DataIO UniSite 82S100 Dumping V1.00

DataIO UniSite Programmable Logic Binary Format

The DataIO File Operations->Save File function outputs a binary file. The UniSite User Manual has some notes about using this raw format with logic devices:

"Note: The More/File Operations/Load File command is a transfer for an absolute binary format. The programmer must receive a JEDEC format for logic devices."

"A saved file is stored in RAM Image Binary format. If you want to store a file in some other format, use the Transfer Data/Output to Disk command."

That said, the programmer doesn't prohibit the Save File of a logic device in RIB format and in the simple case of a read & save of an 82S100 the resulting format is as follows:

```
Byte Offset : Description
  0 ...  3  : <4 bytes, 32-bit number, matches file size, 250>
  4 ...  7  : <4 bytes, 32-bit number, matches file size, 250>
  8 ... 248 : <fuse map>
249         : <1 byte, NULL 0x00 terminator>
```

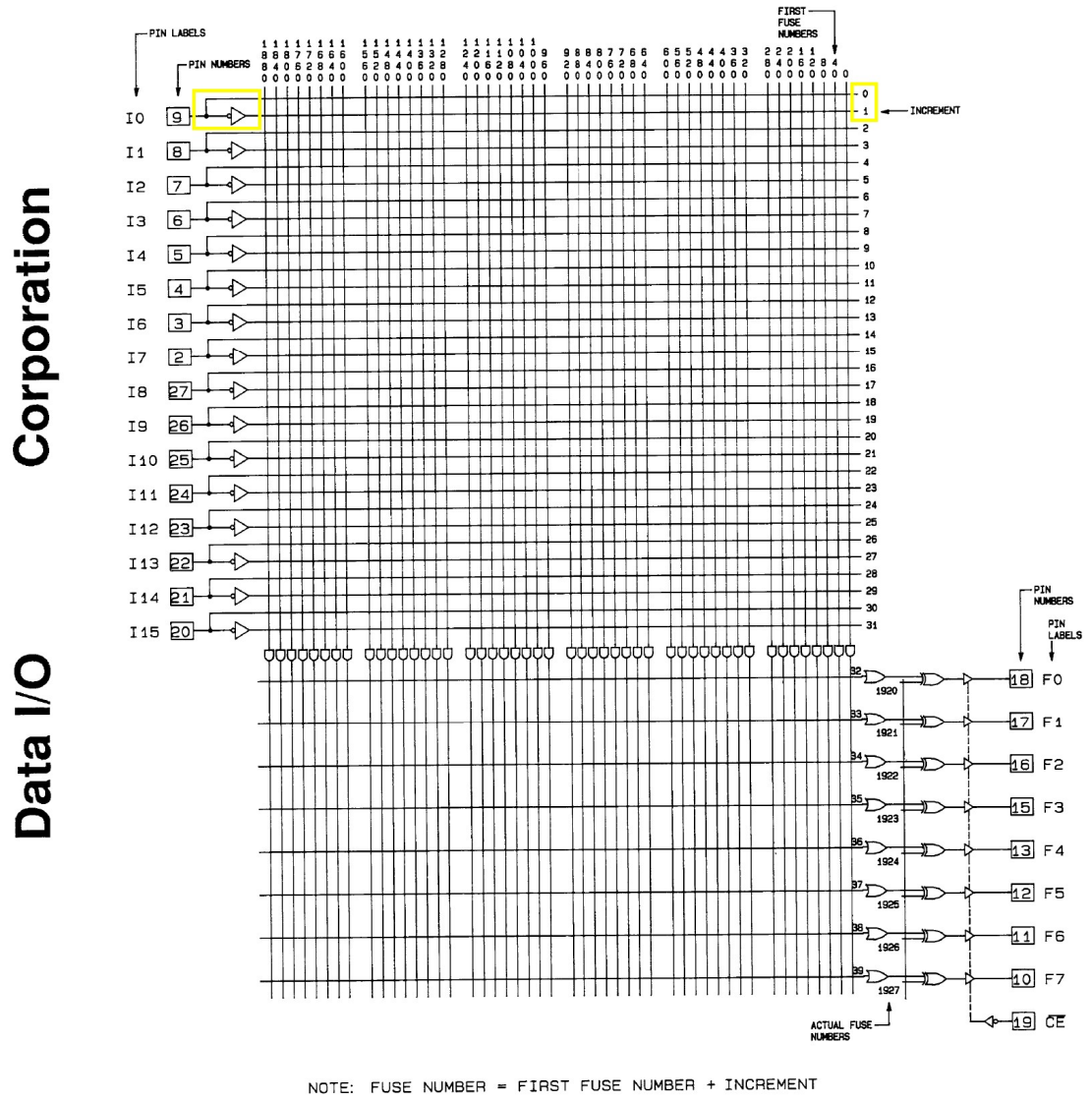
MAME Programmable Logic Binary Format

The logic device binary format used in MAME is documented in the source code for Jedutil:

```
Byte Offset : Description
  0 ...   3 : <4 bytes, 32-bit number, number of fuses, 1928>
  4 ... 244 : <fuse map>
```

Dumping Using JEDEC File Transfer

The resulting UniSite V5.80 "standard" JEDEC output from the 82S100 read does not match the MAME JEDEC output from Jedutil and the conversion of the Data IO JEDEC file to MAME binary format yields incorrect data. The DataIO fuse map for the 82S100 is documented on page 43 of the "`981-0251_ProgrammableLogicDiagramPackage_Sep90`" manual for which the general layout of the fuse map matches Jedutil but the none-inverting/inverting "I" inputs are swapped (i.e., I0 & ~I0, I1 & ~I1 etc.) as highlighted in the diagram below. It's not known why the DataIO dump is swapped.



In binary this difference in fuse order corresponds to a swap transformation on the 4 bytes of the AND matrix thus:

```
Byte Offset : Description
  0 ...   3 : 01234567 -> 10325476
  4         : 01234567 -> no change
  5 ...   8 : 01234567 -> 10325476
```

…

There is a hack of MAME's Jedutil to perform this transformation available:

https://github.com/prswan/arduino-mega-ict/blob/47f0c2b90bdee2b3790468ef90444a05343afe8e/utilities/82S100/jedparse.cpp#L176

```
for ( ; cursrc < srcend; cursrc++)
        if (*cursrc == '0' || *cursrc == '1')
        {
                uint32_t jedcurfuse = curfuse;

                /* Special handling to correct the fuse order from the
                   DataIO UnitSite read of an 82S100. The fuse order
                   translation is 01234567 => 10325476 applied to the
                   AND matrix block (4 bytes of 5). Thus, the lower
                   bit of the fuse address is inverted.

                   0000000E: A5 5A
                   0000000F: FE FD
                   00000013: A9 56
                   00000014: FD FE
                   00000018: A6 59
                */
                if (data->dataio_swap)
                {
                        if ((jedcurfuse < 1920) &&
                                ((jedcurfuse % 40) < 32))
                        {
                                jedcurfuse = curfuse & ~0x1UL;
                                jedcurfuse |= (curfuse & 0x1) ^ 1;
                        }
                }

                jed_set_fuse(data, jedcurfuse, *cursrc - '0');
                if (LOG_PARSE) printf("  fuse %u = %d\n", curfuse, 0);
                if (curfuse >= data->numfuses)
                        data->numfuses = curfuse + 1;
                curfuse++;
        }
```

Reference DataIO Dump of Zaccaria Cat'n Mouse IC 10M

```
                                                    Data I/O*
QP0028* QF1928* G0 *
L0000
11111111101111111010011111111111
11011010111111111011111101101011
11111111101110111111111111111111
01100111101111110010010011111111
11111111100110111111111111110110
11111111101111111001011111111111
01101101111111111111111101011011
11111111001110111111111111111111
01010111111111110000000011111111
11111111011001110111101010110100*
L0320
11111111111111110110011101110110
01001001111111111111111101100111
01111001001001011111111111111111
01100111011101010010010011111111
11101111101010111111111101101101
11111111111110111010101111111111
11110110111111111111111010101011
11111111110110111010111111010101
10101001111111110110110100000000
00000000000000000000000000000000*
L0640
11111111111111111111111111111111
11111111111111111111111111111111
11111111111111111111111111111111
11111111111111111111111111111111
11111111111111111111111111111111
11111111111111111111111111111111
11111111111111111111111111111111
11111111111111110000000000000000
00000000000000000000000000000000
00000000000000000000000000000000*
L0960
01101001110101011010101111111111
01001001100110011101010110101011
11111111001001000101100111010101
10101011111111111011010101100101
11010101101010111111111100100100
10010101110101011010101111111111
11011011010101011101010110101011
11111111101101100000000000000000
00000000000000000000000000000000
00000000000000000000000000000000*
L1280
01101010110101011010101111111111
11011011100110101101010110101011
11111111011011010101101011010101
10101011111111111001001000110110
11010101101010111111111100100100
10010110110101011010101111111111
01001001010101101101010110101011
11111111110011000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000*
L1600
11111111011111111010011111111111
01001001111111110111111101101011
11111111011011011111111111111111
11111111111111111111111111111111
01111111100101111111111111011011
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000
00000000000000000000000000000000*
L1920
00000000*
C9834*
————————————————————————————851F
```

Reference MAME Dump of Zaccaria Cat'n Mouse IC 10M

```
JEDEC file generated by jedutil*
QF1928*
F1*
L00000 11111111011111110101101111111111*
L00032 11011010111111110111111110010111*
L00064 11111111101110111111111111111111*
L00096 10011011011111111001001001111111*
L00128 11111111011001111111111111110110*
L00160 11111111011111110110101111111111*
L00192 01101101111111111111111110100111*
L00224 11111111001111011111111111111111*
L00256 10101011111111110000000011111111*
L00288 11111111100110111011010110110100*
L00320 11111111111111111001101110111001*
L00352 01001001111111111111111110011011*
L00384 10110110001001011111111111111111*
L00416 10011011101110100010010011111111*
L00448 11011111010101111111111101101101*
L00480 11111111111101110101011111111111*
L00512 11110110111111111111110101010111*
L00544 11111111110110110101111111101010*
L00576 01010110111111110110110100000000*
L00608 00000000000000000000000000000000*
L00864 11111111111111110000000000000000*
L00896 00000000000000000000000000000000*
L00928 00000000000000000000000000000000*
L00960 10010110111010100101011111111111*
L00992 01001001011001101110101001010111*
L01024 11111111001001001010011011101010*
L01056 01010111111111110110110110011010*
L01088 11101010010101111111111100100100*
L01120 01101010111010100101011111111111*
L01152 11011011101010101110101001010111*
L01184 11111111101101100000000000000000*
L01216 00000000000000000000000000000000*
L01248 00000000000000000000000000000000*
L01280 10010101111010100101011111111111*
L01312 11011011011001011110101001010111*
L01344 11111111011011011010010111101010*
L01376 01010111111111110010010010011001*
L01408 11101010010101111111111100100100*
L01440 01101001111010100101011111111111*
L01472 01001001101010011110101001010111*
L01504 11111111110011000000000000000000*
L01536 00000000000000000000000000000000*
L01568 00000000000000000000000000000000*
L01600 11111111101111110101101111111111*
L01632 01001001111111111011111110010111*
L01664 11111111011011011111111111111111*
L01728 10111111011010111111111111011011*
L01760 00000000000000000000000000000000*
L01792 00000000000000000000000000000000*
L01824 00000000000000000000000000000000*
L01856 00000000000000000000000000000000*
L01888 00000000000000000000000000000000*
L01920 00000000*
C94EE*
————————————————————————————————A172
```