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April 1st, 2010
Renesas Electronics Corporation

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M16C/60 Series and M16C/20 Series

General-purpose Program for Searching Array

1. Abstract

This program searches for specified data from a two-dimensional array of a given size (maximum 255 x 255 bytes).

2. Introduction

This program searches for specified data from a two-dimensional array of a given size (maximum 255 x 255 bytes). Set the start address of the array in A0, the row size of the array in R0L, the column size of the array in R0H, and the search data in R1L. The address, the row element, and the column element of the coincidence data are output to A0, R0L, and R0H, respectively. Information on whether the search has succeeded or failed is output to the Z flag.

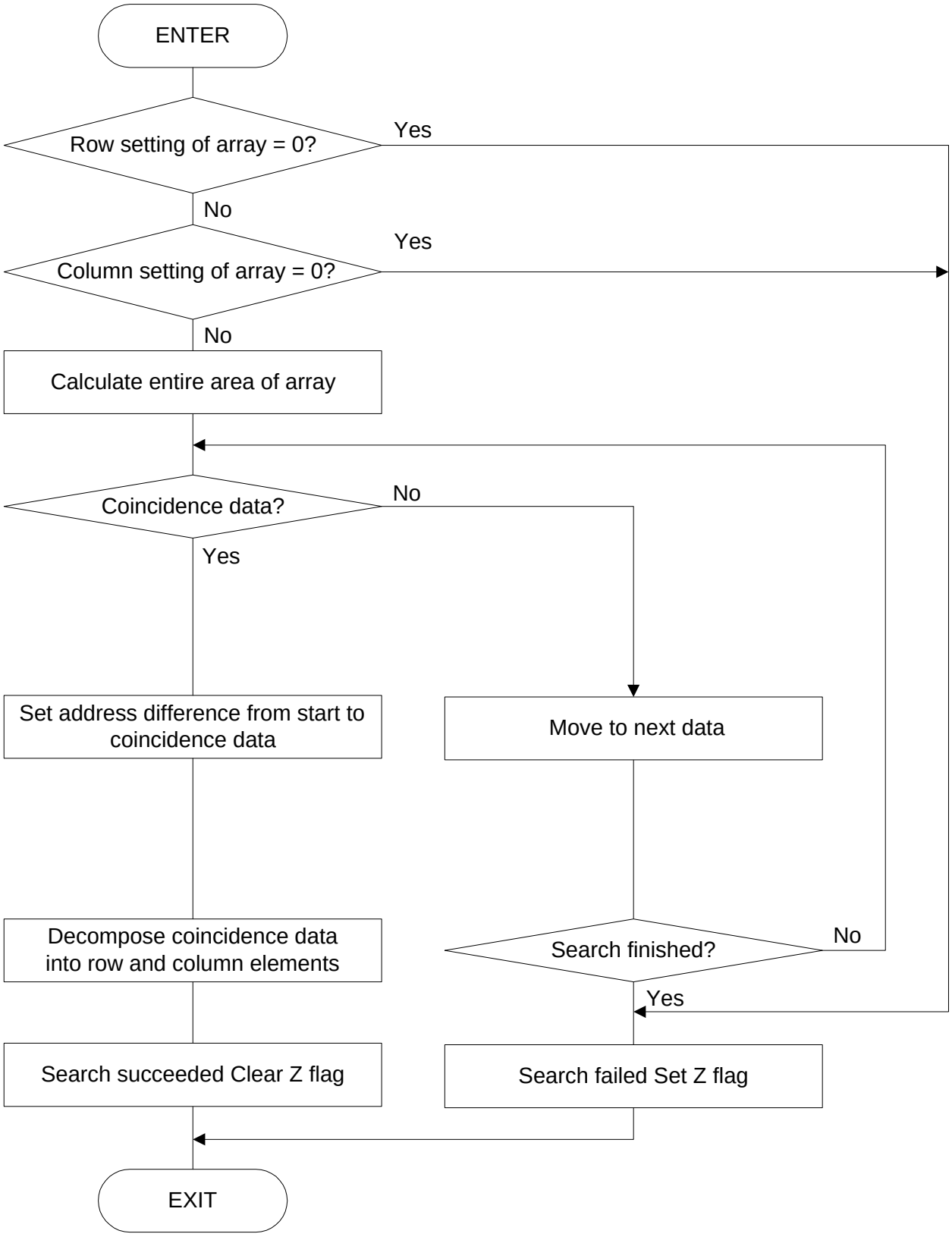
In this program, the overall size of the array is calculated, the specified data is searched from the entire array region, and a difference from the start address to the search address is obtained before decompos-ing the coincidence data into row and column elements.

Z	Meaning
0	Search succeeded
1	Search failed (no coincidence data found, row setting of array = 0, or column setting of array = 0)

Subroutine name : ARRANGE	ROM capacity : 37 bytes
Interrupt during execution : Accepted	Number of stacks used : 2 bytes

Register/memory	Input	Output	Usage condition
R0L	Row size of array	Row element of coincidence data	←
R0H	Column size of array	Column element of coincidence data	←
R1L	Search data	Does not change	←
R1H	-	Indeterminate	Used to save column size
R2	-	-	Unused
R3	-	-	Unused
A0	Start address of array	Address of coincidence data	←
A1	-	Indeterminate	Used to save start address
Z flag	-	Search succeeded/failed	←
Usage precautions			

3. Flowchart


ENTER
Row setting of array = 0?
Yes
No
Column setting of array = 0?
Yes
No
Calculate entire area of array
Coincidence data?
No
Yes
Set address difference from start to coincidence data
Move to next data
Decompose coincidence data into row and column elements
Search finished?
No
Yes
Search succeeded Clear Z flag
Search failed Set Z flag
EXIT

4. The example of a reference program

```
;***********************************************************************
; *
; M16C General-purpose Programs *
; CPU : M16C *
; *
;***********************************************************************
VromTOP     .EQU     0F0000H             ; Declares start address of ROM
;                                        ;
;=============================================================
; Title     : Searching array
; Outline   : Searches for data from two-dimensional array of given size
;         (within 255 x 255 bytes)
; Input     : ------------------------------> Output:
; R0L (Row size of array)          R0L (Row element of coincidence data)
; R0H (Column size of array)       R0H (Column element of coincidence data)
; R1L (Search data)                R1L (Does not change)
; R1H ( )                          R1H (Indeterminate)
; R2 ( )                           R2 (Unused)
; R3 ( )                           R3 (Unused)
; A0 (Start address of array)      A0 (Address of coincidence data)
; A1 ( )                           A1 (Indeterminate)
; Stack amount used: 2 bytes
; Notes     : Success or failure of search is returned by Z flag
;=============================================================
            .SECTION    PROGRAM,CODE
            .ORG     VromTOP             ; ROM area
ARRANGE:                                 ;
   CMP.B       #0,R0L                    ;
   JEQ      ARRANGE_NG                   ; --> No rows of array are set
   MOV.B       R0H,R1H                   ; Saves columns
   JEQ      ARRANGE_NG                   ; --> No columns of array are set
   MOV.W       A0,A1                     ;
   MULU.B      R0H,R0L                   ; Calculates array size
ARRANGE_10:                              ;
   CMP.B       R1L,[A0]                  ;
   JEQ      ARRANGE_20                   ; --> Coincidence data found
   INC.W       A0                        ;
   ADJNZ.W  #-1,R0,ARRANGE_10            ; --> Checks next data
ARRANGE_NG:                              ;
   FSET     Z                           ; Search failed
   JMP      ARRANGE_EXIT                ;
ARRANGE_20:                              ;
   PUSH.W      A0                        ; Saves address of coincidence data
   SUB.W       A1,A0                     ; Creates address difference from start
                                         ; to coincidence data
   MOV.W       A0,R0                     ;
   DIVU.B      R1H                       ; Decomposes coincidence data into
                                         ; row and column elements
   INC.B       R0L                       ; Corrects rows
   INC.B       R0H                       ; Corrects columns
   POP.W       A0                        ; Restores address of coincidence data
   FCLR     Z                           ; Search succeeded
ARRANGE_EXIT:                            ;
   RTS                                   ;
;                                        ;
            .END                         ;
```

5. Reference

SOFTWARE MANUAL
M16C/60 M16C/20 Series SOFTWARE MANUAL
(Acquire the most current version from Renesas web-site)

6. Web-site and contact for support

Renesas Web-site

http://www.renesas.com

Contact for Renesas technical support

Mail to : support_apl@renesas.com

REVISION HISTORY

Rev.	Date	Description	
		Page	Summary
1.00	Jul 08, 2002	-	First edition issued

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