

Engineers' News

November 2020

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Find us on 

November Tour

Nuclear Fission and Hydrogen Fuel Production

POSTPONED

This event has been postponed due to pandemic travel restrictions for an out-of-state-speaker

Upcoming Events

December: Master Spas



Date: Thursday, December 3rd

Time: 3:00 pm

Location: 510 Sumpter Drive, Fort Wayne, IN 46804

Tour the manufacturing facility of swim spa product line. Must be 18 years or older and wear safety glasses and mask which can be provided if needed.



January: Semi-Truck Fuels, Electrification and Aerodynamics

Date: Thursday, January 28th

Time: 6:30 pm

Location: TBD

October Tour Summary

The "theater" type of organ installed in the Embassy Theater in downtown Fort Wayne is maintained by a group of mostly volunteer engineers and enthusiasts, both women and men. They meet most Mondays at 6:30 pm through the back (south) stage door and welcome anyone interested in being part of their group.

They emphasized that the era and the organ's design would be best appreciated by patronizing their silent film nights. Music and surroundings were inherently part of the silent film industry's skills in absorbing an audience's full attention, blotting out other thought.

Theaters were designed to be sound boxes for their organ, orchestra, piano, and/or other accompaniment. The Embassy Theater is only one of two locations worldwide where 4-manual Page theatre organs (Page was in Lima, OH) are still in their original buildings. The sound is essentially as it was in 1928. There are no electronically produced sounds from the organ. The system is "merely" activated and regulated through electrical circuits.

As many as 90-piece orchestras might support each showing of a silent film. This organ was designed to eliminate costs and complexity of an orchestra, although the Embassy Theater also has extensive space under the stage for dressing rooms (etc.) and an orchestra pit with a lifting mechanism. The pit floor can then lift

performers to whatever level is desired in front of the stage. A smaller section independently moves up or down as desired with or without the organ console. The console readily unplugs and rolls into a storage compartment in a wall (right side in picture) of the organ pit. Another compartment houses a grand piano (left side of picture). The lift mechanisms under these floors wore out and were replaced with a Spiralift system using spiral bands synchronized mechanically to an electric motor (wikipedia.org/wiki/Helical_band_actuator). In the picture below, the orchestra floor is fully up and the organ fully down.

The "organ", as we perceive it, is actually just the control console of a much larger system of two pipe chambers (16 sets of pipes total) plus percussions such as xylophone, drums, etc., and effects such as 1920's car horn and siren. A sophisticated blower in its own room supplies pressurized air for the pipes and action. The console is essentially a huge collection of electronic keyboards and toggle switches. The basic principles were conceived in Britain by Robert Hope-Jones, a telephone engineer. It is analogous to a complex switchboard of telephone wires which, at the time, signaled 1920's telephone technologies elsewhere in the



building to then signal musical and other devices distributed in appropriate locations. Not well received in Britain, he tried his luck in America and was quickly embraced. Twelve-volt telephone relays and complex multiple-contact switches, among other details, have been replaced over time with more modern parts due to basic factors such as dust and deterioration. Modernization progressively improved ability to preset, replicate, record, and playback performances (including MIDI).

Some keyboard keys and foot pedals depress slightly to activate one electrical contact or can be depressed further to also activate a second contact. This allows a skilled organist to play contrasting stops (organ voices such as tuba or flute) with one hand.

Retired equipment remains in its hidden areas of the building. A single toggle switch on the console, for instance, could have activated a pair of foot-long wooden slats. Each slat has many tiny electrical contacts on it, and the pair moved together to establish electrical contacts to multiple musical devices simultaneously. There are hundreds of these pairs ("relays") now replaced by programmable chips.

Another wooden switching unit, also retired, is 5' high x 11' long with electrical contacts on both sides to channel air movement through the unit. This had been controlled through eight telephone cables, each 1.75" in diameter, composed of insulated solid strand copper conductors approximately 0.013" diameter.



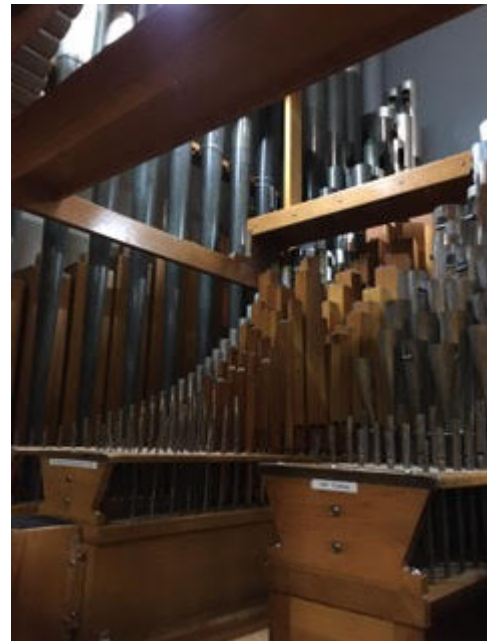
Compartments with music and sound generators are hidden on each side of the stage, appearing to be balconies with curtains. The compartments, called "chambers", also act as acoustic boxes to project their sounds. Arrays of louvers between the curtains and chambers activate as needed to help control volume reaching the auditorium. The chamber we visited (left side for the audience, "stage right" in the vernacular) is immaculately clean and maintained despite containing closely packed arrays ("ranks") of detailed pipes, percussions, and wooden boxes ("tibias"). Each array of pipes (1300 overall) tended to be on

squat rectangular air-supply boxes ("windchests") arranged compactly on a common platform above control boxes supplying consistent air pressure. Each pipe or other unit must be individually cleaned, tuned, and repaired.

These windchests (not pictured) are medium-sized wooden boxes with bottoms and lids that incorporate valves, springs, and weights to set pressure feeds to individual pipe ranks. To untrained eyes, they appear to be simple affairs, held together in each corner by coil springs to determine how much air is relieved past the lids.

One of the two musical chambers includes the internal mechanisms of an upright piano. It can be electrically integrated with the overall organ system and/or an organ keyboard can electrically activate individual hammers.

Air pressure for our musical chamber is generated in a room above it, using the original triple-centrifugal blower. The blower's housing is about 5' in diameter and 30" deep. It is driven by a 10 hp electric motor to develop 15" of head (versus theoretical water column), as much as quadruple what most large church organs utilize. For its size, the blower is unusual



in that it revolves entirely on the motor's ball bearings, with the air impellers precisely balanced in rotation. The design generates very little vibration and therefore minimal unwanted sound. Low vibration has resulted in extremely long motor and fan life (a theme from last month's Wagner Meinert tour). The opposite end of the motor used to drive a flat belt which turned a compound-wound DC generator (somewhat self-regulating) for the organ's relays, console lights, and more.

The Embassy's organ came online just as the industry was shifting to movies with prerecorded sound tracks, typically a vinyl phonograph record to be synchronized with the film (aka Vitaphone). The electrically complex organ console survived in part by having its own enclosed storage under the stage, protected and out of the way. Much of the remote equipment was in areas not needed over the years. As economics of downtowns collapsed during the early 1950's, organist Buddy Nolan



began giving late night recitals to provide respectable after-hours activity downtown, continuing for about a quarter century. The Embassy was saved by not being modernized, from demolition by a large civic fund drive in the 1970's, by a last-minute loan, and then by being slowly restored. FWEC

members were involved, notably Ellsworth Smith.

Wandering during our tour allowed appreciation of Embassy's nationally recognized acoustics. One could clearly hear, from essentially anywhere, conversations taking place on the forward part of the stage. Volume dropped as conversations moved backstage from the stage's portal. Sounds in the audience were muffled, but provided feedback to the stage. The theater is an astonishing sound box, and decidedly integrated with the organ systems. Ornate arches, ceiling domes, pseudo-columns, and fine details all play a role. The building's intricately intermeshed systems are an architectural marvel both intellectually and in how one might coordinate it all as building plans. That may be a future tour.

Our sincere thanks to the organ crew for sharing this combination of science, technology, engineering, art, math, history, and enduring design.

General Info

Thank you for the donations, returned postcards, and positive comments! These levels of support and guidance have significant impact on the continued vitality of Fort Wayne Engineer's Club which has been active since 1935. We appreciate your continued support and participation in club events!

Fort Wayne Engineers Club dues are \$0. Donations are welcome but strictly voluntary. In recent years, club funds have helped support Discover-E, annual bridge building contests in schools, academic awards, networking events, mentoring, our website, and facilitating free tours. Please see FortWayneEngineersClub.org, LinkedIn, or Facebook for updates on current Club activities, other news, and/or prior newsletters.

Those participating in activities through FWEC and our hosts does so strictly at their own risk, including disease exposures. Participation in club events is voluntary, free, nonprofit, and solely for the benefit of participants and the community at large.

Anyone with an interest may participate unless restrictions are specified for specific events, such as minimum age or minimum safety attire.

Local Opportunities

Experimental Aircraft Association Chapter 2

The Experimental Aircraft Association's Chapter 2 is still active. Check the [EAA-2 website](#) for current information!

TekVenture

TekVenture needs donations in cash or membership to help with heating costs while repairs continue after the fire. Membership is the most useful because growth in official numbers has additional impact. See TekVenture.org, a 501(c)3.

Interested in hosting a tour?

Contact us at info@fortwayneengineersclub.org

FWEC Board Meetings

The FWEC board meets eight times a year to plan and organize tours for our members. These meetings are open for anyone to attend. We are always looking for new members to join our team! If you are interested in being a board member please attend our next board meeting or contact us at info@fortwayneengineersclub.org.

**The FWEC has an urgent need to fill the club's Treasurer Trainee position. If you are interested in this opportunity please contact us!

Next Meeting

Date: Tuesday, December 1st

Time: 7:00 pm

Location: 502 E Pettit Ave, Fort Wayne, IN 46806

FWEC roster for FY2020-2021

President: Nate Berndt

Vice President: TBD

Immediate Past President: John Magsam

Secretary: Marna Renteria

Treasurer: Ryan Stark

Treasurer-Trainee: TBD

First-year Board Members: Dave Gordon, TBD

Second-year Board Member: John Renie, Craig Welch

Third-year Board Member: Rob Cisz, Bert Spellman

Editor of Engineer News: Morgan Miller

Membership and Contact Chair: Dave Schaller

Northeast Indiana DiscoverE Chair: TBD

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