FLOW DIAGRAM OF FIVE DIFFERENT TYPES OF INVERTER SYSTEMS

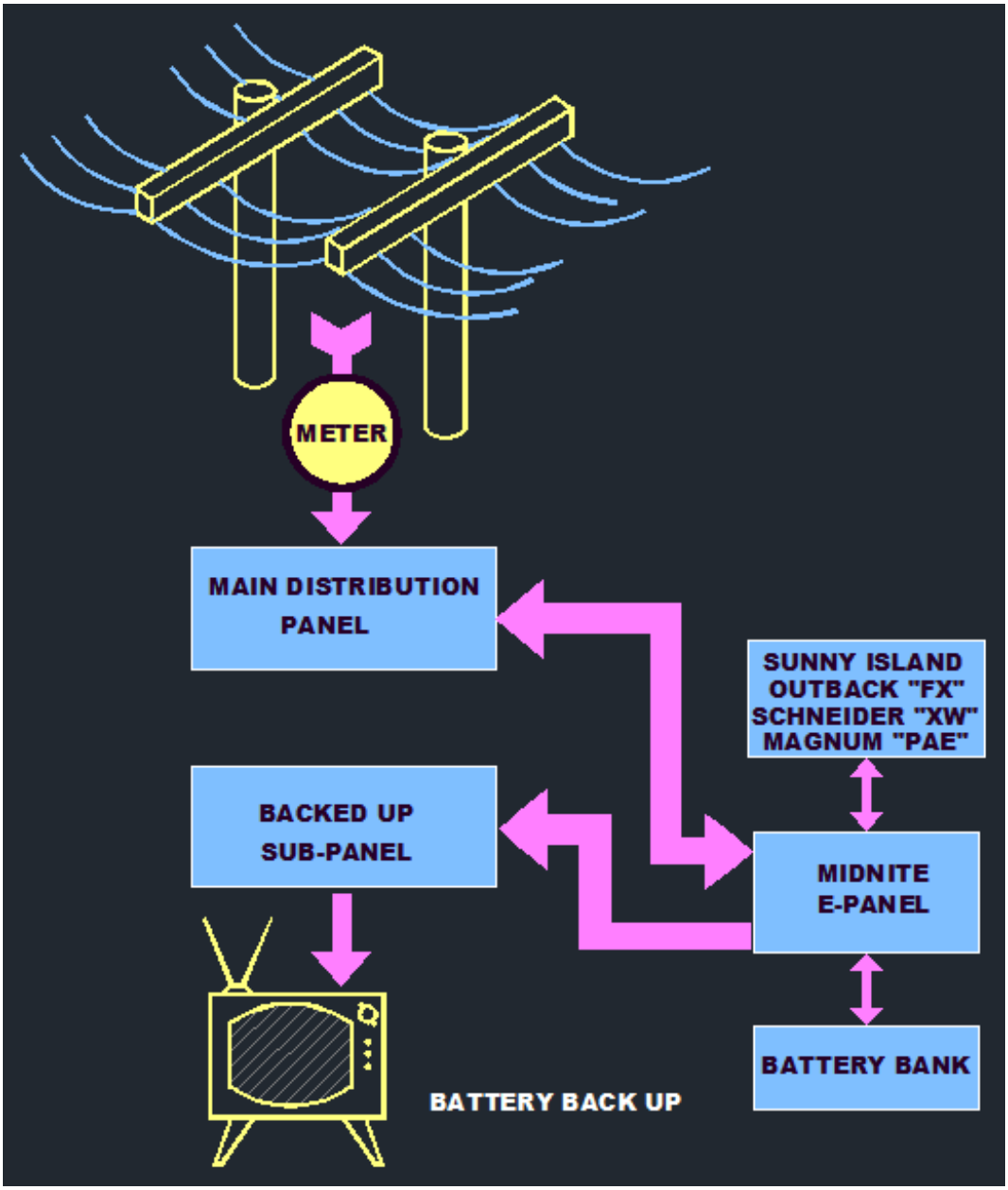

FIGURE 1

Battery back up with no solar. This is the most basic system useful for occasional grid failures. The batteries are kept at full charge at all times from the grid. This system uses a sub-panel to power critical loads during a black out. A generator can also be installed with a transfer switch to recharge batteries and run the critical loads. This system does not require a grid tie inverter. This system does not require an agreement with the utility company because it cannot sell back to the grid. It is incapable of selling back to the grid when installed properly.

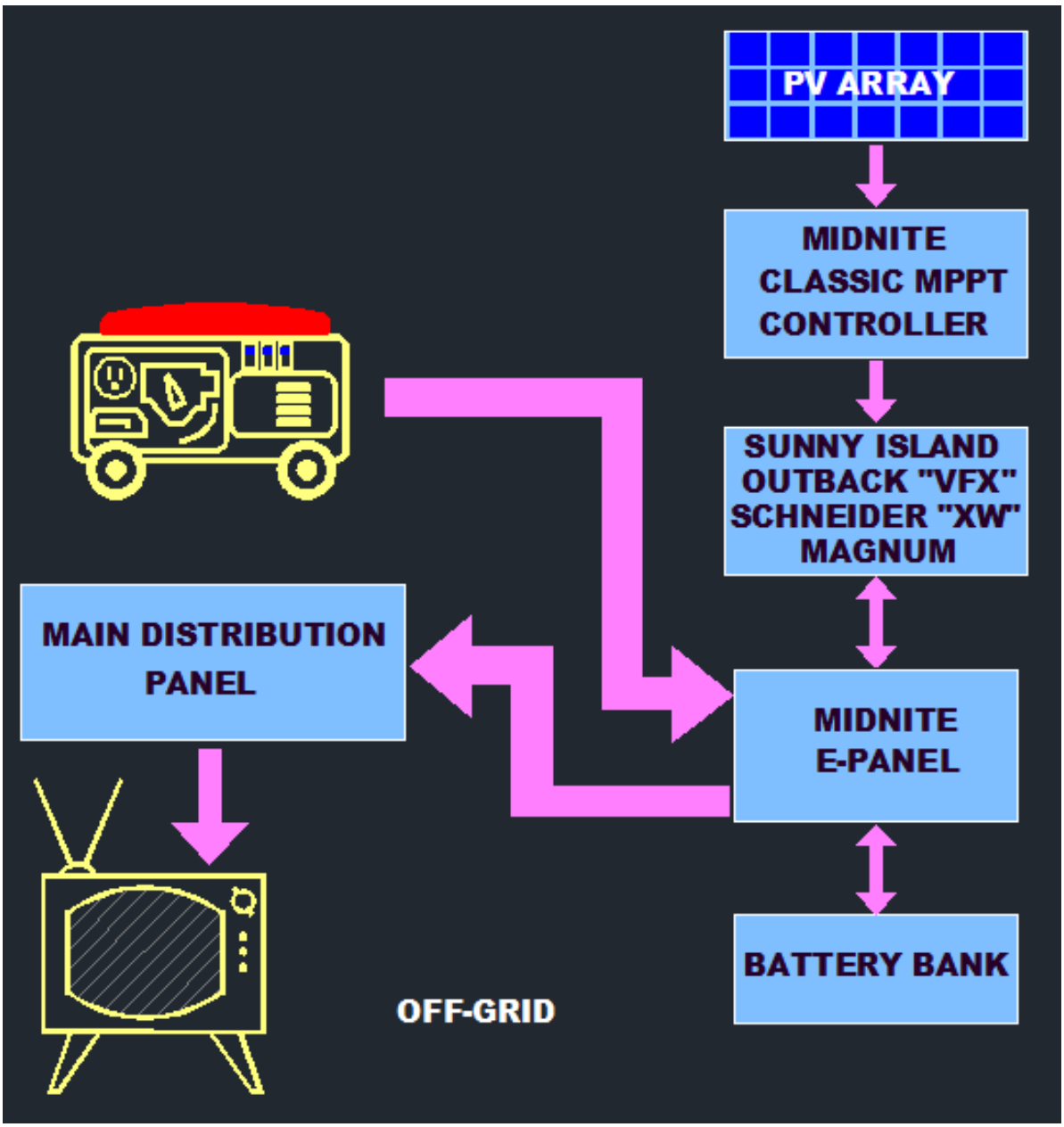

FIGURE 2

This is a basic off-grid system. This does not require a grid tie inverter. It cannot sell back to the grid, as there is no grid. This system has an inverter/charger so it can re-charge batteries from a generator. The primary charging source here is solar. The solar requires a solar charge controller such as the MidNite classic. This system can also have wind and hydro as a charging source, but they would each require their own controller.

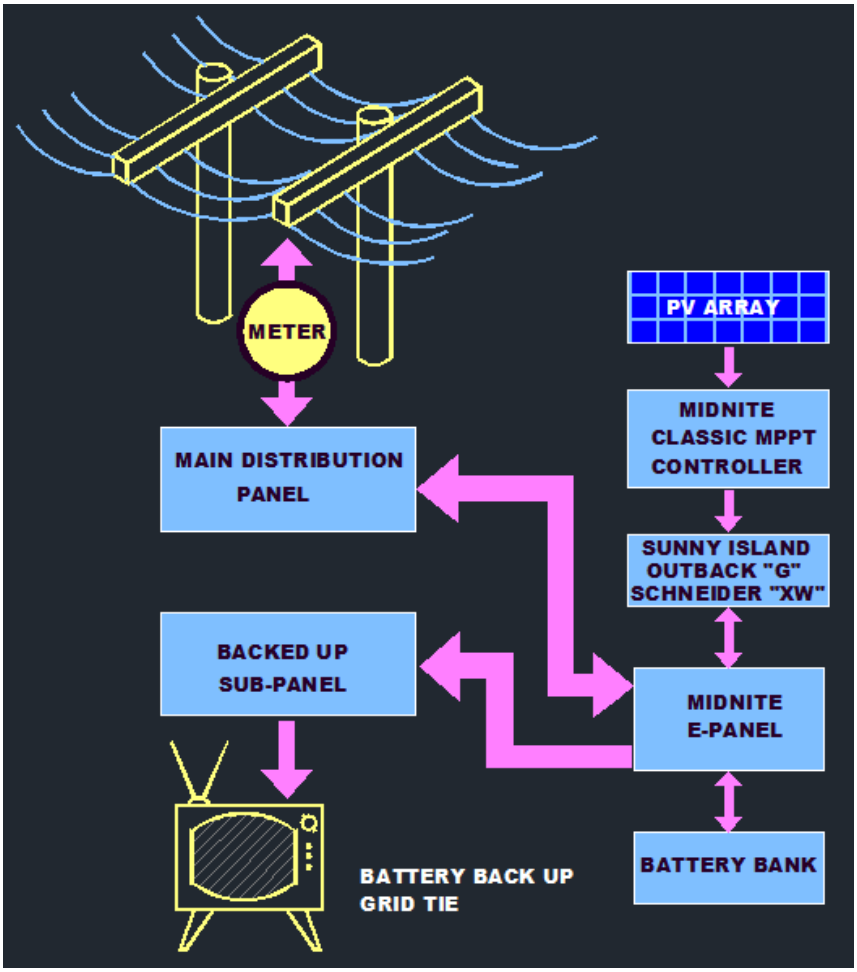

FIGURE 3

This system is very much like an off-grid system with a few important differences.

This system has a utility connection and that is the primary source of power. This system has a battery based grid tie inverter and solar panels. When the sun is shining, the solar panels try to push the voltage of the batteries up. The grid tie inverter is programmed to only allow the batteries to go to a pre-set voltage, so all excess power is sent out the ac input terminals and off to the utility. This makes the utility meter spin backwards. The MPPT solar charge controller does two functions here. It greatly improves the output of the solar array over a PWM controller and it is the fail safe in case the grid goes down. You still need a regulator to protect the batteries from over charge in case the utility goes down. You can add a generator to this system to extend the time where you have power during an outage. Some battery based grid tie inverters will not charge batteries from a generator, but they will all keep the lights on for the critical loads panel during an outage regardless if they can charge or not. You can also have wind and hydro to charge the batteries in a system like this, but each charging source does require its own charge controller.

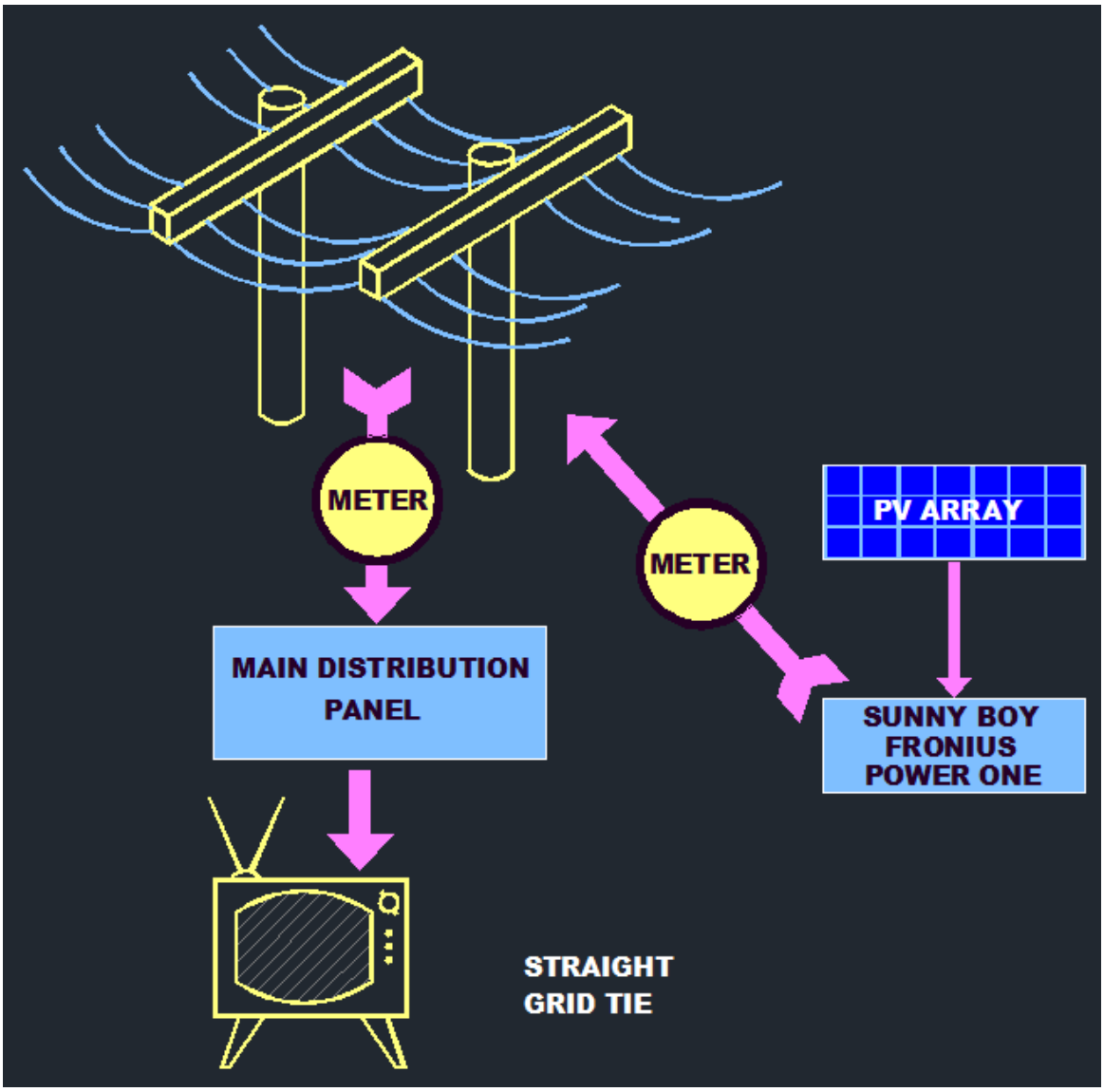

FIGURE 4

Straight grid tie (grid tie). This is the most popular type of solar system. When the sun shines, the grid tie inverter sends power to the utility. Most of these systems will have a separate utility meter so they can tell how much power you are buying vs. selling. This system has no batteries. This system will shut down during a power outage and cannot by law produce any power. The lights in the house will be out during an outage.

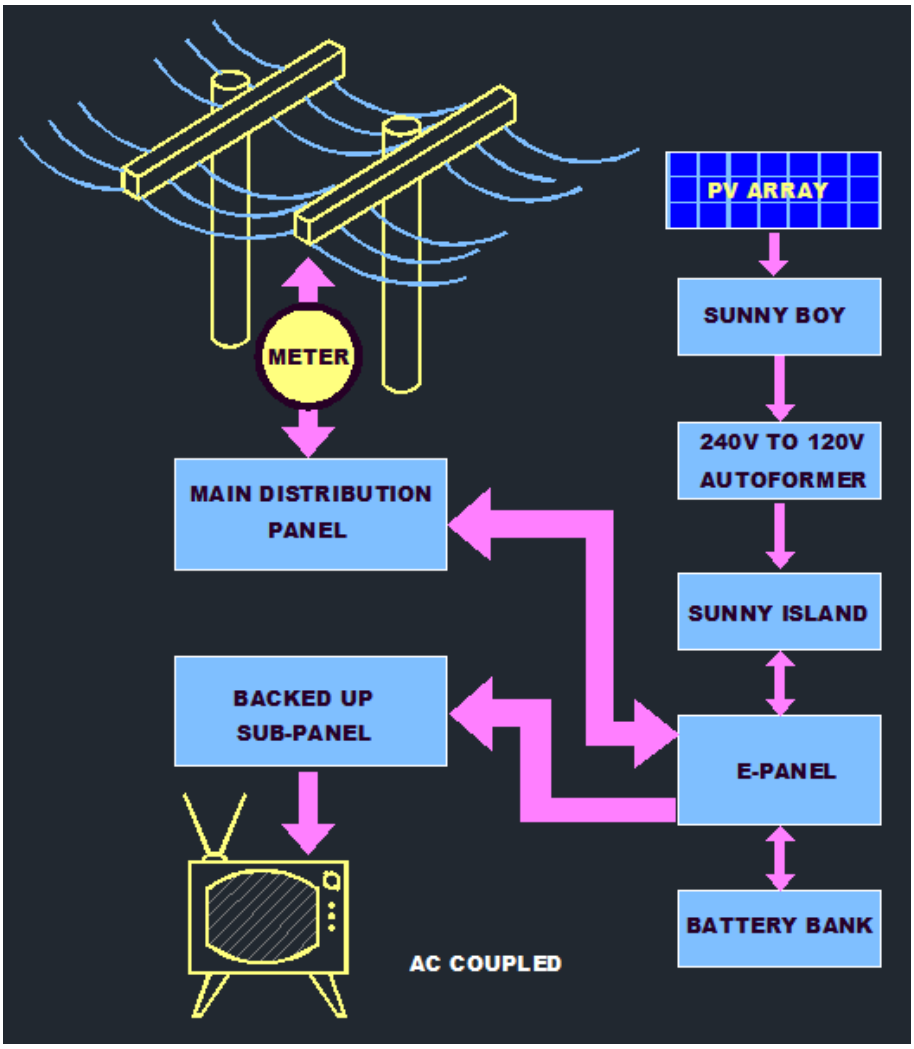

FIGURE 5

This is for those people that bought the straight grid tie system and were shocked to find out the lights went out during a power outage. This system shows SMA equipment, but it can use any straight grid tie inverter. The battery based (non-grid tie) inverter works backwards as the battery charger and passes the power to the utility from the grid tie inverter. When the utility power goes down, the battery based inverter disconnects from the grid and starts powering the backed up critical loads panel. A generator can be added to this system with a transfer switch. The grid tie inverter could be getting power from solar, wind or hydro. The battery based inverter doesn't care where the power comes from, but it must be capable of backfeed operation. OutBack, Magnum, Schneider XW and SMA battery based inverters are the prime choice for the battery based component. The SMA Sunny Boy/Sunny Island combination is the best system because it was designed for AC coupling. All the other battery based inverters and grid tie inverters have short comings that either cause extra parts to be installed or have battery charging issues. They can all work just fine though.