PHILIPS BROADCAST EQUIPMENT CORP: FIELD ENGINEER NOTES (1966–1975)

Structured, Topic-Based Rewrite — Part 1

1. Career Background & Facilities

- Field Engineer with **Philips Broadcast Equipment Corp** from **1966–1975**.
- Company locations during that period:
    - Small building in **Mt. Vernon, NY**
    - Rental facility in **Paramus, NJ**
    - New building in **Montvale, NJ**

2. PC-70 Manufacturing & Components

2.1 Camera Head & Viewfinder

- The **physical camera head** for the PC-70 **always came from Breda, Holland**.
- The **viewfinder** also always arrived from Holland.
- The VF's **high-voltage circuit** was notoriously difficult to troubleshoot and repair.

2.2 Plumbicons

- Early PC-70 units used **Plumbicons shipped from Holland**.
- The **Saltersville** facility opened around **1968** (approximate).
- Early logistics:
    - Plumbicons from Holland were installed in cameras during final test in the U.S.
- Later logistics (possibly tied to Saltersville):
    - Montvale used **test tubes** during final test.
    - New Plumbicons were shipped **separately** in a **gimbal-mounted protective box**.

2.3 U.S.-Made Subassemblies

- At some point, the **horizontal and vertical oscillator board** in the head began being manufactured in the U.S.
    - Dutch resistors were visually distinctive, making the change easy to spot.

3. NBC-Specific Modifications & Interactions

- Performed resistor selection for several circuits, especially the **I and Q black balance circuit**.
- Hand-selected Plumbicons to meet **Fred Himmelfarb's** specifications at Rockefeller Center (8th or 9th floor).
- Himmelfarb understood both the technical and political landscape, including the **Cherry Hill** design situation.
- **Sal Benza (N6)**, the truck engineer whose input Himmelfarb accepted, requested many changes that were never implemented.
- Some NBC-related modifications included:
    - Changing **RGB gain pots** to **attenuators with large knobs**.
    - Possible adjustments to **post-gamma / pre-gamma** gain circuitry.

4. CCU (Camera Control Unit) Notes

4.1 Early U.S. CCUs

- Early CCUs were **not wired** for **Contours Out of Green** (two modules).
- Upgrading required removing the CCU from service for hours and working on a proper bench.
- Many stations lacked adequate maintenance staff or facilities.
- Work involved **miniature coax**, making the job delicate and time-consuming.

4.2 Non-Linear Matrix

- The **Non-Linear Matrix** was an **optional card** for the U.S.-made PC-70 CCU.
- **Stations** often declined it due to cost.
- **Production companies** valued it highly.

4.3 Encoders

- During the PC-60 era, **Philips did not have its own encoder**.
- Third-party encoders were used.

4.4 Interlock Path

- The **TV-81 / USA CCU** had an **interlock path**.

- Jumpering pins **44/45** on the CCU would power it on.
- Many users were unaware of this feature.

5. Tools, Test Gear & Field Techniques

- Carried **Boston Insulated Wire pins** and insertion/removal tools; working on these could take hours.
- Five of the pins were **coaxial**.
- Used a **Tektronix dual-trace oscilloscope** (one arm longer) for timing and gunlock checks.
    - Many customers did not know how to external-trigger a scope.
- In some troubleshooting cases, a **lead pencil** could substitute for a **small-value pF capacitor**.
- Many small stations in the late ’60s had only **one color monitor**, sometimes a “jeeped” unit rather than a Conrac.

6. Test Charts & Demonstrations

- Created a custom **fabric-based test chart** (made by his wife) to simulate color bars.
    - Colors did not align to vectorscope boxes but revealed **Plumbicon strengths** and **competitor weaknesses** during demos.
    - Continued using these charts for **30+ years**, even after several were stolen.
- **Contours Out of Green** was a major competitive advantage — only Philips had **Vertical Detail** circuits at the time.
- In early PC-70 vs. GE vs. RCA demos, Philips typically **won on performance**.
    - Final decisions often depended on station politics, pricing, or GE packaging advantages (VTRs, etc.).

7. RF & Environmental Issues

- RF interference from **subway power** was a known issue.
- Similar problems occurred on **golf courses** near TV/radio transmitters.
- Attempted solutions included:
    - Removing hinges

    - Sanding for bare-metal contact
    - Adding ground braid
    - Aluminum foil shielding

8. PC-100 Development & Early Triax

8.1 Early Development

- Breadboard modules for the **PC-100** were seen in Montvale as early as **1968** (possibly earlier).
- PC-100 components sourced from Holland:
    - Physical head
    - Prism
    - Yokes
    - Viewfinder
- U.S.-made components:
    - Three electronic bays in the head
    - Entire CCU
- Two versions existed:
    - **A-Version** (demoed around 1969)
    - **B-Version** (final production)
- Triax adoption did not accelerate until **1972**.
- Credit for PC-100 design attributed to **Tony Cumo** (sp?).

8.2 Triax Connectors

- The first Triax connector used on PC-100 was **not** the Kings Tri-Loc.
- It was an **Amphenol threaded "U" connector** with:
    - No polarity
    - Threaded barrels that prevented removing the wrong end
    - Softer material than Kings

9. Component & Purchasing Issues

- The U.S. CCU used a basic op-amp transistor: **2N708**.
- Purchasing mistakenly ordered the **wrong 2N708 variant** (multiple specs and manufacturers existed).
- Result: a brief period of technical problems.

10. Corporate Philips & R&D

- North American Philips owned many U.S. companies, including non-electronics firms (e.g., **Genie garage door openers**).
- Philips had an **R&D Lab in Briarcliff, NY**.
- A PC-70 was taken there for a confidential evaluation.
    - Engineers **removed the Plumbicons** and replaced them with **semiconductor pickup devices** (circa 1968–69).
    - Their report concluded:
        - Large-scale circuitry was **not yet advanced enough**.
        - Semiconductor pickup devices would cost **5× more** than a Plumbicon.

11. Lens Manufacturers

- Early years:
    - **Angenieux** (primary)
    - Later: **Schneider** and **Rank Taylor Hobson (RTH)**
- European preference for **servo zoom and focus** meant Angenieux lenses arrived configured that way until manual cable kits became available.

12. CBS & Philips

- One reason CBS favored the PC-70:
    - Holland and GE would not accommodate custom requests.
    - Philips USA would **drill holes wherever "Doc" wanted**.

13. Portable Cameras (PCP-70 & PCP-90)

13.1 PCP-90

- Essentially a **CBS Labs design** rebranded as Norelco.
- Worked well as a **self-contained production camera**.
- On Triax, the **gunlock circuitry** was unstable.
- Could run all day on **Sears Deep Cell Marine batteries**.

13.2 PCP-70

- Often pictured with the cameraman wearing the backpack, but the system was **very heavy**.
- Intended that the backpack might be set on the ground or worn by a second person — but that increased cost.
- During demos, hired station cameramen were instructed to rest every 20 minutes.
    - Two fainted; both were caught before hitting the ground.
- Stations that did not buy a **spare backpack cable** suffered operational problems.

14. PC-70 Special Variants

- Two PC-70 models existed **without a viewfinder**:
    1. **Film chain camera**
        - Included an ND wheel and circuitry superior to most competitors.
    2. **Lab camera**
        - Used on microscopes
        - Also installed inside a **hospital surgical lamp**
- CCUs for these models were **Philips USA** units.

15. Demo Stories & Field Anecdotes (Part 1)

- A Hughes Sports Network tech in New York carried a **PC-70 under each arm** — would have made a great ad, but PR declined.
- Modeled the PCP-70 for magazine ads for **$1**, signing a release.
    - Appeared in publications archived at **worldradiohistory.com** (e.g., BME April, p. 66–67).

Part 1 Complete — Ready for Part 2

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16. Temperature, Environmental Issues & Field Conditions

16.1 Temperature Sensitivity

- Temperature problems were **not** caused by transistors — Philips did **not** use consumer-grade components.
- The real vulnerability was **the glue**:
    - Used in the **prism assembly**
    - Used to hold the **IR button** on the front of the Plumbicon
- Even today, GVG (still Breda) chip cameras provide **temperature data at the MCP** because cameras run extremely hot in sunlight.
    - Components are fine — the issue is **airflow**, and reluctance to use large fans or heat sinks.

16.2 1968 Winter Olympics – ABC

- Worked with ABC's **USA PC-70 truck** on the men's downhill.
- Cold temperatures caused only **minor glue issues**.
- The major problem was **condensation** in the **TV-81 cable connections**.
    - Each morning the **Green channel** would be missing.
- ABC hired a skier as a utility man, gave him an **axe handle**, and had him ski down the mountain hitting each cable connection.
    - Each strike restored the Green channel.
- The French Army had installed the cable the previous summer, with connections mounted high on steel fence posts above snow level.

17. LDH-1 Dealer Camera Issues

17.1 LDH-1 Construction

- The LDH-1 arrived as a **complete Dutch camera**.
- Each door contained **one large circuit board**.

- A particular IC run was known to be **faulty**.
- Carried a bag of correct-version chips:
    - Scoped the area
    - Cut out the bad IC
    - Removed solder
    - Installed the new chip
    - Customers were amazed at the speed and confidence of the repair

17.2 FBI Incident

- Traveled to a dealer preparing for an **Open House** featuring the LDH-1.
- Discovered the IC problem the week before but had no replacement chips.
- Returned the next week with chips and installed the fix.
- While setting up the camera, two **FBI agents** tapped him on the shoulder.
    - They wanted to know who he was and where he had been.
    - The dealer had rented out the studio over the weekend for **XXX film production**, and the producers had mailed some of the footage — triggering an investigation.

18. Demo Anecdotes & Customer Interactions

18.1 PC-70 vs GE vs RCA Demos

- Side-by-side demos were common.
- One chief engineer told an RCA salesman:
    - "Your camera isn't big enough."
    - Meaning: *it was so heavy they couldn't get enough people around it to lift it.*

18.2 The Preacher Who Wanted to Return a Camera

- Traveled with a salesman to a large network customer.
- The preacher insisted the camera was defective and must be returned.
- The engineer fixed the camera while the salesman was sent for coffee.
- When they returned, the preacher declared:

    - "God has told me the camera is no good and cannot be fixed — I want to return it."
- Philips took the camera back without argument.

19. Ambassador College (West Coast)

19.1 Gardner Ted Armstrong

- Ambassador College had a beautiful campus.
- Gardner Ted Armstrong would:
    - Sit at the desk with **no notes or prompter**
    - Talk for **30 minutes** (tape)
    - Take a **10-minute break**
    - Return and record another **30 minutes**
    - Produced **five shows in one day**

19.2 Need for a Fourth Camera

- The CE wanted one more camera for the opening of a new theater.
- The college already had **three studio cameras**.
- The CE had installed **TV-81** for the studio cameras.
- The Philips salesman, hoping for future business, provided a **PC-100**.
- The customer was responsible for providing **Triax** from the theater to the studio via a tunnel.

19.3 The Wrong Triax Cable

- The salesman was not a cable specialist and supplied a **Belden model number**.
- The college purchased and installed the cable.
- When the PC-100 head was connected in the theater:
    - **Nothing happened — the camera would not power on.**
- The issue:
    - Triax, like coax, comes in many variants with different **center-conductor DC resistances**.

    - The cable installed was the **wrong type** for the required distance (~2000 ft).

20. Additional Notes & Observations

20.1 Hughes Sports Network

- A New York Hughes Sports Network tech carried a **PC-70 under each arm**.
- Would have made a great advertisement, but PR declined.

20.2 PCP-70 Advertising

- Modeled the PCP-70 for Philips PR for **$1**, signing a release.
- Appeared in trade magazines archived at **worldradiohistory.com** (e.g., BME April, p. 66–67).

PART 2 COMPLETE