I. \textbf{Battery System}

1. The CV-2 has one \textbf{24} volt, \textbf{34} ampere hour, nickel cadmium battery.

2. The battery is located \textbf{behind} the seat \textbf{under} the flight compartment.

3. The primary purpose of the battery is for \textbf{emergency} power.

4. The battery may also be used for starting the \textbf{engine} in case of an emergency.

5. The circuits powered directly off the battery, regardless of switch positions are the:
   \begin{itemize}
   \item A \textit{Trans Light}
   \item E \textit{Map Light}
   \end{itemize}

6. The battery switch, located on the engine start panel, is a two position switch with positions \textbf{OFF} and \textbf{Battery Master}.

7. The battery relay connects the battery to the \textbf{Main} bus.

8. The battery relay requires a minimum of \textbf{20} volts to close.

9. The battery can power all D.C. busses by placing the \textbf{battery master} switch in \textbf{battery master} position and the \textbf{secondary read switch} in the \textbf{override} position.

10. The battery powers the \textbf{Emergency bus} in flight when both generators are inoperative and the battery switch is in the \textbf{off} position and the \textbf{emergency bus switch} is in the \textbf{emergency} position.

11. The battery is accessible through an access opening in the \textit{left wall} of the flight compartment \textbf{floor panel} wall.

12. The battery is charged in flight by the \textbf{engine generator}.

II. \textbf{External D.C. Power}

1. The external power receptacle is located on the \textbf{left} side of the fuselage just below the \textit{3rd} window from the passenger door. 
   \begin{itemize}
   \item a. It has \textbf{3} large load pins.
   \item b. It has \textbf{1} small control pins.
   \item c. It is an \textit{anti flashblock} type receptacle.
   \end{itemize}

2. The battery switch and the generator switches should be in the \textbf{OFF} position when using external power.

3. After connecting external power check the cockpit voltmeter for a \textbf{positive} voltage indication.
4. External power connects to the main DC bus.

5. External power supplies power for all D.C. buses with no manual control switches in the aircraft.

6. External power is used for starting the engines and for ground operation of electrical equipment.

III. ENGINE DRIVEN GENERATORS

1. The CV-2 has two engine driven generators, one located on each engine accessory case.

2. The rated output of each generator is 377 volts rated at 300 amps and they are the normal source of D.C. power.

3. The voltage regulators are located behind the control on the bottom radio rack.
   
   a. They maintain a constant output voltage under any variable conditions.
   
   b. They are Carbon pile type.

4. The generator relay (mainline contacts) is located in number ___ junction box and it connects the generator to the main bus.

5. The generator control panel is located behind the cockpit on the bottom radio rack and it contains six generator controls.

   A. Voltage Regulator
   
   B. Balanced Differential Relay
   
   C. Equalizer Relay
   
   D. Field Relay
   
   E. Ground Fault Relay
   
   F. Overvoltage Relay

6. The polarized differential relay controls the generator relay. It will not close the generator relay until the generator voltage is from +35 to +70 volts above bus voltage.

7. The equalizer relay connects the two generators together so we can spread the load demand equally between both generators.

8. The field relay operates as an automatic switch and controls the generator field. It will automatically trip the generator off the line in case of an overvoltage or a ground fault.

9. The ground fault relay operates in conjunction with the ground fault transformers to trip the field relay should an open circuit or ground of the generator.
10. The overvoltage relay senses generator output and will trip the generator off the line when a high voltage from 33 to 37 volts occurs.

11. The generator switches are located on the AC DC power panel in front of the CP.

12. The generator switch positions are Off, On and Reset.

13. The reset position on the generator switch electrically resets the Field Relay.

14. The voltameters are located on the AC, DC power panel above the generator switch:
   a. The voltameter reads mains low voltage.
   b. The two voltameters are connected in series.
   c. The voltameters are calibrated from 15 to 33 volts.

15. The amperemeters read current draw for the respective generator:
   a. The amperemeters are calibrated from 0 to 450 amps.
   b. You should never draw over 300 amps on the amperemeters.

IV. GENERATOR FAILURE

1. If one generator warning light comes on perform the following checks:
   a. Generator switch Check ON.
   b. Generator field relay circuit breaker Check On
   c. Generator switch then on
   d. Generator switch OFF.
   e. Switch off all unnecessary service
   f. Secondary bus reset switch in service if necessary

2. If both generators fail:
   a. Generator switches Check ON.
   b. Generator field relay circuit breaker then check in.
   c. Generator switches then ON.
   d. Battery master switch then ON.
   e. Battery master switch OFF.
   f. Switch off any unnecessary service that takes power from the emergency system. Conserve battery.
V. D.C. Bus System

1. The D.C. bus system consists of four busses:
   A. Main bus
   B. Secondary bus
   C. Emergency bus
   D. Battery bus

2. The battery bus supplies power for:
   A. Cockpit lights
   B. C-H map lights

3. The battery bus receives its power directly from the battery.

4. The main D.C. bus supplies power to electrical equipment that is necessary for Normal flight.

5. The main D.C. bus is supplied power by:
   A. Generators
   B. Engine generators

6. The secondary is supplied power by the main bus normally when both engine generators are operating.

7. The secondary bus can be powered by the battery if the Battery bus switch is placed to the override position.

8. The secondary bus reset switch is located on the Circuit breaker panel behind the pilot and copilot.

9. The secondary bus supplies power to the electrical equipment considered secondary to flight safety.

10. The secondary bus reset switch has two positions, normal and manual, it is located to the normal position.

11. The emergency bus supplies power to the electrical equipment considered essential to flight safety.

12. The emergency bus receives its power normally from the main bus.

13. During an emergency (both generators inop) the emergency bus will receive its power from the battery.

14. The emergency bus can be isolated from the main bus by placing the battery switch in the OFF position and placing the emergency bus switch to the EMERGENCY position.

15. The emergency bus can be isolated from the main bus by placing the battery switch in the _____ position and placing the emergency bus switch to the ______ position.
15. The emergency bus switch is located on the circuit breaker panel.

16. The emergency bus switch has two positions: thermal and emergency. It is marked and should be safetied with breakaway wire to the thermal position.

17. Current limiters and thermal, push to reset type circuit breakers are used to protect the D.C. electrical equipment. 125 amp circuit breaker panel generator.

VI. POWER SYSTEM

1. There are three phase inverters located behind the cockpit under the flight compartment floor.

a. The output of these inverters is:
   1. 250 volt amps
   2. 115 volt ± 4.5 volts
   3. 400 cycles per second ± 20 cycles

b. The inverters are main and standby inverters.

c. The inverter switch is located on the D.C. DC central panel in front of the cockpit.

d. The inverter switch has three positions

1. main
2. standby
3. off

f. The RED indicator light indicates no A.C. power on the A.C. bus.

f. The AMBER indicator light indicates that the standby generator is operating.

h. The lights are located in front of the cockpit on the D.C. DC control panel.

i. If the main inverter should fail the standby inverter takes over automatically.

j. The automatic change over relay will change over on new voltage only. (A.C.)

k. On aircraft without reversible props the main inverter receives its D.C. power from the secondary bus and when a generator is lost the main inverter will fail and the standby will take over.

l. The standby inverter receives its power from the emergency bus.

m. On aircraft with reversible props both inverters receive their power from the emergency bus.
2. There are two instrument transformers that step down the 115-volts AC to 26-volts AC for operation of the pressure type instruments, they are:

A. Manifold pressure
B. Ignition pressure
C. Cylinder pressure
D. Gyro compass and transmitter
E. Indicator for hydraulic and brake pressure

3. These transformers are the _Main_ and _Aux_ transformers.

4. The selector switch is located on the circuit breaker panel and has two positions:

A. _Main_
B. _Standby_

5. A 26 volt AC failure light is located in front of the co-pilot and below his flight instruments.

6. The light will glow when the 26 volt step down transformer has failed.

VII. Inverter Failure

1. If the main inverter should fail:

A. On circuit without reversible props, make sure both engines are operating at more than 600 RPM
B. Check inverter circuit breakers
C. Check DC circuit breakers for inverter
D. Inverter switch set off then return to main
E. If standby light remains out, leave switch at main.
F. If standby light stays on, select switch to standby position.

2. Stand by inverter failure:

A. If the standby inverter is in operation and the standby light goes out, the A.C. failure light should come on to indicate complete A.C. power supply failure.
B. To check this malfunction, check inverter circuit breaker.
C. Check D.C. power circuit breakers for inverter.
D. Inverter switch off then main
E. If the A.C. failure light comes on, select inverter switch off.
VIII SAFETY CIRCUITS

1. Some circuits on the CV-2 are controlled by the landing gear weight switches. These circuits are:

A. Nose Gear Switch:
   1. Control for up solenoid on landing gear
   2. Nose wheel steering solenoid
   3. Ramp 15° limit switch
   4. Accessory compartment vent doors

B. Left Main Gear Switch:
   1. Control for up solenoid on landing gear
   2. Connected in series to other gears

C. Right Main Gear Switch
   1. Control for up solenoid on landing gear
   2. Connected in series to other gears

IX. AIRCRAFT LIGHTING

1. Exterior Lighting:
   A. Consists of:
      1. Navigation lights
      2. Wing inspection lights
      3. Anti-collision lights
      4. Landing lights
      5. Taxi lights
      6. Formation lights

   B. The taxi light and the landing light switches are located on the electrical panel.

   C. All other exterior light switches are located on the electrical switch panel.

   D. The landing lights are mounted in the leading edge of each wing.

   E. The wing inspection lights are mounted on the outboard side of each top engine cooling.

   F. The navigation light switch is marked as wing and taxi lights and they have no flash position.

   G. Should the Anti-collision light be on at all times in flight? No, not in cloud.

   H. CAUTION: do not operate the landing lights over one minute on the ground.
2. Interior lights:
   a. Consists of:
      1. Emergency lights - cabin lighting
      2. Cargo loading light
      3. Rear entrance light
      4. Utility light
      5. Flight compartment floor hatch light
      7. Flight compartment dome light
      8. Cabin dome lights
      9. Passenger warning signal lights
      10. Troop jump lights

b. The emergency lights are independent from the aircraft electrical system.
   1. A 6.6 volt nickel cadmium battery located in the cargo roof supplies power for the six exit lights.
   2. The system is tested by a toggle switch marked "test", it is warped and is located on the switch panel below the circuit breaker panel.-which light
   3. In case of a crash the lights are controlled by a Pendants Switch located in the battery case.

   4. The six lights are located:
      a. One at the flight compartment roof hatch.
      b. Cabin emergency door
      c. One at both passenger doors.
      d. One at both sides of cargo doors.

c. The cargo loading light is located at the rear of the cargo compartment mounted in a recess in the cabin roof; it is controlled by a switch located on the flight and has a red and white lens. It also has an extension-15' cord attached to it so it can be used as a walk around light.

d. The rear entrance light is mounted in the roof between the two entrance doors, it is controlled by a toggle switch on the rear control panel just over the left plex. door.

E. There are four utility lights located:
   1. Over the pilots head.
   2. Over the copilots head
   3. One on radio rack behind copilot
   4. One on forward cargo door panel.

F. These utility lights are controlled by a rheostat located on The light itself.
2. Floor hatch, the left or right passenger doors, the cargo door or the ramp doors are not closed and locked.

B. The alarm bell is located on the right side of the fuselage, forward of the center wing section. The switch for the alarm bell is located on the delivery control panel on A/C serial 66-9722 and subsequent on A/C serial 60-3763 through 839721 the switch is located on the circuit breaker panel.

C. Troop Jump Lights:

1. The troop jump lights are located on the aft frame of each passenger door. These is a red caution and a green jump light at each position.

2. There are two switches to control these lights located on the troop jump panel below the fuel control panel in front of the pilot.

3. One switch is for on or off, the other switch controls the red or green light.

4. There is a push to test indicator light one of each color located beside the switches. To indicate to the pilot which light is burning.