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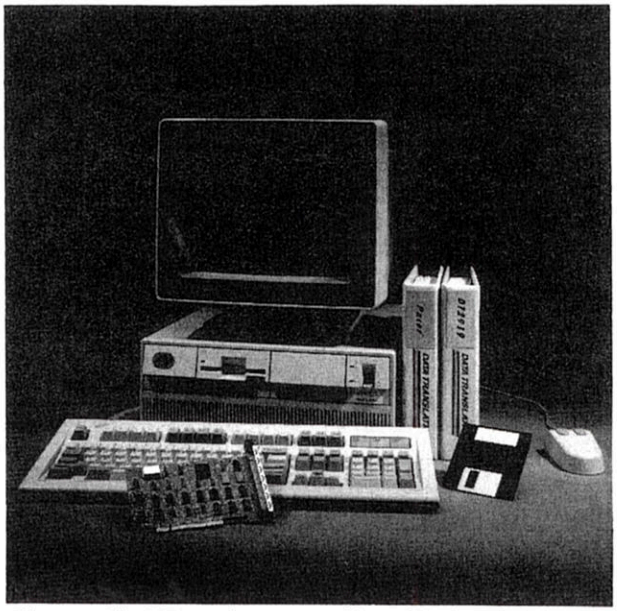
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Find the *Measurement Computing / Data Translation DT2919* at our website: *Click HERE*

FEATURES

- **Counter/timer board and software for IBM® PS/2™ MCA (Micro Channel™ Architecture) models**
- **Counter/timer features:**
  - **AMD Am9513A System Timing Controller provides five 16-bit counter/timers and extremely flexible operation**
  - **High speed counting rate to 7 MHz**
  - **Up/down and binary/BCD counting; programmable input and output polarities**
  - **Built-in frequency source, consisting of selectable 1 MHz or 5 MHz oscillator and a programmable scaler (1, 10, 16, 100, 256, 1,000, 4,096, 10,000, or 65,536)**
  - **Counter/timers can be cascaded for up to 80-bit capacity**
  - **One-shot or continuous outputs**
  - **Programmable count/gate source selection for each counter/timer**
  - **Time-of-day clock option**
  - **Retriggering capability**
  - **Alarm comparators**
  - **Complex duty cycle outputs**
- **Frequency output clock controls offboard events, such as multiple A/D and D/A conversions on data acquisition boards; usable range .95Hz to 5 MHz**
- **Flexible interrupt circuit permits any counter/timer output or user-supplied signal to request system interrupt with POS-selected interrupt level**
- **16 lines of digital I/O, configurable in 8-line ports for input or output; digital inputs on port 0 can be hardware latched**
- **Shipped complete with PACER™ subroutine library software that controls all board functions from user-written programs in Microsoft® C, Pascal, FORTRAN, or QuickBASIC™**



PS/2

Figure 1. The DT2919 is a counter/timer board and software for use with IBM PS/2 MCA models. M-5194

TABLE 2. DT2919 APPLICATIONS

Event count accumulation
Programmed frequency synthesis
Coincidence alarms
Frequency Shift Keying (FSK)
Complex pulse generation
High resolution programmable duty cycle waveforms
Retriggerable digital timing functions
Waveform analysis
Trigger multiple A/D or D/A conversions on data acquisition boards

TABLE 1. DT2919 FEATURES

DIGITAL FUNCTIONS			
Counter/Timers	**Frequency Output Clock**	**Digital I/O Lines**	**INTERRUPTS**
Five 16-bit counter/timers; cascadable to 80 bits	.95Hz to 5 MHz; selectable 1µs or 200ns intervals	16	1; user-selectable input; POS-selectable to level 7, 5, 4, 12, 11, 10, or 9

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GENERAL DESCRIPTION

The DT2919 is a counter/timer board, and compatible subroutine library software package, for use on IBM PS/2 MCA models. The counter/timer board contains five 16-bit counter/timers and 16 lines of digital I/O for a wide variety of applications. Onboard interrupt control circuitry permits any TTL-level signal—whether from the board's own counter/timer or an external circuit—to request an interrupt to the host processor.

The DT2919 is shipped complete with PACER™, a subroutine library software package that permits board operations to be controlled from user-written programs. This greatly simplifies the programming of the board's Am9513A-based counter/timers, providing a flexible and powerful environment for programmers to develop custom applications.

Am9513A

The DT2919 board's counter/timer functions are designed around the popular Am9513A chip from AMD. The Am9513A is an extremely flexible timing control circuit that contains five 16-bit counter/timers, a programmable frequency source, a programmable frequency output, and control circuitry. This integrated circuit provides enormous flexibility permitting hundreds of programmable configurations that count events; generate square waves with simple or complex duty cycles; support external timing sources, triggers, and gates; and provide time-of-day clock and alarm functions. By cascading counter/timers, up to 80-bit (>10^{24}) capacity can be achieved.

Counter/Timers

The input to each counter is user-selectable from the built-in frequency source (selectable from oscillator base frequency of 1 MHz or 5 MHz to 1/65,536 of oscillator base frequency), the output of another counter/timer, any of five external gate inputs, or any of five external source inputs. You can optimize the built-in frequency source for lower frequency values and ease in using the time-of-day clocks by selected the 1 MHz oscillator. Alternatively, the 5 MHz oscillator permits selection of higher frequencies, with far more values to choose from in the 10kHz to 1 MHz range—values are only 200ns apart.

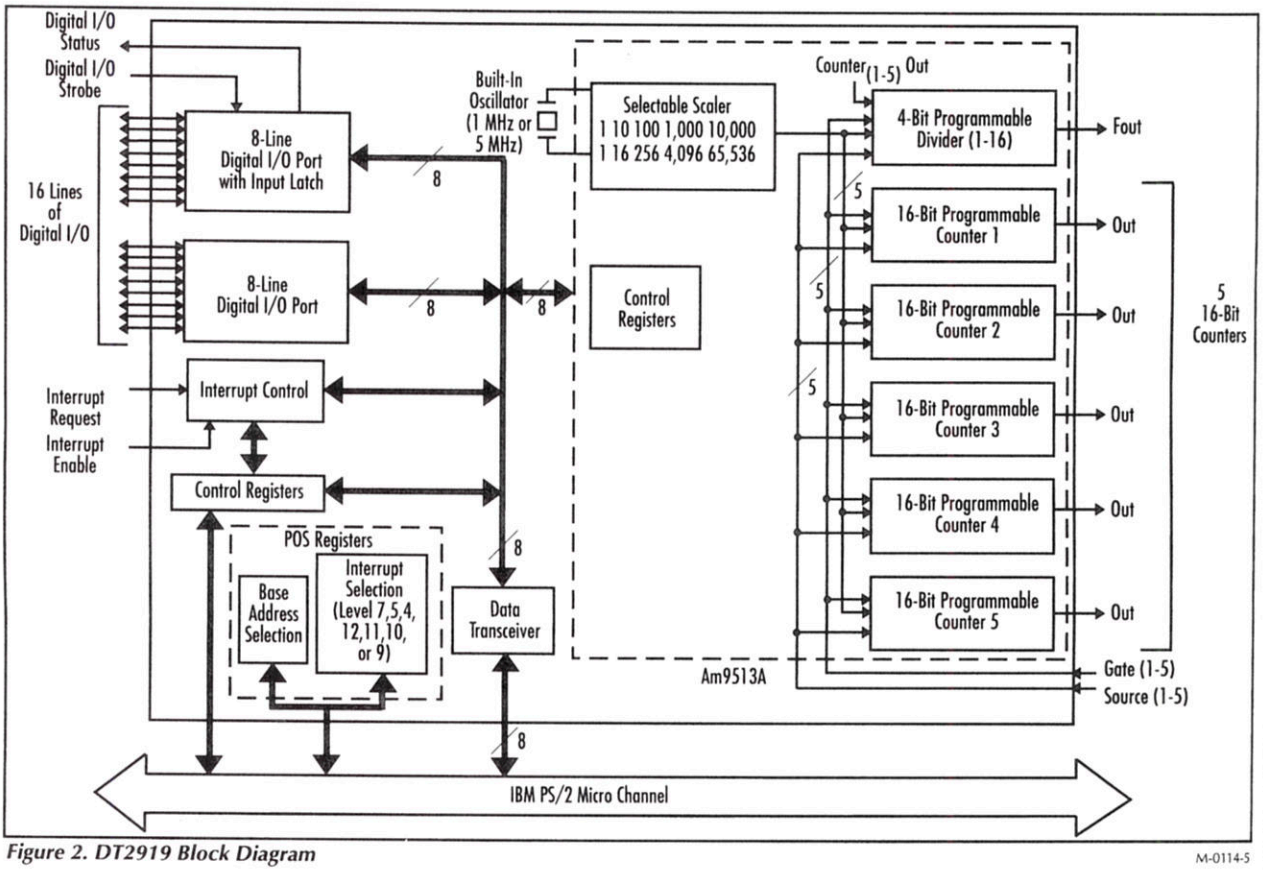


Figure 2. DT2919 Block Diagram

M-0114-5

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Hardware gating is available for several operations, and can be level or edge-triggered, with selectable polarity. Several operating modes are available, and can be selected separately for each counter/timer (these are listed in a following section).

In addition to these features, two counters also contain alarm circuits and time-of-day clock circuits. The alarm circuits consist of registers and comparators that indicate when the actual count matches a stored value. The 24-hour time-of-day clock operates from the built-in frequency source for convenient, accurate operation.

Frequency Output Clock

The Am9513A also contains a sixth circuit that provides a frequency output which can be used as a clock to time offboard events, such as clocked A/D or D/A conversions on a data acquisition board. This circuit consists of a frequency source and a four-bit divider (divides the input by values from 1 to 16). The frequency source is user-selectable from the built-in frequency source (see above), any of five external gate inputs, or any of five external source inputs. Using the built-in frequency source, the frequency output clock has a usable range from .95Hz to 5 MHz (200ns to 1.05s).

DIGITAL I/O

The DT2919 contains 16 digital I/O lines organized as two 8-line ports; each port can be software programmed for digital input or digital output operations. Digital inputs can monitor alarms or sensors that have TTL outputs; digital outputs can drive TTL inputs on control and measurement equipment.

One digital I/O port features latched inputs, and a hardware status line that indicates when data values have been latched into the port. Latched input lines let you control exactly when data values are read, and are useful where digital inputs may change rapidly or must be synchronized with some outside event.

When latched inputs are software-enabled, digital values present on the port's eight input lines are latched (held constant) on the high-to-low transition of an external strobe input. A status line indicates when unread data values are latched on the board. A software read of the contents of this port resets the hardware status line. Both the strobe input and the strobe status line can be accessed from the board's user connector.

INTERRUPTS

The board also contains control circuitry for one user-selected interrupt. This interrupt can be POS-selected for level 7, 5, 4, 12, 11, 10, or 9. The interrupt request input, and a separate interrupt enable line, are brought out to the board's user connector. The interrupt request input can be hardwired to the output of any counter/timer, or to any external source you may select that provides a TTL-level signal. This highly flexible design lets you issue an interrupt to the host processor from a source outside the board or even outside the computer.

Am9513A COUNTER/TIMER OPERATING MODES

Software-Triggered Strobe with No Hardware Gating
Software-Triggered Strobe with Level Gating
Hardware-Triggered Strobe
Rate Generator with No Hardware Gating
Rate Generator with Level Gating
Non-Retriggerable One-Shot
Software-Triggered Delayed Pulse One-Shot
Software-Triggered Delayed Pulse One-Shot with Hardware Gating
Hardware-Triggered Delayed Pulse Strobe
Variable Duty Cycle Rate Generator with No Hardware Gating
Variable Duty Cycle Rate Generator with Level Gating
Hardware-Triggered Delayed Pulse One-Shot
Software-Triggered Strobe with Level Gating and Hardware Retriggering
Software-Triggered Strobe with Edge Gating and Hardware Retriggering
Rate Generator with Synchronization (Event Counter with Auto-Read/Reset)
Retriggerable One-Shot
Reload Source
Frequency Shift Keying
Hardware Save

PS/2

ACCESSORIES

SCREW TERMINAL PANEL

The DT2919 is compatible with the DT758-C screw terminal panel, an accessory product that lets you attach input and output leads conveniently, without soldering. The DT758-C accommodates all DT2919 user connections, and is provided with a cable assembly and a bracket for wall or panel mounting.

Screw terminal panels plug directly into the DT2919's I/O connector, accessible from the rear of the computer chassis.

TABLE 3. COMPATIBLE SCREW TERMINAL PANEL

Model	Screw Terminal Panel	Panel Function
DT2919	DT758-C	General purpose; handles all user connections

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SPECIFICATIONS

Typical at +25°C and rated voltage, unless otherwise specified

COUNTER/TIMERS (Am9513A)

Number	Five 16-bit counter/timers
Maximum Input Frequency	7 MHz
Input Source	Software-selectable from the built-in frequency source, the output of the N–1 counter/timer, any of 5 source inputs, or any of 5 gate inputs

BUILT-IN FREQUENCY SOURCE (Am9513A AND ONBOARD OSCILLATORS)

Function	Provides programmable clock frequency source to counter/timers and frequency output circuitry
Usable Range	15Hz to 5 MHz (200ns to 65.5ms)
Base Frequency	Software-selectable for 1 MHz (1µs interval) or 5 MHz (200ns interval) oscillator
Scaler Values	Base frequency can be divided by 1, 10, 100, 1,000, 10,000 (BCD); or 1, 16, 256, 4,096, or 65,536 (binary)
Oscillator Accuracy	.01%

FREQUENCY OUTPUT CLOCK (Am9513A Fout)

Number	1
Usable Output Range	.95Hz to 5 MHz (200ns to 1.05s)
Frequency Source	Software-selectable as built-in frequency source, the output of any counter/timer, any gate input, or any source input
Programmable Divider	4-bit divider divides frequency source by values from 1 to 16

DIGITAL I/O (See Table 4)

Number of DIO lines	16, configurable in groups of 8 for input or output
Logic Family	ALSTTL
Input Logic Load	1 ALSTTL load
Fanout	Drives 14 LSTTL loads
Logic Sense	High true
Input Type	Level sensitive

DIGITAL I/O STROBE INPUT (see Table 4)

Function	Latches data values into port 0
Input Type	Edge-sensitive; active on high-to-low transition; pullup to +5V

TABLE 4. DC SPECIFICATIONS OF DIGITAL LINES*

Parameter	Digital I/O Lines	DIO Strobe, Int. Req. In	Interrupt Enable In	Digital I/O Status Out
Logic High Input Voltage	2.0V min	2.0V min	2.0V min	—
Logic Low Input Voltage	0.8V max	0.8V max	0.8V max	—
Logic High Input Current	20µA max	20µA max	20µA max	—
Logic Low Input Current	–0.2mA max	–0.4mA max	–0.4mA max	—
Logic High Output Voltage	2.4V min	—	—	2.5V min
Logic Low Output Voltage	0.5V max	—	—	0.5V max
Logic High Output Current	–2.6mA max	—	—	–0.4mA max
Logic Low Output Current	24mA max	—	—	8mA max

*Input and output connections to the counter/timer circuits, including gate and source inputs and counter and Fout outputs, pass directly to the Am9513A chip. See the Am9513A data sheet for complete electrical and timing information.

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SPECIFICATIONS (Continued)

Logic Family	LSTTL
Logic Load	Presents 1 LSTTL load
Minimum Pulse Width	High, 50ns Low, 50ns

DIGITAL I/O STATUS OUTPUT
(see Table 4)

Function	Indicates when unread latched data is present
Logic Sense	Low true
Logic Family	LSTTL
Fanout	Drives 5 LSTTL loads

INTERRUPT ENABLE INPUT
(see Table 4)

Function	Enables or disables the board's interrupt request circuitry
Logic Sense	High true
Input Type	Level-sensitive, pullup to +5V
Logic Family	LSTTL
Logic Load	Presents 1 LSTTL load
Minimum Pulse Width	High, 50ns Low, 50ns

INTERRUPT REQUEST INPUT
(See Table 4)

PS/2

Function	Initiates an interrupt request to the host bus
Polarity	Active on high-to-low transition
Input Type	Schmitt trigger, edge sensitive; clocks on falling edge; pullup to +5V
Logic Family	LSTTL
Logic Load	Presents 1 LSTTL load
Minimum Pulse Width	Clock high, 50ns; clock low, 50ns

INTERFACE CHARACTERISTICS

Compatible Bus	IBM Micro Channel or compatible
Interface Type	I/O mapped with 10-bit addressing;
Bus Loading	Board presents 1 LSTTL load
Number of Locations Occupied	8 bytes reserved
Data Path	8 bits
Base Address Range	POS-selectable from 0FD8 hex to FFD8 hex in increments of 8
Interrupts	POS-selectable to level 7, 5, 4, 12, 11, 10, or 9
Interrupt Sources	Any TTL-level signal, including the output of any counter/timer
Mating Connectors	All user connections are made to a single 50-pin connector (J1); mating connector is 50-pin 3M type, user-supplied (Ansley 609-5030 or equivalent)

POWER REQUIREMENTS

+5V	±5% @.5A typical

PHYSICAL/ENVIRONMENTAL

Dimensions	3.5" H x 6.0" W x .75" D (8.9 x 15.2 x 1.9 cm)
Weight	3 ounces (85g)
Operating Temperature Range	0 to +50°C (+32 to +122°F)
Storage Temperature Range	–25 to +85°C (–13 to +185°F)
Relative Humidity	To 95% non-condensing

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PACER™ SOFTWARE

The DT2919 is shipped complete with PACER™ subroutine library that controls all board operations from user-written programs written in Microsoft C, Pascal, FORTRAN, or QuickBASIC. PACER™ greatly simplifies the complex task of operating the Am2935A chip by providing high-level routines that control clock outputs, event counting, and the time-of-day clock functions. In addition, full support is also provided for digital I/O operations and interrupts. For maximum control, direct access is provided through PACER™ to the Am9513A's internal registers.

PACER™ SUBROUTINES

BOARD SERVICE ROUTINES
Initialize the counter/timer board.
Stop all operations on board and return it to a known state.
Set the board operation timeout period.
Halt Am9513A counters.

CLOCK GENERATION ROUTINES
Produce a gated square wave.
Produce a retriggerable strobe pulse after a delay.
Wait a specified delay, then toggle the counter output.
Produce a variable duty cycle square wave.
Set the frequency output to a desired frequency.

EVENT COUNTING ROUTINES
Prepare counter for counting external events.
Return the number of events counted.
Set the Am9513A alarm to a specified event.
Determine the frequency of a source.
Measures the time interval between pulses.

TIME-OF-DAY ROUTINES
Set the time-of-day clock using DOS parameters.
Set the time-of-day clock using user parameters.
Read the time-of-day clock.
Set the time-of-day alarm.

DIGITAL I/O ROUTINES
Enable a digital port for output.
Enable a digital port for input.
Get a value from a digital port.
Write a value to a digital port.

LOW-LEVEL PACER™ ROUTINES
Write a 16-bit value to any Am9513A internal register.
Read a 16-bit value from any Am9513A internal register.
Write a command to the Am9513A.

INTERRUPT HANDLING ROUTINES
Enable the board interrupt.
Clear an interrupt that has occurred.
Disable interrupts.

PACER™ SYSTEM REQUIREMENTS

To run PACER™, you'll need:

- IBM PS/2 MCA model
- DT2919 Counter/Timer board
- MS-DOS® version 3.3 or later
- One of the following languages: Microsoft C, Pascal, FORTRAN, or QuickBASIC

ORDERING GUIDE

COUNTER/TIMER BOARD

DT2919

With your order, you'll receive:

- DT2919 IBM PS/2 and Micro Channel-compatible counter/timer board with five 16-bit counter timers and 16 lines of digital I/O
- PACER™ Subroutine library software on 3.5" double-sided, double density diskette
- Software license
- DT2919 user manual
- 90-day warranty

SCREW TERMINAL PANEL

DT758-C

The DT758-C general-purpose screw terminal panel accommodates all DT2919 user connections on convenient screw clamp terminal blocks. The panel is supplied complete with a 3.3' (1 meter) cable that plugs directly into the DT2919, and with a bracket for wall or panel mounting.

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