

NEW CB TEST GEAR

75¢ APR. 1976

Radio-Electronics®

THE MAGAZINE FOR NEW IDEAS IN ELECTRONICS

BUILD ONE OF THESE

- ★ Tach & Overspeed Circuits
- ★ Bardot to ASCII Converter
- ★ Serial Interface for TVT-II

TELEVISION

- ★ 30-Channel MATV Systems
- ★ Jack Darr's Service Clinic
- ★ Service Problems & Solutions
- ★ Equipment Reports

HI-FI-STEREO

- ★ Speed Stereo Test Time
- ★ R-E's Lab Tested Reports:
Fuji Tape Cassette
Harman-Kardon Basic Amp

LEARN SOMETHING NEW

- ★ Komputer Korner
- ★ All About Garage Door Openers
- ★ Looking Ahead



GENESACK PUBLICATION

692188 JNK 11024090 14 A DEC78
 R J JENKINS
 1102 SOUTH 45TH ST
 TEMPLE TX 76501
 04

TABLE III
RADIO-ELECTRONICS PRODUCT TEST REPORT

Manufacturer: **Harman-Kardon**

Model **Citation 16**

OVERALL PRODUCT ANALYSIS

Retail price	\$795.00
Price category	High
Price/performance ratio	Very good
Styling and appearance	Excellent
Sound quality	Excellent
Mechanical performance & layout	Excellent

Comments: It is clear that the designers of this new Citation amplifier were intent upon producing the most reliable and rugged power amplifier they knew how to make. Harman-Kardon's design philosophy regarding bandwidth and phase response is well known for audiophiles. They believe in wide-as-possible bandwidth—far beyond audible limits, and have incorporated that philosophy in this design. While we do not propose to get involved in this age old debate (there are equally respected manufacturers who differ violently with this concept, and maintain that extended bandwidth offers no audible benefit to the consumer and costs involved in extending bandwidth might be put to better use), we can only judge the results by what we heard during our listening tests. Sound reproduction, using the Citation 16 hooked up to a pair of low-efficiency speakers capable of response down to below 30 Hz was so clean and transparent as to defy description.

As for reliability and fool-proof design, the Citation 16 can operate into short circuits, unloaded operating conditions, and the kinds of reactive loads presented by electrostatic and other esoteric speaker designs.

The LED power display is effective and provides the more serious and technically oriented audiophile with a very accurate and continuous means of monitoring power fed to the loudspeakers. We suspect that Harman-Kardon's profit margin on the Citation 16 will not be eroded by their very generous two-year service warranty on parts and labor.

PICTURE RUNS SIDWAYS!

The picture runs sideways in this Curtis-Mathes 56M-5748; just like a vertical roll, but crosswise. Now and then it will lock in, then start sliding again. The horizontal hold will stop it, but it slips again in a minute or two. Three shops have said this is a lemon. —L.B., El Paso, TX.

Well, there's an old saying that I just made up: "When you get a lemon, make lemonade!" Joking (?) aside, we have a couple of facts. First, we know the horizontal oscillator is running pretty well because the picture is straight-sided and you can tell that there is only one picture present. However, you do not have any horizontal sync to speak of. The oscillator is free-wheeling.

Ground the AFC grid of the horizontal oscillator tube. This should have some effect on the picture. If it doesn't, turn it off and see if this grid shows a short to ground! (Frankly, from the description, that's what it sounds like!) Another possible cause of this is an open socket contact on the AFC grid of the horizontal oscillator tube. I had a set of another make with this problem and it was hard to catch. (It was trying to tell me what it was, but I didn't listen).

Check out the entire horizontal AFC

circuit including the diode unit, all resistors and capacitors, and check continuity on the little ceramic capacitor that couples the horizontal sync from the sync-separator to the diode unit. If this is open, you could get exactly the same symptoms.

PHOTOSENSITIVE TRANSISTOR!

We had a mysterious hum in a small transistor amplifier. Checking filters did not help. We finally found that you could cover one of the transistors with your fingertips, and the hum stopped! Or, turn out the bench lights! The transistor was a little plastic TO-92 case, but it was a light brown instead of the normal black.

Investigation and checking with the maker disclosed that this was actually the cause. The fix? Cover the transistor case with black tape. All transistor junctions are photosensitive, and the case of this one let in just enough of the fluorescent light to make it hum.

Thanks to Charles Varble, Chart TV, St. Louis, for this cute one!

SAME WAVEFORM GRID AND CATHODE?

I've been all over the place in this Admiral 8T950 color set, trying to find out why I can't get enough height. I need about three inches at bottom of

Summary

In addition to subjecting the amplifier to the laboratory tests described, we spent a great deal of time listening to the amplifier connected to several pairs of our favorite speakers. Our conclusions are summarized in Table III. Certainly, just under \$800.00 is a lot of money for a power amplifier and there are other basic amplifiers around that provide as much power (or more) for less money. In our opinion, however, power output alone is not the sole criterion for judging this kind of component. Reliability, durability and just plain excellence of reproduced sound must play a part in the selection process too. Harman-Kardon seems to have taken all these factors into account—and more—in producing this latest unit in the respected Citation series **R-E**

BAUDOT to ASCII

Build this converter so you can use your Baudot or other teletypewriter as an input device for the TV Typewriter

ROGER L. SMITH

LAST MONTH WE DESCRIBED AN ASCII TO Baudot converter that let you connect your TV Typewriter or Mark 8 Mini-computer to a teletypewriter for hard-copy print-out. Now, we show how to use your teletypewriter as an input device.

BAUDOT to ASCII converter

The BAUDOT to ASCII conversion circuit may not be necessary for your application if all you wanted was a print-out device. However, if you intend to use your BAUDOT Teletype (or Kleinschmidt or Creed) machine for an input device, or if you are a ham operator and want to receive the BAUDOT RTTY signals on your TV Typewriter, you will want the BAUDOT to ASCII converter also.

The BAUDOT to ASCII conversion is simpler in that extra characters (shifts) don't need to be generated. The incoming serial BAUDOT data is clocked into the shift register IC13 (see Fig. 1). The leading "space" pulse starts the clock, which is stopped when this bit reaches flip-flop IC14-b. Gates IC19 and IC21 determine if the character is a LETTERS or FIGURES shift character and sets or resets flip-flop IC17-a accordingly. The proper PROM (IC20 or IC22) is then selected and the correct ASCII output character appears for the equivalent BAUDOT inputs. The shift inputs will generate a null.

Notice that the output ASCII data is not valid until the "data ready" line goes high ("1"). If your set-up requires a logic "0" signal for "data ready", use the \bar{Q} output (IC15-a pin 4). This line will remain high for 10-ms during which time the device being driven gates in the ASCII character. The PROM truth tables for IC20 and IC22 are shown in Tables I and II. These tables are on pages 00 and 00.

Adjustment

If you build the BAUDOT to ASCII Converter, you will need to adjust the oscillator (IC18). With all circuits hooked up (see Fig. 2), set the oscillator to a high rate (200K trimmer near minimum), and while typing a "K", adjust the oscillator until the "K" is received on the ASCII device. Keep turning the trimmer until you get a "Q", then back off half-way. Notice that if you are using *both* boards, you must add a suitable switch to change connections to pin 23 of the timing board when connecting the TV Typewriter I.

The boards are well suited for use with either TV Typewriter. If you are using the Model CT-1024 (Terminal System Kit from Southwest Technical Products) you can cut off the excess portion of the circuit board. Connection to a regular ASCII-encoded keyboard or Ham radio gear is also possible so long as the devices provide the proper "data ready" signals. The use

of these boards with the Mark-8 Mini-computer or other minicomputers is appealing. Output from the computer can then be the normal ASCII (as it would probably be for other output devices). Computer memory would not be used up in storing the codes, timing would be handled by the converter board and the software program would be simplified. **R-E**

CONNECTION OF BAUDOT TO ASCII CONVERTER

TV Typewriter I

On the timing board, cut the foil connection to pin 23. The REPEAT switch becomes the RECEIVE/NORMAL switch. (Substitute suitable switch if both boards in this article are to be used.)

Add Molex pins and jumpers as shown in Fig. 4-a.

Note: CR and LF are not stored in TV Typewriter.

TV Typewriter II (CT-1024)

Add Molex plug P1 (09-52-3151) and wire the pins as shown in Fig. 4-b.

Note: CR and LF are not stored in TV Typewriter.

Minicomputer Connections

Connect as shown in Fig. 4-c.

Ham radio connections

Follow the schematic and observe power connections.

ADDITIONAL PARTS FOR ASCII TO BAUDOT CONNECTION

TV Typewriter I:

Quantity	Type
1	74123 dual monostable IC
1*	2524 512-bit shift register IC
3	2200 ohms, 1/4 W resistor
1*	6800 ohms, 1/4 W resistor
2	220 pF disc capacitors
1*	SPST switch
6	Molex connector (part #09-52-3103)
60	Molex pins 3/4-inch (part #08-54)

TV Typewriter II (CT-1024):

Quantity	Type
1*	2102 1024-bit memory
1	330 ohm, 1/4 W resistor
1	.1 uF disc capacitor
1	Molex 15-pin connector (part #09-52-3151)
15	Molex pins 3/4-inch (part #08-54)
1*	SPST switch

ADDITIONAL PARTS FOR BAUDOT TO ASCII CONNECTION

TV Typewriter I:

Quantity	Type
6	Molex connectors (part #09-52-3103)
60	Molex pins 3/4-inch (part #08-54)

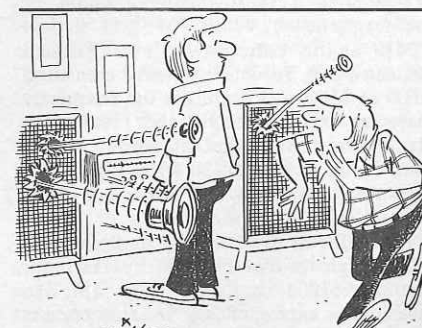
TV Typewriter II (CT-1024):

Quantity	Type
1	Molex connector (part #09-52-3151)
15	Molex pins 3/4-inch (part #08-54)

*These parts *not* required if you can set your Teletype margins to 32 spaces and you have automatic CR and LF.

the raster. All of the parts in the output circuit have been checked, and the tube changed. I see one funny thing. I get the normal waveform on the output tube grid, but I also get the same waveform on the cathode. That isn't right, is it?—J.M., Pettus, WV.

No, sir! This cathode is well bypassed! Whenever you see the same waveform with almost the same amplitude on both grid and cathode of an amplifier tube, you've got a terrific *degeneration* that reduces the gain of the stage very badly. The normal cathode waveform should be a distinct parabola with a P-P amplitude of about 11 volts. Check that 50- μ F electrolytic capacitor that bypasses the cathode. I'll bet you it's open. (I won! It was.)



"I said, 'turn down the volume!'"

ASCII TO BAUDOT CORRECTION

Mr. Roger Smith called our attention to several discrepancies in his article "ASCII to BAUDOT" in the March issue. They are as follows:

The schematic in Fig. 1 shows a connection between pin 3 of IC2-a and pin 2 of IC5-a. This connection is in error. Pin 2 of IC5-a should connect only to pin 11 of IC7. Pin 3 of IC2-a should connect to the top end of C1 at the junction of the lines to pin-15 IC7 and pin-4 IC9-a.

In Table 1, delete the 1's from the B₂ and B₆ output columns for word 31. Delete "BELL" and substitute "NULL."

PARTS LIST BAUDOT TO ASCII CONVERTER

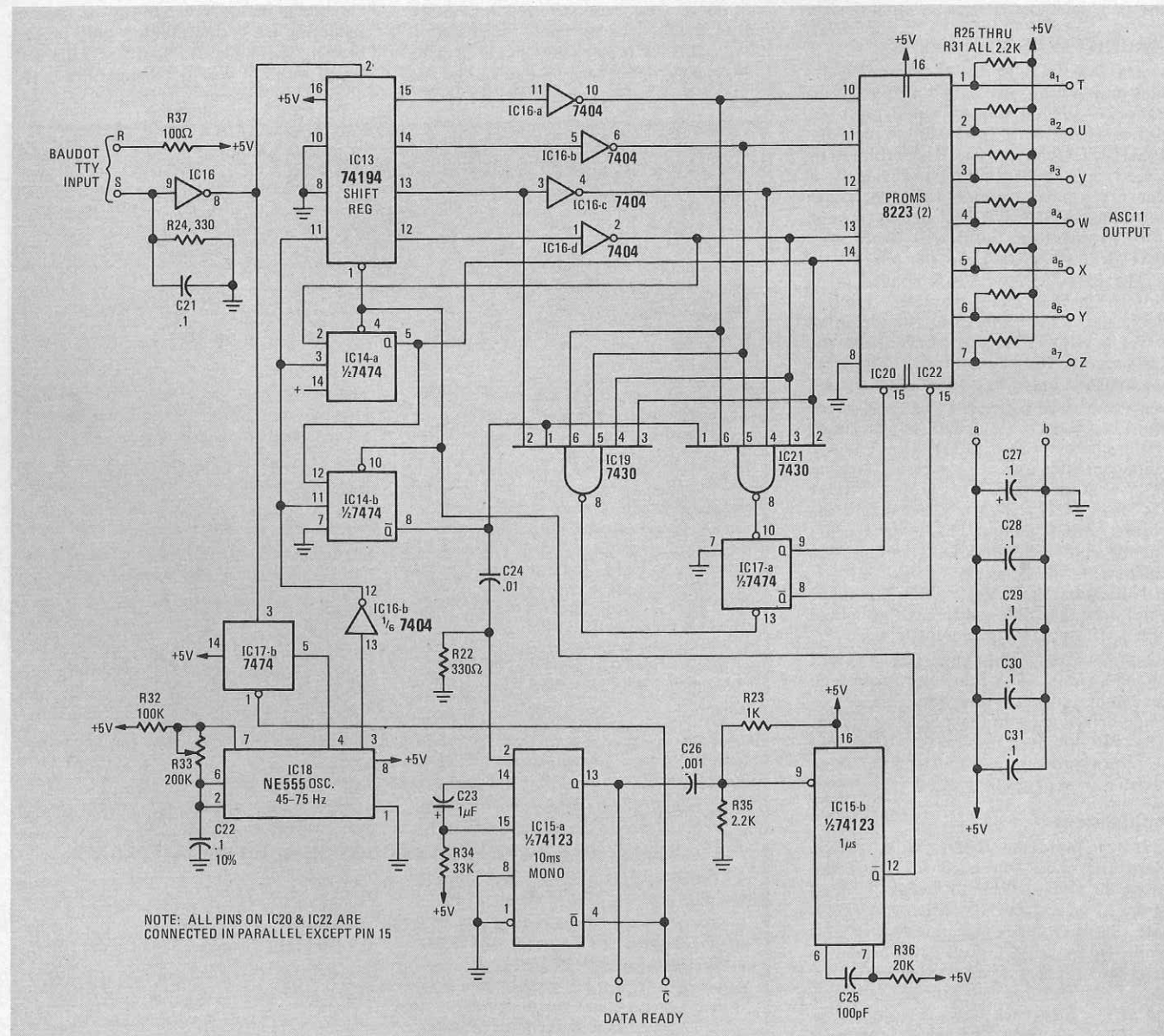
- R22, R24—330 ohms, ¼ watt
- R23—1000 ohms, ¼ watt
- R25-R31, R35—2200 ohms, ¼ watt
- R32—100,000 ohms, ¼ watt
- R33—200,000 ohm, trimmer
- R34—33,000 ohms, ¼ watt
- R36—20,000 ohms, ¼ watt
- R37—100 ohms, ¼ watt
- C21, C27-C30—.1 µF, disc
- C22—.1 µF, 10%, ceramic
- C23—1 µF, 50 volt, electrolytic (upright)
- C24—.01 µF, disc
- C25—100 pF, disc
- C26—.001 µF, disc
- C31—10 µF, 25 volt, electrolytic
- IC13—74194
- IC14, IC17—7474
- IC15—74123

- IC16—7404
 - IC18—555 timer
 - IC19, IC21—7430
 - IC20, IC22—8223 32 × 8 PROM
- See Connection Details for listing of additional parts

The following items are available from Southwest Technical Products Co., 219 W. Rhapsody, San Antonio, TX 78216:

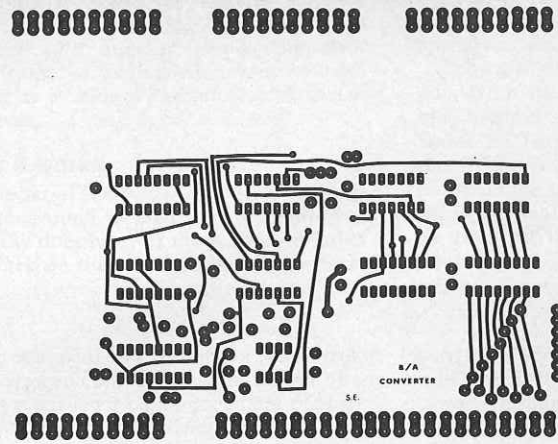
A kit of all basic parts (order additional parts separately) for the BAUDOT To ASCII Converter for \$19.50 postpaid.

Etched and drilled printed circuit board for the BAUDOT To ASCII Converter for \$4.35 postpaid.

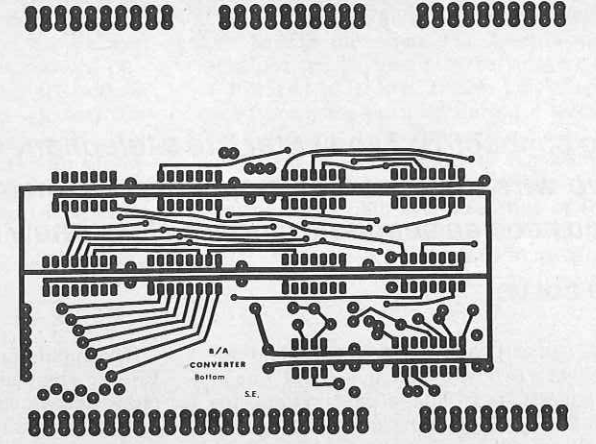


NOTE: ALL PINS ON IC20 & IC22 ARE CONNECTED IN PARALLEL EXCEPT PIN 15

FIG. 1—BAUDOT TO ASCII CONVERTER schematic diagram.



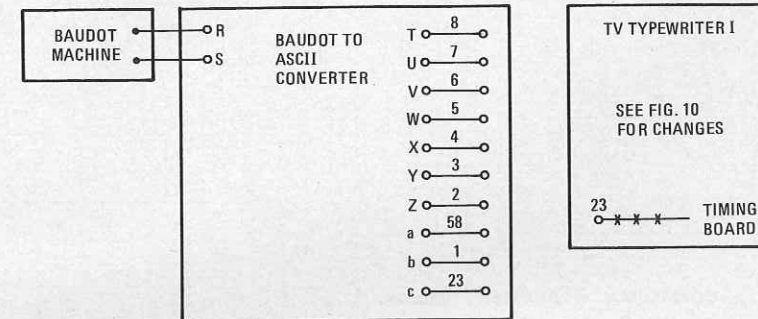
BAUDOT TO ASCII CONVERTER printed circuit board foil pattern. Component side of double-sided board is shown ½-size.



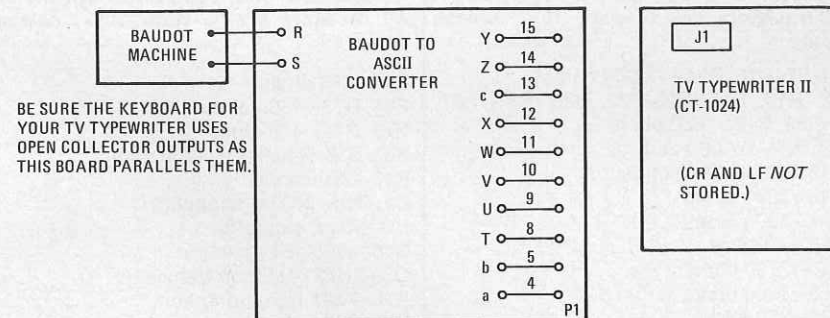
BAUDOT TO ASCII CONVERTER printed circuit board foil pattern. Bottom-side of double-sided board is shown ½-size.

All other necessary construction and descriptive material on this project appeared in the February 1976 issue under the title "ASCII To Baudot Converter" and this material should be scanned if any further details are needed.

Elsewhere in this issue, on page 82 you will find the component-layout diagram for the printed-circuit board and Charts I and II, which are the Truth Tables for the type 8223 PROM used for IC20 and IC22. We do hope that you have enjoyed this project along with the others in this series of ad-ons to TV Typewriter II. R-E

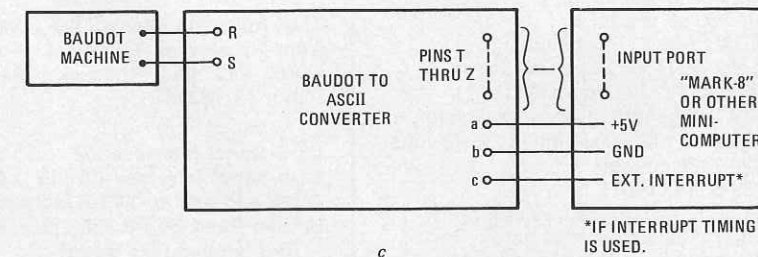


NOTE: THE CR AND LF ARE NOT STORED FOR THIS CONFIGURATION.



BE SURE THE KEYBOARD FOR YOUR TV TYPEWRITER USES OPEN COLLECTOR OUTPUTS AS THIS BOARD PARALLELS THEM.

MOUNT P1 IN FIRST 15 HOLES IN BOTTOM RIGHT EDGE OF BOARD. TRIM BOARD.



*IF INTERRUPT TIMING IS USED.

FIG. 2—BAUDOT TO ASCII CONVERTER connections to TV Typewriter I are shown in a, TV Typewriter II are shown in b, and mini-computer is shown in c.

VERTICAL SWEEP GONE

This little Airline portable, a GEN-3267A, has got us going. No vertical sweep. Still, we can drive it with a B & K Analyst, clear black to the pin-10 grid of the 17JZ8, and get sweep. Everything else is fine, but no vertical sweep.—O.W., Durant, OK.

This has just got to be something in the feedback loop, from plate of the output section to grid of the input section. This is what makes the circuit oscillate. Take it out, and all you have is a two-stage R-C coupled amplifier. If you can get sweep by feeding a drive signal to the input grid, the "amplifier" part is OK.

Suggestion: feed your drive signal to the input grid. Now follow it with a scope, from the output plate back to the input grid. Something in there will be open.

SHORTED CRT IN SCOPE

(This is the end result of quite a bit of correspondence about a problem of severe blooming in the CRT of an Eico 460 oscilloscope. The reader wrote:)

Thank you for the hints about the trouble in my scope. I finally found that the DC voltage on the grid and cathode of the CRT were both the same. This was caused by an internal short between these elements. I blew this out by discharging a 40-µF capacitor across them.—S. Goldhor, Hayward, CA.