# EXPANSION MEMORY HALF CARD

## WITH CLOCK/CALENDAR

# USER'S MANUAL
## AND 2 YEAR WARRANTY
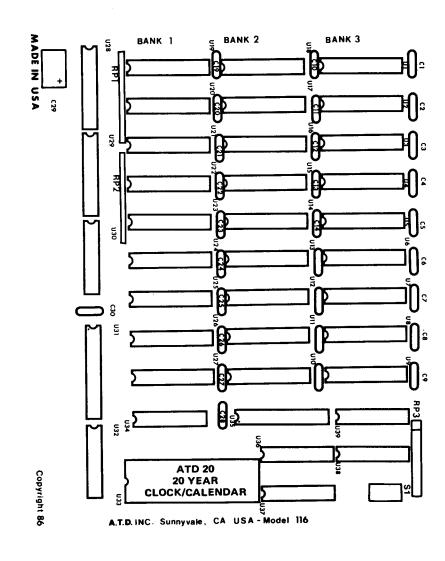
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MADE IN USA

BANK 1 BANK 2 BANK 3

ATD 20
20 YEAR
CLOCK/CALENDAR

A.T.D. INC. Sunnyvale, CA USA - Model 116

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The Expansion Memory Board allows the memory on your IBM PC, XT, Portable or Compatible computer to be expanded to its full capacity of 640K.

It will accept either the ordinary 64K memory chips (4164) or the new 256K memory chips (41256). There are nine possible memory configurations, ranging from a minimum of 64K to a maximum of 576K (see Page 4). The Expansion Memory Board fits in any expansion slot, including the difficult-to-use short slot, except slot 8 in the IBM-XT.

The optional Clock/Calendar plugs directly onto the memory board without taking up any additional slots in your computer. Our clock/calendar is guaranteed to ten years and is accurate to ± 2 minutes a year.

The Expansion Memory Board is made in the U.S.A. and comes with a standard 2-year warranty.

# TECHNICAL SPECIFICATIONS

Compatible with:          IBM PC, XT, Portable or Compatibles

Installation:             Any long or short slot, except slot 8 of IBM-XT

Number of possible
memory combinations:      Nine

Starting address:         64K, 128K, 256K, and 384K

Minimum Memory:           One bank of 64K chips

Maximum Memory:           One bank of 64K chips and two banks of
                          256K chips

Memory Capabilities:      Bank 1        None/64K/256K
                          Bank 2        None/64K/256K
                          Bank 3        None/64K/256K

Parity check:             Enable or Disable

Power:                    5 Volts ± 5%, 60 milliamps

Clock/Calendar:
    Accuracy:             ± 2 minutes per year

    Backup:               2 35ma batteries sealed in an epoxy compound

    Projected life:       20 years

    Power:                300 nanoamps

# INSTALLING THE MEMORY BOARD

*Follow these steps to install the Expansion Memory Board in any slot of the IBM PC, XT, Portable or Compatible computer, except slot 8 in the IBM-XT.*

1.  **CONFIGURE THE SYSTEM**

    a.  Remove the cover from the system.

    b.  Count the number of filled memory banks in your system board. Multiply this number by 64K to get the installed system memory.

    c.  Consult the System Installation Table on Pages 6 and 7 and set the switches on bank one (SW1) of the system board in accordance with your computer and its memory.

2.  **LOAD THE EXPANSION BOARD**

    a.  Set the Expansion Board's dip switches to select parity enable or disable and the starting address (equal to System Board Memory).

| Starting Address (KB) | SWITCH | | |
|---|---|---|---|
| | 1 | 2 | 3 |
| 64 | Off | On | On |
| 128 | On | Off | On |
| 256(A) | On | On | Off |
| 256(B) | On | Off | Off |
| 384 | On | On | On |

| Parity | SWITCH 4 |
|---|---|
| Enable | On |
| Disable | Off |

**Note:**
If you have a multifunction card and want to include its memory, set the Expansion board starting address as the total memory on the System Board plus the memory on the multifunction card.   (A) and (B), see chart on Page 5.

    b.  Choose the memory loading combination you desire from the Memory Loading Table (see Page 5) and set aside a set of nine of each type chip for installation.

        **Note:**
        4164 (64K) and 41256 (256K) chips cannot be mixed in any one bank.

c. Install the chips with the horseshoe ends matching the pattern on the board.

3. **INSTALL EXPANSION BOARD IN THE SYSTEM**

   a. Choose any empty slot and remove the corresponding screw and metal bracket hole cover on the system panel.

   b. Align the memory expansion board in the slot and press firmly downward to make contact with the System Board.

   c. Secure the bracket and board by replacing the screw removed in Step a.

   d. Replace the system cover and power up. It will take longer to boot the system now due to the increase in memory.

   e. Place your DOS disk in Drive A and run check disc program (CHKDSK). One of the following memory codes should appear on your screen.

| MEMORY CODE ON DISPLAY | TOTAL SYSTEM MEMORY INSTALLED (KB) |
|---|---|
| 65536 | 64 |
| 131072 | 128 |
| 196608 | 192 |
| 262144 | 256 |
| 327680 | 320 |
| 393216 | 384 |
| 458752 | 448 |
| 524288 | 512 |
| 589824 | 576 |
| 655360 | 640 |

If the displayed number is different from the total installed memory on System and Expansion boards (see Step 1 of "Having Problems" Page 10).

## MEMORY LOADING

| MEMORY ON SYSTEM BOARD (KB) | EXPANSION BOARD MEMORY INSTALLED (9 CHIPS/BANK) | | | TOTAL INSTALLED MEMORY (KB) | |
|---|---|---|---|---|---|
| TOTAL | BANK 1 | BANK 2 | BANK 3 | EXP. MEM. | TOTAL SYST. |
| 64 | 64 (1) | None | None | 64 | 128 |
| 64 | 64 | 64 | None | 128 | 192 |
| 64 | 64 | 256 (2) | None | 320 | 384 |
| 64 | 64 | 256 | 64 (3) | 384 | 448 |
| 64 | 64 | 256 | 256 | 576 | 640 |
| 128 | None | 64 (3) | None | 64 | 192 |
| 128 | None | 256 | None | 256 | 384 |
| 128 | None | 256 | 64 (3) | 320 | 448 |
| 128 | None | 256 | 256 | 512 | 640 |
| 256 (A) | 64 | None | None | 64 | 320 |
| 256 (A) | 64 | 64 | None | 128 | 384 |
| 256 (A) | 64 | 64 | 64 (3) | 192 | 448 |
| 256 (B) | 256 | None | None | 256 | 512 |
| 256 (B) | 256 | 64 | None | 320 | 576 |
| 256 (A) | 64 | 64 | 256 | 384 | 640 |
| 384 | 64 | None | None | 256 | 512 |
| 384 | 256 | None | None | 320 | 576 |
| 0 | 256 | 256 | 256 | 640 | 640 |

Notes:

(1) Recommended chip is 4164-15 or 4164-20

(2) Recommended chip is 41256-15 or 41256-20

(3) Use for IBM PC-1 and PC-2 only

(A) See Switch Settings, Page 3

(B) See Switch Settings, Page 3

# S Y S T E M

| TYPE OF IBM COMPUTER | MEMORY ON SYSTEM BOARD (KB) | | SET SWITCH EQUAL TO MEMORY ON |
|---|---|---|---|
| | *MIN. BEFORE USING MEMORY EXPANSION* | *MAX. BEFORE USING MEMORY EXPANSION* | |
| PC-1 | 64 | 64 | SYSTEM + EXPANSION BOARDS |
| PC-2 | 256 | 256 | SYSTEM + EXPANSION BOARDS |
| Portable | 64 | 256 | SYSTEM BOARD |
| XT | 128 | 256 | SYSTEM BOARD |

Note:
1. Once a total of 512 KB or more memory is installed on System and Expansion Boards, switches should be set to 512 KB to run most application software.

# I N S T A L L A T I O N

| SWITCH BLOCK 2 | TOTAL MEMORY (KB) | | | | | | | | | | MAX. TOTAL MEMORY SYST. & EXPANSION |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | *64* | *128* | *192* | *256* | *320* | *384* | *448* | *512* | *576* | *640* | *640* |
| S1 | ON | ON | ON | ON | ON | ON | ON | ON | – | – | 640 |
| S2 | ON | OFF | ON | OFF | ON | OFF | ON | OFF | – | – | 544 |
| S3 | ON | ON | OFF | OFF | ON | ON | OFF | OFF | – | – | ADDRESSABLE |
| S4 | ON | ON | ON | ON | OFF | OFF | OFF | OFF | – | – | |
| S1 | ON | ON | ON | ON | ON | ON | ON | ON | ON | ON | 640 |
| S2 | ON | OFF | ON | OFF | ON | OFF | ON | OFF | ON | OFF | |
| S3 | ON | ON | OFF | OFF | ON | ON | OFF | OFF | ON | ON | |
| S4 | ON | ON | ON | ON | OFF | OFF | OFF | OFF | OFF | ON | |
| S5 | ON | ON | ON | ON | ON | ON | ON | ON | OFF | OFF | |
| S3 | ON | OFF | ON | OFF | – | – | – | – | – | – | 640 |
| S4 | ON | ON | OFF | OFF | – | – | – | – | – | – | |
| S3 | – | OFF | OFF | OFF | – | – | – | – | – | – | 640 |
| S4 | – | ON | OFF | OFF | | | | | | | |

# THE CLOCK/CALENDAR

1. **INSTALLING THE CLOCK/CALENDAR**
   Remove the Expansion Memory Board from the computer. Be sure the power is off. Plug the clock/calendar chip into the socket at board location U33 (see Board Diagram, Page iv). Insert the clock/calendar chip into the socket so that the lettering on the chip is facing up when the metal bracket on the Expansion Memory Board is facing downward. Make sure all the legs on the chip are seated properly in the socket. Repeat the steps in "Installing the Expansion Memory Board".

2. **SETTING THE CLOCK/CALENDAR**
   While in DOS, at the A> prompt, insert the clock/calendar software diskette into drive A and type **CLOCKSET** [ENTER]. Follow the instructions on your screen.

3. **READING THE CLOCK/CALENDAR**
   To display current time and date, with the clock/calendar software in drive A, at the A> prompt, type **CLOCK** [ENTER].

4. **AUTOMATIC INITIALIZATION OF THE CLOCK/CALENDAR**
   In order to have the current time and date automatically initialized each time you boot up, follow these steps:

   A. Copy the two clock programs, **CLOCK.COM** and **CLOCKSET.COM** to your working DOS disk. (If you have a hard disk and boot from it, copy these two files to that disk).

   B. If your DOS diskette (or hard disk) already has an **AUTOEXEC.BAT** file, you need to modify it to include the **CLOCK** command. To see the current contents of your **AUTOEXEC.BAT** file, insert the DOS diskette in drive A (or access your hard disk) and from the > prompt, type:

   > **TYPE AUTOEXEC.BAT** [ENTER]

   The contents of your **AUTOEXEC.BAT** file will be listed on your screen. You now need to modify your **AUTOEXEC.BAT** file so that the **CLOCK** command preceeds other commands. To do this, type the following sequence:

   > **COPY CON: AUTOEXEC.BAT** [ENTER]
   > **CLOCK** [ENTER]
   > **XXXX** [ENTER]
   > **XXXX** [ENTER]
   > **XXXX** [ENTER]
   > **Function Key F6** [ENTER]

   (where **XXXX** are the names of your existing **AUTOEXEC.BAT** files). If your DOS diskette (or hard disk) has no **AUTOEXEC.BAT** file, use the above sequence to create one.

# WHICH MEMORY CHIPS ARE USED

The most widely used memory chips in personal computers are 4164-15 and 4164-20 chips. These Dynamic Random Access Memory (DRAM) chips have a matrix of information 64,000 (64K) bits by one byte. A set of eight chips in a bank gives a computer 64K by 8 bytes of memory (64K bytes). A ninth chip is required in each bank as a parity-check bit. The speed with which the chip accesses its memory is measured in nanoseconds: -15 chips have an access time of 150 nanoseconds (150ns), while -20 chips are slower at 200 ns.

This board is compatible with memory chips of 200 ns or faster, such as 150 or 120 ns. Do not combine chips with different access times.

A second type of DRAM chip now exists. These are 41256-15 and 41256-20 chips. They look the same as 4164 DRAMS, but provide four times the memory on each chip. Each 256K chip stores 256,000 bits of information. Eight chips per bank add 256K bytes of memory to the system. Again, a ninth chip is required in each bank for parity checking.

# HAVING PROBLEMS?

1. When check disk (CHKDSK) is run from DOS in Drive A and your screen displays a memory code different from the total memory installed:

   a. Check switch settings on the System board (see System Installation Table, Pages 6 and 7).

   b. Check switch settings on Expansion Memory board (see Step 2 of "Installing the Memory Board," Page 3).

   c. Check that: (1) all new chips have been installed correctly with all pins making contact; (2) each bank used has nine chips; (3) each of the three banks contains one of the following choices of chips:

   | Bank 1 | Bank 2 | Bank 3 |
   |--------|--------|--------|
   | None | None | None |
   | or | or | or |
   | First Set 64K | First Set 64K | First Set 64K |
   | or | or | or |
   | First Set 256K | First Set 256K | First Set 256K |