SUBJECT: WHIRLWIND I ALARMS

To: S&EC Group, Group 61 and Systems Group

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Abstract: The possible causes of WWI alarms due to programming errors and the interpretation of the final contents of pertinent registers are presented in this memorandum.

Introduction

Six types of alarms are generated by the improper use of the WWI instruction code. The alarms described in this memorandum are the arithmetic check, divide, check register, program, parity and inactivity alarms. The attached table (SB-57592) shows how the improper use of the WWI instruction code will produce an arithmetic check, divide error, or check register alarm. This table should be of assistance to the programmer in determining the cause of the alarm and to the computer operator in recording significant register contents at the time of the alarm.

Emphasis has been placed on the Arithmetic Check Alarm (overflow) because any one of nine WWI instructions used improperly will result in this alarm. Each of the other alarms can be caused by the improper use of only one instruction.

Program Alarm

Should the Ferranti reader or Magnetic Tape be selected with too much delay between the si and rd instructions, a program alarm results because the IOR is not cleared and information is read from the Ferranti or Magnetic Tape over the information already in the IOR.

In order to de-select the Magnetic Tape a 400 (o) is added to the IOS if the Computer is stopped while the Magnetic Tape is being used.

If the Computer is stopped while the Ferranti is in use, 400 (o) is not added to the IOS. Therefore, the Ferranti is not de-selected and if the tape is pulled forward manually a program alarm will be generated.

Inactivity Alarm

The inactivity alarm indicates that the computer has waited too long (500 ms) for the completion of an operation. This alarm generally occurs when an illogical sequence of in-out instructions is given or when the in-out equipment is unable to respond. The inactivity alarm is suppressed for four types of in-out equipment: Magnetic Tape, Flexowriter, Camera and Ferranti. Usually the cause of an inactivity alarm may be determined by
examining the In-Out Switch and the Control Switch. In most cases an inactivity alarm results from a programming error, for example, using an "rc" or "bo" instruction with an "si 703". (si 700 - si 703 selects a drum group for a "rd" instruction) The first "rc" or "bo" instructions are ignored and the alarm will occur during performance of the second "rc" or "bo" instruction.

Parity Alarm

A parity alarm usually indicates a computer malfunction but may also occur as a result of an attempt to "bi" or "rd" from an illegal drum group.

Loop

A loop could be termed a non-terminating cycle of instructions. The presence of a loop is generally identified by an accompanying recurrent series of tones in the audio.

Check Register Alarm

In addition to the information on the attached table, programmers and operators should note that a check register alarm occurring during read-in with the PC equal to 104 is an indication that an error in the tape has been uncovered by the sum check. If the same results occur on a second read-in, the tape should be returned to the tape room for correction or re-conversion.

General

On any type of alarm the vertical decoders hold the C(AC) on the last si instruction and the horizontal decoders hold the C(AC) on the last rc instruction.

On any type of alarm FF#2 contains sp y and FF#3 contains sp 1 unless the FFs are used by the program. y refers to the starting address of the last 556 tape read in.

With one exception the In-Out Switch holds the last si instruction executed: when the computer is stopped while the Magnetic Tape is being used, a 400(o) is added to the In-Out Switch in order to de-select the unit.
Definitions for SA 57592

\( x = \) address of a storage register. \( 0 \leq x \leq 2^{10} \)
\( y = \) starting address of 556 tape
\( C(\quad) = \) original contents of register ( ).
\( F(\quad) = \) fractional part of the quantity in ( ).
\( n = \) positive integer (taken mod 32) \( 0 \leq n \leq 2^{10} \).
\( \phi = \) round off from BR. If \( C(BRO) = 1, \phi = 2^{-15} \). If \( C(BRO) = 0, \phi = 0 \).
\( AC+BR = \) the composite 32 digit register (including sign) composed of the AC and BR taken in that order.

In operations dv, srr0, slrn, the sign of the \( C(BR) \) is assumed to be the same as the sign of the \( C(AC) \); in the operation ab, \( C(BR) \) is assumed to have its own sign.

\( PC = \) program counter
\( PAR = \) parity auxiliary register (will serve same purpose as a program register at the proper times)
\( BR = B- \) register
\( AR = A- \) register
\( CR = \) check register
\( CS = \) control switch
\( IOS = \) in-out switch
\( GSR = \) group selector register
\( SAR = \) storage address register
\( IOR = \) in-out register
\( SAM = \) special add memory
\( TPD = \) time pulse distributor
\( FF = \) flip-flop