Instrumentation Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

Digital Dev. Memo #363

To: Eldon Hall
From: Allen Harano
Date: 4 May 1967
Subj: RESTART Indications When Coming Out of STANDBY and During Power Turn-On

Several questions have arisen as to the correct state of the RESTART caution lamp on the DSKY when coming out of STANDBY into OPERATE, or following power (28V) turn-on; and the state of the AGC following power turn-on.

The Standby circuitry will be discussed first since it plays a part in all three questions. Assume the AGC is in the OPERATE mode and that the Standby Enable bit (CH13-11) is set. The STBY button on the DSKY is depressed and held in causing signal SBYBUT (A18-165) to be a logical ONE. This signal is digitally filtered, via gates 45142 through 45147, so that SBYBUT must be present for at least 640 ms before the STNDBY flip-flop (gates 45154 and 45155) is set. Setting of the SINDBY flip-flop causes: 1) 4 and 14 volt switched power to be turned off, 2) GOJAM, 3) sets the SBYEXT flip-flop (gates 41234 and 41235 on A13), 4) enables VFAIL to cause AGC WARNING, 5) lights STBY light on DSKY, 6) causes STRT2 due to loss of switched power. The SBYEXT flip-flop resets the RESTART flip-flop (gates 41237 and 41238 on A13) which controls the RESTART lamp on the DSKY (the RESTART lamp is OFF when in STANDBY).

The STBY button is released and, again, depressed to bring the computer out of STANDBY into OPERATE. Again after at least 640 ms delay, the STNDBY flip-flop is reset, restoring 4 and 14 volt switched power. STRT2, however, is still present, causing a GOJAM because of delay built into the detector. Eventually STRT2 goes to ZERO, and likewise GOJAM goes to ZERO, allowing the computer to begin instruction execution. It should be noted that GOJAM disappears so that no signal is setting the RESTRT flip-flop, yet SBYEXT is still present until at least 10 μsec after GOJAM goes to ZERO, since SBYEXT is reset by T10, therefore the RESTART lamp remains OFF (see Fig.1).

Should a RESTART occur after SBYEXT is reset the RESTART lamp will illuminate. A study of the AGC alarm circuitry (module A13) will show that if an interrupt is <u>not</u> processed sometime during the 130 ms immediately preceeding each F14H a Rupt Lock alarm will occur, causing a RESTART. Also if at least one TC or TCF instruction is <u>not</u> performed during the 5 ms immediately preceeding each F10A a TC Trap Alarm will occur, also causing a RESTART. With the 14 volt supply at nominal and at room temperature, the delay in the turn-off of STRT2 is specified as 260 ± 75 ms -- which means, assuming switching time of the 4 and 14 volt relays is negligible, STRT2 will disappear somewhere between 185 ms and 335 ms after coming out of Standby. Interrupts are inhibited for approximately 5 ms in the Restart Routine, which means if STRT2 disappears 215-220 ms after STINDBY is reset a Rupt Lock Alarm will be generated causing the RESTART lamp to illuminate (see Fig. 2). Also if STRT2 disappears within 120 μs just preceeding F10A a TC Trap Alarm will occur. (Note that many TC Traps, and possibly 2 Rupt Lock Alarms, will occur during the time that STRT2 is present but these will not illuminate the RESTART lamp since SBYEXT is still set.)

If the RESTART lamp illuminates immediately after coming out of STANDBY it is probably due to either a Rupt Lock or TC Trap alarm, and not a parity fail.

The answer to the second question -- the state of the AGC following power turn-on -- is determined by the state of the STNDBY flip-flop when the 4 volt supply rises to its nominal output. The "true" side of the STNDBY flip-flop is connected to a 6.8 μf capacitor in A26 forcing the flip-flop to its "reset" state during power-on, therefore the AGC will be in the OPERATE mode. (Prototype AGC's may come up in either mode since changes in the Standby circuitry were made effective "C" series AGC's.)

The last question -- the state of the RESTART lamp following power-on -- depends on the state of the SBYEXT flip-flop. Signal STRT2 will be present for, nominally, 250 ms after the oscillator starts, setting the RESTRT flip-flop. If the SBYEXT flip-flop comes up in the "set" state the RESTART lamp may or may not illuminate since this is now identical to coming out of STANDBY. If the SBYEXT flip-flop comes up in the "reset" state the RESTART lamp will illuminate since STRT2 is present. The state of the SBYEXT flip-flop following power-on depends solely on the characteristics of the individual gates involved in the AGC.

Dist.

E.C. Hall
A. Hopkins
R. Alonso
H. Thaler
A. Harano
A. Laats
R. Lones
R. Sheridan
J.E. Miller
J. Conners - AC
R. Werner
E. Zagrodnick - Ray
MIT/CAEC
MIT/KSC
MIT/MSC
MIT/NAA

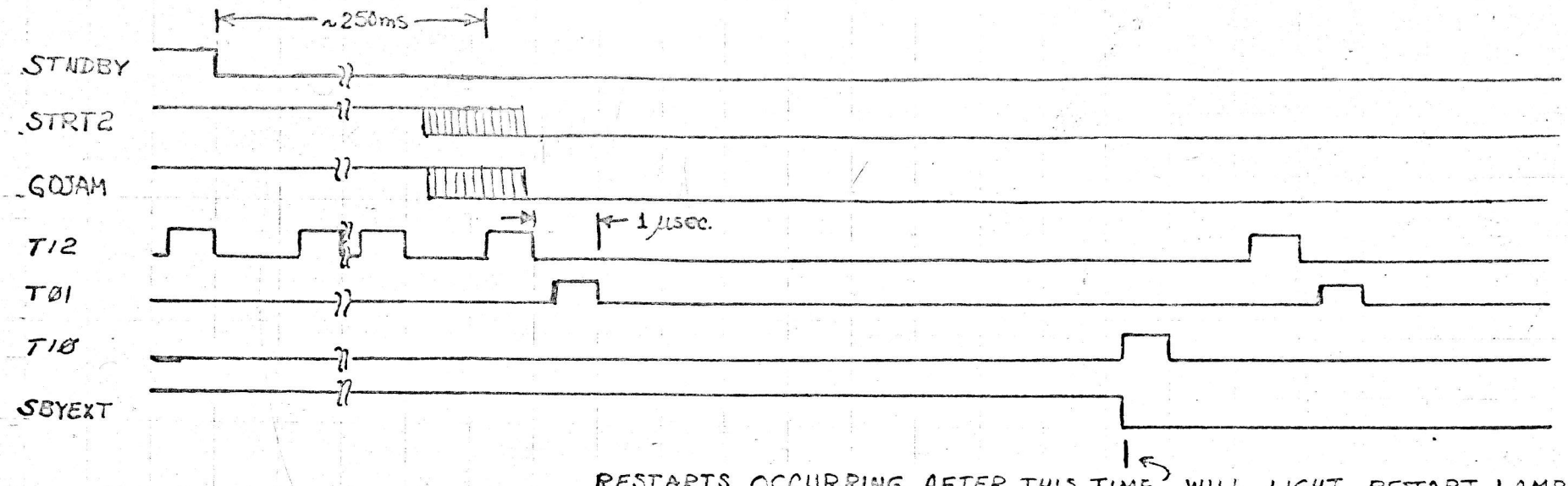


FIG. 1 SBYEXT TIMING

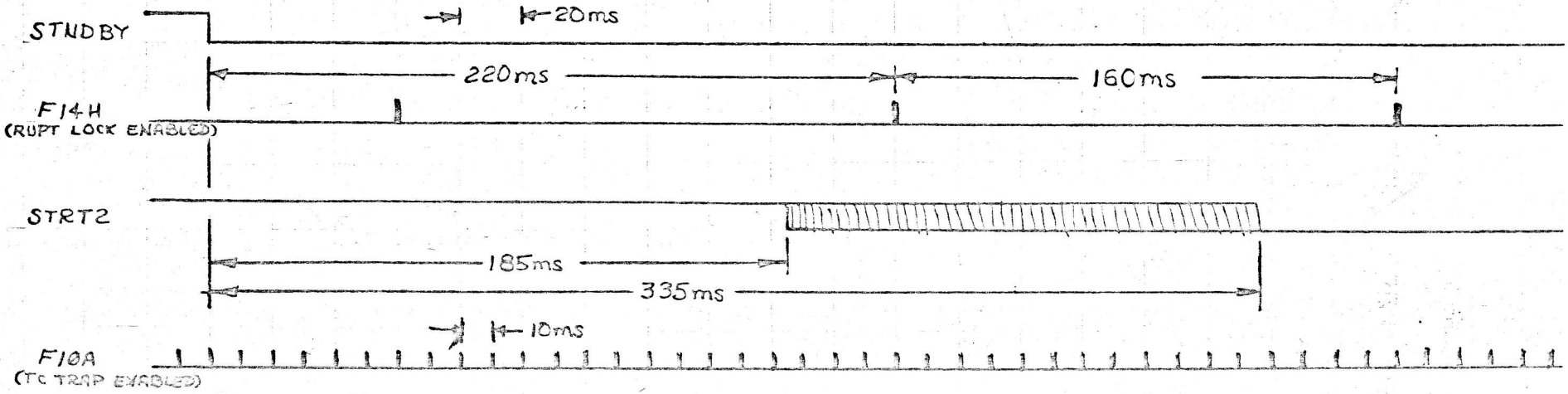


FIG. 2 ALARM TIMING