Vidor CN435 **Battery Valve Radio Restoration** Mike M1DPB

Warning and Disclaimer

These lecture notes were aimed at a target audience of UK licensed radio amateurs aware of the hazards involved and are **not** intended as a series of detailed safety procedures.

As vintage valve radios use potentially hazardous voltages and materials, guidance must be sought from a suitably qualified and experienced person throughout any restoration to ensure this is undertaken safely and in accordance with current local regulations.

Thornbury and District Amateur Radio Club, the Author and Webmaster **cannot** accept any liability for death, injury or damages resulting from restorations prompted by this talk.





Battery Radio History

- First radios were battery powered using 2 volt lead acid and 120 volt dry cell batteries in the 1920s
- Numerous battery suppliers introduced radios manufactured under their brand name.
- Set design evolved into using miniature B7G
 1.4 volt filament valves from mid 1940s
- Last battery valve set manufactured circa 1960 when superseded by wider availability of transistor sets

Advantages / Disadvantages of Restoring Battery Valve Receivers

Unusual battery depresses market price Unlikely to have heat related damage Compact size and weight Use relatively low voltage components 96 series valves delicate and scarce Valve filaments can be easily destroyed

Approach To Restoration – Safety Warnings

- Whilst battery valve sets are not so dangerous as mains sets care still required
- High voltages this set uses 90 volts HT
- Battery eliminators use mains voltages.
- Electrolytic Capacitors venting unexpectedly during reforming process – Use safety goggles!
- Plated Chassis Possibly cadmium Seek advice!
- Need to fuse batteries if modern cells used

Approach to Restoration - CN435 Circuit

Classic 1950s 4 Valve Superhet comprising:

- DK96 Heptode frequency changer and local oscillator
- DF96 Variable Mu Pentode IF amp
- DAF96 Diode detection and pentode first stage audio amplifier
- DL96 Audio power output pentode driving loudspeaker
- Grid bias for AF output stage derived from dropper in –ve HT line

Approach to Restoration - Initial Checks and Repairs I

Obtain circuit / service sheet

- Initial visual examination Mk1 eyeball
- Signs of bodged repairs (competent repairers neatly restore set to specification)
- Damaged / perished / incorrect wiring
- Check Valve filaments for continuity 1.4 v types easily damaged by excess voltage

Approach to Restoration - Initial Checks and Repairs II

- Paper capacitors may have leaky insulation
 - (design life exceeded) Replace with suitably
 - rated polyester/polypropylene capacitors
- Ceramic, silver mica and polystyrene capacitors probably serviceable
- Replace suspect (leaking) electrolytics and any widely out of tolerance resistors.

Approach to Restoration - Initial Checks and Repairs III The one electrolytic capacitor was replaced as a precaution to avoid small leakage currents wasting valuable HT. If this capacitor is retained, it will need to be reformed until the leakage current is within the manufacturers' specification



Before Component Replacement

Component Replacement

After

Power Up Set

- Remove Valves Check HT & LT circuits for shorts
- Apply HT and LT voltages and check correct at all valve base contacts (High voltage!) Remove power
- Replace Valves Apply LT first as valve fitments easily damaged by inadvertently applying HT.
- Measure voltage / current taken from supplies
- Power requirements 90volts @ 9ma plus 1.4 volts @ 130ma.
- Check Loudspeaker for any clicks / noises
 If not fault finding is from this point back to the aerial

Battery Warning Label

IMPORTANT

1. ALWAYS insert plug into the L.T. battery BEFORE inserting plug into the H.T. battery.

2. ALWAYS remove plug from the H.T. battery BEFORE removing plug from the L.T. battery.

NEVER leave the H.T. battery connected to the receiver unless the L.T. battery is ALSO connected.

Options as HT batteries Obsolete

- Use mains eliminator power supply
 - Vintage Mains Eliminators will require restoration and safety checks before use!
- Use battery powered inverter Several proprietary and DIY designs available
- Use several PP3 batteries in series from same batch to fill replica battery box (Suitable Fuse!)
- A single NiMH (nickel–metal hydride) cell provides ideal LT voltage (Suitable Fuse!)

Vintage Mains Battery Eliminator



Faults encountered

- Open Circuit Output Transformer
- Measured open circuit at points "a" and "b" below
- Very small transformer with fine windings
 After 60 years prone to green spot
 - corrosion
- Replacement transformer was salvaged from a scrap set

Faults Encountered



Original Output Transformer



Replacement Output Transformer



Spares & Information Sources I

- New manufacture high voltage capacitors and resistors readily available
- A few traditional UK radio shops still sell NOS (new old stock) components
- Numerous Internet suppliers offer NOS and new manufacture components
- British Vintage Wireless Society (BVWS) and several UK vintage radio Internet forums offer extensive advice, circuit diagrams and spares

Spares & Information Sources II

- 96 range Battery valves and easily damaged Hence care in use
- Capitalise on any valve radio component sales opportunity as it may not be repeated
- Offer redundant spares to other collectors
- Recycle unobtainum components (e.g. coils & transformers) from scrap sets



Another Example – PYE P114BQ Before Component Replacement

Another Example – PYE P114BQ After Component Replacement

88 20

88

163V

OIN

3138

BEMP

N/W35

Conclusion

With care these battery valve sets can be easily restored to full working order and (in this example) the case cleaned using foaming cleaner.

However as low consumption battery valves are a finite resource these sets are not recommended for daily use.