User's Manual

DL7200
Digital Oscilloscope
CAN Bus Signal Analysis Function

IM 701430-51E

YOKOGAWA
Yokogawa Electric Corporation

IM 701430-51E
2nd Edition

Thank you for purchasing the DL7200 Digital Oscilloscope with the CAN Bus Signal Analysis Function. This user's manual describes only the Can Bus analysis function. For information about other functions, operating procedures, and handling precautions of the DL7200, see the following manuals:

Manual Title	Manual No.	Description
DL7100/DL7200 User's Manual	IM701410-01	Explains all functions and procedures of the DL7100/DL7200 excluding the communication functions.
DL7100/DL7200GP-IB Interface User's Manual	IM701410-11	Describes the communication functions of the communication interface.
DL7100/DL7200	IM701410-02	Explains only the basic operations of the instrument.

Notes

- The contents of this manual are subject to change without prior notice as a result of improvements in the instrument's performance and functions. The figures given in this manual may differ from the actual screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer as listed on the back cover of this manual.
- Copying or reproducing all or any part of the contents of this manual without the permission of Yokogawa Electric Corporation is strictly prohibited.
- A guarantee card is attached to the instrument. The card will not be reissued, so please read it carefully and keep it in a safe place.

CAN Bus Signal Analysis Function

CAN stands for Controller Area Network. It is a serial communication protocol standardized internationally by the ISO (International Organization for Standardization).
In communications that use CAN, analysis of the physical layer of the CAN Bus is required when troubleshooting problems that occur due to noise caused by surge voltage and level fluctuations caused by excessive load after connection. By using this function, data can be analyzed while displaying the signal waveforms on the CAN Bus as analog waveforms. In addition, synchronized monitoring of the data on the bus and the analog waveform is possible.
The CAN Bus signal analysis function consists of the following four functions.

- Trigger Function
  Acquires signals using the Identifier and Data values of the CAN Bus frame as trigger conditions. Triggers can also be activated according to the frame type.
- Waveform analysis function
  Displays the Identifier and Data values of the acquired waveform in hexadecimal or binary notation for each frame. Frame type, error type, and other information can also be displayed simultaneously. Stuff bits can also be detected. The analysis results can be output to a file in ASCII format.
- Search function
  You can search data that match a specified data pattern (dominant, recessive, indefinite data) and display the result.
- Field Jump function
  The beginning of the waveform of the specified field can be displayed.

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Contents

1. Connecting a Probe

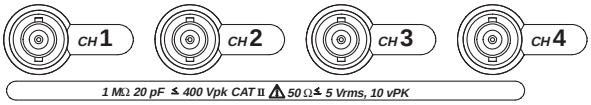
Input Terminals

A probe (or an input cable such as a BNC cable) must be connected to one of the input terminals* (CH1 to CH4) located on the lower section of the front panel.
The input impedance is 1 MΩ ±1.0% and approximately 20 pF or 50 Ω ±1.0%.

* The number of input terminals varies according to machine model.

CAUTION

- The maximum allowable input voltage is 400 V (DC + AC peak) or 282 Vrms when the frequency is 1 kHz or less. Never input a voltage exceeding this level, as it could damage the input section of the instrument. If the frequency exceeds 1 kHz, the input section may be damaged even when the voltage is below 400 V.
- The maximum allowable input voltage is 5 Vrms or 10 Vpeak when using 50-Ω input. Never input voltage exceeding this level, as it could damage the input section of this instrument.



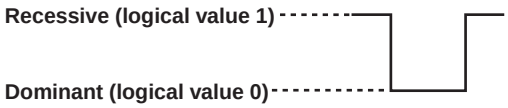
Points to Note when Connecting a Probe

- When measuring the CAN Bus signal, connect to CH1 using a differential probe (recommended differential probe: 701920 by YOKOGAWA). The power to the differential probe (701920) can be connected to the “PROBE POWER” terminal on the rear panel of the DL7200.
- When connecting a probe to the instrument for the first time, perform phase correction of the probe as described in the section 3.5, “Compensating the Probe (Phase Correction)” in the *DL7100/DL7200 User’s Manual IM701410-01E*. Failure to do so may result in unstable gain across different frequencies, thereby preventing correct measurement. Calibration must be performed for each channel.
- If the object to be measured is connected to the instrument directly, without using a probe, correct measurement cannot be performed due to the load effect.

Connection Method of the Differential Probe

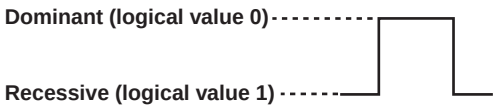
The CAN Bus has two logical values, dominant and recessive.
Depending on how the differential probe is connected, the voltage level of either dominant or recessive can be displayed higher.
However, the DL7200 handles the dominant logical value as 0 and recessive logical value as 1. Change the Vdiff setting in the trigger condition menu and analysis/search menu according to how the probe is connected.

When setting the recessive voltage level higher than the dominant level (Vdiff = CAN_L–CAN_H)



For a two-wire system (differential), connect the wires as follows:
Connect the differential probe negative (–) to CAN_H.
Connect the differential probe positive (+) to CAN_L.
For a single-wire system (single-ended), connect the wires as follows:
Connect the differential probe negative (–) to CAN_H.
Connect the differential probe positive (+) to GND (earth potential).

When setting the dominant voltage level higher than the recessive level (Vdiff = CAN_H–CAN_L)



For a two-wire system (differential), connect the wires as follows:
Connect the differential probe negative (–) to CAN_L.
Connect the differential probe positive (+) to CAN_H.
For a single-wire system (single-ended), connect the wires as follows:*
Connect the differential probe positive (–) to GND (earth potential).
Connect the differential probe positive (+) to CAN_H.

* In this case the passive probe can be connected to CAN_H.

2. Setting the Trigger Conditions

Function

The CAN Bus signal analysis function uses a dedicated trigger for acquiring waveforms.

Setting the Trigger Pattern

Setting the Bit Rate

Select the CAN Bus transfer rate.

Selectable values: 1 M, 500 k, 250 k, 125 k, 100k, 83,3 k, 50 k, and 33.3 kbps

Setting the Sample Point

Specify the sample point within the bit time.

Selectable values: 18.8, 21.9, 25.0, 28.1, 31.3, 34.4, 37.5, 40.6, 43.8, 46.9, 50.0, 53.1, 56.3, 59.4, 62.5, 65.5, 68.8, 71.9, 75.0, 78.1, 81.3, 84.4, 87.5, and 90.6 (%)

Setting the Message Format

Std: Standard format

Ext: Extended format

Setting Vdiff

Select the connection method of the differential probe. See section 1, “Connecting the Probe.”

Select Vdiff from the following two types. In either case, the logical value is recessive = 1 and dominant = 0.

CAN_L–CAN_H: The recessive electric potential is set higher than the dominant electric potential.

CAN_H–CAN_L: The dominant electric potential is set higher than the recessive electric potential.

Note

The bit rate, sample point, and Vdiff settings are synchronized with the analysis menu (section 4, “Analyzing and Searching”).

Setting the Pattern Format

Set the format of the Identifier field and the Data field.

Hex: Hexadecimal

Bin: Binary

Activating the Trigger on Fields and Frames

Specify the type of CAN signal field or frame to be used as trigger conditions from the following five types. The trigger is activated on the AND condition of the five types (combination trigger). However, RTR and Data Field cannot be specified in combination.

- Start of Frame: Activates the trigger on the Start of Frame. The trigger point is set to the end of the Start of Frame.
- Identifier: Activates the trigger on an Identifier matching the specified condition. The trigger point is set to the end of the Identifier.
- RTR: Activates the trigger on a remote frame (RTR is recessive). The trigger point is set to the end of the RTR bit.
- Data Field: Activates the trigger on a data field matching the specified condition. The trigger point is set to the end of the data field.
- Error Frame: Activates the trigger on an error frame. The DL7200 considers 6 successive dominant bits as an error frame trigger condition. Therefore, a trigger occurs if 6 successive dominant bits occur in an overload frame. The trigger point is set to the end of the 6^{th} bit.

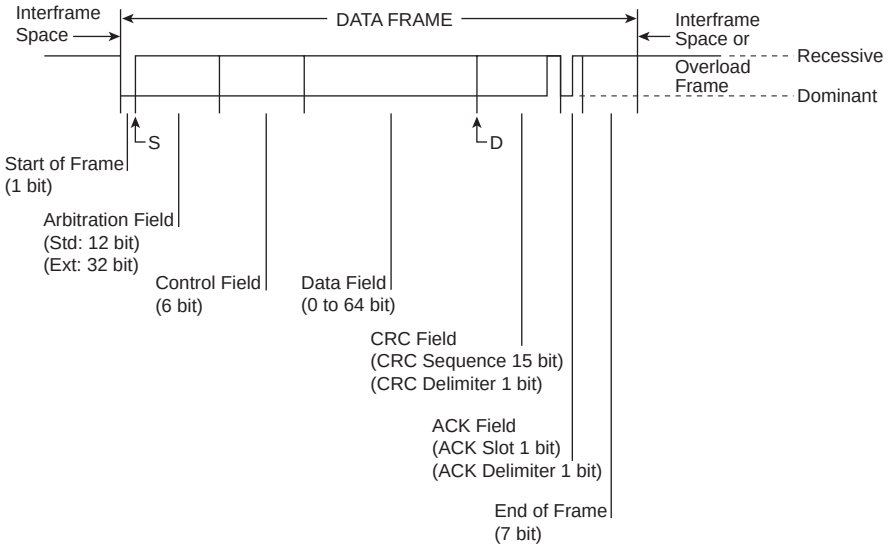
If multiple field and frame types are combined, the trigger point is set to the trigger point of the type that appeared last in the time sequence.

If you specified Identifier or Data Field, specify the bit pattern.
When using hexadecimal notation, enter X or 0 through F in units of 4 bits.
When using binary notation, enter X, 0, or 1.

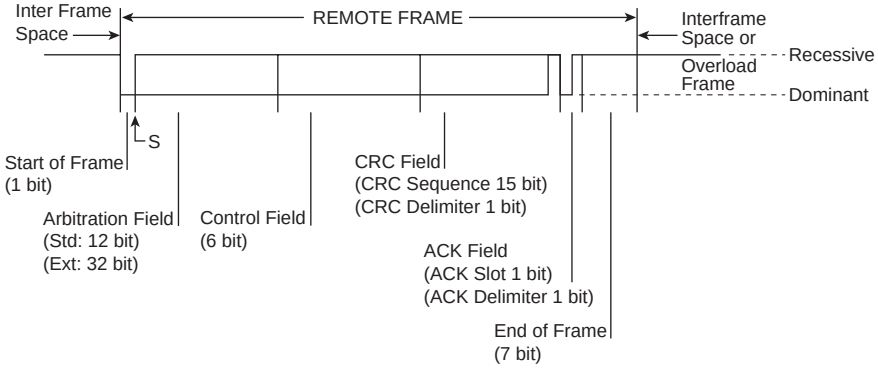
The following figure shows the field and frame formats and trigger position.

S: Trigger position of the Start of Frame
I: Trigger position of the Identifier
R: Trigger position of RTR
D: Trigger position of the Data Frame
E: Trigger position of the Error Frame

- Data frame

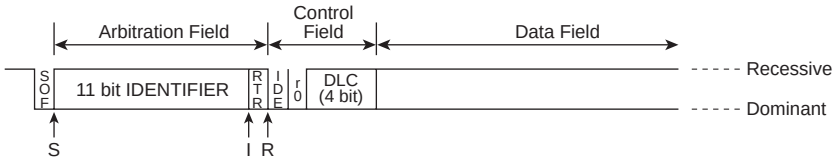


- Remote frame

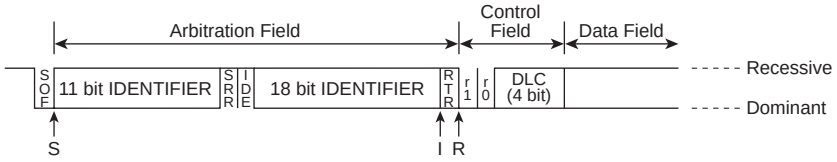


- Standard format and extended format of the data frame and remote frame

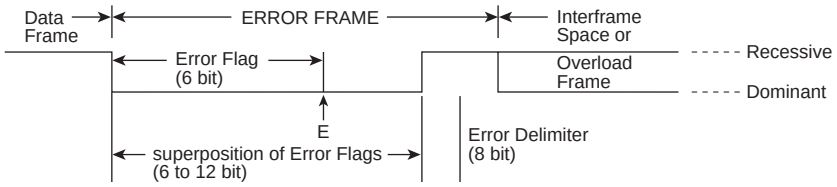
Standard Format



Extended Format



- Error frame



Setting the Identifier Field

- Selecting the condition

  Select from the following:

  True: Trigger occurs when any of the 4 bit patterns is met.

  False: Trigger occurs on a bit pattern other than the four patterns.

- Setting the bit pattern

  Four bit patterns can be specified. A trigger is activated on the OR condition (any of ID1, ID2, ID3, and ID4).

  The number of specified bits varies depending on the format type as follows:

  Standard format: 11 bits (maximum value is 7FF when set to hexadecimal)

  Extended format: 29 bits (maximum value is 1FFFFFFF when set to hexadecimal)

  If Identifier is enabled (ON) and all the bits of the ID field is set to X, the trigger does not occur. The trigger does not occur even when combined with other field and frame types in this condition. In addition, when X is included in the bit pattern, the trigger point is set to the end of the Identifier in the same fashion as when 0, 1 is set to the bit pattern.

Setting the Data Field (DLC)

- Setting the number of valid bytes
  Set the number of valid bytes between 1 and 8. A trigger is activated only on a frame having a Data Field with the specified number of bytes.

- Selecting the condition
  Select the condition from the following four types. Greater and Less can be used only when the data flows from the highest byte (big endian) on the bus.
  True: Trigger is activated when the bit pattern is met.
  False: Trigger is activated when the bit pattern is not met.
  Greater: Trigger is activated when the value of the data flowing on the bus is greater than the specified value.
  Less: Trigger is activated when the value of the data flowing on the bus is less than the specified value.

- Setting the bit pattern
  Set up to 64 bits.
  Hex entry: X, 0 through F, –*
  Bin entry: X, 0, 1, –*
  If Data Field is enabled (ON) and all the bits of the Data Field is set to X, the trigger does not occur. The trigger does not occur even when combined with other field and frame types in this condition. In addition, when X is included in the bit pattern, the trigger point is set to the end of the Data Field in the same fashion as when 0, 1 is set to the bit pattern.
  * If the number of valid bytes is less than 7, the invalid byte is displayed as "–" and cannot be changed.

Note

- RTR and Data Field cannot be turned ON simultaneously. If Data Field is turned ON when RTR is ON, RTR is turned OFF; if RTR is turned ON when Data Field is ON, Data Field is turned OFF.
- The trigger function of the DL7200 does not support the case when the standard format and extended format are mixed on the CAN bus. The trigger is not activated correctly in such case.

Setting the Trigger Level

The trigger source is fixed to CH1 for the CAN Bus signal analysis function. Set the threshold level and coupling of CH1.

Setting the Trigger Level (Level)

Selectable Range: 8 div within the screen
Resolution: 0.01 divisions.
For example, the resolution for 2 mV/div is 0.02 mV.

Setting the Hysteresis (Hys)

Sets a width to the trigger level so that triggers are not activated by small changes in the trigger signal.

 : Approximately 0.3 div* of hysteresis around the trigger level.

 : Approximately 1 div* of hysteresis around the trigger level.

* The value above is an approximate value. It is not strictly guaranteed.

Setting the Trigger Coupling

Select the trigger coupling from the following list of choices.

AC: Uses a signal that is obtained by removing the DC component from the trigger source signal.

DC: Uses the trigger source signal as-is.

Turn ON/OFF the HF Rejection (HF Rej)

Specify 15 kHz or 20 MHz if you wish to use a signal that is obtained by removing the high frequency components (frequency components greater than 15 kHz or 20 MHz) from the trigger source signal as the trigger source.

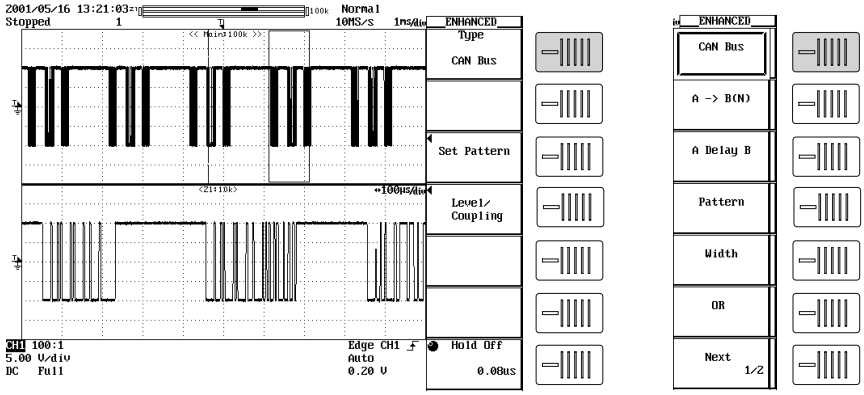
Setting the Hold Off

See section 6.4, “Setting the Hold Off Time” in the *DL7100/DL7200 User’s Manual (IM701410-01E).*

Operating Procedure

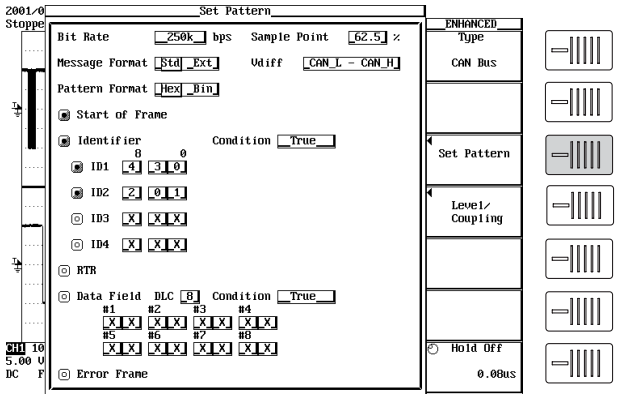
Setting the Trigger Type

1. Press the “ENHANCED” key.
2. Press the “Type” soft key displays the trigger type selection menu.
3. Press the “CAN Bus” soft key.



Setting the Trigger Pattern

4. Press the “Set Pattern” soft key to display a dialog box for setting the trigger pattern.



5. Turn the jog shuttle to move the cursor to “Bit Rate.”
6. Press the “SELECT” key.
7. Turn the jog shuttle to select “1M,” “500k,” “250k,” “125k,” “100k,” “83.3k,” “50k,” or “33.3k.” Press the “SELECT” key to confirm the setting. Pressing the “RESET” key will reset the value to 500k.
8. Turn the jog shuttle to move the cursor to “Sample Point.”
9. Press the “SELECT” key.
10. Turn the jog shuttle to set the sample point. Press the “SELECT” key to confirm the setting. Pressing the “RESET” key will reset the value to 62.5.

11. Turn the jog shuttle to move the cursor to “Message Format.”
12. Press the “SELECT” key to select “Std” or “Ext.”
13. Turn the jog shuttle to move the cursor to Vdiff.
14. Press the “SELECT” key.
15. Turn the jog shuttle to select “CAN_H–CAN_L” or “CAN_L–CAN_H” and press the “SELECT” key.
16. Turn the jog shuttle to move the cursor to Pattern Format.
17. Press the “SELECT” key to select “Hex” or “Bin”.

Selecting the Field or Frame Type

18. Turn the jog shuttle to move the cursor to the field type or frame type to be used as a trigger condition. Select the type from “Start of Frame,” “Identifier,” “RTR,” “Data Field,” and “Error Frame.”
19. Press the “SELECT” key to turn it ON.

When Identifier Is Selected as a Trigger Condition

20. Turn the jog shuttle to move the cursor to **“**Condition.”
21. Press the “SELECT” key the appropriate number of times to select “True” or “False.”
22. Turn the jog shuttle to move the cursor to the Identifier (ID1, ID2, ID3, or ID4) on which to set the bit pattern.
23. Press the “SELECT” key to turn it ON.
24. Turn the jog shuttle to move the cursor to the desired bit and press the “SELECT” key.
25. If you selected Hex for Pattern Format, turn the jog shuttle to select a value from “0” to “F” and “X” and press the “SELECT” key. Pressing the “RESET” key will reset the value to “X.”
    If you selected Bin for Pattern Format, press the “SELECT” key the appropriate number of times to select “0,” “1,” or “X.”
26. Repeat steps 19 to 22 as many times as necessary.

When Data Field Is Selected as a Trigger Condition

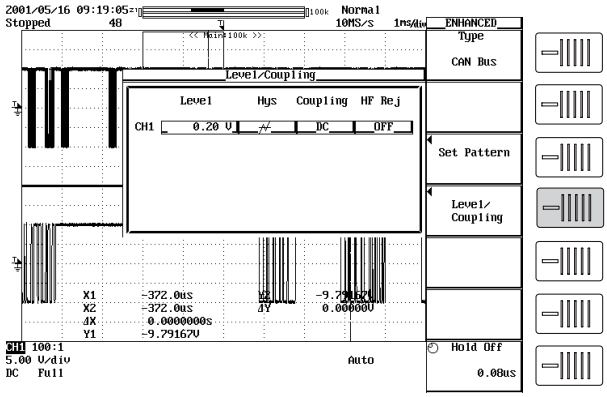
27. Turn the jog shuttle to move the cursor to “DLC.”
28. Press the “SELECT” key.
29. Turn the jog shuttle to set the number of valid bytes. Press the “SELECT” key to confirm the setting. Pressing the “RESET” key will reset the value to 8.
30. Turn the jog shuttle to move the cursor to “Condition.”
31. Press the “SELECT” key.
32. Turn the jog shuttle to select “True,” “False,” “Greater,” or “Less” and press the “SELECT” key.
33. Turn the jog shuttle to move the cursor to the desired bit.
34. If you selected Hex for Pattern Format, turn the jog shuttle to select a value from “0” to “F” and “X” and press the “SELECT” key. Pressing the “RESET” key will reset the value to “X.”
    If you selected Bin for Pattern Format, press the “SELECT” key the appropriate number of times to select “0,” “1,” or “X.”

Note

RTR and Data Field cannot be turned ON simultaneously. If either one is turned ON, the other is turned OFF.

Setting the Trigger Level

1. Carry out steps 1 to 3 in “Setting the Trigger Type” on page 7.
2. Press “Level/Coupling” soft key to display a dialog box used to set the trigger level, hysteresis, coupling, and HF rejection.



Note

CH1 is the only trigger source for the CAN Bus signal analysis function.

Setting the level

3. Turn the jog shuttle to move the cursor to “Level1.”
4. Press the “SELECT” key to display the level selection menu.
5. Turn the jog shuttle to set the level.
   You can move between the digits using the arrow keys. Pressing the “RESET” key resets the trigger level to 0 V.

Setting the Hysteresis

6. Turn the jog shuttle to move the cursor to “Hys.”
7. Press the “SELECT” key to select “ ” or “ .”

Setting the Trigger Coupling

8. Turn the jog shuttle to move the cursor to “Coupling.”
9. Press the “SELECT” key to select “DC” or “AC.”

Setting the HF Rejection

10. Turn the jog shuttle to move the cursor to “HF Rej.”
11. Press the “SELECT” key to select “OFF,” “20MHz,” “15kHz.”

Setting the Hold Off

12. If the jog shuttle control is not set to “Hold Off,” press the “Hold Off” soft key.
13. Turn the jog shuttle to set the hold off time.
    You can move between the digits using the arrow keys. Pressing the “RESET” key resets the hold off time to 0.08us.

3. Setting the Cursor

Function

Cursor1 and Cursor2 can be moved per each CAN Bus transfer rate (bit rate) while maintaining a bit rate of space between them. Using this function, you can perform analysis while counting the number of bits in the CAN Bus waveform.

Bit Rate

You can select the CAN Bus transfer rate from the following values:
1 M, 500 k, 250 k, 125 k, 100 k, 83.3 k, 50 k, 33.3 k (bps)

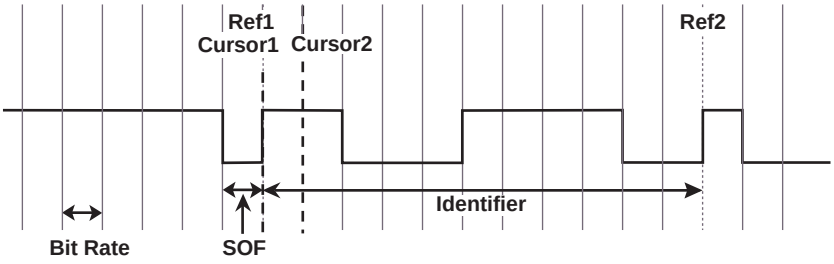
Cursor Jump

You can move Cursor1 to the front of the specified field (SOF, Identifier, Ctrl, Data, CRC, ACK), and move Cursor2 one bit rate after Cursor1. You can also move Ref1 to the front and Ref2 to the back of the specified field.

Note

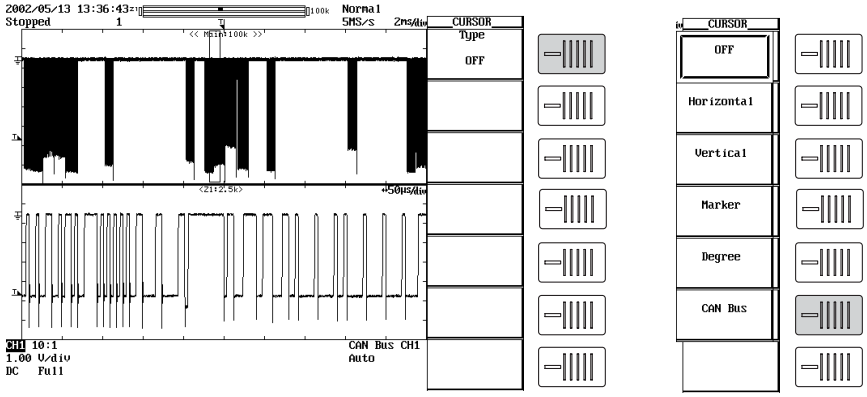
If you set the cursor type to CAN Bus, immediately after analysis Cursor1 moves to the front of SOF and Cursor2 moves to the position one bit rate after Cursor1. Also, if you choose Field Jump (see “Field Jump” on pages 16 and 20), Z1Position, Cursor1, and Ref1 move to the front of the specified field and Ref2 moves to the end of the specified field.

When the Zoom Position Moves to the Identifier Field after Analysis



Operating Procedure

1. Press the **Cursor** key.
2. Press the **Type** soft key. The trigger type selection menu appears.
3. Press the **CAN Bus** soft key.
   Cursor1 remains in the same place, and Cursor2 moves to the position one bit rate after Cursor1. The positions of reference cursors Ref1 and Ref2 remain at their previous settings.



Bit Rate

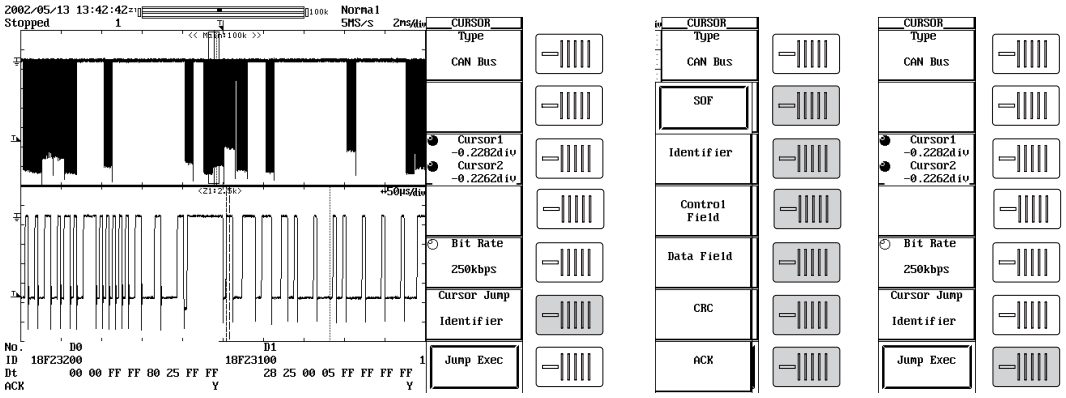
4. If you do not wish to change the bit rate, skip to step 5. To change the bit rate, press the Bit Rate soft key, and select Bit Rate using the jog shuttle. Turn the jog shuttle to select one of the following: 1 M, 500 k, 250 k, 125 k, 100 k, 83.3 k, 50 k, or 33.3 k. Cursor2 moves to the position bit rate after Cursor1, using the changed bit rate.

Note

- The positions of reference cursors Ref1 and Ref2 remain at their previous settings.
- The bit rate reflects the bit rate specified when entering the trigger pattern (see pages 3 and 7) and analyzing the CAN Bus signal (see pages 12 and 16).

Cursor Jump

5. Press the Cursor Jump soft key. The field selection screen appears.
6. Press the SOF, Identifier, Control Field, Data Field, CRC, or ACK soft key.
7. Press the Jump Exec soft key. Cursor1 moves to the front of the field specified in step 6, and Cursor2 moves to a position after Cursor1 that is separated from it by the bit rate.



Note

If you press the Jump Exec soft key when there is no data for analysis, an error message appears.

8. Press the **Cursor1/Cursor2** soft key, then turn the jog shuttle to select **Cursor1/ Cursor2**.
9. Turn the jog shuttle to move Cursor1 and Cursor2. The cursors move while maintaining a bit rate of space between them.

Note

- When analyzing the CAN bus signal with the trigger type set to Can Bus (see section 4, “Analysis/Search” in), Z1Position, Cursor1, and Ref1 move to the front of the SOF field. Cursor2 moves to a position one bit rate after Cursor1.
- If you choose Field Jump with the cursor type set to CAN Bus (see “Field Jump” on pages 16 and 20), Z1Position, Cursor1, and Ref1 move to the front of the specified field, Cursor2 moves to a position one bit rate after Cursor1, and Ref2 moves to the end of the specified field.

4. Analyzing and Searching

Function

Channels Used with the CAN Bus Signal Analysis Function

CH1: CAN signal input channel. For the procedure in connecting the probe, see section 1, “Connecting the Probe.”

Math1: For displaying the stuff bit (see section 5, “Performing Stuff Bit Computation”) after analysis.

Items to Be Analyzed

The frame to be analyzed are the following three types.

Remote Frame

Detects the Identifier value, CRC value, and the presence of Acknowledge.

Data Frame

Detects the Identifier value, Data value, CRC value, and the presence of Acknowledge.

Error Frame

Detects the Identifier value*, Data value*, CRC value*, the presence of Acknowledge*, and the error type.

The DL7200 classifies the error types into the following five types.

- Active Error: When 6 or more successive dominant bits appear on the bus. Error flag (6 dominant bits) output by an error active (normal) unit and 6 or more successive dominant bits appear in bit error and stuff error.
- Passive Error: When 6 or more successive recessive bits appear on the bus. Error flag (6 recessive bits) output by an error passive (error-prone condition) unit and 6 or more successive recessive bits appear in bit error and stuff error.
- Form Error: When an illegal format is present in a fixed-format bit field. Fixed format is as follows:
  CRC delimiter is recessive
  ACK delimiter is recessive
  End of Frame is recessive
  In addition, the DL7200 determines Form Error if the following format is violated.
  Reserve bit (r0 or r1) is dominant
  DLC is 0 to 8
- CRC Error: When the CRC calculated from the retrieved waveform data and the retrieved CRC sequence value differ.
- Acknowledge Error: When the ACK slot is recessive.

* If an error is detected in a frame, the analysis on the frame ends at that point, and the next frame is analyzed. Therefore, the Identifier value, Data value, CRC value, and the presence of Acknowledge after error detection are not analyzed.

CAN Bus Bit Rate

Set the sample speed of the CAN Bus.

Selectable values: 1 Mbps, 500 k, 250 k, 125 k, 83.3 k, and 33.3 k

Sample Point

Specify the sample point within the bit time.

Value: “18.8” “21.9” “25.0” “28.1” “31.3” “34.4” “37.5” “40.6” “43.8” “46.9” “50.0” “53.1” “56.3” “59.4” “62.5” “65.5” “68.8” “71.9” “75.0” “78.1” “81.3” “84.4” “87.5” “90.6” (%)

Setting Vdiff

Select the connection method of the differential probe. See section 1, “Connecting the Probe.”

Select Vdiff from the following two types. In either case, the logical value is recessive = 1 and dominant = 0.

CAN_L–CAN_H: The recessive electric potential is set higher than the dominant electric potential.

CAN_H–CAN_L: The dominant electric potential is set higher than the recessive electric potential.

Note

The bit rate and Vdiff settings are synchronized to the trigger condition menu (see section 2, “Setting the Trigger Conditions”).

Threshold level (Thr Upper/Thr Lower)

To analyze the indefinite data on the signal, specify two signal levels, Thr Upper and Thr Lower.

By comparing the measured data against the threshold levels, 0, 1, or indefinite data is determined.

- When Vdiff=CAN_L–CAN_H
  When measured data < Thr Lower: 0
  When measured data > Thr Upper: 1
  When Thr Lower ≤ measured data ≤ Thr Upper: Indefinite data
- When Vdiff=CAN_H–CAN_L
  When measured data < Thr Lower: 1
  When measured data > Thr Upper: 0
  When Thr Lower ≤ measured data ≤ Thr Upper: Indefinite data

The indefinite data is presumed to be the same value as the previous bit for the purpose of displaying the result. In addition, if indefinite data is found, an asterisk is indicated on the frame that contains the indefinite data in the “list below the screen” and the “detailed analysis list.”

Setting the Stuff Bit (Stuff Bit Operation)

Math1 can be used to perform stuff bit computation. See section 5, “Performing Stuff Bit Computation.”

Executing the Analysis (Analyze Exec)

Analysis is performed on 4000 frames before and after the trigger target frame. Analysis is not performed if there is no Start of Frame on the screen. In addition, if an error is detected in a frame, the analysis on the frame ends at that point, and the next frame is analyzed.

Analysis Result

The following four items are listed at the bottom of the screen.

No.: Frame type (R: Remote Frame, D: Data Frame, and E: Error Frame)
With the trigger target frame set to 0, the frame is numbered No. –1, No. –2, and so on before the target frame and No. 1, No. 2, and so on after the target frame.

ID: Displays the value of the ID field using 11-bit (standard) or 29-bit (extended) hexadecimal value.

Dt: Displays the Data Field value in hexadecimal notation. Displays 8 bits in 1 frame.

ACK: Displays the Acknowledge value (Y if Acknowledge was received, nothing if it was not). Displays a ✲ mark in this column if indefinite data is present within the frame.

Even if standard format and extended format are mixed, it is automatically detected. For items that were not analyzed due to an error detection within the frame, blank is displayed.

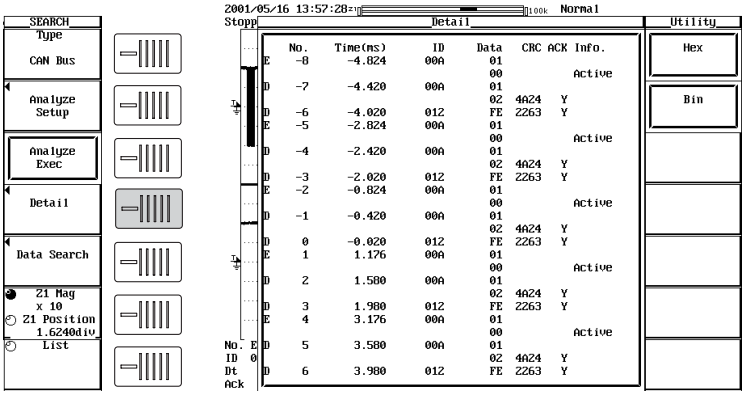
Detailed Analysis List (Detail)

Displays the details of the list that is displayed at the bottom of the screen. The following items are displayed.

Frame type (R: Remote Frame, D: Data Frame, and E: Error Frame)
No. (–4000 to 4000)
The time of Start of Frame from the trigger point: Time (ms)
ID (hexadecimal notation)
Data in the selected format, Hex/Bin*
CRC (hexadecimal notation)
ACK: “Y” if the ACK signal was returned, no display if the signal was not returned.
Error type: Active, Passive, Form, CRC, or ACK (see page 12)

* When the detailed display dialog box is displayed, a soft menu used to select the Data format is also displayed.

If indefinite data is present, a ✲ mark is displayed in the ACK column.



The waveform of the frame that is highlighted in the detailed display is shown in the Zoom window. After executing the analysis, No. 0 is automatically selected. You can highlight an arbitrary frame by No. by turning the jog shuttle in the List (Detail) screen.

Note

The contents of the detailed analysis list can be output to a file in ASCII format. See section 6, “Outputting the Analysis Results to a File.”

Zoom rate (Z1 Mag)

The upper limit of the zoom rate is determined from the display record length as follows:

Display record length divided by 50 (or 40)

The display record length does not necessarily match the record length.

For details on the display record length, see appendix 1, “Relationship between the Time Axis Setting, Sample Rate and Record Length” in the *DL7100/DL7200 User’s Manual (IM701410-01E)*.

Zoom position (Z1 Position)

The zoom position can be set by specifying the zoom center position (center of the zoom box) in the range –5 to +5 divisions with the center of the waveform display frame set to 0 divisions. When the record length is 16 Mwords, the zoom position can be set only in the range in which the edge of the waveform matches the edge of the window. The selectable steps is as follows:

Selectable steps of zoom position: T/div × 10 ÷ display record length

Performing a Pattern Search (Search Setup)

Search the waveform by specifying a field or frame pattern. When a waveform that matches the pattern is found, the Zoom Box moves to that point and displays the specified waveform in the Zoom window. Indefinite data can be specified and searched.

Pattern search and indefinite data search cannot be executed simultaneously.

For a pattern search, indefinite data is searched when the value set in the menu is 1 or 0.

Setup Data

Type: Specify the type of data to be searched.

Frame Pattern: Search for field or frame patterns.

Indefinite State: Search for indefinite data.

If you selected Frame Pattern, set the following item.

Message Format: Select whether the ID field is standard or extended.

Std: Standard format (11 bits)

Ext: Extended format (29 bits)

Pattern Format: Specify the pattern display format.

Hex: Hexadecimal notation

Bin: Binary notation

Setting the pattern: Specify multiple patterns from Identifier, RTR, Data Field, ACK, and Error. Searches for data that matched all the specified patterns (AND condition).

Executing the search (Next, Previous)

- When Patterns Are Searched

  Press the execution key corresponding to the direction in which the search is to be performed from the current selected frame.

  Next: Executes the search on frames that are after the current selected frame.

  Previous: Executes the search on frames that are before the current selected frame.

- When Indefinite Data Is Searched

  Next: Executes the search on data that is after the current Zoom Position.

  Previous: Executes the search on data that is before the current Zoom Position.

Displaying the Search Result

- When Indefinite Data Is Searched
  The head of the indefinite data is displayed at the Zoom Position.
- When Patterns Are Searched
  - When multiple pattern items (Identifier, RTR, Data Field, Ack, and Error) are selected:
    The head of the specified field is displayed at the Zoom Position. If you specify multiple patterns, the Zoom Position moves to the beginning of the field that was found last in the time sequence. However, for Identifier and Data field, if the pattern is set to all Xs, it is equivalent to not specifying a pattern. Thus, search is not performed.
  - When all pattern items (Identifier, RTR, Data Field, Ack, and Error) are OFF:
    A message “Pattern is not specified” is displayed.

Jumping to a Specified Field (Field Jump)

Moves the Zoom Box to a particular field within the current frame. The applicable fields are the following five types.

Identifier
Control Field
Data Field
CRC
ACK

The Zoom Box moves to the head of the specified field.

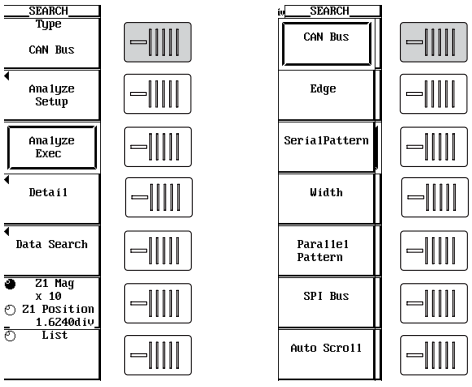
Note

When the memory length is 16 Mwords on a DL7200 16M model, normal operation may not be possible for frames near the ends of the main screen due to the limitation on the Zoom Position. The Zoom Position may stick to the selectable boundary value when search or Field Jump is executed.

Operating Procedure

Showing the CAN Bus Signal Analysis Function Screen

1. Press the “SHIFT” key to set the keys in the shifted condition.
   Functions marked in purple on the panel become active.
2. Press the “ZOOM” key.



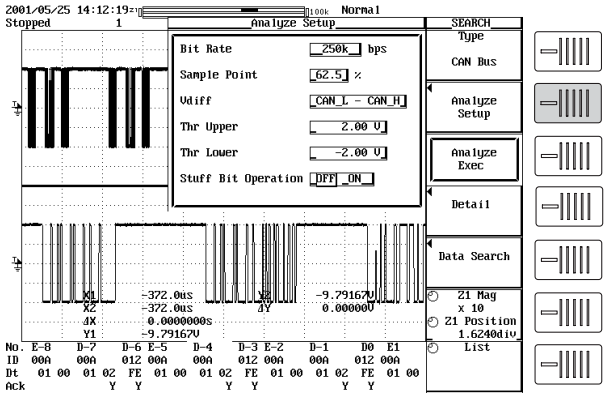
3. Press the “Type” soft key to display the search method selection menu.
4. Press the soft key corresponding to “CAN Bus” to select the search method.

Note

- The item to be analyzed is the history data of CH1.
- When the search type is set to CAN Bus, the display format of the zoomed waveform (see section 8.8 in IM701410-01E) may change. “Main,” “Z2 Only,” and “Main & Z2” change to “Main & Z1.”

Performing the Analysis

5. Press the “Analyze Setup” soft key to display a dialog box for setting the analysis conditions. Turn the jog shuttle to select the item. Press the “SELECT” key to display a menu used to set the item or change the selected item.



Setting the Bit Rate

6. Turn the jog shuttle to move the cursor to “Bit Rate” and press the “SELECT” key.
7. Turn the jog shuttle to select “1M,” “500k,” “250k,” “125k,” “100k,” “83.3k,” “50k,” or “33.3k” and press the “SELECT” key. Pressing the “RESET” key will reset the value to 500k.

Setting the Sample Point

8. Turn the jog shuttle to move the cursor to “Sample Point” and press the “SELECT” key.
9. Turn the jog shuttle to select which point within 1 bit to be sampled and press the “SELECT” key. Pressing the “RESET” key will reset the value to 62.5.

Setting Vdiff

10. Turn the jog shuttle to move the cursor to “Vdiff” and press the “SELECT” key.
11. Turn the jog shuttle to select “CAN_H - CAN_L” or “CAN_L - CAN_H” and press the “SELECT” key.

Setting Thr Upper

12. Turn the jog shuttle to set the level used to judge High and press the “SELECT” key. You can move between the digits using the arrow keys.
    Pressing the “RESET” key resets the level to 0 V.

Setting Thr Lower

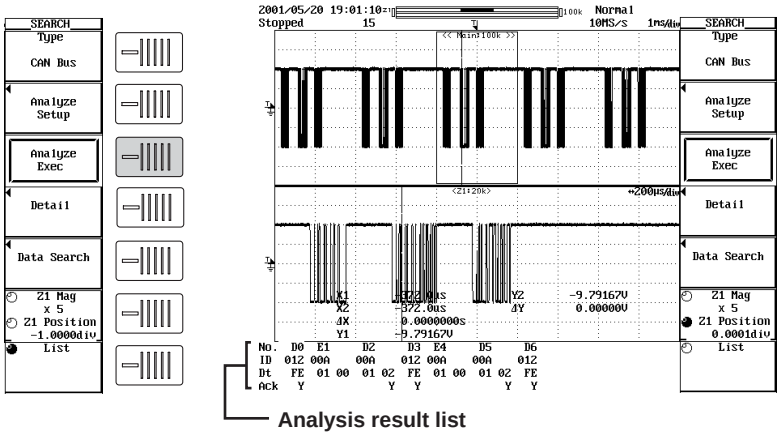
13. Turn the jog shuttle to set the level used to judge Low and press the “SELECT” key. You can move between the digits using the arrow keys.
    Pressing the “RESET” key resets the level to 0 V.

Setting the Stuff Bit

See section 5, “Performing Stuff Bit Computation.”

Executing the Analysis

14. Press the “Test Exec” soft key executes the analysis. The analysis result is listed at the bottom of the screen.



15. If the jog shuttle control is not set to “List,” press the “List” soft key.
16. Turn the jog shuttle to select an arbitrary frame from the list of analysis results. The selected frame appears highlighted. The waveform in the selected frame is displayed in the Zoom Box

Note

When the memory length is 16 Mwords on a 16M DL7200 model, normal operation may not be possible for frames near the ends of the main screen due to the limitation on the Zoom Position. The Zoom Position may stick to the selectable boundary value when search or Field Jump is executed.

Setting the Zoom Ratio

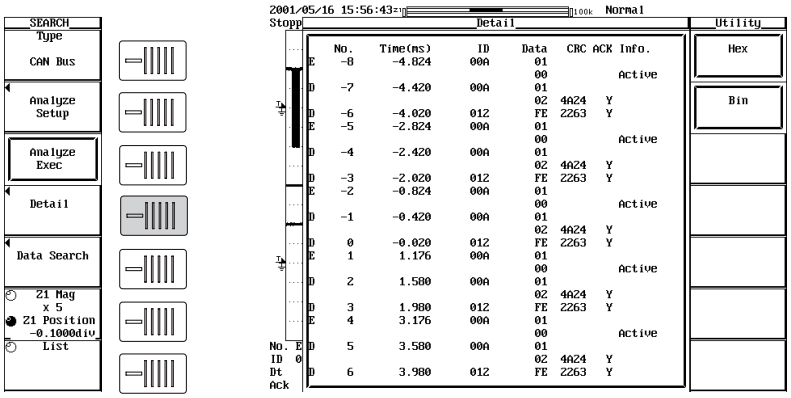
17. Press the “Z1 Mag/Z1 Position” soft key to set the jog shuttle control to “Z1 Mag.”
    Turn the jog shuttle to set the zoom ratio of the Z1 zoom box.

Setting the Zoom Position

18. Press the “Z1 Mag/Z1 Position” soft key to set the jog shuttle control to “Z1Position.”
    Turn the jog shuttle to set the zoom position of the Z1 zoom box. The highlighted display of the list at the bottom of the screen moves to the zoom position frame.

Displaying the Detailed Analysis List

19. Press the “Detail” soft key to display the analysis result dialog box.
    At this point, the highlighted display is located at the same position as the highlighted frame of the list of analysis results in step 14.



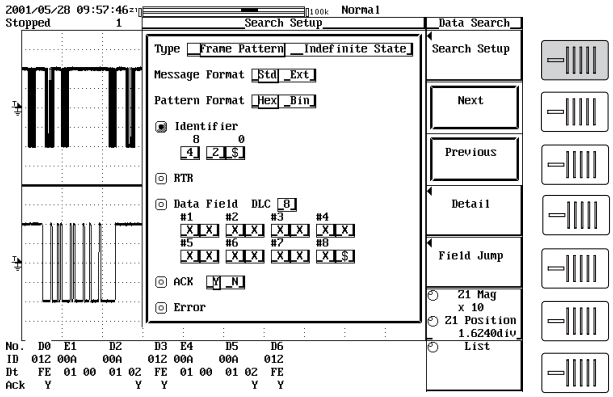
20. Press the “Hex” or “Bin” soft key to select the data format. The data of the data field is displayed using the selected format.

Note

- If indefinite data is present, a ✲ mark is displayed in the ACK column.
- The detailed display list can be output as-is to a file on an external storage medium in ASCII format (.txt extension). See section 6, “Outputting the Analysis Results to a File.”

Performing Pattern Searches

21. Press the “Data Search” soft key followed by the “Search Setup” soft key to display a dialog box used to set the search conditions.
    Turn the jog shuttle to select the item. Press the “SELECT” key to display a menu used to set the item or change the selected item.



Setting the Type

22. Turn the jog shuttle to move the cursor to “Type.”
23. Press the “SELECT” key to select “Frame Pattern” or “Indefinite State.”
    If you selected “Indefinite State,” proceed to step 38.
    If you selected “Frame Pattern,” proceed to the next step.

Setting the Message Format

24. Turn the jog shuttle to move the cursor to “Message Format.”
25. Press the “SELECT” key to select “Std” or “Ext.” The Identifier display changes to the selected format.

Setting the Pattern Format

26. Turn the jog shuttle to move the cursor to “Pattern Format.”
27. Press the “SELECT” key to select “Hex” or “Bin.” The “Identifier” and “Data Field” displays change to the selected format.

Selecting the Field

28. Turn the jog shuttle to select the field. Select the field from “Identifier,” “RTR,” “Data Field,” “ACK,” and “Error” and turn it ON.

When Identifier Is Selected

29. Turn the jog shuttle to move the cursor to the desired bit.
30. If you selected “Hex” for “Pattern Format,” turn the jog shuttle to select a value from “0” to “F” and “X” and Press the “SELECT” key. Pressing the “RESET” key will reset the value to “X.”
    If you selected “Bin” for “Pattern Format,” press the “SELECT” key the appropriate number of times to select “0,” “1,” or “X.”

When Data Field Is Selected

31. Turn the jog shuttle to move the cursor to “DLC.”
32. Press the “SELECT” key.
33. Turn the jog shuttle to set the number of valid bytes. Press the “SELECT” key to confirm the setting. Pressing the “RESET” key will reset the value to 8.
34. Turn the jog shuttle to move the cursor to the desired bit.
35. If you selected “Hex” for “Pattern Format,” turn the jog shuttle to select a value from “0” to “F” and “X” and press the “SELECT” key. Pressing the “RESET” key will reset the value to “X.”
    If you selected “Bin” for “Pattern Format,” press the “SELECT” key the appropriate number of times to select “0,” “1,” or “X.”

When ACK Is Selected

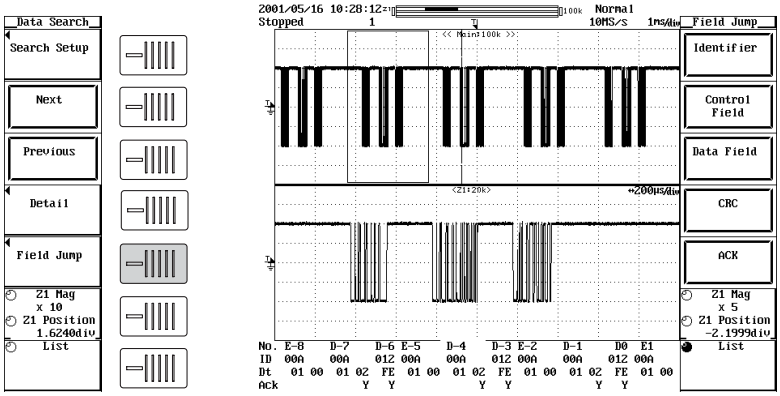
36. Turn the jog shuttle to move the cursor to ACK selection frame.
37. Press the “SELECT” key the appropriate number of times to select “Y” or “N.”

Executing the Search Operation

38. Press the “Next” or “Previous” soft key to execute the search.

Jumping to a Specified Field

39. Press the “Field Jump” soft key to display the field jump screen.

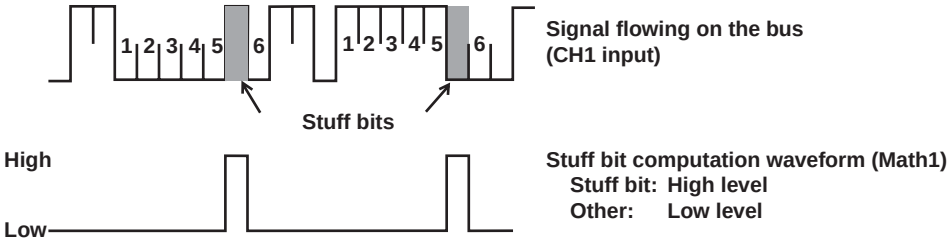


40. Press one of the soft keys from “Identifier,” “Control Field,” “Data Field,” “CRC,” and “ACK.” The zoom box moves to the head of the selected field.

5. Performing Stuff Bit Computation

Function

Detects stuff bits from the CAN Bus signal waveform and displays them as a Math waveform.



Set whether to perform stuff bit computation along with the execution the analysis in the dialog box used to set the analysis conditions (see “Performing the Analysis” on page 17).

OFF: Not perform the computation.

ON: Performs the computation.

Scaling is fixed to ±2.0.

Stuff bit: High level (+1.0)

Other than stuff bits: Low level (0.0)

Note

Stuff bit computation cannot be performed for the following record lengths.

701440 (DL7200 16M/CH model) : When interleave mode is OFF: 8 Mwords

: When interleave mode is ON: 16 Mwords

If you attempt to execute the analysis with the stuff bit turned ON in the above cases, error 851 “Computation cannot be carried out at the current record length” is displayed.

Operating Procedure

1. Switch to the “Analyze Setup” screen (see steps 1 to 5 in section 4, “Analyzing and Searching”).
2. Turn the jog shuttle to move the cursor to “Stuff Bit Operation.”
3. Press the “SELECT” key the appropriate number of times to select OFF or ON.
4. If you press the “Analyze Exec” key when stuff bit computation is ON, computation is executed. The computation result is displayed in Math1.

6. Outputting the Analysis Results to a File

Function

The data of analysis results can be output to a file in ASCII format. The extension is .txt. The data that is output is the data of the detailed analysis list.

Auto Naming Function

If “Auto Naming” is turned ON, files with a three-digit number from 000 to 999 are automatically created when saving the screen data. You can specify a common name (up to five characters, specified through File Name) that is placed before the number.

Note

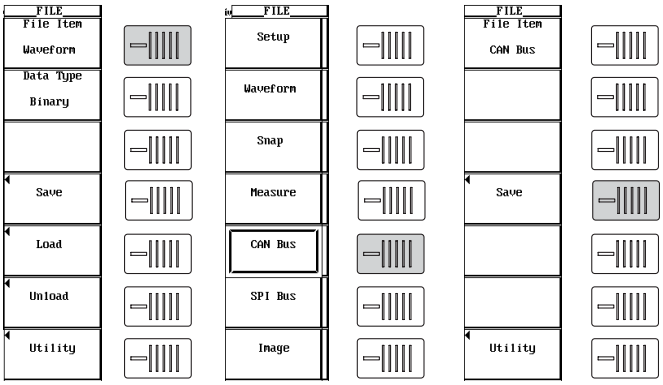
You can enter up to 8 characters for the common name, but only the first five characters are used.

Precautions to Be Taken When Outputting Data

- The maximum number of files that can be saved when auto naming is enabled is 1000.
- If the total number of files and directories exceed 2400 in a single directory, the file list is no longer displayed.

Operating Procedure

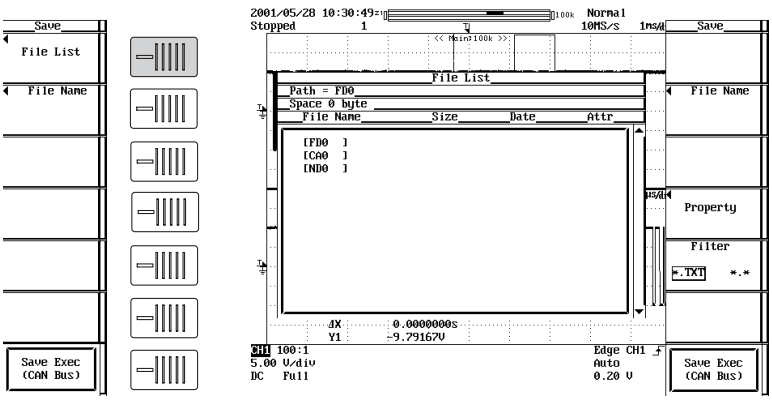
1. Press the “FILE” key.
2. Press the “File Item” soft key.



3. Press the “CAN Bus” soft key. File Item changes to CAN Bus.
4. Press the “Save” soft key.

Setting the Output Destination

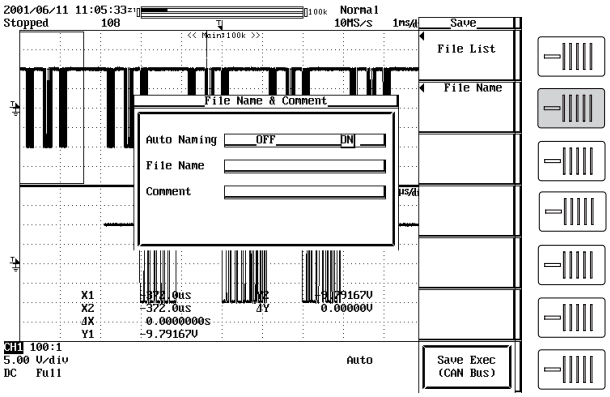
5. Press the “File List” soft key to display a menu used to set the output destination.



6. Turn the jog shuttle to select the save destination. The built-in floppy disk and external SCSI devices are displayed in brackets [ ]. The directory is displayed using < >.
7. Press the “SELECT” key to display the contents of the selected storage medium or directory.
   For details on setting the output destination, see page 11-15 in the *DL7100/DL7200 User’s Manual IM701410-01E*.

Setting the File Name

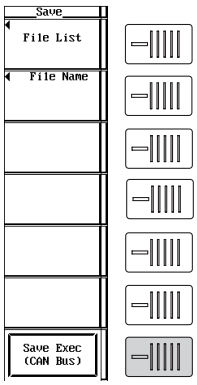
8. Press the “File Name” soft key to display a menu used to set the file name.



9. Turn the jog shuttle to move the cursor to “Auto Naming.”
10. Press the “SELECT” key to select ON or OFF.
11. Turn the jog shuttle to move the cursor to “File Name.”
12. Press the “SELECT” key to display a keyboard screen. Enter the file name using up to 8 characters. If Auto Naming was turned ON, the first five characters are valid. For details on entering the file name, see section 4.1, “Entering Values and Character Strings” in the *DL7100/DL7200 User’s Manual IM701410-01E*.
13. Turn the jog shuttle to move the cursor to “Comment.”
14. Press the “SELECT” key to display a keyboard screen. Enter the comment using up to 25 characters.

Executing the Output

15. Press the “Save Exec (CAN Bus)” soft key to start the output. At the same time, the “Save Exec (CAN Bus)” soft key changes to an “Abort” soft key.
    Pressing the “Abort” soft key to abort the file output. At the same time, the “Abort” soft key changes to a “Save Exec (CAN Bus)” soft key.



7. Error Messages

An message may appear during operation. This section describes the meanings of the messages and their corrective actions. The messages can be displayed either in English or Japanese (See section 14.2, “Changing the Message Language and Click Sound” in the *DL7100/DL7200 User’s Manual IM701410-01E*.) If the corrective action requires servicing, contact your nearest YOKOGAWA dealer as listed on the back cover of this manual for repairs.

Code	Message	Corrective Action	Page
27	Executed the search, but no record was found that matched the pattern.	—	15, 19
33	Aborted the analysis.	—	—
34	Data not detected. Execute again after changing the settings or reacquiring the waveform.	—	3, 7, 16
35	The corresponding field was not found.	—	—
36	The frame contains indefinite data (greater than Thr Lower but less than Thr Upper).	—	13, 16
704	Cannot be executed while running	Stop the operation.	section 4.4 in IM701410-01E
730	Pattern is not specified.	Set at least one ssearch pattern not to X.	15, 19
736	Data to be analyzed does not exist. Execute the analysis.	Execute the analysis.	13, 18
851	Cannot be specified Invalid byte or bit.	Change the record length.	19, section 7.1 in IM701410-01E
869	Cannot be specified. Invalid byte or bit.	ncrease the number of data bytes.	6, 7

8. Specifications

Applicable CAN Bus

CAN Bus CAN Version 2.0B

Bus transfer rate 1 Mbps, 500 kbps, 250 kbps, 125 kbps, 100 kbps, 83.3 kbps, 50 kbps, 33.3 kbps

High Speed CAN(ISO11898)

Low Speed CAN(ISO11519-2)

Trigger Function

Trigger source CH1: Input through a differential probe

Trigger type

Start of Frame

Identifier (4 types selectable)

RTR

Data (selectable up to 8 bytes)

Error Frame

Trigger on the combination (AND condition) of the five trigger types above. However, combination of RTR and Data is not allowed.

Analysis Function

Number of frames that can be analyzed: 4000 frames before and after the trigger target frame (8000 frames maximum)

Display of analysis results

Waveform and list of analysis results

Detailed analysis list

Auxiliary Analysis Function

Data search function

Field jump function

Stuff bit display

Analysis Result Output Function

Output the detailed analysis list to a file in ASCII format.

Extension: txt

For specifications other than those of the CAN Bus signal analysis function, see the *DL7100/DL7200 User's Manual IM70410-01E*.

9. Communications Commands

command	Function	page
CAN Analyze Group		
:SEARch:CAN?	Query all CAN analysis function settings	30
:SEARch:CAN:ANALyze?	Query all CAN analysis execution setting values	30
:SEARch:CAN:ANALyze:ABORt	Abort CAN analysis	30
:SEARch:CAN:ANALyze:EXECute	Execute CAN analysis	30
:SEARch:CAN:ANALyze:SETup?	Query all CAN analysis condition setting values	30
:SEARch:CAN:ANALyze:SETup:BRATe	Enter or query the CAN bus transfer rate in the CAN analysis conditions	30
:SEARch:CAN:ANALyze:SETup:LEVel	Enter or query the threshold in the CAN analysis conditions	30
:SEARch:CAN:ANALyze:SETup:SBIT	Enter or query settings indicating whether stuff bit computation is ON (1) or OFF (0) in the CAN analysis conditions	30
:SEARch:CAN:ANALyze:SETup:SPOint	Enter or query the sample point in the CAN analysis conditions	31
:SEARch:CAN:ANALyze:SETup:VDIFf	Enter or query Vdiff in the CAN analysis conditions	31
:SEARch:CAN:DETail:BINary	Display the Data Field values from the detailed analysis list for the CAN analysis results in binary	31
:SEARch:CAN:DETail:HEXa	Display the Data Field values from the detailed analysis list for the CAN analysis results in hexadecimal	31
:SEARch:CAN:DETail:LIST?	Output 1 frame's worth of CAN analysis results as a string	31
:SEARch:CAN:SEARch?	Query all CAN analysis results search settings	31
:SEARch:CAN:SEARch:FJUMp:ACK	Execute field jump to the ACK Field in the CAN analysis results	31
:SEARch:CAN:SEARch:FJUMp:CONTrol	Execute field jump to the Control Field in the CAN analysis results	31
:SEARch:CAN:SEARch:FJUMp:CRC	Execute field jump to the CRC Field in the CAN analysis results	31
:SEARch:CAN:SEARch:FJUMp:DATA	Execute field jump to the Data Field in the CAN analysis results	31
:SEARch:CAN:SEARch:FJUMp:IDENtifier	Execute field jump to an Identifier in the CAN analysis results	31
:SEARch:CAN:SEARch:NEXT?	Execute a Next search of the CAN analysis results and query the frame number found	32
:SEARch:CAN:SEARch:PREVious?	Execute a Previous search of the CAN analysis results and query the frame number found	32
:SEARch:CAN:SEARch:SETup?	Query all CAN analysis results search settings	32
:SEARch:CAN:SEARch:SETup:ACK?	Query all ACK setting values for pattern searches of the CAN analysis results	32
:SEARch:CAN:SEARch:SETup:ACK:MODE	Enter or query the setting indicating whether ACK was done (1) or not done (0) for CAN analysis results pattern searches	32
:SEARch:CAN:SEARch:SETup:ACK:PATTern	Enter or query the ACK pattern (YES/NO) for CAN analysis results pattern searches	32
:SEARch:CAN:SEARch:SETup:DATA?	Query all Data Field setting values for CAN analysis results pattern searches	32
:SEARch:CAN:SEARch:SETup:DATA:DLC	Enter or query the number of bytes (DLC) for CAN analysis results pattern searches	32
:SEARch:CAN:SEARch:SETup:DATA:HEXa<x>	Enter hexadecimal settings for each byte of the Data Field search patterns of CAN analysis results	32
:SEARch:CAN:SEARch:SETup:DATA:MODE	Enter or query the number of bytes (DLC) for CAN analysis results pattern searches	33
:SEARch:CAN:SEARch:SETup:DATA:PATTern<x>	Enter settings in binary for each byte of the Data Field search patterns of CAN analysis results	33
:SEARch:CAN:SEARch:SETup:ERRor	Enter or query the setting indicating whether Error was found (1) or was not found (0) in CAN analysis results pattern searches	33

command	Function	page
:SEARch:CAN:SEARch:SETup:IDENtifier?	Query all Identifier setting values for CAN analysis results pattern searches	33
:SEARch:CAN:SEARch:SETup:IDENtifier:HEXa	Enter the Identifier search pattern for CAN analysis results pattern searches in hexadecimal	33
:SEARch:CAN:SEARch:SETup:IDENtifier:MODE	Enter or query the setting indicating whether Identifier is used (1) or not used (0) in CAN analysis results pattern searches	33
:SEARch:CAN:SEARch:SETup:IDENtifier:PATTern	Enter the Identifier search pattern for CAN analysis results pattern searches in binary	33
:SEARch:CAN:SEARch:SETup:MFORmat	Enter or query the message format for CAN analysis results pattern searches	33
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command	Function	page
:TRIGger:CAN:SOFRame	Enter or query settings indicating whether trigger activates (1) or does not activate (0) on Start of Frame in the CAN trigger conditions	39
:TRIGger:CAN:SPOint	Enter or query the Sample Point in the CAN trigger conditions	39
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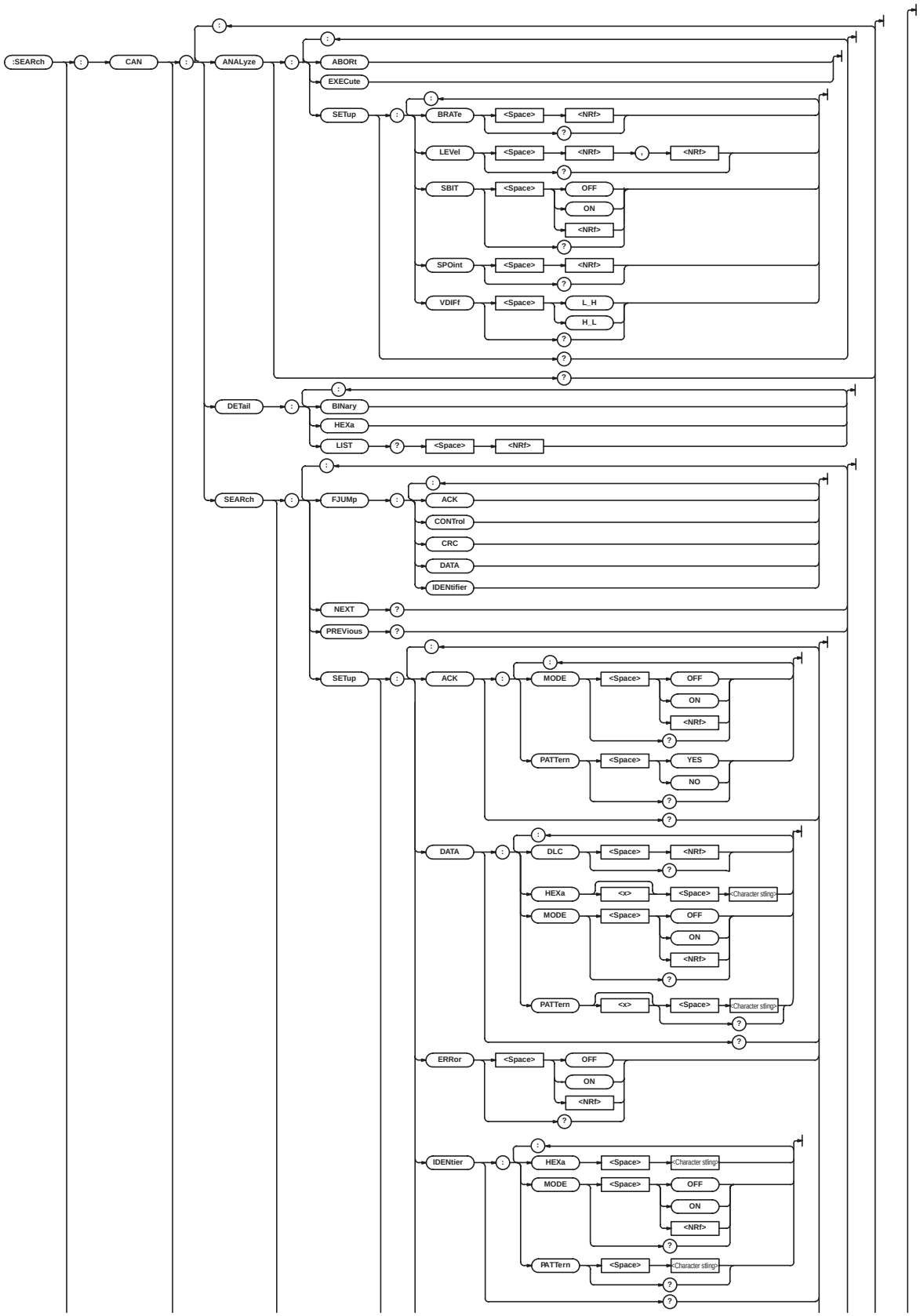
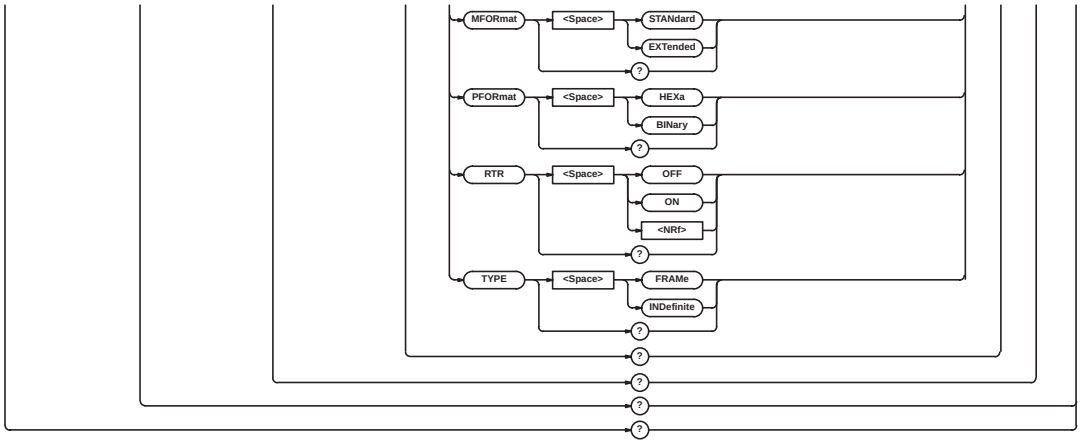
CAN Analyze Group

With communications commands, you can enter or query the same CAN analysis function settings that are accessible using the SEARCH key on the front panel.





:SEARch:CAN?

Function Query all CAN analysis function settings
Syntax :SEARch:CAN?
Example:SEARch:CAN? ->
:SEARCH:CAN:ANALYZE:SETUP:
BRATE 250.0E+03;SPOINT 81.3;
VDIFF L_H;LEVEL -1.900000E+00,
-3.500000E+00;SBIT 0;:SEARCH:
CAN:SEARCH:SETUP:TYPE FRAME;
MFORMAT STANDARD;PFORMAT HEXA;
IDENTIFIER:MODE 0;
PATTERN "XXXXXXXXXXX";:SEARCH:CAN:
SEARCH:SETUP RTR 0;DATA:MODE 0;DLC 8;
PATTERN1 "XXXXXXXX";
PATTERN2 "XXXXXXXX";
PATTERN3 "XXXXXXXX";
PATTERN4 "XXXXXXXX";
PATTERN5 "XXXXXXXX";
PATTERN6 "XXXXXXXX";
PATTERN7 "XXXXXXXX";
PATTERN8"XXXXXXXX";:SEARCH:CAN:SEARCH:
SETUP:ACK:MODE 0;PATTERN YES;:SEARCH:
CAN:SEARCH:SETUP:ERROR 0

:SEARch:CAN:ANALyze?

Function Query all CAN analysis execution settings
Syntax :SEARch:CAN:ANALyze?
Example:SEARch:CAN:ANALyze? ->
:SEARCH:CAN:ANALYZE:SETUP:
BRATE 1.000E+06;SPOINT 62.5;
VDIFF L_H;LEVEL 0.0E+00,0.0E+00;SBIT 0

:SEARch:CAN:ANALyze:ABORt

Function Abort CAN analysis execution
Syntax :SEARch:CAN:ANALyze:ABORt
Example:SEARch:CAN:ANALyze:ABORt

:SEARch:CAN:ANALyze:EXECute

Function Execute CAN analysis
Syntax :SEARch:CAN:ANALyze:EXECute
Example:SEARch:CAN:ANALyze:EXECute

:SEARch:CAN:ANALyze:SETup?

Function Query all CAN analysis conditions setting values
Syntax :SEARch:CAN:ANALyze:SETup?
Example:SEARch:CAN:ANALyze:SETup? ->
:SEARCH:CAN:ANALYZE:SETUP:
BRATE 1.000E+06;SPOINT 62.5;
VDIFF L_H;LEVEL 0.0E+00,0.0E+00;SBIT 0

:SEARch:CAN:ANALyze:SETup:BRATe

Functione Enter or query the CAN bus transfer rate in the CAN analysis conditions
Syntax :SEARch:CAN:ANALyze:SETup:BRATe {<NRf>}
:SEARch:CAN:ANALyze:SETup:BRATe?
<NRf>=33300,50000,83300,100000,125000,250000,
500000,1000000
Example:SEARch:CAN:ANALyze:SETup:BRATe 250000
:SEARch:CAN:ANALyze:SETup:BRATe? ->
:SEARCH:CAN:ANALYZE:SETUP:
BRATE 250.0E+03

:SEARch:CAN:ANALyze:SETup:LEVel

Function Enter or query the threshold in the CAN analysis conditions
Syntax :SEARch:CAN:ANALyze:SETup:LEVel
{<Voltage>,<Voltage>|<Current>,<Current>}
:SEARch:CAN:ANALyze:SETup:LEVel?
Example:SEARch:CAN:ANALyze:SETup:
LEVel 1.0,-1.0
:SEARch:CAN:ANALyze:SETup:LEVel? ->
:SEARCH:CAN:ANALYZE:SETUP:
LEVEL 1.000000E+00,-1.000000E+00

:SEARch:CAN:ANALyze:SETup:SBIT

Function Enter or query settings indicating whether stuff bit computation is ON (1) or OFF (0) in the CAN analysis conditions
Syntax:SEARch:CAN:ANALyze:SETup:
SBIT {<Boolean>}
:SEARch:CAN:ANALyze:SETup:SBIT?
Example:SEARch:CAN:ANALyze:SETup:SBIT 1
:SEARch:CAN:ANALyze:SETup:SBIT? ->
:SEARCH:CAN:ANALYZE:SETUP:SBIT 1

:SEARch:CAN:ANALyze:SETup:SPOint

Function Enter or query the sample point in the CAN analysis conditions

Syntax
```
:SEARch:CAN:ANALyze:SETup:
SPOint {<NRf>}
:SEARch:CAN:ANALyze:SETup:SPOint?
<NRf>=18.8-90.6
```

Example
```
:SEARch:CAN:ANALyze:SETup:SPOint 62.5
:SEARch:CAN:ANALyze:SETup:SPOint? ->
:SEARCH:CAN:ANALYZE:SETUP:SPOINT 62.5
```

:SEARch:CAN:ANALyze:SETup:VDIFf

Function Enter or query the Vdiff (CAN_L-CAN_H/CAN_H-CAN_L) in the CAN analysis conditions

Syntax
```
:SEARch:CAN:ANALyze:SETup:
VDIFf {L_H|H_L}
:SEARch:CAN:ANALyze:SETup:VDIFf?
```

Example
```
:SEARch:CAN:ANALyze:SETup:VDIFf L_H
:SEARch:CAN:ANALyze:SETup:VDIFf? ->
:SEARCH:CAN:ANALYZE:SETUP:VDIFF L_H
```

:SEARch:CAN:DETail:BINary

Function Display the Data Field values in the detailed analysis list for the CAN analysis results in binary

Syntax
```
:SEARch:CAN:DETail:BINary
```

Example
```
:SEARch:CAN:DETail:BINary
```

:SEARch:CAN:DETail:HEXa

Function Display the Data Field values in the detailed analysis list for the CAN analysis results in hexadecimal

Syntax
```
:SEARch:CAN:DETail:HEXa
```

Example
```
:SEARch:CAN:DETail:HEXa
```

:SEARch:CAN:DETail:LIST?

Function Output 1 frame's worth of CAN analysis results as a string

Syntax
```
:SEARch:CAN:DETail:LIST? {<NRf>}
```

Example
```
:SEARch:CAN:DETail:LIST? 0 ->
"D     0      -0.460 18F23200
00,00,FF,FF,80,25,FF,FF  1533     Y"
```

:SEARch:CAN:SEARch?

Function Query all CAN analysis results search settings

Syntax
```
:SEARch:CAN:SEARch?
```

Example
```
:SEARch:CAN:SEARch? ->
:SEARCH:CAN:SEARCH:SETUP:TYPE FRAME;
MFORMAT STANDARD;PFORMATHEXA;
IDENTIFIER:MODE 0;
PATTERN"XXXXXXXXXXX";:SEARCH:CAN:
SEARCH:SETUP:RTR 0;DATA:MODE 0;DLC8;
PATTERN1 "XXXXXXXX";
PATTERN2"XXXXXXXX";
PATTERN3 "XXXXXXXX";
PATTERN4 "XXXXXXXX";
PATTERN5 "XXXXXXXX";
PATTERN6 "XXXXXXXX";
PATTERN7 "XXXXXXXX";
PATTERN8"XXXXXXXX";:
SEARCH:CAN:SEARCH:SETUP:ACK:MODE0;
PATTERNYES;:SEARCH:CAN:SEARCH:SETUP:
ERROR 0
```

:SEARch:CAN:SEARch:FJUMp:ACK

Function Execute field jump to the ACK Field in the CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:FJUMp:ACK
```

Example
```
:SEARch:CAN:SEARch:FJUMp:ACK
```

:SEARch:CAN:SEARch:FJUMp:CONTrol

Function Execute field jump to the Control Field in the CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:FJUMp:CONTrol
```

Example
```
:SEARch:CAN:SEARch:FJUMp:CONTrol
```

:SEARch:CAN:SEARch:FJUMp:CRC

Function Execute field jump to the CRC Field in the CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:FJUMp:CRC
```

Example
```
:SEARch:CAN:SEARch:FJUMp:CRC
```

:SEARch:CAN:SEARch:FJUMp:DATA

Function Execute field jump to the Data Field in the CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:FJUMp:DATA
```

Example
```
:SEARch:CAN:SEARch:FJUMp:DATA
```

:SEARch:CAN:SEARch:FJUMp:IDENtifier

Function Execute field jump to an Identifier in the CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:FJUMp:IDENtifier
```

Example
```
:SEARch:CAN:SEARch:FJUMp:IDENtifier
```

:SEARch:CAN:SEARch:NEXT?

Function Execute a Next search of the CAN analysis results and query the frame number found

Syntax :SEARch:CAN:SEARch:NEXT?

Example :SEARch:CAN:SEARch:NEXT? -> 1

:SEARch:CAN:SEARch:PREVious?

Function Execute a Previous search of the CAN analysis results and query the frame number found

Syntax :SEARch:CAN:SEARch:PREVious?

Example :SEARch:CAN:SEARch:PREVious? -> -1

:SEARch:CAN:SEARch:SETup?

Function Query all CAN analysis results search settings

Syntax :SEARch:CAN:SEARch:SETup?

Example :SEARch:CAN:SEARch:SETup? ->
:SEARCH:CAN:SEARCH:SETUP:TYPE FRAME;
MFORMATSTANDARD;PFORMAT HEXA;
IDENTIFIER:MODE0;PATTERN“XXXXXXXXXX”;:
SEARCH:CAN:SEARCH:SETUP:RTR 0;
DATA:MODE 0;DLC 8;
PATTERN1 “XXXXXXXX”;
PATTERN2 “XXXXXXXX”;
PATTERN3 “XXXXXXXX”;
PATTERN4 “XXXXXXXX”;
PATTERN5 “XXXXXXXX”;
PATTERN6 “XXXXXXXX”;
PATTERN7 “XXXXXXXX”;
PATTERN8 “XXXXXXXX”;
:SEARCH:CAN:SEARCH:SETUP:ACK:
MODE 0;PATTERN YES;:SEARCH:CAN:SEARCH:
SETUP:ERROR 0

:SEARch:CAN:SEARch:SETup:ACK?

Function Query all ACK setting values for pattern searches of the CAN analysis results

Syntax :SEARch:CAN:SEARch:SETup:ACK?

Example :SEARch:CAN:SEARch:SETup:ACK? ->
:SEARCH:CAN:SEARCH:SETUP:ACK:MODE 0;
PATTERN YES

:SEARch:CAN:SEARch:SETup:ACK:MODE

Function Enter or query the active (1) or inactive (0) setting for CAN analysis results pattern searches

Syntax :SEARch:CAN:SEARch:SETup:ACK:MODE {<Boolean>}
:SEARch:CAN:SEARch:SETup:ACK:MODE?

Example :SEARch:CAN:SEARch:SETup:ACK:MODE 1
:SEARch:CAN:SEARch:SETup:ACK:MODE? ->
:SEARCH:CAN:SEARCH:SETUP:ACK:MODE 1

:SEARch:CAN:SEARch:SETup:ACK:PATTern

Function Enter or query the ACK search pattern (YES/NO) for CAN analysis results

Syntax :SEARch:CAN:SEARch:SETup:ACK:
PATTern {YES|NO}
:SEARch:CAN:SEARch:SETup:ACK:PATTern?

Example :SEARch:CAN:SEARch:SETup:ACK:
PATTern YES
:SEARch:CAN:SEARch:SETup:ACK:
PATTern? ->
:SEARCH:CAN:SEARCH:SETUP:ACK:
PATTERN YES

:SEARch:CAN:SEARch:SETup:DATA?

Function Query all Data Field setting values for CAN analysis results pattern searches

Syntax :SEARch:CAN:SEARch:SETup:DATA?

Example :SEARch:CAN:SEARch:SETup:DATA? ->
:SEARCH:CAN:SEARCH:SETUP:DATA:MODE 0;
DLC 8;PATTERN1 “XXXXXXXX”;
PATTERN2 “XXXXXXXX”;
PATTERN3 “XXXXXXXX”;
PATTERN4 “XXXXXXXX”;
PATTERN5 “XXXXXXXX”;
PATTERN6 “XXXXXXXX”;
PATTERN7 “XXXXXXXX”;
PATTERN8 “XXXXXXXX”

:SEARch:CAN:SEARch:SETup:DATA:DLC

Function Enter or query the data length (DLC) for CAN analysis results pattern searches

Syntax :SEARch:CAN:SEARch:SETup:DATA:
DLC {<NRf>}
:SEARch:CAN:SEARch:SETup:DATA:DLC?

Example :SEARch:CAN:SEARch:SETup:DATA:DLC 6
:SEARch:CAN:SEARch:SETup:DATA:DLC? ->
:SEARCH:CAN:SEARCH:SETUP:DATA:DLC 6

:SEARch:CAN:SEARch:SETup:DATA:HEXa<x>

Function Enter byte-by-byte hexadecimal settings for Data Field search patterns of CAN analysis results

Syntax :SEARch:CAN:SEARch:SETup:DATA:
HEXa<x> {<Character string>}
<x>=0-8

Example :SEARch:CAN:SEARch:SETup:DATA:
HEXa1 “A3”

:SEARch:CAN:SEARch:SETup:DATA:MODE

Function Enter or query the data length (DLC) for CAN analysis results pattern searches

Syntax
```
:SEARch:CAN:SEARch:SETup:DATA:
MODE {<Boolean>}
:SEARch:CAN:SEARch:SETup:DATA:MODE?
```

Example
```
:SEARch:CAN:SEARch:SETup:DATA:MODE 0
:SEARch:CAN:SEARch:SETup:DATA:MODE? ->
:SEARCH:CAN:SEARCH:SETUP:DATA:MODE 0
```

:SEARch:CAN:SEARch:SETup:DATA:PATTern<x>

Function Enter byte-by-byte settings in binary for Data Field search patterns of CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:SETup:DATA:
PATTern<x> {<Character string>}
:SEARch:CAN:SEARch:SETup:DATA:
PATTern<x>?
<x>=0-8
```

Example
```
:SEARch:CAN:SEARch:SETup:DATA:
PATTern1 “10X10X10”
:SEARch:CAN:SEARch:SETup:DATA:PATTern1?
-> :SEARCH:CAN:SEARCH:SETUP:DATA:
PATTERN1 “10X10X10”
```

:SEARch:CAN:SEARch:SETup:ERRor

Function Enter or query the setting indicating whether Error is active (1) or inactive (0) in CAN analysis results pattern searches

Syntax
```
:SEARch:CAN:SEARch:SETup:
ERRor {<Boolean>}
:SEARch:CAN:SEARch:SETup:ERRor?
```

Example
```
:SEARch:CAN:SEARch:SETup:ERRor 1
:SEARch:CAN:SEARch:SETup:ERRor? ->
:SEARCH:CAN:SEARCH:SETUP:ERROR 1
```

:SEARch:CAN:SEARch:SETup:IDENtifier?

Function Query all Identifier setting values for CAN analysis results pattern searches

Syntax
```
:SEARch:CAN:SEARch:SETup:IDENtifier?
```

Example
```
:SEARch:CAN:SEARch:SETup:IDENtifier? ->
:SEARCH:CAN:SEARCH:SETUP:IDENTIFIER:
MODE 0;PATTERN “XXXXXXXXXX”
```

:SEARch:CAN:SEARch:SETup:IDENtifier:HEXa

Function Enter the Identifier search pattern for CAN analysis results in hexadecimal

Syntax
```
:SEARch:CAN:SEARch:SETup:IDENtifier:
HEXa {<Character string>}
```

Example
```
:SEARch:CAN:SEARch:SETup:IDENtifier:
HEXa “7FF”
```

:SEARch:CAN:SEARch:SETup:IDENtifier:MODE

Function Enter or query the setting indicating whether Identifier is active (1) or inactive (0) in CAN analysis results pattern searches

Syntax
```
:SEARch:CAN:SEARch:SETup:IDENtifier:
MODE {<Boolean>}
:SEARch:CAN:SEARch:SETup:IDENtifier
:MODE?
```

Example
```
:SEARch:CAN:SEARch:SETup:IDENtifier:
MODE 1
:SEARch:CAN:SEARch:SETup:IDENtifier:
MODE? ->
:SEARCH:CAN:SEARCH:SETUP:IDENTIFIER:
MODE 1
```

:SEARch:CAN:SEARch:SETup:IDENtifier:PATTern

Function Enter the Identifier search pattern for CAN analysis results in binary

Syntax
```
:SEARch:CAN:SEARch:SETup:IDENtifier:
PATTern {<Character string>}
:SEARch:CAN:SEARch:SETup:IDENtifier:
PATTern?
```

Example
```
:SEARch:CAN:SEARch:SETup:IDENtifier:
PATTern “10X10X10X10”
:SEARch:CAN:SEARch:SETup:IDENtifier:
PATTern? ->
:SEARCH:CAN:SEARCH:SETUP:IDENTIFIER:
PATTERN “10X10X10X10”
```

:SEARch:CAN:SEARch:SETup:MFORmat

Function Enter or query the message format (Standard/Extended) in the CAN analysis results

Syntax
```
:SEARch:CAN:SEARch:SETup:
MFORmat {STANdard/EXTended}
:SEARch:CAN:SEARch:SETup:MFORmat?
```

Example
```
:SEARch:CAN:SEARch:SETup:
MFORmat EXTended
:SEARch:CAN:SEARch:SETup:MFORmat? ->
:SEARCH:CAN:SEARCH:SETUP:
MFORMAT EXTENDED
```

:SEARch:CAN:SEARch:SETup:PFORmat

Function Enter or query the setting format for CAN analysis results pattern searches

Syntax
```
:SEARch:CAN:SEARch:SETup:
PFORmat {BINary/HEXa}
:SEARch:CAN:SEARch:SETup:PFORmat?
```

Example
```
:SEARch:CAN:SEARch:SETup:PFORmat HEXa
:SEARch:CAN:SEARch:SETup:PFORmat? ->
:SEARCH:CAN:SEARCH:SETUP:PFORMAT HEXA
```

:SEARch:CAN:SEARch:SETup:RTR

Function Enter or query the setting indicating whether CAN analysis results pattern searches are performed by data frame (0) or by remote frame (1)

Syntax
```
:SEARch:CAN:SEARch:SETup:
RTR {<Boolean>}
:SEARch:CAN:SEARch:SETup:RTR?
```

Example
```
:SEARch:CAN:SEARch:SETup:RTR 1
:SEARch:CAN:SEARch:SETup:RTR? ->
:SEARCH:CAN:SEARCH:SETUP:RTR 1
```

:SEARch:CAN:SEARch:SETup:TYPE

Function Enter or query the setting indicating whether to perform a CAN analysis results pattern search or an indefinite data search.

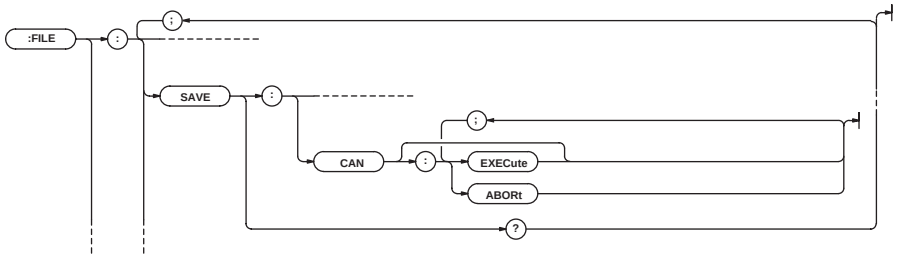
Syntax
```
:SEARch:CAN:SEARch:SETup:
TYPE {FRAMe|INDefinite}
:SEARch:CAN:SEARch:SETup:TYPE?
```

Example
```
:SEARch:CAN:SEARch:SETup:
TYPE INDefinite
:SEARch:CAN:SEARch:SETup:TYPE? ->
:SEARCH:CAN:SEARCH:SETUP:
TYPE INDEFINITE
```

CAN File Group

Communications Commands for the CAN Analysis Results Output Function

With communications commands, you can enter or query the same CAN analysis results output functions that are accessible using the FILE key on the front panel.



:FILE:SAVE:CAN:ABORt

Function Abort output of the detailed analysis list to ASCII-formatted file.

Syntax :FILE:SAVE:CAN:ABORt

Example :FILE:SAVE:CAN:ABORt

:FILE:SAVE:CAN:EXECute

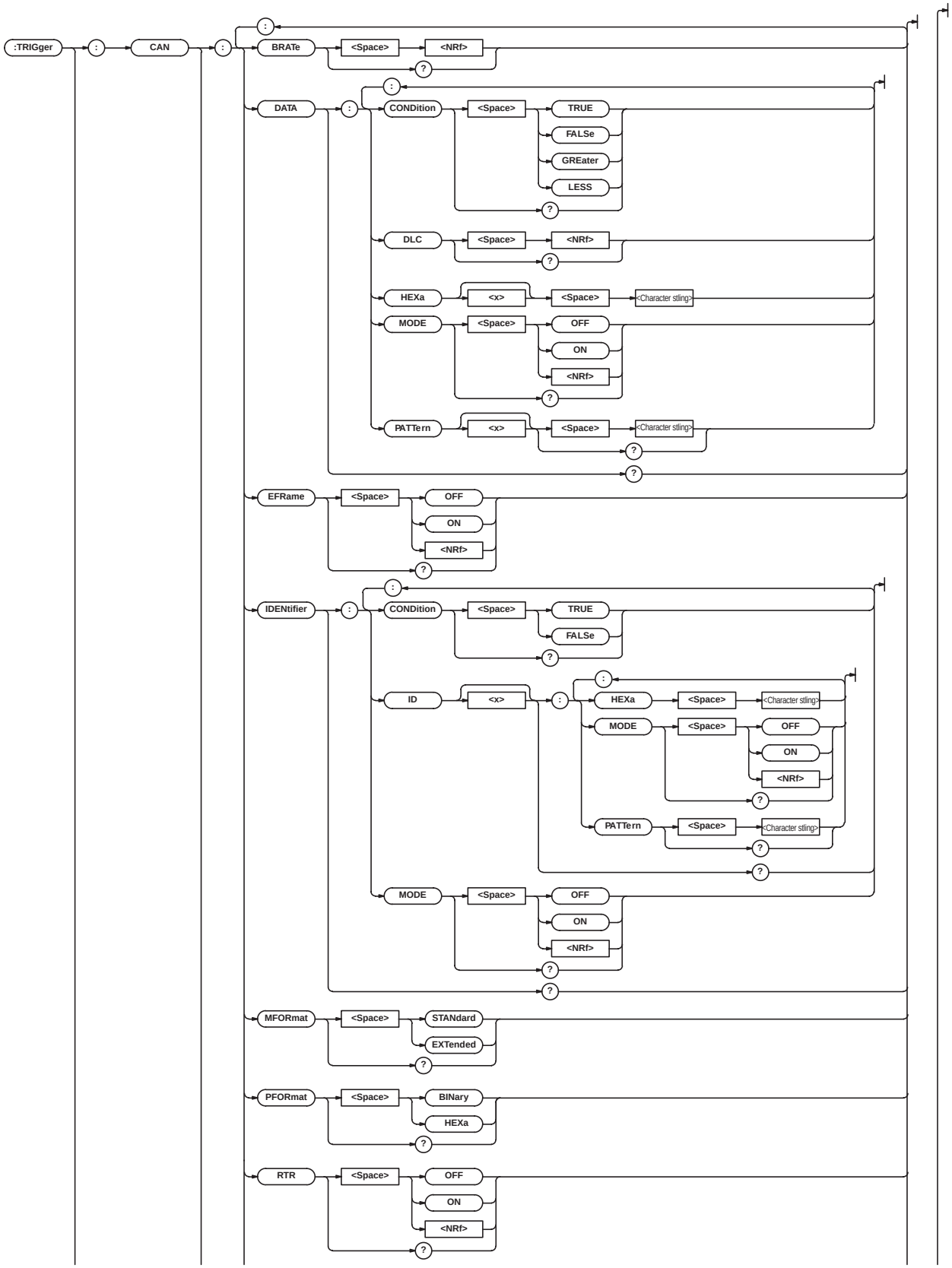
Function Output the detailed analysis list to an ASCII-formatted file.

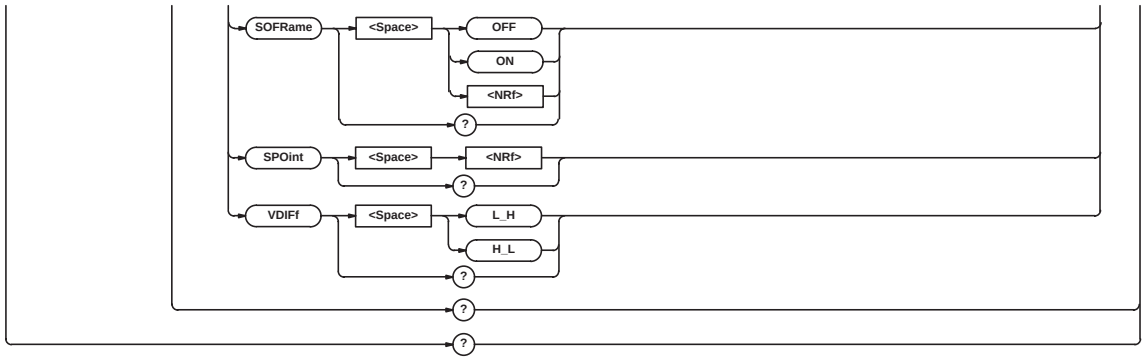
Syntax :FILE:SAVE:CAN:EXECute

Example :FILE:SAVE:CAN:EXECute

CAN Trigger Group

With communications commands, you can query the same CAN trigger settings that are accessible using the ENHANCED key on the front panel.





:TRIGger:CAN?

Function Query all CAN trigger function settings

Syntax :TRIGger:CAN?

Example:TRIGger:CAN? -> :TRIGGER:CAN:
BRATE 500.0E+03;SPOINT 62.5;
MFORMAT STANDARD;VDIFF L_H;
PFORMAT HEXA;SOFRAME 0;IDENTIFIER:
MODE 1;CONDITION FALSE;ID1:
MODE 1;PATTERN“11111101100”;:
TRIGGER:CAN:IDENTIFIER:ID2:
MODE 0;PATTERN “XXXXXXXXXXX”;:
TRIGGER:CAN:IDENTIFIER:ID3:
MODE 0;PATTERN “XXXXXXXXXXX”;:
TRIGGER:CAN:IDENTIFIER:ID4:
MODE 0;PATTERN “XXXXXXXXXXX”;:
TRIGGER:CAN:RTR 0;DATA:MODE 1;DLC 6;
PATTERN1 “10X10X10”;
PATTERN2 “XXXXXXXX”;
PATTERN3 “XXXXXXXX”;
PATTERN4 “XXXXXXXX”;
PATTERN5 “XXXXXXXX”;
PATTERN6 “11111111”;
PATTERN7 “XXXXXXXX”;
PATTERN8 “XXXXXXXX”;
CONDITION FALSE;:TRIGGER:CAN:EFRAME 1

:TRIGger:CAN:BRATe

Function Enter or query bit rate in the CAN trigger conditions

Syntax :TRIGger:CAN:BRATe {<NRf>}
TRIGger :CAN:BRATe? ->
<NRf>=33300,50000,83300,100000,125000,
250000,500000,1000000

Example:TRIGger:CAN:BRATe 500000
TRIGger:CAN:BRATe? ->
:TRIGGER:CAN:BRATE 500.0E+03

:TRIGger:CAN:DATA?

Function Query all Data Field setting values in CAN trigger conditions

Syntax :TRIGger:CAN:DATA?

Example:TRIGger:CAN:DATA? ->
:TRIGGER:CAN:DATA:MODE 1;DLC 8;
PATTERN1 “XXXXXXXX”;
PATTERN2 “XXXX0000”;
PATTERN3 “XXXXXXXX”;
PATTERN4 “XXXXXXXX”;
PATTERN5 “XXXXXXXX”;
PATTERN6 “XXXXXXXX”;
PATTERN7 “XXXXXXXX”;
PATTERN8 “11111111”;
CONDITION TRUE

:TRIGger:CAN:DATA:CONDition

Function Enter or query the Data Field condition (True/False/Greater/Less) in CAN trigger conditions

Syntax :TRIGger:CAN:DATA:
CONDition {TRUE|FALSe|GREater|LESS}
:TRIGger:CAN:DATA:CONDition?

Example:TRIGger:CAN:DATA:CONDition FALSe
:TRIGger:CAN:DATA:CONDition? ->
:TRIGGER:CAN:DATA:CONDITION FALSE

:TRIGger:CAN:DATA:DLC

Function Enter or query settings for the Data Field’s number of data bytes (DLC) in CAN trigger conditions

Syntax :TRIGger:CAN:DATA:DLC {<NRf>}
:TRIGger:CAN:DATA:DLC?
<NRf>=1-8

Example:TRIGger:CAN:DATA:DLC 6
:TRIGger:CAN:DATA:DLC? ->
:TRIGGER:CAN:DATA:DLC 6

:TRIGger:CAN:DATA:HEXa<x>

Function Enter hexadecimal settings for each byte of the Data Field pattern in CAN trigger conditions

Syntax :TRIGger:CAN:DATA:
HEXa<x> {<Character string>}
<x>=1-8

Example:TRIGger:CAN:DATA:HEXa1 “A3”

:TRIGger:CAN:DATA:MODE

Function Enter or query settings indicating whether trigger activates on the Data Field in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:DATA:MODE {<Boolean>}
:TRIGger:CAN:DATA:MODE?
```

Example
```
:TRIGger:CAN:DATA:MODE 1
:TRIGger:CAN:DATA:MODE? ->
:TRIGGER:CAN:DATA:MODE 1
```

:TRIGger:CAN:DATA:PATTern<x>

Function Enter hexadecimal settings for each byte of the Data Field pattern in CAN trigger conditions

Syntax
```
:TRIGger:CAN:DATA:
PATTern<x> {<Character string>}
:TRIGger:CAN:DATA:PATTern<x>?
<x>=1-8
```

Example
```
:TRIGger:CAN:DATA:PATTern1 “10X10X10”
:TRIGger:CAN:DATA:PATTern1? ->
:TRIGGER:CAN:DATA:PATTERN1 “10X10X10”
```

:TRIGger:CAN:EFRame

Function Enter or query settings indicating whether trigger activates on the Data Field in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:EFRame {<Boolean>}
:TRIGger:CAN:EFRame?
```

Example
```
:TRIGger:CAN:EFRame 1
:TRIGger:CAN:EFRame? ->
:TRIGGER:CAN:EFRAME 1
```

:TRIGger:CAN:IDENtifier?

Function Query all Identifier setting values in CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier?
```

Example
```
:TRIGger:CAN:IDENtifier? ->
:TRIGGER:CAN:IDENTIFIER:MODE 1;
CONDITION FALSE;ID1:MODE 1;
PATTERN “11111101100”;:TRIGGER:CAN:
IDENTIFIER:ID2:MODE 0;
PATTERN “XXXXXXXXXXX”;:TRIGGER:
CAN:IDENTIFIER:ID3:MODE 0;
PATTERN “XXXXXXXXXXX”;:TRIGGER:
CAN:IDENTIFIER:ID4:MODE 0;
PATTERN “XXXXXXXXXXX”
```

:TRIGger:CAN:IDENtifier:CONDition

Function Enter or query the Identifier Field condition (True/False) in CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier:
CONDition {TRUE|FALSe}
:TRIGger:CAN:IDENtifier:CONDition?
```

Example
```
:TRIGger:CAN:IDENtifier:CONDition FALSe
:TRIGger:CAN:IDENtifier:CONDition? ->
:TRIGGER:CAN:IDENTIFIER:CONDITION FALSE
```

:TRIGger:CAN:IDENtifier:ID<x>?

Function Query all Identifier ID<x> settings in CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier:ID<x>?
<x>=1-4
```

Example
```
:TRIGger:CAN:IDENtifier:ID1? ->
:TRIGGER:CAN:IDENTIFIER:ID1:
MODE 1;PATTERN “11111101100”
```

:TRIGger:CAN:IDENtifier:ID<x>:HEXa

Function Enter hexadecimal settings for the pattern of the Identifier ID<x> in CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier:ID<x>:
HEXa {<Character string>}
<x>=1-4
```

Example
```
:TRIGger:CAN:IDENtifier:ID1:HEXa “7FF”
```

:TRIGger:CAN:IDENtifier:ID<x>:MODE

Function Enter or query the setting indicating whether trigger activates (1) or does not activate (0) on the Identifier ID<x> in CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier:ID<x>:
MODE {<Boolean>}
:TRIGger:CAN:IDENtifier:ID<x>:
MODE?
<x>=1-4
```

Example
```
:TRIGger:CAN:IDENtifier:ID1:MODE 1
:TRIGger:CAN:IDENtifier:ID1:MODE? ->
:TRIGGER:CAN:IDENTIFIER:ID1:MODE 1
```

:TRIGger:CAN:IDENtifier:ID<x>:PATTern

Function Enter or query settings in binary for the pattern of the Identifier ID<x> in CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier:ID<x>:
PATTern {<Character string>}
:TRIGger:CAN:IDENtifier:ID<x>:
PATTern?
<x>=1-4
```

Example
```
:TRIGger:CAN:IDENtifier:ID1
:PATTern “10X10X10X10”
:TRIGger:CAN:IDENtifier:ID1:
PATTern? ->
:TRIGGER:CAN:IDENTIFIER:ID1:
PATTERN “10X10X10X10”
```

:TRIGger:CAN:IDENtifier:MODE

Function Enter or query settings indicating whether trigger activates (1) or does not activate (0) on the Identifier in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:IDENtifier:
MODE {<Boolean>}
:TRIGger:CAN:IDENtifier:MODE?
```

Example
```
:TRIGger:CAN:IDENtifier:MODE 1
:TRIGger:CAN:IDENtifier:MODE? ->
:TRIGGER:CAN:IDENTIFIER:MODE 1
```

:TRIGger:CAN:MFORmat

Function Enter or query the message format (Standard/Extended) in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:MFORmat {STANdard/EXTended}
:TRIGger:CAN:MFORmat?
```

Example
```
:TRIGger:CAN:MFORmat EXTended
:TRIGger:CAN:MFORmat? ->
:TRIGGER:CAN:MFORMAT EXTENDED
```

:TRIGger:CAN:PFORmat

Function Enter or query the setting format for the trigger pattern in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:PFORmat {BINary/HEXa}
:TRIGger:CAN:PFORmat?
```

Example
```
:TRIGger:CAN:PFORmat HEXa
:TRIGger:CAN:PFORmat? ->
:TRIGGER:CAN:PFORMAT HEXA
```

:TRIGger:CAN:RTR

Function Enter or query settings indicating whether the trigger activates on a data frame (0) or remote frame (1) in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:RTR {<Boolean>}
:TRIGger:CAN:RTR?
```

Example
```
:TRIGger:CAN:RTR 1
:TRIGger:CAN:RTR? ->
:TRIGGER:CAN:RTR 1
```

:TRIGger:CAN:SOFRame

Function Enter or query settings indicating whether trigger activates (1) or does not activate (0) on Start of Frame in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:SOFRame {<Boolean>}
:TRIGger:CAN:SOFRame?
```

Example
```
:TRIGger:CAN:SOFRame 1
:TRIGger:CAN:SOFRame? ->
:TRIGGER:CAN:SOFRAME 1
```

:TRIGger:CAN:SPOint

Function Enter or query the Sample Point in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:SPOint {<NRf>}
:TRIGger:CAN:SPOint?
<NRf>=18.8-90.6
```

Example
```
:TRIGger:CAN:SPOint 78.1
:TRIGger:CAN:SPOint? ->
:TRIGGER:CAN:SPOINT 78.1
```

:TRIGger:CAN:VDIFf

Function Enter or query Vdiff in the CAN trigger conditions

Syntax
```
:TRIGger:CAN:VDIFf {L_H|H_L}
:TRIGger:CAN:VDIFf?
```

Example
```
:TRIGger:CAN:VDIFf L_H
:TRIGger:CAN:VDIFf? ->
:TRIGGER:CAN:VDIFF L_H
```

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