1. An alarm is given if the computer takes more than a maximum time to clear out the previous order or to read in and carry out the current order. If this maximum time is exceeded the computer either gives an audible alarm, shuts down, or remembers that it has forfeited one of its three "lives" and returns to the beginning of the problem. During a search the alarm condition is modified so that a space code must be encountered during the time limit, and, further, no space code may persist for longer than a delay determined by a thermal relay.

2. When the start key is operated QAA operates and holds to earth from JSA 25.24 - QAD 2.1, etc. - QAA 2.3 - QAA ab. QAA 25.26 initiates the generation of the initial orders, see C 47594. The operation of QAA signifies that the computer has started its first life.

3. With OR released earth from OR 28.27 - BSA 25.24 - JPA and JPB 22.21 - JRD de operates JRD. The clock in the mains distribution unit produces a short pulse every half minute which is repeated by relay JP. If the single step, single order and No Alarm keys are not operated earth from K1S 31 via JRD 2.3 is extended by JP 2.3 at the first clock pulse to operate JPA. When JP 2.3 breaks JPB operates in series with JPA. JRD 22.23 provides a holding circuit for JRD.

   The next time pulse would then be routed over JPB 2.3 to signal an alarm condition. Under normal conditions OR will operate in less than half a minute. When OR 28.27 operates JRD is energised with both windings in series opposing and, as winding ab has approximately twice as many turns as winding de, JRD releases. JRD 2.3 releases JPA and JPB. JPA and JPB 22.21 normal allow JRD to re-operate with reversed flux. If this condition, with OR operated, persists while two clock pulses are received an alarm signal is given as before. In general OR will release before this happens and earth from OR 28.27 shorts circuits winding JRD ab. Winding JRD de tends to reverse the energisation and JRD releases. JRD 2.3 releases JPA and JPB. JPA and JPB 22.21 allow JRD to re-operate with the original polarity. JRD therefore performs the function of restoring the alarm counting circuit (JPA and JPB) to zero every time OR operates or releases.

4. During a search OR is normal and BSA 24.25.26 diverts
   the operating circuit for JRD over BTH 24.22 and
   BSP 21.22. Each space code read from the tape
   operates BSP and restores the counting circuit to
   zero. If a space code were marked in continuously
   from the tape reader, e.g. if the tape reader drive
   magnet was not impulsed, the continuous operation
   of BSP would create an alarm signal either by allow-
   ing JRD to remain operated while two clock pulses
   were received, or by allowing BTH, a thermal relay,
   to operate. A more common failure is for the tape
   to become torn or tangled and then if the tape is
   standing at a space row BSP pulses but the thermal
   relay integrates a number of pulses and operates.

5. An alarm earth from JS 24 or BTH 25 is routed by QAA
   21.23 to the delayed alarm keys KAD and KDA. If
   neither is operated there is a circuit to operate
   JAL. Similarly if JPA and JPB detect an alarm con-
   dition due to an unacknowledged "signal" order or
   "finish" order JS 25.26 routes the alarm earth
   directly to JAL. JAL 2.3 provides a hold circuit
   until the alarm is acknowledged by operating the
   No Alarm key. If either delayed alarm key is oper-
   ated the alarm earth from QAA 23 is routed to oper-
   ate JRP. The same earth energises QAB ab and QAA de.
   JPR holds over JP 22.23 - JRP 25.26 for the duration
   of the time pulse.

   Contacts JRP 2.3 earth the "order completed" line so
   that the current order is abandoned, and JRP 22.23
   initiates the regeneration of the initial orders
   (see C 47594). Contacts JRP 5.6 cancel any shift
   order which may have been stored in W relay set
   (see C 47585).

6. When three "lives" have been lost in this way QAD is
   operated and any further failure results in JAL
   being operated.

   If any lives have been lost and a "finish" order is
   marked out JSA 24.25.26 operates. JSA 25.24 breaks
   the hold circuit of the QAA - QAD relays and JSA 25.26
   re-operates QAA. QAA is made slow to release to
   cover the transit time of the JSA contacts. A finish
   signal therefore restores to the computer its full
   number of lives.

7. When JAL operates JAL 24.25 (see C 47593) interrupts the
   "step on" line and prevents the computer carrying on
   if the fault clears, so some indication of the fault
   is retained for inspection. JAL 4.5 lights the alarm
   lamp on the operator's control panel and, if the
   buzzer cut off key is normal, sounds the alarm buzzer.
   JAL 8.9 controls the alarm lamp and buzzer on the
   equipment racks and also, if the "Auto Shut Down"
   switch is operated, energises the Shut Down relay in
   the mains distribution unit to trip the mains relay.