Rauland RANGER®
Media Management System

System Planning KI-1897

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Rauland-Borg Corporation
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Overview 1

Description

The RANGER® Media Management System provides sophisticated media management for educational and institutional uses. The system links together a personal computer, Microsoft Windows™-based media management software, and specialized hardware to provide centralized control of media sources and destinations. The RANGER system allows for remote operation by multiple users of media devices such as VCRs, laser disc players, video floppy disc players, CD-I, CD-ROM, broadcast channels and satellite receivers.

The standard RANGER system includes a rack-mounted Media Control PC and monitor, a rack-mounted Media Center monitor that allows the monitoring of programs that are in progress, control cards for interface with media devices, transmission and receiving devices for communication with remote classrooms, a classroom controller (for each remote classroom), a classroom control device (for each remote classroom), and remote control unit (for each remote classroom).

Scope of Manual

This manual is intended to help you plan a RANGER system installation. Though the manual contains detailed information, it is not intended as an installation manual per se, but as an aid in system design. The intention is to give an overview of how the system works and the components required for each type of system. Keep in mind as you are reading this material that the RANGER system is an integrated system, often bringing together customer-supplied components and those manufactured by Rauland-Borg Corporation. Hence, there are infinite variations on system design. Our intention here is to provide guidelines. Figure 1 illustrates how to best use this manual for the system you are installing.

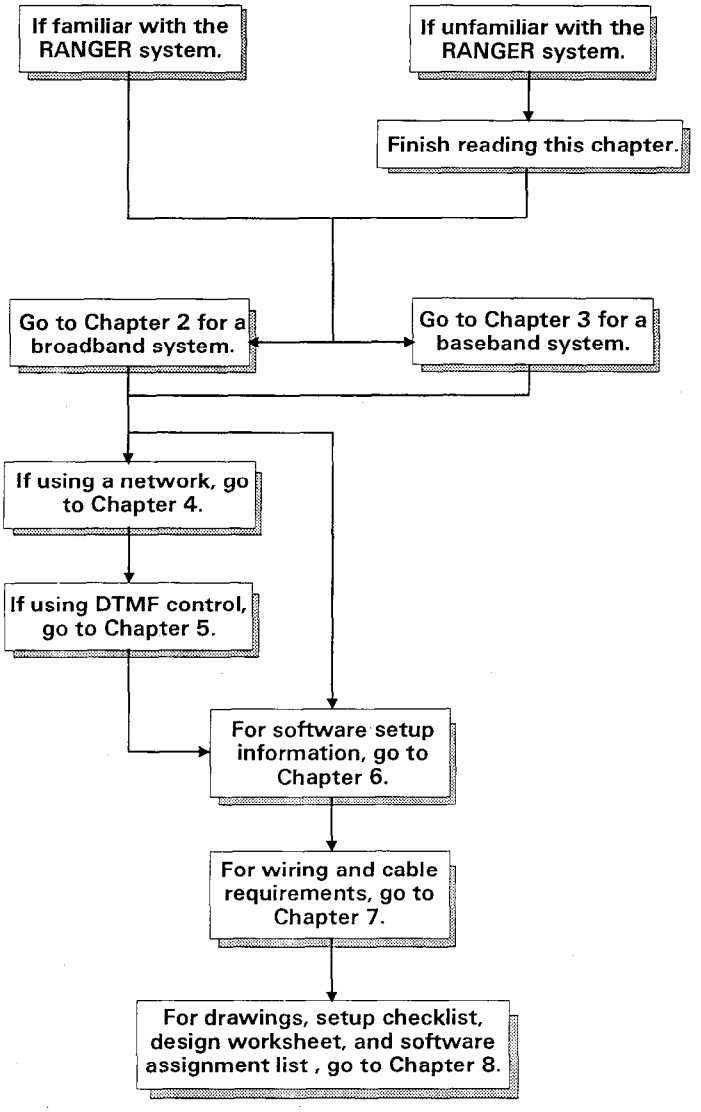


Figure 1. Manual Flow Chart

Broadband

There are two methods of media distribution, broadband and baseband. The broadband method is similar to the way that your local cable television system brings television channels into your home. Cable systems receive programs that are first beamed to a satellite by the originator of the broadcast. The cable operator then receives the program with a satellite dish and in turn broadcasts it over a cable using television channels. You then tune your television to the correct channel to watch the program. This same technology is available to schools who install media management systems.

Controlling Resources

In addition to being able to transfer video and data, a media management system must allow instructors to control the resources from the classroom for media programs to be truly useful. In the next drawing, figure 2, you can see that beside the audio and video signal being transmitted over looped coaxial wire throughout the facility, a separate control link is wired between classrooms. This control link provides a way of sending commands like fast forward, rewind, chapter and frame from either a remote control, or a wall-mounted control panel, to be sent back to the centralized media center equipment. Media management systems utilize an integrated computer to take care of these control functions and the control link that you see in the drawing originates with this computer.

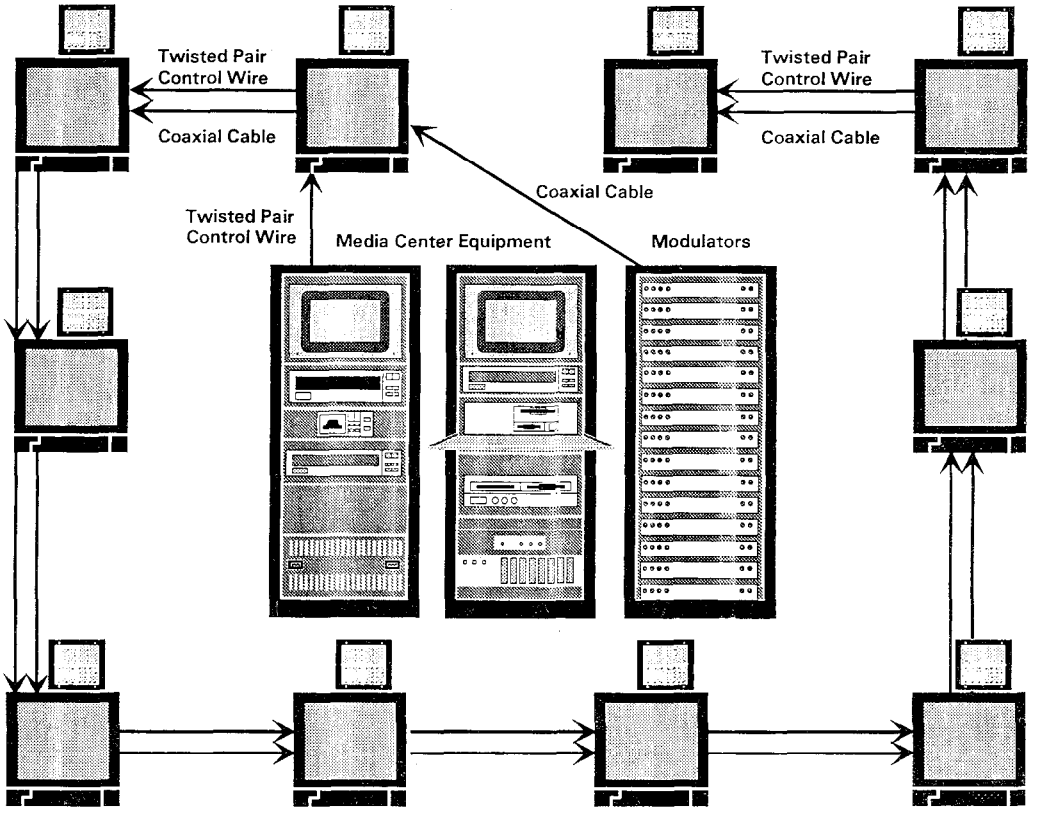


Figure 2. Broadband Media Management System with Control System

Not every system requires a separate control link wire. In certain instances where conduit is not available, it may be easier and less expensive to take the RS485 control signal and modulate it as a subchannel on the same 75Ω wire that is providing the RF audio and video signal. In designing a system, one must balance the cost of adding the devices required to modulate and demodulate the control signal against what it will cost to install

a dedicated control cable. Alternatively, a school data network (LAN) or telephone system (DTMF) can also be used for control in place of the dedicated control wire.

The next drawing, figure 3, shows how a typical school hallway might be cabled for a broadband system. In this drawing the control portion of the system is placed on the audio-video cabling. Additionally, it introduces the concept of trunk cabling or branch runs, where heavier gauge wiring is run down from the media center through the corridors and then tapped off of to get the signal to the classroom. The lighter gauge wires that run into each classroom are often referred to as drops, because the branch runs typically run overhead and the drops are literally dropped off of the main lines to connect to the televisions in the classrooms.

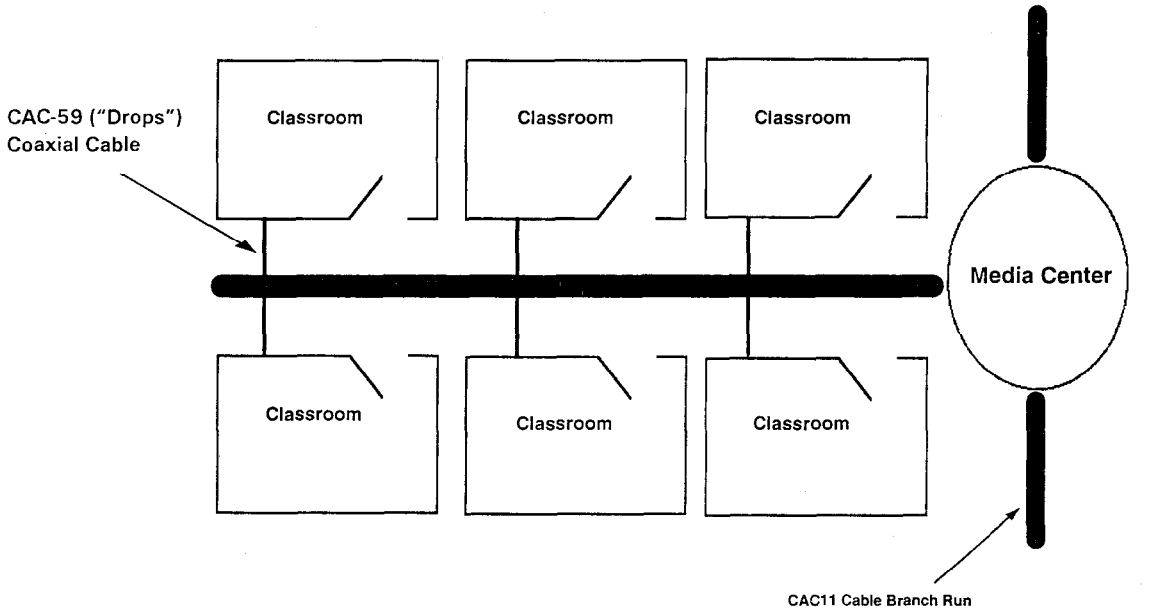


Figure 3. Typical Corridor/Wing Wiring for a Broadband System

Broadband's Benefits

- Many facilities already have the cabling in place from preexisting CATV systems or Whittle Communications' Channel 1.
- Requires less video cable than baseband systems. Also reduces the amount of cabling that you will have to retrofit into an existing cabling plan in older facilities, thus reducing the cost of cable and labor.
- The conduit (pipe or tube for running electrical wires through a building) is often already crowded and it may be difficult to fit additional wiring into it.
- Cost-effective for small to medium size facilities, especially in the K-12 market.

Disadvantages of Broadband

- May not be suited for large facilities with long cabling runs because the strength of the signal begins to degrade after 900-1,000 feet. Distribution amplifiers would be required to extend the cabling range. While this might also be necessary with the baseband systems described in the next section, baseband offers an easier and less costly link to fiber-optic cabling on a per-classroom basis, which can handle greater distance.
- The shared nature of the audio-video cabling scheme produces television pictures that are not as sharp as those of their baseband counterpart.
- Classrooms should have a television equipped with an infrared remote control unit. Many older television models that schools already have in place may not have this capability.
- The infrared television level channel switching causes a potentially noticeable lag in access time when switching between resources. Side-by-side against a baseband system, the difference would be noticeable; nevertheless, this lag is no different than the time it takes to switch between channels on your home cable system.
- The majority of existing broadband systems can only support sixty channels, which would limit the number of media devices the system can support.

Baseband

The other option for media distribution is called baseband. As the name implies, baseband differs from its broadband counterpart by not broadcasting its signal on a radio frequency. Instead of having many channels available on the same wire, as you do in a broadband system, you only have one video signal on the wire at a time. If you use a VCR in your home that requires you to use audio and video jacks to connect to your television, you are already familiar with an application of baseband technology.

The next drawing, figure 4, shows the baseband wiring variation of the hallway or wing portion of a school that was introduced in the last section. The major difference in this scheme is that each classroom has its own dedicated coaxial audio-video cable line that goes back to the media center. This wiring configuration is referred to as homerun, because each point in the system literally must have a wire that is run from the remote location (classroom) to the *home* (the media center). You may also hear reference to the location of the media center equipment as the *headend.*

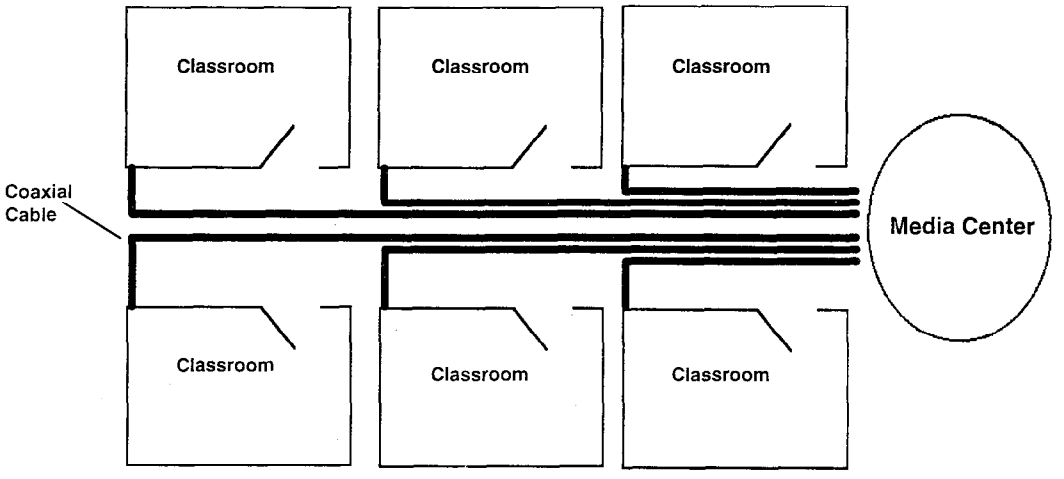


Figure 4. Homerun Baseband Coaxial Wiring

Note: Since the RANCPU can only handle a certain amount of capacitance, there are some advantages to looping the control cable.

The only wiring element that is missing from this scheme is the *control link*. For the sake of our discussion, imagine that the *control link* wiring follows the same path from the classroom back to the media center—it is just on a separate wire. The RANGER system allows the *control link* for baseband systems to be either homerun, or looped as in the broadband system.

Controlling Resources

Baseband RANGER systems require a dedicated video cable from the headend to each of the classrooms. While this offers an improvement in signal strength and television picture quality—the television cabling is not shared by other system users—baseband cabling requires a means of organizing and arranging wires on the media center side, and a means of connecting the correct media resources with the correct classrooms.

This aspect of media management is something that did not come into play in the broadband variation, yet it is a critical component of the baseband version. It is no longer just a question of sending play, fast forward or chapter commands back to the centralized equipment. It is now necessary to link the correct resources' audio video signal with the correct destination. This is done by using a device called a *video matrix switcher*, sometimes generically referred to as a *switch* or *router*.

The switch is located with the rest of the headend equipment in the centralized media center. When a remote user requests the use of a particular media device by pressing a button on their classroom remote control, control panel, or workstation impulses are sent over the control wire (or network) back to the centralized control computer which tells the switch to make the connection between the device requested on their classroom location.

The next drawing, figure 5, will give you a clearer picture of how the wiring works in conjunction with the video matrix switch in a baseband system.

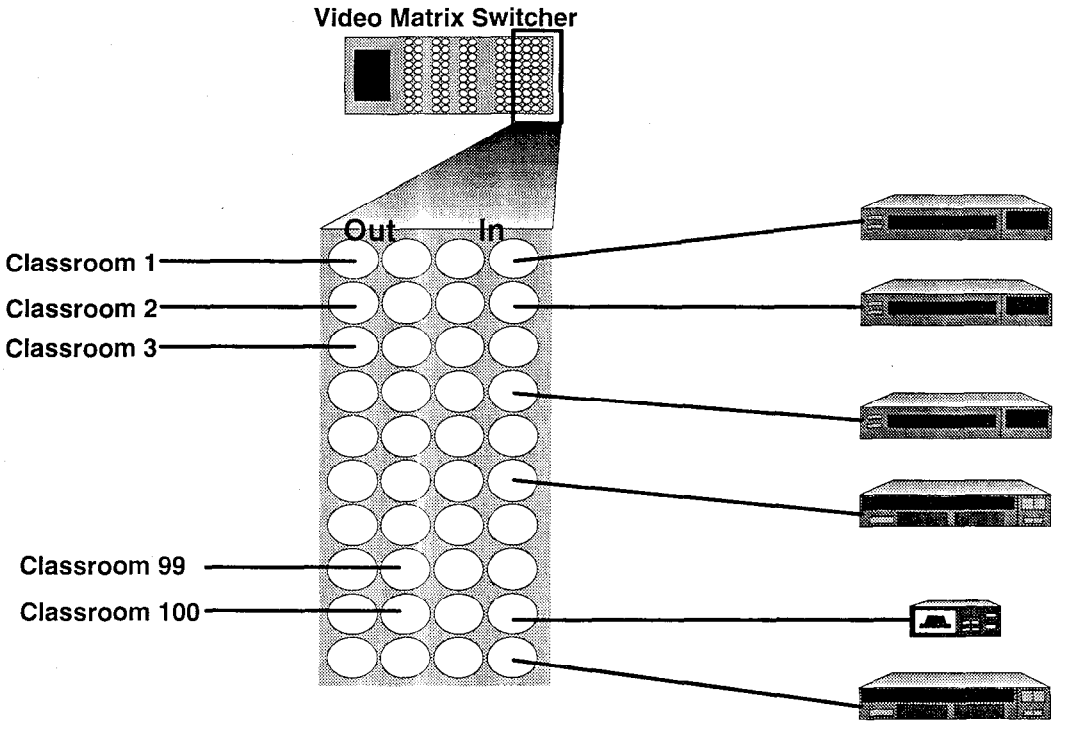


Figure 5. Connecting a Classroom to Media Center Resources

Video matrix switchers provide nearly instantaneous access between inputs (source machines) and outputs (classrooms). For that reason when an instructor moves between resources that are assigned to her classroom, there is no discernible lag from the moment she presses the key on her remote, wall panel or computer keyboard, and the appearance of the picture on the television screen.

Combining Audio and Video Signals

Another important element in baseband configurations is multiplexing. By combining both the audio and video signal into the same switcher inputs and outputs at the media center, the need for separate switching capabilities is unnecessary and the cost of the system is kept down. With the addition of simple demultiplexing circuitry on the classroom side, the audio and video signals are split and played back over standard equipment.

Baseband's Benefits

- Exceptionally high, professional quality audio and video signal, with little if any signal degeneration for short to moderate distances over inexpensive copper coaxial wiring.

- Cable runs longer than 900-1,000 feet can easily be amplified, or linked into fiber optic cabling to avoid signal dropout.
- Simpler to design: end-users and dealers need not configure modulators and appropriate channels for different resources.
- Adjacent channels will not interfere with one another (channel bleed) because there are not so many potentially conflicting signals on the same wire.
- Ideal for systems that need built-in expansion capabilities, or that include many resources that will need to be used simultaneously by many people.
- Offers the fastest access time when moving between different media sources. Instead of the 3-5 second lag that you see in a broadband system, access is nearly instantaneous.

Disadvantages of Baseband

- Depending on the size and type of conduit that exists in a facility, baseband systems can be difficult to retrofit as part of a renovation or technology upgrade project.
- Wiring will be more expensive, as each classroom will require its own dedicated cabling. While wire is a relatively inexpensive item, and the increase in cable is not necessarily a significant expense, for retrofit work, it is often the labor for adding wiring to sometimes crowded conduit that notches up the system price. In some facilities additional cabling may not be able to fit at all, thereby eliminating baseband as an option.
- Video matrix switchers can run as high as $40,000 for a 30-40 classroom school. Moreover, it is possible to make a considerable investment in a video matrix switcher, only to find out that it may not be expandable without considerable additional expense. Coming up with the correct switcher configuration is an important aspect of the design process—it will be especially important to design in enough expansion capacity to protect it against obsolescence.

Glossary

Agile Modulator — A switchable device that translates an audio-visual signal from a source and allows it to be placed onto specific bands of radio frequencies (channels).

Baseband — Of or responsive to a continuous, single radio frequency. Baseband distribution can deliver voice, video and data.

Branch Runs — Heavier gauge wiring that is run down from the media center through the corridors and then tapped off of to get the signal to the classroom.

Broadband — Of or responsive to a continuous, wide range of radio frequencies. Broadband distribution can deliver voice, video, and data.

CATV	An acronym for *Community Antenna Television.* These type of systems use a *broadband* configuration to deliver programs from a centralized location to a remote site, the very same technology that is available to schools who install media management systems.
Coaxial Cable	An insulated conducting tube through which a central conductor (usually copper wire) runs. Typically used for television signals and data networks.
Conduit	Pipe or tube for running electrical wires through a building.
Control Link	A separate wire that provides a way of sending commands like fast forward, rewind, chapter and frame from either a remote control, or a wall-mounted control panel, to the centralized media center equipment.
Demodulator	A device that can interpret a modulated signal. The tuner on your VCR, cable box or television is a demodulator.
Demultiplexer	A device that breaks up a combined audio and video signal so that it can be played back over standard equipment.
Drops	The lighter gauge wires that run into each classroom. *Branch runs* typically run overhead and the *drops* are literally dropped off of the main lines to connect to the televisions in the classrooms.
Fiber Optics	Strands of glass as thin as human hair that carry information in the form of light. Communicating with light gives fiber more than 150,000 times more information carrying capacity than copper wire. With the use of the correct transmitters and receivers, signals transmitted over fiber optic cabling can travel extremely long distances without the need for amplification.
Headend	The location of the centralized media equipment, usually the Library or Media Resource Center.
Homerun	Cable(s) that is run from the headend to one classroom only.
Multiplex	Capable of transmitting two or more signals or messages simultaneously on the same circuit or channel.
Video Matrix Switcher	A device that serves as a connection array, sometimes generically referred to as a *switch.* The *switch* is located with the rest of the *headend* equipment in the centralized media center. When a remote user requests the use of a particular media device by pressing a button on their classroom remote control or control panel, impulses are sent over the control wire back to the centralized control computer which tells the *switch* to make the connection between the device requested and their classroom location.

Broadband 2

Components

Table 1 lists the required and optional components used in a broadband system. Some of these components may be fabricated.

Table 1.

Required	Optional
RANPCSW Media Center Computer	**RANMENU** Character Generator (recommended)
Agile Modulator (e.g., Blonder Tongue Model # AM60-550)	**RANEXPAD** Master Port Expander (if have RANEXP and need more than 12 ports)
Channel Combiner (e.g., Blonder Tongue Model # OC-8C)	**RANBROAD** and **RANBRDCTL** Master Port Expander (to put control signaling on a sub-channel)
2-way Splitter	**RANDTMF** Interface Board (for control via phone)
RANCC16 Control Card Cage	**RANRELAY8** or **RANRELAY14** Universal Relay Card (required if devices are relay controlled)
RANCPU Control System Master Card or **RANEXP** Master Port Expander (control CPU)	**RANIRIS** Infrared Capture Unit (for custom IR codes)
RANIR and/or **RAN232** (control cards)	**RANCLASS1** Classroom Control Panel with a **RANCL201** Classroom Controller or only a **RANCL201CP**
Resources (RANLASER, RANVCR, etc.)	**RANCL201INT** Classroom Interface Box
Television Monitors	**RANDATA** Level III Laser Disc Controller
RANPS12 Power Supply	**RANLPSW** (Lesson Plan SW)
Method of Control (Telephone, PC or Mac on LAN, Remote Control, Wall Panel, etc.)	**MRR7700** and **MRR7800** (DTMF remote and receiver for adding mobility to a DTMF system)
RANSHELF Rack Mount Kit	**RANHHELD** Remote Control

Installation

Parts Required

When installing a broadband RANGER system, besides the components listed in Table 1, you will also need the following items:

- Rack layout. Figure 6 is an example of a typical rack layout.
- Wiring layout
- RANCC16 Control Card Cage layout
- Rack(s) and blank panels
- IR transmitter cables for Interface Cards (supplied with the RANIR)
- RANMON13 (operator console) (optional, but recommended)
- RANMONMNT (used to rack-mount the RANMON13 and the RANPCSW's monitor) (optional, but recommended for the 13″ monitor)
- 75Ω video cable (e.g., WP815) (interconnect wire for resources)
- RAN232 card control cables for serially controlled devices (e.g., RANLASER and RANMENU)
- RANRELAY8 or RANRELAY14 Universal Relay Card (for relay controlled devices) (optional)

Industrial Communication Company S.O. C411152 Detroit College of Business RAN-022 v1.0 Final Version			
Rack Layout: (2) 61 Racks with 1 set of side panels			
Rack Unit	Rack1	Rack 2	
1	RANCC16	BP2	
2			
3	VCR1 w/ RANSHELF	VCR3 w/ RANSHELF	*Notes:*
4			1. Racks 1 and 2 are bolted together.
5			2. Customer to supply PC (XT or higher with
6	VCR2 w/ RANSHELF	VCR4 w/ RANSHELF	1 serial port and DOS 3.0 or higher) for
7			RANMENU. RANSHELF provided for
8			mounting as shown.
9	LASER1 w/ RANSHELF	VCR5 w/ RANSHELF	3. RANCC16 card cage mounted at top of
10			rack per customer's request to display
11			technology in glass paneled room.
12	RANMON13 w/ RANMONMNT	PC MONITOR w/ RANMONMNT	4. Customer to supply 8 Blonder Tongue
13			Agile Modulators and 1 Channel Combiner
14			(8 or 12 channels).
15			Only 7 modulators to be mounted in rack
16			5. Customer to supply 5 Panasonic AG1290
17			VCRs and 1 Pioneer Laserdisc player. 6
18			RANSHELF provided for mounting.
19			6. 3rd rack housing TC21 is under separate
20	RANMENU w/ RANSHELF	KEYBOARD w/ RANKEYMNT	order.
21			7. System to be tested with our Laserdisc
22		RANPCSW w/ RANPCMNT	player, Pioneer CLDV2400, as customers'
23	BP3		has not arrived.
24			8. System to be tested without modulator
25			outputs padded. Customer to install pads.
26	Channel Combiner		**Personal Note: Had problems with this**
27	BP3	BP3	**Dell computer Optiflex 466/L s/n**
28			**#41SRR.**
29			**The purchased date was 9/24/94.**
30	VCR1 Modulator	VCR3 Modulator	
31	VCR2 Modulator	VCR4 Modulator	
32	LASER1 Modulator	VCR5 Modulator	
33	RANMENU Modulator	BP1	
34	BP2	BP2	
35			

Figure 6. Typical Broadband Rack Layout Diagram

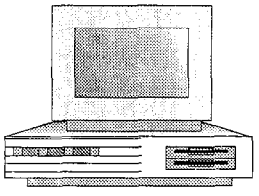
Pre-installation Information

RANCL201 and RANCL201CP Classroom Controllers

The 2-gang box that will hold the RANCL201INT Classroom Interface Box must be mounted within four feet of the RANCL201 or RANCL201CP.

Note: Many installations do not utilize the RANCL201INT interface box. Instead the cabling runs down the TV mount directly into the RANCL201CP (for the RANCL201CP only, NOT the RANCL201).

Headend Video



RANPCSW Media Center Computer

Every RANGER system contains a RANPCSW that includes the Media Control PC, PC monitor and software. The RANPCSW provides media scheduling, database software, media source-machine control and interface, interactive help, diagnostics, message screen displays, system setup and configuration. If rack mounting the RANPCSW (this is not required), use a RANMONMNT, RANSHELF or RANKEYMNT. Customers wishing to supply their own media center computer should contact Rauland-Borg for minimum requirements.

Parts Required

1 Interface cable (refer to drawing VW2379) (interface cable that connects RANGER PC (Serial Port–Com 2) to RANCPU (MC1 RS-232) (supplied)

1 Interface cable (refer to drawing VW2293-1) (interface cable connects RANCC16 [Slot 16] to RANGER PC [Serial 1–Com 1]) (supplied)

1 AC Outlet

Associated Equipment

1 RANSHELF Rack Mount Kit

1 RANKEYMNT (computer keyboard mount)

1 RANMONMNT

1 Power cords (supplied with the RANPCSW)

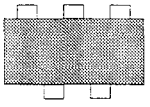
1 RAN232 Serial Control Card (see "RAN232" for more information)

Agile Modulator

An Agile Modulator translates the audio-video signals from a source and allows them to be placed onto specific bands of radio frequencies (channels). This product is not sold by Rauland-Borg Corporation; therefore, you will need to ask the manufacturer if any additional parts are required. Broadband RANGER systems are typically configured using one modulated channel per media device that will be viewed through the system. If "titlers" are included, each of these requires a channel as well. It is also possible to configure a broadband system that uses a small video switcher, if the numbers of media devices exceeds the number of available modulated channels. For more information on this system variation, please contact Rauland-Borg Corporation.

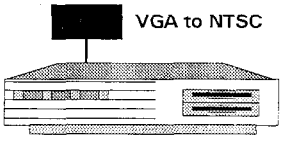
Channel Combiner

This device takes the output from several Agile Modulators and combines it into one output. There are two types of Channel Combiners: Active and Passive. The Active type has a built-in Distribution Amplifier to boost the video signal. The Passive type does not have its own Distribution Amplifier, but you will need to provide one. This product is not sold by Rauland-Borg Corporation; therefore, you will need to ask the manufacturer if any additional parts are required.



Splitter

A Splitter allows the output from the Distribution Amplifier or Active Channel Combiner to be split into different outputs. It is used for the operator's console. This product is not sold by Rauland-Borg Corporation; therefore, you will need to ask the manufacturer if any additional parts are required.



RANMENU Character Generator

The RANMENU uses an IBM compatible PC to generate and display menus for the RANGER system on the classroom TV. A PC running RANMENU software interprets live serial data fed from a RAN232 Serial Control Card housed in the RANCC16 card cage. The data is formatted and sent to the computer VGA video output where it is then converted to a composite NTSC signal via a VGA/NTSC scan converter. The video output is then modulated using an agile modulator. RANMENU includes software, interface cable and a VGA/NTSC converter. Rauland-Borg does not supply a computer. The RANMENU software requires an 8088 or better computer capable of displaying VGA color graphics. The computer requires a license for DOS 3.3 or better, a floppy drive and a RS232 port. No monitor, keyboard, or hard drive is required.

Parts Required

1 Phono to F 75Ω video cable (refer to drawing VW2383)

1 Phono to phono 75Ω video cable (refer to drawing VW2377)

1 Interface Serial Port cable (refer to drawing VW2378)

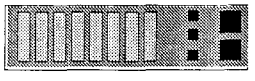
Associated Equipment

1 RAN232 Serial Control Card (see "RAN232" for more information) (for optional character generator)

1 RANCC16 Control Card Cage (see "RANCC16" for more information) (for optional character generator)

Headend Control

RANCC16 Control Card Cage



The RANCC16 Control Card Cage provides rack-mounted housing for up to sixteen control cards (RANIR, RANRELAY8, RANDTMF, and RAN232). These cards each control one media device. Additionally, the RANGER system requires one RAN232 card for communications with the Media Center computer. These units may be daisy chained with additional Control Card Cages for system expansion. The Card Server card provided with the RANCC16 requires 12VDC at 120 mA and mounts in a two rack unit (3.5") space.

Parts Required

1 Card Server Board (Supplied with RANCC16)

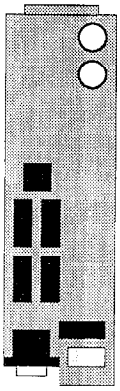
1 18 ga 2-conductor wire for power supply connection (red and black)

4 Mounting screws and washers (supplied with RANCC16) or 4 mounting screws (RB Part # B0439) and 4 washers (RB Part # WL0315)

Associated Equipment

1 12 VDC power source (e.g., RANPS12)

RANCPU, RANIR, RANRELAY8 or RANRELAY14, RAN232, and RANDTMF



RANCPU Control System Master Card

The RANCPU decodes all messages coming from classroom control panels (RANCLASS1 or RANCL201CP) or remote control units (RANHHELD). Unless a RANEXP or RANBROAD Master Port Expander is used, each system must include one RANCPU. This control-system master card mounts in the RANCC16 Control Card Cage and can handle control-link cable runs with up to 60,000pf of capacitance. See *Table 2* to determine the requirements for your system. If the capacitance per foot of the cable that you are using exceeds the maximum cumulative distance indicated in the chart, you will have to use a RANEXP or RANBROAD in place of the RANCPU (see "RANEXP" or "RANBROAD" for more information). The RANCPU is typically connected directly to the RANPCSW computer for programming purposes via a standard RS232 cable (supplied with the RANPCSW).

Table 2. Maximum Cable Distances for use with RANCPU

Cable	Capacitance per Foot	Maximum Cumulative Distance (in Feet)
WP D291	26	2,300
WP 291	45	1,200
WP D2401	14.5	4,000
WP D252401 (Plenum)	14.5	4,000
Belden 8102	12.5	4,500

Parts Required

1 In order to use RANGER software V3.30 or later, the RANCPU should have a label that indicates it is an "AXC-EM ENHANCED MASTER")

Associated Equipment

1 RANCC16 Control Card Cage

1 RANPCSW Media Center Computer

1 CS Card (a Card Server is supplied with every RANCC16)

RANEXP Master Port Expander

The RANEXP is a Master Port Expander that is used in place of a RANCPU Control System Master Card if the total capacitance of the RANGER system's control cable run exceeds the RANCPU's limit (+60,000 pf). Each RANEXP accommodates 12 runs of cable with a maximum of 60,000 pf. It requires 12 VDC at 200 mA and is mounted in a one rack unit (1.75") space. Rauland-Borg expects to make the RANEXP obsolete in the near future and replace it with its functional equivalent, the RANBROAD (see the following

section). The RANEXP (or RANBROAD) is typically connected directly to the RANPCSW computer for programming purposes via a standard RS232 cable (supplied with the RANPCSW).

Parts Required

12 4-pin Phoenix connector (supplied with the RANEXP)

4 Mounting screws and washers (supplied with the RANEXP) or 4 mounting screws (RB Part # B0439) and 4 washers (RB Part # WL0315)

1 1-pair shielded cable for connecting AMX Control Link

1 Interface cable (refer to drawing VW2379)

Associated Equipment

1 6-terminal punch block (Graybar part # S66B3-75)

1 12 VDC power source (e.g., RANPS12)

1 RANCC16 Control Card Cage

Estimating the Number of RANEXP or RANBROAD Ports

In order for the RANGER system to operate correctly with your RANEXP or RANBROAD, it is imperative that you do not exceed the distances specified for the cable that you are using (as detailed in the following table).

1. Locate the type of cable you are using in Table 3.

Table 3. Maximum Cable Distances for use with RANEXP or RANBROAD

Type of Cable	Maximum Cumulative Distance per RANEXP	Maximum Cumulative Distance per RANBROAD	Maximum Distance per AXLINK port on the RANEXP or RANBROAD
WP D291	27,600	23,000	2,300
WP 291	14,400	12,000	1,200
WP D2401	48,000	40,000	4,000
WP D252401 (Plenum)	48,000	40,000	4,000
Belden 8102	54,000	45,000	4,500

2. Add up all the cable distances per classroom to calculate the total distance. See the second column in the example that follows.
3. Locate the cable that your are using in Table 4. Divide the "Total cable distance" that you calculated in the previous step by the "Maximum Distance per AXLINK port on the RANEXP or RANBROAD."

4. The number that you arrive at will determine the number of RANEXP or RANBROAD AXLINK ports needed (see the last column in the table below). If the number you arrive at is larger than 12 for the RANEXP or 10 for the RANBROAD, you will need to add a RANEXPAD or another RANBROAD.

Table 4. RANEXP or RANBROAD Port Estimation Example

Type of Cable	Total Cable Distance	Max. Distance per AXLINK Port on the RANEXP or RANBROAD	Number of RANEXP or RANBROAD AXLINK Ports
WP D291	4,870	2,300	3
WP 291	3,807	1,200	4
WP D2401	8,899	4,000	3
WP D252401 (Plenum)	7,065	4,000	2
Belden 8102	8,038	4,500	2

The number of punch blocks (S66B3-75) you use will be dependent on the length of your cable runs and the way you configure the RANEXP or RANBROAD ports.

RANBROAD Master Port Expander

The RANBROAD is a Master Port Expander that replaces the RANEXP. Each RANBROAD accommodates ten runs of cable with a maximum of 60,000 pf. It requires 12 VDC at 200 mA and is mounted in a one rack unit (1.75") space. In addition to providing the same functions as the RANEXP, the RANBROAD modulates and demodulates the systems RS485 control signal onto a subchannel, allowing RANCL201CP classroom controllers to send and receive RANGER control information without the need for a dedicated control cable. Two RS232 ports are provided for sending the RS485 control signal over fiber cabling when used with the RANDATXCR. Refer to the tables above in the "RANEXP" section to calculate the number of RANBROAD ports needed for your system. The RANBROAD is typically connected directly to the RANPCSW computer for programming purposes via a standard RS232 cable.

Parts Required

1 RANCPU Control System Master Card

4 Mounting screws and washers (supplied with the RANBROAD) or 4 mounting screws (RB Part # B0439) and 4 washers (RB Part # WL0315)

1 6-terminal punch block (Graybar part # S66B3-75)

1 1-pair shielded cable for connecting AMX Control Link

1 Interface cable (refer to drawing VW2379)

1 12 VDC power source (e.g., RANPS12)

Associated Equipment

1 RANBRDCTL (one per classroom)

1 RANCC16 Control Card Cage

1 Terminal punch-block (Graybar SS66B3-75)

1 RANPS12 Power Supply

1 RANDATXCR (one per building)

RANEXPAD Master Port Expander

The RANEXPAD is a Master Port Expander that is used when you require additional ports beyond those available on a RANEXP (12+). You must have at least one RANEXP before you can add a RANEXPAD. Each RANEXPAD adds an additional set of 12 runs of cable (with a maximum of 60,000 pf). It requires 12 VDC at 200 mA and is mounted in a one rack unit (1.75") space. The RANEXPAD must be mounted in the same rack as the RANEXP.

Parts Required

1 RANEXP Master Port Expander

4 Mounting screws and washers (supplied with the RANEXPAD) or 4 mounting screws (RB Part # B0439) and 4 washers (RB Part # WL0315)

12 4-pin Phoenix connector (supplied with the RANEXPAD)

1 Pair shielded cable for connecting AMX Control Link

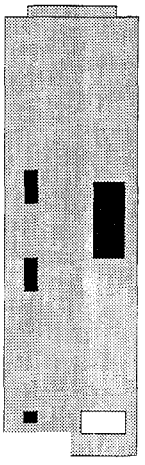
1 Connecting loop cable (1 supplied per unit)

Associated Equipment

1 6-terminal punch block (Graybar part # S66B3-75)

1 12 VDC power source (e.g., RANPS12)

1 RANCC16 Control Card Cage



RAN232 Serial Control Card

Many of the RANGER system's devices are controlled via RS-232 control. In order to provide a universal operating interface for all media devices, the RANGER system emulates these devices' original remote control units with the RAN232, a serial control card that fits in the RANCC16 Control Card Cage. Each device controlled via RS-232 serial commands (e.g., RANLASER, RANMENU, and RANPCSW Media Center Computer) must have a RAN232 card associated with it. Additionally these cards must be appropriately configured for the communication parameters of the associated device. The RAN232 card mounts in the RANCC16 Control Card Cage and requires 12VDC at 45mA power, which is supplied by the RANCC16.

Parts Required

1 Interface serial cable (check the table below for the appropriate cable for the device that you are configuring). Rauland-Borg does not supply interface cables for these cards; for pinout information please consult the *Installation Guide* KI-1856.

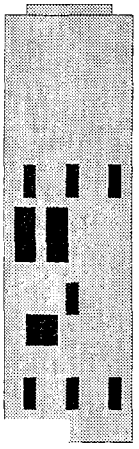
Associated Equipment

1 RANCC16 Control Card Cage (see the section on the RANCC16 for more information)

Table 5. Cable/Resource Requirements

Type of Cable	Type of Resource
VW2378	RANPCSW (Media Center Computer)
VW2292	RANLASER (Laser Disc Player)
VW2353	RANTITLER (Titler)
VW2378	RANMENU (Character Generator)

Refer to the *Installation Guide* (KI-1856) for cable drawings.



RANIR Infrared Control Card

Many of the devices that are operated through the RANGER system are infrared controlled. In order to provide a universal operating interface for all media devices, the RANGER system emulates these devices' original remote control units with the RANIR, an infrared control card that fits in the RANCC16 Control Card Cage. Each IR controlled device (e.g., RANVCR, RANCDI, and RANVFLOP) must have a card associated with it. Additionally, these cards must be programmed with the appropriate IR codes (usually supplied by Rauland-Borg). The RANIR card mounts in the RANCC16 Control Card Cage and requires 12VDC at 45mA power source. If you are planning on including IR controlled devices that are not supplied by Rauland-Borg and you do not have a RANIRIS Infrared Capture Unit, please check with Rauland-Borg prior to installation as to the availability of the proper IR codes for the devices you will be using (including classroom televisions). If these devices are not part of our "library," you may have to send the devices to Rauland-Borg for programming purposes.

Parts Required

1 IR Transmitter Cable (per IR device). This cable is supplied with the RANIR Infrared Control Card

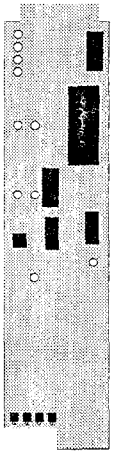
1 IR programming file to match the device that you are installing (if the device was not provided by Rauland-Borg, you may need to send the manufacturer's remote to Rauland-Borg) or learn the codes using the RANIRIS Infrared Capture Unit.

Associated Equipment

1 RANCC16 Control Card Cage (see RANCC16 for more information)

1 RANIRIS Infrared Capture Unit (optional)

1 IRLIB program (supplied with all RANGER systems)



RANDTMF Interface Board

The RANDTMF card is an interface board that allows users to control RANGER resource media devices from telephones. The card mounts in the RANCC16 Control Card Cage and includes an RJ-12 connector that allows interface to standard telephone lines. Users requiring control of RANGER media resources, make a reservation for the media device through the RANGER Media Center, and then dial a specified extension or hunt group (if equipped with caller ID) to connect to the RANDTMF card. Once the card picks up users can then control the media device using the telephone keypad. One RANDTMF card is required for every simultaneous DTMF point-of-access. The card mounts in the RANCC16 Control Card Cage, which supplies the required 12VDC at 90mA power source. See Chapter 5 for more information.

Note: The RANDTMF requires a 48V subscriber loop and disconnect pulse at hang up.

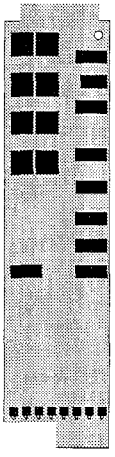
Parts Required

1 8-pin DTMF interface board to RJ12 (supplied with the RANDTMF)

Associated Equipment

1 RANCC16 Control Card Cage

Telecenter V, Telecenter System 21, and Telecenter DSI systems.



RANRELAY8 Universal Relay Card

The RANRELAY8 is a universal relay card that provides eight isolated contact closures. The single-pole-double-throw (SPDT) relays are individually assignable and addressable as normally open (NO) or normally closed (NC) by moving a jumper provided on the card. These relays can be programmed to do a variety of functions in the RANGER system. Most notably, relay cards are likely to be used to trigger an alarm (such as a light or buzzer) that reminds staff that scheduled events are overdue for loading. The card has LEDs that indicate which relay is active. These cards can be linked so a larger number of functions can be controlled. Relays are rated at 1 Amp at 28 VAC or DC. The RANRELAY8 is housed in the RANCC16 Control Card Cage, which provides the required 12 VDC at 150 mA power supply.

Parts Required

2 8-pin Phoenix connector (supplied with the RANRELAY8)

Associated Equipment

1 RANCC16 Control Card Cage

Corridor Lamps, Buzzer, 16mm Film Converter

RANRELAY14 Universal Relay Card

The RANRELAY14 is a universal relay card that provides fourteen non-isolated contact closures. These relays can be programmed to perform a variety of functions in the RANGER system. Most notably, relay cards are used to trigger an alarm to remind staff that scheduled events are overdue for loading. The card has LEDs that indicate which relay is active. These cards can be linked so a larger number of functions can be controlled. Relays are rated at 1 Amp at 28 VAC or DC. The RANRELAY14 is housed in the RANCC16 Control Card Cage, which supplies the required 12 VDC at 150 mA power supply.

Parts Required

2 8-pin Phoenix connector (supplied with the RANRELAY14)

1 RANCC16 Control Card Cage

Associated Equipment

1 RANCC16 Control Card Cage

Corridor Lamps, Buzzer, 16mm Film Converter

RANPS12 Power Supply

The RANPS12 is a 12VDC at 12.5 Amp power supply used to power RANGER systems. It is usually mounted on the bottom of a rack. Multiple units can be used if required.

Parts Required

2 Mounting screws (supplied with the RANPS12)

1 AC Outlet

Associated Equipment

1 18 ga. red and black wire

RANSHELF Rack Mount Kit

The RANSHELF is a three-rack unit universal mounting shelf with Velcro® straps used to hold the equipment in the rack. This shelf does not have a finished front and is intended to fulfill the mounting needs of the widest variety of devices.

Parts Required

6 Mounting screws (supplied)

1 Label to identify source machine

Associated Equipment

RANVCR, RANLASER, RANCDI, etc.

RANIRIS Infrared Capture Unit

Many of the devices that are operated via the RANGER system are infrared controlled. In order to provide a universal operating interface for all media devices, the RANGER system emulates these devices' original remote control units with the RANIR, an infrared control card that fits in the RANCC16 Control Card Cage. Each IR controlled device (e.g. RANVCR, RANCDI, RANVFLOP, or RANVSTILL) must have a card associated with it. For control at the classroom television, use a RANCL201CP or RANCLASS1. Additionally these cards must be programmed with the appropriate IR codes (usually supplied by Rauland-Borg). The RANIRIS is an optional external unit that allows authorized Rauland-Borg distributors to create custom IR codes to match units with remotes that do not have codes supplied by Rauland-Borg Corporation.

Parts Required

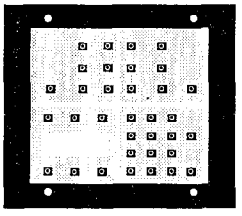
1 RANIRLIB (software to create and download IR library) (not included)

1 9-Pin female data connector to connect from RANIRIS RS-232 port to serial port on a PC (not included) VW2293

Associated Equipment

1 RANPCSW (RANGER Media Center computer) or other PC compatible with a free RS-232 port (not included)

Classroom



Note: the RANCLASSJ cannot be used in conjunction with the RANCL201CP.

RANCLASS1 Classroom Control Panel

The RANCLASS1 is a classroom control panel that permits the teacher to access and fully control from the classroom centrally-located media devices such as VCRs, Laser Disc Players, etc. It mounts into an 8″ × 10″ × 4″ junction box. Mount it on an appropriate wall where a user will be able to see the TV while operating the RANCLASS1. Some of the units features include: logical, easy-to-use format, programmable password assigned to teacher for unauthorized access to the panel, and serial port to support Level III Laser Disc control. It requires a 10-14VDC at 300mA power supply which is supplied by the RANCL201 Classroom Controller.

Parts Required

1 RANBOX2 or 8 × 10 × 4 backbox (Hoffman A-SE 10 × 8 × 4)

Associated Equipment

1 RANMON*xx* (e.g., RANMON27)

1 RANCL201 Classroom Controller

RANCL201 Classroom Controller

The RANCL201 is a broadband classroom electronics unit that replaces the RANCL200. The RANCL201 mounts directly on either a Bretford or Peerless television mount (other mounts may require the drilling of 4 mounting holes) and is primarily designed to function in tandem with the RANCLASS1. The unit resembles a small VCR and includes the following features: IR detector and transmitter, local/headend audio/video switching, connections for Level III laser disc control.

Parts Required

1 RANCLASS1 Classroom Control Panel

1 VP0400, IR Transmitter Cable (supplied with the RANCL201)

1 VW2287 (refer to the drawing for a VW2287. This cable supplied with the RANCL201INT)

1 Control Link wire (e.g., WPD291)

1 75Ω video cable (e.g., WP815)

1 AB3905 wall-mounting bracket (supplied with the RANCL201)

1 9-Pair shielded wire (e.g., West Penn 3655)

Associated Equipment

1 RANCL201INT Classroom Interface Box

1 RANMON*xx* (e.g., RANMON27) or customer supplied monitor

1 Classroom monitor mount (e.g., RANHRDS27)

1 Wall plate with F-type connector

1 Agile Modulator (e.g., Blonder Tongue Model # AM60-550)

1 Channel Combiner (e.g., Blonder Tongue Model # OC-8C)

1 RF Splitter (e.g., 4-way splitter)

1 Tapoff

1 AC Outlet

1 Single-Gang Electrical Box

RANCL201CP Classroom Controller

Note: The RANCL201CP cannot be used with the RANCLASS1.

The RANCL201CP is a broadband classroom electronics unit that combines the functions of the CPU on the RANCLASS1 Classroom Control Panel with those of the RANCL201 providing an efficient and cost-effective means of providing control for remote-only systems. The RANCL201CP mounts directly on either a Bretford or Peerless television mount (other mounts may require the drilling of 4 mounting holes). The unit resembles a small VCR and includes the following features: IR detector and transmitter, local/headend audio and video switching, connections for Level III laser disc control.

Parts Required

1 VP0400, IR transmitter cable (supplied with the RANCL201CP)

1 VW2287 (Refer to drawing on VW2287 and supplied with the RANCL201INT)

1 Control Link wire (e.g., WPD291)

1 75Ω video cable (e.g., WP815)

Associated Equipment

1 RANCL201INT Classroom Interface Box

1 RANMON*xx* (e.g., RANMON27) or customer supplied monitor

1 Classroom monitor mount (e.g., RANHRDS27)

1 RANBRDCTL (daughter board for sub-channel control)

1 F-type connector wall plate (for local origination)

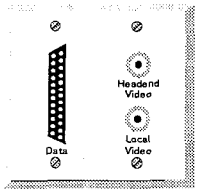
1 Agile Modulator (e.g., Blonder Tongue Model # AM60-550)

1 Channel Combiner (e.g., Blonder Tongue Model # OC-8C)

1 RF Splitter (e.g., 4-way splitter)

1 Tapoff

1 AC Outlet

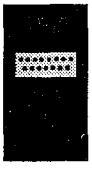


RANCL201INT Classroom Interface Box

This optional broadband component is a termination point for the headend in the classroom. It is used as an intermediary device between the wall and the classroom controller. It is possible to run both the connection for RS485 data and video directly to the back of the RANCL201 or RANCL201CP Classroom Controller, eliminating the need for this wall plate. See the *Installation Guide* (KI-1856) for pinout information.

Parts Required

1 Double-Gang Electrical Box



RANDATA Level III Laser Disc Controller

Used for Level III laser disc control, the RANDATA feeds into a RANCL201 or RANCL201CP Classroom Controller. Be sure to mount the RANDATA close to the computer that will be running the Level III program.

Parts Required

1 Single-Gang Electrical Box

Associated Equipment

RANCL201, RANCL201CP, RANCLASS1