Addendum to DS-3000 KSR Manual
June 16, 1978

MORSE ONLY OPERATION OF THE DS-3000 V3.2 KSR

The following list of operating procedures is offered to clarify some of the details of CW operation with the HAL DS-3000 V3.2 KSR Terminal. This list should provide adequate information to both receive and transmit Morse code with the terminal, but a thorough study of the manual will reveal still more features available on the DS-3000 KSR V3.

1. Hook-up the cables between the DS-3000 KSR, ST-6000, and transceiver.
2. Set the front panel switches of the DS-3000 to:

   SYNCH IDLE = OFF
   UNSHIFT ON SPACE = OFF
   MODE = CONT
   MODE = BAUDOT (note this!)
3. Turn on the power to the DS-3000 KSR and the transceiver. At this point, leave the ST-6000 power OFF.
4. After the screen warms up, the screen should display:

   "BAUD = 45"
5. Change the right-hand mode switch to MORSE and depress and release the RETURN key. The message on the screen should change to:

   "WPM = ØØØ __"
6. Type one, two, or three numbers that represent your desired transmit Morse code speed in wpm (1 to 199 wpm). BE SURE YOU DO NOT LEAVE THE SPEED SET AT ZERO. For example, entering "25" will set the transmit speed to exactly 25 wpm. This setting in no way affects the receive speed - the DS-3000 KSR automatically adjusts to the speed of the station you are receiving.
7. After typing the transmit speed, depress and release the RETURN key. The speed message will disappear and the screen will be blank, ready to receive signals.

   (A modified form of this procedure can be used at any time to change the transmit Morse code speed - see step 17.)
8. Set the transceiver to CW mode (either SSB mode could also be used for reception only) and peak the receiver as you would normally do on either noise or received signals. Now, tune the receiver to a section of the band where there are FEW signals (but do NOT disconnect the antenna!).

9. With ONLY noise being received by the transceiver, adjust the THRESHOLD control on the DS-3000 KSR front panel, rotating in a clockwise direction until the CW DETECT light starts to flash with the noise. Now, decrease the THRESHOLD control counter clockwise until the light just stops flashing with the noise. This adjustment should hold for all operation on this particular band. The exact setting may change as you change bands due to changing noise conditions, but the proper control position will always be fairly close to this position. Also, the correct setting may change somewhat with filter bandwidth or when another receiver is connected. (Most transceivers do select a narrower bandwidth filter in the CW position than in the SSB position, possibly requiring different THRESHOLD control settings.) Important points to remember are: (1) the light should flash infrequently on noise, but should flash with the CW signal (see next step), and (2) avoid the temptation to be frequently adjusting the THRESHOLD control - the proper setting will not change appreciably under normal conditions.

SPECIAL NOTE: The above references to the THRESHOLD control apply to Version 3.2 DS-3000 KSR terminals. The previous Version 3.1 model does NOT have a front panel threshold control. Rather, this control is circuit-board mounted and can accessed with a small screw driver through a vent-hole in the top left of the cabinet (row 3, hole 4 from the left) as indicated in the DS-3000 KSR manual, page 4-2. Since this adjustment should be required infrequently, this limited access may be adequate. However, should you desire to add the THRESHOLD control to your Version 3.1 terminal, HAL can supply the control, knob, wires, and instructions for modification. However, it is recommended that the control be mounted on the real panel due to clearance restrictions of the Version 3.1 cabinet front panel area.

10. Now, tune-in a CW station - look for a moderately strong signal that sounds like a good "fist" until you are experienced at tuning. (The W1AW code transmissions are excellent for getting familiar with Morse reception.

11. Proper receiver tuning is achieved when the CW DETECT light of the DS-3000 KSR flashes with the signal - light on when the sending key is closed (tone on) and off when the key is open (no tone). To minimize noise interference, quite narrow audio filters are used in the DS-3000 KSR, tuned to an 800 Hz center frequency. Optimum receiver tuning therefore occurs when the CW tone is close to 800 Hz.

12. When the receiver is properly tuned, the CW DETECT light should blink on and off with the CW signal. The DS-3000 will take from 2 to 10 characters to "lock" onto the received signal. Until the KSR starts "tracking" the signal, you may see E's, T's, or other incorrect characters on the screen (star - * - is also common). After the tracking starts, the screen will show the next-to-last received character, always displaying one character behind. The terminal retains the last character to use as a comparison of dot and dash lengths to determine the next character. If the received signal stops, as in a pause or the end of a transmission, the final character will be held for approximately five seconds and then displayed.

13. AT ANY TIME, if it appears that the terminal is not responding to the received Morse code, even though the CW DETECT light is flashing correctly, reset the Morse decoder by depressing and holding the CTRL key while pressing the R key (release CTRL after releasing the R key). This reset should correct most "lock-up" problems of the decoder, particularlt those caused by reception of a continuous carrier which may be interpreted by the KSR as a very slow CW signal. (A severe power line transient may cause interruption of the internal computer of the DS-3000 that can only be corrected by turning the AC power off and then back on, as outlined in steps 2 - 7. This is an infrequent occurance, however and the CTRL - R will reset most "lock-up" situations.

14. You can listen to the signal and check the screen to determine how well the signal is being decoded. If a large number of errors are seen, it is probably caused by one of the following problems:

    a. The receiver is not correctly tuned - the CW DETECT light does not "follow" the CW signal.

    b. The signal is so weak that it fades into the noise, thus missing dots or dashes in a character. Our mind does a pretty good job of "filling-in-the-blanks", but the computer just displays what it hears.

    c. There are interfering signals very close in frequency to the desired one. This problem is minimized with the sharp filters in the DS-3000 KSR, but will still cause mis-prints if the frequencies are too close.

    d. There are very strong signals moderately close in frequency to the desired one. What usually happens here is that even though the frequency separation may be fairly wide, the strong signal tends to control the receiver AGC and therefore reduce the volume of the weaker, desired signal indirectly. Use of a good narrow bandwidth CW filter in the receiver helps this problem considerably. Sometimes, turning the AGC off and using a manual RF gain control may also help.

    e. The "fist" of the sending operator is bad. The computer is really quite tolerant of poorly sent CW, but there are some "swing-fists" that defie computer decoder. The only solution in this case is to select another signal and hope that the fellow buys a keyboard soon!

    f. Well sent dots and dashes, but sloppy letters. The computer displays what it "hears" - if you send four unstead of five dots for a five - an "H" will appear instead of a "5"; sending 6 dots will result in a star (*) on the screen, indicating reception of a non-valid Morse character. ALL non-valid characters (includes run-together letters) display as a star (*) on the screen.

15. To transmit CW, just start typing on the keyboard. The CW signal will key the transmitter directly as well as the internal side-tone oscillator of the DS-3000. Note that it is easy to "get-ahead" of the transmitted CW, particularly at low transmitting speeds. The DS-3000 is designed to allow you to get up to 255 characters ahead of the output, but this can be confusing since the code you hear from the side-tone is different from that for the letters you are typing. A little practice will let you get used to this.

16. Until you get really good at typing Morse code, we recommend that you transmit Morse code ONLY using the CONT (continuous) mode because of the confusing outputs that can result from use of Page, Line, or Word modes. After some practice (off the air!), you may wish to try Word mode, but remember, nothing is transmitted until after you type the first letter of the next word in a string. This means that you should always try to stay at least two whole words ahead of the transmitted signal to avoid some potentially confusing pauses for the guy trying to copy your CW! Also, remember to type a RETURN as the very last character of each transmission to assure that the DS-3000 itself goes back to a receive condition.

17. The transmit speed of the DS-3000 KSR is very accurately set with digital electronics to the wpm you select. It stays at that speed until either you change it or the power is turned off. The speed is set initially with the procedure of steps 3 - 7. After the initial setting, you can examine what speed is currently set by typing CTRL - V (press and hold CTRL while typing V, release V before CTRL). This causes the speed message "WPM = Ø25 " to reappear. If you wish to continue sending at 25 wpm, type RETURN; if you want to change speed, type the new speed and then RETURN. NOTE: If you examine the speed while transmitting the output signal to the transmitter will stop until you hit RETURN, at which time it will resume at the new output speed.

18. In CONT (continuous) mode, go back to receive by not typing and waiting for any accumulated characters to transmit out of the buffer. If you use any of the edit modes (Page, Line, or Word), ALWAYS end each transmission with a RETURN key - this assures that the DS-3000 KSR will go back to receive mode and not be left in transmit mode, waiting for more keyboard typing to be transmitted. To be safe, it is a good operating practice to ALWAYS end a transmission with RETURN in all modes of operation, including BAUDOT and ASCII RTTY.

19. Use CTRL-SHIFT-P to program the HERE IS as explained on page 4-12 of the DS-3000 KSR manual. Similarly, the "QUICK BROWN FOX . . ." test message may be transmitted in Morse with CTRL-SHIFT-O. If you have a lot of characters in the output buffer that you would rather not have transmitted, the entire string may be cancelled with CTRL-X.

20. An additional feature of the DS-3000 KSR V3 is the Morse-to-RTTY data converter. When the Morse mode is selected on the DS-3000 KSR, all received AND transmitted signals also key the RTTY connector of the DS-3000. Thus, if a teleprinter is connected in the loop with the DS-3000 and ST-6000, the Morse messages may also be printed! Two notes of caution, however: (1) the ST-6000 should be set for LOCAL rather than for LINE operation to prevent interference between the demodulator and the DS-3000 when receiving; (2) the RTTY output will

20. (cont'd)
be at the speed AND mode that existed BEFORE you switched to the MORSE mode. Thus in the example of steps 3 - 7, the terminal was initially turned-on for BAUDOT, 45 baud operation, which is what will appear at the RTTY connector when Morse is received or sent. If ASCII, 110 baud had been selected prior to entering the Morse mode, then the RTTY output will be ASCII at 110 baud. In addition to providing a printer interface for Morse, this feature also allows use of the RTTY equipment keyboard or tape equipment to transmit Morse code: loop interuptions are converted into Morse code to be transmitted. Therefore, the DS-3000 KSR and ST-6000 can be combined with other RTTY equipment to produce a very flexible, all-mode station. However, note that loop interruptions by the demodulator due to tones or noise will also be interpreted as data to be transmitted, thus the precaution (1).

To summarize, consider these steps to operate the DS-3000 KSR in Morse:

A. Hook-up cables
B. Set DS-3000 switches (IDLE=OFF; USOS=OFF; MODE=CONT; MODE=BAUDOT)
C. Turn-on DS-3000 KSR and transceiver (leave ST-6000 off)
D. See "BAUD = 45"
E. Change MODE to MORSE; See "WPM = ØØØ __"
F. Enter transmit speed and RETURN
G. Tune the receiver away from signals (to noise)
H. Set the THRESHOLD control
I. Tune a CW signal until the CW DETECT light flashes with the signal
J. Correct "lock-up" with CTRL-R
K. See step 14 for ways to improve copy
L. Transmit by typing on keyboard
M. Examine transmit speed with CTRL-V; change = new speed + RETURN.
N. ALWAYS hit RETURN at the end of a transmitted message.
O. Program HERE IS with CTRL-SHIFT-P
P. QUICK BROWN FOX . . . message with CTRL-SHIFT-O
Q. Clear output buffer with CTRL-X