### The 1105—A Portable Wall Socket

Think of the 1105 as a portable wall socket that allows you to carry power to your measurement location. Now, any oscilloscope that draws less than 120 watts can become a portable. This includes the TEKTRONIX 453A and 454A. But don't limit its use to powering oscilloscopes. It can be used to power any instrument or combination of instruments that draws less than 120 watts and will operate on 60-Hertz squarewave voltages. The major items that cannot be operated from the 1105 are induction motors such as electric drills, which induce distortions back into the output of the 1105 power unit. This prevents it from operating correctly, or in extreme cases, damages the 1105. There are also some electronic instruments which cannot operate correctly on the squarewave output of the 1105. Among these are instruments which need a very accurate line frequency or waveshape for correct operation.

The 1105 offers an economy in battery operation if you have a variety of instruments which only occasionally need to be operated from batteries. Many laboratory instruments never intended for use away from the AC power line become "portable" when used with the free-standing 1105.

Since the 1105 is intended for remote applications, it is built rugged to withstand the use and abuse associated with portability. It has two built-in power sockets to power any two instruments whose total power consumption does not exceed 120 watts. These sockets match the sockets commonly in use; N.E.C. (duplex) sockets for U.S. models and I.E.C. sockets for European models.

### The 1106—Take It, Or Leave It

While the 1106 provides portable power in much the same way as the 1105, it is designed in quite a different configuration. This power system is made specifically for the TEKTRONIX 465 and 475 Oscilloscopes. The 465 or 475 must be equipped with Option 7, which adds a DC-to-AC inverter board inside the instrument. With this option installed, the 465 or 475 can operate from external DC sources (11.5 to 14 volts and 22 to 28 volts) as well as from the AC line.

With the addition of the 1106 battery supply, completely self-contained operation is achieved. The 1106 contains the rechargeable batteries and the battery charger circuit. It attaches to the bottom of the 465 or 475 cabinet and supplies power to the instrument through a plug-in power cord.

Designing the 1106 as a unit separate from the oscilloscope provides several advantages. Most important, you need to carry the battery pack only when AC power will not be available—it can be added or removed in a matter of seconds. This quick removal is also an advantage if you must carry the oscilloscope/battery pack system for any distance. The 1106 has its own handle so you can remove it and carry a unit in each hand for a well-balanced load (see Fig. 1).

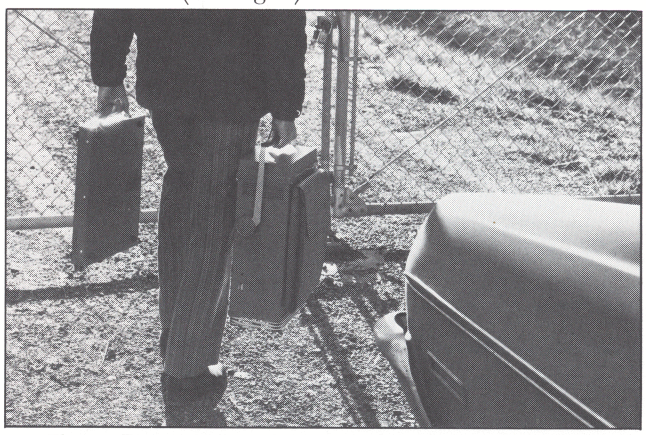

**Fig. 1.** *The 1106 can be separated from the oscilloscope for an easy-to-carry load.*

For continuous operation from batteries, two 1106 battery units can be easily interchanged. Since the battery charger is contained in the 1106 itself, the batteries can be recharged in one unit while the instrument is operated from the second unit. Interchangeability also allows you to use one battery pack to operate any of several 465s or 475s, as long as each instrument has Option 7 installed.

Another advantage already discussed is that the original design of the 465 and 475 was not compromised to build in battery operation. As a result, these instruments offer the best of two worlds—maximum instrument performance at a low price and fully portable battery operation.

### A Look Beneath The Surface

While the 1105 and 1106 have quite a different outward appearance, they share many common features inside the cabinets. Both are powered by 20 type "F" nickel-cadmium cells. The battery circuits include a calibrated meter which indicates the amount of charge left.

Another feature of both instruments is a deep-discharge protection circuit (Fig 2) which shuts off the instrument when the batteries drop to a level where damage could occur by further discharge. This circuit senses the input voltage (battery level) and if it falls below about 22 volts, Schmitt trigger Q1-Q2 changes state so that Q2 is conducting. This turns on Q3 to forward bias diodes D1 and D2, by-passing the primary winding of the feedback transformer. This prevents feedback to inverter transistors Q4-Q5, shutting them down. They remain off, producing no output drive for this supply until the input voltage level rises above the turn-off level (i.e., batteries recharged).

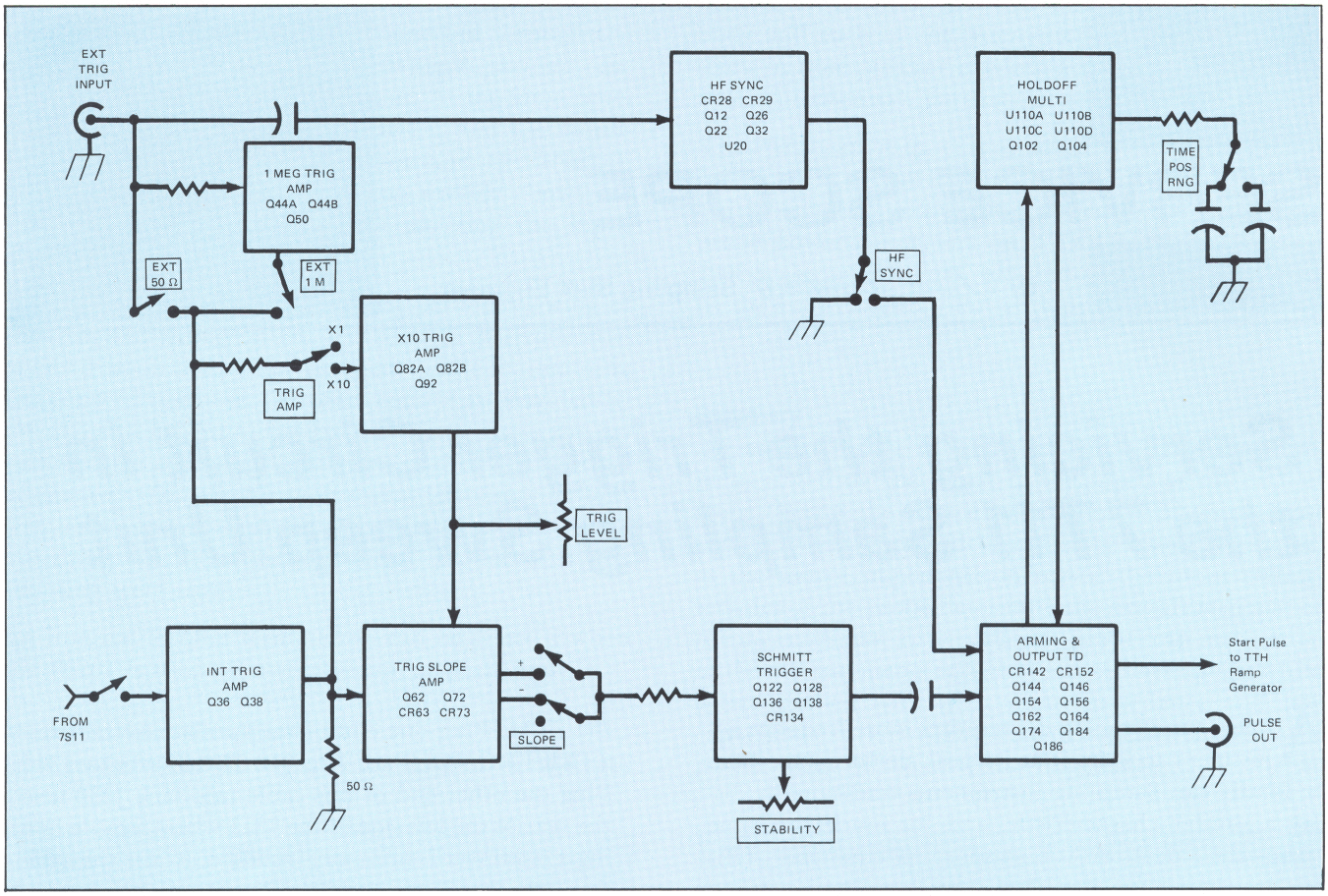


***Fig. 1.*** *Block diagram of the 7T11 Trigger Circuit.*

The instruments are now set up to check the trigger circuits for proper operation. This setup also prepares the 7T11 for the adjustment procedure.

## Trigger Checkout

In any mode of triggering except HF SYNC, it should be possible to control whether the sweep runs or not with the front panel STABILITY and TRIG LEVEL controls. In the HF SYNC mode, the sweep should run with any setting of these controls. Push the 50Ω EXT button and set the STABILITY fully clockwise. Set the TRIG LEVEL to approximately midrange and check for a free-running sweep. You should be able to start and stop the sweep by changing the setting of the TRIG LEVEL control. If a free-running sweep cannot be obtained, check for a pulse approximately 10 volts in amplitude at the 7T11 PULSE OUT jack using a test scope and 10X probe. If the pulse is present, it means that the triggers are functioning and there is a problem in some other section of the instrument. If no pulse is present, press the HF SYNC button and recheck the PULSE OUT. This bypasses much of the trigger input circuitry and Schmitt Trig Regenerator (see Fig. 1).

If a pulse is not present even with the HF SYNC button pressed, the trouble may be in the HF SYNC block, HOLD-OFF MULTI, or the output TD's. If there is a pulse present in the HF SYNC mode but not in EXT 50Ω mode, the Schmitt Trigger circuit is not functioning properly. Before troubleshooting the Schmitt, it's a good idea to push both + and − SLOPE buttons and X10 TRIG AMP button and recheck operation. A problem in either the Trig Slope Amp or X10 Trig Amp can hold the Schmitt in one state which will produce no output. Output from the Schmitt is dependent upon the switching action, not whether it's in its high or low state.

The Schmitt Trigger is a regenerative type of circuit. An output is delivered from the Schmitt when tunnel diode CR134 changes to its high-voltage state. The amount of current needed at the Schmitt input to cause CR134 to fire is determined by the front-panel STABILITY control and Stability Zero adjust R135. Input current is delivered to the emitter of Q122 from the Trig Slope Amp.

Trig Level Zero adjust R120 balances the Slope Amp so that the same current will be delivered when either