

ZEN

FOR THE AMSTRAD CPC464

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Kuma

ZEN

Z80 Assembly Language Programming System

for

the

AMSTRAD CPC 464 MICROCOMPUTER

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Introduction

Thank you for buying this copy of ZEN for the Amstrad CPC64. If you have any questions about ZEN then please feel free to write to Avalon Software. All high level languages have performance limitations, when you need the maximum in speed and flexibility the answer lies in Assembly Language programming. ZEN provides you with the tools to generate or analyse Z80 Assembly Language programs.

Starting up

Unlike BASIC, which is permanently available in ROM, you need to load ZEN from cassette. It is stored on the cassette as a binary file designed to run at address 4000H (16384 decimal). BASIC usually assumes that it has the whole of memory to itself. To ensure that BASIC and ZEN coexist peacefully it is necessary to change the top of memory before loading from cassette. The loading procedure is therefore as follows:

(1) Type MEMORY 16383(ENTER)

(2) Type LOAD"ZEN"(ENTER)

BASIC will then load ZEN into memory, displaying various prompts and messages as it does so. When loading is finished you are returned to BASIC's command level, any existing BASIC programs are unaffected. To transfer control to ZEN type CALL 16384(ENTER).

Command level

Whenever the prompt ZEN> is displayed you are at command level, you may execute any of the following commands:

A ..... Assemble	O ..... Out
B ..... Bye	P ..... Print
C ..... Copy	Q ..... Query
D ..... Down	R ..... Read
E ..... Enter	S ..... Sort
F ..... Fill	T ..... Target
G ..... Goto	U ..... Up
H ..... Howbig	W ..... Write
I ..... In	X ..... Xamine
K ..... Kill	Z ..... Zap
L ..... Locate	c ..... catalog
M ..... Modify	d ..... disassemble
N ..... New	u ..... unscramble

To select a given command type in the first letter of it's name, followed by a parameter if relevant, and then press the (ENTER) key. The DEL key can be used to backspace. The usage of command loop parameters is explained in greater detail in the next section, which examines each command in depth. If ZEN doesn't understand anything you've typed in it will display the error message HUH? The default command, just pressing (ENTER) on it's own will clear the screen.

Assemble The function of the assembler is to read a series of assembly language statements and to produce the corresponding Z80 machine code and listing. The ZEN editing commands are used to create a text file in memory which is the input to the assembler. Output of the machine code file, usually called the object file, is controlled by the LOAD operator (see under PSEUDO-OPS). The listing output is specified by you in response to the OPTION> prompt from the assembler. You may specify V(ENTER), E(ENTER) or (ENTER) for video, external or null list output. The null output option is much the fastest mode (the assembler is peripheral-bound) and should be used until all syntax errors are corrected. The text file is read beginning at the start-of-file and stopping when the END operator is found.

Bye This command gives a warm return to BASIC, any BASIC programs in memory are unaffected. You can do a warm return to ZEN by issuing the CALL 16384 statement as described previously. You can shuttle between ZEN and BASIC whenever you like without affecting any files or data in memory.

Copy This command moves a block of memory. You will be prompted for START>, STOP> and DESTINATION> parameters. Within ZEN's command structure a numeric parameter may be a decimal, hexadecimal or octal number. Hex numbers are 'H' postfixed and octal are 'O' postfixed. So if you wanted to move the block of memory from 200H to 2FFH up to 8000H you would type 200H(ENTER), 2FFH(ENTER) and 8000H(ENTER).

Down This command moves the editor current line down by the number of lines specified in the command parameter. For example D37(ENTER) moves down thirty-seven lines. The default command parameter is one so D(ENTER) moves down one line. The editor in ZEN is line orientated as in BASIC but does not use explicit line numbers, instead you use various commands to move around the text file until you reach the required position. You then use the ENTER or ZAP commands to insert or delete lines of text. If the DOWN command bumps into the end-of-file then the message EOF will be displayed.

Enter This command enters lines of text into the text file. ZEN will display the current line number, type in your line of text then press (ENTER). This process will repeat until you type a full stop as the first character on the line, this returns you to command level. Your text is placed in the file at the current line, the old current and following lines are moved downwards towards EOF. Note that although line numbers are often displayed by ZEN these are dynamically computed and not stored in the text file.

Fill This command fills a block of memory, from START> to STOP> inclusive with a DATA> value. You will be prompted for all three parameters.

Goto This command loads the Z80 registers with the User Image and transfers control to the address specified in the command parameter. For example G0(ENTER) would perform a complete system cold start. If no command parameter is supplied then control is transferred to the address in the User Program Counter. You will then be prompted for a breakpoint address. If you respond with a valid address parameter then a breakpoint is set at that address. If you default, by just pressing (ENTER), then no breakpoint is set. A breakpoint is a way of stopping a running program. A RST 30H instruction (0F7H) is inserted into the program and a vector back to the ZEN trap handler is placed at 0030H. The trap handler will save all the Z80 registers in the User Image area and restore the code under the breakpoint before returning to the ZEN command loop. You can thus examine the state of the Z80 at the time of the breakpoint. You cannot set a breakpoint in ROM, ZEN will generate a MEMORY error message if the breakpoint has failed to set for this reason. You can continue execution by using the G(ENTER) command as the Program Counter is saved as part of the trap process.

Howbig This command displays, in hexadecimal, the start and end addresses of the text file and the top of memory. ZEN will allow the text file to grow up to this top limit but no further. You can change this limit if required (see ZEN listing, the LIMIT constant). It is presently set at AB7FH, the area from AB80H to BFFFH is used by the BASIC operating system. The area from C000H to FFFFH is the video memory.

In This command will display, in hexadecimal and binary, the data read from the I/O port specified by the command parameter. For example I83H(ENTER). The particular hardware configuration of the Amstrad CPC64 means that addresses up to FFFFH are valid.

Kill This command erases the text file, as with the NEW statement in BASIC. It is possible to recover an accidentally KILLED file as ZEN just makes the EOF pointer equal to the SOF pointer, the actual text will still be in memory. Find the address of the last text character, this will be an ASCII Carriage Return code (0DH). Increase this by one and use the MODIFY command to restore the EOF pointer (see ZEN listing, EOFP).

Locate This command is used to search the text file for a particular string of characters. The character string forms the command parameter. For example LBIT 7,A(ENTER) would find the first occurrence of the string BIT 7,A in the text file. The text file is searched from the line after the current line. If the string is found then that line is made the current line. If the search fails you are at end-of-file. There are no restrictions on the contents of the parameter string.

Modify This command allows you to examine and alter memory contents. The start address is specified by the command parameter. For example M7000H(ENTER) would cause the command to start at 7000H. If you supply no address parameter then the command continues from where it last finished. The byte at the address is displayed in hex and ZEN prompts for a data parameter from you. If you supply a parameter then it is stored at that address, if you default ZEN just steps onto the next address. To return to command level type a full stop.

New This command lets you modify the current line of the text file. The line is displayed with the cursor at the rightmost position. Change the line and press (ENTER) to restore the new line to the text file.

Out This command will output a data value to the I/O port specified by the command parameter. You will be prompted for the data parameter.

Print This command displays a number of lines from the text file on the screen. The number of lines is specified by the command parameter, for example P9(ENTER) would display nine lines. The default command parameter is one. The display commences with the current line and the last line displayed becomes the new current line.

Query This command displays sixty-four bytes of memory in hex and ASCII. The command parameter specifies the start address, for example Q4000H(ENTER) would display the start of ZEN. If you supply no address parameter then the display begins from where it last finished.

Read This command reads a file from cassette into memory, you will be prompted for a filename. There are two types of file which concern ZEN, text files and binary files. If the file is a text file then it is added to the end of any text already existing in memory. If the file becomes too large then the error message MEMORY is issued and reading terminates. If it is a binary file then it will be placed at it's load address unless you have specified a load address as a command parameter. For example R7900H would load the file commencing at 7900H irrespective of it's actual load address. The execution address of the binary file is placed in the User Program Counter. These two types of files are the same as the standard BASIC text and binary files. The type of a file is determined by a single byte in the file header. The following seem to be the normal types: BASIC = 00H, BASIC PROTECTED = 01H, BINARY = 02H, TEXT = 16H.

Sort This command will sort and display the symbol table produced during the last assembly. You will be prompted for an output option. Your possible responses are the same as for the Assembler list output. The output of this command is generated a page at a time as with list output. You can restrict the sort process to symbols beginning with a particular letter by entering that letter as a command parameter. For example SB(ENTER) would only produce the symbols beginning with the letter 'B'. Note that symbols are only sorted on the first letter and not the whole name.

Target This command will move you to any line in the text file and make it the current line. The command parameter specifies the line number, for example T1435(ENTER) would move you to line one thousand four hundred and thirty-five. The default command parameter, T(ENTER), moves you to the start-of-file.

Up This command moves you up the text file by the number of lines specified in the command parameter. The default parameter is one.

Write This command writes a text or binary file to cassette, you will be prompted for a file name. The command W(ENTER) writes the text file while the command WB(ENTER) writes an area of memory as a binary file. In this case you will be further prompted for START>, STOP> and EXEC> addresses. The area written is from start to stop inclusive, the execution address is merely placed in the file header for use in later reading.

Xamine This command displays the Z80 registers saved in the User Image. The top line shows the main registers and the lower line the Z80 alternate register set.

Zap This command removes a number of lines from the text file as specified by the command parameter. For example Z100(ENTER) would remove one hundred and eight lines, commencing with the current line. The default command parameter is one.

catalog This command is identical to the BASIC cat command, it will verify and display all the files found on the cassette. File type indicators are: BASIC = $, BASIC PROTECTED = %, BINARY = &, TEXT = *.

disassemble This command performs a symbolic disassembly on an area of memory and generates a text file or listing as output. You will be prompted for the START> and STOP> addresses of the area you wish to disassemble. You will then be asked the address which the program RUNS AT>. Sometimes you may have a program in memory at a different location to it's usual run-time location, the disassembler can relocate any addresses and labels in it's output to reflect this. If you default to the request for the run-time start address then ZEN assumes that the program is at it's normal run-time location. If you supply an actual address parameter then the output file will reflect this run-time address. You will then be asked, repeatedly, for the START> and STOP> addresses of any data areas within the disassembly region. These are areas which will not be decoded as instructions but as data bytes. To terminate this process type in a stop address of zero. There is a maximum of sixty-four seperate data areas, if you exceed this number ZEN will generate the error message FULL. You will now be asked for an output OPTION>. You may specify V(ENTER) or E(ENTER) for listings to the video or external devices. If you default then ZEN will generate a text file and add it to the end of any text already in memory. If the text file grows up to the top of memory limit during disassembly then the error message MEMORY is issued and disassembly terminates. The only other error condition possible during disassembly is for the symbol table to fill up in which case the error message FULL is issued. Note that the disassembler uses the same symbol table as the assembler and so destroys any symbols there. This is only of relevance if you which to perform a later SORT operation. Any illegal opcodes encountered during disassembly are treated as data statements. Labels of the form Lnnnn (where nnnn is an address) will be generated at the appropriate positions.

unscramble This command is a simplified version of the disassembler. It will disassemble eight Z80 instructions beginning at the address specified by the command parameter. For example u41E0H will disassemble the start of ZEN's mainloop. If you default on the address parameter then the command continues from where it last finished. Any illegal opcodes encountered are displayed as data bytes. ZEN will try to make an intelligent guess about how to display eight bit numeric operands. Numbers less than ten are displayed as single digit decimals. Numbers from from 41H to 5AH and 61H to 7AH are displayed as ASCII literal characters. Other numbers are displayed as hex values with a leading zero if necessary.

Further Information

List Output

The commands Assemble, Sort and disassemble can all generate large quantities of output to the video or external devices. With these commmands the output will be generated a page at a time with a short pause between each page. Pressing any key will stop output at the end of the page, to restart press any key except 'Q'. This key will force the command to QUIT and return to the command loop.

The external device is assumed to be eighty characters wide by sixty-six lines long i.e a typical printer. You can change the page length by modifying the PAGE procedure (see ZEN listing). You can change the various field widths by modifying the group of constants COMWIDTH/SYMWIDTH (see ZEN listing). The external device is presumed to respond to the ASCII control characters Formfeed (0CH), Carriage Return (0DH) and Linefeed (0AH). ZEN issues a Formfeed followed by sixty-two lines of text for each page, each line being terminated by Carriage Return, Linefeed. The external device driver (see ZEN listing) will drive EPSON FX-80 type printers as it stands. If you have something unusual there is space in the driver to insert patches, to filter Linefeeds for example.

The video device is assumed to be forty characters wide. Note that line numbers are not generated on the video device for Assembler/disassembler listings because of this reduced width. The symbol, operand and comment fields of a Z80 statement may be of indefinite length. If necessary ZEN will truncate these fields to fit into the required format.

The Symbol Table

The symbol table is the area of memory used by ZEN to store symbols during Assembly/disassembly. It is situated between ZEN and the text file. If you wish to increase it's size it is only necessary to change the start-of-file pointer to the required new value, here's how: (1) KILL the text file (2) Use MODIFY to change SOFP (3) KILL the text file again to copy SOFP into EOFP and CURRENT (4) Perform an ASSEMBLE to shut down the symbol table (5) Use WB to write the new version to cassette.

The External Environment

The Amstrad CPC64 has a complex memory map. When you first enter ZEN you will find that the Operating System and BASIC ROMs have been switched out and that RAM is contiguous from 0 to BFFFH, with the video RAM occupying the remaining space. To switch the ROMs back in is fairly easy. Enter the following keystrokes:

```
K(ENTER)
E(ENTER)
ORG 7000H(ENTER)
LOAD 7000H(ENTER)
CALL 0B900H(ENTER)
CALL 0B906H(ENTER)
JP 4000H(ENTER)
END(ENTER)
.(ENTER)
A(ENTER)
V(ENTER)
G7000H(ENTER)
(ENTER)
```

This short program calls two procedures in the Operating System interface to switch in the upper and lower ROMs. They can now be examined with the Query and unscramble/disassemble commands. For example if you Query around 660H you can see the export market names for the machine. Examination of the region around CC50H will reveal all the BASIC error messages.

ZEN will operate whatever condition the memory map is in. BASIC text files occupy low RAM just after the RESTART block and grow up towards HIMEM. The BASIC cassette operating system requires the use of two 2K buffers for read and write. When you first enter ZEN they are set to 3000H to 37FFH (Read) and 3800H to 3FFFH (Write). You can move these around by modifying the CRBUFF, CWBUFF pointer constants (see ZEN listing). They can occupy the same space if required as ZEN only uses one at a time.

Something you should be aware of when designing a program is the Amstrad's use of background interrupts. The interrupt handler is running constantly in order to scan the keyboard, etc. This interrupt handler expects to find certain information in the Z80 alternate registers. You should therefore never do an EXX instruction in your programs with interrupts enabled. If you have to look at the alternate registers for any reason then disable interrupts first. You should also be aware that any call to the Operating System jump block will turn interrupts back on and will consequently crash if you have the register sets exchanged.

Assembler Syntax

ZEN expects assembly language statements to be constructed according to the syntax defined in the ZILOG Z80 Assembly Language Programming Manual. ZEN deviates from the standard in one instance in that it expects EX AF,AF rather than EX AF,AF'. The section following this one contains an alphabetically sorted listing of the entire Z80 instruction set. Each assembly language statement may be divided into a maximum of four logical fields, they are:

(1) Label
(2) Operator
(3) Operands
(4) Comment

Label A label is a way of marking a statement so that other statements can refer to it. Line numbers serve the same purpose in BASIC, you would use GOTO 240 for example. Assembly Language allows you to use a symbolic name for a label. When you declare the label it must be postfixed with a colon ':' so that the assembler knows that it's a label. A label must begin with a letter but may contain letters or digits after that. ZEN allows labels of any length with all characters being significant. The register and condition-code names may not be used as symbols as these are reserved identifiers. Any attempt to do so will result in an error message.

Operator There are sixty-seven operators in the Z80 Assembly Language. In addition ZEN supports seven PSEUDO-OPS, they are:

END This pseudo-op terminates assembly, it MUST be used.

DS or DEFS Define Storage skips over the number of object locations specified by the operand.

DW or DEFW Define Word places the operand in the object file in reverse order as required by the Z80 word instructions.

DB or DEFB Define Byte(s) places the operand(s) in the object file at successive locations. Operands are delimited by commas, each operand may be an expression with value less than 256 or may be a literal string. Literal strings may be of any length but cannot form part of an expression.

EQU Equate assigns the value of the operand to a symbolic identifier. Any symbolic identifiers used in the operand expression must already be known to the assembler. This 'no forward reference' rule is designed to prevent circular referencing.

ORG Origin defines the start address of the object file. This pseudo-op can be used as often as needed to produce sections of code at different addresses. The 'no forward reference' rule applies to the operand.

LOAD Commences loading code into memory at the operand address. Use of a subsequent ORG pseudo-op will turn this process off, you are explicitly required to re-establish the loading process.

Operands The number of operands in a statement depends upon the operator. There are niladic, monadic and dyadic operators in the Z80 instruction set. These take zero, one and two operands respectively. There are three classes of operand:

(1) Registers (A,B,C,D,E,H,L,I,R,HL,DE,BC,AF,IX,IY,SP)

(2) Condition-codes (NZ,Z,NC,C,PO,PE,P,M)

(3) Numeric expressions

A numeric expression is composed of one or more of the following elements delimited by the infix math operators:

(1) A decimal, hex or octal number. Decimal is the default base with hex numbers being 'H' postfixed and octal 'O' postfixed. Numbers must begin with a digit, a leading zero will be needed with some hex numbers.

(2) A literal character enclosed in single or double quotes.

(3) The $ character. This variable mimics the program counter of the run-time program.

(4) A symbolic name. The assembler will use the associated value in evaluating the expression.

The infix math operators are:

+ addition
- subtraction
* multiplication
/ division
& logical AND
. logical OR

Expressions are evaluated STRICTLY LEFT TO RIGHT with no precedence ordering. Arithmetic is sixteen bit unsigned integer and overflow will be ignored.

Comments Comments are ignored by the assembler. They begin with a semi-colon ';' and are terminated by the end-of-line.

Assembler Error Handling

If the assembler finds a syntax error the following will happen:

(1) Assembly terminates.

(2) An error message is displayed.

(3) The offending line is displayed and is made the editor current line.

(4) The command loop is re-entered.

You can now correct the error and re-assemble. It is impossible to make a syntax error which will damage ZEN or anything in memory. The error messages are:

UNDEFINED You have used an undeclared symbol.

SYMBOL You have declared a zero length symbol or have forgotten the symbol needed with an EQU pseudo-op.

RESERVED You have tried to use a reserved word for a symbol.

FULL The symbol table is full.

DOUBLE SYMBOL You have declared the same symbol more than once.

EOF You have forgotten END and have hit end-of-file.

ORG! You have forgotten ORG.

HUH? The assembler is completely baffled.

OPERAND You have done something wrong with an operand, this covers a multitude of sins! Most types of syntax error will come under this heading as well as errors of magnitude. These occur when you try to offset too far with a relative jump or indexing instruction.

```
                        ; *************************
                        ; *    Z80 Instruction    *
                        ; *          Set          *
                        ; *************************

                                ORG  0

                        INDEX:  EQU  5                  ; IX,IY Index
                        NUMBER: EQU  0584H              ; 16 BIT Operand
                        NUM:    EQU  20H                ; 8 BIT Operand

0000 8E                         ADC  A,(HL)
0001 DD8E05                     ADC  A,(IX+INDEX)
0004 FD8E05                     ADC  A,(IY+INDEX)
0007 8F                         ADC  A,A
0008 88                         ADC  A,B
0009 89                         ADC  A,C
000A 8A                         ADC  A,D
000B 8B                         ADC  A,E
000C 8C                         ADC  A,H
000D 8D                         ADC  A,L
000E CE20                       ADC  A,NUM
0010 ED4A                       ADC  HL,BC
0012 ED5A                       ADC  HL,DE
0014 ED6A                       ADC  HL,HL
0016 ED7A                       ADC  HL,SP
0018 86                         ADD  A,(HL)
0019 DD8605                     ADD  A,(IX+INDEX)
001C FD8605                     ADD  A,(IY+INDEX)
001F 87                         ADD  A,A
0020 80                         ADD  A,B
0021 81                         ADD  A,C
0022 82                         ADD  A,D
0023 83                         ADD  A,E
0024 84                         ADD  A,H
0025 85                         ADD  A,L
0026 C620                       ADD  A,NUM
0028 09                         ADD  HL,BC
0029 19                         ADD  HL,DE
002A 29                         ADD  HL,HL
002B 39                         ADD  HL,SP
002C DD09                       ADD  IX,BC
002E DD19                       ADD  IX,DE
0030 DD29                       ADD  IX,IX
0032 DD39                       ADD  IX,SP
0034 FD09                       ADD  IY,BC
0036 FD19                       ADD  IY,DE
0038 FD29                       ADD  IY,IY
003A FD39                       ADD  IY,SP
003C A6                         AND  (HL)
003D DDA605                     AND  (IX+INDEX)
0040 FDA605                     AND  (IY+INDEX)
0043 A7                         AND  A
0044 A0                         AND  B
0045 A1                         AND  C
0046 A2                         AND  D
0047 A3                         AND  E
0048 A4                         AND  H
0049 A5                         AND  L
004A E620                       AND  NUM
```

```
  61 004C CB46              BIT  0,(HL)
  62 004E DDCB0546          BIT  0,(IX+INDEX)
  63 0052 FDCB0546          BIT  0,(IY+INDEX)
  64 0056 CB47              BIT  0,A
  65 0058 CB40              BIT  0,B
  66 005A CB41              BIT  0,C
  67 005C CB42              BIT  0,D
  68 005E CB43              BIT  0,E
  69 0060 CB44              BIT  0,H
  70 0062 CB45              BIT  0,L
  71 0064 CB4E              BIT  1,(HL)
  72 0066 DDCB054E          BIT  1,(IX+INDEX)
  73 006A FDCB054E          BIT  1,(IY+INDEX)
  74 006E CB4F              BIT  1,A
  75 0070 CB48              BIT  1,B
  76 0072 CB49              BIT  1,C
  77 0074 CB4A              BIT  1,D
  78 0076 CB4B              BIT  1,E
  79 0078 CB4C              BIT  1,H
  80 007A CB4D              BIT  1,L
  81 007C CB56              BIT  2,(HL)
  82 007E DDCB0556          BIT  2,(IX+INDEX)
  83 0082 FDCB0556          BIT  2,(IY+INDEX)
  84 0086 CB57              BIT  2,A
  85 0088 CB50              BIT  2,B
  86 008A CB51              BIT  2,C
  87 008C CB52              BIT  2,D
  88 008E CB53              BIT  2,E
  89 0090 CB54              BIT  2,H
  90 0092 CB55              BIT  2,L
  91 0094 CB5E              BIT  3,(HL)
  92 0096 DDCB055E          BIT  3,(IX+INDEX)
  93 009A FDCB055E          BIT  3,(IY+INDEX)
  94 009E CB5F              BIT  3,A
  95 00A0 CB58              BIT  3,B
  96 00A2 CB59              BIT  3,C
  97 00A4 CB5A              BIT  3,D
  98 00A6 CB5B              BIT  3,E
  99 00A8 CB5C              BIT  3,H
 100 00AA CB5D              BIT  3,L
 101 00AC CB66              BIT  4,(HL)
 102 00AE DDCB0566          BIT  4,(IX+INDEX)
 103 00B2 FDCB0566          BIT  4,(IY+INDEX)
 104 00B6 CB67              BIT  4,A
 105 00B8 CB60              BIT  4,B
 106 00BA CB61              BIT  4,C
 107 00BC CB62              BIT  4,D
 108 00BE CB63              BIT  4,E
 109 00C0 CB64              BIT  4,H
 110 00C2 CB65              BIT  4,L
 111 00C4 CB6E              BIT  5,(HL)
 112 00C6 DDCB056E          BIT  5,(IX+INDEX)
 113 00CA FDCB056E          BIT  5,(IY+INDEX)
 114 00CE CB6F              BIT  5,A
 115 00D0 CB68              BIT  5,B
 116 00D2 CB69              BIT  5,C
 117 00D4 CB6A              BIT  5,D
 118 00D6 CB6B              BIT  5,E
 119 00D8 CB6C              BIT  5,H
 120 00DA CB6D              BIT  5,L
```

```
121 00DC CB76          BIT  6,(HL)
122 00DE DDCB0576      BIT  6,(IX+INDEX)
123 00E2 FDCB0576      BIT  6,(IY+INDEX)
124 00E6 CB77          BIT  6,A
125 00E8 CB70          BIT  6,B
126 00EA CB71          BIT  6,C
127 00EC CB72          BIT  6,D
128 00EE CB73          BIT  6,E
129 00F0 CB74          BIT  6,H
130 00F2 CB75          BIT  6,L
131 00F4 CB7E          BIT  7,(HL)
132 00F6 DDCB057E      BIT  7,(IX+INDEX)
133 00FA FDCB057E      BIT  7,(IY+INDEX)
134 00FE CB7F          BIT  7,A
135 0100 CB78          BIT  7,B
136 0102 CB79          BIT  7,C
137 0104 CB7A          BIT  7,D
138 0106 CB7B          BIT  7,E
139 0108 CB7C          BIT  7,H
140 010A CB7D          BIT  7,L
141 010C DC8405        CALL C,NUMBER
142 010F FC8405        CALL M,NUMBER
143 0112 D48405        CALL NC,NUMBER
144 0115 CD8405        CALL NUMBER
145 0118 C48405        CALL NZ,NUMBER
146 011B F48405        CALL P,NUMBER
147 011E EC8405        CALL PE,NUMBER
148 0121 E48405        CALL PO,NUMBER
149 0124 CC8405        CALL Z,NUMBER
150 0127 3F            CCF
151 0128 BE            CP   (HL)
152 0129 DDBE05        CP   (IX+INDEX)
153 012C FDBE05        CP   (IY+INDEX)
154 012F BF            CP   A
155 0130 B8            CP   B
156 0131 B9            CP   C
157 0132 BA            CP   D
158 0133 BB            CP   E
159 0134 BC            CP   H
160 0135 BD            CP   L
161 0136 FE20          CP   NUM
162 0138 EDA9          CPD
163 013A EDB9          CPDR
164 013C EDA1          CPI
165 013E EDB1          CPIR
166 0140 2F            CPL
167 0141 27            DAA
168 0142 35            DEC  (HL)
169 0143 DD3505        DEC  (IX+INDEX)
170 0146 FD3505        DEC  (IY+INDEX)
171 0149 3D            DEC  A
172 014A 05            DEC  B
173 014B 0B            DEC  BC
174 014C 0D            DEC  C
175 014D 15            DEC  D
176 014E 1B            DEC  DE
177 014F 1D            DEC  E
178 0150 25            DEC  H
179 0151 2B            DEC  HL
180 0152 DD2B          DEC  IX
```

```
 181 0154 FD2B          DEC  IY
 182 0156 2D            DEC  L
 183 0157 3B            DEC  SP
 184 0158 F3            DI
 185 0159 10FE          DJNZ $
 186 015B FB            EI
 187 015C E3            EX   (SP),HL
 188 015D DDE3          EX   (SP),IX
 189 015F FDE3          EX   (SP),IY
 190 0161 08            EX   AF,AF
 191 0162 EB            EX   DE,HL
 192 0163 D9            EXX
 193 0164 76            HALT
 194 0165 ED46          IM   0
 195 0167 ED56          IM   1
 196 0169 ED5E          IM   2
 197 016B ED78          IN   A,(C)
 198 016D DB20          IN   A,(NUM)
 199 016F ED40          IN   B,(C)
 200 0171 ED48          IN   C,(C)
 201 0173 ED50          IN   D,(C)
 202 0175 ED58          IN   E,(C)
 203 0177 ED60          IN   H,(C)
 204 0179 ED68          IN   L,(C)
 205 017B 34            INC  (HL)
 206 017C DD3405        INC  (IX+INDEX)
 207 017F FD3405        INC  (IY+INDEX)
 208 0182 3C            INC  A
 209 0183 04            INC  B
 210 0184 03            INC  BC
 211 0185 0C            INC  C
 212 0186 14            INC  D
 213 0187 13            INC  DE
 214 0188 1C            INC  E
 215 0189 24            INC  H
 216 018A 23            INC  HL
 217 018B DD23          INC  IX
 218 018D FD23          INC  IY
 219 018F 2C            INC  L
 220 0190 33            INC  SP
 221 0191 EDAA          IND
 222 0193 EDBA          INDR
 223 0195 EDA2          INI
 224 0197 EDB2          INIR
 225 0199 E9            JP   (HL)
 226 019A DDE9          JP   (IX)
 227 019C FDE9          JP   (IY)
 228 019E DA8405        JP   C,NUMBER
 229 01A1 FA8405        JP   M,NUMBER
 230 01A4 D28405        JP   NC,NUMBER
 231 01A7 C38405        JP   NUMBER
 232 01AA C28405        JP   NZ,NUMBER
 233 01AD F28405        JP   P,NUMBER
 234 01B0 EA8405        JP   PE,NUMBER
 235 01B3 E28405        JP   PO,NUMBER
 236 01B6 CA8405        JP   Z,NUMBER
 237 01B9 38FE          JR   C,$
 238 01BB 18FE          JR   $
 239 01BD 30FE          JR   NC,$
 240 01BF 20FE          JR   NZ,$
```

```
 241 01C1 28FE          JR    Z,$
 242 01C3 02            LD    (BC),A
 243 01C4 12            LD    (DE),A
 244 01C5 77            LD    (HL),A
 245 01C6 70            LD    (HL),B
 246 01C7 71            LD    (HL),C
 247 01C8 72            LD    (HL),D
 248 01C9 73            LD    (HL),E
 249 01CA 74            LD    (HL),H
 250 01CB 75            LD    (HL),L
 251 01CC 3620          LD    (HL),NUM
 252 01CE DD7705        LD    (IX+INDEX),A
 253 01D1 DD7005        LD    (IX+INDEX),B
 254 01D4 DD7105        LD    (IX+INDEX),C
 255 01D7 DD7205        LD    (IX+INDEX),D
 256 01DA DD7305        LD    (IX+INDEX),E
 257 01DD DD7405        LD    (IX+INDEX),H
 258 01E0 DD7505        LD    (IX+INDEX),L
 259 01E3 DD360520      LD    (IX+INDEX),NUM
 260 01E7 FD7705        LD    (IY+INDEX),A
 261 01EA FD7005        LD    (IY+INDEX),B
 262 01ED FD7105        LD    (IY+INDEX),C
 263 01F0 FD7205        LD    (IY+INDEX),D
 264 01F3 FD7305        LD    (IY+INDEX),E
 265 01F6 FD7405        LD    (IY+INDEX),H
 266 01F9 FD7505        LD    (IY+INDEX),L
 267 01FC FD360520      LD    (IY+INDEX),NUM
 268 0200 328405        LD    (NUMBER),A
 269 0203 ED438405      LD    (NUMBER),BC
 270 0207 ED538405      LD    (NUMBER),DE
 271 020B 228405        LD    (NUMBER),HL
 272 020E DD228405      LD    (NUMBER),IX
 273 0212 FD228405      LD    (NUMBER),IY
 274 0216 ED738405      LD    (NUMBER),SP
 275 021A 0A            LD    A,(BC)
 276 021B 1A            LD    A,(DE)
 277 021C 7E            LD    A,(HL)
 278 021D DD7E05        LD    A,(IX+INDEX)
 279 0220 FD7E05        LD    A,(IY+INDEX)
 280 0223 3A8405        LD    A,(NUMBER)
 281 0226 7F            LD    A,A
 282 0227 78            LD    A,B
 283 0228 79            LD    A,C
 284 0229 7A            LD    A,D
 285 022A 7B            LD    A,E
 286 022B 7C            LD    A,H
 287 022C ED57          LD    A,I
 288 022E 7D            LD    A,L
 289 022F 3E20          LD    A,NUM
 290 0231 ED5F          LD    A,R
 291 0233 46            LD    B,(HL)
 292 0234 DD4605        LD    B,(IX+INDEX)
 293 0237 FD4605        LD    B,(IY+INDEX)
 294 023A 47            LD    B,A
 295 023B 40            LD    B,B
 296 023C 41            LD    B,C
 297 023D 42            LD    B,D
 298 023E 43            LD    B,E
 299 023F 44            LD    B,H
 300 0240 45            LD    B,L
```

```
  301 0241 0620          LD   B,NUM
  302 0243 ED4B8405      LD   BC,(NUMBER)
  303 0247 018405        LD   BC,NUMBER
  304 024A 4E            LD   C,(HL)
  305 024B DD4E05        LD   C,(IX+INDEX)
  306 024E FD4E05        LD   C,(IY+INDEX)
  307 0251 4F            LD   C,A
  308 0252 48            LD   C,B
  309 0253 49            LD   C,C
  310 0254 4A            LD   C,D
  311 0255 4B            LD   C,E
  312 0256 4C            LD   C,H
  313 0257 4D            LD   C,L
  314 0258 0E20          LD   C,NUM
  315 025A 56            LD   D,(HL)
  316 025B DD5605        LD   D,(IX+INDEX)
  317 025E FD5605        LD   D,(IY+INDEX)
  318 0261 57            LD   D,A
  319 0262 50            LD   D,B
  320 0263 51            LD   D,C
  321 0264 52            LD   D,D
  322 0265 53            LD   D,E
  323 0266 54            LD   D,H
  324 0267 55            LD   D,L
  325 0268 1620          LD   D,NUM
  326 026A ED5B8405      LD   DE,(NUMBER)
  327 026E 118405        LD   DE,NUMBER
  328 0271 5E            LD   E,(HL)
  329 0272 DD5E05        LD   E,(IX+INDEX)
  330 0275 FD5E05        LD   E,(IY+INDEX)
  331 0278 5F            LD   E,A
  332 0279 58            LD   E,B
  333 027A 59            LD   E,C
  334 027B 5A            LD   E,D
  335 027C 5B            LD   E,E
  336 027D 5C            LD   E,H
  337 027E 5D            LD   E,L
  338 027F 1E20          LD   E,NUM
  339 0281 66            LD   H,(HL)
  340 0282 DD6605        LD   H,(IX+INDEX)
  341 0285 FD6605        LD   H,(IY+INDEX)
  342 0288 67            LD   H,A
  343 0289 60            LD   H,B
  344 028A 61            LD   H,C
  345 028B 62            LD   H,D
  346 028C 63            LD   H,E
  347 028D 64            LD   H,H
  348 028E 65            LD   H,L
  349 028F 2620          LD   H,NUM
  350 0291 2A8405        LD   HL,(NUMBER)
  351 0294 218405        LD   HL,NUMBER
  352 0297 ED47          LD   I,A
  353 0299 DD2A8405      LD   IX,(NUMBER)
  354 029D DD218405      LD   IX,NUMBER
  355 02A1 FD2A8405      LD   IY,(NUMBER)
  356 02A5 FD218405      LD   IY,NUMBER
  357 02A9 6E            LD   L,(HL)
  358 02AA DD6E05        LD   L,(IX+INDEX)
  359 02AD FD6E05        LD   L,(IY+INDEX)
  360 02B0 6F            LD   L,A
```

```
 361 02B1 68          LD   L,B
 362 02B2 69          LD   L,C
 363 02B3 6A          LD   L,D
 364 02B4 6B          LD   L,E
 365 02B5 6C          LD   L,H
 366 02B6 6D          LD   L,L
 367 02B7 2E20        LD   L,NUM
 368 02B9 ED4F        LD   R,A
 369 02BB ED7B8405    LD   SP,(NUMBER)
 370 02BF F9          LD   SP,HL
 371 02C0 DDF9        LD   SP,IX
 372 02C2 FDF9        LD   SP,IY
 373 02C4 318405      LD   SP,NUMBER
 374 02C7 EDA8        LDD
 375 02C9 EDB8        LDDR
 376 02CB EDA0        LDI
 377 02CD EDB0        LDIR
 378 02CF ED44        NEG
 379 02D1 00          NOP
 380 02D2 B6          OR   (HL)
 381 02D3 DDB605      OR   (IX+INDEX)
 382 02D6 FDB605      OR   (IY+INDEX)
 383 02D9 B7          OR   A
 384 02DA B0          OR   B
 385 02DB B1          OR   C
 386 02DC B2          OR   D
 387 02DD B3          OR   E
 388 02DE B4          OR   H
 389 02DF B5          OR   L
 390 02E0 F620        OR   NUM
 391 02E2 EDBB        OTDR
 392 02E4 EDB3        OTIR
 393 02E6 ED79        OUT  (C),A
 394 02E8 ED41        OUT  (C),B
 395 02EA ED49        OUT  (C),C
 396 02EC ED51        OUT  (C),D
 397 02EE ED59        OUT  (C),E
 398 02F0 ED61        OUT  (C),H
 399 02F2 ED69        OUT  (C),L
 400 02F4 D320        OUT  (NUM),A
 401 02F6 EDAB        OUTD
 402 02F8 EDA3        OUTI
 403 02FA F1          POP  AF
 404 02FB C1          POP  BC
 405 02FC D1          POP  DE
 406 02FD E1          POP  HL
 407 02FE DDE1        POP  IX
 408 0300 FDE1        POP  IY
 409 0302 F5          PUSH AF
 410 0303 C5          PUSH BC
 411 0304 D5          PUSH DE
 412 0305 E5          PUSH HL
 413 0306 DDE5        PUSH IX
 414 0308 FDE5        PUSH IY
 415 030A CB86        RES  0,(HL)
 416 030C DDCB0586    RES  0,(IX+INDEX)
 417 0310 FDCB0586    RES  0,(IY+INDEX)
 418 0314 CB87        RES  0,A
 419 0316 CB80        RES  0,B
 420 0318 CB81        RES  0,C
```

```
 421 031A CB82          RES  0,D
 422 031C CB83          RES  0,E
 423 031E CB84          RES  0,H
 424 0320 CB85          RES  0,L
 425 0322 CB8E          RES  1,(HL)
 426 0324 DDCB058E      RES  1,(IX+INDEX)
 427 0328 FDCB058E      RES  1,(IY+INDEX)
 428 032C CB8F          RES  1,A
 429 032E CB88          RES  1,B
 430 0330 CB89          RES  1,C
 431 0332 CB8A          RES  1,D
 432 0334 CB8B          RES  1,E
 433 0336 CB8C          RES  1,H
 434 0338 CB8D          RES  1,L
 435 033A CB96          RES  2,(HL)
 436 033C DDCB0596      RES  2,(IX+INDEX)
 437 0340 FDCB0596      RES  2,(IY+INDEX)
 438 0344 CB97          RES  2,A
 439 0346 CB90          RES  2,B
 440 0348 CB91          RES  2,C
 441 034A CB92          RES  2,D
 442 034C CB93          RES  2,E
 443 034E CB94          RES  2,H
 444 0350 CB95          RES  2,L
 445 0352 CB9E          RES  3,(HL)
 446 0354 DDCB059E      RES  3,(IX+INDEX)
 447 0358 FDCB059E      RES  3,(IY+INDEX)
 448 035C CB9F          RES  3,A
 449 035E CB98          RES  3,B
 450 0360 CB99          RES  3,C
 451 0362 CB9A          RES  3,D
 452 0364 CB9B          RES  3,E
 453 0366 CB9C          RES  3,H
 454 0368 CB9D          RES  3,L
 455 036A CBA6          RES  4,(HL)
 456 036C DDCB05A6      RES  4,(IX+INDEX)
 457 0370 FDCB05A6      RES  4,(IY+INDEX)
 458 0374 CBA7          RES  4,A
 459 0376 CBA0          RES  4,B
 460 0378 CBA1          RES  4,C
 461 037A CBA2          RES  4,D
 462 037C CBA3          RES  4,E
 463 037E CBA4          RES  4,H
 464 0380 CBA5          RES  4,L
 465 0382 CBAE          RES  5,(HL)
 466 0384 DDCB05AE      RES  5,(IX+INDEX)
 467 0388 FDCB05AE      RES  5,(IY+INDEX)
 468 038C CBAF          RES  5,A
 469 038E CBA8          RES  5,B
 470 0390 CBA9          RES  5,C
 471 0392 CBAA          RES  5,D
 472 0394 CBAB          RES  5,E
 473 0396 CBAC          RES  5,H
 474 0398 CBAD          RES  5,L
 475 039A CBB6          RES  6,(HL)
 476 039C DDCB05B6      RES  6,(IX+INDEX)
 477 03A0 FDCB05B6      RES  6,(IY+INDEX)
 478 03A4 CBB7          RES  6,A
 479 03A6 CBB0          RES  6,B
 480 03A8 CBB1          RES  6,C
```

```
481 03AA CBB2                RES  6,D
482 03AC CBB3                RES  6,E
483 03AE CBB4                RES  6,H
484 03B0 CBB5                RES  6,L
485 03B2 CBBE                RES  7,(HL)
486 03B4 DDCB05BE            RES  7,(IX+INDEX)
487 03B8 FDCB05BE            RES  7,(IY+INDEX)
488 03BC CBBF                RES  7,A
489 03BE CBB8                RES  7,B
490 03C0 CBB9                RES  7,C
491 03C2 CBBA                RES  7,D
492 03C4 CBBB                RES  7,E
493 03C6 CBBC                RES  7,H
494 03C8 CBBD                RES  7,L
495 03CA C9                  RET
496 03CB D8                  RET  C
497 03CC F8                  RET  M
498 03CD D0                  RET  NC
499 03CE C0                  RET  NZ
500 03CF F0                  RET  P
501 03D0 E8                  RET  PE
502 03D1 E0                  RET  PO
503 03D2 C8                  RET  Z
504 03D3 ED4D                RETI
505 03D5 ED45                RETN
506 03D7 CB16                RL   (HL)
507 03D9 DDCB0516            RL   (IX+INDEX)
508 03DD FDCB0516            RL   (IY+INDEX)
509 03E1 CB17                RL   A
510 03E3 CB10                RL   B
511 03E5 CB11                RL   C
512 03E7 CB12                RL   D
513 03E9 CB13                RL   E
514 03EB CB14                RL   H
515 03ED CB15                RL   L
516 03EF 17                  RLA
517 03F0 CB06                RLC  (HL)
518 03F2 DDCB0506            RLC  (IX+INDEX)
519 03F6 FDCB0506            RLC  (IY+INDEX)
520 03FA CB07                RLC  A
521 03FC CB00                RLC  B
522 03FE CB01                RLC  C
523 0400 CB02                RLC  D
524 0402 CB03                RLC  E
525 0404 CB04                RLC  H
526 0406 CB05                RLC  L
527 0408 07                  RLCA
528 0409 ED6F                RLD
529 040B CB1E                RR   (HL)
530 040D DDCB051E            RR   (IX+INDEX)
531 0411 FDCB051E            RR   (IY+INDEX)
532 0415 CB1F                RR   A
533 0417 CB18                RR   B
534 0419 CB19                RR   C
535 041B CB1A                RR   D
536 041D CB1B                RR   E
537 041F CB1C                RR   H
538 0421 CB1D                RR   L
539 0423 1F                  RRA
540 0424 CB0E                RRC  (HL)
```

```
541 0426 DDCB050E          RRC  (IX+INDEX)
542 042A FDCB050E          RRC  (IY+INDEX)
543 042E CB0F              RRC  A
544 0430 CB08              RRC  B
545 0432 CB09              RRC  C
546 0434 CB0A              RRC  D
547 0436 CB0B              RRC  E
548 0438 CB0C              RRC  H
549 043A CB0D              RRC  L
550 043C 0F                RRCA
551 043D ED67              RRD
552 043F C7                RST  0
553 0440 D7                RST  10H
554 0441 DF                RST  18H
555 0442 E7                RST  20H
556 0443 EF                RST  28H
557 0444 F7                RST  30H
558 0445 FF                RST  38H
559 0446 CF                RST  8
560 0447 9E                SBC  A,(HL)
561 0448 DD9E05            SBC  A,(IX+INDEX)
562 044B FD9E05            SBC  A,.(IY+INDEX)
563 044E 9F                SBC  A,A
564 044F 98                SBC  A,B
565 0450 99                SBC  A,C
566 0451 9A                SBC  A,D
567 0452 9B                SBC  A,E
568 0453 9C                SBC  A,H
569 0454 9D                SBC  A,L
570 0455 DE20              SBC  A,NUM
571 0457 ED42              SBC  HL,BC
572 0459 ED52              SBC  HL,DE
573 045B ED62              SBC  HL,HL
574 045D ED72              SBC  HL,SP
575 045F 37                SCF
576 0460 CBC6              SET  0,(HL)
577 0462 DDCB05C6          SET  0,(IX+INDEX)
578 0466 FDCB05C6          SET  0,(IY+INDEX)
579 046A CBC7              SET  0,A
580 046C CBC0              SET  0,B
581 046E CBC1              SET  0,C
582 0470 CBC2              SET  0,D
583 0472 CBC3              SET  0,E
584 0474 CBC4              SET  0,H
585 0476 CBC5              SET  0,L
586 0478 CBCE              SET  1,(HL)
587 047A DDCB05CE          SET  1,(IX+INDEX)
588 047E FDCB05CE          SET  1,(IY+INDEX)
589 0482 CBCF              SET  1,A
590 0484 CBC8              SET  1,B
591 0486 CBC9              SET  1,C
592 0488 CBCA              SET  1,D
593 048A CBCB              SET  1,E
594 048C CBCC              SET  1,H
595 048E CBCD              SET  1,L
596 0490 CBD6              SET  2,(HL)
597 0492 DDCB05D6          SET  2,(IX+INDEX)
598 0496 FDCB05D6          SET  2,(IY+INDEX)
599 049A CBD7              SET  2,A
600 049C CBD0              SET  2,B
```

```
601 049E CBD1                SET  2,C
602 04A0 CBD2                SET  2,D
603 04A2 CBD3                SET  2,E
604 04A4 CBD4                SET  2,H
605 04A6 CBD5                SET  2,L
606 04A8 CBDE                SET  3,(HL)
607 04AA DDCB05DE            SET  3,(IX+INDEX)
608 04AE FDCB05DE            SET  3,(IY+INDEX)
609 04B2 CBDF                SET  3,A
610 04B4 CBD8                SET  3,B
611 04B6 CBD9                SET  3,C
612 04B8 CBDA                SET  3,D
613 04BA CBDB                SET  3,E
614 04BC CBDC                SET  3,H
615 04BE CBDD                SET  3,L
616 04C0 CBE6                SET  4,(HL)
617 04C2 DDCB05E6            SET  4,(IX+INDEX)
618 04C6 FDCB05E6            SET  4,(IY+INDEX)
619 04CA CBE7                SET  4,A
620 04CC CBE0                SET  4,B
621 04CE CBE1                SET  4,C
622 04D0 CBE2                SET  4,D
623 04D2 CBE3                SET  4,E
624 04D4 CBE4                SET  4,H
625 04D6 CBE5                SET  4,L
626 04D8 CBEE                SET  5,(HL)
627 04DA DDCB05EE            SET  5,(IX+INDEX)
628 04DE FDCB05EE            SET  5,(IY+INDEX)
629 04E2 CBEF                SET  5,A
630 04E4 CBE8                SET  5,B
631 04E6 CBE9                SET  5,C
632 04E8 CBEA                SET  5,D
633 04EA CBEB                SET  5,E
634 04EC CBEC                SET  5,H
635 04EE CBED                SET  5,L
636 04F0 CBF6                SET  6,(HL)
637 04F2 DDCB05F6            SET  6,(IX+INDEX)
638 04F6 FDCB05F6            SET  6,(IY+INDEX)
639 04FA CBF7                SET  6,A
640 04FC CBF0                SET  6,B
641 04FE CBF1                SET  6,C
642 0500 CBF2                SET  6,D
643 0502 CBF3                SET  6,E
644 0504 CBF4                SET  6,H
645 0506 CBF5                SET  6,L
646 0508 CBFE                SET  7,(HL)
647 050A DDCB05FE            SET  7,(IX+INDEX)
648 050E FDCB05FE            SET  7,(IY+INDEX)
649 0512 CBFF                SET  7,A
650 0514 CBF8                SET  7,B
651 0516 CBF9                SET  7,C
652 0518 CBFA                SET  7,D
653 051A CBFB                SET  7,E
654 051C CBFC                SET  7,H
655 051E CBFD                SET  7,L
656 0520 CB26                SLA  (HL)
657 0522 DDCB0526            SLA  (IX+INDEX)
658 0526 FDCB0526            SLA  (IY+INDEX)
659 052A CB27                SLA  A
660 052C CB20                SLA  B
```

```
661 052E CB21          SLA  C
662 0530 CB22          SLA  D
663 0532 CB23          SLA  E
664 0534 CB24          SLA  H
665 0536 CB25          SLA  L
666 0538 CB2E          SRA  (HL)
667 053A DDCB052E      SRA  (IX+INDEX)
668 053E FDCB052E      SRA  (IY+INDEX)
669 0542 CB2F          SRA  A
670 0544 CB28          SRA  B
671 0546 CB29          SRA  C
672 0548 CB2A          SRA  D
673 054A CB2B          SRA  E
674 054C CB2C          SRA  H
675 054E CB2D          SRA  L
676 0550 CB3E          SRL  (HL)
677 0552 DDCB053E      SRL  (IX+INDEX)
678 0556 FDCB053E      SRL  (IY+INDEX)
679 055A CB3F          SRL  A
680 055C CB38          SRL  B
681 055E CB39          SRL  C
682 0560 CB3A          SRL  D
683 0562 CB3B          SRL  E
684 0564 CB3C          SRL  H
685 0566 CB3D          SRL  L
686 0568 96            SUB  (HL)
687 0569 DD9605        SUB  (IX+INDEX)
688 056C FD9605        SUB  (IY+INDEX)
689 056F 97            SUB  A
690 0570 90            SUB  B
691 0571 91            SUB  C
692 0572 92            SUB  D
693 0573 93            SUB  E
694 0574 94            SUB  H
695 0575 95            SUB  L
696 0576 D620          SUB  NUM
697 0578 AE            XOR  (HL)
698 0579 DDAE05        XOR  (IX+INDEX)
699 057C FDAE05        XOR  (IY+INDEX)
700 057F AF            XOR  A
701 0580 A8            XOR  B
702 0581 A9            XOR  C
703 0582 AA            XOR  D
704 0583 AB            XOR  E
705 0584 AC            XOR  H
706 0585 AD            XOR  L
707 0586 EE20          XOR  NUM
708
709                    END
```

```
                        ; ******************************
                        ; **      AMSTRAD ZEN 1.0       **
                        ; **                            **
                        ; ** Written by John Hawthorne **
                        ; **                            **
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                        ; **    Cowley , Middlesex      **
                        ; ******************************

                                ORG  4000H

                        ; Control characters

                        BS:             EQU  8
                        LF:             EQU  10
                        CR:             EQU  13
                        FF:             EQU  12
                        BLANK:          EQU  32
                        DEL:            EQU  7FH
                        S:              EQU  80H

                        ; Externals

                        WAITCHAR:       EQU  0BB06H
                        READCHAR:       EQU  0BB09H
                        TXTOUT:         EQU  0BB5AH
                        CURON:          EQU  0BB81H
                        CUROFF:         EQU  0BB84H
                        CINIT:          EQU  0BC65H
                        CCAT:           EQU  0BC9BH
                        CIDIR:          EQU  0BC83H
                        CODIR:          EQU  0BC98H
                        CIABAN:         EQU  0BC7DH
                        COABAN:         EQU  0BC92H
                        CICHAR:         EQU  0BC80H
                        COCHAR:         EQU  0BC95H
                        CIOPEN:         EQU  0BC77H
                        COOPEN:         EQU  0BC8CH
                        CICLOSE:        EQU  0BC7AH
                        COCLOSE:        EQU  0BC8FH
                        BMIR:           EQU  0B91BH
                        PBUSY:          EQU  0BD2EH
                        PSEND:          EQU  0BD31H

                        ; Flag displacements

                        F1:             EQU  0
                        F2:             EQU  1
                        F3:             EQU  2
                        F4:             EQU  3
                        F5:             EQU  4
                        F6:             EQU  5
                        F7:             EQU  6

                        ; Code starts here, skip text etc.

4000 C3E041     ENTRY:          JP   ZEN
4003 C34E47     REENTRY:        JP   TRAP
4006 5A454E3E   M1:             DB   'ZEN>',CR
```

```
 60 400A 0D
 61 400B 4855483F M2:          DB   'HUH?',CR
 61 400F 0D
 62 4010 50414745 M4:          DB   'PAGE',CR
 62 4014 0D
 63 4015 454F460D M5:          DB   'EOF',CR
 64 4019 4F505449 M7:          DB   'OPTION>',CR
 64 401D 4F4E3E0D
 65 4021 44415441 M9:          DB   'DATA AREAS:',CR
 65 4025 20415245
 65 4029 41533A0D
 66 402D 52554E53 M11:         DB   'RUNS AT>',CR
 66 4031 2041543E
 66 4035 0D
 67 4036 52455345 M12:         DB   'RESERVED',CR
 67 403A 52564544
 67 403E 0D
 68 403F 46554C4C M14:         DB   'FULL',CR
 68 4043 0D
 69 4044 444F5542 M13:         DB   'DOUBLE '
 69 4048 4C4520
 70 404B 53594D42 M15:         DB   'SYMBOL',CR
 70 404F 4F4C0D
 71 4052 4F504552 M16:         DB   'OPERAND',CR
 71 4056 414E440D
 72 405A 554E4445 M17:         DB   'UNDEFINED',CR
 72 405E 46494E45
 72 4062 440D
 73 4064 4F524721 M10:         DB   'ORG!',CR
 73 4068 0D
 74 4069 4D454D4F M20:         DB   'MEMORY',CR
 74 406D 52590D
 75 4070 4E414D45 M21:         DB   'NAME>',CR
 75 4074 3E0D
 76 4076 53544152 M22:         DB   'START>',CR
 76 407A 543E0D
 77 407D 53544F50 M23:         DB   'STOP>',CR
 77 4081 3E0D
 78 4083 42524B50 M24:         DB   'BRKPT>',CR
 78 4087 3E0D
 79 4089 45584543 M25:         DB   'EXEC>',CR
 79 408D 3E0D
 80 408F 44455354 M27:         DB   'DEST>',CR
 80 4093 3E0D
 81 4095 44415441 M28:         DB   'DATA>',CR
 81 4099 3E0D
 82 409B 20484C20 M29:         DB   ' HL   DE
 82 409F 20204445
 82 40A3 202020
 83 40A6 42432020              DB   'BC   AF   RI',CR
 83 40AA 20414620
 83 40AE 20205249
 83 40B2 0D
 84 40B3 20495820 M30:         DB     IX   IY
 84 40B7 20204959
 84 40BB 202020
 85 40BE 53502020              DB   'SP   PC',CR
 85 40C2 20504300
 86
 87 40C6 560000   FLAGS:       DB   'V',0,0
```

```
 88 40C9 00000000                DB   0,0,0,0
 89
 90                     ; List field widths
 91
 92 40CD 3C19           COMWIDTH:  DB   60,25
 93 40CF 0C07           SYMWIDTH:  DB   12,7
 94 40D1 0505                      DB   5,5
 95 40D3 120C                      DB   18,12
 96 40D5 1901                      DB   25,1
 97
 98 40D7 0000           PAGENO:    DW   0              ; Page number
 99 40D9 0000           LCT:       DW   0              ; Line count
100 40DB 7FAB           LIMIT:     DW   0AB7FH
101 40DD 0000           CURRENT:   DW   0              ; Current line
102 40DF 0060           SOFP:      DW   AEND+1733
103 40E1 0060           EOFP:      DW   AEND+1733
104 40E3 0000           MDEF:      DW   0              ; MODIFY default
105 40E5 0000           QDEF:      DW   0              ; QUERY default
106 40E7 0000           TEMP:      DW   0
107 40E9 0000           FEP:       DW   0              ; Free entry
108 40EB 0000           STK:       DW   0
109 40ED 0000           LBLP:      DW   0              ; Label pointer
110 40EF 0000           FC:        DW   0
111 40F1 0000           OBJ:       DW   0              ; Object file pointer
112 40F3 0000           BKPTADDR:  DW   0
113 40F5 00             BKPTCODE:  DB   0
114 40F6 C3             VECTOR:    DB   0C3H
115 40F7 0340                      DW   REENTRY
116 40F9 0000           DSTART:    DW   0
117 40FB 0000           DSTOP:     DW   0
118 40FD 0000           DIP:       DW   0
119 40FF 0000           DRSTART:   DW   0
120 4101 0000           DRSTOP:    DW   0
121 4103 0000           DRIP:      DW   0
122 4105 0000           DEOAP:     DW   0
123 4107 3D5A           DSOSP:     DW   AEND+258
124 4109 0000           DEOSP:     DW   0
125 410B 0030           CRBUFF:    DW   3000H          ; Cassette read
126 410D 0038           CWBUFF:    DW   3800H          ; Cassette write
127
128                     USTK:      DS   40
129 4137 0000           IMAGE:     DW   0              ; HL
130 4139 0000                      DW   0              ; DE
131 413B 0000                      DW   0              ; BC
132 413D 0000                      DW   0              ; AF
133 413F 0000                      DW   0              ; IR
134 4141 0000                      DW   0              ; HL
135 4143 0000                      DW   0              ; DE
136 4145 857F                      DW   7F85H          ; BC
137 4147 8C8D                      DW   8D8CH          ; AF
138 4149 0000                      DW   0              ; IX
139 414B 0000                      DW   0              ; IY
140 414D 31             EXIT:      DB   31H
141 414E 3741           USP:       DW   IMAGE
142 4150 FB                        EI
143 4151 C3                        DB   0C3H
144 4152 0000           UPC:       DW   0
145
146                     TBUFF:     DS   140
147                     STACK:     DS   0
```

```
                        ; ZEN Mainloop
41E0 31E041     ZEN:    LD   SP,STACK
41E3 FB                 EI
41E4 DD21C640           LD   IX,FLAGS
41E8 CD7042             CALL TOP
41EB 21EB41             LD   HL,$
41EE E5                 PUSH HL
41EF ED73EB40           LD   (STK),SP
41F3 DD360056           LD   (IX+F1),'V'
41F7 2E06               LD   L,M1&255
41F9 CDAC46             CALL CUE
41FC 0D                 DEC  C
41FD CA2D48             JP   Z,CLEAR
4200 FE53               CP   'S'
4202 CA1B44             JP   Z,SORT
4205 FE57               CP   'W'
4207 CA4643             JP   Z,WRITE
420A FE4C               CP   'L'
420C 2824               JR   Z,LOCATE
420E E5                 PUSH HL
420F C5                 PUSH BC
4210 0E01               LD   C,1
4212 115441             LD   DE,TBUFF
4215 21C045             LD   HL,COMTAB
4218 CD1A4B             CALL SEARCH
421B DACD47             JP   C,E10
421E C1                 POP  BC
421F E3                 EX   (SP),HL
4220 41                 LD   B,C
4221 05                 DEC  B
4222 37                 SCF
4223 2809               JR   Z,ZEN2
4225 13                 INC  DE
4226 CDD247             CALL CONVERT
4229 DACD47             JP   C,E10
422C 44                 LD   B,H
422D 4D                 LD   C,L
422E 2ADD40     ZEN2:   LD   HL,(CURRENT)
4231 C9                 RET

4232 0D         LOCATE: DEC  C
4233 CACD47             JP   Z,E10
4236 2ADD40             LD   HL,(CURRENT)
4239 C5                 PUSH BC
423A CD5248             CALL NEXT
423D C1                 POP  BC
423E 2B                 DEC  HL
423F E5                 PUSH HL
4240 E1         LC1:    POP  HL
4241 7E                 LD   A,(HL)
4242 23                 INC  HL
4243 FE0D               CP   CR
4245 CCAB48             CALL Z,UPDATE
4248 CD0646             CALL EOF
424B 41                 LD   B,C
424C 115541             LD   DE,TBUFF+1
424F E5                 PUSH HL
4250 1A         LC2:    LD   A,(DE)
```

```
208 4251 BE                     CP   (HL)
209 4252 20EC                   JR   NZ,LC1
210 4254 13                     INC  DE
211 4255 23                     INC  HL
212 4256 10F8                   DJNZ LC2
213 4258 E1                     POP  HL
214 4259 CDCE42                 CALL THIS
215 425C 1832                   JR   LINE
216
217 425E 78             UP:     LD   A,B
218 425F B1                     OR   C
219 4260 282E                   JR   Z,LINE
220 4262 CDC442                 CALL LAST
221 4265 3029                   JR   NC,LINE
222 4267 0B                     DEC  BC
223 4268 18F4                   JR   UP
224
225 426A 2ADF40         KILL:   LD   HL,(SOFP)
226 426D 22E140                 LD   (EOFP),HL
227
228 4270 210100         TOP:    LD   HL,1
229 4273 22D940                 LD   (LCT),HL
230 4276 2ADF40                 LD   HL,(SOFP)
231 4279 22DD40                 LD   (CURRENT),HL
232 427C C9                     RET
233
234 427D CD7042         TARGET: CALL TOP
235 4280 0B                     DEC  BC
236
237 4281 78             DOWN:   LD   A,B
238 4282 B1                     OR   C
239 4283 280B                   JR   Z,LINE
240 4285 C5                     PUSH BC
241 4286 CD5248                 CALL NEXT
242 4289 C1                     POP  BC
243 428A CDAB48                 CALL UPDATE
244 428D 0B                     DEC  BC
245 428E 18F1                   JR   DOWN
246 4290 CD0646         LINE:   CALL EOF
247 4293 CD6048                 CALL POSITION
248 4296 C31E46                 JP   PR3
249
250 4299 78             ZAP:    LD   A,B
251 429A B1                     OR   C
252 429B 28F3                   JR   Z,LINE
253 429D E5                     PUSH HL
254 429E C5                     PUSH BC
255 429F CD8C47                 CALL REMOVE
256 42A2 C1                     POP  BC
257 42A3 E1                     POP  HL
258 42A4 0B                     DEC  BC
259 42A5 18F2                   JR   ZAP
260
261 42A7 2E4B           E0:     LD   L,M15&255
262 42A9 ED7BEB40       ER:     LD   SP,(STK)
263 42AD CD1846                 CALL ERR2
264 42B0 2AE740                 LD   HL,(TEMP)
265 42B3 010100                 LD   BC,1
266
267 42B6 78             PRINT:  LD   A,B
```

```
268 42B7 B1                     OR   C
269 42B8 280A                   JR   Z,LAST
270 42BA CD9042                 CALL LINE
271 42BD 23                     INC  HL
272 42BE CDAB48                 CALL UPDATE
273 42C1 0B                     DEC  BC
274 42C2 18F2                   JR   PRINT
275
276 42C4 E5         LAST:       PUSH HL
277 42C5 2AD940                 LD   HL,(LCT)
278 42C8 2B                     DEC  HL
279 42C9 22D940                 LD   (LCT),HL
280 42CC E1                     POP  HL
281 42CD 2B                     DEC  HL
282 42CE CD3248     THIS:       CALL SOF
283 42D1 309D                   JR   NC,TOP
284 42D3 2B                     DEC  HL
285 42D4 7E                     LD   A,(HL)
286 42D5 FE0D                   CP   CR
287 42D7 20F5                   JR   NZ,THIS
288 42D9 23                     INC  HL
289 42DA 22DD40                 LD   (CURRENT),HL
290 42DD 37                     SCF
291 42DE C9                     RET
292
293 42DF CD6048     ENTER:      CALL POSITION
294 42E2 EB                     EX   DE,HL
295 42E3 CDAF46                 CALL USER
296 42E6 FE2E                   CP   '.'
297 42E8 C8                     RET  Z
298 42E9 2AE140                 LD   HL,(EOFP)
299 42EC CD3D48                 CALL MEMCHECK
300 42EF CD2643                 CALL INSERT
301 42F2 EB                     EX   DE,HL
302 42F3 CDAB48                 CALL UPDATE
303 42F6 18E7                   JR   ENTER
304
305 42F8 E5         NEW:        PUSH HL
306 42F9 CD5248                 CALL NEXT
307 42FC 2AE140                 LD   HL,(EOFP)
308 42FF ED42                   SBC  HL,BC
309 4301 E3                     EX   (SP),HL
310 4302 E5                     PUSH HL
311 4303 C5                     PUSH BC
312 4304 115441                 LD   DE,TBUFF
313 4307 D5                     PUSH DE
314 4308 EDB0                   LDIR
315 430A E1                     POP  HL
316 430B C1                     POP  BC
317 430C 0B                     DEC  BC
318 430D CD6048                 CALL POSITION
319 4310 CDA246                 CALL STR1
320 4313 CDB946                 CALL US1
321 4316 CD2146                 CALL CRLF
322 4319 E1                     POP  HL
323 431A E3                     EX   (SP),HL
324 431B CD3D48                 CALL MEMCHECK
325 431E E1                     POP  HL
326 431F E5                     PUSH HL
327 4320 C5                     PUSH BC
```

```
328 4321 CD8C47                 CALL REMOVE
329 4324 C1                     POP  BC
330 4325 D1                     POP  DE
331
332 4326 D5         INSERT:     PUSH DE
333 4327 C5                     PUSH BC
334 4328 2AE140                 LD   HL,(EOFP)
335 432B E5                     PUSH HL
336 432C 09                     ADD  HL,BC
337 432D 22E140                 LD   (EOFP),HL
338 4330 E3                     EX   (SP),HL
339 4331 E5                     PUSH HL
340 4332 ED52                   SBC  HL,DE
341 4334 E3                     EX   (SP),HL
342 4335 C1                     POP  BC
343 4336 D1                     POP  DE
344 4337 03                     INC  BC
345 4338 EDB8                   LDDR
346 433A C1                     POP  BC
347 433B D1                     POP  DE
348 433C 215441                 LD   HL,TBUFF
349 433F EDB0                   LDIR
350 4341 C9                     RET
351
352 4342 31F8BF     BYE:        LD   SP,0BFF8H
353 4345 C9                     RET
354
355 4346 0D         WRITE:      DEC  C
356 4347 2827                   JR   Z,WSOURCE
357 4349 CDBD47     WBIN:       CALL STARTSTOP
358 434C E5                     PUSH HL
359 434D D5                     PUSH DE
360 434E 2E89                   LD   L,M25&255
361 4350 CDA847                 CALL PARAMETER
362 4353 E5                     PUSH HL
363 4354 CDFB46                 CALL WOPEN
364 4357 C1                     POP  BC
365 4358 E1                     POP  HL
366 4359 D1                     POP  DE
367 435A 3E02                   LD   A,2
368 435C DDE5                   PUSH IX
369 435E CD98BC                 CALL CODIR
370 4361 DDE1                   POP  IX
371 4363 3008                   JR   NC,WB4
372 4365 DDE5       WB3:        PUSH IX
373 4367 CD8FBC                 CALL COCLOSE
374 436A DDE1                   POP  IX
375 436C D8                     RET  C
376 436D C392BC     WB4:        JP   COABAN
377
378 4370 2AE140     WSOURCE:    LD   HL,(EOFP)
379 4373 ED5BDF40               LD   DE,(SOFP)
380 4377 B7                     OR   A
381 4378 ED52                   SBC  HL,DE
382 437A CACD47                 JP   Z,E10
383 437D E5                     PUSH HL
384 437E D5                     PUSH DE
385 437F CDFB46                 CALL WOPEN
386 4382 E1                     POP  HL
387 4383 C1                     POP  BC
```

```
388 4384 7E       WS2:      LD   A,(HL)
389 4385 FE0D               CP   CR
390 4387 2007               JR   NZ,WS3
391 4389 CDEB46             CALL WCHAR
392 438C 30DF               JR   NC,WB4
393 438E 3E0A               LD   A,LF
394 4390 CDEB46   WS3:      CALL WCHAR
395 4393 30D8               JR   NC,WB4
396 4395 23                 INC  HL
397 4396 0B                 DEC  BC
398 4397 78                 LD   A,B
399 4398 B1                 OR   C
400 4399 20E9               JR   NZ,WS2
401 439B 18C8               JR   WB3
402
403 439D F5       READ:     PUSH AF
404 439E C5                 PUSH BC
405 439F CD0A47             CALL ROPEN
406 43A2 E1                 POP  HL
407 43A3 C1                 POP  BC
408 43A4 F5                 PUSH AF
409 43A5 C5                 PUSH BC
410 43A6 F1                 POP  AF
411 43A7 3001               JR   NC,RD2
412 43A9 EB                 EX   DE,HL
413 43AA F1       RD2:      POP  AF
414 43AB 3017               JR   NC,RB4
415 43AD FE16               CP   16H
416 43AF 2816               JR   Z,RSOURCE
417 43B1 FE02               CP   2
418 43B3 200F               JR   NZ,RB4
419 43B5 DDE5               PUSH IX
420 43B7 CD83BC             CALL CIDIR
421 43BA DDE1               POP  IX
422 43BC 3006               JR   NC,RB4
423 43BE 225241             LD   (UPC),HL
424 43C1 C37ABC             JP   CICLOSE
425 43C4 C37DBC   RB4:      JP   CIABAN
426
427 43C7 2AE140   RSOURCE:  LD   HL,(EOFP)
428 43CA CDF346   RS2:      CALL RCHAR
429 43CD 301F               JR   NC,RS4
430 43CF FE0A               CP   LF
431 43D1 28F7               JR   Z,RS2
432 43D3 EB                 EX   DE,HL
433 43D4 CD4E48             CALL MEMTOP
434 43D7 B7                 OR   A
435 43D8 ED52               SBC  HL,DE
436 43DA EB                 EX   DE,HL
437 43DB 300D               JR   NC,RS3
438 43DD 2B                 DEC  HL
439 43DE 22E140             LD   (EOFP),HL
440 43E1 2B                 DEC  HL
441 43E2 360D               LD   (HL),CR
442 43E4 CDC443             CALL RB4
443 43E7 C34948             JP   E20
444 43EA 77       RS3:      LD   (HL),A
445 43EB 23                 INC  HL
446 43EC 18DC               JR   RS2
447 43EE 28D4     RS4:      JR   Z,RB4
```

```
448 43F0 22E140                 LD   (EOFP),HL
449 43F3 C37ABC                 JP   CICLOSE
450
451 43F6 CD65BC   CATALOG:      CALL CINIT
452 43F9 ED5B0B41               LD   DE,(CRBUFF)
453 43FD DDE5                   PUSH IX
454 43FF CD9BBC                 CALL CCAT
455 4402 DDE1                   POP  IX
456 4404 18BE                   JR   RB4
457
458 4406 2ADF40   HOWBIG:       LD   HL,(SOFP)
459 4409 CD8D48                 CALL WORDSP
460 440C 2AE140                 LD   HL,(EOFP)
461 440F CD8D48                 CALL WORDSP
462 4412 CD4E48                 CALL MEMTOP
463 4415 CD8D48                 CALL WORDSP
464 4418 C32146                 JP   CRLF
465
466 441B 212146   SORT:         LD   HL,CRLF
467 441E E5                     PUSH HL
468 441F 3A5541                 LD   A,(TBUFF+1)
469 4422 F5                     PUSH AF
470 4423 CD1C49                 CALL GETOPTION
471 4426 DD360201               LD   (IX+F3),1
472 442A F1                     POP  AF
473 442B 4F                     LD   C,A
474 442C FE0D                   CP   CR
475 442E 200B                   JR   NZ,SCAN
476 4430 0E41                   LD   C,'A'
477 4432 CD3B44   SRT2:         CALL SCAN
478 4435 0C                     INC  C
479 4436 79                     LD   A,C
480 4437 FE5A                   CP   'Z'
481 4439 20F7                   JR   NZ,SRT2
482 443B 213A59   SCAN:         LD   HL,AEND-1
483 443E 23       SCN1:         INC  HL
484 443F 23       SCN2:         INC  HL
485 4440 7E                     LD   A,(HL)
486 4441 3C                     INC  A
487 4442 C8                     RET  Z
488 4443 CD3149                 CALL HOLD
489 4446 0600                   LD   B,0
490 4448 54                     LD   D,H
491 4449 5D                     LD   E,L
492 444A 04       SCN3:         INC  B
493 444B CB7E                   BIT  7,(HL)
494 444D 23                     INC  HL
495 444E 28FA                   JR   Z,SCN3
496 4450 1A                     LD   A,(DE)
497 4451 CDBF                   RES  7,A
498 4453 B9                     CP   C
499 4454 20E8                   JR   NZ,SCN1
500 4456 DD3502                 DEC  (IX+F3)
501 4459 2015                   JR   NZ,SCN4
502 445B CD2146                 CALL CRLF
503 445E DD360204               LD   (IX+F3),4
504 4462 DDCB004E               BIT  1,(IX+F1)
505 4466 2803                   JR   Z,SCN31
506 4468 DD3502                 DEC  (IX+F3)
507 446B D5       SCN31:        PUSH DE
```

```
 508 446C CD1847                CALL PAGE
 509 446F D1                    POP  DE
 510 4470 EB        SCN4:       EX   DE,HL
 511 4471 C5                    PUSH BC
 512 4472 D5                    PUSH DE
 513 4473 50                    LD   D,B
 514 4474 0E7F                  LD   C,7FH
 515 4476 CDA44A                CALL SYMFIELD
 516 4479 E1                    POP  HL
 517 447A C1                    POP  BC
 518 447B 5E                    LD   E,(HL)
 519 447C 23                    INC  HL
 520 447D 56                    LD   D,(HL)
 521 447E EB                    EX   DE,HL
 522 447F CD8D48                CALL WORDSP
 523 4482 EB                    EX   DE,HL
 524 4483 18BA                  JR   SCN2
 525
 526 4485 3804      GOTO:       JR   C,GOT2
 527 4487 ED435241              LD   (UPC),BC
 528 448B 2E83      GOT2:       LD   L,M24 &255
 529 448D CDA847                CALL PARAMETER
 530 4490 381A                  JR   C,GOT3
 531 4492 22F340                LD   (BKPTADDR),HL
 532 4495 7E                    LD   A,(HL)
 533 4496 32F540                LD   (BKPTCODE),A
 534 4499 3EF7                  LD   A,0F7H
 535 449B 77                    LD   (HL),A
 536 449C BE                    CP   (HL)
 537 449D C24948                JP   NZ,E20
 538 44A0 21F640                LD   HL,VECTOR
 539 44A3 113000                LD   DE,30H
 540 44A6 010300                LD   BC,3
 541 44A9 CD1BB9                CALL BMIR
 542 44AC F3        GOT3:       DI
 543 44AD 313741                LD   SP,IMAGE
 544 44B0 E1                    POP  HL
 545 44B1 D1                    POP  DE
 546 44B2 C1                    POP  BC
 547 44B3 F1                    POP  AF
 548 44B4 08                    EX   AF,AF
 549 44B5 D9                    EXX
 550 44B6 C1                    POP  BC
 551 44B7 79                    LD   A,C
 552 44B8 ED47                  LD   I,A
 553 44BA 78                    LD   A,B
 554 44BB ED4F                  LD   R,A
 555 44BD E1                    POP  HL
 556 44BE D1                    POP  DE
 557 44BF C1                    POP  BC
 558 44C0 F1                    POP  AF
 559 44C1 D9                    EXX
 560 44C2 08                    EX   AF,AF
 561 44C3 DDE1                  POP  IX
 562 44C5 FDE1                  POP  IY
 563 44C7 C34D41                JP   EXIT
 564
 565 44CA CDBD47    COPY:       CALL STARTSTOP
 566 44CD E5                    PUSH HL
 567 44CE 2E8F                  LD   L,M27 &255
```

```
 568 44D0 CDA847                CALL PARAMETER
 569 44D3 EB                    EX   DE,HL
 570 44D4 C1                    POP  BC
 571 44D5 EDB0                  LDIR
 572 44D7 C9                    RET
 573
 574 44D8 CDBD47    FILL:       CALL STARTSTOP
 575 44DB E5                    PUSH HL
 576 44DC 2E95                  LD   L,M28 &255
 577 44DE CDA847                CALL PARAMETER
 578 44E1 EB                    EX   DE,HL
 579 44E2 C1                    POP  BC
 580 44E3 73        FIL2:       LD   (HL),E
 581 44E4 23                    INC  HL
 582 44E5 0B                    DEC  BC
 583 44E6 78                    LD   A,B
 584 44E7 B1                    OR   C
 585 44E8 20F9                  JR   NZ,FIL2
 586 44EA C9                    RET
 587
 588 44EB 3804      MODIFY:     JR   C,MOD1
 589 44ED ED43E340              LD   (MDEF),BC
 590 44F1 2AE340    MOD1:       LD   HL,(MDEF)
 591 44F4 CD2146    MOD2:       CALL CRLF
 592 44F7 CD8D48                CALL WORDSP
 593 44FA 22E340    MOD3:       LD   (MDEF),HL
 594 44FD 7E                    LD   A,(HL)
 595 44FE CD9248                CALL BYTESP
 596 4501 EB                    EX   DE,HL
 597 4502 CDB346                CALL US0
 598 4505 FE2E                  CP   '.'
 599 4507 CA2146                JP   Z,CRLF
 600 450A C5                    PUSH BC
 601 450B CDAB47                CALL PARAM1
 602 450E C1                    POP  BC
 603 450F EB                    EX   DE,HL
 604 4510 3810                  JR   C,MOD5
 605 4512 73                    LD   (HL),E
 606 4513 79                    LD   A,C
 607 4514 C602                  ADD  A,2
 608 4516 47                    LD   B,A
 609 4517 3E08      MOD4:       LD   A,BS
 610 4519 CD3046                CALL OUTPUT
 611 451C 10F9                  DJNZ MOD4
 612 451E 7E                    LD   A,(HL)
 613 451F CD9248                CALL BYTESP
 614 4522 23        MOD5:       INC  HL
 615 4523 7D                    LD   A,L
 616 4524 E607                  AND  7
 617 4526 28CC                  JR   Z,MOD2
 618 4528 18D0                  JR   MOD3
 619
 620 452A 3804      QUERY:      JR   C,QU2
 621 452C ED43E540              LD   (QDEF),BC
 622 4530 2AE540    QU2:        LD   HL,(QDEF)
 623 4533 7D                    LD   A,L
 624 4534 E6F8                  AND  0F8H
 625 4536 6F                    LD   L,A
 626 4537 0E08                  LD   C,8
 627 4539 0608      QU3:        LD   B,8
```

```
628 453B E5                     PUSH HL
629 453C CD8D48                 CALL WORDSP
630 453F 7E         0U4:        LD   A,(HL)
631 4540 CD9248                 CALL BYTESP
632 4543 23                     INC  HL
633 4544 10F9                   DJNZ 0U4
634 4546 E1                     POP  HL
635 4547 CD2E46                 CALL SPACE
636 454A 0608                   LD   B,8
637 454C 7E         0U5:        LD   A,(HL)
638 454D FE20                   CP   BLANK
639 454F 3002                   JR   NC,0U7
640 4551 3E2E                   LD   A,'.'
641 4553 CD3046     0U7:        CALL OUTPUT
642 4556 23                     INC  HL
643 4557 10F3                   DJNZ 0U5
644 4559 CD2146                 CALL CRLF
645 455C 0D                     DEC  C
646 455D 20DA                   JR   NZ,0U3
647 455F 22E540                 LD   (0DEF),HL
648 4562 C9                     RET
649
650 4563 212146     XAMINE:     LD   HL,CRLF
651 4566 E5                     PUSH HL
652 4567 2E9B                   LD   L,M29&255
653 4569 CD1C46                 CALL PR2
654 456C 213741                 LD   HL,IMAGE
655 456F 0605                   LD   B,5
656 4571 CD9245                 CALL PAIR
657 4574 CD2146                 CALL CRLF
658 4577 0604                   LD   B,4
659 4579 CD9245                 CALL PAIR
660 457C CD2146                 CALL CRLF
661 457F E5                     PUSH HL
662 4580 2EB3                   LD   L,M30&255
663 4582 CD1C46                 CALL PR2
664 4585 E1                     POP  HL
665 4586 0602                   LD   B,2
666 4588 CD9245                 CALL PAIR
667 458B 23                     INC  HL
668 458C CD9145                 CALL ONEPAIR
669 458F 23                     INC  HL
670 4590 23                     INC  HL
671 4591 04         ONEPAIR:    INC  B
672 4592 5E         PAIR:       LD   E,(HL)
673 4593 23                     INC  HL
674 4594 56                     LD   D,(HL)
675 4595 23                     INC  HL
676 4596 EB                     EX   DE,HL
677 4597 CD8D48                 CALL WORDSP
678 459A EB                     EX   DE,HL
679 459B 10F5                   DJNZ PAIR
680 459D C9                     RET
681
682 459E C5         OUTPORT:    PUSH BC
683 459F 2E95                   LD   L,M28&255
684 45A1 CDA847                 CALL PARAMETER
685 45A4 C1                     POP  BC
686 45A5 ED69                   OUT  (C),L
687 45A7 C9                     RET
```

```
688
689 45A8 ED78      INPORT:   IN    A,(C)
690 45AA F5                 PUSH  AF
691 45AB CD9248             CALL  BYTESP
692 45AE F1                 POP   AF
693 45AF 0608               LD    B,8
694 45B1 07       IN2:      RLCA
695 45B2 F5                 PUSH  AF
696 45B3 E601               AND   1
697 45B5 C630               ADD   A,'0'
698 45B7 CD3046             CALL  OUTPUT
699 45BA F1                 POP   AF
700 45BB 10F4               DJNZ  IN2
701 45BD C32146             JP    CRLF
702
703 45C0 D5       COMTAB:   DB    'U'.S
704 45C1 5E42               DW    UP
705 45C3 C9                 DB    'I'.S
706 45C4 A845               DW    INPORT
707 45C6 CF                 DB    'O'.S
708 45C7 9E45               DW    OUTPORT
709 45C9 D1                 DB    'Q'.S
710 45CA 2A45               DW    QUERY
711 45CC D2                 DB    'R'.S
712 45CD 9D43               DW    READ
713 45CF C2                 DB    'B'.S
714 45D0 4243               DW    BYE
715 45D2 CD                 DB    'M'.S
716 45D3 EB44               DW    MODIFY
717 45D5 C6                 DB    'F'.S
718 45D6 D844               DW    FILL
719 45D8 C3                 DB    'C'.S
720 45D9 CA44               DW    COPY
721 45DB C7                 DB    'G'.S
722 45DC 8544               DW    GOTO
723 45DE D8                 DB    'X'.S
724 45DF 6345               DW    XAMINE
725 45E1 C1                 DB    'A'.S
726 45E2 B848               DW    ASMB
727 45E4 CB                 DB    'K'.S
728 45E5 6A42               DW    KILL
729 45E7 C8                 DB    'H'.S
730 45E8 0644               DW    HOWBIG
731 45EA C5                 DB    'E'.S
732 45EB DF42               DW    ENTER
733 45ED D4                 DB    'T'.S
734 45EE 7D42               DW    TARGET
735 45F0 CE                 DB    'N'.S
736 45F1 F842               DW    NEW
737 45F3 C4                 DB    'D'.S
738 45F4 8142               DW    DOWN
739 45F6 DA                 DB    'Z'.S
740 45F7 9942               DW    ZAP
741 45F9 D0                 DB    'P'.S
742 45FA B642               DW    PRINT
743 45FC E3                 DB    'c'.S
744 45FD F643               DW    CATALOG
745 45FF E4                 DB    'd'.S
746 4600 0E52               DW    DASM
747 4602 F5                 DB    'u'.S
```

```
748 4603 AF52                    DW   UNSCRAMBLE
749 4605 FF                      DB   0FFH
750
751 4606 D5          EOF:        PUSH DE
752 4607 EB                      EX   DE,HL
753 4608 2AE140                  LD   HL,(EOFP)
754 460B 2B                      DEC  HL
755 460C B7                      OR   A
756 460D ED52                    SBC  HL,DE
757 460F EB                      EX   DE,HL
758 4610 D1                      POP  DE
759 4611 D0                      RET  NC
760 4612 2E15                    LD   L,MS&255
761
762 4614 ED7BEB40    ERR:        LD   SP,(STK)
763 4618 DD360056    ERR2:       LD   (IX+F1),'V'
764
765 461C 2640        PR2:        LD   H,M1/256
766 461E CDA246      PR3:        CALL STR1
767 4621 F5          CRLF:       PUSH AF
768 4622 3E0D                    LD   A,CR
769 4624 CD3046                  CALL OUTPUT
770 4627 3E0A                    LD   A,LF
771 4629 CD3046                  CALL OUTPUT
772 462C F1                      POP  AF
773 462D C9                      RET
774
775 462E 3E20        SPACE:      LD   A,BLANK
776
777 4630 DDCB004E    OUTPUT:     BIT  1,(IX+F1)
778 4634 2811                    JR   Z,EXTERN
779
780 4636 FE08        VIDEO:      CP   BS
781 4638 200A                    JR   NZ,VID2
782 463A CD4446                  CALL VID2
783 463D 3E20                    LD   A,BLANK
784 463F CD4446                  CALL VID2
785 4642 3E08                    LD   A,BS
786 4644 C35ABB      VID2:       JP   TXTOUT
787
788 4647 00000000    EXTERN:     DB   0,0,0,0
789 464B 00000000                DB   0,0,0,0
790 464F 00000000                DB   0,0,0,0
791 4653 00000000                DB   0,0,0,0
792 4657 00000000                DB   0,0,0,0
793 465B 00000000                DB   0,0,0,0
794 465F 00000000                DB   0,0,0,0
795 4663 00000000                DB   0,0,0,0
796 4667 00000000                DB   0,0,0,0
797 466B 00000000                DB   0,0,0,0
798 466F 00000000                DB   0,0,0,0
799 4673 F5                      PUSH AF
800 4674 CD2EBD      EXT2:       CALL PBUSY
801 4677 38FB                    JR   C,EXT2
802 4679 F1                      POP  AF
803 467A C331BD                  JP   PSEND
804
805 467D CD81BB      KEYBOARD:   CALL CURON
806 4680 CD06BB      KB2:        CALL WAITCHAR
807 4683 FE7F                    CP   DEL
```

```
 808 4685 2002                  JR   NZ,KB22
 809 4687 3E08                  LD   A,BS
 810 4689 FE0D      KB22:       CP   CR
 811 468B 2810                  JR   Z,KB3
 812 468D FE08                  CP   BS
 813 468F 280C                  JR   Z,KB3
 814 4691 FE20                  CP   BLANK
 815 4693 38EB                  JR   C,KB2
 816 4695 FEFC                  CP   0FCH
 817 4697 28E7                  JR   Z,KB2
 818 4699 FEEF                  CP   0EFH
 819 469B 28E3                  JR   Z,KB2
 820 469D C384BB    KB3:        JP   CUROFF
 821
 822 46A0 2640      STRING:     LD   H,M1/256
 823 46A2 7E        STR1:       LD   A,(HL)
 824 46A3 FE0D                  CP   CR
 825 46A5 C8                    RET  Z
 826 46A6 CD3046                CALL OUTPUT
 827 46A9 23                    INC  HL
 828 46AA 18F6                  JR   STR1
 829
 830 46AC CDA046    CUE:        CALL STRING
 831 46AF 212146    USER:       LD   HL,CRLF
 832 46B2 E5                    PUSH HL
 833 46B3 215441    US0:        LD   HL,TBUFF
 834 46B6 010000                LD   BC,0
 835 46B9 CD7D46    US1:        CALL KEYBOARD
 836 46BC 77                    LD   (HL),A
 837 46BD FE08                  CP   BS
 838 46BF 2007                  JR   NZ,US2
 839 46C1 0D                    DEC  C
 840 46C2 FAB346                JP   M,US0
 841 46C5 2B                    DEC  HL
 842 46C6 1810                  JR   US4
 843 46C8 0C        US2:        INC  C
 844 46C9 FE0D                  CP   CR
 845 46CB 3A5441                LD   A,(TBUFF)
 846 46CE C8                    RET  Z
 847 46CF 0D                    DEC  C
 848 46D0 79                    LD   A,C
 849 46D1 FE22                  CP   34
 850 46D3 28E4                  JR   Z,US1
 851 46D5 7E                    LD   A,(HL)
 852 46D6 0C                    INC  C
 853 46D7 23                    INC  HL
 854 46D8 CD3046    US4:        CALL OUTPUT
 855 46DB 18DC                  JR   US1
 856
 857 46DD CD65BC    GETNAME:    CALL CINIT
 858 46E0 2E70                  LD   L,M21&255
 859 46E2 CDAC46                CALL CUE
 860 46E5 215441                LD   HL,TBUFF
 861 46E8 0D                    DEC  C
 862 46E9 41                    LD   B,C
 863 46EA C9                    RET
 864
 865 46EB DDE5      WCHAR:      PUSH IX
 866 46ED CD95BC                CALL COCHAR
 867 46F0 DDE1                  POP  IX
```

```
46F2 C9                     RET
46F3 DDE5       RCHAR:      PUSH IX
46F5 CD80DC                 CALL CICHAR
46F8 DDE1                   POP  IX
46FA C9                     RET
46FB CDD946     WOPEN:      CALL GETNAME
46FE ED5B0D41               LD   DE,(CWBUFF)
4702 DDE5                   PUSH IX
4704 CD8C8C                 CALL COOPEN
4707 DDE1       WPE2:       POP  IX
4709 C9                     RET
470A CDD946     ROPEN:      CALL GETNAME
470D ED5B0B41               LD   DE,(CRBUFF)
4711 DDE5                   PUSH IX
4713 CD758C                 CALL CIOPEN
4716 18EF                   JR   WPE2
4718 DDCB04F5   PAGE:       DEC  (IX+F5)
471C C0                     RET  NZ
471D 3E3C                   LD   A,60
471F DDCB004E               BIT  1,(IX+F1)
4723 2802                   JR   Z,PG2
4725 3E16                   LD   A,22
4727 DD7704     PG2:        LD   (IX+F5,A
472A CD1203                 CALL DELAY
472D E5                     PUSH HL
472E 2E10                   LD   L,M4&255
4730 CDA046                 CALL STRING
4733 2AD940                 LD   HL,(LCT)
4736 E5                     PUSH HL
4737 2AD740                 LD   HL,(PAGENO)
473A 23                     INC  HL
473B 22D740                 LD   (PAGENO),HL
473E 22D940                 LD   (LCT),HL
4741 CD6043                 CALL POSITION
4744 E1                     POP  HL
4745 22D940                 LD   (LCT),HL
4748 E1                     POP  HL
4749 CD2146                 CALL CRLF
474C C32146                 JP   CRLF
474F F3         TRAP:       DI
4750 E3                     EX   (SP),HL
4751 2B                     DEC  HL
4752 225241                 LD   (UPC),HL
4755 E1                     POP  HL
4756 ED734E41               LD   (USP),SP
475A 314D41                 LD   SP,EXIT
475D FDE5                   PUSH IY
475F DDE5                   PUSH IX
4761 08                     EX   AF,AF
4762 D9                     EXX
4763 F5                     PUSH AF
4764 C5                     PUSH BC
4765 D5                     PUSH DE
4766 E5                     PUSH HL
4767 ED5F                   LD   A,R
```

```
 928 4768 67                        LD   H,A
 929 4769 ED57                      LD   A,I
 930 476B 6F                        LD   L,A
 931 476C E5                        PUSH HL
 932 476D D9                        EXX
 933 476E 08                        EX   AF,AF
 934 476F F5                        PUSH AF
 935 4770 C5                        PUSH BC
 936 4771 D5                        PUSH DE
 937 4772 E5                        PUSH HL
 938 4773 2AF340                    LD   HL,(BKPTADDR)
 939 4776 ED5B5241                  LD   DE,(UPC)
 940 477A B7                        OR   A
 941 477B ED52                      SBC  HL,DE
 942 477D 2005                      JR   NZ,TRAP2
 943 477F 3AF540                    LD   A,(BKPTCODE)
 944 4782 12                        LD   (DE),A
 945 4783 1B                        DEC  DE
 946 4784 13              TRAP2:    INC  DE
 947 4785 ED535241                  LD   (UPC),DE
 948 4789 C3E041                    JP   ZEN
 949
 950 478C E5              REMOVE:   PUSH HL
 951 478D CD5248                    CALL NEXT
 952 4790 E5                        PUSH HL
 953 4791 2AE140                    LD   HL,(EOFP)
 954 4794 E5                        PUSH HL
 955 4795 B7                        OR   A
 956 4796 ED42                      SBC  HL,BC
 957 4798 22E140                    LD   (EOFP),HL
 958 479B E1                        POP  HL
 959 479C D1                        POP  DE
 960 479D D5                        PUSH DE
 961 479E B7                        OR   A
 962 479F ED52                      SBC  HL,DE
 963 47A1 E3                        EX   (SP),HL
 964 47A2 C1                        POP  BC
 965 47A3 D1                        POP  DE
 966 47A4 C8                        RET  Z
 967 47A5 EDB0                      LDIR
 968 47A7 C9                        RET
 969
 970 47A8 CDAC46  PARAMETER:        CALL CUE
 971 47AB 41      PARAM1:           LD   B,C
 972 47AC 05                        DEC  B
 973 47AD 37                        SCF
 974 47AE C8                        RET  Z
 975 47AF D5                        PUSH DE
 976 47B0 115441                    LD   DE,TBUFF
 977 47B3 CDD247                    CALL CONVERT
 978 47B6 D1                        POP  DE
 979 47B7 D0                        RET  NC
 980 47B8 CD2146                    CALL CRLF
 981 47BB 1810                      JR   E10
 982
 983 47BD 2E76    STARTSTOP:        LD   L,M22&255
 984 47BF CDA847                    CALL PARAMETER
 985 47C2 EB                        EX   DE,HL
 986 47C3 2E7D                      LD   L,M23&255
 987 47C5 CDA847                    CALL PARAMETER
```

```
 988 47C8 B7                    OR   A
 989 47C9 ED52                  SBC  HL,DE
 990 47CB 23                    INC  HL
 991 47CC D0                    RET  NC
 992
 993 47CD 2E0B          E10:    LD   L,M2&255
 994 47CF C31446                JP   ERR
 995
 996 47D2 2B            CONVERT: DEC  HL
 997 47D3 7E                    LD   A,(HL)
 998 47D4 0E10                  LD   C,16
 999 47D6 FE48                  CP   'H'
1000 47D8 2809                  JR   Z,CV0
1001 47DA 0E08                  LD   C,8
1002 47DC FE4F                  CP   'O'
1003 47DE 2803                  JR   Z,CV0
1004 47E0 0E0A                  LD   C,10
1005 47E2 04                    INC  B
1006 47E3 05           CV0:     DEC  B
1007 47E4 210000               LD   HL,0
1008 47E7 1A           CV1:     LD   A,(DE)
1009 47E8 D630                  SUB  48
1010 47EA FE0A                  CP   10
1011 47EC 3805                  JR   C,CV2
1012 47EE D607                  SUB  7
1013 47F0 FE0A                  CP   10
1014 47F2 D8                    RET  C
1015 47F3 B9           CV2:     CP   C
1016 47F4 3F                    CCF
1017 47F5 D8                    RET  C
1018 47F6 D5                    PUSH DE
1019 47F7 5D                    LD   E,L
1020 47F8 54                    LD   D,H
1021 47F9 CB49                  BIT  1,C
1022 47FB 2008                  JR   NZ,CV3
1023 47FD 110000                LD   DE,0
1024 4800 CB59                  BIT  3,C
1025 4802 2001                  JR   NZ,CV3
1026 4804 29                    ADD  HL,HL
1027 4805 29           CV3:     ADD  HL,HL
1028 4806 29                    ADD  HL,HL
1029 4807 19                    ADD  HL,DE
1030 4808 29                    ADD  HL,HL
1031 4809 5F                    LD   E,A
1032 480A 1600                  LD   D,0
1033 480C 19                    ADD  HL,DE
1034 480D D1                    POP  DE
1035 480E 13                    INC  DE
1036 480F 10D6                  DJNZ CV1
1037 4811 C9                    RET
1038
1039 4812 11C832       DELAY:   LD   DE,13000
1040 4815 CD3149       DEL1:    CALL HOLD
1041 4818 1B                    DEC  DE
1042 4819 7A                    LD   A,D
1043 481A B3                    OR   E
1044 481B 20F8                  JR   NZ,DEL1
1045 481D DDCB005E              BIT  3,(IX+F1)
1046 4821 CC7D46                CALL Z,KEYBOARD
1047 4824 FE51                  CP   'Q'
```

```
1048 4826 CAE041              JP   Z,ZEN
1049 4829 DDCB00DE            SET  3,(IX+F1)
1050 482D 3E0C      CLEAR:    LD   A,FF
1051 482F C33046              JP   OUTPUT
1052
1053 4832 D5        SOF:      PUSH DE
1054 4833 EB                  EX   DE,HL
1055 4834 2ADF40              LD   HL,(SOFP)
1056 4837 B7                  OR   A
1057 4838 ED52                SBC  HL,DE
1058 483A EB                  EX   DE,HL
1059 483B D1                  POP  DE
1060 483C C9                  RET
1061
1062 483D D5        MEMCHECK: PUSH DE
1063 483E 09                  ADD  HL,BC
1064 483F EB                  EX   DE,HL
1065 4840 CD4E48              CALL MEMTOP
1066 4843 B7                  OR   A
1067 4844 ED52                SBC  HL,DE
1068 4846 EB                  EX   DE,HL
1069 4847 D1                  POP  DE
1070 4848 D0                  RET  NC
1071 4849 2E69      E20:      LD   L,M20&255
1072 484B C31446              JP   ERR
1073
1074 484E 2ADB40    MEMTOP:   LD   HL,(LIMIT)
1075 4851 C9                  RET
1076
1077 4852 CD0646    NEXT:     CALL EOF
1078 4855 010000    NX0:      LD   BC,0
1079 4858 7E        NX1:      LD   A,(HL)
1080 4859 23                  INC  HL
1081 485A 03                  INC  BC
1082 485B FE0D                CP   CR
1083 485D 20F9                JR   NZ,NX1
1084 485F C9                  RET
1085
1086 4860 E5        POSITION: PUSH HL
1087 4861 C5                  PUSH BC
1088 4862 217841              LD   HL,TBUFF+36
1089 4865 E5                  PUSH HL
1090 4866 0605                LD   B,5
1091 4868 3620      POS1:     LD   (HL),BLANK
1092 486A 23                  INC  HL
1093 486B 10FB                DJNZ POS1
1094 486D 360D                LD   (HL),CR
1095 486F EB                  EX   DE,HL
1096 4870 1B                  DEC  DE
1097 4871 010A00              LD   BC,10
1098 4874 2AD940              LD   HL,(LCT)
1099 4877 1B        POS2:     DEC  DE
1100 4878 D5                  PUSH DE
1101 4879 EB                  EX   DE,HL
1102 487A CD464C              CALL MA50
1103 487D 7B                  LD   A,E
1104 487E D1                  POP  DE
1105 487F C630                ADD  A,'0'
1106 4881 12                  LD   (DE),A
1107 4882 7D                  LD   A,L
```

```
1108 4883 B4                    OR   H
1109 4884 20F1                  JR   NZ,POS2
1110 4886 E1                    POP  HL
1111 4887 CDA246                CALL STR1
1112 488A C1                    POP  BC
1113 488B E1                    POP  HL
1114 488C C9                    RET
1115
1116 488D 7C          WORDSP:   LD   A,H
1117 488E CD9748                CALL BYTE
1118 4891 7D                    LD   A,L
1119 4892 E5          BYTESP:   PUSH HL
1120 4893 212E46                LD   HL,SPACE
1121 4896 E3                    EX   (SP),HL
1122 4897 F5          BYTE:     PUSH AF
1123 4898 0F                    RRCA
1124 4899 0F                    RRCA
1125 489A 0F                    RRCA
1126 489B 0F                    RRCA
1127 489C CDA048                CALL NYB
1128 489F F1                    POP  AF
1129 48A0 E60F        NYB:      AND  0FH
1130 48A2 C690                  ADD  A,90H
1131 48A4 27                    DAA
1132 48A5 CE40                  ADC  A,40H
1133 48A7 27                    DAA
1134 48A8 C33046                JP   OUTPUT
1135
1136 48AB 22DD40      UPDATE:   LD   (CURRENT),HL
1137 48AE E5          LINC:     PUSH HL
1138 48AF 2AD940                LD   HL,(LCT)
1139 48B2 23                    INC  HL
1140 48B3 22D940                LD   (LCT),HL
1141 48B6 E1                    POP  HL
1142 48B7 C9                    RET
1143
1144                    ; Table lengths
1145
1146                    JL:     EQU  3
1147                    CL:     EQU  1
1148                    TL:     EQU  16
1149                    LL:     EQU  21
1150                    AL:     EQU  2
1151                    SBL:    EQU  2
1152                    ADL:    EQU  4
1153                    INL:    EQU  3
1154                    OL:     EQU  3
1155                    XL:     EQU  4
1156
1157                    ; Register pair identifiers
1158
1159                    IBC:    EQU  0
1160                    IDE:    EQU  2
1161                    IHL:    EQU  4
1162                    IAF:    EQU  0EH
1163                    ISP:    EQU  6
1164
1165                    ; Tiny register IDs
1166
1167                    IB:     EQU  0
```

```
                        IC:         EQU 1
                        ID:         EQU 2
                        IE:         EQU 3
                        IH:         EQU 4
                        IL:         EQU 5
                        IA:         EQU 7

                        IIX:        EQU 0DDH
                        IIY:        EQU 0FDH

                        IREF:       EQU 8
                        IINT:       EQU 0

                        ; Condition code IDs

                        ICY:        EQU 18H
                        INCY:       EQU 10H
                        IZ:         EQU 8
                        INZ:        EQU 0
                        IPO:        EQU 20H
                        IPE:        EQU 28H
                        IMIN:       EQU 38H
                        IPOS:       EQU 30H

                        ; Parser primary IDs

                        TR:         EQU 0
                        TRI:        EQU 4
                        RP:         EQU 1
                        RPI:        EQU 5
                        XY:         EQU 2
                        XYI:        EQU 6
                        NO:         EQU 3
                        NOI:        EQU 7
                        RE:         EQU 8
                        CC:         EQU 9
                        XYD:        EQU 10
                        EOL:        EQU 11
                        TNO:        EQU 12
                        TNOI:       EQU 13

                        ; Parser intermediate IDs

                        TALPHA:     EQU 30H
                        TLAB:       EQU 31H
                        TOPD:       EQU 32H
                        TCOM:       EQU 33H
                        TIND:       EQU 34H
                        TADD:       EQU 40H
                        TSUB:       EQU 0C0H
                        TMUL:       EQU 80H
                        TDIV:       EQU 81H
                        TAND:       EQU 82H
                        TOR:        EQU 83H
                        TDEF:       EQU 35H
                        TLIT:       EQU 36H

                        ; Assembler

1227 48B8 CD1C49        ASMB:       CALL GETOPTION
```

```
1228 48BB 213C59              LD   HL,AEND+1
1229 48BE 36FF                LD   (HL),0FFH
1230 48C0 22E940              LD   (FEP),HL
1231 48C3 CDCA48              CALL PASS
1232 48C6 DDCB00AE            RES  5,(IX+F1)
1233 48CA CD7042   PASS:      CALL TOP
1234 48CD CD3149   PS1:       CALL HOLD
1235 48D0 2ADD40              LD   HL,(CURRENT)
1236 48D3 22E740              LD   (TEMP),HL
1237 48D6 2AEF40              LD   HL,(PC)
1238 48D9 E5                  PUSH HL
1239 48DA 210000              LD   HL,0
1240 48DD 22C740              LD   (FLAGS+F2),HL
1241 48E0 22CB40              LD   (FLAGS+F6),HL
1242 48E3 CD0A4D              CALL CLASS
1243 48E6 FE31                CP   TLAB
1244 48E8 CC4149              CALL Z,SYMBOL
1245 48EB FE0B                CP   EOL
1246 48ED 2819                JR   Z,PS2
1247 48EF FE30                CP   TALPHA
1248 48F1 2024                JR   NZ,E1
1249 48F3 CDFB4A              CALL OPTSCH
1250 48F6 381F                JR   C,E1
1251 48F8 DD7105              LD   (IX+F6),C
1252 48FB CD9549              CALL JUMP
1253 48FE C2504B              JP   NZ,E6
1254 4901 CD9B4B              CALL PARSER
1255 4904 FE0B                CP   EOL
1256 4906 200F                JR   NZ,E1
1257 4908 E1       PS2:       POP  HL
1258 4909 DDCB006E            BIT  5,(IX+F1)
1259 490D CC0F4A              CALL Z,LIST
1260 4910 CDAE48              CALL LINC
1261 4913 04                  INC  B
1262 4914 20B7                JR   NZ,PS1
1263 4916 C9                  RET
1264
1265 4917 2E0B     E1:        LD   L,M2&255
1266 4919 C3A942              JP   ER
1267
1268 491C 2E19     GETOPTION: LD   L,M7&255
1269 491E CDAC46              CALL CUE
1270 4921 F6B8                OR   0B8H
1271 4923 DD7700              LD   (IX+F1),A
1272 4926 DD360401            LD   (IX+F5),1
1273 492A 210000              LD   HL,0
1274 492D 22D740              LD   (PAGENO),HL
1275 4930 C9                  RET
1276
1277 4931 CD09BB   HOLD:      CALL READCHAR
1278 4934 D0                  RET  NC
1279 4935 DDCB0076            BIT  6,(IX+F1)
1280 4939 CAE041              JP   Z,ZEN
1281 493C DDCB009E            RES  3,(IX+F1)
1282 4940 C9                  RET
1283
1284 4941 DDCB01CE SYMBOL:    SET  1,(IX+F2)
1285 4945 0C                  INC  C
1286 4946 DD7106              LD   (IX+F7),C
1287 4949 0D                  DEC  C
```

```
1288 494A CAA742                JP   Z,E0
1289 494D CDE84A                CALL SYMSCH
1290 4950 FD22ED40              LD   (LBLP),IY
1291 4954 DDCB006E              BIT  5,(IX+F1)
1292 4958 2838                  JR   Z,SY2
1293 495A 2E44                  LD   L,M13&255
1294 495C D2A942                JP   NC,ER
1295 495F CDED4A                CALL OPDSCH
1296 4962 2E36                  LD   L,M12&255
1297 4964 D2A942                JP   NC,ER
1298 4967 2AE940                LD   HL,(FEP)
1299 496A E5                    PUSH HL
1300 496B 0600                  LD   B,0
1301 496D 09                    ADD  HL,BC
1302 496E 23                    INC  HL
1303 496F 23                    INC  HL
1304 4970 23                    INC  HL
1305 4971 CD3248                CALL SOF
1306 4974 2E3F                  LD   L,M14&255
1307 4976 DAA942                JP   C,ER
1308 4979 E1                    POP  HL
1309 497A EB                    EX   DE,HL
1310 497B EDB0                  LDIR
1311 497D EB                    EX   DE,HL
1312 497E 2B                    DEC  HL
1313 497F CBFE                  SET  7,(HL)
1314 4981 C1                    POP  BC
1315 4982 D1                    POP  DE
1316 4983 D5                    PUSH DE
1317 4984 C5                    PUSH BC
1318 4985 23                    INC  HL
1319 4986 73                    LD   (HL),E
1320 4987 23                    INC  HL
1321 4988 72                    LD   (HL),D
1322 4989 22ED40                LD   (LBLP),HL
1323 498C 23                    INC  HL
1324 498D 36FF                  LD   (HL),0FFH
1325 498F 22E940                LD   (FEP),HL
1326 4992 C30A4D        SY2:    JP   CLASS
1327
1328 4995 44            JUMP:   LD   B,H
1329 4996 CB7D                  BIT  7,L
1330 4998 2004                  JR   NZ,JP2
1331 499A DDCB01DE              SET  3,(IX+F2)
1332 499E CBBD          JP2:    RES  7,L
1333 49A0 5D                    LD   E,L
1334 49A1 1600                  LD   D,0
1335 49A3 7D                    LD   A,L
1336 49A4 21D749                LD   HL,JPTAB
1337 49A7 19                    ADD  HL,DE
1338 49A8 5E                    LD   E,(HL)
1339 49A9 23                    INC  HL
1340 49AA 56                    LD   D,(HL)
1341 49AB D5                    PUSH DE
1342 49AC FE05                  CP   5
1343 49AE D8                    RET  C
1344 49AF FE25                  CP   37
1345 49B1 DA9B4B                JP   C,PARSER
1346 49B4 CD9B4B                CALL PARSER
1347 49B7 E5                    PUSH HL
```

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1348 49B8 F5                    PUSH AF
1349 49B9 CD9B4B                CALL PARSER
1350 49BC 4F                    LD   C,A
1351 49BD F1                    POP  AF
1352 49BE EB                    EX   DE,HL
1353 49BF E1                    POP  HL
1354 49C0 07                    RLCA
1355 49C1 07                    RLCA
1356 49C2 07                    RLCA
1357 49C3 07                    RLCA
1358 49C4 B1                    OR   C
1359 49C5 4F                    LD   C,A
1360 49C6 FDE1                  POP  IY
1361 49C8 CDBB4C                CALL FIND
1362 49CB 47                    LD   B,A
1363 49CC 2801                  JR   Z,JP3
1364 49CE EB                    EX   DE,HL
1365 49CF 7D            JP3:    LD   A,L
1366 49D0 07                    RLCA
1367 49D1 07                    RLCA
1368 49D2 07                    RLCA
1369 49D3 07                    RLCA
1370 49D4 B3                    OR   E
1371 49D5 FDE9                  JP   (IY)
1372
1373 49D7 6C4B          JPTAB:  DW   MOFB
1374 49D9 624E                  DW   L30
1375 49DB 0B4E                  DW   ENDH
1376 49DD CE4E                  DW   RSTH
1377 49DF DB4E                  DW   RETH
1378 49E1 104F                  DW   PPH
1379 49E3 7D4D                  DW   JRH
1380 49E5 8B4D                  DW   DJH
1381 49E7 3C4F                  DW   INCH
1382 49E9 9B4F                  DW   ML1
1383 49EB D24F                  DW   SRH
1384 49ED C04F                  DW   BITH
1385 49EF AA4D                  DW   DWH
1386 49F1 B04D                  DW   DBH
1387 49F3 CD4D                  DW   DSH
1388 49F5 FE4D                  DW   EQUH
1389 49F7 ED4D                  DW   ORGH
1390 49F9 284F                  DW   IMH
1391 49FB E14D                  DW   LOADH
1392 49FD 0D4E                  DW   LTAB
1393 49FF FA4E                  DW   CALTAB
1394 4A01 E54E                  DW   JMPTAB
1395 4A03 1050                  DW   XTAB
1396 4A05 EB4F                  DW   INTAB
1397 4A07 644F                  DW   ADDTAB
1398 4A09 564F                  DW   ADCTAB
1399 4A0B 5D4F                  DW   SBCTAB
1400 4A0D F54F                  DW   OUTAB
1401
1402 4A0F DDCB0076      LIST:   BIT  6,(IX+F1)
1403 4A13 C8                    RET  Z
1404 4A14 C5                    PUSH BC
1405 4A15 DD4E02                LD   C,(IX+F3)
1406 4A18 ED5BCB40              LD   DE,(FLAGS+F6)
1407 4A1C FD215441              LD   IY,TBUFF
```

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1408 4A20 D5       LS1:    PUSH DE
1409 4A21 DDCB0176         BIT  6,(IX+F2)
1410 4A25 CC1847           CALL Z,PAGE
1411 4A28 DDCB004E         BIT  1,(IX+F1)
1412 4A2C 2007             JR   NZ,LS12
1413 4A2E DDCB017E         BIT  7,(IX+F2)
1414 4A32 CC6048           CALL Z,POSITION
1415 4A35 D1       LS12:   POP  DE
1416 4A36 060E             LD   B,14
1417 4A38 0C               INC  C
1418 4A39 0D               DEC  C
1419 4A3A 2817             JR   Z,LS4
1420 4A3C CD8D48           CALL WORDSP
1421 4A3F 0604             LD   B,4
1422 4A41 FD7E00   LS2:    LD   A,(IY+0)
1423 4A44 CD9748           CALL BYTE
1424 4A47 FD23             INC  IY
1425 4A49 23               INC  HL
1426 4A4A 0D               DEC  C
1427 4A4B 2803             JR   Z,LS3
1428 4A4D 10F2             DJNZ LS2
1429 4A4F 04               INC  B
1430 4A50 CB20     LS3:    SLA  B
1431 4A52 05               DEC  B
1432 4A53 CD2E46   LS4:    CALL SPACE
1433 4A56 10FB             DJNZ LS4
1434 4A58 C5               PUSH BC
1435 4A59 E5               PUSH HL
1436 4A5A FDE5             PUSH IY
1437 4A5C FD21CD40         LD   IY,COMWIDTH
1438 4A60 2AE740           LD   HL,(TEMP)
1439 4A63 0EFF             LD   C,0FFH
1440 4A65 DDCB0146         BIT  0,(IX+F2)
1441 4A69 281A             JR   Z,LS7
1442 4A6B CDA44A           CALL SYMFIELD
1443 4A6E 53               LD   D,E
1444 4A6F CDA84A           CALL FIELD
1445 4A72 5A               LD   E,D
1446 4A73 E5               PUSH HL
1447 4A74 7E       LS5:    LD   A,(HL)
1448 4A75 FE0D             CP   CR
1449 4A77 2808             JR   Z,LS6
1450 4A79 FE3B             CP   3BH
1451 4A7B 2804             JR   Z,LS6
1452 4A7D 14               INC  D
1453 4A7E 23               INC  HL
1454 4A7F 18F3             JR   LS5
1455 4A81 E1       LS6:    POP  HL
1456 4A82 CDA84A           CALL FIELD
1457 4A85 E5       LS7:    PUSH HL
1458 4A86 7E       LS8:    LD   A,(HL)
1459 4A87 FE0D             CP   CR
1460 4A89 2804             JR   Z,LS9
1461 4A8B 14               INC  D
1462 4A8C 23               INC  HL
1463 4A8D 18F7             JR   LS8
1464 4A8F E1       LS9:    POP  HL
1465 4A90 CDA84A           CALL FIELD
1466 4A93 22E740           LD   (TEMP),HL
1467 4A96 FDE1             POP  IY
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1468 4A98 E1                    POP   HL
1469 4A99 C1                    POP   BC
1470 4A9A CD2146                CALL  CRLF
1471 4A9D 0C                    INC   C
1472 4A9E 0D                    DEC   C
1473 4A9F C2204A                JP    NZ,LS1
1474 4AA2 C1                    POP   BC
1475 4AA3 C9                    RET
1476
1477 4AA4 FD21CF40 SYMFIELD:    LD    IY,SYMWIDTH
1478 4AA8 FD4600   FIELD:       LD    B,(IY+0)
1479 4AAB DDCB004E              BIT   1,(IX+F1)
1480 4AAF 2803                  JR    Z,FD1
1481 4AB1 FD4601                LD    B,(IY+1)
1482 4AB4 FD23     FD1:         INC   IY
1483 4AB6 FD23                  INC   IY
1484 4AB8 7A                    LD    A,D
1485 4AB9 B8                    CP    B
1486 4ABA 3801                  JR    C,FD2
1487 4ABC 78                    LD    A,B
1488 4ABD 3C       FD2:         INC   A
1489 4ABE 3D       FD3:         DEC   A
1490 4ABF 280A                  JR    Z,FD4
1491 4AC1 F5                    PUSH  AF
1492 4AC2 7E                    LD    A,(HL)
1493 4AC3 A1                    AND   C
1494 4AC4 CD3046                CALL  OUTPUT
1495 4AC7 F1                    POP   AF
1496 4AC8 23                    INC   HL
1497 4AC9 18F3                  JR    FD3
1498 4ACB 78       FD4:         LD    A,B
1499 4ACC 92                    SUB   D
1500 4ACD 3004                  JR    NC,FD6
1501 4ACF 23       FD5:         INC   HL
1502 4AD0 3C                    INC   A
1503 4AD1 20FC                  JR    NZ,FD5
1504 4AD3 7A       FD6:         LD    A,D
1505 4AD4 90                    SUB   B
1506 4AD5 1600                  LD    D,0
1507 4AD7 3008                  JR    NC,FD8
1508 4AD9 F5       FD7:         PUSH  AF
1509 4ADA CD2E46                CALL  SPACE
1510 4ADD F1                    POP   AF
1511 4ADE 3C                    INC   A
1512 4ADF 20F8                  JR    NZ,FD7
1513 4AE1 7E       FD8:         LD    A,(HL)
1514 4AE2 FE20                  CP    BLANK
1515 4AE4 C0                    RET   NZ
1516 4AE5 23                    INC   HL
1517 4AE6 18F9                  JR    FD8
1518
1519 4AE8 213C59   SYMSCH:      LD    HL,AEND+1
1520 4AEB 182D                  JR    SEARCH
1521
1522 4AED 21BA51   OPDSCH:      LD    HL,CCODES
1523 4AF0 DDCB015E              BIT   3,(IX+F2)
1524 4AF4 2824                  JR    Z,SEARCH
1525 4AF6 21D651                LD    HL,TREGS
1526 4AF9 181F                  JR    SEARCH
1527
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1528 4AFB 79        OPTSCH:  LD   A,C
1529 4AFC 3D                 DEC  A
1530 4AFD 37                 SCF
1531 4AFE C8                 RET  Z
1532 4AFF 1A                 LD   A,(DE)
1533 4B00 D641               SUB  'A'
1534 4B02 D8                 RET  C
1535 4B03 FE1A               CP   'Z'-'A'+1
1536 4B05 3F                 CCF
1537 4B06 D8                 RET  C
1538 4B07 CDEB54             CALL KEYADDR
1539 4B0A 13                 INC  DE
1540 4B0B 0B                 DEC  BC
1541 4B0C CD1A4B             CALL SEARCH
1542 4B0F 03                 INC  BC
1543 4B10 1B                 DEC  DE
1544 4B11 C9                 RET
1545
1546 4B12 CD7E       BAD:    BIT  7,(HL)
1547 4B14 23                 INC  HL
1548 4B15 28FB               JR   Z,BAD
1549 4B17 23                 INC  HL
1550 4B18 23                 INC  HL
1551 4B19 D1                 POP  DE
1552 4B1A 7E         SEARCH: LD   A,(HL)
1553 4B1B 3C                 INC  A
1554 4B1C 37                 SCF
1555 4B1D C8                 RET  Z
1556 4B1E D5                 PUSH DE
1557 4B1F 41                 LD   B,C
1558 4B20 1A         SC2:    LD   A,(DE)
1559 4B21 1002               DJNZ SC3
1560 4B23 CBFF               SET  7,A
1561 4B25 04         SC3:    INC  B
1562 4B26 BE                 CP   (HL)
1563 4B27 20E9               JR   NZ,BAD
1564 4B29 13                 INC  DE
1565 4B2A 23                 INC  HL
1566 4B2B 10F3               DJNZ SC2
1567 4B2D 5E                 LD   E,(HL)
1568 4B2E 23                 INC  HL
1569 4B2F 56                 LD   D,(HL)
1570 4B30 E3                 EX   (SP),HL
1571 4B31 EB                 EX   DE,HL
1572 4B32 FDE1               POP  IY
1573 4B34 C9                 RET
1574
1575 4B35 FE03       RESOLV: CP   NO
1576 4B37 2017               JR   NZ,E6
1577 4B39 DD7E01             LD   A,(IX+F2)
1578 4B3C CB67               BIT  4,A
1579 4B3E C2A64C             JP   NZ,E7
1580 4B41 CB4F               BIT  1,A
1581 4B43 C9                 RET
1582
1583 4B44 FE03       LITLE:  CP   NO
1584 4B46 2008               JR   NZ,E6
1585 4B48 DDCB006E LITLE2:   BIT  5,(IX+F1)
1586 4B4C C0                 RET  NZ
1587 4B4D 7C                 LD   A,H
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1588 4B4E B7                    OR   A
1589 4B4F C8                    RET  Z
1590 4B50 2E52      E6:         LD   L,M16&255
1591 4B52 C3A942                JP   ER
1592
1593 4B55 5D        MOFMIX:     LD   E,L
1594 4B56 CB5B      MOFMX2:     BIT  3,E
1595 4B58 20F6                  JR   NZ,E6
1596 4B5A 7B                    LD   A,E
1597 4B5B 07                    RLCA
1598 4B5C 07                    RLCA
1599 4B5D 07                    RLCA
1600 4B5E B0                    OR   B
1601 4B5F 180C                  JR   MOF
1602 4B61 3EED      MOFPRE:     LD   A,0EDH
1603 4B63 1808                  JR   MOF
1604 4B65 7D        MOFLH:      LD   A,L
1605 4B66 CD6D4B                CALL MOF
1606 4B69 7C        MOFH:       LD   A,H
1607 4B6A 1801                  JR   MOF
1608 4B6C 78        MOFB:       LD   A,B
1609
1610 4B6D E5        MOF:        PUSH HL
1611 4B6E C5                    PUSH BC
1612 4B6F CD1A4D                CALL CL2
1613 4B72 23                    INC  HL
1614 4B73 22EF40                LD   (PC),HL
1615 4B76 DDCB006E              BIT  5,(IX+F1)
1616 4B7A 2018                  JR   NZ,MOF5
1617 4B7C DDCB0066              BIT  4,(IX+F1)
1618 4B80 2008                  JR   NZ,MOF2
1619 4B82 2AF140                LD   HL,(OBJ)
1620 4B85 77                    LD   (HL),A
1621 4B86 23                    INC  HL
1622 4B87 22F140                LD   (OBJ),HL
1623 4B8A 0600      MOF2:       LD   B,0
1624 4B8C DD4E02                LD   C,(IX+F3)
1625 4B8F 215441                LD   HL,TBUFF
1626 4B92 09                    ADD  HL,BC
1627 4B93 77                    LD   (HL),A
1628 4B94 DD3402    MOF5:       INC  (IX+F3)
1629 4B97 C1                    POP  BC
1630 4B98 E1                    POP  HL
1631 4B99 AF                    XOR  A
1632 4B9A C9                    RET
1633
1634 4B9B DDCB0146  PARSER:     BIT  0,(IX+F2)
1635 4B9F 3E0B                  LD   A,EOL
1636 4BA1 C0                    RET  NZ
1637 4BA2 C5                    PUSH BC
1638 4BA3 CDA84B                CALL PA1
1639 4BA6 C1                    POP  BC
1640 4BA7 C9                    RET
1641
1642 4BA8 CD754C    PA1:        CALL TERM
1643 4BAB D8                    RET  C
1644 4BAC FE34                  CP   TIND
1645 4BAE 0600                  LD   B,0
1646 4BB0 2005                  JR   NZ,PA2
1647 4BB2 CD754C                CALL TERM
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1648 4BB5 0604          LD   B,4
1649 4BB7 FE32    PA2:  CP   TOPD
1650 4BB9 2031          JR   NZ,PA7
1651 4BBB 7C            LD   A,H
1652 4BBC B0            OR   B
1653 4BBD 57            LD   D,A
1654 4BBE E5            PUSH HL
1655 4BBF CD754C        CALL TERM
1656 4BC2 E1            POP  HL
1657 4BC3 4F            LD   C,A
1658 4BC4 7A            LD   A,D
1659 4BC5 D8            RET  C
1660 4BC6 FE06          CP   XYI
1661 4BC8 202F          JR   NZ,PER
1662 4BCA CB71          BIT  6,C
1663 4BCC 282B          JR   Z,PER
1664 4BCE 45            LD   B,L
1665 4BCF C5            PUSH BC
1666 4BD0 CD754C        CALL TERM
1667 4BD3 CDFC4B        CALL PA4
1668 4BD6 C1            POP  BC
1669 4BD7 CD484B        CALL LITLE2
1670 4BDA 200C          JR   NZ,PA3
1671 4BDC 7D            LD   A,L
1672 4BDD CB79          BIT  7,C
1673 4BDF 2803          JR   Z,PA31
1674 4BE1 ED44          NEG
1675 4BE3 6F            LD   L,A
1676 4BE4 A9      PA31: XOR  C
1677 4BE5 FA504B        JP   M,E6
1678 4BE8 60      PA3:  LD   H,B
1679 4BE9 3E0A          LD   A,XYD
1680 4BEB C9            RET
1681
1682 4BEC FE36    PA7:  CP   TLIT
1683 4BEE 200C          JR   NZ,PA4
1684 4BF0 B0            OR   B
1685 4BF1 6F            LD   L,A
1686 4BF2 E5            PUSH HL
1687 4BF3 CD754C        CALL TERM
1688 4BF6 E1            POP  HL
1689 4BF7 7D            LD   A,L
1690 4BF8 D8            RET  C
1691 4BF9 C3504B  PER:  JP   E6
1692
1693 4BFC FE03    PA4:  CP   NO
1694 4BFE 20F9          JR   NZ,PER
1695 4C00 B0            OR   B
1696 4C01 F5            PUSH AF
1697 4C02 E5      PA5:  PUSH HL
1698 4C03 CD754C        CALL TERM
1699 4C06 E1            POP  HL
1700 4C07 3811          JR   C,PA6
1701 4C09 F5            PUSH AF
1702 4C0A E5            PUSH HL
1703 4C0B CD754C        CALL TERM
1704 4C0E EB            EX   DE,HL
1705 4C0F E1            POP  HL
1706 4C10 FE03          CP   NO
1707 4C12 20E5          JR   NZ,PER
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1708 4C14 F1              POP  AF
1709 4C15 CD1C4C          CALL MATH
1710 4C18 18E8            JR   PA5
1711 4C1A F1        PA6:  POP  AF
1712 4C1B C9              RET
1713
1714 4C1C FE40      MATH: CP   TADD
1715 4C1E 2002            JR   NZ,MA2
1716 4C20 19              ADD  HL,DE
1717 4C21 C9              RET
1718 4C22 FEC0      MA2:  CP   TSUB
1719 4C24 2003            JR   NZ,MA3
1720 4C26 ED52            SBC  HL,DE
1721 4C28 C9              RET
1722 4C29 FE82      MA3:  CP   TAND
1723 4C2B 2007            JR   NZ,MA4
1724 4C2D 7B              LD   A,E
1725 4C2E A5              AND  L
1726 4C2F 6F              LD   L,A
1727 4C30 7A              LD   A,D
1728 4C31 A4              AND  H
1729 4C32 67              LD   H,A
1730 4C33 C9              RET
1731
1732 4C34 FE83      MA4:  CP   TOR
1733 4C36 2007            JR   NZ,MA5
1734 4C38 7B              LD   A,E
1735 4C39 B5              OR   L
1736 4C3A 6F              LD   L,A
1737 4C3B 7A              LD   A,D
1738 4C3C B4              OR   H
1739 4C3D 67              LD   H,A
1740 4C3E C9              RET
1741
1742 4C3F 4B        MA5:  LD   C,E
1743 4C40 42              LD   B,D
1744 4C41 EB              EX   DE,HL
1745 4C42 FE81            CP   TDIV
1746 4C44 2018            JR   NZ,MA6
1747 4C46 210000    MA50: LD   HL,0
1748 4C49 3E11            LD   A,17
1749 4C4B B7              OR   A
1750 4C4C ED6A      MA51: ADC  HL,HL
1751 4C4E ED42            SBC  HL,BC
1752 4C50 3002            JR   NC,MA52
1753 4C52 09              ADD  HL,BC
1754 4C53 37              SCF
1755 4C54 3F        MA52: CCF
1756 4C55 CB13            RL   E
1757 4C57 CB12            RL   D
1758 4C59 3D              DEC  A
1759 4C5A 20F0            JR   NZ,MA51
1760 4C5C EB              EX   DE,HL
1761 4C5D C9              RET
1762
1763 4C5E FE80      MA6:  CP   TMUL
1764 4C60 2097            JR   NZ,PER
1765 4C62 210000          LD   HL,0
1766 4C65 3E10            LD   A,16
1767 4C67 CB38      MA61: SRL  B
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1768 4C69 CB19                RR   C
1769 4C6B 3001                JR   NC,MA62
1770 4C6D 19                  ADD  HL,DE
1771 4C6E EB          MA62:   EX   DE,HL
1772 4C6F 29                  ADD  HL,HL
1773 4C70 EB                  EX   DE,HL
1774 4C71 3D                  DEC  A
1775 4C72 20F3                JR   NZ,MA61
1776 4C74 C9                  RET
1777
1778 4C75 CD0A4D      TERM:   CALL CLASS
1779 4C78 FE31                CP   TLAB
1780 4C7A CA504B              JP   Z,E6
1781 4C7D FE0B        TE2:    CP   EOL
1782 4C7F 2006                JR   NZ,TE3
1783 4C81 DDCB01C6            SET  0,(IX+F2)
1784 4C85 37                  SCF
1785 4C86 C9                  RET
1786 4C87 FE33        TE3:    CP   TCOM
1787 4C89 37                  SCF
1788 4C8A C8                  RET  Z
1789 4C8B FE30                CP   TALPHA
1790 4C8D 37                  SCF
1791 4C8E 3F                  CCF
1792 4C8F C0                  RET  NZ
1793 4C90 CDED4A              CALL OPDSCH
1794 4C93 3E32                LD   A,TOPD
1795 4C95 D0                  RET  NC
1796 4C96 CDE84A              CALL SYMSCH
1797 4C99 3E03                LD   A,NO
1798 4C9B D0                  RET  NC
1799 4C9C 3F                  CCF
1800 4C9D DDCB01E6            SET  4,(IX+F2)
1801 4CA1 DDCB006E            BIT  5,(IX+F1)
1802 4CA5 C0                  RET  NZ
1803 4CA6 2E5A        E7:     LD   L,M17&255
1804 4CA8 C3A942              JP   ER
1805
1806 4CAB 2ADD40      TYPE:   LD   HL,(CURRENT)
1807 4CAE CD0646              CALL EOF
1808 4CB1 23                  INC  HL
1809 4CB2 22DD40              LD   (CURRENT),HL
1810 4CB5 2B                  DEC  HL
1811 4CB6 7E                  LD   A,(HL)
1812 4CB7 FD21D94C            LD   IY,TYPTAB
1813
1814 4CBB D5          FIND:   PUSH DE
1815 4CBC FDE5                PUSH IY
1816 4CBE E3                  EX   (SP),HL
1817 4CBF 5E                  LD   E,(HL)
1818 4CC0 53                  LD   D,E
1819 4CC1 23          FIN1:   INC  HL
1820 4CC2 BE                  CP   (HL)
1821 4CC3 2803                JR   Z,FIN2
1822 4CC5 15                  DEC  D
1823 4CC6 20F9                JR   NZ,FIN1
1824 4CC8 1600        FIN2:   LD   D,0
1825 4CCA 19                  ADD  HL,DE
1826 4CCB 7E                  LD   A,(HL)
1827 4CCC 19                  ADD  HL,DE
```

```
1828 4CCD 5F                        LD   E,A
1829 4CCE 7E                        LD   A,(HL)
1830 4CCF CB7B                      BIT  7,E
1831 4CD1 CBBB                      RES  7,E
1832 4CD3 19                        ADD  HL,DE
1833 4CD4 E3                        EX   (SP),HL
1834 4CD5 FDE1                      POP  IY
1835 4CD7 D1                        POP  DE
1836 4CD8 C9                        RET
1837
1838 4CD9 100D27    TYPTAB:         DB   TL,CR,"'"
1839 4CDC 242A2F2B                  DB   '$*/+-&.()'
1839 4CE0 2D262E28
1939 4CE4 29
1840 4CE5 3B3A222C                  DB   3BH,':",'
1841 4CE9 00                        DB   0
1842
1843 4CEA 1F                        DB   CL3-$-TL
1844 4CEB 2C                        DB   CL4-$-TL
1845 4CEC 1E                        DB   CL2-$-TL
1846 4CED 1C                        DB   CL3-$-TL
1847 4CEE 1B                        DB   CL3-$-TL
1848 4CEF 1A                        DB   CL3-$-TL
1849 4CF0 19                        DB   CL3-$-TL
1850 4CF1 18                        DB   CL3-$-TL
1851 4CF2 17                        DB   CL3-$-TL
1852 4CF3 16                        DB   CL3-$-TL
1853 4CF4 06                        DB   CLASS-$-TL
1854 4CF5 0D                        DB   CL1-$-TL
1855 4CF6 13                        DB   CL3-$-TL
1856 4CF7 20                        DB   CL4-$-TL
1857 4CF8 11                        DB   CL3-$-TL
1858 4CF9 3B                        DB   CL5-$-TL
1859
1860 4CFA 0B000380                  DB   EOL,0,NO,TMUL,TDIV
1860 4CFE 81
1861 4CFF 40C08283                  DB   TADD,TSUB,TAND,TOR
1862 4D03 34000031                  DB   TIND,0,0,TLAB
1863 4D07 003335                    DB   0,TCOM,TDEF
1864
1865 4D0A CDAB4C    CLASS:          CALL TYPE
1866 4D0D 010021                    LD   BC,2100H
1867 4D10 FDE9                      JP   (IY)
1868
1869 4D12 CDAB4C    CL1:            CALL TYPE
1870 4D15 FE0B                      CP   EOL
1871 4D17 20F9                      JR   NZ,CL1
1872 4D19 C9        CL3:            RET
1873 4D1A 2AEF40    CL2:            LD   HL,(PC)
1874 4D1D DDCB007E                  BIT  7,(IX+F1)
1875 4D21 C8                        RET  Z
1876 4D22 2E64      E11:            LD   L,M18&255
1877 4D24 C3A942                    JP   ER
1878 4D27 E5        CL4:            PUSH HL
1979 4D28 46                        LD   B,(HL)
1880 4D29 5E        CL41:           LD   E,(HL)
1881 4D2A 0C                        INC  C
1882 4D2B CDAB4C                    CALL TYPE
1883 4D2E FE0B                      CP   EOL
1884 4D30 282C                      JR   Z,CLER
```

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1885 4D32 7E            LD   A,(HL)
1886 4D33 B8            CP   B
1887 4D34 20F3          JR   NZ,CL41
1888 4D36 EB            EX   DE,HL
1889 4D37 D1            POP  DE
1890 4D38 0D            DEC  C
1891 4D39 2823          JR   Z,CLER
1892 4D3B 61            LD   H,C
1893 4D3C 3E03          LD   A,NO
1894 4D3E 25            DEC  H
1895 4D3F C8            RET  Z
1896 4D40 24            INC  H
1897 4D41 3E36          LD   A,TLIT
1898 4D43 C9            RET
1899
1900 4D44 7E       CL5: LD   A,(HL)
1901 4D45 B8            CP   B
1902 4D46 38C2          JR   C,CLASS
1903 4D48 FE30          CP   30H
1904 4D4A 3815          JR   C,CL7
1905 4D4C FE3A          CP   3AH
1906 4D4E 3011          JR   NC,CL7
1907 4D50 CD614D   CL6: CALL CL7
1908 4D53 FE31          CP   TLAB
1909 4D55 2807          JR   Z,CLER
1910 4D57 41            LD   B,C
1911 4D58 CDD247        CALL CONVERT
1912 4D5B 3E03          LD   A,NO
1913 4D5D D0            RET  NC
1914 4D5E C3504B   CLER: JP   E6
1915
1916 4D61 E5       CL7: PUSH HL
1917 4D62 D1            POP  DE
1918 4D63 CB7E     CL71: BIT  7,(HL)
1919 4D65 C21749        JP   NZ,E1
1920 4D68 0C            INC  C
1921 4D69 CDAB4C        CALL TYPE
1922 4D6C FE31          CP   TLAB
1923 4D6E C8            RET  Z
1924 4D6F FE35          CP   TDEF
1925 4D71 2004          JR   NZ,CL72
1926 4D73 7E            LD   A,(HL)
1927 4D74 B8            CP   B
1928 4D75 30EC          JR   NC,CL71
1929 4D77 22DD40   CL72: LD   (CURRENT),HL
1930 4D7A 3E30          LD   A,TALPHA
1931 4D7C C9            RET
1932
1933 4D7D FE09     JRH: CP   CC
1934 4D7F 200A          JR   NZ,DJH
1935 4D81 7D            LD   A,L
1936 4D82 E6E7          AND  0E7H
1937 4D84 C0            RET  NZ
1938 4D85 45            LD   B,L
1939 4D86 CBE8          SET  5,B
1940 4D88 CD9B4B        CALL PARSER
1941
1942 4D8B FE03     DJH: CP   NO
1943 4D8D C0            RET  NZ
1944 4D8E CD6C4B        CALL MOFB
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1945 4D91 DDCB006E              BIT  5,(IX+F1)
1946 4D95 200F                  JR   NZ,DJ2
1947 4D97 ED5BEF40              LD   DE,(PC)
1948 4D9B 37                    SCF
1949 4D9C ED52                  SBC  HL,DE
1950 4D9E 7C                    LD   A,H
1951 4D9F 24                    INC  H
1952 4DA0 2802                  JR   Z,DJ1
1953 4DA2 25                    DEC  H
1954 4DA3 C0                    RET  NZ
1955 4DA4 AD            DJ1:    XOR  L
1956 4DA5 F8                    RET  M
1957 4DA6 7D            DJ2:    LD   A,L
1958 4DA7 C36D4B                JP   MOF
1959
1960 4DAA FE03          DWH:    CP   NO
1961 4DAC C0                    RET  NZ
1962 4DAD C3654B                JP   MOFLH
1963
1964 4DB0 FE36          DBH:    CP   TLIT
1965 4DB2 200A                  JR   NZ,DBH3
1966 4DB4 13            DBH1:   INC  DE
1967 4DB5 1A                    LD   A,(DE)
1968 4DB6 CD6D4B                CALL MOF
1969 4DB9 25                    DEC  H
1970 4DBA 20F8                  JR   NZ,DBH1
1971 4DBC 1807                  JR   DBH4
1972
1973 4DBE CD444B        DBH3:   CALL LITLF
1974 4DC1 7D                    LD   A,L
1975 4DC2 CD6D4B                CALL MOF
1976 4DC5 CD9B4B        DBH4:   CALL PARSER
1977 4DC8 FE0B                  CP   EOL
1978 4DCA 20E4                  JR   NZ,DBH
1979 4DCC C9                    RET
1980
1981 4DCD CD354B        DSH:    CALL RESOLV
1982 4DD0 EB                    EX   DE,HL
1983 4DD1 2AEF40                LD   HL,(PC)
1984 4DD4 19                    ADD  HL,DE
1985 4DD5 22EF40                LD   (PC),HL
1986 4DD8 2AF140                LD   HL,(OBJ)
1987 4DDB 19                    ADD  HL,DE
1988 4DDC 22F140                LD   (OBJ),HL
1989 4DDF AF                    XOR  A
1990 4DE0 C9                    RET
1991
1992 4DE1 CD354B        LOADH:  CALL RESOLV
1993 4DE4 22F140                LD   (OBJ),HL
1994 4DE7 DDCB00A6              RES  4,(IX+F1)
1995 4DEB AF                    XOR  A
1996 4DEC C9                    RET
1997
1998 4DED CD354B        ORGH:   CALL RESOLV
1999 4DF0 22EF40                LD   (PC),HL
2000 4DF3 DDCB00E6              SET  4,(IX+F1)
2001 4DF7 DDCB00BE              RES  7,(IX+F1)
2002 4DFB 2007                  JR   NZ,ED2
2003 4DFD C9                    RET
2004
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2005 4DFE CD354B   EQUH:     CALL RESOLV
2006 4E01 CAA742             JP   Z,E0
2007 4E04 EB       EQ2:      EX   DE,HL
2008 4E05 2AED40             LD   HL,(LBLP)
2009 4E08 72                 LD   (HL),D
2010 4E09 2B                 DEC  HL
2011 4E0A 73                 LD   (HL),E
2012 4E0B AF       ENDH:     XOR  A
2013 4E0C C9                 RET
2014
2015 4E0D 15       LTAB:     DB   LL
2016 4E0E 53                 DB   RPI*16.NO
2017 4E0F 03                 DB   TR*16.NO
2018 4E10 80                 DB   RE*16.TR
2019 4E11 08                 DB   TR*16.RE
2020 4E12 00                 DB   TR*16.TR
2021 4E13 11                 DB   RP*16.RP
2022 4E14 72                 DB   NOI*16.XY
2023 4E15 27                 DB   XY*16.NOI
2024 4E16 23                 DB   XY*16.NO
2025 4E17 70                 DB   NOI*16.TR
2026 4E18 07                 DB   TR*16.NOI
2027 4E19 71                 DB   NOI*16.RE
2028 4E1A 17                 DB   RP*16.NOI
2029 4E1B 12                 DB   RP*16.XY
2030 4E1C A3                 DB   XYD*16.NO
2031 4E1D 13                 DB   RP*16.NO
2032 4E1E A0                 DB   XYD*16.TR
2033 4E1F 0A                 DB   TR*16.XYD
2034 4E20 50                 DB   RPI*16.TR
2035 4E21 05                 DB   TR*16.RPI
2036 4E22 00                 DB   0
2037
2038 4E23 95                 DB   L1-$-LL.S
2039 4E24 98                 DB   L2-$-LL.S
2040 4E25 21                 DB   L3-$-LL
2041 4E26 A0                 DB   L3-$-LL.S
2042 4E27 AC                 DB   L4-$-LL.S
2043 4E28 31                 DB   L5-$-LL
2044 4E29 35                 DB   L6-$-LL
2045 4E2A B4                 DB   L6-$-LL.S
2046 4E2B B3                 DB   L6-$-LL.S
2047 4E2C 3C                 DB   L7-$-LL
2048 4E2D BB                 DB   L7-$-LL.S
2049 4E2E 42                 DB   L8-$-LL
2050 4E2F C1                 DB   L8-$-LL.S
2051 4E30 D2                 DB   L9-$-LL.S
2052 4E31 D8                 DB   LA-$-LL.S
2053 4E32 DF                 DB   LB-$-LL.S
2054 4E33 63                 DB   LC-$-LL
2055 4E34 E2                 DB   LC-$-LL.S
2056 4E35 6A                 DB   LE-$-LL
2057 4E36 E9                 DB   LE-$-LL.S
2058 4E37 36                 DB   LER-$-LL
2059
2060 4E38 16064757           DB   16H,6,47H,57H,40H
2060 4E3C 40
2061 4E3D F9222A21           DB   0F9H,22H,2AH,21H
2062 4E41 32                 DB   32H
2063 4E42 3A222AF9           DB   3AH,22H,2AH,0F9H
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2064 4E46 36              DB   36H
2065 4E47 01020A02        DB   1,2,0AH,2,0AH,0
2065 4E4B 0A00
2066
2067 4E4D 7B         L1:  LD   A,E
2068 4E4E FE04            CP   IHL
2069 4E50 C0              RET  NZ
2070 4E51 CD484B     L2:  CALL LITLE2
2071 4E54 CD564B          CALL MOFMX2
2072 4E57 7D              LD   A,L
2073 4E58 C36D4B     L21: JP   MOF
2074
2075 4E5B 7B         L3:  LD   A,E
2076 4E5C FE07            CP   IA
2077 4E5E C0              RET  NZ
2078 4E5F 7D              LD   A,L
2079 4E60 B0              OR   B
2080 4E61 47              LD   B,A
2081 4E62 CD614B     L30: CALL MOFPRE
2082 4E65 C36C4B     L31: JP   MOFB
2083
2084 4E68 7D         L4:  LD   A,L
2085 4E69 B0              OR   B
2086 4E6A 47              LD   B,A
2087 4E6B C3564B          JP   MOFMX2
2088
2089 4E6E FE64       L5:  CP   ISP*16.IHL
2090 4E70 C0              RET  NZ
2091 4E71 18F2            JR   L31
2092
2093 4E73 7B         L6:  LD   A,E
2094 4E74 CD6D4B     L61: CALL MOF
2095 4E77 CD6C4B     L62: CALL MOFB
2096 4E7A C3654B     L63: JP   MOFLH
2097
2098 4E7D 7B         L7:  LD   A,E
2099 4E7E FE07            CP   IA
2100 4E80 28F5            JR   Z,L62
2101 4E82 C3504B     LER: JP   E6
2102
2103 4E85 7B         L8:  LD   A,E
2104 4E86 FE04            CP   IHL
2105 4E88 28ED            JR   Z,L62
2106 4E8A CD614B          CALL MOFPRE
2107 4E8D 78              LD   A,B
2108 4E8E EE61            XOR  61H
2109 4E90 47              LD   B,A
2110 4E91 CD564B          CALL MOFMX2
2111 4E94 C3654B          JP   MOFLH
2112
2113 4E97 7B         L9:  LD   A,E
2114 4E98 FE06            CP   ISP
2115 4E9A C0              RET  NZ
2116 4E9B 60              LD   H,B
2117 4E9C 18DC            JR   L63
2118
2119 4E9E CD484B     LA:  CALL LITLE2
2120 4EA1 7A              LD   A,D
2121 4EA2 65              LD   H,L
2122 4EA3 6B              LD   L,E
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2123 4EA4 18CE                    JR   L61
2124
2125 4EA6 CD564B   LB:            CALL MOFMX2
2126 4EA9 18CF                    JR   L63
2127
2128 4EAB CD694B   LC:            CALL MOFH
2129 4EAE CDC24E                  CALL LE1
2130 4EB1 7D                      LD   A,L
2131 4EB2 18A4                    JR   L21
2132
2133 4EB4 FE07     LE:            CP   IBC*16.IA
2134 4EB6 28AD                    JR   Z,L31
2135 4EB8 CBE0                    SET  4,B
2136 4EBA FE27                    CP   IDE*16.IA
2137 4EBC 28A7                    JR   Z,L31
2138 4EBE 7D                      LD   A,L
2139 4EBF FE04                    CP   IHL
2140 4EC1 C0                      RET  NZ
2141 4EC2 CB58     LE1:           BIT  3,B
2142 4EC4 0646                    LD   B,46H
2143 4EC6 C2564B                  JP   NZ,MOFMX2
2144 4EC9 7B                      LD   A,E
2145 4ECA F670                    OR   70H
2146 4ECC 188A                    JR   L21
2147
2148 4ECE CD444B   RSTH:          CALL LITLE
2149 4ED1 2003                    JR   NZ,RST2
2150 4ED3 7D                      LD   A,L
2151 4ED4 A0                      AND  B
2152 4ED5 C0                      RET  NZ
2153 4ED6 78       RST2:          LD   A,B
2154 4ED7 B5                      OR   L
2155 4ED8 C36D4B                  JP   MOF
2156
2157 4EDB FE09     RETH:          CP   CC
2158 4EDD 28F7                    JR   Z,RST2
2159 4EDF 06C9                    LD   B,0C9H
2160 4EE1 FE0B                    CP   EOL
2161 4EE3 1811                    JR   JMP21
2162
2163 4EE5 03       JMPTAB:        DB   JL
2164 4EE6 6B                      DB   XYI*16.EOL
2165 4EE7 5B                      DB   RPI*16.EOL
2166 4EE8 00                      DB   0
2167 4EE9 03                      DB   JMP1-$-JL
2168 4EEA 06                      DB   JMP2-$-JL
2169 4EEB 10                      DB   JMP3-$-JL
2170 4EEC E9E9C3                  DB   0E9H,0E9H,0C3H
2171
2172 4EEF 60       JMP1:          LD   H,B
2173 4EF0 C3654B                  JP   MOFLH
2174 4EF3 7D       JMP2:          LD   A,L
2175 4EF4 FE04                    CP   IHL
2176 4EF6 C0       JMP21:         RET  NZ
2177 4EF7 C36C4B                  JP   MOFB
2178
2179 4EFA 01       CALTAB:        DB   CL
2180 4EFB 00                      DB   0
2181 4EFC 01                      DB   JMP3-$-CL
2182 4EFD CD                      DB   0CDH
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2183
2184 4EFE 79          JMP3:     LD    A,C
2185 4EFF FE38                  CP    NO*16.EOL
2186 4F01 CA774E                JP    Z,L62
2187 4F04 FE93                  CP    CC*16.NO
2188 4F06 C0                    RET   NZ
2189 4F07 78                    LD    A,B
2190 4F08 E6C6                  AND   0C6H
2191 4F0A B5                    OR    L
2192 4F0B 47                    LD    B,A
2193 4F0C EB                    EX    DE,HL
2194 4F0D C3774E                JP    L62
2195
2196 4F10 FE01        PPH:      CP    RP
2197 4F12 2008                  JR    NZ,PP2
2198 4F14 7D                    LD    A,L
2199 4F15 FE06                  CP    ISP
2200 4F17 CA504B                JP    Z,E6
2201 4F1A CB9D                  RES   3,L
2202 4F1C C3554B                JP    MOFMIX
2203 4F1F FE02        PP2:      CP    XY
2204 4F21 C0                    RET   NZ
2205 4F22 CBE8        PP21:     SET   5,B
2206 4F24 60                    LD    H,B
2207 4F25 C3654B                JP    MOFLH
2208
2209 4F28 CD444B      IMH:      CALL  LITLE
2210 4F2B 2004                  JR    NZ,IM2
2211 4F2D 3E02                  LD    A,2
2212 4F2F 95                    SUB   L
2213 4F30 D8                    RET   C
2214 4F31 11394F      IM2:      LD    DE,IMTAB
2215 4F34 19                    ADD   HL,DE
2216 4F35 46                    LD    B,(HL)
2217 4F36 C3624E                JP    L30
2218
2219 4F39 46565E      IMTAB:    DB    46H,56H,5EH
2220
2221 4F3C FE02        INCH:     CP    XY
2222 4F3E 28E2                  JR    Z,PP21
2223 4F40 FE01                  CP    RP
2224 4F42 CA554B                JP    Z,MOFMIX
2225 4F45 CB50                  BIT   3,B
2226 4F47 0634                  LD    B,34H
2227 4F49 2801                  JR    Z,INC2
2228 4F4B 04                    INC   B
2229 4F4C B7          INC2:     OR    A
2230 4F4D 205A                  JR    NZ,ML2
2231 4F4F 78                    LD    A,B
2232 4F50 E6C7                  AND   0C7H
2233 4F52 47                    LD    B,A
2234 4F53 C3554B                JP    MOFMIX
2235
2236 4F56 02          ADCTAB:   DB    AL
2237 4F57 11                    DB    RP*16.RP
2238 4F58 00                    DB    0
2239 4F59 16                    DB    DL1-$-AL
2240 4F5A B3                    DB    DL5-$-AL.S
2241 4F5B 4A8E                  DB    4AH,8EH
2242
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2243 4F5D 02          SBCTAB:   DB   SBL
2244 4F5E 11                    DB   RP*16.RP
2245 4F5F 00                    DB   0
2246 4F60 0F                    DB   DL1-$-SBL
2247 4F61 AC                    DB   DL5-$-SBL.S
2248 4F62 429E                  DB   42H,9EH
2249
2250 4F64 04          ADDTAB:   DB   ADL
2251 4F65 11                    DB   RP*16.RP
2252 4F66 21                    DB   XY*16.RP
2253 4F67 22                    DB   YY*16.XY
2254 4F68 00                    DB   0
2255 4F69 07                    DB   DL2-$-ADL
2256 4F6A 0D                    DB   DL3-$-ADL
2257 4F6B 19                    DB   DL4-$-ADL
2258 4F6C 9F                    DB   DL5-$-ADL.S
2259 4F6D 09092986              DB   9,9,29H,86H
2260
2261 4F71 CD614B      DL1:      CALL MOFPRE
2262 4F74 7D          DL2:      LD   A,L
2263 4F75 FE04                  CP   IHL
2264 4F77 C0                    RET  NZ
2265 4F78 C3564B                JP   MOFMX2
2266
2267 4F7B 7B          DL3:      LD   A,E
2268 4F7C FE04                  CP   IHL
2269 4F7E CA5045                JP   Z,E6
2270 4F81 7D                    LD   A,L
2271 4F82 CD6D4B                CALL MOF
2272 4F85 C3564B                JP   MOFMX2
2273
2274 4F88 7B          DL4:      LD   A,E
2275 4F89 BD                    CP   L
2276 4F8A 60                    LD   H,B
2277 4F8B C0                    RET  NZ
2278 4F8C C3654B                JP   MOFLH
2279
2280 4F8F 79          DL5:      LD   A,C
2281 4F90 E6F0                  AND  0F0H
2282 4F92 C0                    RET  NZ
2283 4F93 CB53                  BIT  2,E
2284 4F95 CA504B                JP   Z,E6
2285 4F98 79                    LD   A,C
2286 4F99 E60F                  AND  0FH
2287
2288 4F9B FE03        ML1:      CP   NO
2289 4F9D 200A                  JR   NZ,ML2
2290 4F9F CBF0                  SET  6,B
2291 4FA1 CD484B      ML11:     CALL LITLE2
2292 4FA4 65          ML12:     LD   H,L
2293 4FA5 68                    LD   L,B
2294 4FA6 C3654B                JP   MOFLH
2295
2296 4FA9 FE0A        ML2:      CP   XYD
2297 4FAB 2005                  JR   NZ,ML3
2298 4FAD CD694B                CALL MOFH
2299 4FB0 18F2                  JR   ML12
2300
2301 4FB2 FE05        ML3:      CP   RPI
2302 4FB4 CAF34E                JP   Z,JMP2
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2303 4FB7 B7                    OR   A
2304 4FB8 C0                    RET  NZ
2305 4FB9 78                    LD   A,B
2306 4FBA E6F8                  AND  0F8H
2307 4FBC B5                    OR   L
2308 4FBD C36D4B                JP   MOF
2309
2310 4FC0 CD444B   BITH:        CALL LITLE
2311 4FC3 2004                  JR   NZ,BIT2
2312 4FC5 3E07                  LD   A,7
2313 4FC7 95                    SUB  L
2314 4FC8 D8                    RET  C
2315 4FC9 7D       BIT2:        LD   A,L
2316 4FCA 07                    RLCA
2317 4FCB 07                    RLCA
2318 4FCC 07                    RLCA
2319 4FCD B0                    OR   B
2320 4FCE 47                    LD   B,A
2321 4FCF CD9B4B                CALL PARSER
2322
2323 4FD2 FE0A     SRH:         CP   XYD
2324 4FD4 200C                  JR   NZ,SR2
2325 4FD6 E5                    PUSH HL
2326 4FD7 6C                    LD   L,H
2327 4FD8 26CB                  LD   H,0CBH
2328 4FDA CD654B                CALL MOFLH
2329 4FDD E1                    POP  HL
2330 4FDE 60                    LD   H,B
2331 4FDF C3654B                JP   MOFLH
2332
2333 4FE2 F5       SR2:         PUSH AF
2334 4FE3 3ECB                  LD   A,0CBH
2335 4FE5 CD6D4B                CALL MOF
2336 4FE8 F1                    POP  AF
2337 4FE9 18C7                  JR   ML3
2338
2339 4FEB 03       INTAB:       DB   INL
2340 4FEC 07                    DB   TR*16.NOI
2341 4FED 04                    DB   TR*16.TRI
2342 4FEE 00                    DB   0
2343 4FEF 8D                    DB   IO1-$-INL.S
2344 4FF0 93                    DB   IO2-$-INL.S
2345 4FF1 19                    DB   IOER-$-INL
2346 4FF2 DB4000                DB   0DBH,40H,0
2347
2348 4FF5 03       OUTAB:       DB   OL
2349 4FF6 70                    DB   NOI*16.TR
2350 4FF7 40                    DB   TRI*16.TR
2351 4FF8 00                    DB   0
2352 4FF9 03                    DB   IO1-$-OL
2353 4FFA 09                    DB   IO2-$-OL
2354 4FFB 0F                    DB   IOER-$-OL
2355 4FFC D34100                DB   0D3H,41H,0
2356
2357 4FFF CB53     IO1:         BIT  2,E
2358 5001 280A                  JR   Z,IOER
2359 5003 C3A14F                JP   ML11
2360 5006 CD614B   IO2:         CALL MOFPRE
2361 5009 2D                    DEC  L
2362 500A CA564B                JP   Z,MOFMX2
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```
2363 500D C3504B    IOER:       JP   E6
2364
2365 5010 04        XTAB:       DB   XL
2366 5011 11                    DB   RP*16.RP
2367 5012 51                    DB   RPI*16.RP
2368 5013 52                    DB   RPI*16.XY
2369 5014 00                    DB   0
2370 5015 04                    DB   X1-$-XL
2371 5016 11                    DB   X2-$-XL
2372 5017 93                    DB   X3-$-XL.S
2373 5018 0D                    DB   XER-$-XL
2374 5019 EBE3E300              DB   0EBH,0E3H,0E3H,0
2375
2376 501D FE24      X1:         CP   IDE*16.IHL
2377 501F CA6C4B                JP   Z,MOFB
2378 5022 0608                  LD   B,8
2379 5024 FEEE                  CP   IAF*16.IAF
2380 5026 CA6C4B                JP   Z,MOFB
2381 5029 18E2      XER:        JR   IOER
2382
2383 502B C36E4E    X2:         JP   L5
2384
2385 502E C3974E    X3:         JP   L9
2386
2387 5031 6550      KEYTB:      DW   AOPS
2388 5033 7250                  DW   BOPS
2389 5035 7750                  DW   COPS
2390 5037 9A50                  DW   DOPS
2391 5039 C350                  DW   EOPS
2392 503B D650                  DW   FOPS
2393 503D D750                  DW   GOPS
2394 503F D850                  DW   HOPS
2395 5041 DE50                  DW   IOPS
2396 5043 FB50                  DW   JOPS
2397 5045 0251                  DW   KOPS
2398 5047 0351                  DW   LOPS
2399 5049 1E51                  DW   MOPS
2400 504B 1F51                  DW   NOPS
2401 504D 2851                  DW   OOPS
2402 504F 4851                  DW   POPS
2403 5051 5251                  DW   QOPS
2404 5053 5351                  DW   ROPS
2405 5055 9251                  DW   SOPS
2406 5057 AF51                  DW   TOPS
2407 5059 B051                  DW   UOPS
2408 505B B151                  DW   VOPS
2409 505D B251                  DW   WOPS
2410 505F B351                  DW   XOPS
2411 5061 B851                  DW   YOPS
2412 5063 B951                  DW   ZOPS
2413
2414 5065 44C33200  AOPS:       DB   'D','C'+S,50,0
2415 5069 44C43000              DB   'D','D'+S,48,0
2416 506D 4EC412A6              DB   'N','D'+S,18,0A6H
2417 5071 FF                    DB   0FFH
2418
2419 5072 49D41646  BOPS:       DB   'I','T'+S,22,46H
2420 5076 FF                    DB   0FFH
2421
2422 5077 414CCCA8  COPS:       DB   'AL','L'+S,40+S,0
```

```
2422 507B 00
2423 507C D012BE                    DB   'P'+S,18,0BEH
2424 507F 43C6003F                  DB   'C','F'+S,0,3FH
2425 5083 50CC002F                  DB   'P','L'+S,0,2FH
2426 5087 50C902A1                  DB   'P','I'+S,2,0A1H
2427 508B 5049D202                  DB   'PI','R'+S,2,0B1H
2427 508F B1
2428 5090 50C402A9                  DB   'P','D'+S,2,0A9H
2429 5094 5044D202                  DB   'PD','R'+S,2,0B9H
2429 5098 B9
2430 5099 FF                        DB   0FFH
2431
2432 509A 45C3100B DOPS:            DB   'E','C'+S,16,0BH
2433 509E 4A4EDA0E                  DB   'JN','Z'+S,14,10H
2433 50A2 10
2434 50A3 41C10027                  DB   'A','A'+S,0,27H
2435 50A7 C900F3                    DB   'I'+S,0,0F3H
2436 50AA C21A00                    DB   'B'+S,26,0
2437 50AD 4546C21A                  DB   'EF','B'+S,26,0
2437 50B1 00
2438 50B2 D71800                    DB   'W'+S,24,0
2439 50B5 4546D718                  DB   'EF','W'+S,24,0
2439 50B9 00
2440 50BA D31C00                    DB   'S'+S,28,0
2441 50BD 4546D31C                  DB   'EF','S'+S,28,0
2441 50C1 00
2442 50C2 FF                        DB   0FFH
2443
2444 50C3 D82C00    EOPS:           DB   'X'+S,44,0
2445 50C6 58D800D9                  DB   'X','X'+S,0,0D9H
2446 50CA C900FB                    DB   'I'+S,0,0FBH
2447 50CD 51D51E00                  DB   'Q','U'+S,30,0
2448 50D1 4EC404FF                  DB   'N','D'+S,4,0FFH
2449 50D5 FF                        DB   0FFH
2450
2451 50D6 FF        FOPS:           DB   0FFH
2452 50D7 FF        GOPS:           DB   0FFH
2453
2454 50D8 414CD400 HOPS:            DB   'AL','T'+S,0,76H
2454 50DC 76
2455 50DD FF                        DB   0FFH
2456
2457 50DE 4EC31003 IOPS:            DB   'N','C'+S,16,3
2458 50E2 CD2200                    DB   'M'+S,34,0
2459 50E5 CE2E00                    DB   'N'+S,46,0
2460 50E8 4EC902A2                  DB   'N','I'+S,2,0A2H
2461 50EC 4E49D202                  DB   'NI','R'+S,2,0B2H
2461 50F0 B2
2462 50F1 4EC402AA                  DB   'N','D'+S,2,0AAH
2463 50F5 4E44D202                  DB   'ND','R'+S,2,0BAH
2463 50F9 BA
2464 50FA FF                        DB   0FFH
2465
2466 50FB D28C18    JOPS:           DB   'R'+S,12+S,18H
2467 50FE D0AA00                    DB   'P'+S,42+S,0
2468 5101 FF                        DB   0FFH
2469
2470 5102 FF        KOPS:           DB   0FFH
2471
2472 5103 C42600    LOPS:           DB   'D'+S,38,0
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```
2473 5106 44C902A0              DB   'D','I'+S,2,0A0H
2474 510A 4449D202              DB   'DI','R'+S,2,0B0H
2474 510E B0
2475 510F 44C402A8              DB   'D','D'+S,2,0A8H
2476 5113 4444D202              DB   'DD','R'+S,2,0B8H
2476 5117 B8
2477 5118 4F41C424              DB   'OA','D'+S,36,0
2477 511C 00
2478 511D FF                    DB   0FFH
2479
2480 511E FF            MOPS:   DB   0FFH
2481
2482 511F 4FD00000      NOPS:   DB   'O','P'+S,0,0
2483 5123 45C70244              DB   'E','G'+S,2,44H
2484 5127 FF                    DB   0FFH
2485
2486 5128 D212B6        OOPS:   DB   'R'+S,18,0B6H
2487 512B 55D43600              DB   'U','T'+S,54,0
2488 512F 5554C902              DB   'UT','I'+S,2,0A3H
2488 5133 A3
2489 5134 5449D202              DB   'TI','R'+S,2,0B3H
2489 5138 B3
2490 5139 5554C402              DB   'UT','D'+S,2,0ABH
2490 513D AB
2491 513E 5444D202              DB   'TD','R'+S,2,0BBH
2491 5142 BB
2492 5143 52C72000              DB   'R','G'+S,32,0
2493 5147 FF                    DB   0FFH
2494
2495 5148 5553C80A      POPS:   DB   'US','H'+S,10,0C5H
2495 514C C5
2496 514D 4FD00AC1              DB   'O','P'+S,10,0C1H
2497 5151 FF                    DB   0FFH
2498
2499 5152 FF            QOPS:   DB   0FFH
2500
2501 5153 45D488C0      ROPS:   DB   'E','T'+S,8+S,0C0H
2502 5157 53D406C7              DB   'S','T'+S,6,0C7H
2503 515B 45D31686              DB   'E','S'+S,22,86H
2504 515F CC1416                DB   'L'+S,20,16H
2505 5162 4CC31406              DB   'L','C'+S,20,6
2506 5166 4C43C100              DB   'LC','A'+S,0,7
2506 516A 07
2507 516B 4CC10017              DB   'L','A'+S,0,17H
2508 516F D2141E                DB   'R'+S,20,1EH
2509 5172 52C3140E              DB   'R','C'+S,20,0EH
2510 5176 5243C100              DB   'RC','A'+S,0,0FH
2510 517A 0F
2511 517B 52C1001F              DB   'R','A'+S,0,1FH
2512 517F 4CC4026F              DB   'L','D'+S,2,6FH
2513 5183 52C40267              DB   'R','D'+S,2,67H
2514 5187 4554C902              DB   'ET','I'+S,2,4DH
2514 518B 4D
2515 518C 4554CE02              DB   'ET','N'+S,2,45H
2515 5190 45
2516 5191 FF                    DB   0FFH
2517
2518 5192 42C33400      SOPS:   DB   'B','C'+S,52,0
2519 5196 43C60037              DB   'C','F'+S,0,37H
2520 519A 4CC11426              DB   'L','A'+S,20,26H
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2521 519E 52C1142E              DB   'R','A'+S,20,2EH
2522 51A2 52CC143E              DB   'R','L'+S,20,3EH
2523 51A6 45D416C6              DB   'E','T'+S,22,0C6H
2524 51AA 55C21296              DB   'U','B'+S,18,96H
2525 51AE FF                    DB   0FFH
2526
2527 51AF FF            TOPS:   DB   0FFH
2528 51B0 FF            UOPS:   DB   0FFH
2529 51B1 FF            VOPS:   DB   0FFH
2530 51B2 FF            WOPS:   DB   0FFH
2531
2532 51B3 4FD212AE      XOPS:   DB   'O','R'+S,18,0AEH
2533 51B7 FF                    DB   0FFH
2534
2535 51B8 FF            YOPS:   DB   0FFH
2536 51B9 FF            ZOPS:   DB   0FFH
2537
2538 51BA 4EDA0009 CCODES:      DB   'N','Z'+S,INZ,CC
2539 51BE DA0809                DB   'Z'+S,IZ,CC
2540 51C1 4EC31009              DB   'N','C'+S,INCY,CC
2541 51C5 C31809                DB   'C'+S,ICY,CC
2542 51C8 50CF2009              DB   'P','O'+S,IPO,CC
2543 51CC 50C52809              DB   'P','E'+S,IPE,CC
2544 51D0 D03009                DB   'P'+S,IPOS,CC
2545 51D3 CD3809                DB   'M'+S,IMIN,CC
2546 51D6 C20000        TREGS:  DB   'B'+S,IB,TR
2547 51D9 C30100                DB   'C'+S,IC,TR
2548 51DC C40200                DB   'D'+S,ID,TR
2549 51DF C50300                DB   'E'+S,IE,TR
2550 51E2 C80400                DB   'H'+S,IH,TR
2551 51E5 CC0500                DB   'L'+S,IL,TR
2552 51E8 C10700                DB   'A'+S,IA,TR
2553 51EB 42C30001 RPAIRS:      DB   'B','C'+S,IBC,RP
2554 51EF 44C50201              DB   'D','E'+S,IDE,RP
2555 51F3 48CC0401              DB   'H','L'+S,IHL,RP
2556 51F7 53D00601              DB   'S','P'+S,ISP,RP
2557 51FB 41C60E01              DB   'A','F'+S,IAF,RP
2558 51FF 49D8DD02 XYPAIRS:     DB   'I','X'+S,IIX,XY
2559 5203 49D9FD02              DB   'I','Y'+S,IIY,XY
2560 5207 C90008        REREGS: DB   'I'+S,IINT,RE
2561 520A D20808                DB   'R'+S,IREF,RE
2562 520D FF                    DB   0FFH
2563
2564                    ; Disassembler
2565
2566                    ADCOP:  EQU  0*16+0
2567                    ADDOP:  EQU  0*16+1
2568                    ANDOP:  EQU  0*16+2
2569                    BITOP:  EQU  1*16+0
2570                    CALLOP: EQU  2*16+0
2571                    CPOP:   EQU  2*16+1
2572                    CCFOP:  EQU  2*16+2
2573                    CPLOP:  EQU  2*16+3
2574                    CPIOP:  EQU  2*16+4
2575                    CPIROP: EQU  2*16+5
2576                    CPDOP:  EQU  2*16+6
2577                    CPDROP: EQU  2*16+7
2578                    DECOP:  EQU  3*16+0
2579                    DJNZOP: EQU  3*16+1
2580                    DAAOP:  EQU  3*16+2
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2581                    DIOP:       EQU  3*16+3
2582                    DBOP:       EQU  3*16+4
2583                    EXOP:       EQU  4*16+0
2584                    EXXOP:      EQU  4*16+1
2585                    EIOP:       EQU  4*16+2
2586                    HALTOP:     EQU  5*16+0
2587                    INCOP:      EQU  6*16+0
2588                    IMOP:       EQU  6*16+1
2589                    INOP:       EQU  6*16+2
2590                    INIOP:      EQU  6*16+3
2591                    INIROP:     EQU  6*16+4
2592                    INDOP:      EQU  6*16+5
2593                    INDROP:     EQU  6*16+6
2594                    JROP:       EQU  7*16+0
2595                    JPOP:       EQU  7*16+1
2596                    LDOP:       EQU  8*16+0
2597                    LDIOP:      EQU  8*16+1
2598                    LDIROP:     EQU  8*16+2
2599                    LDDOP:      EQU  8*16+3
2600                    LDDROP:     EQU  8*16+4
2601                    NOPOP:      EQU  9*16+0
2602                    NEGOP:      EQU  9*16+1
2603                    OROP:       EQU  10*16+0
2604                    OUTOP:      EQU  10*16+1
2605                    OUTIOP:     EQU  10*16+2
2606                    OTIROP:     EQU  10*16+3
2607                    OUTDOP:     EQU  10*16+4
2608                    OTDROP:     EQU  10*16+5
2609                    PUSHOP:     EQU  11*16+0
2610                    POPOP:      EQU  11*16+1
2611                    RETOP:      EQU  12*16+0
2612                    RSTOP:      EQU  12*16+1
2613                    RESOP:      EQU  12*16+2
2614                    RLOP:       EQU  12*16+3
2615                    RLCOP:      EQU  12*16+4
2616                    RLCAOP:     EQU  12*16+5
2617                    RLAOP:      EQU  12*16+6
2618                    RROP:       EQU  12*16+7
2619                    RRCOP:      EQU  12*16+8
2620                    RRCAOP:     EQU  12*16+9
2621                    RRAOP:      EQU  12*16+10
2622                    RLDOP:      EQU  12*16+11
2623                    RRDOP:      EQU  12*16+12
2624                    RETIOP:     EQU  12*16+13
2625                    RETNOP:     EQU  12*16+14
2626                    SBCOP:      EQU  13*16+0
2627                    SCFOP:      EQU  13*16+1
2628                    SLAOP:      EQU  13*16+2
2629                    SRAOP:      EQU  13*16+3
2630                    SRLOP:      EQU  13*16+4
2631                    SETOP:      EQU  13*16+5
2632                    SUBOP:      EQU  13*16+6
2633                    XOROP:      EQU  14*16+0
2634
2635 520E CDBD47       DASM:       CALL STARTSTOP
2636 5211 2B                        DEC  HL
2637 5212 E5                        PUSH HL
2638 5213 19                        ADD  HL,DE
2639 5214 ED53F940                  LD   (DSTART),DE
2640 5218 22FB40                    LD   (DSTOP),HL
```

```
2641 521B 2E2D          LD   L,M11&255
2642 521D CDA847        CALL PARAMETER
2643 5220 3001          JR   NC,DSM2
2644 5222 EB            EX   DE,HL
2645 5223 22FF40   DSM2: LD   (DRSTART),HL
2646 5226 D1            POP  DE
2647 5227 19            ADD  HL,DE
2648 5228 220141        LD   (DRSTOP),HL
2649 522B 213C59        LD   HL,AEND+1
2650 522E 22E940        LD   (FEP),HL
2651 5231 36FF          LD   (HL),0FFH
2652 5233 23            INC  HL
2653 5234 220541        LD   (DEOAP),HL
2654 5237 2A0741        LD   HL,(DSOSP)
2655 523A 220941        LD   (DEOSP),HL
2656 523D CD8052        CALL GETAREAS
2657 5240 CD1C49        CALL GETOPTION
2658 5243 CD4A52        CALL DPASS
2659 5246 DDCB00AE      RES  5,(IX+F1)
2660 524A 2AF940   DPASS: LD   HL,(DSTART)
2661 524D FD2AFF40      LD   IY,(DRSTART)
2662 5251 22FD40   DPS2: LD   (DIP),HL
2663 5254 FD220341      LD   (DRIP),IY
2664 5258 CD3149        CALL HOLD
2665 525B DDCB03E6      SET  4,(IX+F4)
2666 525F CD1853        CALL DINSTR
2667 5262 DDCB006E      BIT  5,(IX+F1)
2668 5266 CCD052        CALL Z,DLIST
2669 5269 ED5BFD40      LD   DE,(DIP)
2670 526D E5       DPS3: PUSH HL
2671 526E 2AFB40        LD   HL,(DSTOP)
2672 5271 B7            OR   A
2673 5272 ED52          SBC  HL,DE
2674 5274 E1            POP  HL
2675 5275 C8            RET  Z
2676 5276 13            INC  DE
2677 5277 E5            PUSH HL
2678 5278 B7            OR   A
2679 5279 ED52          SBC  HL,DE
2680 527B E1            POP  HL
2681 527C 20EF          JR   NZ,DPS3
2682 527E 18D1          JR   DPS2
2683
2684 5280 2E21 GETAREAS: LD   L,M9&255
2685 5282 CD1C46        CALL PR2
2686 5285 ED5B0541 GTA2: LD   DE,(DEOAP)
2687 5289 13            INC  DE
2688 528A 13            INC  DE
2689 528B 13            INC  DE
2690 528C 13            INC  DE
2691 528D 2A0741        LD   HL,(DSOSP)
2692 5290 B7            OR   A
2693 5291 ED52          SBC  HL,DE
2694 5293 DA2754        JP   C,E4
2695 5296 CDBD47        CALL STARTSTOP
2696 5299 2B            DEC  HL
2697 529A ED5A          ADC  HL,DE
2698 529C C8            RET  Z
2699 529D E5            PUSH HL
2700 529E 2A0541        LD   HL,(DEOAP)
```

```
2701 52A1 73                        LD   (HL),E
2702 52A2 23                        INC  HL
2703 52A3 72                        LD   (HL),D
2704 52A4 23                        INC  HL
2705 52A5 D1                        POP  DE
2706 52A6 73                        LD   (HL),E
2707 52A7 23                        INC  HL
2708 52A8 72                        LD   (HL),D
2709 52A9 23                        INC  HL
2710 52AA 220541                    LD   (DEOAP),HL
2711 52AD 18D6                      JR   GTA2
2712
2713 52AF 3804      UNSCRAMBLE:     JR   C,UM2
2714 52B1 ED43FD40                  LD   (DIP),BC
2715 52B5 2AFD40    UM2:            LD   HL,(DIP)
2716 52B8 0609                      LD   B,9
2717 52BA 22FD40    UM3:            LD   (DIP),HL
2718 52BD 220341                    LD   (DRIP),HL
2719 52C0 05                        DEC  B
2720 52C1 C8                        RET  Z
2721 52C2 C5                        PUSH BC
2722 52C3 DDCB03A6                  RES  4,(IX+F4)
2723 52C7 CD1853                    CALL DINSTR
2724 52CA CDD052                    CALL DLIST
2725 52CD C1                        POP  BC
2726 52CE 18EA                      JR   UM3
2727
2728 52D0 DDCB0076  DLIST:          BIT  6,(IX+F1)
2729 52D4 2829                      JR   Z,DLS3
2730 52D6 3E81                      LD   A,81H
2731 52D8 DDCB0366                  BIT  4,(IX+F4)
2732 52DC 2002                      JR   NZ,DLS2
2733 52DE 3EC1                      LD   A,0C1H
2734 52E0 DD7701    DLS2:           LD   (IX+F2),A
2735 52E3 E5                        PUSH HL
2736 52E4 FDE5                      PUSH IY
2737 52E6 2AFD40                    LD   HL,(DIP)
2738 52E9 115441                    LD   DE,TBUFF
2739 52EC 010400                    LD   BC,4
2740 52EF EDB0                      LDIR
2741 52F1 ED53E740                  LD   (TEMP),DE
2742 52F5 2A0341                    LD   HL,(DRIP)
2743 52F8 CD0F4A                    CALL LIST
2744 52FB FDE1                      POP  IY
2745 52FD E1                        POP  HL
2746 52FE C9                        RET
2747 52FF E5        DLS3:           PUSH HL
2748 5300 215841                    LD   HL,TBUFF+4
2749 5303 E5                        PUSH HL
2750 5304 CD5548                    CALL NX0
2751 5307 2AE140                    LD   HL,(EOFP)
2752 530A E5                        PUSH HL
2753 530B CD3D48                    CALL MEMCHECK
2754 530E D1                        POP  DE
2755 530F E1                        POP  HL
2756 5310 EDB0                      LDIR
2757 5312 ED53E140                  LD   (EOFP),DE
2758 5316 E1                        POP  HL
2759 5317 C9                        RET
2760
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2761 5318 CD2656    DINSTR:     CALL  DECODE
2762 531B CD5D53                CALL  CHKHL
2763 531E CD7D53                CALL  CHKXY
2764 5321 CDBE53                CALL  CHKOPD
2765 5324 23                    INC   HL
2766 5325 D5                    PUSH  DE
2767 5326 E5                    PUSH  HL
2768 5327 ED5BFD40              LD    DE,(DIP)
2769 532B B7                    OR    A
2770 532C ED52                  SBC   HL,DE
2771 532E DD7502                LD    (IX+F3),L
2772 5331 FD2A0341              LD    IY,(DRIP)
2773 5335 EB                    EX    DE,HL
2774 5336 FD19                  ADD   IY,DE
2775 5338 E1                    POP   HL
2776 5339 D1                    POP   DE
2777 533A DDCB006E              BIT   5,(IX+F1)
2778 533E C0                    RET   NZ
2779 533F CD9054                CALL  DLABEL
2780 5342 F5                    PUSH  AF
2781 5343 CDC254                CALL  DOUTOPT
2782 5346 3E20                  LD    A,BLANK
2783 5348 CDDA55                CALL  DOUT
2784 534B 78                    LD    A,B
2785 534C CDFA54                CALL  DOUTOPD
2786 534F CDB554                CALL  COMMA
2787 5352 79                    LD    A,C
2788 5353 CDFA54                CALL  DOUTOPD
2789 5356 3E0D                  LD    A,CR
2790 5358 CDDA55                CALL  DOUT
2791 535B F1                    POP   AF
2792 535C C9                    RET
2793
2794 535D F5        CHKHL:      PUSH  AF
2795 535E 78                    LD    A,B
2796 535F CD6A53                CALL  SWAPHL
2797 5362 47                    LD    B,A
2798 5363 79                    LD    A,C
2799 5364 CD6A53                CALL  SWAPHL
2800 5367 4F                    LD    C,A
2801 5368 F1                    POP   AF
2802 5369 C9                    RET
2803
2804 536A FE06      SWAPHL:     CP    TR*16+6
2805 536C C0                    RET   NZ
2806 536D 3E54                  LD    A,RPI*16+IHL
2807 536F DDCB034E              BIT   1,(IX+F4)
2808 5373 C8                    RET   Z
2809 5374 3EA0                  LD    A,XYD*16
2810 5376 DDCB0356              BIT   2,(IX+F4)
2811 537A C0                    RET   NZ
2812 537B 23                    INC   HL
2813 537C C9                    RET
2814
2815 537D DDCB034E  CHKXY:      BIT   1,(IX+F4)
2816 5381 C8                    RET   Z
2817 5382 F5                    PUSH  AF
2818 5383 78                    LD    A,B
2819 5384 CDA053                CALL  SWAPXY
2820 5387 47                    LD    B,A
```

```
2821 5388 79                    LD   A,C
2822 5389 CDA053                CALL SWAPXY
2823 538C 4F                    LD   C,A
2824 538D F1                    POP  AF
2825 538E DDCB035E              BIT  3,(IX+F4)
2826 5392 2809                  JR   Z,CXY2
2827 5394 FE40                  CP   EXOP
2828 5396 C0                    RET  NZ
2829 5397 78                    LD   A,B
2830 5398 FE12                  CP   RP*16+IDE
2831 539A 3E40                  LD   A,EXOP
2832 539C C0                    RET  NZ
2833 539D 3E34          CXY2:   LD   A,DBOP
2834 539F C9                    RET
2835
2836 53A0 C5            SWAPXY: PUSH BC
2837 53A1 47                    LD   B,A
2838 53A2 FEA0                  CP   XYD*16
2839 53A4 280C                  JR   Z,SXY2
2840 53A6 0620                  LD   B,XY*16
2841 53A8 FE14                  CP   RP*16+IHL
2842 53AA 2806                  JR   Z,SXY2
2843 53AC 0660                  LD   B,XYI*16
2844 53AE FE54                  CP   RPI*16+IHL
2845 53B0 200A                  JR   NZ,SXY3
2846 53B2 DDCB03DE      SXY2:   SET  3,(IX+F4)
2847 53B6 DD7E03                LD   A,(IX+F4)
2848 53B9 E601                  AND  1
2849 53BB B0                    OR   B
2850 53BC C1            SXY3:   POP  BC
2851 53BD C9                    RET
2852
2853 53BE FD2AFD40      CHKOPD: LD   IY,(DIP)
2854 53C2 FD5602                LD   D,(IY+2)
2855 53C5 FE61                  CP   IMOP
2856 53C7 C8                    RET  Z
2857 53C8 FEC1                  CP   RSTOP
2858 53CA C8                    RET  Z
2859 53CB FE10                  CP   BITOP
2860 53CD C8                    RET  Z
2861 53CE FED5                  CP   SETOP
2862 53D0 C8                    RET  Z
2863 53D1 FEC2                  CP   RESOP
2864 53D3 C8                    RET  Z
2865 53D4 F5                    PUSH AF
2866 53D5 CDDA53                CALL GETOPD
2867 53D8 F1                    POP  AF
2868 53D9 C9                    RET
2869
2870 53DA FE34          GETOPD: CP   DBOP
2871 53DC 2008                  JR   NZ,GD2
2872 53DE 01B0C0                LD   BC,TNO*256+EOL*16
2873 53E1 2AFD40                LD   HL,(DIP)
2874 53E4 5E                    LD   E,(HL)
2875 53E5 C9                    RET
2876 53E6 FE70          GD2:    CP   JROP
2877 53E8 2804                  JR   Z,GD22
2878 53EA FE31                  CP   DJNZOP
2879 53EC 2005                  JR   NZ,GD3
2880 53EE CD2C54        GD22:   CALL OFFSET
```

```
2881 53F1 1810          JR   GD5
2882 53F3 CD4B54  GD3:  CALL CHKTNO
2883 53F6 2003          JR   NZ,GD4
2884 53F8 23            INC  HL
2885 53F9 5E            LD   E,(HL)
2886 53FA C9            RET
2887 53FB CD3F54  GD4:  CALL CHKNO
2888 53FE C0            RET  NZ
2889 53FF 23            INC  HL
2890 5400 5E            LD   E,(HL)
2891 5401 23            INC  HL
2892 5402 56            LD   D,(HL)
2893 5403 DDCB006E GD5: BIT  5,(IX+F1)
2894 5407 C8            RET  Z
2895 5408 CD5754        CALL DBOUND
2896 540B D8            RET  C
2897 540C CD6B54        CALL DSYMSCH
2898 540F D0            RET  NC
2899 5410 E5            PUSH HL
2900 5411 2A0941        LD   HL,(DEOSP)
2901 5414 E5            PUSH HL
2902 5415 23            INC  HL
2903 5416 23            INC  HL
2904 5417 23            INC  HL
2905 5418 CD3248        CALL SOF
2906 541B 380A          JR   C,E4
2907 541D E1            POP  HL
2908 541E 73            LD   (HL),E
2909 541F 23            INC  HL
2910 5420 72            LD   (HL),D
2911 5421 23            INC  HL
2912 5422 220941        LD   (DEOSP),HL
2913 5425 E1            POP  HL
2914 5426 C9            RET
2915
2916 5427 2E3F    E4:   LD   L,M14&255
2917 5429 C31446        JP   ERR
2918
2919 542C 23      OFFSET: INC  HL
2920 542D 1600          LD   D,0
2921 542F 5E            LD   E,(HL)
2922 5430 E5            PUSH HL
2923 5431 2A0341        LD   HL,(DRIP)
2924 5434 23            INC  HL
2925 5435 23            INC  HL
2926 5436 CB7B          BIT  7,E
2927 5438 2801          JR   Z,OFS2
2928 543A 15            DEC  D
2929 543B 19      OFS2: ADD  HL,DE
2930 543C EB            EX   DE,HL
2931 543D E1            POP  HL
2932 543E C9            RET
2933
2934 543F 78      CHKNO: LD  A,B
2935 5440 CD4554        CALL CKN2
2936 5443 C8            RET  Z
2937 5444 79            LD   A,C
2938 5445 FE30    CKN2: CP   NO*16
2939 5447 C8            RET  Z
2940 5448 FE70          CP   NOI*16
```

```
2941 544A C9                        RET
2942
2943 544B 78          CHKTNO:       LD   A,B
2944 544C CD5154                    CALL CKTN2
2945 544F C8                        RET  Z
2946 5450 79                        LD   A,C
2947 5451 FEC0        CKTN2:        CP   TNO*16
2948 5453 C8                        RET  Z
2949 5454 FED0                      CP   TNDI*16
2950 5456 C9                        RET
2951
2952 5457 E5          DBOUND:       PUSH HL
2953 5458 D5                        PUSH DE
2954 5459 EB                        EX   DE,HL
2955 545A ED5BFF40                  LD   DE,(DRSTART)
2956 545E B7                        OR   A
2957 545F ED52                      SBC  HL,DE
2958 5461 D1                        POP  DE
2959 5462 3805                      JR   C,DBD2
2960 5464 2A0141                    LD   HL,(DRSTOP)
2961 5467 ED52                      SBC  HL,DE
2962 5469 E1          DBD2:         POP  HL
2963 546A C9                        RET
2964
2965 546B DDCB0366 DSYMSCH:       BIT  4,(IX+F4)
2966 546F 37                        SCF
2967 5470 C8                        RET  Z
2968 5471 C5                        PUSH BC
2969 5472 E5                        PUSH HL
2970 5473 2A0741                    LD   HL,(DSOSP)
2971 5476 ED4B0941 DSS2:          LD   BC,(DEOSP)
2972 547A B7                        OR   A
2973 547B ED42                      SBC  HL,BC
2974 547D 09                        ADD  HL,BC
2975 547E 37                        SCF
2976 547F 280C                      JR   Z,DSS3
2977 5481 4E                        LD   C,(HL)
2978 5482 23                        INC  HL
2979 5483 46                        LD   B,(HL)
2980 5484 23                        INC  HL
2981 5485 EB                        EX   DE,HL
2982 5486 B7                        OR   A
2983 5487 ED42                      SBC  HL,BC
2984 5489 09                        ADD  HL,BC
2985 548A EB                        EX   DE,HL
2986 548B 20E9                      JR   NZ,DSS2
2987 548D E1          DSS3:         POP  HL
2988 548E C1                        POP  BC
2989 548F C9                        RET
2990
2991 5490 F5          DLABEL:       PUSH AF
2992 5491 D5                        PUSH DE
2993 5492 E5                        PUSH HL
2994 5493 215841                    LD   HL,TBUFF+4
2995 5496 22E740                    LD   (TEMP),HL
2996 5499 ED5B0341                  LD   DE,(DRIP)
2997 549D CD6B54                    CALL DSYMSCH
2998 54A0 3E00                      LD   A,0
2999 54A2 380A                      JR   C,DLB2
3000 54A4 CD8855                    CALL DN2
```

```
3001 54A7 3E3A                  LD   A,':'
3002 54A9 CDDA55                CALL DOUT
3003 54AC 3E06                  LD   A,6
3004 54AE DD7706    DLB2:       LD   (IX+F7),A
3005 54B1 E1                    POP  HL
3006 54B2 D1                    POP  DE
3007 54B3 F1                    POP  AF
3008 54B4 C9                    RET
3009
3010 54B5 78        COMMA:      LD   A,B
3011 54B6 FEB0                  CP   EOL*16
3012 54B8 C8                    RET  Z
3013 54B9 79                    LD   A,C
3014 54BA FEB0                  CP   EOL*16
3015 54BC C8                    RET  Z
3016 54BD 3E2C                  LD   A,','
3017 54BF C3DA55                JP   DOUT
3018
3019 54C2 C5        DOUTOPT:    PUSH BC
3020 54C3 D5                    PUSH DE
3021 54C4 E5                    PUSH HL
3022 54C5 47                    LD   B,A
3023 54C6 CDDC54                CALL GETKEY
3024 54C9 CDEB54                CALL KEYADDR
3025 54CC C641                  ADD  A,'A'
3026 54CE CDDA55                CALL DOUT
3027 54D1 CD5D55                CALL DC2
3028 54D4 0C                    INC  C
3029 54D5 DD7105                LD   (IX+F6),C
3030 54D8 E1                    POP  HL
3031 54D9 D1                    POP  DE
3032 54DA C1                    POP  BC
3033 54DB C9                    RET
3034
3035 54DC 211756    GETKEY:     LD   HL,KEYTRAN
3036 54DF 0F        GK2:        RRCA
3037 54E0 0F                    RRCA
3038 54E1 0F                    RRCA
3039 54E2 0F                    RRCA
3040 54E3 E60F                  AND  0FH
3041 54E5 5F                    LD   E,A
3042 54E6 1600                  LD   D,0
3043 54E8 19                    ADD  HL,DE
3044 54E9 7E                    LD   A,(HL)
3045 54EA C9                    RET
3046
3047 54EB 213150    KEYADDR:    LD   HL,KEYTB
3048 54EE D5                    PUSH DE
3049 54EF 5F                    LD   E,A
3050 54F0 1600                  LD   D,0
3051 54F2 19                    ADD  HL,DE
3052 54F3 19                    ADD  HL,DE
3053 54F4 5E                    LD   E,(HL)
3054 54F5 23                    INC  HL
3055 54F6 56                    LD   D,(HL)
3056 54F7 EB                    EX   DE,HL
3057 54F8 D1                    POP  DE
3058 54F9 C9                    RET
3059
3060 54FA C5        DOUTOPD:    PUSH BC
```

```
3061 54FB D5                PUSH DE
3062 54FC E5                PUSH HL
3063 54FD 47                LD   B,A
3064 54FE CDE555            CALL CHKIND
3065 5501 F5                PUSH AF
3066 5502 3E28              LD   A,'('
3067 5504 CCDA55            CALL Z,DOUT
3068 5507 CD1455            CALL DOPD
3069 550A F1                POP  AF
3070 550B 3E29              LD   A,')'
3071 550D CCDA55            CALL Z,DOUT
3072 5510 E1                POP  HL
3073 5511 D1                POP  DE
3074 5512 C1                POP  BC
3075 5513 C9                RET
3076
3077 5514 D5          DOPD: PUSH DE
3078 5515 212055            LD   HL,DOPDTAB
3079 5518 78                LD   A,B
3080 5519 CDDF54            CALL GK2
3081 551C 5F                LD   E,A
3082 551D 19                ADD  HL,DE
3083 551E D1                POP  DE
3084 551F E9                JP   (HL)
3085
3086 5520 0E      DOPDTAB:  DB   DOTR-$
3087 5521 1A                DB   DORP-$
3088 5522 28                DB   DOXY-$
3089 5523 56                DB   DONO-$
3090 5524 0A                DB   DOTR-$
3091 5525 16                DB   DORP-$
3092 5526 24                DB   DOXY-$
3093 5527 52                DB   DONO-$
3094 5528 27                DB   DORE-$
3095 5529 31                DB   DOCC-$
3096 552A 3A                DB   DOXYD-$
3097 552B B9                DB   DUT2-$
3098 552C 68                DB   DOTNO-$
3099 552D 83                DB   DOTNOI-$
3100
3101 552E 21D651      DOTR: LD   HL,TREGS
3102 5531 78                LD   A,B
3103 5532 E60F              AND  0FH
3104 5534 FE07              CP   IA
3105 5536 2026              JR   NZ,DC3
3106 5538 3D                DEC  A
3107 5539 1823              JR   DC3
3108
3109 553B 21EB51      DORP: LD   HL,RPAIRS
3110 553E 78                LD   A,B
3111 553F E60F              AND  0FH
3112 5541 0F                RRCA
3113 5542 FE07              CP   IAF/2
3114 5544 2018              JR   NZ,DC3
3115 5546 3E04              LD   A,4
3116 5548 1814              JR   DC3
3117
3118 554A 21FF51      DOXY: LD   HL,XYPAIRS
3119 554D 180E              JR   DC2
3120
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3121 554F 210752   DORE:     LD   HL,REREGS
3122 5552 78                LD   A,B
3123 5553 E60F              AND  0FH
3124 5555 0F                RRCA
3125 5556 0F                RRCA
3126 5557 0F                RRCA
3127 5558 1804              JR   DC3
3128
3129 555A 21BA51   DOCC:     LD   HL,CCODES
3130 555D 78       DC2:      LD   A,B
3131 555E CDFA55   DC3:      CALL IDFIND
3132 5561 C30856             JP   IDOUT
3133
3134 5564 CD4A55   DOXYD:    CALL DOXY
3135 5567 3E2B              LD   A,'+'
3136 5569 CB7A              BIT  7,D
3137 556B 2806              JR   Z,DXD2
3138 556D 7A                LD   A,D
3139 556E ED44              NEG
3140 5570 57                LD   D,A
3141 5571 3E2D              LD   A,'-'
3142 5573 CDDA55   DXD2:     CALL DOUT
3143 5576 7A                LD   A,D
3144 5577 1838              JR   DTNI2
3145
3146 5579 CD6B54   DONO:     CALL DSYMSCH
3147 557C 300A              JR   NC,DN2
3148 557E 7A                LD   A,D
3149 557F CDC055            CALL DOUTHB
3150 5582 7B                LD   A,E
3151 5583 CDC955            CALL DHB2
3152 5586 1834              JR   DTNI4
3153 5588 3E4C     DN2:     LD   A,'L'
3154 558A CDDA55            CALL DOUT
3155 558D 7A                LD   A,D
3156 558E CDC955            CALL DHB2
3157 5591 7B                LD   A,E
3158 5592 1835              JR   DHB2
3159
3160 5594 7B       DOTNO:   LD   A,E
3161 5595 FE41              CP   'A'
3162 5597 3817              JR   C,DOTNOI
3163 5599 FE5B              CP   'Z'+1
3164 559B 3808              JR   C,DTN2
3165 559D FE61              CP   'a'
3166 559F 380F              JR   C,DOTNOI
3167 55A1 FE7B              CP   'z'+1
3168 55A3 300B              JR   NC,DOTNOI
3169 55A5 CDAC55   DTN2:     CALL DTN3
3170 55A8 7B                LD   A,E
3171 55A9 CDDA55            CALL DOUT
3172 55AC 3E27     DTN3:     LD   A,"'"
3173 55AE 182A              JR   DOUT
3174
3175 55B0 7B       DOTNOI:  LD   A,E
3176 55B1 FE0A     DTNI2:   CP   10
3177 55B3 3004              JR   NC,DTNI3
3178 55B5 C630              ADD  A,'0'
3179 55B7 1821              JR   DOUT
3180 55B9 CDC055   DTNI3:   CALL DOUTHB
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3181 55BC 3E48      DTNI4:      LD   A,'H'
3182 55BE 181A                  JR   DOUT
3183
3184 55C0 FEA0      DOUTHB:     CP   0A0H
3185 55C2 F5                    PUSH AF
3186 55C3 3E30                  LD   A,'0'
3187 55C5 D4DA55                CALL NC,DOUT
3188 55C8 F1                    POP  AF
3189 55C9 F5        DHB2:       PUSH AF
3190 55CA 0F                    RRCA
3191 55CB 0F                    RRCA
3192 55CC 0F                    RRCA
3193 55CD 0F                    RRCA
3194 55CE CDD255                CALL DHB3
3195 55D1 F1                    POP  AF
3196 55D2 E60F      DHB3:       AND  0FH
3197 55D4 C690                  ADD  A,90H
3198 55D6 27                    DAA
3199 55D7 CE40                  ADC  A,40H
3200 55D9 27                    DAA
3201 55DA E5        DOUT:       PUSH HL
3202 55DB 2AE740                LD   HL,(TEMP)
3203 55DE 77                    LD   (HL),A
3204 55DF 23                    INC  HL
3205 55E0 22E740                LD   (TEMP),HL
3206 55E3 E1                    POP  HL
3207 55E4 C9        DUT2:       RET
3208
3209 55E5 78        CHKIND:     LD   A,B
3210 55E6 E6F0                  AND  0F0H
3211 55E8 FE50                  CP   RP1*16
3212 55EA C8                    RET  Z
3213 55EB FE40                  CP   TRI*16
3214 55ED C8                    RET  Z
3215 55EE FE70                  CP   NDI*16
3216 55F0 C8                    RET  Z
3217 55F1 FED0                  CP   TNDI*16
3218 55F3 C8                    RET  Z
3219 55F4 FE60                  CP   XYI*16
3220 55F6 C8                    RET  Z
3221 55F7 FEA0                  CP   XYD*16
3222 55F9 C9                    RET
3223
3224 55FA E60F      IDFIND:     AND  0FH
3225 55FC C8                    RET  Z
3226 55FD CB7E      IDF2:       BIT  7,(HL)
3227 55FF 23                    INC  HL
3228 5600 28FB                  JR   Z,IDF2
3229 5602 23                    INC  HL
3230 5603 23                    INC  HL
3231 5604 3D                    DEC  A
3232 5605 20F6                  JR   NZ,IDF2
3233 5607 C9                    RET
3234
3235 5608 0E00      IDOUT:      LD   C,0
3236 560A 7E        IDT2:       LD   A,(HL)
3237 560B CBBF                  RES  7,A
3238 560D CDDA55                CALL DOUT
3239 5610 0C                    INC  C
3240 5611 CB7E                  BIT  7,(HL)
```

```
3241 5613 23                    INC  HL
3242 5614 28F4                  JR   Z,IDT2
3243 5616 C9                    RET
3244
3245 5617 00        KEYTRAN:    DB   'A'-'A'
3246 5618 01                    DB   'B'-'A'
3247 5619 02                    DB   'C'-'A'
3248 561A 03                    DB   'D'-'A'
3249 561B 04                    DB   'E'-'A'
3250 561C 07                    DB   'H'-'A'
3251 561D 08                    DB   'I'-'A'
3252 561E 09                    DB   'J'-'A'
3253 561F 0B                    DB   'L'-'A'
3254 5620 0D                    DB   'N'-'A'
3255 5621 0E                    DB   'O'-'A'
3256 5622 0F                    DB   'P'-'A'
3257 5623 11                    DB   'R'-'A'
3258 5624 12                    DB   'S'-'A'
3259 5625 17                    DB   'X'-'A'
3260
3261 5626 CD9D57    DECODE:     CALL CHKAREAS
3262 5629 3E34                  LD   A,DBOF
3263 562B D8                    RET  C
3264 562C DD7E03                LD   A,(IX+F4)
3265 562F E6F0                  AND  0F0H
3266 5631 47                    LD   B,A
3267 5632 2AFD40                LD   HL,(DIP)
3268 5635 7E                    LD   A,(HL)
3269 5636 FEDD                  CP   0DDH
3270 5638 2805                  JR   Z,DCD2
3271 563A 04                    INC  B
3272 563B FEFD                  CP   0FDH
3273 563D 2004                  JR   NZ,DCD3
3274 563F CBC8      DCD2:       SET  1,B
3275 5641 23                    INC  HL
3276 5642 7E                    LD   A,(HL)
3277 5643 DD7003    DCD3:       LD   (IX+F4),B
3278 5646 01B0B0                LD   BC,EOL*256+EOL*16
3279 5649 110000                LD   DE,0
3280 564C FEED                  CP   0EDH
3281 564E CA7057                JP   Z,DGED
3282 5651 FECB                  CP   0CBH
3283 5653 CA3757                JP   Z,DGCB
3284 5656 FE40                  CP   40H
3285 5658 DAE356                JP   C,DG00
3286 565B FE80                  CP   80H
3287 565D 3872                  JR   C,DG40
3288 565F FEC0                  CP   0C0H
3289 5661 3854                  JR   C,DG80
3290
3291 5663 E607      DGC0:       AND  7
3292 5665 2835                  JR   Z,DGC00
3293 5667 FD21D957              LD   IY,DGC0TAB1
3294 566B 3D                    DEC  A
3295 566C 2839                  JR   Z,DGC0135
3296 566E 3D                    DEC  A
3297 566F 2825                  JR   Z,DGC02
3298 5671 FD21F157              LD   IY,DGC0TAB3
3299 5675 3D                    DEC  A
3300 5676 282F                  JR   Z,DGC0135
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3301 5678 3D                    DEC  A
3302 5679 2817                  JR   Z,DGC04
3303 567B FD210958              LD   IY,DGC0TAB5
3304 567F 3D                    DEC  A
3305 5680 2825                  JR   Z,DGC0135
3306 5682 3D                    DEC  A
3307 5683 2809                  JR   Z,DGC06
3308 5685 7E        DGC07:      LD   A,(HL)
3309 5686 E638                  AND  38H
3310 5688 5F                    LD   E,A
3311 5689 06C0                  LD   B,TNO*16
3312 568B 3EC1                  LD   A,RSTOP
3313 568D C9                    RET
3314 568E 06C0      DGC06:      LD   B,TNO*16
3315 5690 1829                  JR   DG802
3316 5692 3E20      DGC04:      LD   A,CALLOP
3317 5694 1802                  JR   DGC022
3318 5696 3E71      DGC02:      LD   A,JPOP
3319 5698 0E30      DGC022:     LD   C,NO*16
3320 569A 1802                  JR   DGC002
3321 569C 3EC0      DGC00:      LD   A,RETOP
3322 569E F5        DGC002:     PUSH AF
3323 569F CDCC57                CALL TRIPLET
3324 56A2 F690                  OR   CC*16
3325 56A4 47                    LD   B,A
3326 56A5 F1                    POP  AF
3327 56A6 C9                    RET
3328 56A7 CDCC57    DGC0135:    CALL TRIPLET
3329 56AA 5F        DGC01352:   LD   E,A
3330 56AB 07                    RLCA
3331 56AC 83                    ADD  A,E
3332 56AD CD5357                CALL DGCB4
3333 56B0 FD4601                LD   B,(IY+1)
3334 56B3 FD4E02                LD   C,(IY+2)
3335 56B6 C9                    RET
3336
3337 56B7 CDD357    DG80:       CALL GETREG
3338 56BA 47                    LD   B,A
3339 56BB FD212158  DG802:      LD   IY,DG80TAB
3340 56BF CD5057                CALL DGCB3
3341 56C2 FE01                  CP   ADDOP
3342 56C4 2807                  JR   Z,DG803
3343 56C6 FE00                  CP   ADCOP
3344 56C8 2803                  JR   Z,DG803
3345 56CA FED0                  CP   SBCOP
3346 56CC C0                    RET  NZ
3347 56CD 48        DG803:      LD   C,B
3348 56CE 0607                  LD   B,TR*16+IA
3349 56D0 C9                    RET
3350
3351 56D1 FE76      DG40:       CP   76H
3352 56D3 3E50                  LD   A,HALTOP
3353 56D5 C8                    RET  Z
3354 56D6 CDD357                CALL GETREG
3355 56D9 4F                    LD   C,A
3356 56DA CDCC57    DG402:      CALL TRIPLET
3357 56DD F600                  OR   TR*16
3358 56DF 47                    LD   B,A
3359 56E0 3E80                  LD   A,LDOP
3360 56E2 C9                    RET
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3361
3362 56E3 FD212958 DG00:      LD   IY,DG00TAB0
3363 56E7 E607               AND  7
3364 56E9 28BC               JR   Z,DGC0135
3365 56EB 3D                 DEC  A
3366 56EC 283B               JR   Z,DG001
3367 56EE FD214158           LD   IY,DG00TAB2
3368 56F2 3D                 DEC  A
3369 56F3 28B2               JR   Z,DGC0135
3370 56F5 3D                 DEC  A
3371 56F6 2820               JR   Z,DG003
3372 56F8 3D                 DEC  A
3373 56F9 2812               JR   Z,DG004
3374 56FB 3D                 DEC  A
3375 56FC 280B               JR   Z,DG005
3376 56FE FD215958           LD   IY,DG00TAB7
3377 5702 3D                 DEC  A
3378 5703 204B               JR   NZ,DGCB3
3379 5705 0EC0      DG006:   LD   C,TNO*16
3380 5707 18D1               JR   DG402
3381 5709 3E30      DG005:   LD   A,DECOP
3382 570B 1802               JR   DG0042
3383 570D 3E60      DG004:   LD   A,INCOP
3384 570F F5        DG0042:  PUSH AF
3385 5710 CDCC57             CALL TRIPLET
3386 5713 F600               OR   TR*16
3387 5715 47                 LD   B,A
3388 5716 F1                 POP  AF
3389 5717 C9                 RET
3390 5718 7E        DG003:   LD   A,(HL)
3391 5719 0F                 RRCA
3392 571A 0F                 RRCA
3393 571B 0F                 RRCA
3394 571C E606               AND  6
3395 571E F610               OR   RP*16
3396 5720 47                 LD   B,A
3397 5721 3E60               LD   A,INCOP
3398 5723 CB5E               BIT  3,(HL)
3399 5725 C8                 RET  Z
3400 5726 3E30               LD   A,DECOP
3401 5728 C9                 RET
3402 5729 CD1857    DG001:   CALL DG003
3403 572C 0E30               LD   C,NO*16
3404 572E 3E80               LD   A,LDOP
3405 5730 C8                 RET  Z
3406 5731 48                 LD   C,B
3407 5732 0614               LD   B,RP*16+IHL
3408 5734 3E01               LD   A,ADDOP
3409 5736 C9                 RET
3410
3411 5737 23        DGCB:    INC  HL
3412 5738 DDCB034E           BIT  1,(IX+F4)
3413 573C 2805               JR   Z,DGCB1
3414 573E DDCB03D6           SET  2,(IX+F4)
3415 5742 23                 INC  HL
3416 5743 7E        DGCB1:   LD   A,(HL)
3417 5744 E6C0               AND  0C0H
3418 5746 2012               JR   NZ,DGCB5
3419 5748 FD216158           LD   IY,DGCBTAB1
3420 574C CDD357             CALL GETREG
```

```
3421 574F 47                    LD   B,A
3422 5750 CDCC57   DGCB3:       CALL TRIPLET
3423 5753 5F       DGCB4:       LD   E,A
3424 5754 FD19                  ADD  IY,DE
3425 5756 FD7E00                LD   A,(IY+0)
3426 5759 C9                    RET
3427 575A FD216858 DGCB5:       LD   IY,DGCDTAB2-1
3428 575E 07                    RLCA
3429 575F 07                    RLCA
3430 5760 CD5357                CALL DGCB4
3431 5763 F5                    PUSH AF
3432 5764 CDD357                CALL GETREG
3433 5767 4F                    LD   C,A
3434 5768 CDCC57                CALL TRIPLET
3435 576B 5F                    LD   E,A
3436 576C 06C0                  LD   B,TNO*16
3437 576E F1                    POP  AF
3438 576F C9                    RET
3439
3440 5770 DDCB034E DGED:        BIT  1,(IX+F4)
3441 5774 2024                  JR   NZ,DGED4
3442 5776 23                    INC  HL
3443 5777 7E                    LD   A,(HL)
3444 5778 D640                  SUB  40H
3445 577A 381E                  JR   C,DGED4
3446 577C FE3C                  CP   3CH
3447 577E 300E                  JR   NC,DGED3
3448 5780 FD216C58              LD   IY,DGEDTAB1
3449 5784 CDAA56                CALL DGC01352
3450 5787 FE61                  CP   IMOP
3451 5789 C0                    RET  NZ
3452 578A 59                    LD   E,C
3453 578B 0EB0                  LD   C,EOL*16
3454 578D C9                    RET
3455 578E D660     DGED3:       SUB  60H
3456 5790 3808                  JR   C,DGED4
3457 5792 FD217059              LD   IY,DGEDTAB2
3458 5796 FE1C                  CP   1CH
3459 5798 38B9                  JR   C,DGCB4
3460 579A 3E34     DGED4:       LD   A,DBOP
3461 579C C9                    RET
3462
3463 579D B7       CHKAREAS:    OR   A
3464 579E DDCB0366              BIT  4,(IX+F4)
3465 57A2 C8                    RET  Z
3466 57A3 213D59                LD   HL,AEND+2
3467 57A6 E5       CKA2:        PUSH HL
3468 57A7 ED5B0541              LD   DE,(DEOAP)
3469 57AB B7                    OR   A
3470 57AC ED52                  SBC  HL,DE
3471 57AE E1                    POP  HL
3472 57AF C8                    RET  Z
3473 57B0 5E                    LD   E,(HL)
3474 57B1 23                    INC  HL
3475 57B2 56                    LD   D,(HL)
3476 57B3 23                    INC  HL
3477 57B4 4E                    LD   C,(HL)
3478 57B5 23                    INC  HL
3479 57B6 46                    LD   B,(HL)
3480 57B7 23                    INC  HL
```

```
3481 57B8 E5                    PUSH HL
3482 57B9 2AFD40                LD   HL,(DIP)
3483 57BC B7                    OR   A
3484 57BD ED52                  SBC  HL,DE
3485 57BF 3F                    CCF
3486 57C0 3004                  JR   NC,CKA3
3487 57C2 19                    ADD  HL,DE
3488 57C3 B7                    OR   A
3489 57C4 ED42                  SBC  HL,BC
3490 57C6 E1            CKA3:   POP  HL
3491 57C7 D8                    RET  C
3492 57C8 37                    SCF
3493 57C9 C8                    RET  Z
3494 57CA 18DA                  JR   CKA2
3495
3496 57CC 7E            TRIPLET: LD  A,(HL)
3497 57CD 0F                    RRCA
3498 57CE 0F                    RRCA
3499 57CF 0F                    RRCA
3500 57D0 E607                  AND  7
3501 57D2 C9                    RET
3502
3503 57D3 7E            GETREG: LD   A,(HL)
3504 57D4 E607                  AND  7
3505 57D6 F600                  OR   TR*16
3506 57D8 C9                    RET
3507
3508 57D9 B1            DGC0TAB1: DB  POPOP
3509 57DA 10                    DB   RP*16+IBC
3510 57DB B0                    DB   EOL*16
3511 57DC C0                    DB   RETOP
3512 57DD B0                    DB   EOL*16
3513 57DE B0                    DB   EOL*16
3514 57DF B1                    DB   POPOP
3515 57E0 12                    DB   RP*16+IDE
3516 57E1 B0                    DB   EOL*16
3517 57E2 41                    DB   EXXOP
3518 57E3 B0                    DB   EOL*16
3519 57E4 B0                    DB   EOL*16
3520 57E5 B1                    DB   POPOP
3521 57E6 14                    DB   RP*16+IHL
3522 57E7 B0                    DB   EOL*16
3523 57E8 71                    DB   JPOP
3524 57E9 54                    DB   RPI*16+IHL
3525 57EA B0                    DB   EOL*16
3526 57EB B1                    DB   POPOP
3527 57EC 1E                    DB   RP*16+IAF
3528 57ED B0                    DB   EOL*16
3529 57EE 80                    DB   LDOP
3530 57EF 16                    DB   RP*16+ISP
3531 57F0 14                    DB   RP*16+IHL
3532
3533 57F1 71            DGC0TAB3: DB  JPOP
3534 57F2 30                    DB   NO*16
3535 57F3 B0                    DB   EOL*16
3536 57F4 34                    DB   DBOP
3537 57F5 B0                    DB   EOL*16
3538 57F6 B0                    DB   EOL*16
3539 57F7 A1                    DB   OUTOP
3540 57F8 D0                    DB   TNOI*16
```

```
3541 57F9 07                    DB   TR*16+IA
3542 57FA 62                    DB   INOP
3543 57FB 07                    DB   TR*16+IA
3544 57FC D0                    DB   TNOI*16
3545 57FD 40                    DB   EXOP
3546 57FE 56                    DB   RPI*16+ISP
3547 57FF 14                    DB   RP*16+IHL
3548 5800 40                    DB   EXOP
3549 5801 12                    DB   RP*16+IDE
3550 5802 14                    DB   RP*16+IHL
3551 5803 33                    DB   DIOP
3552 5804 B0                    DB   EOL*16
3553 5805 B0                    DB   EOL*16
3554 5806 42                    DB   EIOP
3555 5807 B0                    DB   EOL*16
3556 5808 B0                    DB   EOL*16
3557
3558 5809 B0            DGC0TAB5:   DB   PUSHOP
3559 580A 10                    DB   RP*16+IBC
3560 580B B0                    DB   EOL*16
3561 580C 20                    DB   CALLOP
3562 580D 30                    DB   NO*16
3563 580E B0                    DB   EOL*16
3564 580F B0                    DB   PUSHOP
3565 5810 12                    DB   RP*16+IDE
3566 5811 B0                    DB   EOL*16
3567 5812 34                    DB   DBOP
3568 5813 B0                    DB   EOL*16
3569 5814 B0                    DB   EOL*16
3570 5815 B0                    DB   PUSHOP
3571 5816 14                    DB   RP*16+IHL
3572 5817 B0                    DB   EOL*16
3573 5818 34                    DB   DBOP
3574 5819 B0                    DB   EOL*16
3575 581A B0                    DB   EOL*16
3576 581B B0                    DB   PUSHOP
3577 581C 1E                    DB   RP*16+IAF
3578 581D B0                    DB   EOL*16
3579 581E 34                    DB   DBOP
3580 581F B0                    DB   EOL*16
3581 5820 B0                    DB   EOL*16
3582
3583 5821 01            DG80TAB:    DB   ADDOP
3584 5822 00                    DB   ADCOP
3585 5823 D6                    DB   SUBOP
3586 5824 D0                    DB   SBCOP
3587 5825 02                    DB   ANDOP
3588 5826 E0                    DB   XOROP
3589 5827 A0                    DB   OROP
3590 5828 21                    DB   CPOP
3591
3592 5829 90            DG00TAB0:   DB   NOPOP
3593 582A B0                    DB   EOL*16
3594 582B B0                    DB   EOL*16
3595 582C 40                    DB   EXOP
3596 582D 1E                    DB   RP*16+IAF
3597 582E 1E                    DB   RP*16+IAF
3598 582F 31                    DB   DJNZOP
3599 5830 30                    DB   NO*16
3600 5831 B0                    DB   EOL*16
```

```
3601 5832 70                    DB    JROP
3602 5833 30                    DB    NO*16
3603 5834 B0                    DB    EOL*16
3604 5835 70                    DB    JROP
3605 5836 90                    DB    CC*128+INZ/8
3606 5837 30                    DB    NO*16
3607 5838 70                    DB    JROP
3608 5839 91                    DB    CC*128+IZ/8
3609 583A 30                    DB    NO*16
3610 583B 70                    DB    JROP
3611 583C 92                    DB    CC*128+INCY/8
3612 583D 30                    DB    NO*16
3613 583E 70                    DB    JROP
3614 583F 93                    DB    CC*128+ICY/8
3615 5840 30                    DB    NO*16
3616
3617 5841 80            DG00TAB2:   DB    LDOP
3618 5842 50                        DB    RPI*16+IBC
3619 5843 07                        DB    TR*16+IA
3620 5844 80                        DB    LDOP
3621 5845 07                        DB    TR*16+IA
3622 5846 50                        DB    RPI*16+IBC
3623 5847 80                        DB    LDOP
3624 5848 52                        DB    RPI*16+IDE
3625 5849 07                        DB    TR*16+IA
3626 584A 80                        DB    LDOP
3627 584B 07                        DB    TR*16+IA
3628 584C 52                        DB    RPI*16+IDE
3629 584D 80                        DB    LDOP
3630 584E 70                        DB    NOI*16
3631 584F 14                        DB    RP*16+IHL
3632 5850 80                        DB    LDOP
3633 5851 14                        DB    RP*16+IHL
3634 5852 70                        DB    NOI*16
3635 5853 80                        DB    LDOP
3636 5854 70                        DB    NOI*16
3637 5855 07                        DB    TR*16+IA
3638 5856 80                        DB    LDOP
3639 5857 07                        DB    TR*16+IA
3640 5858 70                        DB    NOI*16
3641
3642 5859 C5            DG00TAB7:   DB    RLCAOP
3643 585A C9                        DB    RRCAOP
3644 585B C6                        DB    RLAOP
3645 585C CA                        DB    RRAOP
3646 585D 32                        DB    DAAOP
3647 585E 23                        DB    CPLOP
3648 585F D1                        DB    SCFOP
3649 5860 22                        DB    CCFOP
3650
3651 5861 C4            DGCBTAB1:   DB    RLCOP
3652 5862 C8                        DB    RRCOP
3653 5863 C3                        DB    RLOP
3654 5864 C7                        DB    RROP
3655 5865 D2                        DB    SLAOP
3656 5866 D3                        DB    SRAOP
3657 5867 34                        DB    DBOP
3658 5868 D4                        DB    SRLOP
3659
3660 5869 10            DGCBTAB2:   DB    BITOP
```

```
3661 586A C2                    DB   RESOP
3662 586B D5                    DB   SETOP
3663
3664 586C 62            DGEDTAB1:   DB   INOP
3665 586D 00                    DB   TR*16+IB
3666 586E 41                    DB   TRI*16+IC
3667 586F A1                    DB   OUTOP
3668 5870 41                    DB   TRI*16+IC
3669 5871 00                    DB   TR*16+IB
3670 5872 D0                    DB   SBCOP
3671 5873 14                    DB   RP*16+IHL
3672 5874 10                    DB   RP*16+IBC
3673 5875 80                    DB   LDOP
3674 5876 70                    DB   NOI*16
3675 5877 10                    DB   RP*16+IBC
3676 5878 91                    DB   NEGOP
3677 5879 B0                    DB   EOL*16
3678 587A B0                    DB   EOL*16
3679 587B CE                    DB   RETNOP
3680 587C B0                    DB   EOL*16
3681 587D B0                    DB   EOL*16
3682 587E 61                    DB   IMOP
3683 587F C0                    DB   TNO*16
3684 5880 00                    DB   0
3685 5881 80                    DB   LDOP
3686 5882 80                    DB   RE*16+IINT
3687 5883 07                    DB   TR*16+IA
3688 5884 62                    DB   INOP
3689 5885 01                    DB   TR*16+IC
3690 5886 41                    DB   TRI*16+IC
3691 5887 A1                    DB   OUTOP
3692 5888 41                    DB   TRI*16+IC
3693 5889 01                    DB   TR*16+IC
3694 588A 00                    DB   ADCOP
3695 588B 14                    DB   RP*16+IHL
3696 588C 10                    DB   RP*16+IBC
3697 588D 80                    DB   LDOP
3698 588E 10                    DB   RP*16+IBC
3699 588F 70                    DB   NOI*16
3700 5890 34                    DB   DBOP
3701 5891 B0                    DB   EOL*16
3702 5892 B0                    DB   EOL*16
3703 5893 CD                    DB   RETIOP
3704 5894 B0                    DB   EOL*16
3705 5895 B0                    DB   EOL*16
3706 5896 34                    DB   DBOP
3707 5897 B0                    DB   EOL*16
3708 5898 B0                    DB   EOL*16
3709 5899 80                    DB   LDOP
3710 589A 88                    DB   RE*16+IREF
3711 589B 07                    DB   TR*16+IA
3712 589C 62                    DB   INOP
3713 589D 02                    DB   TR*16+ID
3714 589E 41                    DB   TRI*16+IC
3715 589F A1                    DB   OUTOP
3716 58A0 41                    DB   TRI*16+IC
3717 58A1 02                    DB   TR*16+ID
3718 58A2 D0                    DB   SBCOP
3719 58A3 14                    DB   RP*16+IHL
3720 58A4 12                    DB   RP*16+IDE
```

```
3721 58A5 80          DB   LDOP
3722 58A6 70          DB   NOI*16
3723 58A7 12          DB   RP*16+IDE
3724 58A8 34          DB   DBOP
3725 58A9 B0          DB   EOL*16
3726 58AA B0          DB   EOL*16
3727 58AB 34          DB   DBOP
3728 58AC B0          DB   EOL*16
3729 58AD B0          DB   EOL*16
3730 58AE 61          DB   IMOP
3731 58AF C0          DB   TNO*16
3732 58B0 01          DB   1
3733 58B1 80          DB   LDOP
3734 58B2 07          DB   TR*16+IA
3735 58B3 80          DB   RE*16+IINT
3736 58B4 62          DB   INOP
3737 58B5 03          DB   TR*16+IE
3738 58B6 41          DB   TRI*16+IC
3739 58B7 A1          DB   OUTOP
3740 58B8 41          DB   TRI*16+IC
3741 58B9 03          DB   TR*16+IE
3742 58BA 00          DB   ADCOP
3743 58BB 14          DB   RP*16+IHL
3744 58BC 12          DB   RP*16+IDE
3745 58BD 80          DB   LDOP
3746 58BE 12          DB   RP*16+IDE
3747 58BF 70          DB   NOI*16
3748 58C0 34          DB   DBOP
3749 58C1 B0          DB   EOL*16
3750 58C2 B0          DB   EOL*16
3751 58C3 34          DB   DBOP
3752 58C4 B0          DB   EOL*16
3753 58C5 B0          DB   EOL*16
3754 58C6 61          DB   IMOP
3755 58C7 C0          DB   TNO*16
3756 58C8 02          DB   2
3757 58C9 80          DB   LDOP
3758 58CA 07          DB   TR*16+IA
3759 58CB 88          DB   RE*16+IREF
3760 58CC 62          DB   INOP
3761 58CD 04          DB   TR*16+IH
3762 58CE 41          DB   TRI*16+IC
3763 58CF A1          DB   OUTOP
3764 58D0 41          DB   TRI*16+IC
3765 58D1 04          DB   TR*16+IH
3766 58D2 D0          DB   SBCOP
3767 58D3 14          DB   RP*16+IHL
3768 58D4 14          DB   RP*16+IHL
3769 58D5 34          DB   DBOP
3770 58D6 B0          DB   EOL*16
3771 58D7 B0          DB   EOL*16
3772 58D8 34          DB   DBOP
3773 58D9 B0          DB   EOL*16
3774 58DA B0          DB   EOL*16
3775 58DB 34          DB   DBOP
3776 58DC B0          DB   EOL*16
3777 58DD B0          DB   EOL*16
3778 58DE 34          DB   DBOP
3779 58DF B0          DB   EOL*16
3780 58E0 B0          DB   EOL*16
```

```
3781 58E1 CC          DB   RRDOP
3782 58E2 B0          DB   EOL*16
3783 58E3 B0          DB   EOL*16
3784 58E4 62          DB   INOP
3785 58E5 05          DB   TR*16+IL
3786 58E6 41          DB   TRI*16+IC
3787 58E7 A1          DB   OUTOP
3788 58E8 41          DB   TRI*16+IC
3789 58E9 05          DB   TR*16+IL
3790 58EA 00          DB   ADCOP
3791 58EB 14          DB   RP*16+IHL
3792 58EC 14          DB   RP*16+IHL
3793 58ED 34          DB   DBOP
3794 58EE B0          DB   EOL*16
3795 58EF B0          DB   EOL*16
3796 58F0 34          DB   DBOP
3797 58F1 B0          DB   EOL*16
3798 58F2 B0          DB   EOL*16
3799 58F3 34          DB   DBOP
3800 58F4 B0          DB   EOL*16
3801 58F5 B0          DB   EOL*16
3802 58F6 34          DB   DBOP
3803 58F7 B0          DB   EOL*16
3804 58F8 B0          DB   EOL*16
3805 58F9 CB          DB   RLDOP
3806 58FA B0          DB   EOL*16
3807 58FB B0          DB   EOL*16
3808 58FC 34          DB   DBOP
3809 58FD B0          DB   EOL*16
3810 58FE B0          DB   EOL*16
3811 58FF 34          DB   DBOP
3812 5900 B0          DB   EOL*16
3813 5901 B0          DB   EOL*16
3814 5902 D0          DB   SBCOP
3815 5903 14          DB   RP*16+IHL
3816 5904 16          DB   RP*16+ISP
3817 5905 80          DB   LDOP
3818 5906 70          DB   NOI*16
3819 5907 16          DB   RP*16+ISP
3820 5908 34          DB   DBOP
3821 5909 B0          DB   EOL*16
3822 590A B0          DB   EOL*16
3823 590B 34          DB   DBOP
3824 590C B0          DB   EOL*16
3825 590D B0          DB   EOL*16
3826 590E 34          DB   DBOP
3827 590F B0          DB   EOL*16
3828 5910 B0          DB   EOL*16
3829 5911 34          DB   DBOP
3830 5912 B0          DB   EOL*16
3831 5913 B0          DB   EOL*16
3832 5914 62          DB   INOP
3833 5915 07          DB   TR*16+IA
3834 5916 41          DB   TRI*16+IC
3835 5917 A1          DB   OUTOP
3836 5918 41          DB   TRI*16+IC
3837 5919 07          DB   TR*16+IA
3838 591A 00          DB   ADCOP
3839 591B 14          DB   RP*16+IHL
3840 591C 16          DB   RP*16+ISP
```

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3841 591D 80                    DB   LDOP
3842 591E 16                    DB   RP*16+ISP
3843 591F 70                    DB   NOI*16
3844
3845 5920 81          DGEDTAB2: DB   LDIOP
3846 5921 24                    DB   CPIOP
3847 5922 63                    DB   INIOP
3848 5923 A2                    DB   OUTIOP
3849 5924 34                    DB   DBOP
3850 5925 34                    DB   DBOP
3851 5926 34                    DB   DBOP
3852 5927 34                    DB   DBOP
3853 5928 83                    DB   LDDOP
3854 5929 26                    DB   CPDOP
3855 592A 65                    DB   INDOP
3856 592B A4                    DB   OUTDOP
3857 592C 34                    DB   DBOP
3858 592D 34                    DB   DBOP
3859 592E 34                    DB   DBOP
3860 592F 34                    DB   DBOP
3861 5930 82                    DB   LDIROP
3862 5931 25                    DB   CPIROP
3863 5932 64                    DB   INIROP
3864 5933 A3                    DB   OTIROP
3865 5934 34                    DB   DBOP
3866 5935 34                    DB   DBOP
3867 5936 34                    DB   DBOP
3868 5937 34                    DB   DBOP
3869 5938 84                    DB   LDDROP
3870 5939 27                    DB   CPDROP
3871 593A 66                    DB   INDROP
3872 593B A5          AEND:     DB   OTDROP
3873 593C FF                    DB   0FFH
3874
3875                            END
```

AL	0002	ADL	0004	ASMB	48B8	ADCTAB	4F56
ADDTAB	4F64	AOPS	5065	ADCOP	0000	ADDOP	0001
ANDOP	0002	AEND	593B	BS	0008	BLANK	0020
BMIR	B91B	BKPTADDR	40F3	BKPTCODE	40F5	BYE	4342
BYTESP	4892	BYTE	4897	BAD	4B12	BITH	4FC0
BIT2	4FC9	BOPS	5072	BITOP	0010	CR	000D
CURON	BB81	CUROFF	BB84	CINIT	BC65	CCAT	BC9B
CIDIR	BC83	CODIR	BC98	CIABAN	BC7D	COABAN	BC92
CICHAR	BC80	COCHAR	BC95	CIOPEN	BC77	COOPEN	BC8C
CICLOSE	BC7A	COCLOSE	BC8F	COMWIDTH	40CD	CURRENT	40DD
CRBUFF	410B	CWBUFF	410D	CATALOG	43F6	COPY	44CA
COMTAB	45C0	CRLF	4621	CUE	46AC	CONVERT	47D2
CV0	47E3	CV1	47E7	CV2	47F3	CV3	4805
CLEAR	482D	CL	0001	CC	0009	CLASS	4D0A
CL1	4D12	CL3	4D19	CL2	4D1A	CL4	4D27
CL41	4D29	CL5	4D44	CL6	4D50	CLER	4D5E
CL7	4D61	CL71	4D63	CL72	4D77	CALTAB	4EFA
COPS	5077	CCODES	51BA	CALLOP	0020	CPOP	0021
CCFOP	0022	CFLOP	0023	CPIOP	0024	CPIROP	0025
CPDOP	0026	CPDROP	0027	CHKHL	535D	CHKXY	537D
CXY2	539D	CHKOPD	53BE	CHKNO	543F	CKN2	5445
CHKTNO	544B	CKTN2	5451	COMMA	54B5	CHKIND	55E5
CHKAREAS	579D	CKA2	57A6	CKA3	57C6	DEL	007F
DSTART	40F9	DSTOP	40FB	DIP	40FD	DRSTART	40FF
DRSTOP	4101	DRIP	4103	DEOAP	4105	DSOSP	4107
DEOSP	4109	DOWN	4281	DELAY	4912	DEL1	4915
DJH	4D8B	DJ1	4DA4	DJ2	4DA6	DWH	4DAA
DBH	4DB0	DBH1	4DB4	DBH3	4DBE	DBH4	4DC5
DSH	4DCD	DL1	4F71	DL2	4F74	DL3	4F7B
DL4	4F88	DL5	4F8F	DOPS	509A	DECOP	0030
DJNZOP	0031	DAAOP	0032	DIOP	0033	DBOP	0034
DASM	520E	DSM2	5223	DPASS	524A	DPS2	5251
DPS3	526D	DLIST	52D0	DLS2	52E0	DLS3	52FF
DINSTR	5318	DBOUND	5457	DBD2	5469	DSYMSCH	546B
DSS2	5476	DSS3	548D	DLABEL	5490	DLB2	54AE
DOUTOPT	54C2	DOUTOPD	54FA	DOPD	5514	DOPDTAB	5520
DOTR	552E	DORP	553B	DOXY	554A	DORE	554F
DOCC	555A	DC2	555D	DC3	555E	DOXYD	5564
DXD2	5573	DONO	5579	DN2	5588	DOTNO	5571
DTN2	55A5	DTN3	55AC	DOTNOI	55B0	DTNI2	55B1
DTNI3	55B9	DTNI4	55BC	DOUTH3	55C0	DHB2	55C9
DHB3	55D2	DOUT	55DA	DUT2	55E4	DECODE	5626
DCD2	563F	DCD3	5643	DGC0	5663	DGC07	5685
DGC06	568E	DGC04	5692	DGC02	5696	DGC022	5698
DGC00	569C	DGC002	569E	DGC0135	56A7	DGC01352	56AF
DG80	56B7	DG802	56BB	DG803	56CD	DG40	56D1
DG402	56DA	DG00	56E3	DG006	5705	DG005	5709
DG004	570D	DG0042	570F	DG003	5718	DG001	5739
DGCB	5737	DGCB1	5743	DGCB3	5750	DGCE4	5753
DGCB5	575A	DGED	5770	DGED3	578E	DGED4	579A
DGC0TAB1	57D9	DGC0TAB3	57F1	DGC0TAB5	5809	DG80TAB	5821
DG00TAB0	5829	DG00TAB2	5841	DG00TAB7	5859	DGCBTAB1	5961
DGCBTAB2	5869	DGEDTAB1	586C	DGEDTAB2	5920	ENTRY	4000
EOFP	40E1	EXIT	414D	E0	42A7	ER	42A9
ENTER	42DF	EOF	4606	ERR	4614	ERR2	4618
EXTERN	4647	EXT2	4674	E10	47CD	E20	4847
EOL	000B	E1	4917	E6	4B50	E7	4CA6
E11	4D22	EQUH	4DFE	EQ2	4E04	ENDH	4E0B
EOPS	50C3	EXOP	0040	EXXOP	0041	EIOP	0042
E4	5427	FF	000C	F1	0000	F2	0001

F3	0002	F4	0003	F5	0004	F6	0005		
F7	0006	FLAGS	40C6	FEP	40E9	FILL	44D8		
FIL2	44E3	FIELD	4AA8	FD1	4AB4	FD2	4ABD		
FD3	4ABE	FD4	4ACB	FD5	4ACF	FD6	4AD3		
FD7	4AD9	FD8	4AE1	FIND	4CBB	FIN1	4CC1		
FIN2	4CC8	FOPS	50D6	GOTO	4485	GOT2	448B		
GOT3	44AC	GETNAME	46DD	GETOPTION	491C	GOPS	50D7		
GETAREAS	5280	GTA2	5285	GETOPD	53DA	GD2	53E6		
GD22	53EE	GD3	53F3	GD4	53FB	GD5	5403		
GETKEY	54DC	GK2	54DF	GETREG	57D3	HOWBIG	4406		
HOLD	4931	HOPS	50D8	HALTOP	0050	IMAGE	4137		
INSERT	4326	INPORT	45A8	IN2	45B1	INL	0003		
IBC	0000	IDE	0002	IHL	0004	IAF	000E		
ISP	0006	IB	0000	IC	0001	ID	0002		
IE	0003	IH	0004	IL	0005	IA	0007		
IIX	00DD	IIY	00FD	IREF	0008	IINT	0000		
ICY	0018	INCY	0010	IZ	0008	INZ	0000		
IPO	0020	IPE	0028	IMIN	0038	IPOS	0030		
IMH	4F28	IM2	4F31	IMTAB	4F39	INCH	4F3C		
INC2	4F4C	INTAB	4FEB	IO1	4FFF	IO2	5006		
IOER	500D	IOPS	50DE	INCOP	0060	IMOP	0061		
INOP	0062	INIOP	0063	INIROP	0064	INDOP	0065		
INDROP	0066	IDFIND	55FA	IDF2	55FD	IDOUT	5608		
IDT2	560A	JL	0003	JUMP	4995	JP2	499E		
JP3	49CF	JPTAB	49D7	JRH	4D7D	JMPTAB	4EE5		
JMP1	4EEF	JMP2	4EF3	JMP21	4EF6	JMP3	4EFE		
JOPS	50FB	JROP	0070	JPOP	0071	KILL	426A		
KEYBOARD	467D	KB2	4680	KB22	4689	KB3	469D		
KEYTB	5031	KOPS	5102	KEYADDR	54EB	KEYTRAN	5617		
LF	000A	LCT	40D9	LIMIT	40DB	LBLP	40ED		
LOCATE	4232	LC1	4240	LC2	4250	LINE	4290		
LAST	42C4	LINC	48AE	LL	0015	LIST	4A0F		
LS1	4A20	LS12	4A35	LS2	4A41	LS3	4A50		
LS4	4A53	LS5	4A74	LS6	4A81	LS7	4A85		
LS8	4A86	LS9	4A8F	LITLE	4B44	LITLE2	4B48		
LOADH	4DE1	LTAB	4E0D	L1	4E4D	L2	4E51		
L21	4E58	L3	4E5B	L30	4E62	L31	4E65		
L4	4E68	L5	4E6E	L6	4E73	L61	4E74		
L62	4E77	L63	4E7A	L7	4E7D	LER	4E82		
L8	4E85	L9	4E97	LA	4E9E	LB	4EA6		
LC	4EAB	LE	4EB4	LE1	4EC2	LOPS	5103		
LDOP	0080	LDIOP	0081	LDIROP	0082	LDDOP	0083		
LDDROP	0084	M1	4006	M2	400B	M4	4010		
M5	4015	M7	4019	M9	4021	M11	402D		
M12	4036	M14	403F	M13	4044	M15	404B		
M16	4052	M17	405A	M18	4064	M20	4069		
M21	4070	M22	4076	M23	407D	M24	4083		
M25	4089	M27	408F	M28	4095	M29	409B		
M30	40B3	MDEF	40E3	MODIFY	44EB	MOD1	44F1		
MOD2	44F4	MOD3	44FA	MOD4	4517	MOD5	4522		
MEMCHECK	483D	MEMTOP	484E	MOFMIX	4B55	MOFMX2	4B56		
MOFPRE	4B61	MOFLH	4B65	MOFH	4B69	MOFB	4B6C		
MOF	4B6D	MOF2	4B8A	MOF5	4B94	MATH	4C1C		
MA2	4C22	MA3	4C29	MA4	4C34	MA5	4C3F		
MA50	4C46	MA51	4C4C	MA52	4C54	MA6	4C5E		
MA61	4C67	MA62	4C6E	ML1	4F9B	ML11	4FA1		
ML12	4FA4	ML2	4FA9	ML3	4FB2	MOPS	511E		
NEW	42F8	NEXT	4852	NX0	4855	NX1	4858		
NYB	48A0	NO	0003	NOI	0007	NOPS	511F		
NOPOP	0090	NEGOP	0091	OBJ	40F1	ONEPAIR	4591		

OUTPORT	459E	OUTPUT	4630	OL	0003	OPDSCH	4AED
OPTSCH	4AFB	ORGH	4DED	OUTAB	4FF5	OOPS	5128
OROP	00A0	OUTOP	00A1	OUTIOP	00A2	OTIROP	00A3
OUTDOP	00A4	OTDROP	00A5	OFFSET	542C	OFS2	543B
PBUSY	BD2E	PSEND	BD31	PAGENO	40D7	PC	40EF
PRINT	42B6	PAIR	4592	PR2	461C	PR3	461E
PAGE	4718	PG2	4726	PARAMETER	47A8	PARAM1	47AB
POSITION	4860	POS1	4868	POS2	4877	PASS	48CA
PS1	48CD	PS2	4908	PARSER	4B9B	PA1	4BA8
PA2	4BB7	PA31	4BE4	PA3	4BE8	PA7	4BEC
PER	4BF9	PA4	4BFC	PA5	4C02	PA6	4C1A
PPH	4F10	PP2	4F1F	PP21	4F22	POPS	5148
PUSHOP	00B0	POPOP	00B1	QDEF	40E5	QUERY	452A
QU2	4530	QU3	4539	QU4	453F	QU5	454C
QU7	4553	QOPS	5152	READCHAR	BB09	REENTRY	4003
READ	439D	RD2	43AA	RB4	43C4	RSOURCE	43C7
RS2	43CA	RS3	43EA	RS4	43EE	RCHAR	46F3
ROPEN	470A	REMOVE	478C	RP	0001	RPI	0005
RE	0008	RESOLV	4B35	RSTH	4ECE	RST2	4ED6
RETH	4EDB	ROPS	5153	RPAIRS	51EB	REREGS	5207
RETOP	00C0	RSTOP	00C1	RESOP	00C2	RLOP	00C3
RLCOP	00C4	RLCAOP	00C5	RLAOP	00C6	RROP	00C7
RRCOP	00C8	RRCAOP	00C9	RRAOP	00CA	RLDOP	00CB
RRDOP	00CC	RETIOP	00CD	RETNOP	00CE	SYMWIDTH	40CF
SOFP	40DF	STK	40EB	STACK	41E0	SORT	441D
SRT2	4432	SCAN	443B	SCN1	443E	SCN2	443F
SCN3	444A	SCN31	446B	SCN4	4470	SPACE	462E
STRING	46A0	STR1	46A2	STARTSTOP	47BD	SOF	4832
SBL	0002	SYMBOL	4941	SY2	4992	SYMFIELD	4AA4
SYMSCH	4AE8	SEARCH	4B1A	SC2	4B20	SC3	4B25
SBCTAB	4F5D	SRH	4FD2	SR2	4FE2	SOPS	5192
SBCOP	00D0	SCFOP	00D1	SLAOP	00D2	SRAOP	00D3
SRLOP	00D4	SETOP	00D5	SUBOP	00D6	SWAPHL	536A
SWAPXY	53A0	SXY2	53B2	SXY3	53BC	TXTOUT	BB5A
TEMP	40E7	TBUFF	4154	TOP	4270	TARGET	427D
THIS	42CE	TRAP	474E	TRAP2	4784	TL	0010
TR	0000	TRI	0004	TNO	000C	TNOI	000D
TALPHA	0030	TLAB	0031	TOPD	0032	TCOM	0033
TIND	0034	TADD	0040	TSUB	00C0	TMUL	0080
TDIV	0081	TAND	0082	TOR	0083	TDEF	0035
TLIT	0036	TERM	4C75	TE2	4C7D	TE3	4C87
TYPE	4CAB	TYPTAB	4CD9	TOPS	51AF	TREGS	51D6
TRIPLET	57CC	USTK	410F	USP	414E	UPC	4152
UP	425E	USER	46AF	US0	46B3	US1	46B9
US2	46C8	US4	46D8	UPDATE	48AB	UOPS	51B0
UNSCRAMBLE	52AF	UM2	52B5	UM3	52BA	VECTOR	40F6
VIDEO	4636	VID2	4644	VOPS	51B1	WAITCHAR	BB06
WRITE	4346	WBIN	4349	WB3	4365	WB4	436D
WSOURCE	4370	WS2	4384	WS3	4390	WCHAR	46EB
WOPEN	46FB	WPE2	4707	WORDSP	488D	WOPS	5192
XAMINE	4563	XL	0004	XY	0002	XYI	0006
XYD	000A	XTAB	5010	X1	501D	XER	5029
X2	502B	X3	502E	XOPS	51B3	XYPAIRS	51FF
XOROP	00E0	YOPS	51B8	ZEN	41E0	ZEN2	422E
ZAP	4299	ZOPS	51B9				