

# GL220/GL820 Interface Commands

## Outline

Interface commands are a group of commands that are used to connect the GL220/GL820 to a PC via LAN or USB, change internal settings, and perform control functions when measurement data, etc., is received.

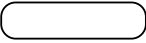






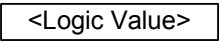
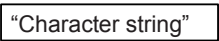
## Interface Command Types

There are two types of interface commands sent from the PC to control the GL220/GL820: Setting commands and Query (Response) commands.

- **Setting commands**  
Setting commands are commands that are used to change settings and to perform processing. These commands are sent from the PC but do not need to be received by the GL220/GL820.
- **Query commands**  
Depending on the type of command, a Query command sent from the PC may require a query (response) to be returned from the GL220/GL820. Whenever a query command is sent from the PC, it must be received by the GL220/GL820.

## Interface Command Format

Interface commands are formatted using ASCII character strings, and there is no distinction made between upper-case and lower-case characters. Moreover, all the query commands from the GL220/GL820 are in a uniformly abbreviated uppercase character format. A New Line code is appended to each command, according to the New Line code format specified at the GL220/GL820. The format will be CR+LF, CR, or LF.

	<b>Command characters</b> The ASCII characters within this symbol represent a command for sending/receiving data. The character string comprises both upper-case and lower-case characters, and the upper-case characters are in an abbreviated format.
	<b>Query character</b> When the Query character is appended to a command, the command becomes a query command and is sent to the GL220/GL820.
	<b>Connection character (colon)</b> Used to connect command characters.
	<b>Continuation character (semicolon)</b> Used for continuous transmission without any breaks between the commands (please limit the number of characters sent at one time to 512).
	<b>Blank space character</b> The blank space character indicates a space that is the size of one alphanumeric number.
	<b>Integer value</b> The integer value is an ASCII text string. Used for GL220/GL820 settings.
	<b>Decimal point, exponent, value with a unit attached</b> Represents a decimal value (such as 1.234), an exponent (such as 1E-6) or a value with a unit attached (such as IKHZ). As its use varies according to the command, please refer to the command flow chart for details.
	<b>Logic value</b> Represented by 1/0, ON/OFF, Enable/Disable, TRUE/FALSE, YES/NO, SET/RESET. Any of these can be used.
	<b>Character string</b> A character string must be enclosed in double quotation marks (" "). <b>Example:</b> :ANN:TITL "DEMO RECORD"

## Error Query

If an invalid command or a command that cannot be set is sent, an error occurs at the GL220/GL820 and an error query is generated. The :STAT:ERR? error query can be used to search for the error. Moreover, since up to 255 error queries are stored in the buffer, errors starting with the oldest error are sent in response whenever a :STAT:ERR? command is sent. Please refer to the Status Report section for further details on the errors.

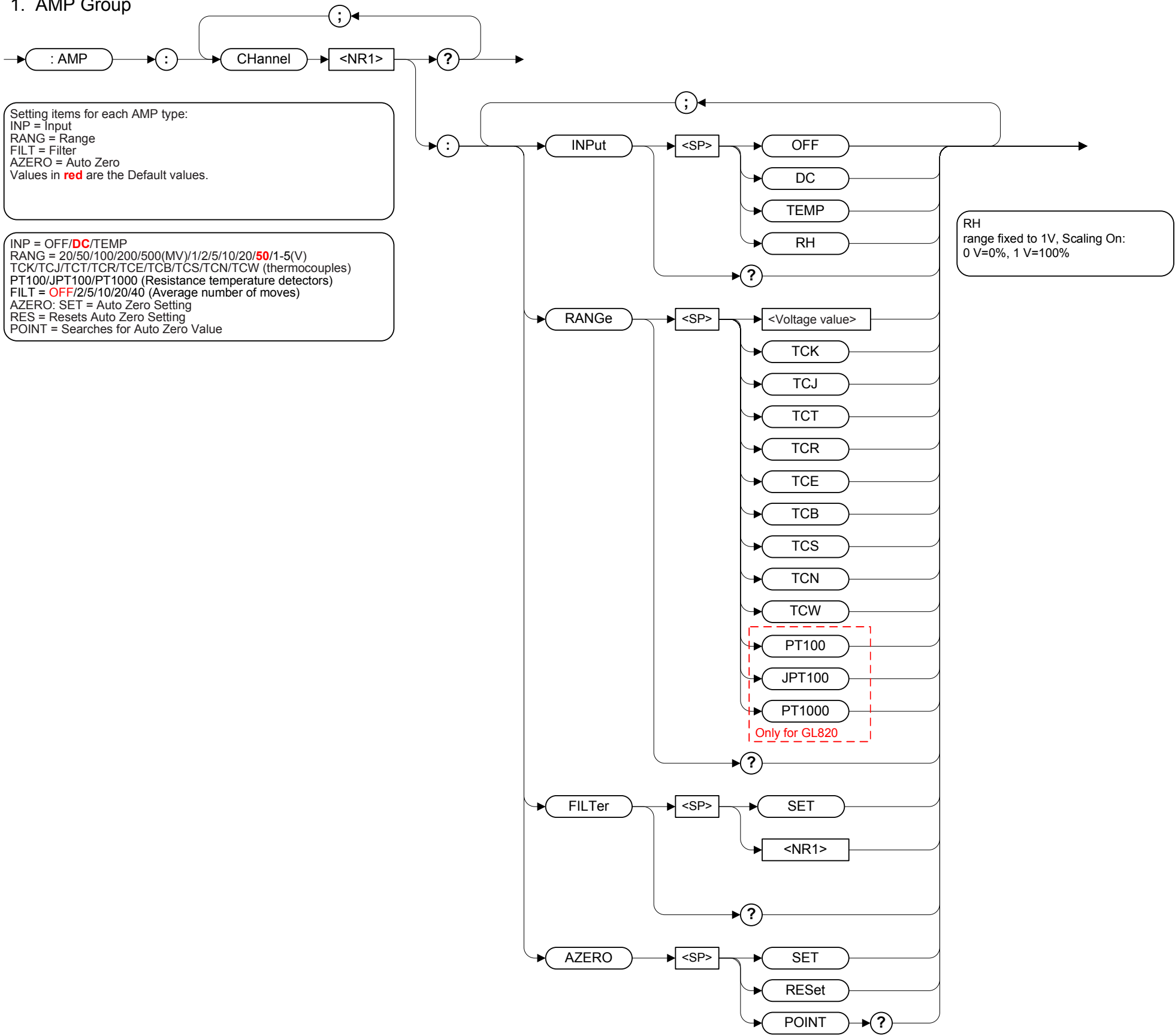
## Status Command

The status command is used to check the status of the GL220/GL820. :STAT:COND? can be used to search for each status, but at high-speed operations, such as when the GL220/GL820 is capturing data to memory at a rate that doesn't even reach 1 second, the status condition changes too quickly from 0 → 1 → 0 to enable an accurate confirmation to be made of the 1 status. At this time, it is recommended that you use :STAT:FILT to enable the status changes to be saved.

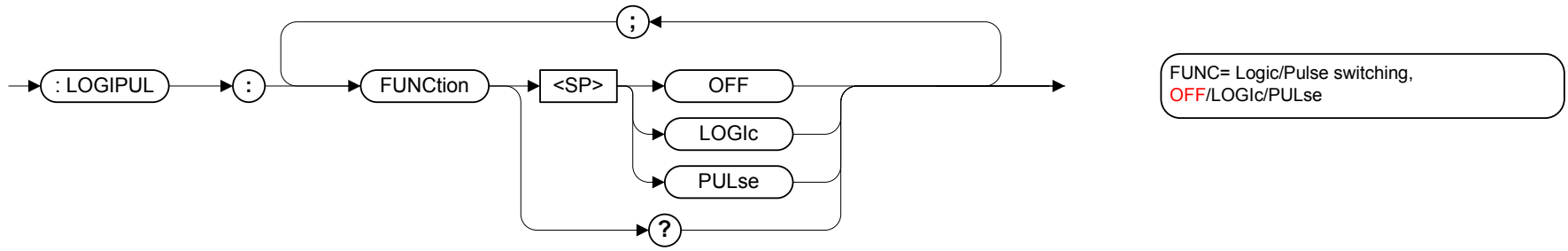
## Command Examples

Command Sent from the PC	Commands Received from the GL220/GL820	Explanation
:AMP:CH1?	:AMP:CH1:INP DC;RANG 50MV;FILT OFF;TYP V	Queries the Input, Range, Filter, and Amp Type for CH1.
:AMP:CH1:RANG 50MV	None	Sets the Range for CH1 to 50mV.
:AMP:CH5:RANG TCK;RANG?	:AMP:CH5:RANG TCK	Sets the Range for CH5 to TCK, and queries the range for the same channel.

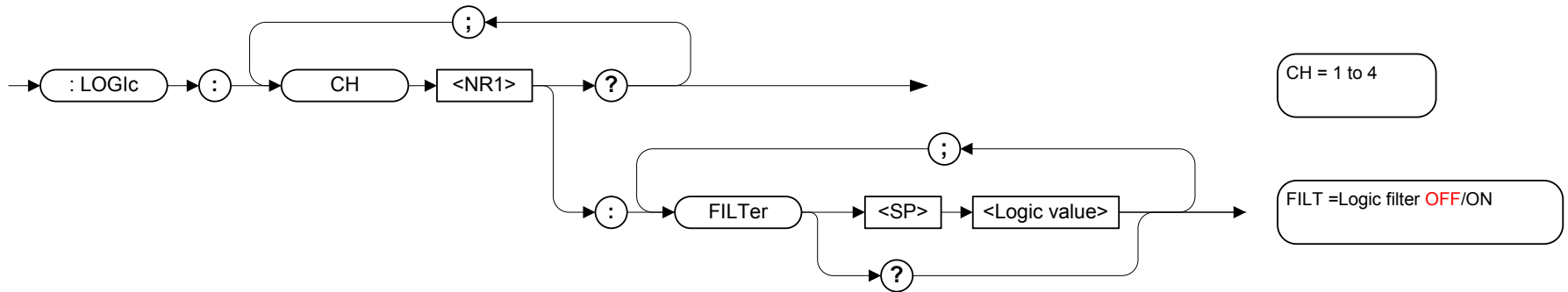
1. AMP Group



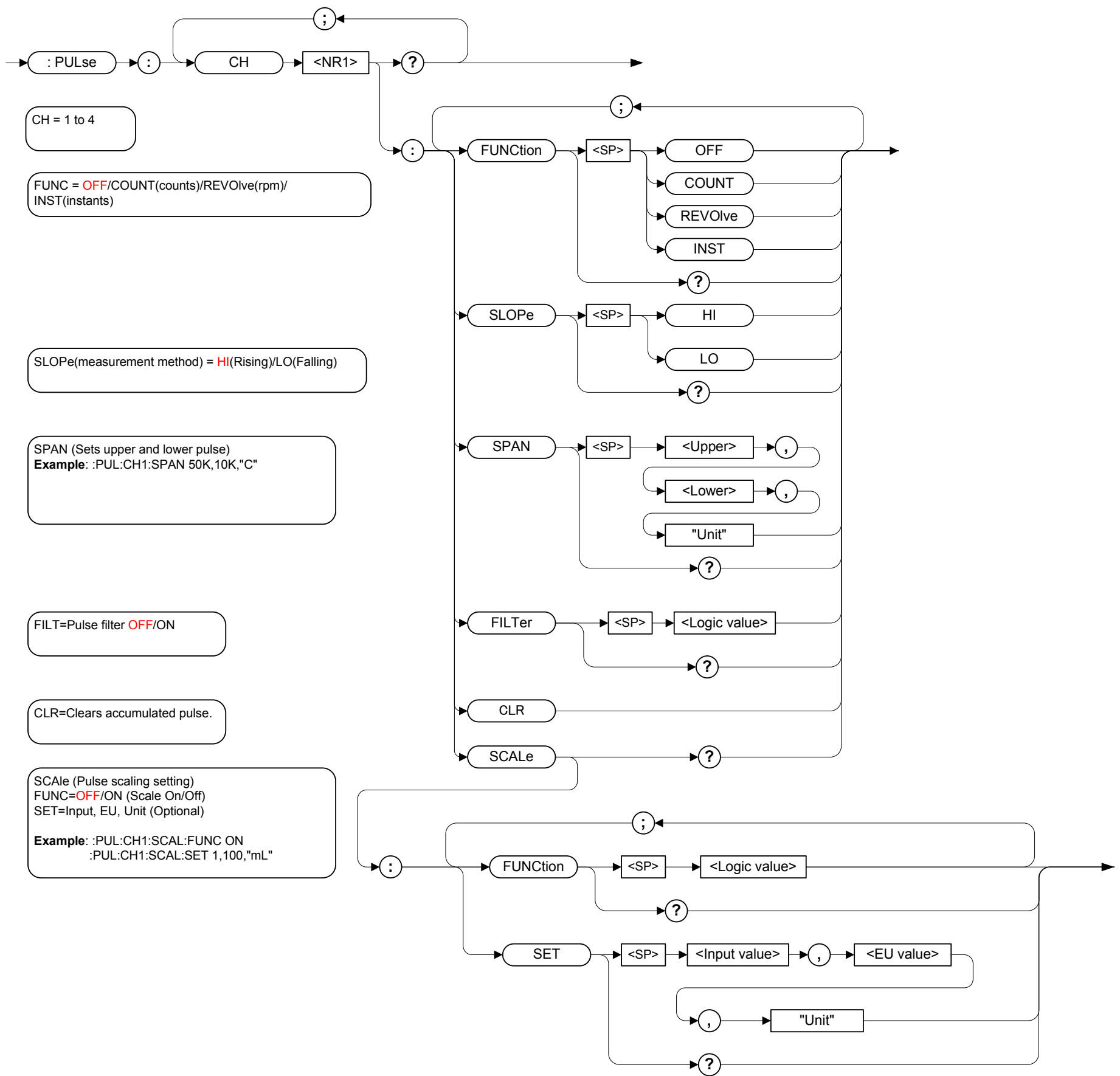
## 2. LOGIC/PULSE Group



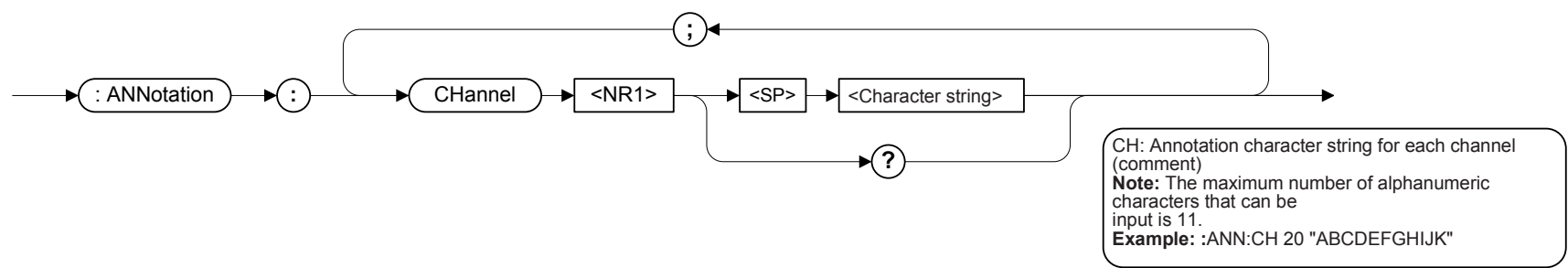
### 3. LOGIC Group



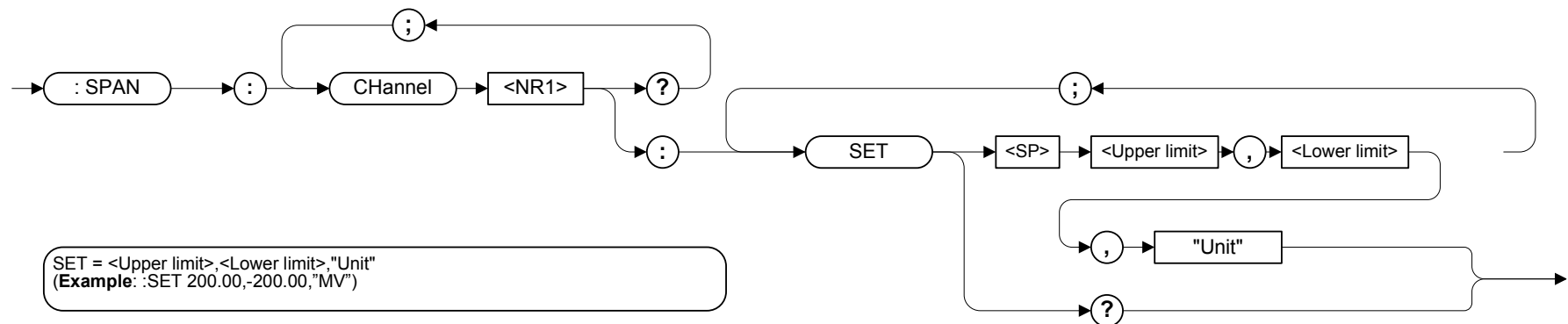
#### 4. PULse Group



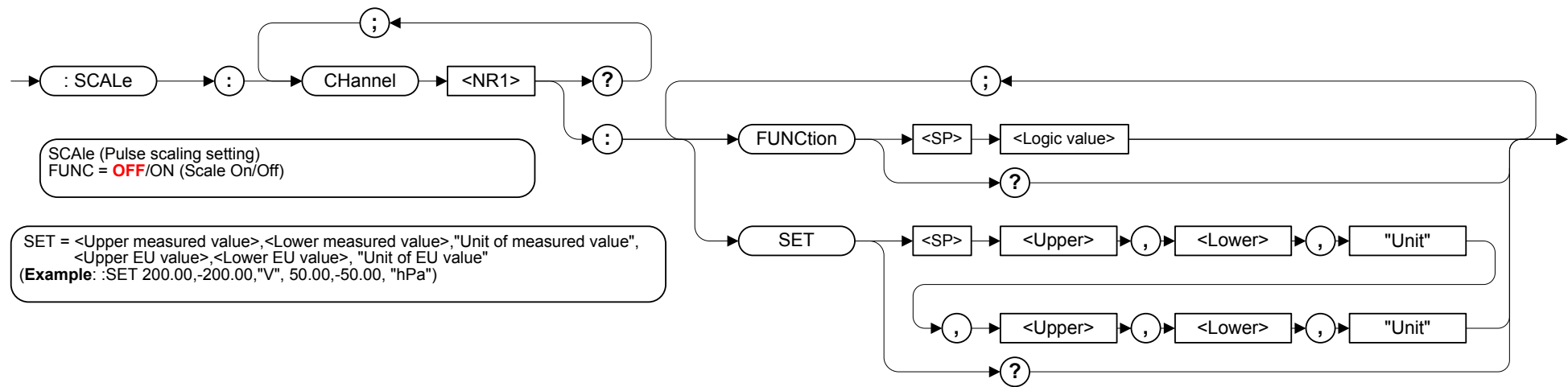
5. ANNOTATION Group



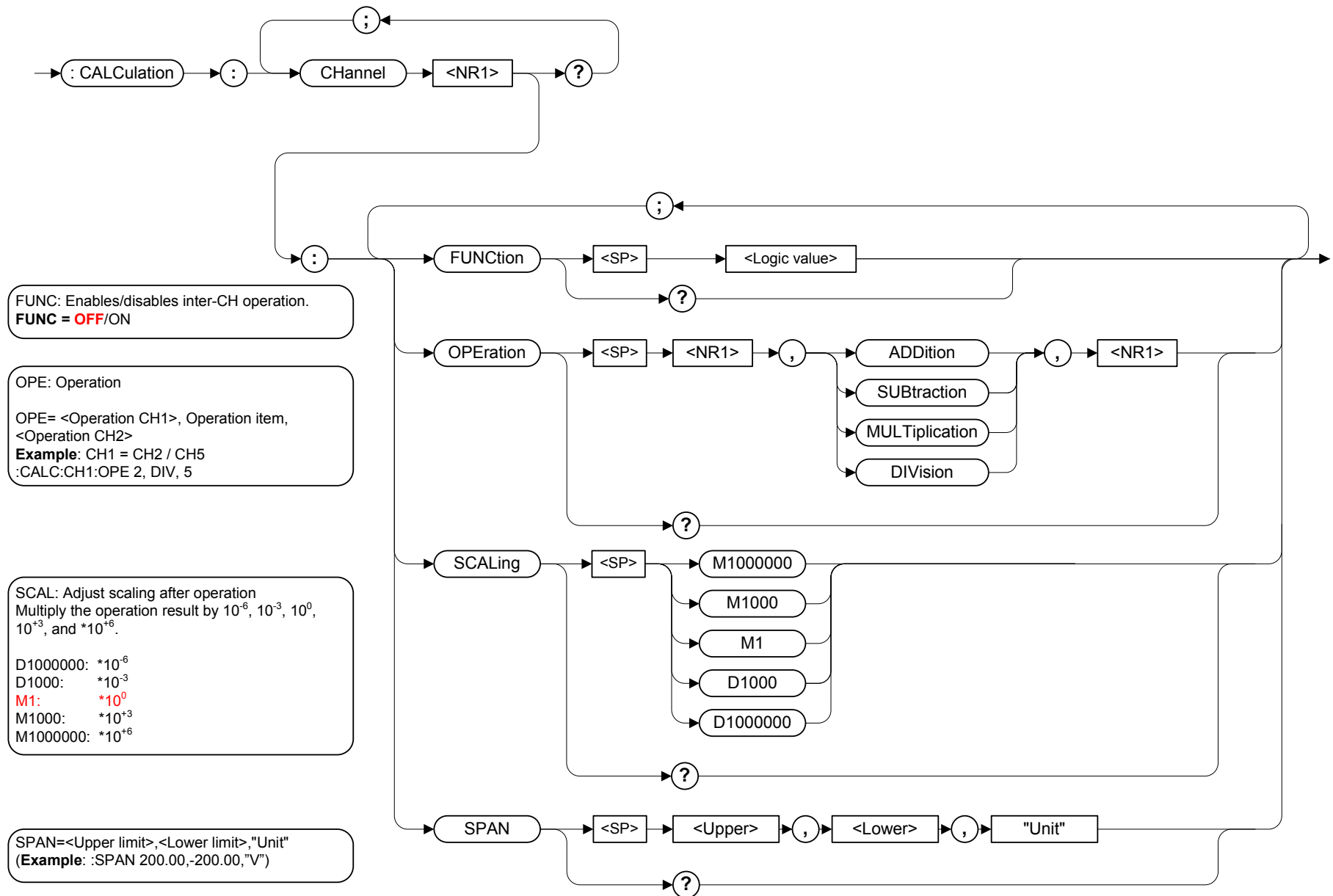
6. SPAN Group



7. SCALE Group



8. CALCULATION Group



9. DATA Group

CAPT (Data capture destination)  
Internal memory = \MEM\  
USB device = \USB1\ , \USB2\.... (The number increases as the number of devices increases)  
**Example:** Disk: :DATA:CAPT DISK,"MEM\DEFAULT.GBD"  
**Example:** For USB device: :DATA:CAPT DISK,"USB1\FOLDER\0001.GBD"  
**Example:** For automatic file name :DATA:CAPT DISK,"MEM\FOLDER"  
(When a folder is specified for the path, a folder is created with the name in the form of Date-Time in the specified folder, and a file is created with the name in the form of Date-Time in the created folder. 050101-123456.GBD)

RECORD (Recording ON/OFF)  
OFF: Recording OFF (dedicated mode from I/F)  
**ON: Recording ON**

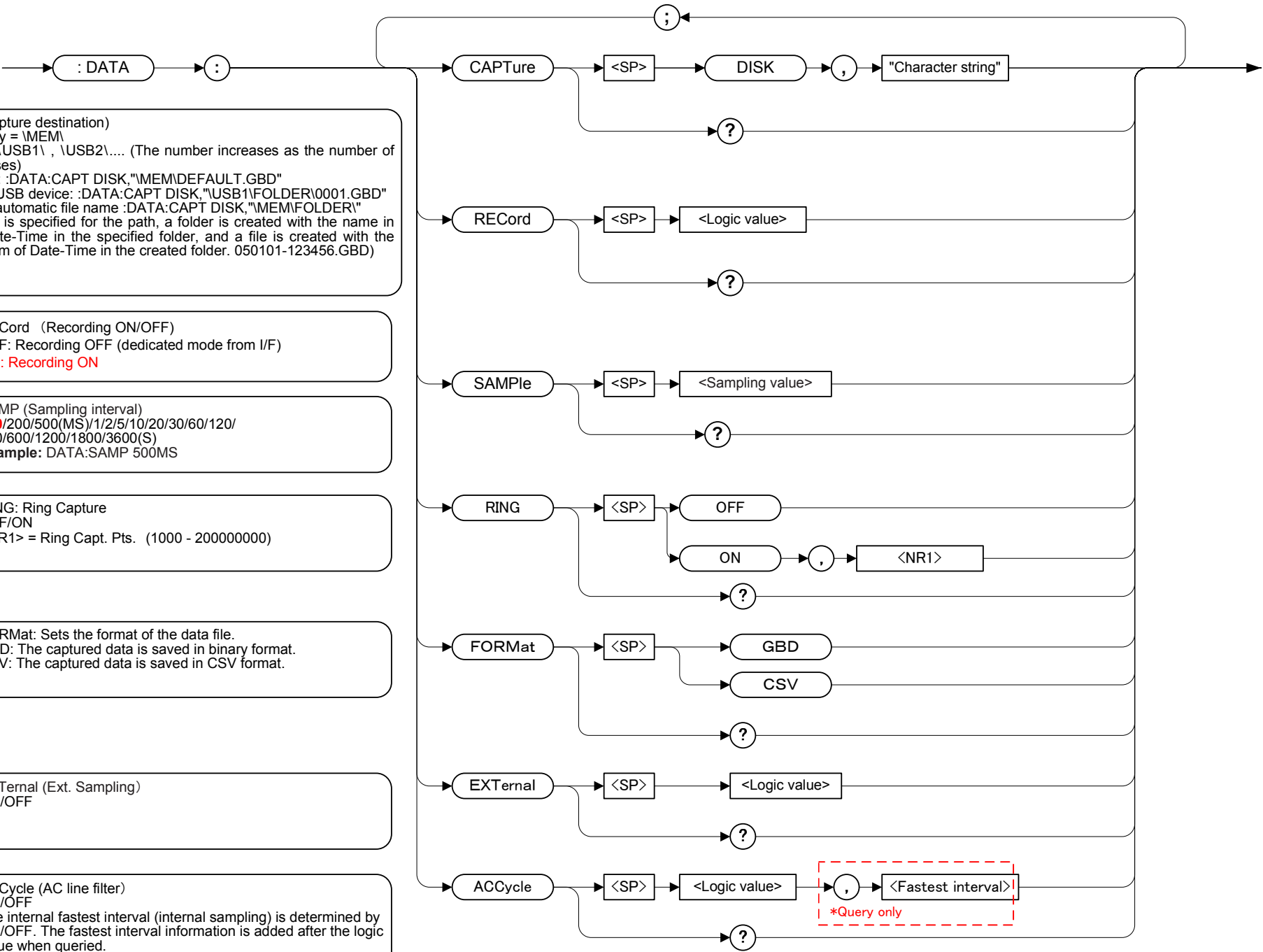
SAMP (Sampling interval)  
**100**/200/500(MS)/1/2/5/10/20/30/60/120/  
300/600/1200/1800/3600(S)  
**Example:** DATA:SAMP 500MS

RING: Ring Capture  
OFF/ON  
<NR1> = Ring Capt. Pts. (1000 - 2000000000)

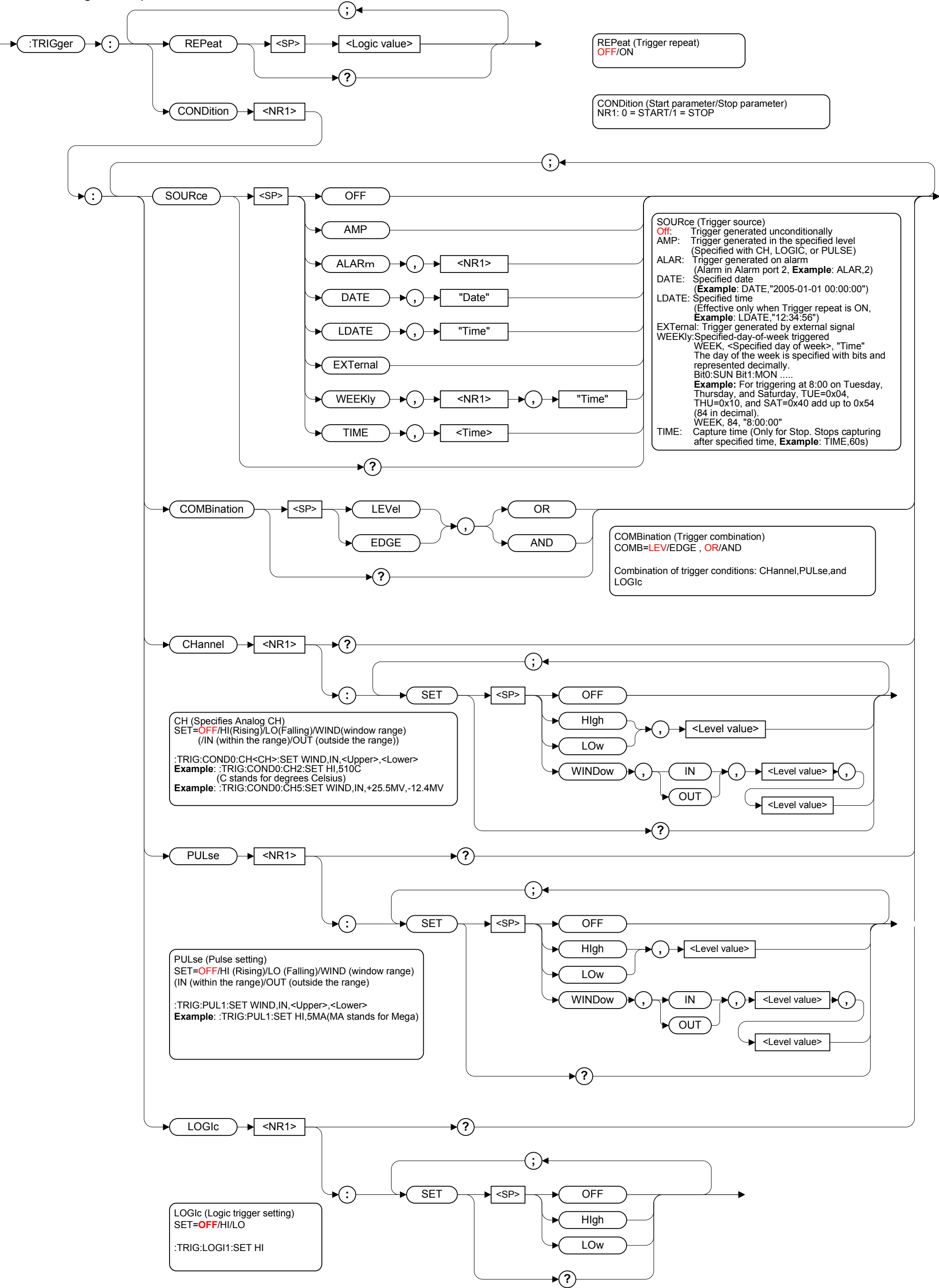
FORMAT: Sets the format of the data file.  
GBD: The captured data is saved in binary format.  
CSV: The captured data is saved in CSV format.

EXTERNAL (Ext. Sampling)  
ON/OFF

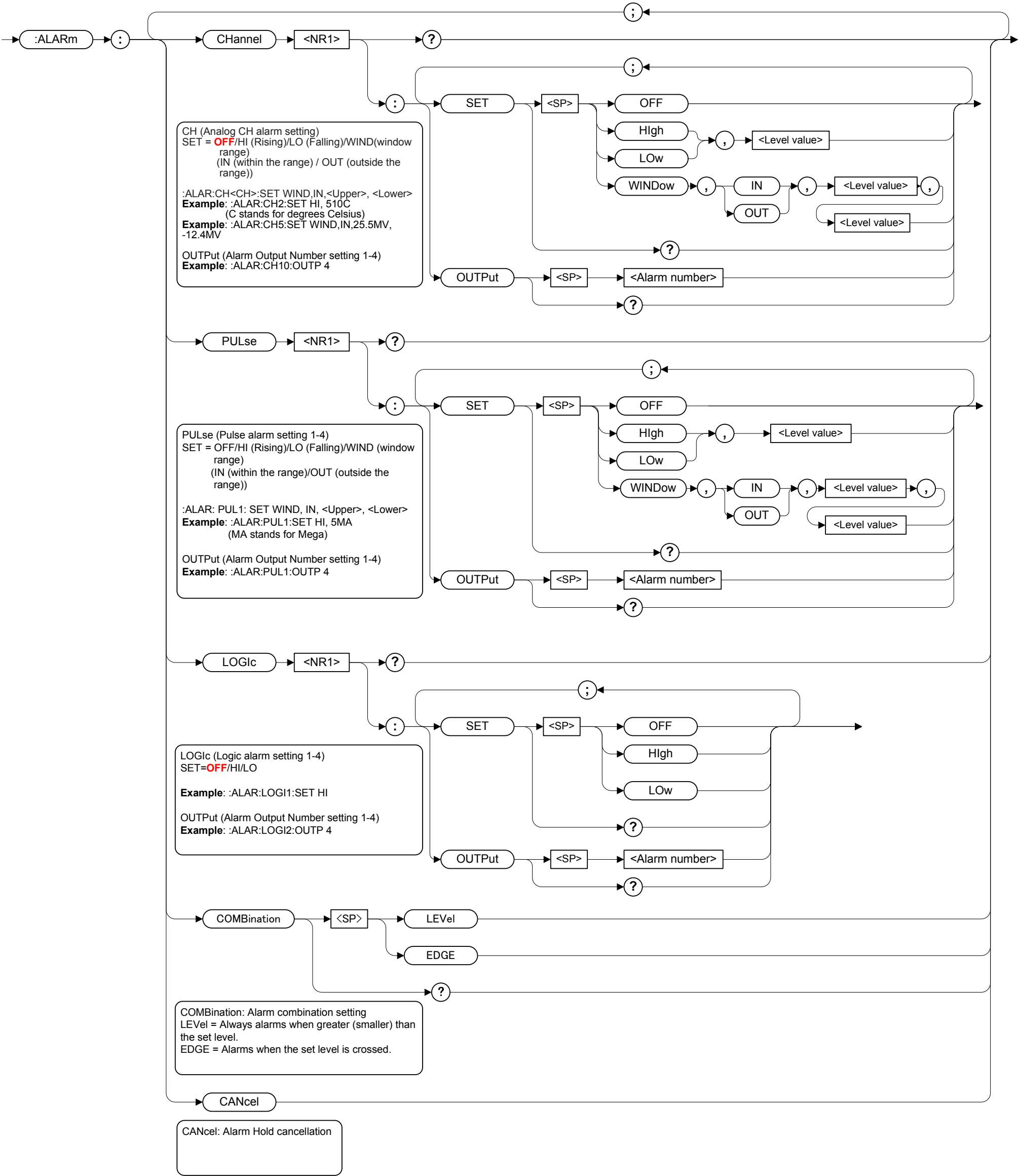
ACCycle (AC line filter)  
ON/OFF  
The internal fastest interval (internal sampling) is determined by ON/OFF. The fastest interval information is added after the logic value when queried.  
**\* Setting and querying are different from each other.**  
Example) When setting: DATA:ACC ON  
When querying: DATA:ACC ON,1S



10. TRIGger Group

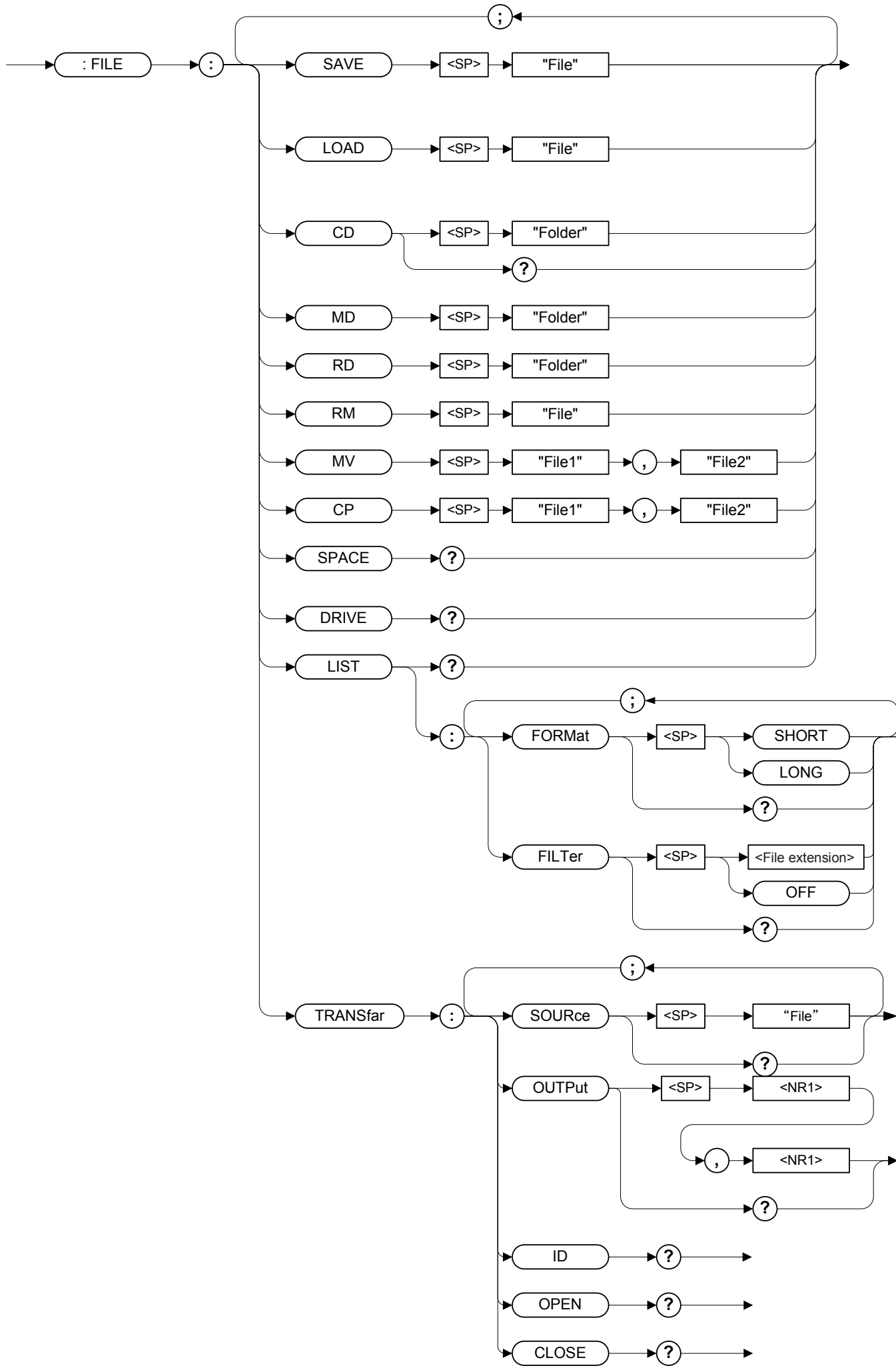


11. ALARm Group





12. FILE Group



About the Device memory and USB device paths  
Device memory: MEM\  
USB device: USB1\, USB2\, USB3\, USB4\  
(Up to a maximum of four USB devices can be recognized)

**SAVE:** Saves the specified file  
**Example:** :FILE:SAVE "MEM\DEFAULT.CND"

**LOAD:** Loads the specified file  
**Example:** :FILE:LOAD "MEM\DEFAULT.CND"

**CD:** Changes the current directory  
**Example:** :FILE:CD "MEM\FOLDER1\  
:FILE:CD "USB1\TEST\

**MD:** Creates a directory  
**Example:** :FILE:MD "MEM\FOLDER2\

**RD:** Removes the directory  
**Example:** :FILE:RD "MEM\FOLDER3\

**MV:** Moves the file  
**Example:** :FILE:MV "MEM\AAA.GBD", "USB1\BBB\AAA.GBD"

**CP:** Copies the file  
**Example:** :FILE:CP "MEM\AAA.GBD", "USB1\BBB\BBB.GBD"

**DRIVE:** Display of built-in drive/USB device  
MEMD= Device memory  
USBD= USB device  
**Example:** :FILE:DRIVE"MEM:MEMD USB1:USBD USB2:USBD"

**SPACE:** Use the CD command to browse the available disk space (bytes) set  
**Example:** :FILE:SPACE 12345678

**LIST:** List Display  
FORM: **SHORT** = File name only  
LONG = File name + date + size + attributes  
FILT: Extension ("\*\*\*\*" 4 characters including the dot)  
Only the files for which extensions were set in Filter are displayed.  
**OFF** = All the files are displayed.

Example of :FILE:LIST:FORM SHORT query  
(When root: Displays the connected device(s))  
:FILE:LIST "MEM", "USB1\  
(When not root)  
:FILE:LIST "FOLDER", "FOLDER2", "050101-010101.GBD", "050502-010101.GBD"  
Example of :FILE:LIST:FORM LONG query  

Attribute	Description
dw-	Directory (folder) to which writing is possible
-w-	File to which writing is possible

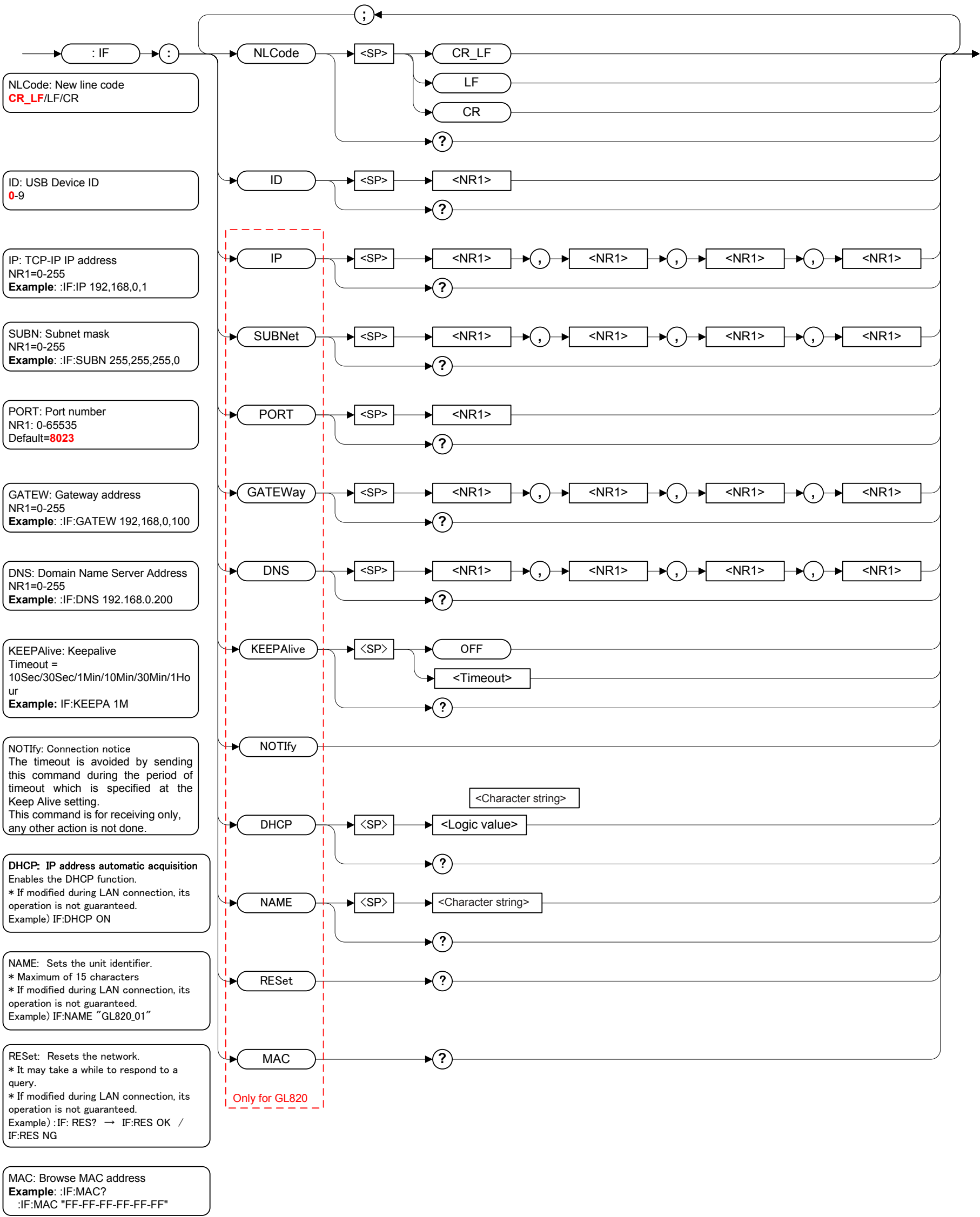
  
(When root: Displays the connected device(s))  
<Device><Available space><Attribute>  
:FILE:LIST "MEM 123456 d--", "USB1 123456 d--"  
(When not root: <File/folder> <Date created> <Attribute>  
:FILE:LIST "FOLDER 2005/01/01 12:34:56 dw-", "FOLDER2 2005/01/01 12:34:57 dw-", "050101-010101.GBD 2005/01/01 12:34:56 -w-", "050502-010101.GBD 2005/01/01 12:34:56 -w-"

**TRANSfar: File transfer**  
Transfers data of the files in the unit.  
  
**SOURce:** Performs the file setting.  
Example) :FILE:TRNAS:SOUR "MEM\FOLDER\ABCD.GBD"  
  
**OUTPut:** Sets the number of file bytes and transfers data  
TRANS:OUTP <NR1(number of transfer-start bytes)> ,<NR1(number of transfer-end bytes)>  
Example) If the number of file bytes is 8000 bytes,  
:FILE:TRANS:OUTP 1,8000 → :FILE:TRANS:OUTP? (See the left box)  
  
**SIZE:** Reference to the file size (number of bytes)  
Refers to the number of bytes of the file that was set by SOURce.  
Example) :FILE:TRANS:SIZE 12345 (12345Byte)  
  
**OPEN:** Opens the file that was set by SOURce.  
:After FILE:TRANS:OPEN?, returns a 3-byte status as a query.  
First byte: 0x00: Reserved byte (not used)  
Second byte: Upper 8 bits of 16-bit status  
Third byte: Lower 8 bits of 16-bit status  
  
Contents of 16-bit status  
Bit 0: 1=Error occurred / 0=No error occurred  
Bit 1 – Bit 15: Not used  
  
**CLOSE:** Closes the file that was opened by OPEN.  
After a file was opened and completely transferred, please make sure to transmit CLOSE to perform the close process.

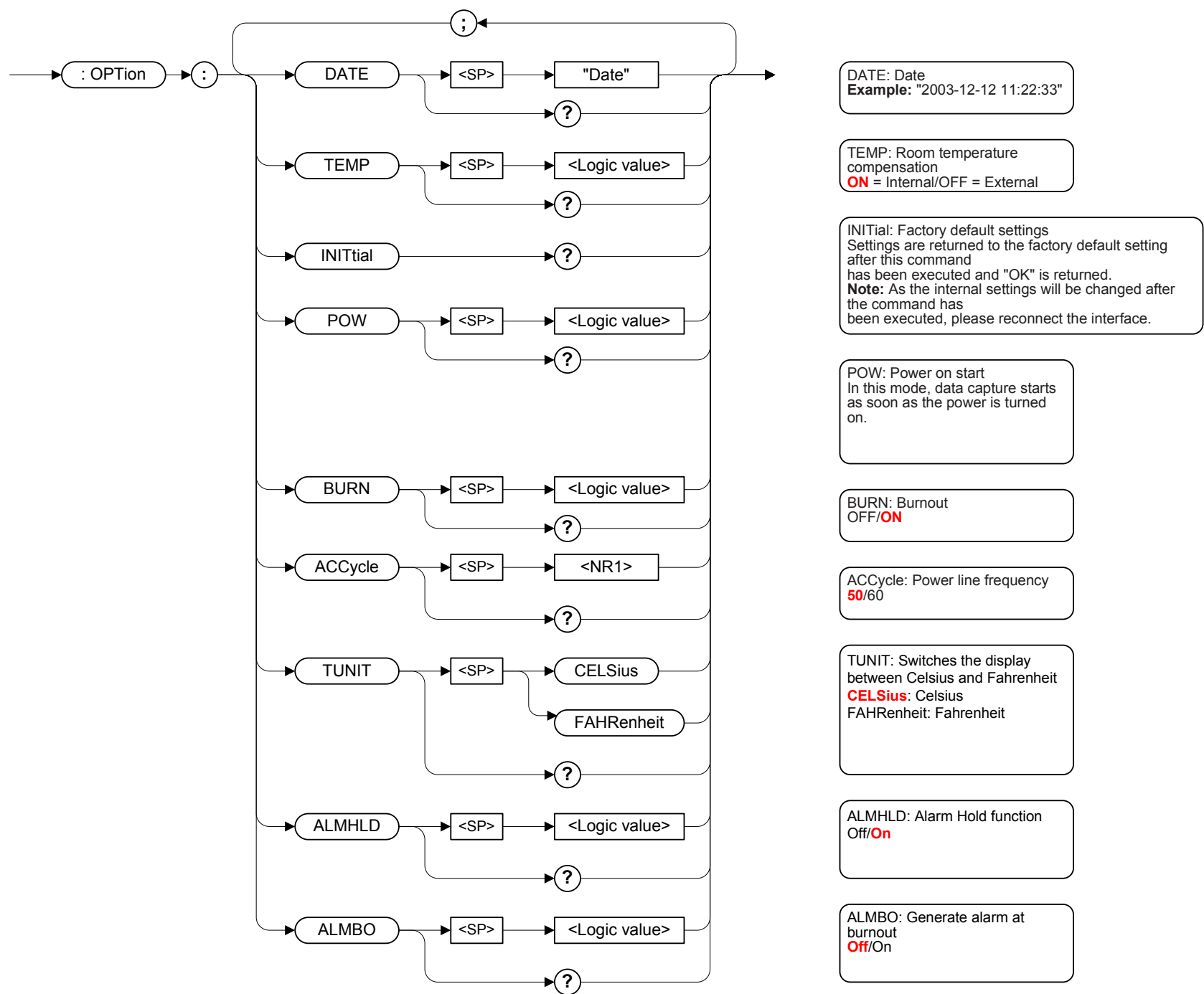
**TRANS:OUTP? Command explanation**  
When transmitting TRANS:OUTP?, the unit returns the following data.  
Header part: #6\*\*\*\*\* (\*\*\*\*\* represents a numeric with the number of bytes excluding the header part and status part.)  
Status part: 2-byte binary data  
First byte: Upper 8 bits of 16-bit status  
Second byte: Lower 8 bits of 16-bit status  
Contents of 16-bit status:  
Bit 0: 1=Error occurred / 0=No error occurred  
Bit 1: 1=The number of transfer-end bytes is invalid / 0=OK  
Bit 2: 1=The number of transfer-start bytes is invalid / 0=OK  
Data part: Data with the number of bytes that has been referred to the header part is transferred.  
  
**TRANS Transfer command procedure**  
1) :FILE:TRANS:SOUR "file path"  
2) :FILE:TRANS:OPNE?  
3) :FILE:TRANS:SIZE?  
4) :FILE:TRANS:OUTP <Start byte>,<End byte>  
5) :FILE:TRANS:OUTP?  
6) :FILE:TRANS:CLOSE?



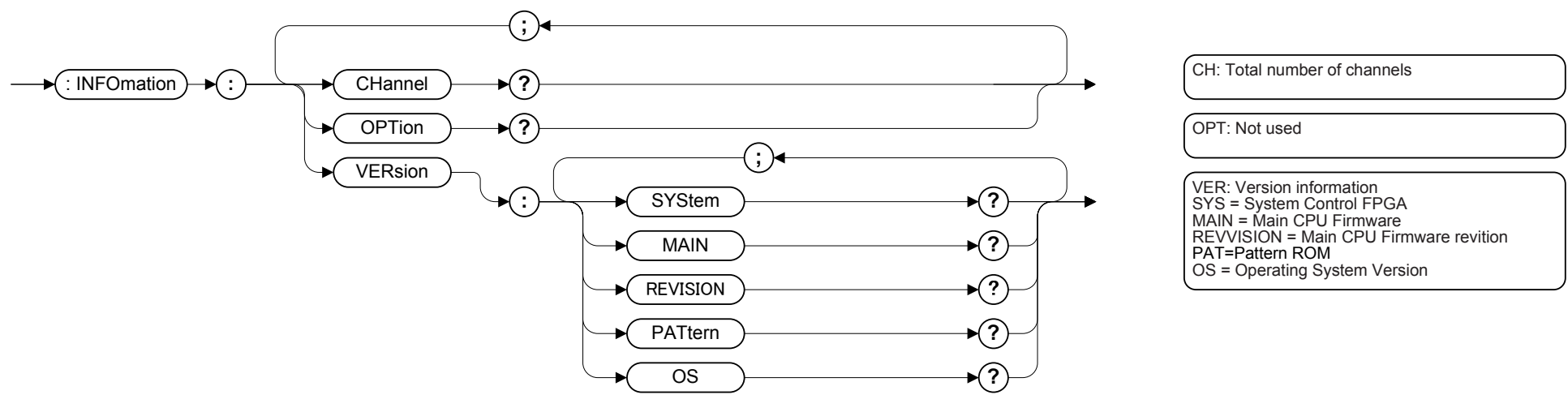
13. IF Group



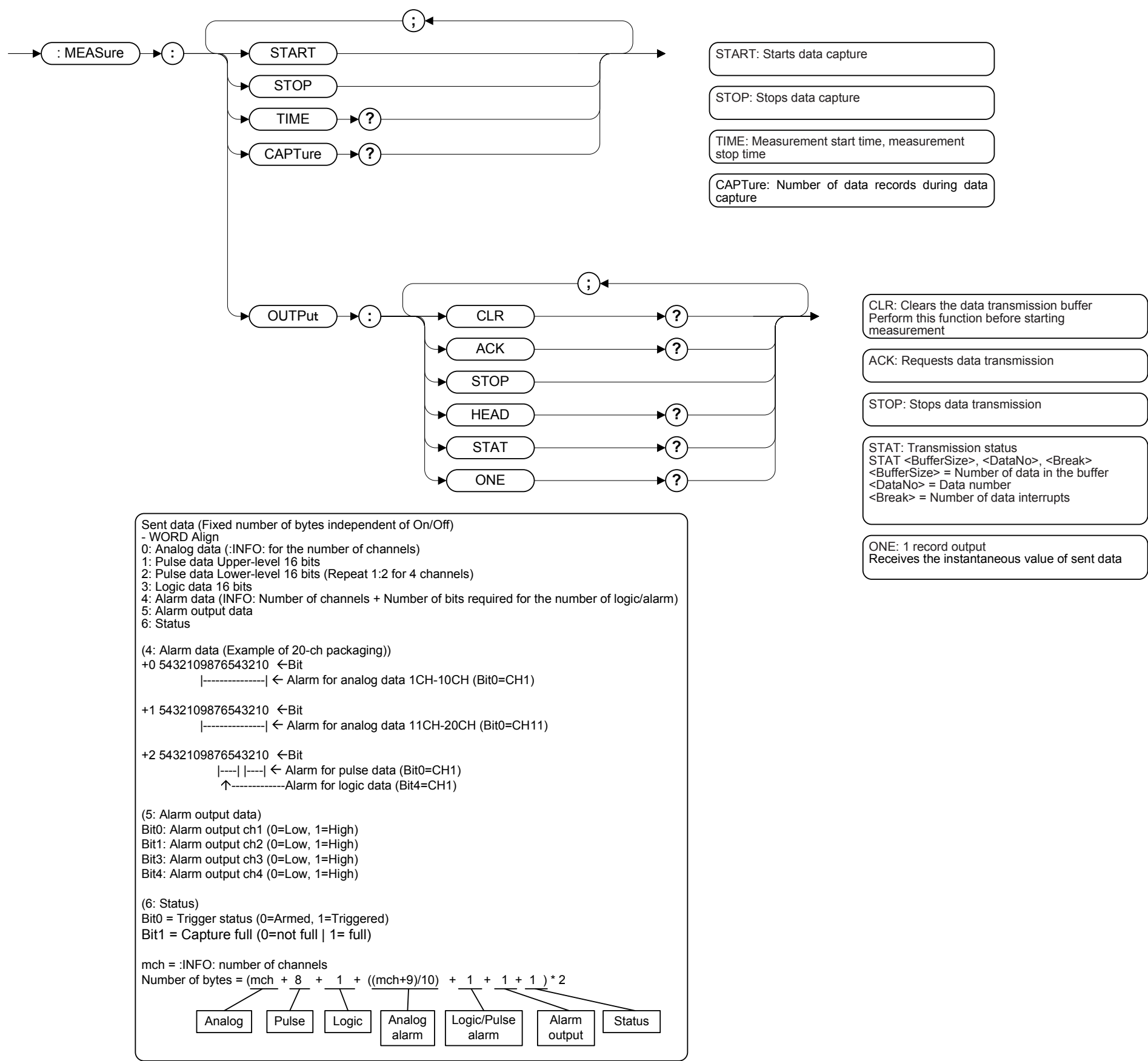
14. OPTion Group



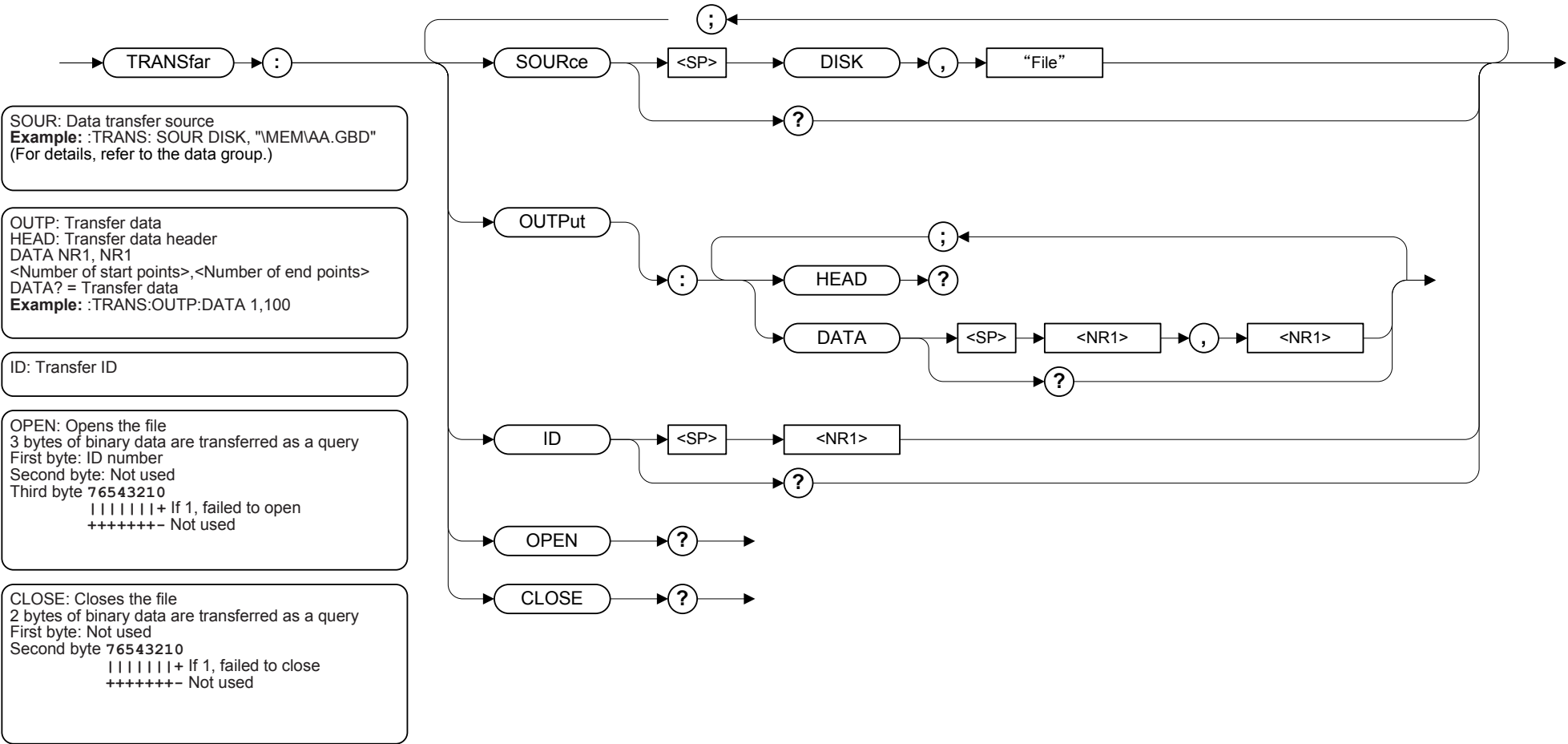
15. INFOrmation Group



16. MEASure Group



17. TRANSfar Group



**OUTP:DATA? Contents**  
#6\*\*\*\*\* (8 bytes, \*\*\*\*\* represents the number of bytes [size to be read out])  
0: Binary status (16 bits, not used)  
↓ ↓ ↓ ↓ Size part repeated ↓ ↓ ↓ ↓  
1: Analog data (excluding channels for which MeasOff has been specified)  
2: Pulse data 1 (Upper-level 16 bits) (None if pulse 1 has been specified as off)  
3: Pulse data 1 (Lower-level 16 bits) (None if pulse 1 has been specified as off)  
4: Pulse data 2 (Upper-level 16 bits) (None if pulse 2 has been specified as off)  
5: Pulse data 2 (Lower-level 16 bits) (None if pulse 2 has been specified as off)  
6: Pulse data 3 (Upper-level 16 bits) (None if pulse 3 has been specified as off)  
7: Pulse data 3 (Lower-level 16 bits) (None if pulse 3 has been specified as off)  
8: Pulse data 4 (Upper-level 16 bits) (None if pulse 4 has been specified as off)  
9: Pulse data 4 (Lower-level 16 bits) (None if pulse 4 has been specified as off)  
10: Logic data (None if logic has been specified as off)  
11: Alarm data (always sent)  
12: Alarm output data (always sent)  
↑ ↑ ↑ ↑ Size part repeated ↑ ↑ ↑ ↑  
13: Checksum (16 bits)

(11: Alarm data (example in the case of 20-channel implementation))  
+0 5432109876543210 bit  
|-----| ← Alarm (Bit 0 = CH1) of analog data of channels 1 through 10

+1 5432109876543210 bit  
|-----| ← Alarm (Bit 0 = CH 11) of analog data of channels 11 through 20

+2 5432109876543210 bit  
|--| |--| ← Alarm (Bit 0 = CH 1) of pulse data  
↑----- Alarm (Bit 4 = CH 1) of logic data  
None when :LOGIPUL:FUNC:OFF

(12: Alarm output data)  
5432109876543210 bit  
|--| ← Alarm output data (Bit 0 = CH1)

**TRANSfer commands**

**SOUR:**  
Selects the file to be transferred from the GL220/GL820 to the PC. Specify a file name that includes the full path.

**OUTPUT:**  
HEAD transfers the header file. DATA sets the start and end points, and DATA? starts data transfer.

**ID:**  
IDs are used when transferring multiple files. This command is used to perform ID setting and searching.

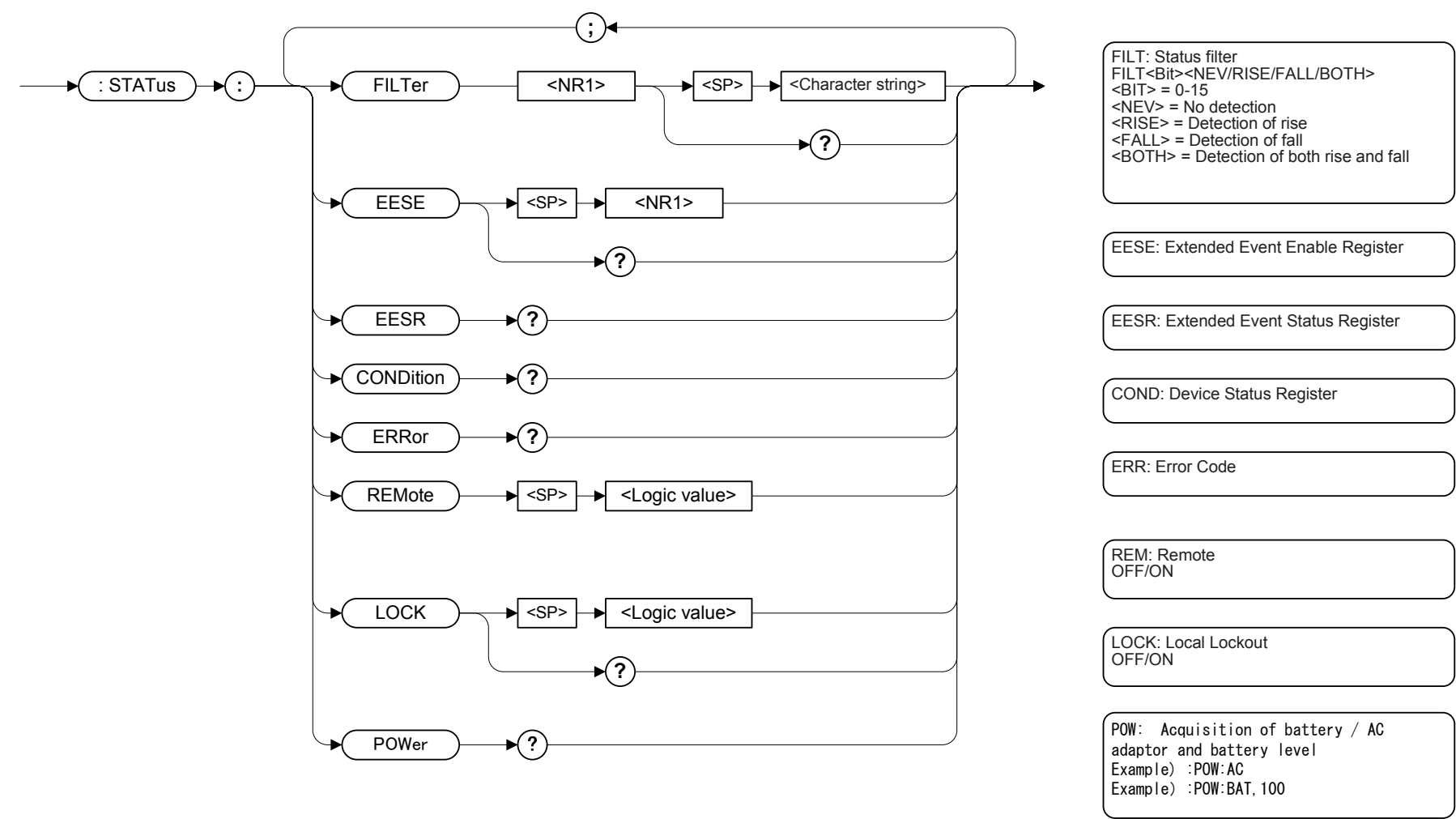
**OPEN:**  
Opens the file that was selected for SOUR. A Query is used to indicate the ID of the opened file, by issuing an ID number (from 1 to 16) for that file when the file is opened. Moreover, when the file is opened, an ID is set for that file in the same way as the ID (ID number) was issued by the ID setting command.

**CLOSE:**  
Closes the open file after the data has been transferred.

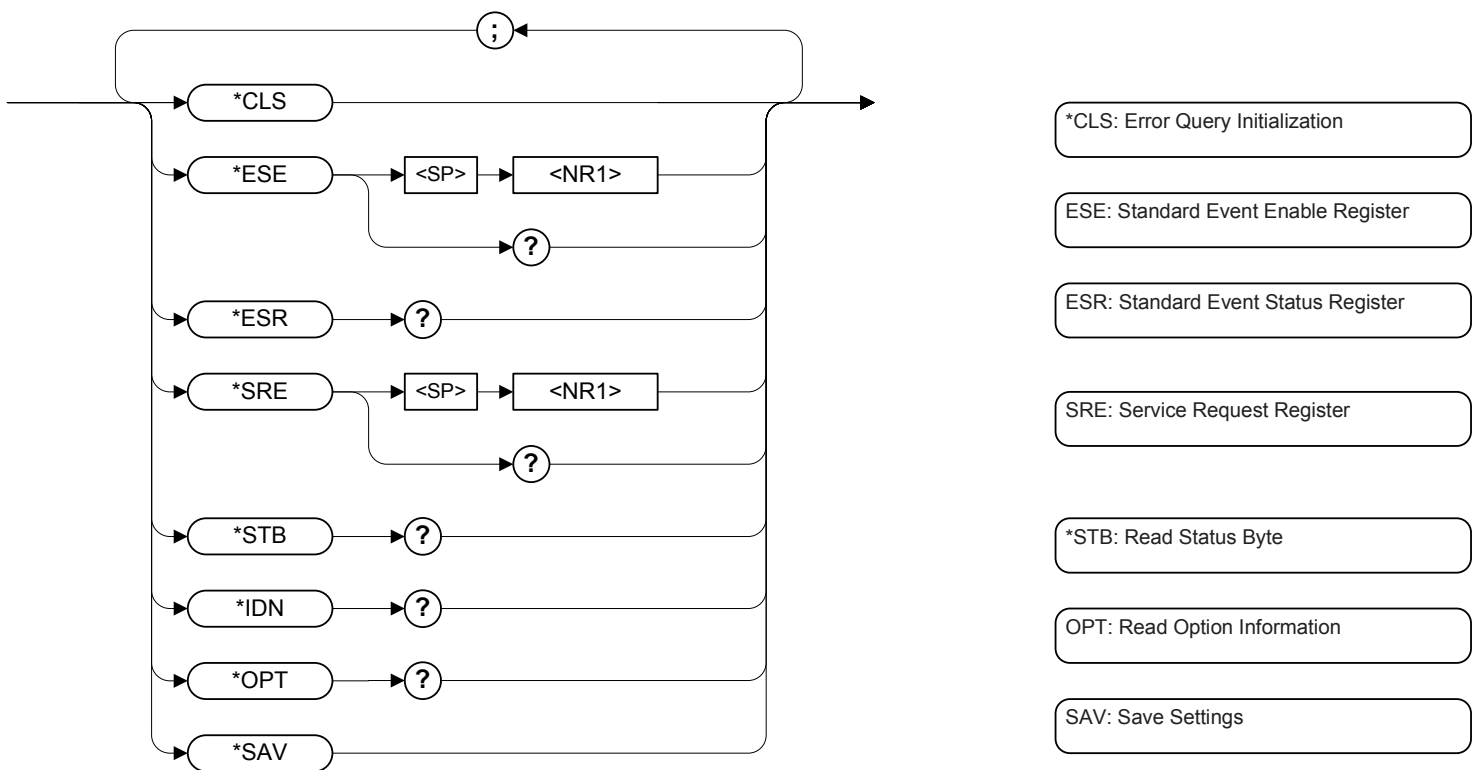
[Normal procedure]:  
1. Specify file as the source of the data you want to transfer.  
2. Use OPEN? to open the file.  
3. Query to return an ID.  
4. Use OUTP:HEAD? to get the header.  
5. Use OUTP:DATA <NR1>,<NR1> to set the file points to get.  
6. Use OUTP:DATA? to get the data.  
7. Use CLOSE to close the file after data transfer.

[ID Usage Example]:  
1. Use SOUR to select file A, then OPEN to open file A (ID1).  
2. Use SOUR to select file B, then OPEN to open file B (ID2).  
3. Use ID1 to set the ID to 1.  
4. Use OUTP:HEAD? to get the file A header.  
5. Use ID2 to set the ID to 2.  
6. Use OUTP:HEAD? to get the file B header.  
7. Set the ID to ID1.  
8. Use OUTP: DATA<NR1>,<NR1> to set the file A points.  
9. Set the ID to ID2.  
10. Use OUTP: DATA<NR1>,<NR1> to set the file B points.  
11. Set the ID to ID1.  
12. Use OUTP: DATA? To get the file A data.  
13. Set the ID to ID2.  
14. Use OUTP: DATA? to get the file B data.  
15. Set the ID to ID1.  
16. Use CLOSE to close file A.  
17. Set the ID to ID2.  
18. Use CLOSE to close file B.

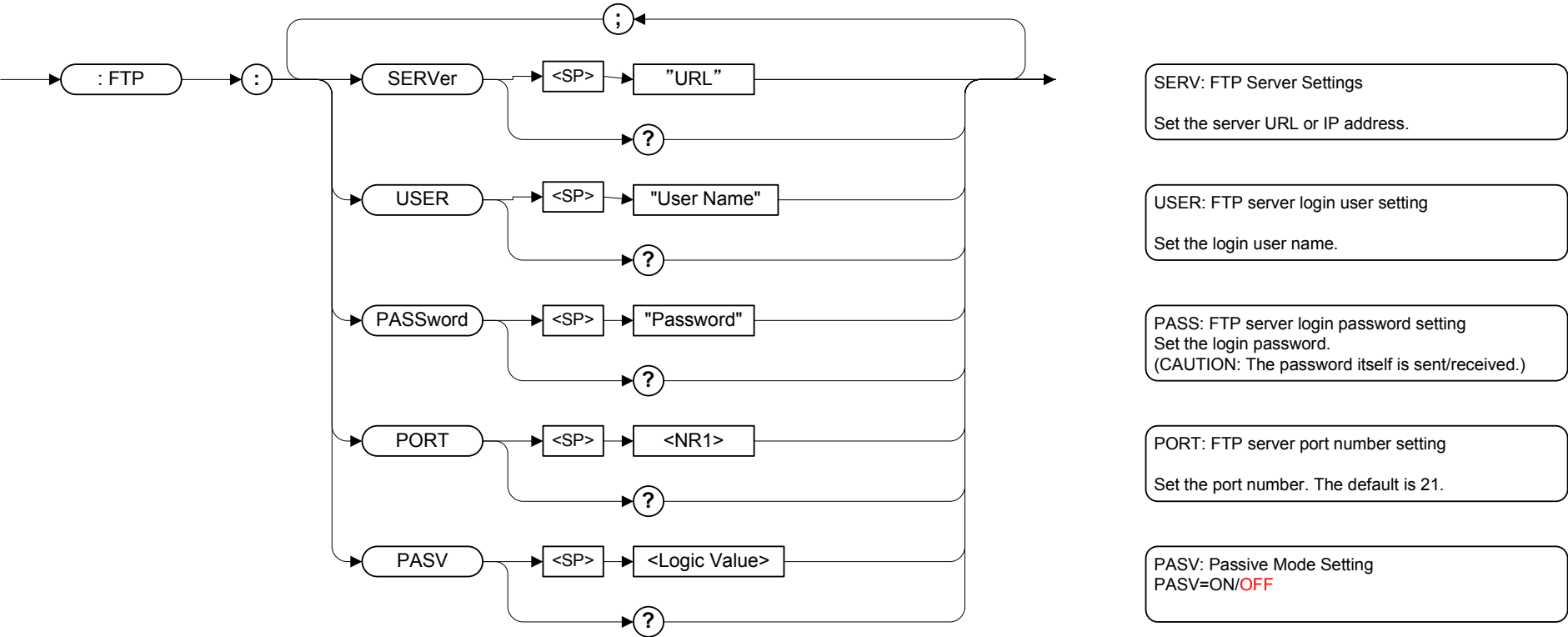
18 STATus Group



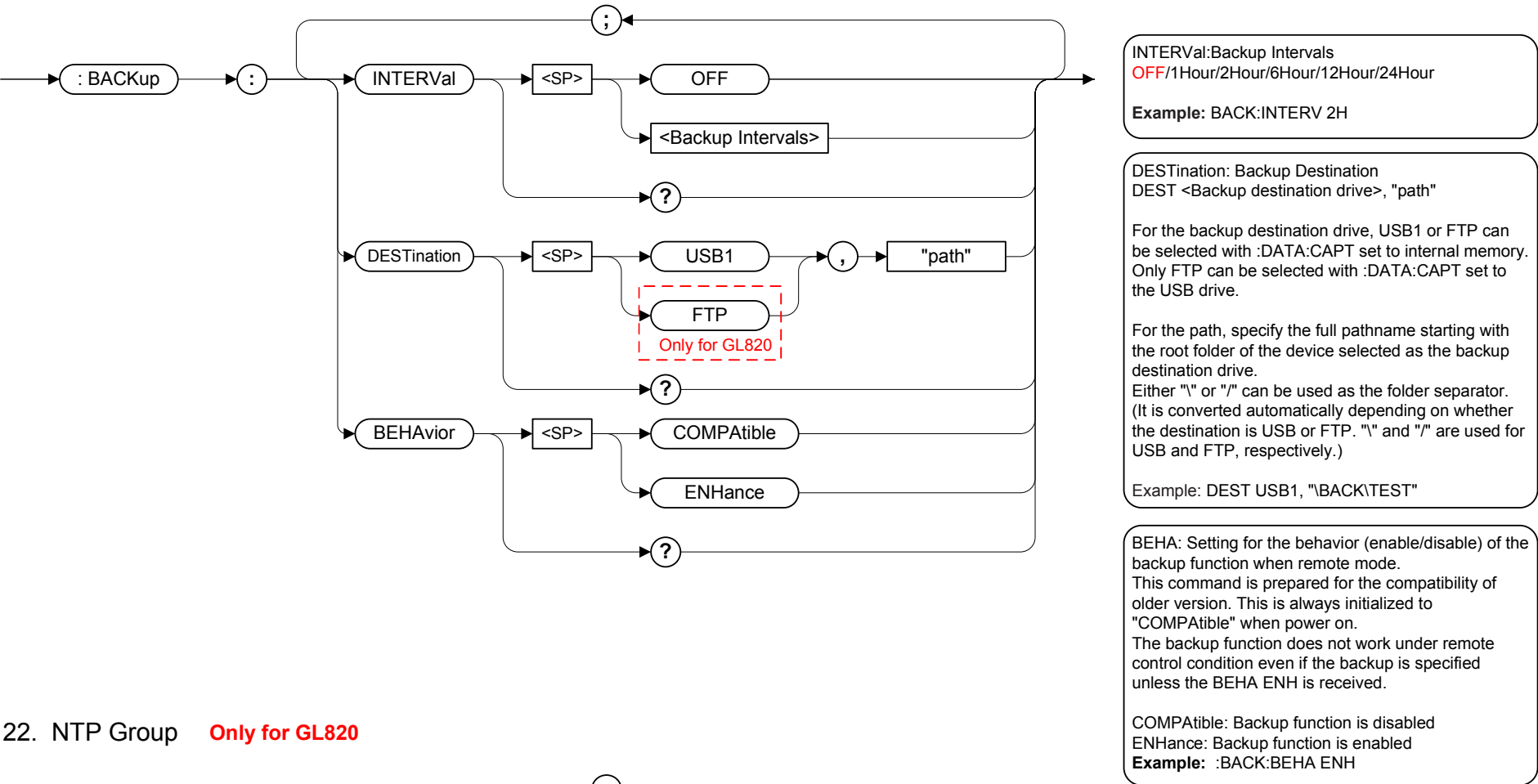
19. COMMON Commands



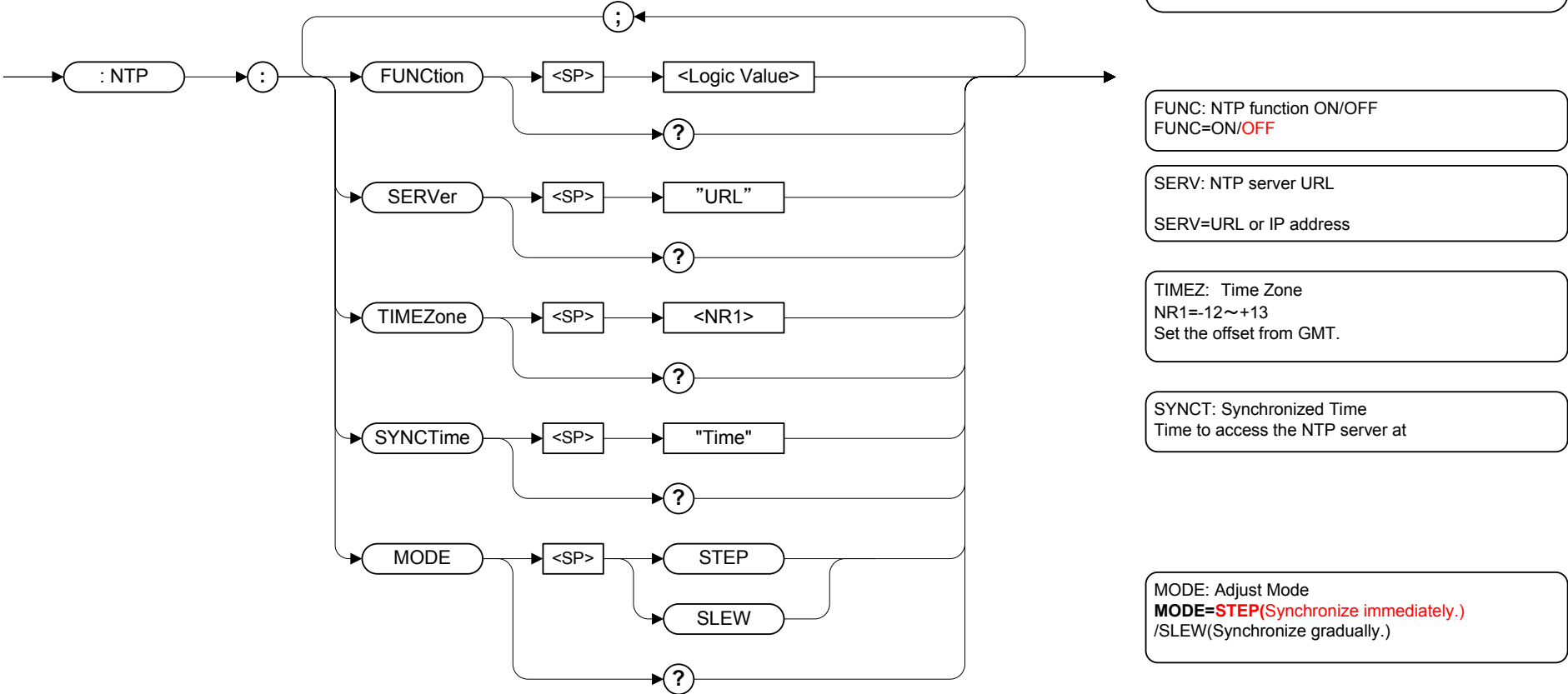
20. FTP Group    Only for GL820



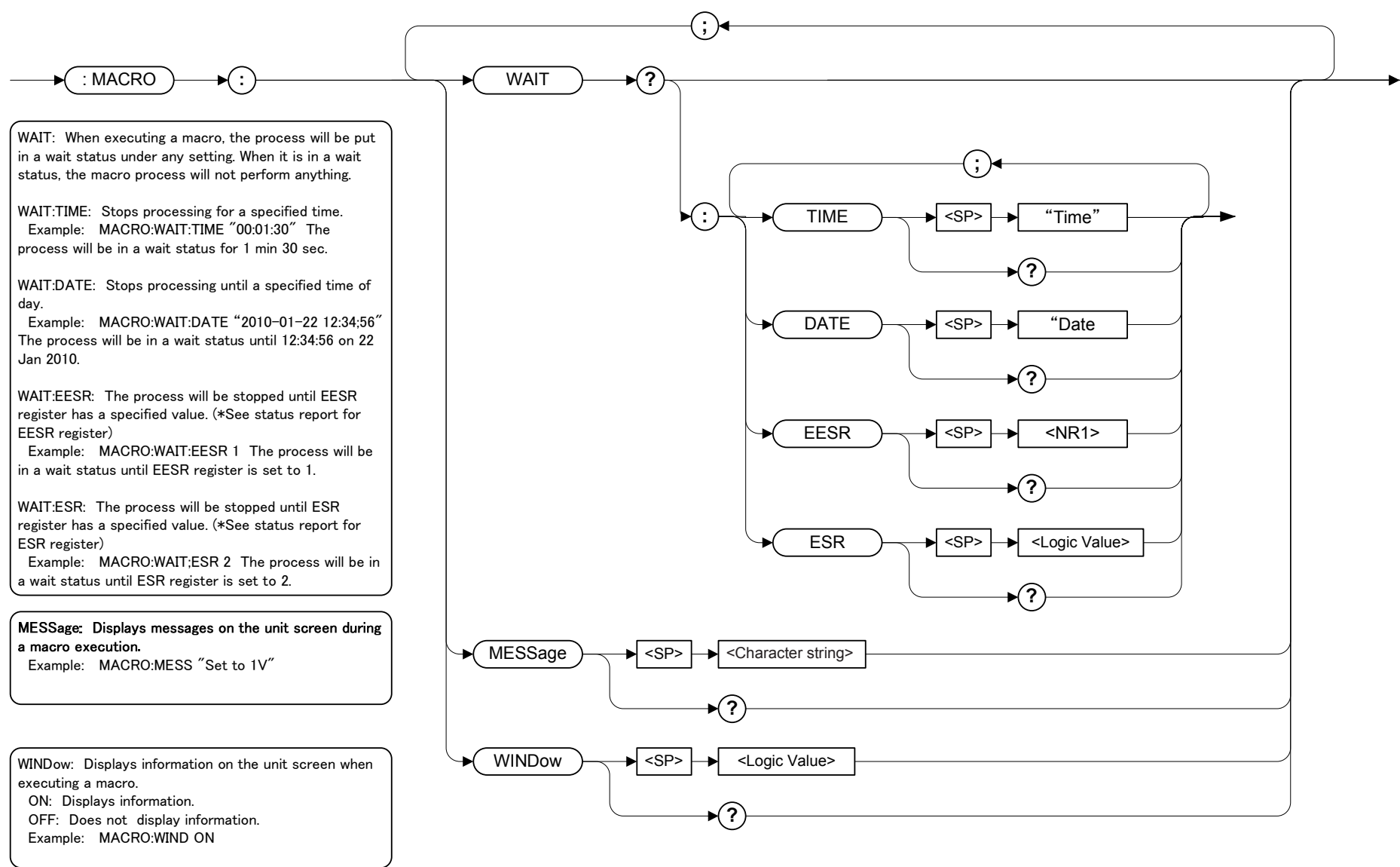
21. BACKUP Group



22. NTP Group    Only for GL820



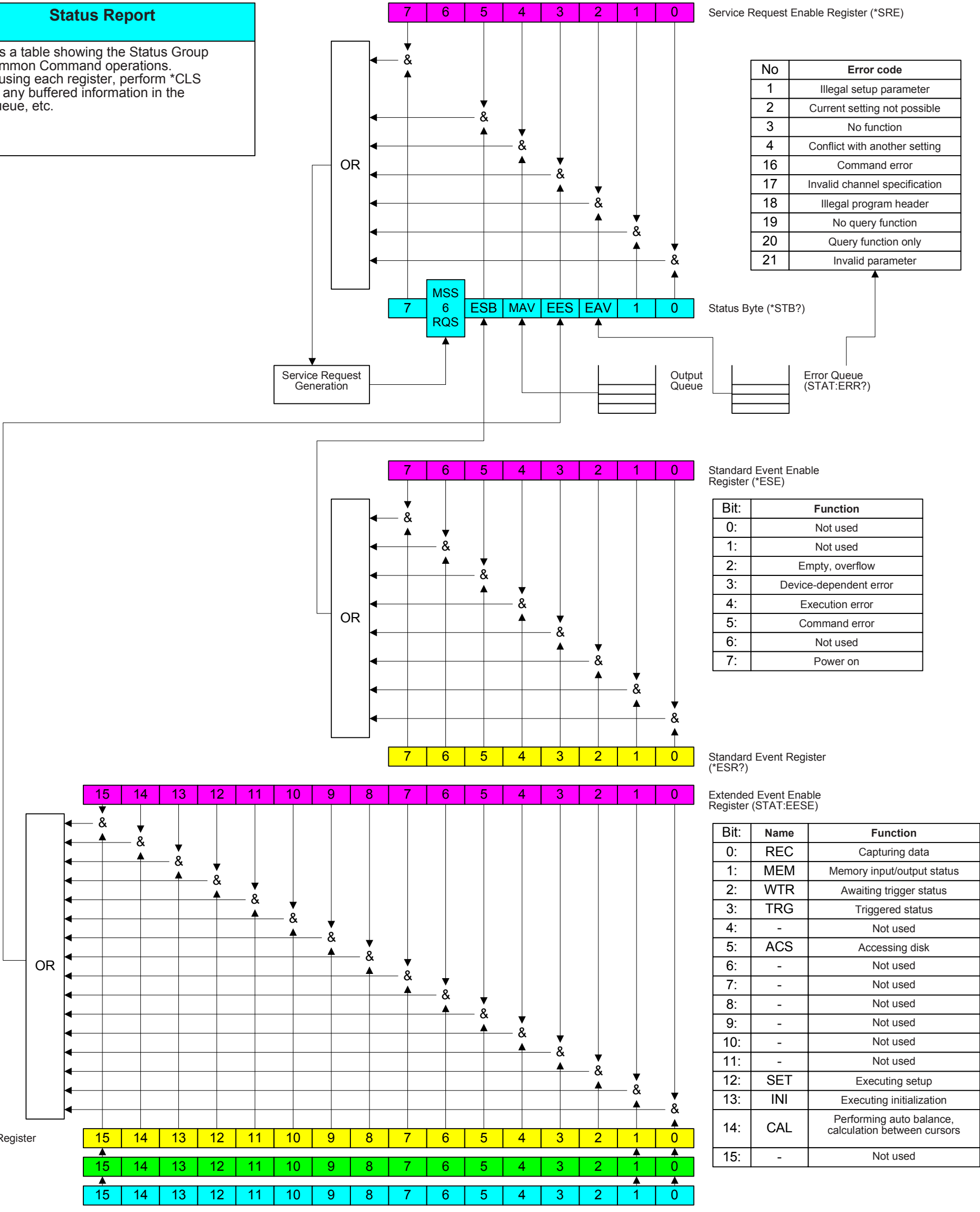
23. MACRO Group





Status Report

Displays a table showing the Status Group and Common Command operations. Before using each register, perform \*CLS to clear any buffered information in the error queue, etc.



## Command Example

### Example 1: Captured to Device memory. No data received in PC.

CH1: Voltage, 1V range, filtered  
CH2: Temperature, T thermocouple  
CH3-CH10: Not used  
Sampling period: 1 second

01. :AMP:CH1:INP DC	Set CH1 input
02. :AMP:CH1:RANG 1V	Set CH1 range
03. :AMP:CH1:FILT ON	Set CH1 filter
04. :AMP:CH2:INP TEMP	Set Ch2 input
05. :AMP:CH2:RANG TCT	Set CH2 thermocouple
06. :AMP:CH3:INP OFF	Set CH3 input Off Set Ch4 to CH10 similarly
07. :DATA:SAMP 1S	Set Sampling period
08. :DATA:CAPT DISK," \MEM\TEST.GBD"	PC card settings. "" indicates location of PC card and file name. (Optional)
09. :MEAS:START	Start capture
==Capture time==	
13. :MEAS:STOP	Stop capture

### Example 2: PC receives all capture data. Trigger is used and only the data after the trigger is captured.

See Example 1 for AMP settings.  
Sampling period: 1 second  
Trigger: Rising edge of 100 mV

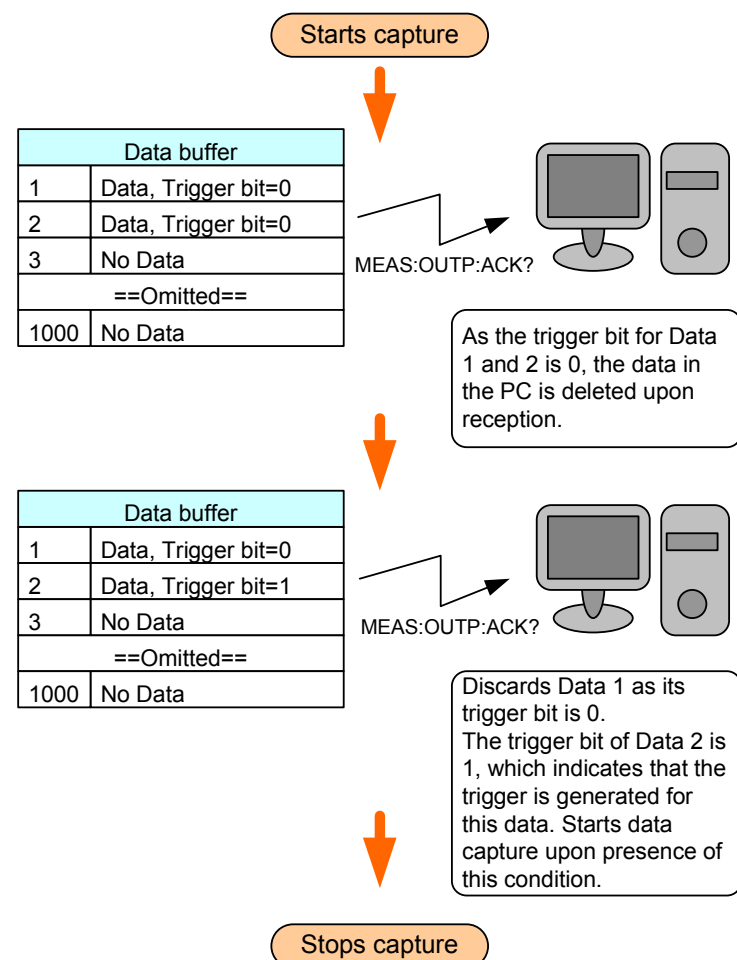
01. :DATASAMP 1S	Set Sampling period
02. :TRIG:COND0:SOUR INTERN :TRIG:COND0:CH:HI,100MV	Set trigger
03. :MEAS:OUTP:HEAD?	Capture header data (When the PC creates a GBD (binary) file that can be handled by the device and the attached application, the header data must to be added to the file head. After the capture, the number of data files and the end time is added to the header.)
04. :MEAS:START	Start capture
05. :MEAS:OUTP:ACK?	Data reception When using the trigger, occasionally check the status of the trigger bit in the data received. When the trigger bit is 0, remove the data as the data is received before the trigger. Capture data to file after the trigger bit turns to 1.  As this command sends all data stored in the buffer (up to 1,000 files), it must be executed before the buffer is full.
==Capture time (Repeat 05.)==	
05. :MEAS:STOP	Stop capture

### Example 3: Data received in an arbitrary interval. Data not captured to device.

See Example 1 for AMP settings.  
Sampling period: 100 ms

01. :MEAS:OUTP:ONE?	Receive 1 record
==Time elapsed==	
02. :MEAS:OUTP:ONE?	Receive 1 record
==The same process repeated==	

## How to use trigger bit



## Creation of GBD file

