



## REMOTE SOLUTION FOR AUTOMOBILE AIR CONDITIONING PERFORMANCE TEST

DATA TAKER Dt80 RECORDS TEMPERATURE, VOLTAGE, CURRENT, PRESSURE & SPEED

Malaysian automobile manufacturer [Proton](#) needed to perform the air conditioning performance test of a newly developed A/C system installed in their Proton Persona 1.6 MT-Line test car. During these rigorous tests, performance was monitored under several different test patterns measuring such factors as ambient temperatures and pressure. Some of these A/C performance tests were conducted in a specialized climactic test chamber and others on test courses or in special conditions. For example, cool down performance measured how effectively the newly-designed system could cool the car's cabin from extremely hot conditions including parking in the sun on a hot day. Idling performance tests checked the air conditioning unit's performance while the car was idling for long periods of time. Traffic jam tests checked the A/C unit's effectiveness on the test course while the car was driven during heavy traffic conditions. Other tests such as engine cooling, high-speed runs and hill climbing were scheduled to provide enough data to give engineers a complete picture of the A/C system's effectiveness. Proton's automotive engineers began searching for a flexible data logging solution for use in test setups to measure the temperature at multiple points on the test car to verify the effectiveness of the air conditioner's performance and ensure that it worked within design requirements. The air conditioning performance test equipment also needed to measure the pressure of the air conditioning system cycle, the blower, radiator fan, compressor, and magnetic clutch voltage. Since frequent access to the logger wasn't practical, the required device had to be a remote solution with a modem to access data on demand and send results from the field to engineers in the automotive plant.





## INSTALLATION

Proton engineers installed a [dataTaker DT80M Intelligent Universal Input Data Logger](#) inside the trunk of the Persona test vehicle. The DT80M was then interfaced with 4 dataTaker CEM 20 Expansion Modules to expand the data logger's channel capacity to accommodate the 128 thermocouple inputs needed for the tests. This stand-alone device measures all common thermocouple types to allow use of a sensor that most closely matched the temperature range being measured. During each test, the DT80M recorded temperature at all of the different points of the test car including the AC compressor, condenser and evaporator coils, inside the cabin, on the engine and exhaust system and outside the car. In addition it was used to capture other readings from the A/C system itself, including voltage, current, and refrigerant pressure at different points on the high and low side of the system. Engine speed measurement (rpm) was done using the DT80M's digital pulse counter connected to a magnetic pickup sensor on the flywheel. The logger features  $\pm 30\text{Vdc}$  input measurement range at 18-bit resolution for accurate measurements without additional signal conditioning. The DT80M offers a broad operating temperature range of  $-45^\circ\text{C}$  to  $70^\circ\text{C}$  ( $-49^\circ\text{F}$  to  $158^\circ\text{F}$ ) allowing operation across a wide range of test climates. All measurements were stored on the data logger's memory which holds up to 10 million data points. The DT80M has extensive internal math, statistical and alarm capabilities allowing functions like direct calculation of air conditioning temperature differentials between the various points right in the logger.



## USAGE

The DT80M data logger and its CEM expansion modules made for compact and low-power solutions in the small space of the test car, and their robust construction protected them against frequent jostling on the test course. Additionally, the DT80M's sophisticated communications allowed connections to a PC from the test car locally using its Ethernet and USB ports, or remotely using the built-in 3G cellular modem. Test engineers created a schedule to automatically upload recorded data via the modem to their server every day. In case of a critical malfunction, the modem was also capable of sending alarm messages via SMS for immediate notification. The DT80M's USB memory stick slot allowed local data collection for quick tests in the field, without the need for a PC to offload data. It utilizes a user-friendly software package called dEX which is built into the logger to enable quick setup and configuration directly using a standard web browser, and also allowed live data to be viewed during the installation and initial checkout.





## BENEFITS

The Proton plant's test program immediately benefitted from installing the dataTaker DT80M data logger and its CEM20 expansion modules to gather data for their air conditioning performance tests in several key ways. The DT80M accepted most types of thermocouples, and the CEM20 provided a convenient, very cost-effective method of expanding the DT80M's channels to carry out the many temperature measurements required as part of the testing. Most importantly, the flexibility of the DT80M handled all the different types of logging needed, monitoring pressure, ambient temperature, voltage, and rpm measurements. The data logger also served as a total remote monitoring solution, giving engineers the data they needed by remotely uploading via FTP and providing critical alarm notifications through SMS messaging.

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For further information on the [dataTaker DT80 Intelligent Data Logger](#), air conditioning performance testing, or to find the ideal solution for your application-specific needs, contact a CAS Data Logger Application Specialist at **(800) 956-4437** or [www.DataLoggerInc.com](http://www.DataLoggerInc.com).