AUTOMATIC PACKET REPORTING SYSTEM

The APRS is a system for automatically reporting the position of properly equipped amateur radio stations via a network of digital radio repeaters separate from the voice radio repeaters and with connection to the internet for world wide tracking. It is sometimes also known as the Automatic Position Reporting System. For public service and disaster communications it is particularly important in the tracking of key ham radio resources such as safety and support vehicles for long distance bike rides and disaster assessment vehicles in the aftermath of a disaster.

For more information go to:
https://en.wikipedia.org/wiki/Automatic_Packet_Reporting_System or
http://www.aprs.org/

Each station being tracked must have a radio transceiver operating on 144.390 MHz simplex and a suitably configured tracking message generator connected to a GPS receiver. The radio transceiver may be an older model with minimal memory and perhaps not even a tone generator but requiring an external message generator and a GPS receiver or may be a modern transceiver incorporating all the essentials within a single package.

In most public service or disaster communications events, a net control station will be designated and will be equipped with a small computer for tracking the other stations in addition to a voice or data transmission capability using radio. If connection to the internet is possible at the net control location, maps with station positions indicated may be viewed by going to www.aprs.fi and entering the call signs of at least one of the station to be tracked. By selecting “Show All”, all the stations in the vicinity (loosely defined) can be viewed including all the involved digital repeater stations. This is an excellent resource for this purpose with Google maps including, if desired, a satellite view and even a street view from Google Earth.

If an internet connection is not present at the net control location, APRS signals can be received directly on a separate radio from the voice radio or even on the data side of a dual band/dual receiver transceiver. The signals involved are 1200 Baud AFSK signals so a packet terminal node controller (TNC) may be required. Some computer sound card packet TNC simulators may be used with some of the APRS receiving computer programs.

Without a hardware TNC, software TNCs can be used. Go to
https://www.sv2agw.com/downloads/ and look for the APRS AGW Tracker for more information. Some experimentation will be required to get the signal levels correct.

With the use of a “smart” phone app called APRSdroid and suitable wiring, even a hand held transceiver can be used as a APRS transceiver. Sorry I don’t believe that there is a similar app for the iPhone. A specialized cable to connect the phone audio circuits to the HT audio circuits must be constructed or purchased.

The Android APRSdroid app can even use the cell phone network to transmit position reports and other data without using ham radio frequencies at all. I do not know of an iPhone App that will do that but then I am not an iPhone user.

Transceiver Requirements

The radio transceiver used for transmitting may be a very simple one lacking all the modern refinements such a multiple memories, frequency scanning, tone transmission, etc.. What is needed is a way to connect to the receive audio before the volume control and to the transmit audio after the microphone pre-amplifier and a suitable connection to exercise the transmit function. This is the same connection used for other packet operations. Some transceivers (particularly dual band models) have a packet radio connector that looks like a PS/2 mouse or keyboard connector. This makes connection easy – other models may require digging into the innards to find the appropriate connection points. Suitable cables may be required to be fabricated.

Some operators may find it useful to use a manufactured radio interface such as a Rig Blaster or a Signal Link, etc.

As stated above, the transceiver operates on 144.390 MHz simplex with no tone required. An operating receiver with a squelch control is required to prevent transmissions at the same time that there are other transmissions present. Most transmissions are less than a second or two in duration and usually not more than once or two per minute.

Transmitter power level may be surprisingly low depending on the geographical area. Some hams are even successful using an HT with a vehicle roof magnetic mount antenna for this service. This may not be successful in the more remote areas.

The receiver used for direct RF reception may even be just a receiver tuned to 144.390 with a suitable audio output to be sent to a hardware or software TNC. This would not be required if the net control computer can be connected to the internet and viewing the results on www.aprs.fi. As noted above even a hand held transceiver using the APRSdroid app may be used to receive the transmissions directly although the screen size on a typical phone may be difficult to interpret..

APRS Message Generator

The message generator is commonly called a “tracker”. Some transceivers have this built in. Many will require an external device. One common device is the TinyTrack 3Plus or TinyTrack 4 from Byonics. (www.byonics.com). Features and cost vary. These can be purchased as a kit to be assembled and soldered or completely assembled and tested. A very small surface mount version is also available as is a combined tracker and portable radio. The standard units can be purchased with a compatible GPS receiver complete in a magnetic mount “hockey puck” antenna with a cable to the tracker.

Programming for these trackers is performed with common Windows, Linux, or MAC computers using a null modem cable to a RS-232 COM port and a power feed. Computers with only USB ports will need a USB to RS-232 converter.

Programming includes entering call sign to be transmitted, any status message desired, time or distance traveled to send a message, and some other common parameters. You may wish to download the manual from www.byonics.com for more information.

As noted above the APRSdroid app may serve as this tracker using even a hand held transceiver or the cell phone system for this function.

Transceivers with the APRS Function built in

A few transceivers may have the APRS function built it. These include:
Kenwood TM-D710GA mobile transceiver
Kenwood TH-D72A, D73A, D74A, or D75A Hand held transceivers
Yaesu FTM-300D, 400D, or 500D mobile transceivers (Fusion C4FM)
Yaesu FT-3DR, FT-4DR, or FT-5DR Hand held transceivers

Icom D-STAR radios have a GPS sending mode known as D-PRS which is not directably compatible with APRS but can be modified. See here for information: https://www.aprs-is.net/dprs.aspx

Applications

For any of the long distance fund raising bike rides for which McARCS provides communications, it is recommended that all SAG vehicles be equipped with a suitable APRS installation. In this way, the net control station can instantly determine which SAG vehicle is nearest to a reported incident requiring a response.

For any disaster incident that McARCS operators may dispatched to report on conditions, each vehicle dispatched should be equipped with an APRS installation for positive indication of their location.

If you are going on a long trip, you may wish to tell your family to track your progress on www.aprs.fi. If they click on “Track in Street View” they may even get a look at what you are seeing – less current traffic and weather of course.

If your vehicle get stolen and you have an operating APRS installation on board, you may be able to tell where it is and can report that location to the police or highway patrol.

If you lend your vehicle to a friend or family member and you have an operating APRS installation on board, you may be able to track their location and speed of travel.

If you spouse is overdue from arriving and his (or her) vehicle is equipped with an APRS installation, you may be able to locate your spouse’s vehicle.

Other Tips

Because it may take some time for the GPS receiver to lock on to the satellites, for a mobile application you may wish to separate the power feed from the vehicle to the GPS receiver/tracker and to the transceiver and keep the GPS receiver and tracker on at all times and only enable the transceiver when the vehicle ignition switch is on. This will provide a near instant report upon vehicle movement with proper programming.

In order to enable a beacon report after the vehicle stops, you may wish to build or purchase a circuit that keeps the transceiver enabled for perhaps 10 to 20 minutes after the ignition switch is turned off.

When operating as a mobile tracking device using RF transmissions, the unit should be identified as CALLSIGN-9 with an icon selected from the selection guide. When operating as a Internet connected device using the cell phone system, the device should be identified as CALLSIGN-5 with a phone icon.

Operating a hand held transceiver should be identified as CALLSIGN-7 but you might also be located in a vehicle so the icon selected might be of a vehicle.

A complete listing of the Call Sign Signal Identification codes can be found here: http://www.aprs.org/aprs11/SSIDs.txt Pick the one that best identifies your station,

A complete display of the associated icons that may be displayed on the www.aprs.fi screen can be found here: https://blog.thelifeofkenneth.com/2017/01/aprs-symbol-look-up-table.html

If you are walking or running, you might want to use /[If you are on a motor cycle you might want to use /< or if you are on a bicycle you may want to use /b. If you are on a horse you might want to use /e

If you are in any kind of motorized vehicle, pick the symbol that best identified that vehicle. You may wish to further identify your station with a brief phrase.