



MAVLink Common Message Set

MAVLink 消息设置

These messages define the common message set, which is the reference message set implemented by most ground control stations and autopilots.

下列消息是通常的消息设置，这些设置已经在大多数的地面站和飞控中得到应用。

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版本：V1.0

原档来源：<https://pixhawk.ethz.ch/mavlink/>

MAVLink Protocol Version 版本

This file has protocol version: 3. The version numbers range from 1-255.

本文版本为：3，版本号的范围是：1～255

MAVLink Type Enumerations 型号表

MAV_AUTOPILOT 飞控类型

Micro air vehicle / autopilot classes. This identifies the individual model. 本参数识别飞控类型

CMD ID	Field Name	Descriptio
0	MAV_AUTOPILOT_GENERIC	Generic autopilot, full support for everything 通用飞控，支持全部功能
1	MAV_AUTOPILOT_PIXHAWK	PIXHAWK autopilot, http://pixhawk.ethz.ch
2	MAV_AUTOPILOT_SLUGS	SLUGS autopilot, http://slugsuav.soe.ucsc.edu
3	MAV_AUTOPILOT_ARDUPILOTMEGA	ArduPilotMega / ArduCopter, http://diydrones.com
4	MAV_AUTOPILOT_OPENPILOT	OpenPilot, http://openpilot.org
5	MAV_AUTOPILOT_GENERIC_WAYPOINTS_ONLY	Generic autopilot only supporting simple waypoints
6	MAV_AUTOPILOT_GENERIC_WAYPOINTS_AND_SIMPLE_NAVIGATION_ONLY	Generic autopilot supporting waypoints and other simple navigation commands 通用飞控，支持航点和简单的导航指令
7	MAV_AUTOPILOT_GENERIC_MISSION_FULL	Generic autopilot supporting the full mission command set

CMD ID	Field Name	Descriptio
		通用飞控，支持全部指令
8	MAV_AUTOPILOT_INVALID	No valid autopilot, e.g. a GCS or other MAVLink component 无效飞控
9	MAV_AUTOPILOT_PPZ	PPZ UAV - http://nongnu.org/paparazzi
10	MAV_AUTOPILOT_UDB	UAV Dev Board
11	MAV_AUTOPILOT_FP	FlexiPilot
12	MAV_AUTOPILOT_PX4	PX4 Autopilot - http://pixhawk.ethz.ch/px4/

MAV_TYPE 飞行器类型

CMD	Field Name	Description
0	MAV_TYPE_GENERIC	Generic micro air vehicle. 通用
1	MAV_TYPE_FIXED_WING	Fixed wing aircraft. 固定翼
2	MAV_TYPE_QUADROTOR	Quadrotor 四轴
3	MAV_TYPE_COAXIAL	Coaxial helicopter 共轴
4	MAV_TYPE_HELICOPTER	Normal helicopter with tail rotor. 直机
5	MAV_TYPE_ANTENNA_TRACKER	Ground installation 地面跟踪天线
6	MAV_TYPE_GCS	Operator control unit / ground control station 地面站
7	MAV_TYPE_AIRSHIP	Airship, controlled 有控飞艇
8	MAV_TYPE_FREE_BALLOON	Free balloon, uncontrolled 自由飞气球
9	MAV_TYPE_ROCKET	Rocket 火箭
10	MAV_TYPE_GROUND_ROVER	Ground rover 地面车辆
11	MAV_TYPE_SURFACE_BOAT	Surface vessel, boat, ship 水面船艇
12	MAV_TYPE_SUBMARINE	Submarine 潜艇
13	MAV_TYPE_HEXAROTOR	Hexarotor 六轴
14	MAV_TYPE_OCTOROTOR	Octorotor 八轴
15	MAV_TYPE_TRICOPTER	Octorotor 【按：勘误 Trirotor】 三轴
16	MAV_TYPE_FLAPPING_WING	Flapping wing 扑翼机
17	MAV_TYPE_KITE	Flapping wing 【按：勘误 Kite】 风筝

MAV_MODE_FLAG 模式标记位

These flags encode the MAV mode. 在 MAVLink 协议中，用一个单字节字符标识飞行器的各种模式（Mode）。模式是 8 个状态开关的各种组合方式。各个标识之间，可以使用“或逻辑”组合起来，共同表示飞控/飞行器的当前状态。

名词解释：

使能：使能状态并非启动，而是使启动指令可以起作用。当使能信号处于 0 状态，不论是否发出启动指令，目标设备都不会动作。只有当使能信号处于 1 状态，启动/关闭指令才可以即时控制目标设备的启动和停止。

CMD ID	Field Name	Description
128	MAV_MODE_FLAG_SAFETY_ARMED	0b10000000 MAV safety set to armed. Motors are enabled / running / can start. Ready to fly. 主发动机使能。准备好起飞。
64	MAV_MODE_FLAG_MANUAL_INPUT_ENABLED	0b01000000 remote control input is enabled. 遥控输入信号使能。
32	MAV_MODE_FLAG_HIL_ENABLED	0b00100000 hardware in the loop simulation. All motors / actuators are blocked, but internal software is full operational. HIL 硬件环在线模拟使能。所有发动机、舵机及其他动作设备阻断，但内部软件处于全部可操作状态。
16	MAV_MODE_FLAG_STABILIZE_ENABLED	0b00010000 system stabilizes electronically its attitude (and optionally position). It needs however further control inputs to move around.高度/位置电子增稳使能。在此状态下，飞行器仍需

CMD ID	Field Name	Description
		要外部操作指令以实现操作。
8	MAV_MODE_FLAG_GUIDED_ENABLED	0b00001000 guided mode enabled, system flies Missions / mission items. 导航使能。导航数据和指令来自导航/航点指令表文件。
4	MAV_MODE_FLAG_AUTO_ENABLED	0b00000100 autonomous mode enabled, system finds its own goal positions. Guided flag can be set or not, depends on the actual implementation. 全自主航行模式使能。系统自行决定目的地。前一项“导航使能”可以设置为 0 或 1 状态，这取决于具体的应用。
2	MAV_MODE_FLAG_TEST_ENABLED	0b00000010 system has a test mode enabled. This flag is intended for temporary system tests and should not be used for stable implementations. 测试模式使能。本标识仅供临时的系统测试之用，不应该用于实际航行的应用中。
1	MAV_MODE_FLAG_CUSTOM_MODE_ENABLED	0b00000001 Reserved for future use. 留待扩展

MAV_MODE_FLAG_DECODE_POSITION 模式标记位掩码

These values encode the bit positions of the decode position. These values can be used to read the value of a flag bit by combining the base_mode variable with AND with the flag position value. The result will be either 0 or 1, depending on if the flag is set or not.

此项数值是前文“模式标记位”的掩码。使用此项数值同实际的模式标记位数据执行“和”逻辑操作，其结果的 0 和非 0【按：勘误，原文为 1，实为非 0】状态可用于识别某项“模式标识”是否处于使能模式。

CMD ID	Field Name	Description
128	MAV_MODE_FLAG_DECODE_POSITION_SAFETY	First bit: 10000000
64	MAV_MODE_FLAG_DECODE_POSITION_MANUAL	Second bit: 01000000
32	MAV_MODE_FLAG_DECODE_POSITION_HIL	Third bit: 00100000
16	MAV_MODE_FLAG_DECODE_POSITION_STABILIZE	Fourth bit: 00010000
8	MAV_MODE_FLAG_DECODE_POSITION_GUIDED	Fifth bit: 00001000
4	MAV_MODE_FLAG_DECODE_POSITION_AUTO	Sixth bit: 00000100
2	MAV_MODE_FLAG_DECODE_POSITION_TEST	Seventh bit: 00000010
1	MAV_MODE_FLAG_DECODE_POSITION_CUSTOM_MODE	Eighth bit: 00000001

MAV_MODE 模式

These defines are predefined OR-combined mode flags. There is no need to use values from this enum, but it simplifies the use of the mode flags. Note that manual input is enabled in all modes as a safety override.

这些模式是“预定义”的“模式标记位”的“或逻辑”的标准组合。用于减轻用户的编程复杂性。这些现成的模式并不是必须使用的，而是可以用于简化应用程序。注意：出于安全的考虑，在所有的模式中，手工输入都处于“使能”状态。

CMD ID	Field Name	Description
0	MAV_MODE_PREFLIGHT 0000 0000	System is not ready to fly, booting, calibrating, etc. No flag is set. 航前。系统正在启动、自检、校准、标定。
80	MAV_MODE_STABILIZE_DISARMED 0101 0000	System is allowed to be active, under assisted RC control. 增稳关闭。系统允许启动，但需要外部遥控辅助。
208	MAV_MODE_STABILIZE_ARMED 1101 0000	System is allowed to be active, under assisted RC control. 增稳启动。系统允许启动，但需要外部遥控辅助。
64	MAV_MODE_MANUAL_DISARMED 0100 0000	System is allowed to be active, under manual (RC) control, no stabilization. 手控关闭。系统允许启动，需要外部遥控，无增稳。
192	MAV_MODE_MANUAL_ARMED 1100 0000	System is allowed to be active, under manual (RC) control, no stabilization. 手控启动。系统允许启动，需要外部遥控，无增稳。

88	MAV_MODE_GUIDED_DISARMED 0101 1000	System is allowed to be active, under autonomous control, manual setpoint. 导航。系统允许启动，自主控制状态，手工设置航点。
216	MAV_MODE_GUIDED_ARMED 1101 1000	System is allowed to be active, under autonomous control, manual setpoint. 导航。系统允许启动，自主控制状态，手工设置航点。【按：存疑】
92	MAV_MODE_AUTO_DISARMED 0101 1100	System is allowed to be active, under autonomous control and navigation (the trajectory is decided onboard and not pre-programmed by MISSIONs) 自动驾驶关闭。系统允许启动，自主控制和导航状态，（航线由机载设备自主设定，并非来自预先编制的任务表）
220	MAV_MODE_AUTO_ARMED 1101 1100	System is allowed to be active, under autonomous control and navigation (the trajectory is decided onboard and not pre-programmed by MISSIONs) 自动驾驶启动。系统允许启动，自主控制和导航状态，（航线由机载设备自主设定，并非来自预先编制的任务表）
66	MAV_MODE_TEST_DISARMED 0100 0100	UNDEFINED mode. This solely depends on the autopilot - use with caution, intended for developers only. 测试模式关闭。此项和飞控密切相关，小心使用，通常仅供开发调试之用。
194	MAV_MODE_TEST_ARMED 1100 0100	UNDEFINED mode. This solely depends on the autopilot - use with caution, intended for developers only. 测试模式启动。此项和飞控密切相关，小心使用，通常仅供开发调试之用。

MAV_STATE 状态

CMD ID	Field Name	Description
0	MAV_STATE_UNINIT	Uninitialized system, state is unknown. 未初始化，状态为止
	MAV_STATE_BOOT	System is booting up. 正在启动
	MAV_STATE_CALIBRATING	System is calibrating and not flight-ready. 正在校准，未准备好起飞。
	MAV_STATE_STANDBY	System is grounded and on standby. It can be launched any time. 系统地面待命，随时可以起飞。
	MAV_STATE_ACTIVE	System is active and might be already airborne. Motors are engaged. 开车/开航。发动机已经启动。
	MAV_STATE_CRITICAL	System is in a non-normal flight mode. It can however still navigate. 系统处于失常飞行状态，仍能导航。
	MAV_STATE_EMERGENCY	System is in a non-normal flight mode. It lost control over parts or over the whole airframe. It is in mayday and going down. 系统处于失常飞行状态，若干设备失灵，坠落状态。
	MAV_STATE_POWEROFF	System just initialized its power-down sequence, will shut down now. 系统刚执行了关机指令，正在关闭。

MAV_COMPONENT 组件

CMD ID	Field Name	Description
0	MAV_COMP_ID_ALL	全部
220	MAV_COMP_ID_GPS	GPS
190	MAV_COMP_ID_MISSIONPLANNER	任务管理器
195	MAV_COMP_ID_PATHPLANNER	路径管理器
180	MAV_COMP_ID_MAPPER	地图
100	MAV_COMP_ID_CAMERA	相机/摄像机
200	MAV_COMP_ID_IMU	姿态传感器设备
201	MAV_COMP_ID_IMU_2	姿态传感器设备 2
202	MAV_COMP_ID_IMU_3	姿态传感器设备 3
240	MAV_COMP_ID_UDP_BRIDGE	网络中继
241	MAV_COMP_ID_UART_BRIDGE	数传中继
250	MAV_COMP_ID_SYSTEM_CONTROL	系统控制器
140	MAV_COMP_ID_SERVO1	舵机 1
141	MAV_COMP_ID_SERVO2	舵机 2
142	MAV_COMP_ID_SERVO3	舵机 3
143	MAV_COMP_ID_SERVO4	舵机 4

CMD ID	Field Name	Description
144	MAV_COMP_ID_SERVO5	舵机 5
145	MAV_COMP_ID_SERVO6	舵机 6
146	MAV_COMP_ID_SERVO7	舵机 7
147	MAV_COMP_ID_SERVO8	舵机 8
148	MAV_COMP_ID_SERVO9	舵机 9
149	MAV_COMP_ID_SERVO10	舵机 10
150	MAV_COMP_ID_SERVO11	舵机 11
151	MAV_COMP_ID_SERVO12	舵机 12
152	MAV_COMP_ID_SERVO13	舵机 13
153	MAV_COMP_ID_SERVO14	舵机 14

MAV_FRAME 消息帧坐标格式

CMD ID	Field Name	Description
0	MAV_FRAME_GLOBAL	Global coordinate frame, WGS84 coordinate system. First value / x: latitude, second value / y: longitude, third value / z: positive altitude over mean sea level (MSL) WGS84 坐标系。 1 纬度，2 经度，3 海拔高度（MSL）
1	MAV_FRAME_LOCAL_NED	Local coordinate frame, Z-up (x: north, y: east, z: down). 局部坐标系。Z 向上。 1 X 向北，2Y 向东，3Z 向下
2	MAV_FRAME_MISSION	NOT a coordinate frame, indicates a mission command. 非坐标帧，标识任务指令。
3	MAV_FRAME_GLOBAL_RELATIVE_ALT	Global coordinate frame, WGS84 coordinate system, relative altitude over ground with respect to the home position. First value / x: latitude, second value / y: longitude, third value / z: positive altitude with 0 being at the altitude of the home location. 相对高度。WGS84 坐标系，高度数据为相对起飞点的高度。纬经高格式。
4	MAV_FRAME_LOCAL_ENU	Local coordinate frame, Z-down (x: east, y: north, z: up) 局部坐标系。 1，X 向东，2，Y 向北，3，Z 向上。

MAVLINK_DATA_STREAM_TYPE 图像格式

CMD ID	Field Name	Description
	MAVLINK_DATA_STREAM_IMG_JPEG	
	MAVLINK_DATA_STREAM_IMG_BMP	
	MAVLINK_DATA_STREAM_IMG_RAW8U	
	MAVLINK_DATA_STREAM_IMG_RAW32U	
	MAVLINK_DATA_STREAM_IMG_PGM	
	MAVLINK_DATA_STREAM_IMG_PNG	

MAV_GOTO 直接位置控制指令

Override command, pauses current mission execution and moves immediately to a position
高优先级指令，暂停指令表的内容，立即执行本指令。

CMD ID	Field Name	Description
0	MAV_GOTO_DO_HOLD	Hold at the current position. 保持当前位置。【存疑】
1	MAV_GOTO_DO_CONTINUE	Continue with the next item in mission execution. 任务继续
2	MAV_GOTO_HOLD_AT_CURRENT_POSITION	Hold at the current position of the system 保持当前位置。
3	MAV_GOTO_HOLD_AT_SPECIFIED_POSITION	Hold at the position specified in the parameters of the DO_HOLD action 保持在 DO_HOLD 指定的位置。

MAV_CMD 指令

Commands to be executed by the MAV. They can be executed on user request, or as part of a mission script. If the action is used in a mission, the parameter mapping to the waypoint/mission message is as follows: Param 1, Param 2, Param 3, Param 4, X: Param 5, Y:Param 6, Z:Param 7. This command list is similar what ARINC 424 is for commercial aircraft: A data format how to interpret waypoint/mission data.

MAV 指令列表。这些指令可以立即执行，也可以预编制成任务脚本。指令参数规定为 7 个。这 7 个参数根据指令的不同而代表不同类型的数据。参照民航飞机的 ARINC424 标准。

CMD ID	Field Name	Description
16	MAV_CMD_NAV_WAYPOINT	Navigate to MISSION. 航点指令
	Mission Param #1	Hold time in decimal seconds. (ignored by fixed wing, time to stay at MISSION for rotary wing) 驻留时间（十进制，秒）。仅对可悬停机型有效。
	Mission Param #2	Acceptance radius in meters (if the sphere with this radius is hit, the MISSION counts as reached) 触发半径（公制米）。进入此半径，即认为本航路点已完成。
	Mission Param #3	0 to pass through the WP, if > 0 radius in meters to pass by WP. Positive value for clockwise orbit, negative value for counter-clockwise orbit. Allows trajectory control. 航路点通过方式：正值顺时针轨迹；负值逆时针。用于航路控制。
	Mission Param #4	Desired yaw angle at MISSION (rotary wing) 指向设定。仅适用可悬停机型。
	Mission Param #5	Latitude 纬度

CMD ID	Field Name	Description
17	Mission Param #6	Longitude 经度
	Mission Param #7	Altitude 高度
	MAV_CMD_NAV_LOITER_UNLIM	Loiter around this MISSION an unlimited amount of time 持续盘旋
	Mission Param #1	Empty 空
	Mission Param #2	Empty 空
	Mission Param #3	Radius around MISSION, in meters. If positive loiter clockwise, else counter-clockwise 盘旋半径(m)，正值顺时针，负值逆时针。
	Mission Param #4	Desired yaw angle. 指向设定。仅适用可悬停机型。
	Mission Param #5	Latitude 纬
	Mission Param #6	Longitude 经
	Mission Param #7	Altitude 高
18	MAV_CMD_NAV_LOITER_TURNS	Loiter around this MISSION for X turns 在航点盘旋 N 圈
	Mission Param #1	Turns 圈数
	Mission Param #2	Empty
	Mission Param #3	Radius around MISSION, in meters. If positive loiter clockwise, else counter-clockwise

CMD ID	Field Name	Description
		盘旋半径(m)，正值顺时针，负值逆时针。
	Mission Param #4	Desired yaw angle. 指向设定。仅适用可悬停机型。
	Mission Param #5	Latitude
	Mission Param #6	Longitude
	Mission Param #7	Altitude
19	MAV_CMD_NAV_LOITER_TIME	Loiter around this MISSION for X seconds 在航点盘旋 N 秒
	Mission Param #1	Seconds (decimal) 秒（十进制）
	Mission Param #2	Empty
	Mission Param #3	Radius around MISSION, in meters. If positive loiter clockwise, else counter-clockwise 盘旋半径(m)，正值顺时针，负值逆时针。
	Mission Param #4	Desired yaw angle. 指向设定。仅适用可悬停机型。
	Mission Param #5	Latitude
	Mission Param #6	Longitude
	Mission Param #7	Altitude
20	MAV_CMD_NAV_RETURN_TO_LAUNC	Return to launch location

CMD ID	Field Name	Description
	H	返回起飞点
	Mission Param #1	Empty
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
21	MAV_CMD_NAV_LAND	Land at location 设定点着陆
	Mission Param #1	Empty
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Desired yaw angle.指向设定。
	Mission Param #5	Latitude
	Mission Param #6	Longitude
	Mission Param #7	Altitude
22	MAV_CMD_NAV_TAKEOFF	Takeoff from ground / hand 地面起飞或手抛起飞

CMD ID	Field Name	Description
	Mission Param #1	Minimum pitch (if airspeed sensor present), desired pitch without sensor 最小爬升率（有空速传感器时适用） 设定的爬升率（无传感器）
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Yaw angle (if magnetometer present), ignored without magnetometer 指向设定。（有罗盘） 如无罗盘，则忽略此参数。
	Mission Param #5	Latitude
	Mission Param #6	Longitude
	Mission Param #7	Altitude
80	MAV_CMD_NAV_ROI	Sets the region of interest (ROI) for a sensor set or the vehicle itself. This can then be used by the vehicles control system to control the vehicle attitude and the attitude of various sensors such as cameras. 兴趣点（可用于操作相机在设定的高度拍照）
	Mission Param #1	Region of interest mode. (see MAV_ROI enum) 兴趣点模式，参考 MAV_ROI 参数
	Mission Param #2	MISSION index/ target ID. (see MAV_ROI enum) 任务索引号/目标代号，参考 MAV_ROI

CMD ID	Field Name	Description
81	Mission Param #3	ROI index (allows a vehicle to manage multiple ROI's) ROI 索引号，用于支持多个 ROI 设定
	Mission Param #4	Empty
	Mission Param #5	x the location of the fixed ROI (see MAV_FRAME) XYZ 位置，参考 MAV_FRAME
	Mission Param #6	y
	Mission Param #7	z
	MAV_CMD_NAV_PATHPLANNING	Control autonomous path planning on the MAV. 避障或其他航路规划设定
	Mission Param #1	0: Disable local obstacle avoidance / local path planning (without resetting map), 1: Enable local path planning, 2: Enable and reset local path planning 0: 关闭局部避障/本地路径规划（无预设地图） 1: 启动本地路径规划 2: 启动并重置本地路径规划
	Mission Param #2	0: Disable full path planning (without resetting map), 1: Enable, 2: Enable and reset map/occupancy grid, 3: Enable and reset planned route, but not occupancy grid 0: 关闭全航路规划（无预设地图） 1: 启动全航路规划 2: 启动和重置（有岛） 3: 启动和重置（无岛）
	Mission Param #3	Empty

CMD ID	Field Name	Description
	Mission Param #4	Yaw angle at goal, in compass degrees, [0..360] 目标指向，基于罗盘角度。
	Mission Param #5	Latitude/X of goal
	Mission Param #6	Longitude/Y of goal
	Mission Param #7	Altitude/Z of goal
95	MAV_CMD_NAV_LAST	NOP - This command is only used to mark the upper limit of the NAV/ACTION commands in the enumeration 无实际内容，仅用于标记导航指令的数量上限。
112	MAV_CMD_CONDITION_DELAY	Delay mission state machine. 延时 N 秒
	Mission Param #1	Delay in seconds (decimal) 秒（十进制）
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty

CMD ID	Field Name	Description
113	MAV_CMD_CONDITION_CHANGE_ALT	Ascend/descend at rate. Delay mission state machine until desired altitude reached. 前往设定高度，然后继续执行其他指令。
	Mission Param #1	Descent / Ascend rate (m/s) 爬升/下降速率
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Finish Altitude 终点高度
114	MAV_CMD_CONDITION_DISTANCE	Delay mission state machine until within desired distance of next NAV point. 前往设定距离（到下一航点），然后继续。
	Mission Param #1	Distance (meters) 距离（米）
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty

CMD ID	Field Name	Description
	Mission Param #6	Empty
	Mission Param #7	Empty
115	MAV_CMD_CONDITION_YAW	Reach a certain target angle. 前往设定的航向。
	Mission Param #1	target angle: [0-360], 0 is north 目标角度: [0-360],0 为北。
	Mission Param #2	speed during yaw change:[deg per second] 转向速率: [度/秒]
	Mission Param #3	direction: negative: counter clockwise, positive: clockwise [-1,1] 指向: 负值逆时针, 正值顺时针。
	Mission Param #4	relative offset or absolute angle: [1,0] 相对偏置或绝对角[1,0]
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
159	MAV_CMD_CONDITION_LAST	NOP - This command is only used to mark the upper limit of the CONDITION commands in the enumeration 无实际内容, 仅用于标记状态指令的数 量上限。
176	MAV_CMD_DO_SET_MODE	Set system mode. 设定模式

CMD ID	Field Name	Description
177	Mission Param #1	Mode, as defined by ENUM MAV_MODE 模式，参考 MAV_MODE
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
	MAV_CMD_DO_JUMP	Jump to the desired command in the mission list. Repeat this action only the specified number of times 跳转到任务单某个位置，并执行 N 次。 相当于 While(i<n);循环。
	Mission Param #1	Sequence number 段号
	Mission Param #2	Repeat count 重复次数
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty

CMD ID	Field Name	Description
178	MAV_CMD_DO_CHANGE_SPEED	Change speed and/or throttle set points. 改变速度和/或油门
	Mission Param #1	Speed type (0=Airspeed, 1=Ground Speed) 1,速度类型（0=空速，1=地速） 2,速度值（米/秒，-1 表示无相关设备） 3,油门（23 表示 23%，-1 表示无相关设备）
	Mission Param #2	Speed (m/s, -1 indicates no change) 速度（米/秒，-1 表示维持原来速度不变）
	Mission Param #3	Throttle (Percent, -1 indicates no change) 油门开度（百分比数据，-1 表示维持原来数值不变）
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
179	MAV_CMD_DO_SET_HOME	Changes the home location either to the current location or a specified location. 设定家位置（起飞点）到当前点或指定点。
	Mission Param #1	Use current (1=use current location, 0=use specified location) 0: 设定点。

CMD ID	Field Name	Description
		1, 使用当前点。
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Latitude
	Mission Param #6	Longitude
	Mission Param #7	Altitude
180	MAV_CMD_DO_SET_PARAMETER	Set a system parameter. Caution! Use of this command requires knowledge of the numeric enumeration value of the parameter. 设定系统参数 注意：了解参数的确切含义，然后再修改.
	Mission Param #1	Parameter number 参数代号
	Mission Param #2	Parameter value 参数数值
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty

CMD ID	Field Name	Description
181	MAV_CMD_DO_SET_RELAY	Set a relay to a condition. 设定继电器开关参数。
	Mission Param #1	Relay number 继电器号
	Mission Param #2	Setting (1=on, 0=off, others possible depending on system hardware) 0=关, 1=开。其他数值应参考相关硬件
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
182	MAV_CMD_DO_REPEAT_RELAY	Cycle a relay on and off for a desired number of cycles with a desired period. 按照设定的次数和周期让继电器反复开关
	Mission Param #1	Relay number 继电器号
	Mission Param #2	Cycle count 循环次数
	Mission Param #3	Cycle time (seconds, decimal) 周期（十进制，秒）
	Mission Param #4	Empty
	Mission Param #5	Empty

CMD ID	Field Name	Description
183	Mission Param #6	Empty
	Mission Param #7	Empty
	MAV_CMD_DO_SET_SERVO	Set a servo to a desired PWM value. 设定舵机舵量
	Mission Param #1	Servo number 舵机号
	Mission Param #2	PWM (microseconds, 1000 to 2000 typical) 数值（1000～2000 微秒，1～2 毫秒）
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
184	MAV_CMD_DO_REPEAT_SERVO	Cycle a between its nominal setting and a desired PWM for a desired number of cycles with a desired period. 按照设定的位置、周期、次数，抖舵。
	Mission Param #1	Servo number 舵机号
	Mission Param #2	PWM (microseconds, 1000 to 2000 typical) 数值（1000～2000 微秒，1～2 毫秒）
	Mission Param #3	Cycle count 循环次数

CMD ID	Field Name	Description
200	Mission Param #4	Cycle time (seconds) 周期（秒）
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
	MAV_CMD_DO_CONTROL_VIDEO	Control onboard camera system. 设定机载摄像机、照相机
	Mission Param #1	Camera ID (-1 for all) 相机号（-1 表示所有相机）
	Mission Param #2	Transmission: 0: disabled, 1: enabled compressed, 2: enabled raw 传输 0: 关闭，1: 压缩传送，2: RAW 传送
	Mission Param #3	Transmission mode: 0: video stream, >0: single images every n seconds (decimal) 模式 0: 视频流，n: 每过 n 秒传送一帧
	Mission Param #4	Recording: 0: disabled, 1: enabled compressed, 2: enabled raw 记录 0: 关闭，1: 压缩，2: RAW
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty

CMD ID	Field Name	Description
240	MAV_CMD_DO_LAST	NOP - This command is only used to mark the upper limit of the DO commands in the enumeration 无实际内容, 仅用于标记指令的数量上限。
	Mission Param #1	Empty
	Mission Param #2	Empty
	Mission Param #3	Empty
	Mission Param #4	Empty
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
241	MAV_CMD_PREFLIGHT_CALIBRATION	Trigger calibration. This command will be only accepted if in pre-flight mode. 航前设备校准, 仅在起飞前模式有效。
	Mission Param #1	Gyro calibration: 0: no, 1: yes 陀螺仪 (0: 不校准, 1: 校准)
	Mission Param #2	Magnetometer calibration: 0: no, 1: yes 罗盘 (0: 不校准, 1: 校准)
	Mission Param #3	Ground pressure: 0: no, 1: yes 气压高度计 (0: 不校准, 1: 校准)
	Mission Param #4	Radio calibration: 0: no, 1: yes

CMD ID	Field Name	Description
		无线电遥控校准（0：不校准，1：校准）
	Mission Param #5	Accelerometer calibration: 0: no, 1: yes 加速度计/水平仪校准（0：不校准，1：校准）
	Mission Param #6	Empty
	Mission Param #7	Empty
242	MAV_CMD_PREFLIGHT_SET_SENSOR_OFFSETS	Set sensor offsets. This command will be only accepted if in pre-flight mode. 传感器偏移量设定
	Mission Param #1	Sensor to adjust the offsets for: 0: gyros, 1: accelerometer, 2: magnetometer, 3: barometer, 4: optical flow 0 陀螺，1 加速度计，2 罗盘，3 气压，4 光学
	Mission Param #2	X axis offset (or generic dimension 1), in the sensor's raw units X 轴偏置数值，传感器的 RAW 格式。
	Mission Param #3	Y axis offset (or generic dimension 2), in the sensor's raw units Y 轴偏置数值，传感器的 RAW 格式。
	Mission Param #4	Z axis offset (or generic dimension 3), in the sensor's raw units Z 轴偏置数值，传感器的 RAW 格式。
	Mission Param #5	Generic dimension 4, in the sensor's raw units 4 轴偏置数值，传感器的 RAW 格式。

CMD ID	Field Name	Description
245	Mission Param #6	Generic dimension 5, in the sensor's raw units 5 轴偏置数值，传感器的 RAW 格式。
	Mission Param #7	Generic dimension 6, in the sensor's raw units 6 轴偏置数值，传感器的 RAW 格式。
	MAV_CMD_PREFLIGHT_STORAGE	Request storage of different parameter values and logs. This command will be only accepted if in pre-flight mode. 参数和任务存取指令
	Mission Param #1	Parameter storage: 0: READ FROM FLASH/EEPROM, 1: WRITE CURRENT TO FLASH/EEPROM 0 从 Flash/EEPROM 读取参数 1 参数写入 Flash/EEPROM
	Mission Param #2	Mission storage: 0: READ FROM FLASH/EEPROM, 1: WRITE CURRENT TO FLASH/EEPROM 0 从 Flash/EEPROM 读取任务 1 任务写入 Flash/EEPROM
	Mission Param #3	Reserved 保留
	Mission Param #4	Reserved 保留
	Mission Param #5	Empty 空
	Mission Param #6	Empty 空
	Mission Param #7	Empty 空
246	MAV_CMD_PREFLIGHT_REBOOT_SH	Request the reboot or shutdown of system components.

CMD ID	Field Name	Description
	UTDOWN	机载计算机和飞控的重启和关机。仅在起飞前模式有效。
	Mission Param #1	0: Do nothing for autopilot, 空 1: Reboot autopilot, 飞控重启 2: Shutdown autopilot. 飞控关机
	Mission Param #2	0: Do nothing for onboard computer, 1: Reboot onboard computer, 2: Shutdown onboard computer. 0: 空 1: 机载计算机重启 2: 机载计算机关机
	Mission Param #3	Reserved
	Mission Param #4	Reserved
	Mission Param #5	Empty
	Mission Param #6	Empty
	Mission Param #7	Empty
	MAV_CMD_OVERRIDE_GOTO	Hold / continue the current action 高优先级强制执行
	Mission Param #1	MAV_GOTO_DO_HOLD: hold 保持 MAV_GOTO_DO_CONTINUE: continue with next item in mission plan 继续执行下一项
252	Mission Param #2	MAV_GOTO_HOLD_AT_CURRENT_ POSITION: Hold at current position MAV_GOTO_HOLD_AT_SPECIFIED_ _POSITION: hold at specified position 当前位置保持. 设定位置保持

CMD ID	Field Name	Description
300	Mission Param #3	MAV_FRAME coordinate frame of hold point 坐标格式
	Mission Param #4	Desired yaw angle in degrees 指向
	Mission Param #5	Latitude / X position 纬度/X 位置
	Mission Param #6	Longitude / Y position 经度/Y 位置
	Mission Param #7	Altitude / Z position 高度/Z 位置
	MAV_CMD_MISSION_START	start running a mission 任务单启动，从 n 到 m
	Mission Param #1	first_item: the first mission item to run 第一项 n，起始点的任务号
400	Mission Param #2	last_item: the last mission item to run (after this item is run, the mission ends) 最后一项 m，终点的任务号
	MAV_CMD_COMPONENT_ARM_DISARM	Arms / Disarms a component 机载组件启动和关闭
	Mission Param #1	1 to arm, 0 to disarm 0: 关闭 1, 启动

MAV_DATA_STREAM

Data stream IDs. A data stream is not a fixed set of messages, but rather a recommendation to the autopilot software. Individual autopilots may or may not obey the recommended messages.

数据流识别标识。数据流不是固定设置的消息，而仅仅是对飞控软件的建议。各种飞控可能并不遵守此建议。

CMD ID	Field Name	Description
0	MAV_DATA_STREAM_ALL	Enable all data streams 使能全部数据流
1	MAV_DATA_STREAM_RAW_SENSORS 27, 姿态原始数据;	Enable IMU_RAW, GPS_RAW, GPS_STATUS packets. 使能姿态传感器、GPS 原始数据、GPS 状态。
2	MAV_DATA_STREAM_EXTENDED_STATUS 1, 状态; 24, GPS_ROW; 42, 当前任务; 62, 导航控制器输出	Enable GPS_STATUS, CONTROL_STATUS, AUX_STATUS 使能 GPS 状态, 控制状态, 辅助状态
3	MAV_DATA_STREAM_RC_CHANNELS 35, RC 通道 RAW 格式数据	Enable RC_CHANNELS_SCALED, RC_CHANNELS_RAW, SERVO_OUTPUT_RAW 使能遥控通道规格化数据, RC 通道原始数据, 舵机输出原始数据。
4	MAV_DATA_STREAM_RAW_CONTROLLER	Enable ATTITUDE_CONTROLLER_OUTPUT, POSITION_CONTROLLER_OUTPUT, NAV_CONTROLLER_OUTPUT. 使能高度控制器输出, 位置控制器输出, 导航控制器输出。
6	MAV_DATA_STREAM_POSITION 无现象	Enable LOCAL_POSITION, GLOBAL_POSITION/GLOBAL_POSITION_INT messages.

CMD ID	Field Name	Description
		使能局部定位，全局定位
10	MAV_DATA_STREAM_EXTRA1 30, 姿态数据	Dependent on the autopilot 飞控自定义
11	MAV_DATA_STREAM_EXTRA2 74, VFR_HUD	Dependent on the autopilot 飞控自定义
12	MAV_DATA_STREAM_EXTRA3 无现象	Dependent on the autopilot 飞控自定义

MAV_ROI 兴趣点

The ROI (region of interest) for the vehicle. This can be used by the vehicle for camera/vehicle attitude alignment (see MAV_CMD_NAV_ROI).

兴趣点可以用于设定相机等设备的自动操作。参考 MAV_CMD_NAV_ROI

CMD ID	Field Name	Description
0	MAV_ROI_NONE	No region of interest. 无兴趣点
1	MAV_ROI_WPNEXT	Point toward next MISSION. 面向下一航点
2	MAV_ROI_WPINDEX	Point toward given MISSION. 面向指定航点
3	MAV_ROI_LOCATION	Point toward fixed location. 面向固定坐标点
4	MAV_ROI_TARGET	Point toward of given id. 面向有代号的目标点

MAV_CMD_ACK 命令应答

ACK / NACK / ERROR values as a result of MAV_CMDs and for mission item transmission.

ACK/NACK/ERROR 数值，是对 MAV_CMD 指令的应答。

CMD ID	Field Name	Description
	MAV_CMD_ACK_OK	Command / mission item is ok. 指令正常
	MAV_CMD_ACK_ERR_FAIL	Generic error message if none of the other reasons fails or if no detailed error reporting is implemented. 无明显原因或更多细节信息的一般性错误。
	MAV_CMD_ACK_ERR_ACCESS_DENIED	The system is refusing to accept this command from this source / communication partner. 拒绝执行
	MAV_CMD_ACK_ERR_NOT_SUPPORTED	Command or mission item is not supported, other commands would be accepted. 不支持的命令
	MAV_CMD_ACK_ERR_COORDINATE_FRAME_NOT_SUPPORTED	The coordinate frame of this command / mission item is not supported. 不支持此命令的坐标格式
	MAV_CMD_ACK_ERR_COORDINATES_OUT_OF_RANGE	The coordinate frame of this command is ok, but the coordinate values exceed the safety limits of this system. This is a generic error, please use the more specific error messages below if possible. 命令坐标格式正常，但坐标数值超过了本系统的安全设定。这是一个比较笼统的错误信息，请尽量使用随后的更加具体的出错信息。
	MAV_CMD_ACK_ERR_X_LAT_OUT_OF_RANGE	The X or latitude value is out of

CMD ID	Field Name	Description
		range. 纬度数据越界
	MAV_CMD_ACK_ERR_Y_LON_OUT_OF_RANGE	The Y or longitude value is out of range. 经度数据越界
	MAV_CMD_ACK_ERR_Z_ALT_OUT_OF_RANGE	The Z or altitude value is out of range. 高度数据越界

MAV_PARAM_TYPE 参数类型

Specifies the datatype of a MAVLink parameter. MAVLink 参数类型详解。

CMD ID	Field Name	Description
1	MAV_PARAM_TYPE_UINT8	8-bit unsigned integer
2	MAV_PARAM_TYPE_INT8	8-bit signed integer
3	MAV_PARAM_TYPE_UINT16	16-bit unsigned integer
4	MAV_PARAM_TYPE_INT16	16-bit signed integer
5	MAV_PARAM_TYPE_UINT32	32-bit unsigned integer
6	MAV_PARAM_TYPE_INT32	32-bit signed integer
7	MAV_PARAM_TYPE_UINT64	64-bit unsigned integer
8	MAV_PARAM_TYPE_INT64	64-bit signed integer
9	MAV_PARAM_TYPE_REAL32	32-bit floating-point
10	MAV_PARAM_TYPE_REAL64	64-bit floating-point

MAV_RESULT 指令返回值

result from a mavlink command. MAVLink 指令返回值

CMD ID	Field Name	Description
0	MAV_RESULT_ACCEPTED	Command ACCEPTED and EXECUTED 接受并执行
1	MAV_RESULT_TEMPORARILY_REJECTED	Command TEMPORARY REJECTED/DENIED 暂时拒绝
2	MAV_RESULT_DENIED	Command PERMANENTLY DENIED 永久拒绝
3	MAV_RESULT_UNSUPPORTED	Command UNKNOWN/UNSUPPORTED 未知命令/不支持的命令
4	MAV_RESULT_FAILED	Command executed, but failed 命令执行失败

MAV_MISSION_RESULT 任务返回值

result in a mavlink mission ack. MAVLink 任务返回值

CMD ID	Field Name	Description
0	MAV_MISSION_ACCEPTED	mission accepted OK 接受
1	MAV_MISSION_ERROR	generic error / not accepting mission commands at all right now 一般错误
2	MAV_MISSION_UNSUPPORTED_FRAME	coordinate frame is not supported 坐标不支持

CMD ID	Field Name	Description
3	MAV_MISSION_UNSUPPORTED	command is not supported 指令不支持
4	MAV_MISSION_NO_SPACE	mission item exceeds storage space 任务超出存储空间
5	MAV_MISSION_INVALID	one of the parameters has an invalid value 参数数据非法
6	MAV_MISSION_INVALID_PARAM1	param1 has an invalid value 参数 1 数据非法
7	MAV_MISSION_INVALID_PARAM2	param2 has an invalid value 参数 2 数据非法
8	MAV_MISSION_INVALID_PARAM3	param3 has an invalid value 参数 3 数据非法
9	MAV_MISSION_INVALID_PARAM4	param4 has an invalid value 参数 4 数据非法
10	MAV_MISSION_INVALID_PARAM5_X	x/param5 has an invalid value X/参数 5 数据非法
11	MAV_MISSION_INVALID_PARAM6_Y	y/param6 has an invalid value Y/参数 6 数据非法
12	MAV_MISSION_INVALID_PARAM7	param7 has an invalid value Z/参数 7 数据非法
13	MAV_MISSION_INVALID_SEQUENCE	received waypoint out of sequence 航点越界
14	MAV_MISSION_DENIED	not accepting any mission commands from this communication partner 拒绝接受此传送者

MAV_SEVERITY 故障等级

Indicates the severity level, generally used for status messages to indicate their relative urgency. Based on RFC-5424 using expanded definitions at:

<http://www.kiwisyslog.com/kb/info:-syslog-message-levels/>.

指示故障等级，用在状态消息中，指示故障的紧急程度。基于 RFC-5424 标准。

CMD ID	Field Name	Description
0	MAV_SEVERITY_EMERGENCY	System is unusable. This is a "panic" condition. 系统不可用，最紧急状态。
1	MAV_SEVERITY_ALERT	Action should be taken immediately. Indicates error in non-critical systems. 警报。非致命性系统故障，应立即应对。
2	MAV_SEVERITY_CRITICAL	Action must be taken immediately. Indicates failure in a primary system. 警报：主要系统故障，应立即应对。
3	MAV_SEVERITY_ERROR	Indicates an error in secondary/redundant systems. 故障：次系统故障/备份系统故障。
4	MAV_SEVERITY_WARNING	Indicates about a possible future error if this is not resolved within a given timeframe. Example would be a low battery warning. 警告：在未来一定时间内可能会出现故障。 例如：电池电量警告。
5	MAV_SEVERITY_NOTICE	An unusual event has occurred, though not an error condition. This should be investigated for the root cause. 注意：出现失常现象，单非错误故障。应该排查其现象根源。
6	MAV_SEVERITY_INFO	Normal operational messages. Useful for logging. No action is required for these

CMD ID	Field Name	Description
		messages. 提示：一般性操作消息，可用于日志。此消息不需要应对行动。
7	MAV_SEVERITY_DEBUG	Useful non-operational messages that can assist in debugging. These should not occur during normal operation. 很有用的调试信息。正常操作的时候不该出现。

MAVLink Messages 消息

HEARTBEAT (

[#0](#)) 心跳包

The heartbeat message shows that a system is present and responding. The type of the MAV and Autopilot hardware allow the receiving system to treat further messages from this system appropriate (e.g. by laying out the user interface based on the autopilot).

心跳消息指示飞行器正在运作并有反应。飞机类型和飞控型号用于通知对方使用相应的其他消息。例如，可以根据飞控型号，在地面站软件的用户界面上做出相应调整。具体来说，地图上的小飞机的标记可能是固定翼，可能是直机。

Field Name	Type	Description
type	uint8_t	Type of the MAV (quadrotor, helicopter, etc., up to 15 types, defined in MAV_TYPE ENUM) 飞行器类型
autopilot	uint8_t	Autopilot type / class. defined in MAV_AUTOPILOT ENUM 飞控型号
base_mode	uint8_t	System mode bitfield, see MAV_MODE_FLAG ENUM in mavlink/include/mavlink_types.h 系统当前模式，参阅 MAV_MODE_FLAG
custom_mode	uint32_t	A bitfield for use for autopilot-specific flags. 用户自定义模式
system_status	uint8_t	System status flag, see MAV_STATE ENUM 系统状态，参阅 MAV_STATE
mavlink_version	uint8_t_mavlink_version	MAVLink version, not writable by user, gets added by protocol because of magic data type: uint8_t_mavlink_version MAVLink 版本，用户不能编辑，协议使用专用数据类型自动生成。

SYS_STATUS (

#1) 系统状态

The general system state. If the system is following the MAVLink standard, the system state is mainly defined by three orthogonal states/modes: The system mode, which is either LOCKED (motors shut down and locked), MANUAL (system under RC control), GUIDED (system with autonomous position control, position setpoint controlled manually) or AUTO (system guided by path/waypoint planner). The NAV_MODE defined the current flight state: LIFTOFF (often an open-loop maneuver), LANDING, WAYPOINTS or VECTOR. This represents the internal navigation state machine. The system status shows whether the system is currently active or not and if an emergency occurred. During the CRITICAL and EMERGENCY states the MAV is still considered to be active, but should start emergency procedures autonomously. After a failure occurred it should first move from active to critical to allow manual intervention and then move to emergency after a certain timeout.

按照 MAVLink 标准，系统状态可以表达为三个模式：

- 1，系统模式。
 - 1.1 锁定 LOCKED（马达关闭/锁定），
 - 1.2 手动 MANUAL（遥控器控制），
 - 1.3 导航 GUIDED（手动设置航点，飞控引导飞向航点），
 - 1.4 自动 AUTO（系统自动计算航点，自动飞向航点）
- 2，导航模式。定义了当前的飞行状态。标识飞控软件内的状态机参数。
 - 1.1 起飞 LIFTOFF（开环动作）
 - 1.2 着陆 LANDING
 - 1.3 航点 WAYPOINTS
 - 1.4 向量 VECTOR
- 3，故障等级。显示系统是否处于激活状态，或故障的严重程度。【按：怀疑原文有误】当故障达到“紧急 EMERGENCY”，则必须立刻应对。故障出现之后，首先会从激活状态转换成手控状态，然后经过一段设定的时间之后转换到紧急状态。

Field Name	Type	Description
onboard_control_sensors_present 位编码方式显示各种控制器、传感器。	uint32_t	Bitmask showing which onboard controllers and sensors are present.
0: 无，1: 有		Value of 0: not present. Value of 1:
0: 三轴陀螺，1: 三轴加速度/倾角仪，		present. Indices: 0: 3D gyro, 1: 3D acc, 2:
2: 三轴磁罗盘，3: 绝对气压计，		3D mag, 3: absolute pressure, 4:
4: 相对气压计，5: GPS，6: 光测设备，		differential pressure, 5: GPS, 6: optical
7: 计算机视觉定位仪，8: 激光定位，		flow, 7: computer vision position, 8: laser
9: 外部激光定位（Vicon 或徠卡），		based position, 9: external ground-truth

Field Name	Type	Description
<p>10: 三轴角速度控制器, 11: 高度稳定器, 12: 方向稳定器 (锁尾等) 13: 高度控制器。 14: X/Y 位置控制器, 15: 马达输出控制器</p> <p>FFFF FC0F 1111 1100 0000 1111 FFFF AC0B 1111 1100 0000 1011 FFFF FC0B 1111 1100 0000 1011</p>		<p>(Vicon or Leica). Controllers: 10: 3D angular rate control 11: attitude stabilization, 12: yaw position, 13: z/altitude control, 14: x/y position control, 15: motor outputs / control</p>
<p>onboard_control_sensors_enabled</p> <p>0: 关闭。 1, 开启 传感器的开启状态。 编码方式同上。</p>	uint32_t	<p>Bitmask showing which onboard controllers and sensors are enabled: Value of 0: not enabled. Value of 1: enabled. Indices: 0: 3D gyro, 1: 3D acc, 2: 3D mag, 3: absolute pressure, 4: differential pressure, 5: GPS, 6: optical flow, 7: computer vision position, 8: laser based position, 9: external ground-truth (Vicon or Leica). Controllers: 10: 3D angular rate control 11: attitude stabilization, 12: yaw position, 13: z/altitude control, 14: x/y position control, 15: motor outputs / control</p>
<p>onboard_control_sensors_health</p> <p>0: 故障 1: 正常【按: 译文可能有误】 传感器的健康状态。 编码方式同上。</p>	uint32_t	<p>Bitmask showing which onboard controllers and sensors are operational or have an error: Value of 0: not enabled. Value of 1: enabled. Indices: 0: 3D gyro, 1: 3D acc, 2: 3D mag, 3: absolute pressure, 4: differential pressure, 5: GPS, 6: optical flow, 7: computer vision position, 8: laser based position, 9: external ground-truth (Vicon or Leica). Controllers: 10: 3D angular rate control 11: attitude stabilization, 12: yaw position, 13: z/altitude control, 14: x/y position control, 15: motor outputs / control</p>
<p>load</p> <p>主循环负载, 机载计算机负载。 此数据应该始终小于 1000</p>	uint16_t	<p>Maximum usage in percent of the mainloop time, (0%: 0, 100%: 1000) should be always below 1000</p>

Field Name	Type	Description
voltage_battery 电池电压	uint16_t	Battery voltage, in millivolts (1 = 1 millivolt)
current_battery 工作电流。	int16_t	Battery current, in 10*milliamperes (1 = 10 milliampere), -1: autopilot does not measure the current
battery_remaining 电池余量	int8_t	Remaining battery energy: (0%: 0, 100%: 100), -1: autopilot estimate the remaining battery
drop_rate_comm 丢包率	uint16_t	Communication drops in percent, (0%: 0, 100%: 10'000), (UART, I2C, SPI, CAN), dropped packets on all links (packets that were corrupted on reception on the MAV)
errors_comm 丢包总计	uint16_t	Communication errors (UART, I2C, SPI, CAN), dropped packets on all links (packets that were corrupted on reception on the MAV)
errors_count1 导航仪误差 1	uint16_t	Autopilot-specific errors
errors_count2 导航仪误差 2	uint16_t	Autopilot-specific errors
errors_count3 导航仪误差 3	uint16_t	Autopilot-specific errors
errors_count4 导航仪误差 4	uint16_t	Autopilot-specific errors

SYSTEM_TIME (

[#2](#)) 系统时间

The system time is the time of the master clock, typically the computer clock of the main onboard computer.

Field Name	Type	Description
time_unix_usec	uint64_t	Timestamp of the master clock in microseconds since UNIX epoch. UNIX 时间戳。从 1970 年 1 月 1 日（UTC/GMT 的午夜）开始所经过的秒数，不考虑闰秒。
time_boot_ms	uint32_t	Timestamp of the component clock since boot time in milliseconds. 系统启动开始的秒数

PING (

[#4](#))

A ping message either requesting or responding to a ping. This allows to measure the system latencies, including serial port, radio modem and UDP connections.

用于检测各种消息（串口、无线电 Modem、UDP 协议）传送的延迟。

Field Name	Type	Description
time_usec	uint64_t	Unix timestamp in microseconds UNIX 时间戳。
seq	uint32_t	PING sequence 序列号
target_system	uint8_t	0: request ping from all receiving systems, if greater than 0: message is a ping response and number is the system id of the requesting system 面向系统的 Pin。0 表示这是一个发送方，发给全体。大于 0 的数据是系统身份代号，表示这是一个回送消息。
target_component	uint8_t	0: request ping from all receiving components, if greater than 0: message is a ping response and number is the system id of the requesting system 面向部件的 Pin。0 表示这是一个发送方，发给全体。大于 0 的数据是部件身份代号，表示这是一个回送消息。

CHANGE_OPERATOR_CONTROL (

[#5](#)) 请求控制权

Request to control this MAV

Field Name	Type	Description
target_system	uint8_t	System the GCS requests control for 目标系统
control_request	uint8_t	0: request control of this MAV, 1: Release control of this MAV 0: 请求控制权。1: 释放控制权
version	uint8_t	0: key as plaintext, 1-255: future, different hashing/encryption variants. The GCS should in general use the safest mode possible initially and then gradually move down the encryption level if it gets a NACK message indicating an encryption mismatch. 0: 文本。1~255, 留给未来扩展的各种格式和加密方式。地面站软件应该尽可能使用最安全的方式, 然后在加密解密无法兼容的情况下, 使用次一级的加密方式。
passkey	char[25]	Password / Key, depending on version plaintext or encrypted. 25 or less characters, NULL terminated. The characters may involve A-Z, a-z, 0-9, and "!?,.-" 密码/密钥, 按照版本, 可能是文本或加密信息。应该小于 25 个字符, NULL 为终止字符。字符可以使用 A~Z, a~z, 0~9, ! ? , .-

CHANGE_OPERATOR_CONTROL_ACK (

[#6](#)) 对请求控制权消息的回应

Accept / deny control of this MAV

Field Name	Type	Description
gcs_system_id	uint8_t	ID of the GCS this message 地面站身份代号
control_request	uint8_t	0: request control of this MAV, 1: Release control of this MAV。回送的验证信息。
ack	uint8_t	0: ACK, 1: NACK: Wrong passkey, 2: NACK: Unsupported passkey encryption method, 3: NACK: Already under control 0: 接受。 1: 不接受。密码不对 2: 不接受。不支持的密码加密方式 3: 不接受。已经在受控方式。

AUTH_KEY (

[#7](#)) 授权码

Emit an encrypted signature / key identifying this system. PLEASE NOTE: This protocol has been kept simple, so transmitting the key requires an encrypted channel for true safety.

发送系统的签名/密钥。请注意：这个协议是个简单协议，请使用其他通道进行加密传送才能做到真正的安全。

Field Name	Type	Description
key	char[32]	key

SET_MODE (

[#11](#)) 模式设置

Set the system mode, as defined by enum MAV_MODE. There is no target component id as the mode is by definition for the overall aircraft, not only for one component.

设置系统模式，

Field Name	Type	Description
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Field Name	Type	Description
target_system	uint8_t	The system setting the mode。目标系统
base_mode	uint8_t	The new base mode 新的基本模式
custom_mode	uint32_t	The new autopilot-specific mode. This field can be ignored by an autopilot. 用户自定义模式

PARAM_REQUEST_READ (

#20)

Request to read the onboard parameter with the param_id string id. Onboard parameters are stored as key[const char] -> value[float]. This allows to send a parameter to any other component (such as the GCS) without the need of previous knowledge of possible parameter names. Thus the same GCS can store different parameters for different autopilots. See also http://qgroundcontrol.org/parameter_interface for a full documentation of QGroundControl and IMU code.*

请求机载计算机发送指定参数。机载参数按照“字符串—浮点数”的格式成对存储。这种方式可以不需要事先知道参数名称的方式访问参数数据。在地面控制站软件中即可针对不同的飞控存储对应的参数。参照 http://qgroundcontrol.org/parameter_interface 的关于 QGroundControl 和 IMU 的完整相关文本。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
param_id	char[16]	Onboard parameter id, terminated by NULL if the length is less than 16 human-readable chars and WITHOUT null termination (NULL) byte if the length is exactly 16 chars - applications have to provide 16+1 bytes storage if the ID is stored as string 字符串格式的参数名称。字符串小于 16 字符时，以 NULL 结尾的。字符串长度为 16 时，无结束符。建议地面站软件的是存储空间开 17 个。

Field Name	Type	Description
param_index	int16_t	Parameter index. Send -1 to use the param ID field as identifier (else the param id will be ignored) 参数索引号, 当此为-1 时, 使用字符串参数名 param_id 。

PARAM_REQUEST_LIST (

[#21](#)) 请求发送所有的参数

Request all parameters of this component. After his request, all parameters are emitted.
请求发送目标部件的所有的参数。请求之后, 所有参数发送一遍。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件

PARAM_VALUE (

[#22](#)) 参数数值

*Emit the value of a onboard parameter. The inclusion of param_count and param_index in the message allows the recipient to keep track of received parameters and allows him to re-request missing parameters after a loss or timeout.*发送机载参数数值。param_count 和 param_index 数据可以被接收方用于对错漏数值的再次请求。

Field Name	Type	Description
param_id	char[16]	Onboard parameter id, terminated by NULL if the length is less than 16 human-readable chars and WITHOUT null termination (NULL) byte if the length is exactly 16 chars - applications have to provide 16+1 bytes storage if the ID is stored as string 机载参数身份号, 字符串格式的参数名称。字符串小于 16 字符时, 以 NULL 结尾的。字符串长度为 16 时, 无结束符。建议地面站软件的是存

Field Name	Type	Description
		储空间开 17 个。
param_value	float	Onboard parameter value 参数数值
param_type	uint8_t	Onboard parameter type: see the MAV_PARAM_TYPE enum for supported data types. 数据类型
param_count	uint16_t	Total number of onboard parameters 参数总数
param_index	uint16_t	Index of this onboard parameter 本参数索引号

PARAM_SET (

#23) 参数设置

Set a parameter value TEMPORARILY to RAM. It will be reset to default on system reboot. Send the ACTION MAV_ACTION_STORAGE_WRITE to PERMANENTLY write the RAM contents to EEPROM. IMPORTANT: The receiving component should acknowledge the new parameter value by sending a param_value message to all communication partners. This will also ensure that multiple GCS all have an up-to-date list of all parameters. If the sending GCS did not receive a PARAM_VALUE message within its timeout time, it should re-send the PARAM_SET message.

临时将参数设置改为 RAM，则此参数将在系统重启之后被设置为缺省值。发送 MAV_ACTION_STORAGE_WRITE 消息可以将参数存储到 EEPROM 或机载硬盘之类的永久性存储装置中。重要提示：接收到参数设置指令的部件应该把参数修改的消息通知所有其他通信伙伴，以此来保证多个地面站都能同步更新参数。发出“设置参数”消息的地面站如果在设定的时间内没有得到回应，可以在此发送“设置参数”。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
param_id	char[16]	Onboard parameter id, terminated by NULL if the length is less than 16 human-readable chars and WITHOUT null termination (NULL) byte if the length is exactly 16

Field Name	Type	Description
		chars - applications have to provide 16+1 bytes storage if the ID is stored as string 机载参数身份号，字符串格式的 参数名称。字符串小于 16 字符时，以 NULL 结尾的。 字符串长度为 16 时，无结束符。建议地面站软件的是存储空间开 17 个。
param_value	float	Onboard parameter value 参数数值
param_type	uint8_t	Onboard parameter type: see the MAV_PARAM_TYPE enum for supported data types. 参数类型

GPS_RAW_INT (

[#24](#)) RAW 格式的 GPS 数据

The global position, as returned by the Global Positioning System (GPS). This is NOT the global position estimate of the system, but rather a RAW sensor value. See message GLOBAL_POSITION for the global position estimate. Coordinate frame is right-handed, Z-axis up (GPS frame).

GPS 原始数据。GLOBAL_POSITION 消息返回的是加工好的数据。

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds since UNIX epoch or microseconds since system boot) UNIX 格式时间戳。
fix_type	uint8_t	0-1: no fix, 2: 2D fix, 3: 3D fix. Some applications will not use the value of this field unless it is at least two, so always correctly fill in the fix. 0 或 1: 尚未定位，2: 2D 定位，3: 3D 定位。 一些应用程序只有在得到 2 和 3 的时候才会使用这个数据。所以，请把这个数据认真写好。
lat	int32_t	Latitude in 1E7 degrees 1E7 格式的纬度

Field Name	Type	Description
lon	int32_t	Longitude in 1E7 degrees 1E7 格式的经度
alt	int32_t	Altitude in 1E3 meters (millimeters) above MSL 1E3 格式的海拔高度
eph	uint16_t	GPS HDOP horizontal dilution of position in cm (m*100). If unknown, set to: 65535 水平定位精度。 如果不知道，就设置为 65535.
epv	uint16_t	GPS VDOP horizontal dilution of position in cm (m*100). If unknown, set to: 65535 垂直定位精度。如果不知道，就设置为 65535。 【按：英文原文写错了。horizontal 应该是 vertical】
vel	uint16_t	GPS ground speed (m/s * 100). If unknown, set to: 65535 地速。如果不知道，就设置为 65535.
cog	uint16_t	Course over ground (NOT heading, but direction of movement) in degrees * 100, 0.0..359.99 degrees. If unknown, set to: 65535 方向。注意：这不是机头指向，而是整体移动方向。如果不知道，就设置为 65535。
satellites_visible	uint8_t	Number of satellites visible. If unknown, set to 255 可见卫星数。如果不知道，就设置为 255.

GPS_STATUS (

#25) GPS 状态

The positioning status, as reported by GPS. This message is intended to display status information about each satellite visible to the receiver. See message GLOBAL_POSITION for the global position estimate. This message can contain information for up to 20 satellites.

GPS 卫星状态。这个消息可以用于显示每个可见卫星的状态信息。GLOBAL_POSITION 消息包含实际的定位信息。本消息最多包含 20 颗卫星的信息。

Field Name	Type	Description
satellites_visible	uint8_t	Number of satellites visible 可见卫星数
satellite_prn	uint8_t[20]	Global satellite ID 卫星 ID
satellite_used	uint8_t[20]	0: Satellite not used, 1: used for localization 0: 未用, 1: 可用
satellite_elevation	uint8_t[20]	Elevation (0: right on top of receiver, 90: on the horizon) of satellite 卫星在天空中的仰角, 0 为天顶, 90 在地平线处。
satellite_azimuth	uint8_t[20]	Direction of satellite, 0: 0 deg, 255: 360 deg. 卫星方位角。0: 0 度 (正北), 255: 360 度。
satellite_snr	uint8_t[20]	Signal to noise ratio of satellite。信噪比, 信号强度。

SCALED_IMU (

[#26](#)) 处理之后的姿态传感器信息。

The RAW IMU readings for the usual 9DOF sensor setup. This message should contain the scaled values to the described units

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot) 启动上电开始计时的时间戳。
xacc	int16_t	X acceleration (mg) 加速度 X。
yacc	int16_t	Y acceleration (mg) 加速度 Y
zacc	int16_t	Z acceleration (mg) 加速度 Z
xgyro	int16_t	Angular speed around X axis (millirad /sec)

Field Name	Type	Description
		绕 X 轴的角速度
ygyro	int16_t	Angular speed around Y axis (millirad /sec) 绕 Y 轴的角速度
zgyro	int16_t	Angular speed around Z axis (millirad /sec) 绕 Z 轴的角速度
xmag	int16_t	X Magnetic field (milli tesla) 地磁强度 X
ymag	int16_t	Y Magnetic field (milli tesla) 地磁强度 Y
zmag	int16_t	Z Magnetic field (milli tesla) 地磁强度 Z

RAW_IMU (

[#27](#)) 原始的姿态传感器信息。

The RAW IMU readings for the usual 9DOF sensor setup. This message should always contain the true raw values without any scaling to allow data capture and system debugging.

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds since UNIX epoch or microseconds since system boot) UNIX 格式时间戳。
xacc	int16_t	X acceleration (raw) 加速度 X。
yacc	int16_t	Y acceleration (raw) 加速度 Y
zacc	int16_t	Z acceleration (raw) 加速度 Z
xgyro	int16_t	Angular speed around X axis (raw) 绕 X 轴的角速度

Field Name	Type	Description
ygyro	int16_t	Angular speed around Y axis (raw) 绕 Y 轴的角速度
zgyro	int16_t	Angular speed around Z axis (raw) 绕 Z 轴的角速度
xmag	int16_t	X Magnetic field (raw) 地磁强度 X
ymag	int16_t	Y Magnetic field (raw) 地磁强度 Y
zmag	int16_t	Z Magnetic field (raw) 地磁强度 Z

RAW_PRESSURE (

[#28](#)) 原始格式气压数据

The RAW pressure readings for the typical setup of one absolute pressure and one differential pressure sensor. The sensor values should be the raw, UNSCALED ADC values.

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds since UNIX epoch or microseconds since system boot) UNIX 格式时间戳。
press_abs	int16_t	Absolute pressure (raw) 绝对气压
press_diff1	int16_t	Differential pressure 1 (raw) 相对气压 1
press_diff2	int16_t	Differential pressure 2 (raw) 相对气压 2
temperature	int16_t	Raw Temperature measurement (raw) 原始温度数据

SCALED_PRESSURE (

[#29](#)) 处理之后的气压数据

The pressure readings for the typical setup of one absolute and differential pressure sensor. The units are as specified in each field.

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot) 时间戳
press_abs	float	Absolute pressure (hectopascal) 绝对气压 （毫巴）
press_diff	float	Differential pressure 1 (hectopascal) 相对气压
temperature	int16_t	Temperature measurement (0.01 degrees celsius) 温度。（1234 表示 12.34 摄氏度）

ATTITUDE (

#30) 姿态数据

The attitude in the aeronautical frame (right-handed, Z-down, X-front, Y-right). 飞行器标准坐标系

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot) 时间戳
roll	float	Roll angle (rad, -pi..+pi) 滚转角
pitch	float	Pitch angle (rad, -pi..+pi) 俯仰角
yaw	float	Yaw angle (rad, -pi..+pi) 偏航角
rollspeed	float	Roll angular speed (rad/s) 滚转角速度
pitchspeed	float	Pitch angular speed (rad/s) 俯仰角速度
yawspeed	float	Yaw angular speed (rad/s) 偏航角速度

ATTITUDE_QUATERNION (

#31) 四元数法表示的姿态数据

The attitude in the aeronautical frame (right-handed, Z-down, X-front, Y-right), expressed as quaternion. 飞行器标准坐标系

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)时间戳
q1	float	Quaternion component 1 元数 1
q2	float	Quaternion component 2 元数 2
q3	float	Quaternion component 3 元数 3
q4	float	Quaternion component 4 元数 4
rollspeed	float	Roll angular speed (rad/s) 横滚角速度
pitchspeed	float	Pitch angular speed (rad/s) 俯仰角速度
yawspeed	float	Yaw angular speed (rad/s) 偏航角速度

LOCAL_POSITION_NED (

#32) 本地定位“北东下坐标系”

The filtered local position (e.g. fused computer vision and accelerometers). Coordinate frame is right-handed, Z-axis down (aeronautical frame, NED / north-east-down convention)

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)时间戳

Field Name	Type	Description
x	float	X Position
y	float	Y Position
z	float	Z Position
vx	float	X Speed
vy	float	Y Speed
vz	float	Z Speed

GLOBAL_POSITION_INT (

#33) 整型数表示的全球定位数据

The filtered global position (e.g. fused GPS and accelerometers). The position is in GPS-frame (right-handed, Z-up). It is designed as scaled integer message since the resolution of float is not sufficient. 浮点数表示的 GPS 数据效率比较差，所以用这个。

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)时间戳
lat	int32_t	Latitude, expressed as * 1E7 纬度
lon	int32_t	Longitude, expressed as * 1E7 经度
alt	int32_t	Altitude in meters, expressed as * 1000 (millimeters), above MSL 海拔高度
relative_alt	int32_t	Altitude above ground in meters, expressed as * 1000 (millimeters) 地面相对高度

Field Name	Type	Description
vx	int16_t	Ground X Speed (Latitude), expressed as m/s * 100 X 地速 （1234 表示 12.34 米/秒）
vy	int16_t	Ground Y Speed (Longitude), expressed as m/s * 100 Y 地速 （1234 表示 12.34 米/秒）
vz	int16_t	Ground Z Speed (Altitude), expressed as m/s * 100 Z 地速 （1234 表示 12.34 米/秒）
hdg	uint16_t	Compass heading in degrees * 100, 0.0..359.99 degrees. If unknown, set to: 65535 罗盘。（1234 表示 12.34, 0~359.99）

RC_CHANNELS_SCALED (

[#34](#))

*The scaled values of the RC channels received. (-100%) -10000, (0%) 0, (100%) 10000.
Channels that are inactive should be set to 65535.*

调整之后的遥控接收机通道数据。-10000 表示-100%，0 表示 0%，10000 表示 100%。无效通道为 65535

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)时间戳
port	uint8_t	Servo output port (set of 8 outputs = 1 port). Most MAVs will just use one, but this allows for more than 8 servos. 舵机输出端口。大多数飞控只用这一个端口就够了。这是一个 8 位端口，因此一个端口集成 8 路信号，可以分别控制 8 路舵机，但每个舵机只能工作在两个控制位置。适用于伞舱盖、起落架、襟翼等开关量控制场合。这里的 8 个开关通道和下面的 8 个比例通道一起计，一共 16 个通道控制能力。注意：二位开关可以使用开关通道，三位开关需要使用比例通道。

Field Name	Type	Description
chan1_scaled	int16_t	RC channel 1 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 1,
chan2_scaled	int16_t	RC channel 2 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 2
chan3_scaled	int16_t	RC channel 3 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 3
chan4_scaled	int16_t	RC channel 4 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 4
chan5_scaled	int16_t	RC channel 5 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 5
chan6_scaled	int16_t	RC channel 6 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 6
chan7_scaled	int16_t	RC channel 7 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 7
chan8_scaled	int16_t	RC channel 8 value scaled, (-100%) -10000, (0%) 0, (100%) 10000, (invalid) 32767. 比例通道 8
rssi	uint8_t	Receive signal strength indicator, 0: 0%, 100: 100%, 255: invalid/unknown. 接收机信号强度指示器

RC_CHANNELS_RAW (

#35) 遥控通道 RAW 格式数据

The RAW values of the RC channels received. The standard PPM modulation is as follows: 1000 microseconds: 0%, 2000 microseconds: 100%. Individual receivers/transmitters might violate this specification.

遥控通道原始数据。标准 PPM 调制方式为：使用 50hz 的方波传送比例通道信号。方波的高电平脉冲宽度代表通道数据，即舵机位置。1 毫秒代表 0%，1.5 毫秒代表 50%，2 毫秒代表 100%。个别遥控器/接收机可能略有差异。

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)时间戳
port	uint8_t	Servo output port (set of 8 outputs = 1 port). Most MAVs will just use one, but this allows for more than 8 servos. 舵机输出端口。大多数飞控只用这一个端口就够了。这是一个 8 位端口，因此一个端口集成 8 路开关量控制，可以分别控制 8 路舵机，但每个舵机只能工作在两个控制位置。适用于伞舱盖、起落架、襟翼等开关量控制场合。
chan1_raw	uint16_t	RC channel 1 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 1
chan2_raw	uint16_t	RC channel 2 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 2
chan3_raw	uint16_t	RC channel 3 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 3
chan4_raw	uint16_t	RC channel 4 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 4
chan5_raw	uint16_t	RC channel 5 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 5
chan6_raw	uint16_t	RC channel 6 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 6
chan7_raw	uint16_t	RC channel 7 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 7
chan8_raw	uint16_t	RC channel 8 value, in microseconds. A value of 65535 implies the channel is unused. 比例通道 8

Field Name	Type	Description
rss	uint8_t	Receive signal strength indicator, 0: 0%, 100: 100%, 255: invalid/unknown. 接收机信号强度指示器

SERVO_OUTPUT_RAW (

#36) 舵机输出原始数据

The RAW values of the servo outputs (for RC input from the remote, use the RC_CHANNELS messages). The standard PPM modulation is as follows: 1000 microseconds: 0%, 2000 microseconds: 100%.

舵机输出原始数据（遥控器输入信号是 RC_CHANNELS），标准 PPM 调制方式为：使用 50hz 的方波传送比例通道信号。方波的高电平脉冲宽度代表通道数据，即舵机位置。1 毫秒代表 0%，1.5 毫秒代表 50%，2 毫秒代表 100%。个别遥控器/接收机可能略有差异。

Field Name	Type	Description
time_usec	uint32_t	Timestamp (microseconds since system boot)时间戳
port	uint8_t	Servo output port (set of 8 outputs = 1 port). Most MAVs will just use one, but this allows to encode more than 8 servos. 舵机输出端口。大多数飞控只用这一个端口就够了。这是一个 8 位端口，因此一个端口集成 8 路开关量控制，可以分别控制 8 路舵机，但每个舵机只能工作在两个控制位置。适用于伞舱盖、起落架、襟翼等开关量控制场合。
servo1_raw	uint16_t	Servo output 1 value, in microseconds 舵机输出 1
servo2_raw	uint16_t	Servo output 2 value, in microseconds 舵机输出 2
servo3_raw	uint16_t	Servo output 3 value, in microseconds 舵机输出 3
servo4_raw	uint16_t	Servo output 4 value, in microseconds 舵机输出 4
servo5_raw	uint16_t	Servo output 5 value, in microseconds 舵机输出 5

Field Name	Type	Description
servo6_raw	uint16_t	Servo output 6 value, in microseconds 舵机输出 6
servo7_raw	uint16_t	Servo output 7 value, in microseconds 舵机输出 7
servo8_raw	uint16_t	Servo output 8 value, in microseconds 舵机输出 8

MISSION_REQUEST_PARTIAL_LIST (

[#37](#)) 请求回送一部分任务清单

Request a partial list of mission items from the system/component.

http://qgroundcontrol.org/mavlink/waypoint_protocol. If start and end index are the same, just send one waypoint.

请求回送一部分任务清单。如果起始代号和结束代号相同，则只发送一个航路点。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
start_index	int16_t	Start index, 0 by default 起始代号，缺省值为 0
end_index	int16_t	End index, -1 by default (-1: send list to end). Else a valid index of the list 结束代号 缺省值为-1，表示发送后续全部清单。

MISSION_WRITE_PARTIAL_LIST (

[#38](#)) 任务上传并插在指定的序号位置

This message is sent to the MAV to write a partial list. If start index == end index, only one item will be transmitted / updated. If the start index is NOT 0 and above the current list size, this request should be REJECTED! 此消息用于任务上传，如果起始代号和结束代号相同，则仅传送一个任务。如果起始代号不为 0 并且大于现有的机载任务单结束代号，则这个任务上传指令会被拒绝执行。

Field Name	Type	Description
target_system	uint8_t	System ID 目标系统
target_component	uint8_t	Component ID 目标部件
start_index	int16_t	Start index, 0 by default and smaller / equal to the largest index of the current onboard list. 起始代号,缺省值为 0，此数值应该小于等于当前飞控任务单的总任务数。
end_index	int16_t	End index, equal or greater than start index. 结束代号，应该大于等于起始代号。

MISSION_ITEM (

[#39](#)) 任务项

Message encoding a mission item. This message is emitted to announce the presence of a mission item and to set a mission item on the system. The mission item can be either in x, y, z meters (type: LOCAL) or x:lat, y:lon, z:altitude. Local frame is Z-down, right handed (NED), global frame is Z-up, right handed (ENU). See also http://qgroundcontrol.org/mavlink/waypoint_protocol.

用于传送具体的任务项。可以使用 XYZ 坐标系，单位为米。或经纬度坐标。局部坐标系中 Z 轴向下，全球坐标系中，Z 轴向上。请参阅 http://qgroundcontrol.org/mavlink/waypoint_protocol.

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件

Field Name	Type	Description
seq	uint16_t	Sequence 序号
frame	uint8_t	The coordinate system of the MISSION. see MAV_FRAME in mavlink_types.h 坐标系
command	uint16_t	The scheduled action for the MISSION. see MAV_CMD in common.xml MAVLink specs 指令。参考 MAV_CMD 后续的 param1~param4 的含义同 MAV_CMD 相关。
current	uint8_t	false:0, true:1
autocontinue	uint8_t	autocontinue to next wp 自动继续执行下一个航点指令
param1	float	PARAM1 / For NAV command MISSIONs: Radius in which the MISSION is accepted as reached, in meters
param2	float	PARAM2 / For NAV command MISSIONs: Time that the MAV should stay inside the PARAM1 radius before advancing, in milliseconds
param3	float	PARAM3 / For LOITER command MISSIONs: Orbit to circle around the MISSION, in meters. If positive the orbit direction should be clockwise, if negative the orbit direction should be counter-clockwise.
param4	float	PARAM4 / For NAV and LOITER command MISSIONs: Yaw orientation in degrees, [0..360] 0 = NORTH
x	float	PARAM5 / local: x position, global: latitude
y	float	PARAM6 / y position: global: longitude
z	float	PARAM7 / z position: global: altitude

MISSION_REQUEST (

#40) 任务下载请求

Request the information of the mission item with the sequence number seq. The response of the system to this message should be a MISSION_ITEM message.

http://ggroundcontrol.org/mavlink/waypoint_protocol 请求下载指定序号的任务。对这个消息的回应应该是一个 MISSION_ITEM 消息。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
seq	uint16_t	Sequence 序号

MISSION_SET_CURRENT (

#41) 设置当前任务

Set the mission item with sequence number seq as current item. This means that the MAV will continue to this mission item on the shortest path (not following the mission items in-between).

设定指定代号的任务为当前任务。这意味着飞行器将直接飞向当前任务所在的位置，然后继续。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
seq	uint16_t	Sequence 序号

MISSION_CURRENT (

#42) 当前任务

Message that announces the sequence number of the current active mission item. The MAV will fly towards this mission item.

设定指定代号的任务为当前任务。这意味着飞行器将直接飞向当前任务所在的位置，然后继续。
【按，同 41 号消息的区别尚为明白】

Field Name	Type	Description
seq	uint16_t	Sequence 序号

MISSION_REQUEST_LIST (

[#43](#)) 任务单下载请求

Request the overall list of mission items from the system/component.

请求下载所有的任务清单内容。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件

MISSION_COUNT (

[#44](#)) 任务计数

This message is emitted as response to MISSION_REQUEST_LIST by the MAV and to initiate a write transaction. The GCS can then request the individual mission item based on the knowledge of the total number of MISSIONs.

这个消息是对 43 号任务的回应，用于初始化一个传送过程。地面站软件可以用这个数据开启一个专用的处理程序。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件

Field Name	Type	Description
count	uint16_t	Number of mission items in the sequence 任务总数

MISSION_CLEAR_ALL (

#45) 任务清空

Delete all mission items at once.

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件

MISSION_ITEM_REACHED (

#46) 任务项到达

A certain mission item has been reached. The system will either hold this position (or circle on the orbit) or (if the autocontinue on the WP was set) continue to the next MISSION.

特定任务项已到达。系统将驻留在航点位置或按照一定的轨迹盘旋，或继续飞向下任务项。这个消息通常是飞控在引导飞机成功到达某一航点或完成某一任务之后用于通知地面站。

Field Name	Type	Description
seq	uint16_t	Sequence 序号

MISSION_ACK (

#47) 任务回应

Ack message during MISSION handling. The type field states if this message is a positive ack (type=0) or if an error happened (type=non-zero). 任务回应是对任务消息的返回值。0 表示成功。非零数据表示出错。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
type	uint8_t	See MAV_MISSION_RESULT enum 参阅

SET_GPS_GLOBAL_ORIGIN (

[#48](#)) 设置 GPS 原点

As local waypoints exist, the global MISSION reference allows to transform between the local coordinate frame and the global (GPS) coordinate frame. This can be necessary when e.g. in- and outdoor settings are connected and the MAV should move from in- to outdoor.

为了兼容局部航点，全局任务参考坐标系可以在局部坐标系和 GPS 坐标系之间进行转换。这样的操作是为了保证飞行器在室内环境和室外环境的坐标系转换。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
latitude	int32_t	global position * 1E7 纬度
longitude	int32_t	global position * 1E7 经度
altitude	int32_t	global position * 1000 高度

GPS_GLOBAL_ORIGIN (

[#49](#)) GPS 原点

Once the MAV sets a new GPS-Local correspondence, this message announces the origin (0,0,0) position 在执行“GPS 原点设定”指令之后，广播本消息，通知其他设备。

Field Name	Type	Description
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Field Name	Type	Description
latitude	int32_t	Latitude (WGS84), expressed as * 1E7 纬度
longitude	int32_t	Longitude (WGS84), expressed as * 1E7 经度
altitude	int32_t	Altitude(WGS84), expressed as * 1000 高度

SET_LOCAL_POSITION_SETPOINT (

[#50](#)) 设置局部坐标系的航点

Set the setpoint for a local position controller. This is the position in local coordinates the MAV should fly to. This message is sent by the path/MISSION planner to the onboard position controller. As some MAVs have a degree of freedom in yaw (e.g. all helicopters/quadrotors), the desired yaw angle is part of the message.

为局部坐标系的位置控制器设置航点。这个消息是航路规划设备发到机载位置控制设备的消息。因为一些飞行器（如各种可以悬停的旋翼机）的飞行姿态有一个额外的指向自由度，因此这个数据也是本消息的一部分。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
coordinate_frame	uint8_t	Coordinate frame - valid values are only MAV_FRAME_LOCAL_NED or MAV_FRAME_LOCAL_ENU 坐标类型
x	float	x position
y	float	y position
z	float	z position
yaw	float	Desired yaw angle

LOCAL_POSITION_SETPOINT (

[#51](#)) 局部坐标航点

Transmit the current local setpoint of the controller to other MAVs (collision avoidance) and to the GCS. 传送局部位置航点给其他飞行器（用于防撞）和地面控制站。

Field Name	Type	Description
coordinate_frame	uint8_t	Coordinate frame - valid values are only MAV_FRAME_LOCAL_NED or MAV_FRAME_LOCAL_ENU 坐标系类型
x	float	x position
y	float	y position
z	float	z position
yaw	float	Desired yaw angle

GLOBAL_POSITION_SETPOINT_INT (

[#52](#)) 全局坐标系设置整型数形式的航点

Transmit the current local setpoint of the controller to other MAVs (collision avoidance) and to the GCS. 传送整型数的全局位置航点给其他飞行器（用于防撞）和地面控制站。

Field Name	Type	Description
coordinate_frame	uint8_t	Coordinate frame - valid values are only MAV_FRAME_GLOBAL or MAV_FRAME_GLOBAL_RELATIVE_ALT
latitude	int32_t	WGS84 Latitude position in degrees * 1E7

Field Name	Type	Description
longitude	int32_t	WGS84 Longitude position in degrees * 1E7
altitude	int32_t	WGS84 Altitude in meters * 1000 (positive for up)
yaw	int16_t	Desired yaw angle in degrees * 100

SET_GLOBAL_POSITION_SETPOINT_INT (

[#53](#)) 设置全局坐标系的航点

Set the current global position setpoint.

Field Name	Type	Description
coordinate_frame	uint8_t	Coordinate frame - valid values are only MAV_FRAME_GLOBAL or MAV_FRAME_GLOBAL_RELATIVE_ALT 坐标系类型
latitude	int32_t	WGS84 Latitude position in degrees * 1E7 纬度
longitude	int32_t	WGS84 Longitude position in degrees * 1E7 经度
altitude	int32_t	WGS84 Altitude in meters * 1000 (positive for up)高度
yaw	int16_t	Desired yaw angle in degrees * 100 指向

SAFETY_SET_ALLOWED_AREA (

[#54](#)) 设置安全区

Set a safety zone (volume), which is defined by two corners of a cube. This message can be used to tell the MAV which setpoints/MISSIONs to accept and which to reject. Safety areas are often enforced by national or competition regulations.

设置安全区（安全空域），用长方体的两个对角点的坐标定义安全区/安全空间。飞行器可以根据这个空间的设定对航点作出执行或者不执行的操作。安全区的设定通常来自于国家的相关法律法规或竞赛规则。

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
frame	uint8_t	Coordinate frame, as defined by MAV_FRAME enum in mavlink_types.h. Can be either global, GPS, right-handed with Z axis up or local, right handed, Z axis down.坐标系类型
p1x	float	x position 1 / Latitude 1 纬度 1
p1y	float	y position 1 / Longitude 1 经度 1
p1z	float	z position 1 / Altitude 1 高度 1
p2x	float	x position 2 / Latitude 2 纬度 2
p2y	float	y position 2 / Longitude 2 经度 2
p2z	float	z position 2 / Altitude 2 高度 2

SAFETY_ALLOWED_AREA (

[#55](#)) 安全区

Read out the safety zone the MAV currently assumes. 安全区广播

Field Name	Type	Description
frame	uint8_t	Coordinate frame, as defined by MAV_FRAME enum in mavlink_types.h. Can be either global, GPS, right-handed with Z axis up or local, right handed, Z

Field Name	Type	Description
		axis down. 坐标系类型
p1x	float	x position 1 / Latitude 1 纬度 1
p1y	float	y position 1 / Longitude 1 经度 1
p1z	float	z position 1 / Altitude 1 高度 1
p2x	float	x position 2 / Latitude 2 纬度 2
p2y	float	y position 2 / Longitude 2 经度 2
p2z	float	z position 2 / Altitude 2 高度 2

SET_ROLL_PITCH_YAW_THRUST (

[#56](#)) 设置横滚角、俯仰角、偏航角、油门

Set roll, pitch and yaw.

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
roll	float	Desired roll angle in radians 横滚
pitch	float	Desired pitch angle in radians 俯仰
yaw	float	Desired yaw angle in radians 偏航
thrust	float	Collective thrust, normalized to 0 .. 1 油门

SET_ROLL_PITCH_YAW_SPEED_THRUST (

[#57](#)) 设置滚转速度、俯仰角速度、偏航角速度、油门

Set roll, pitch and yaw.

Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
roll_speed	float	Desired roll angular speed in rad/s 滚转角速度
pitch_speed	float	Desired pitch angular speed in rad/s 俯仰角速度
yaw_speed	float	Desired yaw angular speed in rad/s 偏航角速度
thrust	float	Collective thrust, normalized to 0 .. 1 油门

ROLL_PITCH_YAW_THRUST_SETPOINT (

[#58](#)) 滚转角、俯仰角、偏航角、油门

Setpoint in roll, pitch, yaw currently active on the system.

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp in milliseconds since system boot 时间戳
roll	float	Desired roll angle in radians 滚转
pitch	float	Desired pitch angle in radians 俯仰
yaw	float	Desired yaw angle in radians 航向

Field Name	Type	Description
thrust	float	Collective thrust, normalized to 0 .. 1 油门

ROLL_PITCH_YAW_SPEED_THRUST_SETPOINT (

[#59](#)) 滚转角速度、俯仰角速度、偏航角速度、油门

Setpoint in rollspeed, pitchspeed, yaw speed currently active on the system.

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp in milliseconds since system boot
roll_speed	float	Desired roll angular speed in rad/s 滚转
pitch_speed	float	Desired pitch angular speed in rad/s 俯仰
yaw_speed	float	Desired yaw angular speed in rad/s 偏航
thrust	float	Collective thrust, normalized to 0 .. 1 油门

SET_QUAD_MOTORS_SETPOINT (

[#60](#)) 四轴机型，马达转速设定

Setpoint in the four motor speeds

Field Name	Type	Description
target_system	uint8_t	System ID of the system that should set these motor commands 目标系统
motor_front_nw	uint16_t	Front motor in + configuration, front left motor in x configuration 前，左前

Field Name	Type	Description
motor_right_ne	uint16_t	Right motor in + configuration, front right motor in x configuration 右，右前
motor_back_se	uint16_t	Back motor in + configuration, back right motor in x configuration 后，右后
motor_left_sw	uint16_t	Left motor in + configuration, back left motor in x configuration 左，左后

SET_QUAD_SWARM_ROLL_PITCH_YAW_THRUST (

[#61](#)) 四轴机群姿态设置

Setpoint for up to four quadrotors in a group / wing, 每组最多支持 4 个飞行器

Field Name	Type	Description
group	uint8_t	ID of the quadrotor group (0 - 255, up to 256 groups supported) 身份代号 (0~255)
mode	uint8_t	ID of the flight mode (0 - 255, up to 256 modes supported) 模式【按，含义存疑】
roll	int16_t[4]	Desired roll angle in radians +-PI (+-32767) 滚转角
pitch	int16_t[4]	Desired pitch angle in radians +-PI (+-32767)俯仰角
yaw	int16_t[4]	Desired yaw angle in radians, scaled to int16 +-PI (+-32767)指向角
thrust	uint16_t[4]	Collective thrust, scaled to uint16 (0..65535) 油门

NAV_CONTROLLER_OUTPUT (

#62) 导航控制器输出

Outputs of the APM navigation controller. The primary use of this message is to check the response and signs of the controller before actual flight and to assist with tuning controller parameters. APM 导航控制器输出。主要用于在实际飞行之前检查控制的输出信号，以便调节控制器内部参数。

Field Name	Type	Description
nav_roll	float	Current desired roll in degrees 目标滚转角
nav_pitch	float	Current desired pitch in degrees 目标俯仰角
nav_bearing	int16_t	Current desired heading in degrees 目标指向角
target_bearing	int16_t	Bearing to current MISSION/target in degrees 【按，不明】
wp_dist	uint16_t	Distance to active MISSION in meters 到下一任务点的距离
alt_error	float	Current altitude error in meters 高度差
aspd_error	float	Current airspeed error in meters/second 速度差
xtrack_error	float	Current crosstrack error on x-y plane in meters 水平位置差【按，不明】

SET_QUAD_SWARM_LED_ROLL_PITCH_YAW_THRUST

(#63) 【按，不明】

Setpoint for up to four quadrotors in a group / wing

Field Name	Type	Description
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Field Name	Type	Description
group	uint8_t	ID of the quadrotor group (0 - 255, up to 256 groups supported)
mode	uint8_t	ID of the flight mode (0 - 255, up to 256 modes supported)
led_red	uint8_t[4]	RGB red channel (0-255)
led_blue	uint8_t[4]	RGB green channel (0-255)
led_green	uint8_t[4]	RGB blue channel (0-255)
roll	int16_t[4]	Desired roll angle in radians +-PI (+-32767)
pitch	int16_t[4]	Desired pitch angle in radians +-PI (+-32767)
yaw	int16_t[4]	Desired yaw angle in radians, scaled to int16 +-PI (+-32767)
thrust	uint16_t[4]	Collective thrust, scaled to uint16 (0..65535)

STATE_CORRECTION (

[#64](#)) 状态修正

*Corrects the systems state by adding an error correction term to the position and velocity, and by rotating the attitude by a correction angle.*引入偏移量，以修正姿态和速度数据。

Field Name	Type	Description
xErr	float	x position error X 位置误差
yErr	float	y position error Y 位置误差

Field Name	Type	Description
zErr	float	z position error Z 位置误差
rollErr	float	roll error (radians) 滚转误差
pitchErr	float	pitch error (radians) 俯仰误差
yawErr	float	yaw error (radians) 航向误差
vxErr	float	x velocity X 速度误差
vyErr	float	y velocity Y 速度误差
vzErr	float	z velocity Z 速度误差

REQUEST_DATA_STREAM (

[#66](#)) 请求数据流

Field Name	Type	Description
target_system	uint8_t	The target requested to send the message stream. 目标系统
target_component	uint8_t	The target requested to send the message stream. 目标部件
req_stream_id	uint8_t	The ID of the requested data stream 数据身份代号
req_message_rate	uint16_t	The requested interval between two messages of this type 请求按照设定的时间间隔发送数据，即刷新周期。 【按，实测发现，此数值表示频率，而非周期】
start_stop	uint8_t	1 to start sending, 0 to stop sending.1 开始，0 停止

DATA_STREAM (

#67) 回应数据请求

Field Name	Type	Description
stream_id	uint8_t	The ID of the requested data stream 数据流标识
message_rate	uint16_t	The requested interval between two messages of this type 数据流刷新率
on_off	uint8_t	1 stream is enabled, 0 stream is stopped. 开关。1 开，0 关。

MANUAL_CONTROL (

#69) 手动控制

This message provides an API for manually controlling the vehicle using standard joystick axes nomenclature, along with a joystick-like input device. Unused axes can be disabled and buttons are also transmit as Boolean values of their 本消息提供标准 JOYSTICK 的控制接口，也可以用于其他类似游戏杆的设备。不用的轴可以关掉。按钮可以传送布尔数据类型的开关量。

Field Name	Type	Description
target	uint8_t	The system to be controlled. 目标系统
x	int16_t	X-axis, normalized to the range [-1000,1000]. A value of INT16_MAX indicates that this axis is invalid. Generally corresponds to forward(1000)-backward(-1000) movement on a joystick and the pitch of a vehicle. X 轴，取值范围是-1000 到 1000，建议使用 1000 表示向前最大值，-1000 表示向后最大值。
y	int16_t	Y-axis, normalized to the range [-1000,1000]. A value of INT16_MAX indicates that this axis is invalid. Generally corresponds to left(-1000)-right(1000) movement on a joystick and the roll of a vehicle.

Field Name	Type	Description
		Y 轴，取值范围是-1000 到 1000，建议使用 1000 表示向右最大值， -1000 表示向左最大值。
z	int16_t	Z-axis, normalized to the range [-1000,1000]. A value of INT16_MAX indicates that this axis is invalid. Generally corresponds to a separate slider movement with maximum being 1000 and minimum being -1000 on a joystick and the thrust of a vehicle. Z 轴，取值范围是-1000 到 1000，建议使用 1000 表示油门最大值， -1000 表示向油门最小值
r	int16_t	R-axis, normalized to the range [-1000,1000]. A value of INT16_MAX indicates that this axis is invalid. Generally corresponds to a twisting of the joystick, with counter-clockwise being 1000 and clockwise being -1000, and the yaw of a vehicle. R 轴，建议使用摇杆的扭转轴。逆时针最大位置为 1000，顺时针最大位置为-1000。
buttons	uint16_t	A bitfield corresponding to the joystick buttons' current state, 1 for pressed, 0 for released. The lowest bit corresponds to Button 1. 二进制编码的摇杆按钮表。1 表示按下， 0 表示松开。最低位表示按钮 1。

RC_CHANNELS_OVERRIDE (

[#70](#)) 遥控通道超越控制

The RAW values of the RC channels sent to the MAV to override info received from the RC radio. A value of -1 means no change to that channel. A value of 0 means control of that channel should be released back to the RC radio. The standard PPM modulation is as follows: 1000 microseconds: 0%, 2000 microseconds: 100%. Individual receivers/transmitters might violate this specification. 原始格式的遥控通道数据传给飞控，用于超越无线电遥控器的控制信号。即，飞机受地面站电脑的控制，不受手持式遥控器的控制。数据-1 表示通道数据维持原值。0 表示控制权交还给手持式遥控器。标准的 PPM 调制信号为：1000 微秒表示 0%，2000 微秒表示 100%，各种型号的接收机可能信号范围略有差异。

Field Name	Type	Description
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Field Name	Type	Description
target_system	uint8_t	System ID 系统
target_component	uint8_t	Component ID 部件
chan1_raw	uint16_t	RC channel 1 value, in microseconds 通道 1
chan2_raw	uint16_t	RC channel 2 value, in microseconds 通道 2
chan3_raw	uint16_t	RC channel 3 value, in microseconds 通道 3
chan4_raw	uint16_t	RC channel 4 value, in microseconds 通道 4
chan5_raw	uint16_t	RC channel 5 value, in microseconds 通道 5
chan6_raw	uint16_t	RC channel 6 value, in microseconds 通道 6
chan7_raw	uint16_t	RC channel 7 value, in microseconds 通道 7
chan8_raw	uint16_t	RC channel 8 value, in microseconds 通道 8

VFR_HUD (

[#74](#))

Metrics typically displayed on a HUD for fixed wing aircraft 通常用在 HUD 显示上的各种数据。

Field Name	Type	Description
airspeed	float	Current airspeed in m/s 空速
groundspeed	float	Current ground speed in m/s 地速
heading	int16_t	Current heading in degrees, in compass units (0..360, 0=north) 航向

Field Name	Type	Description
throttle	uint16_t	Current throttle setting in integer percent, 0 to 100 油门
alt	float	Current altitude (MSL), in meters 高度
climb	float	Current climb rate in meters/second 爬升率

COMMAND_LONG (

[#76](#)) 命令

Send a command with up to four parameters to the MAV

发送一个命令，带有至多 4 个参数。【按：原文可能有误，应该是 7 个参数】

Field Name	Type	Description
target_system	uint8_t	System which should execute the command 目标系统
target_component	uint8_t	Component which should execute the command, 0 for all components 目标部件
command	uint16_t	Command ID, as defined by MAV_CMD enum. 命令
confirmation	uint8_t	0: First transmission of this command. 1-255: Confirmation transmissions (e.g. for kill command) 确认次数
param1	float	Parameter 1, as defined by MAV_CMD enum. 参数 1
param2	float	Parameter 2, as defined by MAV_CMD enum. 参数 2
param3	float	Parameter 3, as defined by MAV_CMD enum. 参数 3
param4	float	Parameter 4, as defined by MAV_CMD enum. 参数 4

Field Name	Type	Description
param5	float	Parameter 5, as defined by MAV_CMD enum. 参数 5
param6	float	Parameter 6, as defined by MAV_CMD enum. 参数 6
param7	float	Parameter 7, as defined by MAV_CMD enum. 参数 7

COMMAND_ACK (

[#77](#))命令应答

Report status of a command. Includes feedback wether the command was executed.

报告命令状态。包括相应命令是否顺利执行。

Field Name	Type	Description
command	uint16_t	Command ID, as defined by MAV_CMD enum. 命令
result	uint8_t	See MAV_RESULT enum 执行结果

ROLL_PITCH_YAW_RATES_THRUST_SETPOINT (

[#80](#)) 姿态和油门控制设置

Setpoint in roll, pitch, yaw rates and thrust currently active on the system. 设置姿态和油门

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp in milliseconds since system boot 时间标签
roll_rate	float	Desired roll rate in radians per second 滚转速率
pitch_rate	float	Desired pitch rate in radians per second 俯仰速率

Field Name	Type	Description
yaw_rate	float	Desired yaw rate in radians per second 偏航角速率
thrust	float	Collective thrust, normalized to 0 .. 1 油门

MANUAL_SETPOINT (

[#81](#))手动设置姿态

Setpoint in roll, pitch, yaw and thrust from the operator 操作员手动设置

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp in milliseconds since system boot 时间签
roll	float	Desired roll rate in radians per second 滚转角速率（弧度/秒）
pitch	float	Desired pitch rate in radians per second 俯仰角速率（弧度/秒）
yaw	float	Desired yaw rate in radians per second 偏航角速率（弧度/秒）
thrust	float	Collective thrust, normalized to 0 .. 1 油门
mode_switch	uint8_t	Flight mode switch position, 0.. 255 模式设置
manual_override_switch	uint8_t	Override mode switch position, 0.. 255 强制设置

LOCAL_POSITION_NED_SYSTEM_GLOBAL_OFFSET (

[#89](#)) 东北下坐标系和全球坐标系的偏移量设置

The offset in X, Y, Z and yaw between the LOCAL_POSITION_NED messages of MAV X and the global coordinate frame in NED coordinates. Coordinate frame is right-handed, Z-axis down (aeronautical frame, NED / north-east-down convention)

东北下坐标系和全球坐标系的偏移量设置

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot) 时间签
x	float	X Position X 位置
y	float	Y Position Y 位置
z	float	Z Position Z 位置
roll	float	Roll 滚转角
pitch	float	Pitch 俯仰角
yaw	float	Yaw 航向角

HIL_STATE ([#90](#)) 硬件环状态

Sent from simulation to autopilot. This packet is useful for high throughput applications such as hardware in the loop simulations. 消息发到仿真环境下的飞控。本消息用于模拟飞行软件向飞控发送硬件环仿真数据。

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds since UNIX epoch or microseconds since system boot) 时间签
roll	Float	Roll angle (rad) 滚转角

Field Name	Type	Description
pitch	float	Pitch angle (rad) 俯仰角
yaw	float	Yaw angle (rad) 航向角
rollspeed	float	Roll angular speed (rad/s) 滚转角速度
pitchspeed	float	Pitch angular speed (rad/s) 俯仰角速度
yawspeed	float	Yaw angular speed (rad/s) 偏航角速度
lat	int32_t	Latitude, expressed as * 1E7 纬度
lon	int32_t	Longitude, expressed as * 1E7 经度
alt	int32_t	Altitude in meters, expressed as * 1000 (millimeters) 高度，单位是毫米，因此 1000 表示 1 米。
vx	int16_t	Ground X Speed (Latitude), expressed as m/s * 100 X 速度，单位是厘米/秒
vy	int16_t	Ground Y Speed (Longitude), expressed as m/s * 100 Y 速度，单位是厘米/秒
vz	int16_t	Ground Z Speed (Altitude), expressed as m/s * 100 Z 速度，单位是厘米/秒
xacc	int16_t	X acceleration (mg) X 加速度，单位是毫 G，即，9800 表示 9.8 米/（秒×秒）
yacc	int16_t	Y acceleration (mg) Y 加速度
zacc	int16_t	Z acceleration (mg) Z 加速度

HIL_CONTROLS (

#91) 硬件环控制

Sent from autopilot to simulation. Hardware in the loop control outputs

飞控发给模拟软件的消息。

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds since UNIX epoch or microseconds since system boot) 时间签
roll_ailerons	float	Control output -1 .. 1 副翼偏角
pitch_elevator	float	Control output -1 .. 1 升降舵偏角
yaw_rudder	float	Control output -1 .. 1 方向舵偏角
throttle	float	Throttle 0 .. 1 油门
aux1	float	Aux 1, -1 .. 1 辅助 1
aux2	float	Aux 2, -1 .. 1 辅助 2
aux3	float	Aux 3, -1 .. 1 辅助 3
aux4	float	Aux 4, -1 .. 1 辅助 4
mode	uint8_t	System mode (MAV_MODE) 系统模式
nav_mode	uint8_t	Navigation mode (MAV_NAV_MODE) 导航模式

HIL_RC_INPUTS_RAW (

#92) 硬件环遥控输入原始数据

Sent from simulation to autopilot. The RAW values of the RC channels received. The standard PPM modulation is as follows: 1000 microseconds: 0%, 2000 microseconds: 100%. Individual receivers/transmitters might violate this specification. 仿真软件发给飞控，遥控器输

入信号。标准的 PPM 调制信号是 1000 微秒表示 0%，2000 微秒表示 100%。个型号接收机指标略有差异。

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds since UNIX epoch or microseconds since system boot)时间签
chan1_raw	uint16_t	RC channel 1 value, in microseconds 通道 1，微秒单位
chan2_raw	uint16_t	RC channel 2 value, in microseconds 通道 2，微秒单位
chan3_raw	uint16_t	RC channel 3 value, in microseconds 通道 3，微秒单位
chan4_raw	uint16_t	RC channel 4 value, in microseconds 通道 4，微秒单位
chan5_raw	uint16_t	RC channel 5 value, in microseconds 通道 5，微秒单位
chan6_raw	uint16_t	RC channel 6 value, in microseconds 通道 6，微秒单位
chan7_raw	uint16_t	RC channel 7 value, in microseconds 通道 7，微秒单位
chan8_raw	uint16_t	RC channel 8 value, in microseconds 通道 8，微秒单位
chan9_raw	uint16_t	RC channel 9 value, in microseconds 通道 9，微秒单位
chan10_raw	uint16_t	RC channel 10 value, in microseconds 通道 10，微秒单位
chan11_raw	uint16_t	RC channel 11 value, in microseconds 通道 11，微秒单位
chan12_raw	uint16_t	RC channel 12 value, in microseconds 通道 12，微秒单位
rssi	uint8_t	Receive signal strength indicator, 0: 0%, 255: 100% 接收信号的强度。

OPTICAL_FLOW (

[#100](#)) 光流【按，APM 官方译法是“光流”或“光学流”。建议理解为类似于光学鼠标技术的位移传感器】

Optical flow from a flow sensor (e.g. optical mouse sensor) 光流传感器

Field Name	Type	Description
time_usec	uint64_t	Timestamp (UNIX) 时间签
sensor_id	uint8_t	Sensor ID 传感器标识
flow_x	int16_t	Flow in pixels in x-sensor direction X 像素数移动量
flow_y	int16_t	Flow in pixels in y-sensor direction Y 像素数移动量
flow_comp_m_x	float	Flow in meters in x-sensor direction, angular-speed compensated X 方向的移动量（米）。已角速度补偿。
flow_comp_m_y	float	Flow in meters in y-sensor direction, angular-speed compensated Y 方向的移动量（米）。已角速度补偿。
quality	uint8_t	Optical flow quality / confidence. 0: bad, 255: maximum quality 光流质量。0：差，255：最高质量
ground_distance	float	Ground distance in meters. Positive value: distance known. Negative value: Unknown distance 到地面的距离。正数为数据，负值表示距离未知。

GLOBAL_VISION_POSITION_ESTIMATE (

[#101](#)) 全局视觉位置估值

Field Name	Type	Description
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Field Name	Type	Description
usec	uint64_t	Timestamp (microseconds, synced to UNIX time or since system boot)时间签
x	float	Global X position X 位置
y	float	Global Y position Y 位置
z	float	Global Z position Z 位置
roll	float	Roll angle in rad 滚转角
pitch	float	Pitch angle in rad 俯仰角
yaw	float	Yaw angle in rad 航向角

VISION_POSITION_ESTIMATE (

#102) 视觉位置估值

Field Name	Type	Description
usec	uint64_t	Timestamp (microseconds, synced to UNIX time or since system boot) 时间签
x	float	Global X position X 位置
y	float	Global Y position Y 位置
z	float	Global Z position Z 位置
roll	float	Roll angle in rad 滚转角
pitch	float	Pitch angle in rad 俯仰角

Field Name	Type	Description
yaw	float	Yaw angle in rad 航向角

VISION_SPEED_ESTIMATE (

[#103](#)) 视觉速度估值

Field Name	Type	Description
usec	uint64_t	Timestamp (microseconds, synced to UNIX time or since system boot)时间签
x	float	Global X speed X 速度
y	float	Global Y speed Y 速度
z	float	Global Z speed Z 速度

VICON_POSITION_ESTIMATE (

[#104](#)) VICON 位置估值

Field Name	Type	Description
usec	uint64_t	Timestamp (microseconds, synced to UNIX time or since system boot)时间签
x	float	Global X position X 位置
y	float	Global Y position Y 位置
z	float	Global Z position Z 位置
roll	float	Roll angle in rad 滚转角

Field Name	Type	Description
pitch	float	Pitch angle in rad 俯仰角
yaw	float	Yaw angle in rad 航向角

HIGHRES_IMU (

[#105](#)) 高分辨率 IMU

The IMU readings in SI units in NED body frame. IMU 读数，SI 单位，北东下坐标系

Field Name	Type	Description
time_usec	uint64_t	Timestamp (microseconds, synced to UNIX time or since system boot) 时间签
xacc	float	X acceleration (m/s^2) X 加速度
yacc	float	Y acceleration (m/s^2) Y 加速度
zacc	float	Z acceleration (m/s^2) Z 加速度
xgyro	float	Angular speed around X axis (rad / sec) X 角速度
ygyro	float	Angular speed around Y axis (rad / sec) Y 角速度
zgyro	float	Angular speed around Z axis (rad / sec) Z 角速度
xmag	float	X Magnetic field (Gauss) X 磁场强度
ymag	float	Y Magnetic field (Gauss) Y 磁场强度
zmag	float	Z Magnetic field (Gauss) Z 磁场强度
abs_pressure	float	Absolute pressure in millibar 气压值 毫巴

Field Name	Type	Description
diff_pressure	float	Differential pressure in millibar 相对气压值 毫巴
pressure_alt	float	Altitude calculated from pressure 气压结算高度
temperature	float	Temperature in degrees Celsius 摄氏度温度
fields_updated	uint16_t	Bitmask for fields that have updated since last message, bit 0 = xacc, bit 12: temperature 已刷新数据的掩码表示。例如 0000 1000 0000 0001 表示 X 加速度和温度数据有了更新。

FILE_TRANSFER_START (

[#110](#)) 文件传输开始

Begin file transfer 开始传输

Field Name	Type	Description
transfer_uid	uint64_t	Unique transfer ID 唯一的传输标识
dest_path	char[240]	Destination path 目标路径
direction	uint8_t	Transfer direction: 0: from requester, 1: to requester 发送方向。 0: 请求对方发送，自己接收。 1: 请求对方接收，自己发送。
file_size	uint32_t	File size in bytes 文件大小
flags	uint8_t	RESERVED 保留，暂时不用。

FILE_TRANSFER_DIR_LIST (

#111) 文件传输目录列表

Get directory listing 获取目录列表

Field Name	Type	Description
transfer_uid	uint64_t	Unique transfer ID 唯一的标识
dir_path	char[240]	Directory path to list 字符串格式的目录
flags	uint8_t	RESERVED 保留，暂时不用。

FILE_TRANSFER_RES (

#112) 文件传输结果

File transfer result 文件传输结果

Field Name	Type	Description
transfer_uid	uint64_t	Unique transfer ID 唯一的标识
result	uint8_t	0: OK, 1: not permitted, 2: bad path / file name, 3: no space left on device 0: OK。 1: 不允许传送。 2: 路径不合适或文件名不合适。 3: 空间不足，无法传送。

BATTERY_STATUS (

#147) 电池状态

Transmitte battery informations for a accu pack.

传输电池信息，用于 accu【按：含义不明】包。

Field Name	Type	Description
accu_id	uint8_t	Accupack ID 标识
voltage_cell_1	uint16_t	Battery voltage of cell 1, in millivolts (1 = 1 millivolt) 1 号电芯，电压。单位是毫伏
voltage_cell_2	uint16_t	Battery voltage of cell 2, in millivolts (1 = 1 millivolt), -1: no cell 2 号电芯，电压。单位是毫伏。-1 表示无此电芯
voltage_cell_3	uint16_t	Battery voltage of cell 3, in millivolts (1 = 1 millivolt), -1: no cell 3 号电芯，电压。单位是毫伏。-1 表示无此电芯
voltage_cell_4	uint16_t	Battery voltage of cell 4, in millivolts (1 = 1 millivolt), -1: no cell 4 号电芯，电压。单位是毫伏。-1 表示无此电芯
voltage_cell_5	uint16_t	Battery voltage of cell 5, in millivolts (1 = 1 millivolt), -1: no cell 5 号电芯，电压。单位是毫伏。-1 表示无此电芯
voltage_cell_6	uint16_t	Battery voltage of cell 6, in millivolts (1 = 1 millivolt), -1: no cell 6 号电芯，电压。单位是毫伏。-1 表示无此电芯
current_battery	int16_t	Battery current, in 10*milliamperes (1 = 10 milliampere), -1: autopilot does not measure the current 电池电流，1 表示 10 毫安。-1 表示无相关测量设备。
battery_remaining	int8_t	Remaining battery energy: (0%: 0, 100%: 100), -1: autopilot does not estimate the remaining battery 剩余电量。(0%: 0, 100%: 100), -1: 表示无相关测量设备。

SETPOINT_8DOF (

[#148](#)) 8 自由度位置设置

Set the 8 DOF setpoint for a controller.

Field Name	Type	Description
target_system	uint8_t	System ID 系统标识
val1	float	Value 1 数据 1
val2	float	Value 2 数据 2
val3	float	Value 3 数据 3
val4	float	Value 4 数据 4
val5	float	Value 5 数据 5
val6	float	Value 6 数据 6
val7	float	Value 7 数据 7
val8	float	Value 8 数据 8

SETPOINT_6DOF ([#149](#)) 6 自由度位置设置

Set the 6 DOF setpoint for a attitude and position controller.

Field Name	Type	Description
target_system	uint8_t	System ID 系统标识
trans_x	float	Translational Component in x 平动坐标 X
trans_y	float	Translational Component in y 平动坐标 Y
trans_z	float	Translational Component in z 平动坐标 Z

Field Name	Type	Description
rot_x	float	Rotational Component in x 转动坐标 X
rot_y	float	Rotational Component in y 转动坐标 Y
rot_z	float	Rotational Component in z 转动坐标 Z

MEMORY_VECT (

[#249](#))

Send raw controller memory. The use of this message is discouraged for normal packets, but a quite efficient way for testing new messages and getting experimental debug output.

【按，用途不明】

Field Name	Type	Description
address	uint16_t	Starting address of the debug variables
ver	uint8_t	Version code of the type variable. 0=unknown, type ignored and assumed int16_t. 1=as below
type	uint8_t	Type code of the memory variables. for ver = 1: 0=16 x int16_t, 1=16 x uint16_t, 2=16 x Q15, 3=16 x 1Q14
value	int8_t[32]	Memory contents at specified address

DEBUG_VECT (

[#250](#)) 调试

Field Name	Type	Description
name	char[10]	Name 名字符串

Field Name	Type	Description
time_usec	uint64_t	Timestamp 时间签
x	float	x
y	float	y
z	float	z

NAMED_VALUE_FLOAT (

[#251](#))

Send a key-value pair as float. The use of this message is discouraged for normal packets, but a quite efficient way for testing new messages and getting experimental debug output.

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)
name	char[10]	Name of the debug variable
value	float	Floating point value

NAMED_VALUE_INT (

[#252](#))

Send a key-value pair as integer. The use of this message is discouraged for normal packets, but a quite efficient way for testing new messages and getting experimental debug output.

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot)

Field Name	Type	Description
name	char[10]	Name of the debug variable
value	int32_t	Signed integer value

STATUSTEXT (

[#253](#)) 状态

Status text message. These messages are printed in yellow in the COMM console of QGroundControl. WARNING: They consume quite some bandwidth, so use only for important status and error messages. If implemented wisely, these messages are buffered on the MCU and sent only at a limited rate (e.g. 10 Hz). 状态文本消息。在 QGC 软件中，本消息的内容在 COMM 控制台以黄颜色显示。警告：本消息对带宽的占用比较大，建议仅用于发送重要的状态和出错消息。请尽量将本消息存储在设定的缓冲区中，然后按照限定的频率（例如 10Hz）发送，已避免瞬间占用大量带宽。

Field Name	Type	Description
severity	uint8_t	Severity of status. Relies on the definitions within RFC-5424. See enum MAV_SEVERITY. 消息级别
text	char[50]	Status text message, without null termination character 消息内容。

DEBUG (

[#254](#)) 调试

Send a debug value. The index is used to discriminate between values. These values show up in the plot of QGroundControl as DEBUG N. 发送调试数据。索引号用于区分各种数据。在 QGC 软件中，这些数据显示在绘图窗口，标记为 DEBUG N。

Field Name	Type	Description
time_boot_ms	uint32_t	Timestamp (milliseconds since system boot) 时间签

Field Name	Type	Description
ind	uint8_t	index of debug variable 索引号
value	float	DEBUG value 数值

Messages are defined by the [common.xml](#) file. The C packing/unpacking code is generated from this specification, as well as the HTML documentaiton in the section above. *The XML displayed here is updated on every commit and therefore up-to-date.*

消息定义由 commom.xml 文件描述。C 语言的打包解包代码由这个文件自动生成。上述 HTML 文件也是。这个 XML 是跟随每个新版本软件即时更新的。