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DS3100 APR

Operators Guide



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GENERAL INFORMATION

Receive Features:

Word wrap-around	Full non-overprint feature in all modes; does <i>not</i> split words at end of a line. When more than 72 characters are received for one line, all characters following the last received space are transferred to the following line.
USOS (UnShift On Space)	Active with Baudot code only; provides a letters case shift following receipt of a space character. Improves reception of text on noisy signals—should be switched off for certain number-oriented transmissions (from the National Weather Service, for example). Controlled with FN-USOS.
CW Threshold	Active in Morse reception only; allows adjustment of signal vs noise detection threshold. Set while receiving noise only so that CW DETECT light is just below threshold of flickering on noise. When properly set, CW DETECT light will flash <i>with</i> CW signal but <i>not</i> with noise or interference.
CAPLK (Capital letters lock)	Active in ASCII transmit operations only. Allows use of full upper/lower case letters or capital letters only. Controlled with FN-CAPLK.
HDX/FDX (Half-duplex / Full-duplex)	In half-duplex mode, <i>all transmitted</i> text (as well as all received text) is stored in the receive buffer and displayed (transmitted text = dim, receive text = bright). In full-duplex, <i>only received</i> text is stored in the receive buffer or displayed in the receive section of the display. Functions in Baudot and ASCII codes; controlled with FN-HD/FD.

Keyboard Features:

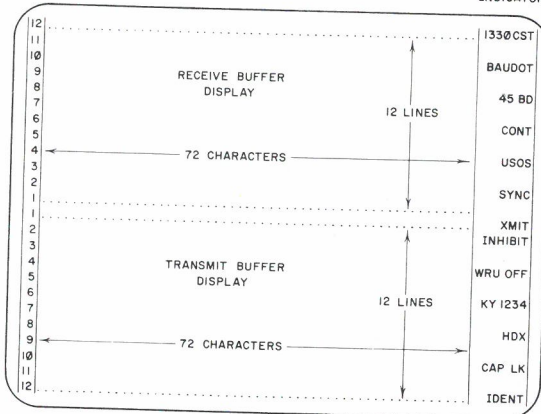
Baudot Characters	A through Z, Ø through 9, -:;\$/(),BELL;"/LTRS, FIGS, CR/LF, Space; auto LTRS & FIGS as required.
Morse Characters	A through Z, Ø through 9, .,:;"/() , AR, AS, BT, ES, KN, SK
ASCII Characters	A through Z (upper and lower case), Ø through 9, !"#%&'()*+,-./:;<>=?@[ ]^_`{|}~\ , NUL, SOH, STX, ETX, EOT, ENQ, ACK, BEL, BS, HT, LF, VT, FF, CR, SO, SI, DLE, DC1, DC2, DC3, DC4, NAK, SYN, ETB, CAN, EM, SUB, ESC, FS, GS, RS, US, RUB OUT.
Terminal Functions	FN key plus second (or third) key controls terminal operation. FN operation of each key is shown by front edge labeling of keytop. With exception of certain ASCII characters (see ASCII section), FN-____ keys control the terminal and do <i>not</i> produce output characters. CR and LF are generated as required to prevent overprint.

Deluxe Features:

Time clock	Internal clock keeps time, zone, and date in 24 hour format: eg, 1232 Z APR 11, 1980.
HERE IS	Up to 10 separate and programmable HERE IS messages of 32 characters each; can include calls to other HERE IS segments, TIME, etc. within HERE IS program. Contents of HERE IS-1 and HERE IS-Ø are stored in non-volatile EAROM.
WRU	Programmable WRU text stored in non-volatile EAROM; receipt of text triggers reply sequence through HERE IS messages and controls KY4 switch feature.
IDENT	Separate key that allows transmission of contents of HERE IS-Ø in Morse code <i>only</i> , regardless of terminal code or mode.
KOS	Keyboard Operated Switch provides automatic transmit-receive control of radio equipment.
KY1, KY2, KY3, KY4	Keyboard operated switched outputs; can be included in HERE IS programs to control various external devices.
EAROM	Non-volatile but re-programmable storage for critical terminal parameters and messages. Terminal always "turns-on" in conditions specified by the EAROM device.
Screen	Green, P31 phosphor for easy viewing. Line numbers for both transmit and receive buffers. Status Indicators on right side instantly show terminal operating status. Receive text is displayed brighter than transmit text to give clear distinction. 24 × 72 character lines.

Condensed Specifications:

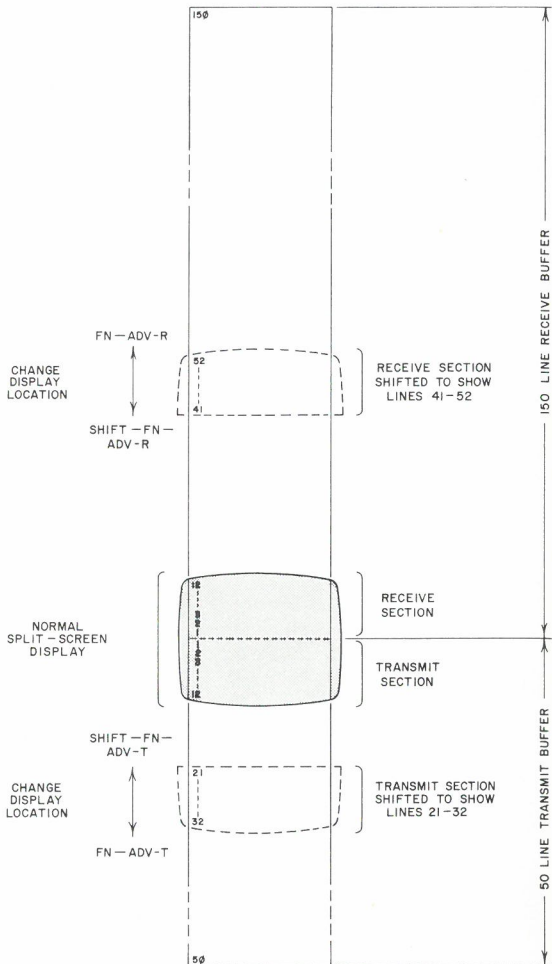
Input / Output:	Baudot & ASCII = Current Loop or RS-232 (Modem connector provided for ASCII)
	Morse = 800 Hz, 500 ohm input; positive and negative key output; sidetone output.
Power Requirements:	105-130 vac 50/60 Hz; 210-250 vac 50/60 Hz; 70 Watts
Physical Data:	13.5" W × 20.5" D × 15.25" H; 45 lbs net, 60 lbs ship. (34.3 × 52.1 × 39.4 cm; 20.4 kg net, 27.2 kg shipping)
Data Rates:	Baudot = 45, 50, 57, 74, and 100 baud ASCII = 110, 150, 300, 600, 1200, 1800, 2400, 4800 and 9600 baud Morse = 1 to 175 words per minute in 1 wpm increments
Buffer capacities:	Receive buffer = 150 lines, 72 characters per line Transmit buffer = 50 lines, 72 characters per line

STATUS
INDICATORS

- 1 TIME Status—shows first 7 digits of time message—shows TIME = 00 00 at turn-on
- 2 CODE Status—shows BAUDOT, MORSE, or ASCII
- 3 RATE Status—shows Baudot and ASCII baud rates—shows speed in WPM in Morse
- 4 MODE Status—shows CONT (continuous), LINE, or WORD
- 5 USOS Status—UnShift On Space—blank when USOS is off
- 6 SYNC Status—SYNChronous idle feature—blank when SYNC is off
- 7, 8 XMIT Status—shows condition of transmit buffer—XMIT INHIBIT, XMIT ENABLED, XMIT ACTIVE
- 9 WRU Status—shows WRU OFF, WRU ACT (active), WRU PRG (programming)
- 10 KY Status—shows which KY switch is “ON”—KY 1 3 4 — 1,3&4 = ON, 2 = OFF
- 11 HDX Status—shows HDX(half duplex) or FDX(full duplex)
- 12 CAP LK Status—if ASCII is locked in capital letters only mode
- IDENT Status—flashes if XMIT ACTIVE more than 10 minutes since last IDENT
- 13 PROG Status—shows PROG if HERE IS is being programmed

TERMINAL MODE CONTROLS

KEYS	OPERATION	STATUS INDICATOR
FN — CODE	Set terminal data code	BAUDOT, ASCII, MORSE
FN — RATE	Increase data rate	Baudot: 45, 50, 57, 74, 100 baud
SHIFT — FN — RATE	Decrease data rate	ASCII: 110, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 9600 Baud MORSE: 1 - 175 WPM in 1 WPM steps.
FN — MODE	Set transmitting mode	CONT, LINE, WORD
FN — USOS	Control UnShift (Baudot mode only)	USOS
FN — SYNC	Control Synchronous idle Baudot: LTRS (11111) ASCII: NULL (0 0 0 0 0 0 0 0) MORSE: BT (_ _ _)	SYNC or blank
FN — HD/FD	Set Half or Full Duplex	HDX = half duplex FDX = full duplex
FN — KY1	Control KYx switched outputs: first operation turns switch on, second turns switch off.	shows which KYx switches are on: KY1 3 4 = #1,3, & 4 on, 2 = off.
FN — KY2		
FN — KY3		
FN — KY4		
FN — QBF	Transmit QBF test message: “THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG’S BACK 1234567890”; works in all codes.	
FN — RYS	Transmit test string: Baudot = line of “RYRY...” ASCII = line of “U*U*...” Morse = no output	
FN — BRK	Test transmitter: Baudot & ASCII = SPACE condition MORSE = Key down	



SCREEN CONTROLS

KEYS	OPERATION	SCREEN INDICATION
FN - ADV-R	Advance receive display by one line. If held, repeats at 10 lines/sec. rate.	Displayed lines and line numbers shift <i>down</i> on screen. Stops at line 150.
SHIFT - FN - ADV-R	Retard receive display by one line. If held, repeats at 10 lines/sec. rate.	Displayed lines and line numbers shift <i>up</i> on screen. Stops at line 1.
FN - ADV-T	Advance transmit display by one line. If held, repeats at 10 lines/sec. rate.	Displayed lines and line numbers shift <i>up</i> on screen. Stops at line 50.
SHIFT - FN - ADV-T	Retard transmit display by one line. If held, repeats at 10 lines/sec. rate.	Displayed lines and line numbers shift <i>down</i> on screen. Stops at line 1.
FN - SCRN	Changes from split screen (receive = upper half, transmit = lower half) to full receive only display (transmit buffer <i>not</i> on screen). Control toggles between split & full conditions with each FN-SCRN key operation.	Split screen has line number discontinuity at center—receive buffer lines count up; transmit buffer lines count down. Only receive buffer lines and line numbers shown in full screen mode.
FN - COPY	Copy one line from receive buffer to transmit buffer. Bottom line of receive buffer is copied into next available line of transmit buffer. Use FN-ADV-R to position receive buffer to copy desired line. After copying line, receive display shifts to next line for further copying.	Copied line appears in next available line of transmit buffer as FN-COPY is operated.
SHIFT - FN - COPY	Copy <i>top</i> line of receive buffer display into transmit buffer	

PROGRAMMABLE FEATURES

KEYS	OPERATION	INDICATIONS
FN — TIME	Enter time code into transmit buffer or HERE IS program.	Top status indicator shows current time and zone <i>only</i> ; does <i>not</i> show date segment.
SHIFT — FN — TIME	Program time message. Programming format: a. SHIFT-FN-TIME b. 1345CST MAR 22, 1979 c. SHIFT-FN-TIME	Show TIME = $\emptyset \emptyset \emptyset \emptyset$ at turn-on and while programming; show correct time and zone after programming.
HERE IS — (number)	Enter selected HERE IS into transmit buffer.	See message entered in transmit buffer.
FN — HERE IS — 1 to \emptyset	Program selected HERE IS segment. The previous programmed message may be retained, edited, or the entire message reprogrammed. Also, terminate programming with second FN-HERE IS#.	During programming, the entire transmit buffer area of screen is used to show both the previous message (top line) and the new text (lower line). Separate cursors in the two lines show copy and keyboard positions.
FN — COPY	When used during programming, FN-COPY recopies the previous HERE IS message, letter by letter, as shown by the cursor positions and new text written.	Cursors move and letters are copied into the new text section.
FN — (arrows)	Use to reposition cursor in <i>new text</i> section of display.	RUB OUT may also be used to edit the new text section.
SHIFT — FN — (arrows)	Use to reposition cursor in <i>previous text</i> section of display to copy into the new text section.	

Procedure:

1. FN-HERE IS# See previous text on screen
2. Enter text or copy from previous text; up to 31 characters per separate segment. See new text on screen. Bottom status indicator shows PROG throughout programming operation.
3. End programming with cursor at *end* of new text.
4. FN-HERE IS# PROG status indicator off.

Rules:

1. Program up to 31 characters per segment. Use of the 32nd character opens the next sequential segment for programming.
2. Each keyboard key combination counts as one character for programming; FN-QBF, FN-RYS, etc. each require *only one* position.
3. Other HERE IS segments may be called within the HERE IS program.
4. TIME and KY1 - KY4 may also be included in the program.

Other Considerations:

When multiple character features are included in the HERE IS programs, the full text of each is *not* displayed to conserve display space. Rather, special *bright* characters or symbols are used to represent these features. When the HERE IS message is transmitted, the *entire* text of each feature is inserted at the proper position. Thus, the time message is not actually called until it is transmitted, assuring that the currently correct time is always sent. Similarly, the KY1 - KY4 switch functions are not controlled until they are transmitted.

The special *bright* characters are:

HERE IS 1	1	RYS	r
HERE IS 2	2	IDENT	i
HERE IS 3	3	LTRS	<
		etc.	FIGS
HERE IS \emptyset	\emptyset	KY1	z
		KY2	x
TIME	t	KY3	c
QBF	q	KY4	v

These *bright* character abbreviations are also displayed in normal usage of the transmit buffer.

IDENT

Transmits the contents of HERE IS-Ø in Morse code *only*, regardless of terminal operating code.

Lower right-hand status indicator shows "IDENT" after a total 10 minutes of uninterrupted transmitting; goes off when IDENT key is depressed.

FN — WRU

Turns WRU feature on or off alternately. When WRU is active, receipt of WRU code message (or ASCII WRU character) causes following chain:

- a. Turn KY4 on
- b. Delay 4 seconds
- c. Transmit HERE IS-1
- d. Turn KY4 off

Status indicator shows "WRU OFF" or "WRU ACT"

SHIFT — FN — WRU

Program WRU code message. Programming format:

- a. SHIFT-FN-WRU
- b. Type code message text = 10 characters maximum length.
- c. SHIFT-FN-WRU

Status indicator shows "WRU PRG".

FN — STORE

Store *present* operating parameters of DS3100 in EAROM memory device. Stored parameters are:

- a. CODE
- b. RATE (baud rates & wpm)
- c. MODE
- d. USOS
- e. SYNC
- f. HERE IS-1 contents
- g. HERE IS-Ø contents
- h. WRU code message

Status indicator shows "STORE" while programming EAROM

TRANSMITTING CONTROLS**KEYS****FN — XMIT**

Control output of transmitter buffer. Alternate operations INHIBIT / ACTIVATE the output of text from the transmit buffer.

XMIT INHIBIT = text is saved in transmit buffer and *not* output from terminal; KOS is off. XMIT ACTIVE = text is being *actively* transmitted; KOS is on. XMIT ENABLED = new text *will be* transmitted when it is typed, but transmit buffer is currently empty; KOS is off.

SHIFT — HOLD

Immediately *halt* output from the transmit buffer; maintain XMIT ACTIVE status and KOS turned on. Use RUB OUT and FN-arrow keys to move keyboard cursor and correct errors. Transmitting *resumes* when new printing character is typed.

XMIT ACTIVE status and KOS on condition continue while holding. RTTY outputs are held in mark condition; Morse is held in key open condition.

FN — FLAG

Define a new starting line for transmitting, different from line 1. Position keyboard cursor with FN-arrow keys to be in desired starting line.

Flag character (*) is placed to the right of the line number of the chosen starting line.

FN-FLAG sets * character at beginning of line; reposition cursor to either desired end point or to continue typing text. When XMIT is enabled, transmission starts at the flag *closest* to the keyboard cursor. Multiple flags may be used; the *entire* contents of the transmit buffer are saved when a FN-FLAG is used. Contents of transmit buffer can be erased with FN-CLRS.

FN — HD/FD

Change terminal from half duplex (HDX) to full duplex (FDX).

HDX = all keyboard characters are written into the receive buffer as they are transmitted, but displayed in the receive section with *dim intensity* to differentiate from received text.

KEYS

OPERATION

INDICATION

FDX = keyboard and receive display are *completely independent*. Keyboard characters are *not* entered into the receive buffer as they are transmitted.

FN — SYNC

Turns synchronous idle feature on or off with alternate FN-SYNC operations. Transmit sync character while awaiting further text from the keyboard. Synchronous character stops if no characters are typed following a NEW LINE key. Synchronous characters used:
BAUDOT = LTRS
(11111)
ASCII = NULL
($\emptyset \emptyset \emptyset \emptyset \emptyset \emptyset \emptyset$)
MORSE = BT
($_ \dots _$)

Status indicator shows SYNC or blank. XMIT ACTIVE status will continue and KOS remain on while synchronous idle is operating.

FN — MODE

Set transmitting mode *when transmit buffer is empty*. CONT = characters are transmitted as they are typed. LINE = text is not transmitted until NEW LINE is typed. WORD = text is not transmitted until the first character following a space; text is transmitted one word at a time.

Status indicator: CONT, WORD, LINE XMIT ACTIVE and KOS will remain on for 2 seconds following a character in CONT mode or 2 seconds after NEW LINE in LINE or WORD mode.

FN — BRK

Test transmitter: Baudot & ASCII = space condx. Morse = Key down

FN — CLRS

CLeaRS transmitter buffer; *all* text in the transmitter buffer is permanently *erased*.

BAUDOT DATA CODE

Bit Number	Case	Letters	Figures
5 4 3 2 1			
0 0 0 0 0		BLANK	BLANK
0 0 0 0 1		E	3
0 0 0 1 0		LF	LF
0 0 0 1 1		A	.
0 0 1 0 0	SPACE	SPACE	SPACE
0 0 1 0 1		S	BELL
0 0 1 1 0		I	8
0 0 1 1 1		U	7
0 1 0 0 0	CR	CR	
0 1 0 0 1		D	\$
0 1 0 1 0		R	4
0 1 0 1 1		J	'
0 1 1 0 0	N	.	
0 1 1 0 1	F	:	
0 1 1 1 0	C	:	
0 1 1 1 1	K	(
1 0 0 0 0	T	5	
1 0 0 0 1	Z	"	
1 0 0 1 0	L	"	
1 0 0 1 1	W	2	
1 0 1 0 0	H	#	
1 0 1 0 1	Y	6	
1 0 1 1 0	P	0	
1 0 1 1 1	Q	1	
1 1 0 0 0	O	9	
1 1 0 0 1	B	?	
1 1 0 1 0	G	&	
1 1 0 1 1	FIGS	FIGS	
1 1 1 0 0	M	.	
1 1 1 0 1	X	/	
1 1 1 1 0	V	:	
1 1 1 1 1	LTRS	LTRS	

Notes:

Mark = "1" = Loop Current On
 = Negative RS-232 Voltage

LF = Line Feed = CTRL-J
 CR = Carriage Return = CTRL-M
 LTRS = Letters Case Shift = FN-LTRS
 FIGS = Figures Case Shift = FN-FIGS

NEW LINE key = CR + LF + LTRS
 CTRL-G = BELL
 ESC = blank
 # = STOP (Figure case H)
 FN-BRK = Space condition (for testing)
 Transmission Order = Bit 1 to Bit 5
 Start Pulse = 1 unit space
 Stop Pulse = 1.5 unit mark

BAUDOT OPERATION

INITIAL SET-UP OPERATIONS:

Operation	Use	Status Indicator
Select Baudot code	FN-CODE	BAUDOT
Select data rate	FN-RATE	45,50,57,74,100
Select transmitting mode	FN-MODE	CONT, LINE, WORD
Set USOS on or off	FN-USOS	USOS or blank
Set SYNC on or off	FN-SYNC	SYNC or blank
Turn transmitter output off	FN-XMIT	XMIT INHIBIT

RECEPTION OF BAUDOT:

After Baudot code and desired data rate have been selected, the terminal will receive encoded RTTY signals connected to either the loop or RS-232 inputs. Reception will continue regardless of whether the transmitting section of the ASR is active or not. The word wrap-around and USOS features should allow good reception on even very weak signals. If recognizable text is not displayed, try retuning the receiver to the demodulator, inverting the demodulator output, changing the data rate, and, finally, try ASCII code. If none of these alternatives result in recognizable text, the signal may be cryptically encoded at the transmitter and cannot be received by the DS3100 ASR. Most commercial Baudot RTTY signals will be found to use 50 or 74 baud (66 or 100 wpm) data rates and use either 425 or 850 Hz frequency shift, frequently with mark being the *lower* radio frequency ("upside-down"). Radio amateurs commonly use 45 baud (60 wpm) or 74 baud (100 wpm) and 170 Hz shift with mark being the *higher* radio frequency ("rightside-up").

TRANSMITTING BAUDOT:

Text to be transmitted in Baudot can be typed at any time, even *while receiving*. It is recommended that most RTTY activity use the half-duplex mode of operation and that transmit text be written with the transmit buffer in the XMIT INHIBIT status. When reception has ended, begin transmitting the pre-composed text with FN-XMIT to get the XMIT ACTIVE status. Continue typing the transmit text. If the transmitted output "catches-up" with the typing, the terminal will now revert to the selected transmit mode, CONT, LINE, or WORD, with or without the SYNChronous idle, as selected. Normally, Baudot LTRS, FIGS, LF, and CR characters are automatically inserted as required and need not be of concern to the operator. However, in the event that such characters are required individually, special key combinations are provided (FN-LTRS, FN-FIGS, CTRL-M, CTRL-J, and ESC). The KOS feature may be used to control transmit-receive circuitry; KOS switch is "on" when XMIT ACTIVE status is shown.

Baud Rate	Avg. WPM	Select Pulse
45.45	60.61	22 ms
50.00	66.67	20 ms
56.92	75.89	17.57 ms
74.20	98.99	13.47 ms
100.00	133.33	10.00 ms

CONTINENTAL MORSE CODE

CHARACTER	CODE	CHARACTER	CODE
A	• -	1	• - - - -
B	- • • •	2	• - - - -
C	- • - •	3	• • • - -
D	- • •	4	• • • - -
E	•	5	• • • • -
F	• • - •	6	- • • • •
G	- - - •	7	- - • • •
H	• • • •	8	- - - • •
I	• •	9	- - - - •
J	• - - - -	Ø	- - - - -
K	• - •	(period)	• - - - -
L	• • • •	, (comma)	- - - - -
M	- -	: (colon)	- - • • •
N	- •	: (s-col)	- - - - -
O	- - - -	- (dash)	- • • • -
P	• • - •	' (apos)	- - - - -
Q	- - - •	/ (slash)	- • • • -
R	• • • •	() (paren)	- - - - -
S	• • • •	" (quote)	- • • • -
T	-	? (query)	• • - • •
U	• • •	AR	• • • •
V	• • • •	AS	• • • •
W	• • - -	BT	- • - -
X	- • • •	ES	• • • •
Y	- • - -	KN	- • - - •
Z	- - • •	SK	• • • • -
		error	• • • • •

Notes:

- = one dot unit of key down time
- = one dash unit of key down time
- = three dot units

Element space = one dot unit

Letter space = three dot units

Word space = seven dot units

$$\text{Speed in WPM} = \frac{\text{dots/min}}{25}$$

$$= 2.4 (\text{dots/sec})$$

$$\cong \text{number of 0's repeated in 26 seconds (1.5\% accuracy)}$$

AR = SHIFT-P
AS = SHIFT-(dash)
BT = SHIFT-;
ES = SHIFT-6
KN = SHIFT-(period)
SK = SHIFT-:

FN-BRK = Key down (for testing)

MORSE OPERATION

INITIAL SET-UP OPERATIONS:

Operation	Use	Status Indicator
Select Morse code	FN-CODE	MORSE
Select data rate (WPM)	FN-RATE	1 - 175 WPM, as selected
Select transmitting mode	FN-MODE	CONT, LINE, WORD
Turn Transmitter output off	FN-XMIT	XMIT INHIBIT

RECEPTION OF MORSE:

After Morse code and desired WPM speed have been selected, the CW THRESHOLD control should be adjusted for proper reception. To set, tune the receiver frequency so that only noise is received (no signals). Adjust the CW THRESHOLD control so that the CW DETECT light is on the verge of flashing on noise. Now, tune-in a CW signal to produce an 800 Hz audio tone out of the receiver. When properly tuned-in and adjusted, the CW DETECT light should flash in unison with the signal and not flash on noise or interfering signals. You may wish to readjust the CW THRESHOLD slightly after the correct receiver tuning is achieved. The receiving speed of the DS3100 ASR adjusts *automatically* to track the speed of the received signal. It may require several CW characters before complete "lock" has been achieved, during which time the letters "T" and "E" may appear on the screen. After lock has been obtained, the screen should display the characters as they are received. Since the dot and dash lengths of a character are used to set the anticipated speed of the next character, the display will always be one character *behind* the received signal; the final character of a transmission is held for approximately five seconds and then displayed if no further signal is received. The DS3100 ASR will display error-free copy of well-sent Morse code and is surprisingly tolerant of "sloppy" hand-sent code. However, run-together characters and excessive weight distortion ("Lake-Erie swing"), often defy deciphering and will be displayed by a star (*) character. Occasionally, a long period of continuous received carrier will cause the automatic speed adjusting circuitry to attempt to track a very slow CW speed, giving the appearance of "lock-up." If another signal is tuned, the terminal will eventually re-adjust the speed and receive properly. However, the process can be expedited by re-setting the receive circuitry with FN-CLR key combination. This control clears the Morse receive circuitry of previous speed data and restarts the search of the automatic tracking circuit.

TRANSMITTING MORSE:

Text to be transmitted in Morse can be composed and stored at any time, even *while receiving*. When it is desired to transmit the pre-composed text, use FN-XMIT to start and note the XMIT ACTIVE status indicator. Continue typing transmit text; if the transmit output "catches-up" with the typing, the terminal will revert to the selected transmit mode, CONT, LINE, or WORD, with or without the SYNCHRONOUS idle (BT), as selected. Normally, Morse transmitting is best done in CONT mode, but the LINE and WORD edit features also operate in Morse code. The special Morse characters, AR, AS, BT, ES, KN, and SK, may be transmitted with the designated SHIFT- key operations.

ASCII DATA CODE

	7	0	0	0	1	1	1	1
	6	0	0	1	1	0	0	1
	5	0	1	0	1	0	1	0
4 3 2 1								
0 0 0 0	NUL	DLE	SPC	0	@	P		p
0 0 0 1	SOH	DC1	!	1	A	Q	a	q
0 0 1 0	STX	DC2	"	2	B	R	b	r
0 0 1 1	ETX	DC3	#	3	C	S	c	s
0 1 0 0	EOT	DC4	\$	4	D	T	d	t
0 1 0 1	WRU	NAK	%	5	E	U	e	u
0 1 1 0	ACK	SYN	&	6	F	V	f	v
0 1 1 1	BEL	ETB	'	7	G	W	g	w
1 0 0 0	BS	CAN	(	8	H	X	h	x
1 0 0 1	HT	EM	)	9	I	Y	i	y
1 0 1 0	LF	SUB	*	:	J	Z	j	z
1 0 1 1	VT	ESC	+	;	K	[	k	{
1 1 0 0	FF	FS	<	<	L	\	l	|
1 1 0 1	RTN	GS	=	=	M	]	m	}
1 1 1 0	SO	RS	>	>	N	_	n	~
1 1 1 1	SI	US	/	::	O	—	o	RBO

ACK = acknowledge	HT = horizontal tab (—)
BEL = signal bell	LF = line feed (l)
BS = backspace (—)	NAK = not acknowledge
CAN = cancel	NUL = null
DC1 = device control 1	RS = record separator
DC2 = device control 2	RTN = carriage return
DC3 = device control 3	RBO = RUB OUT = DEL
DC4 = device control 4	SI = shift in
DLE = data link escape	SO = shift out
EM = end of medium	SOH = start of heading
EOT = end of trans.	STX = start of text
ESC = escape	SUB = substitute
ETB = end of block	SYN = synchronous idle
ETX = end of text	US = unit separator
FF = form feed (home)	VT = vertical tab (l)
FS = file separator	WRU = enquiry (ENQ)
GS = group separator	SPC = space

Notes:

Mark = "1" = Loop Current On
= Neg RS232 Voltage

FN-BRK = Space condition
DLE = CTRL-P
FS = SHIFT-CTRL-L
GS = SHIFT-CTRL-M
NUL = SHIFT-CTRL-P
RS = SHIFT-CTRL-N
RTN = CTRL-M
SI = CTRL-O
SO = CTRL-N
US = SHIFT-CTRL-O
△ = SHIFT-FN-N
NEW LINE = RTN + LF

Transmission order = bit 1 to bit 7
Parity = none; bit 8 = space
Start bit = 1 unit space
Stop bit = 2 unit mark (110 baud)
= 1 unit mark (other rates)

ASCII OPERATION

INITIAL SET-UP CONDITIONS:

Operation	Use	Status Indicator
Select ASCII code	FN-CODE	ASCII
Select data rate	FN-RATE	110, 150, 300, 600, 1200, 1800, 2400, 4800, 9600 baud
Select transmitting mode	FN-MODE	CONT, LINE, or WORD
Set SYNC on or off	FN-SYNC	SYNC or blank
Turn transmitter output off	FN-XMIT	XMIT INHIBIT
Select half- or full duplex	FN-HD/FD	HDX or FDX
Select all capitals or full case	FN-CAPLK	CAP LK or blank

RADIO RECEPTION OF ASCII:

After ASCII code and desired data rate have been selected, the terminal will receive encode RTTY signals connected to either the loop or RS-232 inputs. Reception will continue regardless of whether the transmitting section of the DS3100 is active or not. It is recommended that the HDX (Half-duplex) mode of operation be used for most radio telecommunications. To prevent erasure or overprint of received text by noisy signals, the standard cursor manipulation characters (HT, BS, LF, VT, and FF) are ignored while receiving. Reception of a RTN (carriage return) or more than 72 characters in a line will cause a NEW LINE to be started. The word wrap-around feature prevents splitting of words at the ends of lines. The slower data rates (110 or 300 baud) are usually used in radio transmissions. The capital letter only feature (CAP LK) affects transmission only and all characters are displayed as *received*. However, ASCII control characters (such as ACK, CAN DC1, etc.) are *not* displayed. Reception of the ASCII WRU (sometimes called ENQ) code will trigger the same WRU response as reception of the WRU code message.

RADIO TRANSMISSION OF ASCII:

Text to be transmitted in ASCII can be typed at any time, even *while receiving*. It is recommended that most radio communications use the half-duplex mode. Text to be transmitted can be pre-composed in the transmit buffer with a XMIT INHIBIT buffer status, using FN-XMIT to start transmitting (XMIT ACTIVE status) when desired. If the transmit buffer empties and the output "catches-up" with the typing, the terminal will revert to the selected transmit mode, CONT, LINE, or WORD. The SYNC feature (synchronous idle) feature may be invoked to aid in synchronizing receiving *machines* at the other station (NULL character). The KOS switch is "on" whenever the status is XMIT ACTIVE.

COMPUTER CONNECTION:

The DS3100 ASR can be directly connected to a computer or data set modem for use as a computer terminal. Either half-duplex loop or RS232 connections can be used or half or full-duplex connections can be made directly to the 25 pin Modem connector. Full control signals (CTS, RTS, etc.) are provided as well as RS232 connections. Refer to the ASCII OPERATION section of the Technical Manual for further details.

ST-6000 Front Panel Controls

SWITCH	POSITION	FUNCTION
POWER	ON - OFF	Controls AC power to ST-6000
	ON - OFF	Turns autostart circuit on or off
AUTOSTART	FAST-SLOW	Selects autostart response time (1 or 3 sec.)
KOS	ON - OFF	Turns KOS circuit on or off
PRINT	LINE	Allows received data to drive printer
	LOCAL	Locks printer in mark for "local-loop" operation
DTH	ON - OFF	Turns DTH circuit on or off
ATC	ON - OFF	Turns ATC circuit on or off
SENSE	NORM	Normal signal polarity; mark = lower tone
	REV	Reverse signal polarity; mark = higher tone
LIMITER	ON - OFF	Turns limiter stage on or off
SHIFT (HZ)	170	Selects 170 Hz shift
	425	Selects 425 Hz shift
	850	Selects 850 Hz shift
	INT	Adjust oscilloscope trace intensity
	FOC	Adjust oscilloscope trace focus
Optional oscilloscope	VER	Adjust oscilloscope vertical position
	HOR	Adjust oscilloscope horizontal position

ST-6000 Front Panel Indicators

INDICATOR	FUNCTION
○ POWER	Indicates AC power on when lit
○ AUTO	Indicates when the autostart circuit will allow passage of the data to the printer. This lamp is on whenever the autostart senses a valid TTY signal OR if the AUTOSTART switch is OFF.
○ MARK	Indicates marking condition on the pre-autostart data output from the slicer stage.
○ KOS	Indicates that the KOS circuit is in TRANSMIT mode.
○ SPACE	Indicates that the post-autostart data is in space condition.
○ LOOP	Indicates marking condition in the LOOP 1 circuit.

METER Indicates tuning of receiver.

OSCILLOSCOPE (optional) Indicates tuning of receiver.

ST-6000 Simplified Operating Procedure

1. Use the "standard" cables and jumper plugs supplied with the ST-6000 to connect the unit to a receiver and printer or display as described in section 3.2 of the ST-6000 manual.
2. AFTER CONNECTIONS ARE MADE, plug-in the ST-6000 and other equipment and turn-on the AC power to each.
3. Set the ST-6000 switches as follows:

POWER	- ON
AUTOSTART	- OFF
	- FAST or SLOW
KOS	- OFF
PRINT	- LINE
DTH	- OFF
ATC	- ON
SENSE	- NORM
LIMITER	- ON
SHIFT	- select desired shift
4. Set the receiver to LSB mode and tune to a FSK RTTY signal. (Approximately 3600 kHz at night and 14,100 kHz during the day are good frequencies to look for 170 Hz shift radio amateur RTTY signals at 60 WPM.)
5. Tune the receiver dial until the tuning meter deflects up-scale to approximately 0.6 to 0.7 and has minimum fluxuation as the signal changes from mark-to-space. (If the optional tuning oscilloscope is installed, tune for perpendicular ellipses on the screen.)
6. The printer should now print the received signal. If it doesn't try reversing the SENSE switch or selecting different speeds on the printer or display.

