CIS-30 TROUBLE SHOOTING GUIDE

BEFORE YOU BEGIN TROUBLE SHOOTING THE CIS-3Ø, MAKE SURE YOUR CASSETTE RECORDERS, DATA TERMINAL, AND COMPUTER FUNCTION PROPERLY. CONNECT THE DATA TERMINAL DIRECTLY TO THE COMPUTER AND EXECUTE SEVERAL OF THE SYSTEM MONITOR COMMANDS.

RE-READ THE OPERATING INSTRUCTIONS CAREFULLY. YOUR CIS-3Ø MAY BE WORKING PERFECTLY. THE PROBLEM MAY BE YOUR PROCEDURE.

TO GIVE YOU A POINT OF REFERENCE, THE PERCOM 68ØØ SYSTEM CONSISTS OF A SWTP MP-68ØØ COMPUTER, A COURIER VIDEO TERMINAL, THE PERCOM CIS-3Ø, AND RADIO SHACK CTR-21 CASSETTE RECORDERS ($69.95). WITH THIS SYSTEM WE ROUTINELY LOAD THE SWTP CO-RESIDENT EDITOR/ASSEMBLER, 8K BASIC (VERSION 2.Ø) AND THE TSC SPACE VOYAGE AT 12ØØ BAUD AND HAVE NEVER HAD A BAD LOAD. ALL CASSETTE TAPE IS PRETESTED BEFORE USE IN ACCORDANCE WITH THE PROCEDURE IN APPENDIX C OF THE INSTRUCTION MANUAL.

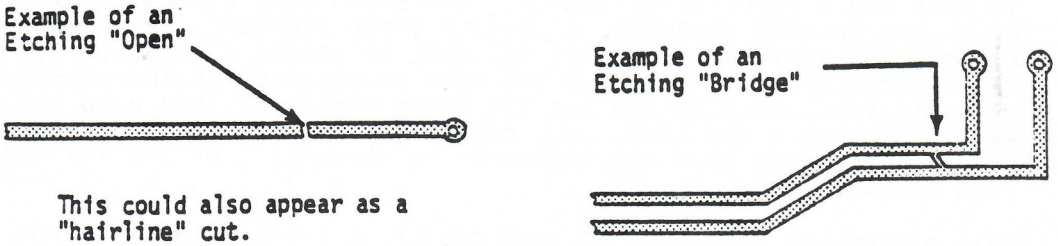
THIS SYSTEM HAS BEEN USED TO LOAD CASSETTES SUPPLIED BY SWTP AND TSC. THE FIRST SWTP CO-RESIDENT EDITOR/ASSEMBLER TAPE WE TRIED WAS DEFECTIVE AND WAS REPLACED BY THE LOCAL DEALER FROM WHOM IT WAS PURCHASED. WITH THIS EXCEPTION, THE CASSETTES SUPPLIED BY SWTP AND TSC ALL LOAD FLAWLESSLY AT 3ØØ BAUD.

THE VOLUME CONTROL ON THE RADIO SHACK CTR-21 CASSETTE TAPE UNITS IS MARKED FROM Ø TO 1Ø. CASSETTES RECORDED USING THE CIS-3Ø CAUSE THE CIS-3Ø LED TO FLICKER WITH A VOLUME SETTING OF 7. RELIABLE PLAYBACK IS OBTAINED WITH ANY VOLUME SETTING FROM 4 THRU 1Ø. THIS CORRESPONDS TO INPUT VOLTAGE LEVELS OF FROM LESS THAN ONE VOLT TO MORE THAN 6 VOLTS PEAK TO PEAK.

IF YOUR CIS-3Ø IS ASSEMBLED, ADJUSTED, AND USED PROPERLY, YOUR EXPERIENCE WITH IT SHOULD BE AS SATISFACTORY AS OURS. OURS IS NOT AN ISOLATED TEST ON ONE UNIT. IT HAS BEEN REPEATED ON EVERY ASSEMBLED UNIT WE HAVE SOLD AND SIMILAR PERFORMANCE IS REPORTED BY A NUMBER OF OUR CUSTOMERS. KEEP IN MIND THAT SOME CASSETTE RECORDERS JUST WILL NOT WORK AT 12ØØ BAUD. THESE ARE THE LOW COST (UNDER $4Ø.ØØ) VARIETY WHICH HAVE TERRIBLE PHASE AND FREQUENCY RESPONSE OR WORN AND DIRTY HEADS. WE USE THE RADIO SHACK CTR-21 WITH EXCELLENT RESULT AND HAVE RECEIVED REPORTS FROM CUSTOMERS HAVING SIMILIAR RESULTS WITH OTHER BRANDS.

MOST PROBLEMS ARE CAUSED BY SOLDER BRIDGES OR INCORRECTLY INSTALLED COMPONENTS. WE HAVE HAD UNITS RETURNED FROM SUPPOSEDLY COMPETENT INDIVIDUALS WHO ARE CONVINCED "THE DESIGN WAS BAD AND COULD NOT POSSIBLY WORK". THE PROBLEM IS ALWAYS SOMETHING SIMPLE. SO BEFORE YOU WORK YOURSELF INTO A PANIC, CAREFULLY EXAMINE ALL SOLDER JOINTS FOR BRIDGES TO ADJACENT CIRCUITRY.

CAREFULLY EXAMINE ALL OF THE CIRCUIT TRACE FOR ETCHING "BRIDGES" AND "OPENS". THESE ARE MOST EASILY SEEN BY BACK-LIGHTING THE CIRCUIT CARD.



CHECK ALL OF THE COMPONENTS FOR PROPER VALUE AND ORIENTATION.

47K OHM RESISTORS (YL-VI-OR) ARE OFTEN CONFUSED WITH 4.7K OHM RESISTORS (YL-VI-RD)

DIODES ARE FREQUENTLY INSTALLED BACKWARD.

TRANSISTORS MAY BE MIXED UP OR BACKWARD. SOME OF THE TRANSISTORS SUPPLIED IN YOUR KIT MAY NEED TO BE INSTALLED DIFFERENTLY THAN INDICATED ON THE CIRCUIT CARD. BE SURE TO READ THE ERRATA SHEET AND PARTS SUBSTITUTION NOTICES.

DISC CAPACITORS ARE OCCASSIONALLY MIXED UP. THE 75Ø PF DISC SHOULD BE IN C4 AND C8. THE Ø.Ø1 UFD DISC SHOULD BE IN C3, C9, C1Ø, C13, C14.

SWITCHES MAY NOT BE WIRED CORRECTLY.

INTERCONNECTING CABLES MAY BE WIRED OR CONNECTED IMPROPERLY. CHECK ALL CONNECTIONS. USE AN OHMMETER FOR CONTINUITY CHECKS FROM ONE END OF THE CABLE TO THE OTHER. ALSO CHECK FOR SHORTS BETWEEN ADJACENT PINS OF THE CONNECTORS.

IF YOU ARE NOT EXPERIENCED IN TROUBLE SHOOTING AND HAVE DILIGENTLY PERFORMED THE ABOVE CHECKS, IT WOULD BE WISE TO RETURN THE UNIT FOR REPAIR BY OUR SERVICE STAFF. THE TYPICAL REPAIR CHARGE IS $5.ØØ TO $8.ØØ PLUS SHIPPING. IF THE CHARGE IS LIKELY TO EXCEED $2Ø.ØØ WE WILL NOTIFY YOU BEFORE PROCEEDING WITH THE REPAIR.

THE FOLLOWING PROCEDURES ASSUME YOU HAVE ACCESS TO AND ARE FAMILIAR WITH THE USE OF:

A TRIGGERED SWEEP OSCILLOSCOPE
A FREQUENCY COUNTER
AN AUDIO OSCILLATOR

FROM THIS POINT ON IT IS IMPORTANT TO UNDERSTAND HOW THE CIRCUITRY OF THE CIS-3Ø FUNCTIONS IN ORDER TO TROUBLE SHOOT EFFECTIVELY. BEFORE PROCEEDING ANY FURTHER THOROUGHLY STUDY THE DESCRIPTION OF "HOW IT WORKS" BEGINNING ON PAGE 3Ø OF THE CIS-3Ø INSTRUCTION MANUAL.

THE FOLLOWING CHECKS MUST BE PERFORMED IN SEQUENCE. MAKE SURE THE REQUIREMENTS OF EACH CHECK ARE SATISFIED BEFORE PROCEEDING TO THE NEXT CHECK. PROBLEMS USUALLY HAVE SIMPLE CAUSES SO WHILE YOU ARE TROUBLE SHOOTING, KEEP YOUR MIND OPEN TO THE OBVIOUS.

BECAUSE OF THE QUALITY OF COMPONENTS USED IN THE CIS-3Ø, COMPONENTS ARE RARELY DEFECTIVE UNLESS THEY HAVE BEEN INSTALLED INCORRECTLY. OUR EXPERIENCE INDICATES YOU HAVE LESS THAN 3 CHANCES IN 1ØØ OF HAVING A DEFECTIVE COMPONENT. THE MOST FREQUENT COMPONENT DEFECTS WE HAVE ENCOUNTERED ARE MISBANDED DIODES.

PROCEDURE:

1. CONNECT CIS-3Ø TO COMPUTER AND MEASURE VOLTAGE ACROSS C12. IT MUST BE +5±Ø.25 VOLTS.

2. MEASURE THE VOLTAGE AT EDGE CONNECTOR PIN 13. THIS IS TYPICALLY -15 VOLTS, THE EXACT VALUE IS NOT CRITICAL.

3. OBSERVE THE WAVEFORM AT EDGE CONNECTOR PIN 16. IT MUST BE A RECTANGULAR WAVEFORM OF TTL LEVEL WITH FREQUENCY OF 18.73 KHZ. THIS WAVE FORM COMES FROM THE COMPUTER BAUD RATE GENERATOR.

4. FLIP THE TAPE SWITCH TO AUTO. Z9-1 MUST BE AT LOGIC ONE.

5. OBSERVE THE WAVE FORM AT EDGE CONNECTOR PIN 17. IT MUST BE A CLEAN RECTANGULAR WAVE FORM AT ALL POSITIONS OF THE RATE SWITCH.

6. MEASURE THE FREQUENCY AT EDGE CONNECTOR PIN 17 WITH THE RATE SWITCH IN THE VARIOUS POSITIONS.

RATE	PIN 17
3ØØ	4.68 KHZ
6ØØ	9.36 KHZ
12ØØ	18.73 KHZ

7. MEASURE THE FREQUENCY AT Z1Ø-9. IT SHOULD BE 2.34 KHZ.

8. WITH A CLIP LEAD, GROUND Z8-2. Z1Ø-9 SHOULD NOW READ 1.17 KHZ. REMOVE THE CLIP LEAD.

9. OBSERVE THE WAVE FORM AT THE AUX OUTPUT. IT SHOULD LOOK LIKE THE FOLLOWING DRAWING:

1Ø. OBSERVE Z8-3. IT SHOULD BE A LOGIC ZERO LEVEL.

11. PRESS THE COMPUTER RESET BUTTON. YOU SHOULD OBSERVE THE DATA WAVE FORM AT Z8-3 WHILE THE COMPUTER OUTPUTS ITS INITIALIZATION CHARACTERS. THE DATA TERMINAL SHOULD DISPLAY AN ASTERISK (*) EVERY TIME THE RESET BUTTON IS PRESSED.

THIS COMPLETES THE CHECKOUT OF MODULATOR Z1Ø, Z8(A), AND Q3.

13. CLIP LEAD EDGE CONNECTOR PIN 1Ø TO +5 VOLTS (PLUS END OF C25). Z9-1 SHOULD GO LOW.

14. REMOVE THE CLIP LEAD AND FLIP THE TAPE SWITCH TO ON. Z9-1 SHOULD GO LOW.

THIS CHECKS TRANSISTOR Q4 AND TAPE SWITCH S1.

15. CONNECT AN AUDIO OSCILLATOR TO THE EARPLUG INPUT. ADJUST THE LEVEL UNITL THE LED JUST COMES ON.

16. OBSERVE THE WAVE FORM AT Z7-13. IT SHOULD BE A SQUARE WAVE OF TTL LEVEL AT THE SAME FREQUENCY AS THE SIGNAL FROM THE OSCILLATOR.

17. SET THE OSCILLATOR FOR 18ØØ HZ AND OBSERVE THE VOLTAGE LEVEL AT Z2-9.

18. ADJUST RT1 UNTIL THE LEVEL AT Z2-9 CHANGES. GET THE ADJUSTMENT AS CLOSE TO THE POINT OF CHANGE AS POSSIBLE.

19. VARY THE OSCILLATOR FREQUENCY BACK AND FORTH ACROSS 18ØØ HZ. THE LEVEL AT Z2-9 SHOULD SWITCH HIGH OR LOW DEPENDING ON WHETHER THE OSCILLATOR FREQUENCY IS ABOVE OR BELOW 18ØØ HZ.

20. SWITCH THE TAPE SWITCH ON AND OBSERVE EDGE CONNECTOR PIN 14.

21. AS THE AUDIO OSCILLATOR IS VARIED ABOUT 1800 HZ, PIN 14 SHOULD BE POSITIVE IF THE FREQUENCY IS LESS THAN 1800 HZ. AND NEGATIVE IF THE FREQUENCY IS ABOVE 1800 HZ.

22. SWITCH THE TAPE SWITCH TO AUTO AND STRIKE ANY KEY ON THE TERMINAL KEYBOARD. YOU SHOULD OBSERVE THE DATA WAVE FORM AT EDGE CONNECTOR PIN 19, Z9-3, AND EDGE CONNECTOR PIN 14.

23. SWITCH THE TERMINAL SWITCH TO LOCAL AND OBSERVE THAT THE TERMINAL KEYBOARD IS ECHOED BACK TO THE TERMINAL DISPLAY.

THIS COMPLETES THE TEST OF SIGNAL CONDITIONER Z7(C), SIGNAL LEVEL SENSOR Z7(B), DATA RECOVERY CIRCUIT Z1 AND Z2, EIA TO TTL TRANSLATOR Q5, DATA SELECTOR Z9(A), AND TTL TO EIA TRANSLATOR Q5.

24. WITH NOTHING CONNECTED TO THE EARPLUG INPUT, MEASURE THE VOLTAGE AT THE END OF R19 NEAREST Q1. IT SHOULD BE BE-T TWEEN 1.75 AND 2.1 VOLTS. IF NOT SOMETHING IS AMISS IN THE PHASE LOCKED LOOP MADE UP OF VCO (Z7A), DIVIDER Z4, PHASE DETECTOR Z8B, AND FILTER BUFFER Q1.

25. CONNECT THE FREQUENCY COUNTER TO Z7-1. ADJUST TRIMMER RT2 FOR 19.2 KHZ. THE TRIMMER SHOULD BE WITHIN 20 DEGREES OF THE CENTER OF ROTATION.

26. MEASURE THE FREQUENCY AT Z8-6. IT SHOULD BE 1200 HZ.

27. CONNECT THE AUDIO OSCILLATOR TO THE EARPLUG INPUT AND ADJUST THE LEVEL FOR LED FLICKER. SET THE FREQUENCY FOR APPROXI-MATELY 2400 HZ.

28. SWITCH THE TAPE SWITCH TO ON; THE RATE SWITCH 300.

29. NOW VARY THE OSCILLATOR FREQUENCY AROUND 2400 HZ. THE WAVE FORM AT EDGE CONNECTOR PIN 17 SHOULD EXACTLY FOLLOW THE OSCILLATOR FREQUENCY VARIATIONS. THIS INDICATES THE PHASE LOCKED LOOP IS TRACKING THE INPUT SIGNAL.

30. REDUCE THE OSCILLATOR FREQUENCY TO 1200 HZ. AS YOU "GO THRU" 1800 HZ THERE SHOULD BE SOME INSTABILITY IN THE VCO BUT IT SHOULD "LOCK UP" IMMEDIATELY AND FOLLOW THE OSCIL-LATOR VARIATION DOWN TO 900 HZ.

31. IF THE AUDIO OSCILLATOR IS BELOW 1800 HZ, THE FREQUENCY OF THE WAVE FORM AT PIN 17 WILL BE EXACTLY FOUR TIMES THE OSCILLATOR FREQUENCY. ABOVE 1800 HZ PIN 17 WILL BE EXACTLY TWICE THE AUDIO OSCILLATOR FREQUENCY.

32. DISCONNECT THE AUDIO OSCILLATOR AND MEASURE THE FREQUENCY

OF THE WAVE FORM AT EDGE CONNECTOR PIN 17.

RATE SWITCH	PIN 17
3ØØ	≈48ØØ HZ
6ØØ	≈96ØØ HZ
12ØØ	≈19.2 KHZ

IF THE CIS-3Ø PASSES ALL OF THE ABOVE CHECKS, IT IS DOING ALL THAT IT WAS DESIGNED TO DO. IF YOU STILL HAVE A PROBLEM, YOU CAN FAIRLY CONCLUDE THE PROBLEM IS ELSEWHERE IN YOUR SYSTEM.