Errata

Title & Document Type: **8012B Pulse Generator Operating and Service Manual**

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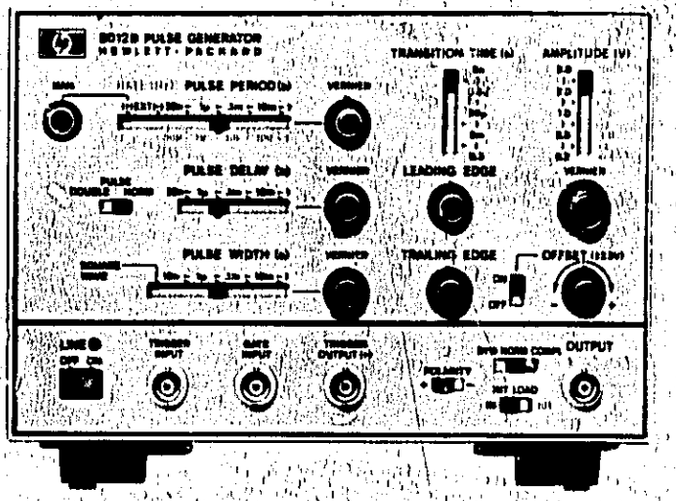
8012B

OPERATING AND SERVICE MANUAL

8012B PULSE GENERATOR



HEWLETT PACKARD

8012D

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.

WARRANTY AND ASSISTANCE

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.

Service contracts or customer assistance agreements are available for Hewlett-Packard products that require maintenance and repair on-site.

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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.

D-703 BÖBLINGEN, HERRENBERGER STR. 110,
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.

SECTION 1

GENERAL INFORMATION

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 > 30ns, maximum deviation from a straight line between the 10% and 90% points is lesss than 5% of pulse amplitude.

Overshoot and Ringing: < ± 5% of pulse amplitude unless INT LOAD is switched OUT and amplitude reduced to 0.4V – 4V when it may increase to ± 10%.

Preshoot: < ± 5% of pulse amplitude.

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

Width Jitter: < 0.1% + 50ps 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 ± 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 ± 2.5V across 50 ohms and is independent of amplitude settings. With INT LOAD switched OUT, offset is automatically switched off.

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

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

REPETITION RATE AND TRIGGER

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

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

Square Wave: 0.5 Hz to 25 MHz in four ranges. Duty cycle 50% ± 5% up to 1 MHz, tolerance increases to ± 15% at 25 MHz.

Double Pulse: up to 25 MHz simulating 50 MHz.

Trigger Output: > +1V across 50Ω, 16ns ± 10ns 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 > 1.7V p-p (about zero) or pulses > 0.8V either polarity with a width of > 7ns.

Maximum input amplitude: ± 7V.

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

Input impedance: 50 ohms ± 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 ≤ 12mA. Input impedance approx. 160Ω. Gate input signal: voltage > +1.5V or resistor > 1KΩ to ground enables rep. rate generator. Voltage < +0.8V or resistor < 160Ω disables rep. rate generator. Gate input TTL compatible. Maximum input ± 5V.

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 > +1V, maximum input ± 5V. Width > 7ns.

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

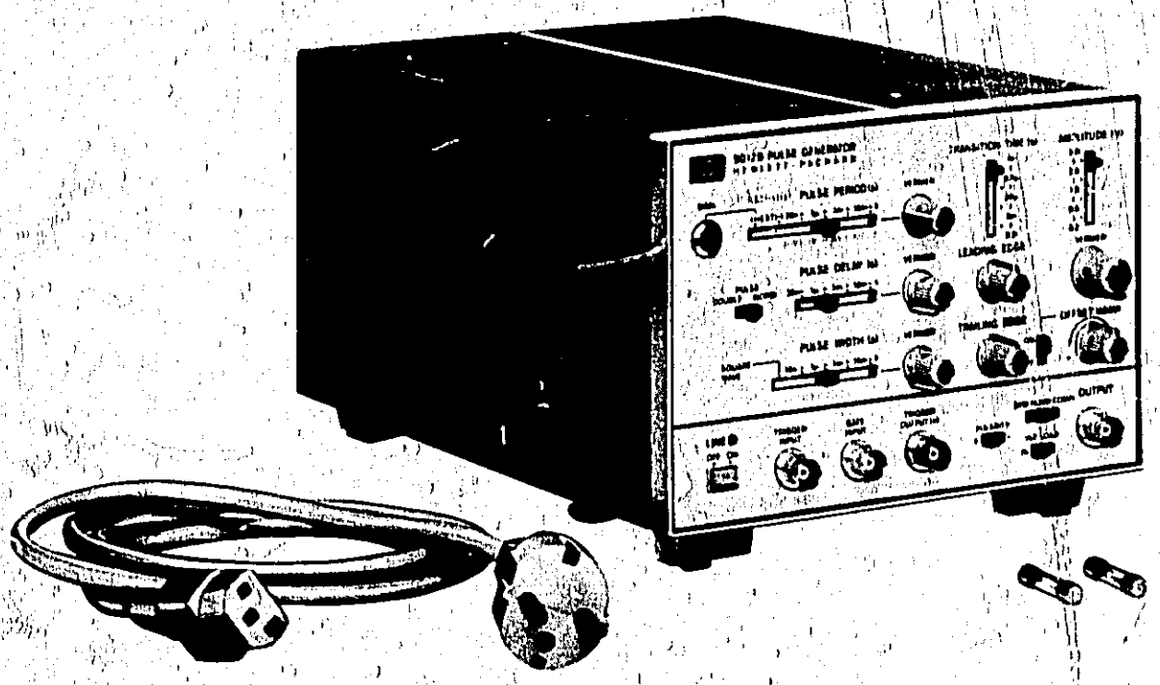


Figure 2–1. 8012B and Supplied Accessories

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.

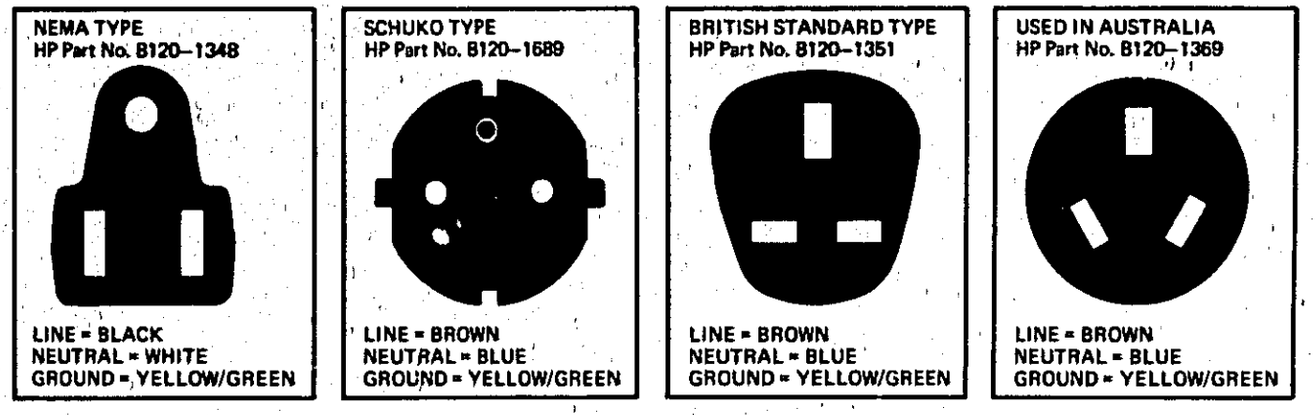


Figure 2–2. Power Cords

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:

a. Minimum current rating of 2A
b. Ground connection
c. 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.

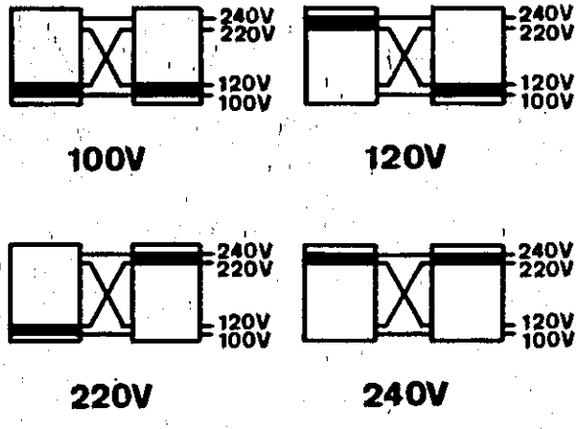


Figure 2–3. Selector settings for the nominal power line voltages.

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 acress 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.

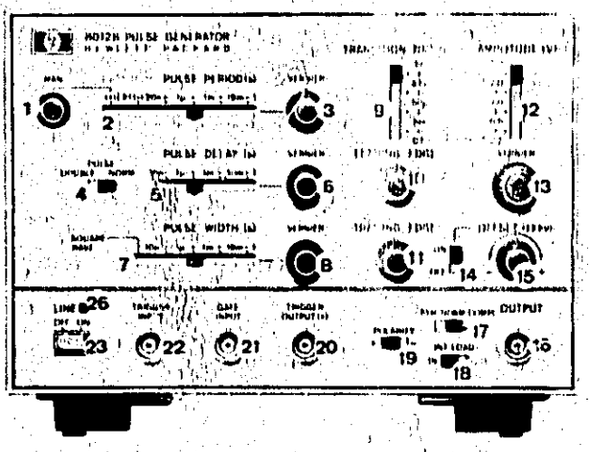
2–17 TEMPERATURE REQUIREMENTS

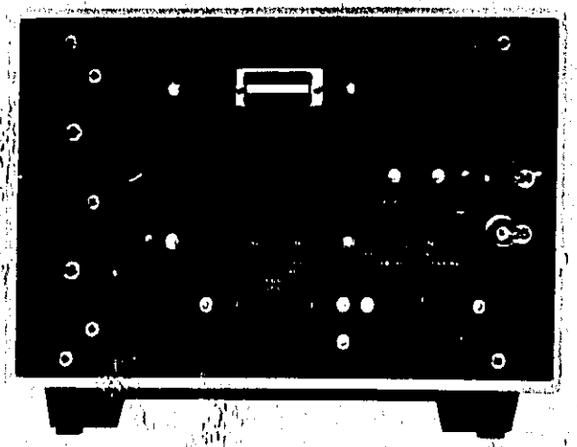
2–18 The 8012B will operate within specifications when the ambient temperature is between 0°C (32°F) and 55°C (131°F). It can be stored at temperatures between –40°C (–40°F) and 75°C (167°F).

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.

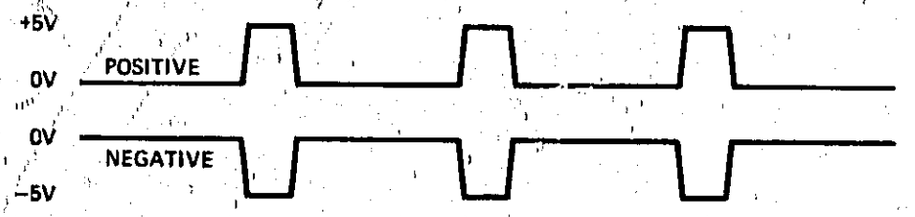


Figure 3–2. Positive and negative pulse outputs

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.

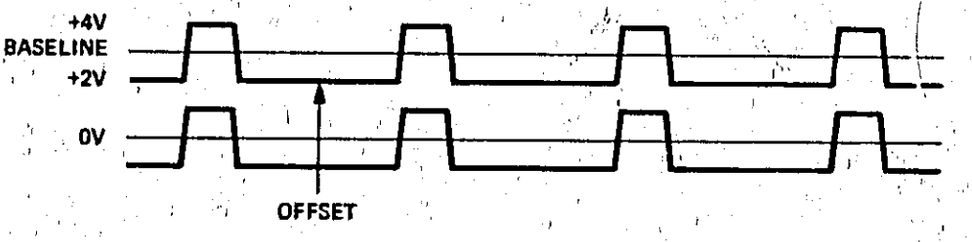


Figure 3–3. Symmetrical Pulse Output

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.

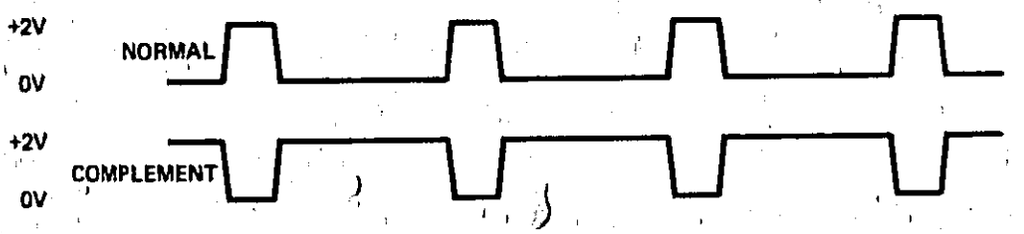


Figure 3-4. Normal and Complement Outputs

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 ± 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.

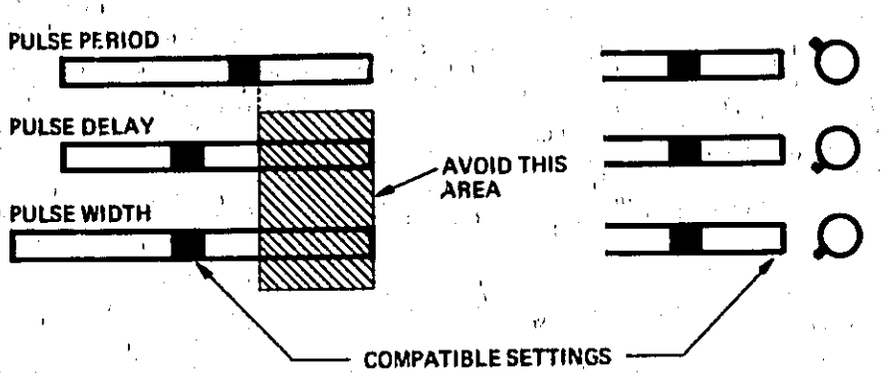


Figure 3–5. Positioning of Controls

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 ± 8ns, 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 5μs/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)	5n–0.5μ
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

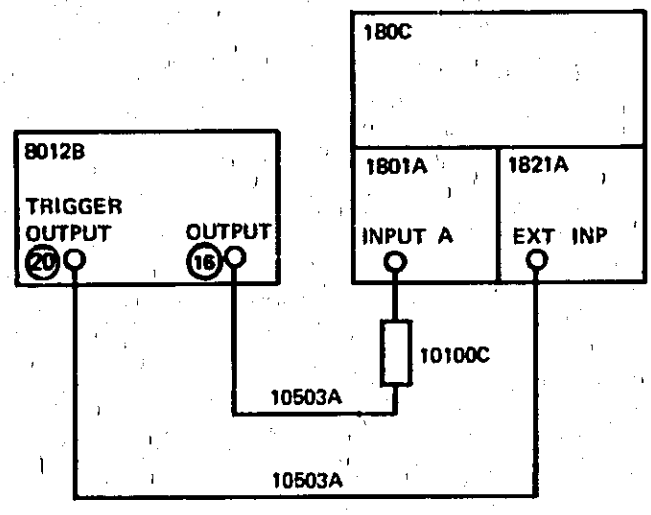


Figure 3–6. Initial control settings and test equipment

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

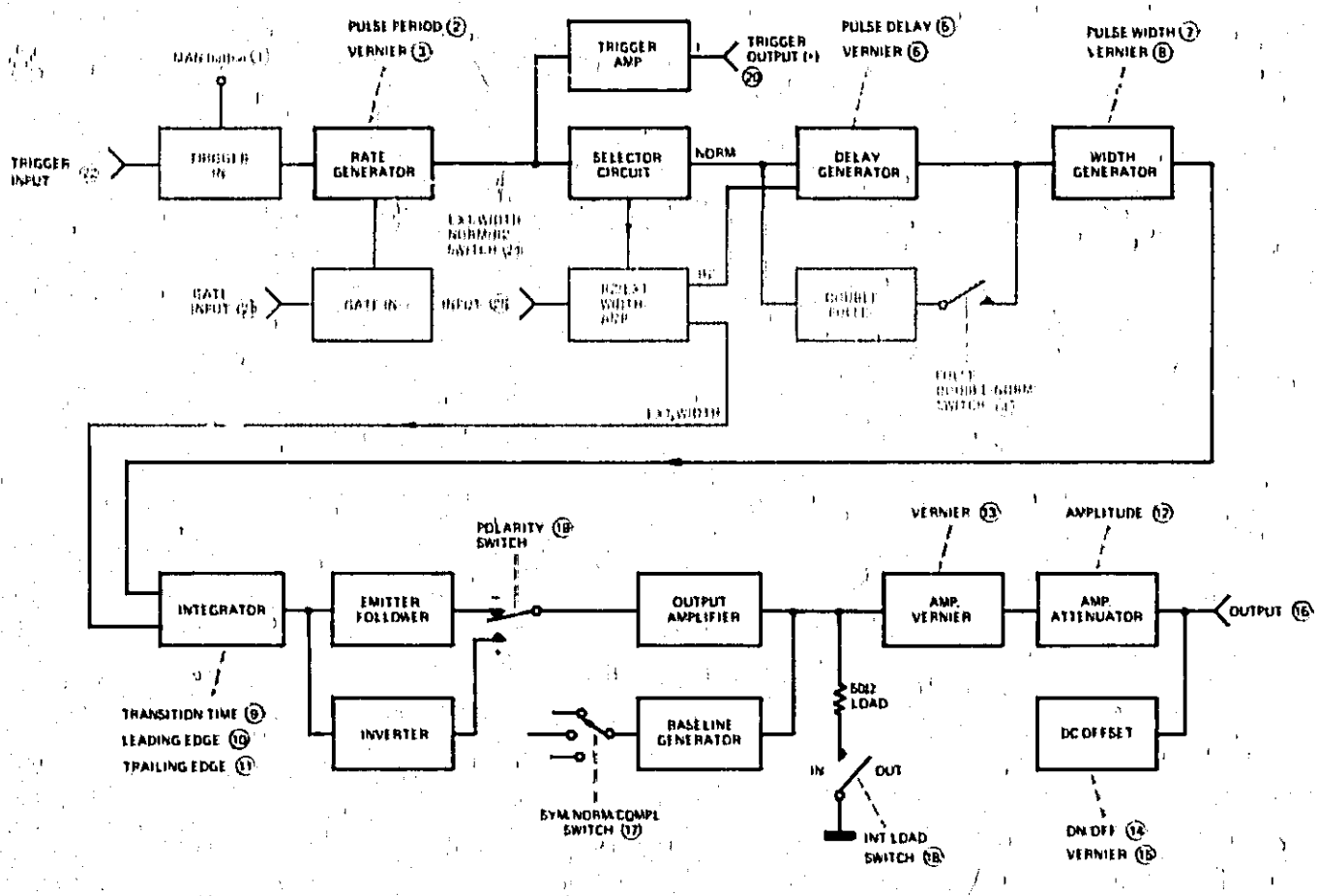


Figure 3–7. Normal Internal Trigger Mode — Block Diagram

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 (19) 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 ± 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.

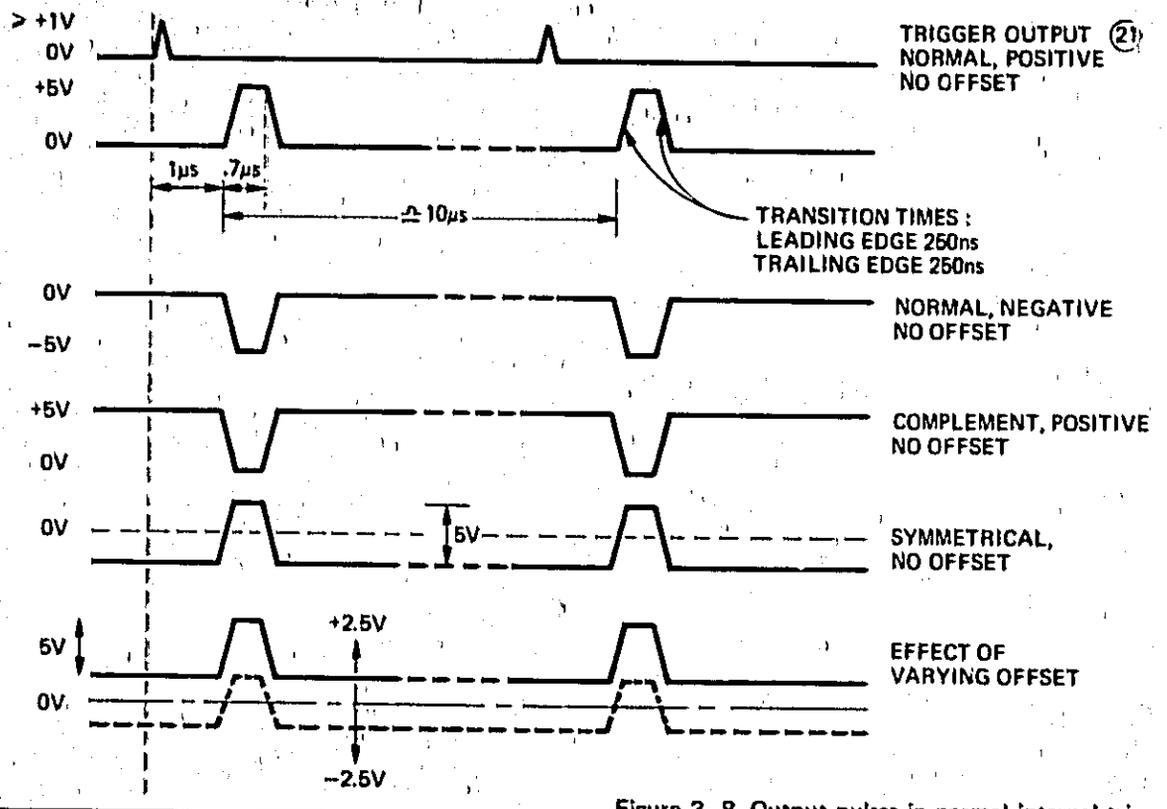


Figure 3–8. Output pulses in normal internal trigger mode

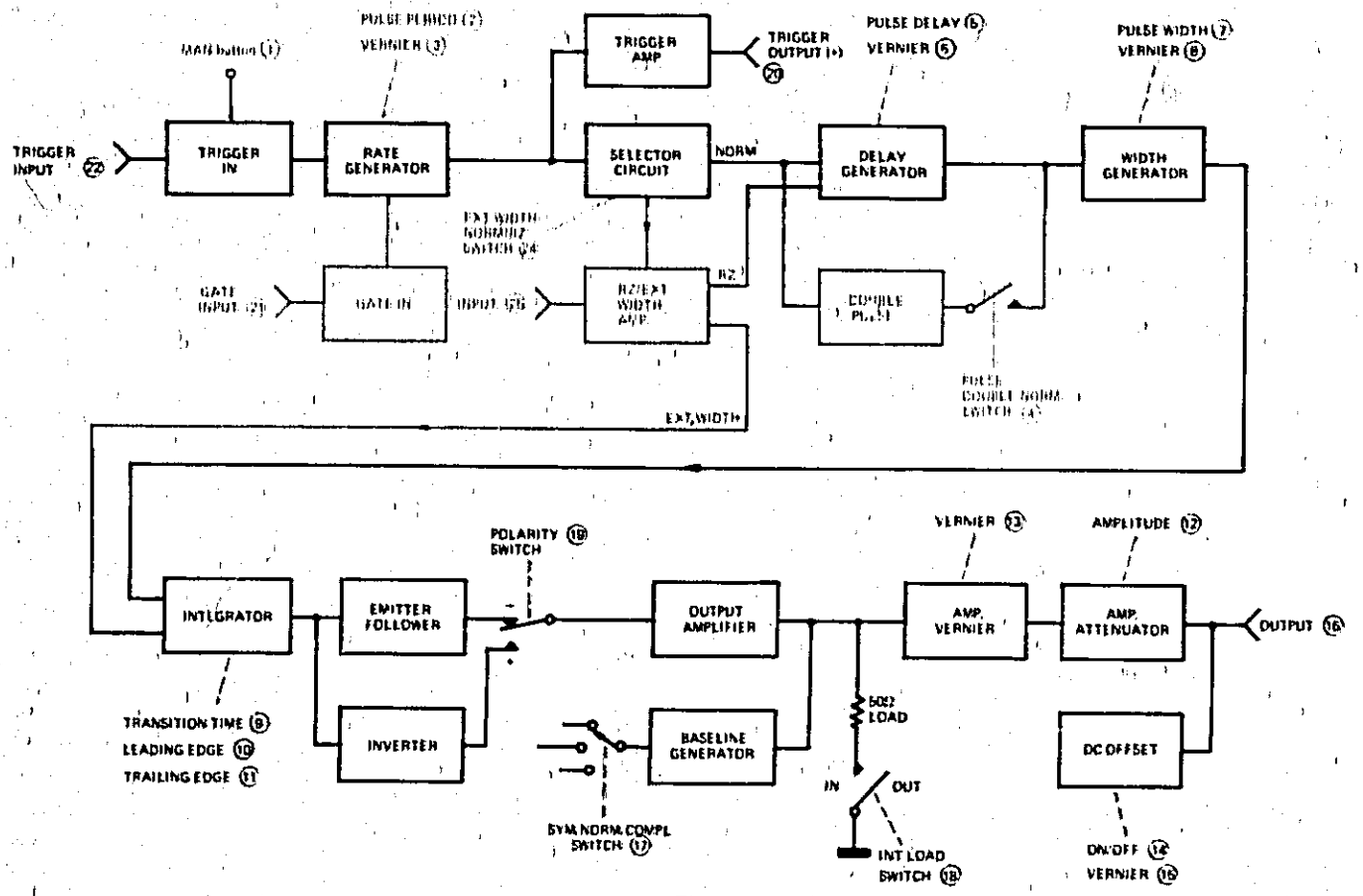


Figure 3–9. Normal External Trigger Mode — Block Diagram

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–).

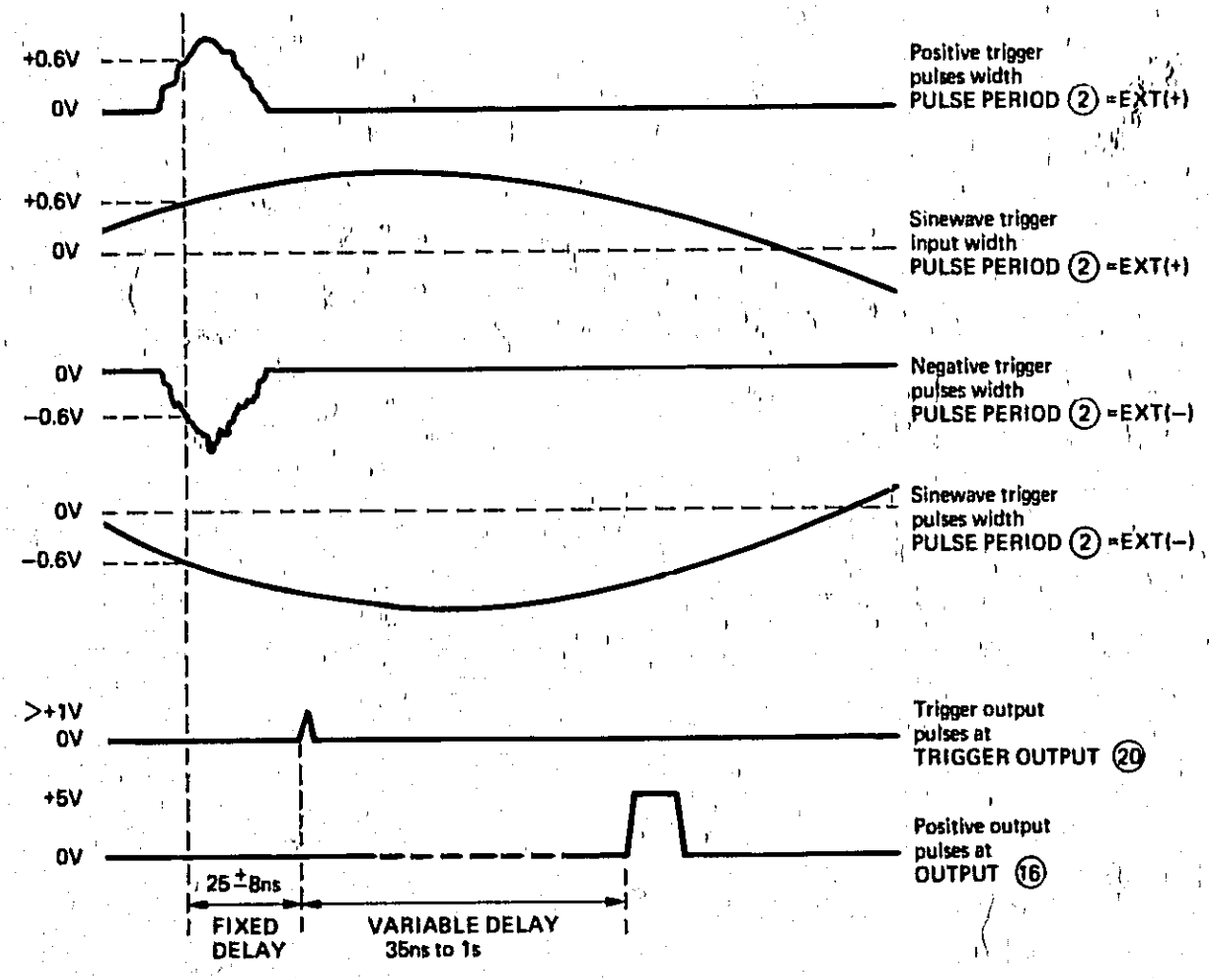


Figure 3–10. Output pulses in normal external trigger mode

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.

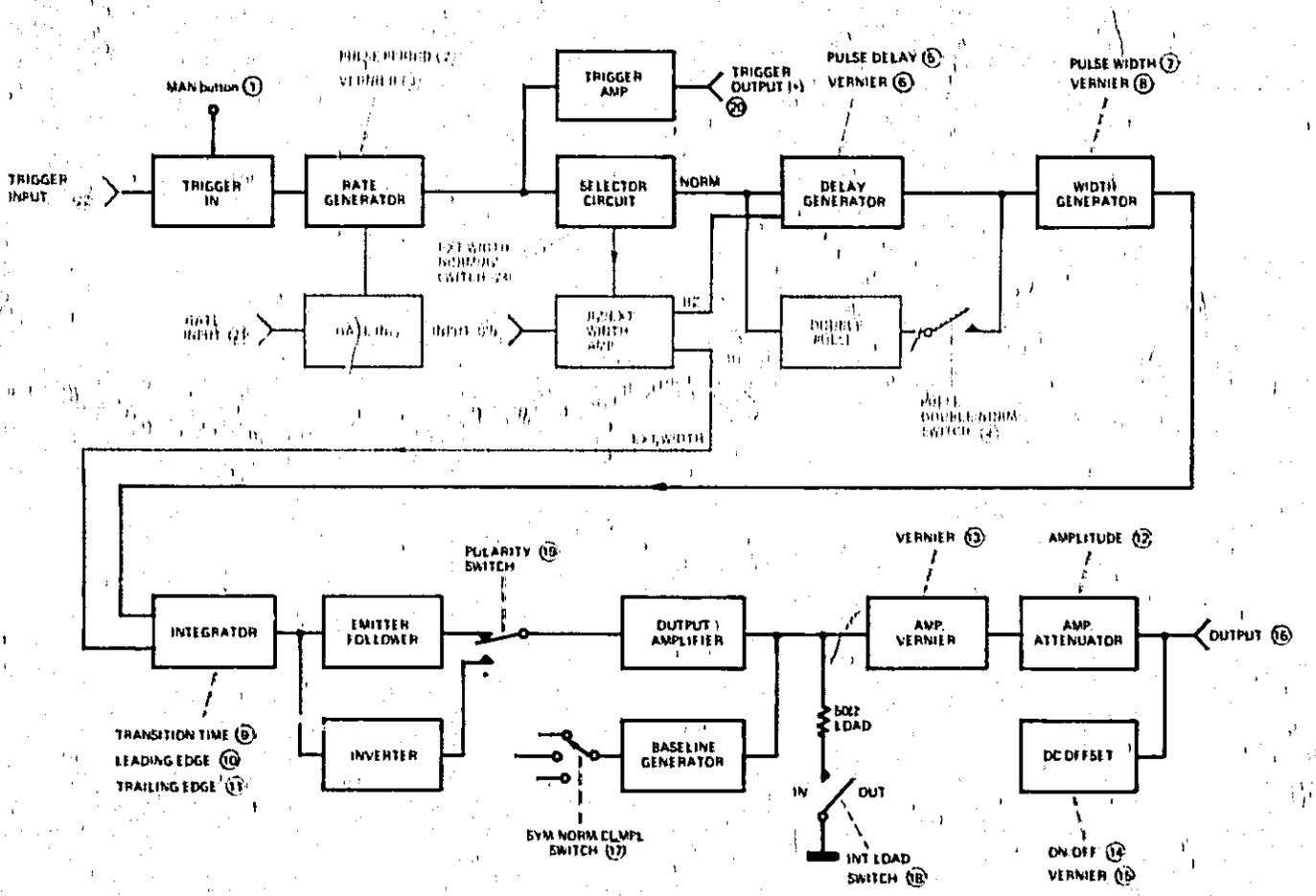


Figure 3–11. Normal Manual Trigger Mode – Block Diagram

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

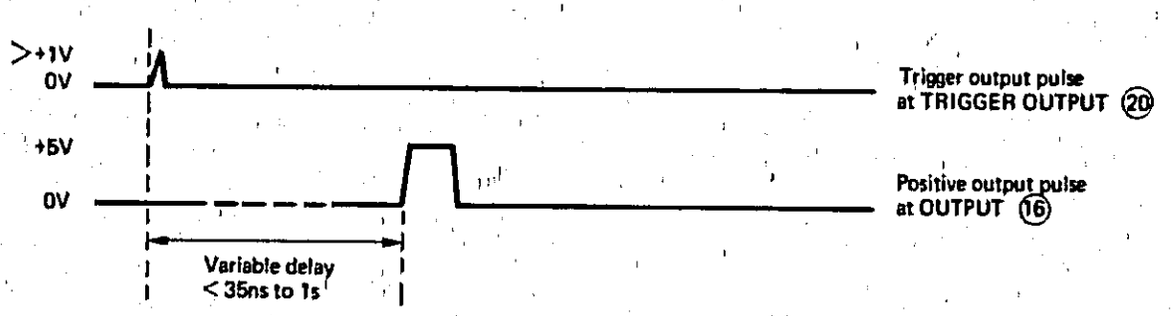


Figure 3–12. Output pulses in normal manual trigger mode

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.

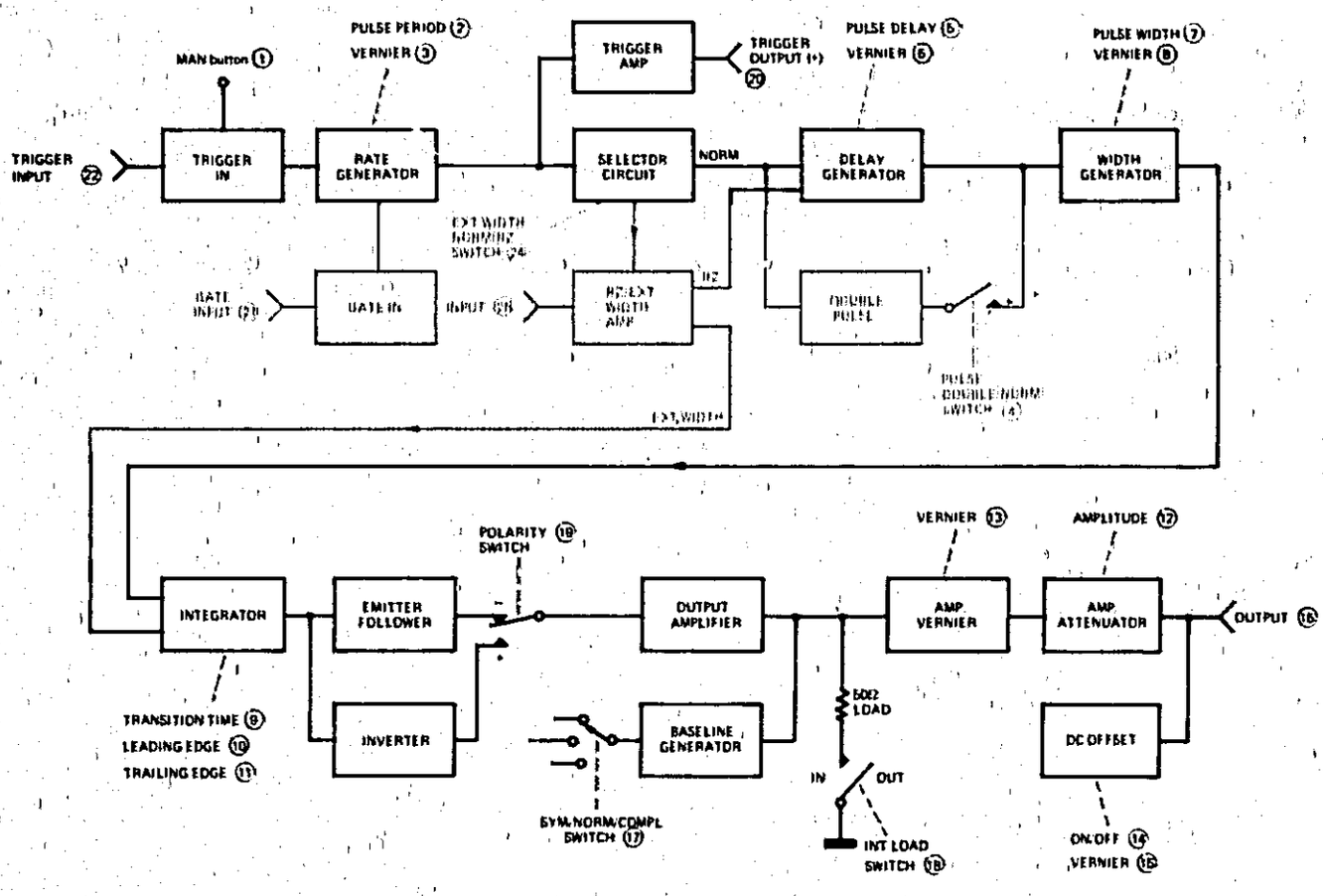


Figure 3–13. Normal square wave mode – block diagram

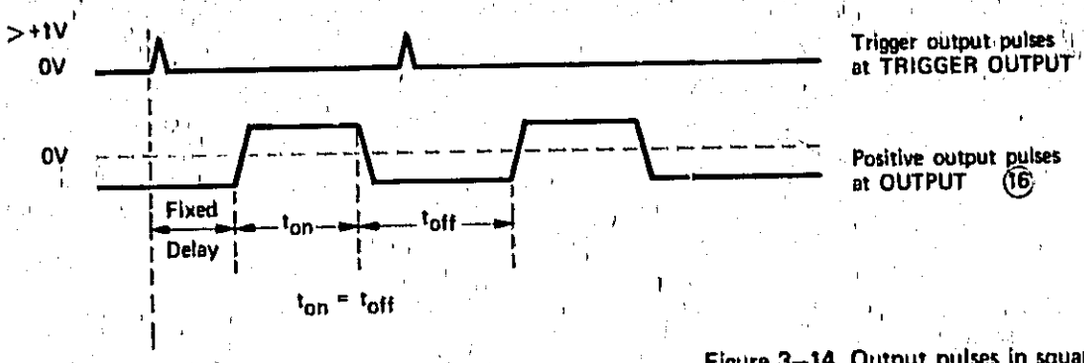


Figure 3–14. Output pulses in square wave mode

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.

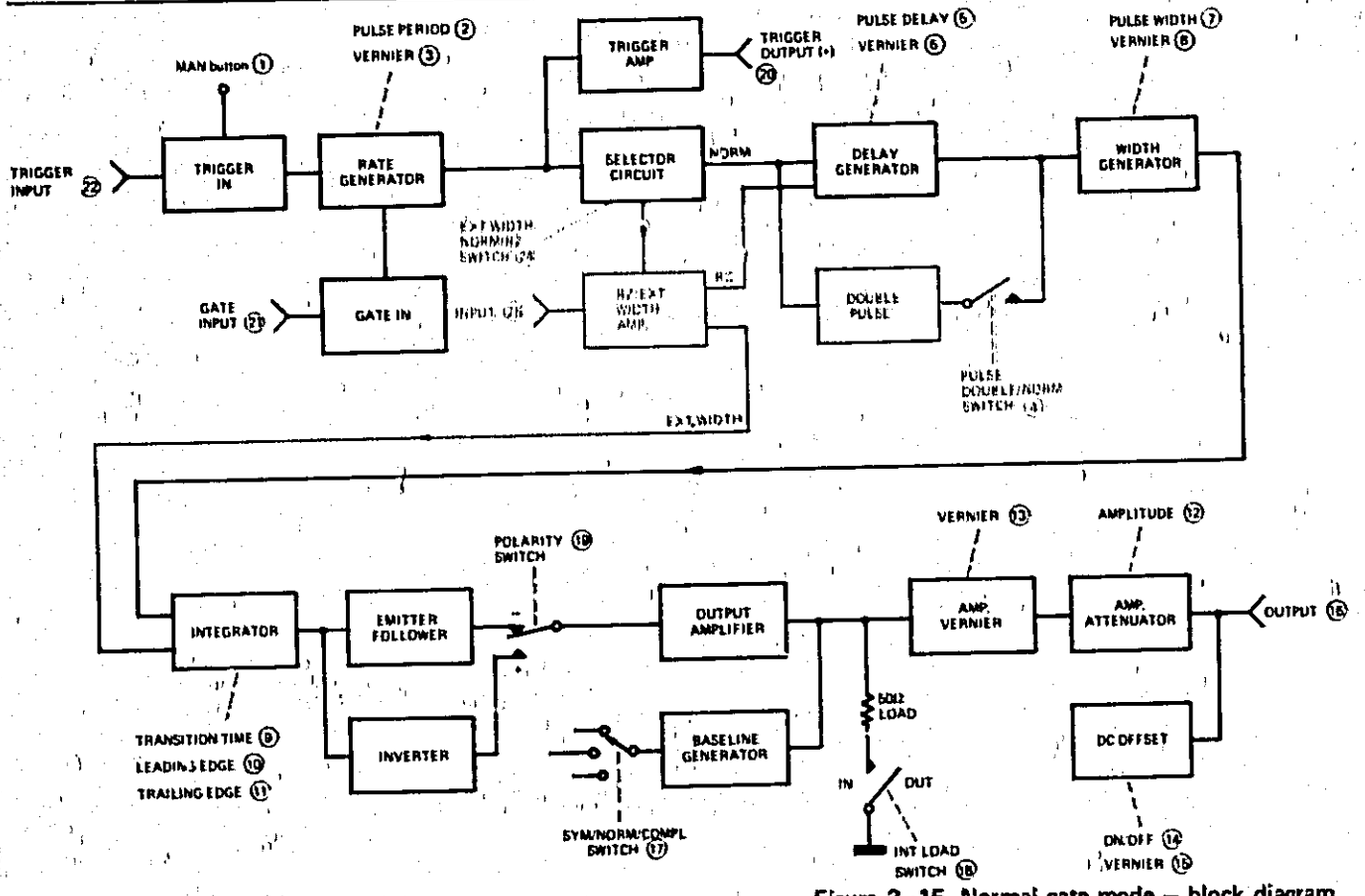


Figure 3–15. Normal gate mode – block diagram

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

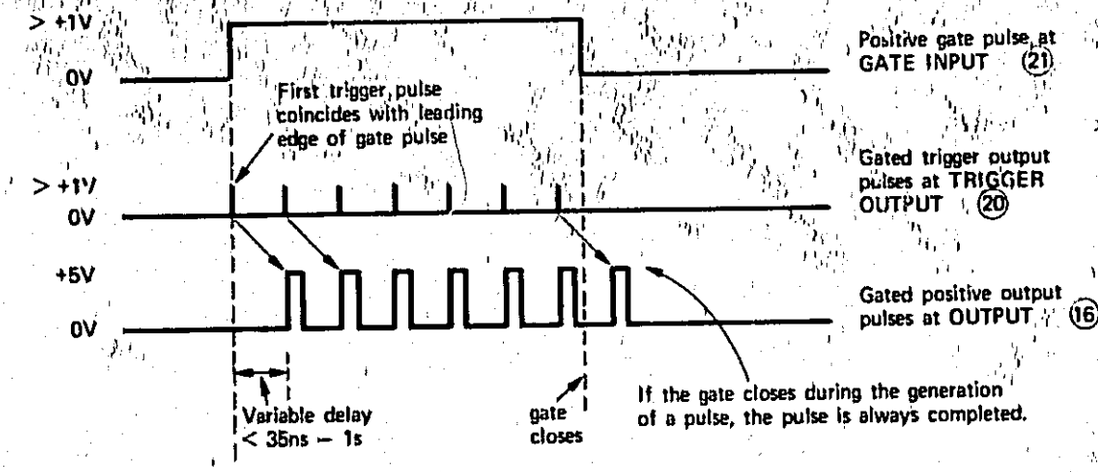
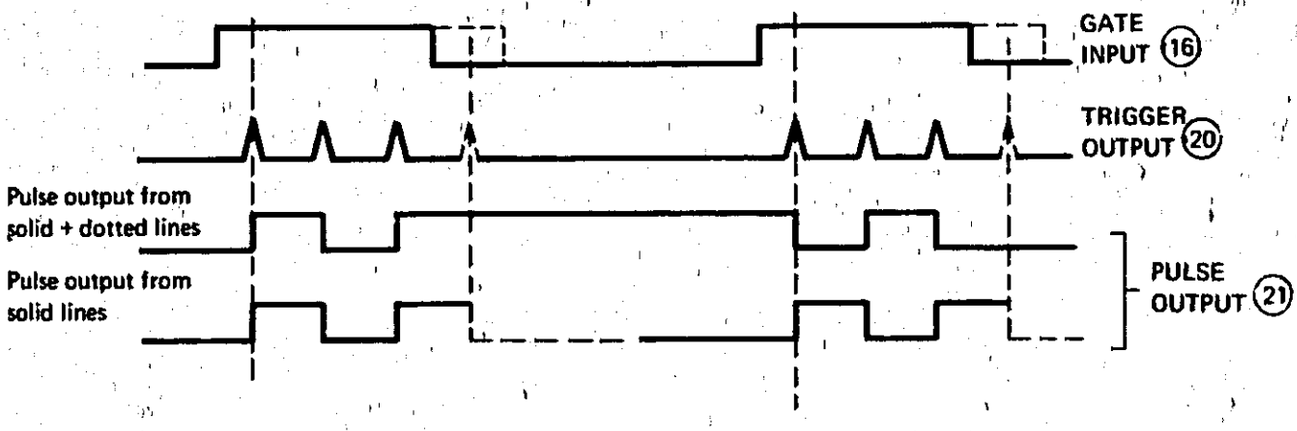


Figure 3–16. Output pulses in gate mode



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 80128 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.

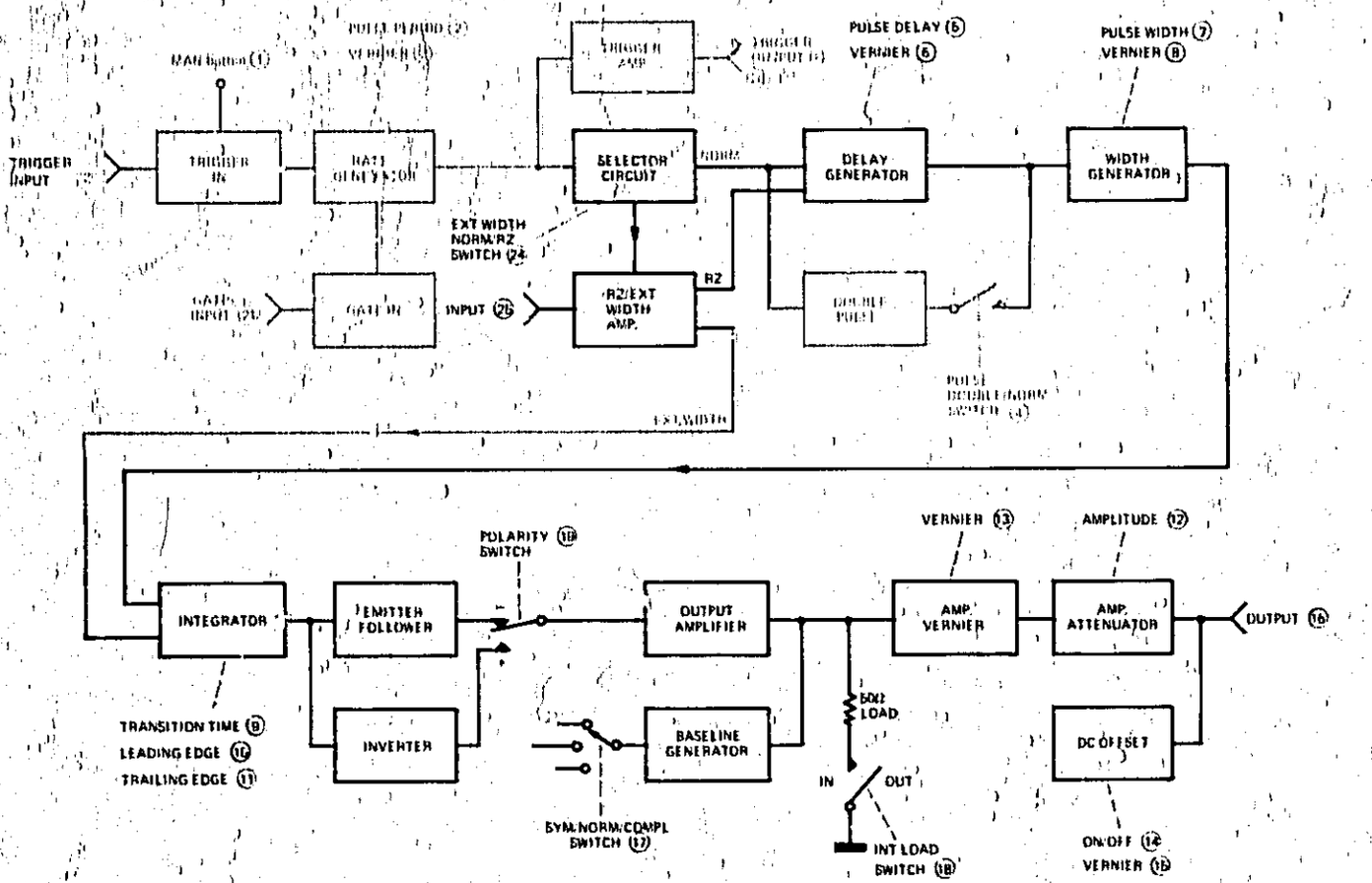


Figure 3–18. RZ mode – block diagram

3–42 The RZ input signal must be > +1V to a maximum of ± 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.

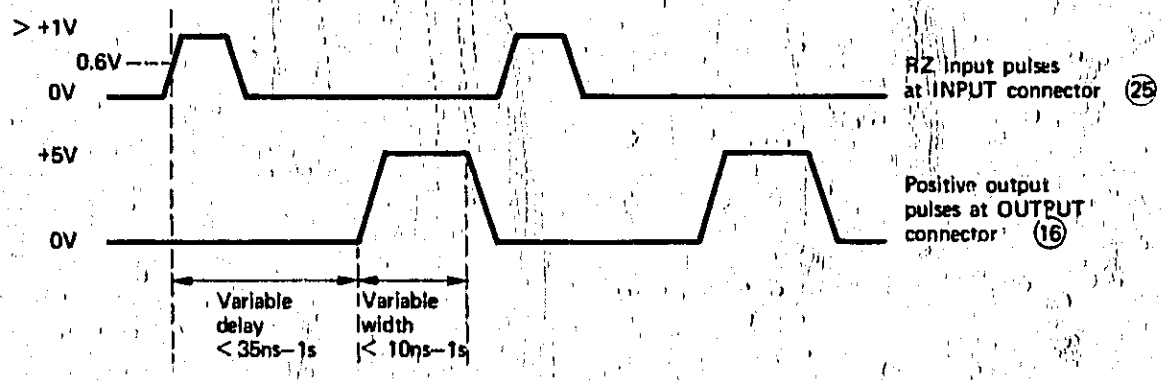


Figure 3–19. Output pulses in RZ mode

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).

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.

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

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

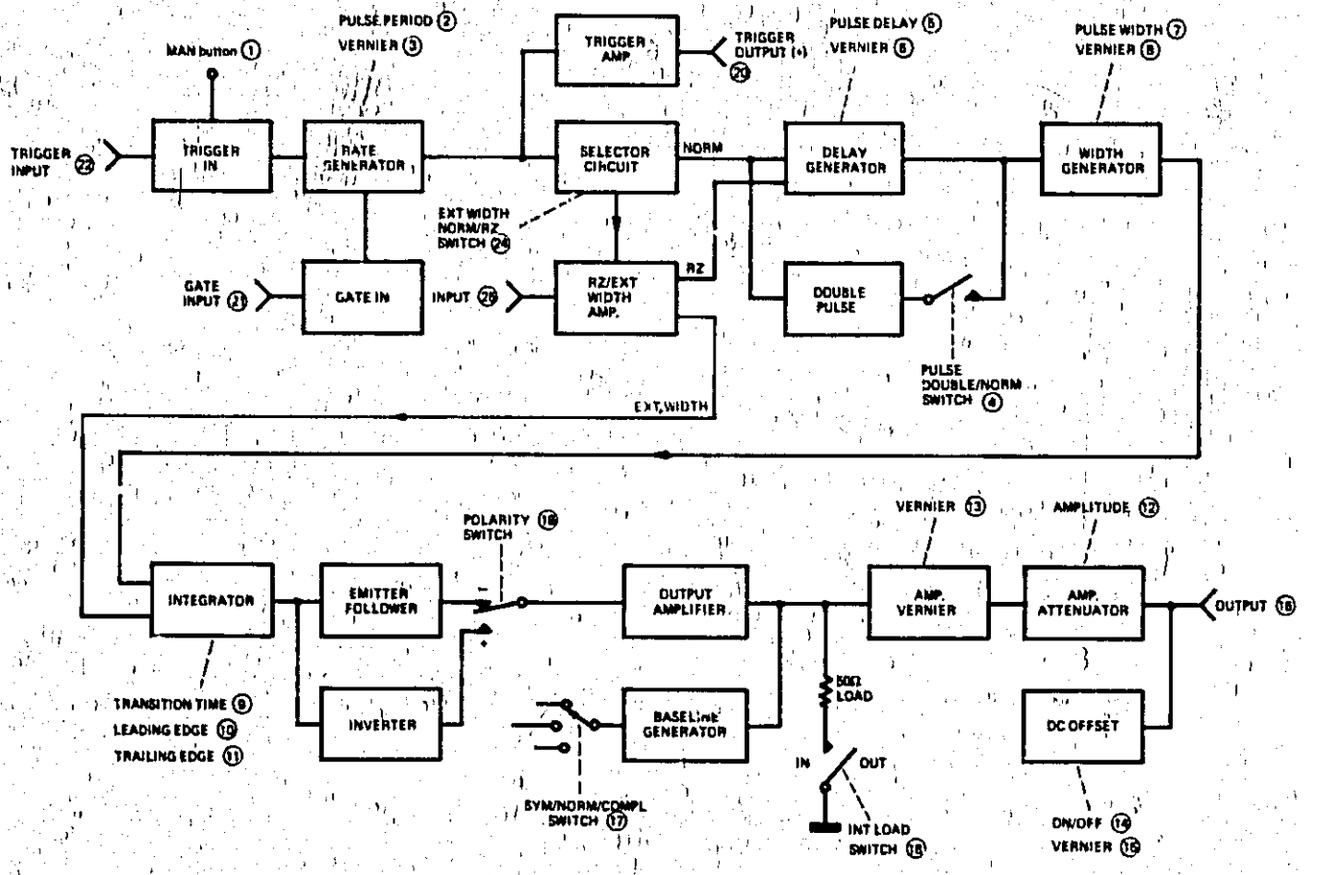


Figure 3–20. Double pulse mode – block diagram

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

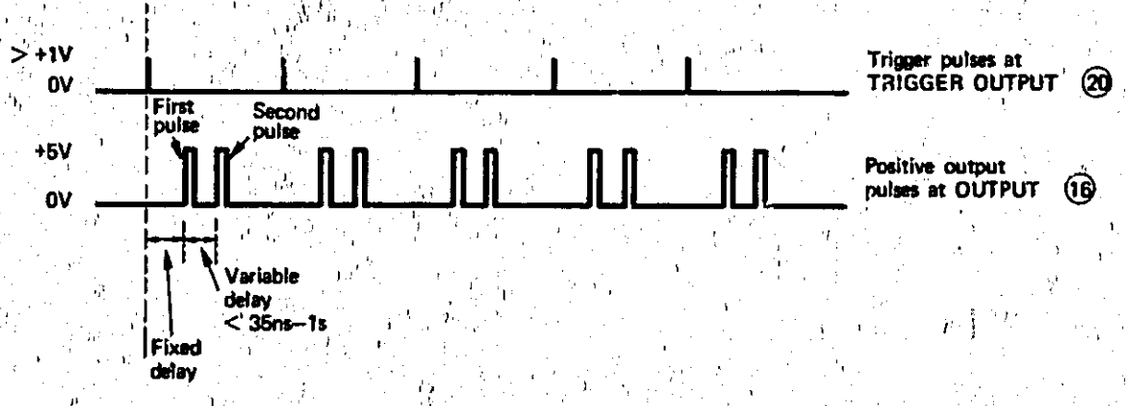


Figure 3–21. Output pulses in double pulse mode

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 ± 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.

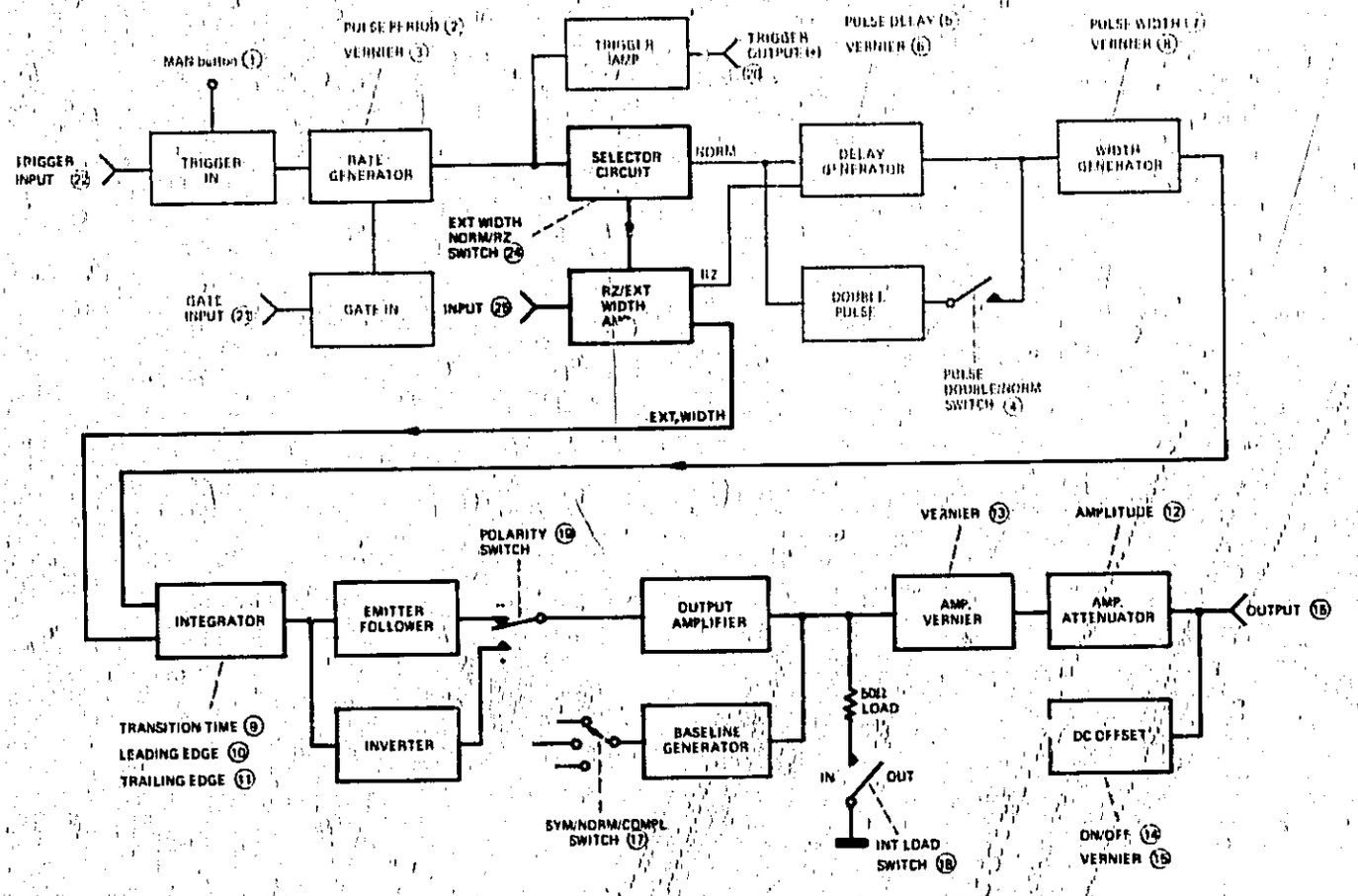


Figure 3–22. External width mode – block diagram

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 (21) 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.

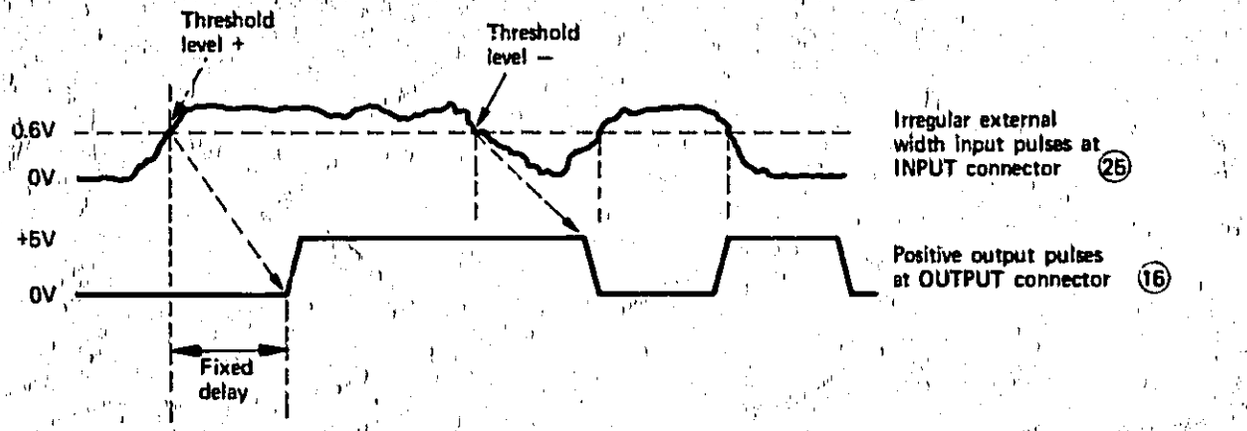


Figure 3–23. Output pulses in external width mode

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.

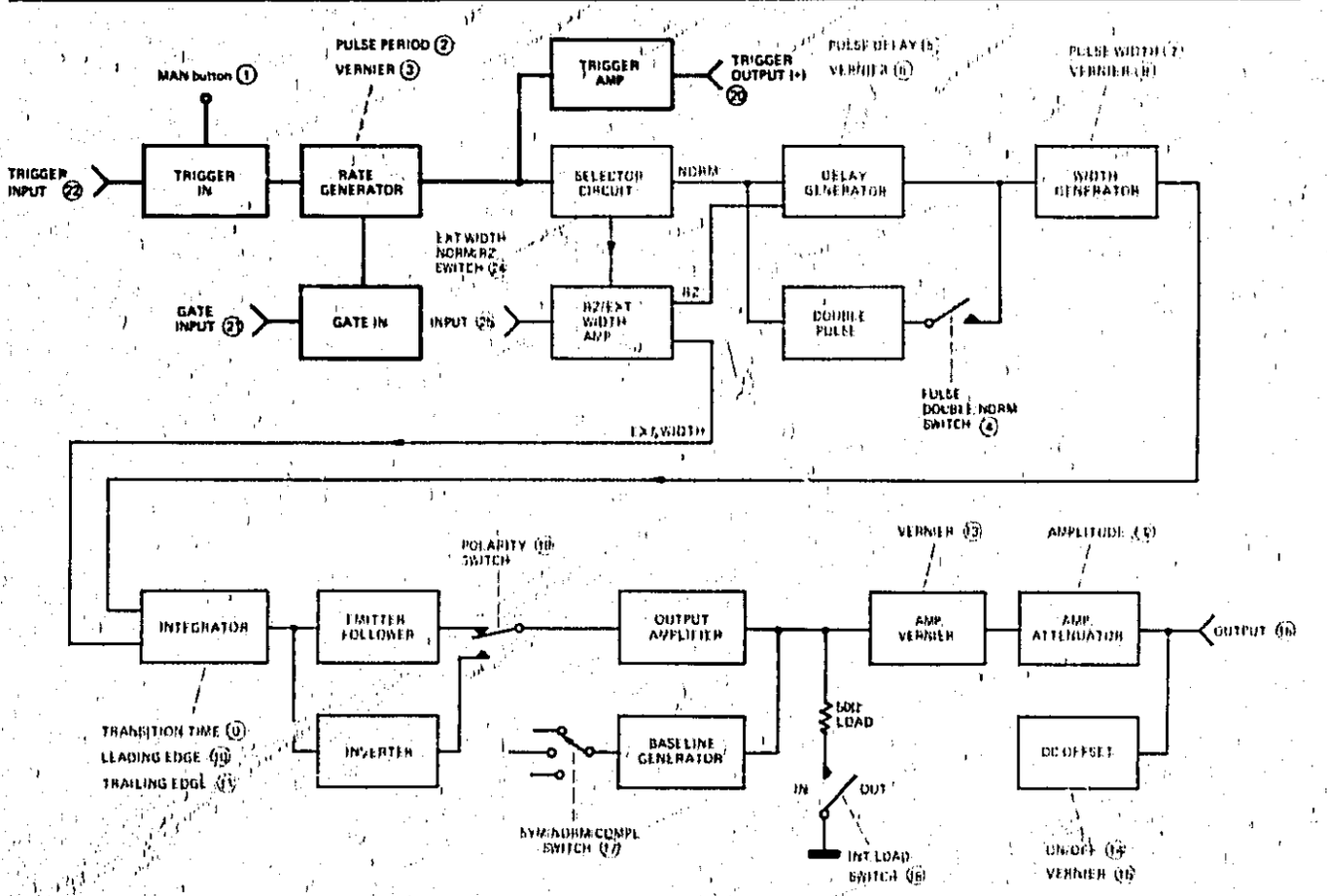


Figure 3–24. Independent clock generator in RZ/EXT WIDTH modes – block diagram

THEORY

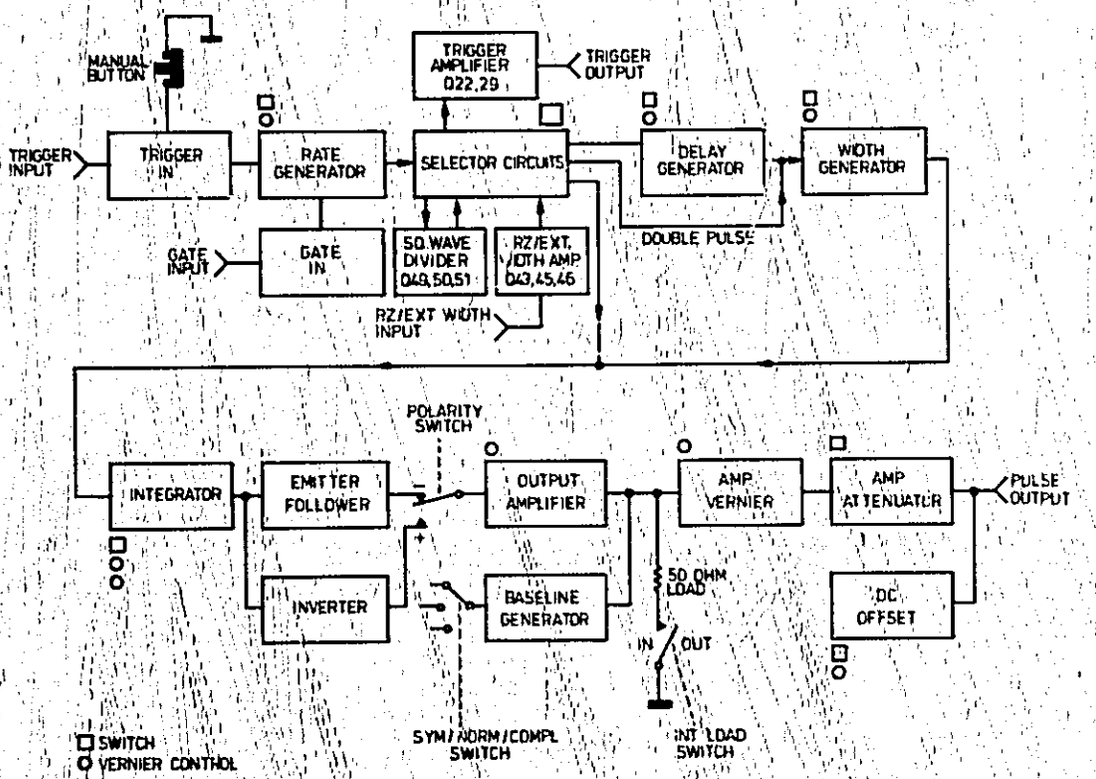


Figure 4-1. 8012B Pulse Generator – Block Diagram

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 dou .e 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.

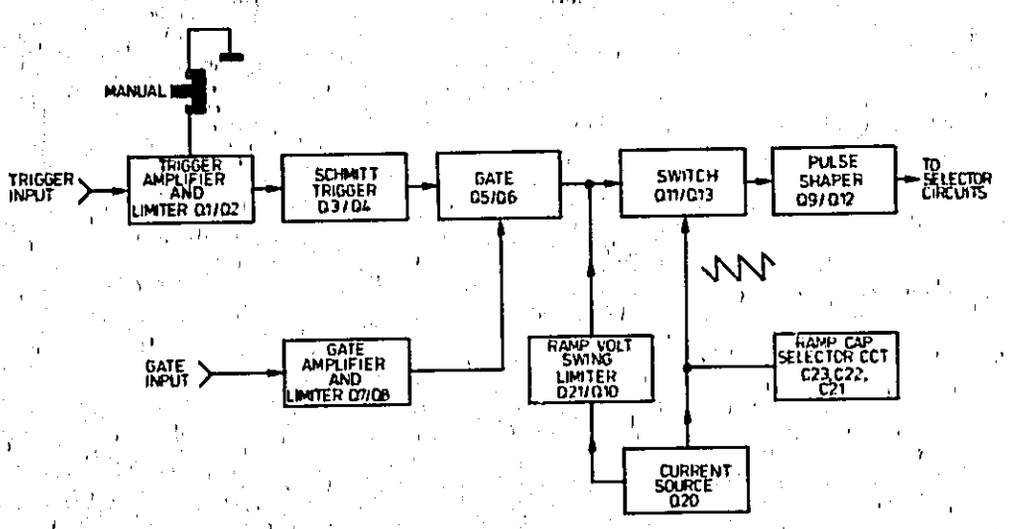


Figure 4–2. Repetition Rate Generator – Block Diagram

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:
a) by the internal rate generator
b) externally using an applied signal
c) 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 biassed 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 singals 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.

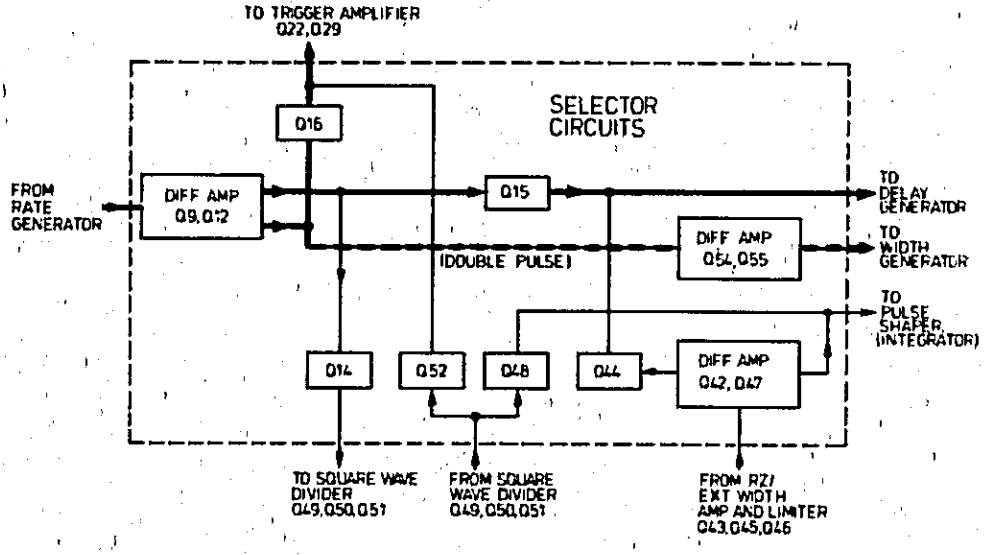


Figure 4–3A Normal Mode (including external trigger and gate mode)

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).

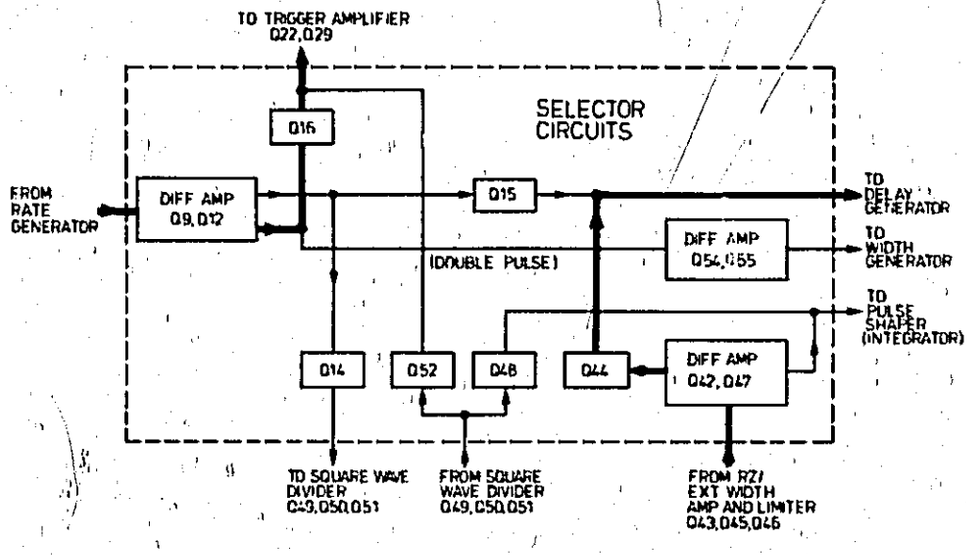


Figure 4–3B RZ Mode

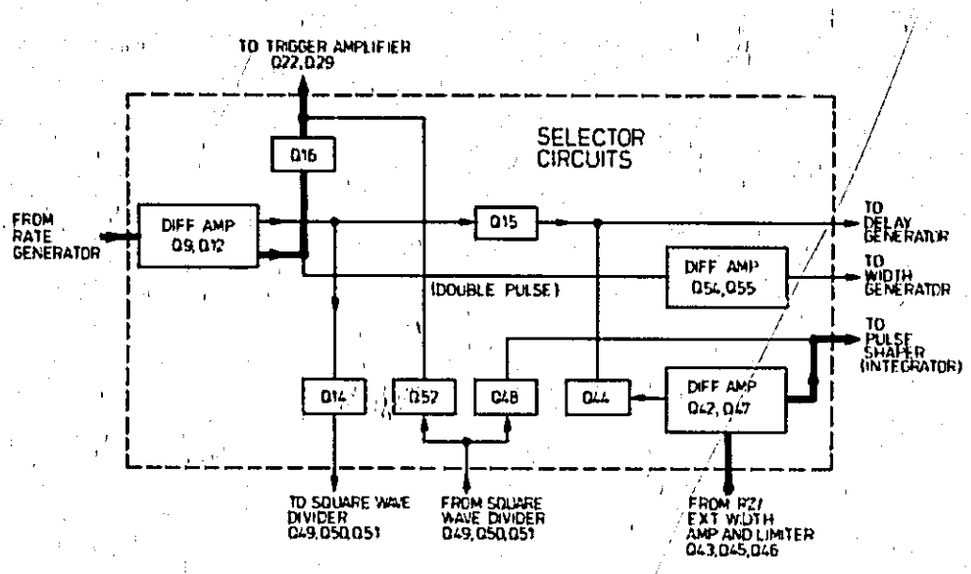


Figure 4–3C. Ext. Width Mode

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.

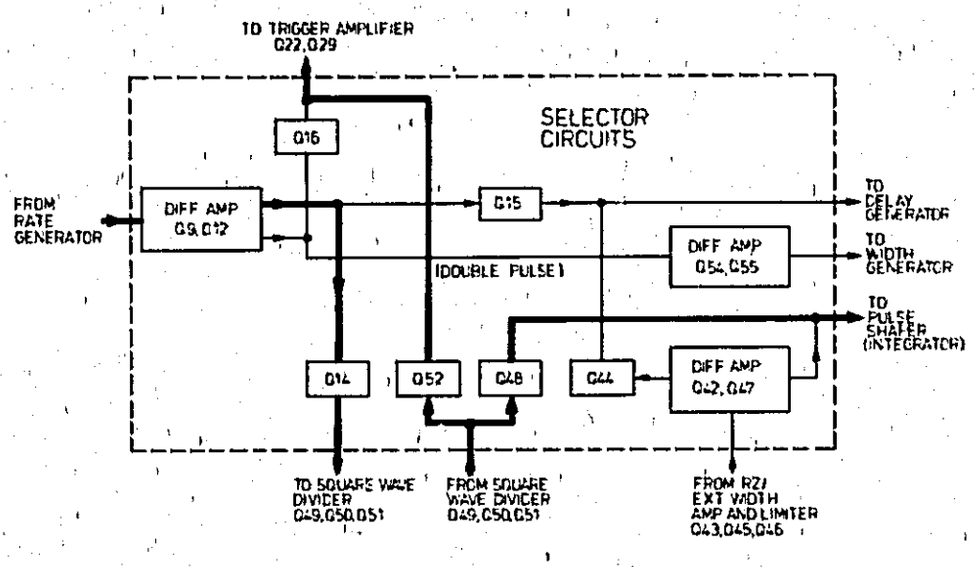


Figure 4–3D Square Wave Mode

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 1 s, with respect to the trigger output.

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

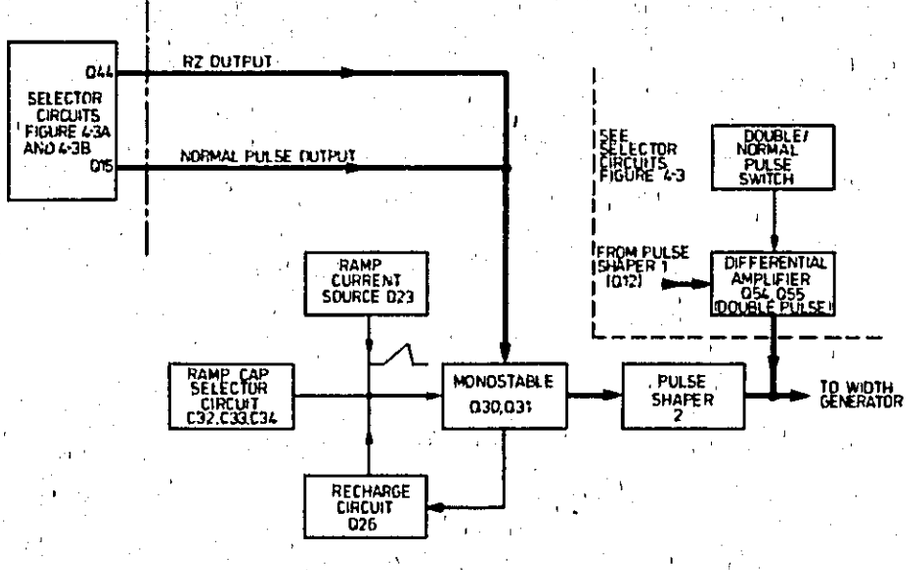


Figure 4–4 Delay Generator – Block Diagram

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.

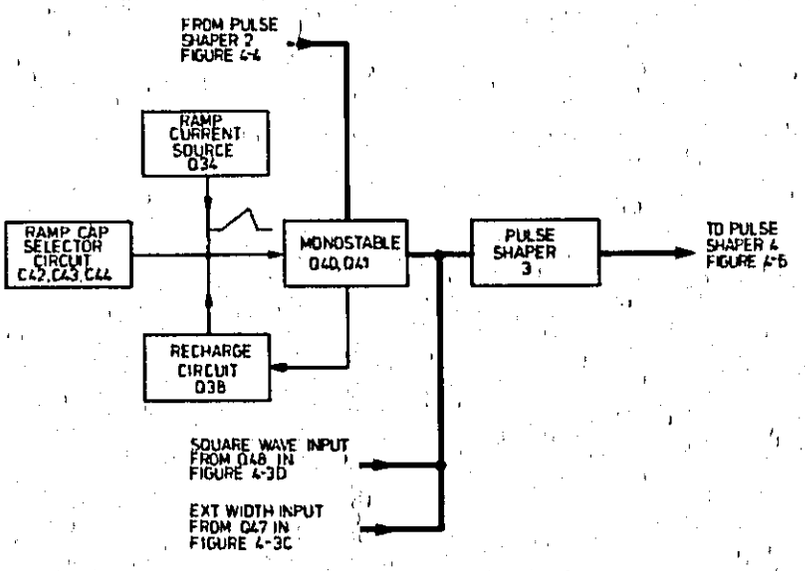


Figure 4–5 Width Generator – Block Diagram

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.

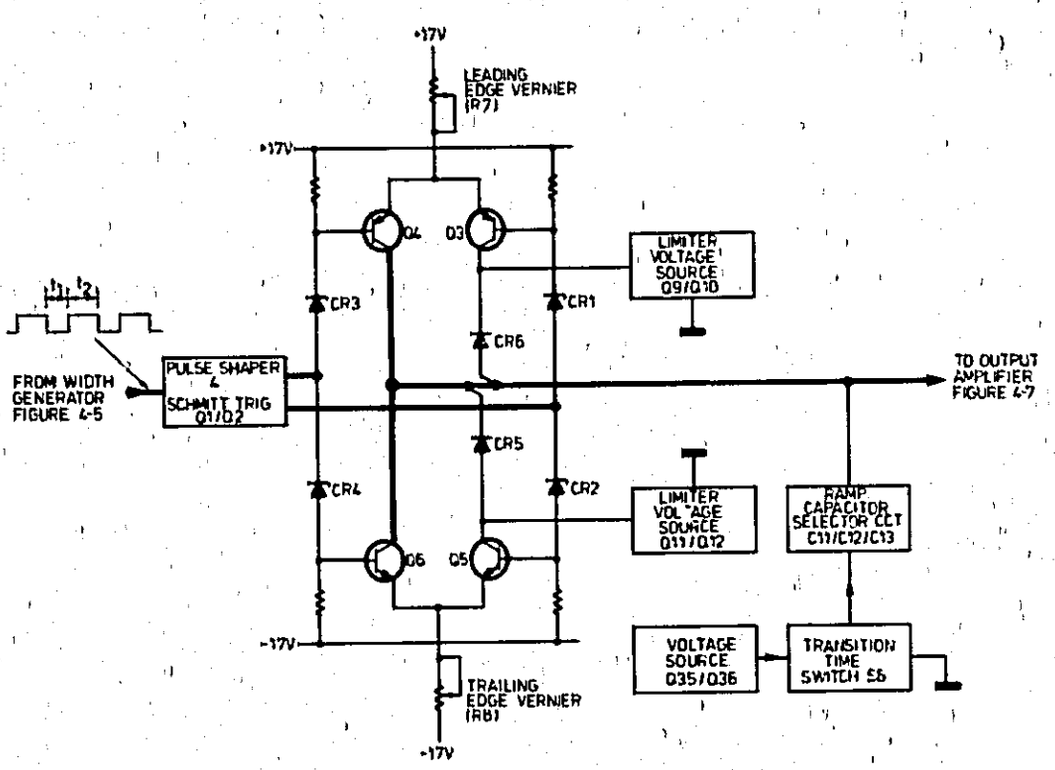
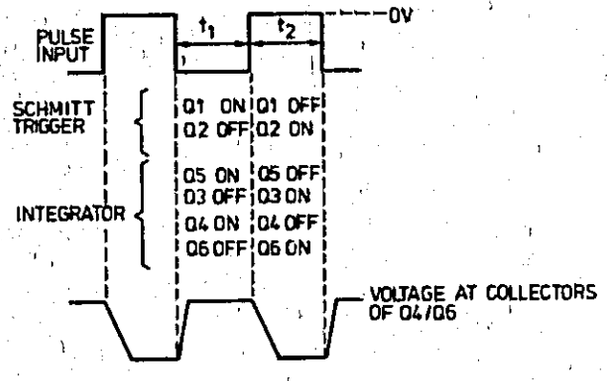


Figure 4–6 Integrator – Block Diagram

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 (R 7). 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 (R 8). 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 biassed 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 µs 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.

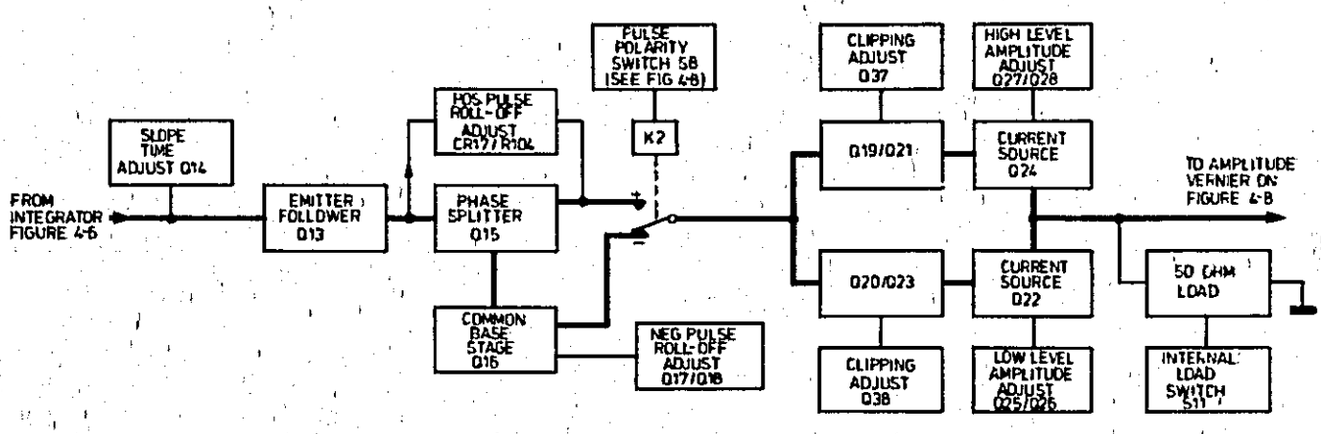


Figure 4–7. Output Amplifier – Block Diagram

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

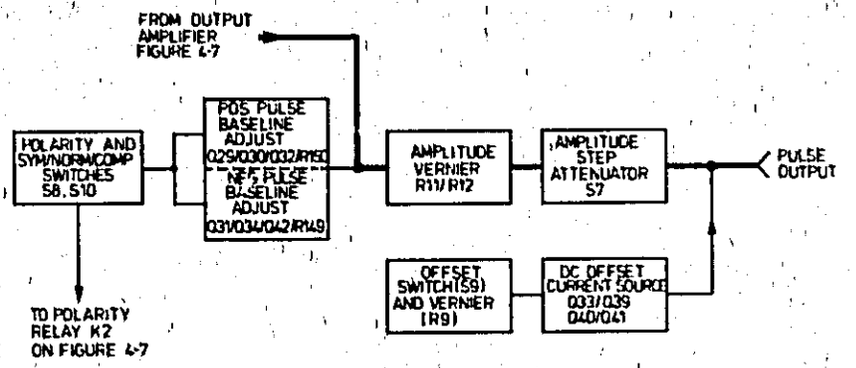


Figure 4–8 Offsets and Attenuators – Block Diagram

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 frome. 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 specifiction. The checks should be performed in the order in which they appear.

5–28 SERVICE PRODUCT SAFETY CHECK

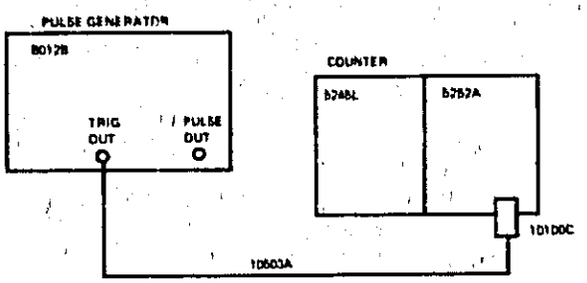
5–29 This check (table 5–30) should be performed following the internal checks and adjustments to verify the instrument safety.

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 ± (0.03% reading + 0.01% range).	HP 3470 system comprising 34740A display and 34702A Multimeter.
Sampling Oscilloscope	Dual-channel, * GHz bandwidth 2mV/div. sensitivity, sweep speeds 100ps/div to 50μs/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 (1μs to 100ms), amplitude 0V to ± 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–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
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

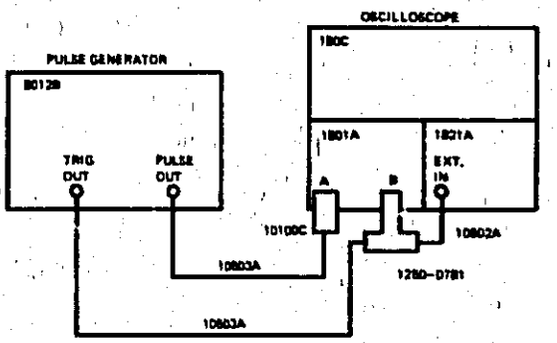
STEP INSTRUCTIONS

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

PULSE PERIOD 2	VERNIER 3	PULSE PERIOD	FREQUENCY
20n–1μ	CCW	<20ns	>50MHz
1μ–.1m	CCW	<1μs	>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

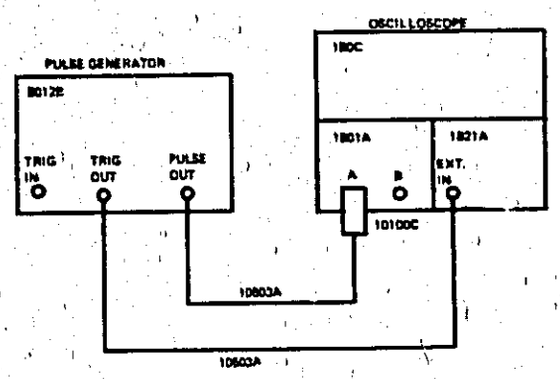
PULSE PERIOD 2	see step 1
VERNIER 3	see step 1
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	see step 1
VERNIER 6	CCW
PULSE WIDTH 7	see step 1
VERNIER 8	CCW
TRANSITION TIME 9	5n–0.5μ
LEADING EDGE 10	CCW
TRAILING EDGE 11	CCW
AMPLITUDE 12	5.0–2.0
VERNIER 13	CW
OFFSET SWITCH 14	OFF
OFFSET VERNIER 15	–
SYM/NORM/COMPL 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

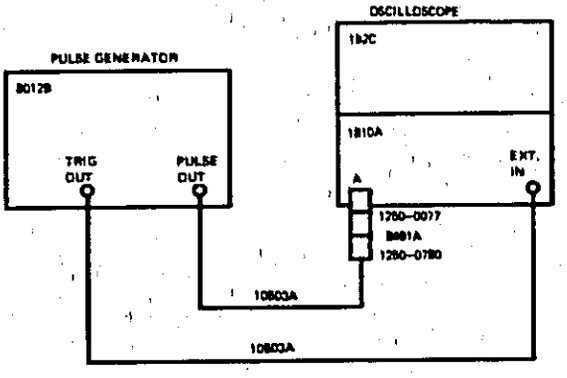
PULSE PERIOD 2	see step 1
VERNIER 3	CW
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	35n–1μ
VERNIER 6	CCW
PULSE WIDTH 7	see step 1
VERNIER 8	CCW
TRANSITION TIME 9	5n–0.5μ
LEADING EDGE 10	CCW
TRAILING EDGE 11	CCW
AMPLITUDE 12	5.0–2.0
VERNIER 13	CW
OFFSET SWITCH 14	OFF
OFFSET VERNIER 15	–
SYM/NORM/COMPL SWITCH 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

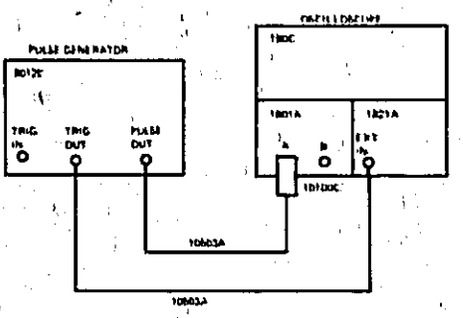


INITIAL CONTROL SETTINGS

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	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:

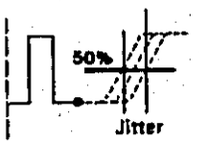
Main Sweep	10 ms/div
Delayed Sweep	1μs/div
Sweep Mode	Norm.
Delayed Trigger	Auto.
CM Delay	2.0

2 Adjust pulse period VERNIER to obtain 0.1mS pulse period on display.

3 Switch Mode switch on 1821A to DELAYED.

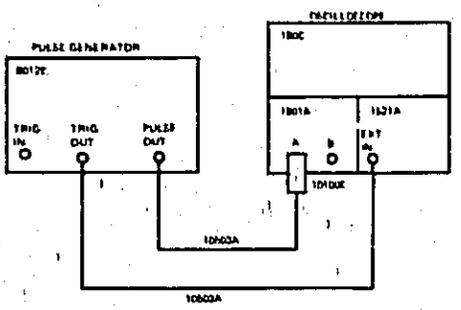
4 Adjust 1821A Delay (Div) vernier until leading edge of secound pulse is on display.

5 Set Magnifier to x 10. Display should be:



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

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

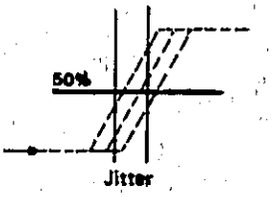
2 Adjust pulse period VERNIER 3 to obtain 0.4mS pulse period on display.

3 Adjust pulse delay VERNIER 6 to obtain 0.1mS pulse delay.

4 Switch Mode switch on 1821A to DELAYED.

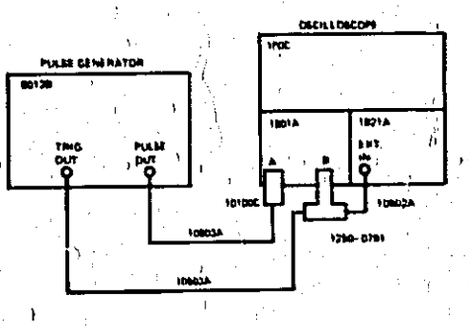
5 Adjust 1821A Delay (Div) vernier until leading edge of first pulse is on display.

6 Set Magnifier to x 10. Display should be:



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

1 Set 1821A controls as follows:

Main Sweep	50 ms/div
Delayed Sweep	1μs/div
Sweep Mode	Norm.
Delayed Trigger	Auto.
Magnifier	x 1

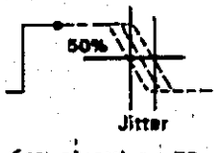
2 Adjust pulse period VERNIER 3 to obtain 0.4ms pulse period on display.

3 Adjust pulse width VERNIER 8 to obtain 0.1ms pulse width.

4 Switch Mode switch on 1821A to DELAYED.

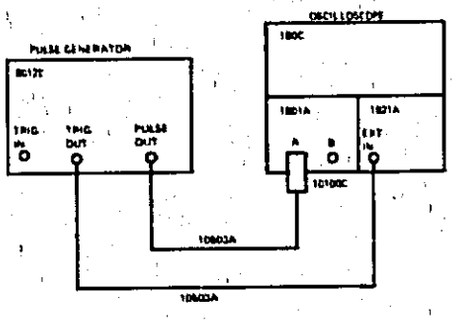
5 Adjust 1821A Delay (Div) vernier until trailing edge of first pulse is on display.

6 Set Magnifier to x 10. Display should be:



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

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

1 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%

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

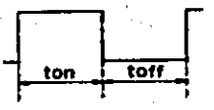
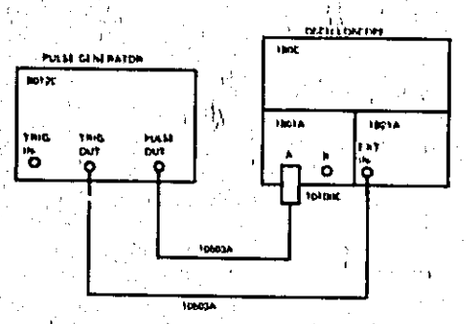


Table 5–10. Performance Test: Duty Cycle

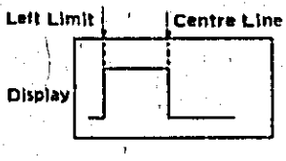


INITIAL CONTROL SETTINGS

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

1 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):



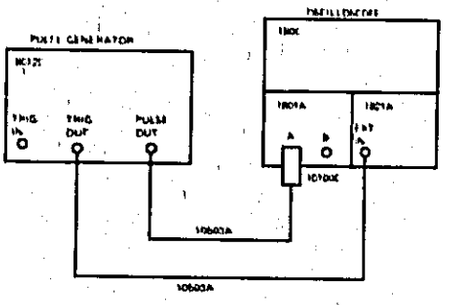
Starting with the pulse period VERNIER 3 fully CW turn VERNIER 3 slowly CCW until the trailing edge of the pulse begins to move or the pulse divides. When this happens measure the pulse period (Tp) and use in the formula:

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

RESULTS

PULSE PERIOD 2	VERNIER 3	PULSE WIDTH 7	VERNIER 8	
1u–.1m	CW	1u–.1m	Adjust for 1uS	>75%
.1m–10m	CW	.1m–10m	Adjust for 0.1mS	>75%
10m–1	CW	10m–1	Adjust for 10mS	>75%

Table 5–11. Performance Test: Manual Operation



INITIAL CONTROL SETTINGS

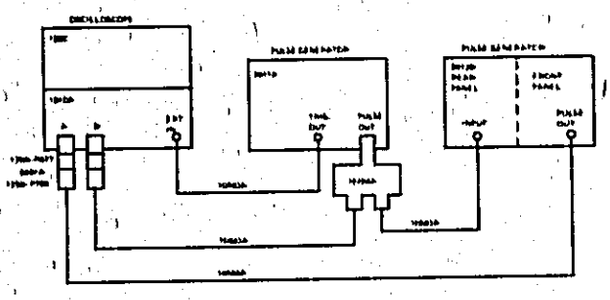
PULSE PERIOD 2	EXT +
VERNIER 3	–
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	35n–1μ
VERNIER 6	CCW
PULSE WIDTH 7	1μ–.1m
VERNIER 8	CW
TRANSITION TIME 9	5n–0.5μ
LEADING EDGE 10	CW
TRAILING EDGE 11	CW
AMPLITUDE 12	5.0–2.0
VERNIER 13	CW
OFFSET SWITCH 14	OFF
OFFSET VERNIER 15	–
SYM/NORM/COMPL SWITCH 17	NORM
INT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

STEP INSTUCTIONS

1 Press MAN button 1.

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

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.

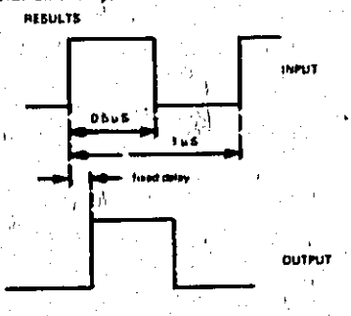
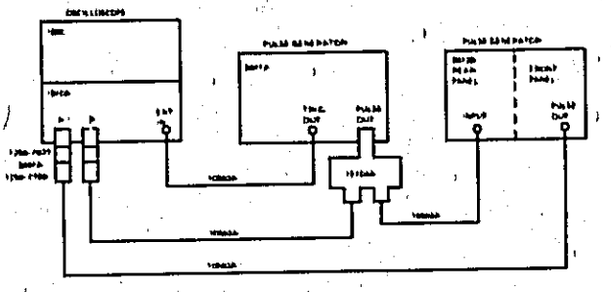


Table 5–13. Performance Test: RZ Operation

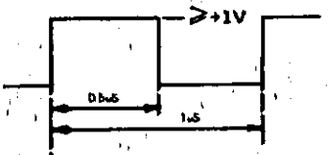


INITIAL CONTROL SETTINGS

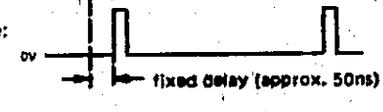
PULSE PERIOD 2	EXT +
VERNIER 3	–
PULSE DOUBLE/NORMAL 4	NORMAL
PULSE DELAY 5	35n–1μ
VERNIER 6	CCW
PULSE WIDTH 7	10n–1μ
VERNIER 8	Center
TRANSITION TIME 9	5n–0.5μ
LEADING EDGE 10	CCW
TRAILING EDGE 11	CCW
AMPLITUDE 12	5.0–2.0
VERNIER 13	CCW
OFFSET SWITCH 14	OFF
OFFSET VERNIER 15	–
SYM/NORM/COMPL SWITCH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

STEP INSTRUCTIONS RESULTS

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

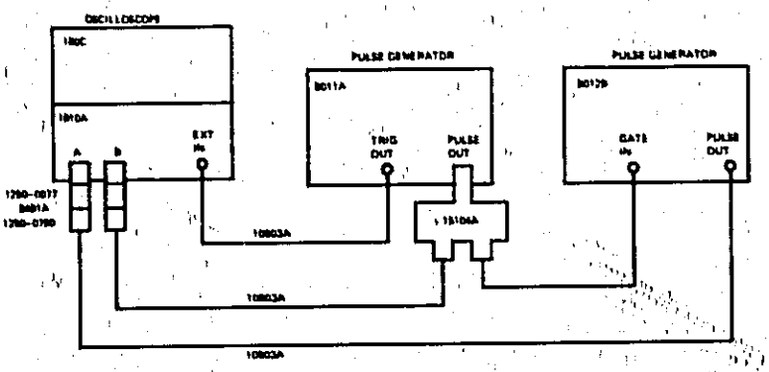


2 Output should be:



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



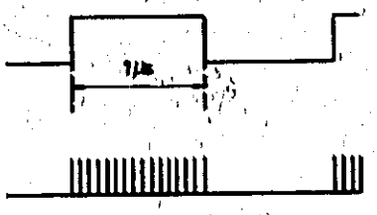
INITIAL CONTROL SETTINGS

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–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	NORM

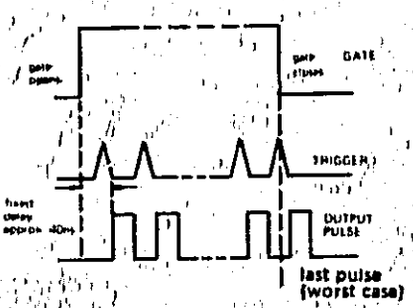
STEP INSTRUCTIONS

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.

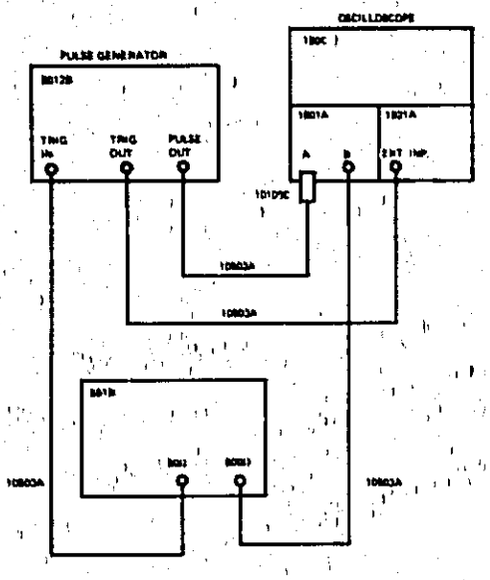


3 Check that leading edge of first trigger output pulse (TRIGGER OUTPUT 20) occurs a short time (owing to fixed delay) after the leading edge of the gate pulse.



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	–
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

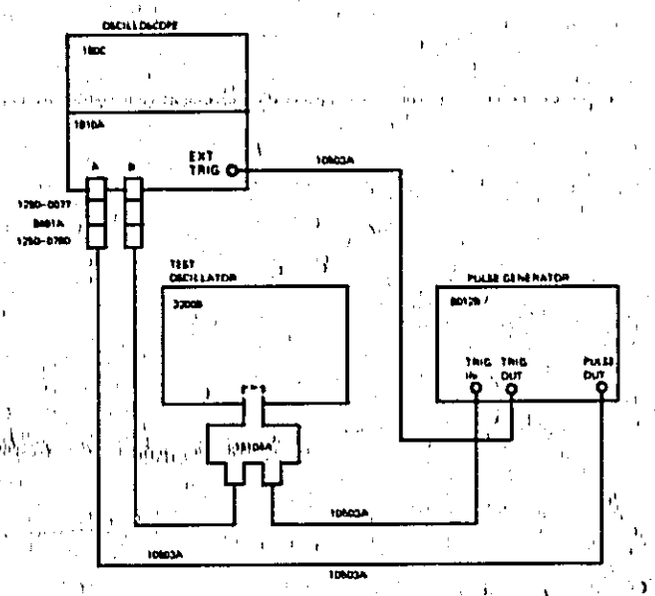
1 Set the 661B controls as follows:

Range	X100
Vernier	2.5
Attenuator	+10 dB (1.0V)
Amplitude	0.61V (RMS)

2 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.

3 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	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/PZ SWITCH 24	NORM

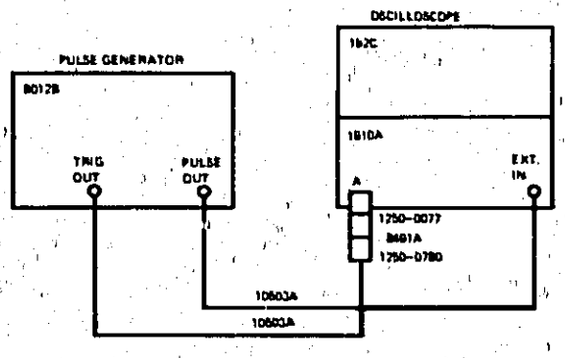
STEP INSTRUCTIONS

1 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.

2 Set PULSE PERIOD 2 to EXT–.

3 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

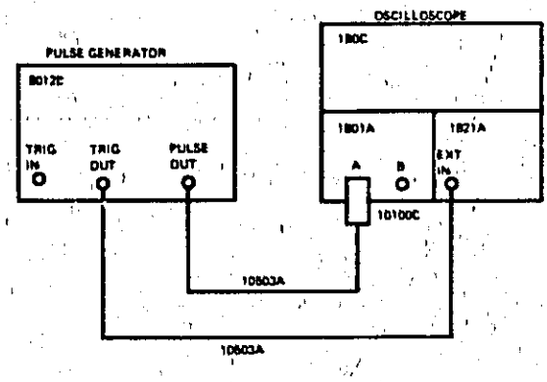


INITIAL CONTROL SETTINGS

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 24	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 1u –.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

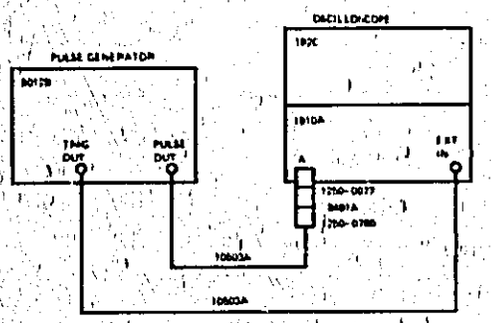
PULSE PERIOD 2	1μ–.1m
VERNIER 3	CCW
PULSE DOUBLE/NORMAL 4	NORM
PULSE DELAY 5	35n–1μ
VERNIER 6	CCW
PULSE WIDTH 7	SQUARE WAVE
VERNIER 8	–
TRANSITION TIME 9	0.5μ–50μ
LEADING EDGE 10	CCW
TRAILING EDGE 11	CCW
AMPLITUDE 12	5.0–2.0
VERNIER 13	CW
OFFSET SWITCH 14	OFF
OFFSET VERNIER 15	–
SYM/NORM/COMPL SWITCH 17	NORM
INT LOAD 18	IN
POLARITY 19	+
EXT WIDTH/NORM/RZ SWITCH 24	NORM

STEP INSTRUCTIONS

1 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
1u–.1m	CCW	0.5u–50u	CCW	<0.5u
.1m–10m	CCW	50u–5m	CCW	<50uS
10m–1	CCW	5m–0.5	CCW	<5mS
1u–.1m	CW	0.5u–50u	CW	>50uS
.1m–10m	CW	50u–5m	CW	>5mS
10m–1	CW	5m–0.5	CW	>0.5S

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

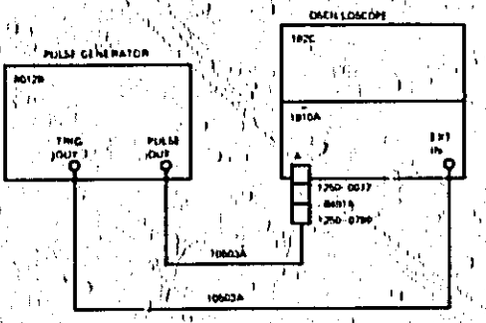


INITIAL CONTROL SETTINGS

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.	⩾0.5uS

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

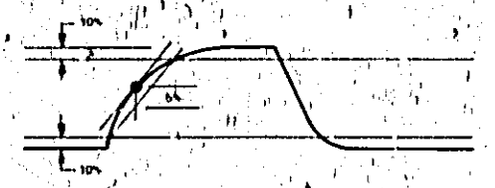
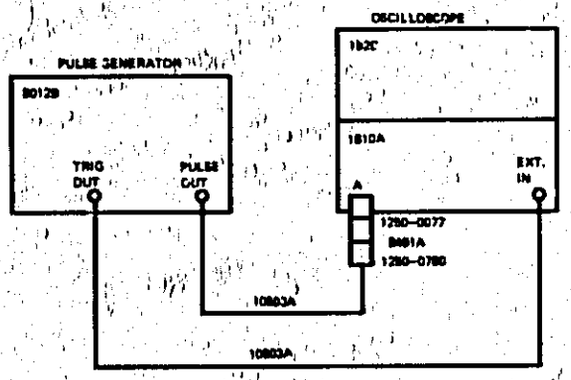
STEP	INSTRUCTIONS	RESULTS
1	Adjust pulse period VERNIER 3 to obtain a pulse period of 100nS.	
2	Adjust pulse width VERNIER 8 to obtain a pulse width of 50nS.	
3	Adjust LEADING EDGE 10 and TRAILING EDGE 11 verniers to obtain rise and fall times of 30nS.	
4	Adjust amplitude VERNIER 13 to obtain full screen 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	RESULTS
1	Measure preshoot, overshoot and ringing of the pulse as a percentage of pulse amplitude. Refer to diagram below.	<±5%
2	Set POLARITY 19 to –	
3	Repeat step 1.	

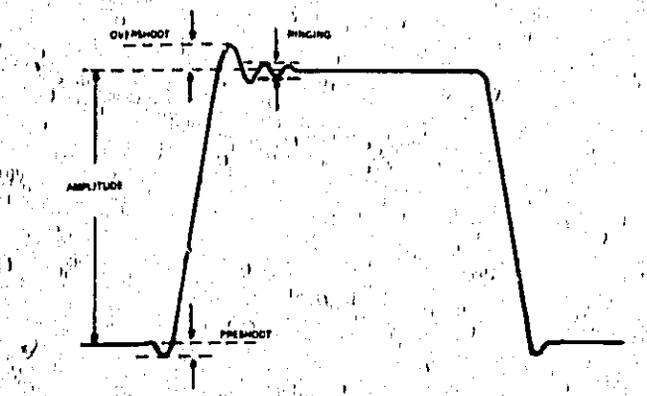
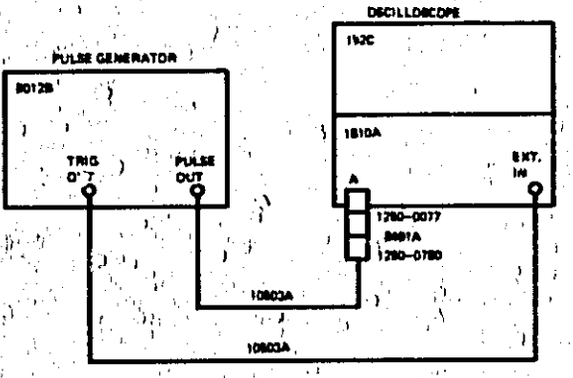


Table 5–22. Performance Test: Attenuator Calibration

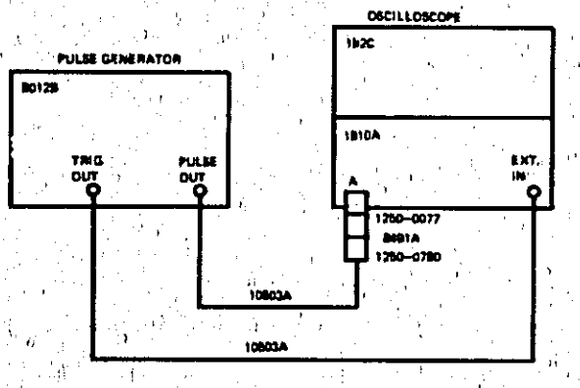


INITIAL CONTROL SETTINGS

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	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

AMPLITUDE 12	VERNIER 13	INT LOAD 18 IN	INT LOAD 18 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

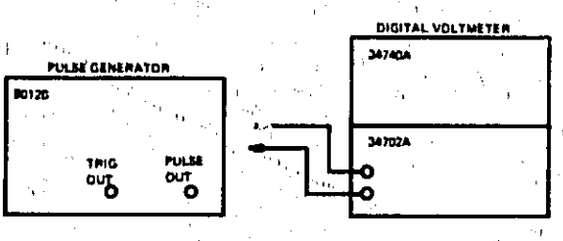


INITIAL CONTROL SETTINGS

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	RESULTS
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.	

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.

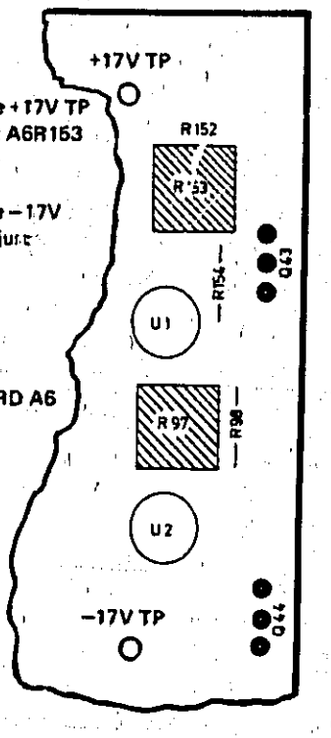
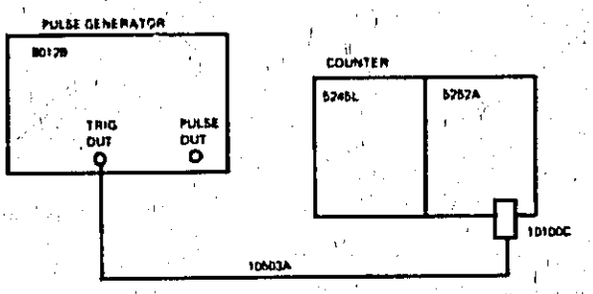


Table 5–25. Internal Checks and Adjustments: Repetition Rate



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.

BOARD A5

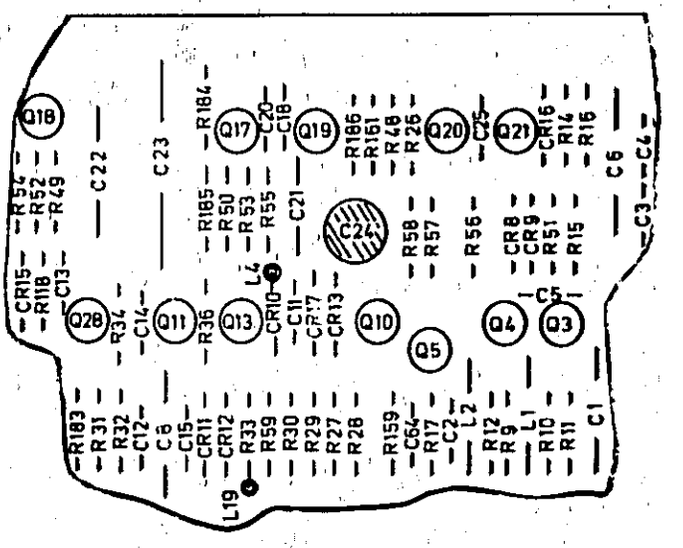
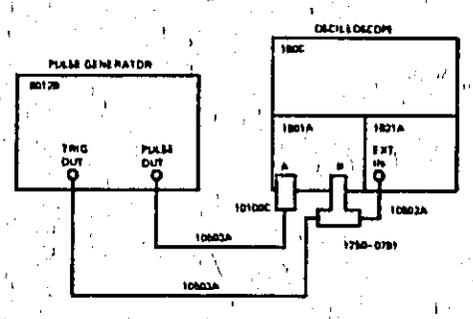


Table 5–26. Internal Checks and Adjustments: Delay and Width Timing



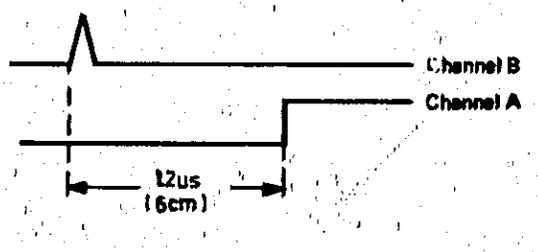
INITIAL CONTROL SETTINGS

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

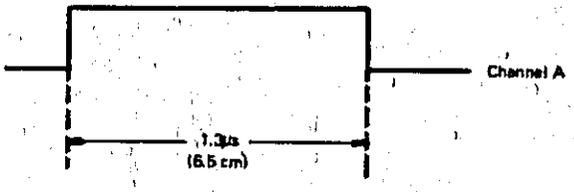
1. Pulse Delay

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

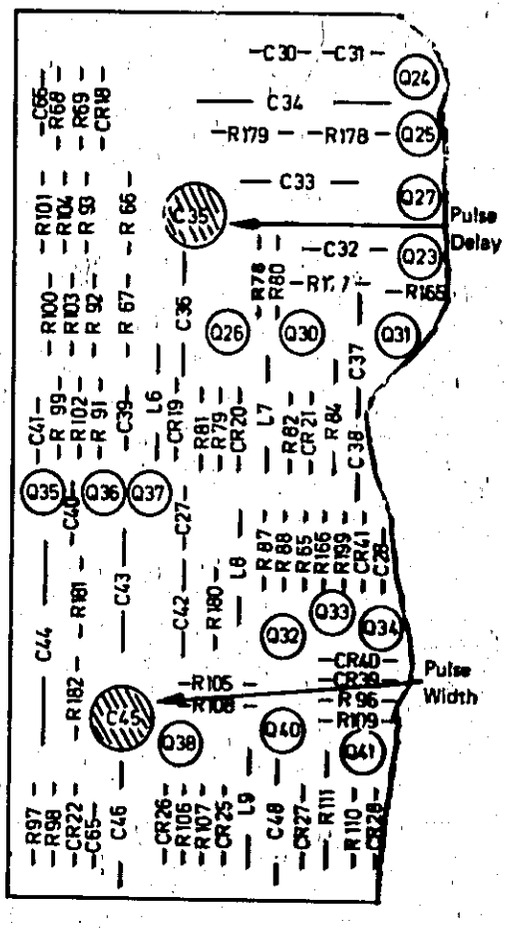
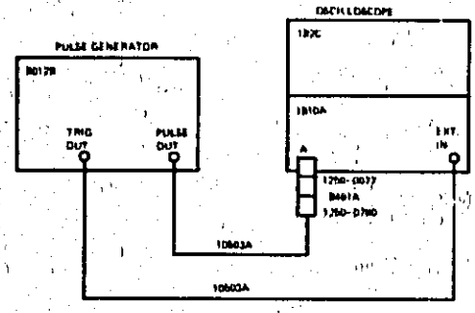


Table 5–27. Internal Checks and Adjustments: Amplitude and Baseline



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	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	OUT
POLARITY 19	positive
EXT WIDTH/NORM/RZ SWITCH 24	NORM

1810A:

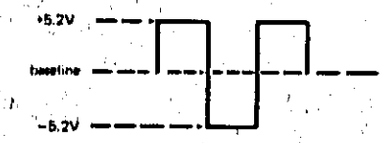
TIME/CM	0.2μs
MILLIVOLTS/CM	200mV

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 A6 R87 for –5.2V amplitude
Adjust A6 R88 for +5.2V amplitude



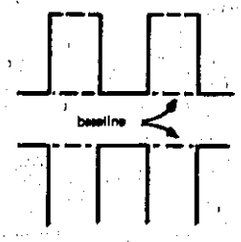
3 Set the 1810A to 10mV/cm.
Set the 8012B SYM/NORM/COMPL SWITCH 24 to NORM.

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

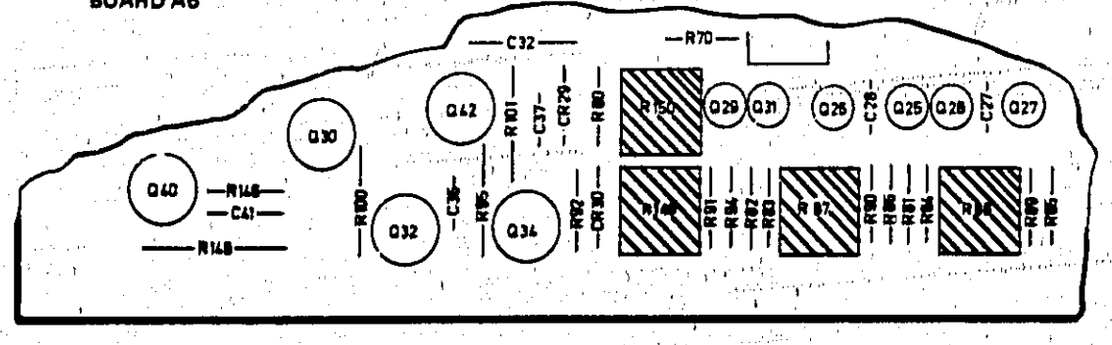
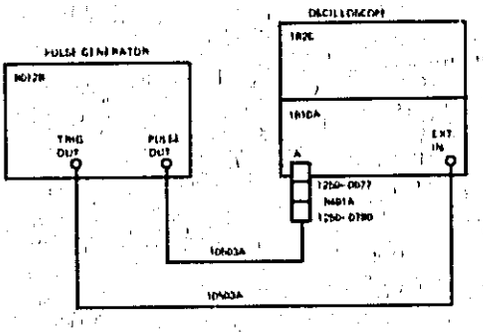


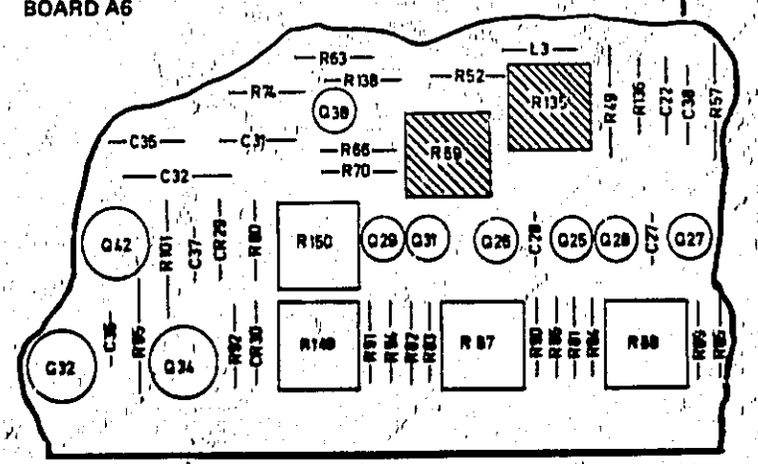
Table 5–28. Internal Checks and Adjustments: Pulse Clipping and Roll-Off



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

BOARD A6



1. Pulse Clipping

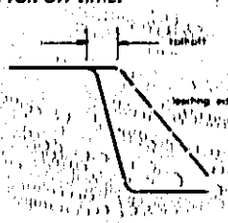
STEP	INSTRUCTION
1	Adjust the pulse period vernier for a stable display.
2	Adjust A6 R69 for the best possible pulse shape.

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).

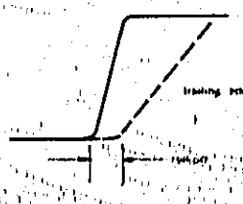
Table 5–28. (cont'd)

2. Pulse Roll-off

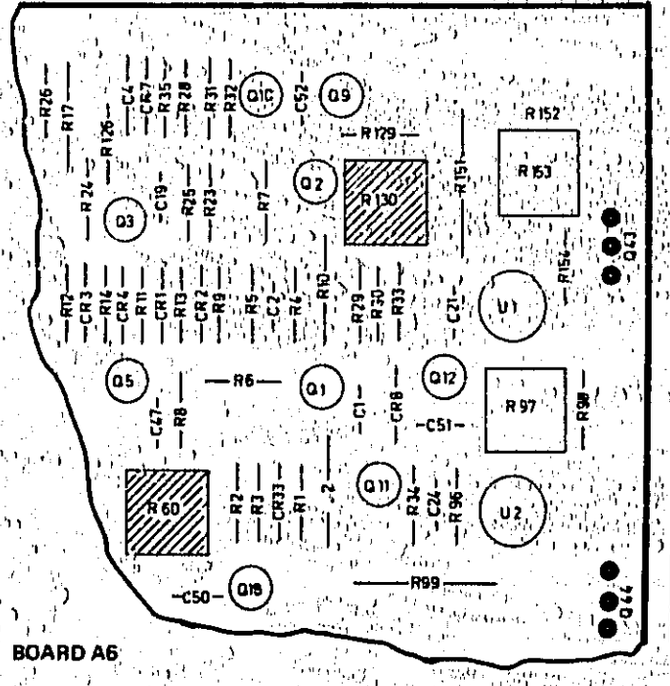
STEP	INSTRUCTION
1	Set the 8012B transition time verniers **10** and **11** to CCW.
2	Expand the 1810A timebase to display only the pulse leading edge and position it symmetrically on the screen.
3	Turn the leading edge vernier **10** from CCW to CW and measure the roll-off time.



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 re-adjust the potentiometers if necessary.

BOARD A6

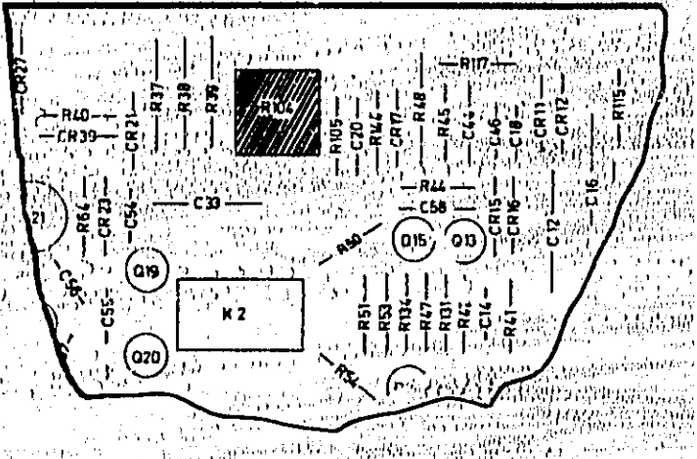
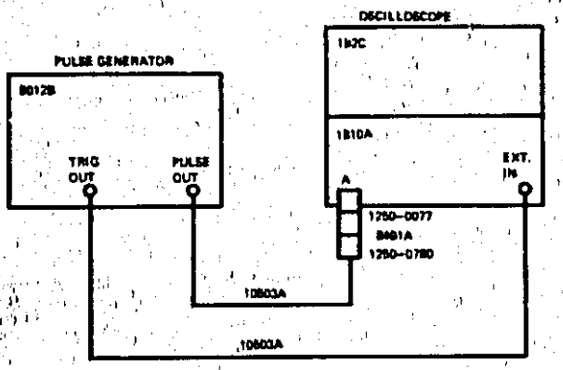


Table 5–29. Internal Checks and Adjustments: Double Pulse

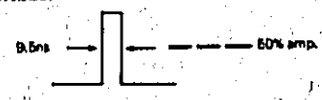


INITIAL CONTROL SETTINGS

PULSE PERIOD 2	20n–1μ
VERNIER 3	center
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	NORM
INT LOAD 18	IN
POLARITY 19	positive
EXT WIDTH/NORM/RZ SWITCH 24	NORM

Table 5–29. (cont'd)

STEP	INSTRUCTION
1	Position the output pulse on the oscilloscope screen.
2	Adjust A5C35 for 9.5ns pulse width at 50% of pulse amplitude.



3	Set the 8012B pulse double/norm switch to double.
4	Adjust the 8012B delay vernier 6 for a pulse delay of ≥ 20ns between the pulse leading edges.
5	Adjust A5R188 to produce a first (undelayed) pulse of the same width as the delayed pulse (9.5ns – see step 2)

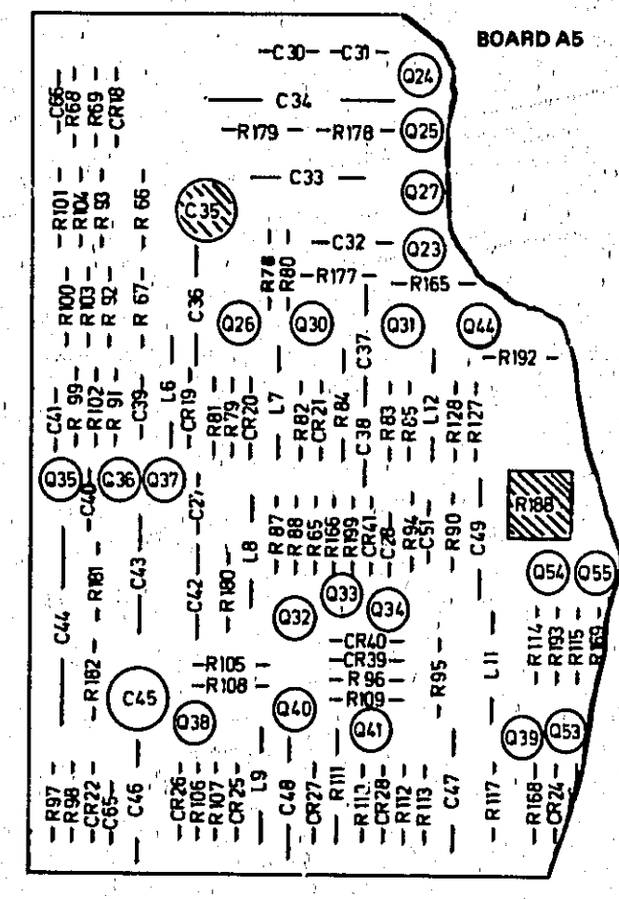


Table 5–30. Service Product Safety Check

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 card 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 ⏚.
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	Results: 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	**Minimum Pulse Width**		≤10ns	
step 4			≤10ns	
5–6 step 6	**Pulse Period Jitter**		<1%	

Table 5–31 Performance Test Record (2 of 4)

Table No.	Test Description	Results	
		Specified	Actual
5–7 step 7	**Pulse Delay Jitter**	<1%	_____
5–8 step 7	**Pulse Width Jitter**	<1%	_____
5–9	**Square Wave**		
	20n–1μ CCW	50% ± 15%	_____
	CW	50% ± 5%	_____
	1μ–.1m CCW	50% ± 5%	_____
	CW	50% ± 5%	_____
	.1m–10m CCW	50% ± 5%	_____
	CW	50% ± 5%	_____
	10m–1 CCW	50% ± 5%	_____
	CW	50% ± 5%	_____
step 2		—	satisfactory ☐ not satisfactory ☐
5–10	**Duty Cycle**		
	1μ–.1m	>75%	_____
	.1m–10m	>75%	_____
	10m–1	>75%	_____
5–11	**Manual Operations**	—	satisfactory ☐ not satisfactory ☐
5–12 step 2	**External Width**	—	satisfactory ☐ not satisfactory ☐
5–13 step 2	**RZ Operation**	—	satisfactory ☐ not satisfactory ☐
step 3		—	satisfactory ☐ not satisfactory ☐

Table 5–31 Performance Test Record (3 of 4)

Table No.	Test Description	Results	
		Specified	Actual
5–14	**Gate Operation**		
step 2		—	satisfactory ☐ not satisfactory ☐
step 3		—	satisfactory ☐ not satisfactory ☐
step 4		—	satisfactory ☐ not satisfactory ☐
5–15	**External Trigger Operation**		
step 2		—	satisfactory ☐ not satisfactory ☐
step 3		—	satisfactory ☐ not satisfacotry ☐
5–16	**High Frequency Trigger Operation**		
step 1		—	satisfactory ☐ not satisfactory ☐
step 3		—	satisfactory ☐ not satisfactory ☐
5–17	**Trigger Output**		
	Amplitude	>1.0V	_____
	Width	16ns ± 10ns	_____
step 3		—	satisfactory ☐ not satisfactory ☐
step 4		—	satisfactory ☐ not satisfactory ☐
step 5		—	satisfactory ☐ not satisfactory ☐
5–18	**Rise and Fall Times (slow)**		
	0.5μ–50μ CCW	<0.5μs	_____
	CW	>50μs	_____
	50μ–5m CCW	<50μs	_____
	CW	>5ms	_____
	5m–0.5 CCW	<5ms	_____
	CW	>0.5s	_____

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)**	 <5ns <5ns >0.5μs >0.5μs	
5–20 step 6 step 7	**Transition Time Linearity**	 <5% <5%	
5–21	**Pulse Shape** Polarity + Preshoot Overshoot Ringing Polarity – Preshoot Overshoot Ringing	 <5% <5% <5% <5% <5% <5%	
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 In / Out >5.0V / >10V <2.0V / <4V >2.0V / >4V <1.0V / <2V >1.0V / >2V <0.5V / <1V >0.5V / >1V <0.2V / <0.4V	
5–23 step 6 step 8 step 10	**DC Offset**	 >+2.5V >–2.5V –	satisfactory ☐ not satisfactory ☐

SCHEMATIC DIAGRAMS

PARTS LIST

SECTION 6

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			
HR = heater		VR = voltage regulator	
J = jack		W = cable	
K = relay		X = socket	
L = inductor		Y = crystal	
M = meter		TP = test point	

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

U1 — Microcircuit

Screwdriver Adjustment

Primary Signal Path

931 / 931 — Indicates wire colour using resistor colour code.

Coaxial cable

Chassis/Ground

P/O — Part Of

F.S. — Factory Selected

Zener Diode

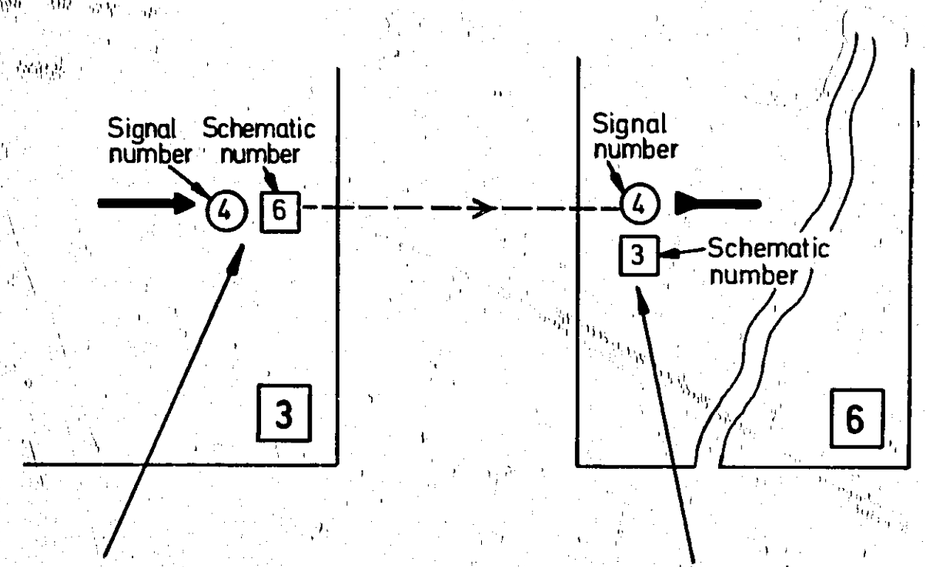
2 X5 — Printed circuit board edge connector and socket (X5) with pin number (2).

Single pin or soldered connection.

Coaxial Connector
Bolt down cable bush

Coaxial Connector
bulkhead mounted.

K1 — Relay



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

Table 6–3. Manufacturer Codes

8012B

MFR. NR.	MANUFACTURER NAME	ADDRESS	ZIP CODE
FR0C3	SOVCOR ELECTRONIQUE	LE VESINET FRANCE	
FR009	GAM	MEAUX FRANCE	77
GM015	DEUTSCHE VITROHM GMBH & CO	GERMANY	
00815	STETTNER-TRUSH INC	CAZENOVIA NY	13035
01121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
02114	FERROXCUBE CORP	SAUGERTIES NY	12477
02735	RCA CORP SOLID STATE DIV	SOMMERVILLE NJ	08876
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
12697	CLAROSTAT MFG CO INC	DOVER NH	03820
13103	THERMALLOY CO	DALLAS TX	75247
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	27604
17537	LAMPS INC	TORRENCE CA	90502
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	14070
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
28480	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
71785	TRW ELEK COMPONENTS CINCH DIV	ELK GROVE VILLAGE IL	60007
72136	ELECTRO MOTIVE MFG CO INC	WILLIMANTIC CT	06226
73138	BECKMAN INSTRUMENTS INC HELIPOT DIV	FULLERTON CA	92634
75042	TRW 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
91949	AMPHENOL SALES DIV OF BUNKER-RAMO	HAZELWOOD MO	63042

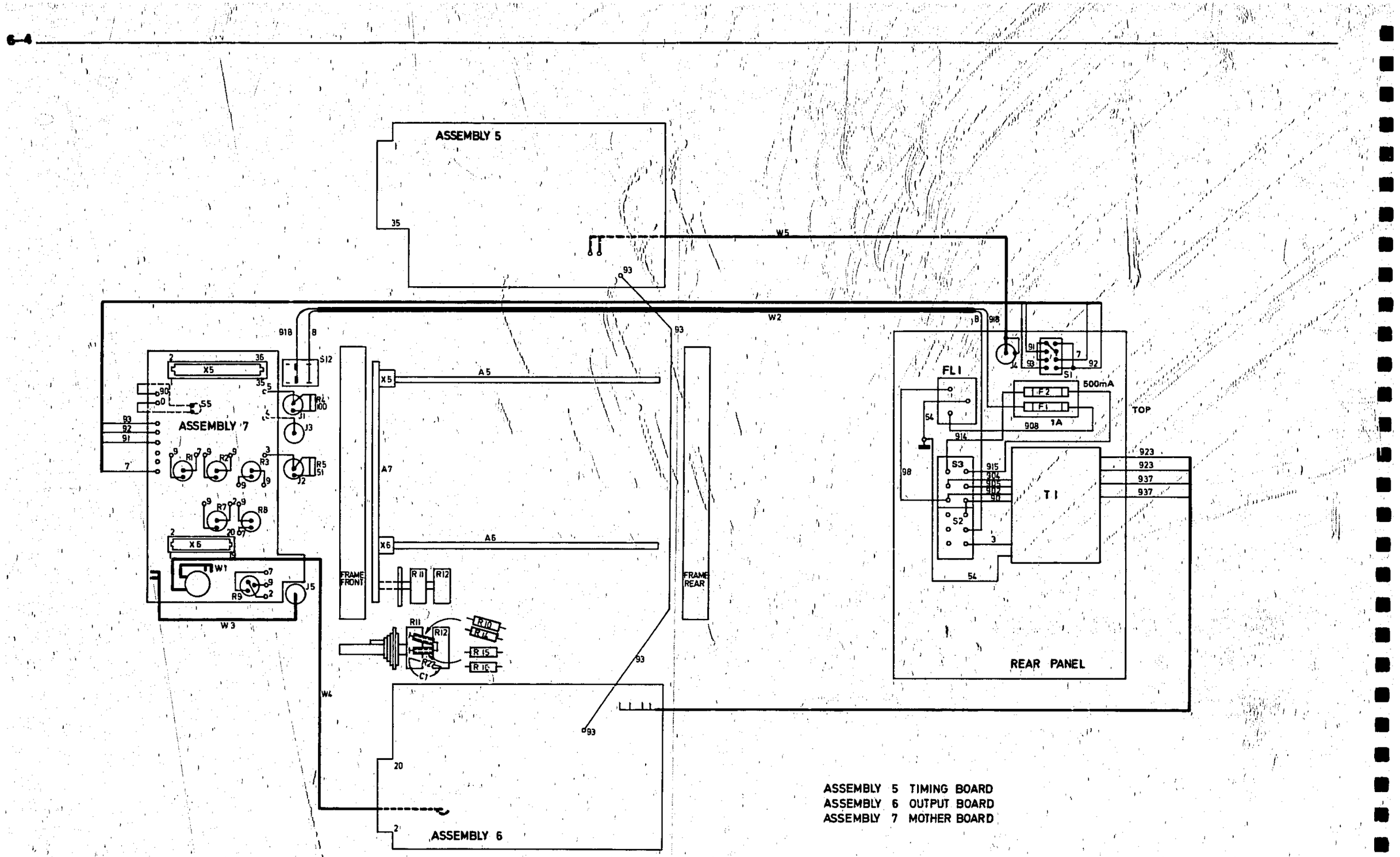
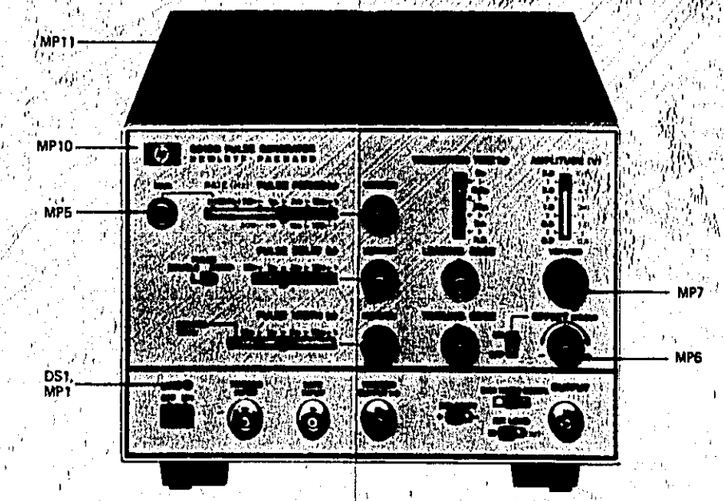


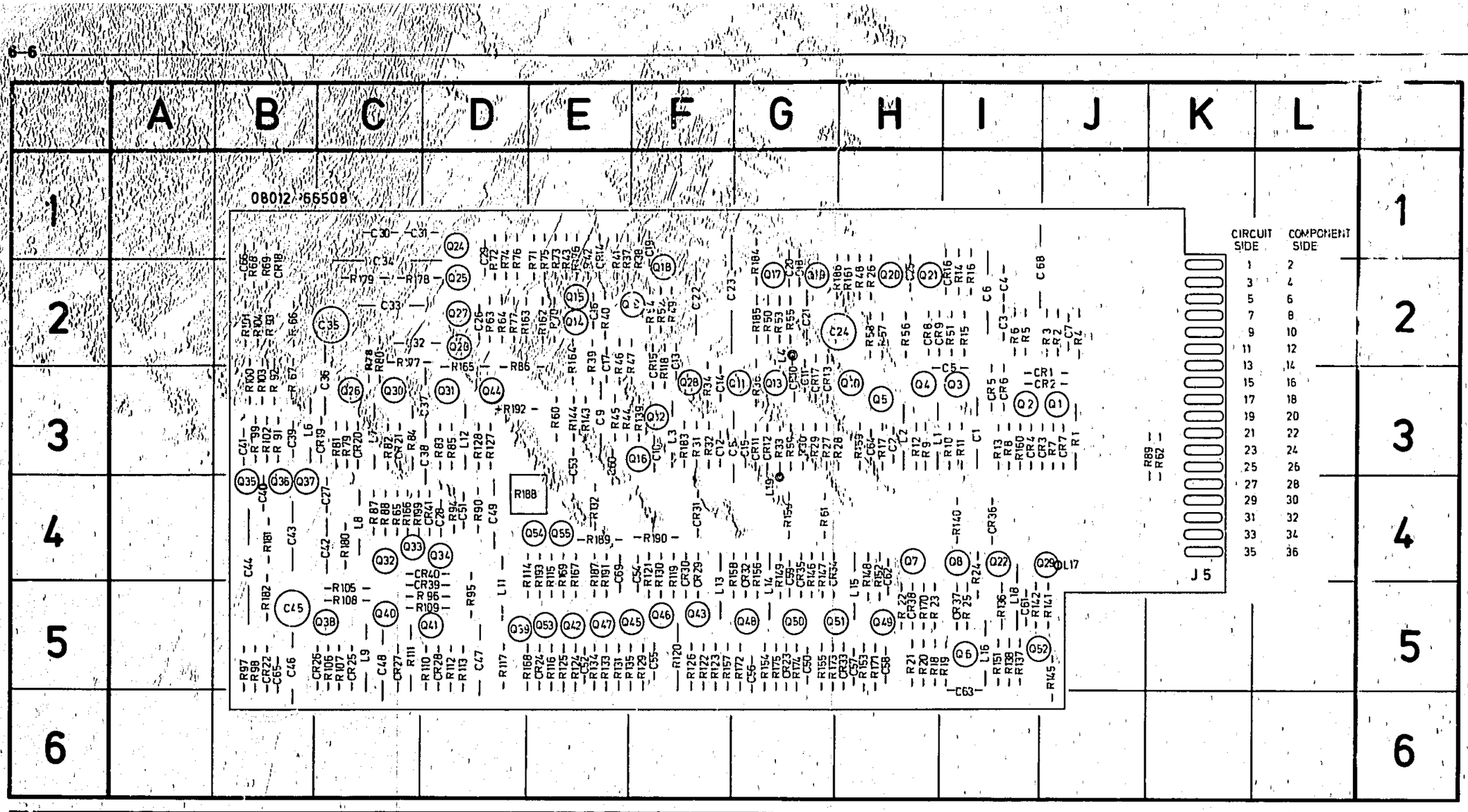
Figure 6–1. Assembly Diagram

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	28480	08012-66508
A6	08012-66506		BOARD ASSEMBLY, INTEGRATED AMPLIFIER	28480	08012-66506
A7	08012-66507		BOARD ASSEMBLY, MOTHER	28480	08012-66507
C1	C140-0145	1	CAPACITOR-FXD 22PF +-5% 500WVDC MICA	72136	DM15C220J050WV1CR
DS1	2140-0253	1	LAMP-INCAND T-1 BULB 28V	17537	6A1ANSI 6839
F1	2110-0007	1	FUSE 1A 250V SLO-BLO 1.25X.25 UL	71400	MDL-1
	0510-0748	1	FUSEHOLDER-BLOCK 2-FU .25X1.25FUSE	71400	3023-2
F2	2110-0202	1	FUSE .5A 250V SLO-BLO 1.25X.25 UL IEC	75915	313.5005
FL1	9100-3121	1	FILTER-ELEC 2A	28480	9100-3121
J1	1250-0118	5	CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J2	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J3	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J4	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
J5	1250-0118		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
MP1	1450-0404	1	LIGHT-IND LENS CAP CLR 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 JGK SGI-DECAL	28480	0370-1005
MP7	0370-1097	1	KNOB-BASE-PTR .5 IN JGK SGI-DECAL	28480	0370-1097
MP8	00180-24705	1	STANDOFF, REAR PANEL	28480	00180-24705
MP9	08012-60202	1	PANEL, REAR	28480	08012-00204
MP10	08012-00206	1	PANEL, FRONT	28480	08012-00206
MP11	08012-04101	2	COVER ASSEMBLY	28480	08012-04101
R1	2100-3081	5	RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R2	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R3	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R4	0759-0024		RESISTOR 100 2% .25W F TC=0+-100	24546	C5-1/4-T0-101-J
R5	0759-0126		RESISTOR 51 5% .25W F TC=0+-100	24546	C5-1/4-T0-51R0-J
R7	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R8	2100-3081		RESISTOR-VAR CONTROL CC 50K 10% 10CW	12697	SERIES 63M
R9	2100-2488	1	RESISTOR-VAR CONTROL CC 10K 20% LIN	12697	342
R10	0757-0796	2	RESISTOR 82.5 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-82R5-F
R11	2100-3104	2	RESISTOR, VAR 50 OHM 10% 5W, CC	01121	OBD
R12	2100-3104		RESISTOR, VAR 50 OHM 10% 5W, CC	01121	OBD
R13	0698-5882	1	RESISTOR 18 5% .25W F TC=0+-100	24546	C5-1/4-T0-18R0-J
R14	0757-0796		RESISTOR 82.5 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-82R5-F
R15	0757-0199	2	RESISTOR 100 1% .5W F TC=0+-100	19701	MF7C1/2-T0-101-F
R16	0757-0199		RESISTOR 100 1% .5W F TC=0+-100	19701	MF7C1/2-T0-101-F
S1	3101-0903	1	SWITCH-SL DP3T-NS MINTR .5A 125VAC/DC	79727	G1285-00034
S2, S3	3101-2042	2	SWITCH-SL DPDT-NS STD 1.5A 250VAC SLDR		
S5	3101-0124	1	SWITCH-PB SPST NC MOM	82389	962
T1	08012-61101	1	TRANSFORMER, POWER	28480	08012-61101
W1	08012-61622	1	CABLE ASSEMBLY, SMIL	28480	08012-61622
W2	08012-61620	1	CABLE ASSEMBLY, SMIL POWER	28480	08012-61620
W3	08012-61624	1	CABLE ASSEMBLY, SMIL	28480	08012-61624
W4	08012-61623	1	CABLE ASSEMBLY, SMIL	28480	08012-61623
W5	08012-61621	1	CABLE ASSEMBLY, SMIL INPUT	28480	08012-61621

See Table 6-3 for Manufacturer Codes





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	C22	F-2	C44	B-4	C66	B-2	CR19	C-3	L1	H-3	Q4	H-3	Q26	C-3	Q48	G-5	R15	I-2	R37	E-1	R59	G-3	R82	C-3	R104	B-2	R127	D-3	R149	G-4	R172	G-5
C2	H-3	C23	F-2	C45	B-5			CR20	C-3	L2	H-3	Q5	H-3	Q27	D-2	Q49	H-5	R16	I-2	R38	F-1	R60	E-3	R83	D-3	R105	C-5	R128	D-3	R150	G-4	R173	G-5
C3	I-2	C24	H-2	C46	B-5	C68	I-2	CR21	C-3	L3	F-3	Q6	I-5	Q28	F-3	Q50	G-5	R17	H-3	R39	E-2	R61	G-4	R84	C-3	R106	C-5	R129	F-5	R151	I-5	R174	G-5
C4	I-2	C25	H-2	C47	D-5	C69	E-5	CR22	B-5	L4	G-2	Q7	H-4	Q29	J-4	Q51	H-5	R18	H-5	R40	E-2	R62	K-3	R85	D-3	R107	C-5	R130	F-4	R152	H-4	R175	G-5
C5	I-3	C26	D-2	C48	C-5	CR1	J-3	CR23	G-5			Q8	I-4	Q30	C-3	Q52	J-5	R19	I-5	R41	E-1	R63	D-2	R86	D-3	R108	C-5	R131	E-5	R153	H-5	R176	E-1
C6	I-2	C27	C-4	C49	D-4	CR2	J-3	CR24	E-5	L6	B-3	Q9	F-2	Q31	D-3	Q53	E-5	R20	H-5	R42	E-1	R64	D-2	R87	C-4	R109	D-5	R132	E-4	R154	G-5	R177	C-2
C7	J-2	C28	D-4	C50	G-5	CR3	J-3	CR25	C-5	L7	C-3	Q10	H-3	Q32	C-4	Q54	E-4	R21	H-5	R43	E-1	R65	C-4	R88	C-4	R110	D-5	R133	E-5	R155	G-5	R178	C-2
C8	F-3	C29	D-1	C51	D-4	CR4	I-3	CR26	C-5	L8	C-4	Q11	G-3	Q33	C-4	Q55	E-4	R22	H-5	R44	E-3	R66	B-2	R89	K-3	R111	D-5	R134	E-5	R156	G-4	R179	C-2
C9	E-3	C30	C-1	C52	E-5	CR5	I-3	CR27	C-5	L9	C-5	Q12	F-3	Q34	D-4	R1	J-3	R23	H-5	R45	E-3	R67	B-3	R90	D-4	R112	D-5	R135	F-5	R157	F-5	R180	C-4
C10	F-3	C31	C-1	C53	E-3	CR6	I-3	CR28	D-5					Q35	B-4	R2	J-2	R24	I-4	R46	E-2	R68	B-2	R91	B-3	R113	D-5	R136	I-5	R158	G-4	R181	B-4
C11	G-3	C32	C-2	C54	F-4	CR7	J-3	CR29	F-4	L11	D-5	Q13	G-3	Q36	B-4	R3	J-2	R25	I-5	R47	E-2	R69	B-2	R92	B-3	R114	E-4	R137	I-5	R159	H-3	R182	B-5
C12	F-3	C33	C-2	C55	F-5	CR8	H-2	CR30	F-4	L12	D-3	Q14	E-2	Q37	B-4	R4	J-2	R26	H-2	R48	H-2	R70	E-2	R93	B-2	R115	E-4	R138	I-5	R160	I-3	R183	F-3
C13	F-2	C34	C-2	C56	G-5	CR9	H-2	CR31	F-4	L13	F-4	Q15	E-2	Q38	C-5	R5	J-2	R27	G-3	R49	F-2	R71	E-1	R94	D-4	R116	E-5	R139	F-3	R161	H-2	R184	G-2
C14	F-3	C35	C-2	C57	H-5	CR10	G-3	CR32	G-4	L14	G-4	Q16	F-3	Q39	D-5	R6	I-2	R28	G-3	R50	G-2	R72	D-1	R95	D-5	R117	D-5	R140	I-4	R162	E-2	R185	G-2
C15	G-3	C36	C-3	C58	H-5	CR11	G-3	CR33	H-5	L15	H-5	Q17	G-2	Q40	C-5	R7	J-3	R29	G-3	R51	I-2	R73	E-1	R96	D-5	R118	F-2	R141	J-5	R163	D-2	R186	H-2
C16	E-2	C37	D-3	C59	G-4	CR12	G-3	CR34	G-4	L16	I-5	Q18	F-2	Q41	D-5	R8	I-3	R30	G-3	R52	F-2	R74	D-1	R97	B-5	R119	F-4	R142	I-5	R164	E-2	R187	E-4
C17	E-2	C38	D-3	C60	E-3	CR13	G-3	CR35	I-4	L17	J-4	Q19	G-2	Q42	E-5	R9	H-3	R31	F-3	R53	G-2	R75	E-1	R98	B-5	R120	F-5	R143	E-3	R165	D-3	R188	E-4
C18	G-2	C39	B-3	C61	I-5	CR14	E-1	CR36	I-5	L18	I-5	Q20	H-2	Q43	F-5	R10	I-3	R32	F-3	R54	F-2	R76	D-1	R99	B-3	R121	F-4	R144	E-3	R166	C-4	R189	E-4
C19	F-1	C40	B-4	C62	H-4	CR15	F-2	CR37	H-5	L19	G-4	Q21	H-2	Q44	D-3	R11	I-3	R33	G-3	R55	G-2	R77	D-2	R100	B-3	R122	F-5	R145	J-5	R167	E-4	R190	F-4
C20	G-2	C41	B-3	C63	I-5	CR16	I-2	CR38	H-5	Q1	J-3	Q22	I-4	Q45	F-5	R12	H-3	R34	F-3	R56	H-2	R78	C-2	R101	B-2	R123	F-5	R146	G-4	R168	E-5	R191	E-4
C21	G-2	C42	B-4	C64	H-3	CR17	G-3	CR39	D-5	Q2	I-3	Q23	D-2	Q46	F-5	R13	I-3			R57	H-2	R79	C-3	R102	B-3	R124	E-5	R147	G-4	R169	E-4	R192	D-3
		C43	B-4	C65	B-5	CR18	B-2	CR40	D-4	Q3	I-3	Q24	D-1	Q47	E-5	R14	I-2	R36	G-3	R58	H-2	R80	C-2	R103	B-3	R125	E-5	R148	H-4	R170	H-5	R193	E-4
								CR41	D-4			Q25	D-2									R81	C-3			R126	F-5			R171	H-5	R199	C-4

Figure 6–2. Component Layout — Board A5

Table 6–5. Board A5 Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5	08012-66508	1	BOARD ASSEMBLY, TIMING	28480	08012-6650P
A5C1	0150-0121	20	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C2	0160-2055	47	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C3	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C4	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C5	0160-2199	1	CAPACITOR-FXD 30PF +-5% 300WVDC MICA	28480	0160-2199
A5C6	0180-0374	6	CAPACITOR-FXD: 10UF+-10% 20VDC TA-SOLID	56289	150D106X9020B2
A5C7	0160-2307	1	CAPACITOR-FXD 47PF +-5% 300WVDC MICA	28480	0160-2307
A5C8	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C9	0150-0121		CAPACITOR-FXC .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C10	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C11	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C12	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C13	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C14	0160-2198	4	CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A5C15	0160-2197	1	CAPACITOR-FXD 10PF +-5% 300WVDC MICA	28480	0160-2197
A5C16	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C17	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C18	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C19	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C20	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C21	0160-3714	1	CAPACITOR-FXD 5600PF +-10% 250WVDC MET	28480	0160-3714
A5C22	0160-3725	3	CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A5C23	0180-0375	3	CAPACITOR-FXD: 68UF+-10% 20VDC TA-SOLID	56289	150D686X9020B2
A5C24	0121-0046	3	CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304322 9/35PF N650
A5C25	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C26	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C27	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C28	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C29	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C30	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C31	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C32	0160-3220	2	CAPACITOR-FXD 6800PF +-5% 250WVDC MET	FR009	CMR-68
A5C33	0160-3725		CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A5C34	0180-0375		CAPACITOR-FXD: 68UF+-10% 20VDC TA-SOLID	56289	150D686X9020B2
A5C35	0121-0046		CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304322 9/35PF N650
A5C36	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C37	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C38	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C39	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C40	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C41	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C42	0160-3220		CAPACITOR-FXD 6800PF +-5% 250WVDC MET	FR009	CMR-68
A5C43	0160-3725		CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A5C44	0180-0375		CAPACITOR-FXD: 68UF+-10% 20VDC TA-SOLID	56289	150D686X9020B2
A5C45	0121-0046		CAPACITOR-V TRMR-CER 9/35PF 200V PC-MTG	00865	304322 9/35PF N650
A5C46	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C47	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C48	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C49	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A5C50	0140-0191	1	CAPACITOR-FXD 56PF +-5% 300WVDC MICA	72136	DM15E560J03D04V1CR
A5C51	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C52	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C53	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C54	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C55	0160-2198		CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A5C56	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C57	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C58	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C59	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C60	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C61	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C62	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C63	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C64	0160-2198		CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A5C65	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C66	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5C68	0180-0374		CAPACITOR-FXD: 10UF+-10% 20VDC TA-SOLID	56289	150D106X9020B2
A5C69	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A5CR1	1901-0040	34	DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR2	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR3	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR4	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-35	28480	1901-0040
A5CR5	1901-0040		DIODE-SWITCHING 30V 50MA 2NS DO-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		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR7	1902-0037	1	DIODE-ZNR 9.09V 10% DO-7 PD=.4W	04713	10939-169
A5CR8	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR9	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR10	1901-0179	9	DIODE-SWITCHING 15V 5CNA 750PS DO-7	28480	1901-0179
A5CR11	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR12	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR13	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR14	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR15	1901-0533	8	DIODE-SCHOTTKY	28480	1901-0533
A5CR16	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR17	1910-0022	2	DIODE-GE 5V 60NA 3.5NS DO-7	28480	1910-0022
A5CR18	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR19	1902-0049	4	&	04713	SZ 10939-122
A5CR20	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR21	1902-0126	2	DIODE-ZNR 2.61V 5% DO-7 PD=.4W TC=-.073%	04713	SZ 10939-16
A5CR22	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR23	1902-0025	3	DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A5CR24	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A5CR25	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR26	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
A5CR27	1902-0126		DIODE-ZNR 2.61V 5% DO-7 PD=.4W TC=-.073%	04713	SZ 10939-16
A5CR28	1910-0034	1	DIODE-GE 30V 80NA 8NS DO-7	28480	1910-0034
A5CR29	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR30	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR31	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR32	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR33	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR34	1902-0032	2	DIODE-ZNR 5.49V 5% DO-7 PD=.4W TC=+.009%	04713	SZ 10939-107
A5CR35	1902-0032		DIODE-ZNR 5.49V 5% DO-7 PD=.4W TC=+.009%	04713	SZ 10939-107
A5CR36	1902-0025		DIODE-ZNR 10V 5% DO-7 PD=.4W TC=+.06%	04713	SZ 10939-182
A5CR37	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR38	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A5CR39	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5CR40	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5CR41	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A5L1	9100-1611	3	COIL-FXD MOLDED RF CHOKE .22UH 20%	24226	15/220
A5L2	9100-1614	2	COIL-FXD MOLDED RF CHOKE .82UH 10%	24226	15/820
A5L3	9100-1611		COIL-FXD MOLDED RF CHOKE .22UH 20%	24226	15/220
A5L4	9170-0029	6	CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A5L6	9140-0179	2	COIL-FXD MOLDED RF CHOKE 22UH 10%	24226	15/222
A5L7	9100-1613	3	COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A5L8	9140-0094	1	COIL-FXD MOLDED RF CHOKE .68UH 10%	24226	15/680
A5L9	9140-0179		COIL-FXD MOLDED RF CHOKE 22UH 10%	24226	15/222
A5L11	9100-1611		COIL-FXD MOLDED RF CHOKE .22UH 20%	24226	15/220
A5L12	9140-0096	2	COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	15/101
A5L13	9140-0096		COIL-FXD MOLDED RF CHOKE 1UH 10%	24226	15/101
A5L14	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A5L15	9100-1613		COIL-FXD MOLDED RF CHOKE .47UH 20%	24226	15/470
A5L16	9140-0112	1	COIL-FXD MOLDED RF CHOKE 4.7UH 10%	24226	15/471
A5L17	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A5L18	9100-1614		COIL-FXD MOLDED RF CHOKE .82UH 10%	24226	15/820
A5L19	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A5MP28	1205-0037	10	HEAT-DISSIPATOR SGL TO-36 PKG	28480	1205-0037
A5MP29	1205-0037		HEAT-DISSIPATOR SGL TO-36 PKG	28480	1205-0037
A5Q1	1854-0296	2	TRANSISTOR NPN SI TO-92 PD=310MW	28480	1854-0296
A5Q2	1854-0296		TRANSISTOR NPN SI TO-92 PD=310MW	28480	1854-0296
A5Q3	1854-0092	4	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	1	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0096
A5Q6	1854-0019	4	TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A5Q7	1853-0036	3	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0036
A5Q8	1853-0036		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0036
A5Q9	1853-0357	15	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q10	1853-0036	20	TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q11	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q12	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q13	1854-0345	8	TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q14	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q15	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q16	1854-0069	4	TRANSISTOR NPN 2N709 SI TO-18 PD=300MW	28480	1854-0039
A5Q17	1854-0215	13	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 TO-18 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
A5Q21	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q22	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A5Q23	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q24	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q25	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q26	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q27	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q28	1854-0019		TRANSISTOR NPN SI TO-18 PD=360MW	28480	1854-0019
A5Q29	1853-0034		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0034
A5Q30	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q31	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q32	1853-0018	1	TRANSISTOR PNP SI TO-72 PD=200MW FT=1GHZ	28480	1853-0018
A5Q33	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q34	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q35	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q36	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q37	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A5Q38	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q39	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q40	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q41	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q42	1854-0009		TRANSISTOR NPN 2N709 SI TO-18 PD=300MW	28480	1854-0009
A5Q43	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q44	1853-0015	1	TRANSISTOR PNP SI PD=200MW FT=500MHZ	28480	1853-0015
A5Q45	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q46	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A5Q47	1854-0009		TRANSISTOR NPN 2N709 SI TO-18 PD=300MW	28480	1854-0009
A5Q48	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A5Q49	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A5Q50	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5Q51	1854-0092		TRANSISTOR NPN SI PD=200MW FT=600MHZ	28480	1854-0092
A5Q52	1854-0009		TRANSISTOR NPN 2N709 SI TO-18 PD=300MW	28480	1854-0009
A5Q53	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A5Q54	1853-0218	2	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0218
A5Q55	1853-0218		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0218
A5R1	0758-0024	3	RESISTOR 100 5% .25W F TC=0+-100	24546	CC5-1/4-T0-101-J
A5R2	0698-0083	4	RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A5R3	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1961-F
A5R4	0757-0276	1	RESISTOR 61.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-61R9-F
A5R5	0698-3443	2	RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A5R6	0698-3443		RESISTOR 287 1% .125W F TC=0+-100	16299	C4-1/8-T0-287R-F
A5R7	0757-0448	3	RESISTOR 18.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1822-F
A5R8	0757-1094	3	RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1471-F
A5R9	0757-0401	14	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R10	0757-0400	3	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A5R11	0757-0421	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A5R12	0757-0282	2	RESISTOR 221 1% .125W F TC=0+-100	24546	C4-1/8-T0-221R-F
A5R13	0757-0420	4	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A5R14	0757-0426	3	RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1301-F
A5R15	0698-4426	1	RESISTOR 1.58K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1581-F
A5R16	0757-0407	7	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A5R17	0757-0395	3	RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-56R2-F
A5R18	0757-0442	11	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R19	0757-0399	3	RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-82R5-F
A5R20	0757-0409	4	RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A5R21	0757-0424	5	RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1101-F
A5R22	0757-0448		RESISTOR 18.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1822-F
A5R23	0757-0283	1	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A5R24	0757-0428	2	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A5R25	0757-0406	2	RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-T0-182R-F
A5R26	0757-0443	4	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A5R27	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R28	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R29	0757-0274	11	RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1211-F
A5R30	0757-0273	4	RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A5R31	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A5R32	0698-0085	1	RESISTOR 2.61K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2611-F
A5R33	0757-0404	4	RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A5R34	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R35	0757-0404		RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A5R37	0698-3151	1	RESISTOR 2.87K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2871-F
A5R38	0698-0084	7	RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2151-F
A5R39	0757-0438	12	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R40	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A5R41	0757-0421		RESISTOR 825 1% .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

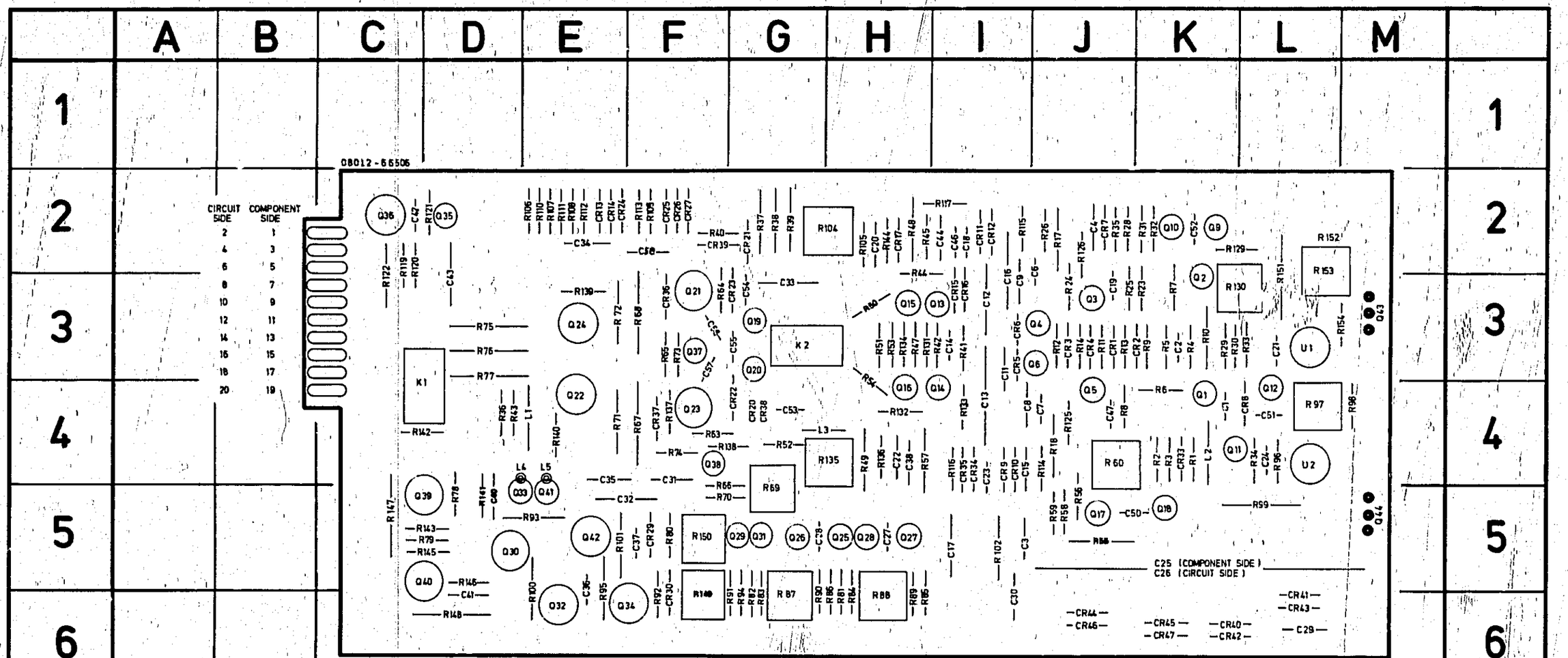
Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5R42	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R43	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R44	0757-0403	2	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121-F
A5R45	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A5R46	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2151-F
A5R47	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A5R48	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R49	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R50	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R51	0757-0439	1	RESISTOR 6.81K 1% .125W F TC=0+-100	24546	C4-1/8-T0-6811-F
A5R52	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A5R53	0757-0443		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1102-F
A5R54	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A5R55	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1213-F
A5R56	0757-0417	3	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-T0-5620-F
A5R57	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R58	0757-0433	2	RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3321-F
A5R59	0757-0427	3	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A5R60	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A5R61	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A5R62	0757-0391	1	RESISTOR 39.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-39R2-F
A5R63	0698-3439	1	RESISTOR 178 1% .125W F TC=0+-100	16299	C4-1/8-T0-178R-F
A5R64	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2151-F
A5R65	0757-0429	3	RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A5R66	0757-0467	1	RESISTOR 16.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1622-F
A5R67	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A5R68	0757-0278	3	RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A5R69	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2151-F
A5R70	0698-3492	10	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A5R71	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A5R72	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A5R73	0698-3158	4	RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A5R74	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A5R75	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R76	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R77	0757-0290	4	RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A5R78	0757-0390	4	RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-36R5-F
A5R79	0757-0393	4	RESISTOR 47.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-47R5-F
A5R80	0757-0390		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-36R5-F
A5R81	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A5R82	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A5R83	0757-0404		RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A5R84	0758-0002	2	RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A5R85	0757-0429		RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A5R86	0757-0284	3	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A5R87	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A5R88	0757-0282		RESISTOR 221 1% .125W F TC=0+-100	24546	C4-1/8-T0-221-F
A5R89	0757-0389	3	RESISTOR 33.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-33R2-F
A5R90	0698-3438	1	RESISTOR 147 1% .125W F TC=0+-100	16299	C4-1/8-T0-147R-F
A5R91	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A5R92	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A5R93	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2372-F
A5R94	0698-4424	1	RESISTOR 1.4K 1% .125W F TC=0+-100	16299	C4-1/8-T0-1401-F
A5R95	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-T0-6191-F
A5R96	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R97	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1781-F
A5R98	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2151-F
A5R99	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R100	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R101	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A5R102	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A5R103	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A5R104	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2671-F
A5R105	0757-0390		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-36R5-F
A5R106	0757-0393		RESISTOR 47.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-47R5-F
A5R107	0757-0427		RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1501-F
A5R108	0757-0390		RESISTOR 36.5 1% .125W F TC=0+-100	24546	C4-1/8-T0-36R5-F
A5R109	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A5R110	0757-0404		RESISTOR 130 1% .125W F TC=0+-100	24546	C4-1/8-T0-131-F
A5R111	0758-0002		RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A5R112	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A5R113	0757-0429		RESISTOR 1.82K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1821-F
A5R114	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A5R115	0757-0394	1	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A5R116	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F

See table 6–3 for Manufacturer Co es

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

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A5R117	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A5R118	0757-0346	9	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R119	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C-1/8-TO-2671-F
A5R120	0758-0126	2	RESISTOR 51 5% .25W F TC=0+-100	24546	C-1/4-TO-51R0-J
A5R121	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C-1/8-TO-201-F
A5R122	0757-0419	2	RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-TO-681R-F
A5R123	0757-0419		RESISTOR 681 1% .125W F TC=0+-100	24546	C4-1/8-TO-681R-F
A5R124	0757-0280	10	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A5R125	0757-0437	4	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4751-F
A5R126	0757-0405	3	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-TO-162R-F
A5R127	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-TO-82R5-F
A5R128	0757-0411	4	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-TO-332R-F
A5R129	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1101-F
A5R130	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-TO-751-F
A5R131	0757-0278		RESISTOR 1.78K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1781-F
A5R132	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A5R133	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1301-F
A5R134	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-TO-201-F
A5R135	0757-0436	1	RESISTOR 4.32K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4321-F
A5R136	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-TO-274R-F
A5R137	0757-0430	1	RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2211-F
A5R138	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1211-F
A5R139	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-TO-1623-F
A5R140	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R141	0757-0410	1	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-TO-301R-F
A5R142	0757-0388	9	RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A5R143	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4751-F
A5R144	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A5R145	0757-0406		RESISTOR 182 1% .125W F TC=0+-100	24546	C4-1/8-TO-182R-F
A5R146	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1471-F
A5R147	0757-1094		RESISTOR 1.47K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1471-F
A5R148	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R149	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R150	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R151	0757-0414	1	RESISTOR 432 1% .125W F TC=0+-100	24546	C4-1/8-TO-432R-F
A5R152	0757-0398	3	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-TO-75R0-F
A5R153	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1101-F
A5R154	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1101-F
A5R155	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A5R156	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-TO-75R0-F
A5R157	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A5R158	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3321-F
A5R159	0757-0384	5	RESISTOR 20 1% .125W F TC=0+-100	19701	MFAC1/8-TO-20R0-F
A5R160	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R161	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1213-F
A5R162	0698-3158		RESISTOR 23.7K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2372-F
A5R163	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5111-F
A5R164	C757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R165	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R166	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R167	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-TO-201-F
A5R168	0757-0279	1	RESISTOR 3.16K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3161-F
A5R169	0757-0422	2	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-TO-909R-F
A5R170	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R171	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R172	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A5R173	0757-0395		RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-TO-56R2-F
A5R174	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-TO-201-F
A5R175	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MFAC1/8-TO-6191-F
A5R176	0757-0408	4	RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-TO-243R-F
A5R177	0683-1055	9	RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R178	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R179	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R180	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R181	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R182	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R183	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A5R184	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R185	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R186	0683-1055		RESISTOR 1M 5% .25W FC TC=-800/+900	01121	CB1055
A5R187	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-TO-909R-F
A5R188	2100-0554	5	RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A5R189	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A5R190	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-TO-243R-F
A5R191	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-TO-243R-F
A5R192	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R192	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A5R193	0698-4422	1	RESISTOR 1.27K 1% .125W F TC=0+-100	16299	C4-1/8-TO-1271-F
A5R193	0757-0412	1	RESISTOR 365 1% .125W F TC=0+-100	24546	C4-1/8-TO-365R-F

See table 6–3 for Manufacturer Codes



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	K-4	C26	K-5	C51	L-4	CR15	I-3	CR43	L-6	Q14	I-4			R17	J-2	R45	H-2			R93	E-5	R117	I-2	R145	D-5
C2	K-3	C27	H-5	C52	K-2	CR16	I-3	CR44	J-6	Q15	H-3	Q37	F-3	R18	J-4	R47	H-3	R71	E-4	R94	G-6	R119	C-2	R146	D-5
C3	I-5	C28	G-5	C53	G-4	CR17	H-2	CR45	K-6	Q16	H-4	Q38	F-4	R23	K-3	R48	H-2	R72	E-3	R95	E-6	R120	C-2	R147	C-5
C4	J-2	C29	L-6	C54	G-3	CR20	G-4	CR46	J-6	Q17	J-5	Q39	D-5	R24	J-3	R49	H-4	R73	F-3	R96	L-4	R121	D-2	R148	D-6
C6	J-2	C30	I-6	C55	G-3	CR21	G-2	CR47	K-5	Q18	K-5	Q40	D-5	R25	J-3	R50	H-3	R74	F-4	R97	L-4	R122	C-3	R149	F-6
C7	J-4	C31	F-4	C56	F-3	CR22	G-4	K1	C-4	Q19	G-3	Q41	E-5	R26	J-2	R51	H-3	R75	D-3	R98	M-4	R125	J-4	R150	F-5
C8	I-4	C32	F-5	C57	F-3	CR23	G-3	K2	G-3	Q20	G-3	Q42	E-5	R28	J-2	R52	G-4	R76	D-3	R99	L-5	R126	J-2	R151	L-2
C9	I-3	C33	G-3	C58	F-2	CR24	E-2	L1	E-4	Q21	F-3	Q43	M-3	R29	K-3	R53	H-3	R77	D-3	R100	E-6	R129	K-2	R152	L-2
C11	I-3	C34	E-2	CR1	J-3	CR25	F-2	L2	K-4	Q22	E-4	Q44	M-5	R30	K-3	R54	H-4	R78	D-5	R101	E-5	R130	K-3	R153	L-2
C12	I-3	C35	E-4	CR2	K-3	CR26	F-2	L3	H-4	Q23	F-4	R1	K-4	R31	K-2	R55	J-5	R79	D-5	R102	I-5	R131	H-3	R154	M-3
C13	I-3	C36	E-5	CR3	J-3	CR27	F-2	L4	E-4	Q24	E-3	R2	K-4	R32	K-2	R56	J-5	R80	F-5	R104	H-2	R132	H-4	U1	L-3
C14	I-3	C37	F-5	CR4	J-3	CR29	F-5	L5	E-4	Q25	H-5	R3	K-4	R33	L-3	R57	H-3	R81	G-6	R105	H-2	R133	I-4	U2	L-4
C15	I-4	C38	H-4	CR5	I-3	CR30	F-6	Q1	K-4	Q26	G-5	R4	K-3	R34	L-4	R58	J-5	R82	G-6	R106	E-2	R134	H-4		
C16	I-3	C40	D-5	CR6	I-3	CR33	K-4	Q2	K-3	Q27	H-5	R5	K-3	R35	J-2	R59	J-5	R83	G-6	R107	E-2	R135	H-4		
C17	I-5	C41	D-6	CR7	J-2	CR34	I-4	Q3	J-3	Q28	H-5	R6	K-4	R36	D-4	R60	J-4	R84	H-6	R108	E-2	R136	H-4		
C18	I-2	C42	C-2	CR8	L-4	CR35	I-4	Q4	J-3	Q29	G-5	R7	K-3	R37	G-2	R63	F-4	R85	H-6	R109	F-2	R137	F-4		
C19	J-3	C43	D-3	CR9	I-4	CR36	F-3	Q5	J-4	Q30	D-5	R8	J-4	R38	G-2	R64	F-3	R86	H-6	R110	E-2	R138	F-4		
C20	H-2	C44	I-2	CR10	I-4	CR37	F-4	Q6	J-3	Q31	G-5	R9	K-3	R39	G-2	R65	F-3	R87	G-6	R111	E-2	R139	E-3		
C21	L-3			CR11	I-2	CR38	G-4	Q9	K-2	Q32	E-6	R10	K-3	R40	F-2	R66	F-5	R88	H-6	R112	E-2	R140	E-4		
C22	H-4			CR12	I-2	CR39	F-2	Q10	K-2	Q33	D-5	R11	J-3	R41	I-3	R67	F-4	R89	H-6	R113	F-2	R141	D-5		
C23	I-4	C46	I-2	CR13	E-2	CR40	K-6	Q11	K-4	Q34	F-6	R12	J-3	R42	I-3	R68	F-3	R90	H-6	R114	J-4	R142	C-4		
C24	L-4	C47	J-4	CR14	E-2	CR41	L-6	Q12	L-4	Q35	D-2	R13	J-3	R43	D-4	R69	G-5	R91	G-6	R115	I-2	R143	D-5		
C25	K-5	C50	J-4			CR42	K-5	Q13	I-3	Q36	C-2	R14	J-3	R44	H-3	R70	F-5	R92	F-6	R116	I-4	R144	H-2		

Figure 6–3. Component Layout — Board A6

Table 6–6. Board A6 Replaceable Parst 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 +80-20% 100WVDC CER	28480	0160-2055
A6C2	0160-2198		CAPACITOR-FXD 20PF +-5% 300WVDC MICA	28480	0160-2198
A6C3	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C4	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C6	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C7	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C8	0160-0174	5	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C9	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C11	0160-3713	1	CAPACITOR-FXD 4700PF +-10% 250WVDC MET	28480	0160-3713
A6C12	0160-3724	1	CAPACITOR-FXD .47UF +-10% 400WVDC MET	28480	0160-3724
A6C13	0180-0387	1	CAPACITOR-FXD: 47UF+-5% 20VDC TA-SOLID	56289	150D476X5020R2
A6C14	0160-2204	1	CAPACITOR-FXD 100PF +-5% 300WVDC MICA	28480	0160-2204
A6C15	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C16	0180-0374		CAPACITOR-FXD: 10UF+-10% 20VDC TA-SOLID	56289	150D106X9020B2
A6C17	0180-0374		CAPACITOR-FXD: 10UF+-10% 20VDC TA-SOLID	56289	150D106X9020B2
A6C18	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C19	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C20	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C21	0160-2940	2	CAPACITOR-FXD 470PF +-5% 300WVDC MICA	28480	0160-2940
A6C22	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C23	0160-3443	1	CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0160-3443
A6C24	0160-2940		CAPACITOR-FXD 470PF +-5% 300WVDC MICA	28480	0160-2940
A6C25	0180-1784	2	CAPACITOR-FXD 1000UF +75-10% 40VDC AL	56289	39D108G040DGP4
A6C26	0180-1784		CAPACITOR-FXD 1000UF +75-10% 40VDC AL	56289	39D108G040DGP4
A6C27	0160-2139	8	CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C28	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C29	0160-4213	2	CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A6C30	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A6C31	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C32	0180-0374		CAPACITOR-FXD: 10UF+-10% 20VDC TA-SOLID	56289	150D106X9020B2
A6C33	0180-0374		CAPACITOR-FXD: 10UF+-10% 20VDC TA-SOLID	56289	150D106X9020B2
A6C34	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C35	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C36	0180-0309	2	CAPACITOR-FXD: 4.7UF+-20% 10VDC TA	56289	150D475X0010A2
A6C37	0180-0309		CAPACITOR-FXD: 4.7UF+-20% 10VDC TA	56289	150D475X0010A2
A6C38	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C40	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C41	0150-0121		CAPACITOR-FXD .1UF +80-20% 50WVDC CER	28480	0150-0121
A6C42	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C43	0180-0229	1	CAPACITOR-FXD: 33UF+-10% 10VDC TA-SOLID	56289	150D336X9010B2
A6C44	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C46	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C47	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C50	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C51	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C52	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C53	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C54	0160-2055		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2055
A6C55	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C56	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C57	0160-2139		CAPACITOR-FXD 220PF +80-20% 1000WVDC CER	28480	0160-2139
A6C58	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A6C59	0160-2265		CAPACITOR-FXD 8.2PF		
A6C59	0160-2249		CAPACITOR-FXD 4.7PF		
A6CR5	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A6CR6	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A6CR7	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR8	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR9	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A6CR10	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A6CR11	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A6CR12	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A6CR13	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR14	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR15	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A6CR16	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A6CR17	1910-0022		DIODE-GE 5V 60NA 3.5NS DO-7	28480	1910-0022
A6CR20	1902-3104	2	DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A6CR21	1902-3104		DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A6CR22	1902-3137	2	DIODE-ZNR 8.06V 2% DO-7 PD=.4W TC=+.052%	04713	SZ 10939-156
A6CR23	1902-3137		DIODE-ZNR 8.06V 2% DO-7 PD=.4W TC=+.052%	04713	SZ 10939-156
A6CR24	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR25	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR26	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR27	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR29	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR30	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A6CR33	1902-3139	1	DIODE-ZNR 8.25V 5% DO-7 PD=.4W TC=+.053%	04713	SZ 10939-158
A6CR34	1901-0179		DIODE-SWITCHING 15V 50NA 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 50NA 750PS DO-7	28480	1901-0179
A6CR36	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A6CR37	1901-0533		DIODE-SCHOTTKY	28480	1901-0533
A6CR38	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
A6CR39	1902-0049		DIODE-ZNR 6.19V 5% DO-7 PD=.4W TC=+.022%	04713	SZ 10939-122
A6CR40	1901-0159	8	DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR41	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR42	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR43	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR44	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR45	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR46	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6CR47	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A6K1	0490-1079	1	RELAY-REED 1A .5A 100V CONT 5V-COIL	28480	0490-1079
A6K2	0490-0817	1	RELAY-REED 1C .25A 28V CONT 5V-COIL	28480	0490-0817
A6L1	9140-0119	2	COIL-FXD MOLDED RF CHOKE 500UH 5%	24226	15/503
A6L2	9100-1612	1	COIL-FXD MOLDED RF CHOKE .33UH 20%	24226	15/330
A6L3	9100-2247	1	COIL-FXD MOLDED RF CHOKE .1UH 10%	24226	10/100
A6MP3	1205-0037	8	HEAT-DISSIPATOR SGL TO-36 PKG	28480	1205-0037
A6MP6	1205-0037		HEAT-DISSIPATOR SGL TO-36 PKG	28480	1205-0037
A6MP8	1205-0037		HEAT-DISSIPATOR SGL TO-36 PKG	28480	1205-0037
A6MP9	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	1205-0033	6	HEAT-DISSIPATOR SGL TO-5/TO-39 PKG, Q21	28480	1205-0033
A6MP22	1205-0237	2	HEAT DISSIPATOR, Q22 (SEE MP43)	28480	1205-0237
A6MP23	1205-0033		HEAT-DISSIPATOR SGL TO-5/TO-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/TO-39 PKG, Q30	28480	1205-0033
A6MP32	1205-0033		HEAT-DISSIPATOR SGL TO-5/TO-39 PKG, Q32	28480	1205-0033
A6MP34	1205-0033		HEAT-DISSIPATOR SGL TO-5/TO-39 PKG, Q34	28480	1205-0033
A6MP39	1205-0213	2	HEAT-DISSIPATOR SGL TO-5/TO-39 PKG, Q39	28480	1205-0213
A6MP40	1205-0213		HEAT-DISSIPATOR SGL TO-5/TO-39 PKG, Q40	28480	1205-0213
A6MP42	1205-0033		HEAT-DISSIPATOR SGL TO-5/TO-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-LK HLCL NO. 4 .115 IN ID .173 IN	28480	2190-0030
A6MP47	0340-0473	1	INSULATOR, TRANSISTOR	28480	0340-0473
A6MP48	0340-0720	1	INSULATOR-XSTR TO-18 .1-THK	28480	0340-0720
A6MP49	0380-0741	2	STANDOFF-RVT-ON .187LG 6-32THD .250D BRS	28480	0380-0741
A6MP50	0380-0741		STANDOFF-RVT-ON .187LG 6-32THD .250D BRS	28480	0380-0741
A6MP51	1200-0185	1	INSULATOR-XSTR TO-5 .075-THK	17103	7717-B6N RED
A6Q1	1854-0260	4	TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A6Q2	1854-0260		TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A6Q3	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q4	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q5	1854-0630	2	TRANSISTOR NPN SI TO-52 PD=360MW	04713	552077
A6Q6	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	552077
A6Q9	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q10	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q11	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q12	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q13	1854-0260		TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A6Q14	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q15	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q16	1854-0260		TRANSISTOR NPN 2N3227 SI TO-18 PD=360MW	04713	2N3227
A6Q17	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q18	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q19	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A6Q20	1854-0345		TRANSISTOR NPN 2N5179 SI TO-72 PD=200MW	04713	2N5179
A6Q21	1853-0201	2	TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0201
A6Q22	1854-0332	2	TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0332
A6Q23	1854-0332		TRANSISTOR NPN SI TO-39 PD=1W FT=800MHZ	28480	1854-0332
A6Q24	1853-0201		TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0201
A6Q25	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q26	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q27	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q28	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q29	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q30	1853-0027	2	TRANSISTOR PNP SI TO-39 PD=1W FT=100MHZ	28480	1853-0027
A6Q31	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q32	1853-0027		TRANSISTOR PNP SI 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		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q34	1854-0039	2	TRANSISTOR NPN 2N3053 SI TO-5 PD=1W	04713	2N3053
A6Q35	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A6Q36	1854-0013	1	TRANSISTOR NPN 2N2218A SI TO-5 PD=800MW	04713	2N2218A
A6Q37	1853-0036		TRANSISTOR PNP SI, PD=310MW FT=250MHZ	28480	1853-0036
A6Q38	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A6Q39	1853-0045	1	TRANSISTOR PNP 2N4036 SI TO-5 PD=1W	02735	2N4036
A6Q40	1854-0448	1	TRANSISTOR NPN SI TO-39 PD=1W FT=100MHZ	28480	1854-0448
A6Q41	1853-0036		TRANSISTOR PNP SI PD=310MW 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=900M FT=2MHZ	28480	1854-0433
A6Q44	1854-0433		TRANSISTOR NPN SI PD=900M FT=2MHZ	28480	1854-0433
A6R1	0757-0402	1	RESISTOR 110 1% .125W F TC=0+-100	24546	C4-1/8-TO-111-F
A6R2	0757-0424		RESISTOR 1.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1101-F
A6R3	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-TO-1961-F
A6R4	0698-0083		RESISTOR 1.96K 1% .125W F TC=0+-100	16299	C4-1/8-TO-1961-F
A6R5	0757-0420		RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-TO-751-F
A6R6	0757-0398		RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-TO-75R0-F
A6R7	0757-0393		RESISTOR 47.5 1% .125W F TC=0+-100	24546	C4-1/8-TO-47R5-F
A6R8	0757-0395		RESISTOR 56.2 1% .125W F TC=0+-100	24546	C4-1/8-TO-56R2-F
A6R9	0757-0393		RESISTOR 47.5 1% .125W F TC=0+-100	24546	C4-1/8-TO-47R5-F
A6R10	0758-0127	1	RESISTOR 430 5% .25W F TC=0+-100	24546	C5-1/4-TO-431-J
A6R11	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A6R12	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A6R13	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A6R14	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A6R17	0758-0062	2	RESISTOR 200 5% .25W F TC=0+-100	24546	C5-1/4-TO-201-J
A6R18	0758-0062		RESISTOR 200 5% .25W F TC=0+-100	24546	C5-1/4-TO-201-J
A6R23	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A6R24	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A6R25	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A6R26	0757-0418	1	RESISTOR 619 1% .125W F TC=0+-100	24546	C4-1/8-TO-619R-F
A6R28	0698-3496	4	RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R29	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R30	0698-3136	2	RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-TO-1782-F
A6R31	0698-3136		RESISTOR 17.8K 1% .125W F TC=0+-100	16299	C4-1/8-TO-1782-F
A6R32	0698-3155	3	RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-TO-4641-F
A6R33	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-TO-4641-F
A6R34	0698-3242	5	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R35	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R36	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4751-F
A6R37	0758-0013	3	RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-TO-121-J
A6R38	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-TO-121-J
A6R39	0758-0013		RESISTOR 120 5% .25W F TC=0+-100	24546	C5-1/4-TO-121-J
A6R40	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-TO-243R-F
A6R41	0757-0397	1	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-68R1-F
A6R42	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A6R43	0757-0200	3	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5621-F
A6R44	0757-0346		RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-TO-10R0-F
A6R45	0757-0415	1	RESISTOR 475 1% .125W F TC=0+-100	24546	C4-1/8-TO-475R-F
A6R47	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A6R48	0758-0030	1	RESISTOR 510 5% .25W F TC=0+-100	24546	C5-1/4-TO-511-J
A6R49	0758-0066	1	RESISTOR 620 5% .25W F TC=0+-100	24546	C5-1/4-TO-621-J
A6R50	0757-0403		RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-TO-121R-F
A6R51	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-TO-162R-F
A6R52	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-TO-151-F
A6R53	0757-0389		RESISTOR 33.2 1% .125W F TC=0+-100	24546	C4-1/8-TO-33R2-F
A6R54	0757-0389		RESISTOR 33.2 1% .125W F TC=0+-100	24546	C4-1/8-TO-33R2-F
A6R55	0757-0426		RESISTOR 1.3K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1301-F
A6R56	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2671-F
A6R57	0758-0007	1	RESISTOR 150 5% .25W F TC=0+-100	24546	C5-1/4-TO-151-J
A6R58	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R59	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3011-F
A6R60	2100-3211	3	RESISTOR-VAR TRMR 1KOHM 10% C TOP ADJ	73138	72PR1K
A6R63	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A6R64	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A6R65	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-TO-90R9-F
A6R66	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-TO-90R9-F
A6R67	0698-3497	2	RESISTOR 43 5% 1W MO TC=0+-200	16299	FP32-1-T00-43R0-J
A6R68	0698-3497		RESISTOR 43 5% 1W MO TC=0+-200	16299	FP32-1-T00-43R0-J
A6R69	2100-3210	1	RESISTOR-VAR TRMR 10KOHM 10% C TOP ADJ	73138	72PR10K
A6R70	0757-0448		RESISTOR 18.2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1822-F
A6R71	0698-3887	2	RESISTOR 30 5% .25W F TC=0+-100	GM005	CCA
A6R72	0698-3887		RESISTOR 30 5% .25W F TC=0+-100	GM005	CCA
A6R73	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-TO-562R-F
A6R76	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-TO-562R-F
A6R75	0761-0035	3	RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-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		RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-J
A6R77	0761-0035		RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-J
A6R78	0757-0288	2	RESISTOR 5.09K 1% .125W F TC=0+-100	19701	MF4C1/8-TO-5091-F
A6R79	0757-0288		RESISTOR 5.09K 1% .125W F TC=0+-100	19701	MF4C1/8-TO-5091-F
A6R80	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-TO-332R-F
A6R81	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1213-F
A6R82	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1213-F
A6R83	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R84	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R85	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1213-F
A6R86	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1213-F
A6R87	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A6R88	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A6R89	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R90	0698-3496		RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A6R91	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A6R92	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-TO-332R-F
A6R93	0758-0093	4	RESISTOR 56 5% .25W F TC=0+-100	24546	C5-1/4-TO-56R0-J
A6R94	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1001-F
A6R95	0758-0093		RESISTOR 56 5% .25W F TC=0+-100	24546	C5-1/4-TO-56R0-J
A6R96	0757-0435	2	RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3921-F
A6R97	2100-3211		RESISTOR-VAR TRMR 1KOHM 10% C TOP ADJ	73138	72PR1K
A6R98	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2671-F
A6R99	0811-0929	2	RESISTOR .51 5% 2W PW TC=0+-800	75042	BWN2-R51-J
A6R100	0758-0093		RESISTOR 56 5% .25W F TC=0+-100	24546	C5-1/4-TO-56R0-J
A6R101	0758-0093		RESISTOR 56 5% .25W F TC=0+-100	24546	C5-1/4-TO-56R0-J
A6R102	0758-0029	1	RESISTOR 470 5% .25W F TC=0+-100	24546	C5-1/4-TO-471-J
A6R104	2100-2740	1	RESVAR CERMET 22K OHM 20%	28480	2100-2740
A6R105	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A6R106	0757-0450	4	RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2212-F
A6R107	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2212-F
A6R108	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2212-F
A6R109	0757-0450		RESISTOR 22.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2212-F
A6R110	0757-0444	4	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1212-F
A6R111	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1212-F
A6R112	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1212-F
A6R113	0757-0444		RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1212-F
A6R114	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A6R115	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A6R116	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A6R117	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A6R119	0698-3153	1	RESISTOR 3.83K 1% .125W F TC=0+-100	16299	C4-1/8-TO-3831-F
A6R120	0698-3155		RESISTOR 4.64K 1% .125W F TC=0+-100	16299	C4-1/8-TO-4641-F
A6R121	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-TO-332R-F
A6R122	0758-0024		RESISTOR 100 5% .25W F TC=0+-100	24546	C5-1/4-TO-101-J
A6R125	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-TO-20R0-F
A6R126	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-TO-20R0-F
A6R129	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-TO-5621-F
A6R130	2100-3214	1	RESISTOR-VAR TRMR 100KOHM 10% C TOP ADJ	73138	72PR100K
A6R131	0757-0456	2	RESISTOR 43.2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4322-F
A6R132	0757-0456		RESISTOR 43.2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4322-F
A6R133	0757-0290		RESISTOR 6.19K 1% .125W F TC=0+-100	19701	MF4C1/8-TO-6191-F
A6R134	0757-0442		RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1102-F
A6R135	2100-2782	1	RESVAR CERMET 100K OHM 20% LIN 0.5W	28480	2100-2782
A6R136	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A6R137	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2151-F
A6R138	0698-0084		RESISTOR 2.15K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2151-F
A6R139	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-TO-20R0-F
A6R140	0757-0384		RESISTOR 20 1% .125W F TC=0+-100	19701	MF4C1/8-TO-20R0-F
A6R141	0698-6458	2	RESISTOR 590 1% .125W F TC=0+-100	24546	C4-1/8-TO-590R-F
A6R142	0757-0274		RESISTOR 1.21K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1213-F
A6R143	0757-0161	2	RESISTOR 604 1% .125W F TC=0+-100	24546	C4-1/8-TO-604R-F
A6R144	0757-0399		RESISTOR 82.5 1% .125W F TC=0+-100	24546	C4-1/8-TO-82R5-F
A6R145	0757-0161		RESISTOR 604 1% .125W F TC=0+-100	24546	C4-1/8-TO-604R-F
A6R146	0698-6458		RESISTOR 590 1% .125W F TC=0+-100	24546	C4-1/8-TO-590R-F
A6R147	0757 1001	2	RESISTOR 56.2 1% .5W F TC=0+-100	19701	MF7C1/2-TO-56R2-F
A6R148	0757-1001		RESISTOR 56.2 1% .5W F TC=0+-100	19701	MF7C1/2-TO-56R2-F
A6R149	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A6R150	2100-0554		RESISTOR-VAR TRMR 500 OHM 10% C TOP ADJ	73138	72PR500
A6R151	0811-0929		RESISTOR .51 5% 2W PW TC=0+-800	75042	BWN2-R51-J
A6R152	0757-0435		RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3921-F
A6R153	2100-3211		RESISTOR-VAR TRMR 1KOHM 10% C TOP ADJ	73138	72PR1K
A6R154	0698-3492		RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2671-F
A6U1	1820-0196	2	IC LIN REGULATOR	07263	723MC
A6U2	1820-0196		IC LIN REGULATOR	07263	723MC
A6V1	1902-3105	4	DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A6V2	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A6V3	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111
A6V4	1902-3105		DIODE-ZNR 5.62V 2% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-111

See table 6–3 for Manufacturer Codes

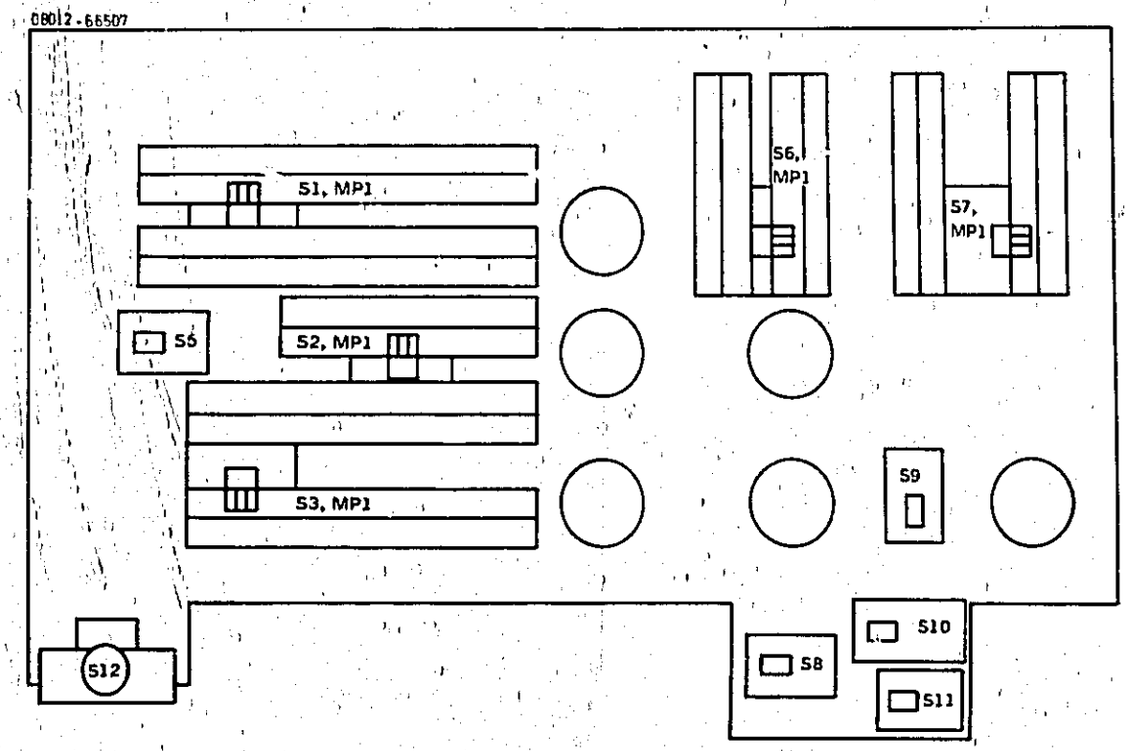


Figure 6–4. Component Layout – Board A7 – Front View

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-CONT/ROW 2-ROWS	71785	252-18-33-300
A7L1 A7L2	9140-0118 5081-1973		COIL-RFD MOLDED RF CHOKE 500UH 5% IND AY (3 BEADS)	24226	19/503
A7MP1	5020-3440	5	SPRING DETENT FOR S1, S2, S3, S6, S7	28480	5040-3440
A7R8	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A7R9	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A7R10	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A7R18	0760-0027	2	RESISTOR 150 2% 1W MO TC=0+-200	FR003	C32
A7R19	0760-0027		RESISTOR 150 2% 1W MO TC=0+-200	FR003	C32
A7R20	0757-0172	1	RESISTOR 37.4 1% .5W F TC=0+-100	19701	MF7C1/2-T0-37R4-F
A7R21	0760-0026	2	RESISTOR 75 2% 1W MO TC=0+-200	FR003	C32
A7R22	0760-0026		RESISTOR 75 2% 1W MO TC=0+-200	FR003	C32
A7R23	0757-0799	1	RESISTOR 121 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-1211-F
A7R24	0698-3616	1	RESISTOR 62 5% 2W MO TC=0+-200	16299	FP42-2-T00-62R0-J
A7R25	0758-0094	1	RESISTOR 62 5% .25W F TC=0+-100	24546	C5-1/4-T0-62R0-J
A7R26	0757-0071	1	RESISTOR 267.5 1% .25W F TC=0+-100	19701	MF52C1/4-T0-2675-F
A7R27	0698-4476	1	RESISTOR 10.2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1022-F
A7R33	0758-0028	1	RESISTOR 270 5% .25W F TC=0)-100	24546	C5-1/4-T0-271-J
A751	5040-1109	2	SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1109
A752	5040-1109		SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1109
A753	5040-1110	1	SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1110
A755	3101-1311	4	SWITCH-SL DPDT-NS STD .5A 125VAC/DC	28480	3101-1311
A756	5040-1111	1	SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1111
A757	5040-1112	1	SLIDE ASSEMBLY, P.C. SWITCH	28480	5040-1112
A758	3101-1311		SWITCH-SL DPDT-NS STD .5A 125VAC/DC	28480	3101-1311
A759	3101-1311		SWITCH-SL DPDT-NS STD .5A 125VAC/DC	28480	3101-1311
A7510	3101-1313	1	SWITCH-SL DP3T-NS MINTR .5A 125VAC/DC PC	79727	G12B5-0004
A7511	3101-1311		SWITCH-SL DPDT-NS STD .5A 125VAC/DC	28480	3101-1311
A7512	3101-1720	1	SWITCH-PB DPDT P-P 4A 250VAC	28480	3101-1720
A7X4	1251-2034	1	CONNECTOR-PC EDGE 10-CONT/ROW 2-ROWS	71785	252-10-30-300

See table 6–3 for Manufacturer Codes

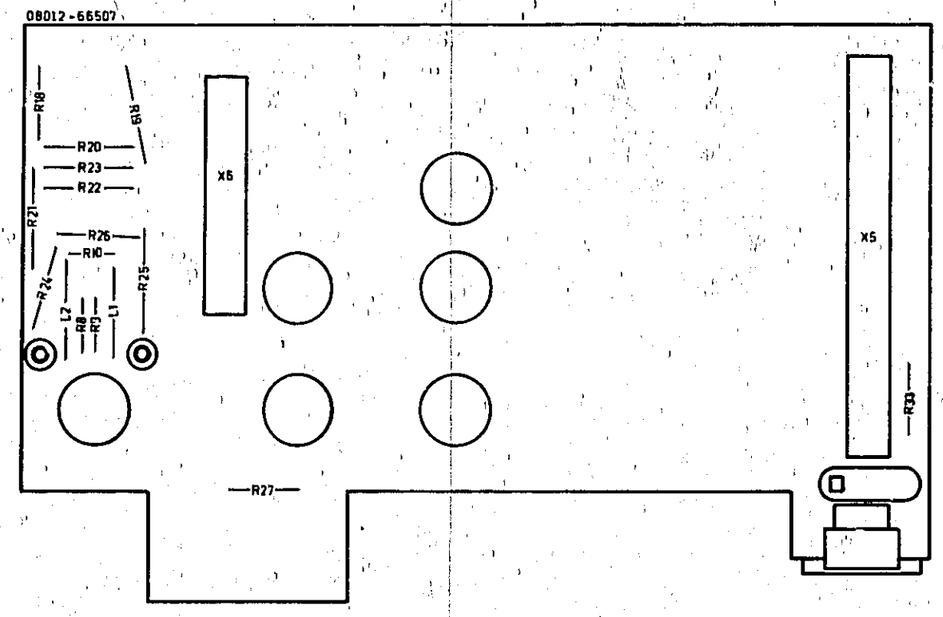


Figure 6–5. Component Layout — Board A7 — Rear View

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

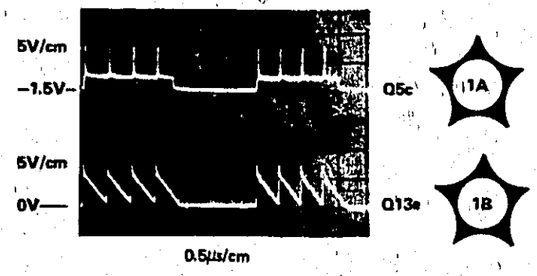
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

3. A model 180C oscilloscope with 1001A and 1821A plug-ins was used for the waveform measurements.

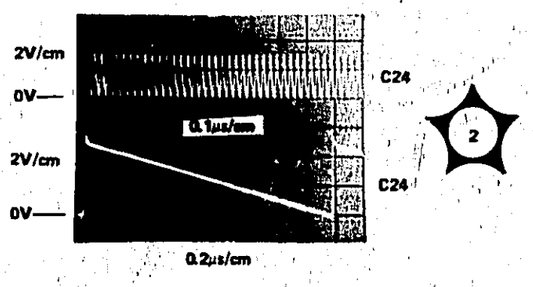
4. A model 8015A pulse generator was used to provide the external input signals.

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

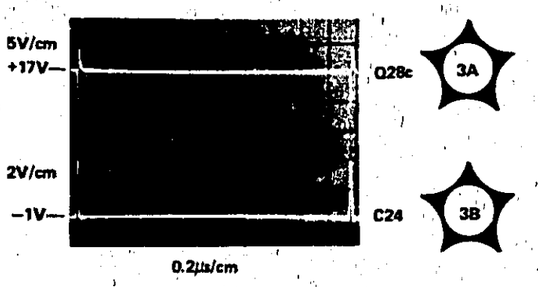
EXTERNAL GATE INPUT (21)	330KHz
PULSE PERIOD (2)	20n–1μ
VERNIER (3)	Center

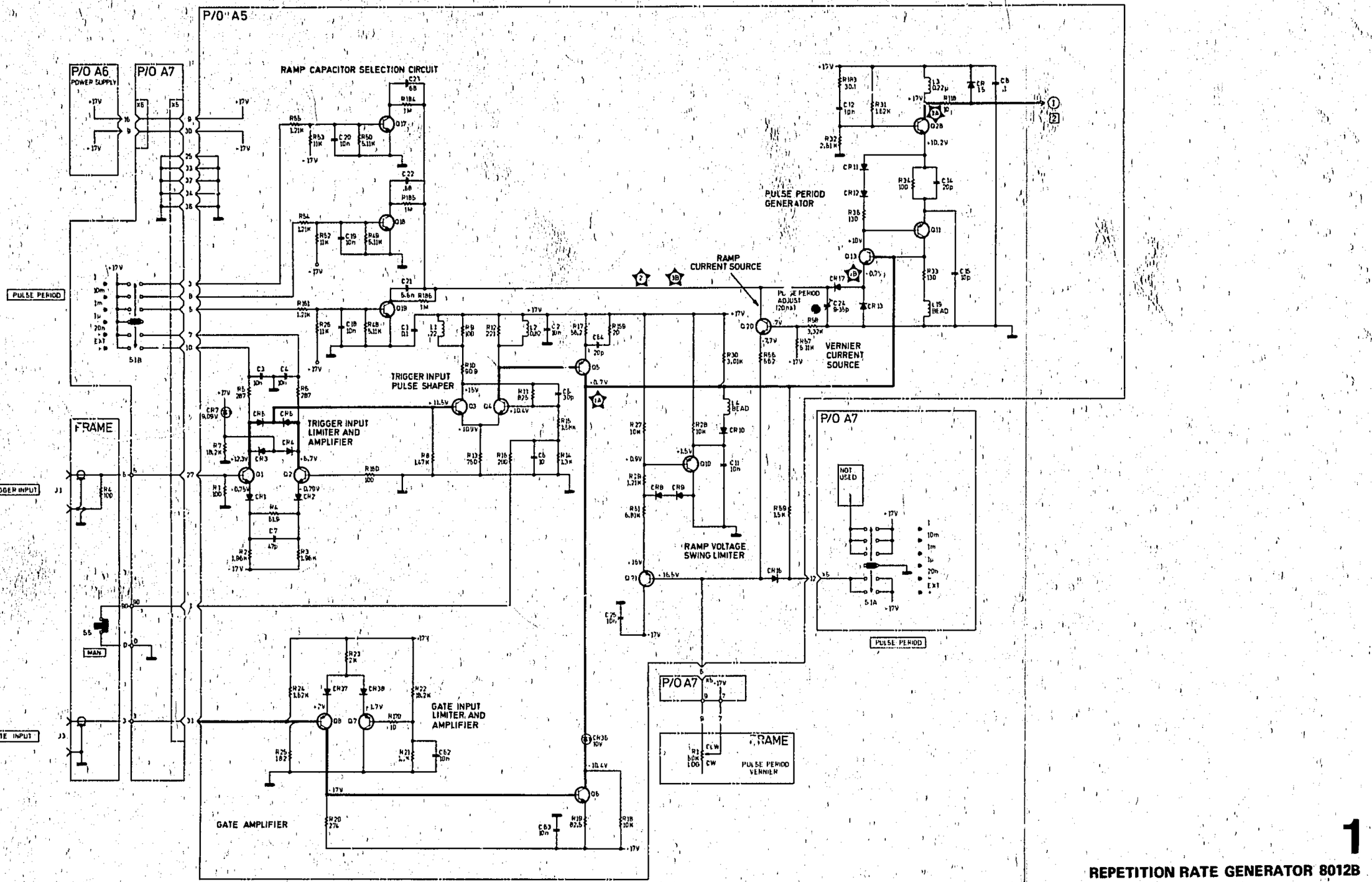


PULSE PERIOD (2)	20n–1μ
VERNIER (3)	CCW
VERNIER (3)	CW



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




P/O A5
P/O A6
POWER SUPPLY
P/O A7
RAMP CAPACITOR SELECTION CIRCUIT
PULSE PERIOD
PULSE PERIOD GENERATOR
RAMP CURRENT SOURCE
VERNIER CURRENT SOURCE
TRIGGER INPUT PULSE SHAPER
TRIGGER INPUT LIMITER AND AMPLIFIER
RAMP VOLTAGE SWING LIMITER
GATE INPUT LIMITER AND AMPLIFIER
GATE AMPLIFIER
FRAME
TRIGGER INPUT
GATE INPUT
MAN
NOT USED
PULSE PERIOD VERNIER

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

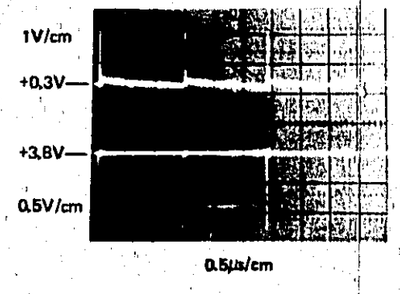
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

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.

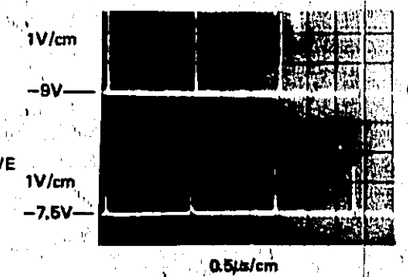
Pulse settings as for d. c. measurements (see note 1) except for:

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



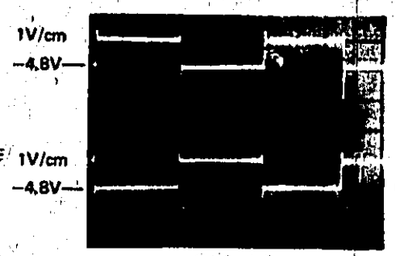
Q9c 4A
Q12c 4B

PULSE PERIOD (2) 20n–1μ
VERNIER (3) CW
PULSE WIDTH (7) SQUARE WAVE



Q15c 5A
Q14c 5B

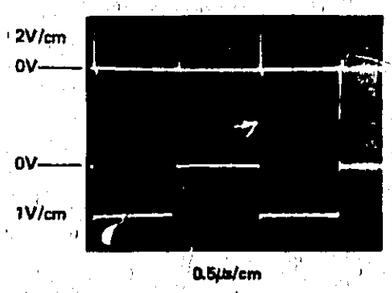
PULSE PERIOD (2) 20n–1μ
VERNIER (3) CW
PULSE WIDTH (7) SQUARE WAVE



Q51b 6A
Q50b 6B

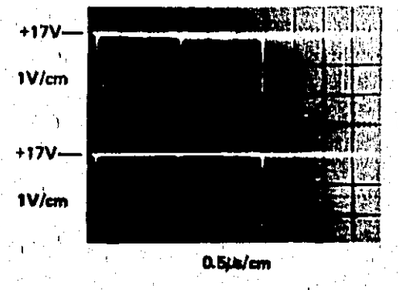
Pulse settings as for d. c. measurements (see note 1) except for:

PULSE PERIOD (2) 20n–1
VERNIER (3) CW
PULSE WIDTH (7) SQUARE WAVE



Q49c 7A
Q48c 7B

PULSE PERIOD (2) 20n–1μ
VERNIER (3) CW
PULSE WIDTH (7) SQUARE WAVE

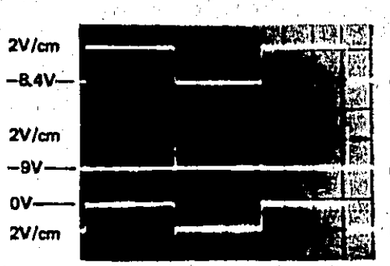


Q22c 8

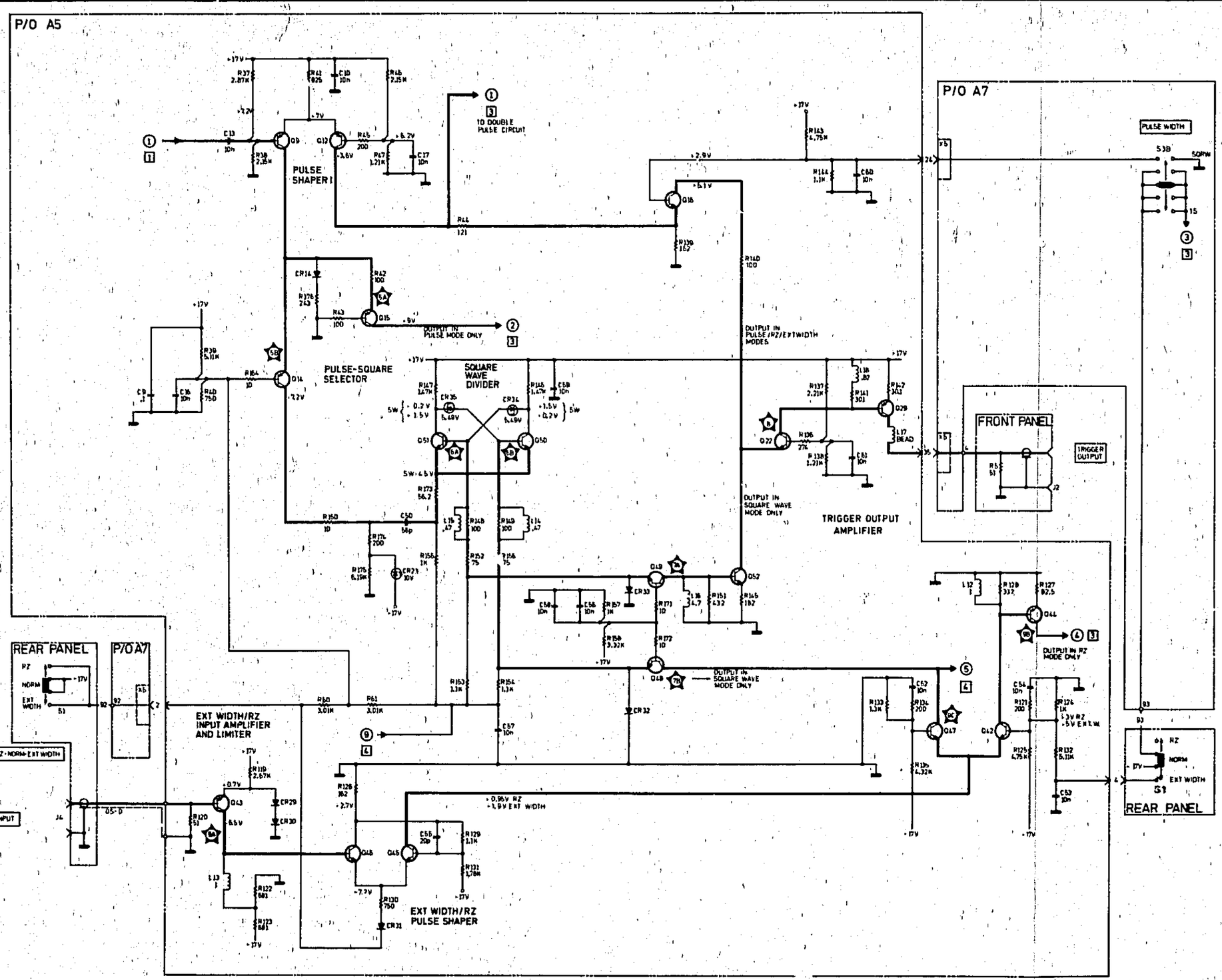
External input to EXT. WIDTH/NORM/RZ connector (25) on rear panel ≙ 330 KHz

EXT WIDTH/NORM/RZ switch (24)

NORM
RZ
EXT WIDTH



Q43c 9A
Q44c 9B
Q47c 9C


P/O A5
P/O A7
PULSE SHAPER
PULSE-SQUARE SELECTOR
SQUARE WAVE DIVIDER
TRIGGER OUTPUT AMPLIFIER
EXT WIDTH/RZ INPUT AMPLIFIER AND LIMITER
EXT WIDTH/RZ PULSE SHAPER
10 DOUBLE PULSE CIRCUIT
OUTPUT IN PULSE MODE ONLY
OUTPUT IN PULSE/RZ/EXT WIDTH MODES
OUTPUT IN SQUARE WAVE MODE ONLY
OUTPUT IN RZ MODE ONLY
PULSE WIDTH
FRONT PANEL
TRIGGER OUTPUT
REAR PANEL
INPUT
RZ · NORM · EXT WIDTH

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

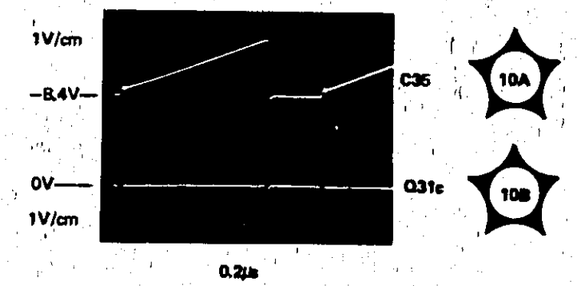
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

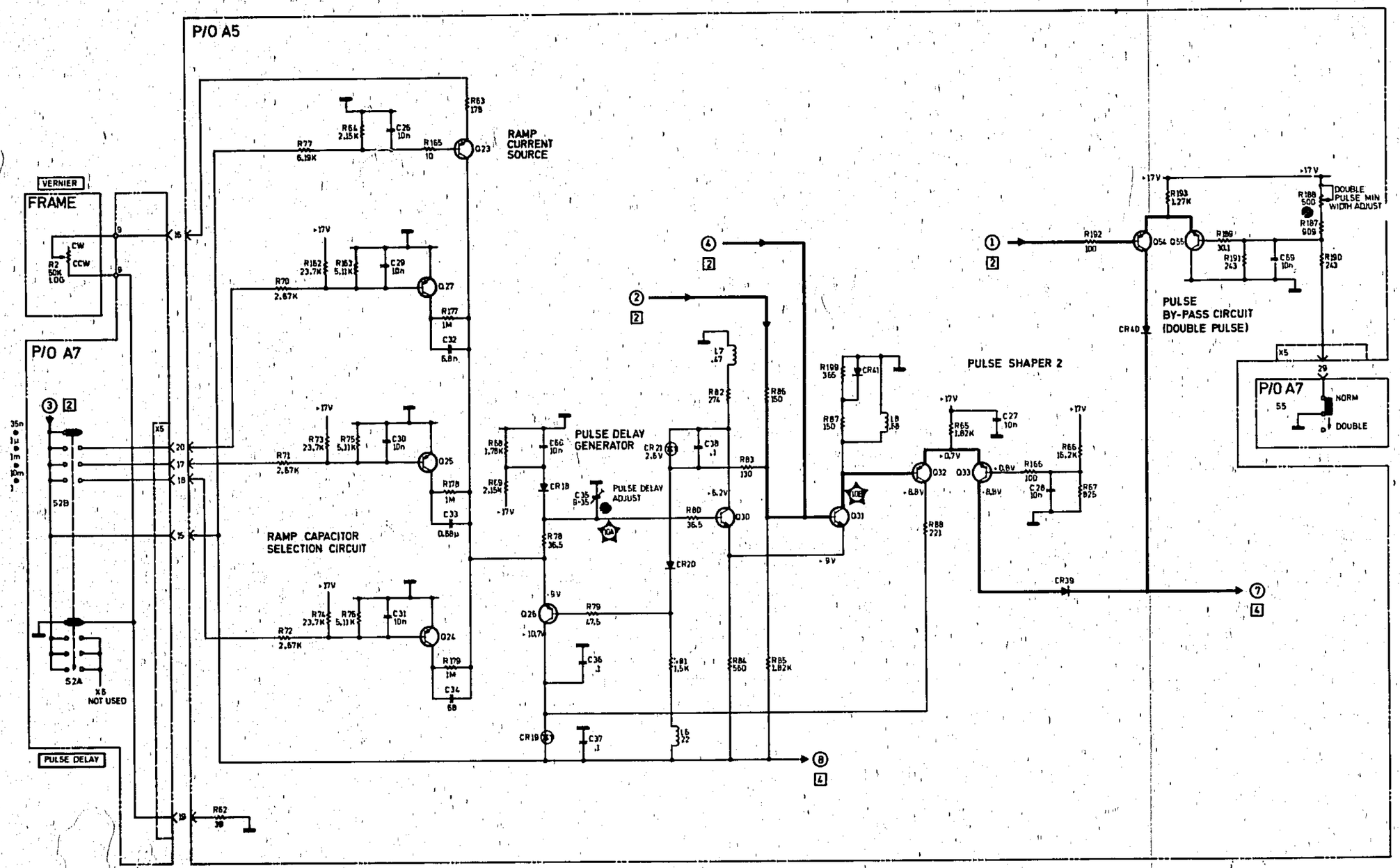
3. A model 180C oscilloscope with 1801A and 1821A plug-ins was used for the waveform measurements.

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 DELAY (5)	35n–1μ
VERNIER (6)	Center




P/O A5
RAMP CURRENT SOURCE
VERNIER
FRAME
CW
CCW
R2 50K LOG
P/O A7
RAMP CAPACITOR SELECTION CIRCUIT
PULSE DELAY GENERATOR
PULSE DELAY ADJUST
PULSE SHAPER 2
PULSE BY-PASS CIRCUIT (DOUBLE PULSE)
DOUBLE PULSE MIN WIDTH ADJUST
NORM
DOUBLE
S2B
S2A
X5 NOT USED
PULSE DELAY

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

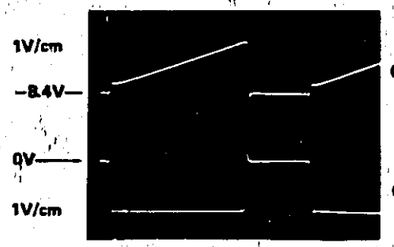
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

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



11A

11B

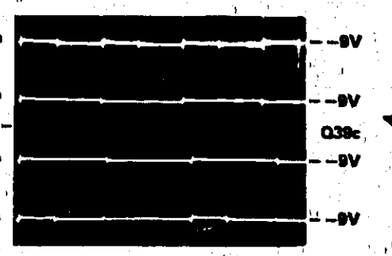
PULSE PERIOD (2)	20n–1μ
VERNIER (3)	CW
PULSE WIDTH (7)	10n–1μ
VERNIER (8)	Center
PULSE PERIOD (2)	20n–1μ
VERNIER (3)	CW
PULSE WIDTH (7)	SQUARE WAVE

External input to EXT WIDTH/NORM/RZ connector (25) on rear panel ≙ 330 KHz

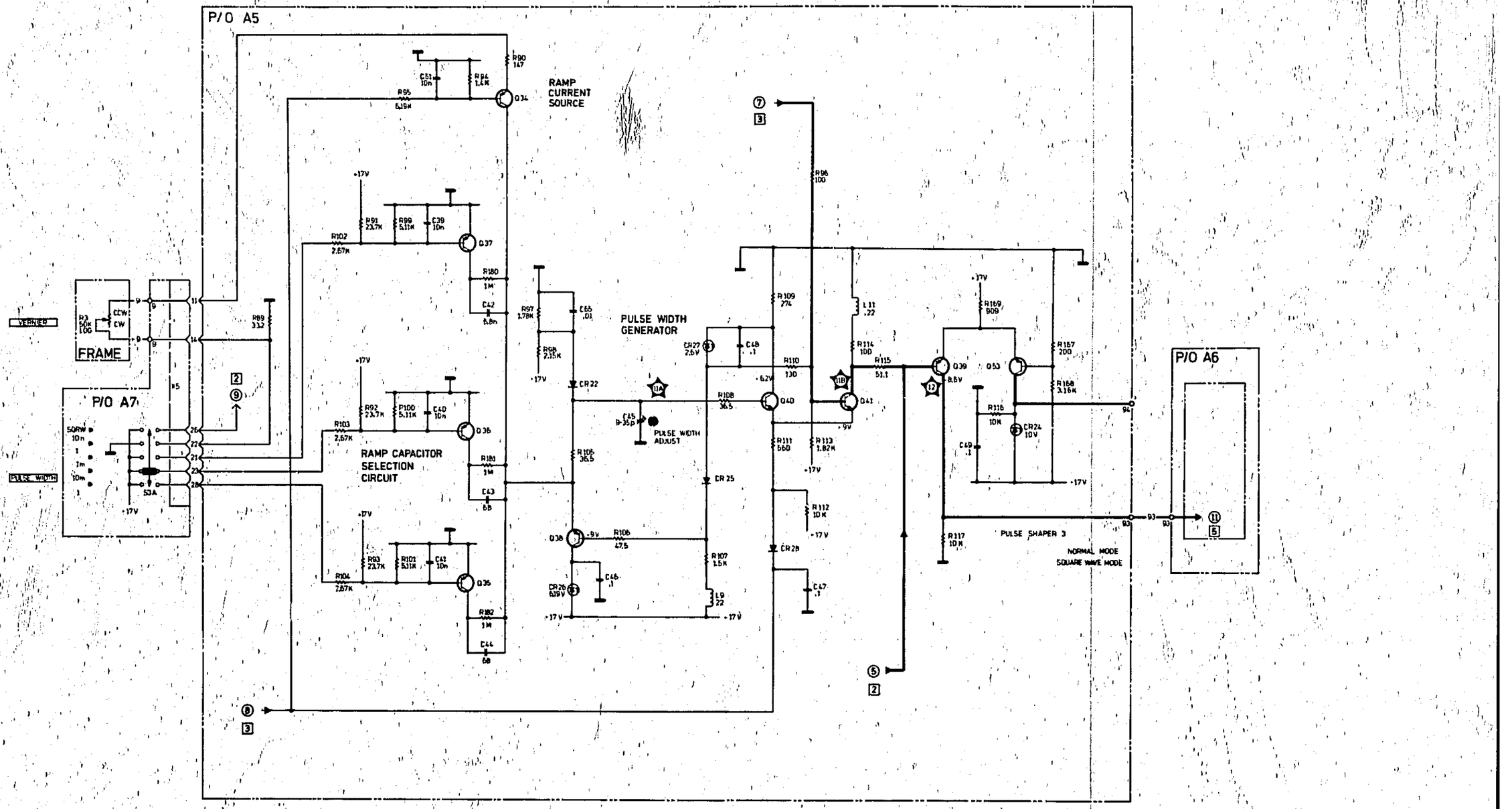
EXT WIDTH

RZ

EXT WIDTH/NORM/RZ switch (24)



12


P/O A5
RAMP CURRENT SOURCE
PULSE WIDTH GENERATOR
RAMP CAPACITOR SELECTION CIRCUIT
PULSE WIDTH ADJUST
PULSE SHAPER 3
NORMAL MODE
SQUARE WAVE MODE
VERNIER
FRAME
PULSE WIDTH
P/O A7
P/O A6

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–1μ
VERNIER (6)	CCW
PULSE WIDTH (7)	SQUARE WAVE
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

   No external input required.

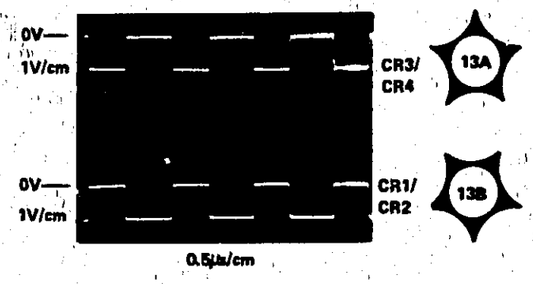
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

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

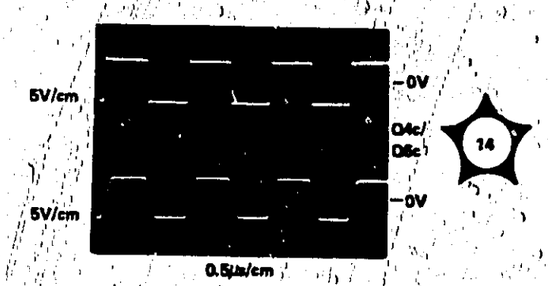
4. A model 8015A pulse generator was used to provide the external input signals.

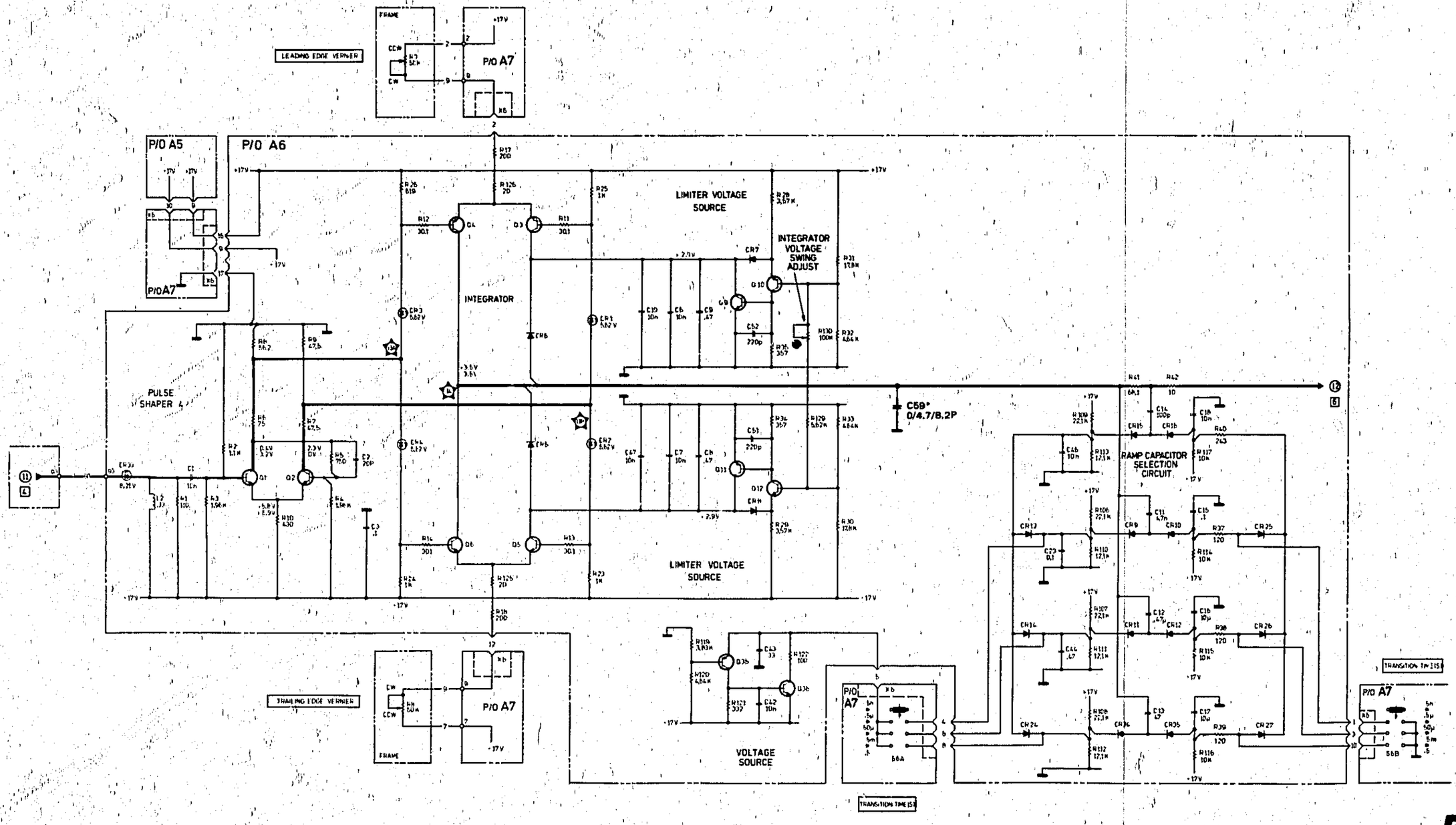
Pulse settings as for d.c. measurements (see note 1) except for:

PULSE PERIOD (2)	20n–1μ
VERNIER (3)	CW
PULSE WIDTH (7)	10n–1μ
VERNIER (8)	Center



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




LEADING EDGE VERNIER
FRAME
CCW
CW
P/O A7
P/O A5
P/O A6
LIMITER VOLTAGE SOURCE
INTEGRATOR VOLTAGE SWING ADJUST
INTEGRATOR
PULSE SHAPER
LIMITER VOLTAGE SOURCE
C59* 0/4.7/8.2P
RAMP CAPACITOR SELECTION CIRCUIT
TRAILING EDGE VERNIER
VOLTAGE SOURCE
TRANSITION TIMES
TRANSITION TIMES

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/NROMAL 4	NORM
PULSE DELAY 5	35n–1μ
VERNIER 6	CCW
PULSE WIDTH 7	SQUARE WAVE
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	–
SYN/NORM/COMPL switch 17	NORM
INT LOAD 18	IN
POLARITY 19	+
EXT WIDTH/NORM/RZ switch 24	NORM

   No external input required

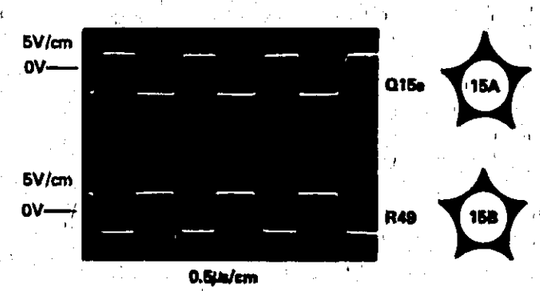
2. A model 3440A digital voltmeter with a 3444A plug-in was used for the d.c. measurements.

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

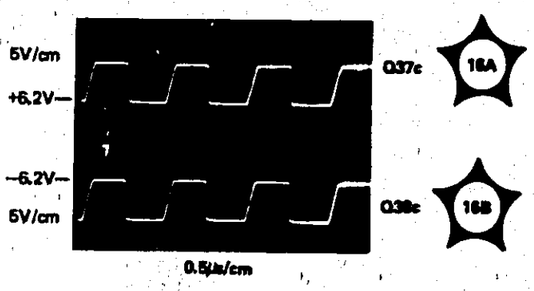
4. A model 8015A pulse generator was used to provide the external input signals.

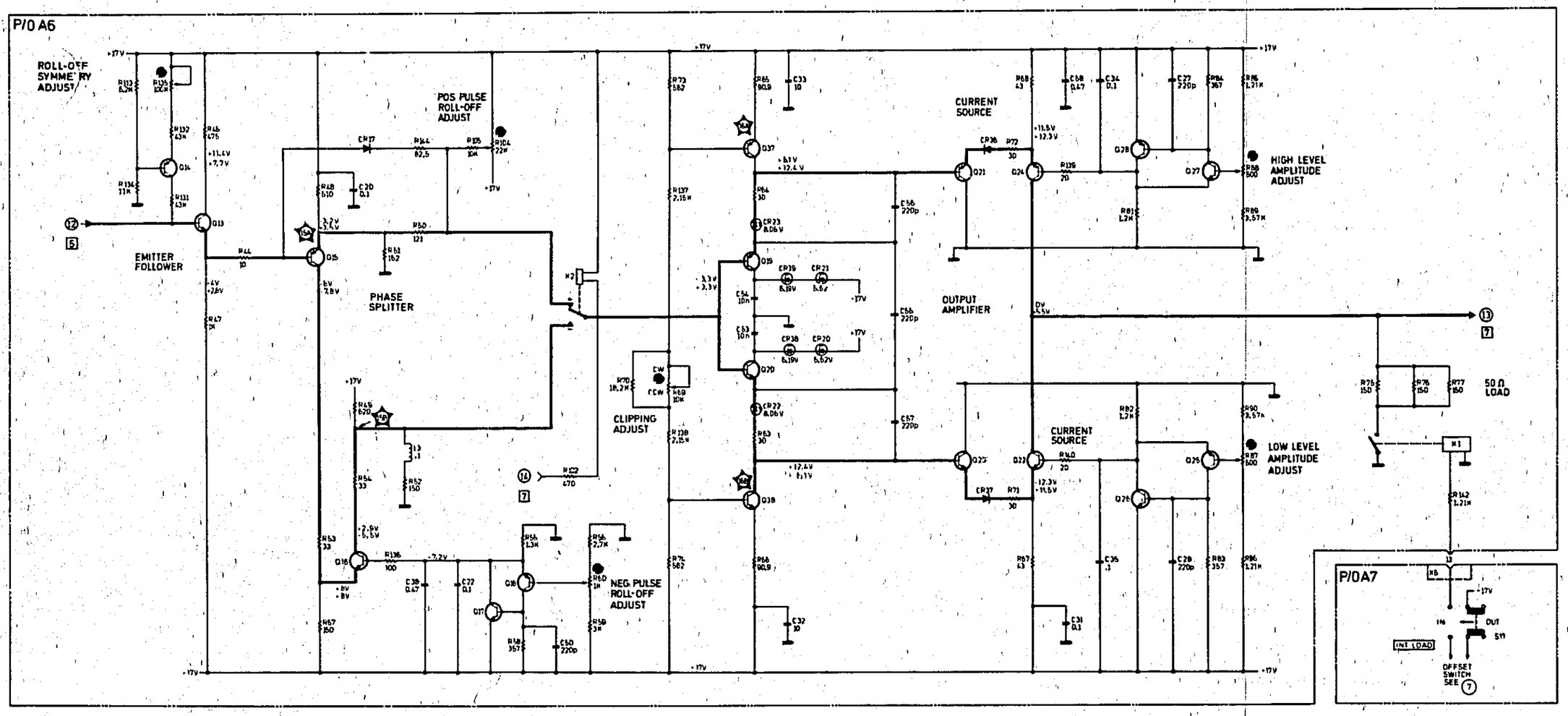
Pulse settings as for d.c. measurements (see note 1) except for:

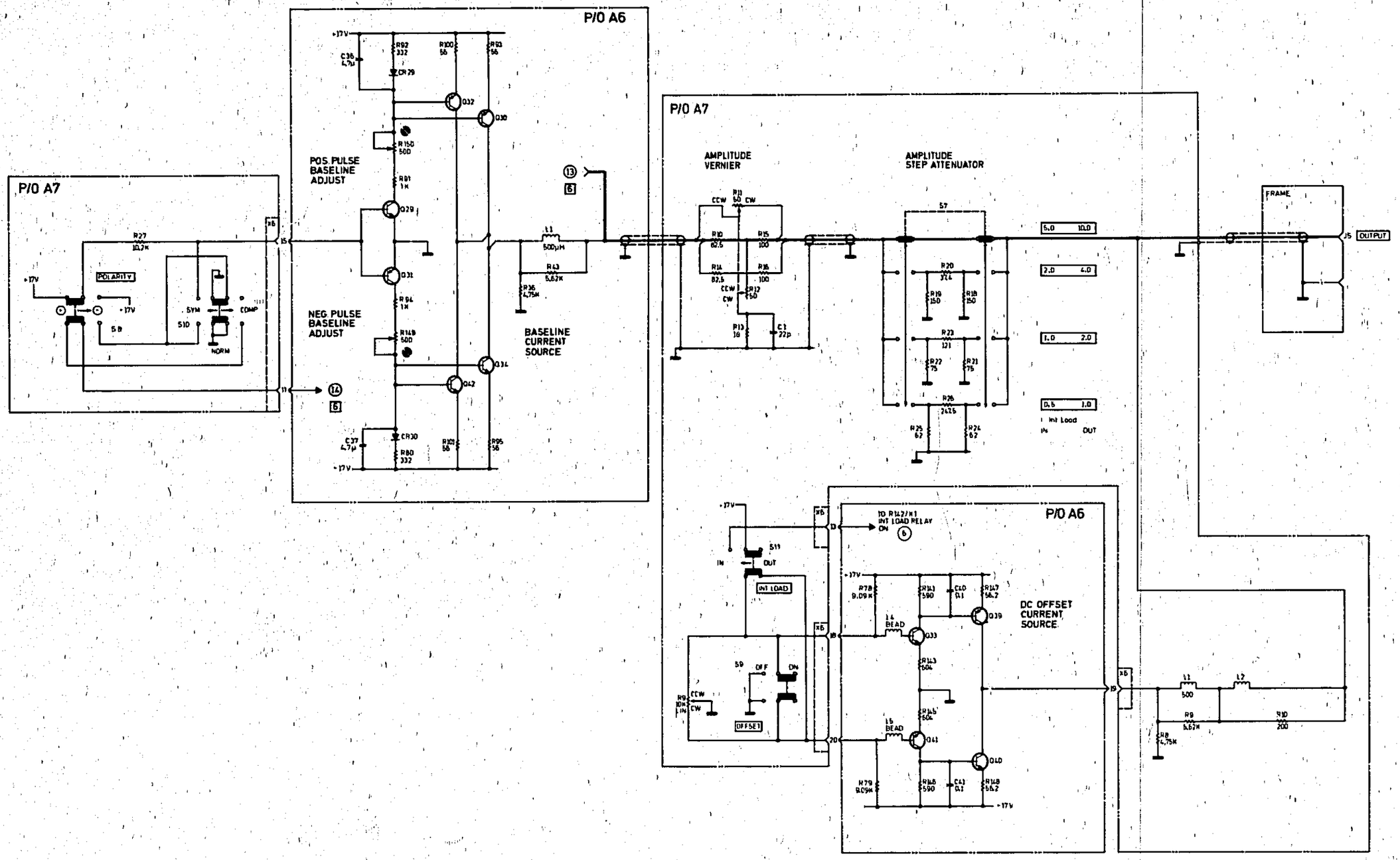
PULSE PERIOD (2)	20n–1μ
VERNIER (3)	CW
PULSE WIDTH (7)	10n–1μ
VERNIER (8)	Center
LEADING EDGE (10)	Center
TRAILING EDGE (11)	CCW

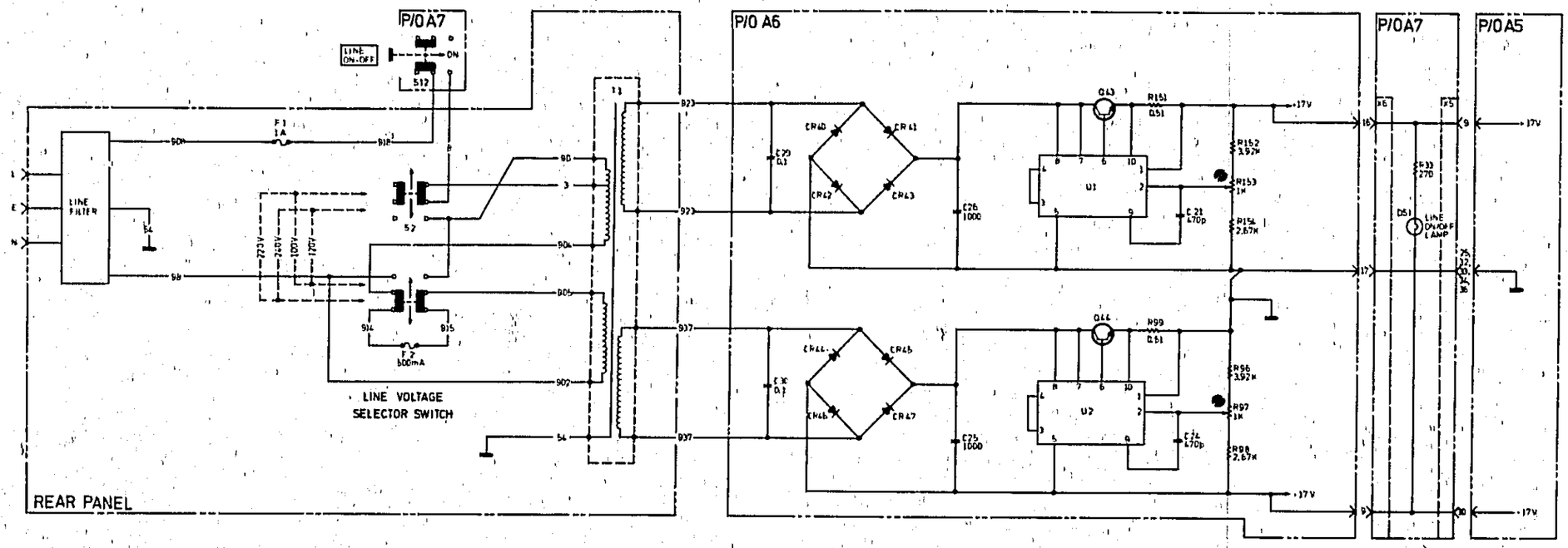


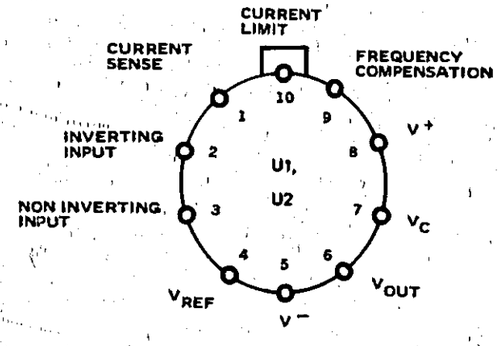
PULSE PERIOD (2)	20n–1μ
VERNIER (3)	CW
PULSE WIDTH (7)	10n–1μ
VERNIER (8)	Center
LEADIN G EDGE (10)	Center
TRAILING EDGE (11)	CCW




P/O A6
ROLL-OFF SYMMETRY ADJUST
POS PULSE ROLL-OFF ADJUST
EMITTER FOLLOWER
PHASE SPLITTER
CLIPPING ADJUST
NEG. PULSE ROLL-OFF ADJUST
CURRENT SOURCE
OUTPUT AMPLIFIER
CURRENT SOURCE
HIGH LEVEL AMPLITUDE ADJUST
LOW LEVEL AMPLITUDE ADJUST
50 Ω LOAD
P/O A7
INT LOAD
OFFSET SWITCH SEE 7
+17V
-17V

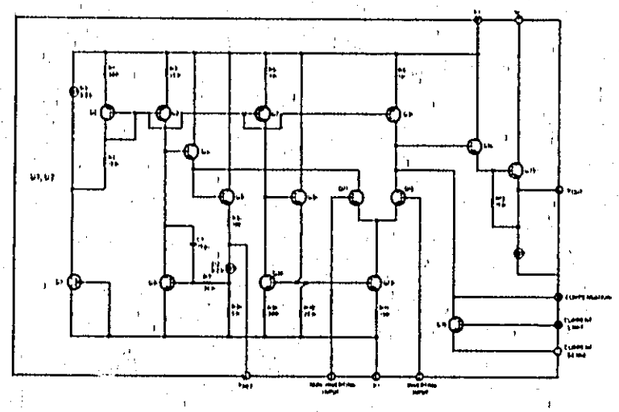

P/O A6
POS PULSE BASELINE ADJUST
NEG PULSE BASELINE ADJUST
BASELINE CURRENT SOURCE
P/O A7
AMPLITUDE VERNIER
AMPLITUDE STEP ATTENUATOR
FRAME
OUTPUT
P/O A7
POLARITY
SYM
COMP
NORM
P/O A6
INT LOAD
OFFSET
DC OFFSET CURRENT SOURCE
P/O A6





NOTE: Pin 5 connected to case.

U1, U2 } µA 723HC



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 nubmers 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	5, 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)

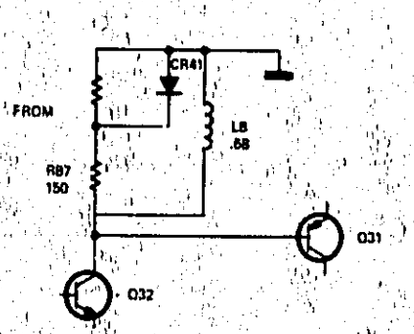
Table 6–4 Change the following components to:

A5	L11	9100–1612	COIL	CHOKE .33μH
A5	R168	0757–0437	R–F	4.75K 1%

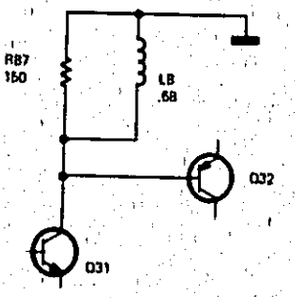
Delete
A5 CR41 and A5 R199 (delete also from board A5 component layout).

Change schematic 3 as shown below.

FROM



TO



Schematic 4. Change L11 to 0.33μH and R168 to 4.75K.

Table 6–4 Change the following components to:

A5	L3	9100–1613	COIL	CHOKE .47μH
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

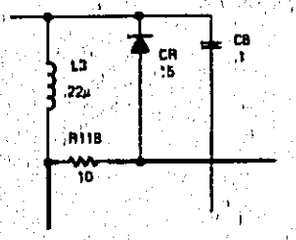
Table 6–5 Change the following components to:

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

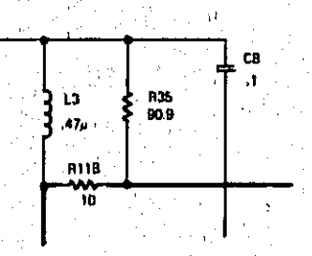
Delete L4 and L5

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 R1?2 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.

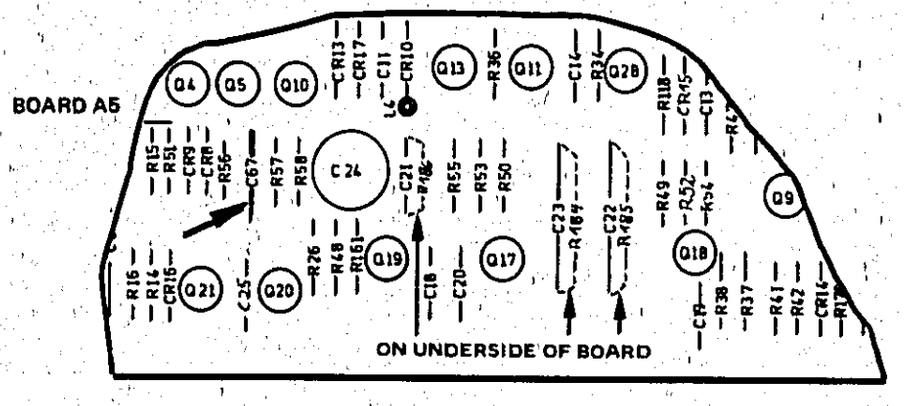


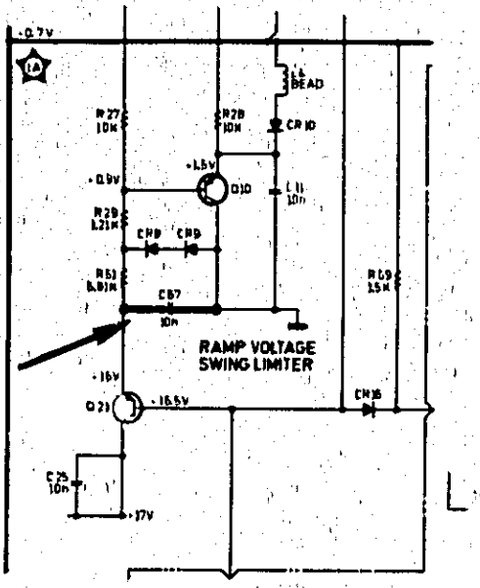
Table 6–4. Add the following component

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.

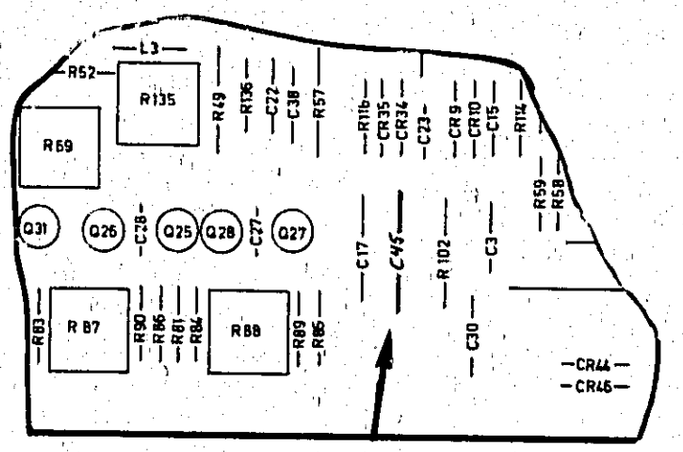
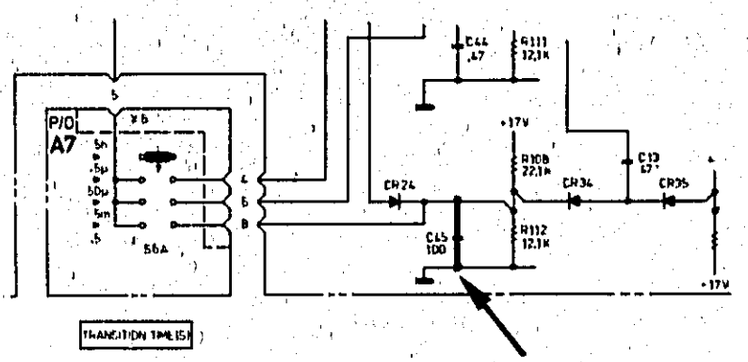


Table 6–5 Change the following components to:

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	100μF 15V

Schematic 5. Add C45 as shown below.



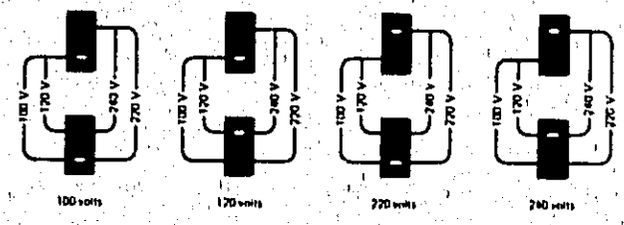
Schematic 7. Change the values of R91 and R94 to 1.21K.

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:



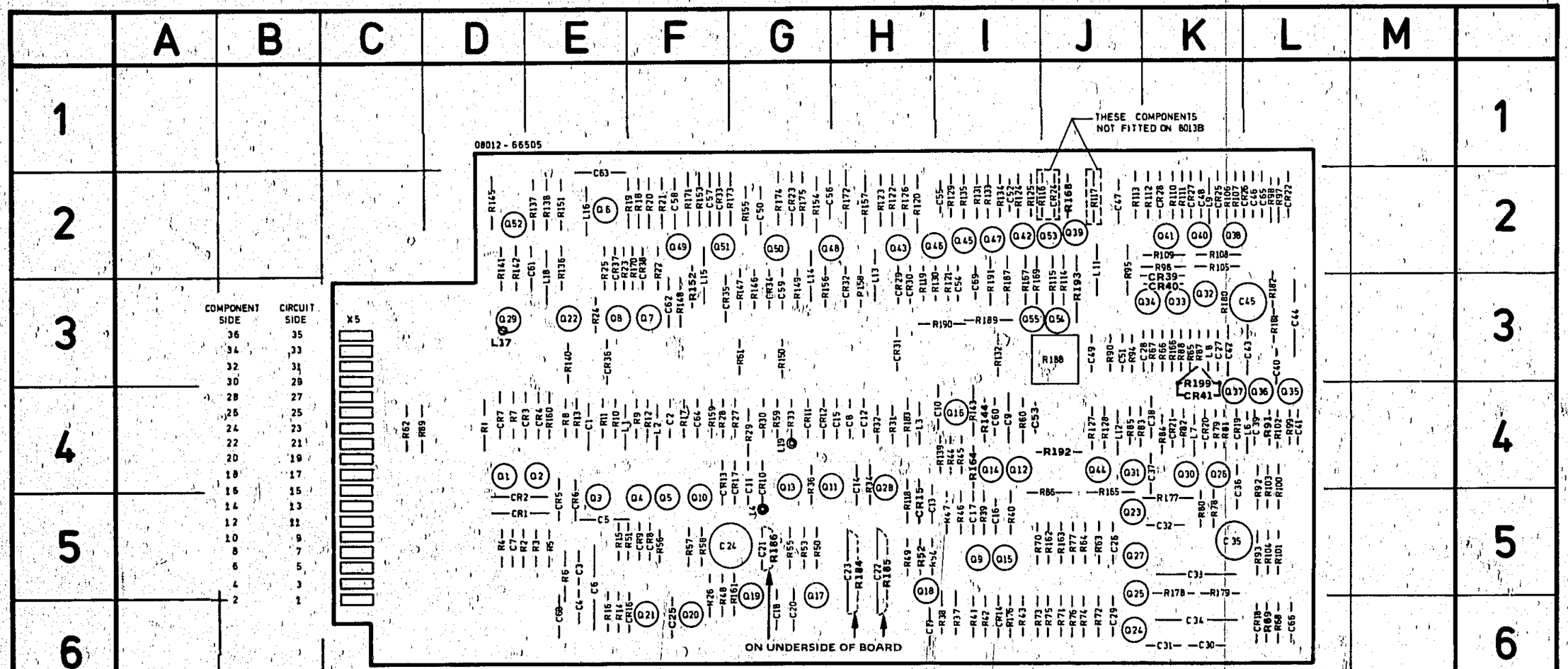
Page 6–4, 6–5. Change S2 and S3 for a single switch:

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.



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	E-4	C24	F-5	C48	K-2	CR2	D-5	CR25	K-2	L9	K-2	Q13	G-4	Q36	L-4	R4	D-5	R27	G-4	R51	F-5	R74	J-6	R97	L-2	R120	H-2	R143	I-4	R166	K-3	R189	I-3
C2	F-4	C25	F-6	C49	J-3	CR3	D-4	CR26	L-2	L11	J-2	Q14	I-4	Q37	K-4	R5	E-5	R28	F-4	R52	H-5	R75	J-6	R98	L-2	R121	I-3	R144	I-4	R167	I-3	R190	I-3
C3	E-5	C26	J-5	C50	G-2	CR4	E-4	CR27	K-2	L12	J-4	Q15	I-5	Q38	K-2	R6	E-5	R29	G-4	R53	G-5	R76	J-6	R99	L-4	R122	H-2	R145	D-2	R168	J-2	R191	I-3
C4	E-6	C27	K-3	C51	J-3	CR5	E-5	CR28	K-2	L13	H-2	Q16	I-4	Q39	J-2	R7	D-4	R30	G-4	R54	H-5	R77	J-5	R100	L-4	R123	H-2	R146	G-3	R169	I-3	R192	J-4
C5	E-5	C28	K-3	C52	I-2	CR6	E-5	CR29	H-3	L14	G-2	Q17	G-6	Q40	K-2	R8	E-4	R31	H-4	R55	G-5	R78	K-5	R101	L-5	R124	I-2	R147	G-3	R170	F-2	R193	J-3
C6	E-5	C29	J-6	C53	I-4	CR7	D-4	CR30	H-3	L15	F-2	Q18	H-5	Q41	K-2	R9	F-4	R32	H-4	R56	F-5	R79	K-4	R102	L-4	R125	I-2	R148	F-3	R171	F-2	R199	K-3
C7	D-5	C30	K-6	C54	I-3	CR8	F-5	CR31	H-3	L16	E-2	Q19	G-5	Q42	I-2	R10	E-4	R33	H-4	R57	F-5	R80	K-5	R103	L-4	R126	H-2	R149	G-3	R172	H-2		
C8	H-4	C31	K-6	C55	I-2	CR9	F-5	CR32	H-3	L18	E-3	Q20	F-6	Q43	H-2	R11	E-4	R34	H-4	R58	F-5	R81	K-4	R104	L-5	R127	J-4	R150	G-3	R173	F-2		
C9	I-4	C32	K-5	C56	G-2	CR10	G-4	CR33	F-2	L19	G-4	Q21	F-6	Q44	J-4	R12	F-4	R35	H-5	R59	G-4	R82	K-4	R105	K-2	R128	J-4	R151	E-2	R174	G-2		
C10	I-4	C33	K-5	C57	F-2	CR11	G-4	CR34	G-3	L17	D-3	Q22	E-2	Q45	I-2	R13	E-4	R36	I-4	R60	I-4	R83	J-4	R106	K-2	R129	I-2	R152	F-3	R175	G-2		
C11	G-4	C34	K-6	C58	F-2	CR12	G-4	CR35	F-3	Q1	D-4	Q23	J-5	Q46	I-2	R14	E-6	R37	I-6	R61	G-3	R84	K-4	R107	K-2	R130	H-3	R153	F-2	R176	I-6		
C12	H-4	C35	K-5	C59	G-3	CR13	F-5	CR36	E-3	Q2	E-4	Q24	J-6	Q47	I-2	R15	E-5	R38	I-6	R62	C-4	R85	J-4	R108	K-2	R131	I-2	R154	G-2	R177	K-5		
C13	H-5	C36	K-4	C60	I-4	CR14	I-6	CR37	E-2	Q3	E-5	Q25	K-5	Q48	H-2	R16	E-6	R40	I-5	R63	J-5	R86	J-5	R109	K-2	R132	I-3	R155	G-2	R178	K-5		
C14	H-4	C37	K-4	C61	E-2	CR15	H-5	CR38	F-2	Q4	F-5	Q26	K-4	Q49	F-2	R17	F-4	R41	I-6	R64	J-5	R87	K-3	R110	K-2	R133	I-2	R156	G-3	R179	K-5		
C15	H-4	C38	K-4	C62	F-3	CR16	F-6	CR39	K-3	Q5	F-5	Q27	J-5	Q50	G-2	R18	F-2	R42	I-6	R65	K-3	R88	K-3	R111	K-2	R134	I-2	R157	H-2	R180	K-3		
C16	I-5	C39	L-4	C63	E-2	CR17	G-4	CR40	K-3	Q6	E-2	Q28	H-4	Q51	F-2	R19	F-2	R43	I-6	R66	K-3	R89	C-4	R112	K-2	R135	I-2	R158	H-3	R181	L-3		
C17	I-5	C40	L-3	C64	F-4	CR18	L-6	CR41	K-3	Q7	F-3	Q29	D-3	Q52	D-2	R20	F-2	R44	I-4	R67	K-3	R90	J-3	R113	J-2	R136	E-2	R159	F-4	R182	L-3		
C18	G-6	C41	L-4	C65	L-2	CR19	K-4	L1	E-4	Q8	E-3	Q30	K-4	Q53	J-2	R21	F-2	R45	I-4	R68	L-6	R91	L-4	R114	J-3	R137	E-2	R160	E-4	R183	H-4		
C19	H-6	C42	K-3	C66	L-6	CR20	K-4	L2	F-4	Q9	I-5	Q31	J-4	Q54	J-3	R22	F-2	R46	I-5	R69	L-6	R92	L-4	R115	J-3	R138	E-2	R161	G-5	R184	H-5		
C20	G-6	C43	L-3	C67	F-5	CR21	K-4	L3	H-4	Q10	F-5	Q32	K-3	Q55	I-3	R23	E-2	R47	I-5	R70	I-5	R93	L-5	R116	J-2	R139	I-4	R162	J-5	R185	H-5		
C21	G-5	C44	L-3	C68	E-6	CR22	L-2	L4	G-5	Q11	G-4	Q33	K-3	R1	D-4	R24	E-3	R48	H-5	R71	J-6	R94	J-3	R117	J-2	R140	E-2	R163	J-5	R186	G-5		
C22	H-5	C45	L-3	C69	I-3	CR23	G-2	L5	K-4	Q12	I-4	Q34	K-3	R2	D-5	R25	E-2	R49	H-5	R72	J-6	R95	J-2	R118	H-5	R141	D-2	R164	I-4	R187	I-3		
C23	H-5	C47	J-2	CR1	D-5	CR24	J-2	L8	K-3			Q35	L-4	R3	E-5	R26	F-5	R50	G-5	R73	I-6	R96	K-2	R119	H-3	R142	D-2	R165	J-5	R188	J-3		

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
1448A	1
2110A	1, 2

Serial Prefix or Number	Make Manual Changes

▲ NEW ITEM

ERRATA

Table 6-5. 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. DM15E470J0500 WV1CR.

Change: A5Q9, 11, 12, 14, 15, 26, 33, 38, 39, 43, 53, HP Part No. 1853-0218, TRANSISTOR PNP SI CHIP TO-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 ±10% 35VDC TA-SOLID, Mfr Code 56289, Mfr Part No. 150D4746X9035S2.

Change: A6K2, HP Part No. 0490-0535, RELAY REED 1C 250MA 28VDC 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.

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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 .68UF ±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±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±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±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±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±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

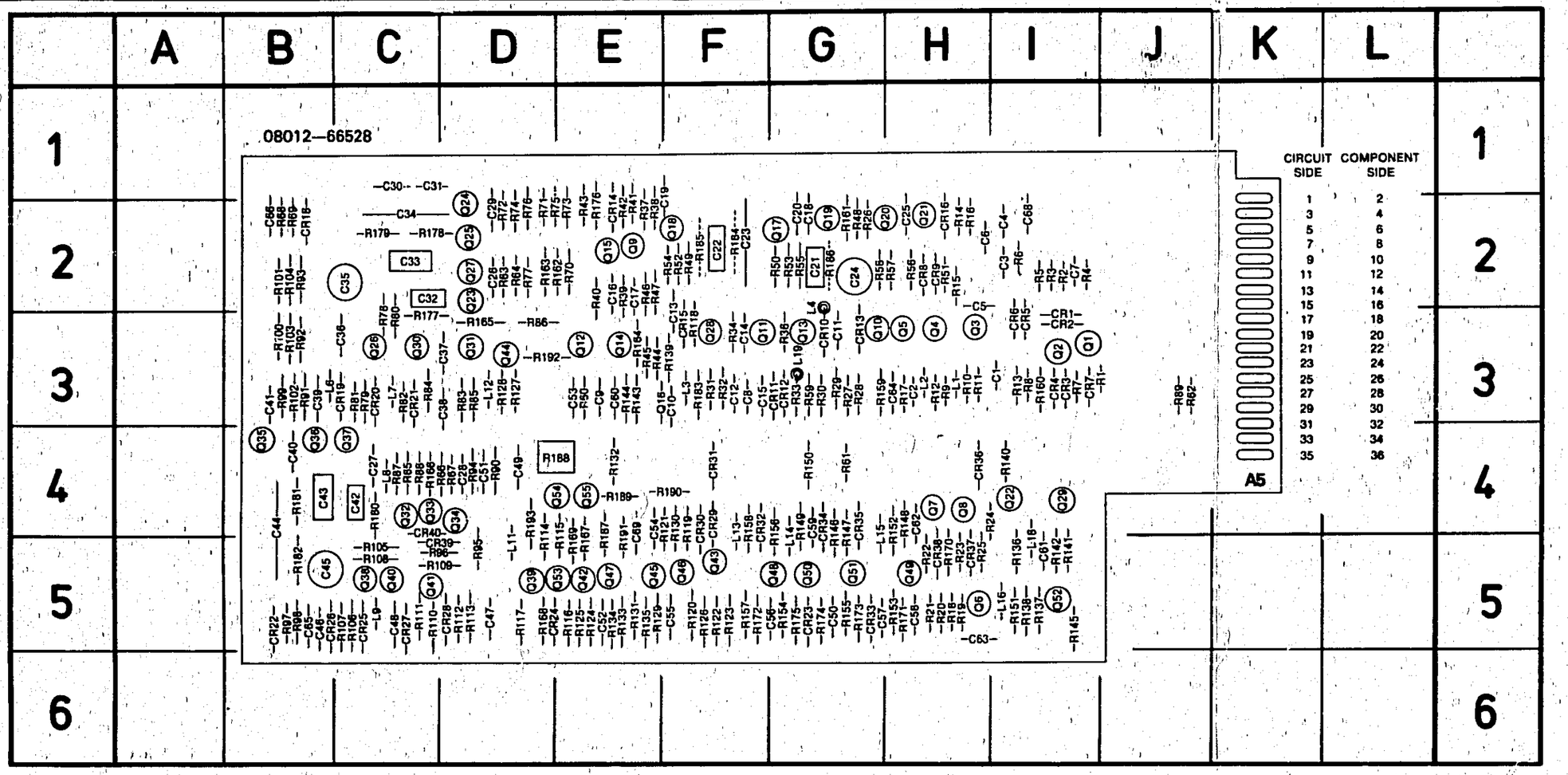
Table 6-4. Frame Replaceable Parts List,

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.



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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	C58	I-2	CR21	C-3	L4	G-2	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	C59	E-4	CR22	B-5	L5	B-3	Q11	F-3	Q33	C-4	Q55	E-4	R22	H-5	R44	E-3	R66	D-4	R88	C-4	R110	C-5	R134	E-5	R155	G-5	R176	E-2
C4	I-2	C26	D-2	C48	C-5	CR1	I-3	CR23	G-5	L7	C-3	Q12	E-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	C-4	C49	D-4	CR2	I-3	CR25	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	I-3	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	I-3	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	I-3	CR28	D-5	L12	D-3	Q16	E-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	I-3	CR29	F-4	L13	F-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	I-3	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	H-2	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-7	R184	F-2
C12	F-3	C34	C-2	C56	G-5	CR9	H-2	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	G-3	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	G-3	CR34	G-4	L19	G-4	Q22	I-4	Q44	D-3	R11	H-3	R33	G-3	R55	G-2	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	G-3	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	G-3	CR36	H-4	Q2	I-3	Q24	D-2	Q46	F-5	R13	I-3			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	E-2	CR37	H-5	Q3	H-3	Q25	D-2	Q47	E-5	R14	H-2	R35	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	F-3	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	H-2	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	B-5	CR18	B-2	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	C-3	L2	H-3	Q8	H-4	Q30	C-3	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