other extreme it's been my sad experience that some young married couples and single men make doubtful propositions. Some simply forget to pay, others have no intention of doing so. Stick to standing orders where you can, and bear in mind that the above comments are only generalisations, which are always dangerous.

Servicing Aspects

You'll need manuals or at least circuit diagrams for each type of set you have out on rental. A fair selection of spares should also be carried, including the major valves if you have hybrid chassis, at least a couple of e.h.t. trays (the universal ones if your sets suit), tuner units, aerial sockets, on/off switches, one or more line output transformers, fuses, crystals and the usual assortment of droppers, resistors, small electrolytics and semiconductor devices. Electrolytics present a problem: they do age when simply left, and are rather expensive. It's best to replace them when doing your initial service, prior to installation.

This initial service must be thorough if you are to minimise the failure rate and customer dissatisfaction. I start by cleaning out all debris and dust, with paintbrush and vacuum, then carry out a careful inspection. Cabinets can be tidied up at this point (see my article on Cabinet Renovation in the January 1983 issue). Clean and lubricate all variable resistors and user adjustable presets with Servisol or similar switch cleaner, but don't use this on the mains switch. If this item is rough or uncertain in operation, replace it. Make sure that the mains filter capacitor is in place: if missing, fit one rated at 1kV at least.

Check all presets on the timebase panels, especially the height and linearity potentiometers, using a spot of switch cleaner or replacing the component as necessary. Check for dry-joints, first visually on the power and timebase panels then, whilst observing the picture, by gentle tapping on the video, chroma, i.f. and tuner panels. Clean dust away from the c.r.t. base panel, checking the spark gaps especially.

You may well find that certain potentiometers on the convergence panel are in an advanced state of decay. These tend to work hard, and replacements should of course be heavy-duty wirewound types.

The main thing is to be thorough and give each set a soak test. When carrying out the installation it's useful to have with you some mains plugs, including the older 5A round pin type, and a few coaxial plugs.

In Conclusion

Running an efficient rental organisation is no picnic. It demands skill and knowledge and, at least to start with, quite a lot of groundwork. There's also the initial outlay, both in terms of time and money, little of which is likely to return quickly – it must be looked upon as a medium-term investment. It's not an easy way to riches, but can make a worthwhile supplement to your earnings, giving an extra string to your bow and a satisfying outlet for your skill.

Finally, rental forms (see earlier) can be obtained from Willow Vale Electronics Ltd, Old Hall Works, Shinfield, Reading, Berks. Literature explaining licence requirements is available from the Office of Fair Trading, Consumer Credit Branch, Bromyard Avenue, London W3.

B & O Tripler Conversion

Keith Cummins

DISASTER struck one evening. The Beovision 2600 had no picture and smoke was emerging from the back. A quick check showed that the e.h.t. transformer's overwinding was overheating – the result of shorted turns. For those not familiar with this particular chassis (90° hybrid) I should perhaps mention that there are separate, linked line output and e.h.t. generator stages, each with its own output transformer. This means that a superbly regulated e.h.t. is provided.

The e.h.t. transformer has always been an expensive item, and now appears to be obsolete. Being reluctant to write off what has always been a very good receiver, I decided to investigate the possibility of using an e.h.t. tripler.

Modification Details

The e.h.t. transformer was removed and the overwinding clamped in a vice. Then, using a hacksaw, I cut down through the overwinding until the saw was just nibbling the ferrite core. Twisting a screwdriver in the slot thus produced cracked the overwinding into two parts. The leads were unsoldered and the whole overwinding was opened out and withdrawn from the core. The third harmonic tuning coil and an 0·01μF capacitor were also removed, so that the transformer was left with just the windings on the opposite leg of the core.

Having done this I replaced the transformer and reconnected those parts remaining. Upon switching the set on, the expected healthy sparks could be drawn from the top caps of the PL509 and PY500A valves, using an insulated screwdriver, thus indicating that the primary winding was operating normally.

There's a pulse of some 8kV at the top cap of the PL509, and the use of a tripler would increase this to 24kV for the c.r.t. The GY501 e.h.t. rectifier and its base were removed, and an ITT replacement tripler, type TS30-11THV, was fitted to the inside of the e.h.t. enclosure just above where the GY501 had been situated.

Fig. 1 shows the connections. The tripler's grey input lead is driven from the anode of the PL509 while the black lead is taken to pin 3 of the transformer – this is the boost voltage point and has the grey leads from the receiver attached to it. Since the focus voltage in this chassis is produced by a separate rectifier driven by the line output stage, the tripler's white focus lead was cut short and sleeved. The red e.h.t. lead was cut and joined to the original lead to the c.r.t., then heavily insulated – this maintains the capacitive feedback used to improve the regulation in these sets. The mauve lead which emerges from the receiver's cableform and goes to the earthy end of the overwinding was cut back to the loom and sleeved, being no longer required.

Both the e.h.t. max and min potentiometers should be rotated fully clockwise (minimum position when observed from the component side of the board). The e.h.t. max potentiometer should be left in this position and not touched again.

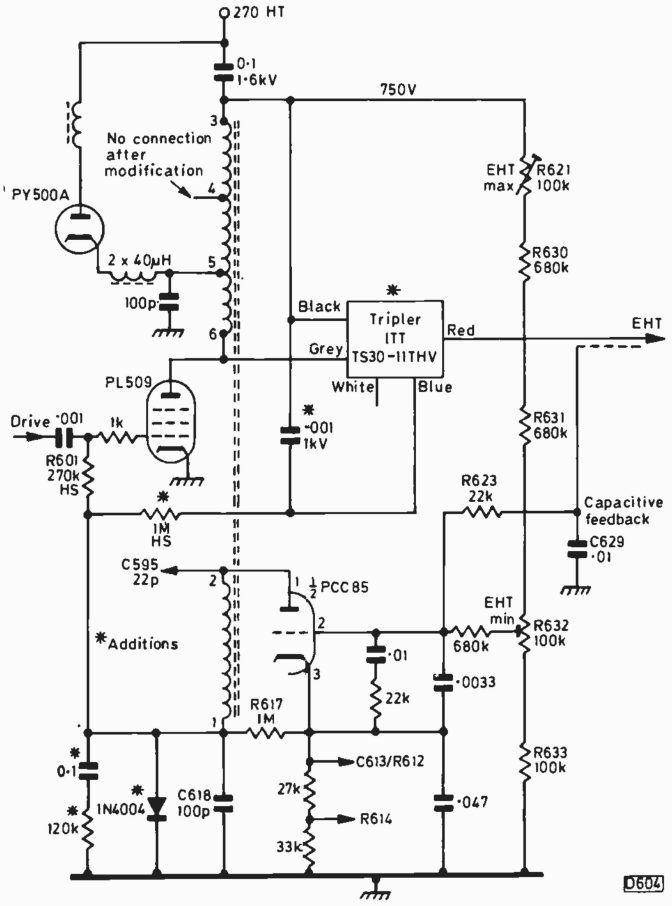

Fig. 1: Circuit details.

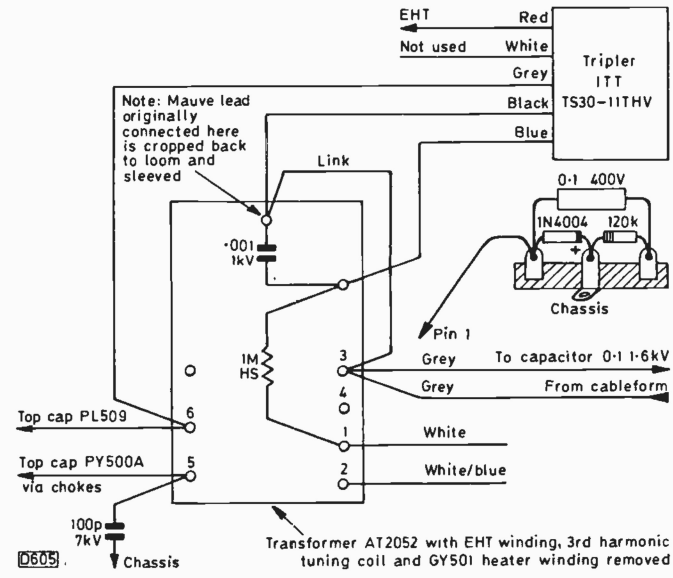

Fig. 2: Mechanical details.

Whilst testing the circuit I discovered that the regulation could be improved to almost the original Bang and Olufsen standard by employing feedback from the tripler's blue clipper diode output lead to the PL509's control grid circuit. An 0·001µF, 1kV capacitor is used as a reservoir and the feedback is taken via a 1MΩ H.S. resistor (and, physically, pin 1 on the transformer). The feedback voltage becomes less negative as the circuit is loaded. Also added, from pin 1 of the transformer to chassis, are a 1N4004 clamp diode and an anti-hunt network consisting of an 0·1µF capacitor and 120kΩ resistor in series – these components are mounted on a tagstrip held by one of the screws that originally secured the GY501's socket. The anti-hunt network ensures rapid warm-up stabilisation, while the clamp diode prevents the control line going positive even under fault conditions.

Fig. 2 shows the physical connections.

Setting Up

The system should be set up as follows. Turn the two potentiometers to the minimum position as previously mentioned then, with the brightness turned down, adjust the e.h.t. min potentiometer for 24kV at the c.r.t.'s final anode. Turn the brightness up, and if necessary set up the contrast, focus, scan amplitudes etc., preferably on a test card.

Circuit Operation

Some of you may be interested in a little more detail on the working of the circuit. Pin 3 of the e.h.t. transformer sits at a nominal boost voltage of 750V, to which the "earthy" end of the tripler is connected. As a result, the e.h.t. voltage generated sits on this 750V pedestal. The clipper diode output also sits on this voltage, and under no-load conditions reaches an amplitude of approximately −950V. Thus the voltage at the junction of the 0·001µF reservoir capacitor and the 1MΩ feedback resistor relative to earth is 750 − 950V = −200V. Loading affects this voltage, but the 750V offset makes the change proportionately larger with respect to earth. If for example the loading reduces the negative voltage from 950V to 850V, the resultant potential becomes 750 − 850 = −100V. It will be seen then that a small percentage change in the loading can produce a large proportional change in the voltage when the 750V offset has been built in.

The feedback obtained in this way is in phase with the action of the PCC85 stabiliser triode, which sets the bias applied to the PL509 from pin 1 of the transformer. We have thus enhanced the regulation, offsetting the relatively "soft" (fairly high impedance) drive from the PL509's anode circuit. The amount of feedback is determined by the value of the feedback resistor – 1MΩ was found to be the optimum.

Another point worth mentioning is that removal of the GY501 rectifier results in a quicker warm-up time. About twenty seconds is saved. The convolutions of the circuits as they settle down (rolling or jittery defocused picture for example) will be displayed before the proper picture appears.

In Conclusion

This has proved to be a simple and cheap answer to the transformer problem and works well. Under normal viewing conditions it's hard to notice any difference from the set's original performance.

Finally I must emphasize the need to set the two e.h.t. adjustment potentiometers to their minimum position initially, as described above, before the modified set is switched on. Failure to do this can result in excessive voltages which could damage the tripler or even the tube. Remember also that this receiver does not discharge the e.h.t. energy stored in the tube's capacitance. Be careful to discharge this energy (it can remain stored for days) before commencing the job – otherwise you might receive a nasty jolt.