***‘V’ Command used in Service Programming Track Mode*** Draft #3 April 23, 2021  
  
Verify ‘V’ Command is a new design feature in DCC++EX v3.1 and it will significantly speed up CV reads & verification if the expected value is previously known by ‘guessing’ it is still the same value currently stored in the roster. Thereby speeding up the Command Station responses and enhancing third party Controllers like JMRI Decoder Pro functionality, performance & speed.  
  
The V command can also be used directly through either the Arduino IDE Serial Monitor or the Decoder Pro Send DCC++ Command panel.  
  
Command Structure;  
V Command is <V cv value> for Byte verify, or <V cv bit 0|1> for Bit verify if it is a 1 or a 0.  
<V 1 3> Guess that CV 1 was a 3, and station acknowledges quicker.   
  
If the value given matches the CV, then the -r return is much faster. If however, it does not match, then the CV is read normally for a very small overhead compared with original <R> read command.  
  
Where it’s most commonly used;  
‘V’ Verify feature is automatically combined with and utilizes JMRI Decoder Pro saved “Roster” engine information when checking through a list of CVs while Programming in Service mode on the Programming track.  
In combining the two product features, a Read or Compare Full sheet in Decoder Pro and can perform up to ten times faster with DCC++EX v3.1 and JMRI 2.23.3 or greater.   
  
Sample Speed Comparison of JMRI Decoder Pro and DCC++ Classic vs DCC++EX with new V Command  
  
 Function Speed Sound Compare Approx.  
 Decoder Loco# Basic Map Table Levels Full Sheet # of CV’s  
 Classic Tsunami Sound Steam 1225 0.12.0 0.19.8 0.41.6 0.9.2 2.07.0 109+ CVs  
 EX Tsunami Sound Steam 1225 0.1.2 0.1.6 0.3.6 0.0.9 0.18.8 109+ CVs   
  
Don’t blink, I’m not kidding. Guaranteed to bring a smile to your face or your money back.   
V for Victory!  
  
New JOIN Command & Logic Programming Protection;  
By using the new <1 JOIN> command and activating an insulated programming track spur or siding with dual plastic joiners as a main line you automatically combine the benefits of V verify & speed with Operations mode but with a failsafe of insuring only programming One engine at a time.  
  
If you inadvertently touch or send any Programming command while an Engine is sitting on the PROG track when it's active as a [JOIN] Main line track, the DCC++EX software Automatically kicks back to Program Track Mode before accepting any other commands as safety procedure. Such as <R> read or any Prog track command such as Program off <0 PROG>.  
  
The prog track does not need to be visually on or have LEDs lit for the Prog track commands to work. If you issue any prog command while it's off, the CS will power it on for the duration of the command and then power it down again with the motor shield LEDs turned off.  
  
Audible Sound Confirmation;  
There’s an Additional Benefit when combining the new ‘JOIN’ command while Programming in ‘Service mode’ on the Prog Track. You can now Listen to the changes you make when programming a sound decoder on a Prog track. First make your CV sound change and then test it by sending <1 JOIN> command then pressing a throttle function F1, F2 keys.   
Previously your engine would remain Silent when making sound changes on the Prog Track, but could only be heard if you moved it to or made those changes to a specified Loco# in ‘Operations mode’ programming on the Main line track. Now it can whistle and bell clang on both the Prog & Main thanks to ‘JOIN’.

*Precaution Wiring Prog & Main;*   
Please be sure ‘Both’ Programming Track rails are Insulated with dual plastic joiners from the Main line rails and that both the wiring for CAB A Main and CAB B Prog positive leads are in sync with the right rail and the negative leads are in sync on the other rail. Or else undesirable gremlins may appear, you’ve been forewarned. The proceeding is a public service announcement and the DCC++EX team makes no expressed or implied guarantees if the user fails his or her due diligence.

***Engine Drivers New Enhanced Feature ‘Request Loco ID’ & “Drive Away’ with DCC++ EX*** Draft #3 Apr 20, 2021  
  
The Android Engine Driver v 2.29.126 App directly connected to a DCC++EX v3.1 Standalone WiFi Command Station allows a user to place a Loco on a Programming track spur {insulated from the Main line track} then Request Loco ID, acquire the Loco# and automatically load it into the Engine Driver Throttle, then you just Drive Away onto the Main line track.   
  
Where it’s used;  
DCC++EX WiFi Command Station in Standalone Operations mode Directly connected with Engine Driver WiFi Throttles utilizing the new Standalone WiThrottle Server feature imbedded in DCC++EX.

Used when a Mega DCC++EX CS is set up WiFi enabled in either Access Point AP mode or Station STA (client) mode in a Standalone Operations configuration, that is, Without the use of a third party software controller like JMRI or Rocrail.   
  
How it works;  
DCC++EX has a new software implementation version that in a sense replaces a hardwired DPDT switch and combines two DCC++ commands in a sequence to perform the magic dubbed 'Drive Away'.  
  
When Engine Driver App is Directly connected to the DCC++EX Command Stations IP address: port#, a new enhancement “Request Loco ID” radio dial appears and is selected to trigger a read, acquire and load Loco# and join the Prog track to the Main line.  
  
Place a DCC Engine on an insulated Programming track while it is on or Active, and the Program track is setup as spur or siding connected with dual plastic joiners to the Main layout track.  
  
On Engine Driver WiFi throttle you touch Select Loco, then choose ‘Request Loco ID’ radio dial and press ‘Request Loco’ button. It triggers a <R> read the CV1 Short or CV 17 & 18 Long address then returns and automatically loads the Loco# into the throttle, the Command Station then automatically sets <1 JOIN> command to switch the PROG track to MAIN line and allows your Engine Driver Throttle to drive it away onto the main line. Place a second engine on the programming track and repeat the steps as many times as you would like.   
  
The Prog track does not need to be visually on or have LEDs lit for the Prog track commands to work. If you issue any prog command while it's off, the CS will power it on for the duration of the command and then power it down again with the motor shield LEDs turned off.  
  
Function Key layout;  
Because the Engine Driver throttle is directly connected to the Command Station any WiFi Throttle Function keys would be in ‘Default Mode’ and would load function names you have previously set up, and they would Not load the JMRI Roster or Rocrail function keys unless or until you switched your WiFi connection to the SSID that JMRI WiThrottle Server is set to and reconnected the new SSID IP: port # on your Engine Driver throttle to the JMRI WiThrottle Server.  
  
Logic Programming Protection;  
If you inadvertently touch or send any Programming command while an Engine is sitting on the PROG track when it's active as a [JOIN] Main line track, the DCC++EX software Automatically kicks back to Program Track Mode before accepting any other commands as safety procedure.   
  
Technical Code Feature In DCC++EX v3.1;  
The internal WiThrottle code in the Command Station accepts a special version of the acquire command M+ that causes the CS to query the loco on the prog track, join automatically and then reply exactly as if the throttle had asked to acquire that loco. This code feature is found in Withrottle.cpp, look for case '+': // add loco request.  
If you are implementing drive-away in a send< > command capable type throttle, you just need to first <R>, read the reply and then <1 JOIN>. No other commands are required!  
  
The motor shield LEDs on the Prog track will be lit or on when joined. If you want to have another LED lit to indicate join, then you could use the relay pin feature see DCC:SetJoinRelayPin to light up a third LED places on the layout.  
  
  
*Precaution Wiring Prog & Main;*   
Please be sure ‘Both’ Programming Track rails are Insulated with dual plastic joiners from the Main line rails and that both the wiring for CAB A Main and CAB B Prog positive leads are in sync with the right rail and the negative leads are in sync on the other rail. Or else undesirable gremlins may appear, you’ve been forewarned. The proceeding is a public service announcement and the DCC++EX team makes no expressed or implied guarantees if the user fails his or her due diligence.