

CONNECT SYSTEMS INCORPORATED

1802 Eastman Ave., Suite 116
Ventura, Ca. 93003

Phone (805) 642-7184
Fax (805) 642-7271

FLEX SERIES UNIVERSAL CONTROLLER FLEX IIIA LTR CONTROLLER AND COMMUNITY TONE PANEL

User's Instruction Manual

Made in U.S.A.

Copyright 2006 By Connect Systems Inc.

CONNECT SYSTEMS INCORPORATED

1802 Eastman Ave., Suite 116
Ventura, Ca. 93003

Phone (805) 642-7184
Fax (805) 642-7271

FLEX SERIES UNIVERSAL CONTROLLER FLEX IIIA LTR CONTROLLER AND COMMUNITY TONE PANEL

User's Instruction Manual Version 1.03

Made in U.S.A.

Copyright 2006 By Connect Systems Inc.

Table of Content

<u>GENERAL DESCRIPTION</u>	6
<u>SETTING EVERYTHING BACK TO FACTORY DEFAULT</u>	7
<u>GETTING INTO PROGRAMMING MODE</u>	7
<u>DIFFERENT PROGRAMMING AREAS USED</u>	7
<u>GETTING ADDITIONAL INFORMATION</u>	7
<u>OVERVIEW</u>	8
<u>CONNECTING THE FLEX IIIA TO YOUR RADIO</u>	9
<u>LTR BUS FOR THE FLEX IIIA CONTROLLERS</u>	9
<u>INSTALLATION PROCEDURES</u>	9
<u>DIAGNOSTIC MODES</u>	11
<u>Diagnostic Mode 1</u> -----	11
<u>Diagnostic Mode 2</u> -----	11
<u>Diagnostic Mode 3</u> -----	11
<u>CTCSS PROGRAMMING AREA</u>	12
<u>DCS PROGRAMMING AREA</u>	14
<u>LTR USER ID PROGRAMMING AREA</u>	17
<u>CWID FIELD</u>	18
<u>GLOBAL PROGRAMMING AREA</u>	19
<u>Programming Parameters</u> -----	19
<u>REPEATER NUMBER</u> *0000#01#RR# *0000#01*	19
<u>SITE NUMBER</u> *0000#02#NN# *0000#02*	19
<u>CTCSS PROGRAMMING AREA</u>	20
<u>Programming Parameters</u> -----	20
<u>COURTESY BEEP</u> *10RR#NNN#01#J# *10RR#NNN#01*	20
<u>CTCSS/DCS DURING HANG TIME</u> *10RR#NNN#02#J# *10RR#NNN#02*	20
<u>SUBSCRIBER ENABLE/DISABLE</u> *10RR#NNN#03#J# *10RR#NNN#03*	20
<u>RESERVE TONE</u> *10RR#NNN#04#J# *10RR#NNN#04*	20
<u>PARAMETER 5 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>	20
<u>PARAMETER 6 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>	20
<u>DCS PROGRAMMING AREA</u>	21
<u>Programming Parameters</u> -----	21
<u>COURTESY BEEP</u> *20RR#NNN#01#J# *20RR#NNN#01*	21
<u>J = 1 = Enabled, J = 0 = Disabled</u> Default = 0	21
<u>CTCSS/DCS DURING HANG TIME</u> *20RR#NNN#02#J# *20RR#NNN#02*	21
<u>SUBSCRIBER ENABLE/DISABLE</u> *20RR#NNN#03#J# *20RR#NNN#03*	21
<u>RESERVE TONE</u> *20RR#NNN#04#J# *20RR#NNN#04*	21
<u>PARAMETER 5 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>	21
<u>PARAMETER 6 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>	21
<u>LTR PROGRAMMING AREA</u>	22

Programming Parameters	22
COURTESY BEEP *30RR#III#01#J# *30RR#III#01*	22
SUBSCRIBER ENABLE/DISABLE *30RR#III#02#J# *30RR#III#02*	22
PARAMETER 3 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	22
PARAMETER 4 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	22

REPEATER PARAMETER AREA.....**23**

Programming Parameters	23
PARAMETER 1 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	23
RADIO PROGRAMMING *80RR#02#J# *80RR#02*	23
PARAMETER 3 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	23
COMPUTER PROGRAMMING *80RR#04#J# *80RR#04*	23
PROGRAMMING MODE ACCESS CODE *80RR#05#NNNNNN# *80RR#05*	23

Level Control

PARAMETER 6 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	23
DTMF RADIO LEVEL *80RR#07#MMM# *80RR#07*	23
BEEP RADIO LEVEL *80RR#08#MMM# *80RR#08*	23
PARAMETER 9 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	23
CW ID RADIO LEVEL *80RR#10#MMM# *80RR#10*	23
VOICE RADIO LEVEL *80RR#11#MMM# *80RR#11*	24
PARAMETER 12 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	24
PAGING TONE RADIO LEVEL *80RR#13#MMM# *80RR#13*	24
CTCSS RADIO LEVEL *80RR#14#MMM# *80RR#14*	24
DCS RADIO LEVEL *80RR#15#MMM# *80RR#15*	24
LTR RADIO LEVEL *80RR#16#MMM# *80RR#16*	24
REPEAT RADIO LEVEL *80RR#17#MMM# *80RR#17*	24
PARAMETER 18 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	24
PARAMETER 19 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA	24
RADIO LIMIT LEVEL *80RR#20#MMM# *80RR#20*	24

COS/SQUELCH Parameters

COS OR INTERNAL SQUELCH *80RR#21#J# *80RR#21*	24
COS POLARITY SELECT *80RR#22#J# *80RR#22*	25
COS TRIGGER VOLTAGE *80RR#23#MMM# *80RR#23*	25
COS ACQUISITION TIME *80RR#24#MM# *80RR#24*	25
COS RELEASE TIME *80RR#25#MM# *80RR#25*	25

Sense Parameters

SENSE POLARITY SELECT *80RR#26#J# *80RR#26*	25
SENSE TRIGGER VOLTAGE *80RR#27#MMM# *80RR#27*	25
SENSE ACQUISITION TIME *80RR#28#MM# *80RR#28*	25
SENSE RELEASE TIME *80RR#29#MM# *80RR#29*	25

LTR Parameters

LTR HOLD DELAY *80RR#30#MM# *80RR#30*	26
PTT TURN OFF TIME *80RR#31#MM# *80RR#31*	26
REPEATER TIMEOUT *80RR#32#MM# *80RR#32*	26

Tone Panel Parameters

ANTI-KERCHUNKING TIME *80RR#33#MM# *80RR#33*	26
SQUELCH TAIL LENGTH *80RR#34#MM# *80RR#34*	26
CTCSS/DCS HOLD DELAY *80RR#35#MM# *80RR#35*	26
CROSS BUSY DELAY TIME *80RR#36#MM# *80RR#36*	26
CROSS BUSY HOLD TIME *80RR#37#MM# *80RR#37*	26
LTR SYNC BIT *80RR#38#J# *80RR#38*	26

LTR Parameters

PRIORITY LEVEL *80RR#39#N# *80RR#39*	27
LTR ENCODE POLARITY *80RR#40#J# *80RR#40*	27
LTR DECODE POLARTIY *80RR#41#J# *80RR#41*	27
TEST ID CODE *80RR#42#MMM# *80RR#42*	27

<u>IDLE MESSAGE TIMER</u>	<u>*80RR#43#MMM# *80RR#43*</u>	27
<u>AREA BIT</u>	<u>*80RR#44#J# *80RR#44*</u>	27
<u>MASTER OR SLAVE</u>	<u>*80RR#45#J# *80RR#45*</u>	27
<u>CTCSS/DCS Parameters</u>		27
<u>DCS ENCODE POLARITY</u>	<u>*80RR#46#J# *80RR#46*</u>	27
<u>DCS DECODE POLARITY</u>	<u>*80RR#47#J# *80RR#47*</u>	27
<u>COURTESY TONE DELAY</u>	<u>*80RR#48#MM# *80RR#48*</u>	28
<u>SUBSCRIBER HANG TIME</u>	<u>*80RR#49#MM# *80RR#49*</u>	28
<u>CARRIER DROP DELAY</u>	<u>*80RR#50#MM# *80RR#50*</u>	28
<u>Common Repeater Parameters</u>		28
<u>ACCESS DELAY</u>	<u>*80RR#51#MM# *80RR#51*</u>	28
<u>STATION IDENTIFICATION MODE</u>	<u>*80RR#52#J# *80RR#52*</u>	28
<u>VOICE OR MORSE CODE</u>	<u>*80RR#53#J# *80RR#53*</u>	28
<u>REPEATER CW ID INTERVAL</u>	<u>*80RR#54#MM# *80RR#54*</u>	28
<u>CW ID SPEED</u>	<u>*80RR#55#MM# *80RR#55*</u>	28
<u>CWID FREQUENCY</u>	<u>*80RR#56#MM# *80RR#56*</u>	29
<u>CWID SEQUENCE CHARACTERS</u>	<u>*80RR#57#AAAAAAAAAAAA# *80RR#57*</u>	29
<u>PTT TURN DELAY</u>	<u>*80RR#58#MM# *80RR#58*</u>	29
<u>COURTESY BEEP FREQUENCY</u>	<u>*80RR#59#MM# *80RR#59*</u>	29
<u>REPEATER DISABLE</u>	<u>*80RR#60#N# *80RR#60*</u>	29
<u>PARAMETER 61 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		29
<u>CROSS BUSY MODE</u>	<u>*80RR#62#N# *80RR#62*</u>	29
<u>RADIO REPEATER GAIN</u>	<u>*80RR#63#N# *80RR#63*</u>	30
<u>PARAMETER 64 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>Networking Parameters</u>		30
<u>PARAMETER 65 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>Alarm Parameters</u>		30
<u>PARAMETER 66 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>PARAMETER 67 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>PARAMETER 68 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>PARAMETER 69 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>Interconnects</u>		30
<u>PARAMETER 70 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>Miscellaneous Parameters</u>		30
<u>PARAMETER 71 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA</u>		30
<u>FCC NOTICE TO USERS</u>		31
<u>REVISION HISTORY</u>		32

GENERAL DESCRIPTION

The FLEX SERIES LTR CONTROLLER AND COMMUNITY TONE PANEL by Connect Systems Inc. is a combination LTR Controller and Community Tone Panel. A built-in LCD digital display allows the user to obtain the maximum power from the on-board microprocessor. All features are user programmable and/or selectable. Additionally, there are three modes of operation to choose from...

1. Standard Community Tone Panel

It supports 51 CTCSS tones and 112 DCS Codes

2. Standard LTR Controller

It supports 250 Users per repeater with up to 20 repeaters in a system.

3. Combination Tone Panel and LTR Controller

It allows independent operation of both the LTR Controller and Community Tone Panel

This product allows the user to eliminate the separate Tone Panel used in competing products and still have both a standard tone panel and a LTR controller. Plus this product is the first panel that will allow the dealer to migrate his user to a full LTR system without giving up the legacy conventional radios by allowing the users conventional radios to communicate with the users LTR radios.

Powerful built in standard features make this FLEX Series Universal Controller the best deal going in LTR and CTCSS/DCS Communication Controllers today!

SETTING EVERYTHING BACK TO FACTORY DEFAULT

If for some reason it is necessary to set the system back to factory default, plug a computer into the front of the unit and enter the command "F1" or "CNTRL + [" using Hyperterminal or some other terminal emulation program. The Com port should be set for 2400 baud, 8 bits, no parity, 1 stop bit, and no flow control.

GETTING INTO PROGRAMMING MODE

This product allows the user to get into programming mode from either the radio if enabled or a computer if using Connect Systems Window Based program. If using a radio, use ##123456## where "123456" is the default access code. To get out of the programming mode use the command "####".

DIFFERENT PROGRAMMING AREAS USED

This product uses the following programming areas:

GLOBAL
CTCSS
DCS
LTR
REPEATER

GETTING ADDITIONAL INFORMATION

The web site at www.connectsystems.com has additional manuals for this product. These manuals should be used in conjunction with this manual.

OVERVIEW

The Flex IIIA Series LTR Controller and Community Tone Panel is a sophisticated Trunking Repeater Manager (Controller) and Community Tone Panel for use on LTR trunked repeater systems. The Flex IIIA Series LTR Controller and Community Tone Panel may not be used with any other make of LTR controllers except the FLEX III and the FLEX IV. The Flex IIIA Series LTR Controller and Community Tone Panel provides up to 250 LTR USER ID's per repeater, 112 DCS users and 51 CTCSS users. There may be up to 20 repeaters per system.

The Flex IIIA Series LTR Controller and Community Tone Panel "talks" to the other FLEX controllers on the system using a proprietary RS485 Bus Protocol that transfers both LTR data and Programming data. Other panels use two separate busses. Thus a Modem connected to the master CSI panel gives programming and downloading control of all other CSI controllers on the same system.

The CSI panels with a front panel LCD display keeps you totally informed about repeater and system status while you are at the repeater site. User ID and other useful data are constantly displayed.

Another unique feature is the ability to set levels remotely. Most other panels require you to be at the site and take the repeater out of the rack. This panel allows you to change levels thousands of miles away.

A CLOSER LOOK

Hardware Connection

In the FLEX IIIA, the LTR subtone and voice AUDIO both come off the rear removable connector. The LTR subtone is on pin 7 and voice AUDIO is on pin 4.

Dispatch Logic Unit

The Flex IIIA Series LTR Controller and Community Tone Panel decodes and encodes digital LTR data, DCS data, and CTCSS data to and from the mobile units, routes conversations to other repeaters, and controls audio paths.

Validator

The built-in validator will only allow access to mobiles with enabled User ID's.

Site Monitor

A separate FLEX Series controller can be used to monitor the status of all channels in the system. This special software version will display the activity on up to 20 channels on the front panel LCD display. The monitor will indicate if there is a LTR controller on a given channel, if the channel is active, or the channel is busy.

CONNECTING THE FLEX IIIA TO YOUR RADIO

For optimal use, use shielded wiring for all connections and make sure to connect all shields to GND. Most installations do not require shielded wiring. The removable plug is connected to J3.

Name	Pin	Description
GND	1,3	Connect to the ground of the power supply.
+12 VDC	2	Connect to the 12-15 VDC of the power supply.
TX AUD:	4	Connect to the transmitter voice input.
TX KEY	5	Connect to the transmitter PTT line.
RX DET	6	Connect to the receiver discriminator output.
TX SUB	7	Connect to the transmitter modulator input.
RX COS	8	Connect to the COS /COR of the receiver.
Not Used	9,10	Unused connection
Sense 1	11	Is used as the Cross Busy input.
SSB SUB	12	Is used for special applications.

LTR BUS FOR THE FLEX IIIA CONTROLLERS

Select one of them as a master, others are slaves.
(note: be sure only one controller is the master per site. **All parameter settings must be programmed into the master instead of each slave.**)

Daisy chain connection is used for the LTR bus. Use wires provided by CSI to connect RPTR BUS of each Flex IIIA LTR repeater controller.

INSTALLATION PROCEDURES

Set each FLEX IIIA controller you get to factory default by pressing ****123456**** from a radio or hyperterminal.

1. Assign each FLEX IIIA controller a repeater number (REPEATER NUMBER global parameter 1) by the command ***0000*1#RR#** where RR is the repeater number. It must be in programming mode to use this command.
2. Select one of FLEX IIIA controllers as the master by the command ***80RR#45#0#**. It must be in programming mode to use this command. As an example, let's assume you want to use repeater number 5 as the master. Then use the command ***8005#45#0#**.

Typically, the master is also assigned to the home channel of the system.

3. Connect the removable 12-pin connector attached to the repeater assigned as the home channel to the FLEX IIIA controller assigned as the master.

4. Use Diagnostic modes specified in the next page to adjust various programmable parameters. Remember to use the proper repeater number when programming. As an example, if you are setting the LTR Encode Polarity and you are using repeater number 5, then use the command *8005#40#J#.

5. Remove the removable connector from the home repeater and attach the FLEX IIIA unit assigned as the master to the next repeater. Repeat step 4 for all repeaters in the system. This is done because only the master gets programmed by the user.

6. Connect each Flex IIIA controller to its designated repeater using the removable connector.

7. Connect LTR bus (refer to LTR bus for Flex IIIA controller).

8. Allow the system run few minutes so that the master will send all parameter settings to each slave.

9. Adjust all pots for proper levels in all FLEX IIIA units using the diagnostic modes or other methods of your choosing.

10. Program the master as needed for your application.

11. If still having problems call Connect Systems Inc at (805) 642-7184 for technical assistance.

DIAGNOSTIC MODES

There are three special diagnostic modes for this product.

Diagnostic Mode 1

By putting a jumper into JP6, the system will generate a LTR signal defined by the repeater number and the TEST ID CODE. Audio on the input is passed to the output. This diagnostic mode is used for the following:

It allows the user to set the LTR modulation level with a service monitor and to set the LTR encode polarity to match the radios. The Audio Out pot sets the overall level of the LTR. And the parameter LTR ENCODE POLARITY determines the transmitted LTR polarity. It is in line 40 of REPEATER PARAMETER AREA.

Diagnostic Mode 2

By putting a jumper into JP5, the system will allow the user to determine the value to set the SENSE and COS inputs as well as adjust the squelch pot if COS is not used. When in this mode, the display will look as follows:

```
-----  
|S|Q|U|E| | |C|O|S| | |S|E|N|S|E|  
-----  
|O|F|F| | | |1|3|7| | | |2|3|5| |  
-----
```

The user then generates a high and low value for either the COS or Sense input and watches the display. The value for the trigger voltage for the appropriate parameter is a value between the two points.

The squelch pot is used for proper adjustment of the "SQUE". The results will be either on or off.

Diagnostic Mode 3

By putting a jumper into JP4, the system will allow the user to determine if the system is decoding DTMF properly. The bottom line of the display will be used for recording DTMF tones from the radio.

CTCSS PROGRAMMING AREA

The CTCSS programming area is used to program parameters where the CTCSS tone is of importance. As an example, the command *1067#03#1# is used to turn on a user with a tone of 67 hertz.

The general form of this area is *1nnn#... where the 1 indicates the area is CTCSS and the nnn corresponds to a valid CTCSS number as shown in table 1. If the nnn has a value of 999, then gang programming is used and the 51 different CTCSS users will have the same value programmed.

As an example, if you want to turn off all the CTCSS users, use the command *1999#03#0#. The 1 indicates it's a CTCSS field, the 999 indicates it's a gang programming command, the 03 indicates its an enable/disable user field, and the 0 indicates the user should be disabled.

The gang programming feature is only available when programming via radio.

TABLE OF CTCSS TONES AND THE CORRESPONDING USER VALUES

<u>CTCSS TONE</u>	<u>USER VALUE</u>	<u>CTCSS TONE</u>	<u>USER VALUE</u>
63.0 *	630	156.7	156
67.0	670	159.8 *	159
69.4 *	694	162.2	162
71.9	719	165.5 *	165
74.4	744	167.9	167
77.0	770	171.3 *	171
79.7	797	173.8	173
82.5	825	177.3 *	177
85.4	854	179.9	179
88.5	885	183.5 *	183
91.5	915	186.2	186
94.8	948	189.9 *	189
97.4	974	192.8	192
100.0	100	196.6 *	196
103.5	103	199.5 *	199
107.2	107	203.5	203
110.9	110	206.5 *	206
114.8	114	210.7	210
118.8	118	218.1	218
123.0	123	225.7	225
127.3	127	229.1 *	229
131.8	131	233.6	233
136.5	136	241.8	241
141.3	141	250.3	250
146.2	146	254.1 *	254
151.4	151		

TABLE 1

* non standard tones

DCS PROGRAMMING AREA

The DCS programming area is used to program parameters where the DCS code is of importance. As an example, the command *2023#03#1# is used to turn on user with a code of 023.

The general form of this area is *2nnn#... where the 2 indicates the area is DCS and the nnn corresponds to a valid DCS number as shown in table 2. If the nnn has a value of 999, then gang programming is used and the 112 different DCS users will have the same value programmed.

As an example, if you want to turn off all the DCS users, use the command *2999#03#0#. The 2 indicates it's a DCS field, the 999 indicates it's a gang programming command, the 03 indicates its an enable/disable user field, and the 0 indicates the user should be disabled.

The gang programming feature is only available when programming via radio.

TABLE OF DCS CODES

<u>DCS CODE</u>	<u>DCS CODE</u>	<u>DCS CODE</u>
006 *	172	431
007 *	174	432
015 *	205	445
017 *	212 *	446 *
021 *	214 *	452 *
023	223	454 *
025	225 *	455 *
026	226	462 *
031	243	464
032	244	465
036 *	245	466
043	246 *	503
047	251	506
050 *	252 *	516
051	255 *	523 *
053 *	261	526 *
054	263	532
065	265	546
071	266 *	565
072	271	606
073	274 *	612
074	306	624
114	311	627
115	315	631
116	325 *	632
122 *	331	654
125	332 *	662
131	343	664
132	346	703
134	351	712
141 *	356 *	723
143	364	731
145 *	365	732
152	371	734
155	411	743
156	412	754
162	413	
165	423	

TABLE 2

* non standard codes

NORMAL / INVERSE DCS CODES

<u>DCS</u>	<u>INVERSE</u>	<u>DCS</u>	<u>INVERSE</u>	<u>DCS</u>	<u>INVERSE</u>
006	021	172	036	431	723
007	214	174	074	432	516
015	141	205	263	445	043
017	050	212	356	446	255
021	006	214	007	452	053
023	047	223	134	454	266
025	244	225	122	455	332
026	464	226	411	462	252
031	627	243	351	464	026
032	051	244	025	465	331
036	172	245	072	466	662
043	445	246	523	503	162
047	023	251	165	506	073
050	017	252	462	516	432
051	032	255	446	523	246
053	452	261	732	526	325
054	413	263	205	532	343
065	271	265	156	546	132
071	306	266	454	565	703
072	245	271	065	606	631
073	506	274	145	612	346
074	174	306	071	624	632
114	712	311	664	627	031
115	152	315	423	631	606
116	754	325	526	632	624
122	225	331	465	654	743
125	365	332	455	662	466
131	364	343	532	664	311
132	546	346	612	703	565
134	223	351	243	712	114
141	015	356	212	723	431
143	412	364	131	731	155
145	274	365	125	732	261
152	115	371	734	734	371
155	731	411	226	743	654
156	265	412	143	754	116
162	503	413	054		
165	251	423	315		

TABLE 3

LTR USER ID PROGRAMMING AREA

The LTR USER ID programming area is used to program parameters where the LTR ID number and repeater number is of importance. As an example, the command *3015#246#02#1# is used to turn on user with a repeater number of 15 and a ID number of 246.

The general form of this area is *30nn#iii#... where the 30 indicates the area is LTR and the nn corresponds to a valid repeater number and iii is the ID number.

A valid repeater number has to be between 01 and 20 and a valid ID number has to be between 001 and 250. Leading zeros must be used for the repeater number and optionally for the ID number.

If the iii has a value of 999, then gang programming is used and the 250 different ID numbers for the repeater selected will have the same value programmed.

The gang programming feature is only available when programming via radio.

CWID FIELD

Certain fields such as fields that require the user to enter in CWID characters or names require letters and numbers. Being that the radio keypad has only 10 numbers, a method has to be used to accommodate all the letters, special characters, and numbers with only ten numeric keys. This is accomplished by pressing two numeric keys for each letter. As the user enters the second key, the display will show the equivalent letter, special character, or number. The table to accomplish this is shown below.

CHAR VALUE	CHAR VALUE	CHAR VALUE	CHAR VALUE
A 00	Z 25	y 50	- 75
B 01	a 26	z 51	+ 76
C 02	b 27	0 52	= 77
D 03	c 28	1 53	{ 78
E 04	d 29	2 54	} 79
F 05	e 30	3 55	[80
G 06	f 31	4 56] 81
H 07	g 32	5 57	82
I 08	h 33	6 58	; 83
J 09	i 34	7 59	: 84
K 10	j 35	8 60	< 85
L 11	k 36	9 61	> 86
M 12	l 37	` 62	' 87
N 13	m 38	~ 63	. 88
O 14	n 39	! 64	? 89
P 14	o 40	@ 65	/ 90
Q 16	p 41	# 66	sp 91
R 17	q 42	\$ 67	sp 92
S 18	r 43	% 68	sp 93
T 19	s 44	^ 69	sp 94
U 20	t 45	& 70	sp 95
V 21	u 46	* 71	sp 96
W 22	v 47	(72	sp 97
X 23	w 48) 73	sp 98
Y 24	x 49	_ 74	sp 99

TABLE 4

GLOBAL PROGRAMMING AREA

	TO PROGRAM	TO DISPLAY
	V	V
	Programming Parameters	
REPEATER NUMBER	*0000#01#RR#	*0000#01*
RR ranges from 1 to 20 This is the repeater number.		Default = 1
SITE NUMBER	*0000#02#NN#	*0000#02*
NN ranges from 1 to 99 This is the site number. The site number is used for several advanced features such as remote programming and phantom radio detection.		Default = 1

CTCSS PROGRAMMING AREA

TO PROGRAM

TO DISPLAY

|
V

|
V

Programming Parameters

COURTESY BEEP	*10RR#NNN#01#J#	*10RR#NNN#01*
J = 1 = Enabled, J = 0 = Disabled		Default = 0
CTCSS/DCS DURING HANG TIME	*10RR#NNN#02#J#	*10RR#NNN#02*
J = 1 = Enabled, J = 0 = Disabled		Default = 1
SUBSCRIBER ENABLE/DISABLE	*10RR#NNN#03#J#	*10RR#NNN#03*
J = 1 = Enabled, J = 0 = Disabled		Default = 0
It allows enabling or disabling specific tones or codes.		
RESERVE TONE	*10RR#NNN#04#J#	*10RR#NNN#04*
J = 1 = Enabled, J = 0 = Disabled		Default = 0
If a subscriber tone/code is turned off and reserve tone is enabled, the repeater will come up, but no audio will pass. Beeps indicate reserve tone is active.		

PARAMETER 5 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

PARAMETER 6 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

DCS PROGRAMMING AREA

TO PROGRAM

TO DISPLAY

|
V

|
V

Programming Parameters

COURTESY BEEP *20RR#NNN#01#J# *20RR#NNN#01*
J = 1 = Enabled, J = 0 = Disabled Default = 0

CTCSS/DCS DURING HANG TIME *20RR#NNN#02#J# *20RR#NNN#02*
J = 1 = Enabled, J = 0 = Disabled Default = 1

SUBSCRIBER ENABLE/DISABLE *20RR#NNN#03#J# *20RR#NNN#03*
J = 1 = Enabled, J = 0 = Disabled Default = 0
It allows enabling or disabling specific tones or codes.

RESERVE TONE *20RR#NNN#04#J# *20RR#NNN#04*
J = 1 = Enabled, J = 0 = Disabled Default = 0
If a subscriber tone/code is turned off and reserve tone is enabled, the repeater will come up, but no audio will pass. Beeps indicate reserve tone is active.

PARAMETER 5 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

PARAMETER 6 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

LTR PROGRAMMING AREA

TO PROGRAM

TO DISPLAY

|
V

|
V

Programming Parameters

COURTESY BEEP

***30RR#III#01#J#**

30RR#III#01

J = 1 = Enabled, J = 0 = Disabled

Default = 0

SUBSCRIBER ENABLE/DISABLE

***30RR#III#02#J#**

30RR#III#02

J = 1 = Enabled, J = 0 = Disabled

Default = 1

Allows enabling or disabling specific codes.

PARAMETER 3 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

PARAMETER 4 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

REPEATER PARAMETER AREA

TO PROGRAM

TO DISPLAY

|
V

|
V

Programming Parameters

PARAMETER 1 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

RADIO PROGRAMMING

*80RR#02#J#

80RR#02

J = 0 = Disabled J = 1 = Enabled

Default = 1

When enabled, the controller will allow the parameters to be programmed by radio. If disabled, the controller will ignore any attempt to program the parameters via radio.

PARAMETER 3 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

COMPUTER PROGRAMMING

*80RR#04#J#

80RR#04

J = 0 = Disabled J = 1 = Enabled

Default = 1

When enabled, the controller will allow the parameters to be programmed by a computer plugged into the RS232 port in the front of the controller. If disabled, the controller will ignore any attempt to program the parameters via a computer plugged into the front of the controller.

PROGRAMMING MODE ACCESS CODE

*80RR#05#NNNNNN#

80RR#05

NNNNNN = 000000 - 999999

Default 123456

Code must be precisely six digits. This code is used to enter the programming mode from all sources.

Level Control

PARAMETER 6 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

DTMF RADIO LEVEL

*80RR#07#MMM#

80RR#07

MMM = 0 - 255

Default = 50

This is the level the DTMF will be transmitted over the radio. Used for remote programming.

BEEP RADIO LEVEL

*80RR#08#MMM#

80RR#08

MMM = 0 - 255

Default = 50

This is the level annunciating beeps will be heard over the radio.

PARAMETER 9 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

CW ID RADIO LEVEL

*80RR#10#MMM#

80RR#10

MMM = 0 - 255

Default = 50

It is the level for Morse code station identification over the radio.

LTR Parameters

LTR HOLD DELAY *80RR#30#MM# *80RR#30*
MM = 2 - 99 in 100 millisecond increments Default = 30
LTR Hold Delay is the amount of time between valid mobile LTR packets before the mobile loses the repeater.

PTT TURN OFF TIME *80RR#31#MM# *80RR#31*
MM = 1 - 255 in 10 millisecond increments Default = 26
The time to hold the repeater keyed after a data packet is sent.

REPEATER TIMEOUT *80RR#32#MM# *80RR#32*
MM = 0 - 255 in 1 second increments Default = 180
This is mainly to lock out stuck mobile transmitters. This parameter is used in both the LTR and Tone panel operation.

Tone Panel Parameters

ANTI-KERCHUNKING TIME *80RR#33#MM# *80RR#33*
MM = 01-99, 0 to disable (.1 sec/step) Default = 0
If enabled, repeater will not hang unless user keys down at least as long as the time set. Does not affect pick up speed. In increments of 100 milliseconds.

SQUELCH TAIL LENGTH *80RR#34#MM# *80RR#34*
MM = 0-99 in Milliseconds increments Default = 0
Set to 0 for minimum tail. Only used if the receiver has a poor squelch and can stop word clipping by adding squelch delay. If there is a tail noise when set to 0, it is caused by slow squelch response in the receiver. The controller does not add any more tail than is inherent to the receivers squelch if set to 0. In increments of 1 milliseconds.

CTCSS/DCS HOLD DELAY *80RR#35#MM# *80RR#35*
MM = 3-99 in 100 millisecond increments Default = 30
Use the lowest setting possible without introducing talk off. It fills the missing gap when CTCSS/DCS decoding momentarily falters due to over modulation, momentary weak signal etc.

CROSS BUSY DELAY TIME *80RR#36#MM# *80RR#36*
MM = 0-99 in 100 millisecond increments Default = 30
The delay before busying on sense 1 if cross busy is enables. Make sure there is enough time to decode an LTR word. If the cross busy is set to zero, then the feature is disabled.

CROSS BUSY HOLD TIME *80RR#37#MM# *80RR#37*
MM = 0-250 in 100 millisecond increments Default = 30
Delay before dropping busy after release of sense.

LTR SYNC BIT *80RR#38#J# *80RR#38*
J = 1 = Skip, J = 0 = Non skip Default = 0
There are nine bits for LTR SYNC. This parameter determines if the program should skip the first bit or not.

COURTESY TONE DELAY *80RR#48#MM# *80RR#48*
MM 0- 99 (.01-.99 Seconds) Default = 10
Delays courtesy beep after mobile drops his carrier. In increments of 10 milliseconds.

SUBSCRIBER HANG TIME *80RR#49#MM# *80RR#49*
MM = 0 - 99 (0-9.9 Seconds) Default = 30
Determines how long the carrier remains on after the CTCSS/DCS drops. In increments of 100 milliseconds.

CARRIER DROP DELAY *80RR#50#MM# *80RR#50*
MM = 00-99, (0 - .99 Seconds) Default = 99
Adjusts how long carrier remains on after CTCSS/DCS drops at end of hang time. Keeping the carrier on quiets the mobile while the mobile CTCSS/DCS decoder is dropping and allows the repeater to go off without a squelch tail heard. The default value is .99 seconds and probably will not need to be changed. In increments of 10 milliseconds

Note: The carrier drop delay is additive to hang time and in effect increases the total beyond the value set for hang time.

Common Repeater Parameters

ACCESS DELAY *80RR#51#MM# *80RR#51*
MM = 0-99, (0-9.9 Seconds) Default = 10
It is user selectable delays to compensate for PTT hang after pressing a DTMF key on mobile and portable radios. Select a value that allows you to hear all of the return DTMF in programming mode without clipping. In increments of 100 milliseconds.

STATION IDENTIFICATION MODE *80RR#52#J# *80RR#52*
J = 0 = BEACON, J = 1 = Activity Default = 0
In Beacon mode, the Station ID will go out periodically according to the interval. In Activity mode, the Station ID will go out periodically according to the interval but only if there was activity since the last transmission.

VOICE OR MORSE CODE *80RR#53#J# *80RR#53*
J = 0 (Voice), J= 1 (Morse code) Default = 1
It determines if the call sign is going to be sent using voice or Morse code. The voice mode is not supported in the FLEX IIIA and must be set to 1.

REPEATER CW ID INTERVAL *80RR#54#MM# *80RR#54*
MM = 01-99, 0 to disable (1-99 Minutes) Default = 0
Determines how often the system will send its call sign using voice or Morse code when the system is not in use. It is in increments of 1 minute. Zero means disabled.

CW ID SPEED *80RR#55#MM# *80RR#55*
MM = 04-99 (Milliseconds for a DI) Default = 5 (20 WPM)

Determines how fast the Morse code will be sent. The larger the number, the slower the speed is. A DAH is three times longer than a DI.

CWID FREQUENCY

***80RR#56#MM#**

80RR#56

MM = 1 - 20

Default = 5

It sets the frequency of the Morse code per the user's preference. By having a different frequency for each repeater, the user can determine which repeater is active if they are being monitored. When "N" = 1, then the frequency is 400 Hz. Each increment of "N" increases the frequency by 100 Hz.

CWID SEQUENCE CHARACTERS

80RR#57#AAAAAAAAAA# *80RR#57

AAAAAAAAAA

Default blank

The station call sign can consist of any letter, number, and a few special characters that can be up to 10 characters in length. Trailing blanks are ignored and any illegal character will be sent. Lower case and upper case letters can be used.

PTT TURN DELAY

***80RR#58#MM#**

80RR#58

MM = 0 - 99 (0 - .99 Seconds)

Default = 10

It's the time to wait after keying the repeater before issuing an LTR or DCS code. This delay compensates for any key-up delay in the transmitter. In Increments of 10 milliseconds.

COURTESY BEEP FREQUENCY

***80RR#59#MM#**

80RR#59

MM = 1 - 20

Default = 5

It sets the frequency of the courtesy beep per the user's preference. By having a different frequency for each repeater, the user can determine which repeater is active if they are being monitored. When "N" = 1, then the frequency is 400 Hz. Each increment of "N" increases the frequency by 100 Hz.

REPEATER DISABLE

***80RR#60#N#**

80RR#60

N = 0 - 2

Default = 0

It allows the repeater to be in special modes in case of trouble with co-channel users or other things.

0 = Normal operation

1 = Shut down like the repeater does not even exist

2 = Will transmit GOTO information on its channel but will not act as a repeater.

PARAMETER 61 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

CROSS BUSY MODE

***80RR#62#N#**

80RR#62

N = 0 - 4

Default = 0

If N = 0, Cross Busy is not used for this repeater. The system can process LTR, CTCSS and DCS codes.

If N = 1, the system monitors the Carrier. If Carrier is active and there is no LTR code found, the system will be in Cross Busy mode 1 and it will not active.

If N = 2, the system monitors the Carrier. If Carrier is active and there is no LTR code found, the system will be in Cross Busy mode 2, and send out GOTO message using the test ID code.

If N = 3, the system looks at the Sense input. If the Sense input is active, the system will be in Cross Busy mode 3 and it will not activate.

If N = 4, the system looks at the Sense input. If the sense input is active, the system will be in Cross Busy mode 4 and keep sending out GOTO message using the test ID code.

For all cross busy modes except 0, only LTR will be processed.

RADIO REPEATER GAIN

***80RR#63#N#**

80RR#63

N = 1 - 9

Default = 1

It acts as an electronic pre-amp for the audio coming from the radio. Effectively increases the repeater gain.

PARAMETER 64 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

Networking Parameters

PARAMETER 65 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

Alarm Parameters

PARAMETER 66 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

PARAMETER 67 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

PARAMETER 68 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

PARAMETER 69 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

Interconnects

PARAMETER 70 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

Miscellaneous Parameters

PARAMETER 71 USED IN FLEX III AND FLEX IV BUT NOT FLEX IIIA

FCC NOTICE TO USERS

1. This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference which may cause undesirable operation.
2. This equipment generates and uses radio frequency energy and if not installed and used properly, i.e. in strict accordance with the service manual, may cause interference to radio or television reception. It has been tested and found to comply with the limits for a Class B computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when operated in a residential installation.
3. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
 - a. Reorient the receiving antenna.
 - b. Relocate the equipment with respect to the receiver.
 - c. Move the equipment away from the receiver.
 - d. Plug the equipment into a different outlet so that equipment and receiver are on different branch circuits.
 - e. Ensure that card mounting screws, attachment connector screws, and ground wires are tightly secured.
 - f. If cables not offered by this company are used with this equipment, it is suggested that you use shielded, grounded cables with in line filters, if necessary.
 - g. If necessary consult your dealer service representative for additional suggestions.
4. The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. It is the responsibility of the user to correct such interference.

REVISION HISTORY

February 7, 2006 (Version 1.00) First production Release

March 7, 2006 (Version 1.01) Made a few small corrections to remove technical errors and deleted parameters not used in FLEX IIIA.

March 9, 2006 (Version 1.02) Corrected minor mistakes and added additional information to make this manual self contained for purposes of programming.

August 4, 2006 (Version 1.03) Corrected mistake. CTCSS tone of 127.3 was not in table. Does not affect the firmware. Page 17 of manual showed *3015#246#03#1#. Should be *3015#246#02#1#.