

Exhibit 2. Instruction manual

Crestron **CNWM & CNWML** Hand-Held Wireless Mouse

Operations Guide



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Wireless Mouse

Description

Functional Description

The wireless mouse is a hand-held user interface that uses radio frequency (RF) to communicate with either the CRESNET II system or SmarTouch STS. As part of the CRESNET II system, the wireless mouse communicates with the system via the CNRFGWA, RF receiver. As part of the SmarTouch STS, the wireless mouse communicates with the system via the ST-CP, control processor.

NOTE: The CNRFGWA must have PROM # 2251 for wireless mouse support. A CNRFGWA with this PROM reports on the network with software version 2.00. Early versions of the CNRFGWA do not support the wireless mouse.

There are two CRESTRON wireless mice available: CNWM and CNWML. The only difference between the two configurations is that one, the CNWML, is equipped with a laser pointer. The laser can be turned ON and OFF by depressing the smaller center button on the front of the unit.

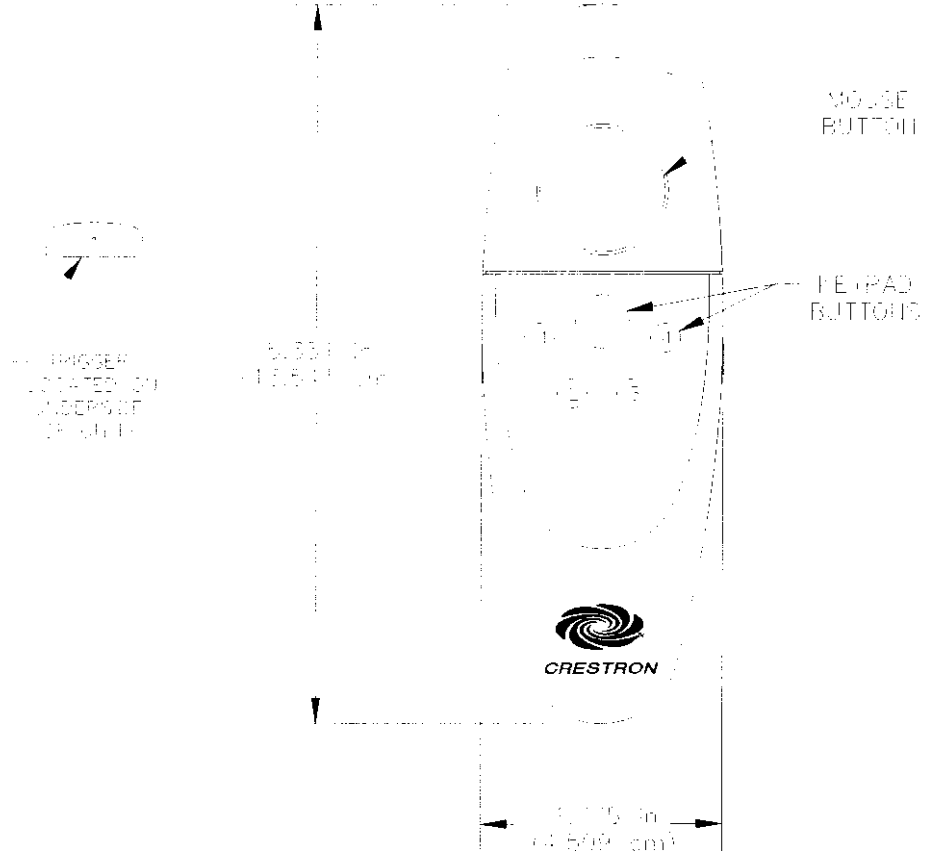
By design, the most logical application for the wireless mouse is as the user interface in a presentation system. The wireless mouse and PC keyboard/mouse controller, CNMK, can be added to control your customized presentation system. These devices in conjunction with CRESTRON's simple-to-use Windows software improve the portability of the user interface. They facilitate the transmission of programmed PC mouse and keyboard operations as well as serial and IR device commands remotely.

The CNWM is not restricted to presentation systems. The unit can be used without the CNMK as a wireless transmitter capable of controlling multiple devices remotely via the CRESNET II system or SmarTouch STS. A non-presentation application is provided as an alternative in "SIMPL" on page 9 and "Workshop" on page 11.

Physical Description

The wireless mouse is housed in a black plastic enclosure that can easily fit in the user's palm, shown below. Nearly all the buttons, except for one - the trigger, can be found on the top side of the unit. The lone trigger can be found on the underside of the unit. Button placement has been carefully designed into the unit for ease of use.

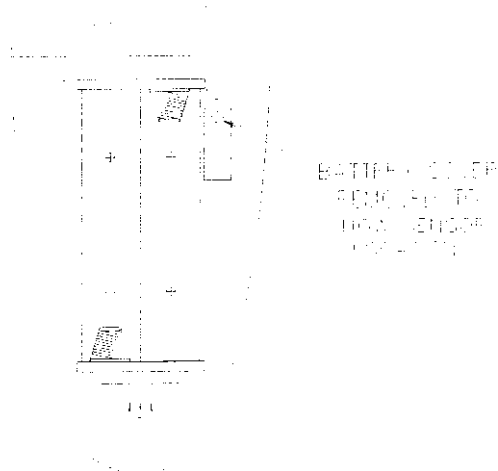
Wireless Mouse Physical Views



Notice the lined paper beneath the clear plastic cover that surrounds the keypad buttons. Once functionality has been assigned to the keypad buttons, a brief description can be written on the lined paper. To access the paper beneath the plastic cover, refer to “Accessing the Function Description Sheet” on page 15.

Two AAA-sized batteries are provided with the wireless mouse. Access to the battery compartment is permitted after the battery cover, located on the underside of the unit, is removed, shown below. A sensor (photo transistor) used to program the RF identity code is also located in the battery compartment.

Battery Compartment (Rear View)



Leading Specifications

The table below provides a summary of leading specifications for the wireless mouse. Dimensions and weight are approximations rounded to the nearest thousandth unit.

Leading Specifications of the Wireless Mouse

SPECIFICATION	DETAILS
Battery	2 disposable "AAA" cells
CRESNET II Workshop	Version 5.20 or later
SIMPL Compiler	3.17.15 or later
CRESNET II Operating System	3.17.29 or later
CNRFGWA Software	version 2.00/PROM # 2251
SmarTouch Operating System	4.00.38-s or later
SmarTouch Monitor Version	1.29 or later
STS/VisionTools for Windows	Version 10.6 or later
Dimensions & Weight (without batteries)	Height: 5.331 in (13.541 cm) for CN-WM TBD in (TBD cm) for CN-WML Width: 1.775 in (4.509 cm) Depth: 1.380 in (3.505 cm) Weight: 0.140 lb (0.064 kg) for CN-WM TBD lb (TBD kg) for CN-WML

Laser Specifications of the CNWML

SPECIFICATION	DETAILS
Wavelength	670 nm (Class IIIa Product)
Output Power	Less than 5 mW

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. The equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

As of the date of manufacture, the unit has been tested and found to comply with specifications for CE marking.



Setup

General Use and Safety

DANGER: The CNWML contains a Class IIIa laser. Avoid direct eye exposure.

Compliance to the following suggestions may extend the life of the wireless mouse and laser.

- If the unit is not going to be used for a month or longer, remove batteries. Never leave weak or dead batteries in the unit; they might leak chemicals that can damage the unit.
- Use care when handling the unit. Dropping the unit can unfocus the lens, damage circuit boards, and cause the unit to work improperly.
- Operate and store the unit in moderate temperatures. Do not place the unit in environments below freezing or exceeding 110°F. Temperature extremes can shorten the life of electrical devices, damage the batteries, and distort or melt plastic parts.
- Keep the unit away from dust and dirt which can cause premature wear on parts. Use a damp cloth to wipe the unit. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the device.

RF Identity Code

Every hand-held wireless transmitter communicating with either the ST-CP or CNRFGWA requires a unique RF identity (ID) code. The code is a two-digit hexadecimal number. To maintain code diversity within a system, use codes between 10 and FE for the transmitters. There are two methods to change the RF ID code on the wireless mouse: via the CNIDC (Identity Code Cable) and Workshop or depressing buttons on the unit that represent a binary code.

NOTES: The RF ID CODE on the wireless mouse is factory set to 30.

Do not use 00 or FF as an RF ID.

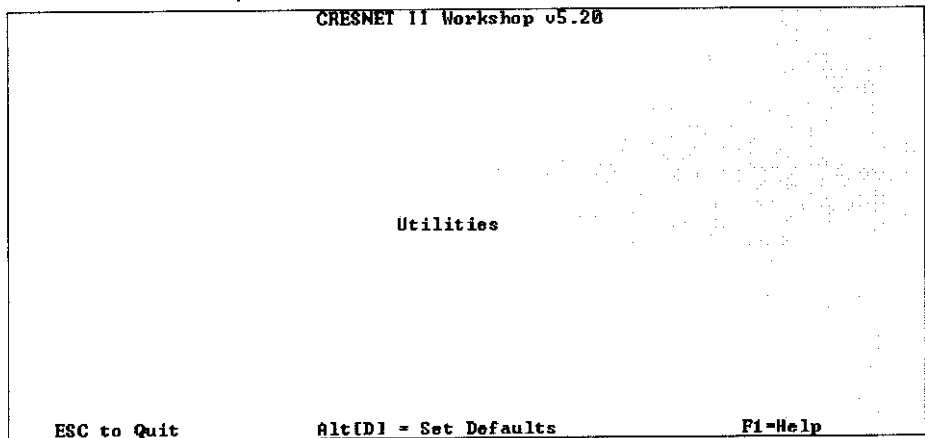
Do not confuse RF ID with network (NET) ID.

Change RF ID via CNIDC and Workshop

To set the RF ID using this method, a PC running CRESNET II Workshop, version 5.0 or later, and a CNIDC is required. Complete the following steps in the order provided to ensure proper RF ID code assignment of the unit.

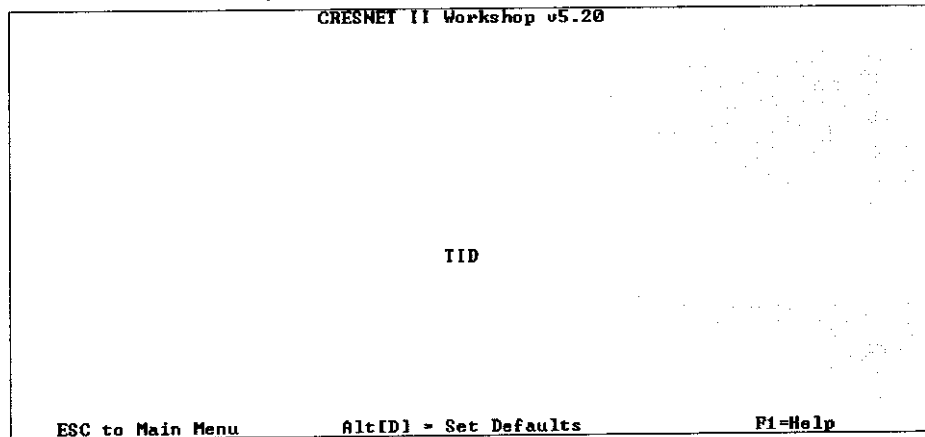
1. Start up the CRESNET II Workshop.
2. The Worksop commences with an opening screen. Depress any key to open the MAIN MENU, shown after this paragraph.

MAIN MENU, Workshop



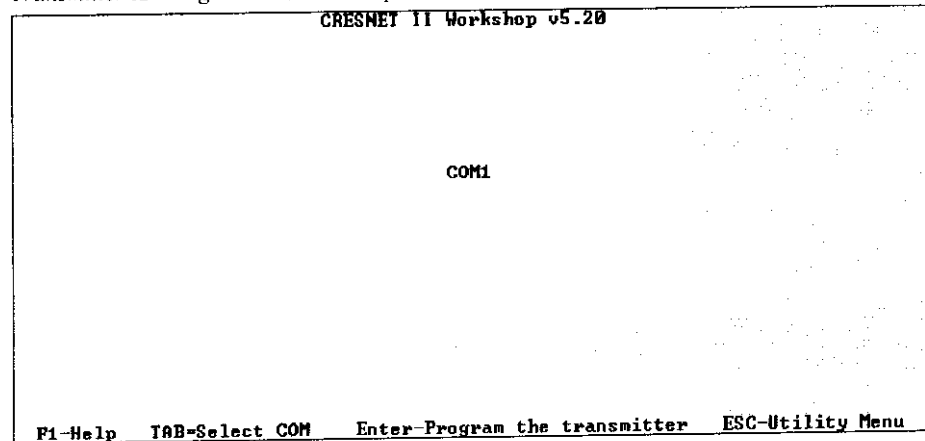
3. From the MAIN MENU, highlight Utilities and depress ENTER. The UTILITY MENU, shown below, appears on the display.

UTILITY MENU, Workshop



4. From the UTILITY MENU, highlight TID and depress ENTER. The Transmitter ID Programmer, shown below appears on the display.

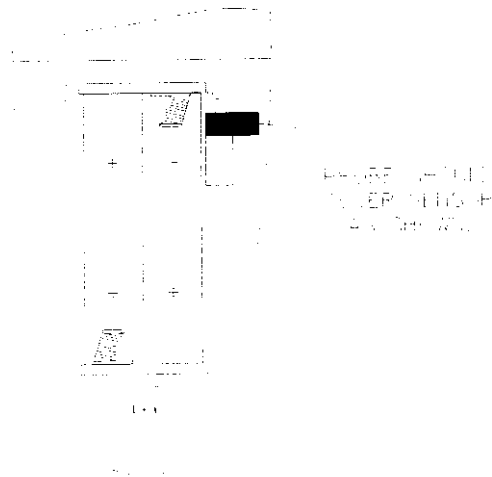
Transmitter ID Programmer, Workshop



5. From the Transmitter ID Programmer screen, specify the PC's COM port with the TAB key.

6. Connect the 9-pin DIN connector from the CNIDC to the proper COM port on the back of the PC. Use the same port as that assigned in the previous step.
7. Position the wireless mouse button-side down so the battery compartment is accessible.
8. Remove the battery compartment cover to expose the battery compartment.
9. Place the LED probe from the CNIDC over the sensor (photo transistor), as shown below. The probe should rest between the battery compartment and the sensor opening so that it completely covers the opening.

Probe Placement



10. From the PC, type the two-digit RF ID code and depress ENTER.
11. Remove the probe from the back of the unit. The RF ID code is programmed into the wireless mouse.
12. Secure the battery cover over the battery compartment.
13. Disconnect the CNIDC from the PC.

Change RF ID via Button Presses

A procedure to change the RF ID using button presses has an advantage over the CNIDC/Workshop method, because no extraneous items (i.e., software and probe) are required. All that is needed is the unit itself and a knowledge of representing an alphanumeric hex digit as a four-digit binary code. Select buttons 2 and 4 on the wireless mouse correspond to the binary digits 0 and 1, respectively. If your recall of binary coding is rusty, refer to the table that follows the procedure. It provides the four-digit binary code and sequential four button press/release on the unit for each single alphanumeric digit. For example, if the RF ID needs to be changed to 25, a hexadecimal "2" is represented as 0010 in binary code or by pressing and releasing the select buttons in the following sequence 2242. Likewise, hexadecimal "5" is represented as 0101 in binary or a sequential button press/release of 2424. Complete the following procedure to set an RF ID of 25. (Steps 1 through 3 must precede any eight button sequence to initialize the unit.)

1. Open battery compartment and remove one battery.

2. Depress and hold any button on the unit while replacing battery. For the CNWML model, do not use the center keypad button, since it is dedicated to switching the laser ON and OFF.
3. Replace battery compartment cover and release center keypad button.
4. Press/release button 2 (binary 0).
5. Press/release button 2.
6. Press/release button 4 (binary 1).
7. Press/release button 2.
8. Press/release button 2.
9. Press/release button 4.
10. Press/release button 2.
11. Press/release button 4.

RF ID CODE Conversion Table

HEX (ALPHANUMERIC DIGIT)	BINARY CODE	BUTTON PRESS/RELEASE
0	0000	2222
1	0001	2224
2	0010	2242
3	0011	2244
4	0100	2422
5	0101	2424
6	0110	2442
7	0111	2444
8	1000	4222
9	1001	4224
A	1010	4242
B	1011	4244
C	1100	4422
D	1101	4424
E	1110	4442
F	1111	4444

Programming

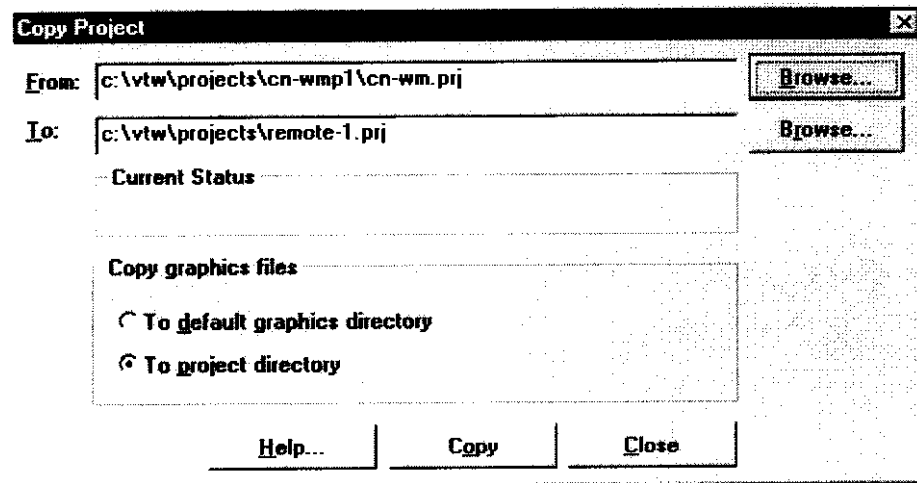
The wireless mouse is unlike any other user interface available from CRESTRON. It permits the user full mobility about a given area while providing remote control of the system PC (via mouse and keyboard operation) and other controllable devices such as a TV and VCR. The wireless mouse has clearly been designed, although not limited, to simplify the task of orchestrating a presentation. Due to its uniqueness, CRESTRON provides a sample project (cn-wm.prj) for the wireless mouse and a sample project tutorial with STS/VisionTools for Windows (VTW) software.

NOTE: To access the tutorial, select Contents from the Help pull-down menu. Click on the Search tab and enter "SmarTouch Presentation System".

CRESTRON recommends that the user does not create a wireless mouse project from scratch, but rather copy the sample available from STS/VTW software and use it as a

platform on which the user builds their own custom programming. Simply copy the respective sample project by selecting Copy Project from the File menu of an open project. The "Copy Project" dialog box is displayed.

Copy Project Dialog Box



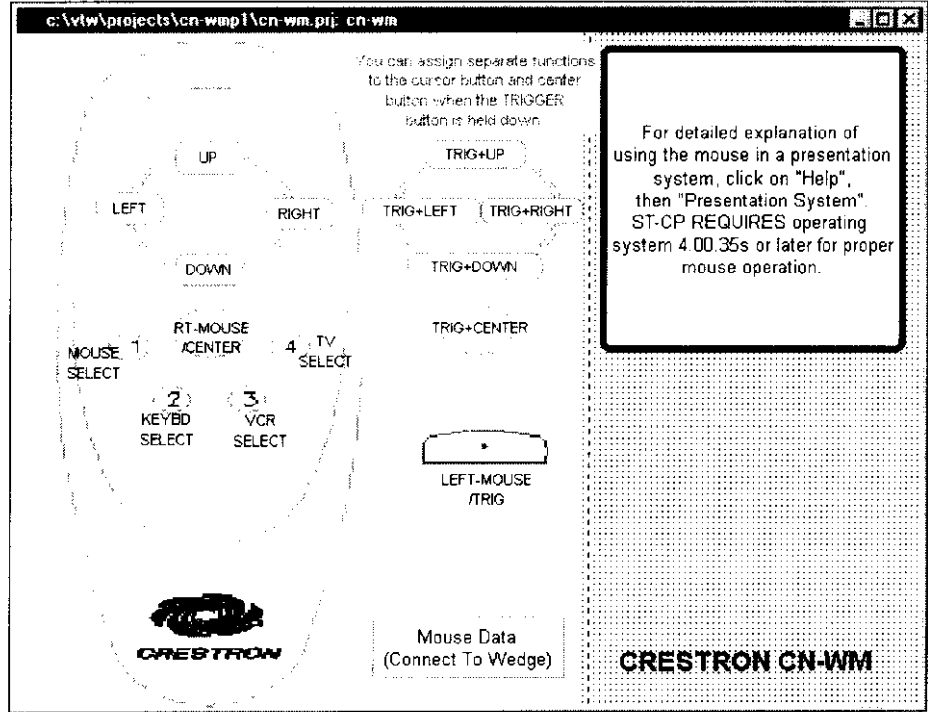
NOTE: The illustration above shows what the "Copy Project" dialog box would look like if the programmer were to copy the CNWM sample project with the new project name, *remote-1*.

As illustrated, a "From" and "To" field is provided. If the desired project is not present in the field, directly key in the path name (at the From: box) or select Browse to display the "Open" dialog box and scroll through directories to establish the correct path of a desired source for the copy. The destination path is entered in the same manner. Once source and destination paths have been chosen, select Copy to initiate project copying. By default, all copied graphic files are copied to the same directory as the project or touchpanel.

The CNWM sample project has one page, shown below, and is designed to control predetermined PC mouse and keyboard operations and certain VCR and TV transport functions. If the particular devices in the custom system do not match those in the sample, alterations are necessary. Changes can be easily made by simply opening up certain dialog boxes and modifying some of the fields. For example, to access the functional properties of the button, simply right-click on the object and select Function from the pop-up menu. The "Function" dialog box appears. The more the system devices differ from the sample project, the more extensive changes become.

NOTE: The CNWM is not limited to the functions and device control portrayed in the sample project. The unit can be programmed as a wireless transmitter capable of controlling multiple serial and IR devices remotely.

Open Page of CN-WM.PRJ



If you draw your own project, remember to change the target type to CN-WM in the dialog box after selecting New and Project from the File menu.

SIMPL

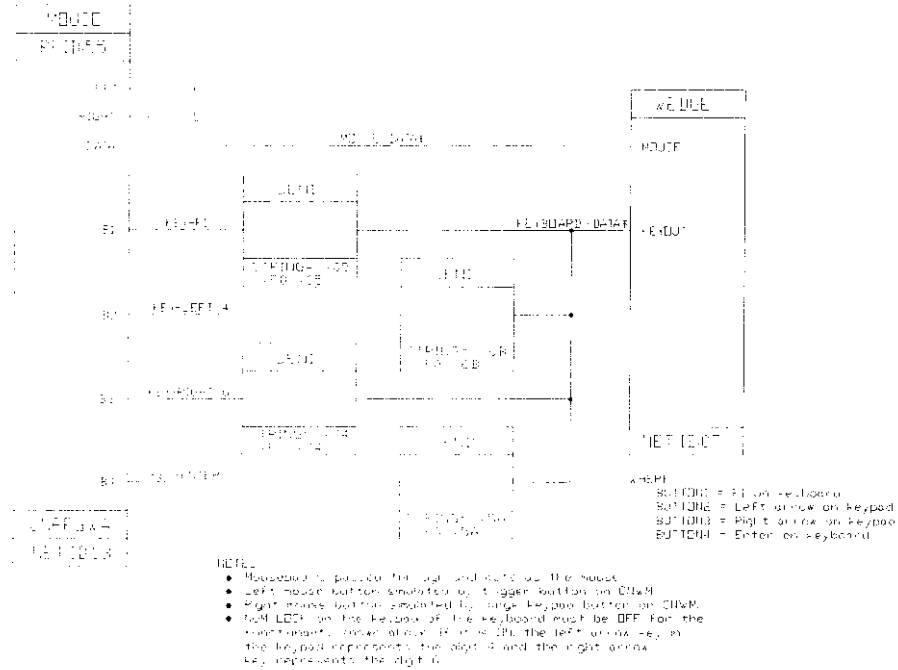
SIMPL is CRESTRON's programming language designated for easy implementation of the control system requirements. The objects that are used in SIMPL are called symbols. Two basic CNWM SIMPL programs (presentation system and wireless transmitter) are shown and described below.

SIMPL

Example 1:

Presentation System

CNWM SIMPL Program - Presentation System



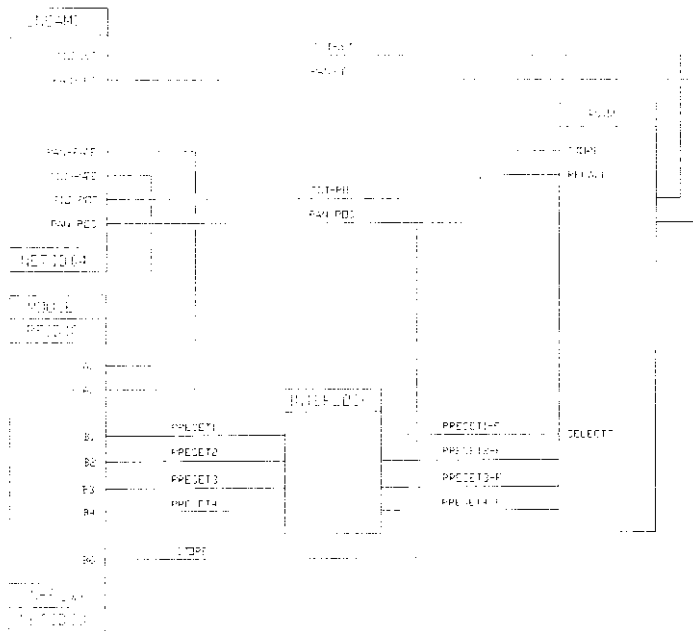
This presentation system sample is designed to control predetermined PC mouse and keyboard operations. For this purpose, a CNMK, mouse/keyboard controller (also known as the wedge), is required in the system. The large mouse button on the wireless mouse is used to move the cursor. The larger keypad button is used as a left mouse click and the trigger is used as a right mouse click. The four small keypad buttons perform keyboard functions.

SIMPL

Example 2:

Wireless Transmitter

CNWM SIMPL Program - Wireless Transmitter



This example shows a CNWM controlling a pan/tilt head on a CRESTRON CNCAMI. The large mouse button on the wireless mouse is used to control pan by pressing it right or left. Tilt is controlled by pressing the same button either up or down. The four small keypad buttons are used to engage presets. The larger keypad button is used to issue the SAVE command which saves the last selected preset.

Workshop

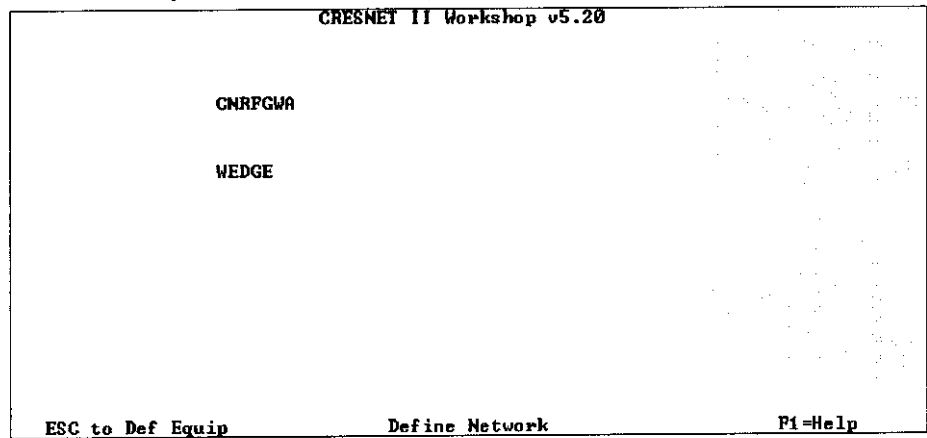
The CRESNET II Workshop is designed to simplify the various operations needed to program and run a CRESNET II control system. The two series of screen displays shown below are accessible from the "Define Network" option of the SIMPL-I Menu in the CRESNET II Workshop. These screens are shown to clarify the means of assigning signal names for the SIMPL program in the previous two illustrations.

Workshop

Example 1:

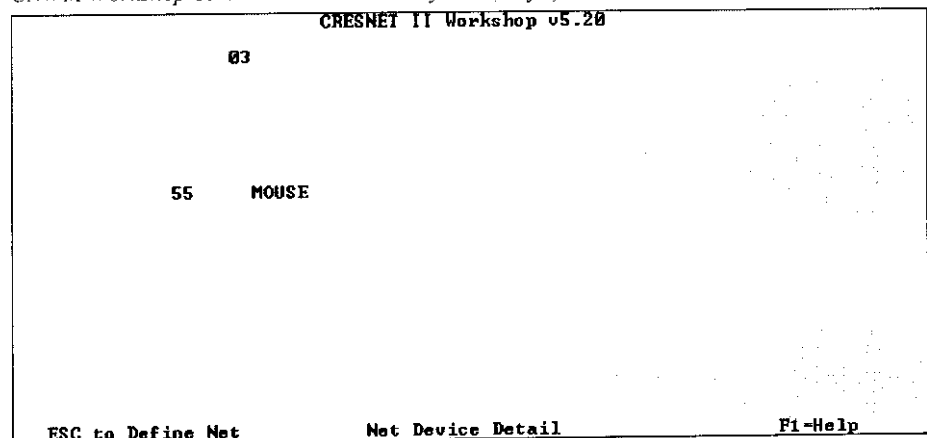
Presentation System

CNWM Workshop Screens - Presentation System (1 of 4)

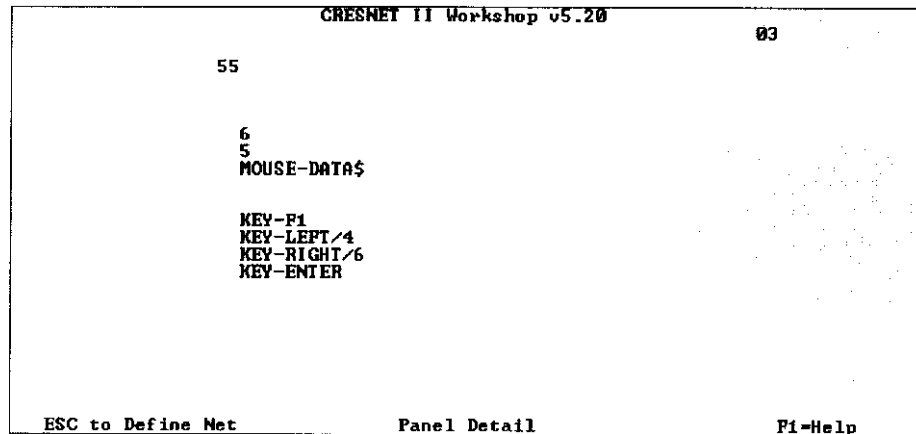


NOTE: When using the CNWM with other CRESTRON RF transmitters (i.e., ST-1500) while communicating with the same CNRFGWA, the CNWM must be defined as the last transmitter in the CNRFGWA Net Device Detail screen (2 of 4).

CNWM Workshop Screens - Presentation System (2 of 4)



CNWM Workshop Screens - Presentation System (3 of 4)

**Description of CNWM Signals:**

The CNWM has a total of seven buttons on the unit. There is a large pressure sensitive “thumb pad”, known as the mouse button, and five keypad buttons on the top side of the CNWM. The four smaller keypad buttons are numbered 1 through 4 (**B1** through **B4**) and the larger keypad button is **B5**. **B6** is the “trigger” button and it is located on the underside of the unit.

LEFT, RIGHT, DATA (Configured as PS/2 Mouse)

When the CNWM is configured as a PS/2 mouse, the right and left mouse buttons are defined by **RIGHT** and **LEFT**. Each of these can be set to any number (1 through 6) corresponding to buttons 1 through 6. As an example, if **RIGHT** is set to 5, then the center button acts like the right button on the PS/2 mouse.

DATA is a name used to link the CNWM information with the CNMK, mouse/keyboard controller.

XVAL, YVAL

Think of the large mouse button as a compass with four quadrants, North, South, East, and West. East and West represent the X direction, while North and South represent the Y direction. Pressure on these points produces analog signals **XVAL** and **YVAL**. When there is no pressure on the “thumb pad”, both analog signals (**XVAL** and **YVAL**) are 50%. Pressure on the northern quadrant of the mouse button raises the signal on **YVAL** greater than 50%. Pressure on the western quadrant of the mouse button reduces the analog signal for **XVAL** below 50%. Pressure on the southeast quadrant of the mouse button causes **YVAL** to decrease below 50% and, simultaneously, increase the value of **XVAL** above 50%.

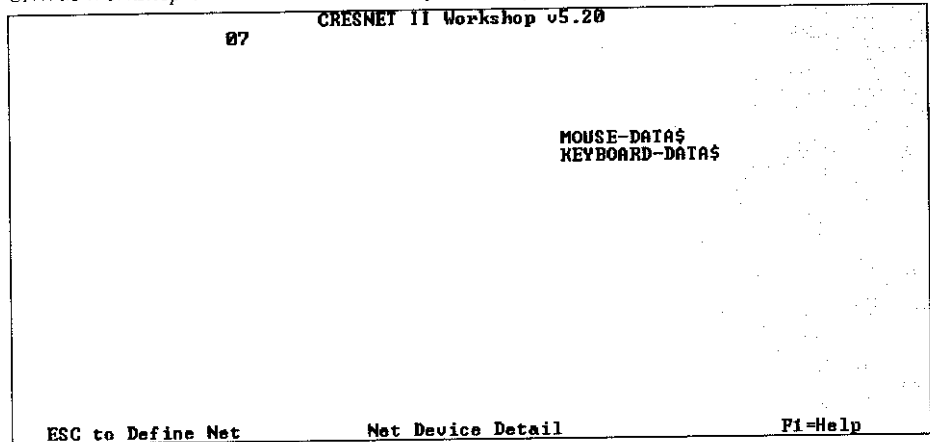
B1 through B6

The keypad buttons and trigger produce discrete (true/false) signals. These signals are represented by **B1** through **B6**. For example, if button 3 is pressed, the signal **B3** is “true”. Several buttons may be pressed at the same time; all pressed buttons produce “true” signals. The signals of all buttons not pressed remain “false”.

DISABLE

DISABLE is not used at this time.

CNWM Workshop Screens - Presentation System (4 of 4)



Description of CNMK Signals:

MOUSEIN

Data enters the control system from the CNMK (i.e., from the PC mouse). This signal is unused and should be left blank.

KEYIN

Data enters the control system from the CNMK (i.e., from the PC keyboard). This signal is unused and should be left blank.

MOUSE

Data sent from the control system to the CNMK (i.e., to the PC). Generally, this data signal comes from the DATA line of the wireless mouse definition in the Workshop. This allows the CNMK to control the mouse attached to the PC.

KEYOUT

Data sent from the control system to the CNMK (i.e., to the PC). The data sent is meant to simulate a key press on the keyboard of the PC. Typically, a SEND symbol is used to send a scan code to KEYOUT. Refer to "Appendix A: AT Scan Code" on page 19 for a table of scan codes.

DISABLE

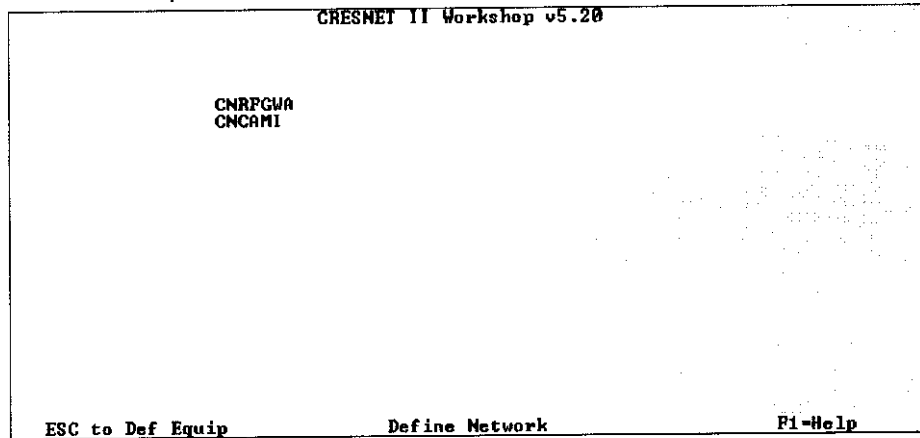
When high, this line disables the CNMK from functioning. In normal operations, it should be driven low. Leaving it blank enables the line at all times.

Workshop

Example 2:

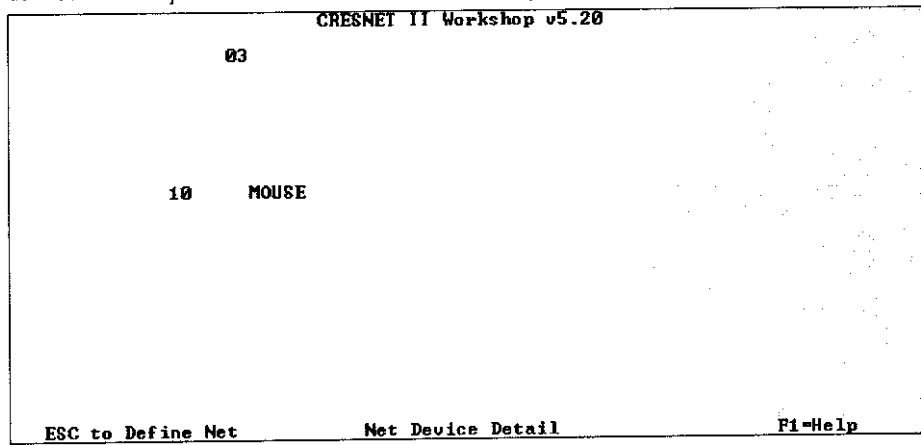
Wireless Transmitter

CNWM Workshop Screens - Wireless Transmitter (1 of 4)

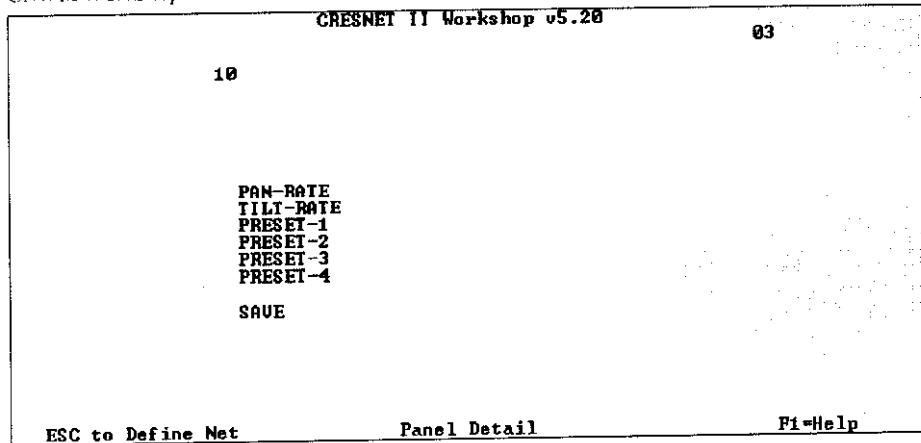


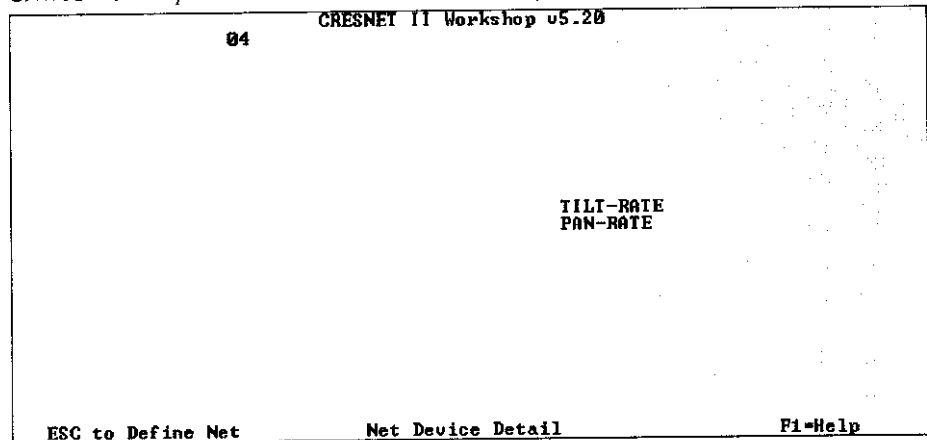
NOTE: When using the CNWM with other CRESTRON RF transmitters (i.e., ST-1500) while communicating with the same CNRFGWA, the CNWM must be defined as the last transmitter in the CNRFGWA Net Device Detail screen (2 of 4).

CNWM Workshop Screens - Wireless Transmitter (2 of 4)



CNWM Workshop Screens - Wireless Transmitter (3 of 4)



CNWM Workshop Screens - Wireless Transmitter (4 of 4)

Accessing the Function Description Sheet

Each of the keypad buttons on the wireless mouse performs multiple functions. Rather than memorizing what each button does, write the functional descriptions on the paper that surrounds the buttons. It is possible that the CNWM can be reprogrammed and thus the descriptions written on the function description sheet beneath the plastic cover no longer apply. Therefore, nine copies of the paper template, refer to “Appendix B: Function Description Sheet Template” on page 21, are provided. Trace over it to create a new function description sheet. The electronic version of the paper template is also provided as a .DXF on the BBS and CRESTRON’s website. The paper template file name is CNWM-TMP.DXF. The direct website address is <http://www2.crestron.com/crestron/Cpages/graphicssw.html>. Open this file in a CAD system or similar type application and type in functional descriptions for a professional look.

Remove Cover

Simply remove the clear plastic cover by inserting a flat lever such as a small flathead screwdriver into the opening above the largest keypad button. Apply a small amount of pressure with the flat lever to disengage the tongue and groove connections of the plastic cover with the rest of the unit. Write functional descriptions on the paper with a ball point pen or replace the existing sheet with one that has been printed with typed descriptions using the forementioned .DXF file.

Fasten Cover

The first step to fasten the cover is to insert the curved-end tongue of the plastic cover into the appropriate groove of the unit. Lower the cover inserting the tongue from one side of the plastic cover into the appropriate groove of the unit. Slightly bend the plastic cover and simultaneously apply pressure down to insert the remaining tongue into place.

Problem Solving

Troubleshooting

The table below provides corrective action for possible trouble situations. If further assistance is required, please contact a CRESTRON technical support representative.

Wireless Mouse Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Intermittent response during transmission.	No batteries in unit or batteries are dead.	Install new batteries.
	Receiver is blocked or moved.	Verify that heavy metal is not in vicinity of transmission.
	Receiver is in vicinity of metal.	Verify that large amount of metal is not blocking transmission.
No response from system.	Refer to causes for intermittent response during transmission.	Refer to corrective actions for intermittent response during transmission.
	NET ID of receiver is incorrectly set.	Enter Performance Viewport from the STS/VTW software. Depress the F4 key to poll the network. Verify that the NET ID for the receiver is properly set to match the SIMPL program. NOTE: After changing the identity code, disconnect and reconnect the network connector.
	RF ID is incorrectly set.	Verify that the RF ID is properly set to match the SIMPL program. NOTE: NET ID and RF ID are separate parameters.
	Program does not match hardware.	Verify correct program is loaded in system via Performance Viewport.
	Receiver is unplugged (no power).	Verify power to the receiver.
	Two or more receivers are too close together.	Verify that multiple receivers are properly spaced (>50 feet) from each other.
	Wrong transmitter in use.	If multiple transmitters are accessible, verify proper unit is used.

Further Inquiries

If after reviewing this Operations Guide for the hand-held transmitter, you can not locate specific information, please take advantage of CRESTRON's award winning technical support team in your area. Dial one of the following numbers.

- In the US, call (888) CRESTRON [(888) 273-7876] - the call is toll free or (201) 767-3400.
- In Europe, call +32.15.730.974.
- In Asia, call +852.2341.2016.
- In Latin America, call +525.574.15.90.

Return and Warranty Policies

Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.
2. Products may be returned for credit, exchange or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, Cresskill, N.J., or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.
3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its Cresnet II products, denoted by a "CN" prefix model number, to be free from manufacturing defects in materials and workmanship for a period of three (3) years from the date of shipment to purchaser. Disk drives and any other moving or rotating mechanical parts are covered for a period of one (1) year. CRESTRON warrants all its other products for a period of one year from the defects mentioned above, excluding touchscreen display components which are covered for 90 days. Incandescent lamps are completely excluded from Crestron's Limited Warranty. CRESTRON shall, at its option, repair or replace any product found defective without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

CRESTRON shall not be liable to honor warranty terms if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed.

This warranty shall be the sole and exclusive remedy to the purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON makes no other warranties nor authorizes any other party to offer any warranty, expressed or implied, including warranties of merchantability for this product. This warranty statement supercedes all previous warranties.

Appendix A: AT Scan Code

The PC interface is designed so the system software has maximum flexibility in defining certain keyboard operations. This is accomplished by having the keyboard return scan codes rather than ASCII codes. Each key generates a "make" scan code when pressed and a "break" scan code when released. The computer system interprets the scan codes to determine what operation it is to perform.

The illustration of the PC keyboard, shown below, in conjunction with the AT scan code table, on the following page, provides the "make" and "break" scan codes. Simply identify the specific key on the keyboard illustration. Notice that each key has a "find #" printed in the lower right corner. Locate the "find #" in the AT scan code table to determine the "make" and "break" scan codes. For example, from the keyboard illustration, notice that the "S" key has an "find #" of "32". From the AT scan code table, notice that "find #" 32 has a "make" scan code of "\x1B" and a "break" scan code of "\xF0\x1B". Although typical "break" scan code is simply the "make" code preceded by hex FO, there are exceptions. Therefore, refer to the enclosed table for accurate scan codes.

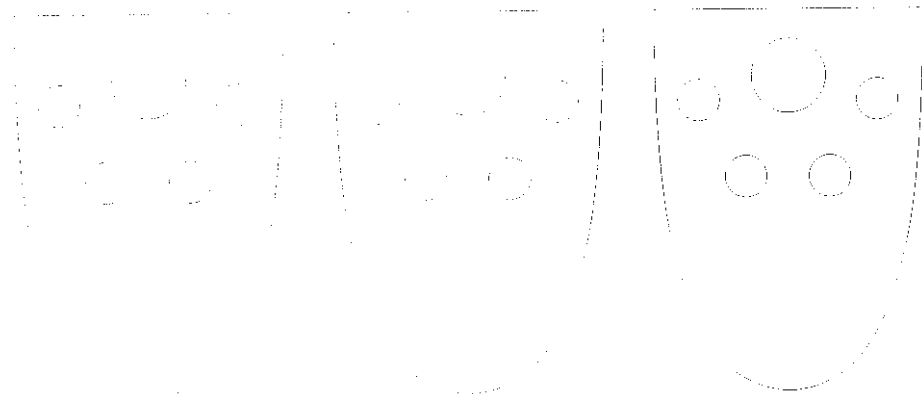
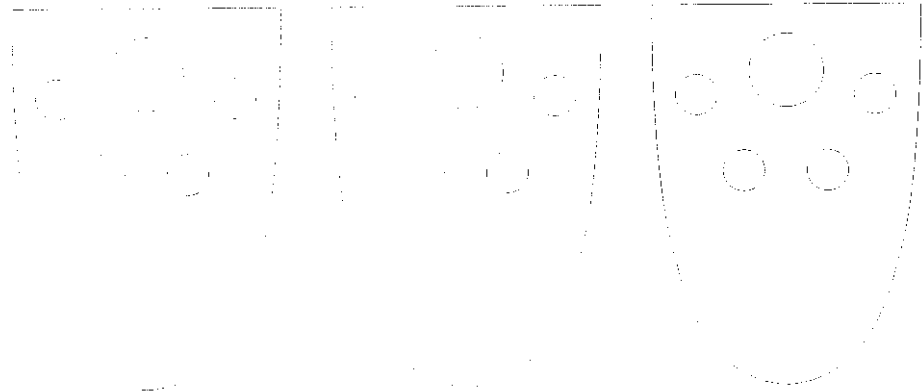
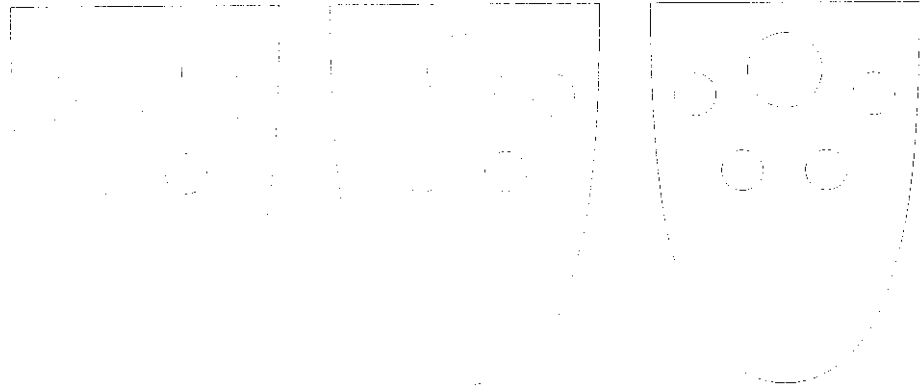
PC Keyboard with Find #s

Exc 110	F1 112	F2 113	F3 114	F4 115	F5 116	F6 117	F7 118	F8 119	F9 120	F10 121	F11 122	F12 123	Print Screen 124	Scroll Lock 125	Pause 126	Num Lock 127	Cap Lock 128	Scroll Lock 129																																																																																																																																																																																					
~ 1	!@ 2	# 3	\$% 4	^& 5	* 6	<> 7	~ 8	{} 9	~ 10	-= 11	+ 12	~ 13	~ 14	~ 15	~ 16	~ 17	~ 18	~ 19	~ 20	~ 21	~ 22	~ 23	~ 24	~ 25	~ 26	~ 27	~ 28	~ 29	~ 30	~ 31	~ 32	~ 33	~ 34	~ 35	~ 36	~ 37	~ 38	~ 39	~ 40	~ 41	~ 42	~ 43	~ 44	~ 45	~ 46	~ 47	~ 48	~ 49	~ 50	~ 51	~ 52	~ 53	~ 54	~ 55	~ 56	~ 57	~ 58	~ 59	~ 60	~ 61	~ 62	~ 63	~ 64	~ 65	~ 66	~ 67	~ 68	~ 69	~ 70	~ 71	~ 72	~ 73	~ 74	~ 75	~ 76	~ 77	~ 78	~ 79	~ 80	~ 81	~ 82	~ 83	~ 84	~ 85	~ 86	~ 87	~ 88	~ 89	~ 90	~ 91	~ 92	~ 93	~ 94	~ 95	~ 96	~ 97	~ 98	~ 99	~ 100	~ 101	~ 102	~ 103	~ 104	~ 105	~ 106	~ 107	~ 108	~ 109	~ 110	~ 111	~ 112	~ 113	~ 114	~ 115	~ 116	~ 117	~ 118	~ 119	~ 120	~ 121	~ 122	~ 123	~ 124	~ 125	~ 126	~ 127	~ 128	~ 129	~ 130	~ 131	~ 132	~ 133	~ 134	~ 135	~ 136	~ 137	~ 138	~ 139	~ 140	~ 141	~ 142	~ 143	~ 144	~ 145	~ 146	~ 147	~ 148	~ 149	~ 150	~ 151	~ 152	~ 153	~ 154	~ 155	~ 156	~ 157	~ 158	~ 159	~ 160	~ 161	~ 162	~ 163	~ 164	~ 165	~ 166	~ 167	~ 168	~ 169	~ 170	~ 171	~ 172	~ 173	~ 174	~ 175	~ 176	~ 177	~ 178	~ 179	~ 180	~ 181	~ 182	~ 183	~ 184	~ 185	~ 186	~ 187	~ 188	~ 189	~ 190	~ 191	~ 192	~ 193	~ 194	~ 195	~ 196	~ 197	~ 198	~ 199	~ 200

AT Scan Code Table

FIND #	DESCRIPTION/ SYMBOl	"MAKE" SCAN CODE	"BREAK" SCAN CODE	FIND #	DESCRIPTION/ SYMBOl	"MAKE" SCAN CODE	"BREAK" SCAN CODE
1	~	\x0E	\xF0\x0E	55	/	\x4A	\xF0\x4A
2	1	\x16	\xF0\x16	57	Shift (right-most)	\x59	\xF0\x59
3	2	\x1E	\xF0\x1E	58	Ctrl (left-most)	\x14	\xF0\x14
4	3	\x26	\xF0\x26	60	Alt (left-most)	\x11	\xF0\x11
5	4	\x25	\xF0\x25	61	Space Bar	\x29	\xF0\x29
6	5	\x2E	\xF0\x2E	62	Alt (right-most)	\xE0\x11	\xE0\xF0\x11
7	6	\x36	\xF0\x36	64	CTRL (right-most)	\xE0\x14	\xE0\xF0\x14
8	7	\x3D	\xF0\x3D	75	Insert	\xE0\x70	\xE0\xF0\x70
9	8	\x3E	\xF0\x3E	76	Delete	\xE0\x71	\xE0\xF0\x71
10	9	\x46	\xF0\x46	79	Left Arrow	\xE0\x6B	\xE0\xF0\x6B
11	0	\x45	\xF0\x45	80	Home	\xE0\x6C	\xE0\xF0\x6C
12	-	\x4E	\xF0\x4E	81	End	\xE0\x69	\xE0\xF0\x69
13	=	\x55	\xF0\x55	83	Up Arrow	\xE0\x75	\xE0\xF0\x75
15	Backspace	\x66	\xF0\x66	84	Down Arrow	\xE0\x72	\xE0\xF0\x72
16	Tab	\x0D	\xF0\x0D	85	Page Up	\xE0\x7D	\xE0\xF0\x7D
17	Q	\x15	\xF0\x15	86	Page Down	\xE0\x7A	\xE0\xF0\x7A
18	W	\x1D	\xF0\x1D	89	Right Arrow	\xE0\x74	\xE0\xF0\x74
19	E	\x24	\xF0\x24	90	Num Lock	\x77	\xF0\x77
20	R	\x2D	\xF0\x2D	91	7 (Keypad)	\x6C	\xF0\x6C
21	Tab	\x2C	\xF0\x2C	92	4 (Keypad)	\x6B	\xF0\x6B
22	Y	\x35	\xF0\x35	93	1 (Keypad)	\x69	\xF0\x69
23	U	\x3C	\xF0\x3C	95	/ (Keypad)	\xE0\x4A	\xE0\xF0\x4A
24	I	\x43	\xF0\x43	96	8 (Keypad)	\x75	\xF0\x75
25	O	\x44	\xF0\x44	97	5 (Keypad)	\x73	\xF0\x73
26	P	\x4D	\xF0\x4D	98	2 (Keypad)	\x72	\xF0\x72
27	[\x54	\xF0\x54	99	0 (Keypad)	\x70	\xF0\x70
28]	\x5B	\xF0\x5B	100	* (Keypad)	\x7C	\xF0\x7C
29	\	\x5D	\xF0\x5D	101	9 (Keypad)	\x7D	\xF0\x7D
30	Cap Lock	\x58	\xF0\x58	102	6 (Keypad)	\x74	\xF0\x74
31	A	\x1C	\xF0\x1C	103	3 (Keypad)	\x7A	\xF0\x7A
32	S	\x1B	\xF0\x1B	104	. (Keypad)	\x71	\xF0\x71
33	D	\x23	\xF0\x23	105	- (Keypad)	\x7B	\xF0\x7B
34	F	\x2B	\xF0\x2B	106	+ (Keypad)	\x79	\xF0\x79
35	G	\x34	\xF0\x34	108	Enter (Keypad)	\xE0\x5A	\xE0\xF0\x5A
36	H	\x33	\xF0\x33	110	Esc	\x76	\xF0\x76
37	J	\x3B	\xF0\x3B	112	F1	\x05	\xF0\x05
38	K	\x42	\xF0\x42	113	F2	\x06	\xF0\x06
39	L	\x4B	\xF0\x4B	114	F3	\x04	\xF0\x04
40	.	\x4C	\xF0\x4C	115	F4	\x0C	\xF0\x0C
41	,	\x52	\xF0\x52	116	F5	\x03	\xF0\x03
43	Enter	\x5A	\xF0\x5A	117	F6	\x0B	\xF0\x0B
44	Shift (left-most)	\x12	\xF0\x12	118	F7	\x83	\xF0\x83
46	Z	\x1A	\xF0\x1A	119	F8	\x0A	\xF0\x0A
47	X	\x22	\xF0\x22	120	F9	\x01	\xF0\x01
48	Cap Lock	\x21	\xF0\x21	121	F10	\x09	\xF0\x09
49	V	\x2A	\xF0\x2A	122	F11	\x78	\xF0\x78
50	Backspace	\x32	\xF0\x32	123	F12	\x07	\xF0\x07
51	N	\x31	\xF0\x31	124	Print Screen	\xE0\x12\xE0\x7C	E0\xF0\x7C\xE0\xF0\x12
52	M	\x3A	\xF0\x3A	125	Scroll Lock	\x7E	\xF0\x7E
53	.	\x41	\xF0\x41	126	Pause	\xE1\x14\x77\xE1	\xF0\x14\xF0\x77
54	,	\x49	\xF0\x49				

Appendix B: Function Description Sheet Template





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Exhibit 3. Photographs of transmitter