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Bringing Glass Cockpit Training to Aircraft Maintenance Technician Courses

Keven R. Mitchell
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INTRODUCTION

Aeronautical technology advanced in General Aviation (GA) in the past two decades to three dimensional (3D) "virtual reality" touch screen displays. Prior to this technology leap, an average GA aircraft was equipped with a standard six-pack configuration of vacuum driven analog flight displays. The aircraft's avionics systems typically consisted of two Very High Frequency (VHF) communication radios, and two VHF Omnidirectional Radio Range (VOR) and Instrument Landing System (ILS) navigation radios, typically accompanied by two additional navigational aids; Automatic Direction Finder (ADF) and Distance Measuring Equipment (DME). A mode "C" pressure altitude reporting transponder was the latest advancement in use to help air traffic controllers to identify the aircraft and to maintain aircraft separation in flight. If it was a well-equipped aircraft a person might marvel at finding a Long Range Navigation System (Loran), using low frequency radio transmitters.

As "Solid State" transistors has transformed tube based avionic systems with improved reliability and amazing reductions in size, weight, and power consumption, so too has digital electronics transformed avionic systems. Advances in today's new GA aircraft can only be described as breathtaking. GA aircraft today typically roll off the production line equipped with "glass cockpits" featuring dual Global Positioning Systems (GPS), dual radios and navigation systems, complete with XM satellite weather, active traffic systems displaying real time traffic with announced audio conflicts. Systems are controlled and displayed with multiple large Liquid Crystal Display (LCD) screens integrating color moving maps with artificial 3D terrain along with navigation flight plan with weather overlade for advanced situational awareness. Additionally, today's aircraft are all digitally integrated using data bus management systems for communications. Digital integration enables systems, such as the autopilot, to access flight plans stored in Flight Management Systems (FMS).

With FMS information, coupled with the latest in Attitude Heading Reference Systems and Air Data Computers, the autopilot has once again redefined its role in GA aircraft. The autopilot now has the ability to track GPS course data enabling the aircraft to fly multi-leg flight plans. Aircraft flown with autopilots now arrive at the pre-programmed destinations, fly any required procedural turns, and make approaches down to decision height altitude, all the while as aircrews monitor flight conditions and to initiate inputs as directed from air traffic control. The ATC radar transponders found onboard today's aircraft are equipped with mode S capability, and now respond individually to ATC request with 24-bit address identifying call sign, aircraft beacon code, aircraft class, altitude and groundspeed.

No longer are LORAN systems used for navigation and eventually VOR systems are to be phased out, to be replaced as part of the FAA's strategic plans to transition to satellite navigation (Federal Aviation Administration [FAA], 2011b). Approaches using Instrument landing systems (ILS) are replaceable today with Localizer Performance with Vertical guidance (LPV) procedures using WAAS enhanced GPS systems (FAA, 2008). According to the FAA's August 25, 2011, update of WAAS approaches 148 new WAAS LPV approach procedures have been published. The current LPV total is 2,675. The number of Localizer Performance (LP) approach procedures also continues to climb. Thirty two new LPs have been added bringing the total number of LPs to 165. There are twice as many WAAS procedures (LPVs and LPs) as there are ILS glide slopes in the U.S. National Airspace System today (FAA, 2011a).

Pilot training to utilize the GPS based navigation systems is an on-going process as equipment and systems are updated. With the advanced technology and new operating procedures, aircraft maintenance technicians must also stay up on training to understand the complexities of the Next Generation Navigation systems (NexGen) and the new operational procedures being used.

Table 1

	Procedures Part 139 Airports	Procedures Non-Part 139 Airports	Total Number of Procedures
LNAV Procedures	1751	3491	5242
LNAV/VNAV Procedures	1248	1350	2598
LPV Procedures	1206	1469	2675
LP Procedures	32	133	165
GPS Stand-Alone Procedures	23	276	299

GPS WAAS Approaches
-S-ource FAA

SYSTEMS TRAINING

In an evaluation of systems operation and performance in the NexGen Airways system, technicians must be able to comprehend when, where, and what has occurred to gain a full understanding of system operations. Technicians not only need to know how to operate systems on the ground, but also understand how the systems operate during flight while communicating with other aircraft and ground systems. Knowing system operations during flight include knowing the requirements that must be met to execute an approach procedure. If an altitude requirement is not made, or GPS coverage is inadequate for the procedure, the technician must understand how these affect the performance and operation in addition to any system failures and their effects. This level of comprehension is critical in system diagnoses when determining the type of system failure.

Faculty in the Department of Aviation Technologies at Southern Illinois University Carbondale has previously identified the advantage of teaching FMS operations to technicians. The Flight Management Systems course, AVT405, was designed to give technicians, who may or may not be rated pilots, exposure to fly using navigation systems and techniques in use by aircrews. A recent upgrade of computer hardware for our Computer Based Training (CBT) laboratory facilitated the ability to upgrade systems training software. As a result, three new software programs have been purchased to simulate system operations, with emphasis on newer GPS navigation systems. Garmin's GNS430 GPS, communication and navigation simulator for Personal Computers (PC) is available online at Garmin's web site as a free download. The GNS430 is used in our program as an introduction for GPS system operation. All GPS systems must meet similar requirements for satellite availability and reception. Garmin's GNS430 is the predecessor for today's integrated advanced glass cockpit systems. The GNS430 with its GPS unit combined with a navigation and communication system, all within its own display, lends itself to a natural progression trainer to demonstrate GPS approaches and procedures. With an understanding of GPS procedures, students start Aerosim's Cirrus Avionics Systems Training program, version 1.2 for Windows 7. Originally designed and developed for Aerosim's Flight Training Academy the software is self-paced. The courseware combines interactive training with simulations to help introduce glass cockpit for the Cirrus SR20 and SR22. The software uses a series of guided lessons combined with practice scenarios to bring the students to a level of demonstrated proficiency with the avionics systems. The system is setup so each student must log on to a CBT laboratory PC. A password and user name is given to each student. The courseware requires each student to complete each block of instruction prior to proceeding to the next. After completing all blocks of system training, students must successfully complete an evaluation flight scenario and test to receive a print certificate button to appear. With individual log-ins, the program can be later accessed by faculty to verify completion if necessary.

The courseware covers Single Pilot Resource Management (SRM) that introduces a level of understanding of the decision process that takes place in flight. After completing the SRM training the courseware goes into systems training covering Avidyne's Flightmax Entegra Primary Flight Display (PFD) and Multifunction Display (MFD). The PFD and MFD receive data from Garmin's avionic stack consisting of dual GNS430s, GTX327 mode "S" transponder and the GMA340 audio and marker beacon panel.

The STEC 55X autopilot is equipped to fly GPS Steering (GPSS) for navigation using GPS course information. The malfunction training block improves troubleshooting skills by showing how a fault appears to the pilot, and type of information is lost. Understanding what the aircrew experiences in flight give a more comprehensive perspective on systems operation and helps save time during fault diagnoses.

The courseware is a good introduction to GA panel mounted systems outputting to a PFD and MFD, however, the dual GPS system is not WAAS enabled. The simulator's default instrument panel lay-out is similar to the SR22 cockpit. In the default configuration, the system is unable to display both the PFD and the MFD at once, as seen in figure 1. To view the unseen display, an Avidyne logo at the top bezel on the PFD and MFD is used as an imaginary button to toggle back and forth from the PFD to and from the MFD displays. The layout can be changed from the cockpit scan with only the PFD to a layout using both the PFD and the MFD as in figure 2. The layout change enables a view of the complete system minus all redundant systems found in the aircraft, taking the simulator from an aircraft avionics familiarization simulator to a more functional systems simulator. Several GA aircraft have similar avionics configurations; Cessna's Columbia 350 and 400 aircraft utilized the same displays in a portrait layout.

With wide spread usage of the Garmin equipment systems, the training is relevant what one finds on the flight line today. The simulator operation is focused more on system training rather than flight training. There is a throttle, but no control stick, flaps, or prop controls. The simulator steering inputs are driven by the GNS430 navigation inputs coupled with the STEC 55X autopilot. The courseware has a free-play flight option, which this author uses to perform individual check flights with each student after completing system training. During check flights, the students are given configuration cards outlining aircraft location, fuel and meteorology conditions. Student must configure the systems to meet check flight conditions and locations. The arrival destination and required approach procedure is given and loaded prior to takeoff. The check flights are a short flight during which students are quizzed on system operation and function while performing an ILS approach. Once successfully completing the check flight, students begin upgrading training to the next system..

Figure 1

Default Flight Panel Configuration

Figure 2

Configurable layout using both the PFD and the MFD

G1000

With the growing number of installations of Garmin's G1000 system, it seems logical to include the G1000 system to Southern Illinois University's revised FMS training program. Garmin does not give away the G1000 system trainer, as they do with the GNS430 systems trainer. Nevertheless, they are very reasonable with pricing. On Garmin's web site a person can purchase system software for just about every aircraft installation. Version 9.1 of the G-1000, and higher, has been upgraded to Garmin's Synthetic Vision Technology. With the additional of Synthetic Vision Technology a new level of sophistication to the overall appearance and function of the simulator is added. All computer simulator software in use in Southern Illinois University's CBT laboratory lacks the visual reference known as out the window. The addition of Synthetic Vision Technology to the simulator reinforces its function in the cockpit by enhancing situational awareness during night, rain, fog or solid Instrument Meteorological Conditions (IMC) conditions keeping you from viewing out windows.

The G1000 operation and controls are very similar the GNS430 system, so systems upgrade training is kept to a minimum. As with the GNS430 simulator, the G1000 simulator is a systems simulator and not a programed course of study. The systems are setup per aircraft specifications and layout but the simulator flight characteristics is not designed for the aircraft (Garmin, 2011). The same flight plan used for the Cirrus flight checks is practiced on the G1000 system focusing more on the operation of systems and less on new navigation destinations. It takes a few hours of training to become proficient with the page contents and operation to fully utilize the systems capabilities.

The Garmin G1000 software is able to run two PC monitors with compatible video cards or display both the PFD and MFD on one screen. If the aircraft is equipped with a separate Garmin Control Panel (GCP) and Autopilot Flight Control System (AFCS) all may be displayed and accessible during training as seen in Figure 3.

To keep with previous simulator type training, the Cirrus Perspective G1000 Trainer version 10.0 is used. The Cirrus SR22 equipped with the G1000 system does have a separate Garmin GCP, turning the simulator's tedious chore having to click with the mouse on a small knob several times to spell out airport identifiers into a task of simply clicking on an alpha numeric key pad as seen in figure 3. Not only is the control panel convenient for pilots in flight, it also reduces PC simulator workload. The G1000 system is equipped with dual navigation and WAAS enabled GPS receivers supporting new LPV and LP approaches.

Transitioning from ILS approaches using Avidyne Entegra system coupled with the GNS430 to using the G1000 system using LPV approaches was effortless. The G1000 system has HITS guidance as an option to the flight director. G1000's level of sophistication and virtual 3D graphics quickly won over our computer savvy students. Using the soft keys to page through information became second nature as flight time increased. The check flight became less of a challenge with the LPV approach and the sophistication of the AFCS. With all the bells and whistles in guidance and graphics with the G1000 system it was a letdown for the students to upgrade to a full FMS simulator.

Figure 3

COLLINS 4200 FMS

Aerosim's Collins 4200 FMS simulator version 1.0 uses a generic version of the typical Collins 4200 type FMS. The system is configured with the FMS Control Display Unit (CDU), a generic moving map display, a generic Attitude Display Indicator (ADI) and a generic autopilot panel as seen in figure 4 (Aerosim, 2011). Flight plans are entered into the CDU along with basic operating initialization and performance data. The 4200 FMS is an excellent opportunity to introduce advanced navigation skills. With the FMS, the flight check progressed to using new procedures utilizing high altitude charts and airways. For the FMS check flight students are given origin airport, destination airport, flight plans with way points and arrival procedures. Performance information is also given denoting passenger count, cargo weight, thrust limits, outside air temperatures and target speeds with transition altitudes.

The simulator has a short training session on preflight procedures for the FMS and includes preflight and in-flight procedures checklist that can be displayed concurrently side-by-side during use. The introduction of vertical navigation and performance standards are something not covered with previous GA systems. The 4200 FMS is used primarily on Canadair Regional Jet (CJR) aircraft. The simulator works well for the introduction of larger aircraft FMS operations. The FMS simulator is void of all the fanfare which helps the students to focus on the task at hand and not the layout of the cockpit.

Figure 4

Aerosim's Collins 4200 FMS layout

SUMMARY

With the development and transition of the NexGen airways systems will forever change our flight paths and operations to meet future capacities and increased performances needs. ADS-B is on the forefront with the FAA taking steps to increase coverage. The GPS systems with WAAS and GBAS are at the heart of the NexGen airways system. Add new approaches and routes to the equation and everyone we be requiring continual training to keep pace. This is especially true with aircraft maintenance technicians. Not only are they required to know how to maintain the neuromas avionic systems, they need to know how to operate each one as it is used in flight. Budgets cannot keep up with all the equipment used in NexGen technology so simulators become more commonplace. Students completing the AVT405 FMS course at Southern Illinois University Carbondale leave with a better understanding of system use in flight and more confidence in system diagnoses.

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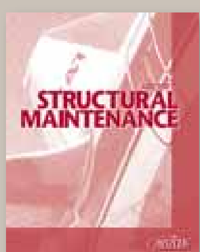

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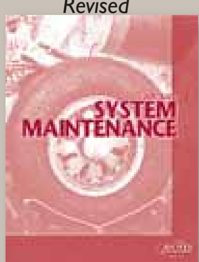

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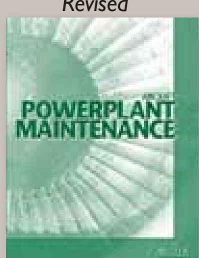

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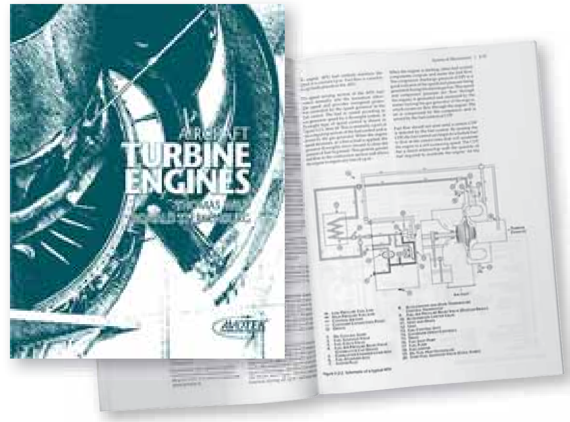

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Environmental Effects on Fiber Optic Cable Data Throughput

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Southern Illinois University

ABSTRACT

With more extensive use of fiber optic cable in aeronautical applications, considerations as to the effects of the operating environment on cable performance continues to be both of interest and concern to maintenance personnel. Prior research by the author and undergraduate assistants indicated influence of humidity effects on the transmissivity of 1 mm plastic core, multimode fiber optic cable as may be used in aircraft applications. Data collected over an extended period inferred that cable transmissivity dropped slightly as the operating environment humidity increased beyond 30%. Further investigation revealed this trend to be apparent in glass core fiber optic cable as well. In both cable types, relative humidity levels above 50% appeared to have the greatest negative effect on cable performance. Based on these data, it was decided to continue this research to examine if any humidity and temperature effects occur in digital signal data throughput as well as cable transmissivity.

INTRODUCTION

In previous research conducted at the Southern Illinois University Department of Aviation Technologies, effects of short term exposure to common aircraft chemicals and solvents on fiber optic cable transmissivity were evaluated to determine the level of degradation occurring due to chemical activity if any. Test groups of cables and controls were prepared and baseline values of cable transmissivity measured and recorded. Cable ends were exposed to various solvents and chemicals including a standard 99% isopropyl alcohol cleaning solution. The cables were retested and the results recorded and evaluated. While a number of the chemicals tested adversely affected cable performance, the set of cables exposed to a typical isopropyl alcohol cleaning chemical for one week and subjected to the same standard regimen performed on all the test samples revealed no significant short term degradation of performance (Hannon and Ramsundar, 2007).

Based on the data collected in the study, it was apparent that repetitive thorough cable end face cleaning using the cotton swab and 99% isopropyl alcohol method had little effect on fiber optic cable transmissivity. Although minor ambient temperature variations occurred during the study, no temperature related effects on cable transmissivity were evident. It was noted, however, that humidity variations in the testing environment appeared to have a slight but present adverse effect on cable performance. During the course of the evaluation, relative humidity varied from less than 15% to a maximum of approximately 50% over the duration of the study. Humidity data was plotted along with temperature and cable transmissivity and is depicted in Chart 1 below.

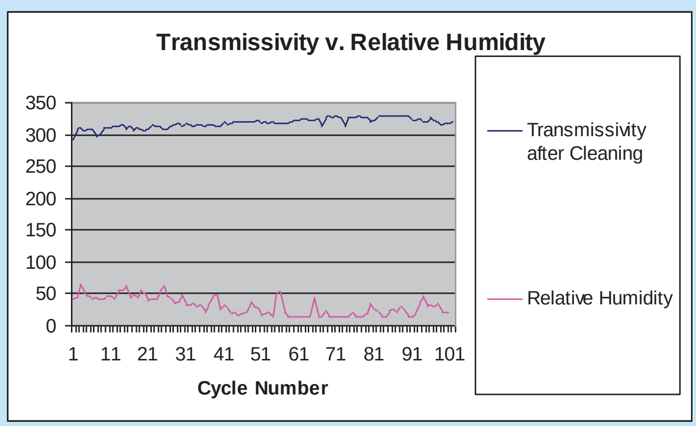

Chart 1. Transmissivity (y) correlated with relative humidity (x)

A regression plot along with a coefficient of variance (Chart 2 and Table 1 below) was run on the humidity versus cable transmissivity indicating an inverse relationship between humidity and cable transmissivity.

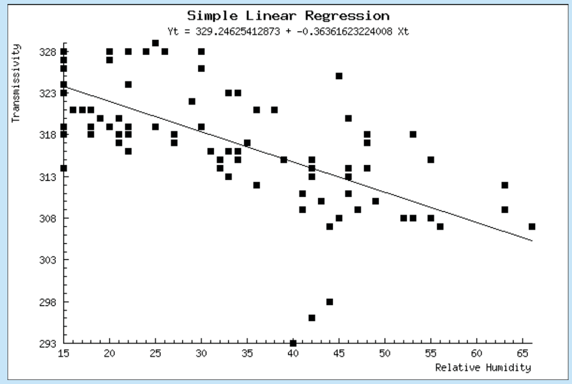

Chart 2. Original Data Regression Plot of Transmissivity (y) v. Relative Humidity (x)

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	329.246254			
Beta	-0.363616	0.038444	-9.45837	H0: beta = 0
Elasticity	-0.035589	0.003763	-275.224526	H0: elast. = 1
Durbin-Watson Autocorrelation	0.97557			

Table 1. Original Coefficients of variants humidity v. transmissivity

Repetitive cable transmissivity testing was again conducted during the period of mid-August, 2008 through December, 2009, this time specifically examining any effects of temperature and humidity. Chart 3 depicts the parameters examined including temperature and humidity of the testing environment over the 16-month testing period. As in the previous study, the ambient temperature remained fairly flat throughout the testing period. Humidity fluctuated from a low of 15% or less to highs of over 60%. Long term variances in cable transmissivity were noted which generally followed the fluctuating relative humidity levels as was noted in previous studies (Hannon, 2008). As noted above, the ambient temperature remained fairly constant (66 - 76º F; mean of 70.6º, Standard Deviation 2.99) over the 16-month period and appeared not to have an appreciable effect on cable performance. Humidity levels under 15% were below the range of the measuring instrument and therefore may have been actually lower than indicated. As indicated in chart 3, samples 47 – 110 and 185 to the end of the sampling period reflected readings taken during prolonged periods of low relative humidity.

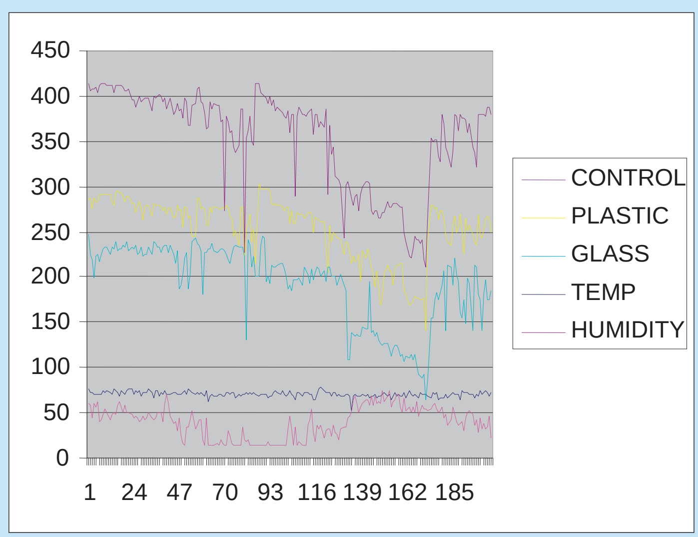

Chart 3. Cable Transmissivity, Temperature and Relative Humidity Levels (Y) during multiple test runs (X)

Statistical investigation again indicated an inverse relationship between humidity and cable transmissivity. These data corresponded favorably to the original findings (Hannon, 2008). The regression scatter plots in charts 4 and 5 below reveal the results of that investigation:

PLASTIC CORE CABLE

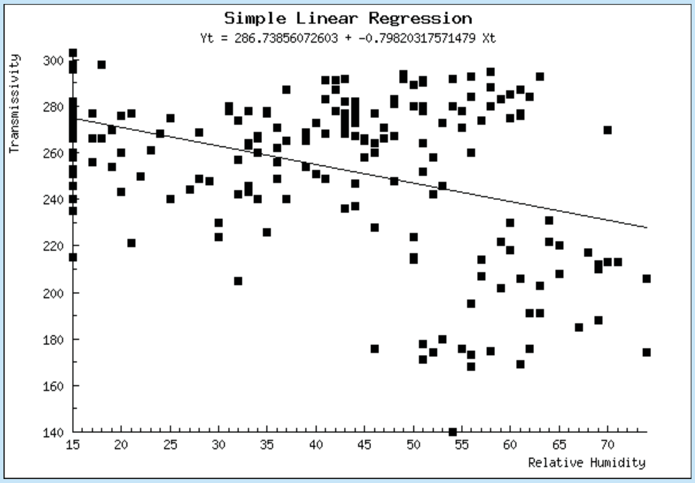

Chart 4. Regression Plot of Plastic Core Fiber Transmissivity (y) v. Humidity (x)

GLASS CORE CABLE

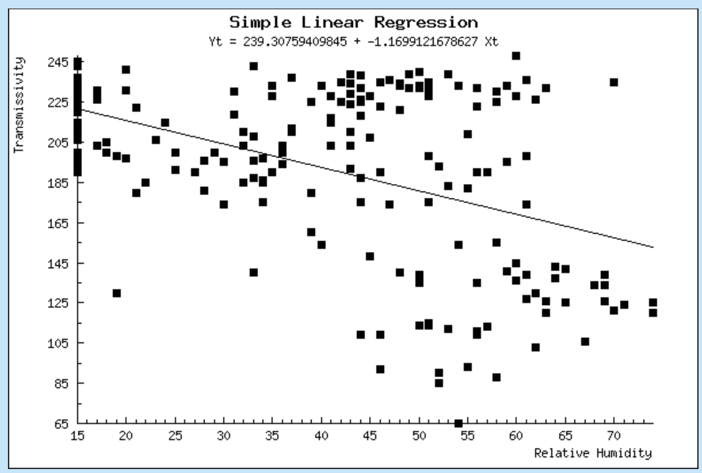

Chart 5. Regression Plot of Glass Core Fiber Transmissivity (y) v. Humidity (x)

It was concluded that in both plastic and glass core cables, relative humidity levels had a minor but definite negative effect on cable performance with humidity levels above 50% appearing to have the greatest effect. While the effect did not emerge as pronounced as in the original study, an inverse relationship between relative humidity levels and cable transmissivity remained evident (Hannon, 2009).

The test methodology used in the 2008 - 2009 study used relative power transmissivity variations and did not include actual data throughput variations relating to frequency, volume of data and data error monitoring. To provide more complete and meaningful data, additional studies were undertaken in 2010 – 2011 to include the transmission of discrete digital signals over test cables to determine if data throughput performance is similarly affected by changes in humidity. Data transfer protocols and transmission rates similar to those employed in low and high speed ARINC 429 application standards were utilized in an effort to simulate what may occur in equipment used in actual digital data transfer operations.

PROCEDURE

In order to achieve electronic to fiber optic signal conversion and quantify fiber optical cable throughput, two optic-to-electronic data converters were constructed. One converter was designed to handle low speed (12 Kbs) data and the other to handle higher speed (100 kbs) data as may be utilized in ARINC 429 transfer rate based digital data bussing protocol. The devices were constructed from Industrial Fiber Optics™ kits designed to convert electronic data to optical data and link digital or analog transmissions through fiber optic cables (Industrial fiber Optics, 2006). An integrated receiver was employed to covert the fiber optic data back to electronic data for visual display and quantification of signal frequency and amplitude. Each converter was packaged with a regulated power supply and an optical cable to electronic data interface. The converters with internal views of the circuitry and component layout are pictured below. The low speed converter was modified from an Industrial Fiber Optics transmitter/receiver kit contained in IFO's Fiber Optics Mini-Course (IFO Cat #32FBMC10). The high speed device was modified from IFO's Model IF-SD11Simplex Fiber Optic Communications Prototype Kit. Both kits were obtained through RSR/Electronix Express and are listed in their current catalog (Electronix Express, 2010).

Figure 1. Low Speed Converter, external and internal view

Figure 2. High Speed Converter, external and internal view

Both converters were built around 2N3904 NPN transistors as converter/amplifiers with optical pickups and emitters consisting of phototransistors and red LEDs respectively. Compression type push-through couplings were used to mount the fiber optic cables to the converters and keep the cables aligned with the pickups and emitters. Each converter was powered by a transformer/rectifier regulated 12 volt d.c. analog power supply using an LM78L12 three-terminal regulator for voltage stability.

Input low and high speed electronic digital signals were supplied by two BK Precision® 4010A Function Generators. 5 volt peak, 100% duty cycle square waves were used as inputs to simulate typical digital data bus signals as may be utilized in an ARINC based system (Condor Engineering, 2010). The initial testing consisted of varying the low and high speed signals to the highest frequency levels that the conversion apparatuses were able to process under daily varying conditions of temperature and humidity. Subsequent testing utilized fixed frequency signals initially set at approximately 12 and 100 kbs respectively. The output of each converter was displayed on a Tektronix® 2236 100 MHz, dual channel oscilloscope with frequency counter (Figure 3). Output waveforms in both test regimens were monitored for good definition to ensure minimal degradation of the signals through the conversion process.

Figure 3. 12 and 100 kbs Monitoring Set-up

Prior to the test initiation, specific lengths of fiber optic cables were prepared and cleaned utilizing Cisco Systems' recommended inspection and cleaning procedures (Cisco Systems, 2006). The cables were then connected to the appropriate converter and leads for the electronic input and output signals attached to the function generator and dual trace oscilloscope. An independent test control monitor consisting of a similar length and type of fiber optic cable and an Industrial Fiber Optics #IF-FOM fiber optic transmissivity test set employing 650 □M wavelength red light was used to monitor the control cable transmissivity performance in conjunction with the cables under test.

In the initial data throughput test regimen, maximum signal cut-off values using variable frequency inputs were recorded along with the prevailing environmental temperature and relative humidity level at the time of the test run. More than 100 tests were conducted from February, 2010 through September 2010 using this initial test regimen over an eight-month period. In subsequent testing, fixed frequency input versus variable frequency signal outputs were likewise checked and recorded. Secondary testing was also conducted over an eight-month testing period from September, 2010 through mid-May, 2011, wherein input signal data rates were maintained a constant level while variations in output data rates were recorded and analyzed. Statistical correlations with humidity for both testing regimens were run using Wessa Free Statistics Software (Wessa, 2009) and interpreted in accordance with guidelines presented in Berman's *Essential Statistics* text and other sources (Berman, 2002) .

RESULTS

In Chart 6 and Table 2 below, correlation between low speed data throughput and relative humidity is examined. The scatter plot, regression line and regression data indicate a negative relationship between data throughput and relative humidity as was apparent in the two earlier studies. While the relationship remains less pronounced than in the transmissivity study, an inverse correlation is suggested.

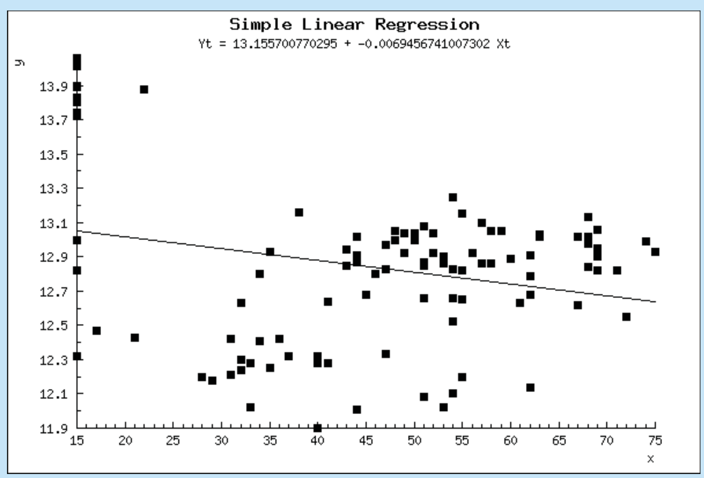

Chart 6. Regression Plot of Low Speed Data Throughput (y) v. Humidity (x)

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	13.155701			
Beta	-0.006946	0.002766	-2.511374	H0: beta = 0
Elasticity	-0.024735	0.009849	-104.044576	H0: elast. = 1
Durbin-Watson Autocorrelation	0.554100			

Table 2. Coefficients of Variants Low Speed Data Throughput v. Humidity

Simultaneous testing run with higher speed data, however, does not reveal a similar trend (Chart 7 and Table 3). In fact an almost flat regression line with a very slight upward slope is revealed indicating, if anything a direct relationship between humidity and data throughput contrary to the data in the low speed analysis. The Durbin-Watson Autocorrelation suggests this also, however, the correlation probability is lower (1.509626 v. 0.554100)

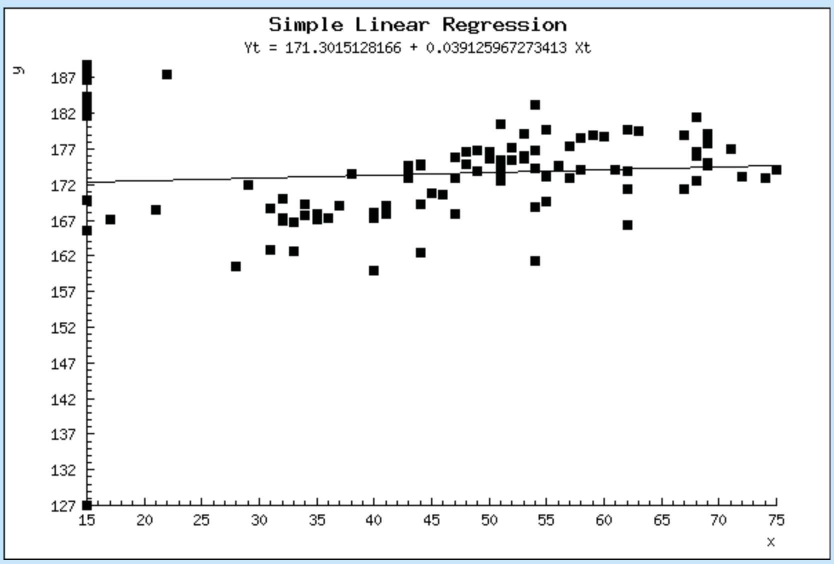

Chart 7. Regression Plot of High Speed Data Throughput (y) v. Humidity (x)

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	171.301513			
Beta	0.039126	0.4483	0.871724	H0: beta = 0
Elasticity	0.010334	0.011855	-83.480211	H0: elast. = 1
Durbin-Watson Autocorrelation	1.509626			

Table 3. Coefficients of Variants High Speed Data Throughput) v. Humidity

In an attempt to verify the validity of the first relationship involving the low and high speed data signals, simple regression was run on the high speed versus the low speed data rate results independent of humidity influence. As can be seen in Chart 8 and Table 4, below a positive relationship exists between the two sets of data indicating a similar trend of both data rate sets when paired by date tested as influenced by humidity. Based on this correlation, it appears that both high and low speed data transfer rates were negatively influenced by humidity, but the humidity effects on the high-speed data were not as evident.

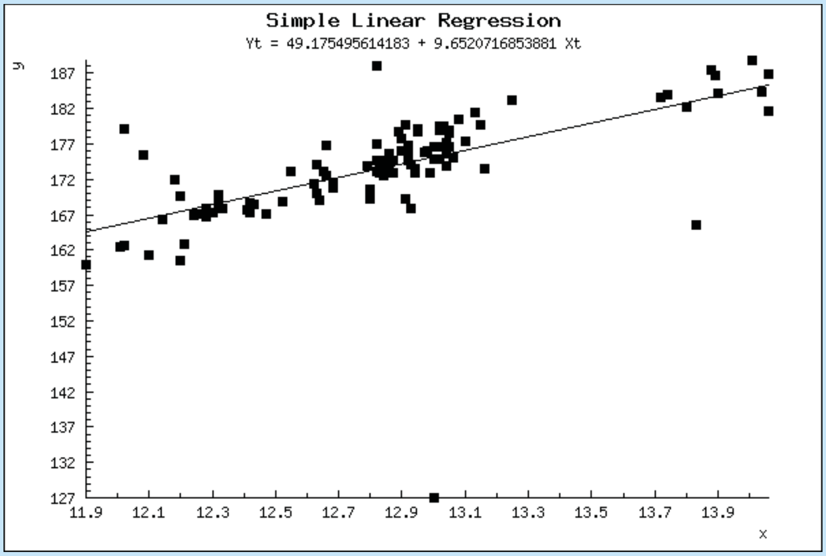

Chart 8. Regression Plot of High Speed Data Throughput (y) v. Low Speed Data (x)

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	49.175496			
Beta	9.652072	1.245161.	7.751668	H0: beta = 0
Elasticity	0.715897.	0.092354	-3.076244	H0: elast. = 1
Durbin-Watson Autocorrelation	1.898144			

Table 4. Coefficients of Variants High Speed Data v. Low Speed Data

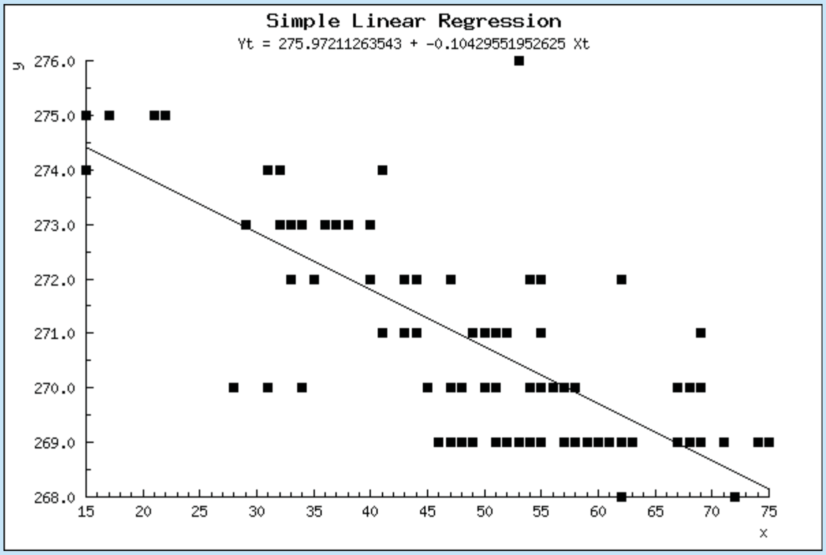

Chart 9. Regression Plot of Control Cable Transmissivity (y) v. Humidity (x)

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	275.972113			
Beta	-0.104296	0.007230.	-14.425458	H0: beta = 0
Elasticity	-0.017582	0.001219	-834.906197	H0: elast. = 1
Durbin-Watson Autocorrelation	1.146110			

Table 5. Coefficients of Variants Control Cable Transmissivity v. Humidity

Chart 9 and Table 5 show the relationship of humidity and transmissivity of the control. As indicated above, the control consisted of a similar length and type of plastic multi-mode cable subjected to 650 M unmodulated red light signal. While the transmissivity range of the control was narrow (269 – 272 mW), it was evident that the control exhibited the same inverse response to differences in relative humidity as was noted in previous testing (Hannon and Ramsundar, 2008 and Hannon 2009). Good correlation was further supported by the Durbin-Watson Autocorrelation test that yielded a value of 1.146110.

TREND VALIDATION

In order to validate the data and correlate it to the apparent inverse trend of data transfer rate versus humidity, a third, longer term, 143 sample, study using the same set up as that which yielded the results depicted in Charts 6-8 and Tables 2-4 above was conducted. This study ran from September, 2010 through mid-May 2011, a period of eight and a half months.

As in the previous studies, concurrent controls were run and monitored carefully using separate equipment to mitigate any skewing of data as a result of deviations in equipment performance due to variations in temperature and humidity. While the control utilized cable transmissivity as the dependent variable rather than data throughput, the results correlated well as can be seen in the tables and charts below.

Chart 10 and 11 and tables 6 and 7 depict regression scatter plots and statistical analysis of the long-term study.

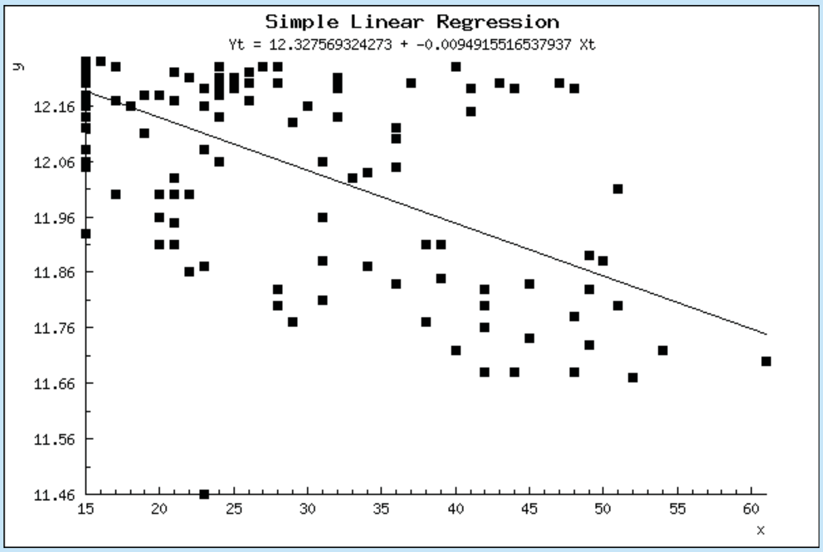

Chart 10. Coefficients of Variants Low Speed Data Throughput v. Humidity

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	12.327569			
Beta	-.0.009492	0.001007	-0.424925	HO Beta = 0
Elasticity Durbin-Watson Autocorrelation	-0.020738 0.734952	0.002200	-463.898289	HO: Elast. = 1

Table 6. Coefficients of Variants Low Speed Data Throughput v. Humidity

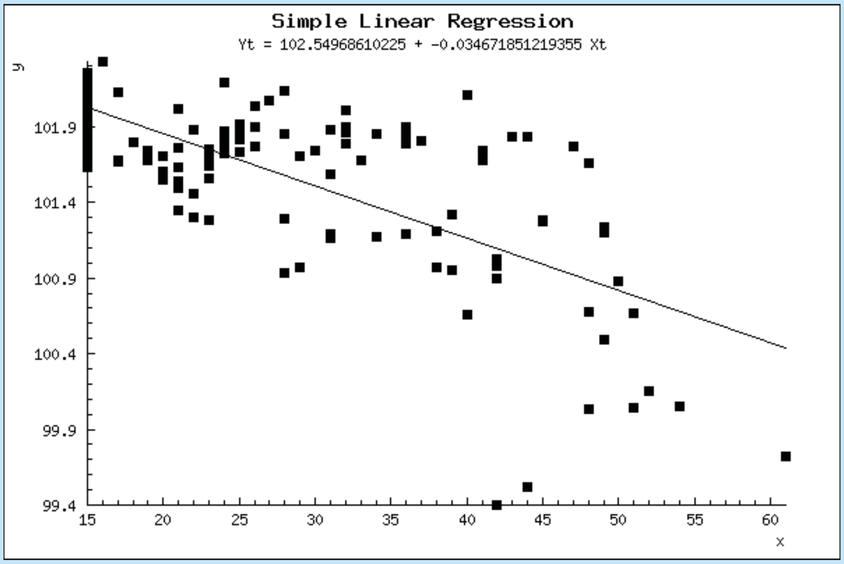

Chart 11. Coefficients of Variants High Speed Data Throughput v. Humidity

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	102.549686			
Beta	-0.034672	0.002772	-12.508846	H0: beta = 0
Elasticity	-0.009002	0.000720	1402.100665	H0: elast. = 1
Durbin-Watson Autocorrelation	0.368129			

Table 7. Coefficients of Variants High Speed Data Throughput v. Humidity

As noted in the statistical data above, both the high speed and low speed data transmission rates versus humidity correlated well. The larger sample population better defined the descending trend line as humidity increased as in the previous study.

Again, a coefficient of variants test was run on high speed versus low speed data rates. As indicated in Chart 12 and Table 8 below, there was a positive correlation indicating both low and high speed data rates increased proportionally as ambient humidity decreased.

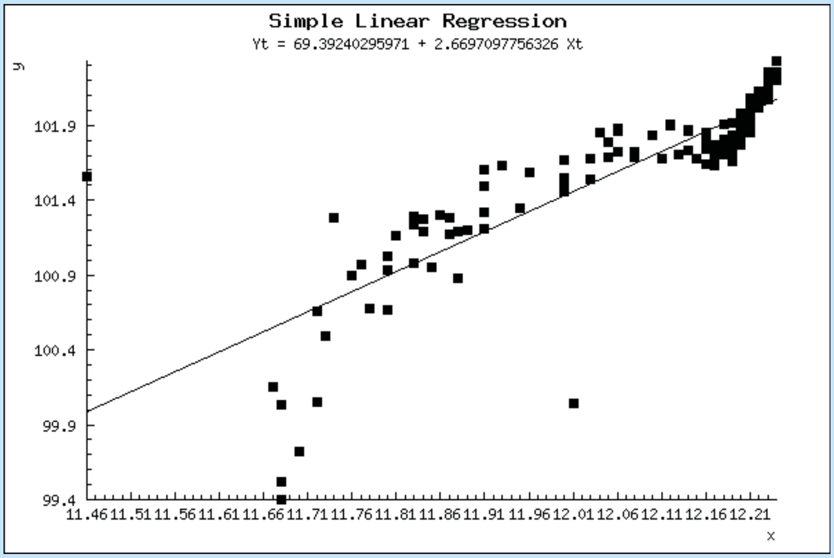

Chart 12. Coefficients of Variants Low Speed Data Throughput v. High Speed Data Throughput.

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	69.392403			
Beta	2.669710	0.138544	19.269708	H0: beta = 0
Elasticity Durbin-Watson Autocorrelation	0.317238 0.574683	0.000720	-41.472469	H0: elast. = 1

Table 8. Coefficients of Variants Low Speed Data Throughput v. High Speed Data Throughput.

In an effort to demonstrate the performance of the transmissivity control run concurrently with the low and high speed data studies, analyses were run on data throughput v. transmissivity. While the spread of the transmissivity power level again was narrow (269 – 276 mW), the results indicated a good correlation between the performance of the control and both the low and high speed data rates with humidity levels:

Chart 13. Transmissivity Control v. Low Speed Data Rate.

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	49.175496			
Beta	9.652072	1.245161.	7.751668	H0: beta = 0
Elasticity Durbin-Watson Autocorrelation	0.715897. 1.898144	0.092354	-3.076244	H0: elast. = 1

Table 9. Transmissivity Control v. Low Speed Data Rate

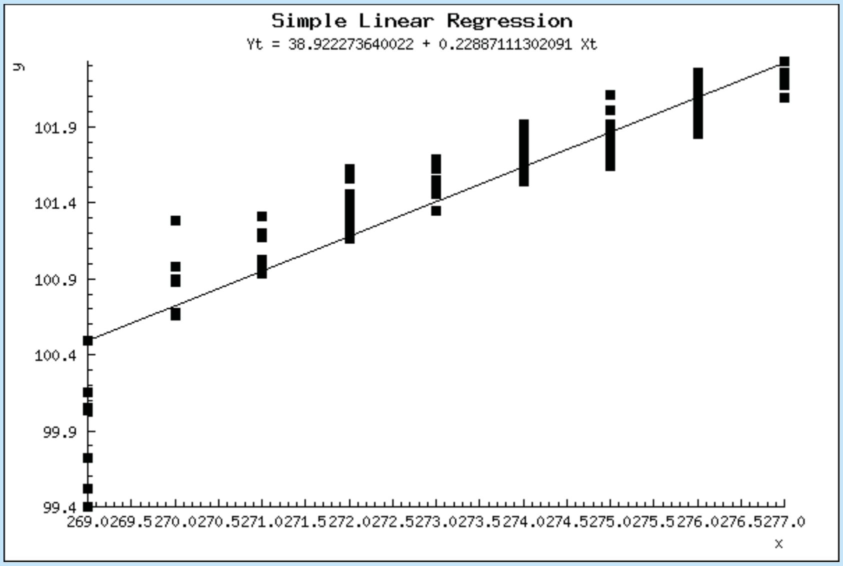

Chart 14. Transmissivity Control v. High Speed Data Rate.

Simple Linear Regression - Ungrouped Data				
Parameter	Value	S.E.	T-STAT	Notes
Constant	38.922274			
Beta	0.228871	0.007691	29.756897	H0: beta = 0
Elasticity Durbin-Watson Autocorrelation	0.617036	0.020736	-18.468633	H0: elast. = 1

Table 10. Transmissivity Control v. High Speed Data Rate.

CONCLUSION

These two latest investigations were conducted over the period from early February 2010 through mid-May 2011. Two different approaches to the investigation of variations of humidity effects on fiber optic cable data transmission rates were performed in an effort to verify data collected during the earlier studies completed in 2008 and 2009 was repeatable and to ensure that an adequate sample population and an adequate dry to humid period cycle was utilized. Cable performance as to data transfer rates in fact again improved when cables were tested in lower versus higher humidity environments. Based on the data observed in both original studies and this latest study, it is apparent that observed trends in variations of relative humidity affecting cable performance over periods of low and high relative humidity are valid. In plastic core cables, both at low and high speed data rates; relative humidity levels above 30% appeared to have the greatest negative effect on cable performance. The test methodology used in this study further revealed that data transfer rates varied concurrently and directly with cable energy transmissivity as demonstrated by appropriate controls.

While the variations in low and high speed data throughput rates were relatively minor (7.6% and 2.7%) compared to the nominal data rates of 12 and 100 kbs respectively, effective performance of certain ARINC equipment in higher humidity environments may be slightly degraded in some cases depending on optimal data sampling rates and other variables. We plan to undertake further research in this regard through utilization of ARINC 429 device applications such as airspeed or distance to station in an effort to determine if performance degradation, if occurring, is related to higher humidity operating environments.

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ATEC Update

PRESIDENT'S MESSAGE

As you move into a new school year, the ATEC officers and board extend best wishes for your continued success. To facilitate your success, ATEC is working hard to provide a new shared course content portal by April 2012. We envision this portal as place where members can exchange ideas and content – making all of us better at what we do. ATEC Government Relations continues to work with individual programs when a third party can assist with differences between the school and FAA and provide updates on regulatory matters. We are consolidating Industry Relations and Member Services into a single streamlined committee to provide better offerings. In short, we are ramping up activities to better serve you, our member institutions.

Be sure to mark your calendars for the ATEC Annual Conference, April 14-17, 2012 in Tempe, Arizona. The 2012 conference will have outstanding programming, headlined by Dr. Mark Taylor. Building on his presentation on understanding the millennial student, Dr. Taylor will be getting into the details on technical teaching with today's student and how to prepare this cohort for school and the workplace.

ATEC will continue to keep you informed of our work and efforts to improve your ATEC experience and services. I personally look forward to seeing you in April 2012.

Best –
Raymond Thompson

GOVERNMENT RELATIONS

Over the Spring and Summer, the committee has been dealing with local FAA FSDO issues and problems affecting assistance to three schools. The Board is considering listing these issues on the website along with the final resolution. This would help national standardization. For assistance with local school issues, contact Andrew Smith at atsmith@ksu.edu.

HUMAN FACTORS TEST QUESTIONS

AFS-630 HAS DEVELOPED QUESTIONS AND ADDED THEM TO THE Aviation Maintenance Technician General Knowledge Test beginning February 1, 2012.

FAA Advisory Circular currently contains in Appendix 4, optional curriculum guidance to include human factors as part of a 147 approved curriculum.

ATEC 147 schools that currently do not have any training information in their curriculums regarding human factors/maintenance errors should be thinking about incorporating such information in the future.

AFS-630 has posted sample questions for Human Factors on the FAA website. http://www.faa.gov/training_testing/testing/airmen/test_questions/

TEST STANDARDS

General, Airframe and Powerplant Practical Test Standards will be reviewed via a committee. Ed Hall asked if ATEC wanted to sit at the table to provide input. David Jones and Tom Hendershot will serve on this committee and keep us informed.

PART 147 FINAL ARAC TRANSITION TO NPRM

At a September meeting with AFS-300 in Washington DC, ATEC Board members were told that the 147 NPRM is number six on a ten point priority list for AFS-300. It was suggested that ATEC meet with AFS-2 to help raise awareness of the need for the new rule and raise its priority level. An ATEC/AFS-2 meeting is being set for October.

ELECTRONIC PROCESSING AND FILING SYSTEMS – FORM 8610-2

Because of the severe FAA budget constraints there is no movement on this initiative.

MAKING ORAL AND PRACTICAL TESTING LESS TIME CONSUMING

Mechanic PTS is currently under review for revision. ATEC Board members are represented on the committee and a review of testing time required to do the O&P will be considered.

AGE REQUIREMENT FOR GENERAL, A&P WRITTEN/KNOWLEDGE TESTING

It was suggested that when ATEC meets with AFS-600 they discuss this topic of an age requirement of 16 listed in the Handbook to take the Computerized Knowledge Test. This requirement is not supported by the rule. It seems unnecessary and should be revised out.

DISTANCE EDUCATION (DE)

Before the FAA can approve DE schools, surveillance specifics for testing students in DE need to be worked out.

ATEC will be looking more closely at the DE issue through an ad hoc committee to formulate workable solutions.

147 ELECTRONIC RECORDKEEPING

Ed Hall in the FAA, directed all school personnel to review and follow AC120-78 as guidance for electronic recordkeeping.

CLARIFICATION OF "ACTIVELY ENGAGED"

There are still conflicts among 8900.1, 65.91 and 147.

On a positive note, the refined FAA definition does provide more opportunity for AMT instructors who, in addition to teaching, are involved with approval for return to service. The key is good communication between an instructor and assigned ASI.

INSTRUCTIONAL DVDs

The entire (almost 200) instructional materials library is now fully converted to DVD format. They are available on the ATEC website, www.atec-amt.org (click on Instructional Materials) with a downloadable form.

The numbering system for ordering is still the same with a "check" qualifier after the number to signify the DVD format. You can also continue to order video tape format materials if you choose.

NOMINATIONS FOR ATEC BOARD

In 2012, ATEC will have three seats open for four year Board terms and three will be appointed one year terms. We will also be voting for president and vice-president in 2012. See attached Board application form.

2012 SCHOLARSHIPS AND AWARDS

The scholarship and award programs being administered by the Northrop Rice Foundation for ATEC schools, instructors, and students for the coming year are:

- Aeronautical Repair Station Association Student Tuition Scholarship
- Snap-On Tool Sets Awards for Students
- AVOTEK Dale Hurst Memorial Scholarship for Instructors
- AVOTEK Book Sets Awards for Students
- Northrop Rice Foundation Instructor Assistance Award
- Northrop Rice Foundation Student Tuition Scholarships
- Wing Aero Book Sets Awards for Students
- NIDA Corporation Training Equipment Award for Schools
- Rotorcraft Enterprises Training Equipment Award for Schools
- FlightSafety International King Air Maintenance Scholarship for Instructors
- Southwest Airlines Boeing Systems/Avionic Scholarship for Instructors
- American Eurocopter Helicopter Maintenance Scholarship for Instructors

Others will be added soon. To access the details and application forms, go to www.atec-amt.org and click on the list in the right hand column. All deadlines are in early 2012.

Winners will receive their awards/scholarships on April 16 at the ATEC annual conference at the Fiesta Resort in Tempe, Arizona (4 miles from the Phoenix Airport).

ATEC COMMITTEES

The following are the Board Committee Chairs and their contact information.

Committee	(Co-)Chair	Email
Finance	Bret Johnson	bjohnson@hallmarkcollege.edu
Communications	Tom Hagovsky	hagovsky@purdue.edu
	Paul Herrick	afpeh@uaa.alaska.edu
Instructional Materials	David Jones	directoredaim@aviationmaintenance.edu
Member Relations	Ryan Goertzen	rgoertzen@mail.spartan.edu
(Blending Industry Relations & Member Services)	Amy Kienast Ivan Livi	akienast@miat.edu ivan.livi@verizon.net
Call for Presentations	Ryan Goertzen	rgoertzen@mail.spartan.edu
Awards	Nick Herman	nicholarsherman1949@gmail.com
Nominations	Andrew Smith	atsmith@ksu.edu

For a complete list of all committee members, go to www.atec-amt.org and click on Committees.

ATEC WEBSITE

The website is scheduled for a major overhaul this Fall and Winter.

Among some of the planned enhancements:

- Easier navigation from homepage and back
- A secure members-only section with special annual log-in password
- File sharing/posting of instructor powerpoints, labs, lectures, videos
- Expanded FAQ link
- Sections for students, instructors, industry, and schools
- Expanded scholarships and awards section
- Modules for developing technicians to be teachers

WOMEN IN AVIATION SCHOLARSHIPS

FedEx Express JT8D Engine Award – Fed Ex Express is accepting applications from qualified aviation schools, universities, museums and other aviation education organizations for a JT8D engine with stand from the company's retiring fleet. To be considered for this donation, please submit a detailed summary of your organization, including information about your program, now the engine would enhance your program and any joint use opportunities with other area programs to increase the utilization of the asset. The recipient will be required to sign a contract that restricts the transfer of ownership, the sale of parts and acknowledges that the engine will be used for g round training only.

FedEx Express B-727 Aircraft New for 2012 – FedEx Express is accepting applications from qualified aviation schools/ universities; airport rescue/firefighting groups; government agencies; museums and other aviation education organizations for a B-727 airplane from the company's retiring fleet. To be considered for this donation, please submit a detailed summary of our organization, including information about your program, how the aircraft would enhance your program and any joint use opportunities with other area programs to increase the utilization of the asset. The recipient must have adequate parking space available and will be required to sign a contract that restricts the transfer of ownership, the sale of parts and acknowledges that the aircraft will be used for ground training only.

Contract approval and a delivery date will be finalized with the selected organization, and the winner will be announced at the 2012 WAI Conference in Dallas, Texas, March 8-10. Applicants must be a corporate member of Women in Aviation to be eligible.

UPDATE YOUR SCHOOL PROFILE

Please go to www.atec-amt.org. Click on 147 Institutional Members then click on your state.

Review your listing for accuracy. If it needs to be changed, print it out, make changes and fax it to 717-540-7121 by December 3. Be sure to check contacts and contact information.

CALL FOR PAPER PRESENTATIONS

If you have a technical classroom related presentation that you would like to present at the April 14-17 conference, see the attached application information and return it by December 1, 2011.

EDUCATOR AND STUDENT OF THE YEAR AWARD NOMINATIONS

Included in this Update are the letters announcing the two major ATEC awards to be presented at the ATEC Conference, April 14-17, 2012 in Tempe, Arizona.

PRELIMINARY CONFERENCE AGENDA

Mark Your Calendar!! Attached is the Preliminary Conference Agenda for ATEC 2012 at the Fiesta Resort, Tempe, Arizona (4 miles from the Phoenix Airport) April 14-17.

Note: IA Renewal Training is on Saturday, April 14, at the Fiesta Resort.


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Call for Presentations

The Aviation Technician Education Council is seeking papers for presentation at ATEC 2012, Fiesta Resort, Tempe, AZ, April 14-17, 2012. Papers for presentation on the following topics with the general theme of "**Successes in the Classroom**" are sought as they relate to the instruction and administration of FAR Part 147 programs:

Capstone Experiences
Development (fund raising)
Distance Education/ Computer Based Education
Industry Advisory Boards
Innovative Laboratory Projects
Multimedia in the Classroom
New Trends in Airframes & Powerplants
Outcome Based Assessment
Professional Development
Program Assessment
Recruitment & Retention
Strategic Planning

Abstracts (400 words maximum) must be electronically submitted in Microsoft Word by **December 1, 2011**. All abstracts will be reviewed and authors of accepted abstracts will be invited to submit a full paper. Authors must supply their own laptop computer or make other arrangements with ATEC prior to the convention. **Authors must register for and present their work at Tempe, AZ on Monday, April 16 (as scheduled), at the Fiesta Resort.**

Deadlines

December 1, 2011: Abstract Submission
January 24, 2012: Notification of Acceptance/ Rejection
February 25, 2012: Submission of Draft Full Paper/ Audio and Video requirements
March 18, 2012: Electronic Submission of Final Paper

Please direct any questions and or submissions to:

Ryan Goertzen
Spartan College of Aeronautics & Technology
8820 E. Pine Street
Tulsa, OK 74158-2633
Office 918-831-5227
rgoertzen@mail.spartan.edu

ATEC BOARD OF DIRECTOR'S NOMINATION FORM

Several seats are open on the ATEC Board of Directors for 2012

If you would like to have your name placed in nomination for the ATEC Board, please complete the form below by **February 1, 2012** and mail to:

ATEC
2090 Wexford Court
Harrisburg, PA 17112
FAX to: (717) 540-7121
Email to: ccdq@aol.com

Name: ____

Institution: ____

Address: ____

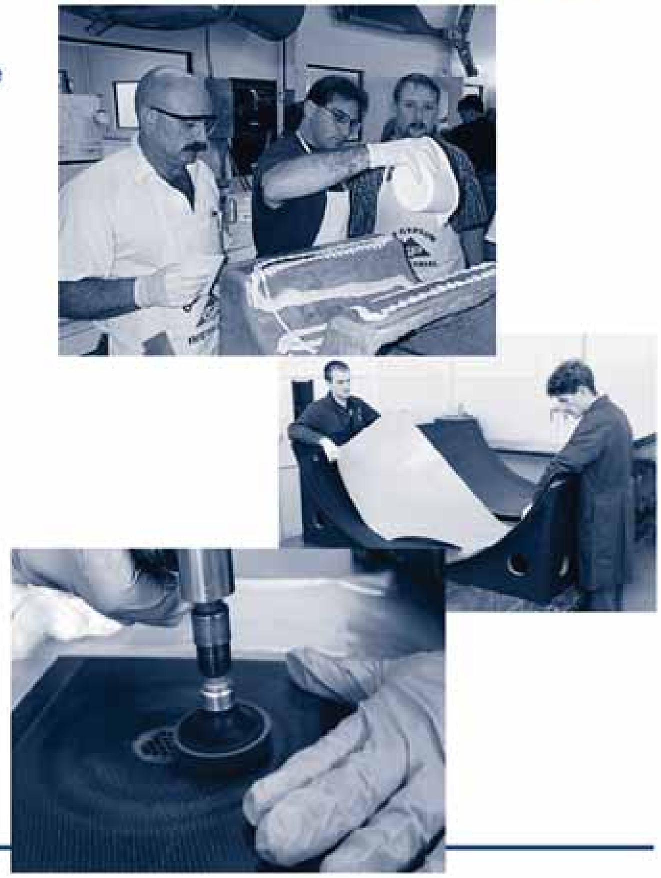
Phone: _______________ Fax: _______________ E-mail:__________________

NOTE: Your institution must be an institutional member in order for you to run for the Board.

For those who place their name in nomination, we will be asking you in February to send a picture and a brief write-up of your background and what you would like to accomplish on the Board. This will be shared with all conference attendees in Orlando in April.

DEADLINE: February 1, 2012

Let Abaris be Your Key to the World of Composite Training



Abaris has been specializing in advanced composite training in all industries since 1983. Our courses are hands-on as well as theoretical, supplying students with troubleshooting techniques that save both time and money. We provide strong foundations in the classroom, and then go to workshops where students fabricate and repair actual parts. Students are also encouraged to bring practical problems to class.

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EDUCATOR OF THE YEAR AWARD

September 2011

Dear Member:

The ATEC awards committee is pleased to solicit nominations for the 23rd annual Ivan D. Livi Aviation Maintenance Educator of the Year Award. You will find the criteria for eligibility and appropriate forms on the ATEC Website at www.atec-amt.org. Click on Livi (Educator) Award. Or, request a form from ATEC fax (717) 540-7121. I sincerely encourage each member institution to carefully review these forms and forward a nomination to the selection committee as specified in the instructions.

Through this award, we have potential to recognize some of our many outstanding instructors. It has become a regular part of ATEC's activities. In addition, the school of the winning educator will receive a framed picture of the "Flying Wing" donated by the Northrop Rice Foundation.

ATEC pays all the travel expenses "and a free conference registration" to the ATEC Conference for the winner. The twenty-third annual award will be presented on April 16, 2012 at our Tempe, Arizona Conference. Forward your nomination by **February 1, 2012** to the ATEC Business Office, 2090 Wexford Court, Harrisburg, PA 17112.

Upon receipt of your application material, the ATEC Business Office will send you a confirmation of receipt. If you do not receive a confirmation within two weeks of sending your material, contact the ATEC Office immediately.

Sincerely,

Raymond Thompson
ATEC President

ATEC

AVIATION TECHNICIAN EDUCATION COUNCIL

2012

IVAN D. LIVI AVIATION MAINTENANCE EDUCATOR OF THE YEAR AWARD

Purpose: This award recognizes the outstanding achievement of an aviation maintenance technology instructor. This achievement can be in the form of a single event or long term outstanding performance but must have had a direct impact on the Aviation Maintenance student.

This award will be presented at the annual ATEC Conference April 14-17, 2012 in Tempe, Arizona. The winner will be contacted in late February.

CRITERIA FOR ELIGIBILITY

TO BE ELIGIBLE for the ATEC outstanding educator award, the nominee must:

1. Be employed by an institution and/or organization that is a member of the Aviation Technician Education Council.

2. Be an active instructor of Airframe and/or Powerplant Technicians. The applicant's workload must be of such a nature that they spend 80% of their workload time in contact with students teaching actual aviation maintenance technology classes.

3. Present a completed application with appropriate signatures by **February 1, 2012** to ATEC, Awards Committee, 2090 Wexford Court, Harrisburg, PA 17112.

4. Nominations may be made for one particular outstanding achievement by a person. They may also be made for a person who has consistently contributed above average performance.

5. Nominees are not eligible if they are a current member of the Executive Board or, as regular members, they are serving on the Public Relations Committee.

CRITERIA USED FOR EVALUATION

1. Initiative/creativity: What did this person do, what new ideas or applications were used and what was the outcome?
Total value in per cent...45%

2. Attitude/performance: What was the direct impact to the student(s)? How was the attitude and/or performance of the student effected by the event, ideas, or performance?
Total value in per cent...25%

3. Education/training: What education and training does the nominee possess? How did this influence the event, idea, or performance?
Total value in per cent...15%

4. Recommendation(s) and/or nomination statements from the benefit and effect of the event, idea or performance.
Total value in per cent...15%

IVAN D. LIVI AVIATION MAINTENANCE EDUCATOR OF THE YEAR AWARD

NOMINATION FORM

DATE: ______________________________

NOMINEE: ____

POSITION/TITLE: ____

LENGTH OF SERVICE IN THIS POSITION: ____

NOMINEE ADDRESS: ____

PHONE NO.: Business _________________________ Home ___________________________

INSTITUTION AND/OR COMPANY: ____

INSTITUTION AND/OR COMPANY ADDRESS: __________________________________

____ Phone No. ___________________

NOMINATOR: ___________________________________ Phone No. ___________________

NOMINATOR POSITION/TITLE: ____

NOMINATOR ADDRESS: ____

NOTE: Nomination statements must be limited to this form and not exceed these pages. Recommendations (separate attachments) are limited to three, no more than one page each. They must be signed and the organization name stated.

NOMINATION STATEMENT

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1. INITIATIVE/CREATIVITY:

2. ATTITUDE/PERFORMANCE:

3. EDUCATION/TRAINING: ____

4. RECOMMENDATIONS AND/OR EFFECT OF PERFORMANCE:

All information given on this application is correct. I hereby authorize release of all information contained on this application to any authorized awards committee member or board member.

Nominee Signature ____ Date _______________

Nominator's Signature ____________________________________ Date _______________

STUDENT OF THE YEAR AWARD

September 2011

Dear Member:

The ATEC awards committee is pleased to solicit nominations for the 13th annual award of the James Rardon Aviation Maintenance Technician Student of the Year. You will find the criteria for eligibility and appropriate forms on the ATEC Website at www.atec-amt.org. Click on Rardon (Student) Award. Or, request a form from ATEC fax (717) 540-7121. I sincerely encourage each member institution to review carefully these forms and forward a nomination to the selection committee as specified in the instructions.

Through this award, we have potential to recognize some of our outstanding students.

ATEC and Northrop Rice Foundation pays coach airfare, lodging for three nights, $75 stipend "and a free conference registration" to the ATEC Conference for the winner. The thirteenth annual award will be presented on April 14-17, 2012 at our Tempe, Arizona Conference. Forward your nomination by **February 1, 2012** to the ATEC Business Office, 2090 Wexford Court, Harrisburg, PA 17112.

Upon receipt of your application material, the ATEC Business Office will send you a confirmation of receipt. If you do not receive a confirmation within two weeks of sending your material, contact the ATEC Office immediately.

Sincerely,

Raymond Thompson
ATEC President

JAMES RARDON AVIATION MAINTENANCE TECHNICIAN STUDENT OF THE YEAR AWARDS

Purpose: These awards recognize the outstanding achievement of Aviation Maintenance Technician students. These achievements must be demonstrated through academics as well as through involvement that makes a direct impact on the student's associates, school and/or community.

Eligibility: To be nominated, an individual must be a full-time AMT student at an institution that is a member of the Aviation Technician Education Council.

Nomination Process: Nominators must complete a Nomination Form with appropriate signatures by **February 1, 2012** and forward it to ATEC, Awards Committee, 2090 Wexford Court, Harrisburg, PA 17112.

Review Process: Following receipt of the nominations, they will be reviewed by the ATEC Awards Committee and Northrop Rice Foundation Board of Directors to determine ten (10) finalists. The Board of the Northrop Rice Foundation will then select the James Rardon AMT Student of the Year award winner from the finalists. The winner will be contacted in late February 2012.

Selection Criteria:

1. **Leadership/Motivation:** What has the student done to encourage and lead his/her students to newer and higher levels of learning, or to promote aviation maintenance as a career?
   Total value in per cent. 35%

2. **Academics:** How has the student approached his/her own learning, and what grade level has the student achieved?
   Total value in per cent. 30%

3. **School/Community:** What has the student done to assist the school faculty develop new/better training methods, maintain necessary records and maintenance requirements, and/or promote the institution in the community?
   Total value in per cent. 25%

4. **Recommendation(s):** Additional (up to 3) recommendations or nomination statements will be considered to become as familiar as possible with the attributes, abilities and achievements of the nominated student.
   Total value in per cent. 10%

Awards: The 2012 James Rardon AMT Student of the Year award winner will receive transportation costs (airfare, hotel, meals, etc.) to attend the ATEC Annual Conference in Tempe, Arizona on April 14-17, 2012. The recipient will be honored during the Awards Luncheon and will receive the "James Rardon Aviation Maintenance Technician Student of the Year" plaque. The other nine (9) finalists will receive by mail a "James Rardon Outstanding AMT Student" certificate. These ATEC awards are sponsored and funded by the **Northrop Rice Foundation**. Registration at the ATEC Annual Conference for the James Rardon award winner is provided by ATEC.

JAMES RARDON AVIATION MAINTENANCE TECHNICIAN STUDENT OF THE YEAR AWARD

NOMINATION FORM

DATE: ______________________________

NOMINEE: ____

LENGTH OF TIME AT THE SCHOOL: ______________________________________

NOMINEE ADDRESS: ____

PHONE NO.: School______________________________ Home ______________________________

INSTITUTION AND/OR COMPANY: ____

INSTITUTION AND/OR COMPANY ADDRESS: ________________________________

____Phone No. __________________________

NOMINATOR: ___________________________________ Phone No. _________________________

NOMINATOR POSITION/TITLE: ____

NOMINATOR ADDRESS: ____

NOTE: Nomination statements must be limited to this form and not exceed these pages. Recommendations (separate attachments) are limited to three, no more than one page each. They must be signed and the organization name stated.

NOMINATION STATEMENT

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1. LEADERSHIP/MOTIVATION: ______________________________

2. ACADEMICS: ______________________________

3. SCHOOL/COMMUNITY: ____

4. RECOMMENDATIONS/ADDITIONAL ACHIEVEMENTS

All information given on this application is correct. I hereby authorize release of all information contained on this application to any authorized awards committee member or board member.

Nominee Signature ____ Date ____________

Nominator's Signature _____________________________________ Date ____________