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OMRON
MICROSCAN

MS-3 Laser Scanner User Manual

P/N 84-000003-02 Rev E

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Disclaimer

The information and specifications described in this manual are subject to change without notice.

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About the MS-3 Laser Scanner

The MS-3 is an ultra-compact scanner that can decode high density symbols from 2 to 10 inches at a 70 degree scan angle, at speeds of 300 to 1,000 decodes per second, with a power draw of only 300mA at 5V. The multi-function **EZ** button can be used for read rate tests and automatic calibration right out of the box, and it can also be programmed to perform a variety of other functions.

Programmable firmware also allows considerable control of multiple features, including three programmable relay outputs and new master and trigger inputs.

The scanner can be configured with **ESP** (**E**asy **S**etup **P**rogram), Omron Microscan's proprietary scanner setup software. **ESP** can be downloaded from the Omron Microscan website at **www.microscan.com**. You must be running Microsoft Windows 2000 or higher to use **ESP**.

Scanner Communication

There are five ways to program the scanner:

1. Omron Microscan's Windows-based **ESP**, which offers point-and-click ease of use and visual responses to user adjustments.
2. Serial commands such as **<K100,1>** can be sent from ESP's Terminal or another terminal program.
3. Embedded firmware (onboard menus).
4. Symbol configuration.
5. The **EZ Button** on the top of the scanner.

Note: You can learn the current setting of any parameter by inserting a question mark after the command number, as in **<K100?>** To see all "**K**" commands, send **<K?>**.

Warning and Caution Summary

This equipment has been tested and found to comply with the limits for a Class A 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. This 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 communication. 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.

For connection to a UL-listed direct plug-in power unit marked Class II and rated 10 to 28 VDC at 5 watts or greater.

European models must use a similarly rated Class I or Class II power supply that is certified to comply with standard for safety EN 60950.

Based on the assessment of IEC 60825-1 3rd Edition (2014), the MS-3 does not exceed the AEL of a Class 1 laser product.

Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous laser light radiation exposure.

There are no user-serviceable parts in the scanner. Opening the scanner voids the Omron Microscan Systems, Inc. warranty and could expose the user to laser diode power.

The laser beam can be harmful to eyesight. Avoid eye contact with the laser beam. Never point the beam at other people, or in a direction where people may be passing.

Warning and Caution Summary (cont.)

The following label is located on side of the MS-3 Laser Scanner:

- Embedded Laser Diode - 650nm, 12mW
- Wavelength: 650nm
- Beam Divergence: 0.6˚ (typ.)
- Pulse Duration: 38µs
- Maximum Power: 1mW
- Based on the assessment of IEC 60825-1 3rd Edition (2014), the MS-3 does not exceed the AEL of a Class 1 laser product.

Location of the MS-3's laser aperture:

CAUTION: Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

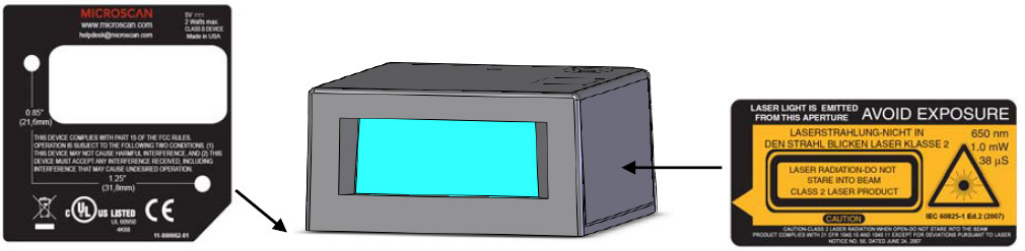
IMPORTANT: The MS-3 is intended for connection to a UL-listed direct plug-in power unit marked Class 2 and rated 5 VDC at 3.5 Watts, or greater if using electrical accessories.

European models must use a similarly rated Class 1 or Class 2 power supply that is certified to comply with standard for safety EN 60950.

Warning and Caution Summary (cont.)

Warning Label Placement

These labels are located on the MS-3 Laser Scanner:



On Bottom On Side

Statements of Compliance

This device has been tested in accordance with IEC 60825-1 2nd ed., and has been certified to be under the limits of a Class 2 Laser device.

The MS-3 has been tested for compliance with FCC (Federal Communications Commission) regulations and has been found to conform to all applicable FCC Rules and Regulations.
To comply with FCC RF exposure compliance requirements, this device must not be co-located or operate in conjunction with any other antenna or transmitter.
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
The MS-3 conforms to the following requirements:

- FCC 15.107:2015 Class B Conducted Emissions
- FCC 15.109(g):2015 Class B Radiated Emissions

The MS-3 has been tested for compliance with CE (Conformité Européenne) standards and guidelines, and has been found to conform to applicable CE standards, specifically the following requirements:

- EN 55022:2010/AC:2011 Class B Radiated Emissions
- EN 55022:2010/AC:2011 Class B Conducted Emissions
- EN 55032:2012 Class B Radiated Emissions
- EN 55032:2012 Class B Conducted Emissions

The MS-3 has been tested by an independent electromagnetic compatibility laboratory in accordance with the applicable specifications and instructions.
The MS-3 is compliant with FDA performance standards for laser products except for deviations pursuant to laser notice no. 50, dated June 24, 2007.

Canada

The MS-3 conforms to the following requirement:

- ICES-003:2012 updated 2014 Class B Radiated and Conducted Emissions

Japan

The MS-3 conforms to the following requirement:

- VCCI:2015-04 Class B Radiated and Radiated and Conducted Emissions

Australia and New Zealand

The MS-3 conforms to the following requirements:

- AS/NZS CISPR 22:2009 + A1:2010 Class B Radiated and Conducted Emissions
- AS/NZS CISPR 32:2013 Class B Radiated and Conducted Emissions

Manufacturer: Omron Microscan Systems, Inc., 700 SW 39th St., Renton, WA 98057, USA
Производитель: «Омрон Майкроскан Системс Инк., США, Рентон, штат Вашингтон 98057, 700 SW 39th Street
Representative: Omron Electronics Limited Liability Company, 125040, Russian, Moscow, Ulitsa Pravdy, 26. OGRN 10677746976582
Представитель: Общество с ограниченной ответственностью "Омрон Электроникс", 125040, Российская Федерация, город Москва, улица Правды, дом 26, ОГРН 10677746976582
Date of Manufacture: The first two digits of the serial number are the two-digit year of manufacture, or the year of manufacture +20 for serial numbers starting with 3.

Дата изготовления: первые две цифры серийного номера являются двумя последними цифрами года изготовления + 20 для серийных номеров, начинающихся с 3.

Statement of RoHS Compliance

All Omron Microscan readers with a ‘G’ suffix in the FIS number are RoHS-Compliant. All compliant readers were converted prior to March 1, 2007. All standard accessories in the Omron Microscan Product Pricing Catalog are RoHS-Compliant except 20-500013-01 and 98-000039-02. These products meet all the requirements of “Directive 2002/95/EC” European Parliament and the Council of the European Union for RoHS compliance. In accordance with the latest requirements, our RoHS-Compliant products and packaging do not contain intentionally added Deca-BDE, Perfluorooctanes (PFOS) or Perfluorooctanic Acid (PFOA) compounds above the maximum trace levels. To view the document stating these requirements, please visit:

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32002L0095:EN:HTML

and

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:372:0032:0034:EN:PDF

Please contact your sales manager for a complete list of Omron Microscan’s RoHS-Compliant products.

This declaration is based upon information obtained from sources which Omron Microscan believes to be reliable, and from random sample testing; however, the information is provided without any representation of warranty, expressed or implied, regarding accuracy or correctness. Omron Microscan does not specifically run any analysis on our raw materials or end product to measure for these substances.

The information provided in this certification notice is correct to the best of Omron Microscan’s knowledge at the date of publication. This notice is not to be considered a warranty or quality specification. Users are responsible for determining the applicability of any RoHS legislation or regulations based on their individual use of the product.

In regards to “RoHS Directive 2011_65_EU” Omron Microscan produces Monitoring and Control Instruments as well as Industrial Monitoring & Control Instruments as defined within the directive. Omron Microscan has developed and is implementing a RoHS2 compliance plan with the intention of bringing all active products listed in our current marketing literature within full compliance as per the directive deadlines.

Key milestones for the transition plan are as follows:

- Complete internal product audit by July 2014.
- Initial “Monitoring and Control Instruments” RoHS2 compliant products available by December 2014
- Initial “Industrial Monitoring & Control Instruments” RoHS2 compliant products available by July 2015
- All new products introduced in 2015 are expected to be WEEE & RoHS2 compliant.

Omron Microscan will mark the products with the ‘CE’ marking that complies with the RoHS2 process to acquire ‘CE’ certification per the example given: Example >> Machinery directive + EMC directive + RoHS2 = Declaration of Conformity.

1 Quick Start

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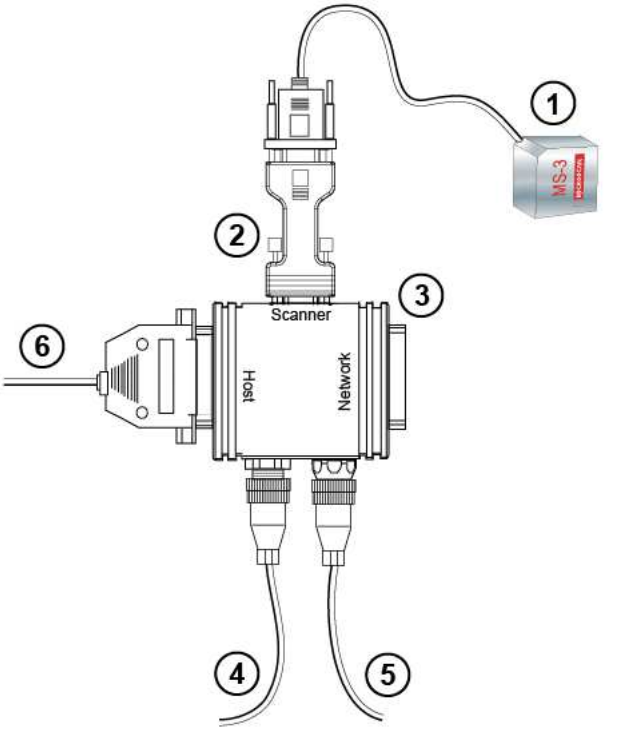
This section is designed to get the scanner up and running quickly so the user can get a sense of its capabilities and test sample bar code symbols. Detailed setup information for configuring the scanner for your specific application can be obtained in the subsequent chapters.

Step 1 — Hardware Required

Itema	Part Number	Description
1	MS-3-XXXXG	MS-3 laser scanner
2	FIS-0001-0035G	IC-332 Interface converter
3	99-000018-01	IB-131 Interface box
4	User-supplied	Host computer
5	61-300026-03	Null modem configuration cable
6	97-000012-02 (90-264 VAC, 24VDC)	Power supply
7	99-000017-01	Optional object detector

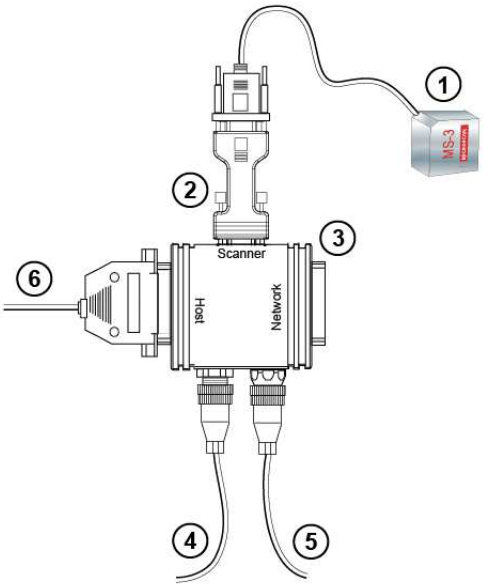


MS-3 Hardware Configuration

Caution: If using your own power supply, be certain that it is wired correctly and supplied voltage is within the +10-28VDC limits. Incorrect wiring or voltage can cause software or equipment failures.

Step 2 — Connect the System

1. Connect the scanner (**1**) to the “SCANNER” connector on the IC-332 interface converter (**2**) using the attached 3-foot cable.[1]
2. Connect the IC-332 directly to the “SCANNER” 15 pin connector on the IB-131 (**3**).
3. Connect the host computer (**4**) to the IB-131 “HOST” 25-pin connec- tor via the null modem cable (**5**).[2](Refer to **“IB-131 Interface” on page A-8** for pin connections.)
4. Connect power supply (**6**) to the IB-131 “POWER” connector.
5. Apply power to the system.



MS-3 Hardware Configuration

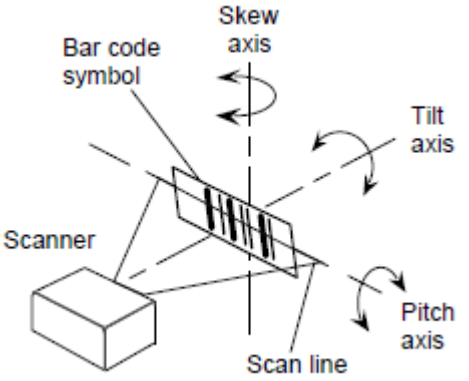
Caution: Be sure that all cables are connected **BEFORE** applying power to the system. Always power down **BEFORE** disconnecting any cables.

1. Since power supply is included in the single cabling assembly, the reader cable should not exceed 3 feet. RS-232 cabling from the IB-131 to the host can be up to 47 feet provided it does not include power input.
2. If using your own null modem RS-232 host cable, be certain that the host’s TxD connects to the reader’s RxD and the reader’s TxD connects to the host’s RxD.

Step 3 — Position Symbol and Scanner

Note: **Code 39** is the default code type enabled. If you are uncertain as to your symbology type, enable all codes by selecting the **Auto Discriminate** macro in **Terminal** mode.

1. Set up a symbol at the scanning distance you are using in your application. (See **"Read Ranges" on page A-3**.)
2. Avoid bright light or IR light from other sources, including other scanners.
3. Pitch symbol or scanner slightly to avoid specular reflection, the return of direct, non-diffused light.



Symbol/Scanner Position

Note: If using an I 2/5 symbol, verify that the number of characters in the symbol being scanned matches the symbol length enabled for the I 2/5 symbol type. (Default is 10 and 6.) See **"Interleaved 2 of 5" on page 5-13**.

Step 4 — Install ESP

(**ESP** stands for Easy Setup Program.)

Once your scanner is connected to a host computer with Windows™ operating system (XP or above), you can use **ESP** (Easy Setup Program) for configuration and control.

To install ESP from the Omron Microscan Tools Drive:

- Insert your Omron Microscan Tools Drive into a USB port on your computer.
- Click **Setup.exe** and follow the prompts.

To download ESP from the Web:

- Go to **www.microscan.com**.
- Click **Setup.exe** and follow the prompts.
- At the end of the install process, copy a shortcut **ESP** icon onto your desktop.

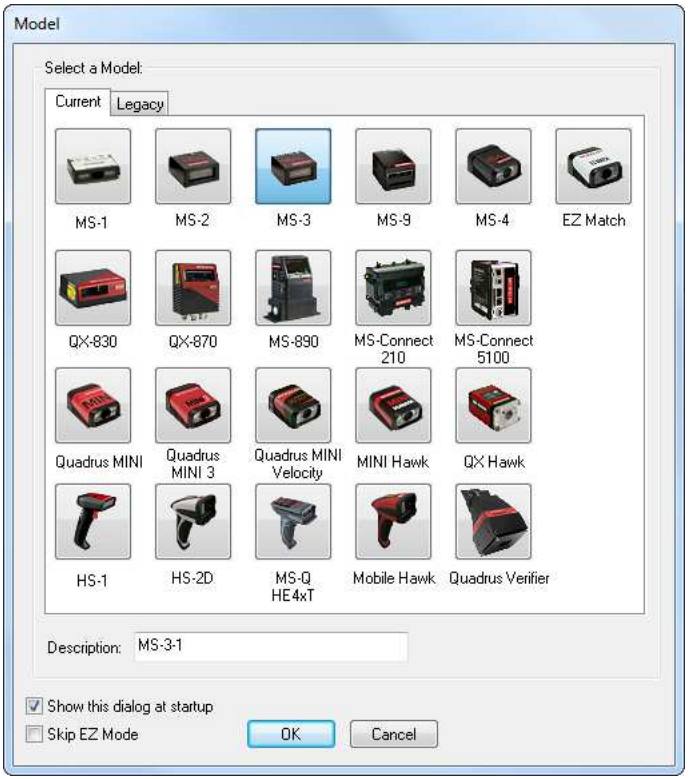
- Click the **ESP** icon to run the program.

Minimum System Requirements

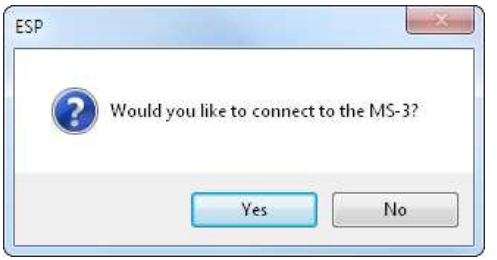
- 233 MHz Pentium® PC
- Windows® 10 or 7 operating system (32-bit or 64-bit)
- Internet Explorer® 6.0 or higher
- 128 MB RAM or greater
- 160 MB free disk space
- 800 x 600 256 color display (1024 x 768 32-bit color recommended)

Step 5 — Select Scanner Model in ESP

When you start the program, the following menu will appear:



1. Select **MS-3 Laser** from the menu and click **OK**. If you do not want to make this selection every time you load **ESP**, uncheck “Show this window at Startup”.
2. Select the default name (**MS-3 Laser-1**) or type in a file name of your choice and click **OK**.
3. Click **Yes** when the following dialog box appears:



Note: If you need to select another model later, you can find it in **App Mode** under **Model** on the menu bar.

Step 6 — Autoconnect

1. In the **Connecting...** dialog, if your communications port is not the default **COM1**, use the dropdown to change your communications port.

2. Click the **Start** button.

   When connected, the scanner's settings will be loaded into **ESP** and the **CONNECTED** message will appear in a green box in the status bar at the bottom right of your screen.

3. If the connection fails, enable a different **Com Port**, check connections, and try again.

   Tip: If you do not see the CONNECTED or DISCONNECTED message at the bottom of your dialog, try expanding the ESP window horizontally.

   Note: When you connect to the reader, the reader's settings will be loaded into ESP.

Step 7 — Test Read Rate

With this test you can learn the percentage of decodes per images captured by observing the LEDs (20% through 100%) on the top of the MS-3 which are active during a read rate test. If the results are not satisfactory, move on to **Step 8 — "Calibrate the Scanner"**.

By ESP

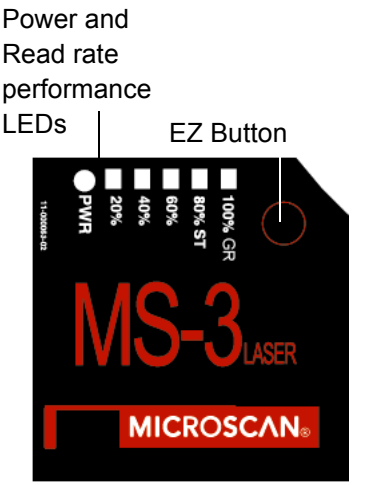
After connecting to the scanner, **ESP** will open in **Setup Mode**.

1. Click the **Test button** in **EZ Mode** to begin the read rate test.

2. Follow the instructions in **Easy Setup Mode**.
3. To end the read rate test, click the **Stop** button.

By the EZ Button

1. Press and hold the **EZ** button on the MS-3 until you hear one beep and see one LED momentarily turn amber. This will signal the beginning of the read rate routine.[1]
2. To end the read rate test press the EZ button and quickly release.



1. This assumes that the default functions of the EZ button have not been re-programmed.

Step 8 — Calibrate the Reader

If, after doing the read rate test, the results are not satisfactory, try the calibration routine.

During the calibration routine, the scanner attempts various settings to determine the optimum decode rate for the given conditions. In this process it might do the following:

- Adjust laser power
- Adjust mirror motor speed
- Adjust AGC gain
- Enable Autodiscrimination (read several symbol types)

The test will end automatically when the optimum combination of settings has been achieved.

By ESP

Click the **Calibrate** button in **Easy Setup Mode** to begin the read rate test.

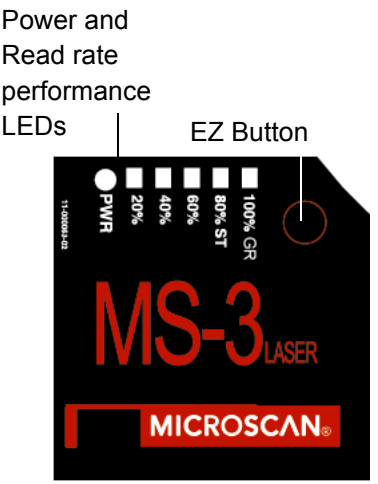
You can observe the progress of the calibration routine on the **Calibration** popup.

Note: You can also use the **Calibration** menu in **App Mode**.

By the EZ button

Press and hold the **EZ Button** until you hear two beeps and see two performance LEDs turn amber to indicate that the calibration is in progress.

The scanner will beep once at the end of calibration.



Step 9 — Save Calibration Settings

After calibrating the MS-3, you can save your new settings to be available at power-on.

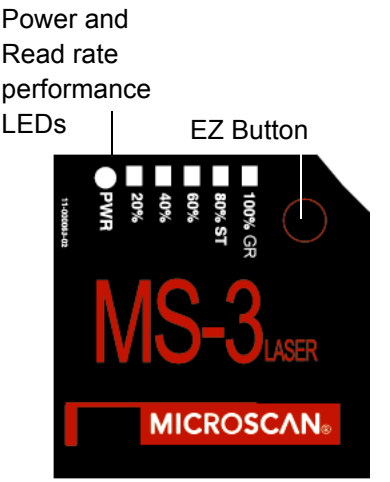
By ESP

Caution: If you have settings in the scanner that you have not yet loaded into **ESP**, the **ESP** settings will overwrite the scanner's settings when you save. Under these conditions, it is highly recommended that you first select **Receive Reader Settings** before you save for power-on.

After testing and/or calibrating the scanner, you can save the settings for power-on by clicking the **Save** button.

By the EZ Button

Press and hold the **EZ Button** until you hear three beeps and see three performance LEDs momentarily turn amber.[1]

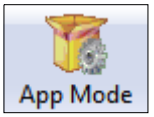


1. This assumes that the default functions of the EZ Button have not been re-programmed.

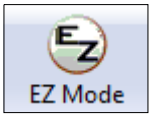
Step 10 — Configure the Reader

By ESP

To change reader settings, or to access the **Utilities** or **Terminal** windows, click the **App Mode** button. See Chapter 2, **"Using ESP"**.



To return to the **Setup Mode**, click the **EZ Mode** button.



By Serial Command

From your terminal program or the **Terminal** screen in **ESP**, you can enter serial commands and configuration and utility commands. See **"Serial Configuration Commands"** on page A-13 and **"Summary of Utilities Commands"** on page 11-3.

Note: You can learn the current setting of any parameter by inserting a question mark after the number, as in **<K100?>**. To see all **K commands**, send **<K?>**.

2 Using ESP

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This section is designed to help you understand the structure, elements, and application of **ESP** (Easy Setup Program).

When you start up **ESP**, unless otherwise specified, you will enter the **EZ Mode** for initial setup. From there, you move easily into the **App Mode** (application mode) where you can access several configuration and utilities menus.