

KENWOOD

Kenwood TrueX™ CD-ROM Drive Reviewer's Guide



TRUE-X™ World's Fastest CD-ROM Drive



November 1999

Please Read Before Starting Your TrueX™ CD-ROM Drive Evaluation

Thank you for considering the world's fastest line of CD-ROM Drives, Kenwood's TrueX™ CD-ROM Drives, for your evaluation. Kenwood would like your experience with this Kenwood TrueX™ CD-ROM Drive to be positive. Kenwood is confident that you will find the performance of the TrueX CD-ROM Drive that you are about to evaluate vastly superior to that of any other CD-ROM drive currently on the market.

Unlike single beam "Max" drives, Kenwood's TrueX CD-ROM Drives use Zen's TrueX Technology for TrueX Performance. Only TrueX CD-ROM Drives offer extremely high data transfer rates at significantly low rotational speeds for a faster, quieter, and more reliable CD-ROM Drive. TrueX Drives are available in 42X TrueX, 52X TrueX and 72X TrueX models.

The Kenwood TrueX™ CD-ROM Drive is a high-end product that breaks through technological barriers. In order to ensure that you will be able to see the TrueX Drive perform at its optimum level, please take a moment to review the following suggestions.

1. Follow the recommended System Requirements:

Kenwood TrueX™ CD-ROM Drives are high-end products designed to work on newer PCs. Often older software and hardware components can create unforeseen "bottlenecks". It is important to recognise that the TrueX Drive will work on an older PC, but sometimes at slower results than expected. We recommend having Windows 95 OSR2 or higher, and Intel's 440LX chipset (or equivalent) or higher to achieve the maximum performance from Kenwood TrueX™ CD-ROM Drives.

Kenwood recommends the following configuration for your PC:

Recommended For Optimum Performance

- 233MHz Pentium® with MMX or higher (or equivalent)†
- 32MB RAM or higher recommended
- PCI Bus Master Controller
- PCI Bus Master EIDE Drivers for Windows 95/NT®
- Windows® 95 OSR2 or Windows® 98

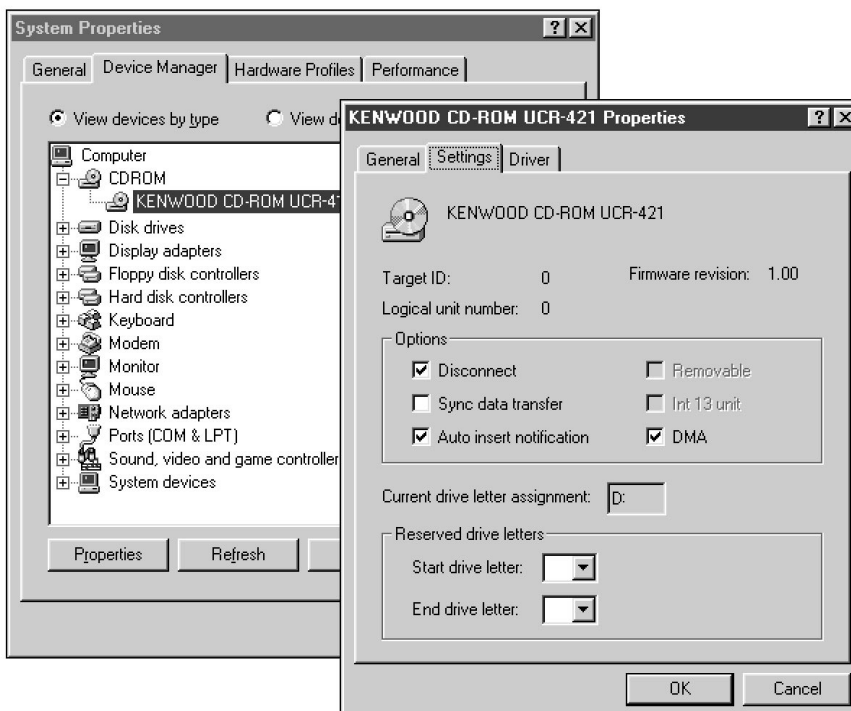
2. Attach the Kenwood TrueX™ Drive as the MASTER device on the Secondary IDE channel.

3a. For Windows 95 and Windows 98, make sure bus-mastering DMA is enabled and file system properties are optimised.

DMA and File System Properties:

Your system must have Bus Mastering DMA enabled for the Kenwood TrueX™ CD-ROM Drive to operate at optimum performance. Use the following procedure (as shown below):

- 1) Using the right mouse button, click the “My Computer” icon on the Windows® 95 desktop and select “Properties”.
- 2) Select the “Device Manager” tab.
- 3) Click on the “+” in front of the “CD-ROM” icon to expand the list (if it is not already expanded).
- 4) Double-click on the “KENWOOD CD-ROM”.
- 5) Select the “Settings” tab.
- 6) The DMA checkbox is located to the right of the “Auto insert notification” checkbox. If it is not already checked, click in the DMA box. And click “OK”

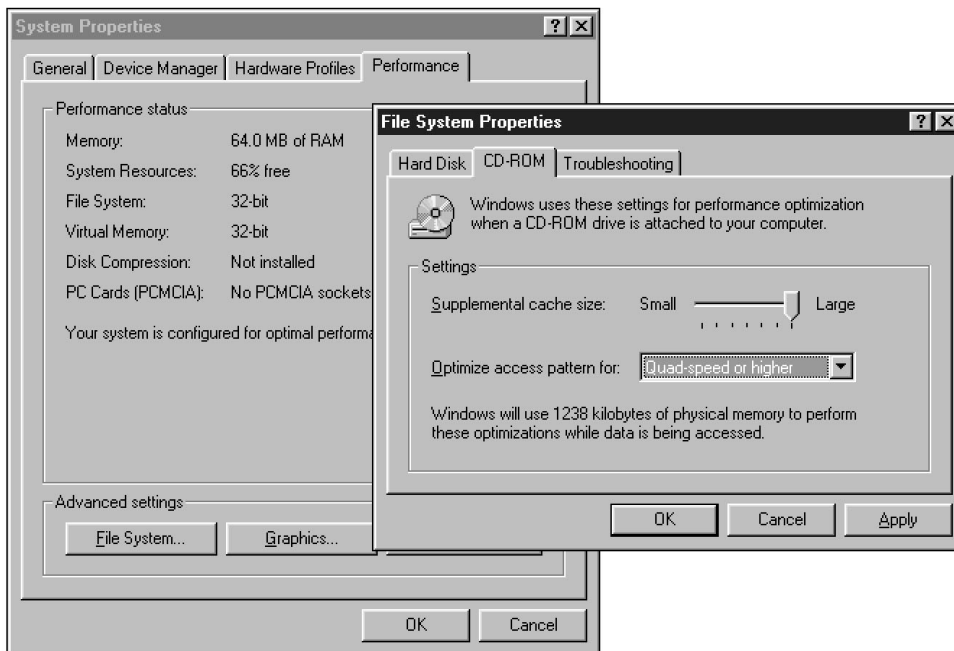


In order to get the added benefits the Windows® operating system provides, you should make sure the File System Properties for CD-ROM are optimised. Follow the process below to ensure your operating system is set for best results (as shown below):

- 1) Using the right mouse button, click once on the “My Computer” icon on your desktop and select “Properties”.
- 2) Select the “Performance” tab.
- 3) Click once on the “File System” button.
- 4) Select the “CD-ROM” tab.

1) If the Kenwood CD-ROM is not listed in step 4, your drive is not connected properly. Go back to Sections 3 & 4 of the Installation & User's Guide to verify your installation.
 2) If no DMA checkbox is visible in step 6, you must contact your computer's motherboard manufacturer or Microsoft for the Bus Mastering DMA software.

- 5) Move the "Supplemental cache size" adjustment bar to "Large" and select "Quad-speed or higher" in the drop-down menu.
- 6) Click "OK".



Since DOS and Windows 3.1x generally do not support bus-mastering DMA, our TrueX Drive will not perform at its optimum speed in these environments.

3b. Windows NT does not always support bus-mastering DMA

You may have to download and install a bus-mastering driver in order to get full performance from the Kenwood TrueX™ CD-ROM Drive. If you encounter any performance degradation or other issues in NT, please contact your motherboard manufacturer for a bus-mastering driver, or contact us. See contact information at the end of the document.

4. Verify BIOS Settings

a) 52X TrueX CD-ROM Drives

Settings for the secondary controller and make sure it is set to PIO Mode 4. If unsure on how to do this, check with your motherboard manufacturer or contact us. See contact information at the end of the document.

b) 72X TrueX CD-ROM Drives

Ultra DMA is automatically enabled if your system supports UDMA.

5. Benchmark Testing

a) 52X TrueX CD-ROM Drives

We tested the 52X TrueX™ Drive with several benchmark programs to determine which reported consistent and reasonable results for both our 52X TrueX™ Drive and our competitor's "Max" products. You may want to use any of three programs to benchmark the 52X TrueX™ Drive versus other "Max" CD-ROM drives. We suggest using either: CD WinBench 99 (available from Ziff-Davis); CD Tach 98 (a copy is enclosed); or the enclosed Kenwood Demo CD 1.0. The Kenwood Demo CD contains a visual benchmarking program called picPlayer which displays 80 – 1 MB high-resolution images to the screen as fast as it can read it off of CD. There are two copies of the Kenwood Demo CD enclosed which will allow you to run a side by side comparison of the 52X TrueX™ Drive versus a competitor's "Max" drive. When running on the Kenwood 52X TrueX™ Drive we recommend that you use the one titled "picPlayer", as it has the Kenwood logo on the screen. When benchmarking a competitor's "Max" drive, we recommend that you run the program titled "picPlayer NoLogo" – it is the same program as picPlayer, only it does not display the Kenwood logo on the screen.

b) 72X TrueX CD-ROM Drives

Kenwood tested the 72X TrueX CD ROM Drive with WinBench '99 (ver1.1). Kenwood chose WinBench '99 as its bench marking tool because WinBench has implemented better support for CD-ROM drives with very large data transfer rates and better reflects TrueX performance.

6. In some cases, if you are using discs with a lot of eccentricity or scratches, you may encounter less than 45X-72X results.

This is normal. Our TrueX Drive prioritizes data integrity over data speed, so if it finds spots that are difficult to read, it will reduce the speed of data by reducing the number of tracks being read concurrently. Also when reading CD-R and CD-RW media you will experience less than full performance, depending on the quality of the media, and recording environment.

7. Slower than expected performance

The TrueX CD-ROM installs and is recognized by Windows®95/98, but is performing slower than expected:

- Make sure that DMA is enabled (see point 3).
- Confirm correct BIOS settings (see point 4).
- Confirm that "Supplemental Cache Size" is set to "LARGE" and Read- Ahead caching is set to "Quad-Speed or Higher" (see point 3).

Note: Ultra DMA is automatically enabled if your system supports UDMA.

8) Call Technical Support if you encounter problems

One of the best values Kenwood offers to its customers is unlimited technical support. You may contact Kaz Nakamura via email at knakamura@kenwoodtech.com with the word "EVAL!" in the subject field, or call us at +1 408 4677922. Kenwood's technical support staff has the experience to help resolve most issues within a few minutes. Please use them if necessary.

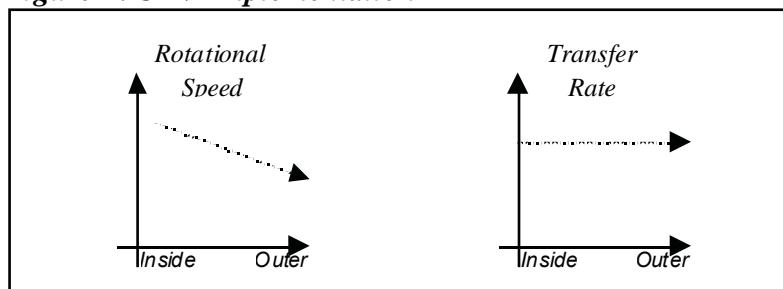


With these tips in mind, we trust your experience with Kenwood's award winning line of TrueX™ CD-ROM Drives will be an amazing one. Kenwood fully intends to use its technological expertise gained from 50 years in the consumer electronics business to design computer peripherals that take the industry to a brand new level of performance and quality standards.

CD-ROM Basics

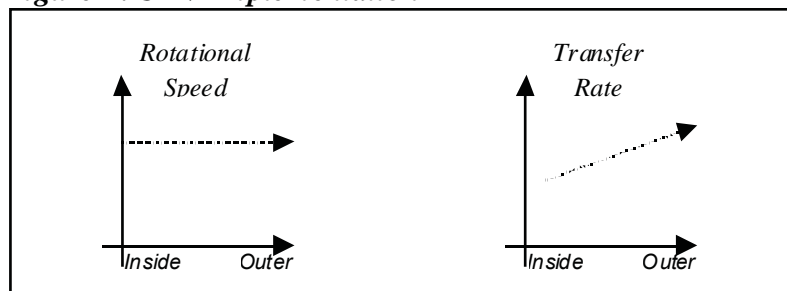
Originally, CDs had a transfer rate performance of 150 KB/second (today referred to as 1X) and were designed for audio, which required a constant data throughput in order to deliver smooth and level sounds. Since the data on an audio disc was located in one continuous track starting from the inside of the disc, the outer tracks contained more data. To create the constant data transfer, the drives had to rotate fastest on the innermost track and slowest on the outermost track. This method of providing constant data by spinning the disc at variable speeds was termed Constant Linear Velocity or CLV (see Figure 1).

Figure 1: CLV Implementation



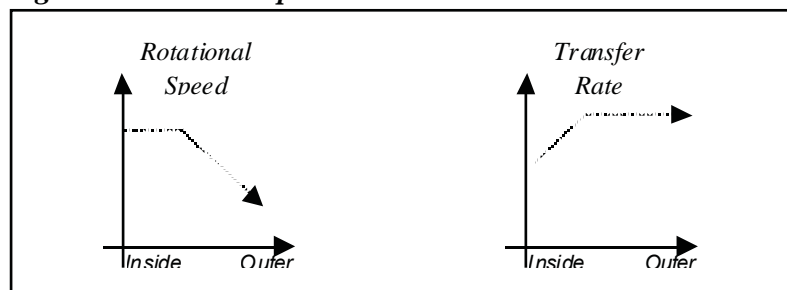
Once CD-ROM drives reached 12X speeds (over 6000 rpm) the CLV method became problematic. The higher rotational speed on the inner tracks caused vibration that affected the data readability and overall reliability of the device. So the industry implemented a new method that spun the disc at a constant rpm, thereby delivering a variable data rate increasing from inner track to outer track. This method is known as Constant Angular Velocity or CAV (see Figure 2). Until TrueX, CD-ROMs could only read a single track at a time. Improvements in transfer rate were made by using the CAV method and increasing the rotational speed of the disc. This method delivers very small incremental performance gains; introduces disc wobble, noise and vibration; and never maintains the “advertised” transfer rate. In reality, the average disc is less than half full (about 300MB), therefore the maximum rating is never achieved because data rarely resides on the outermost tracks.

Figure 2: CAV Implementation



Today, all CD-ROM drives that boast higher than 12X transfer rates are using some variation of CAV or Partial CAV (see Figure 3). Since the drives that use CAV or a variation of CAV have a variable transfer rate, much of the industry refers to these CD-ROMs as "MAX" drives (for example, 32X MAX). Those companies that are more conservative in their marketing refer to both the maximum and the minimum transfer rates so the consumer understands the reality (i.e. 32X max/14X min). (see Figure 3)

Figure 3: P-CAV Implementation



Kenwood's Approach

Kenwood has taken a different approach to CAV, CLV and PCAV technologies. Kenwood's 52X TrueX™ employs CLV with Zen's TrueX™ technology. The Kenwood 72X TrueX employs PCAV (Particle Constant Angular Velocity) and Zen's TrueX™.

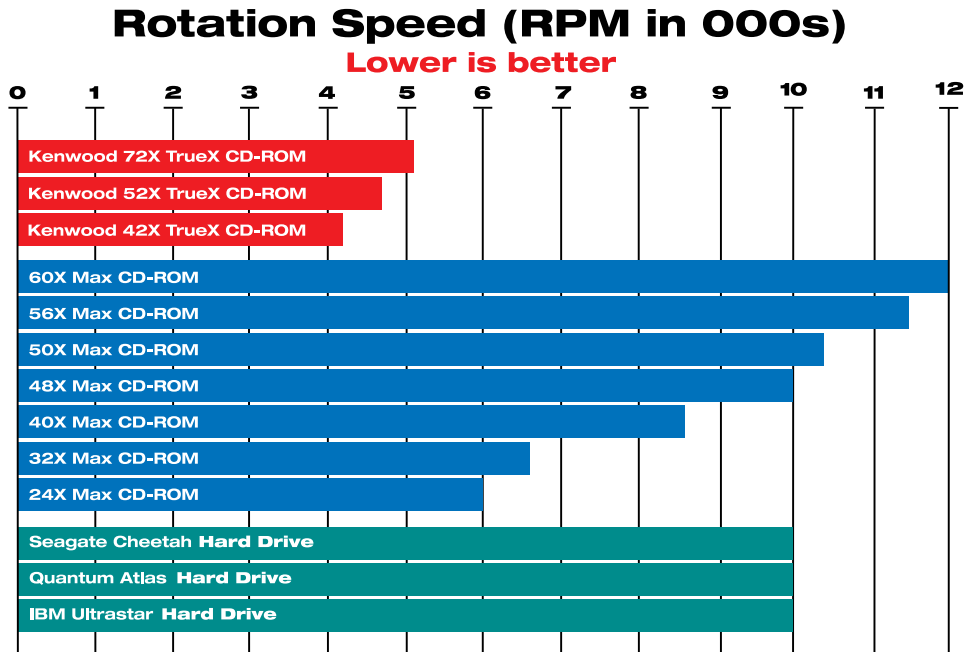
Kenwood began using PCAV and TrueX technology with the 72X TrueX CD-ROM Drive in order to take advantage of both higher more consistent transfer rates and to achieve better access times at lower rotational speeds; TrueX Performance.

Some may ask, "If Kenwood is using P-CAV technology, how is it different from MAX drives on the market today?". The answer is simple, "TrueX technology".

TRUE-X™

Rotational Speeds

Until recently, CD-ROMs had to spin the discs faster to achieve marginal performance gains. In fact, today's 48X MAX drives are spinning at over 10,000 rpm to achieve 48X only at the outermost tracks of a disc (as mentioned before, IF data even exists in this portion of the disc). Furthermore, vibration, noise, long spin-up times, and media readability continue to cause problems as rotation speeds increase.



Lower Rotation Speeds Reduce Vibration and Noise

As the chart above illustrates, even the rotational speeds of the 48X Max drives reach the same RPM level as the fastest hard drives. Remember, hard drive platters are balanced, polished, and then hermetically sealed. These devices have much tighter tolerances than their removable media counterparts. Furthermore, these devices are not expected to read removable media that could be under a pile, on a users desk for weeks before being used. Therefore, how can CD media that has lower tolerances, and much higher vulnerable to damage, due to it removability, be expected to function correctly at such high rotational speeds? (10,000 RPM, the same speed as the fastest hard drives).

Disc wobble, noise and instability has become even more of an issue recently with the 50X-56X MAX drives that have been appearing in the market.

TrueX technology is the answer to these performance limitations!

TRUE-X™

TrueX technology is a component set that includes optics, detection devices and a high-speed ASIC. With more than 10 years of experience manufacturing high-precision optical pick-ups for use with audio CD players, Mini Discs systems, and Laser Discs players, Kenwood was able to develop the world's first 7-Beam Pickup to form the heart of its TrueX CD-ROM Drive offering.

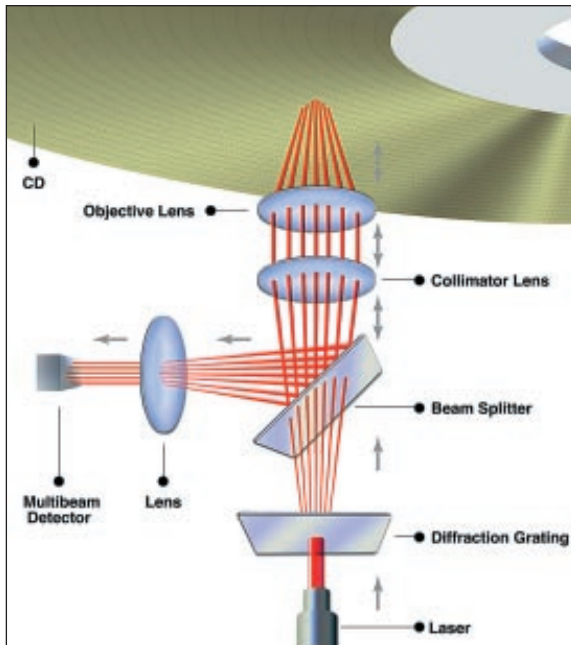


Kenwood Multi Beam Pick Up



Zen Research ASIC

figure 4



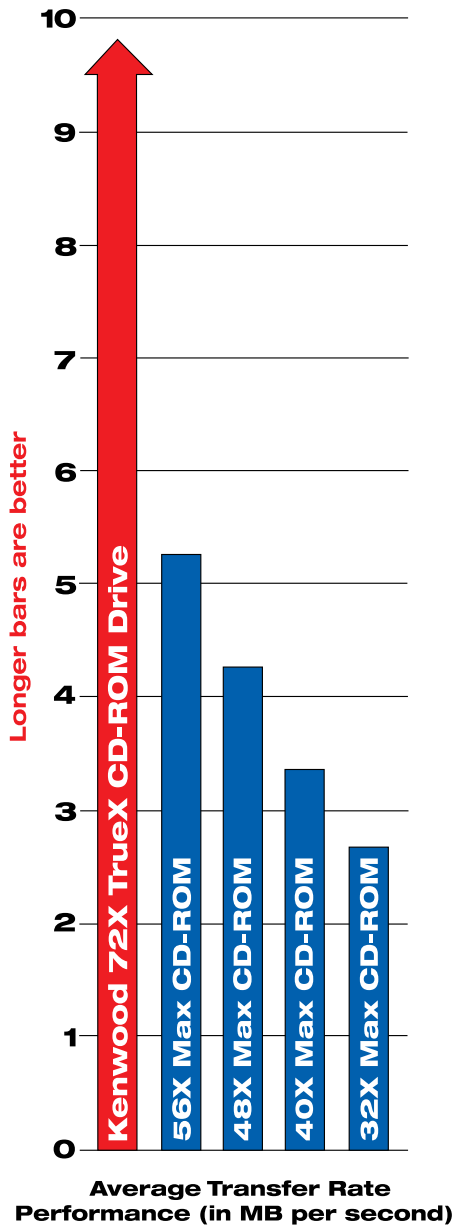
TrueX™ technology works by illuminating multiple tracks simultaneously, reading them in parallel, and processing the data through the custom ASIC, yielding superior read performance when compared to traditional single beam drives.

(see figure 4).



TrueX Speed and Performance

Kenwood TrueX™ CD-ROM drives use Zen's TrueX™ technology to deliver a transfer rate far exceeding anything obtainable by a traditional single beam CD-ROM drive. Kenwood currently offers 42X TrueX, 52X TrueX and 72X TrueX CD-ROM Drives. That's a data transfer rate of up to 10.8 MB per second across the disc. This speed is faster than most hard drives, at significantly lower rotational speeds.



The chart to the left compares the average transfer rates of traditional single beam "Max" Drives on the market today with Kenwood Technologies' TrueX CD-ROM Drives. The results are truly amazing.

The 72X TrueX CD-ROM Drive is 80% faster than the average 50X single beam Max drive.

TrueX performance is not just higher average transfer rates.

TrueX performance is **higher** transfer rates at **lower** rotational speeds. The 72X TrueX CD-ROM Drive has a rotational speed of 2,700 to 5,100 rpms which is half the rotational speed of the average 50X single beam Max drive available today.

TrueX Drives can therefore break through existing limitations to deliver the highest performance at significantly low rotational speeds; TrueX performance. The result is a faster, quieter and more reliable CD-ROM drive.

No single beam "Max drive" on the market today can claim such high transfer rate at such low rotational speeds. Only Kenwood TrueX CD-ROM Drives give end-users the TrueX performance they can count on for applications such as 3D games, multimedia, digital audio extraction, installations, and reference content.

With Kenwood TrueX CD-ROM Drives, CD based applications and data get TrueX performance, high transfer rates at low rotational speeds, from the beginning of the disc to the end. Innovative technology powered by Zen, available only from Kenwood.

Contact and Fact Sheet

Product Names:

- Kenwood 72X TrueX™ CD-ROM Drive
- Kenwood 52X TrueX™ CD-ROM Drive
- Kenwood 42X TrueX™ CD-ROM Drive

Price:

- 72X TrueX Suggested Retail Price: €130 (Excluding Vat)

Manufactured and Sold By:

Kenwood Technologies (USA), Inc.

1701 Junction Court, Suite 100, San Jose, CA 95112 USA

Phone: +1 408 467-7900 • Fax: +1 408 451-1150 Web: www.kenwoodtech.com

Sales Information:

Web: www.kenwoodtech.com

Email: sales@kenwoodtech.com

Product Information:

Web: www.kenwoodtech.com

UK: Tel: + 353 61 702 071

Email: mullins@pie.ie

Nordic: Tel: + 353 61 702 043

Email: Gabriel@pie.ie

Technical Support Information:

Web: www.kenwoodtech.com

Email: support@kenwoodtech.com

Tel: + 353 61702 985 • Fax: + 353 61 702 001

General Information in Europe:

Web: www.kenwoodtech.com

Email: info@pie.ie

Phone: +353 61702 000 • Fax: + 353 61702 001

Press Information:

Kenwood Press Room: www.kenwoodtech.com

Image Library: www.kenwoodtech.com

Thomas Hatcher, V.P. Marketing

Kenwood Technologies (USA), Inc.

Phone: +1 408 467-7920

Email: thatcher@kenwoodtech.com

Public Relations Contact:

Heather Swanson, Account Executive

Shotwell Public Relations, Inc.

Phone: +1 408 530-8081 x103

Email: heather@shotwellpr.com

Powered by Zen TrueX™ Technology:

Zen Research, Inc.

20400 Stevens Creek Blvd.

Cupertino, CA 95014

Phone: +1 408 863-2700

Fax: +1 408 863-2772

Web: www.zenresearch.com

Public Relations Contact:

Marie Bahl, Rainmaker Communications

Phone +1 650 210-9474

Email: marie_bahl@rainmakerpr.com

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