```
ADDR CODE    LABEL   OPCODE  OPERAND   COMMENT
0036 5E              STR             Store result in
                                     location FF
0037 1F              INC             Point RF.0 to
                                     result
0038 64              OUT4            Display result
0039 00                              Put anything here.

                                     This location
                                     written by set up
                                     sections
003A 3E              X'3E'           If overflow or
                                     borrow, go to
                                     location 3E
003B 7A              REQ             No overflow or
                                     borrow, so make
                                     sure Q off
003C 3000            BR      BEGIN   Then go back and
                                     get ready
                                     for a new
                                     calculation
003E 7B              SEQ             Turn on Q to
                                     indicate overflow
                                     or borrow
003F 3000            BR      BEGIN   Then go back and
                                     get ready for a
                                     new calculation
```

```
0000 3041 A1E1 3F04 3706 6CA4 F835 A2F8 39A3
0010 D4F8 F452 F833 5330 20F8 F752 F83B 53C4
0020 F8FE AFEF 3F24 6C64 3728 3F2A 6C64 372E
0030 2F8F AE2F 0EF4 5E1F 6433 3E7A 3000 7B30
0040 00F8 00B2 B3B4 BEBF F8FF 3002 CC1B B824
0050 6C6D
```

SUPER ELF CASSETTE FORMAT

The Super Elf Super Monitor and Super Basic use the following cassette format.

This approach allows automatic loading into memory since the starting address is on the tape. A test can be made to see if there is enough space in memory for the file prior to loading because the file also contains the number of bytes. Each byte includes a parity bit which is used for error checking. The rate of recording and playback is approximately 1200 bytes per second with a 1.79MH clock. Reliable operation has been achieved (with a recommended recorder) at 2000 bytes per second using a 3.0MH clock. The read software used in the Super Monitor and Super Basic allows starting the recorder with the cassette fully rewound. The plastic leader/tape splice does not cause problems and it is not necessary to advance the cassette past the leader prior to starting. In fact there are **no level adjustments or tape positioning required** (when using one of the recommended recorders). Just load, set volume and tone to max and go. This format is self clocking and insensitive to speed variations of over +-15%.

The Format Consists of:

1. A 10 second leader of all 'ones' terminated with a zero bit.
2. Data bytes.
3. A 5 sec trailer of all 'zeros'.

The Data Section Consists of:

1. Starting address 2 bytes Hi/Low.
   (0000 TO FFFF HEX)
2. Number of bytes 2 bytes Hi/Low.
   (0000 TO FF00 HEX)
3. Data bytes 8 bits with the most significant (MSB) first with an added parity bit. (For a total of 9 bits). Even parity is used, i.e. the sum of the ones in the data plus the parity bit is always an even number.

```
DATA 0111 01 01  PARITY=1      (6'1's)
DATA 0011 00 11  PARITY=0      (4'1'S)
```

A bit is defined as a high level followed by an equal length low level. A zero bit is three times the length of a one bit. The end of a bit is the beginning of the next bit.

The following bit times are for a 1.79 MH clock. The effects of other clock frequencies are discussed later.

1. A ONE bit has a 206 microsec ON time and a 609 to 627 microsec OFF time.
2. A ZERO bit has a 618 microsec ON time and a 609 to 627 microsec OFF time.

The standard Super Elf with a 1.79 MH clock and either Super Basic or the Super Monitor uses this format. If your system uses a different clock frequency, make the following changes to For Different Clock Rates, Solve this equation:

VALUE=8 X CLOCK RATE (MH)-1.3

Round off VALUE, convert to hexadecimal and patch into location 8193 in the Super Monitor V1.1 or 2.0; and location 2947 in Super Basic 1.4; QKOC is the location in the cassette read routine.

Super Elf owners may ignore this section. Non Super Elf owners must use the listed cassette read routine and may need to use the schematic for read hardware. Elf II owners usually can successfully read with their own hardware. The following table lists the changes required for the different sense lines.

	EF1	EF2	EF3	EF4
QK16	34	35	36	37
QK1D	3C	3D	3E	3F
QK2C	3C	3D	3E	3F
QK41	34	35	36	37
QK48	3C	3D	3E	3F
QK53	3C	3D	3E	3F

Where QK is the Quarter K of memory in which the cassette read routine is loaded. NOTE: Do not load the read routine in a page which will be written into by the read routine.

If you have trouble reading you may have the signal inverted (all recorders are not the same even the same brand and model). This software usually but not always accepts either normal or inverted data, it depends upon the amount of distortion introduced by the recorder. The following table inverts the data.

	EF1	EF2	EF3	EF4
QK16	3C	3D	3E	3F
QK1D	34	35	36	37
QK2C	34	35	36	37
QK41	3C	3D	3E	3F
QK48	34	35	36	37
QD53	34	35	36	37

To use the cassette read routine (non Super Elf owners only), follow the following instructions.

1. Load program per this load listing. QK refers to your page of memory where you want the program to reside:

2. Branch into the program from register 0 into location QK00. If you wish to branch into the program from any other register (but not register 2 or 5) then change the "90" instruction at location QK00 to "9P" where P is the same as the register designation which you are using. Then branch into QK00.

3. After starting the program, load the cassette at the beginning, start recorder in playback with maximum volume and treble on the tone control. There is a 10 second leader and then the low address of the current loaction of memory being loaded off the cassette will be displayed. The rate is about 1200 baud. At the end of loading, an "AA" will show up on the display (If you have a hex display at output port 64).

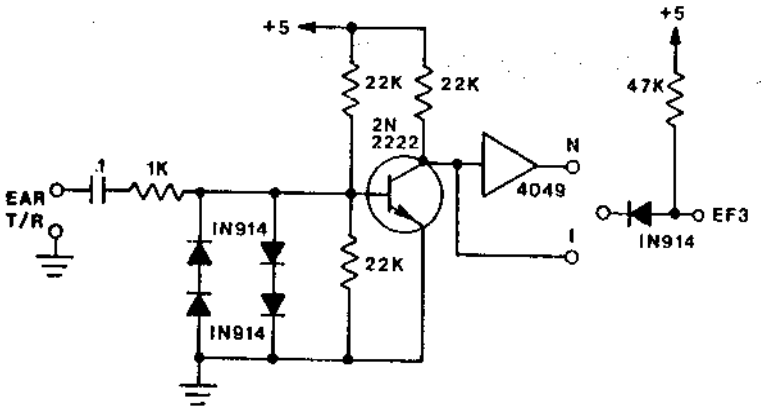
4. If a parity error is detected, an "EE" will be displayed (on the hex display). Check the program for loading errors and try re-running the playback. Also check your hardware setup.

Future articles will be discussed:

a. The Elf II format and how non Elf II owners can read Elf II cassettes.

b. The Super Elf Write/Read software source listings.

```
QK00 90B3 E2B5 B2F8 72A2 F812 A5F8 0DB6 F83E
QK10 A3D3 F808 A6A7 3616 96FF 013B 223E 1927
QK20 302E F800 FC01 3B2C F8EE 306F 3E24 8632
QK30 3797 7EB7 2630 1687 F633 2897 3011 F80A
QK40 B436 4196 FF01 3B50 3E44 9432 4124 3041
QK50 943A 3E3E 53D5 B8D5 A8D5 B9D5 A929 99FC
QK60 01B9 D558 8852 6422 1829 993A 62F8 AA52
QK70 6400
```



A TRICKY SOLUTION TO A CLEAR PROBLEM

By S. G. Grant

In QUESTDATA No. 8, Jay Mallin in his article **DOODLE PROGRAM** on page 8 issued a challenge of sorts, "It's possible to write a program that will clear all but one byte-try it sometime." Well, reader Arthur S. G. Grant has come up with a program which cleverly does the job in 12 machine language bytes. Do any readers have new challenges in search of solutions? If so, let us know. QUESTDATA readers can solve any challenge, right?

```
ADDR CODE    LABEL   OPCODE OPERAND COMMENT

0000 3030            BR
0001 00                             Hint- this
 ...                                later be-
 ...                                comes im-
 ...                                portant
 ...                                (this 00 in
 ...                                01) No more
 ...                                hints-tracing
 ...                                thru this
 ...                                program is
 ...                                part of the
 ...                                fun
0030 90              GHI    R0
0031 A1              PLO    R1
0032 B1              PHI    R1
0033 E1              SEX1
0034 F873            LDI    '73'
0036 73              STXD
0037 90              GHI    R0
0038 A0              PLO    R0
```