



Bulletin 2707 DTAM Programming Software with AS511 Protocol (Catalog Number 2707-NP3)

Release Contents

This document supports Release 1.0 of the DTAM Programming Software (Catalog Number 2707-NP3) with AS511 protocol capability. It includes information on:

- cabling requirements
- supported Operand Types
- data formats
- screen types and definitions
- controller-specific configuration requirements
- communication port setup
- troubleshooting
- communication error codes specific to the communications protocol
- special menu selections

DTAM Module-to-Controller Communications Cable Requirements

For communications, a SIMATIC® S5 programmable controller contains one or more programming ports. The programming ports are female 15-pin D-sub connectors configured as a serial digital 20 mA current loop interface. To communicate with the DTAM module, a special cable is required to convert the 20 mA current loop serial data to the RS-232 levels that can be interpreted by the DTAM module. The recommended converter cable is Siemens part number: **6ES5 734-1BD20**

Note: The programming port of the SIMATIC S5 controller may also be used for point-to-point communications, as supported by the AS511 protocol.

Important: The DTAM module communications parameters (baud rate, data bits, and parity) must match that of the AS511 processor, but unless you have changed these parameters in the AS511 processor, you should not have to reset anything: the default DTAM module settings match those of the AS511 processor.

Supported Operand Types

The DTAM module supports the following operand types in an AS511 processor:

Operand	Definition	Address Range	Allowed Data Formats
I (IW, IB)	Inputs	128 bytes (0-127)	KH, KM, KF, KS, KB
Q (QW, QB)	Outputs	128 bytes (0-127)	KH, KM, KF, KS, KB
F (FW, FB)	Flags	256 bytes (0-255)	KH, KM, KF, KS, KB
T	Timers	128 words (0-127)	KT, KM
C	Counters	128 words (0-127)	KC, KM
DW	Data words	256 words (0-255)	KH, KM, KF, KS, KB

Most AS511 operands listed above can be addressed as bits, words, or bytes. Timers and Counters are addressed as bits or words only. Input Word 0, for example, would contain Input Bytes 0 and 1.

- To address a word, the IW, QW, FW, T, C, and DW ID codes are used.
- To address a byte, the IB, QB, FY, DL (Data Word Left), and DR (Data Word Right) codes are used.

Note: The AS511 operands listed above are a subset of the operands defined by the AS511 protocol. Other operands defined by the protocol are not used by the low-end SIMATIC S5 controllers that this protocol implementation is designed to support.

Data Formats

The data selected for a particular controller location must reflect the same format as the data actually stored in that location. This is the only way you can ensure that correct, consistent information is displayed on the DTAM products.

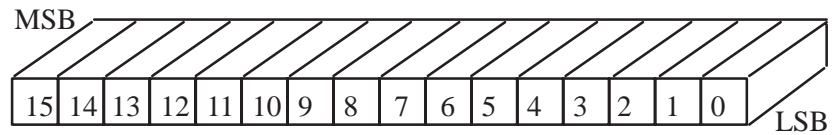
For example, selecting the Hex (KH) format for a location will display data in one way. Selecting the Byte (KB) format for the same location will display the data in another way. It is important to understand each data format and its characteristics.

The following table illustrates all supported Siemens data formats for the AS511 processor and the ranges applicable to each:

Data Format	Definition	Range
KM	Bits	0000 0000 0000 0000 to 1111 1111 1111 1111
KH	Hex	Binary 0000 to FFFF BCD 0000 to 9999
KF	Fixed Point	-32768 to 32767
KS	ASCII Data	1 ASCII Character per byte
KB	Unsigned Byte	0 to 255
KC	Counter Load Value	000 to 999 BCD
KT	Timer Load Value	abc.d abc=count 0 to 999 BCD, d=timebase 0 to 3 (0=0.01 sec/count, 1=0.1 sec/count, 2=1.0 sec/count, 3=10 sec/count)

See the manual for your controller for more detail on the AS511 data formats. The available data formats are described below.

Bit Format (KM)



16 Individual Bits
(One 16 Bit address)

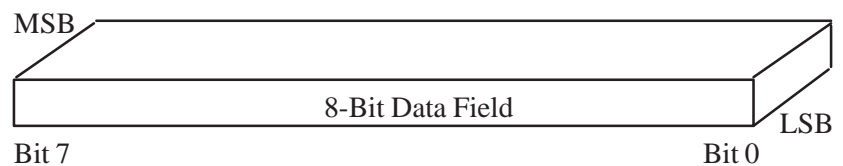
The controller stores a binary (0 or 1) status for each bit location. The DTAM module will read a controller bit location and determine whether the operational status of the bit is ON (1) or OFF (0).

You can specify associated text to be displayed for either state of a specified bit. This description can be up to twenty characters.

For example, the OFF(0) state of a bit might display “Pump is OFF”, and the ON(1) state “Pump is ON”. DTAM-SPS allocates enough screen characters for the longer of the two text strings. In this example, 11 characters would be allocated to display “Pump is OFF”.

Note: The fewer the characters used, the less memory is required. In the example above, displaying “OFF” (given the appropriate context) conveys the same information in 3 characters as “Pump is OFF” does with 11 characters.

8-Bit Unsigned Integer (Byte, KB)

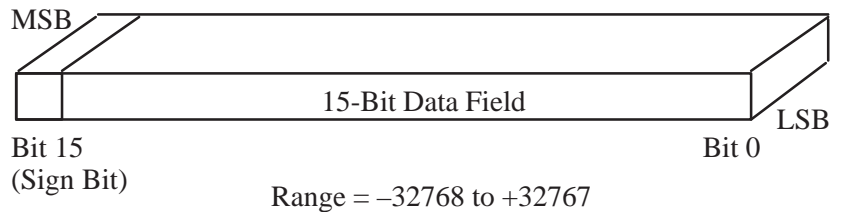


Range = 0 to +255

This data format displays a 8-bit register as a Unsigned Integer value. It represents a positive number by using the eighth bit as a data bit rather than as a sign bit. The 8-bit Unsigned Integer values have a range of 0 to +255.

Note: This data format may also be scaled to different engineering units.

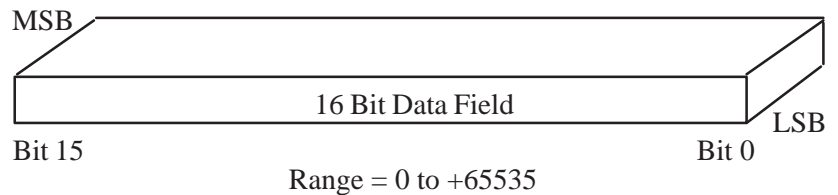
16 Bit Signed Integer (Fixed Point, KF)



This data format displays a 16 bit register as a signed Integer (two's complement) value. The sixteenth bit (Bit 15) of the register is the sign bit and is set (1) for a negative and cleared (0) for a positive number. The 16-bit signed integer values have a range of -32768 to +32767.

Note: This data format may also be scaled to different engineering units.

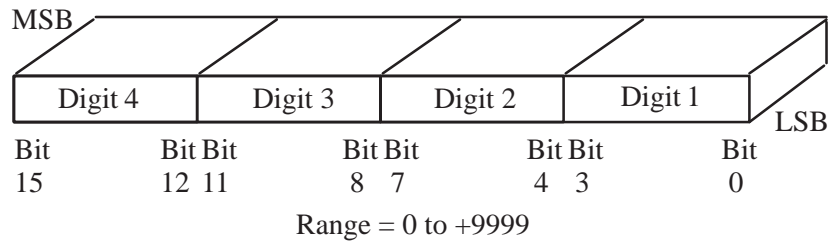
16-Bit Unsigned Integer (No Equivalent Siemens Format)



This data format displays a 16-bit register as an Unsigned Integer value. It represents a positive number by using the sixteenth bit as a data bit rather than as a sign bit. The 16-bit Unsigned Integer values have a range of 0 to +65,535.

Note: This data format may also be scaled to different engineering units.

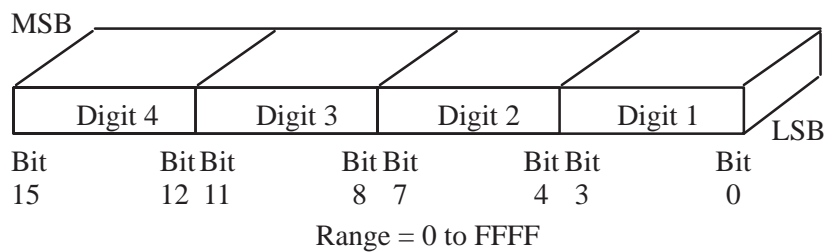
16-Bit Binary Coded Decimal (KH)



This data format displays a 16 bit register location as a 4-digit Binary Coded Decimal value. The range for the 16 bit BCD selection is 0 to +9999.

Note: This data format may also be scaled to different engineering units.

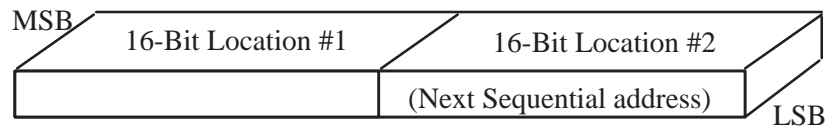
16-Bit Hexadecimal (KH)



This data format displays a 16-bit register location as a 4-digit hexadecimal value. The range for the 16-bit Hex format is 0 to +FFFF. The Hexadecimal number system is defined as a base of 16 (0-9 and the characters A, B, C, D, E, F).

Note: This data format **cannot** be scaled to different engineering units. It is used for display-only (non-entry) operations.

32-Bit Unsigned Integer (No Equivalent Siemens Format)

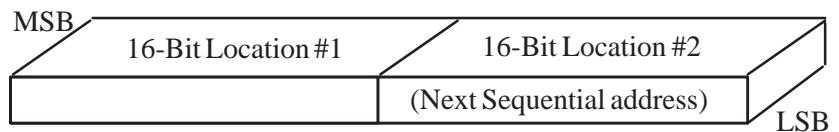


Range = 0 to +4,294,967,295

This data format displays data located in two consecutive 16-bit register locations as a 32-bit Unsigned Integer. It uses a memory register plus the next higher register to form the 32-bit location. The High data value is stored in the first register and the Low data value is stored in the next sequential register location. The range for the 32-bit unsigned integer is 0 to +4,294,967,295.

Note: This format **cannot** be scaled to different engineering units.

32-Bit Binary Coded Decimal (KH)

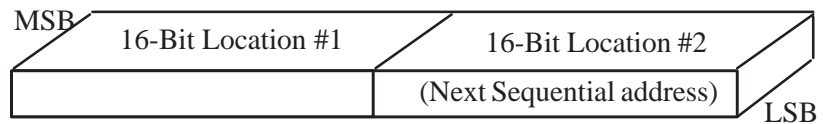


Range = 0 to +99,999,999

This data format displays two consecutive 16-bit register location as a 32-bit BCD value. It uses a memory register plus the next higher register to form the 32-bit location. The range for the 32-bit BCD value is 0 to +99,999,999.

Note: This format **cannot** be scaled to different engineering units.

32-Bit Hexadecimal (KH)

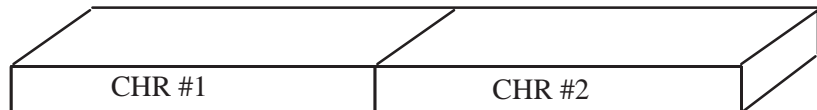


Range = 0 to FFFF FFFF

This data format displays two consecutive 16-bit register locations as a 32-bit Hex value. It uses a memory register plus the next higher register to form the 32-bit location. The range for the 32-bit HEX value is 0 to FFFF FFFF.

Note: This format **cannot** be scaled to different engineering units. Use this data format for display-only (non-entry) operations.

ASCII (KS)

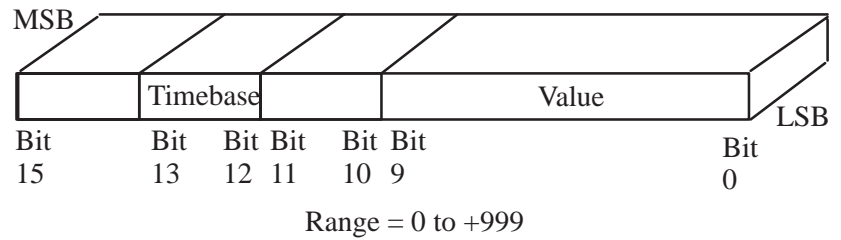


Each 16-bit location may contain two ASCII characters (1 byte each). By default, the highest byte of the base address stores the first character, the lowest byte stores the second character, the first byte of the next sequential location stores the third character, and so on. The data held in this range of address locations is expected to be an ASCII data format.

Note: The ASCII data format is very useful for controller applications reading ASCII data from bar code readers or data collection terminals.

Note: Both the DTAM Micro and DTAM Plus are capable of handling AS511 Print Logic when configured in terminal mode.

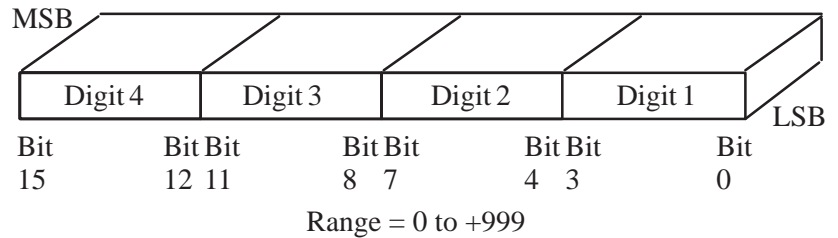
Timer (KT)



This data format displays the first 10 bits of a 16 bit register location as a 3-digit unsigned integer. The range for the Timer selection is 000.0 to +999.*d*, where *d* is the timebase (0 = 0.01 sec/count, 1 = 0.1 sec/count, 2 = 1.0 sec/count, and 3 = 10 sec/count). Timebase *d* is found in bits 12 and 13.

Note: This data format **cannot** be scaled to different engineering units.

Counter (KC)



This data format displays a 16 bit register location as a 3-digit unsigned integer. The range for the Counter selection is 0 to +999.

Note: This data format **cannot** be scaled to different engineering units.

Screen Types and Data Formats

Each DTAM Screen type may not support all data formats. The following lists each screen type and the associated data formats supported.

Data Formats Supported	Display, Alarm, Printer Form Screens	Data Entry Screens	Bar Graph Screens	Background Monitor	Recipe Screens
Bit (KM)	Yes	Yes	No	Yes	No
8-Bit Unsigned Integer (KB)	Yes	Yes	No	No	No
16 Bit Signed Integer (KF)	Yes	Yes	Yes	Yes	Yes
16 Bit Unsigned Integer	Yes	Yes	No	No	Yes
16 Bit BCD (KH)	Yes	Yes	Yes	Yes	Yes
16 Bit Hex (KH)	Yes	No	No	No	No
32 Bit Unsigned Integer	Yes	Yes	No	No	Yes
32 Bit BCD (KH)	Yes	Yes	No	No	Yes
32 Bit Hex (KH)	Yes	No	No	No	No
ASCII (KS)	Yes	Yes	No	No	No
Timer (KT)	Yes	No	No	No	No
Counter (KC)	Yes	No	No	No	No

Time Synchronization

The Real Time Clock of the DTAM Plus may either be written to the controller or synchronized with the controller by using the Write Time or Read Time selections. These selections can be found by selecting Time Synchronization from the DPS Configuration Data menu.

The Real Time Clock data will be written to the controller in a batch of eight byte registers. A base register is defined as the first of eight bytes to hold the clock data. These eight byte registers contain data as follows:

Register	Contents
Base	Unused
Base + 1	Day of Week, 1-7 (Sunday=1)
Base + 2	Day of Month (1-31)
Base + 3	Month (1-12)
Base + 4	Year, tens and units (for example, 1996=96)
Base + 5	Hour, 0-23
Base + 6	Minutes, 0-59
Base + 7	Seconds, 0-59

The clock data will be synchronized on a 60 to 69 second interval. These eight locations should not be the actual clock location of the controller, as the DTAM Plus is not setting the controller clock itself, but simply providing a clock source to the controller at a certain location.

Communications Port Setup

To define the Communications Port Parameters, select DTAM Configuration Data from the Edit File-Option Selection menu. At the DTAM Configuration Data menu, select the controller Hardware Parameters item. The baud rate, data bits and parity information must be entered to match the respective settings of the AS511 processor.

The Communications Port parameters have the same default values as the AS511 processor:

Parameters	Default Value
Baud Rate	9600
Data Bits	8
Parity	Even

Troubleshooting

Most problems involve communications between the DTAM module and the controller. The communication driver software used with the controller has been tested and has passed critical compliance procedures. It is unlikely therefore that the problem lies with the software.

The most common causes of problems are incorrect cabling configurations and/or the communication parameter values (baud rate, data bits, and parity). These parameters must be identical for both the DTAM module and the controller.

If the communications cabling and communications parameters are all correct, perform the Self-Test Mode to rule out any malfunction of the DTAM module.

Note: Refer to the DTAM Micro and the DTAM Plus user's manuals for information about the Self-Test Mode.

Controller-Oriented Problems

The following graphics indicate controller-oriented problems displayed on the DTAM module and if necessary, possible actions to take.



Meaning: The DTAM module is attempting to communicate with the controller.

Solution: This is the normal display when initiating communications with the controller. No action necessary.

PLC CPU TYPE
<PLC NOT FOUND>

Meaning: This is displayed after the DTAM module has tried for 4 seconds to establish communications with the controller.

Solution: Check cabling and communications parameters to verify that the controller matches those of the DTAM module. Perform the Self-Test function if the Comm port is suspected.

Comm ERROR
Press ENTER to Reset

Meaning: This is displayed after the DTAM module has tried for 4 seconds to establish communications with the controller.

Solution: Check DTAM module to controller cabling and controller operating conditions.

COMM LOSS, PRESS Y
ERROR CODE: XXX

Meaning: Communication was lost with the controller. 16 attempts at re-establishing communication were unsuccessful.

Solution: Refer to Communication Error Codes, below, and/or controller documentation for more information.

Communications Error Codes

Communication Error Codes appear on the DTAM module display as follows:

COMM LOSS, PRESS Y
ERROR CODE: XXX

where XXX is a controller-specific error code.

The Communication Error codes are necessarily cryptic. They do, however, offer valuable information when other symptoms either have not been discovered or have not been understood.

The most common Communications Error Codes specific to the communication protocols for the AS511 and the DTAM module are described below.

Error Code	Means	Description
12H, 15H, 16H	General Message Structure Error	Occurs when an expected message response from the controller does not occur. For example, an error would occur if the DTAM module expected but did not receive an acknowledge from the controller of data written to the controller.
14H	Illegal Data Block	The DTAM module has requested a data block that is undefined within the controller. The operator should request data from the data block that has been defined by the programming of the controller.
18H	Illegal Data Word	The DTAM module is trying to access a data word of a data block that is beyond the controllers programmed range for the requested data block. The operator should request a data word that is within the range that has been defined by the programming of the controller's data block.

Special Menu Selections

After pressing the Function Key (DTAM Plus) or Mode Key (DTAM Micro), one of the menu item selections is called SPECIAL. This selection provides access to two functions: the Point-Access/Display (P-A/D) function and the controller Start/Stop function.

- The P-A/D function gives you access to all unrestricted AS511 controller operands. With this access, operands may be displayed and modified. This feature of the DTAM module is extremely useful in start-up or debugging sessions of DTAM programs or regular controller operations.



ATTENTION: The Point-Access/Display function is a powerful tool. Its access should be restricted solely to authorized personnel who have a security code. When using this function, it is possible to change controller data that may alter critical process control operations.

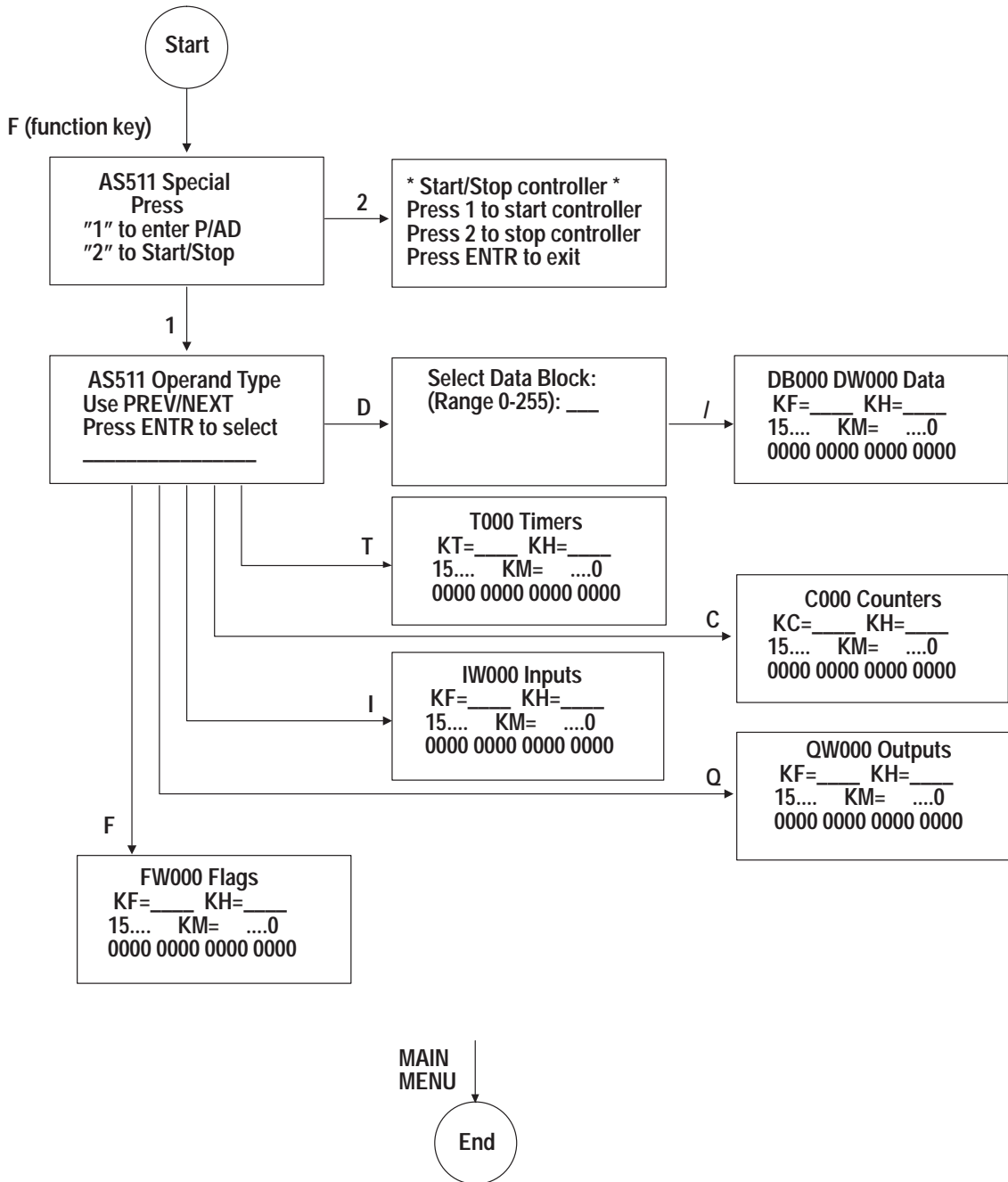
- The Start/Stop function gives you the ability to start or stop the controller from the DTAM module.

The first screen to be displayed in the Special menu is the Special Security Screen, assuming it was created in the program file. Enter one of the three programmed security codes to continue to the AS511 Special Operations menu screen.

Note: If the Special Security Screen is not programmed, the first screen displayed is the AS511 Special Operations menu screen.

Accessing Special Operations for DTAM Plus

This figure shows the Special Operations screens and the keys or selections linking them:



To display or modify controller operands:

1. Press “F” (the function key) on the DTAM module keypad.
2. Select “Special” (item 5) from the menu that appears. If a Special Security Screen appears, enter any one of the programmed security codes.
3. Press “1” to use the P-A/D function.
4. Press “PREV” or “NEXT” until the operand type you want to display or modify appears, and then press “↵” (the enter key).
5. If you selected the Data Block operand type, enter the block you want to display or modify.

For all other operand types, press “Y” or “N” to increment or decrement the address shown, and then press “↵” (the enter key) to display the contents in real time.

Note: The contents of each address appear in several different formats depending on the operand type selected.

6. Press “PREV” or “NEXT” to move the cursor to the field you want to modify, and enter new data, if desired. To edit binary data, position the cursor at the binary field, press “↵” (the enter key), and press “+/-” to toggle between 1 or 0.
7. Press “↵” (the enter key) to load the new data into the controller. The new data that was loaded into the controller is immediately displayed.

Note: At any point, pressing “MAIN MENU” returns you to the main menu.

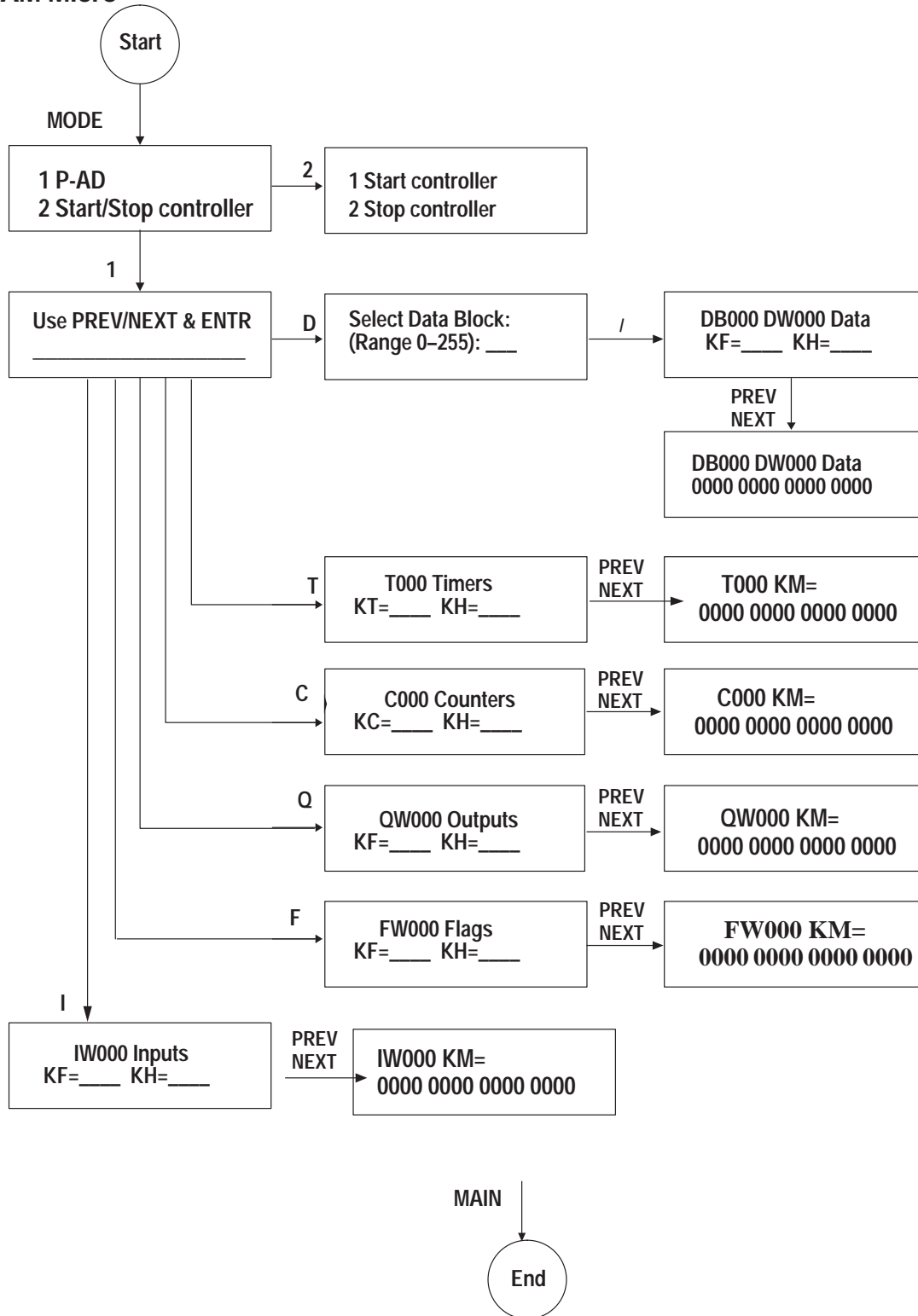
To start/stop the controller:

1. Press “F” (the function key) on the DTAM Plus keypad.
2. Select “Special” (item 5) from the menu that appears. If a Special Security Screen appears, enter any one of the programmed security codes.
3. Press “2” to use the Start/Stop function.
4. Press “1” to start the controller or “2” to stop it. Press “↵” (the enter key) to exit without starting or stopping the controller.

Important: Allow 1–2 seconds for the controller to start or stop.

Accessing Special Operations for DTAM Micro

This figure shows the Special Operations screens and the keys or selections linking them:



Allen-Bradley Replacements

To display or modify controller operands:

1. Press “MODE” on the DTAM Micro keypad.
2. Select “Special” (item 4) from the menu that appears. If a Special Security Screen appears, enter any one of the programmed security codes.
3. Press “1” to use the P-A/D function.
4. Press “PREV” or “NEXT” until the operand type you want to display or modify appears, and then press “↵” (the enter key).
5. If you selected the Data Block operand type, enter the block you want to display or modify.

For all other operand types, press “F1” or “F2” to increment or decrement the address shown, and then press “↵” (the enter key) to display the contents in real time.

Note: The contents of each address appear in several different formats, depending on the operand type selected.

6. Press “PREV” or “NEXT” to move the cursor to the field you want to modify, and enter new data, if desired. To edit binary data, position the cursor at the binary field, press “↵” (the enter key), and press “+/-” to toggle between 1 or 0.
7. Press “↵” (the enter key) to load the new data into the controller. The new data that was loaded into the controller is immediately displayed.

Note: At any point, pressing “MENU” returns you to the main menu.

To start/stop the controller:

1. Press “MODE” on the DTAM Micro keypad.
2. Select “Special” (item 4) from the menu that appears. If a Special Security Screen appears, enter any one of the programmed security codes.
3. Press “2” to use the Start/Stop function.
4. Press “1” to start the controller or “2” to stop it. Press “↵” (the enter key) to exit without starting or stopping the controller.

Important: Allow 1–2 seconds for the controller to start or stop.

Notes

Allen-Bradley Replacements

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Worldwide representation.



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