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TLA700 Series  
TMS09JM Hitachi 6301/6303  
MICROPROCESSOR SUPPORT INSTRUCTIONS

This Manual Supports  
TMS09JM Software Version 1.000

TLA700 Application Software  
Version 1.0.0 and above.

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## Section 1: Microprocessor Support Overview

### SUPPORT DESCRIPTION

The TMS09JM Microprocessor Support provides the user with timing analysis and state analysis capability for systems based on Hitachi's X Series and Y Series of the 6301 and 6303 microprocessors. The R Series and V Series of these microprocessors are not supported due to the lack of an instruction fetch indicator (LIR-). The following table lists the microprocessors in the 6301/3 family which are supported by the TMS09JM application software.

Table 1. 6301/3 X/Y Series devices supported.

Device	Operating Mode			Device	Operating Mode		
	Mode 1	Mode 2	Mode 3		Mode 1	Mode 2	Mode 3
6301X0P	Yes	Limited	No	6303XP	Yes	N/A	N/A
63A01X0P	Yes	Limited	No	63A03XP	Yes	N/A	N/A
63B01X0P	Yes	Limited	No	63B03XP	Yes	N/A	N/A
6301X0F	Yes	Limited	No	6303XF	Yes	N/A	N/A
63A01X0F	Yes	Limited	No	63A03XF	Yes	N/A	N/A
63B01X0F	Yes	Limited	No	63B03XF	Yes	N/A	N/A
6301X0CP	Yes	Limited	No	6303XCP	Yes	N/A	N/A
63A01X0CP	Yes	Limited	No	63A03XCP	Yes	N/A	N/A
63B01X0CP	Yes	Limited	No	63B03XCP	Yes	N/A	N/A
6301Y0P	Yes	Limited	No	6303Y0P	Yes	N/A	N/A
63A01Y0P	Yes	Limited	No	63A03Y0P	Yes	N/A	N/A
63B01Y0P	Yes	Limited	No	63B03Y0P	Yes	N/A	N/A
63C01Y0P	Yes	Limited	No	63C03Y0P	Yes	N/A	N/A
6301Y0F	Yes	Limited	No	6303Y0F	Yes	N/A	N/A
63A01Y0F	Yes	Limited	No	63A03Y0F	Yes	N/A	N/A
63B01Y0F	Yes	Limited	No	63B03Y0F	Yes	N/A	N/A
63C01Y0F	Yes	Limited	No	63C03Y0F	Yes	N/A	N/A
6301Y0CP	Yes	Limited	No	6303Y0CP	Yes	N/A	N/A
63A01Y0CP	Yes	Limited	No	63A03Y0CP	Yes	N/A	N/A
63B01Y0CP	Yes	Limited	No	63B03Y0CP	Yes	N/A	N/A
63C01Y0CP	Yes	Limited	No	63C03Y0CP	Yes	N/A	N/A
6301Y0H	Yes	Limited	No	6303Y0H	Yes	N/A	N/A
63A01Y0H	Yes	Limited	No	63A03Y0H	Yes	N/A	N/A
63B01Y0H	Yes	Limited	No	63B03Y0H	Yes	N/A	N/A
63C01Y0H	Yes	Limited	No	63C03Y0H	Yes	N/A	N/A
63701X0C	Yes	Limited	No	63701Y0C	Yes	Limited	No
637A01X0C	Yes	Limited	No	637A01Y0C	Yes	Limited	No
637B01X0C	Yes	Limited	No	637B01Y0C	Yes	Limited	No

Mode 1 operation is defined by external memory access being enabled with internal ROM being disabled. Mode 2 operation has external memory access enabled with internal ROM also enabled. Mode 3 has all external memory accesses disabled. For Mode 1 operation the TMS09JM microprocessor support software offers full functionality. For Mode 2 operation the functionality is limited. The TLA700 will be unable to see instruction fetches from internal ROM and will therefore only provide a limited view of processor activity. No support is offered for Mode 3.

The TMS09JM support runs on TLA700 mainframes equipped with logic analyzer modules that are 68 channels or wider. At the time this manual was printed the supported TLA700 logic analysis modules include the TLA7L2 and TLA7M2 68 channel modules, TLA7L3 and TLA7M3 102 channel modules, and the TLA7L4 and TLA7M4 136 channel modules. Contact your local Tektronix sales office to verify whether newer logic analysis modules not listed above are supported by the TMS09JM application software.

## Section 2: Configuring the TLA700

### INSTALLING THE 6301/3 SUPPORT

Place the TMS09JM installation disk in the TLA700 mainframe floppy disk drive. Click on the Windows 95 Start icon and select the Windows Explorer program. Click on the 3 1/2 Floppy icon to see the contents of the application software installation disk. Now double click on the Setup.exe file to start the installation process.

The installation program will automatically uncompress the application software and place it into the appropriate folders in the TLA700 file system. Microprocessor support software for the TLA700 series will be loaded into the C:/Program Files/TLA700/Support/6301\_3 folder.

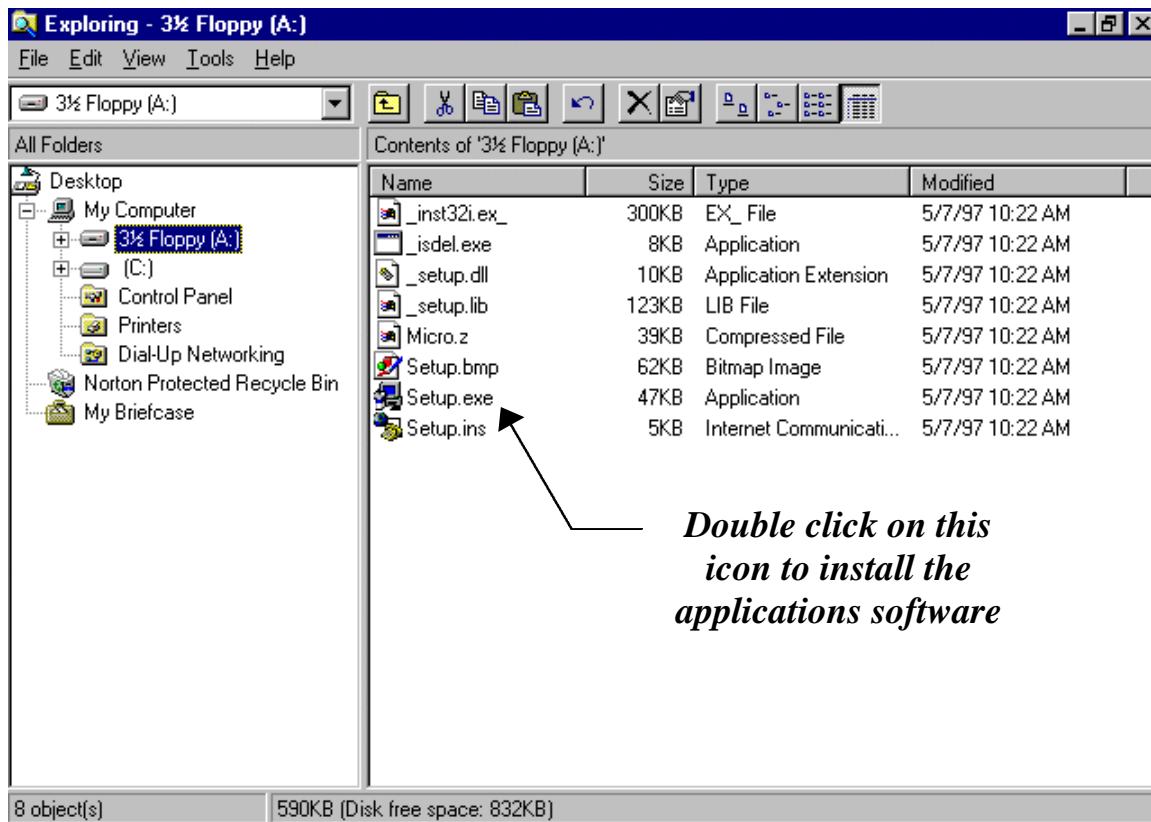


Figure 1. Windows Explorer program showing contents of application installation disk.

## LOADING THE 6301/3 SUPPORT

To Load the TMS09JM support package you must first select the logic analysis module which will be connected to the 6301/3 based system under test. In the TLA700 System menu select the logic analysis module you will be using by clicking on the title bar (labeled LA 1 below). This field will be renamed to the name of the supported microprocessor, in this case 6301\_3, after successfully loading the support software.

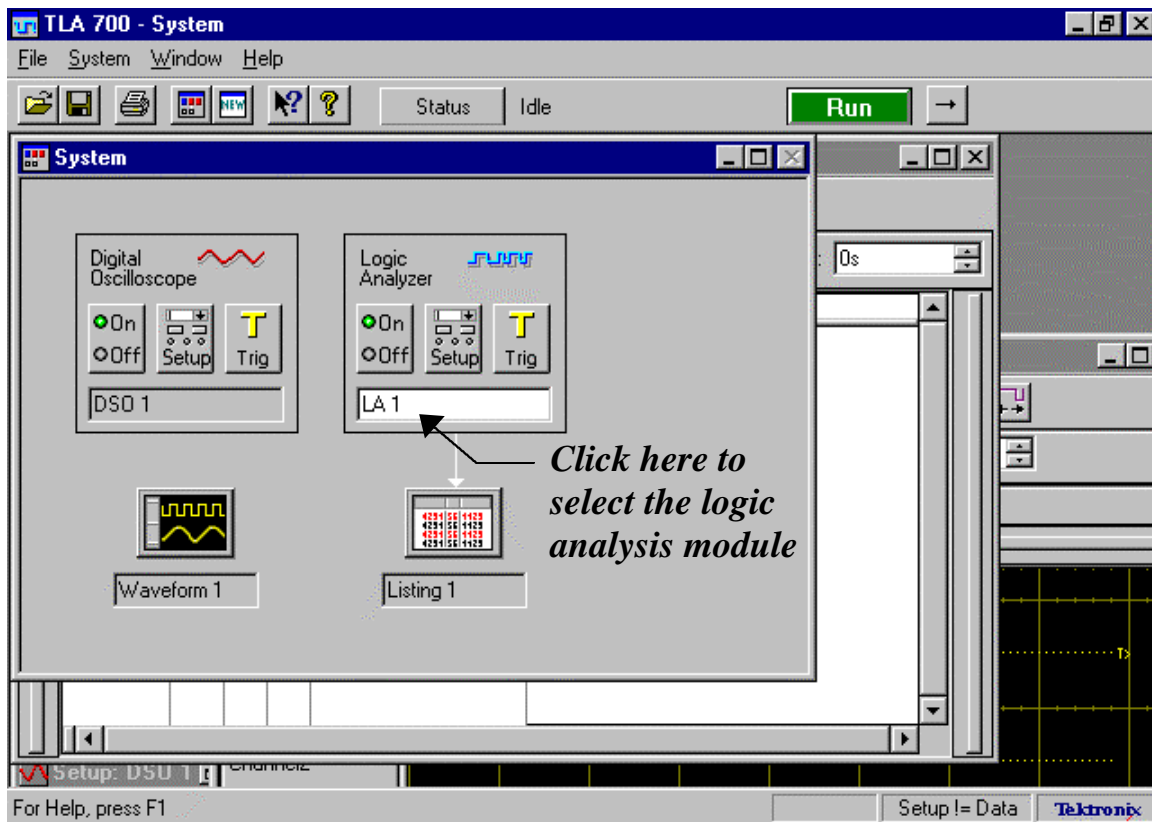


Figure 2. Selecting the logic analysis module for loading TMS09JM support software.

Now click on File in the toolbar and select the Load Support Package option. The menu shown in Figure 3 will pop up on screen allowing you to pick the support package you wish to load into the logic analysis module. Note that the list of support packages shown will depend on which microprocessor support applications you have previously loaded onto the TLA700 mainframe harddisk drive.

Click on the name of the microprocessor or bus that you will be using and then click on the Load button. A dialog box with the following text will appear on screen: "Loading a support package invalidates a module's acquired data. Do you wish to save the current module's settings and data before loading the support package?" If you choose Yes a Save As file dialog box will appear allowing you to save your

current module setup or setup and data. Selecting No will cause the TLA700 to overwrite your current setup and data with the support package setup.

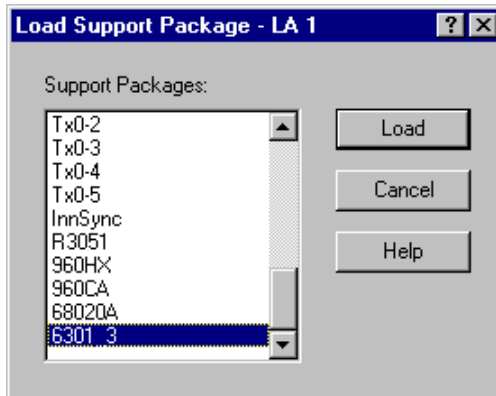


Figure 3. Load Support Package dialog box.

Clicking on the Setup button for the logic analysis module will take you to the Setup menu shown in Figure 4. Note that all of the input channels to be connected to the microprocessor or bus have already been grouped and named.

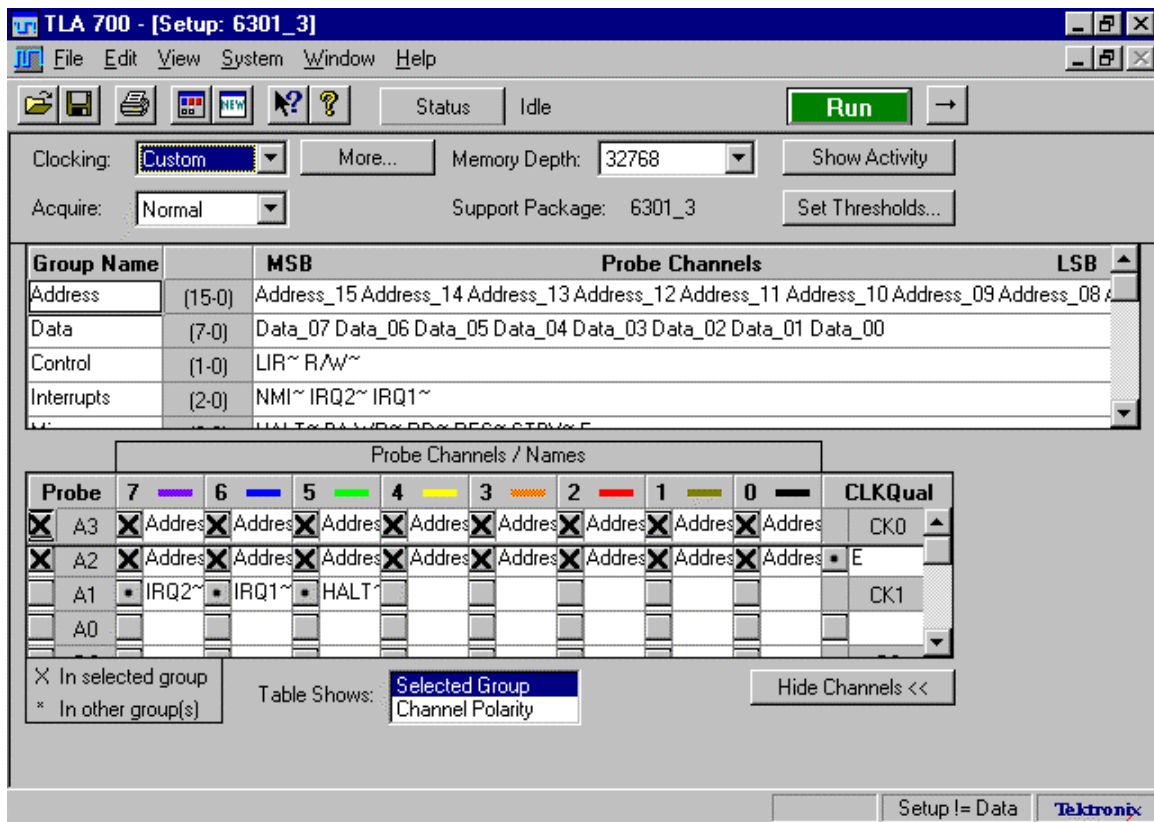


Figure 4. Logic analysis module Setup menu after support has been loaded.

## CLOCKING OPTIONS FOR 6301/3 SUPPORT

Depending on the complexity of the microprocessor or bus supported by the support software there may be one or more options you can select that affect how the logic analysis module collects data. For the TMS09JM package there are no clocking options.

## CONNECTING TO THE 6301/3 SYSTEM

The 6301/3 family of microprocessors are available in a variety of packages. To physically connect the TLA700 logic analysis module probes to the system under test (SUT) the appropriate probe adapter must be used. The TMS09JM uP support does not provide a probe adapter.

General purpose probe adapters for socketed & surface mounted IC's are available from a number of commercial vendors. The probe connections for the TLA700 logic analysis modules are listed in Table 2-1.

## CHANNEL GROUPS AND ASSIGNMENTS

Table 2-1 : 6301/3 Channel Assignments for the TLA700.

TLA700 Channel Group	TLA700 Channel	6301/3 Signal	TLA700 Channel Group	TLA700 Channel	6301/3 Signal
Address	A3:7	Address 15 <sup>1</sup>	Data	D1:7	Data 07 <sup>1</sup>
	A3:6	Address 14 <sup>1</sup>		D1:6	Data 06 <sup>1</sup>
	A3:5	Address 13 <sup>1</sup>		D1:5	Data 05 <sup>1</sup>
	A3:4	Address 12 <sup>1</sup>		D1:4	Data 04 <sup>1</sup>
	A3:3	Address 11 <sup>1</sup>		D1:3	Data 03 <sup>1</sup>
	A3:2	Address 10 <sup>1</sup>		D1:2	Data 02 <sup>1</sup>
	A3:1	Address 09 <sup>1</sup>		D1:1	Data 01 <sup>1</sup>
	A3:0	Address 08 <sup>1</sup>		D1:0	Data 00 <sup>1</sup>
	A2:7	Address 07 <sup>1</sup>	Interrupts	D0:1	NMI <sup>~2</sup>
	A2:6	Address 06 <sup>1</sup>		A1:7	IRQ2 <sup>~2</sup>
	A2:5	Address 05 <sup>1</sup>		A1:6	IRQ1 <sup>~2</sup>
	A2:4	Address 04 <sup>1</sup>	MISC	D0:5	BA <sup>~2</sup>
	A2:3	Address 03 <sup>1</sup>		D0:4	WR <sup>~2</sup>
	A2:2	Address 02 <sup>1</sup>		D0:3	RD <sup>~2</sup>
	A2:1	Address 01 <sup>1</sup>		D0:2	RES <sup>~2</sup>
	A2:0	Address 00 <sup>1</sup>		D0:0	STBY <sup>~2</sup>
Control	D0:7	LIR <sup>~1</sup>		A1:5	HALT <sup>~2</sup>
	D0:6	R/W <sup>~1</sup>	Clock 0	E <sup>1</sup>	

NOTES: 1) Signals required for disassembly.  
2) Optional signals, not required for disassembly.



GENERAL NOTES:

The ground connections for the Address, Data, and Control sections, can be made with 2-to-1 (Tektronix part # 012-1377-00) and 4-to-1 (Tektronix part # 012-1378-00) lead set adapters, when using the any of the probe adapters.

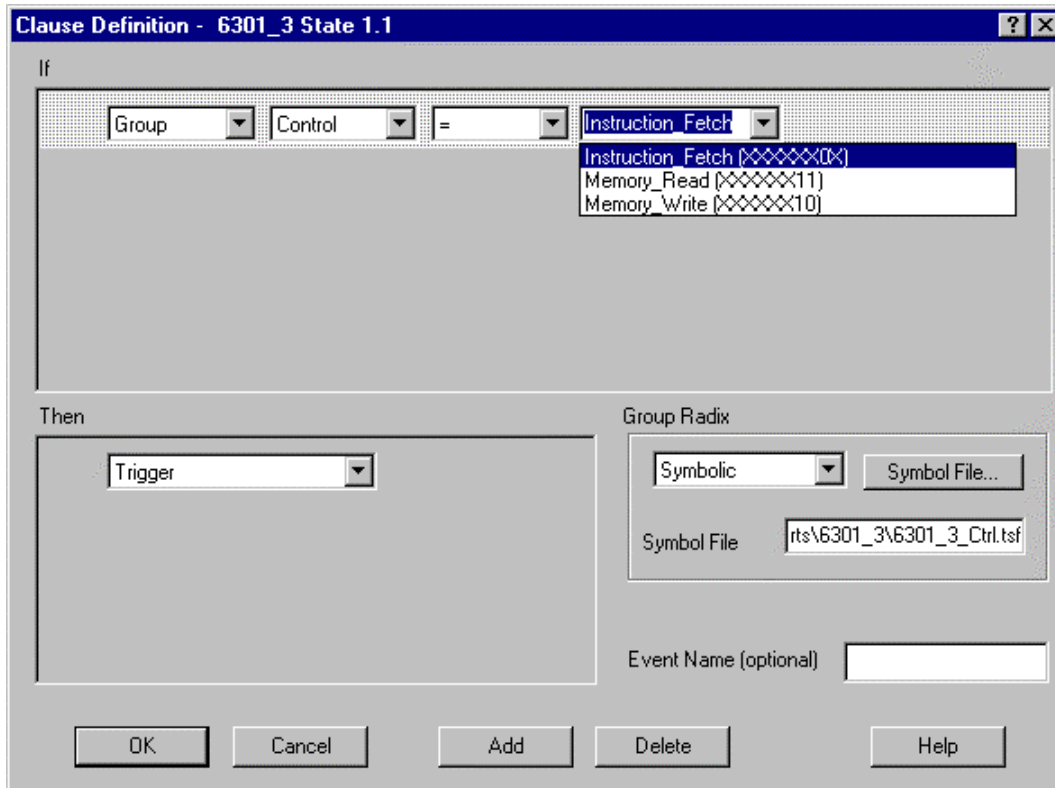
SYMBOL TABLES

A symbol table for the Control group is included with this uP support package. The Control symbol table contains patterns that identify the type of valid bus transaction cycles for the symbolic disassembly. This symbol table is automatically selected for use in defining Control group patterns in the logic analyzer module's trigger menu as shown in Figure 6. Table 2.2 shows the predefined Control group symbols.

Table 2-2 : Control Group Symbol Table 6301\_3\_Ctrl for the TLA700.

Symbol Name	Signals		Description
	L	R	
	I	/	
	R	W	
	~	~	
Instruction Fetch	0	X	Instruction fetch
Memory_Read	1	1	Memory read bus cycle
Memory_Write	1	0	Memory write bus cycle

Figure 6. Using symbolic triggering.



## Section 3: Disassembly & Timing Analysis

### DISPLAYING DISASSEMBLED DATA

Once the TMS09JM support package has been loaded the Listing display for the logic analysis module will automatically display disassembled data. Figure 7 shows an example of disassembled data for a 68010A microprocessor.

Sample	68010A Address	68010A Data	68010A Mnemonics	Timestamp
0	000000	00C3	( RESET: INITIAL SSP )	0 ps
1	000002	FFFO	( RESET: INITIAL SSP )	500.000 ns
2	000004	0000	( RESET: INITIAL PC )	500.000 ns
3	000006	1500	( RESET: INITIAL PC )	500.000 ns
4	001500	6100	BSR 00150A	500.000 ns
5	001502	0008	( EXTENSION )	749.500 ns
6	00150A	4E56	LINK A6,#FFFC	750.500 ns
7	00150C	FFFC	( EXTENSION )	499.500 ns
8	C3FFEC	0000	( WRITE )	<500,500 us
9	C3FFEE	1504	( WRITE )	<500,000 us
10	00150E	7010	MOVEQ #10,DO	500.000 ns
11	C3FFE8	00C3	( WRITE )	<500,000 us
12	C3FFEA	FFD8	( WRITE )	<500,000 us
13	001510	13C0	MOVE.B DO,200005	500.000 ns
14	001512	0020	( EXTENSION )	500.000 ns

Figure 7. Disassembled data display for the 68010A microprocessor.

Depending on the complexity of the microprocessor or bus supported there can be several display options which allow customization of the data display. These option selections can be found under the Disassembly tab of the Listing display properties menu. To go to this menu place the mouse pointer anywhere in the Listing data and click the right mouse button. Select the Properties choice from the pop-up list.

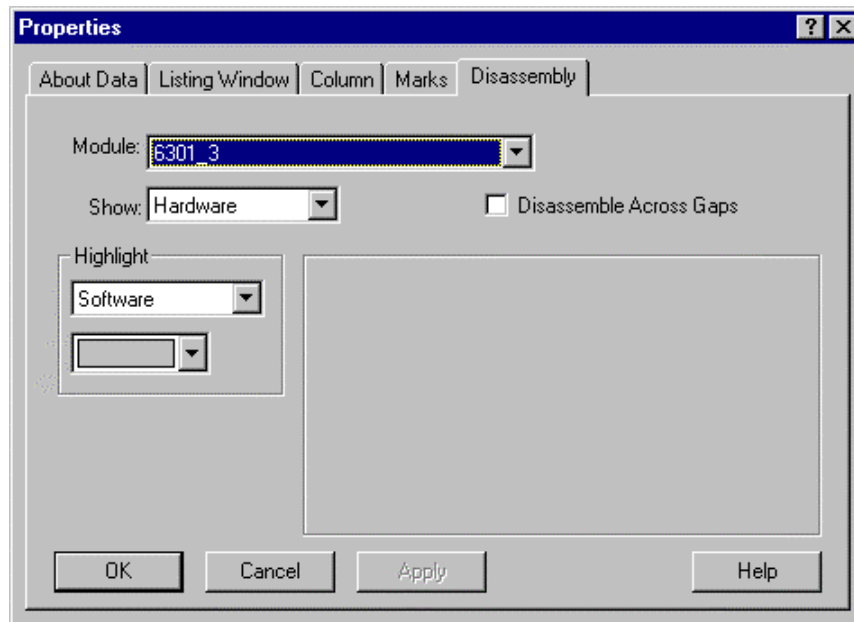


Figure 8. Disassembly tab of Listing display Properties menu.

Figure 8 shows the Disassembly page (tab) of Listing display properties menu. The **Show** field has four choices: Hardware, Software, Control Flow, and Subroutine. The selection in this field will alter the manner in which the Listing display shows data. Briefly, the four selections filter data as follows:

- Hardware: This format selection shows all acquired processor or bus cycle types and instruction mnemonics in the order they occurred.
- Software: This format selection suppresses all opcode extensions and flushed cycles and displays a menu that looks similar to an assembly language program listing.
- Control Flow: Only instructions that change the control flow of the microprocessor will be displayed. Instructions such as branches, calls, returns, etc.
- Subroutine: Displays only subroutine calls, exceptions, and returns.

The **Highlight** field allows you to selectably highlight instructions that match the above definitions for Software, Control Flow, and Subroutine. This allows you to easily see these instructions while still viewing all of the acquired data. Figure 7 shows a disassembly display with Highlight set to Software.

## DISPLAYING TIMING DATA

A timing or waveform view of the data can be seen in the Waveform display. In addition to displaying the data collected in the main logic analyzer memory the Waveform display allows you to add the high resolution 2GHz data collected by the MagniVu memory to the timing diagram display.