

SERVICE DATA

Modification of earplug: Connect a 330 ohm resistor between signal and earth leads of earplug to allow earplug to be left in place while saving a programme.

Inserting or removing such items as joysticks, especially via a Kempston interface, while the computer is switched on will damage the power resistors and regulator.

Modification to voltage generator circuit: Where not fitted already, insert a 22uf capacitor between the TR4 and D15 as shown in the circuit diagram, this will ensure the correct 12v supply. On early models replace R60 by a 270 ohm resistor and fit C74 if missing. Ensure that the 12v supply is 12v.

Manufacturer's advised modifications: In early versions replace all ceramic capacitors by axial ones and replace C46 by a high-temperature 1uf type. All resistors to be changed to show the second value show in centre pages circuit diagram herein; same applies to capacitors.

Weak sound: Only if particularly noticeable should the sound section be changed to same as shown herein.

Tape and Sound Circuits: 5Vp-p at ear socket for 2Vp-p at IC1 verifies IC1.

Alignment: Only needed for early models. Place meter on pin 4 of IC4 and adjust VR1 to obtain 130mV; adjust VR2 to obtain -75mV at pin 2 with a 20mV allowable error either way. Use TC2 to set colour subcarrier frequency to 4.433619MHz to 50Hz either way. TC1 only helpful to improve screen colour pattern.

Alignment: All models. Run the programme to display the eight colours in sequence from black to white. This is normally given as:-

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10 FOR A=0 TO 7
20 FOR B=0 TO 3
30 PAPER A: PRINT " ";
40 NEXT B
50 NEXT A
60 GOTO 10
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If this shows incorrect or missing colours then align as stated for early models. See repair data for later models.

REPAIR DATA

1) GENERAL REPAIR PROCEDURE AND NOTES ON ALL FAULTS

These computers are reportedly very unreliable with some 50% of new ones alleged to have to be returned for replacement. Many faults are due to loose or badly fitted components so that a good checkover is essential for this reason, to determine if a factory failure first.

Check heatsink first for any reported fault, is it loose? Are there overtightened screws? Look for dry joints, cracks in print or cracked boards, badly fitted components, especially ICs; dirty or tarnished contacts, pins, holders, edge connectors; damaged keyboard tails and fins are certainly not uncommon for whatever reason.

Before investigating any fault check any add-ons and interfaces to the computer for broken solder, etc. caused by user wiggling them about. It is also essential to note if add-on is loose or faulty which will give a guide to any damage so caused. This will also determine if fault in add-on not computer. Knowing what add-ons are used can be a good guide to probable fault: for example, suspect TR4 blown and/or destroyed RAMS if a Kempton is used.

Check! if customer has been inserting or removing any add-ons without first switching off and point out how this practice has damaged machine and costing him unnecessary expenditure. If this is admitted then check TR4 first then RAMS and see symptom 3.

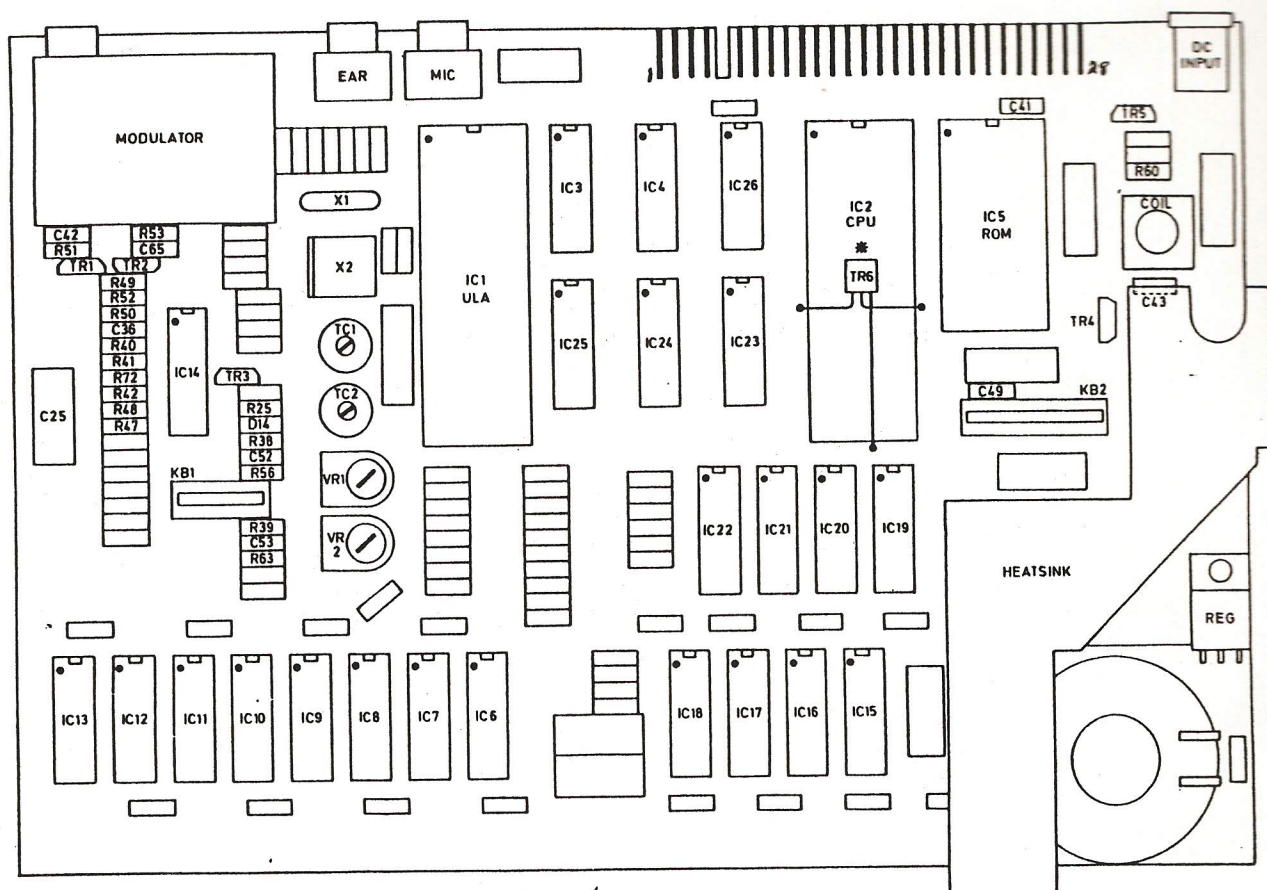
2) WONT LOAD FROM RECORDER

Almost invariably this will be caused by the alignment of the recorder head not being good enough. The recorder will play music, etc. and function well but it will still need adjusted to operate the Spectrum properly and it matters not whether it is an old or just newly bought recorder.

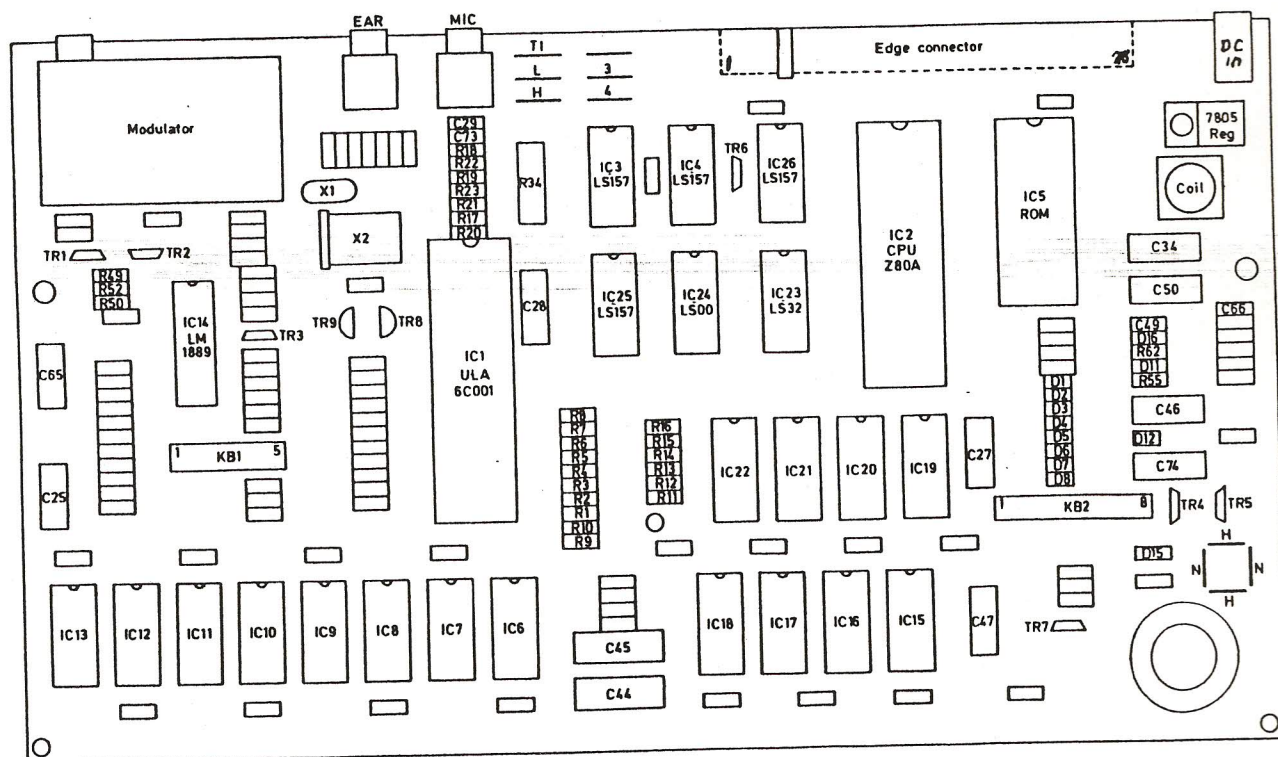
Disconnect Spectrum from recorder and with any tape playing use a long thin-bladed screwdriver to adjust the azimuth screw through the hole normally provided for this purpose. The object is to obtain the sharpest possible sounding note, noting that if note is in the least muffled sounding then there is no chance of the Spectrum loading from it.

If no hole is provided this should be done with the recorder cover removed. Although it is recommended that volume should be set at midpoint it is far better to vary volume setting to that at which maximum treble is obtained. Finally give head a good clean and recheck setting.

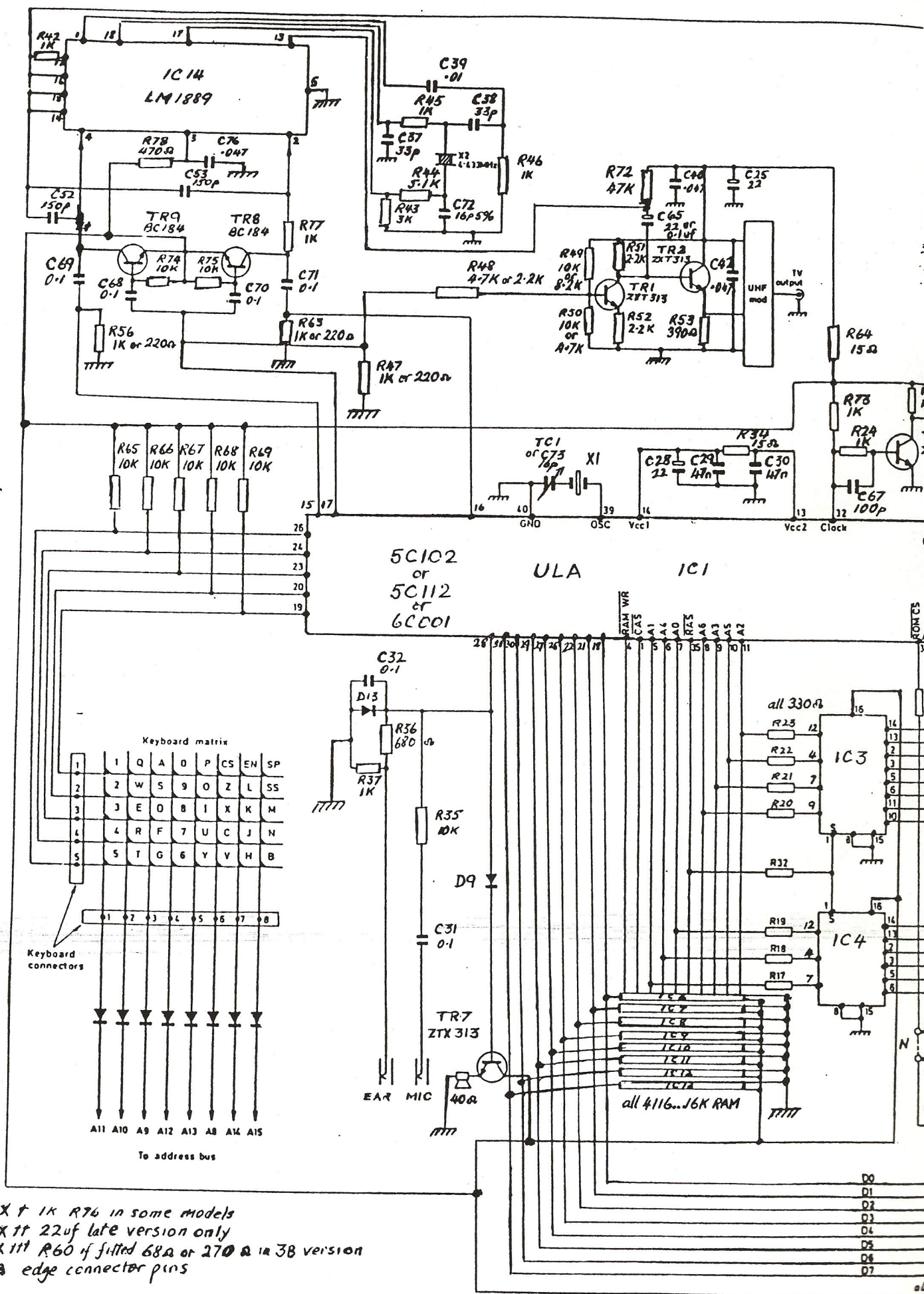
If the adjustment does not cure the problem then save a short programme from the computer (or use one previously saved) and if this doesn't load then it is safe to assume that there is a fault, probably in the computer. In this case, check connections to computer and the circuit from the edge connector to the first I.C.

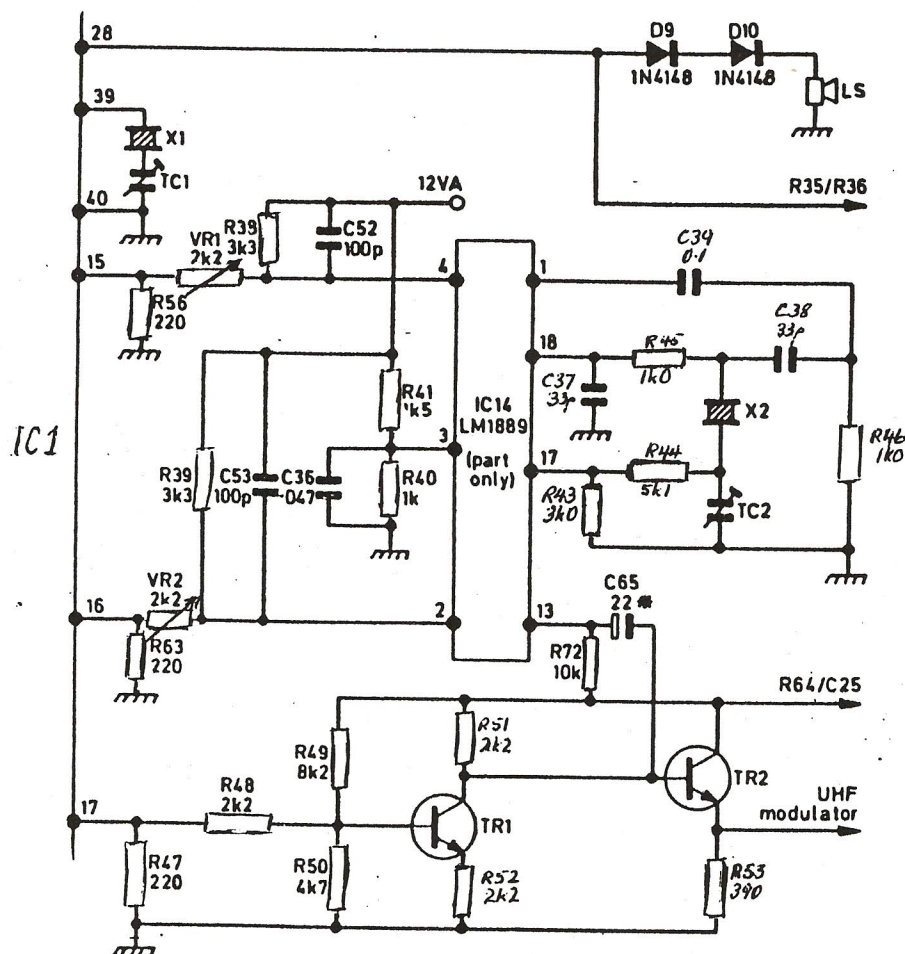


Early types board



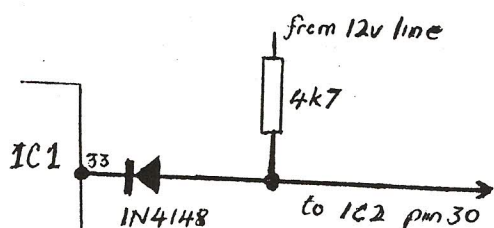
Later types board



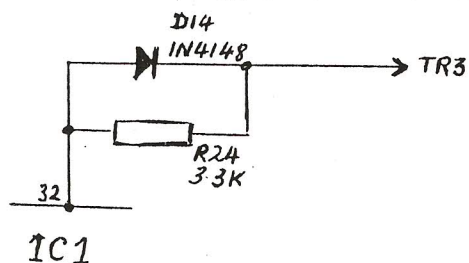


Early circuit showing presets TC1, TC2, VR1 and VR2 to match the early type boards.

Note:- the different pins 16/17 setup from IC1 in the generalised circuit diagram shown in the middle pages.



In very versions, instead of TR6 a somewhat unreliable, resistor/diode was used which should be modified as shown in the centre pages.



This very unreliable circuit was used in very early versions from pin 32 to base of IC1. This circuit should be modified to that shown in the centre pages if not already done.

Modifications associated with IC1

3) NO COIL BUZZ FROM INVERTER, -5V ABSENT

From symptom 1 it should be obvious that TR4 (ZTX650) is very prone to damage and this symptom is a sure indication that TR4 must be replaced. However, before replacing the TR4 check the TR5 (ZTX213) (using a transistor tester is O.K.) and the coil since it is not unknown for all three to have gone at the same time and if only the TR4 is replaced it can fail again immediately if the others are faulty.

Whether or not these three are faulty or not, there can be one or more faulty RAMS as well caused possibly by the same forcing in of an interface during switch on. If all else has been fixed, switch on and check if any RAM gets hot; replace any very hot RAMS either in basic set or in extra board as this is a sure sign of being short circuit. If open circuit, the quickest way to check is to by-pass each RAM in turn using a RAM known to be O.K. When so doing the same RAM must be used as the suspect and it should not be removed after each check for some ten seconds after each switch off or it will fault itself. Use of a 'scope or logic probe is clearly a better alternative if available. Tandy make a good, inexpensive logic probe.

4) DIRECT CHECK FOR A SINGLE FAULTY RAM

Type PRINT PEEK 23732+256 * PEEK 23733 (CR). If computer RAMS O.K. the reply is either 32767 or 65535, if less than either this means that there is a shortage of available RAMS, thus one or more RAMS may be faulty.

Call the reply N and if POKE N+1,85 (CR) then PRINT PEEK N+1 (CR) is typed the reply should be 85 if RAMS O.K., in that case type POKE N+1,170 (CR) then PRINT PEEK N+1 (CR) when a different number to the 170 you have just poked into that address will be printed. 85 and 170 are the easiest binary numbers (01010101 and 10101010) to cover all combinations in an 8-bit chip.

Where a different reply is given to either POKE locate the incorrect IC as follows:-

Where 85 is poked in

IC6 faulty gives 84; IC7 87; IC8 81; IC9 93; IC10 69; IC11 117; IC12 21; IC13 213.

Where 170 is poked in

IC15 faulty gives 171; IC16 168; IC17 174; IC18 162; IC19 186; IC20 138; IC21 234; IC22 42.

5) NO COIL BUZZ FROM INVERTER, REG7805 OPEN CIRCUIT

Before replacing the 7805 check the heatsink to see if faulty or badly fitted. Remedy any physical defect in print or damage around screws, etc. Also check the TR4/5 and coil.

6) CONTINUAL FAILURE OF POWER SUPPLY TRANSISTORS

Ensure that all modifications have been carried out and that the edge connector is O.K. and not loose or damaged. Check for proper fitting of all peripherals and verify that owner is not persistently inserting/removing any of the add-ons, etc. while the computer is switched on. Note that many users are apparently incapable of grasping this simple point. Check the plug/sockets and cable, if not suitable then replace with correct ones. Check the mains and possible interference from other items on same circuit.

If satisfied then check if the 0v is correct on earth. Monitor the 0v while running computer as this may show up an intermittent voltage fault. A systematic check on all capacitors/resistors to earth should find the culprit for this uncommon cause.

7) KEYBOARD FAULTS

It is recommended that keyboards are better replaced completely since they take a lot of battering and replacement is quite inexpensive. If it is decided that the keyboard is worth repairing then the diagram will show which key is faulty according to keys in error.

If the entire keyboard is non-functional then check the 5v supply is reaching it O.K. before replacing the ULA I.C. Probably the commonest fault lies with a faulty 10K resistor (R65 to R69) easily identified according to which keyboard column is faulty.

8) VARIOUS FAULTS WHICH APPEAR ONLY WHEN WARM

Check heatsink thoroughly. If heatsink is O.K. then the ULA I.C. IC1 will be the cause. If IC1 has been replaced before it may be worth adding extra heatsink for it. See also following symptom.

9) INTERMITTENT FAULTS

If such faults show up with a comparatively new Spectrum then it is most likely that they are due to poor contacts/soldering during the manufacturing process. Check all holders and pins for tarnish and dry joints. Replace faulty holders by cutting them out and replacing completely. Check after this for poor contacts or loose contacts, look for items which have been poorly soldered or even where soldering has been omitted. Finally check the boards for hairline cracks and breaks, especially radiating from heatsink screws.

