



FIGURE 3. Low Cost Hand Held Programmable Financial Computer using the MM5762 Calculator and MM5765 Programmer

KEYBOARD BOUNCE AND NOISE REJECTION

The MM5762 is designed to interface with most low cost keyboards, which are often the least desirable from a false or multiple entry standpoint.

A key closure is sensed by the calculator chip when one of the key inputs, K1, K2, K3 or K4 are forced more positive than the Logical High Level specified in the electrical specifications. An internal counter is started as a result of the closure. The key operation begins after nine word times if the key input is still at a Logical High Level. As long as the key is held down (and the key input remains high) no further entry is allowed. When the key input changes to a Logical Low Level, the internal counter starts a sixteen word time-out for key release. During both entry and release time-outs the key inputs are sampled approximately every other word time for valid levels. If they are found invalid, the counter is reset and the calculator assumes the last valid key input state.

One of the popular types of low-cost keyboards available, the elastomeric conductor type, has a key pressure versus contact resistance characteristics that can generate continuous noise during "teasing" or low pressure key depressions. The MM5762 defines a series contact resistance up to 50 k Ω as a valid key closure, assuring a reliable interface for that type of keyboard.

AUTOMATIC DISPLAY CUTOFF

If no key is depressed for approximately thirty-five seconds, an internal automatic display cutoff circuit will blank all segments and display nine decimal points. Any key depression will restore the display; to restore the display without modifying the status of the calculator, use two Change Sign key depressions.

READY SIGNAL OPERATION

The Ready signal indicates calculator status. When the calculator is in an "idle" state the output is at a Logical High Level (near V_{SS}). When a key is closed, the internal key entry timer is started. Ready remains high until the time-out is completed and the key entry is accepted as valid, then goes low as indicated in *Figures 4 and 5*. It remains at a Logical Low Level until the function initiated by the key is completed and the key is released. The low to high transition indicates the calculator has returned to an idle state and a new key can be entered.

ERROR INDICATION

In the event of an operating error, the MM5762 will display all zeros and all decimal points. The error indication occurs if division by zero is attempted or either a result or intermediate value exceeds 99999999.