Errata

Title & Document Type: 8011A Pulse Generator, Operation & Service Manual

Manual Part Number: 08011-90004

Revision Date: 1990

HP References in this Manual

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

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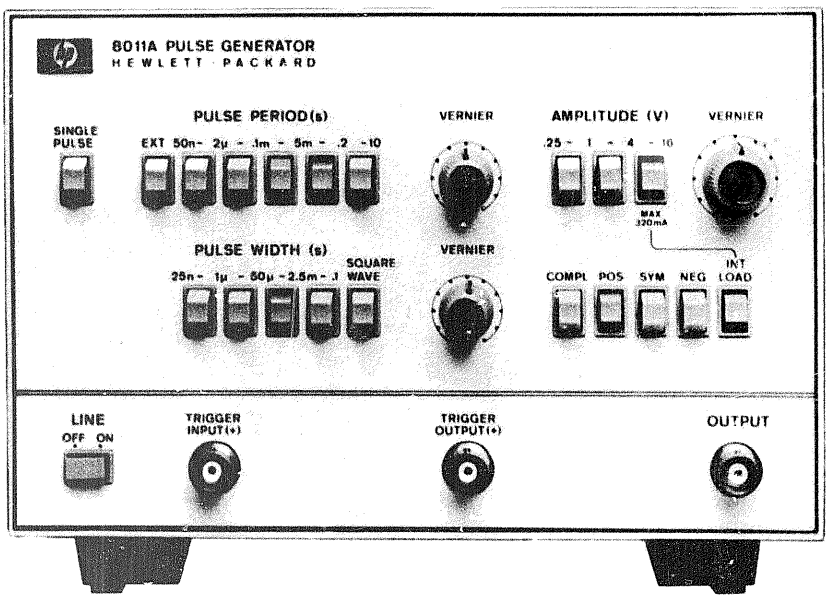
Agilent Technologies

OPERATING AND SERVICE MANUAL

8011A PULSE GENERATOR



HEWLETT hp PACKARD

HP 8011A

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.

For any assistance, contact your nearest Hewlett-Packard Sales and Service Office. Addresses are provided at the back of this manual.

HEWLETT hp PACKARD

OPERATING AND SERVICE MANUAL

8011 A
PULSE GENERATOR

SERIAL NUMBERS

This manual applies directly to instruments with serial number 1411 G 01136 and higher. Any changes made in instruments having serial numbers higher than the above number will be found in a "Manual Changes" supplement (yellow pages) 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

MANUAL PART NO. 08011-90004
Microfiche Part No. 08011-95004

Printed: Sept. 1977

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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 (sometimes used in manual to indicated circuit common connected to grounded chassis).

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

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

WARNING

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

1–1 DESCRIPTION

1–2 The Hewlett-Packard Model 8011A is a 20 MHz pulse source that can be externally and manually triggered. Ease of operation is ensured by logically arranged and clearly identified controls.

1–3 Pulse amplitudes up to 16V and selectable output format ensure compatibility with most logic families powered from either positive or negative supplies, and using either positive or negative logic conventions. Pulse width is continuously variable from 25ns to 100ms, or can be 50% of pulse period by selecting square wave mode.

1–4 Variable pulse width or square wave operation with up to 16V amplitude and the ability to produce positive, negative or symmetrical pulses in positive or negative logic make the instrument suitable for driving TTL, DTL, RTL, HTL and CMOS as well as discrete logic and linear circuits.

1–5 Serviceability is enhanced by using high quality components, and stable circuits reduce calibration adjustments to a minimum.

1–6 PULSE BURST OPTION 001

1–7 Thumbwheel switches on the front panel permit any number of pulses between 1 and 9999 to be preset. A "burst" starts on receipt of an electrical or manual trigger and ceases when the set number of pulses has been generated.

Table 1–1. Specifications

PULSE CHARACTERISTICS
(50 ohm source and load impedances)

Transition times: < 10ns fixed.

Overshoot, ringing and preshoot: < ± 5% of pulse amplitude. May increase to 10% at counter-clockwise positions of amplitude vernier.

Pulse width: 25ns to 100ms in four ranges. Vernier provides continuous adjustment within each range.

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

Maximum duty cycle: > 50% (100% using pulse complement).

Maximum output: 16V, with internal 50 ohms and external high impedance load or, with internal high impedance and external 50Ω. 8V with 50Ω source and load impedances.

Attenuator: three step attenuator provides the ranges 0.25V – 1V – 4V –16V. Vernier provides continuous adjustment within each range.

Source impedance: 0.25V – 1V – 4V ranges, 50 ohms ± 10% shunted by 30pF. 4V–16V range, 50 ohms ± 10% or high impedance switch selectable.

Polarity: positive, negative or symmetrical switch selectable.

Format: normal or complement switch selectable.

REPETITION RATE AND TRIGGER

Repetition rate: 0.1 Hz to 20 MHz.

Period Jitter: < 0.1% + 50ps for any period setting.

Square wave: 0.05 Hz to 10 MHz.

Trigger output: dc coupled 50 ohm (typ) source delivering ≥ +1V across 50 ohm load.

Trigger pulse width: 20ns ± 10ns.

EXTERNALLY CONTROLLED OPERATION

External Input

Input impedance: 50 ohms ± 10%

Maximum input: ± 5V

Trigger polarity: positive.

Table 1–1. Specifications (cont'd)

Sensitivity: 1V

Manual: front panel pushbutton for generating single pulse.

External Triggering

Repetition rate: 0 to 20 MHz. In square wave, output frequency is half input frequency.

Trigger source: manual or external signal. Min external signal width, 10ns.

Burst mode (optional): preselected number of pulses generated on receipt of trigger.

Burst trigger source: external signal or manual. Min external signal width, 25ns.

GENERAL

Operating temperature: 0°C to 55°C

Power: 100V, 120V, 220V or 240V, +5%, −10%. 48 Hz to 440 Hz, 70 VA max.

Weight: net 4 kg (9 lbs), shipping 6.5 kg (14.6 lbs).

Dimensions: 200mm wide, 142mm high, 300mm deep (7.9 in. x 5.6 in. x 11.8 in.).

Figure 2–1. 8011A and Delivered Accessories

2–1 GENERAL

2–2 Initial Inspection

2–3 Inspect the instrument and accessories for physical damage and if damage is evident refer to paragraph 2–14 for the recommended claim procedure and repacking information.

2–4 The 8011A is supplied with the following items:

Description	HP Part Number
300mA fuse (for 220/240V operation	2110–0044
600mA fuse (for 110/120V operation)	2110–0016
Power Cord (one of those shown in figure 2–2).	

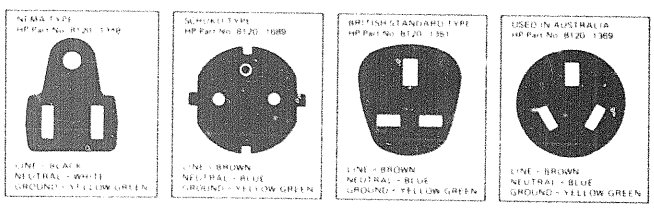


Figure 2–2. Power Cords

2–5 INSTALLATION

CAUTION

Before applying power to the instrument, check that the 8011A is set in accordance with local supply conditions. To gain access to the voltage selector switches and fuse holder remove cover adjacent to the LINE switch.

2–6 Power Source Requirements

2–7 The model 8011A will operate from nominal ac line supplies of 100V, 120V, 220V, or 240V (–10%, +5%) at 48 Hz to 440 Hz. Two internally mounted switches allow one of the four voltages to be selected.

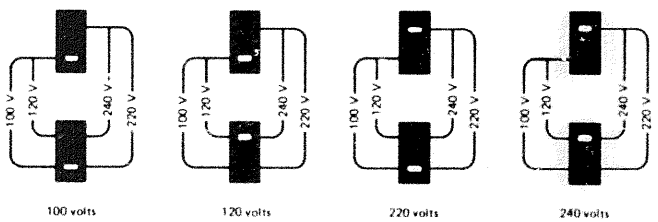


Figure 2–3. Switch Settings for the Various Nominal Powerline Voltages. The power dissipation is 70VA maximum.

2–8 To check the power requirements proceed as follows:

Disconnect the power cable.

Remove the fuse and check its value:
for 230V operation 300mA
for 115V operation 600mA

Check that the line selector switch position corresponds to the local supply voltage. If they do not correspond use a screwdriver to change the switch positions.

Insert the correct fuse into the fuse-holder.

Connect the power cable to the rear connector.

2–9 Power Cord

2–10 The 3-wire power cable supplied with the 8011A 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.

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

Minimum current rating of 1A.
Ground connection
Cable clamp

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

2–12 Temperature Requirements

2–13 The model 8011A operates within specifications when the ambient temperature is between 0°C (32°F) and 55°C (131°F). The pulse generator may be stored between –40°C (–40°F) and 75°C (167°F).

2–14 CLAIMS AND REPACKAGING

2–15 Claims for Damage

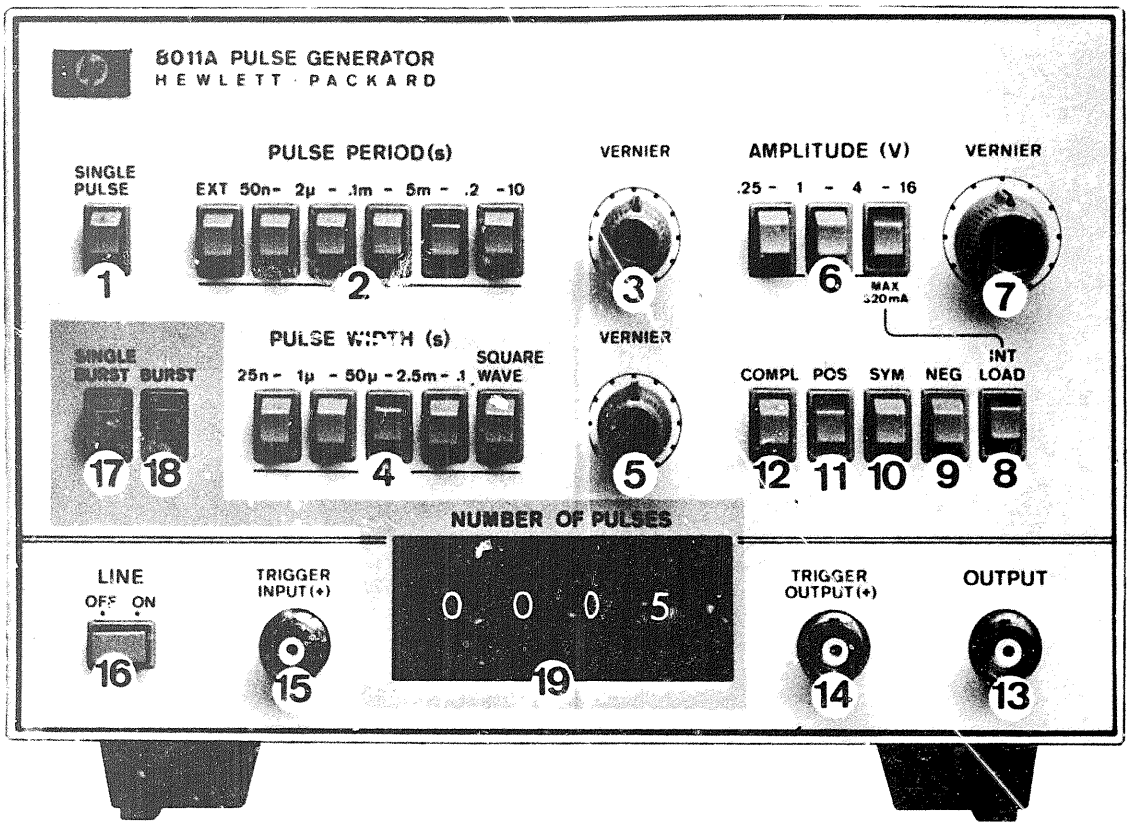
2–16 If physical damage is evident or if the instrument does not meet specifications when received, notify the carrier and the nearest Hewlett-Packard Sales/Service Office. The Sales/Service Office will arrange for repair or replacement of the unit without waiting for settlement of the claim against the carrier.

2–17 Repackaging for Shipment and Storage

2–18 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 may be re-usable but the Hewlett-Packard Sales/Service Office will also provide information and recommendations on materials to be used if the original packing is not available or re-usable.

2–19 RACK MOUNTING

2–20 To rack mount model 8011A, order model 15179A Adapter for rackmounting 2 units



1 SINGLE PULSE: push-button for manually generating a single pulse in the EXTernal and Burst modes.

2 PULSE PERIOD: mutually exclusive push-buttons for selecting the range of pulse rate in the internal mode of operation. When EXT is selected rate controls are disabled.

3 Rate VERNIER: for continuous adjustment of the repetition rate between the limits of the range selected. Clockwise rotation increases the pulse period (i.e. reduces the rate).

4 PULSE WIDTH: mutually exclusive push-buttons for selecting pulse width range.

5 Pulse Width VERNIER: for continuous adjustment of pulse width between the limits of the range selected (is inoperative in SQUARE WAVE).

6 AMPLITUDE: mutually-exclusive push-buttons for selecting amplitude range. Note that, in the 4–16 Volt range the maximum current available is 320mA (from a current source) and in the other ranges the source impedance is 50Ω.

7 Amplitude VERNIER: for continuous adjustment of the amplitude between the limits of the range selected .

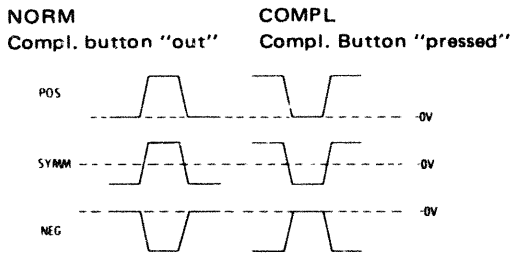
8 INT LOAD: push-button switch for connecting (pressed) and disconnecting (released) the 50Ω internal load in the 4–16 Volt range. In the other ranges the 50Ω load is always connected.

9 NEG: push-button for selecting negative polarity output.

10 SYM: push-button for selecting an output which is symmetrical about zero volt.

11 POS: push-button for selecting positive polarity output.

12 COMPL: push-button for selecting the pulse complement of the set pulse.



13 *OUTPUT*: BNC connector, 50Ω source (or, on 4–16 Volt range, current source if INT LOAD is released).

14 TRIGGER OUTPUT (+): BNC connector, positive trigger pulses from internal rate generator.

15 TRIGGER INPUT (+): BNC connector, to which external input signal is applied in EXTernal mode and Burst mode. Maximum input signal +5V.

16 LINE ON–OFF: press-for-on-press-for-off switch.

OPTION 001

17 SINGLE BURST: push-button for initiating a pulse burst.

18 BURST: push-button switch for selecting pulse burst mode.

19 NUMBER OF PULSES: thumbwheel switches on which the required number of pulses in a burst is set.

Figure 3–1. Controls and Connectors

3–1 GENERAL

3–2 The following instructions apply to model 8011A–Option 001. For the standard model, the instructions 3–7 and 3–8 for burst operation should be ignored.

3–3 MODES OF OPERATION

3–4 Internal

In this mode the 8011A requires no external signal to produce an output. Figure 3–2 shows the control which are effective in this mode.

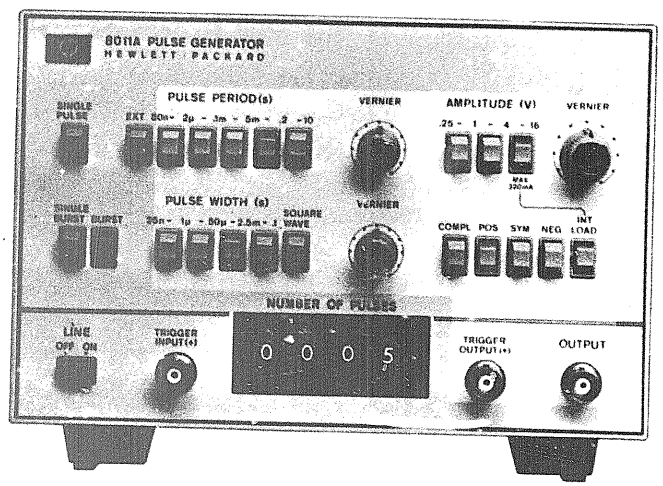


Figure 3–2. 8011A Internal Mode

3–5 External

3–6 In EXT 2 mode the repetition rate generator is externally triggered by a signal applied to the TRIGGER INPUT 15 or manually by means of the SINGLE PULSE push button 1 . Figure 3–3 shows the controls which are effective in this mode.

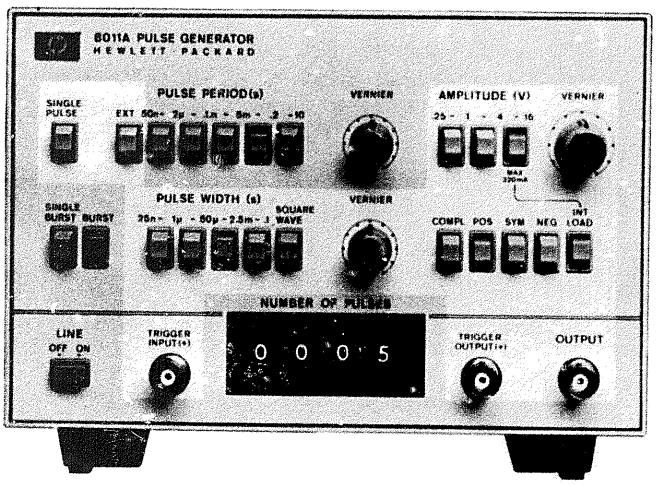
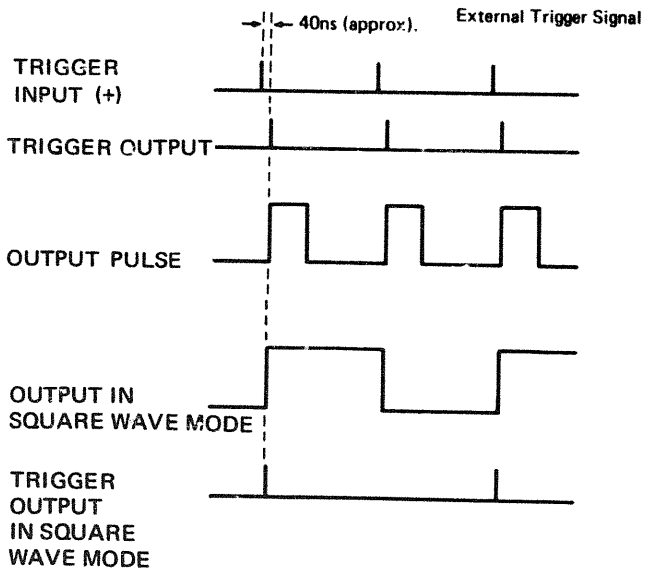


Figure 3–3. 8011A External Mode

Figure 3–4 illustrates the timing sequence between the trigger input and trigger and pulse outputs. Note that in SQUARE WAVE the trigger output frequency is half that of the external input.



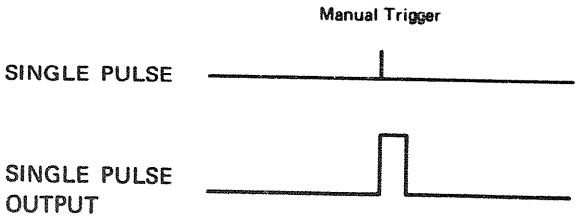


Figure 3–4. External Triggering Timing Sequence

3–7 Burst Mode

3–8 To operate the generator in BURST Mode press the BURST push-button **18** , set the required NUMBER OF PULSES on the thumbwheel switches **19** and set the pulse parameters (rate, width, etc) on the front panel. A burst is started by pressing the SINGLE BURST button **17** or by applying a signal to the TRIGGER INPUT **15** . At the end of a burst, single pulses can be added by pressing the SINGLE PULSE button. Figure 3–5 shows the controls which are effective in this mode and figure 3–6 illustrates examples or repetitive and single burst output.

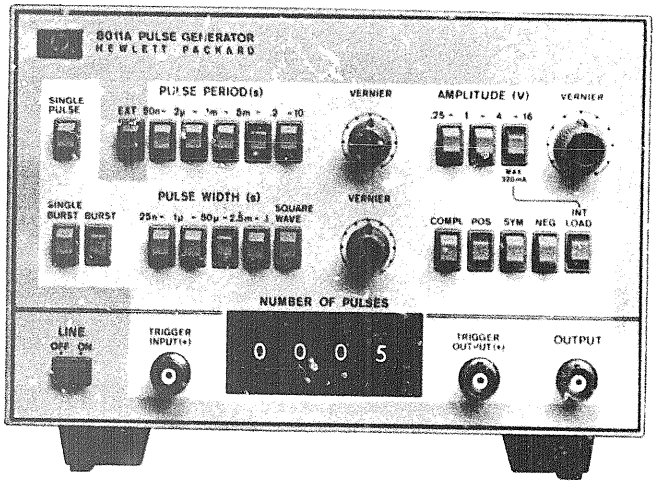


Figure 3–5. 8011A Burst Mode

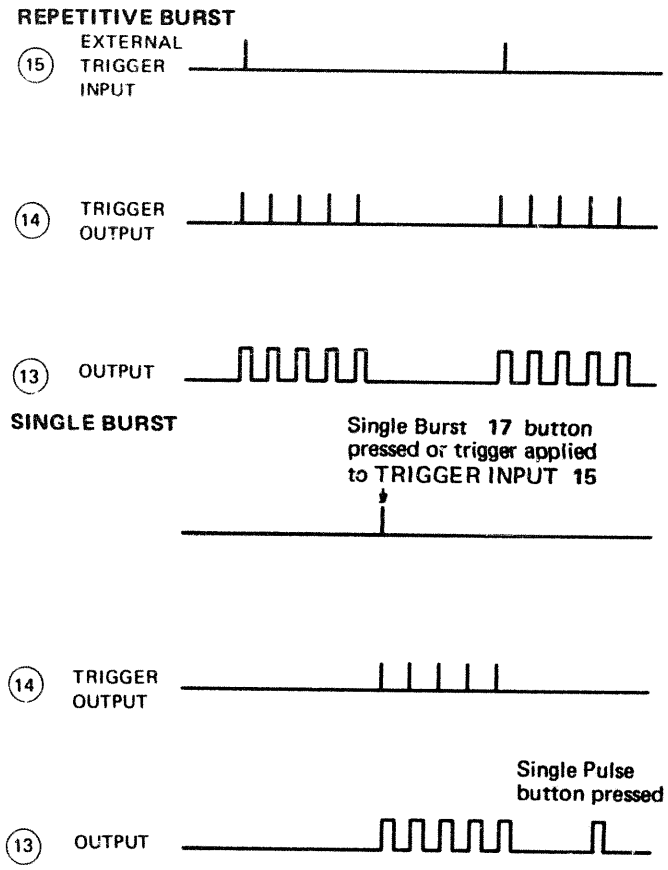


Figure 3–6. Examples of Repetetive and Single Burst Output.

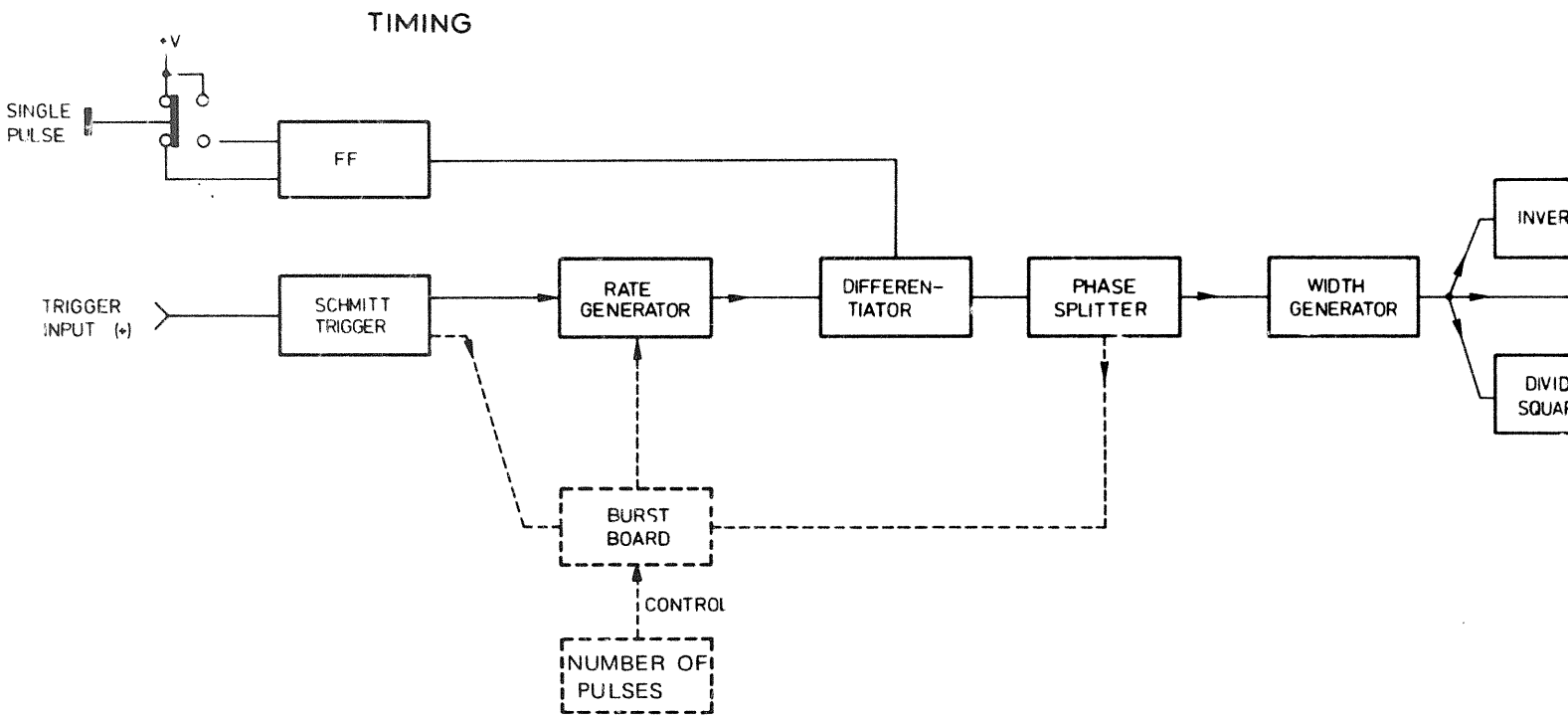
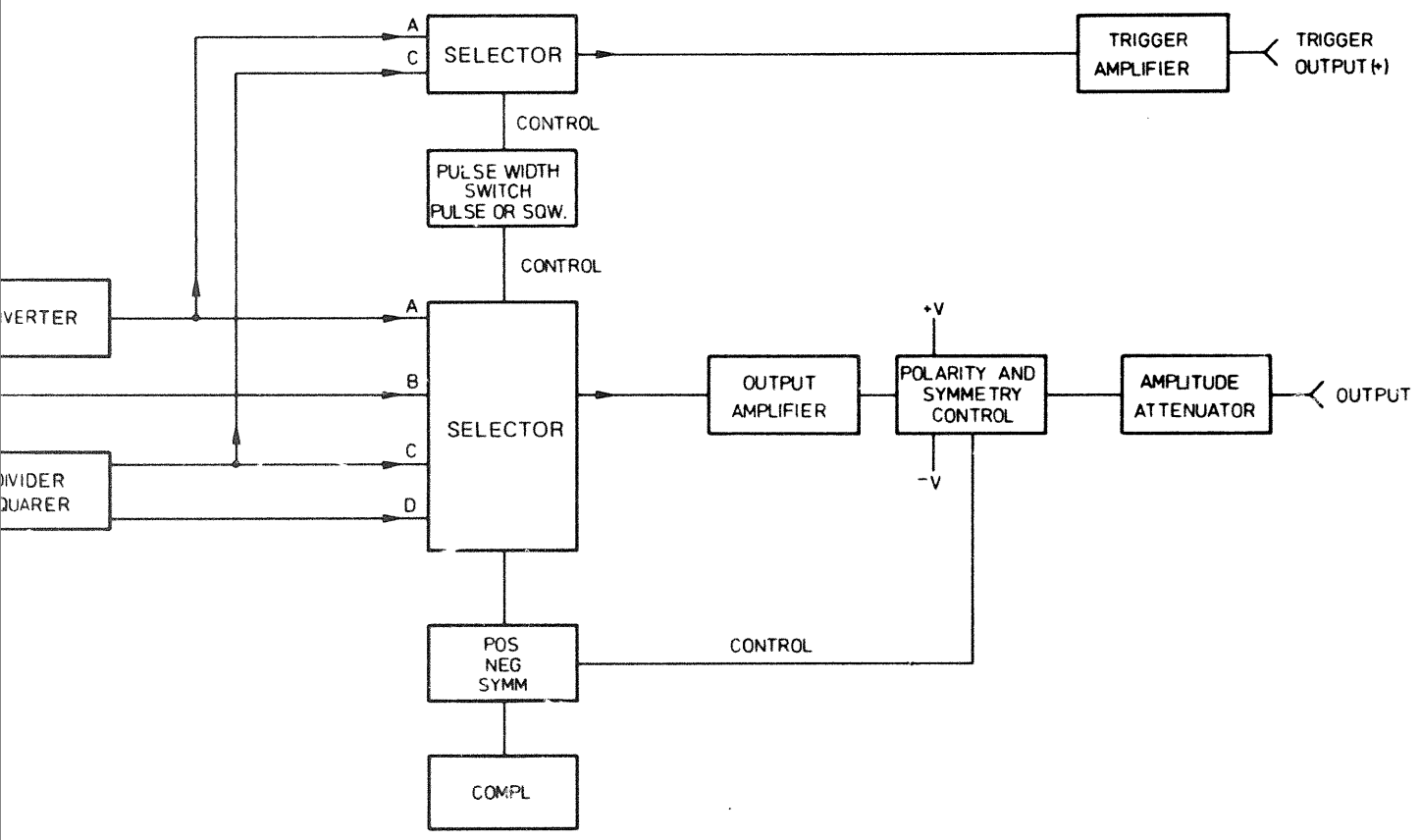


Figure 4–1. 8011A Block Diagram

PULSE SHAPING



4–1 INTRODUCTION (figure 4–1)

4–2 In normal mode operation, the rate generator is free-running at a rate determined by the PULSE PERIOD controls. In the external mode the disabled rate generator is turned on and off by the signal applied to the TRIGGER INPUT connector. The pulse generator can also be manually triggered by means of the SINGLE PULSE button which gives stimulus to the pulse shaping circuits via a flip-flop. When the 8011A has the Burst Option (001) the rate generator can be turned on by an external signal and turned off after a predetermined number of pulses have been generated.

4–3 In all modes of operation the pulse shaping circuits define the width (or square wave) and whether the normal or complement of the signal is to be used to drive the output stages. The conditioned signals (A,B,C and D) are selected by a series of OR gates. Symmetry and polarity control and baseline correction take place in the output stage.

4–4 The trigger amplifier is driven by either signal A, which is the rate signal via an inverter in pulse width mode, or by signal C, which is the Q output from the divider squarer flip-flop in square wave mode.

4–5 RATE GENERATOR (Figure 4–2 and Diagram 1)

4–6 In the internal mode of operation the rate generator is free running and produces spikes at a rate determined by a multivibrator under the control of the PULSE PERIOD switch and RATE vernier. Under no-signal conditions in EXT mode, the rate generator is disabled. The pulse rate is then dependent on the frequency of the input signal which turns the multivibrator on and off.

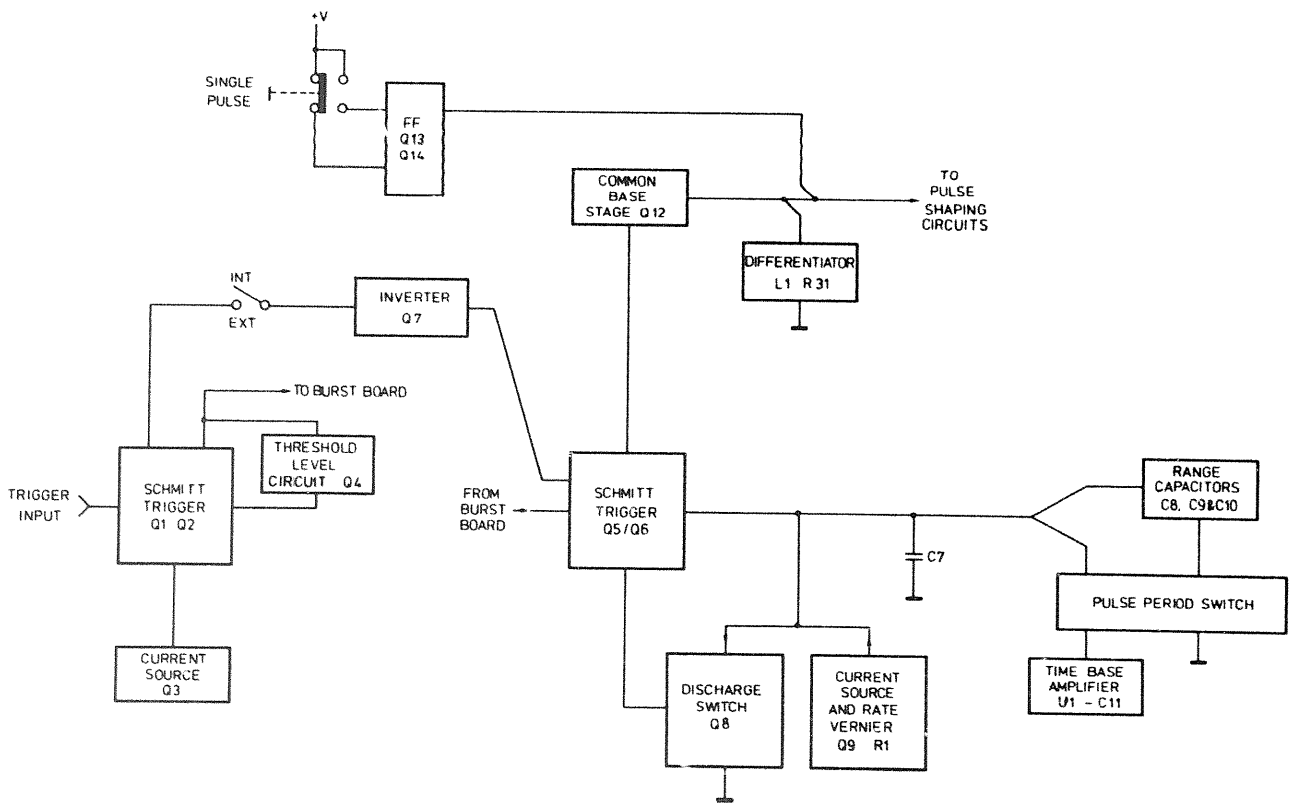


Figure 4–2. Repetition Rate Generator

4–7 The rate generator is a Schmitt trigger (Q5 and Q6) which switches when the voltage output of a ramp generator (Q9, vernier R1 and one or more of the range capacitors C7 to C10) reaches its threshold level. When switched it activates a switch (Q8) which rapidly discharges the ramp capacitor(s), causing the voltage to fall and reset the Schmitt trigger. This turns the switch off and the cycle repeats. Each time Q5 is turned off, a positive spike appears at differentiator (L1R31).

4–8 In the slowest rep rate range the available ramp current is reduced in order to prolong the charge cycle. That is, the capacitance of C10 is effectively increased during the charge cycle by "bleeding-off" the ramp current and thus increasing the time taken to charge the capacitor. For this purpose, a time base amplifier (U1) is connected in parallel with C10. This results in a division and reduction of the ramp current by an amount proportional to that drawn by the amplifier.

4–9 When the 0.2s – 10s range switch is closed, the voltage across the ramp capacitors C7 and C10 is amplified by a linear amplifier (U1 – A). The resulting signal, which is differentiated by C11, activates an operational amplifier (U1 – B) in order to equalize the IR drop across R29 with R30.

4–10 During the discharge cycle, the operational amplifier is disabled by the forward biased diode CR26 and the ramp capacitors are rapidly discharged.

4–11 The external input circuit comprises a Schmitt trigger (Q1 and Q2) a current source (Q3) and an inverter (Q7). Q4 maintains a constant voltage at the base of Q2 in spite of the changes in the supply caused by format selection. Refer to paragraph 4–27 for information concerning the power supplies.

4–12 The leading edge of a positive signal applied to the TRIGGER INPUT turns Q1 on, Q7 on and Q5 off. Each time Q5 is turned off, a positive spike appears at the differentiator (L1/R31).

4–13 When the EXT mode is selected, the Schmitt trigger (Q5/Q6) is disabled. Each time the SINGLE PULSE push button is depressed, a flip-flop (Q13/Q14) rapidly turns on and then off. Each time the flip-flop is turned on, a positive spike appears at the differentiator (L1/R31).

4–14 In all modes of operation, the phase splitter (Q15/Q16) is turned on and off by the positive spikes applied to the base of Q15. When on, it produces a positive pulse to drive the width circuit and a negative pulse which is applied to the burst counter (when fitted).

4–15 WIDTH GENERATOR (Figure 4–3 and Diagram 2)

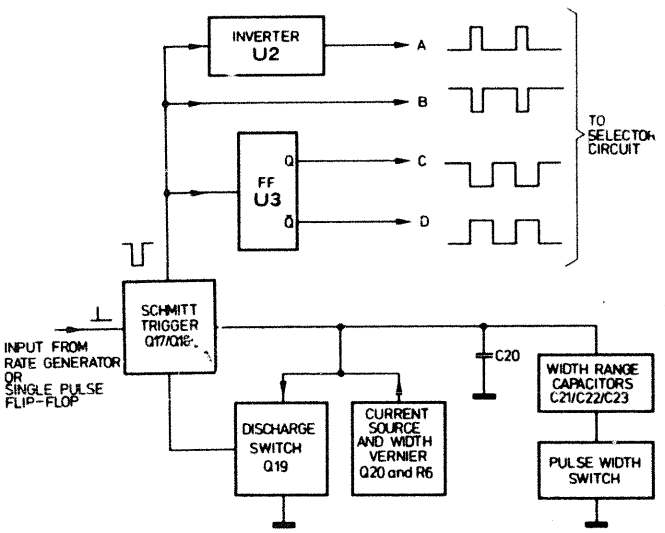


Figure 4–3. Width Generator

4–16 In the normal mode, the pulse leading edge occurs when Q17 turns on and Q18 off. The pulse width is determined by the time taken for the selected range capacitor (C20 and C21 or C22 or C23), charged from the variable current source (Q20/vernier R2), to reach the threshold level of the Schmitt trigger. The pulse trailing edge is created when the Schmitt trigger switches and turns on the discharge switch (Q19).

4–17 In selecting SQUARE WAVE, the width vernier (R2) is shorted and the narrowest pulse width range is automatically selected. This is in order to deliver a pulse of constant width to a divider-squarrer flip-flop which generates the square wave.

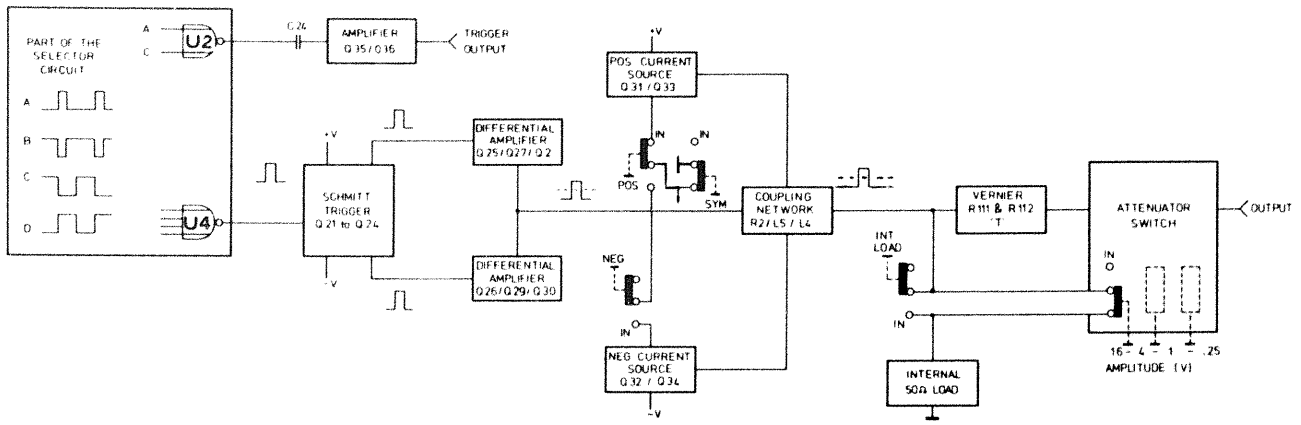


Figure 4–4. Output Stages

4–18 The Schmitt trigger output is applied directly (signal B) and via an inverter (U2 – signal A) and via the divider squarer (signals C and D) to an array of gates which select the required output as follows:

	Output Format	Mode	
		Pulse	Square Wave
Normal	Positive	B	D
	Symmetrical	B	D
	Negative	A	C
Complement	Positive	A	C
	Symmetrical	A	C
	Negative	B	D

4–19 OUTPUT STAGES (Figure 4–4 and Diagrams 2 and 3)

4–20 Trigger Output Stage (Q35, Q36)

4–21 This is an ac-coupled cascode amplifier which produces a positive output pulse for each input pulse.

4–22 Pulse Output Stage

4–23 The function of the pulse output stage is to amplify the selected input signal, to supply the voltages for base line and polarity selection and attenuate the signal voltage to the required output level. The 50Ω internal load is always connected in the lower ranges but may be switched out in the 4–16 Volt range.

4–24 When POS output is selected, a positive current source (Q31, Q34) drives the output amplifier output above zero volts. For NEG outputs, a negative current source is enabled. Both current sources are disabled when SYMMetrical outputs are selected. The potentiometers R81 and R84 are used for positive (R81) and negative (R84) base line calibration.

4–25 Attenuator

4–26 The output attenuator comprises two resistive networks which provide stepped attenuation of the output. A bridged-T vernier provides continuous overlapping adjustment between the settings of the output attenuator. The internal 50Ω-load can be disconnected in the 4–16 Volt range when the INT LOAD button is released.

4–27 POWER SUPPLY (Figure 4–5 and Diagram 4)

4–28 The positive and negative power supplies are identical monolithic voltage regulators (U5 and U6) with external PNP pass transistors (Q37 and Q38). The nominal output voltage with respect to the isolated PC board returns is ± 14V. The voltage levels with respect to zero volts, however, are dependent on the polarity and format switches:

POS switch closed +22.3V/–5.7V
NEG switch closed –22.3V/+5.7V
SYMM switch closed ± 14V.

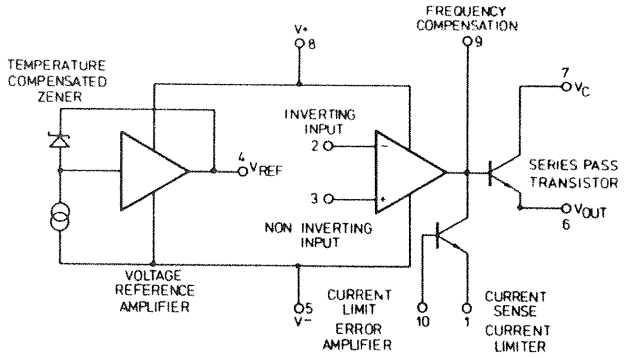


Figure 4–5. Voltage Regulator

4–29 A portion of the output voltage developed across the potential divider (R127, R129) is applied to an error amplifier which compares this with an internally developed reference voltage. If the difference between these voltages varies, the amplifier varies the base voltage of a series pass transistor which regulates the flow through Q37. Current limiting is accomplished by sensing the voltage drop across R123 by means of a current limiting device.

4–30 8011A Option 001 – Pulse Burst (Figure 4–6 and Diagram 5)

4–31 The Burst Control essentially consists of a counter which is loaded with numbers from front panel thumbwheel switches. When a burst is started, pulses from the rate generator decrement the counter until it is empty. This condition (all zeroes) is detected and generates a BURST COMPLETE signal which disables the rate generator.

4–32 The following description, in conjunction with figure 4–6, divides the burst operation into four successive stages:

1. Loading the Burst Counter
2. Start Burst
3. Zero Detection
4. Burst Complete

4–33 Loading the Burst Counter

4–34 When BURST mode is selected, the BURST ENABLE line goes high (0V) and 'clears' U19 (via Q7, C6, U13, U12), setting the Q output low. A low on this output then enables data to be loaded from the thumbwheel switches into the counter.

As data is being loaded, a comparator (U1, U2, U7 and U8) checks for equivalence between the counter inputs and outputs. When equivalence is detected, input pin 11 of U12d goes high, and the LOAD line (from output pin 13 of U12d) goes low thus preventing further loading of the counter.

4–35 Throughout this load process, the high on the $\overline{Q}$ output of U19 disables the repetition rate generator (via AND gate CR11, CR12 and OR gate Q2, Q3), and therefore prevents the counter from counting.

4–36 Start Burst

4–37 When the START BURST signal is received, U19 is 'preset' (via NAND gate Q5, Q6) causing the Q and $\overline{Q}$ outputs to change state. The low on the $\overline{Q}$ output starts the repetition rate generator, and the counter begins to count down from the preset number. The high on the Q output of U19 ensures that the LOAD line remains disabled, thus preventing a re-load of the counter (e.g. by thumbwheel switch change) before the end of the burst.

4–38 Zero Detection

4–39 Throughout the count-down process, all outputs of the counter are monitored by two 'zero detect' configurations, one consisting of U9 and U11, and the other consisting of U9 and CR2→CR10. The significance of the two configurations is explained in the following Burst Complete description.

4–40 Burst Complete

4–41 When the counter reaches the 'all zero' condition, the fast 'zero detect' circuit (U9, CR2 → CR10) generates a BURST COMPLETE signal, which disables the repetition rate generator via OR gate Q2, Q3. This fast zero detection is achieved by using a 'hot carrier' diode for CR10, which monitors the final zero state, C1, of the counter. Fast detection then ensures that the repetition rate generator is switched off after the correct number of pulses have been output.

4–42 The other 'zero detect' circuit (U9, U11) clears U19, setting the Q output low again, and thus allowing the counter to be loaded once more from the thumbwheel switches.

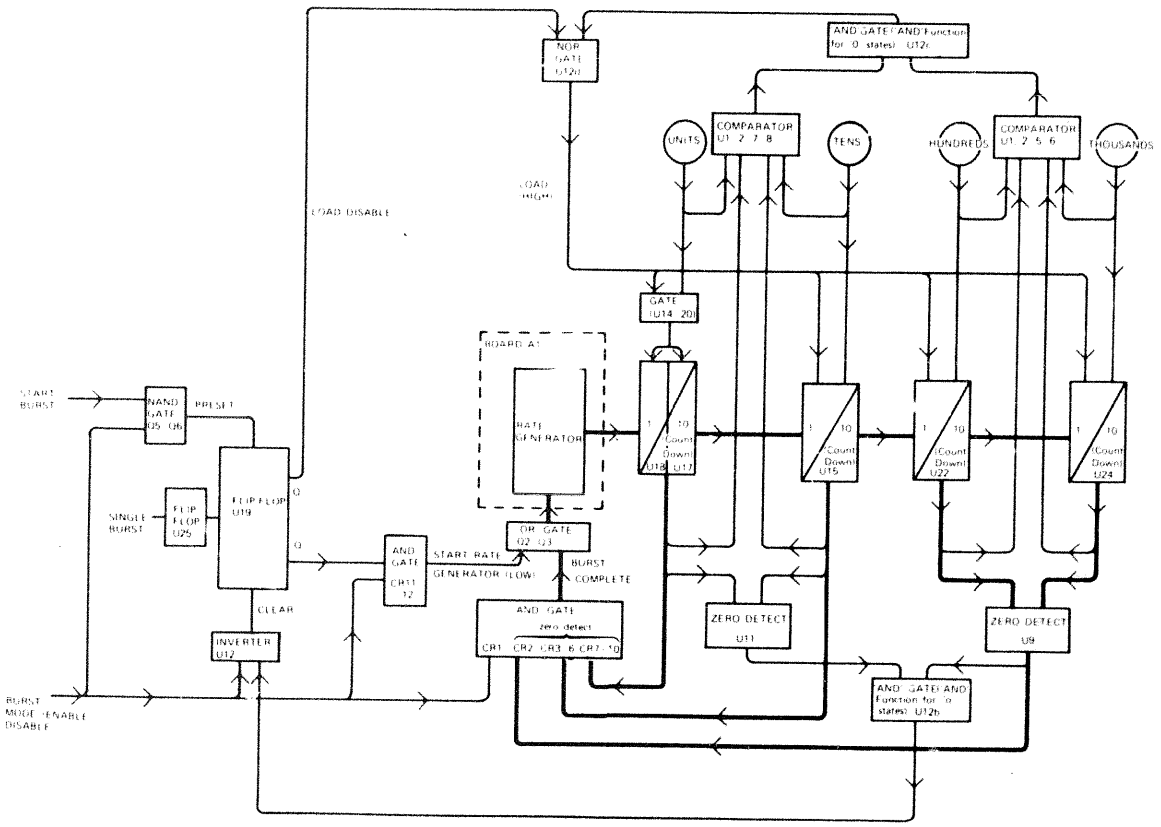


Figure 4–6. Pulse Burst Control

SECTION 5

MAINTENANCE

5–1 INTRODUCTION

5–2 The Model 8011A contains reliable components mounted on gold plated PC boards. These are subjected to a series of tests and calibration procedures which ensure accuracy and long life. In addition, maintenance and servicing is made easy by a non-complicated design and a simple "all on one board" construction.

5–3 Preventive Maintenance

5–4 The inherent reliability and accuracy of the pulse generator can be maintained by periodic cleaning and mechanical inspections. To gain access to the interior of the instrument remove the two panel covers. These are removed by releasing the four screws in the respective cover and sliding it away from the side of the instrument.

5–5 Remove dust from the interior and check that all fittings, connectors and boards are firmly in place. Check that the wiring and cables – especially those of power supply and line voltage – are in good condition. Ensure correct function of the controls by checking that the switch push rods and vernier knobs are able to move freely.

5–6 SERVICING

5–7 The following service information is only for servicing down to component level. When servicing the 8011A, if a fault cannot be localised within two hours, the complete instrument should be sent to the nearest repair centre.

NOTE: There is no board-exchange program for the 8011A.

5–8 Removal of Assemblies

5–9 The PC board should only be removed in extreme circumstances e.g. burnt board.

If necessary, however, the board can be removed as follows:

1. Remove AMPLITUDE vernier knob.
2. Remove the four screws that fix the rear panel to the frame.
3. Unsolder the TRIGGER IN cable, the TRIGGER OUT cable and the OUTPUT cable.
4. Unsolder WIDTH and RATE vernier cables.
5. Pull the 'rear panel/board' assembly out of the frame.
6. Unsolder transformer wires, power switch cables and power lamp cables.
7. Remove the two heat-sink screws from the rear panel.

5–10 Performance Checks and Adjustment Procedures

5–11 After completion of a repair or periodic inspection, verify that the instrument is working to specification by carrying out the performance checks (Table 5–2 to 5–17). Rigid observance to the sequence in which the checks appear is unnecessary. Table 5–18 and 5–19 give the procedures for checking and adjusting the power supplies and pulse base line.

5–12 Troubleshooting

5–13 When a fault symptom is evident, try to locate the fault to a functional block using figure 4–1. Then use table 5–21, the first page of which will indicate the direction in which troubleshooting is to proceed. The most convenient test point for the waveforms and voltages presented in the table can be located on figure 5–1.

Table 5–1. Test Equipment and Accessories Required

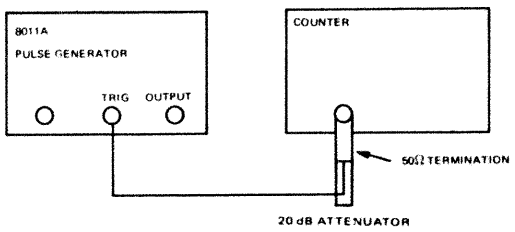
INSTRUMENT	BRIEF SPECIFICATION	RECOMMENDED MODEL
Oscilloscope	Dual Channel, 50 MHz bandwidth, sweep speeds 0.1μs/div. to 2 s/div. with sweep delay, 10mV/div. to 10 V/div. sensitivity.	HP 180C with plug-ins 1801A and 1821A
Sampling Oscilloscope	Dual Channel, 1 GHz bandwidth, 10mV/div. to 0.2 V/div. sensitivity, sweep speeds 1ns/div. to 10ms/div.	HP 180C with plug-ins 1810A
Counter	Frequency Range 0 to > 20 MHz	HP 5245L
VHF Test Oscillator	Frequency Range > 20 MHz	HP 3200B
Test Oscillator	Frequeny Range 10 Hz to 10 MHz	HP 651B
Pulse Source	Frequency Range up to 20 MHz	HP 8011A
Digital Voltmeter	Sensitivity 0.1 V to 100 V	HP 34740A with plug-on HP 34702A
AC Voltmeter	Sensitivity 0.1 mV to 100mV	HP 3400A

ACCESSORIES	RECOMMENDED MODEL
50 Ω cable assy 23 cm long with BNC male connectors	HP 10502A
50 Ω cable assy 122 cm long with BNC male connectors (4 required)	HP 10503A
Test leads for DVM-dual banana plug to probe and clip	HP 11003A
20 dB 20 W power attenuator	HP 8491A
Connector BNC male to type N female	HP 1250-0077
Connector type N male to BNC male	HP 1250-0780
Tee connector, BNC	HP 1250-0781
50 Ω feed-through termination (2 required)	HP 11048C
50 Ω adder/splitter	HP 15104A

Table 5–2. Performance Check – Repetition Rate

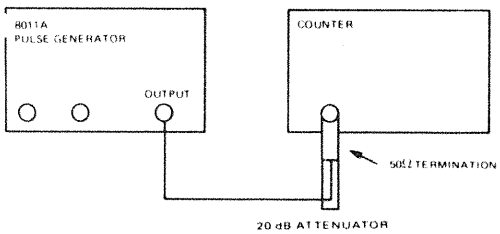
INITIAL CONTROL SETTINGS

PULSE PERIOD 2	50n – 2μ
VERNIER 3	CCW
PULSE WIDTH 4	25n – 1μ
VERNIER 5	CCW
AMPLITUDE 6	4 – 16
VERNIER 7	CW
POLARITY 11	POS
INT LOAD 8	ON



STEP	INSTRUCTION		RESULT
1	Check the repetition rate for each setting of the controls listed below.		
	PULSE PERIOD 2	VERNIER 3	
	50n – 2μ	CCW	>20MHz
		CW	<500kHz
	2μ – 0.1m	CCW	>500kHz
		CW	<10kHz
	0.1m – 5m	CCW	>10kHz
		CW	<200Hz
2	For the following ranges set the counter for period measurement:		
	5m – 0.2	CCW	<5ms
		CW	>200ms
	0.2 – 10	CCW	<200ms
		CW	>10s.

Table 5–3. Performance Check – Manual Trigger

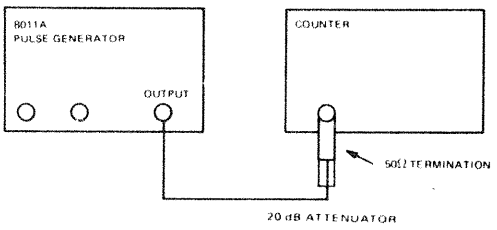


INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	EXT
VERNIER **3**	
PULSE WIDTH **4**	25n – 1μ
VERNIER **5**	CCW
AMPLITUDE **6**	4 – 16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	ON

STEP	INSTRUCTION	RESULT
1	Set the counter for manual start.	
2	Press the SINGLE PULSE button once only:	1 pulse

Table 5–4. Performance Check – Square Wave



INITIAL CONTROL SETTINGS

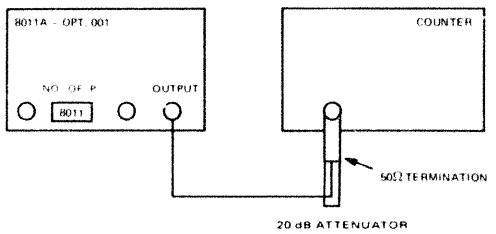
PULSE PERIOD **2**	50n – 2μ
VERNIER **3**	CCW
PULSE WIDTH **4**	SQUARE WAVE
VERNIER **5**	–
AMPLITUDE **6**	4 – 16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	ON

STEP	INSTRUCTION	RESULTS
1	Set the counter function to measure frequency.	
2	Check the square wave pulse for each control setting listed below:	
	PULSE PERIOD **2**	
	50n – 2μ	> 10 MHz
	2μ – 0.1m	> 250 kHz
	0.1m – 5m	> 5 kHz
3	Set counter function to period average	
	5m – 0.2	< 10ms
	0.2 – 10	< 400ms

Table 5–5. Performance Check – Single Burst (8011A – Opt. 001)

INITIAL CONTROL SETTINGS

PULSE PERIOD 2	50n – 2μ
VERNIER 3	CCW
PULSE WIDTH 4	25n – 1μ
VERNIER 5	CCW
AMPLITUDE 6	4 – 16
VERNIER 7	CW
POLARITY 11	POS
INT LOAD 8	ON
BURST MODES	ON
NUMBER OF PULSES 19	8011

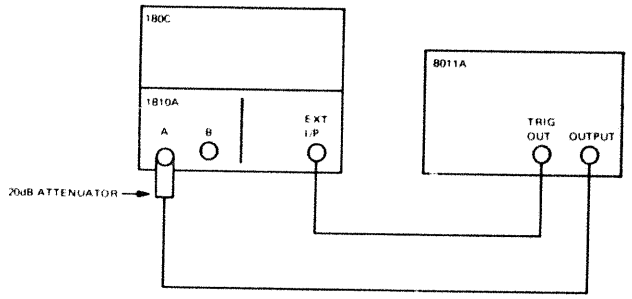


STEP	INSTRUCTIONS	RESULTS
1	Press SINGLE BURST button:	8011 pulses

Table 5–6. Performance Check – Pulse Width

INITIAL CONTROL SETTINGS

PULSE PERIOD 2	50n – 2μ
VERNIER 3	CCW
PULSE WIDTH 4	25n – 1μ
VERNIER 5	CCW
AMPLITUDE 6	4 – 16
VERNIER 7	CW
POLARITY 11	POS
INT LOAD 8	ON

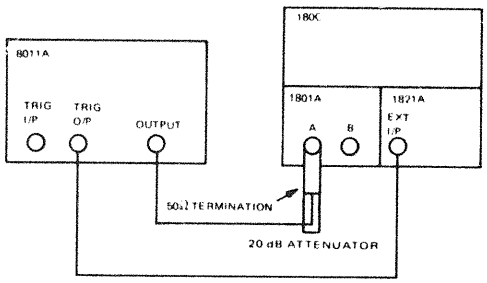


STEP	INSTRUCTION				RESULTS
1	Check the pulse width for each of the control settings listed below.				
	PULSE PERIOD 2	VERNIER 3	PULSE WIDTH 4	VERNIER 5	
	50n – 2μ	CCW	25n – 1μ	CCW	< 25ns
	2μ – .1m	CCW	1μ – 50μ	CCW	< 1μ
	.1m – 5m	CCW	50μ – 2.5m	CCW	< 50μ
	5m – .2	CCW CW	2.5m –.1	CCW CW	< 2.5m > .1s

CAUTION

Output power when 4–16 V range selected can destroy scope's internal 50 ohm load. Use a 20 dB power attenuator.

Table 5–7. Performance Check – Duty Cycle

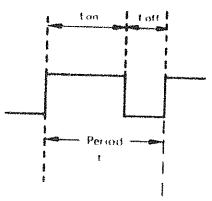


INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	50n–2μ
VERNIER **3**	CW
PULSE WIDTH **4**	1μ – 5μ
VERNIER **5**	CCW
AMPLITUDE **6**	4 – 16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	ON

STEP	INSTRUCTIONS	RESULTS
1	By means of the pulse width VERNIER **5**. Set the pulse leading edge on the first line of the oscilioscope screen and the trailing edge on the centre line (5 cm).	
2	Turn the pulse period VERNIER **3** slowly CCW until the trailing edge moves and/or the pulse is divided.	
3	Measure the distance between the both pulse leading edges for each setting of the controls listed below:	

PULSE PERIOD **2**	PULSE WIDTH **4**	VERNIER **5**	Divisions
50n – 2μ	1μ – 50μ	as in	< 10 = > 50%
2μ – 0.1m	50μ – 2.5m	step 1	< 10 = > 50%
0.1m – 5m	2.5m – 0.1		< 10 = > 50%

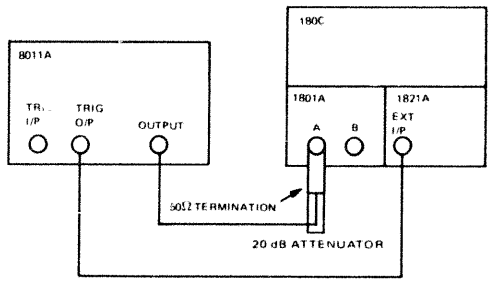


Duty cycle formula is $\frac{t_{on} \times 100}{t \text{ (period)}}$ % = % Duty Cycle

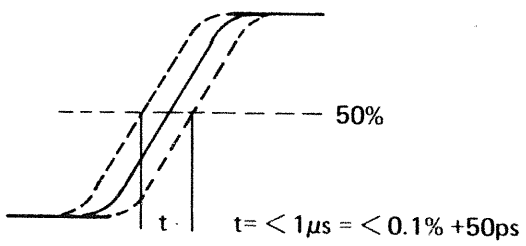
Table 5–8. Performance Check – Pulse Period Jitter

INITIAL CONTROL SETTINGS

PULSE PERIOD	2	0.1m – 5m
VERNIER	3	see below
PULSE WIDTH	4	50μ – 2.5m
VERNIER	5	CCW
AMPLITUDE	6	4 – 16
VERNIER	7	CW
POLARITY	11	POS
INT LOAD	8	



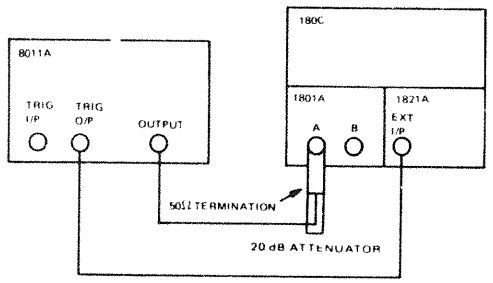
STEP	INSTRUCTIONS	RESULTS
1	Main Sweep .1ms/div Delayed Sweep 10μs/div Sweep Display MAIN Magnifier X 1	
2	Adjust the pulse period VERNIER (**3**) to obtain a 1ms pulse period.	
3	Adjust the oscilloscope delay (div.) until the intensified Spot coincides with the leading edge of the second pulse on the display.	
4	Switch to Delayed sweep display on oscilloscope and Magnifier X 10	
5	Measure pulse period jitter t.	



CAUTION

Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

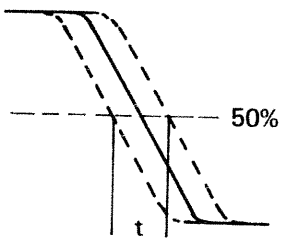
Table 5–9. Performance Check – Pulse Width Jitter



INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	0.1m – 5m
VERNIER **3**	CW
PULSE WIDTH **4**	50μ – 2.5m
VERNIER **5**	CCW
AMPLITUDE **6**	4 – 16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	ON

STEP	INSTRUCTIONS	RESULTS
1	Set the controls of the oscilloscope as follows Main Sweep .1ms/cm Delayed Sweep 10μs/cm Sweep Display MAIN Magnifier X 1	
2	Adjust the pulse width vernier to obtain a 1ms pulse width.	
3	Adjust the Delay (Div.) until the intensified spot coincides with the trailing edge of the first pulse	
4	Switch to Delayed sweep display on oscilloscope and Magnifier X 10	
5	Measure width jitter t	



t = < 1μ = < 0.1% +50ps

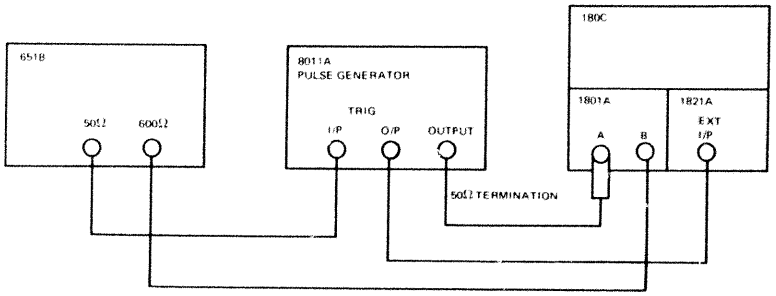
CAUTION

Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

Table 5–10. Performance Check – External Trigger

INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	EXT
VERNIER **3**	CW
PULSE WIDTH **4**	50μ – 2.5m
VERNIER **5**	mid-position
AMPLITUDE **6**	1 – 4
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	ON



STEP	INSTRUCTIONS
1	Adjust the oscillator output amplitude to 2.0Vpp and frequency to 1 kHz.
2	On the oscilloscope, center both channels vertically.
3	Observe pulse, ensure that pulse occurs during positive slope of the input sine wave.

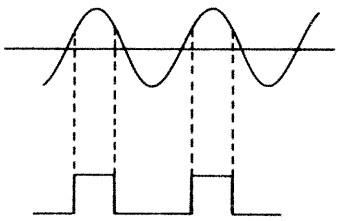
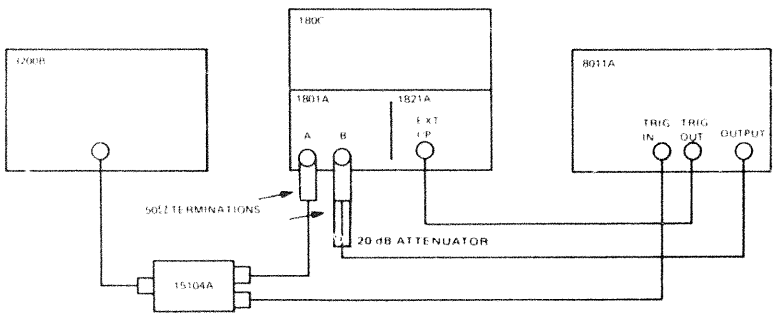


Table 5–11. Performance Check – High Frequency Triggering



INITIAL CONTROL SETTINGS

PULSE PERIOD	2	EXT
VERNIER	3	–
PULSE WIDTH	4	25n – 1μ
VERNIER	5	CCW
AMPLITUDE	6	4 – 16
VERNIER	7	CW
POLARITY	11	POS
INT LOAD	8	ON

STEP	INSTRUCTIONS
1	Adjust the oscillator output amplitude for 2.0Vpp at 8011A TRIG IN. Set Frequency to 20 MHz. (NOTE: Peturbation delay of typically 50ns)
2	Check that the 8011A output pulse has the same pulse period as the external signal.
3	Set the 8011A to NEG and repeat steps 2 and 3. Set the 8011A to SYMM and repeat steps 2 and 3.

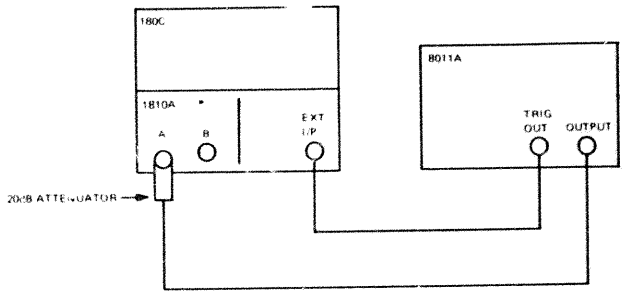
CAUTION

Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

Table 5–12. Performance Check – Minimum Width

INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	50n – 2μ
VERNIER **3**	MIDDLE
PULSE WIDTH **4**	25n – 1μ
VERNIER **5**	CCW
AMPLITUDE **6**	4 – 16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	–

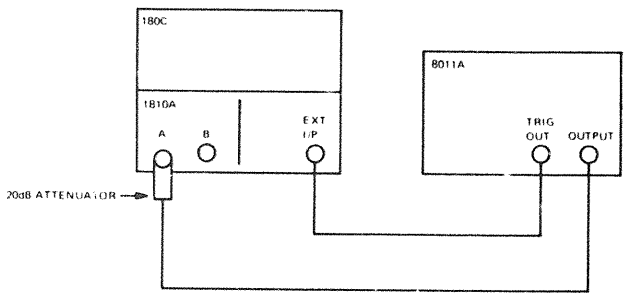


STEP	INSTRUCTIONS	RESULTS
1	Set the oscilloscope to obtain a full-screen pulse amplitude display.	
2	Measure pulse width at 50% of amplitude	< 25ns
3	Set 8011A controls to NEG and repeat steps 2 and 3	< 25ns

CAUTION

Output power when 4–16 V range selected can destroy scope's internal 50 ohm load. Use a 20 dB power attenuator.

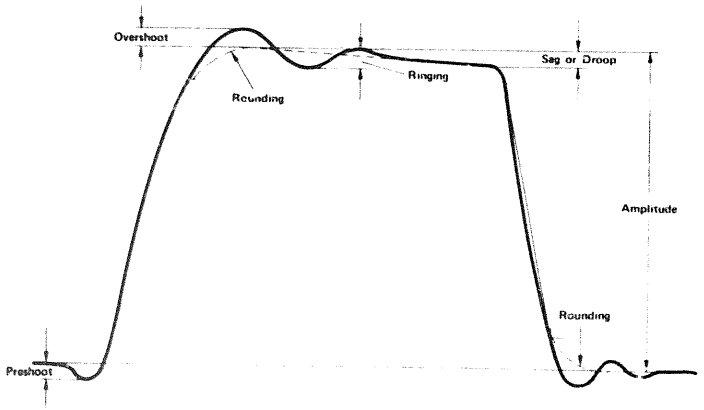
Table 5–13. Performance Check – Preshoot, Overshoot and Ringing



INITIAL CONTROL SETTINGS

PULSE PERIOD	50n – 2μ
VERNIER	CCW
PULSE WIDTH	SQR WAVE
VERNIER	–
AMPLITUDE	4 – 16
VERNIER	CW
POLARITY	POS
INT LOAD	ON

STEP	INSTRUCTIONS	RESULTS
1	Set the oscilloscpe to obtain a full-screen amplitude display.	
2	With reference to the diagram below, measure preshoot, overshoot and ringing. All should be	⩽ 5% of pulse* amplitude



*Overshoot may increase to 10% with Amplitude vernier CCW.

3	Set INT LOAD to OFF. Verify preshoot, overshoot and ringing.	⩽ 10 % of pulse amplitude

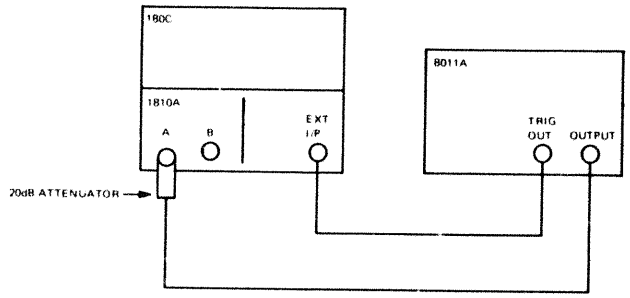
CAUTION

Output power when 4–16 V range selected can destroy scope's internal 50 ohm load. Use a 20 dB power attenuator.

Table 5–14. Performance Check – Transition Times

INITIAL CONTROL SETTINGS

PULSE PERIOD 2	50n – 2μ
VERNIER 3	CCW
PULSE WIDTH 4	SQR WAVE
VERNIER 5	–
AMPLITUDE 6	4–16
VERNIER 7	ADJUST FOR 16V
POLARITY 11	POS
INT LOAD 8	OFF

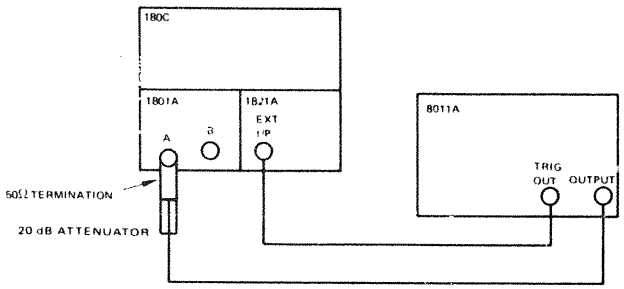


STEP	INSTRUCTIONS	RESULTS
1	Set the oscilloscope to obtain the following: (1) full screen amplitude display (2) expanded sweep (3) leading edge of pulse at centre of screen	
2	Measure leading edge between 10% and 90% of amplitude	< 10ns
3	Centralize trailing edge on screen	
4	Measure trailing edge betwen 10% and 90% of amplitude.	< 10ns

CAUTION

Output power when 4–16 V range selected can destroy scope's internal 50 ohm load. Use a 20 dB power attenuator.

Table 5–15. Performance Check – Output Amplitude



INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	50n – 2μ
VERNIER **3**	MIDDLE
PULSE WIDTH **4**	SQR WAVE
VERNIER **5**	–
AMPLITUDE **6**	4–16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	OFF

STEP	INSTRUCTIONS		RESULTS
1	Check the amplitude for each setting of the controls listed below		
	AMPLITUDE **6**	VERNIER **7**	
	4 – 16	CW (with INT. LOAD OFF)	> 16V
		CW (with INT. LOAD ON)	> 8V
		CCW	< 4V
	1 – 4	CW	> 4V
		CCW	< 1V
	0.25 – 1	CW	> 1V
		CCW	< 0.25V

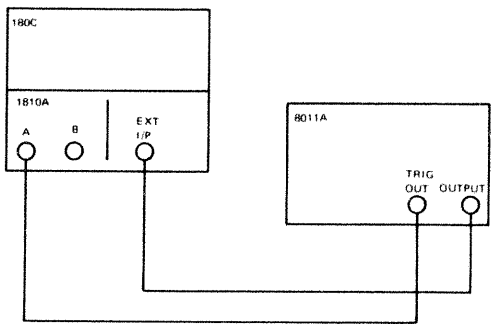
CAUTION

Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

Table 5–16. Performance Check – Trigger Output

INITIAL CONTROL SETTINGS

PULSE PERIOD 2	50n – 2μ
VERNIER 3	CCW
PULSE WIDTH 4	25n – 1μ
VERNIER 5	CCW
AMPLITUDE 6	0.25 – 1
VERNIER 7	CW
POLARITY 11	POS
INT LOAD 8	ON



STEP	INSTRUCTIONS	RESULTS
1	Check trigger output (1) Amplitude: (2) Width:	⩾1V >10ns<30 ns
2	Turn 8011A pulse period vernier slowly clockwise and check that trigger output is as above	
3	Set the 8011A to SQR WAVE and repeat step 2.	

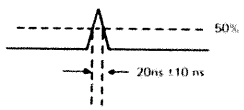
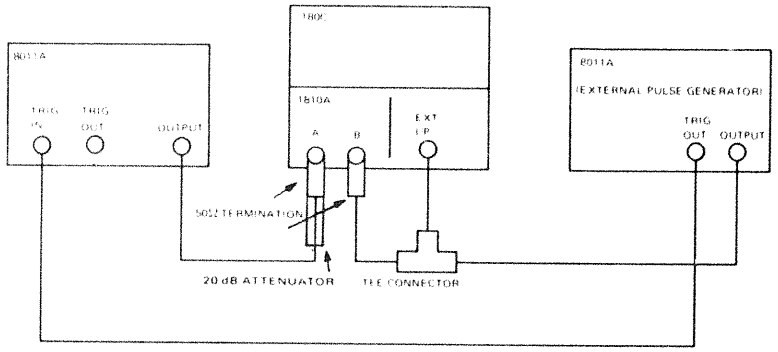
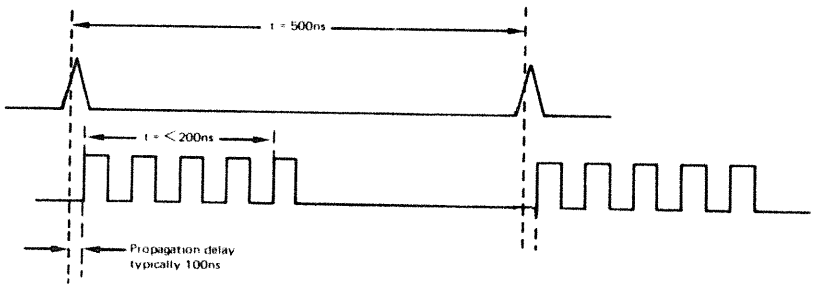


Table 5–17. Performance Check – Repetitive Burst (8011A – Opt. 001)



INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	50n – 2μ
VERNIER **3**	CCW
PULSE WIDTH **4**	25n – 1μ
VERNIER **5**	CCW
AMPLITUDE **6**	4 – 16
VERNIER **7**	CW
POLARITY **11**	POS
INT LOAD **8**	ON
NUMBER OF PULSES	5
BURST MODE	OFF

STEP	INSTRUCTIONS	RESULTS
1	Set rep. rate of external signal to 2 MHz:	
2	Select BURST MODE and observe pulses on the oscilloscope	

CAUTION

Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

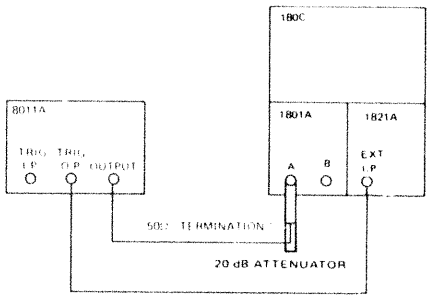
Table 5–18. Adjustment Procedure: Power Supplies

INITIAL CONTROL SETTINGS

PULSE PERIOD **2**	EXT
VERNIER **3**	CW
PULSE WIDTH **4**	1μ – 50μ
VERNIER **5**	CCW
AMPLITUDE **6**	1 – 4
VERNIER **7**	CW
POLARITY **11**	SYMM
INT LOAD **8**	ON
BURST MODE (if fitted)	OFF

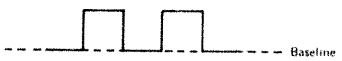
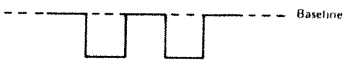
STEP	INSTRUCTIONS	ADJUST	RESULTS
1	The following measurement are with respect to zero volts using a digital voltmeter.		
2	Measure voltage at the +14V test point	A1R125	+14V ± 100mV
3	Measure voltage at the –14V test point	A1R128	–14V ± 100mV
4	If the Burst option (001) is fitted measure voltage at the +5V test pin on assembly 1		+5V ± 200mV
5	The following measurements are with respect to zero volts using an AC voltmeter.		
6	Measure the ripple on the following supplies		
	+14V		<1mV rms
	–14V		<1mV rms
	+5V		<1mV rms

Table 5–19. Adjustment Procedure – Base Line



INITIAL CONTROL SETTINGS

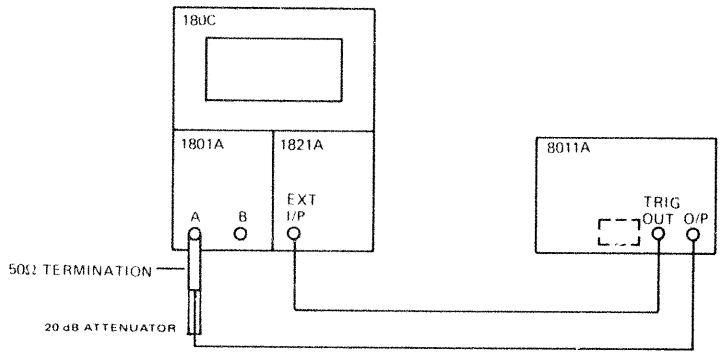
PULSE PERIOD	2	EXT
VERNIER	3	–
PULSE WIDTH	4	1μ – 50μ
VERNIER	5	CCW
AMPLITUDE	6	4 – 16
VERNIER	7	CW
POLARITY	11	POS
INT LOAD	8	OFF

STEP	INSTRUCTIONS	
1	With the oscilloscope set to Ground, center the trace on the graticule.	
2	Switch to DC operation and check that the pulse base remains center of the graticule.	
3	If necessary, adjust R81 accordingly.	
4	Select NEG on the 8011A.	
5	Repeat step 2.	
6	If necessary, adjust R84 accordingly.	

CAUTION

Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

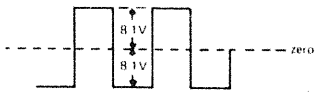
Table 5–20. Adjustment Procedure-Amplitude



INITIAL CONTROL SETTINGS

PULSE PERIOD **2**		2μ–0.1m
VERNIER **3**		CCW
PULSE WIDTH **4**	SQ	SQUARE WAVE
AMPLITUDE **6**		4–16
VERNIER **7**		CW
POLARITY **11**		SYM
INT LOAD **8**		OFF

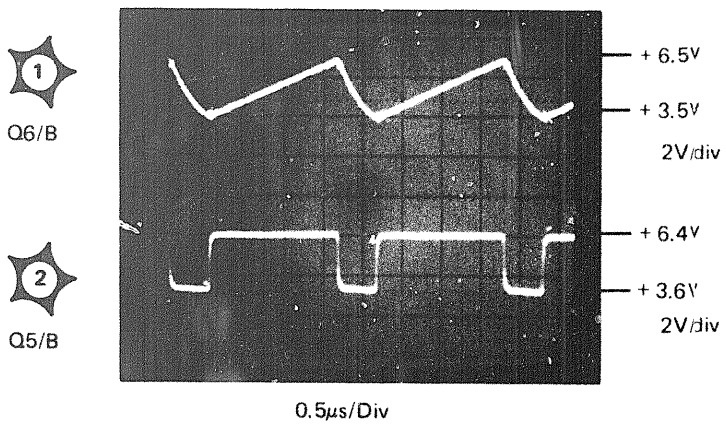
STEP	INSTRUCTIONS
1	With the oscilloscope set to ground, center the trace on the graticule.
2	Adjust A1R131 for a positive amplitude of 8.1 V
3	Adjust A1R133 for a negative amplitude of 8.1 V
4	Re-check Base Line Table 5–19

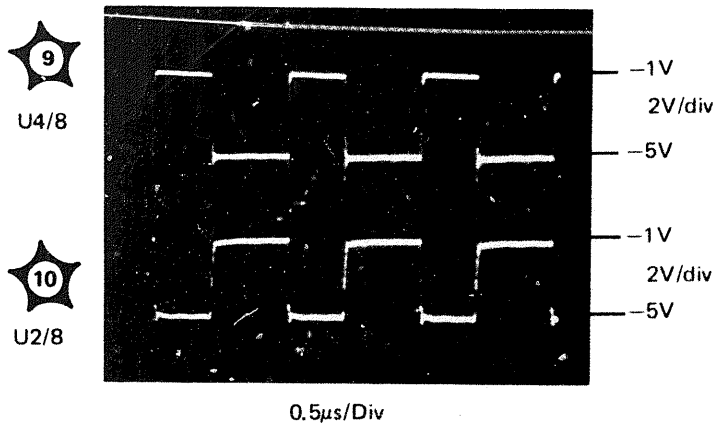


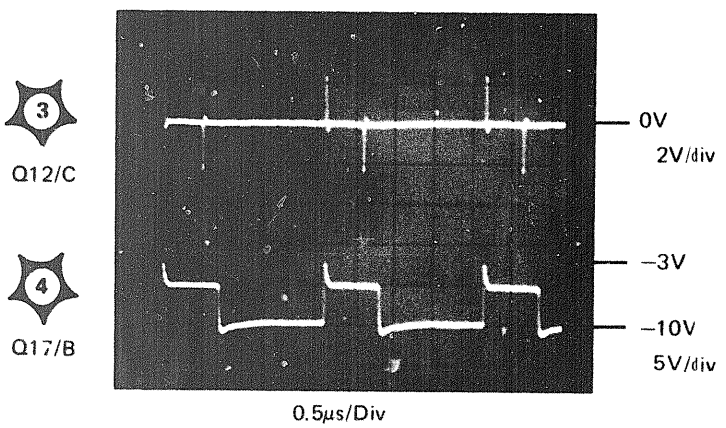
CAUTION

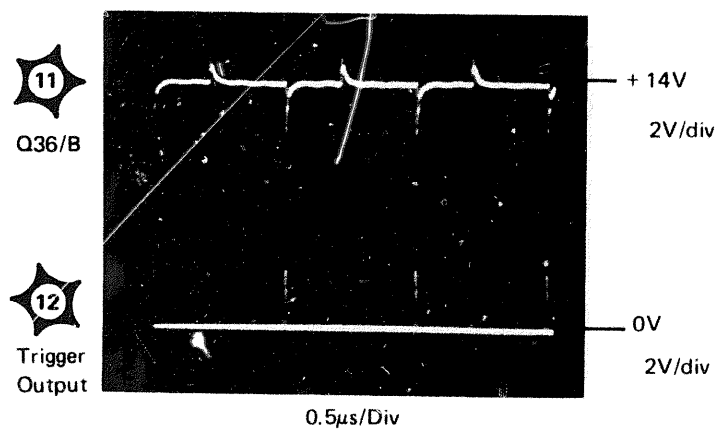
Output power when 4–16 V range selected can destroy an ordinary 50 ohm load. Use a 20 dB power attenuator or a 50 ohm power termination.

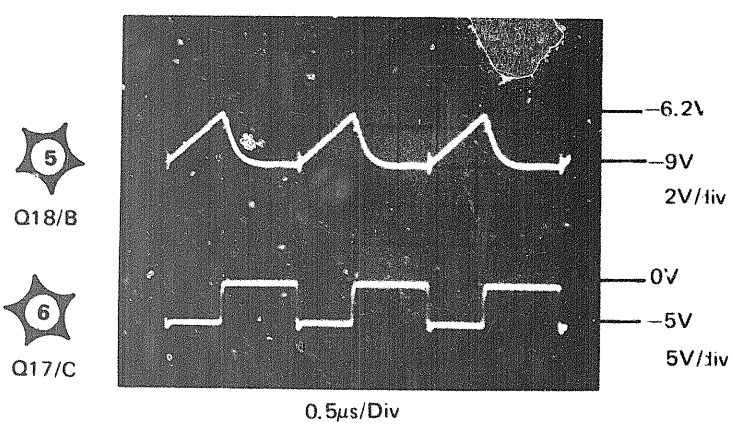
Figure 5–1. Assembly 1, Assembly 2 – Troubleshooting Aid

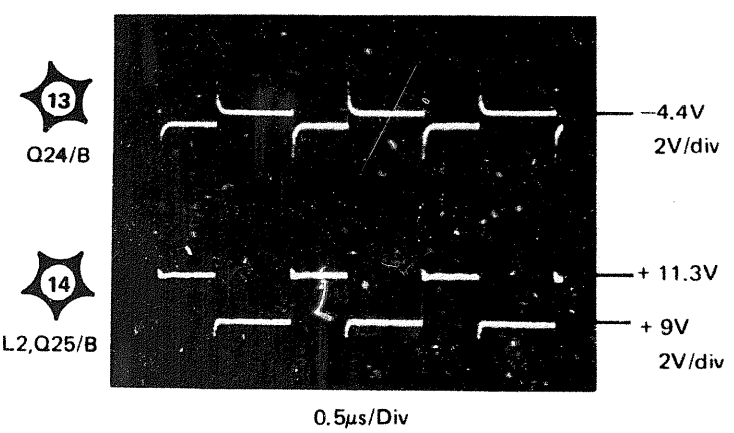


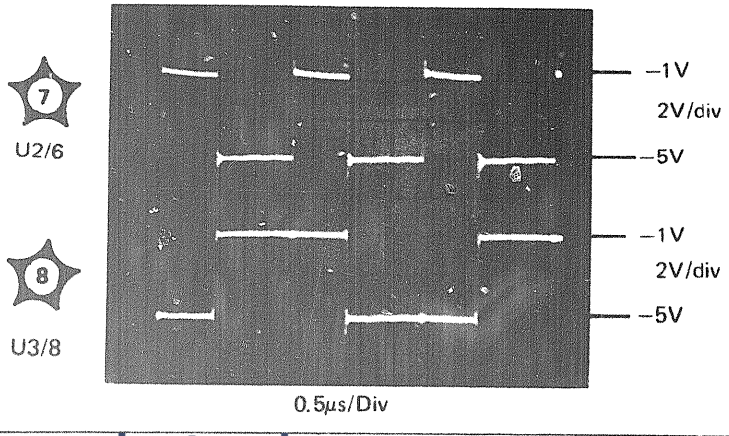


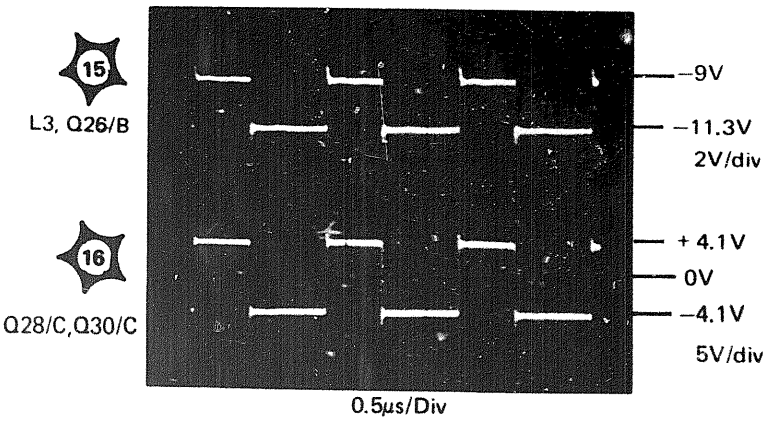


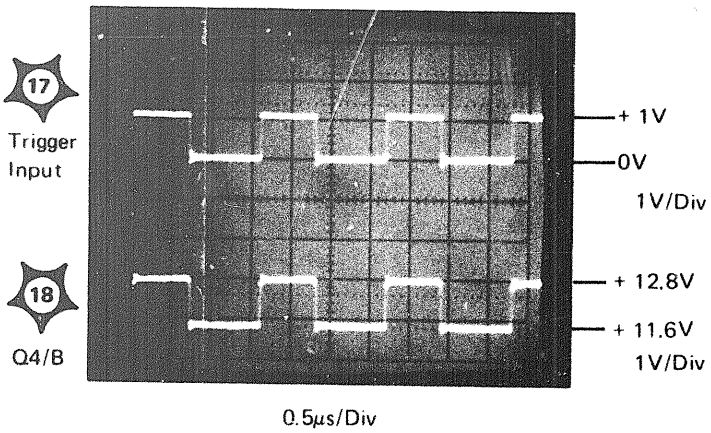






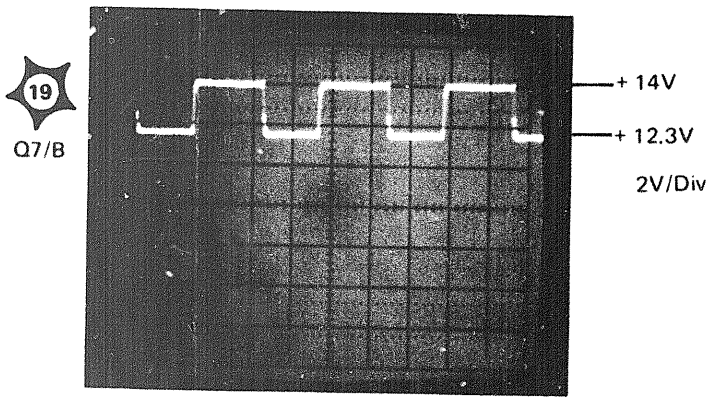




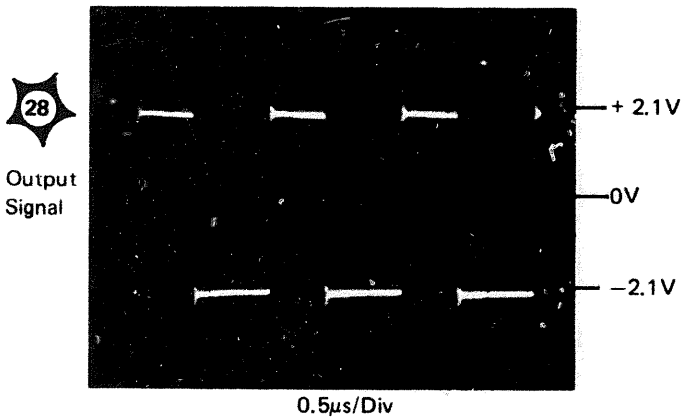


0.5μs/Div

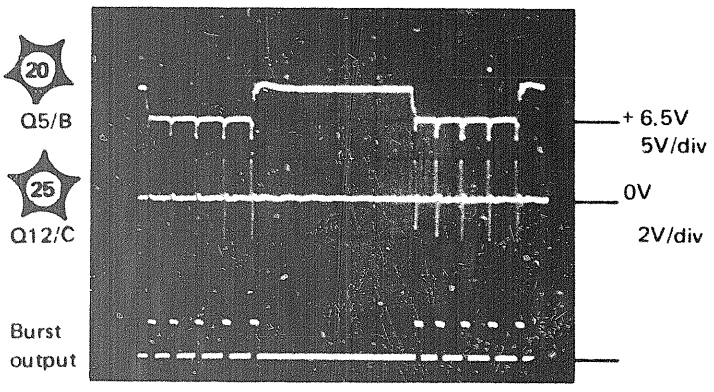
20ms/Div



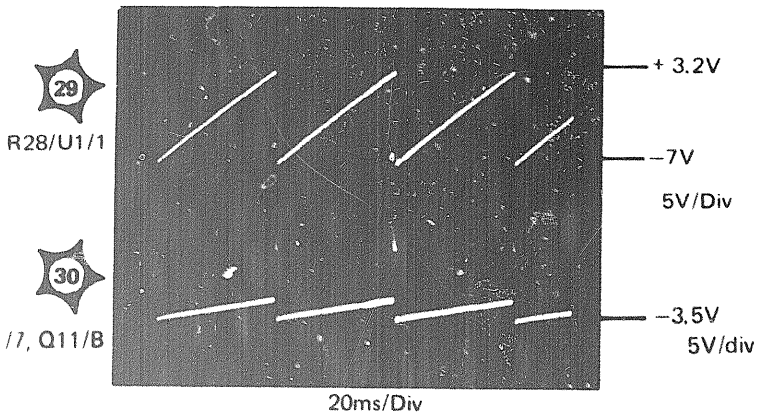
0.5μs/Div



0.5μs/Div

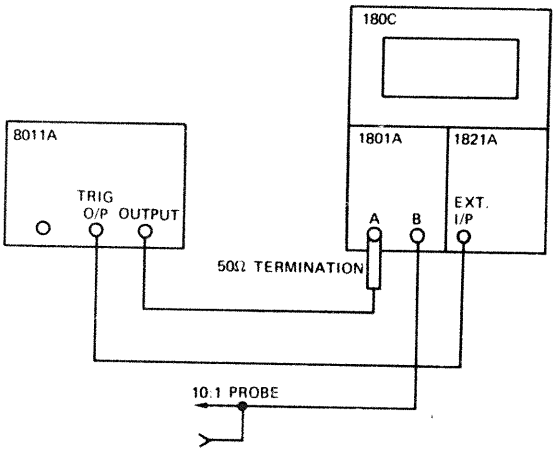


0.5μs/Div



20ms/Div

Table 5–21. Troubleshooting Procedures



INITIAL CONTROL SETTINGS

PULSE PERIOD	50n – 2μ
VERNIER	Mid-range
PULSE WIDTH	25n – 1μ
VERNIER	Mid-range
AMPLITUDE	1 – 4
VERNIER	CW
SYMM	ON
COMPL	OFF

STEP INSTRUCTIONS

1. Set the oscilloscope as follows:
   EXT TRIGGER
   0.5μs/Div

2. Start the troubleshooting procedure by checking all functions

3. For Burst troubleshooting see page 6–23

4. For checking the EXT Function apply a Pulse Generator with the same settings and 1V Amplitude

5. The illustrated waveforms and voltages can be readily located by refering to Figure 5–1.

   Note: All voltages are referenced to floating ground.

Table 5–21. cont'd.

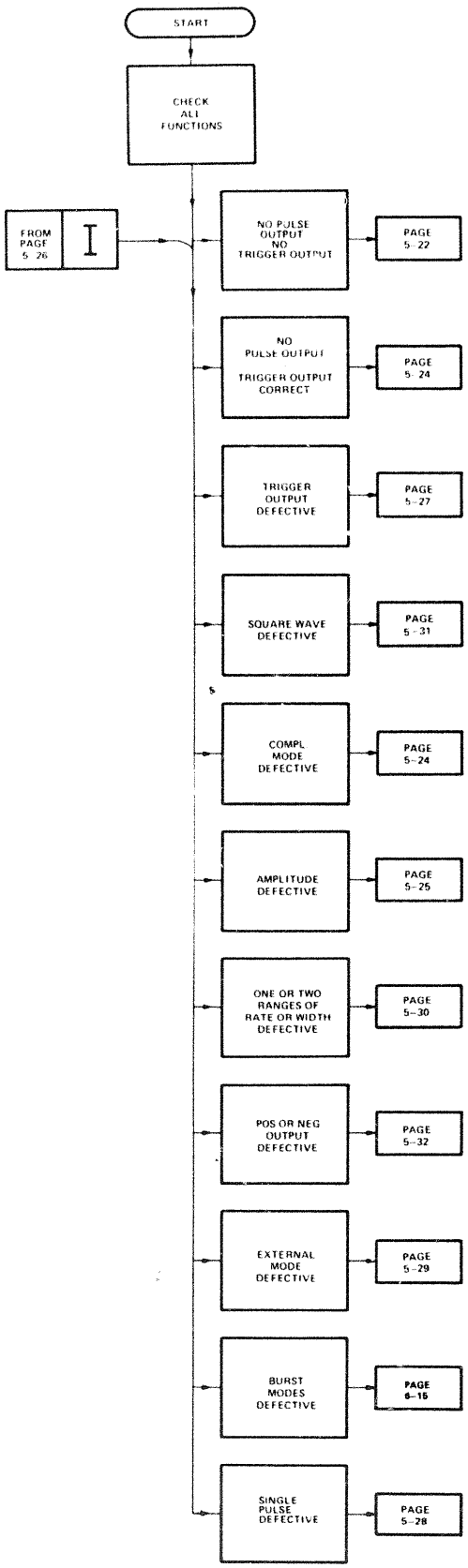
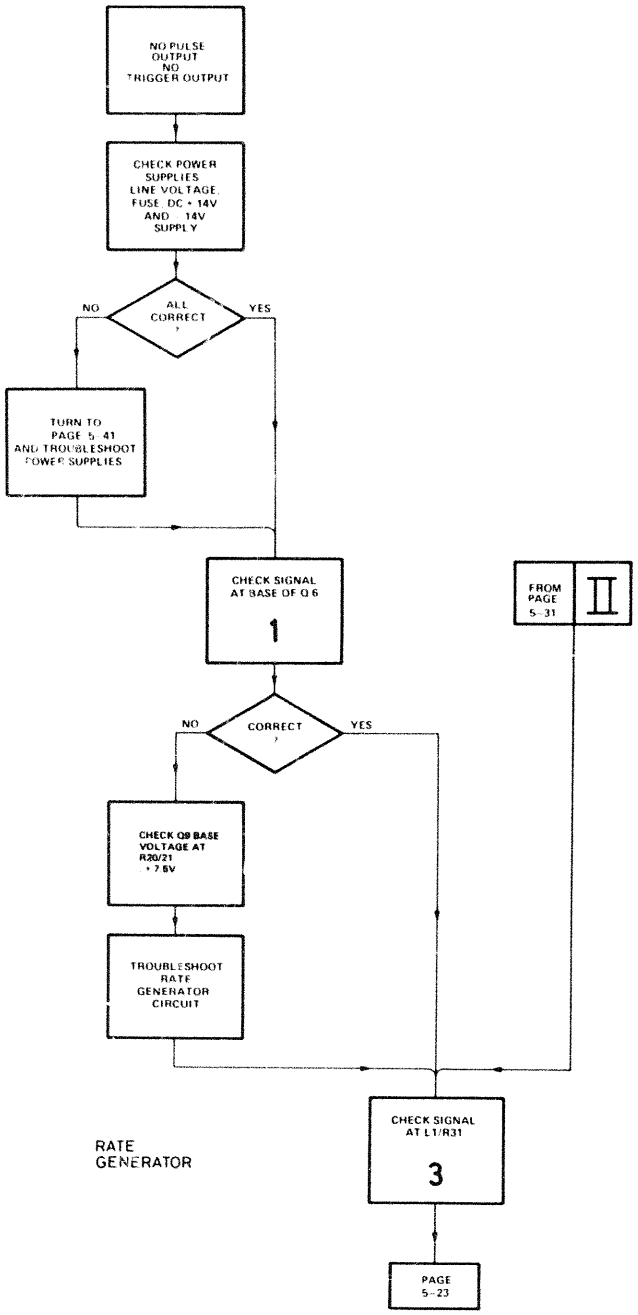


Table 5–21. cont'd.



Numbers in the boxes identify waveforms illustrated in Figure 5–1. For example

CHECK SIGNAL
AT BASE OF Q6
1

the signal at the base of Q6 is to be found at photograph 1 on Figure 5–1.

Table 5–21. cont'd.

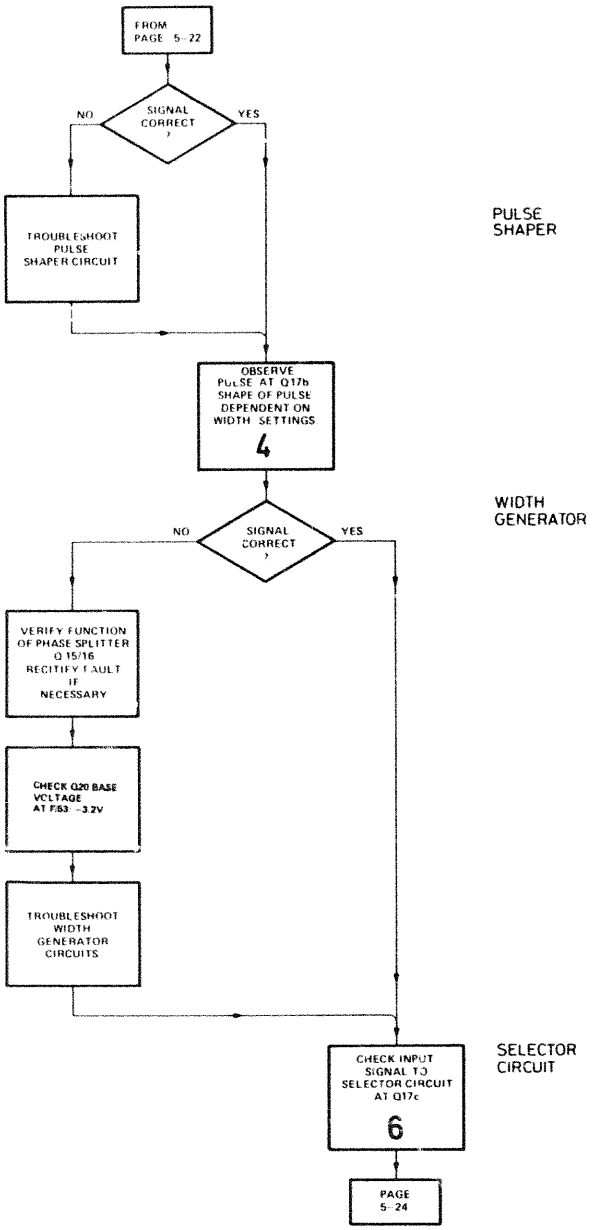


Table 5–21. cont'd.

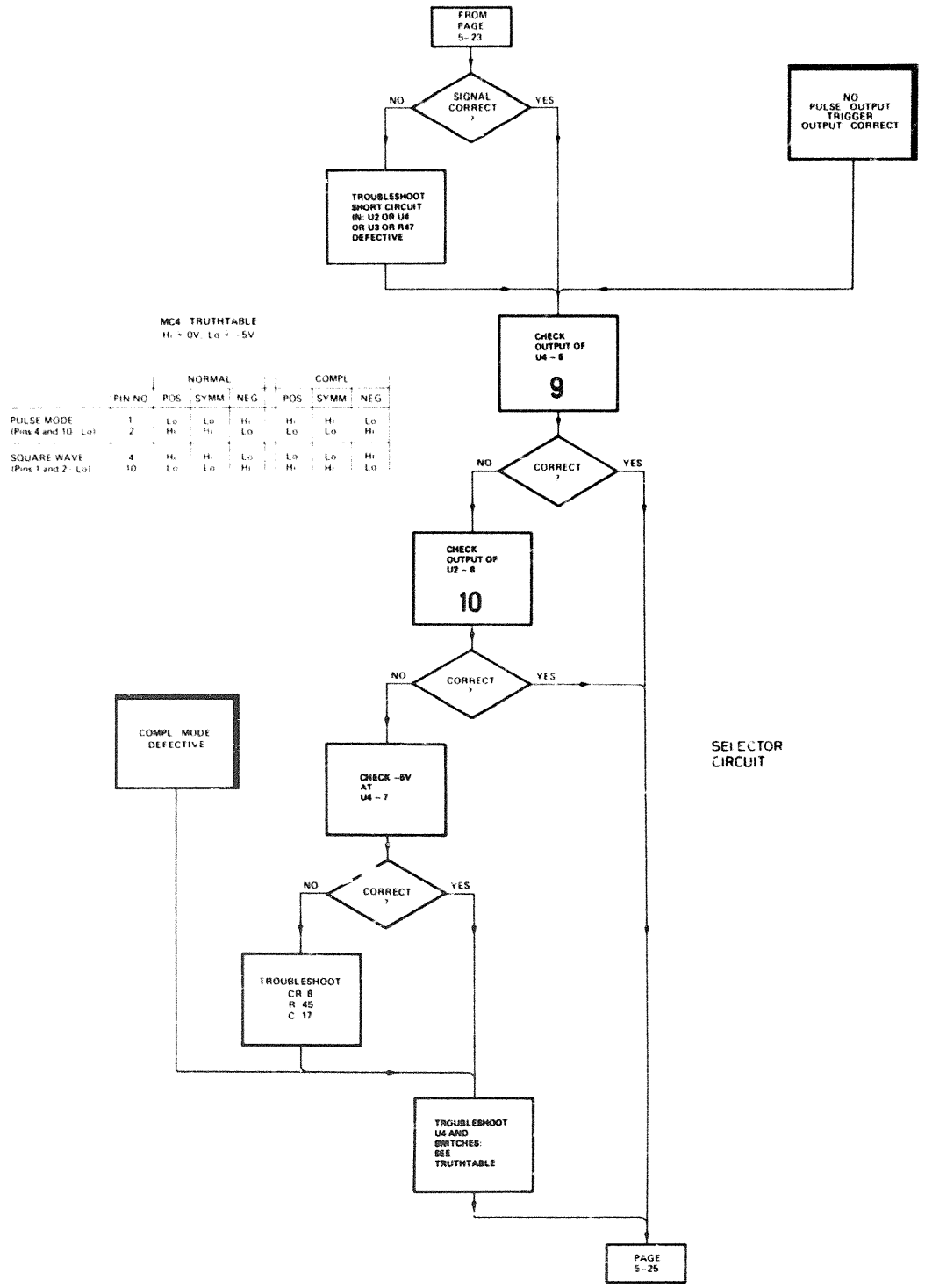


Table 5–21. cont'd.

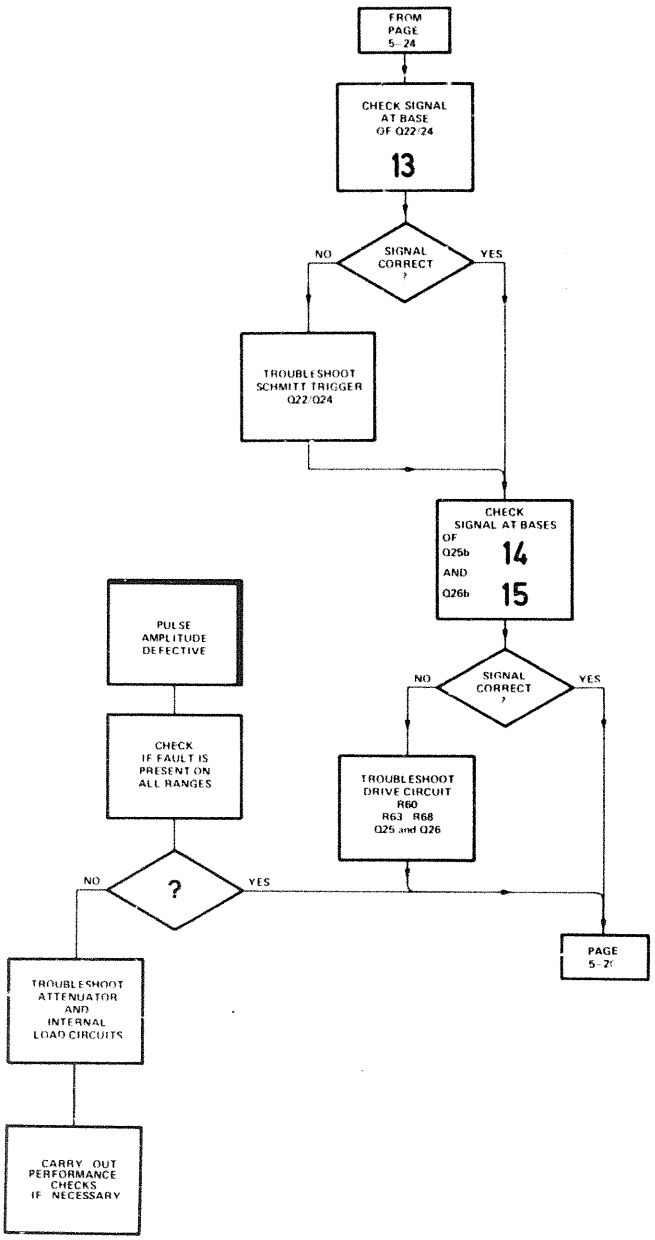


Table 5–21. cont'd.

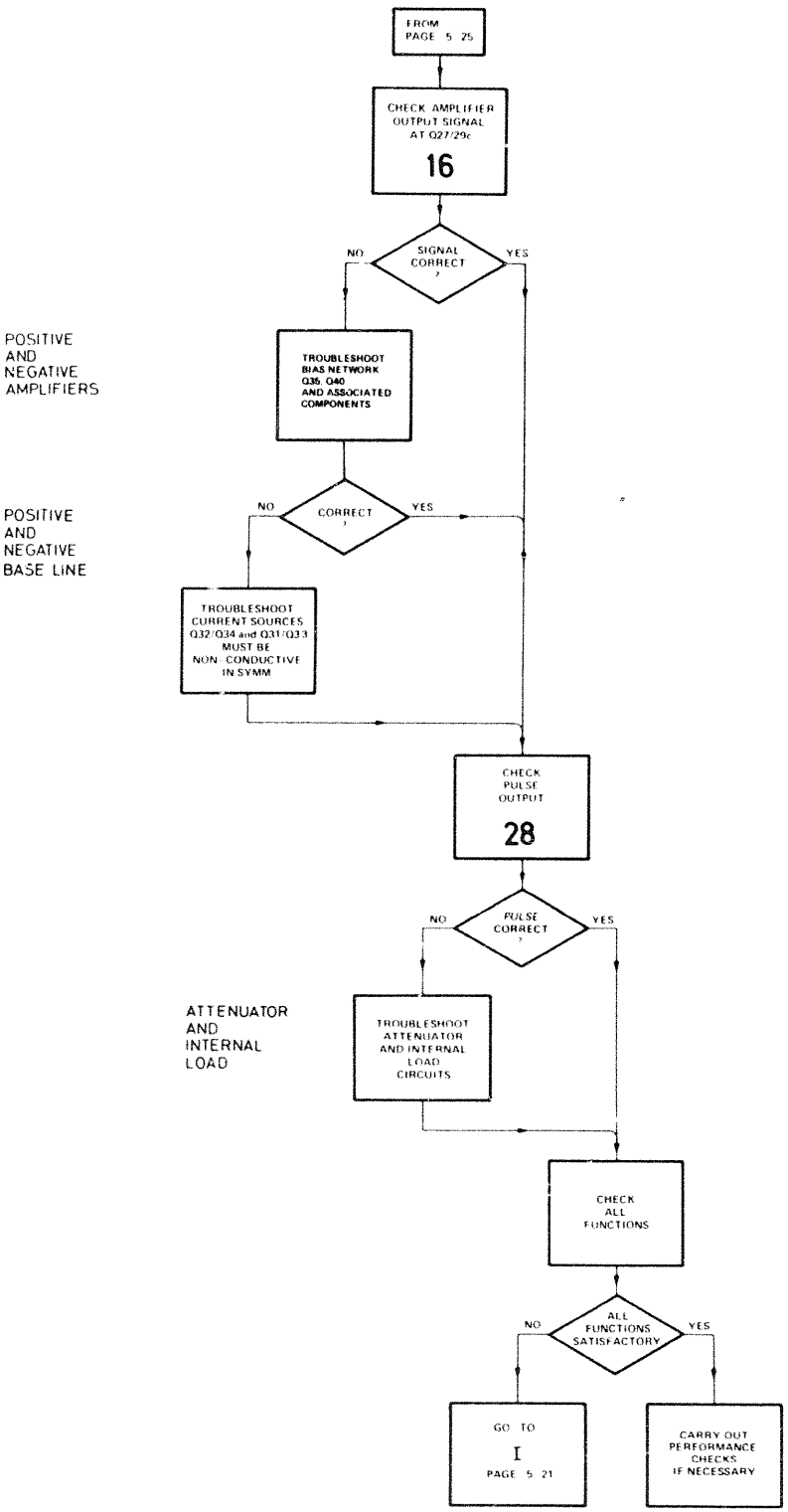
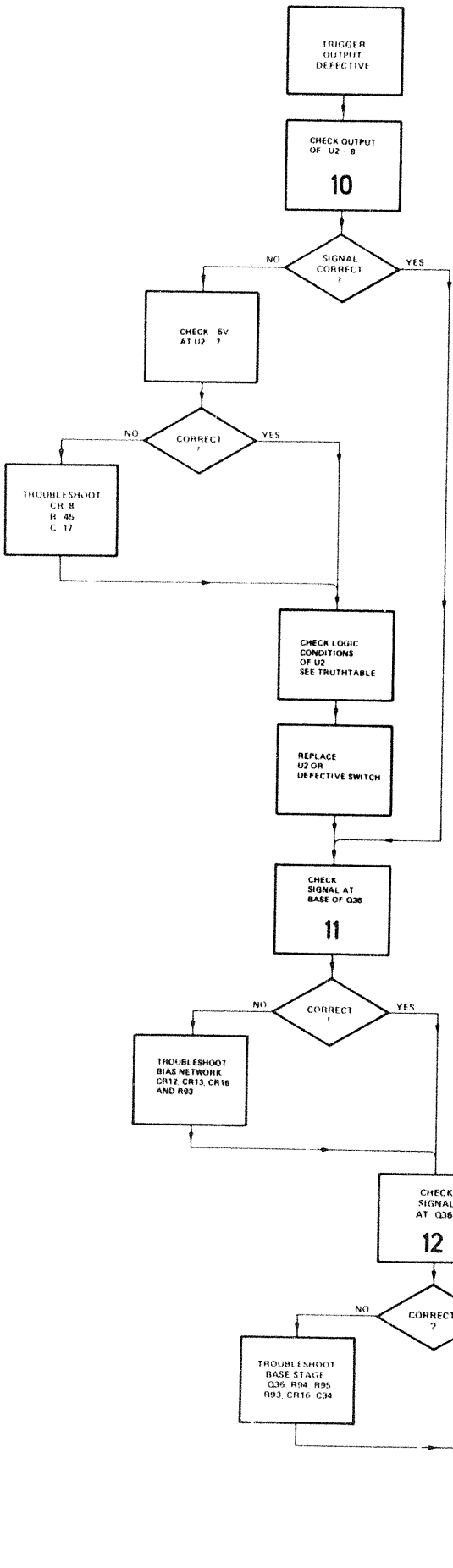


Table 5–21. cont'd



MC 2 TRUTHTABLE
Hi = 0V, LO = 5V

PIN N°	PULSE MODE	SQUARE WAVE
9	Lo	Hi
13	Hi	Lo

Table 5–21. cont'd.

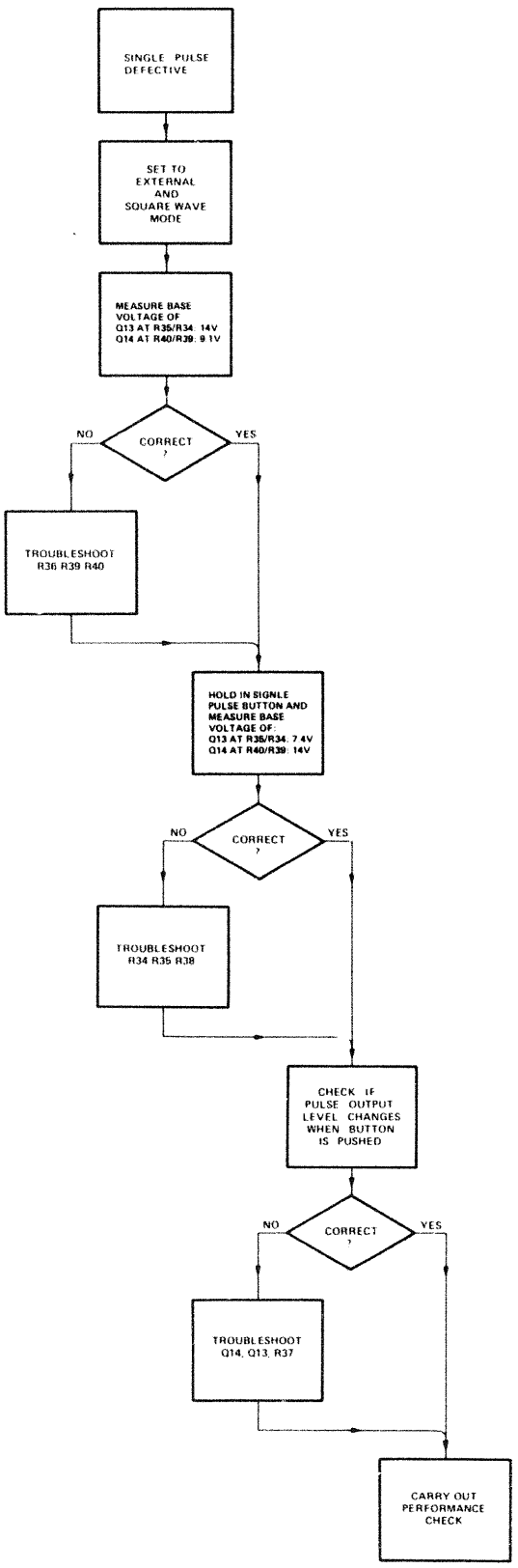


Table 5–21. cont'd.

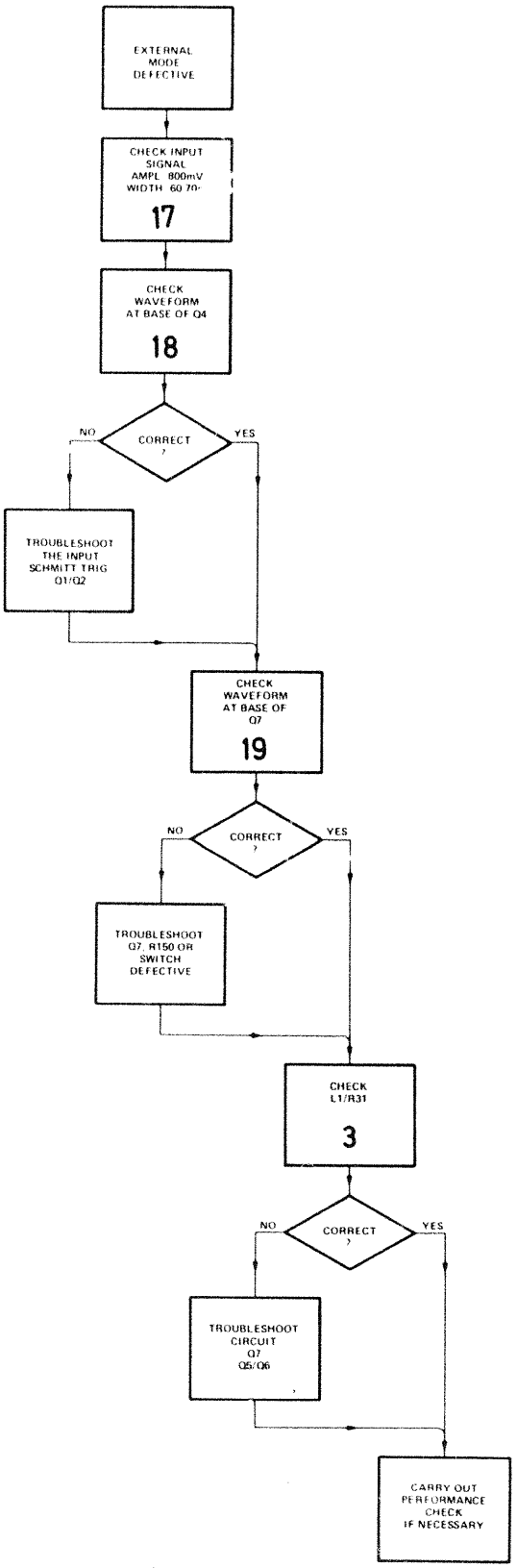


Table 5–21. cont'd.

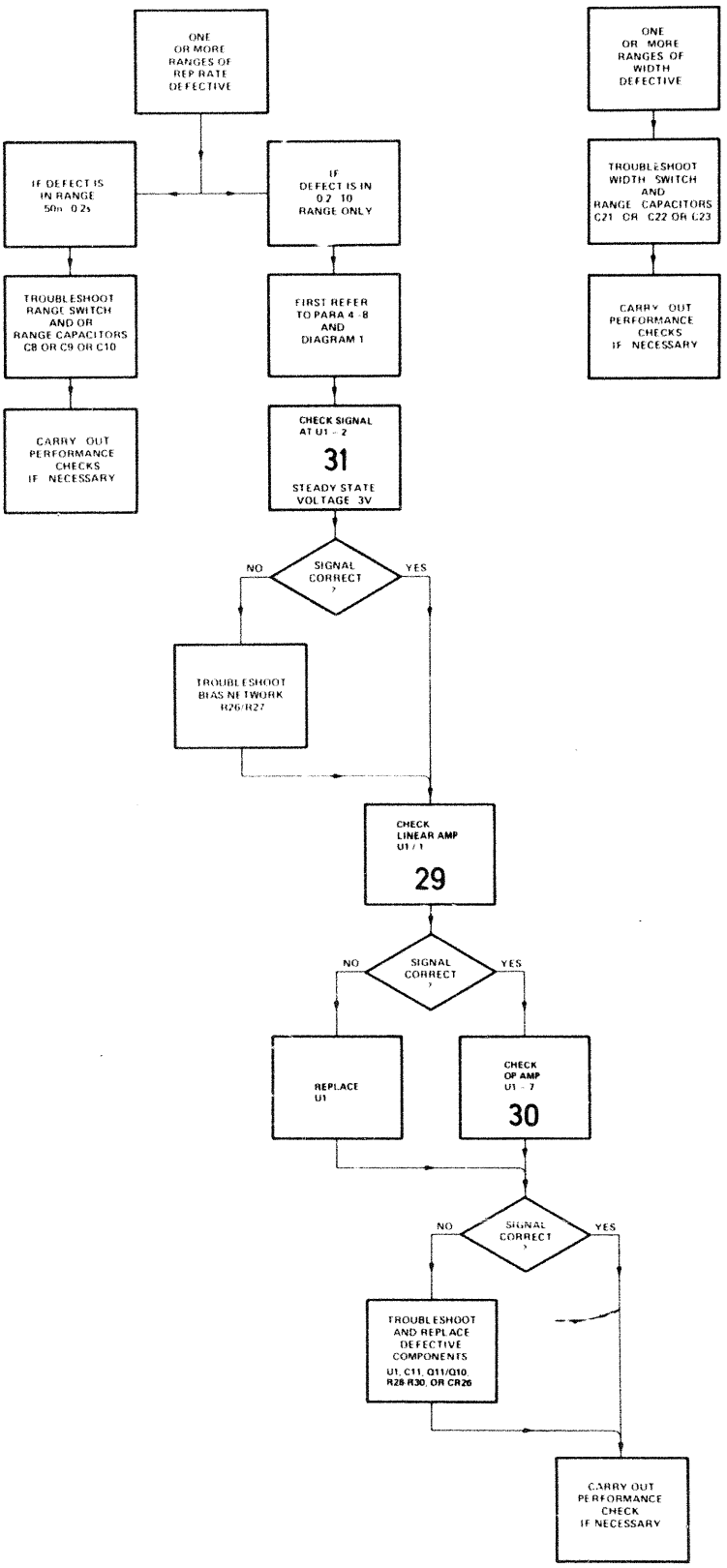


Table 5–21. cont'd.

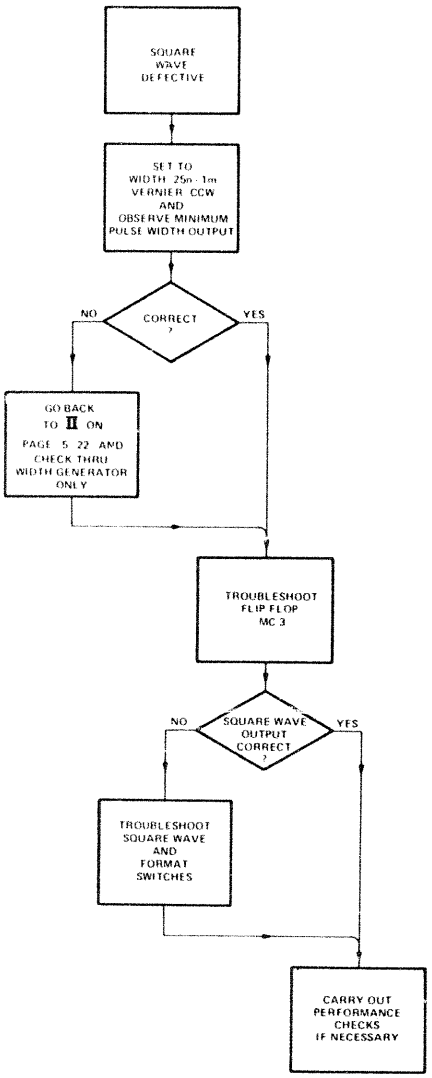


Table 5–21. cont'd.

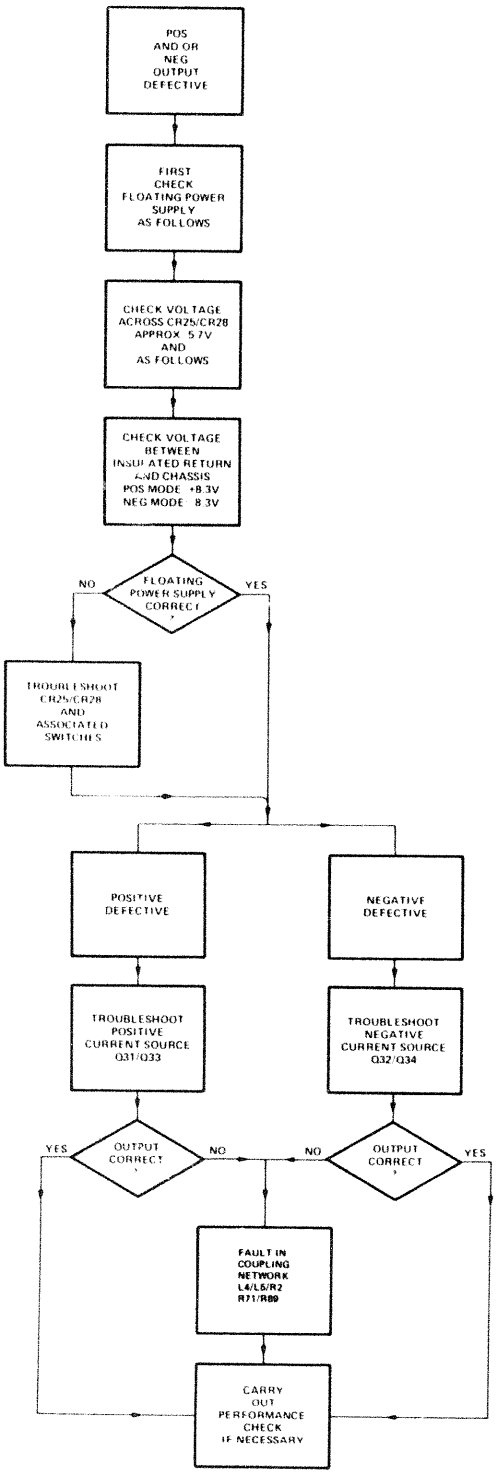


Table 5–21. cont'd.

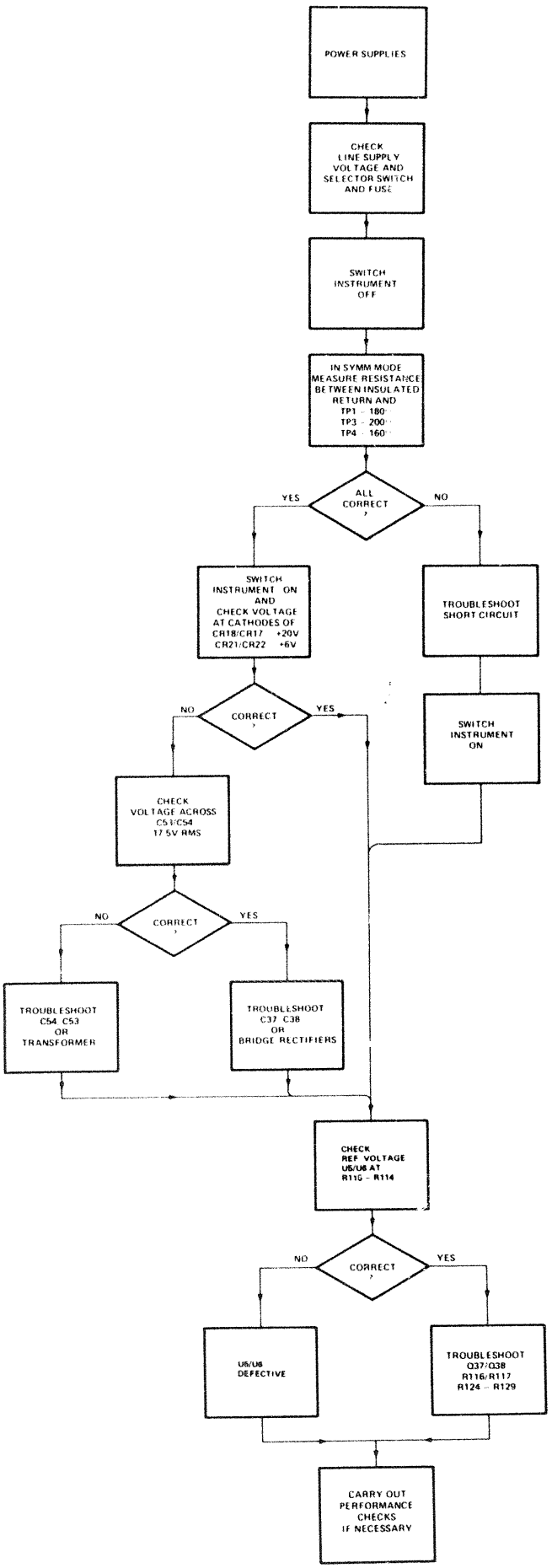


Table 5–22. Performance Test Record

Hewlett-Packard Company Model 8011A Pulse Generator Serial Number		Tested by Date		
Table No.	Test Description	Results		
		Min	Actual	Max
5–2	**Repitition Rate**			
	50n – 2μ CCW	20MHz	_____	500kHz
	50n – 2μ CW		_____	
	2μ – 0.1m CCW	500kHz	_____	10kHz
	2μ – 0.1m CW		_____	
	0.1m – 5m CCW	10kHz	_____	200Hz
	0.1m – 5m CW		_____	5ms
	5m – 0.2 CCW	200ms	_____	200ms
	5m – 0.2 CW		_____	
	0.2 – 10 CCW	10s	_____	
	0.2 – 10 CW		_____	
5–3	**Manual Trigger** Satisfactory		Yes/No.	
5–4	**Square Wave**			
	50m – 2μ	10MHz	_____	10ms
	2μ – 0.1m	250kHz	_____	
	0.1m – 5m	5kHz	_____	400ms
	5m – 0.2		_____	
	0.2 – 10		_____	
5–5	**Single Burst (Option 001 only)** Satisfactory		Yes/No	
5–6	**Pulse Width**			
	25n – 1μ CCW	1μs	_____	25ns
	25n – 1μ CW		_____	
	1μ – 50 μ CCW	50μs	_____	1μs
	1μ – 50 μ CW		_____	
	50μ – 2.5m CCW	2.5ms	_____	50μs
	50μ – 2.5m CW		_____	
	2.5m – 0.1 CCW	0.1s	_____	2.5ms
	2.5m – 0.1 CW		_____	
5–7	**Duty Cycle**			
	1μ – 50μ	50 %	_____	
	50μ – 2.5m	50 %	_____	
	2.5m – 0.1	50 %	_____	
5–8	**Pulse Period Jitter** Jitter		_____	1μs (0.1% + 50 ps)

Table 5–22. (cont'd.) Performance Test Record

Hewlett-Packard Company Model 8011A Pulse Generator Serial Number		Tested by Date		
Table No.	**Test Description**	**Results**		
		Min	**Actual**	**Max**
5–9	**Pulse Width Jitter** Jitter		_____	1μs (0.1% + 50 ps)
5–10	**External Trigger** Satisfactory		Yes/No	
5–11	**HF Triggering** Satisfactory		Yes/No	
5–12	**Minimum Width** Pos Neg		 _____ _____	 25ns 25ns
5–13	**Preshoot, Overshoot, Ringing** Int load on Int load off		 _____ _____	 5 % 10 %
5–14	**Transition Times** Leading edge Trailing edge		 _____ _____	 10ns 10ns
5–15	**Output Amplitude** 4–16V CW (Int load off) (Int load on) CCW (Int load on) 1–4V CW CCW 0.25–1V CW CCW	 16V 8V 4V 1V 	 _____ _____ _____ _____ _____ _____ _____	 4V 1V 0.25V
5–16	**Trigger Output** Amplitude Width	 1V 10ns	 _____ _____	 30ns
5–17	**Repetitive Burst** Satisfactory		Yes/No	
5–23	**Safety Check** Interior inspection Resistance cabinet to power plug gnd Resistance cabinet to line Line fuse Line fuse safety cover Heatsinks secure	 2MΩ 	 _____ _____ _____ ☐ ☐ ☐	 1Ω

Table 5–23

Safety Check

1. Disconnect power cord from line. Visually inspect interior for any sign of abnormal internally generated heat, such as discolored printed circuit borads or components, damaged insulation, or evidence of arcing. Determine cause and remedy.

2. Check resistance from cabinet to ground pin on power plug with suitable ohmmeter. The reading must be less than one ohm. Flex the power cord while making the measurement to detect any intermittent discontinuity. Check internal ground connections on boards and frame. Also check resistance of any front or rear panel ground terminals marked ⏚

3. Check resistance from cabinet to line and neutral (tied together) with the power switch on and the power source disconnected. The minimum acceptable resistance is two megohms. Replace any component which results in a failure or refer to production Memo or Service Note issued by product division for alternate action.

4. Check line fuse to verify that the proper value is installed.

5. Check that the plastic safety cover for the line fuse is installed.

6. Check that all coaxial and flat cables inside are properly connected. Check that all boards and the heatsink on the chassis are properly connected.

7. Inform Hewlett-Packard (internally, the responsible product division) of any repeated failures in the above tests or any other safety features.

SECTION VI

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 list 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 Wester 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.

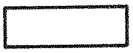
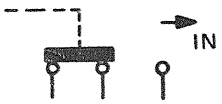
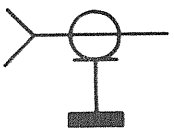
Table 6–1. Reference Designators

A	=	assembly	P	=	plug
B	=	motor	Q	=	transistor
BT	=	battery	R	=	resistor
C	=	capacitor	RT	=	thermistor
CP	=	coupler	S	=	switch
CR	=	diode	T	=	transformer
DL	=	delay line	TB	=	terminal board
DS	=	lamp	U	=	micro-circuit
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

Resistance in ohms, capacitance in microfarads, inducatance in microhenries unless other noted

All voltages are referenced to floating ground.

P/O	Part of
*	denotes a factory selected value. Values shown are typical.
	Screwdriver adjustment
	Encloses front panel nomenclature
	Encloses rear panel nomenclature
	Zener diode
	Chassis ground (0 volts)
	Floating ground
— 901 —	Wire colour e.g. white, black, brown.
	Part of push-button switch
	Signal input/output connectors

6–8 CIRCUIT DIAGRAM WAVEFORMS

6–9 Waveforms shown on the circuit diagrams **1** to **3** were taken with the 8011A set as follows, changes in time base and sensitivity are noted on the waveform concerned:

PULSE PERIOD	50n – .2μ
VERNIER	Mid-range
PULSE WIDTH	25n – 1μ
VERNIER	Mid-range
AMPLITUDE	1V – 4V
VERNIER	CW
SYM	ON
COMPL	OFF
BURST	OFF

To obtain waveforms shown on diagram **5** select BURST MODE.

Table 6–3. List of Manufacturers Codes (to be used in conjunction with Replaceable Parts Lists)

MFR. NO.	MANUFACTURER NAME	ADDRESS	ZIP CODE
FR009	GAM	MEAUX FRANCE	77
00501	ILLUMINATED PRODUCTS INC	ANAHEIM CA	92803
0.121	ALLEN BRADLEY CO	MILWAUKEE WI	53212
01295	TEXAS INSTR INC SEMICOND CMPNT DIV	DALLAS TX	75231
02114	FERROXCUBE CORP	SAUGERTIES NY	12477
04713	MOTOROLA SEMICONDUCTOR PRODUCTS	PHOENIX AZ	85008
07263	FAIRCHILD SEMICONDUCTOR DIV	MOUNTAIN VIEW CA	94040
11502	TRW INC BOONE DIV	BOONE NC	28607
12697	CLAROSTAT MFG CO INC	DOVER NH	03820
16299	CORNING GL WK ELEC CMPNT DIV	RALEIGH NC	27604
19701	MEPCO/ELECTRA CORP	MINERAL WELLS TX	76067
23880	STANFORD APPLIED ENGINEERING INC	SANTA CLARA CA	95050
24226	GOWANDA ELECTRONICS CORP	GOWANDA NY	14070
24546	CORNING GLASS WORKS (BRADFORD)	BRADFORD PA	16701
27167	CORNING GLASS WORKS (WILMINGTON)	WILMINGTON NC	28401
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
72136	ELECTRO MOTIVE MFG CO INC	WILLIMANTIC CT	06226
75915	LITTELFUSE INC	DES PLAINES IL	60016
76381	3M COMPANY	ST. PAUL MN	55101
9D949	AMPHENOL SALES DIV OF BUNKER-RAMO	HAZELWOOD MO	63042
91637	DALE ELECTRONICS INC	COLUMBUS NE	68601

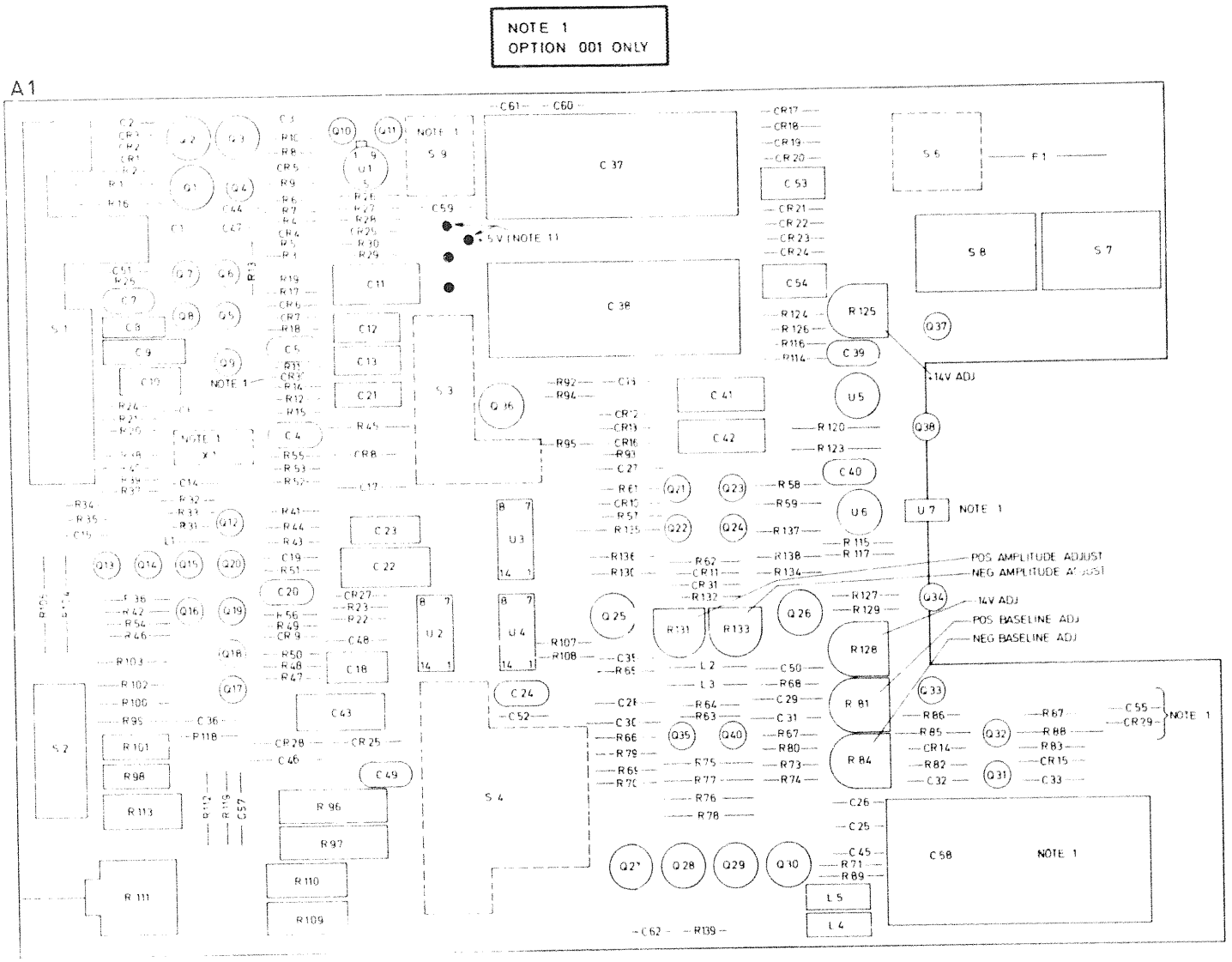
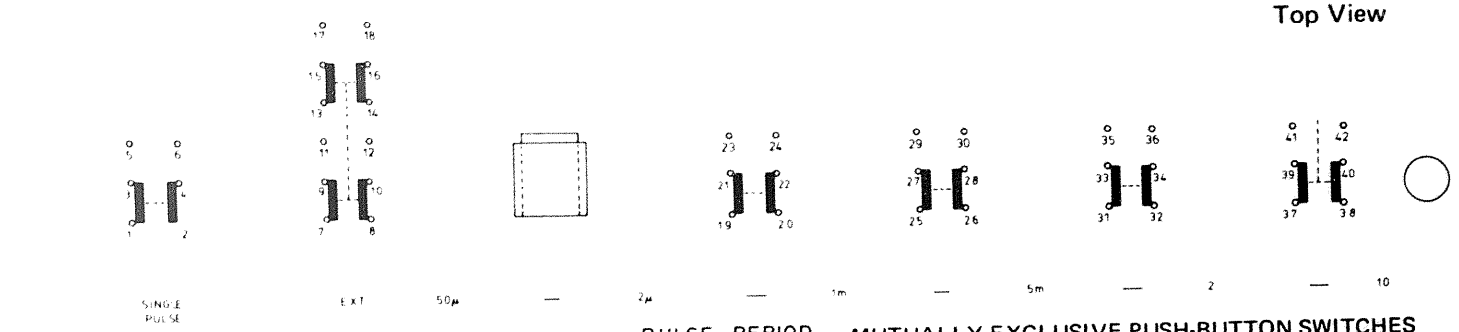


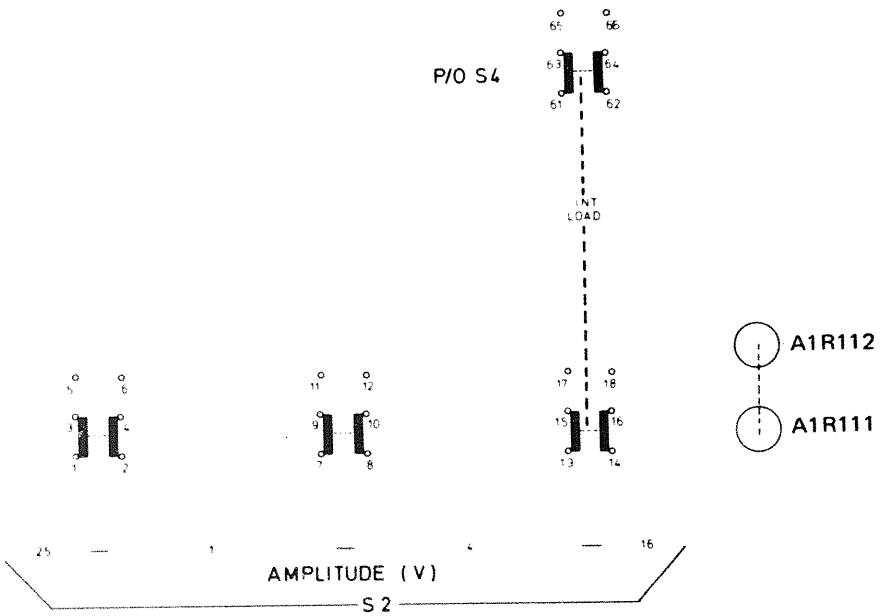
Table 6-4. Frame (Standard) Replacable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	08011-66501		BOARD ASSEMBLY, PULSE GENERATOR	28480	08011-66501
DS1	2140-0016	1	LAMP-INCAND T-1 BULB 5V	00501	11-AS25
F1	2110-0020	1	FUSE .8A 250V SLO-BLO 1.25X.25 UL	71400	MDL 8/10
F1	2110-0034	1	FUSE .4A 250V SLO-BLO 1.25X.25 UL	75915	313.400S
FL1	9100-3121	1	FILTER-ELEC 2A (EUROPE)	28480	9100-3121
	1251-2357	1	POWER LINE CONNECTOR (USA)		
J1	1250-0118	3	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	1250-0113		CONNECTOR-RF BNC FEM SGL HOLE FR	90949	31-2221-1022
MP1	0370-1005	2	PERIOD AND WIDTH VERNIER KNOBS	28480	0370-1005
MP2	0370-1097	1	AMPLITUDE VERNIER KNOB	28480	0370-1097
MP3	0370-2486	20	PUSHBUTTON (SOLID GRAY)	28480	0370-2486
MP4	08011-00205	1	PANEL, FRONT	28480	08011-00205
MP5	08011-00202	1	PANEL, REAR	28480	08011-00202
MP6	08011-04101	1	COVER, SAFETY	28480	08011-04101
MP7	5040-1124	1	KNOB, PUSHBUTTON, POWER	28480	5040-1124
MP9	5040-0445	1	FOOT ASSEMBLY	28480	5040-0445
MP10	1460-1300	1	STAND, TILT	28480	1460-1300
MP11	1450-0404	1	LENS, PILOT LIGHT	28480	1450-0404
MP13	08011-43701	1	ROD, POWER SWITCH	28480	08011-43701
MP14	08012-04101	1	COVER ASSEMBLY	28480	08012-04101
MP15	08011-43702	1	ROD, AMPLIFIER SWITCH	28480	08011-43702
R1	2100-2590	2	RESISTOR-VAR CONTRL CC 10K 10% 10CW	12697	SERIES 63M
R2	2100-2590		RESISTOR-VAR CONTRL CC 10K 10% 10CW	12697	SERIES 63M
T1	5080-0978	1	TRANSFORMER, POWER	28480	5080-0978

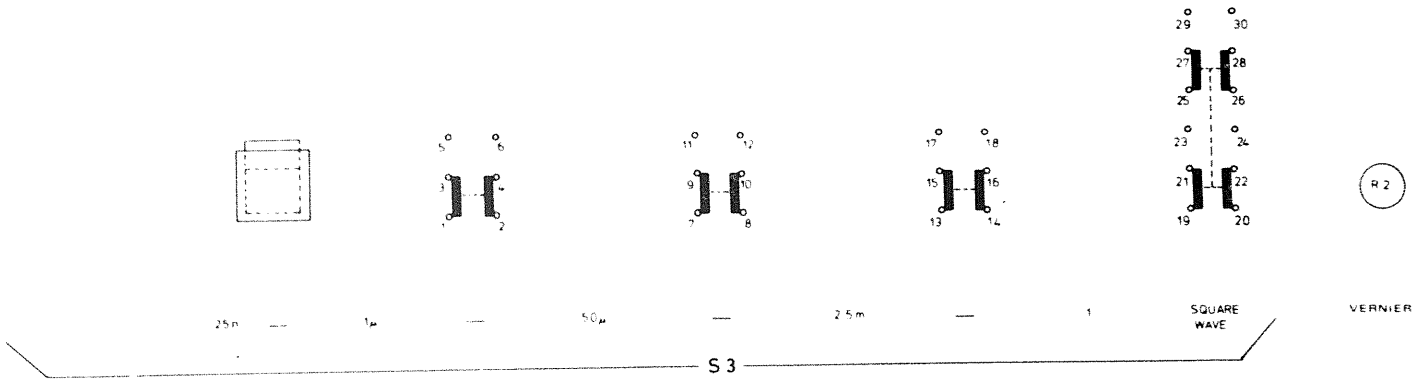
Top View



(viewed from above the instrument)



(viewed from above the instrument)



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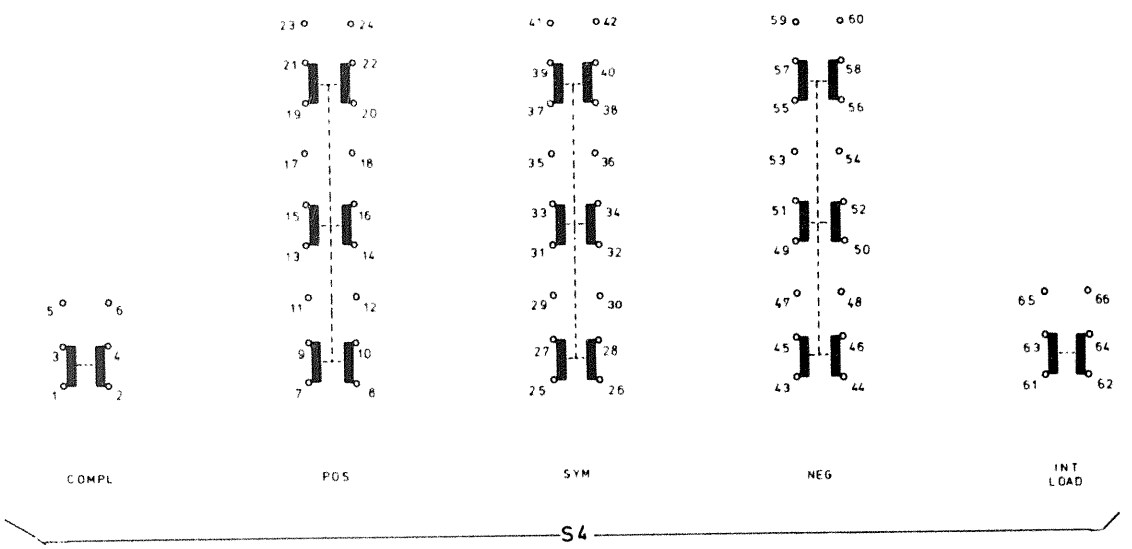
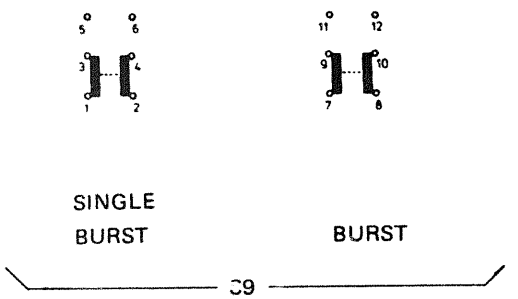


(viewed from above the instrument)

BURST SWITCHES: (OPTION 001)



(viewed from above the instrument)

Table 6–5. Board A1 (Standard) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	08011-66501	1	BOARD ASSEMBLY, PULSE GENERATOR	28480	08011-66501
A1C1	0160-2208	2	CAPACITOR-FXD 330PF +-5% 300WVDC MICA	28480	0160-2208
A1C2	0160-4210	16	CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C3	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C4	0140-0210	1	CAPACITOR-FXD 270PF +-5% 300WVDC MICA	72136	DM15F271J0300WV1CR
A1C5	0160-2150	1	CAPACITOR-FXD 33PF +-5% 300WVDC MICA	28480	0160-2150
A1C6	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C7	0140-0195	1	CAPACITOR-FXD 130PF +-5% 300WVDC MICA	72136	DM15F131J0300WV1CR
A1C8	0160-3715	1	CAPACITOR-FXD .015UF +-10% 250WVDC MET	28480	0160-3715
A1C9	0160-3725	1	CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A1C10	0180-0229	1	CAPACITOR-FXD; 33UF+-10% 10VDC TA-SOLID	56289	150D336X9010B2
A1C11	0160-3839	1	CAPACITOR-FXD 2.2UF +-10% 40WVDC MET	28480	0160-3839
A1C12	0160-4213	5	CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C13	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C14	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C15	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C16	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C17	0160-0127	2	CAPACITOR-FXD 1UF +-20% 25WVDC CER	28480	0160-0127
A1C18	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C19	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C20	0140-0193	2	CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A1C21	0160-3220	1	CAPACITOR-FXD 6800PF +-5% 250WVDC MET	FR009	CKB-68
A1C22	0160-3723	1	CAPACITOR-FXD .33UF +-10% 40WVDC MET	28480	0160-3723
A1C23	0180-1746	1	CAPACITOR-FXD; 15UF+-10% 20VDC TA-SOLID	56289	150D156X9020B2
A1C24	0160-2208		CAPACITOR-FXD 330PF +-5% 300WVDC MICA	28480	0160-2208
A1C25	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C26	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C27	0140-0193		CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A1C28	0160-0174	7	CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C29	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C30	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C31	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C32	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C33	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C34	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C35	0160-2959	2	CAPACITOR-FXD 1000PF +80-20% 1000WVDC	28480	0160-2959
A1C36	0160-0127		CAPACITOR-FXD 1UF +-20% 25WVDC CER	28480	0160-0127
A1C37	0180-2240	2	CAPACITOR-FXD; 2400UF+75-10% 25VDC AL	56289	39D248G025JL2
A1C38	0180-2240		CAPACITOR-FXD; 2400UF+75-10% 25VDC AL	56289	39D248G025JL2
A1C39	0160-4209	2	CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A1C40	0160-4209		CAPACITOR-FXD .01UF +-20% 50WVDC POLYE	28480	0160-4209
A1C41	0180-0061	3	CAPACITOR-FXD; 100UF+75-10% 16VDC AL	56289	30D107G016DC2
A1C42	0180-0061		CAPACITOR-FXD; 100UF+75-10% 16VDC AL	56289	30D107G016DC2
A1C43	0180-0061		CAPACITOR-FXD; 100UF+75-10% 16VDC AL	56289	30D107G016DC2
A1C44	0160-2306	1	CAPACITOR-FXD 27PF +-5% 300WVDC MICA	28480	0160-2306
A1C45	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C47	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C48	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C49	0160-2259	1	CAPACITOR-FXD 12PF +-5% 500WVDC CER	28480	0160-2259
A1C50	0160-2959		CAPACITOR-FXD 1000PF +80-20% 1000WVDC	28480	0160-2959
A1C51	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C52	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C53	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C54	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C57	0160-0134	1	CAPACITOR-FXD 220PF +-5% 300WVDC MICA	28480	0160-0134
A1C57	0160-2205	1	CAPACITOR-FXD 120PF +-5% 300WVDC MICA	28480	0160-2205
A1C60	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C61	0160-0174		CAPACITOR-FXD .47UF +80-20% 25WVDC CER	28480	0160-0174
A1C62	0160-3470		CAPACITOR-FXD .01UF +80-20% 50WVDC CER		
A1CR1	1901-0040	13	DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR2	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR3	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR4	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR5	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR6	1902-0041	4	DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1CR7	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR8	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1CR9	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1CR10	1902-3104	2	DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A1CR11	1902-3104		DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A1CR12	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR13	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR14	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR15	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040

Table 6-5. (cont'd) Board A1 (Standard) Replaceable Parts List

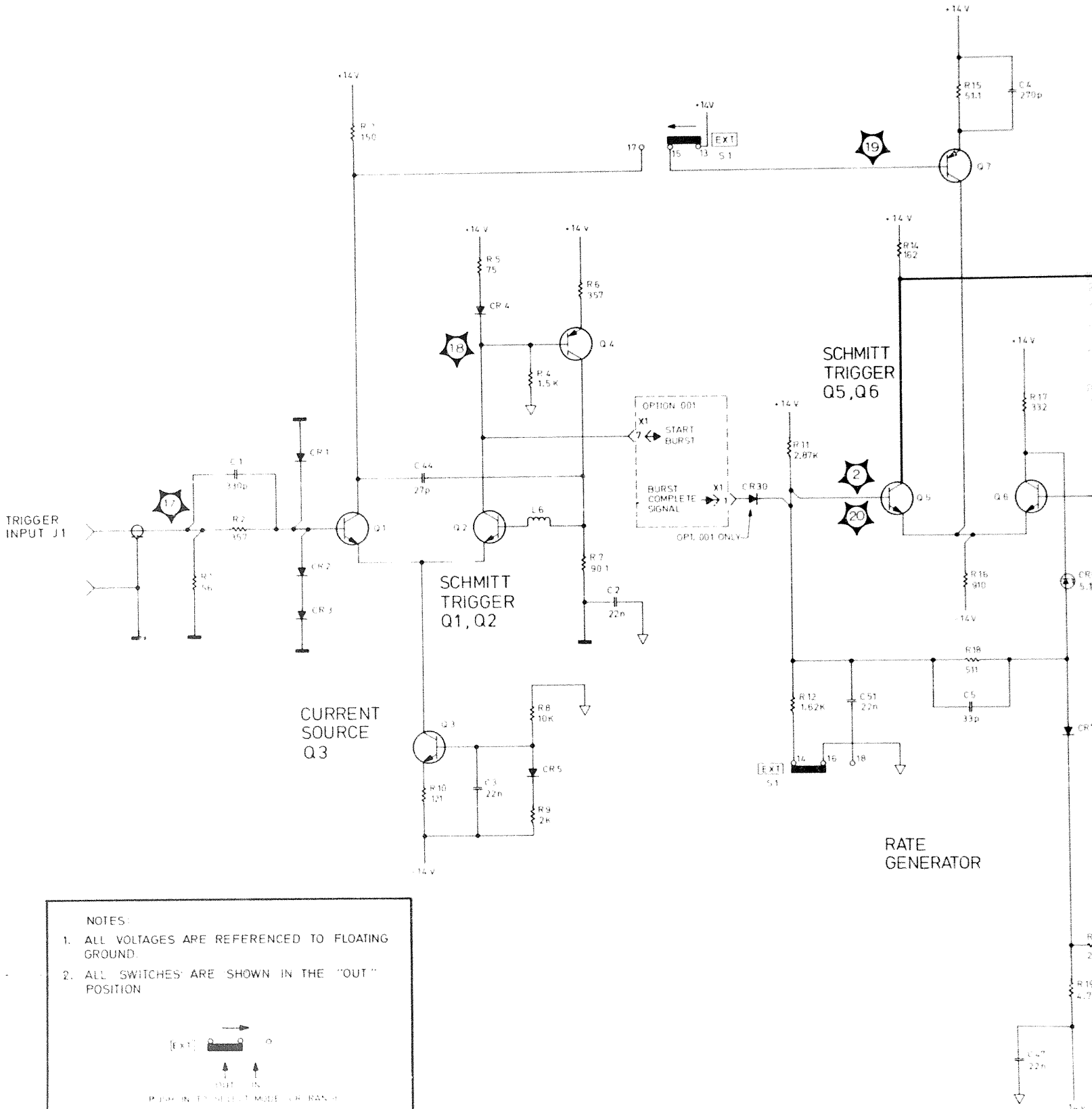
Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1CR16	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR17	1901-0159	9	DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR18	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR19	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR20	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR21	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR22	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR23	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR24	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR25	1902-1291	1	DIODE-ZNR 1N5338B 5.1V 5% PD=5W IR=1UA	04713	1N5338B
A1CR26	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR27	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR28	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR31	1902-3041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1L1	9140-0096	1	COIL-FXD MOLDED RF CHOKE 1UH 10%		
A1L2	9140-0096	2	COIL-FXD MOLDED RF CHOKE 1UH 20%		
A1L3	9100-1612		COIL-FXD MOLDED RF CHOKE .33UH 20%	24226	15/330
A1L4	9100-1657	2	COIL-FXD MOLDED RF CHOKE 1.5MH 5%	24226	22/154
A1L5	9100-1657		COIL-FXD MOLDED RF CHOKE 1.5MH 5%	24226	22/154
A1L6	9170-0029	3	CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A1L7	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A1L8	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A1MP1	08011-01101	1	HT-SINK FOR Q33, Q34, Q37, Q38	28480	08011-01101
A1MP2	08011-01102	1	HT-SINK FOR Q27, Q28, Q29, Q30	28480	08011-01102
A1Q1	1854-0053	3	TRANSISTOR NPN 2N2218 SI TO-5 PD=800MW	04713	2N2218
A1Q2	1854-0053		TRANSISTOR NPN 2N2218 SI TO-5 PD=800MW	04713	2N2218
A1Q3	1854-0053		TRANSISTOR NPN 2N2218 SI TO-5 PD=800MW	04713	2N2218
A1Q4	1853-0089	7	TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q5	1854-0215	5	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q6	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q7	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q8	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q9	1853-0036	7	TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q10	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q11	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q12	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q13	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q14	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q15	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q16	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q17	1854-0630	4	TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q18	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q19	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q20	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q21	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q22	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q23	1853-0357	2	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A1Q24	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A1Q25	1853-0315	1	TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0315
A1Q25	1205-0061	2	HEAT-DISSIPATOR SGL TO-5/TO-39 PKG	28480	1205-0061
A1Q26	1854-0498	1	TRANSISTOR TO-39 PD=1W	28480	1854-0498
A1Q26	1205-0061		HEAT-DISSIPATOR SGL TO-5/TO-39 PKG	28480	1205-0061
A1Q27	1853-0012	3	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A1Q28	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A1Q29	1854-0213	2	TRANSISTOR NPN 2N2538 SI TO-5 PD=800MW	28480	1854-0213
A1Q30	1854-0213		TRANSISTOR NPN 2N2538 SI TO-5 PD=800MW	28480	1854-0213
A1Q31	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q32	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q33	1854-0402	1	TRANSISTOR NPN SI PD=30W FT=3MHZ	28480	1854-0402
A1Q34	1853-0254	1	TRANSISTOR PNP SI PD=30W FT=3MHZ	28480	1853-0254
A1Q35	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q36	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A1Q37	1853-0356	2	TRANSISTOR PNP SI PD=6EW FT=3MHZ	28480	1853-0356
A1Q38	1853-0356		TRANSISTOR PNP SI PD=65W FT=3MHZ	28480	1853-0356
A1Q40	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1R1	0758-0093	1	RESISTOR 56 5% .25W F TC=0+-100	24546	C5-1/4-TO-56R0-J
A1R2	0698-3242	4	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A1R3	0757-0284	2	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-TO-151-F
A1R4	0757-0427	1	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1501-F
A1R5	0757-0398	1	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-TO-75R0-F
A1R6	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A1R7	0757-0400	2	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-TO-90R9-F
A1R8	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A1R9	0757-0283	2	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2001-F
A1R10	0757-0403	1	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-TO-121R-F
A1R11	0698-3151	1	RESISTOR 2.87K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2871-F
A1R12	0757-0428	7	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1621-F
A1R13	0757-0407	4	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-TO-201-F
A1R14	0757-0405	3	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-TO-162R-F
A1R15	0757-0394	2	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-51R1-F

Table 6–5. (cont'd) Board A1 (Standard) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R16	0758-0068	1	RESISTOR 910 5% .25W F TC=0+-100	24546	C5-1/4-T0-911-J
A1R17	0757-0411	3	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A1R18	0757-0416	3	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R19	0757-0437	2	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A1R20	0757-0422	2	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A1R21	0757-0273	3	RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A1R22	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A1R23	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R24	0757-0397	3	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A1R25	0757-0381	1	RESISTOR 15 1% .125W F TC=0+-100	19701	MF4C1/8-T0-15R0-F
A1R26	0757-0438	5	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R27	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A1R28	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R29	0757-0401	7	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R30	0698-3245	1	RESISTOR 20.5K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2052-F
A1R31	0757-0408	2	RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A1R32	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R33	0757-0200	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R34	0757-0431	4	RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R35	0757-0430	1	RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A1R36	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R37	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R38	0757-0410	2	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A1R39	0757-0431		RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R40	0757-0435	1	RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A1R41	0757-0414	1	RESISTOR 432 1% .125W F TC=0+-100	24546	C4-1/8-T0-432R-F
A1R42	0757-0420	1	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R43	0757-0200		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R44	0757-0410		RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A1R45	0757-0799	1	RESISTOR 121 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-121R-F
A1R46	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A1R47	0698-3441	1	RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
A1R48	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A1R49	0757-0409	2	RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A1R50	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R51	0757-0386	2	RESISTOR 24.3 1% .125W F TC=0+-100	19701	MF4C1/8-T0-24R3-F
A1R52	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A1R53	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A1R54	0757-0392	1	RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A1R55	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R56	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A1R57	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R58	0758-0002	1	RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A1R59	0758-0054	1	RESISTOR 330 5% .25W F TC=0+-100	24546	C5-1/4-T0-331-J
A1R61	0757-0280	1	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R62	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A1R63	0698-3262	2	RESISTOR 40.2 1% .125W F TC=0+-100	16299	C4-1/8-T0-4022-F
A1R63	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A1R63	0757-0401		RESISTOR 100 1% .125W F TC=0+-100		
A1R64	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A1R64	0698-3262		RESISTOR 40.2 1% .125W F TC=0+-100	16299	C4-1/8-T0-4022-F
A1R64	0757-0384		RESISTOR 20 1% .125W F TC=0+-100		
A1R65	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A1R66	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R67	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R68	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A1R69	0698-7521	4	RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R70	0698-7521		RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R71	0757-0431		RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R73	0698-7521		RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R74	0698-7521		RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R75	0757-0500	4	RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R76	0757-0500		RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R77	0757-0500		RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R78	0757-0500		RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R79	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R80	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R81	2100-0567	2	RESISTOR, VAR 2K 20% 0.5W LIN CC	28480	2100-0567
A1R82	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R83	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R84	2100-0567		RESISTOR, VAR 2K 20% 0.5W LIN CC	28480	2100-0567
A1R85	0698-5876	2	RESISTOR 10 5% .25W F TC=0+-100	24546	C5-1/4-T0-10R0-J
A1R86	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R87	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R88	0698-5876		RESISTOR 10 5% .25W F TC=0+-100	24546	C5-1/4-T0-10R0-J
A1R89	0757-0431		RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R92	0757-0346	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F

Table 6–5. (cont'd) Board A1 (Standard) Replaceable Parts List

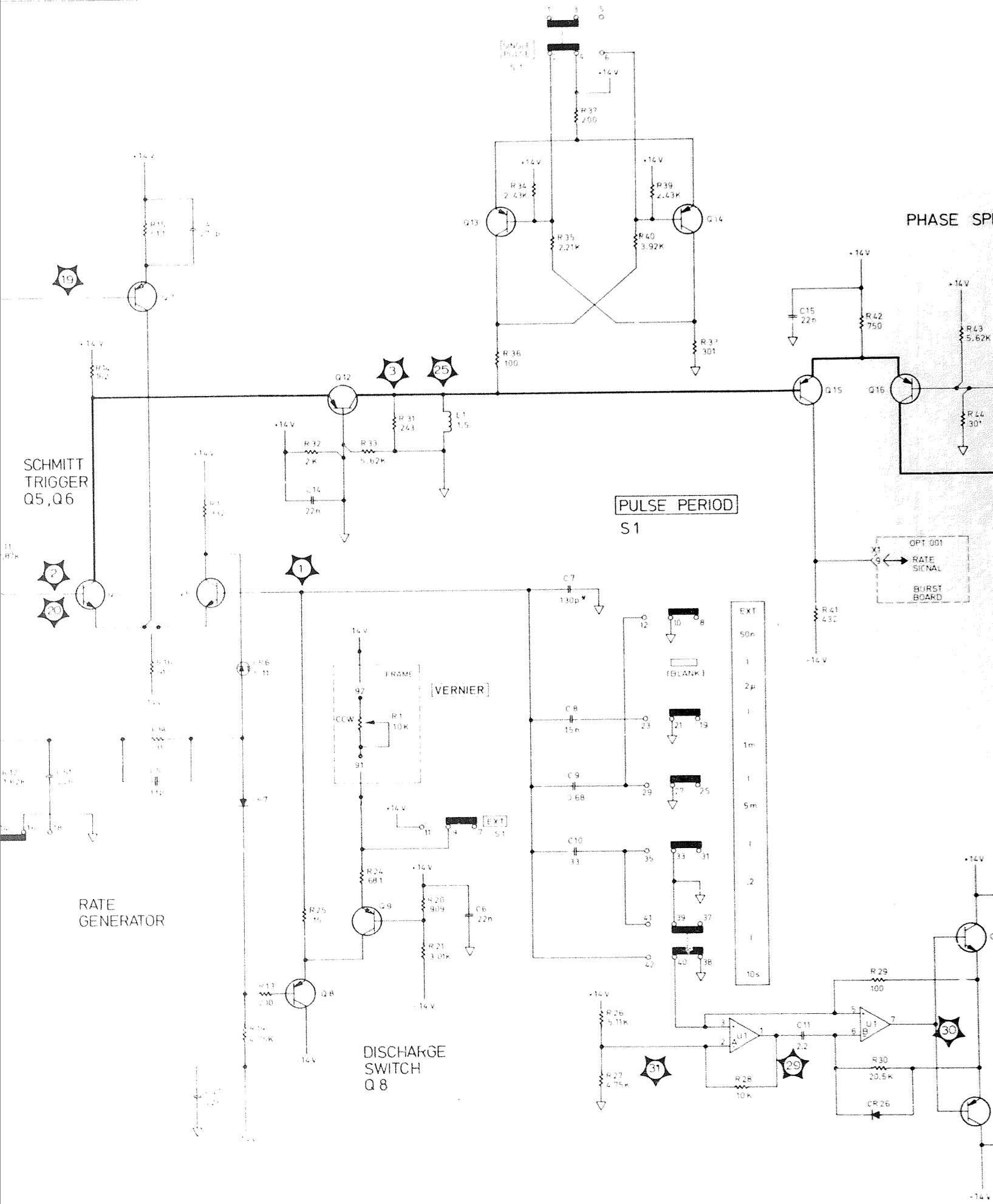
Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R93	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R94	0757-0386		RESISTOR 24.3 1% .125W F TC=0+-100	19701	MF4C1/8-T0-24R3-F
A1R95	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R96	0766-0025	2	RESISTOR 101 2% 3W MO TC=0+-250	27167	FP3-3-250-101R-G
A1R97	0766-0025		RESISTOR 101 2% 3W MO TC=0+-250	27167	FP3-3-250-101R-G
A1R98	0761-0035	2	RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-J
A1R99	0758-0080	2	RESISTOR 75 5% .25W F TC=0+-100	24546	C5-1/4-T0-7502-J
A1R100	0758-0080		RESISTOR 75 5% .25W F TC=0+-100	24546	C5-1/4-T0-7502-J
A1R101	0761-0035		RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-J
A1R102	0758-0082	2	RESISTOR 130 5% .25W F TC=0+-100	24546	C5-1/4-T0-131-J
A1R103	0758-0082		RESISTOR 130 5% .25W F TC=0+-100	24546	C5-1/4-T0-131-J
A1R104	0757-1060	1	RESISTOR 196 1% .5W F TC=0+-100	19701	MF7C1/2-T0-196R-F
A1R105	0698-4825	1	RESISTOR 64.9 1% .5W F TC=0+-100	24546	NA6
A1R107	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R108	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R109	0698-3620	2	RESISTOR 100 5% 2W MO TC=0+-200	24546	FP42-2-T00-100R-J
A1R110	0698-3620		RESISTOR 100 5% 2W MO TC=0+-200	24546	FP42-2-T00-100R-J
A1R111	2100-3104	1	RESISTOR, VAR 50 OHM 10% 5W, CC	01121	OBD
A1R112	0698-5880	2	RESISTOR 15 5% .25W F TC=0+-100	24546	C5-1/4-T0-15R0-J
A1R113	0698-3616	1	RESISTOR 62 5% 2W MO TC=0+-200	16299	FP42-2-T00-62R0-J
A1R114	0757-0421	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R115	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R116	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A1R117	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A1R118	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R119	0698-5880		RESISTOR 15 5% .25W F TC=0+-100	24546	C5-1/4-T0-15R0-J
A1R120	0812-0021	2	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A1R123	0812-0021		RESISTOR .47 5% 3W PW TC=0+-90	91637	CW2B1-3-T2-47/100-J
A1R124	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R125	2100-3211	2	R:VAR CERMET 1000 OHM 20%	28480	2100-3211
A1R126	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R127	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R128	2100-3211		R:VAR CERMET 1000 OHM 20%	28480	2100-3211
A1R129	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R130	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R131	2100-3212	2	R VAR 200 OHM	28480	2100-3212
A1R132	0698-4431	1	RESISTOR 2.05K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2051-F
A1R133	2100-3212		R VAR 200 OHM	28480	2100-3212
A1R134	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R135	0698-5137	4	RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R136	0698-5137		RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R137	0698-5137		RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R138	0698-5137		RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R139	0757-0384		RESISTOR 20 1% 125W F TC=0+-100		
A1S1	3101-0597	1	SWITCH-PB 9STA .394 IN-CTRS .25A 120VAC	28480	3101-0597
A1S2	3101-0596	1	SWITCH-PB 3STA INTLH .394 IN-CTRS .25A	28480	3101-0596
A1S3	3101-0595	1	SWITCH-PB 5STA .394 IN-CTRS .25A 120VAC	28480	3101-0595
A1S4	3101-0593	1	SWITCH-PB 5STA .394 IN-CTRS .25A 120VAC	28480	3101-0593
A1S5	3101-0598	1	SWITCH-PB DPDT MOM	28480	3101-0598
A1S6	3101-0555	1	SWITCH-PB DPDT ALTNG 4A 250VAC	28480	3101-0555
A1S7	3101-0629	2	SWITCH-SL DPDT-NS MINTR 2A 250VAC PC	28480	3101-0629
A1S8	3101-0629		SWITCH-SL DPDT-NS MINTR 2A 250VAC PC	28480	3101-0629
A1U1	1826-0092	1	IC AMPL	28480	1826-0092
A1U2	1820-0111	1	IC MC1458 50 N GATE		
A1U3	1820-0065	1	IC SN74 70 N FLIP-FLOP	01295	SN7470N
A1U4	1820-0330	1	IC SN74H 53 N GATE	01295	SN74H53N
A1U5	1820-0196	2	IC RGLTR	07263	723HC
A1U6	1820-0196		IC RGLTR	07263	723HC

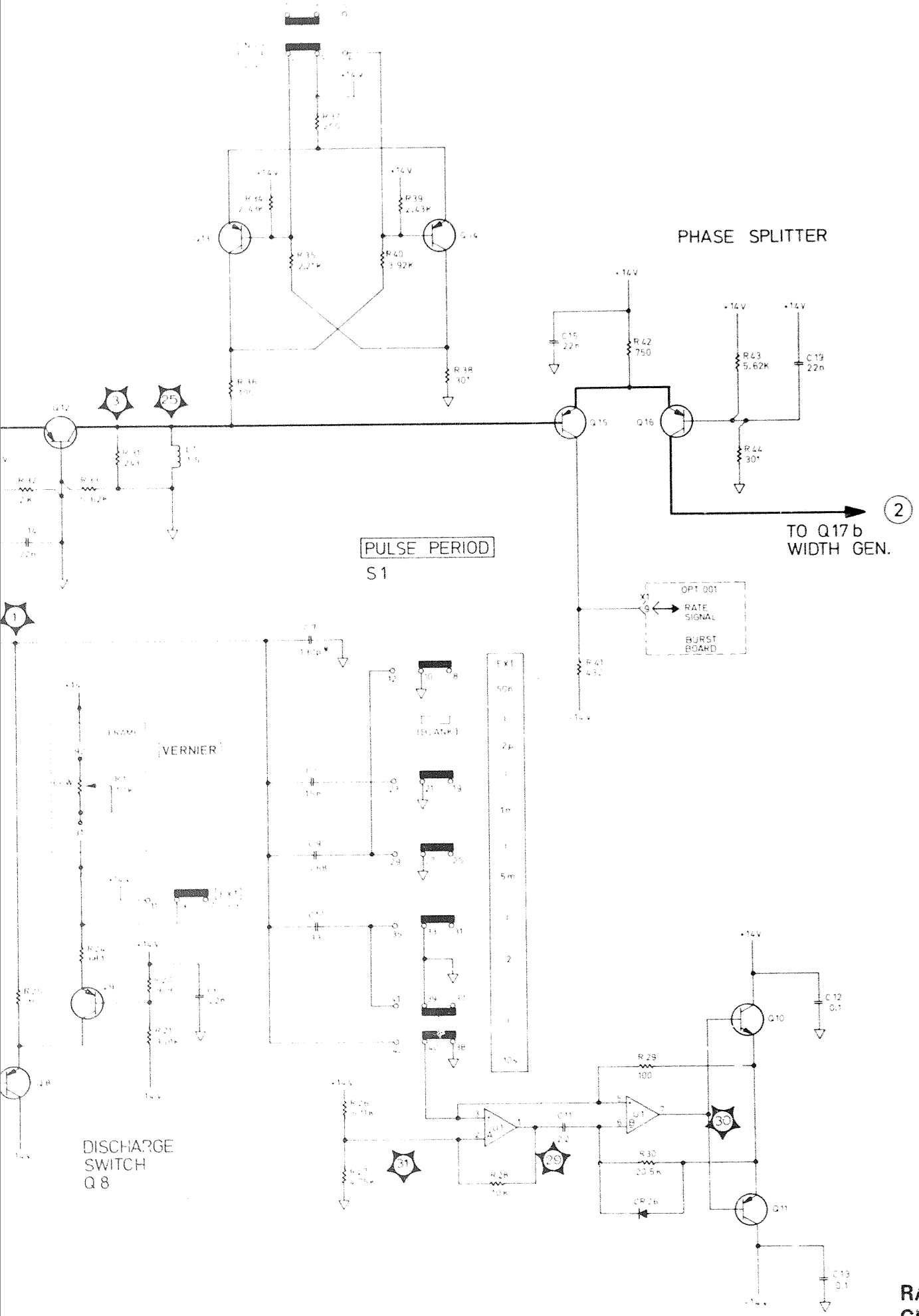


NOTES:

1. ALL VOLTAGES ARE REFERENCED TO FLOATING GROUND.
2. ALL SWITCHES ARE SHOWN IN THE "OUT" POSITION

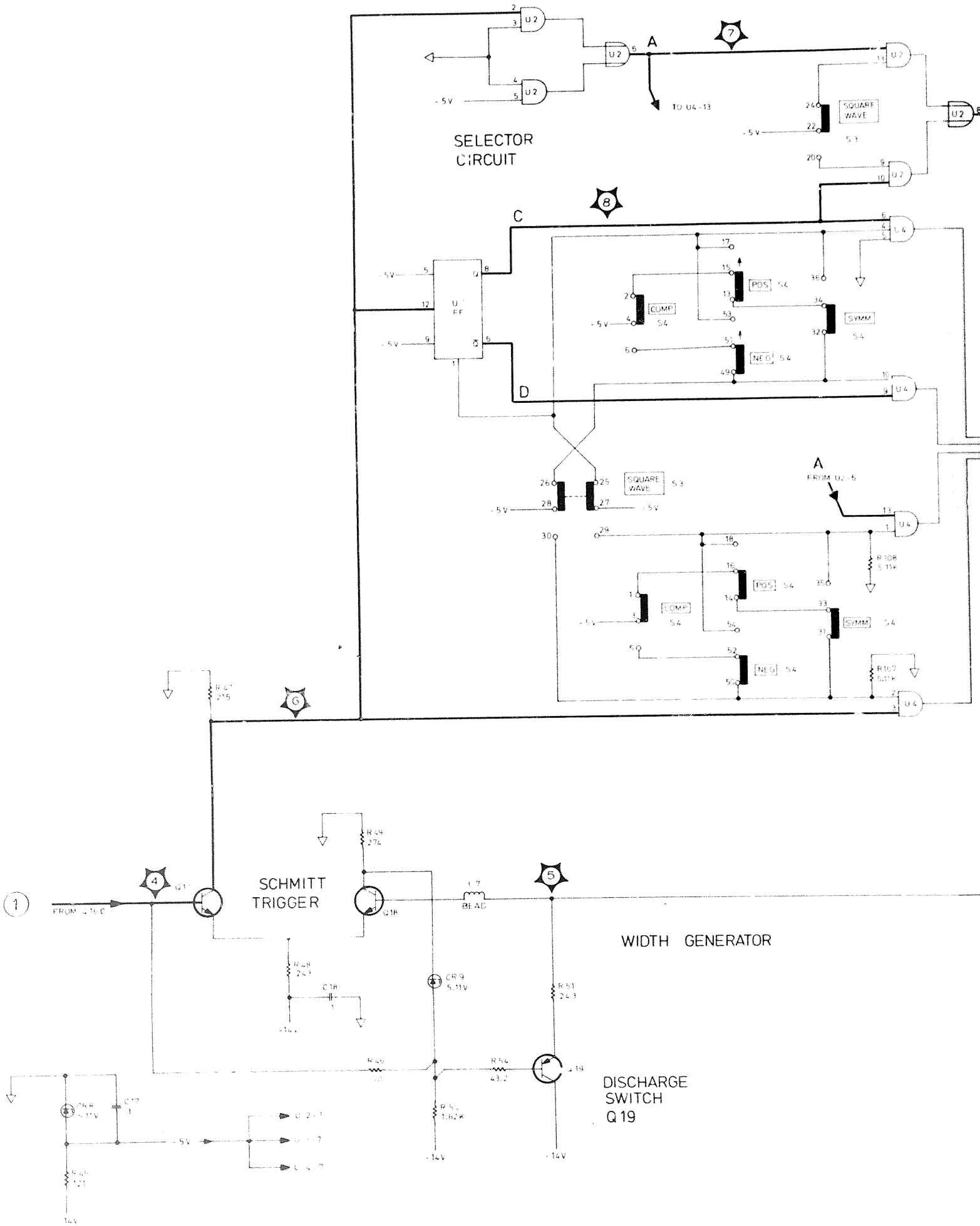
3. COMPONENT A1C7 IS FACTORY SELECTABLE AND MAY VARY FROM 120pF TO 140pF (INFLUENCES MAXIMUM REPETITION RATE)

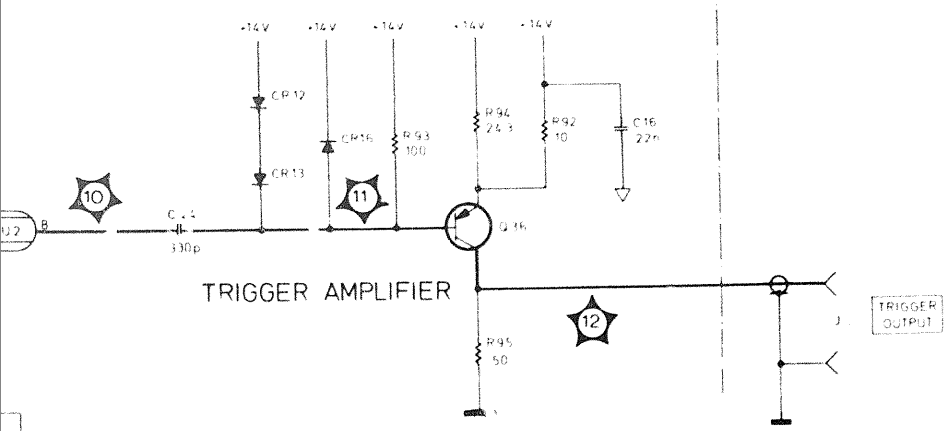


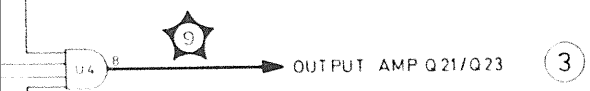


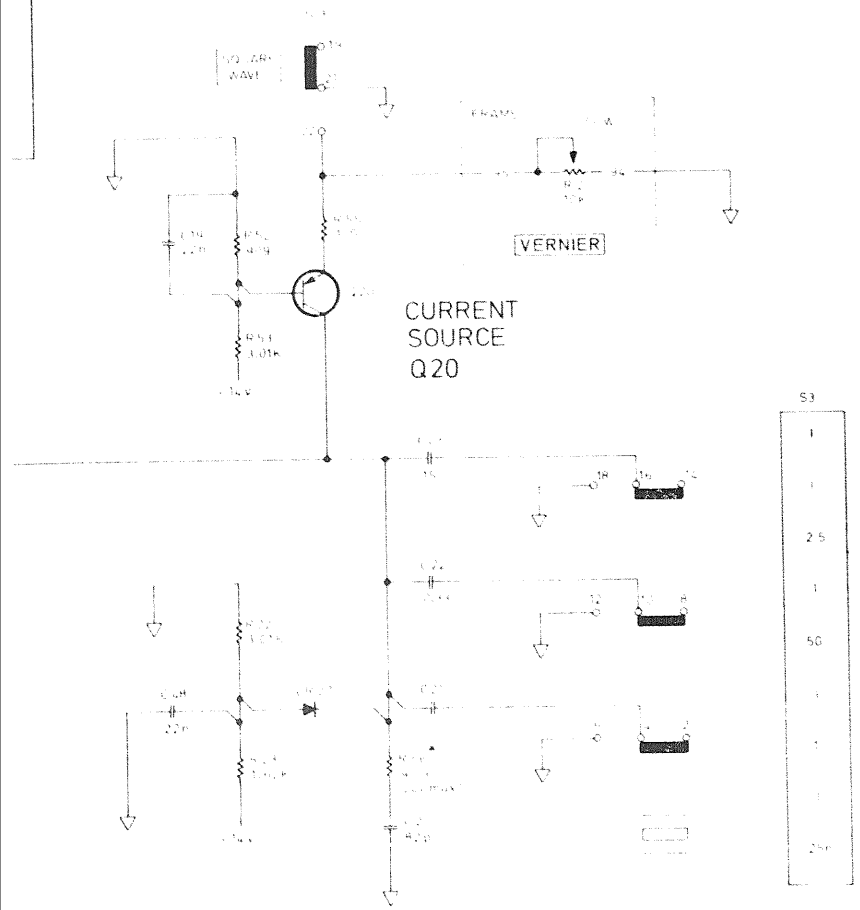
1

RATE GENERATOR



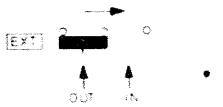






NOTES:

1. UNLESS OTHERWISE STATED ALL VOLTAGES ARE REFERENCED TO FLOATING GROUND.
2. ALL SWITCHES ARE SHOWN IN THE "OUT" POSITION

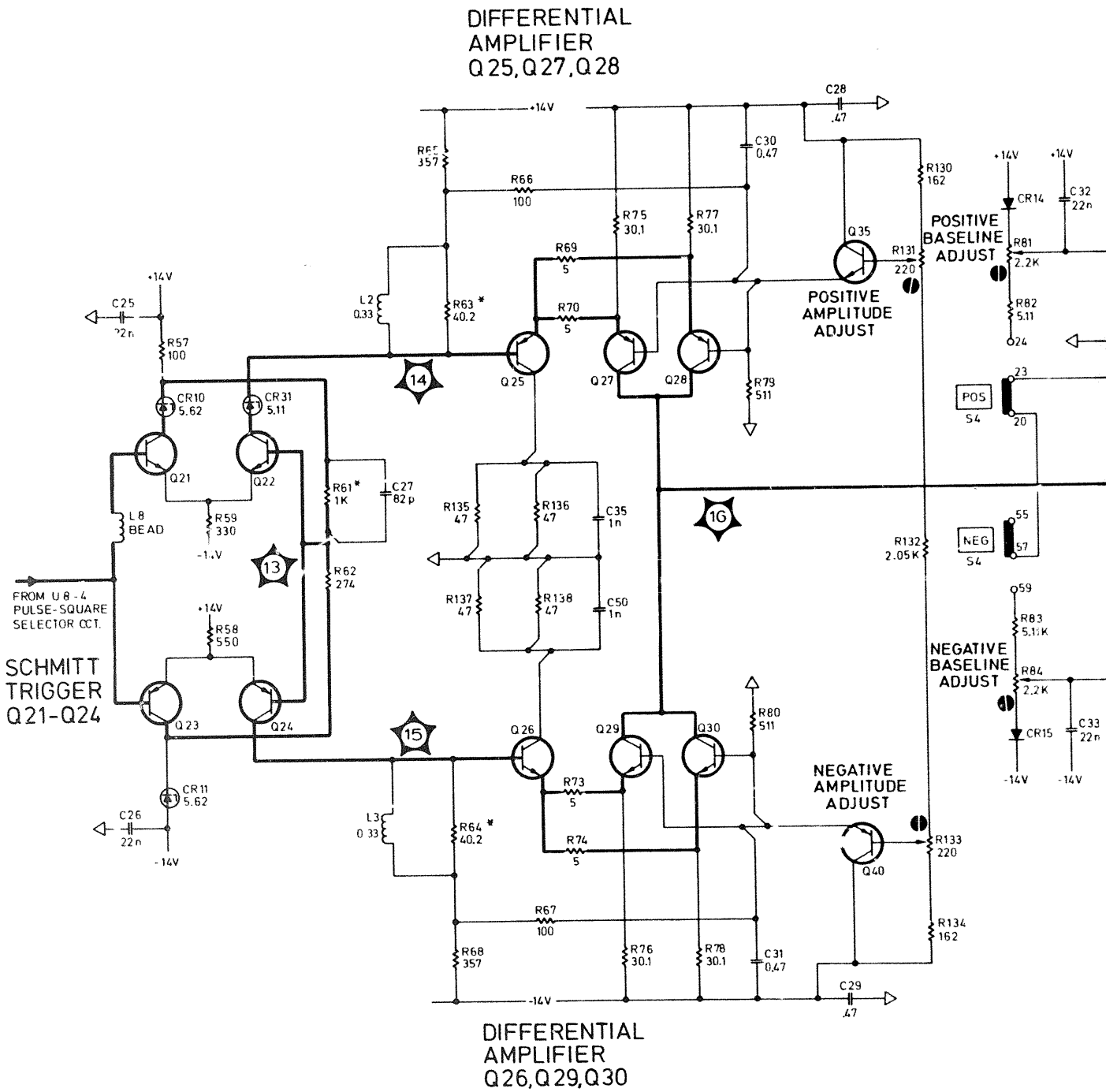


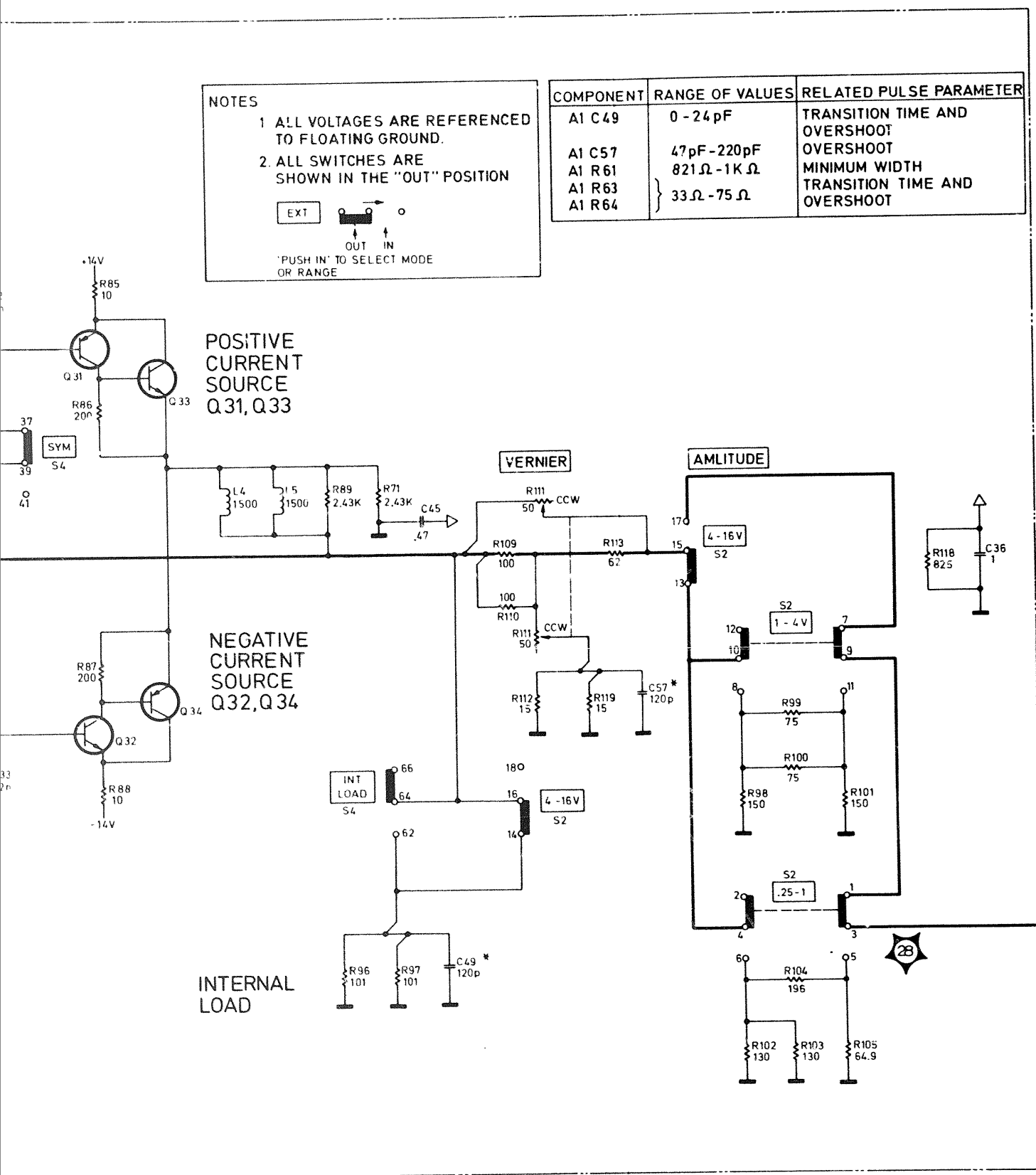
3. COMPONENT A1R56 IS FACTORY SELECTABLE AND MAY VARY FROM 90.9 Ω TO 200 Ω (INFLUENCES MINIMUM WIDTH)

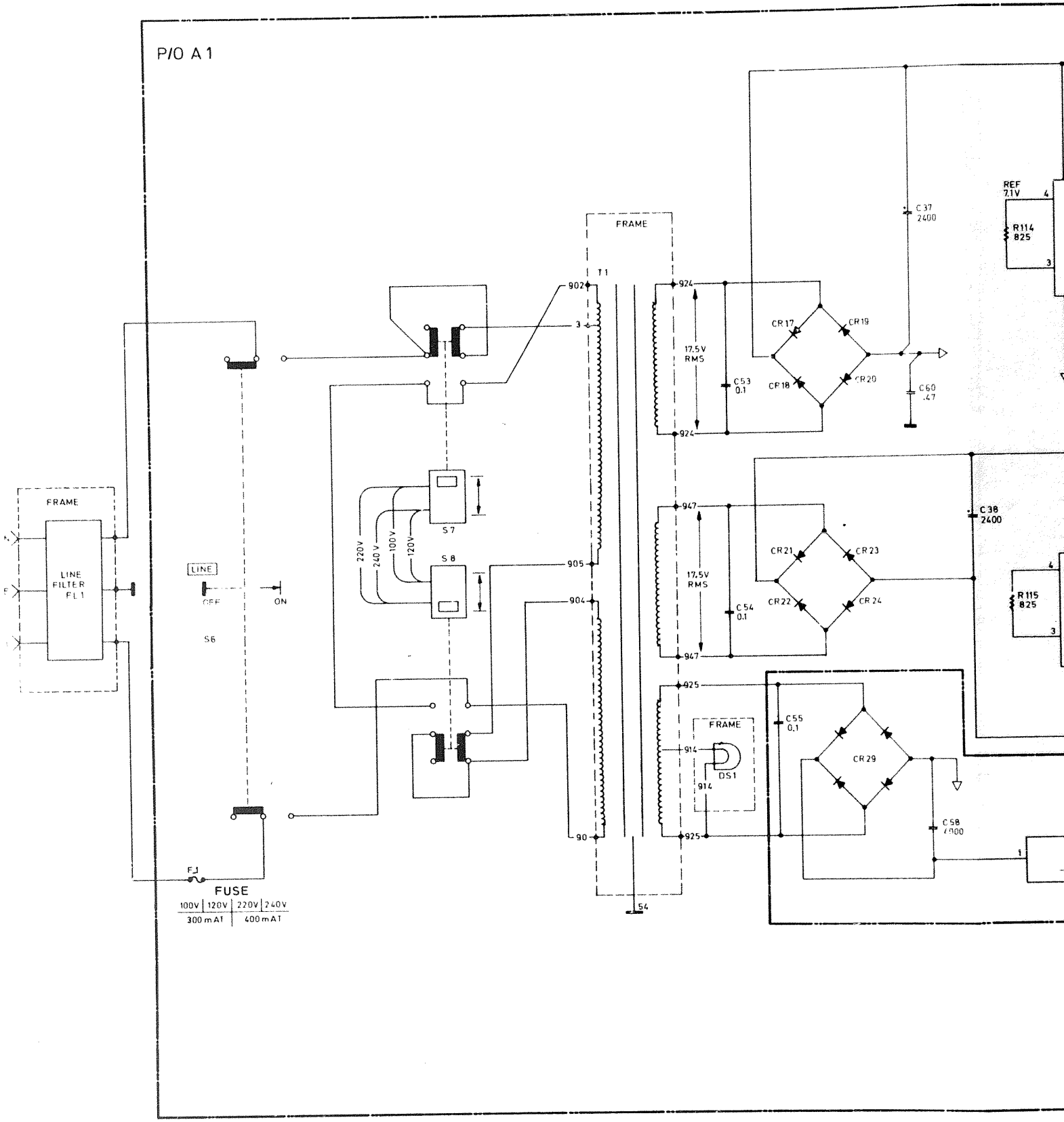
2

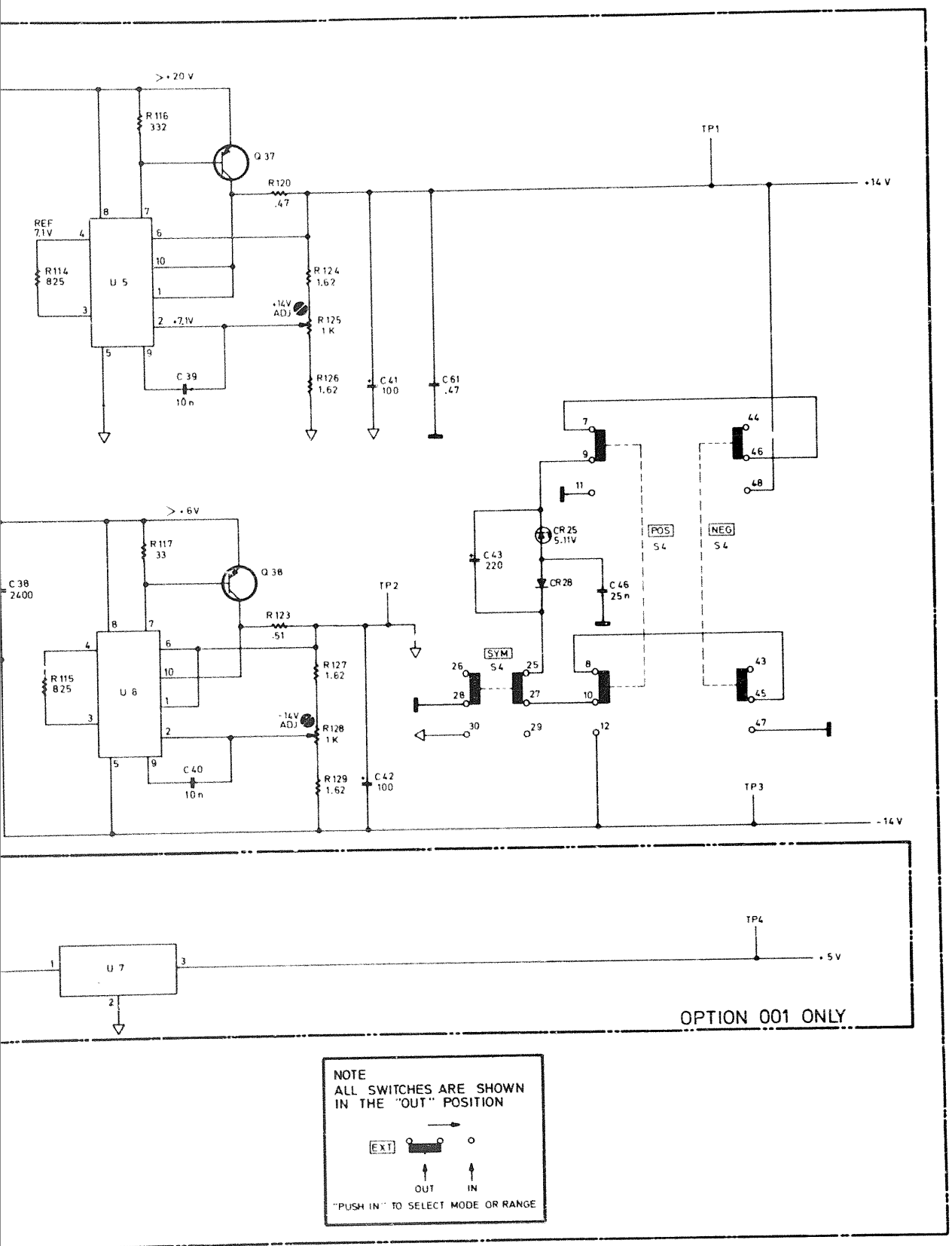
WIDTH GENERATOR AND SELECTOR CIRCUIT

P/O A1









NOTE
ALL SWITCHES ARE SHOWN IN THE "OUT" POSITION

"PUSH IN" TO SELECT MODE OR RANGE

4

POWER SUPPLY

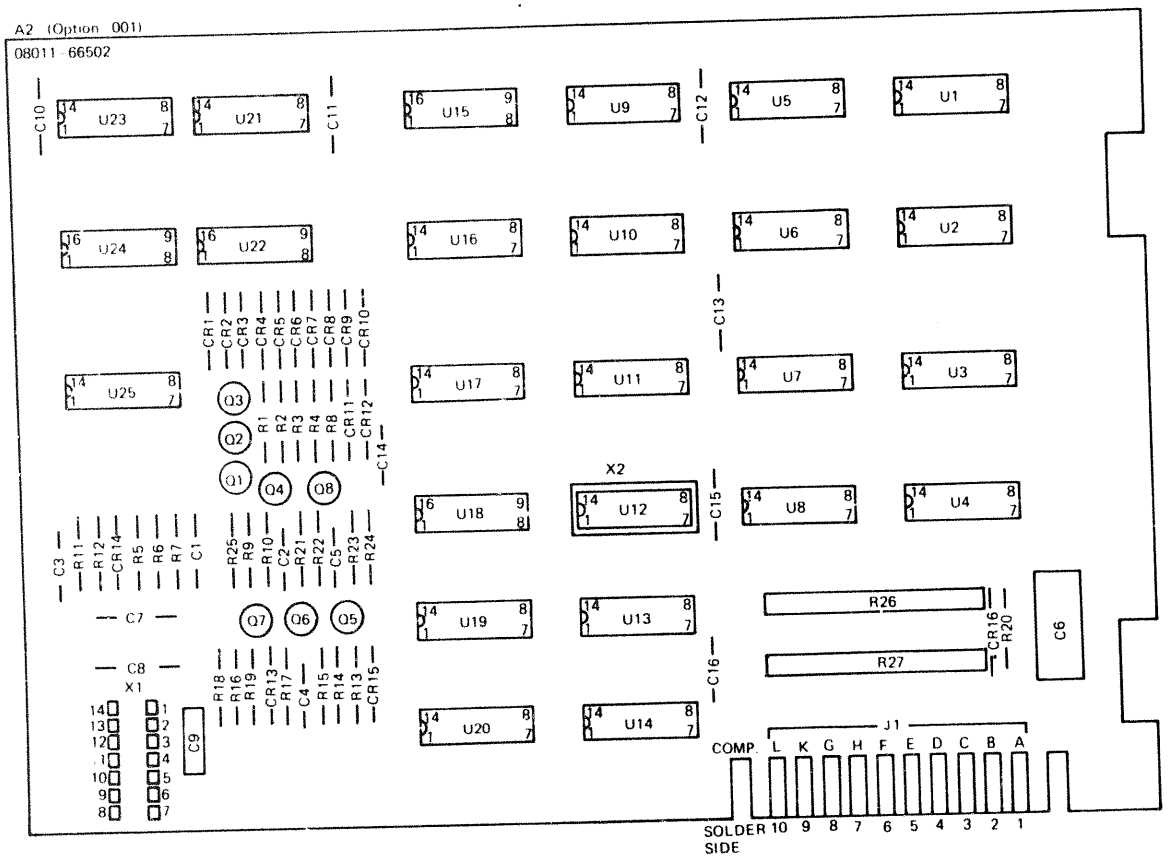


Table 6—6. Board A2 (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2	08011-66502		BOARD ASSEMBLY, BURST (OPTION 001)	28480	08011-66502
A2C1	0160-4210	3	CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A2C2	0140-0192	1	CAPACITOR-FXD 68PF +-5% 300WVDC MICA	72136	DM15E680J0300WV1CR
A2C3	0160-2216	1	CAPACITOR-FXD 820PF +-5% 300WVDC MICA	28480	0160-2216
A2C4	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A2C5	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A2C6	0180-0229	2	CAPACITOR-FXD: 33UF+-10% 10VDC TA-SOLID	56289	150D336X9010B2
A2C7	0160-4213	2	CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A2C8	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A2C9	0180-0229		CAPACITOR-FXD: 33UF+-10% 10VDC TA-SOLID	56289	150D336X9010B2
A2C10	0160-2930	7	CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2C11	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2C12	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2C13	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2C14	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2C15	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2C16	0160-2930		CAPACITOR-FXD .01UF +80-20% 100WVDC CER	28480	0160-2930
A2CR1	1901-0179	11	DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR2	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR3	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR4	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR5	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR6	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR7	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR8	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR9	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR10	1901-0535	1	DIODE-SCHOTTKY	28480	1901-0535
A2CR11	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR12	1901-0179		DIODE-SWITCHING 15V 50NA 750PS DO-7	28480	1901-0179
A2CR13	1901-0040	4	DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A2CR14	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A2CR15	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A2CR16	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A2Q1	1854-0215	2	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A2Q2	1853-0089	5	TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A2Q3	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A2Q4	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A2Q5	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A2Q6	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A2Q7	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A2Q8	1854-0005	1	TRANSISTOR NPN 2N708 SI TO-18 PD=360MW	28480	1854-0005
A2R1	0757-0411	2	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-TO-332R-F
A2R2	2698-3242	1	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A2R3	0757-0398	2	RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A2R4	0757-0388		RESISTOR 30.1 1% .125W F TC=0+-100	24546	C4-1/8-TO-30R1-F
A2R5	0757-0413	1	RESISTOR 392 1% .125W F TC=0+-100	24546	C4-1/8-TO-392R-F
A2R6	0757-0417	2	RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-TO-562R-F
A2R7	0757-0410	2	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-TO-301R-F
A2R8	0757-0410		RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-TO-301R-F
A2R9	0757-0417		RESISTOR 562 1% .125W F TC=0+-100	24546	C4-1/8-TO-562R-F
A2R10	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-TO-332R-F
A2R11	0757-0437	1	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-TO-4751-F
A2R12	0757-0416	1	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-TO-511R-F
A2R13	0757-0407	1	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-TO-201-F
A2R14	0757-0401	1	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-TO-101-F
A2R15	0757-0428	1	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1621-F
A2R16	0757-0444	1	RESISTOR 12.1K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1212-F
A2R17	0698-3496	1	RESISTOR 3.57K 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A2R18	0757-0433	2	RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3321-F
A2R19	0757-0443	1	RESISTOR 11K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1102-F
A2R20	0757-0442	1	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1002-F
A2R21	0757-0433		RESISTOR 3.32K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3321-F
A2R22	0698-3432	1	RESISTOR 2.67K 1% .125W F TC=0+-100	16299	C4-1/8-TO-2671-F
A2R23	0757-0421	1	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-TO-825R-F
A2R24	0757-0283	1	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-TO-2001-F
A2R25	0757-0435	1	RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-TO-3921-F
A2R26	1810-0055	2	NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0055
A2R27	1810-0055		NETWORK-RES 9-PIN-SIP .15-PIN-SPCG	28480	1810-0055

Table 6–6. (cont'd) Board A2 (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A2U1	1820-0070	4	IC SN74 30 N GATE	01295	SN7430N
A2U2	1820-0070		IC SN74 30 N GATE	01295	SN7430N
A2U3	1820-0174	6	IC SN74 04 N INV	01295	SN7404N
A2U4	1820-0174		IC SN74 04 N INV	01295	SN7404N
A2U5	1820-0282	4	IC SN74 86 N GATE	01295	SN7486N
A2U6	1820-0282		IC SN74 86 N GATE	01295	SN7486N
A2U7	1820-0282		IC SN74 86 N GATE	01295	SN7486N
A2U8	1820-0282		IC SN74 86 N GATE	01295	SN7486N
A2U9	1820-0070		IC SN74 30 N GATE	01295	SN7430N
A2U10	1820-0174		IC SN74 04 N INV	01295	SN7404N
A2U11	1820-0070		IC SN74 30 N GATE	01295	SN7430N
A2U12	1820-0328	1	IC SN74 02 N GATE	01295	SN7402N
A2U13	1820-0174		IC SN74 04 N INV	01295	SN7404N
A2U14	1820-0054	3	IC SN74 00 N GATE	01295	SN7400N
A2U15	1820-1277	3	IC SN74 192 N COUNTER	01295	SN74192N
A2U16	1820-0371	1	IC SN74H 10 N GATE	01295	SN74H10N
A2U17	1820-0076	1	IC SN74 76 N FLIP-FLOP	01295	SN7476N
A2U18	1820-0629	1	IC SN74S 112 N FLIP-FLOP	01295	SN74S112N
A2U19	1820-0304	1	IC SN74 72 N FLIP-FLOP	01295	SN7472N
A2U20	1820-0054		IC SN74 00 N GATE	01295	SN7400N
A2U21	1820-0174		IC SN74 04 N INV	01295	SN7404N
A2U22	1820-1277		IC SN74 192 N COUNTER	01295	SN74192N
A2U23	1820-0174		IC SN74 04 N INV	01295	SN7404N
A2U24	1820-1277		IC SN74 192 N COUNTER	01295	SN74192N
A2U25	1820-0054		IC SN74 00 N GATE	01295	SN7400N
A2X1	1200-0424	1	SOCKET IC 14 CON	23880	CSA 2900-14B
A2X2	1200-0474	1	SOCKET IC 14 CON	23880	CSA-3100-14B

Table 6–7. Frame (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
			(OPTION 001)		
A1	08011-66504		BOARD ASSEMBLY, PGEN-BURST	28480	08011-66504
A2	08011-66502	1	BOARD ASSEMBLY, BURST	28480	08011-66502
A3	08011-66503	1	BOARD ASSEMBLY, CONNECTOR	28480	08011-66503
MP2	5040-7023	2	PUSH-ROD	28480	5040-7023
MP3	0370-2486	2	KNOB, PUSHBUTTON, SINGLE BURST, BURST	28480	0370-2486
MP4	08011-00207	1	PANEL, FRONT, OPT 001	28480	08011-00207
S1	3100-0552	4	SWITCH, THUMBWHEEL	28480	3100-0552

Table 6–8. Board A1 (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1	08011-66504	1	BOARD ASSEMBLY,PGEN-BURST (OPTION 001)	29480	08011-66504
A1C1	0160-2208	2	CAPACITOR-FXD 330PF +-5% 300WVDC MICA	28480	0160-2208
A1C2	0160-4210	17	CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C3	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C4	0140-0210	1	CAPACITOR-FXD 270PF +-5% 300WVDC MICA	72136	DM15F271J0300WV1CR
A1C5	0160-2150	1	CAPACITOR-FXD 33PF +-5% 300WVDC MICA	28480	0160-2150
A1C6	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C7	0140-0195	1	CAPACITOR-FXD 130PF +-5% 300WVDC MICA	72136	DM15F131J0300WV1CR
A1C8	0160-3715	1	CAPACITOR-FXD .015UF +-10% 250WVDC MET	28480	0160-3715
A1C9	0160-3725	1	CAPACITOR-FXD .68UF +-10% 40WVDC MET	28480	0160-3725
A1C10	0180-0229	1	CAPACITOR-FXD; 33UF+-10% 10VDC TA-SOLID	56289	150D336X9010B2
A1C11	0160-3839	1	CAPACITOR-FXD 2.2UF +-10% 40WVDC MET	28480	0160-3839
A1C12	0160-4213	6	CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C13	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C14	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C15	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C16	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C17	0160-0127	2	CAPACITOR-FXD 1UF +-20% 25WVDC CER	28480	0160-0127
A1C18	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C19	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C20	0140-0193	2	CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A1C21	0160-3220	1	CAPACITOR-FXD 6800PF +-5% 250WVDC MET	FR009	CKB-68
A1C22	0160-3723	1	CAPACITOR-FXD .33UF +-10% 40WVDC MET	28480	0160-3723
A1C23	0180-1746	1	CAPACITOR-FXD; 15UF+-10% 20VDC TA-SOLID	56289	150D156X9020B2
A1C24	0160-2208		CAPACITOR-FXD 330PF +-5% 300WVDC MICA	28480	0160-2208
A1C25	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C26	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C27	0140-0193		CAPACITOR-FXD 82PF +-5% 300WVDC MICA	72136	DM15E820J0300WV1CR
A1C28	0160-0174	7	CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C29	0160-0174		CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C30	0160-0174		CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C31	0160-0174		CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C32	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C33	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C34	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C35	0160-2959	2	CAPACITOR-FXD 1000PF +80-20% 1000WVDC	28480	0160-2959
A1C36	0160-0127		CAPACITOR-FXD 1UF +-20% 25WVDC CER	28480	0160-0127
A1C37	0180-2240	2	CAPACITOR-FXD; 2400UF+75-10% 25VDC AL	56289	39D248G025JL2
A1C38	0180-2240		CAPACITOR-FXD; 2400UF+75-10% 25VDC AL	56289	39D248G025JL2
A1C39	0160-4209	2	CAPACITOR-FXD .01UF -+20% 50WVDC POLYE	28480	0160-4209
A1C40	0160-4209		CAPACITOR-FXD .01UF -+20% 50WVDC POLYE	28480	0160-4209
A1C41	0180-0061	3	CAPACITOR-FXD; 100UF-75-10% 16VDC AL	56289	30D107G016DC2
A1C42	0180-0061		CAPACITOR-FXD; 100UF-75-10% 16VDC AL	56289	30D107G016DC2
A1C43	0180-0061		CAPACITOR-FXD; 100UF-75-10% 16VDC AL	56289	30D107G016DC2
A1C44	0160-2306	1	CAPACITOR-FXD 27PF +-5% 300WVDC MICA	28480	0160-2306
A1C45	0160-0174		CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C46	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C47	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C48	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C49	0160-2259	1	CAPACITOR-FXD 12PF +-5% 500WVDC CER	28480	0160-2259
A1C50	0160-2959		CAPACITOR-FXD 1000PF +80-20% 1000WVDC	28480	0160-2959
A1C51	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C52	0160-4210		CAPACITOR-FXD .022UF +-20% 50WVDC POLYE	28480	0160-4210
A1C53	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C54	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C55	0160-4213		CAPACITOR-FXD .1UF +-20% 50WVDC POLYE	28480	0160-4213
A1C57	0160-2205	1	CAPACITOR-FXD 120PF +-5% 300WVDC MICA	28480	0160-2205
A1C57	0160-0134	1	CAPACITOR-FXD 220PF +-5% 300WVDC MICA	28480	0160-0134
A1C58	0180-2296	1	CAPACITOR-FXD 4000UF +75-10% 15VDC AL	28480	0180-2296
A1C60	0160-0174		CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C61	0160-0174		CAPACITOR-FXD .47UF -80-20% 25WVDC CER	28480	0160-0174
A1C62	0160-3470		CAPACITOR-FXD .01UF +50VDC CER		
A1CR1	1901-0040	13	DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR2	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR3	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR4	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR5	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR6	1902-0041	4	DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1CR7	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR8	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1CR9	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1CR10	1902-3104	2	DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110

Table 6–8. (cont'd) Board A1 (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1CR11	1902-3104		DIODE-ZNR 5.62V 5% DO-7 PD=.4W TC=+.016%	04713	SZ 10939-110
A1CR12	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR13	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR14	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR15	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR16	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR17	1901-0159	9	DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR18	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR19	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR20	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR21	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR22	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR23	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR24	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR25	1901-0159		DIODE-PWR RECT 400V 750NA DO-41	04713	SR1358-4
A1CR25	1902-1291	1	DIODE-ZNR 1N5338B 5.1V 5% PD=5W IR=1UA	04713	1N53388
A1CR26	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR27	1901-0040		DIODE-SWITCHING 30V 50NA 2NS DO-35	28480	1901-0040
A1CR29	1901-0363	1	DIODE-MULT FULL WAVE BRIDGE RECTIFIER	04713	SDA 10185-3
A1CR30	1901-0533	1	DIODE-SCHOTTKY	28480	1901-0533
A1CR31	1902-0041		DIODE-ZNR 5.11V 5% DO-7 PD=.4W TC=-.009%	04713	SZ 10939-98
A1L1	9140-0096	1	COIL FXD MOLDED RF CHOKE 10H 10%		
A1L2	9140-0096	2	COIL FXD MOLDED RF CHOKE 10H 10%		
A1L3	9100-1612		COIL-FXD MOLDED RF CHOKE .33UH 20%	24226	15/330
A1L4	9100-1657	2	COIL-FXD MOLDED RF CHOKE 1.5MH 5%	24226	22/154
A1L5	9100-1657		COIL-FXD MOLDED RF CHOKE 1.5MH 5%	24226	22/154
A1L6	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A1L7	9170-0029	3	CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A1L8	9170-0029		CORE-SHIELDING BEAD	02114	56-590-65A2/4A
A1MP1	08011-01101	1	HT-SINK FOR Q33, Q34, Q37, Q38, U7	28480	08011-01101
A1MP2	08011-01102	1	HT-SINK FOR Q27, Q28, Q29, Q30	28480	08011-01102
A1Q1	1854-0053		TRANSISTOR NPN 2N2218 SI TO-5 PD=800MW	04713	2N2218
A1Q2	1854-0053	3	TRANSISTOR NPN 2N2218 SI TO-5 PD=800MW	04713	2N2218
A1Q3	1854-0053		TRANSISTOR NPN 2N2218 SI TO-5 PD=800MW	04713	2N2218
A1Q4	1853-0089	7	TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q5	1854-0215	5	TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q6	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q7	1853-0039		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q8	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q9	1853-0036	7	TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q10	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q11	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q12	1853-0039		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q13	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q14	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q15	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q16	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q17	1854-0630	4	TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q18	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q19	1853-0089		TRANSISTOR PNP 2N4917 SI PD=200MW	07263	2N4917
A1Q20	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q21	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q22	1854-0630		TRANSISTOR NPN SI TO-52 PD=360MW	04713	SS2077
A1Q23	1853-0357	2	TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A1Q24	1853-0357		TRANSISTOR PNP SI TO-18 PD=360MW	28480	1853-0357
A1Q25	1853-0315	1	TRANSISTOR PNP SI TO-39 PD=1W FT=1GHZ	28480	1853-0315
	1205-0061	2	HEAT-DISSIPATOR SGL TO-5/TO-39 PKG	28480	1205-0061
A1Q26	1854-0498	1	TRANSISTOR TO-39 PD=1W	28480	1854-0498
	1205-0061		HEAT-DISSIPATOR SGL TO-5/TO-39 PKG	28480	1205-0061
A1Q27	1853-0012	3	TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A1Q28	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A1Q29	1854-0213	2	TRANSISTOR NPN 2N2538 SI TO-5 PD=800MW	28480	1854-0213
A1Q30	1854-0213		TRANSISTOR NPN 2N2538 SI TO-5 PD=800MW	28480	1854-0213
A1Q31	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1Q32	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q33	1854-0402	1	TRANSISTOR NPN SI PD=30W FT=3MHZ	28480	1854-0402
A1Q34	1853-0254	1	TRANSISTOR PNP SI PD=30W FT=3MHZ	28480	1853-0254
A1Q35	1854-0215		TRANSISTOR NPN SI PD=350MW FT=300MHZ	04713	SPS 3611
A1Q36	1853-0012		TRANSISTOR PNP 2N2904A SI TO-5 PD=600MW	01295	2N2904A
A1Q37	1853-0356	2	TRANSISTOR PNP SI PD=65W FT=3MHZ	28480	1853-0356
A1Q38	1853-0356		TRANSISTOR PNP SI PD=65W FT=3MHZ	28480	1853-0356
A1Q40	1853-0036		TRANSISTOR PNP SI PD=310MW FT=250MHZ	28480	1853-0036
A1R1	0758-0093	1	RESISTOR 56 5% .25W F TC=0+-100	24546	C5-1/4-TO-56R0-J
A1R2	0698-3242	4	RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-TO-357R-F
A1R3	0757-0284	2	RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-TO-151-F
A1R4	0757-0427	1	RESISTOR 1.5K 1% .125W F TC=0+-100	24546	C4-1/8-TO-1501-F
A1R5	0757-0398	1	RESISTOR 75 1% .125W F TC=0+-100	24546	C4-1/8-TO-75R0-F

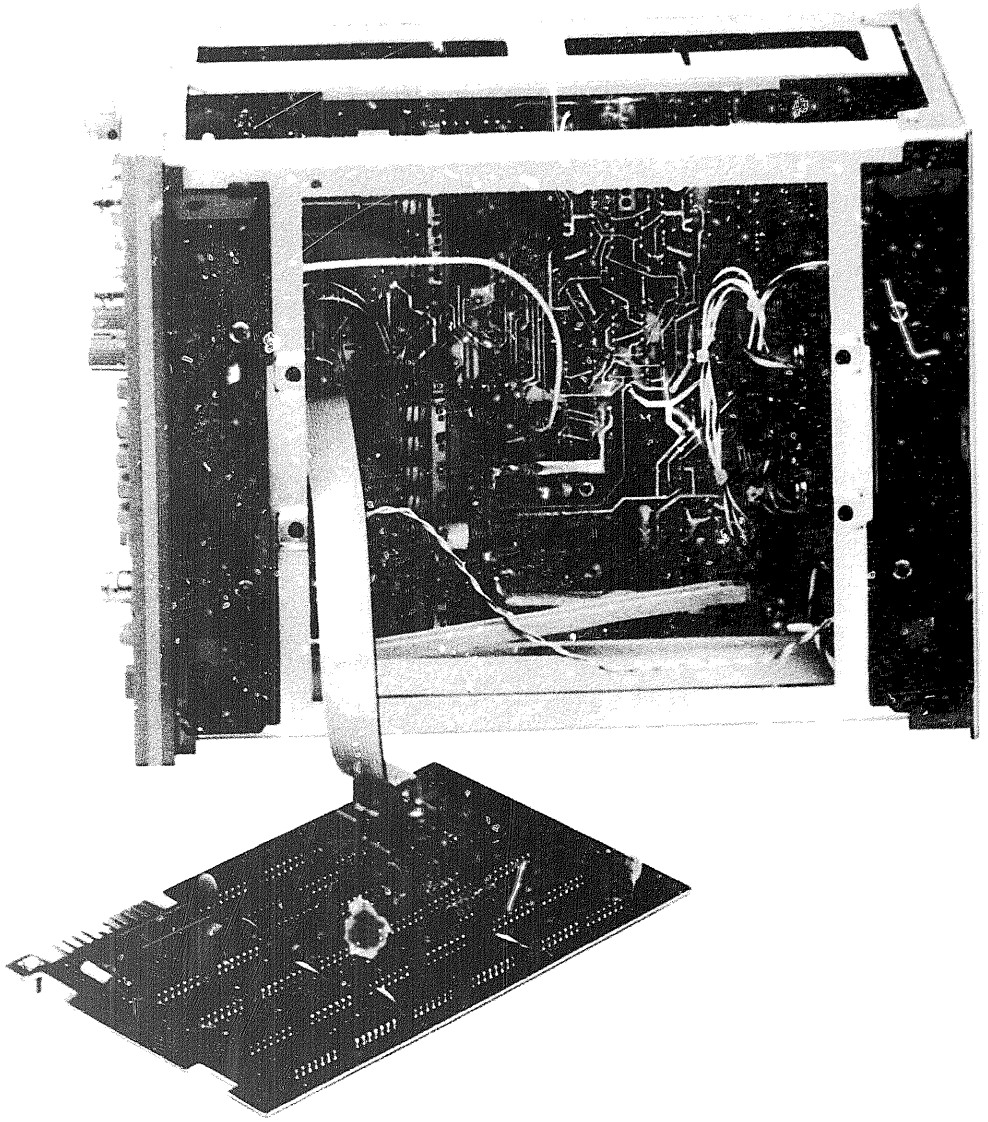
Table 6–8. (cont'd) Board A1 (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R6	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A1R7	0757-0400	2	RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A1R8	0757-0442	2	RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R9	0757-0283	2	RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R10	0757-0403	1	RESISTOR 121 1% .125W F TC=0+-100	24546	C4-1/8-T0-121R-F
A1R11	0698-3151	1	RESISTOR 2.87K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2871-F
A1R12	0757-0428	7	RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R13	0757-0407	4	RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R14	0757-0405	3	RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R15	0757-0394	2	RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R16	0758-0068	1	RESISTOR 910 5% .25W F TC=0+-100	24546	C5-1/4-T0-911-J
A1R17	0757-0411	3	RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A1R18	0757-0416	3	RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R19	0757-0437	2	RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A1R20	0757-0422	2	RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A1R21	0757-0273	3	RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A1R22	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A1R23	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R24	0757-0397	3	RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A1R25	0757-0381	1	RESISTOR 15 1% .125W F TC=0+-100	19701	MF4C1/8-T0-15R0-F
A1R26	0757-0438	5	RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R27	0757-0437		RESISTOR 4.75K 1% .125W F TC=0+-100	24546	C4-1/8-T0-4751-F
A1R28	0757-0442		RESISTOR 10K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1002-F
A1R29	0757-0401	7	RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R30	0698-3245	1	RESISTOR 20.5K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2052-F
A1R31	0757-0408	2	RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A1R32	0757-0283		RESISTOR 2K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2001-F
A1R33	0757-0290	2	RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R34	0757-0431	4	RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R35	0757-0430	1	RESISTOR 2.21K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2211-F
A1R36	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R37	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R38	0757-0410	2	RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A1R39	0757-0431		RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R40	0757-0435	1	RESISTOR 3.92K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3921-F
A1R41	0757-0414	1	RESISTOR 432 1% .125W F TC=0+-100	24546	C4-1/8-T0-432R-F
A1R42	0757-0420	1	RESISTOR 750 1% .125W F TC=0+-100	24546	C4-1/8-T0-751-F
A1R43	0757-0290		RESISTOR 5.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5621-F
A1R44	0757-0410		RESISTOR 301 1% .125W F TC=0+-100	24546	C4-1/8-T0-301R-F
A1R45	0757-0799	1	RESISTOR 121 1% .5W F TC=0+-100	19701	MF7C-1/2-T0-121R-F
A1R46	0757-0284		RESISTOR 150 1% .125W F TC=0+-100	24546	C4-1/8-T0-151-F
A1R47	0698-3441	1	RESISTOR 215 1% .125W F TC=0+-100	16299	C4-1/8-T0-215R-F
A1R48	0757-0408		RESISTOR 243 1% .125W F TC=0+-100	24546	C4-1/8-T0-243R-F
A1R49	0757-0409	2	RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A1R50	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R51	0757-0386	2	RESISTOR 24.3 1% .125W F TC=0+-100	19701	MF4C1/8-T0-24R3-F
A1R52	0757-0422		RESISTOR 909 1% .125W F TC=0+-100	24546	C4-1/8-T0-909R-F
A1R53	0757-0273		RESISTOR 3.01K 1% .125W F TC=0+-100	24546	C4-1/8-T0-3011-F
A1R54	0757-0392	1	RESISTOR 43.2 1% .125W F TC=0+-100	24546	C4-1/8-T0-43R2-F
A1R55	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R56	0757-0400		RESISTOR 90.9 1% .125W F TC=0+-100	24546	C4-1/8-T0-90R9-F
A1R57	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R58	0758-0002	1	RESISTOR 560 5% .25W F TC=0+-100	24546	C5-1/4-T0-561-J
A1R59	0758-0054	1	RESISTOR 330 5% .25W F TC=0+-100	24546	C5-1/4-T0-331-J
A1R61	0757-0280	3	RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R62	0757-0409		RESISTOR 274 1% .125W F TC=0+-100	24546	C4-1/8-T0-274R-F
A1R63	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A1R63	0698-3262	2	RESISTOR 40.2 1% .125W F TC=0+-100	16299	C4-1/8-T0-4022-F
A1R63	0757-0401		RESISTOR 100 1% .125W F TC=0+-100		
A1R64	0757-0397		RESISTOR 68.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-68R1-F
A1R64	0698-3262		RESISTOR 40.2 1% .125W F TC=0+-100	16299	C4-1/8-T0-4022-F
A1R64	0757-0384		RESISTOR 20 1% .125W F TC=0+-100		
A1R65	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A1R66	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R67	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R68	0698-3242		RESISTOR 357 1% .125W F TC=0+-100	16299	C4-1/8-T0-357R-F
A1R69	0698-7521	4	RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R70	0698-7521		RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R71	0757-0431		RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R73	0698-7521		RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R74	0698-7521		RESISTOR 5.1 5% .25W F TC=0+-100	11502	TF07-1/4-T0-5R1-J
A1R75	0757-0500	4	RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R76	0757-0500		RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R77	0757-0500		RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R78	0757-0500		RESISTOR 30.1 1% .25W F TC=0+-100	24546	C5-1/4-T0-30R1-F
A1R79	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R79	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F

Table 6–8. (cont'd) Board A1 (Option 001) Replaceable Parts List

Reference Designation	HP Part Number	Qty	Description	Mfr Code	Mfr Part Number
A1R80	0757-0280		RESISTOR 1K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1001-F
A1R80	0757-0416		RESISTOR 511 1% .125W F TC=0+-100	24546	C4-1/8-T0-511R-F
A1R81	2100-2799	2	RESISTOR, VAR 2.2K 20% 0.5W LIN CC	28480	2100-2799
A1R82	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R83	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R84	2100-2799		RESISTOR, VAR 2.2K 20% 0.5W LIN CC	28480	2100-2799
A1R85	0698-5876	2	RESISTOR 10 5% .25W F TC=0+-100	24546	C5-1/4-T0-10R0-J
A1R86	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R87	0757-0407		RESISTOR 200 1% .125W F TC=0+-100	24546	C4-1/8-T0-201-F
A1R88	0698-5876		RESISTOR 10 5% .25W F TC=0+-100	24546	C5-1/4-T0-10R0-J
A1R89	0757-0431		RESISTOR 2.43K 1% .125W F TC=0+-100	24546	C4-1/8-T0-2431-F
A1R92	0757-0346	1	RESISTOR 10 1% .125W F TC=0+-100	24546	C4-1/8-T0-10R0-F
A1R93	0757-0401		RESISTOR 100 1% .125W F TC=0+-100	24546	C4-1/8-T0-101-F
A1R94	0757-0386		RESISTOR 24.3 1% .125W F TC=0+-100	19701	MF4C1/8-T0-24R3-F
A1R95	0757-0394		RESISTOR 51.1 1% .125W F TC=0+-100	24546	C4-1/8-T0-51R1-F
A1R96	0766-0025	2	RESISTOR 101 2% 3W MO TC=0+-250	27167	FP3-3-250-101R-G
A1R97	0766-0025		RESISTOR 101 2% 3W MO TC=0+-250	27167	FP3-3-250-101R-G
A1R98	0761-0035	2	RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-J
A1R99	0758-0080	2	RESISTOR 75 5% .25W F TC=0+-100	24546	C5-1/4-T0-75R0-J
A1R100	0758-0080		RESISTOR 75 5% .25W F TC=0+-100	24546	C5-1/4-T0-75R0-J
A1R101	0761-0035		RESISTOR 150 5% 1W MO TC=0+-200	24546	FP32-1-T00-151-J
A1R102	0758-0092	2	RESISTOR 130 5% .25W F TC=0+-100	24546	C5-1/4-T0-131-J
A1R103	0758-0092		RESISTOR 130 5% .25W F TC=0+-100	24546	C5-1/4-T0-131-J
A1R104	0757-1060	1	RESISTOR 196 1% .5W F TC=0+-100	19701	MF7C1/2-T0-196R-F
A1R105	0698-4825	1	RESISTOR 64.9 1% .5W F TC=0+-100	24546	NA6
A1R107	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R108	0757-0438		RESISTOR 5.11K 1% .125W F TC=0+-100	24546	C4-1/8-T0-5111-F
A1R109	0698-3620	2	RESISTOR 100 5% 2W MO TC=0+-200	24546	FP42-2-T00-100R-J
A1R110	0698-3620		RESISTOR 100 5% 2W MO TC=0+-200	24546	FP42-2-T00-100R-J
A1R111	2100-3104	1	RESISTOR, VAR 50 OHM 10% 5W, CC	01121	0BD
A1R112	0698-5880	2	RESISTOR 15 5% .25W F TC=0+-100	24546	C5-1/4-T0-15R0-J
A1R113	0698-3616	1	RESISTOR 62 5% 2W MO TC=0+-200	16299	FP42-2-T00-62R0-J
A1R114	0757-0421	3	RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R115	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R116	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A1R117	0757-0411		RESISTOR 332 1% .125W F TC=0+-100	24546	C4-1/8-T0-332R-F
A1R118	0757-0421		RESISTOR 825 1% .125W F TC=0+-100	24546	C4-1/8-T0-825R-F
A1R119	0698-5880		RESISTOR 15 5% .25W F TC=0+-100	24546	C5-1/4-T0-15R0-J
A1R120	0812-0021	2	RESISTOR .47 5% 3W PW TC=0+-90	91637	CW281-3-T2-47/100-J
A1R123	0812-0021		RESISTOR .47 5% 3W PW TC=0+-90	91637	CW281-3-T2-47/100-J
A1R124	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R125	2100-2800	2	R:VAR CERMET 1000 OHM 20%	28480	2100-2800
A1R126	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R127	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R128	2100-2800		R:VAR CERMET 1000 OHM 20%	28480	2100-2800
A1R129	0757-0428		RESISTOR 1.62K 1% .125W F TC=0+-100	24546	C4-1/8-T0-1621-F
A1R130	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R131	2100-2739	2	R:VAR 220 OHM	28480	2100-2739
A1R132	0698-4431	1	RESISTOR 2.05K 1% .125W F TC=0+-100	16299	C4-1/8-T0-2051-F
A1R133	2100-2739		R:VAR 220 OHM	28480	2100-2739
A1R134	0757-0405		RESISTOR 162 1% .125W F TC=0+-100	24546	C4-1/8-T0-162R-F
A1R135	0698-5137	4	RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R136	0698-5137		RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R137	0698-5137		RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R138	0698-5137		RESISTOR 47 5% .25W F TC=0+-100	24546	C5-1/4-T0-47R0-D
A1R139	0757-0384		RESISTOR 20 1% 125W F TC=0+-100		
A1S1	3101-0597	1	SWITCH-PB 9STA .394 IN-CTRS .25A 120VAC	28480	3101-0597
A1S2	3101-0596	1	SWITCH-PB 3STA INTLH .394 IN-CTRS .25A	28480	3101-0596
A1S3	3101-0595	1	SWITCH-PB 5STA .394 IN-CTRS .25A 120VAC	28480	3101-0595
A1S4	3101-0593	1	SWITCH-PB 5STA .394 IN-CTRS .25A 120VAC	28480	3101-0593
A1S5	3101-0598	1	SWITCH-PB DPDT MOM	28480	3101-0598
A1S6	3101-0555	1	SWITCH-PB DPDT ALTNG 4A 250VAC	28480	3101-0555
A1S7	3101-0629	2	SWITCH-SL DPDT-NS MINTR 2A 250VAC PC	28480	3101-0629
A1S8	3101-0629		SWITCH-SL DPDT-NS MINTR 2A 250VAC PC	28480	3101-0629
A1S9	3101-0594	1	SWITCH-PB 2STA .394 IN-CTRS .25A 120VAC	28480	3101-0594
A1U1	1826-0092	1	IC AMPL	28480	1826-0092
A1U2	1820-0111	1	IC MC 1458 50 N GATE	01295	SN74H50N
A1U3	1820-0065	1	IC SN74 70 N FLIP-FLOP	01295	SN7470N
A1U4	1820-0380	1	IC SN74H 53 N GATE	01295	SN74H53N
A1U5	1820-0196	2	IC RGLTR	07263	723HC
A1U6	1820-0196		IC RGLTR	07263	723HC
A1U7	1826-0122	1	IC RGLTR	07263	7805UC
A1W1	8120-1459	1	CABLE RIBBON	28480	8120-1459
A1X1	1251-2499	2	CONNECTOR FOR W1	76381	3406-0000

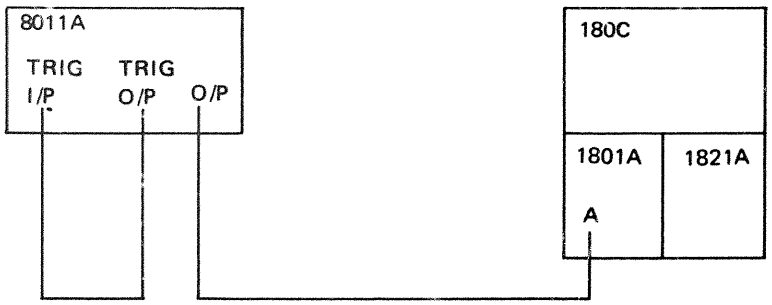
Removal of Board A2 (Burst Option) for Troubleshooting



Board A2 is removed, as follows, in preparation for the troubleshooting procedure:

1. Remove screw fixing board A2 to the frame.
2. Place 8011A on its side
3. Remove board A2, leaving ribbon cable, W1 connected (see photograph above)

Table 6–9. Burst Option Troubleshooting



1. With oscilloscope set to 1μs/division, set the 8011A output to exactly 1 MHz with minimum width.
2. Set 8011A to Burst Mode.
3. Connect the 8011A TRIGGER OUTPUT to the 8011A TRIGGER INPUT.
4. Disconnect the base connection of transistor A2Q4 and leave as 'open base'.
5. Disconnect pin 13 of A2U12 from socket X2 and leave as 'open circuit'.
6. Wire-connect the open track (from which A2U12 pin 13 is disconnected) to floating ground.
7. Set 1821A to internal trigger.
8. Check the waveforms detailed in the following list:

Test Point	8011 Board A2 Reference Point	Oscilloscope Screen	180C Time/Div	Trigger Slope
1	U18 Pin 1		1μs	⊖
2	U15 Pin 4	20% Screen Width	1μs	⊖
3	U22 Pin 4	10% Screen Width	10μs	⊖
4	U24 Pin 4	10% Screen Width	0.1ms	⊖
5	U24 Pin 7	20% Screen Width	1ms	⊖
6	U2 Pin 8	1% Screen Width	10μs	⊖
7	U1[illegible] 8	1% Screen Width	1ms	⊖
8	U12 Pins 10, 11	1/100 % Screen Width	1ms	⊕
9	U11 Pin 8	1% Screen Width	10μs	⊖
10	U9 Pin 8	1% Screen Width	1ms	⊖
11	U19 Pin 2	1/100% Screen Width	1ms	⊖
12	Q3 emmitter	1/100% Screen Width	1ms	⊕
13	U19 Pin 13		1μs	⊖
14	U19 Pin 6	1/100% Screen Width	1ms	⊕
15	Q3 collector	1/100% Screen Width	1ms	⊕
16	U19 Pin 8	1/100% Screen Width	1ms	⊖
17	U12 Pin 13	* 1/100% Screen Width	1ms	⊕

NOTES: 1. * Only for Burst number greater than 0000
2. Some duty cycles are difficult to see on oscilloscope screen

9. Set the 8011A to SYM output and check all power supply voltages.
10. Check that all the A2J1 pins which are normally connected to the thumbwheel switches (but now disconnected) are high.

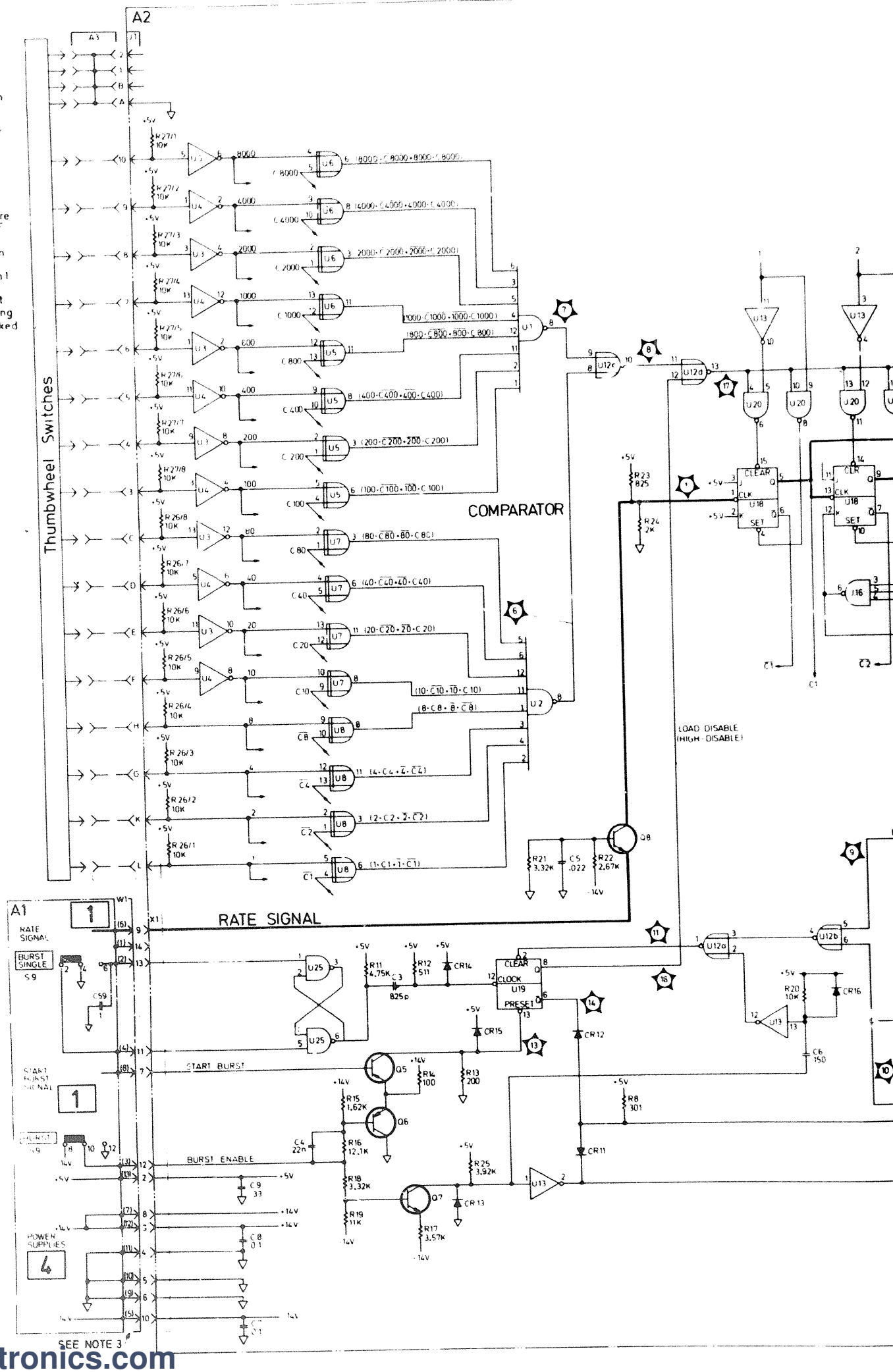
NOTES

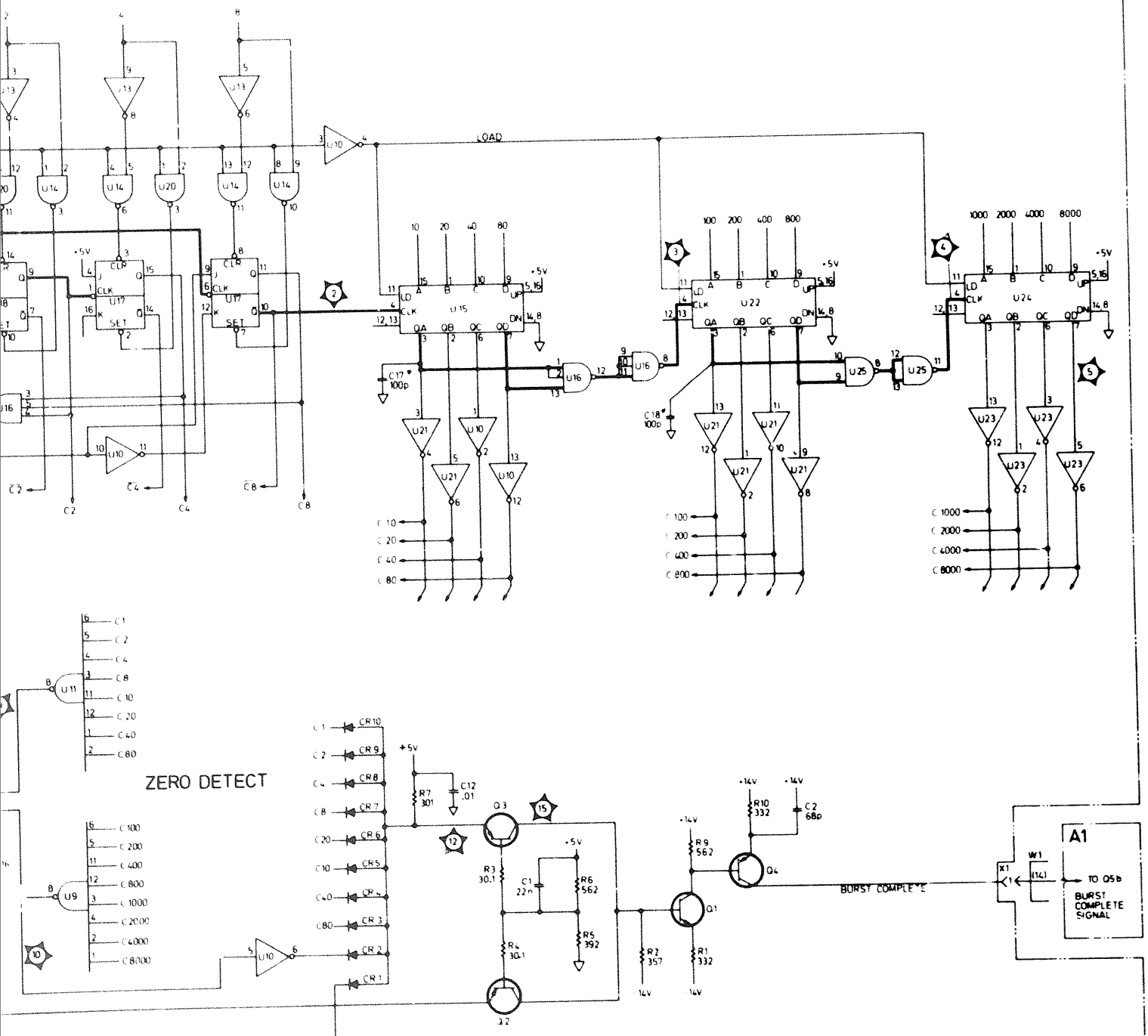
1 Outputs from the exclusive OR gates MC 6 to MC 8 are given in the Boolean Algebra form e.g. (80 $\overline{C80}$ + $\overline{80}$ · C 80) means ...iat the output is "true" when either 80 is present and C 80 is not present or when 80 is not present and C 80 is present

2 Normally components A2 C17 and A2 C18 are not needed, but on occasions when they are needed, both values are 100pF

3 Pin numbers marked between cable W1 and socket A2 X1 refer to the X1 pin number (pin 1 of socket X1 is marked by a solder spot on the component side of A2) The corresponding cable W1 pin number is marked in brackets

4 ⬡ indicates a trouble-shooting test point (see table facing)





5

OPTION 001
BURST BOARD

7–1 INTRODUCTION

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

NOTES: 1. The backdating information does not include changes detailed in Service Notes 8011A–G1 to 8011A–G5. These changes are also serial number related, and should be incorporated (in manual and instrument) in addition to the backdating information.

2. During the production life of this instrument, certain capacitors have been changed for improved component quality. When replacing these parts in old instruments, the values given in this manual should be the replacement value. The capacitors concerned are as follows:

Board A1 (Standard and Option) – C2, C3, C6, C12, C13, C14, C15, C16, C18, C19, C25, C26, C32, C33, C34, C39, C40, C41, C42, C46, C47, C48, C51, C52, C53, C54.

Board A2 – C1, C4, C5, C7, C8

CHANGE 1 (Serial number 1411G00910 and below)
On schematic 1, disconnect pin 13 of EXT switch from +14V.

CHANGE 2 (Serial number 1410G00380 and below)
in Tables 6–5 and 6–8 change the following components to:

C24	0140–0192	C–F 68pF 300 V
C35	0160–2147	C–F .025μF 100V
C43	0180–0159	C–F 220μF 10V
C50	0160–2147	C–F .025μF 100V
C56	0160–2214	C–F 680pF 300V
C57	0160–0134	C–F 220pF
CR12	1902–3074	DIO BKDN 4.32V
CR13	1902–3074	DIO BKDN 4.32V
CR16	1902–3003	DIO BKDN 2.37V
L2	9140–0094	CHOKE 0.68μH
L3	9140–0094	CHOKE 0.68μH
Q17	1854–0498	XSTR SI NPN
Q18	1854–0498	XSTR SI NPN
Q21	1854–0005	XSTR SI 2N708
Q22	1854–0053	XSTR SI 2N708
Q23	1853–0034	XSTR SI PNP
Q24	1853–0034	XSTR SI PNP
Q25	1853–0201	XSTR SI PNP
Q26	1854–0332	XSTR SI PNP
Q29	1854–0053	XSTR SI 2N2218
Q30	1854–0053	XSTR SI 2N2218
Q35	1854–0053	XSTR SI 2N2218R–F 180 5%

R45	0758–0014	R–F 180 5% .25W
R46	0757–0401	R–F 100 .125W
R63	0757–0397	R–F 68.1 1%
R64	0757–0397	R–F 68.1 1%
R65	0757–0284	R–F 150 1% 0.125W
R66	0757–0146	R–F 511 1% 0.125W
R67	0757–0146	R–F 511 1% 0.125W
R68	0757–0284	R–F 150 1% 0.125W
R69	0757–0346	R–F 10 1% 0.125W
R70	0757–0346	R–F 10 1% 0.125W
R73	0757–0346	R–F 10 1% 0.125W
R74	0757–0346	R–F 10 1% 0.125W
R75	0698–6213	R–F 37.4 1% 0.25W
R76	0698–6213	R–F 37.4 1% 0.25W
R77	0698–6213	R–F 37.4 1% 0.25W
R78	0698–6213	R–F 37.4 1% 0.25W
R79	0757–0280	R–F 1K 1% 0.125W
R80	0757–0280	R–F 1K 1% 0.125W
R93	0757–0280	R–F 1K 1% 0.125W

Delete the following components from Tables 6–5 and 6–8.

CR31, L7, L8, Q40, R130, R131, R132, R133, R134, R135, R136, R137, R138.

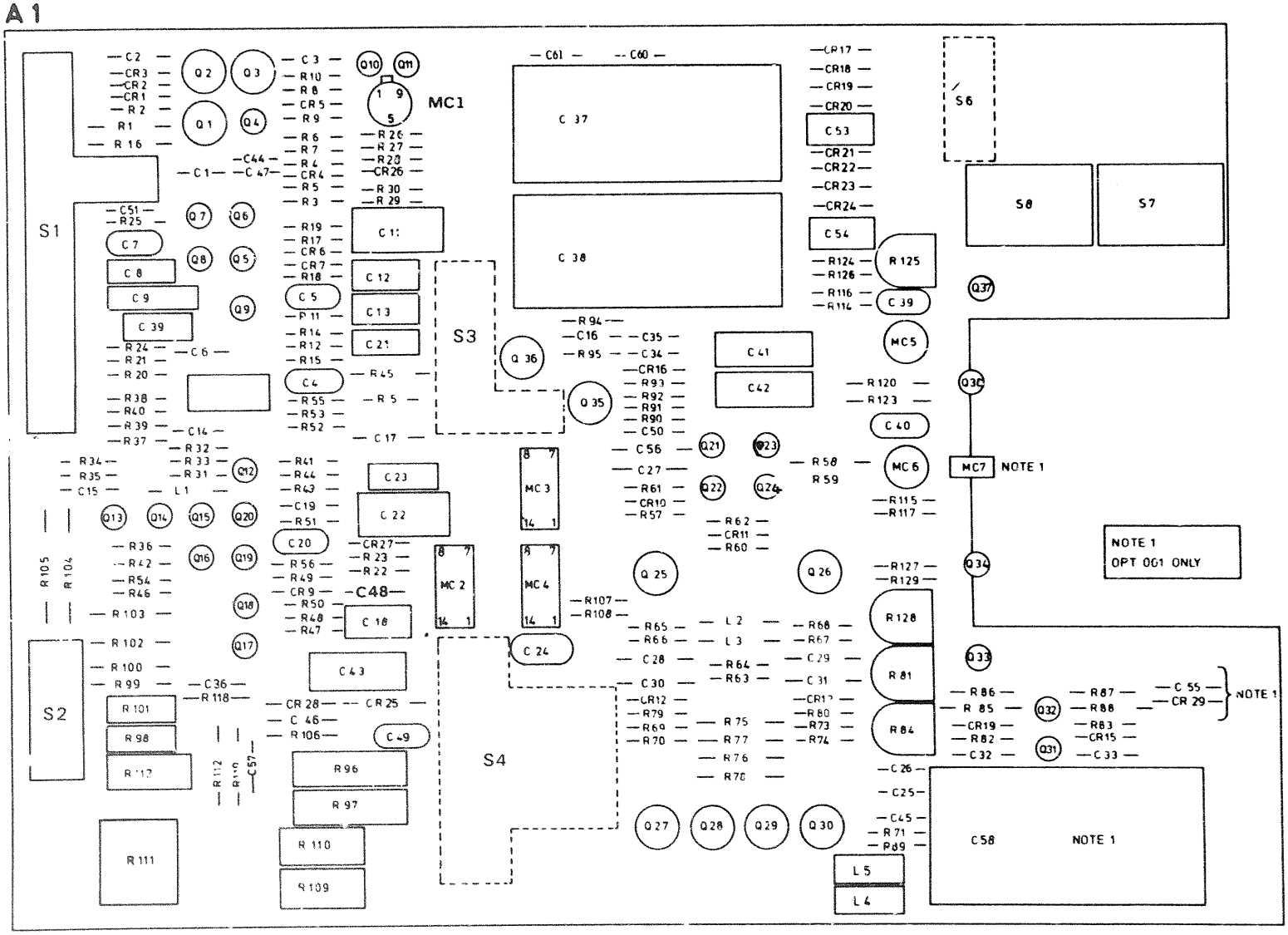
Delete CR30 from Table 6–8.

Add the following compoent

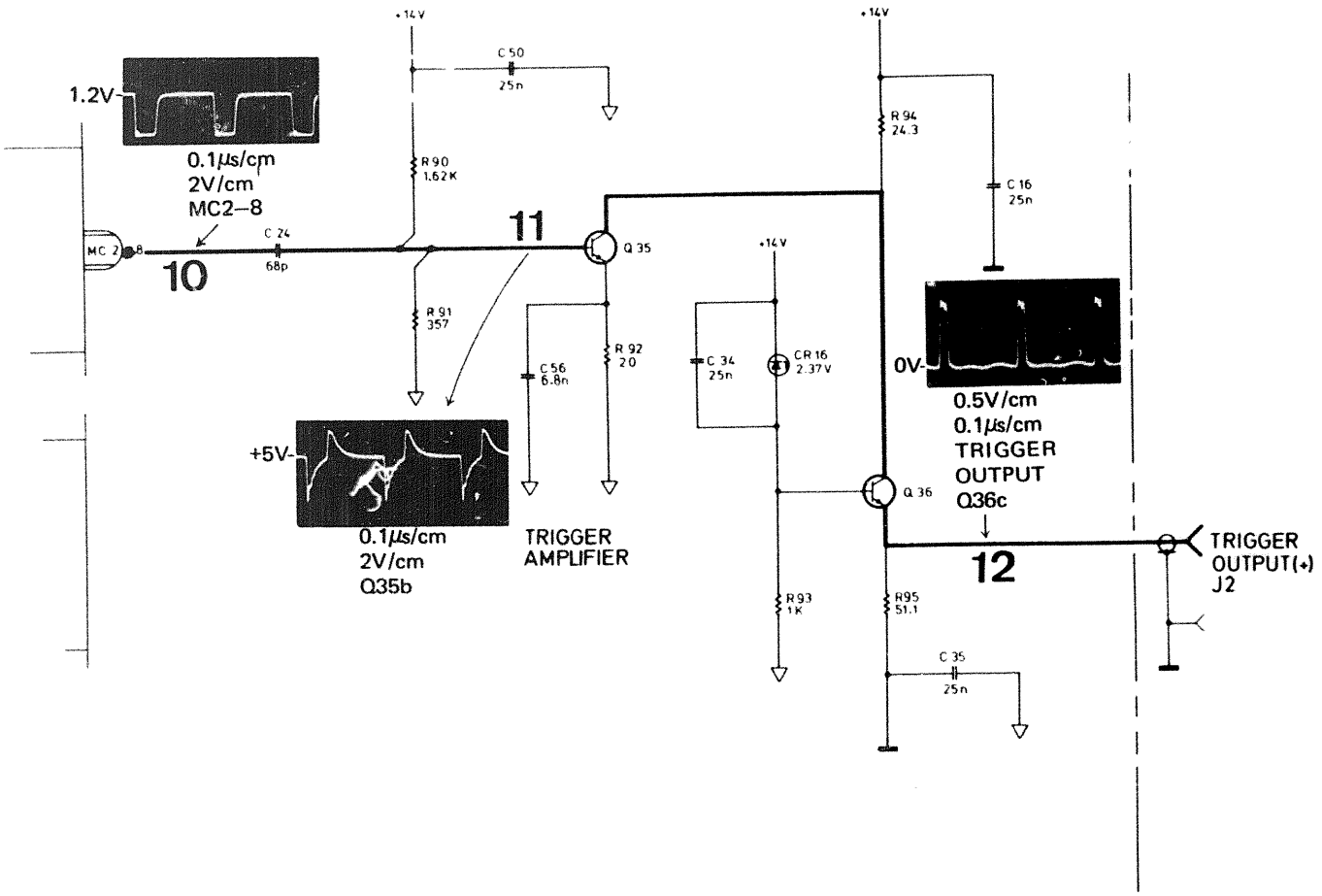
Add the following components to Tables 6–5 and 6–8.

MP35	1205–0033	HT SINK FOR Q35
R60	0757–0405	R–F 162 1% .125W
R91	0698–3242	R–F 357 1% .125W
R92	0757–0384	R–F 20 1% .125W

A1

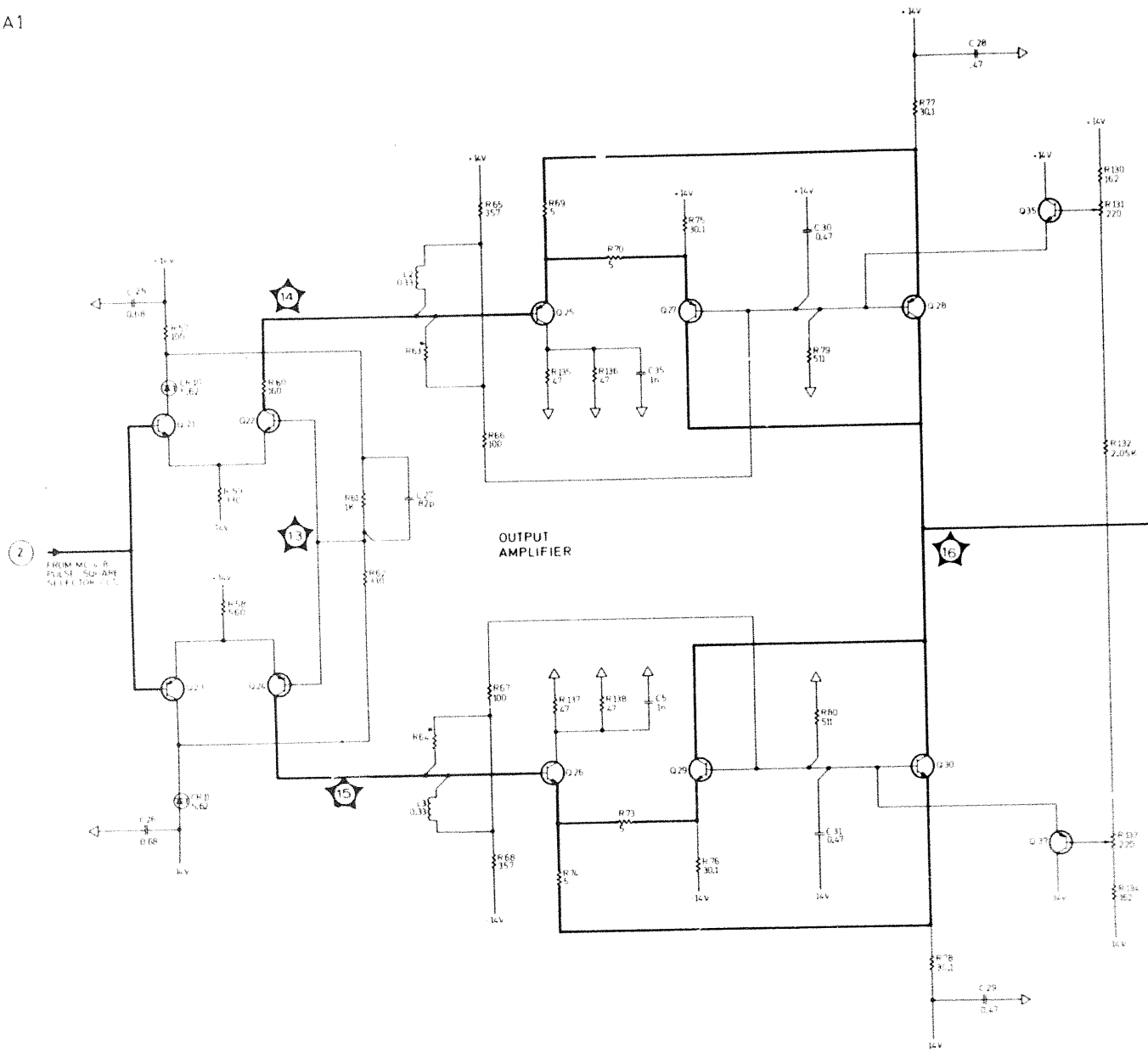


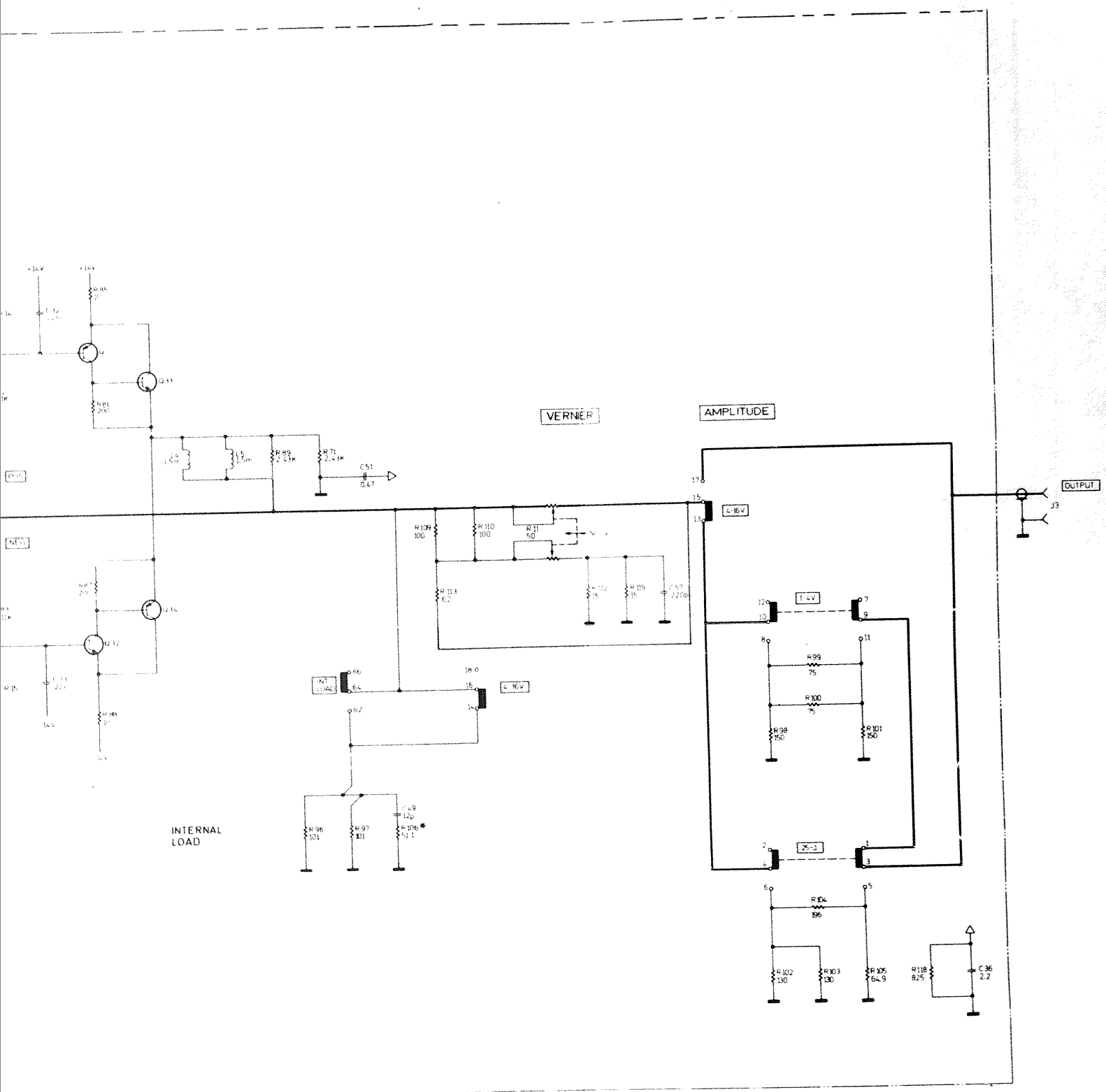
Change Schematic 2 as follows:



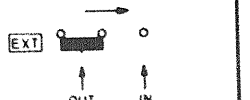
Change Schematic 3 as follows:

A1





NOTE
ALL SWITCHES ARE SHOWN IN THE "OUT" POSITION



"PUSH IN" TO SELECT MODE OR RANGE

MANUAL CHANGES

Check the following table for your instrument serial number.

Serial Number	Manual Changes
1411 G 01286 on	1
1411 G 01311 on	1, 2
1411 G 01386 on	1–3
1411 G 01411 on	1–4

MANUAL CHANGE 1

Standard 8011A, change

A1R4	0757–0431	R–F	2.43K
A1R6	0757–0407	R–F	200

8011A Option 001, change

A4R4	0757–0431	R–F	2.43K
A4R6	0757–0407	R–F	200

MANUAL CHANGE 2

On Page 6–6, Assembly A1 Parts List:
delete A1C34 0160–4210

On Page 6–4, Frame Parts List:
change MP5 Part No. to 08011–60202

MANUAL CHANGE 3

On Page 6–18, Assembly A2 Parts List:
change Q5, Q6 Part No. to 1853–0281

MANUAL CHANGE 4

Change parts list and schematic:
Standard Instrument – A1 (08011–66501)

Add C 46 0160–4210 C–F 0.022 UF
Add F 1 2110–0340 FUSE 0.4 FER

Option 001 – A1 (0801 –66504)
Delete C34 0160–4210 C–F 0.022 UF
Add F1 2110–0340 FUSE 0.4 FER

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MANUAL CHANGES

Manual for Model Number	8011A
Manual printed on	Sept 1977
Manual Part Number	08011-90004

Model 8011A

Make all ERRATA corrections.

Check the following table for your instrument serial prefix/serial number and make the listed changes to your manual.

▶ New Item

Serial Prefix or Serial Number	Manual Changes	Serial Prefix or Serial Number	Manual Changes
1411G01635 and below	Refer to Manual's yellow pages		
1411G01636 on	1		
1411G01661 on	2		
1411G01761 on	3		

ERRATA

Page 6-21 Change A1W1 as follo

A1W1 5081-1968 CABLE AY RI

Delete A1X1

Manual Change 1

Pages 6-8, 6-15, 6-21, change

A1R68 0698-4421 RF 249 1%

Manual Change 2

Page 6-4 change FL 1 9100-312

FL1 9135-0035

Manual Change 3

Pages 6-9 and 6-21, Board A1 (S

change U5, U6 1826-0010

NUAL CHANGES

l for Model Number	8011A
l printed on	Sept 1977
l Part Number	08011-90004

erial number

Prefix or Number	Manual Changes

Model 8011A

ERRATA

Page 6-21 Change A1W1 as follows:

A1W1 5081-1958 CABLE AY RIBBON

Delete A1X1

Manual Change 1

Pages 6-8, 6-15, 6-21, change

A1R68 0698-4421 RF 249 1% .125W

Manual Change 2

Page 6-4 change FL 1 9100-3121 to

FL1 9135-0035

Manual Change 3

Pages 6-9 and 6-21, Board A1 (Standard and Option) Parts List:

change U5, U6 1826-0010 IC V-REG.

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