

From RepRapWiki

< G-code

English • العربية • български • català • český • Deutsch • Ελληνικά • español • فارسی • français • hrvatski • magyar • italiano • română • 日本語 • 한국어 • lietuvių • Nederlands • norsk bokmål • polski • português • русский • Türkçe • українська • 中文（中国大陆） • 中文（台灣） • עברית •

该页面尝试描述RepRap的固件怎样使用和他们如何工作。该固件的主要目的是用于FFF/FDM方式的增材制造（译者注：国内流行使用“3D打印”）。其代码用于控制打印头的移动遵守NIST RS274NGC G-code标准（http://www.nist.gov/manuscript-publication-search.cfm?pub_id=823374），因此RepRap的固件同时可用于CNC机床（或类似）的控制。

正因为如此，许多固件能够被开发出来并不断完善和加入新功能，而他们的开发者不需要参与之前的开发，甚至不需要了解之前的功能是如何实现，却也能够为这些固件添加他们想要的功能。

Contents

- 1 概述
- 2 RepRap G代码 区域
- 3 注释
- 4 Individual commands
 - 4.1 Checking 标记代码
 - 4.1.1 N 和 *
 - 4.2 延时G 命令
 - 4.2.1 G0: Rapid move 快速移动
 - 4.2.2 G1: Controlled move 可控移动
 - 4.2.3 G28: Move to Origin 移动到原点
 - 4.2.4 G29-G32: Bed probing 加热床检查
 - 4.3 即时G 命令
 - 4.3.1 G4: Dwell 停顿
 - 4.3.2 G10: 打印头偏移
 - 4.3.3 G20: Set Units to Inches 使用英寸作为单位
 - 4.3.4 G21: Set Units to Millimeters 使用毫米作为单位
 - 4.3.5 G90: Set to Absolute Positioning 设置成绝对定位
 - 4.3.6 G91: Set to Relative Positioning 设置成相对定位
 - 4.3.7 G92: Set Position 设置位置
 - 4.4 即时的 M 和 T 命令
 - 4.4.1 M0: Stop 停止
 - 4.4.2 M1: Sleep 睡眠
 - 4.4.3 M3: Spindle On, Clockwise (CNC specific)
 - 4.4.4 M4: Spindle On, Counter-Clockwise (CNC specific)
 - 4.4.5 M5: Spindle Off (CNC specific)
 - 4.4.6 M7: Mist Coolant On (CNC specific)
 - 4.4.7 M8: Flood Coolant On (CNC specific)
 - 4.4.8 M9: Coolant Off 冷却系统关闭(CNC specific)
 - 4.4.9 M10: Vacuum On (CNC specific)
 - 4.4.10 M11: Vacuum Off (CNC specific)
 - 4.4.11 M17: Enable/Power all stepper motors 启动所有步进马达
 - 4.4.12 M18: Disable all stepper motors 关闭所有步进马达
 - 4.4.13 M20: List SD card 读取SD卡
 - 4.4.14 M21: Initialize SD card 初始化SD卡
 - 4.4.15 M22: Release SD card 弹出SD卡
 - 4.4.16 M23: Select SD file 选择SD卡的文件
 - 4.4.17 M24: Start/resume SD print 开始SD卡的打印
 - 4.4.18 M25: Pause SD print 暂停SD卡打印

- 4.4.19 M26: Set SD position
- 4.4.20 M27: Report SD print status
- 4.4.21 M28: Begin write to SD card
- 4.4.22 M29: Stop writing to SD card
- 4.4.23 M30: Delete a file on the SD card
- 4.4.24 M40: Eject
- 4.4.25 M41: Loop
- 4.4.26 M42: Stop on material exhausted / Switch I/O pin
 - 4.4.26.1 M42 in ???
 - 4.4.26.2 M42 in Marlin/Sprinter
 - 4.4.26.3 M42 in Teacup
- 4.4.27 M43: Stand by on material exhausted
- 4.4.28 M80: ATX Power On 打开ATX电源
- 4.4.29 M81: ATX Power Off 关闭ATX电源
- 4.4.30 M82: 设置挤出机使用绝对坐标模式
- 4.4.31 M83: 设置挤出机为相对坐标模式
- 4.4.32 M84: Stop idle hold
- 4.4.33 M92: 设置 axis_steps_per_unit 参数
- 4.4.34 M98: 获取 axis_hysteresis_mm 参数
- 4.4.35 M99: 设置 axis_hysteresis_mm 参数
- 4.4.36 M101 正转挤出机1的操作方向 /撤销Extruder Retraction (挤出回缩)
 - 4.4.36.1 M101 in Teacup firmware
 - 4.4.36.2 M101 in other firmwares
- 4.4.37 M102 反转挤出机1的操作方向
- 4.4.38 M103 关闭所有挤出机 / Extruder Retraction (挤出回缩)
 - 4.4.38.1 M103 in Teacup firmware
 - 4.4.38.2 M103 in other firmwares
- 4.4.39 M104:设置挤出机(热头)温度
 - 4.4.39.1 M104 in Teacup Firmware
- 4.4.40 M105: 获取温度
- 4.4.41 M106: 打开风扇
 - 4.4.41.1 M106 in Teacup Firmware
- 4.4.42 M107: 关闭风扇
- 4.4.43 M108: 设置挤出机速度
- 4.4.44 M109: 设置挤出机温度, 并等待
 - 4.4.44.1 M109 in Teacup
 - 4.4.44.2 M109 in Marlin, Sprinter固件 (ATmega port)
 - 4.4.44.3 M109 in Sprinter (4pi port)
- 4.4.45 M110: 设置当前的行码
- 4.4.46 M111: 设置Debug除错等级
- 4.4.47 M112: 紧急停止
- 4.4.48 M113: 设置挤出机的 PWM
- 4.4.49 M114: 获取当前位置
- 4.4.50 M115: 获取固件信息
- 4.4.51 M116: 等待
- 4.4.52 M117: Get Zero Position
- 4.4.53 M117 in Marlin: 显示消息
- 4.4.54 M118: Negotiate Features
- 4.4.55 M119: Get Endstop Status
- 4.4.56 M120: Push
- 4.4.57 M121: Pop
- 4.4.58 M126: Open Valve
- 4.4.59 M127: Close Valve
- 4.4.60 M128: Extruder Pressure PWM
- 4.4.61 M129: Extruder pressure off
- 4.4.62 M130: 设置 PID P 值
- 4.4.63 M131: 设置 PID I 值
- 4.4.64 M132: 设置 PID D 值
- 4.4.65 M133: Set PID I limit value
- 4.4.66 M134: Write PID values to EEPROM
- 4.4.67 M136: Print PID settings to host
- 4.4.68 M140: Bed Temperature (Fast)
- 4.4.69 M141: Chamber Temperature (Fast)
- 4.4.70 M142: Holding Pressure
- 4.4.71 M143: 设置最大热头温度

- 4.4.72 M160: Number of mixed materials
- 4.4.73 M190: Wait for bed temperature to reach target temp
- 4.4.74 M200 - Set filament diameter / Get Endstop Status
- 4.4.75 M201 - 设置最大打印加速度
- 4.4.76 M202 - 设置最大移动加速度
- 4.4.77 M203 - 设置电机最大速度
- 4.4.78 M204 - 设置默认加速度
- 4.4.79 M205 - 高级设置
- 4.4.80 M206: 设置归位偏差
- 4.4.81 M207: 通过测量Z的最大活动范围 来 校准Z轴
- 4.4.82 M208: 设置XYZ轴行程的限制
- 4.4.83 M209: 允许自动回丝 (Retraction)
- 4.4.84 M220:set speed factor override percentage
- 4.4.85 M221: set extrude factor override percentage
- 4.4.86 M226: Gcode Initiated Pause
- 4.4.87 M227: Enable Automatic Reverse and Prime
- 4.4.88 M228: Disable Automatic Reverse and Prime
- 4.4.89 M229: Enable Automatic Reverse and Prime
- 4.4.90 M230: Disable / Enable Wait for Temperature Change
- 4.4.91 M240: Start conveyor belt motor / Echo off
- 4.4.92 M241: Stop conveyor belt motor / echo on
- 4.4.93 M245: 打开风扇
- 4.4.94 M246: 关闭风扇
- 4.4.95 M300: 播放提示音
- 4.4.96 M301: Set PID parameters - Hot End
- 4.4.97 M303: Run PID tuning
- 4.4.98 M304: Set PID parameters - Bed
- 4.4.99 M420: Set RGB Colors as PWM
- 4.4.100 T: 选择工具
- 5 Proposed EEPROM configuration codes
 - 5.1 M500: 保存修改 数据将保存在EEPROM上
 - 5.2 M501: 从EEPROM读取设置
 - 5.3 M502: 重置为出厂模式.
 - 5.4 M503: 获取设置
- 6 Replies from the RepRap machine to the host computer
- 7 Proposal for sending multiple lines of G-code
 - 7.1 Problem to solve
- 8 Alternatives to G-code

概述

一句能够被RepRap识别的Gcode代码应该是这样子的:

```
N3 T0*57
N4 G92 E0*67
N5 G28*22
N6 G1 F1500.0*82
N7 G1 X2.0 Y2.0 F3000.0*85
N8 G1 X3.0 Y3.0*33
```

以上这些句子中的各个符号(当然还有其他符号)的意义将会在下面解释。 The meaning of all those symbols and numbers (and more) is explained below.

以下这个表格可以清楚表明某个语句在哪些固件支持, 或尚处于试验性质

Support	Fived	Teacup	Sprinter	Marlin	Repetier
	yes	automatic	yes	yes	experimental

Here means:

yes

完全支持.
experimental
实验中的, 有一些支持. 但通常情况下, 你需要检查下源代码并可能需要做出一些修改。
automatic
自动的, 这说明在这个固件中这项命令是自动生成并处理的, 因此该命令是不需要的, 例如在Teacup (一种固件) 你不会用到 power supply on/off (M80/M81)这个命令。

power supply on/off 电源开/关

no
这个固件不支持这项指令.

另外, 每一行命令 (代码) 都以一个<nl>结尾, 或者以<nl><cr>结尾, 因此, 无论是Unix式和windows式的结尾都是有效的。

RepRap G代码 区域

以下是意译 对于指令Xnnn, 其中大写X为指令头, 可以是G, M, T, S等, 而nnn则是一个整数, 或者一个小数, 这取决与当时的具体环境。
原文 (This section explains the letter-preceded fields. The numbers in the fields are represented by nnn. Numbers can be integers, or can contain a decimal point, depending on context. For example an X coordinate can be integer (X175) or fractional (X17.62), whereas trying to select extruder number 2.76 would make no sense.)

Letter	Meaning
Gnnn	标准 GCode 命令, 例如移动到一个坐标点。
Mnnn	RepRap定义的命令, 例如打开一个冷却风扇。
Tnnn	选择工具代码nnn. 在 RepRap中, 工具通常是挤出头 (extruder) 。
Snnn	命令参数, 例如马达的电压。
Pnnn	命令参数, 频率: 1次每毫秒。
Xnnn	X坐标, 通常用于移动命令。
Ynnn	Y坐标, 通常用于移动命令。
Znnn	Z坐标, 通常用于移动命令。
Innn	参数 - 现在仍未使用 (定义) 。
Jnnn	参数 - 现在仍未使用 (定义) 。
Fnnn	进料速度 单位: 毫米每分钟 (关系到打印速度)。
Rnnn	参数 - 温度相关。
Qnnn	参数- 现在仍未使用 (定义) 。
Ennn	挤出长度 (单位: 毫米)。就像 X, Y 和 Z命令, 但这个命令用于控制挤出线材的长度. 这更适合新式的步进电机系统... (PS: 这句不知道什么意思)。 Better: 在 Skeinforge 40 和更新的版本, 该命令控制的是进入挤出机线材的长度, 而不是挤出机挤出线材的长度。
Nnnn	行码 Line number. 在发送错误情况后, 这可以用来重复输入某行代码 (命令) 。
*nnn	校验码 (Checksum)。用于检测通信错误。

注释

G Code 注释:

```
N3 T0*57 ;这是一条注释
N4 G92 E0*67
;; 这也是
N5 G28*22
```

注释会被RepRap忽略掉, 就像空白行, 但最好在发送命令之前把注释清除掉, 省点流量嘛。。

Individual commands

Checking 标记代码

N 和 *

Example: N123 [...G Code 写在这里...] *71

这是行码和标记码。RepRap的固件会以一个本地计算的值来对比标记码，如果两者值不同，就会要求一个重复的输入

行码和检查码都可以去掉 - RepRap仍会工作，但它不会做检查。你必须同时使用，或同时放弃使用。

检查码cs 是通过对对应的一串Gcode cmd(包括它的的行码)的原始字节数据 进行 异或位运算得出的

下面是实例代码：

```
int cs = 0;
for(i = 0; cmd[i] != '*' && cmd[i] != NULL; i++)
    cs = cs ^ cmd[i];
cs &= 0xff; // Defensive programming...
```

检查码cs的值即使其*符号右边的十进制数字

RepRap固件希望每次命令的行代码都是逐次增加1的大小，不然的话，它会返回一个错误。当然你也可以发送一个M110命令（详情请看下面）强行重置机器。

译者注:行码和检查码是为了减少信号干扰而存在。

延时G 命令

RepRap固件接收到这些命令后，会先存储在一个循环队列缓存里再执行。这意味着固件在接收到一条命令后马上可以传输下一条。另一方面，这也意味着一组线段可以没有间断的情况下连续打印。为了实现命令流的控制，当接受到可缓存的命令时，如果固件把它成功放到本地缓存里，就立即给出应答，如果本地缓存已满，则会延时等到缓存有空出的位置时，才给出应答。

G0: Rapid move 快速移动

Example: G0 X12

这个命令会移动的距离 X = 12 mm. 事实上，对于RepRap来说，这个命令的效果和G1 X12是一样的。（这条命令本来是为了让那些喜欢走折线路径的老机器走直线这个比较快的路径，所以叫做快速移动）

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
???	yes	yes	yes	yes	yes

G1: Controlled move 可控移动

Example: G1 X90.6 Y13.8 E22.4

从当前的位置点(X, Y) 移动到目的点(90.6, 13.8)，并会在行进过程中挤出22.4mm的打印丝（注意，挤出命令是由E22.4控制的）

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
yes	yes	yes	yes	yes	yes

RepRap 对于进料速度很敏感。因此：

```
G1 F1500
G1 X90.6 Y13.8 E22.4
```

会先设置 1500毫米每分钟 的进料速度，然后才会移动（X90.6 Y13.8）并且吐丝。
但是

```
G1 F1500
G1 X90.6 Y13.8 E22.4 F3000
```

这串代码却会先设置1500毫米每分钟 的进料速度，然后在移动的时候提升进料速度，直到3000毫米每分钟。

RepRap 可以通过E命令轻易对进料速度进行加/减速，就像对X, Y, Z, E命令一样，这样，机器才能在必要的点吐必要的丝。

提示：不是所有的固件都支持这项功能(移动在改变进料速度)，例如： 当前的 Marlin 会从一开始就使用新的进料速度，而不会尝试在中途改变它。

第一个例子是在移动时保持固定进料速度，而第二个例子则是在移动中改变进料速度。 因此：

```
G1 F1500
G1 X90.6 Y13.8 E22.4 F3000
G1 X80 Y20 E36 F1500
```

这段代码会先加速进料速度到3000毫米每分钟 减速到1500 毫米每分钟。

吸丝操作，通过反向转动挤出机马达，减少挤出机内部压力，避免在悬空移动时候的吐丝，可以有效减少打印过程中的毛刺现象，具体操作：发送G1 Ennn指令给RepRap 其中nnn的值应当小于当前的值

G28: Move to Origin 移动到原点

Example: G28

该命令会是机器的挤出机复位到原点。准确的说，是一直朝着限位开关（endstops）的方向移动，直到触发限位开关，才会停止移动。需要注意，为了尽早复位，移动过程回不断加速，而到了限位开关之后，它会做一次大约1mm的往返移动，来保证复位操作的精确度。

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
	yes	yes	yes	yes	yes

如果你加上坐标值，那么，只有被加上的坐标值才会被复位 例如：“G28 X0 Y72.3”

只会复位X和Y方向，而不会对高度（Z方向）进行复位。（X和Y后面的数字会被忽略处理）

G29-G32: Bed probing 加热床检查

G29 Detailed Z-Probe 详细检查

在3个不同位置对加热床进行检查

G30 Single Z Probe 单一检查

在当前的位置对加热床进行检查

G31 Report Current Probe status 报告检查结果

reports whether Z probe is triggered.

G32 Probe Z and calibrate with FPU

在3个不同位置对加热床进行检查并依据检查结果做出调整 and updates transformation matrix for bed leveling compensation.

G29-G30原文如下

- G29Detailed Z-Probe

probes the bed at 3 points.

- G30 Single Z Probe

probes bed at current XY location.

- G31 Report Current Probe status

reports whether Z probe is triggered. G32 Probe Z and calibrate with FPU probes the bed at 3 points and updates transformation matrix for bed leveling compensation.

即时G 命令

以下命令也可以被缓存，但是直到所有之前缓存的命令被执行完，并且该命令执行后，才会给出应答。因此主机会等待命令执行完毕（才收到的应答）。这些命令导致的短暂停顿不会影响机器的正常性能。

Teacup Firmware buffers G20, G21, G90 and G91.

G4: Dwell 停顿

Example: G4 P200

停顿200毫秒。在停顿过程中机器仍可以被控制，如挤出头温度。

G10: 打印头偏移

实例: G10 P3 X17.8 Y-19.3 Z0.0 R140 S205

这条命令设置打印头3（参数P3）的X, Y, 方向偏移。你也可以使用Z方向的非零偏移值，但是通常情况下，这不是一个好主意。因为除非打印头是用某种装置动态加载的，通常情况下机器上打印头安装位置应当是同样的高度。因为如果不设置特定的值，机器会使用上一次设置给出的值作为缺省，因此通常还是应当显式的设定Z0.0.

命令里面的 R 值用来指定待机时的温度，单位是摄氏度，S值是工作时的温度， 如果不想工作和待机时温度有区别，可以把两个值设为相同，可以参考T命令对应的说明。

NIST G-code 标准 (http://www.nist.gov/customcf/get_pdf.cfm?pub_id=823374) 提到了一个额外的 L 参数，当前会自动忽略

该条命令目前 提出供讨论.

G20: Set Units to Inches 使用英寸作为单位

Example: G20

从现在开始，使用英寸作为单位.

G21: Set Units to Millimeters 使用毫米作为单位

Example: G21

从现在开始使用毫米作为单位（这是RepRap的默认设置.）

G90: Set to Absolute Positioning 设置成绝对定位

Example: G90

All coordinates from now on are absolute relative to the origin of the machine. (This is the RepRap default.)

所有坐标从现在开始变成绝对坐标，即与机器原始位置相对的...RepRap的默认...

G91: Set to Relative Positioning 设置成相对定位

Example: G91

All coordinates from now on are relative to the last position
所有坐标从现在开始变成相对于当前位置的相对坐标

G92: Set Position 设置位置

Example: G92 X10 E90

可用来设定绝对0点，或者重置现在的位置到规定的坐标。例如设置机器的X坐标为10，喷头的坐标为90。不会发生物理运动

没有指定坐标的G92命令会重置所有轴到0

即时 的 M 和 T 命令

M0: Stop 停止

Example (例子): M0

RepRap 会终止任何动作，然后关机。所有的马达和加热器都很被关掉，你需要点击reset按钮来重启主控制器 See also M1, M112.

M1: Sleep 睡眠

Example: M1

RepRap 会终止任何动作，然后关机。所有的马达和加热器都很被关掉，你仍可以发送 G或 M 命令来唤醒它 See also M0, M112.

M3: Spindle On, Clockwise (CNC specific)

Example: M3 S4000

The spindle is turned on with a speed of 4000 RPM.

M4: Spindle On, Counter-Clockwise (CNC specific)

Example: M4 S4000

The spindle is turned on with a speed of 4000 RPM.

M5: Spindle Off (CNC specific)

Example: M5

The spindle is turned off.

M7: Mist Coolant On (CNC specific)

Example: M7

气雾冷却系统开启 (如果有的话)

M8: Flood Coolant On (CNC specific)

Example: M8

水冷系统开启(如果有的话)

M9: Coolant Off 冷却系统关闭(CNC specific)

Example: M9

所有的冷却系统关闭。

M10: Vacuum On (CNC specific)

Example: M10

吸尘系统开启.

M11: Vacuum Off (CNC specific)

Example: M11

吸尘系统关闭.(CNC 专用)

M17: Enable/Power all stepper motors 启动所有步进马达

Example: M17

M18: Disable all stepper motors 关闭所有步进马达

Example: M18

关闭所有马达，这可能会导致某些方向上'自由移动'，（由于惯性或重力）

- Is this not the same as M84? -- MrAlvin 05:53, 20 September 2012 (UTC)

M20: List SD card 读取SD卡

Example: M20

所有在SD卡根目录的文件夹都会被读取，并显示在Serial Port界面，结果像是这样子

ok Files: {SQUARE.G,SQCOM.G,}

‘，’符号是可选的。注意到文件名是大写的，但 - 如果是 M23 命令(below) 它们则会使小写的。This seems to be a function of the SD software. Go figure...

M21: Initialize SD card 初始化SD卡

Example: M21

初始化SD卡。如果在机器通电时插入SD卡，会默认初始化SD卡。开始其他SD卡功能时SD卡一定要初始化。

M22: Release SD card 弹出SD卡

Example: M22

SD卡已经弹出，可以真的被拔出来...

M23: Select SD file 选择SD卡的文件

Example: M23 filename.gco

SD卡上这个文件filename.gco (8.3 naming convention is supported)会被选中准备打印

M24: Start/resume SD print 开始SD卡的打印

Example: M24

机器打印M23选定的文件

M25: Pause SD print 暂停SD卡打印

Example: M25

机器在当前位置暂停打印M23选定的文件

M26: Set SD position

Example: M26

Set SD position in bytes (M26 S12345).

M27: Report SD print status

Example: M27

Report SD print status.

M28: Begin write to SD card

Example: M28 filename.gco

File specified by filename.gco is created (or overwritten if it exists) on the SD card and all subsequent commands sent to the machine are written to that file.

M29: Stop writing to SD card

Example: M29 filename.gco

File opened by M28 command is closed, and all subsequent commands sent to the machine are executed as normal.

M30: Delete a file on the SD card

Example: M30 filename.gco

filename.gco is deleted.

M40: Eject

If your RepRap machine can eject the parts it has built off the bed, this command executes the eject cycle. This usually involves cooling the bed and then performing a sequence of movements that remove the printed parts from it. The X, Y and Z position of the machine at the end of this cycle are undefined (though they can be found out using the M114 command, q.v.).

See also M240 and M241 below.

M41: Loop

Example: M41

If the RepRap machine was building a file from its own memory such as a local SD card (as opposed to a file being transmitted to it from a host computer) this goes back to the beginning of the file and runs it again. So, for example, if your RepRap is capable of ejecting parts from its build bed then you can set it printing in a loop and it will run and run. Use with caution – the only things that will stop it are:

1. When you press the reset button,
2. When the build material runs out (if your RepRap is set up to detect this), and
3. When there's an error (such as a heater failure).

M42: Stop on material exhausted / Switch I/O pin

M42 in ???

Example: M42

If your RepRap can detect when its material runs out, this decides the behaviour when that happens. The X and Y axes are zeroed (but not Z), and then the machine shuts all motors and heaters off. You have to press reset to reactivate the machine. In other words, it parks itself and then executes an M0 command (q.v.).

M42 in Marlin/Sprinter

Example: M42 P7 S255

M42 switches a general purpose I/O pin.

M42 in Teacup

Not needed. General purpose devices are handled like a heater, see M104.

M43: Stand by on material exhausted

Example: M43

If your RepRap can detect when its material runs out, this decides the behaviour when that happens. The X and Y axes are zeroed (but not Z), and then the machine shuts all motors and heaters off except the heated bed, the temperature of which is maintained. The machine will still respond to G and M code commands in this state.

M80: ATX Power On 打开ATX电源

Example: M80

Turns on the ATX power supply from standby mode to fully operational mode. No-op on electronics without standby mode.

Note: some firmwares, like Teacup, handle power on/off automatically, so this is redundant there.

M81: ATX Power Off 关闭ATX电源

Example: M81

关闭ATX电源支持. 与M80相反.

M82: 设置挤出机使用绝对坐标模式

Example: M82

makes the extruder interpret extrusion as absolute positions.

这是repetier的初始设置.

M83: 设置挤出机为相对坐标模式

Example: M83

makes the extruder interpret extrusion values as relative positions.

M84: Stop idle hold

Example: M84

Stop the idle hold on all axis and extruder. In some cases the idle hold causes annoying noises, which can be stopped by disabling the hold. Be aware that by disabling idle hold during printing, you will get quality issues. This is recommended only in between or after printjobs.

M92: 设置 axis_steps_per_unit 参数

Example: M92 X<newsteps> Sprinter和Marlin固件

允许重新设置steps per unit of axis , 可脱机保存. 在校准的时候非常有用

M98: 获取 axis_hysteresis_mm 参数

Example: M98

报告XYZ三个方向的当前的hysteresis值 .

用于 Marlin

M99: 设置 axis_hysteresis_mm 参数

Example: M99 X<mm> Y<mm> Z<mm> E<mm>

允许重新设置hysteresis值. 齿轮等机械结构, 在转换方向时候都会有滞后现象. 你可以测量在他们在转换方向的时候有多长的距离是丢失掉的, 然后把它写入hysteresis值, 这样之后的转向运动, 机器将会进补偿运动, 来弥补这些误差。(原文: Mechanical pulleys, gears and threads can have hysteresis when they change direction. That is, a certain number of steps occur before movement occurs. You can measure how many mm are lost to hysteresis and set their values with this command. Every time an axis changes direction, these extra mm will be added to compensate for the hysteresis.)

用于 Marlin

M101 正转挤出机1的操作方向 /撤销Extruder Retraction (挤出回缩)

M101 in Teacup firmware

If a DC extruder is present, turn that on. Else, undo filament retraction, which means, make the extruder ready for extrusion. Complement to M103.

M101 in other firmwares

Deprecated. Regarding filament retraction, see M227, M228, M229.

M102 反转挤出机1的操作方向

Deprecated.

M103 关闭所有挤出机 / Extruder Retraction (挤出回缩)

M103 in Teacup firmware

If a DC extruder is present, turn that off. Else, retract the filament in the hope to prevent nozzle drooling. Complement to M101.

M103 in other firmwares

Deprecated. Regarding extruder retraction, see M227, M228, M229.

M104:设置挤出机（热头）温度

例如: M104 S190

将挤出机的温度设置为190°C 并将操作全归还给操作主机（控制PC）（i.e. before that temperature has been reached by the extruder). See also M109.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
	yes	yes	yes	yes	yes

This is deprecated because temperatures should be set using the G10 and T commands (q.v.).

Deprecation is subject to discussion. --Traumflug 11:33, 19 July 2012 (UTC)

M104 in Teacup Firmware

In Teacup Firmware, M104 can be additionally used to handle all devices using a temperature sensor. It supports the additional P parameter, which is a zero-based index into the list of sensors in config.h. For devices without a temp sensor, see M106.

Example: M104 P1 S100

Set the temperature of the device attached to the second temperature sensor to 100 ° C.

M105: 获取温度

Example: M105

请求当前温度（单位：°C），温度将立即返回到控制程序（T：挤出机 B：加热床） 例如，输出候会得到这样的答复 ok T:201 B:117

M106: 打开风扇

Example: M106 S127

打开风扇（半速）

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes	yes	yes	

’S’表示 PWM值（0-255）。可简单理解为风扇有0-255级强度可选，其中 M106 S0 意味着风扇将被关掉。

M106 in Teacup Firmware

Additionally to the above, Teacup Firmware uses M106 to control general devices. It supports the additional P parameter, which is an zero-based index into the list of heaters/devices in config.h.

Example: M106 P2 S255

Turn on device #3 at full speed/wattage.

Note: When turning on a temperature sensor equipped heater with M106 and M104 at the same time, temperature control will override the value given in M106 quickly.

M107: 关闭风扇

不推荐. 请用M106 S0 代替.

M108: 设置挤出机速度

设置挤出机电机的转速（不推荐，请使用 M113）

M109: 设置挤出机温度，并等待

M109 in Teacup

Not needed. To mimic Marlin behaviour, use M104 followed by M116.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
	???	not needed	see text	yes	???

M109 in Marlin, Sprinter固件 (ATmega port)

设置挤出机温度，并等待.

Example: M109 S185

M109 in Sprinter (4pi port)

Parameters: S (optional), set target temperature value. If not specified, waits for the temperature set by M104. R (optional), sets target temperature range maximum value.

Example: M109 S185 R240 //sets extruder temperature to 185 and waits for the temperature to be between 185 - 240.

If you have multiple extruders, use T or P parameter to specify which extruder you want to set/wait.

Another way to do this is to use G10.

M110: 设置当前的行码

Example: M110 N123

设置当前行为第123行. 然后, 接下来的那行命令会变成第124行命令.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
	???	not needed	???	???	???

M111: 设置Debug除错等级

Example: M111 S6

Set the level of debugging information transmitted back to the host to level 6. The level is the OR of three bits:

```
#define DEBUG_ECHO (1<<0)
#define DEBUG_INFO (1<<1)
#define DEBUG_ERRORS (1<<2)
```

Thus 6 means send information and errors, but don't echo commands. (This is the RepRap default.)

Example: M253

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		Debug			

M112: 紧急停止

Example: M112

所有进行中的动作都会被立即终止，然后关掉Reprap。所有电机和加热器都会被关掉。可以按Reset按钮（板上）以重启。 See also M0 and M1.

M113: 设置挤出机的 PWM

Example: M113

Set the PWM for the currently-selected extruder. On its own this command sets RepRap to use the on-board potentiometer on the extruder controller board to set the PWM for the currently-selected extruder's stepper power. With an S field:

M113 S0.7

it causes the PWM to be set to the S value (70% in this instance). M113 S0 turns the extruder off, until an M113 command other than M113 S0 is sent.

M114: 获取当前位置

Example: M114

This causes the RepRap machine to report its current X, Y, Z and E coordinates to the host.

For example, the machine returns a string such as:

```
ok C: X:0.00 Y:0.00 Z:0.00 E:0.00
```

M115: 获取固件信息

Example: M115

Request the Firmware Version and Capabilities of the current microcontroller The details are returned to the host computer as key:value pairs separated by spaces and terminated with a linefeed.

sample data from firmware:

```
ok PROTOCOL_VERSION:0.1 FIRMWARE_NAME:FiveD FIRMWARE_URL:http%3A//reprap.org MACHINE_TYPE:Mendel EXTRUDER_COUNT:1
```

This M115 code is inconsistently implemented, and should not be relied upon to exist, or output correctly in all cases. An initial implementation was committed to svn for the FiveD Reprap firmware on 11 Oct 2010. Work to more formally define protocol versions is currently (October 2010) being discussed. See M115_Keywords for one draft set of keywords and their meanings.

M116: 等待

Example: M116

等待所有温度，或者其他缓慢变化的值达到目标值 See also M109.

M117: Get Zero Position

Example: M117

This causes the RepRap machine to report the X, Y, Z and E coordinates in steps not mm to the host that it found when it last hit the zero stops for those axes. That is to say, when you zero X, the x coordinate of the machine when it hits the X endstop is recorded. This value should be 0, of course. But if the machine has drifted (for

example by dropping steps) then it won't be. This command allows you to measure and to diagnose such problems. (E is included for completeness. It doesn't normally have an endstop.)

M117 in Marlin: 显示消息

Example: M117 Hello World

这命令能让消息显示在LCD显示屏上。上述命令显示的是 Hello World.

M118: Negotiate Features

Example: M118 P42

This M-code is for future proofing. NO firmware or hostware supports this at the moment. It is used in conjunction with M115's FEATURES keyword.

See Protocol_Feature_Negotiation for more info.

M119: Get Endstop Status

Example: M119

Returns the current state of the configured X, Y, Z endstops. Takes into account any 'inverted endstop'

settings, so one can confirm that the machine is interpreting the endstops correctly.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes		yes	

M120: Push

Push the state of the RepRap machine onto a stack. Exactly what variables get pushed depends on the implementation (as does the depth of the stack - a typical depth might be 5). A sensible minimum, however, might be

1. Current feedrate, and
2. Whether moves (and separately extrusion) are relative or absolute

M121: Pop

Recover the last state pushed onto the stack.

M126: Open Valve

Example: M126 P500

Open the extruder's valve (if it has one) and wait 500 milliseconds for it to do so.

M127: Close Valve

Example: M127 P400

Close the extruder's valve (if it has one) and wait 400 milliseconds for it to do so.

M128: Extruder Pressure PWM

Example: M128 S255

PWM value to control internal extruder pressure. S255 is full pressure.

M129: Extruder pressure off

Example: M129 P100

In addition to setting Extruder pressure to 0, you can turn the pressure off entirely. P400 will wait 100ms to do so.

M130: 设置 PID P 值

Example: M130 P 0 S 8.0 # Sets heater
0 P factor to 8.0

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes			

M131: 设置 PID I 值

Example: M130 P 1 S 0.5 # Sets heater
1 I factor to 0.5

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes			

M132: 设置 PID D 值

Example: M130 P 0 S 24 # Sets heater
0 D factor to 24.0

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes			

M133: Set PID I limit value

Example: M130 P 1 S 264 # Sets heater
0 I limit value to 264

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes			

M134: Write PID values to EEPROM

Example: M134

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes			

M136: Print PID settings to host

Example: M136 P1 # print heater 0 PID
parameters to host

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		Debug			

M140: Bed Temperature (Fast)

Example: M140 S55

Set the temperature of the build bed
to 55°C and return control to the
host immediately (i.e. before that
temperature has been reached by the bed).

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		yes	yes	yes	yes

M141: Chamber Temperature (Fast)

Example: M141 S30

Set the temperature of the chamber to 30°C and return control to the host immediately (i.e. before that temperature has been reached by the chamber).

M142: Holding Pressure

Example: M142 S1

Set the holding pressure of the bed to 1 bar.

The holding pressure is in bar. For hardware which only has on/off holding, when the holding pressure is zero, turn off holding, when the holding pressure is greater than zero, turn on holding.

M143: 设置最大热头温度

Example: M143 S275

设置热头最大温度为 275°C

当机器达到这个温度，将采取紧急措施，例如 紧急停止。这是为了防止对热头的破坏。

M160: Number of mixed materials

Example: M160 S4

Set the number of materials, N, that the current extruder can handle to the number specified. The default is 1.

When N >= 2, then the E field that controls extrusion requires N+1 values separated by spaces after it like this:

```
M160 S4
G1 X90.6 Y13.8 E22.4 0.1 0.1 0.1 0.7
G1 X70.6 E42.4 0.0 0.0 0.0 1.0
G1 E42.4 1.0 0.0 0.0 0.0
```

The second line moves straight to the point (90.6, 13.8) extruding 22.4mm of filament. The mix ratio at the end of the move is 0.1:0.1:0.1:0.7.

The third line moves back 20mm in X extruding 20mm of filament. The mix varies linearly from 0.1:0.1:0.1:0.7 to 0:0:0:1 as the move is made.

The fourth line has no physical effect, but sets the mix proportions for the start of the next move to 1:0:0:0.

M190: Wait for bed temperature to reach target temp

Example: M190 S60

This will wait until the bed temperature reaches 60 degrees, printing out the temperature of the hot end and the bed every second.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		obsolete, see M116	yes	yes	

M200 - Set filament diameter / Get Endstop Status

M200 设置线材的直径.

Question: what does a firmware do with filament diameter? Has this an effect on how much an E command moves the extruder motor? --Traumflug 11:34, 14 October 2012 (UTC)

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
				yes	

M201 - 设置最大打印加速度

in units/s² for print moves (M201 X1000 Y1000)

M202 - 设置最大移动加速度

in units/s² for travel moves (M202 X1000 Y1000) Unused in Marlin!!

M203 - 设置电机最大速度

这是你机器可以维持的最大速度 例如 (M203 X200 Y200 Z300 E10000) 单位 mm/min

Note: this should be in units/minute, just like the F code.

M204 - 设置默认加速度

S normal moves T filament only moves (M204 S3000 T7000) in mm/sec² also sets minimum segment time in ms (B20000) to prevent buffer underruns and M20 minimum feedrate

M205 - 高级设置

minimum travel speed S=while printing T=travel only, B=minimum segment time X=maximum xy jerk, Z=maximum Z jerk, E=maximum E jerk

M206: 设置归位偏差

Example: M206 X10.0 Y10.0 Z-0.4

The values specified are added to the endstop position when the axes are referenced. The same can be achieved with a G92 right after homing (G28, G161).

With Marlin firmware, this value can be saved to EEPROM using the M500 command.

A similar command is G10, aligning these two is subject to discussion.

M207: 通过测量Z的最大活动范围 来 校准Z轴

Example: M207

After placing the tip of the nozzle in the position you expect to be considered Z=0, issue this command to calibrate the Z axis. It will perform a z axis homing routine and calculate the distance traveled in this process. The result is stored in EEPROM as z_max_length. For using this calibration method the machine must be using a Z MAX endstop.

This procedure is usually more reliable than mechanical adjustments of a Z MIN endstop.

M208: 设置XYZ轴行程的限制

Example: M208 X250 Y210 Z180

此值设置在XYZ轴正方向行程的软件限制。 Marlin firmware, 可以用M500命令被保存到EEPROM中。

The values specified set the software limits for axis travel in the positive direction.

With Marlin firmware, this value can be saved to EEPROM using the M500 command.

M209: 允许自动回丝 (Retraction)

Example: M209 S1

This boolean value S 1=true or 0=false enables automatic retract detect if the slicer did not support G10/11: every normal extrude-only move will be classified as retract depending on the direction.

M220: set speed factor override percentage

Example: M220 S80

S<factor in percent>- set speed factor override percentage

M221: set extrude factor override percentage

Example: M221 S70

S<factor in percent>- set extrude factor override percentage

M226: Gcode Initiated Pause

Example: M226

Initiates a pause in the same way as if the pause button is pressed. That is, program execution is stopped and the printer waits for user interaction. This matches the behaviour of M1 in the NIST RS274NGC G-code standard (http://www.nist.gov/manuscript-publication-search.cfm?pub_id=823374) and M0 in Marlin firmware.

M227: Enable Automatic Reverse and Prime

Example: M227 P1600 S1600

P and S are steps.

"Reverse and Prime" means, the extruder filament is retracted some distance when not in use and pushed forward the same amount before going into use again. This shall help to prevent drooling of the extruder nozzle. Teacup firmware implements this with M101/M103.

M228: Disable Automatic Reverse and Prime

Example: M228

See also M227.

M229: Enable Automatic Reverse and Prime

Example: M229 P1.0 S1.0

P and S are extruder screw rotations. See also M227.

M230: Disable / Enable Wait for Temperature Change

Example: M230 S1

S1 Disable wait for temperature change S0 Enable wait for temperature change

M240: Start conveyor belt motor / Echo off

Example: M240

The conveyor belt allows to start mass production of a part with a rewrap.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		Debug: Echo off			

Echoing may be controlled in some firmwares with M111

M241: Stop conveyor belt motor / echo on

Example: M241

Echoing may be controlled in some firmwares with M111

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
		Debug: Echo on			

M245: 打开风扇

Example: M245

used to cool parts/heated-bed down after printing for easy remove of the parts after print

M246: 关闭风扇

Example: M246

M300: 播放提示音

Usage: M300 S<frequency Hz> P<duration ms>

Example: M300 S300 P1000

在打印结束时播放提示音来提醒我们。 Play beep sound, use to notify important events like the end of printing. See working example on (<http://www.3dprinting-r2c2.com/?q=content/seasons-greetings>) R2C2 electronics.

M301: Set PID parameters - Hot End

Example: M301 P1 I2 D3 C5

Sets Proportional, Integral and Derivative values for hot end, the value C refers to an extrusion rate.

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
				PID	

Alternate implementation

Example: M301 W125

M303: Run PID tuning

Hotend Usage: M303 S<temperature> C<cycles> Bed Usage: M303 E-1 C<cycles> S<temperature> Example: M303 C8 S175

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
				PID	PID

Generate Proportional, Integral and Derivative values for the hotend or bed (E-1). Send the appropriate code and wait for the output to update the firmware.

M304: Set PID parameters - Bed

Example: M304 P1 I2 D3

Sets Proportional, Integral and
Derivative values for bed

Support	FiveD	Teacup	Sprinter	Marlin	Repetier
				PID	

M420: Set RGB Colors as PWM

Usage: M420 R<Red PWM (0-255)> E<Green PWM (0-255)> B<Blue PWM (0-255)>

Example: M420 R255 E255 B255

Set the color of your RGB LEDs that are connected to PWM-enabled pins. Note, the Green color is controlled by the E value instead of the G value due to the G code being a primary code that cannot be overridden.

T: 选择工具

Example: T1

选择操作挤出机1.

The sequence followed is:

1. Set the current extruder to its standby temperature specified by G10 (see above),
2. Set the new extruder to its operating temperature specified by G10 and wait for all temperatures to stabilise,
3. Apply any X, Y, Z offset for the new extruder specified by G10,
4. Use the new extruder.

Selecting a non-existent tool (100, say) just does Step 1. above. That is to say it leaves all tools in their standby state. You can, of course, use the G10 command beforehand to set that standby temperature to anything you like.

Note that you may wish to move to a parking position before executing a T command in order to allow the new extruder to reach temperature while not in contact with the print. It is acceptable for the firmware to apply a small offset [by convention (-1mm x tool-number) in Y] to the current position when the above sequence is entered to allow temperature changes to take effect just away from the parking position. Any such offset must, of course, be undone when the procedure finishes.

If the Z value changes in the offsets and the head moves up, then the Z move is made before the X and Y moves. If Z moves down, X and Y are done first.

After a reset extruders will not start heating until they are selected. You can either put them all at their standby temperature by selecting them in turn, or leave them off so they only come on if/when you first use them. The M0, M1 and M112 commands turn them all off. You can, of course, turn them all off with the M1 command, then turn some back on again. Don't forget also to turn on the heated bed (if any) if you use that trick.

Extruder numbering starts at 0.

Proposed EEPROM configuration codes

BRIEFLY: each RepRap has a number of physical parameters that should be persistent, but easily configurable, such as extrusion steps/mm, various max values, etc. Those parameters are currently hardcoded in the firmware, so that a user has to modify, recompile and re-flash the firmware for any adjustments. These configs can be stored in MCU's EEPROM and modified via some M-codes. Please see the detailed proposal at M-codes for EEPROM config. (This is proposed by --AlexRa on 11-March-2011. There is currently no working implementation of the proposed commands).

Marlin uses these codes to manipulate EEPROM values.

Sprinter has implemented the following commands to manipulate EEPROM Commit message
(<https://github.com/kliment/Sprinter/commit/4b1b0f1d96d2be2ed3941095f40a5c2d2bbb943d>)
.

Teacup uses codes M130-M136 to set, read, and save some parameters.

M500: 保存修改 数据将保存在EEPROM上

M501: 从EEPROM读取设置

If you need to reset them after you changed them temporarily

M502: 重置为出厂模式.

你还是需要M500来保存这个设置.

M503: 获取设置

Replies from the RepRap machine to the host computer

All communication is in printable ASCII characters. Messages sent back to the host computer are terminated by a newline and look like this:

```
xx [line number to resend] [T:93.2 B:22.9] [C: X:9.2 Y:125.4 Z:3.7 E:1902.5] [Some debugging or other information may be here]
```

xx can be one of:

ok

rs

!!

ok means that no error has been detected.

rs means resend, and is followed by the line number to resend.

!! means that a hardware fault has been detected. The RepRap machine will shut down immediately after it has sent this message.

The T: and B: values are the temperature of the currently-selected extruder and the bed respectively, and are only sent in response to M105. If such temperatures don't exist (for example for an extruder that works at room temperature and doesn't have a sensor) then a value below absolute zero (-273°C) is returned.

C: means that coordinates follow. Those are the X: Y: etc values. These are only sent in response to M114 and M117.

The RepRap machine may also send lines that look like this:

```
// This is some debugging or other information on a line on its own. It may be sent at any time.
```

Such lines will always be preceded by //.

The most common response is simply:

ok

When the machine boots up it sends the string

start

once to the host before sending anything else. This should not be replaced or augmented by version numbers and the like. M115 (see above) requests those.

All this means that every line sent by RepRap to the host computer except the start line has a two-character prefix (one of ok, rs, !! or //). The machine should never send a line without such a prefix.

Exceptions: Marlin 1.0.0 Gen6 Firmware does not follow the two character rule. 'rs' is actually 'Resend' and '!!' is 'Error'. Example Lines:

- Error: Line Number is not current line + 1. Last Line: 7
- Resend: 8
- Writing to File: print.gco
- Done saving file.
- File opened:print.gco Size:22992
- File selected

When in the code base did this change take place and what other firmwares are affected?

Proposal for sending multiple lines of G-code

So far, this is a proposal, open for discussion.

Problem to solve

Each line of G-code sent from the host to the controller is answered with an ok before the next line can be sent without locking communications up. This makes operations very slow, as the usual USB-TTL converters and probably also the host's operating system drivers come with substantial latency, often 10 milliseconds.

For more details on this proposal, and some suggested solutions, and comments please see [GCODE_buffer_multiline_proposal](#)

Alternatives to G-code

Main article: [Firmware/Alternative#alternatives to G-code](#)

- Wikipedia: STEP-NC: "STEP-NC was designed to replace ... G-codes ... adding tolerance data ... [with a] XML format."
- Elegant multispline motion controller "will not use G-code. It will use a custom language based on cubic Bezier curves. This allows for much better description of arcs and will result in much higher quality prints with a much lower data throughput requirements."

Retrieved from "http://reprap.org/mediawiki/index.php?title=G-code/zh_cn&oldid=141170"

Category: 3D model manufacturing software/zh cn

-
- This page was last modified on 11 January 2015, at 03:21.
 - Content is available under GNU Free Documentation License 1.2.