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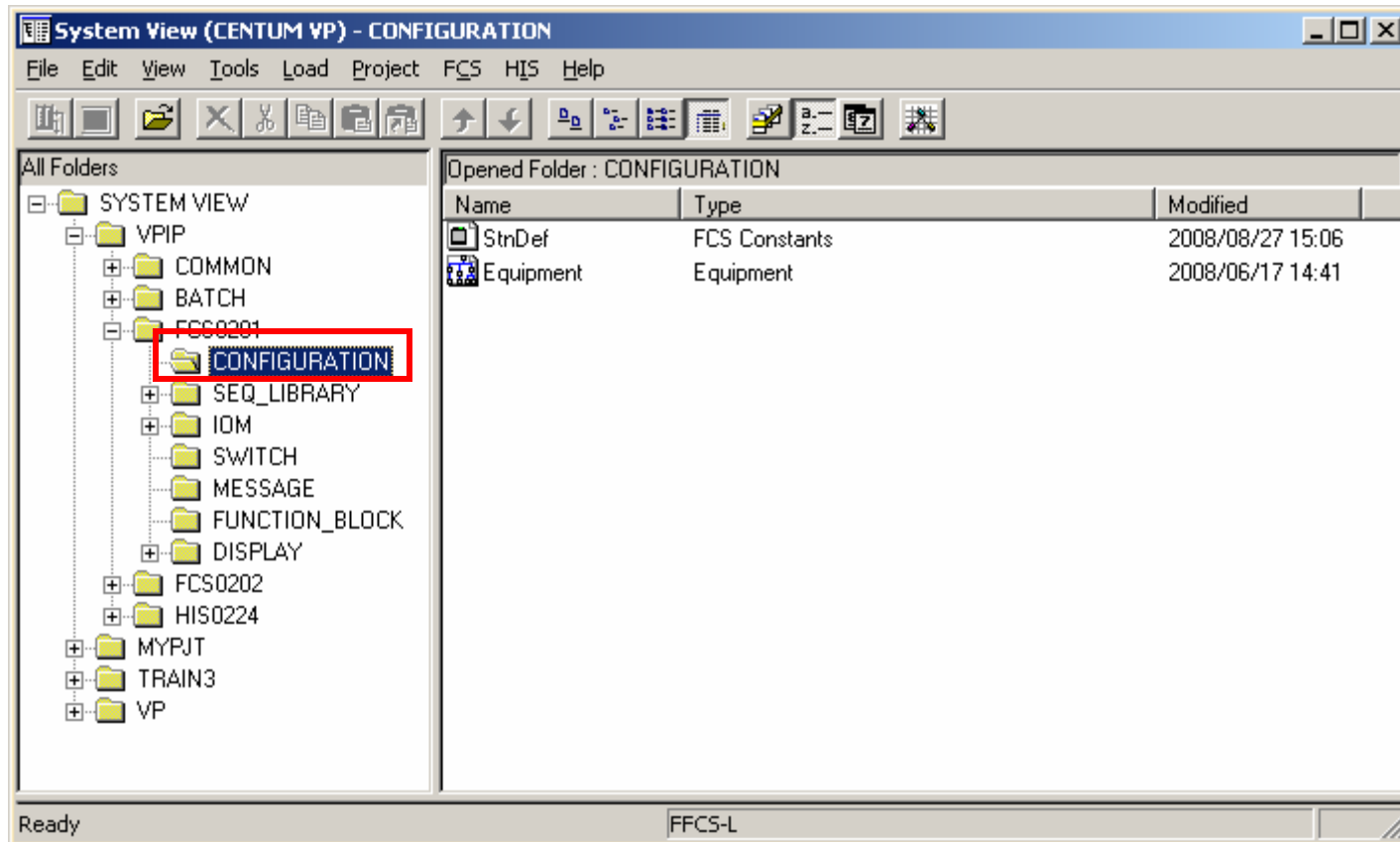


**CENTUM<sup>®</sup>VP**

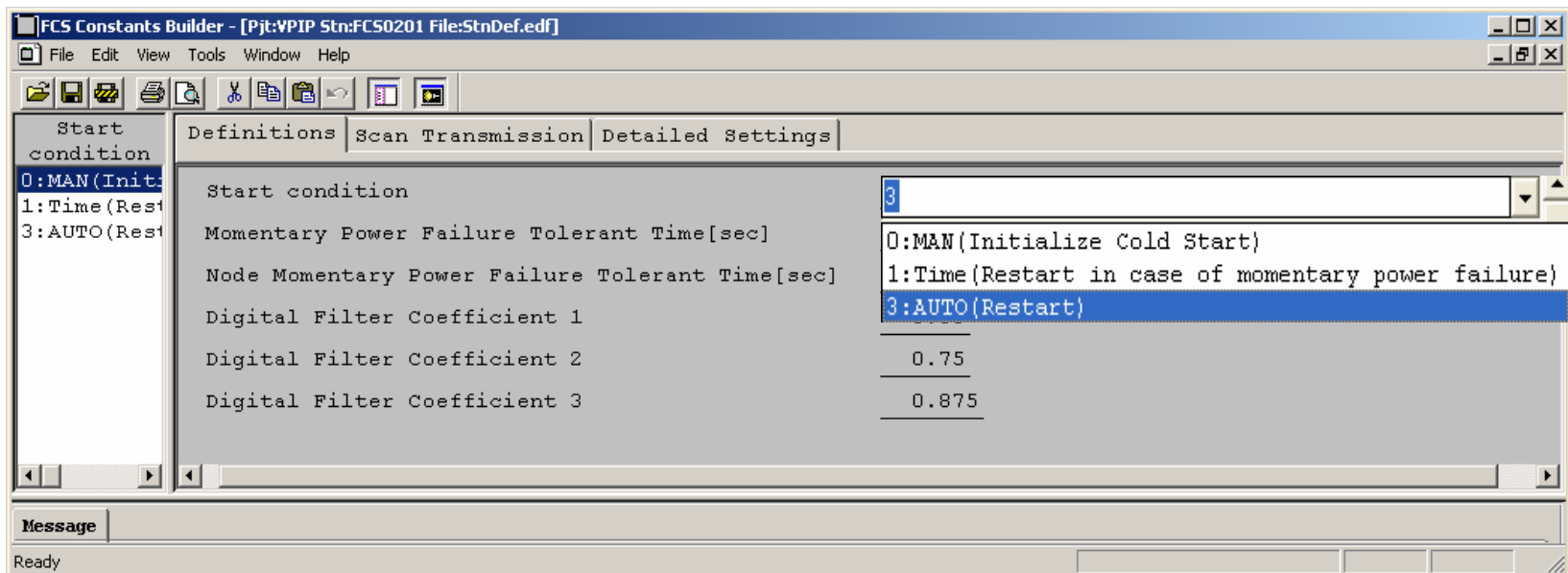


***CENTUM***<sup>®</sup>***VP***

# FCS - Configuration



The start condition determines which method to be used, initial cold start or restart, to initiate the FCS, upon turning on the power to FCS which was in the power shutoff status.



The behavior of FCS regarding to function blocks when the FCS is undergoing Initial Cold Start or Restart is shown as follows.

Table: Internal Status of Function Block

Internal function block item	Initial cold start	Restart
Order of execution	Start execution from the top block	Restart from current block
Block mode	MAN fallback in the block in which output terminal is directly connected to I/O module	Hold previous status
Alarm status	Hold previous status, including flashing status	Hold previous status including flashing status
Process alarm message	Transmit messages starting with new messages (*1)	Transmit messages starting with new messages
Resource scheduler	All requests are canceled	Operation continues
Valve monitor	Built-in error state reset timer is reset	
Totalization	Operation continues (Data during stop status are ignored.)	Operation continues (Data during stop status are ignored.)

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\*1: If a repeated warning alarm occurs at start operation, process alarm message is output assuming that a new alarm is created. As long as the alarm status lasts, the repeated warning alarm message is continuously output at regular intervals. If specified, all alarm messages occurred at initial cold start can be output.

MAN fallback of function block differs depending on the type of start operation as described below.

- At initial cold start

If the function blocks shown below are connected to the process I/O at start operation, the block mode becomes MAN by the MAN fallback function.

Table: List of Function Blocks That Perform MAN Fallback at Initial Cold Start

Function block type	Code
Regulatory Control Blocks	PID, PI-HLD, ONOFF, ONOFF-E, ONOFF-G, ONOFF-EG, PID-TP, PD-MR, PI-BLEND, PID-STC, MLD-SW, MC-2, MC-2E, MC-3, MC-3E, RATIO, PG-L13, BSETU-2, BSETU-3, VELLIM,AS-H/M/L, FFSUM, XCPL
Sequence Control Blocks	SO-1, SO-2, SIO-11,SIO-12, SIO-21, SIO-22, SIO-12P, SIO-22P, SO-1E, SO-2E, SIO-11E,SIO-12E, SIO-21E, SIO-22E, SIO-12PE, SIO-22PE

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- At restart

When restart, the function blocks connected to process I/O restore to their previous block mode before the power failure.

The table below shows the behavior of FCS regarding to the specific function blocks when starting the FCS.

Table: Status of Special Function Block

Function block name	Initial cold start	Restart
Time-Proportioning ON/OFF Controller Block	MV is forced to MSL (low limit of MV scale).	Operation continues.
Motor Control Blocks	Answerback tracking is performed when both pulsive output and answerback tracking are specified.	Operation continues.
Sequence Table Blocks (*1)	Operation is restarted from the first step (or the step that follows Step 00) after the windup operation. If all conditions are satisfied, operation is performed.	Operation continues from the current step. (Normal periodic processing is executed as if no power failure occurred.)
Logic Chart	Block Built-in timer is reset.	Operation continues.
Switch Instrument Blocks	Track output value to MV. Built-in timer is reset.	Operation continues.
Timer block	Stopped	PV starts from previous value.
Software counter block		PV starts from previous value. However, the value input during power failure are invalid.
Pulse train input counter block		

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\*1: The start operation for sequence table can be changed by changing the contents of start operation identification switch.

# FCS Constants – Start Condition

Momentary Power Failure Tolerant Time: Set 0.0 to 4.0 (sec).

MAN

(Initialize cold start)

$t > 2\text{ s}$

Momentary power failure

tolerant time (sec)

Default : 2 secs (t)

AUTO

(Restart)

$t < 2\text{ s}$

RC

Before power trip

AUT (automatic feedback control)

After power recovery

MAN

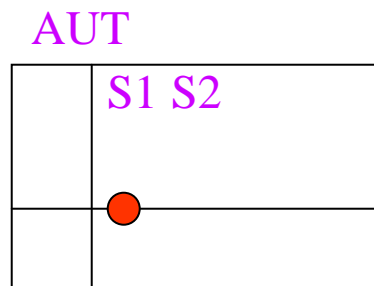
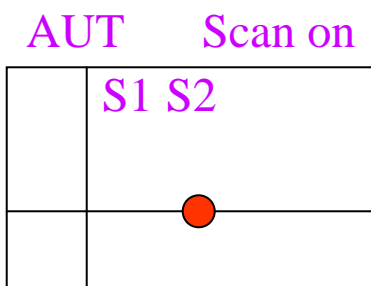
Before power trip

AUT (automatic feedback control)

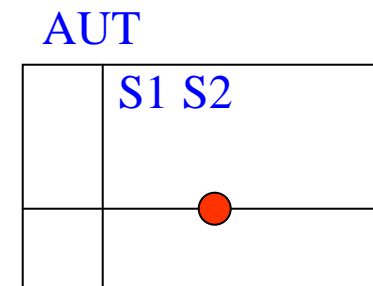
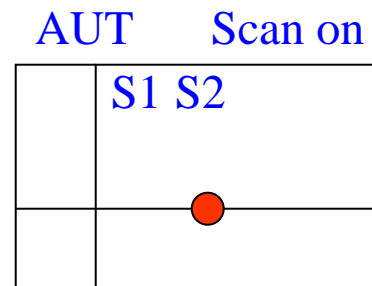
After power recovery

AUT

## Sequence Table



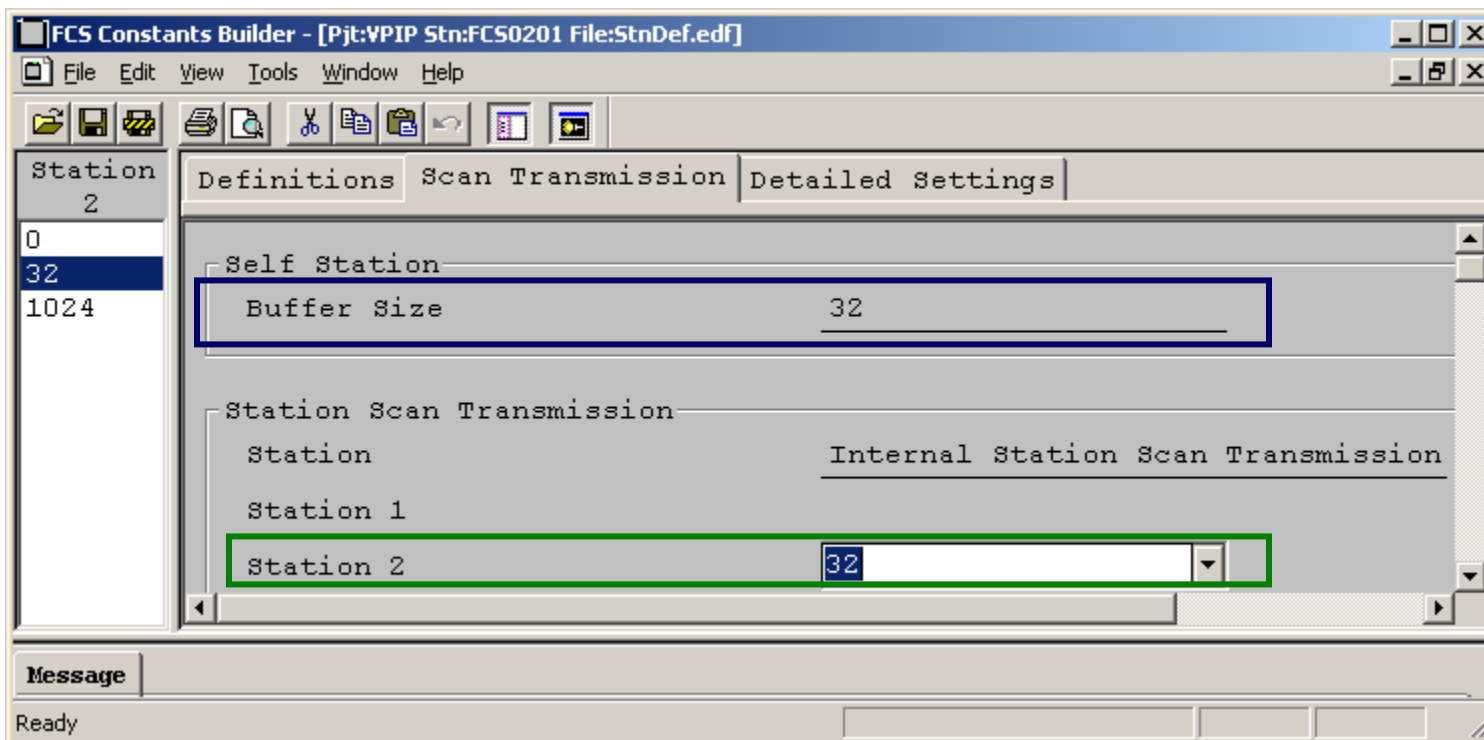
Restarted from the first step



Continues from the current step



# FCS Constants – Scan Transmission



Define the communication buffer size to transfer the values of global switches assigned to the present station to other stations.

Define whether to receive the values of global switches under the control of other stations if transferred.

If the value smaller than 32 bytes is defined for the buffer size of the present station, global switches will not work.

A global switch is an internal switch with the same logical value on all stations in the same domain.

The value of global switch assigned to the present station can be checked and defined from any application on a station. Up to 256 write-enable global switches can be assigned to each station. The defined value is broadcasted to each station in the system via control bus scan transmission when data transfer to other stations is defined at Scan Transmission Definition on the FCS Constants Builder.

When the values of global switches under the control of other stations are sent via scan transmission, the global switch on the present station is updated when data receipt is defined at Scan Transmission Definition on the FCS Constants Builder.

The values of global switches are updated by 100 msec, which is fixed.

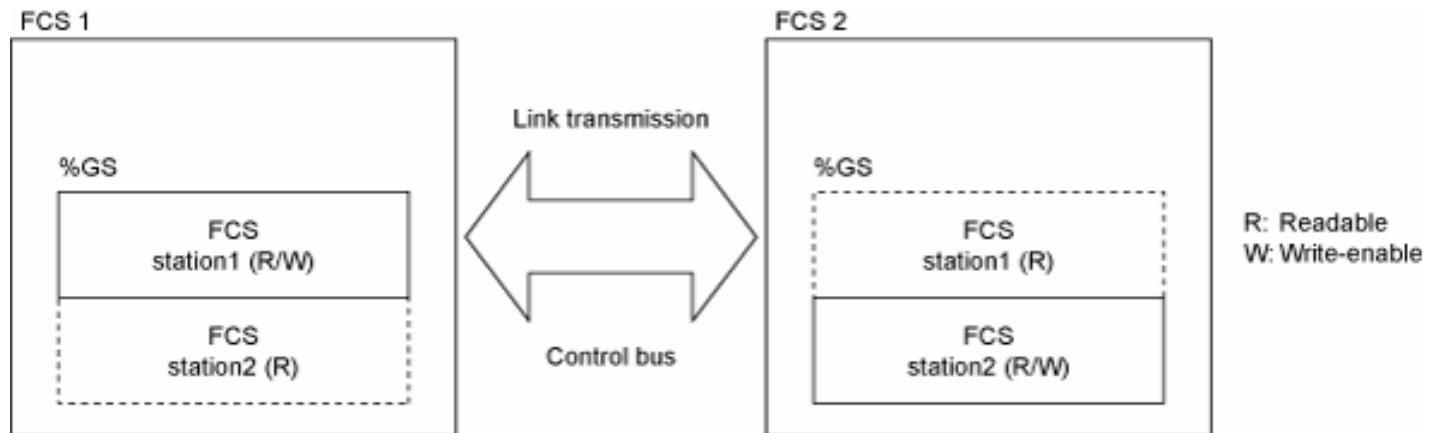
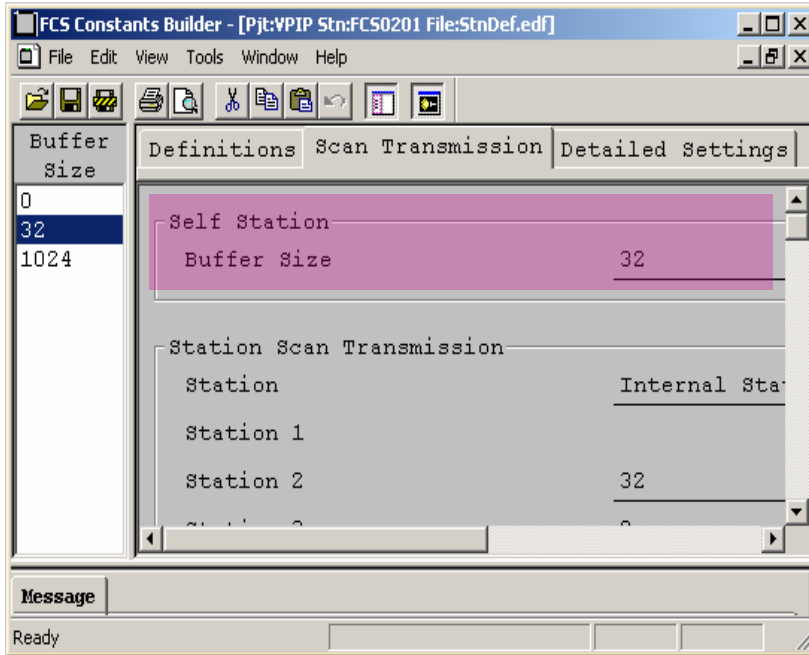


Figure: Global Switch

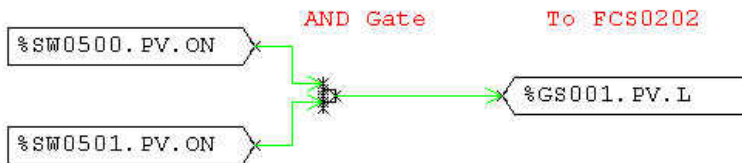
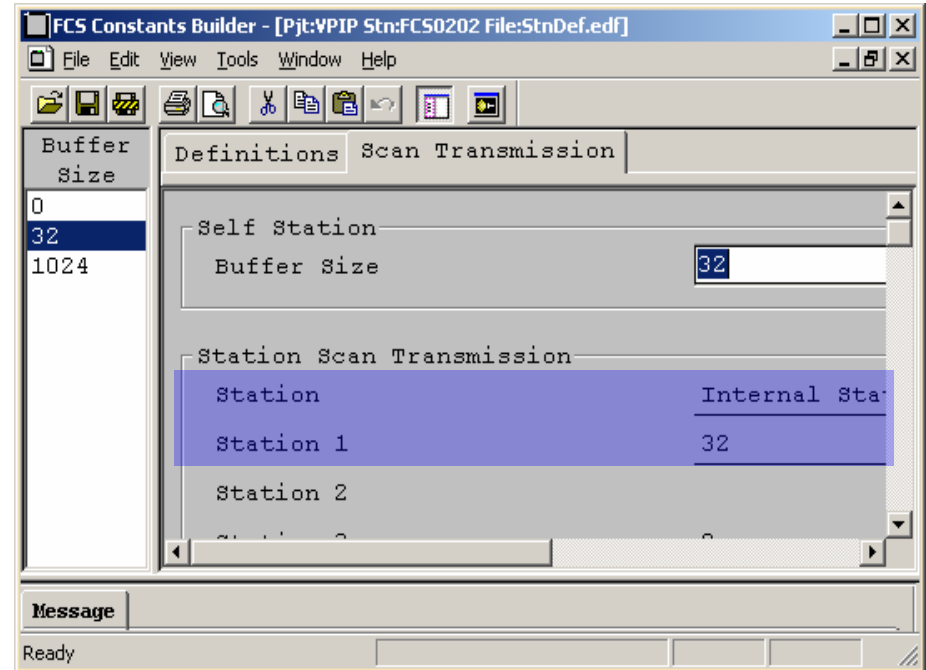
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# Example of Global Switch

## FCS0201



## FCS0202

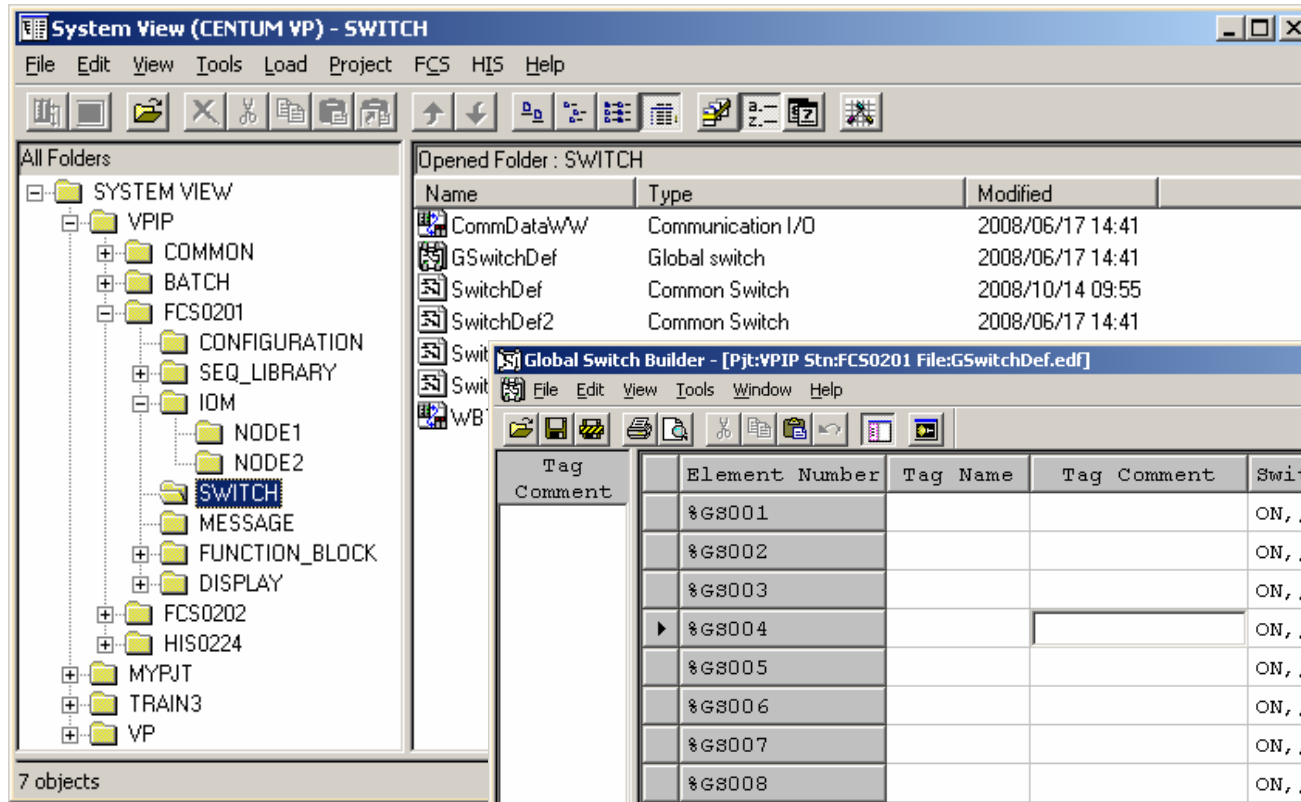


Software inputs/outputs are virtual inputs/outputs that are provided by the FCS's internal software.

Two types of software inputs/outputs are available:

- i) an “internal switch,” which is used to exchange logical values between function blocks or other application functions; and
- ii) a “message output,” which is used to inform the occurrence of an event.

# Global Switches (%GS)



Up to 256 write-enable global switches can be assigned to each station. .

# Common Switches (%SW)

Common switches are internal switches used by various control functions to save the shared logical values in an FCS.

The screenshot shows the 'System View (CENTUM VP) - SWITCH' application. On the left is a file explorer showing a tree structure under 'SYSTEM VIEW'. The 'SWITCH' folder is selected. The main window displays a table of common switches:

Name	Type	Modified
CommDataWw	Communication I/O	2008/06/17 14:41
GSwitchDef	Global switch	2008/06/17 14:41
SwitchDef	Common Switch	2008/10/14 09:55
SwitchDef2	Common Switch	2008/06/17 14:41
SwitchDef3	Common Switch	2008/06/17 14:41
SwitchDef4	Common Switch	2008/06/17 14:41

System common switches from %SW0001 to %SW0400 are used to indicate the different statuses of the FCS.

Two overlapping 'Common Switch Builder' windows are shown. The top window is for 'SwitchDef.edf' and the bottom window is for 'SwitchDef4.edf'. Both windows display a table of switch configurations:

Element Number	Tag Name	Tag Comment	Switch Position Label
%SW0001		System Reserved	ON, , OFF, ON
%SW0002		System Reserved	ON, , OFF, ON
%SW0003		System Reserved	ON, , OFF, ON

Element Number	Tag Name	Tag Comment	Switch Position Label
%SW3996			ON, , OFF, ON
%SW3997			ON, , OFF, ON
%SW3998			ON, , OFF, ON
%SW3999			ON, , OFF, ON
%SW4000			ON, , OFF, ON

# Annunciator Message (%AN)

Annunciator message is used to notify the operator of errors in the process.

## 1000 Annunciator Messages (FFCS-L)

Up to 24 alphanumeric characters are used.

Message	Element Number	Message	Tag Name	Swit
	%AN0001	Low Level		ON, , OFF, ON
	▶ %AN0002			ON, , OFF, ON
	%AN0003			ON, , OFF, ON
	%AN0004			ON, , OFF, ON
	%AN0005			ON, , OFF, ON

%AN0001S0201  
Low Level

NR

PV 0

ON

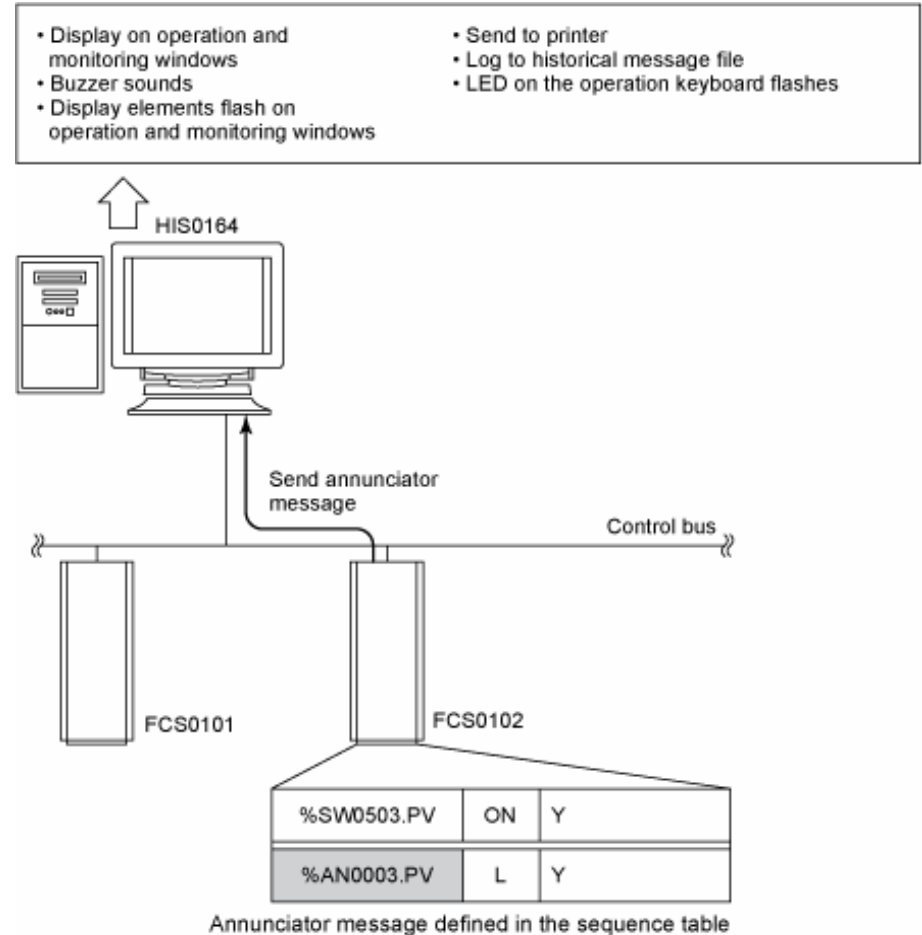
ON

# Annunciator Message (%AN)

The HIS annunciator function simulates the annunciator instrument panel.

These special message outputs are used to simulate the annunciator panels of the instrument panels

Annunciator message outputs store alarm-occurrence statuses as logical values.



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Figure: Flow of Annunciator Message Processing

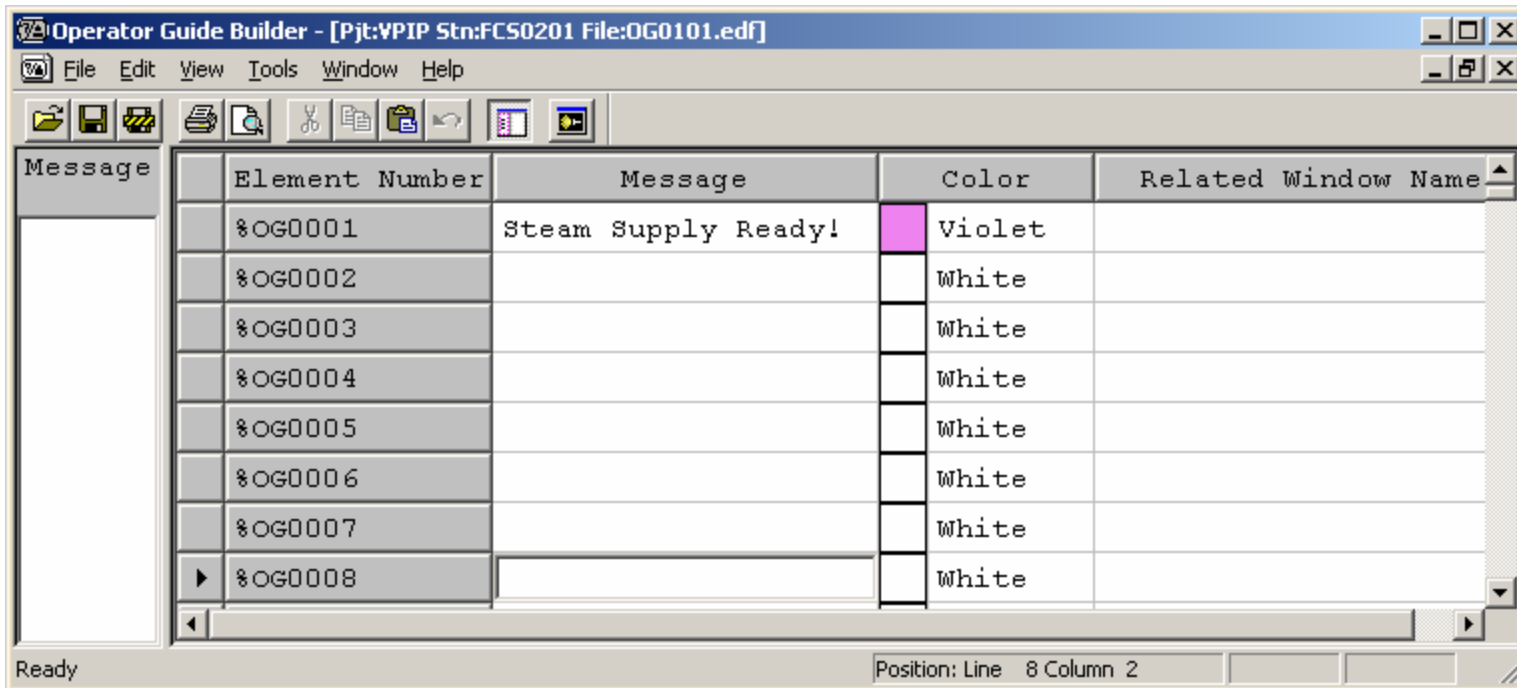


# Operator Guide Message (%OG)

Operator guide messages are used to prompt the operator's acknowledgment for certain operation during certain progress of the process.

## 500 Operator Guide Messages (FFCS-L)

Up to 70 alphanumeric characters are used.



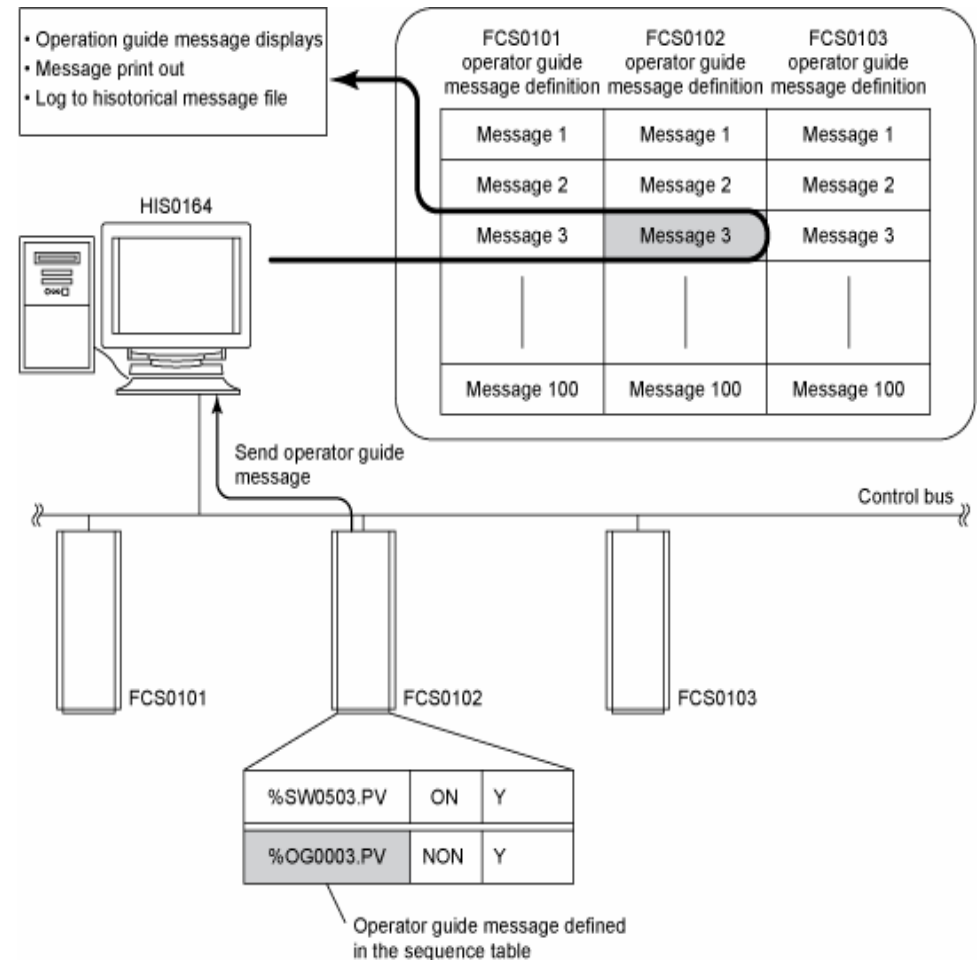
The screenshot shows the 'Operator Guide Builder' application window. The title bar reads 'Operator Guide Builder - [Pjt:VPIP Stn:FC50201 File:OG0101.edf]'. The menu bar includes 'File', 'Edit', 'View', 'Tools', 'Window', and 'Help'. The toolbar contains various icons for file operations and editing. The main area is a table with the following columns: 'Message', 'Element Number', 'Message', 'Color', and 'Related Window Name'. The table contains 8 rows of data. The first row is highlighted in pink and contains the message '%OG0001 Steam Supply Ready!' with a color of 'Violet'. The other rows have white backgrounds and contain messages from '%OG0002' to '%OG0008', all with a color of 'White'. The status bar at the bottom left shows 'Ready' and the bottom right shows 'Position: Line 8 Column 2'.

Message	Element Number	Message	Color	Related Window Name
	%OG0001	Steam Supply Ready!	Violet	
	%OG0002		White	
	%OG0003		White	
	%OG0004		White	
	%OG0005		White	
	%OG0006		White	
	%OG0007		White	
	%OG0008		White	

# Operator Guide Message (%OG)

Operator guide messages are triggered by the sequence control of the control station.

When the Operation and Monitoring Functions detect an operator guide message, a character string that corresponds to the message number is displayed in the Operator Guide view, then the operator guide message is saved to the historical message log file.



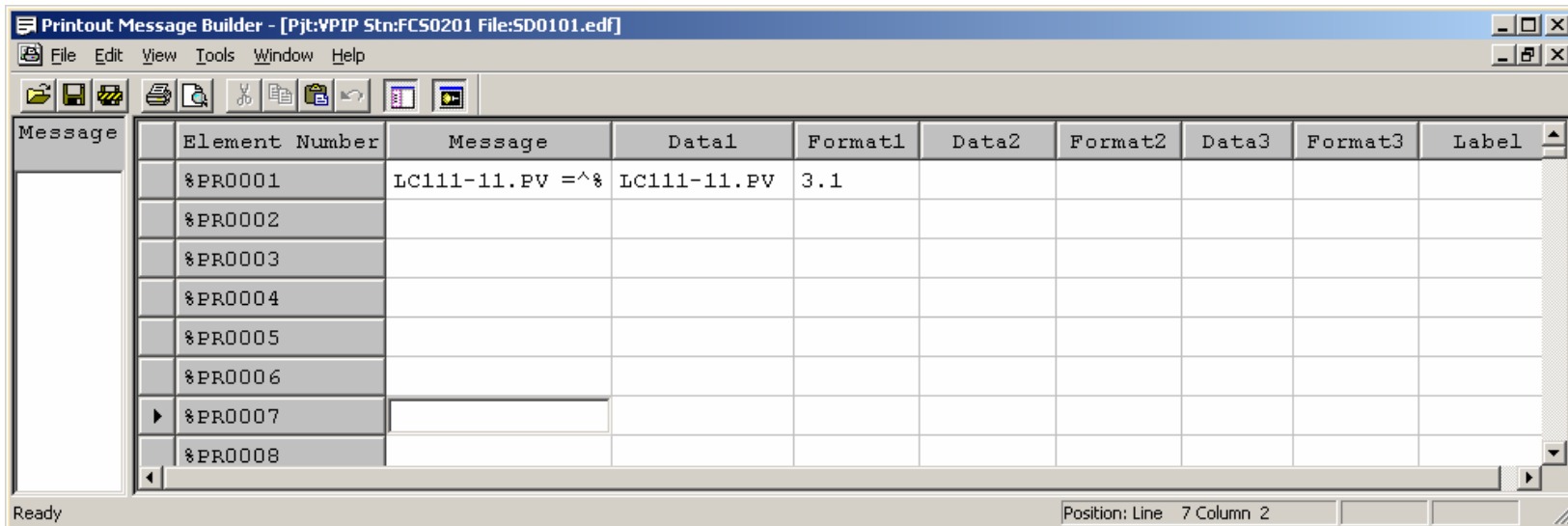
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Figure: Flow of Operator Guide Message Processing

Print messages are triggered by the Sequence Control Function to print out the message to indicate certain timing of the process.

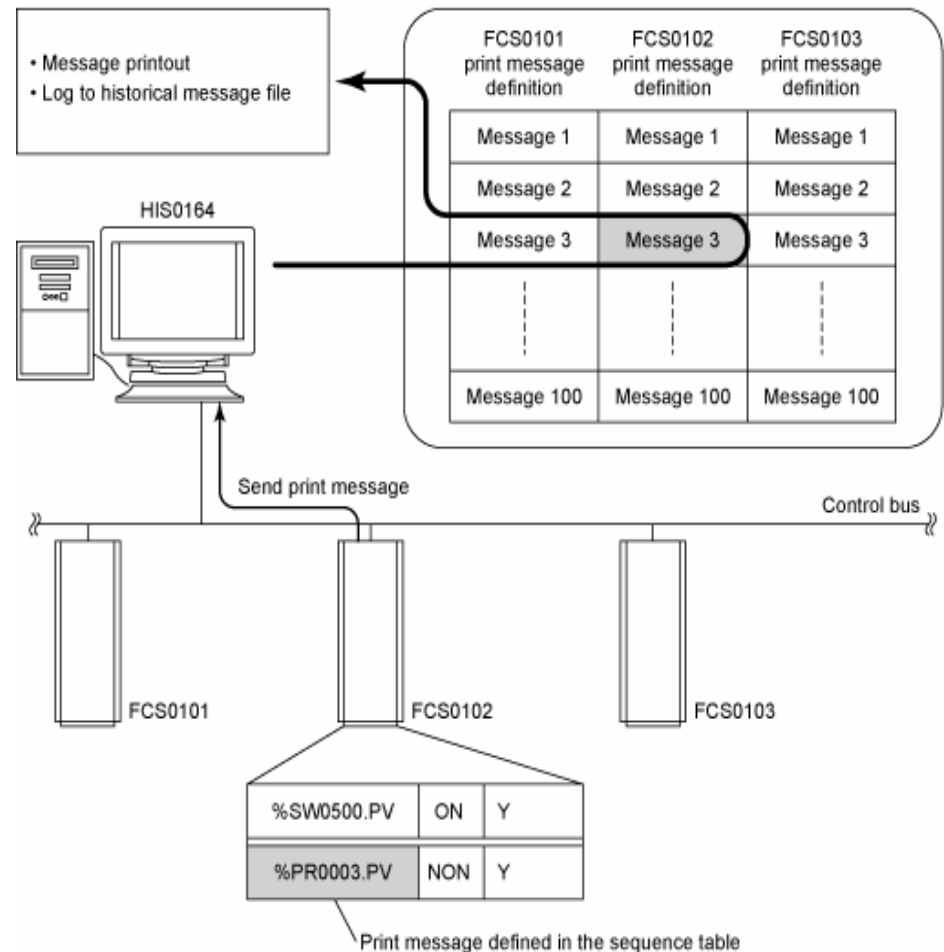
## 1000 Printout Messages (FFCS-L)

Comment message plus up to 3 process data in the order of data1, data2, data3 may be printed out.



# Printout Messages (%PR)

When a print message request is sent from a field control station to an HIS, the Operation and Monitoring Functions print the character string that corresponds to the message number, then saves the print message to the historical message log file.



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Figure: Flow of Print Message Processing

# Printout Messages (%PR)

Define a print message up to 80 alphanumeric characters. When printing the data, specify the place to insert data by the [^] symbol. The data values are printed in the order of data items (data1, data 2, data3) at the place indicated by the [^] symbol.

Specify the data up to 34 capital alphanumeric characters. The format that specifies the data is [TagName.DataItem].

Element No.	Message	Data1	Format1
%PR0001	Tank AΔInjection completedΔQuantity=^ΔL	FIC100.SUM	5
%PR0002			
%PR0003			

[Leading Zero]    [Digits] .    [DP]    [Conversion]  
 "                    "                    "                    "  
 Default            5                    Default            Default

%PR0001 Printout

Tank AΔInjection completedΔQuantity=12345ΔL

FIC100.SUM value

EC00109E.ai

Δ:Space

Figure: Example of Printout