El sector de arranque.

Por Santiago Calvo

Estudio del sector de arranque

```
-d03e0
0000:7C00  00 00 70 00 EB 34 90 49-42 4D 20 20 33 2E 33 00   ..p..4.IBM  3.3.
0000:7C10  02 08 01 00 02 00 02 03-51 F8 08 00 11 00 04 00   ........Q.......
0000:7C20  01 00 00 00 00 00 00 00-00 00 00 00 00 00 00 00   ................
0000:7C30  00 00 00 12 00 00 00 00-01 00 FA 33 C0 8E D0 BC   ...........3....
0000:7C40  00 7C 16 07 BB 78 00 36-C5 37 1E 56 16 53 BF 2B   .¦...x.6.7.V.S.+
0000:7C50  7C B9 0B 00 FC AC 26 80-3D 00 74 03 26 8A 05 AA   ¦.....&.=.t.&...
0000:7C60  8A C4 E2 F1 06 1F 89 47-02 C7 07 2B 7C FB CD 13   .......G...+¦...
0000:7C70  72 67 A0 10 7C 98 F7 26-16 7C 03 06 1C 7C 03 06   rg..¦..&.¦...¦..
0000:7C80  0E 7C A3 3F 7C A3 37 7C-B8 20 00 F7 26 11 7C 8B   .¦.?¦.7¦. ..&.¦.
0000:7C90  1E 0B 7C 03 C3 48 F7 F3-01 06 37 7C BB 00 05 A1   ..¦..H....7¦....
0000:7CA0  3F 7C E8 9F 00 B8 01 02-E8 B3 00 72 19 8B FB B9   ?¦.........r....
0000:7CB0  0B 00 BE D8 7D F3 A6 75-0D 8D 7F 20 BE E3 7D B9   ....}..u... ..}.
0000:7CC0  0B 00 F3 A6 74 18 BE 77-7D E8 6A 00 32 E4 CD 16   ....t..w}.j.2...
0000:7CD0  5E 1F 8F 04 8F 44 02 CD-19 BE C2 7D EB EB A1 1C   ^....D.....}....
0000:7CE0  05 33 D2 F7 36 0B 7C FE-C0 A2 3C 7C A1 37 7C A3   .3..6.¦...<¦.7¦.
0000:7CF0  3D 7C BB 00 07 A1 37 7C-E8 49 00 A1 18 7C 2A 06   =¦....7¦.I...¦*.
0000:7D00  3B 7C 40 38 06 3C 7C 73-03 A0 3C 7C 50 E8 4E 00   ;¦@8.<¦s..<¦P.N.
0000:7D10  58 72 C6 28 06 3C 7C 74-0C 01 06 37 7C F7 26 0B   Xr.(.<¦t...7¦.&.
0000:7D20  7C 03 D8 EB D0 8A 2E 15-7C 8A 16 FD 7D 8B 1E 3D   ¦.......¦...}..=
0000:7D30  7C EA 00 00 70 00 AC 0A-C0 74 22 B4 0E BB 07 00   ¦...p....t".....
0000:7D40  CD 10 EB F2 33 D2 F7 36-18 7C FE C2 88 16 3B 7C   ....3..6.¦....;¦
0000:7D50  33 D2 F7 36 1A 7C 88 16-2A 7C A3 39 7C C3 B4 02   3..6.¦..*¦.9¦...
0000:7D60  8B 16 39 7C B1 06 D2 E6-0A 36 3B 7C 8B CA 86 E9   ..9¦.....6;¦....
0000:7D70  8A 16 FD 7D 8A 36 2A 7C-CD 13 C3 0D 0A 45 72 72   ...}.6*¦.....Err
0000:7D80  6F 72 20 65 6E 20 64 69-73 6B 65 74 74 65 20 6F   or en diskette o
0000:7D90  20 64 69 73 6B 65 74 74-65 20 73 69 6E 20 44 4F    diskette sin DO
0000:7DA0  53 0D 0A 43 A0 6D 62 69-65 6C 6F 20 79 20 70 75   S..C.mbielo y pu
0000:7DB0  6C 73 65 20 63 75 61 6C-71 75 69 65 72 20 74 65   lse cualquier te
0000:7DC0  63 6C 61 0D 0A 00 0D 0A-45 72 72 6F 72 20 65 6E   cla.....Error en
0000:7DD0  20 61 72 72 61 6E 71 75-65 0D 0A 00 49 42 4D 42    arranque...IBMB
0000:7DE0  49 4F 20 20 43 4F 4D 49-42 4D 44 4F 53 20 20 43   IO  COMIBMDOS  C
0000:7DF0  4F 4D 00 00 00 00 00 00-00 00 00 00 00 00 00 00   OM..............
```

```
3F03:03E0 0000          ADD   [BX+SI],AL
3F03:03E2 7000          JO    03E4
3F03:03E4 EB34          JMP   041A


3F03:041A FA            CLI
3F03:041B 33C0          XOR   AX,AX
3F03:041D 8ED0          MOV   SS,AX
3F03:041F BC007C        MOV   SP,7C00;En la dirección 0000:7C00 es donde
                         ;se carga el sector de arranque
3F03:0422 16            PUSH  SS
3F03:0423 07            POP   ES   ;ES con el valor 0000
3F03:0424 BB7800        MOV   BX,0078;preparandose para cargar en DS:SI
                         ;el vector de int1E que apunta a los
                         ;parametros del disco flexible del
                         ;BIOS.
3F03:0427 36            SS:
3F03:0428 C537          LDS   SI,[BX];En la posicion SS:[BX] esta el vector
                         ;de int1E
3F03:042A 1E            PUSH  DS
3F03:042B 56            PUSH  SI
3F03:042C 16            PUSH  SS
3F03:042D 53            PUSH  BX
3F03:042E BF2B7C        MOV   DI,7C2B
```

```
3F03:0431 B90B00          MOV   CX,000B     ;preparados para manipular una cadena
                            ;de 12 bytes
3F03:0434 FC              CLD
3F03:0435 AC              LODSB ;DS:SI apuntando a parametros de la unidad
                        ;de disco flexible.Vector de int1E la 1.ª. vez
                        ;Se ha decrementado CX
                        ;si se biene de LOOP.
3F03:0436 26              ES:
3F03:0437 803D00          CMP   BYTE PTR [DI],00; ES:DI=0000:7C2B
3F03:043A 7403            JZ    043F
3F03:043C 26              ES:         ;No era cero entonces cargar
3F03:043D 8A05            MOV   AL,[DI]    ;[ES:DI] en AL.
3F03:043F AA              STOSB        ;
3F03:0440 8AC4            MOV   AL,AH       ;El valor original de AH permanece
                           ;a cero desde que se cargo asi en
                           :la instruccion de direccion 3F03:041B
3F03:0442 E2F1            LOOP  0435
3F03:0444 06              PUSH  ES
3F03:0445 1F              POP   DS   ;DS:=0000
3F03:0446 894702          MOV   [BX+02],AX      ;(BX+02)=007AH
                                ;se carga  AX en la direccion
                                ;segmento del vector de int1E
                                ;
3F03:0449 C7072B7C        MOV   WORD PTR [BX],7C2B;La direccion desplazamiento
                                ;del vector de int1E es
                                ;cambiada al valor 7C2B
3F03:044D FB              STI
3F03:044E CD13            INT   13
3F03:0450 7267            JB    04B9 ;la instrucion anterior que afecto los
                           ;indicadores esta en la direccion
                           ;3f03:0437
3F03:0452 A0107C          MOV   AL,[7C10] ;[7C10]=02H
3F03:0455 98              CBW
3F03:0456 F726167C        MUL   WORD PTR [7C16]       ;[7C16]=0302H
DX.AX:=AX*0302H
3F03:045A 03061C7C        ADD   AX,[7C1C] ;[7C1C]=0011H
3F03:045E 03060E7C        ADD   AX,[7C0E] ;[7C0E]=0033H
3F03:0462 A33F7C          MOV   [7C3F],AX
3F03:0465 A3377C          MOV   [7C37],AX
3F03:0468 B82000          MOV   AX,0020
3F03:046B F726117C        MUL   WORD PTR [7C11]       ;[7C11]=0108H,DX.AX:=AX*002
0H
3F03:046F 8B1E0B7C        MOV   BX,[7C0B] ;[7C0B]=3320H
3F03:0473 03C3            ADD   AX,BX
3F03:0475 48              DEC   AX
3F03:0476 F7F3            DIV   BX
3F03:0478 0106377C        ADD   [7C37],AX
3F03:047C BB0005          MOV   BX,0500
3F03:047F A13F7C          MOV   AX,[7C3F]
3F03:0482 E89F00          CALL  0524
3F03:0485 B80102          MOV   AX,0201
3F03:0488 E8B300          CALL  053E ;Leer sector
3F03:048B 7219            JB    04A6
3F03:048D 8BFB            MOV   DI,BX
F03:048F B90B00           MOV   CX,000B
F03:0492 BED87D           MOV   SI,7DD8
F03:0495 F3               REPZ
F03:0496 A6               CMPSB
```

```
3F03:0497 750D           JNZ   04A6
3F03:0499 8D7F20         LEA   DI,[BX+20]
3F03:049C BEE37D         MOV   SI,7DE3
3F03:049F B90B00         MOV   CX,000B
3F03:04A2 F3             REPZ
3F03:04A3 A6             CMPSB
3F03:04A4 7418           JZ    04BE
3F03:04A6 BE777D         MOV   SI,7D77
3F03:04A9 E86A00         CALL  0516 ;Presentar el mensaje
                          ;"Error en diskette o diskette sin DOS
                          ;Cambielo y pulse cualquier tecla"
3F03:04AC 32E4           XOR   AH,AH      ;Esperar la pulsacion de
3F03:04AE CD16           INT   16   ;una tecla.
3F03:04B0 5E             POP   SI
3F03:04B1 1F             POP   DS
3F03:04B2 8F04           POP   [SI] ;
3F03:04B4 8F4402         POP   [SI+02]
3F03:04B7 CD19           INT   19   ;reboot
3F03:04B9 BEC27D         MOV   SI,7DC2
3F03:04BC EBEB           JMP   04A9
3F03:04BE A11C05         MOV   AX,[051C]
3F03:04C1 33D2           XOR   DX,DX
3F03:04C3 F7360B7C       DIV   WORD PTR [7C0B]
3F03:04C7 FEC0           INC   AL
3F03:04C9 A23C7C         MOV   [7C3C],AL
3F03:04CC A1377C         MOV   AX,[7C37]
3F03:04CF A33D7C         MOV   [7C3D],AX
3F03:04D2 BB0007         MOV   BX,0700
3F03:04D5 A1377C         MOV   AX,[7C37]
3F03:04D8 E84900         CALL  0524
3F03:04DB A1187C         MOV   AX,[7C18]
3F03:04DE 2A063B7C       SUB   AL,[7C3B]
3F03:04E2 40             INC   AX
3F03:04E3 38063C7C       CMP   [7C3C],AL
3F03:04E7 7303           JNB   04EC
3F03:04E9 A03C7C         MOV   AL,[7C3C]
3F03:04EC 50             PUSH  AX
3F03:04ED E84E00         CALL  053E
3F03:04F0 58             POP   AX
3F03:04F1 72C6           JB    04B9
3F03:04F3 28063C7C       SUB   [7C3C],AL
3F03:04F7 740C           JZ    0505
3F03:04F9 0106377C       ADD   [7C37],AX
3F03:04FD F7260B7C       MUL   WORD PTR [7C0B]
3F03:0501 03D8           ADD   BX,AX
3F03:0503 EBD0           JMP   04D5
3F03:0505 8A2E157C       MOV   CH,[7C15]
3F03:0509 8A16FD7D       MOV   DL,[7DFD]  ;[7DFD]=00H
3F03:050D 8B1E3D7C       MOV   BX,[7C3D]
3F03:0511 EA00007000     JMP   0070:0000


;*
3F03:0516 AC             LODSB ;DS:SI=
3F03:0517 0AC0           OR    AL,AL
3F03:0519 7422           JZ    053D
3F03:051B B40E           MOV   AH,0E      ;preparado para escribir un caracter
3F03:051D BB0700         MOV   BX,0007 ;en modo teletipo.El caracter esta en
```

```
3F03:0520 CD10          INT   10      ;AL.Escribir
3F03:0522 EBF2          JMP   0516
;*
3F03:0524 33D2          XOR   DX,DX
3F03:0526 F736187C      DIV   WORD PTR [7C18]
3F03:052A FEC2          INC   DL
3F03:052C 88163B7C      MOV   [7C3B],DL
3F03:0530 33D2          XOR   DX,DX
3F03:0532 F7361A7C      DIV   WORD PTR [7C1A]
3F03:0536 88162A7C      MOV   [7C2A],DL
3F03:053A A3397C        MOV   [7C39],AX
3F03:053D C3            RET


;*
3F03:053E B402          MOV   AH,02
3F03:0540 8B16397C      MOV   DX,[7C39]
3F03:0544 B106          MOV   CL,06          ;
3F03:0546 D2E6          SHL   DH,CL
3F03:0548 0A363B7C      OR    DH,[7C3B]
3F03:054C 8BCA          MOV   CX,DX
3F03:054E 86E9          XCHG  CH,CL
3F03:0550 8A16FD7D      MOV   DL,[7DFD] ;[7DFD]=00H disco flexible
3F03:0554 8A362A7C      MOV   DH,[7C2A]
3F03:0558 CD13          INT   13
3F03:055A C3            RET
........
```