Technical Manual

MAINTENANCE INSTRUCTIONS FOR

AUTO/STROBONAR 772

Honeywell PHOTOGRAPHIC PRODUCTS DIVISION

73003219-001

Technical Manual

MARCH 1972

MAINTENANCE INSTRUCTIONS FOR

AUTO/STROBONAR 772

Honeywell PHOTOGRAPHIC PRODUCTS DIVISION
P. O. BOX 1010 • LITTLETON, COLORADO • 80120

73003219-001A 3C MARCH 1972 Printed in USA

SECTION 1

INTRODUCTION

SECTION 2

PRINCIPLES OF OPERATION

SECTION 3

CHECKOUT AND TROUBLESHOOTING

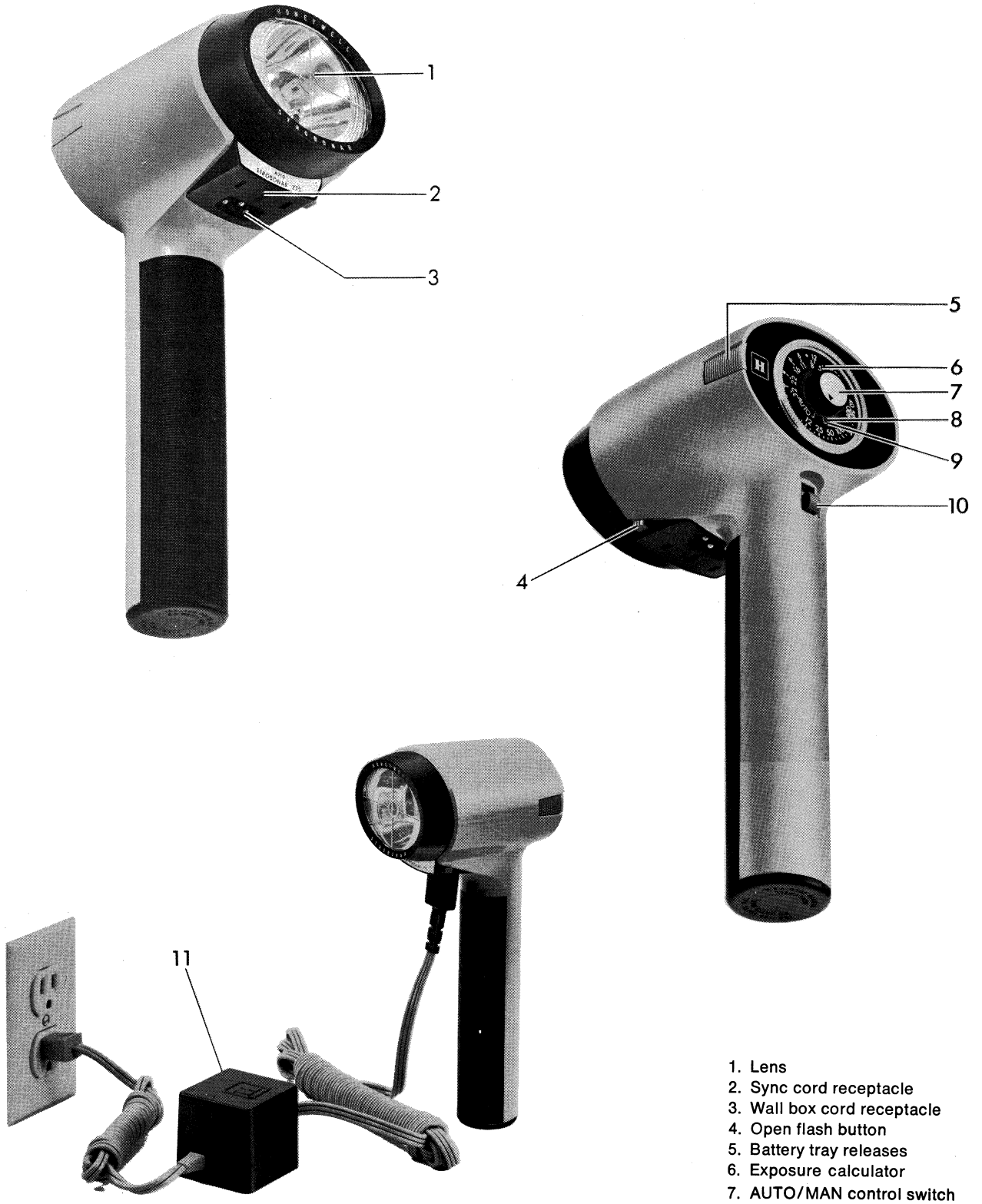
SECTION 4

MAINTENANCE

SECTION 5

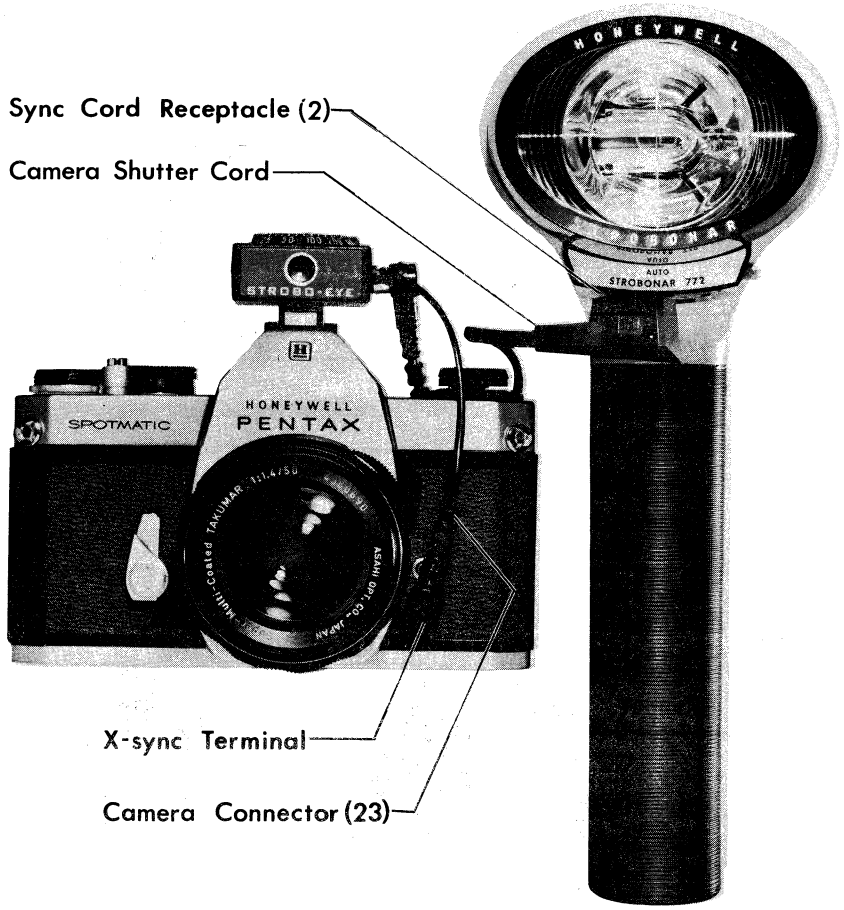
PARTS LIST AND DIAGRAMS

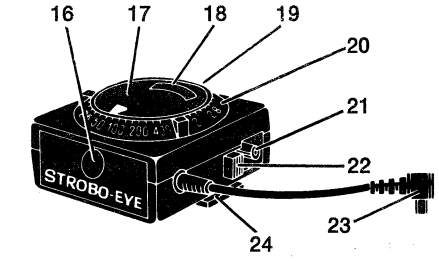
LIST OF ILLUSTRATIONS

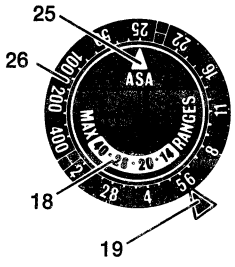


1. Lens
2. Sync cord receptacle
3. Wall box cord receptacle
4. Open flash button
5. Battery tray releases
6. Exposure calculator
7. AUTO/MAN control switch
8. Ready (Red) light
9. Green light exposure indicator
10. Battery switch
11. Wall box

Figure 1-1. Remote Auto/Strobonar 772

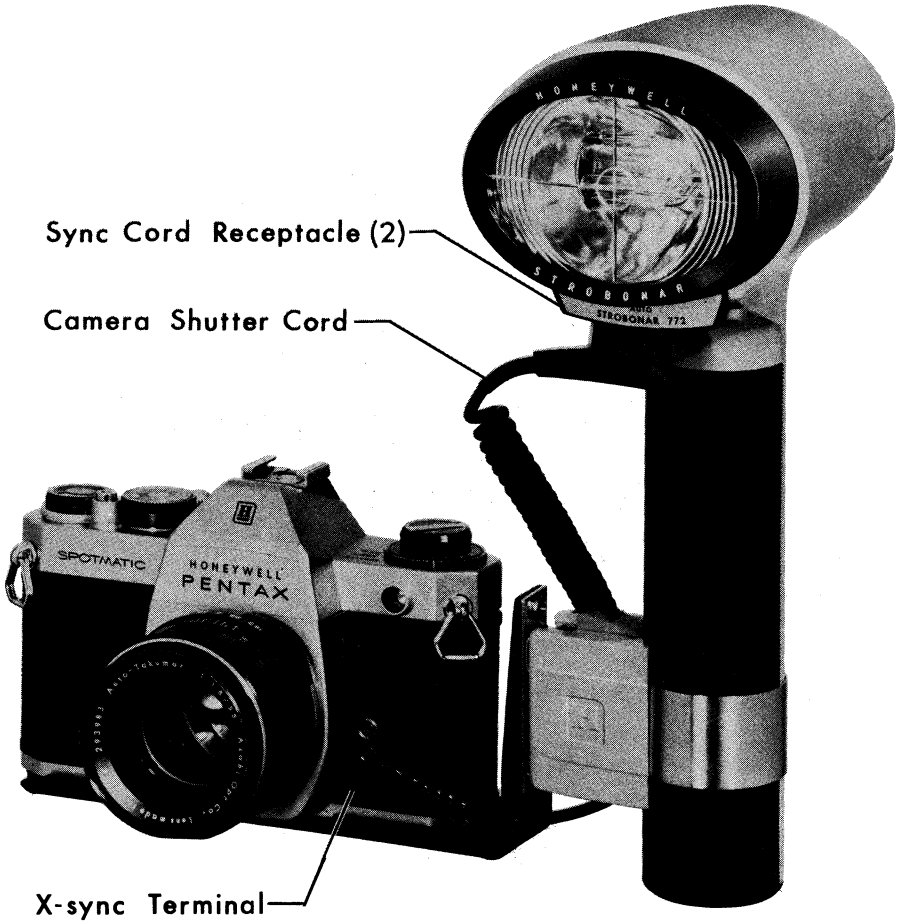


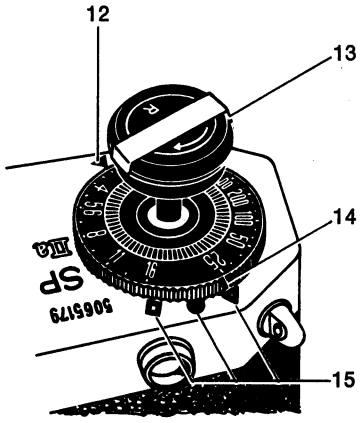




16. Sensor
17. Film speed indicator button
18. Maximum ranges scale
19. F/stop index
20. F/stop dial
21. Flash unit sync cord receptacle
22. Flash unit connector lock
23. Camera connector
24. Mounting foot
25. ASA index
26. ASA scale (blue)

Figure 1-2. Strobo-Eye Remote Sensor Accessory and Remote Auto/Strobonar 772





12. F/stop index
13. Film rewind knob
14. ASA index
15. Range indexes

Figure 1-3. Pentax Spotmatic IIa Camera and Remote Auto/Strobonar 772

SECTION I

INTRODUCTION

1-1. SCOPE OF MANUAL.

This manual provides maintenance instructions for the Honeywell Remote Auto/Strobonar 772, Strobo-Eye Remote Sensor Accessory and the electronic circuits associated with automatic flash operation in the Pentax Spotmatic IIa Camera. It includes information on operational checkout, principles of operation, troubleshooting, disassembly, repair, component replacement, recommended equipment and list of replaceable parts.

1-2. UNIT DESCRIPTION.

The Auto/Strobonar/Strobo-Eye system consists of three major assemblies; Auto/Strobonar 772, wall box, and Strobo-Eye (either Remote Sensor Accessory or Spotmatic IIa Camera. The Strobonar provides a source of repeating photo flash light and can operate as an automatic flash when connected to either of the Strobo-Eye units.

1-3. AUTO/STROBONAR 772.

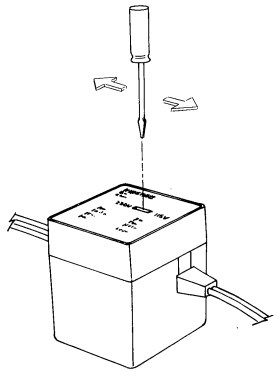
The Auto/Strobonar is powered by either battery, battery/AC, or AC only. Battery power is supplied by four "Sub-C" welded nickel cadmium cells located in the replaceable tray at the back of the flash lead. AC power is supplied by the wall box which also contains the battery charger.

On the back of the Strobonar are mounted an exposure calculator, an AUTO/MAN control switch, a ready (red) light, an exposure (green) indicator, and the battery switch. The sync cord receptacle and wall box cord receptacle are located under the flash head. An open flash button on the side of the flash head provides a means of open flashing or test flashing the unit.

1-4. WALL BOX (SEE FIGURE 1-1).

The wall box allows the unit to operate on AC power and recharges the batteries in the Auto/Strobonar. Two styles of wall boxes have been designed for use with the Auto/Strobonar 772; single voltage and multi-voltage.

The single voltage wall box provides 105-129 VAC, 50-60 Hz power while the multi-voltage wall box provides either 105-129 VAC, 50-60 Hz or 208-258 VAC, 50-60 Hz power depending upon the position of the selector switch on the base of the wall box.



The power cord connects the wall box to AC line power and the charge cord connects the wall box to the Strobonar for AC operation and battery charging.

1-5. STROBO-EYE REMOTE SENSOR ACCESSORY (SEE FIGURE 1-2).

Remote Sensor Accessory automatically controls exposure from the position of the sensor. The sensor measures the light reflected from the subject and supplies a signal to the Strobonar to activate the automatic (quench) circuit.

The Remote Sensor Accessory may be mounted on the camera accessory shoe or mounted off camera with the use of an extension cord. The flash unit sync cord receptacle and the camera connector are located on the side of the Accessory.

Exposure scales and dials are mounted on the top of the unit to permit selection of four f/stops or ranges depending upon the film speed selected. The sensor is located on the front surface of the unit.

1-6. SPOTMATIC IIa CAMERA (SEE FIGURE 1-3).

Spotmatic IIa Camera automatic quench circuitry automatically controls exposure from the position of the sensor on the front of the camera. The sensor measures the light reflected from the subject and supplies a signal to the Strobonar to activate the automatic (quench) circuit.

The X-sync terminal on the front of the camera provides a means of connecting the camera to the Auto/Strobonar.

Exposure scales and dials are mounted on top of the camera to permit selection of three f/stops or ranges depending upon the film speed selected.

1-7. SPECIFICATIONS.

1-8. AUTO/STROBONAR 772.

a. Power Source

Battery . . . . . Four "Sub-C" size (welded) nickel cadmium rechargeable cells.

AC . . . . . 105 to 129 VAC, 50-60 Hz.

. . . . . 208 to 258 VAC, 50-60 Hz.

b. Battery Charging . . . . . 18 hours at 117 VAC, 50-60 Hz.

c. Storage Capacitor Forming . . . . . 1 hour at or near full power anode voltage.

d. Equivalent Battery Source . . . . . 5.25 ±0.1 VDC and an impedance of less than 1/4 ohm.

e. Flashes per Charge . . . . . 80 minimum before recycle time exceeds 30 seconds.

f. Guide Number

Automatic . . . . . Not applicable.

Manual . . . . . 80 for ASA 25 film.

g. Automatic Range with Strobo-Eye . . . . . 1.5 feet to 40 feet.

h. Flash Duration

Automatic . . . . . .about 1/50,000 to 1/500 second.

Manual . . . . . about 1/500 second.

i. Recycle Time

Battery . . . . . 15 seconds maximum with fully charged batteries. Recycle time is from flash to neon at the 5th cycle.

Combination Battery/AC. . . . . 12 seconds maximum with fully charged batteries. Recycle time is from flash to neon at the 5th cycle.

AC . . . . . 15 seconds maximum to 365 volts anode (half power) at 120 VAC input. The ready light may not light.

j. Angle of Illumination

Horizontal . . . . . $50^{o} \pm 2^{o}$.

Vertical . . . . . $40^{o} \pm 2^{o}$.

k. Color Temperature . . . . . Approximately noon daylight.

l. Full Power Center Axis Light Output . . . . . 114 lumen-seconds per square foot when measured at 4 feet.

m. Auto-Quench Light Output . . . . . 4.5 to 4.8 lumen-seconds per square foot when measured at 4 feet. F/stop set at f/2.0.

n. Shutter Synchronization

Between the lens Shutter . . . . . X-sync all speeds.

Focal Plane Shutter . . . . . X-sync - usually 1/60 second.

o. Battery Switch . . . . . 2-position, ON-OFF switch.

p. Open Flash Button . . . . . Open flash or test flash.

q. Automatic Control

AUTO . . . . . Turns quench circuit on.

MAN . . . . . Turns quench circuit off.

r. Ready (Red) Light . . . . . Neon full-light indicator, battery and battery/AC operation.

s. Green Light. . . . . Proper automatic exposure indicator.

t. Weight . . . . . 26 ounces complete with batteries.

u. Size . . . . . 4.2" deep x 3.5" wide x 9.3" high.

1-9. STROBO-EYE REMOTE SENSOR ACCESSORY.

a. Mount . . . . . Standard universal shoe mount.

b. Connector . . . . . Locking tip connector or standard PC connector.

c. Max Ranges Scale . . . . . .Selection of four ranges.

d. ASA Scale . . . . . Select ASA number of film.

e. F/Stop Scale . . . . . Selection of four f/stop settings for each film speed.

f. Sensor Angle . . . . . 12 degrees.

1-10. STROBO-EYE (SPOTMATIC IIa CAMERA).

a. Quench Circuitry . . . . . Built in camera body.

b. Connection . . . . . Standard connection from Strobonar to X-sync terminal on camera body.

c. Range Indexes . . . . . Selection of three ranges.

d. ASA Scale . . . . . Select ASA number of film.

e. F/Stop Scale . . . . . Selection of three f/stop settings for each film speed.

f. Sensor Angle . . . . . 12 degrees.

1-11. COMPONENT REFERENCE DESIGNATIONS.

To avoid component reference designator duplication, each unit in the system, such as the Strobonar, wall box, etc., has been assigned a prefix number. A prefix has therefore been added to each reference designator as shown below.

UNIT	PREFIX	EXAMPLE
Auto/Strobonar 772	No prefix	CR1
SCR Test Circuit	#1 prefix	1CR1
Wall Box (Single Voltage)	#2 prefix	2CR1
Strobo-Eye Remote Sensor Accessory	#3 prefix	3CR1
Strobo-Eye (Spotmatic IIa Camera)	#4 prefix	4CR1
Strobo-Eye Test Circuit	#5 prefix	5CR1
Wall Box (Multi-Voltage)	#6 prefix	6CR1

SECTION 2

PRINCIPLES OF OPERATION

2-1. GENERAL.

Auto Strobonar 772 provides a source for repeating photoflash light. When coupled with the Honeywell Strobo-Eye Remote Sensor Accessory or the Pentax Spotmatic IIa Camera, it operates as an automatic electronic flash unit.

The battery power supply, main xenon flashtube and main flashtube trigger circuit are located in the Strobonar. The quench or dump tube (a xenon flashtube with much lower impedance than the main flashtube) and associated trigger circuit are also located in the Strobonar. Circuits for measuring the light level reflected from the subject and for generating a light control signal are located in the Strobo-Eye Remote Sensor Accessory or the Strobo-Eye portion of the Spotmatic IIa Camera.

The Strobonar is powered by four "Sub-C" size welded nickel-cadmium cells. The wall transformer box contains a battery charger and provides combination battery/AC or AC only operation.

2-2. CIRCUIT DESCRIPTION (SEE FIGURE 5-14).

The circuit description is keyed to the system schematic, Figure 5-14. The system schematic shows the wall box and the Strobo-Eye Remote Sensor Accessory connected to the Strobonar. The Strobo-Eye portion of the Spotmatic IIa is shown not connected at bottom left of Figure 5-14. A description of the various circuits follow.

2-3. OSCILLATOR (SEE FIGURE 5-14).

The transistor-driven flyback oscillator converts the low DC voltage from the battery (BT1) to high DC voltage which is stored in the high-energy, storage capacitor C3.

The oscillator circuit consists of Q1, T1, SCR1, CR1, R1, R2, R3, R4, C1 and C2. The oscillator has two modes of operation: power and idle. The storage capacitor C3 is charged during the power mode. With the Battery switch S1 set to ON, Q1 is forward biased by the base current flowing through N1, R1 and base emitter junction of Q1. This is the starting loop which causes the oscillator to start running initially in the idle mode. As the collector of Q1 rises in voltage toward the emitter, current flows through the emitter-collector of Q1, N1 to the battery. This is the primary loop. The current flowing in N1 induces a voltage in N2 and N3. The voltage is positive at pins 4 and 6 of T1.

Winding N3 is the base current drive loop. When the voltage induced in N3 becomes high enough, SCR1 turns on and the oscillator switches to the power mode. With the base-emitter drive circuit completed through SCR1 and as the regenerative feed-back of N1 to N3 increases, Q1 saturates.

Assume for the moment that there is a constant current flowing in the base circuit of Q1. Winding N1 is a very large inductor and the collector current from the time Q1 is turned on is ramping positive, storing energy in the core of T1. This ramp current is becoming increasingly large. For an incremental unit of time, there is an incremental increase in current. This current continues to increase until a point is reached where Q1 base current times the gain of Q1 (I_b) can no longer supply collector current. At this point, Q1 comes out of saturation because its base drive is insufficient to keep it saturated.

As soon as Q1 starts to come out of saturation, the collector voltage falls toward the battery minus causing the voltage to switch across N2 and make pin 5 positive. Pin 2 will now be more negative than the battery minus, and so, Q1 shuts off. The speed at which Q1 shuts off is controlled by C2.

When pin 5 goes positive, the magnetic field in the core collapses, the voltage rises on all windings until a load is presented to make the current flow. Thus, the voltage at pin 5 continues to rise until CR2 is forward biased and the core energy is dumped into the storage capacitor C3. The voltage of all windings of T1 drops to 0 and the cycle repeats.

The sequence of operation is repeated for many cycles until C3 charges to the cutoff voltage established by the adjustment of R6. The cutoff voltage is between 445 and 495 VDC at the anode of FT1. This cutoff voltage should be adjusted within the range for a full power center axis light output of 114 lumen-seconds per square foot minimum when measured at 4 feet. The average cutoff voltage adjustment is 475 volts.

When the cutoff voltage is reached, neon ready light VR1 fires, providing a base current path for Q2 and Q2 turns on. Note that Q2 is across the gate cathode of SCR1. So, if Q2 is on, SCR1 is off. The circuit then switches to idle or high-frequency, low-power mode and rests until the anode voltage of FT1 falls below the cutoff level.

When the anode voltage falls below the cutoff level, VR1 turns off, removing the base curent from Q2 and Q2 turns off. Thus, SCR1 can turn on and the power mode is initiated.

The charge on C3 is maintained at the cutoff level by the oscillator switching between the two modes until the main flashtube (FT1) is fired.

You can hear the oscillator switch from the power to the idle mode. In the power mode the oscillator frequency is low, between 2 and 4 KHz. However, the frequency varies widely from unit to unit. The oscillator frequency during the idle mode is 10 to 20 KHz or approximately 5 times greater than the power mode. Idle mode frequency is controlled primarily by the tuned secondary of T1.

Diode CR1 allows the carriers to be swept out of the PNP junction of Q1 so it switches from saturation to cutoff faster. And so, CR1 protects Q1. A shorted or open CR1 will cause Q1 to fail. Always check CR1 if Q1 is found defective.

Capacitor C1 and R2 allow the oscillator to go into high frequency oscillation when SCR1 is turned off.

Resistor R3 is the base drive resistor for Q1 which determines the amount of current in the base circuit of Q1. The value of R3 is either 24 or 30 ohms depending upon the particular Q1 being used in the circuit.

2-4. WALL BOX (SEE FIGURE 5-14).

The wall box serves as an AC power supply and charger. The wall box plugs into a standard 105 to 129 VAC wall outlet and is connected through a 3-wire power cord to a plug-in receptacle located under the flash head.

2-5. AC ONLY. Transformer 2T1 steps up the AC line voltage so that the voltage between pins E and F is 300 to 365 (RMS) with 105 to 129 VAC line between pins A and B. The peak output voltage between pins E and F is between 425 and 516 volts.

When pin F of 2T1 is positive with respect to pin E, current flows through 2CR1, CR10 and R17 to charge high-energy storage capacitor C3. On the next half cycle of AC, pin F is negative and both diodes block the flow of current. Thus, half-wave rectification of the stepped-up AC line is produced.

Diode CR10 isolates the power input prongs of wall box receptacle J3 in the bottom of the flash head to prevent shock.

2-6. COMBINATION BATTERY AND AC. The unit operates on AC only when the wall box is connected and Battery switch S1 is OFF. The unit operates on battery plus AC if the wall box is connected and S1 is ON. Capacitor C3 is charged from two parallel sources (oscillator and AC circuits). Thus, C3 charges to the cutoff voltage faster.

2-7. CHARGER. Half-wave rectifier 2CR5 and limiting resistor R16 comprise the charging circuit for the four nickel-cadmium cells of BT1. The circuit supplies a constant charging current of about 1/10 amp to BT1. It takes 10 to 18 hours to charge a fully discharged battery.

Transformer 2T1 steps the input line voltage down to about 13 VAC across N3. When pin C of 2T1 is positive, current flows through 2CR5, R16 and BT1 to charge BT1. On the half cycle when pin C is negative, 2CR5 is back-biased and no current flows. Battery switch S1 should be set to OFF when charging the battery.

The storage capacitor C3 is automatically formed by the AC only circuit while the battery is charging.

2-8. MAIN FLASHTUBE TRIGGER CIRCUIT (SEE FIGURE 5-14).

The trigger circuit provides a high-voltage pulse to the exterior of the flashtube. This pulse ionizes the xenon gas in the tube, providing a discharge path through the tube for the energy stored in capacitor C3.

Transformer T3 is the flashtube trigger coil which ignites the flashtube by impressing a few thousand volts to the exterior of the flashtube. Assume that Q3 is shorted initially, collector and emitter at the same voltage, resistors R10 and R11 then act as a voltage divider which produces about 200 volts at the anode of SCR3 if the flashtube anode voltage is about 500 volts DC. Trigger capacitor C6 will charge through the primary of T3 and R10 to the anode voltage of SCR3. Transistor Q3 is turned on by the base current path through CR8, CR5, R18 and R14. The voltage at the signal line (junction of CR5 and CR6) is about 1.8 volts which is necessary to keep Q3 on. SCR3 cannot turn on when Q3 is on because its gate is shorted to ground by Q3.

The main flashtube is triggered by either closing the Open Flash switch S3 or closing the camera shutter contacts at J1. Closing either contacts cause the voltage at the anode of CR6 to drop to about 1.2 VDC, which removes the base current drive from Q3 and Q3 turns off. With Q3 off, current flows from SCR3 cathode to gate through R11 and SCR3 turns on. This provides the discharge path for C6. Capacitor C6 then discharges through the primary of T3 and SCR3 producing the high voltage pulse that fires flashtube FT1. Capacitor C7 is a noise filter.

If the AUTO/MAN switch S2 is closed, the voltage at the anode of CR6 will be .6 volts when Open Flash switch S3 or camera shutter contacts are closed.

When the main flashtube fires, the signal line (junction of CR5 and CR6) will go negative as a result of the discharge of C8 and C9. The signal line was at 1.8 volts positive until J1 is shorted with the shutter contact closure or when S3 is closed. So the signal line will drop from three diode drops to two diode drops or to about 1.2 volts positive until SCR3 fires as a result of turning off Q3. In manual operation, AUTO/MAN switch S2 open, the signal line will continue to go negative until it gets to 24 volts and zener CR5 fires and holds it at 24 volts. It will stay at a negative 24 volts because C8 and C9 will continue discharging into the signal line as long as the voltage across C3 falls as the flashtube is firing. After the flash is completed, signal line will return to 1.8 volts as C3 is charged for the next flash.

Capacitor C11 and R20 decouple open flash switch S3. If S3 is closed and held closed, Q3 will turn off; SCR3 will turn on; and the flash will take place as previously discussed. After the flash is completed and anode voltage again appears on C3, current will flow through R14, R18, CR6 (if S2 is open), C11 and CR7 to charge C11 up to about a volt so Q3 can turn back on even though S3 is held closed.

If C11 was shorted and S3 was held closed, Q3 would stay off after the initial flash. Therefore, the Strobonar would continue to self-flash because SCR3 would act like a relaxation oscillator.

2-9. AUTOMATIC (SEE FIGURE 5-14).

Since the Strobo-Eye Remote Sensor Accessory and Spotmatic IIa circuits are functionally identical, only the Accessory circuit will be discussed. Note by looking at Figure 5-14 that some of the Spotmatic IIa metering circuit is on the Strobo-Eye circuit board. The metering circuit functions independent of the Strobo-Eye.

With the Strobo-Eye attached, the automatic circuit regulates exposure at distances of 1.5 to 40 feet depending upon the aperture setting in front of the Strobo-Eye sensor. Exposure is controlled by the position of the Strobonar in respect to the subject.

The Strobo-Eye uses a photosensitive SCR (3LASCR1) as a transducer to detect the light reflected from the subject and to convert the light to electrical energy. The Strobo-Eye automatic circuit then integrates (sums) this electrical analog of reflected light. When the integrated electrical analog reaches a predetermined level, a light control signal is generated and applied to the Strobonar at J1. This signal triggers the xenon-filled quench tube FT2. The quench tube is connected across flashtube FT1. When both tubes are ionized, FT2 has less than 1/10 of the impedance of FT1, thus shorting FT1 and quenching the light to control exposure automatically.

With AUTO/MAN switch S2 closed and Strobo-Eye connected at J2, closing the camera shutter contacts will drop the signal line from about 1.8 volts to the diode drop across 3CR1 which is about .6 volt. This turns off Q3 in the Strobonar and fires the main flashtube FT1 as discussed previously. Note that until the main flashtube is fired, there is no voltage on the Strobo-Eye circuit and 3LASCR1 cannot conduct for there is no voltage produced as a result of ambient light. This is because the signal line is at 1.8 volts and diode 3CR2 is therefore back-biased. So the integrating or summing circuit, composed of 3C3 and 3R1 is at 0 volts until the main flashtube fires and powers the Strobo-Eye.

When the main flashtube fires, the signal line will go negative as a result of the discharge of C8 and C9 as the flashtube anode voltage falls. This forward biases 3CR2 and current will flow in the Strobo-Eye circuit as the signal line goes negative. The signal line continues to

negative until zener 3CR3 fires. Thus, 3Q1 is forward biased and turns on. The signal line at this point will be a constant -16 VDC, plus the two diode drops of 3CR2 and base-emitter junction of 3Q1 or to about 17.2 volts negative.

Note that diodes CR5 and CR4 in the Strobonar do not turn on because the signal line is held at a negative 17.2 VDC and it would have to go to a negative 24 VDC for CR5 to fire.

When 3Q1 turns on, the reference voltage established by the charge on 3C4 and controlled by the reference voltage adjust pot 3R3, is at the cathode of 3LASCR1. Now as the light reflected from the subject falls on 3LASCR1, current flows in the anode gate portion to charge 3C3 through 3R1. Resistor 3R1 is an anticipation resistor and the voltage across it is directly proportional to the light intensity and the voltage across 3C3 is proportional to the integral of the light intensity. So as the light continues to fall on 3LASCR1, the gate will continue to rise as 3C3 charges until a point is reached where the gate voltage exceeds the reference voltage at the cathode of 3LASCR1. At this point, 3LASCR1 turns on and the 12 to 15 VDC that was across it will be applied directly to the signal line as a positive going automatic control signal. This signal is used to fire the quench tube FT2.

The quench tube trigger circuit in the Strobonar, consisting of SCR4, C12 and T2, and associated circuitry, functions identically to the main flashtube trigger circuit.

The positive going leading edge of the automatic control signal is coupled through C13 to the gate of SCR4. SCR4 then turns on, providing a discharge path for trigger capacitor C12. Capacitor C12 discharges to the primary of T2, providing a high energy ringing pulse to fire FT2. Firing FT2 turns off the main flashtube and rapidly discharges the energy stored in capacitor C3.

Capacitor 3C1 and 3C2 are noise filters. Capacitor 3C4 couples the control signal to the signal line when 3LASCR1 turns on.

2-10. GREEN LIGHT.

The green light, DS1 lights when the quench tube FT2 fires if the Battery switch is ON. The lamp is used in two ways, either to test for proper automatic exposure or to indicate proper exposure. The green light does not operate on AC. The green light lights when SCR2 turns on. If SCR2 is off, the green light is off. SCR2 turns off each time the main flashtube fires and turns on each time the quench tube fires. The green light is on as long as FT2 is being fired on successive flashes unless the battery switch is set to OFF and then set back to ON. Because the flash and quench occur within millionths of a second of each other, the green light will appear to be always on.

Capacitor C4 will charge through R21 to the anode voltage of SCR3. When SCR3 fires, capacitor C4 will discharge through CR14 to ground, driving the anode of SCR2 negative in respect to ground commutating it off. When SCR4 turns on as a result of an automatic control signal and C12 discharges through the primary of T2, the ringing pulse produced across T2 will be applied to the gate of SCR2. This will turn on SCR2 and current will flow through DS1 and SCR2, turning on the green light.

Capacitor C5 couples the quench signal from T2 to the gate of SCR2, and R7 is a current limiting resistor for DS1. Resistor R8 is a clamp that holds SCR2 off from its own leakage current at high temperature. It desensitizes the SCR. Diode CR14 protects SCR2 by clamping its anode voltage to .6 of a volt negative, otherwise the anode would swing to essentially -200 volts due to the discharge of C4. Capacitor C4 is the commutating capacitor for SCR2 and controls its turn off time. So, if the green light will not turn off, check C4.

SECTION 3

CHECKOUT AND TROUBLESHOOTING

3-1. GENERAL.

To checkout or troubleshoot the Strobonar/Strobo-Eye flash system, first determine which unit is at fault or malfunctioning. Substitute the suspected faulty Strobonar with another known to be operating properly. If the system is still malfunctioning, substitute the Strobo-Eye (either Remote Sensor Accessory or Spotmatic IIa Camera) with a unit known to be operating properly.

If it is necessary to replace any components in the automatic circuit while servicing the Strobonar or Strobo-Eye units (either Remote Sensor Accessory or Spotmatic IIa Camera) it will be necessary to calibrate the Strobo-Eye circuit.

When checking out the Strobonar, insure that all electrical connections are good; that the storage capacitor has been formed; and that the batteries are fully charged **before** checking or adjusting the Remote Auto/Strobonar. The storage capacitor is automatically formed after the batteries have been charged with 117 VAC applied to the Strobonar through the wall box for two hours. Forming is accelerated by flashing the unit a few times, allowing a minute or so between flashes.

WARNING

When repairing the unit, discharge the storage capacitor through a 100 ohm, 2 watt resistor to insure that the unit is safe to work on.

3-2. OPERATIONAL CHECKOUT.

3-3. TEST EQUIPMENT.

The following test equipment is required for operational check of the units.

Volt-Ohm Meter - Triplett Model 630-NA or equivalent.
DC Power Supply - Variable to 500 VDC.
Four Ni-Cad "D" cells and associated charger - Honeywell catalog #318.
Isolation Transformer - Triad Type N-53M or equivalent.
Light Meter - Honeywell TE 611, EG&G Model 580-11, or equivalent.
Quench Calibrator - Honeywell TE 534, used only to calibrate the quench circuit.
Strobo-Eye Test Circuit (See Figures 3-3, 3-4).

3-4. STORAGE CAPACITOR C3 FORMING.

Before performing any operational checkout, form the storage capacitor C3 for at least one hour at 435 to 495 VDC. Flash the unit a few times to accelerate forming.

3-5. STORAGE CAPACITOR C3 LEAKAGE CHECK.

Disconnect one end of capacitor C3 from the circuit. Using a d-c power supply, form the capacitor for one hour at 435 to 495 volts with a 1K ohm, 1% resistor in series with the capacitor. With 490 volts across C3, connect a voltmeter in parallel with the 1K ohm resistor. Measure the leakage current of C3 by reading the voltage across the 1K ohm resistor. If the leakage current exceeds 4.9 ma (4.9 volts across the 1K ohm resistor), replace C3.

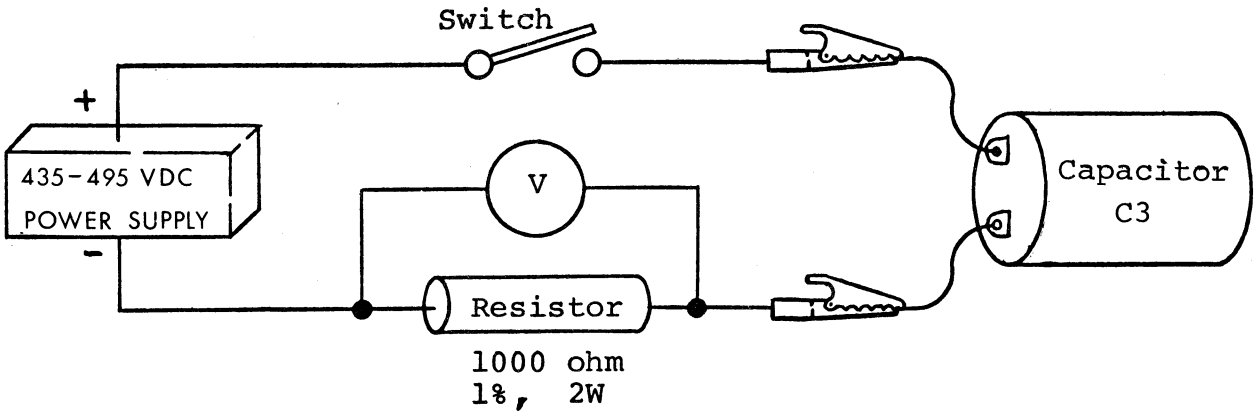


Figure 3-1. Storage Capacitor Leakage Test

3-6. ANODE VOLTAGE CHECK AND CUTOFF ADJUSTMENT.

Insure that the storage capacitor C3 is formed and that the batteries are fully charged before adjusting the cutoff voltage.

Remove the battery tray as shown in Figure 5-1, page 5-3. Connect "D" cells (Catalog No. 318) to battery contacts as shown in Figure 5-2, page 5-3. Set the Battery switch on the back of the Strobonar to ON. Connect voltmeter as shown in Figure 5-2.

Wait until the neon ready (Red) light lights and then flash the unit several times while observing the reading on the meter and the elapsed time between flash and ready light illumination.

Adjust cutoff potentiometer R6 (3, Figure 5-1) between the limits of 435 to 495 volts for a minimum of 1824 Beam Candle Power Seconds (114 lumen-seconds per square foot) with a recycle time of 15 seconds maximum when measured at 4 feet.

3-7. NEON READY (RED) LIGHT.

The ready (Red) light should come on when the anode voltage reaches the cutoff point and will glow until the anode voltage decreases to 80% of the cutoff voltage.

3-8. FULL POWER LIGHT OUTPUT CHECK.

Check that the full power center light output is a minimum of 1824 Beam Candle Power Seconds (114 Lumen Seconds Per Squre Foot when measured with the Strobonar four feet from the diffusing lens of the light meter).

3-9. AUTO QUENCH LIGHT OUTPUT CHECK.

Position the Strobonar and Strobo-Eye four feet from the center of an 18 percent reflectance neutral gray target which has a minimum diameter of five feet. The diffusing lens of the light meter must be at the center of the target. Activate the quench circuit by setting the AUTO/MAN switch to AUTO.

Set the Strobo-Eye and camera lens to f/2.0. Flash the Strobonar and measure its light output. The light output should be between 4.5 and 4.8 lumen seconds per square foot.

3-10. RECYCLE TIME.

3-11. BATTERY OPERATION. With the unit operating on a freshly charged set of batteries, the unit should recycle to the neon indicator voltage within 15 seconds after flashing.

3-12. COMBINATION BATTERY/AC OPERATION. With the unit operating on a freshly charged set of batteries and with the wall box connected, the unit should recycle to the neon indicator within 12 seconds after flashing.

3-13. AC OPERATION. With the unit operating with the wall box connected, the unit should recycle within 18 seconds at 120 VAC nominal line input. The ready (Red) lamp may not light.

3-14. TROUBLESHOOTING.

For assistance in troubleshooting the Auto/Strobonar, Strobo-Eye Remote Sensor Accessory and Spotmatic IIa Camera refer to the circuit description in Section 2, the troubleshooting data charts in Section 3-24 and to the schematic in Section 5.

NOTES

Observe polarity (indicated by green dot) when replacing VR1 in the Strobonar.

Before replacing oscillator Q1 in the Strobonar, check oscillator protection diode CR1. A defective diode could cause damage to the Q1 replacement.

3-15. TECHNIQUES.

The first step in troubleshooting a defective Strobonar/Strobo-Eye flash system is to determine which unit is at fault. Replace the Strobonar with another known to be operating properly. If the system is still malfunctioning, replace the Strobo-Eye (either Remote Sensor Accessory or Spotmatic IIa Camera) with a unit known to be operating properly.

Look for obvious things: broken wires, broken or discolored components, or evidence of physical damage. Faults such as arcing and burned-out resistors or transformers can often be detected by sight, smell, or sound. Most faults can be located by voltage, current and resistance measurements. Check electrical connections at connectors.

Isolate the section of the circuit responsible for the fault. An operational check will demonstrate what the circuit is doing or what it is NOT doing. Observe the actions of switches and indicators to isolate the fault.

Having isolated the defective section of the circuit, isolate the component responsible for the malfunction. Consider which components, if faulty, could cause the voltages or currents to be as you find them. Refer to the schematic diagrams located in Section 5.

3-16. COMPONENT CHECKS.

No attempt is made in the troubleshooting data to describe how to test or check a particular part. The method of checking and testing is left to the technician. However, the technician is reminded of the following points:

a. Turn off power and discharge C3 before making resistance measurements.

b. Set ohmmeter to the lowest range when checking continuity.

c. Set ohmmeter to the highest range when checking high resistance.

d. Capacitors which are shorted can be found by resistance measurements.

e. Check the large electrolytic capacitor (C3) for leakage current. The leakage current must not exceed 4.9 ma with 490 VDC applied across the capacitor. Form capacitor before performing leakage test.

f. A capacitor which is suspected of being open can be checked checked by substituting a good capacitor and seeing if this makes the unit operational.

3-17. PRECAUTIONS.

Follow the listed precautions while troubleshooting the Strobonar.

a. Do not connect an oscilloscope or meter across R6, R7 or VR1 when checking or setting cutoff voltage.

b. Use extreme caution to avoid shorting components when making voltage measurements on the circuit board.

c. If the "Sub C" batteries are of questionable condition or if excessive d-c testing is required, substitute four Ni-Cad "D" cells.

d. Use an isolation transformer when operating the unit on AC.

3-18. SCR TEST CIRCUIT.

Remove the SCR from the Strobonar circuit, set up the test circuit as shown below and check the SCR. Set the potentiometer 1R3 for 0 current on meter 1M1. Close switch 1S2, hold switch 1S1 closed and increase 1R3 until 1M1 reverses and goes in a negative direction. The reading on 1M1 should be 1 to 2 ma.

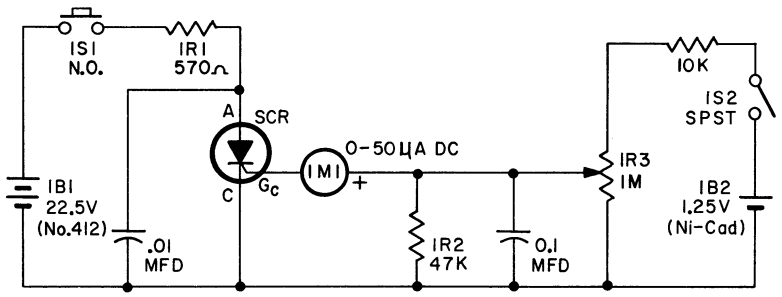


Figure 3-2. SCR Test Circuit

3-19. SEMICONDUCTOR CHECK

An ohmmeter will detect catastrophic defects in the transistors or diodes. First determine the polarity of the ohmmeter with a voltmeter or diode. In each pair of resistance readings the high resistance reading should be at least 10 times the low resistance reading. Use the same ohmmeter range for both readings in each pair.

3-20. PNP TRANSISTOR

1. Base to emitter, positive lead to base - high resistance.

   Base to emitter, positive lead to emitter - low resistance.

2. Base to collector, positive lead to base - high resistance.

   Base to collector, positive lead to collector - low resistance.

3. Collector to emitter, base shorted to emitter, either polarity - high resistance.

3-21. NPN TRANSISTOR

1. Base to emitter, positive lead to base - low resistance.

   Base to emitter, positive lead to emitter - high resistance.

2. Base to collector, positive lead to base - low resistance.

   Base to collector, positive lead to collector - high resistance.

3. Collector to emitter, base shorted to emitter, either polarity - high resistance.

3-22. DIODE

1. Resistance across a good diode with the positive lead to the anode is low.

2. Resistance across a good diode with the positive lead to the cathode is high.

3-23. LASCR.

1. Gate to cathode, positive lead to gate - low resistance.

   Gate to cathode, positive lead to cathode - high resistance.

2. Anode to cathode, positive lead to anode with gate shorted to cathode and the component shielded from light - high resistance.

   Anode to cathode, positive lead to cathode with gate shorted to cathode and the component shielded from light - high resistance.

3-24. TROUBLESHOOTING DATA.

TROUBLE: No AC operation.

ACTION	INDICATION	REMARKS
a. Substitute the wall box for one known to be operating properly.	AC operation.	Go to step b.
	No AC operation.	Go to step d.
b. Check 2T1 for 300-365 VRMS between pins A and B with 129 VAC input.	Good	Go to step c.
	Bad	Replace 2T1.
c. Check 2CR1	Good	Check all connections.
	Bad	Replace 2CR1.
d. Check CR10	Good	Go to step e.
	Bad	Replace CR10.
e. Check R17	Good	Go to step f.
	Bad	Replace R17.
f. Check C3	Good	Check all connections.
	Bad	Replace C3.

TROUBLE: No battery charge operation.

ACTION	INDICATION	REMARKS
a. Substitute the wall box for one known to be operating properly.	Charge	Go to step b.
	No charge	Go to step d.
b. Check 2CR5.	Good	Go to step c.
	Bad	Replace 2CR5.
c. Check 2T1 secondary for 13 VAC across N3.	Good	Check all connections.
	Bad	Replace 2T1.
d. Check switch S1.	Good	Go to step e.
	Bad	Replace S1.
e. Check R16.	Good	Go to step f.
	Bad	Replace R16.
f. Check BT1 for dead cell.	Good	Check all connections.
	Bad	Replace BT1.

TROUBLE: Operates in power mode only.

ACTION	INDICATION	REMARKS
a. Check for defective VR1.	Good	Go to step b.
	Bad	Replace VR1.
b. Check CR1, C1 and/or R2 for short.	Good	Go to step c.
	Bad	Replace CR1, C1 and/or R2.
c. Check SCR1 for anode to cathode short.	No short.	Go to step d.
	Short	Check SCR1 as described in para. 3-18.
d. Check C1 for open.	Good	Go to step e.
	Bad	Replace C1.
e. Check for defective Q2.	Good	Check storage capacitor for leakage as described in para. 3-5.
	Bad	Replace Q2.

TROUBLE: Operates in Idle Mode only.

ACTION	INDICATION	REMARKS
a. Check for R6 out of adjustment.	Good	Go to step b.
	Bad	Adjust R6. Refer to para. 3-6 for procedure.
b. Check SCR1. Momentarily short SCR1 anode to cathode.	Advances and remains in power mode.	Check SCR1 as described in para. 3-18.
	Advances and remains in power mode if short is maintained.	Go to step c.
c. Check SCR1. Momentarily short SCR1 gate to anode through a 47 ohm resistor.	Advances and remains in power mode.	Go to step d.
	Advances and remains in power mode if short is maintained.	Check SCR1 as described in para. 3-18.
d. Check for R3 and/or R4 open.	Good	Check for Q2 shorted.
	Bad	Replace R3 and/or R4.

TROUBLE: No flash-battery or AC.

	ACTION	INDICATION	REMARKS
a.	Check for 445 to 495 at anode of FT1 with battery switch set to ON.	Good	Go to step b.
		Bad	Go to step g.
b.	Short anode of CR5 or 6 to ground.	No flash	Go to step c.
		Flash	Check CR6, 3CR1 or 4CR3 and associated circuitry and replace or repair defect.
c.	Measure 1.2 to 2 VDC at CR5 anode.	1 to 2 VDC	Go to step d.
		Above 2 VDC	Go to step i.
		Below 1 VDC	Check CR4, SCR4 and C12 for short. Check R14 and R18 for open. Replace defective component.
d.	Measure 100 VDC or greater between SCR3 anode and cathode.	100 VDC or greater.	Go to step e.
		Below 100 VDC.	Check SCR3, CR3 and C6 for short. Replace defective component.
e.	Momentarily short SCR3 anode to cathode.	FT1 flashes.	Go to step f.
		No flash but contacts spark.	Check FT1, T3 and FT1 trigger lead connections. Replace or repair defect.
		No spark.	Check C6 and T3 for open and replace defective component.
f.	Check SCR3.	Good	Go to step 1.
		Bad	Replace SCR3.
g.	Check C3.	Good	Go to step h.
		Bad	Replace C3.

UNIT ALWAYS QUENCHES IN AUTO OR MANUAL.

REPLACE SCR4

TROUBLE: No flash-battery or AC (Continued)

ACTION	INDICATION	REMARKS
h. Check CR2.	Good	Check circuit board for open or short and repair.
	Bad	Replace CR2.
i. Check CR5 for open.	Good	Go to step j.
	Bad	Replace CR5.
j. Check CR8.	Good	Go to step k.
	Bad	Replace CR8.
k. Check Q1.	Good	Check circuit board for open.
	Bad	Replace Q1.
l. Check Q3.	Good	Check C7.
	Bad	Replace Q3.

TROUBLE: Improper cutoff voltage.

ACTION	INDICATION	REMARKS
a. Check for R6 out of adjustment.	Good	Go to step b.
	Bad	Adjust R6. Refer to para. 3-6 for procedure.
b. Check if the cut-on voltage is less than 80% of cutoff voltage.	Less	Replace VR1. Observe polarity (indicated by green dot) when replacing VR1.

TROUBLE: No quench.

	ACTION	INDICATION	REMARKS
a.	Substitute the Strobo-Eye with one known to be good, making sure all connections are good.	No quench.	Go to step b.
		Quench	Go to para. 3-26 for Strobo-Eye testing.
b.	Short SCR4 anode to cathode.	FT2 flashes.	Go to step c.
		No flash.	Go to step e.
c.	Check SCR4.	Good	Go to step d.
		Bad	Replace SCR4.
d.	Check S2.	Good	Check C13, C10 and R19 and associated circuitry.
		Bad	Repair S2.
e.	Check C12.	Good	Go to step f.
		Bad	Replace C12.
f.	Check T2.	Good	Check FT2 and associated connections. Replace or repair defective component.
		Bad	Replace T2.

TROUBLE: Unit quenches - no green light.

	ACTION	INDICATION	REMARKS
a.	Short SCR2 anode to cathode and check green light.	Lighted	Go to step b.
		Not lighted.	Check DS1, R7 and associated connections. Replace or repair defect.
b.	Check SCR2.	Good	Check C5 and R8 and associated connections. Replace or repair defect.
		Bad	Replace SCR2.

TROUBLE: Intermittent self flash.

ACTION	INDICATION	REMARKS
a. Check Q3.	Good	Go to step b.
	Bad	Replace Q3.
b. Check CR8.	Good	Go to step c.
	Bad	Replace CR8.
c. Check CR4.	Good	Go to step d.
	Bad	Replace CR4.
d. Check CR5.	Good	Go to step e.
	Bad	Replace CR5.
e. Check SCR4.	Good	Go to step f.
	Bad	Replace SCR4.
f. Check C12.	Good	Go to step g.
	Bad	Replace C12.
g. Check R18.	Good	Go to step h.
	Bad	Replace R18.
h. Check R14.	Good	Check circuit board for open. Repair defect.
	Bad	Replace R14.

TROUBLE: Green light DS1 will not turn off when unit does not quench or operates on manual (S1 on).		
ACTION	INDICATION	REMARKS
a. Check SCR2.	Good	Go to step b.
	Bad	Replace SCR2.
b. Check CR14.	Good	Go to step c.
	Bad	Replace CR14.
c. Check CR11.	Good	Go to step d.
	Bad	Replace CR11.
d. Check C4.	Good	Check circuit board for short. Repair defect.
	Bad	Replace C4.

3-25. STROBO-EYE TROUBLESHOOTING.

3-26. GENERAL.

Perform the following troubleshooting procedures after isolating trouble to the Strobo-Eye Remote Sensor Accessory or to the Spotmatic IIa Camera. The Strobo-Eye automatic quench circuit (either in the Accessory or Camera) receives operating power only while the main flashtube FT1 is on. Since the flashtube is on for a very short time (about 1/500 second or shorter) dynamic testing is possible only if you have test equipment that can remember the measurement such as a storage oscilloscope or photographs of the actual waveforms from a regular scope.

If you don't have this equipment, you can troubleshoot the Strobo-Eye automatic circuit by testing each component until you discover the fault or you can use the Honeywell Strobo-Eye Tester.

3-27. TESTER.

The tester was designed for quick and easy checkout of the Strobo-Eye automatic circuit. The internal power supply provides a constant current to act as a reference when checking the circuit. Three resistance circuits, selected by the rotary switch 5S2, provide three different readings on the meters. The measurements should be taken with the Strobo-Eye sensor covered and uncovered.

A PC cord from 5J1 connects the Strobo-Eye to the tester with meter VM_1 indicating the voltage reading between the signal line and ground.

The single lead probe from jack 5J2 is used to sense the voltage on the center tap of the potentiometer in the Strobo-Eye circuit. Meter VM_2 displays the voltage reading between the signal line and the potentiometer.

If an erroneous reading is suspected, push switch 5S3 to reset the meters.

NOTES

The numerical readings on the meters and in Tables 3-1 and 3-2 are reference numbers only. Actual voltage values are approximately one-half of the reference numbers listed.

Disregard the word "MICROAMPERES" listed on the meters. The meters actually record voltage measurements.

3-28. REMOTE SENSOR ACCESSORY TROUBLESHOOTING.

If you are troubleshooting the Accessory, all you have to do is remove the accessory foot to gain access to reference adjust potentiometer 3R3. Refer to para. 4-5 and Figure 5-10 for disassembly instructions. Set the potentiometer 3R3 to the center of the adjustment range.

Set the ON-OFF switch 5S1 on the tester to the ON position. Connect the PC cord from jack 5J1 on the tester to the flash sync cord receptacle on the Accessory. Voltage measurements will be indicated on meter VM_1.

Touching the single lead probe from 5J2 on the tester to the center tap of 3R3 as shown in Figure 3-3 will provide voltage measurements on meter VM_2.

Perform checkout per Table 3-1, covering and uncovering the sensor as instructed and selecting the three positions by use of the rotary switch 5S2. If an erroneous reading is suspected, push switch 5S3 to reset the meters.

Compare the readings on the meters with the readings listed in Table 3-1.

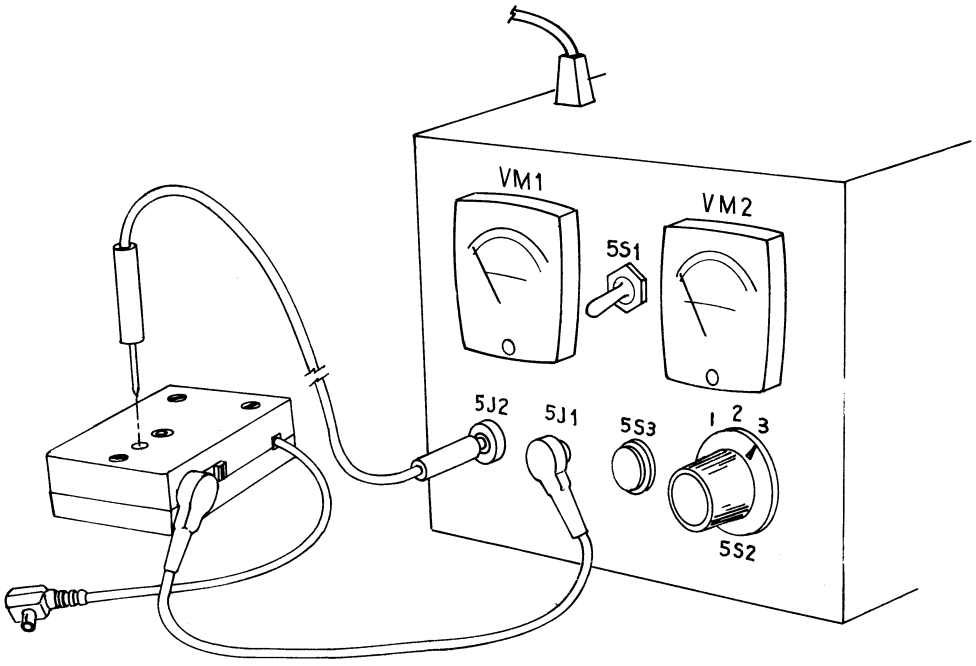


Figure 3-3. Remote Sensor Accessory Test Layout

SENSOR	SWITCH POS. 1		SWITCH POS. 2		SWITCH POS. 3		REMARKS
	VM_1	VM_2	VM_1	VM_2	VM_1	VM_2	
Covered	11.0	9.0	33.0	7.0	33.0	7.0	Normal
Uncovered	11.0	9.0	33.0	32.0	33.0	32.0	Normal
Covered	6.0	1.0	33.0	6.0	33.0	6.0	3Q1 emitter to collector short or 3R3 open. Replace 3Q1 or 3R3.
Uncovered	3.0	1.5	12.0	10.0	22.0	20.0	
Covered	11.0	10.0	33.0	32.0	33.0	32.0	3Q1 emitter to base short or low gain. 3Q1 collector open. 3LASCR1 cathode to anode short. 3LASCR1 gate to anode short. Check and replace 3Q1 and 3LASCR1.
Uncovered	11.0	10.0	33.0	32.0	33.0	32.0	
Covered	2.0	0.2	2.5	0.2	2.5	0.2	Check for 3CR3 zener shorted. Replace 3CR3.
Uncovered	2.0	0.2	2.5	0.4	2.5	0.4	

SENSOR	SWITCH POS. 1		SWITCH POS. 2		SWITCH POS. 3		REMARKS
	VM_1	VM_2	VM_1	VM_2	VM_1	VM_2	
Covered Uncovered	11.0 11.0	10.0 10.0	50.0 50.0	46.0 46.0	50.0 50.0	46.0 46.0	Check for 3CR3 open. Check for 3Q1 emitter open. Check for 3Q1 base open. Replace either 3CR3 or 3Q1.
Covered Uncovered	5.0 2.0	0.0 0.0	3.0 3.0	0.0 0.0	3.0 3.0	0.0 0.0	Check 3C2 for short.
Covered Uncovered	11.0 11.0	10.0 10.0	33.0 33.0	7.0 7.0	33.0 33.0	7.0 7.0	3LASCR1 cathode to gate short. 3CR1 gate to signal line short. Replace either 3LASCR1 or 3CR1.

Table 3-1. Accessory Test Voltage Measurements

3-29. SPOTMATIC IIa CAMERA TROUBLESHOOTING.

If you are troubleshooting the camera, all you have to do is remove the Rewind Assembly to gain access to the reference adjust potentiometer 4R3. Refer to para. 4-9 and Figure 5-12 for disassembly instructions. Set the potentiometer 4R3 to the center of the adjustment range.

Set the ON-OFF switch 5S1 on the tester to the ON position. Connect the PC cord from jack 5J1 to the X-sync terminal on the front of the camera. Voltage measurements will be indicated on meter VM_1.

Touching the single lead probe from 5J2 on the tester to the center tap of 4R3 as shown in Figure 3-4 will provide voltage measurements on meter VM_2.

Perform the checkout per Table 3-2, covering and uncovering the sensor as instructed and selecting the three positions by use of the rotary switch 5S2. If an erroneous reading is suspected, push switch 5S3 to reset the meters.

Compare the readings on the meters with the readings listed in Table 3-2.

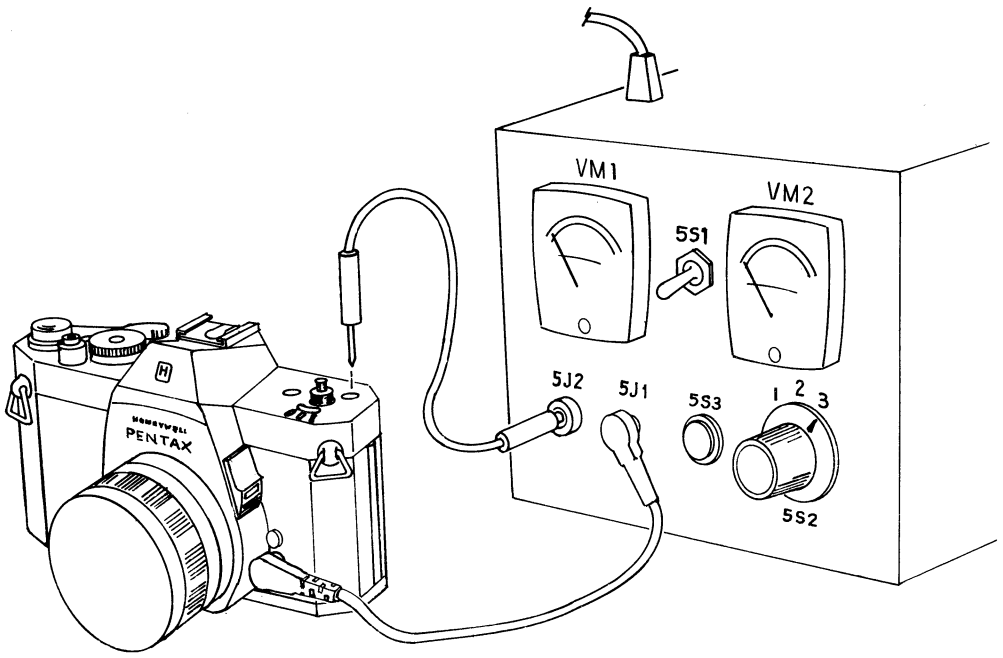


Figure 3-4. Spotmatic IIa Test Layout

SENSOR	SWITCH POS. 1		SWITCH POS. 2		SWITCH POS. 3		REMARKS
	VM_1	VM_2	VM_1	VM_2	VM_1	VM_2	
Covered Uncovered	11.0 11.0	9.0 9.0	33.0 33.0	7.0 32.0	33.0 33.0	7.0 32.0	Normal Normal
Covered Uncovered	6.0 3.0	1.0 1.5	33.0 12.0	6.0 10.0	33.0 22.0	6.0 20.0	4Q1 emitter to collector short or 4R3 open. Replace 4Q1 or 4R3.
Covered Uncovered	11.0 11.0	10.0 10.0	33.0 33.0	32.0 32.0	33.0 33.0	32.0 32.0	4Q1 emitter to base short or low gain. 4Q1 collector open. 4LASCR1 cathode to anode short. 4LASCR1 gate to anode short. Check and replace 4Q1 or 4LASCR1.
Covered Uncovered	2.0 2.0	0.2 0.2	2.5 2.5	0.2 0.4	2.5 2.5	0.2 0.4	Check for 4CR2 zener short. Replace 4CR2.
Covered Uncovered	11.0 11.0	10.0 10.0	50.0 50.0	46.0 46.0	50.0 50.0	46.0 46.0	Check for 4CR2 zener open. Check for 4Q1 emitter open. Check for 4Q1 base open. Replace either 4CR2 or 4Q1.

SENSOR	SWITCH POS. 1		SWITCH POS. 2		SWITCH POS. 3		REMARKS
	VM_1	VM_2	VM_1	VM_2	VM_1	VM_2	
Covered	5.0	0.0	3.0	0.0	3.0	0.0	Check 4C4 for short.
Uncovered	2.0	0.0	3.0	0.0	3.0	0.0	
Covered	11.0	10.0	33.0	7.0	33.0	7.0	4LASCR1 cathode to gate short. 4CR3 gate to signal line short. Replace either 4LASCR1 or 4CR3.
Uncovered	11.0	10.0	33.0	7.0	33.0	7.0	

Table 3-2. Spotmatic IIa Test Voltage Measurements

SECTION 4

MAINTENANCE

4-1. GENERAL.

This section contains procedures for disassembly, cleaning, electrical component removal, reassembly and component checks of the Remote Auto/Strobonar 772, the Strobo-Eye Remote Sensor Accessory and the quench circuitry in the Honeywell Spotmatic IIa camera.

Disassemble the units to the extent necessary for operational checkout, troubleshooting and repair. Reassembly is the reverse of disassembly. Special reassembly instructions are included where required.

4-2. TOOLS.

No special tools are required for maintenance of the Strobonar. Ordinary and Phillips screwdrivers, diagonal cutters, long-nose pliers, a soldering iron and other common hand tools are adequate to perform all necessary repair and replacement.

A small tip, low wattage soldering iron is required when repairing the Strobo-Eye units and special spanner wrenches are required for disassembling the Spotmatic IIa Camera.

4-3. DISASSEMBLY.

4-4. AUTO/STROBONAR 772 (SEE FIGURE 5-1).

WARNING

When operating or checking the Strobonar circuit, it is necessary to form the storage capacitor at full power anode voltage for at least one hour. Extreme caution MUST be exercised since a serious shock hazard exists if the terminals of capacitor C3 are touched.

NOTE

When disassembling or repairing the unit, discharge the storage capacitor through a 100 ohm, 2 watt resistor to insure that the unit is safe to work on.

a. Squeeze the two battery tray release buttons (1, Figure 5-1) and withdraw the battery tray.

b. Remove the two screws (2, Figure 5-1) that hold the chassis assembly to the housing, and pull the chassis assembly out the front of the housing.

c. To remove the nose ring assembly from the chassis assembly, remove the three screws (3, Figure 5-1) that hold the nose ring assembly to the chassis. Separate the nose ring from the chassis.

d. Continue disassembly as required. (See Figures 5-3, 5-4 and 5-5.)

4-5. STROBO-EYE (REMOTE SENSOR ACCESSORY - SEE FIGURES 5-10 AND 5-11).

a. Remove the nameplate (1).

b. Remove the flat head screw (2), attaching the foot (3) to the bottom case (5). Remove the foot.

c. Remove the three Phillips Head screws (4) securing the bottom case to the top case assembly (9). Separate the two cases.

d. Remove the lens (7) to avoid misplacing it.

e. Lift out the circuit board assembly if necessary to repair.

NOTE

If any parts in the top cover assembly need to be repaired or replaced, the whole top cover assembly must be replaced.

4-6. STROBO-EYE (PORTION OF SPOTMATIC IIa CAMERA - SEE FIGURES 5-12 AND 5-13).

The disassembly procedure outlined in this section is intended to enable the technician to disassemble the Spotmatic IIa camera to provide access to the quench circuit. It is recommended that all parts removed from a particular camera be replaced in that same camera, and not interchanged with another.

4-7. FILM COUNTER/WIND LEVER ASSEMBLY.

a. Loosen three set screws on Counter Dial Cover Ring and remove the Ring.

NOTE

When reassembling, insure that the red arrow on the Ring points to the minus (-) 2 position on the Counter Dial.

b. Remove the Counter Dial Retainer Screw (left-hand thread) and the Counter Dial.

NOTE

When reassembling, insure that the Counter Dial is not replaced 180° out of position.

c. Remove the Rapid Lever Shaft Nut (left-hand thread) using spanner wrench, Honeywell No. 231K-C75-1-A . Remove Counter Dial Housing.

d. Remove the three Rapid Wind Lever Retainer Screws.

e. Rotate the Rapid Wind Lever Retainer Spring in either direction to loosen and remove using spanner wrench, Honeywell No. 231K-C06-A.

NOTE

When reassembling, insure that the Spring is replaced right side up.

f. Remove the Rapid Wind Lever.

g. Remove the Rapid Wind Lever Collar.

4-8. ASA/SHUTTER SPEED DIAL ASSEMBLY.

a. Remove the Speed Dial Retainer Screw. Use spanner wrench, Honeywell No. 231K-E91-A.

b. Remove the Speed Dial and Exposure Index Dial.

c. Loosen the three Phillips Head set screws on the side of the Speed Dial Knob and remove the Speed Dial Knob Spring and Knob.

NOTE

When reassembling, insure that the slot in the Knob is fitted over the positioning tab and that the Spring is replaced right side down. Insure that the tab on the Exposure Index Dial is positioned in the slot in the Knob and that the Speed Dial is not replaced 180° out of position.

4-9. REWIND ASSEMBLY.

a. Open the back of the camera and insert a screwdriver or similar object into the fork on the Rewind Shaft. Hold the shaft while unscrewing the Rewind Knob.

b. Remove the Rewind Knob Shaft Nut. Use spanner wrench.

c. Remove the ASA-F/STOP DIAL.

NOTE

Exercise caution to avoid losing the Indent Ball located on the underside of the ASA-F/Stop Dial.

When reassembling, insure that the Indent Ball is properly positioned when replacing the Dial.

d. Remove the flat washer spacer(s) if any are required.

NOTE

If the Rewind Shaft is inadvertently depressed into the camera body and cannot be retrieved, the Top Cover must be removed to gain access to the Back Cover Key. Slide the Key upward to open the camera and reposition the Rewind Shaft.

4-10. TOP COVER.

a. Remove the Knob and Dial Assemblies as described in para. 4-7, 4-8, and 4-9.

b. Remove the Phillips head screw on the top of the cover near the Wind Lever.

c. Remove the two screws on the back of the cover, one on each side of the viewfinder.

d. Remove the camera lens to gain access to the Top Cover Retainer Screw. Loosen the screw. Do not remove.

NOTE

Two screws are located in the same immediate area. The screw to be loosened is larger and is closer to the front of the camera than the other.

e. Remove the Top Cover. Tilt forward slightly when the cover is removed.

NOTE

The Shutter Button Shaft is not permanently affixed to the Top Cover, but held in place by lubricant. Insure that the Shaft is not misplaced while disassembling or in handling.

4-11. SPOTMATIC IIa CIRCUIT BOARD.

If it is determined from the Strobo-Eye Troubleshooting procedures in para. 3-25 through 3-29 that repair or replacement of the Spotmatic IIa circuit board is required, it will be necessary to remove the circuit board to repair most problems.

Potentiometers 4R2 and 4R3 may be adjusted simply by removing the Rewind Assembly as described in para. 4-9 and shown in Figure 5-12. The Top Cover need not be removed to adjust the potentiometers.

Transistor 4Q1 and diode 4CR1 may be replaced without removing the circuit board from the camera. Remove the two screws (1 and 2, Figure 4-1) securing the board to the camera and lift the board slightly to gain access to the two components. The board will still be attached to the camera by the two additional screws (3 and 4, Figure 4-1) in the bracket. Use caution when lifting to avoid damaging the board.

To remove the board from the camera, it is necessary to remove the two Prism Retainer Springs, the Prism Retainer Plate, and the black rubber Prism Protector. Refer to Figure 5-12.

NOTE

Examine the position of the Prism Retainer Springs and replace where they were originally secured to the camera body.

Remove the two screws (1 and 2, Figure 4-1) securing the board to the camera body and the two screws (3 and 4, Figure 4-1) securing the bracket to the camera body. Lift the board free. Remove wire leads as necessary. Repair or replace components as necessary.

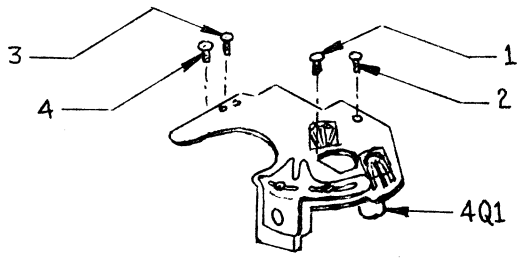


Figure 4-1. Spotmatic IIa Circuit Board

4-12. REFLECTOR AND FLASHTUBE.

4-13. REFLECTOR DISASSEMBLY (SEE FIGURE 5-3).

CAUTION

Handle the reflector and flashtube assembly gently to avoid damaging the electrode seals on the ends of the flashtube. Refer to paragraph 4-15.

To remove the reflector and flashtube assembly (16, 19), snap the reflector (16) out of the reflector housing (18).

To remove the flashtube (19), press on the clip on the end of the flashtube and withdraw the flashtube and clip from the reflector.

4-14. FLASHTUBE REPLACEMENT.

4-15. POSITIONING. Flashtube removal and replacement should be accomplished with extreme caution to avoid cracking the seals around the metal electrodes. The points where the electrodes enter the glass envelope are the most sensitive areas of the flashtube. Bending or cutting the electrodes will cause excessive strain between the glass and the electrodes. The flashtube should be positioned to "float" when mounted in the reflector with the leads exerting minimum pressure on the flashtube.

The reflector and flashtube assembly should be handled gently and properly positioned in the Strobonar. Any contact with other components should be avoided to prevent damaging or shorting the metal electrodes.

4-16. POLARITY (SEE FIGURE 4-2). The polarity of the flashtube must be checked when replacing the tube. The positive high voltage lead must be connected to the anode. The cathode, identified by the black getter deposit on the inside of the envelope, must be connected to the negative lead.

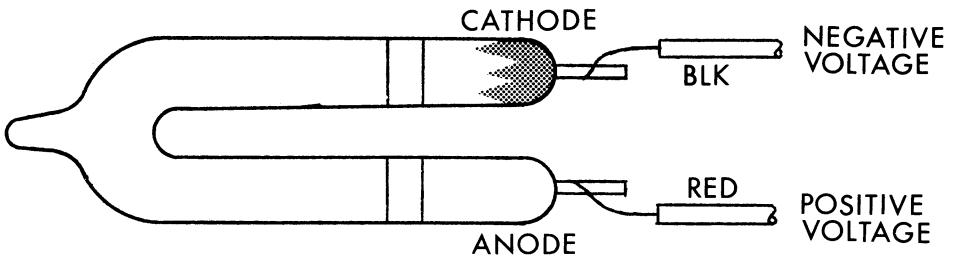


Figure 4-2. Flashtube Polarity

CAUTION

Reversing the polarity of the flashtube may result in a failure of flash or may produce low light output. Continued use will permanently damage the flashtube.

4-17. SOLDERING. Soldering the high voltage leads of the flashtube requires a special solder designed for use on stainless steel. The following type of solder has been found to be acceptable in repairing and replacing the flashtubes. An equivalent solder can be used if it matches or exceeds the specifications of Eutec Rod 157-B, manufactured by Eutectic Welding Alloys Corporation of 40-40 172nd Street in Flushing, N.Y. Caution should be taken to avoid exerting any pressure on the metal electrode leads when soldering.

4-18. CLEANING.

4-19. MECHANICAL AND ELECTRICAL COMPONENTS.

Wipe the large surfaces with a clean, dry, lint-free cloth. Use low pressure compressed air to blow dust from hard-to-reach areas. When using compressed air, always direct the first blast of air at the floor to remove moisture from the air line.

4-20. STROBONAR REFLECTOR AND LENS.

Disassemble the Strobonar as described in paragraph 4-4 and remove the reflector. Immerse the reflector or lens in warm, soapy water and wipe it gently with a clean piece of cotton. Rinse in cold water and BLOT dry (do not wipe) with a clean, dry piece of lint-free cloth or tissue. Do not allow the surface to air dry; air drying allows water marks to form. Remove lint with a lens brush.

4-21. ELECTRICAL COMPONENT REPLACEMENT.

When removing or replacing electrical components, observe the following precautions:

a. When applying heat, use a heat sink to avoid component and circuit board damage from heat conduction of component leads.

b. Apply heat sparingly to the component lead to be removed and lift the lead clear of the junction.

c. Use heat sinks and apply heat sparingly when installing new components.

d. Component placement and lead dressing of new components should be the same as for the original.

SECTION 5

PARTS LISTS AND DIAGRAMS

5-1. GENERAL.

This section includes a listing of all replaceable parts, exploded views of all assemblies and schematics for the Remote Auto/ Strobonar 772 and the Strobo-Eye units (Remote Sensor Accessory and Spotmatic IIa Camera). The following explains the column headings as used in the parts lists:

INDEX REF - Lists the reference (or call-out) number of each part as shown in the illustrations.

SCHEM REF - Lists the schematic reference designator of electrical parts.

HONEYWELL PART NO. - Lists the number by which an item may be ordered.

DESCRIPTION - Lists the part name and specifications required for identification.

QTY/UNIT - Lists the total quantity of each item used in the unit or assembly.

5-2. SCHEMATIC REFERENCE PREFIXES.

Prefix numbers have been added to the schematic reference designators to avoid designator duplication. Each unit in the Strobonar/Strobo-Eye system has been assigned a prefix number as shown in the chart.

UNIT	PREFIX	EXAMPLE
Auto/Strobonar 772	No prefix	CR1
Wall Box (Single Voltage)	#2 prefix	2CR1
Strobo-Eye Remote Sensor Accessory	#3 prefix	3CR1
Strobo-Eye (Spotmatic IIa Camera	#4 prefix	4CR1
Strobo-Eye Test Circuit	#5 prefix	5CR1
Wall Box (Multi-Voltage)	#6 prefix	6CR1

5-3. ORDERING INFORMATION.

When ordering spare or replacement parts, specify the unit model number, item description, Honeywell part number and quantity required.

Order parts from:

Honeywell
Photographic Products Division
P.O. Box 1010
Littleton, Colorado 80120

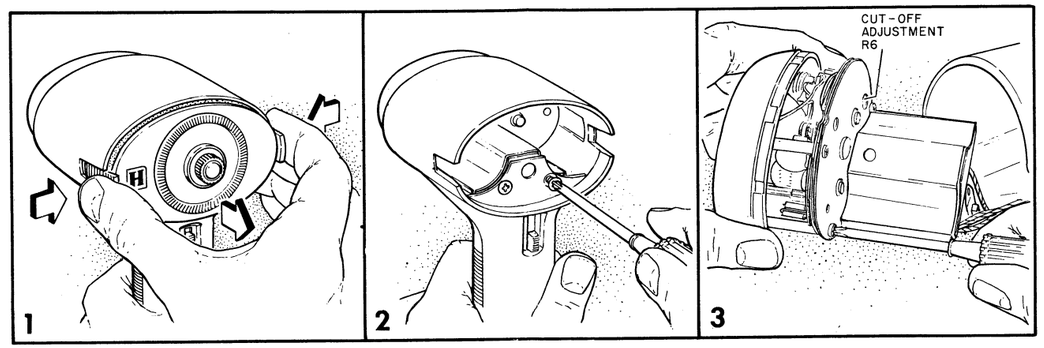


Figure 5-1. Disassembly Procedure

Figure 5-2. Anode Voltage Checks

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
		H73002682 001*	Strobonar Assembly	1
1		H73002683 001	Battery and Tray Assembly (Refer to Figure 5-6)	1
2		H16761246 023	Screw, Flat Hd.	2
3		H16759761 002	⚠2 Housing	1
4		H16761246 003	Screw, Flat Hd.	1
5		H73000042 026	Screw, Fil. Hd.	3
6		H16755813 002	Switch	1
7		H16765888 002	Chassis	1
8		H73002677 001	Circuit Board #2 Assembly (Refer to Figure 5-5)	1
9		H73002676 001	Circuit Board #1 Assembly (Refer to Figure 5-4)	1
10		H73000595 006	Sleeving	1
11		H73000806 001	Insulator	2
12		H16738755 002	Insulator	1
13		H73001541 001	Quench Tube Assembly	1
14		H73001214 001	Sleeving	1
15		H73000606 001	Insulator	1
16		H73000076 002	Reflector	1
17		H73000678 004	Lens	1
18		H16766498 001	Housing, Reflector	1
19		H16764213 005	Flashtube Assembly	1
20		H73000595 003	Sleeving	2
21		H16754482 002	Terminal, Crimp	2
22		H73002821 001	Decal, Receptacle	1
23		H73002678 001	Receptacle Assembly	1
24		H16766626 002	⚠2 Handle, Cover	1
25	C3	H73000024 001	⚠2 Capacitor	1
26		H16766627 001	⚠2 Bushing, Handle	1
27		H73001039 005	⚠2 Cap and Housing Assembly	1

* Parts not supplied for Service purposes.

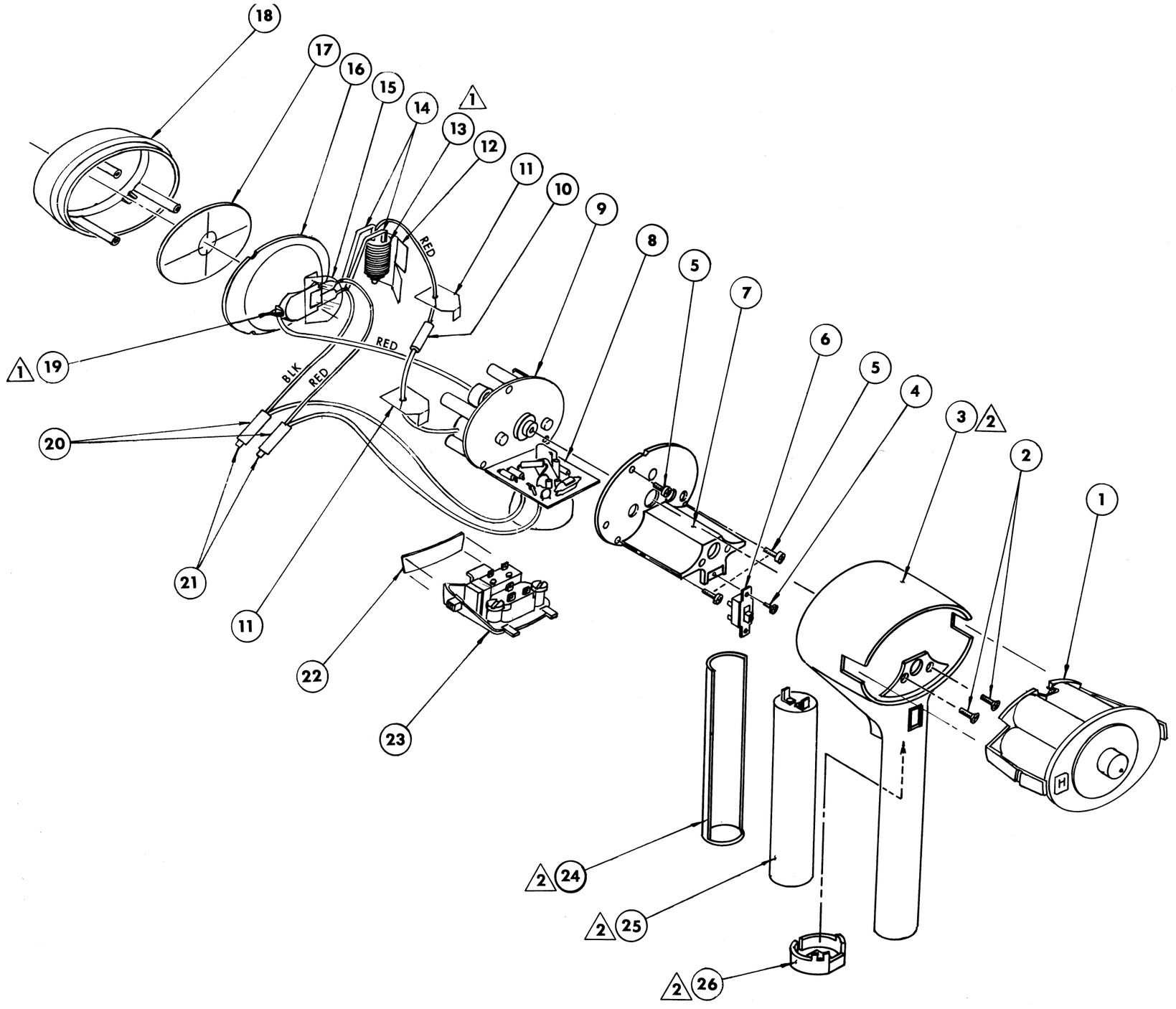


Figure 5-3.
Exploded View -
Auto/Strobonar 772

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
32	R18	H16758183 622	Resistor, 1M, ½W, 5%	1
33	R13	H16758183 834	Resistor, 1.5K, ½W, 10%	1
34	CR8	H73001970 001	Diode, 50V	1
35	CR5	H73002602 003	Diode, 24VZ	1
36		H16750979 008	Sleeving, 3/8" Lg, Red	1
37	R12	H16758183 580	Resistor, 18K, ½ W, 5%	1
38		H73001644 001	Rotor, Switch	1
39		H73001645 001	Contact	2
40	R4	H16758183 852	Resistor, 47K, ½W, 10%	1
41	SCR1	H73002511 006	Silicon Controlled Rectifier, 30V	1
42	R16	H16758183 803	Resistor, 3.9 ohm, ½W,5%	1
43		H73000428 001	Contact Rivet	2
44		H73003211 001	O-Ring	2

△1 CR3, CR4, CR10 and CR11 cathodes face board surface.

△2 CR5 and CR8 anodes face board surface.

△3 With S2 closed, an ohmmeter check at test points 1 and 2 should show less than 1 ohm DC resistance. With S2 open, should show > 1 meg ohm.

△4 The following components make up the Oscillator Kit, Honeywell Part No. H73003033-002.

If transistor Q1 is: (on Circuit Board No. 1)	Resistor R3 must be: (on Circuit Board No. 2)
H16756821-004	H16758183-510 (24 ohm)
H16756821-005	H16758183-512 (30 ohm)

△5 Transistor Q3 not to extend higher than .350 above board surface.

△6 Item No. 44 to be installed between capacitors and circuit board.

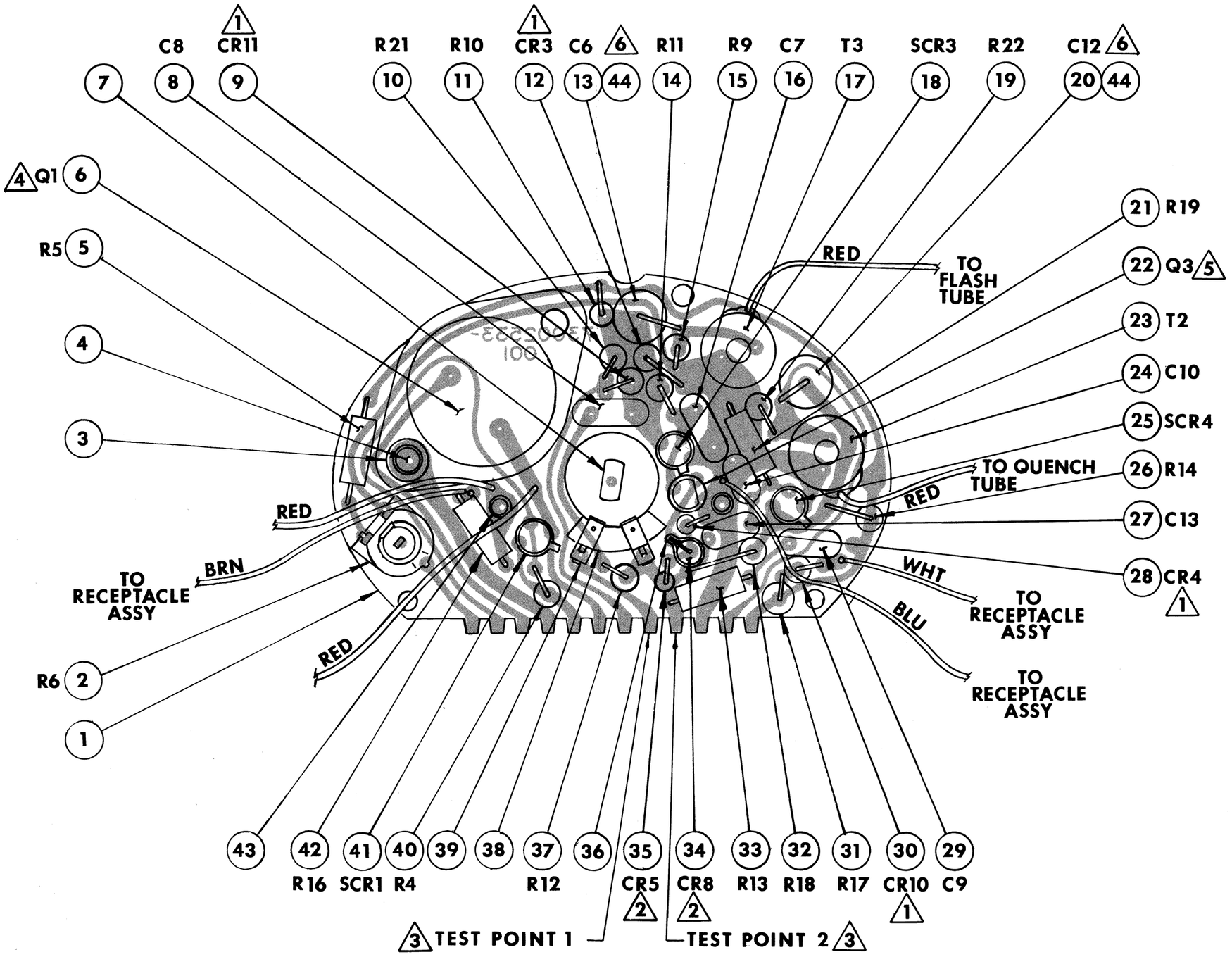


Figure 5-4.
Circuit Board No. 1 Assembly

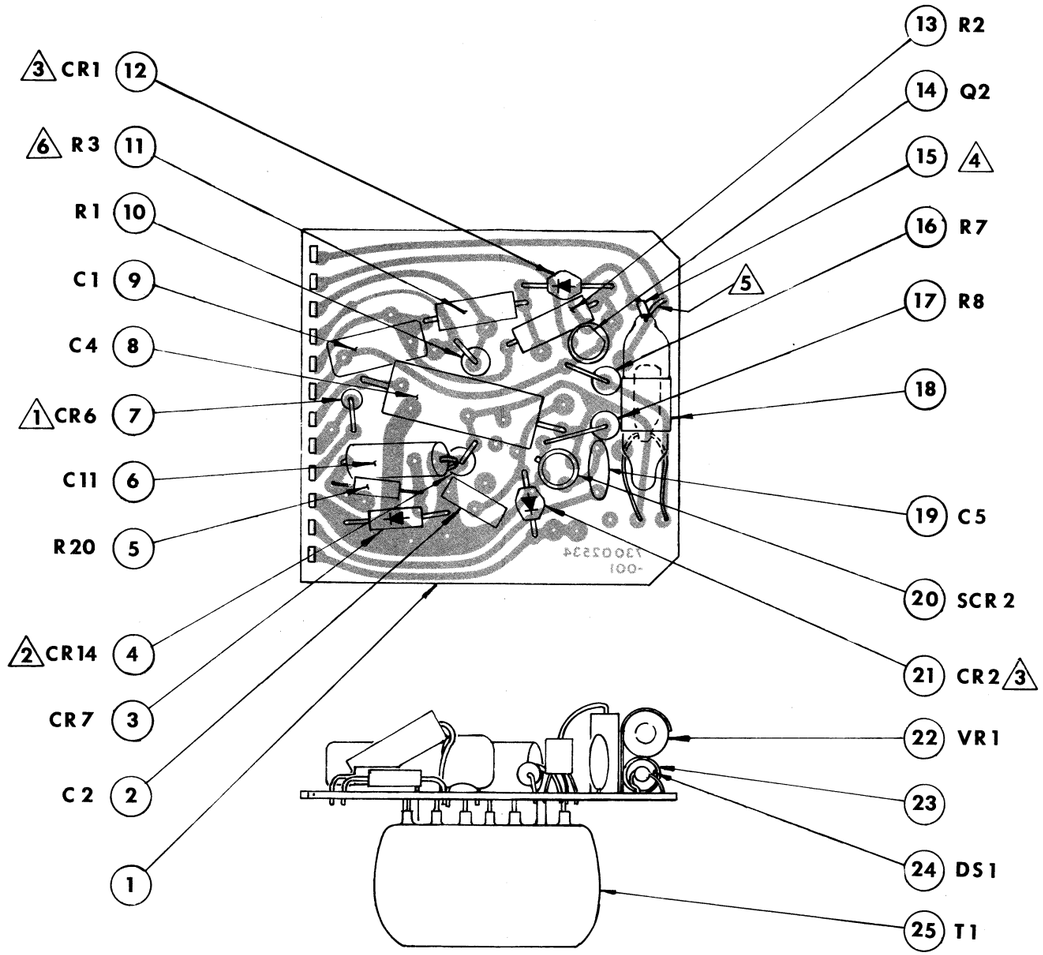


Figure 5-5.
Circuit Board No. 2 Assembly

1. CR6 cathode faces board surface.
2. CR14 anode faces board surface.
3. CR1 and CR2 must be flush to board surface.
4. This lead must be sleeved and oriented on top.
5. Marked lead of neon must be in this location.
6. The following components make up the Oscillator Kit, Honeywell Part No. H73003033-002.

If transistor Q1 is: (on Circuit Board No. 1)	Resistor R3 must be: (on Circuit Board No. 2)
H16756821 004	16758183 510 (24 ohm)
H16756821 005	16758183 512 (30 ohm)

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
		H73000023 003	Battery and Tray Assembly	1
		H73002685 001	Battery Tray Assembly	1
1		H73000427 005	E-Ring	1
2		H16759851 001	Spring	1
3		H16766615 001	Snap Ring	1
4		H16738656 001	Spring, Detent	1
5		H73000008 001	Decal, Knob	1
6		H73000004 001	Shaft	1
7		H16759994 003	Dial, Exposure	1
8		H16766588 008	Back Plate	1
9		H16766504 001	Tray	1
10		H73002980 001	Filler, Battery Pack	1
11		H16765473 001	Battery Assembly, Welded	1
12		H16750977 159	Sleeving, 3/8" Lg.	1
13		H16765479 001	Clip, Spring	1

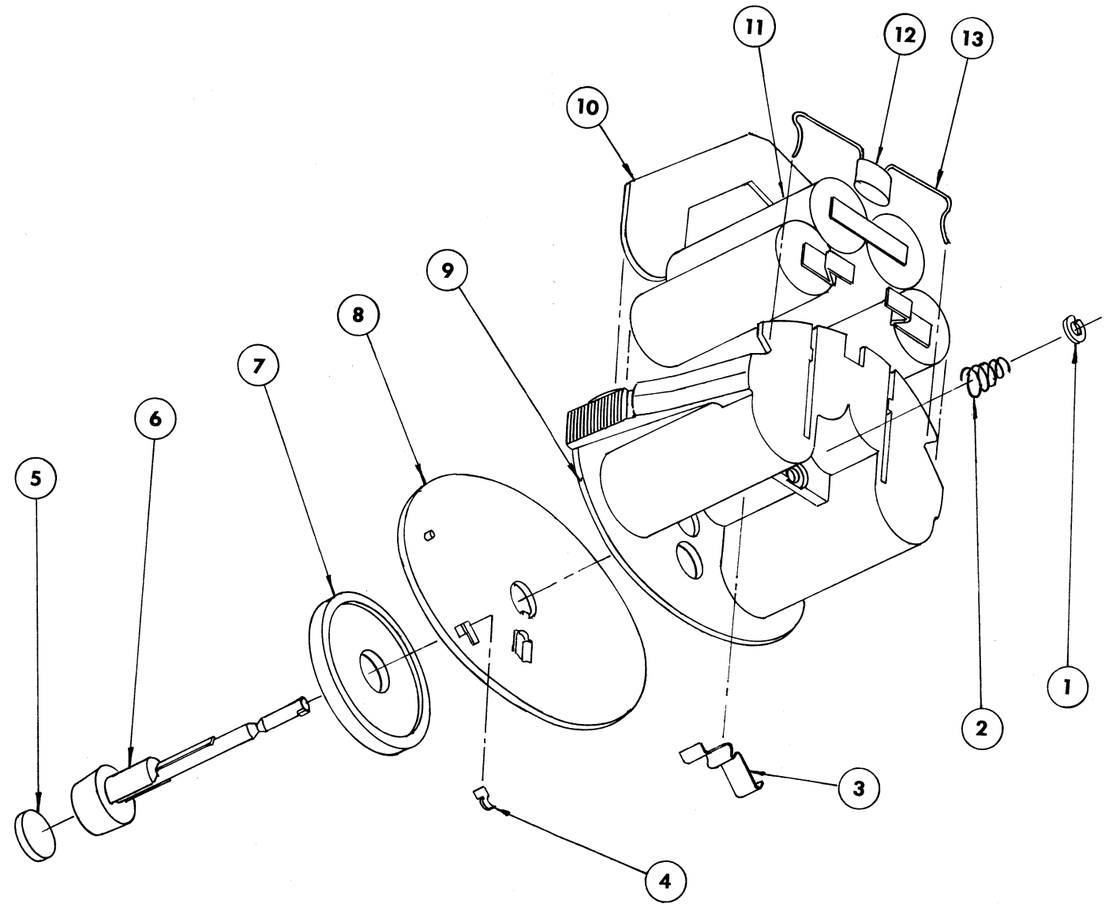


Figure 5-6.
Battery and Tray Assembly

REF		HONEYWELL PART NO	DESCRIPTION	QTY
INDEX	SCHEM			
		H73002680 001	Wall Box Assembly	1
1		H73001173 001	Cover	1
2		H16766484 005	Cable Assembly	1
3		H73001167 004	Base	1
4		H16756377 024	Screw	2
5		H73001140 001	AC Power Cord	1
6		H73002831 003	Decal, Wall Box	1
7		H73002727 001	Circuit Board Assembly	1
8	2CR1	H73001970 005	Diode, 600V	1
9	2CR5	H73001970 003	Diode, 200V	1
10		H73000009 001	Circuit Board	1
11	2T1	H73001732 001	Transformer	1

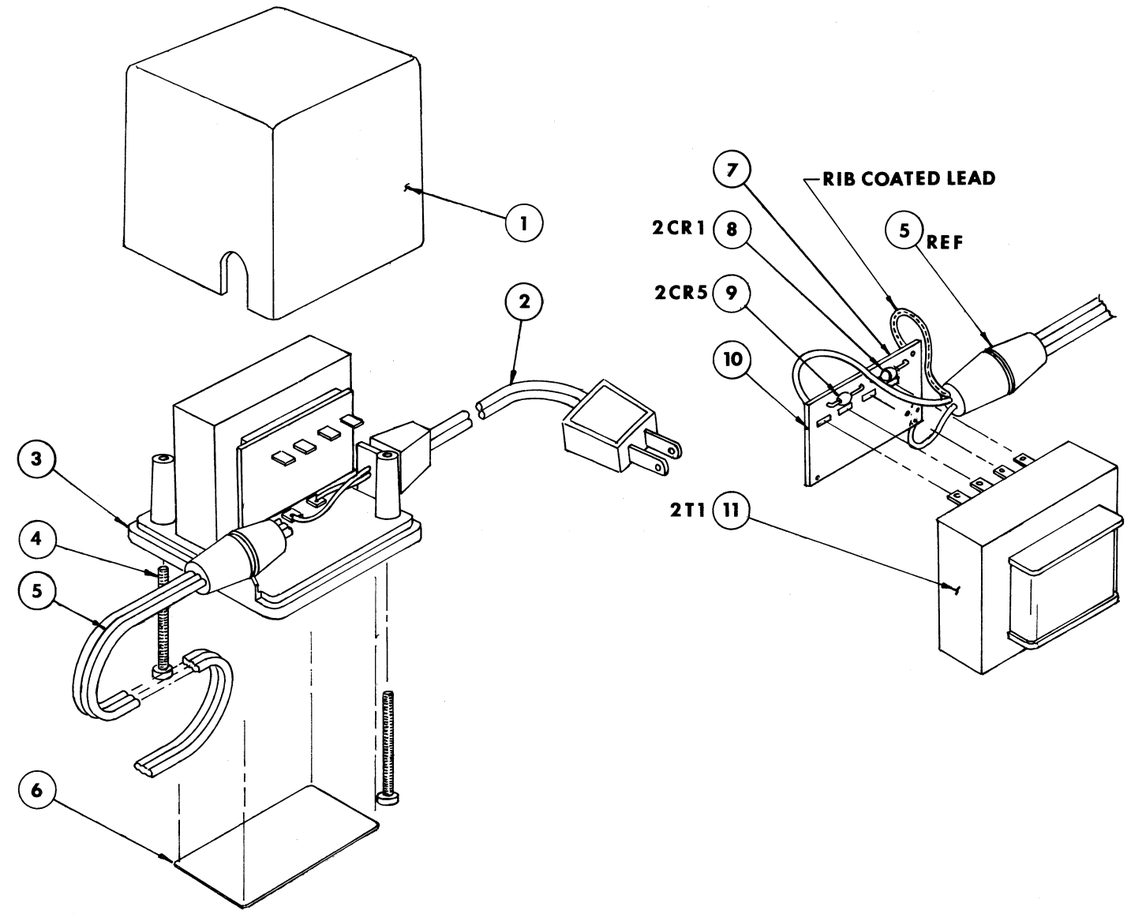


Figure 5-7.
Wall Box Assembly -
Single Voltage

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
		H73003067 002	Wall Box Assembly, Multi-Voltage	1
1		H73003083 001	Decal	1
2		H16756377 023	Screw	2
3		H73002930 001	Base	1
4		H16766484 005	Cord, Charge	1
5		H73003066 002	Circuit Board Assembly (See Figure 5-9)	1
6		H73001140 001	Cord, Power	1
7		H73001173 001	Cover	1

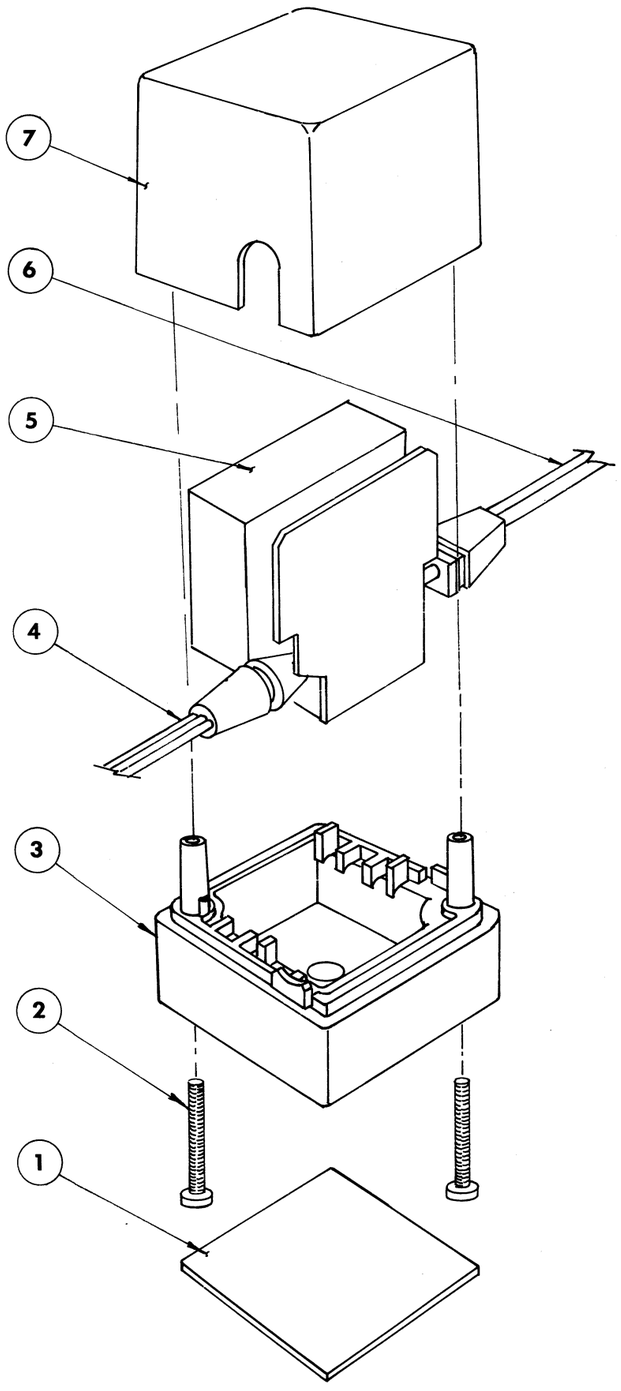


Figure 5-8.
Wall Box Assembly -
Multi-Voltage

REF		HONEYWELL PART NO	DESCRIPTION	QTY
INDEX	SCHEM			
		H73003066 002	Circuit Board Assembly, Multi-Voltage Wall Box	1
1		H73003065 001	Circuit Board	1
2	6S1	H73002937 001	Switch	1
3	6T1	H73003208 001	Transformer	1
4	6CR1	H73001970 005	Diode, 600V	1
5	6CR5	H73001970 001	Diode, 50V	1

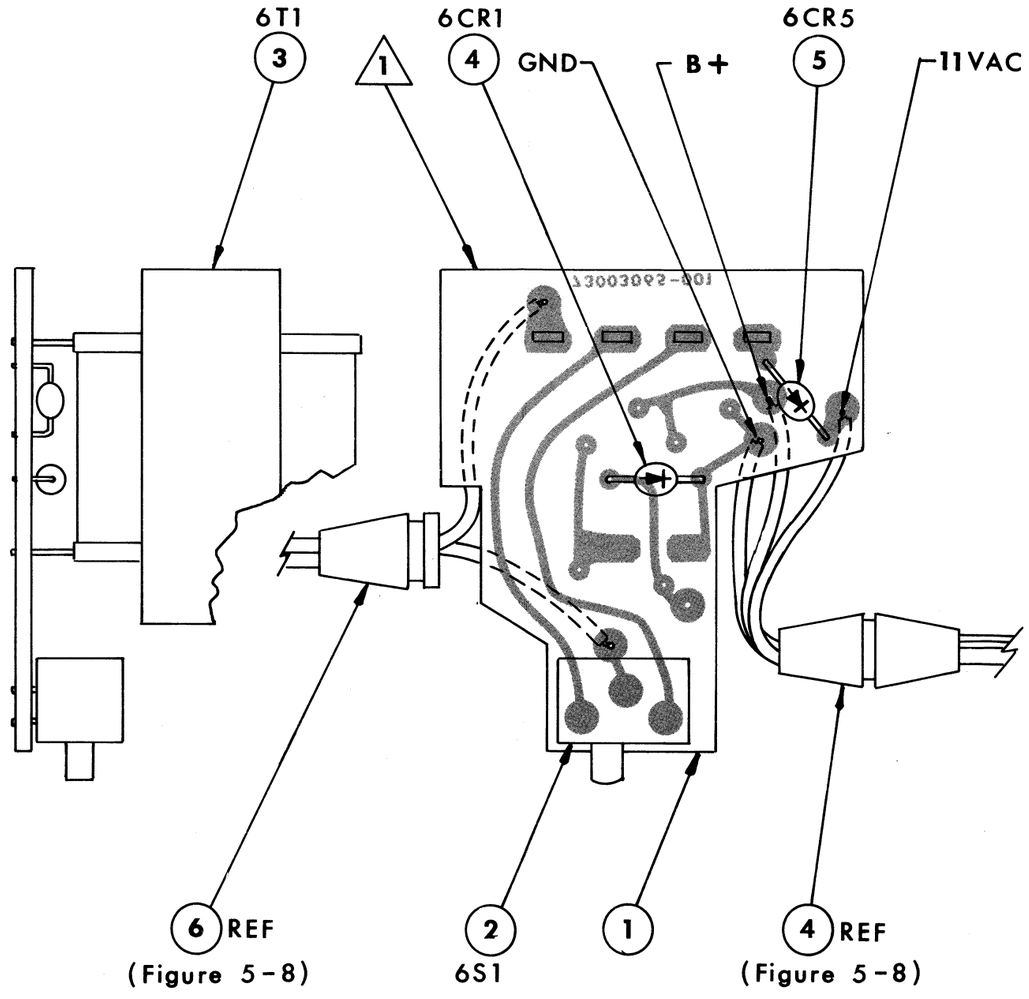


Figure 5-9.
Circuit Board Assembly -
Multi-Voltage Wall Box

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
		H73002799 001	Strobo-Eye Remote Sensor Accessory Assembly	1
1		H73002809 001	Nameplate	1
2		H73002841 206	Screw, Flat Head	1
3		H73002756 001	Foot	1
4		H73002640 008	Screw, Self-Tapping, 2-56	3
5		H73002741 001	Case, Bottom	1
6		H73002824 003	Insert, Threaded	1
7		H73002182 001	Lens	1
8		H73002740 001	Circuit Board Assy. (See Figure 5-11)	1
9			Top Case Assy.	1
10		H73002788 001*	Aperture	1
11		H73002780 001*	Holder, Aperture	1
12		H73002781 001*	Button, Indicator	1
13		H73002407 002*	Washer, Wave	1
14		H73002816 001*	Decal, Range	1
15		H73002745 001*	Dial	1
16		H73002742 001*	Case, Top	1

* Parts not supplied for Service purposes.

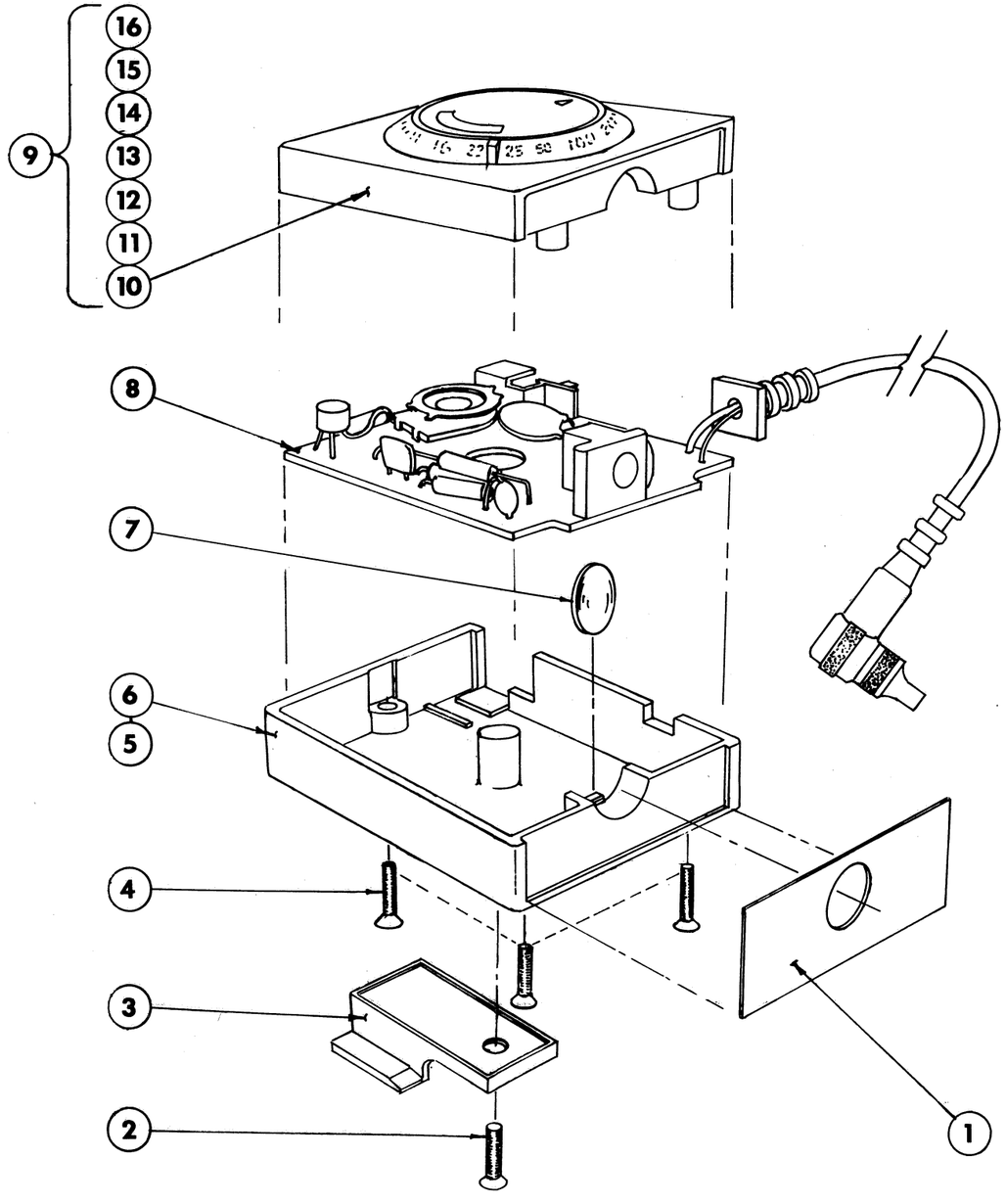
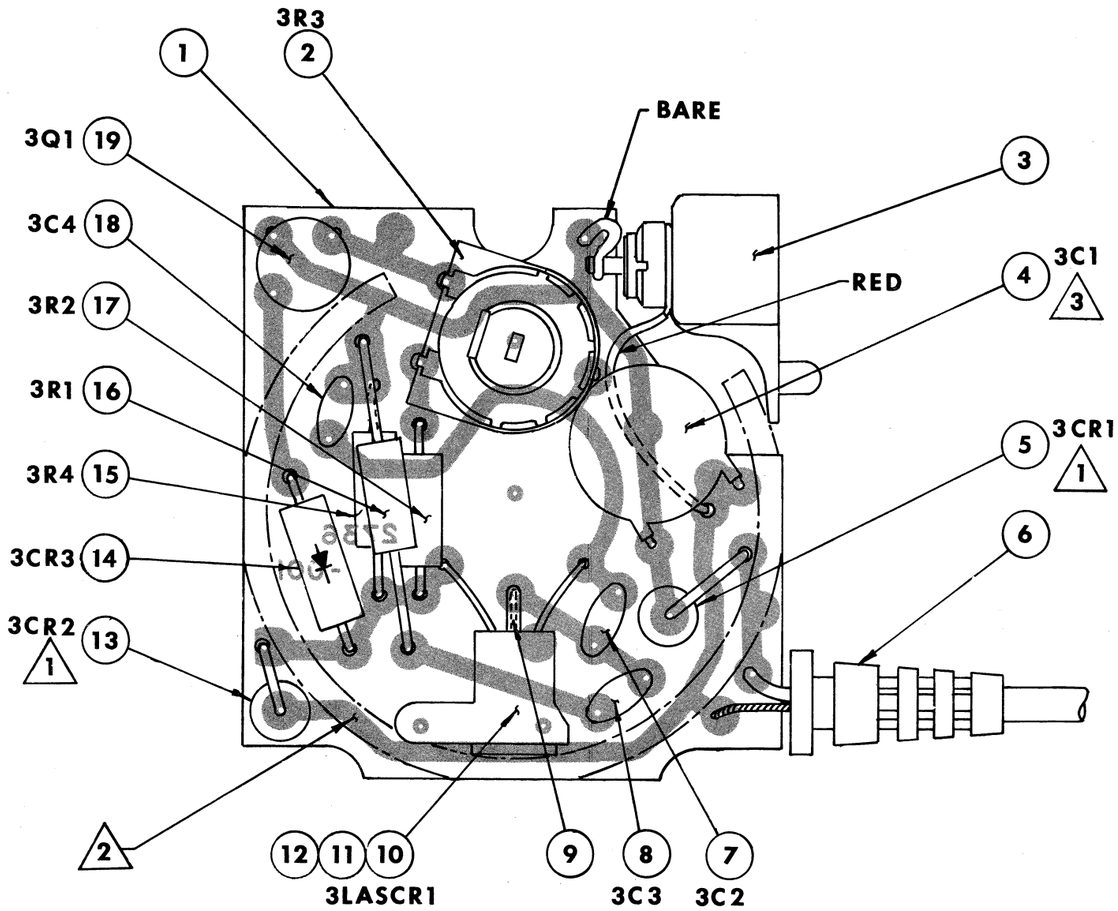


Figure 5-10.
Exploded View - Strobo-Eye
(Remote Sensor Accessory)

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
		H73002740 001	Circuit Board Assembly - Remote Sensor Accessory	1
1		H73002736 001*	Circuit Board	1
2	3R3	H16762587 114	Resistor, Var., 15K	1
3		H73002802 001	PC Module Assembly	1
4	3C1	H73001150 024	Capacitor, 680 pf	1
5	3CR1	H73001970 005	Diode, 600V	1
6		H73002826 002	Cord, PC	1
7	3C2	H73002426 001	Capacitor, 100 pf	1
8	3C3	H73002426 002	Capacitor, .001 mfd	1
9		H16750978 038	Tubing, Teflon, ¼ Lg.	1
10	3LASCR1	H73000533 013	LASCR, 100V	1
11		H73002186 001	Lens	1
12		H73002778 001	Lens, IR Filter	1
13	3CR2	H73001970 005	Diode, 600V	1
14	3CR3	H73002602 002	Diode, Zener, 16V	1
15	3R4	H16759940 089	Resistor, 47K, 10%, ¼W	1
16	3R1	H16759940 279	Resistor, 18K, 5%, ¼W	1
17	3R2	H16759940 280	Resistor, 20K, 5%, ¼W	1
18	3C4	H73002426 006	Capacitor, .0015 mfd	1
19	3Q1	H16759913 003	Transistor, NPN	1

* Parts not supplied for Service purposes.



1. 3CR1 and 3CR2 anodes face board surface.
2. All components and wires to be outside noted area, except items 11 and 12.
3. Capacitor 3C1 not to extend higher than .220 above board surface.

Figure 5-11
Circuit Board Assembly -
Remote Sensor Accessory

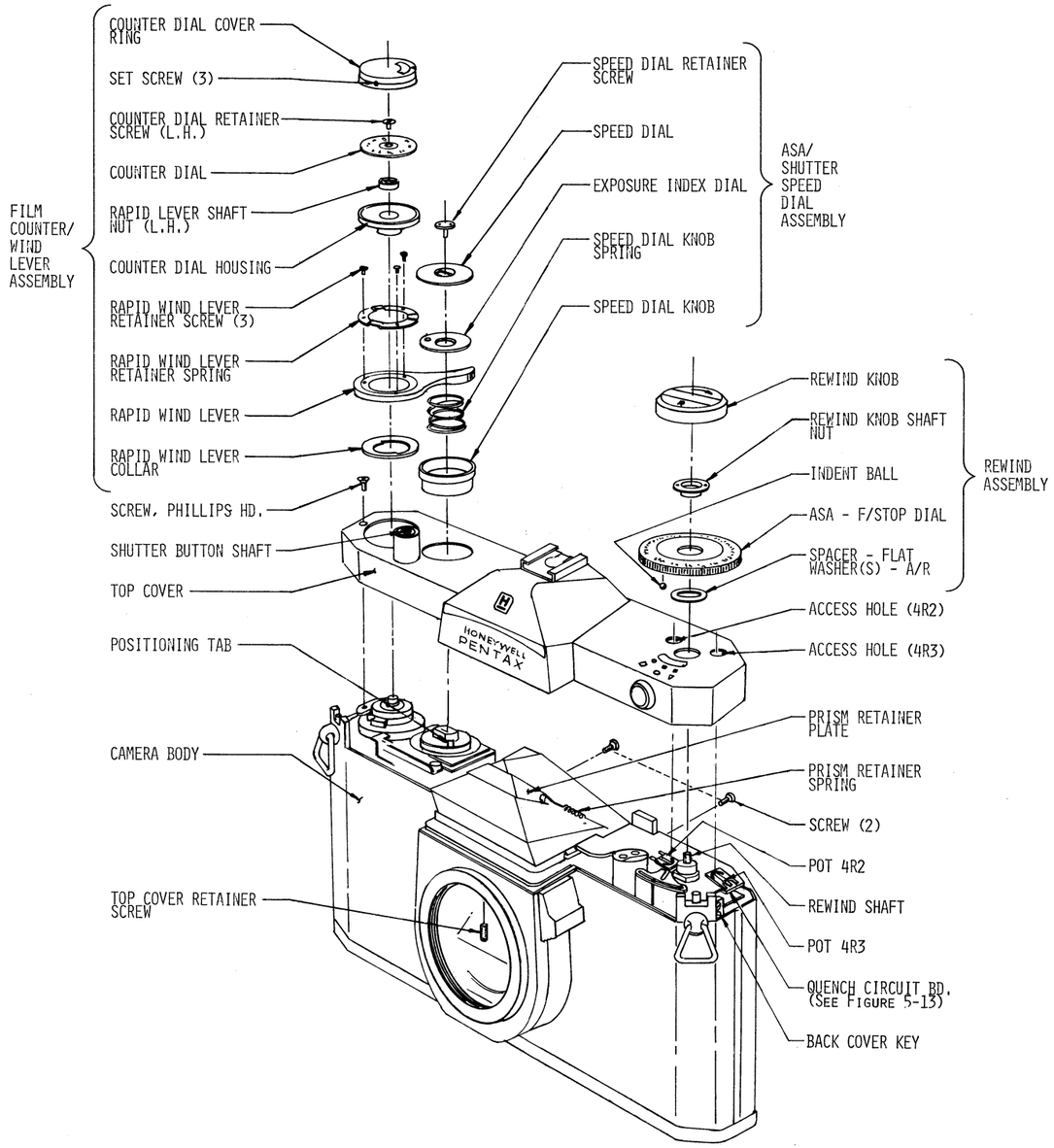
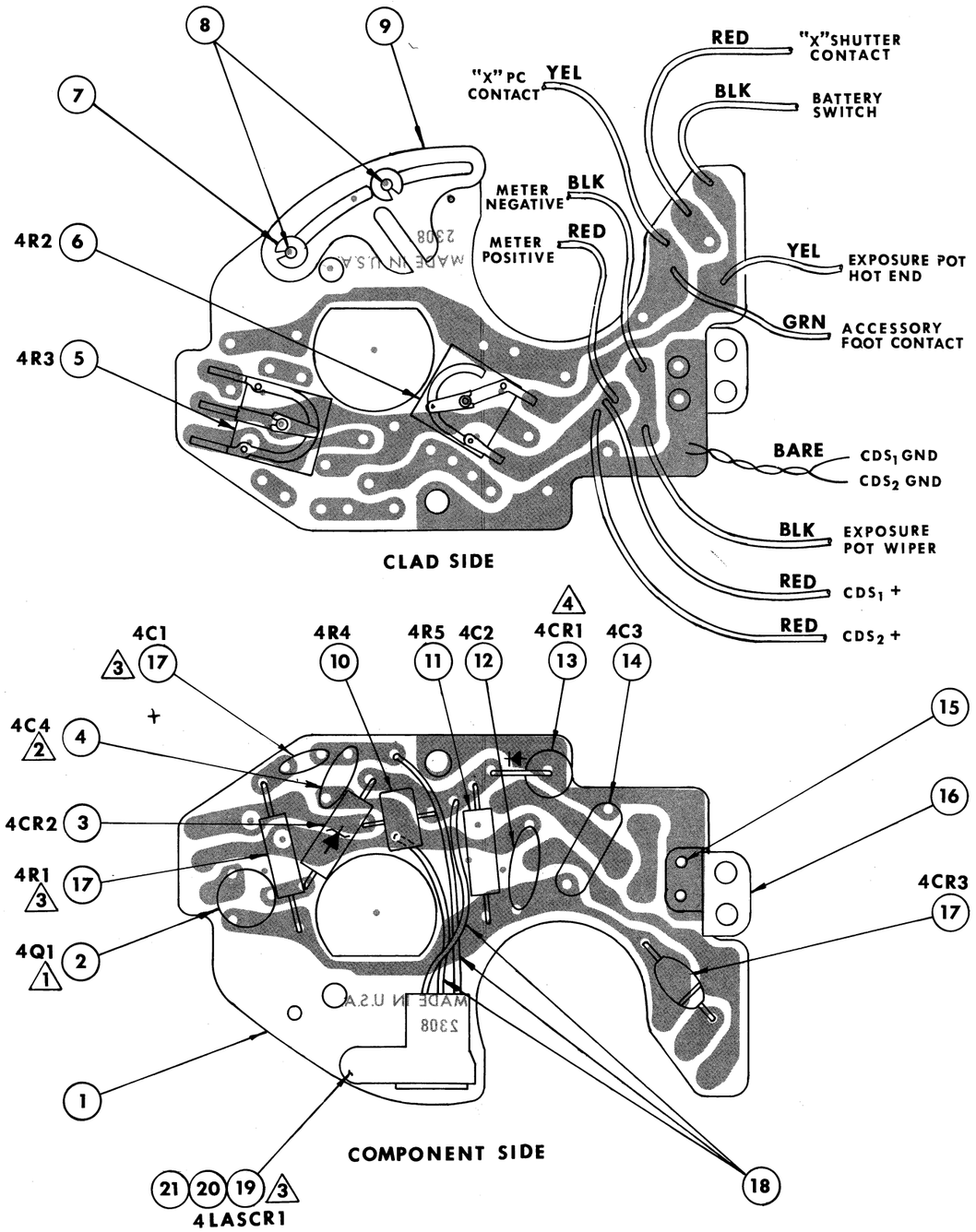


Figure 5-12.
Exploded View - Strobo-Eye
(Spotmatic IIa Camera)

REF INDEX	REF SCHEM	HONEYWELL PART NO	DESCRIPTION	QTY
		H73002428 001	Circuit Board Assembly, Spotmatic IIa Camera	1
1		H73002308 001*	Circuit Board	1
2	4Q1	H16759913 003	Transistor, NPN	1
3	4CR2	H73002602 002	Diode, Zener, 16V	1
4	4C4	H73002426 001	Capacitor, 100 pf	1
5	4R3	H73002424 108	Resistor, Variable, 15K	1
6	4R2	H73003235 003	Resistor, Variable, 100K	1
7		H73003235 004	C-Clip	2
8		H73002721 002	Standoff	2
9		H73003235 005	Plate, Diaphragm	1
10	4R4	H16759940 280	Resistor, 20K, ¼W, 5%	1
11	4R5	H16759940 089	Resistor, 47K, ¼W, 10%	1
12	4C2	H73002426 006	Capacitor, .0015 mfd,50V	1
13	4CR1	H73001970 005	Diode, 600V	1
14	4C3	H73001150 024	Capacitor, 680 pfd	1
15		H73003235 002	Rivet	2
16		H73003235 001	Bracket	1
17	4CR3	H73001970 005	Diode, 600V	1
18		H16750978 038	Sleeving, Teflon	3
19	4LASCR1	H73003130 001	LASCR Kit (Refer to Notes for list of parts)	1
20		H73002186 001	Lens	1
21		H73002778 001	Lens, IR Filter	1

* Parts not supplied for Service purposes.



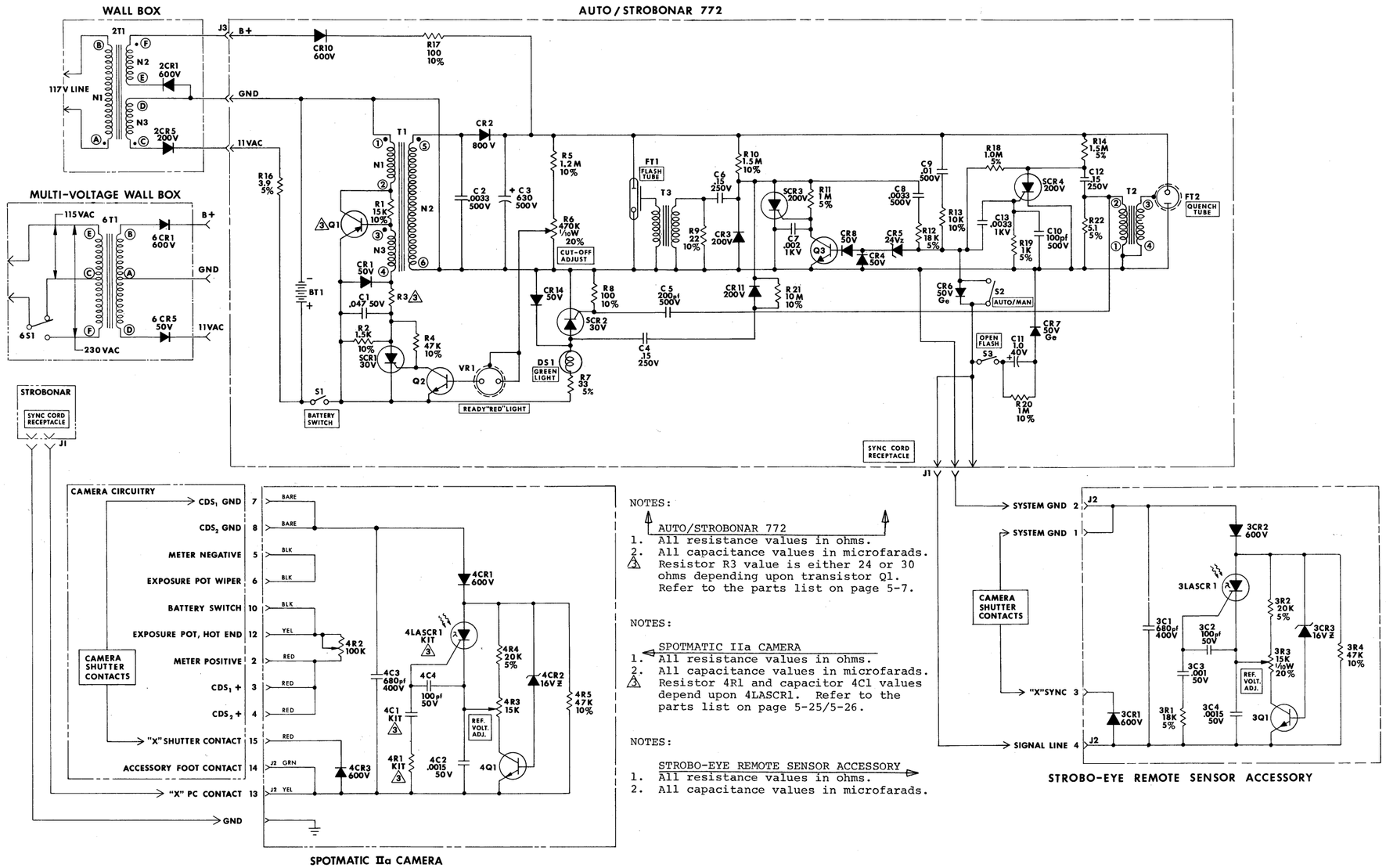
NOTES:

1. Transistor 4Q1 not to extend higher than .250 above board surface.
2. Capacitor 4C4 not to extend higher than .300 above board surface.
3. The following components make up the 4LASCR Kit, Honeywell Part No. H73003130-001.

If 4LASCR is:		Resistor 4R1 must be:		Capacitor 4C1 must be:	
H73000533-014	70-120	H16759940-279	18K ohm	H73002426-002	.001 mfd
H73000533-008	95-175	H16759940-275	12K ohm	H73002426-002	.001 mfd

4. 4CR1 anode faces board surface.

Figure 5-13.
Circuit Board Assembly - Spotmatic IIa Camera



NOTES:

AUTO/STROBONAR 772

1. All resistance values in ohms.
2. All capacitance values in microfarads.
3. Resistor R3 value is either 24 or 30 ohms depending upon transistor Q1. Refer to the parts list on page 5-7.

NOTES:

SPOTMATIC IIa CAMERA

1. All resistance values in ohms.
2. All capacitance values in microfarads.
3. Resistor 4R1 and capacitor 4C1 values depend upon 4LASCR1. Refer to the parts list on page 5-25/5-26.

NOTES:

STROBO-EYE REMOTE SENSOR ACCESSORY

1. All resistance values in ohms.
2. All capacitance values in microfarads.

Figure 5-14.
Schematic
Auto/Strobonar 772 -
Strobo-Eye System