INSTRUCTION MANUAL

MORSE CODE

IDENTIFIER/STATION MONITOR

MODEL ID/SM-700

data SIGNAL INCORPORATED

TABLE OF CONTENTS

TABLE OF CONTENTS

ID/SM-700

SECTION 1.0 GENERAL DESCRIPTION.

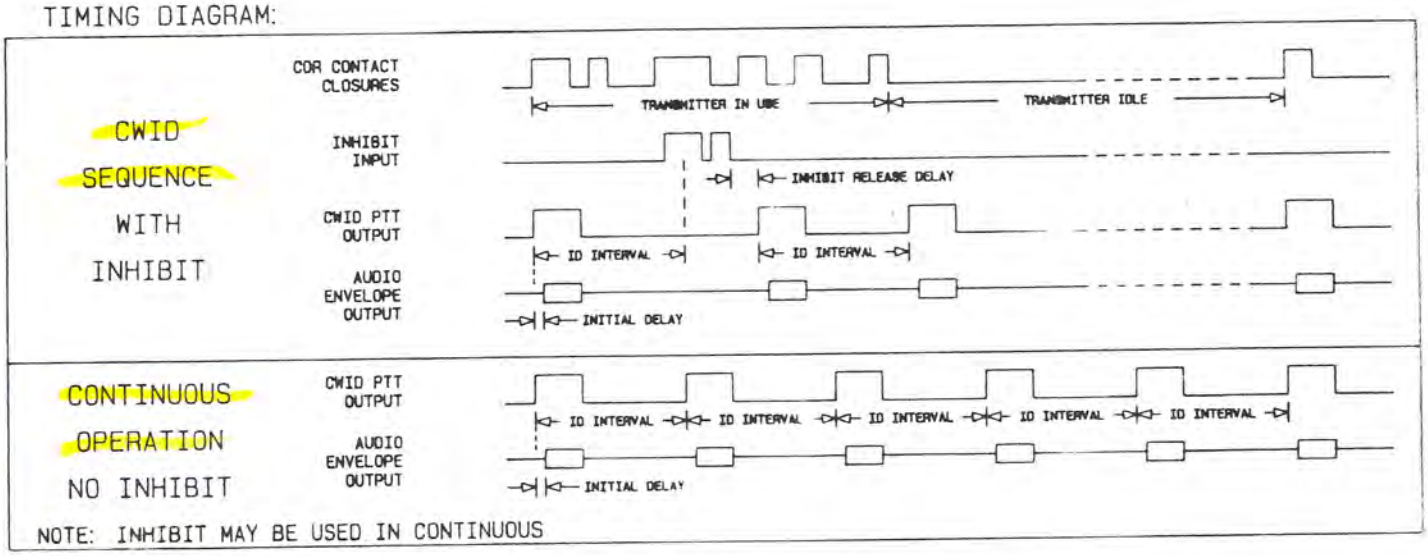
1.1 GENERAL. The Data Signal Inc. Model ID/SM-700 is a self-contained, solid-state, microcomputer-controlled, morse code identifier that provides automatic generation of a radio user's call sign at predetermined intervals. Also included is a six function site monitor feature for simultaneously monitoring various site functions.

1.2 CWID FEATURES. The model ID/SM-700 can operate in COR, CONTINUOUS, or TEST modes and it also provides an inhibit feature. All parameters, including the CWID, are field programmable via a 12 button keypad or internal dip switches. Two audio inputs, a high impedance output, and a 600 ohm balanced audio output are supplied to interface with virtually any configuration. An internal speaker with front panel control and four status indicators are provided for convenience. The CWID mode is selectable by two front panel switches.

1.3 SITE MONITOR. The ID/SM-700 also incorporates a defeatable site-monitor feature allowing the unit to monitor up to 6 separate site functions simultaneously. It can provide site status data in DTMF signalling at predetermined intervals and, whenever a fault is sensed, immediately transmit fault data. The site status data includes a programmable site number code to uniquely identify up to 9 sites. The companion SITE FAULT DECODER, model SFD-700, can be used to monitor the status data from various sites.

1.4 HOUSING. The ID/SM-700 makes use of linear and CMOS integrated circuits as well as discrete devices to achieve high reliability and flexibility. It is housed in a rugged, rack-mountable metal case.

TIMING DIAGRAM:



SECTION 2.0 CWID INSTALLATION. The following paragraphs deal with the installation of the ID/SM-700 to the radio equipment. The user is required to supply the necessary cabling between the radio and the enclosed plugs. Once cabled, the unit becomes a plug-in peripheral to the radio system providing easy access.

2.1 SYSTEM POWER. (+12Vdc at 250 mA maximum, and ground). Connect the regulated +12Vdc input to J101 pin 1. Connect the system ground to J101 pin 2.

2.2 AUDIO CONNECTIONS. The ID/SM-700 provides an audio interface for virtually all radio interfaces and applications. Two external audio inputs are provided for routing of normal audio for mixing with or isolation from the ID/SM-700 audio. Two external audio outputs are also available for high impedance or 600 ohm balanced interfaces. Each audio connection is described in detail below.

2.2.1 HIGH IMPEDANCE AUDIO OUTPUT. J101 pin 9 provides the interface for the CWID output when connecting to high impedance inputs of the radio.

2.2.2 BALANCED 600 OHM AUDIO OUTPUT. J101 pins 12 and 13 are used when a 600 ohm, transformer isolated interface is required. When using the balanced output, both pins 12 and 13 must be connected. For a low-impedance unbalanced output, connect the audio to J101 pin 12 and connect ground to J101 pin 13.

2.2.3 MIXED EXTERNAL AUDIO INPUT. J101 pin 4 is an input for external audio. This audio is amplified internally and is continuously available at the high-impedance output. It is also available at the balanced output whenever the Identifier is active. The external audio will be mixed with the identifier/monitor audio whenever both are present simultaneously. This audio is adjustable by R101.

2.2.4 AUXILIARY AUDIO INPUT. J101 pins 10 and 11 are provided for auxiliary audio input. This audio input is routed directly to the balanced audio output pins through a set of normally closed contacts of an activity relay. J101 pin 10 connects internally to J101 pin 12. J101 pin 11 connects internally to J101 pin 13. The activity relay is energized whenever the ID/SM-700 is actively generating an ID or status information tones. When the activity relay is on, the contacts break the audio path between the auxiliary audio input and the balanced audio output pins and applies the ID/STATUS tones to the balanced audio output. This precludes any mixing of the two audios.

2.3 PTT. Connect J101 pin 15 to the PTT keying input of the radio. The unit is shipped with jumper JP-101 installed. Ground is supplied via a set of form C relay contacts to J101 pin 15 for PTT keying.

2.3.1 POSITIVE PTT KEYING. If a dc voltage level other than ground is required to key PTT in the radio, connect that dc voltage source to J101 pin 14. NOTE: When wiring this input, JP-101 MUST BE REMOVED!!

2.4 INHIBIT CONTROL. Two inhibit inputs are provided to prevent the transmission of the CWID code sequence from interrupting voice traffic

or interfering with another carrier on a shared system. One negative keying input pin and one positive keying input pin is provided. The inputs may be used together in an OR'd condition.

The two inhibits inputs function with regard to their own threshold reference settings. U102 pin 10 is the negative inhibit reference, which is adjusted by R114. U102 pin 13 is the positive inhibit reference, which is adjusted by R118. Whenever the level at the negative inhibit input is below its threshold, or the level at the positive inhibit input is above its threshold, the ID sequence is prevented from being transmitted.

2.4.1 NEGATIVE INHIBIT. J101 pin 7 is the negative inhibit input pin. The threshold reference is factory set at 6Vdc. It assumes a normally open input which is switched to ground or a voltage less than 5Vdc whenever inhibit is required.

The connection to the negative inhibit pin may be any point in the radio that provides a dc voltage level shift greater than 2Vdc in the negative direction whenever inhibit is required. When connecting J101 pin 7 to a point that provides a dc voltage level shift, R114 may require adjustment. Measure the voltage level at U102 pin 9 when inhibit is and is not present. Set the reference at U102 pin 10 with R114 at a level midway between the two readings.

2.4.2 POSITIVE INHIBIT. J101 pin 8 is the positive inhibit input pin. The threshold reference voltage is factory set at 6Vdc. It assumes a normally open input is connected to J101 pin 8 that will switch a voltage greater than 7 volts to the unit whenever inhibit is required.

The connection to the positive inhibit pin may be any point in the radio that provides a dc voltage level shift greater than 2Vdc in the positive direction whenever inhibit is required. When connecting J101 pin 8 to a point that provides a dc voltage level shift, R118 may require adjustment. Measure the voltage level at U102 pin 12 when inhibit is and is not present. Set the reference at U102 pin 13 with R118 at a level midway between the two readings.

2.5 COR TRIGGER INPUT. When operating in the COR mode, at least one trigger input pin requires connection. In CONTINUOUS mode, neither pin needs to be wired. The two input pins, one for a negative-edge trigger and one for a positive-edge trigger are provided for initiation of the ID sequence. The inputs may be used in an OR'd configuration.

The two trigger inputs function with regard to their own threshold reference settings. U102 pin 3 is the negative trigger reference, which is adjusted by R106. U102 pin 6 is the positive trigger reference, which is adjusted by R110. Whenever the level at the negative trigger input pin is below its threshold, or the level at the positive trigger input pin is above its threshold, the internal circuitry will recognize the COR trigger input and act accordingly.

2.5.1 NEGATIVE TRIGGER. J101 pin 5 is the negative trigger input pin. The threshold reference is factory set at 6Vdc. It assumes a normally open input which is switched to ground or a voltage less that 5Vdc whenever the trigger signal is present.

The connection to the negative inhibit pin may be any point in the radio that provides a dc voltage level shift greater that 2Vdc in the

negative direction whenever the trigger is present. When connecting J101 pin 5 to a point that provides a dc level shift, R106 may require adjustment. Measure the voltage level at U102 pin 2 when trigger is and is not present. Set the reference at U102 pin 3 with R106 at a level midway between the two readings.

2.5.2 POSITIVE TRIGGER J101 pin 6 is the positive trigger input pin. The threshold reference is factory set at 6Vdc. It assumes a normally open input which is switched to a voltage greater that 7Vdc whenever trigger is present.

The connection to the positive trigger pin may be any point in the radio that provides a dc voltage level shift greater that 2Vdc in the positive direction whenever trigger is present. When connecting J101 pin 6 to a point that provides this shift, R110 may require adjustment. Measure the voltage level at U102 pin 5 when trigger is and is not present. Set the reference at U102 pin 6 with R110 at a level midway between the two readings.

2.6 ACTIVITY OUTPUT CONTROL. J101 pin 16 is the activity indication pin. A normally-open set of relay contacts are closed, and ground is supplied to J101 pin 16 whenever the ID/SM-700 keys the associated transmitter. The ground may be used to control external equipment or other circuitry.

2.7 SITE FUNCTION INPUTS. These six inputs provide the interface to simultaneously monitor up to six different site functions. The six inputs are normally activated upon sensing a ground on the input. Two of the six inputs can be configured to sense a voltage change of 2 volts or more, in either the positive or negative direction, when an alarm condition is present. Two of the six inputs can be configured to sense a ground on the input as an alarm condition, or to sense an open on the input as an alarm condition. The remaining two inputs require ground as the alarm condition.

2.7.1 SITE FUNCTION INPUTS #1 AND #2. J102 pins 1 and 2 are the input pins for site functions 1 and 2. These two input pins can be configured to detect a voltage change of 2Vdc (minimum), that changes in the negative or positive direction. The next 3 paragraphs describe the set-up.

2.7.1.1 POSITIVE FAULT INPUT. To set the circuit to detect a fault condition with a positive input, set the dip switches on S102 as follows:

Site function input #1: S102-1 and -3 off, S102-2 and -4 on
Site function input #2: S102-5 and -7 off, S102-6 and -8 on

2.7.1.2 NEGATIVE FAULT INPUT. To set the circuit to detect a fault condition with a negative input, set the dip switches on S102 as follows:

Site function input #1: S102-1 and -3 on, S102-2 and -4 off
Site function input #2: S102-5 and -7 on, S102-6 and -8 off

2.7.1.3 FAULT INPUT THRESHOLD LEVEL. Record the two voltage levels at pin 1 of S102 for input #1 or pin 5 of S102 for input #2 when the site function input is normal and in a fault condition (ie. door closed

and door open). Adjust R123 for a voltage midway between the two levels at S102 pin 2 for fault input #1. Adjust R127 for a voltage midway between the two levels as a S102 pin 6 for fault input #2.

2.7.2 SITE FUNCTION INPUTS #3 AND #4. J102 pins 4 and 5 are the input pins for site function #3 and #4 respectively. These two inputs can only be activated be placing ground on the input pin. Blocking diodes and internal pull-up resistors allow the inputs to remain normally open until a fault is detected.

2.7.3 SITE FUNCTION INPUTS #5 AND #6. J102 pins 6 and 7 are the input pins for site functions #5 and #6 respectively. These 2 inputs are controlled by dip switch S101-3. When S101-3 is OFF, these two inputs are exactly the same as function inputs #3 and #4. (That is, a ground is required to activate the fault). Switching S101-3 ON, configures the #5 and #6 inputs such that a ground is required to inhibit the fault detect circuit and an open input allows the fault to activate.

SECTION 3 PROGRAMMING AND ALIGNMENT. The following paragraphs describe the keypad and dip-switch programming of the ID/SM-700. Table 3.11 at the end of Section 3 depicts the default parameters of the ID/SM-700 as shipped from the factory.

3.1 KEYPAD PROGRAMMING. Most of the features available on the ID/SM-700 are programmable via the internal keypad shipped with the unit. To access the memory and alter any of the default parameters of the ID/SM-700, a sub-menu must first be entered corresponding to the parameter desired. Upon entry into the sub-menu, a series of short beeps will be heard corresponding to the sub-menu number. Table 3.1 shows the various sub-menus and the code required to enter each sub-menu. The succeeding paragraphs describe the methods to alter the parameters for each sub-menu. To exit any sub-menu, press the # key, and 2 long-beeps are heard. This indicates that the main menu is re-entered.

TABLE 3.1 MAIN MENU

CODE	SUB-MENU FUNCTION
1*	PROGRAM CWID SEQUENCE
2*	PROGRAM SITE MONITOR PREAMBLE
3*	PROGRAM CWID TIMING PARAMETERS
4*	PROGRAM SITE MONITOR PARAMETERS
5*	DTMF TEST TONE
6*	SINGLE TEST TONE

2 LONG BEEPS--ENTER MAIN MENU
2 SHORT BEEPS--VALID ENTRY.SAVE IN MEMORY
1 LONG BEEP--INVALID ENTRY.NOTHING HAPPENED
N SHORT BEEPS--N SUB-MENU

3.2 PROGRAM CWID SEQUENCE. After entering the "1*", one short beep is heard indicating this sub-menu is entered. The CWID sequence may now be programmed or altered. A maximum of 10 alpha-numeric characters may be entered in the sequence. The ID sequence is programmed by entering a series of 2-digit codes corresponding to the alpha-numeric characters of the ID sequence. The programmer should begin by entering the 2-digit code that corresponds to the first alpha-numeric character of the sequence. If the entry is valid, two short beeps will be heard after the second digit is released. The next character can then be programmed. If for any reason an entry is invalid, one long error beep will be heard. This means the programmer must begin again, starting with the first alpha-numeric character of the sequence. Table 3.2 matches a 2-digit code to each of the given alpha-numeric characters. Any code not in the table is invalid. After all of the characters have been programmed, the # key must be pressed to save the CWID in memory and then re-enter the main menu. Two long beeps indicate the save was successful and the main menu was reentered. See example #1 for CWID programming. See section 4.1 for operation.

NOTE: If this sub-menu is entered, the CWID will be altered to what is entered at this time. Entering the # as the first digit after first

entering this sub-menu will clear the ID memory and essentially eliminate the ID function. If this sub-menu is entered by mistake, re-enter the original ID and then exit.

EXAMPLE 1: TO PROGRAM THE CWID FOR "WJRP102", enter the following:

"32" = W
"19" = J
"27" = R
"25" = P
"01" = 1
"00" = 0
"02" = 2
"#" = save and exit to main menu

TABLE 3.2 CWID TABLE.

CODE	CHARACTER	CODE	CHARACTER	CODE	CHARACTER	CODE	CHARACTER
00	0	10	A	20	K	30	U
01	1	11	B	21	L	31	V
02	2	12	C	22	M	32	W
03	3	13	D	23	N	33	X
04	4	14	E	24	O	34	Y
05	5	15	F	25	P	35	Z
06	6	16	G	26	Q	+36	*
07	7	17	H	27	R	+37	#
08	8	18	I	28	S		
09	9	19	J	29	T		

+These are used for the site monitor functions only.

3.3 CWID PARAMETERS. The following paragraphs address the parameters of the CWID that are programmable via the internal keypad. Table 3.11 at the end of section 3 shows the default parameters of the CWID. After " 3* " is entered in the main menu, 3 short beeps will be heard, indicating entering the CWID parameter sub-menu. Any of the programmable CWID parameters may be altered with a sequence of four digits. The first two digits indicate the parameter to change. The second two digits indicate the new data to be stored in memory (See Table 3.3). The second two digits entered, the parameter data, may be any combination of two digits. If the programmer enters parameter data outside the valid data range, the software recognizes this and substitutes the default data for that parameter.

To exit this sub-menu, simply press # as the first digit of the sequence. Two long beeps are heard when re-entering the main menu. If an invalid parameter code is keyed in, one long beep is given and the programmer must begin again with the parameter code.

TABLE 3.3 CWID PARAMETERS

PARAMETER CODE	PARAMETER	VALID DATA RANGE
01	INTERVAL BETWEEN ID'S	01-60
02	ID SPEED (WPM)	01-06
03	ID TONE FREQUENCY	01-17
04	INHIBIT RELEASE DELAY TIME	01-32
05	PTT TO TX DELAY TIME	01-08
#	EXIT TO MAIN MENU	--

3.3.1 INTERVAL BETWEEN ID'S. The time between ID transmissions is determined by the data stored for this parameter. It is factory set for 30 minutes, but may be changed to any time from 1 minute to 60 minutes, in 1 minute increments. To alter the internal time, enter the parameter code (from Table 3.3), "01", followed by any 2 digits from "01" to "60", corresponding to the time required in minutes.
EXAMPLE: To change the interval time between ID's from 30 minutes to every 15 minutes. Enter "0115", then hear 2 short beeps.

3.3.2 ID SPEED. The speed at which the ID sequence is transmitted is determined by the data stored for this parameter. The speed is factory set for 22 words-per-minute, but may be changed from 20 to 25 words-per-minute in one word-per-minute increments. The FCC approved speed range for CW Identifications is 20 to 25 WPM. To alter the identification speed, enter the parameter code (from Table 3.3), "02", followed by two digits for the speed. Obtain the two digits for the speed from Table 3.4.
EXAMPLE: Change the speed to 24 WPM. Enter "0205", then hear 2 short beeps.

TABLE 3.4 ID SPEED

SPEED CODE	SPEED(WPM)
01	20
02	21
03	22
04	23
05	24
06	25

3.3.3 ID TONE FREQUENCY. The frequency of ID is determined by the data stored for this parameter. The ID frequency is factory set for 1200Hz, but may be changed to a frequency from 400Hz to 2000Hz in 100Hz increments. The FCC approved tone range for CW Identification is 400Hz to 2000Hz. To alter the ID tone frequency, enter the parameter code (from Table 3.3), "03", followed by the two-digit code for the ID tone frequency from Table 3.5.
EXAMPLE: Change the frequency to 800hz. Enter "0305", the hear two beeps.

TABLE 3.5 ID TONE FREQUENCY

FREQUENCY CODE	TONE(Hz)	FREQUENCY CODE	TONE(Hz)
01	400	10	1300
02	500	11	1400
03	600	12	1500
04	700	13	1600
05	800	14	1700
06	900	15	1800
07	1000	16	1900
08	1100	17	2000
09	1200		

3.3.4 INHIBIT RELEASE DELAY. This is the time interval that the channel must be quiet for before the ID can begin. This prevents the ID from "walking on" any mobile traffic. The delay interval is factory set for 5 seconds but may be changed from 250ms (milli-seconds) to 8 seconds in 250ms increments. To alter the inhibit release delay (IRD), enter the parameter code (from Table 3.3), "04", followed by the two-digit code for the IRD from Table 3.6.
EXAMPLE: Change the IRD to 2.75 seconds. Enter "0411", then hear two beeps.

TABLE 3.6 INHIBIT RELEASE DELAY

IRD CODE	DELAY(SEC)	IRD CODE	DELAY(SEC)	IRD CODE	DELAY(SEC)
01	0.25	12	3.0	23	5.75
02	0.50	13	3.25	24	6.0
03	0.75	14	3.5	25	6.75
04	1.0	15	3.75	26	6.50
05	1.25	16	4.0	27	6.75
06	1.50	17	4.25	28	7.0
07	1.75	18	4.5	29	7.25
08	2.0	19	4.75	30	7.50
09	2.25	20	5.0	31	7.75
10	2.50	21	5.25	32	8.00
11	2.75	22	5.5		

3.3.5 PTT TO Tx DELAY TIME. This is the time period between the initial keying of the PTT line and the application of audio to the Tx audio line. This allows the transmitter to come to full power. The initial delay is factory set for 750 milli-seconds but is programmable from 250 milli-seconds to 2 seconds in 250 milli-seconds increments. To alter the initial delay, enter the parameter code (from Table 3.3) "05", followed by the two digit code for the initial delay from Table 3.7.
EXAMPLE: Change the initial delay to 250 ms. Enter "0501", then hear two beeps.

TABLE 3.7 INITIAL DELAY

ID CODE	DELAY(SEC)	ID CODE	DELAY(SEC)
01	0.25	05	1.25
02	0.50	06	1.50
03	0.75	07	1.75
04	1.0	08	2.0

3.4 SITE MONITOR PARAMETERS. The following paragraphs address the features of the site monitor that are programmable via the internal keypad. Table 3.11 at the end of section 3 shows the default parameters of the monitor. After "4*" is entered in the main menu, 4 short beeps will be heard, indicating entering the site monitor parameter sub-menu. Any of the programmable site monitor parameters may be altered with a sequence of four digits. The first two digits indicate the parameter to change. The second two digits indicate the new data to be stored in memory. (See Table 3.8). The second two digits entered, the parameter data, may be any combination of two digits. If the programmer enters parameter data outside the valid data range, the software recognizes this and substitutes the default data for that parameter.

To exit this sub-menu, simply press # as the first digit of the sequence. Two long beeps are heard when re-entering the main menu. If an invalid parameter code is keyed in, one long error beep is given and the programmer must begin again with the parameter code.

TABLE 3.8 SITE MONITOR PARAMETERS

PARAMETER CODE	PARAMETER	VALID DATE RANGE
01	SITE NUMBER	01-09
02	INTERVAL BETWEEN STATUS	01-04
03	# OF ALERTS, SF #1	01-04
04	# OF ALERTS, SF #2	01-04
05	# OF ALERTS, SF #3	01-04
06	# OF ALERTS, SF #4	01-04
07	# OF ALERTS, SF #5	01-04
08	# OF ALERTS, SF #6	01-04
09	ACTIVE FAULT CODE	00-15
10	INACTIVE FAULT CODE	00-15
11	INTERVAL BETWEEN FAULT ALERTS	01-10
12	ALERT SPEED (DPS)	05-15
#	EXIT TO-MAIN MENU	

3.4.1 SITE NUMBER. When transmitting the status of the site functions, the ID/SM-700 sends the preamble, if programmed, followed by the site number, site function number, and the active/inactive character. This site number is factory set to a 1, but may be altered to any digit from 1 to 9. This allows up to 9 site monitors to interface with one site fault decoder. To alter the site number, enter the parameter code (from Table 3.8), "01", followed by the desired site number from "01 to 09".

EXAMPLE: Change the site number from 1 to 5. Enter "0105", then hear two beeps.

3.4.2 INTERVAL BETWEEN STATUS. This is the time period between site status transmissions. When enabled, the site monitor will automatically send a fault code sequence for each site function input including the preamble, site number, site function number and the active/inactive character. The interval between status transmissions is factory set at 2 hours, but may be altered from 1 hour to 4 hours in 1 hour increments. To alter the interval between status, enter the parameter code (from Table 3.8), "02", followed by the digit code for the interval from "01 to 04". EXAMPLE: Change the interval between status from 2 to 4 hours. Enter "0204", hear two beeps.

3.4.3 NUMBER OF ALERTS, SITE FUNCTION #N. This is the number of times the site fault monitor will transmit the fault code sequence whenever the monitor detects a fault on one of the site functions. The number of times may be from 1 to 4 and the default is 2. The fault code sequence consists of the preamble, site number, site function number and the active/inactive characters. Once the fault is sensed by the monitor, the fault code sequence is transmitted the number of times corresponding to the digit stored in memory for that site function number at the intervals programmed in the INTERVAL BETWEEN FAULT ALERTS (See para 3.4.6). Each site function is individually programmable to transmit from 1 to 4 times after the initial recognition. If the site fault input remains active after the total number of alerts has been sent, the fault code sequence will not be retransmitted until status transmission. At this time, the number of alerts is reset to the number programmed and will begin again. The interval between each transmission is programmable by the INTERVAL BETWEEN FAULT ALERTS (SEE SECTION 3.4.6).

To alter the number of alerts for any of the six site function inputs, the programmer begins by entering the two digit parameter code for the site function number (see Table 3.8). This may be any pair from 03 to 08 which relates to site function numbers 1 to 6 respectively. The second two digits may be from 01 to 04 indicating 1 to 4 transmissions. EXAMPLE: Change site function #1 from 2 to 4 times. Enter "0304", hear two beeps.
EXAMPLE: Change site function #5 from 2 to 1 time. Enter "0701", hear two beeps.

3.4.4 ACTIVE FAULT CODE. This is the character that is transmitted in the fault code sequence during alarm transmissions and status transmissions to indicate to the decoder that the site function input is in an active fault condition. This code is factory set for a star (*) digit, but may be altered to any of the 16 DTMF digits. To change the active fault code, enter the parameter code, "09", followed by the code for the desired DTMF digit from Table 3.9.
EXAMPLE: Change the active fault code to DTMF B. Enter "0911", then hear two beeps.

3.9 DTMF DIGIT CODES

CODE	DTMF CHAR	CODE	DTMF CHAR
00	0	08	8
01	1	09	9
02	2	10	A
03	3	11	B
04	4	12	C
05	5	13	D
06	6	14	*
07	7	15	#

3.4.5 INACTIVE FAULT CODE. This is the character that is transmitted in the fault code sequence during status transmissions to indicate to the decoder that the site function input is not in an active fault condition. This code is factory set for a pound (#) digit, but may be altered to any of the 16 DTMF digits. To change the inactive fault code, enter the parameter code, "10", followed by the code for the desired DTMF digit from Table 3.9.
EXAMPLE: Change the inactive fault code to DTMF 8. Enter "1008", then hear two beeps.

3.4.6 INTERVAL BETWEEN FAULT ALERTS. This is the time period between fault code sequence transmissions whenever the faults are in an active (fault) condition. The interval is factory set for 5 minutes between transmissions, but may be changed from 1 minute to 10 minutes, in one minute increments. To change the time period, enter the parameter code (from Table 3.8), "11", followed by the interval time in minutes, a number from 01 to 10.
EXAMPLE: Change the interval time from 5 to 2 minutes. Enter "1102", hear two beeps.

3.4.7 ALERT SPEED. This is the speed at which the fault code sequence is transmitted. The sequence is a series of DTMF digits, thus, the speed is in digits per second (DPS). The alert speed is factory set at 5 DPS but may be changed to any speed from 5 to 15 DPS, in 1 DPS increments. To change the alert speed, enter the parameter code "12" (from Table 3.8), followed by the desired alert speed in digits per second, a number from 05 to 15.
EXAMPLE: Change the alert speed to 10 DPS. Enter "1210", hear two beeps.

3.5 PREAMBLE. The preamble is a sequence of DTMF digits that is used to uniquely identify a particular site-fault decoder. The preamble opens up the site-fault decoder for the succeeding status information. Any other decoder would ignore the transmission. The preamble is programmed by first entering "2*" while in the main menu. Upon releasing the *, two short beeps will be heard indicating the Preamble sub-menu. A maximum of 7 digits can be programmed into the preamble. To program, begin by entering a series of two-digit entries from Table 3.10 that correspond to the DTMF digit in the preamble.
EXAMPLE: Program the preamble as 16*4A7. Enter "01-06-36-04-10-07" followed by #. then hear two short beeps.

TABLE 3.10 PREAMBLE CODE

CODE	DTMF DIGIT	CODE	DTMF DIGIT
00	0	08	8
01	1	09	9
02	2	10	A
03	3	11	B
04	4	12	C
05	5	13	D
06	6	36	*
07	7	37	#

3.6 DIP SWITCH PROGRAMMING. The following paragraphs describe in detail the options and features that may be utilized via the dip switch S101.

3.6.1 ALARM OVERRIDE. S101 switch 1 controls the alarm override feature. This switch allows the site monitor to ignore any INHIBIT inputs. In the event any of the site function inputs change to a fault condition, the alarm sequence will be transmitted immediately, regardless of the INHIBIT inputs. S101-1 in the ON position enables the override feature.

3.6.2 TEST SELECT. S101 switch 2 controls the purpose of the front panel test switch. When S101-2 is in the OFF position, the ID, if programmed, will be transmitted each time the front panel test button is pressed. If S101-2 is in the ON position, the ID, if programmed, and the status codes for all of the site functions are transmitted.

3.6.3 SITE FUNCTION POLARITY. The ID/SM-700 can be configured to sense site function inputs #5 and #6 in a fault condition as either an open or ground input condition. With S101-3 ON, site functions #5 and #6 need to be wired such that the inputs are normally grounded and go into an open state when in a fault condition. With S101-3 OFF, the #5 and #6 inputs need to be wired such that the inputs are normally open and ground is applied when in a fault condition.

3.6.4 STATUS INHIBIT. Placing S101-4 in the ON position inhibits all status transmissions. The periodic status transmissions of all 6 site functions will be transmitted if S101-4 is OFF.
NOTE: This does not affect the fault transmissions. If any of the 6 site function inputs are sensed in a fault state, the fault code sequence is sent. Placing S101-3 OFF, S101-4 ON and leaving J101 pins 1 thru 7 unwired will inhibit the site monitor feature.

TABLE 3.11 DEFAULT PARAMETERS

CWID PARAMETERS:	
CWID INTERVAL	30 MINUTES
CWID SPEED	22 WPM
CWID FREQUENCY	1200 HZ
+INHIBIT RELEASE DELAY	5 SEC
++INITIAL DELAY	750 MS
CWID CODE	NONE PROGRAMMED *
SITE FAULT PARAMETERS:	
PREAMBLE	NONE PROGRAMMED **
STATUS INTERVAL	2 HOURS
NUMBER OF ALERTS, SITE FCTN #1	2 TIMES
NUMBER OF ALERTS, SITE FCTN #2	2 TIMES
NUMBER OF ALERTS, SITE FCTN #3	2 TIMES
NUMBER OF ALERTS, SITE FCTN #4	2 TIMES
NUMBER OF ALERTS, SITE FCTN #5	2 TIMES
NUMBER OF ALERTS, SITE FCTN #6	2 TIMES
ALERT SPEED	5 DPS
ALERT INTERVAL	5 MINUTES
FAULT ACTIVE CHARACTER	*
FAULT INACTIVE CHARACTER	#

NOTES:

\+ applies to CWID and site fault
++ applies to CWID and site fault
* must be programmed or CWID will not function
** optional parameter used with Data Signal SFD-700

TABLE 3.12 FACTORY SETTINGS

TRIGGER THRESHOLD	6Vdc
INHIBIT THRESHOLD	6Vdc
SITE FUNCTION #1 AND #2	
THRESHOLD	6Vdc
S102-1,3,5,7	ON
S102-2,4,6,8	OFF
ALARM OVERRIDE	S101-1 OFF
TEST SELECT	S101-2 OFF
SITE FCTN #5 AND #6 PRIORITY	S101-3 OFF
STATUS INHIBIT	S101-4 ON

SECTION 4.0 OPERATION. The following paragraphs are concerning the various modes of operation for the CWID and the site fault monitor.

4.1 CWID OPERATION. The CWID is capable of operating in CONTINUOUS, COR or TEST modes. Either the CONTINUOUS or COR modes may be used with the inhibit feature. The inhibit feature prevents the ID or fault codes from being transmitted on top of normal channel traffic (See diagram 4.1).

4.1.1 CONTINUOUS. Place the front panel switch labelled COR/CONTINUOUS in the CONTINUOUS position. When power is applied to the ID/SM-700, the ID, if programmed, will be transmitted at precise intervals. The interval, speed and frequency are determined by the parameters programmed for those variables. See Table 3.11 for the default parameters.

4.1.2 CONTINUOUS WITH INHIBIT. This mode of operation is exactly the same as CONTINUOUS (see para 4.1.1) in addition to the inhibit parameter. The inhibit, whenever active, prevents the ID from being transmitted until the inhibit input returns to normal. The inhibit input is normally active when the channel is busy. The ID is further delayed by the INHIBIT RELEASE DELAY parameter (See Sections 3.3.4 and 2.4).

4.1.3 COR. Place the front panel switch labelled COR/CONTINUOUS in the COR position. The COR lamp on the front panel should illuminate. In this mode of operation, the ID will be transmitted after each interval period ONLY if an external trigger input occurs. This is normally an input from COR, COS or PTT indicating station traffic (See Section 2.5).

4.1.4 COR WITH INHIBIT. This mode of operation is exactly the same as COR (see para 4.1.3), in addition to the inhibit parameter. The inhibit, whenever active, prevents the ID from being transmitted until the inhibit input return to normal. The inhibit input is normally active when the channel is busy. The ID is further delayed by the INHIBIT RELEASE DELAY parameter (See sections 3.3.4, 2.4 and 2.5).

4.1.5 TEST. Conveniently located on the front panel is a momentary push button switch labelled TEST. Pressing this switch causes the ID/SM-700 to immediately transmit the programmed ID. If, S101-2 is ON, the ID/SM-700 will send the ID and status information.

4.1.6 DTMF TONE TEST. The ID/SM-700 has the capability to internally generate the 12 standard DTMF tones and to generate each of the 7 tones individually with the programming keypad. To generate any of the DTMF tones for internal or external alignment or test, enter "5*" then hear 5 short beeps. After the beeps have finished, pressing any of the 12 keys will cause the unit to generate the DTMF digit and send it out the audio path. To exit this mode, press the TEST SWITCH and hear 2 long beeps.

To generate a specific row or column tone component, enter "6*" then hear 6 short beeps. After the beeps have occurred, pressing any of the 12 keys will cause the unit to generate either the row or column

tone component for that digit. Whether the row or column tone is generated is dependent directly upon the setting of S101-2. S101-2 OFF causes the row (low) tone and S101-2 ON causes the column (high) tone to be generated. To exit this mode, press the TEST switch and then hear 2 long beeps.

4.2. SITE MONITOR OPERATION. The following paragraphs describe the operation of the site monitor feature of the ID/SM-700. The site monitor can be used to monitor up to 6 individual site functions simultaneously. The ID/SM-700 is designed to transmit a sequence of DTMF digits indicating the site number of the monitor (1-9), the site function number (1-6), and either an active or inactive character showing the status of the site function. The ID/SM-700 can be configured to transmit this code as follows:

1) only when the monitor senses an abnormal state;
2) when the monitor senses an abnormal state, and to send the status of all 6 functions at predetermined intervals;
3) and to defeat the site monitor completely.

4.2.1 FAULT CODE SEQUENCE. The fault code sequence consists of four parts. Each part has a specific purpose which assists the decoder and the operator in determining the location and status of a particular site function. The sequence is as follows:

1. PREAMBLE
2. SITE NUMBER
3. SITE FAULT NUMBER
4. ACTIVE/INACTIVE

The preamble is optional and is used to identify a particular decoder. When more than one decoder is used to monitor a number of sites. The site number can be changed to identify individual sites.

4.2.2 OPERATION WITHOUT STATUS (STATUS INHIBIT). If the status feature of the ID/SM-700 is inhibited with S101-4 ON, the periodic transmission showing the status, regardless of state, of the six site functions will not occur. The ID/SM-700 will transmit the fault code sequence for only those site functions that are connected and in an abnormal state. Once an abnormal state is sensed by the site monitor, the inhibit input pin is tested for activity, and if not active or the override switch is ON, the site monitor will key the transmitter and send: the preamble if programmed, the site number, the site fault number and the fault character. When the transmission is complete, the transmitter is unkeyed. The site monitor then waits for the INTERVAL BETWEEN FAULT ALERTS. Once the interval expires, the monitor tests the NUMBER OF ALERTS programmed for that specific site function. If the monitor still senses the site function in an abnormal state and the fault code sequence has not been transmitted the number of times indicated in NUMBER OF ALERTS, the fault code sequence is transmitted again. This entire sequence of events is repeated until one of two events occur; the monitor senses the site function input in a normal state or the fault code sequence is sent the number of times programmed into NUMBER OF ALERTS for that site function.

4.2.3 OPERATION WITH STATUS. When the status feature is enabled by S101-4, the site monitor will, in addition to the operation described

in paragraph 4.2.2, transmit periodic status information. When the INTERVAL BETWEEN STATUS timer expires, the site monitor will transmit the preamble, if programmed, the site number, the site function and the status code for an active fault or a non-active fault depending upon the status of the site functions. The monitor will send the information for all six site functions. It will also reset the NUMBER OF ALERTS.

4.2.4 DEFEAT SITE MONITOR. The site monitor function may be defeated entirely by leaving J102 (the site function inputs) open, switching S101-4 ON, and S101-3 OFF. The ID/SM-700 will operate as an identifier only.

4.2.5 INHIBIT. When the inhibit input is used, this will affect the site monitor operation in the same manner as the CWID. If the status interval timer expires or an abnormal condition is sensed at the site function inputs, the site monitor first checks the inhibit input pin for activity. If active, the monitor waits for the inhibit to return inactive. Once the inhibit input is inactive, the monitor waits for the INHIBIT RELEASE DELAY to expire prior to any transmission. If the inhibit pin returns active before the INHIBIT RELEASE DELAY expires, the monitor continues to wait and the INHIBIT RELEASE DELAY timer is reset.

NOTE: To defeat the inhibit feature for the site monitor in a fault condition, switch S101-1 ON.

SECTION 5.0 CIRCUIT DESCRIPTION. The heart of the ID/SM-700 is a CMOS microcomputer which performs all of the input sensing, reads the keypad for programming, utilizes internal timers and algorithms to control all of the various timing functions, and generates the various tones required for the CWID and DTMF signalling. Consult the schematic diagram.

5.1 TRIGGER INPUTS. U102A and U102B are configured as voltage comparators with a variable threshold level adjust. R106 adjusts the threshold voltage on U102 pin 3 and R110 adjusts the threshold voltage on U102 pin 6. R104 is a pull-up resistor holding the sense pin, pin 2, at +12Vdc. If the input at J101 pin 5 drops below the threshold voltage set by R106, the output of U102A pin 1 goes high. R109 is a pull-down resistor holding U102 pin 5 at ground. If the input at J101 pin 6 goes above the threshold voltage at U102 pin 6, the output of U102B pin 7 goes high.

If either U102A pin 1 or U102B pin 7 go high, the trigger input pin at U101 pin 11 goes low and the CWID is started.

5.2 INHIBIT INPUTS. U102C and U102D are configured as voltage comparators with a variable threshold level adjust. R114 adjusts the threshold voltage on U102C pin 10 and R118 controls the threshold voltage on U102D pin 13. If the input on J101 pin 7 goes below the threshold set by R114, the the output of U102C pin 8 goes high. If the input on J101 pin 8 goes above the level set by R118, then the output of U102D pin 14 goes high. If either U102C pin 8 or U102D pin 14 go high, U101 pin 10 is forced low and the INHIBIT is sensed.

5.3 AUDIO OUTPUT. Audio is generated by internal algorithms and is output at U101 pins 12, 13, 14 and 15. The data output by U101 is shaped by R138 and capacitively coupled to R146 and R139. R146 is located on the front panel and adjusts the audio to speaker amp U106. R139 adjusts the audio to output amplifier U105. U105 amplifies the audio and acts as a low-pass filter to eliminate high frequency noise. The output of U105 is applied to J101 pin 9 as a high impedance output and to T101 for a balanced audio output. An external audio input is available at J101 pin 4. The external audio is adjustable by R101. After adjustment, the external audio is applied to U105 to be mixed with the internal audio. Whenever the internal PTT is keyed, K101 energizes, and the internal audio on T101 will be placed on the balanced audio output pins of J101, pins 12 and 13.

5.4 TRANSMITTER CONTROL. Whenever the ID/SM-700 needs to key the transmitter, U101 pin 16 goes high. This turns on Q101 which activates K101 the audio output relay K102 the PTT relay, and CR110 which is the front panel status indicator.

5.5 PROGRAMMING CIRCUITS. The ID/SM-700 can be programmed by a keypad or dip switches. When the ID/SM-700 is not generating tones, it monitors the keypad via J103 for any key closures. U101 places a high on each row output, one at a time, and senses the column inputs for any closures. R102 holds the column inputs at ground until a column input goes high.

The dip switches are read by U101 at pins 31-35. A low on the input is sensed as a switch OFF while a high is a switch ON. U101 pin 17 controls BZ-101 for audible cueing while programming.

5.6 SITE FUNCTION CIRCUITRY. The six function inputs are on J101 pins 1,2,4,5,6 and 7 for function numbers 1,2,3,4,5 and 6 respectively.

5.6.1 FUNCTIONS #1 AND #2. U103A and U103B are comparators which activate if the dc voltage level on the positive (P) input pin exceeds the dc voltage level on the negative (N) input pin. R123 and R127 adjust the threshold voltage level for U103A and U103B respectively. S102 selects the polarity of the inputs on J102-1 and 2. If the polarity is positive to negative the S102-1,3,5 and 7 are ON, and 2,4,6 and 8 are OFF. If the polarity is negative to positive, the switches are reversed. This is such that the output pins of U103A and U103B go high whenever the inputs at J102 pin 1 or J102 pin 2 are abnormal. (See para 2.7-2.7.1.2)

5.6.2 SITE FUNCTION #3 AND #4. These two input pins, J101 pin 4 and pin 5 are normally open or some dc voltage above 5Vdc. When the function being monitored is abnormal, the input switches to ground which places a high on U101 pins 7 or 6 for J101 pin 4 or 5 respectively.

5.6.3 SITE FUNCTION #5 AND # 6. These two input pins J101 pins 6 and 7 can be configured to recognize the input pin as abnormal in either an open condition or if ground is switched to the input. S101-3 ON will recognize an open input on J101 pin 6 or 7 as an abnormal state. S101-3 OFF recognizes ground on the input as an abnormal condition. U101 pins 5 and 4 sense J101 pins 6 and 7 respectively.

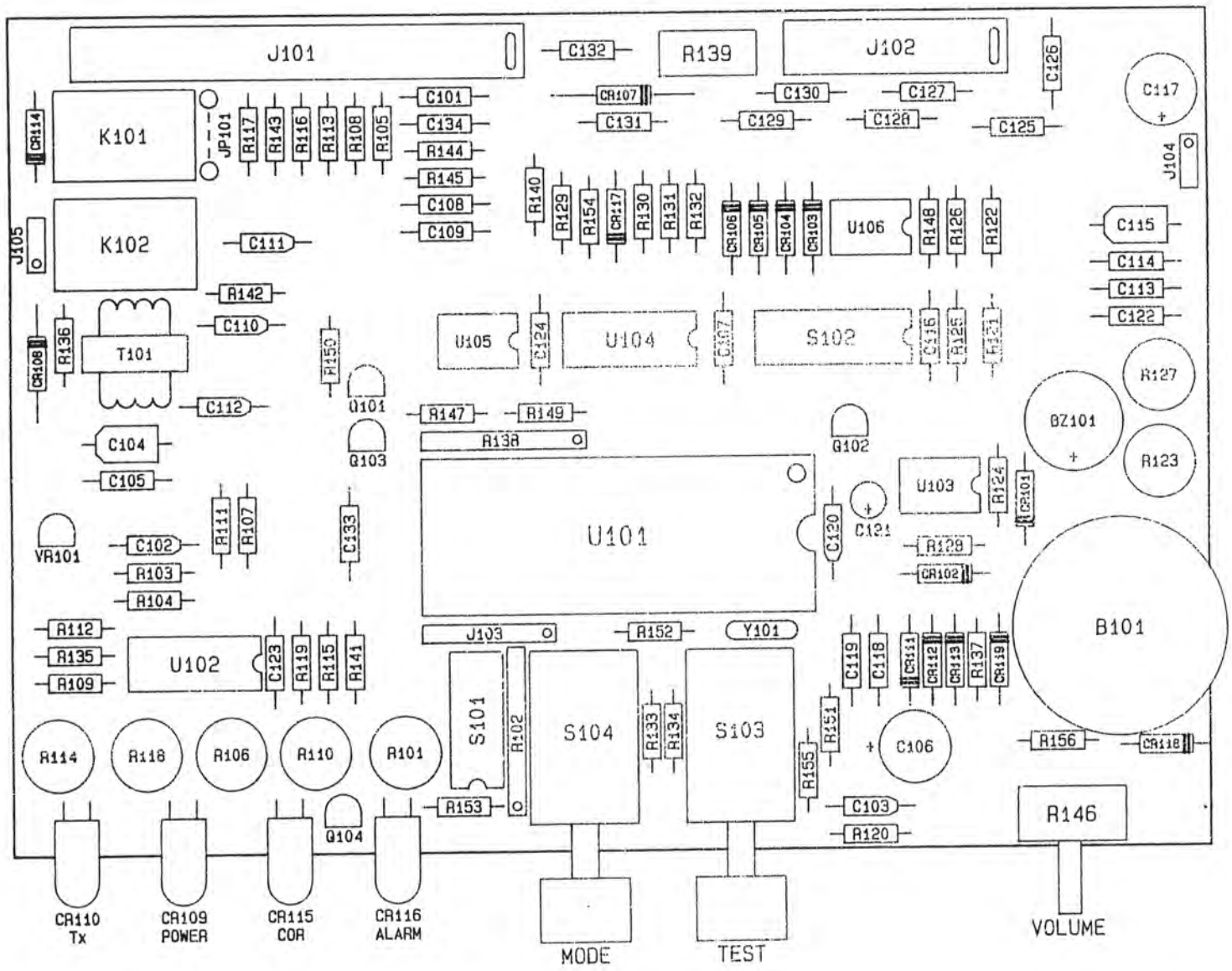
PARTS LIST

When ordering space parts for the ID/SM-700, order by symbolic designation following ID/SM-700. Example: ID/SM-700-C101 would be a .1uf 50Vdc monolithic capacitor.

SYMBOL	COMPONENTS	TYPE
CAPACITORS:		
C101, C105, C107, C113, C133, C134	.1uf 50Vdc	MONOLITHIC AXIAL
C102, C103, C110, C112, C120, C121	4.7uf 20Vdc	TANTALUM AXIAL
C104, C115	10uf 20Vdc	TANTALUM AXIAL
C106, C117	100uf 16Vdc	ELECTROLYTIC RADIAL
C108, C109	.001uf 50Vdc	MONOLITHIC AXIAL
C111	2.2uf 20Vdc	TANTALUM AXIAL
C114	680pf 50Vdc	MONOLITHIC AXIAL
C116, C122-132	.01uf 50Vdc	MONOLITHIC AXIAL
C118, C119	10pf 50Vdc	MONOLITHIC AXIAL
RESISTORS:		
R101	10K single turn	PT-10 VARIABLE
R102	10K X 9	SIP, 1 COMMON
R103, 120, 148	120 ohm 1/4W 5%	CARBON FILM
R104, 109, 112, 117, R121, 125	1 Meg ohm 1/4W 5%	CARBON FILM
R105, 107, 108, 111, R113, 115, 116, 119, R122, 124, 126, 128	100K ohm 1/4W 5%	CARBON FILM
R106, 110, 114, 118, R123, 127	50K single turn	PT-10 VARIABLE
R129-136, 151, 153	1K ohm 1/4W 5%	CARBON FILM
R137	22 ohm 1/4W 5%	CARBON FILM

SYMBOL	COMPONENTS	TYPE
R138	Binary SIP	DSI SPECIAL
R139	10K single turn	PT-15 VARIABLE
R140, 147,149,152	4.7K ohm 1/4W 5%	CARBON FILM
R141, 142	56K ohm 1/4W 5%	CARBON FILM
R143	47K ohm 1/4W 5%	CARBON FILM
R144	100 ohm 1/4W 5%	CARBON FILM
R145, 150	10K ohm 1/4W 5%	CARBON FILM
R146	10K single turn	31 CV VARIABLE
DIODES: CR101-106, 111, 112, CR114, 117	1N4148	SILICON SIGNAL
CR107, 108	1N4001	POWER DIODE
CR109, 110, 115, 116	T-1 3/4	LED
CR113	1N751A	ZENER, 5.1V
INTEGRATED CIRCUITS:		
U101	u COMPUTER	CUSTOM
U102	TL064	QUAD JFET OP AMP
U103	TL062	DUAL JFET OP AMP
U104	4001	QUAD 2-IN NOR GATE
U105	741C	OP AMP
U106	LM386	AUDIO AMP
RELAYS:		
K101, 102	RZ 12	DPDT 12Vdc COIL
TRANSISTORS:		
Q101	MPSA13	DARLINGTON SWITCH
Q102-104	2N2222	NPN
TRANSFORMER:		
T101	TL016	600/600 AUDIO

SYMBOL	COMPONENTS	TYPE
MISCELLANEOUS:		
J101	.156 CONNECTOR X 16	HORIZONTAL PINS
J102	.156 CONNECTOR X 8	HORIZONTAL PINS
J104, 105	.100 CONNECTOR X 2	VERTICAL PINS
J103	.100 CONNECTOR X 8	HORIZONTAL SOCKETS
B1-101	LITHIUM BATTERY, SOCKET	3Vdc
BZ-101	BUZZER	12Vdc
S101	DIP SWITCH	6 POLES
S102	DIP SWITCH	8 POLES
S103	SWITCH, MOMENTARY	DPDT HORIZONTAL
S104	SWITCH, PUSH-PUSH	DPDT HORIZONTAL
VR101	78L05, 5Vdc 100mA	REGULATOR
Y101	4.0 MEGAHERTZ	CRYSTAL



REVISIONS		DATA SIGNAL INC.		
LTR	DATE			
		CW IDENTIFIER/ SITE MONITOR OVERLAY		
		DRAWN BY RCB	DATE 3/29/90	DWG NO. DS 272-0360-1
		APP'D BY	DATE	
		FILENAME	IDSM700.OVL	

LIMITED WARRANTY

Data Signal, Inc., warrants each new product sold to be free from defective material and workmanship for a period of one year from date of shipment and agrees to repair any such defect or to furnish a new part of any unit which under normal installation, use, and service, discloses such defect. The original owner of the unit or part must return the merchandise freight prepaid to Data Signal and provided that an examination discloses in our judgement that it is defective, and the unit or part is approved by us for repair or exchange hereunder, the unit or part will be repaired or exchanged by Data Signal, Inc. without charge to the owner. This warranty is in lieu of all other warranties expressed or implied and no representative or persons is authorized to assume for us any other liability in connection with sale of our products.

All warranty repairs must be performed by Data Signal, Inc. No credit will be allowed for repair work attempted by the customer. Data Signal will return, freight prepaid, the repaired or replaced equipment to purchaser, within the Continental United States. Equipment found NOT to be defective will be returned at purchaser's expense and shall include cost of handling, testing and returning of equipment.

Equipment for repair may be returned to the factory without prior written authorization. It is required, however, that a brief description of the defect be included with the equipment.

Out-of-warranty repairs will be billed at the rate of $35.00 per hour, plus components needed for replacement.

Excepted from this one-year warranty are the SME encoders, DTMF series encoders and the Data-Coder series of microphones which carry a 90-day warranty from date of shipment. Batteries are not included in the Limited Warranty.

This warranty does not extend to any of our products which have been subjected to misuse, accident, incorrect wiring not our own, improper installation, or used in violation of the instructions furnished by us, and does not extend to units which have been repaired or altered outside of our factory. It does not extend to damage incurred by natural causes such as lightening, fire, floods, or other such catastrophes, nor to damage caused by environmental extremities, such as power surges and/or transients.

Data Signal, Inc. reserves the right to make any improvements to its products which it may deem desirable without obligation to install such improvements in its previously sold products.

DATA SIGNAL, INC. 2403 COMMERCE LANE ALBANY, GA 31708 (912) 883-4703

2403 COMMERCE LANE ALBANY, GEORGIA 31708