



INTERNATIONAL ATOMIC ENERGY AGENCY
UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION



INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
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COLLEGE ON MICROPROCESSORS:
TECHNOLOGY AND APPLICATIONS IN PHYSICS

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SOLUTIONS TO LOGIDULE EXERCISES

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These are preliminary lecture notes, intended only for distribution to participants. Missing or extra copies are available from Room 230.


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DR CODE EXTENSIONS SOURCE STATEMENT
00 NAM I/O PROGRAM
    BF60 DISPLAY EQU $BF60
    BF62 SWITCH EQU $BF62
    00 START EQU * BEGIN
00 B6 BF62 LDAA SWITCH (A) <- SWITCHVALUE
03 B7 BF60 STAA DISPLAY (A) -> DISPLAY
06 3F SWI END
09 END

```

```

DR CODE EXTENSIONS SOURCE STATEMENT
00 NAM IF-THEN-ELSE PROGRAM
    BF60 DISPLAY EQU $BF60
    BF62 SWITCH EQU $BF62
    00 START EQU * BEGIN
00 B6 BF62 LDAA SWITCH IF (A) > 0
03 B1 00 CMP A #$0
05 27 08 BEQ SETLSB
07 07 SETMSB EQU *
07 B6 80 LDAA #$80 THEN DISPLAY MSB
09 B7 BF60 STAA DISPLAY
0C 7E 0014 JMP FINI
0F 0F SETLSB EQU *
0F B6 01 LDAA #$1 ELSE DISPLAY LSB
11 B7 BF60 STAA DISPLAY
14 14 FINI EQU *
14 3F SWI ENDIF
17 END

```

```

DR CODE EXTENSIONS SOURCE STATEMENT
00 NAM IF-THEN-ELSE-IF PROGRAM
    BF60 DISPLAY EQU $BF60
    BF62 SWITCH EQU $BF62
    00 START EQU * BEGIN
00 B6 BF62 LDAA SWITCH
03 03 TSTLOW EQU *
03 B1 08 CMP A #$8 IF A<8
05 2C 08 BGE TSTHI
07 B6 07 LDAA #$7 THEN DISPLAY LSB'S
09 B7 BF60 STAA DISPLAY
0C 7E 0020 JMP FINI
0F 0F TSTHI EQU *
0F B1 15 CMP A #$15 ELSEIF A>15
11 23 08 BLS TSTMID
13 B6 E0 LDAA #$E0 THEN DISPLAY MSB'S
15 B7 BF60 STAA DISPLAY
18 7E 0020 JMP FINI
18 18 TSTMID EQU *
18 B6 3C LDAA #$3C ELSE DISPLAY MIDDLE BITS
1D B7 BF60 STAA DISPLAY
20 20 FINI EQU *
23 3F SWI END

```

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```

000
BF60
BF62
70
00
000 B6 BF62
003 B4 07
005 48
006 CE 0010
009 BD 0060
00C EE 00
00E 6E 00
10
010 0020
012 0028
014 0030
016 0038
018 0040
01A 0048
01C 0050
01E 0058
20
020 86 01
022 B7 BF60
025 7E 005D
28
028 86 02
02A B7 BF60
02D 7E 005D
30
030 86 04
032 B7 BF60
035 7E 005D
38
038 86 08
03A B7 BF60
03D 7E 005D
40
040 86 10
042 B7 BF60
045 7E 005D
48
048 86 20
04A B7 BF60
04D 7E 005D
50
050 86 40
052 B7 BF60
055 7E 005D
58
058 96 80
05A B7 BF60
05D 3F
60
060 DF 70
062 9B 71
064 97 71
066 24 03
068 7C 0070
68
068 DE 70
06D 39

```

```

NAM CASE PROGRAM
DISPLAY EQU $BF60
SWITCH EQU $BF62
XSAVD EQU $70
START EQU * BEGIN
    LDAA SWITCH (A) <= SWITCHVALUE
    ANDA #$7 MASKOUT MS5 BITS
    ASLA DOUBLE THE FORWARD ADDRESS
    LDX #CTAB (XR) = BASE OF JUMP TABLE
    JSR ADDAX (XR) <= (XR) + (A)
    LDX 0,X (XR) IS CASE ADDRESS
    JMP 0,X JUMP TO CASE ADDRESS
CTAB EQU *
    FDB CASE0
    FDB CASE1
    FDB CASE2
    FDB CASE3
    FDB CASE4
    FDB CASE5
    FDB CASE6
    FDB CASE7
CASE0 EQU *
    LDAA #$1
    STAA DISPLAY CASE 0 LSB LED IS ZEROETH DECIM
    JMP ENDCAS
CASE1 EQU *
    LDAA #$2
    STAA DISPLAY
    JMP ENDCAS
CASE2 EQU *
    LDAA #$4
    STAA DISPLAY
    JMP ENDCAS
CASE3 EQU *
    LDAA #$8
    STAA DISPLAY
    JMP ENDCAS
CASE4 EQU *
    LDAA #$10
    STAA DISPLAY
    JMP ENDCAS
CASE5 EQU *
    LDAA #$20
    STAA DISPLAY
    JMP ENDCAS
CASE6 EQU *
    LDAA #$40
    STAA DISPLAY
    JMP ENDCAS
CASE7 EQU *
    LDAA $80
    STAA DISPLAY
ENDCAS SWI
* ADDAX ADDS A ONE BYTE OFFSET TO THE INDEX REGISTER
ADDAX EQU *
    STX XSAVD STORE X IN XSAVD, XSAVD+1
    ADDA XSAVD+1 A=A+XLOW
    STAA XSAVD+1 STORE UPDATED LOW BYTE
    BCC ENDIFA IF CARRY THEN
    INC XSAVD INCREMENT XHIGH
ENDIFA EQU *
    LDX XSAVD LOAD X FROM UPDATED XSAVD
    RTS END

```

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```

DDR CODE EXTENSIONS      S O U R C E - S T A T E M E N T
000
    NAM LOOP PROGRAM
    DISPLAY EQU $BF60
    SWITCH EQU $BF62
    START EQU *
        80
        01
        LDAA #$80
        LDAB #$1
        EQU *
        BITA SWITCH
        BNE FINI
        CLC
        ROR A
        INC B
        CMP B #$8
        BGT FINI
        JMP TEST
    TEST
        BF62
        0A
        04
        B5
        26
        0C
        46
        5C
        C1
        2E
        7E
        13
        B7
        3F
        BF60
    FINI
        PRINT PRIORITY BIT
        ENDWHILE
    END
    16

```

DDR CODE EXTENSIONS S O U R C E - S T A T E M E N T

```

000
    NAM FIRE-ALARM
    DISPLAY EQU $BF60
    SWITCH EQU $BF62
    DOWHIL EQU *
        BF62
        08
        01
        BF60
        0000
        ENWHIL EQU *
        REPT EQU *
        LDAA #$FE
        STAA DISPLAY
        LDAA SWITCH
        BNE REPT
    FINI
        UNTIL ALARM=0
    END
    16
    0D
    0F
    12
    15
    17
    3F
    1A
    BEGIN
        DO WHILE ALARM=0
            DISPLAY <= 'OK' LIGHT
        ENDWHILE; ALARM SEEN
        REPEAT
            DISPLAY <= 'ALARM' LIGHT
        UNTIL ALARM=0
    END

```