**\*\* DRAFT \*\***

**Instructions for implementing communications between a Test stand Control and Data Acquisition System PC and Vision PC using the ASAP3 driver**

**Vision PC preparation**

* **Prepare Vision project file for ASAP3 communication (reference “ATI ASAP3 Implementation User Manual” chapter 2 page 9 for details).**
* **Configure network interface card with IP address 192.168.0.10 and Subnet Mask 255.255.255.0.**
* **Add TCP/IP communication port to your Vision tree.**
* **Right click TCP/IP communications port and add ASAP3 host. \*\*PCM must not be renamed once the ASAP3 host is defined\*\*.**
* **Must un-arm chart recorder in the utilized Vision project (duplicate data being requested on the CAN BUS is un-necessary and causes issue).**
* **We chose to set the refresh rate to 1x per second for data lists within the utilized Vision project (duplicate data being requested on the CAN BUS is un-necessary and causes issue).**

**Control and Data Acquisition (C&DA) hardware preparation:**

* **Ethernet is utilized for ASAP3 communication to the Vision PC. C&DA PC to Vision PC requires crossover cable. C&DA PC to Ethernet switch to Vision PC requires straight through cable.**
* **Private IP address range (192.168.x.x) is utilized for ASAP3 communication between C&DA host and Vision host.**
* **Configure network interface card with IP address 192.168.0.1 Subnet Mask 255.255.255.0.**

**Establishing Communications between the Control and Data Acquisition (C&DA) PC and the Vision PC via ASAP3:**

* **Laboratory-specific engine startup routine. If starting or resuming the main portion of the test, we establish the connectivity between the C&DA PC and the Vision PC as follows:**
	+ **Restart Driver:**
		- **Stop ASAP3 driver**
			* **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>** **DIE”**
		- **Start ASAP3 driver**
			* **For example a C&DA that supports mailslot messaging may use the following command structure: "\\.\mailslot\Softpanel>>$EXECUTE;Asap3Engine.exe $SUPPORTDIR\config.drv ASAP3\_Client1"**
	+ **Send INIT command three times (to clear any remnants of a previous communication session)**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>INIT”**
	+ **Prompt the operator to establish communication between Vision and the engine ECU.**
	+ **Ask operator if communication has been established (Yes or No).**
	+ **If Operator answers Yes, Restart ASAP3 driver:**
		- **Stop ASAP3 driver**
			* **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>** **DIE”**
		- **Start ASAP3 driver**
			* **For example a C&DA that supports mailslot messaging may use the following command structure: "\\.\mailslot\Softpanel>>$EXECUTE;Asap3Engine.exe $SUPPORTDIR\config.drv ASAP3\_Client1"**
	+ **Send INIT command three times to initiate ASAP3 communication with Vision host.**
	+ **Send IDENTIFY command**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>IDENTIFY 201 MTS”**
	+ **Send SELECT\_FILES command**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>SELECT\_FILES ? ?”**
	+ **Send “Switch off line” command by sending a “SWITCH\_ON\_LINE 0”**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>SWITCH\_ON\_LINE 0”**
	+ **Send a LOAD\_DAQ\_MAP**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>load\_map DacMapFilename” where DacMapFilename is the name of the DAQ map used in your system.**
	+ **Send a parameters for acquisition command**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>parameters\_for\_aquisition”**
	+ **Send “Switch online” command by sending a “SWITCH\_ON\_LINE”**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>SWITCH\_ON\_LINE 1”**
	+ **Send START\_SCANNING command**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>START\_SCANNING”**

**Terminating Control and Data Acquisition (C&DA) to Vision Communications via ASAP3:**

* + **One minute after start of engine cooldown we set parameters for the EGR and VGT flags to 0 (Off/False) so that engine ECU returns to default EGR (90 %) and VGT (58 %) setpoints.**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>SET\_PARAMETER egd\_EGR\_POS\_OVERRIDE\_ON\_FLAG 0”**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>SET\_PARAMETER vgtd\_FORCED\_POS\_FLAG 0”**
	+ **At engine shutdown, send STOP\_SCANNING command**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>STOP\_SCANNING”**
	+ **At engine shutdown, send stop ASAP3 driver**
		- **For example a C&DA that supports mailslot messaging may use the following command structure: “\\.\Mailslot\ASAP3\_Client1>>** **DIE”**
* **Appendix A**
	+ **Example of configuration parameters for ASAP3 driver**
		- **section,keyword,value,merge**
		- **ASAP3\_Client1,FULL\_ASAP3\_LENGTH,TRUE,0**
		- **ASAP3\_Client1,COMMAND\_STATUS,Asap3\_Command\_Status,0**
		- **ASAP3\_Client1,CONNECTION\_STATUS,Asap3\_Connection\_Status,0**
		- **ASAP3\_Client1,ENHANCED\_MODE,FALSE,0**
		- **ASAP3\_Client1,STATUS\_CHANNEL,Asap3Status,0**
		- **ASAP3\_Client1,SEND\_TIMEOUT,2000,0**
		- **ASAP3\_Client1,RECEIVE\_TIMEOUT,2000,0**
		- **ASAP3\_Client1,MAILSLOT\_NAME,\\.\mailslot\ASAP3\_Client1,0**
		- **ASAP3\_Client1,MODE,CLIENT,0**
		- **ASAP3\_Client1,SERVER\_IP\_ADDRESS,192.168.0.10,0**
		- **ASAP3\_Client1,DEVICE\_ID,5,0**
		- **ASAP3\_Client1,LOADABLE,PC,0**
		- **ASAP3\_Client1,SERIAL\_PARITY,NONE,0**
		- **ASAP3\_Client1,ETHERNET\_PORT,22222,0**
		- **ASAP3\_Client1,SERIAL\_BITS,8,0**
		- **ASAP3\_Client1,ETHERNET\_INET,192.168.0.1,0**
		- **ASAP3\_Client1,SERIAL\_BAUD,19200,0**
		- **ASAP3\_Client1,ETHERNET\_GW,192.168.0.10,0**
		- **ASAP3\_Client1,GPIB\_ADDR,2,0**
		- **ASAP3\_Client1,SERIAL\_PORT,7,0**
		- **ASAP3\_Client1,COMM,ETHERNET,0**
		- **ASAP3\_Client1,SECURITY\_KEY,?,0**
		- **ASAP3\_Client1,DRIVER NAME,ASAP3\_Client1,0**
		- **ASAP3\_Client1,LOAD FILE,asap3engine.exe,0**
		- **ASAP3\_Client1,ENABLED,ENABLED,0**
		- **ASAP3\_Client1,ENHANCED\_SCAN\_MODE,FALSE,0**
	+ **Example of Vision parameters mapping to C&DA**
		- **[MapType]**
		- **Type=ASAP**
		- **\***
		- **\* Up to 40 is recommended limit. Count is the last item number to include**
		- **\***
		- **[Data]**
		- **header=local,remote,type,rate,uom**
		- **\*count=40 MAX**
		- **count=23**
		- **entry\_1=ECU001,bfp\_AFR,get,1000,ratio**
		- **entry\_2=ECU002,bfp\_TotAirMassFlow,get,1000,kg/s**
		- **entry\_3=ECU003,em\_FuelAngle,get,1000,edeg**
		- **entry\_4=ECU004,em\_FuelValue,get,1000,mg/str**
		- **entry\_5=ECU005,emf\_EgrMassFlowValidated,get,1000,kg/s**
		- **entry\_6=ECU006,lac\_EstimEgrPos,get,1000,%**
		- **entry\_7=ECU007,nop\_Angle,get,1000,edeg**
		- **entry\_8=ECU008,pd\_PedalPos,get,1000,%**
		- **entry\_9=ECU009,se\_EgrDiffPres,get,1000,no unit**
		- **entry\_10=ECU010,se\_EgrTemp,get,1000,no unit**
		- **entry\_11=ECU011,tc\_IndTrqValue,get,1000,Nm**
		- **entry\_12=ECU012,tm\_AdvAng,get,1000,edeg**
		- **entry\_13=ECU013,vsra\_vgtPosSRA,get,1000,%**
		- **entry\_14=ECU014,aps\_engineSpeed,get,1000,rpm**
		- **entry\_15=ECU015,se\_AirInletTemp,get,1000,C**
		- **entry\_16=ECU016,se\_BoostTemp,get,1000,no unit**
		- **entry\_17=ECU017,se\_CoolantTemp,get,1000,no unit**
		- **entry\_18=ECU018,se\_BoostPres,get,1000,no unit**
		- **entry\_19=ECU019,se\_CrCasePres,get,1000,no unit**
		- **entry\_20=ECU020,se\_FuelPres,get,1000,no unit**
		- **entry\_21=ECU021,mfv\_ExhaustMassFlow,get,1000,kg/s**
		- **entry\_22=ECU022,se\_OilPres,get,1000,no unit**
		- **entry\_23=ECU023,se\_TurboSpd,get,1000,no unit**
		- **entry\_24=ECU024,**
		- **entry\_25=ECU025,**
		- **entry\_26=ECU026,**
		- **entry\_27=ECU027,**
		- **entry\_28=ECU028,**
		- **entry\_29=ECU029,**
		- **entry\_30=ECU030,**
		- **entry\_31=ECU031,**
		- **entry\_40=ECU040,se\_EngExhTemp,get,1000,C**

**Appendix B**

**Example of Successful C&DA PC to Vision PC Communications**



**Appendix C**

**Example of the ASAP3 driver initialization**

Here is a sample of what the communication looks like.

After some initial “hand shaking” between the CELL PC and ATI VISION the variables are specified by the CELL PC and then the CELL PC requests the DAQ values.

11/08/11 13:44:56  CMD: PARAMETER FOR VALUE ACQUISITION :  65535 500 0

11/08/11 13:44:56  ERR: PARAMETER FOR VALUE ACQUISITION: Status 0xffff: Error 3 "Context not initialized; must execute INIT first"

11/08/11 13:45:01  CMD: INIT

11/08/11 13:45:01  RSP: INIT

11/08/11 13:45:02  CMD: INIT

11/08/11 13:45:02  RSP: INIT

11/08/11 13:45:03  CMD: INIT

11/08/11 13:45:03  RSP: INIT

11/08/11 13:45:10  CMD: IDENTIFY :  0x201 "MTS"

11/08/11 13:45:10  RSP: IDENTIFY :  0x201 "ATI Vision"

11/08/11 13:45:16  CMD: SELECT DESCRIPTION FILE AND BINARY FILE :  "" "" 0

11/08/11 13:45:16  RSP: SELECT DESCRIPTION FILE AND BINARY FILE :  0

11/08/11 13:45:19  CMD: SWITCHING OFFLINE/ONLINE :  0

11/08/11 13:45:19  RSP: SWITCHING OFFLINE/ONLINE

11/08/11 13:45:22  CMD: PARAMETER FOR VALUE ACQUISITION :  0 500 0

11/08/11 13:45:22  RSP: PARAMETER FOR VALUE ACQUISITION

11/08/11 13:45:22  CMD: PARAMETER FOR VALUE ACQUISITION :  0 1000 38 "APS\_EngineSpeed\_TS" "EGR1\_egc\_CalibPos" "atas\_RequestCoolTempFiltEng" "atns\_BufferControlSignal" "atns\_UreaMassFlowDemand" "atts\_TmScrTempAvg" "bfd\_NOxFeedback" "bfp\_AFR" "bfp\_BurnedAirFrac" "bfd\_BurnedFracDemand" "edpc\_EGRDiffPres" "egb\_EgrBaseMode" "em\_FuelAngle" "em\_FuelValue" "mfv\_AirMassFlowValidated" "mfv\_EgrMassFlowValidated" "mfv\_ExhaustMassFlow" "mse\_DynStatPerc" "nfv\_NoxConversion" "nop\_Angle" "pd\_PedalPos" "se\_BoostPres" "se\_BoostTemp" "se\_CoolantTemp" "se\_DpfTemp" "se\_EgrTemp" "se\_EngExhTemp" "se\_HCHeatTemp" "se\_NOx2Level" "se\_NOxLevel" "se\_TurboSpd" "sl\_AFRLimValue" "tc\_EngineTrqMode" "tc\_IndTrqValue" "tm\_AdvAng" "vgtac\_VgtControlMode" "vgtd\_BFracControlSignal" "vsra\_VgtPosSRA"

11/08/11 13:45:23  RSP: PARAMETER FOR VALUE ACQUISITION

11/08/11 13:45:26  CMD: PARAMETER FOR VALUE ACQUISITION :  0 500 38 "APS\_EngineSpeed\_TS" "EGR1\_egc\_CalibPos" "atas\_RequestCoolTempFiltEng" "atns\_BufferControlSignal" "atns\_UreaMassFlowDemand" "atts\_TmScrTempAvg" "bfd\_NOxFeedback" "bfp\_AFR" "bfp\_BurnedAirFrac" "bfd\_BurnedFracDemand" "edpc\_EGRDiffPres" "egb\_EgrBaseMode" "em\_FuelAngle" "em\_FuelValue" "mfv\_AirMassFlowValidated" "mfv\_EgrMassFlowValidated" "mfv\_ExhaustMassFlow" "mse\_DynStatPerc" "nfv\_NoxConversion" "nop\_Angle" "pd\_PedalPos" "se\_BoostPres" "se\_BoostTemp" "se\_CoolantTemp" "se\_DpfTemp" "se\_EgrTemp" "se\_EngExhTemp" "se\_HCHeatTemp" "se\_NOx2Level" "se\_NOxLevel" "se\_TurboSpd" "sl\_AFRLimValue" "tc\_EngineTrqMode" "tc\_IndTrqValue" "tm\_AdvAng" "vgtac\_VgtControlMode" "vgtd\_BFracControlSignal" "vsra\_VgtPosSRA"

11/08/11 13:45:27  RSP: PARAMETER FOR VALUE ACQUISITION

11/08/11 13:45:30  CMD: SWITCHING OFFLINE/ONLINE :  1

11/08/11 13:45:30  RSP: SWITCHING OFFLINE/ONLINE

11/08/11 13:45:35  CMD: SWITCHING OFFLINE/ONLINE :  1

11/08/11 13:45:35  RSP: SWITCHING OFFLINE/ONLINE

11/08/11 13:45:35  CMD: GET ONLINE VALUE

11/08/11 13:45:35  RSP: GET ONLINE VALUE :  76 1058.252807617187500 29.980491638183594 63.817382812500000 1.000000000000000 0.000000000000000 150.260940551757810 0.000000000000000 150.000000000000000 0.000000000000000 5.455399990081787 1.906871557235718 1.000000000000000 0.000000000000000 0.000000000000000 0.080036923289299 0.036245189607143 0.085451416671276 0.000000000000000 1.000000000000000 0.000000000000000 0.000000000000000 105.261238098144530 43.745887756347656 78.690734863281250 90.625000000000000 74.918663024902344 63.437500000000000 77.218750000000000 0.000000000000000 0.000000000000000 27294.511718750000000 21.500000000000000 0.000000000000000 0.000000000000000 6.000000000000000 1.000000000000000 0.000000000000000 31.699996948242187 1058.252807617187500 29.980491638183594 63.817382812500000 1.000000000000000 0.000000000000000 150.260940551757810 0.000000000000000 150.000000000000000 0.000000000000000 5.455399990081787 1.906871557235718 1.000000000000000 0.000000000000000 0.000000000000000 0.080036923289299 0.036245189607143 0.085451416671276 0.000000000000000 1.000000000000000 0.000000000000000 0.000000000000000 105.261238098144530 43.745887756347656 78.690734863281250 90.625000000000000 74.918663024902344 63.437500000000000 77.218750000000000 0.000000000000000 0.000000000000000 27294.511718750000000 21.500000000000000 0.000000000000000 0.000000000000000 6.000000000000000 1.000000000000000 0.000000000000000 31.699996948242187

11/08/11 13:45:35  CMD: GET ONLINE VALUE

11/08/11 13:45:35  RSP: GET ONLINE VALUE :  76 1058.252807617187500 29.980491638183594 63.817382812500000 1.000000000000000 0.000000000000000 150.260940551757810 0.000000000000000 150.000000000000000 0.000000000000000 5.455399990081787 1.906871557235718 1.000000000000000 0.000000000000000 0.000000000000000 0.080036923289299 0.036245189607143 0.085451416671276 0.000000000000000 1.000000000000000 0.000000000000000 0.000000000000000 105.261238098144530 43.745887756347656 78.690734863281250 90.625000000000000 74.918663024902344 63.437500000000000 77.218750000000000 0.000000000000000 0.000000000000000 27294.511718750000000 21.500000000000000 0.000000000000000 0.000000000000000 6.000000000000000 1.000000000000000 0.000000000000000 31.699996948242187 1058.252807617187500 29.980491638183594 63.817382812500000 1.000000000000000 0.000000000000000 150.260940551757810 0.000000000000000 150.000000000000000 0.000000000000000 5.455399990081787 1.906871557235718 1.000000000000000 0.000000000000000 0.000000000000000 0.080036923289299 0.036245189607143 0.085451416671276 0.000000000000000 1.000000000000000 0.000000000000000 0.000000000000000 105.261238098144530 43.745887756347656 78.690734863281250 90.625000000000000 74.918663024902344 63.437500000000000 77.218750000000000 0.000000000000000 0.000000000000000 27294.511718750000000 21.500000000000000 0.000000000000000 0.000000000000000 6.000000000000000 1.000000000000000 0.000000000000000 31.699996948242187

11/08/11 13:45:35  CMD: GET ONLINE VALUE

11/08/11 13:45:35  RSP: GET ONLINE VALUE :  76 1058.981201171875000 29.980491638183594 63.819862365722656 1.000000000000000 0.000000000000000 150.193099975585940 0.000000000000000 150.000000000000000 0.000000000000000 5.455399990081787 1.903066992759705 1.000000000000000 0.000000000000000 0.000000000000000 0.079999715089798 0.036231908947229 0.085177034139633 0.000000000000000 1.000000000000000 0.000000000000000 0.000000000000000 105.535896301269530 43.752933502197266 78.688446044921875 90.687500000000000 74.930152893066406 63.437500000000000 77.218750000000000 0.000000000000000 0.000000000000000 27293.365234375000000 21.500000000000000 0.000000000000000 0.000000000000000 6.000000000000000 1.000000000000000 0.000000000000000 31.699996948242187 1058.981201171875000 29.980491638183594 63.819862365722656 1.000000000000000 0.000000000000000 150.193099975585940 0.000000000000000 150.000000000000000 0.000000000000000 5.455399990081787 1.903066992759705 1.000000000000000 0.000000000000000 0.000000000000000 0.079999715089798 0.036231908947229 0.085177034139633 0.000000000000000 1.000000000000000 0.000000000000000 0.000000000000000 105.535896301269530 43.752933502197266 78.688446044921875 90.687500000000000 74.930152893066406 63.437500000000000 77.218750000000000 0.000000000000000 0.000000000000000 27293.365234375000000 21.500000000000000 0.000000000000000 0.000000000000000 6.000000000000000 1.000000000000000 0.000000000000000 31.699996948242187