SECTION 1

TMB EPROM PROGRAMMER DESCRIPTION

04/26/82

1.1   HARDWARE DESCRIPTION

The Hardware is designed to handle both 32K (4K x 8) TI and 64K (8k x 8) Motorola EPROMs, both of which are 5V only parts in 24-pin DIP packages.   The standard 2 ms pulse technique used by everybody but TI (on their 5V only parts) is used with 60 ms of accumulated program time.

Hardware and Software together provide for a "COLD" insertion of the EPROM for the several Software operations included.

Software settable parameters allow operating on any part or all of an EPROM.   All buffer addresses are preset to default values, but may be changed as desired.

1.2   SOFTWARE DESCRIPTION

Some seven different operations are provided, and each is discussed in the following paragraphs. Default values are given for each function, and may be selected by "spacing" through the respective value.   Software was written to operate on both a 733 hard copy and a CRT terminal. With the exception of the "Q" function, all operations indicate completion by a message of "PUSH ANY KEY TO CONTINUE".

The buffer default values assume a standard 32K Memory Expansion is connected.

1.2.1   HELP Menu.   The HELP Menu lists the seven different functions provided. These range from actual EPROM functions to buffer manipulations. The functions are as follows.

*   "C" for COPY EPROM to Buffer area.

 * "I" for Buffer Initialization.

 * "M" for Buffer Merge operation.

 * "P" for EPROM Program.

 * "Q" for return to OURBUG.

 * "S" for Buffer Splitting operation.

 * "V" for Verify EPROM with Buffer.

1.2.2   COPY Menu.   The COPY function is used to copy an EPROM to
a Buffer area specified by the user.   The options are as follows.

 * EPROM type is defaulted to be a 32K.   Any four hex
   character entry will cause a 64K connection to be made.

 * EPROM Start Address is defaulted to be >0000. A four
   hex character entry may be made to bias from >0000 if so
   desired.

 * Buffer Start Address is defaulted to >A000 (in the 32K
   Memory Expansion space), and may be changed to any BYTE
   address one may choose to enter.

 * Buffer End Address is defaulted to >AFFE.   It may also
   be changed as desired.   This is the last WORD address to
   be copied into.

     The   total   area   copied   will   start   with the Buffer Start
Address, and end with the Buffer End Address +1; thus,   the copy
span is   determined   by the Buffer parameters - not by the EPROM
parameters.   We can copy any contiguous part of the EPROM to any
buffer area.

1.2.3 Initialize Buffer.   This operation will allow one to set a
given buffer area to ZEROs or to ONEs.   The Initialize Buffer
Menu is as follows.

 * Data to be loaded is defaulted to be all ONEs,   as   this
   is the erased state of an EPROM.   Any four hex character
   entry will cause the data to be set to ZEROs.

 * The EPROM Start Address is defaulted to >0000, and is
   not used in this routine.   For the sake of simplicity,
   use the default values.

* Buffer Start Address is defaulted to >A000, and determines the start of the buffer area to be initialized. Any four hex character value may be substituted for >A000.

* Buffer End Address is defaulted to >AFFE, and may be changed to any four hex character value. This address +1 is the address of the last BYTE to be initialized.

1.2.4 MERGE Function. The MERGE Function is used to build one file out of two others. This function covers the case where two EPROMs for the 16-bit DATA Bus of a TMS9900 based system need to be combined into a single one for a TMS9995 based system; i.e. an EPROM exists that has only MSBYs and another for LSBYs. The two may be coppied into separate buffer areas, and then combined with the MERGE operation. The SPLIT Function is the reverse of this. The MERGE Menu is as follows.

* MSBY Buffer Start Address is defaulted to be >A000, and is the BYTE address of the first MSBY. It may be changed to any four hex character quantity.

* LSBY Buffer Start address is the BYTE address of the first LSBY. Any four character hex value may be substituted for the default value.

* The Merge Buffer Start Address should be an even address, and is defaulted to >C000. It will be the MSBY of the merged buffer.

* The Merge Buffer End Address sets the MERGE Buffer size, and is defaulted to >CFFE. This value is the next to the last character in the merged buffer, and is the MSBY of the last WORD in the merged buffer.

    Notice that the MERGE Buffer parameters set the length of the copy concatenate operation. This span should be less than or equal to the sum of the address spans of the MSBY and LSBY Buffers.

1.2.5 PROGRAM Operation. The Program Operation is used to actually program the selected EPROM, and then to verify it after the Program Operation has completed. The Software checks for >FF BYTEs, and skips over these to reduce EPROM heating due to the high voltage programming pulses. The Program Operation parameters are as follows.

* The EPROM Type is defaulted to a 32K, and will be

changed with any four hex character entry to be a 64K
type.

* The EPROM Start Address is defaulted to be >0000, but
  may be biased to any value in the EPROM address space if
  desired.

* Buffer Start Address is the BYTE location of the first
  BYTE to be programmed. It is defaulted to >A000, but
  may be changed to any four hex character value.

* The Buffer End Address is the address of the last WORD
  to be programmed.

     Note that the Buffer parameters determine the number of
locations to be programmed, and that the EPROM start address may
be biased from >0000. As is with other cases, one may do bad
things if the total number of bytes to be programmed exceeds the
address space of the EPROM. The EPROM Address Counter simply
wraps around, and location >0000 gets reprogrammed with different
data.

1.2.6 QUIT Function. The QUIT function simply returns control
to OURBUG.

1.2.7 SPLIT Operation. The SPLIT Operation takes a single
buffer and builds two others. The first is formed with all of
the original buffer EVEN addresses, and the second is built with
all of the orginal ODD addresses. This covers the case where an
EPROM for a TMS9995 needs to be split into two EPROMs for the 16-
bit DATA Bus of TMS9900 based system. The SPLIT parameters are
as follows.

* The MSBY Start Address is defaulted to >A000, and may be
  changed to any four hex character value. This is the
  first address of the MSBY buffer to be built, and will
  contain the first BYTE from the buffer to be split.

* LSBY Buffer Address may be changed to any four hex
  character value, and is defaulted to >B000. It is the
  first address of the LSBY buffer, and contains the
  second BYTE of the Buffer to be split.

* The Split Buffer Start Address is defaulted to >C000,
  and is the first address of the buffer to be split into
  two others. It may be changed into any four hex
  character quantity.

*   The Split Buffer End Address +1 determines the last BYTE
    to be placed in the new buffer for the ODD addresses of
    the Split Buffer.

    Notice that the Split Buffer parameters determine the number
of BYTES for the two new buffers to be built from.   The sum of
their two sizes will be determined by the   Split   Buffer
parameters.

1.2.8 VERIFY Operation.   The Verify Operation is used to compare
the   contents   of   an   EPROM to that of a buffer area.   The total
error count is printed, and is used as a PASS/FAIL indicator.
Only the first 8 error ADDRESSES with both GOOD and BAD data are
listed.   The Parameters are as follows.

*   The EPROM Type is defaulted to a 32K, and any four hex
    character entry will cause the 64K type to be selected.

*   EPROM Start Address is the start address for the verify
    operation, and may be biased from the default location
    of >0000 if desired.

*   The Buffer Start Address is the first location for
    comparison to occur.   It is defaulted to >A000, but may
    be changed to any other four hex character quantity.

*   The Buffer End Address is defaulted to >AFFE, and may be
    changed to any four hex character value.   This address
    +1 is the last address used in the comparison operation.

    Note that the Buffer parameters determine the comparison
span, and the EPROM parameters determine the EPROM type and
starting address.

1.3 CONCLUSION

    The Hardware and Software design is the result of 2,984
years of combined experience in designing EPROM Programmers.   Jim
Tolson, Chuck McCarthy, and Mike Bunyard hope you enjoy using it,
and solicit any feedback in improving this system.   MLB