

PLEASE NOTE

This instrument incorporates a new method for tracking changes to its circuit boards. Starting July 1, 1988, all circuit boards will be labeled with a unique serial number. The SERIAL number will replace the previously used SERIES number, even though there may have been no change to the circuit board. Thus, if changes were made after July 1, 1988, they will be documented in this change sheet using the new circuit board SERIAL number. Changes made before that time are documented with the SERIES number.

Therefore, Circuit changes described in this change sheet may reference either the older SERIES number or the new SERIAL number. Using both numbers enables this change sheet to support both older and newer products. To determine which changes apply to your instrument, find the instrument's serial number prefix located on the rear panel, and make the manual changes indicated in this change sheet for that serial number prefix. For example, if the serial number is 2804A12345, make changes to the manual indicated for serial prefix 2804.

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page ii, Safety Considerations:

All Serials >Add the Safety Considerations supplied in this manual change.

Page 1-0, Figure 1-1. Model 105A/B and Accessories:

All Serials >Change "ACCESSORY KIT" to "ACCESSORIES".
>Delete "KIT-ACCESSORY 00105-6032".
>Change AC Power Cable p/n from 8120-1348 to 8120-1378.

NOTE

The Accessory Kit has been discontinued; all parts of the kit are still supplied as Accessories:

Page 1-1. General

1940A Paragraph 1-8. OSCILLATOR ASSEMBLY REPAIR:
>Change part number for restored oscillator assembly (00105-6034) to 00105-6033.

2128A >Delete paragraphs 1-8 and 1-9.

Page 1-2, Table 1-1. Specifications:

All Serials >Change text under ACCESSORIES FURNISHED to read:
"105A/B Rack Mounting Kit is not supplied as described in this manual. If ordered with an instrument, the Rack Mounting Kit is available as Option 908, at additional cost. When ordered separately, Rack Mounting Kit is available by ordering HP Part No. 5060-8739. Disregard manual references stating that the Rack Mounting Kit is supplied with the instrument."

All Serials >Add the following after "Complementary Equipment":
OPTIONS:
Option W30 (Extended Hardware Support) provides two additional years of return-to-HP hardware-service support. Option W30 is available only at time of purchase. Service contracts are available from Hewlett-Packard for instruments which did not include Option W30 at time of purchase. For more information, contact your nearest Hewlett-Packard Sales and Support office (offices are listed at the back of this manual).

SAFETY CONSIDERATIONS

The 105A/B Quartz Oscillator is a Safety Class I instrument (provided with a protective earth terminal), designed and tested according to international safety standards. To ensure safe operation and to keep the instrument in safe condition, the user must follow the information, cautions, and warnings provided below and in the Operating and Service Manual.

```
*****  
*           *  
*   WARNING   *  
*           *  
*****
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Before switching on this instrument, the protective earth terminal of the instrument must be connected to the protective conductor of the (mains) power cord. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord (power cable) without a protective conductor (grounding).

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

All protective earth terminals, extension cords, autotransformers, and devices connected to this instrument should be connected to a protective earth grounded socket outlet. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in personal injury.

For continued protection against fire hazard, replace the line fuse only with a 250V fuse of the same current rating and type. Do not use repaired fuses or short circuited fuseholders.

Before switching on this instrument, make sure that it is adapted to the voltage of the ac power source.

Any maintenance or service requiring removal of protective covers should be performed by service-trained personnel who are aware of the hazard involved (for example, fire and electrical shock).

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

Table 1-1. Specifications (SERIES 1940A)

<p>FREQUENCY STABILITY: (See Definition of Terms) Long-Term Stability (Aging Rate): $< 5 \times 10^{-10}$ per 24 hours. Short-Term Stability: For 5 MHz output only. Refer to tables below.</p> <p style="text-align: center;">Table 1: Time Domain Stability</p> <table border="1"> <thead> <tr> <th>Averaging Time τ [seconds]</th> <th>Stability $\sigma_y(\tau)$</th> </tr> </thead> <tbody> <tr> <td>10⁻³</td> <td>7.5×10^{-10}</td> </tr> <tr> <td>10⁻²</td> <td>1.5×10^{-10}</td> </tr> <tr> <td>10⁻¹</td> <td>1.5×10^{-11}</td> </tr> <tr> <td>10⁰</td> <td>1×10^{-11}</td> </tr> <tr> <td>10¹</td> <td>1×10^{-11}</td> </tr> </tbody> </table> <p style="text-align: center;">Table 2: Frequency Domain Stability</p> <table border="1"> <thead> <tr> <th>Offset from 5 MHz f [Hz]</th> <th>Phase Noise Ratio $\mathcal{L}(f)$ [dBc]</th> </tr> </thead> <tbody> <tr> <td>10⁰</td> <td>-90</td> </tr> <tr> <td>10¹</td> <td>-120</td> </tr> <tr> <td>10²</td> <td>-126</td> </tr> <tr> <td>10³</td> <td>-146</td> </tr> <tr> <td>10⁴</td> <td>-150</td> </tr> </tbody> </table> <p>As a Function of Ambient Temperature: Frequency change is less than 2.5×10^{-9} total from 0°C to +50°C. As a Function of Load: $\pm 2 \times 10^{-11}$ from open circuit to short, 50Ω R, L, or C load change. As a Function of Supply Voltage: $\pm 5 \times 10^{-11}$ for 22-30V dc for 26V dc reference (battery operation, 105B) and for 115/230V $\pm 10\%$.</p> <p>FREQUENCY ADJUSTMENTS: Fine Adjustments: Front-panel control with $\pm 5 \times 10^{-8}$ range, with digital dial reading parts in 10¹⁰. Coarse Adjustments: 1×10^{-6}, coarse control is screw-driver adjustment at front panel.</p> <p>PHASE LOCKING CAPABILITY: An external +5V to -5V applied to EFC connector allows > 2 parts in 10⁸ frequency control for locking to an external source.</p> <p>WARM-UP (at 25°C): To within 1×10^{-7} in 15 min., 1×10^{-8} in 20 min., 1×10^{-9} in 30 min. of final value (24 hours after turn-on).</p> <p>OUTPUTS: Frequencies: 5 MHz, 1 MHz, 100 kHz. Voltage Levels: $\geq 1V$ rms into 50Ω; clock drive $\geq 0.5V$ rms into 1000Ω. Connectors: 5 MHz, 1 MHz, 100 kHz front- and rear-panel BNC connectors, clock drive, and electronic frequency control rear-panel BNC connectors. Harmonic Distortion: (5 MHz, 1 MHz, 100 kHz.) Down more than 40 dB from rated output. Spurious Phase Modulation: (Discrete sidebands 10 Hz to 25 kHz) down more than 80 dB from rated output (5 MHz, 1 MHz, 100 kHz).</p> <p>ENVIRONMENTAL: Temperature, Operating: 0°C to +50°C. Temperature, Storage: -40°C to +75°C (manufacturer specifies -40°C to +50°C limit for 105B battery storage).</p>	Averaging Time τ [seconds]	Stability $\sigma_y(\tau)$	10 ⁻³	7.5×10^{-10}	10 ⁻²	1.5×10^{-10}	10 ⁻¹	1.5×10^{-11}	10 ⁰	1×10^{-11}	10 ¹	1×10^{-11}	Offset from 5 MHz f [Hz]	Phase Noise Ratio $\mathcal{L}(f)$ [dBc]	10 ⁰	-90	10 ¹	-120	10 ²	-126	10 ³	-146	10 ⁴	-150	<p>No permanent degradation from the following: Altitude: 50,000 ft. Shock: MIL-T-21200 (30 G's). Vibration: MIL-STD-167 and MIL-T-21200. Electromagnetic Compatibility (EMC): MIL-I-6181D.</p> <p>MONITOR METER: Front-panel meter and associated selector switch monitors: supply voltage, +18V, oven, 5 MHz output, 1 MHz output, 100 kHz output.</p> <p>STANDBY SUPPLY CAPACITY: (Model 105B only) ≥ 8 hours at +25°C ambient temperatures:</p> <p>POWER REQUIREMENTS: (Typical) 115/230V $\pm 10\%$ at 17W (70W warm-up) for 105A; 18W (71W warm-up) for 105B float charge. Add 12W for fast charge. 22 to 30V dc at 6.4W (10.3W warm-up).</p> <p>DIMENSIONS:</p> <p>NOTE: DIMENSIONS IN INCHES AND (MILLIMETERS) ① EIA RACK HEIGHT (INCLUDING FILLER STRIP), TOP CABINET HEIGHT (INCLUDING FEET); ADD 1/8" TO EIA RACK HEIGHT ② REAR APPROX RECESS</p> <p>WEIGHT: 105A — Net, 16 lb. (8 kg). Shipping 23 lb. (10.5 kg). 105B — Net, 24 lb. (11 kg). Shipping 31 lb. (14 kg).</p> <p>ACCESSORIES AVAILABLE: Rack Mounting Kit: HP 5060-8739 Board Extender, 15 pin: HP 5060-0049 Board Extender, 22 pin: HP 5060-0630 Connector (EXT DC, 5 pin): HP 1251-0126</p> <p>COMPLEMENTARY EQUIPMENT: Model 5085A Standby Power Supply with battery for extending standby power capability by 40-70 hours, \$3000.00.</p> <p>DEFINITION OF TERMS: Long-Term Stability: Is defined as the absolute value (magnitude) of the fractional frequency change with time. An observation time sufficiently long to reduce the effects of random noise to an insignificant value is implied. Frequency changes due to environmental effects must be considered separately. Time Domain Stability $\sigma_y(\tau)$: Is defined as the two-sample deviation of fractional frequency fluctuations due to random noise. The measurement bandwidth is 100 kHz. Frequency Domain Stability $\mathcal{L}(f)$: Is defined as the single sideband phase noise-to-signal ratio on a per Hertz basis.</p> <p style="text-align: right;">See "NBS-Monograph 140" for measurement details.</p>
Averaging Time τ [seconds]	Stability $\sigma_y(\tau)$																								
10 ⁻³	7.5×10^{-10}																								
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*Specifications describe the instrument's warranted performance. Supplemental characteristics are intended to provide information useful in applying the instrument by giving TYPICAL or NOMINAL, but nonwarranted performance parameters. Definition of terms is provided at the end of the specification section.

MANUAL CHANGES MODEL 105A/B (00105-9025)

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 1-2, Table 1-1. Specifications (Cont'd):

1940A >Replace Table 1-1 with new Table 1-1 supplied in this manual change sheet.

2044A00682 (105A) STABILITY:
2044A00986 (105B) >Change "As a function of load: <+-2X10E-11 for..." to "...<+-9X10E-11..."
Make the same change to Table 1-1 supplied in these changes.

2144A Table 1-1. Specifications (in these manual changes)
>Change FREQUENCY STABILITY as a Function of Ambient Temperature to read:
"Frequency change is less than 5X10-9 total from 0 degrees C to +50 degrees C.
>Change STANDBY SUPPLY CAPACITY to read:
(Model 105B only) >6 hours at +25 degrees C ambient temperatures.
>Change POWER REQUIREMENTS to read:
"115/230 +-10% at 18W (70W warmup) for 105A;
19W (71W warmup) for 105B"
>Delete under COMPLEMENTARY EQUIPMENT, \$3000.00.

PAGE 2-1. INSTALLATION:

2848A >Change the first five lines of paragraph 2-4 to read:
"2-4. Before storing the Model 105B, disconnect the internal battery by pressing pushbutton switch S5 after unplugging the instrument; this switch is located on the A5 printed circuit board assembly.

PAGE 2-2. INSTALLATION:

All Serials Paragraph 2-17 (3):
>Delete "the Model 105B battery is fully charged when shipped".
(The battery is not shipped fully charged. There is no way to guarantee that they stay charged during long shipment or storage time.)

MANUAL CHANGES MODEL 105A/B (00105-9025)

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 2-3. Installation

All Serials Paragraph 2-22:

>Replace "Application Note 52 (supplied with this manual)"
with "Application Note 52-2 (Part Number 02-5952-7874)".

Table 2-2. Initial Indications

>Change "CIRCUIT CHECK Switch Position" for "OVEN" to
read:

"Full scale for approximately 1/4 hour (50 to 90 after
1/4 hour)".

Page 2-4. Installation:

2848A >Delete paragraphs 2-29 and 2-30.

Pages 3-1/3-2. Theory:

2128A >Delete paragraphs 3-5 through 3-21.
>Add paragraphs 3-5 through 3-18 supplied in this manual
change to replace the deleted paragraphs.

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 3-3. Theory:

- 2128A >Change the last ten lines of paragraph 3-37 to read as follows:
"Rear-panel slide switch S1 connects the power transformer primary windings in parallel for 115-volt operation or in series for 230-volt operation. The 24-volt regulator does not operate when the Model 105A/B is operating from dc power.
- 2848A >Replace paragraphs 3-38 through 3-45 with the following:
- 3-38. The unregulated voltage from the rectifiers CR6 and CR7 is input to preregulator U8, R13, and R14, to provide about +28V. This 28V is fed through R23 to the Circuit Check meter to show voltage when set to the SUPPLY position. The rectified ac voltage is also sent to preregulator regulator U4 and then to charge current regulator U5. This regulator provides charge current to the battery and supply to U1 and U6. U6 is a +5V regulator that ensures supply ensures supply for the digital IC's whether in AC or battery operation; U1 is part of the Low Battery Voltage Sensor circuit. Finally, half-wave rectifier CR5 is used with R3, R18, and zener diode CR1 to provide a half-wave AC sense for the Low Battery Voltage Sensor circuitry. This provides a clock for the D flip-flop U2.2 EXT DC operation will only supply the +28V and +18.7V circuitry. Since there is no +5V supply, the battery connection (K1) and AC INTERRUPTION lamp circuits do not operate in EXT DC mode.
- 3-39. The 28V is sent through CR4 to U7 to produce the +18.7 volts for the instrument. When the 105A/B is connected to a +22 to 30V DC supply, the power comes from the rear panel connector through CR1 and fuse F2 to provide the necessary voltage to the +18.7 regulator via the same 28V line. The EXT DC is isolated from the ac rectified 28V by CR1 (mounted off the board). When the battery is used, it will also provide 28V supply to the +18.7 regulator through isolating rectifier CR8. All three supplies provide supply voltage for U9. U9 drives the necessary logic to light the AC INTERRUPTION lamp and energize relay K1. Note that if the AC INTERRUPTION lamp is incandescent, the jumper W1 connects R21 in the circuit to provide the necessary extra drive current.

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 3-3. Theory (Cont'd):

2848A

- >Delete paragraph 3-40.
- >Replace paragraphs 3-41 and 3-42 with the following:

3-41. **STANDBY BATTERY CIRCUITS**

(Model 105B only)

(Circuit Diagrams: Figure 7-10)

3-42. When ac power is first applied to the instrument, the 28V, +18.7V, and 5V supplies come up immediately. Comparator U9(1) is pulled up to +5V from the presence of the 28V and +18.7V inputs. This pulls the Reset of D Flip-flop U2.1(1) up to enable it to clock data through. U2.1(2) is brought up to +5 more slowly; when U2.1(3) powers up from 0 to +5V (a rising edge) U2.1(2) is still low and U2.1(6) toggles high. This high state is tied to line drivers U3(5) and U3(6). The presence of this high state enables a flow of current through either U3(11) or U3(12), providing a ground so that DS2 can turn on. The total result is that when ac power is first applied, the AC INTERRUPTION lamp will light. With ac power now on, using the RESET switch on the front panel will clock a rising edge through the U2.1(3) input with U2.1(2) now high. This toggles U2.1(6) low, turning off the lamp. With no ac power applied, the output of U9 goes to ground. U2.1(1) has a low state, causing U2.1(6) to stay high and turn on the AC INTERRUPTION LAMP. Any clock pulses (from the RESET button) now will have no affect on U2.1(6), ensuring that the AC INTERRUPTION lamp stays on until ac power is restored.

Part of Pages 3-1/3-2: (SERIES 2128A)

3-5. 5 Mhz OSCILLATOR ASSEMBLY A1

3-6. General

3-7. The A1 Oscillator/Divider Assembly (HP Part No. 00105-6100) provides a stable, high quality 5MHz signal at an output level of at least 1V rms into 50-ohms and is a replacement for the discontinued HP Part No. 00105-6012, 00105-6013, and 00105-6033 (restored) assemblies formerly used in the 105A/B.

3-8. This new assembly consists of three subassemblies; A1A1 precision 10MHz quartz oscillator; A1A3 power supply circuit board assembly; and A1A2 circuit frequency divider/amplifier assembly to divide the 10MHz oscillator signal by two for two 5 MHz outputs.

3-9. Electronic Frequency Control (EFC) inputs enable the oscillator frequency to be adjusted electronically, as part of a servo loop, or by a potentiometer. Oscillator assembly A1A1 is covered by the 10811A/B Operating and Service Manual supplied with the 105A/B Operating and Service Manual.

3-10. Circuit Board Operation

3-11. The 10MHz output from oscillator assembly A1A1 passes through 10MHz bandpass filter L1 and C5 on power supply assembly A3; then through J1 to edge triggered D-type flip-flop (A2U1) which divides the 10MHz signal by two. The 5MHz TTL output at U1(5) passes through 5MHz bandpass filter L7 and C12. This signal is then amplified and filtered by emitter-coupled switch (Q1,Q4), and cascade amplifier Q2.

3-12. Potentiometer R8, in the emitter circuit of Q1 and Q4, sets level at the "5MHZ-1V" output jack to 1.1Vrms into 50-ohms. The impedance transforming circuit consisting of C8 and L4 allows Q3 to efficiently drive a 50-ohm external load. Choke L3 provides dc to the collector of Q3, C9 blocks dc in the 5MHz output, and L6 provides a dc return for the external load.

3-13. A resistive divider consisting of A1A2R5 and R4, provides a low level signal to the "5MHZ-DIV" output jack. Nominal output voltage at this point is 70mVrms into 1000-ohms.

3-14. A reference power supply provides a stable +15Vdc reference for external circuits connected to the + or - EFC inputs. This supply consists of A1A2CR1, A1A2CR2, and associated parts.

3-15. Power supply assembly A1A3 accepts inputs at the "20V" and "24V" jacks. The "24V" input is within a range of +21V to +30Vdc from the parent instrument. This voltage is regulated by A1U1 to +18Vdc for the oven heater in A1A1. The 18Vdc is further regulated to 12Vdc by A3U1 for use in A1A1 signal circuits. Diode A1A2CR1, transistor A1A2Q1, and associated parts regulate 12Vdc to 5Vdc for use by TTL divider A1A2U1.

3-16. Inverting amplifier A1A3Q2 is driven by the "oven monitor" circuit in oscillator assembly A1A1 and gives an output signal to drive the "OVEN" meter or monitor in the parent instrument.

Part of Pages 3-1/3-2: (SERIES 2128A)

3-17. Electronic frequency control (EFC) inputs from the parent instrument are summed by A1A3R9, R10, and R11 and drive the EFC input to oscillator A1A1. Factory-selected resistor A1A3R11 sets EFC sensitivity.

3-18. If power supply assembly A1A3 and/or oscillator A1A1 are changed, a new value must be selected for resistor A1A3R11. In addition, if certain repairs are made in A1A1, resistor A1A3R11 must also be adjusted. See Paragraph 4-16.G., in these Changes, for details to select a new A1A3R11 value.

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 3-4. Theory:

2848A

>Replace paragraphs 3-43 thru 3-45 with the following:

3-43. The battery relay connect circuit works as follows: With both ac and battery connected, the half-wave AC sense is tied to U1(6); +12V from the battery and zener diode CR2 is tied to U1(2) and U1(5) as a reference. U1(3) is connected to the battery voltage divided across R16 and R17. This is about 15V for a fully-charged battery. U1(7) outputs a 60-Hz clock signal to U2.2(11) which allows the D input U2.2(12) to clock through. This caused U2.2(8) to be low, which disables U3(16). This allows U1(1) to go to +5V, which drives U3(14) low, turning on the battery relay and connecting the battery to allow charging current to flow (about 400 mA). C1 ensures that K1 energizes after the ac conditions have stabilized. Diode CR10 acts as a drain to high voltage surge when the K1 coil de-energizes. This is the steady state operation under AC supply. Note that if the instrument is powered down and only EXT DC power is applied, the K1 relay will not energize. Therefore, the battery will not be available to provide standby power in the event of EXT DC failure. The battery only connects through relay K1 when AC power is supplied.

3-44. When ac power is removed, the following things occur: The 16V ac sense disappears first, allowing U1(7) to go high, removing the clock input from U2.2(11). This enables the Clock line to later be toggled by switch A5S5 as described below:

U2.2(12) goes low as a result of the ac being removed; this occurs slightly later than the changing of the U2.2 Clock so that there is no change on U2.2(8). Note that the AC INTERRUPTION lamp will light as described above and that the battery is no longer being charged. The battery provides the necessary supply voltages to the instrument and to its own logic circuitry. If the EXT DC supply is connected, both the battery and EXT DC are providing power to the instrument, but the battery is not being charged. Capacitor C1 ensures that ac spikes will not cause the K1 relay to disconnect.

3-45. When the battery voltage gets too low (about 20V), the voltage at U1(3) drops lower than the +12V reference at U1(2), causing U1(1) to switch low. This causes U3(14) to stop sinking current and de-energizes relay K1, disconnecting the battery and effectively shutting down the

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 3-4. Theory:

2848A

Paragraph 3-45 continued:

entire instrument. (This assumes that the EXT DC is not also connected.) Switch A5S5 disconnects the battery for storage or shipping purposes. When pressed, it momentarily grounds U1(7), and on release, allows that point to go high again. This is a clock for U2.2(11) that allows the low on the D input to toggle U2.2(8) high. This forces U3(16) low and connects R20 into the voltage divider circuit at R16 and R17. The lower voltage presented to U3(3) acts like a low battery, disconnecting the K1 relay as described above.

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 4-8. Maintenance

- 2128A >Replace paragraph 4-16 with paragraphs 4-16a through 4-16j supplied in this manual change. The new paragraphs apply to A1 Oscillator Assembly HP Part No. 00105-6100 (SERIES 2120).
- 2848A >Replace paragraph 4-13 with the following:
- 4-13.
- a. To remove plug-in circuit board A2 or A3, grasp the edge opposite the plug and pull with a slight rocking movement.
- b. To remove plug-in board A5, remove the three screws holding the heatsink to the AC Cover. These can be seen from above as the three screws adjacent to the large electrolytic capacitor. Remove 2 screws from the shield-to-chassis, and 2 screws from the heatsink-to-chassis. The board can then be removed as described for the A2 and A3 assemblies above.
- c. Use caution when removing boards to avoid damaging components. The HP part number appears on the circuit board for identification. Refer to Section V for replacement parts and HP part number information.

Page 4-9. Maintenance:

- 2120A Paragraphs 4-30/4-31
>Change all references to +18.6 to +17.9, +18.7 to +18.0, and +18.8 to +18.1.
- 2128A >Delete paragraphs 4-27/4-28. The information in these paragraphs does not apply to the new oscillator assembly for A1.
- 2848A >Replace paragraphs 4-29/4-30 with the following:

4-29. Regulated Power Supply Voltages

4-30. MODEL 105A/B. Regulated power supplies provide +28 (nominal) and +18.7 volts DC. Neither supply is adjustable. To check output voltage and regulation, connect instrument to a variable ac voltage source and proceed as follows:

a. Connect a DC voltmeter to regulator output A5U8(2) and set the line voltage to 115 vac. DC voltmeter should show +18 to +32 volts.

b. Vary the ac line voltage from 103 vac to 127 vac. DC output voltage should remain between +18 and +32 volts.

MANUAL CHANGES MODEL 105A/B (00105-9025)

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 4-9. Maintenance (Cont'd):

c. Connect DC voltmeter to A5 connector pin 21 or 43 and set the line voltage to 115 vac. DC voltmeter should show +18.6 to +18.8 volts.

d. Vary the ac line voltage from 103 vac to 127 vac. DC output voltage should remain between +18.6 and +18.8 volts.

>Delete paragraph 4-31.

>Change step e, paragraph 4-33, to read as follows:

e. To charge the battery, plug in the ac line cord and charge for 16 hours.

>Change step 3, paragraph 4-33, to read as follows:

g. The battery should be checked every 3 to 6 months as part of a regular maintenance cycle.

>Change "S5" to "A5S5" in paragraph 4-35, step c.

Pages 4-12. Maintenance

2144A

Paragraph 4-32. Battery Check (105B Only)

>Change paragraph e to read: "To charge battery, plug in the AC line cord, set BATTERY CHARGE switch to FAST, and charge for 24 hours maximum.

Part of Page 4-8: (SERIES 2128A)

4-16.A. GENERAL

4-16.B. Assembly A1 consists of a selected 10811A 10MHz oscillator (HP Part No. 10811-60109) and two circuit board assemblies to provide 5 MHz outputs for use by the parent instrument. The oscillator is field repairable as covered in the 10811A/B Operating and Service Manual. Assembly A1A2 divides the 10MHz output by two and provides two 5MHz outputs. All input and output connections are on A1A2. Power supply assembly A1A3 provides an interface between the parent instrument power supplies and circuits in assembly A1.

A1 INPUT AND OUTPUT CONNECTIONS

CONNECTOR NAME	IN OR OUT	SIGNAL CHARACTERISTIC
+24	INPUT	22V to 30Vdc primarily for oven heater power. (About 160mA is normal; 450mA during warm-up).
+20	INPUT	18V to 22Vdc for oscillator and output circuits (50mA nominal).
+EFC OR -EFC	INPUT	Voltages to control A1 output frequency.
1V	OUTPUT	5MHz sine wave output. At least 1.0Vrms into a 50-ohm load.
DIV	OUTPUT	5MHz sine wave. Nominal 50mV to 150mVrms into 1000-ohm load.
+15	OUTPUT	14.0V to 15.8Vdc for FINE parts in 1010
M	OUTPUT	To OVEN position of CIRCUIT CHECK meter via A4 circuit board assembly.

4-16.C. A1 REPAIR.

4-16.D. If repair or adjustment of A1 is needed, the assembly must be removed from the parent instrument. (See A1 Input and Output Connections Table.) Once removed, assembly A1 can be operated independently by connecting two power supplies. Set one power supply for 22 to 30Vdc (450mA maximum current) and connect to the "+24" input. Set the other supply to 20Vdc (approximately 50mA) and connect to "+20" input. Connect both negative (-) terminals to A1 chassis.

Another method is to obtain power from the 105A/B. Use clip leads to connect the A1 chassis to the 105A/B chassis. Connect the "+24" terminal on A1 to XA5(17) for 24 to 33V and the "+20" terminal to XA5(21) for +18.7V.

Part of Page 4-8: (SERIES 2128A)

With A1 removed and operating outside the instrument, troubleshooting is relatively easy. Power supply voltages can be measured on A1A3 sockets. If power supply is defective, remove oscillator assembly A1A1 to gain access to power supply assembly A1A3. A1A3 will operate normally with A1A1 removed. If fault is in A1A1, it can be removed and operated independent of A1. See 10811A/B Operating and Service Manual for details.

4-16.E. ADJUSTMENTS, GENERAL.

There are four adjustments in the A1 assembly: A1A1 output amplitude, frequency, EFC gain, and A1 output level. Assembly A1A1 output amplitude adjustment is covered in the 10811A/B Operating and Service Manual. Frequency adjustment is covered as part of the 105A/B operating procedure. A1 output amplitude and EFC gain adjustments are covered in the following paragraphs.

4-16.F. OUTPUT AMPLITUDE ADJUSTMENT

1. With A1 operating outside the 105A/B, as previously described, connect A1 "1V" output through a 50-ohm feedthrough to an oscilloscope vertical input.
2. Adjust A1A3R8 for an oscilloscope display of 3.1Vp-p (1.1Vrms).
3. Remove connections to A1 and replace in parent instrument.

4-16.G. SELECTION PROCEDURE FOR A1A3R11 EFC GAIN RESISTOR

4-16.H. Resistor A1A3R11 needs changing under two conditions: First, if A1A1 oscillator assembly is changed; Second, if Y1, CR1, or C1 inside A1A1 is changed. If A1A1 is changed, the proper value for A1A3R11 is supplied with the replacement unit (the resistor value is shown on the A1A1 label). This resistor should be installed for A1A3R11 before the new A1A1 oscillator is installed. If Y1, CR1, or C1 inside A1A1 is changed for a repair, a new value must be selected for A1A3R11 by means of the following procedure:

1. Connect A1 for operation outside the 105A/B as previously described. Allow instrument to warm up for at least one hour.
2. Obtain a high-resolution frequency counter such as HP Models 5345A or 5335A Option 010. Allow counter to warm up and stabilize for several hours before continuing.
3. Set a power supply for 5.0Vdc. Connect the negative (-) side of the supply to the A1 chassis and the positive (+) side to A1A3J2 (10 MHz oscillator assembly socket) pin 6. Make connection on circuit side of A1A3. Double check before connecting supply to be sure you have the correct pin.
4. Connect frequency counter to "1V" output, and set it to measure frequency with a measurement time (gate time) of one second. The counter reading should be quite stable.

Part of Page 4-8: (SERIES 2128A)

4-16.H. SELECTION PROCEDURE FOR A1A3R11 EFC GAIN RESISTOR (Cont'd):

5. Adjust A1 oscillator output to 5 MHz \pm 0.1Hz. Record counter indication within a 0.01 Hz resolution.
6. Remove power supply connection at A1A3J2(6). Connect A1A3J2(6) to A1 chassis.
7. Again record frequency reading from counter in Hz (.01 Hz resolution).
8. Subtract the first reading recorded in step 5 from the second reading recorded in step 7. The result is DELTA F in Hz.
9. The new value of A1A3R11 can be found in the table below opposite the value of DELTA F (computed in step 8).
10. Remove A1 power connections and remove A1A1 to expose A1A3R11. Install newly-selected resistor for R11 to complete the procedure. Special solder terminals on A1A3 simplify resistor replacement. All resistors are 1% 0.125W Film TC=0 \pm -100.

DELTA F (HZ)	A1A3R11 (OHMS)	HP PART NO.
0.49 or less	562.0 k	0698-8824
0.50 to 0.59	316.0 k	0698-3457
0.60 to 0.71	215.0 k	0698-3454
0.72 to 0.86	147.0 k	0698-3452
0.87 to 1.04	110.0 k	0757-0466
1.05 to 1.23	82.5 k	0757-0463
1.24 to 1.42	68.1 k	0757-0461
1.43 to 1.65	56.2 k	0757-0459
1.66 to 1.93	46.4 k	0698-3162
1.94 or more	38.3 k	0698-3161

4-16.I. A1 ASSEMBLY REPLACEMENT.

4-16.J. Whenever A1 is replaced, no internal adjustments are necessary. After A1 is installed, perform the "Turn-On" procedure starting in Paragraph 2-15 of the Operating and Service Manual.

MANUAL CHANGES MODEL 105A/B (00105-9025)

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 5-2, Figure 5-1. Replacement Modular Cabinet Parts

All Serials >Delete cabinet parts listed in columns with headings of X95 and X85.

2144A00837 (105A) >Change part number for Item No. 5, Cover Assembly: Top,
2144A01116 (105B) to 00105-0025.

Page 5-3, Table 5-1. A1 15 MHz Oscillator Reference Designation Index

1940A >Change A1 from 00105-6013 to 00105-6012 Oscillator Assembly
5 MHz (Restored Oscillator Assembly available under HP
Part Number 00105-6033).

Pages 5-3/5-5 Table 5-1. A2 1 MHz Divider Reference Designation Index

All Serials >Add MPR29, MPR34 0360-0065 TERM-MTG FORK.
>Add A2R35 0757-0924 RESISTOR-FXD MET FLM 1000 Ohm 2% 1/4W.

2112A >Add SERIES 2116 to A2 (00105-6017) description.
>Delete A2Q10, R30, R32.

Page 5-5/5-7, Table 5-1. A3 100 KHz Divider Reference Designation Index

All Serials >Change A3R35* from 0757-0952 to 0757-0955 20K.
>Add MPR33, MPR35 0360-0065 TERM-MTG FORK.

2116A >Add SERIES 2116 (00105-6035) to A3 description.
>Delete the following components:

A3C12	A3C16	A3L5	A3R17	A3R20	A3R27
A3C13	A3C17	A3Q5	A3R18	A3R25	A3R29
A3C14	A3C22	C3Q7	A3R19	A3R26	

2228A >Change A3 (00105-6035) SERIES to 2228.
>Change R9 to 0727-0002 RESISTOR 3 1% .5W CF TC=0-500.

MANUAL CHANGES MODEL 105A/B (00105-9025)

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 5-7, Table 5-1. A4 Oscillator EFC and 5 MHz Assembly
Reference Designation Index

All Serials >Change A4R5* to 0757-0438 RESISTOR-FXD 5.11K 1% .125W TF
TC=0+-100.

2128A >Add SERIES 2120 to A4 (00105-6029) description.
>Delete resistors A4R1 (7500 ohms) and A4R2 (17.8K).
>Add resistor A4R8 0698-3156 RESISTOR-FXD 14.7K 1% .125W
TC=0+-100. This resistor replaces R1, R2.
>Delete 0510-0123, FASTENER: PUSH-ON TYPE.

Page 5-8, Table 5-1. A5 Power Supply (105A) Reference Designation Index
(00105-6026)

All Serials >Delete A5CR3.
>Add A5CR8 1901-0028 DIODE-SILICON 400PIV 0.5 AMP.
>Add A5R22 from 0757-0473 to 0698-3266 237K.

2120A >Change A5CR10A, A5CR10B to 1902-0685 DIODE-ZNR 9V 2%
DO-7 PD=.5W TC=+.001%.

Pages 5-9/5-11, Table 5-1. A5 Power Supply (105B) Reference Designation Index
(00105-6027)

All Serials >Add A5F1 2110-0274 FUSE - 3A 125V FAST-BLOW.
>Add MPF1 0360-0065 TERM-MTG FORK.

2120A >Change A5CR10A, A5CR10B from 1902-0676 to 1902-0685
DIODE-ZNR 9V 2% DO-7 PD=.5W TC=+.001%.

2628A >Change A5 (00105-6027) SERIES 2628.
>Change A5C1 from 0150-0121 (.1UF) to 0160-0174 CAP-FXD
.47UF +80-20% 50VDC CER.

2848A >Replace A5 (00105-6027) Replaceable Parts List with A5
(00105-6047, Date Code 88481) Replacable Parts List
supplied in these manual changes.

MANUAL CHANGES MODEL 105A/B (00105-9025)

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Pages 5-10/5-11, Table 5-1. 105A/B Replaceable Chassis Parts:

All Serials >Add "Chassis Parts" heading after A5R22.
>Change Q1 from 1854-0039 to 1854-0703. These two transistors are both 2N3053 units except the 1854-0703 has long leads as required in the HP Model 105A/105B Quartz Oscillator.
>Change W1 p/n from 8120-1348 to 8120-1378.

2044A >Delete C2, 0160-3611.
>Add C3, C4 0160-4355 CAPACITOR-FXD .01UF +-10% 250VAC (RMS).

2228A01126 (105B) >Change HP Part No. for BTI BATTERY to 1420-0312.

2308A01137 (105B) >Change Q3 from 1854-0020 to 1854-0959.

2620A >Change Q3 from 1854-0959 to 1854-0020 TRANSISTOR-SEL 2N1701.

NOTE

A change in Q3 (105B only) can cause oscillation (approximately 50 KHz at 600 mV peak-to-peak) of the 24V supply when S3 is in the "FLOAT" position. This shows up as spurious noise in the output signals. Change A5C1 to 0.47 UF, 50V (0160-0174) to stop this oscillation.

Pages 5-11/5-12, Table 5-1. 105A/105B Miscellaneous Parts:

2128A >Delete 00105-2026 GUIDE-FREQ ADJUST.
>Delete 00105-4013 GUARD.
>Add mechanical parts A1MP1 through A1MP5 from the table for A1 (00105-6100, SERIES 2128) supplied in this manual change
>Delete KIT-ACCESSORY, 00105-6032.
>Add heading "ACCESSORIES:" above p/n 1251-0126.
>Change 114B-16A to 8120-1378.

NOTE

The Accessory Kit (00105-6032) has been discontinued. The individual parts are all still available (1251-0126, 5060-0049, 5060-0630, and 8120-1378).

2848A >Delete 00105-0017, SHIELD-AC.
>Delete 0340-0019, INSULATOR-BUSHING, NYLON

Table 5-1. 105B A5 Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
A5	00105-6047	0	1	BD ASSY, A1 POWER SUPPLY (Date Code 88471)	28480	00105-6047
A5C1	0180-0230	0	1	CAPACITOR-FXD 1UF +-20% 50VDC TA	56289	150D105SX0050A2
A5C2	0160-0576	5	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	04222	SR205C104MAA
A5C3	0160-4557	0	1	CAPACITOR-FXD .1UF +-20% 50VDC CER	04222	SAE305C104MAA
A5C4	0180-3831	8	1	CAPACITOR-FXD 10UF +-10% 35VDC TA	56289	299D106X9035DB1
A5CR1	1902-0963	9	1	DIODE-ZNR 16V 5% D0-35 PD=.4W TC=0+- .88	28480	1902-0963
A5CR2	1902-0960	6	1	DIODE-ZNR 12V 5% D0-35 PD=.4W TC=0+- .077	28480	1902-0960
A5CR3	1901-0732	6	6	DIODE-PWR RECT 1KV 1A	28480	1901-0732
A5CR4	1901-0732	6		DIODE-PWR RECT 1KV 1A	28480	1901-0732
A5CR5	1901-0732	6		DIODE-PWR RECT 1KV 1A	28480	1901-0732
A5CR6	1901-0732	6		DIODE-PWR RECT 1KV 1A	28480	1901-0732
A5CR7	1901-0732	6		DIODE-PWR RECT 1KV 1A	28480	1901-0732
A5CR8	1901-0732	6		DIODE-PWR RECT 1KV 1A	28480	1901-0732
A5CR9	1901-0050	3	1	DIODE-SW 80V 200MA 2NS D0-35	9N171	1901-0050
A5K1	0490-1523	3	1	RELAY, 1C 18VDC COIL 3A 30VDC	08543	LZ-18S-C
A5R1	0757-0278	9	1	RESISTOR, 1.787K +-1% .125W FF TC=0+-100	91637	DCS-1/2-15
A5R2	0757-0442	9	5	RESISTOR, 10K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R3	0698-8827	4	1	RESISTOR, 1M +-10% .125W FF	2M627	CRB14 OR CRB25
A5R4	0757-0442	9		RESISTOR, 10K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R5	0757-0442	9		RESISTOR, 10K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R6	0757-0442	9		RESISTOR, 10K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R7	0757-0200	7	1	RESISTOR, 5.62K +-1% .125W FF	2M627	CRB14 OR CRB25
A5R8	0698-3442	9	3	RESISTOR, 237 +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R9	0811-1732	8	1	RESISTOR, 1 +-5% 3W PWI TC=0+-50	01686	T2B-79
A5R10	0811-1831	8	1	RESISTOR, 2 5% 32 PWI TC=0+-50	01686	T2B-79
A5R11	0698-5556	0	1	RESISTOR, 3.3K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R12	0698-3442	9		RESISTOR, 237 +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R13	0757-0438	3	1	RESISTOR, 5.1 1k +-1% .125W FF	2M627	CRB14 OR CRB25
A5R14	0698-3442	9		RESISTOR, 237 +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R15	0812-0086	5	1	RESISTOR, 5 +-5% 3W PWI TC=0+-50	01686	T2B-79
A5R16	0757-0467	8	1	RESISTOR, 121K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R17	0757-0463	4	2	RESISTOR, 82.5K +-1% .125W FF	2M627	CRB14 OR CRB25
A5R18	0698-0083	8	1	RESISTOR, 1.95K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R19	0757-0442	9		RESISTOR, 10K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R20	0757-0463	4		RESISTOR, 82.5K +-1% .125W FF TC=0+-100	2M627	CT4-1/8-T0-7502-F
A5R21	0757-0424	7	1	RESISTOR, 1.1K +-1% .125W FF	2M627	CRB14 OR CRB25
A5R22	0757-0402	1	1	RESISTOR, 110 +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R23	0698-3459	8	1	RESISTOR, 383K +-1% .125W FF TC=0+-100	2M627	CRB14 OR CRB25
A5R24	0698-3266	5	1	RESISTOR, 237K +-1% .125W FF TC=0+-100	24546	CT4-1/8-T0-2373-F
A5S5	3101-2488	1	1	SWITCH, PUSHBUTTON SPDT MOM .02A RED BTN	95146	TPA11FG-RA2
A5U1	1826-0412	1	2	IC-COMPARATOR PRCN DUAL 8-DIP	27014	MC14536BCP
A5U2	1820-2691	0	1	IC, FF TTL F D-TYPE POS-EDGE TRIG	04713	MC74F74N
A5U3	1820-2111	9	1	IC, INTERFACE DRIVER INV	01295	SN75468N
A5U4	1826-0393	7	4	IC, V-REG ADJ-POS 1.2/37V T0-220	01295	ALM317KC
A5U5	1826-0393	7		IC, V-REG ADJ-POS 1.2/37V T0-220	01295	ALM317KC
A5U6	1826-0551	9	1	IC, V-REG FXD-POS 4.9/5.1V T0-220	01295	TL7805ACKC
A5U7	1826-0393	7		IC, V-REG ADJ-POS 1.2/37V T0-220	01295	LM317KC
A5U8	1826-0393	7		IC, V-REG-ADJ-POS 1.2/37V T0-220	01295	LM317KC
A5U9	1826-0412	1		IC, COMPARATOR PRCDN DUAL 8-DIP	27014	MC14536BCP
A5W2	8159-0005	0	2	RESISTOR, 0 OHM 22 AWG LEAD DIA	55210	L-2007-1
A5W3	8159-0005	0		RESISTOR, 0 OHM 22 AWG LEAD DIA	55210	L-2007-1

See introduction to this section for ordering information

Table 5-1. 105B A5 Replaceable Parts

Reference Designation	HP Part Number	C D	Qty	Description	Mfr Code	Mfr Part Number
	2360-0181	4	8	SCREW, MACH 6-32 .25-IN LG 82-DEG	28480	2360-0181
	2360-0200	8	4	SCREW, MACH 6-32 .5-IN-LG 100-DEG	28480	2360-0200
	2420-0001	5	2	NUT, HEX 6-32	28480	2420-0001
	2510-0045	8	5	SCREW, MACH .375-IN-LG PAN-HD	28480	2510-0045
	2510-0046	9	13	SCREW, MACH 8-32 .375-IN-LG 82-DEG	28480	2510-0046
	2580-0004	6	6	NUT, HEX DBL-CHAM 8-32 .125-IN-THK	28480	2580-0004
	2580-0001	8	2	NUT, HEX DBL-CHAM 3/8-32 THD	28480	2950-0001
	2950-0040	5	1	NUT, HEX DBL-CHAM 3/8-32 THD	28480	2950-0040
	2950-0054	1	8	NUT, HEX DBL-CHAM 1/2-28 THD	28480	2950-0054
	2950-0072	3	1	NUT, HEX DBL-CHAM 1/4-32 THD	28480	2950-0072
	3050-0019	1	4	WASHER, FLAT NO. 10 .2-IN-ID	28480	3050-0019
	3050-0066	8	13	WASHER, FLAT NO. 6 .147-IN-ID	28480	3050-0066
	3050-0105	6	6	WASHER, FLAT NO. 4 .125-IN-ID	28480	3050-0105
	5000-0050	7	2	PLATE, FLUTED	28480	5000-0050
	5000-0230	5	2	INSULATOR, PC BOARD	28480	5000-0230
	5000-0232	7	1	INSULATOR, PC BD CONNECTOR	28480	5000-0232
	5000-8589	3	2	COVER, SIDE	28480	5000-8589
	5060-0049	0	1	BD ASSY, 15-PIN EXTENDER	28480	5060-0049
	5060-0630	5	1	BD ASSY, 22-PIN EXTENDER	28480	5060-0630
	5060-0729	3	2	FRAME, 3X11	28480	5060-0729
	5060-0767	9	5	FOOT ASSY, FM	28480	5060-0767
	5060-8711	9	1	COVER, BOTTOM	28480	5060-8711
	5060-8739	1	1	KIT-RACK MOUNT	28480	5060-8739
	00105-0007	0	1	CHASSIS, MAIN	28480	00105-0010
	00105-0010	7	1	PANEL, REAR	28480	00105-0007
	00105-0012	1	1	SHIELD, POWER SUPPLY	28480	00105-0012
	00105-0013	3	1	BRACKET, TRANSFORMER	28480	00105-0013
	00105-0015	7	1	BRACKET, CAPACITOR	28480	00105-0015
	00105-0025	8	1	COVER, TOP	28480	00105-0025
	00105-0026	0	1	BRACKET, HEATSINK	28480	00105-0026
	00105-0027	2	1	BRACKET, SUPPORT	28480	00105-0027
	00105-0028	4	1	PANEL, FRONT	28480	00105-0048
	00105-2045	2	1	GUIDE, COARSE TUN	28480	00105-2045
	00310-48801	0	2	WASHER, SHLDR LG	28480	00310-48801
	05065-6093	8	1	SHAFT ASSY, COUPLING	28480	05065-6093

See introduction to this section for ordering information

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

**Pages 5-13/5-17, Table 5-1a. Crystal Oscillator/Oven Assembly
Reference Designations**

All Serials	>Add to A1A3Q1 description "2N708". >Change A1A3Q6 to 1854-0005 and add to description "2N708".
2128A	>Replace Table 5-1a with new Table 5-1a supplied in this manual change.
2432A	>Change A1A2 part number from 05061-6165 to 05061-6174, SERIES 2432. >Change R11 to 0698-3452 RESISTOR 147K 1% .125W F TC=0+-100.
2732A	>Change A1A2 part number from 05061-6174 to 05061-6199, SERIES 2736. >Change A1A2R1 from 0698-0082 (454 ohms) to 0698-3446 RESISTOR-FXD 383 1% .12W F TC=0+-100.

Page 5-20, Table 5-2. Replaceable Parts:

All Serials	>Change 1884-0003 (3N58) to 1884-0070 THYRISTOR-SCR PNPN TO-72 VRRM=65; 03508; 3N81; TQ-105B=1. >Add 2110-0274 FUSE 3A 125V FAST-FLOW; 75915; 276003; 105B TQ=1.
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Page 5-21, Table 5-2. Replaceable Parts:

2128A	>Add 00105-0023 PANEL,FRONT (105A) >Add 00105-0024 PANEL,FRONT (105B)
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NOTE

The 00105-0018 panel is replaced by the 00105-0023 panel when the 00105-6100 Oscillator Assembly is installed for A1 in 105A instruments.

The 00105-0019 panel is replaced by the 00105-0024 panel when the 00105-6100 Oscillator Assembly is installed for A1 in 105B instruments.

Page 5-22/5-23. Table 5-2a. Crystal Oscillator/Oven Assembly, Parts

2128A	>Delete all of Table 5-2a.
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Table 5-1a. CRYSTAL OSCILLATOR AND OVEN ASSEMBLY
Reference Designation Index*

Reference Designation	HP Part No.	Description
A1A1	10811-60109	ASSEMBLY 10 MHZ OSCILLATOR (SERIES 2120)
A1A2	05061-6165	ASSEMBLY FREQ.DIVIDER/AMP. BD (SERIES 2120)
A1A3	00105-6044	ASSEMBLY POWER SUPPLY BD (SERIES 2128)
A1MP1	1460-1920	SPRING-COMPRESSION TUNING SHAFT INNER-END
A1MP2	05065-6093	SHAFT-TUNING FIBER-GLASS
A1MP3	00105-2045	HOUSING-TUNING SHAFT
A1MP4	00105-0022	BRACKET-MTG (FOR ENTIRE A1 ASSEMBLY)
A1MP5	00105-0021	BRACKET-SUPPORT (FOR A2 CIRCUIT BOARD)
A1U1	1826-0393	IC ADJ VOLT-REG TO-220 TYPE LM317T
-----	10811-90002	MODEL 10811AB CRYSTAL OSCILLATOR OPER./SERV. MANUAL
		A1U1 MISCELLANEOUS MTG PARTS
	3050-0791	WASHER-EXTRUDED TRANSISTOR MOUNTING
	0340-0864	INSULATOR-TRANSISTOR MOUNTING
	3050-0229	WASHER-FLAT NO. 4/.125 ID
	2200-0141	SCREW-MACHINE 4-40/PAN-HEAD-POZI-LOCKWASHER
A1A2	05061-6165	ASSY, CKT BD: FREQ.DIVIDER/AMP. (SERIES 2120)
A1A2C1	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C2	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C3	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C4	0160-4511	CAPACITOR-FXD 220 PF 5% 200VDC CER
A1A2C5	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C6	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C7	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C8	0160-4511	CAPACITOR-FXD 220 PF 5% 200VDC CER
A1A2C9	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C10	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C11	0160-4835	CAPACITOR-FXD .1 UF 10% 50VDC CER
A1A2C12	0160-4387	CAPACITOR-FXD 47 PF 5% 200VDC CER
A1A2C13	0180-0161	CAPACITOR-FXD 3.3 UF 10% 35VDC TANT
A1A2CR1	1902-0033	DIODE BKDOWN 6.2V 5% DO-7 PD=.4W TYPE 1N823
A1A2CR2	1902-0787	DIODE BKDOWN 9.0V 5% DO-7 PD=.5W TYPE 1N938
A1A2J1	1250-0257	CONNECTOR-RF SMB M PC 50-OHM COAXIAL
thru J4		
A1A2J5	-----	NOT ASSIGNED
A1A2J6	0360-0124	CONNECTOR-SGL CONT-PIN RND PUSH-ON
thru J9		

Table 5-1a. CRYSTAL OSCILLATOR AND OVEN ASSEMBLY
Reference Designation Index*

Reference Designation	HP Part No.	Description
A 1A2L1	9100-0566	COIL MOULDED 4.7UH 5% Q=45
A 1A2L2	9100-2280	COIL MOULDED 220UH 10% Q=30
A 1A2L3	9100-2280	COIL MOULDED 220UH 10% Q=30
A 1A2L4	9100-0566	COIL MOULDED 4.7UH 5% Q=45
A 1A2L5	9100-2280	COIL MOULDED 220UH 10% Q=30
A 1A2L6	9100-2280	COIL MOULDED 220UH 10% Q=30
A 1A2L7	9140-0604	COIL MOULDED 22UH
A 1A2Q1 thru Q4	1854-0215	TRANSISTOR-SI NPN PD=350MW TYPE 2N3904
A 1A2R1	0698-0082	RESISTOR-FXD 464 1% .125W F TC=0+-100
A 1A2R2	0698-0082	RESISTOR-FXD 464 1% .125W F TC=0+-100
A 1A2R3	0757-0443	RESISTOR-FXD 11.0K 1% .125W F TC=0+-100
A 1A2R4	0757-0180	RESISTOR-FXD 31.6 1% .125W F TC=0+-100
A 1A2R5	0698-3447	RESISTOR-FXD 422 1% .250W F TC=0+-100
A 1A2R6	0698-3442	RESISTOR-FXD 237 1% .250W F TC=0+-100
A 1A2R7	0698-3132	RESISTOR-FXD 261 1% .250W F TC=0+-100
A 1A2R8	2100-1788	RESISTOR-TRMR 500 30% CC TOP-ADJ 1-TRN
A 1A2R9	0757-0280	RESISTOR-FXD 1.0K 1% .125W F TC=0+-100
A 1A2R10	0698-3155	RESISTOR-FXD 4.64K 1% .250W F TC=0+-100
A 1A2R11	0757-0279	RESISTOR-FXD 3.16K 1% .125W F TC=0+-100
A 1A2R12	0757-0289	RESISTOR-FXD 13.3K 1% .125W F TC=0+-100
A 1A2R13	0698-3155	RESISTOR-FXD 4.64K 1% .250W F TC=0+-100
A 1A2R14	0757-0280	RESISTOR-FXD 1.0K 1% .125W F TC=0+-100
A 1A2R15	0757-0416	RESISTOR-FXD 511 1% .125W F TC=0+-100
A 1A2R16	0257-0278	RESISTOR-FXD 1.78K 1% .125W F TC=0+-100
A 1A2R17	0757-0416	RESISTOR-FXD 511 1% .125W F TC=0+-100
A 1A2R18	0757-0416	RESISTOR-FXD 511 1% .125W F TC=0+-100
A 1A2TP1	0360-1682	TERMINAL-STUD SGL-TUR PRESS-MTG
A 1A2U1	1820-0077	IC FF TTL DUAL POS-EDGE-TRIG TYPE SN7474N
A 1A2MP1	0510-0568	BUTTON-PLASTIC INSULATOR PUSH-IN

Table 5-1a. CRYSTAL OSCILLATOR AND OVEN ASSEMBLY
Reference Designation Index*

Reference Designation	HP Part No.	Description
A1A3	00105-6044	ASSY, CIRCUIT BOARD: POWER SUPPLY (SERIES 2128)
A1A3C1	0180-0230	CAPACITOR-FXD 1 UF 20% 50VDC TANT
A1A3C2	0180-0230	CAPACITOR-FXD 1 UF 20% 50VDC TANT
A1A3C3	0180-0116	CAPACITOR-FXD 6.8 UF 10% 35VDC TANT
A1A3C4	0180-0230	CAPACITOR-FXD 1 UF 20% 50VDC TANT
A1A3C5	0160-4521	CAPACITOR-FXD 12 PF 5% 200VDC CER TC=+/-30
A1A3C6	0180-0230	CAPACITOR-FXD 1 UF 20% 50VDC TANT
A1A3CR1	1902-0984	DIODE-BKDOWN 6.4V 2% DO-7 PD=.4W
A1A3CR2	1901-0050	DIODE-SWITCHING 80V 200 MA 2 NS DO-35
A1A3CR3	1901-0050	DIODE-SWITCHING 80V 200 MA 2 NS DO-35
A1A3J1	1251-2035	CONNECTOR-PC EDGE 2-ROWS 15-CONT/ROW
A1A3J2	1251-2035	CONNECTOR-PC EDGE 2-ROWS 15-CONT/ROW
A1A3L1	9140-0604	COIL-MOULDED 22UH
A1A3Q1	1854-0831	TRANSISTOR-SI NPN PD=625MW TYPE 2N6429A
A1A3Q2	1854-0215	TRANSISTOR-SI NPN PD=350MW TYPE 2N3904
A1A3R1	0757-0279	RESISTOR-FXD 3.16K 1% .125W F TC=0+-100
A1A3R2	0698-3442	RESISTOR-FXD 237 1% .125W F TC=0+-100
A1A3R3	0757-0424	RESISTOR-FXD 1.1K 1% .125W F TC=0+-100
A1A3R4	0757-0200	RESISTOR-FXD 5.62K 1% .125W F TC=0+-100
A1A3R5	-----	NOT ASSIGNED
A1A3R6	0757-0200	RESISTOR-FXD 5.62K 1% .125W F TC=0+-100
A1A3R7	0757-0199	RESISTOR-FXD 21.5K 1% .125W F TC=0+-100
A1A3R8	0757-0442	RESISTOR-FXD 10.0K 1% .125W F TC=0+-100
A1A3R9	0698-3457	RESISTOR-FXD 316K 1% .125W F TC=0+-100
A1A3R10	0698-3457	RESISTOR-FXD 316K 1% .125W F TC=0+-100
A1A3R11*	0698-3454	RESISTOR-FXD 215K 1% .125W F TC=0+-100 *FACTORY SELECTED VALUE; AVG VALUE SHOWN.
A1A3R11	0360-0065	TERMINAL-STUD FORKED-TUR SWGFRM-MTG (R11 MTG)
A1A3R12	0698-0082	RESISTOR-FXD 464 1% .125W F TC=0+-100
A1A3R13	0698-0082	RESISTOR-FXD 464 1% .125W F TC=0+-100
A1A3TP1	0360-1682	TERMINAL-STUD SGL-TUR PRESS-MTG
A1A3U1	1826-0275	IC VOLTAGE REGULATOR TO-92 TYPE MC78L12ACP

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 7-3, Figure 7-2. Block Diagram

1940A >Change A1 Oscillator assembly from 00105-6013 to 00105-6012.

NOTE

Any other mention of part numbers 00105-6013 or 00105-6034 appearing in this operating and service manual should be changed to 00105-6012 and 00105-6033 respectively.

2128A >Change A1 part number to 00105-6100.
>Change connections for oscillator "FINE, PARTS IN 10{10}" frequency control R2 to agree with connections and changes shown in attached A1 (00105-6100) schematic diagram.
>Add fixed resistor A4R8 (14.7K) as shown in attached A1 schematic diagram.
>Delete A1 "115V AC" connection to power transformer T1. This twisted pair of wires can be removed since the new A1 oscillator assembly does not require 115V AC to heat the crystal oven.

Page 7-5, Figure 7-3. A1 Oscillator Assembly Block Diagram

2128A >Replace Figure 7-3 (00105-6013) with new Figure 7-3 (00105-6100) supplied in this manual change.

Page 7-7, Figure 7-4. A1 Oscillator Assembly/A1A1, A1A3 Temperature Control Circuit

2128A >Delete Figure 7-4 schematic diagrams for A1, A1A1, and A1A3 portions of 00105-6013 Oscillator Assembly.
>Add component locator illustrations supplied in this manual change for A1A2, A1A3 for new 00105-6100 Oscillator.

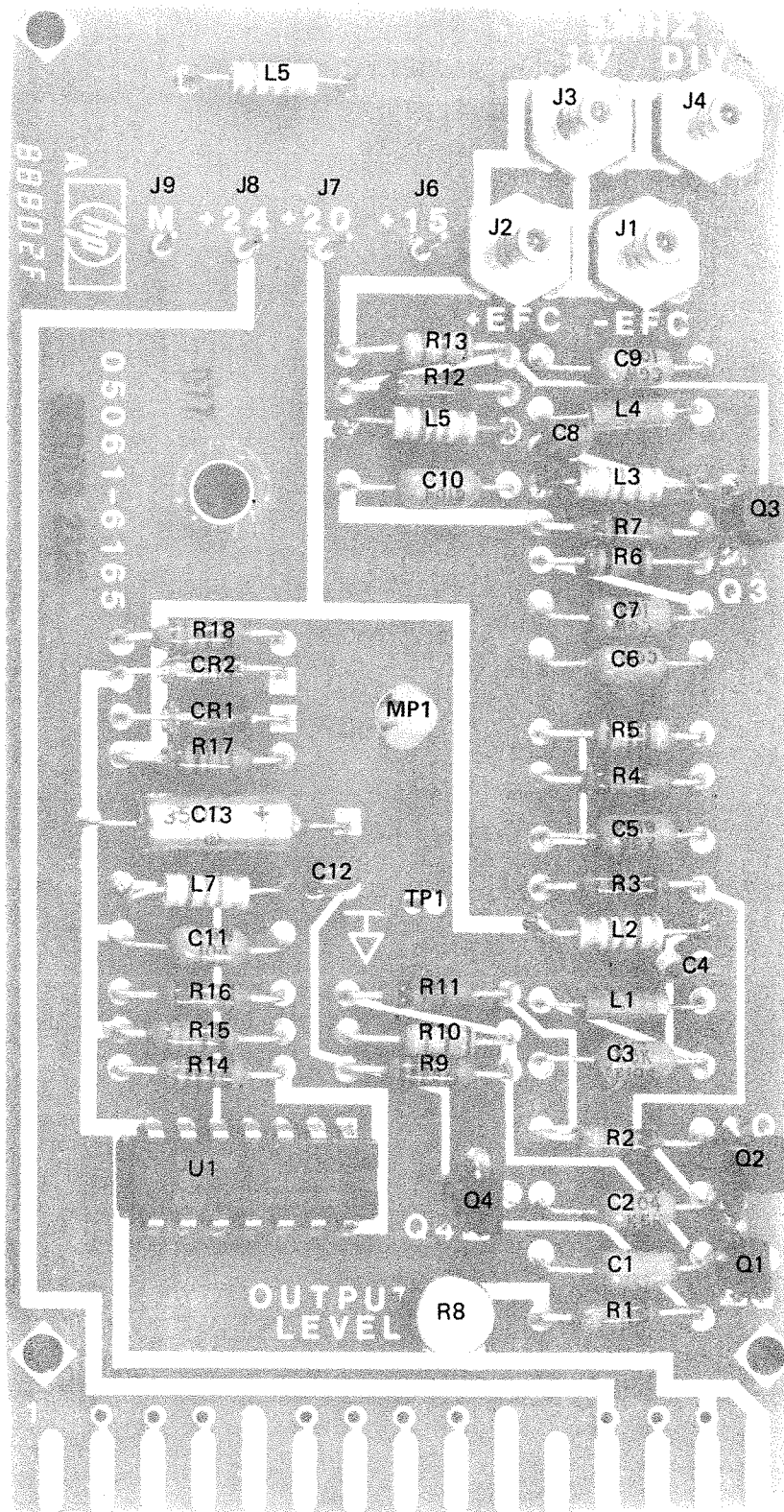
2432A >Replace A1A2 component locator with SERIES 2432A component locator supplied in this manual change.

2732A >Change A1A2 part number from 05061-6174 to 05061-6199, SERIES 2736.
>Change A1A2R1 value from 484 ohms to 383 ohms.

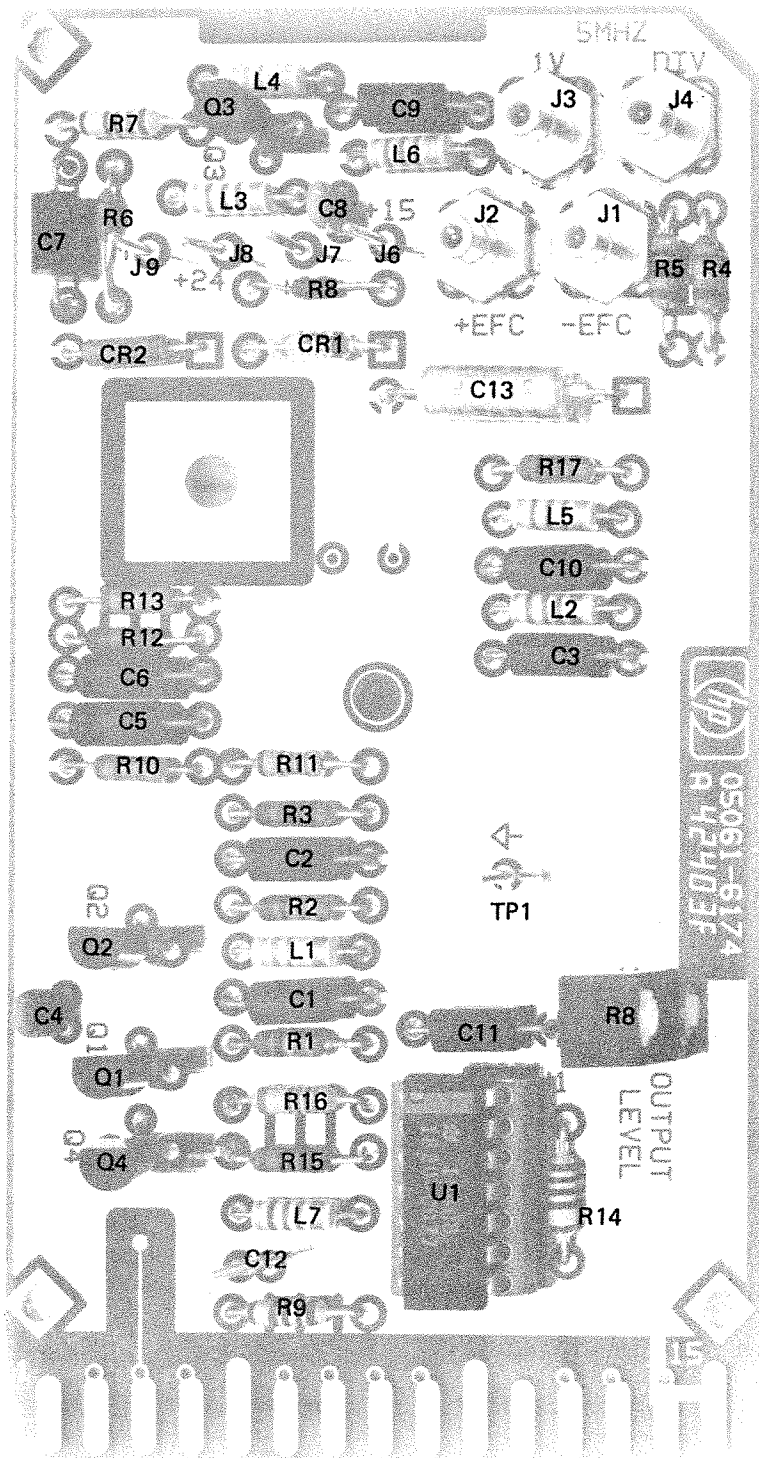
**Page 7-9, Figure 7-5. A1 Oscillator Assembly
A2A1, A2A2 5 MHz Oscillator and AGC**

All Serials >Change value of C5 and C6 from 5000uf to 5000pf.

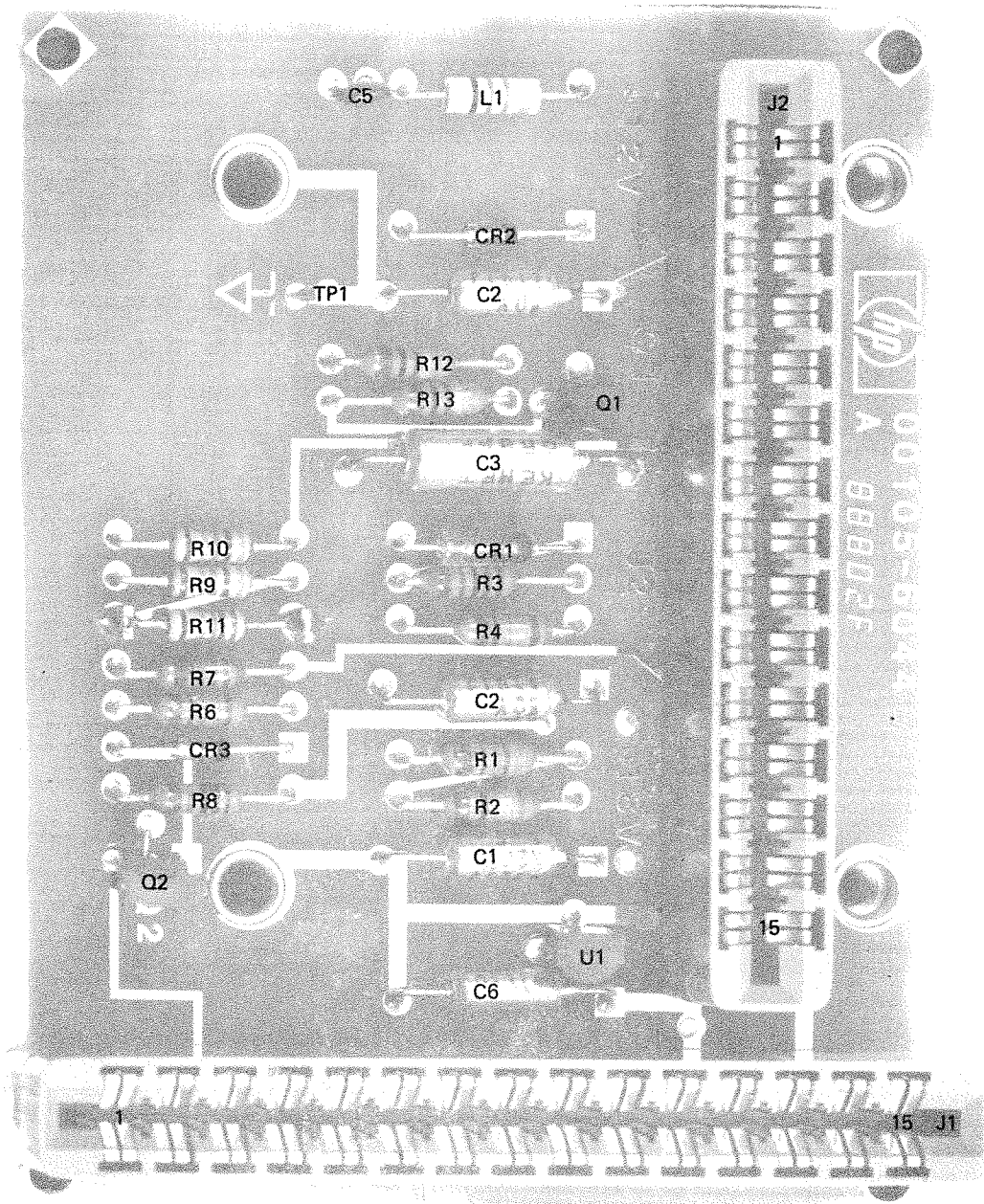
2128A >Delete Figure 7-5 schematic diagrams for A1, A2A1, and A2A1 portions of 00105-6013 Oscillator Assembly.
>Add waveforms supplied in this manual change for new 00105-6100 Oscillator.



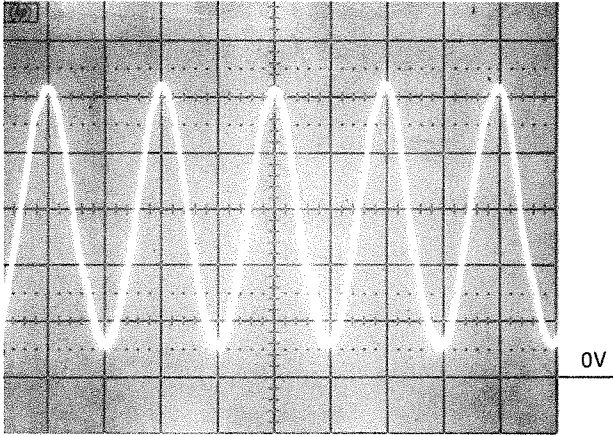
Part of Figure 7-4
 A1A2 Frequency Divider/Amplifier Assembly
 Component Locator (05061-6165, SERIES 2120)
 Page 7-7



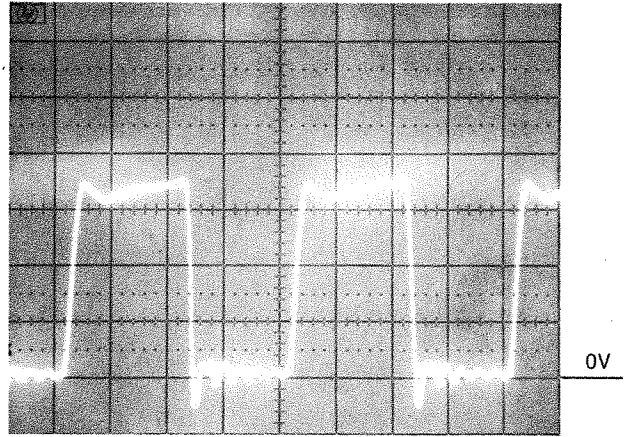
Part of Figure 7-4
 A1A2 Frequency Divider/Amplifier Assembly
 Component Locator (05061-6174, SERIES 2432)
 Page 7-7



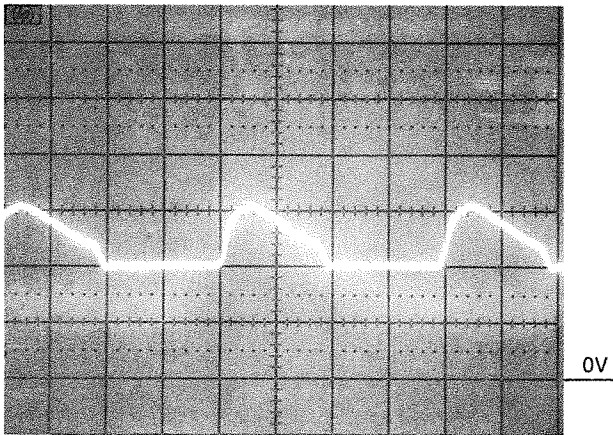
Part of Figure 7-7
 A1A3 Power Supply Assembly
 Component Locator (00105-6044 SERIES 2128)
 Page 7-7



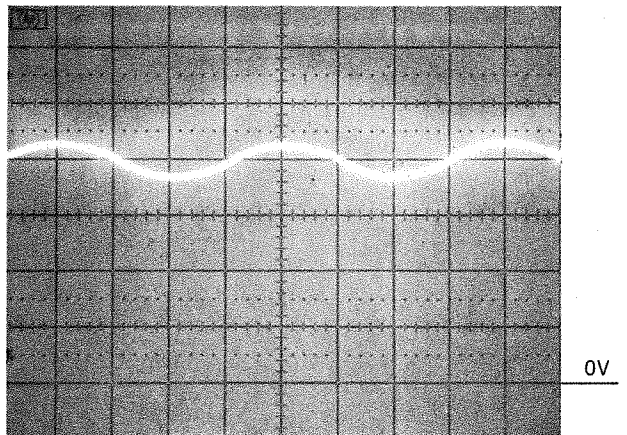
① Vert = .5V/div.
 Horiz = 50 ns/div.



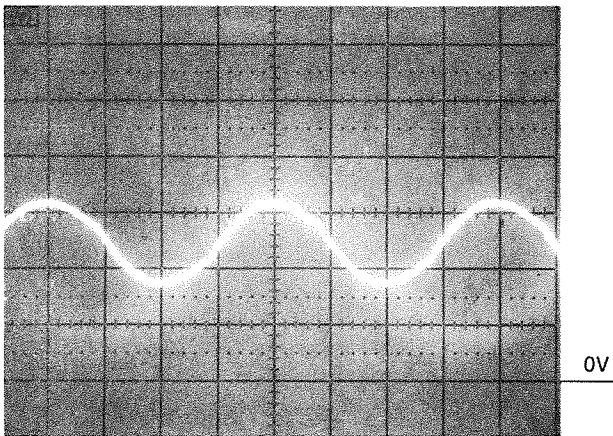
② Vert = 1V/div.
 Horiz = 50 ns/div.



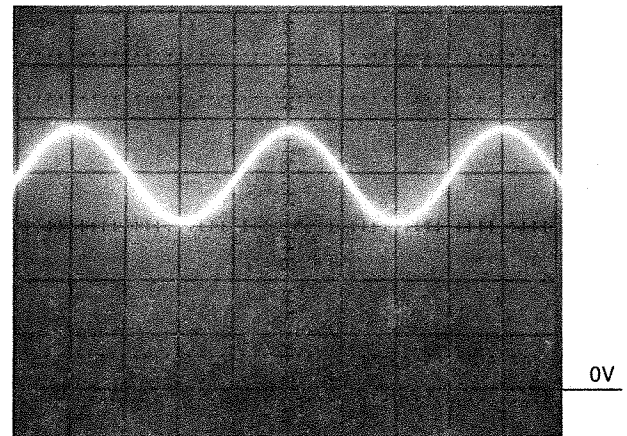
③ Vert = 2V/div.
 Horiz = 50 ns/div.



④ Vert = 5V/div.
 Horiz = 50 ns/div.



⑤ Vert = 2V/div.
 Horiz = 50 ns/div.



⑥ Vert = 5V/div.
 Horiz = 50 ns/div.

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 7-11, Figure 7-6. A1 Oscillator Assembly/A1A3 Power Amplifier

- 2128A >Delete Figure 7-6 schematic diagrams for A1 and A2A3 portions of 00105-6013 Oscillator Assembly.
>Add new schematic diagram for 00105-6100 A1 Oscillator Assembly (SERIES 2128) and corresponding changes in A4 Oscillator EFC and 5 MHz Assembly (HP Part No. 00105-6029, SERIES 2120).
- 2432A >Change A1A2 part number from 05061-6165 to 05061-6174, SERIES 2432.
>Change R11 value to 147K.

Page 7-13, Figure 7-7. A2 1 MHz Divider Schematic/Component Locator

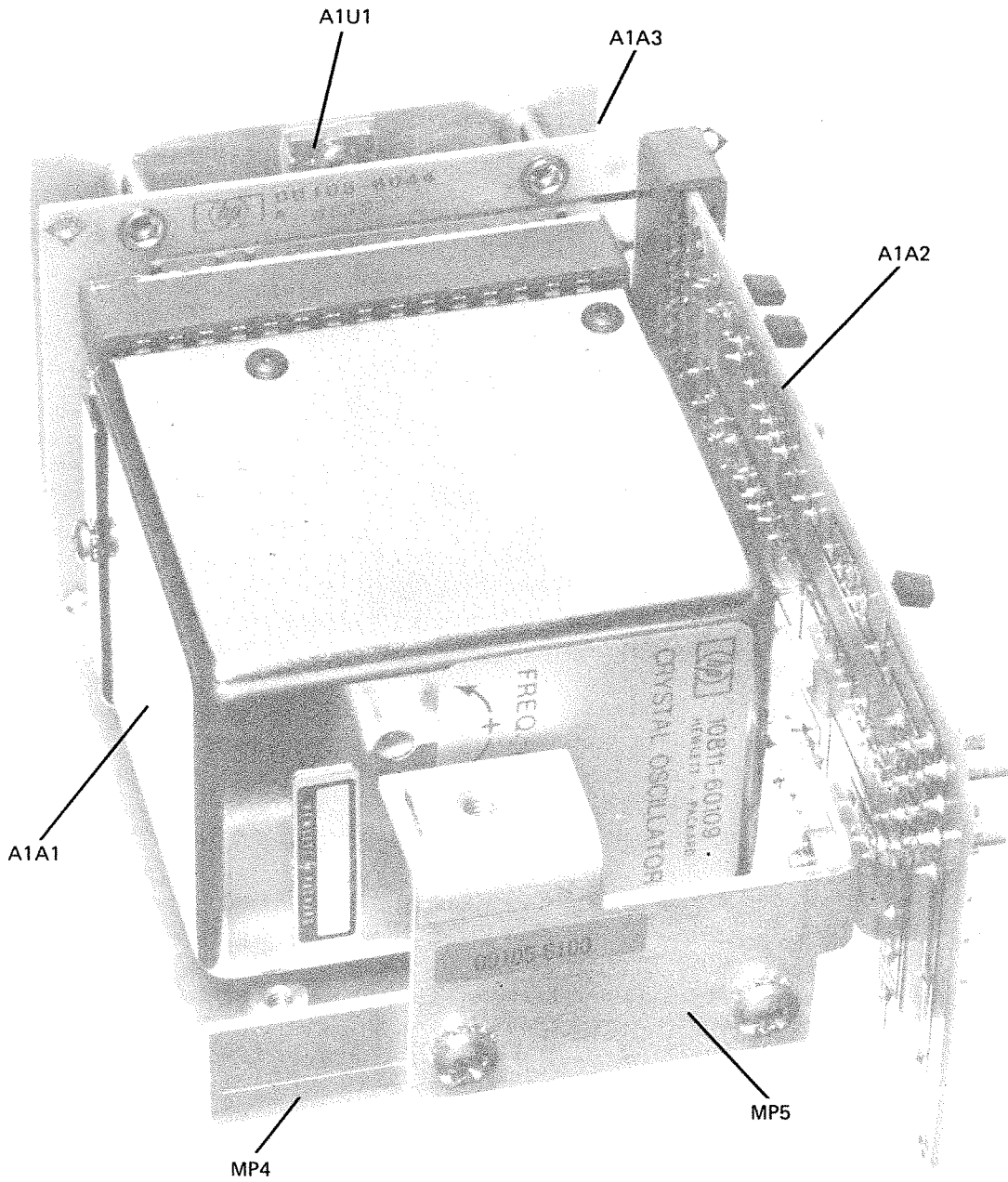
- All Serials >Replace A2 component locator with new A2 component locator supplied in this manual change.
- 2116A >Add SERIES 2116 to A2 description at top of schematic.
>Delete the following circuitry on schematic diagram and component locator: Q10, R30, and R32.

Page 7-15, Figure 7-8. A3 100 kHz Divider Assembly Schematic/Component Locator

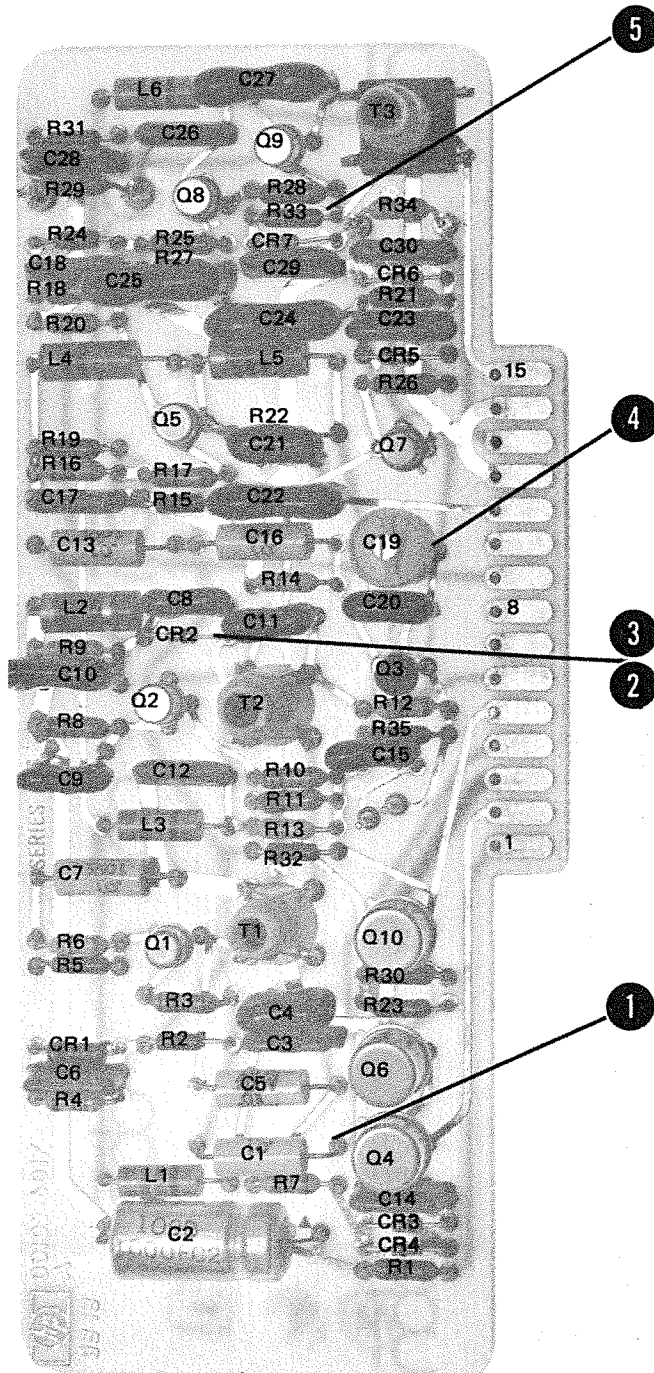
- 2116A >Add SERIES 2116 to A3 description at top of schematic.
>Delete the following circuitry on schematic diagram and component locator: C12, C13, C14, C16, C17, C22, L5, Q5, Q7, R17, R18, R19, R20, R25, R26, R27, and R29.

Page 7-17, Figure 7-9. A5 Power Supply (105A only) Schematic/Component Locator

- All Serials >Change A5R22 value from 221K to 237K.
>Change Q1 to 1854-0703.
>Add to note 3: "They are selected so that the sum of their breakdown voltage is 18.7V".
>Delete "18.7V" next to CR10A and B.
>Change 24VDC to EXT DC in upper left corner of schematic.
- 2044A >Change A5C2A, C2B to C3 and C4, respectively, with values of .01UF.
- 2120A >Change CR10A and CR10B to 9.0V.
>Change all other references to +18.7V to +18.0V.
>Delete Note 3 and all references to Note 3.



SEE TABLE 3 FOR PARTS IDENTIFICATION
AND TUNING SHAFT PARTS
(NOT SHOWN HERE)



Part of Figure 7-7
 A2 1MHZ DIVIDER Component Locator
 (00105-6017 SERIES 2432)
 7-13

SERIAL PREFIX OR
SERIAL NUMBER

CHANGES

Page 7-19, Figure 7-10. A5 Power Supply (105B only) Schematic/Component Locator

All Serials	<ul style="list-style-type: none"> >Change A5F1 location to show fuse in series with connection between A5(13) and terminal of A5K1 relay. >Change A5CR9 from 3N58 to 3N81. >Change Q1 to 1854-0703. >Add to note 3: "They are selected so that the sum of their breakdown voltage is 18.7V". >Delete "18.7V" next to CR10A and B. >Change 24VDC to EXT DC in upper left corner of schematic.
2044A	<ul style="list-style-type: none"> >Change A5C2A, C2B to C3 and C4, respectively, with values of .01UF.
2120A	<ul style="list-style-type: none"> >Change CR10A and CR10B to 9.0V. >Change all other references to +18.7 to +18.0V. >Delete Note 3 and all references to Note 3.
2228A01126 (105B)	<ul style="list-style-type: none"> >Change R9 value to 3 ohms.
2628A	<ul style="list-style-type: none"> >Change A5 SERIES to 2628. >Change A5C1 value from .1UF to .47UF.
2848A	<ul style="list-style-type: none"> >Replace A5 (00105-6027) Component Locator/Schematic Diagram with A5 (00105-6047, Date Code 88481) Component Locator/Schematic Diagram supplied in these manual changes.

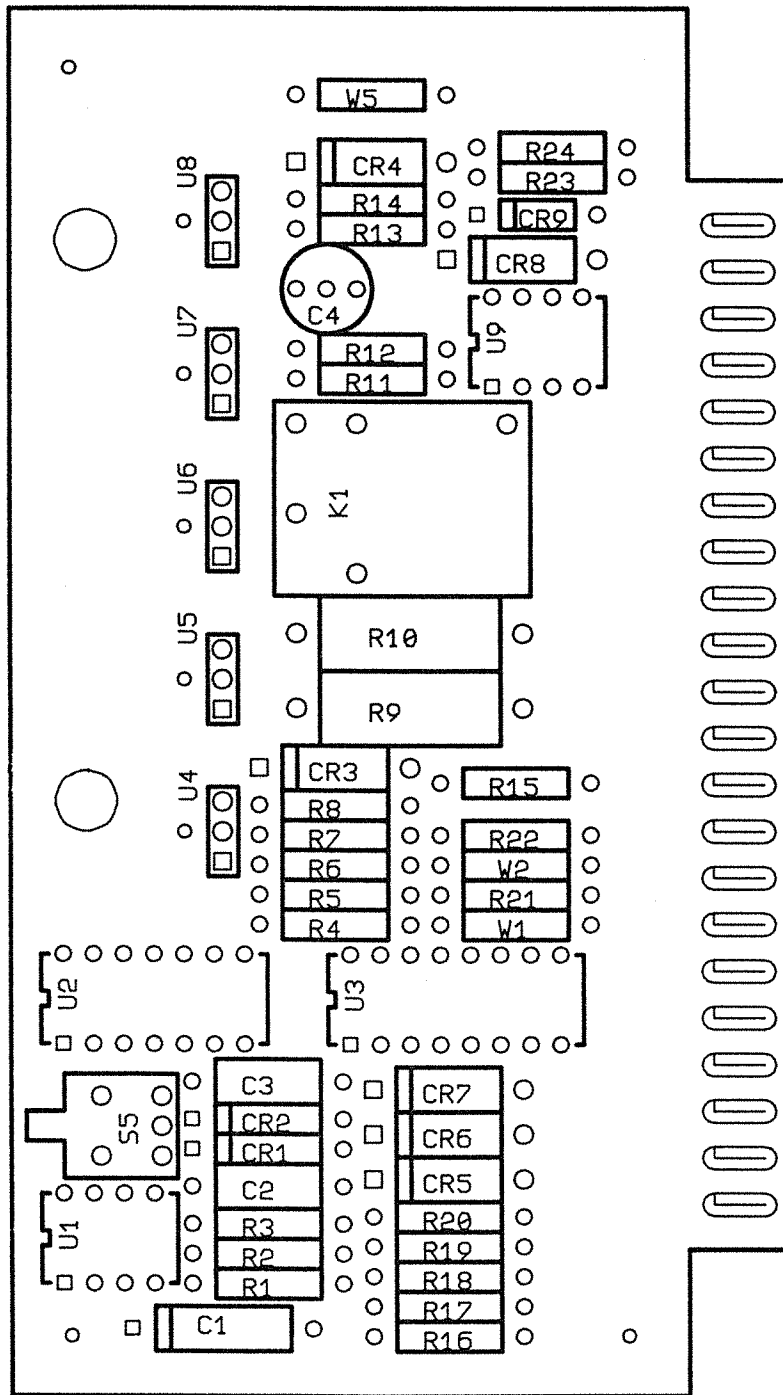


Figure 7-10
 A5 105B Power Supply Assembly
 (00105-6047 Date Code 88471)
 Component Locator

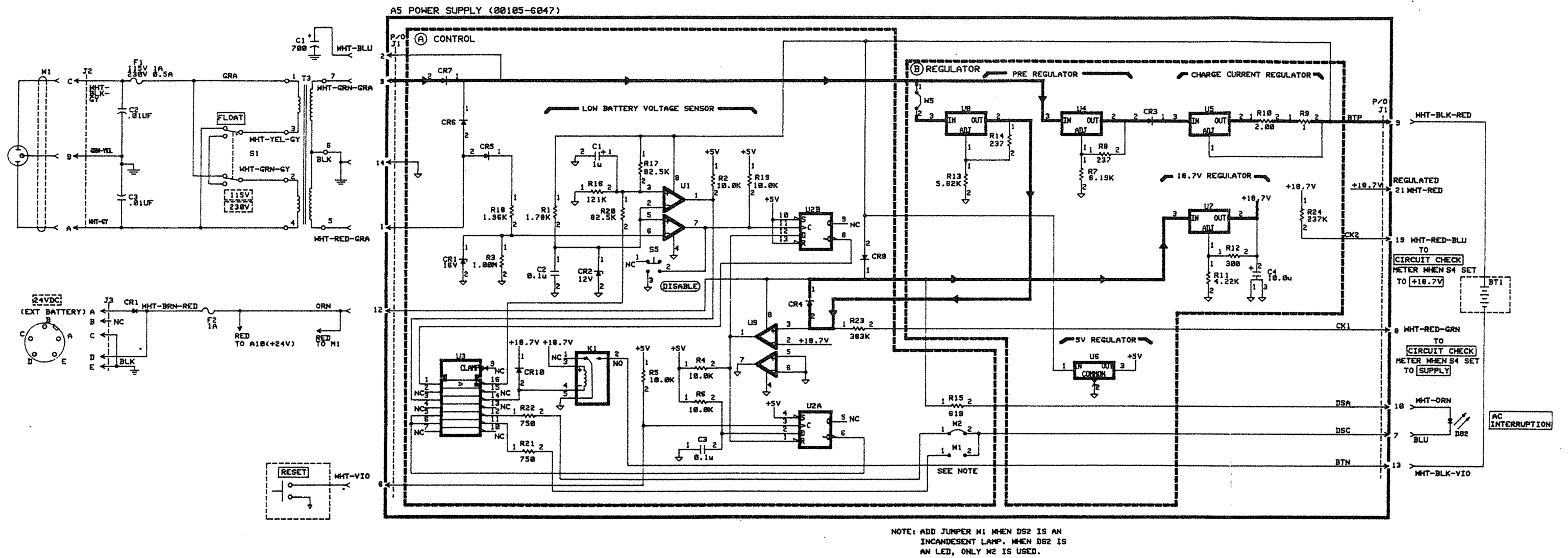
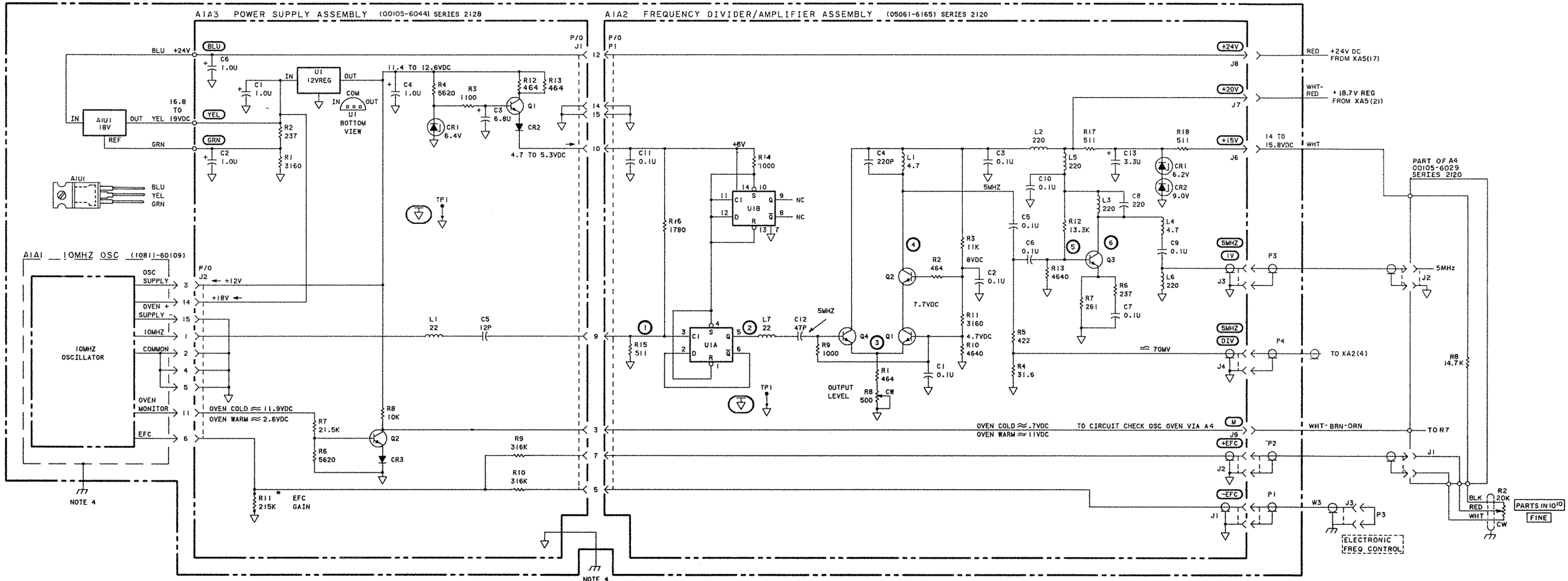


Figure 7-10
 A5 105B Power Supply Assembly
 (00105-6047 Date Code 88471)
 Schematic Diagram

A1 OSCILLATOR ASSEMBLY (00105-6100) SERIES 2128



- NOTES:
1. REFERENCE DESIGNATIONS WITHIN THIS ASSEMBLY ARE ABBREVIATED. ADD ASSEMBLY NUMBER TO ABBREVIATION FOR COMPLETE DESCRIPTION.
 2. UNLESS OTHERWISE INDICATED: RESISTANCE IN OHMS; CAPACITANCE IN FARADS; INDUCTANCE IN MICROHENRIES.
 3. * INDICATES FACTORY SELECTED VALUE.
 4. CHASSIS CONNECTIONS MADE BY A1 MOUNTING SCREWS.
 5. ALL VOLTAGES AND WAVEFORMS TAKEN WITH 20VDC INPUT TO "20V" TERMINAL (J1) AND OUTPUT LEVEL SET TO 1.1V RMS INTO 50 OHMS AT "5MHZ IV" TERMINAL (J3).

REFERENCE DESIGNATIONS

NO PREFIX	A1A1	A1A2	A1A3
P1-4	SEE 10811A OPERATING AND SERVICE MANUAL	C1-13 CR1,2 J1-9,9-9 L1-7	C1-6 CR1-3 J1,2 L1
R2		Q1-4 R1-18 TP1 UI	Q1,2 R1-4,6-13 TP1 UI

NOT ASSIGNED: A1A2J5, A1A3R5

TABLE OF ACTIVE ELEMENTS

CIRCUIT REF.	HP AND MFR PART NO.
A1U	1826-0390 (LM317T)
A1A2CR1	1902-0033 (1N823)
A1A2CR2	1902-0787 (1N938)
A1A2Q1-Q4	1854-0215 (2N3904)
A1A2U1	1820-0077 (5N7474N)
A1A3CR1	1902-0984
A1A3CR2,CR3	1902-0050
A1A3Q1	1854-0831 (2N6429A)
A1A3C2	1854-0215 (2N3904)

NOTE--ALL TRANSISTORS ARE NPN SILICON

Part of Figure 7-3
 A1 Oscillator Assembly
 (00105-6100 SERIES 2128)
 Page 7-5