FEATURES:

- Up to 32K bytes of TMS 2716 EPROM.
- Up to 16K bytes of TMS 2114 Static RAM.
- 1 microsecond cycle time (3 MHz).
- Bus compatible with T-BUS TM990/10X CPU boards.
- TM990/201-44 compatible with TM990/1481.
- 16 memory maps for both EPROM and RAM.
- Selectable Wait State generator.
- 0–70°C temperature range.
- Factory burnt-in.

DESCRIPTION:

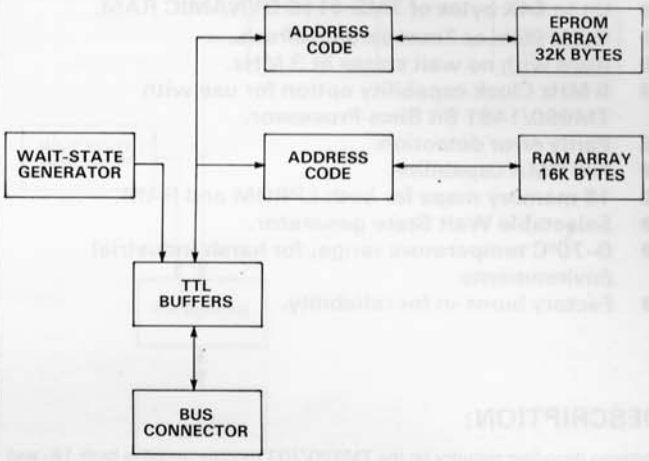
The TM990/201 memory expansion board is a member of Texas Instruments line of OEM computer products which takes advantage of Texas Instruments broad based semiconductor technology to provide economical, computer based solutions for OEM applications. The memory expansion board is contained on a $7\frac{1}{2} \times 11$ inch printed circuit board which is fully compatible with the TM990 board format.

The TM990/201 features up to 16K bytes of static RAM and up to 32K bytes of EPROM. The static RAM array is composed of Texas Instruments TMS 4014/2114 1K × 4 static memory devices. The EPROM array comprises Texas Instruments TMS 2716, 2K × 8 EPROM devices. The static RAM array is arranged into four banks of memory, each 2K × 16. The EPROM array is likewise arranged into eight banks, each 2K × 16. Both memory arrays are socketed for convenient memory expansion. (The TM990/201-42 and TM990/201-43 are fully socketed).

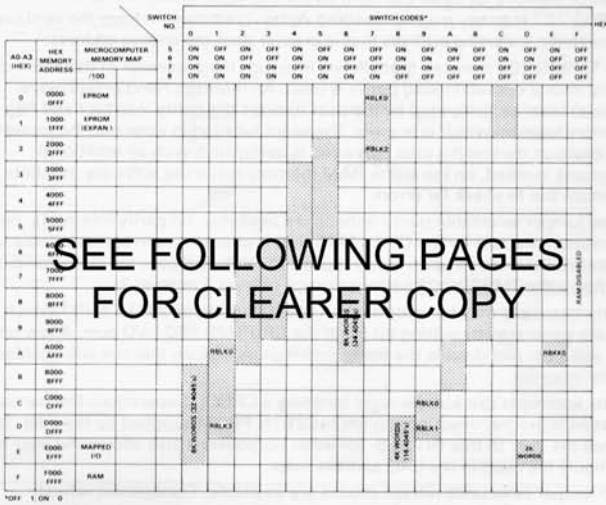
The TM990/201 memory controller logic provides the timing and memory mapping functions necessary to interface the TM990/201 to 16-bit TM990/10X series microcomputers. The memory map is switch selectable for both the RAM and EPROM arrays. Sixteen convenient memory map configurations are possible for each array, and the maps are configured on 4K byte address boundaries. The map logic also is designed to accommodate customized memory maps.

The TM990/201-4X family of memory expansion boards is populated with TMS 4014/2114-45 static RAM's and TMS 2176 EPROM's. Both devices offer 450 nsec access time; consequently, each memory cycle to the TM990/201 is extended one clock cycle by the insertion of a wait state. If faster static RAM's are utilized in the RAM array, the WAIT state in RAM memory cycles can be conveniently removed using only a jumper.

BLOCK DIAGRAM:

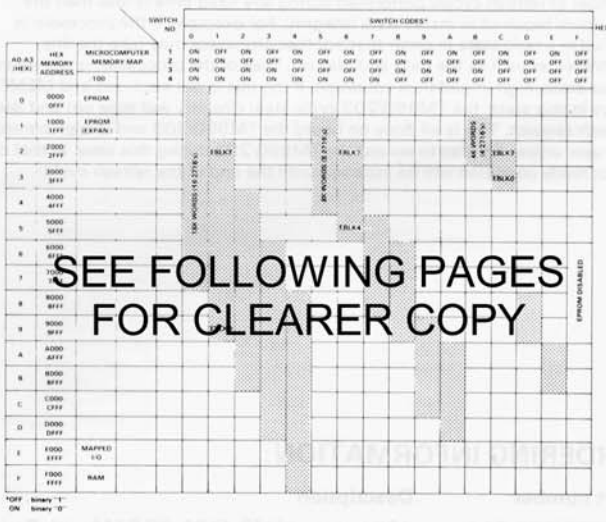


RAM DECODE CONFIGURATIONS:



N.B. THE TM990/201-44 HAS DIFFERENT MEMORY CODE CONFIGURATIONS

EPROM DECODE CONFIGURATIONS:



N.B. THE TM990/201-44 HAS DIFFERENT MEMORY CODE CONFIGURATIONS

ORDERING INFORMATION:

Part number	EPROM	RAM	Typical Power Requirements +5V	+12V	−12V
TM990/201-41	8K (16K)	4K (8K)	1.0 A	160 mA	50 mA
TM990/201-42	16K (32K)	8K (16K)	1.4 A	225 mA	125 mA
TM990/201-43	32K (32K)	16K (32K)	2.2 A	475 mA	225 mA
TM990/201-44	0 (32K)	16K @ 5 MHz	2.2 A	475 mA	225 mA

Numbers in brackets refer to area socketed. All memory sizes are in bytes.

RAM MEMORY MAP

A0-A3 (HEX)	HEX MEMORY ADDRESS	MICROCOMPUTER MEMORY MAP /100 AND /101		SWITCH NO. 5 6 7 8	SWITCH CODES* 0 ON ON ON ON	1 OFF ON ON ON	2 ON OFF ON ON	3 OFF OFF ON ON	4 ON ON OFF ON	5 OFF ON OFF ON	6 ON OFF OFF ON	7 OFF OFF OFF ON	8 ON ON ON OFF	9 OFF ON ON OFF	A ON OFF ON OFF	B OFF OFF ON OFF	C ON ON OFF OFF	D OFF ON OFF OFF	E ON OFF OFF OFF	F OFF OFF OFF OFF
0	0000-0FFF	EPROM										RBLK0								RAM DISABLED
1	1000-1FFF	EPROM (EXP)																		
2	2000-2FFF											RBLK2								
3	3000-3FFF																			
4	4000-4FFF																			
5	5000-5FFF																			
6	6000-6FFF																			
7	7000-7FFF																			
8	8000-8FFF										6K WORDS (24 × 2114s)									
9	9000-9FFF																			
A	A000-AFFF					RBLK0													RBLK0	
B	B000-BFFF				8K WORDS (32 × 2114s)															
C	C000-CFFF													RBLK0						
D	D000-DFFF					RBLK3							4K WORDS (16 × 2114s)	RBLK1						
E	E000-EFFF	MAPPED I/O																2K WORDS		
F	F000-FFFF	RAM																		

* OFF = 1. ON = 0.

⇑ RAM block numbers marked on PCB.

EPROM MEMORY MAP

A0-A3 (HEX)	HEX MEMORY ADDRESS	MICROCOMPUTER MEMORY MAP /100 AND /101		SWITCH NO.	SWITCH CODES* 0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
				1	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	OFF
				2	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON	OFF	OFF
				3	ON	ON	ON	ON	OFF	OFF	OFF	OFF	ON	ON	ON	ON	OFF	OFF	OFF	OFF
				4	ON	ON	ON	ON	ON	ON	ON	ON	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
0	0000-0FFF	EPROM			16K WORDS (16 × 2716s)															EPROM DISABLED
1	1000-1FFF	EPROM (EXP)								8K WORDS (8 × 2716s)						4K WORDS (4 × 2716s)				
2	2000-2FFF					EBLK7					EBLK7						EBLK7			
3	3000-3FFF																EBLK6			
4	4000-4FFF																			
5	5000-5FFF										EBLK4									
6	6000-6FFF																			
7	7000-7FFF																			
8	8000-8FFF																			
9	9000-9FFF					EBLK0														
A	A000-AFFF																			
B	B000-BFFF																			
C	C000-CFFF																			
D	D000-DFFF																			
E	E000-EFFF	MAPPED I/O																		
F	F000-FFFF	RAM																		

* OFF = 1. ON = 0.

⇑ EPROM block numbers marked on PCB.