

Should We Tell?

By Lowell A. Benson, UNIVAC 1960 => Unisys 1994.

INTRODUCTION

I was copied on an email from Duane Craps to his former co-workers. His subject line was: "Should we tell them that it is not a 1218 part?" His message was an eBay link, object screen shot here.

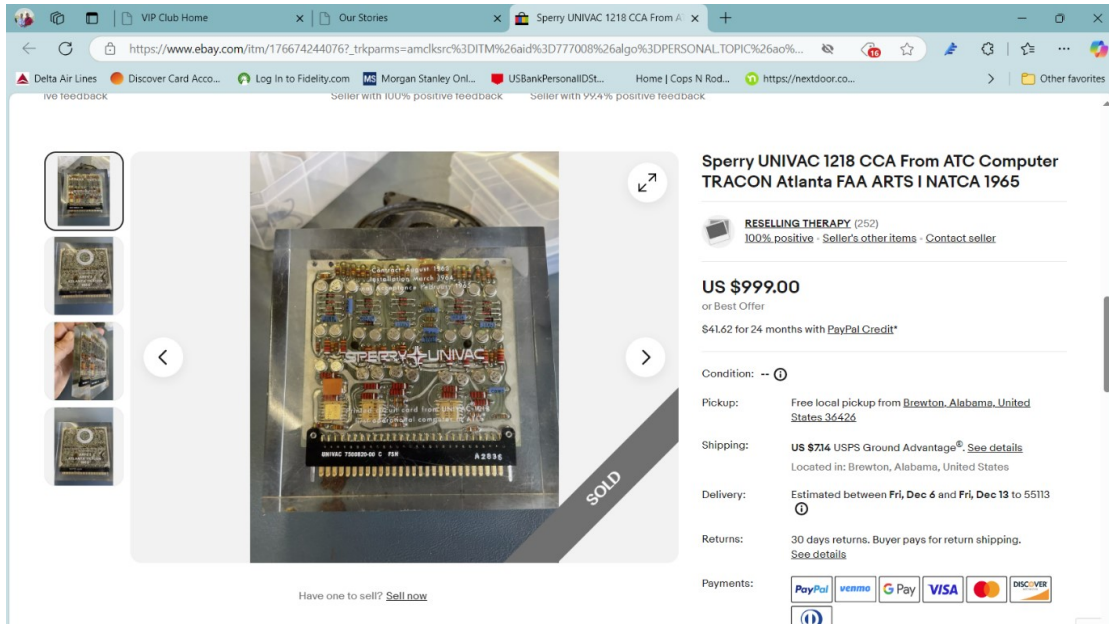


Figure 1. Screen shot of eBay advertisement 176674244076

My answer to Duane's question is YES, however in addition to telling them that the Computer Card Assembly (CCA) is not a 1218 CCA, we herewith provide correct information about the card.

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Written and edited with Microsoft Word, December 11, 2024

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Credentials:

Mr. Craps is noted in the 2nd paragraph of the VIP Club's Chapter 53 Introduction, <https://vipclubmn.org/cp18bit.html>. He and friends had resurrected a 1219B computer from the Johns Hopkins University Applied Physics Laboratory for the [Wall NJ Vintage Computer Federation](#).

Mr. Benson operated a Type 1218 computer in the early 60s, was a system engineer on the FAA Advanced Automation Systems project in the early 90s and has been the VIP Club's 'Historian' since 2005. <https://vipclubmn.org/PeopleDocImg/Vol01Book1.pdf>.

OBJECT for SALE

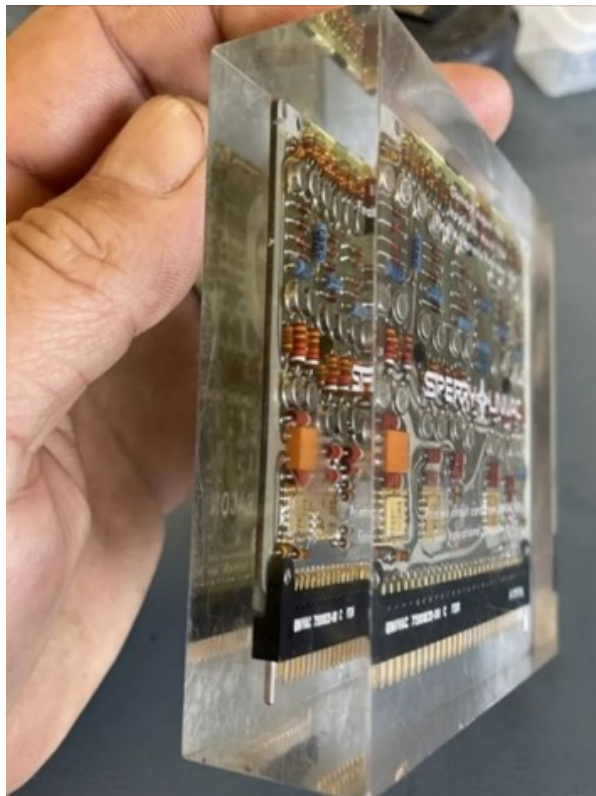
The object of the e-Bay posting is a 56-pin printed circuit card encapsulated in clear plastic; the component side of the card is reflected on the inner surface of the plastic. At Lowell's first glance it appeared to be either a Navy CP-890 module or an FAA ARTS III module.

The lettering on the CCA circuit side:

- A Federal Aviation Administration 'seal'
- In recognition of the ... FIRST AUTOMATED AIR TRAFFIC CONTROL FACILITY IN THE WORLD
- ARTS I ATLANTA TRACON 1963

The lettering on the component side:

- Contract August 1963
- Installation March 1964
- Final Acceptance February 1965
- SPERRY + UNIVAC
- Printed circuit card from UNIVAC® 1218
- First operational computer in ATC



Mr. Craps, his former co-workers, and Mr. Benson dispute the lettering highlighted in yellow!

ARTS => Automated Radar Terminal System
ATC => Air Traffic Control
CCA => Computer Card Assembly
FAA => Federal Aviation Administration.

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CCA FORENSICS:

The eBay screen shot in figure 1 above has four side pictures, selecting anyone of them gives a larger image for readers to get a closeup view. This paper has three of their four images, the 2nd and 4th appeared to be the same.

Circuit side

We have no issue with the wording on this side of the object. The lettering on the connector is the first 'clue' in identifying this module. The 000404-0002N may be the manufacturing factory job number. The 68 38 is the date code of card manufacturing, the 38th week of 1968.

My memory from the 60s is that pins 55 and 56 were the +5V power connections for the card thus the heavy metal along the right side of the card. Pins 7-8, 19-20, 31-32, and 43-44 are the power ground pins.



Component side

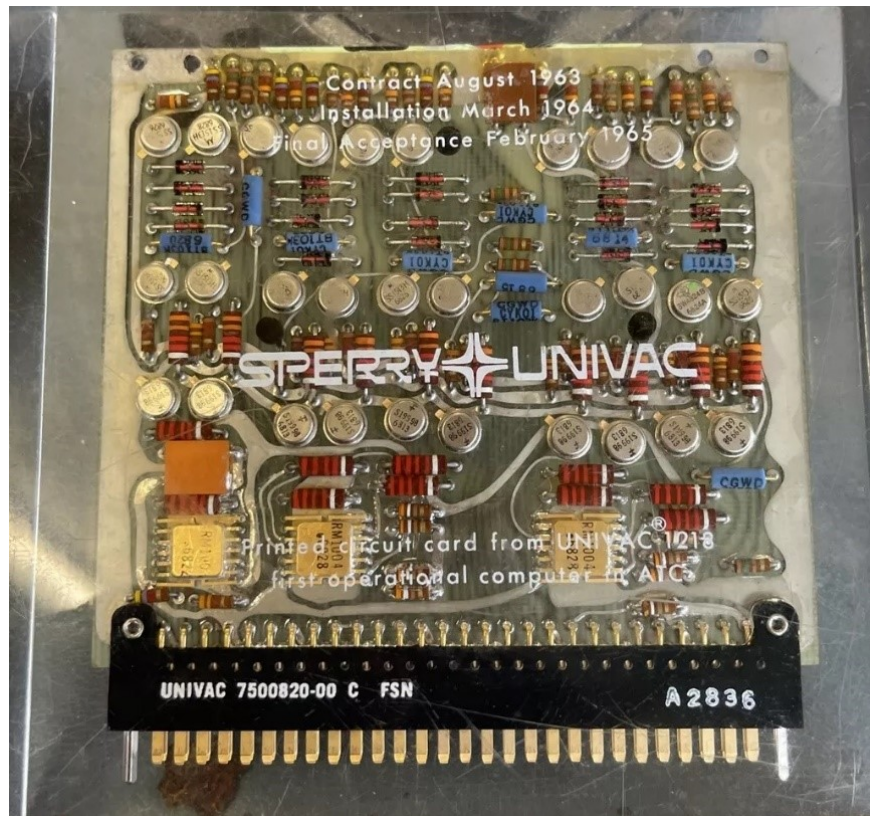


Figure 2. Component side of circuit card assembly (CCA) extracted from eBay figure 1 above.

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The first three white information lines: *Contract August 1963 – Installation March 1964 – Final Acceptance February 1965* are correct. The label **SPERRY+UNIVAC** is a chronology faux pas; that corporate name and logo did not exist before 1973 when the St. Paul division of Sperry Rand was named Sperry UNIVAC, Defense Systems Division, <https://vipclubmn.org/lmcolegacy.html#Names>.

We dispute the white “**Printed circuit card from UNIVAC 1218...**”

Both Mr. Craps and Benson know that all the 1218 printed circuit modules were 15 pin cards using germanium transistors. This image is from <https://vipclubmn.org/Artifacts.html#PCcards>, one of many old PC cards in our artifact collection at the Lawshe Memorial Museum, <https://vipclubmn.org/Exhibits.html#Lawshe>.



On the component side of the eBay image is the UNIVAC part number 7500820-00 C FSN (Federal Stock Number). The A2836 is the card S/N. The right two flat-pack integrated circuits are labeled RM1004, 6828 meaning manufactured in the 28th



week of 1968. RM1004 is the last four digits of the purchase part specification, see https://vipclubmn.org/Articles/The_Univac_7901000RevC.pdf component family specification info.

The left integrated circuit is labeled RM1003, 6824 – chip manufactured the 24th week of 1968. The 7901003 and 7901004 specifications were a +10°C to +95°C temperature version of the 7901001 & 7901002 devices and were in 14-lead flat packages. It could be used where operating temperature was not as severe as the 7901001 or 7901002 (Military specification requirements.)

MORE FORENSICS

Similar Circuit Cards

At the Lawshe Memorial Museum in St. Paul we have a Circuit Card Assembly 7500820-00 B S/N A0258, at the below right shown here with CCA 7500800-00 B S/N A0227.

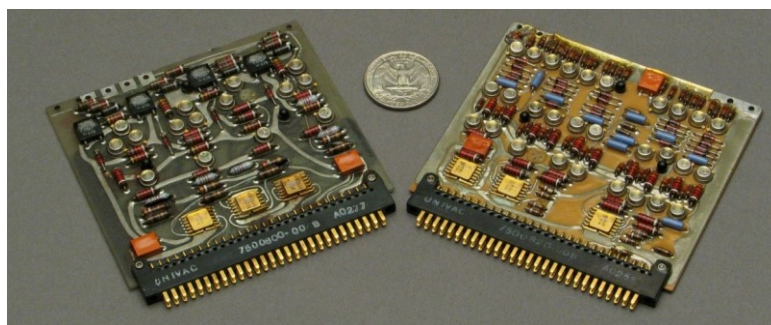


Figure 3. IMG_1980.jpg at the Lawshe Memorial Museum.

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Our website, <https://vipclubmn.org/Artifacts.html#PCcards>, descriptive text for 7500820 is: "PC Card, 56-pin, air cooled, no T bar, "-3V Input Amplifier", has early Westinghouse WS286 and WS287 chips on board (7901003 and 7901004). Designed 7/1967 by Mel Wagner – 1968 - 3.5x3.5x0.3 - 7078027 Drawer Assy (1219?)."

The companion card description (left) is: "7500800-00 - Rev. B - S/N A0277 - PC Card, 56-pin, air cooled, no T bar, "-3V Data Line Driver Amplifier", has early Westinghouse WS287 and Raytheon RM1004 chips on board (7901003 and 7901004). Designed 7/1967 by Mel Wagner – 1967 - 3.5x3.5x0.3 - 7078027 Drawer Assy (1219?)."

- The almost obvious difference between the eBay card and our museum card is the connector labeled revision letter after the part number; we have revision **B** whereas eBay shows revision **C**. The update from **B** to **C** is not obvious, could have been a parts list change of a component.
- The use of the CCA in Drawer 7078027 (1219?) means that the person identifying the card was not sure if the PC card was used in the 1219. The 1219 is an update from the 1218, the cards in the 1219 used silicon transistors versus germanium of the 1218. Also, the 1219 had a 2-microsecond memory cycle time versus the 1218's 4-microsecond memory cycle.
- The descriptive words "-3V Input Amplifier" is the type of communications voltage level which would have been in accordance with UNIVAC/Sperry Design Specification DS-4772, Type B. The DS-4772 Type A was -15V and Type C was +3V. DS-4772 was the baseline for the government Mil-Std-1397 for Navy equipment communications. In general, the 1218 equipment used Type A whereas the 1219 used Type B.
- Personally, Lowell designed parts of the CP-901 airborne computer which used CCAs with T-bars as did the shipboard AN/UYSK-7 computer. T-bar cards were conduction cooled whereas no T-bar cards were convection cooled.

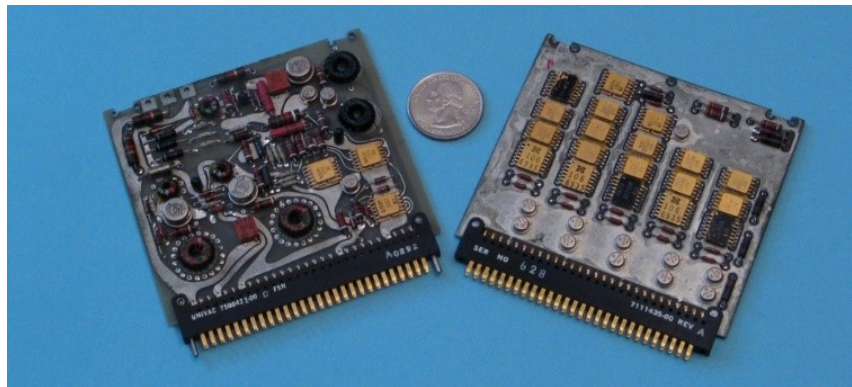


Figure 4. Similar CCAs, IMG_1984 at the museum.

These two Circuit Card Assemblies are shown and described here because they are of the same general format and creation time frame. Descriptive text: Univac - 7500421-00, Rev. C, S/N A0150 - PC Card, 56-pin, air cooled, no T bar, "Read/Write Drive Diverter", has Raytheon RM1001 chips (7901001) on board. Designed 2/1968 by D. Ripley – 1968 - 3.5x3.5x0.3 - 1219B, 7053750 Memory, 7078028 Drawer.

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- The Drawer assembly drawing number of these two memory cards is adjacent to the Input and output cards drawer no., i.e. 7053728 and 7053727, thus designed at the same time.
- The application is 1219B, Memory Drawer as noted by the person archiving the card.

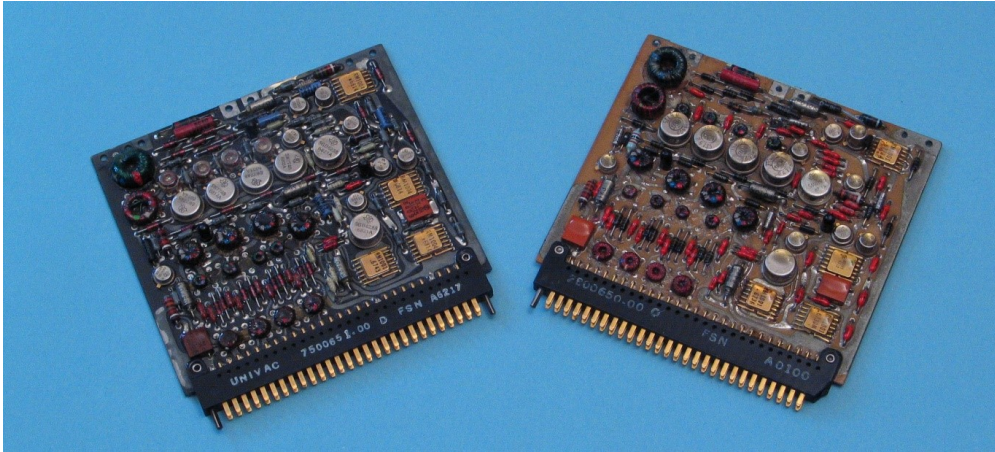


Figure 5. IMG_1870 shows card types 7500651 and 7500650.

PC Card, 56-pin, no T bar, "Sense and Inhibit Amplifier", uses 7901004 chips and transistors. Designed 8/1970 by Jim Warwick. Univac - 7500651-00 Rev. D, S/N A6217 – 1968 -3.4x3.5x0.2 - 1219B Memory.

- The difference between the 7500651 and 7500650 cards was an artwork change. Did I mention that my first job at UNIVAC was as a drawing control clerk thus learning about why part numbers and/or revision levels changed. LAB

This begs the question; was there a 1219B with 56 pin cards at Atlanta after 1968 when these CCAs were assembled?

Military Computers

I reviewed the Military 1219B Technical Manual, available on-line via Bit Savers, https://bitsavers.trailing-edge.com/pdf/univac/military/1219/PX4682-2-2_TYPE_1219B_DIGITAL_DATA_COMPUTER_VOLUME_2_SECTION_9_Jul72.pdf. This manual to me is the military 1219B (CP-848). It lists the part numbers for the CCA card chassis/drawers for both memory and Input/Output drawers; none of which match the 7078027 nor 7078028 associated with the 56 pin CCAs listed on the above pages.

Early military computers data is tabulated, <https://vipclubmn.org/Computers.html#Models>. This shows that there were 367 CP-848 (1219Bs) manufactured. We know that the primary use of these was as launch control for the Tarter, Talos, and Terrier shipboard ship-to-air, ship-to-shore, and ship-to-ship targeting. We have not found any specific data showing any of these configurations for civilian applications.

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Air Traffic Control

ARTS I place in history is illustrated by this Genealogy of ATC systems

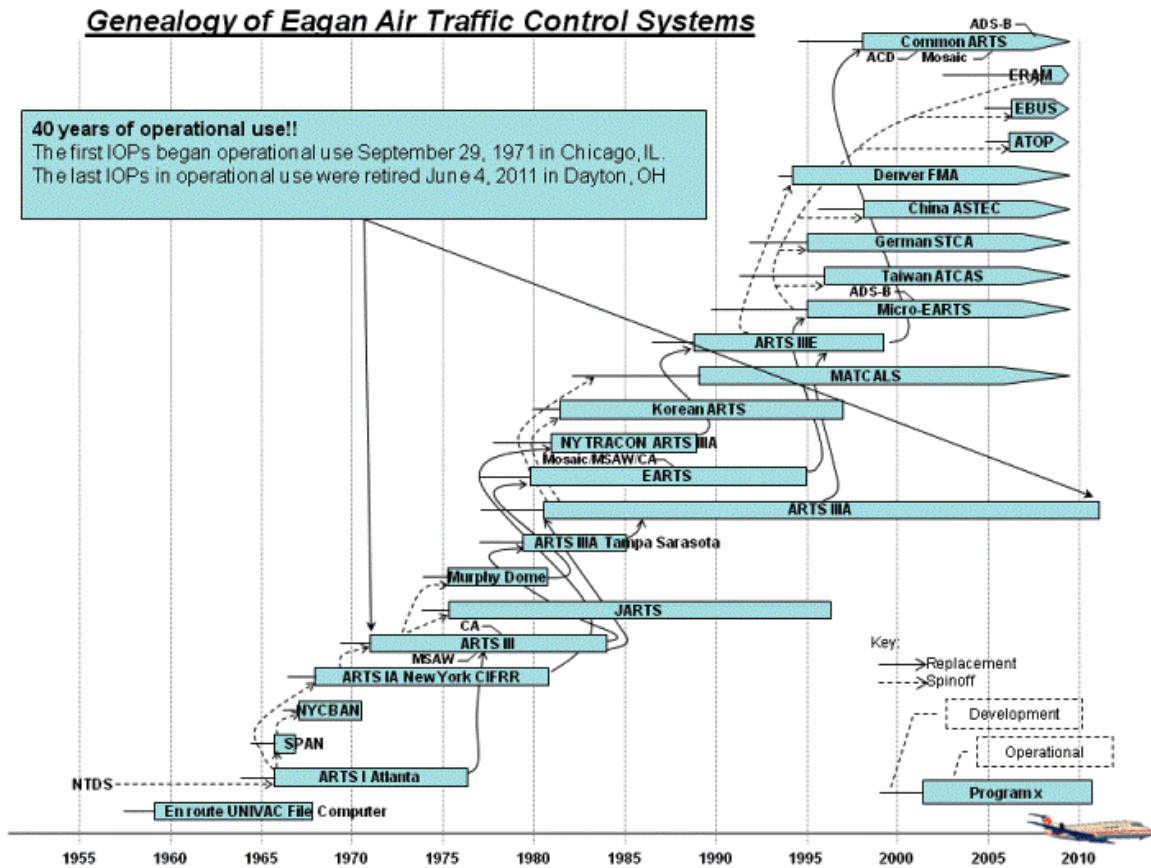


Figure 6. ATC systems with ERA/UNIVAC/Sperry/LMCO involvement. It should be noted that the FAA systems went international – in some cases cooperating with ATC systems developed by the French. In the 90s Denver FMA required a special system because of the three parallel runways DIA and the close proximity of the old DEN facility still in operation.

Descriptive text of each listed system is at

https://vipclubmn.org/ATCntl/Eagan_ATC_history_2012brief.pdf.

Table I. The first four Air Traffic Control (ATC) systems were:

<p>1. 1956, UNIVAC File Computer used to process flight information</p>	<p>In 1956, the FAA tapped Univac to find out how to use computers for air traffic control. The UNIVAC File Computer used to process flight information at five ATC centers by 1959.</p>
<p>2. 1963-1966, ARTS I - Atlanta In 1963 the FAA awarded a contract to the Univac Division</p>	<p>Two UNIVAC 1218 computers bring automated air traffic control to Atlanta, Georgia. The date, 1964. The computer backed up system called ARTS, uses advanced electronics to tag radar blips with symbols¹, letters and numbers - alphanumeric. (Per Swiss</p>

¹ This tagging technology was a variation of the Naval Tactical Data System for Identification Friend or Foe (IFF) that had been fielded using the CP-789, a shipboard environment version of the Type 1218 computer.

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<p>of Sperry Rand for ARTS I in Atlanta</p>	<p>ATC proposal and a 1963 Journal of ATC article, ARTS meant Advanced Radar Traffic Control System.) INCO at Atlanta tower to start in March 1964 with full operation scheduled for July 1964. The Radars were ASR-4 and ATCRBI-3. 1218 computers. (JWF) System Test in Feb 1965 (8000 instr.) A lot of evaluation time. The system was declared operational after field trials in 1966.</p>
<p>3. 1964, Stored Program Alpha-Numeric (SPAN) beacon system 1964</p> <p><i>This high-altitude display experiment provided fodder for the eventual enroute center operations as developed by the FAA Atlantic City system test facility.</i> LAB</p>	<p>Per 1963 Journal of ATC article, ARTS is primarily a terminal system. A similar system for beacon readout only will be installed in the high-Altitude Positive Control Facility at Indianapolis Center. This system is called SPAN. Per Sept 1964 journal of ATC article, "early next Spring controllers will get a preview of the future method for displaying aircraft identification and altitude on their displays."</p> <p>Apr - Sept 1966 (after SPAN) New York Center Beacon Alpha Numeric (NYCBAN). It consisted of the Indianapolis SPAN system that was relocated to Lake Ronkonkoma, NY which was the location of the Center. The software was modified to adapt it to the New York Center environment. As far as I can recall, it never went any further as a system.</p>
<p>4. 1967 ARTS IA - New York Common IFR Room (CIFRR)</p>	<p>Put into operation early in 1967. Dedication ceremony July 11, 1968. Operational commissioning in June 1969. In 1966, Univac was awarded the contract for the ARTS IA for the CIFRR. Installation began in late 1966 and was completed early in 1968. (JWF) CIFRR contract Aug 15, 1966; contract end Feb 9, 1968. The CIFRR system remained in operation at hanger 11 near JFK airport until it was decommissioned in Jan 1981, when the New York TRACON ARTS IIIA system came on line.</p>

- There is nothing obvious in these systems overview descriptions to indicate that the Atlanta **ARTS I** 1218 systems were updated to use a 1219B computer.
- Sperry document GS3577 lists 94 1218 (CP-789) configurations and 35 1219 configurations (CP-848). None seem to be associated with ARTS.

The figure 5 diagram of <https://vipclubmn.org/ATCntl/CIFRR.pdf> shows that 1219 computers were used in the New York installation. The text thereof is: "Two UNIVAC 1219 general purpose digital computers provide the system with a capability for arithmetic computation, logical decision making, data storage, and overall system coordination." This is the **ARTS IA** summarized as the fourth ATC system above and shown in the timeline on page 7. The manufactured date codes of the 56-pin CCAs pictured in this paper are consistent with the **ARTS IA** timeline.

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CONCLUSION

Although FAA's ARTS I was the first Automated Air Traffic Control Facility in the world, ALANTA TRACON 1963; the encapsulated 1968 Computer Card Assembly was not a part thereof. *Sorry, this is not a 1218 logic module.*

Whoever sold the 'souvenir' recognition module should give the buyer his/her money back.

It is entirely possible that an FAA expanded ATC system used a special version of the 1219 as a 1218 software compatible unit for the **ARTS IA** system. Thus, the FAA may have had a test system in Atlanta to mimic the functions of the New York CIFRR system – perhaps an employee grabbed obsolete 1219? CCA from a spares shelf with good intentions but without application/use knowledge.

History Tidbits

➤ Our archivists labeled some 56-pin PC cards as 1219? were correct, but the B of 1219 may have been guesses. This investigation showed the chassis #s not being in the CP-848/1219B manual. Unfortunately, the individuals listed as the CCA designers are deceased thus we can't verify why a special memory chassis, and an Input/Output chassis were created for the ARTS IA system(s). Still seeking retiree feedback of this topic.

➤ ARTS II was not a UNIVAC ATC system, rather was a Systems Development Corporation (SDC) system implemented at 128 small US Airports. ARTS III was implemented at 64 major airports, both interacted with 23 enroute centers which used IBM computers until the Common ARTS was started in the late 90s for all enroute centers as well as small and large airports.

➤ There is an ARTS III IOP at the Lawshe Memorial Museum as well as an ARTS II display which can show MSP aircraft ground locations in real-time.

➤

Respectively submitted, *Lowell A. Benson,*

BEE 1966, U of MN