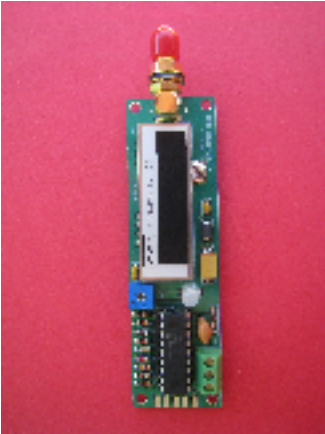


MICRO-TRAK 300 MANUAL VER 1.7



The Micro-Trak 300 Version 1.7 is a miniature APRS (Automatic Position Reporting System) transmitter operating on the North American APRS frequency standard of 144.390 MHz. The transmitter is a “motherboard” and accepts a TinyTrak3 compatible DIP PIC. The entire assembly is only 1 X 3.5 inches, and weighs less than one ounce! The Micro-Trak 300 is a creation of VHS Products, and is distributed exclusively by Byonics. The MT-300 Version 1.7 has many significant improvements, including an improved audio path and deviation control.

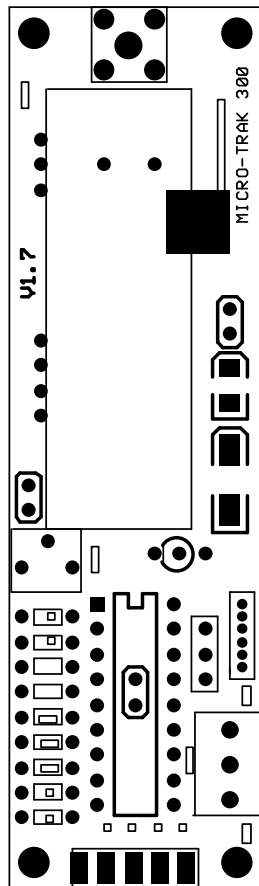
Because of its small size and light weight, the MT-300 Version 1.7 is ideal for airborne operations. Small size notwithstanding, the Micro-Trak 300 has a power output in the range of 300 mW, and is capable of operating at extremely long ranges.

An on-board 5 volt regulator provides an optional 200 MA, power output for your GPS receiver. (Many applications, including the use of the device with hand-held GPS units, will not require the 5 volt output of the Micro-Track.) The entire system runs well on 9-15 volts DC, and draws only about 10 milliamps in standby, and increases to 180 milliamps during transmissions (which last approximately 1/3 of a second using MIC-E) An accessory connector position (connector not included) is located on the board to allow operation with Byonics GPS 3 receiver.

The programming and primary GPS input connection is set up to use a DB9 Male connector (The same as a standard TinyTrak 3) by simply sliding the connector over the tabs and soldering it in place. The Micro-Trak can connect to a standard GPS receiver directly through the DB9 connector, but it is important to remember that computer programming and communication uses a reversed connection, meaning you will need a female to female Null modem cable, or a null modem adaptor and a gender-changer connector for programming your Micro-Trak. These cables and/or connectors are available from Byonics. The pads on the board that the DB-9 slides over should be lightly tinned with solder before sliding the DB-9 connector onto the board. This allows for a tight interference fit while soldering and an easier job of soldering the pins with minimal solder bulk. It is also helpful to avoid pressing the DB-9 too tightly against the PC board: leaving a little exposed space on the solder tabs on the board makes soldering easier, since the ends of the DB-9 pins and the mating pads can be heated simultaneously

. Complete information about TinyTrak and the Micro-Trak 300, Version 1.7, as well as configuration software may be found at: <http://www.byonics.com/microtrak300> .E-Mail information requests about the Micro-Trak 300 can be addressed to: microtrak300@byonics.com

Micro-Trak 300 Serial Connections



1 2 3 4 5
TOP SURFACE DB9 CONNECTIONS

Pin 1	No connection
Pin 2	Serial Data IN (GPS and programming)
Pin 3	Serial Data OUT
Pin 4	+ 5 Regulated output (optional for GPS power)
Pin 5	Ground

Auxiliary Connector

A 6 pin 1.2mm connector may be installed next to the 3 screw terminal. The connector is available from Byonics and will allow a Byonics GPS 3 GPS receiver to be plugged in, replacing the need to attach the GPS using the DB-9 connector. Note that you must disconnect a receiver connected to this port while programming through the DB-9 connector. For applications requiring extremely light weight, you may choose not to install the DB-9 connector permanently.

Operation and Programming

The Micro-Trak may be connected to a computer for programming by sliding a DB-9 male serial connector over the card edge connector on the bottom edge of the board. For a temporary connection without the benefit of soldering, you may have to tilt the connector manually to ensure a good connection while programming. The DB-9 connector may be permanently installed by soldering the connector to the card edge connections. Note that you will require a Null Modem and gender changer adaptor to program your Micro-Trak. Consult the TinyTrak 3 manual for instructions on using the Byonics configuration software to program the TT3 PIC on-board the Micro-Trak. Be aware that the Micro-Trak is a transmit-only device, and will transmit over other stations. It is not a good practice to send position reports too frequently, since this can jam other stations, and will use Micro-Trak battery power too quickly. 120 second transmission intervals are recommended.

Power Input

The three screw terminal is used to connect external ground and voltage not to exceed 15 Volts. Note that the center screw is Ground, and the screw closest to the antenna connector (marked "V+") is for the Positive power input. The screw closest to the DB-9 connector (marked "SW") is a switch input used to change between the primary profile and the secondary profile (Configured using the TT3 config software) When the "SW" input is grounded, it will switch to your pre-programmed secondary configuration. Please note that this switch input is not used while programming the unit in any way.

Antenna Connection

The MT-300 has a conventional SMA connector, allowing the use of any antenna designed for two meter operation.

Deviation Trimmer Control

The blue trimmer adjustment is used to set the deviation of the MT-300. It is shipped set as shipped to send clear decodable data. The deviation should not be set to exceed 3.5KHZ deviation. It is possible to adjust the deviation "by ear" by listening to APRS traffic and setting the Micro-Trak to equal or lesser volume in your receiver.

Bi-Color LED Indicator

The device has a single LED indicator mounted just above the Integrated Circuit. This LED contains a RED and a Green segment, which may appear yellow while both segments are lit. In operation, the Red and Green Segments will flash briefly when power is applied, and the unit will broadcast a beacon. The Red segment of the LED generally indicates that a transmission is taking place, and should only last 1/3 to 1 seconds in duration. The Green LED segment is primarily a GPS status light. While the connected GPS is sending invalid (not locked on) data, the Green segment will flash at a rate of about once per second. When the GPS is locked on, and sending valid data, the Green LED will be lit continuously.

A Note About Range

The Micro-Trak 300 has a relatively low power output, making it unsuitable for long range applications over ground. For terrestrial use, it works well in applications such as rocket recovery, where you will be monitoring transmissions locally, potentially, without digipeater support. The air-to-ground range of the MT-300 has been reported to exceed 500 miles from a height of 117,000 feet, using a simple quarter wave antenna.

Alternate Controller Chips

The MT-300 can accept any chip designed for the TT3 encoder, including the Weather Track chip and the Tiny Pack data transmitter. Contact Byonics after you have placed your order to request an alternative PIC, after checking carefully to see if the chip in mind is suitable for your application.

MICRO-TRAK DATA SPECIFICATIONS

The **MICRO-TRAK 300** is a narrow band radio transmitter for use in data transfer applications.

Applications

- Tracing and asset tracking systems
- Packetized data transmissions
- Telemetry and telecommand
- In-building monitoring and control
- Weather Stations

Technical Summary

- Transmit power: 300mW (24.7dBm) nominal
- Operating frequency: 144.390 MHZ , or 144.800 MHZ
- Supply range: 9-15 VDC
- Current consumption: 180mA nominal transmit
- Data rate: 300, 1200 Baud AFSK
- PCB Dimensions 1 X 3.5 Inches
- Weight < 1 ounce

Performance specifications

Absolute maximum ratings

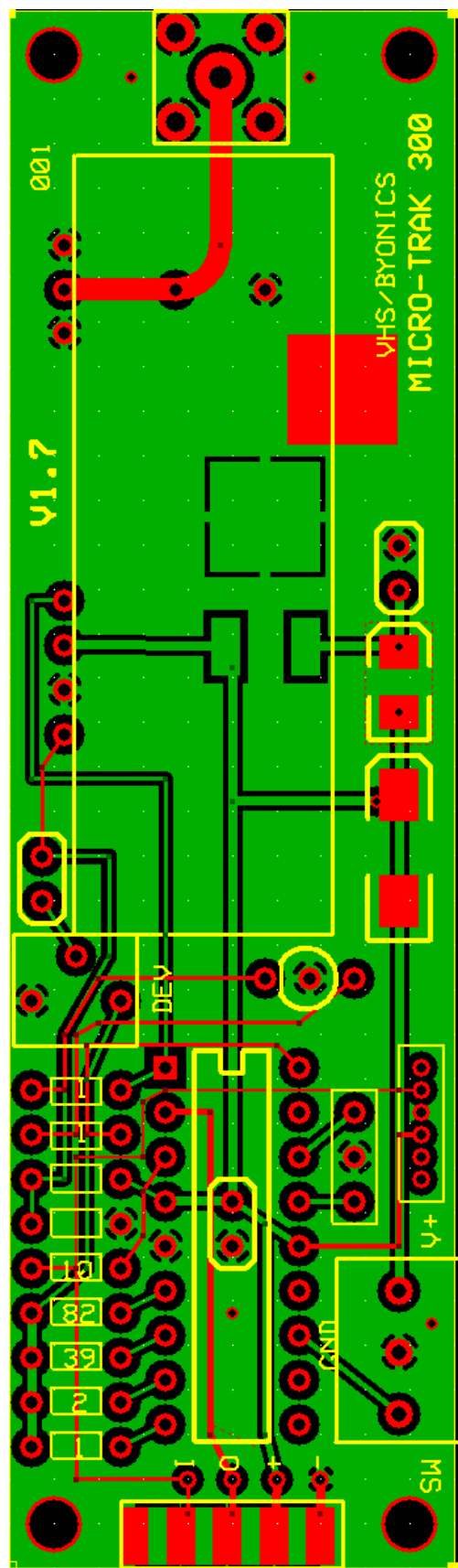
Operating temperature: -10°C to +60°C

Storage temperature: -30°C to +70°C

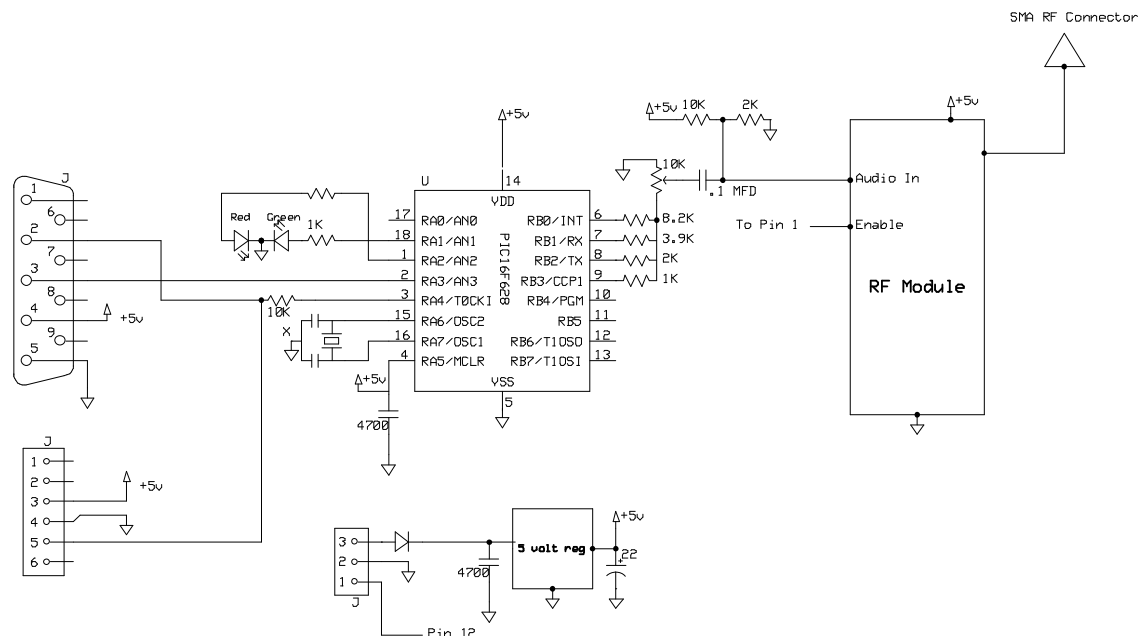
Electronic Characteristics

DC supply	9-15 VDC
TX Supply current	180 mA
RF Power Output	+25.7 dBm (max)
Spurious emissions	-40 dBm
FM Deviation	3.5 kHz (Peak)
RF Center Frequency	144.390 /144.800 MHZ
Modulation bandwidth @ -3dB	3 KHz
TX select to full RF	<5 ms

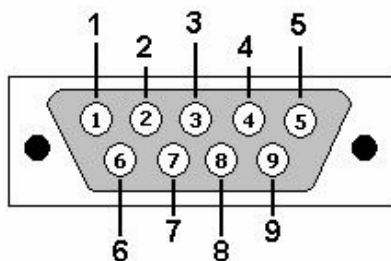
Printed Circuit Board Layout



Schematic



VHS		
MT-300 V 1.7		
A.R. Lord	Rev 1.0	1 of 1
	06/24/2010	



DB9: View looking into male connector

Pin No.	Dir	Notes/Description
1	-	No Connection
2	IN	Serial Input - From GPS RS-232 TX or PC
3	OUT	Serial Output - (Only used during programming)
4	OUT	+5 volts output to power GPS
5	OUT	Ground

Configuration

Complete details about the functions of each programmable feature of the TT3 chip may be viewed in the TT3 manual, available for download from www.byonics.com. In order to program the Micro-Trak, you will have to connect the device to a serial port on an IBM PC compatible computer. This is accomplished with a serial null modem cable, which is wired oppositely to a GPS receiver. The Micro-Trak is designed primarily for operation with a GPS, so the adapter cable is required to allow communications with a PC.

Very few Personal Computers these days have actual DB-9, true serial ports. Instead, most have USB ports. This will require the use of a USB to serial converter. These vary widely in quality, but we have found that most name brand adapters will work fine. In some cases, your adapter may only allow you to write to the MT-300's memory, and not be able to read back for confirmation. You can verify that your PC can have at least a one-way conversation with the Micro-Trak by using the "Tone Test" buttons, located on the bottom, middle of the configuration screen. If you have connected your Micro-Trak correctly, have set the serial port setting to that of your USB to serial adapter or actual serial port, and of course, provided power to the Micro-Trak (required for programming) the red LED segment will light solidly when you click on any of the three tone "send" buttons. Don't send tones too long, especially if you are connected to an antenna instead of a dummy load. Even the 300 mW signal of the Micro-Trak can jam the local digipeaters if left on continuously.

Many of the functions shown on the configuration program will not have any importance for a Micro-Trak user. We recommend using the default settings as much as is possible. At a bare minimum, you will need to enter your call sign. The Configuration Program is set to send the automobile APRS icon as default. The APRS icon is set by choosing a "Symbol" and "Overlay" from a table of APRS icons. The symbol you actually see on WebPages like APRS.FI, or OPENAPRS.NET, are generated by their mapping programs, and only Icons supported by the APRS network are possible (You can't for instance, send your photo as an Icon)

Difficulties with programming generally are a result of your PC being unable to find your serial port USB adaptor. You can verify your communications port and the Micro-Trak's ability to send data to your PC by opening a terminal program and powering the Micro-Trak. It should respond with the name and version number of your chip. The terminal program should be sent to 480, N, 8 and 1. One serial program that I find particularly useful may be found here: <http://www.microridge.com/comtestserial.htm>

APRS Symbol Set

Primary Table /					Secondary Table \						
!		Police Stn	P		Police	!		Emergency	P		Parking
"		No Symbol	Q		TBD	"		No Symbol	Q		Quake
#		Digi	R		Rec Veh'le	#		No. Digi	R		Restaurant
\$		Phone	S		Shuttle	\$		Bank	S		Sat/Pacsat
%		DX Cluster	T		SSTV	%		No Symbol	T		T'storm
&		HF Gateway	U		Bus	&		No. Diam'd	U		Sunny
'		Plane sm	V		ATV	'		Crash site	V		VORTAC
(		Mob Sat Stn	W		WX Service	(		Cloudy	W		No. WXS
)		WheelChair	X		Helo	)		MEO	X		Pharmacy
*		Snowmobile	Y		Yacht	*		Snow	Y		No Symbol
+		Red Cross	Z		WinAPRS	+		Church	Z		No Symbol
,		Boy Scout	[		Jogger	,		Girl Scout	[		Wall Cloud
-		Home	\		Triangle	-		Home (HF)	\		No Symbol
.		X	]		PBBS	.		UnknownPos	]		No Symbol
/		Red Dot	^		Plane lrg	/		Destination	^		No. Plane
0		Circle (0)	`		WX Station	0		No. Circle	`		No. WX Stn
1		Circle (1)	~		Dish Ant.	1		No Symbol	~		Rain
2		Circle (2)	a		Ambulance	2		No Symbol	a		No. Diamond
3		Circle (3)	b		Bike	3		No Symbol	b		Dust blwng
4		Circle (4)	c		ICP	4		No Symbol	c		No. CivDef
5		Circle (5)	d		Fire Station	5		No Symbol	d		DX Spot
6		Circle (6)	e		Horse	6		No Symbol	e		Sleet
7		Circle (7)	f		Fire Truck	7		No Symbol	f		Funnel Cld
8		Circle (8)	g		Glider	8		No Symbol	g		Gale
9		Circle (9)	h		Hospital	9		Petrol Stn	h		HAM store
:		Fire	i		IOTA	:		Hail	i		No. Blk Box
;		Campground	j		Jeep	;		Park	j		WorkZone
<		Motorcycle	k		Truck	<		Gale Fl	k		SUV
=		Rail Eng.	l		Laptop	=		No Symbol	l		Area Locns
>		Car	m		Mic-E Rptr	>		No. Car	m		Milepost
?		File svr	n		Node	?		Info Kiosk	n		No. Triang
@		HC Future	o		EOC	@		Hurricane	o		Circle sm
A		Aid Stn	p		Rover	A		No. Box	p		Part Cloud
B		BBS	q		Grid squ.	B		Snow blwng	q		No Symbol
C		Canoe	r		Antenna	C		Coast G'rd	r		Restrooms
D		No Symbol	s		Power Boat	D		Drizzle	s		No. Boat
E		Eyeball	t		Truck Stop	E		Smoke	t		Tornado
F		Tractor	u		Truck 18wh	F		Fr'ze Rain	u		No. Truck
G		Grid Squ.	v		Van	G		Snow Shwr	v		No. Van
H		Hotel	w		Water Stn	H		Haze	w		Flooding
I		Tcp/ip	x		XAPRS	I		Rain Shwr	x		No Symbol
J		No Symbol	y		Yagi	J		Lightning	y		Sky Warn
K		School	z		Shelter	K		Kenwood	z		No. Shelter
L		Usr Log-ON	{		No Symbol	L		Lighthouse	{		Fog
M		MacAPRS			TNC Stream Sw	M		No Symbol			TNC Stream SW
N		NTS Stn	}		No Symbol	N		Nav Buoy	}		No Symbol
O		Balloon	~		TNC Stream Sw	O		Rocket	~		TNC Stream SW

