J3C
A25C29	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C30	0180-0229	1	CAPACITOR-FXD 33UF+-10% 10VDC TA	56289	1500336X9010B2
A25C31	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C32	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C35	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C36	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C37	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C38	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C39	0180-0106	2	CAPACITOR-FXD 60UF+-20% 6VDC TA	56289	1500606X0006B2
A25C40	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C41	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C42	0180-0106		CAPACITOR-FXD 60UF+-20% 6VDC TA	56289	1500606X0006B2
A25C43	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C45	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A25C46	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C100	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C101	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A25C102	0180-0228	1	CAPACITOR-FXD 22UF+-10% 15VDC TA	56289	1500226X9015B2
A25 CR1	1902-3105	4	DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A25 CR2	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A25 CR3	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A25 CR4	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A25CR5	1901-0533	4	DIODE-SCHOTTKY	28480	1901-0533
A25CR6	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A25CR7	1901-0040	8	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR8	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR9	1901-0179	20	DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR10	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR11	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR12	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR13	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR14	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR15	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR16	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR17	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR18	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR19	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR20	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A25CR21	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR22	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR23	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A25CR24	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A25CR25	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A25CR26	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179

Additional Replaceable Parts Option 004

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A25L1	9170-0029	2	CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A25L2	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A25Q1	1854-0260	2	TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A25Q2	1854-0260		TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A25Q3	1853-0012	1	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A25Q4	1853-0357	6	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A25Q5	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A25Q6	1854-0274	2	TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A25Q7	1854-0960	2	TRANSISTOR	28480	1854-0960
A25Q8	1854-0960		TRANSISTOR	28480	1854-0960
A25Q9	1853-0090	3	TSTR:SI PNP	28480	1853-0090
A25Q10	1854-0307	2	TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A25Q11	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A25Q12	1853-0090		TSTR:SI PNP	28480	1853-0090
A25Q13	1854-0274		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A25Q14	1853-0090		TSTR:SI PNP	28480	1853-0090
A25Q15	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A25Q16	1854-0630	2	TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A25Q17	5080-1083	2	TRANSISTOR, MATCHED PAIR	28480	5080-1083
A25Q18	5080-1083		TRANSISTOR, MATCHED PAIR	28480	5080-1083
A25Q19	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A25Q20	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A25Q21	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A25Q22	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A25R1	0757-0384	9	RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R3	0757-0264	1	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A25R4	0757-0276	3	RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A25R5	0757-0392	6	RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A25R6	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A25R7	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A25R8	0758-0127	1	RESISTOR 430 5% .25W F TC=0+-100	24546	C5-1/4-T0-431-J
A25R9	0698-3242	3	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R10	0757-0401	5	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A25R11	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R12	0757-0405	2	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A25R13	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A25R14	0757-0280	6	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A25R15	0757-0422	2	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A25R16	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A25R17	0757-0388	6	RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A25R18	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A25R19	0757-0467	2	RESISTOR 121K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A25R20	0758-0062	2	RESISTOR 200 5% .25W F TC=0+-100	24546	C5-1/4-T0-201-J
A25R21	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R22	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A25R23	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A25R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A25R25	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A25R26	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A25R27	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A25R28	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A25R29	0757-0467		RESISTOR 121K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A25R30	0758-0062		RESISTOR 200 5% .25W F TC=0+-100	24546	C5-1/4-T0-201-J
A25R31	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R32	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A25R33	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A25R34	0698-3496	4	RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R35	0757-0449	2	RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A25R36	2100-2800	2	R:VAR CERMET 1000 OHM 20%	28480	2100-2800
A25R37	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R38	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R39	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R40	0757-0449		RESISTOR 20K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2002-F
A25R41	2100-2800		R:VAR CERMET 1000 OHM 20%	28480	2100-2800
A25R42	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R43	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A25R44	0757-0450	4	RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A25R45	0757-0444	4	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A25R46	0758-0013	3	RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A25R47	0757-0442	4	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A25R48	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A25R49	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A25R50	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A25R51	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F

Additional Replaceable Parts Option 004

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A25R52	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A25R53	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A25R54	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-T0-121-J
A25R55	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A25R56	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2212-F
A25R57	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1212-F
A25R58	0757-0408	1	RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A25R59	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A25R60	0757-0276		RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-6192-F
A25R61	0698-3153	1	RESISTOR 3.83K 1% .125W F TC=0+-100	16299	C4-1/8-T0-3831-F
A25R62	0698-3155	1	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-T0-4641-F
A25R63	0757-0411	1	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A25R64	0758-0024	1	RESISTOR 100 5% .25W F TC=0+-100	24546	C5-1/4-T0-101-J
A25R65	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R66	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R67	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R68	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A25R69	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A25R70	0757-0392	2	RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A25R71	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R72	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A25R74	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A25R75	0757-0392		RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A25R76	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A25R77	0757-0394	6	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A25R79	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A25R80	2100-2739	2	R+VAR 220 OHM	28480	2100-2739
A25R81	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-30R1-F
A25R82	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A25R84	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A25R85	2100-2739		R+VAR 220 OHM	28480	2100-2739
A25R88	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A25R89	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A25R90	0758-0368		RESISTOR 910 5% .25W F TC=0+-100	24546	C5-1/4-T0-911-J
A25R91	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-T0-20R0-F
A25R101	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A25R102	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A25S41	3101-0569	2	SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	GM032	C42315-A60-A2
A25S42	3101-0569		SWITCH-SL DPDT-NS MINTR 1A 125VAC PC	GM032	C42315-A60-A2
A25X12	1251-2675	2	CONNECTOR, P.C. 3-MALE CONTACT	28480	1251-2675
A25X13	1251-2675		CONNECTOR, P.C. 3-MALE CONTACT	28480	1251-2675
A32	08015-66532	1	BOARD, DIRECT OUTPUT ACC	28480	08015-66532
A32C1	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A32C3	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A32CR1	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR2	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR3	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR4	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR5	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR6	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR7	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR8	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR9	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32CR10	1901-0179		DIODE-SWITCHING 15V 50MA 750PS DO-7	28480	1901-0179
A32J1	1250-1163	2	CONNECTOR-RF BNC FEM SGL HOLE RR	28480	1250-1163
A32J2	1250-1163		CONNECTOR-RF BNC FEM SGL HOLE RR	28480	1250-1163
A32Q1	1854-0354	2	TRANSISTOR NPN SI TO-52 PD=360MW	28480	1854-0354
A32Q2	1854-0354		TRANSISTOR NPN SI TO-52 PD=360MW	28480	1854-0354
A32R1	0698-4458	2	RESISTOR 590 1% .125W F TC=0+-100	24546	C4-1/8-T0-590R-F
A32R2	0698-3441	4	RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
A32R3	0698-3439	6	RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A32R4	0698-3439		RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A32R5	0698-3439		RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A32R6	0698-4014	1	RESISTOR 787 1% .125W F TC=0+-100	16299	C4-1/8-T0-787R-F
A32R7	0698-3447	1	RESISTOR 422 1% .125W F TC=0+-100	16299	C4-1/8-T0-422R-F
A32R8	0698-3443	1	RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A32R9	2100-3349	2	RESISTOR-TRMR 100 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-101
A32R10	0698-3437	2	RESISTOR 133 1% .125W F TC=0+-100	16299	C4-1/8-T0-133R-F

Additional Replaceable Parts Option 004

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A32R11	0698-4458		RESISTOR 590 1% .125W F TC=0+-100	24546	C4-1/8-T0-590R-F
A32R12	0698-3439		RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A32R13	0698-3439		RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A32R14	0698-3439		RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A32R15	0698-3441		RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
A32R16	2100-3349		RESISTOR-TRMR 100 10% C SIDE-ADJ 1-TRN	32997	3386X-Y46-101
A32R17	0698-3437		RESISTOR 133 1% .125W F TC=0+-100	16299	C4-1/8-T0-133R-F
A32R18	0698-3441		RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
A32R19	0698-3441		RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
W41	08015-61613	2	CABLE ASSEMBLY, SIGNAL INPUT	28480	08015-61613
W42	08015-61613		CABLE ASSEMBLY, SIGNAL INPUT	28480	08015-61613

Additional Replaceable Parts Option 005

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
OPTION 005					
A10	08015-66510	1	BOARD ASSEMBLY, TTL OUTPUT	28480	08015-66510
A10C1	0160-0174	3	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A10C2	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A10C3	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A10CR1	1902-0049	1	DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
A10CR2	1902-0064	1	DIODE-ZNR 7.5V 5% DO-7 PD=.4W TC=+.05%	04713	SZ 10939-146
A10CR3	1901-0533	2	DIODE-SCHOTTKY	28480	1901-0533
A10CR4	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A10CR5	1901-0040	1	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A10K1	0490-0617	1	RELAY-REED IC 250MA 28VDC 5VDC-COIL	28480	0490-0617
A10Q1	1854-0354	2	TRANSISTOR NPN SI TO-52 PD=360MW	28480	1854-0354
A10Q2	1854-0354		TRANSISTOR NPN SI TO-52 PD=360MW	28480	1854-0354
A10Q3	1854-0637	1	TRANSISTOR NPN 2N2219A SI TO-5 PD=800MW	28480	1854-0637
A10Q4	1853-0315	2	TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0315
A10Q5	1853-0315		TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0315
A10R1	0757-0407	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A10R2	0757-0398	2	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A10R3	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-T0-75R0-F
A10R4	0698-4411	2	RESISTOR 140 1% .125W F TC=0+-100	24546	C4-1/8-T0-140R-F
A10R5	0698-4411		RESISTOR 140 1% .125W F TC=0+-100	24546	C4-1/8-T0-140R-F
A10R6	0757-0346	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A10R7	0757-0283	1	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-20R1-F
A10R8	0757-0724	1	RESISTOR 392 1% .25W F TC=0+-100	24546	C5-1/4-T0-392R-F
A10R9	0757-0796	1	RESISTOR 82.5 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-82R5-F
A10R10	0757-0500	2	RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A10R11	0696-5965		RESISTOR 50 1% .5W F TC=0+-100	24546	NA6
A10R12	0696-5965		RESISTOR 50 1% .5W F TC=0+-100	24546	NA6
A10R13	0698-5965		RESISTOR 50 1% .5W F TC=0+-100	24546	NA6
J51	1250-0118	1	CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
MP23A	08015-00210	1	PANEL, FRONT (OPT 005)	28480	08015-00210
MP23B	08015-00211	1	PANEL, FRONT (OPT 002 AND 005)	28480	08015-00211

Additional Replaceable Parts Option 006

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
J51	1250-0118	2	CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J52	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
R51	0698-4473	2	RESISTOR 8.06K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8061-F
R52	0698-4473		RESISTOR 8.06K 1% .125W F TC=0+-100	24546	C4-1/8-T0-8061-F
R53	0698-4434	4	RESISTOR 2.32K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2321-F
R54	0698-4434		RESISTOR 2.32K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2321-F
R55	0698-4434		RESISTOR 2.32K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2321-F
R56	0698-4434		RESISTOR 2.32K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2321-F
S51	3101-0070	2	SWITCH-SL DPDT-NS MINTR .5A 125VAC/DC	79727	GF-126-0000
S52	3101-0070		SWITCH-SL DPDT-NS MINTR .5A 125VAC/DC	79727	GF-126-0000

**7-1-1 OPTION 001 –
SINGLE CHANNEL VERSION**

7-1-2 Specifications and General

7-1-3 The 8015A Option 001 is an 8015A less channel A; the modes (with respect to Channel A) A + B, A SEP B DEL/associated with the standard version are consequently not available. Other specifications are identical except:

7-1-4 Differences in assemblies and parts are indicated in fig. 6-2, the Option 001 Part List (Section 6) and Service Sheets 4, 5, 6a and 7 (Section 9). Option 001 precludes Option 003, 004, 005 and 006.

Power: 140VA
Weight: net 10.5kg (23.3lbs), shipping
11.5kg (25.5lbs).

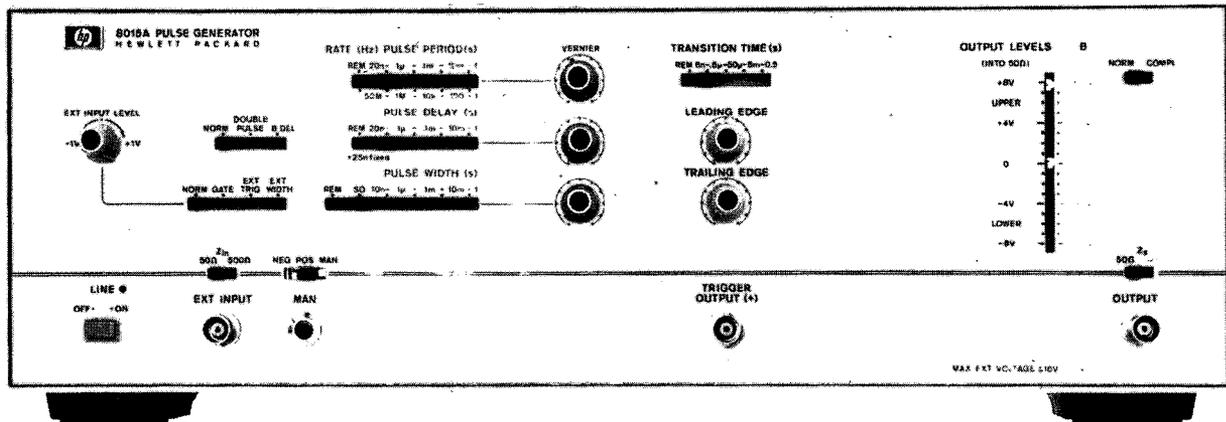
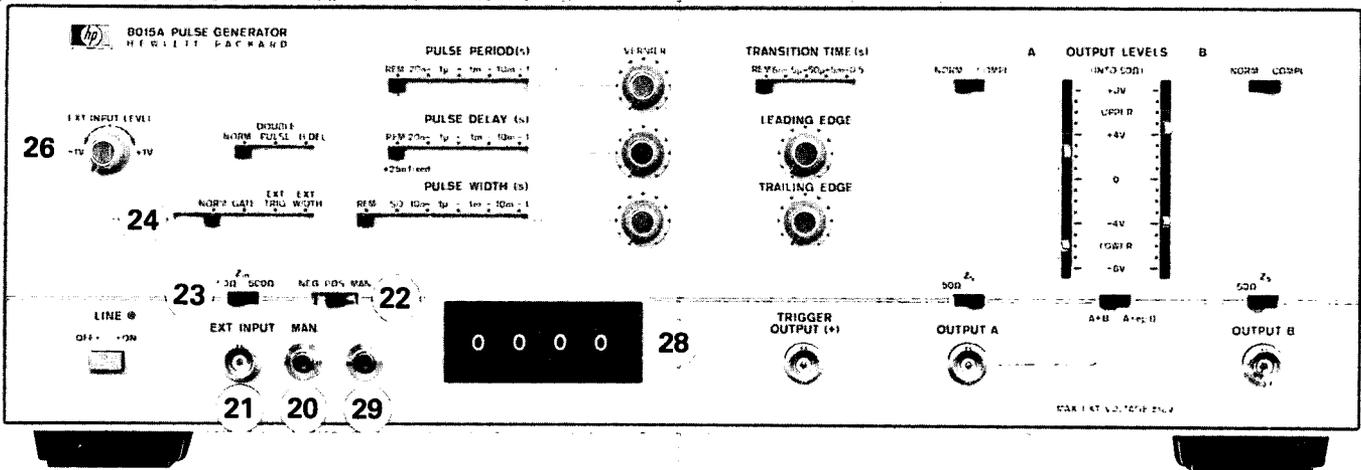


Figure 7-1-1. 8015A Option 001



Controls in standard instruments which affect burst:

20 MAN push-button: for generating external trigger signals when in the GATE, EXT TRIG and EXT WIDTH modes, and to initiate a burst in the BURST mode. Effective only when NEG-POS-MAN switch 22 is in the MAN position.

21 EXT INPUT connector: DC coupled input to which external triggering/gating burst-initiating signals are applied. Input impedance either 50Ω or 500Ω with corresponding maximum input levels of $\pm 7V$ or $\pm 25V$ respectively.

22 NEG-POS-MAN switch: for selecting the polarity/slope and/or source of external trigger signals. In the POS (slope/polarity) and NEG (slope/polarity) positions, signals are applied to EXT INPUT connector 21.

23 Z_{IN} $50\Omega/500\Omega$ switch: selects input impedance of EXT INPUT.

24 BURST NORM, GATE, EXT TRIG and EXT WIDTH switch: for selecting mode of operation of 8015A.

26 EXT INPUT LEVEL control: defines the threshold level of the external input over a range of $+1V$ to $-1V$ ($Z_{IN}=50\Omega$) or $+10V$ to $-10V$ ($Z_{IN}=500\Omega$).

Controls of Option 002 only:

28 NUMBER OF PULSES: Thumbwheel switches on which the required number of pulses in a burst is programmed. See operation instructions.

29 SINGLE PULSE: Pushbutton switch for generating single pulse while still in BURST mode.

Figure 7-2-1. 8015A Option 002

7-2-1 OPTION 002 – PULSE BURST

7-2-2 Specifications and General

7-2-3 The 8015A Option 002 is an 8015A plus a pulse burst capability. When the burst mode is selected, a preset number of pulses is generated on receipt of an external trigger pulse or manual trigger. The number of pulses (between 1 and 9999) is set on a 4-digit thumbwheel switch on the front panel. An additional single pulse can be generated manually. Specifications are identical to the standard version except:

Burst Mode
 Preselected number of pulses (1 to 9999) generated on receipt of a trigger signal.

Trigger source: external or manual, min width ≥ 20 ns.
 Repetition rate: 0 to 40MHz.
 Minimum time between bursts: 200ns.
 Minimum time between trigger input and first pulse: 100ns.

Burst Mode, Single Pulse.
 Single pulse generated on manual command, irrespective of selected number of pulses.

General
 Power: 200 VA
 Weight: net 11.5kg (25.2lbs), shipping 12.5kg (27.4lbs).

7-2-4 Operating Instructions

7-2-5 This is similar to the NORM mode in that the pulse parameters (rate, width, etc.) are set on the front panel controls, however, the required NUMBER OF PULSES is set on the thumbwheel switches (28). A burst can be started externally or manually.

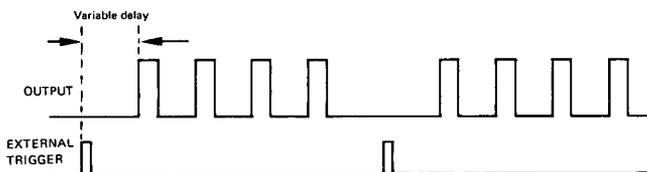


Figure 7-2-2. Burst Repetition



Figure 7-2-3. Manual Initiation of Burst

7-2-6 BURST can be selected in conjunction with NORM, DOUBLE PULSE, B DEL or Square Wave (SQ). When selected with NORM (i. e. NORM-DOUBLE PULSE – B DEL switch 25 set to NORM) the burst will cease after the preset number of pulses have been generated. In conjunction with DOUBLE PULSE twice the preset number of pulses will be generated. In conjunction with B DEL, the burst from OUTPUT A (17) will start immediately after the trigger input and the burst from OUTPUT B will start after the time set on the DELAY controls (3 & 4). At the end of a burst, pulses can be added individually by pressing the SINGLE PULSE button.

7-2-7 If burst is selected in conjunction with square wave, the output frequency will be half that set on the RATE controls and only half the number of pulses set on the thumbwheel switches will be generated. Also, if the output level at the end of the burst is required to be the same as it was at the beginning, then an even number must be set on the thumbwheel switches. To set a desired start level, switch the NEG-POS-MAN switch (22) to MAN, the Mode switch (24) to NORM and PULSE WIDTH switch (5) to SQ. Press the MAN button to set either an upper or lower level than switch back to BURST mode and the desired trigger input condition.

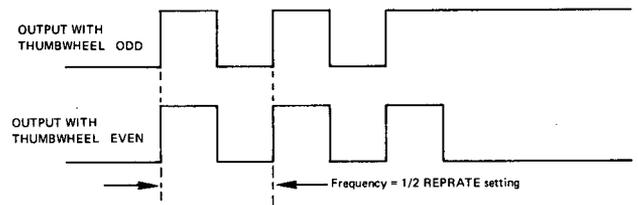


Figure 7-2-4. Burst with Square Wave

7-2-8 Principles of Operation (Service Sheet 8)

7-2-9 Burst generation is controlled by a counter which is loaded from the thumbwheel switches. On receipt of the externally- or manually-initiated 'start burst' signal, the rep rate generator is enabled and the burst commences. Each pulse decrements the counter by one. When the counter is empty, a zero-state detector disables the rep rate generator – thus terminating the burst – and initiates the reloading of the counter in readiness for the next 'start burst' signal.

7-2-10 Initial Conditions

7-2-11 To illustrate how the burst circuit operates, assume that burst mode is selected and that the 8015A

has just been switched on; the start circuit will then provide a pulse which clears U19, consequently:

a low is applied to U12 pin 8 which enables counter reloading,

Q2 emitter goes high, causing Q1 to conduct. This disables the rep rate generator.

7-2-12 Loading the Burst Counter

7-2-13 When the counter contents are not equal to the thumbwheel switch outputs, the comparator outputs a low at U12 pin 13. This means that, with U12 pin 8 low:

units data from the thumbwheel switch is applied as clear (or set) to the flip-flops U17/18 (these form a high-speed counter with feedback to force a decade count),

U10 pin 4 goes low so that the BCD counters U15, 22, 24 accept the data applied from the 10's, 100's, 1000's decades of the thumbwheel switch.

Consequently, the counter assumes the value set on the thumbwheel switch.

7-2-14 Start Burst

7-2-15 On receipt of the start burst signal, U19 is clocked causing:

a high to be applied to U12 pin 8 which prevents the counter from reloading. The counter consequently decrements due to the rep rate signal applied via Q4, 5 and 8,

a low is applied to Q2 emitter via CR12 so that the hold-off signal is terminated (Q1 cuts off, rep rate generator runs).

7-2-16 Zero Detection

7-2-17 The zero-state detector must be capable of:

fast response — so that the rep rate generator is stopped as soon as the last pulse of the burst has been generated,

holding off the rep rate generator until the

next burst is required,

initiating counter reload.

To do this, fast and slow channels are used.

7-2-18 The fast zero detector generates the leading edge of the hold-off signal (when the counter is zero, a positive level exists on the cathodes of diodes cr2 to 10, consequently, a positive voltage exists at Q3 emitter and Q1 is turned on). CR10, carrying the first units (fastest-changing) bit is a hot-carrier diode for fast response.

7-2-19 Q1 is held conducting by the action of U9 and U11 which, in clearing U19, provides a positive level at Q2 emitter. At the same time, a low is applied to U12 pin 8 to enable counter reloading.

7-2-20 Single Pulse

7-2-21 The SINGLE PULSE pushbutton removes the ground connection from the thumbwheel switch and causes A27Q1 to current-sink the first bit of the thumbwheel switch. This results in a 1 being loaded into the counter.

7-2-22 The SINGLE PULSE pushbutton also initiates a start burst signal (see Q6 on Service Sheet 6) and a burst of one pulse is consequently generated.

7-2-23 Normal Mode

7-2-24 If burst operation is not required, the burst enable line goes open. This means:

Q9 goes open and the rep rate signal to the counter is disabled,

U13 pin 2 goes low which inhibits the action of the fast zero detector (Q3-side of OR-gate) and, via CR11, the Q2-side of the OR-gate. The hold-off signal is, therefore, inhibited,

Q7 goes open, disabling the start-burst signal to the clock input of U19.

7-2-25 Replaceable Parts and Service Information

7-2-26 Refer to the Option 002 Replaceable Parts list (Section 6), fig. 6-3 Service Sheet 8 and table 7-2-1.

PERFORMANCE CHECK

Table 7-2-1. Burst Function (Option 002)

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CW
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	20n-1μ
VERNIER 6	MID POSITION
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL >11	MIN
CH A LOWER LEVEL	
CH B UPPER LEVEL >12	MIN
CH B LOWER LEVEL	
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	-
TRIG INPUT IMPEDANCE 23	-
FUNCTION 24	BURST
MODE 25	NORM
EXT INPUT LEVEL 26	-

SPECIFICATION

Option 002 Pulse Burst
 Number of pulse 1-9999
 1 Hz - 40 MHz minimum time
 between bursts 200ns

DESCRIPTION

Check pulse burst.

EQUIPMENT

Counter ≥ 50 MHz Frequency

Test Equipment:

1. Set number of pulses to 8015 or any number wanted.
2. Press MAN button.
3. Counter should show the same number as set on the burst selector.

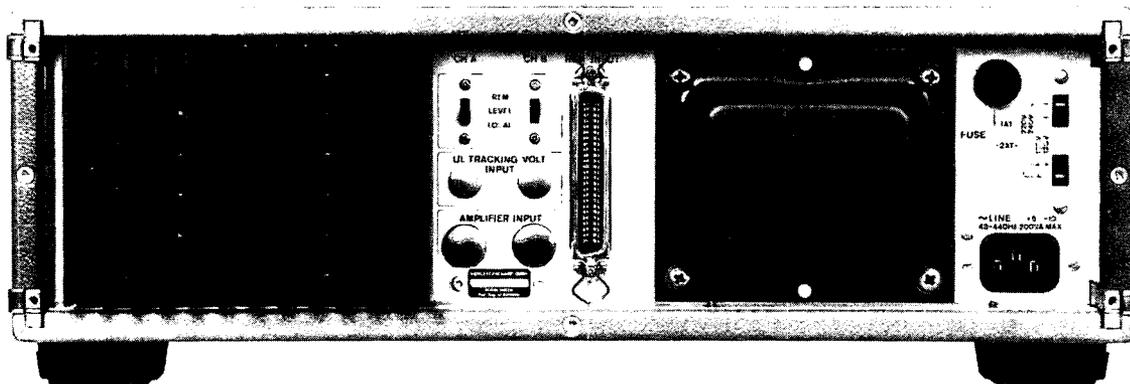
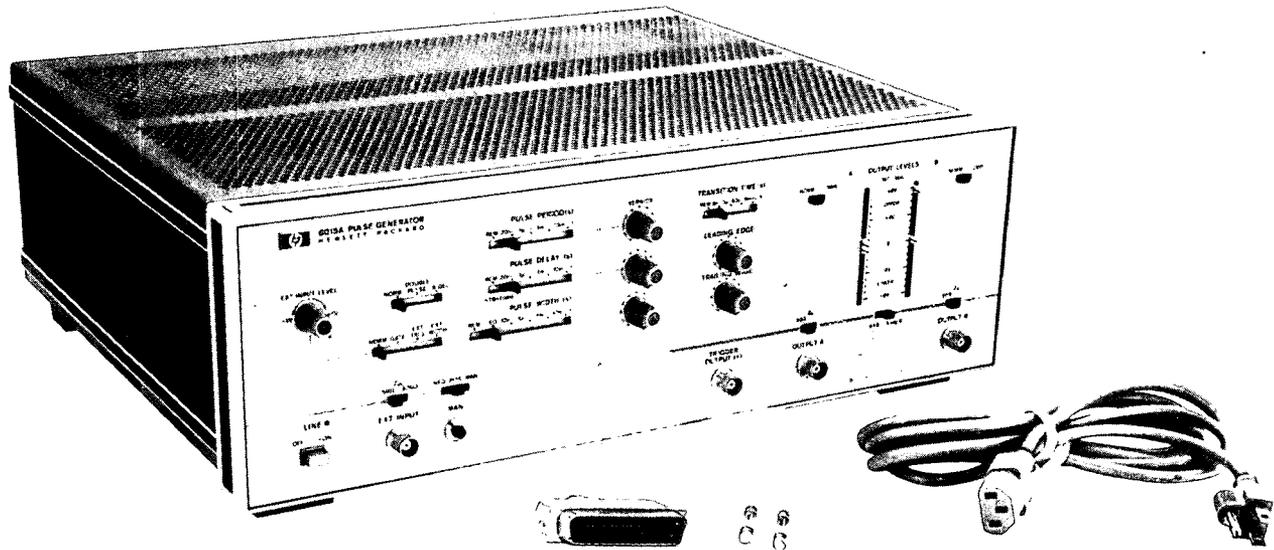


Figure 7-3-1 8015A Option 003

7-3-1 OPTION 003 – REMOTE CONTROL

7-3-2 Specifications and General

7-3-3 Option 003 permits pulse period, delay, width, transition times, output levels and (when combined with option 002) burst length to be remote controlled. Range switching and burst length selection are TTL compatible. Verniers and levels are analog-controlled. Control of the various parameters is independent and any desired mix of manual and remote operation can be achieved. See specifications table 7-3-1.

7-3-4 As shown in fig. 6-4, the option consists of the following additional assemblies:

Board assembly analog A33
 Board assembly digital A30
 Cable assembly remote control W15
 (includes rear panel REMOTE connector
 W15 X 11 and LEVEL – LOCAL/REM
 switches W15 S1/2)

and board assembly switch A31 instead of A21. If option 002 is fitted as well, cable assembly A27W1 (fig. 6-5) has a different part number, see option 002 parts list.

7-3-5 The option is factory installed and is delivered with accessory plug, part number 1251-0086 for the remote control socket on the rear panel (see fig. 7-3-1).

7-3-6 This option precludes Options 001 and 006.

- 1 Rep. Rate Range 3
- 2 Rep. Rate Range 2
- 3 Rep. Rate Range 1

- 4 Delay Range 3
- 5 Delay Range 2
- 6 Delay Range 1

- 7 Width Range 3
- 8 Width Range 2
- 9 Width Range 1

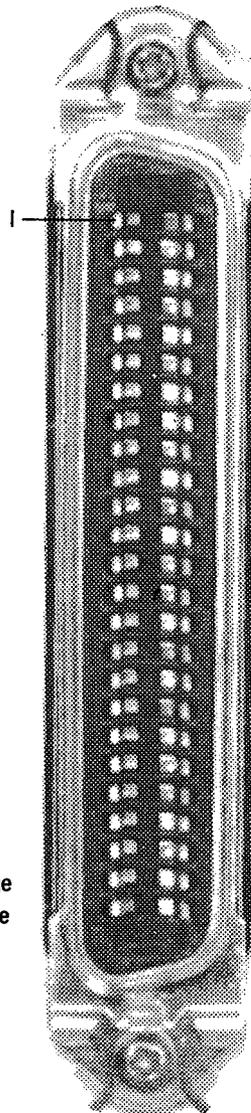
- 10 Square W.

- 11 Trans. T. Range 3
- 12 Trans. T. Range 2
- 13 Trans. T. Range 1

- 14 Ground (OV)
- 15 Ground (OV)
- 16 Ground (OV)

- 17 Vernier Rep. Rate
- 18 Delay
- 19 Width
- 20 Leading Edge
- 21 Trailing Edge

- 22 $V_{UL A}$
- 23 $V_{LL A}$
- 24 $V_{UL B}$
- 25 $V_{LL B}$



- 26 1 Burst 10^0
- 27 2 Burst 10^0
- 28 4 Burst 10^0
- 29 8 Burst 10^0

- 30 1 Burst 10^1
- 31 2 Burst 10^1
- 32 4 Burst 10^1
- 33 8 Burst 10^1

- 34 1 Burst 10^2
- 35 2 Burst 10^2
- 36 4 Burst 10^2
- 37 8 Burst 10^2

- 38 1 Burst 10^3
- 39 2 Burst 10^3
- 40 4 Burst 10^3
- 41 8 Burst 10^3

- 42 Ground (OV)
- 43 Ground (OV)

- 44 –
- 45 –
- 46 –
- 47 –
- 48 –
- 49 –
- 50 –

Figure 7-3-2. Remote Control Connections

Table 7-3-1. Remote control specifications for option 003

REP RATE: 40 MHz max. PULSE WIDTH: 13ns min	achieved by setting the corresponding vernier control fully counter clockwise.																	
TIMING RANGES	Output levels																	
Period, width, delay and transition time ranges are independently programmable by separate control lines. Ranges 1, 2, 3 of a function (1 is slowest) are selected by contact closure to ground of the corresponding line. The fastest range is automatically selected when the lines for ranges 1, 2 and 3 are all open. Contact closure on more than one line is illegal. When the square wave line is grounded, square wave is selected and the width and delay settings are automatically inhibited.	Lower and upper levels of each channel are independently controllable (voltage sink mode) by separate control lines each connected to a buffer amplifier ($R_{in} = 10 K \pm 200\Omega$).																	
Levels: TTL compatible, Range selected, contact closure Range not selected, contact open Open control line voltage +5V.	<table border="1"> <thead> <tr> <th></th> <th>Control voltage</th> <th>Pulse generator output voltage (50Ω into 50Ω)</th> </tr> </thead> <tbody> <tr> <td rowspan="3">Upper level</td> <td>+ 8V</td> <td>+ 8V (max +)</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>- 7V</td> <td>- 7V (max -)</td> </tr> <tr> <td rowspan="3">Lower level</td> <td>+ 7V</td> <td>+ 7V (max +)</td> </tr> <tr> <td>0</td> <td>0</td> </tr> <tr> <td>- 8V</td> <td>- 8V (max -)</td> </tr> </tbody> </table>		Control voltage	Pulse generator output voltage (50 Ω into 50 Ω)	Upper level	+ 8V	+ 8V (max +)	0	0	- 7V	- 7V (max -)	Lower level	+ 7V	+ 7V (max +)	0	0	- 8V	- 8V (max -)
	Control voltage	Pulse generator output voltage (50 Ω into 50 Ω)																
Upper level	+ 8V	+ 8V (max +)																
	0	0																
	- 7V	- 7V (max -)																
Lower level	+ 7V	+ 7V (max +)																
	0	0																
	- 8V	- 8V (max -)																
TIMING VERNIERS	Conditions: upper level - lower level $\geq 1V \leq 8V$ (Differences smaller than 1V or greater than 8V are invalid. Due to internal clamping, upper level takes precedence and the lower level limits at 1V/8V below upper level.) Open line puts upper level at zero volts and lower level to -1V.																	
Period, width delay, leading edge and trailing edge are independently controllable by separate control lines connected to a voltage source (open circuit voltage 10V \pm 100mV, source resistance = 10 K \pm 200 Ω).	MANUAL REMOTE CONTROL OPERATION																	
Continuous vernier adjustment from minimum (T min) to maximum (T max) can be simulated in one of three modes:	Programmable operation can be selected for each function independently by setting the desired range switch (or, in the case of the output levels, the appropriate rear panel LEVEL switch) to REM. When combined with option 002 (burst), remote operation is enabled by setting the burst length switch to zero.																	
<table border="1"> <thead> <tr> <th></th> <th>T_{max}</th> <th>T_{min}</th> <th>Absolute Max input excursion</th> </tr> </thead> <tbody> <tr> <td>current sink</td> <td>-1 mA</td> <td>-0.1 mA</td> <td>0 to -1.1 mA</td> </tr> <tr> <td>voltage sink</td> <td>0V</td> <td>9V</td> <td>0 to +10V</td> </tr> <tr> <td>resistor</td> <td>0Ω</td> <td>90kΩ</td> <td>-</td> </tr> </tbody> </table>		T _{max}	T _{min}	Absolute Max input excursion	current sink	-1 mA	-0.1 mA	0 to -1.1 mA	voltage sink	0V	9V	0 to +10V	resistor	0 Ω	90k Ω	-	GENERAL	
	T _{max}	T _{min}	Absolute Max input excursion															
current sink	-1 mA	-0.1 mA	0 to -1.1 mA															
voltage sink	0V	9V	0 to +10V															
resistor	0 Ω	90k Ω	-															
Refer to figures 7-3-3 to -10 for characteristics. Open line is equivalent to a minimum time slightly below that	Power: 200 VA Weight: net 11.5kg (25.3lbs), shipping 12.5kg (27.4lbs).																	

7-3-7 Operating Instructions

7-3-8 The pulse parameters can be selected independently for remote control by setting the corresponding range switch to REM or, for output level, by setting the appropriate LEVEL switch (rear panel) to REM. If option 002 (burst) is fitted, the burst length switch must be set to zero to obtain remote control; conversely, the

control lines for burst length must be open if the burst length is to be set manually. When burst is remote-controlled, the single pulse pushbutton should not be used.

7-3-9 Remote control signal levels are defined in the specifications and the following curves show typical remote control/output characteristics of the verniers.

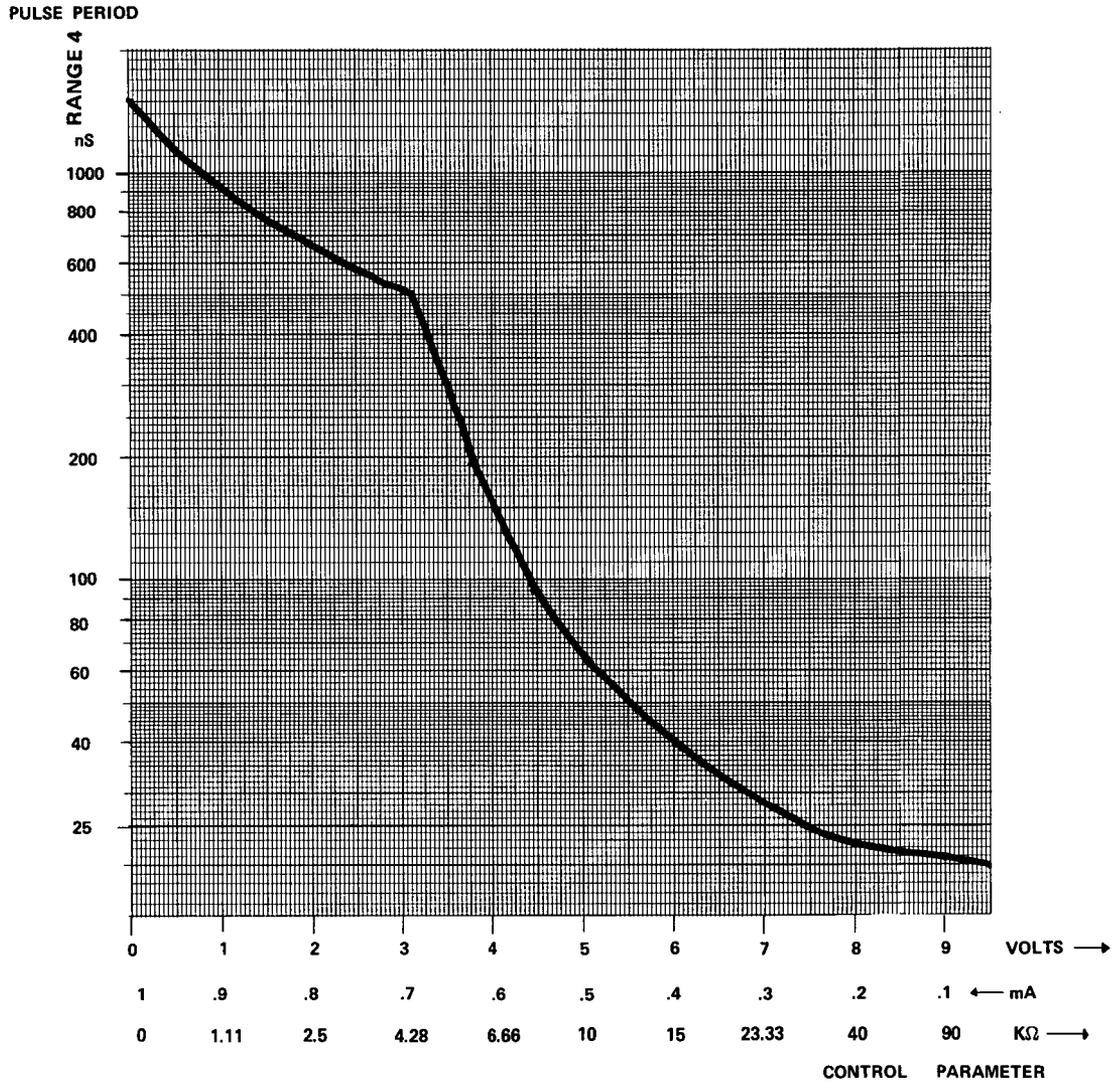


Figure 7-3-3. Pulse period remote control: range 4

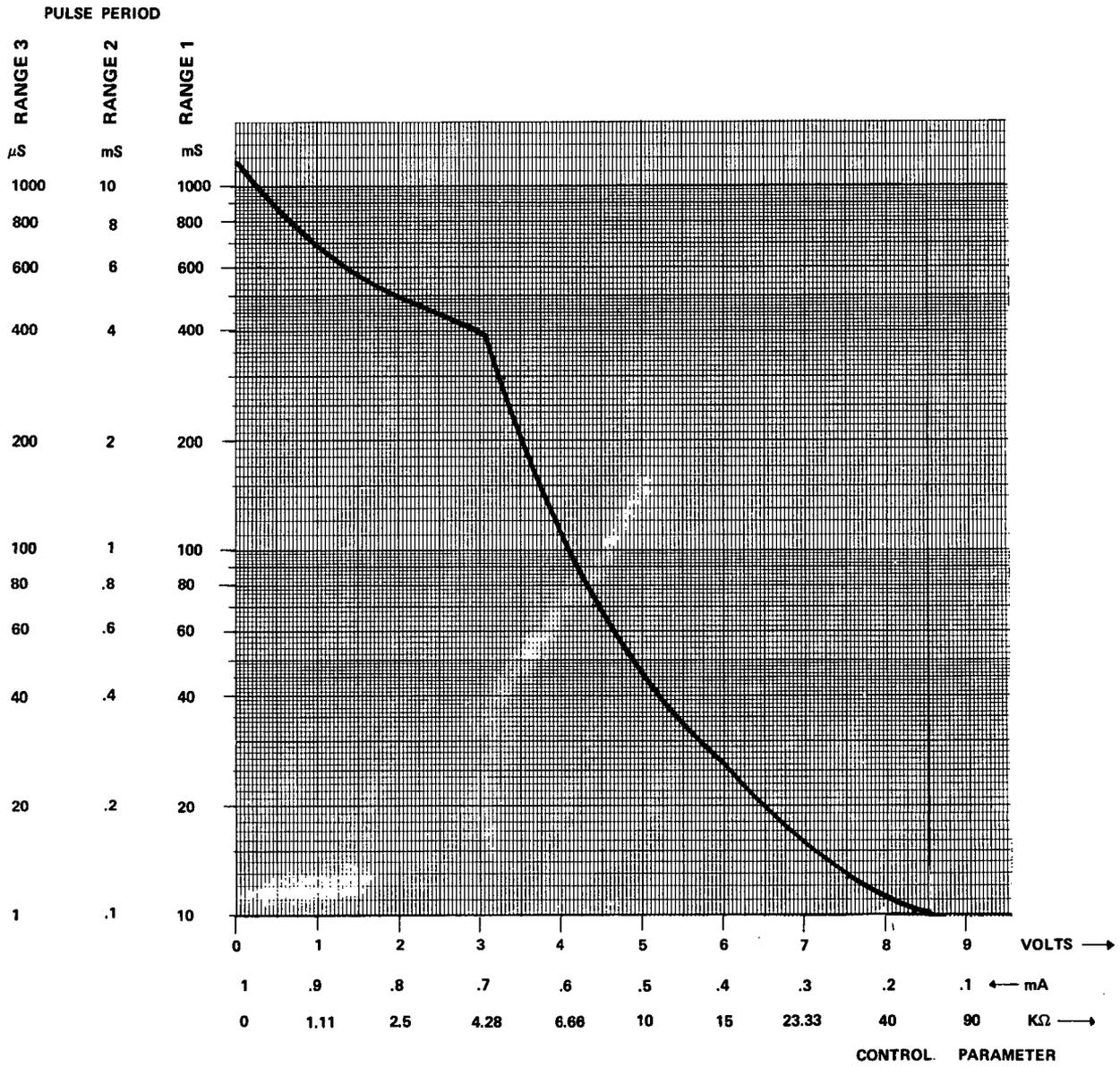


Figure 7-3-4. Pulse period remote control range: ranges 1, 2 and 3

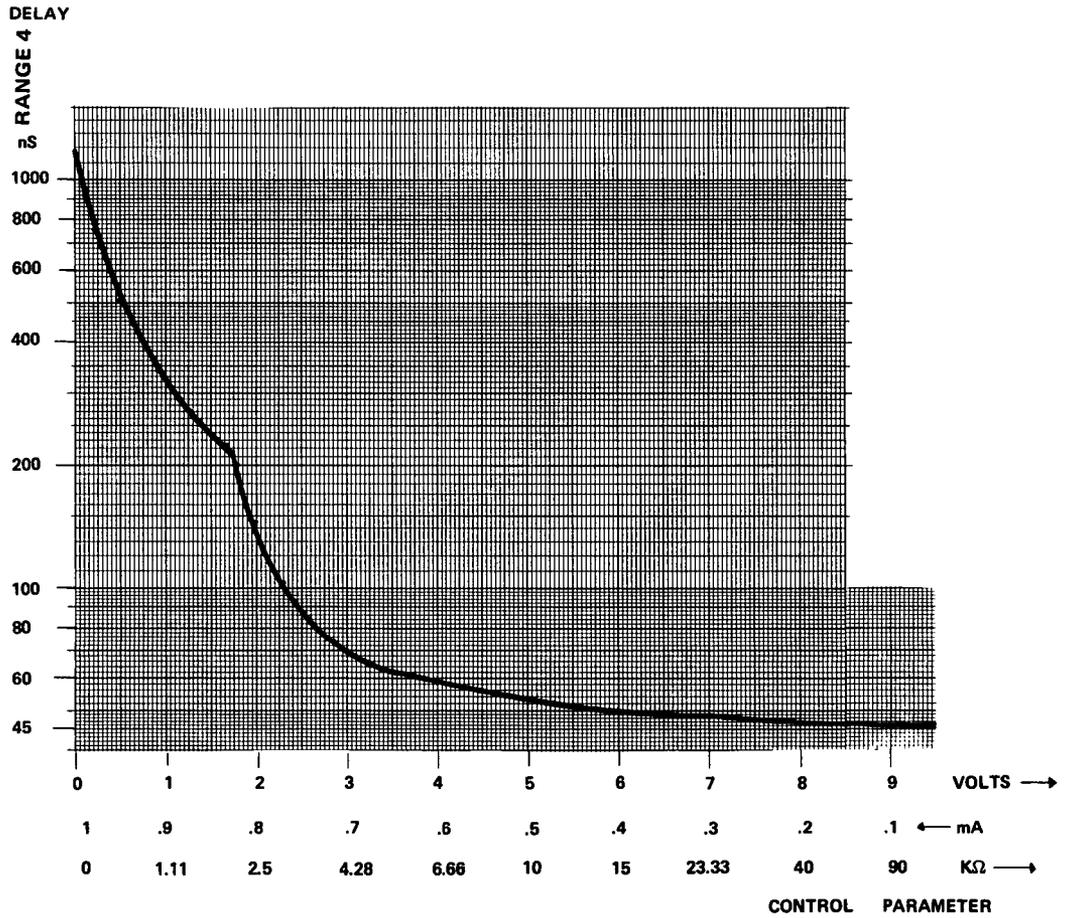


Figure 7-3-5. Delay remote control: range 4

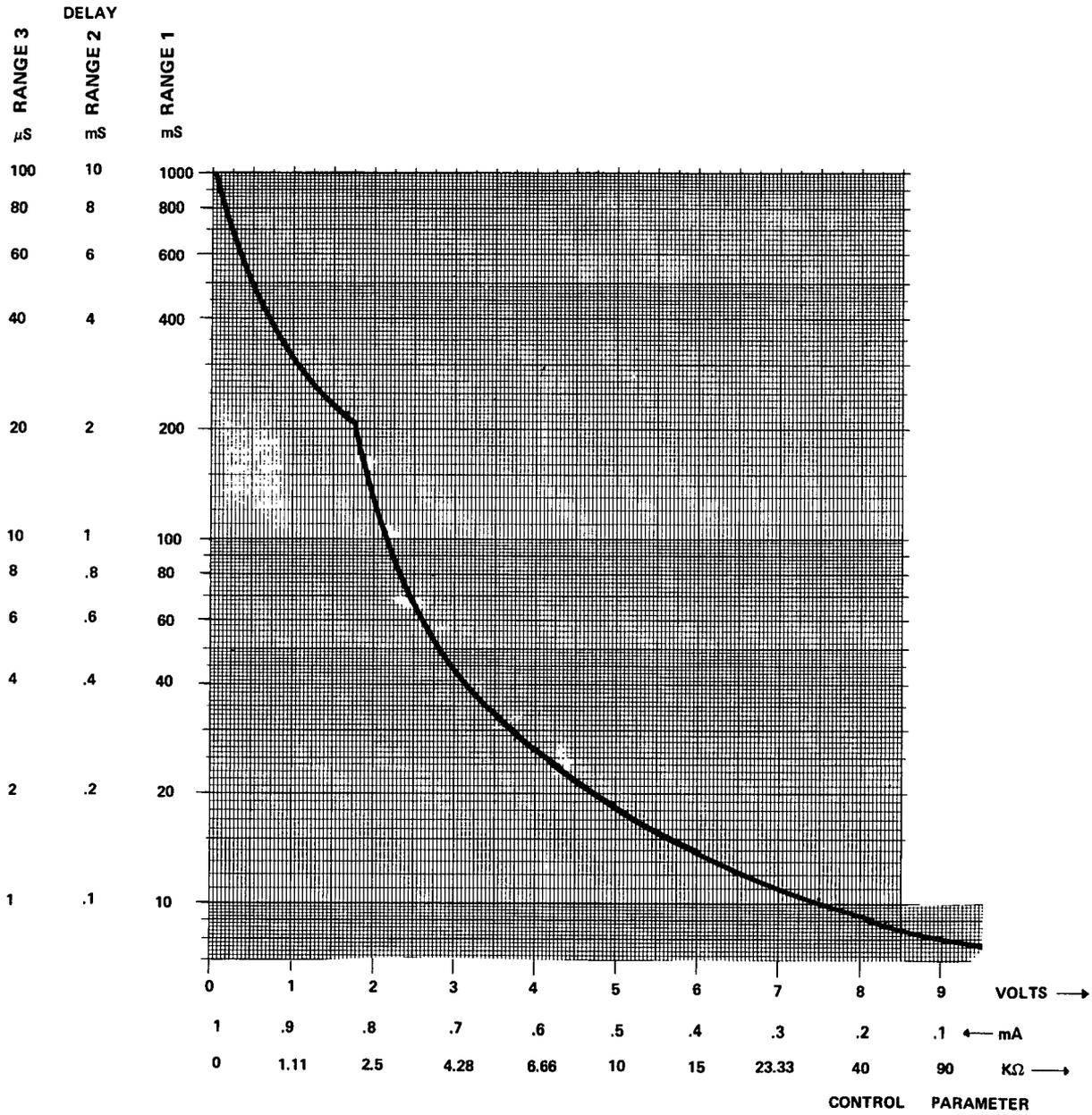


Figure 7-3-6. Delay remote control: ranges 1, 2 and 3

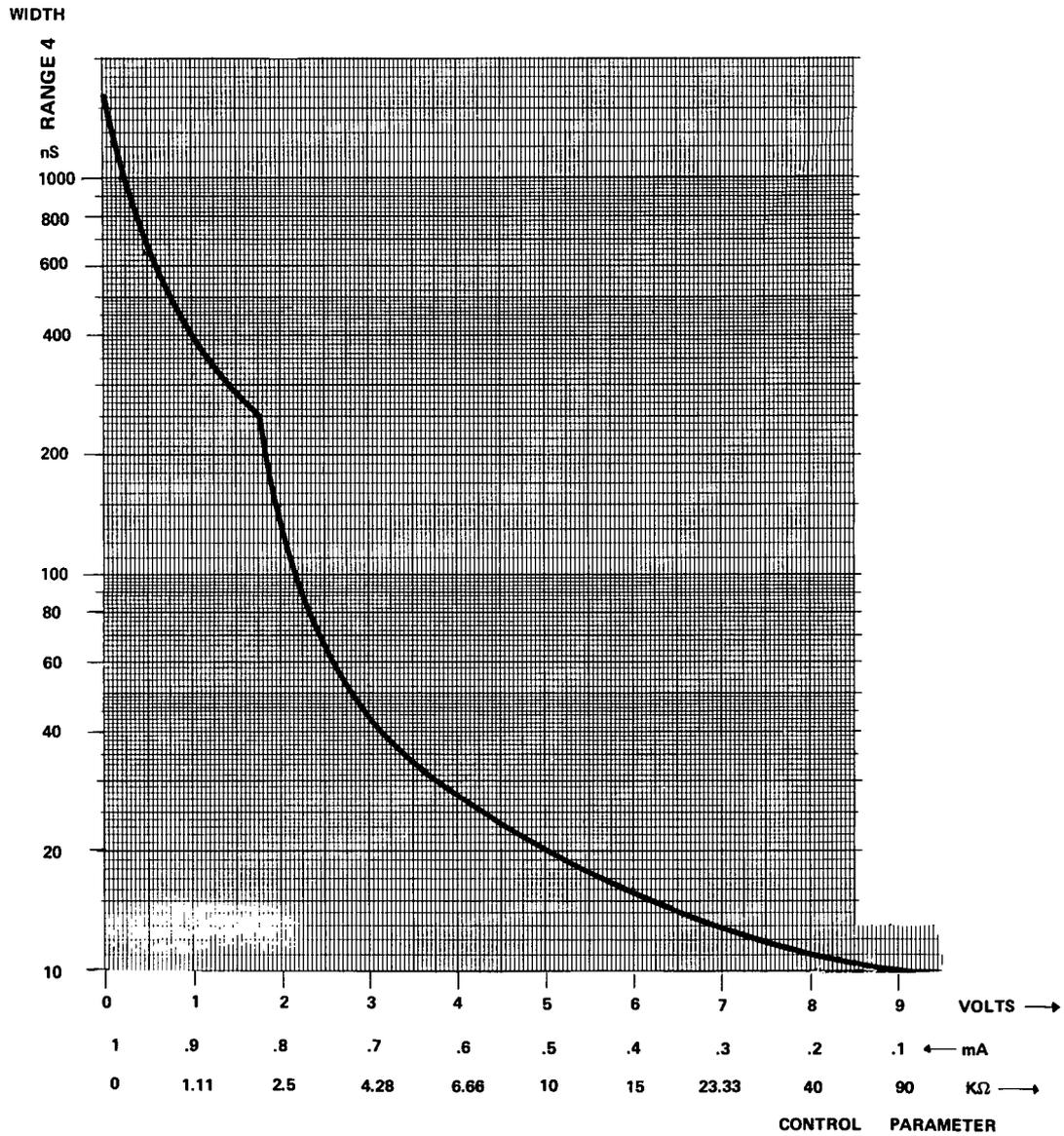


Figure 7-3-7. Width remote control: range 4

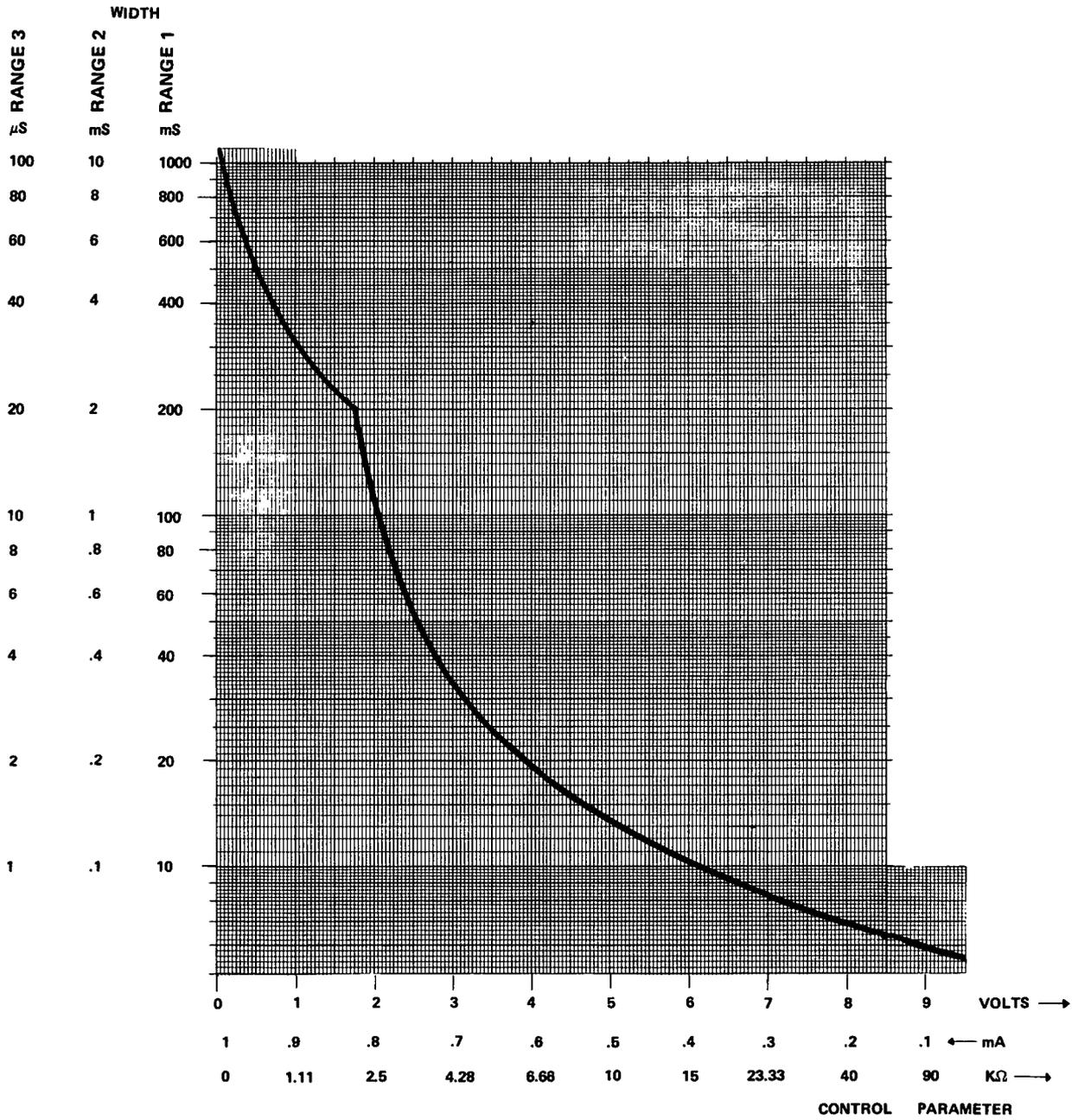


Figure 7-3-8. Width remote control: ranges 1, 2 and 3

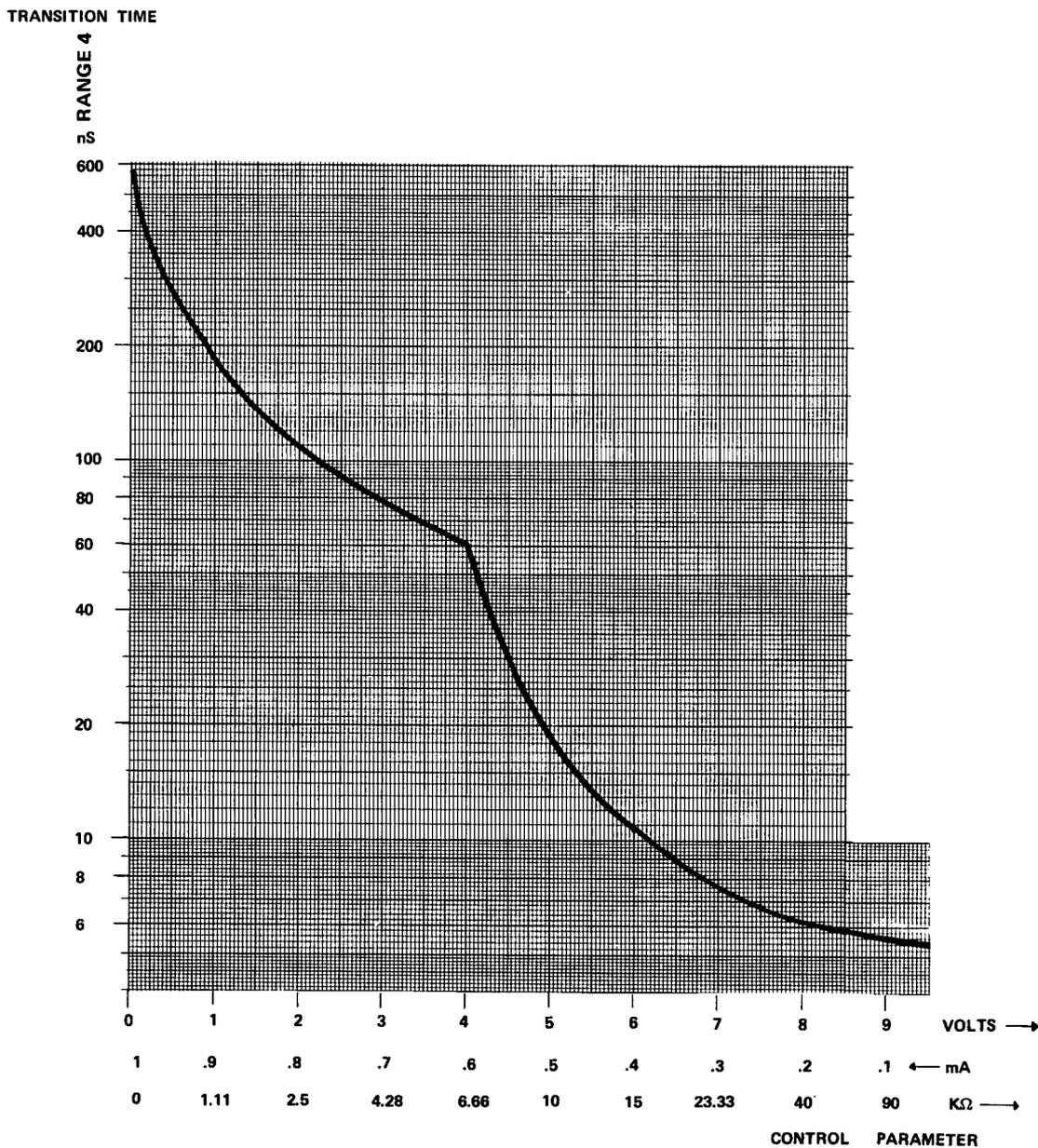


Figure 7-3-9. Transition time remote control: range 4

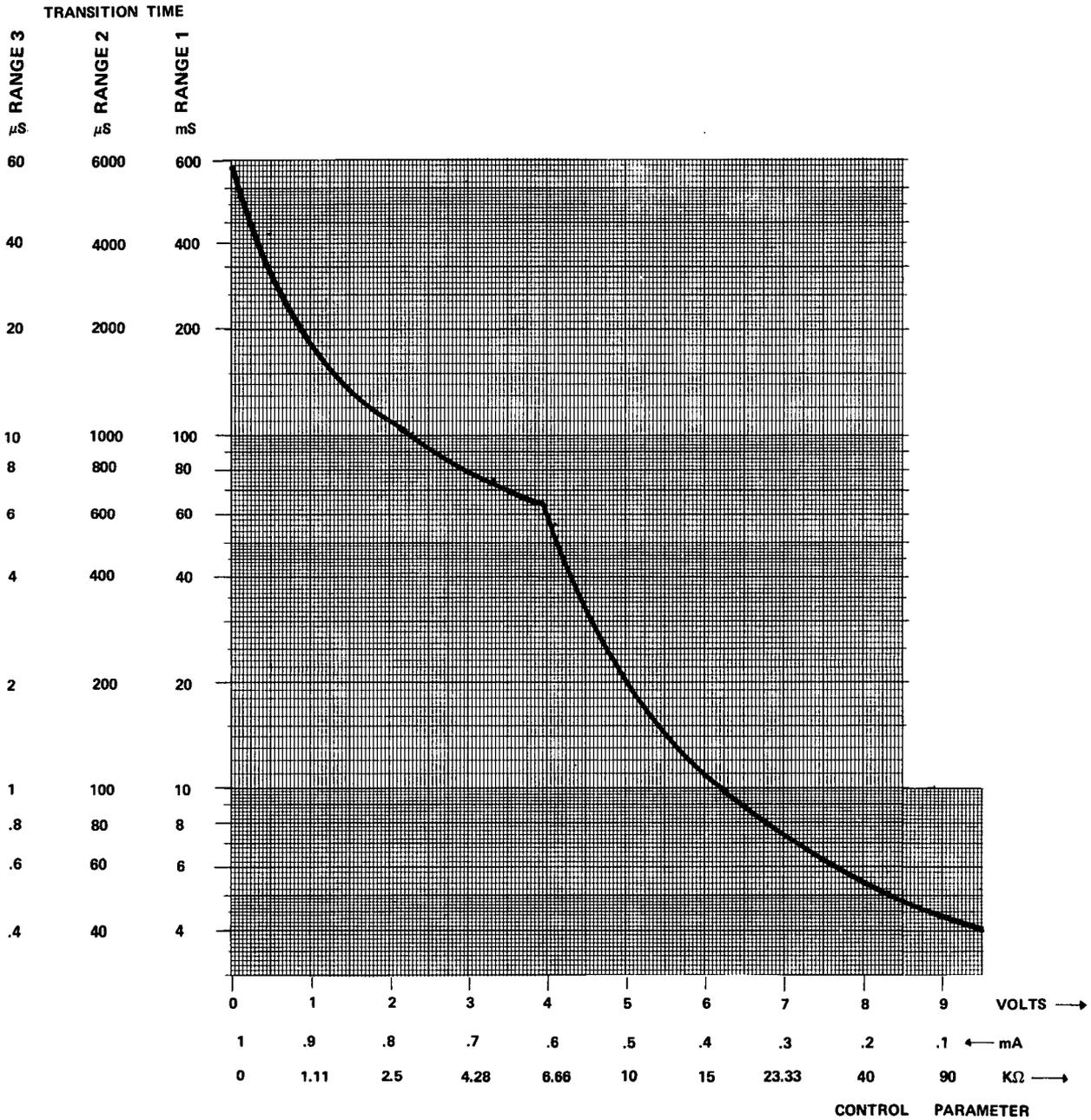


Figure 7-3-10. Transition time remote control: ranges 1, 2 and 3

7-3-10 Principles of Operation

7-3-11 REMOTE RANGE CONTROL

7-3-12 Remote control lines for pulse period, width, delay and transition time range are fed from the rear panel control connector to decoding circuits on A30. These circuits generate steering signals which simulate the front panel range switches. The steering signals are fed to the period, width, delay, square wave and transition time circuits on A3 via A31. See service sheets 6b and 9 of Section 9.

7-3-13 REMOTE VERNIER CONTROL

7-3-14 The vernier control lines are fed from the rear panel connector to A33 where they control non-linear current sources which simulate the front panel vernier controls. These sources are brought into operation by relays which close when the range switch in question is set to REM.

7-3-15 A typical current source and its characteristic are shown in figure 7-3-11.

7-3-16 The outputs of the current sources are taken to the appropriate timing circuits on A3 via A31. Refer to service sheets 6b and 10 of Section 9.

7-3-17 REMOTE OUTPUT LEVEL CONTROL

7-3-18 The output level control lines are fed to A33 where they are buffered. Clamping ensures that the lower level cannot be less than 1V, or more than 8V, negative with respect to the upper level – even if the control voltages are outside these limits. The buffered and clamped outputs are fed via A31 to A2A and A2B.

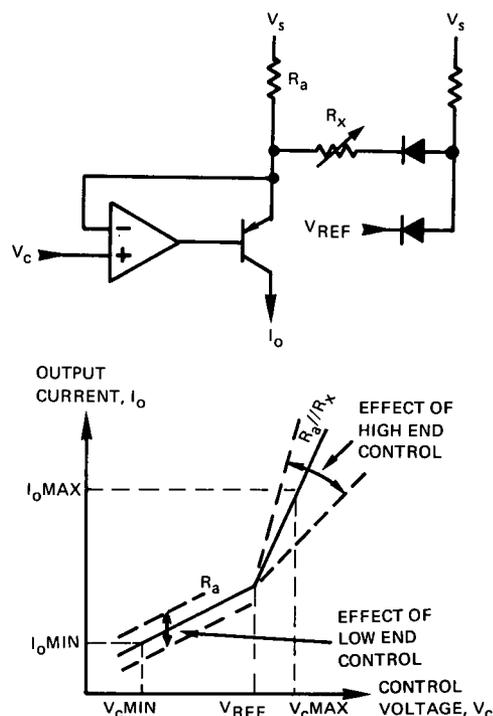


Figure 7-3-11. Principles of current source for vernier remote control

7-3-19 REMOTE BURST CONTROL

7-3-20 When fitted with the burst option, the burst control lines are fed by A27 W2 to A6 in parallel with the outputs of the front panel burst length control.

7-3-21 Replaceable Parts and Service Information

7-3-22 Refer to figs. 6-4, 6-5, the Option 003 Replaceable Parts List (Section 6), Service Sheets 6b, 9 and 10 and tables 7-3-2, 7-3-3 and 7-3-4.

ADJUSTMENTS

Table 7-3-2. Adjustment procedure 1 for Option 003

Test Equipment: Oscilloscope arrangement as for rate, delay width adjustments.

	Remote Connector XII				Adjustment A33		
	Rate	Delay	Width		Rate	Delay	Width
Range 2	1	4	7	Minimum adj.	R17	R31	R42
Range 3	2	5	8				
Range 4	3	6	9	Maximum adj.	R5	R23	R34

NOTE: The standard instrument must be in specification.

PROCEDURE

Set corresponding switch to REM.

1. Set your ext vernier to the min limit (90 K Ω , 9V, 0.1mA).
2. Enable required circuit with a TTL high level \geq +2.4V.
3. Lower limit: Select the 3 lower ranges one after the other and measure on scope which range has the lowest relative value (to setting).

Example: Rate (Vernier min)
 Range 1 0.16 m
 Range 2 14 m
 Range 3 1.5 s

Range 2 has the lowest deviation, so this range will be adjusted 10% above the setting value (11ms in this case).

4. Upper Limit: Set your ext vernier to max limit (0 Ω , 0V, 1mA). Select the 3 lower ranges one after the other and measure which range has the highest relative value (to setting).

Example: Rate (Vernier max)
 Range 1 0.88 μ s
 Range 2 85 μ s
 Range 3 8.7 ms

Range 1 has the highest deviation so this range will be adjusted 10% above the setting value (0.90 μ s in this case).

5. Set 8015A via opt 003 to min width.
 If necessary readjust A3 R42 for (best compromise)

\leq 13ns

ADJUSTMENTS

Table 7-3-3. Adjustment procedure 2 for Option 003

Test Equipment:	Oscilloscope		
	Arrangement as for transition time		
Remote Connector XII			Adjustment A33
Transition Time XII			leading edge trailing edge
Range 2 11	Minimum adjust	R58	R76
Range 3 12			
Range 4 13	Maximum adjust	R45	R66

NOTE: The standard instrument must be in specification.

PROCEDURE

1. Set transition time switch to REM.
2. Set ext vernier to min limit (90 K Ω , 9V, 0.1mA).
3. Enable needed ranges with a TTL high level \geq +2.4V.
4. Lower limit:
Select the 3 lower ranges one after the other and measure on scope which range has the lowest relative value (to setting).

Example: (Vernier min)

Range 1	55 μ
Range 2	5.8m
Range 3	0.53s

Range 2 has the lowest deviation, so this range has to be adjusted 10% below the setting value (0.55s in this case).

5. Upper limit:
Set ext vernier to max limit (0 Ω , 0V, 1mA).
Select the 2 lower ranges one after the other and measure which range has the highest relative value (to setting).

Example: (Vernier max)

Range 1	0.48 μ
Range 2	45 μ
Range 3	4.6m

Range 1 has the highest deviation so this range has to be adjusted 10% above the setting value (0.45 μ in this case).

ADJUSTMENTS

Table 7-3-4. Adjustment procedure 3 for Option 003

Test Equipment: Oscilloscope, variable voltage source (dual)
check and, if necessary, adjust of offset gain and zero.

NOTE: Standard instrument should be okay.

PULSE PERIOD 1	1 μ –0.1m	CH A NORM/COMPL 10	NORM
VERNIER 2	CW	CH B NORM/COMPL 13	NORM
PULSE DELAY 3	20n–1 μ	CH B Zs 14	1 K Ω
VERNIER 4	CCW	CH A NORM/COMPL 16	A sep B
PULSE WIDTH 5	SQUARE WAVE	CH A Zs 18	1 K Ω
VERNIER 6	–	TRIG POLARITY 22	–
TRANSITION TIME 7	6n–0.5 μ	TRIG INPUT IMPEDANCE 23	–
LEADING EDGE 8	CCW	FUNCTION 24	NORM
TRAILING EDGE 9	CCW	MODE 25	NORM
		EXT INPUT LEVEL 26	–

- Center scope beam for zero volt reference, connect it to channel A output.
- Set dual voltage source to +4 and –4V (via 20 dB attenuator, 50 Ω Term).

Remote connector

pin	X11		max ampl	min ampl
22	lower level channel A	apply –4V	–0.5V	
23	upper level channel A	apply +4V	+0.5V	
24	lower level channel B	apply –4V	–0.5V	
25	upper level channel B	apply +4V	+0.5V	

- Check and if necessary adjust A5 R for a max CH A Amplitude of 16.5V \pm 0.1V.
- Check and if necessary adjust A5 R for a max CH B amplitude of 16.5V \pm 0.1V.
- Check and if necessary adjust A2A R117 for a min CH A amplitude of 1.8V \pm 0.1V.
- Check and if necessary adjust A2B R117 for a min CH B amplitude of 1. V \pm 0.1V.
Set Zs switches to 50 Ω .

- Set upper level voltage to +8V and lower level voltage to 0V.
- Operate norm-compl switch. If necessary adjust A2A (B) R9 for not shift on lower level.
- Apply +8V to upper level, 0V to lower level.
- Change to 0V to upper level, –8V to lower level.
- Observe display and watch sym to zero.
- If necessary adjust A2A (B) R159 for sym display.
- If display is sym now, but not at the zero volt baseline adjust A2A (B) R152 to zero.
- Apply +4 to upper level, 0V to lower level.
- If lower level is not on zero V baseline:
adjust A2A (B) R60 for norm mode to zero
adjust A2A (B) R61 for compl mode to zero.

If necessary check same procedure (5–22) for the standard instrument and if necessary find best compromise.

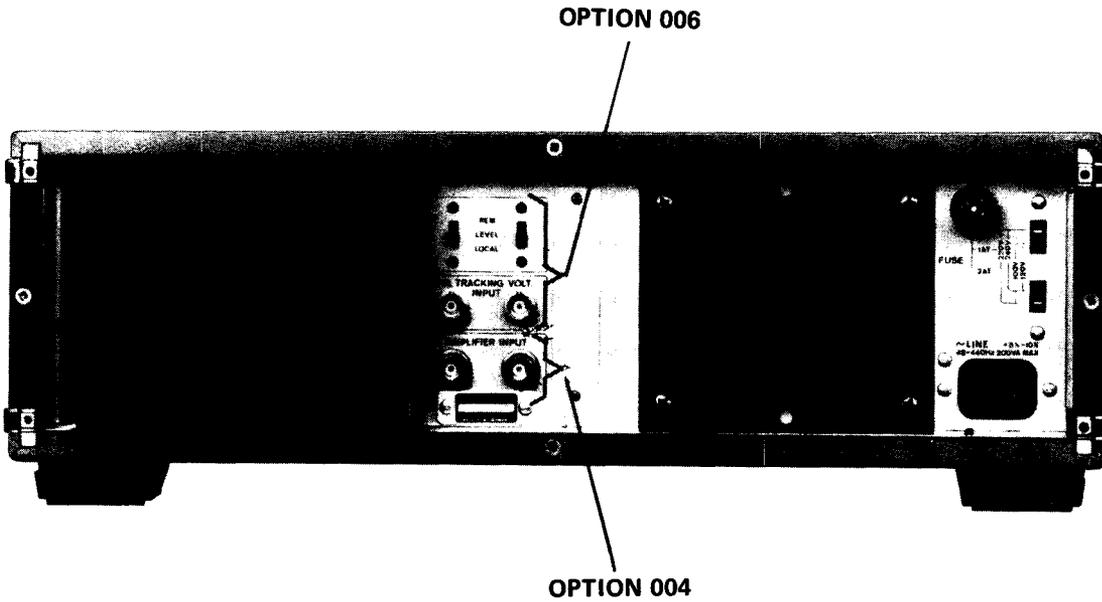


Figure 7-4-1. 8015A Option 004 (with Option 006) - Rear Panel

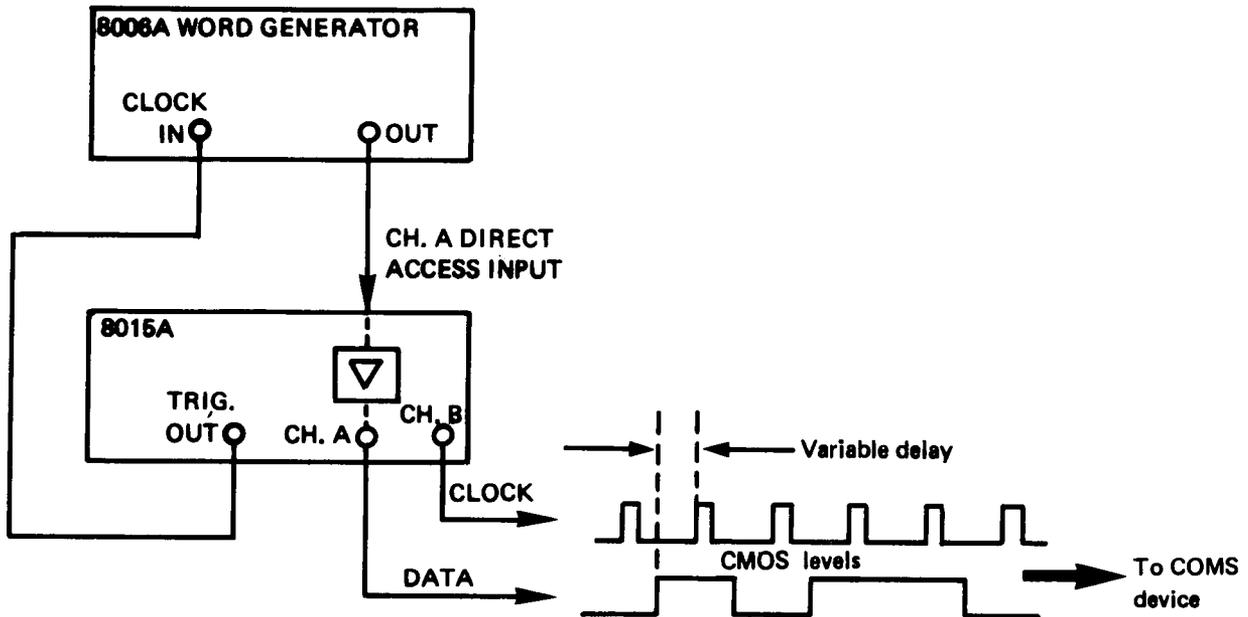


Figure 7-4-2. CMOS Test Set-up

7-4-1 OPTION 004 – DIRECT ACCESS TO OUTPUT AMPLIFIERS

7-4-2 Specifications and General

7-4-3 Option 004 allows direct access to both of the 8015A's output amplifiers. The amplifiers are linear, and any waveforms within a certain voltage swing (see specifications) can be applied to the inputs. The waveforms will be amplified to a level determined by the 8015A amplitude controls. This enables, for example, TTL signals or low-level word generator outputs to be converted to higher amplitude levels for driving CMOS circuits. The option is enabled/disabled using two switches situated on the 8015A Option 004 Integrator board (replaces the normal Integrator board). The option operates with asymmetrical input voltage swings (see specification) but can be modified for symmetrical inputs as described in paragraph 7-4-5.

7-4-4 This option precludes Option 001.

7-4-5 Conversion for Symmetrical Operation

7-4-6 The output amplifiers can be driven by input signals that are symmetrical about 0 volts if the follow-

ing modification is made (refer to figure 6-5 and Service Sheet 4 when reading the following description).

1. Remove from the 8015A rear panel by unscrewing the two BNC connectors.
2. Disconnect the +5V and -5V power supply cables and insulate the ends of the cables.
3. Unsolder and remove transistors Q1 and Q2 from A32.
4. Link the +5V and -5V pins on A32 to ground.
5. Refit A3 to the 8015A rear panel.

7-4-7 Replaceable Parts and Service Information

7-4-8 Refer to the Option 004 Replaceable Parts table in Section 6, figure 6-5, Service Sheet 4 and tables 7-4-2 and 7-4-3.

Table 7-4-1. Specifications

<p>All specifications apply for an 8015A output source impedance of 50 ohms and no load.</p> <p>Input impedance: 50 ohms \pm 5 %.</p> <p>Operation: asymmetrical (symmetrical with modification).</p> <p>Input voltage swing for full output swing: \geq 2.5Vpp (to +2.5V, baseline 0V).</p> <p>Maximum input voltage: \pm 5V.</p> <p>Output signal: can be shifted within a window of 0V to 16V.</p>	<p>Voltage gain (typical): continuously variable between 0.8 and 6.4 using level controls.</p> <p>Clipping: occurs if upper level of input signal exceeds +2.5V or if lower level of input signal goes negative.</p> <p>Frequency response (-3dB): 0 to 50MHz (50 ohm source, no load), 0 to 80MHz (50 ohm source, 50 ohm load).</p> <p>Polarity: inverting for NORM mode, non-inverting for COMPL mode.</p> <p>A+B mode: both outputs can be paralleled (A+B mode) when both inputs are being driven. In this case the maximum output swing can be 30Vpp symmetrical about 0V.</p>
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PERFORMANCE CHECK

Table 7-4-2. Direct Output Amplifier Access (Option 004)

PROCEDURE

Set up equipment as shown and set controls as follow:

PULSE PERIOD 1	—
VERNIER 2	—
PULSE DELAY 3	—
VERNIER 4	—
PULSE WIDTH 5	—
VERNIER 6	—
TRANSITION TIME 7	—
LEADING EDGE 8	—
TRAILING EDGE 9	—
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL 11	+4V
CH A LOWER LEVEL	0V
CH B UPPER LEVEL 12	+4V
CH B LOWER LEVEL	0V
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POIARITY 22	—
TRIG INPUT IMPEDANCE 23	—
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	—

SPECIFICATION

Option 004 direct output access
 Input impedance 50 ± 5%, asymmetrical operation input
 voltage for max output 2.5V pp baseline 0V top +2.5V
 polarity: inverting for norm, non-inverting for compl.

DESCRIPTION

Check of direct output amplifier access function.

EQUIPMENT

Oscilloscope: 50 MHz bandwidth
 Pulse Generator: 20 MHz Repetition Rate

Test Equipment: Set ext pulse generator to 10 MHz and amplitude to positive 2.5V.

1. Verify switches S41 and S42 on A5 are in direct access (EXT) position (Service Sheet 4).
2. Check output with level controls at min and max separation.

ADJUSTMENTS

Table 7-4-3. Adjustment Procedure for Option 004

Test Equipment: Oscilloscope

CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	—
TRIG INPUT IMPEDANCE 23	—
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	—

1. Set switches A5 S44, S42 to EXT.
2. Set scope to zero volt reference.
3. Apply channel A to scope (leave 8015A rear panel inputs open).
4. Set levers in min separation to exact sym zero.
5. Adjust A32 R9 for zero baseline.
 If zero adjust is not possible move levers in maximum separation from full positive to full negative and adjust A32 R9 for sym voltage to zero.
6. Repeat step 4 and 5 for channel B adjusting A32 R16.

7-5-1 OPTION 005 – TTL OUTPUT

7-5-2 Specifications and General

7-5-3 The 8015A TTL Output option (005) provides a TTL compatible output at a front panel BNC connector (see figure 7-5-1). The logic levels of this output are $\geq 4.5V$ for a logic 1 and 0V for a logic 0; all other pulse parameters remain variable.

7-5-4 This option greatly increases the speed and ease with which pulses can be set up when testing TTL circuitry. A further advantage is that because the TTL output has a 50 ohm source impedance, no external 50 ohm termination is required.

7-5-5 The specifications for the TTL output pulse parameters are the same as for the channel A output except for pulse amplitude.

Output levels (into an open circuit): logic 1 $\geq 4.5V$; logic 0 zero volts.

Format: normal and complement (switched by Channel A NORM/COMP switch).

Output impedance: 50 ohms.

7-5-6 Differences in assemblies and parts are indicated in figure 6-7, the Option 005 Replaceable Parts list (Section 6) and Service Sheet 4. Option 005 precludes Option 001.

7-5-7 Operating Instructions

7-5-8 When it is required to switch the TTL output from normal to complement, or vice versa, use the NORM/COMP switch for channel A.

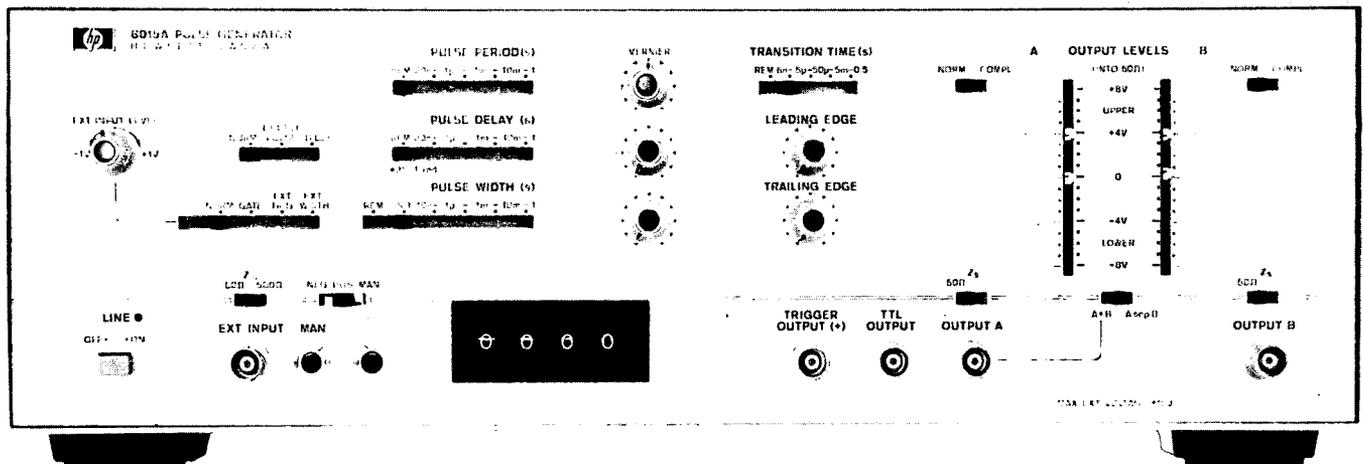


Figure 7-5-1. 8015A Option 005 (with Option 002)

7-5-9 Principles of Operation (Service Sheet 4)

7-5-10 The output of the integrator (emitter followers Q19/Q20) is applied to differential amplifier Q1/Q2 with constant current source Q3. The normal and complement outputs of this differential amplifier are applied to a second differential amplifier, Q4/Q5, where the TTL output levels are established. Both amplifiers

are linear so that the variable transition time feature B retained in the TTL output.

7-5-11 The TTL output levels (logical 1: $\geq 4.5V$, logical 0: 0V) are generated across two 50 ohm loads (R12, R13). These loads form the 50 ohm source impedance and either one or the other is selected by relay K1. This relay is controlled by the Channel A NORM/COMPL switch on the front panel.

7-5-12 Replaceable Parts and Service Information

7-5-13 Refer to figure 6-7, the Option 005 Replaceable Parts list (Section 6), Service Sheet 4 and table 7-5-1.



PERFORMANCE CHECK

Table 7-5-1. TTL Output (Option 005)

PROCEDURE

Set up equipment as shown and set controls as follows:

PULSE PERIOD 1	20n-1 μ
VERNIER 2	CW
PULSE DELAY 3	20n-1 μ
VERNIER 4	CCW
PULSE WIDTH 5	SQUARE WAVE
VERNIER 6	-
TRANSITION TIME 7	6n-0.5 μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL 11	-
CH A LOWER LEVEL 11	-
CH B UPPER LEVEL 12	-
CH B LOWER LEVEL 12	-
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	-
TRIG INPUT IMPEDANCE 23	-
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

SPECIFICATION

Option 005 extra TTL Output
 logic 1 \geq 4.5V, logic 0 \leq 0.2V
 source impedance 50 Ω
 coincident with channel A
 (Norm-Compl)

DESCRIPTION

Check of TTL levels.

EQUIPMENT

Oscilloscope \geq 50 MHz Bandwidth

Test Equipment: Set scope for best resolution.

1. Check level of output signal.
2. Set channel A Norm-Compl to Compl and check level.

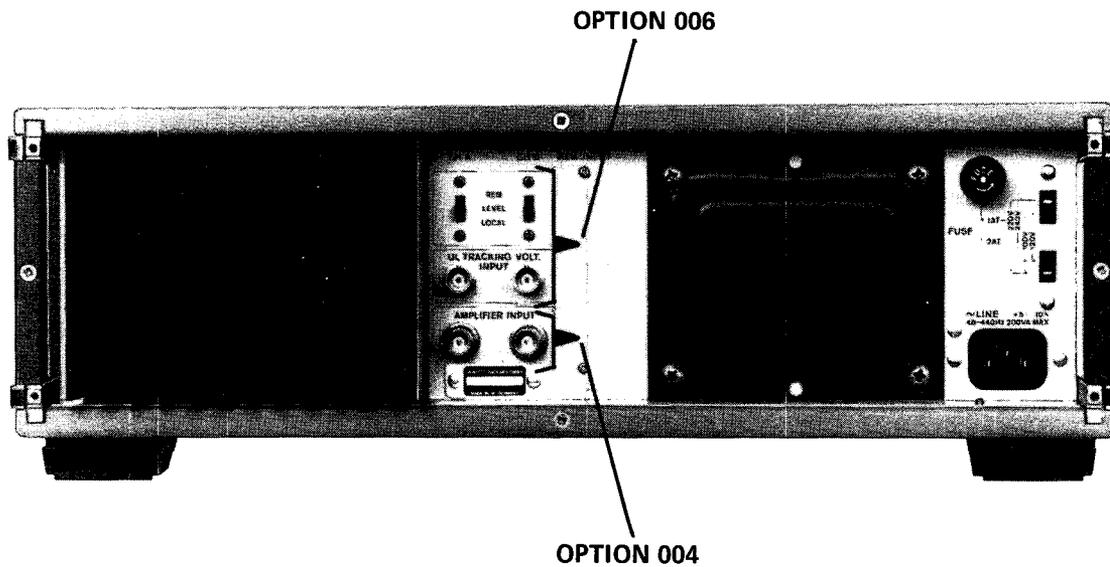


Figure 7-6-1. 8015A Option 006 (with Option 004) – Rear Panel

7-6-1 OPTION 006 – UPPER-LEVEL TRACKING

7-6-2 Specifications and General

7-6-2 This option provides upper level control of the output pulse amplitude by means of an external control voltage. The upper level of the output pulse is equal to the control voltage when the 8015A is set to 50 ohms source impedance and no external termination is used. The lower level of the output pulse is held at 0V.

7-6-3 The input connectors for the control signal are situated on the 8015A rear panel and each connector has a REMOTE/LOCAL switch so that the option can be used with either one or both channels.

7-6-4 This option is particularly useful when testing CMOS circuits; the CMOS supply voltage is used as the control input and the 8015A output is used as the CMOS gate supply (see figure 7-6-2). This arrangement ensures that if the CMOS supply voltage fails or is changed there is no danger of the gate voltage exceeding the supply voltage and damaging the CMOS circuit.

7-6-5 All 8015A output pulse parameters, except amplitude, remain variable from the front panel controls. The following specifications apply to both control

inputs for an 8015A source impedance of 50 ohms into an open circuit.

Upper level control voltage: +2V to +16V for a pulse output of +2V to +16V.

Upper level output accuracy: $\pm 5\%$ of control voltage.

Lower level of output pulse held at $0V \pm 250mV$.

Control input impedance: $10K\ ohms \pm 7\%$

Maximum control voltage: +20V

Minimum control voltage: 0V

Settling time to $\pm 5\%$ of final value: $400\mu s$.

Option 006 precludes Options 001 and 003.

7-6-6 Operating Instructions

7-6-7 The control voltage is applied to one or both upper Level Tracking connectors on the rear panel and the appropriate REMOTE/LOCAL switch is set to REMOTE. The control voltage must not exceed the limits given in the Specifications.

7-6-8 Replaceable Parts and Service Information

7-6-9 Refer to figure 6-8, the Option 006 Replaceable Parts list (Section 6), Service Sheet 6, and table 7-6-1.

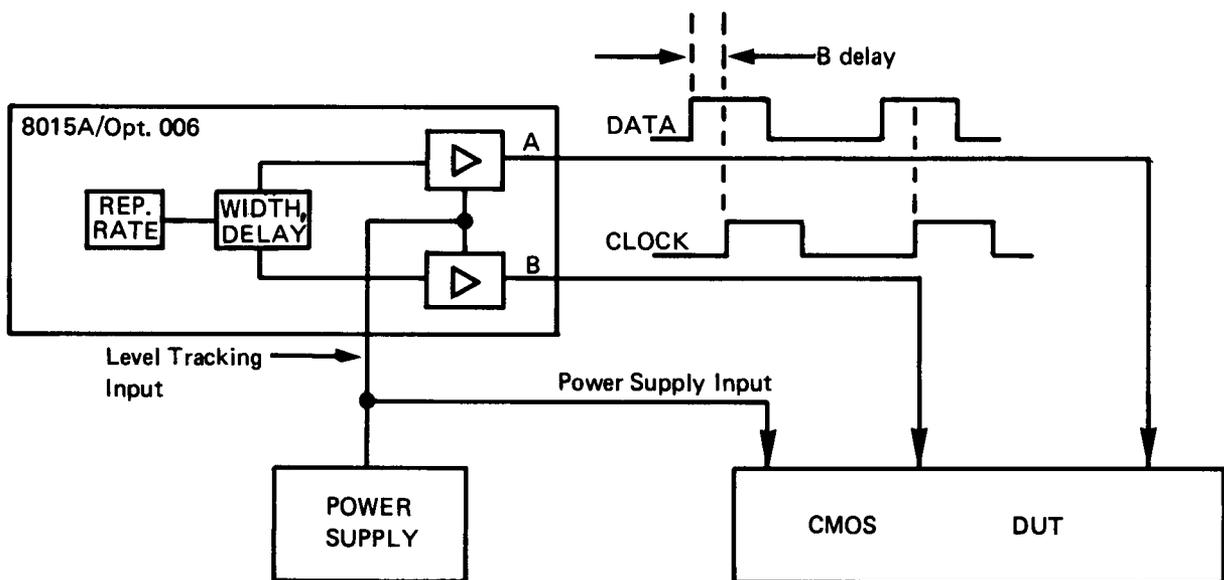


Figure 7-6-2. CMOS test circuit

PERFORMANCE CHECK

Table 7-6-1. Upper Output Level Tracking (Option 006)

PROCEDURE

Set controls as follows:

PULSE PERIOD 1	20n-1μ
VERNIER 2	CW
PULSE DELAY 3	20n-1μ
VERNIER 4	CCW
PULSE WIDTH 5	SQUARE WAVE
VERNIER 6	-
TRANSITION TIME 7	6n-0.5μ
LEADING EDGE 8	CCW
TRAILING EDGE 9	CCW
CH A NORM/COMPL 10	NORM
CH A UPPER LEVEL 11	-
CH A LOWER LEVEL 11	-
CH B UPPER LEVEL 12	-
CH B LOWER LEVEL 12	-
CH B NORM/COMPL 13	NORM
CH B Zs 14	50 Ω
CHANNEL SUMMING 16	A sep B
CH A Zs 18	50 Ω
TRIG POLARITY 22	-
TRIG INPUT IMPEDANCE 23	-
FUNCTION 24	NORM
MODE 25	NORM
EXT INPUT LEVEL 26	-

SPECIFICATION

Option 006 upper output level tracking
 Input voltage +2V to +16V
 Input Impedance 10 kΩ ± 5%.
 Upper level accuracy
 ± 5% of control voltage
 lower level accuracy
 0V ± 250mV.

DESCRIPTION

Check of Option 006 upper output level tracking.

EQUIPMENT

Oscilloscope ≥ 50 MHz
 Variable voltage source +2V to +16V

1. Connect oscilloscope to channel A.
2. Apply tracking voltage. Vary slowly from +2V to +16V.
3. Verify output amplitude follows.
4. Connect oscilloscope to channel B and repeat steps 2 and 3.

8-1 Serial Numbers 1538G 00685 and below

8-2 A24 is replaced by A4, A28 by W8 (or A38 by W18 for option 001). Refer to Service Sheet 7a, Figure 8-1 and the following Replaceable Part list.

CAUTION

Connect device-under-test to outputs AFTER switching ON.
Disconnect device-under-test BEFORE switching OFF.

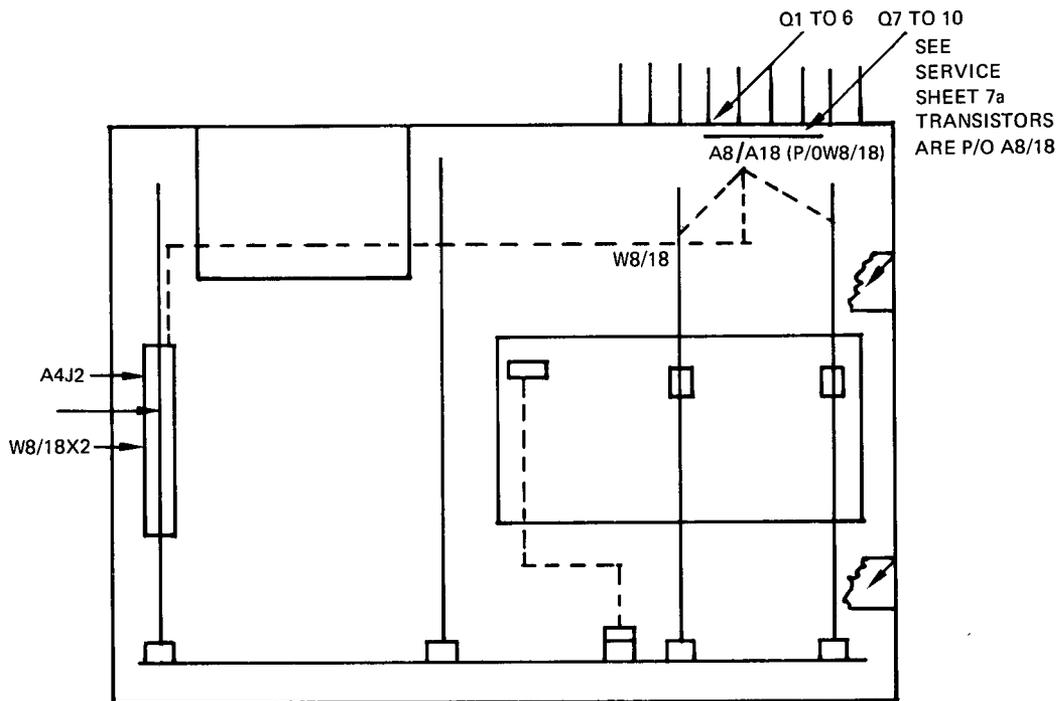


Figure 8-1. Changed Assemblies – Serial Numbers 1538G 00685 and below

Changed Replaceable Parts (Serial Numbers 1538G00685 and below)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
MP19	08015-21102	1	HEATSINK	28480	08015-21102
MP22	08015-00203	1	PANEL REAR	28480	08015-00203
WB	08015-61601	1	CABLE ASSEMBLY, MAIN	28480	08015-61601
WBX2	1251-0335	1	CONNECTOR-PC EDGE 24-CONT/ROW 2-ROWS	28480	1251-0335
WBA8	08015-66508	1	BOARD ASSEMBLY, RESISTOR	28480	08015-66508
A8C1	0180-0100	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X903582
A8C2	0180-0100	2	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X903582
A8Q1	1853-0212	5	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A8Q2	1853-0212	5	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A8Q3	1853-0212	5	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A8Q4	1854-0368	5	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A8Q5	1854-0368	5	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A8Q6	1854-0368	5	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A8Q7	1854-0368	5	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A8Q8	1853-0212	5	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A8Q9	1854-0368	5	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A8Q10	1853-0212	5	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A8R1	0757-0442	16	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A8R2	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R3	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R4	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R5	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R6	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R7	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R8	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R9	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R10	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R11	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R12	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R13	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R14	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R15	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R16	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A8R17	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
W18	08015-61611	1	CABLE ASSEMBLY, MAIN (OPTION 001)	28480	08015-61611
W18X2	1251-0335	1	CONNECTOR-PC EDGE 24-CONT/ROW 2-ROWS	28480	1251-0335
A18	08015-66518	1	BOARD ASSEMBLY, RESISTOR (OPTION 001)	28480	08015-66518
A18C1	0180-0100	4	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X903582
A18C2	0180-0100	4	CAPACITOR-FXD 4.7UF+-10% 35VDC TA	56289	1500475X903582
A18Q1	1853-0212	4	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A18Q2	1853-0212	4	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A18Q3	1853-0212	4	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A18Q4	1854-0368	4	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A18Q5	1854-0368	4	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A18Q6	1854-0368	4	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A18Q7	1854-0368	4	TRANSISTOR NPN 2N5191 SI PD=40W FT=2MHZ	04713	2N5191
A18Q8	1853-0212	4	TRANSISTOR PNP 2N5194 SI PD=40W FT=2MHZ	04713	2N5194
A18R1	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A18R10	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R11	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R12	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R13	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R14	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R15	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R16	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C
A18R17	0757-1004	16	RESISTOR 53.27 .25% .5W F TC=0+-100	19701	MF7C1/2-T0-53R27-C

Changed Replaceable Parts (Serial Numbers 1538G00685 and below)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4	08015-66504		BOARD ASSEMBLY POWER SUPPLY	28480	08015-66504
A4C1	0170-0084	21	CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C3	0140-0200	1	CAPACITOR-FXD 390PF +-5% 300WVDC MICA	72136	DM15F391J0300WV1CR
A4C4	0180-0291	2	CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A4C5	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C6	0180-1745	2	CAPACITOR-FXD 1.5UF+-10% 20VDC TA	56289	1500155X9020A2
A4C8	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C10	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C11	0180-1745		CAPACITOR-FXD 1.5UF+-10% 20VDC TA	56289	1500155X9020A2
A4C12	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C14	0160-2938	1	CAPACITOR-FXD .01UF +-20% 100WVDC POLYE	28480	0160-2938
A4C15	0180-0291		CAPACITOR-FXD 1UF+-10% 35VDC TA	56289	1500105X9035A2
A4C16	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C17	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C18	0180-2352	2	CAPACITOR-FXD 6000UF+75-10% 15VDC AL	28480	0180-2352
A4C19	0180-2352		CAPACITOR-FXD 6000UF+75-10% 15VDC AL	28480	0180-2352
A4C20	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C21	0180-1954	2	CAPACITOR-FXD 4.7UF+-5% 6VDC TA	56289	1500475X5006A2
A4C22	0160-2205	1	CAPACITOR-FXD 120PF +-5% 300WVDC MICA	28480	0160-2205
A4C23	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C25	0180-1954		CAPACITOR-FXD 4.7UF+-5% 6VDC TA	56289	1500475X5006A2
A4C26	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C27	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C28	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C29	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C30	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C31	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C32	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C33	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C34	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C35	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C36	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4C37	0170-0084		CAPACITOR-FXD .068UF +-20% 50WVDC POLYE	84411	601PE6830R5W3
A4CR1	1901-0522	12	DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR2	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR3	1901-0025	1	DIODE-GEN PRP 100V 200MA DO-7	28480	1901-0025
A4CR4	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR5	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR6	1902-0025	1	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A4CR7	1902-3256	1	DIODE-ZNR 23.7V 5% DO-7 PD=.4W TC=+.076%	04713	SZ 10939-290
A4CR8	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR9	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR10	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR11	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR12	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR13	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR14	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR15	1901-0522		DIODE-GEN PRP 200V 3A 2US	28480	1901-0522
A4CR16	1902-3290	2	DIODE-ZNR 31.6V 5% DO-7 PD=.4W TC=+.074%	04713	SZ 10939-326
A4CR17	1901-0033	3	DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A4CR18	1901-0033		DIODE-GEN PRP 180V 200MA DO-7	28480	1901-0033
A4CR19	1901-0040	5	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR21	1902-3290		DIODE-ZNR 31.6V 5% DO-7 PD=.4W TC=+.074%	04713	SZ 10939-326
A4CR22	1902-3224	1	DIODE-ZNR 17.8V 5% DO-7 PD=.4W TC=+.067%	04713	SZ 10939-254
A4CR23	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR24	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR25	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4CR26	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A4Q1	1854-0307	2	TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A4Q2	1854-0090	2	TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0090
A4Q3	1854-0274	1	TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0274
A4Q4	1853-0012	2	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A4Q5	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A4Q6	1854-0090		TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0090
A4Q7	1854-0329	2	TSTR:SI NPN	28480	1854-0329
A4Q8	1854-0307		TRANSISTOR NPN SI TO-18 PD=300MW	28480	1854-0307
A4Q9	1853-0090	1	TSTR:SI PNP	28480	1853-0090
A4Q10	1854-0329		TSTR:SI NPN	28480	1854-0329

Changed Replaceable Parts (Serial Numbers 1538G00685 and below)

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A4R1	0757-0283	2	RESISTOR 2K 1% .125W F TC=±-100	24546	C4-1/8-T0-2001-F
A4R2	0757-0273	1	RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A4R3	0757-0430	1	RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A4R4	0757-0440	1	RESISTOR 7.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-7501-F
A4R5	0757-346	2	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A4R6	0757-0455	1	RESISTOR 36.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3652-F
A4R7	0757-0280	4	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R8	1812-0019	1	INTEGRATED CIRCUIT	28480	1812-0019
A4R9	0757-0437	7	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R10	0757-0401	7	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R11	0698-3158	1	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A4R12	2100-2788	1	RESISTOR VAR 4.7K OHM 20% C LIN 0.5W	28480	2100-2788
A4R13	0757-0317	1	RESISTOR 1.33K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1331-F
A4R14	0698-3498	1	RESISTOR 8.66K 1% .125W F TC=0+-100	16299	C4-1/8-T0-866R-F
A4R15	0698-6322	4	RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A4R16	0698-6343	4	RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A4R17	0698-7563	1	RESISTOR 13.3K .5% .125W F TC=0+-50	19701	MF4C1/8-T2-1332-D
A4R18	0698-6835	1	RESISTOR 3.16K .5% .125W F TC=0+-50	24546	NC4-1/8-T2-3161-D
A4R19	0757-0442	7	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R20	0757-0401	7	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R21	0698-3492	3	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A4R22	0757-0437	3	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R23	0757-0417	5	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A4R24	0812-0021	5	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A4R25	0757-0442	5	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R26	0686-1025	1	RESISTOR 1K 5% .5W CC TC=0+647	01121	EB1025
A4R27	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R28	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R29	0757-0437	1	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R30	0698-6343	1	RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A4R31	0698-6343	1	RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A4R32	0812-0021	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A4R33	0758-0016	2	RESISTOR 300 5% .25W F TC=0+-100	24546	C5-1/4-T0-301-J
A4R34	0757-0437	2	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R36	0757-0280	2	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R37	0812-0021	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A4R38	0757-0437	1	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R39	0757-0417	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A4R40	0757-0417	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A4R41	0757-0346	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A4R42	0758-0032	1	RESISTOR 820 5% .25W F TC=0+-100	24546	C5-1/4-T0-821-J
A4R43	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R44	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R45	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R46	0698-3492	1	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A4R47	0698-6343	1	RESISTOR 9K .1% .125W F TC=0+-25	24546	NE55
A4R48	0698-6322	1	RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A4R49	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4R50	0698-6322	1	RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A4R51	0698-6322	1	RESISTOR 4K .1% .125W F TC=0+-25	24546	NE55
A4R52	0812-0021	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A4R53	0757-0417	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A4R54	0757-0437	1	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R56	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R57	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R58	0757-0283	1	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A4R59	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A4R60	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A4R61	0698-3492	1	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A4R62	0758-0016	1	RESISTOR 300 5% .25W F TC=0+-100	24546	C5-1/4-T0-301-J
A4R63	0757-0437	1	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A4R64	0757-0417	1	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-562R-F
A4R65	0812-0021	1	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A4R66	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A4U1	1820-0439	1	IC UA 723C V RGLTR	07263	723PC
A4U2	1826-0092	2	IC MC 1458 OP AMP	28480	1826-0092
A4U3	1826-0092	2	IC MC 1458 OP AMP	28480	1826-0092
A4U4	1820-0216	1	IC UA 741 OP AMP	28480	1820-0216

8-3 Serial Number 1342G 00510 and below

8-4 Mainframe capacitors C1, C2, C3, C4 and MP21, 30 are replaced by A9 Capacitor Assembly and Capacitor Clamp MP5.

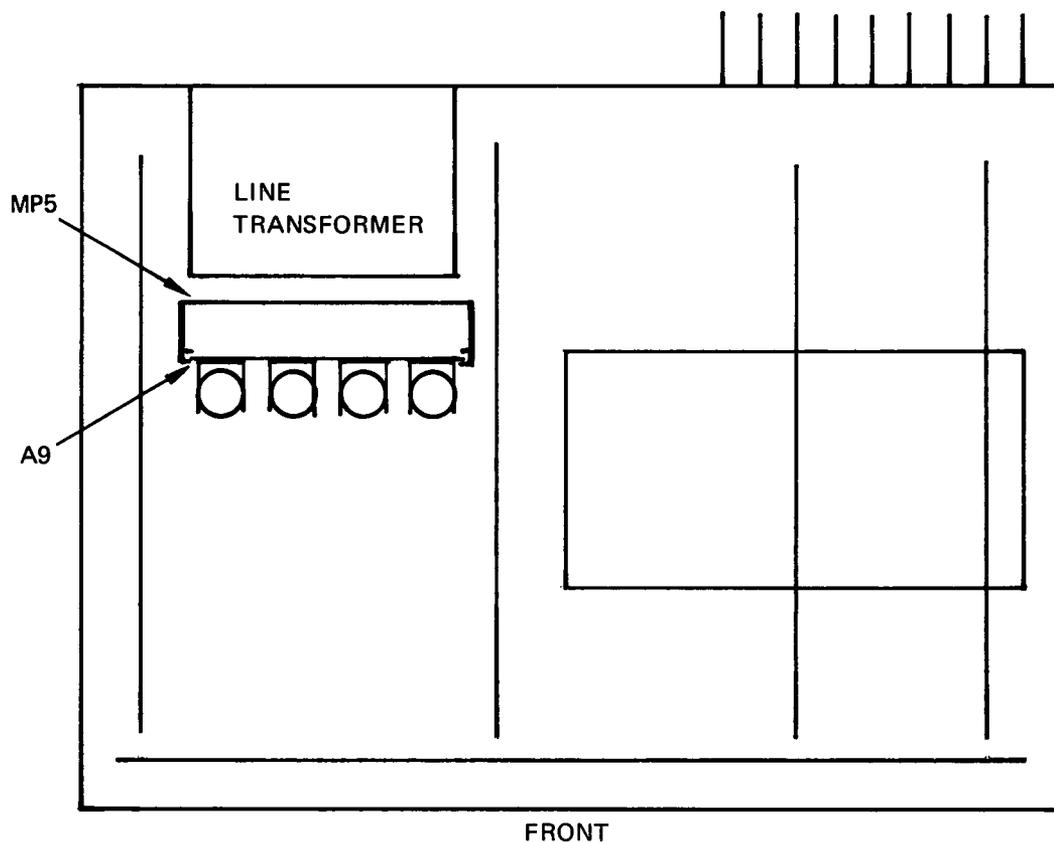


Figure 8-2. Changed Assemblies – Serial Numbers 1342G 00685 and below

Changed Replaceable Parts (Serial Numbers 1342G 00685 and below).

Delete: C1, C2, C3, C4, MP21, MP30 from Mainframe List.

Add:

MP5	08015-01204	BRACKET CAPACITOR BD
A9	08015-66509	ASSEMBLY CAPACITOR
A9 C1 to C4	0180-2406	C-F 5000UF 40V
A9MP1 to 4	1400-0040	CLIP CAPACITOR

8-5 Serial Number 1538G 00925

8-6 Rear panel and line voltage selector are changed,
S16 and S17 being replaced by a double pole switch, S16.

MP22	08015-00209	REAR PANEL
S16	3101-1609	SWITCH DUAL DPDT



9-1 INTRODUCTION

9-2 This section contains the component layouts and schematic diagrams. Tables listing the reference designators and schematic symbols used are also given. Refer to section 6 for the replaceable parts information.

9-3 RECOMMENDED TEST EQUIPMENT

9-4 Test equipment and test equipment accessories required are listed in tables 5-1 and 5-13. Equipment other than that listed can be used if it meets the listed critical specifications.

Table 9-1. Reference Designators

A = assembly	U = micro-circuit
B = motor	! = transistor
BT = battery	R = resistor
C = capacitor	RT = thermistor
CP = coupler	S = switch
CR = diode	T = transformer
DL = delay line	TB = terminal board
DS = lamp	V = vacuum, tube, neon bulb, photocell, etc.
F = fuse	VR = voltage regulator
FL = filter	W = cable
HR = heater	Y = crystal
J = connector	TP = test point
K = relay	
L = inductor	
M = meter	

Table 9-2. Index to Service Sheets

A2	Output	5
A3	Timing	1, 2, 3
A4	Power supply	7a
A5	Integrator	4
A6	Burst (002)	8
W8A8	Power/offset supply	7a, 5
A10	TTL (005)	4
A11	Switch Bd Ay (001)	6y
W18A18	Power/offset supply (001)	7a, 5
A21	Switch Bd Ay	6
A24	Power supply	7
A25	Integrator (004)	4
A27	Burst (002)	8
A28	Power/offset supply	7, 5
A30	Rem control, digital (003)	9
A31	Switch Bd Ay (003)	6b
A32	Amplifier access (004)	4
A33	Rem control, analog (003)	10
A38	Power/offset supply (001)	7, 5
Option 001		6a, 7
002		6, 8
003		6b, 9, 10
004		4
005		6, 4
006		6

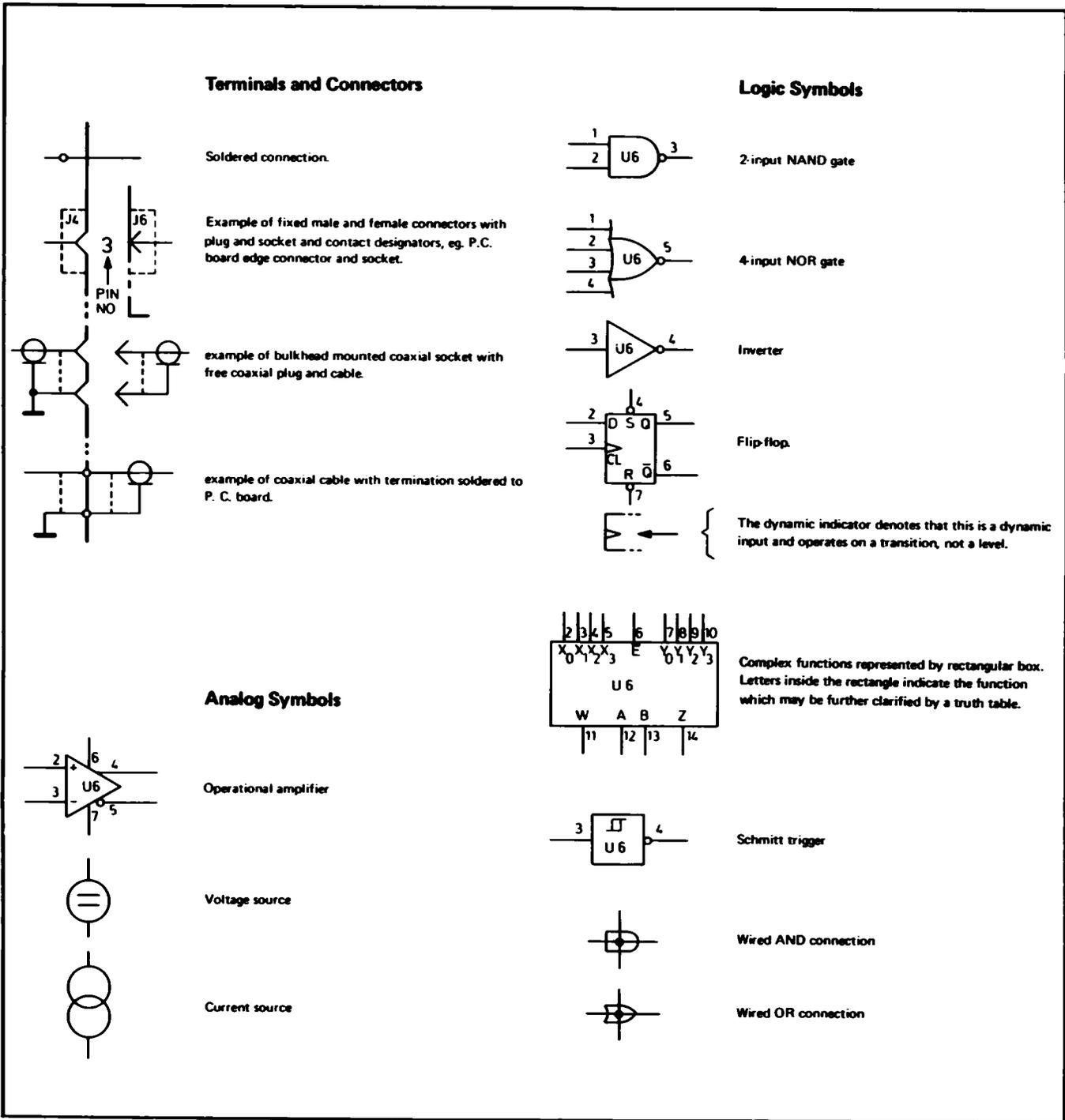
Table 9-3. Schematic Diagram Notes (1 of 2)

The following symbols conform, as far as possible, with ANSI Y32.2, IEEE No. 315 and ANSI Y32.14 (for the

logic symbols). These standards should be consulted when further information is required.

General		Components	
Units	Resistance values are in ohms, capacitance values in microfarads and inductance values in microhenries unless otherwise noted!		Normally open toggle switch. Circles (O) are used for the contacts to indicate a locking type switch.
P/O	Part of		Spring return, 2-position transfer switch. Triangles (▲) are used for the contacts to indicate a non-locking type switch.
*	Asterisk denotes a factory selected value. The value shown is the nominal value.		2-position, 2-pole slide switch.
	Encloses front panel nomenclature		Air cored inductor.
	Encloses rear panel nomenclature		Air cored transformer. The dot (●) is used, when necessary, to indicate instantaneous polarity.
	Heavy line indicates signal path		Iron core
	Heavy dashed line indicates primary feedback path		Ferrite core
	Wire colour code. Same as resistor colour code. First number is wire body colour.		Ferrite bead
	Wire or plug used as link.		Varactor diode
	Test point in a circuit. Point may/may not be identified on P. C. board.		Multi-junction diode
	Used with trimmer potentiometers or capacitors to indicate screwdriver adjustment.		Diode
	Direct connection to earth.		Zener diode
	Ground connection to instrument chassis or frame.		Schottky diode
	Used when a number of common-return connections are at the same potential. If there is more than one such system in the same circuit, numbers are written in the triangles so that all connections with the same potential have the same number.		Light Emitting Diode (LED)
	Specific potential difference with respect to a potential reference level, eg. +10V		Photodiode
Schematic Referencing			Fuse
<p>The diagram shows two schematic diagrams, labeled 3 and 6, connected by a dashed line. In schematic 3, a signal line exits a circle containing the number 4 and enters a square containing the number 6. In schematic 6, a signal line enters a circle containing the number 4 and exits a square containing the number 3. Arrows indicate the direction of signal flow from schematic 3 to schematic 6.</p>			Neon
<p>These references on a signal leaving a schematic diagram indicate the signal destination. The circle contains the signal number and the square contains the number of the schematic to which that signal goes.</p>			Filament lamp
<p>These references on a signal entering a schematic diagram indicate the signal origin. The circle contains the signal number and the square contains the number of the schematic on which that signal originates.</p>			

Table 9-3. Schematic Diagram Notes (2 of 2)



EXT TRIG

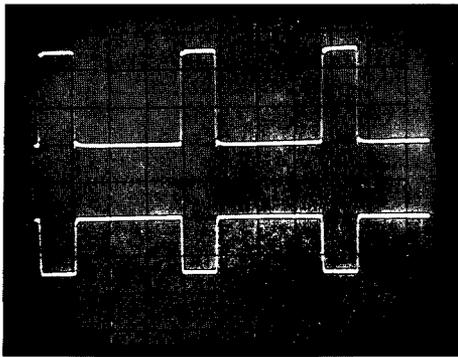
0.5V/Div.

EXT WIDTH

1V/Div.



Q1/B

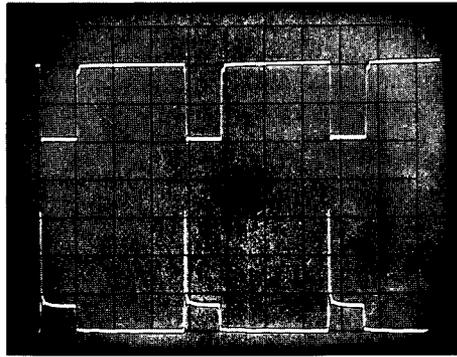


0.5µs/Div.

1V/Div.



Q35/C

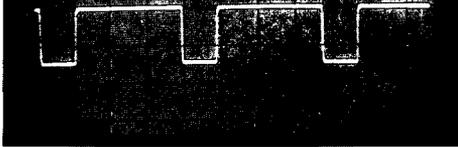


0.5µs/Div.

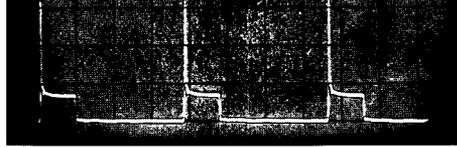
2V/Div.



Q4/C



Q13/C



GATE MODE

EXT TRIG

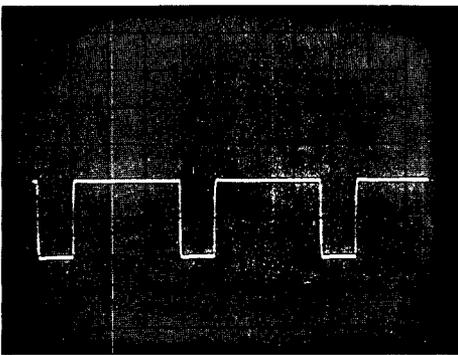
1V/Div.

TEST EQUIPMENT:

Digital Voltmeter	3465A
Oscilloscope	180C/1801A/1821A
Ext Pulse Generator	8015A



Q7/B



0.5µs/Div.

Settings for waveforms 1-5

Rate	20n-1µ
Vernier	CW
Delay	20n-1µ
Vernier	CCW
Width	10n-1µ
Vernier	mid position
Trans. Time	6n-0.5µ
Verniers	CCW
Neg-pos-man	pos
Zin	50Ω
Function	Ext Trigger

Settings for waveform 6
same except:

Function	Ext Width
----------	-----------

Settings for wave form 7
same except:

Function	Gate
----------	------

EXT TRIG

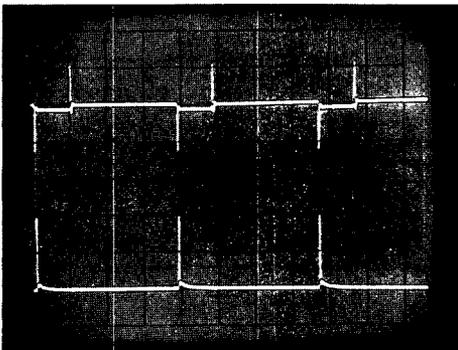
1V/Div.

External Pulse Generator:

Rate	20n-1µ
Vernier	CW
Delay	20n-1µ
Vernier	CCW
Width	10n-1µ
Vernier	mid position
Amplitude	2V
Lower Level	zero



Q10/C

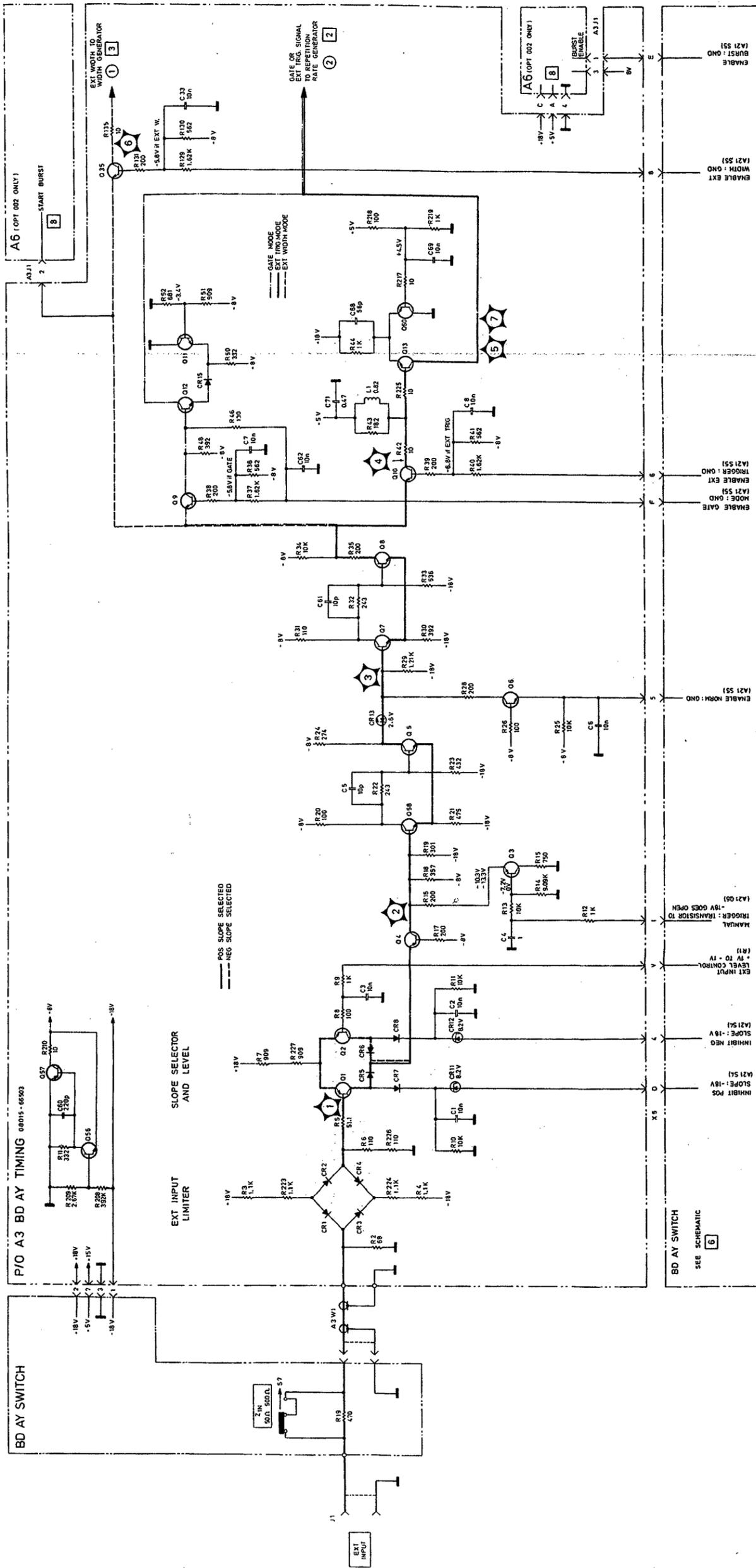


0.5µs/Div.

2V/Div.



Q13/C



1
EXTERNAL
SIGNAL CONDITIONING A3

BD AY SWITCH
SEE SCHEMATIC
6

INHIBIT POS
SLOPE: -18V
(A21 54)

INHIBIT NEG
SLOPE: -18V
(A21 54)

EXT INPUT
LEVEL CONTROL
+1V TO -1V
(R11)

MANUAL
INHIBIT: TRANSISTOR TO
+1V GOES OPEN
(A21 05)

ENABLE GATE
MODE: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

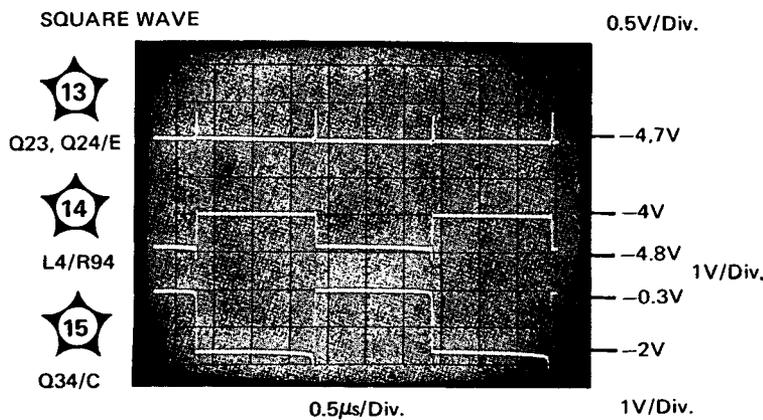
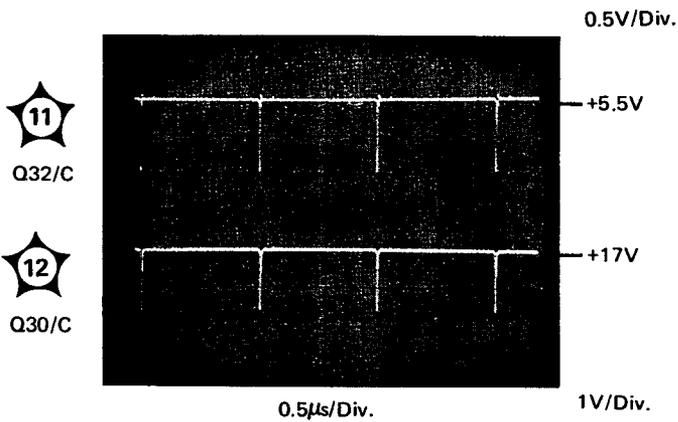
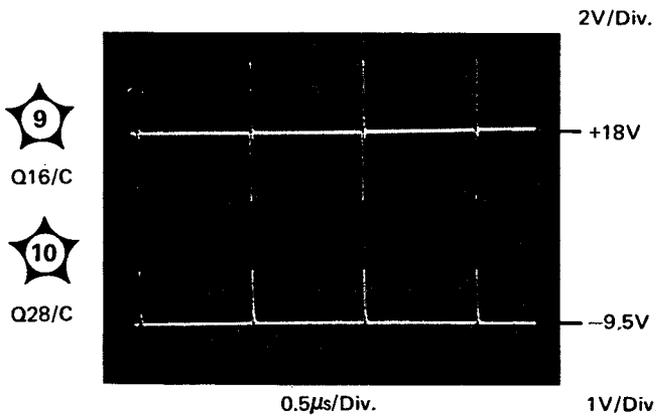
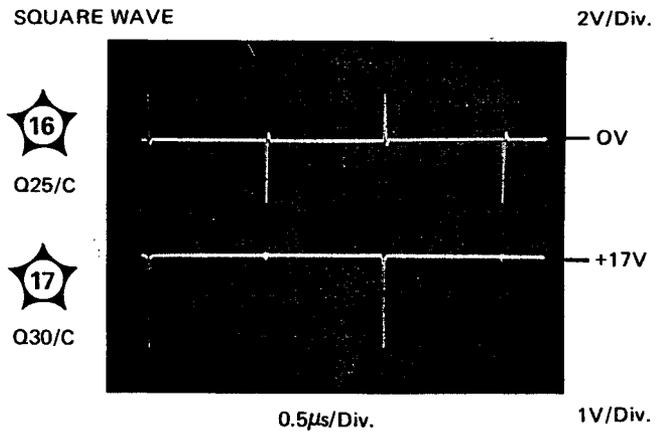
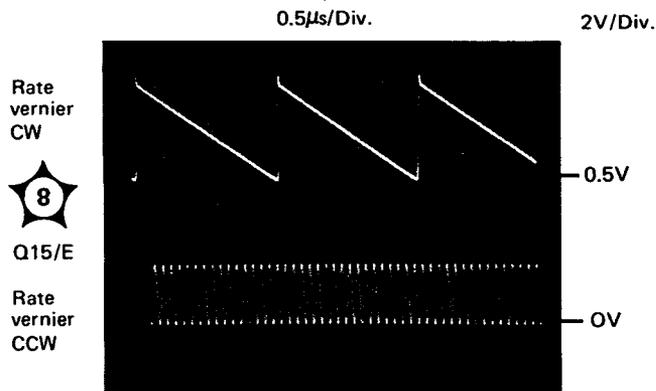
ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)

ENABLE EXT
INHIBIT: GND
(A21 55)

ENABLE BURST
INHIBIT: GND
(A21 55)



TEST EQUIPMENT

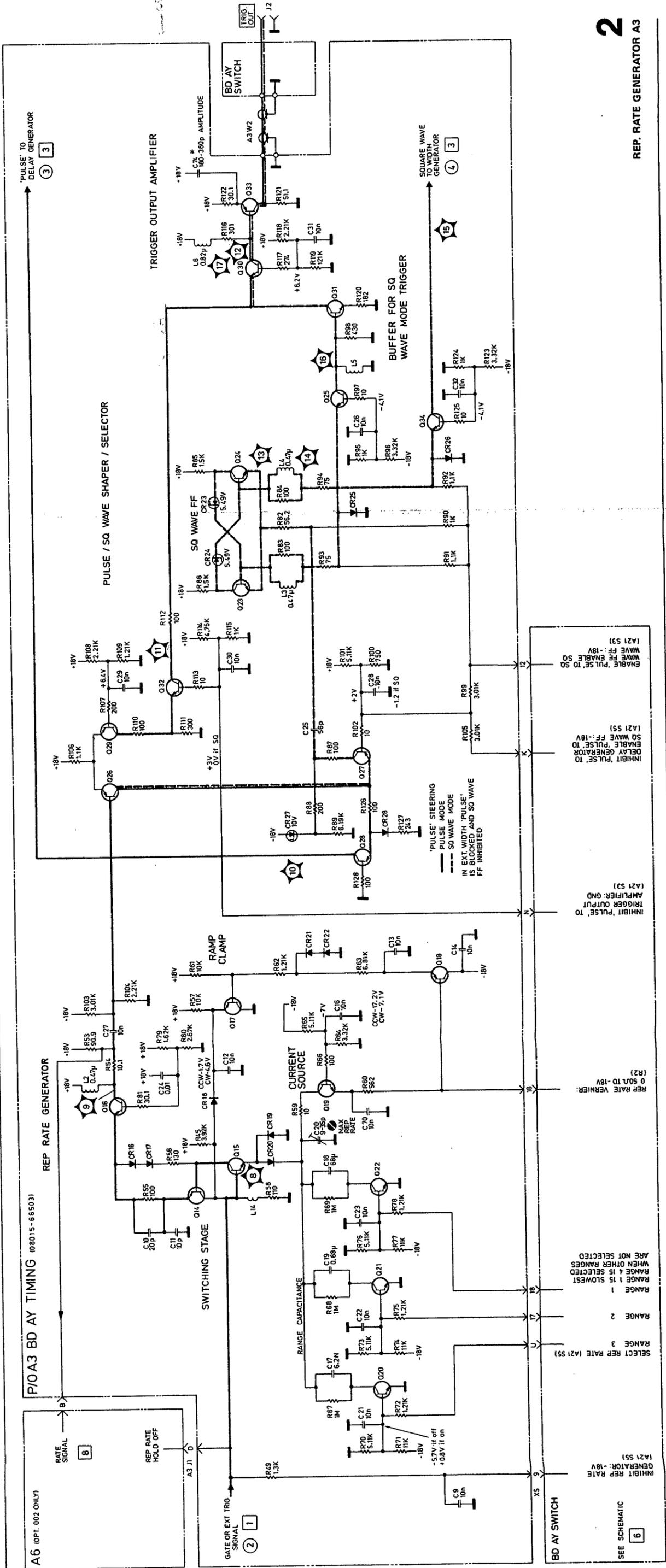
Digital voltmeter 3465A
Oscilloscope 180C/1801A/1821A

Settings for wave forms 1-5

Rate	20n-1 μ
Vernier	CW
Delay	20n-1 μ
Vernier	CCW
Width	10n-1 μ
Vernier	mid position
Trans. Times	6n-0.5 μ s
Verniers	CCW
Function	NORM

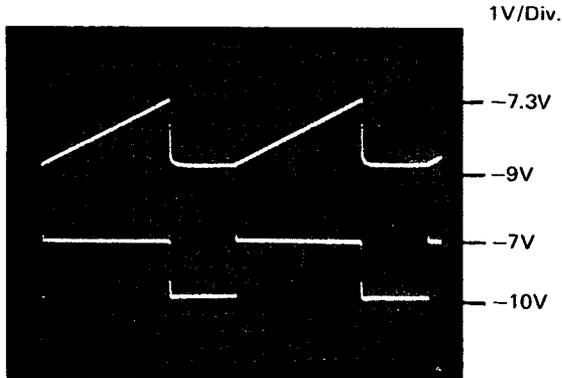
Settings for waveforms 6-10 same except:

Width	square wave
-------	-------------



18

Q38/B



19

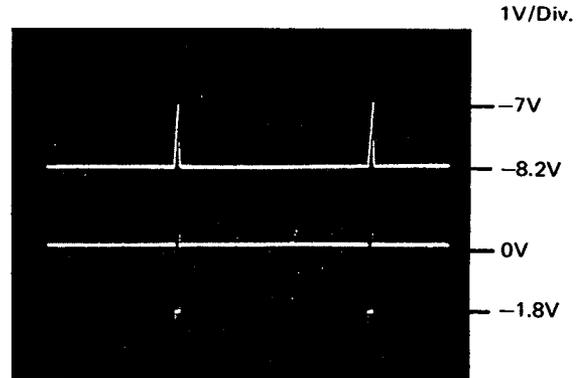
CR29/C

0.5µs/Div.

2V/Div.

25

Q45/B

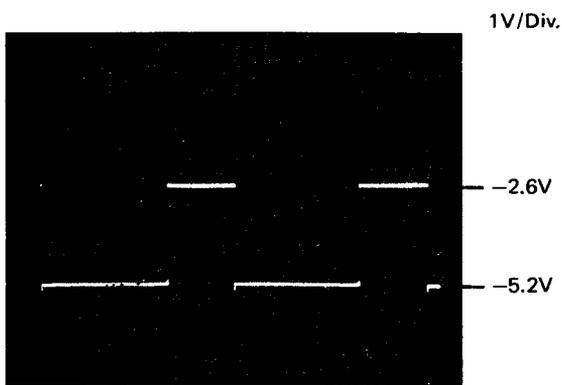


26

Q44/C

20

Q39/C



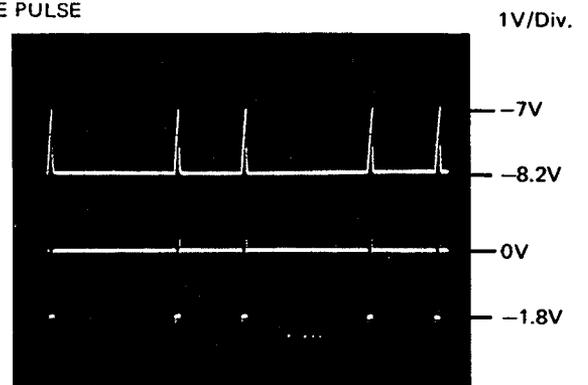
0.5µs/Div.

1V/Div.

DOUBLE PULSE

27

Q45/B

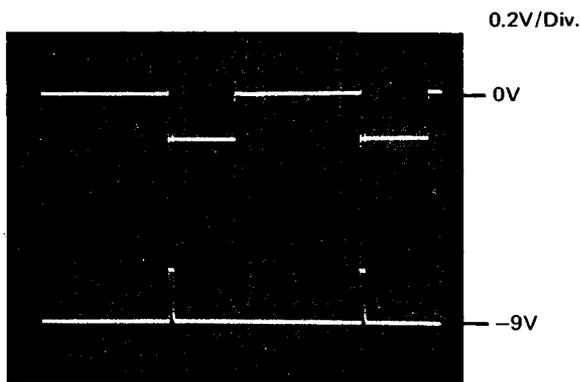


28

Q44/C

21

Q40/C



0.5µs/Div.

2V/Div.

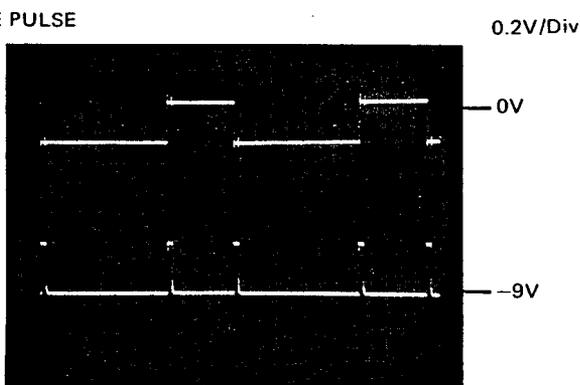
22

Q44/B

DOUBLE PULSE

23

Q41/C



0.5µs/Div.

2V/Div.

24

Q44/B

TEST EQUIPMENT:

Digital Voltmeter

3465A

Oscilloscope

180C/1801A/1821A

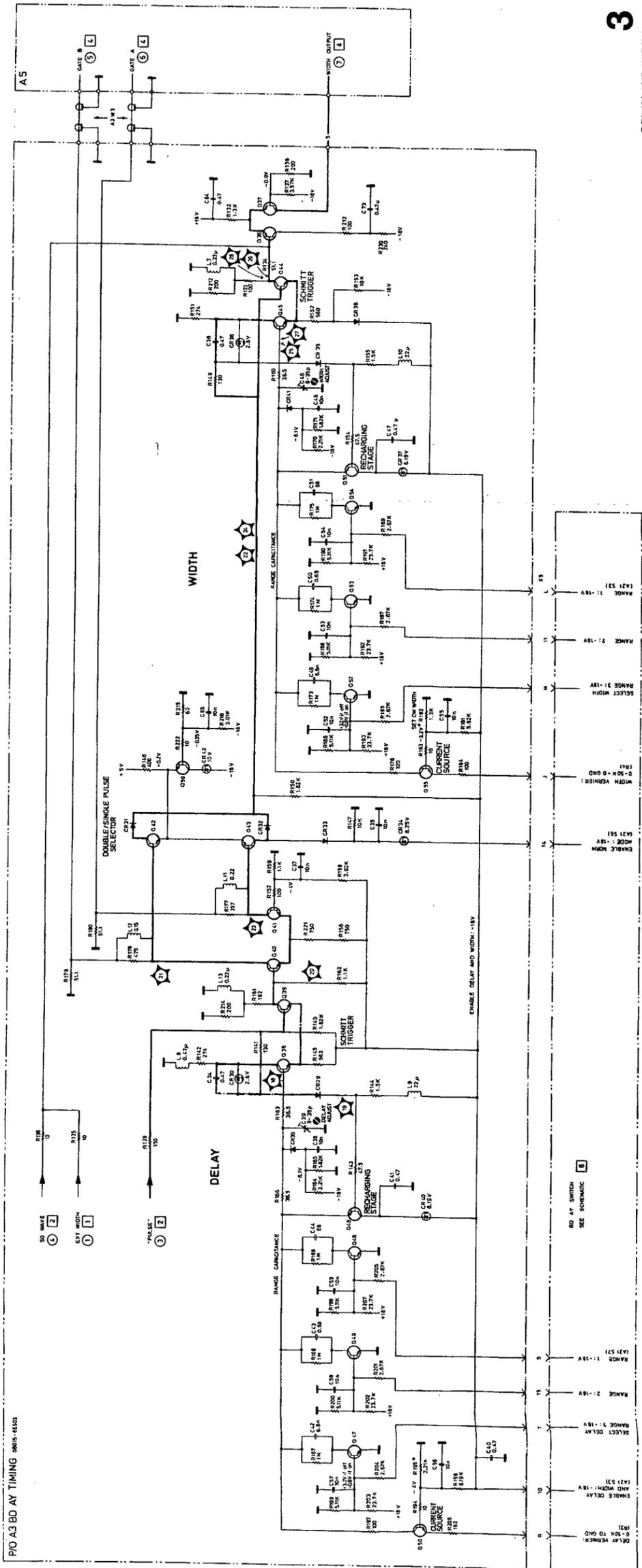
Settings for wave forms 1-5, 8-9 first

Rate 1µ-0.1m
 Vernier mid position
 Delay 1µ-0.1m
 Vernier mid position
 Width 1µ-0.1m
 Vernier CCW

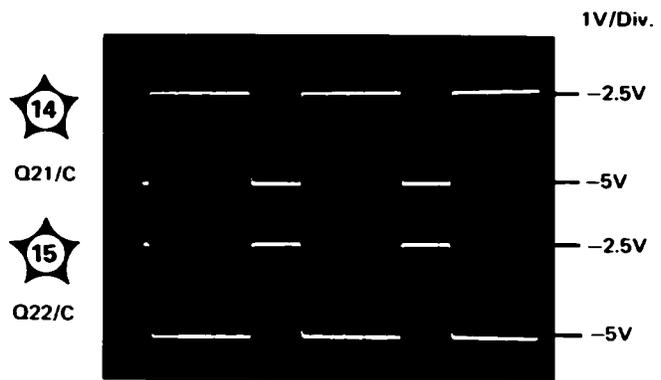
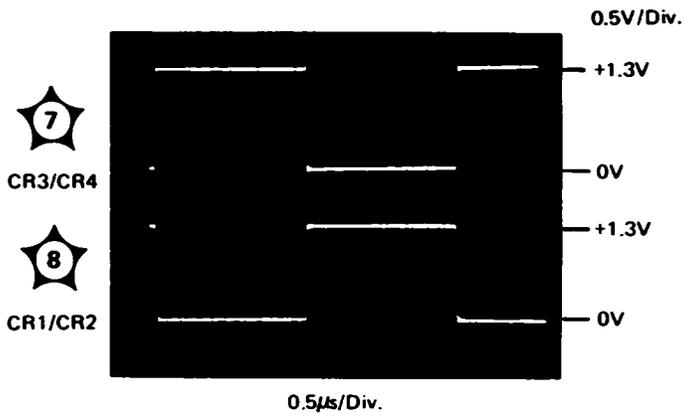
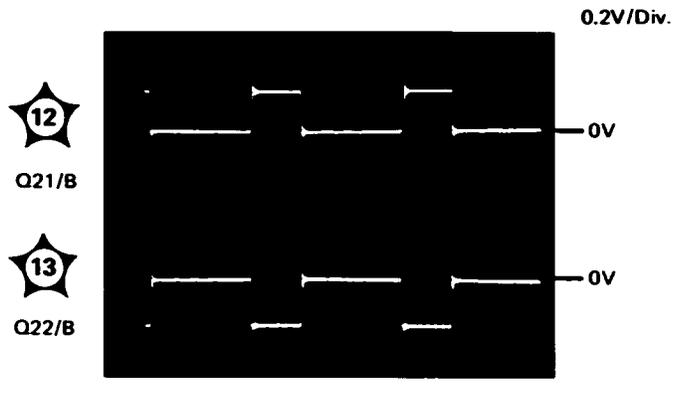
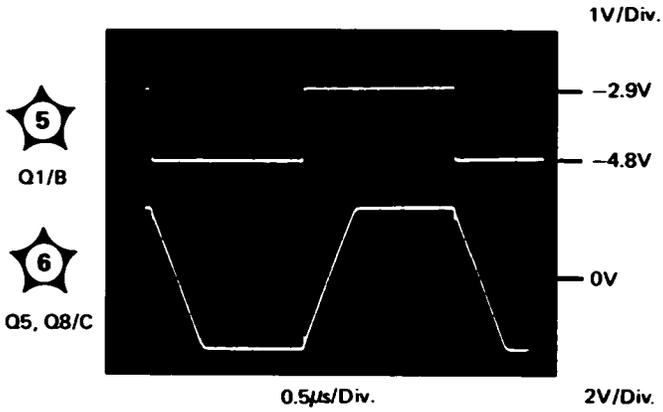
Settings for wave forms 6-7, 8-9 second

same as above except:

Mode Double Pulse



3
DELAY AND WIDTH A3



TEST EQUIPMENT:

Digital Voltmeter 3465A
Oscilloscope 180C/1801A/1821A

Settings for wave forms 1-7

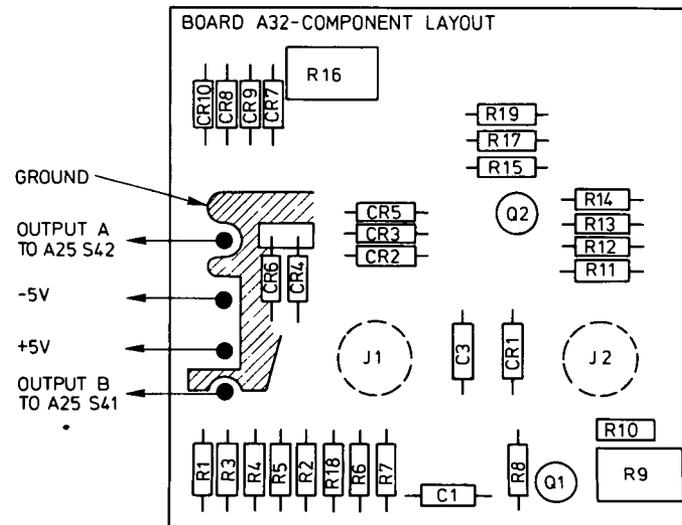
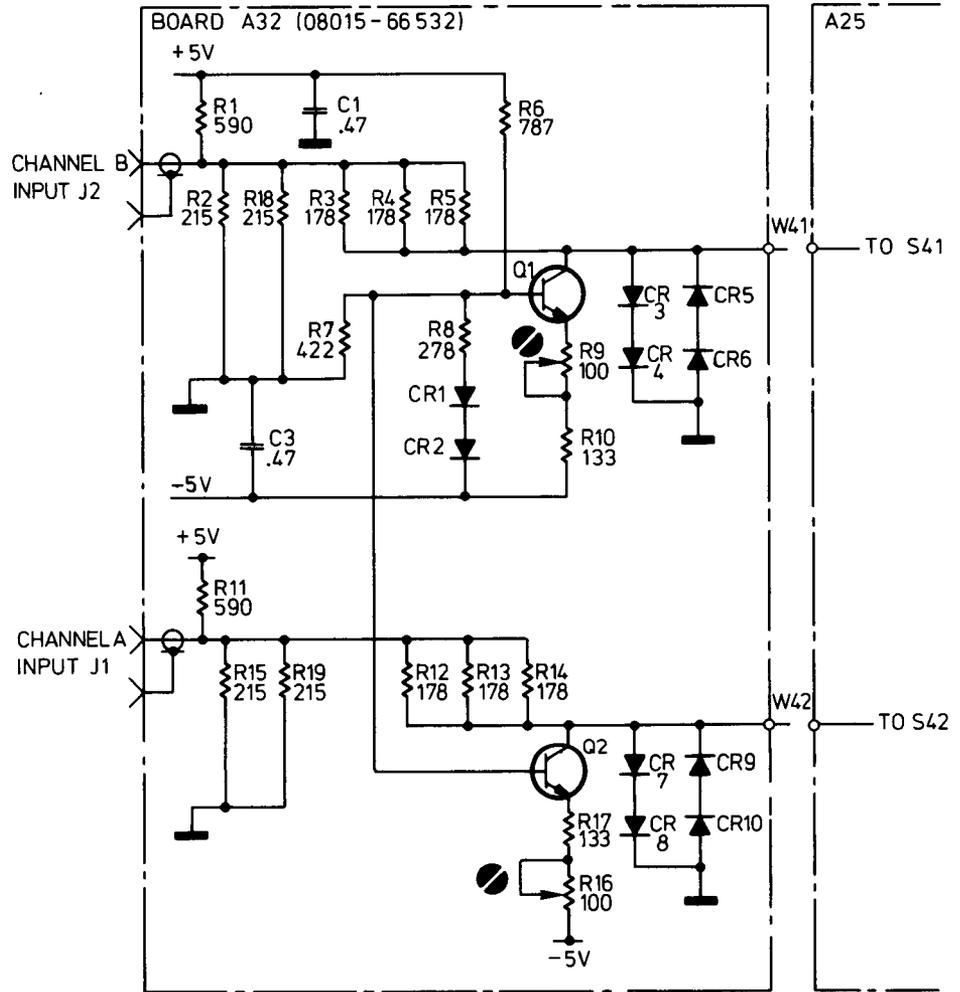
Rate 1µ-0.1m
Vernier mid position
Delay 20n-1µ
Vernier C+
Width square wave
Trans. Time 5µ-50µ
Verniers CCW

Settings for wave forms 8-11

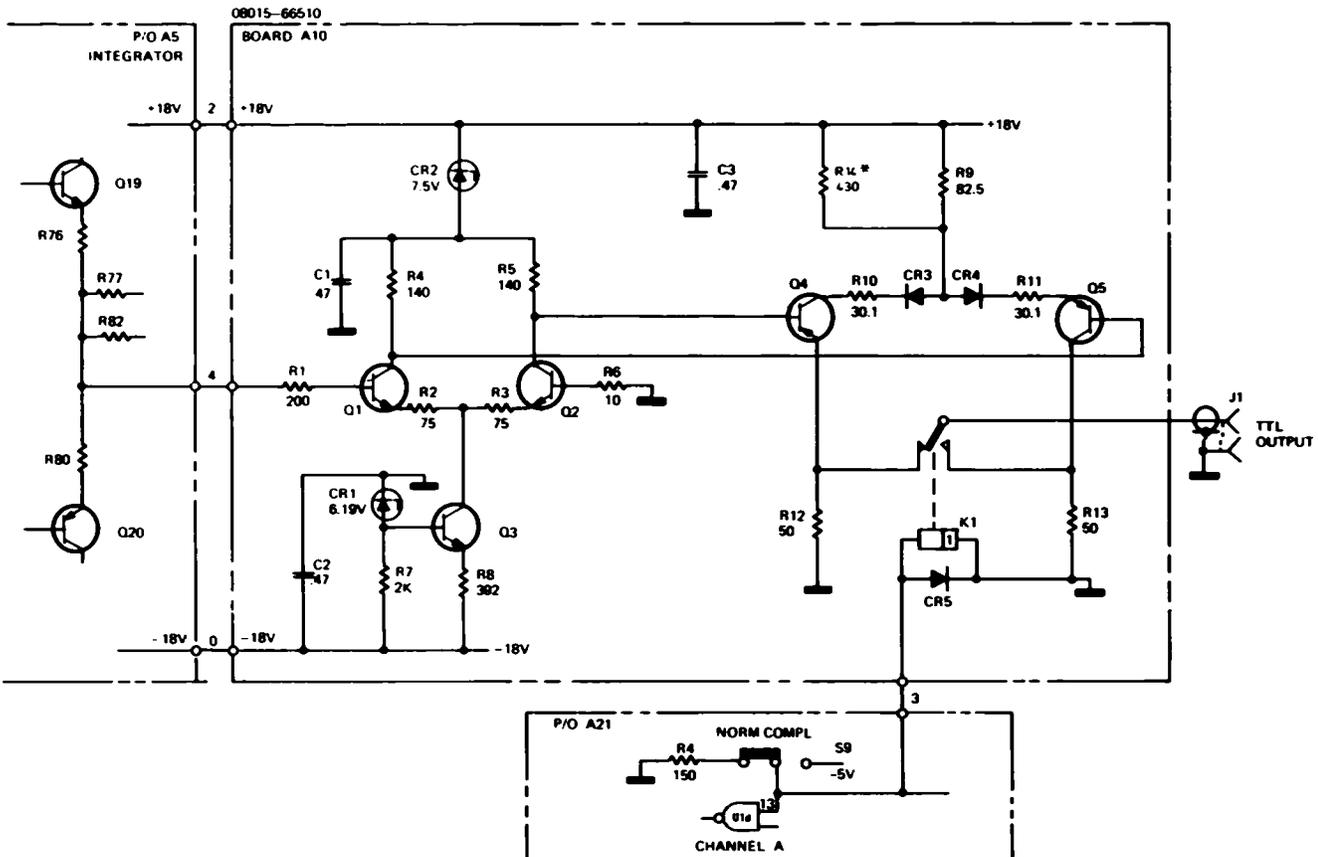
same except:
Width 10n-1µ
Vernier CCW
Mode B-DEL

NOTE: A wrong clamp voltage will cause a bad integrator output.

8015A OPTION 004 ONLY
 DIRECT AMPLIFIER ACCESS
 A32 BD AY DIRECT AMP ACCESS 08015-66532
 (mounted on rear panel)

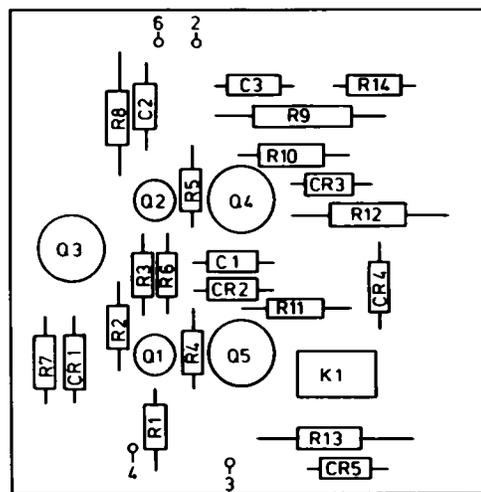


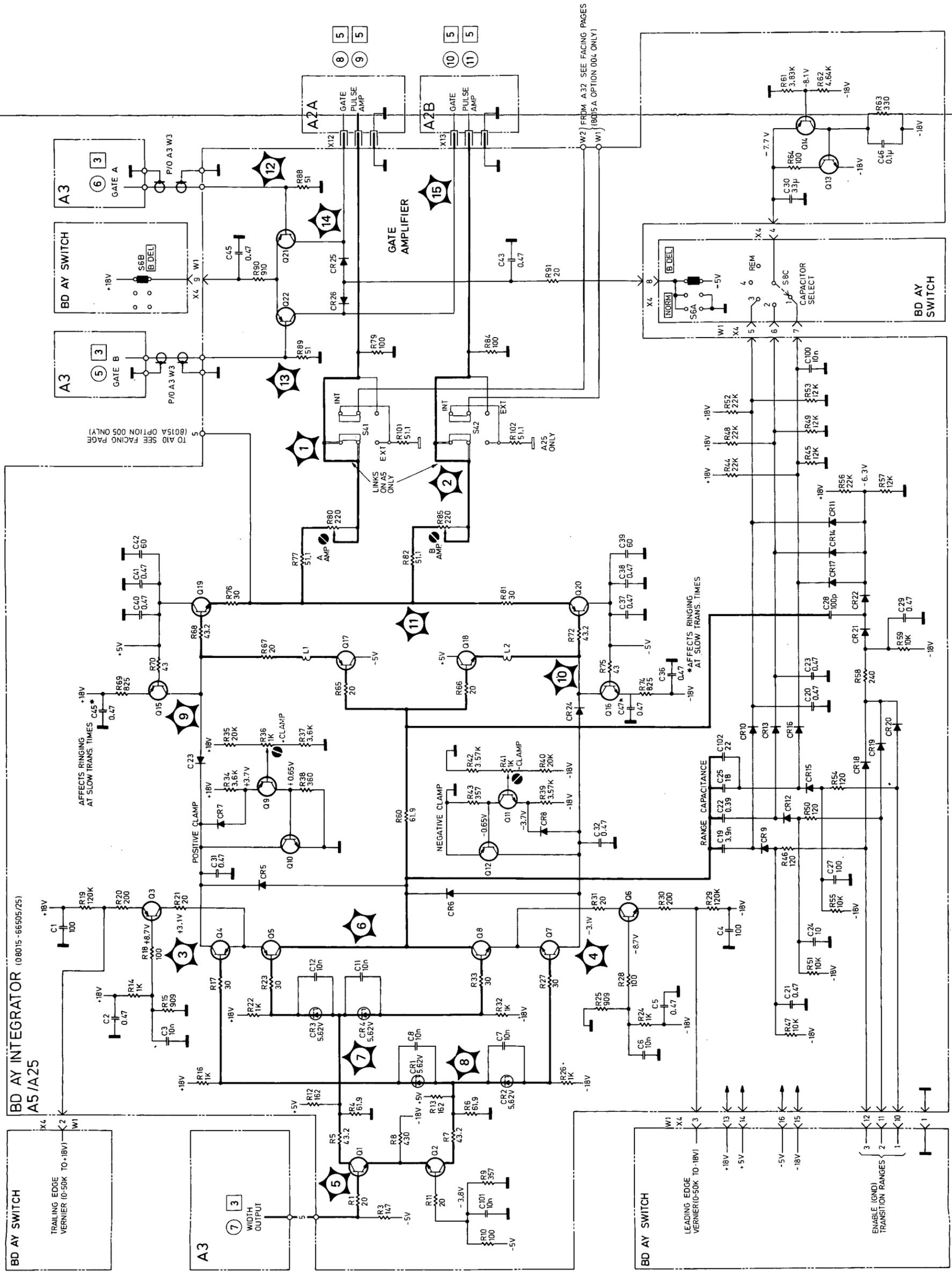
8015A OPTION 005 ONLY
TTL OUTPUT



* R14 350-500Ω TTL Output voltage adjust (4.8 to 5.0V without load)

A10 BD A4 TTL OUTPUT 08015-65510





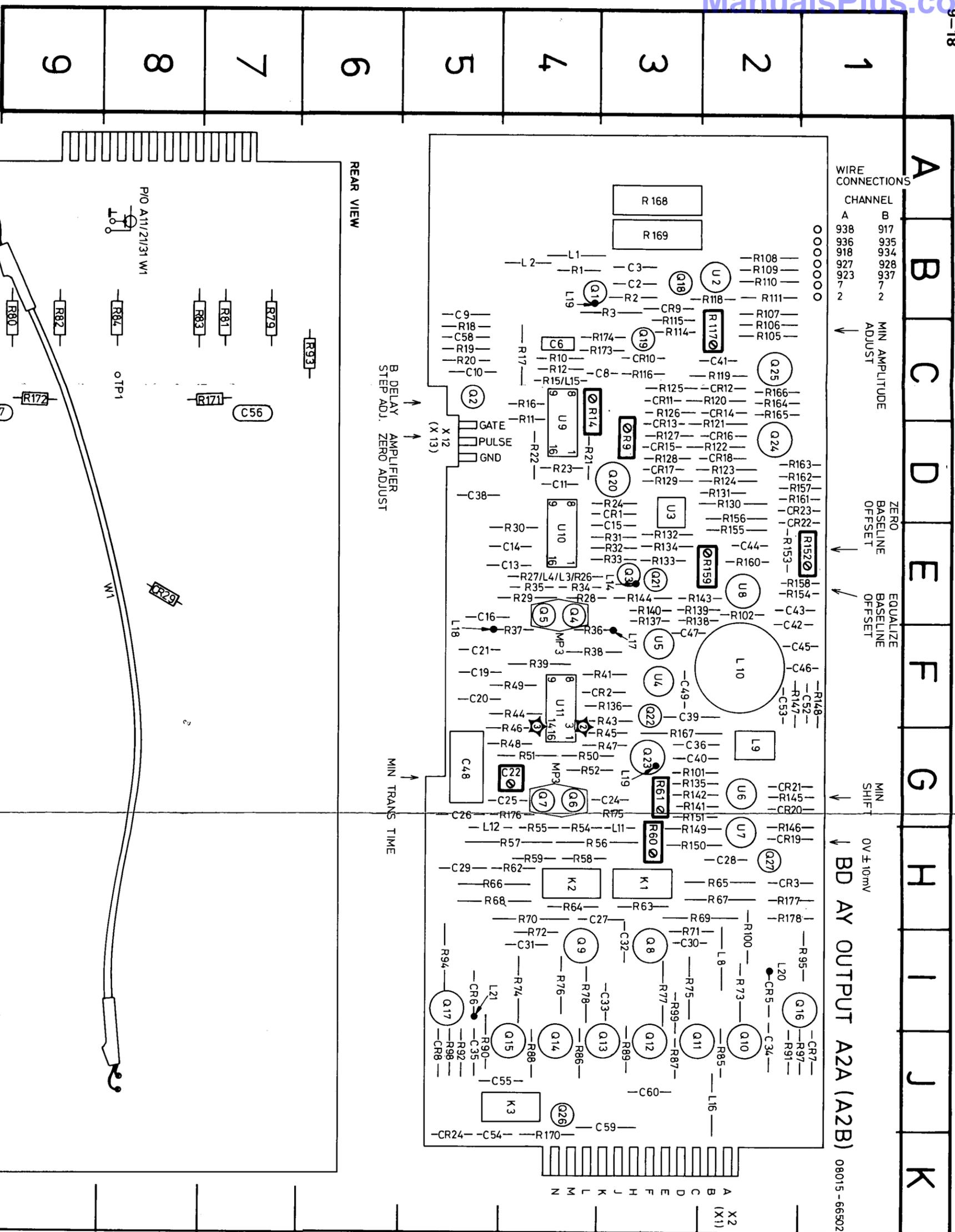
TO A10 SEE FACING PAGE (8015 A OPTION 005 ONLY)

LINKS ON AS ONLY

AFFECTS RINGING AT SLOW TRANS. TIMES

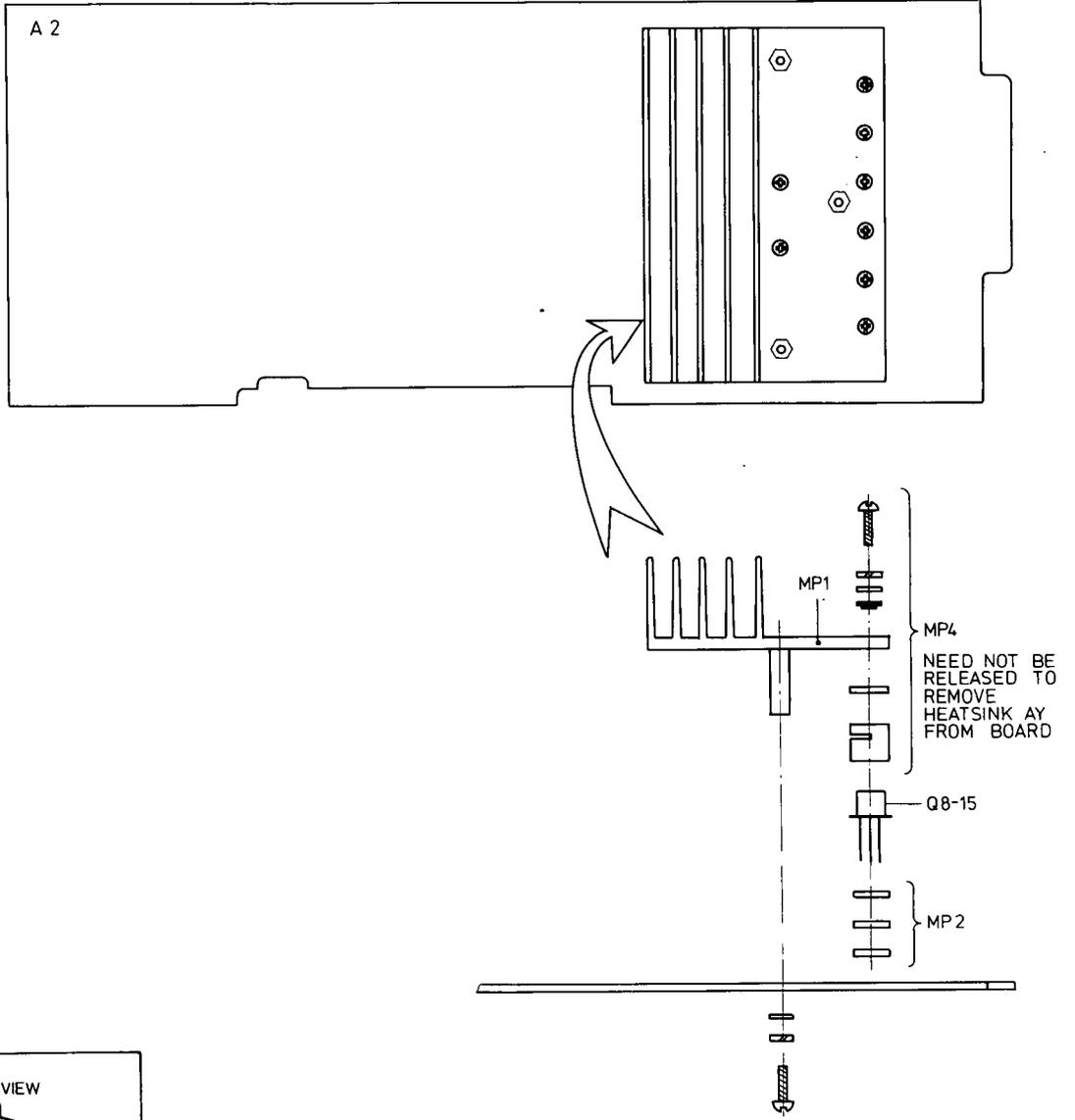
RANGE CAPACITANCE *AFFECTS RINGING AT SLOW TRANS. TIMES

W2) FROM A32 SEE FACING PAGES (8015 A OPTION 004 ONLY)



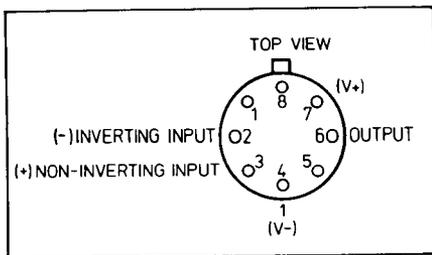
C2	B3	K1	H3	R23	E3	R115	C3
C3	B4	K2	H4	R34	E4	R116	C4
C6	C4	K3	J4	R35	E4	R117	C2
C8	C3	K4	J4	R36	F3	R118	B2
C9	B5	K3	J4	R37	F4	R119	C2
C10	C5	L1	J4	R38	F3	R120	C2
C11	D4	L2	J4	R39	F4	R121	D2
C13	E4	L3	E4	R41	F3	R122	D2
C14	E4	L8	I2	R43	F3	R123	D2
C15	E4	L9	G2	R44	F4	R124	D2
C16	E6	L10	F2	R45	G3	R125	C3
C19	F5	L11	H3	R46	G4	R126	C3
C20	F5	L12	H4	R47	G3	R127	D3
C21	F5	L14	E3	R48	G3	R128	D3
C22	F4	L14	E3	R49	F4	R129	D3
C24	G3	L15	C4	R49	F4	R129	D3
C25	G4	L16	J2	R50	G3	R130	D2
C26	G5	L17	F3	R51	G4	R131	D2
C27	H3	L18	F5	R52	G3	R132	E3
C28	H2	L19	B3,G3	R54	H4	R133	E3
C29	H5	L20	I2	R55	H4	R134	E3
C30	I3	L21	I5	R56	H3	R135	G2
C31	I4	L21	I5	R57	H4	R136	F3
C32	I3	L21	I5	R58	H3	R137	E3
C33	I3	L21	I5	R59	H4	R138	E2
C34	J2	L21	I5	R60	H3	R139	E2
C35	J5	L21	I5	R61	G3	R140	E3
C36	G2	L21	I5	R62	H4	R141	G2
C38	D5	L21	I5	R63	H3	R142	G2
C39	F2	L21	I5	R64	H4	R143	E2
C40	G2	L21	I5	R65	H2	R144	E3
C41	C2	L21	I5	R66	H4	R145	G1
C42	E1	L21	I5	R67	H2	R146	H1
C43	E1	L21	I5	R68	H4	R147	F1
C44	E2	L21	I5	R69	H2	R148	F1
C45	F1	L21	I5	R70	H4	R149	H2
C46	F1	L21	I5	R71	I2	R150	H2
C47	F2	L21	I5	R72	I4	R151	G2
C48	G5	L21	I5	R73	I2	R152	E1
C49	F3	L21	I5	R74	I4	R153	E2
C52	F1	L21	I5	R75	I3	R154	E1
C53	F2	L21	I5	R76	I4	R155	E2
C54	K4	L21	I5	R77	I3	R156	D2
C55	J4	L21	I5	R78	I4	R157	D1
C56	C7	L21	I5	R79	C7	R158	E1
C57	C9	L21	I5	R80	C9	R159	E2
C58	C5	L21	I5	R81	C7	R160	E2
C59	J3	L21	I5	R82	C9	R161	D1
C60	J3	L21	I5	R83	C7	R162	D1
CR1	D3	R1	B4	R84	C8	R163	D1
CR2	F3	R2	B3	R85	J2	R164	C2
CR3	H1	R3	B3	R86	J4	R165	C2
CR6	I5	R9	D3	R87	J3	R166	C2
CR7	J1	R10	C4	R88	J4	R167	G2
CR8	J5	R11	C4	R89	J3	R168	A3
CR9	B3	R12	C4	R90	J5	R169	B3
CR10	C3	R13	C4	R91	J2	R170	K4
CR11	C3	R14	C3	R92	J5	R171	C7
CR12	C2	R15	C4	R93	C6	R172	C9
CR13	C2	R16	C4	R94	I5	R173	C3
CR14	C3	R17	C4	R95	I1	R174	C3
CR15	D3	R18	C5	R96	C9	R175	G3
CR16	D2	R19	C5	R97	J1	R176	G4
CR17	D3	R20	C5	R98	J5	R177	H1
CR18	D2	R21	D4	R99	J5	R178	H1
CR19	H1	R22	D4	R100	I2		
CR20	G1	R23	D4	R101	G2		
CR21	G1	R24	D3	R102	E2		
CR22	E1	R26	E4	R105	C2		
CR23	D1	R27	E4	R106	C2		
CR24	K5	R28	E4	R107	B2		
CR29	E8	R29	E4	R108	B2		
		R30	E4	R109	B2		
		R31	E3	R110	B2		
		R32	E3	R111	B2		
		R33	E3	R114	C3		
				W1	E9		

HEATSINK AY FOR Q8 TO Q15

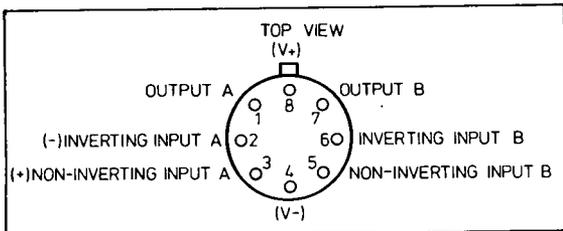


NEED NOT BE
RELEASED TO
REMOVE
HEATSINK AY
FROM BOARD

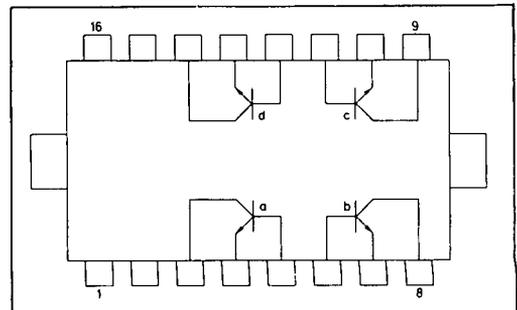
SCREW (1 OF 3) TO REMOVE
ENTIRE HEATSINK AY.



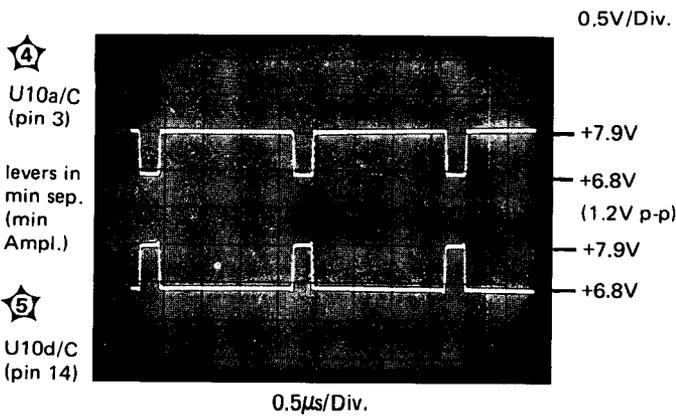
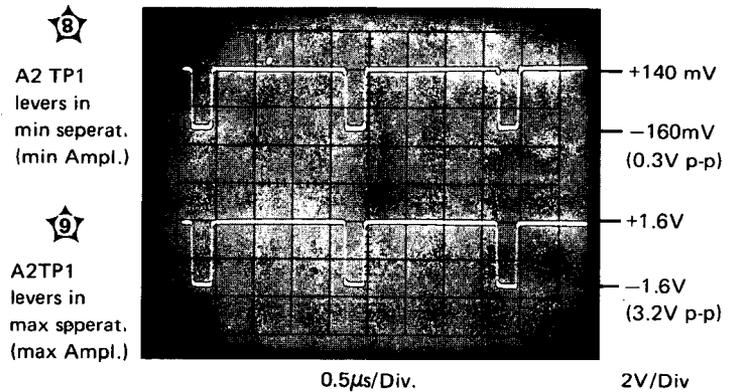
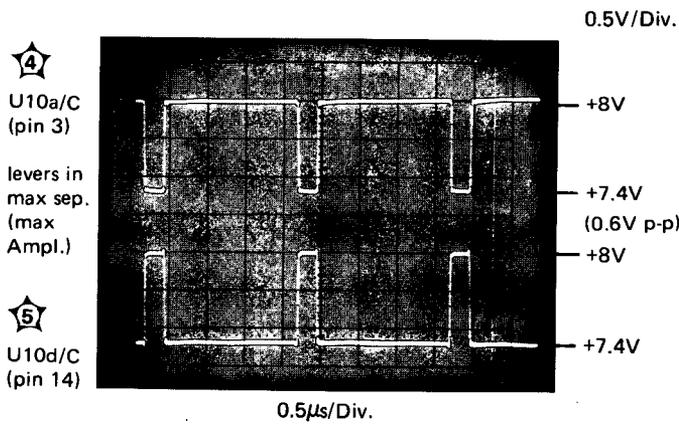
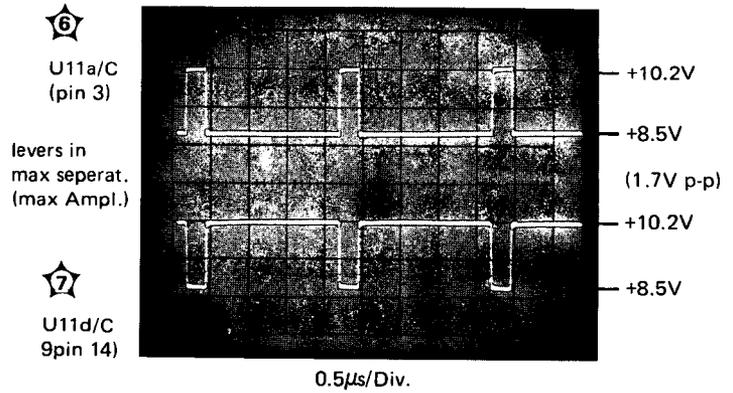
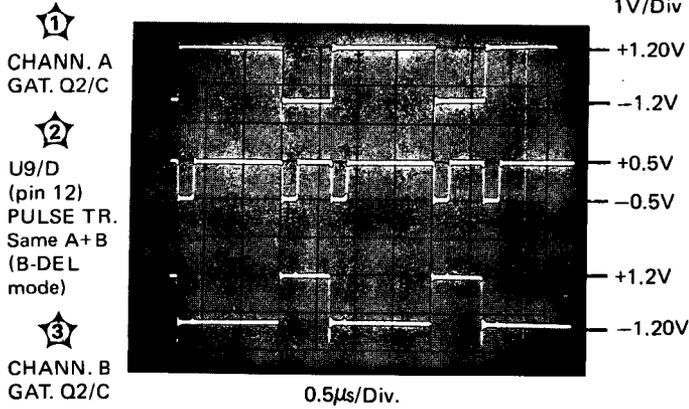
U3, U4, U5 (1820-0043)
U6, U7, U8 (1820-0203)



U2 (1826-0092)



U9, U10, U11 (1858-0030)



TEST EQUIPMENT:

Digital Voltmeter 3465A
Oscilloscope 180C/1801A/1821A

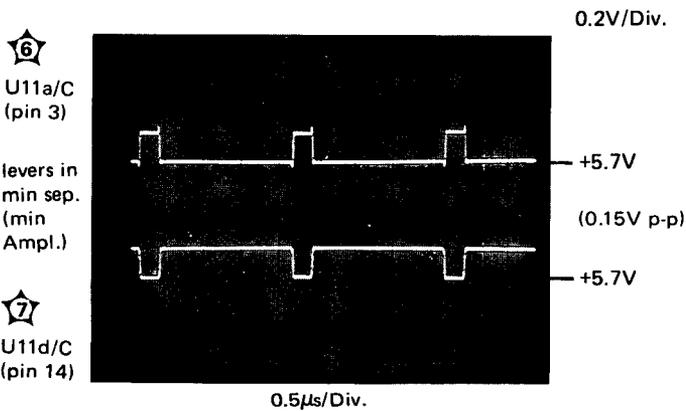
Settings for waveforms 1-3

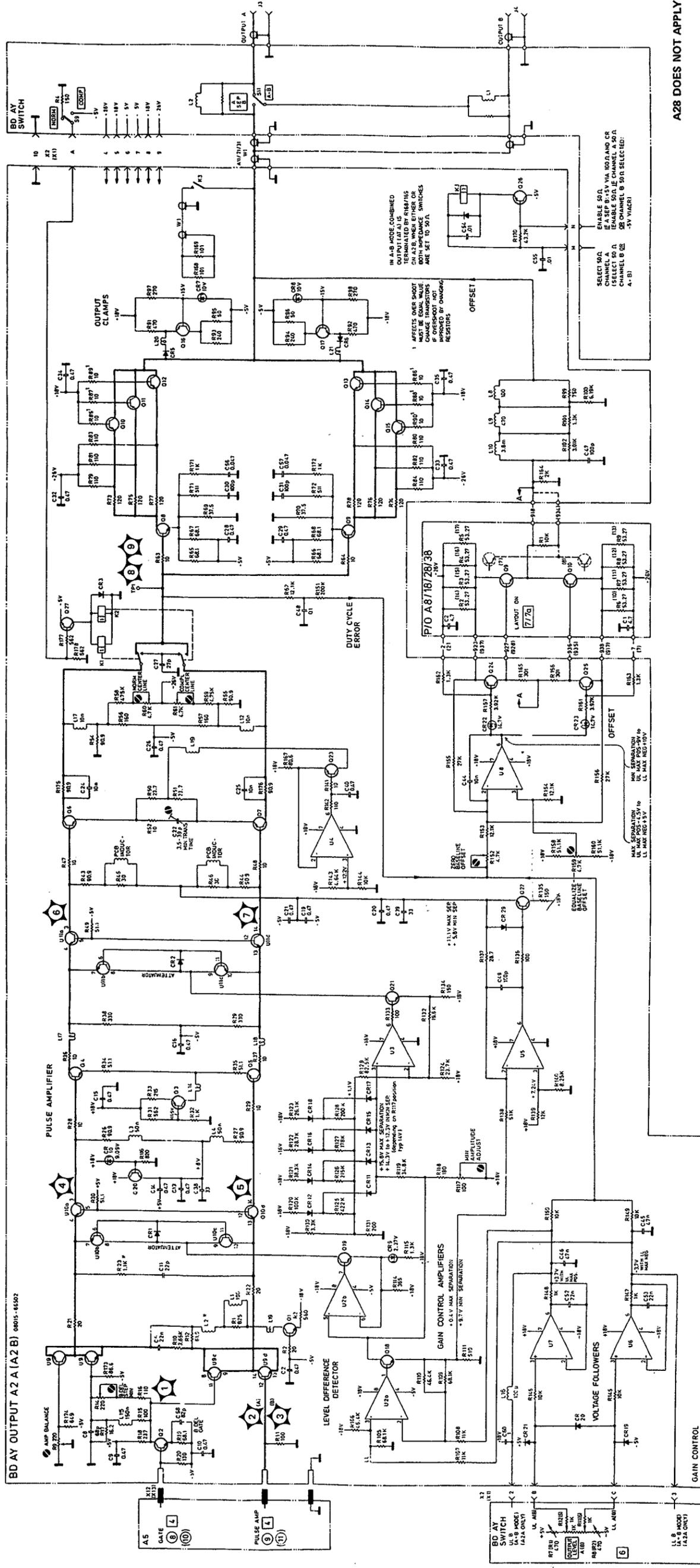
Rate 1µ-0.1m
Vernier mid position
Delay 20n-1µ
Vernier CW
Width 10n-1µ
Vernier mid position
Trans. Time 6n-0.5µs
Verniers CCW
Mode B-Del

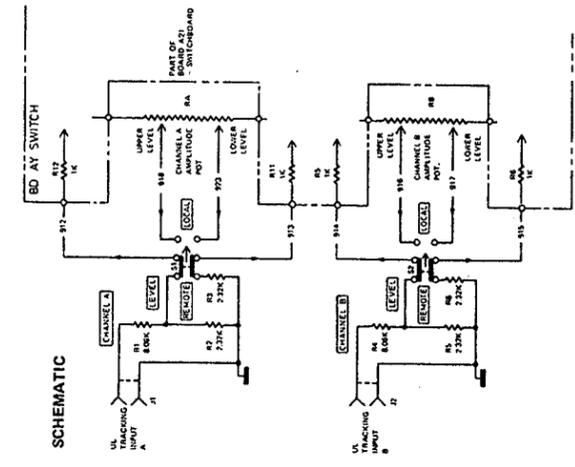
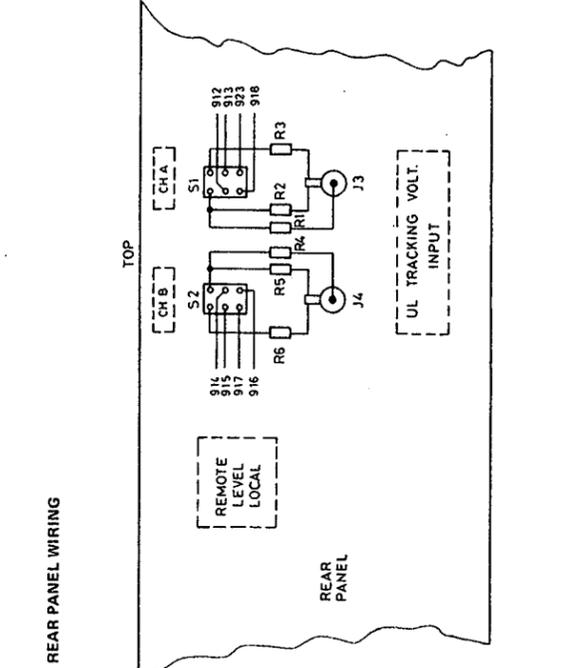
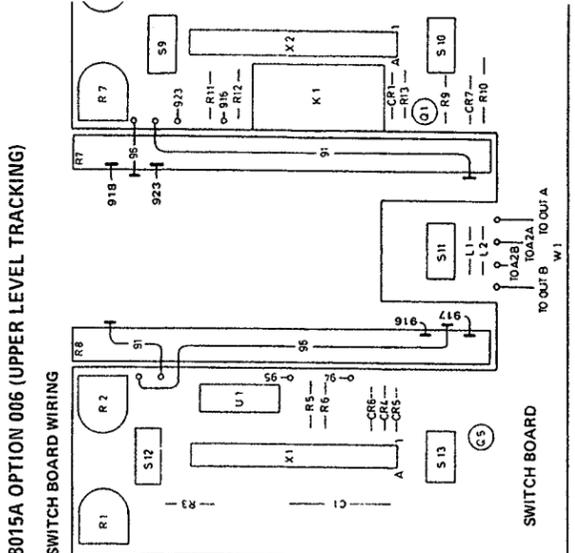
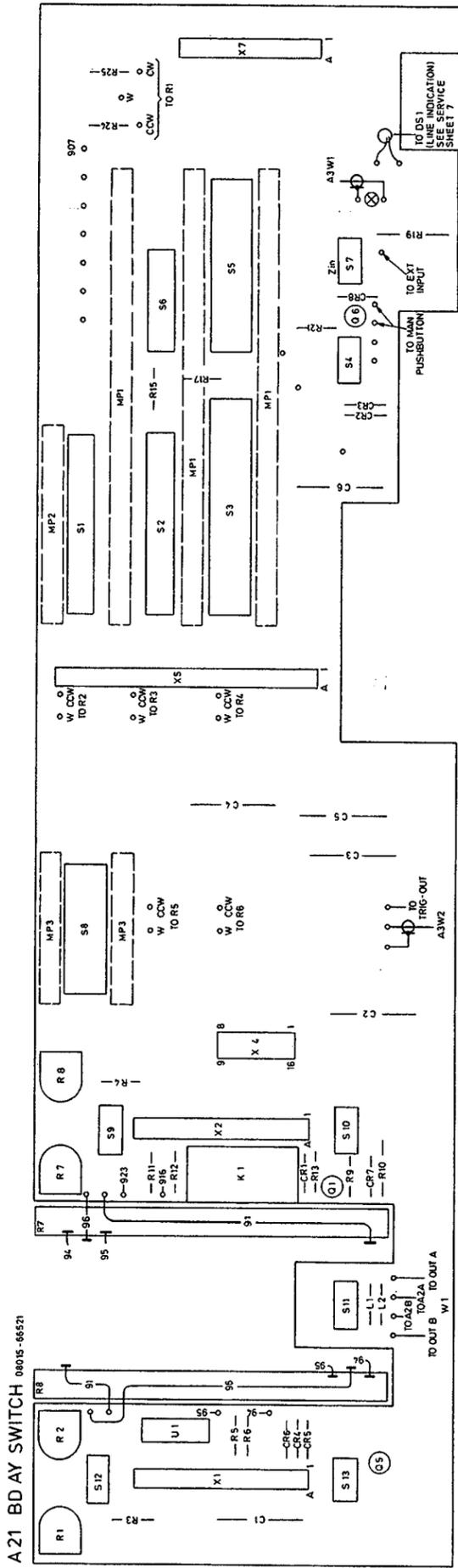
Settings for waveforms 4-10

same exopt:
Mode NORM

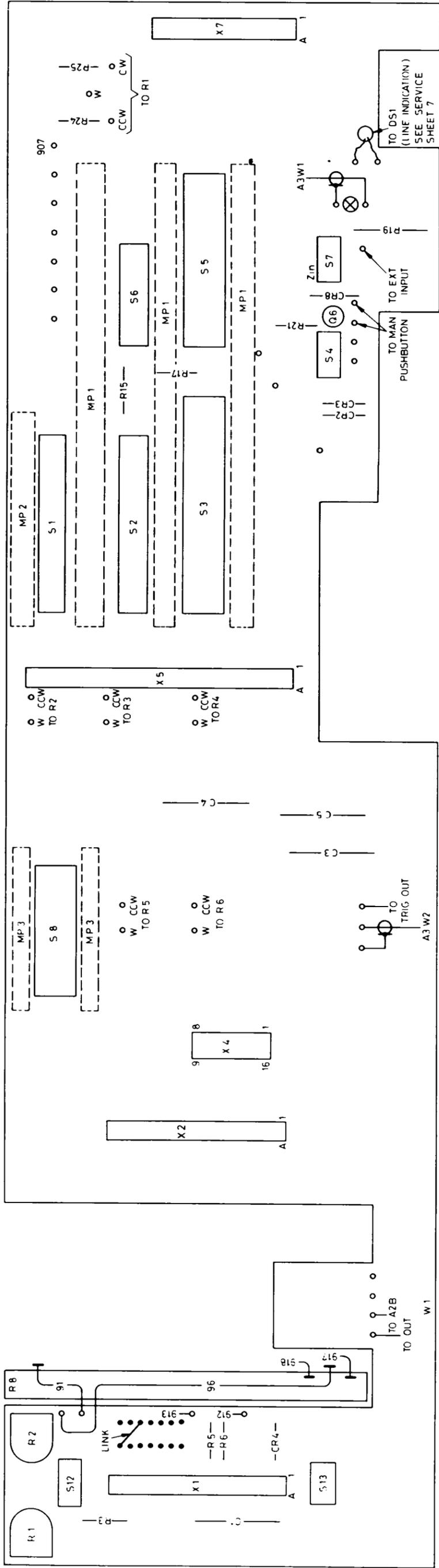
NOTE: Amplitudes are average values and may vary depending on min. amplitude adjust A2 R117 and max. amplitude adjust A5 R80/R85.



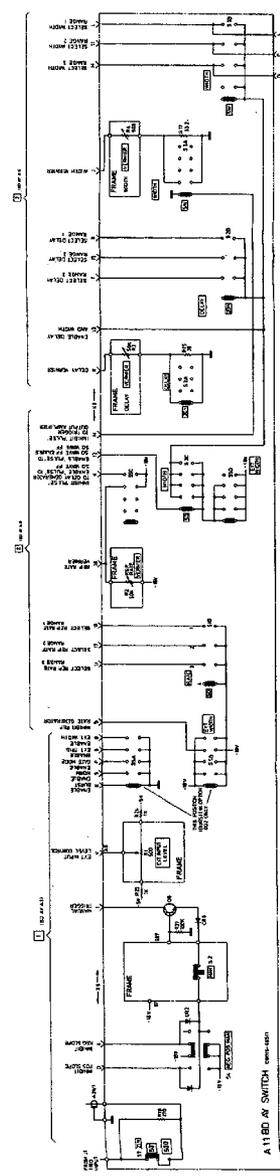
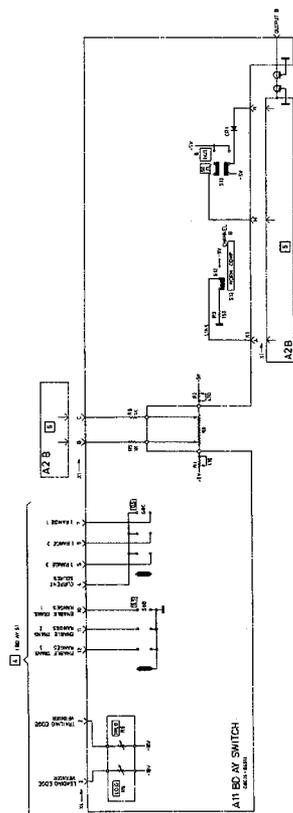




A11 BD AY SWITCH 08015-66511

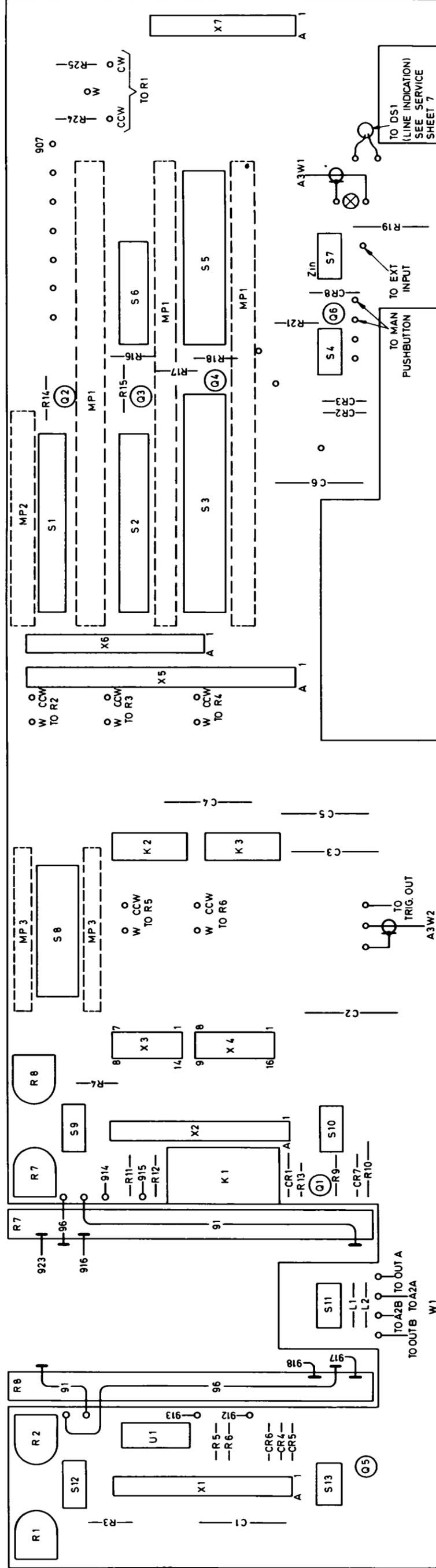


8-2

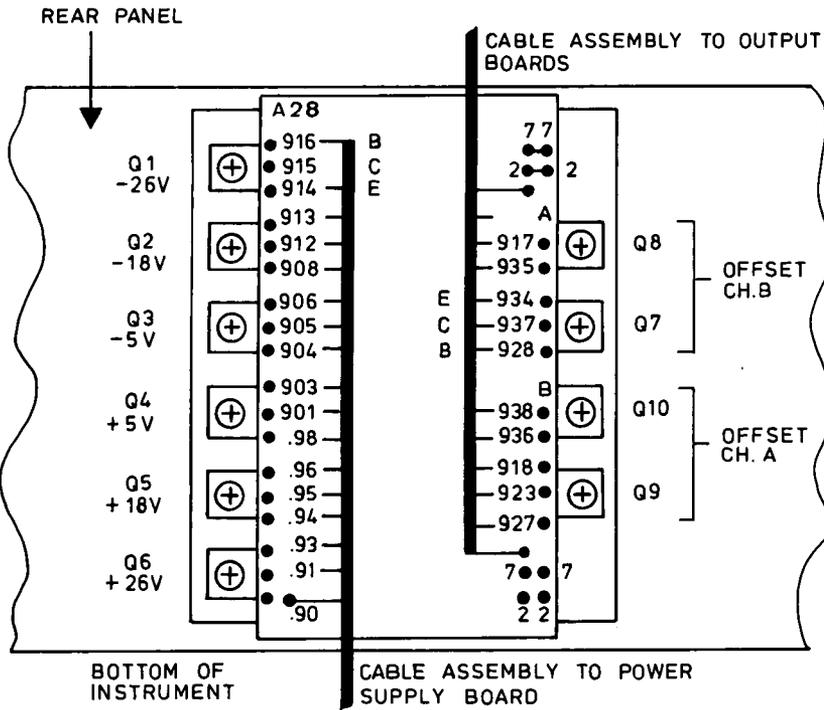


6a
601A OPTION 601 ONLY
SWITCHING A11

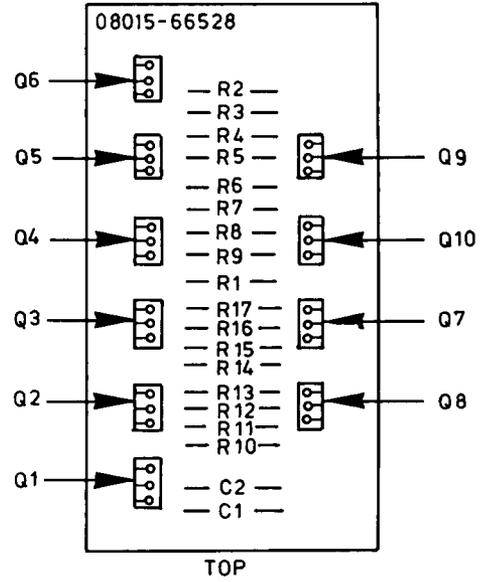
A31 BD A1 SWITCH 08015 - 66531



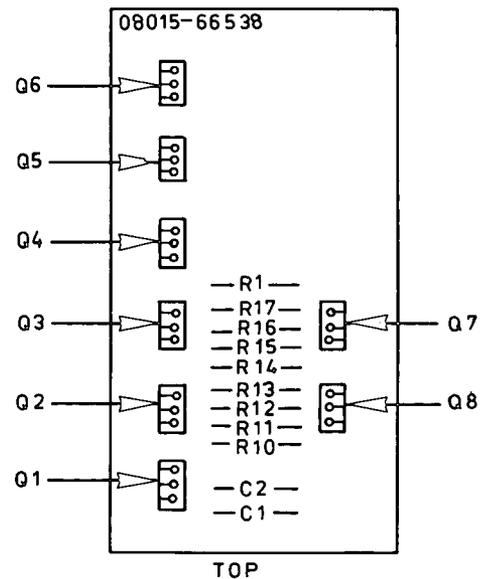
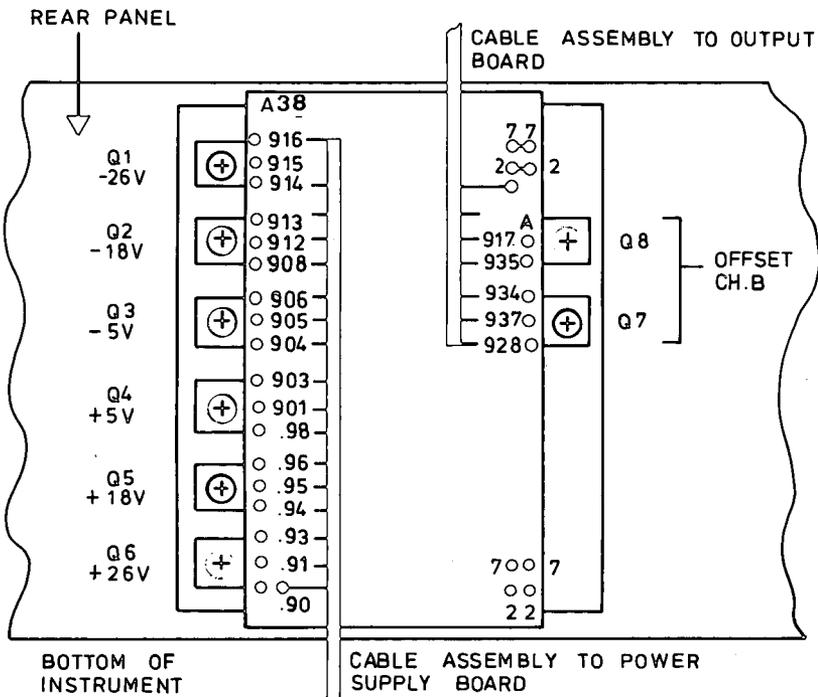
A28 BD AY RESISTOR 07015-66528
VIEW OF INSIDE OF REAR PANEL

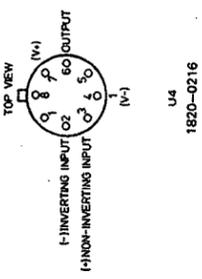
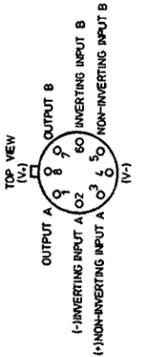
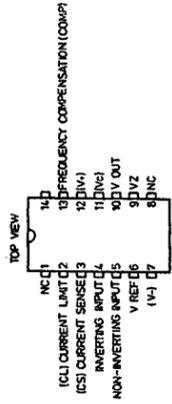
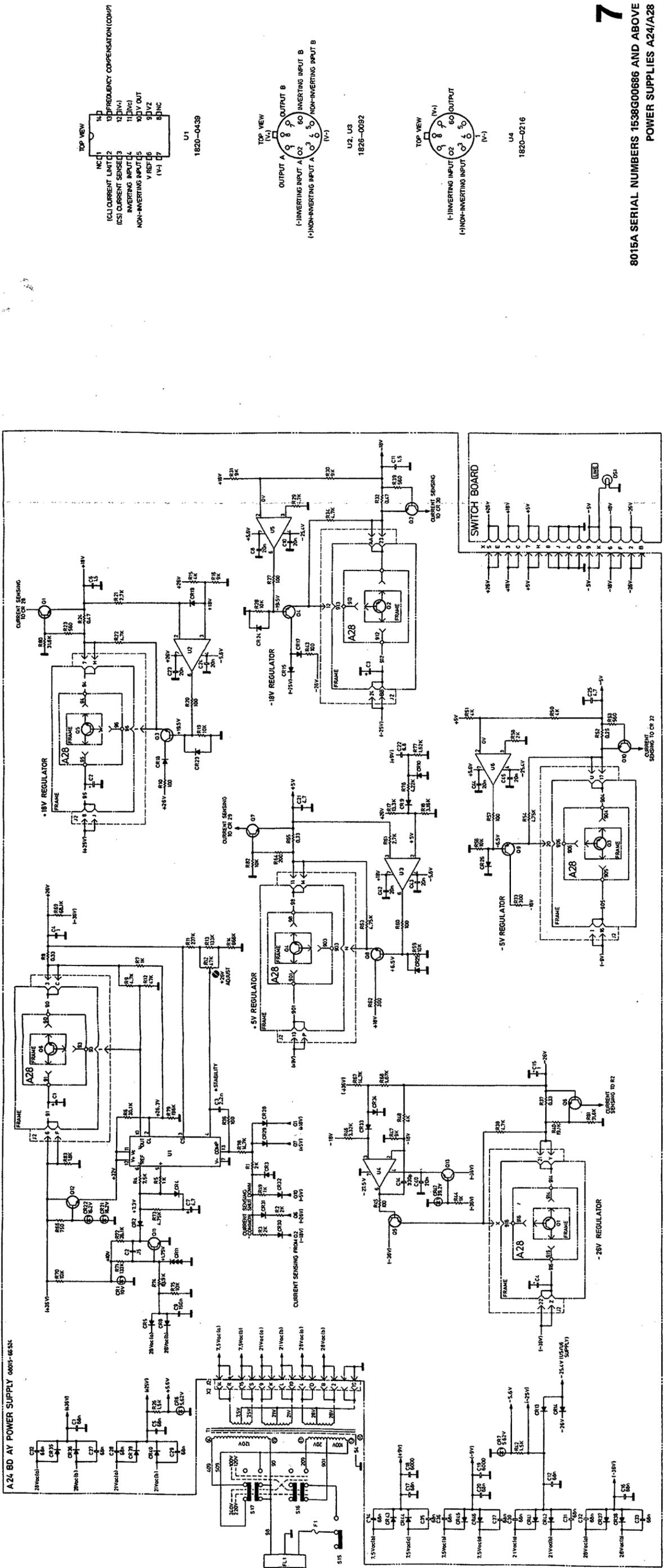


VIEW ON COMPONENT SIDE



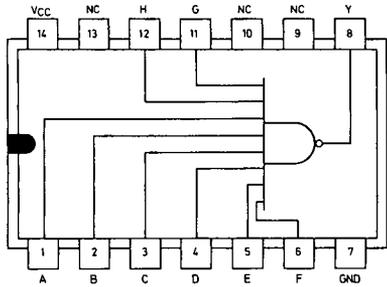
8015A OPTION 001
A38 BD AY RESISTOR 07015-66538
VIEW OF INSIDE OF REAR PANEL



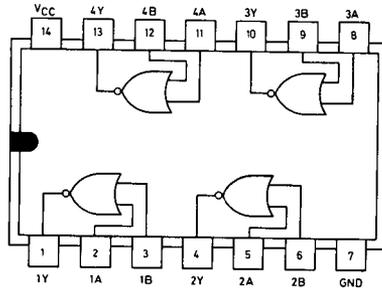


7

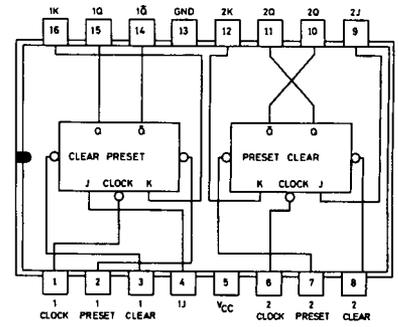
8015A SERIAL NUMBERS 1538G00686 AND ABOVE
POWER SUPPLIES A24/A28



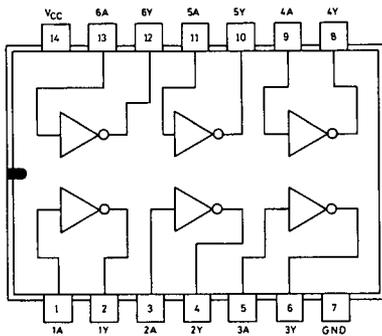
U1, U2, U9, U11
1820-0070



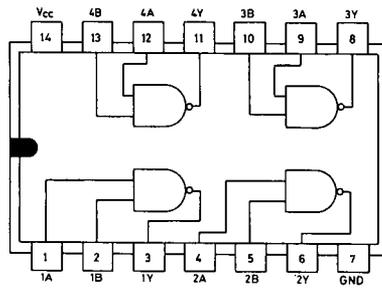
U12
1820-0328



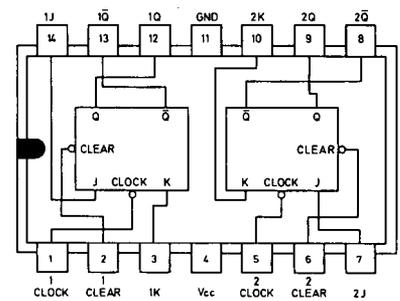
U17
1820-0076



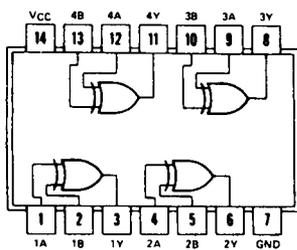
U3, U4, U10, U13, U21, U23
1820-0174



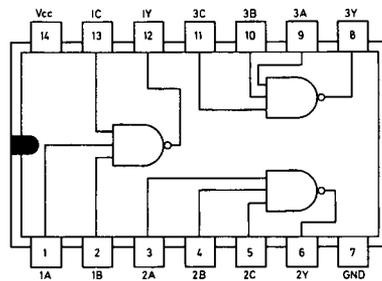
U14, U25, U20
1820-0054



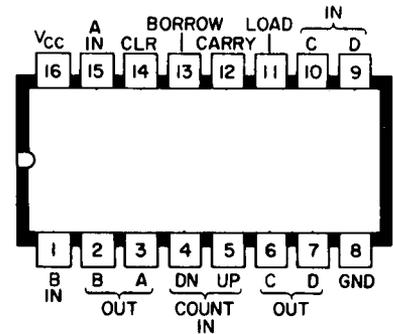
U19
1820-0075



U5, U6, U7, U8
1820-0282

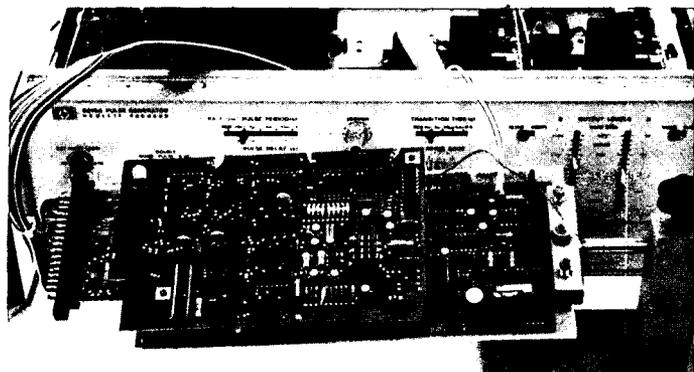


U16
1820-0371



U15, U22, U24
1820-0546

Burst option troubleshooting



TEST SETUP

This procedure tests the burst board by interrupting the load loop and making the counter operate constantly. Thus an easy check of counter chain and gates (zero detect, comparator, load enable) is possible.

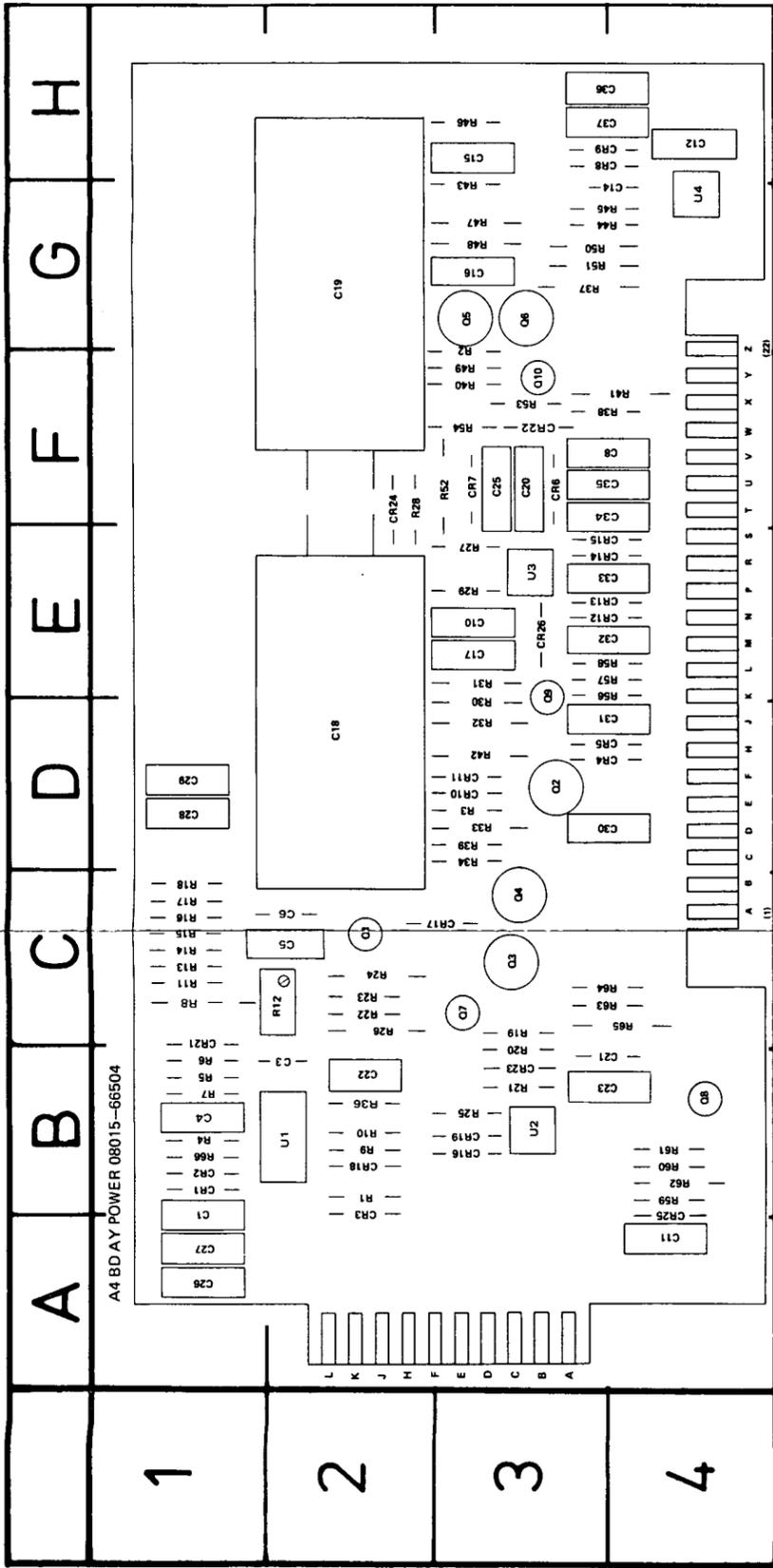
PROCEDURE

1. Set scope to $1\mu\text{s}/\text{div}$ adjust 8015A rate to exactly 1 MHz, width to about $25\mu\text{s}$.
2. Set 8015A to burst, adjust Ext trigg. input for signal.
3. Connect trigger output to trigger input cable of A3 (use of an external trigger source is also possible).
4. Disconnect the base connection of transistor A6 Q1 and leave it as open base (rate generator now enabled).
5. Disconnect pin 13 of A6 U12 from socket X2 and leave as open circuit.
6. Wire-connect the open track (from which A6U12 pin 13 is disconnected) to GND on A6.
7. Set scope time base to internal trigger.
8. Check the waveforms detailed in the following list:

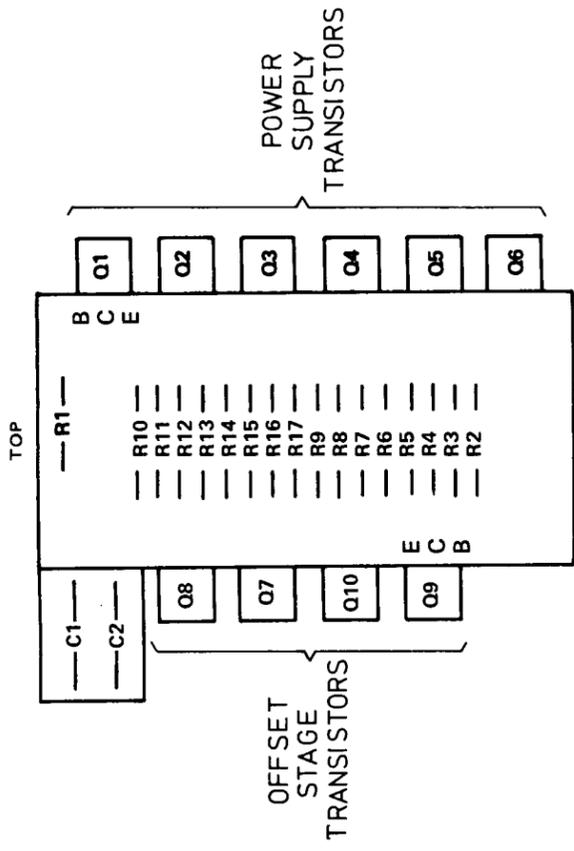
Test Point	Burst board reference point	Oscilloscope display (10 div)	Time/div	Slope trigger
1	U18 Pin 1		$1\mu\text{s}$	-
2	U15 Pin 4		$1\mu\text{s}$	-
3	U22 Pin 4		$10\mu\text{s}$	-
4	U24 Pin 4		$0,1\text{ms}$	-
5	U24 Pin 7		1ms	-
6	U2 Pin 8		$50\mu\text{s}^*$	-
	U2 Pin 8		$10\mu\text{s}$	-
7	U1 Pin 8		$0,5\text{ms}^*$	-
8	U12 Pin 13		1ms	+
9	U11 Pin 8		$10\mu\text{s}$	-
10	U9 Pin 8		1ms	-
11	U19 Pin 2		1ms	-
12	Q3 E		1ms	+
13	Q7 C		$1\mu\text{s}$	-
14	U19 Pin 13		1ms	+
15	Q3 C		1ms	+
16	U19 Pin 12		1ms	-
17	U12 Pin 10		1ms	+

* Signals may show differently, depending on trigger.

Note: Some signals are difficult to see due to low duty cycle.



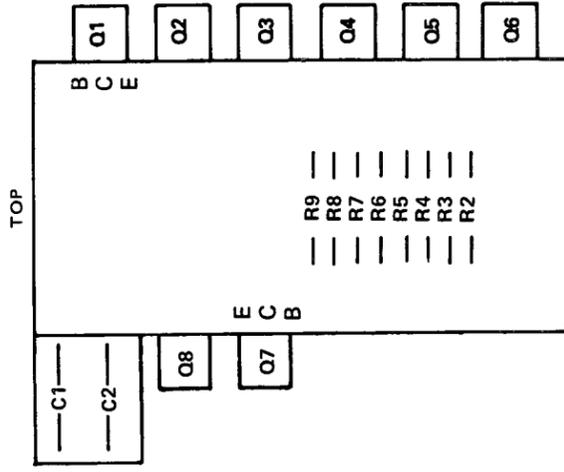
A8 BD AY RESISTOR 08015-66508 (COMPONENT SIDE)



OFFSET
STAGE
TRANSISTORS

POWER
SUPPLY
TRANSISTORS

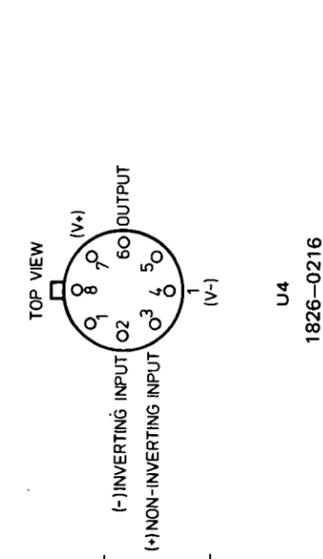
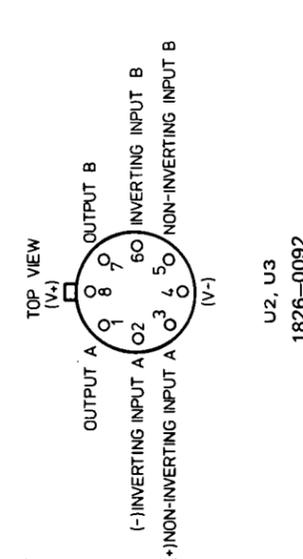
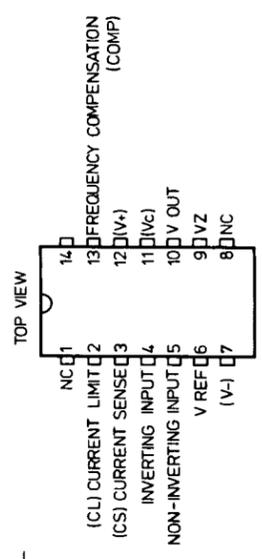
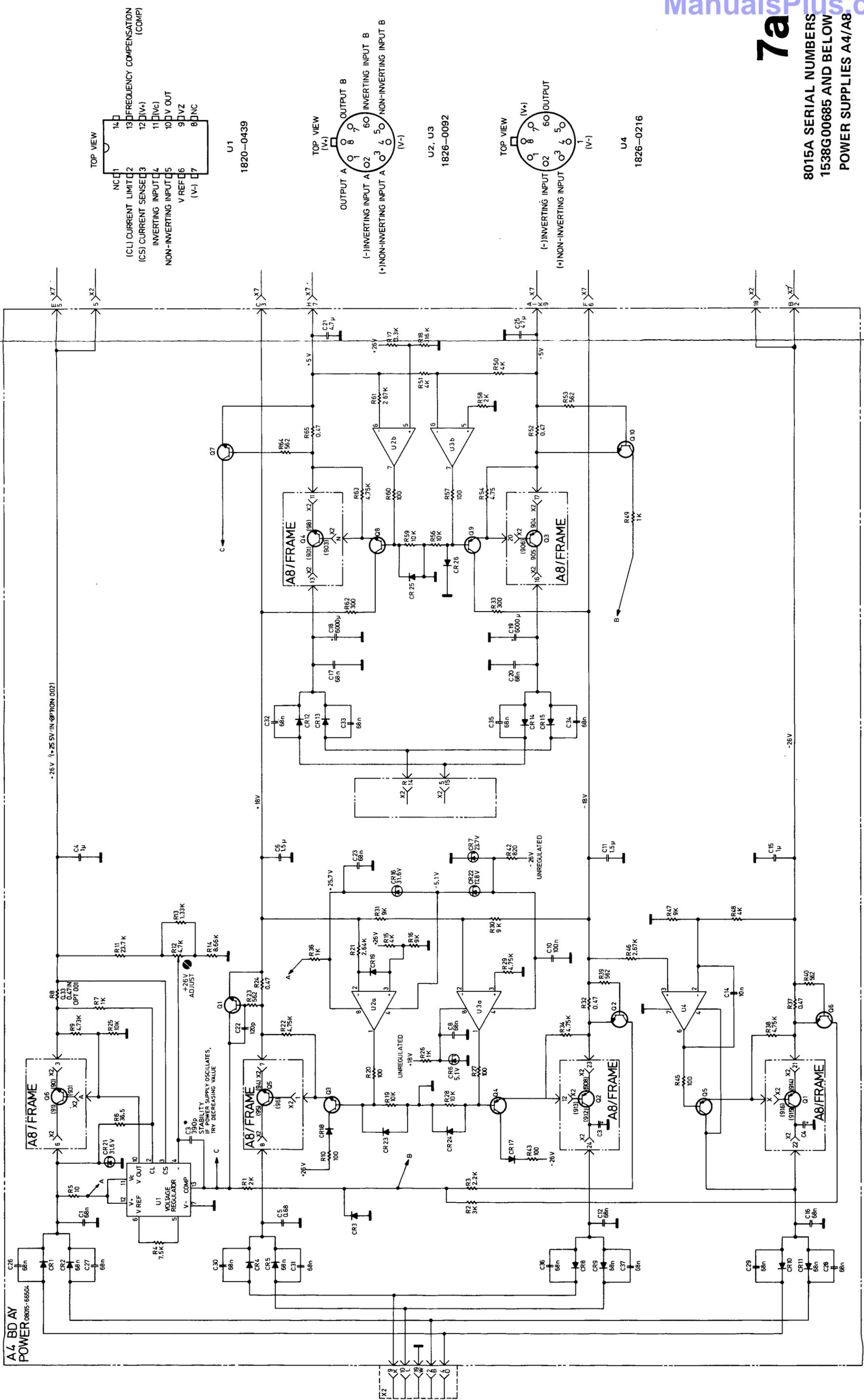
A18 BD AY RESISTOR 08015-66518 (COMPONENT SIDE)
(8015A OPTION 001)



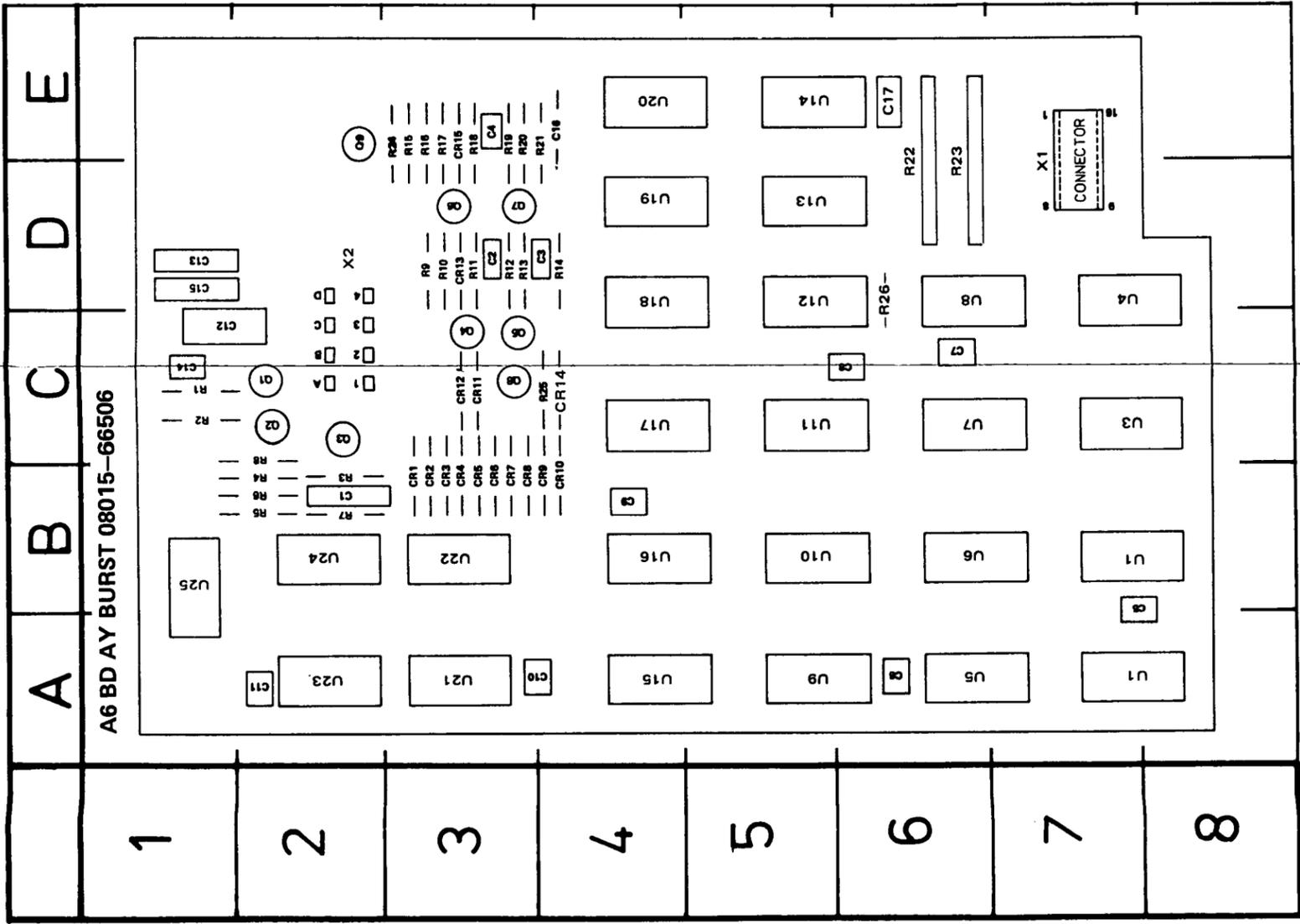
- | | | | | | | | | | |
|-----|----|------|----|-----|----|-----|----|-----|----|
| C1 | A1 | C36 | H4 | Q1 | C2 | R21 | B3 | R52 | F3 |
| C3 | B2 | C37 | H4 | Q2 | D3 | R22 | C2 | R53 | F3 |
| C4 | B1 | CR1 | B1 | Q3 | C3 | R23 | C2 | R54 | F3 |
| C5 | C2 | CR2 | B1 | Q4 | C3 | R24 | C2 | R55 | E4 |
| C6 | C2 | CR3 | B2 | Q5 | G3 | R25 | B3 | R56 | E4 |
| C8 | F4 | CR4 | D4 | Q6 | G3 | R26 | C2 | R58 | E4 |
| C10 | E3 | CR5 | D4 | Q7 | C3 | R27 | E3 | R59 | B4 |
| C11 | A4 | CR6 | H4 | Q8 | B4 | R28 | F2 | R60 | B4 |
| C12 | H4 | CR7 | F3 | Q9 | E3 | R29 | E3 | R61 | B4 |
| C14 | G4 | CR8 | H4 | Q10 | F3 | R30 | D3 | R62 | B4 |
| C15 | H3 | CR9 | H4 | R1 | B2 | R31 | E3 | R63 | C4 |
| C16 | G3 | CR10 | D3 | R2 | G3 | R32 | D3 | R64 | C4 |
| C17 | E3 | CR11 | D3 | R3 | D3 | R33 | D3 | R65 | C4 |
| C18 | D2 | CR12 | E4 | R4 | B1 | R34 | D3 | R66 | B1 |
| C19 | G2 | CR13 | E4 | R5 | B1 | R35 | B2 | U1 | B2 |
| C20 | F3 | CR14 | E4 | R6 | B1 | R37 | G4 | U2 | B3 |
| C21 | B4 | CR15 | E4 | R7 | B1 | R38 | F4 | U3 | E3 |
| C22 | B2 | CR16 | B3 | R8 | C1 | R39 | D3 | U4 | G4 |
| C23 | B4 | CR17 | C3 | R9 | B2 | R40 | F3 | | |
| C25 | F3 | CR18 | B2 | R10 | B2 | R41 | F4 | | |
| C26 | A1 | CR19 | B3 | R11 | C1 | R42 | D3 | | |
| C27 | A1 | CR20 | B3 | R12 | C2 | R43 | H3 | | |
| C28 | D1 | CR21 | C1 | R13 | C1 | R44 | G4 | | |
| C29 | D1 | CR22 | F3 | R14 | C1 | R45 | G4 | | |
| C30 | D4 | CR23 | B3 | R15 | C1 | R46 | H3 | | |
| C31 | D4 | CR24 | F2 | R16 | C1 | R47 | G3 | | |
| C32 | E4 | CR25 | A4 | R17 | C1 | R48 | G3 | | |
| C33 | E4 | CR26 | E3 | R18 | C1 | R49 | F3 | | |
| C34 | F4 | | | R19 | C3 | R50 | G4 | | |
| C35 | F4 | | | R20 | B3 | R51 | G4 | | |

7a

8015A SERIAL NUMBERS
1538G00685 AND BELOW
POWER SUPPLIES A4/A8



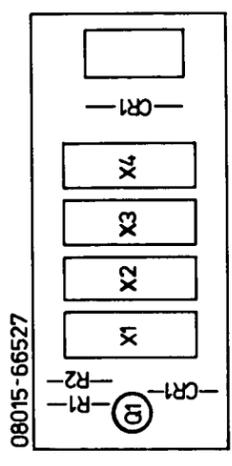
A4, BD AY
POWER 08015-66504



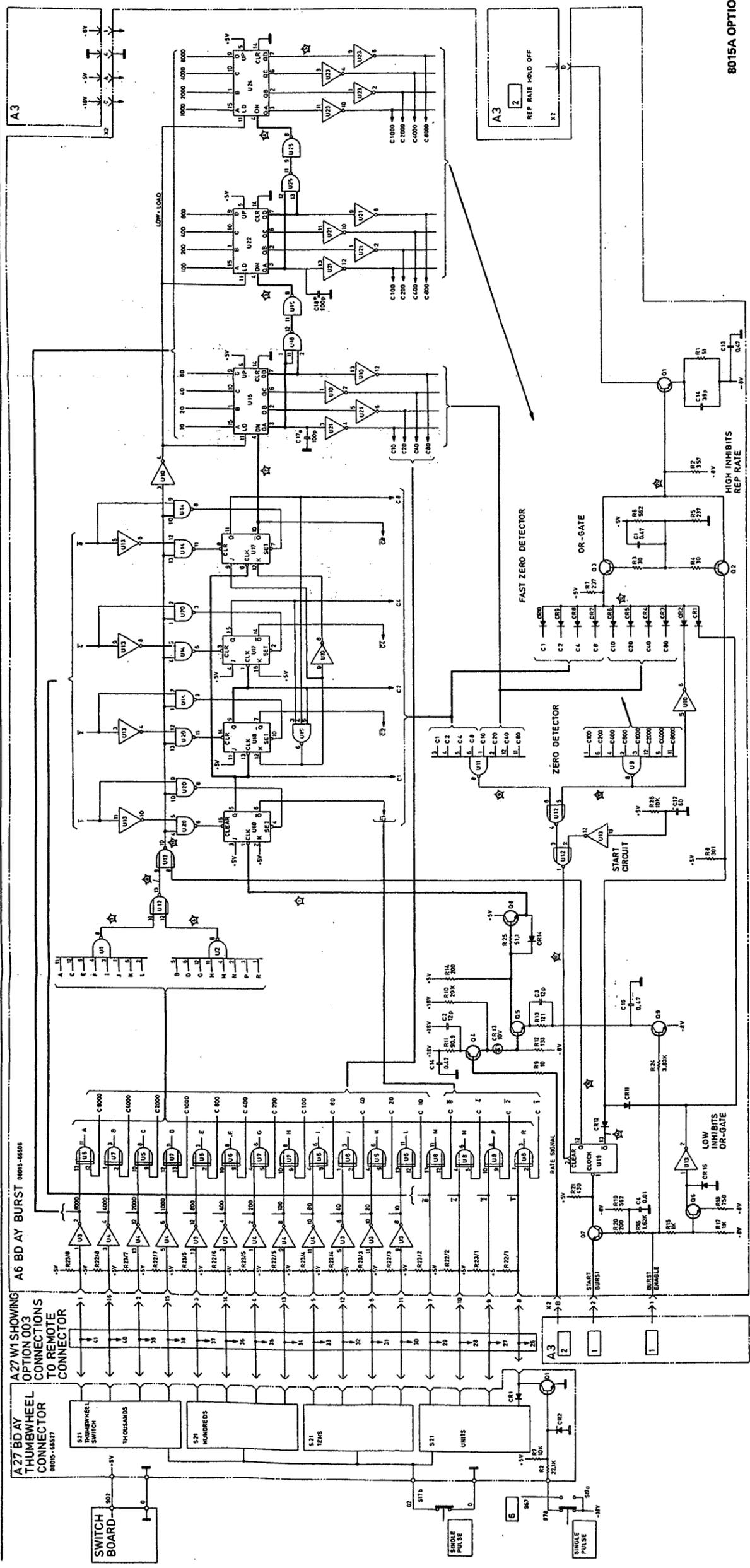
A6 BD AY BURST 08015-66506

- | | | | | | |
|------|----|-----|----|-----|----|
| C1 | B2 | R1 | C1 | U16 | B4 |
| C2 | D3 | R2 | C1 | U17 | C4 |
| C3 | D4 | R3 | B2 | U18 | C4 |
| C4 | E3 | R4 | B2 | U19 | D4 |
| C5 | B7 | R5 | B2 | U20 | E4 |
| C6 | A6 | R6 | B2 | U21 | A3 |
| C7 | C6 | R7 | B2 | U22 | B3 |
| C8 | C6 | R8 | B2 | U23 | A2 |
| C9 | B4 | R9 | D3 | U24 | B2 |
| C10 | A3 | R10 | D3 | U25 | B1 |
| C11 | A2 | R11 | D3 | X1 | D7 |
| C12 | C1 | R12 | D3 | X2 | C2 |
| C13 | D1 | R13 | D3 | | |
| C14 | C1 | R14 | D4 | | |
| C15 | D1 | R15 | E3 | | |
| C16 | E4 | R16 | E3 | | |
| C17 | E6 | R17 | E4 | | |
| CR1 | B3 | R18 | E3 | | |
| CR2 | B3 | R19 | E3 | | |
| CR3 | B3 | R20 | E3 | | |
| CR4 | B3 | R21 | E4 | | |
| CR5 | B3 | R22 | E6 | | |
| CR6 | B3 | R23 | E6 | | |
| CR7 | B3 | R24 | E3 | | |
| CR8 | B3 | R25 | C4 | | |
| CR9 | B4 | R26 | C6 | | |
| CR10 | B4 | | | | |
| CR11 | C3 | U1 | A7 | | |
| CR12 | C3 | U2 | B7 | | |
| CR13 | D3 | U3 | C7 | | |
| CR14 | C4 | U4 | D7 | | |
| CR15 | E3 | U5 | A6 | | |
| MP3 | | U6 | B6 | | |
| Q1 | C2 | U7 | C6 | | |
| Q2 | C2 | U8 | D6 | | |
| Q3 | C2 | U9 | A5 | | |
| Q4 | C3 | U10 | B5 | | |
| Q5 | C3 | U11 | C5 | | |
| Q6 | D3 | U12 | D5 | | |
| Q7 | D3 | U13 | D5 | | |
| Q8 | C3 | U14 | E5 | | |
| Q9 | E2 | U15 | A4 | | |

A27 BD AY THUMBWHEEL CONN.

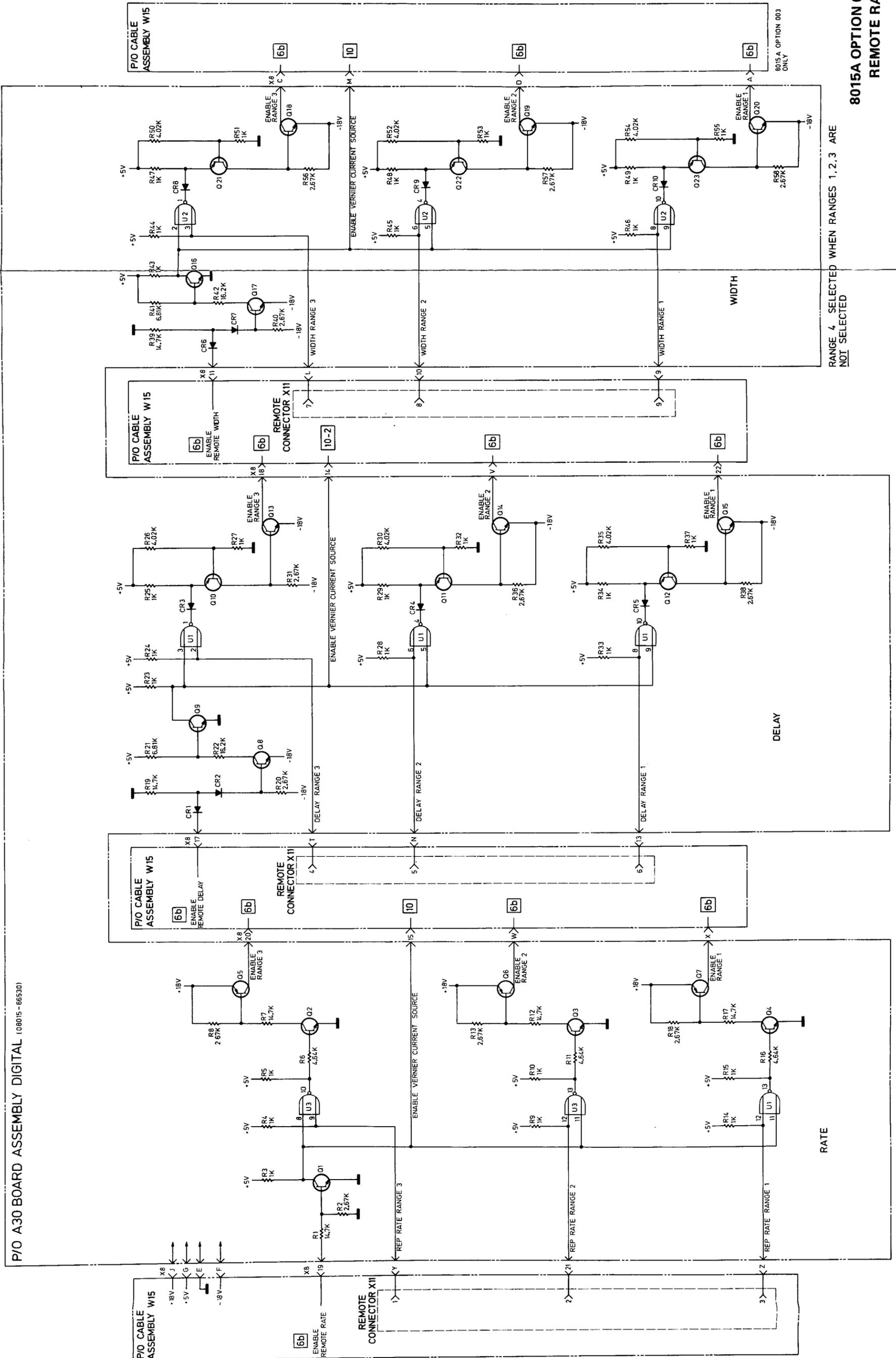


08015-66527



8015A OPTION 002 ONLY BURST A6 AND A27

P/O A30 BOARD ASSEMBLY DIGITAL (08015-66530)



RANGE 4 SELECTED WHEN RANGES 1, 2, 3 ARE NOT SELECTED

8015 A OPTION 003 ONLY

RATE

DELAY

WIDTH

P/O CABLE ASSEMBLY W15

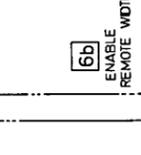
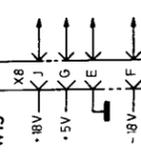
P/O CABLE ASSEMBLY W15

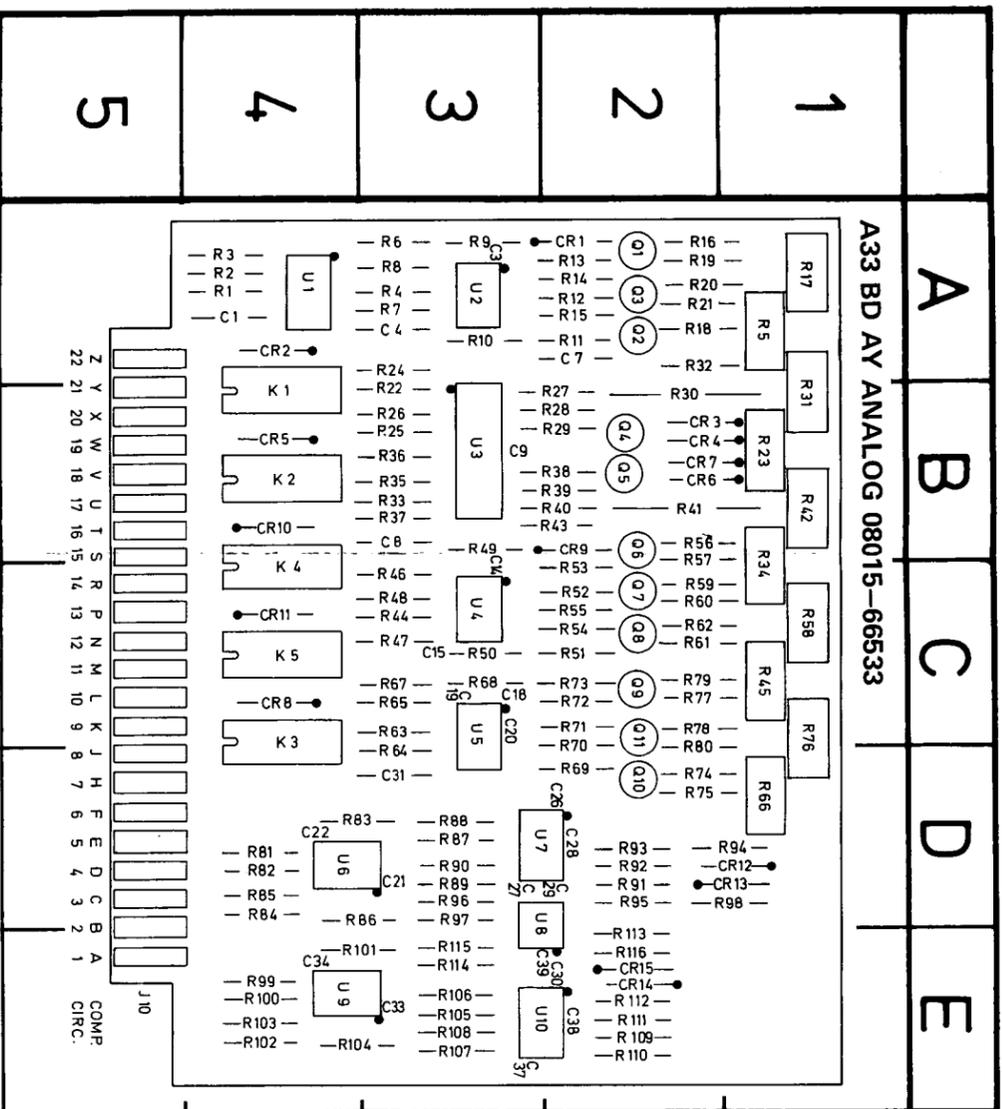
P/O CABLE ASSEMBLY W15

REMOTE CONNECTOR X11

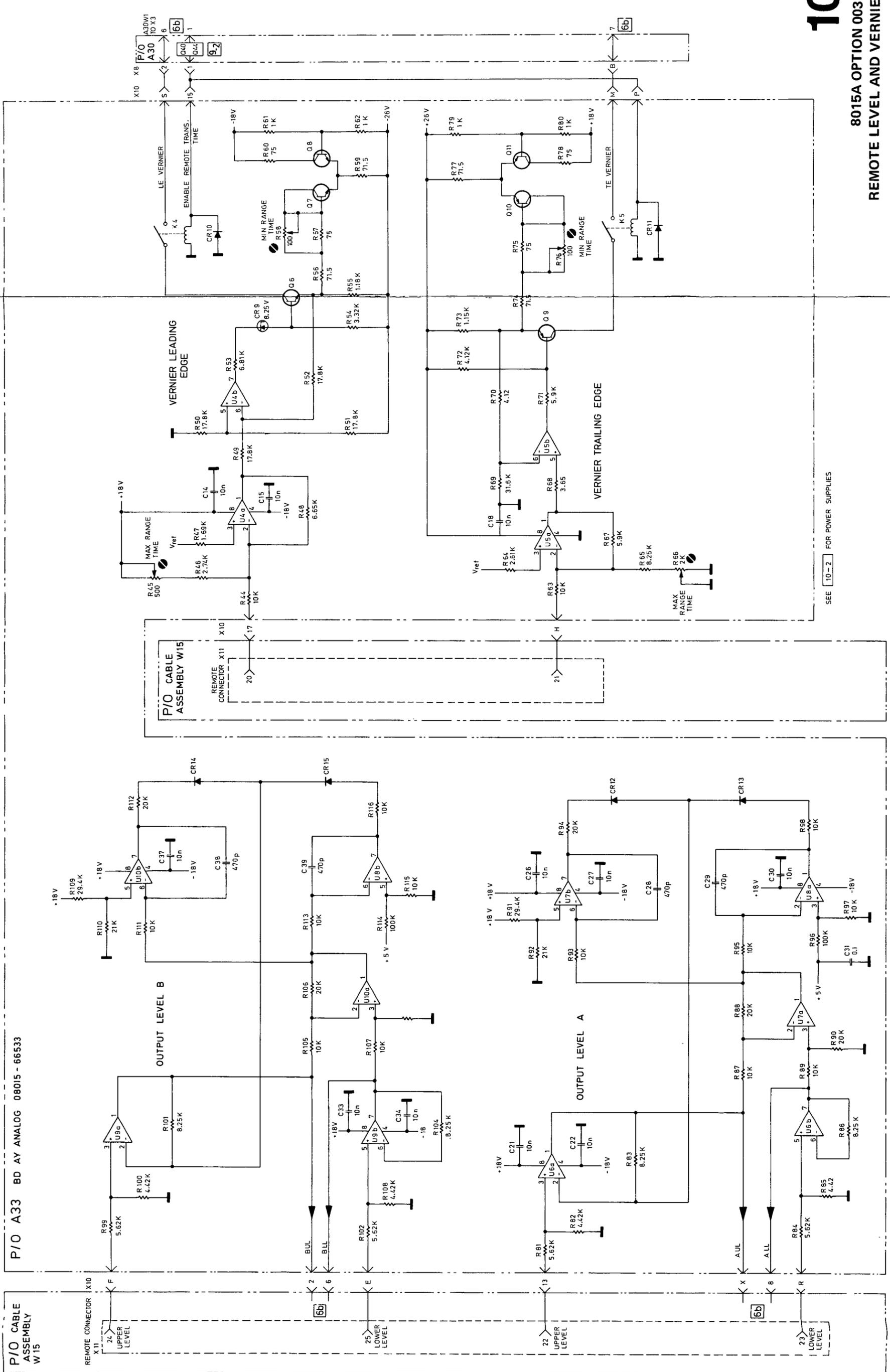
REMOTE CONNECTOR X11

REMOTE CONNECTOR X11





C1	A4	R1	A4	R56	B2	R111	E2
C3	A3	R2	A4	R57	B2	R112	E2
C7	A2	R3	A4	R58	C1	R113	E2
C8	B3	R4	A3	R59	C2	R114	E3
		R5	A1	R60	C2	R115	E3
C9	B3	R6	A3	R61	C2	R116	E2
C14	C3	R7	A3	R62	C2	U1	A4
C15	C3	R8	A3	R63	C3	U2	A3
C18	C3	R9	A3	R64	C3	U3	B3
C21	D3	R10	A3	R65	C3	U4	C3
C22	D4	R11	A2	R66	D1	U5	C3
C26	D2	R12	A2	R67	C3	U6	D3
C27	D3	R13	A2	R68	C3	U7	D2
C28	D2	R14	A2	R69	D2	U8	D2
C29	D2	R15	A2	R70	C2	U9	E3
		R16	A2	R71	C2	U10	E2
C30	E2	R17	A1	R72	C2		
C31	D3	R18	A2	R73	C2		
C33	E3	R19	A2	R74	D2		
C34	E4	R20	A2	R75	D2		
C37	E2	R21	A2	R76	C1		
		R22	B3	R77	C2		
C38	E2	R23	B1	R78	C2		
C39	E2	R24	A3	R79	C2		
		R25	B3	R80	C2		
CR1	A2	R26	B3	R81	D4		
CR2	A4	R27	B2	R82	D4		
CR3	B2	R28	B2	R83	D3		
CR4	B2	R29	B2	R84	D3		
CR5	B4	R30	B2	R85	D4		
CR6	B2	R31	A1	R86	D3		
CR7	B2	R32	A2	R87	D3		
CR8	C4	R33	B3	R88	D3		
CR9	B2	R34	B1	R89	D3		
CR10	B4	R35	B3	R90	D3		
CR11	C4	R36	B3	R91	D2		
CR12	D1	R37	B3	R92	D2		
CR13	D1	R38	B2	R93	D2		
CR14	E2	R39	B2	R94	D1		
CR15	E2	R40	B2	R95	D2		
		R41	B2	R96	D3		
		R42	B1	R97	D3		
Q1	A2	R43	B2	R98	D1		
Q2	A2	R44	C3	R99	E3		
Q3	A2	R45	C1	R100	E4		
Q4	B2	R46	C3	R101	E3		
Q5	B2	R47	C3	R102	E4		
Q6	B2	R48	C3	R103	E4		
Q7	C2	R49	B3	R104	E3		
Q8	C2	R50	C3	R105	E3		
Q9	C2	R51	C2	R106	E3		
C10	D2	R52	C2	R107	E3		
		R53	C2	R108	E3		
		R54	C2	R109	E2		
Q11	C2	R55	C2	R110	E2		



P/O A33 BD AY ANALOG 08015 - 66533

P/O CABLE ASSEMBLY W15

SEE 10-2 FOR POWER SUPPLIES

10-2

8015A OPTION 003 ONLY
REMOTE VERNIER A33

P/O A33 BOARD ASSEMBLY 08015 - 66533

P/O CABLE ASSEMBLY W15

