

82H656-W0X

Dec. 1997

OPERATION MANUAL

Digital High Speed

MEMRECAM Ci/RX-2



IMAGE TECHNOLOGY

Figure 1 consists of two line graphs. The left graph shows the growth rate (log CFU/h) of *E. coli* in a 100% water activity medium as a function of temperature (°C). The growth rate increases from approximately 0.5 at 10°C to a peak of about 1.5 at 37°C, and then decreases to about 0.5 at 50°C. The right graph shows the growth rate (log CFU/h) of *E. coli* in a 90% water activity medium as a function of temperature (°C). The growth rate increases from approximately 0.5 at 10°C to a peak of about 1.5 at 37°C, and then decreases to about 0.5 at 50°C. Both graphs show a similar trend, with a peak in growth rate around 37°C.

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

READ BEFORE USE

SAFETY PRECAUTIONS

Be sure about the following safety precautions when using the system. They are indicated as symbols or warnings where maximum care must be taken in handling the system.

DANGER

The DANGER indicates as imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

The WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

The CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

This sign is also placed where the equipment connected this system would likely to be damaged.

SAFETY ALERT symbol



This symbol invites attention to the matter or operation harmful to the user. be sure about the directions following the symbol when using the system.

GROUND TERMINAL symbol



This symbol indicates grounding terminals for protection.

Be sure that these terminals are grounded, or it will be dangerous around this system especially its metallic portions. This grounding is also effective in reducing the noise occurring to the signal lines.

WARNING



Power must be OFF when connecting or disconnecting cables.
Otherwise, it may invite electrical shock or damage to the equipment.

HIGH VOLTAGE WARNING symbol



This symbol is placed where no touching is permitted because of the presence of a dangerous voltage.

Do not operate the system with its case open. Do not touch any part of the system with a wet hands. Line voltage is used in some parts.

There is the case that unexpected anomaly appears in by use condition / busy condition of equipment in addition to the above. Therefore use it after it was understood all affairs item mentioned in operation manual of equipment (users manual) fully. And If you may not understand about equipment, promptly inform a store directly.

OPERATING CONDITION

1. Temperature and Humidity

- Use the system in the ambient temperature between 0 and 40 degrees C, the humidity between 30 and 80% without condensation.
- Do not store the system where the ambient temperature exceeding between -10 and 60 degrees C, humidity exceeding 30 and 80% RH.

2. Equipment

- If you are using an internal cartridge drive, always hold the DRP bottom sit on level surface.

3. Ventilation

- Do not block or cover the air intake slits on panel and air outlet at the rear, to prevent the camera from overheating.

4. Ambient Environment

- Do not use the system in an environment where soot, corrosive gas, or strong magnetic fields are presented.
- Do not place the system in an environment exposed to direct sun light, rainfall, or salt water.
- Avoid using the system for a long period in a dusty environment.

5. Transportation

- For transportation, use of own container is strongly recommended.

MEMRECAMci/RX-2 is suited for application by the vehicle deployment as bearing vibration and stronger shock.

Vibration resistance and impact resistance is considered especially, and specification is established. Offer periodical inspection in our company and preparation to maintain necessary performance by condition becoming use of a customer.

PERIODIC REPLACEMENT PARTS

■ Internal Battery (for Clock and parameter backup)

Replacement of internal battery may be required every 5 years period. The battery must be replaced at a qualified facility, please contact our Service Center for the battery replacement.

■ Built-in battery for Memory Backup (Option)

Replacement of internal battery may be required every 1 years period. The battery must be replaced at a qualified facility, please contact our Service Center for the battery replacement.

PERIODIC MAINTENANCE

In case of repetition use with high shock environment and high vibration environment. As prescribed by specification, and by number of times or period, need to get periodic inspection. Because inspection and maintenance is not completed by user, send MEMRECAM to our Service Center.

APPLICABLE STANDARDS

■ Standards

FCC Statements

This equipment complies with the requirements in Part 15 of FCC Rules for a Class A computing device. Operation of this equipment in a residential area may cause unacceptable interference to radio and TV reception requiring the operator to take whatever steps are necessary to correct the interference.

EMC Notice

products with the CE Marking comply with the EMC Directive (89/336/EEC) issued by the Commission of the European Community. Compliance with these directives implies conformity to the following European Norms:

EN55022, Class A-Radio Frequency Interference
EN50082-2, Electromagnetic Immunity

• Cable Connection

Connection to this device must be made with shielded cables with metallic RFI/EMI connector hood and put 25mm or more length of EMC ferrite core on the both ends of cable on maintain compliance with EMC Directive (89/336/EEC).

• Performance Degradation in the Immunity Test

NAC, Inc. specifies that in the MEMRECAM ci/RX-2, the performance degradation implies only when a loss of sync in video image occurs due to external interfere.

INTRODUCTION

MEMRECAM series affects needs of analysis of event to move fast invisibly.

As for MEMRECAMci/RX-2, there is superior shock and vibration resistance. Utilize exclusive Hi-G lens and optional Hi-G light source and carry it to on-board vehicle crash test.

MEMRECAMci/RX-2 changes architecture according to application as built-in and separate configuration. In case of built-in configuration pursue compactness of film camera and all-in-one usefulness of film camera. As a separate configuration realize unprecedented anti shock and vibration performance and shooting as a narrow place.

Because MEMRECAM has IC memory built-in as recording medium, and all function is controlled with processor, it has the function performance that it was possible for association to digital network of instrumentation system to contain it to record playback and automated analysis by simple operation.

And, in photography of high-speed event to happen in severe ambient condition, as for small and ruggedized and anti-electromagnetic performance becomes important. Vulnerable point of image holding in power source OFF which is defect of IC memory, it is solved when used optional memory back up function.

To use MEMRECAM ci/RX-2 efficiently, this operation manual described specification, operating instruction, interface with peripheral device and system extensibility.

WARRANTY

NAC warrants product of its manufacture to be free from defects in design, workmanship and material under normal and proper use and service for a period of twelve (12) months after the date of NAC's shipment or delivery.

NAC agrees to repair or replace at the place of manufacture, without charge, all parts of said products which are returned, for inspection, to NAC within the applicable warranty period, provided such inspection discloses that the defects are as above specified and provided also that the equipments has not been altered or repaired other than with authorization from NAC and by its procedures, subjected to misuse, improper maintenance, negligence, or accident, damaged by excessive current or otherwise, or had its serial number or any part thereof altered, defaced or removed.

Shipping expenses to and from NAC will be to the account of the customer. Consumer goods such as lamp, fuse, etc. considered by NAC are not applied to this warranty.

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4. TECHNICAL DESCRIPTION

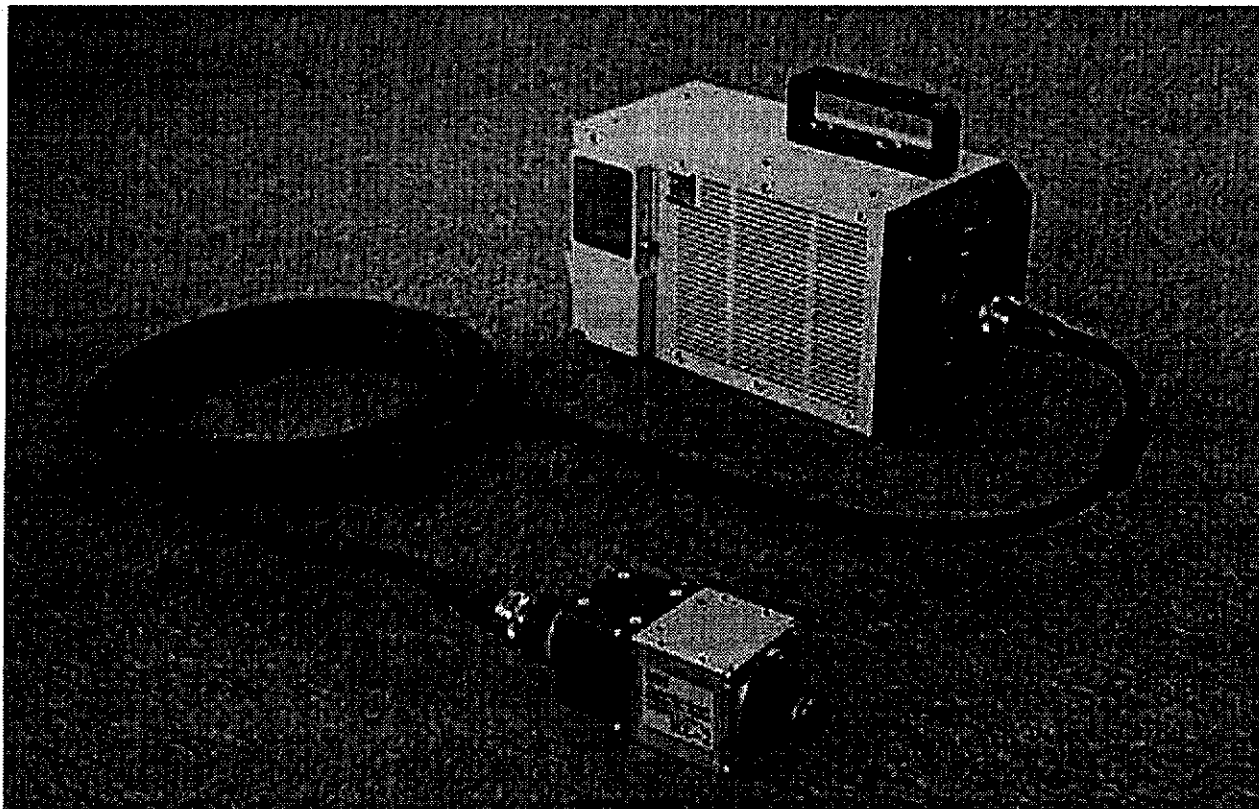
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5. SPECIFICATIONS OF MEMRECAMci/RX-2

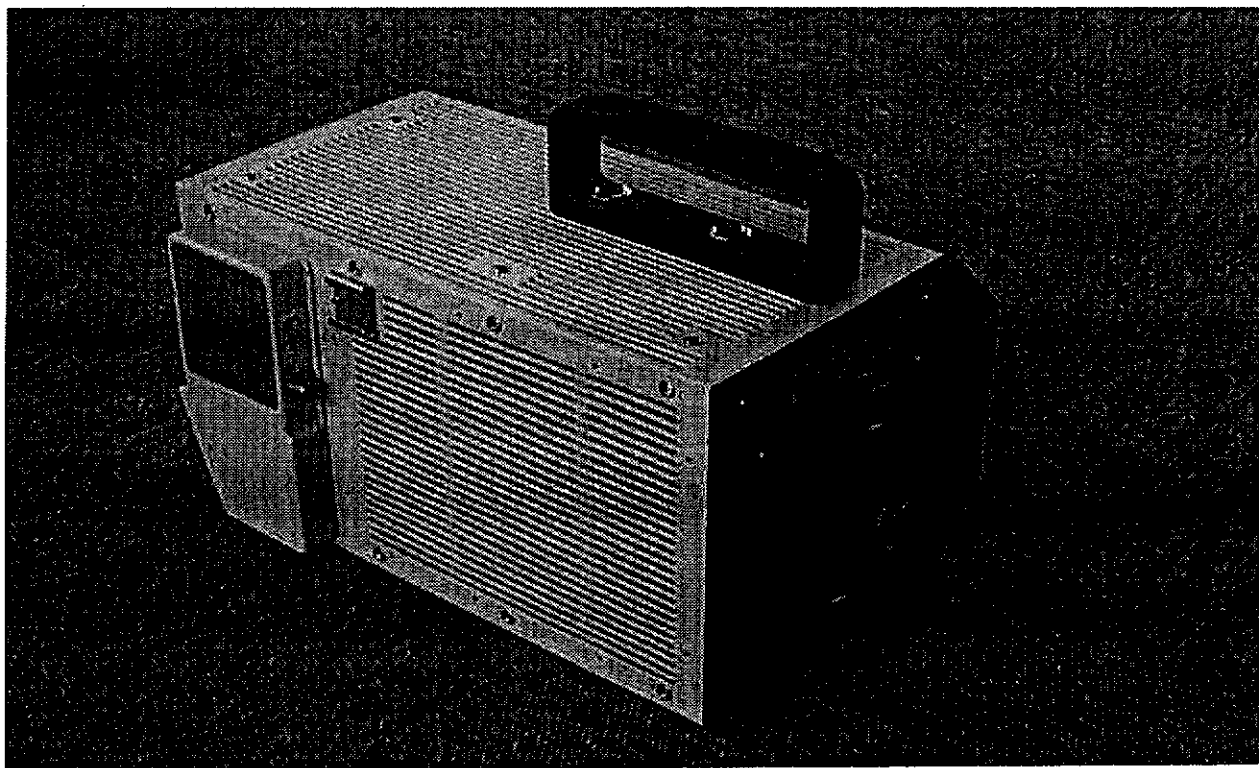
.....	5 - 1
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1

INTRODUCTION TO MEMRECAMci/RX-2



Outline of separated operation



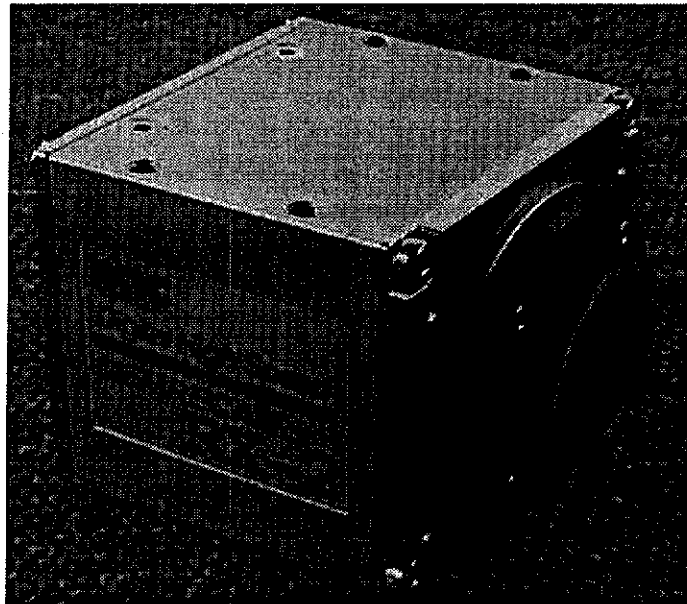
Outline of built-in operation

1-2

COMPONENTS AND FUNCTIONS

1 CAMERA HEAD

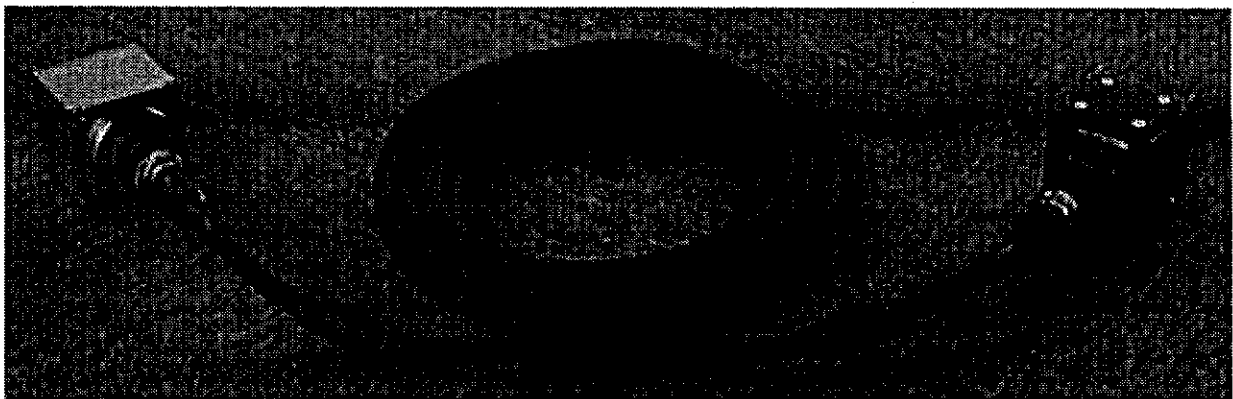
Camera Head built in it in DRP or it can be use as Camera Head separation mode with Camera Separation Unit.



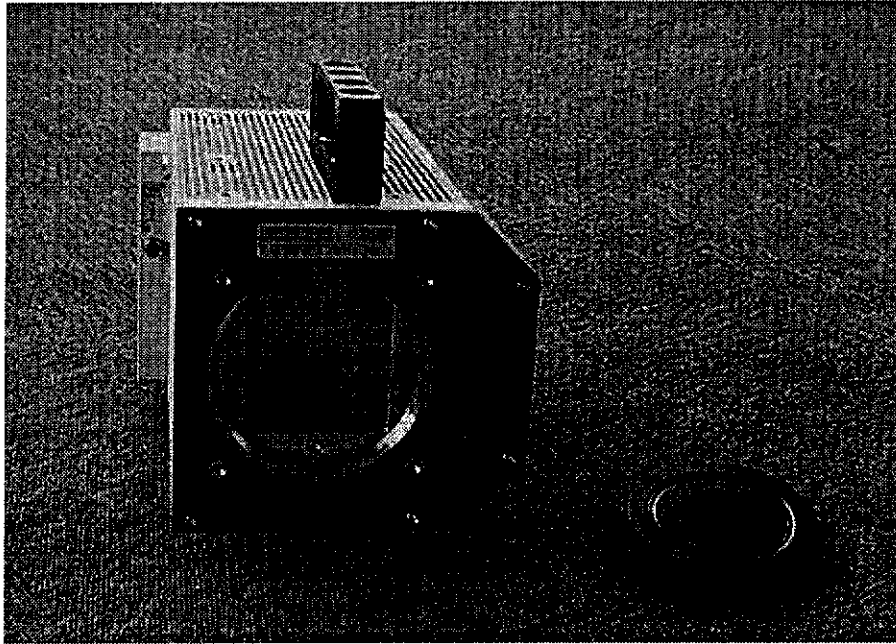
2 Camera Head Separation Unit

It is unit and cable to use when camera head is separated from DRP.

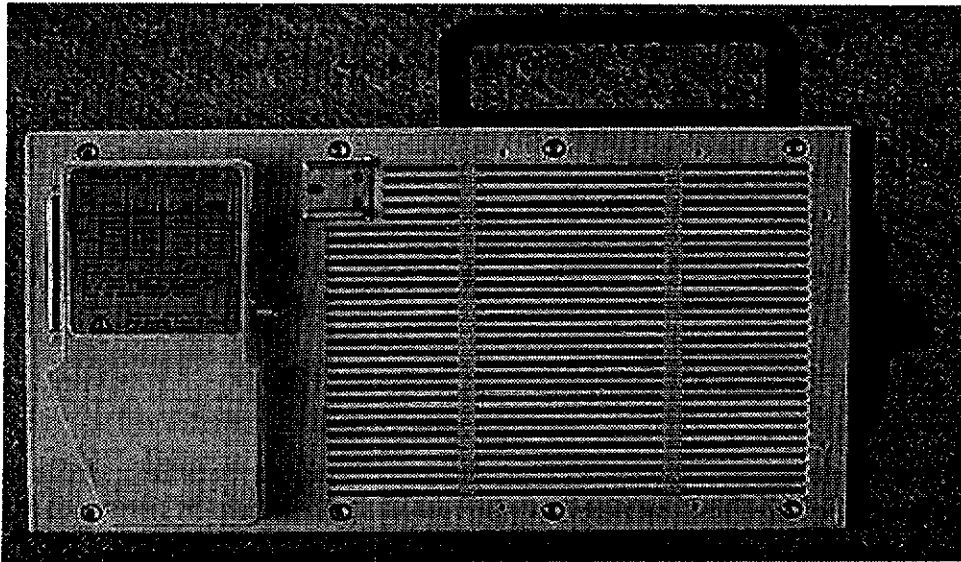
- | | |
|--------------|---|
| TX unit | Connected to Camera Head. |
| RX unit | It is built in instead of Camera Head in DRP. |
| Camera Cable | It connects between TX unit and RX unit. |



Installation of camera head or installation of camera head separation unit.



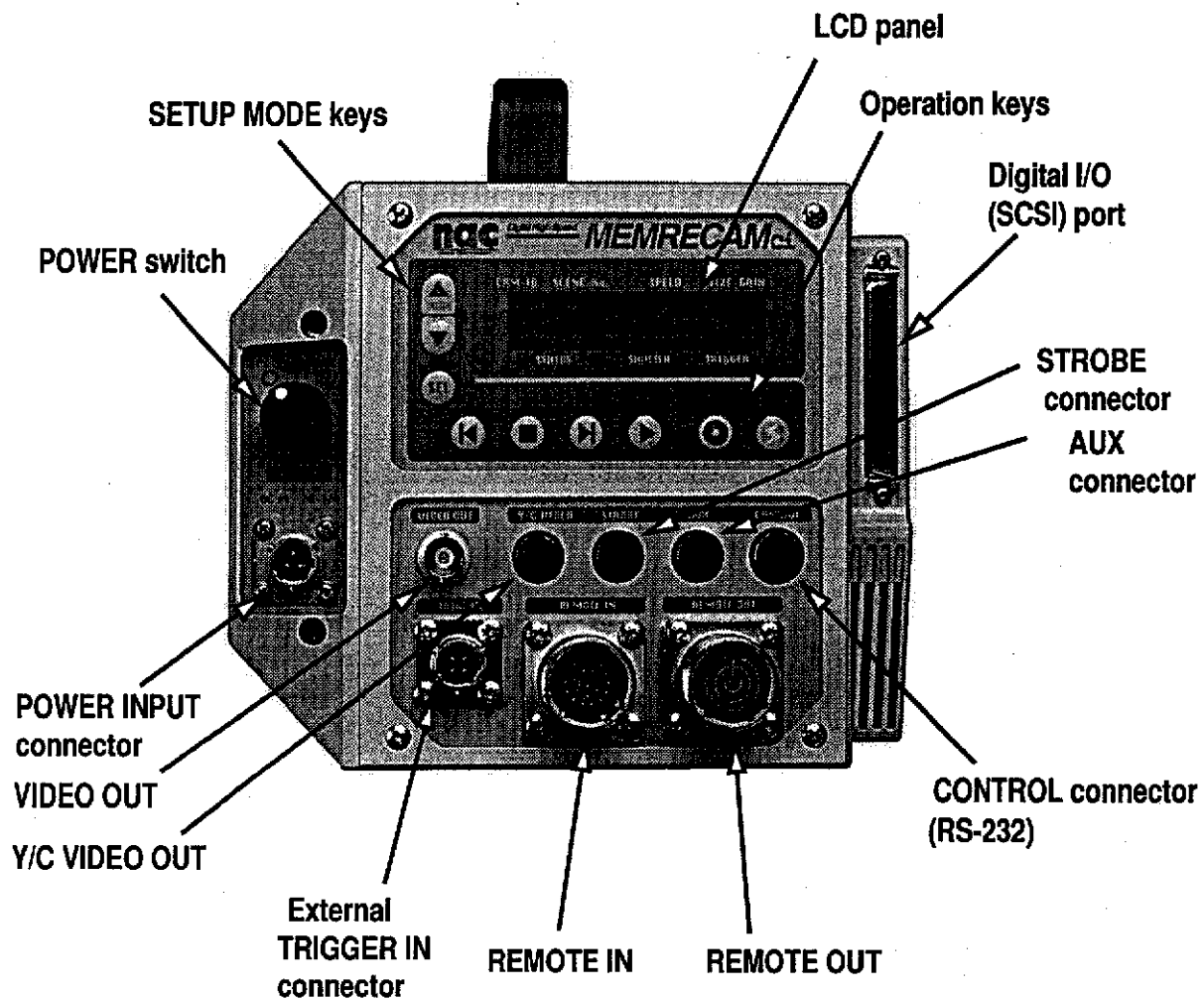
Viewfinder attachment and viewfinder output connector are located.



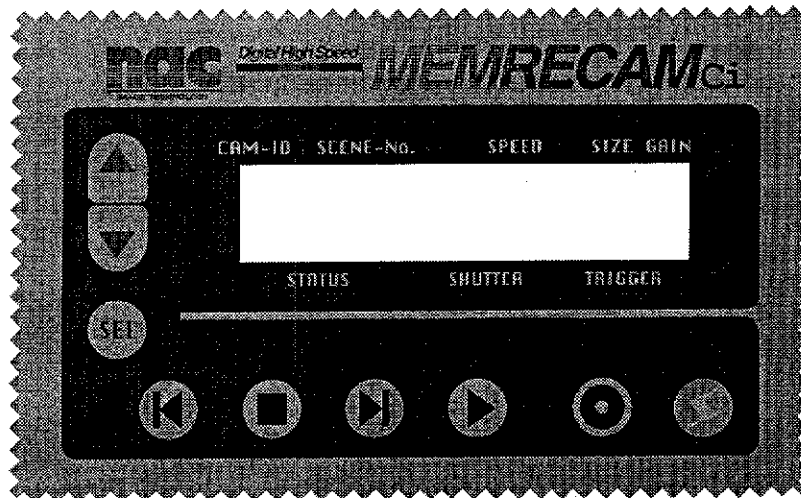
Side panel has lots of slit which used for air intake to cool inside the camera. Air outlet is provided at rear of cameras just below the SCSI connector. Do not block or cover these slits.

DRP REAR PANEL

All controls, indicators and connectors are located.



In the upper part of rear panel, operation panel are located including 9 keys and 7 LED indicators.



■ Setup Mode keys (keys used in the SETUP mode)

UP



Move to upper parameter or increase value.

DOWN



Move to lower parameter or decrease value.

SEL



Starts the SETUP mode. Select the parameter.

■ Record, Replay Operation Keys

REV STEP



Starts the REVerse single frame feeding, or starts REWInd. During PLAY, it reduce the playback speed.

STOP



During PLAY, it stops playback and display still image. If pressed during recording it stops recording.

FWD STEP



Starts the ForWorD single frame feeding, or starts Fast Feeding. During PLAY, it increase the playback speed.

PLAY



Starts PLAYback mode.

VIEW/ARM



Starts VIEW or ARM mode.

TRIGGER



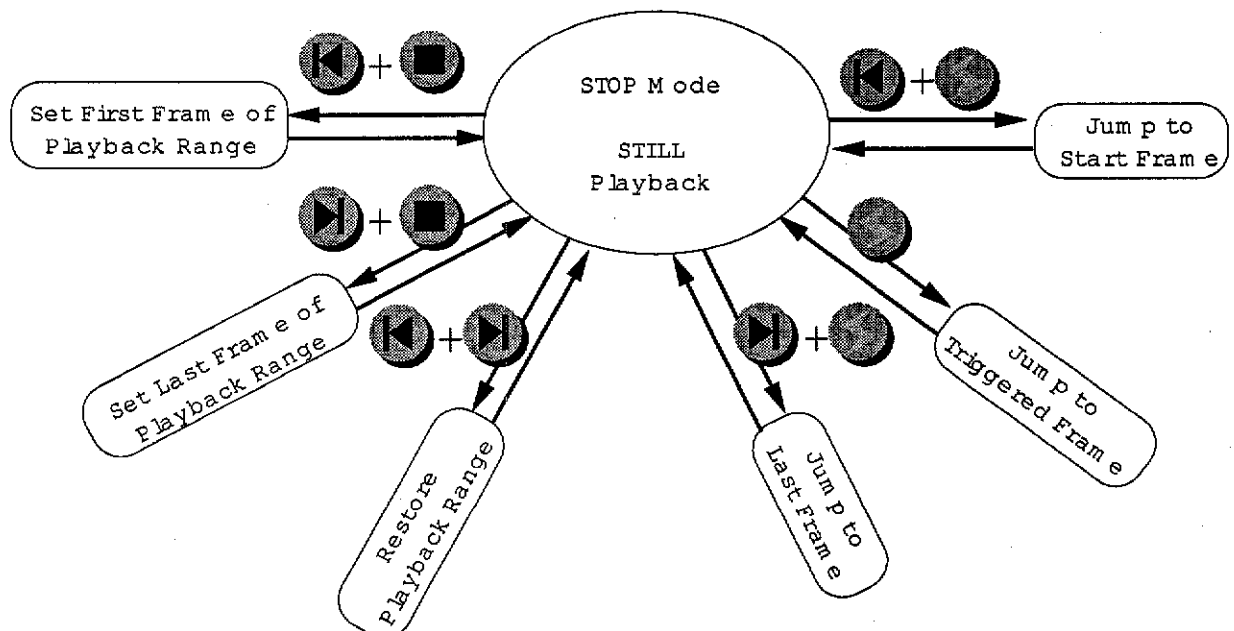
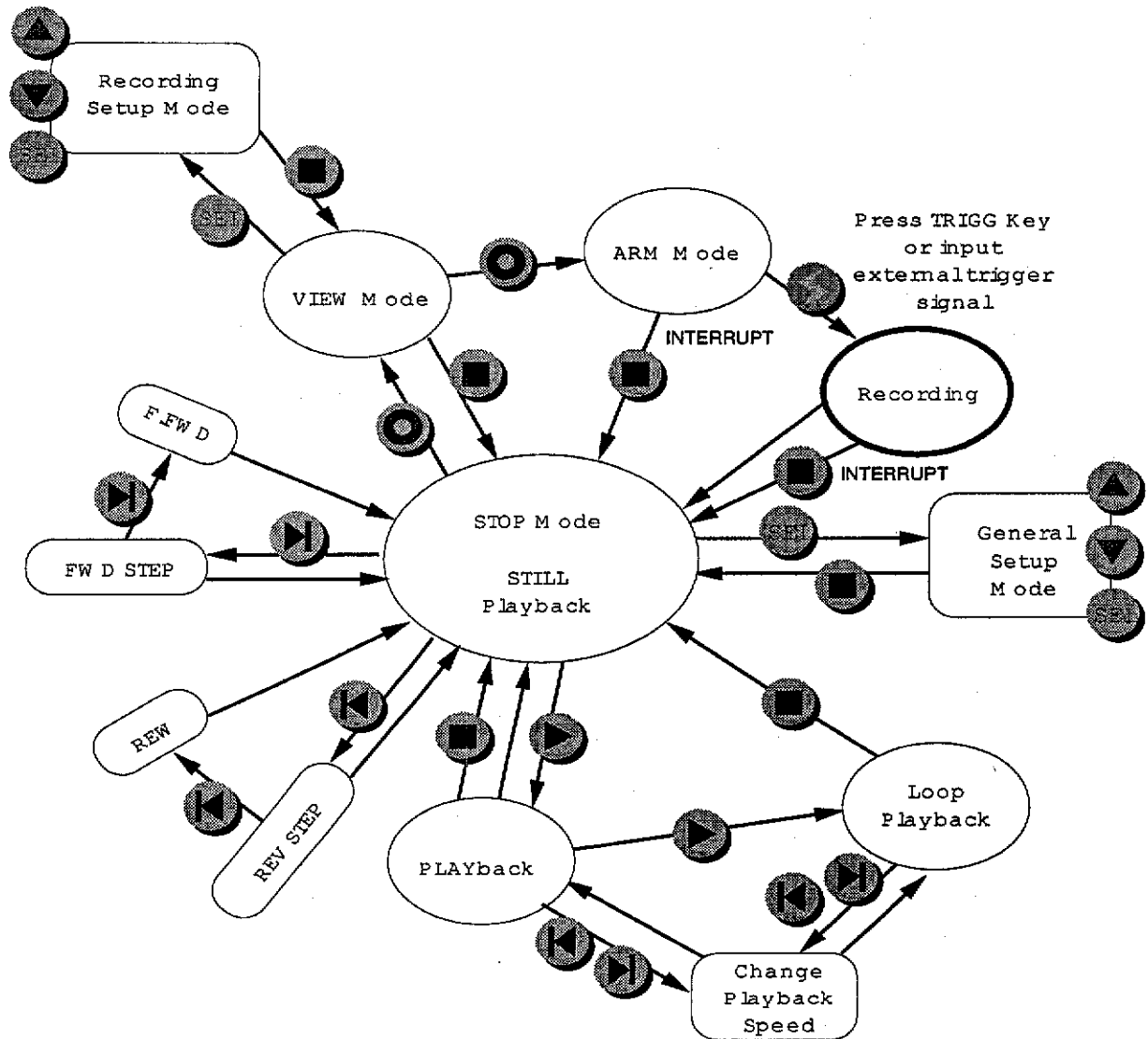
Manual trigger is activated if pressed during ARM mode.

■ LED lamps

LED lamps are placed near the associated keys.

SEL LED	●	Lights during setup mode.
STOP LED	■	Lights during stop (still) mode.
PLAY LED	▶	Lights during playback.
LOOP LED	↺	Lights during loop playback.
VIEW LED	VIEW	Lights during VIEW mode.
ARM LED	ARM	Lights during ARM mode.
		Flashes from triggering to the end of recording.
TRIG LED	TRIG.	Flashes from triggering to the end of recording.

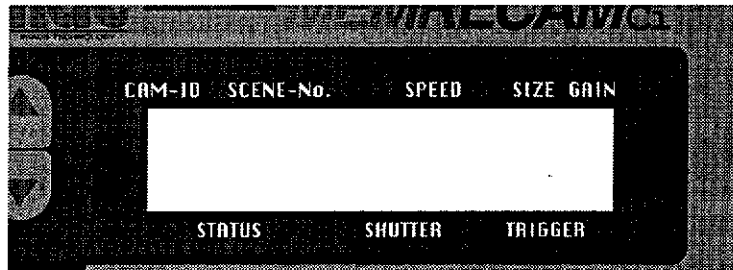
■ Operation Schematic Diagrams are shown as follows.



REAR, LCD PANEL

LCD panel of 16 characters 2 lines is located, to indicates the status of camera.

CAM-ID DRP ID number (0 - 9, A - Z)



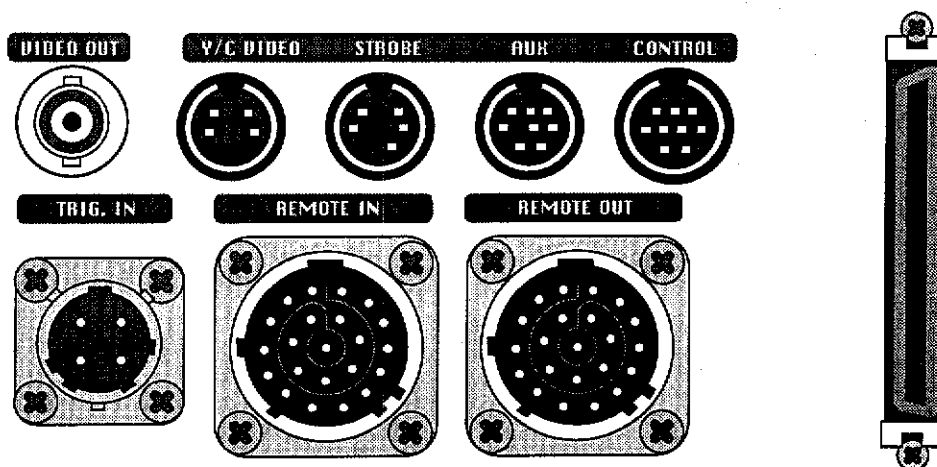
SCENE-No.	Recording scene number (0 - 65535)
SPEED	Recording rate (in pps : pictures per second)
SIZE	Frame size (1/1)
GAIN	Camera sensitivity (0, 6, or 12)
STATUS	Status of camera
SHUTTER	Shutter parameters
TRIGGER	Trigger mode (start, center, or end)

Contents of LCD panel varies depending on parameters set in the camera.

- a) In playback mode, recording parameters such as **SCENE-No.**, **SPEED**, **SIZE**, **GAIN**, **TRIGGER** and **SHUTTER** are displayed, and for **CAM-ID** , current status are displayed.
- b) In recording mode, current DRP status are shown.
- c) In the setup mode, menu is displayed. To select the item to change, use UP and DOWN key to bring the menu item on the LCD panel.

REAR, CONNECTOR PANEL

- On the rear connectore panel, 9 in/out connectors are located.

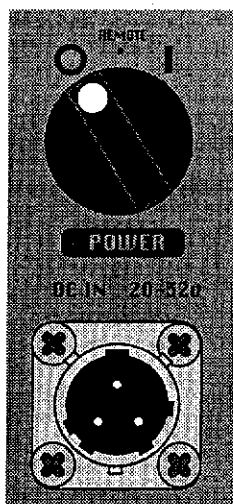


NAME	Part Number	
VIDEO OUT	(BNC)	VIDEO signal output
Y/C VIDEO		S-VIDEO signal output
STROBE	(TCS7658-01-201)	Strobe or an external device sync control signal output
AUX		Auxiliary connector for future use
CONTROL	(TCS7693-01-201)	For J-Pad or REMOTE CONTROL input (only for J-Pad combined use with REMOTE IN/OUT is allowed)
TRIG. IN	(PT02H-8-4P)	Trigger signal input
REMOTE IN	(ACT90MC35PN)	Connecting to the Synchronous Unit
REMOTE OUT	(ACT90MC35SN)	Connecting to the Synchronous Unit
DIGITAL I/O	(176972-8-68P)	SCSI port for connecting to the Data Magazine or External Jaz drive.

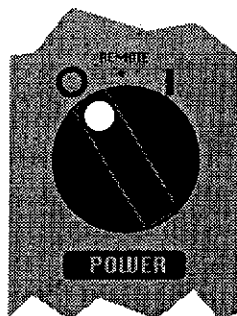
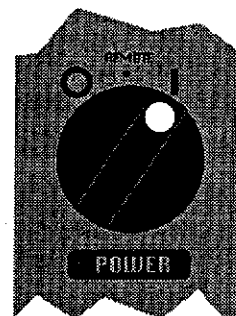
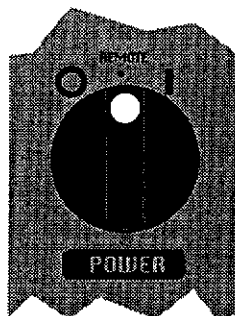
- In the connectore panel area, 3 LED lamps are located.

CONTROL LED	Indicates usage of CONTROL connector
TRIG. LED	Blinks in green when trigger signal is acceptable
REMOTE LED	Indicates usage of REMOTE connector

- POWER switch has three positions as follows :



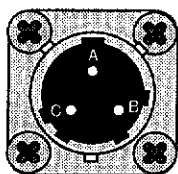
POWER OFF

Power REMOTE control
(with Synchronous Unit)

POWER ON

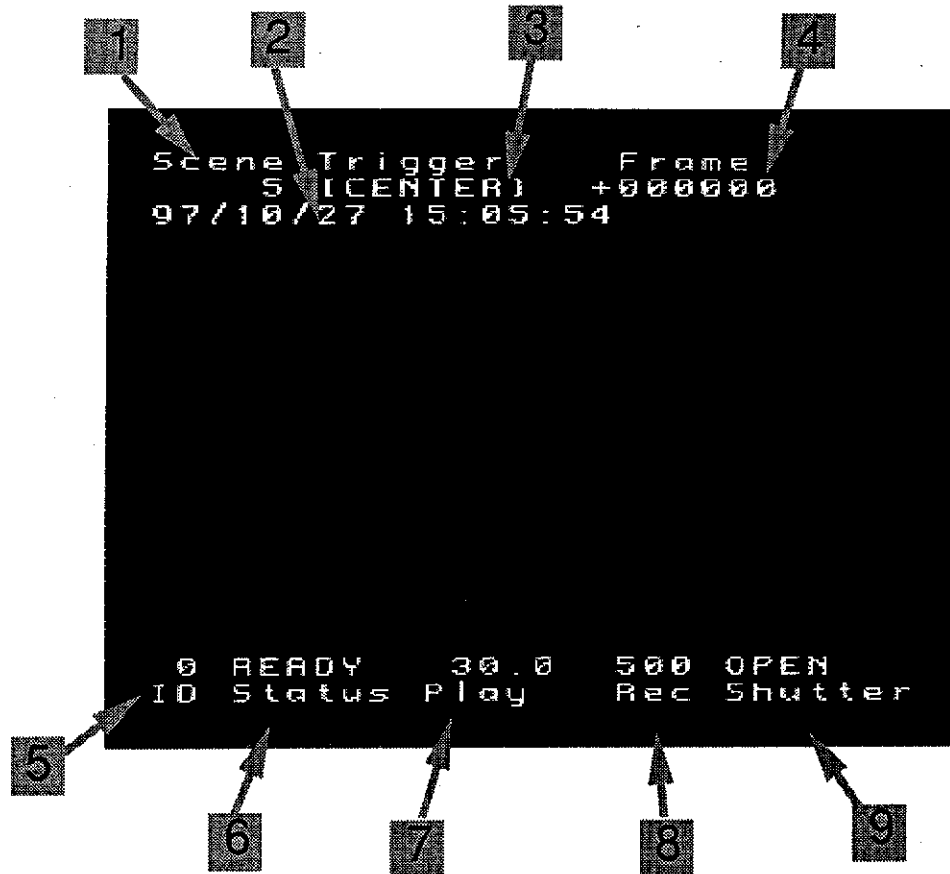
- Power input to the camera is DC 20 to 32 V.

Use AC POWER SYSTEM or Battery to provide DC power.



Pin No.	Assign	Description
A	DC IN	DC 20 - 32 V input
B	F. GND	Frame Ground
C	DC RTN	DC Ground

In the monitor (connected to VIDEO OUT) or on the viewfinder (both optional) video display from the camera is seen as following, except setup mode. Camera parameters seen in upper and lower part of the display depends on the camera mode.



- | | |
|-------------|--|
| 1 Scene | Recording scene number. Counts up by 1 at every trigger. |
| 2 Trigger | Triggering time is displayed. |
| 3 [ICENTER] | Trigger mode at the recording is displayed. |
| 4 Frame | [in playback] Current frame number is displayed.
[in ARM mode] Remaining number of frames is displayed. |
| 5 ID | ID number of the DRP is displayed. |
| 6 Status | Current status of the DRP is displayed. |
| 7 Play | [in playback] Playback speed is displayed. |
| 8 Rec | Recording rate is displayed. |
| 9 Shutter | Shutter parameters such as shutter speed are displayed. |

1-3

Camera Head Connection

1

INSTALLING CAMERA HEAD in DRP

Install CAMERA HEAD in DRP during power off.

You can use as all in one operation.

Un-install CAMERA HEAD from DRP during power off.

2

INSTALLING RX unit in DRP

Install RX unit in DRP during power off.

Un-install RX unit from DRP during power off.

3

CONNECTING TX unit

Connect TX unit to CAMERA HEAD during power off or during CAMERA CABLE disconnected , then turn and tighten screw by Hex screw driver.

Disconnect TX unit during power off.

4

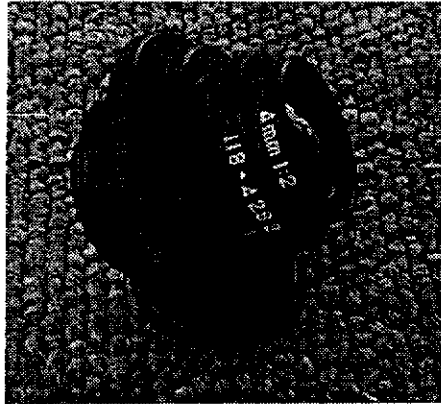
CONNECTING CAMERA CABLE

Connect CAMERA CABLE between TX and RX unit during power off.

5

INSTALLING LENS

MEMRECAMci/RX-2 has a C-mount and install Hi-G lens. Attach the C-mount thread of the lens to the mount of the camera and screwing the lens clockwise until it stops.



So that there is too long end of lens, a part of wide angle lens when uses other C mount lens the distance from lens seating plane and the end of lens must be less than 9 mm, otherwise internal optics in the camera may be damaged.



In use except attached lens with high G environment, pay attention to Hi-G resistant performance of the lens.

6

HANDLE

MEMRECAMci/RX-2 DRP is equipped with a handle to carry the camera body. The handle may be removed, if necessary, by removing two Hex socket cap screws (3/8-16UNC) using Hex driver (8mm width) .

7

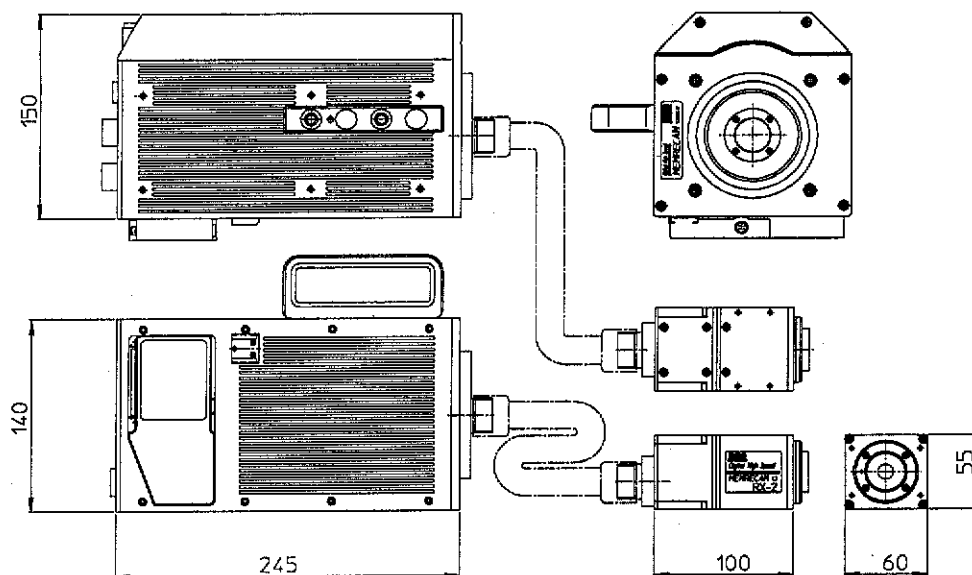
Installation



Under Hi-G environment install after consideration of strength of fixture, and by form to surround Camera Head, Separation Unit and DRP.

1 - 4

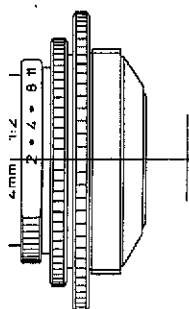
OUTLINE DRAWING



: mm

MEMRECAM cI/RX2

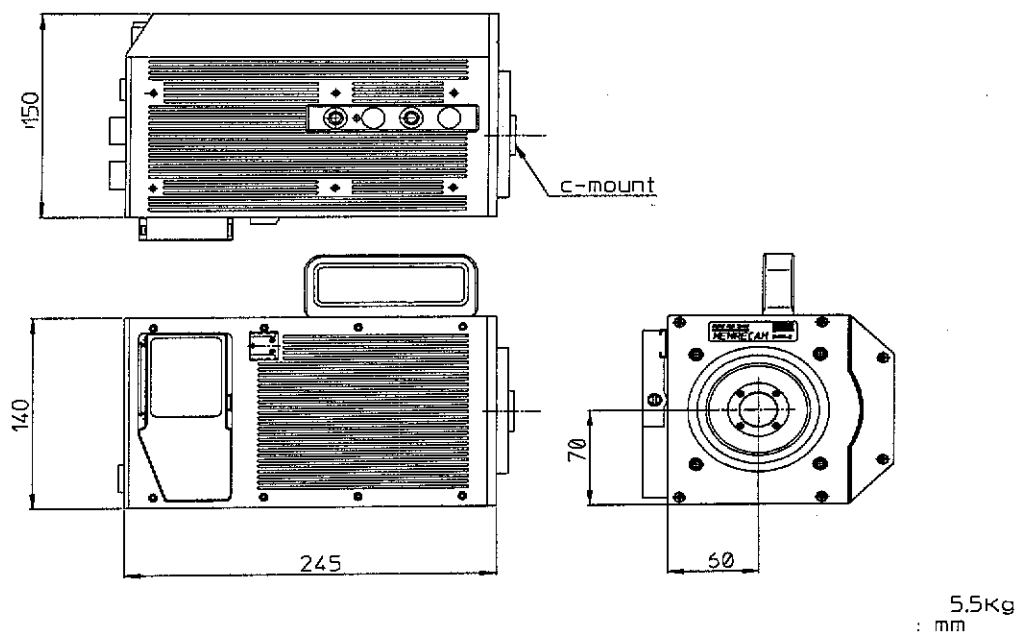
Fig Outline drawing of separated operation



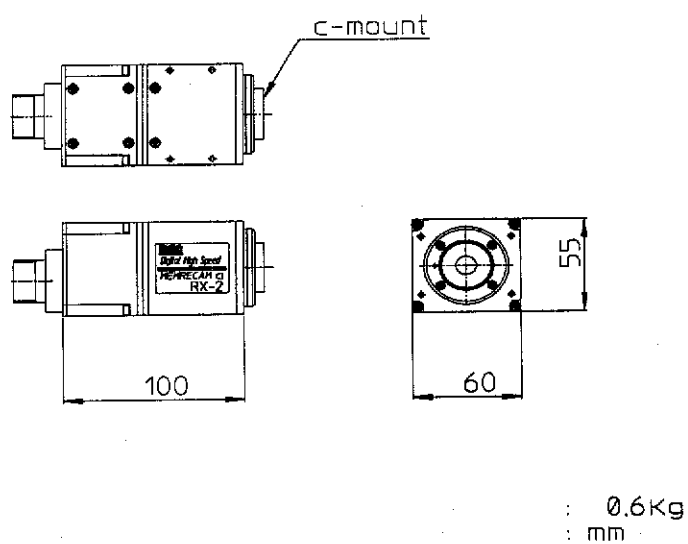
MEMRECAM RX2

f=4mm, F/2.0

Fig Hi-G Lens outline drawing



Outline drawing of built-in operation



Outline drawing of Camera Head with Separation Unit



Connect DC cable to POWER connector (DC IN 20-32V) when use AC POWER SYSTEM.

(With high G environment use the POWER SYSTEM which considered)



Caution

Because AC POWER SYSTEM includes a point occurring high voltage. Do not open cover

Connect with outside earth connecting by all means.

When it wasn't contacted, and it was used, there is a case to receive electricity shock from metal part of this unit.

2

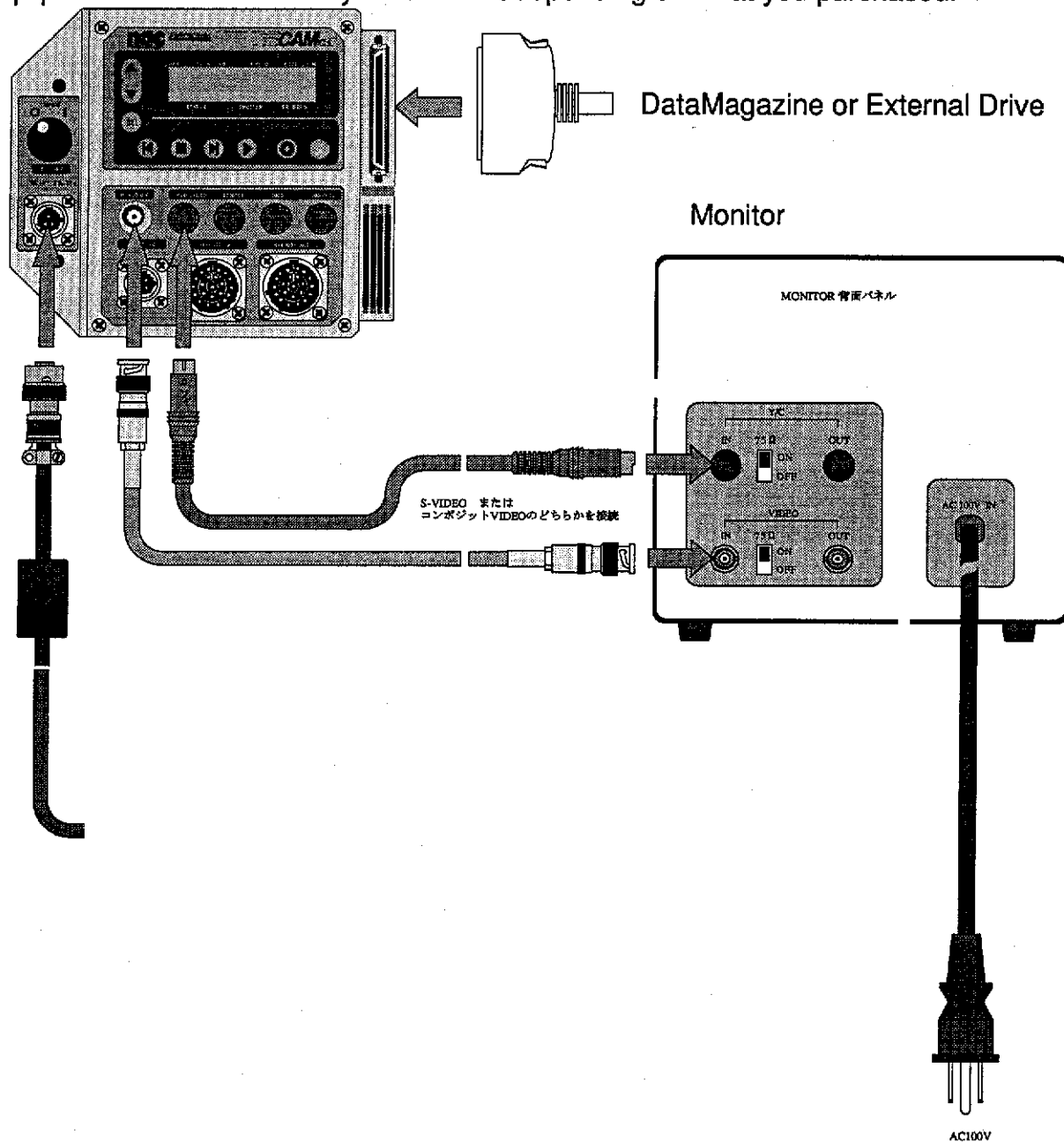
TYPICAL OPERATION

This section explains the simple typical operation pass from connecting cables , recording until playback, for the user who touches the system at the first time.

TYPICAL CABLE CONNECTION

Before applying the power to the camera, make sure that the POWER switch is set to OFF position, and connect cables as shown in following example.

Equipment shown below may be different depending on what you purchased.



1

CONNECTING MEMRECAM and MONITOR

Connect MEMRECAM and Monitor with Y/C Video cable or BNC Cable attached. If you connect nothing on video output connector of monitor, you should set 75ohm switch on the monitor to on. Then put power cable of the monitor to AC.

2

CONNECTING MEMRECAM to DataMagazine or External Drive

Connect DataMagazine and MEMRECAM with DataMagazine Cable.

For DataCartridge use attached ci to SCSI cable for external drive to connect MEMRECAM.

Under high-G environment, connect DataMagazine or External Drive after applied high-G shock.

3

CONNECTING DC POWER



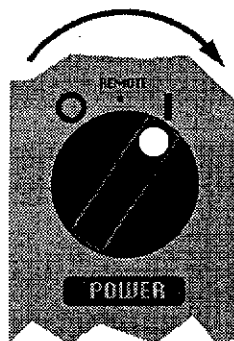
Provide a suitable DC power for the DRP. Always consult your nearest distributor for make sure a prepared power is good for the MEMRECAM

2-2

TYPICAL PROCEDURE

1 POWER ON

Turn the Monitor power switch on, then turn the MEMECAM POWER switch on.



POWER ON

2

START UP SEQUENCE

When the MEMECAMci/RX-2 is powered on, the system get into start up sequence which perform self diagnostics with beep sound. The start up sequence finishes within about 30 seconds, and operation to the system will be enabled.

If the MEMRECAM is used at the first time, the recording parameter have set at the factory defaults, as follows :

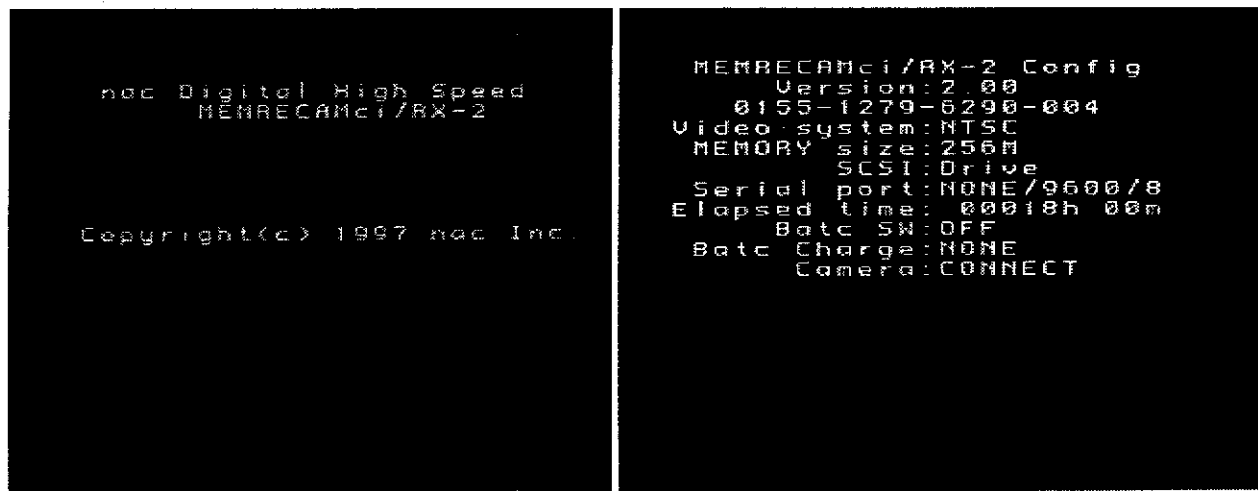
Recording Rate :	500 pps
Triger mode :	CENTER
Shutter :	OPEN

NOTE :

A new recording parameter will be stored at power OFF.
To change parameters, refer to Section 3.

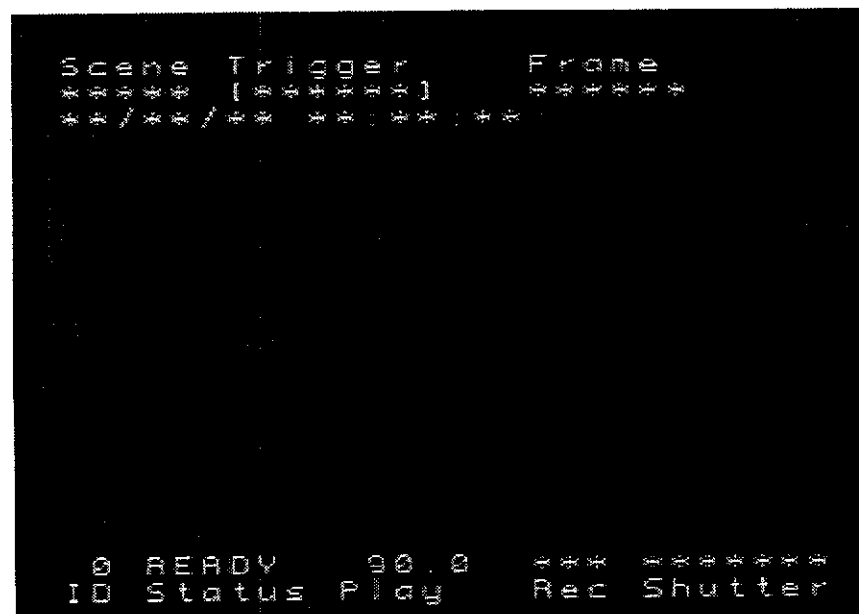
■ **Start Up Display #1 and #2 on a Video Monitor:**

At first title of MEMRECAMci/RX-2 is displayed then System Version number, DRP built-in software serial number and actual system setting and so on are displayed.



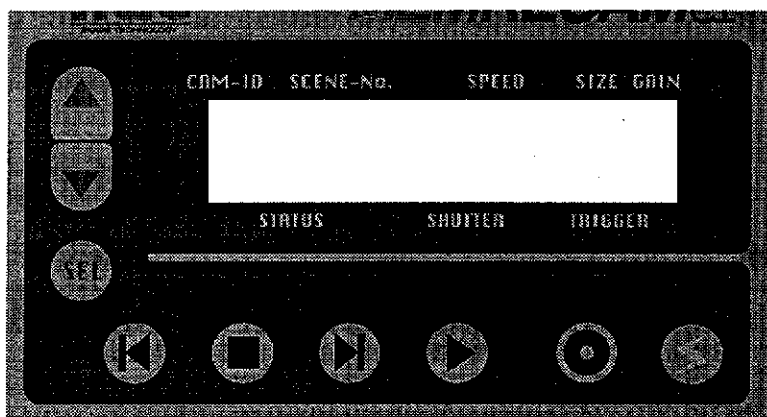
■ Start Up Display

A test recorded (during start up sequence if camera head was connected) picture is shown at still mode is displayed.




FIRST RECORDING

When the start up sequence is completed, the camera get into Still mode automatically. A picture displaying at this moment is of test recorded picture during the start up sequence. If memory backup option is installed and enabled backuped picture is displayed. Lets START RECORDING, by operating keys on the operation panel.



■ Set the camera into VIEW mode.


First, press the **VIEW/ARM** key . This makes the camera generate acknowledge sound, and change into VIEW mode. The **VIEW** lamp comes on.

In the VIEW mode, live image taken by the image sensor is displayed on the monitor. Perform image adjustment such as lens iris, focusing, and lighting to an object.



In the daily use, further adjustments such as Gamma, White Balance, and setting of Recording Rate and Trigger mode will be needed according to experiment, however, at this stage those adjustments are left default for simple recording.

■ Set the camera into ARM mode.


Press the **VIEW/ARM** key  again and release. This makes the camera generate acknowledge sound, and change into ARM mode. At the same time, **VIEW** lamp goes off and **ARM** lamp comes on.

As the ARM mode overwrites memory with newly coming image data and previous data will be lost.

In the ARM mode, live image is viewed on the monitor, and recording can be started any time. In this ARM mode, image is being written into the memory and updated repeatedly, and waiting for a trigger signal input.

The frame counter value indicates remaining remaining number of frames until the end of recording.


■ Complete of recording upon input of trigger signal.

Press the **TRIGGER** key , and release. With a short beep sound, the frame counter in the monitor start counting, and recording stops after 2.2 seconds (500pps, 250MB) .

4 PLAYBACK

When the recording is completed, the triggered frame is displayed on the monitor in still mode. In this simple recording, the CENTER trigger is used so the frame and time shown is just the center of entire recording duration.




■ Starts playback, immediately after recording.

Press the PLAY key , and release. Again, a short beep sound, and plays recorded picture up to the last frame. At the end, last frame is displayed in still mode.

5 ABOUT PLAYBACK MODE

Various playback is done by operation keys in the rear operation panel. Refer to Section 1-2, 4 for functions on each operation key.

■ Loop playback

Press the PLAY key , again during playback to get into loop playback. The loop lamp  comes on to indicate that the playback is in loop mode. When STOP key  is pressed, loop playback is stopped and get into STILL mode.

■ Jumping to the triggered frame

In STILL mode, pressing of **TRIGGER** key  jumps the display frame to the triggered frame.

■ Jumping to the first frame





In STILL mode, while pressing of **TRIGGER** key  and pressing REV STEP key  jumps the display frame to the first frame.

■ Jumping to the last frame



In STILL mode, while pressing of **TRIGGER** key  and pressing FWD STEP key  jumps the display frame to the last frame.

■ Setting a range for loop playback

A range for loop playback can be set.

Bring the first frame of a range on the monitor, and press STOP key  and REV STEP key  at the same time. Then, bring the last frame of a range on the monitor, and press STOP key  and FWD STEP key  at the same time. On the monitor, "FRAME" item is changed to "[FRAME]" to indicate that the playback range has set ("FRAME" character is enclosed with []).

■ Restore the range

In STILL mode, press the REV STEP key  and FWD STEP key  at the same time to remove the display range.

CAUTION



Upon power off, image data in the DRP will be lost

If you wish to save the existing data, save it in a data cartridge before power off.

(During memory backup option is enabled existing data was saved.)

Power off can be attempted any mode except during DataMagazine or Data Cartridge access. To turn power off power, set the POWER switch to off position, and is automatically removed after current parameter of camera and DRP are stored.

3

CAMERA SETUP

This section explains in details the parameter setting
for recording and playback

3-1

Separation and connection of Camera Head

Attention for separation and connection of camera head, camera separation unit and camera cable.

MEMRECAM ci/RX-2 has a capability to use camera head built-in and separate operation. There are the function for separation and connection of camera head, camera separation unit and camera cable on the DRP front panel.

Confirm POWER switch on DRP is of during connect or disconnect operation.

1

BUILT-in OPERATION

It is necessary to do the procedure shown below for built-in operation.

- 1 Remove RX unit from DRP if it was installed.
- 2 Install camera head in DRP.

2

SEPARATE OPERATION

It is necessary to do the procedure shown below for separate operation.

- 1 Remove camera head from DRP if it was installed.
- 2 Install RX unit in DRP and connect TX unit to camera head and connect camera cable between RX unit and TX unit.

3-2

RECORDING SETUP MODE


In recording setup mode, recording parameters will be set. Setting is performed in VIEW mode, while viewing set parameters on the monitor.

Change of recording rate sets up FRAME RATE parameter with general setup mode before entering recording setup mode (Explain it by 3-3)
And even in general setup mode you can set up a part of recording parameter and a part of common parameter.

In the upper part of the monitor, setting parameters and current mode are shown.

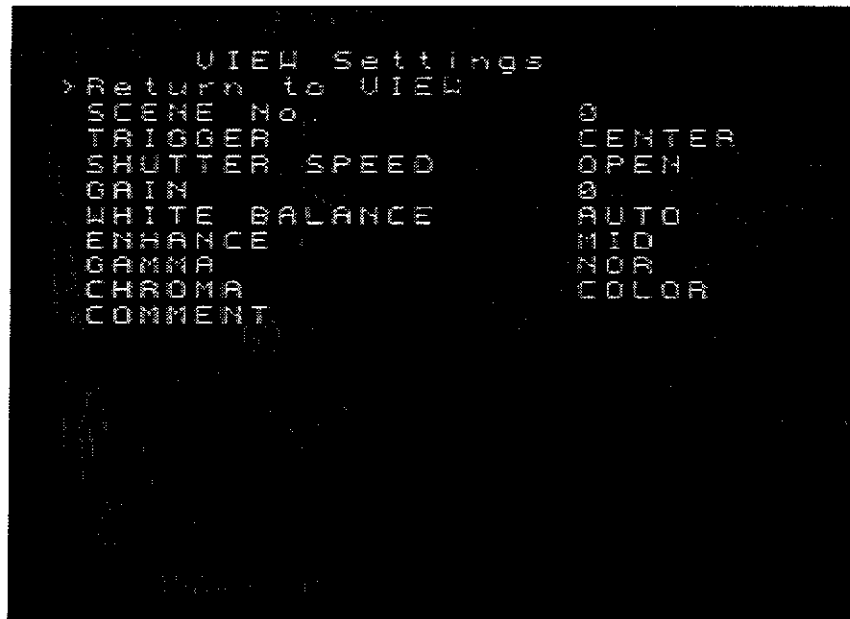
1

STARTS RECORDING SETUP MODE




From the STILL mode, pressing of the **VIEW/ARM** key  turns the camera into VIEW mode. In this mode, live image is seen on the monitor.



Then, pressing of SEL key  turns the camera into recording setup mode. On the monitor




screen, setting items and current parameters are shown.

To select a parameter to be changed, use UP/DOWN keys  , and change of its contents is done in sub menu which are shown by SEL key .

Selection among sub menu item is done by the same manner.

Exiting from the recording setup mode is done by either :

Press STOP key , or

Select (bring the block cursor over) "Return to VIEW" item in the menu, and press SEL key .

2 SCENE No.

SCENE number is increase by 1 at every completion of recording. At this stage set an initial number.

Number can change by UP and DOWN key



SCENE No.

>0

3 TRIGGER

Select a trigger mode among ; START, CENTER, or END. Details will be explained in Section 4-1.

TRIGGER

START	A trigger point(frame) will be at the start of memory.
>CENTER	A trigger point(frame) will be at the center of memory.
END	A trigger point(frame) will be at the end of memory.

Besides it indicates CUSTOM, it should be changed only by REMOTE CONTROL SOFTWARE.

4 SHUTTER SPEED

Select the shutter speed of the camera. Units are seconds.

SHUTTER SPEED

>OPEN	Shutter open (factory default settings)
1/1K	1/1000sec
1/2K	1/2000sec
1/4K	1/4000sec
1/10K	1/10000sec
1/20K	1/20000sec

5 GAIN

Set a gain of the camera. Units are dB

GAIN

>0	0dB (factory default settings)
6	+6dB, Increase camera sensitivity by 1 stop of lens iris relative to GAIN 0
12	+12dB, Increase camera sensitivity by 2 stop of lens iris relative to GAIN 0

6 WHITE BALANCE

Perform the white balance adjustment for color recording. Explanation on white balance is given in Section 4-2

WHITE BALANCE

>AUTO	Auto tracking mode (factory default settings)
3100	3100K fixed
5000	5000K fixed
9000	9000K fixed
REG	Set white balance to previous saved data in register
SET REG	Save current white balance data to register. Select SET REG from AUTO to save the data.

7 ENHANCE

Carry out picture outline intensity setting

ENHANCE

OFF	
LOW	
>MID	(factory default settings)
HIGH	

8 GAMMA

Select the gamma correction level for a better view

```
GAMMA
OFF
LOW
>HOF (factory default settings)
```

9 CHROMA

Carry out color/monochrome display setting

```
GCHROMA
>COLOR Color, (factory default settings)
MONO Black and white
```

10 COMMENT

The recording scene's comment can be set using up to a maximum of 30 multiple symbols and alphabetical letters. A comment that has been set once is used in recording until it is changed. (The comment of a recorded scene cannot be changed.) By turning the comment display on, it is shown in the designated position during play back. (See DISPLAY STYLE heading under OTHER Settings)

Comment input operation :

1. Move the cursor to the input line and press the SEL key.

The table of characters that can be input appears as in the display below.

2. Select the character you want to input from the table using the UP and DOWN keys and press SEL key

One character can be input at a time.

Repeat with other characters to input a text string (comment) .

3. Press the STOP button when you have finished inputting the text string.

The display returns to the original menu.

```

COMMENT
  Return
>Input
  Delete
  [TEST-1          ]
  [                ]

  ABCDEFGHIJKLMNOPQRSTUVWXYZ
  abcdefghijklmnopqrstuvwxyz
  0123456789 !"#$%&'()*+,-./
  :;<=>?@[\\]_`{|}~

```

Deleting the Comment :

1. Move the cursor to the line of the text string you want to delete (the [TETS-1] line in the above example) , move the position of the characters to the right with the PLAY button, and press the SEL button.
2. Then move the cursor to the Delete item, and press the SEL key.
Select Return to return to the previous menu.

11 Saving the Settings

The setting in recording setup mode or general setup mode are saved in the parameter memory when the power switch is turned off or at completion of recording. Any previously saved setting details remain in the memory.

Only ALERT DISPLAY turn on next power up automatically.


3-3

GENERAL SETUP MODE







In the general setup mode, various parameter will be set. Also, connection parameters for external equipment including the data cartridge, in addition to recording rate are set.


1

STARTS GENERAL SETUP MODE

From the STILL mode, pressing of SEL key  start the TOP MENU for general setup mode. On the monitor, setting items and current parameters are displayed.



To select parameter to be changed, use UP/DOWN keys   and press SEL key  to display its contents. Change of contents is done by UP/DOWN keys   and is fixed by pressing of the SEL key . Selection among sub menu item is done by the same manner.

Exiting from the general setup mode is done by either selecting "Return to Operation" or press STOP key .

Generally, a parameter and item indicated by a menu sorts function with the foreground color.

- RED Recording parameter. It will be used next picture recording.
- BLUE Playback parameter. It is using current playback. If the parameters are for picture quality it will use next recording.
- YELLOW Parameters are not related to picture recording and playback.
Also display of operation error is indicated by yellow characters.
- WHITE They are submenu and menu control items except parameter.

2 TRIGGER

Select the Trigger mode which set the trigger frame among three points. Refer to 3-2 Recording setup

TRIGGER

- START Set the trigger point at the start of memory
- >CENTER Set the trigger point at the center of memory
- END Set the trigger point at the end of memory

3 FRAME RATE

Select the recording Frame Rate among three alternatives.

Unit is pps : Picture Per Second

FRAME RATE

- 100
- 250
- >500

4 COMMNET

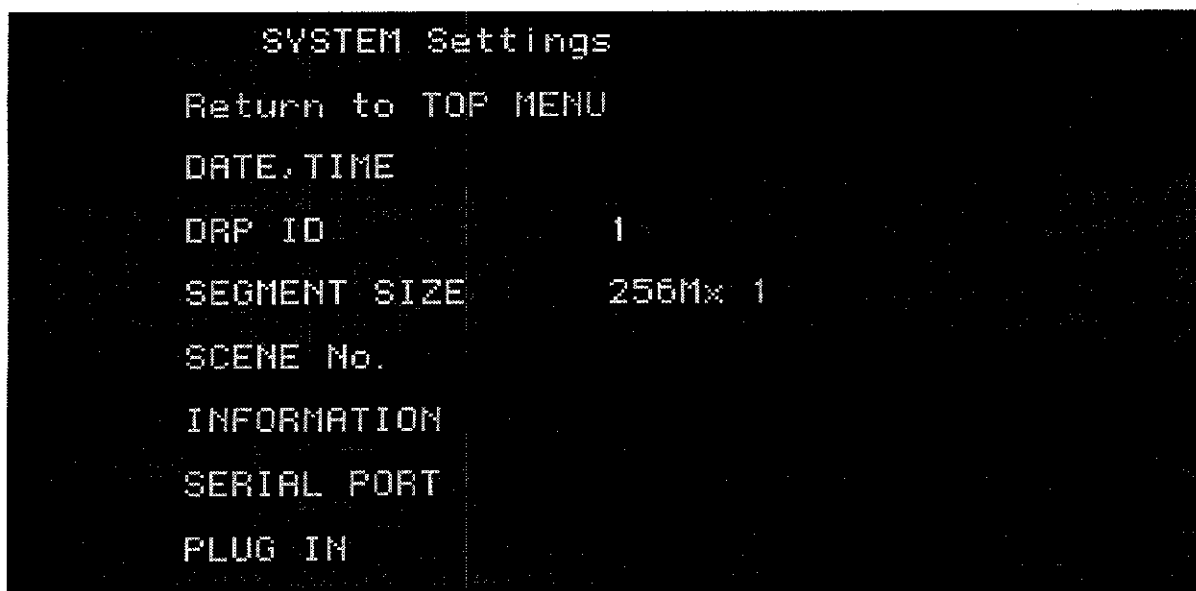
Setup for recording. Refer Recording submenu of 3-2 Recording setup mode.

5 GAIN, WHITE BALANCE, ENHANCE, GAMMA, CHROMA

They are commonness setups for recording and playback. Refer Recording submenu of 3-2 Recording setup mode. There isn't SET REG item in WHITE BALANCE in general setup menu.

6 SYSTEM Settings

Setting of the date, time and some system parameters. And confirm camera serial number and DRP input voltage on INFORMATION.



- DATE, TIME Set year, month, date, hour, and minutes. They will be recorded with image during recording as Trigger time.
- DRP ID Set ID number of MEMRECAM (DRP)
ID is used to identify among cameras when multi-camera operation
- SEGMENT SIZE Set the using size of image recording memory when recording.
- SCENE No. Set the scene number.

■ INFORMATION (Example of Factory default settings shown below)

```
ELAPSED TIME      : 000000h 00m
VERSION           : 2.00
MEMORY SIZE       : 268435456
DC IN             : 23.9
CAMERA S/N        : 1001
VIDEO OUT         : NTSC
BATC SW           : OFF
BATC CHARGE       : NONE
CAMERA            : CONNECT
```

Press SEL key  to return System Settings.

Indicated items shown below.

ELAPSED TIME	Elapsed time (Unit/minutes)
VERSION	System version
MEMORY SIZE	Image memory size (Unit/byte)
DC IN	DC input voltage
CAMERA S/N	Serial number of connected camera head
VIDEO OUT	Out put video system
BATC SW	Status of backup battery switch
BATC CHARGE	Condition of backup battery
CAMERA	indication of camera head is connected or not

■ SERIAL PORT

Set system serial port (Factory settings are shown below)

SERIAL PORT	
» PROTOCOL	NONE
BAUD RATE	9600
DATA BIT	8
STOP BIT	1
PARITY BIT	NONE

• PROTOCOL

CONTROL

Enable remote control via control connector on the panel.
Can not use J-Pad

REMOTE

Enable multi camera control with Synchronization Unit via Remote connector.

NONE

Disable remote control (Factory default settings)

• BAUD RATE

9600

(Factory default settings)

38400

Standard setting for remote control and multi camera connection.

• DATA BIT

7

8

Standard setting for remote control and multi camera connection.
(Factory default settings)

• STOP BIT

1

Standard setting for remote control and multi camera connection.
(Factory default settings)

2

• PARITY BIT

NONE

Standard setting for remote control and multi camera connection.
(Factory default settings)

EVEN

ODD

■ PLUG IN

Set added function (option) on the system software.

AutoPilot is a function to set the procedure previously and operate automatically. It carries out automatic sequence like MEMRECAM go into ARM mode and after getting trigger and finished recording then save the data to DataCartridge.

OTHER Settings

Another remaining parameter can be set, however in normal situation you may use default settings shown below.

```
OTHER Settings
Return to TOP MENU
FIELD SMOOTHING      ON
FIELD SELECT         1st
DISPLAY STYLE
VIDEOMARK DISPLAY    ON
FRAME DISPLAY        FRAME
ALERT DISPLAY        ON
DM DISP INTERVAL     0030
DM INDEX DISP        TRIG TIME
```

■ FIELD SMOOTHING

Reducing corrugations due to scanning line.

```
FIELD SMOOTHING
OFF
>ON
```

■ FIELD SELECT

Select image refresh TV field in 30 pps playback.

```
FIELD SELECT
>1st
2nd
```

■ DISPLAY STYLE

Select character to be displayed in the monitor. Display position on each items can be changed by CUSTOM SET item

DISPLAY STYLE	
Return to OTHER	
DISPLAY	ON Setup display on/off for all items
CUSTOM SET	Custermize by each item.
FACTORY SET	Rerturn to factory default settings

Display items which can be setup by CUSTOM SET during recording and playback shown below.

Scene, Trigger Date, Trigger Time, Trigger Pos, Frame Count,
Status, DRP ID, Play Rate, Rec Rate, Comment, Shutter
(Comment is not displayed on factory default settings)

At each item menu shown below isdisplayed and can be setup.

DISPLAY	Setup whether display item or not
ON	Display item
w/o PLAY	Do not display during constant speed playback
OFF	Do not display
X POSITION	Setup display position by character number from left side of monitor screen.
Y POSITION	Setup display position by row from top of monitor screen. (If the character position overlap with another or deviates from display area, can not display correctly.)
DATA POS	Set position of data.
NO TITLE	Display no title
UPPER	Display on the title
LOWER	Display under the title
RIGHT	Display right side of title

■ VIDEOMARK DISPLAY

Setup VIDEO MARK DISPLAY

VIDEOMARK DISPLAY	
OFF	Do not display (factory default settings)

Display information as shown below

Frame number of image currntly displayed. Scene number DRP ID
Recording speed. Start mark. End mark.

■ FRAME DISPLAY

Set frame counter display units.

FRAME DISPLAY

>FRAME	Display frame number as trigger frame is 0
TIME	Display elapsed time from trigger input
%	Display current playback frame location in % of memory size

■ ALERT DISPLAY

Set on/off of display of input voltage and battery switch position.

ALERT DISPLAY

OFF
>ON

■ DM DISP INTERVAL

Set display refresh interval during transferring the data to DataMagazine/DataCartridge

DM DISP INTERVAL

>0030 Refresh the display every 30 frame

■ DM INDEX DISP

Select the index item of DataMagazine/DataCartridge

DM INDEX DISP

SAVE TIME	Display data saved date.
>TRIG. TIME	Display trigger input time of scene
FRAME RANGE	Display number of frames in the stored scene

■ STROBE

Set the strobe control function

STROBE

>OFF	No strobe control
ON	On the strobe automatically during VIEW and ARM mode

8 MEMORY SEGMENT

Make partition on image memory to part memory area for recording and playback.

Display current partition number and display designated image by pointed by the cursor.

Display memory segment number, scene number and recorded date. and

```
          MEMORY SEGMENT
> 0:00000007/00/2518:55:17
  1:*****/**/****:***
```

**** indicates memory segment which has not recorded.

9 DRIVE SELECT

Select SCSI ID for external drive.

For the DataMagazine set 0 for SCSI ID. For external Jaz drive set 0 normally. (refer operation manual of external Jaz drive)

10 Saving the Setting

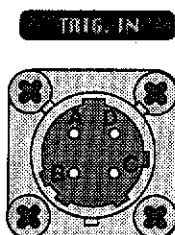
The setting details in recording setup mode or general setup mode are saved in the memory when the power switch is turned off. They are not saved if the power is turned off in any way other than by the power switch. Any previously saved setting details remain in the memory.

Only ALERT DISPLAY turn on next power up automatically.

3-4

EXTERNAL TRIGGER INPUT

When a trigger signal is applied externally, use TRIG. IN connector.



Connector

Receptacle : PT02H-8-4P

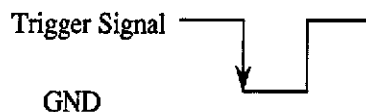
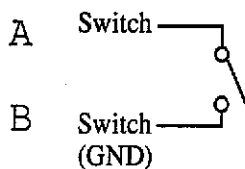
Plug : PT06E-8-4S (SR)

■ For an input of a MAKE contact or TTL signal

Use pins A and B

When an instant makes contact or TTL signal changed from HI to LO level, Trigger become active

Pin Number



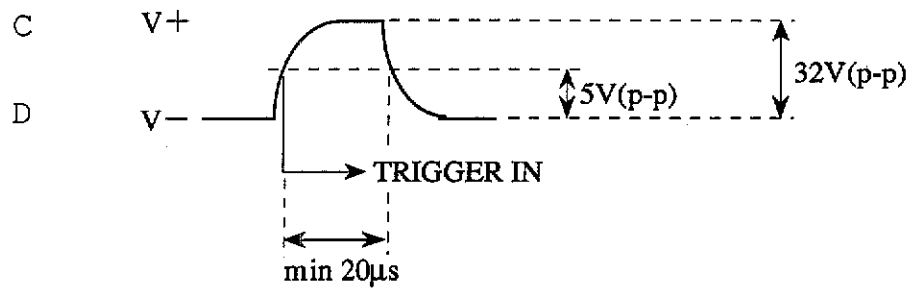
On when Low
(10mA, 1.5V or less)

■ For an input of photo-isolate

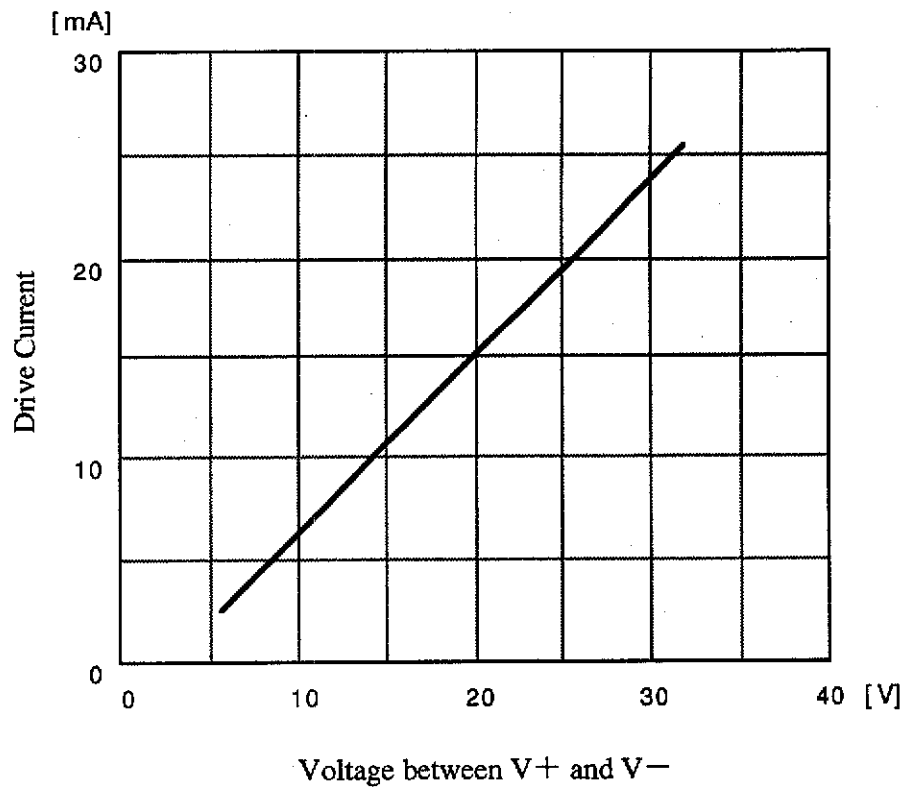
Use pins C and D.

Input impedance across pins C and D is about 1500 ohms. Trigger become active when voltage across pins C and D is 5 to 32 V.

Pin Number



Voltage vs Current when pins C and D are used




3-5

DataMagazine/Cartridge Access

CAUTION :



The Data magazine is a mass storage hard disk,
do not give vibrations and shock during accessing.

Connect Data Magazine/DataCartridge by exclusive and selecting Data Magazine item in
the top menu and press SEL key  following display is obtained

CAUTION : It can not be loaded MEMRECAM (ci, c2s, c3) image except MEMRECAMci/
RX-2 image.

Display DataMagazine in Menu but it supports DataCartridge

```
Return
APPEND  -5~19/2467
DELETE  ALL
DELETE  LAST
RX2  000000097/09/2518:55:17
>RX2  000000097/09/2518:55:17
RX2  000000097/09/2518:55:17
```

1

SAVING IMAGE TO DATA CARTRIDGE



If play back range has set, only the data in range is saved.

Playback range can be confirmed by performing loop playback

Select APPEND by using UP/DOWN keys  , and press SEL key , so that image data in the MEMRECAM is saved into the DataMagazine/Data Cartridge.

2

LOADING IMAGE TO MEMRECAM

By loading image data into the DRP from the DataMagazine/Data Cartridge, it can be replayed using playback function of the MEMRECAM






When the scene is loaded from DataMagazine/Data

Cartridge to the DRP, existing data in the DRP will be

erased. If existing data in the DRP is needed, save it in the

DataMagazine/Data Cartridge in advance.

Select a scene line from a list of image data on the monitor by using UP/DOWN keys  , and the first frame of the scene is brought on the monitor. If you agree, press SEL key , so that scene in the DataMagazine/Data Cartridge is loaded into the memory of the DRP. Loaded data can be played back by playback function as recorded image.


DELETING SCENE IN DataMagazine/Data Cartridge



Delete process of the scene is the following 2 ways. Cannot select and erase middle scene.

Once the deleting is executed, it can not be restored. Please be sure whether it can be deleted or not.


■ DELETING ALL SCENES

Select DELETE ALL item in the menu, and press SEL key , and following message is displayed.

```
Are you sure ?  
>NO          Cancel deleting.  
YES          Execute deleting all.
```

Select "YES" or "NO" by UP/DOWN key and press SEL key to execute.

■ DELETING LAST SCENE

Select DELETE LAST item in the menu, and press SEL key , and following message is displayed.

```
Are you sure ?  
NO          Cancel deleting.  
>YES        Execute deleting the last.
```

Select "YES" or "NO" by UP/DOWN key and press SEL key to execute.

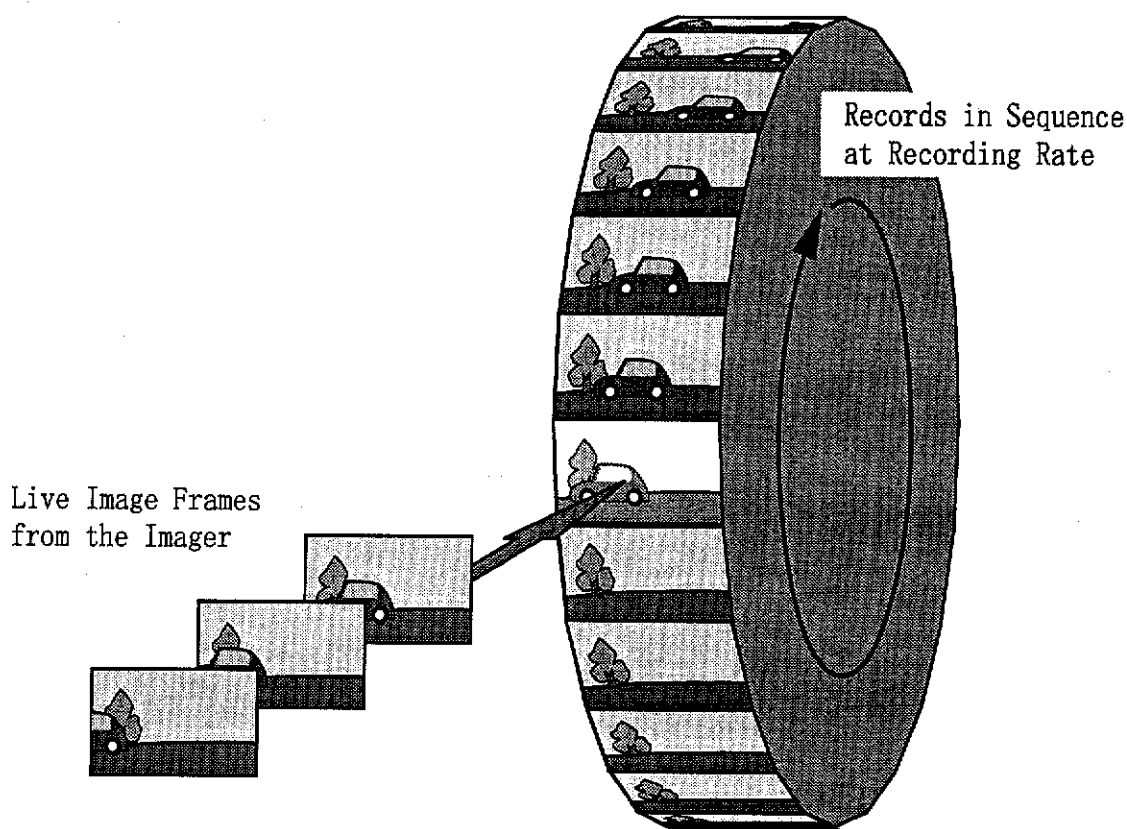
4

TECHNICAL DESCRIPTION

Principle operations of the MEMRECAM ci/RX-2 such as recording technique, color balance methods and video timing mark will be explained.

RECORDING INTO SOLID-STATE MEMORY

The recording part of the MEMRECAMci/RX-2 is of solid-state memory and is configured as a ring buffer. The ring buffer, in an idea, illustrated as below, the first recording frame and the last one is connected to form loop memory. The ring buffer is well suited hardware for high speed camera like the MEMRECAMci/RX-2.

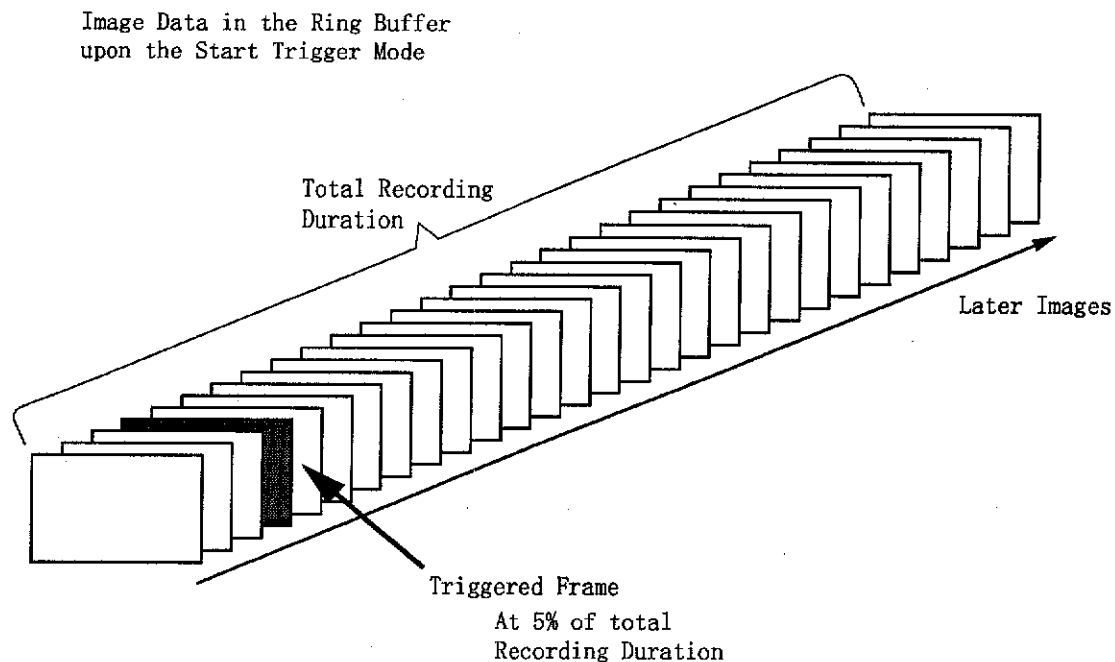


Writing image data into the ring buffer is started when the camera is in ARM mode. During ARM mode, images from the image sensor at speed you selected are coming into the input port of the ring memory and are recorded sequentially. The ARM mode retains this sequential recording so that images in the ring buffer are always updated until the trigger is coming,

The MEMRECAMci/RX-2 has three triggering mode ; START, CENTER, and END, and are effective only during ARM mode. As in ARM mode, recording images are continuing, trigger signal input determines when and how the recording is stopped.

■ Start Triggered Recording

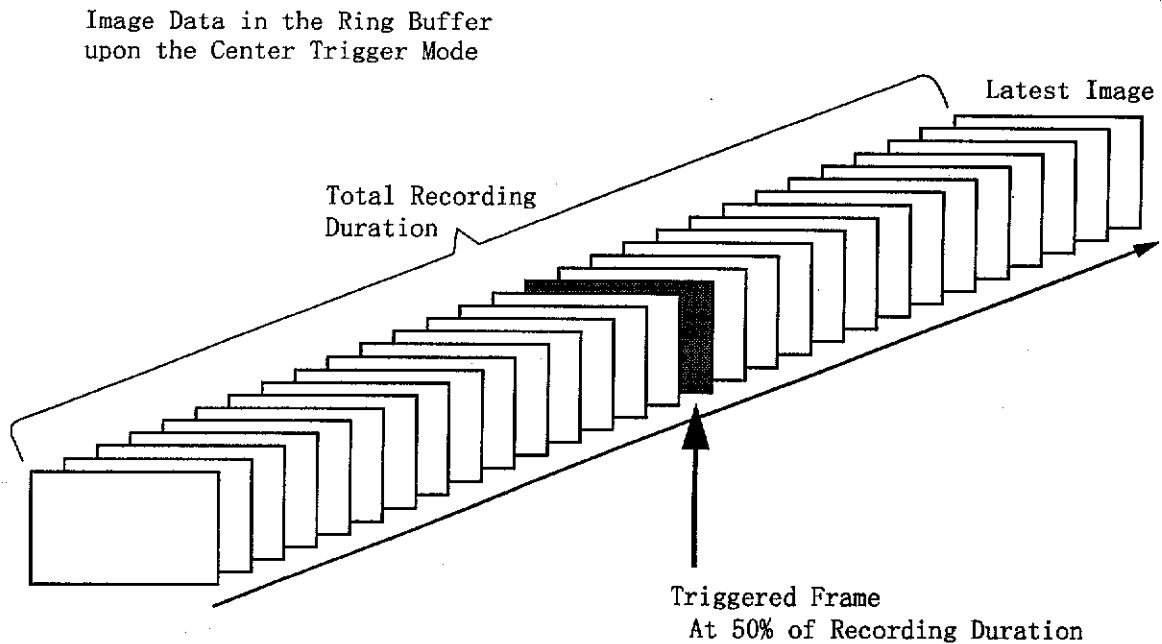
Place the triggered time stamp at the start of entire recording duration (capacity) . Assuming that writing image data into the ring buffer become effective (not over-written) upon trigger and is stopped at the end of memory. In the ring buffer, image data set from trigger instant to the end of memory is stored.



We think that images around a time of triggering are valueable, the MEMRECAMci holds 5% offset, befor the trigger in START trigger mode, and after the trigger in END trigger, where the images are recorded.

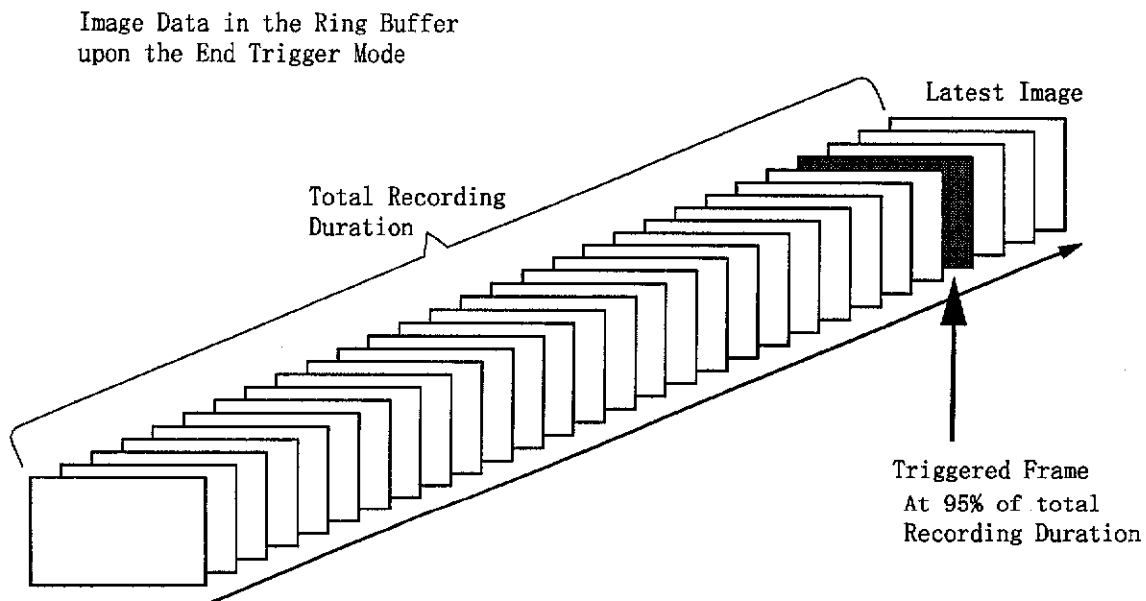
■ Center triggered recording

Place the triggered time stamp at the center of entire recording duration (capacity) .
Assuming that writing image data into the ring buffer is stopped when ring is half rotated.
In the ring buffer, image data set half before and half after the trigger are stored.



■ End triggered recording

Place the triggered time stamp at the end of entire recording duration (capacity) .
Assuming that writing image data into the ring buffer is stopped upon input of the trigger.
In the ring buffer, image data set up to trigger instant is stored.



1 WHITE BALANCE

The WHITE BALANCE menu (in both recording setup and general setup mode) is to adjust white balance in the following 6 variations (selectable) .

■ AUTO TRACKING

In this mode, white balance is maintained appropriately by determining color temperature relatively from video signal, in the range of 3000 K (Kelvin) and 9000 K. However, if a hue over the entire frame area is uniform (almost red color only for example) , white balance falls poor result. To maintain better balance tracking, larger white area should be presented in the field of view.

■ 3100

Select this mode, if color temperature of lighting is 3100 K, such as tungsten lamp.

■ 5000

Select this mode, if color temperature of lighting is 5000 K. Daylight, strobe light and Metal-Halide lamp illumination will match this mode.

■ 9000

Select this mode, if color temperature of lighting is 9000 K,

■ REG

Select this mode, if white balance data is used which has set in the SET REG function.

■ SET REG

Select this mode, if better white balance is needed, or when decision of color temperature may suffer during recording.

When the mode is selected, internally, the auto tracking function become active. Then, visually confirm the white balance on the monitor and if you satisfied, press SEL key, and the white balance data at the moment is set in the register. Lastely, select REG mode to use this registered white balance data.

PRINCIPLE OF AUTO WHITE BALANCE (AWB)

An auto tracking function of the AWB in the MEMRECAMci employs a relative color detection technique while video signal from the image sensor is being image processing. With this technique, it is necessary to extract no-color data from video signal, to obtain accurate white balance. Therefore, an assumption that "when whole picture area is integrated (mix various colors) , it become no-color" is made, and error between no-color and detected color is being corrected to obtain white balance.

Although, it may introduce poor result if a specific color occupies large area in the image, the MEMRECAMci overcome this problem by improving control algorithm to obtain white balance information sufficient enough in practical use.

5

SPECIFICATIONS OF MEMRECAMci/RX-2

1 IMAGER PART

- 1) Imager 1/3 inch, single chip 270thousand pixel color
- 2) Recording speed 100、 250、 500 pps
- 3) Sensing Areas

Pixels (HxV)	Area Size (HxV)
510 (H) × 484 (V)	4.896 (H) × 3.63 (V) mm

Note : Number of pixels in Playback are 508 (H) X480 (V).

- 4) Sensitivity 10,000lx (at F/4, gain 0dB, 500pps)
- 5) Signal to Noise Ratio 45dB and more (at Ych, 500pps, γ : OFF, Enhance : OFF)
- 6) Shutter
 - Electronic OPEN, 1/1k, 1/2k, 1/4k, 1/10k, 1/20k
- 7) Lens Mount "C"Mount standard (Exclusive Hi-G lens)

2 RECORDER PART

- 1) Recording Method Solid-State Memory

- 2) Recording Time

Recording time (in second) depends on recording rate as follows :

Recording Speed (pps)	Recording Time (seconds)
100	21.7
250	8.6
500	4.3

(256MByte)

- 3) Video Monitoring During Recording

* VIEW mode Color live camera images are shown at 30 pps, but image are not written into the memory.

* ARM mode

Color live camera images being written into the memory
are shown at 30 pps.

4) Recording Trigger Modes

START Trigger

Trigger point will be a frame 5% (of whole capacity) after the first
frame of memory.

CENTER Trigger

Trigger point will be a center of the memory

END Trigger

Trigger point will be a frame 5% (of whole capacity) before the end
frame of memory.

5) Recording Data

DRP ID, Scene number, Trigger data & time, Shutter speed,
Video process data

3 VIDEO PROCESS PART

1) Settings

Gain	0, +6, +12 dB
White Balance	3100, 5000, 9000 K, Auto tracking, Register
Gamma	3 levels
Enhance	4 levels (Horizontal, Vertical)
Chroma	On/Off (Monochrome display)

2) Graduation

Y, R-Y, B-Y, 8 bit each

4 REPRODUCTION PART

- 1) Video System NTSC (or PAL)
- 2) Output Signal
Video 1.0 Vp-p, 75 ohms, BNC, one output
S-VIDEO, S connector, one output
Video 1.0Vp-p, 75 ohms (for Viewfinder)
- 3) Playback Speeds
1 - 30 pps, FWD/REV step, 2-32 times fast (NTSC)
1 - 25 pps, FWD/REV step, 2-32 times fast (PAL)
- 4) Playback Modes Single, Loop
- 5) Loop Setting Set manually a Start and End frame
- 6) Frame Jump Trigger frame, start frame, and end frame

5 SYSTEM CONTROL PART

1) System Settings

Date	Year, Month, and Date
Time	Hour, and minute
DRP ID	0 to 9 or A to Z
Scene Number	0 to 65535 (increments by 1 at every trigger input)

2) Other Settings

Character Display	Full information, Selected items, or no display at all
Frame Display Unit	Frame number, elapsed time (from trigger) , or % memory
Playback Field	1st field or 2nd field
Filed Smoothing	On or Off

3) Display Data

Mode Information	DRP ID, DRP mode
Recording Information	Scene number, Trigger date & time, trigger mode, recording rate, shutter speed
Playback Information	Frame number, playback speed
System Information	Power voltage, elapsed operating time, recording memory capacity, system version
Warning Display	At low power voltage become excessive.

4) Setting Parameter Storage

Store Timing	Store latest parameter at power off
Store Parameters	
Recording	Recording rate, recording trigger, video process, gain, white balance, gamma, enhance, chroma
System	DRP ID, scene number
Others	Character display, unit of frame number, playback field, field smoothing
Clock Function	Date, time, elapsed time of operation
Resetting	Restore all parameters to factory defaults

5) Selection of Control Module

Selects moduled function for an external control.

Application specific module can be added later.

- Auto Sequencer Function

Within camera, routine operation procedures can be registered.

Using this function, auto saving to DataMagazine/Data Cartridge,

VCR auto dubbing can be performed.

6 POWER SUPPLY PART

- 1) Power Input DC 20 - 32V, 2.5 - 1.7 A
- 2) Power Switch Rotary switch (OFF, REMOTE, ON)
- 3) Remote Power Control

Controllable via REMOTE IN when power switch is in REMOTE position

- 4) Power Off Delay Time

POWER switch 1 second, approx.

Remote Control 4 seconds, approx.

7 ENVIRONMENT

- 1) Operation 0 - 40 degree C, 30 - 80 %RH, no condensation
- 2) Storage -10 - 60 degree C, 20 - 80 %RH, no condensation
- 3) Shock

Camera Head, Separation Unit, Hi-G lens 150G (11ms) , more than 1000 impacts

DRP 100G (11ms)、 more than 1000 impacts

- 4) Vibration MIL-STD-810D, METHOD 514.3

8 DRP DIMENSIONS

- 1) Size W150 × H140 × D245mm approx. (without connector, handle and option)
- 2) Weight 5.5 kg approx. (without handle and option)
- 3) Tripod Mounting Hole 3/8-16 UNC

9 Camera Head DIMENSIONS (with TX unit)

- 1) Size W60 × H55 × D100mm approx. (without connector, and lens mount)
- 2) Weight 0.6 kg approx. (without lens)

Figure 1. The effect of the concentration of the *Agrobacterium* suspension on the transformation efficiency of *Agrobacterium* strains.

1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 26

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