

Flight Link

**KR-1 Digital Avionics Stack
Stand-Alone Version**

User's Manual

INTRODUCTION

Thank you for purchasing the Flight Link KR-1 Digital Avionics Stack. Flight Link is an industry leader in developing and supporting PC-based aviation training devices. We are dedicated to providing you with the highest quality possible in both product and customer service.

We have kept the instructions for this highly complex equipment short and to the point. With detailed drawings and step by step instructions, this manual should get you in the air in no time.

TECHNICAL SUPPORT

Our technical support hours are Monday-Friday, 8am-4:30pm PST
You can contact us by phone, fax or by e-mail:

Phone: (530) 891-4987

Fax: (530) 891-0405

Email: support@flightlink.com

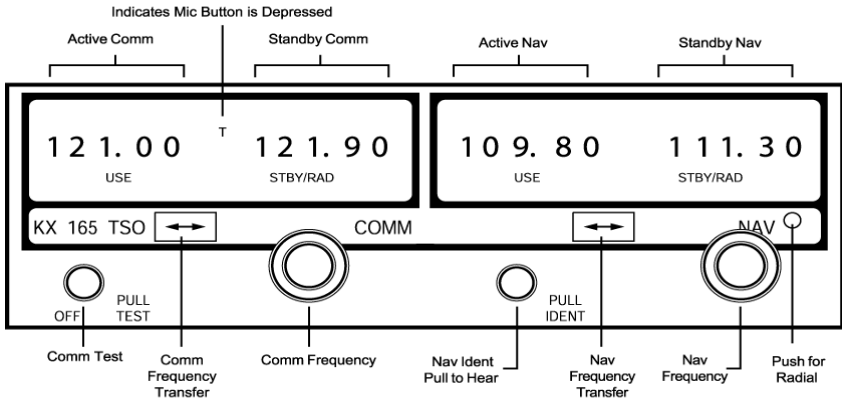
Website: www.flightlink.com

Chico Municipal Airport,
275 Fairchild Ave. 100B,
Chico, CA 95973-8833 USA

Before contacting us for technical support, please gather all available information about your system such as:

- Flight simulator hardware configuration
- Flight simulator software (FSX or X-Plane)
- Specific error messages if applicable
- Computer type including:
 - Manufacturer
 - Operating system
 - Peripherals

KX 165 NAV/COM



COMM TRANSCEIVER

The left portion of the digital display readout is allocated for COMM, USE and STANDBY frequencies. A "T" between the display indicates the TRANSMIT mode of operation.

Select the desired operating frequency in the standby display by rotating the increment/decrement knobs either clockwise or counter-clockwise. A clockwise rotation will increment the previous frequency while a counterclockwise rotation will decrement the previous frequency.

The larger knob will change the MHz portion of the standby display. The smaller knob will change the kHz portion of the standby display.

To tune the radio to the desired operating frequency, the desired frequency must be entered into the standby display and then the transfer button must be pressed. This will trade the contents of the active and standby display.

The transceiver is always tuned to the frequency appearing in the USE display. It is therefore possible to have two different frequencies stored in the USE and STANDBY displays and to change back and forth between them with a simple press of the transfer button.

Activating the push-to-talk switch on the control wheel will cause a "T" to appear between the USE and STANDBY displays, signifying that the transceiver is in the transmit mode of operation.

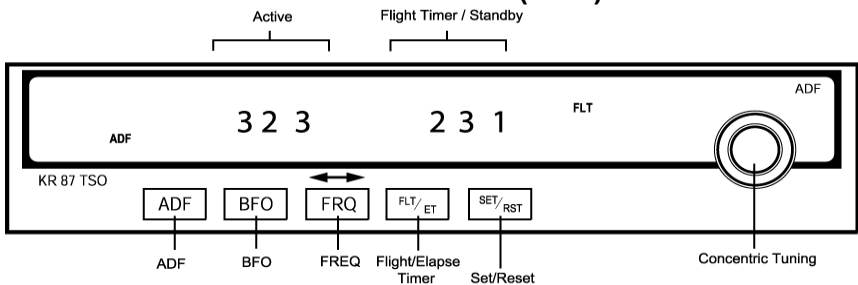
NAV RECEIVER

The right portion of the display is allocated to NAV receiver USE and STANDBY/ RAD information. The frequency channeling is the same as the COMM when operating in the frequency mode. The NAV increment/decrement knob is located on the right hand side of the KX 165. The larger knob operates MHz and increments/decrements the STANDBY/RAD frequency display.

The smaller knob operates kHz. The NAV receiver's lower and upper frequency limits are 108.00 MHz and 117.95 MHz respectively. Exceeding the upper limit of the frequency band would automatically return to the lower limit and vice verse. When the white button located to the right of the large knob is pressed, the VOR bearing is digitally displayed in the STANDBY/RAD window. This is called "Radial mode". In radial mode of operation, the right hand window of the NAV display shows the bearing FROM the station.

Depressing the NAV TRANSFER button will interchange the USE and STANDBY/ RAD frequencies. The NAV IDENT knob is active in the pulled out position so that both voice and IDENT can be heard. When this knob is pushed in, the IDENT tone is attenuated.

KR 87 Automatic Direction Finder (ADF)



The KR 87 Automatic Direction Finder has two operational modes. In the ANT (Antenna) mode, the loop antenna is disabled and the unit simply acts as a receiver, allowing audio reception through the speaker

and the ANT message on the left side of the display will be lighted. Pushing the BFO (Beat Frequency Oscillator) switch will cause a 1000 HZ tone to be heard whenever there is a radio carrier signal present at the selected frequency. It will also light the BFO message in the center of the display.

With the ADF button pressed, the unit is placed into the ADF mode and the loop antenna is enabled. The ADF message on the left side of the display will also be lighted.

FREQUENCY CONTROL

Active Frequency

The active frequency is displayed in the left hand window. This frequency may be changed with the concentric knobs when either timer mode (FLT or ET is being displayed in the right hand window. The exception to this is when the ET message is flashing (see below). To set the 1's and 10's digit, rotate the small knob. Clockwise rotation will increment the digits. The digit will roll over at 99 to 00 and roll under (when turning the knob counterclockwise) at 00 to 99.

Turning the large knob changes the 100's digit and the 1000's digit. The 100's digit carries to the 1000's digit from 9 to 10 and borrows from 10 to 9. The two digits roll over from 17 to 02 and under from 02 to 17, thus limiting the frequencies to the range of 200 KHz to 1799 KHz.

Standby Frequency

The standby frequency is displayed in the right window when the FRQ message is lighted. When this is the case, this frequency may be changed with the knobs in a manner similar to that explained above for the active frequency.

If the standby frequency is not being displayed it may be called to the window by pressing the FRQ button. Pressing this button when the standby frequency is displayed causes the current standby and active frequencies to be exchanged.

FLT/ET Button

If elapsed time (ET) is currently displayed the FLT/ET button will cause the flight timer to be displayed. Pressing this button again will exchange the two timers in the display. If the standby frequency is displayed, the FLT/ET button will cause the timer last displayed to reappear in the window.

Flight Timer

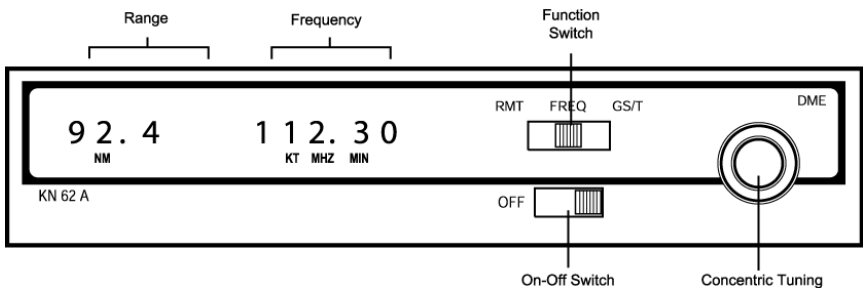
The flight timer is displayed in the right hand window when the FLT message is lit. This timer will count up to 59 hours, 59 minutes, 59 seconds. Minutes and seconds will be displayed until a value of 59 minutes and 59 seconds is reached. On the next count the display will shift to hours and minutes.

Elapsed Timer

This timer has two modes; Count Up and Count Down. When power is applied it is in the count up mode starting at 0. As is true with the flight timer, the elapsed timer will count to 59 hours, 59 minutes, 59 seconds, displaying minutes and seconds until one hour has elapsed, then displaying hours and minutes. When in the Count Up mode the timer may be reset to 0 by pressing the reset button. (Note: Pressing the reset button will reset the elapsed timer regardless of what is currently being displayed.)

To enter the Count Down mode, the Reset (RST) button is held depressed for approximately 2 seconds until the ET message begins to flash (this may be done regardless of current display). While the ET message is flashing the timer is in the ET Set mode. In this mode a number up to 59 minutes, 59 seconds may be preset into the elapsed timer with the concentric knobs. The smaller knob modifies the seconds while the larger knob modifies the minutes. The timer will remain in the ET Set mode (ET message flashing) for 15 seconds after a number is set in or until the RST, FLT/ET, or FRQ button is pressed. The number preset will remain unchanged until the RST button is pressed. When the RST button is pressed after a number is preset, the elapsed timer will start counting down.

KN 62A Distance Measuring Equipment (DME)



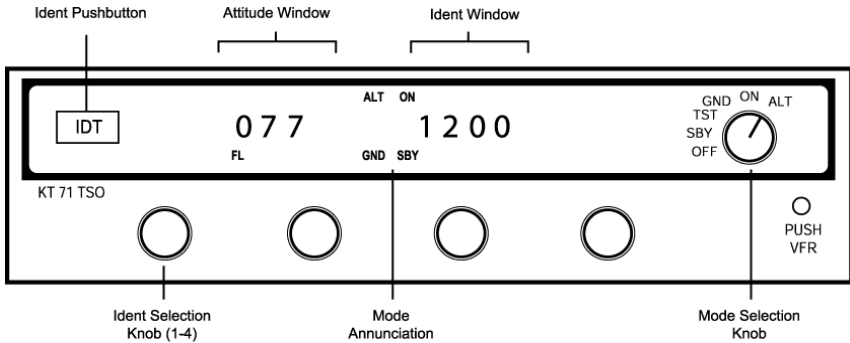
The DME front panel controls consist of an ON-OFF switch, a function switch, and frequency selection knobs. The function switch determines both the information displayed and the channeling source for the DME. In Remote (RMT) mode, the DME is channeled from an external control head, and the display shows range, speed, and time-to-station. In Frequency (FREQ) mode, the DME is channeled from its own frequency selection knobs, and the display shows range and frequency. In Ground Speed/Time-to-Station (GSFT) mode, the DME holds the last internally selected frequency and displays range, speed, and time-to-station.

The frequency hold feature in GS/T mode is necessary to prevent accidental re-channeling of the DME when frequency is not being displayed. To prevent the unit from displaying false information, the DME will display dashes and stay in "search" whenever power is turned on or momentarily interrupted in GS/T mode. Normal operation is re-established by switching to FREQ or RMT mode.

When the DME is locked to a ground station, range is displayed to the nearest 0.1 nautical mile from 0 to 99.9 nautical miles and to the nearest 1 nautical mile from 100 to 389 nautical miles. Ground speed is displayed to the nearest knot from 0 to 199 knots. Time-to-station is displayed to the nearest minute from 0 to 99 minutes. The display also indicates 99 minutes for any computed time-to-station. When the DME is in search mode, dashes are displayed instead of range, speed, and time-to-station.

The effective range of the DME depends on many factors; most important being the altitude of the aircraft. When the aircraft is on the ground, the KN 62A usually will not receive DME stations due to line-of-sight signal limitations. Other contributing factors to the DME's effective range are the location and altitude of the ground transmitter, transmitter power output, and the degree of maintenance of the ground facility. The distance measured by the KN 62A is slant-range distance (measured on a slant from aircraft to ground station) and should not be confused with actual ground distance. The difference between ground distance and slant-range distance is smallest at low altitude and long range. These distances may differ considerably when in close proximity to a VOR/DME facility. However, if the range is three times the altitude or greater, this error is negligible. In order to obtain accurate ground speed and time-to-station, the aircraft must be tracking directly to or from the station.

KT71 Transponder



IDENT PUSHBUTTON

Depressing the "IDT" push button causes the special position identification pulse (SPI) to be appended to Mode A replies for a period of 18 seconds. During this period the KT 71 will annunciate the "R".

VFR PUSHBUTTON

Momentarily depressing the VFR push button (below Mode Selection Knob) causes the pre-programmed VFR code to supersede whatever code was previously entered. The ID code will immediately be accepted for interrogation reply sequence. This ID code will be stored as the last active ID code just as if it were entered from the front panel.

The VFR code is programmed by the following sequence:

- (1) - Place the unit in Standby
- (2) - Dial in the desired VFR code with the ident code selector knobs
- (3) - Depress the "VFR" push button while holding the "IDT" push button

MODE SELECTION KNOB

(Off) - The unit is not energized.

(Standby) - The unit is energized, but is inhibited from replying to any interrogations. "SBY" is annunciated on the display in this mode. The altitude display is disabled. Ground- The unit is inhibited from replying to any interrogation. The ID 4096 code is displayed on the right side of the display and the altitude on the left. "GND" is annunciated on the display in this mode.

(On) - The unit is able to reply to all valid Mode A and Mode C interrogations, however, the altitude display is blank and the ID 4096

code is displayed on the right. "ON" is annunciated on the display in this mode.

(Altitude) - The unit is able to reply to all valid Mode A and Mode C interrogations. The altitude information will be sent in Mode C replies. The ID 4096 code will be displayed on the right and the altitude displayed on the left. "ALT" is annunciated on the display in this mode.

(TST) - The unit will illuminate all segments for at least four seconds.

REPLY

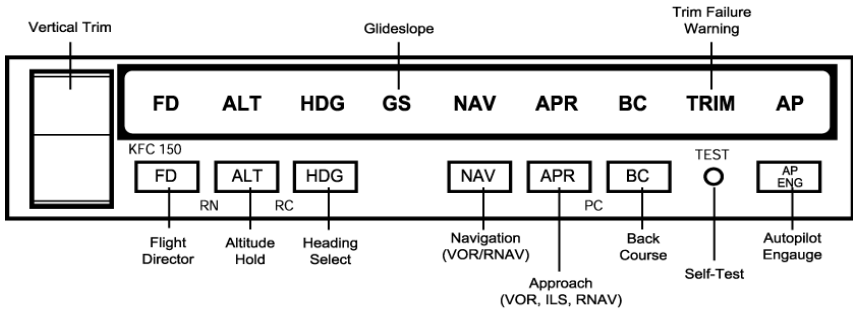
The reply indicator, "R", is illuminated for 750 msec +/- 100 msec when the transponder is replying to a valid interrogation and during the 18 seconds following the initiation of an Ident.

ALTITUDE DISPLAY

The KT 71 displays the Flight Level altitude on the left side of the display. The display is in hundreds of feet. "FL" is annunciated to indicate Flight Level altitude. Flight Level is a term to indicate that the altitude is not true altitude, but barometric altitude which is not corrected for local pressure. For example, FL 040" corresponds to an altitude of 4000 feet, meaning sea level pressure of 29.92 inches of mercury.

Flight Level altitude is only displayed when altitude reporting is enabled, Altitude and Ground mode. The altitude range is -1000 to 99900 feet. If an invalid code is detected, dashes will appear in the altitude window. Altitude reporting will be disabled if the altitude window is blank or has dashes.

FC 150 Autopilot



FLIGHT DIRECTOR (FD) MODE

The flight director mode is activated by depressing the "FD" button. The V-bar (located in the attitude indicator) will appear and provide commands to maintain wing level and the pitch attitude existing at the time of engagement. To satisfy the V-bar command the pilot can manually fly the orange delta wing "aircraft" into the V-bar to align the top of the delta wing flush with the bottom edge of the V-bar or the pilot can engage the autopilot and let it satisfy the commands by maneuvering the aircraft in a similar manner.

The flight director can also be activated by direct selection of any specific mode, which will activate the command V-bar. Such selection will illuminate both FD and the appropriate annunciation mode. Selection of a mode which supersedes one already selected will cause the flight director and/or autopilot to follow the mode most recently selected by the pilot.

AUTOPILOT ENGAGEMENT (AP ENG)

NOTE: If your simulator software provides flight director depiction the autopilot cannot be engaged until the flight director is engaged. The autopilot is engaged by depressing the "AP ENG" button on the KFC 150.

Once engaged, the autopilot will attempt to satisfy the V-bar commands generated by the selected flight director modes.

WARNING: WHENEVER THE AUTOPILOT IS DISENGAGED, THE AP LEGEND ON THE ANNUNCIATOR PANEL WILL FLASH AND AN AURAL TONE WILL SOUND TO ALERT THE PILOT.

HEADING SELECT (HDG) MODE

To operate in heading select mode:

- 1) Move the heading "bug" to the desired heading on the HSI (using the DG knob located in the GAT II.
- 2) Depress the HDG button on the KFC 150 to engage the heading select mode. The V-bar on the FCI will command a bank towards the selected heading, in the direction of the shortest turn. If the autopilot is engaged it will turn the aircraft to intercept and fly the heading.
- 3) The V-bar will continue to command the bank necessary to maintain the elected heading. If you move the heading "bug" again while heading select mode is engaged, the V-bar will immediately turn the aircraft in the direction of the new heading. If the autopilot is engaged, it will immediately turn the aircraft in the direction of the new heading. The HDG is cancelled when NAV or APR coupling occurs, or when the HDG or FD mode buttons are pushed again to "off."

NAVIGATION (NAV) MODE (VOR, RNAV)

The Navigation (NAV) mode provides guidance to the pilot (or autopilot) in intercepting and tracking VOR and RNAV courses. To operate in navigation mode:

- 1) Tune the frequency for the selected VOR (or VORTAC) station. For RNAV set in the way-point distance and VORTAC radial.
- 2) Set the HSI course pointer to the desired course.
- 3) Establish the desired intercept angle by setting the heading "bug" on the intercept heading, and activate HDG mode. ("HDG" light will illuminate.)
- 4) Depress the "NAV" button on the KFC 150. "NAV" light will flash to signify that the NAV mode is armed.
- 5) The V-bar will command the required bank to maintain the selected heading until the capture point is reached. Then the V-bar will command a turn to the intercept course. If the autopilot is engaged, it will turn to satisfy the commands. (The HDG light will go off as HDG mode is disengaged, and the NAV light will stop flashing and illuminate continuously as the NAV mode goes from arm to engage.)

APPROACH (APR) MODE

The approach (APR) mode provides guidance to the pilot (or autopilot) in intercepting and tracking ILS (both localizer and glide slope), and the VOR and RNAV courses. To operate in the APR mode:

- 1) Tune the frequency for the selected ILS, VOR or RNAV approach.

- 2) Set the PNI course pointer to the final approach course (ILS front course even when flying a back course approach.)
- 3) Set the HDG SEL "bug" on the PNI to the desired intercept angle and activate the HDG mode.
- 4) Depress the "APR" button. This arms the automatic capture function. (The "APR" light will flash to signify the approach mode is armed.)
- 5) The V-bar will command the required bank to maintain the selected heading until the capture point is reached. Then the V-bar will command a turn to the intercept course. If the autopilot is engaged it will turn to satisfy the commands. As the V-bar commands the turn to intercept the selected course, the heading mode will be cancelled and the APR mode will go from arm to engage. (HDG light will go out and APR light will go from flashing to steady.)
- 6) Once localizer course capture has occurred on an ILS, the glide slope mode is armed. Automatic capture occurs as the aircraft approaches the glide slope from either above or below. When the intercept occurs, "GS" is illuminated on the annunciation panel. The V-bar commands the pitch necessary to maintain the glide slope. If the autopilot is engaged it will satisfy these commands. If the altitude hold (ALT) mode had been engaged prior to GS capture, it will disengage at capture and the "ALT" light will go out.

BACK COURSE (BC) MODE

The back course (BC) mode provides guidance to the pilot (or autopilot) in intercepting and tracking a reverse course LOC. To operate in the back course mode:

1. Tune the frequency for the selected ILS back course.
2. BE CERTAIN TO SET IN THE ILS FRONT COURSE EVEN THOUGH YOU WILL BE FLYING A RECIPROCAL HEADING ON AN ILS BACK COURSE. FOR EXAMPLE, THE BACK COURSE APPROACH MIGHT HAVE A FRONT COURSE OF 090 DEGREES WHICH YOU WILL SET IN AS YOU FLY A BACK COURSE HEADING 270 DEGREE TO RUNWAY 27.
3. Set the heading select "bug" on the HSI to the desired intercept angle and activate the HDG mode.
4. Select the back course mode by either depressing the "APR" button and then the "BC" button or by merely depressing the BC button by itself. (BC will light and the "APR" light will flash to signify approach mode is armed.)
- 5) The V-bar will command the required bank to maintain the selected heading until the capture point is reached, then it will command a turn to intercept the

course. The "HDG" light will go off and the "APR" light will illuminate steadily as the BC mode goes from arm to engage. If the autopilot is engaged it will turn to satisfy the commands

ALTITUDE HOLD (ALT) MODE

The altitude hold (ALT) mode provides guidance to the pilot (or autopilot) for maintaining the altitude at which this mode was engaged. To operate in the ALT mode:

1. Depress the "ALT" button when the aircraft has reached the altitude you wish to maintain. (For smoother operation, press the "ALT" button when the vertical velocity is no more than 500 fpm.)
2. The V-bar will command the required pitch to maintain the selected altitude. The pilot can maintain this altitude manually by following the V-bar or engage the autopilot and have it satisfy the flight director commands.
- 3) The vertical trim switch may be used to adjust altitude up or down at a maximum rate of 500 fpm without disengaging altitude hold. (The ALT mode is cancelled by automatic glide slope capture or by depressing the "ALT" button.) When the vertical trim switch is released, the flight director V-bar will begin to command pitch changes to maintain a new altitude.

SYSTEM SELF-TEST

The KFC 150 system incorporates a system self-test function which is activated when the Test button is pressed. The following actions will occur when the Test button is pressed:

1. All annunciation lights and the trim light will illuminate.
2. The trim light will flash 4 times.
3. The annunciation legends will go blank, an aural tone will beep 6 times and the "AP" light will flash 12 times and go off.
4. The KFC 150 display will go blank.
- 5.

Windows 7/Vista/XP Installation

KR-1 uses the EPIC USB system and needs to have EPIC associated drivers and software (EPICenter) installed. EPICenter will only work with the Windows (7/Vista [64/32 bit] and XP [32 bit only]) operating system.

If an older version (previous to version 1.4.0.1) of EPICenter is installed: please follow the "[Removing Older EPICenter Versions](#)" instructions at the end of this document.

1. Plug in and switch on the power to the KR-1--Do NOT connect the USB cable to your computer yet.
2. With your computer on and booted into Windows insert the EPICenter 1.4.0.1 install CD--installation should start; follow the on-screen instructions and select your hardware. If installation does not start automatically use Windows Explorer to navigate to the CDROM and double-click on "EPICenter_1401_Full.exe" to start the installation.
3. After the EPICenter installation finishes, connect the USB cable to an available USB socket on your computer, please give Windows a minute or two to detect and install *its* drivers. If Windows cannot locate the drivers, direct Windows to the "C:\EPIC\drivers\WDM" folder.
4. **REBOOT** Windows to start the EPIC driver service.
5. Now insert the Control Center install disc, installation should begin automatically, and follow the on-screen directions.

Removing Older EPICenter Versions

BACK-UP YOUR SYSTEM FIRST.

[Follow the instructions below **ONLY** if there is/was an older version of EPICenter installed on your PC]

Uninstall Control Center and/or EPICenter in Windows Control Panel first then follow these steps:

Step 1: Uninstall from device manager:

Plug in EPIC USB.

Go to device manager...Universal serial bus controllers.

Find Composite device (there may be more than one), right click properties, details, hardware IDs. EPIC USB is "VID_A2C0," right click on the correct one. Uninstall the driver.

Step 2: Delete existing ".inf" and ".pnf" files:

In "Windows\inf" directory (if this is hidden, to unhide different in different OS's, for windows7: right-click on the Start Button and "Open Windows Explorer," click C:, Tools, Folder Options..., click View tab, select "show hidden files and folders" under "Hidden files and folders," and uncheck "hide extensions for known file types--click "OK." Now search in the "Windows/inf" directory for OEM*.inf containing VID_A2C0 and delete the OEMxx.INF and OEMxx.PNF files found.

Step 3: Unplug EPICUSB. run EPICenter_1.401_Full.exe--make sure you select

to install the driver when the question comes up.

Step 4: plug in EPICUSB; new hardware should be found and installed...

Step 5: REBOOT WINDOWS.

Step 6: After Restarting, run EPICenter, it should find EPICUSB0. In EPICenter under menu item "Tools/Hardware.../Load EEPROM" select and Open "USBW13BF.bin" in the "Enter Checksum" window, type "13BF" and wait for Epicenter to update the EEPROM; close EPICenter.

Insert the Control Center installation CD and follow the onscreen instructions.