6345
Memorandum M-1108

Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: SPECIAL DISPLAY

To: Wieser, Taylor, Rich, Daggett, Gould, O'Brien, Mayer, Adams, Israel, Kirshner

From: D. A. Buck

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Special display is controlled by three WWI orders: QH, QD, and QF. With these three orders, the computer is able to display patterns of points on three output oscilloscopes, two of which are remotely located for better viewing and the third of which is mounted in test control as a monitor scope.

Order QH sets the horizontal deflection of all three scopes to a voltage which is proportional to the numerical value of digits zero through seven of the accumulator. The conversion from an eight-digit number to a proportional voltage is done by the horizontal decoder. This voltage is held by the horizontal decoder, and thus maintained on the horizontal deflection plates of the three scopes, until the next QH order comes along. On time pulse seven of each QH order the horizontal decoder is cleared, and on time pulse one the new eight-digit number is read in.

Both QD and QF set the vertical deflection of the three scopes to a voltage which is proportional to the numerical value of digits zero through seven of the accumulator. The conversion from an eight-digit number to a proportional voltage is done by the vertical decoder. This voltage is held by the vertical decoder for about eighty microseconds and then dropped.

During the eighty microseconds, one of the two remotely located scopes is intensified at the coordinates determined by the two decoders. Order QD intensifies the D scope and order QF intensifies the F scope. The monitor scope in test control, called the M scope, can be intensified when the D scope is intensified, when the F scope is intensified, or when either is intensified. Selection is by means of a manual switch.

The display consumes a large amount of time compared with the time taken by the computer to execute an order, so it was decided to allow the computer to operate during the intensification of the scopes. Only when a second display order comes along while the first display order is still being executed does the computer stop. The IOC interlock is used to accomplish this, as shown in SC-36146. The interlock is set

whenever a QD or a QF order comes along, and is cleared about two-hundred microseconds later, when the display has finished and the vertical decoder has had time to clear itself in preparation for the next order. This delay is achieved by counting 62.5 kc pulses in a low-speed 2^6 counter. If, during this delay, a QH, QD, or QF order comes along, the computer clock is stopped and the interlock is cleared. The end-carry from the delay counter, then, starts the clock once more, and the order which stopped the clock is executed.

Restoration continues during intensification, and because the horizontal decoder employes ac-coupled flip-flops, the restorer interval must be blanked out of the intensification gate, otherwise a horizontal streak will appear on the scope face as the horizontal decoder is complimented by the restorers. The blanking is accomplished by gate tubes in the intensification gate generator unit which are gated on and off by an ac-coupled register panel. This register panel is set by the start delay pulse and is cleared by the restorer-pulse generator end-carry.
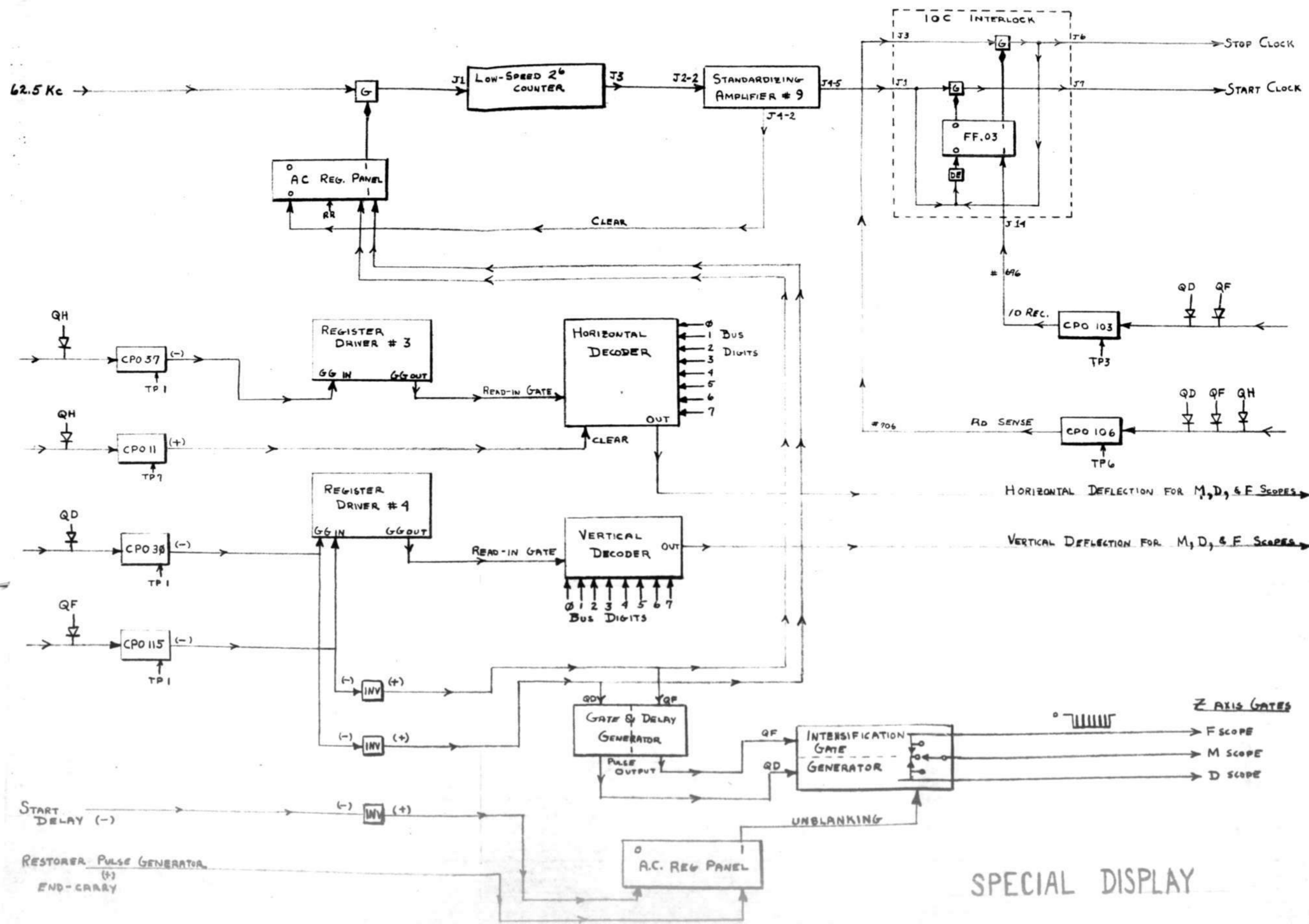
The intensification gates are generated by phantastrons in the intensification gate generator unit. The length of the gate is continuously variable from zero to 165 microseconds. Included in this unit are drivers for the Z-axis intensification lines out to the three scopes and provision for mixing the intensification gates to the D and F scopes for the K scope.

Signed. D. A. Buck
D. A. Buck

Approved. C. R. Wieser
C. R. Wieser

DAB:ap

Drawing Attached:
SC-36146

SPECIAL DISPLAY