Special Relays

D

In This Appendix. . . .

Startup and Real-time Special Relays

SP0	First scan	on for the first scan after a power cycle or program to run transition, and is reset to off on the second scan. It is useful when a function needs to be performed only at startup.
SP1	Always ON	provides a contact to insure a instruction is executed every scan.
SP2	Always OFF	provides a contact that is always off.
SP3	1 minute	on for 30 seconds and off for 30 seconds.
SP4	1 second	on for 0.5 second and off for 0.5 second.
SP5	100 millisecond	on for 50 ms. and off for 50 ms.
SP6	50 millisecond	on for 25 ms. and off for 25 ms.
SP7	Alternate scan	on every other scan.

CPU Status Relays

SP11	Forced run mode	on anytime the CPU keyswitch is in the RUN position.
SP12	Terminal run mode	on when the CPU keyswitch is in the TERM position and the CPU is in the run mode.
SP13	Test run mode	on when the CPU is in the test run mode.
SP14	Break relay 1	on when the BREAK instruction is executed. It is off when the CPU is in any other mode.
SP15	Test program mode	on when the CPU is in the test program mode.
SP16	Terminal PGM mode	on when the CPU keyswitch is in the TERM position and the CPU is in program mode.
SP17	Forced stop mode	on anytime the CPU keyswitch is in the STOP position.
SP21	Break relay 2	on when the BREAK instruction is executed. It is off only when the CPU mode is changed to RUN.
SP22	Interrupt enabled	on when hardware interrupts are enabled using the ENI instruction.
SP25	CPU battery disabled	on when the CPU battery is disabled by dipswitch 1 on the rear of the CPU.
SP26	I/O update disable	(DL440/DL450) turned on by the application program, thus freezing the state of the I/O.
SP27	Selective I/O update disable	(DL440/DL450) relay can be turned on by the application program. If turned on the I/O update is frozen at last state, for I/O modules sensing a missing terminal block .
SP30	Dipswitch 1 status	(DL430/DL440) follows the On/Off status of dipswitch 1 on the rear of the CPU.
SP31	Dipswitch 2 status	(DL430/DL440) follows the On/Off status of dipswitch 2 on the rear of the CPU.
SP32	Dipswitch 3 status	(DL430/DL440) follows the On/Off status of dipswitch 3 on the rear of the CPU.
SP33	Dipswitch 4 status	(DL430/DL440) follows the On/Off status of dipswitch 4 on the rear of the CPU.
SP37	Scan control error	(DL450) this relay will be on if the actual scan time is in excess of the scan time set in fixed or limit scan modes. The relay contact may be useful in program error recovery.

System Monitoring Relays

SP40	Critical error	on when a critical error such as I/O communication loss has occurred.
SP41	Warning	on when a non critical error such as a low battery has occurred.
SP43	Battery low (440/450)	on when either the memory cartridge battery or the CPU battery is low. Once detected, check V7757 for the exact error code.
SP44	Program memory error	on when a memory error such as a memory parity error or a failed memory cartridge has occurred.
SP45	I/O error	on when a I/O error such as blown fuse or 24V bad has occurred.
SP46	Communications error	on when a communications error has occurred on any of the CPU ports.
SP47	I/O configuration error	on if a I/O configuration error has occurred. The I/O configuration check must be set on in the CPU before this relay will be functional.
SP50	FAULT instruction	on when a FAULT Instruction is executed.
SP51	Math timeout relay	on if the CPU time out on a math function.
SP52	Grammatical error	on if a grammatical error has occurred either while the CPU is running or if the syntax check is run. Once detected check V7755 for a exact error code.
SP53	Math/Table pointer	on if there is math execution error or a table pointer error.
SP54	Communication error	on when RX, WX, RD, WT instructions are executed with the wrong parameters.
SP56	Table instruction overrun	on if a table instruction with a pointer is executed and the pointer value is outside the table boundary.

Accumulator Status Relays

SP53	Math/Table pointer error	on if there is math execution error or a table pointer error.
SP60	Value less than	on when the value in the accumulator is less than the instruction value.
SP61	Value equal to	on when the value in the accumulator is equal to the instruction value.
SP62	Value greater than	on when the value in the accumulator is greater than the instruction value.
SP63	Zero	on when the result of the instruction causes the value in the accumulator to be zero.
SP64	Half borrow	on when the 16 bit subtraction instruction results in a borrow.
SP65	Borrow	on when the 32 bit subtraction instruction results in a borrow.
SP66	Half carry	on when the 16 bit addition instruction results in a carry.
SP67	Carry	when the 32 bit addition instruction results in a carry.
SP70	Sign (negative)	on anytime the value in the accumulator is negative.
SP71	Pointer reference error	on when the V-memory specified by a pointer (P) is not valid.
SP72	Floating point	(DL450) on when the numerical value in the accumulator is a floating point number.
SP73	Overflow	on when a signed addition or subtraction results in an incorrect sign bit.
SP74	Under flow	(DL450) on when a floating point math operation results in an underflow error.
SP75	Data error	on when a BCD instruction is executed and a NON–BCD number was encountered.
SP76	Load zero	on when the value loaded into the accumulator by any instruction is zero.

Communication Monitoring Relays

The Communications Monitoring Relays are numbered in pairs corresponding to CPU port numbers or slot positions in a base. The two relay types are:

- **Module/port busy** – on when the port or the communication module in the referenced slot and base is busy transmitting or receiving. You must use this relay with RX and WX instructions to prevent attempting to execute a RX or WX while the module is busy.
- **Communication error** – on when a communications error occurs. This error automatically clears when another RX or WX instruction executes.

All DL405 CPUs		DL450 CPU only					
		SP112	CPU port busy Port 1	SP114	CPU port busy Port 2	SP116	CPU port busy Port 3
		SP113	Comm error Port 1	SP115	Comm error Port 2	SP117	Comm error Port 3
Local Base		**Expansion Base #1**		**Expansion Base #2**		**Expansion Base #3**	
SP120	Module busy Slot 0	SP140	Module busy Slot 0	SP160	Module busy Slot 0	SP200	Module busy Slot 0
SP121	Comm error Slot 0	SP141	Comm error Slot 0	SP161	Comm error Slot 0	SP201	Comm error Slot 0
SP122	Module busy Slot 1	SP142	Module busy Slot 1	SP162	Module busy Slot 1	SP202	Module busy Slot 1
SP123	Comm error Slot 1	SP143	Comm error Slot 1	SP163	Comm error Slot 1	SP203	Comm error Slot 1
SP124	Module busy Slot 2	SP144	Module busy Slot 2	SP164	Module busy Slot 2	SP204	Module busy Slot 2
SP125	Comm error Slot 2	SP145	Comm error Slot 2	SP165	Comm error Slot 2	SP205	Comm error Slot 2
SP126	Module busy Slot 3	SP146	Module busy Slot 3	SP166	Module busy Slot 3	SP206	Module busy Slot 3
SP127	Comm error Slot 3	SP147	Comm error Slot 3	SP167	Comm error Slot 3	SP207	Comm error Slot 3
SP130	Module busy Slot 4	SP150	Module busy Slot 4	SP170	Module busy Slot 4	SP210	Module busy Slot 4
SP131	Comm error Slot 4	SP151	Comm error Slot 4	SP171	Comm error Slot 4	SP211	Comm error Slot 4
SP132	Module busy Slot 5	SP152	Module busy Slot 5	SP172	Module busy Slot 5	SP212	Module busy Slot 5
SP133	Comm error Slot 5	SP153	Comm error Slot 5	SP173	Comm error Slot 5	SP213	Comm error Slot 5
SP134	Module busy Slot 6	SP154	Module busy Slot 6	SP174	Module busy Slot 6	SP214	Module busy Slot 6
SP135	Comm error Slot 6	SP155	Comm error Slot 6	SP175	Comm error Slot 6	SP215	Comm error Slot 6
SP136	Module busy Slot 7	SP156	Module busy Slot 7	SP176	Module busy Slot 7	SP216	Module busy Slot 7
SP137	Comm error Slot 7	SP157	Comm error Slot 7	SP177	Comm error Slot 7	SP217	Comm error Slot 7