MORSE CODE AUTOMATIC READOUT ON A TV SCREEN

How to interface the Morse-a-Letter to a "TV Typewriter."

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ALTHOUGH the Morse-A-Letter (January 1977) deciphers Morse code signals very effectively, its usefulness is somewhat limited by its single-character LED readout. At higher code speeds, the characters are displayed briefly, straining the operator's ability to copy down the entire text. However, it's easy to interface the Morse-A-Letter to a "TV typewriter." This combination, called "Morse-A-Display," will allow message display in page format—a boon to CW operators and SWL's interested in copying Morse.

Designed with this application in mind, the Morse-A-Letter contains all electronics necessary for converting dits and dahs to TTL-compatible ASCII-6 code. The required interface is simple and straightforward. All features of the original project are retained.

ASCII. Before examining the interface, let's review some basics of ASCII code. This will help us understand how the Morse-A-Letter/TV typewriter team op-

erates. ASCII is a standard 8-bit information code used with most computers and data terminals. It may be used in the parallel (all bits present simultaneously on separate lines) or serial (one bit at a time on a single line) mode. Most systems do not use the eighth bit of the code and it is, therefore, assumed to be a logic one at all times. Some systems, however, use the eighth bit for parity or error testing. The remaining seven bits provide a total of 128 possible charac-

ters. Of these, one group of 32 is reserved for the upper case alphabet and a few punctuation marks. Another group of 32 is used for numbers, spacing and additional punctuation symbols. Rarely used punctuation marks and a lower case alphabet are assigned a third group of 32. Finally, the last 32 combinations are assigned as machine or control commands. This group does not actually get printed but is provided to handle hardware operations such as line feed (LF) or carriage return (CR). If only upper case alphanumerics are needed, only the first two groups of 32 codes are required, and only six of the eight bits of the code are used. This diminutive ASCII code is called ASCII-6 and is essentially the code produced by the Morse-A-Letter. No control codes are produced by the Morse-A-Letter, however, so most "housekeeping" operations (line feed, carriage return, etc.) must be performed by the TV terminal. This does not present a real problem, since most TV terminals are programmed to handle

INTERCONNECTIONS	
Morse-A-Letter Connector	**TV Terminal Connector**
A13	Bit 7*
A21	Bit 6
A20	Bit 5
A19	Bit 4
A18	Bit 3
A17	Bit 2
A16	Bit 1
A14	Strobe
A1, A9	Ground
* Optional, see text	

these operations automatically in the absence of specific commands.

Interfacing. Almost any TV terminal capable of receiving TTL-level, 7-bit parallel ASCII code can be used with the Morse-A-Letter. Most terminals will work well with the ASCII-6 code without any changes or additions. However, some terminals require the presence of the seventh bit (B7—not to be confused with edge connector location B7) to produce a question mark (?), due to the method used to check control characters. If the seventh bit is required by your terminal, don't despair! It can easily be obtained because B7 is merely the complement of B6 for the 41 valid ASCII characters produced by the Morse-A-Letter. This modification requires a small amount of additional wiring on the Morse-A-Letter circuit board. Fortunately, no additional parts are needed since an unused inverter (actually one half of *IC5*, a 7413 dual NAND Schmitt Trigger) is already "on the board."

To generate bit 7, connect a wire from B6 of the ASCII output (edge connector location A21) to pin 13 of *IC5*. Also, connect a wire from pin 8 of *IC5* to edge connector location A13. This becomes B7 of the ASCII code. Keep in mind that many TV terminals will function adequately with just the ASCII-6 code, so this addition may be optional.

The TV terminal will normally require a "data ready" signal to tell it when an ASCII character is applied to its input connector. This signal is also sometimes referred to as a "keypressed strobe" or "new character" pulse. It is usually a positive going pulse that appears whenever the ASCII character is ready to be entered. The Morse-A-Letter provides this new character pulse in the form of a positive going pulse at edge connector location A14, which is generated every time a new Morse character is received.

A word of caution is in order. If your terminal does not utilize TTL levels at the ASCII input connector and/or requires a negative-going strobe pulse, an additional interface is needed.

As an example of an interface, the Table lists the wiring requirements for interfacing the Morse-A-Letter to the Southwest Technical Products CT-1024 Terminal, which has a TTL-compatible input and a positive strobe line. All that's required is connecting a suitable cable from the appropriate points on the Morse-A-Letter connector to the TV terminal connector. Note that no power supplies or additional electronics are necessary. Most other TV terminals will interface in a similar manner.

Operation. There are no adjustments required for the Morse-A-Display other than the normal code speed adjustment. It will function in either the code practice or the reception mode. Once a signal is properly tuned in, the television display will read out the incoming characters directly on the television screen. Illegal Morse characters willl be displayed as "@." Noisy signals may generate strings of "E"s or "T"s on the screen, but this is normal. Do not expect to view perfectly edited copy since word spaces are rarely sent in Morse code and the Morse-A-Display is not designed to decode them. This is not a serious handicap, however, and with a little practice you will be able to read complete messages from the screen. To copy high-speed Morse, it might be desirable to reduce the Morse-A-Letter's *C9* from 6.8 microfarads to 2.0 microfarads in the original circuit. This reduces noise immunity slightly, but enables copy at code speeds up to 50 WPM or more.

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