Argent Data Systems
Tracker3 系列
用户手册

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翻译 BD6CR/4

未翻译部分请参考 OT2m 中文说明书：
http://www.argentdata.com/support/tracker2_manual_sc.pdf

Preliminary

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APRS® 是 Bob Bruninga, WB4APR 的注册商标。

FCC Part 15 Notice

This device complies with Part 15 of the FCC Rules Operation is subject to the following two conditions: this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B Digital Device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. However, there is no grantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by tuning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CE Declaration

This device complies with the essential protection requirements of the European Parliament and of the Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. Assessment of compliance of the product with the requirements relating to electromagnetic compatibility was based on the following standards:

EN 55022 : 2006
EN 61000 - 3 - 2 : 2006
EN 61000 - 3 - 3 : 1995+A1 : 2001+A2 : 2005
EN 55024 : 1998 + A1 : 2001+ A2 : 2003
EN 61000-4-2 /-3 /-4 /-5 /-6 /-11

1. 简介

Tracker3 系列包括单独的 OT3m 型号小黑盒、Alinco DR-135T 的内置板 T3-135 和内置 5 瓦电台的 T3-301。所有这些型号软件功能相同，只有少许差异。此手册涵盖所有 Tracker3 的型号。

Tracker3 是一个专用于 APRS™应用（包括位置报告、消息和遥测）的业余无线电分组通信（packet radio）接口。 它取代了前一代的 Tracker2，并带有更快的 32 比特处理器、USB 支持、更多的 RAM 和更大的扩展空间。

固件更新和升级会周期性发布，所以可查看支持网站 http://www.argentdata.com/support 确保获得最新的固件和文档。维基网站 http://wiki.argentdata.com 也有深入的技术信息和用户贡献的使用技巧。

2. APRS 概览

为了了解 Tracker3 和它如何被应用，非常有必要先了解一下 APRS 到底是什么。

APRS 是英文“Automatic Packet Reporting System”的缩写，中文译为“自动分组报告系统”。这个名称是发明者 Bob Bruninga，WB4APR 的注册商标。名称中所指的内容可能会让新手困惑。

首先，APRS 是一个通信协议。它定义了数据（包括电台和地图物体位置、气象信息、无线电测向、文字消息和遥测）如何通过无线电分组电台（packet radio stations）通信。

APRS 也指包含 APRS 信息的网络。贯穿美国、欧洲和一些其他的国家，一个数字中继（'digipeaters'）网络，通常工作在一个统一的全国性的频率，为 APRS 分组提供传输。通常大部分 APRS 电台工作在其中一个常用的频道，但是不绝对。

APRS 互联网系统（APRS-IS）是一个基于互联网的附属于电台的网络。互联网网关（IGate）通常就是一台能访问互联网的家庭 PC 和一部电台。网关将电台网络的流量传送到一个共享的、世界范围的 APRS 流。许多 IGate 至少会传送文本信息流，一些时候也会传送其他信息。从互联网将数据传回电台网络。用这种方法，文字信息可以从一个电台传递到另一个电台。甚至两个电台间不存在中继器或不在一个中继器的覆盖范围内。

APRS 的名称有时候指 WB4APR 原始的 MS-DOS APRS 地图程序。但是这个程序现在正确的叫法是 APRSdos。目前有数种地图和消息程序存在，使用 APRS 电台网络或 APRS-IS，或者两者均用。一些程序同样拥有 IGate 功能。

连接到世界范围的 APRS-IS 流是许多数据库服务。这些系统（findu.com 和 aprsworld.net 是两个最受欢迎的系统）处理、存储所有的 APRS 数据流，按照转发规则将数据转发到世界上任何一个 IGate。大多数系统提供地图、天气显示、基于流量的地遥测图。这个功能允许任何人通过互联网访问监视 APRS 数据而不需要电台设备或特殊的软件。

当然，将数据上传到 web 连接的数据库并不是 APRS 唯一的好处。依靠网络的覆盖和负载，仅使用电台网络完成数百英里范围内通讯覆盖也是可能的。但是，在一个共享网络中伴随着中继器的增加，系统可靠度降低。APRS 最可靠的级别是地区级（LOCAL LEVEL），所以在一个地区使用多于两个或三个数字中继是不明智的。通常情况下，使用一个中继器是最适合本地覆盖的。

APRS 协议、硬件、软件可以独立的使用在国家级网络上。本地或临时网络可能因为特殊事件或满足特定组织需要而建立。一些应用可能不需要数字中继。例如高空气球经常使用 APRS 将位置和遥测数据通过一个专用频率直接发送到搜寻队。

移动使用 APRS 可以有多种不同的形式。最简单移动 APRS 配置是一个仅具有发射功能的追踪器连接一部电台和一个 GPS 接收机。除了在发射前追踪器会检测频道是否被占用外，这些追踪器通常没有接收功能。追踪器允许自己的车辆被他人追踪，但是无法接收信息或者位置。

另外一种选择是一部具有 APRS 功能的电台，例如建伍出售的电台。这些电台有一个文字显示屏，但是需要一部带有地图功能的 GPS 接收机显示位置和其他电台。

一部普通电台配合 TNC 与一部笔记本电脑或 PDA 结合使用可以提供完整的 APRS 功能。包括地图定位、消息功能，尽管这通常是最贵的配置而且在驾驶的过程中操作不方便。

3. Tracker3 的适用范围

Tracker3 有能力在 APRS 系统中扮演多种角色。如同它的名称，它是一个追踪器。它可以编码和发送从 GPS 接收机接收到的位置数据。它还接收和解调来自其它 APRS 电台的位置信息。

当它接收到一个电台的位置或地图物体，Tracker3 可以为这个位置创建一个 GPS 航点。在一个有地图功能的 GPS 接收机上，这个功能允许用户在地图上看到其他电台的位置。地图上的位置会随着接收到新的位置数据而更新。

当连接到合适的带有地图的 GPS 接收机的时候，追踪器为航点挑选最合适的符号（包含 APRS 定制符号，如果可用），航点还额外加入高度、状态文本（通常包含航向和速度）等详细信息。对于很多应用，这些功能允许你的 GPS 接收器代替 PC 或 PDA。

除了追踪功能外，Tracker3 同样可以用作数字中继。它的遥控控制功能可以通过遥控重新配置 Tracker3，甚至可以通过 IGate。使用路径限制功能，让管理员减少网络传输的与系统无关的流量。

在 KISS 模式，当连接到一台连接到互联网的计算机，使用适当的软件，Tracker3 同样可以用作 IGate 的一部分。

除了很少的例外情况下，Tracker3 可以同时使用它所有的功能。例如，安装在山顶可以同时当作数字中继、气象站、台址监视器（报告电压和气温）及用作 IGate 功能的 TNC。

4. 主要功能

APRS 追踪器 - Tracker3 是全功能的 APRS 追踪器。它可与工业标准的 NMEA 格式（$GPRMC, $GPGGA, 和$GPGLL 语句）或专用的 Garmin 二进制协议的 GPS 接收机配合工作。除了发送自己的位置，还可以解码接收到的位置并以航点的方式在 GPS 接收机的屏幕上绘制出来。如果接收机支持的话，还可以选择合适的符号、设置注释文本和其他航点细节。

KISS 模式 - KISS 协议定义了一个 TNC 和主机（通常为 PC）之间的接口。这种模式让 Tracker3 可以被用于基于 PC 的 APRS 程序，如 Xastir, WinAPRS 和 UI-View32。它也可以被用于非 APRS 应用，但受限于 Tracker3 的发送和接收缓冲的限制。

数字中继 - 数字中继工作为一个单工数字转发器，接收分组然后转发它们，通常收发同频。Tracker3 的数字中继功能是特别为 APRS 用途设计的，支持诸如 WIDEn-N 操作、跳数限制（hop count limiting）、重复消除（duplicate elimination）、抢先中继（preemptive digipeating）和多别名（multiple aliases）的高级功能。

气象站 – Tracker3 可以连接多种型号的气象站，包括 Peet Bros. Ultimeter 2000 系列， Davis Vantage Pro 2 和 LaCrosse WS-2310 无线气象站，提供远程气象遥测。

命令控制台 – 尽管 Tracker3 附带一个 Windows 下的配置程序，它还可以通过类似于传统的 TNC2 的命令语法的传统控制台接口进行配置，调试和升级。还可以通过 'converse'模式进行键盘对键盘的 QSO，另外支持 APRS 消息命令。

电源控制 – OT3m 包含了一个集成的固态继电器，可用来控制外部直流负载。一般来说，这用来控制收发信机的电源，在诸如太阳能供电的气象站等应用中节省电源。电台可以在发射前一会被自动接通电源，发射完毕后再关闭电源。电源输出也可以通过 APRS 消息手动控制。

遥测 – 所有 Tracker3 型号包括了集成的温度传感器。OT3m 和 T3-301 可以测量和报告它们的供电电压， OT3m 还包含了四个 0-20V 模拟输入和一个数字遥测输入。温度和电压读数可以在状态分组中报告，其它读数可以在 APRS 遥测消息中报告。

脚本 – 为了自动化一些任务和增加设备的功能， Tracker3 包括了一个简单的用户可编程脚本系统。

5. 硬件描述 – OT3m

Tracker3 型号 OT3m 有一个结实的钢外壳，尺寸大约为 4.2 英寸 x 3.2 英寸 x 1 英寸。电路用表面贴装工艺制成，包括过压和过流保护，并在外部接口上有针对射频干扰的滤波。

5.1. 前面板

前面板有两个双色发光管，标为 ACT (活动) 和 TX/RX (发射/接收)。可拆卸的 10 脚接线柱是一个附件接口，提供一个 Dallas 1-wire 数据总线、一个 5V 电源、四个 0 到 20V 模拟输入、一个计数器/发射触发输入、一个数字 I/O 脚和一个 7A 固态继电器输出。

5.2. 后面板

后面板有一个 9 芯 DB9 串口母头用于连接电台。一个 9 芯 DB9 串口公头，根据软件设置，提供一个带有硬件流控制的 RS-232 接口或者两个独立的 RS-232 接口。一个标准的 2.1x5.5mm 中心为正的电源接口可连接 7-28V 直流电源，还有一个 B 型的 USB 口用来将追踪器连接到 PC。


POWER
USB

6. 连线说明

6.1. 串行（SERIAL）接口

2: 端口 A 数据输入 / Data in (port A)
3: 端口 A 数据输出 / Data out (port A)
4: 供 GPS 的电源输出 / Power output for GPS
5: 地 / Ground
7: 端口 B 数据输出或 CTS / Data out (port B) or CTS
8: 端口 A 数据输入或 RTS / Data in (port B) or RTS

注意：串行接口配置为 DTE（数据终端设备）用于直接连接 GPS 接收器。连接 PC 需要一根串口交叉线（NULL-MODEM 电缆）。

6.2. 电台（RADIO）接口

1: 音频输出 / Audio out
2: COR / 静噪输入 / COR / Squelch input
3: PTT 输出 / PTT out
5: 音频输入 / Audio in
6: 地 / Ground
7: 电源输入 / Power in
8: PTT 输入 / PTT in

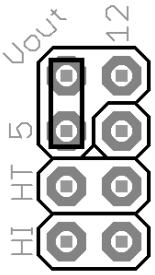
6.3. 附件（ACCESSORY）接口

1: +5V 输出 / +5v output
2: Dallas 1-Wire 数据总线 / Dallas 1-Wire data bus
3-6: 0-20V 模拟输入 / 0-20v analog inputs
7: 计数器/发送触发输入 / Counter / TX trigger input
8: 数字 I/O 线 / Digital I/O line
9: 继电器输出 / Relay output
10: 地 / Ground

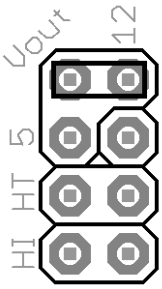
连接器是 3.81mm 脚距可插拔接线柱。

7. 跳线设置

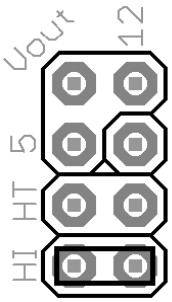
OT3m 板上的跳线组提供如下设置：



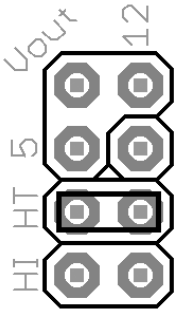
电压选择 – '5'. 连接串行接口的 4 脚到 5V 稳压器的输出。使用这个设置为+5V GPS 或其他外部设备供电。



电压选择 – '**12**'. 连接串行接口的 4 脚到 5V 稳压器的输入。使用这个设置从电台连接口提供未经稳压的电源为 GPS 供电。或从串行接口为 Tracker 供电。



'HI' – 这个跳线设置音频输出在高电平范围。这个主要用于移动台（车载台），特别是一些非业余的电台。



'HT' – 如果允许 PTT 信号接到音频输出线，选择这个跳线。多用于 ICOM，Yaesu，Alinco 手持电台，但是 Kenwood 除外。

8. 安装与配置

安装完成以后，你可以使用 PC 连接 Tracker3，可以用 Windows 配置程序 (otwincfg.exe)，或者根据你的爱好选择的终端模拟程序，如 HyperTerminal, SecureCRT, 或 Minicom。

最新的 USB 端口的驱动文件和操作系统相关的设置请参照 http://wiki.argentdata.com。

为了使用命令控制台，以合适的波特率（默认为 4800 波特）连接，按回车多次直到你看到命令提示符。为了使用 Windows 配置程序，只需要启动程序，选择 COM 口，给设备加电。

通常的 APRS 跟踪器操作必不可少的设置是呼号。其他设置默认设置应该可行，但是你应检查当地推荐的设置，特别是中继路径。

9. 位置模式

在开始前，很重要的一点需要明确，Tracker3 通常不能自动发送信息（包含位置、状态、气象和遥测分组），除非它知道自己的位置。

当它从 GPS 接收器接收到有效定位的 GPS 信号，或者当被用户设置了一个固定位置后，Tracker3 才知道自己的位置。Tracker3 可以被配置为在没有有效定位的情况下发射。如果在加电后没有获得定位，那么仅状态和遥测分组会被发送。如果最后接收到的 GPS 有效定位信息超过 30 秒钟，一个"NO FIX"警告会被添加到每条位置分组。

如果 AUTOSAVE 选项开启，当超过 30 秒钟没有接收到有效的定位信息时，最后接收到的位置信息被存储，设备进入固定位置模式。这个功能在便携式数字中继和气象站仅在设置时短暂的连接 GPS 的情况非常有用。

10. 端口模式

Tracker3 有两个串行端口，共享同一个物理的接口。如果需要可以用一个"Y"适配器分开两个端口。两个端口都可以工作在 多种模式下：

AUTO – 在这种模式下，设备自动监测 NMEA GPS 数据，Peet Bros 气象数据，或者（仅对 A 端口）命令控制台输入。注意虽然两个端口都可以配置为 AUTO 模

式，但是在任意时刻仅一个端口可以使用指定功能。例如：A 口可以接收 NMEA 数据同时 B 口接收气象数据。当时假如两个端口同时接收 NMEA 数据，将会产生无法预测的操作。

GARMIN – 这个模式强制所选端口为 9600 波特，忽略任何手动设置，开始高明二进制通信。

KISS – 在 KISS 模式，一台 PC 或者其他主机设备发送和接收原始 AX.25 分组。记住，即使在一个或两个端口在 KISS 模式，Tracker3 会继续运行其它功能，包括信息和数字中继。主机应该使用一个不同的呼号/SSID 组合来避免重复。

WS2300 – 以 2400 波特支持 LaCrosse WS-2300 系列气象站，也忽略手动波特率设置。

DAVIS – 支持 Davis Vantage Pro 系列气象站。

FLOW – 仅对端口 B 有效，这个设置使端口 B 的引脚作为端口 A 的 CTS/RTS 流控制信号。不适用于 T3-135。

USB 端口通常工作在命令控制台模式。如果 USBKISS 被勾选，USB 端口工作在 KISS 模式。为了退出 KISS 模式，可以在终端程序上输入 control-C 三次。

11. 远程访问

可以通过APRS消息遥控Tracker3执行命令。发送命令电台的呼号必须出现在设备的安全身份验证表中（查看AUTHLIST命令）。命令需加上CMD前缀，如果存在命令执行结果，将通过APRS消息发送回发出命令的电台。

例如，从一个APRS客户端发送“CMD VERSION”，将使目标设备回复自身的固件版本。

对于复位（RESET）命令的反馈，设备会尝试在复位前发送一条确认消息。这是为了防止因为消息重试造成多次复位。但是需要注意，如果频道很繁忙的话有可能在复位前确认消息没有被发送出来。一条复位命令应该在数次重试而没有收到反馈消息的情况下取消。此时需要检查一下设备是否事实上已经被复位。

12. 身份验证

除了安全身份验证表之外，遥控访问Tracker3还可以通过一种更安全的一次密码机制。这种机制在设置PWAUTH ON后生效。

设置一次密码身份验证，使用SECRET命令后跟随至少16个字符的密码短语。设备将用这个密码短语生成一个128位的密钥，存储在非易失存储器中。当这个密钥建立后，密码序号计数器设置为零。

然后可以用 PASSLIST 命令用于创建 4 字符的一次密码，每个都是独一无二的序列码，这些密码必须按指定的顺序使用。你可以打印出这组密码，然后使用后划掉用过的密码。

```
cmd:secret The quick brown fox jumps over the lazy dog.
Set.
cmd:passlist 24
   0:C0EP    1:U6OT    2:8JES    3:BVBN    4:Z2ZC    5:TEAR    6:VA5S    7:EV1F
   8:JCBX    9:NE8G   10:NAAM   11:P1Y8   12:ZJ59   13:H654   14:KSBB   15:PDM8
  16:VM89   17:GTNW   18:CW52   19:B7ZX   20:X4DF   21:Z5HF   22:CNNU   23:A8FS
```

密码的使用方法是，将密码附加在一条命令消息的开始部分的CMD前缀的后面。例如，如果下一条有效密码是“SBCY”，消息“CMDSBCY VERSION”将执行VERSION命令。

基本上，除非他人知道你的密码短语，否则是无法计算出下一条密码的。但是系统并不是万无一失的。一定不要将同一个密码短语用于两个不同的设备。因为一个截收者当他听到一条用于一个设备的密码。（或者他从在线数据库检索到一条旧消息）就有潜在的可能将这个密码用于其它设备。

同样，一条有效的密码发出后但没有被目标设备接收，一个截听者就可以知道下一条有效密码。如果你不确定你能联络到目标设备，发送一条不包含身份验证的消息或先查询并确认你得到回复。

13. Garmin 车队管理系统接口

一些高明导航系统提供一个车队管理系统接口 (FMI)可以在适合的电缆配合下与 Tracker3 一起工作。当前的兼容信息和电缆要求见 http://wiki.argentdata.com。

为了使用 FMI 功能，设置 Tracker3 中的一个串口为 GARMIN 模式并连接 FMI 电缆。在车队管理模式下，Tracker3 将自动将导航系统置成车队管理模式，添加一个“Dispatch”菜单，同时有可能改变其它菜单的布局。这种模式改变仅可以使用删除导航系统所有用户数据的方法撤销。

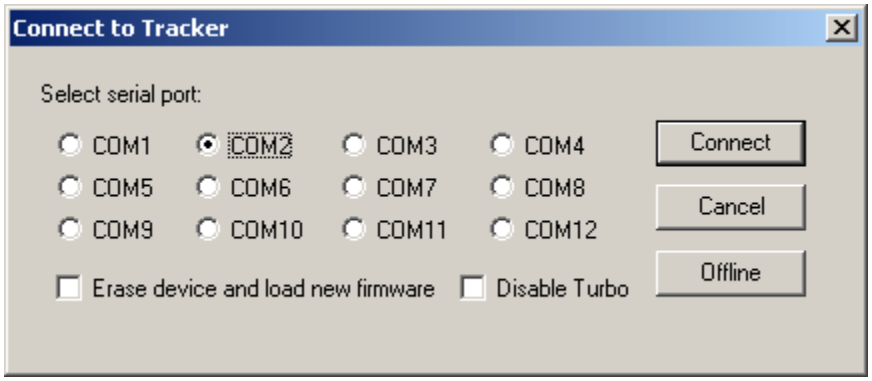
接收到的 APRS 消息将在导航系统的屏幕上显示一个消息图标，并存储在收件箱内。发出的消息可以指定接收的电台，在消息开始前加一个破折号“-”，目的地呼号，然后加一个空格及消息文本。如果没有指定电台，消息将发送到最后接收到的消息的发送的电台。这个功能对话过程中非常方便，不必经常重复输入呼号。

为了发送一个配置命令到 Tracker3，消息开始使用双破折号“--”例如，“--VERSION”将导致 Tracker3 反馈一条消息说明固件版本。

OTWINCFG 配置程序

Tracker3可以在Windows下使用otwincfg.exe程序进行配置。此程序可以在 http://www.argentdata.com/support下载。

连接 Tracker3 并启动配置程序。显示的第一个窗口让你选择 Tracker 连接的 COM 口。



13.1. 覆盖重写一个无效的配置

“Erase device and load new firmware”选项将加载新的固件映像，使用默认配置设置，而不必先试图读取目前现有配置。如果系统配置无效或者丢失，这特别有用。

13.2. Turbo 模式

默认情况下，配置程序将尝试以115200波特进行连接。如果连接有问题，请使用“Disable Turbo”选项，强制使用19200波特进行连接。 这个设置对通过USB的连接无效。

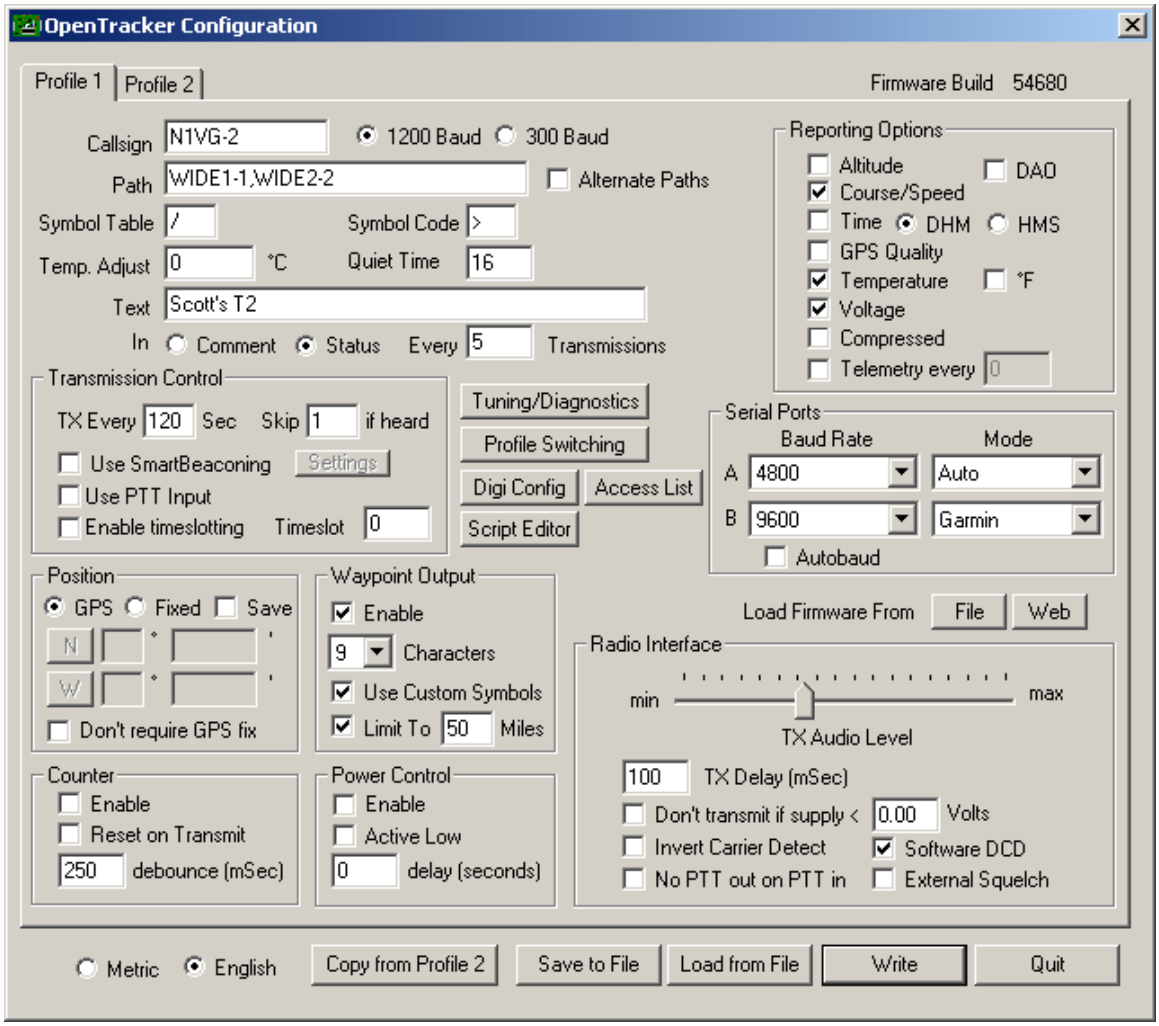
13.3. 热启动与冷启动

当你点击“Connect”按钮时，如果系统已经接通电源工作，程序会尝试一次,热启动`并进入的设备配置模式。如果固件已损坏，比如，因为升级失败而造成，它可能不能进入配置模式。您可以通过执行正确的“冷启动”，在点击“connect”按钮以后关闭电源，重新加电。 这个冷启动的步骤不适应于USB连接。

13.4. 脱机工作

如果您需要编辑配置内容而不连接Tracker，请点击“Offline”按钮。您需要基于保存过的配置文件进行工作。

13.5. 配置主窗口



13.6. Configuration Profiles（配置组）

The Tracker3 can store two separate configuration profiles. The profile currently being shown is selected using the tabs at the top of the window labeled ‘Profile 1’ and ‘Profile 2’.

When it is first powered on, the Tracker3 will always start out using Profile 1. After startup, profile selection depends on the settings in the profile switching screen. To access these settings, click 'Profile Switching'. See the section below on profile switch for more information.

13.7. 加载和保存设置

After changing any configuration options, you must click the 'Write' button to write the changes to the tracker's firmware. You may also use the 'Save to File' button to save the configuration options to a file, which can be loaded later using the 'Load from File' button.

13.8. 基本配置选项

Callsign – The radio callsign to use when transmitting. Tactical callsigns may be used, but FCC and ITU rules require periodic identification. If the actual callsign is not used here, be sure to include it in the comment field.

Baud Rate – For normal VHF operation this should be 1200. 300 baud is commonly used for HF. The Tracker3 uses mark and space frequencies of 1600 and 1800 hz respectively in 300 baud mode.

Path – This specifies the digipeater path to use. Specific callsigns may be entered (e.g., 'K6SYV-10, K6TZ-10') but for APRS operation a set of common aliases are usually used. A suggested default path is 'WIDE1-1, WIDE2-1'. It is rarely necessary to use a path greater than WIDE3-3 (requesting three 'wide' digipeater hops), and excessive paths generate large amounts of traffic that degrade the performance of the network. If you're not sure what path should be used for your local area, check with a local digipeater operator. This field may be left blank.

Alternate Paths - When enabled, this option causes the tracker to alternate between the paths specified in either profile with each transmission.

Symbol Table and **Symbol Code** – These settings control the symbol used to indicate the station's position when drawn on a map. See Appendix B for a listing of available symbols. Common symbols can be selected using a drop-down menu.

Temp. Adjust – Calibration offset for onboard temperature sensor. The sensor used on the tracker is fairly linear across its operating range and requires a single-point calibration. The easiest way to accomplish this is to set a thermometer next to the tracker. Subtract the temperature reported by the tracker from the temperature shown by the thermometer, and enter that value in this field. For example, if the thermometer shows the temperature as 26°C and the tracker reports 29°C, enter –3 for the adjustment value.

Quiet Time – This setting determines how long the channel must be clear before the tracker will transmit. Each unit is approximately 1/56 second. Setting the quiet time to zero causes the tracker to ignore detected traffic.

Text – This is a freeform text field. Anything entered here will be displayed in the comment portion of the transmission or in a separate status packet, as selected. Keep comments as brief as possible to avoid wasting channel capacity, or use the 'Every __ Transmissions' option to reduce how often the text is sent.

Altitude, Course/Speed, Time – When checked, report these values as indicated by the GPS receiver. The timestamp may be in Days/Hours/Minutes or Hours/Minutes/Seconds.

DAO – Enables the proposed !DAO! APRS extension to provide the map datum used and an extra digit of latitude and longitude resolution. May not be supported by all APRS clients. The datum is always reported as WGS84, which is the standard for normal APRS operation.

GPS Quality – Report number of satellites in use and horizontal dilution of precision information as reported by the GPS receiver.

Temperature – Report temperature as indicated by the onboard temperature sensor in the comment field. The temperature may be reported in Celsius (the default option) or Fahrenheit degrees.

Voltage – Report input voltage in the comment field. The maximum value is 18.5 volts, and the minimum is the dropout voltage of the regulator – typically 6.7 volts.

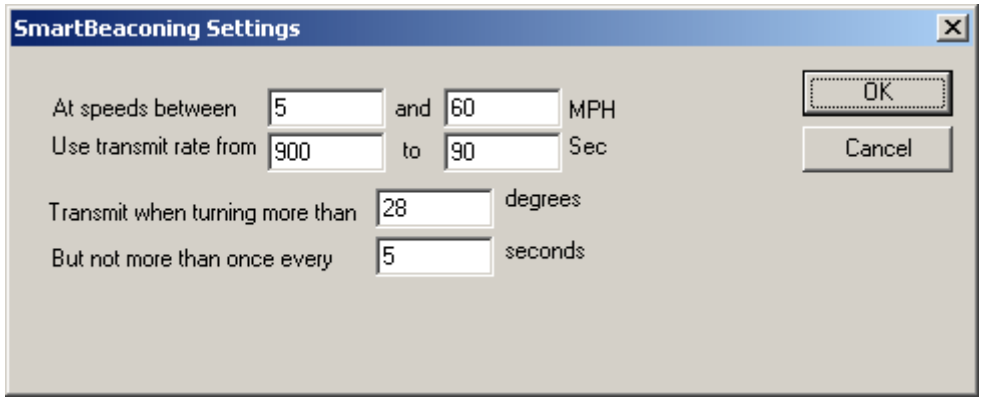
Compressed – Enables Base91 compressed position reporting. This mode is widely, but not universally, supported. Packets in Base91 format are shorter than their uncompressed equivalents and provide greater position resolution.

Telemetry every *n* – Sends a telemetry packet every *n* transmissions. See the telemetry section for more details.

TX Interval – How often the tracker should transmit. Allowable values are 0 to 65,535 seconds. This setting will depend on your intended use. One transmission every two minutes is acceptable for most mobile stations. A fixed station (e.g., a solar powered site reporting battery voltage and temperature) might choose an interval in the range of 5 to 30 minutes. If you require transmissions more often than every two minutes or so, consider using the SmartBeaconing™ options detailed below. Special events with many trackers and short transmission intervals should be operated on a separate frequency, not on the shared APRS channel. An interval of zero will disable timed transmissions.

SmartBeaconing – Originally developed for the HamHUD by Tony Arnerich, KD7TA, and Steve Bragg, KA9MVA, the SmartBeaconing™ algorithm allows the tracker to operate more efficiently by changing how often it transmits depending on its speed and direction of travel.

When stopped or moving at a speed below the low speed setting, the tracker will transmit at a fixed rate determined by the lower rate setting. Above the specified high-speed threshold, the higher rate setting is used. Between these two extremes, the interval varies between the low and high rates depending on the speed. A turn angle can also be specified to cause the tracker to transmit when turning. The final setting ensures that the tracker will never transmit more often than the specified interval, regardless of speed and turn rate. This can be useful to avoid transmitting more than once in a long, shallow turn.



Use PTT Input – When this checkbox is enabled, the tracker can be connected inline with a microphone to operate in burst-after-voice (mic encoder) mode. A packet will be transmitted whenever the microphone PTT is released.

Timeslot – The timeslot option is typically used to coordinate multiple trackers, especially for special events where many transmitters will be sharing the same channel with a high beacon rate. The number entered selects the timeslot's offset, in seconds, from the start of the hour. The tracker will transmit at this time, and every transmit interval after that. The timeslot value should be smaller than the transmit interval.

As an example, two trackers could be configured with an interval of 10 seconds, with one tracker set to slot 0 and the other to slot 5. The first tracker would transmit at 12:00:00, 12:00:10, 12:00:20, and so on, while the second would transmit at 12:00:05, 12:00:15, and 12:00:20.

The Tracker3 will accept timeslot settings in half-second increments.

Position – The tracker can operate in GPS or fixed position mode. When entering a fixed position, enter degrees in the first box and decimal minutes in the next box. Click on the buttons next to the coordinates to select North/South and East/West.

Don't require GPS fix – Normally, while in GPS mode, the tracker will not transmit without a valid fix. When this option is selected, the tracker will continue to transmit its last known position if GPS lock is lost for more than 30 seconds. This condition is indicated by the text 'NOFIX' in the status message. If the tracker has received no valid fix since startup, no position will be reported. Status text and telemetry packets will be unaffected. This option is particularly useful for applications like high altitude balloons that may lose GPS lock after landing, but still need to transmit to be found.

Save – When enabled, the tracker will save its last-known GPS position as a permanent fixed position if the GPS fix is lost. This may be used in the case of a temporary digipeater or weather station where a GPS receiver is installed only during setup and is removed to conserve power. The system must remain powered on for 30 seconds after GPS fix loss before the position is saved.

Waypoint Output – Enabling the waypoint output option causes the tracker to parse received APRS positions and output them over the serial port at 4800 baud. Waypoints are provided in both NMEA 0183 format ($GPWPL sentence) and Magellan format ($PMGNWPL sentence).

Length Limit – Some GPS receivers are not capable of display the full 9 characters required for APRS call signs and object names. Setting this option to a smaller number causes the tracker to intelligently truncate the name of the waypoint. Spaces and dashes are eliminated first, and if further truncation is required, characters are dropped from the left first. This prevents stations with different SSIDs from conflicting – for example, with a limit of 6 characters, KB6YUO-12 and KB6YUO-6 would be truncated as 6YUO12 and B6YUO6 respectively.

Use Custom Symbols - Enables the use of custom symbols if they have been uploaded to a compatible Garmin GPS receiver (using the Garmin xImage utility).

Range Limit - When enabled, waypoints will only be created for stations and objects within the specified range.

Enable Counter – This checkbox enables the digital counter function. When this function is enabled, the tracker will no longer transmit immediately when the CT pin on the terminal block (OT3m only) is shorted to ground. Instead, it will increment a counter and include the current count in the status text, e.g., 'CNT00001'. The maximum count is 65535, after which the counter rolls over to zero. This option can not be used concurrently with profile switching with the 'jumper' option.

Reset on Transmit – Setting this checkbox causes the counter to reset with every transmission. Hence, the count reported is the number of events since the last transmission.

Debounce – This is a delay applied to the counter input. After a counter event is registered, all subsequent events are ignored until the specified time has elapsed. Without a suitable debounce setting, a typical pushbutton could register several events for one press.

Power Control – When selected, the tracker will activate its internal solid state relay before each transmission. The tracker will pause for the specified number of

seconds to give the transmitter time to power up. The power control feature is especially useful for solar-powered weather or telemetry stations.

TX Audio Level – This slider sets the audio output level. This level can be set interactively from the Tuning/Diagnostics screen. If you find that the required level is less than one quarter of the full scale, make sure you have the 'HI' jumper removed. Running with the audio level set in software to a very low level can increase DAC quantization noise.

TX Delay – All radios require a certain amount of time to stabilize on their transmitting frequency, and receivers also require time to lock on. This value specifies the number of milliseconds the tracker should wait after the start of the transmission before it begins sending data. Allowable values are 0 to 1023 milliseconds. Setting this value too high will keep the channel busy longer than necessary. Setting it too low will prevent packets from being transmitted properly. Finding the optimum value for your radio may require some experimentation.

Don't transmit if supply < *n* – To avoid over-discharging batteries, enable this option and enter the minimum voltage at which the tracker should operate the transmitter.

Invert Carrier Detect – Usually used with mobile radios, this checkbox indicates that the channel is busy when the carrier detect input is low.

Software DCD – This option selects the data carrier detect (DCD) mode used. When unchecked, the tracker considers the channel to be busy in the presence of any noise, including voice or static. When checked, the channel is considered busy only when a valid 1200 baud signal is present.

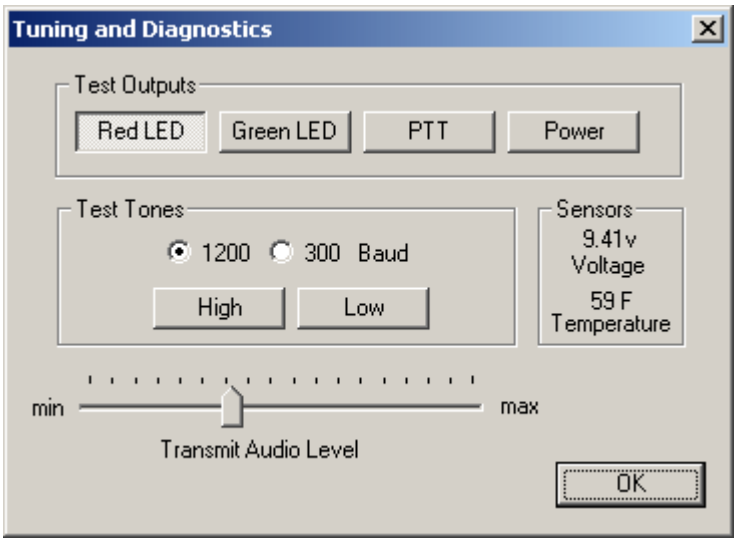
No Suppress PTT Out on PTT In – This option allows the tracker to be used in burst-after-voice mode without breaking any lines between the microphone and radio. PTT is not asserted by the tracker until the microphone PTT is released.

External Squelch – Enables the use of an external squelch or COR input.

Copy from Profile *n* – This button copies the contents of one profile to the other.

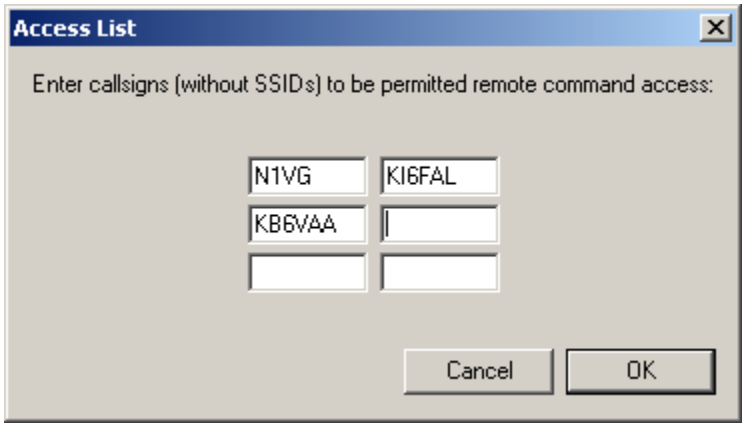
13.9. Tuning and Diagnostics（调整/诊断）

Access the tuning and diagnostics screen with the 'Tuning/Diagnostics' button.



From this screen, you can exercise the Tracker3 hardware and set the audio level. The top row of buttons controls the red and green elements of the ACT LED, the PTT output, and the power relay, and the second row allows AFSK tones to be sent, either with or without PTT on. When both tone buttons are on, the tracker sends alternating mark/space tones at the specified baud rate. The 'Sensors' pane shows the raw readings from the on-board sensors. The temperature reading is shown without the calibration constant applied.

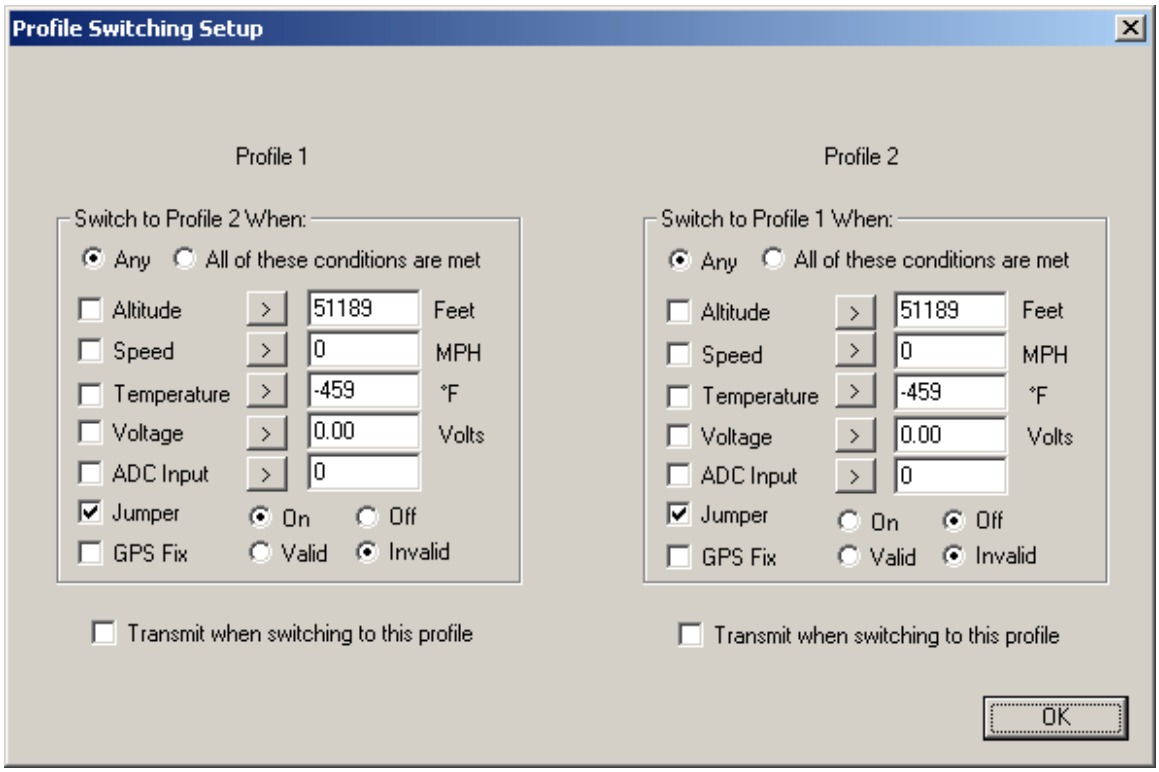
13.10. Access List（访问列表）



This screen allows editing of the tracker's remote access control list.

13.11. Profile Switching（配置组切换）

To access the profile switching setup, click on the 'Profile Switching' button from the main configuration screen.



The conditions to test are selected using the checkboxes to the left of each condition. The comparison can be either '>' (greater than) or '<=' (less than or equal to). Clicking on the button showing the comparison operator toggles it between these two settings.

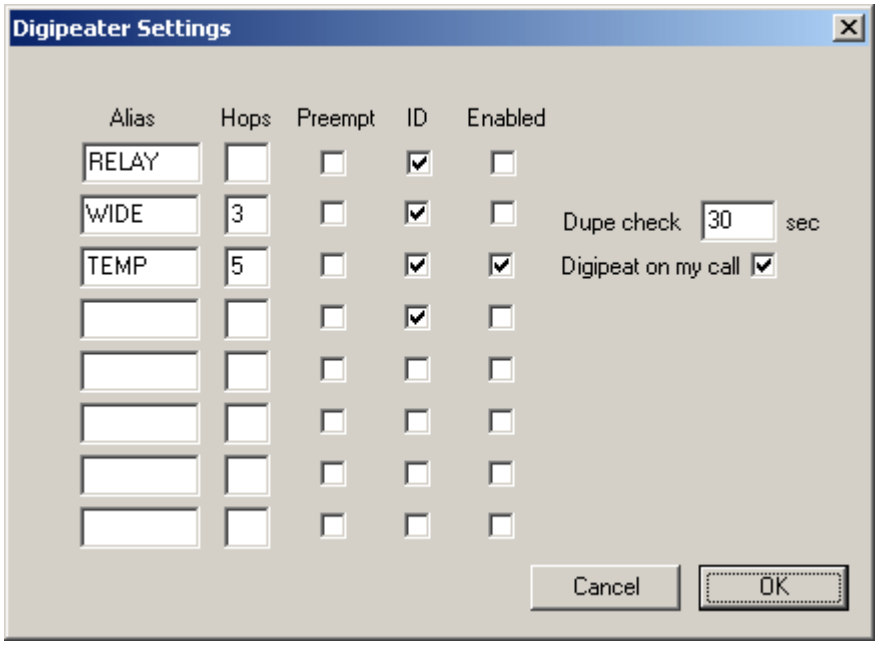
The *Altitude* and *Speed* values are compared with those indicated by the GPS. Onboard sensors provide readings for comparison with the *Temperature* and *Voltage* fields. *ADC Input* refers to the extra unused analog-to-digital converter input on X1 pin 9. The possible values are 0 to 255, corresponding to a range of 0 to 5 volts. The 'jumper' setting refers to the state of the CFG input on the accessory port. The input is 'Off' when the CFG pin is pulled to ground, as through a toggle or pushbutton switch. The *GPS Fix* is considered invalid if it has been more than 20 seconds since the last valid position was received from the GPS unit.

The selected tests are run once every second. If the conditions are met, the new profile is loaded. If *Transmit when switching to this profile* is checked in the new profile, a packet is transmitted immediately.

If the conditions in both profile panes are met, the tracker will switch between the two profiles each second and may cause undesired operation.

13.12. 数字中继设置

Access the Digipeater Settings screen using the 'Digi Config' button.



The 'Digipeat on my call' option causes the tracker to repeat packets with the tracker's own callsign in the packet's digipeater list. This allows any Tracker3 with the default configuration to be used as a relay if explicitly selected by the sending station.

The entries in the alias list specify other digipeater address that the unit should respond to. Only those with the 'Enabled' checkbox checked will be used. The 'Enabled' option is set in each profile. All other alias settings are global and affect both profiles.

'Hops' specifies the maximum number of hops to allow for this alias. This option limits excessive paths.

Normally the unit will repeat a packet only if it finds a match in its alias list for the next unused address entry in the packet's digipeater list. The 'Preempt' option tells the tracker to honor the alias if it appears anywhere in the digipeater list.

'ID' causes insertion of the tracker's callsign in the packet's digipeater list, allowing the actual path of a packet to be traced.

Each packet is checked against a duplicate list to avoid multiple transmissions of the same packet. The 'Dupe check' time setting determines how long entries are kept in this list.

14. 命令索引

Most commands can be issued through the serial console, APRS message, or fleet management message. Some commands make sense only when used from the local console and are not available for remote access.

The Tracker3 will accept command abbreviations. A minimum of three characters must be entered. For example, CALIBRATE can be entered as CAL. AUTOBAUD can be entered as AUTOB, the additional characters being required to distinguish it from AUTOSAVE.

1WIREWX

Enables 1-Wire Weather Station mode. The TAI8515 weather station (or a DS18S20 temperature sensor alone) should be connected to the 1-wire bus.

ABAUD 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200

Sets baud rate for the primary serial port. Default is 4800 baud.

ALIAS <n> <callsign>

Sets digipeater alias for slot <n>, where n is between 1 and 8. This will typically be a generic alias like 'WIDE'. No SSID is allowed in this field.

ALTITUDE on|off

Report altitude in position packet.

ALTPATH on|off

Causes the tracker to alternate between the digipeater path entries in either profile with each transmission.

AMODE AUTO | GARMIN | KISS | DAVIS | WS2300

Sets mode for primary serial port. See 'Port Modes' above for more information.

AUTHLIST +/-<callsign>

Displays or changes the list of callsigns authorized for remote access. +callsign adds a callsign to the list, -callsign removes a callsign from the list, and 'none' erases the entire list. Up to six callsigns can be stored.

AUTOBAUD on|off

Enables automatic baud rate detection. When a baud rate mismatch is detected, the unit will attempt to automatically select the proper baud rate.

AUTOSAVE on|off

When enabled, the tracker will save its last-known GPS position as a permanent fixed position if the GPS fix is lost. This may be used in the case of a temporary digipeater or weather station where a GPS receiver is installed only during setup and is removed to conserve power. The system must remain powered on for 30 seconds after GPS fix loss before the position is saved.

BBAUD 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | 57600 | 115200

Sets baud rate for the secondary serial port. Default is 4800 baud.

BEACON [text] (local only)

If no beacon text is specified, a position beacon (and weather beacon, if applicable) will be queued for immediate transmission. If a text string is entered, that text will be transmitted as an AX.25 text packet.

The command 'BEACON W' will transmit only a weather packet, and 'BEACON P' will transmit a position packet.

BMODE AUTO | GARMIN | KISS | WS2300 | DAVIS | FLOW

Sets mode for secondary serial port. See 'Port Modes' above.

CALIBRATE LOW | HIGH | ALT | PACKET (local only)

Calibration functions to set demodulator tuning and transmitter deviation. 'Low' transmits a 1200 hz tone, 'high' transmits a 2200 hz tone, 'alt' transmits alternating 1200 and 2200 hz tones, 'packet' sends a test packet repeatedly, and 'tune' displays a tuning indicator for adjustment of the demodulator. Use the '[' and ']' keys for coarse adjustment of the transmit audio level, and '-' and '+' for fine adjustment. Press any other key to exit calibration mode.

CDINVERT on|off

Inverts carrier detect input polarity.

CLIMB on|off

Enables rate-of-climb indication. Climb rate is reported in feet per minute, positive or negative, immediately following the altitude. Available only in Garmin binary mode.

CNTRESET on|off

Causes counter to reset with each transmission. See accessory port information.

COMMENT <string>

Sets beacon text / comment string, up to 64 characters.

COMPRESS on|off

Enables Base91 compressed format for position transmissions.

CONFIG 1|2 (local only)

Selects configuration profile to modify.

CONVERSE (local only)

In converse mode, text entered at the console is transmitted when the ENTER key is pressed. Hit CTRL-C to exit. The command 'K' may also be used to enter CONVERSE mode.

COUNTER on|off

Transmits counter value in status text.

CUSTSYM on|off

Enables the use of custom symbols if they have been uploaded to a compatible Garmin GPS receiver (using the Garmin xImage utility).

CWBEACON <text> (local only)

Sends <text> as a Morse code beacon.

DAO on|off

Enables transmission of the !DAO! extended-precision construct. This provides an extra digit of precision over the standard APRS position format, but results in a longer packet and may not be supported by all APRS clients.

DEVLIST (local only)

Lists addresses of all connected 1-wire devices.

DIGI on|off

When enabled, the tracker will digipeat packets having its own callsign (MYCALL) in the next digipeater address field.

DIGIID <n> on|off

Enables callsign substitution for digipeater alias <n> (1 to 8). This should normally be enabled.

DISPLAY (local only)

Lists all configuration parameters.

DOUBLE <n> on|off

When enabled, two identical copies of the position packet are sent with each transmission. This should only be used with short packets when extra redundancy is required.

DUMP (local only)

Displays the tracker's memory contents for troubleshooting purposes. By default only RAM contents are displayed. DUMP CONFIG displays configuration memory contents, and DUMP ALL displays everything.

DUPETIME <0-255> (seconds)

Sets digipeating duplicate suppression period.

EXTSQL on | off

Enables external squelch input.

EXTTEMP on | off

Enables temperature reporting from an external DS18S20 temperature sensor connected to the 1-wire data bus..

FAHRENHT on|off

Reports temperatures in Fahrenheit when temperature output in the status text is enabled.

FILTER on | off

When FILTER is ON, the MONITOR command will only output printable characters.

GPSDATA on|off

Reports GPS quality data in status text: Horizontal dilution of precision and number of satellites for NMEA mode, or estimated position error for Garmin mode.

HALFSLOT on|off

When timeslotting is enabled, HALFSLOT adds ½ second to the slot time.

HBAUD 1200|300

Selects transmission baud rate. Note that the reception baud rate is fixed at 1200 baud.

HEADERLN on|off

Breaks MONITOR packets into two lines, with header and payload separated.

HOPLIMIT <n> <hops>

For digipeater alias <n> (1-8), sets the maximum number of digipeater hops allowed. This can be used to limit excessively long paths that may cause network degradation.

INFO

Displays general system and diagnostic data, including number of packets heard, packets digipeated, and frame check sequence errors detected.

INTERVAL <0-65535> (seconds)

Sets the interval between automatic transmissions.

LVINHIBIT <0-255> (* 0.0784 volts)

Sets the low-voltage inhibit threshold. When the supply voltage drops below this level, the unit will cease transmitting. Each unit is 0.0784 volts, so a setting of 100 equals 7.84 volts.

MAXRANGE <0-255> (miles)

When set to a non-zero value, waypoints will only be created for stations and objects within the specified range.

MONITOR on|off

Displays incoming packets on the console as they are received.

MYCALL <xxxxxx-nn>

Sets the unit's callsign and optional SSID.

NICE <n>

When the tracker hears one of its own packets digipeated, it will skip the following <n> transmissions. This allows a faster beacon rate to be used in areas with poor coverage, without increasing the load on the network in areas with better coverage.

PASSALL on|off

Normally the Tracker3 ignores all received packets that fail a frame check sequence test. PASSALL disables the FCS test. This option should only be used for troubleshooting as it will result in output of corrupted packets.

PASSLIST [n] (local only)

Generates a list of the next *n* one-time passwords to be used, based on the pass phrase entered with the SECRET command. Default is 144.

PATCH <hex string>

The patch command allows direct modification of the contents of the Tracker3's flash memory. This command should only be used as directed by the manufacturer. Improper use of this command may render the Tracker3 inoperable.

PATH <call1,call2,…>

Comma-separated digipeater path list, containing up to three digipeater addresses.

POSITION <hhmm.mmx hhhmm.mmx> | GPS

Sets fixed position or enable GPS. Position must be entered in degrees and decimal minutes, including leading zeros. Setting position to 'GPS' reverts to GPS tracking mode.
Example: POSITION 4851.49N 00217.66E

POWER on|off|<0-255> (seconds)

ON or OFF will manually set the state of the power output. Specifying a value in seconds will enable automatic power control mode, where the power output is turned on for the specified number of seconds prior to transmission, and turned off immediately after transmission.

PREEMPT <n> on|off

Enables digipeater preemption for alias <n> (1-8). If preemption is enabled, packets will be digipeated on this alias even if it isn't the next address in the packet's digipeater list.

PROFILE 1 | 2

Selects the configuration profile to use. If profile switching is enabled, the profile switching parameters will still be in effect.

PROPWPT on|off

Enables proprietary waypoint strings. With PROPWPT OFF, output formats are $GPWPL and $PGRMW. With PROPWPT ON, $PKWDWPL, $GPWPT, and $PMGNWPL are output.

PTTINPUT on|off

Enables PTT input for mic encoder opration. A position packet will be transmitted when the mic PTT is released. OT3m model only.

PULSE <0-255> (seconds)

Activates power output for specified duration.

PWAUTH on|off

Enables one-time password authentication.

QUIET <0-255>

Time channel must be free before transmission can occur, in 1/64 second units.

REARM <0-255> (milliseconds)

Specifies minimum time between counter inputs. May be used for switch de-bouncing.

REPLY <message> (local only)

Sends a text message to the last person who sent a message addressed to this unit's callsign

RETRIES <0-255>

Number of times to retransmit an outgoing message.

RETRYTIME <0-255> (seconds)

Time between message retry attempts - interval increases by this value with each transmission.

REQALL on|off

Require all configuration switch parameters to be met before switching profiles.

RESET

Perform software reset. Saved settings are unaffected.

RING on|off

Sends a bell character whenever an incoming message arrives.

SCRIPT on|off

Enables the script engine.

SECRET <pass phrase>

Sets the pass phrase for the one-time password authentication system.

SEND <callsign> <message> (local only)

Sends a text message to the designated recipient.

SHAREDPTT on|off

Controls PTT line behavior for mic encoder mode. If enabled, PTT output is not asserted until the PTT input is released.

SLOT <0-65535>

Time slot for transmission (if TIMESLOT is on). Slot position is counted in seconds from the start of the hour.

SMARTBCON <low speed> <high speed> <low rate> <angle> <time>

Configures SmartBeaconing. The SmartBeaconing algorithm allows the tracker to operate more efficiently by changing how often it transmits depending on its speed and turn rate.

When stopped or moving at a speed below the low speed setting, the tracker will transmit at a fixed rate determined by the lower rate setting. Above the specified high-speed threshold, the higher rate setting is used. Between these two extremes, the interval varies between the low rate and high rate (specified separately with the INTERVAL command) depending on the speed.

The <low speed> and <high speed> settings define these two limits. For storage efficiency, the speeds are represented in units of 32 centimeters/second. To convert from miles per hour, multiply by 1.397. To convert from kilometers per hour, divide by 1.152.

Setting	MPH	Km/h
5	3.6	5.7
10	7.2	11.5
15	10.7	17
25	17.9	29
40	28.6	46
60	43	69
80	57	92
100	71	115

<low rate> and <high rate> are specified in seconds. <angle> indicates the change of direction, in degrees, that will cause an immediate transmission. <time> specifies, in seconds, the minimum time required between transmissions, regardless of speed or turns.

SNOOP on|off (local only)

The SNOOP command outputs on port A each character received on port B until another key is pressed. Use this command to troubleshoot GPS and weather station connections on port B. Make sure port A's baud rate is equal to or greater than port B's baud rate.

SQUAWK <0-255> (seconds)

Transmits alternating tones for specified number of seconds. May be used for testing or direction finding.

SWDCD on|off

ON selects software data carrier detect mode, providing a channel busy indication only when data is present. OFF selects energy detect mode, which will provide a busy indication for any signal, including static or voice. Use the ON setting for digipeater operation with open squelch for fastest signal acquisition.

STATUS <0-255>

Status packets are sent every *n* transmissions, or if set to 0, status text is sent as part of the position packet.

SYMBOL <1-2 characters>

APRS symbol character, optionally preceded by symbol table or overlay identifier.

TELEMETRY on|off

Enables transmission of telemetry packets.

TEMP on|off

Enables transmission of temperature readings from the on-board temperature sensor.

TEMPADJ <-128 to 127> (degrees C)

Offset for temperature sensor in degrees C.

TIMEHMS on|off

Sets timestamp mode to hour/minute/second when enabled. Default is day/hour/minute. Applies only to NMEA mode – hour/minute/second format is always used in Garmin binary mode.

TIMESLOT on|off

Force position packets to be transmitted only in designated time slots, expressed as the number of seconds from the start of the hour to the first transmission.

TIMESTAMP on|off

Report time information in the position packet.

TRACE on|off (local only)

When trace is on, each received raw packet is output in hexadecimal on port A.

TXDELAY <0-255>

Delay between start of transmission and start of data. This setting should be set to the minimum value that allows reliable reception of transmitted packets. An excessively high TXDELAY setting wastes channel capacity. Each unit is one character time – 1/150 second at 1200 baud.

TXLEVEL <1-255>

Sets transmission audio level. This value should be selected to provide an appropriate FM deviation level, typically about 3.5 kHz.

TXNOFIX on|off

Allows transmission of last position if GPS fix is lost for more than 30 seconds. Default behavior is to cease transmitting the position in the absence of a valid GPS signal.

TXONCHG on|off

Causes an immediate transmission when switching configuration profiles.

USEALIAS <n> on|off

Enables digipeating for alias *n*.

VELOCITY on|off

Enables transmission of velocity (course and speed) information in the position packet.

VERSION

Displays firmware version number.

VOLTAGE on|off

Enables reporting of supply voltage in status text.

WAYPOINTS on|off

Enables output of waypoints from received positions.

WPTLEN <6-9>

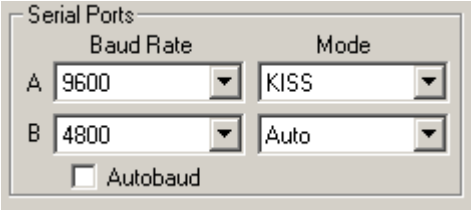
Sets maximum waypoint name length.

WXINFO

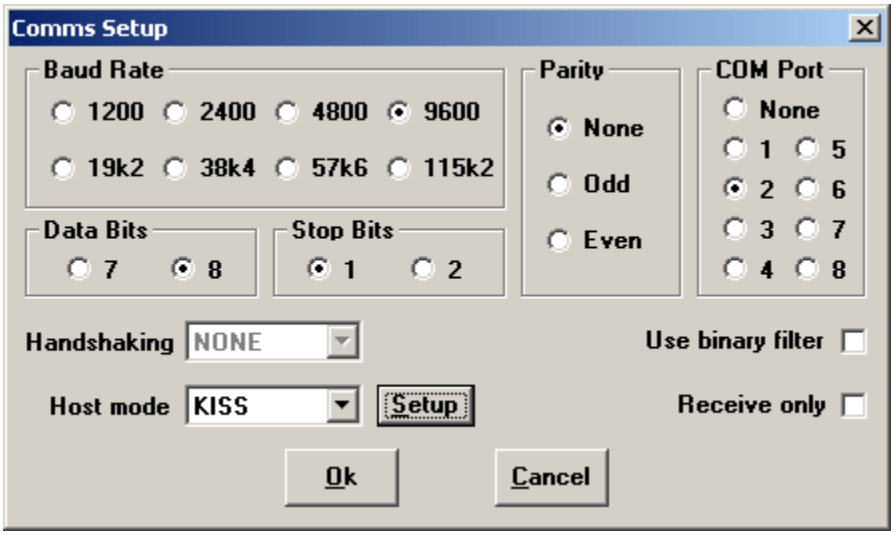
Displays weather information from attached station.

15. UI-View32 设置

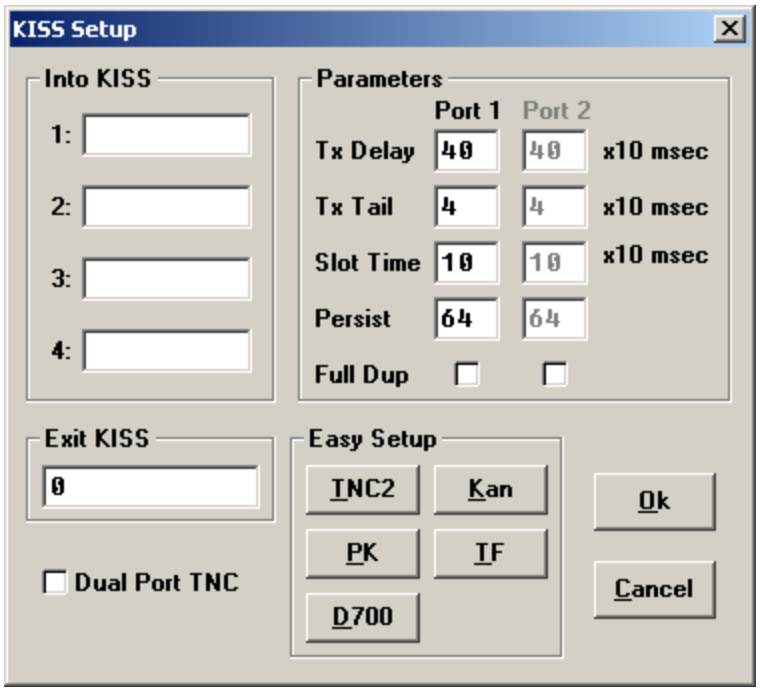
For use with the UI-View32 APRS client, either port of the Tracker3 can be set manually to KISS mode. No configuration commands are needed in UI-View32 once this has been accomplished.



In this example, port A has been set to KISS mode at 9600 baud using the tracker configuration utility. The console commands AMODE KISS and ABAUD 9600 produce the same result.

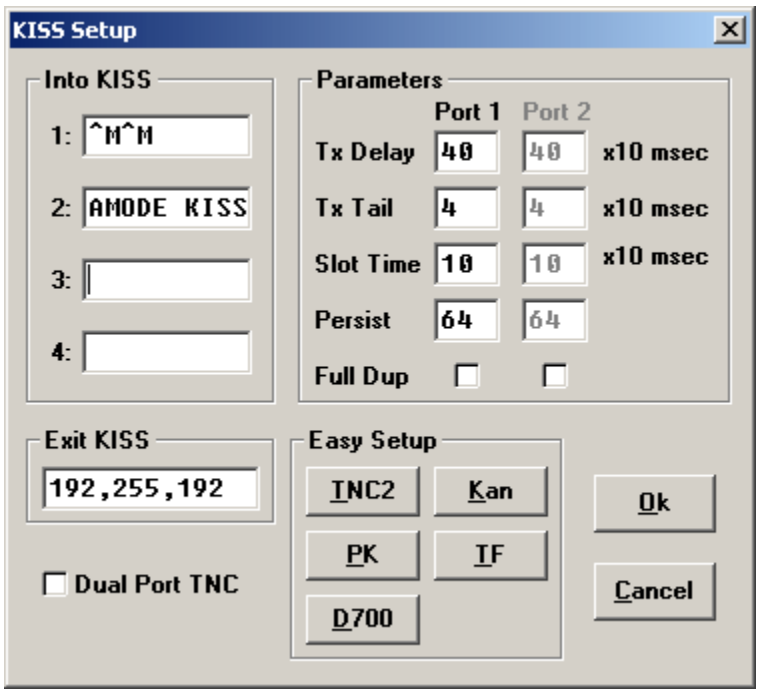


The baud rate selected in the UI-View32 'Comms Setup' screen must match the rate selected for the port in use. Select host mode 'KISS', and be sure to choose the correct COM port for your PC. Click on 'Setup' to continue configuration.



No 'Into KISS' or 'Exit KISS' commands are needed, and any settings in these fields should be deleted. Placing a '0' in the 'Exit KISS' field avoids a bug in UI-View32 that prevents it from exiting properly when the option is left blank.

If you would prefer to have UI-View32 automatically reconfigure the tracker for KISS mode each time the program is started, use the following settings:



This configuration will *only* work with port A, as the command console is not available on port B.