

Errata

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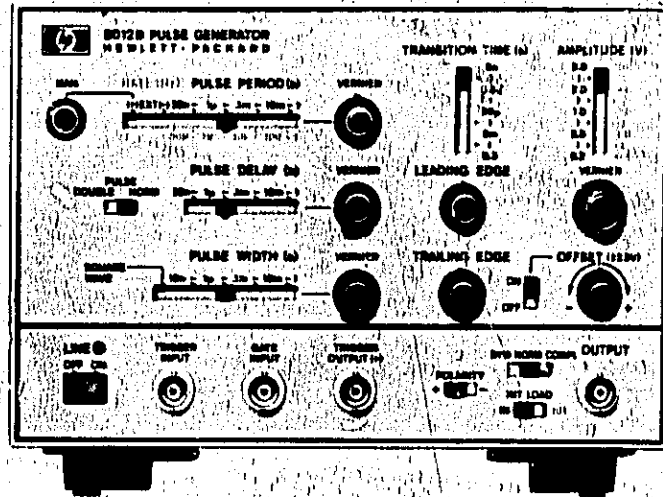
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8012B PULSE GENERATOR



CERTIFICATION

The Hewlett-Packard Company certifies that this instrument was thoroughly tested and inspected and found to meet its published specifications when it was shipped from the factory. The Hewlett-Packard Company further certifies that its calibration measurements are traceable to the U.S. National Bureau of Standards to the extent allowed by the Bureau's calibration facilities, or to the calibration facilities of other International Standards Organization members.

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This Hewlett-Packard product is warranted against defects in materials and workmanship. This warranty applies for one year from the date of delivery. Hewlett-Packard will repair or replace products which prove to be defective during the warranty period provided they are returned to Hewlett-Packard. No other warranty is expressed or implied. We are not liable for consequential damages.

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**HEWLETT
PACKARD**

OPERATING AND SERVICE MANUAL

8012B PULSE GENERATOR

SERIAL NUMBERS

This manual applies directly to instruments with serial number 1633 G 00491 and higher. Any changes made in instruments having serial numbers higher than the above number will be found in a "Manual Changes" supplement supplied with this manual. Be sure to examine this supplement for any changes which apply to your instrument and record these changes in the manual.

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FEDERAL REPUBLIC OF GERMANY

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SAFETY SUMMARY

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Hewlett-Packard Company assumes no liability for the customer's failure to comply with these requirements.

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:

Do not remove instrument covers when operating.

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. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or perform any unauthorized modification to the instrument.

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.

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.



WARNING



Dangerous voltages, capable of causing death, are present in this instrument. Use extreme caution when handling, testing, and adjusting.

1-1 INTRODUCTION

1-2 The 8012B is an extremely versatile, easy-to-operate pulse generator with a wide range of applications. It has a complete set of variable pulse parameters with a repetition rate of 0-50 MHz and transition times as low as 5ns. This makes it ideal for testing digital logic: RTL, DTL, TTL, some ECL and some MOS can be dynamically tested and noise patterns can be simulated. Any triangular or trapezoidal waveforms can be generated (up to a maximum ratio of 1:100 or 100:1 between leading and trailing edge transitions) over the entire frequency range. The pulse polarity can be set to positive or negative, and the pulse output format to symmetrical, normal or complement using front panel switches, without affecting pulse amplitude or offset. The complement format can be used to obtain duty cycles of 100% and symmetrical format provides a means of checking device threshold, driving operational amplifiers and simulating amplifier outputs.

1-3 The 8012B has a selectable source impedance which makes impedance matching to the circuit under test very simple. It also has a square wave facility that is independent of width and delay settings and a double pulse facility that is useful for testing device recovery times and making noise immunity measurements.

1-4 The front panel of the 8012B has been carefully designed to provide a logical layout of the controls; horizontal controls for pulse timing parameters, vertical controls for pulse amplitude parameters. Also, compatible pulse settings are guaranteed as long as that the pulse delay and pulse width controls are either set to the left of the pulse period control or; if set vertically below the period control, that the

delay and width verniers are set counterclockwise of the period vernier. This simple, straightforward design enables pulses to be set up extremely quickly and easily.

1-5 The 8012B will operate in three different modes as follows:

Normal Mode: in this mode the internal rate generator determines the repetition rate of the output pulses. The generator can be triggered internally, externally or manually or can be gated. A trigger pulse is generated for each output pulse and the pulse output can be delayed with respect to the trigger output.

RZ Mode: in this mode external signals are applied to the input socket on the rear panel. These signals by-pass the internal rate generator and trigger the delay generator directly, thus determining the repetition rate of the output pulses. All other pulse parameters are determined by the front panel controls. Because the internal rate generator is not used in RZ mode, it is available to provide independent trigger pulses.

External Width Mode: in this mode external pulses applied to the input socket on the rear panel determine the width and repetition rate of the output pulses. In fact the output is a pulse-shaped version of the external input. The pulse available at the trigger output, being derived from the internal rate generator, is independent of the RZ output.

Table 1-1. Specifications

PULSE CHARACTERISTICS

Transition times: 5ns – 0.5s with INT. LOAD switched IN, 6ns – 0.5s with INT. LOAD switched OUT. In four ranges, common for leading and trailing edges. Verniers provide separate control of leading and trailing edges within each range up to a maximum ratio 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 unless INT LOAD is switched OUT and amplitude reduced to 0.4V – 4V when it may increase to $\pm 10\%$.

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

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

Width Jitter: $< 0.1\% + 50$ ps on any width setting.

Maximum Duty Cycle: $> 75\%$ from 1 Hz to 10 MHz, decreasing to $> 40\%$ at 50 MHz. Up to 100% in COMPL mode.

Maximum Output: With INT LOAD switched IN, output is 5V across 50 ohms, 10V across open circuit. With INT LOAD switched OUT, output is 10V across 50 ohms. Output circuit cannot be damaged by short circuits.

Attenuator: 4-step attenuator reduces output to 0.2V with INT LOAD switched IN, or to 0.4V with INT LOAD switched OUT. Vernier provides continuous adjustment within ranges.

Polarity: positive or negative selectable.

Output Format: symmetrical, normal or complement selectable.

Source Impedance: 50 ohms $\pm 10\%$ shunted by typically 20pF with INT LOAD switched IN. > 50 ohms shunted by typically 20pF with INT LOAD switched OUT.

DC Offset: With INT LOAD switched IN, offset is ± 2.5 V across 50 ohms and is independent of amplitude settings. With INT LOAD switched OUT, offset is automatically switched off.

Pulse Delay: < 35 ns to 1s (with respect to trigger output) in four ranges; vernier provides continuous adjustment within ranges.

Delay Jitter: $< 0.1\% + 50$ ps on any delay setting.

REPETITION RATE AND TRIGGER

Repetition Rate: 1 Hz to 50 MHz in four ranges, continuous adjustment within ranges.

Period Jitter: $< 0.1\% + 50$ ps on any rate setting.

Square Wave: 0.5 Hz to 25 MHz in four ranges. Duty cycle $60\% \pm 5\%$ up to 1 MHz, tolerance increases to $\pm 15\%$ at 25 MHz.

Double Pulse: up to 25 MHz simulating 50 MHz.

Trigger Output: $> +1$ V across 50 Ω , 16ns ± 10 ns wide. Suitable for triggering another 8012B/13B.

EXTERNALLY CONTROLLED OPERATION**External Triggering**

Repetition Rate: 0 to 50 MHz. For square wave output, frequency is divided by 2.

Trigger input: sinewaves > 1.7 V p-p (about zero) or pulses > 0.8 V either polarity with a width of > 7 ns.

Maximum input amplitude: ± 7 V.

Delay: 25ns ± 8 ns between leading edge of trigger input and trigger output signals.

Input impedance: 50 ohms $\pm 10\%$, dc-coupled.

Manual: front panel pushbutton for single pulse.

Table 1-1. Specifications (cont'd)

Gating

Synchronous gating: gating signal turns generator on. First trigger output pulse is coincident with leading edge of gate pulse. Last output pulse is always generated with normal width even if the gate pulse ends during the generation of the pulse.

Gate input: dc-coupled; voltage at open connector approx. +1.8V. Shorting current $\leq 12\text{mA}$. Input impedance approx. 160Ω . Gate input signal: voltage $> +1.5\text{V}$ or resistor $> 1\text{K}\Omega$ to ground enables rep. rate generator. Voltage $< +0.8\text{V}$ or resistor $< 160\Omega$ disables rep. rate generator. Gate input TTL compatible. Maximum input $\pm 5\text{V}$.

External Width and RZ Modes

External width: output pulse width determined by the width of the drive input signal. Transition times and amplitude are selectable. Trigger pulses, produced by internal rate generator, are independent of the output pulses.

RZ Mode: external input signal switched directly to delay generator. Output pulse period determined by period of RZ input signal. Transition times, delay, width, amplitude and output formats are selectable. Trigger pulses, produced by internal rate generator, are independent of the output pulses.

Input signal: Input impedance 50 ohms, dc-coupled. Signal amplitude $> +1\text{V}$, maximum input $\pm 5\text{V}$. Width $> 7\text{ns}$.

GENERAL

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

Power: 100/120/220/240V, +5%, -10%, 48 to 400 Hz, 100VA max.

Weight: net 4 kg (8.8 lbs); shipping 6.5 kg (14.6 lbs).

Dimensions: 200mm wide, 142mm high, 330mm deep, (7.9" x 5.6" x 13").

Accessories: 15179A Adapter Frame; rackmount for two units.

INSTALLATION

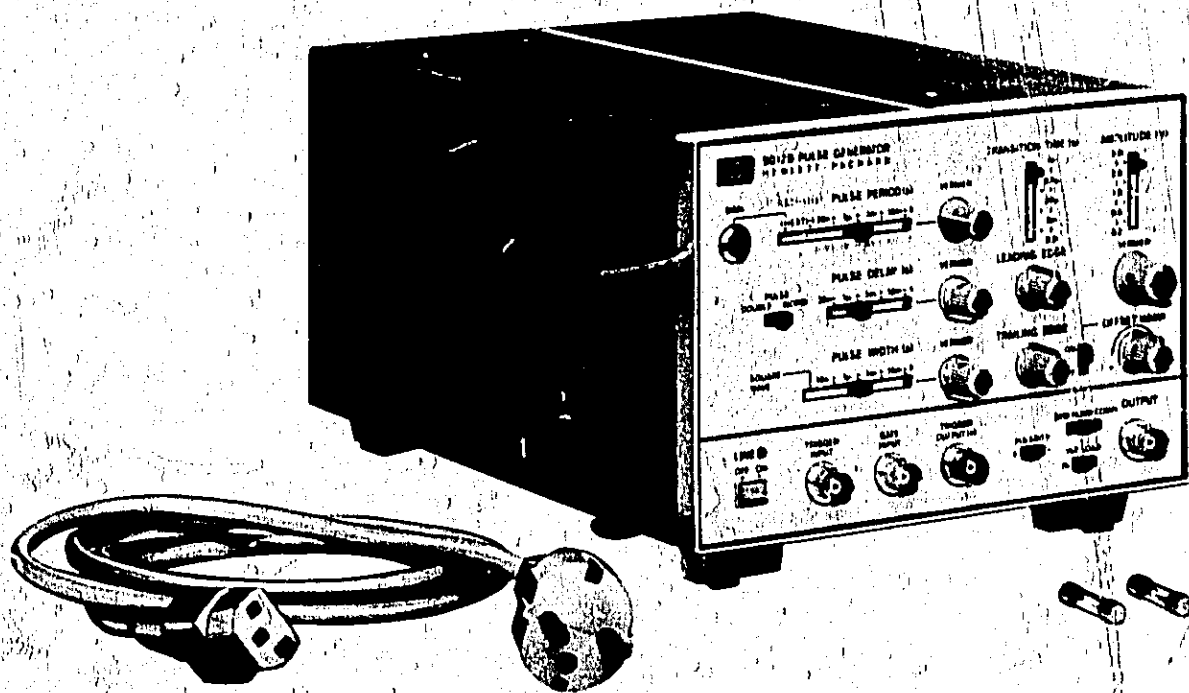


Figure 2-1. 8012B and Supplied Accessories

2-1 INITIAL INSPECTION

2-2 Inspect the instrument and accessories for physical damage and if damage is evident refer to paragraphs 2-5 to 2-8 for the recommended claim procedure and repacking information.

2-3 The 8012B is delivered complete with the following items.

| ITEM | HP Stock Number |
|--|-----------------|
| Spare 0.5A fuse for 220/240V operation | 2110-0202 |
| Spare 1A fuse for 100/120 and 220/240V operation | 2110-0007 |
| Power cord | see below |
| Manual | 08012-90001 |

2-4 The power cord delivered with the 8012B will be one of the following:

2-5 CLAIMS FOR DAMAGE

2-6 If physical damage is evident or if the instrument does not meet specifications 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.

2-7 REPACKING

2-8 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 packing material can be re-used 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.

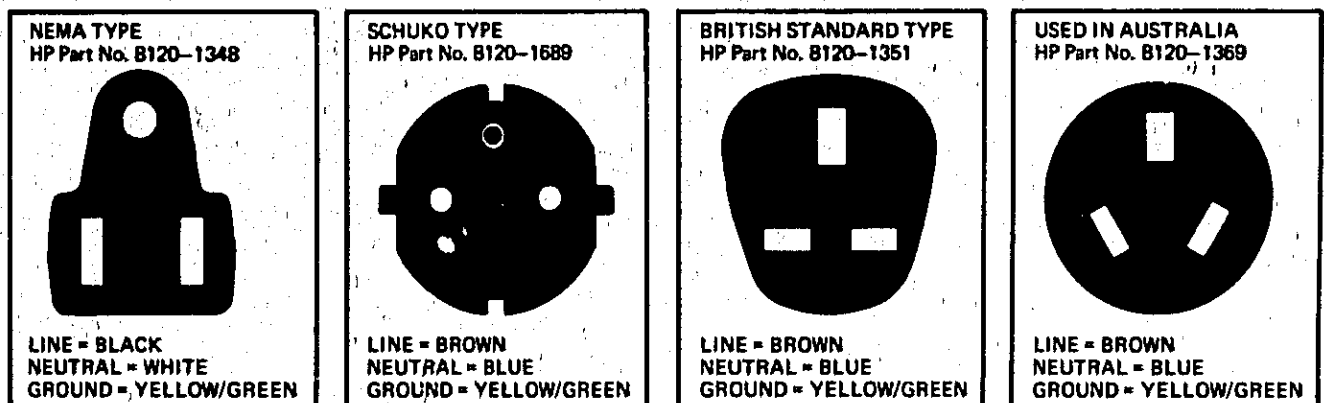


Figure 2-2. Power Cords

2-9 PREPARATION FOR USE

2-10 Power Cord

2-11 The 3-wire power cable supplied with the 8012B when connected to the appropriate power outlet, 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.

2-12 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 requirements 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 2-2).

2-13 POWER SOURCE REQUIREMENTS

2-14 The model 8012B will operate from nominal ac line supplies of 100V, 120V, 220V or 240V (-10%, +5%) at 48 Hz to 400 Hz. Two switches on the rear panel allow one of the four voltages to be selected.

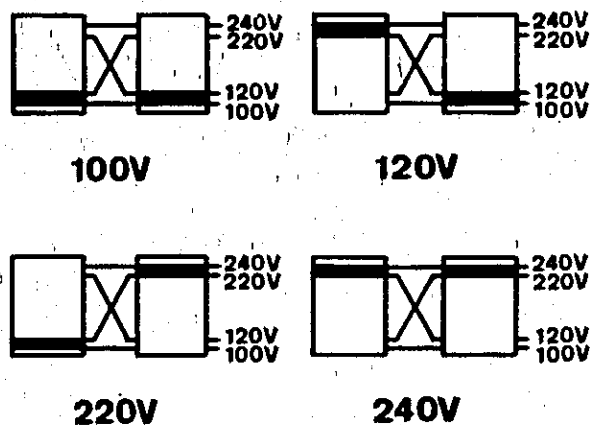


Figure 2-3. Selector settings for the nominal power line voltages.

The power dissipation is 100VA max.

CAUTION

Before applying power to the instrument, check on the rear panel that the 8012B is set in accordance with local supply conditions (see para. 2-14). If not, use a screwdriver to change the voltage selector positions.

WARNING

Remove power cord before removing cover.

2-15 To replace fuses, remove left hand side cover to gain access to inside of rear panel. Fuse location is shown in Figure 6-1, Page 6-4.

2-16 Connect the power cable to the rear connector.

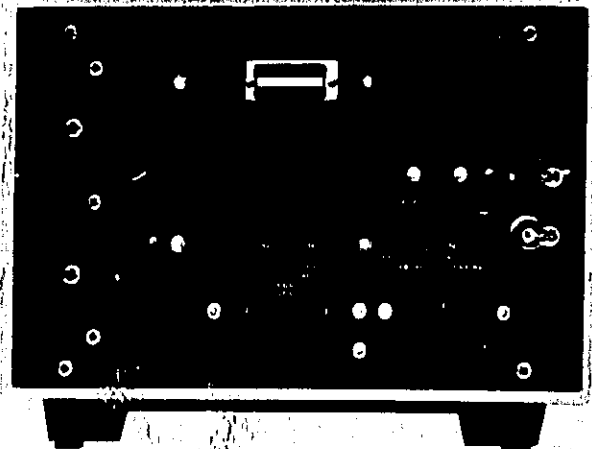
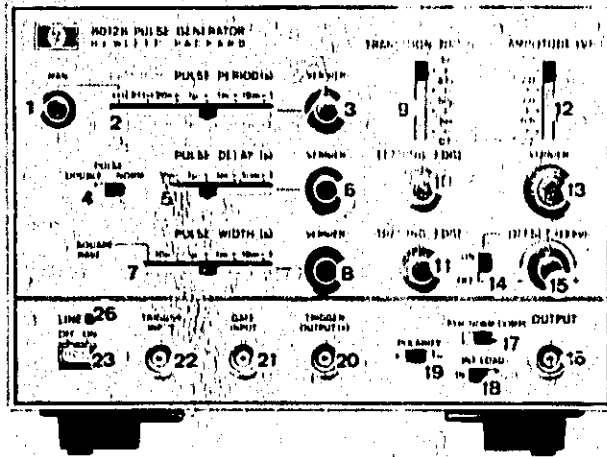
2-17 TEMPERATURE REQUIREMENTS

2-18 The 8012B will operate within specifications when the ambient temperature is between 0°C (32°F), and 55°C (131°F). It can be stored at temperatures between -40°C (-40°F) and 75°C (167°F).

2-19 RACK MOUNTING

2-20 The 8012B can be mounted in a rack using the 15179A Adapter Frame. This frame has space for mounting either one or two 8012B pulse generators alongside each other in a rack.

OPERATION



- ① MAN pushbutton: push to generate single pulses when the RATE switch is set to EXT (+) or EXT (-).
- ② RATE switch: for selecting the range of pulse rate.
- ③ Rate VERNIER: for continuous adjustment of the repetition rate between the limits of the range selected on the RATE switch. Clockwise rotation increases the pulse period (i.e. reduces the rate). In the RZ and EXT WIDTH modes the RATE controls define the frequency of trigger output pulses only.
- ④ PULSE DOUBLE/NORMAL switch: in the DOUBLE PULSE position the 8012B delivers two pulses for every trigger pulse - one pulse in phase with the trigger output and one delayed by the amount set on the PULSE DELAY controls. DOUBLE PULSE is not available in the EXT WIDTH mode and is automatically inhibited if selected. In the NORMAL position, for each trigger pulse, the 8012B delivers one pulse which is delayed on the trigger pulse by the amount set on the PULSE DELAY controls.
- ⑤ PULSE DELAY switch: for selecting the range of pulse delay with respect to trigger in all modes except SQUARE and EXT WIDTH.
- ⑥ Pulse delay VERNIER: for continuous adjustment of pulse delay between the limits of the range selected on the PULSE DELAY switch. Clockwise rotation increases the delay.
- ⑦ PULSE WIDTH switch: for selecting the range of pulse width required in all modes except SQUARE and EXT WIDTH.
- ⑧ Pulse width VERNIER: for continuous adjustment of pulse width between the limits of the range set on the PULSE WIDTH switch.
- ⑨ TRANSITION TIME(s) switch: for selecting one of the five pulse transition time ranges.
- ⑩ LEADING EDGE vernier: for continuous adjustment of pulse leading edge transition time between limits of the range selected on the TRANSITION TIME switch. Clockwise rotation increases transition time.
- ⑪ TRAILING EDGE vernier: for continuous adjustment of pulse trailing edge transition times between limits of the range selected on the TRANSITION TIME switch. Clockwise rotation increases transition time.
- ⑫ AMPLITUDE (V) switch: for selecting range of output pulse voltage.
- ⑬ Amplitude VERNIER: for continuous adjustment of output voltage between limits of the range selected on the AMPLITUDE (V) switch. Clockwise rotation increases the output amplitude.
- ⑭ OFFSET switch: for enabling/disabling the offset VERNIER which permits the baseline of the pulse OUTPUT to be adjusted. In the OFF position, the baseline of the pulse OUTPUT is zero volts.
- ⑮ OFFSET vernier: for adjustment of baseline of pulse OUTPUT over the range $-2.5V$ to $+2.5V$.
- ⑯ OUTPUT connector: BNC connector.
- ⑰ SYM/NORM/COMPL switch: SYM position provides an output that is symmetrical about the pulse baseline. NORM/COMPL reverses the duty cycle of the output; what was the normal output becomes the complement and vice versa.
- ⑱ INT LOAD switch: switches the internal 50 ohm load either IN or OUT. With load OUT, max. amplitude is doubled to 10V.
- ⑲ PULSE POLARITY switch: for selecting pulses of either positive or negative polarity with respect to the baseline.
- ⑳ TRIGGER OUTPUT connector: BNC connector supplies positive trigger output. Trigger output is not related to the Input in EXT WIDTH and RZ modes.
- ㉑ GATE INPUT connector: BNC connector to which gate pulses are applied. The pulse output and trigger output are synchronous to the gate signal.
- ㉒ TRIGGER INPUT connector: BNC connector to which trigger pulses are applied when the RATE switch is set to EXT (-) or EXT (+).
- ㉓ LINE ON-OFF switch: press-for-on-press-for-off switch.
- ㉔ EXT WIDTH, NORM, RZ switch: NORM enables synchronous pulse and trigger output. With rate switch set to EXT+ and this switch set to RZ (delay trigger) or EXT WIDTH (width trigger) the trigger output is asynchronous to signals applied to the INPUT connector.
- ㉕ INPUT connector: BNC connector to which RZ or EXT WIDTH trigger pulses are applied. Input disabled when rate switch is set to an internal range.
- ㉖ LINE lamp: glows when LINE ON/OFF switch is ON.

Figure 3-1. 8012B Front and Rear Panels - Control Identification Diagrams

3-1 GENERAL

3-2 This section gives some general notes on the operation of the 8012B together with operating instructions for each of the operating modes:

NORM operating mode
RZ operating mode
EXT WIDTH operating mode

Full setting up instructions are given for normal internal trigger mode. For each successive mode only the changes necessary to the control settings are given. For ease of operation the instructions will refer to Figure 3-1 which

shows the controls identified by a reference number in a circle. The same reference numbers are used in the text when each control is mentioned. The control settings shown in Figure 3-1 are the same as the initial settings given for normal internal trigger mode.

3-3 OUTPUT FORMATS

3-4 The voltage polarity of the output pulses can be set to positive or negative using the POLARITY switch (19). This facility provides a simple means of adapting the 8012B to drive circuits with shifted power supplies.

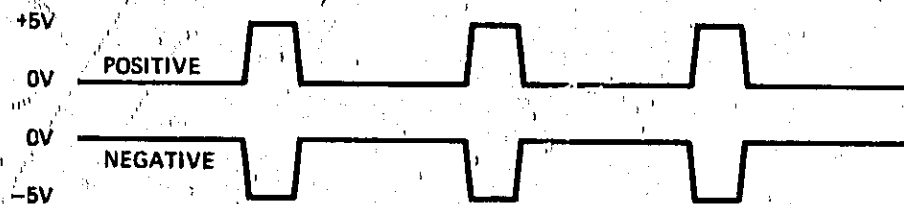


Figure 3-2. Positive and negative pulse outputs

3-5 The output pulse can be set to symmetrical, normal or complement using the SYM/NOR**/COMPL switch (17). Thus formats can be changed without having to re-adjust offset or amplitude controls. Symmetrical format provides a very simple means of checking device threshold levels, driving operational amplifiers and simulating amplifier outputs.

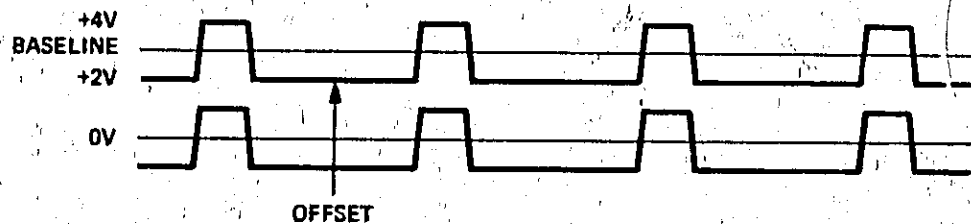


Figure 3-3. Symmetrical Pulse Output

3-6 Normal/Complement pulse switching can be used to provide duty cycles of up to 100% and for rapid switching between logic conventions when testing flip-flop set-up and hold times.

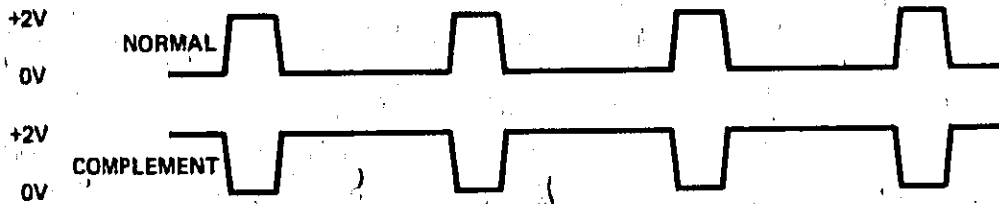


Figure 3-4. Normal and Complement Outputs

3-7 INTERNAL 50 OHM LOAD

3-8 The internal 50 ohm load of the 8012B can be switched in or out using the INT LOAD switch (18). This makes impedance matching to the circuit under test very convenient and also provides a maximum pulse amplitude of $\pm 10V$ with the load switched out. When switched in, the output is 5V from 50 ohms into 50 ohms. The DC-offset is automatically switched off when the load is switched out.

3-9 CONTROL LAYOUT

3-10 The front panel of the 8012B has been carefully designed to provide a logical layout of the controls; horizontal controls for pulse timing parameters, vertical controls for pulse amplitude parameters. Thus a particular pulse can be set up extremely easily and quickly. Also, the pulse period, delay and width controls are designed in such a way that incompatible pulse settings will be noticed immediately.

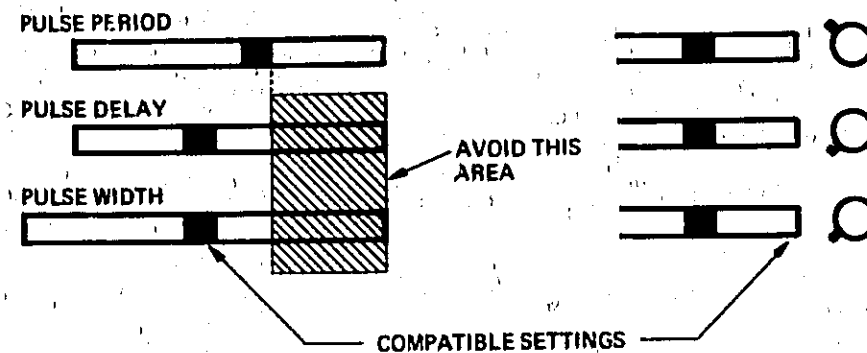


Figure 3-5. Positioning of Controls

3-11 Compatible pulse settings are guaranteed as long as the pulse delay and pulse width controls are either set to the left of the pulse period control or if set vertically below the period control, that the delay and width verniers are set counter clockwise of the period vernier.

3-12 NORM OPERATING MODE

3-13 There are six ways of operating in the normal mode:

Internal trigger — the repetition rate is determined by the internal rate generator which is internally triggered.

External trigger — the rate generator is disabled and an external signal is used as the trigger source.

Manual trigger — one pulse is produced each time the MAN button is pressed.

Square wave — in each of the above modes a square wave output can be selected (pulse width = pulse period/2) instead of the variable pulse width output. The frequency is divided by two.

Gating — each of the outputs obtained above (except square wave) can be gated using an external input.

Double pulse — this mode can be selected with any of the above outputs except square wave. Two pulses are produced for each trigger pulse. The delay between each pulse in a pair is variable using the delay controls (5) and (6).

All output pulses are preceded by a trigger pulse at the TRIGGER OUTPUT connector (20). In square wave mode the delay between the trigger output and the pulse output is fixed at 25 ± 8 ns, but in other modes the delay can be varied using the PULSE DELAY (5) and VERNIER (6) controls.

3-14 Internal Trigger

3-15 In this mode the 8012B requires no external signal to produce an output. Rate, delay, width, transition times, etc. are all adjustable using the front panel controls. The initial control settings (also shown in Figure 3-1) are given to assist someone unfamiliar with the operation of the 8012B. The pulse and trigger outputs should be connected to an oscilloscope using a 50 ohm system (as shown in Figure 3-6). The oscilloscope (an HP 180C mainframe with 1801A and 1821A plug-ins) should be set with the sweep time at 5μ s/div and the sensitivity at 2V/div.

| | |
|-----------------------|-----------------|
| PULSE PERIOD (2) | 1μ -.1m |
| VERNIER (3) | Center |
| PULSE DOUBLE/NORM (4) | NORM |
| PULSE DELAY (5) | 1μ -.1m |
| VERNIER (6) | CCW |
| PULSE WIDTH (7) | 1μ -.1m |
| VERNIER (8) | CCW |
| TRANSITION TIME (9) | 5 n-.05 μ |
| LEADING EDGE (10) | Center |
| TRAILING EDGE (11) | Center |
| AMPLITUDE (12) | 5.0-2.0 |
| VERNIER (13) | CW |
| POLARITY (19) | + |
| OFFSET (14) | ON |
| VERNIER (15) | Center |
| SYM/NORM/COMPL (17) | NORM |
| INT LOAD (18) | IN |
| Mode selector (24) | NORM |
| LINE (23) | ON |

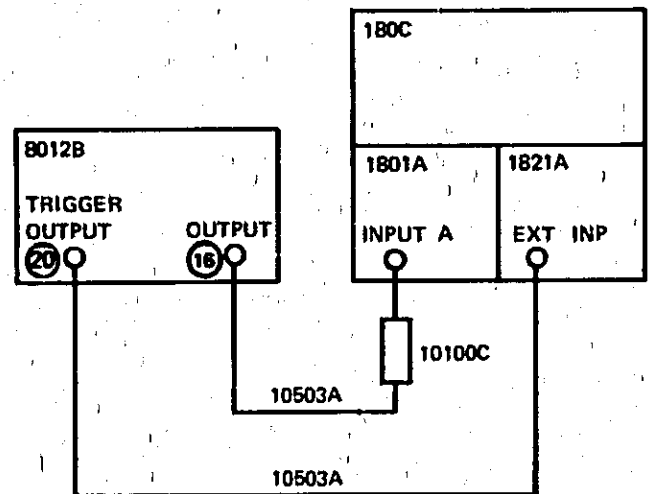


Figure 3-6. Initial control settings and test equipment

3-16 The circuits and controls involved in normal internal trigger mode are shown in Figure 3-7.

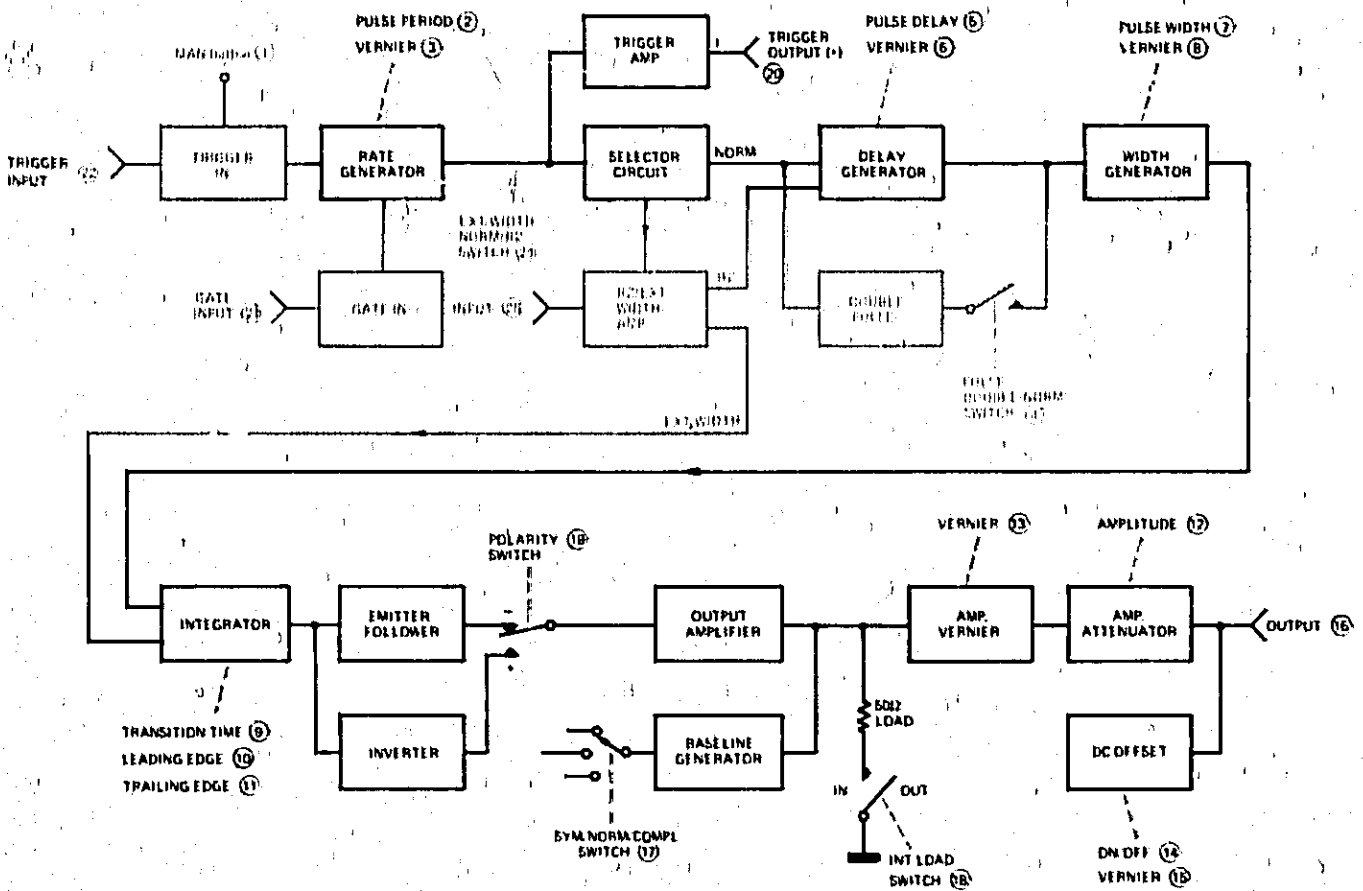


Figure 3-7. Normal Internal Trigger Mode - Block Diagram

3-17 The output pulses should appear at the OUTPUT (16) connector as shown in Figure 3-8 according to the settings of the POLARITY switch (14) and the SYM/NORM/COMPL switch (17).

3-18 If the INT LOAD switch (18) is set to OUT, the internal 50 ohm load is switched out (this can only be done if the 8013B has an external 50 ohm load), the amplitude of the output pulse doubles and the offset is disabled. All other pulse parameters remain the same.

3-19 External Trigger

3-20 In this mode the repetition rate generator is disabled and each trigger pulse is produced by an external signal which is applied at the TRIGGER INPUT connector (22). The input signal can be sinewave

of $> 1.7V$ p-p (about zero) or pulses $> 0.8V$ amplitude (positive or negative) and at least 7ns wide. The amplitude must not exceed $\pm 7V$.

a. Set the PULSE PERIOD control (2) to EXT (+) to trigger on the positive going slope of the input or to EXT (-) to trigger on the negative going slope.

b. The pulse delay, width, amplitude, transition times, etc. are determined by the front panel controls and can be left at the same settings as for normal internal trigger mode.

3-21 The circuits and controls involved in normal external trigger mode are shown in Figure 3-9.

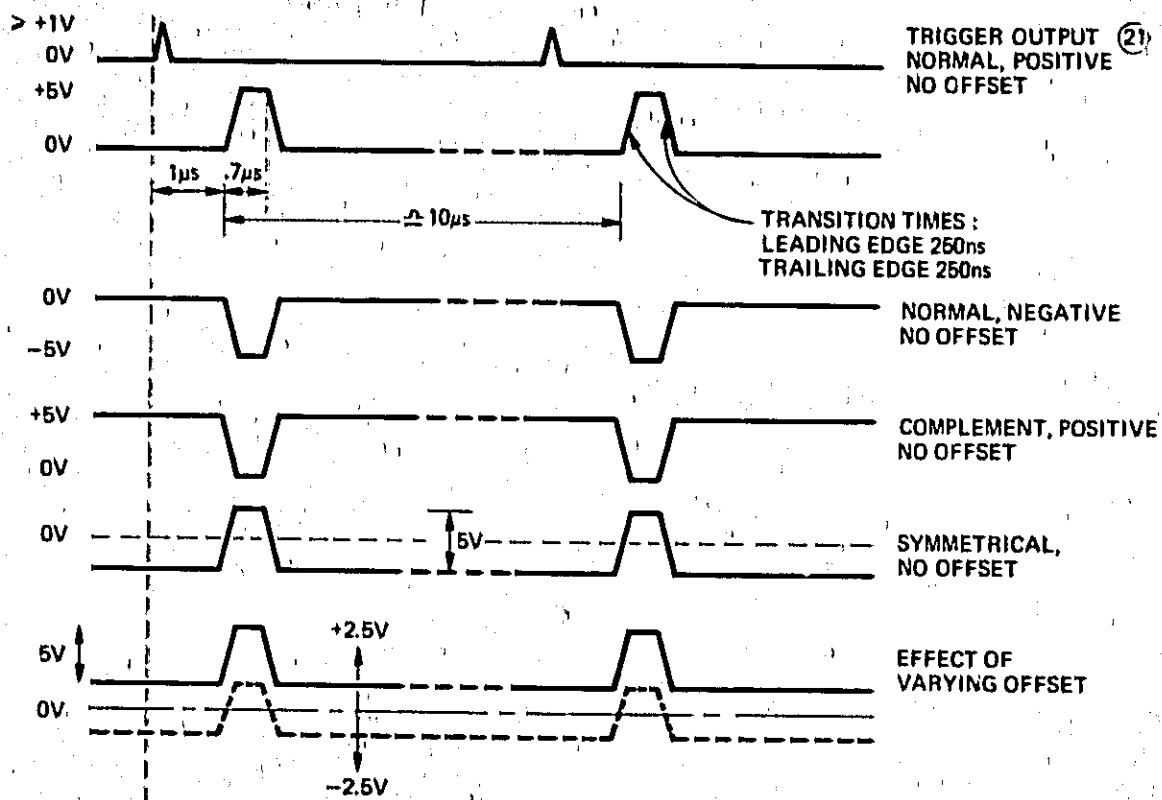


Figure 3-8. Output pulses in normal internal trigger mode

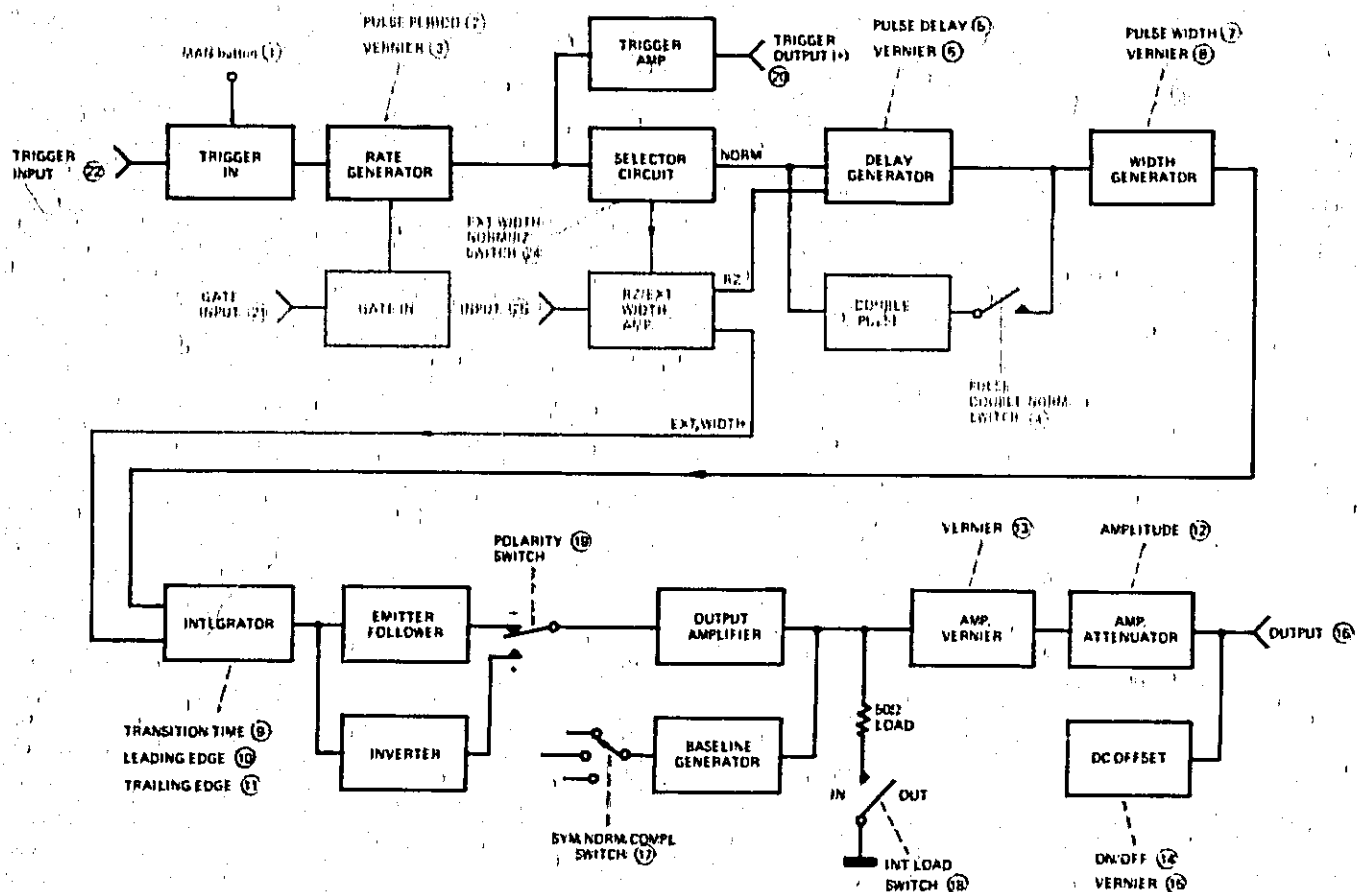


Figure 3-9. Normal External Trigger Mode - Block Diagram

3-22 The output pulses should appear at the TRIGGER OUTPUT (20) and OUTPUT (16) connectors as shown in Figure 3-10 according to the

applied trigger and the setting of the PULSE PERIOD control (2) (either EXT+ or EXT-).

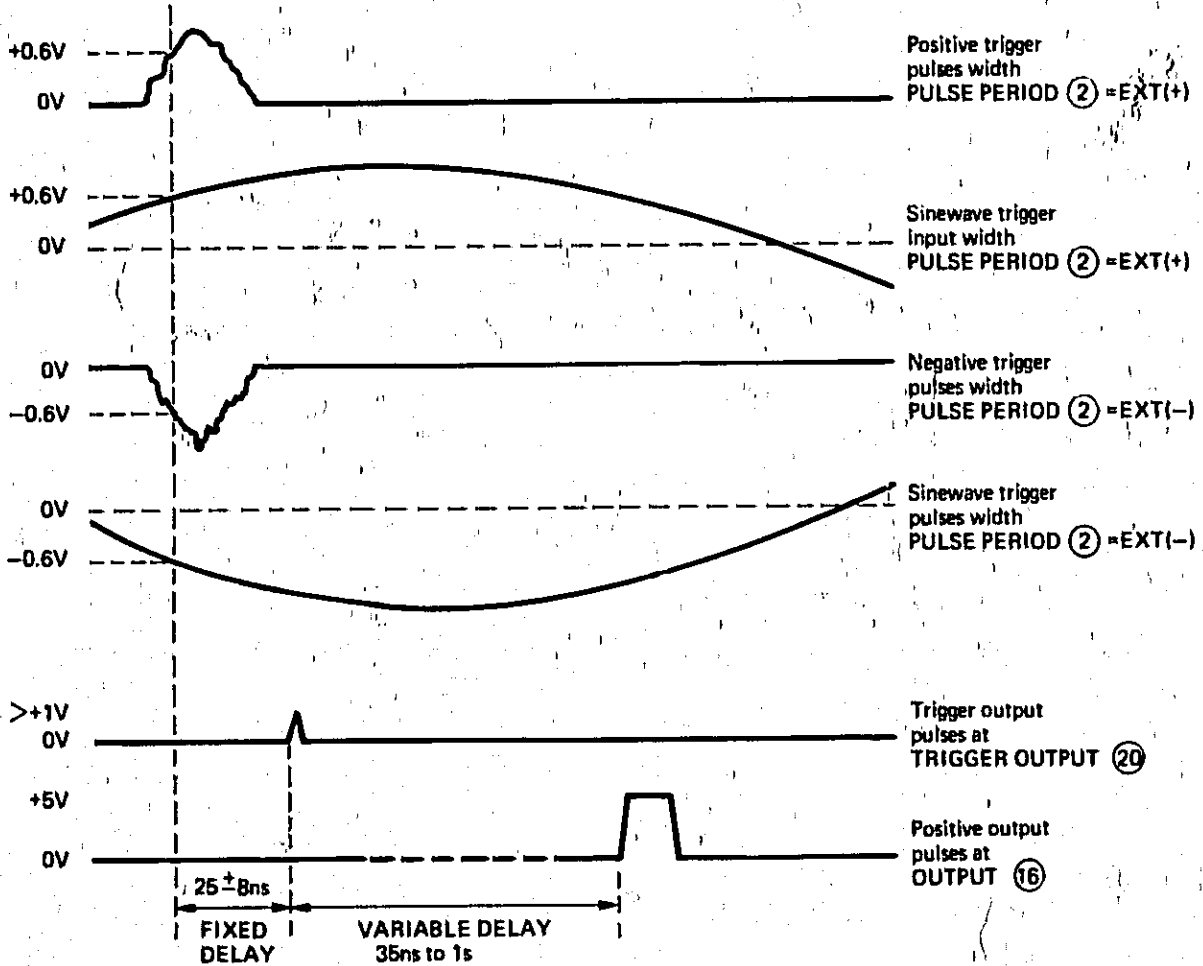


Figure 3-10. Output pulses in normal external trigger mode.

3-23 The output pulse parameters and format can be varied using the controls shown in Figure 3-9.

3-24 Manual Trigger

3-25 In this mode the repetition rate generator is again disabled and each trigger pulse is produced by pressing the MAN button (1) once.

a. Set the PULSE PERIOD control (2) to either EXT(+) or EXT(-).

b. The pulse delay, width, amplitude, transition times etc. are determined by the front panel controls and can be left at the same settings as for normal internal trigger mode.

c. Press the MAN button (1) once for each output pulse.

3-26 The circuits and controls involved in normal manual trigger operation are shown in Figure 3-11.

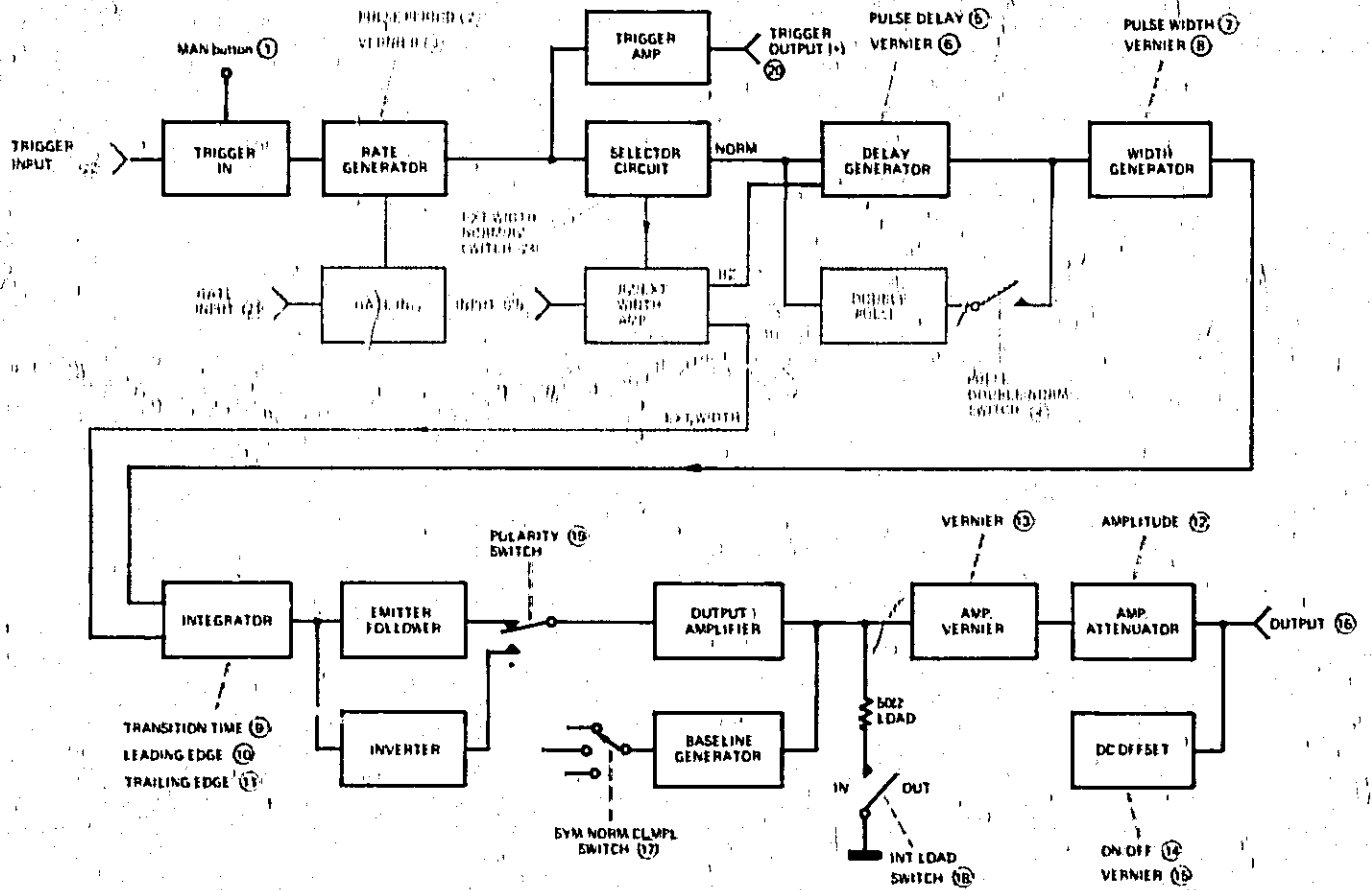


Figure 3-11. Normal Manual Trigger Mode - Block Diagram

3-27 The output pulses should appear at the TRIGGER OUTPUT (20) and OUTPUT (16) connectors as shown in Figure 3-12.

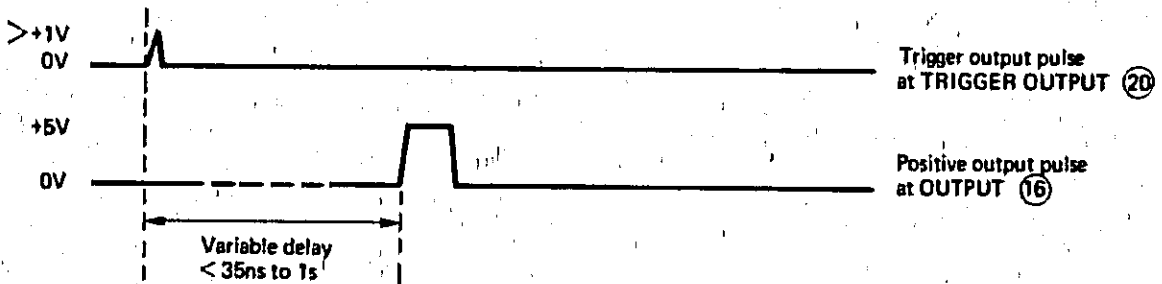


Figure 3-12. Output pulses in normal manual trigger mode

3-28 The output pulse parameters and format can be varied using the controls shown in Figure 3-11.

3-29 Square Wave Mode

3-30 In this mode the pulse width is exactly half the pulse period (50% duty cycle). Pulse period, delay, transition times, amplitude etc. can still be varied using the front panel controls. A square wave output can be selected in any of the preceding operating modes; the following points must, however, be remembered.

- a. Output pulse has 50% duty cycle.
- b. Output pulse rate is half that of the rate generator (or input trigger pulse).
- c. The delay between input trigger pulse and square wave output is fixed.
- d. The output pulse is symmetrical above and below the offset level.
- e. Square wave output cannot be gated.

3-31 The square wave output can be produced as follows:

- a. Set the PULSE PERIOD control (2) to an internal range (as in normal internal trigger mode) or to EXT and apply external trigger pulses at the TRIGGER INPUT connector (22) in order to determine the repetition rate of the output pulses.
- b. Set the PULSE WIDTH control (7) to SQUARE WAVE.
- c. Set the transition times, amplitude etc of the output pulses as for normal internal trigger mode.

3-32 The circuits and controls involved in square wave mode are shown in Figure 3-13.

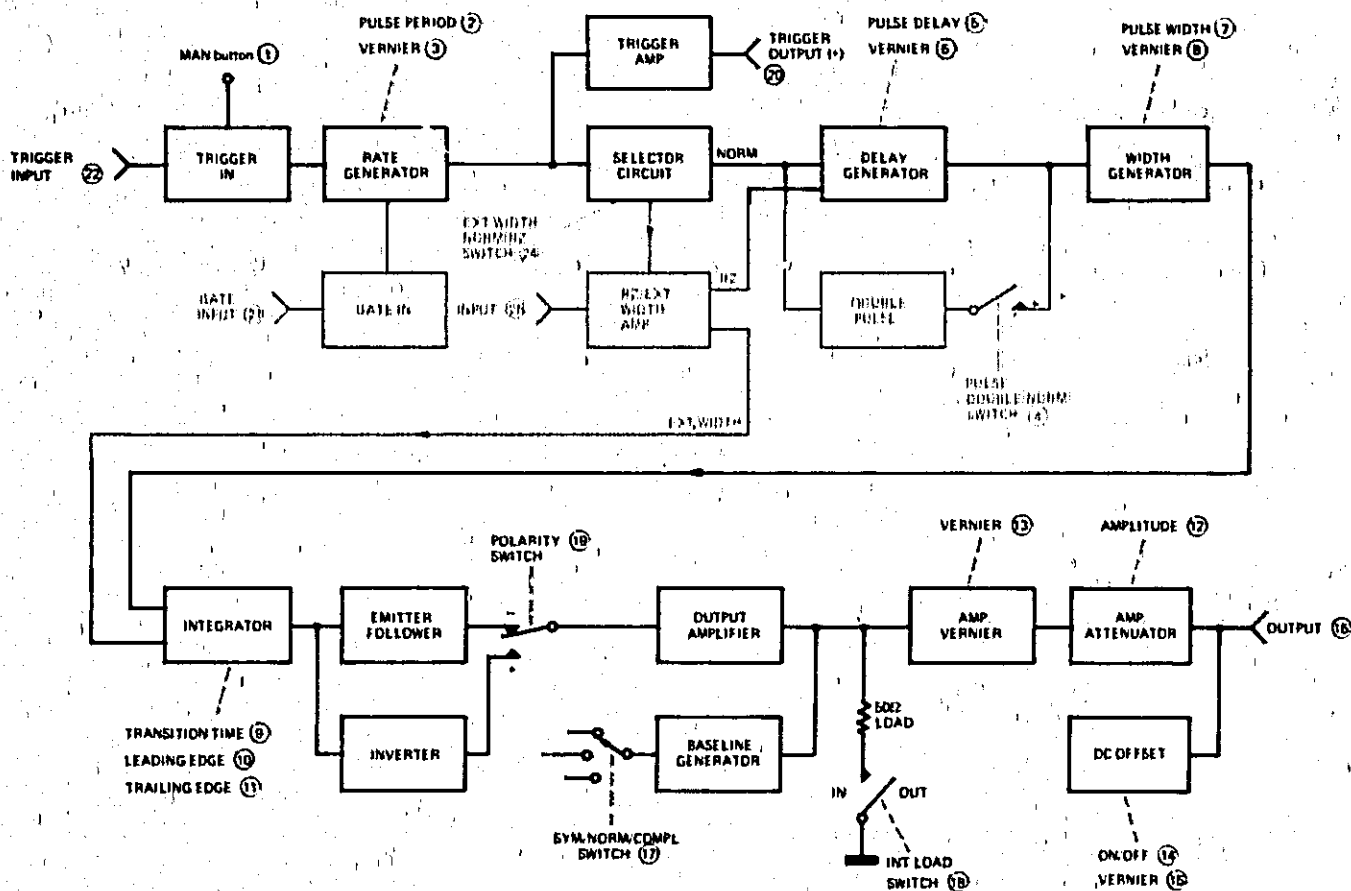


Figure 3-13. Normal square wave mode - block diagram

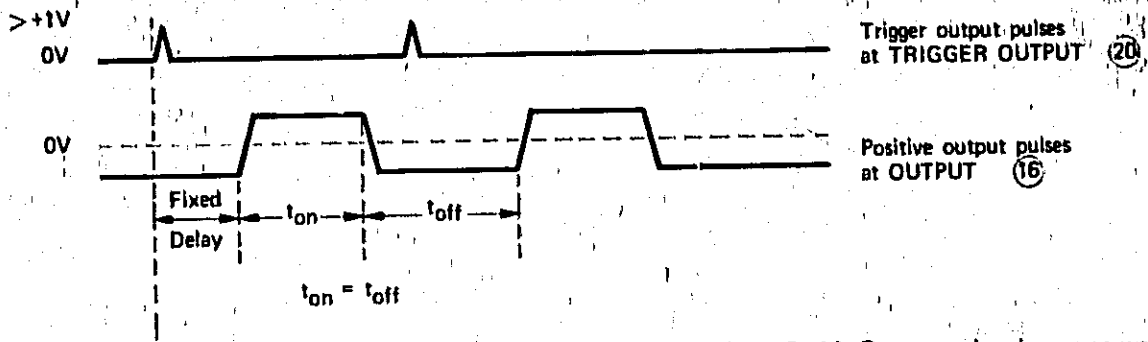


Figure 3-14. Output pulses in square wave mode

3-33 The output pulses should appear at the OUTPUT connector (16) as shown in figure 3-14.

3-34 The output pulse can be switched to negative or normal or complement and the offset and amplitude can be varied.

3-35 Gating Mode

3-35 The output pulses obtained in any of the preceding operating modes can be gated by applying an appropriate pulse to the GATE INPUT (21). If square wave mode is gated, the level of the pulse baseline after the gate has closed depends on the number of pulses during the gate 'on' time (see figure 3-17).

The gate input must meet the following requirements:

to enable the rate generator —
input voltage > +1.5V or resistor > 1KΩ
from gate input to ground.

to disable the rate generator —
input voltage < +0.8V or resistor < 160Ω
from gate input to ground.

The gate input is TTL compatible and the input voltage must not exceed ± 5V.

3-37 The circuits and controls involved in gate mode are shown in Figure 3-15.

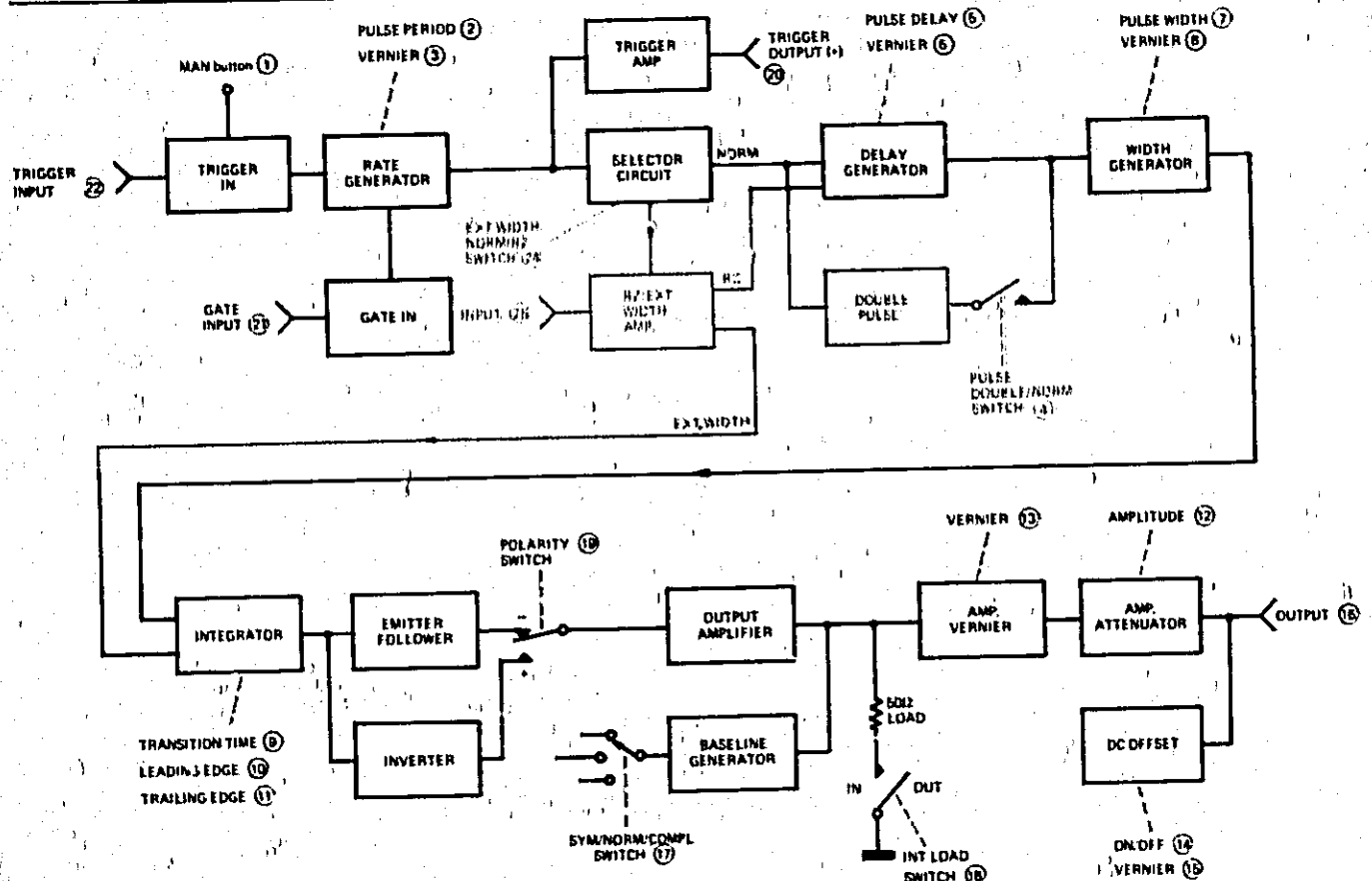


Figure 3-15. Normal gate mode — block diagram

3-38 The output pulses should appear at the TRIGGER OUTPUT (20) and OUTPUT (16) connectors as shown in Figure 3-16.

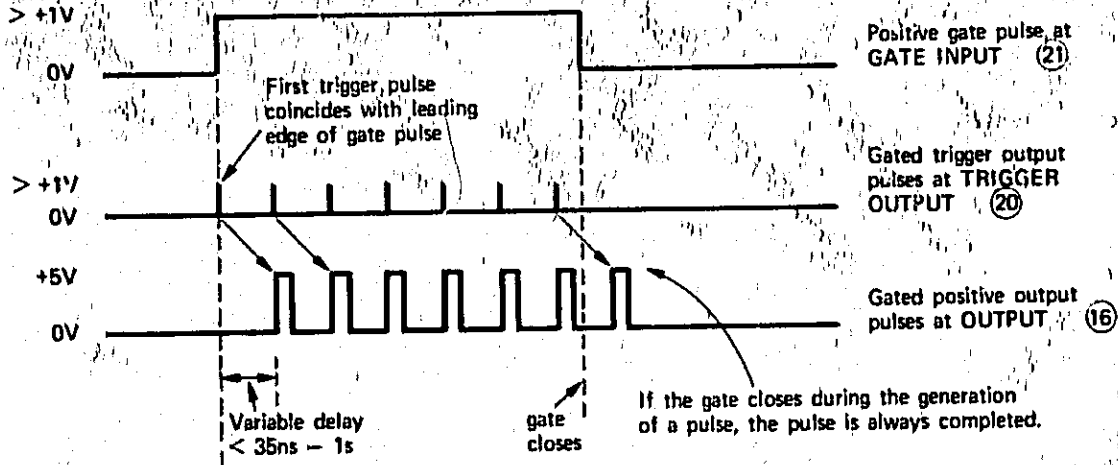
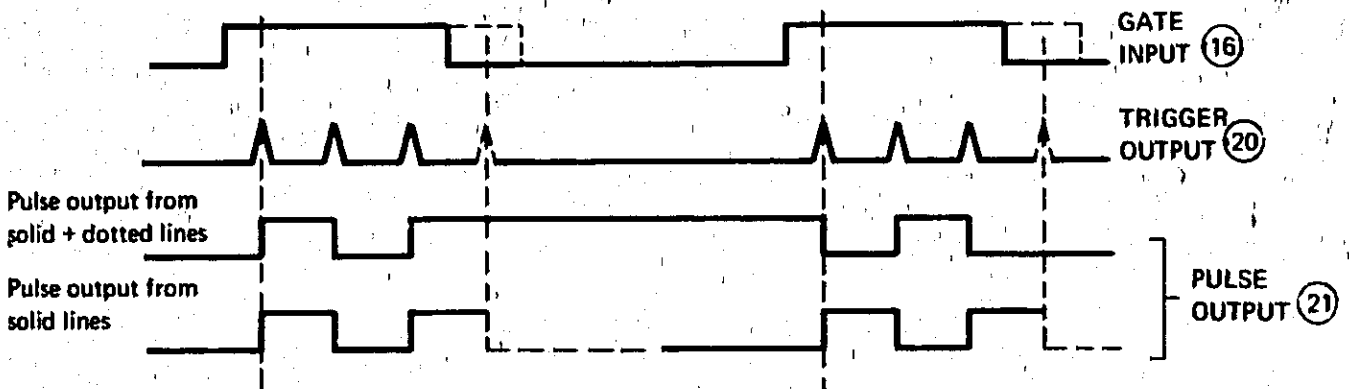


Figure 3-16. Output pulses in gate mode



Note that repetition rate is divided by 2.

Figure 3-17. Gated output in square wave mode

3-39 RZ MODE

3-40 In RZ mode external pulses, applied to the INPUT connector (25) on the 8012B rear panel, trigger the delay generator directly (see figure 3-18), and the shape of the output pulses is determined by the pulse forming circuits following the delay generator. The

internal rate generator is not used in RZ mode, thus the trigger output (derived from the rate generator) is independent of the pulse output. The pulse output cannot be gated in RZ mode.

3-41 The circuits and controls involved in RZ mode are shown in Figure 3-18.

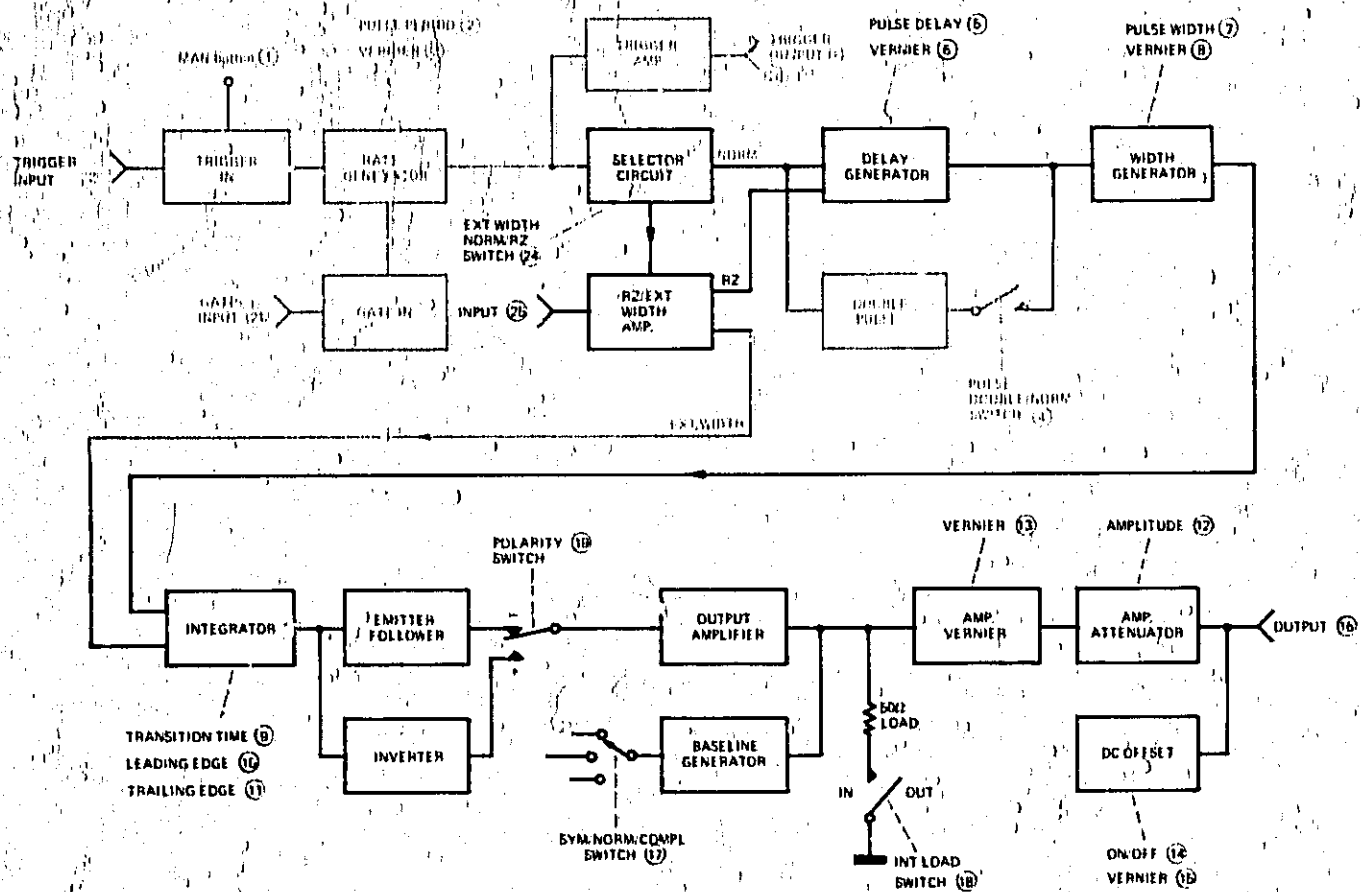


Figure 3-18. RZ mode - block diagram

3-42 The RZ input signal must be $> +1V$ to a maximum of $\pm 5V$ in amplitude and must be at least 7ns wide.

3-43 The procedure for obtaining an output in RZ mode is as follows:

a. Connect the external signal to the INPUT connector (25) on the rear panel of the 8012B.

b. Set the Mode Selector switch (24) to RZ.

c. Set the pulse delay, width, transition times, amplitude, offset and output format as required.

3-44 The output pulses should appear at the OUTPUT connector (16) as shown in Figure 3-19.

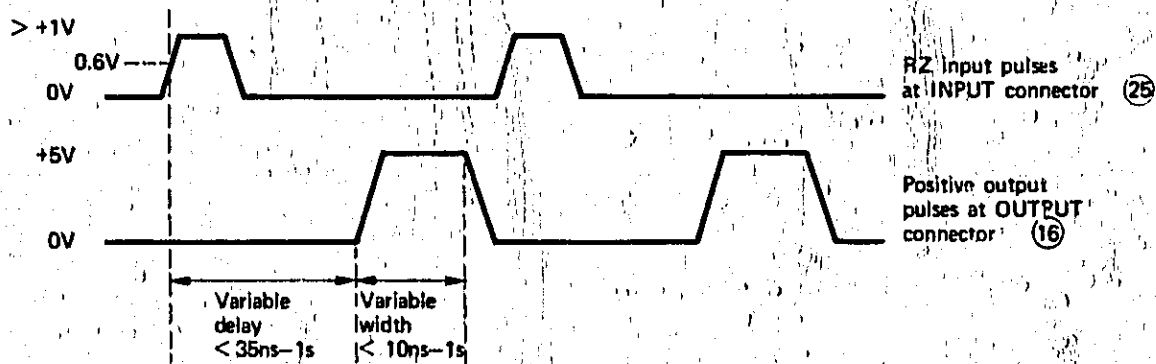


Figure 3-19. Output pulses in RZ mode

3-45 DOUBLE PULSE Mode

3-46 In this mode, the 8012B delivers two pulses at the OUTPUT connector (16) for each trigger pulse. One pulse is in phase with the TRIGGER OUTPUT (20); the other pulse is delayed by the time set on the PULSE DELAY controls (5) and (6).

3-47 Double pulse output can be selected in any of the preceding operating modes except square wave.

Double pulse output is produced as follows:

a. Set the PULSE DOUBLE/NORM switch (4) to DOUBLE.

b. The remaining pulse parameters and output format can be set as required.

3-48 The circuits and controls involved in double pulse mode are shown in Figure 3-20.

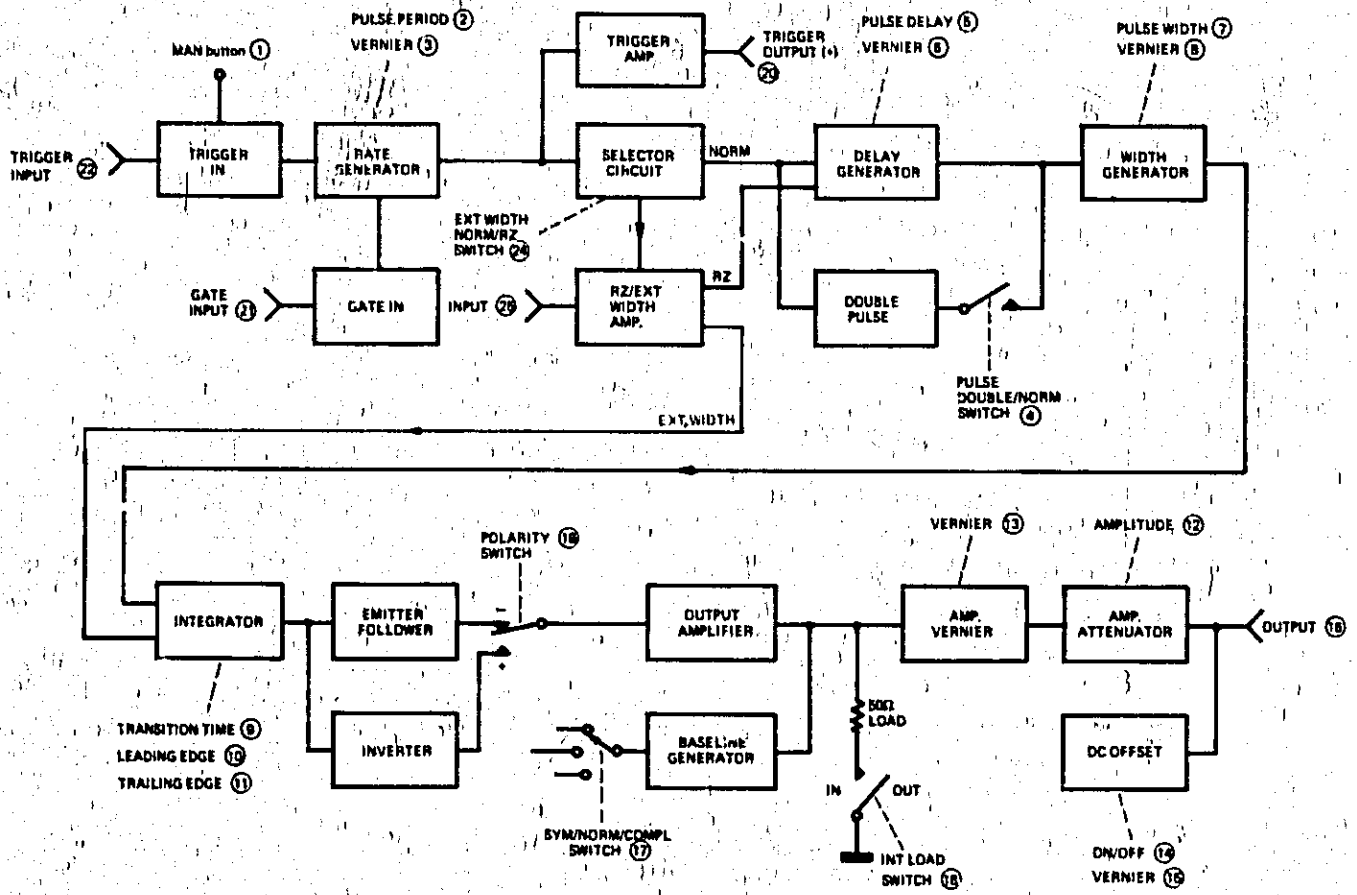


Figure 3-20. Double pulse mode - block diagram

3-49. The trigger and output pulses should appear at the TRIGGER OUTPUT (20) and OUTPUT (16) connectors as shown in Figure 3-21.

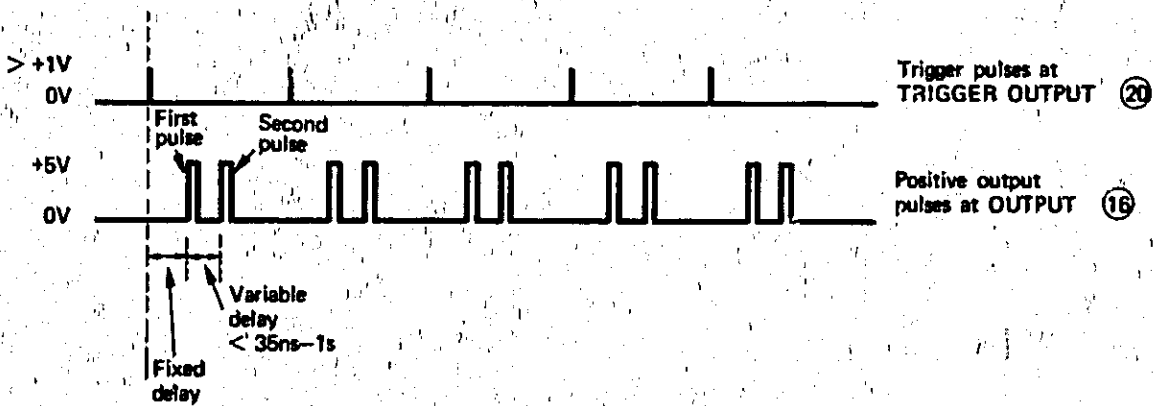


Figure 3-21, Output pulses in double pulse mode

3-50 EXTERNAL WIDTH MODE

3-51 In this mode, external pulses, applied to the INPUT connector (25) on the rear panel, trigger the transition time integrator (see figure 3-22) and cause the output amplifiers to change state at the threshold level of the input signal. Thus the pulse output is a

shaped version of the input. It is also independent of the TRIGGER OUTPUT (20). The external width input signal must be $> +1V$ to a maximum of $\pm 5V$ in amplitude and must be at least 7ns wide.

3-52 The circuits and controls involved in external width mode are shown in Figure 3-22.

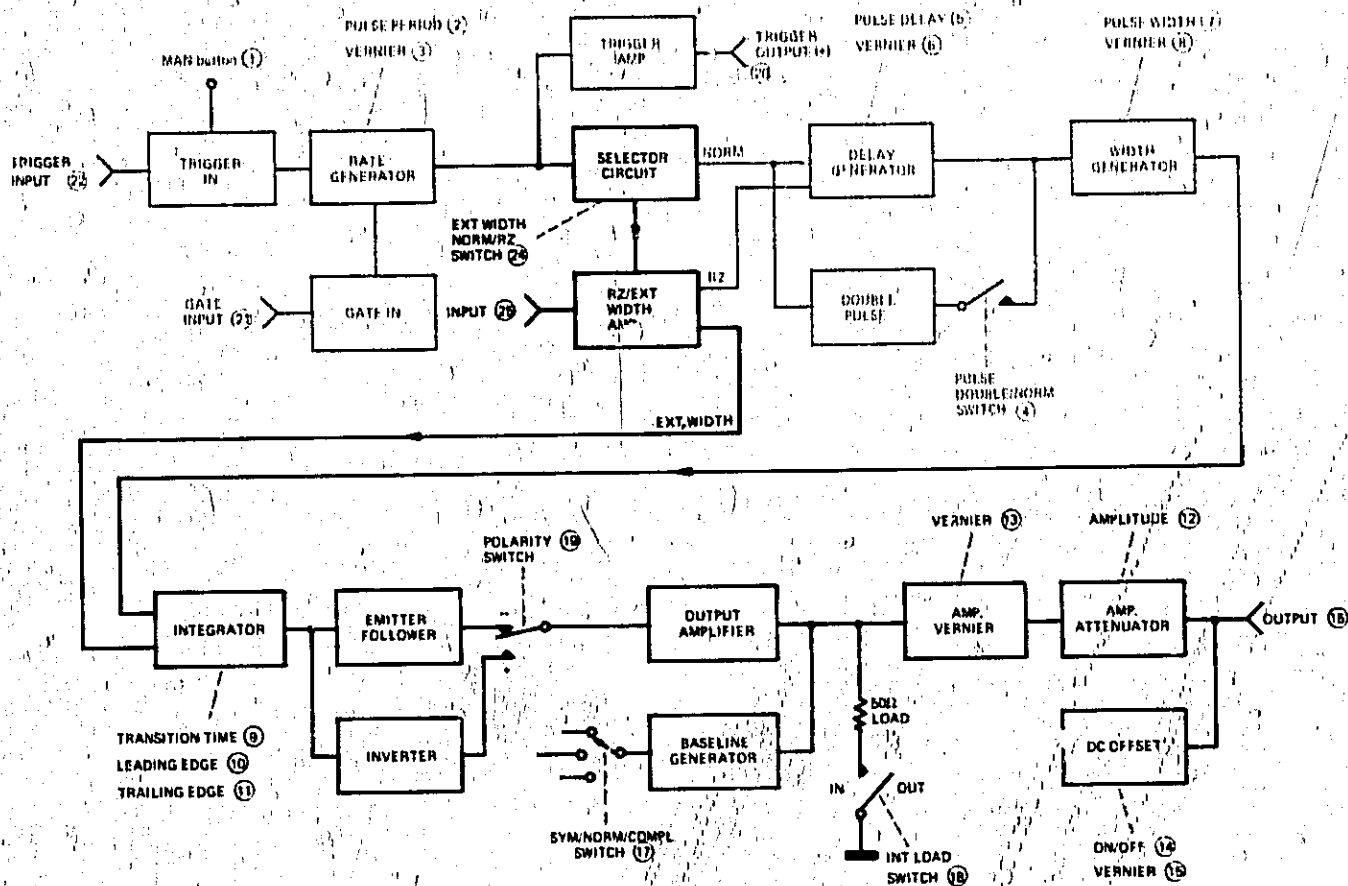


Figure 3-22. External width mode - block diagram

3-53 The procedure for obtaining an output in external width mode is as follows:

a. Connect the external signal to the INPUT connector (25) on the rear panel of the 8012B.

b. Set the Mode Selector switch (24) to EXT WIDTH.

c. Set the pulse transition times, amplitude and output format as required.

3-54 The output pulses should appear at the OUTPUT connector (16) as shown in Figure 3-23.

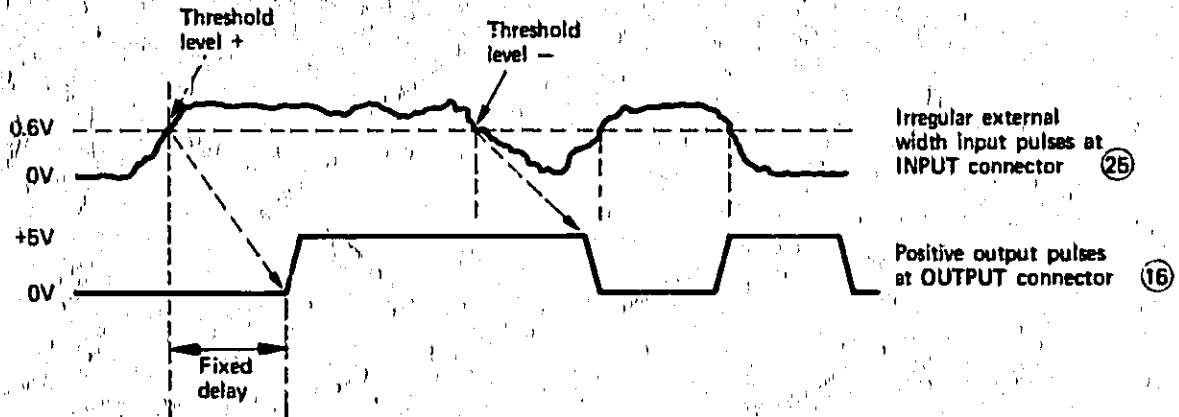


Figure 3-23. Output pulses in external width mode

3-55 ADDITIONAL FACILITIES IN RZ AND EXT WIDTH MODES

3-56 When operating in RZ or EXT WIDTH modes, the internal rate generator is available as an independent clock generator which provides an output at the TRIGGER OUTPUT connector (20). This

output can be triggered internally, externally or manually and can also be gated as in the normal operating mode. If this facility is not required, it can be switched off by setting the PULSE PERIOD control (2) to EXT and disconnecting the TRIGGER INPUT (20). The circuits and controls involved in this facility are shown in Figure 3-24.

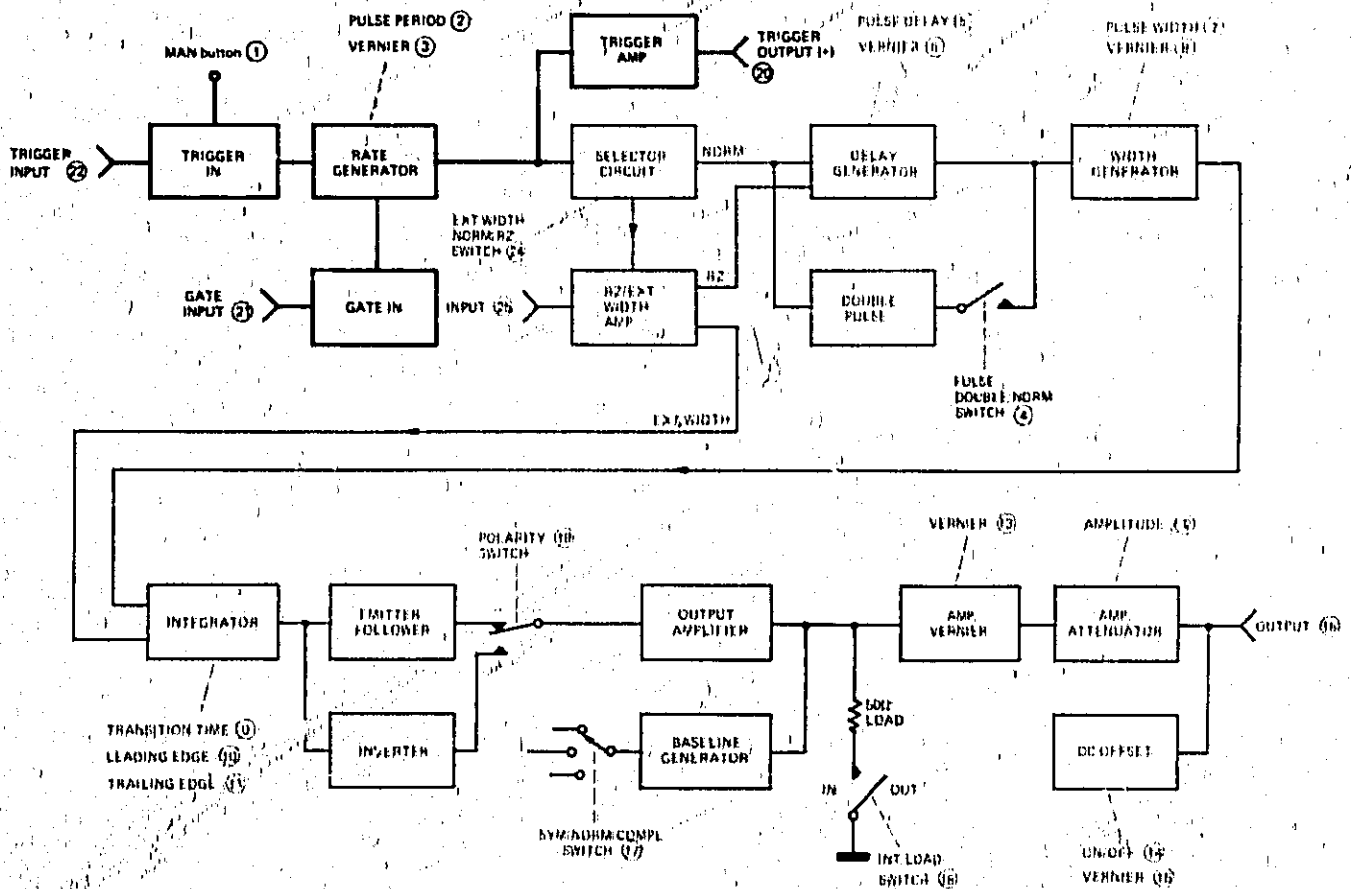


Figure 3-24. Independent clock generator in RZ/EXT WIDTH modes - block diagram

THEORY

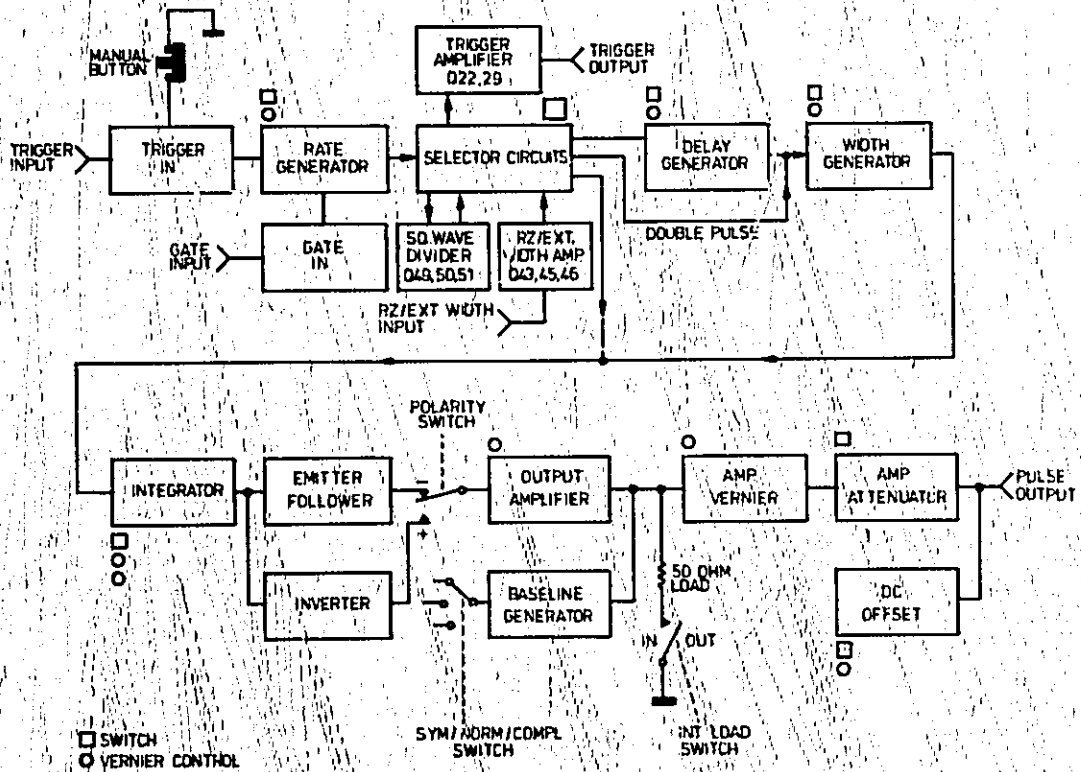


Figure 4-1. 8012B Pulse Generator - Block Diagram

4-1 INTRODUCTION

4-2. A basic block diagram of the 8012B is shown in Figure 4-1 and this diagram should be referred to when reading the following description. The pulse repetition rate is generated either internally by the rate generator, manually using a push-button, or externally by an applied signal. The pulses thus produced can be gated synchronously by applying an external gating signal to the gate input. The output of the rate generator is fed to the selector circuits and to the trigger amplifier to produce a trigger output.

4-3. The 8012B can be used in one of three modes of operation: Normal mode, RZ mode and External Width mode. In Normal mode the pulses are generated as described above; In RZ mode external signals, applied directly to the delay generator, determine the repetition rate of the output pulses; In External Width mode external signals, applied to the integrator, determine width and repetition rate of the output pulses. The mode switching is accomplished by the selector circuits.

4-4. The output of the selector circuits, in Normal and RZ modes is applied to the delay generator which delays the pulses by the amount set on the delay controls.

4-5. In double pulse mode two pulses are produced for each trigger pulse; the normal delayed pulse plus an extra pulse that by-passes the delay generator and is thus not delayed.

4-6. The pulse spikes from the delay generator are applied to the width generator where pulses of defined width are created.

4-7. The output of the width generator or, in External Width mode, the external input signal is applied to the integrator where the transition times of the leading and trailing edges are made variable.

4-8. Finally the output of the integrator is amplified, passed through a variable attenuator and has the variable DC offset added.

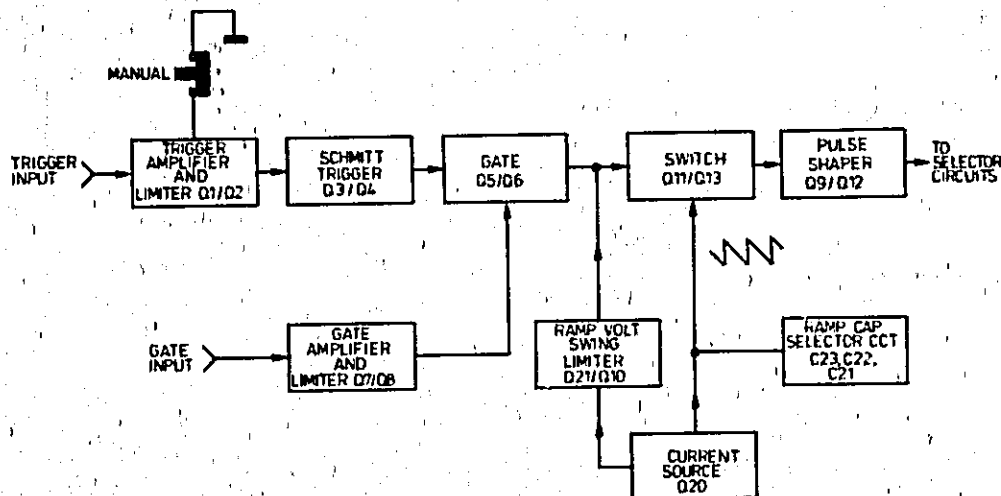


Figure 4-2. Repetition Rate Generator - Block Diagram

4-9 REPETITION RATE GENERATOR

4-10 A block diagram of the repetition rate generator is given in figure 4-2 and a full schematic in diagram 1. These diagrams should be referred to when reading the following description.

4-11 The pulse repetition rate is determined:

- by the internal rate generator
- externally using an applied signal
- manually using a push button.

4-12 Internal rate generator

4-13 When the internal rate generator is used, one of four period ranges is selected using the period range switch. In the three slower ranges, ramp capacitors (C23, C22, C21) are selected to provide the required repetition rate, transistors Q17, Q18 and Q19 switch these capacitors in or out. In the fastest range, no ramp capacitor is switched in; the time is determined by preset capacitor C24. In operation the selected capacitor discharges through constant current sink Q20 controlled by the pulse period vernier RI and the value of the capacitor. As the voltage at Q20 collector approaches zero, CR17 becomes forward biased causing Q11 and Q13 to conduct and rapidly recharge the capacitor. The pulse period vernier controls Q21 and Q10 which act as a voltage swing limiter and determine the upper voltage limit to which the ramp capacitor can recharge. When the capacitor has recharged to this limit, Q13 and Q11 cut off thus allowing the discharge cycle to resume. The output from Q11 is applied, via the differentiator network Q28/L3/R35, to the delay generator and the trigger output amplifier.

4-14 External trigger operation

4-15 In external trigger mode the rate generator is used as a pulse shaper. Trigger pulses are applied to the differential amplifier Q1/Q2 which in turn switches the Schmitt trigger formed by Q3/Q4. The negative output spikes from the collector of Q4 turn Q5 on and Q13 base rises so that Q13 and Q11 turn on to produce an output pulse.

4-16 Manual operation

4-17 When the manual pushbutton is pressed, a negative spike is produced at the collector of Q4 which enables the current switch Q11/Q13. One pulse is produced from Q11 each time the Manual pushbutton is pressed.

4-18 GATING

4-19 Gate signals are applied to the gate amplifier Q8/Q7. Q8, normally 'off', is turned on by the OV level (off time) of the gate input pulse. Thus Q6 is turned on, the current through Q6 lowers the base voltage of Q13 and so disables the rate generator. When the level of the gate input pulse reaches +1.8V (on time) Q8 turns on and enables the pulse source. Thus output pulses will be produced from the rate generator only during the gate input pulse 'on' time.

4-20 SELECTOR CIRCUITS

4-21 A block diagram of the selector circuits is given in figure 4-3 and is repeated for each mode of operation showing the signal paths used. Figures 4-1, 4-3 and the schematic diagram 2 should be referred to when reading the following description.

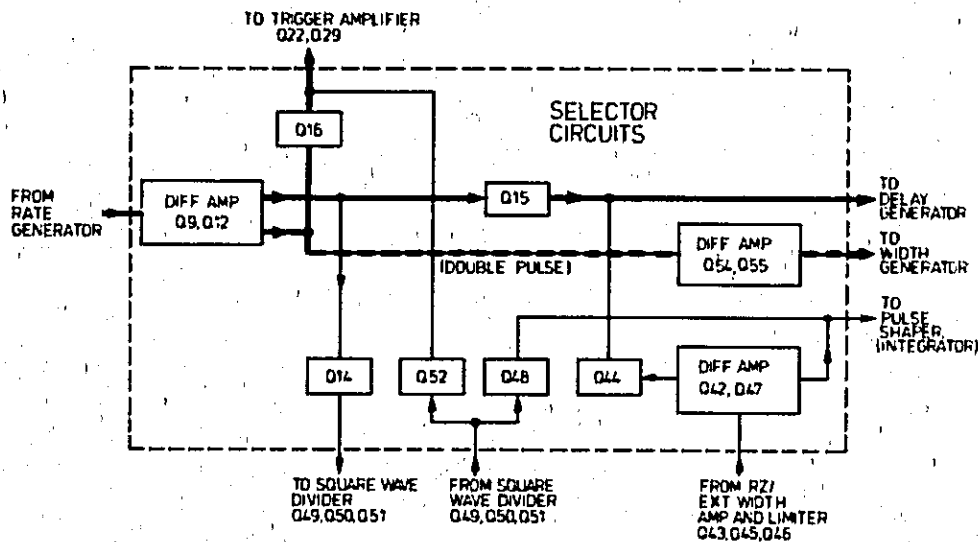


Figure 4-3A, Normal Mode (including external trigger and gate mode)

4-22 In Normal mode, the rate generator output is applied to the delay generator via Q15 and to the trigger amplifier via Q16. If double pulse mode is selected, the pulse is also applied to the width generator via differential amplifier Q54/Q55 (see schematic 3).

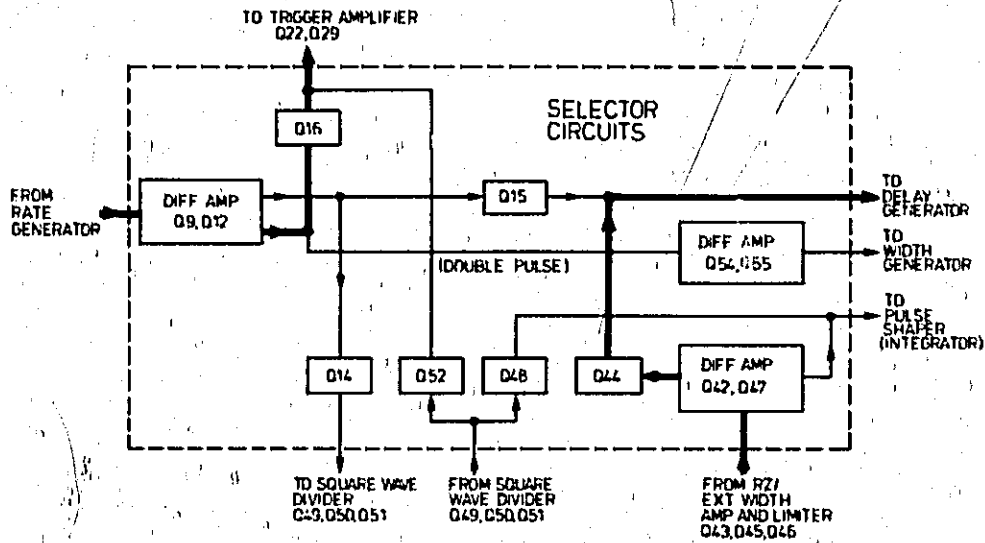


Figure 4-3B RZ Mode

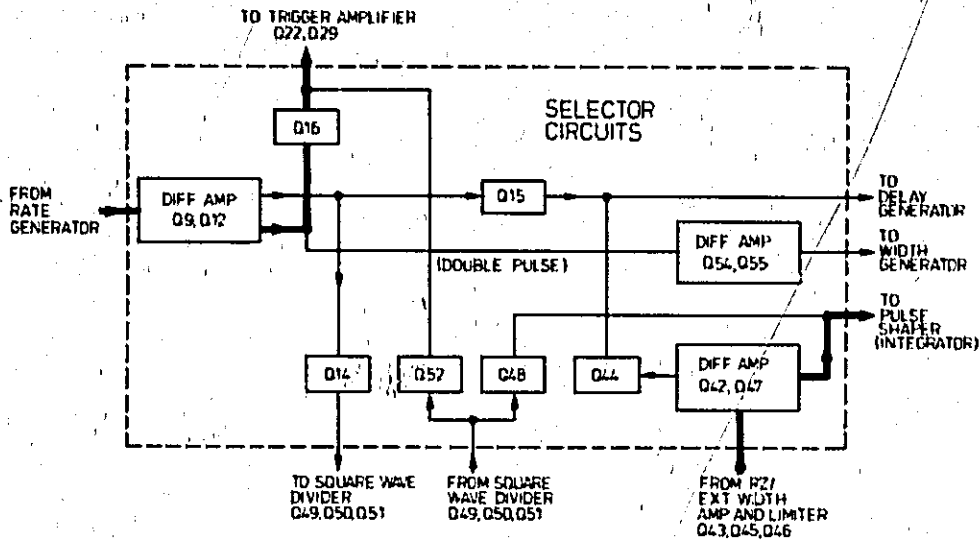


Figure 4-3C. Ext. Width Mode

4-23 In RZ mode the rate generator output is only used to generate trigger pulses, via Q16. The RZ input is applied, via Q43, Q46, Q45 to the differential amplifier Q42/Q47 and gate Q44, to the delay generator.

4-24 In Ext. Width mode the rate generator output is only used to generate trigger pulses, via Q16. The Ext. Width input is applied, via Q43, Q46, Q45 to the differential amplifier Q42/Q47 to pulse shaper 3 and the integrator.

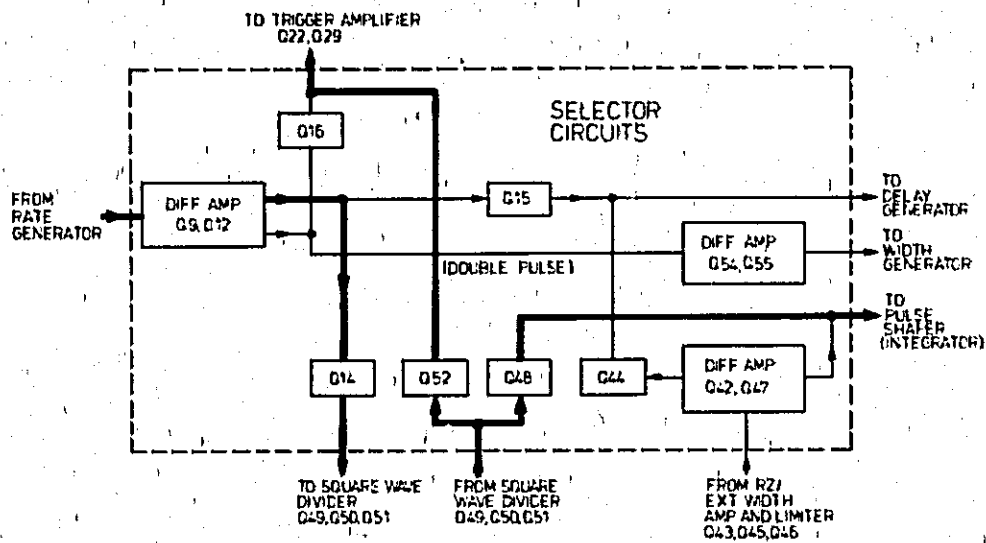


Figure 4-3D Square Wave Mode

4-25 In Square wave mode the output of the rate generator is applied, via Q14, to the square wave divider. The output of the divider is applied to the trigger amplifier, via Q52, and pulse shaper 3 and the integrator, via Q48.

4-26 DELAY GENERATOR

4-27 A block diagram of the delay generator is given in figure 4-4 and a full schematic in diagram 3. These diagrams should be referred to when reading the following description.

4-28 The purpose of the delay generator is to delay the pulse source, whether from the internal rate generator, external trigger or from the RZ input, within the range of 35 ns to 1s, with respect to the trigger output.

4-29 The current source (Q23), the monostable (Q30/Q31) and the recharge circuit (Q26) are controlled by the width switch so that the delay circuit is inhibited in square wave and external width modes.

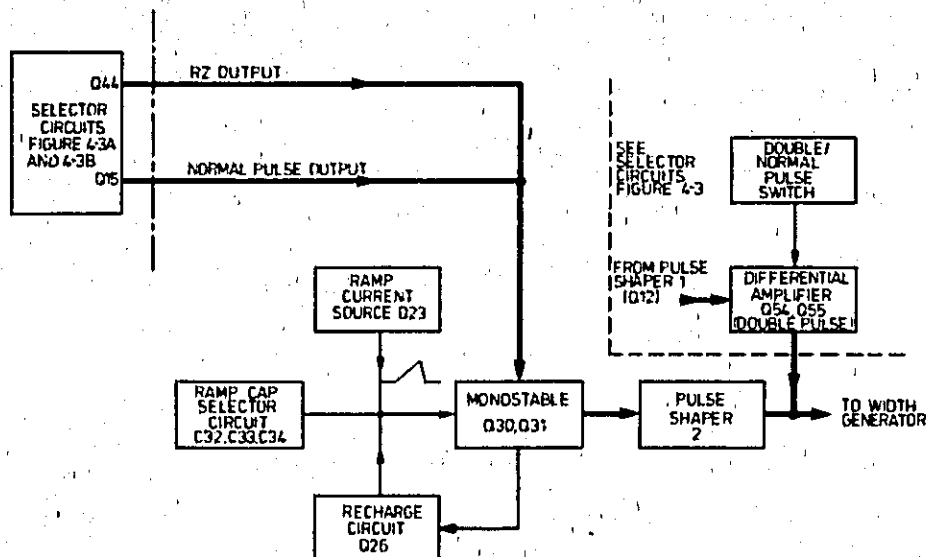


Figure 4-4 Delay Generator - Block Diagram

4-30 Under no-signal conditions, Q31 is off, Q30 is on and Q26 is acting as a sink for the ramp current. Thus the ramp current source (Q23) cannot charge the ramp capacitors. A positive pulse input signal turns Q31 on and Q30 off, Q26 follows Q30 collector and thus is non-conducting. The selected ramp capacitor is charged by the current source Q23 until a level is reached when Q30 turns on again, which turns Q31 off, Q26 now

conducts again and rapidly discharges the selected ramp capacitor. The output from the monostable is a negative spike, coincident with the pulse input, followed by a positive spike which occurs some time later and is used to drive pulse shaper 2. The time between the pairs of spikes is the time taken for the ramp waveform to reach the threshold level of the monostable (Q30/Q31), i. e. the delay time.

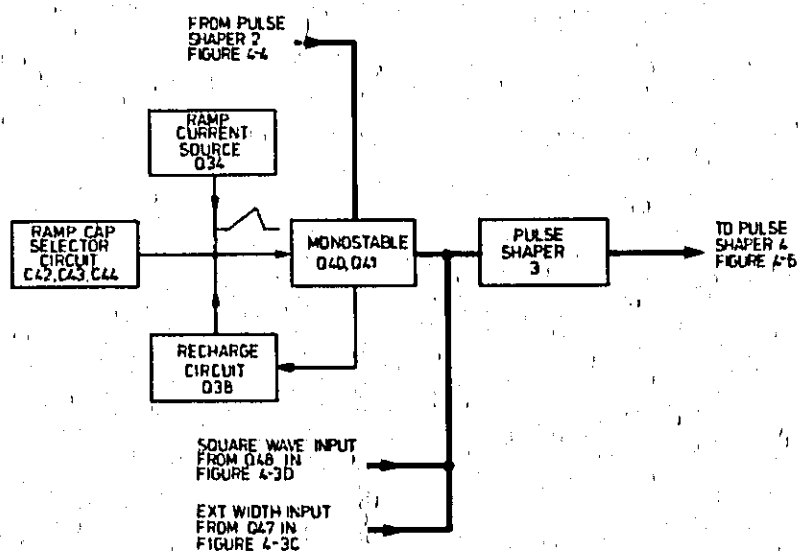


Figure 4-5 Width Generator -- Block Diagram

4-31 WIDTH GENERATOR

4-32 A block diagram of the width generator is given in figure 4-5 and a full schematic in diagram 4. These diagrams should be referred to when reading the following description.

4-33 The function of the width generator is to create a pulse of defined width for each positive pulse spike received from the delay generator. The current source (Q34) and the monostable (Q40/Q41) are controlled by the width switch so that the width circuit is inhibited in square wave and external width modes.

4-34 The width generator circuit is identical to the delay generator circuit except for the differentiator on the output (L11); see para. 4-30. The output pulse is applied to pulse shaper 3.

4-35 If square wave or external width modes are being used, the output signals from the selector circuits in figures 4-3C and 4-3D are applied directly to pulse shaper 3 and both the delay and width generators are disabled.

4-36 INTEGRATOR

4-37 A block diagram of the integrator is given in figure 4-6 and a full schematic in diagram 5. These diagrams should be referred to when reading the following description.

4-38 The purpose of the integrator circuit is, in all modes of operation, to vary the rise and fall times (transition times) of the pulse leading and trailing edges. The theory of operation is given for normal pulse mode only.

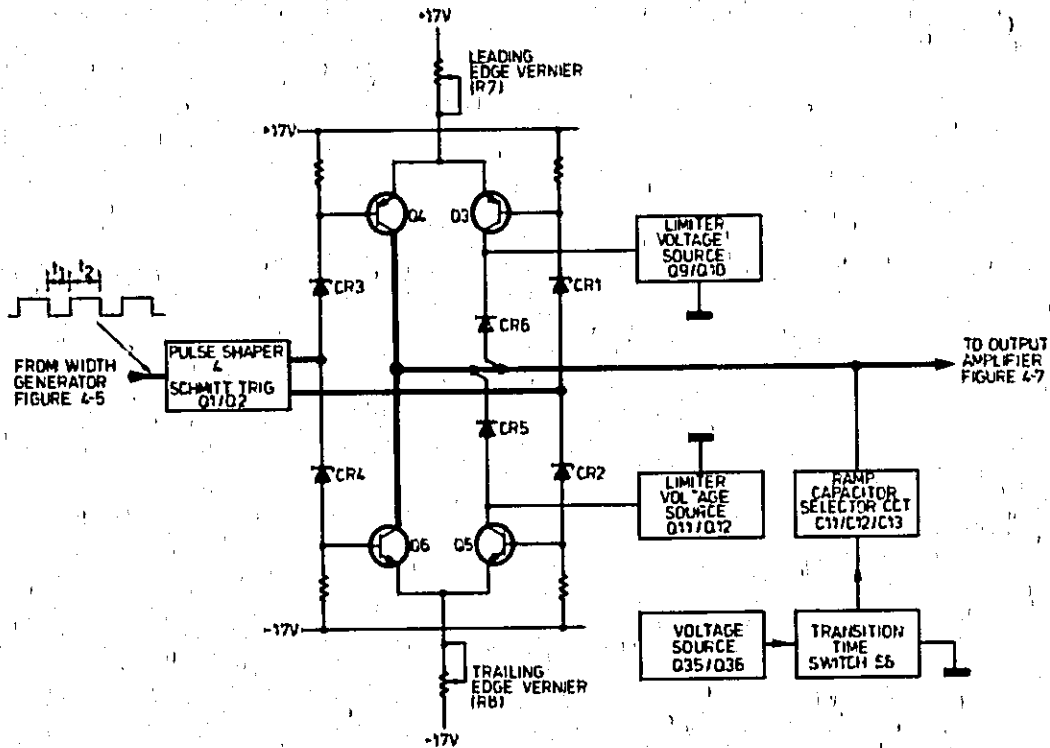
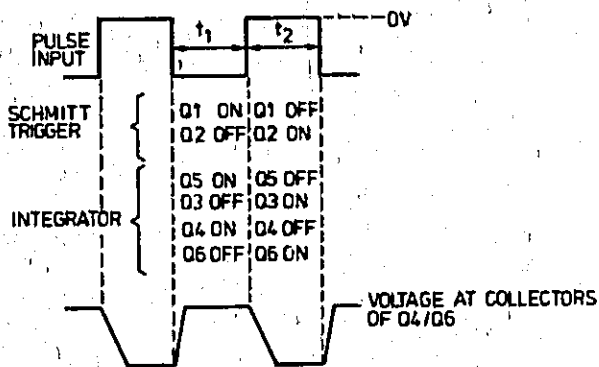


Figure 4-6 Integrator - Block Diagram

4-39 The leading and trailing edges of the pulse from the width generator turn the Schmitt trigger (Q1/Q2) on and off. Transistors Q1 to Q6 turn on and off as follows:



4-40 The leading edge of a pulse (beginning of t_1) switches Q1 on which in turn switches Q4 and Q5 on. Current flows from the +17V line through Q4 and charges the selected ramp capacitor (C11, C12 or C13). The current flow is controlled by the leading edge vernier (R7). Q5 acts as a current switch and delivers the current from Q11 through Q5 to the -17V line.

4-41 The ramp capacitor charges in a linear manner until CR6 becomes forward biased and begins to conduct via Q9. Thus the pulse top is clamped at a potential defined by the voltage source Q9/Q10.

4-42 At the end of period t_1 , Q1 switches off and thus Q4 and Q5 switch off. Q2 switches on which in turn switches Q6 and Q3 on. The selected ramp capacitor now begins to discharge through Q6 to the -17V line. The current flow is controlled by the trailing edge vernier (R8). Q3 acts as a current switch and supplies current from the +17V line to Q9.

4-43 The ramp capacitor discharges in a linear manner until CR5 becomes forward biased and begins to conduct via Q11. Thus the pulse base is clamped at a potential defined by the voltage source Q11/Q12. The cycle is repeated when, at the end of t_2 , Q2 turns off and Q1 turns on again.

4-44 The voltage source Q35/Q36 supplies the reference voltage for switching the ramp capacitors.

4-45 The range capacitor C14 and R41/R42 constitute a low pass filter which is active in the ranges between 0.5 μ s and 0.5 s. The filter is turned on and off via CR13/CR14 and CR24 to CR27.

4-46 OUTPUT AMPLIFIER

4-47 A block diagram of the output amplifier is given in figure 4-7 and a full schematic in diagram 6. These diagrams should be referred to when reading the following description.

4-48 The output of the integrator is applied to emitter follower Q13 and then to phase splitter Q15. Transistor Q14 adjusts the symmetry between the leading and trailing edge transition times in the vernier CW position. Roll-off adjustment for positive pulses is achieved using R104/CR17 and for negative pulses using Q17/Q18/R60.

4-49 The appropriate pulse polarity is selected by relay K2 which is controlled via the pulse polarity switch S8.

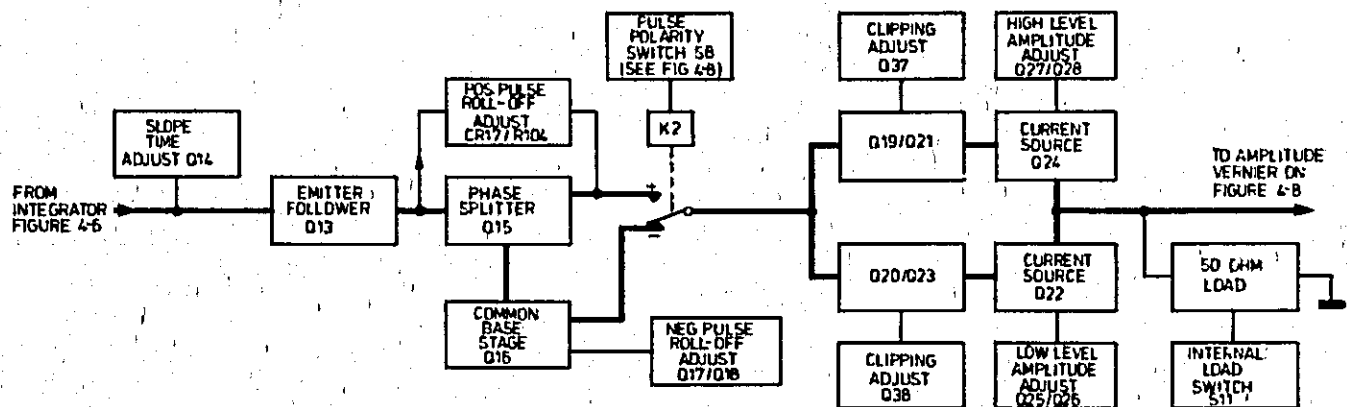


Figure 4-7. Output Amplifier - Block Diagram

4-50 The pulse is then applied to a push-pull amplifier (Q19 to Q24), the output of which is symmetrical about the baseline. High level amplitude adjustment is accomplished by adjusting voltage source Q27/Q28/R88 supplying the common base stage Q24. Low level amplitude adjustment is accomplished by adjusting voltage source Q25/Q26/R87 supplying the common base stage Q22.

4-51 Pulse clipping correction is accomplished by adjusting R69.

4-52 The internal 50 ohm load is switched in or out by the int. load switch via relay K1.

4-53 OFFSETS AND ATTENUATORS

4-54 A block diagram of the offset and attenuator circuits is given in figure 4-8 and a full schematic in diagram 7. These diagrams should be referred to when reading the following description.

4-55 Transistors Q30/Q32 and Q34/Q42 are pulse baseline current sources and the appropriate pair are switched on by the polarity switch. If symmetrical format is selected, both current sources are inhibited.

4-56 Positive and negative pulse baseline adjustment is achieved using R150 and R149 respectively.

4-57 In order to adjust the amplitude and maintain the correct output impedance, a four step attenuator (S7) is used in conjunction with a ganged potentiometer network (R11/R12).

4-58 Transistors Q33, Q39, Q41 and Q48 provide dc offset for the output pulse. If the offset switch (S9) is set to off, transistors Q33 and Q41 are held off and there is no dc offset output. If the offset switch is set to on, the bias on the bases of Q33 and Q41 depends on the

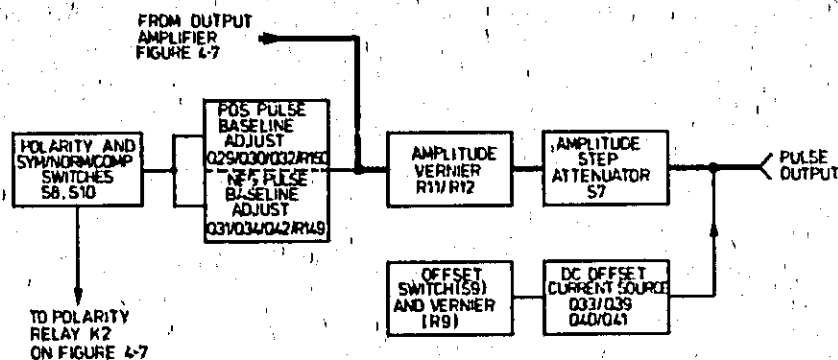


Figure 4-8 Offsets and Attenuators – Block Diagram

setting of the offset vernier (R9). As the vernier is turned counter clockwise Q33 is turned off and Q41 is turned on supplying a negative offset current. As the vernier is turned clockwise Q41 is turned off and Q33 is turned on supplying a positive offset current. The current is applied to an output load (L1 to L4, R8 to R10).

4-59 POWER SUPPLIES

4-60 The +17V and -17V power supplies are identical series regulated types using IC regulators (U1 and U2) and series pass transistors (Q43 and Q44). Resistors R151 and R99 act as current sensing resistors to enable the regulators to limit the current output.

MAINTENANCE

5-1 GENERAL

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

5-3 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.

5-4 REMOVAL OF COVERS

5-5 The gain access to all test points and assemblies remove the four screws from each of the two covers and slide the covers off.

5-6 REMOVAL OF ASSEMBLIES

5-7 Reference should be made to the Assembly Location diagram (6-1) before attempting to remove assemblies. Table 6-2 gives the colour code used to identify the internal wiring, eg. wire 93 is white with an orange stripe.

5-8 Timing Board — Assembly 5

5-9 Disconnect coaxial cable W5 and wire 93 from board A5. Remove the three long securing screws and spacers and ease the board out of its connector on board A7.

5-10 Output Board — Assembly 6

5-11 Disconnect wire 93 and unsolder coaxial cable W4 from board A6.

5-12 Remove the four screws securing the rear panel to the frame. Withdraw the rear panel and board A6 through the rear of the frame as far as the power supply leads will permit.

5-13 Remove the three screws securing board A6 to the rear panel. Unsolder the two wires number 937 and the two wires number 923 from board A6. Carefully withdraw board A6 from the frame.

5-14 When board A6 is being refitted, thermal compound (HP part no. 6040-0265) must be applied to the output amplifier heat sink where it bolts on to the rear panel. This is necessary to improve thermal conductivity between the two surfaces.

5-15 Mother Board — Assembly 7

5-16 Remove boards A5 and A6 as detailed in paragraphs 5-8 to 5-13.

5-17 Unsolder coaxial cable W3 connecting the output jack to board A7 at the board A7 end.

5-18 Unsolder the power supply wires from the line on/off switch (S12).

5-19 Disconnect the six wires 7, 91, 92, 93, 0 and 90 from the top rear of board A7.

5-20 Disconnect the three wires 3, 4 and 5 from the bottom rear of board A7.

5-21 Disconnect the wires from all vernier controls except amplitude, ie R1, R2, R3, R7, R8 and R9, at the board A7 end.

5-22 Remove the knob from the amplitude vernier (R11/R12) using an Allen key.

5-23 Remove the six screws securing board A7 to the front panel and carefully remove the board from the frame.

5-24 PERFORMANCE TESTS

5-25 Tables 5-2 to 5-23 give the procedures for verifying that the instrument is working to the specifications. Rigid observance of the sequence in which the tests appear is unnecessary.

5-26 INTERNAL CHECKS AND ADJUSTMENTS

5-27 The internal checks and adjustments in tables

5-24 to 5-29 give the procedures for adjusting a serviceable instrument to bring it within specification. The checks should be performed in the order in which they appear.

5-28 SERVICE PRODUCT SAFETY CHECK

5-29 This check (table 5-30) should be performed following the internal checks and adjustments to verify the instrument safety.

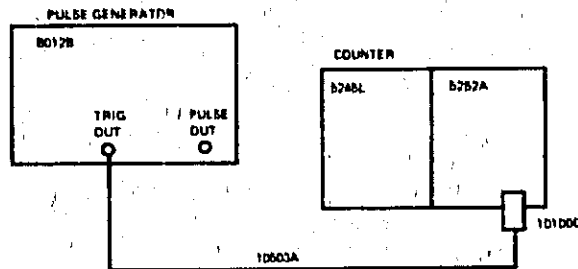
Table 5-1. Test Equipment and Accessories

| INSTRUMENT | BRIEF SPECIFICATION | RECOMMENDED MODEL |
|-----------------------|---|--|
| Counter | Frequency range 0 – 50 MHz with Prescaler plug-in | HP 5245L HP 5252A |
| Oscilloscope | Dual-channel, 50MHz bandwidth 20mV/div sensitivity, sweep speeds 100ns/div to 1s/div, with sweep delay | HP 180C with plug-ins 1801A, 1821A |
| Digital Voltmeter | 100V range, Accuracy $\pm (0.03\% \text{ reading} + 0.01\% \text{ range})$. | HP 3470 system comprising 34740A display and 34702A Multimeter. |
| Sampling Oscilloscope | Dual-channel, GHz bandwidth 2mV/div. sensitivity, sweep speeds 100ps/div to 50 μ s/div. | HP 180C with plug-in 1810A |
| Test Oscillator | Frequency range 10 Hz to 10 MHz | HP 651B |
| Test Oscillator | Frequency range 10 MHz to 500 MHz | HP 3200B |
| Pulse Generator | Rep. rate at least 1MHz, variable width (1 μ s to 100ms), amplitude 0V to \pm 5V. | HP 8011A |

ACCESSORIES

| | |
|--|------------------------------|
| 50 ohm cable assembly, 23cm long, with male BNC connectors | HP 10502A |
| 50 ohm cable assembly, 122cm long, with male BNC connectors (4 required) | HP 10503A |
| Test leads for DVM – dual banana plug to probe and clip | HP 11003A |
| Connector, BNC male to type N female (2 required) Connector, type N male to BNC male (2 required) | HP 1250-0077 HP 1250-0780 |
| Tee Connector, BNC | HP 1250-0781 |
| 50 ohm Feed-through termination | HP 10100C |
| Pulse Adder | HP 15104A |
| 20dB Attenuator, 50 ohm (2 required) | HP 8491A |

Table 5-2. Performance Test: Pulse Period



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|--------------|
| PULSE PERIOD 2 | 20n-1 μ |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1 μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1 μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5 μ |
| LEADING EDGE 10 | CCW |
| TRAINING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

5245L:

| | |
|-------------|---------------------|
| FUNCTION | FREQUENCY |
| SENSITIVITY | 1V |
| TIME BASE | adjust as necessary |

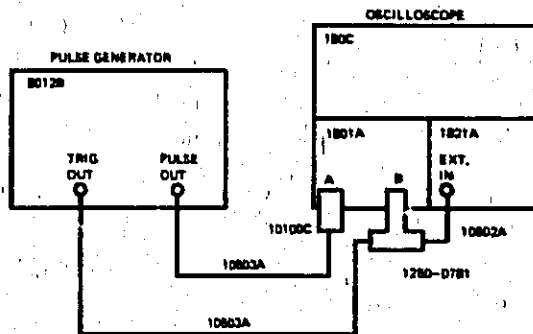
STEP INSTRUCTIONS

- 1 Check repetition rate for each set of control settings given in table:

| PULSE PERIOD 2 | VERNIER 3 | PULSE PERIOD | FREQUENCY |
|-------------------|--------------|--------------|-----------|
| 20n-1 μ | CCW | < 20ns | > 50MHz |
| 1 μ -1m | CCW | < 1 μ s | > 1MHz |
| .1m-10m | CCW | < .1ms | > 10KHz |
| 10m-1 | CCW | < 10ms | > 100Hz |
| 10m-1 | CW | > 1s | < 1Hz |

For the last setting, set the 5245L
FUNCTION switch to PERIOD AVERAGE 1
and measure the pulse period.

Table 5-3. Performance Test: Pulse Delay



INITIAL CONTROL SETTING

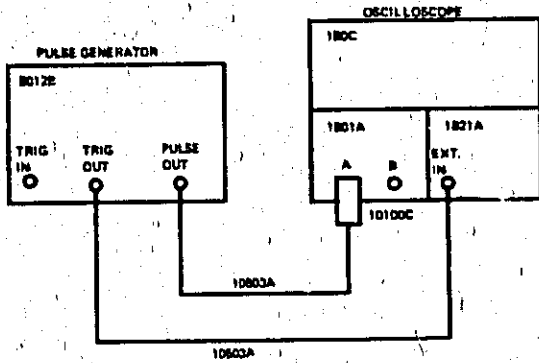
| | |
|------------------------------------|------------|
| PULSE PERIOD 2 | see step 1 |
| VERNIER 3 | see step 1 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | see step 1 |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | see step 1 |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- 1 For each of the control settings given in the table, measure the delay time between the leading edge of the trigger output pulse and the leading edge of the output pulse.

| PULSE PERIOD 2 | VERNIER 3 | PULSE DELAY 5 | PULSE WIDTH 7 | |
|--------------------------|---------------------|-------------------------|-------------------------|---------|
| 1μ - .1m | center | 35n - 1μ | .10n - 1μ | <35 ns |
| 1μ - .1m | center | 1μ - .1m | 1μ - .1m | <1 μs |
| 10m - 1 | CCW | .1m - 10m | .1m - 10m | <100 μs |
| 10m - 1 | CW | 10m - 1 | .1m - 10m | <10 ms |

Table 5-4. Performance Test: Pulse Width



INITIAL CONTROL SETTINGS

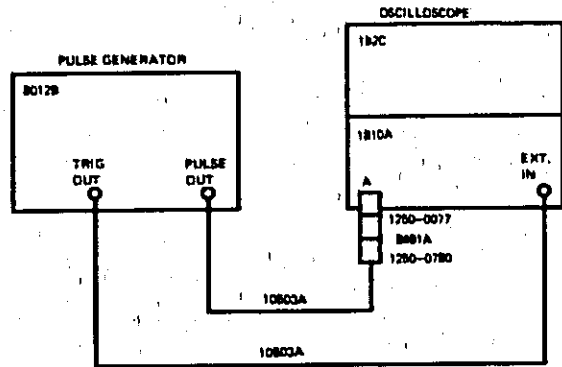
| | |
|-----------------------------|------------|
| PULSE PERIOD 2 | see step 1 |
| VERNIER 3 | CW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | see step 1 |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- 1 Measure the pulse width for each of the control settings given in table.

| PULSE PERIOD 2 | PULSE WIDTH 7 | |
|-------------------|------------------|--------|
| 1μ-.1m | 1μ-.1m | < 1μS |
| .1m-10m | .1m-10m | < .1mS |
| 10m-1 | 10m-1 | < 10mS |

Table 5-5. Performance Test: Minimum Pulse Width



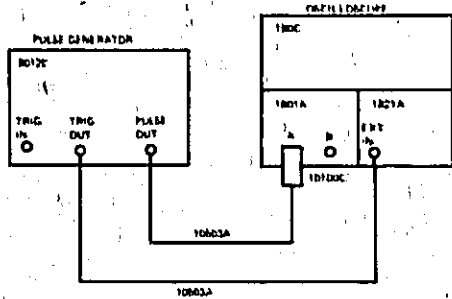
INITIAL CONTROL SETTINGS

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | Center |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | neg. |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTION

| STEP INSTRUCTION | RESULTS |
|---|---------|
| 1 Adjust amplitude VERNIER 13 to obtain full-screen display of pulse amplitude. | |
| 2 Measure pulse width: | < 10nS |
| 3 Set POLARITY 19 to + | |
| 4 Measure pulse width: | < 10nS |

Table 5-6. Performance Test: Pulse Period Jitter



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|------------|
| PULSE PERIOD 2 | 1μ-0.1m |
| VERNIER 3 | see step 2 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 1μ-.1m |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

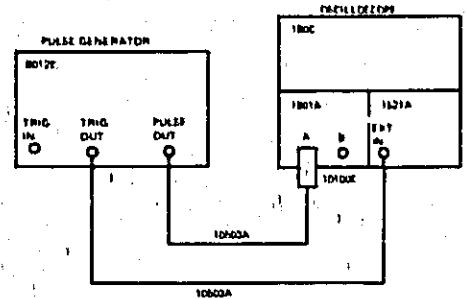
STEP INSTRUCTIONS

- 1 Set the 1821A controls as follows:

| | |
|-----------------|-----------|
| Main Sweep | 10 ms/div |
| Delayed Sweep | 1μs/div |
| Sweep Mode | Norm. |
| Delayed Trigger | Auto. |
| CM Delay | 2.0 |
- 2 Adjust pulse period VERNIER to obtain 0.1mS pulse period on display.
- 3 Switch Mode switch on 1821A to DELAYED.
- 4 Adjust 1821A Delay (Div) vernier until leading edge of second pulse is on display.
- 5 Set Magnifier to x 10. Display should be:

Jitter
- 6 Measure pulse period jitter: <.1% of setting + 50 ps. (i.e., < 1 div.)

Table 5-7. Performance Test: Pulse Delay Jitter



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|------------|
| PULSE PERIOD 2 | .1m-10m |
| VERNIER 3 | see step 2 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 1μ-.1m |
| VERNIER 6 | see step 3 |
| PULSE WIDTH 7 | 1μ-.1m |
| VERNIER 8 | Center |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

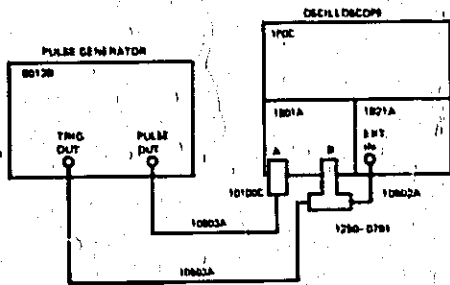
STEP INSTRUCTIONS

- 1 Set the 1821A controls as follows:

| | |
|-----------------|-----------|
| Main sweep | 50 ms/div |
| Delayed Sweep | 1μs/div |
| Sweep Mode | Norm. |
| Delayed Trigger | Auto. |
| Magnifier | x 1 |
- 2 Adjust pulse period VERNIER 3 to obtain 0.4mS pulse period on display.
- 3 Adjust pulse delay VERNIER 6 to obtain 0.1mS pulse delay.
- 4 Switch Mode switch on 1821A to DELAYED.
- 5 Adjust 1821A Delay (Div) vernier until leading edge of first pulse is on display.
- 6 Set Magnifier to x 10. Display should be:

Jitter
- 7 Measure pulse delay jitter: <.1% of setting + 50 ps (i.e., < 1 div.)

Table 5-8. Performance Test: Pulse Width Jitter



INITIAL CONTROL SETTING

| | |
|-----------------------------|------------|
| PULSE PERIOD 2 | .1m-10m |
| VERNIER 3 | see step 2 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 1μ-.1m |
| VERNIER 8 | see step 3 |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

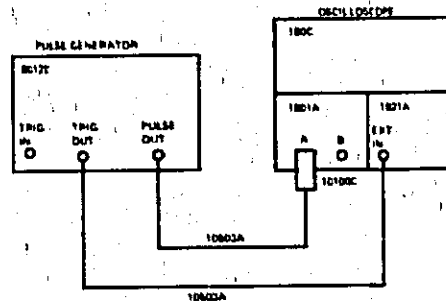
STEP INSTRUCTIONS

- Set 1821A controls as follows:

| | |
|-----------------|-----------|
| Main Sweep | 50 ms/div |
| Delayed Sweep | 1μs/div |
| Sweep Mode | Norm. |
| Delayed Trigger | Auto. |
| Magnifier | x 1 |
- Adjust pulse period VERNIER 3 to obtain 0.4ms pulse period on display.
- Adjust pulse width VERNIER 8 to obtain 0.1ms pulse width.
- Switch Mode switch on 1821A to DELAYED.
- Adjust 1821A Delay (Div) vernier until trailing edge of first pulse is on display.
- Set Magnifier to x 10. Display should be:

Jitter
- Measure pulse width jitter: <math>< 1\% \text{ of setting} + 50 \text{ ps}</math> (i.e., <math>< 1 \text{ div.}</math>)

Table 5-9. Performance Test: Square Wave



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|-------------|
| PULSE PERIOD 2 | see step 1 |
| VERNIER 3 | see step 1 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | SQUARE WAVE |
| VERNIER 8 | - |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- For each setting of the PULSE PERIOD 2 control given in table below, turn VERNIER 3 slowly from fully CCW to fully CW and check that the PULSE DELAY 5 has no effect on the position of the displayed pulse.

| PULSE PERIOD 2 | VERNIER 3 | Symmetry |
|----------------|-----------|-----------|
| 20n - 1μ | CCW | 50% ± 15% |
| 20n-1μ | CW | 50% ± 5% |
| 1μ-.1m | CCW to CW | 50% ± 5% |
| .1m-10m | CCW to CW | 50% ± 5% |
| 10m-1 | CCW to CW | 50% ± 5% |

- For all settings of the pulse period control check that the pulse width equals pulse OFF time within the above limits.

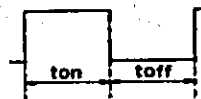
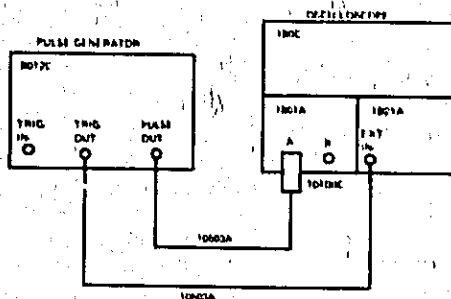


Table 5-10. Performance Test: Duty Cycle

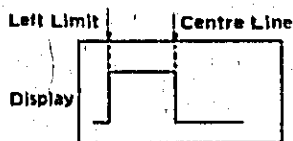


INITIAL CONTROL SETTINGS

| | |
|-----------------------------|------------|
| PULSE PERIOD 2 | see step 1 |
| VERNIER 3 | see step 1 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | see step 1 |
| VERNIER 8 | see step 1 |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- For each set of control settings given in the table below, display the output pulse so that it occupies half of the display (see diagram):

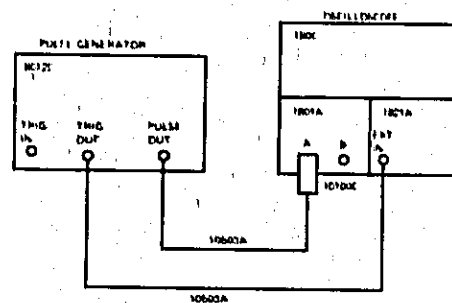


Starting with the pulse period VERNIER 3 fully CW turn VERNIER 3 slowly CCW until the trailing edge of the pulse begins to move or the pulse divides. When this happens measure the pulse period (Tp) and use in the formula:

$$\text{Duty Cycle Max} = \frac{\text{Pulse Width (Tw)}}{\text{Pulse Period (Tp)}} \times 100\%$$

| PULSE PERIOD 2 | VERNIER 3 | PULSE WIDTH 7 | VERNIER 8 |
|-------------------|--------------|------------------|------------------|
| 1u-.1m | CW | 1u-.1m | Adjust for 1uS |
| .1m-10m | CW | .1m-10m | Adjust for 0.1mS |
| 10m-1' | CW | 10m-1' | Adjust for 10mS |

Table 5-11. Performance Test: Manual Operation



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT + |
| VERNIER 3 | - |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 1μ-.1m |
| VERNIER 8 | CW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CW |
| TRAILING EDGE 11 | CW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

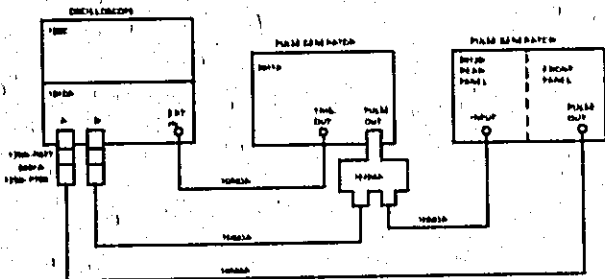
- Press MAN button 7.

Only one output pulse must occur when the button is pressed, no pulse must occur when the button is released.

RESULTS

> 75%
> 75%
> 75%

Table 5-12. Performance Test: External Width Operation



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|-----------|
| PULSE PERIOD 2 | EXT + |
| VERNIER 3 | - |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | - |
| VERNIER 6 | - |
| PULSE WIDTH 7 | - |
| VERNIER 8 | - |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CCW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | EXT WIDTH |

STEP INSTRUCTIONS

- 1 Apply external width pulses of >1V to INPUT 25 (>100 mV on Scope).
- 2 Output should be as shown below. Note leading and trailing edges of output pulses are delayed on input pulses by a fixed delay of approx. 30ns. This is the propagation delay of the 8012B internal circuitry.

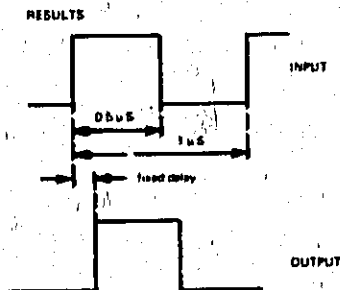
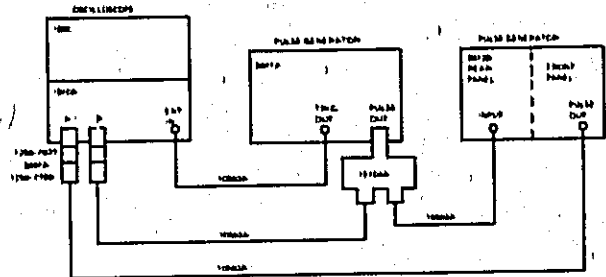


Table 5-13. Performance Test: RZ Operation



INITIAL CONTROL SETTINGS

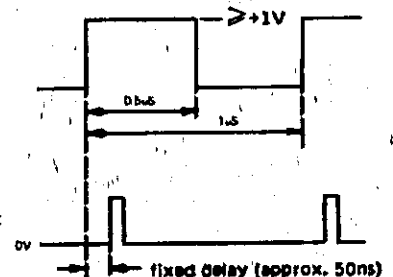
| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT + |
| VERNIER 3 | - |
| PULSE DOUBLE/NORMAL 4 | NORMAL |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | Center |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CCW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | RZ |

STEP INSTRUCTIONS

- 1 Apply RZ pulses of >1V to INPUT 25 (>100 mV on Scope).

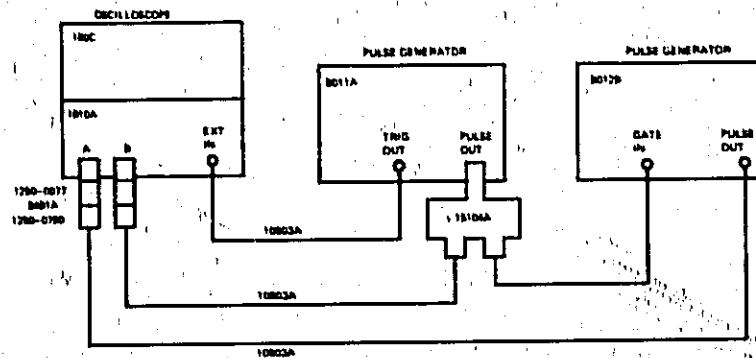
RESULTS

- 2 Output should be:



- 3 Check that pulse delay VERNIER 6 and pulse width VERNIER 8 vary the pulse delay and pulse width.

Table 5-14. Performance Test: Gate Operation



INITIAL CONTROL SETTINGS

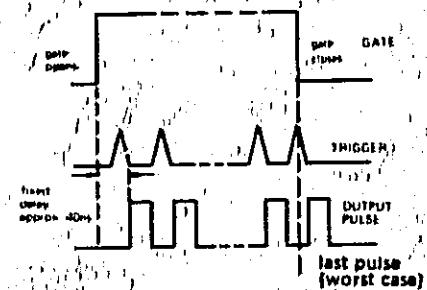
| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-3.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CCW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- 1 Apply gate pulse of $>1.5V$ to GATE INPUT 25, (>150 mV on Scope).
- 2 Check that output pulses at OUTPUT 16 only occur during ON time of gate pulse: Turn pulse period VERNIER 3 slowly CW and check gate operation for all pulse periods.

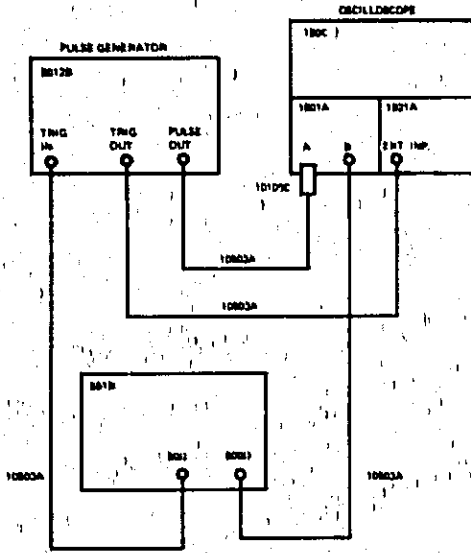


- 3 Check that leading edge of first trigger output pulse (TRIGGER OUTPUT 20) occurs a short time (owing to fixed delay) after the leading edge of the gate pulse.



- 4 Check that last pulse width is correct even when gate pulse trailing edge occurs just before or during the last pulse (owing to the effect of the fixed delay of approx. 45ns).

Table 5-15. Performance Test: External Trigger Operation



INITIAL CONTROL SETTINGS

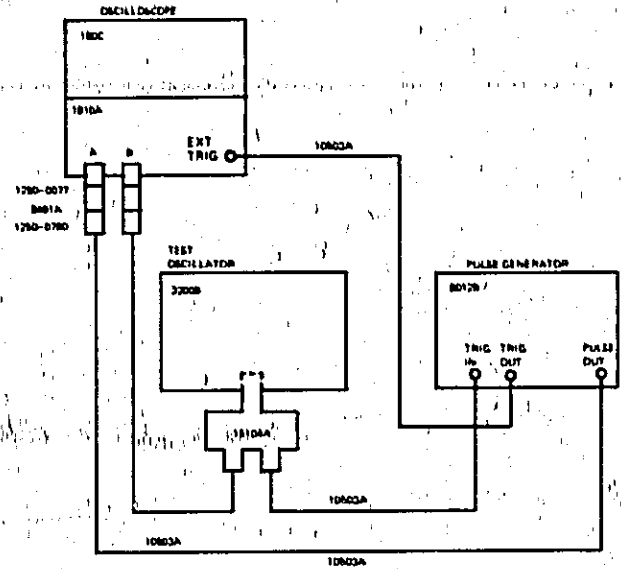
| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT + |
| VERNIER 3 | NORM |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | .1m-10m |
| VERNIER 8 | Center |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- Set the 651B controls as follows:

| | |
|------------|---------------|
| Range | X100 |
| Vernier | 2.5 |
| Attenuator | +10 dB (1.0V) |
| Amplitude | 0.61V (RMS) |
- Center both vertical channels on the oscilloscope and observe the waveforms. The leading edge of the output pulse shall occur during positive slope of the sinewave.
- Set PULSE PERIOD 2 to EXT (-): the leading edge of the output pulse shall occur during negative slope of the sinewave.

Table 5-16. Performance Test: High Frequency Trigger Operation



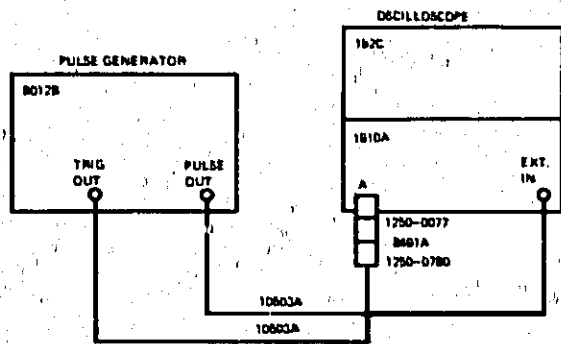
INITIAL CONTROL SETTINGS

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT + |
| VERNIER 3 | - |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35 n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10m-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/PZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- Apply sinewave with repetition rate of 50 MHz and amplitude of 1.7V p-p (170 mV on Scope). Check repetition rate of output is equal to repetition rate of input i.e. 50 MHz.
- Set PULSE PERIOD 2 to EXT-.
- Repeat step 1. Note that there is a delay of 25ns± 8ns between the trigger input and output.

Table 5-17. Performance Test: Trigger Output

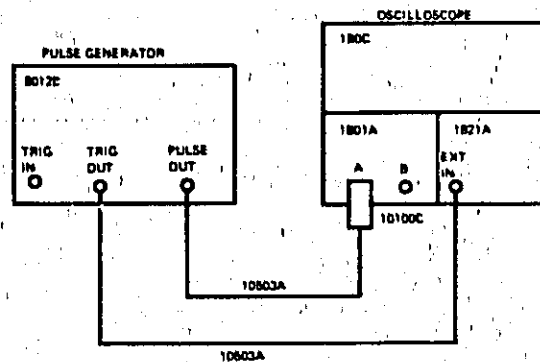


INITIAL CONTROL SETTINGS

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 2.0-1.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 20 | NORM |

| STEP INSTRUCTIONS | RESULTS |
|---|-------------|
| 1. Measure amplitude of trigger output pulse (TRIGGER OUTPUT 20). | > 1.0V |
| 2. Measure width of trigger output pulse at 50% of pulse amplitude. | 16ns ± 10ns |
| 3. Turn VERNIER 3 slowly from CCW to CW, the amplitude and width limits given must be true for the whole range. | |
| 4. Switch PULSE PERIOD 2 to range 1μ - 1m and repeat steps 1 to 3. | |
| 5. Switch PULSE WIDTH 7 to SQUARE WAVE and repeat steps 1 to 3. | |

Table 5-18. Performance Test: Rise and Fall Times (Slow ranges)



INITIAL CONTROL SETTINGS

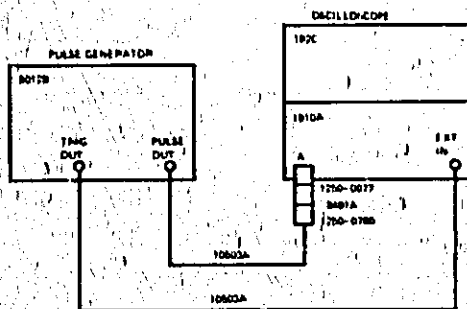
| | |
|-----------------------------|-------------|
| PULSE PERIOD 2 | 1μ-1m |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | SQUARE WAVE |
| VERNIER 8 | - |
| TRANSITION TIME 9 | 0.5μ-50μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 20 | NORM |

STEP INSTRUCTIONS

- Adjust oscilloscope sensitivity for full screen pulse display and measure rise and fall times between 10% and 90% of amplitude for each of the following control settings.

| PULSE PERIOD 2 | VERNIER 3 | TRANSITION TIME 9 | LEADING EDGE 10 TRAILING EDGE 11 | RESULTS |
|----------------|-----------|-------------------|-------------------------------------|---------|
| 1μ-1m | CCW | 0.5μ-50μ | CCW | < 0.5μ |
| .1m-10m | CCW | 50μ-5m | CCW | < 50μS |
| 10m-1 | CCW | 5m-0.5 | CCW | < 5mS |
| 1μ-1m | CW | 0.5μ-50μ | CW | > 50μS |
| .1m-10m | CW | 50μ-5m | CW | > 5mS |
| 10m-1 | CW | 5m-0.5 | CW | > 0.5S |

Table 5-19. Performance Test: Rise and Fall Times (Fast ranges)



INITIAL CONTROL SETTINGS

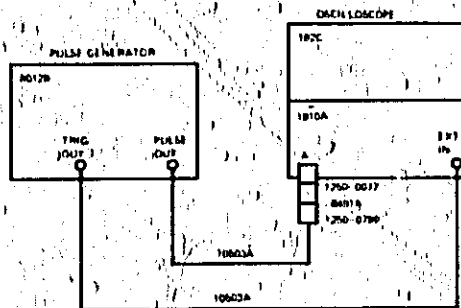
| | |
|-----------------------------|-------------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | SQUARE WAVE |
| VERNIER 8 | - |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

RESULTS

| | | |
|---|---|---------|
| 1 | Adjust amplitude VERNIER 13 to obtain full screen display of pulse amplitude. | |
| 2 | Adjust pulse period VERNIER 3 to obtain full screen pulse period display. | |
| 3 | Measure rise and fall times: | ≤ 5nS |
| 4 | Set POLARITY 19 to - and repeat steps 1 to 3. | ≤ 5nS |
| 5 | Turn LEADING EDGE 10 and TRAILING EDGE 11 verniers fully CW and measure rise and fall times between 10% and 90% of amplitude. | ≥ 0.5μS |
| 6 | Set POLARITY 19 to + and repeat step 5. | ≥ 0.5μS |

Table 5-20. Performance Test: Transition Time Linearity



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|------------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | see step 1 |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | see step 2 |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | see step 3 |
| TRAILING EDGE 11 | see step 3 |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | see step 4 |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

RESULTS

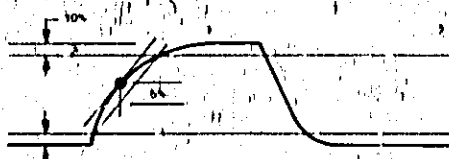
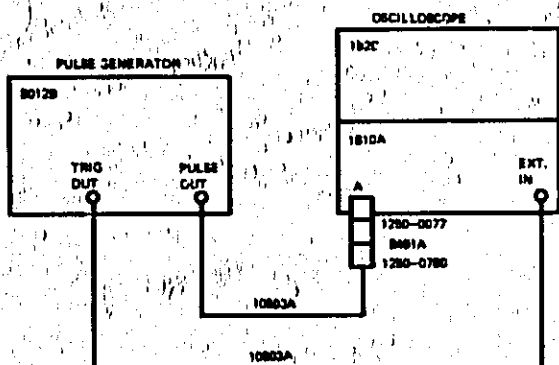
| | | |
|---|---|------|
| 1 | Adjust pulse period VERNIER 3 to obtain a pulse period of 100nS. | |
| 2 | Adjust pulse width VERNIER 8 to obtain a pulse width of 50nS. | |
| 3 | Adjust LEADING EDGE 10 and TRAILING EDGE 11 verniers to obtain rise and fall times of 30nS. | |
| 4 | Adjust amplitude VERNIER 13 to obtain full screen display of pulse amplitude. | |
| 5 | Refer to diagram: | |
| |  | |
| 6 | Measure risetime and falltime linearity: | < 5% |
| 7 | Repeat steps 1 to 6 with POLARITY 19 set to -. | < 5% |

Table 5-21. Performance Test: Pulse Shaping



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|-------------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | SQUARE WAVE |
| VERNIER 8 | - |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

- 1 Measure preshoot, overshoot and ringing of the pulse as a percentage of pulse amplitude. Refer to diagram below.
- 2 Set POLARITY 19 to -
- 3 Repeat step 1.

RESULTS

< ±5%

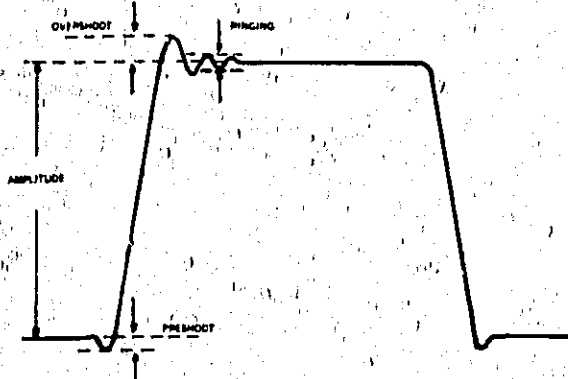
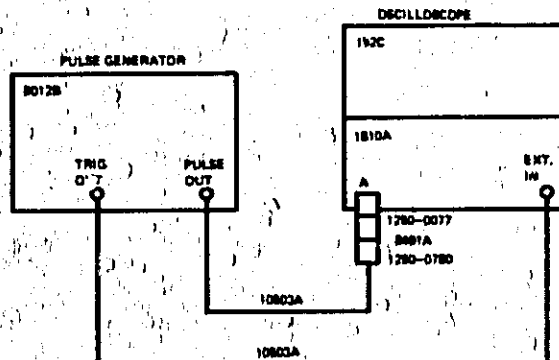


Table 5-22. Performance Test: Attenuator Calibration

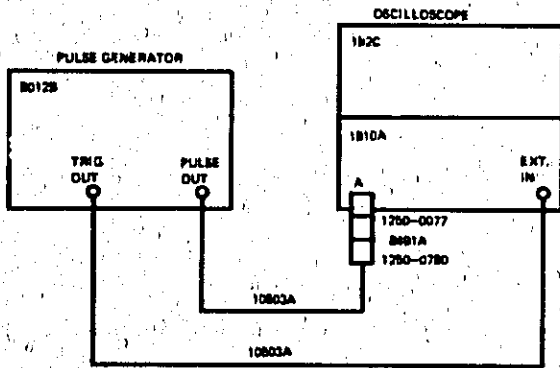


INITIAL CONTROL SETTINGS

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | Center |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 0.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

| AMPLITUDE 12 | VERNIER 13 | INT LOAD 18 | |
|--------------|------------|-------------|--------|
| | | IN | OUT |
| 5.0-2.0 | CW | √ 5.0 | √ 10V |
| 5.0-2.0 | CCW | √ 2.0 | √ 4V |
| 2.0-1.0 | CW | √ 2.0 | √ 4V |
| 2.0-1.0 | CCW | √ 1.0 | √ 2V |
| 1.0-0.5 | CW | √ 1.0 | √ 2V |
| 1.0-0.5 | CCW | √ 0.5 | √ 1V |
| 0.5-0.2 | CW | √ 0.5 | √ 1V |
| 0.5-0.2 | CCW | √ 0.2 | √ 0.4V |

Table 5-23. Performance Test: DC Offset



INITIAL CONTROL SETTINGS

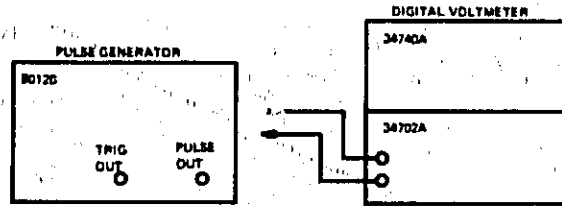
| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT + |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

STEP INSTRUCTIONS

| | | |
|----|--|--------|
| 1 | Disconnect 8012B from oscilloscope | |
| 2 | Center the oscilloscope display trace | |
| 3 | Reconnect 8012B to the oscilloscope | |
| 4 | Set OFFSET 14 to ON | |
| 5 | VERNIER 15 fully CW | |
| 6 | Measure positive offset: | ≥+2.5V |
| 7 | Turn VERNIER 15 fully CCW | |
| 8 | Measure negative offset: | ≥-2.5V |
| 9 | Turn OFFSET 14 to OFF | |
| 10 | Output pulse baseline should be at center of oscilloscope display. | |

RESULTS

Table 5-24. Internal Checks and Adjustments - Power Supply



INITIAL CONTROL SETTINGS 8012B:

| | |
|-----------------------------|----------|
| PULSE PERIOD 2 | EXT |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| SYM/NORM/COMPL SWITCH 17 | SYM |
| INT LOAD 18 | IN |
| POLARITY 19 | Positive |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

3444A:

| | |
|-----------------|-------|
| FUNCTION SWITCH | VOLTS |
| RANGE SWITCH | 100 V |

STEP INSTRUCTIONS

- 1 Connect the DVM between the +17V TP on board A6 and GND. Adjust A6R153 for +17V ± 100mV.
- 2 Connect the DVM between the -17V TP on board A6 and GND. Adjust A6R97 for -17V ± 100mV.

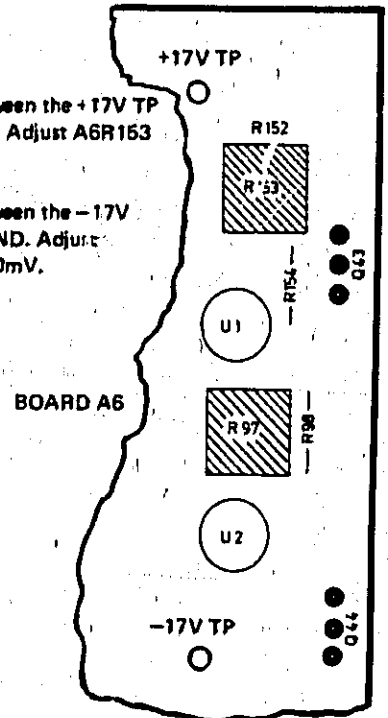
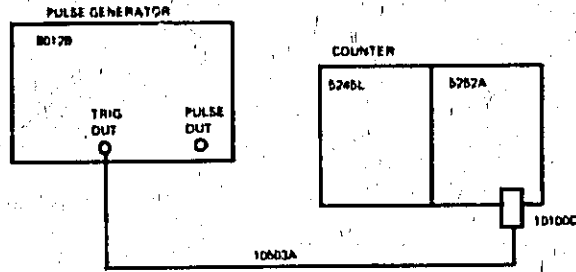


Table 5-25. Internal Checks and Adjustments: Repetition Rate



INITIAL CONTROL SETTINGS

8012B:

| | |
|-----------------------------|----------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| SYM/NORM/COMPL SWITCH 17 | SYM |
| INT LOAD 18 | IN |
| POLARITY 19 | positive |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

5245L:

| | |
|--------------|-----------|
| SENSITIVITY | 0.1 |
| SIGNAL INPUT | AC |
| TIME BASE | 0.1ms |
| FUNCTION | FREQUENCY |

STEP INSTRUCTION

- 1 Adjust capacitor A5C24 for a nominal frequency of 51.5MHz. Limits > 51MHz < 52MHz

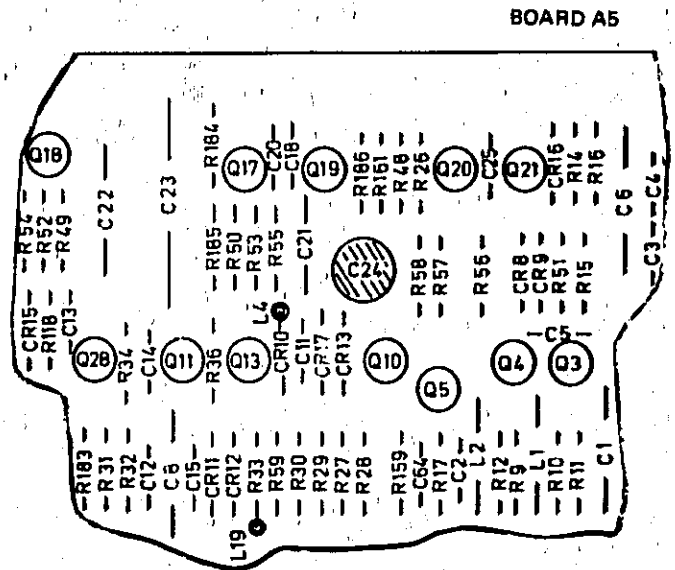
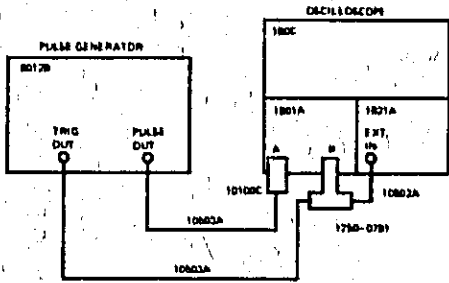


Table 5-26. Internal Checks and Adjustments: Delay and Width Timing



INITIAL CONTROL SETTINGS

8012B:

| | |
|-----------------------------|----------|
| PULSE PERIOD 2 | 1μ-0.1m |
| VERNIER 3 | CW |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| SYM/NORM/COMPL SWITCH 17 | SYM |
| INT LOAD 18 | IN |
| POLARITY 19 | positive |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

1. Pulse Delay

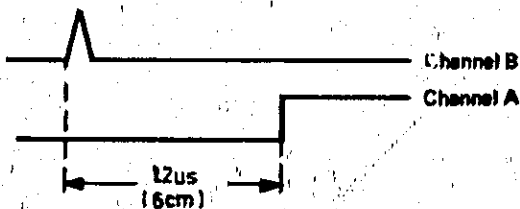
STEP INSTRUCTION

- 1 Set up the oscilloscope as follows:

1801A:
 DISPLAY ALT, channel B
 VOLTS/DIV 2V
 POLARITY + UP, DC INPUT

1821A:
 TIME/DIV 0.2μs

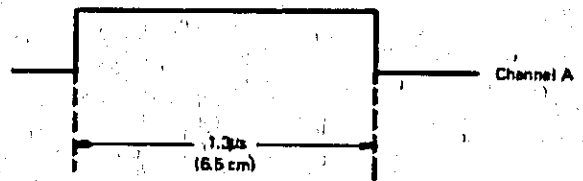
- 2 Set the leading edge of the trigger output pulse on the first vertical line on the screen. Measure the time of the leading edge of the output pulse. Adjust A5 C35 for a nominal 1.2μs. Limits > 1.1μs < 1.35μs.



2. Pulse Width

STEP INSTRUCTION

- 1 Set the oscilloscope DISPLAY switch to channel A only.
- 2 Set the pulse leading edge on the first line of the screen. Adjust A5 C45 for a nominal 1.3μs. Limits > 1.1μs < 1.5μs (Min. width with vernier B in CCW position is < 10 ns, using sampling oscilloscope).



BOARD A5

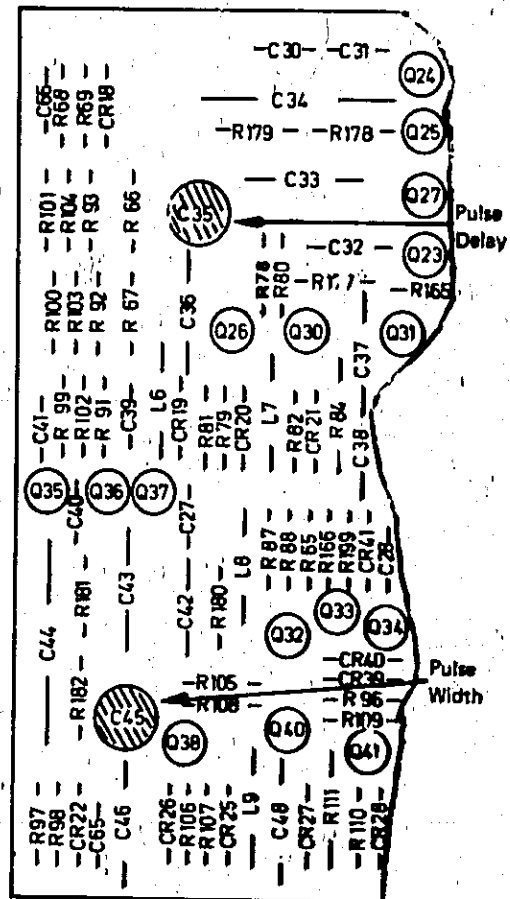
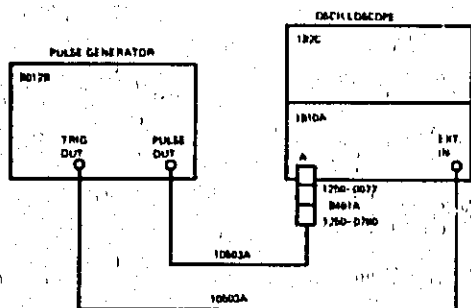


Table 5-27. Internal Checks and Adjustments:
Amplitude and Baseline



INITIAL CONTROL SETTINGS

8012B:

| | |
|-----------------------------|-------------------------------|
| PULSE PERIOD 2 | 20n-1μ |
| VERNIER 3 | CW |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | adjust for 50 % duty cycle |
| TRANSITION TIME 9 | 5-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| SYM/NORM/COMPL SWITCH 17 | SYM |
| INT LOAD 18 | OUT |
| POLARITY 19 | positive |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

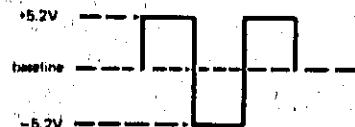
1810A:

| | |
|---------------|-------|
| TIME/CM | 0.2μs |
| MILLIVOLTS/CM | 200mV |

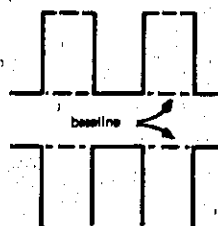
Table 5-27. cont'd.

STEP INSTRUCTION

- 1 Disconnect the 8012B pulse output from the oscilloscope and center the beam on the oscilloscope screen. Re-connect the 8012B output.
- 2 Adjust A5 R87 for -5.2V amplitude
Adjust A6 R88 for +5.2V amplitude



- 3 Set the 1810A to 10mV/cm.
Set the 8012B SYM/NORM/COMPL SWITCH 24 to NORM.
- 4 Disconnect the 8012B pulse output from the oscilloscope and center the beam on the oscilloscope screen. Re-connect the 8012B output.
- 5 Adjust A6 R150 to center the baseline.
- 6 Set the 8012B POLARITY SWITCH 19 to negative.
- 7 Adjust A6 R149 to center the baseline.



BOARD A6

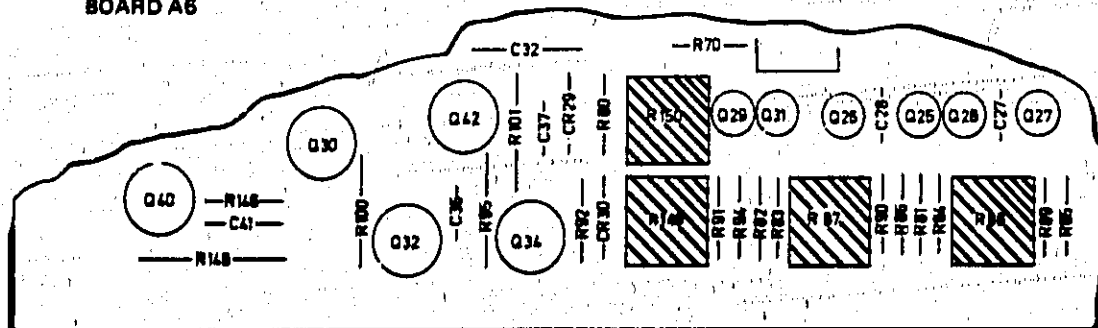
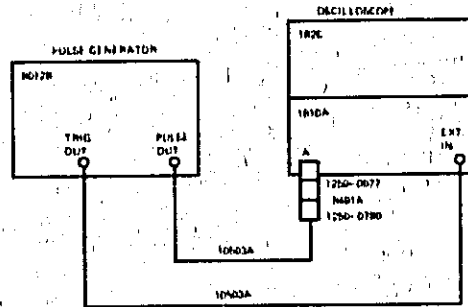


Table 5-28. Internal Checks and Adjustments: Pulse Clipping and Roll-Off



INITIAL CONTROL SETTINGS

| | |
|-----------------------------|------------------|
| PULSE PERIOD 2 | 1μ-0.1m |
| VERNIER 3 | see below |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CW |
| TRAILING EDGE 11 | CW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | 10 cm deflection |
| OFFSET SWITCH 14 | OFF |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | negative |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

1. Pulse Clipping

STEP INSTRUCTION

- 1 Adjust the pulse period vernier for a stable display.
- 2 Adjust A6 R69 for the best possible pulse shape.



- 3 Expand the 1810A timebase to display only the pulse leading edge. Measure the pulse risetime.
- 4 Display the pulse trailing edge and measure the fall time.
- 5 Adjust A6 R135 for equal rise and fall times (> 0.56μs).

BOARD A6

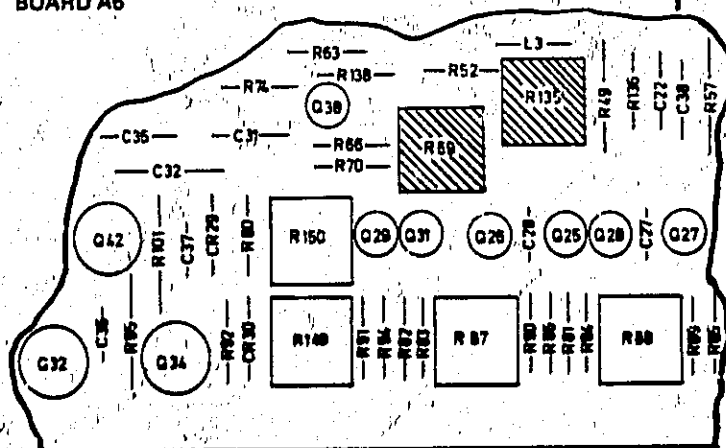


Table 5-28. (cont'd)

2. Pulse Roll-off

STEP INSTRUCTION

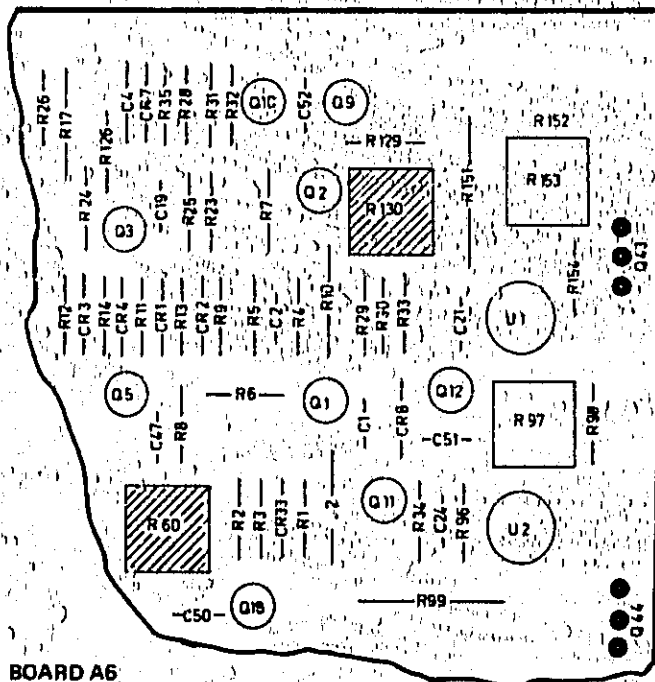
- 1 Set the 8012B transition time verniers 10 and 11 to CCW.
- 2 Expand the 1B10A timebase to display only the pulse leading edge and position it symmetrically on the screen.
- 3 Turn the leading edge vernier 10 from CCW to CW and measure the roll-off time.



- 4 Position the pulse trailing edge symmetrically on the screen.
- 5 Turn the trailing edge vernier 11 from CCW to CW and measure the roll-off time.



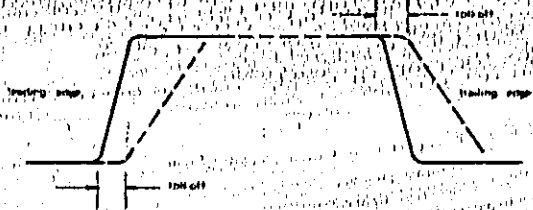
- 6 Adjust A6R60 for equal roll-off on both the leading and trailing edges.



BOARD A6

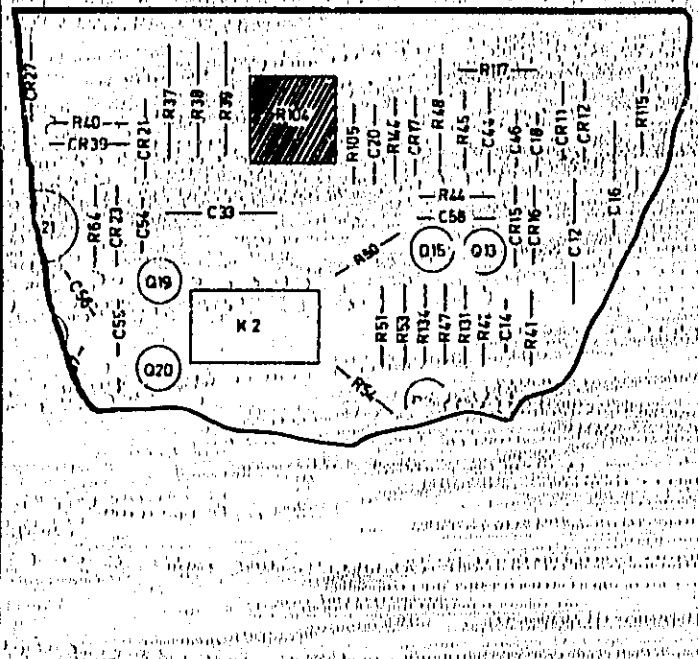
Table 5-28. (cont'd)

- 7 Adjust A6R130 for a nominal 80ns roll-off. Limits >60ns <100ns.
- 8 Set both 8012B transition time verniers 10 and 11 to CCW.
- 9 Position first the pulse leading edge and then the pulse trailing edge on the screen and check the transition times. They should be <5ns.
- 10 Set the 8012B polarity switch 19 to positive.
- 11 Repeat steps 2 to 5 for the positive pulse and adjust A6R104 for equal roll-off on both the leading and trailing edges.



- 12 Repeat steps 1 to 11, and readjust the potentiometers if necessary.

BOARD A6



BOARD A6

Table 5-30. Service Product Safety Check

STEP INSTRUCTION

- 1 Visually inspect interior of 8012B for any sign of abnormal internally generated heat, such as discolored printed circuit boards or components, damaged insulation, or evidence of arcing. Determine and remedy cause of any such condition if the product is in warranty. Disconnect power cord from line.
- 2 Check resistance from 8012B cabinet to ground pin on power plug with suitable ohmmeter. The reading must be less than one ohm. Flex the power cord while making this 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 \equiv .
- 3 Check resistance from 8012B 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 the line fuses to verify that the correct values are installed.
- 5 Check that the line voltage selector is set to the customers requirements.
- 6 Check that all coaxial cables and wires inside the 8012B are properly connected. Check that all boards are properly connected and that there is good thermal contact between the power supply transistors and the rear panel heat sink.
- 7 Inform the responsible product division of any repeated failures in the above tests or any other safety features.

Table 5-31 Performance Test Record (1 of 4)

| Hewlett-Packard Model 8012B Pulse Generator Serial No. _____ | | | Tested by _____ Date _____ | |
|---|---------------------|----------------|-------------------------------|-------|
| Table No. | Test Description | Results | | |
| | | Specified | Actual | |
| 5-2 | Pulse Period | | | |
| | 20n-1μ | CCW | <20ns / >50MHz | _____ |
| | | CW | >1μs / <1MHz | _____ |
| | 1μ-.1m | CCW | <1μs / >1MHz | _____ |
| | | CW | >.1ms / <10kHz | _____ |
| | .1m-10m | CCW | <.1ms / >10kHz | _____ |
| | CW | >10ms / <100Hz | _____ | |
| | 10m-1 | CCW | <10ms / >100Hz | _____ |
| | | CW | >1s / <1Hz | _____ |
| 5-3 | Pulse Delay | | | |
| | 35n-1μ | CCW | <35ns | _____ |
| | | CW | >1μs | _____ |
| | 1μs-.1m | CW | >100μs | _____ |
| | | CCW | <1μs | _____ |
| | .1m-10m | CW | >10ms | _____ |
| | CCW | <100μs | _____ | |
| | 10m-1 | CW | >1s | _____ |
| | | CCW | <10ms | _____ |
| 5-4 | Pulse Width | | | |
| | 10n-1μ | CW | >1μs | _____ |
| | 1μ-.1m | CW | >.1ms | _____ |
| | | CCW | <1μs | _____ |
| | .1m-10m | CW | >10ms | _____ |
| | | CCW | <1ms | _____ |
| | 10m-1 | CW | >1s | _____ |
| | | CCW | <10ms | _____ |
| 5-5 step 2 step 4 | Minimum Pulse Width | | <10ns <10ns | _____ |
| 5-6 step 6 | Pulse Period Jitter | | <.1% | _____ |

Table 5-31 Performance Test Record (4 of 4)

| Table No. | Test Description | Results | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|--|-----|--------------------|-------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|------------------|--------------------|--------------------|--------------------|--------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | Specified | Actual | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-19 step 3 step 4 step 5 step 6 | Rise and Fall Times (fast) | $\leq 5\text{ns}$ $\leq 5\text{ns}$ $\geq 0.5\mu\text{s}$ $\geq 0.5\mu\text{s}$ | <hr/> <hr/> <hr/> <hr/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-20 step 6 step 7 | Transition Time Linearity | $\leq 5\%$ $\leq 5\%$ | <hr/> <hr/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-21 | Pulse Shape Polarity + Preshoot Overshoot Ringing Polarity - Preshoot Overshoot Ringing | $\leq 5\%$ $\leq 5\%$ $\leq 5\%$ $\leq 5\%$ $\leq 5\%$ $\leq 5\%$ | <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-22 | Attenuator Calibration 5.0-2.0 CW CCW 2.0-1.0 CW CCW 1.0-0.5 CW CCW 0.5-0.2 CW CCW | INT LOAD <table border="1"> <thead> <tr> <th>In</th> <th>Out</th> </tr> </thead> <tbody> <tr> <td>$\geq 5.0\text{V}$</td> <td>$\geq 10\text{V}$</td> </tr> <tr> <td>$\geq 2.0\text{V}$</td> <td>$\geq 4\text{V}$</td> </tr> <tr> <td>$\geq 2.0\text{V}$</td> <td>$\geq 4\text{V}$</td> </tr> <tr> <td>$\geq 1.0\text{V}$</td> <td>$\geq 2\text{V}$</td> </tr> <tr> <td>$\geq 1.0\text{V}$</td> <td>$\geq 2\text{V}$</td> </tr> <tr> <td>$\geq 0.5\text{V}$</td> <td>$\geq 1\text{V}$</td> </tr> <tr> <td>$\geq 0.5\text{V}$</td> <td>$\geq 1\text{V}$</td> </tr> <tr> <td>$\geq 0.2\text{V}$</td> <td>$\geq 0.4\text{V}$</td> </tr> <tr> <td>$\geq 0.2\text{V}$</td> <td>$\geq 0.4\text{V}$</td> </tr> </tbody> </table> | In | Out | $\geq 5.0\text{V}$ | $\geq 10\text{V}$ | $\geq 2.0\text{V}$ | $\geq 4\text{V}$ | $\geq 2.0\text{V}$ | $\geq 4\text{V}$ | $\geq 1.0\text{V}$ | $\geq 2\text{V}$ | $\geq 1.0\text{V}$ | $\geq 2\text{V}$ | $\geq 0.5\text{V}$ | $\geq 1\text{V}$ | $\geq 0.5\text{V}$ | $\geq 1\text{V}$ | $\geq 0.2\text{V}$ | $\geq 0.4\text{V}$ | $\geq 0.2\text{V}$ | $\geq 0.4\text{V}$ | <table border="1"> <tbody> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> <tr><td> </td><td> </td></tr> </tbody> </table> | | | | | | | | | | | | | | | | | | | | |
| In | Out | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 5.0\text{V}$ | $\geq 10\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 2.0\text{V}$ | $\geq 4\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 2.0\text{V}$ | $\geq 4\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 1.0\text{V}$ | $\geq 2\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 1.0\text{V}$ | $\geq 2\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 0.5\text{V}$ | $\geq 1\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 0.5\text{V}$ | $\geq 1\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 0.2\text{V}$ | $\geq 0.4\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| $\geq 0.2\text{V}$ | $\geq 0.4\text{V}$ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5-23 step 6 step 8 step 10 | DC Offset | $\geq 2.5\text{V}$ $\geq -2.5\text{V}$ | <hr/> <hr/> satisfactory <input type="checkbox"/> not satisfactory <input type="checkbox"/> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

SCHEMATIC

DIAGRAMS

PARTS

LIST

DIAGRAMS AND REPLACEABLE PARTS

6-1 INTRODUCTION

6-2 This section contains the circuits, component location diagrams and the lists of replaceable parts. Waveforms shown with the circuits are included for guidance only and failure to observe identical results should not be automatically taken as indication of a fault.

6-3 ORDERING INFORMATION**6-4 General**

6-5 The replaceable parts tables give parts in alphanumerical order of their reference designators and indicate the description and HP stock number of each part, together with any applicable notes.

6-6 To order a replacement part, address order or enquiry either to your authorized Hewlett-Packard sales representative or to:

CUSTOMER SERVICE
Hewlett-Packard Company,
333 Logue Avenue,
Mountain View, California 94040

or, in Western Europe, to:

Hewlett-Packard (Schweiz) SA
Rue du Bois-du-Lan 7
1217 Meyrin 2
Geneva

6-7 Specify the following information for each part:

- a) Model and complete serial number of instrument.
- b) Hewlett-Packard stock number.
- c) Circuit reference stock number.
- d) Description.

To order a part not listed, give a complete description of the part and include its function and location.

Table 6-1. Reference Designators

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

Table 6-2. Diagram Notes

Unless otherwise stated:

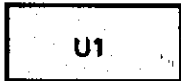
capacitance in microfarads
 inductance in microhenries
 resistance in ohms

Wiring colour code:

- 0 black
- 1 brown
- 2 red
- 3 orange
- 4 yellow
- 5 green
- 6 blue
- 7 violet
- 8 grey
- 9 white



Encloses front panel nomenclature



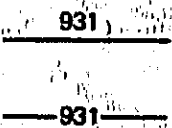
Microcircuit



Screwdriver Adjustment



Primary Signal Path



Indicates wire colour using resistor colour code.



Coaxial cable



Chassis/Ground

P/O

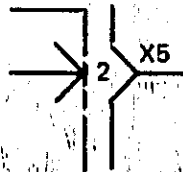
Part Of

F.S.

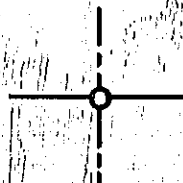
Factory Selected



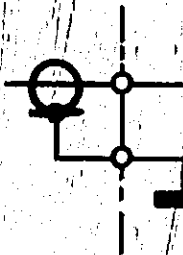
Zener Diode



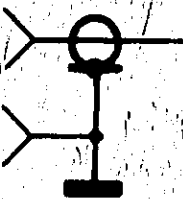
Printed circuit board edge connector and socket (X5) with pin number (2).



Single pin or soldered connection.



Coaxial Connector Bolt down cable bush

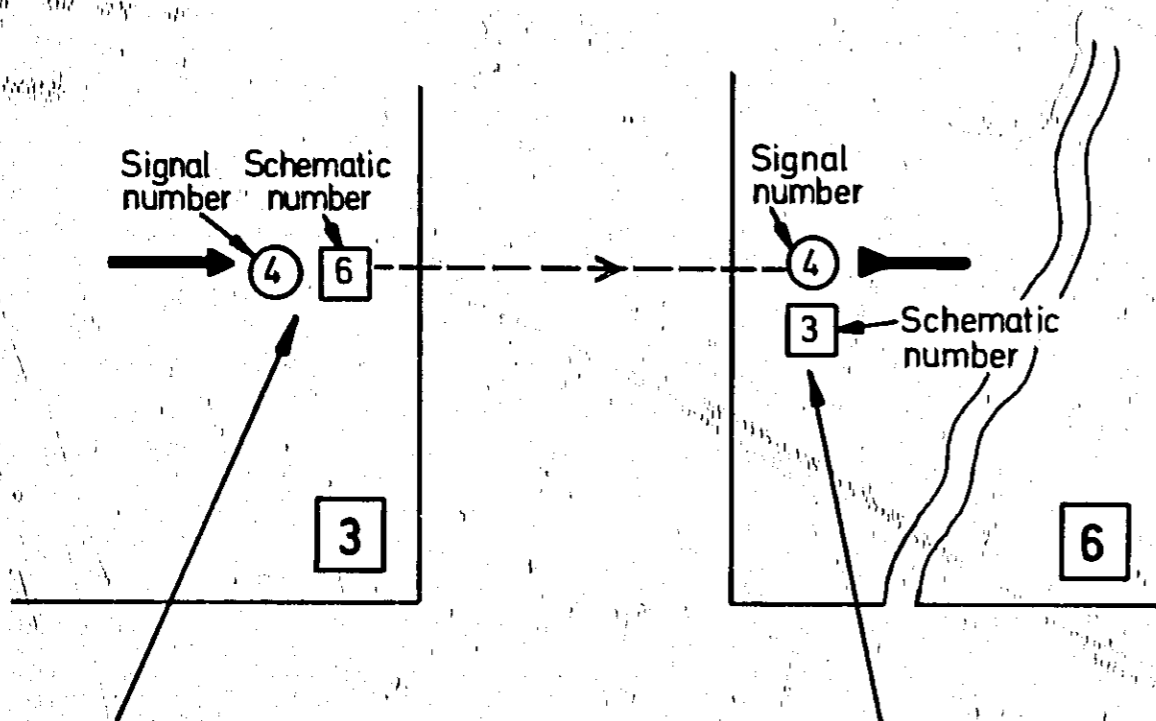


Coaxial Connector bulkhead mounted.



Relay

Table 6-3. Manufacturer Codes

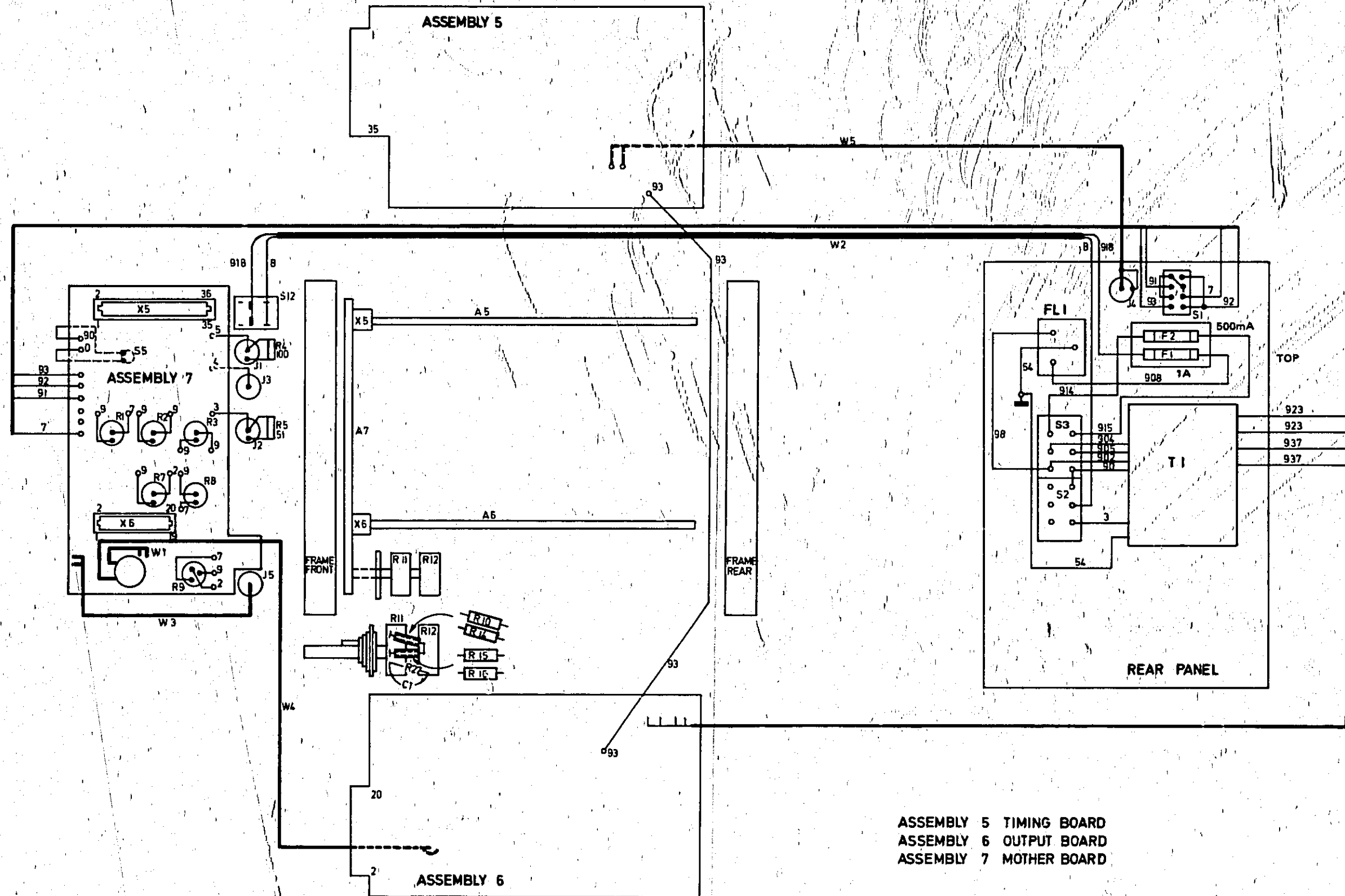


These references on a signal leaving a schematic diagram indicate the signal destination: The circle contains the signal number and the square contains the number of the schematic to which that signal goes.

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.

8012B

| MFR. NR. | MANUFACTURER NAME | ADDRESS | ZIP CODE |
|----------|-------------------------------------|----------------------|----------|
| FR002 | SPVCOE ELECTRONIQUE | LE VESINET FRANCE | |
| FR009 | GAM | MEAUX FRANCE | 77 |
| GM015 | DEUTSCHE WITPOHM GMBH & CO | GERMANY | |
| GR019 | STETTNER-TRUSH INC | CAZENOVIA NY | 13035 |
| J1121 | ALLEN BRADLEY CO | MILWAUKEE WI | 53212 |
| 02114 | FERROXCOPE CORP | SAUGERTIES NY | 12477 |
| 02735 | RCA CORP SOLID STATE DIV | SOMMERSVILLE NJ | 08876 |
| 04713 | MOTOROLA SEMICONDUCTOR PRODUCTS | PHOENIX AZ | 85008 |
| 07263 | FAIRCHILD SEMICONDUCTOR DIV | MOUNTAIN VIEW CA | 94040 |
| 12697 | CLARSTAT MFG CO INC | DOVER NH | 03820 |
| 13103 | THERMALLOY CO | DALLAS TX | 75247 |
| 16259 | COENING GL WK FLFC CMPNT DIV | RALEIGH NC | 27604 |
| 17537 | LAMPS INC | TORRENCE CA | 90502 |
| 19701 | MFCO/ELECTRA CORP | MINERAL WELLS TX | 76067 |
| 24226 | GOWANDA ELECTRONICS CORP | GOWANDA NY | 14070 |
| 24546 | COENING GLASS WORKS (BRADFORD) | BRADFORD PA | 16701 |
| 20480 | HEWLETT-PACKARD CO CORPORATE HQ | PALO ALTO CA | 94304 |
| 56289 | SPRAGUE ELECTRIC CO | NORTH ADAMS MA | 01247 |
| 71400 | BUSSMAN MFG DIV OF MCGRAW-EDISON CO | ST LOUIS MO | 63017 |
| 71765 | TEW ELK COMPONENTS CINCH DIV | ELK GROVE VILLAGE IL | 60007 |
| 72136 | ELECTRO MOTIVE MFG CO INC | WILLIMANTIC CT | 06226 |
| 73138 | BECKMAN INSTRUMENTS INC HELIPDT DIV | FULLERTON CA | 92634 |
| 75042 | TEW INC PHILADELPHIA DIV | PHILADELPHIA PA | 19108 |
| 75915 | LITTELFUSE INC | DES PLAINES IL | 60016 |
| 79727 | C-W INDUSTRIES | WARMINSTER PA | 18974 |
| 82389 | SWITCHCRAFT INC | CHICAGO IL | 60630 |
| 90940 | AMPHENOL SALES DIV OF BUNKER-RAND | HAZELWOOD MO | 63042 |



ASSEMBLY 5 TIMING BOARD
 ASSEMBLY 6 OUTPUT BOARD
 ASSEMBLY 7 MOTHER BOARD

Figure 6-1. Assembly Diagram

Table 6-4. Frame Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|--------------------|
| A5 | 08012-66508 | | BOARD ASSEMBLY, TIMING | 28400 | 08012-66508 |
| A6 | 08012-66506 | | BOARD ASSEMBLY, INTEGRATED AMPLIFIER | 28400 | 08012-66506 |
| A7 | 08012-66507 | | BOARD ASSEMBLY, MOTHER | 28480 | 08012-66507 |
| C1 | C140-0145 | 1 | CAPACITOR-FXD 22PF 0-5V 500MVDC MICA | 72136 | DM15C220J0500MVICR |
| DS1 | 2140-0253 | 1 | LAMP-INCAND T-1 BULB 28V | 17537 | 641ANSI 68391 |
| F1 | 2110-0007 | 1 | FUSE 1A 250V SLO-BLO 1.25X.25 UL | 71400 | MDL-1 |
| F2 | 0510-0748 | 1 | FUSEHOLDER-BLOCK 2-FU .25X1.25 FUSE | 71400 | 3823-2 |
| | 2110-0202 | 1 | FUSE .5A 250V SLO-BLO 1.25X.25 UL REC | 75915 | 313.5005 |
| FL1 | 9100-3121 | 1 | FILTER-ELEC 2A | 28480 | 9100-3121 |
| J1 | 1250-0110 | 5 | CONNECTOR-RF BNC FEM SGL HOLE FR | 90949 | 31-2221-1022 |
| J2 | 1250-0110 | | CONNECTOR-RF BNC FEM SGL HOLE FR | 90949 | 31-2221-1022 |
| J3 | 1250-0110 | | CONNECTOR-RF BNC FEM SGL HOLE FR | 90949 | 31-2221-1022 |
| J4 | 1250-0110 | | CONNECTOR-RF BNC FEM SGL HOLE FR | 90949 | 31-2221-1022 |
| J5 | 1250-0110 | | CONNECTOR-RF BNC FEM SGL HOLE FR | 90949 | 31-2221-1022 |
| MP1 | 1450-0404 | 1 | LIGHT-IND LENS CAP CLM TL LENS | 28480 | 1450-0404 |
| MP2 | 1460-1300 | 1 | STAND, TILT | 28480 | 1460-1300 |
| MP4 | 5040-0445 | 2 | FOOT ASSEMBLY | 28480 | 5040-0445 |
| MP5 | 5040-1124 | 1 | KNOB, PUSHBUTTON, POWER | 28480 | 5040-1124 |
| MP6 | 0370-1005 | 6 | KNOB-BASE-PTR .375 IN JCK SGI-DECAL | 28480 | 0370-1005 |
| MP7 | 0370-1097 | 1 | KNOB-BASE-PTR .5 IN JCK SGI-DECAL | 28480 | 0370-1097 |
| MP8 | 00180-24705 | 1 | STANDOFF, REAR PANEL | 28480 | 00180-24705 |
| MP9 | 08012-60202 | 1 | PANEL, REAR | 28480 | 08012-60202 |
| MP10 | 08012-60206 | 1 | PANEL, FRONT | 28480 | 08012-60206 |
| MP11 | 08012-64101 | 2 | COVER ASSEMBLY | 28480 | CBC12-64101 |
| R1 | 2100-3081 | 5 | RESISTOR-VAR CONTROL CC 50K 10% 10CM | 12697 | SERIES 63M |
| R2 | 2100-3081 | | RESISTOR-VAR CONTROL CC 50K 10% 10CM | 12697 | SERIES 63M |
| R3 | 2100-3081 | | RESISTOR-VAR CONTROL CC 50K 10% 10CM | 12697 | SERIES 63M |
| R4 | 0758-0024 | | RESISTOR 100 1% .25W F TC=0-100 | 26546 | CS-1/4-70-101-J |
| R5 | 0758-0124 | | RESISTOR 51 5% .25W F TC=0-100 | 26546 | CS-1/4-70-51R0-J |
| R7 | 2100-3081 | | RESISTOR-VAR CONTROL CC 50K 10% 10CM | 12697 | SERIES 63M |
| R8 | 2100-3081 | | RESISTOR-VAR CONTROL CC 50K 10% 10CM | 12697 | SERIES 63M |
| R9 | 2100-2488 | 1 | RESISTOR-VAR CONTROL CC 10K 20% 11M | 12697 | 302 |
| R10 | 0757-0796 | 2 | RESISTOR 82.5 1% .5W F TC=0-100 | 19701 | M7C-1/2-70-82R5-F |
| R11 | 2100-3104 | 2 | RESISTOR, VAR 50 OHM 10% 5W, CC | 01121 | 080 |
| R12 | 2100-3104 | | RESISTOR, VAR 50 OHM 10% 5W, CC | 01121 | 080 |
| R13 | 0698-5882 | 1 | RESISTOR 18 5% .25W F TC=0-100 | 26546 | CS-1/4-70-18R0-J |
| R14 | 0757-0796 | | RESISTOR 82.5 1% .5W F TC=0-100 | 19701 | M7C-1/2-70-82R5-F |
| R15 | 0757-0198 | 2 | RESISTOR 100 1% .5W F TC=0-100 | 19701 | M7C1/2-70-101-F |
| R16 | 0757-0198 | | RESISTOR 100 1% .5W F TC=0-100 | 19701 | M7C1/2-70-101-F |
| S1 | 3101-0903 | 1 | SWITCH-SL DPDT-NS MENTR .5A 125VAC/DC | 79727 | G1285-0003A |
| S2, S3 | 3101-2042 | 2 | SWITCH-SL DPDT-NS STD 1.5A 250VAC SLDR | | |
| S5 | 3101-0124 | 1 | SWITCH-PB SPST NC NDM | 82389 | 962 |
| T1 | 08012-61101 | 1 | TRANSFORMER, POWER | 28480 | 08012-61101 |
| W1 | 08012-61622 | 1 | CABLE ASSEMBLY, SMI1 | 28480 | 08012-61622 |
| W2 | 08012-61620 | 1 | CABLE ASSEMBLY, SMI1 POWER | 28480 | 08012-61620 |
| W3 | 08012-61624 | 1 | CABLE ASSEMBLY, SMI1 | 28480 | 08012-61624 |
| W4 | 08012-61623 | 1 | CABLE ASSEMBLY, SMI1 | 28480 | CBC12-61623 |
| W5 | 08012-61621 | 1 | CABLE ASSEMBLY, SMI1 INPUT | 28480 | 08012-61621 |

See Table 6-3 for Manufacturer Codes

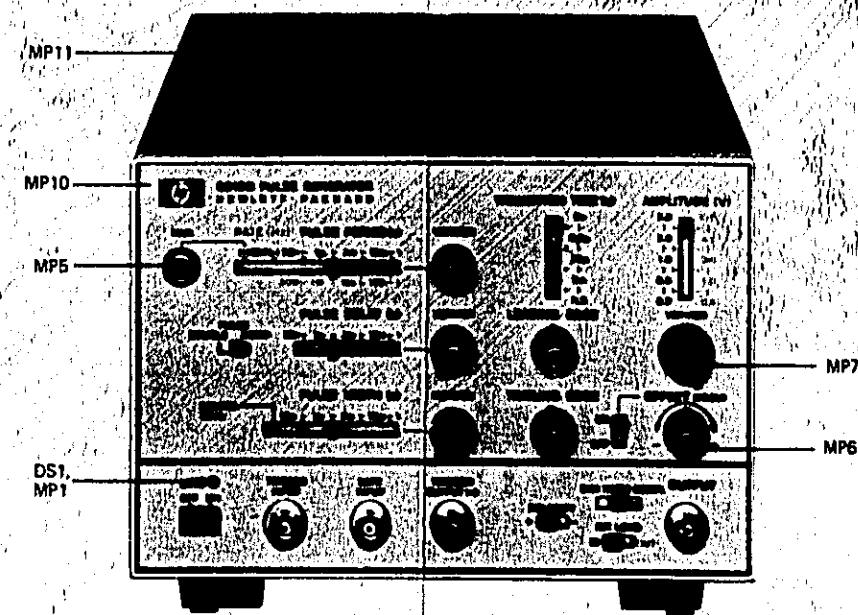


Table 6-5. Board A5 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|--------------------|
| A5 | 08012-6650B | 1 | BOARD ASSEMBLY, TIMING | 28480 | 08012-6650B |
| A5C1 | 0150-0121 | 20 | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C2 | 0160-2055 | 47 | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C3 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C4 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C5 | 0160-2199 | 1 | CAPACITOR-FXD 30PF +-5K 300WVDC MICA | 28480 | 0160-2199 |
| A5C6 | 0180-0374 | 6 | CAPACITOR-FXD: 10UF+-10K 20VDC TA-SOLID | 56289 | 150D10KX9020B2 |
| A5C7 | 0160-2307 | 1 | CAPACITOR-FXD 47PF +-5K 300WVDC MICA | 28480 | 0160-2307 |
| A5C8 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C9 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C10 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C11 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C12 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C13 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C14 | 0160-2198 | 4 | CAPACITOR-FXD 20PF +-5K 300WVDC MICA | 28480 | 0160-2198 |
| A5C15 | 0160-2197 | 1 | CAPACITOR-FXD 10PF +-5K 300WVDC MICA | 28480 | 0160-2197 |
| A5C16 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C17 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C18 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C19 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C20 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C21 | 0160-3714 | 1 | CAPACITOR-FXD 5600PF +-10K 250WVDC MET | 28480 | 0160-3714 |
| A5C22 | 0160-3725 | 3 | CAPACITOR-FXD .68UF +-10K 40WVDC MET | 28480 | 0160-3725 |
| A5C23 | 0160-0375 | 3 | CAPACITOR-FXD: 68UF+-10K 20VDC TA-SOLID | 56289 | 150D68KX7020B2 |
| A5C24 | 0121-0046 | 3 | CAPACITOR-V TMR-CER 9/35PF 200V PC-MTG | 00865 | 304322 9/35PF N650 |
| A5C25 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C26 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C27 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C28 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C29 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C30 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C31 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C32 | 0160-3220 | 2 | CAPACITOR-FXD 6800PF +-5K 250WVDC MET | FR009 | KM9-68 |
| A5C33 | 0160-3725 | | CAPACITOR-FXD .68UF +-10K 40WVDC MET | 28480 | 0160-3725 |
| A5C34 | 0180-0375 | | CAPACITOR-FXD: 68UF+-10K 20VDC TA-SOLID | 56289 | 150D68KX7020B2 |
| A5C35 | 0121-0046 | | CAPACITOR-V TMR-CER 9/35PF 200V PC-MTG | 00865 | 304322 9/35PF N650 |
| A5C36 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C37 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C38 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C39 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C40 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C41 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C42 | 0160-3220 | | CAPACITOR-FXD 6800PF +-5K 250WVDC MET | FR009 | KM9-68 |
| A5C43 | 0160-3725 | | CAPACITOR-FXD .68UF +-10K 40WVDC MET | 28480 | 0160-3725 |
| A5C44 | 0180-0375 | | CAPACITOR-FXD: 68UF+-10K 20VDC TA-SOLID | 56289 | 150D68KX7020B2 |
| A5C45 | 0121-0046 | | CAPACITOR-V TMR-CER 9/35PF 200V PC-MTG | 00865 | 304322 9/35PF N650 |
| A5C46 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C47 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C48 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C49 | 0150-0121 | | CAPACITOR-FXD .01UF +80-20K 50WVDC CER | 28480 | 0150-0121 |
| A5C50 | 0140-0191 | 1 | CAPACITOR-FXD 56PF +-5K 300WVDC MICA | 72136 | DM15E560J03004V1R4 |
| A5C51 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C52 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C53 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C54 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C55 | 0160-2198 | | CAPACITOR-FXD 20PF +-5K 300WVDC MICA | 28480 | 0160-2198 |
| A5C56 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C57 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C58 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C59 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C60 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C61 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C62 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C63 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C64 | 0160-2198 | | CAPACITOR-FXD 20PF +-5K 300WVDC MICA | 28480 | 0160-2198 |
| A5C65 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C66 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C68 | 0180-0374 | | CAPACITOR-FXD: 10UF+-10K 20VDC TA-SOLID | 56289 | 150D10KX9020B2 |
| A5C69 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20K 100WVDC CER | 28480 | 0160-2055 |
| A5C71 | 1901-0040 | 34 | DIODE-SWITCHING 30V 50MA 2MS DD-35 | 28480 | 1901-0040 |
| A5C72 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2MS DD-35 | 28480 | 1901-0040 |
| A5C73 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2MS DC-35 | 28480 | 1901-0040 |
| A5C74 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2MS DD-35 | 28480 | 1901-0040 |
| A5C75 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2MS DD-35 | 28480 | 1901-0040 |

See table 6-3 for Manufacturer Codes

Table 6-5 (cont'd). Board A5 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|-----------------|
| A5CR6 | 1901-0040 | 1 | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR7 | 1902-0037 | | DIODE-ZNR 9.09V 10R DD-7 PD=.4M | 04713 | 10939-169 |
| A5CR8 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR9 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR10 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 75UPS DD-7 | 28480 | 1901-0179 |
| A5CR11 | 1901-0040 | 8 | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR12 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR13 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR14 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR15 | 1901-0533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A5CR16 | 1901-0040 | 2 | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR17 | 1910-0022 | | DIODE-GE 5V 50MA 3.5NS DD-7 | 28480 | 1910-0022 |
| A5CR18 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR19 | 1902-0049 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 04713 | 52 10939-122 |
| A5CR20 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR21 | 1902-0126 | 2 | DIODE-ZNR 2.61V 5R DD-7 PD=.4M TC=.073R | 04713 | 52 10939-14 |
| A5CR22 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR23 | 1902-0025 | | DIODE-ZNR 10V 5R DD-7 PD=.4M TC=.06R | 04713 | 52 10939-182 |
| A5CR24 | 1902-0025 | | DIODE-ZNR 10V 5R DD-7 PD=.4M TC=.06R | 04713 | 52 10939-182 |
| A5CR25 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR26 | 1902-0049 | 1 | DIODE-ZNR 6.19V 5R DD-7 PD=.4M TC=.022R | 04713 | 52 10939-122 |
| A5CR27 | 1902-0126 | | DIODE-ZNR 2.61V 5R DD-7 PD=.4M TC=.073R | 04713 | 52 10939-14 |
| A5CR28 | 1910-0034 | | DIODE-GE 30V 50MA 8NS DD-7 | 28480 | 1910-0034 |
| A5CR29 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR30 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR31 | 1901-0040 | 2 | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR32 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR33 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR34 | 1902-0032 | | DIODE-ZNR 5.49V 5R DD-7 PD=.4M TC=.009R | 04713 | 52 10939-107 |
| A5CR35 | 1902-0032 | | DIODE-ZNR 5.49V 5R DD-7 PD=.4M TC=.009R | 04713 | 52 10939-107 |
| A5CR36 | 1902-0025 | 1 | DIODE-ZNR 10V 5R DD-7 PD=.4M TC=.06R | 04713 | 52 10939-182 |
| A5CR37 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR38 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DD-35 | 28480 | 1901-0040 |
| A5CR39 | 1901-0533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A5CR40 | 1901-0533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A5CA91 | 1901-0533 | 1 | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A5L1 | 9100-1611 | 3 | COIL-FRD MOLDED RF CHOKE .22UH 20R | 24226 | 15/220 |
| A5L2 | 9100-1614 | | COIL-FRD MOLDED RF CHOKE .82UH 10R | 24226 | 15/820 |
| A5L3 | 9100-1611 | | COIL-FRD MOLDED RF CHOKE .22UH 20R | 24226 | 15/220 |
| A5L4 | 9170-0029 | | CORE-SHIELDING BEAD | 02114 | 56-590-65A2/4A |
| A5L5 | 9140-0179 | | COIL-FRD MOLDED RF CHOKE 22UH 10R | 24226 | 15/222 |
| A5L7 | 9100-1613 | 3 | COIL-FRD MOLDED RF CHOKE .67UH 20R | 24226 | 15/670 |
| A5L8 | 9140-0094 | | COIL-FRD MOLDED RF CHOKE .80UH 10R | 24226 | 15/800 |
| A5L9 | 9140-0179 | | COIL-FRD MOLDED RF CHOKE 22UH 10R | 24226 | 15/222 |
| A5L11 | 9100-1611 | | COIL-FRD MOLDED RF CHOKE .22UH 20R | 24226 | 15/220 |
| A5L12 | 9140-0094 | | COIL-FRD MOLDED RF CHOKE 1UH 10R | 24226 | 15/101 |
| A5L13 | 9140-0094 | 1 | COIL-FRD MOLDED RF CHOKE 1UH 10R | 24226 | 15/101 |
| A5L14 | 9100-1613 | | COIL-FRD MOLDED RF CHOKE .67UH 20R | 24226 | 15/670 |
| A5L15 | 9100-1613 | | COIL-FRD MOLDED RF CHOKE .67UH 20R | 24226 | 15/670 |
| A5L16 | 9140-0112 | | COIL-FRD MOLDED RF CHOKE 4.7UH 10R | 24226 | 15/471 |
| A5L17 | 9170-0029 | | CORE-SHIELDING BEAD | 02114 | 56-590-65A2/4A |
| A5L18 | 9100-1614 | 1 | COIL-FRD MOLDED RF CHOKE .82UH 10R | 24226 | 15/820 |
| A5L19 | 9170-0029 | | CORE-SHIELDING BEAD | 02114 | 56-590-65A2/4A |
| A5MP28 | 1205-0037 | 10 | HEAT-DISSIPATOR SGL TD-36 PNG | 28480 | 1205-0037 |
| A5MP29 | 1205-0037 | | HEAT-DISSIPATOR SGL TC-36 PNG | 28480 | 1205-0037 |
| A5Q1 | 1854-0296 | 2 | TRANSISTOR NPN SI TD-92 PD=310MW | 28480 | 1854-0296 |
| A5Q2 | 1854-0296 | | TRANSISTOR NPN SI TD-92 PD=310MW | 28480 | 1854-0296 |
| A5Q3 | 1854-0092 | | TRANSISTOR NPN SI PD=200MW FT=600MHZ | 28480 | 1854-0092 |
| A5Q4 | 1854-0092 | | TRANSISTOR NPN SI PD=200MW FT=600MHZ | 28480 | 1854-0092 |
| A5Q5 | 1853-0096 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0096 |
| A5Q6 | 1854-0019 | 4 | TRANSISTOR NPN SI TD-18 PD=360MW | 28480 | 1854-0019 |
| A5Q7 | 1853-0034 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0034 |
| A5Q8 | 1853-0034 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0034 |
| A5Q9 | 1853-0357 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0357 |
| A5Q10 | 1853-0034 | | TRANSISTOR PNP SI PD=310MW FT=250MHZ | 28480 | 1853-0034 |
| A5Q11 | 1853-0357 | 8 | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0357 |
| A5Q12 | 1853-0357 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0357 |
| A5Q13 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TD-72 PD=200MW | 04713 | 2N5179 |
| A5Q14 | 1853-0357 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0357 |
| A5Q15 | 1853-0357 | | TRANSISTOR PNP SI TD-18 PD=360MW | 28480 | 1853-0357 |
| A5Q16 | 1854-0009 | 4 | TRANSISTOR NPN 2N709 SI TD-18 PD=300MW | 28480 | 1854-0009 |
| A5Q17 | 1854-0215 | | TRANSISTOR NPN SI PD=350MW FT=300MHZ | 04713 | SPS 3611 |
| A5Q18 | 1854-0215 | | TRANSISTOR NPN SI PD=350MW FT=300MHZ | 04713 | SPS 3611 |
| A5Q19 | 1854-0215 | | TRANSISTOR NPN SI PD=350MW FT=300MHZ | 04713 | SPS 3611 |
| A5Q20 | 1854-0019 | | TRANSISTOR NPN SI TD-10 PD=360MW | 28480 | 1854-0019 |

See table 6-3 for Manufacturer Codes

Table 6-5 (cont'd). Board A5 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|------------------|
| A5021 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5022 | 1854-0019 | | TRANSISTOR NPN SI TO-18 PD=360MHZ | 28480 | 1854-0019 |
| A5023 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5024 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5025 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5026 | 1853-0357 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0357 |
| A5027 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5028 | 1854-0019 | | TRANSISTOR NPN SI TO-18 PD=360MHZ | 28480 | 1854-0019 |
| A5029 | 1853-0036 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0036 |
| A5030 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MHZ | 04713 | 2N5179 |
| A5031 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MHZ | 04713 | 2N5179 |
| A5032 | 1853-0018 | | TRANSISTOR PNP SI TO-72 PD=200MHZ FT=1GHZ | 28480 | 1853-0018 |
| A5033 | 1853-0036 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0036 |
| A5034 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5035 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5036 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5037 | 1853-0036 | | TRANSISTOR PNP SI PD=310MHZ FT=250MHZ | 28480 | 1853-0036 |
| A5038 | 1853-0357 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0357 |
| A5039 | 1853-0357 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0357 |
| A5040 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MHZ | 04713 | 2N5179 |
| A5041 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MHZ | 04713 | 2N5179 |
| A5042 | 1854-0009 | | TRANSISTOR NPN 2N709 SI TO-18 PD=300MHZ | 28480 | 1854-0009 |
| A5043 | 1853-0357 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0357 |
| A5044 | 1853-0015 | | TRANSISTOR PNP SI PD=200MHZ FT=500MHZ | 28480 | 1853-0015 |
| A5045 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MHZ | 04713 | 2N5179 |
| A5046 | 1854-0345 | | TRANSISTOR NPN 2N5179 SI TO-72 PD=200MHZ | 04713 | 2N5179 |
| A5047 | 1854-0009 | | TRANSISTOR NPN 2N709 SI TO-18 PD=300MHZ | 28480 | 1854-0009 |
| A5048 | 1854-0215 | | TRANSISTOR NPN SI PD=350MHZ FT=300MHZ | 04713 | SP5 3611 |
| A5049 | 1854-0215 | | TRANSISTOR NPN SI PD=350MHZ FT=300MHZ | 04713 | SP5 3611 |
| A5050 | 1854-0092 | | TRANSISTOR NPN SI PD=200MHZ FT=600MHZ | 28480 | 1854-0092 |
| A5051 | 1854-0092 | | TRANSISTOR NPN SI PD=200MHZ FT=600MHZ | 28480 | 1854-0092 |
| A5052 | 1854-0009 | | TRANSISTOR NPN 2N709 SI TO-18 PD=300MHZ | 28480 | 1854-0009 |
| A5053 | 1853-0357 | | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0357 |
| A5054 | 1853-0218 | 2 | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0218 |
| A5055 | 1853-0218 | 2 | TRANSISTOR PNP SI TO-18 PD=360MHZ | 28480 | 1853-0218 |
| A5R1 | 0757-0424 | 3 | RESISTOR 100 5R .25W F TC=0+-100 | 24546 | C4-1/8-T0-101-F |
| A5R2 | 0698-0083 | 4 | RESISTOR 1.98K 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-1981-F |
| A5R3 | 0698-0083 | 4 | RESISTOR 1.98K 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-1981-F |
| A5R4 | 0757-0276 | 1 | RESISTOR 61.9 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1619-F |
| A5R5 | 0698-3443 | 2 | RESISTOR 287 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-287R-F |
| A5R6 | 0698-3443 | 3 | RESISTOR 287 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-287R-F |
| A5R7 | 0757-0448 | 3 | RESISTOR 18.2K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-287R-F |
| A5R8 | 0757-1094 | 3 | RESISTOR 1.47K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1922-F |
| A5R9 | 0757-0401 | 14 | RESISTOR 100 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1471-F |
| A5R10 | 0757-0400 | 3 | RESISTOR 90.9 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-101-F |
| A5R11 | 0757-0421 | 3 | RESISTOR 825 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-909R-F |
| A5R12 | 0757-0282 | 2 | RESISTOR 221 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-825R-F |
| A5R13 | 0757-0420 | 4 | RESISTOR 750 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-221-F |
| A5R14 | 0757-0426 | 3 | RESISTOR 1.3K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-751-F |
| A5R15 | 0698-4426 | 1 | RESISTOR 1.58K 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-1301-F |
| A5R16 | 0757-0407 | 7 | RESISTOR 200 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1581-F |
| A5R17 | 0757-0395 | 3 | RESISTOR 56.2 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-201-F |
| A5R18 | 0757-0442 | 11 | RESISTOR 10R 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-562-F |
| A5R19 | 0757-0399 | 3 | RESISTOR 82.5 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-10R-F |
| A5R20 | 0757-0409 | 4 | RESISTOR 274 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-825-F |
| A5R21 | 0757-0424 | 5 | RESISTOR 1.1K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-274R-F |
| A5R22 | 0757-0448 | 1 | RESISTOR 18.2K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-201-F |
| A5R23 | 0757-0283 | 1 | RESISTOR 2K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1822-F |
| A5R24 | 0757-0428 | 2 | RESISTOR 1.62K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-2001-F |
| A5R25 | 0757-0406 | 2 | RESISTOR 182 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1621-F |
| A5R26 | 0757-0443 | 4 | RESISTOR 11K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-182R-F |
| A5R27 | 0757-0442 | 1 | RESISTOR 10R 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1102-F |
| A5R28 | 0757-0442 | 1 | RESISTOR 10R 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1002-F |
| A5R29 | 0757-0274 | 11 | RESISTOR 1.21K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1002-F |
| A5R30 | 0757-0273 | 4 | RESISTOR 3.01K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1213-F |
| A5R31 | 0757-0428 | 1 | RESISTOR 1.62K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-3011-F |
| A5R32 | 0698-0085 | 1 | RESISTOR 2.61K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-1621-F |
| A5R33 | 0757-0404 | 4 | RESISTOR 130 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-2611-F |
| A5R34 | 0757-0401 | 4 | RESISTOR 100 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-131-F |
| A5R35 | 0757-0404 | 4 | RESISTOR 130 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-101-F |
| A5R36 | 0757-0404 | 4 | RESISTOR 130 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-131-F |
| A5R37 | 0698-3151 | 1 | RESISTOR 2.87K 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-2871-F |
| A5R38 | 0698-0984 | 7 | RESISTOR 2.15K 1R .125W F TC=0+-100 | 16299 | C4-1/8-T0-2151-F |
| A5R39 | 0757-0438 | 12 | RESISTOR 5.11K 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-5111-F |
| A5R40 | 0757-0420 | 1 | RESISTOR 750 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-751-F |
| A5R41 | 0757-0421 | 1 | RESISTOR 825 1R .125W F TC=0+-100 | 24546 | C4-1/8-T0-825R-F |

See table 6-3 for Manufacturer Codes

Table 6-5 (cont'd). Board A5 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------|
| ASR42 | 0757-0401 | 2 | RESISTOR 100 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-101-F |
| ASR43 | 0757-0401 | | RESISTOR 100 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-101-F |
| ASR44 | 0757-0403 | | RESISTOR 121 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-121K-F |
| ASR45 | 0757-0407 | | RESISTOR 200 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-201-F |
| ASR46 | 0698-0084 | | RESISTOR 2.15K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2151-F |
| ASR47 | 0757-0274 | 1 | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1213-F |
| ASR48 | 0757-0438 | | RESISTOR 5.11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-5111-F |
| ASR49 | 0757-0438 | | RESISTOR 5.11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-5111-F |
| ASR50 | 0757-0438 | | RESISTOR 5.11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-5111-F |
| ASR51 | 0757-0439 | | RESISTOR 6.81K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-6811-F |
| ASR52 | 0757-0443 | 3 | RESISTOR 11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1102-F |
| ASR53 | 0757-0443 | | RESISTOR 11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1102-F |
| ASR54 | 0757-0274 | | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1213-F |
| ASR55 | 0757-0274 | | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1213-F |
| ASR56 | 0757-0417 | | RESISTOR 562 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-562R-F |
| ASR57 | 0757-0438 | | 2 | RESISTOR 5.11K 1K .125W F TC=0+-100 | 24546 |
| ASR58 | 0757-0433 | RESISTOR 3.32K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-3321-F |
| ASR59 | 0757-0427 | RESISTOR 1.5K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-1501-F |
| ASR60 | 0757-0273 | RESISTOR 3.01K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-3011-F |
| ASR61 | 0757-0273 | RESISTOR 3.01K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-3011-F |
| ASR62 | 0757-0391 | 1 | | RESISTOR 39.2 1K .125W F TC=0+-100 | 24546 |
| ASR63 | 0698-3439 | | RESISTOR 178 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-178R-F |
| ASR64 | 0698-0084 | | RESISTOR 2.15K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2151-F |
| ASR65 | 0757-0429 | | RESISTOR 1.82K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1821-F |
| ASR66 | 0757-0467 | | RESISTOR 16.2K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1622-F |
| ASR67 | 0757-0421 | | 3 | RESISTOR 825 1K .125W F TC=0+-100 | 24546 |
| ASR68 | 0757-0278 | RESISTOR 1.78K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-1781-F |
| ASR69 | 0698-0084 | RESISTOR 2.15K 1K .125W F TC=0+-100 | | 16299 | CA-1/B-T0-2151-F |
| ASR70 | 0698-3492 | RESISTOR 2.67K 1K .125W F TC=0+-100 | | 16299 | CA-1/B-T0-2671-F |
| ASR71 | 0698-3492 | RESISTOR 2.67K 1K .125W F TC=0+-100 | | 16299 | CA-1/B-T0-2671-F |
| ASR72 | 0698-3492 | 6 | | RESISTOR 2.67K 1K .125W F TC=0+-100 | 16299 |
| ASR73 | 0698-3158 | | RESISTOR 23.7K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2372-F |
| ASR74 | 0698-3158 | | RESISTOR 23.7K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2372-F |
| ASR75 | 0757-0438 | | RESISTOR 5.11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-5111-F |
| ASR76 | 0757-0438 | | RESISTOR 5.11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-5111-F |
| ASR77 | 0757-0290 | | 4 | RESISTOR 6.19K 1K .125W F TC=0+-100 | 19701 |
| ASR78 | 0757-0390 | RESISTOR 36.5 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-36R5-F |
| ASR79 | 0757-0393 | RESISTOR 47.5 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-47R5-F |
| ASR80 | 0757-0390 | RESISTOR 136.5 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-136R5-F |
| ASR81 | 0757-0427 | RESISTOR 1.5K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-1501-F |
| ASR82 | 0757-0409 | 2 | | RESISTOR 274 1K .125W F TC=0+-100 | 24546 |
| ASR83 | 0757-0404 | | RESISTOR 130 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-131-F |
| ASR84 | 0758-0002 | | RESISTOR 560 5K .25W F TC=0+-100 | 24546 | C5-1/4-T0-561-J |
| ASR85 | 0757-0429 | | RESISTOR 1.82K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1821-F |
| ASR86 | 0757-0284 | | RESISTOR 190 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-191-F |
| ASR87 | 0757-0284 | | 3 | RESISTOR 190 1K .125W F TC=0+-100 | 24546 |
| ASR88 | 0757-0282 | RESISTOR 221 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-221R-F |
| ASR89 | 0757-0389 | RESISTOR 33.2 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-332-F |
| ASR90 | 0698-3438 | RESISTOR 147 1K .125W F TC=0+-100 | | 16299 | CA-1/B-T0-147R-F |
| ASR91 | 0698-3158 | RESISTOR 23.7K 1K .125W F TC=0+-100 | | 16299 | CA-1/B-T0-2372-F |
| ASR92 | 0698-3158 | 1 | | RESISTOR 23.7K 1K .125W F TC=0+-100 | 16299 |
| ASR93 | 0698-3158 | | RESISTOR 23.7K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2372-F |
| ASR94 | 0698-4474 | | RESISTOR 1.44K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-1401-F |
| ASR95 | 0757-0290 | | RESISTOR 6.19K 1K .125W F TC=0+-100 | 19701 | MFAC1/B-T0-6191-F |
| A-198 | 0757-0401 | | RESISTOR 100 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-101-F |
| ASR97 | 0757-0438 | | 1 | RESISTOR 1.78K 1K .125W F TC=0+-100 | 24546 |
| ASR98 | 0698-0084 | RESISTOR 2.15K 1K .125W F TC=0+-100 | | 16299 | CA-1/B-T0-2151-F |
| ASR99 | 0757-0438 | RESISTOR 5.11K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-5111-F |
| ASR100 | 0757-0438 | RESISTOR 5.11K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-5111-F |
| ASR101 | 0757-0438 | RESISTOR 5.11K 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-5111-F |
| ASR102 | 0698-3492 | 1 | | RESISTOR 2.67K 1K .125W F TC=0+-100 | 16299 |
| ASR103 | 0698-3492 | | RESISTOR 2.67K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2671-F |
| ASR104 | 0698-3492 | | RESISTOR 2.67K 1K .125W F TC=0+-100 | 16299 | CA-1/B-T0-2671-F |
| ASR105 | 0757-0390 | | RESISTOR 36.5 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-36R5-F |
| ASR106 | 0757-0393 | | RESISTOR 47.5 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-47R5-F |
| ASR107 | 0757-0427 | | 1 | RESISTOR 1.5K 1K .125W F TC=0+-100 | 24546 |
| ASR108 | 0757-0390 | RESISTOR 36.5 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-36R5-F |
| ASR109 | 0757-0409 | RESISTOR 274 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-274R-F |
| ASR110 | 0757-0404 | RESISTOR 130 1K .125W F TC=0+-100 | | 24546 | CA-1/B-T0-131-F |
| ASR111 | 0758-0002 | RESISTOR 560 5K .25W F TC=0+-100 | | 24546 | C5-1/4-T0-561-J |
| ASR112 | 0757-0442 | 1 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 |
| ASR113 | 0757-0429 | | RESISTOR 1.82K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1821-F |
| ASR114 | 0757-0401 | | RESISTOR 100 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-101-F |
| ASR115 | 0757-0390 | | RESISTOR 36.5 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-36R5-F |
| ASR116 | 0757-0442 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-T0-1002-F |

See table 6-3 for Manufacturer Code

Table 6-5 (cont'd). Board A5 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|-------------------|
| ASR117 | 0757-0442 | 9 | RESISTOR 10K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1002-F |
| ASR118 | 0757-0346 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR119 | 0698-3492 | | RESISTOR 2.67K 1% .125W F TC=0+-100 | 16299 | CA-1/B-TD-2671-F |
| ASR120 | 0758-0126 | | RESISTOR 51 5% .25W F TC=0+-100 | 24546 | CA-1/B-TD-5100-J |
| ASR121 | 0757-0407 | | RESISTOR 200 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-201-F |
| ASR122 | 0757-0419 | 2 | RESISTOR 681 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-681A-F |
| ASR123 | 0757-0419 | | RESISTOR 681 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-681A-F |
| ASR124 | 0757-0280 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| ASR125 | 0757-0437 | | RESISTOR 4.75K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-4751-F |
| ASR126 | 0757-0405 | | RESISTOR 162 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-162R-F |
| ASR127 | 0757-0399 | 4 | RESISTOR 82.5 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-8285-F |
| ASR128 | 0757-0411 | | RESISTOR 332 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-332R-F |
| ASR129 | 0757-0424 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1101-F |
| ASR130 | 0757-0420 | | RESISTOR 750 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-751-F |
| ASR131 | 0757-0278 | | RESISTOR 1.78K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1781-F |
| ASR132 | 0757-0438 | 1 | RESISTOR 5.11K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-5111-F |
| ASR133 | 0757-0426 | | RESISTOR 1.3K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1301-F |
| ASR134 | 0757-0407 | | RESISTOR 200 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-201-F |
| ASR135 | 0757-0436 | | RESISTOR 4.32K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-4321-F |
| ASR136 | 0757-0409 | | RESISTOR 274 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-274R-F |
| ASR137 | 0757-0430 | 1 | RESISTOR 2.21K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-2211-F |
| ASR138 | 0757-0274 | | RESISTOR 1.21K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1211-F |
| ASR139 | 0757-0405 | | RESISTOR 162 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1621-F |
| ASR140 | 0757-0401 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR141 | 0757-0410 | | RESISTOR 301 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-301R-F |
| ASR142 | 0757-0388 | 9 | RESISTOR 30.1 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-3011-F |
| ASR143 | 0757-0437 | | RESISTOR 4.75K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-4751-F |
| ASR144 | 0757-0280 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| ASR145 | 0757-0406 | | RESISTOR 182 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-182R-F |
| ASR146 | 0757-1094 | | RESISTOR 1.47K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1471-F |
| ASR147 | 0757-1094 | 1 | RESISTOR 1.47K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1471-F |
| ASR148 | 0757-0401 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR149 | 0757-0401 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR150 | 0757-0346 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR151 | 0757-0314 | | RESISTOR 432 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-432R-F |
| ASR152 | 0757-0398 | 3 | RESISTOR 75 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-7500-F |
| ASR153 | 0757-0424 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1101-F |
| ASR154 | 0757-0424 | | RESISTOR 1.1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1101-F |
| ASR155 | 0757-0280 | | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| ASR156 | 0757-0398 | | RESISTOR 75 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-7500-F |
| ASR157 | 0757-0280 | 5 | RESISTOR 1K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| ASR158 | 0757-0433 | | RESISTOR 3.32K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-3321-F |
| ASR159 | 0757-0384 | | RESISTOR 20 1% .125W F TC=0+-100 | 19701 | MF4C1/B-TD-20AD-F |
| ASR160 | 0757-0401 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR161 | 0757-0274 | | RESISTOR 2.21K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-2213-F |
| ASR162 | 0698-3158 | 1 | RESISTOR 23.7K 1% .125W F TC=0+-100 | 16299 | CA-1/B-TD-2372-F |
| ASR163 | 0757-0435 | | RESISTOR 5.11K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-5111-F |
| ASR164 | 0757-0346 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR165 | 0757-0346 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR166 | 0757-0401 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR167 | 0757-0407 | 2 | RESISTOR 200 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-201-F |
| ASR168 | 0757-0279 | | RESISTOR 3.16K 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-3161-F |
| ASR169 | 0757-0422 | | RESISTOR 509 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-509R-F |
| ASR170 | 0757-0346 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR171 | 0757-0346 | | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR172 | 0757-0346 | 4 | RESISTOR 10 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-1000-F |
| ASR173 | 0757-0395 | | RESISTOR 56.2 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-5622-F |
| ASR174 | 0757-0407 | | RESISTOR 200 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-201-F |
| ASR175 | 0757-0290 | | RESISTOR 6.19K 1% .125W F TC=0+-100 | 19701 | MF4C1/B-TD-6191-F |
| ASR176 | 0757-0408 | | RESISTOR 243 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-243R-F |
| ASR177 | 0683-1055 | 9 | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR178 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR179 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR180 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR181 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR182 | 0683-1055 | 1 | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR183 | 0757-0388 | | RESISTOR 30.1 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-30M1-F |
| ASR184 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR185 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR186 | 0683-1055 | | RESISTOR 1M 5% .25W FC TC=-800/+900 | 01121 | CB1055 |
| ASR187 | 0757-0422 | 5 | RESISTOR 509 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-509R-F |
| ASR188 | 2100-0354 | | RESISTOR-VAR TRMR 500 OHM 10% C TYP ADJ | 72PR500 | 72PR500 |
| ASR189 | 0757-0388 | | RESISTOR 30.1 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-30M1-F |
| ASR190 | 0757-0408 | | RESISTOR 243 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-243R-F |
| ASR191 | 0757-0408 | | RESISTOR 243 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-243R-F |
| ASR192 | 0757-0401 | 1 | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR192 | 0757-0401 | | RESISTOR 100 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| ASR193 | 0698-4422 | | RESISTOR 1.27K 1% .125W F TC=0+-100 | 16299 | CA-1/B-TD-1271-F |
| ASR193 | 0757-0412 | | RESISTOR 365 1% .125W F TC=0+-100 | 24546 | CA-1/B-TD-365R-F |

See table 6-3 for Manufacturer Codes

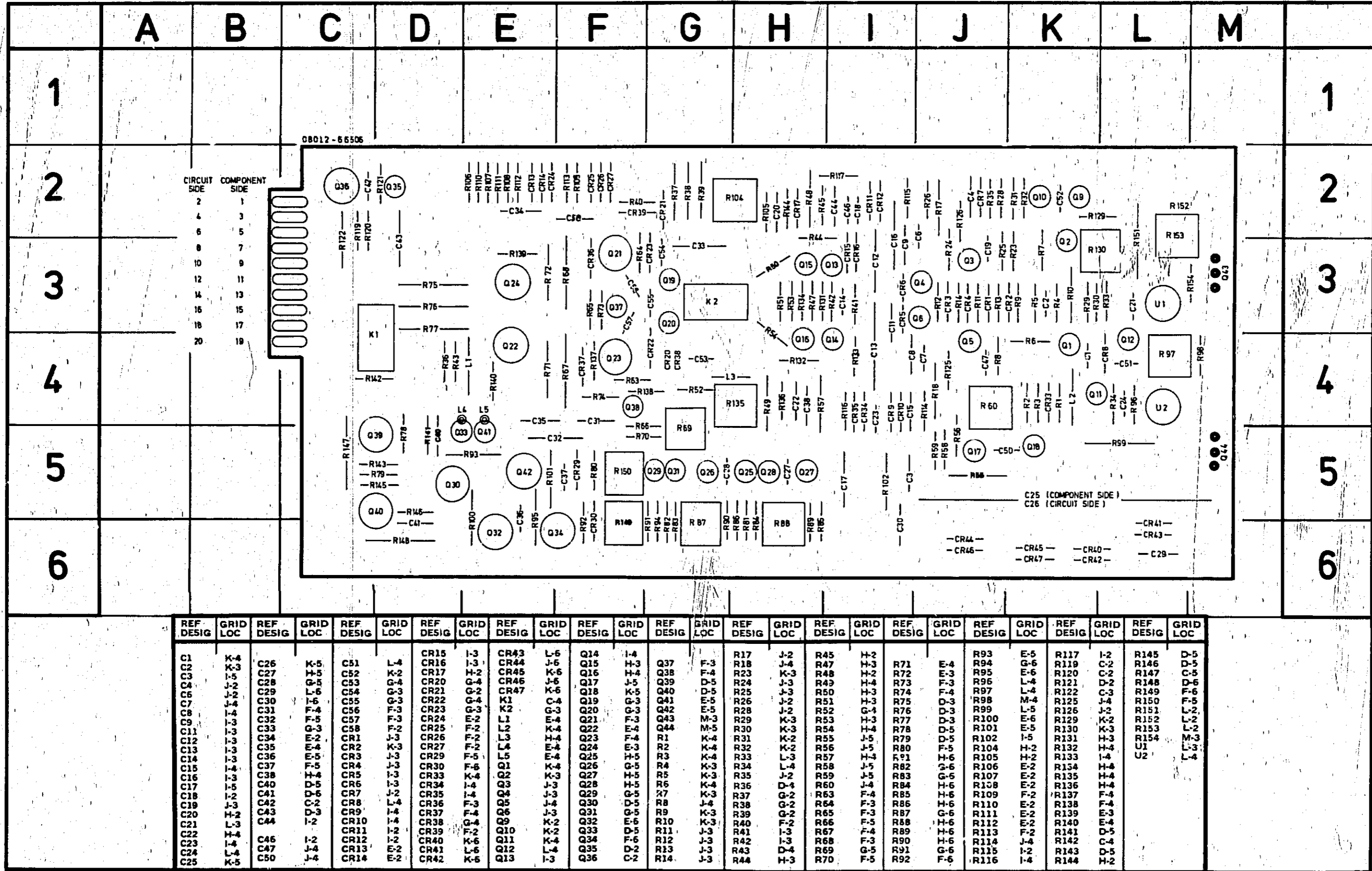


Figure 6-3. Component Layout - Board A6

Table 6-6. Board A6 Replaceable Part List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|-----------------|
| A6 | 08012-66506 | 1 | BOARD ASSEMBLY, INTEGRATED AMPLIFIER | 28480 | 08012-66506 |
| A6C1 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C2 | 0160-2198 | | CAPACITOR-FXD 20PF +-5R 300MVDC MICA | 28480 | 0160-2198 |
| A6C3 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C4 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C6 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C7 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C8 | 0160-0174 | 5 | CAPACITOR-FXD .47UF +80-20R 25MVDC CER | 28480 | 0160-0174 |
| A6C9 | 0160-0174 | | CAPACITOR-FXD .47UF +80-20R 25MVDC CER | 28480 | 0160-0174 |
| A6C11 | 0160-3713 | 1 | CAPACITOR-FXD 4700PF +-10R 250MVDC MET | 28480 | 0160-3713 |
| A6C12 | 0160-3724 | 1 | CAPACITOR-FXD .47UF +-10R 40MVDC MET | 28480 | 0160-3724 |
| A6C13 | 0160-0387 | 1 | CAPACITOR-FXD: 47UF+-5R 20VDC TA-SOLID | 56289 | 1500476X9020R2 |
| A6C14 | 0160-2204 | 1 | CAPACITOR-FXD 100PF +-5R 300MVDC MICA | 28480 | 0160-2204 |
| A6C15 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C16 | 0160-0374 | | CAPACITOR-FXD: 10UF+-10R 20VDC TA-SOLID | 56289 | 1500106X9020R2 |
| A6C17 | 0160-0374 | | CAPACITOR-FXD: 10UF+-10R 20VDC TA-SOLID | 56289 | 1500106X9020R2 |
| A6C18 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C19 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C20 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C21 | 0160-2940 | 2 | CAPACITOR-FXD 470PF +-5R 300MVDC MICA | 28480 | 0160-2940 |
| A6C22 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C23 | 0160-3443 | 1 | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0160-3443 |
| A6C24 | 0160-2940 | | CAPACITOR-FXD 470PF +-5R 300MVDC MICA | 28480 | 0160-2940 |
| A6C25 | 0160-1784 | 2 | CAPACITOR-FXD 1000UF +-75-10R 40VDC AL | 56289 | 390108G040GPA |
| A6C26 | 0160-1784 | | CAPACITOR-FXD 1000UF +-75-10R 40VDC AL | 56289 | 390108G040GPA |
| A6C27 | 0160-2139 | 8 | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C28 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C29 | 0160-4213 | 2 | CAPACITOR-FXD .1UF +-20R 50MVDC POLYE | 28480 | 0160-4213 |
| A6C30 | 0160-4213 | | CAPACITOR-FXD .1UF +-20R 50MVDC POLYE | 28480 | 0160-4213 |
| A6C31 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C32 | 0160-0374 | | CAPACITOR-FXD: 10UF+-10R 20VDC TA-SOLID | 56289 | 1500106X9020R2 |
| A6C33 | 0160-0374 | | CAPACITOR-FXD: 10UF+-10R 20VDC TA-SOLID | 56289 | 1500106X9020R2 |
| A6C34 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C35 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C36 | 0160-0309 | 2 | CAPACITOR-FXD: 4.7UF+-20R 10VDC TA | 56289 | 1500475X0010A2 |
| A6C37 | 0160-0309 | | CAPACITOR-FXD: 4.7UF+-20R 10VDC TA | 56289 | 1500475X0010A2 |
| A6C38 | 0160-0174 | | CAPACITOR-FXD .47UF +80-20R 25MVDC CER | 28480 | 0160-0174 |
| A6C40 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C41 | 0150-0121 | | CAPACITOR-FXD .1UF +80-20R 50MVDC CER | 28480 | 0150-0121 |
| A6C42 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C43 | 0160-0229 | 1 | CAPACITOR-FXD: 33UF+-10R 10VDC TA-SOLID | 56289 | 1500336X9010B2 |
| A6C46 | 0160-0174 | | CAPACITOR-FXD .47UF +80-20R 25MVDC CER | 28480 | 0160-0174 |
| A6C46 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C47 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C48 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C51 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C52 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C53 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C54 | 0160-2055 | | CAPACITOR-FXD .01UF +80-20R 100MVDC CER | 28480 | 0160-2055 |
| A6C55 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C56 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C57 | 0160-2139 | | CAPACITOR-FXD 220PF +80-20R 1000MVDC CER | 28480 | 0160-2139 |
| A6C58 | 0160-0174 | | CAPACITOR-FXD .47UF +80-20R 25MVDC CER | 28480 | 0160-0174 |
| A6C59 | 0160-2255 | | CAPACITOR-FXD 8.2PF | | |
| A6C59 | 0160-2249 | | CAPACITOR-FXD 4.7PF | | |
| A6C85 | 1901-0533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A6C86 | 1901-0533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A6C87 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C88 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C89 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |
| A6C10 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |
| A6C11 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |
| A6C12 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |
| A6C13 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C14 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C15 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |
| A6C16 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |
| A6C17 | 1910-0022 | | DIODE-GE 5V 60MA 3.5NS DO-7 | 28480 | 1910-0022 |
| A6C20 | 1902-3104 | 2 | DIODE-ZNR 5.62V 5R DO-7 PD=.4W TC=+.016R | 04713 | 52 10939-110 |
| A6C21 | 1902-3104 | | DIODE-ZNR 5.62V 5R DO-7 PD=.4W TC=+.016R | 04713 | 52 10939-110 |
| A6C22 | 1902-3137 | 2 | DIODE-ZNR 8.06V 2R DO-7 PD=.4W TC=+.052R | 04713 | 52 10939-156 |
| A6C23 | 1902-3137 | | DIODE-ZNR 8.06V 2R DO-7 PD=.4W TC=+.052R | 04713 | 52 10939-156 |
| A6C24 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C25 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C26 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C27 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C29 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C30 | 1901-0040 | | DIODE-SWITCHING 30V 50MA 2NS DO-35 | 28480 | 1901-0040 |
| A6C33 | 1902-3139 | 1 | DIODE-ZNR 8.25V 5R DO-7 PD=.4W TC=+.053R | 04713 | 52 10939-158 |
| A6C34 | 1901-0179 | | DIODE-SWITCHING 15V 50MA 750PS DO-7 | 28480 | 1901-0179 |

See table 6-3 for Manufacturer Codes

Table 6-6 (cont'd). Board A6 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|--|----------|-----------------|
| A6CR35 | 1901-0179 | | DIODE-SWITCHING 15V 40MA 750PS DO-7 | 28480 | 1901-0179 |
| A6CR36 | 1901-C533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A6CR37 | 1901-0533 | | DIODE-SCHOTTKY | 28480 | 1901-0533 |
| A6CR38 | 1902-0049 | | DIODE-PWR 6.19V 5R DO-7 PD=4W TC=+.022K | 04713 | 52 10929-122 |
| A6CR39 | 1902-0049 | | DIODE-PWR 6.19V 5R DO-7 PD=4W TC=+.022K | 04713 | 52 10539-122 |
| A6CR40 | 1901-0159 | 8 | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR41 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR42 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR43 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR44 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR45 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR46 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6CR47 | 1901-0159 | | DIODE-PWR RECT 400V 750MA DO-41 | 04713 | 5P1358-4 |
| A6K1 | 0490-1079 | 1 | RELAY-REFD 1A .5A 100V CNT 5V-COIL | 28480 | 0490-1079 |
| A6K2 | 0490-0617 | 1 | RELAY-REFD 1C .25A 28V CNT 5V-COIL | 28480 | 0490-0617 |
| A6L1 | 9100-C119 | 2 | COIL-FXD MOLDED WF CHUCKE 500UH 5R | 24226 | 177503 |
| A6L2 | 9100-1612 | 1 | COIL-FXD MOLDED WF CHUCKE .33UH 20R | 24226 | 157330 |
| A6L3 | 9100-2247 | 1 | COIL-FXD MOLDED WF CHUCKE .1UH 10R | 24226 | 107100 |
| A6MP3 | 1205-0037 | 8 | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP4 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP5 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP6 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP15 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP16 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP19 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP20 | 1205-0037 | | HEAT-DISSIPATOR SGL TO-36 PKG | 28480 | 1205-0037 |
| A6MP21 | 1205-0037 | 6 | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q21 | 28480 | 1205-0037 |
| A6MP22 | 1205-0237 | 2 | HEAT DISSIPATOR, Q22 (SEE MP43) | 28480 | 1205-0237 |
| A6MP23 | 1205-0033 | | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q23 | 28480 | 1205-0033 |
| A6MP24 | 1205-0237 | | HEAT DISSIPATOR, Q24 (SEE MP43) | 28480 | 1205-0237 |
| A6MP30 | 1205-0033 | | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q30 | 28480 | 1205-0033 |
| A6MP32 | 1205-0033 | | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q32 | 28480 | 1205-0033 |
| A6MP34 | 1205-0033 | | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q34 | 28480 | 1205-0033 |
| A6MP39 | 1205-0213 | 2 | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q39 | 28480 | 1205-0213 |
| A6MP40 | 1205-0213 | | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q40 | 28480 | 1205-0213 |
| A6MP42 | 1205-0033 | | HEAT-DISSIPATOR SGL TO-5/YO-39 PKG, Q42 | 28480 | 1205-0033 |
| A6MP43 | 08012-01101 | 1 | HEAT SINK Q22, Q24 (SEE MP22, MP24) | 28480 | 08012-01101 |
| A6MP44 | 08012-01201 | 1 | BRACKET, P.C. BOARD | 28480 | 08012-01201 |
| A6MP45 | 2220-0010 | 1 | SCREW-MACH 4-40 .5-IN-LG FIL-HD SLT-REC | 28480 | 2220-0010 |
| A6MP46 | 2190-0030 | 1 | WASHER-1K HCLC NO. 4 .115 IN ID .173 IN | 28480 | 2190-0030 |
| A6MP47 | 0340-0473 | 1 | INSULATOR, TRANSISTOR | 28480 | 0340-0473 |
| A6MP48 | 0340-0720 | 1 | INSULATOR-MSTR TO-18 .1-TMR | 28480 | 0340-0720 |
| A6MP49 | 0380-0741 | 2 | STANDOFF-RVT-OM .187LG 6-32TMD .250D BMS | 28480 | 0380-0741 |
| A6MP50 | 0380-0741 | | STANDOFF-RVT-OM .187LG 6-32TMD .250D BMS | 28480 | 0380-0741 |
| A6MP51 | 1200-0185 | 1 | INSULATOR-MSTR TO-5 .075-TMR | 28480 | 1717-B8N RED |
| A6Q1 | 1854-0260 | 4 | TRANSISTOR NPN 2N3227 5I TO-18 PD=360MW | 04713 | 2N3227 |
| A6Q2 | 1854-0260 | | TRANSISTOR NPN 2N3227 5I TO-18 PD=360MW | 04713 | 2N3227 |
| A6Q3 | 1853-0357 | | TRANSISTOR PNP 5I TO-18 PD=360MW | 28480 | 1853-0357 |
| A6Q4 | 1853-0357 | | TRANSISTOR PNP 5I TO-18 PD=360MW | 28480 | 1853-0357 |
| A6Q5 | 1854-0630 | 2 | TRANSISTOR NPN 5I TO-52 PD=360MW | 04713 | 552077 |
| A6Q6 | 1854-0630 | | TRANSISTOR NPN 5I TO-52 PD=360MW | 04713 | 552077 |
| A6Q9 | 1854-0215 | | TRANSISTOR NPN 5I PD=350MW FT=300MHZ | 04713 | 5P5 3611 |
| A6Q10 | 1853-0036 | | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q11 | 1853-0036 | | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q12 | 1854-0215 | | TRANSISTOR NPN 5I PD=350MW FT=300MHZ | 04713 | 5P5 3611 |
| A6Q13 | 1854-0260 | | TRANSISTOR NPN 2N3227 5I TO-18 PD=360MW | 04713 | 2N3227 |
| A6Q14 | 1853-0036 | | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q15 | 1853-0357 | | TRANSISTOR PNP 5I TO-18 PD=360MW | 28480 | 1853-0357 |
| A6Q16 | 1854-0260 | | TRANSISTOR NPN 2N3227 5I TO-18 PD=360MW | 04713 | 2N3227 |
| A6Q17 | 1854-0215 | | TRANSISTOR NPN 5I PD=350MW FT=300MHZ | 04713 | 5P5 3611 |
| A6Q18 | 1853-0036 | | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q19 | 1853-0357 | | TRANSISTOR PNP 5I TO-18 PD=360MW | 28480 | 1853-0357 |
| A6Q20 | 1854-0345 | | TRANSISTOR NPN 2N5179 5I TO-72 PD=200MW | 04713 | 2N5179 |
| A6Q21 | 1853-0201 | | TRANSISTOR PNP 5I TO-39 PD=1W FT=1GHZ | 28480 | 1853-0201 |
| A6Q22 | 1854-0332 | 2 | TRANSISTOR NPN 5I TO-39 PD=1W FT=800MHZ | 28480 | 1854-0332 |
| A6Q23 | 1854-0332 | | TRANSISTOR NPN 5I TO-39 PD=1W FT=800MHZ | 28480 | 1854-0332 |
| A6Q24 | 1853-0201 | | TRANSISTOR PNP 5I TO-39 PD=1W FT=1GHZ | 28480 | 1853-0201 |
| A6Q25 | 1853-0036 | | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q26 | 1854-0215 | | TRANSISTOR NPN 5I PD=350MW FT=300MHZ | 04713 | 5P5 3611 |
| A6Q27 | 1854-0215 | | TRANSISTOR NPN 5I PD=350MW FT=300MHZ | 04713 | 5P5 3611 |
| A6Q28 | 1853-0036 | | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q29 | 1854-0215 | | TRANSISTOR NPN 5I PD=350MW FT=300MHZ | 04713 | 5P5 3611 |
| A6Q30 | 1853-0027 | | TRANSISTOR PNP 5I TO-39 PD=1W FT=100MHZ | 28480 | 1853-0027 |
| A6Q31 | 1853-0036 | 2 | TRANSISTOR PNP 5I PD=310MW FT=250MHZ | 28480 | 1853-0036 |
| A6Q32 | 1853-0027 | | TRANSISTOR PNP 5I TO-39 PD=1W FT=100MHZ | 28480 | 1853-0027 |

See table 6-3 for Manufacturer Codes

Table 6-6 (cont'd), Board A6 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----|---|----------|------------------|
| A6Q33 | 1854-0215 | 2 | TRANSISTOR NPN SI PD=350MH FT=300MHZ | 04713 | SPS 3611 |
| A6Q34 | 1854-0039 | | TRANSISTOR NPN 2N3053 SI TO-5 PD=1W | 04713 | 2N3053 |
| A6Q35 | 1853-0036 | | TRANSISTOR PNP SI PD=310MH FT=250MHZ | 28480 | 1853-0036 |
| A6Q36 | 1854-0013 | | TRANSISTOR NPN 2N2218A SI TO-5 PD=800MH | 04713 | 2N2218A |
| A6Q37 | 1853-0036 | | TRANSISTOR PNP SI PD=310MH FT=250MHZ | 28480 | 1853-0036 |
| A6Q38 | 1854-0215 | 1 | TRANSISTOR NPN SI PD=350MH FT=300MHZ | 04713 | SPS 3611 |
| A6Q39 | 1853-0045 | | TRANSISTOR PNP 2N4036 SI TO-5 PD=1W | 02735 | 2N4036 |
| A6Q40 | 1854-0448 | | TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ | 28480 | 1854-0448 |
| A6Q41 | 1853-0036 | | TRANSISTOR PNP SI PD=310MH FT=250MHZ | 28480 | 1853-0036 |
| A6Q42 | 1854-0039 | | TRANSISTOR NPN 2N3053 SI TO-5 PD=1W | 04713 | 2N3053 |
| A6Q43 | 1854-0433 | 2 | TRANSISTOR NPN SI PD=90M FT=2MHZ | 28480 | 1854-0433 |
| A6Q44 | 1854-0433 | | TRANSISTOR NPN SI PD=90M FT=2MHZ | 28480 | 1854-0433 |
| A6R1 | 0757-0402 | 1 | RESISTOR 110 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-111-F |
| A6R2 | 0757-0424 | | RESISTOR 1.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1101-F |
| A6R3 | 0698-0083 | | RESISTOR 1.9K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-1961-F |
| A6R4 | 0698-0083 | | RESISTOR 1.9K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-1961-F |
| A6R5 | 0757-0420 | | RESISTOR 750 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-751-F |
| A6R6 | 0757-0398 | 1 | RESISTOR 75 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-750-F |
| A6R7 | 0757-0393 | | RESISTOR 67.5 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-675-F |
| A6R8 | 0757-0395 | | RESISTOR 56.2 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-562-F |
| A6R9 | 0757-0393 | | RESISTOR 67.5 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-675-F |
| A6R10 | 0758-0127 | | RESISTOR 430 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-431-J |
| A6R11 | 0757-0388 | 2 | RESISTOR 30.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-301-F |
| A6R12 | 0757-0388 | | RESISTOR 30.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-301-F |
| A6R13 | 0757-0388 | | RESISTOR 30.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-301-F |
| A6R14 | 0757-0388 | | RESISTOR 30.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-301-F |
| A6R17 | 0758-0062 | | RESISTOR 200 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-201-J |
| A6R18 | 0758-0062 | 1 | RESISTOR 200 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-201-J |
| A6R19 | 0757-0280 | | RESISTOR 1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| A6R23 | 0757-0280 | | RESISTOR 1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| A6R24 | 0757-0280 | | RESISTOR 1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| A6R25 | 0757-0418 | | RESISTOR .114 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-619-F |
| A6R28 | 0698-3496 | 4 | RESISTOR 3.57K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R29 | 0698-3496 | | RESISTOR 3.57K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R30 | 0698-3136 | | RESISTOR 17.8K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-178-F |
| A6R31 | 0698-3136 | | RESISTOR 17.8K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-178-F |
| A6R32 | 0698-3155 | | RESISTOR 4.64K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-464-F |
| A6R33 | 0698-3155 | 3 | RESISTOR 4.64K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-464-F |
| A6R34 | 0698-3242 | | RESISTOR 357 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R35 | 0698-3242 | | RESISTOR 357 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R36 | 0757-0437 | | RESISTOR 4.75K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-475-F |
| A6R37 | 0758-0013 | | RESISTOR 120 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-121-J |
| A6P38 | 0758-0013 | 1 | RESISTOR 120 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-121-J |
| A6P39 | 0758-0013 | | RESISTOR 120 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-121-J |
| A6P40 | 0757-0408 | | RESISTOR 243 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-243-F |
| A6P41 | 0757-0397 | | RESISTOR 68.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-681-F |
| A6P42 | 0757-0346 | | RESISTOR 10 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10R-F |
| A6R43 | 0757-0200 | 3 | RESISTOR 5.62K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-562-F |
| A6R44 | 0757-0346 | | RESISTOR 10 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10R-F |
| A6R45 | 0757-0615 | | RESISTOR 475 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-475-F |
| A6R47 | 0757-0240 | | RESISTOR 1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| A6R48 | 0758-0030 | | RESISTOR 510 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-511-J |
| A6R49 | 0758-0066 | 1 | RESISTOR 620 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-621-J |
| A6R50 | 0757-0403 | | RESISTOR 121 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-121-F |
| A6R51 | 0757-0403 | | RESISTOR 162 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-162-F |
| A6R52 | 0757-0284 | | RESISTOR 150 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-151-F |
| A6R53 | 0757-0389 | | RESISTOR 33.2 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-332-F |
| A6R54 | 0757-0389 | 1 | RESISTOR 33.2 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-332-F |
| A6R55 | 0757-0426 | | RESISTOR 1.3K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1301-F |
| A6R56 | 0698-3492 | | RESISTOR 2.67K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-2671-F |
| A6R57 | 0758-0007 | | RESISTOR 150 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-151-J |
| A6R58 | 0698-3742 | | RESISTOR 357 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6P59 | 0757-0273 | 3 | RESISTOR 3.01K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-3011-F |
| A6R60 | 2100-3211 | | RESISTOR-VAR TRMR 100OHM 10K C TOP ADJ | 73138 | Z2PR1K |
| A6R63 | 0757-0388 | | RESISTOR 30.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-3011-F |
| A6R64 | 0757-0388 | | RESISTOR 30.1 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-3011-F |
| A6R65 | 0757-0400 | | RESISTOR 90.9 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-909-F |
| A6R66 | 0757-0400 | 2 | RESISTOR 90.9 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-909-F |
| A6R67 | 0698-3497 | | RESISTOR 43 5K 1W MD TC=0+-200 | 16299 | FP32-1-TD-43RD-J |
| A6R68 | 0698-3497 | | RESISTOR 43 5K 1W MD TC=0+-200 | 16299 | FP32-1-TD-43RD-J |
| A6R69 | 2100-3210 | | RESISTOR-VAR TRMR 100OHM 10K C TOP ADJ | 73138 | Z2PR1K |
| A6R70 | 0757-0448 | | RESISTOR 18.2K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1822-F |
| A6R71 | 0698-3887 | 2 | RESISTOR 30 5K .25W F TC=0+-100 | C4005 | CCA |
| A6R72 | 0698-3887 | | RESISTOR 30 5K .25W F TC=0+-100 | C4005 | CCA |
| A6R73 | 0757-0417 | | RESISTOR 562 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-562-F |
| A6R74 | 0757-0417 | | RESISTOR 562 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-562-F |
| A6R75 | 0761-0035 | | RESISTOR 150 5K 1W MD TC=0+-200 | 24546 | FP32-1-TD-151-J |

See table 6-3 for Manufacturer Codes

Table 6-6 (cont'd), Board A6 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|-----------------------|----------------|-----------------------------------|---|------------------|-------------------|
| A6R76 | 0761-0035 | 2 | RESISTOR 150 5K 1W MD TC=0+-200 | 24546 | FP32-1-TD-151-J |
| A6R77 | 0761-0035 | | RESISTOR 150 5K 1W MD TC=0+-200 | 24546 | FP32-1-TD-151-J |
| A6R78 | 0757-0288 | | RESISTOR 5.09K 1K .125W F TC=0+-100 | 19701 | MFAC1/B-TD-9091-F |
| A6R79 | 0757-0288 | | RESISTOR 5.09K 1K .125W F TC=0+-100 | 19701 | MFAC1/B-TD-9091-F |
| A6R80 | 0757-0411 | | RESISTOR 332 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-332-F |
| A6R81 | 0757-0274 | 1 | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1213-F |
| A6R82 | 0757-0274 | | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1213-F |
| A6R83 | 0698-3242 | | RESISTOR 357 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R84 | 0698-3242 | | RESISTOR 357 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R85 | 0757-0274 | | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1213-F |
| A6R86 | 0757-0274 | 1 | RESISTOR 1.21K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1213-F |
| A6R87 | 2100-0554 | | RESISTOR-VAR TRMR 500 OHM 10K C TOP ADJ | 73138 | Z2PR500 |
| A6R88 | 2100-0554 | | RESISTOR-VAR TRMR 500 OHM 10K C TOP ADJ | 73138 | Z2PR500 |
| A6R89 | 0698-3496 | | RESISTOR 3.57K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R90 | 0698-3496 | | RESISTOR 3.57K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-357-F |
| A6R91 | 0757-0280 | 4 | RESISTOR 1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| A6R92 | 0757-0411 | | RESISTOR 32 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-32-F |
| A6R93 | 0758-0033 | | RESISTOR 56 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-56R-J |
| A6R94 | 0757-0280 | | RESISTOR 1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1001-F |
| A6R95 | 0758-0093 | | RESISTOR 56 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-56R-J |
| A6R96 | 0757-0435 | 2 | RESISTOR 3.02K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-3021-F |
| A6R97 | 2100-3211 | | RESISTOR-VAR TRMR 100OHM 10K C TOP ADJ | 73138 | Z2PR1K |
| A6R98 | 0698-3492 | | RESISTOR 2.67K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-2671-F |
| A6R99 | 0811-0929 | | RESISTOR 51 2W 2W TC=0+-800 | 75042 | BW2-R51-J |
| A6R100 | 0758-0393 | | RESISTOR 56 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-56R-J |
| A6R101 | 0758-0029 | 1 | RESISTOR 470 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-471-J |
| A6R102 | 2100-2740 | | RESISTOR-VAR TRMR 22K OHM 20K | 28480 | 2100-2740 |
| A6R103 | 0757-0442 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F |
| A6R104 | 0757-0450 | | RESISTOR 22.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-2212-F |
| A6R105 | 0757-0442 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F |
| A6R106 | 0757-0450 | 4 | RESISTOR 22.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-2212-F |
| A6R107 | 0757-0450 | | RESISTOR 22.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-2212-F |
| A6R108 | 0757-0450 | | RESISTOR 22.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-2212-F |
| A6R109 | 0757-0450 | | RESISTOR 22.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-2212-F |
| A6R110 | 0757-0444 | | RESISTOR 12.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1212-F |
| A6R111 | 0757-0444 | 4 | RESISTOR 12.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1212-F |
| A6R112 | 0757-0444 | | RESISTOR 12.1K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1212-F |
| A6R113 | 0757-0442 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F |
| A6R114 | 0757-0442 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F |
| A6R115 | 0757-0442 | | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F |
| A6R116 | 0757-0442 | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F | |
| A6R117 | 0757-0442 | 1 | RESISTOR 10K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-10K2-F |
| A6R118 | 0698-3155 | | RESISTOR 3.03K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-3031-F |
| A6R119 | 0698-3155 | | RESISTOR 4.64K 1K .125W F TC=0+-100 | 16299 | CA-1/B-TD-4641-F |
| A6R120 | 0757-0411 | | RESISTOR 332 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-332-F |
| A6R121 | 0758-0024 | | RESISTOR 100 5K .25W F TC=0+-100 | 24546 | CS-1/A-TD-101-J |
| A6R122 | 0757-0388 | 1 | RESISTOR 20 1K .125W F TC=0+-100 | 19701 | MFAC1/B-TD-20RD-F |
| A6R123 | 0757-0388 | | RESISTOR 20 1K .125W F TC=0+-100 | 19701 | MFAC1/B-TD-20RD-F |
| A6R124 | 0757-0200 | | RESISTOR 5.62K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-5621-F |
| A6R125 | 2100-3211 | | RESISTOR-VAR TRMR 100OHM 10K C TOP ADJ | 73138 | Z2PR100K |
| A6R126 | 0757-0456 | | RESISTOR 43.2K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-4322-F |
| A6R127 | 0757-0290 | 1 | RESISTOR 6.19K 1K .125W F TC=0+-100 | 19701 | MFAC1/B-TD-6191-F |
| A6R128 | 0757-0442 | | RESISTOR 11K 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-1102-F |
| A6R129 | 2100-2782 | | RESISTOR-VAR TRMR 100OHM 20K LIN 0.5W | 28480 | 2100-2782 |
| A6R130 | 0757-0401 | | RESISTOR 100 1K .125W F TC=0+-100 | 24546 | CA-1/B-TD-101-F |
| A6R131 | 0698-0084</ | | | | |

08012-66507

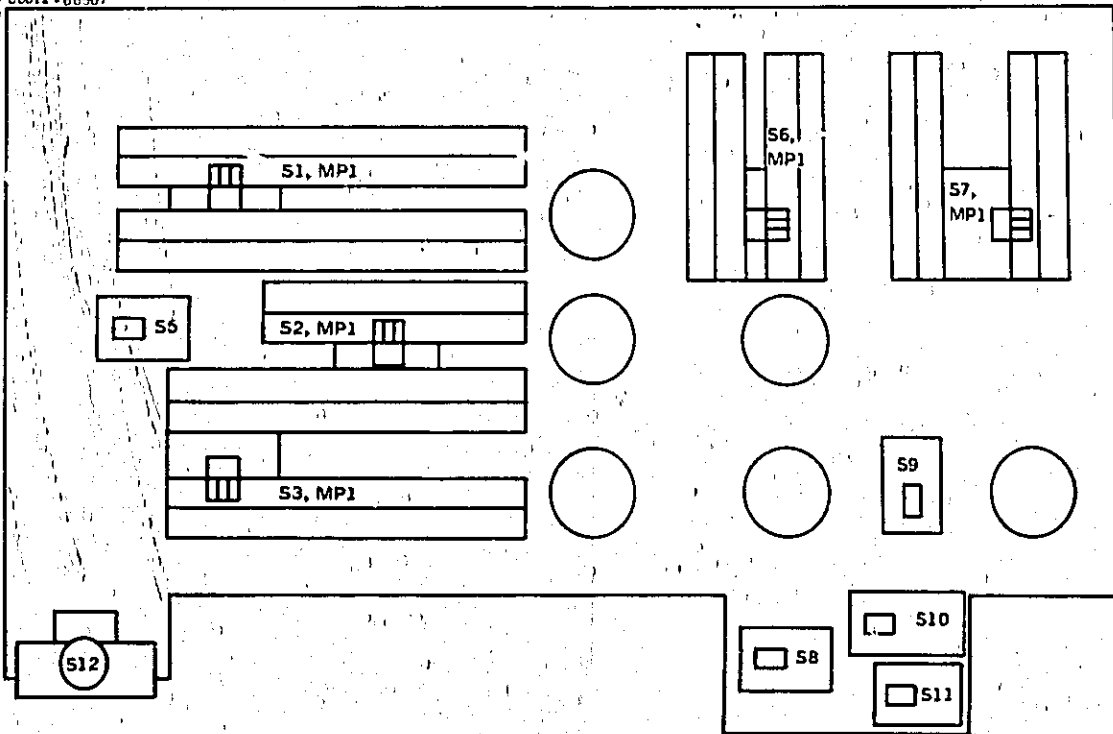


Figure 6-4. Component Layout – Board A7 – Front View

Table 6-7. Board A7 Replaceable Parts List

| Reference Designation | HP Part Number | Qty | Description | Mfr Code | Mfr Part Number |
|---|--|-----------------------|---|--|--|
| A7 | 08012-66507 | 1 | BOARD ASSEMBLY, MOTHER | 28480 | 08012-66507 |
| A7J5 | 1251-2026 | 1 | CONNECTOR-PC EDGE 18-CONY/RDM 2-ROWS | 71785 | 252-18-3J-300 |
| A7L1 A7L2 | 9140-0118 5081-1973 | 1 | COIL-FKD MOLDED RF CHUKE 500UH 5% IND AY (3 BEADS) | 24226 | 197303 |
| A7P1 A7R8 A7R9 A7R10 A7R18 A7R19 | 5020-3440 0757-0437 0757-0200 0757-0407 0760-0027 0760-0027 | 5 | SPRING DETENT TOP 51, 52, 53, 56, 57 RESISTOR 4.75K 1% .125W F TC=0+-100 RESISTOR 5.12K 1% .125W F TC=0+-100 RESISTOR 200 1% .125W F TC=0+-100 RESISTOR 200 2% 1W MD TC=0+-200 RESISTOR 150 2% 1W MD TC=0+-200 | 28480 24546 24546 24546 FR003 FR003 | 5020-3440 CA-1/8-TO-6751-F CA-1/8-TO-5821-F CA-1/8-TO-201-F C32 C32 |
| A7R20 A7R21 A7R22 A7R23 A7R24 | 0757-0172 0760-0026 0760-0026 0757-0799 0698-3616 | 1 2 | RESISTOR 37.4 1% .5W F TC=0+-100 RESISTOR 75 2% 1W MD TC=0+-200 RESISTOR 75 2% 1W MD TC=0+-200 RESISTOR 121 1% .5W F TC=0+-100 RESISTOR 62 5% 2W MD TC=0+-200 | 19701 FR003 FR003 19701 16299 | MF7C1/2-TO-3794-F C32 C32 MF7C-1/2-TO-1219-F FP42-2-TO-6290-J |
| A7R25 A7R26 A7R27 A7R33 | 0758-0034 0757-0071 0698-4476 0758-0028 | 1 1 1 1 | RESISTOR 62 5% .25W F TC=0+-100 RESISTOR 247.5 1% .25W F TC=0+-100 RESISTOR 18.2K 1% .125W F TC=0+-100 RESISTOR 270 5% .25W F TC=0+-100 | 24546 19701 24546 24546 | C5-1/4-TO-6290-J MF52C1/4-TO-247.5-F CA-1/8-TO-1022-F C5-1/4-TO-271-J |
| A7S1 A7S2 A7S3 A7S5 A7S6 | 5040-1109 5040-1109 5040-1110 3101-1311 5040-1111 | 2 1 1 4 1 | SLIDE ASSEMBLY, P.C. SWITCH SLIDE ASSEMBLY, P.C. SWITCH SLIDE ASSEMBLY, P.C. SWITCH SWITCH-SL DPDT-MS STD .5A 125VAC/DC SLIDE ASSEMBLY, P.C. SWITCH | 28480 28480 28480 28480 28480 | 5040-1109 5040-1109 5040-1110 3101-1311 5040-1111 |
| A7S7 A7S8 A7S9 A7S10 A7S11 | 5040-1112 3101-1311 3101-1311 3101-1311 3101-1311 | 1 1 1 1 1 | SLIDE ASSEMBLY, P.C. SWITCH SWITCH-SL DPDT-MS STD .5A 125VAC/DC SWITCH-SL DPDT-MS STD .5A 125VAC/DC SWITCH-SL DPDT-MS MINTR .5A 125VAC/DC PC SWITCH-SL DPDT-MS STD .5A 125VAC/DC | 28480 28480 28480 79727 28480 | 5040-1112 3101-1311 3101-1311 G1285-0004 3101-1311 |
| A7S12 | 3101-1720 | 1 | SWITCH-PB DPDT P-P 4A 250VAC | 28480 | 3101-1720 |
| A7X6 | 1251-2034 | 1 | CONNECTOR-PC EDGE 10-CONY/RDM 2-ROWS | 71785 | 252-10-30-300 |

See table 6-3 for Manufacturer Codes

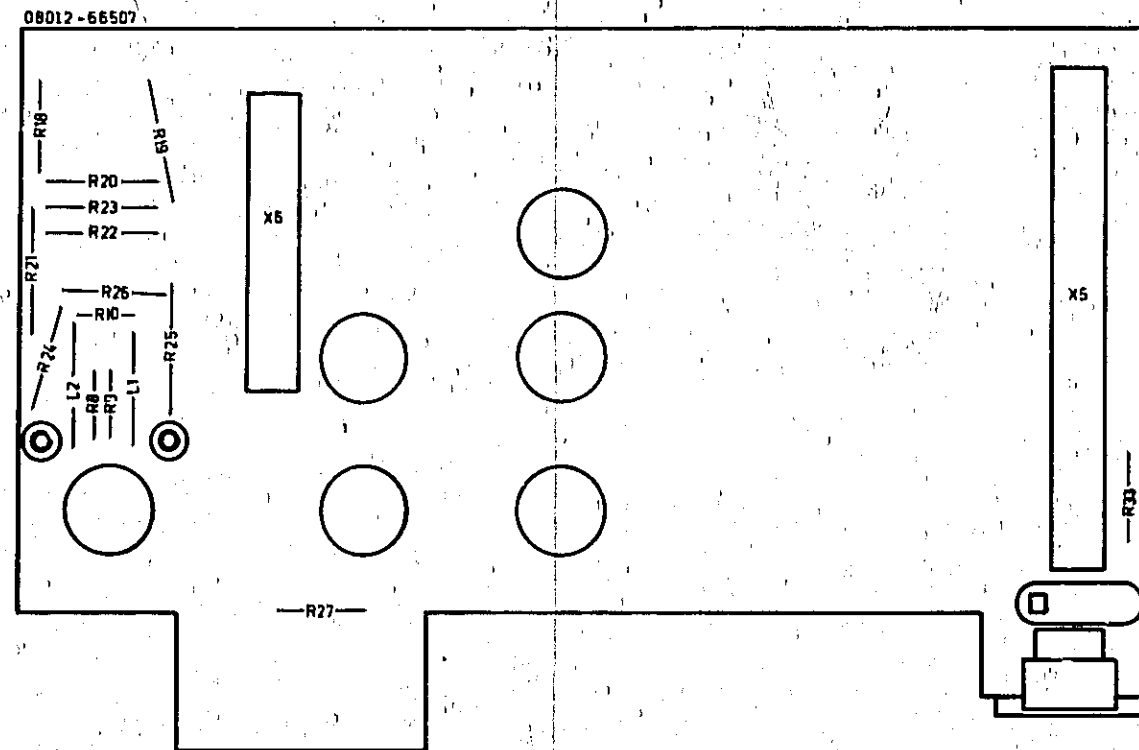


Figure 6-5. Component Layout - Board A7 - Rear View

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT (+) |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORM 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAINING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

No external input signal

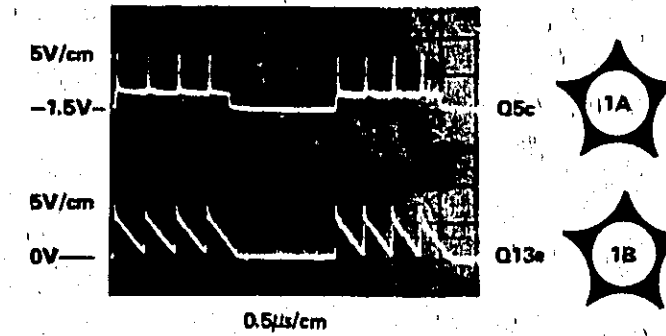
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1C01A and 1B21A plug-ins was used for the waveform measurements.

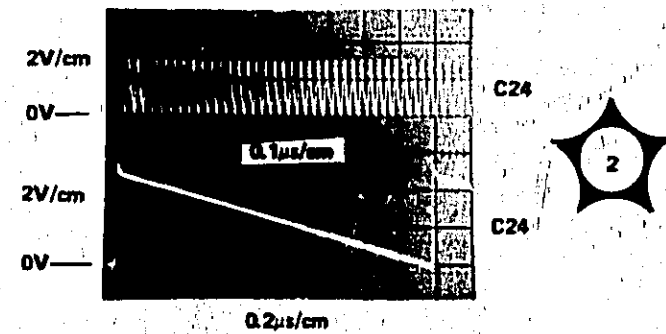
4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d.c. measurements (see note 1) except for:

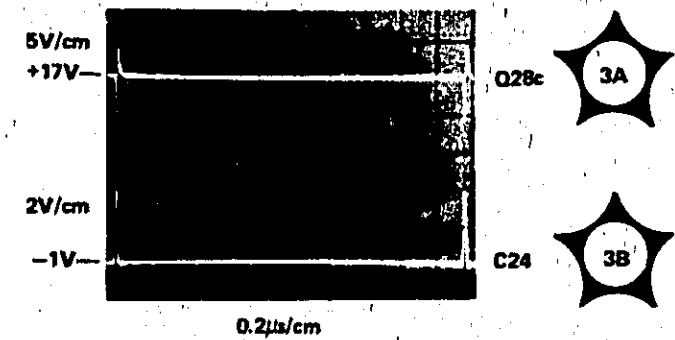
EXTERNAL GATE INPUT (21) 330KHz
 PULSE PERIOD (2) 20n-1μ
 VERNIER (3) Center

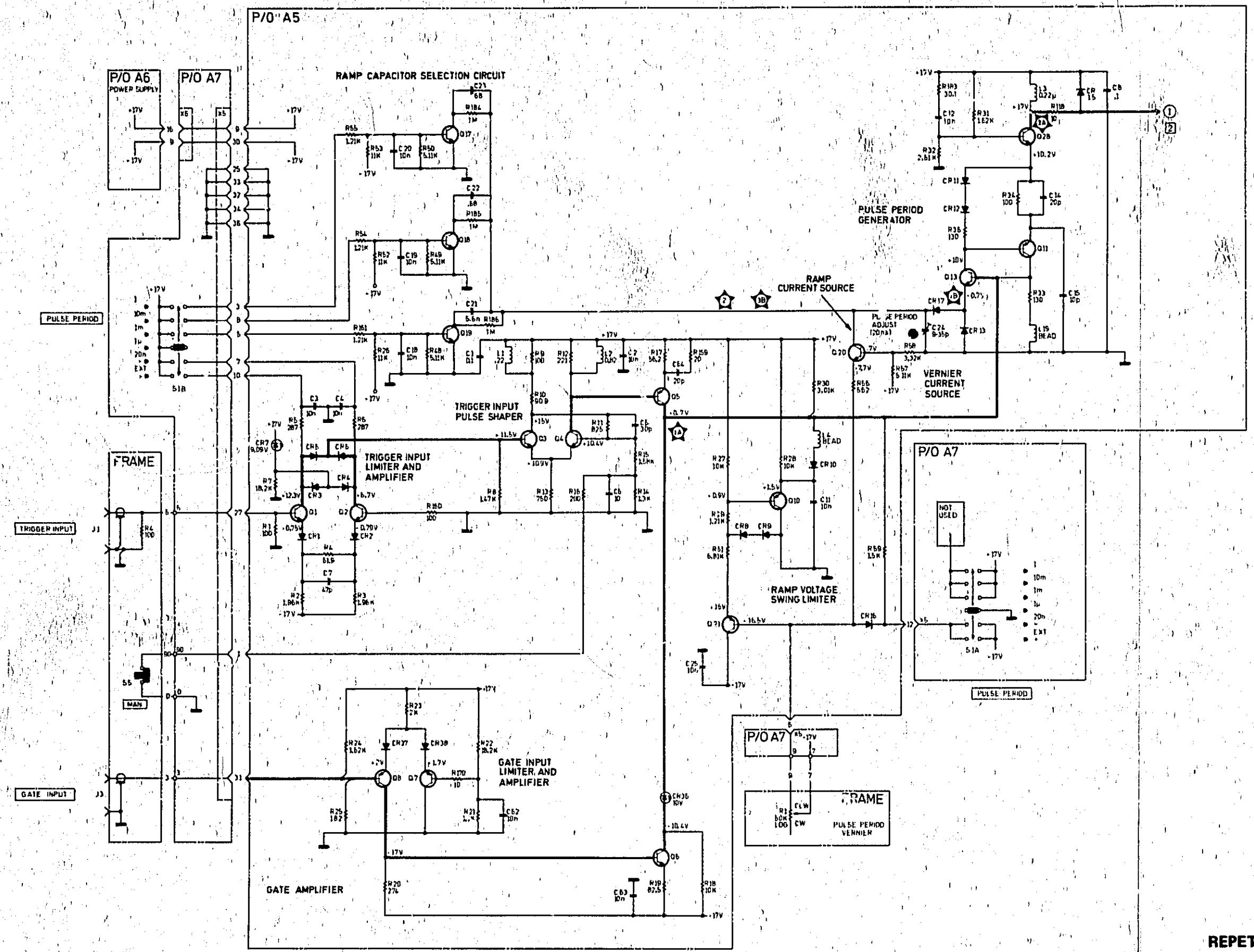


PULSE PERIOD (2) 20n-1μ
 VERNIER (3) CCW
 VERNIER (3) CW



PULSE PERIOD (2) EXT (+)
 EXTERNAL TRIGGER INPUT (22) sine wave ≈ 500 KHz





REPETITION RATE GENERATOR 8012B

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

- | | |
|--|---------|
| PULSE PERIOD 2 | EXT(+) |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| (but set to SQUARE WAVE for voltages marked SW). | |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |
| (but set to RZ and EXT WIDTH for voltages marked RZ and EXT WIDTH respectively). | |

No external input signal required

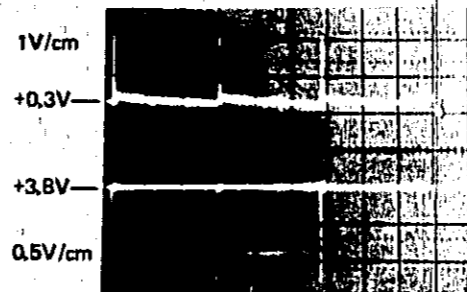
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

4. A model 8015A pulse generator was used to provide the external input signal.

Pulse settings as for d. c. measurements (see note 1) except for:

- PULSE PERIOD ② 20n-1μ
 VERNIER ③ CW

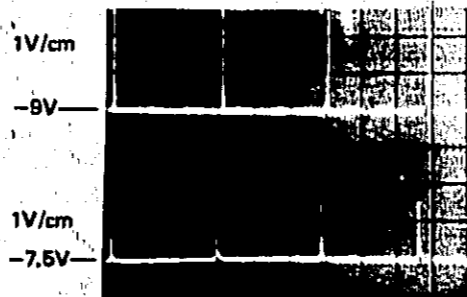


Q9c 4A

Q12c 4B

0.5μs/cm

- PULSE PERIOD ② 20n-1μ
 VERNIER ③ CW
 PULSE WIDTH ⑦ SQUARE WAVE

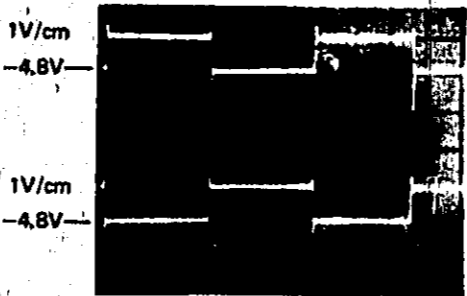


Q15c 5A

Q14c 5B

0.5μs/cm

- PULSE PERIOD ② 20n-1μ
 VERNIER ③ CW
 PULSE WIDTH ⑦ SQUARE WAVE



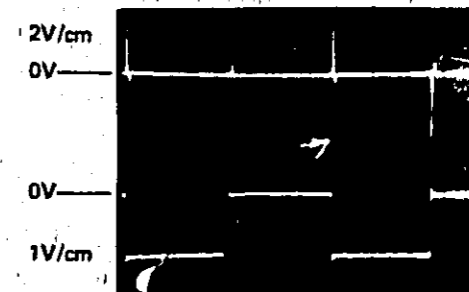
Q51b 6A

Q50b 6B

0.5μs/cm

Pulse settings as for d. c. measurements (see note 1) except for:

- PULSE PERIOD ② 20n-1
 VERNIER ③ CW
 PULSE WIDTH ⑦ SQUARE WAVE

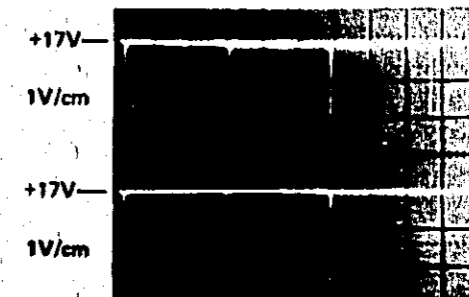


Q49c 7A

Q48c 7B

0.5μs/cm

- PULSE PERIOD ② 20n-1μ
 VERNIER ③ CW



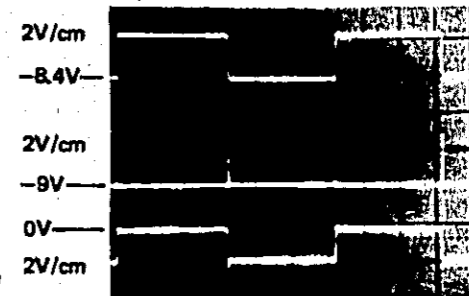
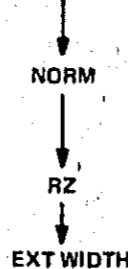
Q12c 8

0.5μs/cm

- PULSE PERIOD ② 20n-1μ
 VERNIER ③ CW
 PULSE WIDTH ⑦ SQUARE WAVE

External input to EXT. WIDTH/NORM/RZ connector ②5 on rear panel = 330 KHz

EXT WIDTH/NORM/RZ switch ②4

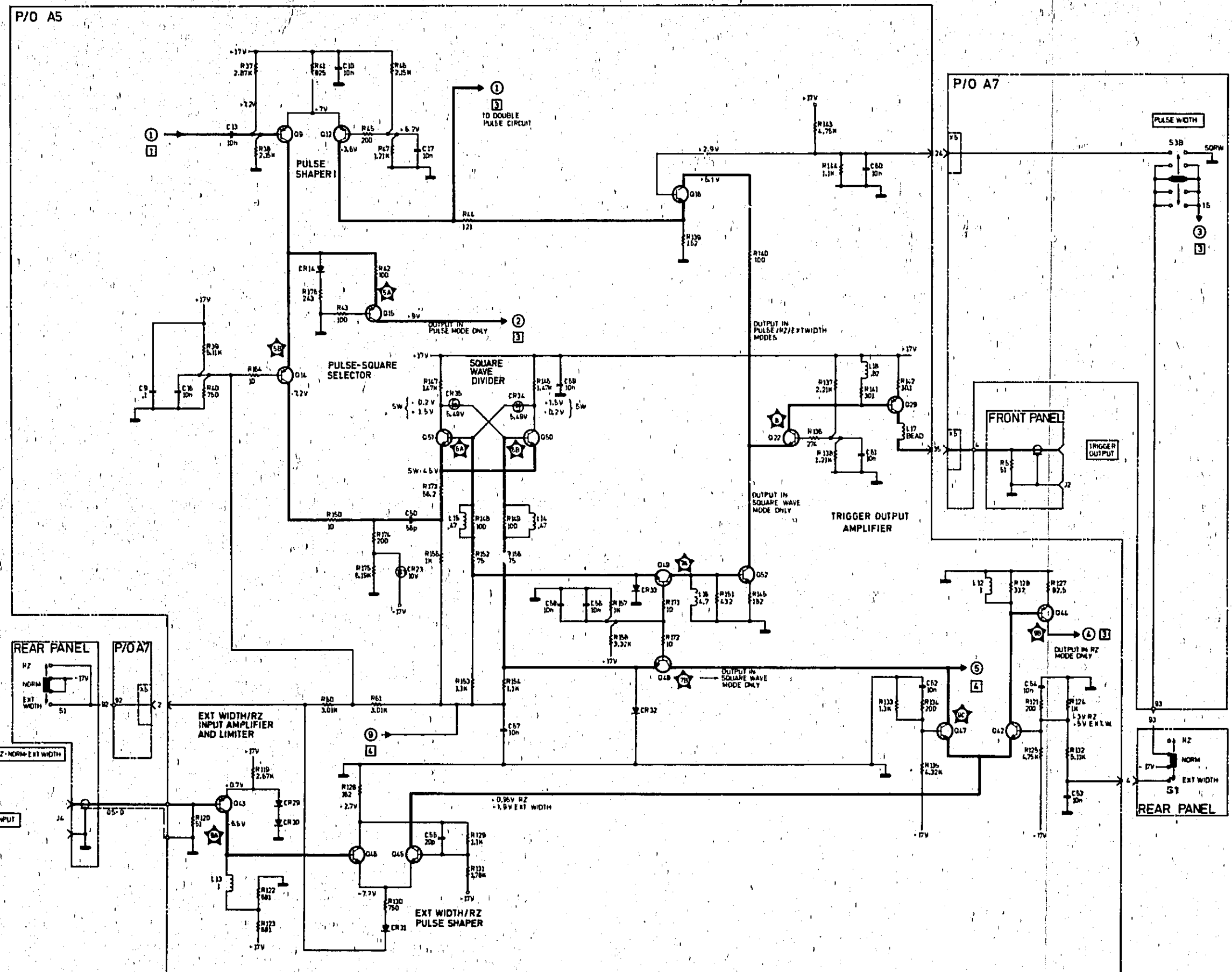


Q43c 9A

Q44c 9B

Q47c 9C

0.5μs/cm



MODE SELECTOR, TRIGGER AMPLIFIER, EXT. INPUT AND SQUARE WAVE CIRCUITS 8012B

NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

| | |
|-----------------------------|--------------|
| PULSE PERIOD 2 | EXT(+) |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1 μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1 μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5 μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | - |
| EXT WIDTH/NORM/RZ SWITCH 24 | NORM |

No external input signal

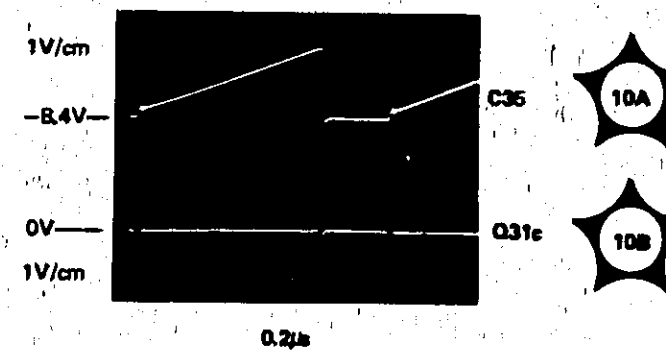
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

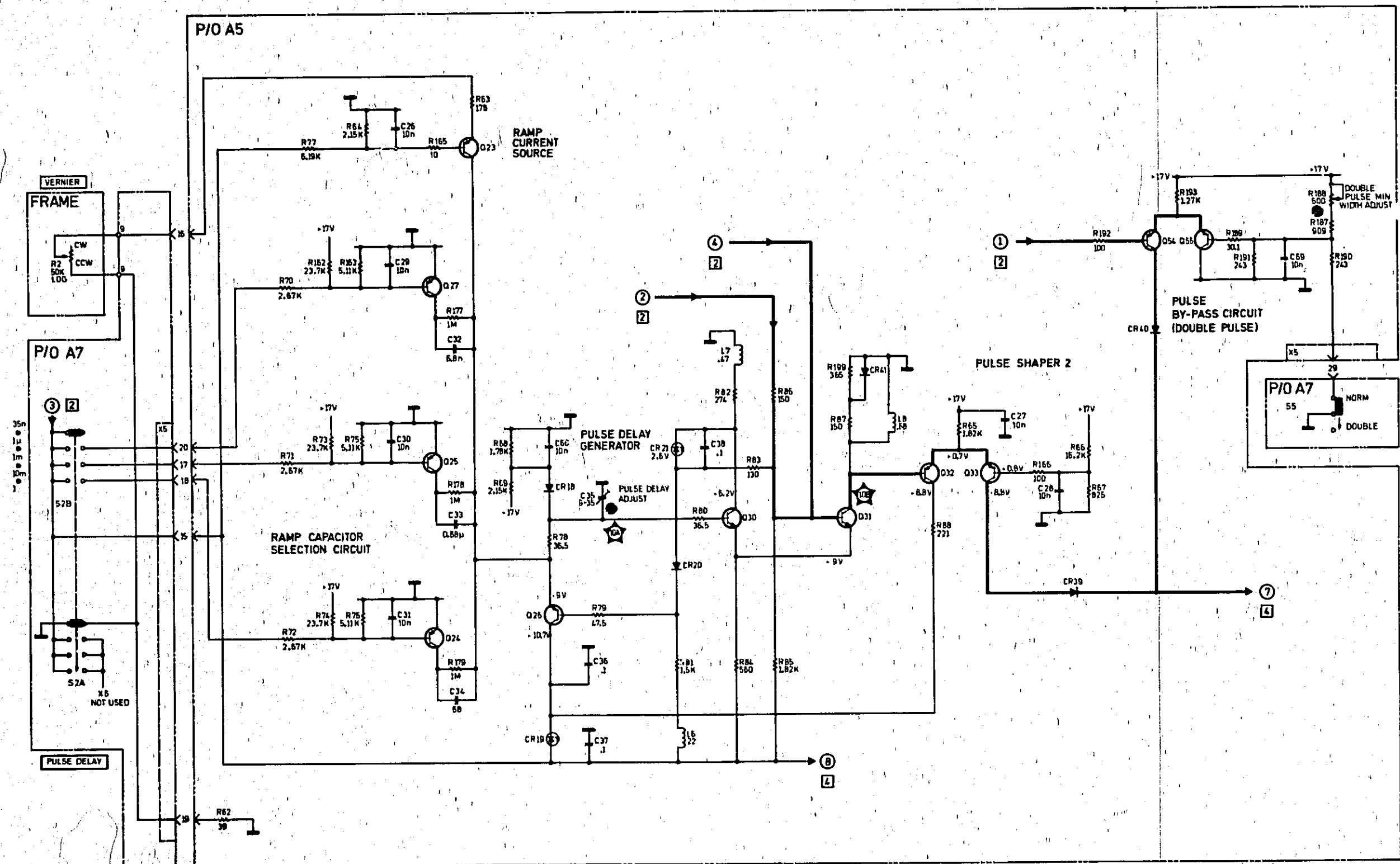
3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d. c. measurements (see note 1) except for:

| | |
|----------------|-------------|
| PULSE PERIOD ② | 20n-1 μ |
| VERNIER ③ | CW |
| PULSE DELAY ⑤ | 35n-1 μ |
| VERNIER ⑥ | Center |





NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

| | |
|-----------------------------|---------|
| PULSE PERIOD 2 | EXT(+) |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | 10n-1μ |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5μ |
| LEADING EDGE 10 | CCW |
| TRAINING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET SWITCH 14 | OFF |
| OFFSET VERNIER 15 | - |
| SYM/NORM/COMPL SWITCH 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ switch 24 | NORM |

No external input signal

2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

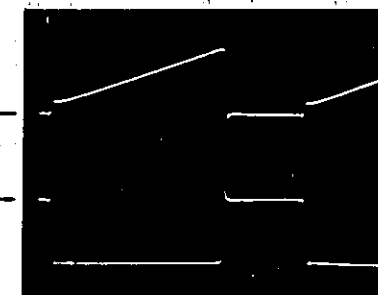
3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d.c. measurements (see note 1) except for:

| | |
|----------------|--------|
| PULSE PERIOD ② | 20n-1μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | 10n-1μ |
| VERNIER ⑧ | Center |

1V/cm
-8.4V
0V
1V/cm



0.2μs/cm



| | |
|----------------|--------|
| PULSE PERIOD ② | 20n-1μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | 10n-1μ |
| VERNIER ⑧ | Center |

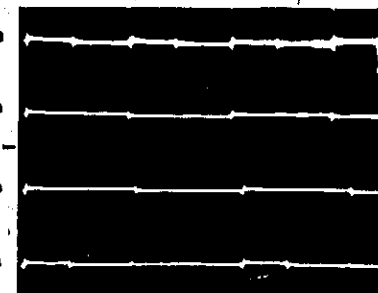
| | |
|----------------|-------------|
| PULSE PERIOD ② | 20n-1μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | SQUARE WAVE |

External input to EXT WIDTH/NORM/RZ connector ⑳ on rear panel ≈ 330 KHz

EXT WIDTH 2V/cm
RZ 2V/cm

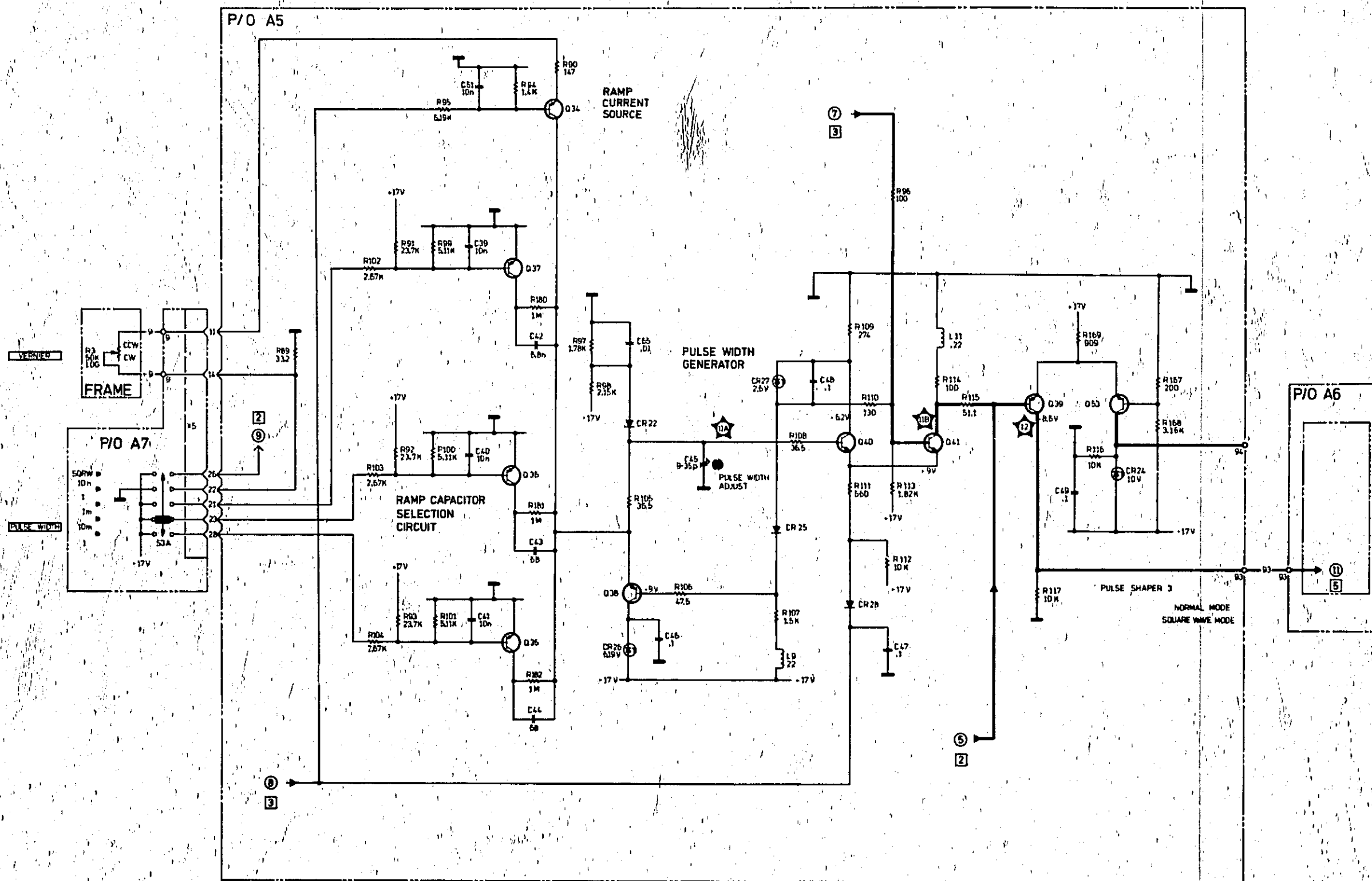
EXT WIDTH/NORM/RZ switch ⑳

2V/cm
-9V
-9V
-9V
-9V



0.5μs/cm





NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

Press and release the MAN button 1 to change from one voltage level to the other.

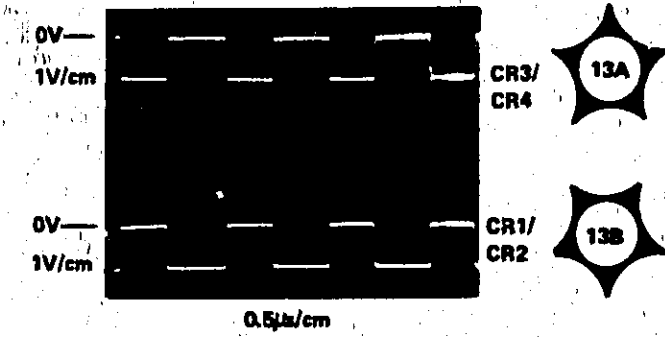
| | |
|-----------------------------|--------------|
| PULSE PERIOD 2 | EXT (+) |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1 μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | SQUARE WAVE |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5 μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET switch 14 | OFF |
| OFFSET vernier 15 | - |
| SYM/NORM/COMPL switch 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ switch 24 | NORM |

No external input required.

2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.
3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.
4. A model 8015A pulse generator was used to provide the external input signals.

Pulse settings as for d.c. measurements (see note 1) except for:

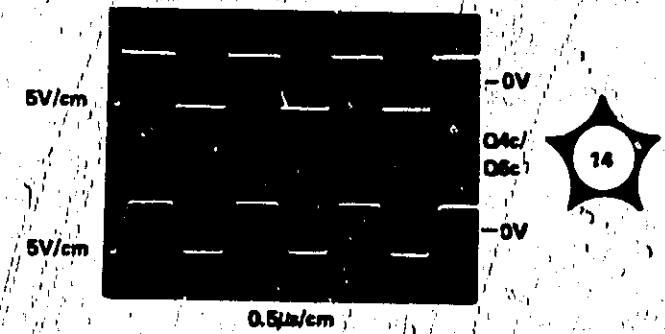
| | |
|----------------|-------------|
| PULSE PERIOD ② | 20n-1 μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | 10n-1 μ |
| VERNIER ⑧ | Center |

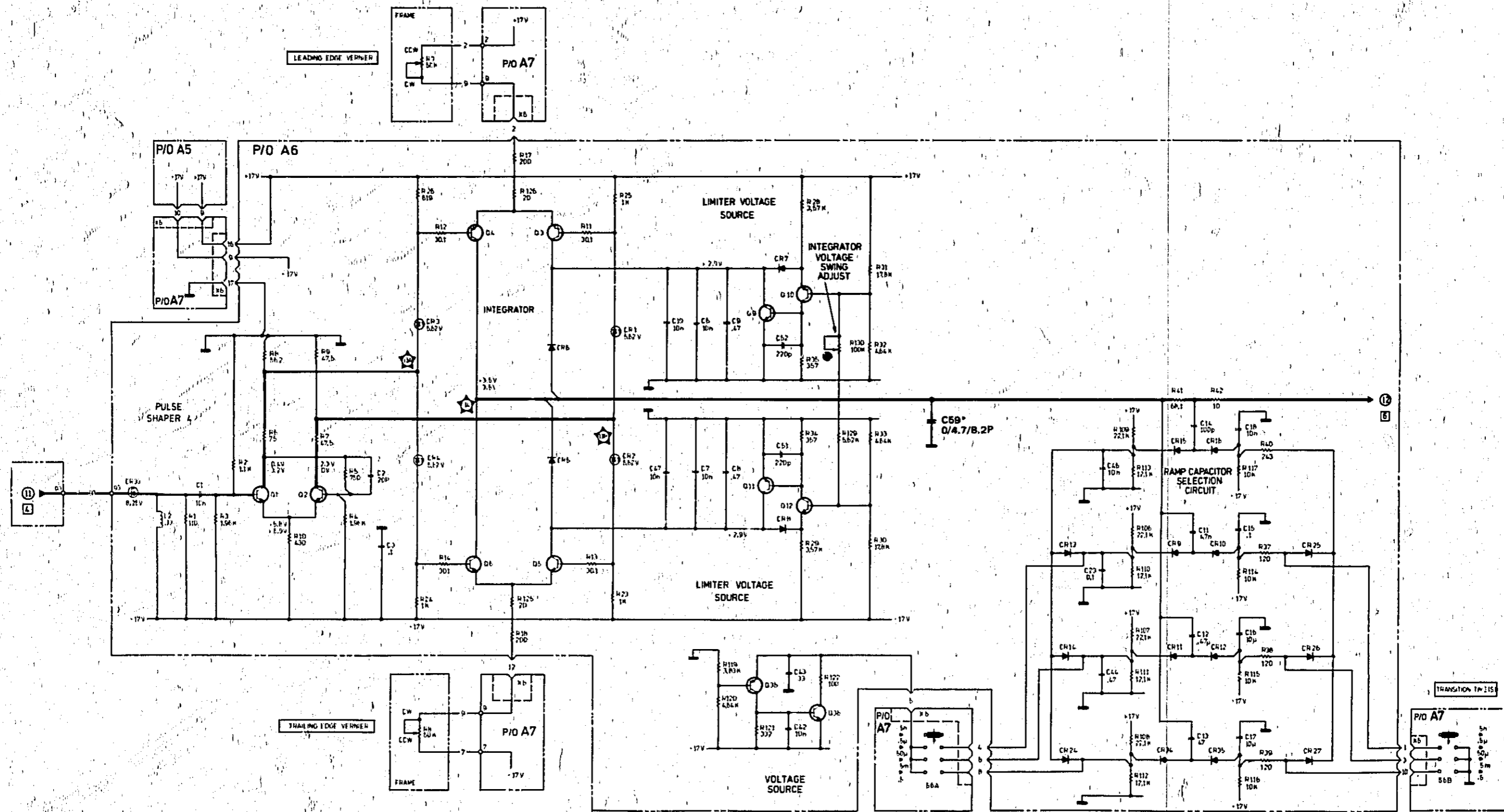


| | |
|----------------|-------------|
| PULSE PERIOD ② | 20n-1 μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | 10n-1 μ |
| VERNIER ⑧ | Center |

| | |
|-----------------|-----|
| LEADING EDGE ⑩ | CCW |
| TRAILING EDGE ⑪ | CCW |

| | |
|-----------------|--------|
| LEADING EDGE ⑩ | Center |
| TRAILING EDGE ⑪ | Center |





NOTES

1. All d.c. voltages were measured with the following pulse settings unless otherwise stated.

Press and release the MAN button 1 to change from one voltage level to the other.

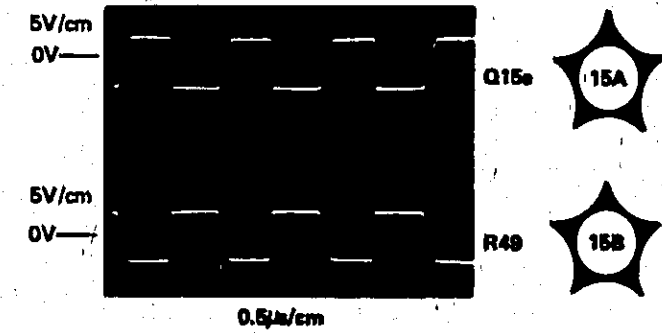
| | |
|-----------------------------|--------------|
| PULSE PERIOD 2 | EXT(+) |
| VERNIER 3 | CCW |
| PULSE DOUBLE/NORMAL 4 | NORM |
| PULSE DELAY 5 | 35n-1 μ |
| VERNIER 6 | CCW |
| PULSE WIDTH 7 | SQUARE WAVE |
| VERNIER 8 | CCW |
| TRANSITION TIME 9 | 5n-0.5 μ |
| LEADING EDGE 10 | CCW |
| TRAILING EDGE 11 | CCW |
| AMPLITUDE 12 | 5.0-2.0 |
| VERNIER 13 | CW |
| OFFSET switch 14 | OFF |
| OFFSET vernier 15 | - |
| SYN/NORM/COMPL switch 17 | NORM |
| INT LOAD 18 | IN |
| POLARITY 19 | + |
| EXT WIDTH/NORM/RZ switch 20 | NORM |

No external input required

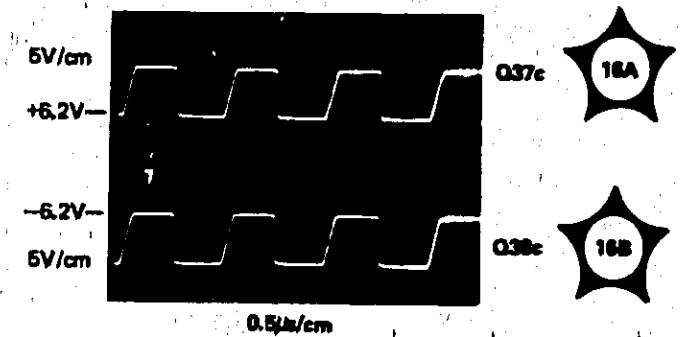
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.
3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.
4. A model 8015A pulse generator was used to provide the external input signals.

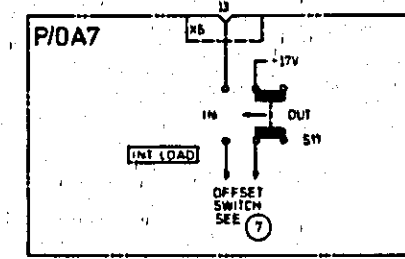
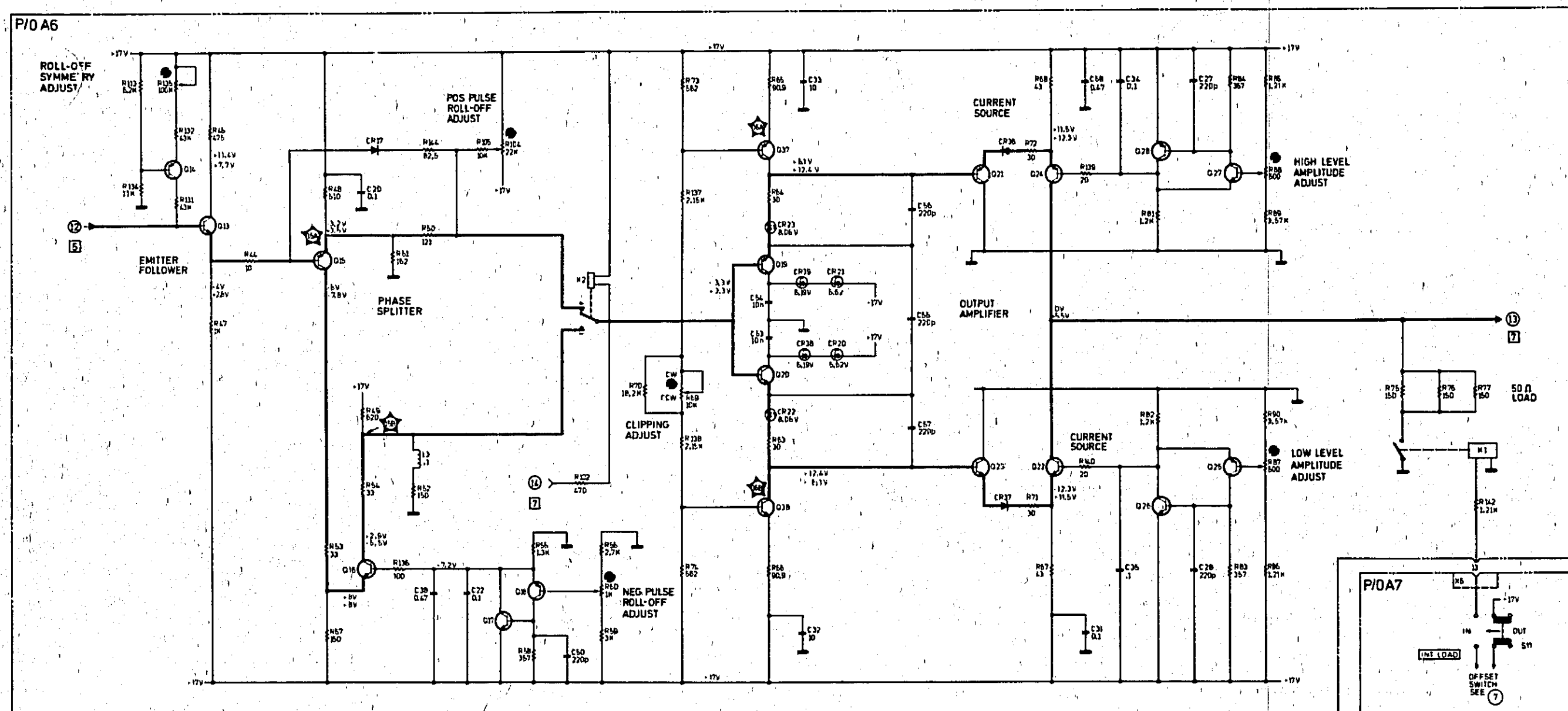
Pulse settings as for d.c. measurement:
(see note 1) except for:

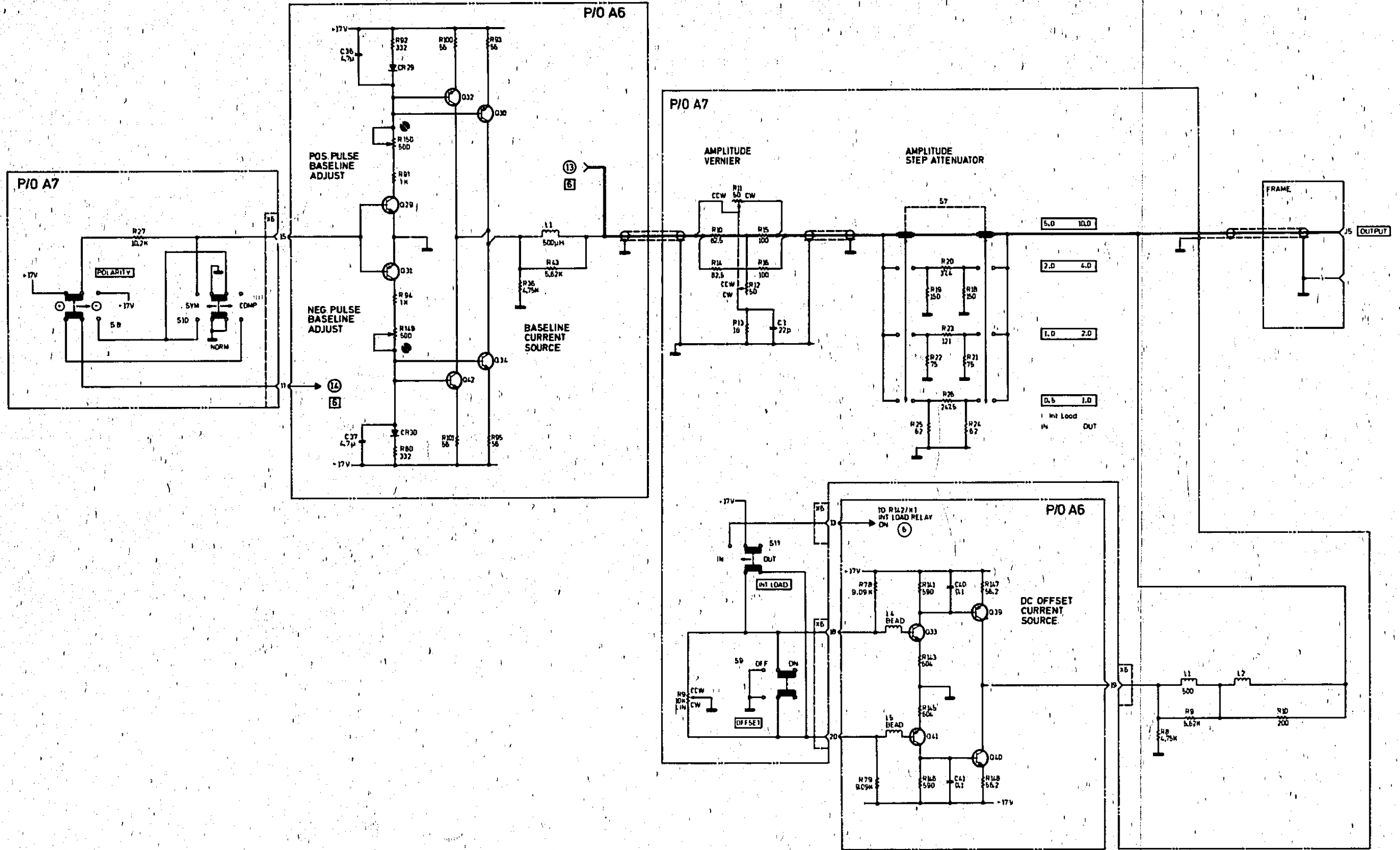
| | |
|-----------------|-------------|
| PULSE PERIOD ② | 20n-1 μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | 10n-1 μ |
| VERNIER ⑧ | Center |
| LEADING EDGE ⑩ | Center |
| TRAILING EDGE ⑪ | CCW |

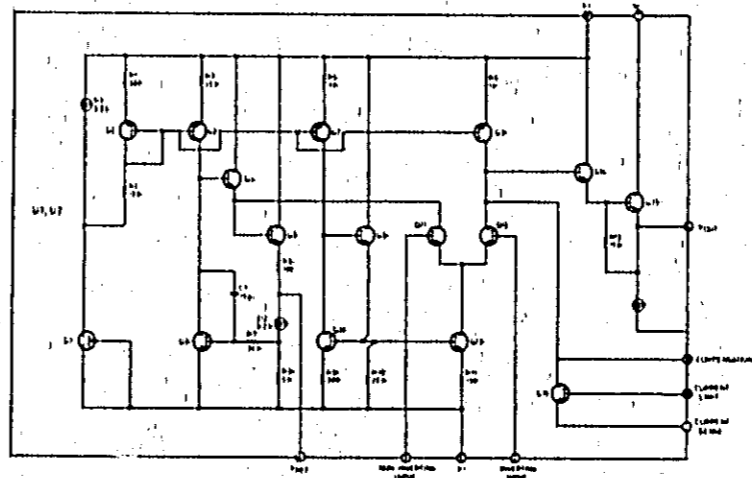
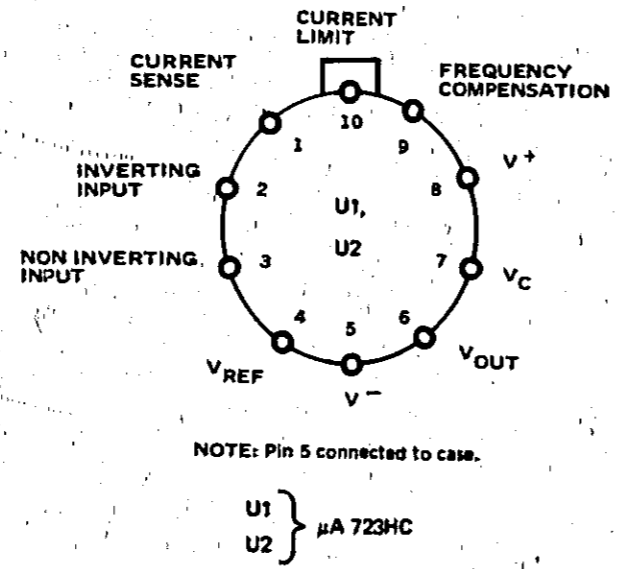
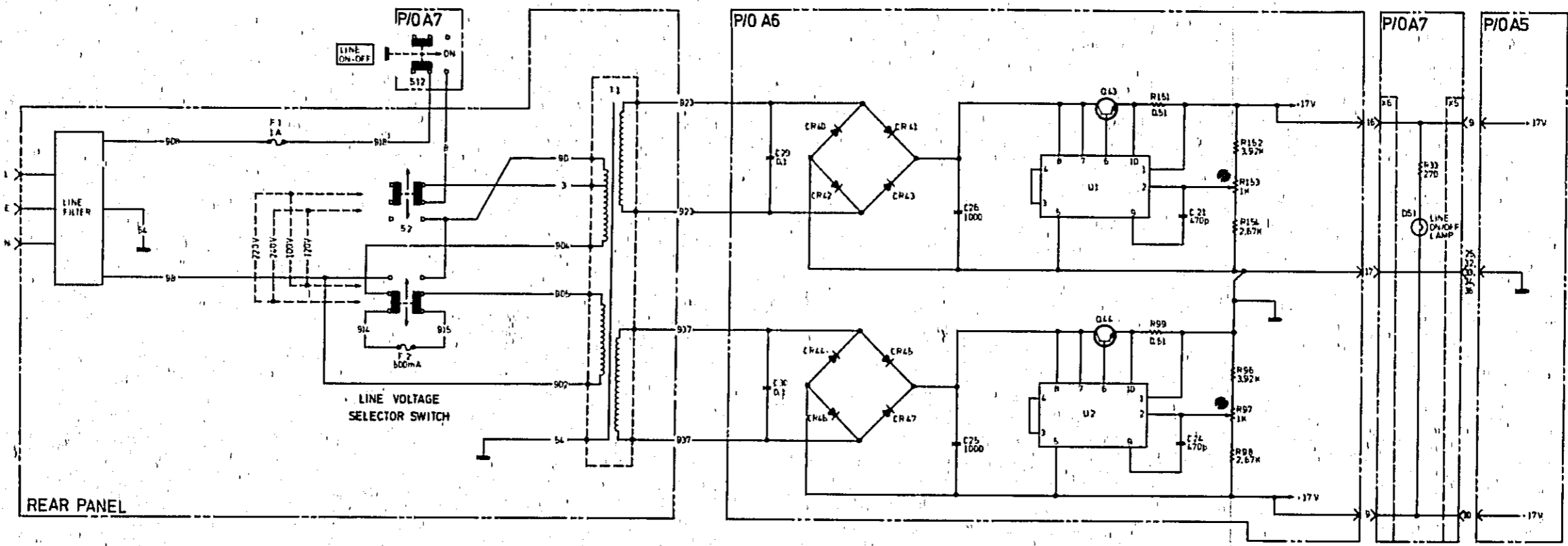


| | |
|-----------------|-------------|
| PULSE PERIOD ② | 20n-1 μ |
| VERNIER ③ | CW |
| PULSE WIDTH ⑦ | 10n-1 μ |
| VERNIER ⑧ | Center |
| LEADING EDGE ⑩ | Center |
| TRAILING EDGE ⑪ | CCW |









VOLTAGE REGULATOR IC's - BOARD A6

**BACK DATING
MANUAL
CHANGES**

7-1 INTRODUCTION

7-2 This section contains backdating information which adapts this manual to instruments with serial numbers lower than that shown inside front cover.

7-3 CHANGE SEQUENCE

7-4 Changes are listed in the serial number order that they occurred in the manufacture of the instrument. In adapting this manual to an instrument with a particular serial number, apply the changes in reverse order. That is, begin with the latest change and progress to the earliest change that applies to the serial number in question. Table 7-1 lists the serial numbers to which each change applies.

Table 7-1. Manual Backdating Changes

| Instrument Serial Number | Make Backdating Changes |
|--------------------------|-------------------------|
| 1403G 0051 to 55 | 7 through 1 |
| 1412G 00101 to 170 | 7 through 2 |
| 1412G 00171 to 210 | 7 through 3 |
| 1412G 00211 to 270 | 7 through 4 |
| 1412G 00271 | 7 |
| 1412G 00272 | 5, 6, 7 |
| 1412G 00273, 274 | 6, 7 |
| 1412G 00275 | 5, 6, 7 |
| 1412G 00276 | 6, 7 |
| 1412G 00277 | 5, 6, 7 |
| 1412G 00278 | 6, 7 |
| 1412G 00279, 280 | 5, 6, 7 |
| 1412G 00281 | 6, 7 |
| 1412G 00282 to 284 | 5, 6, 7 |
| 1412G 00285 to 287 | 6, 7 |
| 1412G 00288 to 292 | 5, 6, 7 |
| 1412G 00293 | 6, 7 |
| 1412G 00294, 295 | 5, 6, 7 |
| 1412G 00296, 297 | 6, 7 |
| 1412G 00298, 299 | 6, 6, 7 |
| 1412G 00300, 301 | 6, 7 |
| 1412G 00302, 303 | 5, 6, 7 |
| 1412G 00304 to 310 | 6, 7 |
| 1412G 00311 to 315 | 5, 6, 7 |
| 1412G 00316 | 6, 7 |
| 1412G 00317 | 5, 6, 7 |
| 1412G 00318 | 6, 7 |
| 1412G 00319 to 321 | 5, 6, 7 |
| 1412G 00322 to 324 | 6, 7 |
| 1412G 00325 to 330 | 5, 6, 7 |
| 1412G 00331 to 355 | 6, 7 |
| 1633G 00356 to 490 | 7 |

CHANGE 1 (for serial numbers 1403G 00051 to 55)

Table 6-4 and schematics 2, 3 and 4. Change the following components to:

| | | | | |
|----|------|-----------|-----|--------------|
| A5 | R150 | 0757-0401 | R-F | 100 1% .125W |
| A5 | R84 | 0757-0417 | R-F | 562 1% .125W |
| A5 | R111 | 0757-0417 | R-F | 562 1% .125W |

Table 6-5 and schematic 6. Change the following component to:

| | | | | |
|----|------|-----------|-----|---------------|
| A6 | R142 | 0757-0427 | R-F | 1.5K 1% .125W |
|----|------|-----------|-----|---------------|

CHANGE 2 (for serial numbers 1403G 00051 to 1412G 00170)

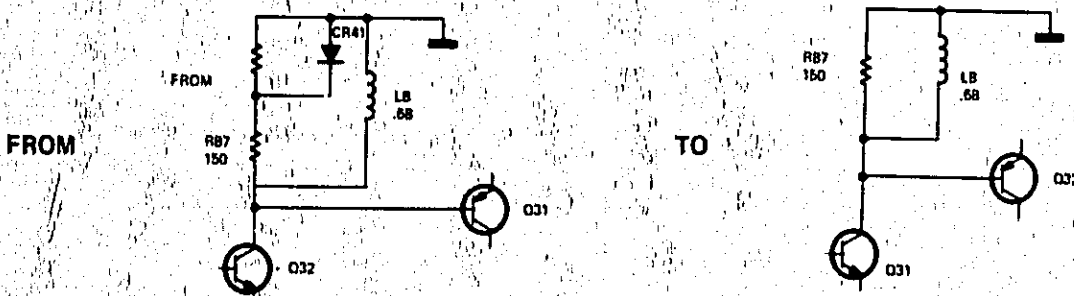
Table 6-4 Change the following components to:

| | | | | |
|----|------|-----------|------|-------------------|
| A5 | L11 | 9100-1612 | COIL | CHOKE .33 μ H |
| A5 | R168 | 0757-0437 | R-F | 4.75K 1% |

Delete

A5 CR41 and A5 R199 (delete also from board A5 component layout).

Change schematic 3 as shown below.



Schematic 4. Change L11 to 0.33 μ H and R168 to 4.75K.

Table 6-4 Change the following components to:

| | | | | |
|----|------|-----------|------|-------------------|
| A5 | L3 | 9100-1613 | COIL | CHOKE .47 μ H |
| A5 | R44 | 0757-0401 | R-F | 100 1% .125W |
| A5 | R102 | 0698-3492 | R-F | 2.67K 1% |
| A5 | R139 | 0757-0407 | R-F | 200 1% .125W |

Board A5 component layout and table 6-4.

Delete

CR15

Add

A5 R35 0757-0400 R-F 90.0 1% .125W

On component layout add R35 in place of CR15.

Board A6 component layout.

Delete L4 and L5

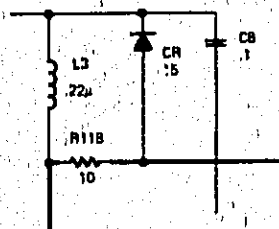
Table 6-5 Change the following components to:

| | | | | |
|----|-----|-----------|-----|----------|
| A6 | R67 | 0698-3698 | R-F | 47 5% 1W |
| A6 | R68 | 0698-3698 | R-F | 47 5% 1W |

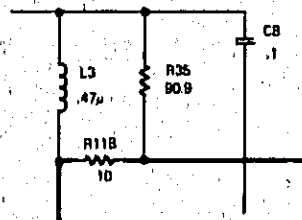
Delete L4 and L5

Change schematic 1, top right-hand corner, as shown below.

FROM



TO



Schematic 2. Change R44 to 100 and R139 to 200.

Schematic 4. Change R132 to 2.67K.

Schematic 6. Change R67 and R68 to 47.

Schematic 7. Delete ferrite beads A6 L4 and A6 L5.

CHANGE 3 (for serial numbers 1403G 00051 to 1412G 00210)

Table 6-5 Change the following components to:

| | | | | |
|----|------|-----------|------------|----------|
| A6 | R85 | 0757-0428 | R-F | 1.62K 1% |
| A6 | R86 | 0757-0428 | R-F | 1.62K 1% |
| A6 | R102 | 0757-0803 | R-F | 182 |
| A6 | K2 | 0490-0535 | RELAY REED | |
| A6 | CR22 | 1902-3126 | DIO BKDN | 7.15V |
| A6 | CR23 | 1902-3126 | DIO BKDN | 7.15V |

Schematic 6. Change R85 and R86 to 1.62K.

Change R102 to 182. Change CR22 and CR23 to 7.15V.

Also change the d.c. levels on the following transistors.

Change d.c. levels at Q37 collector to +5.7V

+12V

Change d.c. levels at Q38 collector to -12V

-5.7V

Change d.c. levels at Q24 emitter to +7.3V

+12V

Change d.c. levels at Q22 emitter to -12V

-7.4V

CHANGE 4 (for serial numbers 1403G 00051 to 1412G 00270)

Board A5 component layout. Add C67 as shown below.

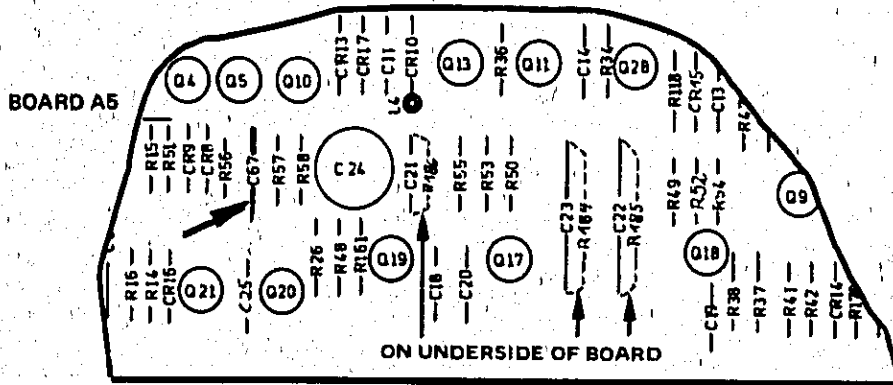


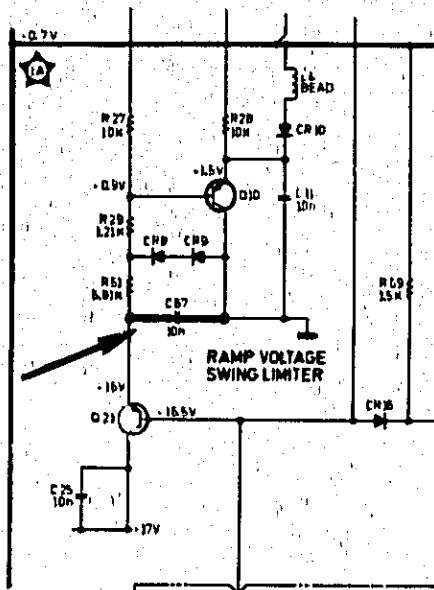
Table 6-4. Add the following component

A5 C67 0150-0093 C-F .01μF 100V

Table 6-5. Change the following component to:

A6 C23 0150-0093 C-F .01μF 100V

Schematic 1. Add C67 as shown below.



Schematic 5. Change C23 to 10n.

CHANGE 5 (for serial numbers as shown in table 8-1)

Board A6 component layout. Add C45 as shown below.

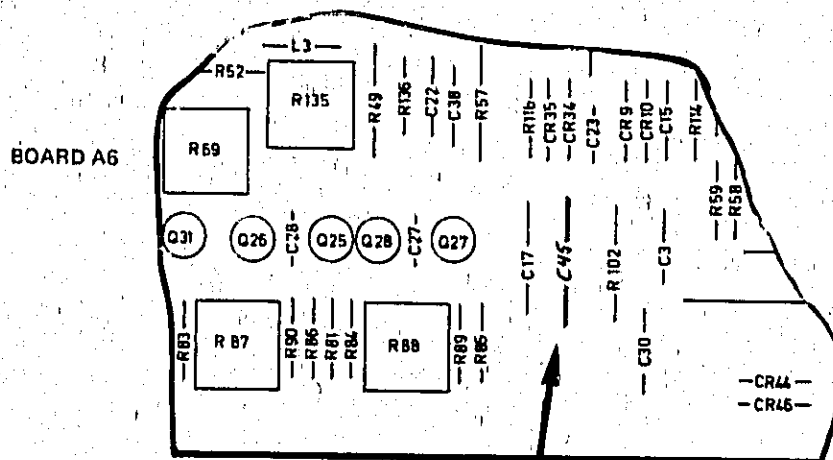
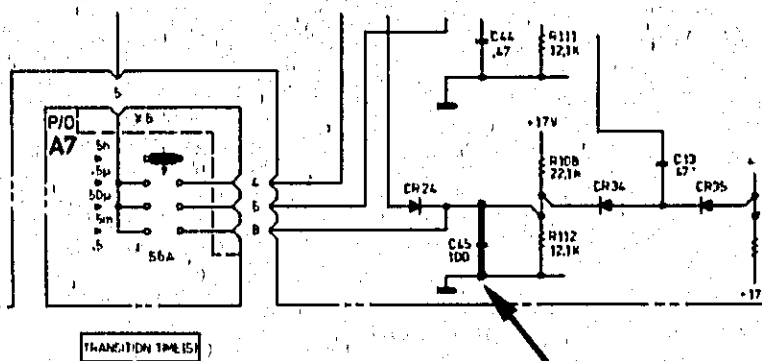


Table 6-5 Change the following components to:

| | | | | |
|--------|-----|-----------|-----|-----------------|
| A6 | R91 | 0757-0274 | R-F | 1.21K 1% |
| A6 | R94 | 0757-0274 | R-F | 1.21K 1% |
| Add A6 | C45 | 0180-0061 | C-F | 100 μ F 15V |

Schematic 5. Add C45 as shown below.



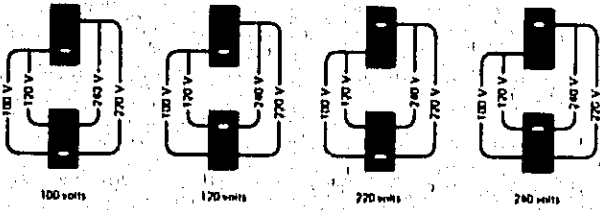
Schematic 7. Change the values of R91 and R94 to 1.21K.

CHANGE 6 (for serial numbers 1403G 00051 to 1412G 00355)

Change the complete component layout for board A5 as shown on the following page.

CHANGE 7 (for serial numbers 1403G 00051 to 1633G 490)

Figure 2-3. Change as follows:



Page 6-4, 6-5. Change S2 and S3 for a single switch:

S2 3101-1609 switch 2 DPDT 1.5A, 250V AC.

Change MP9 08012-00204 panel rear.

Pages 6-17, 6-31. Change A7 L2 for 3 separate inductors:

A7 L2/3/4 9170-0029 bead.

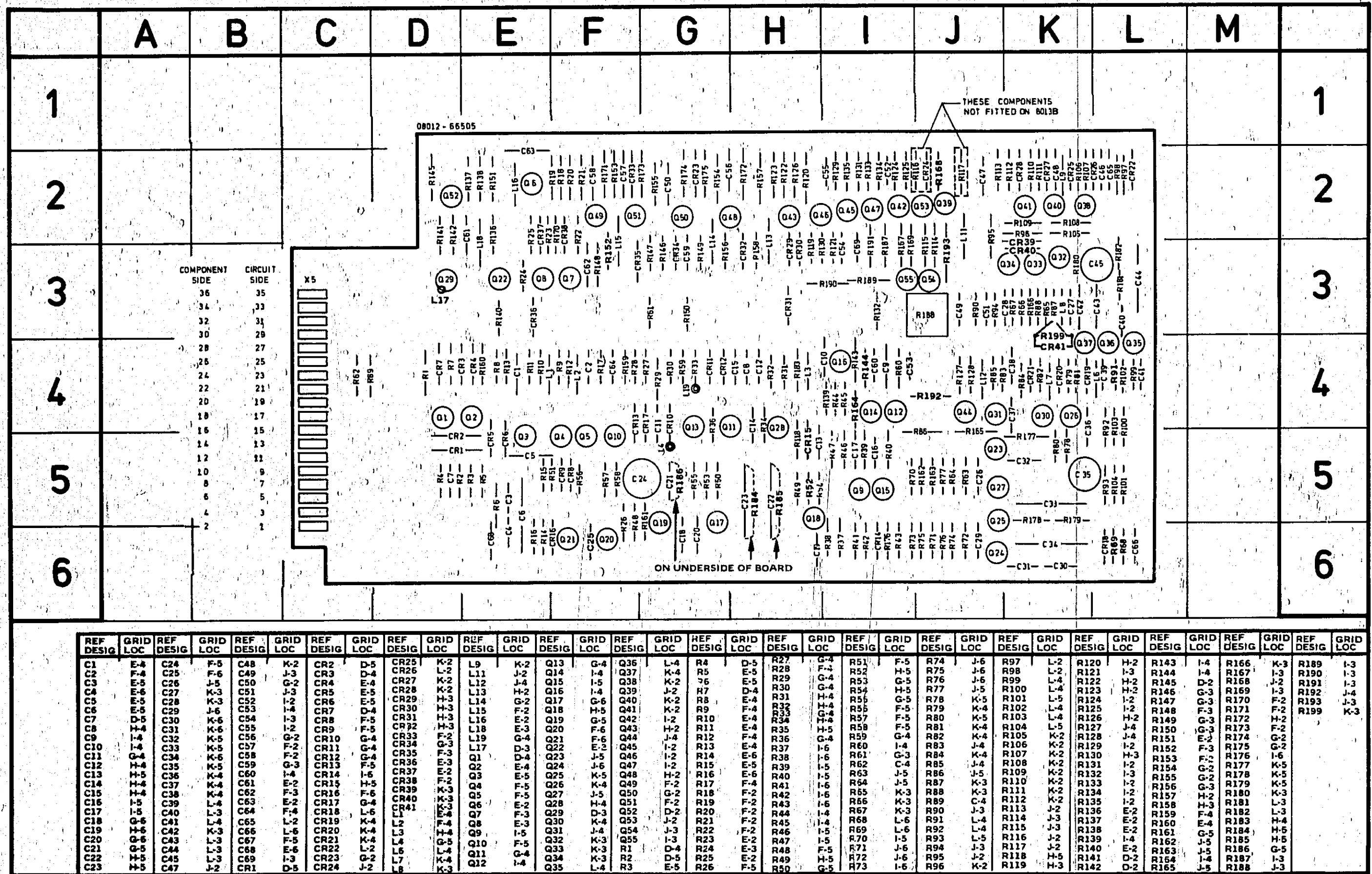


Figure 6-2. Component Layout - Board A5

MANUAL CHANGES

MANUAL CHANGES

MANUAL IDENTIFICATION

Model Number: 8012B

Date Printed: January 1980

Part Number: 08012-90005

This supplement contains important information for correcting manual errors and for adapting the manual to instruments containing improvements made after the printing of the manual.

To use this supplement:

Make all ERRATA corrections.

Make all appropriate serial number related changes indicated in the tables below.

| Serial Prefix or Number | Make Manual Changes | Serial Prefix or Number | Make Manual Changes |
|-------------------------|---------------------|-------------------------|---------------------|
| 1448A | 1 | | |
| 2110A | 1, 2 | | |
| | | | |
| | | | |
| | | | |
| | | | |

▲ NEW ITEM

ERRATA

Table 6-F, Board A5 Replaceable Parts.

Change: A5C2-4, 10-13, 16-20, 25-31, 39-41, 51-54, 56-63, 65, 66, 69, HP Part No. 0150-0093, CAPACITOR-FXD .01UF +80-20% 100 WVDC CER, Mfr Code 28480, Mfr Part No. 0150-0093.

Change: A5C7, HP Part No. 0140-0204, CAPACITOR-FXD 47PF ±5% 500 WVDC MICA, Mfr Code 72136, Mfr Part No. DM15E47QJ0500 WV1CR.

Change: A5Q9, 11, 12, 14, 15, 26, 33, 38, 39, 43, 53, HP Part No. 1853-0218, TRANSISTOR PNPSICHIPTO-18 PD=360MW, Mfr Code 28480, Mfr Part No. 1853-0218.

Table 6-6, Board A6 Replaceable Parts.

Change: A6C1, 6, 7, 18, 19, 42, 47, 53 and 54, HP Part No. 0150-0093, CAPACITOR-FXD .01UF +80-20% 100 WVDC CER, Mfr Code 28480, Mfr Part No. 0150-0093.

Change: A6C13, HP Part No. 0180-0097, CAPACITOR-FXD 47 UF ±15% 35VDC TA-SOLID, Mfr Code 56289, Mfr Part No. 150D4746X9035S2.

Change: A6K2, HP Part No. 0490-0635, RELAY REED 1C 250MA, 2BVDC 6VDC-COIL 3VA, Mfr Code 15636, Mfr Part No. RA 3042-1061.

Delete: A6MP47.

Delete: A6MP48.

Change: A6MP49, HP Part No. and Mfr Part No. to 0380-0046.

NOTE

Manual change supplements are revised as often as necessary to keep manuals as current and accurate as possible. Hewlett-Packard recommends that you periodically request the latest edition of this supplement. Free copies are available from all HP offices. When requesting copies quote the manual identification information from your supplement, or the model number and print date from the title page of the manual.

ERRATA (Cont'd)

- Change: A6Q3, Q4, Q15 and Q19, HP Part No. 1853-0218, TRANSISTOR PNP SI PD=360MW F=800 MHz, Mfr Code 28480, Mfr Part No. 1853-0218.
 Change: A6Q5 and 6, HP Part No. 1854-0354, TRANSISTOR NPN SI TO-52 PD=360MW, Mfr Code 28480, Mfr Part No. 1854-0354.
 Change: A6Q39, HP Part No. 1853-0226, TRANSISTOR PNP SI TO-18 PD=500MW, Mfr Code 28480, Mfr Part No. 1853-0226.
 Change: A6R67 and 68, HP Part No. 0698-7031, RESISTOR 43 2% 1W MO, Mfr Code 28480, Mfr Part No. 0698-7031.
 Change: A6R75, 76, and 77, HP Part No. 0760-0027, RESISTOR 150 2% 1 W MO, Mfr Code 27167, Mfr Part No. FP-32.
 Change: A6V1-V4, REFERENCE DESIGNATIONS to A6CR1-CR4.

Table 6-7. Board A7 Replaceable Parts.

- Change: A7J5, Reference DESIGNATION to A7X5.
 Change: A7L2, HP Part No. 08007-71301, JUMPER ASSY-INCLUDES 3 BEADS, Mfr Code 28480, Mfr Part No. 08007-71301.
 Add: A7MP2, HP Part No. 02116-0001, CONTACT SPRING FOR DS-1, Mfr Code 28480, Mfr Part No. 02116-0001.

▲ Table 6-4. Frame Replaceable Parts.

- Change: A6, HP Part No. and Mfr Part No. to 08012-66529.
 Add: XF1A, HP Part No. 2110-0564, FUSE HOLDER BODY, Mfr Code 28480, Mfr Part 2110-0564.
 Add: XF1B, HP Part No. 2110-0564, FUSE CARRIER, Mfr Code 28480, Mfr Part No. 2110-0564.
 Add: XF1C, HP Part No. 2110-0569, NUT-FUSE HOLDER, Mfr Code 28480, Mfr Part No. 2110-0569.

Table 6-5. Board A5 Replaceable Parts List.

- Change: A5C22, HP Part No. 0160-1713, 1, CAPACITOR-FXD 56UF ±5% 35VDC TA, Mfr Code 56289, Mfr Part No. 150D565X5035B2.
 Change: A5C23, HP Part No. 0160-1718, 1 CAPACITOR-FXD .66UF ±10% 20VDC TA, Mfr Code 56289, Mfr Part No. 150D566X9020S2.
 Change: A5C33, HP Part No. 0160-3762, CAPACITOR-FXD .68UF ±5% 50WVDC MFT, Mfr Code 28480, Mfr Part No. 0160-3762.

Figure 6-3. Component Layout-Board A6.

- Change: R117 location to between R115 and R26.

Table 6-6. Board A6 Replaceable Parts List.

- Change: A6, HP Part No. and Mfr Part No. to 08012-66529.
 Change: A6R102, HP Part No. 0687-4711, RESISTOR 470 10% .5W CC TC=O +529, Mfr Code 01121, Mfr Part No. EB4721.

CHANGE 1

Table 6-4. Frame Replaceable Parts.

- Change: A5, HP Part No. and Mfr Part No. to 08012-66528.
 Change: A6, HP Part No. and Mfr Part No. to 08012-66526.
 Change: A7, HP Part No. and Mfr Part No. to 08012-66527.
 Add: A8, HP Part No. 08012-61921, AMPL VERN ASSY, INCLUDES R10 THRU R15 (R16 DELETED), Mfr Code 28480, Mfr Part No. 08012-61921.
 Delete: FL1.
 Add: J7, HP Part No. 1251-4470, CONN AC PNR MALE, Mfr Code 28480, Mfr Part No. 1251-4470.
 Change: MP8, Description to include (P/O MP9).
 Change: MP9, HP Part No. and Mfr Part No. to 08012-00224.
 Change: MP10, HP Part No. and Mfr Part No. to 08012-00226.
 Change: MP11, HP Part No. and Mfr Part No. to 08012-74101.
 Delete: R16.
 Change: S1 and S2 Description to include (P/O MP9).
 Change: T1, HP Part No. and Mfr Part No. to 9100-3470.
 Change: W1, HP Part No. and Mfr Part No. to 08012-61642.
 Change: W2, HP Part No. and Mfr Part No. to 08012-61640.
 Change: W3, HP Part No. and Mfr Part No. to 08012-61644.
 Change: W4, HP Part No. and Mfr Part No. to 08012-61643.
 Change: W5, HP Part No. and Mfr Part No. to 08012-61641.
 Add: W6, HP Part No. 8120-1378, POWER CORD 7.5 FT, Mfr Code 28480, Mfr Part No. 8120-1378.

▲ Figure 6-2. Component Layout-A5 Board.

- Replace: component layout and grid locator with figure 1 of this change sheet.

Table 6-5. Board A5 Replaceable Parts List.

Change: A5, HP Part No. and Mfr Part No. to 08012-66528.

Add: A5C70, HP Part No. 0140-0201, CAPACITOR-12 PF \pm 5% 500 VDCW MICA, Mfr Code 24266, Mfr Part No. DM15E470J0500 WV1CR.

Delete: CR17.

Delete: CR41.

Change: A5L11, HP Part No. to 9100-1612, COIL-FXD-MOLDED RF CHOKE 33UH 20%, Mfr Code 24226, Mfr Part No. 15/330.

Change: A5R44, HP Part No. 0757-0401, RESISTOR 100 1% .125W F TUBULAR, Mfr Code 24546, Mfr part No. C4-1/8-TO-101-F.

Change: A5R67, HP Part No. 0757-0917, RESISTOR 510 2% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-TO-511-G.

Change: A5R84, HP Part No. 0757-0727, RESISTOR 562 1% .125W F TUBULAR, Mfr Code 24546, C5-1/4-TO-562R-F.

Change: A5R90, HP Part No. 0757-0402, RESISTOR 110 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-TO-111-F.

Change: A5R111, HP Part No. 0757-0727, RESISTOR 562 1% .125W F TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-TO-562-F.

Change: A5R139, HP Part No. 0757-0407, RESISTOR 200 1% .125W F TC=0 \pm 100, Mfr Code 24546, Mfr Part No. C4-1/8-TO-201-F.

Change: A5R142, HP Part No. 0757-0346, RESISTOR 101% .125W F TC=0 \pm 100, Mfr Code 24546, Mfr Part No. C4-1/8-TO-10R0-F.

Change: A5R168, HP Part No. 0757-0437, RESISTOR 4.75K 1% .125W F TUBULAR, Mfr Code 24546, Mfr. Part No. C4-1/8-TO-1213-F.

Change: A5R193, HP Part No. 0757-0274, RESISTOR 1.21K 1% .125 W TUBULAR, Mfr Code 24546, Mfr Part No. C4-1/8-TO-4751-F.

Delete: A5R199.

Figure 6-3. Component Layout-Board A6.

Add: C45 between C17 and R102.

Table 6-6. Board A6 Replaceable Parts List.

Change: A6, HP Part No. and Mfr Part No. to 08012-66526.

Add: A6C45, HP Part No. 0180-0094, CAPACITOR-FXD 100 UF \pm 75-10% 25VDC AL, Mfr Code 56289, Mfr Part No. RA 3042-1061.

Change: A6R78 and 79, HP Part No. 0757-0946, RESISTOR 8.2K 2% .125 W TC=0 \pm 100, Mfr Code 24546, Mfr Part No. C4-1/8-TO-8201-F.

Change: A6R102, HP Part No. 0757-0803, RESISTOR 182 1% .5WF, Mfr Code 19701, Mfr Part No. MF7C-1.

Table 6-7. Board A7 Replaceable Parts List.

Change: A7, HP Part No. and Mfr Part No. 08012-66527.

Schematic 1.

Add: A5C70, 12 PF, in parallel with A5R13.

Delete: A5CR17.

Change: A5L3, value to 0.47 UH.

Schematic 2.

Change: A5R44 value to 100 ohms.

Change: A5R139 value to 200 ohms.

Change: A5R142 value to 10 ohms.

Schematic 3.

Change: A5R67 value to 510 ohms.

Change: A5R84 value to 562 ohms.

Change: A5R193 value to 1210 ohms.

Delete: A5CR41.

Delete: A5R199.

Schematic 4.

Change: A5L11 value to 0.33.

Change: A5R90 value to 110 ohms.

Change: A5R111 value to 562 ohms.

Change: A5R168 value to 4750 ohms.

Schematic 5.

Add: A6C45, 100 UF, in parallel with A6R112.

Schematic 6.

Change: A6R102 value to 182 ohms.

Schematic 7.

Change: A6R78 and 79 value to 8.2K ohms.

Change: A6R91 and 94 value to 1.21 kilohms.

▲ CHANGE 2

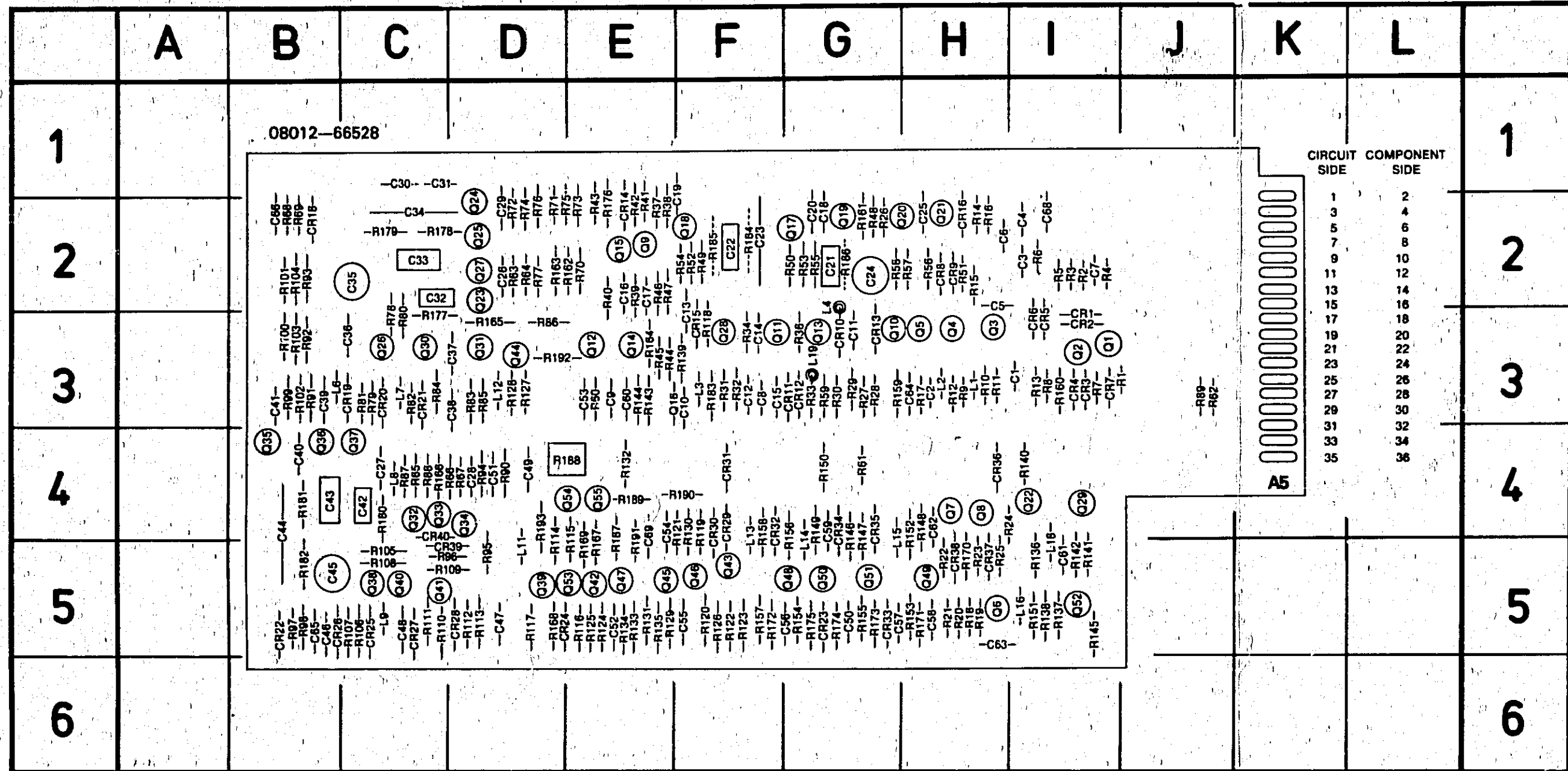
Table 6-4. Frame Replaceable Parts List.

Add: FL1, HP Part No. 9135-0112, FILTER-LINE (P/O MP9), Mfr Code 28480, Mfr Part No. 9135-0112

Change: MP9, HP Part No. and Mfr Part No. to 08012-00227.

Change: S2, HP Part No. 3101-2298, SWITCH-DPDT (P/O MP9), Mfr. Code 28480, Mfr Part No. 3101-2298.

Change: S3, HP Part No. 3101-2298, SWITCH-DPDT (P/O MP9), Mfr Code 28480, Mfr Part No. 3101-2298.



| REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC | REF DESIG | GRID LOC |
|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|-----------|----------|
| C1 | I-3 | C23 | F-2 | C45 | B-5 | | CR20 | C-3 | L3 | F-3 | Q9 | E-2 | Q31 | D-3 | Q53 | E-5 | R20 | H-5 | R42 | E-2 | R64 | D-2 | R86 | D-3 | R108 | C-5 | R132 | E-4 | R153 | G-5 | R174 | G-5 | | | |
| C2 | H-3 | C24 | G-2 | C46 | B-5 | C68 | CR21 | C-3 | L4 | F-3 | Q10 | G-3 | Q32 | C-4 | Q54 | D-4 | R21 | H-5 | R43 | E-2 | R65 | C-4 | R87 | C-4 | R109 | D-5 | R133 | E-5 | R154 | G-5 | R175 | G-5 | | | |
| C3 | I-2 | C25 | H-2 | C47 | D-5 | C69 | CR22 | B-5 | L6 | B-3 | Q11 | F-3 | Q33 | C-4 | Q55 | E-4 | R22 | H-5 | R44 | E-3 | R66 | D-4 | R88 | C-4 | R110 | D-5 | R134 | E-5 | R155 | G-5 | R176 | E-2 | | | |
| C4 | I-2 | C26 | D-2 | C48 | C-5 | CR1 | CR23 | G-5 | L7 | C-3 | Q12 | F-3 | Q34 | D-4 | R1 | J-3 | R23 | H-5 | R45 | E-3 | R67 | D-4 | R89 | J-3 | R111 | C-5 | R135 | E-5 | R156 | G-4 | R177 | C-3 | | | |
| C5 | H-2 | C27 | D-4 | C49 | G-4 | CR2 | CR26 | C-5 | L8 | C-4 | Q13 | G-3 | Q35 | B-4 | R2 | I-2 | R24 | H-4 | R46 | E-2 | R68 | B-2 | R90 | D-4 | R112 | D-5 | R136 | I-5 | R157 | F-5 | R178 | C-2 | | | |
| C6 | H-2 | C28 | D-4 | C50 | G-5 | CR3 | CR26 | B-5 | L9 | C-5 | Q14 | E-3 | Q36 | B-4 | R3 | I-2 | R25 | H-5 | R47 | E-2 | R69 | B-2 | R91 | B-3 | R113 | D-5 | R137 | I-5 | R158 | F-4 | R179 | C-2 | | | |
| C7 | I-2 | C29 | D-2 | C51 | D-4 | CR4 | CR27 | C-5 | L11 | D-5 | Q15 | E-2 | Q37 | C-4 | R4 | I-2 | R26 | G-2 | R48 | G-2 | R70 | E-2 | R92 | B-3 | R114 | D-5 | R138 | I-5 | R159 | G-3 | R180 | C-4 | | | |
| C8 | F-3 | C30 | C-1 | C52 | E-5 | CR5 | CR28 | D-5 | L12 | D-3 | Q16 | F-3 | Q38 | C-5 | R5 | I-2 | R27 | G-3 | R49 | F-2 | R71 | E-2 | R93 | B-2 | R115 | E-4 | R139 | F-3 | R160 | I-3 | R181 | B-4 | | | |
| C9 | E-3 | C31 | C-1 | C53 | E-3 | CR6 | CR29 | F-4 | L13 | T-4 | Q17 | G-2 | Q39 | D-5 | R6 | I-2 | R28 | G-3 | R50 | G-2 | R72 | D-2 | R94 | D-4 | R118 | F-3 | R140 | I-4 | R161 | G-2 | R182 | B-5 | | | |
| C10 | F-3 | C32 | C-2 | C54 | E-4 | CR7 | CR30 | F-4 | L14 | G-5 | Q18 | F-2 | Q40 | C-5 | R7 | I-3 | R29 | G-3 | R51 | H-2 | R73 | E-2 | R95 | D-5 | R119 | F-4 | R141 | I-5 | R162 | E-2 | R183 | F-3 | | | |
| C11 | G-3 | C33 | C-2 | C55 | F-5 | CR8 | CR31 | F-4 | L15 | G-4 | Q19 | G-2 | Q41 | C-5 | R8 | I-3 | R30 | G-3 | R52 | F-2 | R74 | D-2 | R96 | D-5 | R120 | F-5 | R142 | I-5 | R163 | D-2 | R184 | F-2 | | | |
| C12 | F-3 | C34 | C-2 | C56 | G-5 | CR9 | CR32 | F-4 | L16 | I-5 | Q20 | G-2 | Q42 | E-5 | R9 | H-3 | R31 | F-3 | R53 | G-2 | R75 | D-2 | R97 | B-5 | R121 | F-4 | R143 | E-3 | R164 | E-3 | R185 | F-2 | | | |
| C13 | F-3 | C35 | C-2 | C57 | G-5 | CR10 | CR33 | G-5 | L18 | I-5 | Q21 | H-2 | Q43 | F-5 | R10 | H-3 | R32 | F-3 | R54 | F-2 | R76 | D-2 | R98 | B-5 | R122 | F-5 | R144 | E-3 | R165 | D-3 | R186 | G-2 | | | |
| C14 | F-3 | C36 | C-3 | C58 | H-5 | CR11 | CR34 | G-4 | L19 | G-4 | Q22 | I-4 | Q44 | D-3 | R11 | H-3 | R33 | G-3 | R55 | G-7 | R77 | D-2 | R99 | B-3 | R123 | F-5 | R145 | I-5 | R166 | C-4 | R187 | E-5 | | | |
| C15 | F-3 | C37 | D-3 | C59 | G-4 | CR12 | CR35 | G-4 | Q1 | I-3 | Q23 | D-2 | Q45 | E-5 | R12 | H-3 | R34 | F-3 | R56 | H-2 | R78 | C-3 | R100 | B-3 | R124 | E-5 | R146 | G-4 | R167 | E-5 | R188 | E-4 | | | |
| C16 | E-2 | C38 | D-3 | C60 | E-3 | CR13 | CR36 | H-4 | Q2 | I-3 | Q24 | D-2 | Q46 | F-5 | R13 | I-3 | R35 | H-2 | R57 | H-2 | R79 | C-3 | R101 | B-2 | R125 | E-5 | R147 | G-4 | R168 | D-5 | R189 | E-4 | | | |
| C17 | E-2 | C39 | B-3 | C61 | I-5 | CR14 | CR37 | H-5 | Q3 | H-3 | Q25 | D-2 | Q47 | E-5 | R14 | H-2 | R36 | G-3 | R58 | G-2 | R80 | C-3 | R102 | B-3 | R126 | F-5 | R148 | H-4 | R169 | E-5 | R190 | F-4 | | | |
| C18 | G-2 | C40 | B-4 | C62 | H-4 | CR15 | CR38 | H-5 | Q4 | H-3 | Q26 | C-3 | Q48 | G-5 | R15 | H-2 | R37 | E-2 | R59 | G-3 | R81 | C-3 | R103 | B-3 | R127 | D-3 | R149 | G-4 | R170 | H-5 | R191 | E-5 | | | |
| C19 | F-2 | C41 | B-3 | C63 | H-5 | CR16 | CR39 | D-5 | Q5 | H-3 | Q27 | D-2 | Q49 | H-5 | R16 | H-2 | R38 | E-2 | R60 | E-3 | R82 | C-3 | R104 | B-2 | R128 | D-3 | R150 | G-4 | R171 | H-5 | R192 | D-3 | | | |
| C20 | G-2 | C42 | C-4 | C64 | H-3 | | CR40 | C-4 | Q6 | H-5 | Q28 | F-3 | Q50 | G-5 | R17 | H-3 | R39 | E-2 | R61 | G-4 | R83 | D-3 | R105 | C-5 | R129 | E-5 | R151 | I-5 | R172 | F-5 | R193 | D-4 | | | |
| C21 | G-2 | C43 | B-4 | C65 | H-5 | CR18 | L1 | H-3 | Q7 | H-4 | Q29 | I-4 | Q51 | G-5 | R18 | H-5 | R40 | E-2 | R62 | J-3 | R84 | C-3 | R106 | C-5 | R130 | F-4 | R152 | H-4 | R173 | G-5 | | | | | |
| C22 | F-2 | C44 | B-4 | C66 | B-2 | CR19 | L2 | H-3 | Q8 | H-4 | Q30 | H-4 | Q52 | I-5 | R19 | H-5 | R41 | E-2 | R63 | D-2 | R85 | D-3 | R107 | C-5 | R131 | E-5 | | | | | | | | | |

Figure 1. Component Layout - Board A5