

# Step-by-Step Tutorial: Installing MinGW and Lightspeed for MATLAB R2019a

This tutorial provides a detailed guide to install the MinGW-w64 compiler and the Lightspeed package for MATLAB R2019a. Follow these steps to ensure a successful installation.

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## 1. Install MinGW-w64 Compiler

MATLAB requires a supported compiler to compile MEX files. The MinGW-w64 compiler is officially supported and can be installed as follows:

### Step 1.1: Download the MinGW Add-On

1. Open MATLAB R2019a.
2. Go to the **Home** tab and click on **Add-Ons > Get Add-Ons**.
3. In the Add-On Explorer, search for:

MATLAB Support for MinGW-w64 C/C++/Fortran Compiler

4. Alternatively, you can directly download the add-on from this link:  
[MATLAB Support for MinGW-w64 C/C++/Fortran Compiler](#).
5. Click **Install** to download and install the MinGW-w64 compiler (version 5.3.0).

### Step 1.2: Verify the Compiler Installation

1. After installation, verify that MATLAB recognizes the compiler by running the following command in the MATLAB Command Window:

```
mex -setup C++
```

2. MATLAB should display a message confirming that the MinGW-w64 compiler is selected as the default compiler.

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## 2. Download and Extract the Lightspeed Package

1. Download the Lightspeed package from its source (e.g., GitHub or a shared repository).
2. Extract the package to a directory on your system. For example:

```
C:\matlab\lightspeed
```

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### 3. Add Lightspeed to MATLAB Path

1. Open MATLAB.
2. Add the Lightspeed directory to your MATLAB path by creating or editing the `startup.m` file:
3. Locate the `startup.m` file in your MATLAB directory (usually `C:\Users\<YourUsername>\Documents\MATLAB`).
4. If the file does not exist, create a new one.
5. Add the following line to the file:

```
```matlab
addpath(genpath('C:\matlab\lightspeed'))
```
```

Replace ``C:\matlab\lightspeed`` with the actual path to the Lightspeed directory.

4. Save the file.

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### 4. Compile the Lightspeed MEX Files

#### Step 4.1: Navigate to the Lightspeed Directory

1. In MATLAB, navigate to the Lightspeed directory:

```
cd('C:\matlab\lightspeed')
```

#### Step 4.2: Modify the `install_lightspeed.m` Script

The `install_lightspeed.m` script may need modifications to work with MATLAB R2019a and the MinGW-w64 compiler.

1. Open the `install_lightspeed.m` file in MATLAB:

```
edit install_lightspeed
```

2. Locate the line where the `flags` variable is defined (around line 55). It might look like this:

```
flags = ' -R2018a';
```

3. Change the value of `flags` to use the `-R2017b` compatibility mode:

```
flags = ' -R2017b ';
```

4. Save the changes to the script.

#### Step 4.3: Run the Installation Script

1. Run the installation script to compile the MEX files:

```
install_lightspeed
```

2. If the installation is successful, MATLAB will display messages indicating that the MEX files were compiled.
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## 5. Verify the Installation

1. Test the Lightspeed package to ensure it works correctly:

```
test_lightspeed
```

2. This script will run a series of tests. If all tests pass, the installation was successful.
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## 6. Troubleshooting

### Common Issues and Fixes

- **Error: Reference to non-existent field 'LIBLOC':**
    - Modify the `install_lightspeed.m` script to manually specify the library directory. Replace:

```
libdir = options.LIBLOC;
```

  
With:

```
libdir = fullfile(matlabroot, 'extern', 'lib',  
computer('arch'), 'microsoft');
```
  - **Error: Separate complex matrix function `mxGetPi` was called:**
    - Ensure the `flags` variable in the `install_lightspeed.m` script is set to -R2017b.
  - **Warnings about `INFINITY` and `NAN` being redefined:**
    - These warnings can be ignored unless they cause runtime issues. If needed, edit the `util.c` file to remove or comment out the conflicting definitions.
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## 7. Final Notes

- Ensure that the MinGW-w64 compiler is properly installed and configured before running the Lightspeed installation script.
- Always test the package after installation to verify that it works correctly.
- For more information about the MinGW-w64 compiler, visit the [MATLAB Support for MinGW-w64 C/C++/Fortran Compiler](#) page.

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By following this guide, you should be able to successfully install and configure the MinGW-w64 compiler and the Lightspeed package for MATLAB R2019a. If you encounter any issues, feel free to seek help from the MATLAB community or consult the official documentation.