

WOOD & DOUGLAS 70PA2/S 432MHz RF Switched Pre-amplifier

The effectiveness of r.f. pre-amplifiers has been discussed several times in *PW* and the main conclusion reached is that for optimum overall system sensitivity/lowest noise figure the place to locate a pre-amplifier is as close to the antenna as possible. On 432MHz the result of placing the pre-amplifier at the shack end of 15m of UR67 coaxial cable, assuming a noise figure of 1.9dB for the pre-amplifier and a 6dB receiver noise figure, would result in an overall noise figure of 6.1dB. The **overall** system noise figure for a mast-head mounted pre-amplifier would be 2.63dB—a **very** significant improvement.

Wood and Douglas developed the 70PA2/S for this purpose and the unit can be purchased ready built or as a kit. As with all W & D products yet seen by this reviewer the level of preparation is exceedingly good and sets the standard for kit suppliers.

As the double-sided p.c.b. is laid out with a device density similar to that found on industrial assemblies reasonable proficiency in forming and soldering the 57 components is called for. The kit version on review took approximately 2½ hours to assemble following the concise instructions provided, which include circuit diagrams, p.c.b. overlays and all relevant device identification information.

Circuit wise the 70PA2/S uses an NE 21936 low noise bi-polar transistor in a common emitter configuration with tuned input and output. Protection from excessive r.f. to both input and output is provided by back-to-back 1N4148 clamping diodes.

Electro-mechanical relays are dispensed with in favour of *pin* diodes for r.f. switching, which has the advantages of reduced price, size and long term stability. The only disadvantage is that this arrangement does limit the power handling to a safe level of 30W, but for most commercial transceivers, ATV transmitters etc., this is still well within safe limits.

The r.f. switching arrangements are designed to provide maximum versatility and incorporate both r.f. sense VOX and "hardline" control options as standard. With no d.c. supply (12V) applied to the pre-amplifier the unit is effectively "transparent" to r.f. in both directions (typical insertion loss 0.8dB). Connecting either the "+T"

terminal to ground or the "+T" to the supply positive rail switches the unit into the "straight through" mode, useful if running QRP below the level needed to actuate the r.f. VOX (30mW). For s.s.b. use a hang time of 100ms is also built in.

On test the gain of the pre-amplifier was measured at 13.5dB with a supply of 12V d.c. and a standing current on receive of 60mA. All parameters quoted by the manufacturer were met by the constructed kit sample.

Alignment of the kit pre-amplifier consists of adjusting three film trimmers—one to set the through-switching line up for minimum insertion loss and the other two to peak the tuned input/output sections. The method adopted for the review sample was to mount the terminated pre-amplifier onto the antenna system (with mast winched over) and to audibly peak-up on a known constant weak signal source. (In this case a mysterious non-identified carrier apparently vertically polarised and first heard during early 83—any guesses?)

In use the pre-amplifier has been mounted at the mast-head approximately 1.5m from the antenna driven element (Quad Loop/Silver 70 Yagi). As the pre-amplifier is not supplied in a

case a suitable r.f. and water tight enclosure was constructed by using a skimmed milk powder tin. N type r.f. connectors and d.c. input feedthroughs were mounted on the lid with the pre-amplifier sat on a copper strip bracket soldered on the rear of the lid. A wrap around with self-amalgamating tape and a generous coat of Finigans Wax Oil complete the weatherproofing which after six months of rain/snow etc., shows no signs of deterioration.

Switching in the pre-amplifier during ATV contacts always results in a typical weak picture improvement of at least two grades and on s.s.b./f.m. certainly "lifts" stations out of the noise. These results must be qualified by the fact that the MCP shack feeder is currently "only" 35m of military grade UR67 with a measured through loss of close to 6dB. Notwithstanding this drawback ATV signals have been exchanged under flat conditions over 120km and PAO worked on s.s.b.

Thanks go to **Wood & Douglas Limited, Unit 13, Youngs Development, Aldermaston, Reading, RG7 4PQ, Telephone (07356) 5324** for the review kit which is currently available at £14.75 + p. & p., or alternatively as a built and tested unit at £21.10.

John M. Fell.

