



8. POWER SUPPLIES

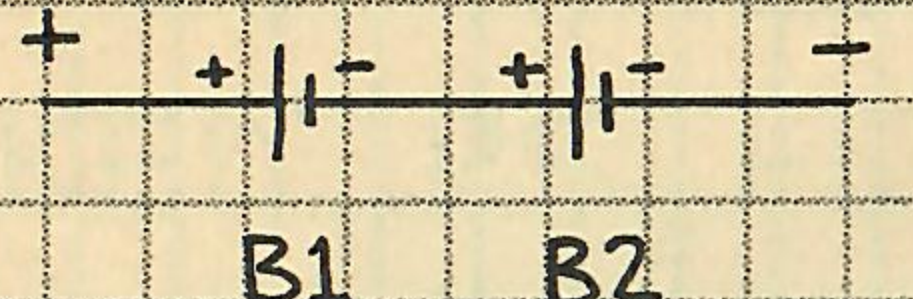
BATTERIES

SYMBOLS

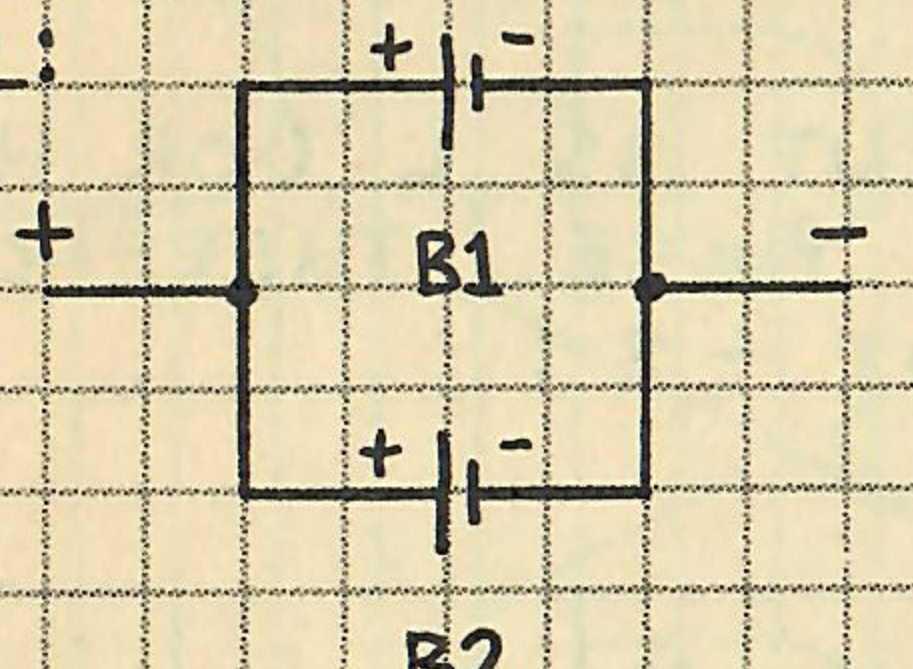
SINGLE CELL:  MULTIPLE CELL: 

CONNECTIONS

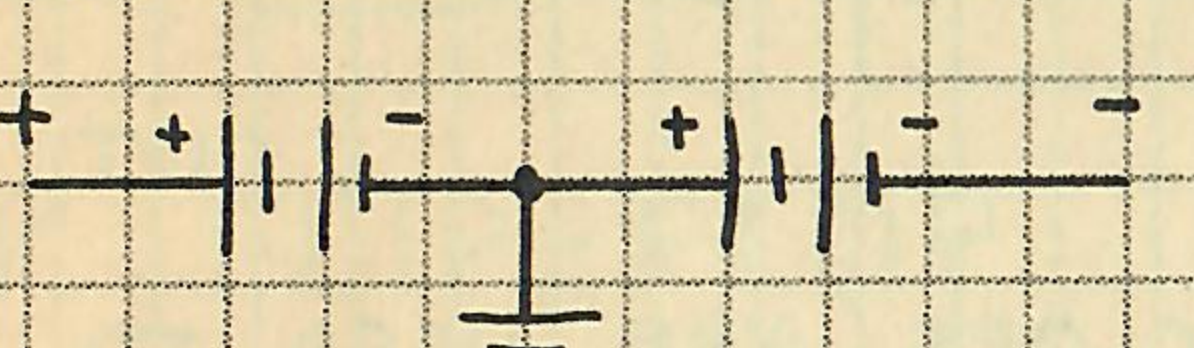
SERIES:

 TOTAL VOLTAGE IS SUM OF EACH CELL VOLTAGE.

PARALLEL:

 TOTAL CURRENT CAPACITY IS SUM OF EACH CELL CAPACITY. CELLS SHOULD HAVE EQUAL CAPACITY.

BIPOLAR:

 USE TO POWER OPERATIONAL AMPLIFIERS.

STORAGE BATTERIES

STORAGE BATTERIES CAN BE USED AND RECHARGED MANY TIMES. PRINCIPLE TYPES:

LEAD-ACID — 2.0 VOLTS PER CELL. HIGH CURRENT CAPACITY. GOOD AT LOW TEMPERATURE.

NICKEL-CADMIUM (NICAD) — 1.2 VOLTS PER CELL. CAN BE STORED FOR EXTENDED TIME WHEN DISCHARGED. MANY DIFFERENT KINDS AVAILABLE. VERY ECONOMICAL POWER SOURCE.

PRIMARY BATTERIES

PRIMARY BATTERIES ARE NOT RECHARGEABLE. CHIEF AMONG THE MANY TYPES AVAILABLE:

CARBON-ZINC — 1.5 VOLTS PER CELL. READILY AVAILABLE AND LOW COST.

ZINC-CHLORIDE — 1.5 VOLTS PER CELL. TWICE THE ENERGY DENSITY OF CARBON-ZINC.

ALKALINE — 1.5 VOLTS PER CELL. USE FOR HIGH CURRENT LOADS (MOTORS, LAMPS, ETC.).

MERCURY — 1.35 AND 1.4 VOLTS PER CELL. UNIFORM VOLTAGE DURING DISCHARGE.

SILVER OXIDE — 1.5 VOLTS PER CELL. NEARLY UNIFORM VOLTAGE DURING DISCHARGE.

LITHIUM MANGANESE — 3.0 VOLTS PER CELL. EXCEPTIONALLY LONG STORAGE LIFE. VERY HIGH ENERGY DENSITY.

BATTERY PRECAUTIONS

1. DO NOT CHARGE PRIMARY CELLS.
2. BATTERIES MAY EXPLODE WHEN HEATED.
3. DO NOT SOLDER LEADS TO A BATTERY. USE A BATTERY CLIP OR HOLDER.
4. NEVER SHORT CIRCUIT A BATTERY'S TERMINALS.
5. MOST BATTERIES SHOULD BE REMOVED FROM EQUIPMENT IN STORAGE. EXCEPTIONS ARE STORAGE BATTERIES AND LITHIUM CELLS.
6. WHEN BATTERY LEADS EXCEED ≈ 6 INCHES, CONNECT $0.1 \mu\text{F}$ CAPACITOR ACROSS LEADS AT CIRCUIT BOARD.