LR5-LAN Socket Communication

Sample Program

(Excel　Macro VBA)

content

1. Overview

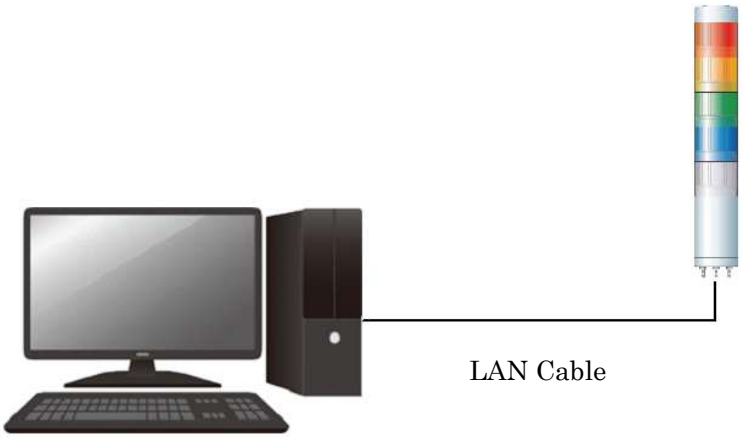
This is an outline of sample programming to control LR5-LAN via socket communication.

The programs are intended to control the unit using Excel Macro VBA without using the DLLs provided by PATLITE

1.1. System Overview

The system configuration diagram of this program is as follows.

The sample program controls one LR5-LAN by socket communication.



2. Development Environment

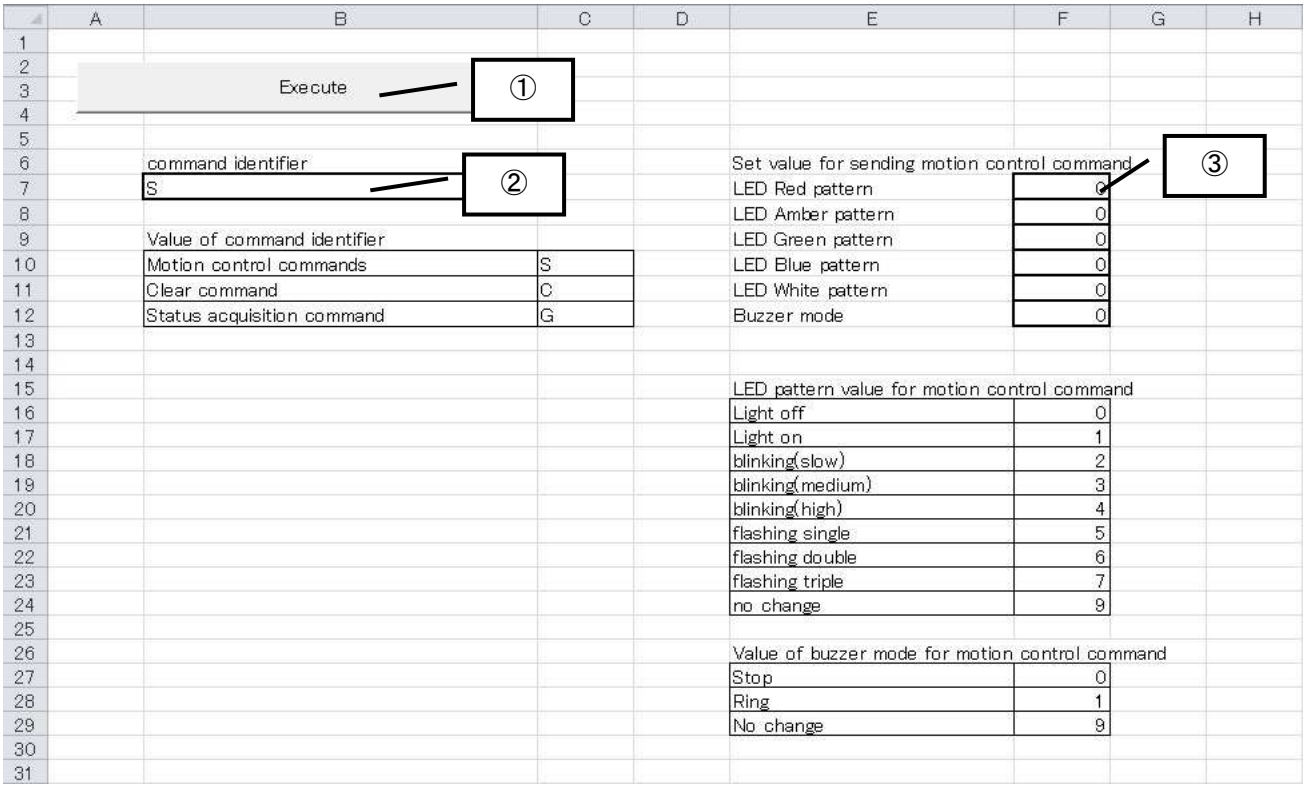
The development environment of the sample program is shown below.

Development Environment		Remarks
Development OS	Windows11 64bit	
Development Language	VBA	Excel 2013
Application	GUI	

3. Application Overview

3.1. Screen operation explanation

In Excel, when you press the execute button after specifying the ID of the command to be executed and the parameters to be used when executing the command, the command for each operation will be executed.



No.	Item Name	content
①	Execute button	Executes the command with the specified command ID.
②	Command ID	Select the command ID to execute
③	Operation control command sending setting	Set the red, yellow, green, blue, and white LED patterns and buzzer mode used when executing operation control commands.

3.1.1. Command list

command name	content
Operation control command	Control each color pattern and buzzer (On/Off) of the LED unit
Clear Command	Turn off the LED unit and turn off the buzzer
Status Acquisition Command	Used to acquire status of signal lines and the status of the led unit and alarm..

3.1.2. Operation control command

Set the following Value in Excel and press the Execute button to execute the command.

No.	Command Line Argument	Value
1	Command ID	S
2	LED Unit Red	Off:0 On:1 Flashing(slow):2 Flashing(medium):3 Flashing(fast):4 Single flash:5 Double flash:6 Triple flash:7 No change:9
3	LED Unit Amber	
4	LED Unit Green	
5	LED Unit Blue	
6	LED Unit White	
7	Alarm Pattern	Off:0 On:1 No change:9

3.1.3. Clear Command

Set the following Value in Excel and press the Execute button to execute the command.

No.	Parameters	Value
1	Command ID	C

3.1.4. Status Acquisition Command

Set the following Value in Excel and press the Execute button to execute the command.

No.	Parameters	Value
1	Command ID	G

3.2. Function Description

3.2.1. Function List

Function Name	Explanation
SocketOpen	Connect to LR5-LAN
SocketClose	close the socket
SendCommand	send command
PNS_RunControlCommand	Send PNS command operation control commands
PNS_ClearCommand	Send clear PNS command
PNS_GetDataCommand	Send PNS Command Status Acquisition Command

3.2.2. Connect to LR5-LAN

Function Name	Private Function SocketOpen(ByVal ip As String, ByVal port As Integer) As Integer	
Parameters	ByVal ip As String	LR5-LAN IP address
	ByVal port As Integer	LR5-LAN port number
Return Value	Integer	Success: 0, Failure: other than 0
Explanation	Connect to LR5-LAN with specified IP address and port number using socket communication	
How to use functions	‘ Definition of Socket class variables Private lngSck As Long ‘ Main function Sub Run_Click() ‘ Connect to LR5-LAN lngRtn = SocketOpen(″192.168.10.1″, 10000) If lngRtn <> 0 Then Exit Sub End Sub	
Remarks	Please refer to「4.1Connect to LR5-LAN」For The Program Overview.	

3.2.3. close socket

Function Name	Private Sub SocketClose()
Parameters	None
Return Value	None
Explanation	Close the socket connected to LR5-LAN
How to use functions	‘ Main function Sub Run_Click() ‘ Connect to LR5-LAN Dim lngRtn As Long lngRtn = SocketOpen(″192.168.10.1″, 10000) If lngRtn <> 0 Then Exit Sub ‘ close socket lngRtn = PNS_ClearCommand() End Sub
Remarks	Please refer to「4.2close socket」For The Program Overview.

3.2.4. Send Command

Function Name	Private Function SendCommand(ByRef sendData() As Byte, recvData() As Byte) As Integer	
Parameters	ByRef sendData() As Byte	Transmission Data
	Byte, recvData() As Bytez	Received Data
Return Value	Integer	Success: 0, Failure: other than 0
Explanation	Send data to the connected LR5-LAN and return response data	

How to use functions	‘ Main function
	Sub Run_Click()
	‘ Connect to LR5-LAN
	Dim lngRtn As Long
	lngRtn = SocketOpen(″192.168.10.1″, 10000)
	If lngRtn <> 0 Then Exit Sub
	
	‘ Create transmission data
	Dim sendData(7) As Byte
	Dim recvData() As Byte
	sendData [0] = &H42
	sendData [1] = &H42
	sendData [2] = &H53
	sendData [3] = &H0
	sendData [4] = &H0
	sendData [5] = &H0
	sendData [6] = &H1
	
	‘ Send Command
	lngRtn = SendCommand(sendData(), recvData())
	If lngRtn <> 0 Then
	Debug.Print (″failed to send data″)
	Exit Function
	End If
	
	‘ close socket
	SocketClose()
	End Sub	

Remarks	Please refer to「4.3Send Command」For The Program Overview.	

3.2.5. PNS Command Operation Control Command Transmission

Function Name	Private Function PNS_RunControlCommand(runControlData As PNS_RUN_CONTROL_DATA) As Integer	
Parameters	runControlData As PNS_RUN_CONTROL_DATA	TRANSMISSION DATA THAT CONTROLS EACH COLOR PATTERN AND BUZZER OF THE LED UNIT For Details, See「3.3.1Motion control data structure」For The Program Overview.
Return Value	Integer	Success: 0, Failure: other than 0
Explanation	Send PNS command operation control commands to control each color pattern and buzzer of the led unit	
How to use functions	' Main function Sub Run_Click() ' Connect to LR5-LAN Dim lngRtn As Long lngRtn = SocketOpen("192.168.10.1", 10000) If lngRtn <> 0 Then Exit Sub ' PNS Command Operation Control Command Transmission ' Led pattern0 : Off ' Led pattern1 : On ' Led pattern2 : Flashing(slow) ' Led pattern3 : Flashing(medium) ' Led pattern4 : Flashing(fast) ' Led pattern5 : Single flash ' Led pattern6 : Double flash ' Led pattern7 : Triple flash ' Led pattern9 : No change 'Alarm Pattern0 : Off 'Alarm Pattern1 : On 'Alarm Pattern9 : No change Dim runControlData As PNS_RUN_CONTROL_DATA runControlData.ledRedPattern = PNS_RUN_CONTROL_LED_ON runControlData.ledAmberPattern = PNS_RUN_CONTROL_LED_BLINKING_SLOW runControlData.ledGreenPattern = PNS_RUN_CONTROL_LED_NO_CHANGE runControlData.ledBluePattern = PNS_RUN_CONTROL_LED_OFF runControlData.ledBluePattern = PNS_RUN_CONTROL_LED_ FLASHING_TRIPLE runControlData.buzzerPattern = PNS_RUN_CONTROL_BUZZER_RING lngRtn = PNS_RunControlCommand(runControlData) ' close socket SocketClose() End Sub	
Remarks	Please refer to「4.4PNS Command Operation Control Command Transmission」For The Program Overview.	

3.2.6. Send Clear Command For PNS Command

Function Name	Private Function PNS_ClearCommand() As Integer	
Parameters	None	
Return Value	Integer	Success: 0, Failure: other than 0
Explanation	Send the PNS clear command to turn off the led unit and stop the buzzer	
How to use functions	‘ Main function Sub Run_Click() ‘ Connect to LR5-LAN Dim lngRtn As Long lngRtn = SocketOpen(″192.168.10.1″, 10000) If lngRtn <> 0 Then Exit Sub ‘ Send Clear Command For PNS Command PNS_ClearCommand() ‘ close socket SocketClose() End Sub	
Remarks	Please refer to「4.5Send Clear Command For PNS Command」For The Program Overview.	

3.2.7. Send PNS Command Status Acquisition Command

Function Name	Private Function PNS_GetDataCommand(statusData As PNS_STATUS_DATA) As Integer	
Parameters	statusData As PNS_STATUS_DATA	Status Acquisition Command の Received Data(LED UNIT AND BUZZER STATUS) For Details, See 「3.3.3Operation control status data」For The Program Overview.
Return Value	int	Success: 0, Failure: other than 0
Explanation	Send the status acquisition command of the PNS command to acquire the status of the led unit and buzzer.	
How to use functions	' Main function Sub Run_Click() ' Connect to LR5-LAN Dim lngRtn As Long lngRtn = SocketOpen("192.168.10.1", 10000) If lngRtn <> 0 Then Exit Sub ' Send PNS Command Status Acquisition Command Dim statusData As PNS_STATUS_DATA PNS_GetDataCommand(statusData) ' close socket SocketClose() End Sub	
Remarks	Please refer to「4.6Send PNS Command Status Acquisition Command」For The Program Overview.	

3.3. Constant Description

3.3.1. Product Differentiation

Constant name	Value	Explanation
PNS_PRODUCT_ID	0x4142	LR5-LAN product classification

3.3.2. PNS Command Identifier

Constant name	Value	Explanation
PNS_RUN_CONTROL_COMMAND	0x53	Operation control command
PNS_CLEAR_COMMAND	0x43	Clear Command
PNS_GET_DATA_COMMAND	0x47	Status Acquisition Command

3.3.3. PNS Command Response Data

Constant name	Value	Explanation
PNS_ACK	0x06	Normal Response
PNS_NAK	0x15	Abnormal Response

3.3.4. LED unit pattern for operation control commands

Constant name	Value	Explanation
PNS_RUN_CONTROL_LED_ON	0x00	Off
PNS_RUN_CONTROL_LED_OFF	0x01	On
PNS_RUN_CONTROL_LED_BLINKING_SLOW	0x02	Flashing(slow)
PNS_RUN_CONTROL_LED_BLINKING_MEDIUM	0x03	Flashing(slow)
PNS_RUN_CONTROL_LED_BLINKING_HIGH	0x04	Flashing(slow)
PNS_RUN_CONTROL_LED_FLASHING_SINGLE	0x05	Single flash
PNS_RUN_CONTROL_LED_FLASHING_DOUBLE	0x06	Double flash
PNS_RUN_CONTROL_LED_FLASHING_TRIPLE	0x07	Triple flash
PNS_RUN_CONTROL_LED_NO_CHANGE	0x09	No change

3.3.5. Buzzer pattern for operation control commands

Constant name	Value	Explanation
PNS_RUN_CONTROL_BUZZER_STOP	0x00	Off
PNS_RUN_CONTROL_BUZZER_RING	0x01	On
PNS_RUN_CONTROL_BUZZER_NO_CHANGE	0x09	No change

3.4. Structure Description

3.4.1. Motion control data structure

Name	PNS_RUN_CONTROL_DATA
Definition	Type PNS_RUN_CONTROL_DATA ' LED Unit Red pattern ledRedPattern As Byte ' LED Unit Amber pattern ledAmberPattern As Byte ' LED Unit Green pattern ledGreenPattern As Byte ' LED Unit Blue pattern ledBluePattern As Byte ' LED Unit White pattern ledWhitePattern As Byte ' Buzzer status buzzerMode As Byte End Type
Explanation	Structure of each color pattern and buzzer status of the LED unit in the data area sent by operation control command

3.4.2. Operation control status data

Name	PNS_STATUS_DATA
Definition	Type PNS_STATUS_DATA ' Led pattern1～5 ledPattern (5) As Byte ' Buzzer Mode buzzer As Byte End Type
Explanation	Operation control Status Acquisition Command response data LED UNIT AND BUZZER STATUS structure

4. Program Overview

Describe only the main points of the program's operation.。

4.1. Connect to LR5-LAN

Program	Explanation
LR5-LAN_Sample_VBA.xlsm `Private lngSck As Long`	→Definition of socket member variables

LR5-LAN_Sample_VBA.xlsm SocketOpen()
`Private Function SocketOpen(ByVal ip As String, ByVal port`
`    Dim lngRtn As Long`
 	
`    ' Initializing the socket`
`    Dim wsa_data As WSADATA`
`    lngRtn = WSAStartup(&H101, wsa_data)`
`    If lngRtn = SOCKET_ERROR Then`
`        MsgBox ("failed to initialize")`
`        SocketOpen = -1`
`        Exit Function`
`    End If`
 	
`    ' Socket open`
`    lngSck = socket(AF_INET, SOCK_STREAM, 0)`
`    If lngSck = SOCKET_ERROR Then`
`        MsgBox ("failed to create socket")`
`        SocketOpen = -1`
`        Exit Function`
`    End If`
 	
`    ' Connect to LR5-LAN`
`    Dim to_adr As SOCKADDR`
`    to_adr.sin_family = AF_INET`
`    to_adr.sin_addr = inet_addr(ip)`
`    to_adr.sin_port = htons(port)`
`    lngRtn = connect(lngSck, to_adr, Len(to_adr))`
`    If lngRtn = SOCKET_ERROR Then`
`        MsgBox ("failed to connect")`
`        closesocket lngSck`
`        WSACleanup`
`        SocketOpen = -1`
`        Exit Function`
`    End If`
`End Function`
	→Initializing winsock
	
	→Create a socket instance
	
	→Connect to the device using the socket Connect function

4.2. close socket

Program	Explanation
LR5-LAN_Sample_VBA.xlsm SocketClose() Private Sub SocketClose() ' Close the socket closesocket lngSck ' Socket End WSACleanup End Sub	→close socket →Winsock termination process

4.3. Send Command

Create transmission data in the transmission data format for each command and send the command data to LR5-LAN Please refer to「4.4PNS Command Operation Control Command Transmission」and onwards for the transmission data format of each command.

Program	Explanation

LR5-LAN_Sample_VBA.xlsm SendCommand()
 	
' Socket transmission
lngRtn = send(lngSck, sendData(0), UBound(sendData) + 1,
If lngRtn = SOCKET_ERROR Then
Debug.Print ("failed to send")
SendCommand = -1
Exit Function
End If
 	
' Socket reception
Dim rdat(1024) As Byte
lngRtn = recv(lngSck, rdat(0), UBound(rdat) + 1, 0)
If lngRtn = SOCKET_ERROR Then
Debug.Print ("failed to recv")
SendCommand = -1
Exit Function
End If
 	
ReDim recvData(lngRtn - 1) As Byte
MoveMemory VarPtr(recvData(0)), VarPtr(rdat(0)), lngRtn
	→Send the created Transmission Data using the Send function
	
	→After sending, use the Receive function to get the response from the device.

4.4. PNS Command Operation Control Command Transmission

Program	Explanation

LR5-LAN_Sample_VBA.xlsm PNS_RunControlCommand()
 	
Dim sendData(11) As Byte
 	
' Product Category (AB)
Dim productId() As Byte
productId = Int2Bytes(PNS_PRODUCT_ID)
MoveMemory VarPtr(sendData(0)), VarPtr(productId(0)), 2
 	
' Command identifier (S)
sendData(2) = PNS_RUN_CONTROL_COMMAND
 	
' Empty (0)
sendData(3) = 0
 	
' Data size
Dim dataSize() As Byte
dataSize = Int2Bytes(6)
MoveMemory VarPtr(sendData(4)), VarPtr(dataSize(0)), 2
 	
' Data area
MoveMemory VarPtr(sendData(6)), VarPtr(runControlData), 6
 	
' Send PNS command
Dim recvData() As Byte
lngRtn = SendCommand(sendData(), recvData())
If lngRtn <> 0 Then
Debug.Print ("failed to send data")
PNS_RunControlCommand = -1
Exit Function
End If
 	
' check the response data
If recvData(0) = PNS_NAK Then
' receive abnormal response
Debug.Print ("negative acknowledge")
PNS_RunControlCommand = -1
Exit Function
End If
	Create Transmission Data in the following order
	→1st byte：Product Differentiation（A：0x41）
	→：Product Differentiation（B：0x42）
	→3rd byte：ID（S：0x53）
	→4th byte：Unused（0x00）
	→5th byte：Data Size（0x00）
	→6th byte：Data Size（0x06）
	→7～1：Data Area
	Data size is 6 bytes
	Set the value of "3.3.1 Motion control data structure" in the Data Area.
	
	→Call "4.3 Send Command/Receive" and send data to the device
	
	→Check response data after sending
	Normal Response：ACK（0x06）
	Abnormal Response：NAK（0x15）

4.5. Send Clear Command For PNS Command

Program	Explanation

LR5-LAN_Sample_VBA.xlsm PNS_ClearCommand()
 	
`Dim sendData(5) As Byte`
 	
`' Product Category (AB)`
`Dim productId() As Byte`
`productId = Int2Bytes(PNS_PRODUCT_ID)`
`MoveMemory VarPtr(sendData(0)), VarPtr(productId(0)), 2`
 	
`' Command identifier (C)`
`sendData(2) = PNS_CLEAR_COMMAND`
 	
`' Empty (0)`
`sendData(3) = 0`
 	
`' Data size`
`Dim dataSize() As Byte`
`dataSize = Int2Bytes(0)`
`MoveMemory VarPtr(sendData(4)), VarPtr(dataSize(0)), 2`
 	
`' Send PNS command`
`Dim recvData() As Byte`
`lngRtn = SendCommand(sendData(), recvData())`
`If lngRtn <> 0 Then`
`  Debug.Print ("failed to send data")`
`  PNS_ClearCommand = -1`
`  Exit Function`
`End If`
 	
`' check the response data`
`If recvData(0) = PNS_NAK Then`
`  ' receive abnormal response`
`  Debug.Print ("negative acknowledge")`
`  PNS_ClearCommand = -1`
`  Exit Function`
`End If`
	Create Transmission Data in the following order
	→1st byte：Product Differentiation（A：0x41）
	→：Product Differentiation（B：0x42）
	→3rd byte：ID（C：0x43）
	→4th byte：Unused（0x00）
	→5th byte：Data Size（0x00）
	→6th byte：Data Size（0x00）
	Data size is 0 bytes
	No data area
	
	→Call “4.3 Send Command/Receive” and send data to the device
	
	→Check response data after sending
	Normal Response：ACK（0x06）
	Abnormal Response：NAK（0x15）

4.6. Send PNS Command Status Acquisition Command

Program	Explanation

LR5-LAN_Sample_VBA.xlsm PNS_GetDataCommand()
 	
Dim lngRtn As Long
Dim sendData(5) As Byte
 	
' Product Category (AB)
Dim productId() As Byte
productId = Int2Bytes(PNS_PRODUCT_ID)
MoveMemory VarPtr(sendData(0)), VarPtr(productId(0)), 2
 	
' Command identifier (G)
sendData(2) = PNS_GET_DATA_COMMAND
 	
' Empty (0)
sendData(3) = 0
 	
' Data size
Dim dataSize() As Byte
dataSize = Int2Bytes(0)
MoveMemory VarPtr(sendData(4)), VarPtr(dataSize(0)), 2
 	
' Send PNS command
Dim recvData() As Byte
lngRtn = SendCommand(sendData(), recvData())
If lngRtn <> 0 Then
MsgBox ("failed to send data")
PNS_GetDataCommand = -1
Exit Function
End If
 	
' check the response data
If recvData(0) = PNS_NAK Then
' receive abnormal response
MsgBox ("negative acknowledge")
PNS_GetDataCommand = -1
Exit Function
End If
 	
' LED Pattern 1 to 5
MoveMemory VarPtr(statusData.ledPattern(0)), VarPtr(recvD
 	
' Buzzer Mode
statusData.buzzer = recvData(5)
	Create Transmission Data in the following order
	→1st byte：Product Differentiation（A：0x41）
	→：Product Differentiation（B：0x42）
	→3rd byte：ID（G：0x47）
	→4th byte：Unused（0x00）
	→5th byte：Data Size（0x00）
	→6th byte：Data Size（0x00）
	Data size is 0 bytes
	No data area
	
	→Call “4.3 Send Command/Receive” and send data to the device
	
	→Check response data after sending
	Normal Response: The response data in ″3.3.3 Operation control status data″ is obtained.
	Abnormal Response：NAK（0x15）
	
	Acquire each data of response data using the following process.
	→1st to 5th byte：LED UNIT STATUS
	・1st byte：LED Unit Redstatus
	・：LED Unit Amberstatus
	・3rd byte：LED Unit Greenstatus
	・4th byte：LED Unit Bluestatus
	・5th byte：LED Unit Amberstatus
	・6th byte：Buzzer status