ENGINEERING CHANGE ORDER		Number 03-	
Project Engineer	Stephen L. Robinson	Cross Ref. Doc. Type & Number **None**	Page 1 of
Change Requested By	Stephen L. Robinson		1

Description of Change

Release of technical documentation for archive:

Sanyo CCTV System Protocol (Tentative), Ver. 1.00, Jan 20 1999 with Non-Disclosure

Reason for Change   None

Scope of Change	Documentation Affected			
☐ Changes Form, Fit, or Function	Product Model Number: None			
☐ Other performance enhancement	Drawing Number		Old Rev	New Rev
☒ Internal	None			

Type of Change	Material Disposition	
☐New Product	☒None	
☐Error	☐Scrap	
☐Design Improvement	☐Rework	
☒Additional Info	☐Finished Goods	
☐Cost Reduction	☐Work In Progress	
☐Conform to Present Practices	☐Stock	
	☐Running Change	

Approvals	Engineering Signature	Date	Manager's Initials in Appropriate Box
	Materials Signature	Date	
Cost Impact	0	New Comp. Cost	0
Obsol. Impact	0	New Comp. Lead Time	0

☐ EWS   ☐ Hot   ☒ Normal

Required Tasks (use attachments if necessary)	Initials	Date
Manufacturing None		
Production None		
Materials None		
Stock Room None		
Sales / Marketing None		
Repair None		
Quality Assurance None		
Other None		

Terms abbreviated from Non-disclosure Agreement
Security Serial Protocol

- Sanyo Fisher Company (SFC) is willing to disclose such proprietary information to Pelco used solely for the purpose of evaluating the usefulness and applicability thereof in Pelco's or other controller products. "Controller products" shall mean any device or item of equipment that controls other security system products, devices or items of equipment.
- All information provided by SFC to Pelco relating to the Security Serial Protocol (SSP), in written form and which is marked "Confidential", shall be deemed by the parties to be Confidential Information.
- Pelco shall safeguard and treat in strict confidence all Confidential Information.
- Pelco shall limit access to the Confidential Information, on a need to know basis. *Note: Dave Smith will determine who can have a copy. Do not give copies out on your own.*
- Pelco shall not disclose or make available to any third party the Confidential Information.
- Upon SFC's request, Pelco shall promptly return to SFC all of the Confidential Information supplied to Pelco including without limitation any and all notes, copies, compilations, summaries, models, drawings, designs, samples, interpretations, analysis and reproductions thereof.
- Pelco shall not make any statements or claims directly or indirectly, that Pelco is in any way affiliated with SFC.
- The Confidential Information shall remain subject to the conditions of non-disclosure and non-use set forth for a period of 10 years.

NON-DISCLOSURE AND CONFIDENTIALITY AGREEMENT
[SECURITY SERIAL PROTOCOL]

THIS AGREEMENT made as of this _9th_ day of _January_, 19_99_, by and between SANYO FISHER COMPANY, a division of Sanyo North America Corporation, a Delaware corporation (hereinafter referred to as "SFC"), and _Pelco_, a _General Partnership_ ~~corporation~~ (hereinafter referred to as "Recipient").

W I T N E S S E T H:

WHEREAS, Recipient desires to obtain from SFC proprietary information in regards to the Security Serial Protocol (the "SSP") designed and developed by Sanyo Electric Co., Ltd., Sanyo North America Corporation's parent company, for incorporation into controller products only, which proprietary information SFC has the right to use and to disclose;

WHEREAS, SFC is willing to disclose such proprietary information to Recipient in accordance with the terms and conditions of this Agreement solely for the purpose of evaluating the usefulness and applicability thereof in Recipient's or other controller products (for purposes of this agreement, "controller products" shall mean any device or item of equipment that controls other security system products, devices or items of equipment);

WHEREAS, Recipient desires to enter into this Agreement in order to induce SFC to disclose such proprietary information to Recipient;

NOW, THEREFORE, in consideration of the premises and the mutual promises set forth herein, the parties hereto agree as follows:

1. All information provided _written_ by SFC to Recipient relating to the SSP, in ~~whatever~~ form _and which is marked "Confidential",_ shall be deemed by the parties to be Confidential Information. For the purpose of the Agreement, "Confidential Information" shall include all price lists, technical data, know-how, trade secrets, designs, ideas, drawings, models, samples, specifications, manuals, source or object codes, diagrams, schematics, layouts or other information, and any portion or component thereof, relating to the SSP.

2. Recipient shall:

    a. Safeguard and treat in strict confidence all Confidential Information of whatever nature or form, whether directly or indirectly, in writing or verbally, and whether prior to or subsequent to the date of this Agreement;

b. Limit access to the Confidential Information, on a need to know basis, to such of its employees as are reasonably required to review Confidential Information solely for the purpose set forth in this Agreement. Prior to disclosing any Confidential Information to any of said employees, Recipient shall cause each such employee to agree, in writing, to maintain such Confidential Information in strict confidence;

c. Not use the Confidential Information for any purpose other than solely for the purpose of evaluating the usefulness and applicability thereof in Recipient's or other controller products;

d. Not disclose or make available to any third party the Confidential Information, and shall use its best effort to ensure that its employees do not disclose, or make available to any third party, any of the Confidential Information; and

e. Upon SFC's request, promptly return to SFC all of the Confidential Information supplied to Recipient, including without limitation any and all notes, copies, compilations, summaries, models, drawings, designs, samples, interpretations, analyses and reproductions thereof.

f. Not advertise or make any statements or claims, directly or indirectly, that Recipient is in any way affiliated with SFC, Sanyo North America Corporation, its parent or affiliates.

3. The obligations of Recipient to SFC in the Agreement shall not apply to information:

a. Which Recipient can demonstrate by written evidence was lawfully in its possession prior to its first receipt of the Confidential Information from SFC;

b. Which at the date hereof or hereafter becomes available in the public domain without breach by Recipient of this Agreement or by any unlawful act; or

c. Which is independently obtained by Recipient from third persons under circumstances permitting SFC to reasonably believe that said third persons obtained such information lawfully and not in violation with the terms of this or any other agreement.

4. The Confidential Information shall remain subject to the conditions of non-disclosure and non-use set forth in Paragraph 2 of this Agreement for a period of ten years after the date of this Agreement or until such time as the Confidential Information lawfully becomes available in the

public domain, other than through a breach of this Agreement, whichever first occurs.

5.   By this Agreement no right or license regarding the Confidential Information is granted by SFC to Recipient. Neither this Agreement nor the rights or obligations hereto may be assigned or delegated by Recipient, by operation of law or otherwise, and any attempted assignment or delegation shall be a breach of the Agreement.

6.   Recipient hereby acknowledges (a) that the Confidential Information received or to be received by Recipient from SFC pursuant to this Agreement constitutes the valuable proprietary know-how and trade secrets of SFC; (b) that its obligations under this Agreement are special, unique and extraordinary and, for these reasons, breach by it of any term or provision thereof shall be material and shall cause irreparable harm to SFC, not properly compensable by damages in an action at law; and (c) that the rights and remedies of SFC for such breach may be enforced by temporary restraining order, preliminary or permanent injunction, or such other relief as may be obtained in any court of competent jurisdiction, without the necessity of proving damages, posting any bond or other security, and without prejudice to or diminution of any other rights or remedies which may be available to SFC at law, in equity or otherwise.

7.   The construction and performance of this Agreement shall be governed by the laws of the State of California and the Uniform Trade Secrets Act, as set forth in California Civil Code §§ 3426 et. seq. Subject to the remedies available to SFC pursuant to Paragraph 6 of this Agreement, any dispute arising in connection with the construction, operation or enforcement of the provisions of this Agreement or the application or validity thereof, shall be submitted to arbitration, such arbitration proceedings to be held in Los Angeles, California in accordance with the rules then obtaining of the American Arbitration Association to which shall be added the provisions of Part IV of Title 3 of the California Code of Civil Procedure relating to the Production of Evidence. Any award rendered in any such arbitration proceeding shall be final and binding on each of the parties, and judgment may be entered thereon in the Superior Court of the State of California for the County of Los Angeles, or any other court of competent jurisdiction. If any arbitration or other proceeding, or any action at law or in equity is commenced by either party to enforce or interpret the terms of this Agreement, the prevailing party (as defined in California Code of Civil Procedure § 1032) in such proceedings or action shall be entitled to recover from the unsuccessful party its reasonable attorneys' fees, costs and necessary disbursements in addition to any other relief to which it may be entitled.

8.   The failure of either party to enforce any provision of

this Agreement shall not constitute a waiver of such provision or of the right of such party thereafter to enforce each and every provision hereto.

9. This Agreement, or any of the terms or provisions thereof, may not be changed, amended or waived except by written agreement executed by both parties.

10. Recipient represents and warrants that its parents, subsidiaries, divisions, affiliates, officers, directors, employees, servants and agents shall be bound by the terms of this Agreement and that it shall cause such entities and individuals to be bound to the terms of this Agreement prior to their receipt of any Confidential Information.

11. There are no understandings not contained in this Agreement with respect to the subject matter of this Agreement, and this Agreement shall supersede and cancel all pervious contracts, arrangements, or understandings that may have existed or may exist between the parties with respect to the subject matter of this Agreement.

12. The undersigned persons who have executed this Agreement on behalf of Recipient and SFC have been duly authorized by Recipient and SFC, respectively, to execute and deliver this Agreement on their behalf.

        IN WITNESS WHEREOF, the parties have executed this Agreement as of the date and year first above written.

SFC: SANYO FISHER COMPANY

                                  By _Paul M. D'Arcy_____

                                  Title _Senior Vice President_

Recipient: _____

                                  By _David A. Smith_____

                                  Title _VP Marketing._

SANYO

Tentative
SANYO CCTV SYSTEM
RS485 Serial Transmission Protocol
Ver1.00

CONFIDENTIAL

Copy 002

Issued on 20 Jan.1999

SANYO Electric Co. ,Ltd.
CE Media Business Headquarters
Video Imaging Systems Division
Product Planning Department

□ RS485 Serial Control Protocol □

□□Outline of Prescriptions on Communication

1)Electrical Specification   : RS-485

2) Total Maximum Nodes   : 256 nodes
    ¥Device Category Nodes   : Up to 8 nodes
    (Note : Devices of the same kind category are connected to the bus line with the exception
          of Controller   : Up to 128 nodes.)
    ¥Controller Nodes   : Up to 5 nodes
    ¥Grouping   : Up to 15 groups
    (Note : Any group can be consist of any kind of category device.)

3) Two wire system   : Twisted pair cable
    (Note : The RJ-11 or Pushed lock terminal are used for the connector)

4) Transmission distance   : Theoretically Up to 1.2km (4000 ft) with more thicker cable
          than 26 AWG.
    (Note : Transmission distance is depend on the material of the wire and condition of wiring,
       therefore distance is just theoretical figure.

5) Transmission system   : Half-duplex

6) Data format
    Data Transfer System   : asynchronous start-stop system
    Character length   : 1 start bit, 8 bit data, None parity bit, 1 stop bit
    Baud rate (selective)   : 2400, 4800, 9600, 19200 bits per second

7) Bus system   : Bi-directional

8) Wire Connection   : Daisy chain

*RJ-11 terminal
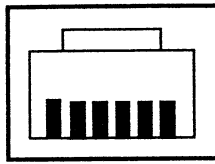
1 2 3 4 5 6

(OUTSIDE VIEW)

* Pin assignment

	Terminal A	Terminal B
1pin	NC	NC
2pin	NC	NC
3pin	A□signal	B□signal
4pin	B□signal	A□signal
5pin	NC	NC
6pin	NC	NC

*Push lock terminal
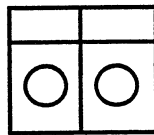
A signal B signal

(OUTSIDE VIEW)

* Connection

To connect one device to the other device,
A signal should be connected to A signal
And B signal should be connected to B signal.

*Interface of the terminal on the device   (Driver IC : MAX3082XSA)

DI

DE

$\overline{RE}$

RD

A signal
B signal
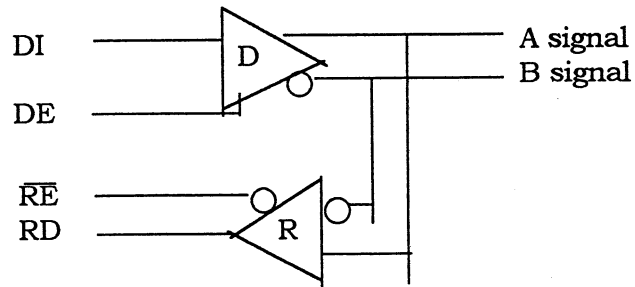
□□Outline of SANYO communication protocol

1)Outline of address system

An address code peculiar to each device is consist of 2 bytes(16 bits) code. The first byte of each device indicates the device category and the second byte of it indicates the device address or the broadcast.(User can only set the device address.) The total 128 address codes from 00H to 7FH can be allocated separately to each device and the same address number can be assigned when used in the different device category.

For example: [VCR 01, MPX 01, CAM 01 etc.]

(Note : The same address code cannot be allocated within the identical device category.) Maximum nodes connected to the bus line are limited up to 256 ones. That is why a system configuration with 120 VCRs, 120 cameras,3 multiplexers and 5 controllers [Total 248 nodes] is theoretically possible, however as the total device nodes in the identical category is limited up to 128 nodes the system configuration with 70 VCRs, 140 cameras and 1 controller[Total 211 nodes] is not possible.

(Note : Up to 5 controller can be connected to the same bus line)

(Note : As to the final maximum node numbers they will be changed depending on the progress of our future verification.)

2)Broadcast communication

The device address code of "1110****" in the second byte has been reserved as the broadcast address and the broadcast communications are available for both the all devices connected to the bus line and each group(total grouping are available up to 15).

User can make freely the setting of each group configuration and can do the broadcast communication for the each group.

3)Detail description of the address assignment

3-1)The first byte : Device Category Code : 1111 XXXX(User cannot set this code)

a)All device category   : 1111 0000

  b) Controller   : 1111 0001

  c) Multiplexer   : 1111 0010

d)VCR   : 1111 0011

e)Camera   : 1111 0100

                1111 0101

  f) Reserved for Extension   : 1111 0110

                  1111 0111

                  1111 1000

  g)Not used   : |

                  1111 1111

(Note : Totally 8 kinds of devices are available.)

3-2)The second byte : For each device address or the broadcast communication

  a) Each device address   : 0000 0000 (00H □ 7FH)

                |

        : 0111 1111

(Note : The total 128 address codes from 00H to 7FH can be allocated separately to each device. Up to 5 address codes from 00H to 04H can be assigned for Controller.)

b)Broadcast communication   : 1110 XXXX

b-1)For any devices on the bus line   : 1110 0000

b-2)For any devices within each group : 1110 0001 (For Group 1)

                □

        : 1110 1111 (For Grope 15)

(Note : Up to 15 address codes from E1H to EFH can be allocated to any group.)

☐ **Address designation for the individual device:**

First byte   Second byte

<u>1 1 1 1 X X X X</u> <u>0 X X X X X X X</u>

(Device category code   ) (Individual device address   )

(Note: The upper 4 digits(half byte) from MSD of the first byte is used for *both the header* identification *and the device category code*.)

☐ **Address designation for the broadcast communication:**

First byte   Second byte

<u>1 1 1 1 X X X X</u> <u>1 1 1 0 X X X X</u>

(.   Device category code   ) (Individual device address   )

(Note: The upper 4 digits(half byte) from MSD of the first byte is used for both the header identification and the device category code.)

☐ **Examples**

Ex.1) Multiplexer No.5

First byte   Second byte

<u>1 1 1 1 0 0 1 0</u> <u>0 0 0 0 0 1 0 1</u>

(Multiplexer category code   ) (Multiplexer address No.5   )

Ex.2) Broadcast to all VCRs on the bus line

First byte   Second byte

<u>1 1 1 1 0 0 1 1</u> <u>1 1 1 0 0 0 0 0</u>

(VCR category code   ) (Broadcast for any device on the bus line)

Ex.3) Broadcast to all VCRs within Group No.3

First byte   Second byte

<u>1 1 1 1 0 0 1 1</u> <u>1 1 1 0 0 0 1 1</u>

(VCR category code   ) (Broadcast for any device in Group No.3)

Ex.4) Broadcast for all devices on the bus line

First byte   Second byte

<u>1 1 1 1 0 0 0 0</u> <u>1 1 1 0 0 0 ☐ ☐</u>

(All device category address) (Broadcast for any device on the bus line)

3. Detail description of communication protocol

3-1.The Process of Point-To-Point Communication
The process of the point to point communication is prescribed in this clause.

(1) Process of Sending Point-To-Point Data
1. **Ascertaining if the Bus Line is free:**
A sending device should make sure the Bus Line is free in the beginning that is there is no data on it for not less than 170 milliseconds.

2.**Ascertaining if no data collision occurs:**
2-1)When the Bus Line is free, a sender outputs the first byte of its own address(**Device Category Code**) on the Bus. The sender itself receives that code. If it is different from the issued one then the waiting process on the data collisions on the Bus described in the clause of 3-3. is being executed consecutively after that the sender returns to the process described in the first place of this paragraph.

2-2)When there is no data collision of the first byte of the sender's own address, the sender issues the second byte of its own address(**Device Address**) again within the period of time from not less than 15 to not more than 50 milliseconds after outputting the first byte.
The sender receives the code and if it is different from the issued one then the waiting process is being executed consecutively. After that the sender returns to the process described in the first place of paragraph 2-1).

3. **Sending the designated receiver's address & Ascertaining the overlapping of the address:**
3-1)In case there are no data collisions of the sender's own address, the sender outputs the **first byte(Device Category Code) of the designated receiver's address** on the Bus Line within the period of time from not less than 15 to not more than 50 milliseconds after outputting the second byte of its own address.
The sender should make sure if there is the overlapping of the address before outputting the second byte(**Device Address**) of the designated receiver's address.
a) If the [**Receive check(FEH)**] code is received then the overlapping of the address is recognized to be occurred. After that the communication will be suspended.
b) If any code is not received then it is recognized for no overlapping of the address to occur. The ascertainment at the sending side is to be completed. Further communication
process will be continued.
3-2)The sender outputs the second byte(Device Address) of the designated receiver's address on the bus within the period of time from not less than 15 to not more than 50milliseconds after outputting the first byte of the designated receiver's address.
Then the sender is waiting the [**Receive check(FEH)**] code from the receiving device.
3-3)In waiting the [**Receive check(FEH)**] code the sender executes the following process in less than 100 milliseconds.
a) If the only one [**Receive check(FEH)**] code is received then the sender outputs the [**Transmission start(FDH)**]code on the Bus Line and it will wait the [**ACK(0AH)**] code from the receiving device.
[**Transmission start(FDH)**]code should be output in less than 100 milliseconds after outputting the Second Byte of Recorder(Device Address),and moreover [**Transmission start(FDH)**]code should be output within 50ms after receiving the [**Receive check(FEH)**] code.
If the second [**Receive check(FEH)**] codes is received before outputting the [**Transmission start(FDH)**]code, then they are recognized for the overlapping of the address to occur and after that the communication will be suspended.
b) If the code other than the [**Receive check(FEH)**] is received, then they are recognized for the communication error to occur and after that the communication will be suspended.
c) If any code is not received then the sender recognizes there is no receiver's address

4.Waiting the [ACK(0AH)] code & Establishing the communication:
4-1)After the sender goes into the waiting the [ACK(0AH)] code mode from the receiving
 device if it receives the following data within 100 milliseconds;
  a)If no data is received or if the code other than the [ACK] is received,
    then they are recognized for the communication error to occur and after that the
    communication will be suspended.
  b)If the [ACK] code is received then the communication between the sending device and
    the designated receiver has been established and the further process will be proceeded.
    ☐   The communication protocol between the individual device after this are provided
      separately for each device.
4-2)After establishing the communication between the sending device and the designated
 receiver within the period of time from not less than 15 to not more than 100
 milliseconds the sender should output the command.
4-3)If the sender will proceed the communication with the same designated device after
 having received the response(like [ACK]), it should continue to output the further
 command within the period of time from not less than 15 to not more than 100
 milliseconds.
 In case of outputting the commands successively its interval must be within the period
 of time from not less than 15 to not more than 100 milliseconds.
4-4)In the sender's waiting the [ACK(0AH)] code from the receiving device if the Bus Line
 is free for not less than 130 milliseconds during the communication then it is
 recognized for the communication to be interrupted and the code or the data being
 transmitted are annulled.

5. In some special commands for instance like as [COUNT CODE(D0)], [HEAD TIME(D2)],
 [STATUS SENSE(D7)], [GROUP CHECK(6D)], more than two bytes data will be returned.

(2) Process of Receiving Point-To-Point Data
1. A receiving device should be making sure if there is no data on the Bus Line for not
less than 150 milliseconds.

2. When the receiving device receives the data during making sure Bus Line is free, it
 examines first if it is **the first byte(Device Category Code) of a sending device.**
  a) If the received data is any one of "F1H" through "F7H"then they are recognized to
   be **the first byte(Device Category Code)** of a sending device. And then the receiver
   is waiting for the next data.
  b) If the received data is other code than "1H" through "7H" then the receiver returns
   to the process described in the first place of paragraph 1.

3. When the receiving device receives the next data within 100 milliseconds after having
  recognized the first byte of a sending device, it examines if it is **the second byte(Device
  Address) of a sending device.**
  a) If the received data is any one of "00H" through "7FH" then they are recognized to be
   the second byte(Device Category Code) of the sending device. And then the receiver
   is waiting for the next data.
  b) If the received data is other code than "00H" through "7FH" or If any code is not received
   in less than 100 milliseconds then the receiver returns to the process described in
   paragraph 1.

4.When the receiving device receives the next data in less than 100 milliseconds after
  receiving the second bytes of a sending device then it will make sure that is same code
  as **the first byte(Device Category Code)** of the receiver's own address.
 a)If the received data is same as **the first byte(Device Category Code)** of its own address
  then the receiving device is waiting for the next data.
 b) If the received data is the **[All Device Category Code "F0H"]** then the receiving device
  will do the process of receiving broadcast data which is described later.

receiver's own address or if any data is not received in less than 100 milliseconds then the receiver returns to the process described in paragraph 1.

5. When the receiving device receives the next data in less than 100 milliseconds after having recognized its own first byte to be output, then it will make sure if that data is the same as either **the second byte(Device Address)** of receiver's own address or the broadcast address.

   a) If the received data is same as the second byte then within 50 milliseconds the receiver should output the [**Receive Check(FEH)**] code and is waiting for the [**Transmission Start(FDH)**] code.

   b) If the received data is same as any one of the broadcast codes of "E0H" through "EFH" then the receiving device will do the process of receiving broadcast data which is described later.

   c) If the received data is different from the second byte of the receiver's own address or if any data is not received in less than 100 milliseconds then the receiver returns to the process described in paragraph 1.

6. In waiting the [**Transmission Start(FDH)**] code when the receiver receives the following data in less than 100 milliseconds;

   a) If the [**Transmission Start(FDH)**] code is detected then in less than 50 milliseconds the receiver should output the [ACK] code and is waiting for the command from the sender.

   b) If the code other than [**Transmission Start(FDH)**] is received or if any code is not received in less than 100 milliseconds then the receiver returns to the process described in paragraph 1.

7. After the communication between the sending device and the receiving device is established, when the receiving device is waiting for the coming command the following process is performed.

   a) If the command from the sender is received within 130 milliseconds then the receiver should transmit the command like the [ACK]code to the sender within the period of time from not less than 15 to not more than 100 milliseconds.

   b) If the special command defined separately is received within 130 milliseconds then the receiver should output the number of command or data successively which is defined for each command within the period of time from not less than 15 to not more than 100 milliseconds.

   c) If any command is not received in less than 130 milliseconds then it is recognized for the communication to be interrupted and the code or the data being sent or received are annulled.

Flow Chart of Point to Point Communication Protocol

| Sending Device | Designated Receiving Device |

<Note:1

T1 — First Byte of Sender(Device Category Code) — T2

T1 — Second Byte of Sender(Device Address) — T2

T1 — First Byte of Receiver(Device Category Code) — T2

T2 — Second Byte of Receiver(Device Address) — T2

T2 — Receive Check Code(FEH) — T2

,'3 — T3 Transmission Start Code(FDH) — T2

T2 — Communication established

ACK(0AH) — T3 — T5

T5 — Command issued

T4 — ACK(0AH) — T4 — T5

T5

T4

Communication established

T4 — T4

T4 — T4

T5 — T4

T5 — T4

T5

Note: T1(15ms□T1□50ms), T2(T2□100ms), T3(T3□50ms), T4(15ms□T4□100ms),
<Note:1> T5(T5□130ms),
Based on the above chart it takes about 390 through 580 milliseconds for any one command
to be completed, for example this is the case the controller issues "PLAY" command and
receives ACK from VCR.

3-2.The Process of Broadcast Communication
The process of the broadcast communication of which purpose is to transmit a command or message to all devices in a designated device category or group connected to the bus is prescribed in this clause.
The command requiring the individual device to respond cannot be issued with the broadcast communication.

(1) Process of Sending Broadcast Data

1. **Ascertaining whether the bus line is free:**
   A sending device should be making sure if there is no data on the bus line for not less than 170 milliseconds.

2. **Ascertaining whether the no data collision occurs:**
2-1)When the bus line is free, the sender issues the first byte of its own address(**Device Category Code**) on the bus line. The sender itself receives this code and if the received code is different from the issued one then the waiting process on the data collisions on the bus described in clause of 3-3. is being executed consecutively. After that the sender returns to the first place of the process described in this paragraph.
2-2)When there is no data collision of the first byte of the sender's own address, the sender issues **the second byte of it(Device Address)** within the period of time from not less than 15 to not more than 50 milliseconds after outputting the first byte .
   The sender receives them and if the their code is different from the issued one then the waiting process on the data collisions is being executed consecutively. After that the sender returns to the first place of the process described in the paragraph.2-1)

3. **Ascertaining whether the overlapping of the address occurs:**
   In case there are no data collisions of the sender's own address, the sender outputs **the first byte(Device Category Code)** of the designated receiver's address within the period of time from not less than 15 to not more than 50 milliseconds after outputting the second byte of its own address. During that period the sender checks if there is an overlapping of the address.
   a) If the sender receives the **[Receive check(FEH)]** code, then it recognizes the overlapping of the address occurs. After that the communication will be suspended.
   b) If any code are not received by the sender, then the sender recognizes no overlapping of the address. The ascertaining process at the sending side is to be completed. Further communication will be continued.

4. **Sending the designated receiver's address:**
4-1)In case that there are no data collision of both the first and second bytes of the sender's own address, the sending device issues **the first byte(Device Category Code)** of the designated receiver's address on the bus as the broadcast code.
4-2)After that the sending device issues **the second byte(Broadcast Code)** of the designated device address which is one of sixteen codes from (E0H) to (EFH) within the period of time from not less than 15 to not more than 50 milliseconds.
   In this case each device will not answer any response like the **[ACK]**.

5. The sender should output the broadcast command within the period of time from not less than 15 to not more than 100 millisecond after having transmitted the broadcast code and finish the broadcast communication. In the broadcast communication any command cannot be issued continuously except **[STATUS" command (BCH-BFH)]**.

6. It is possible for the status data to be issued successively after [STATUS] command. In this case the data should be sent within the period of time from not less than 15 to not more than 100 milliseconds after the [STATUS] command having been issued.

7. If some data or codes are recognized on the bus line during the sender's issuing the
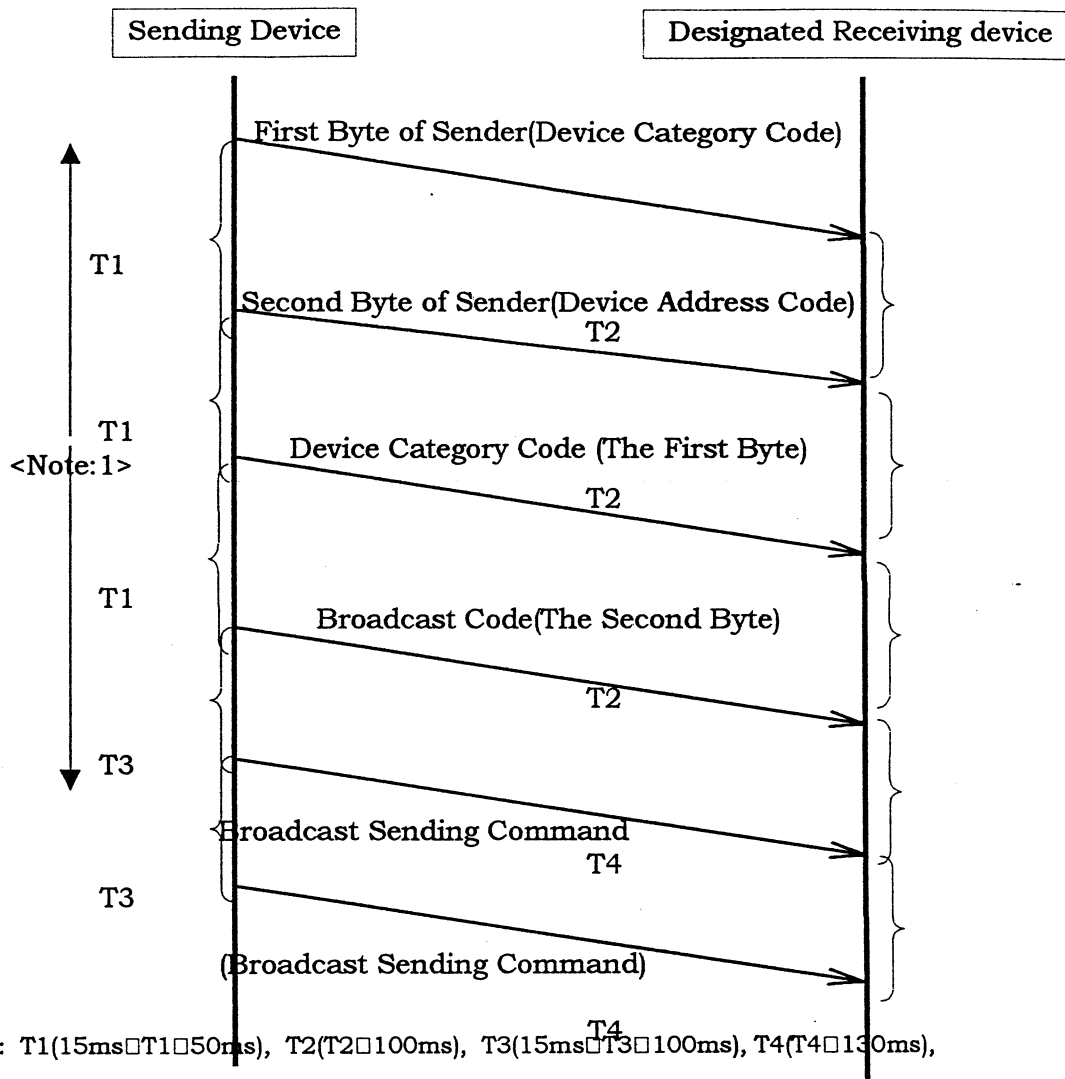
error process.
The transmitted code as not having been recognized will be annulled.

8.To make the further broadcast communication again, return to the step 1 in this paragraph.

(2)Process of Receiving Broadcast Data
1. A receiving device should be making sure if there is no data on the bus line for not less than 150 milliseconds.

2. When the receiving device receives the data during making sure the bus line is free, it examines first if it is **the first byte(Device Category Code)** of a sending device.
   a)If the received data is any one of "F1H" through "F7H"then they are recognized to be **the first byte(Device Category Code)** of the sending device. And then the receiver is waiting for the next data.
   b)If the received data is other code than "F1H" through "F7H" then the receiver returns to the process described in paragraph 1.

3.When the receiving device receives the next data within 100 milliseconds after having recognized **the first byte(Device Category Code)** of a sending device, it examines if it is **the second byte(Device Address)** of a sending device.
   a)If the received data is any one of "00H"through "7FH" then they are recognized to be **the**
   second byte(Device Category Code) of the sending device. And then the receiver is waiting for the next data.
   b) If the received data is other code than "00H" through "7FH" or If any code is not received in less than 100 milliseconds then the receiver returns to the process described in paragraph 1.

4.When the receiving device receives the next data in less than 100 milliseconds after receiving the second byte of a sending device then it will make sure that is same code as **the first byte(Device Category Code)** of the receiver's own address.
   a)If the received data is same as **the first byte(Device Category Code)** of its own address then the receiving device is waiting for the next data.
   b)If the received data is the **[All Device Category "F0H"]** then the receiving device will do the process of receiving broadcast data which is described later.
   c)If the received data is different from **the first byte(Device Category Code)** of the receiver's own address or if any data is not received in less than 100 milliseconds then the receiver returns to the process described in paragraph 1.

5. When the receiving device receives the following broadcast codes(from E0H to EFH) in less than 100 milliseconds after having recognized its own **first byte(Device Category Code)** or all **Device Category "F0H"** to be output, the receiving device is waiting the broadcast command.
   a) If the received data is "E0H"(the broadcast communication for any device on the bus line), the receiving device is waiting the broadcast command.
   b)If the received data is same as any one of the group broadcast codes of "E1H" through "EFH" and if that received data is same code as the group in which the receiver is registered, then the receiving device is waiting for the broadcast command .(For instance :If the device is belong to Group 2, the received code should be "E2H".)
   c) If the received data is same as the second byte of the receiver's own device address, in this case the process of receiving Point-To-Point Data is executed. But in case the all **Device Category "F0H"** has been recognized and if any other type of code than the broadcast code are received as the second byte, it is considered to be error and the receiver returns to the process described in paragraph 1.
   d)If the received data is different from the second byte of the receiver's own address or different from any **broadcast code (E0H□EFH)** or if any data is not received within less than 100 milliseconds, then the receiver returns to the process described in

6.If the device receive the command in less than 130 millisecond when it is waiting the broadcast command, then it will be regard as broadcast command.
The receiving device will stop the waiting the broadcast command if any one command is received, except [STATUS command (BCH-BFH)].

7.If the device receives the [STATUS" command (BCH-BFH)], other data should be received in less than 130 millisecond after that.

8.The individual designated device will not answer any response like the [ACK] code even if it receives the broadcast address and command.

9.If the bus goes to be free for not less than 130 millisecond after receiving the broadcast address, then it is recognized for the broadcast communication to be interrupted and finish the waiting status of the broadcast command.

Flow Chart of broadcast Communication Protocol

| Sending Device | | Designated Receiving device |

First Byte of Sender(Device Category Code)

T1

Second Byte of Sender(Device Address Code)
T2

T1
<Note:1>

Device Category Code (The First Byte)
T2

T1

Broadcast Code(The Second Byte)

T2

T3

Broadcast Sending Command
T4

T3

(Broadcast Sending Command)

T4

Note: T1(15ms☐T1☐50ms), T2(T2☐100ms), T3(15ms☐T3☐100ms), T4(T4☐130ms),

<Note 1>
Based on the above chart it takes about 60 through 250 milliseconds for any one command to be completed by broadcast, for example this is the case the controller issues "PLAY" command to VCR.

3-3.Waiting Process When Data Collision Occurs On The Bus

When a sending device will try to start to communicate with the designated device, if it receives a different code from its own issued one then it is recognized that the data collision on the bus occurs. In this case after it waits the processing time described in this clause and then it is issuing **the first byte(device category code)** of own address again to try to establish the communication with the designated device.
Before proceeding the waiting process from 1 to 3 below , the sending device should confirm that the bus line is free for not less than 150 milliseconds.
(Note : This process is applied to data collisions on both the first byte and the second byte of the sending device's own address respectively.)

1. First a sender execute the following process. It is issuing **the first byte(device category code)** of own address again after waiting for the period of the calculated result of this process.

   ˙1 A sender make an operation of shifting the first byte of own address code to the left (to the upper digit side) by 2 bits and then setting the shifted lower 2 bits to"00". This calculation makes a new 8 bit data.

   2 It makes another operation of subtracting 1 from the lower half byte(the lower 4 bits) of own device category code and then extracting the lower 2 bits from the former result. This calculation makes another new 8 bit data.

   3 It makes the other operation of logical adding with using the above two 8 bit data and then multiply 50msec by the result of this logical adding 8 bit data.

   □[The Logical Add of the results of□and□] X [5msec](+0□25msec)□
   After waiting for the period of getting this value it is issuing the first byte of own address again

2.If the data collision on the bus occurs again after executing the process of item 1 then the sender is issuing the first byte of own address again after waiting for the period of the calculated result of the following process.

   1 It makes an operation of shifting the first byte of own address code to the left(to the upper digit side) by 2 bits and then setting the shifted lower 2 bits to "00". This calculation makes a new 8 bit data.

   2 It makes another operation of subtracting 1 from the lower half byte(the lower 4 bits) of own device category code and further shifting that result to the right(to the lower digit side) and then extracting the lower 2 bits from the former result. This calculation makes another new 8 bit data.

   3 It makes the other operation of logical adding with using the above two 8 bit data and then multiply 50msec by the result of this logical adding 8 bit data.

   □[The Logical Add of the results of□and□] X [5msec](+0□25msec)□
   After waiting for the period of getting this value it is issuing the first byte of own address again.

3. If the data collision occurs yet again after executing the process of item 1 and 2, the sender is issuing the first byte of own address again after waiting for the period of the result of following calculation.

   [Sender's device category code(half byte) □5msec](+0□+25msec)

4. After executing the processes of item 1, 2, and 3 if there will be being the data collision then the sender is proceeding the error process and after that the further communication is being stopped.
   The error process is prescribed in the individual device communication process.

Note: With above calculation, the waiting time is depend on the category and address of each devices, therefore even if one collision is happened, in most of case the collision should be solved after the waiting process.
But if a lot of collisions are happened at the same time, above three times of retry could not be enough.
After the 3 rd trial, if the other collision is still happened, the communication will be stopped and all address and all data which on the way to send will be disappeared.

[Example of the waiting process]
Ex : device A = VCR address:002   B = VCR address001
        C = Multiplexer address 001   D = Camera address 001

| A :1 st trial | | B :1   st | First collision between A & |

Waiting process 1 of Device A

Waiting process 1 of Device B

| A   :2   nd | | B   :2   nd | Second collision between A & |

Waiting process 2 of Device A

Waiting process 2 of Device B
150+20 ms +(0□25ms)

| | | B :3 rd trial |

| A   :3   rd | | C :1 st trial | Collision between A & C |

Waiting process 3 of Device A

| | | D :1 st trial | Collision between A & D |

Communication for device A is stopped. Address and all the data about the device A   will   be

Waiting process 1 of Device C

| | | C :2 nd trial |

Waiting process 1 of Device D

| | | D :2 nd trial |

4 COMMAND FOR CONTROL

COMMAND CONTROLLER	FROM	RETURN FROM DEVICE		DEVICE CATEGOLY			CONTROL		COMMAND TYPE	
NAME	CODE (H)	MANE	CODE (H)	VR	MX	CM	RS 485	RS 232 C	PtoP	Broad cast
PLAY	3A	ACK	0A	X	-	-	X	X	X	X
STOP	3F	ACK	0A	X	-	-	X	X	X	X
REV PLAY	4A	ACK	0A	X	-	-	X	X	X	X
STILL	4F	ACK	0A	X	-	-	X	X	X	X
EJECT	A3	ACK	0A	X	-	-	X	X	X	X
FF	AB	ACK	0A	X	-	-	X	X	X	X
REW	AC	ACK	0A	X	-	-	X	X	X	X
TRACKING +	50	ACK	0A	X	-	-	X	X	X	X
TRACKING-	51	ACK	0A	X	-	-	X	X	X	X
TRACKING CENTER	52	ACK	0A	X	-	-	X	X	X	X
TIMER ON/OFF	60	ACK	0A	X	-	-	X	X	X	X
AUDIO/SEARCH	22	ACK	0A	X	-	-	X	X	X	X
COUNTER RESET	E2	ACK	0A	X	-	-	X	X	X	X
COUNTER MEMORY	E3	ACK	0A	X	-	-	X	X	X	X
MENU	74	ACK	0A	X	X	X	X	X	X	X
SHIFT □	53	ACK	0A	X	X	X	X	X	X	X
SHIFT □	63	ACK	0A	X	X	X	X	X	X	X
SHIFT □	54	ACK	0A	X	X	X	X	X	X	X
SHIFT □	64	ACK	0A	X	X	X	X	X	X	X
SET+/RP UP	65	ACK	0A	X	X	-	X	X	X	X
SET-/RP DOWN	66	ACK	0A	X	X	-	X	X	X	X
SECURITY LOCK ON	69	ACK	0A	X	X	-	X	X	X	X
SECURITY LOCK OFF	6A	ACK	0A	X	X	-	X	X	X	X
POWER ON/OFF	7B	ACK	0A	X	X	-	X	X	X	X
SET ON	7C	ACK	0A	X	X	-	X	-	X	X
SET OFF	7D	ACK	0A	X	X	-	X	-	X	X
CLOCK ADJUST	E0	ACK	0A	X	X	-	X	X	X	X
MENU RESET	E1	ACK	0A	X	X	-	X	X	X	X
SHIFT	73	ACK	0A	-	X	-	-	X	X	-
NEXT	75	ACK	0A	-	X	-	X	X	X	X
EXIT	76	ACK	0A	-	X	-	X	X	X	X
LIVE	80	ACK	0A	-	X	-	X	X	X	X
VCR PB	81	ACK	0A	-	X	-	X	X	X	X
MULTI	82	ACK	0A	-	X	-	X	X	X	X
QUAD	83	ACK	0A	-	X	-	X	X	X	X
PLUS	84	ACK	0A	-	X	-	X	X	X	X
ZOOM	85	ACK	0A	-	X	-	X	X	X	X
STILL	86	ACK	0A	-	X	-	X	X	X	X
SEQUENCE	87	ACK	0A	-	X	-	X	X	X	X
MON 2	88	ACK	0A	-	X	-	X	X	X	X
FULL 1	90	ACK	0A	-	X	-	X	X	X	X
FULL 2	91	ACK	0A	-	X	-	X	X	X	X
FULL 3	92	ACK	0A	-	X	-	X	X	X	X
FULL 4	93	ACK	0A	-	X	-	X	X	X	X
FULL 5	94	ACK	0A	-	X	-	X	X	X	X
FULL 6	95	ACK	0A	-	X	-	X	X	X	X
FULL 7	96	ACK	0A	-	X	-	X	X	X	X
FULL 8	97	ACK	0A	-	X	-	X	X	X	X
FULL 9	98	ACK	0A	-	X	-	X	X	X	X
FULL 10	99	ACK	0A	-	X	-	X	X	X	X
FULL 11	9A	ACK	0A	-	X	-	X	X	X	X
FULL 12	9B	ACK	0A	-	X	-	X	X	X	X
FULL 13	9C	ACK	0A	-	X	-	X	X	X	X
FULL 14	9D	ACK	0A	-	X	-	X	X	X	X
FULL 15	9E	ACK	0A	-	X	-	X	X	X	X
FULL 16	9F	ACK	0A	-	X	-	X	X	X	X

COMMAND FROM CONTROLLER		RETURN FROM DEVICE		DEVICE CATEGOLY			CONTROL		COMMAND TYPE	
NAME	CODE (H)	MANE	CODE (H)	VR	MX	CM	RS 485	RS2 32C	PtoP	Broad Cast
ALARM SEARCH WITH DATA + ENTER + FF/REW	B0	ACK	0A	X	-	-	X	X	X	-
		COMPLETION	01							
		NOT TARGET	05							
ALARM SCAN WITH FF/REW	B1	ACK	0A	X	-	-	X	X	X	-
		COMPLETION	01							
		NOT TARGET	05							
R/P SPEED SET WITH DATA + ENTER	7E	ACK	0A	X	-	-	X	X	X	-
T/D SEARCH WITH DATA + ENTER + FF/REW	B2	ACK	0A	X	-	-	X	X	X	-
		COMPLETION	01							
		NOT TARGET	05							
REC WITH REC/DUB REQUEST	CA	ACK	0A	X	-	-	X	X	X	X
COUNT CODE	D0	DATA	-	X	-	-	X	X	X	-
HEAD TIME	D2	DATA	-	X	-	-	X	X	X	-
POWER ON TIME	D3	DATA	-	X	-	-	X	X	X	-
ALARM STATUS SENSE	D5	DATA	-	-	X	-	X	X	X	-
T/L STATUS SENSE	D6	DATA	-	X	-	-	X	X	X	-
STATUS SENSE	D7	DATA	-	X	X	-	X	X	X	-
RS232C TABLE ON	F6	ACK	0A	X	-	-	-	X	X	-
RS232C TABLE OFF	F7	ACK	0A	X	-	-	-	X	X	-
REC/DUB REQUEST	FA	ACK	0A	X	-	-	X	X	X	X
VCR INQUIRY	FB	ACK	0A	X	-	-	-	X	X	X
CLEAR	56	ACK	0A	X	-	-	X	X	X	X
CLER ERROR	41	ACK	0A	X	-	-	X	X	X	X
ENTER	40	ACK	0A	X	X	-	X	X	X	X
MASTER LOCK ON (only for CONTROLLER)	68	-	-	-	-	-	X	-	-	X
MASTER LOCK OFF (only for CONTROLLER)	6B	-	-	-	-	-	X	-	-	X
GROUP SET WITH DATA	6C	ACK	0A	X	X	X	X	-	X	-
GROUP CHECK WITH DATA	6D	DATA	-	X	X	X	X	-	X	-
GROUP CLEAR WITH DATA	6E	ACK	0A	X	X	X	X	-	X	-
-	-	ALARM IN	06	X	-	-	-	X	X	-
-	-	CASSETE OUT	03	X	-	-	-	X	X	-
-	-	STATUS WITH DATA	BC	X	X	X	X	-	-	X
-	-	STATUS WITH DATA	BD	X	X	X	X	-	-	X
-	-	STATUS WITH DATA	BE	X	X	X	X	-	-	X
-	-	STATUS WITH DATA	BF	X	X	X	X	-	-	X
-	-	ERROR	02	X	X	X	X	X	X	X
COMMAND For Establishment of the RS-485 Communication										
RS-485 RCV CHECK	FE	RS-485 TRANSMISSION START	FD	X	X	X	X	-	X	-
ACK	0A									

DEVICE CATEGOLY
VR   : Command for VCR
MX   : Command for Multiplexer
CM   : Command for Camera

CONTROL
RS485   : Command for RS485 communication
RS232C   : Command for RS232C communication

COMMAND TYPE
PtoP   :"PtoP" command can be sent by point to point communication control.
Broadcast   :"Broadcast" command can be sent by broad cast communication control.

5.Command Reference

5-1. Command for Time lapse VCR

- **PLAY (3A)**

  Play back a tape.

  When this command is sent while recording, the VCR enters REC CHECK.

- **STILL (4F)**

  Pause tape.

  When this command is sent while recording, the VCR enters REC PAUSE.

- **STOP (3F)**

  Stop tape.

- **FF (AB)**

  Fast forwards the tape.

  When this command is sent while playing, the VCR enters LOCKED CUE.

  During still , the VCR advances forward one image.

  During search/scan, the VCR switches to forward search/scan.

- **REW (AC)**

  Rewinds the tape.

  When this command is sent while playing, the VCR enters LOCKED REVIEW.

  During still , the VCR advances reverse one image.

  During search/scan, the VCR switches to reverse search/scan.

- **EJECT□□(A3)**

  Ejects the tape.

  The VCR returns ACK(0A) at ones when it receives this command, then returns CASSETTE OUT (03) after it ejects the tape.

- **REC□□(CA)**

  Records.

  Before sending this command, REC/DUB REQUEST(FA) should be sent.

RXD	FA	CA
TXD	0A	0A

- **REV.PLAY (4A)**

  Plays back a tape in reverse at normal speed.

- **TIMER ON/OFF (60)**

  Switches on/off timer recording.

- **MENU□(74)**

  Displays the menu.

  The menu screen changes each time you send this command.

- **SHIFT□, (63)**

  Shift the position of display to the right.

  When menu is displayed, it shifts the cursor to the next input position.

- **SHIFT□, (53)**

  When menu is displayed, it brings the cursor back to the preceding position.

- **SHIFT□, (64)**

  Shifts the position of display to the below .

- **SET+,R/P UP□(65) / SET+,R/P DOUN (66)**

  Changes the setting of the selected item.

- **POWER ON/OFF (7B) , SET ON (7C) , SET OFF (7D)**
  Turns on/off the VCR.
- **SECURITY LOCK ON (69) / SECURITY LOCK OFF (6A)**
  Switches on/off security lock.
- **AUDIO/SEARCH (22)**
  When this command is sent while playing in the 12/24 hour mode, the sound switches on/off.
  During stop , the VCR enters SEARCH/SCAN mode.
  When the menu is displayed, this command ends the menu.
  When the VCR receives the commands above, the VCR returns ACK(0A).
- **ALARM SEARCH (BO)**
  Initiates search for a specific alarm point. Send this command, then enter the alarm point (date,time) and send FF(AB) to search forward or REW(AC) to search backward.
  Eg:Search forward for alarm point 23.

RXD	BO	32	33	40	AB	
TXD		0A	0A	0A	0A	0A

  When the alarm point is located, the VCR returns COMPLETION(01).If the tape comes to the end or beginning without the alarm point being located, the VCR returns NOT TARGET(05).
- **ALARM SCAN (B1)**
  Initiates scanning of alarm point(five seconds each).
  Second this command, then send FF(AB) to scan forward or REW(AC) to scan backward.
- **T/D SEARCH (B2)**
  Initiates search for a specific time/date. Send this command, followed by the date and time then send FF(AB) to search forward or REW(AC) to search backward.

  Eg:Search forward for the 16 th , 15 o'clock.

RXD	BO	31	36	31	35	40	AB	
TXD		0A	0A	0A	0A	0A	0A	0A

  When the time/date is located, the VCR returns COMPLETION(01) . If the tape comes to the end or beginning without the time/date being located, the VCR return NOT TARGET(05).
- **MENU RESET(E1)**
  Reset the MENU setting.
- **CLOCK ADJUST□(E0)**
  Adjust the CLOCK setting of the VCR. Minute and second are adjusted to 00:00
- **TRACKING UP (51) / TRACKING DOUN (52)**
  Move the trucking adjustment one step to the up/down side.
  When this command is sent while STILL mode, then V STILL adjustment is moved one step to the up/down side.
- **TRACKING CENTER (53)**
  Return the trucking adjustment to the center.

- **COUNT RESET (E2)**

  Resets the counter. The VCR returns ACK(0A).

- **COUNT MEMORY (E3)**

  Switches on/off the counter memory. The VCR returns ACK(0A).

  When the memory is switched on, the tape being fast forwarded or rewound stops automatically at the point of counter "0:00:00".

- **COUNT CODE (D0)**

  In response to this command, the VCR returns the counter value(six bytes).

  "30H" indicates "+" and "31H" indicates "-".

  Eg:□-1:23:45

RXD	D0					
TXD		31	31	32	33	34	35

- **HEAD TIME (D2)**

  In response to this command , the VCR returns the operation time of the video heads.

  This command does not function when the menu is displayed.

  Eg: "00529H"

RXD	D2				
TXD		30	30	35	32	39

- **POWER TIME (D3)**

  In response to this command, the VCR returns the power on time (five bytes).

  This command does not function when the menu is displayed.

- **R/P SPEED SET (7E)**

  Set the recording/playing speed.

  Send this command, then enter the speed.

  Eg: Setting the speed to 120h.

RXD	7E	31	32	30	40
TXD		0A	0A	0A	0A	0A

- **T/L STATUS SENSE (D6)**

  In response to this command, the VCR returns the time lapse status information (five bytes).

RXD	D6				
TXD		d1	d2	d3	d4	d5

- **T/L STATUS SENSE bit allocation**

  *First, second, third bytes: Indicates the time lapse recording/playback speed.

  Byte 1 : Indicate the first digit.

  Byte 2 : Indicate the second digit.

  Byte 3 : Indicate the third digit.

  Eg: 120hour mode. | 30 | 32 | 31 |

  *Fourth byte

  Bit 7: ALARM REC MODE ON

  Bit 6: 1 SHOT REC MODE ON

  Bit 5: SERIES REC MODE ON

  Bit 4: TIMER REC MODE ON

  Bit 3: 0

  Bit 2: 0

  Bit 1: POWER ON

  Bit 0: AUDIO ON

  VCR is in audio playback mode

  *Fifth byte

  Bit 7: MENU MODE ON

  Bit 6: T/D SEARCH MODE ON

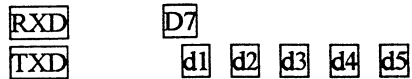 Bit 5: T/D SEARCH SET

  Bit 4: ALARM SCAN MODE ON

  Bit 3: 0

  Bit 2: ALARM SEARCH MODE

  Bit 1: ALARM SEARCH SET

  Bit 0: 0.

- **STATUS SENSE (D7)**

  In response to this command, the VCR returns the status information (five bytes).

  | RXD | D7 |
  | TXD | | d1 | d2 | d3 | d4 | d5 |

  STATUS SENSE bit allocation

  *First byte
  - Bit 7: 0
  - Bit 6: 0
  - Bit 5: 0
  - Bit 4: REC INHIBIT
  - Bit 3: CASESET OUT
  - Bit 2: 0
  - Bit 1: 0
  - Bit 0: ERROR

  *Second byte
  - Bit 7: 0
  - Bit 6: 0
  - Bit 5: 0
  - Bit 4: 0
  - Bit 3: WARNING
  - Bit 2: 0
  - Bit 1: 0
  - Bit 0: 0

  *Third byte
  - Bit 7: 0
  - Bit 6: TIMER REC ON
  - Bit 5: COUNTER MEMORY
  - Bit 4: 0
  - Bit 3: 0
  - Bit 2: REPEAT MODE
  - Bit 1: 0
  - Bit 0: 0

  *Fourth byte
  - Bit 7: PLAY MODE
  - Bit 6: FF MODE
  - Bit 5: REW MODE
  - Bit 4: STOP MODE
  - Bit 3: 0
  - Bit 2: EJECT MODE
  - Bit 1: REC MODE
  - Bit 0: 0

  *Fifth byte
  - Bit 7: 0
  - Bit 6: 0
  - Bit 5: CUE MODE
  - Bit 4: REVIEW MODE
  - Bit 3: 0
  - Bit 2: 0
  - Bit 1: PAUSE MODE
  - Bit 0: STILL MODE

- **STATUS (BC,BD,BE,BF)**

When status is changed on the VCR, each VCR issues this command with 1 byte data.

But the controller issued broadcast command then VCR does not issue this STATUS command.

| TXD | | BF | d1 |

(Note: Only "BF" is used for the status of VCR. Other "BC, BD, BE" are spare command for future use.)

*STATUS data bit allocation

Bit 7: WARNING

1:WARNING ON

0: normal

Bit 6,5 : Indicate ALARM REC START, ALARM REC STOP with these 2 bits.

1,0:ALARM REC START

0,1:ALARM REC STOP

0,0:normal

Bit 4,3,2,1,0 : Indicate the MODE of VCR with these 5 bits.

0,0,0,0,0:NO MODE CHANGE   0,1,0,0,0:PLAY

0,0,0,0,1:CASSETTE   OUT(POWER   0,1,0,0,1:REC

ON)   0,1,0,1,0:REVERSE PLAY

0,0,0,1,0:CASSETTE   OUT(POWER   0,1,0,1,1:CUE

OFF)   0,1,1,0,0:REVIEW

0,0,0,1,1:STANDBY(POWER ON)   0,1,1,0,1:FF

0,0,1,0,0:STANDBY(POWER OFF)   0,1,1,1,0:REW

0,0,1,0,1:TIMER STANDBY   0,1,1,1,1:FORWARD FRAME ADVANCE

0,0,1,1,0:PLAY STILL   1,0,0,0,0:REVERSE FRAME ADVANCE

0,0,1,1,1:REC PAUSE

- **ACK (0A)**

Acknowledges the command.

- **NCK (0B)**

Rejects the command.

- **COMPLETION (01)**

Notifies that a search/scan point has been located.

- **NOT TERGET (05)**

Notifies that the tape has come to the end or beginning without the search/scan point being located..

- **ERROR (02)**

Indicates an error in the second or following byte of a multiple-byte command.

- **REC/DUB REQUEST (FA)**

Send this command just before sending the REC or DUB command..

- **ENTER (40)**

Send this command to indicate the end of a numeric command.

- **CLEAR (56)**

Clears a multiple-byte command.

- **CLEAR ERROR (41)**

Clears the last byte entered of a multiple-byte command.

- **CASSETE OUT (03) (only for RS232C, not used for RS485 control)**

Confirms that the cassette has been ejected.

- **ALARM IN (06) (only for RS232C, not used for RS485 control)**

Notifies that an alarm signal has been input.

5-2. Command for Multiplexer

- **FULL 1□16 (90□9F)**

  Display the FULL picture of selected channel on the monitor 1.

- **MULTI (82)**

  Display the MULTI picture on the monitor 1.

  When MULTI picture is displayed, 16 or 9 divided multi picture are switched.

- **QUAD (83)**

  Display the QUAD picture on the monitor 1.

  When QUAD picture is displayed, Switch the Quad picture.

  (1,2,3,4/5,6,7,8/9,10,11,12/13,14,15,16)

- **SEQUENCE (87)**

  When FULL picture is displayed on monitor 1, switch the channel sequentially automatically with FULL picture.

  When QUAD picture is displayed , switch the quad picture sequentially.

- **PLUS (84)**

  Add the picture on the display of monitor1.

- **ZOOM (85)**

  Zoom up the display of monitor 1.

- **STILL (86)**

  Still the display of monitor 1

- **LIVE (80)**

  Change the function of MUX to the LIVE mode.

- **VCR (81)**

  Change the function of MUX to the VCR mode.

- **MON2 (88)**

  Turn on / off the setup mode of monitor 2.

- **MENU (74)**

  Display the menu.

  The menu screen changes each time you send this command.

- **+,- (65,66)**

  Change the setting of the selected item.

- **□,□,□□, (63,64,53,54)**

  Shifts the cursor to the item on the right/below/left/up.

- **NEXT (75)**

  Change the layer of the menu.

- **EXIT (76)**

  Exit from the menu.

- **MENU RESET (E1)**

  Reset the menu setting.

- **CLOCK ADJUST (E0)**

  Adjust the CLOCK setting of device. Minute and second are adjusted to 00:00

- **POWER ON/OFF (7B) , SET ON (7C) , SET OFF (7D)**

  Turns on/off the device.

- **SECURITY LOCK ON (69) / SECURITY LOCK OFF (6A)**

  Switches on/off security lock.

- **ALARM STATUS SENSE (D5)**

In response to this command, the device returns the status information (five bytes).

RXD   D5

TXD   d1   d2   d3   d4   d5
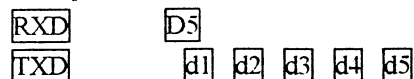
*First byte

    Bit 7: ALARM ON 8

    Bit 6: ALARM ON 7

    Bit 5: ALARM ON 6

    Bit 4: ALARM ON 5

    Bit 3: ALARM ON 4

    Bit 2: ALARM ON 3

    Bit 1: ALARM ON 2

    Bit 0: ALARM ON 1

*Second byte

    Bit 7: ALARM ON 16

    Bit 6: ALARM ON 15

    Bit 5: ALARM ON 14

    Bit 4: ALARM ON 13

    Bit 3: ALARM ON 12

    Bit 2: ALARM ON 11

    Bit 1: ALARM ON 10

    Bit 0: ALARM ON 9

*Third byte

    Bit 7: SENSOR ON 8

    Bit 6: SENSOR ON 7

    Bit 5: SENSOR ON 6

    Bit 4: SENSOR ON 5

    Bit 3: SENSOR ON 4

    Bit 2: SENSOR ON 3

    Bit 1: SENSOR ON 2

    Bit 0: SENSOR ON 1

*Fourth byte

    Bit 7: SENSOR ON 16

    Bit 6: SENSOR ON 15

    Bit 5: SENSOR ON 14

    Bit 4: SENSOR ON 13

    Bit 3: SENSOR ON 12

    Bit 2: SENSOR ON 11

    Bit 1: SENSOR ON 10

    Bit 0: SENSOR ON 9

*Fifth byte

    Bit 7: VIDEO LOSS ON 8

    Bit 6: VIDEO LOSS ON 7

    Bit 5: VIDEO LOSS ON 6

    Bit 4: VIDEO LOSS ON 5

    Bit 3: VIDEO LOSS ON 4

    Bit 2: VIDEO LOSS ON 3

    Bit 1: VIDEO LOSS ON 2

    Bit 0: VIDEO LOSS ON 1

*Fifth byte

    Bit 7: VIDEO LOSS ON 16

    Bit 6: VIDEO LOSS ON 15

    Bit 5: VIDEO LOSS ON 14

    Bit 4: VIDEO LOSS ON 13

    Bit 3: VIDEO LOSS ON 12

    Bit 2: VIDEO LOSS ON 11

    Bit 1: VIDEO LOSS ON 10

    Bit 0: VIDEO LOSS ON 9

- **STATUS SENSE (D7)**

In response to this command, the device returns the status information (five bytes).

RXD D7

TXD d1 d2 d3 d4 d5
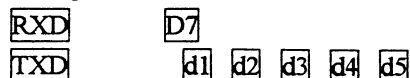
STATUS SENSE bit allocation

*First byte

Bit 7: 0:LIVE.1:VCR

Bit 6.5.4:Indicate the Display Mode.

0:FULL / 1:QUAD / 2:MULTI / 3:PLUS / 4:MENU

Bit 3.2.1.0:Indicate the channel of display

FULL picture :	0:FULL CH1 /... /15:FULL CH16
QUAD picture :	0:QUAAD 1.2,3.4 / 1:QUAD 5,6,7,8 /
	2:QUAD 9,10,11,12 / 3:QUAD 13,14,15,16
MULTI picture:	0:FULL / 8:9 divided picture / 15:16 divided picture
MENU picture:	0:Menu 0 / .../15:Menu 15
PLUS picture:	Cannel of on PLUS picture 0:CH1 /... /15:CH16

*Second byte

Bit 7: EXT.ALARM ON

Bit 6: VIDEO LOSS ON

Bit 5: SENSOR ON

Bit 4: Reserved for Extension

Bit 3.2.1.0: Indicate the status of display.

0:NORMAL / 1:SEQUENCE / 2:ZOOM / 3:STILL / 4:ZOOM-STILL / 5:STILL-ZOOM /

6:ZOOM POSITION / 7STILL-ZOOM POSITION

*Third byte

Bit 7: Reserved for Extension

Bit 6: Reserved for Extension

Bit 5: MON2 SET UP

Bit 4: MON2 0:FULL / 1:SEQUENCE

Bit 3.2.1.0: Indicate the channel No. displayed on MON2

0:CH1 / ... / 15:CH16

*Fourth byte : Reserved for Extension

*Fifth byte : Reserved for Extension

- **STATUS (BC,BD,BE,BF)**

    When alarm is activated on the device then device issues this command with 1 byte data.

    TXD   BF d1

    (Note: Only "BF" is used for the status of alarm. Other "BC, BD, BE" are spare command for future use.)

    *STATUS data bit allocation

    Bit 7,6: Indicate the type of ALARM

    0:NO ALARM / 1:EXT.ALARM / 2:VIDEO LOSS / 3:SENSOR ALARM

    Bit 5: Reserved for Extension

    Bit 4: Reserved for Extension

    Bit 3,2,1,0:Indicate the ALARM channel

    0:CH 1 / ... / 15:CH 16

- **ACK (0A)**

    Acknowledges the command.

- **NCK (0B)**

    Rejects the command.

5-3 Command for camera

- **MENU (74)**

    Display the menu.

    The menu screen changes each time you send this command.

- **□,□,□□, (63,64,53,54)**

    Shifts the cursor to the item on the right/below/left/up.

    Change the setting of the selected item.

- **ENTER (40)**

    Send this command to fix the menu setup.

- **STATUS (BC,BD,BE,BF)**

    When alarm is activated on the device then device issues this command with 1 byte data.

    TXD   BF d1

    (Note: Only "BF" is used for the status of alarm. Other "BC, BD, BE" are spare command for future use.)
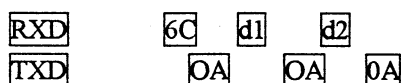
    *STATUS data bit allocation

    (To be announced)

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5-4. Command for control bus

- **MASTER LOCK ON(68)**

  Block the communication of bus line.
- **MASTER LOCK OFF(6B)**

  Release the communication of bus line.
- **RS485 TRANSMISSION START (FD)**

  Send this command to indicate that the sender will start to send the command .
- **RS485 RECEIVE CHECK (FE)**

  Send this command to confirm that the receiver is ready to receive the command.
- **GROUP SET (6C)**

  Controller send this command with 2 bytes group data to resister the group of the device.

RXD	6C	d1	d2
TXD	0A	0A	0A

  Group data bit allocation

*First byte	*Second byte
Bit 7 :Group 7	Bit 7 :Group 15
Bit 6 :Group 6	Bit 6 :Group 14
Bit 5 :Group 5	Bit 5 :Group 13
Bit 4 :Group 4	Bit 4 :Group 12
Bit 3 :Group 3	Bit 3 :Group 11
Bit 2 :Group 2	Bit 2 :Group 10
Bit 1 :Group 1	Bit 1 :Group 9
Bit 0 :0 (not used)	Bit 0 :Group 8

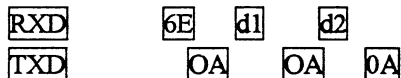 Eg: Register group 5

RXD	6C	20	00
TXD	0A	0A	0A
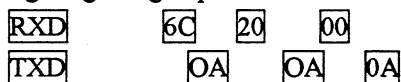
- **GROUP CLEAR (6E)**

  Controller send this command with 2 bytes group data to clear the group of the device.

RXD	6E	d1	d2
TXD	0A	0A	0A

  Group data bit allocation are same as above.

- **GROUP CHECK (6D)**

  In response to this command , the device returns the registered group number.

RXD	6D	
TXD	d1	d2