



Gotek Floppy Emulator User Manual



GOTEK Floppy to USB Emulator User Manual for Models:

SFR1M44-U100K code*: U00

SFR1M44-U100K-R code: U01

SFR1M44-TU100K code: U02

Floppy Drive Emulator Functions:

- * Emulates 2HD floppy disks with 1.44Mb capacity
- * Format of Disk:

| | |
|----------------------|----------|
| Cylinders: | 80 |
| Tracks (both sides): | 160 |
| Sectors per Track: | 18 |
| Bytes/Sector: | 512 |
| Data Transfer Rate: | 500 kbps |
| Encoding Method: | MFM |

Floppy Drive Emulator Features:

- * Uses normal USB flash drive as the medium for storage design.
- * Has 34-pin interface and 5Vdc standard 3.5" power plug, easy to install.
- * Has 1.44Mb Storage Capacity per Partition, formatted as:
2HD 3.5" Floppy Disk, with 80 Cylinders, 160 Tracks,
18 Sectors/Track, 512 Bytes/Sector, 500 kbps Data
Transfer Rate, MFM Encoding Method.
- * Can use 1000 Partitions maximum in a 2Gb USB flash drive
(or larger). Smaller flash drives have fewer partitions for use.
- * Built-in self-format function by turning power ON while pressing
both buttons until digits begin to increment from 000.
- * Jumpers with function for different machines
(SFR1M44-U100K does NOT support all jumpers)

Front Panel:

- * Has three 8-segment numbers to represent partition number (000-999)
- * Green LED: Status of read and write operation.
Although, a red Power LED may also exist inside the case and can be inserted into a hole drilled in the front panel of the case.
- * Buttons:
 - Right button used to rise number single-digit
 - Left button used to rise number tens-digit
 - Both buttons together used to rise number hundreds-digit

Note: During normal operation, pressing both buttons for any length of time will NOT cause a reformat of the USB flash drive; it just causes the hundredths digit to increment. To reformat the USB flash drive, you must press both buttons while turning power ON.



Rear Panel:

- * Has 34-pin drive connector interface
- * Has standard 3.5" 5Vdc power plug
- * Thru-holes to add programming jumpers
- * Normal Operation Jumper Settings:

| | SFR1M44-TU100K | SFR1M44-U100K-R | SFR1M44-U100K |
|-----|---|-----------------|----------------|
| J5: | --- | --- | --- |
| JA: | Set to generate READY signal on 34-pin Floppy Drive Interface | | |
| JC: | --- | --- | --- |
| JB: | --- | --- | --- |
| S0: | Drive Select 0 | | Drive Select 0 |
| S1: | Drive Select 1 | | Drive Select 1 |
| MO: | Motor On | | Motor On |

Operation:

Format USB Flash Drive:

1. Use built-in self-format function to format USB Flash Drive into **1000** Partitions, each representing a 3.5" 1.44Mb Floppy Drive, 000-999 disks maximum. Self-format is done by holding down both buttons **as you connect the power lead**, and will delete all data on the USB stick inserted. After showing the version codes, while keeping both buttons pressed, the partitioning sequence starts counting up from 000. Now the buttons can be released, while the unit quickly creates up to 1000 1.44Mb partitions, based upon the size of the USB Flash Drive. In a 256Mb key, it can create 163 virtual floppies.
2. Use software in the CD to format the USB Flash Drive using a Windows PC, into **100** Partitions, each representing a 3.5" 1.44Mb Floppy Drive, 000-099 disks maximum. Mine came without a CD.
3. Install the emulator, with a USB flash drive installed, to the 34-pin floppy drive connector in the computer and format each partition separately as drive A:. Computer operation is described later.
4. Using a USB to Gotek floppy emulator adapter and USB 2.0 Male A to Male A cable, plug the Gotek emulator, with USB flash drive installed, externally to a USB port of the computer and it will be recognized automatically as a removable drive A: or B: under Windows XP/2000/7/8/10 (you may need to modify the BIOS of earlier Windows computers to recognize another floppy drive). Windows will only recognize the partition number shown on the Gotek display as the present floppy drive, but another partition can be selected as needed. Format each partition, separately. The Gotek also has a built-in self-format.

Changing the USB Flash Drive:

1. To prevent possibly damaging the USB flash drive or the Gotek emulator, do NOT remove the USB flash drive from the Gotek emulator with power still applied. You may safely remove the USB cable from the computer to shut off power to the Gotek emulator, then remove or change the USB flash drive.

Read/Write Data:

1. Install the emulator in the machine or computer, or attach the emulator via a USB adapter to the USB port of the computer.
2. The emulator will be recognized automatically as a removable drive A: or B: under Windows XP/2000/7/8/10 (you may need to modify the BIOS of earlier Windows computers to recognize another floppy drive). Read or write data as you would to a floppy.

Keeping a Disk Index:

1. With as many as 1000 Floppy Disks to keep track of, it is wise to keep a disk index, by track number, such as:

| | |
|-----|---------------|
| 000 | Boot DOS Disk |
| 001 | DOS Games |
| 002 | ZBASIC |
| 003 | Multiplan |
| --- | |

Firmware Version of Emulator:

1. Press the two buttons together, power ON, and the 3 digit, 7-segment numbers will display the firmware version number and model number of emulator. For example, mine shows: F01 126 U00.
2. After showing these codes, if you keep the buttons pressed, the partitioning sequence starts, counting up from 000. Now the buttons can be released, while the unit quickly creates the partitions allowed, depending upon the size of the USB Flash Drive. In a 256Mb key, it creates 163 virtual floppies.

Known Error Codes:

- E0: No specified file in USB Flash Drive
E16: Built-in memory fault

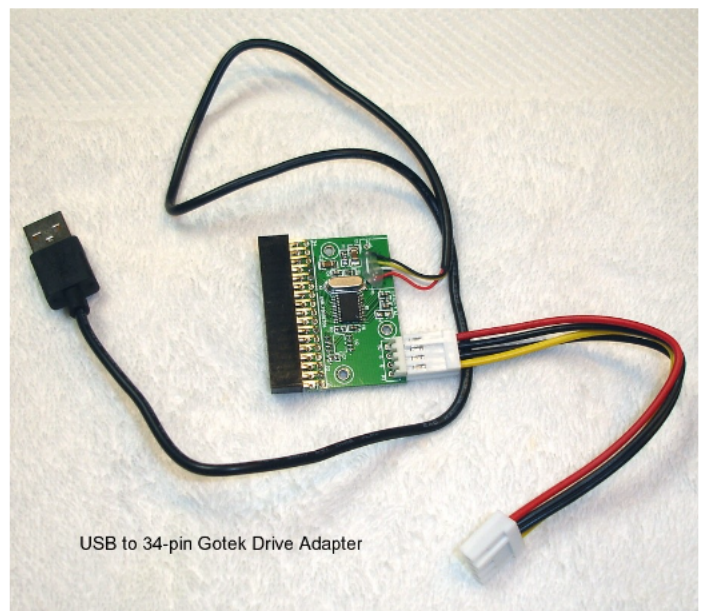
Use in an IBM-PC Clone Computer

For use with an early PC, the Gotek floppy disk emulator drive can be installed internally, if an extra drive bay is available and the BIOS permits adding an additional floppy drive. I do not recommend replacing the normal 3" drive with the Gotek, in the event you find a floppy that you may want to keep.

For later model computers that have eliminated the floppy drive, or only permits one, the Gotek floppy disk emulator can be used externally via the computer's USB port. This requires a USB cable adapter. If you need one, search for something on Ebay that resembles the one pictured:

1.44MB 3.5" Floppy Drive Connector 34 PIN 34P to USB Cable Adapter PCB Board

It costs about \$10.00, but you can probably find one for less on Ebay. It includes the USB 2.0 Male A cable to 34-pin drive connector and the necessary power cable.





The power cable goes between the USB adapter and the Gotek power connector. This second picture shows the Gotek connected to the front USB connector on my Windows 10 PC, using the adapter. The emulator was detected immediately.

Clicking on “This PC” or “My Computer”, or something similar on your computer, shows the new entry on the screen under Devices and Drives.

Mine were:

- Floppy Disk Drive (A:) (this Gotek)
- Windows (C:)
- Recovery Image (D:)
- DVD RW Drive (F:)

Double Clicking on Floppy Disk Drive (A:) lists all the files that were loaded on the 000 partition, if any. I had several files on it.

Right Clicking on Floppy Disk Drive and selecting Properties, lists:

- Type: Floppy Disk Drive
- File System: FAT
- Used Space: 824Kb
- Free Space: 599Kb
- Capacity: 1.38Mb

Incrementing the digits on the Gotek to an unformatted partition, right clicking drive A:, and clicking Properties brings up the message:

- Type: Floppy Disk Drive
- File System:
- Used Space: 0 bytes
- Free Space: 0 bytes
- Capacity: 0 bytes

Running FORMAT on the unformatted partition brings up the FORMAT window:

- Capacity
[3.5", 1.44Mb, 512 bytes/screen]
- File System
[FAT (default)]
- Allocation Unit Size
[512 bytes]
- [Restore device defaults]
- Volume Label
[FDISK0xx]
- Format options
[X] Quick Format
[Start] [Close]

The x's in the Volume Label represent the Gotek's partition number. The FORMAT went fine. I copied files from pictures and documents folders... but you can't fit much on a 1.44Mb drive...

Conclusions: The USB drive was instantly detected, the same as any other USB drive, but the emulator makes the USB drive act exactly like a floppy drive – right down to the formatting. I have an external real floppy drive that I can plug into the USB port, and everything worked the same.

What happens with a Windows XP computer?

Well, not that much different.

First, do NOT plug the Gotek into the USB port until after power up – except if you have a bootable system on the 000 partition. More on this in a minute.

I thought that I would need to plug the Gotek in before power up. Nope; the computer stalled with a lit LED on the real floppy drive A: and a lit LED on the Gotek.

During the next attempt at power up, I had the Gotek removed. I entered Setup and looked for the capability to add a second floppy drive to the BIOS – Nope. No capability found.

So, after a normal boot to Windows XP, I clicked on “My Computer” and plugged in the Gotek drive. Windows instantly detected the Gotek, reported it as “Found New Hardware”, initially as a Teac device, but eventually getting it right, loaded the correct drivers and eventually called it a USB Flash Drive, then reported it as “Ready for use”.

It added a 3.5" Floppy drive (B:) in the “My Computer” window. Double clicking gave the correct contents of partition 000.

I copied the contents to Floppy A: and the reverse, changing partition numbers on the Gotek emulator and the Gotek worked perfectly throughout, so I won't bore you with the details.

Finally, I wanted to see if the Gotek was bootable. As there was no way to tell the BIOS of an additional floppy drive, or even the boot sequence or what to look for in advance, I really had my doubts. So I decided to use partition 223, but instead of the normal format, I clicked on the “Want to create an MS-DOS startup disk” selection. I also added the label “TESTWINXP”.

I tried a “Restart” – but forgot to remove the floppy from drive A. Sure enough, the computer stalled – stuck on drive A with no system

start files. I removed the non-system disk from A:. Powered down, and powered up again. Only to stall again... The Gotek was at partition 000. No system files there either! I forgot that at power-up, the Gotek switches to the first partition!

But, fearing I may harm the Gotek emulator, I certainly did not want to push Gotek buttons while booting. So I removed the Gotek again, booted back up, then plugged in the Gotek, which was instantly recognized as Floppy drive B:. I reformatted partition 000 as the system disk, thinking I got you now! And just to make sure, DIR showed the start files were there.

Selected Restart – and during the boot process – stalled again! LED's stuck ON for both the real Drive A: and the Gotek.

I powered down and double checked that drive A: was empty, then powered up again.

Got it! The system booted to drive A: (now the Gotek, partition 000) and I ran DIR just to make sure it was not my imagination. Ok.

So that should make the real floppy drive B: Yes!

I placed the floppy disk back in the real drive (now B:), made it the default by typing B: and {Enter}.

I repeated my copy operations between the two drives and confirmed that all went well.

Conclusion: The Gotek works perfectly on the PC, as bought. I have not tried using Win 95 or 98, as that computer has the USB port on the back, but as I recall, the BIOS can be set for an additional drive – I'm already running both a 5" and a 3" drive on it.

I'm sure the Gotek could easily replace the 3" or the 5" (if changed to 3" in the BIOS). However, I'm not sure a floppy emulator is needed on any computer where you can plug in any sized USB Flash Drive and write all the partitions you could use to back up files. I'm already running an IDE Compact Flash to back up important files. So why force yourself to use 1000 1.44Mb partitions that can't even take the size of some Windows files? And, you can only see one of those partitions at a time. Except for our ability to transfer files between the PC and the Z-100, I see NO advantages of using a Gotek on any PC.

Use in the Z-100 Series Computer OR Basic Gotek Course 101

This gets a bit complicated, so bear with me.

For those with the latest Z-DOS v4 and upgraded ZROM, and using a Z-207 Floppy Controller with the Barfield Mod, you simply plug the Gotek Floppy Disk Emulator into the 34-pin interface, specify a 3" High Density 135 tpi drive on the 34-pin connector in DRIVECFG and you should be good to go. If you have no drive positions left on the 34-pin interface, or if you would prefer to use the 50-pin interface, specify the 3" drive on the 50-pin interface in DRIVECFG and you are ALMOST ready to go. You will need to construct a 50-pin Z-207 Interface double row female connector to 34-pin double row female drive connector (standard 3" drive type). Depending upon the Gotek model, you may need to include a diode to simulate a drive Ready signal, required on the 50-pin interface. The 34-pin interface does not use a Ready signal.

If you look at the models above, some Gotek floppy disk emulators have a jumper to provide a Ready signal (JA), but one, such as mine, does NOT recognize the jumpers. Rather than get further into this now, let me discuss use with the earlier DOS systems next. They will certainly have difficulty, and I'll discuss Ready Signals there.

Pre-ZDOS v4, the Z-100 could only use standard density, 48 tpi, 5" drives **OR** standard density, 96 tpi, 5" drives on the 34-pin interface of the Z-207 Floppy Controller Card. The setting of section 0 of the DS1 DIP switch on the Z-207 Floppy Drive Controller would determine which drives that controller could use; set 0 (OFF) for 48 tpi or set 1 (ON) for 96 tpi drives .

Furthermore, **high density** media must use the 500K rate of the 50-pin interface (8" media). While normal DOS would only recognize 8" drives, a special software driver, **DiskPack**, would enable use of this new Floppy Disk Emulator on the Z-207's 50-pin interface on a standard, unmodified Z-100!

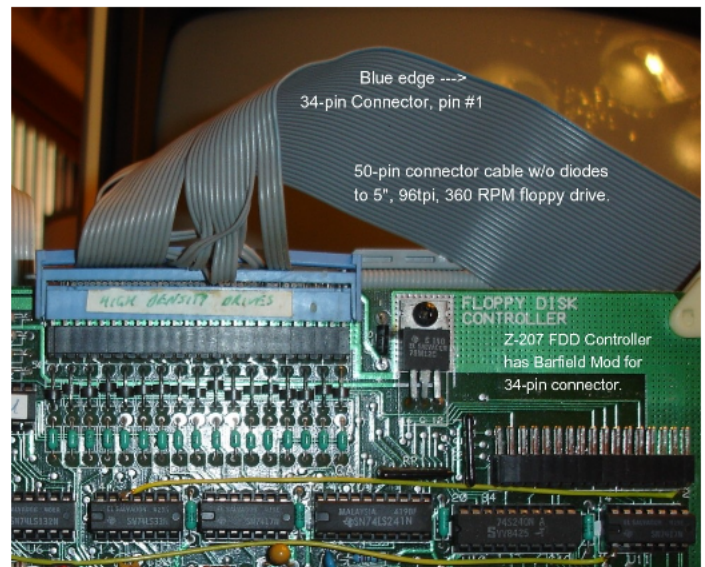
DiskPack was a software floppy driver which allowed a person to use many popular floppy disk formats on the Heath/Zenith Z-100 series computer, including PC compatible formats. Aside from the floppy drives and cables, no additional special hardware was required - all formats supported by DiskPack were provided using the standard Z-207 floppy disk controller already installed in your Z-100.

The DiskPack driver supported all popular 8", 5" (actually 5.25"), and 3" (actually 3.5") floppy disk formats. This included the standard Z-100 formats, as well as IBM AT compatible 1.2 Mb (megabyte) 5" drives, and 720 Kb (kilobyte) 3" formats. Additional formats were also available, some of which provide even greater capabilities.

I have inserted the DiskPack User Manual in issue #134 of the "Z-100 LifeLine".

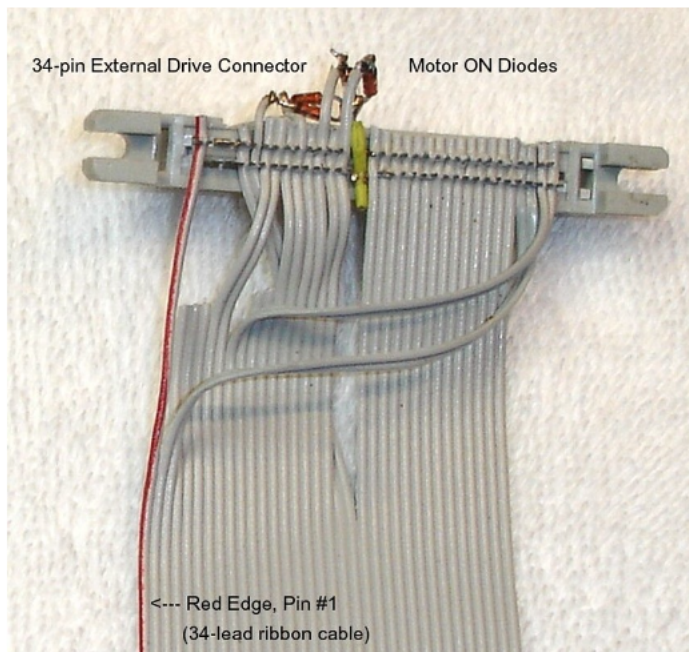
If you do not wish to undergo the expense of upgrading to ZDOS v4 and the IDE Controller, I recommend you take a look at the advantages of DiskPack for your needs.

As I already mentioned, you will need to construct a 50-pin to 34-pin cable adapter if you wish to use the new Gotek on the 50-pin interface of the Z-207 Floppy Disk Controller. Such a cable will look like this:



To construct the adapter cable, you will need a 50-pin female connector, a spare standard 34-lead drive ribbon cable (about 12" long), and one or two 1N34 diodes.

Remove the board-edge connector from the end of the 34-lead drive cable. The Gotek drive uses a male dual row connector often found on 3" drives, and similar in shape to the normal 50-pin connector.



As you can see in the above picture, the object is to route the leads from the 34-pin drive connector to the appropriate pins of the 50-pin connector. This picture shows the back of a 34-pin connector with motor on diodes installed for another application, but you will need to construct something similar for the Drive Select diodes on the 50-pin connector. Do NOT reference these pictures for line placement; use the line diagram given next.

Note that pin #1 is to the right end on the 50-pin connector in the first picture; to the left in this second picture. Make all connections in reference to the marked edge of the 34-lead ribbon cable and the right end of the Z-207 Controller 50-pin interface. This ribbon may have a red, blue or another color edge to mark pin #1 of the 34-lead cable. If you found a cable without a colored edge, color the correct edge with a permanent magic marker to avoid confusion.

Two additional issues arise when trying to use the Gotek emulator with DiskPack.

First, the Gotek Emulator has only drive select 0 and 1 available under jumper control, but because the BIOS must control drive select 0 and 1 drives, DiskPack will require use of drive select 2 or 3. Second, while some Gotek models reportedly have a Ready jumper, mine did not.

I have created an adapter configuration that should meet your needs. See the next line diagram as we discuss the options available with it.

50-pin to 34-pin Adapter Cable With Ready Signal Diodes

| | Z-207 50-pin 500K Interface | | 34-pin Drive Connector |
|------------------|--------------------------------|-----------|---------------------------|
| Ground | 1 | ----- | 1 Ground |
| Two Sided | 10 | -- Ground | |
| Side 1 Select | 14 | -----> | 32 Side 1 Select |
| Index | 20 | <----- | 8 Index/Sector |
| Head Load | 18 | ----- | 16 Motor ON |
| Drive Ready | 22 | <----- | 34 Disk Change (drive) |
| Drive Select 0 | 26 | --x | Drive Select 0 (8") |
| Drive Select 1 | 28 | --x | (or Gotek w/Rdy) |
| Drive Select 2 | 30 | -----> | 10 DS0 (Gotek w/Rdy) |
| Drive Select 3 | 32 | -----> | 12 DS1 (Gotek w/o Rdy) |
| Direction Select | 34 | -----> | 18 Direction Select |
| Step | 36 | -----> | 20 Step |
| Comp. Write Data | 38 | -----> | 22 Comp. Write Data |
| Write Gate | 40 | -----> | 24 Write Gate |
| Track 0 | 42 | <----- | 26 Track 0 |
| Write Protected | 44 | <----- | 28 Write Protected |
| Comp. Read Data | 46 | <----- | 30 Comp. Read Data |

Notes:

All odd number pins on both connections are assumed to be ground.

Other pins not shown are no connection (NC).

All lines active low.

Loop a wire from pin 9 or pin 11 to pin 10 (to ground pin 10).

If the Drive does NOT create a Ready signal (no jumper), install 1N34 diodes (the **x** symbol) as shown with the band towards the Drive Select signal. Each drive should be Ready with their Drive Select signal.

The left column shows the pins of the 50-pin connector to attach to the Z-207 Floppy Controller 50-pin interface. The right column shows the corresponding pins of the 34-pin drive connector. The arrows represent the signal direction.

Note: When making the cable adapter, it is ok to leave the odd numbered lines of the cable attached to their even lines - they just attach to the odd pins as they are available on the 50-pin connector. You do not need to cut them short (See the picture).

Note: Route each lead of the 34-pin cable to the appropriate pin of the 50-pin connector and press into the connector pin. Leave about an inch on those ribbon cable lines that will need a diode connected. For our fake Ready Line, you will need to extend lines 22 and 32, to have enough room to solder the diode. Remember, the banded end of the diode must be attached to the drive select line. While the diagram does not show it, you may install another diode between lines 22 and 30, in case a second drive may ever need it.

Referring to the line diagram, from the left column:

- Pin 1 is ground. All the odd pins on both connectors are connected together and grounded, but we are just labeling pin 1 as ground.
- Pin 10 is for two-sided media. As all our media will be double side, we can attach pin 10 to ground by taking a length of wire about 1" long and attach pin 10 to either pin 9 or pin 11 on the same connector.
- Pin 14 is Side 1 Select. Attach line 32 from our 34-line cable to pin 14.
- Pin 18 is Head Load, necessary for some 8" drives, but it can be used to signal Motor ON for some 5" drives. However, this signal is not a consistent signal under some applications (such as DIAG). If your drive requires a Motor ON signal, it is best to add a 1N34 diode from the appropriate drive select line on the 50-pin connector to line 16 of the drive (similar to the diode shown but to line 16). See the DiskPack documentation for further info.

- Pin 20 is the Index signal. Attach lead 8 of our cable.
- Pin 22 is the Drive Ready signal we discussed. Attach line 34 of our cable. It will be used IF the Gotek drive has a Ready jumper (JA), which causes line 34 to go low, indicating the drive is Ready. If the drive you wish to use does not have a Ready signal, it will have to be created. So, here we use a 1N34 diode from the appropriate drive select line of our cable (next).
- Pins 26 thru 32 are the Drive Select lines, 0 thru 3. We will leave Pins 26 and 28 for connection to any 8" drive(s) through a 50-pin splitter, such as possibly a back panel connector. These 8" drives would be under BIOS control and would use DS0 and DS1. Attach lines 10 and 12 of our cable to pins 30 and 32, leaving about 1" of lead on each line to attach the diode (one or two). The line diagram shows only one diode being used. This is because some Gotek models have a Ready Signal when JA is jumpered. And since it is doubtful that you may wish to use the Gotek with another drive, other than possibly the 8" drive under BIOS control, we can attach the Gotek either as drive 0 (with a Ready signal) or as drive 1 (without a Ready signal). This gives us the flexibility to try it as Drive 0 first, or as Drive 1, if it did not work satisfactorily.
- Pin 34 is Direction Select. Attach line 18.
- Pin 36 is the Step signal. Attach line 20.
- Pin 38 is Composite Write Data. Attach line 22.
- Pin 40 is the Write Gate signal. Attach line 24.
- Pin 42 is the Track 0 signal. Attach line 26.
- Pin 44 is the Write Protect signal. Attach line 28.
- Pin 46 is Composite Read Data. Attach line 30.

Note: These last lines can be attached without separating them.

Note: This cable can be used with ZDOSv4 or with ZDOS v2 or v3. With ZDOSv4, configure the Gotek drive as drive 0 (with Ready) or drive 1 (w/o Ready) and use DRIVECFG to assign the Gotek as unit 2 or 3. With ZDOS v2 or v3, use DiskPack. Configure the Gotek as drive 0 (with Ready) or drive 1 (w/o Ready) and using the utility DPCNFG, assign the drive to the DiskPack driver as unit 2 or 3, as necessary. The new adapter cable should work for any configuration.

Note: The Z-207 Floppy Controller need NOT be modified for use with DiskPack. The Z-207 Floppy Controller need only be modified for using high density drives on the 34-pin connector under ZDOS4.

Note: Drives under control of the DiskPack Driver are NOT bootable. You can only boot from the BIOS controlled drives; A:, B:, C:, D, or the hard drive.

I do not recommend replacing both your normal floppy drives with emulators, as I feel that it would be best to retain a normal floppy drive, if you should need to read a floppy sometime. But for normal bootup and use, this emulator seems like just what is needed to permanently store your floppy files and have them instantly available when needed.

Let me know your successes or failures. I'll keep you posted.

Copy Issues: Operation of the basic Gotek has shown some problems. I get occasional Seek Errors when copying from the Floppy Drive A: to the Gotek drive.

Under ZDOS v4, I can attach it to the Z-207 Floppy Controller 34-pin interface with the standard floppy drive A: or attach it to the 50-pin interface as drive C:.

Under ZDOS v2 or v3, I must attach it to the Z-207 Floppy Controller 50-pin interface (for high density operation) and assign it to the DiskPack Floppy Driver as unit 2 or 3.

In any case, operation with my 10Mb MFM hard drive is flawless, but if I copy files from my standard floppy drive A: to the Gotek, I get Seek Errors reading drive A: and occasionally Seek Error writing drive B: or C: (the Gotek).

Without going into too much detail, I'm using ZDOS v4 on a 768Kb, 8MHz motherboard, standard Z-207 Floppy Controller with the Barfield Modification, a standard 360Kb, 5" floppy drive as drive A: and the standard, unmodified Gotek Floppy Disk Emulator as drive B:.

The COPY operation generally goes as follows:

- I boot to ZDOS v4 on my 10 Mb MFM hard drive.
- I select an unused Gotek partition, say 010.
- I run the command FORMAT B:/s/v to make the Gotek bootable.
 - The Gotek is bootable, with no issues
 - Files copy between the hard drive and the Gotek just fine.
- If I attempt to copy files from drive A, using COPY A:.* B:/v
 - The first file is COMMAND.COM and the program asks if I wish to overwrite? I respond {N}o.
 - The first few files will copy fine.
 - The next file will cause a "Seek error reading drive A"
 - Generally, it will end with an "Abort, Retry, Ignore, Fail"
 - I choose {I}gnore.
 - The copy operation continues with a few more files.
 - Another file will cause a "Seek error reading drive A"
 - This time, it ends with "Abort, Retry, Fail"
 - I choose {F}ail.
 - The program asks "Overwrite B:COMMAND.COM"
 - I respond {N}o.
 - The program may continue copying another file, but gives: "Seek error writing drive B:"
 - "Abort, Retry, Fail"
 - I respond {F}ail.
 - The program ends: "Fail on INT24 - B:{filename}"
 - "xx files copied"

Of special note, the same files cause the same errors, whether the Gotek is used on the 34-pin interface or the 50-pin interface. I can copy the files to the hard drive, then the Gotek without a problem.

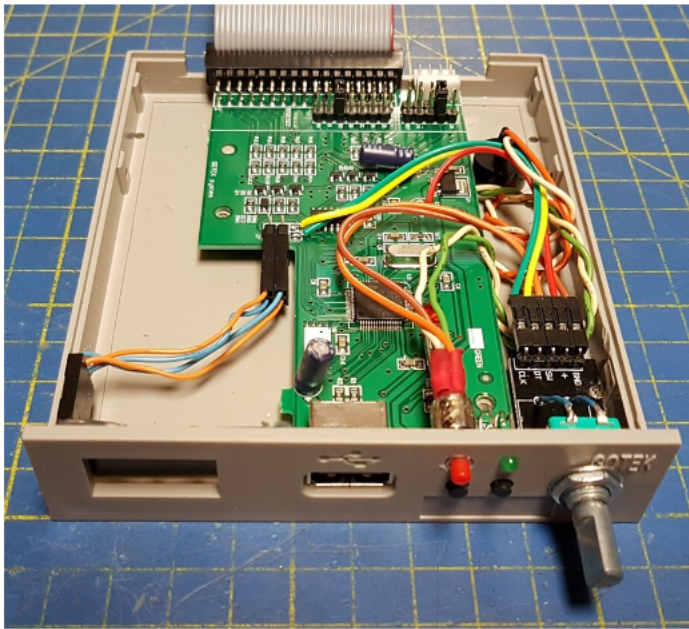
I have switched between two motherboards (the other 192Kb RAM, 5 MHz), three Z-207 Floppy Controllers, two floppy drives (Qume and Mitsubishi), different cables, and used the 50-pin interface and the 34-pin interface. I have tried changing most of the chips on one Z-207 Floppy Controller to faster chips, but any changes to the above routine was minor.

Interestingly, I had no issues when using DiskPack. All COPY operations were successful.

I can only attribute the seek errors to the firmware of the present Gotek. Hopefully, the firmware upgrade will fix the above issue.

March 2021 Update: The firmware upgrade did fix the copy issues discussed here and added a lot of new capabilities. Please see the next Gotek article in issue #134 for additional details.

GOTEK Floppy Emulator Upgrades:



Probably, the most critical upgrade that you can make to the Gotek Floppy Disk Emulator is to the firmware. The original firmware has limited capability and the aftermarket firmware upgrades are considerably more powerful, adding capability and flexibility to the original product.

Presently, there are two viable firmware upgrades available that promise several improvements over the standard 1.44 Mb 3" drive emulator:

Hundreds of computers, keyboards, music synthesizers, and computer controlled machines, such as textile or milling equipment are supported!

- 3.5", 5.25", & 8" disks supported.
- Single and Double sided disks supported.
- FM / SD, MFM / DD or HD densities supported.
- Bitrate : 125Kb/s, 250Kb/s, 300Kb/s, 500Kb/s...
- All RPM supported : 300 RPM, 360 RPM, 600 RPM...
- All sector sizes supported : 128/256/512/1024/2048/4096 Bytes... even mixed sizes supported!
- All track skew and sector interleaving supported.
- Up to 255 tracks per disk supported.
- And much more!

So, while the standard, early versions of ZDOS only support the usual 5" and 8" drives, the DiskPack driver can own, and control, the other sized drives and formats that you may need or desire, with minimal expense. However, there are some limitations to DiskPack:

- Difficulty getting the cabling correct:
 - Requires a special cable to change drive unit to 2 or 3 because the BIOS uses units 0 and 1 and most drives do not have DS2 or DS3.
 - The 50-pin connector requires a Ready Signal, not available on most newer drives.

- Cannot Boot to any drives not owned by the BIOS.
- Cannot be used with any operating system other than ZDOS v2 or v3.

The new firmware ads promise use with nearly all formats of floppies, possibly even CP/M. I'm going to address use with the Free Flash Floppy firmware next time, in "Flash Floppy Gotek Course 201"

Resources:

Find great video at retrofriends.com:

<https://www.bing.com/videos/search?q=gotek+floppy+emulator&view=detail&mid=6B6E6E788D98E23D81716B6E6E788D98E23D8171&FORM=VRDGAR&ru=%2Fvideos%2Fsearch%3Fq%3Dgotek%2Bfloppy%2Bemulator%26%26FORM%3DVVVXX>

1. Installing an OLED display, .91" 128x32 resolution (Ebay has 2 for ~\$10.00).
2. Installing a piezo speaker for sound (Provides floppy drive type sounds).
3. Installing a rotary encoder switch to replace the two buttons. The rotary encoder will rotate through the floppy names, while pressing the button selects the desired floppy for display and access.

Another great video can be found at:

<https://www.youtube.com/watch?v=J3OZo261EpA>

It discusses:

1. Flashing the Gotek Floppy Emulator with upgraded firmware.

The video shows the flashing procedure with a separate circuit board to USB connection to a computer that downloads the file from a website.

The best firmware at the time (Aug2020) was

"Flash Floppy Firmware" from ST.COM at website:

www.st.com/en/development-tools/flasher-stm32.html.

The file needed is the hex file: ff_gotek-v3.16.hex.

2. Installing an OLED display, .91" 128x32 resolution.
Note: Apparently two OLED screen resolutions are supported:

* 128x32: 0.91", 2.23"

* 128x64: 0.96", 1.3", 2.42"

However, this larger display requires more case and possibly CB modifications.

The smaller, a 12C OLED display, is easiest. Just ensure it has four pins; GND, VCC, SCL & SDA.

3. Installing a rotary encoder switch to replace the two buttons.

The rotary encoder will rotate through the floppy names and pressing the button selects the desired floppy for display and access.

Note: Do not use the rotary encoder with an integral circuit board - it will not fit in the front panel without modification. With the upgraded firmware to v3.16, the encoder will also allow ejecting the USB Flash drive and to insert another, apparently without powering up with the two buttons pushed.

Note: The above photo includes many of the upgrades discussed, including the addition of a red (eject) pushbutton - to permit removing the USB flash drive to change it, then inserting another USB flash drive, without having to power down the computer or push both normal pushbuttons while powering up. As the rotary encoder also has a push button capability, I think having both is overkill.

March 2021 Update: I have found it unnecessary for either push button while in use on the Z-100. I believe these buttons were for PC systems that required a disk change signal. The Z-100 does not use a disk change signal. While using the Z-100, you select the partition number and those files are ready for use.

If you have any thoughts or information regarding this modification, please let me know.

Update: February 13, 2021

While the Firmware upgrade was fairly painless, the entire experience of trying to use the new firmware effectively was another matter. I recommend that you read the next article "Flash Floppy Gotek Course 201" before considering installing any of the upgrades.

As you recall from above, the basic Gotek had an auto-format that created 1000 partitions. Each partition could be used as a 3" 1.44Mb floppy.

Both firmware upgrades treat the USB flash drive completely different. It was apparently developed by gamers for gamers, which used compressed disk images of floppy disks to be installed in the Root directory of the USB flash drive, which was then automatically placed into separate partitions by the firmware.

These compressed disk images had several advantages:

- They could be easily created using Disk Image Software.
- They were in a compressed format, but could be played as if the individual game files were on a floppy disk.
- They could be sold or given away as groups of games for the Atari, Amiga, and other gaming computers.

These disk images made it possible to select a game (or a disk of files) by using the rotary encoder, and playing the game as though it were the original floppy disk. It required no further uncompressing nor manipulation.

Other reported advantages of the new firmware were:

- Operation with a rotary encoder, could be an improvement over the two buttons of the basic Gotek emulator.
- Operation with a speaker for floppy disk sounds.
- Operation with an OLED display, displaying names of disks rather than just partition numbers.
- Operation with all 8", 5" and 3" disk drive formats.
- Operation exactly as a floppy drive would, with files & partitions.
- Flexibility is created through the use of additional files, FF.CFG, which controls the configuration of the firmware to use the upgrades mentioned, and IMG.CFG, which sets the disk size parameters. Both must be installed in the USB Root directory.

Disadvantages?

Well, at least in my mind:

- Setup has become very complicated.
- The websites of both firmware upgrades is complicated and completely lacking of any organization. If you are new to this Gotek and gaming, as a whole, expect a steep learning curve.
- Partitions are only created individually, created by the firmware automatically by the number of image files loaded in the USB flash floppy's Root directory. Only have 10 images, all you get is 10 partitions. Want all 1000? Install 1000 blank images!
- For use as a normal disk drive, the Root directory must at least contain a blank disk image, which tells the firmware to create an empty disk partition for your use.
- Flexibility is created through the use of additional files, FF.CFG and IMG.CFG, which increases setup complexity and are NOT very well explained on either of the websites.

So, what does all this mean?

Well, for someone like me with nearly 1000 floppy disks stored safely under the bed in the guest room, the basic Gotek sounds like the perfect answer - the disks already have disk numbers, and as infrequently as they are needed, even having to use two buttons to select the disk from a paper index is a piece of cake.

For someone who wants to play games from a compressed set of games listed on Ebay, or other gaming sites - the new firmware is ideal. But, we really do not have a whole lot of games usable on the Z-100, and to create disk images of each BASIC game routine would be a bit of overkill, and a lot of work for someone to create.

Which brings us to the average Z-100 user who just wants to eliminate the floppy disks on the shelf. You will need to upgrade the firmware if:

- You need to use the Gotek to emulate disks other than 3".
- You would like an OLED display.
- You get tired of the two buttons to navigate.

You do not need to create a disk image, to back up a disk. So, I will not be addressing the procedures used to create disk images, as it is outside the scope of my articles. You will need to wade through what is found on line for creating disk images, and there is plenty of that. My articles will just concentrate on, and simplify, Gotek use in the Z-100 to meet our general needs.

Using blank images, you can create the number of partitions needed, or add them as needed at any time by just adding additional blank disk images anytime in the future. I do recommend retaining a disk drive of each type for future use.

Note: I'll update this manual with new information as it becomes available. If you wish to add any additional information and/or your comments on experimentation, please let me know at:

z100lifeline@swvagts.com

I hope this helps clarify the use of the Gotek Floppy Emulator in the Z-100 series computer. Look forward to my next article on the Firmware update. Stay safe.

Cheers,



Steven W. Vagts
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