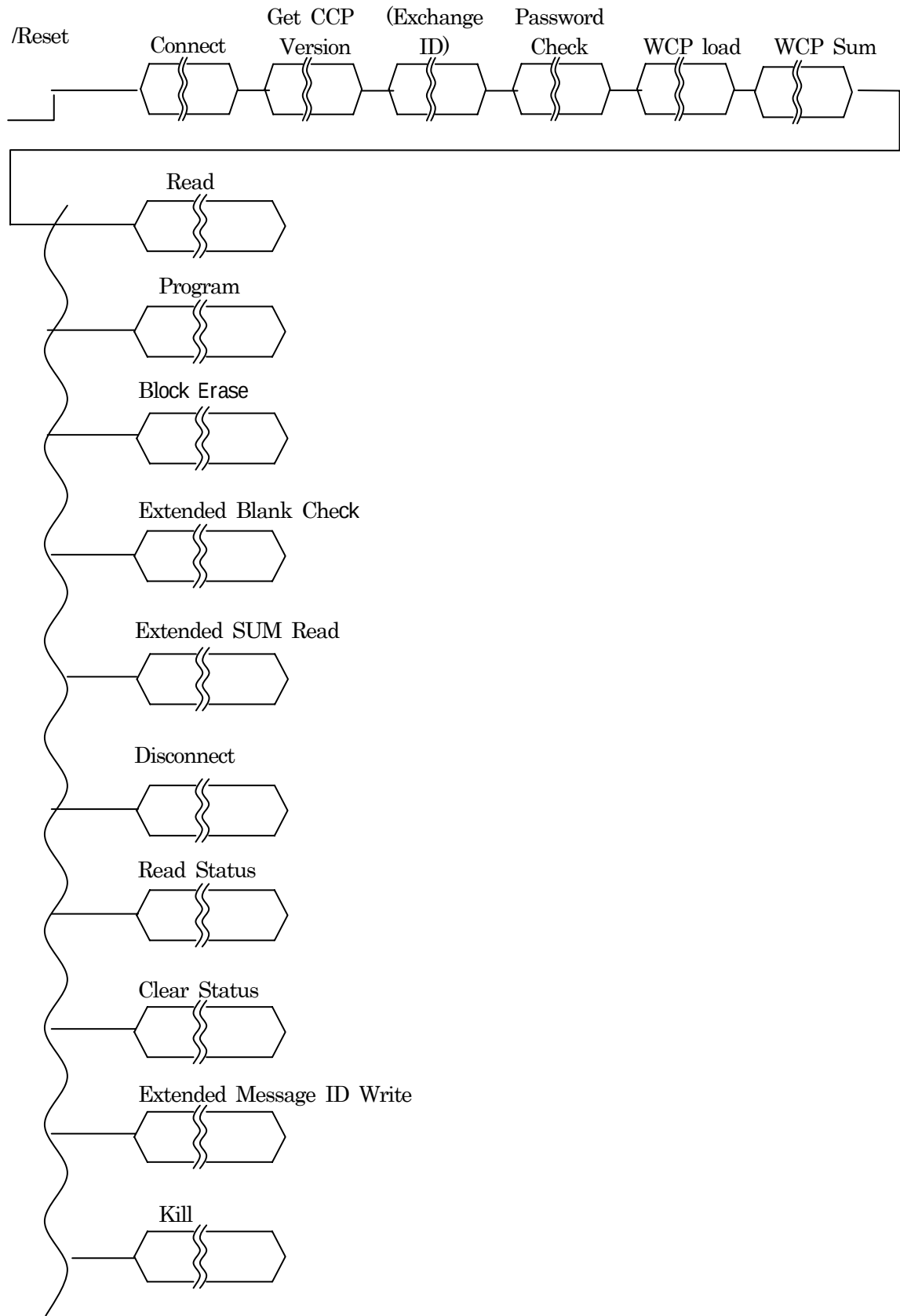


UCOP Protocol Specification

FC239-S2 Specifications of Command Protocol

Rev. No	Date	Item	By
Rev1.00	03.04.01	Issued as Japanese edition	Mikami/Ue
Rev1.01	03.12.05	Merged into English	Sakurai
Rev1.02	03.12.10	Modified	Sugimoto
Rev1.03	03.12.24	Modified	Sugimoto
Rev1.04	04.05.27	Chap 2 Reserve #7A, #7B	Sakurai

1. Command Sequence overview for CAN Programming



2. UCOP Command List

Command	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
	CMD	CTR	Parameter and data field					
Ready	70h	CTR	SRD	SRD1				
Data transport_6	71h	CTR	Transmit Data (6byte)					
a.Read* ¹	72h	CTR	A0-A7	A8-A15	A16-A23	A24-A31	xxh	
b.Download* ²	73h	CTR	A0-A7	A8-A15	A16-A23	A24-A31	00h	
b.Program* ²	73h	CTR	A0-A7	A8-A15	A16-A23	A24-A31	01h	
c.Block Erase	74h	CTR	A0-A7	A8-A15	A16-A23	A24-A31		
d.Erase Multi block	75h	CTR						
e.Read SRD	76h	CTR						
f.Clear SRD	77h	CTR						
AUX	78h	CTR						
AUX	79h	CTR						
AUX	7Ah	CTR						
AUX	7Bh	CTR						
g.Extended Blank Check	7Ch	CTR	A8-A15	A16-A23	A24-A31	A8-A15	A16-A23	A24-A31
h.Extended Sum Read	7Dh	CTR	A8-A15	A16-A23	A24-A31	A8-A15	A16-A23	A24-A31
Data transport* ³	7Eh	CTR	01h-05h	Transmit Data (1byte-5byte)				
Ext'd Command* ³	7Eh	CTR	1xh	Extended Command Data				
i.Pass Word Check	7Eh	CTR	10h	A0-A7	A8-A15	A16-A23	A24-A31	xxh
j.Message ID write	7Eh	CTR	11h					
k.KILL write	7Eh	CTR	12h					
Terminator	7Fh	CTR						
l.Connect	01h	CTR	xxh	xxh				
m.Get CCP Version	1Bh	CTR	02h	01h				
n.Exchange ID	17h	CTR						
o.Disconnect	07h	CTR	xxh		xxh	xxh		
p.Extended Message ID write	7Eh	CTR	13h					
Error * ⁴	FEh	36h	CTR					

Message ID between Server (ECU) and Client (Programmer) defined as the exclusive IDs and should be used only for the UCOP Programming.

*1: xxh of Data7 defines the number of bytes to be read out.

*2: Data7= 00h shows that this frame is defined as Download Command for WCP loading.
Data7= 01h shows that this frame is defined as Program Command.

*3: Data3= from 01h to 05h shows the effective succeeding bytes as the transferred data.
Data3= 1xh shows that this frame is the extended frame for future expansion.

*4: Error frame is returned from Server(ECU) if illegal command is received by Server.
Error frame is returned just after the 1st command frame issued from Client

Slashed data is not effective and FFh is sent if not defined.

SRD is the data from Status Registers.

SRD1 is the data from Status Register 1.

3. Definition of each command sequence

a. Read Command

This command is used to readout the data from server,

In the 1st frame, readout start address and the number of bytes are designated.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Read Command Frame			5sec timeout
2 nd Frame			Busy frame or Error frame	
3 rd Frame			Read frame Readout data from server	
			• • •	
44 th Frame			Read frame Readout data from server	
45 th Frame			Read frame Readout data from server	↓
46 th Frame			Ready frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	command	72h	CTR	A0-A7	A8-A15	A16-A23	A24-A31	xxh*2	
2 nd Frame	busy	72h*1	CTR						
3 rd Frame	read	71h	CTR	readout data (6byte)					
				readout data(6byte)					
				readout data(6byte)					
44 th Frame	read *	71h	CTR	readout data(6byte)					
45 th Frame	read	7Eh	CTR	04(data size)	readout data(4byte)				
46 th Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is not effective and FFh is sent.

*2: xxh is the number of data readout from server.

In case 00h 256 bytes data should be readout.

b. “Download Data(WCP)” Command or “Program Data” Command

This command is used to download WCP into the RAM on ECU or program the flash data.

Data7 in 1st frame defines this command as the download command or program command.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command frame			5sec timeout
2 nd Frame			Busy frame	x sec timeout
3 rd Frame	Write frame Download data to server			
	• • •			
44 th Frame	Write frame Download data to server			
45 th Frame	Write frame Download data to server			
46 th Frame	Termination frame			5sec timeout
47 th Frame			Ready frame	

This table is the example of 256 bytes download.

* x sec timeout : This is a timeout in ECU. This depends on IBL or WCP design.

Frame No.	Frame Type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	73h	CTR	A0-A7	A8-A15	A16-A23	A24-A31	00 or 01 ^{*2}	
2 nd Frame	Busy	73h ^{*1}	CTR						
3 rd Frame	Write	71h	CTR	Write data into server (6byte)					
				Write data into server (6byte)					
				Write data into server (6byte)					
44 th Frame	Write	71h	CTR	Write data into server (6byte)					
45 th Frame	Write	7Eh	CTR	Data size	Write data into server (4byte)				
46 th Frame	Terminator	7Fh	CTR						
47 th Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.

*2: Data7= 00h : Download data

In case of Download Data command, size is the designated data size. (WCP volume)

Data7= 01h : Program data

In case of Program Data command, Page size should be 256 bytes maximum.

*3: Slashed Data is the non effective data and FFh is sent.

*Page : Data transferred to ECU in one Download.

c. Block Erase Command

This command is used to erase one block flash memory in ECU.

A31 to A0 is defined as the last address of the block to be erased.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout ↓
2 nd Frame			Busy Frame	
3 rd Frame			Ready Frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	74h	CTR	A0-A7	A8-A15	A16-A23	A24-A31		
2 nd Frame	Busy	74h ^{*1}	CTR						
3 rd Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

This command is the command to erase the designated flash memory block.

Address A31 to A0 shows the last address of the block to be erased.

In this specification, this address is called as the block address.

From A7 to A0 should be always FFh.

d. Deleted

~~Erase multiple block Command~~

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout
2 nd Frame			Busy Frame	5sec timeout

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	75h	CTR						
2 nd Frame	Busy	75h* ¹	CTR						
3 rd Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

This command is the command to erase all of flash reprogramming memory area.

Usually erased state is defined as FFh .

SR6 should become “1” in case of erasing error.

e. Read SRD Command

This command is used to read out the flash control status.

Two status registers(SRD and SRD1) are defined.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout
2 nd Frame			Busy Frame	
3 rd Frame			Read frame	
4 th Frame			Ready frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	76h	CTR						
2 nd Frame	Busy	76h ^{*1}	CTR						
3 rd Frame	Read	7Eh	CTR	02h	SRD	SRD1			
4 th Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

This command is used to check the flash controlling status.

SRD, SRD1 is also able to be readout through ready frame too.

<Status Registers(SRD)>

SRD bit No.	Definition	Value	
		"1"	"0"
SR7(bit7)	Busy(command execution)	Ready	Busy
SR6(bit6)	Erased status	Error	Pass
SR5(bit5)	Programmed status	Error	Pass
SR4(bit4)	Reserved	---	---
SR3(bit3)	Reserved	---	---
SR2(bit2)	Reserved	---	---
SR1(bit1)	Timeout status for receiving data from ECU	Timeout	Non time-out
SR0(bit0)	Reserved	---	---

(a)SR7 (Busy : status of the predefined command execution)

SR7 is set to "0" during device functions like erase and program.

SR7 is set to "1" after the completion of these device functions.

(b)SR6 (Erased status)

SR6 is set to "1" if erasing error has happened.

SR6 is cleared only when Clear status Register command is received.

(c)SR5 (Programmed status)

SR5 is set to "1" when programming error has happened.

SR6 is cleared only when Clear status Register command is received.

(e)SR1 (Timeout status)

SR1 shows the timeout status detected by the client during data receiving

<Status Register1(SRD1)>

8bit register in ECU(MCU) in which received command is registered by Server (ECU).

f Clear SRD Command

This command is used to clear the flash status register on ECU.

Both flash control status registers(SRD,SED1) should be cleared before starting the new device function.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout ↓
2 nd Frame			Busy Frame	
3 rd Frame			Ready Frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	77h	CTR						
2 nd Frame	Busy	77h ^{*1}	CTR						
3 rd Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

g. Extended Blank Check Command

This command is used to check if all of the designated flash areas are erased or not.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout
2 nd Frame			Busy Frame	↓
3 rd Frame			Read frame	↓
4 th Frame			Ready frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	7Ch	CTR	A8-A15 ^{*3}	A16-A23 ^{*3}	A24-A31 ^{*3}	A8-A15 ^{*4}	A16-A23 ^{*4}	A24-A31 ^{*4}
2 nd Frame	Busy	7Ch ^{*1}	CTR						
3 rd Frame	Read	7Eh	CTR	01 or 05 ^{*6}	Blank check ^{*2} Status	A0-A7 ^{*5}	A8-A15 ^{*5}	A16-A23 ^{*5}	A24-A31 ^{*5}
4 th Frame	Ready	70h	CTR	SRD	SRD1				

*1: Data1 of busy command should be the same data as the Data1 of 1st frame.
Slashed Data is the non effective data and FFh is sent.

*2 Result of Blank check shows if all of the designated areas are in erased or not.
Data6 = FFh : Pass. All of designated areas are erased.
Data6 = 01h: Error. The data designated flash is not in erased status.
A31 to A0 shows the first error address after blank check started.

*3 Start address for blank check command

*4 Last address for blank check command
All of flash area between start and last address are blank-checked.

*5 Blank check error address
The first error address detected after starting blank check.

*6 Data5 in 3rd frame is 01 in case result of blank check is "Pass".
Data5 in 3rd frame is 05 in case result of blank check is "Error".

h. Extended Sum Read Command

SUM read out command. This command requires the SUM value of one(1) block flash memory designated from start/end address.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout
2 nd Frame			Busy Frame	↓
3 rd Frame			Read frame	↓
4 th Frame			Ready frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	7Dh	CTR	A8-A15 ^{*2}	A16-A23 ^{*2}	A24-A31 ^{*2}	A8-A15 ^{*3}	A16-A23 ^{*3}	A24-A31 ^{*3}
2 nd Frame	Busy	7Dh ^{*1}	CTR						
3 rd Frame	Read	7Eh	CTR	04(Size)	D0-D7 ^{*4}	D8-D15 ^{*4}	D0-D7 ^{*5}	D8-D15 ^{*5}	
4 th Frame	Ready	70h	CTR	SRD	SRD1				

*1 Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

*2 Block start address for SUM calculation.

Start Address information shows the block beginning address to be erased.

(A8-A15):mid-low address

(A16-A23):mid-high address

(A24-A31):high address

*3 Block end address for SUM calculation

End address information shows the block terminal address to be erased.

(A8-A15):mid-low address

(A16-A23):mid-high address

(A24-A31):high address

*4 Calculated 8bit SUM data

As 8bit sum 16bit compare, 8bit sum 8bit compare function is available,

8bit calculated 16bit sum data is always output from ECU in 8bit SUM mode.

(D0:D7) Low byte of SUM data.

(D8:D15) High byte of SUM data.

*5 Calculated 16bit SUM data

(D0:D7)Low byte data of SUM data.

(D8:D15)High byte data of SUM data.

i. Password Check Command

Thus command is used to send the password data to server ECU.

Received password (by ECU) should be compared to the data located specific flash area.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout
2 nd Frame			Busy Frame	x sec timeout *
3 rd Frame	Write frame (password data)			
	.			↓
	.			5sec timeout
	.			↓
xx+3 rd Frame			Read frame	
xx+4 th Frame			Ready frame	

* x sec timeout : This is a timeout in ECU. This depended on IBL or WCP designed.

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	7Eh	CTR	10h	A0-A7	A8-A15	A16-A23	A24-A31	xxh* ²
2 nd Frame	Busy	7Eh* ¹	CTR						
3 rd Frame	Write	7Eh	CTR	01-05h	Password data				
					Password data				
					Password data				
xx+3 rd Frame	Read	7Eh	CTR	01h	Matched* ³				
xx+4 th Frame	Ready	70h	CTR	SRD	SRD1				

*1 Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

*2 Data8 shows the number of password bytes. (should be over and equal to 4 bytes)

Password data designated from 3rd Frame is compared to the password programmed in designated flash area.

*3 Matched status

FFh : Matched

01h : Unmatched Error

02h : Password size error (in case Data8 in Frame1 is under 4 bytes)

03h : Address error (in case the designated address is out of the password address area)

j. Deleted

~~Message ID write Command~~

This command is used to change the message ID of the server ECU.(through CAN)

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout
2 nd Frame			Busy Frame	
3 rd Frame	Write frame New message ID			
4 th Frame			Ready frame	

Frame No.	Frame type	Data 1	Data 2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	7Eh	CTR	11h					
2 nd Frame	Busy	7Eh ^{*1}	CTR						
3 rd Frame	Write	71h	CTR	D0-D7	D8-D15	D16-D23	D24-D31	00h or 01h ^{*2}	00h or 01h ^{*3}
4 th Frame	Ready	70h or FEh ^{*4}	CTR or 32h ^{*4}	FF or CTR ^{*3}					

* 1 ビジコマンドとしては、各コマンドフレームのCMDを返します。

斜線枠のデータは参照しません。初期値でFFhを記入します。

Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

* 2 Data7において

[00h] :スタンダードID

[01h] :エクステンデットID

Data7 in frame 3 shows the type of message ID.

00h : standard ID

01h : extended ID

* 3 Data8において

[00h] :ライター→マイコン ID

[01h] :マイコン→ライタ ID

Data 8 in frame 3 shows this message ID is for send or receive message ID.

00h : This message ID is the message ID for data receive by server ECU.

01h : This message ID is the message ID for data send from server ECU.

* 4 エラー時は(追記不可時)Data1=FEh ,Data2=32h(parameter(s) out of range) ,Data3=CTR

正常終了時は Data1=70h ,Data2=CTR ,Data3以降は参照しません

Data1 in Frame4 shows the success of ID exchange.

FEh : exchange incomplete. In this case Data2 becomes 32h, Data3 = CTR

70h : exchange complete.

k. KILL write Command

This command is used to disable UCOP function after the completion of this command.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			5sec timeout ↓
2 nd Frame			Busy Frame	
3 rd Frame			Ready Frame	

Frame No.	Frame type	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	7Eh	CTR	12h					
2 nd Frame	Busy	7Eh* ¹	CTR						
3 rd Frame	Ready	70h	CTR	SRD	SRD1				

- *1 Data1 of busy command should be the same data as the Data1 of 1st frame.
Slashed Data is the non effective data and FFh is sent.

1. Connect Command

Connect command is the basic CCP command, and used to start the programming session.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			25msec timeout
2 nd Frame			DTO *	

* DTO : Data Transmission Object

Frame No.	Frame type	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	01h	CTR	xxh ^{*1}	xxh ^{*1}				
2 nd Frame	Busy	FFh or FEh ^{*2,4}	xxh ^{*3}	CTR					

Slashed Data is the non effective data and FFh is sent.

* 1 Station address

Data3 and Data4 in frame1 shows the station ID.

* 2 Packet ID

[FFh] :Pass

[FEh] :Error

*3 Data2 of frame2 is the Command return code.

[00h] :acknowledge / no error

[30h] :unknown command

[31h] :command syntax error

[32h] :parameter(s) out of range error

[33h] :access denied error

[34h] :overload error

[35h] :access locked

[36h] :resource/function not available

*4 In case station address is not matched with the address of server ECU, ECU should send back access denied error.

*5 CTR in Connect Command(1st Frame) is defined as “00h”.

*6 In case “resource/function not available”(data2 in frame2 = 36h) response returned, client retries to send the connect command.

Number of retry (connect) commands and the interval of retry commands are defined as follows.

Number of retry commands: 0 to 255 times (as the default value : 5 times)

Interval of retry commands: 0 to 2550msec (as the default value: 200msec)

m Get_CCP_Version Command

This command is optional, and not always necessary.

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			25msec timeout
2 nd Frame			DTO	

Frame No.	Frame type	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	1Bh	CTR	02h ^{*1}	01h ^{*1}				
2 nd Frame	Busy	FFh or FEh ^{*2}	xxh ^{*3}	CTR	02h ^{*1}	01h ^{*1}			

Slashed Data is the non effective data and FFh is sent.

*1 As the UCOP is defined based on CCP Ver 2.1, Data3 of frame1 should be 2 and Data4 of frame 1 should be 1.

*2 Packet ID

[FFh] :Pass

[FEh] :Error

*3 Data2 of frame2 is the command return code.

[00h] :acknowledge / no error

[30h] :unknown command

[31h] :command syntax error

[32h] :parameter(s) out of range error

[33h] :access denied error

[34h] :overload error

[35h] :access locked

[36h] :resource/function not available

n Exchange_ID Command

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			25msec timeout
2 nd Frame			DTO	

Frame No.	Frame type	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	17h	CTR						
2 nd Frame	Busy	FFh or FEh ^{*2}	xxh ^{*3}	CTR	00h ^{*1}	00h ^{*1}	41h ^{*1}	00h ^{*1}	

Slashed Data is the non effective data and FFh is sent.

*1 Should not be changed in any case.

*2 Packet ID

[FFh] :Pass

[FEh] :Error

*3 Data2 of frame2 is the command return code.

[00h] :acknowledge / no error

[30h] :unknown command

[31h] :command syntax error

[32h] :parameter(s) out of range error

[33h] :access denied error

[34h] :overload error

[35h] :access locked

[36h] :resource/function not available

o. Disconnect Command

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command Frame			25msec timeout
2 nd Frame			Busy Frame	

Frame No.	Frame type	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	07h	CTR	01h ^{*1}		xxh ^{*2}	xxh ^{*2}		
2 nd Frame	Busy	FFh or FEh ^{*3,5}	xxh ^{*4}	CTR					

Slashed Data is the non effective data and FFh is sent.

*1 Data3 in frame1 shows the disconnecting mode.

01h : This disconnect command is sent as a end of session.
(temporary disconnect is not supported in UCOP)

*2 Data5 and Data6 in frame1 the station address.

*3 Packet ID

[FFh] :Pass

[FEh] :Error

*4 Data2 in frame2 is a command return code and shows the following status.

[00h] :acknowledge / no error

[30h] :unknown command

[31h] :command syntax error

[32h] :parameter(s) out of range error

[33h] :access denied error

[34h] :overload error

[35h] :access locked

[36h] :resource/function not available

*5 In case station address received by server ECU is not matched to its station address,
Server ECU sends 33h (access denied) message to the client (programmer).

p. Extended Message ID write Command

Sequence	TOOL → MICOM	Baud Rate	MICOM → TOOL	Maximum time to next frame
1 st Frame	Command frame			5sec timeout
2 nd Frame			Busy frame	x sec timeout
3 rd Frame	Write frame Message ID (Client to server ID)			↓
4 th Frame	Write frame Message ID (Server to client ID)			
5 th Frame	Write frame Aux data bytes for SUM Value adjustment			5sec timeout
6 th Frame			Ready frame	

* x sec timeout : This is a timeout in ECU. This depends on IBL or WCP design.

Frame No.	Frame type	Data1	Data2	Data3	Data4	Data5	Data6	Data7	Data8
		CMD	CTR	Parameter and data field					
1 st Frame	Command	7Eh	CTR	13h					
2 nd Frame	Busy	7Eh* ¹	CTR						
3 rd Frame	Write	71h	CTR	D0-D7	D8-D15	D16-D23	D24-D31	00h or 01h* ²	
4 th Frame	Write	71h	CTR	D0-D7	D8-D15	D16-D23	D24-D31	00h or 01h* ²	
5 th Frame	Write	71h	CTR	D0-D7	D8-D15				
6 th Frame	Ready	70h or FEh* ³	CTR or 32h* ³	CTR* ³					

Data1 of busy command should be the same data as the Data1 of 1st frame.

Slashed Data is the non effective data and FFh is sent.

*1 Deleted

*2 Data7 in frame 3 shows the type of message ID.

00h : standard ID

01h : extended ID

*3 Data1 in Frame4 shows the success of ID exchange.

FEh : exchange incomplete. In this case Data2 becomes 32h, Data3 = CTR

70h : exchange complete.

4. Operating Specification of Device Function

Before Device Function

Device Function	Operating Command to Micom	Note
Start Device Function	Set Control Signal CONNECT GET CCP VERSION EXCHANGE ID Password Check WCP Download WCP SUM Check(Extended SUM Read Command)	

Device Function and Function 8x

Device Function	Operating Command to Micom	Note
ERASE	Read SRD Clear SRD Block Erase *3 Blank Check(Page Read Command / Extended Blank Check)*1 *3 DISCONNECT	
BLANK	Blank Check(Page Read Command / Extended Blank Check)*1 *3 DISCONNECT	
PROGRAM	Read SRD Clear SRD Page Program *3 SUM Check(Page Read Command / Extended SUM Read Command)*2 *3 DISCONNECT	
READ	Page Read *3 DISCONNECT	
E.P.R	Read SRD Clear SRD Block Erase *3 Blank Check(Page Read Command / Extended Blank Check)*1 *3 Read SRD Clear SRD Page Program *3 SUM Check(Page Read Command / Extended SUM Read Command)*2 *3 DISCONNECT	
COPY	Page Read *3 DISCONNECT	Execute Full Verify after data is loaded into Buffer RAM area
Add Secondary ID (Func 89)	Extended Message ID write Command DISCONNECT	
KILL Register ON (Func 87)	KILL write Command DISCONNECT	

- *1 Two modes are provided in Blank Check function.
Extended Blank Check command is recommended for the high speed blank check and is used as the default operation mode.
- *2 Two modes are provided in Read Verify Function.
Full read verify mode is for more reliable verify and all of the programmed data is read out from FROM and compared with it's original data in programmer.
SUM verify mode is for high speed verification and SUM of FROM is calculated on ECU and is sent to the programmer.
- *3 Each command should be repeated to cover all of the specified FROM area.