Computer Interface Option

Owner's Manual

Firmware Version 3.5

(October 14, 1988)

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Chapter 1
Bulletin Board System (BBS) Serial Port Access

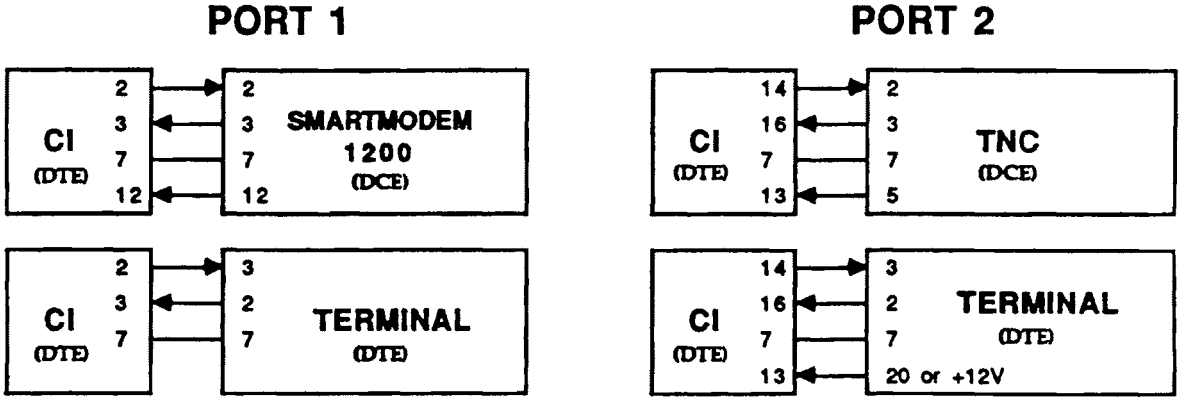
Two RS-232C serial ports are accessible at the Computer connector on the rear of the controller. A terminal or computer running a terminal emulation program (communication program) can connect directly to the DB-25 connector, or may connect indirectly through a modem or packet TNC.

For *local access*, either port may connect *directly to a terminal* by connection of transmit data, receive data, and signal ground. Note that both the controller and the terminal are Data Terminal Equipment (DTEs), so that transmit and receive data pins must be reversed between the controller and the terminal.

For *remote access*, Port 1 is intended to connect to a Smartmodem 1200 or software/hardware compatible, and provides automatic baud rate selection based on the High Speed Indicator from the modem. Port 2 is intended to connect to a packet TNC, and provides hardware flow control to prevent overflowing the TNC input character buffer. Other remote access configurations are possible, such as use of higher speed modems, but are the responsibility of the user to design and implement. See Table I for the Computer connector pinout.

TABLE I — RC-850 REPEATER CONTROLLER CI BOARD DB-25 CONNECTOR DEFINITION

	RS-232 Standard		*CI Conn. / Port 1*	*SM1200*	*CI Conn. / Port 2*	*TNC*
Pin	*Ckt*	*Description*	*Description*	*CI<—>SM*	*Description*	*CI<—>TNC*
1	AA	Protective Ground	Protective Ground	<—>	Protective Ground	<—>
2	BA	Transmitted Data	Transmitted Data	—>		
3	BB	Received Data	Received Data	<—		
6	CC	Data Set Ready - not used				
7	AB	Signal Ground	Signal Ground	<—>	Signal Ground	<—>
12	SCF/CI	High Speed Indicator	High Speed Indicator	<—		
13	SCB	Sec. Clear to Send			Clear to Send	<—
14	SBA	Sec. Transmitted Data			Transmitted Data	—>
16	SBB	Sec. Received Data			Received Data	<—
19	SCA	Sec. Request to Send - not used				
20	CD	Data Terminal Ready - not used				
25		Unassigned - Serial Port 3 Output				



Baud Rate

Port 1 may be set to 300 or 1200 baud based on the level applied to the High Speed Indicator signal (pin 12) of the RS-232 connector. It is controlled automatically by 1200 baud intelligent modems such as the Smartmodem 1200. (If a High Speed Indicator signal is not available, an RS-232 low signal or an open circuit selects 300 baud, and an RS-232 high signal selects 1200 baud. A high level signal is typically available at the connector of a terminal, such as at pin 20 - Data Terminal Ready. Consult your terminal or computer manual for details if you'd like to strap the port to 1200 baud.)

The baud rate of port 2 is DIP switch selectable between 300 and 9600 baud as shown in Table II. Be sure to leave only one switch ON.

TABLE II — PORT 2 BAUD RATE

Baud Rate	SW1	SW2	SW3	SW4	SW5	SW6
300	OFF	OFF	OFF	OFF	OFF	ON
600	OFF	OFF	OFF	OFF	ON	OFF
1200	OFF	OFF	OFF	ON	OFF	OFF
2400	OFF	OFF	ON	OFF	OFF	OFF
4800	OFF	ON	OFF	OFF	OFF	OFF
9600	ON	OFF	OFF	OFF	OFF	OFF

Terminal / Communications Program Setup

Characters sent and received by the controller are asynchronous, 8 data bits, 1 stop bit, and no parity. The controller does not echo characters, so select *half duplex*. Configure your terminal or comm program so that typing a carriage return causes the cursor to be line fed to a new line.

Flow Control

Both ports support software flow control by recognizing <control>S to suspend character transmission and <control>Q to resume. For example, if you're downloading a long file, such as the entire command log, you may freeze the transmission to look at the information on the screen by typing <control>S and resume transmission of the file by typing <control>Q.

Character <control>P will terminate the downloading of a file.

In addition, hardware flow control is supported on Port 2 to prevent buffer overflow in a packet TNC when sending long files. The controller will hold back from sending characters when the CTS signal supplied from the TNC is low, and will resume when the signal is high. Note that port 2's CTS signal must be connected to the TNC or terminal, *or must be strapped high* for the port to function.

Menu

The serial ports provide a text menu from which the user may enter commands. See Appendix 1 for a tour of the screen displays, including the text of the Help file, which provides information about the operation of each of the commands, and views of the menus and downloadable files. Type "Return" to see the menu.

Connection to a Modem (Port 1)

For telephone line data connection between the controller and your terminal or computer, an auto-answer modem such as a Hayes Smartmodem 1200 or software/hardware compatible is recommended at the repeater controller location. An intelligent or manual modem may be used at the terminal or computer location. Note that some modems which are represented as "Hayes compatible" may only be compatible to varying degrees. We've had good results with the Packard Bell PB1200PLUS. Before hooking the controller to a modem, try using the modem with your home terminal or computer and communications program. *Ensure that the modem is working properly before taking it to the repeater site. Offshore clones of Hayes' modems seem to have a relatively high "out of the box failure" rate.*

See Table I for hookup to a Smartmodem 1200. Set the modem DIP switches as follows:

1	DOWN	Forces DTR TRUE; enables modem to execute commands.
2	DOWN	(don't care in this application)
3	UP	No result codes sent from modem to CI.
4	DOWN	Modem does not echo characters.
5	DOWN	Modem will not auto-answer. Overridden by modem command sent by controller to auto-answer after 5 rings. AA light should be on after controller reset.
6	UP	Must be up to use Carrier Detect output as signal to Phone Line Busy
7	UP	Setting used for connection to RJ 11 modular telephone jack.
8	DOWN	Enables modem command recognition.

You may call the modem at either 300 or 1200 baud and the Smartmodem and Computer Interface will automatically adjust to the proper baud rate.

Sharing a Telephone Line

The auto-answer modem may share a telephone line with the controller. With both the controller and the modem on the line, answering priority should go to the controller. In other words, normally, the controller should answer first.
Set the controller's phone answer delay timer to 10-15 seconds. Unless otherwise specified, the controller sends the modem command "AT SØ=5" on reset to set the modem to answer after the fifth ring (≈30 seconds). This may be modified using the controller's T command (see Appendix I).

To access the modem, call the controller or enter on another command channel the Don't Answer Next Time Control Op level command. Then immediately call back and the controller will allow the modem to answer the phone.

When the modem is in use sharing the controller's patch telephone line, it is desirable to inhibit telephone patches by indicating to the repeater user that the line is busy. Since the modem is independent of the controller, the controller has no way of knowing when the modem is actually using the telephone line. For best results, a signal should be taken from the modem to indicate to the controller's Phone Line Busy input when the phone is in use by the modem.

A modem in use signal can be derived in one of two ways. In both cases, the controller's Shared Phone Line mode should be selected with the *5405 Programming command.

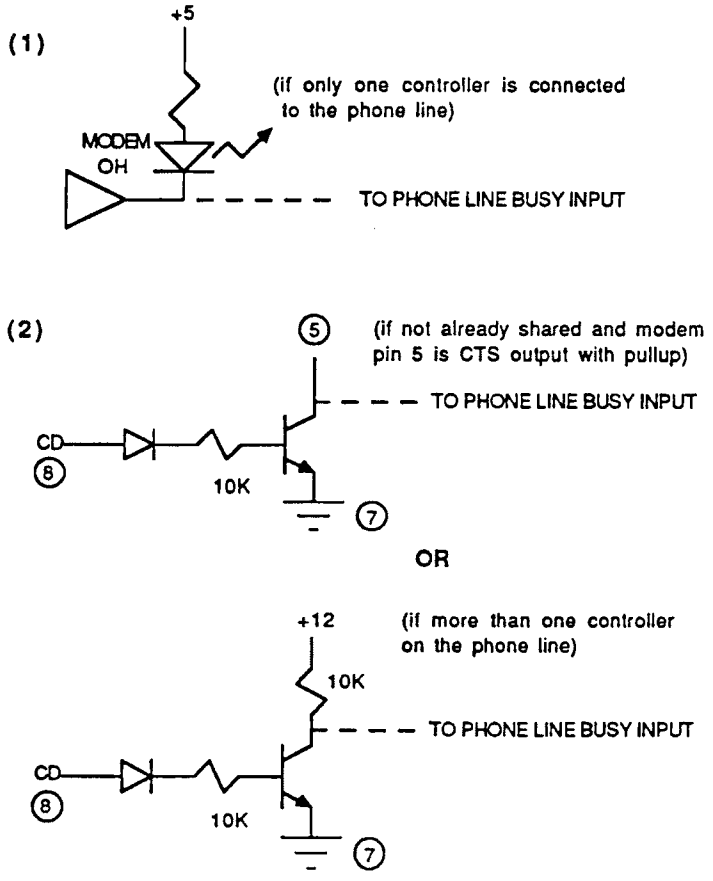
(1) *Get a signal from inside the modem - probably no added parts.*

Most modems have an Offhook (OH) LED indicator, with its anode pulled up to five volts through a resistor, and the cathode driven by a high current driver to ground to light the LED. This low true signal (at cathode of LED) can be taken to an unused pin of the DB-25 connector, typically such as pin 25, and taken directly to the Phone Line Busy input of the controller (Analog Connector pin 24). When the modem is offhook, the logic low signal to the controller causes a "Busy" response to anyone attempting to make a patch.

If more than one controller is already sharing a phone line with the new modem, then method 2 is recommended.

(2) *No need to get inside the modem but must add a transistor.*

If the modem does not have an Offhook LED, you aren't sure of the modem circuitry, or you don't want to get inside the modem, the Carrier Detect output of the modem may be used to indicate to the controller that the shared phone line is in use. This high true RS-232 signal must be inverted as shown below to change the logic sense and also provide the logic levels acceptable to the controller. Pin 5, the Clear to Send output of the modem, may be used as a convenient pullup resistor, depending on your modem.



Connection to a Packet TNC (Port 2)

Port 2 may be connected to a packet radio terminal node controller. The signals to be connected include transmit and receive data, and, depending on your application and your TNC, the flow control signal to prevent the controller from overflowing the TNC's incoming character buffer. See Table I for hookup. (Check the operation of your TNC to verify that pin 5 provides a CTS signal which goes low to indicate buffer full.)

Control Timers

For security, certain commands and downloadable files may not be accessed via the serial ports unless control is enabled through that port. The protected commands include Command entry, Text message entry, Print a programmable message, Edit a programmable message, Autodial number examine and load, and Front Panel display. The protected downloadable files include COMMAND.LOG, CALL.TXT, AUTODIAL.TXT and E2PROM.HEX.

For each port, a control enable and disable Control Op level command is available. See the Command Code Summary for the codes. The enable/disable status for each port is stored in the controller macro sets. In addition, each port has a programmable timer which begins to run when control is enabled for that port. The timer is refreshed each time a protected command is entered or a protected file is downloaded. If the timer is allowed to expire, control is disabled for that port and must be reenabled via another port.

To keep control permanently enabled on a serial port, program the timer value to zero to effectively disable the timer, and enable control. Otherwise, a value of approximately three to five minutes might be appropriate.

Chapter 2
Auxiliary Touch-Tone Decoders

Two auxiliary Touch-Tone decoders are provided on the Computer Interface Board. The audio inputs to the decoders appear at solder pads on the CI board and may be taken to the spare phono jacks on the rear panel of the controller. The audio level may range between .5 and 5 volts peak-to-peak. The decoder outputs are read by the controller's CPU through computer input ports implemented on the board.

Commands may be entered independently and simultaneously through the shared decoder on the main controller board and the two auxiliary decoders on the Computer Interface Board. Each auxiliary decoder may be assigned to replace a channel of the shared decoder with Programming commands. The decoders may be assigned to the telephone, the links or remote bases, and the control receiver.

Each command is acted on independently at the command evaluation point – when the command channel COS goes inactive, or after # if assigned to the phone. Command responses are directed to the system transmitters or the telephone.

Programming Commands

*5411x	Assign Auxiliary Decoder #1
*5412x	Assign Auxiliary Decoder #2

Channel	0 = phone	3 = Link / RB 3
	1 = Link / RB 1	4 = Link / RB 4 / Control Receiver
	2 = Link / RB 2	5 = Not used

Example
Auxiliary Decoder #1 may be assigned to replace the telephone channel of the shared decoder and wired to the telephone audio available on the Telephone Interface Board. The telephone is then "uncoupled" from the shared decoder, and the audio from the phone is always being monitored for commands by the new Touch-Tone decoder.

Wire the decoder input pad labeled DTMF1 on the CI board to the telephone interface board U5 pin 7. No ground wire is necessary.

With the controller unlocked, enter Programming command *54110.

Now when the phone rings and is answered by the controller, the shared decoder will not switch to the phone, and commands (terminated with #) will be accepted through the Auxiliary Decoder #1. Commands will be evaluated after the #.

Example
Auxiliary Decoder #2 may be assigned to replace link 3 channel of the shared decoder and may be wired to link 3 receiver audio. Link 3 is then "uncoupled" from the shared decoder, and the audio from the link is always being monitored for commands by the new Touch-Tone decoder.

Wire the decoder input labeled DTMF2 on the CI board to a spare phono jack on the rear panel. Using a phono Y connector, route link 3 receiver audio to the phono jack.

With the controller unlocked, enter Programming command *54123.

Now when the link COS is active, the shared decoder will not switch to the link, and commands will be accepted through the Auxiliary Decoder #2. Commands will be evaluated when link 3 COS goes away (actually after the Delay to Segment 1 period for Courtesy Tone 11).

Chapter 3
Vocabulary Expansion Option

The VEO adds new words to the controller's vocabulary, bringing the total to over 530 words. Each word is accessible from the Touch-Tone activated message editor and from the terminal accessible message editing capability. The vocabulary codes for the complete word list are shown on the following pages. All words take up one slot in messages, except that *2, *3, *4, *5 and *9 words *each take up two slots*. Remember this when figuring how long messages can be. The vocabulary listing may also be viewed from the serial ports by downloading the file WORDLIST.TXT.

(PAUSE)	34
A	21
A.M.	*110
ABORT	*992
ABOUT	*855
ABOVE	*112
ACKNOWLEDGE	*114
ACTION	*115
ADJUST	*944
ADVANCED	*916
ADVISE	*116
AERIAL	*117
AFFIRMATIVE	*118
AFTERNOON†	*842
AIR	*120
AIRPORT	*122
ALERT	40
ALL	*685
ALOFT	*124
ALPHA	*621
ALTERNATE	*125
ALTITUDE	*127
AMATEUR	*917
AMPS	*831
AND	74
ANSWER	*128
APRIL	*131
AREA	*713
ARRIVAL	*132
AS	*133
AT	*742
AUGUST	*135
AUTO	*918
AUTOMATIC	*741
AUTOPILOT	*136
AUXILIARY	*137
B	22
BAND	*138
BANK	*140
BASE	*141
BATTERY	*142
BELOW	*143
BETWEEN	*660
BLOWING	*144
BOARD	*145
BOOST	*146
BOZO	*147
BRAKE	*148
BRAVO	*622
BREAK	*743
BROKEN	*151
BUTTON	*993
BY	*152
C	23
CABIN	*153
CALIBRATE	*735
CALL	*751
CALLING	*155
CALM	*156
CANCEL	*664
CAUTION	*711
CEILING	*158
CENTER	*161
CHANGE	*875
CHARLIE	*623
CHECK	*865
CIRCUIT	*720
CLEAR	*163
CLIMB	*165
CLOCK	*945
CLOSED	*166
CLUB	*926
CODE	75
COME	*167
COMPLETE	*721
COMPUTER	*927
CONDITION	*168
CONGRATULATIONS	*170
CONNECT	*940
CONTACT	*171
CONTROL	*624
CONVERGING	*172
COUNT	*173
COURSE	*174
CRANE	*950
CROSSWIND	*175
CURRENT	*177
CYCLE	*951
D	31
DANGER	*712
DAYS	*952
DAYTON	*928
DECEMBER	*181
DECREASE	*182
DECREASING	*183
DEGREES	*722
DELTA	*631
DEPARTURE	*185
DEVICE	*953
DIAL	*936
DINNER	*186
DIRECTION	*752
DISPLAY	*954
DOOR	*955
DOWN	*654
DOWNWIND	*188
DRIVE	*190
DRIZZLE	*191
DUST	*192
E	32
EAST	*754
ECHO	*632
-ED(suffix)	*193
EIGHT	08
EIGHT†	*808
EIGHTEEN†	*884
ELECTRICIAN	*943
ELEVATION	*196
ELEVEN	11
ELEVEN†	*811
EMERGENCY	*937
ENGINE	*198
ENTER	*995
EQUAL	*893
-ER(suffix)	*210
ERROR	*211
ESTIMATED	*212
EVACUATE	*213
EVACUATION	*214
EVENING†	*843
EXIT	*761
EXPECT	*215
F	33
FAIL	*755
FAILURE	*216
FARAD	*930
FARENHEIT	*217
FAST	*925
FEBRUARY	*218
FEET	15
FIF-(prefix)	50
FIFTEEN†	*854
FIFTY†	*850
FILED	*223
FINAL	*224
FIRE	*634
FIRST	*225
FIVE	05
FIVE†	*805
FLAPS	*227
FLIGHT	*228
FLOW	*960
FOG	*230
FOR	*231
FORTY†	*840
FOUR	04
FOUR†	*804
FOURTEEN†	*814
FOURTH	*234
FOXTROT	*633
FREEDOM	*235
FREEZING	*236
FREQUENCY	*610
FRIDAY	*237
FROM	64
FRONT	*238
FULL	*241
G	41
GALLONS	*991
GATE	*845
GAUGE	*961
GEAR	*244
GET	*962
GLIDE	*245
GO	*895
GOLF	*641
GOOD†	*834
GREEN	*762
GROUND	*248
GUSTING TO	*250
H	42
HAIL	*251
HALF	*252
HAM	*938
HAMFEST	*946
HAMVENTION	*947
HAVE	*253
HAZARDOUS	*254
HAZE	*255
HEAVY	*257
HELP	*258
HENRY	*260
HERTZ	*684
HIGH	*763
HOLD	*963
HOME	*615
HOTEL	*642
HOUR	*261
HOURS	*655
HUNDRED	*640
I	43
ICE	*262
ICING	*263
IDENTIFY	*264
IGNITE	*266
IGNITION	*267
IMMEDIATELY	*268
IN	*270
INBOUND	*271
INCH	*964
INCREASE	*272
INCREASING TO	*274
INDIA	*643
INDICATED	*275
INFLIGHT	*276
INFORMATION	*996
-ING(suffix)	*948
INNER	*277
INSPECTOR	*785
INTRUDER	*764
IS	*733
IS†	*823
IT	*281
J	51
JANUARY	*282
JULIET	*651
JULY	*283
JUNE	*284
K	52
KEY	*285
KILO	*652
KNOTS	*286
L	53
LAND	*287
LANDING	*288
LATE	*956
LAUNCH	*291
LEAN	*292
LEFT	*770
LEG	*293
LESS THAN	*294
LEVEL	*295
LIGHT	*934

LIMA	*653	OCLOCK†	*824	REPAIR	*745	TELEPHONE	*438
LINE	*942	OCTOBER	*346	REPEAT	*982	TEMPERATURE	*724
LINK	*998	OF	*694	REPEATER	80	TEN	10
LIST	*296	OFF	*614	RICH	*383	TEN†	*810
LOCK	*297	OH†	*800	RIG	*384	TERMINAL	*440
LONG	*298	OHIO	*348	RIGHT	*665	TEST	*792
LOOK	*957	OHMS	*933	ROAD	*385	-TH(suffix)	*441
LOW	*771	OIL	*350	ROGER	*386	THANK YOU	*978
LOWER	*310	ON	*613	ROMEO	*672	THAT	*442
LUNCH	*311	ONE	01	ROUTE	*388	THE	24
		ONE†	*801	RUNWAY	*390	THE(long e)	*443
M	61	OPEN	94			THE(short e)	*444
MACHINE	84	OPERATION	*352	S	73	THE†	*821
MAINTAIN	*312	OPERATOR	*630	-S(suffix)	*915	THIR-(prefix)	13 or 30
MANUAL	*965	OSCAR	*663	SAFE	*784	THIRD	*447
MARCH	*313	OTHER	*353	SAND	*391	THIRTEEN	*448
MARKER	*314	OUT	*740	SANTA CLARA	*392	THIRTEEN†	*813
MAY	*315	OUTER	*355	SATURDAY	*393	THIRTY†	*830
MAYDAY	*316	OVER	*773	SCATTERED	*394	THIS	*451
ME	*920	OVERCAST	*356	SECOND	*395	THIS IS	65
MEAN	*317			SECONDS	*635	THOUSAND	*644
MEASURE	*970	P	71	SECURITY	*396	THREE	03
MEETING	35	P.M.	*358	SELECT	*397	THREE†	*803
MEGA	*680	PAPA	*671	SEPTEMBER	*398	THUNDERSTORMS	*452
MESSAGES	*625	PARTIALLY	*361	SEQUENCE	*410	THURSDAY	*453
METER	*620	PASS	*774	SERVICE	*723	TIME	44
MICRO	*931	PASSED	*974	SET	*885	TIME†	*822
MIKE	*661	PATCH	*966	SEVEN	07	TIMER	*732
MILES	*322	PATH	*362	SEVEN†	*807	TO	*455
MILL	*971	PER	*364	SEVENTEEN†	*874	TODAY	*456
MILLI	*825	PERCENT	*675	SEVERE	*413	TOMORROW	55
MILLION	*323	PHONE	*914	SEXY	*414	TONIGHT	45
MINUS	*612	PICO	*932	SHORT	*415	TOOL	*985
MINUTES	*645	PLEASE	*967	SHOWERS	*416	TORNADO	*457
MIST	*324	PLUS	*611	SHUT	*765	TOUCHDOWN	*458
MOBILE	*958	POINT	*674	SIDE	*417	TOWER	*460
MODERATE	*326	POLICE	*968	SIERRA	*673	TRAFFIC	*461
MONDAY	*327	POSITION	*780	SIGHT	*418	TRANSMIT	*462
MONTH	*328	POWER	*714	SIX	06	TRIM	*463
MORE THAN	*330	PRACTICE	85	SIX†	*806	TUESDAY	*464
MORNING†	*841	PRESS	*781	SIXTEEN†	*864	TURBULANCE	*465
MOTOR	*972	PRESSURE	*935	SLEET	*423	TURN	*990
MOVE	*973	PRIVATE	*366	SLOPE	*424	TWELVE	12
MUCH	*332	PROBE	*975	SLOW	*983	TWELVE†	*812
		PROGRAMMING	*367	SMOKE	*795	TWENTY	20
N	62	PULL	*980	SNOW	*425	TWENTY†	*820
NEAR	*333	PUSH	*977	SOUTH	*790	TWO	02
NEGATIVE	*334			SPEED	*984	TWO†	*802
NET	25	Q	70	SPRAY	*427	-TY(suffix)	60
NEW	*335	QUEBEC	*670	SQUAWK	*428		
NEXT	*336			STALL	*431	U	82
NIGHT	*337	R	72	START	*730	UNDER	*775
NINE	09	RADIO	*976	STOP	*731	UNIFORM	*682
NINE†	*809	RAIN	*374	STORM	*433	UNIT	*715
NINETEEN†	*894	RAISE	*375	SUNDAY	*434	UNLIMITED	*467
NO	*342	RANGE	*981	SWITCH	*725	UNTIL	*468
NORTH	*772	RATE	*376	SYSTEM	*997	UP	*650
NOT	*695	READY	*783			USE(noun)	*470
NOVEMBER	*662	REAR	*377	T	81	USE(verb)	*471
NUMBER	*734	RECEIVE	*378	TANGO	*681		
		RED	*744	TANK	*435	V	83
O	63	RELEASE	*381	TARGET	*436	VALLEY	*986
OBSCURED	*344	REMARK	*382	TAXI	*437	VALVE	*941
OCLOCK	*345	REMOTE	*910	-TEEN(suffix)	14	VARIABLE	*473

VERIFY	*475
VICTOR	*683
VISIBILITY	*476
VOLTS	*750
W	91
WAIT	54
WAKE	*477
WAKE UP	*478
WARNING	*480
WATCH	*481
WATTS	*815
WAY	*482
WEATHER	95
WEDNESDAY	*484
WELCOME	*913
WEST	*793
WHISKEY	*691
WILL	*912
WIND	*487
WITH	*490
WRONG	*491
X	92
X-RAY	*692
Y	93
YANKEE	*693
YELLOW	*794
YESTERDAY	*492
YOU	*493
YOUR	*987
Z	90
ZED	*988
ZERO	00
ZONE	*494
ZULU	*690

SOUND EFFECTS

CROWD	*892
EXPLOSION	*891
LASER	*873
PHASER	*882
TIC	*860
TOC	*870
TRAIN	*883
WHISTLE	*881

NUMBERS (MALE)

NUMBER	*734
ZERO	00
OH	63
ONE	01
TWO	02
THREE	03
FOUR	04
FIVE	05
SIX	06
SEVEN	07
EIGHT	08
NINE	09
TEN	10
ELEVEN	11
TWELVE	12
THIRTEEN	*448
THIR-(prefix)	13
-TEEN(suffix)	14
TWENTY	20
FIF-(prefix)	50
HUNDRED	*640
THOUSAND	*644
MILLION	*323
-TY(suffix)	60
FIRST	*225
SECOND	*395
THIRD	*447
FOURTH	*234

NUMBERS (FEMALE)

OH†	*800
ONE†	*801
TWO†	*802
THREE†	*803
FOUR†	*804
FIVE†	*805
SIX†	*806
SEVEN†	*807
EIGHT†	*808
NINE†	*809
TEN†	*810
ELEVEN†	*811
TWELVE†	*812
THIRTEEN†	*813
FOURTEEN†	*814
FIFTEEN†	*854
SIXTEEN†	*864
SEVENTEEN†	*874
EIGHTEEN†	*884
NINETEEN†	*894
TWENTY†	*820
THIRTY†	*830
FORTY†	*840
FIFTY†	*850

DAYS OF THE WEEK

DAYS	*952
SUNDAY	*434
MONDAY	*327
TUESDAY	*464
WEDNESDAY	*484
THURSDAY	*453
FRIDAY	*237
SATURDAY	*393

MONTHS OF YEAR

MONTH	*328
JANUARY	*282
FEBRUARY	*218
MARCH	*313
APRIL	*131
MAY	*315
JUNE	*284
JULY	*283
AUGUST	*135
SEPTEMBER	*398
OCTOBER	*346
NOVEMBER	*662
DECEMBER	*181

COLORS

GREEN	*762
RED	*744
YELLOW	*794

DIRECTIONS

EAST	*754
NORTH	*772
SOUTH	*790
WEST	*793

NAMES

CHARLIE	*623
DEE	31
HENRY	*642
JAY	51
JULIET	*651
KAYE	52
MIKE	*661
OSCAR	*663
PAPA	*671
ROMEO	*672
VICTOR	*683

MACROS

MACRO 1	*861
MACRO 2	*862
MACRO 3	*863
MACRO 4	*852

RUN-TIME VARIABLES

M/A/E	*844
TIME	*872
AM/PM	*832
DATE	*833
MAIL PRESENT	*994
T. O. PERIOD	*5731
# MESSAGES	*5732
VRT	*57xx

CHANGE TYPE

MORSE	*50
SPEECH	*51
DTMF	*52(digits)
PAGER	*53xx
DVR	*55xyz
EXT. DEVICE	*56x

Chapter 4

ICOM IC-900A/901 Remote Base / Link Support

Introduction

The FC-900 Interface connects ACC's repeater controller products to the ICOM IC-900A and IC-901 FM Mobile band units for an easy-to-hook-up remote base or link installation.

The FC-900 provides the hardware interface to the FM band units, replacing the ICOM IC-900A Interface Units A and B or the IC-901 transceiver in this application. In addition, the FC-900 can recover expanded remote control output functions (UF outputs) for the controllers which may be used for antenna selection and other external control functions. The '850 controller implementation supports up to four link / remote base ports using IC-900A/ IC-901 band units.

Please note that the FC-900 Interface supports the FM band units only –*not* SSB band units, and *not* the IC-901 internal 2 meter and 440 MHz transceivers.

ICOM IC-900 / IC-901 System Description

The IC-900 Super-Multibander System is a modular mobile transceiver system which provides trunk-mounted rf decks (band units), dash mounted remote controller, and a fiber-optic link with associated interface units.

The IC-901 is an integrated 2 meter / 440 MHz dual band mobile transceiver which may be expanded to other bands by adding band units. The '901 can be "split apart" to allow trunk mounting of the rf modules with wireline or fiber optic connection to the dash mounted controller, similar to the '900.

Available FM band units cover six amateur bands from 29 MHz to 1300 MHz. Continued availability of the 2 meter and 440 MHz band units is unclear, since the IC-901, which replaces the IC-900, has built-in 2 meter and 440 MHz coverage and does not need external band units for these bands.

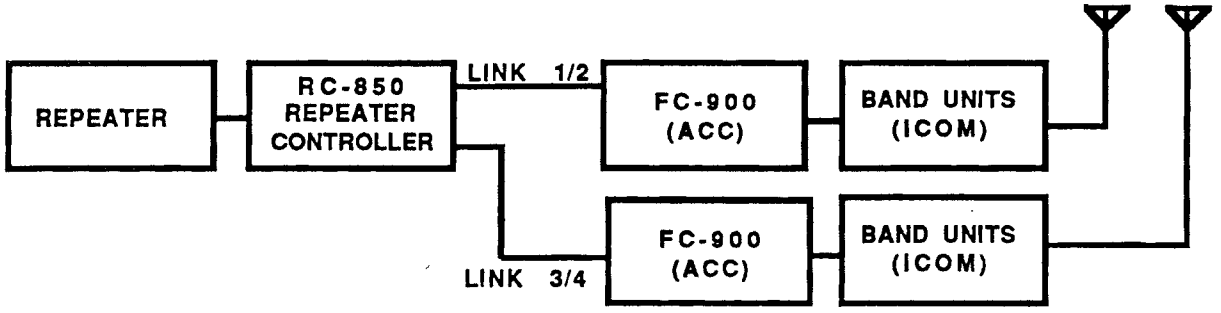
The IC-900A/901 system architecture supports two of up to six bands active at a time. The main band is available for transmit and receive while the sub band is receive-only ('850 support permits transmit from *both* band units). Cross-band full-duplex operation is permitted, transmitting on the main while receiving on the sub. There are no provisions for in-band full-duplex since band units are half-duplex and are assigned unique bus addresses.

ACC Remote Base Description

In ACC's remote base application, the ICOM band units are interfaced to the repeater controller through the FC-900 Interface. No additional ICOM interface units are needed. The FC-900 Interface provides the electronic interface to the ICOM internal bus; transmit audio processing including pre-emphasis, symmetrical limiting, and level and deviation controls; receive audio processing including squelch pots for each band unit, de-emphasis, and squelch gating; programmable CTCSS encode; and recovery of seven general purpose remote control (UF) outputs.

The controller software is responsible for controlling the internal circuitry of the band units, including the frequency synthesizer and other basic radio functions.

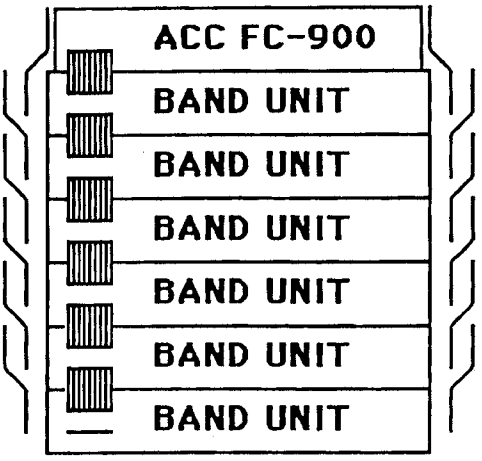
ACC REMOTE BASE SYSTEM DIAGRAM



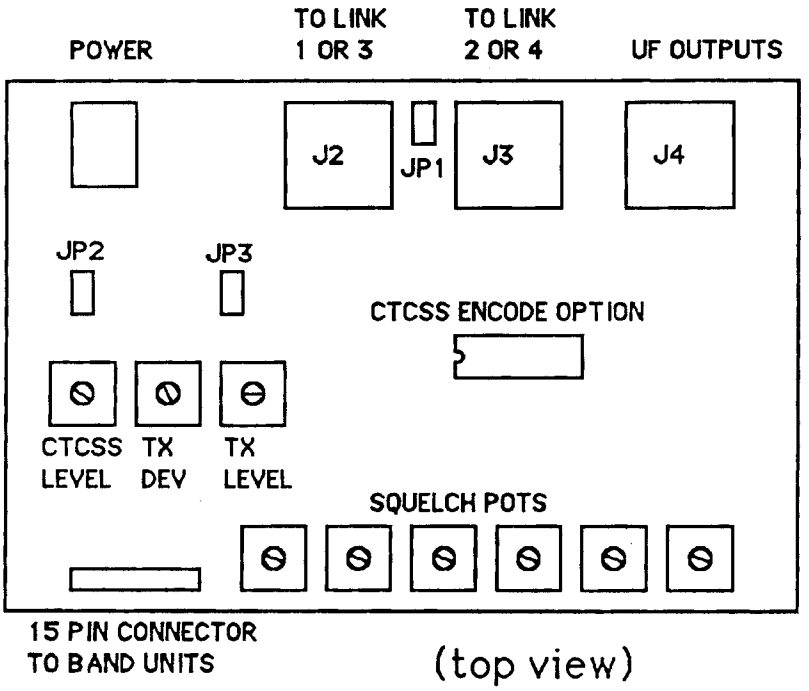
Mechanical Hookup

The mechanical hookup of the FC-900 Interface is shown below. It mounts on the top of the stack of the available band units and bolts together using mounting brackets supplied with the band units. Use the ACC supplied screws for bolting in the FC-900. The mounting brackets should be configured as shown in the diagram.

The 15 pin cable supplied with each band unit connects it to the band unit mounted above it. The cable from the top band unit connects to the plug in the FC-900. The bottom connector of the bottom band unit does not connect to anything. The band units may be stacked in any order. *No additional mounting brackets or 15 pin jumper cables are needed.*

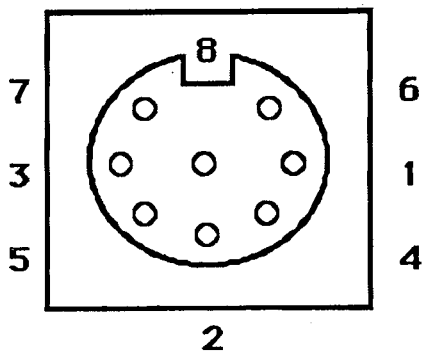


(front view)



(top view)

DIN CONNECTOR PINOUT
(rear view of FC-900)



Power Supply

The ICOM band units operate off +12 volts which must be supplied from a power supply capable of supplying high current on a continuous basis. In addition, the FC-900 requires +12 volts at 25 mA.

Band Units (Power)

The band units are intended to plug into ICOM's Interface Unit B (which you don't have) which has six mating Molex power connectors. Instead, cables which mate to the band unit connectors are available through ICOM dealers. Alternatively, a power bus may be wired using mating Molex connectors or pins. The mating connectors are also available through ICOM dealers.

At most two units (out of six total) may be in transmit. Transmit current ranges from 1.5A (10M low power) to 9.5A (2M 45 watt high power). Refer to the specifications of your band units for details.

The low and high power levels of each band unit are internally adjustable. It may be desirable, depending on the application, air circulation and power available, to back down on one or both power levels (see band unit documentation). If extended high power operation is anticipated, consideration should be given to adding a fan for forced air cooling of the heat sinks. ICOM's CF-11 Cooling Fan Unit is <u>not</u> supported by the FC-900 interface.

FC-900 Interface (Power)

The FC-900 power connector is a barrel jack which is compatible with many wall mount power supplies (center pin positive!). Alternatively, the supplied barrel plug may be wired to your 12 volt power supply.

Connection to Controller

An FC-900 interface can connect either to link ports 1 and 2 <u>or</u> to ports 3 and 4. Two interfaces can connect to both port pairs where four bands need to be active simultaneously.

Connection to the RC-850 controller requires wiring one end of the supplied DIN cables to the controller's digital I/O connector and phono jacks as shown below. (If a single cable is supplied with connectors on both ends, cut the cable in half. Verify wire color vs. pinout with an ohmmeter.) The FC-900 Interface can connect to either Link ports 1 and 2 or to Link ports 3 and 4. Two FC-900 Interfaces can connect to both link port pairs.

Interface to Link 1 and 2 (Controller DIP Switch 4 ON)

J2 DIN Pin #	Color	RC-850 Signal	Connector/Pin
1	black	Link 1 Receiver COS	Digital I/O pin 4
2	brown	Ground	(optional Digital I/O pin 25)
3	red	DATA	Digital I/O pin 11 (formerly RBDATA)
4	orange	STB	Digital I/O pin 19 (formerly L1 PTT)
5	yellow	CLK	Digital I/O pin 6 (formerly L2 PTT)
6	green	Transmitter Audio	TX phono jack
7	blue	Link 1 Receiver Audio	L1 phono jack
8	white	-	-
SHIELD	tinned wire	Ground	Phono jack shield

J3 DIN Pin #	Color	RC-850 Signal	Connector/Pin
1	black	Link 2 Receiver COS	Digital I/O pin 16
2	brown	Ground	(optional Digital I/O pin 25)
3	red	-	-
4	orange	-	-
5	yellow	-	-
6	green	-	-
7	blue	Link 2 Receiver Audio	L2 phono jack
8	white	-	-
SHIELD	tinned wire	Ground	Phono jack shield

Interface to Link 3 and 4 (Controller DIP Switch 5 ON)

J2 DIN Pin #	Color	RC-850 Signal	Connector/Pin
1	black	Link 3 Receiver COS	Analog pin 22
2	brown	Ground	(optional Digital I/O pin 25)
3	red	DATA	Digital I/O pin 11 (formerly RBDATA)
4	orange	STB	Digital I/O pin 22 (formerly L3 PTT)
5	yellow	CLK	Digital I/O pin 10 (formerly L4 PTT)
6	green	Transmitter Audio	TX phono jack
7	blue	Link 3 Receiver Audio	SP1 phono jack
8	white	-	-
SHIELD	tinned wire	Ground	Phono jack shield

J3 DIN Pin #	Color	RC-850 Signal	Connector/Pin
1	black	Link 4 Receiver COS	Analog pin 23
2	brown	Ground	(optional Digital I/O pin 25)
3	red	-	-
4	orange	-	-
5	yellow	-	-
6	green	-	-
7	blue	Link 4 Receiver Audio	SP2 phono jack
8	white	-	-
SHIELD	tinned wire	Ground	Phono jack shield

Jumpers

Jumpers JP1 and JP2 should be cut. (These jumpers allow mixing main and sub receiver audio and COS signals into a single port for use with ACC's RC-85 and RC-96 Repeater Controllers.) Jumper JP3 may need to be removed to increase input sensitivity, but this will not be necessary if transmit audio level from the controller is several volts peak-to-peak as recommended.

Adjustments

Several adjustments must be made after installation. Because the band units must be operating to make the adjustments, it will be necessary to read ahead to learn how to command the transceivers. The adjustments are straightforward to make after the units are turned on.

Squelch Pots - Pots R104-R109 are adjusted for the desired squelch setting when the respective band unit is selected. Bring up the band unit in receive-only and adjust the respective pot (each pot is labeled on the board by band).

Transmit Level - R103 adjusts the level of the transmit audio applied to the limiter in the FC-900. It should be adjusted so that transmit audio just enters clipping (at the cathode of CR5).

Transmit Deviation - R102 determines the amplitude of limited audio applied to the modulators in the band units. It should be adjusted for 3-5 kHz peak deviation.

CTCSS - R101 determines the level of the CTCSS signal applied to the modulator. It should be adjusted for ≈800 Hz deviation when a CTCSS tone is selected. The CTCSS Encoder option is required for this feature.

Link Receive Audio Level - Adjust controller pot R111, R110, R109 or R108 respectively for Links 1-4.

DIP Switches

Controller DIP switches must be set properly to accomodate the FC-900 interface.

Link Ports 1 and 2

DIP Switch 4 OFF	BCD Frequency Control
DIP Switch 4 ON	FC-900 Frequency Control

Link Ports 3 and 4

DIP Switch 5 OFF	Fixed Frequency
DIP Switch 5 ON	FC-900 Frequency Control

Command Codes

The following sections describe the repeater controller commands which control the FC-900 interface and band units.

Receive-Only / Transmit / Off

Link 1-4 may be controlled independently. A "*" appended to transmit commands brings the link up in crosslink mode.

(Link Prefix) 1 – Link 1 On Receive Only
(Link Prefix) 2 – Link 1 Receive/Transmit
(Link Prefix) 3 – Link 1 Off
(Link Prefix) 4 – Link 2 On Receive Only
(Link Prefix) 5 – Link 2 Receive/Transmit
(Link Prefix) 6 – Link 2 Off
(Link Prefix) 7 – Link 3 On Receive Only
(Link Prefix) 8 – Link 3 Receive/Transmit
(Link Prefix) 9 – Link 3 Off
(Link Prefix) * – Link 4 On Receive Only
(Link Prefix) 0 – Link 4 Receive/Transmit
(Link Prefix) 9 – Link 4 Off

The link frequencies are selected with the following commands. "mhtof" represents MHz, hundreds kHz, tens kHz, ones kHz, and offset (1/minus, 2/simplex, 3/plus). The * (decimal point) is optional but if omitted the frequency readback is inhibited.

(Link Prefix) 1 (m*htof)	**Link 1 Frequency**
(Link Prefix) 4 (m*htof)	**Link 2 Frequency**
(Link Prefix) 7 (m*htof)	**Link 3 Frequency**
(Link Prefix) * (m*htof)	**Link 4 Frequency**

Band Selections

Users may select the desired band segment for Link 1-4. The band segment definition includes optional transmit offsets and legal frequency ranges. Selecting a band also turns the link on in receive-only mode.

(Link Prefix) 1 x *	**Link 1 Band Select**
(Link Prefix) 4 x *	**Link 2 Band Select**
(Link Prefix) 7 x *	**Link 3 Band Select**
(Link Prefix) * x *	**Link 4 Band Select**

X	"Band"	Rx Frequency Range	Tx Offsets	Tx Frequency Range*	Band Unit
0	1240	1240.000 -1249.995 MHz	S, ±12 MHz	1240.000 1261.995 MHz	UX-129A
1	10 meter	29.000 29.695 MHz	S, ±100 kHz	29.000 29.695 MHz	UX-19A
2	2 meter	144.000 - 147.995 MHz	S, ±600 kHz	144.000 - 147.995 MHz	UX-29A/H
3	220	220.000 - 224.995 MHz	S, ±1.6 MHz	220.000 - 224.995 MHz	UX-39A
4	440	440.000 - 449.995 MHz	S, ±5 MHz	438.000 - 449.995 MHz	UX-49A
5	430**	430.000 - 439.995 MHz	S, ±5 MHz	425.000 - 444.995 MHz	UX-49A
6	6 meter	50.000 - 53.995 MHz	S, ±1 MHz	50.000 - 53.995 MHz	UX-59A
7	420**	420.000 - 429.995 MHz	S, ±5 MHz	420.000 - 434.995 MHz	UX-49A
8	1280	1280.000 - 1289.995 MHz	S, ±12 MHz	1268.000 - 1299.995 MHz	UX-129A
9	1290	1290.000 - 1299.995 MHz	S, ±20 MHz	1270.000 - 1299.995 MHz	UX-129A
A	1270	1270.000 - 1279.995 MHz	S, ±20 MHz	1250.000 - 1299.995 MHz	UX-129A
B	1270	1270.000 - 1279.995 MHz	S, ±12 MHz	1258.000 - 1291.995 MHz	UX-129A
C	1250	1250.000 - 1259.995 MHz	S, ±12 MHz	1240.000 - 1271.995 MHz	UX-129A

* Transmit frequency range contains gaps - range indicated is intended to show limits. Add and subtract transmit offset to receive frequency ranges to determine transmit segments. Limited by amateur band edges.

**Warning: Neither ACC nor ICOM guarantees operation of band unit in these frequency ranges. Band units may require retuning. Success and performance may vary from band unit to band unit.

Memories

Band, frequency and CTCSS selection can be recalled from seven memories each for Links 1 and 2. See the Programming Reference Manual Chapter 15 for storing memories; memory names are programmed using the Message Editor (Chapter 3).

(Link Prefix) 1 (1-7)	**Link 1 Memory 1-7 Frequency**
(Link Prefix) 4 (1-7)	**Link 2 Memory 1-7 Frequency**

High/Low Power Select

The band units include provisions for high/low power selection. Refer to your band unit manual for power level information.

Caution: Remember that the band units are intended for intermittent duty cycle. External cooling may be desirable. Keep this in mind when selecting high power.

(Link Prefix) 1 *	**Link 1 Power Interrogate**
(Link Prefix) 1 * 1	**Link 1 High Power**
(Link Prefix) 1 * 0	**Link 1 Low Power**
(Link Prefix) 4 *	**Link 2 Power Interrogate**
(Link Prefix) 4 * 1	**Link 2 High Power**
(Link Prefix) 4 * 0	**Link 2 Low Power**
(Link Prefix) 7 *	**Link 3 Power Interrogate**
(Link Prefix) 7 * 1	**Link 3 High Power**
(Link Prefix) 7 * 0	**Link 3 Low Power**
(Link Prefix) * *	**Link 4 Power Interrogate**
(Link Prefix) * * 1	**Link 4 High Power**
(Link Prefix) * * 0	**Link 4 Low Power**

CTCSS Encode (Option)

An optional remotely selectable 37 tone CTCSS encoder is available to allow accessing repeaters which are set up for CTCSS access or control. The option plugs into the IC socket at U7. The CTCSS audio is applied to any band unit selected for transmit.

(Link Prefix) 7 xx	**Link 1/2 CTCSS Select (00=off, 01-38=on)**
(Link Prefix) * xx	**Link 3/4 CTCSS Select (00=off, 01-38=on)**

Note: The CTCSS encode *level* is adjusted using pot CTCSS LEVEL R101 on FC-900 board.

CTCSS FREQUENCIES			
01 67.0	**11** -	**21** 136.5	**31** 192.8
02 71.9	**12** 100.0	**22** 141.3	**32** 203.5
03 74.4	**13** 103.5	**23** 146.2	**33** 210.7
04 77.0	**14** 107.2	**24** 151.4	**34** 218.1
05 79.7	**15** 110.9	**25** 156.7	**35** 225.7
06 82.5	**16** 114.8	**26** 162.2	**36** 233.6
07 85.4	**17** 118.8	**27** 167.9	**37** 241.8
08 88.5	**18** 123.0	**28** 173.8	**38** 250.3
09 91.5	**19** 127.3	**29** 179.9	
10 94.8	**20** 131.8	**30** 186.2	

Macro Set Storage

The repeater controller has the ability to take "snapshots" of your controller setup, which are stored in "macro sets". Each macro set can be called up with a single control operator level command allowing instant selection of an entire group of parameters. The FC-900 support software (V3.6 and up) integrates link and remote base information into the macro sets for quick selection of a link or remote base setup.

The information stored in the controller's macro sets include for each link:

- Off / receive-only / receive-transmit
- Band
- Frequency
- High / low power
- CTCSS encode on/off and tone

Recovering Expanded UF Outputs

In addition to controlling the IC-900 band units, the FC-900 Interface can recover seven expanded User Function remote control outputs supplied by the controllers. (The limitation to seven rather than eight is due to the seven bit width of the IC-900 control word.) The outputs are available at connector J4, with pinout shown below. Outputs are open collector and are low true. The outputs are the true UF outputs controllable from the UF user commands, not the alternate functions which the direct outputs may serve.

Interface to Link 1 and 2 (Controller DIP Switch 4 ON)

Signal	Pin	Signal	Pin
UF1	1	UF5	5
UF2	2	UF6	6
UF3	3	UF7	7
UF4	4	+12V	8
		GND	shield

Interface to Link 3 and 4 (Controller DIP Switch 5 ON)

Signal	Pin	Signal	Pin
UF9	1	UF13	5
UF10	2	UF14	6
UF11	3	UF15	7
UF12	4	+12V	8
		GND	shield

Command Summary

Link 1/2 Ports

(Link Prefix) 1	Link 1 On Receive Only
(Link Prefix) 2 [*]	Link 1 On Receive/Transmit
(Link Prefix) 3	Link 1 Off
(Link Prefix) 4	Link 2 On Receive Only
(Link Prefix) 5 [*]	Link 2 On Receive/Transmit
(Link Prefix) 6	Link 2 Off
(Link Prefix) 1 x *	Link 1 Band Select
(Link Prefix) 4 x *	Link 2 Band Select

x = 0 1240, 1 10 meter, 2 2 meter, 3 220, 4 440, 5 430, 6 6 meter, 7 420, 8 1280, 9 1290, A 1270 (±20 MHz), B 1270 (±12 MHz), C 1250

(Link Prefix) 1 (mhtof)	Link 1 Frequency
(Link Prefix) 1 (m*htof)	Link 1 Frequency
(Link Prefix) 4 (mhtof)	Link 2 Frequency
(Link Prefix) 4 (m*htof)	Link 2 Frequency
(Link Prefix) 1 (1-7)	Link 1 Memory 1-7 Frequency
(Link Prefix) 4 (1-7)	Link 2 Memory 1-7 Frequency
(Link Prefix) 1 *	Link 1 Power Interrogate
(Link Prefix) 1 * 1	Link 1 High Power
(Link Prefix) 1 * 0	Link 1 Low Power
(Link Prefix) 4 *	Link 2 Power Interrogate
(Link Prefix) 4 * 1	Link 2 High Power
(Link Prefix) 4 * 0	Link 2 Low Power
(Link Prefix) 7 xx	CTCSS Select (00=off, 01-38=on)

Link 3/4 Ports

(Link Prefix) 7	Link 3 On Receive Only
(Link Prefix) 8 [*]	Link 3 On Receive/Transmit
(Link Prefix) 9	Link 3 Off
(Link Prefix) *	Link 4 On Receive Only
(Link Prefix) 0 [*]	Link 4 On Receive/Transmit
(Link Prefix) 9	Link 4 Off
(Link Prefix) 7 x *	Link 3 Band Select
(Link Prefix) * x *	Link 4 Band Select

(see above)

(Link Prefix) 7 (mhtof)	Link 3 Frequency
(Link Prefix) 7 (m*htof)	Link 3 Frequency
(Link Prefix) * (mhtof)	Link 4 Frequency
(Link Prefix) * (m*htof)	Link 4 Frequency
(Link Prefix) 7 *	Link 3 Power Interrogate
(Link Prefix) 7 * 1	Link 3 High Power
(Link Prefix) 7 * 0	Link 3 Low Power
(Link Prefix) * *	Link 4 Power Interrogate
(Link Prefix) * * 1	Link 4 High Power
(Link Prefix) * * 0	Link 4 Low Power
(Link Prefix) * xx	CTCSS Select (00=off, 01-38=on)

Chapter 5
V3.5 New Command Code Summary

Programming Commands

Timers
*4029(seconds) Serial Port 1 Control Timer
*4030(seconds) Serial Port 2 Control Timer

Auxiliary Touch-Tone Decoder Command Channels
*5411x Assign Auxiliary Decoder #1
*5412x Assign Auxiliary Decoder #2

Channel 0 = phone 3 = Link / RB 3
1 = Link / RB 1 4 = Link / RB 4 / Control Receiver
2 = Link / RB 2 5 = Not used

Command Log Filter
*5420 Disable logging of all commands
*5421xx Enable logging of command xx

xx	Command
00	Unlock
01	Control Op (air)
14	Control Op (phone)
05	Primary Autopatch
16	Secondary Autopatch
17	Tertiary Autopatch
03	Primary Emergency Autodialer
18	Secondary Emergency Autodialer
04	User Loadable Autodial Bank 0
19	User Loadable Autodial Bank 1
29	User Loadable Autodial Bank 2
07	User Loadable Autodial Bank 0 L/E
20	User Loadable Autodial Bank 1 L/E
30	User Loadable Autodial Bank 2 L/E
13	Patch Utility P (rp answer, custom hu, duplex, cover, timer extend)
21	Patch Utility Q (redial, hookflash)
11	Reverse Patch Activate
22	Patch/Spare 1 Hangup, Lock
23	Rotor Control
02	User Function Remote Control
06	Link / Remote Base
15	Paging
12	Spare Audio 1 On
10	Demo Message / Bulletin Board
25	Mailbox
09	Voice Response Telemetry
08	Touch-Tone Access Up/Down

26 Touch-Tone Pad Test
27 User Mapped Control Op
28 Individual User Access Code

Control Operator Commands

NA	254	444	724	984	†Don't Answer Next Time
S1E	271	461	741	001	Enable Control From Serial Port 1
S1D	272	462	742	002	Disable Control From Serial Port 1
S2E	273	463	743	003	Enable Control From Serial Port 2
S2D	274	464	744	004	Disable Control From Serial Port 2
CCL	275	465	745	005	†Clear Command Log

Appendix I
Screen Examples

Computer terminal screen displays are shown below `in this font`. Commands entered by the user ***are in this font***. Each line entered by the user should be terminated by a carriage return. Commands may be entered in either upper or lower case after the prompt character >.

Menu

There are two forms of the menu available at any time when entering carriage return - the short form and the long form. The short form just says "de [the repeater callsign]". The long form includes additional information, and displays the commands available.

Each form of the menu includes your repeater callsign which you program with the T command, described in detail later.

This is the short form of the menu:

```
de [the repeater callsign]
>
```

In other words, with the repeater callsign having been loaded with the T command, the short menu might look like this:

```
de WA6AXX 440 Repeater
>
```

Note that before a callsign is loaded using the T CALL <callsign> command, as will be the case when you first fire up the Computer Interface, the short menu will look like this:

```
de
>
```

Program your repeater's callsign into the controller by entering the following command. Control must be enabled from the serial port (Touch-Tone command [COP prefix]271 for serial port 1, assuming Control Op root set #1). The T command will take several seconds to execute, since the text callsign is being programmed into your controller's E^2PROM.

```
>t call WA6AXX 440 Repeater

de WA6AXX 440 Repeater
>
```

The long form of the menu may be selected by entering the Short/Long Menu command, X. This is the long menu when control is *not* enabled from the serial port:

```
de WA6AXX 440 Repeater
>x
de WA6AXX 440 Repeater : Date 880830  Time 1356      1 active message(s)
Messages: L - List, S - Send, K - Kill
Files:    W - What, D - Download
Misc:     X - Short/Long menu, I - Information, H - Help

>
```

The date is given in yymmdd format, along with time in military format. The number of messages in the mailbox is indicated.

The List, Send and Kill commands relate to the electronic mailbox.

The What command causes the list of downloadable files to be displayed, and the Download command is used to download these files.

The Short/Long menu command toggles the menu form between the short and long form, as described above. The Information command causes a programmable text message to be displayed. The Help command displays on-line help messages about the various commands.

When control *is* enabled from the serial port (via the Enable Control From Serial Port command entered from a Touch-Tone channel), the long menu looks like this:

```
de    : Date 880830  Time 1347      1 active message(s)
Messages: L - List, S - Send, K - Kill
Files:    W - What, D - Download
Control:  C - Command entry, T - Text message entry
          P - Print a programmable message
          E - Edit a programmable message
          A - Autodial number print/load/erase
          F - Front Panel display
Misc:     X - Short/Long menu, I - Information, H - Help

>
```

The additional "Control" commands are available only when control is enabled from the serial port.

The Command entry command allows any Touch-Tone command to be entered from the terminal, with a text response message displayed on the terminal screen. The Text message entry command allows defining certain text messages associated with the BBS, including the repeater callsign, VRT channel descriptions, and others. The Print command allows any programmable message in the controller (IDs, tail messages, etc.) to be printed as text on the terminal display. The Edit command allows these messages to be edited by typing the words themselves rather than vocabulary codes. The Autodial command allows programming autodial

numbers from the terminal. The Front Panel command presents a display of the controller's front panel on the screen.

Toggle between the short and long form of the menu at any time by entering x. When the long form of the menu is selected, the Control commands are listed only when control is enabled from the serial port. If a control command is entered when control is not enabled, a message is sent indicating that control is not enabled.

```
de WA6AXX 440 Repeater
>x

de WA6AXX 440 Repeater : Date 880830  Time 1353      0 active message(s)
Messages: L - List, S - Send, K - Kill
Files:    W - What, D - Download
Misc:     X - Short/Long menu, I - Information, H - Help

>f
Control not enabled from this port.

de WA6AXX 440 Repeater : Date 880830  Time 1353      0 active message(s)
Messages: L - List, S - Send, K - Kill
Files:    W - What, D - Download
Misc:     X - Short/Long menu, I - Information, H - Help
>x

de WA6AXX 440 Repeater
>
```

Help

On-line help messages are available by typing H, or H and the letter representing the command that you'd like help with. HH gives help messages for all commands.

Below is the text of the Help file, printed here for your convenience. It may be displayed by typing HH, or by downloading the help file (D HELP.TXT).

```
>hh
(H)elp
Help on any command may be requested by entering 'Hx'.
Arguments [x] - [L]ist, [S]end, [K]ill, [W]hat, [D]ownload,
[C]ommand entry, [T]ext message entry,
[P]rint a progammable message, [E]dit a programmable message,
[A]utodial number print/load/erase,
[F]ront Panel display,
[X]Short/Long menu, [I]nformation, [H]elp All.

(L)ist
List mailbox messages in the repeater.  These mailbox messages
were entered either through the voice port or computer port.

(S)end
Send a mailbox message to the voice repeater.
```

```
Arguments - recipient callsign, sender callsign, message number.
Example:  For WA6AXX to send mailbox message number 2 to WB6KHP ...
  S WB6KHP WA6AXX 2.
The recipient and sender callsigns must be stored in the
controller's non-volatile memory by the repeater owner
to be recognized.  To see the available messages to be sent
[messages 0-9], download [D] MAILMSGS.TXT.

(K)ill
Kill mailbox messages destined for a user.
Argument - callsign of the user.
Example:  For WA6AXX to kill his mailbox messages ... K WA6AXX.

(W)hat
What repeater controller files are available for Download.
See Download.

(D)ownload a file FROM the repeater.
Argument - Name of file to download.
Example:  To download the meter reading file ... D METER.RDG.
See What.
File downloading may be frozen by entering <cntl>S and resumed
by entering <cntl>Q, and may be aborted by entering <cntl>P.

(C)ommand
Enter a Touch-Tone equivalent command from the keyboard.
Argument [x] - Touch-Tone digits.  The command is acted on by
the controller and the command response is sent to the terminal
as text.
Example:  Command User Function 1 high ... C 911

(T)ext message
Program a text message into the controller.
Arguments
 [x] - The name of the text message, including:
  MBM0-MBM9 - Text equivalent of mailbox messages
    (MBM0-2 15 chars, MBM3-8 23 chars, MBM9 31 chars)
  INFO1-INFO8 - Lines 1-8 of [I]nformation message (63 chars)
    (all lines must be programmed and will be displayed)
  VRT1-VRT16 - VRT channel description for METER.RDG (15 chars)
  CALL - Repeater callsign for menus and headings (19 chars)
  BATCH1-BATCH2 - Text sent by the controller on reset to
    initialize modem, etc. (15 chars)
 [y] - The text string, which should be limited to the
  number of characters indicated above.
Example:  To define VRT channel 15 as internal temperature ...
    T VRT15 internal temp.

(P)rint
Print a remotely programmable controller message by entering 'Px'.
Argument [x] - message name.  Download [D] MSGNAMES.TXT for the names
of messages stored in the controller.

(E)dit
Edit a remotely programmable controller message by entering 'Ex'.
Argument [x] - message name.  Download [D] MSGNAMES.TXT for the names
of messages stored in the controller.
```

```
The controller responds with a * prompt, rather than the normal > prompt.
At the *, type the words, letters and tokens which make up the programmable
message.  Download [D] WORDLIST.TXT for the words and tokens which are
recognized by the controller.  If the entire message does not fit on a
line, terminate the line with % to tell the controller that the message
continues on the next line.
Example:  To program the Special ID ...
>E SPID
*THISIS THE NUMBER 1 REPEATER IN THE AREA PAUSE W A 6 A X X %
*ON 2 TWENTY 4 POINT 6 8 MEGA HERTZ <MORSE> 7 3
>

(A)utodial number print/load/erase
Print, load, or erase Autodial numbers.
Print - A [x]      x=autodial slot 0-249
Load  - A [x][y]   x=autodial slot, y=telephone number
Erase - A E [x]    x=autodial slot 0-249
Example:  Load autodial slot 39 with 253-8085
>A E 39
Slot erased.
>A 39 2538085
>A 39
2538085
>

(F)ront Panel
Display the controller's front panel.
The display resembles the LED panel on the controller, and
is enhanced with some additional information.
See the manual for an explanation of the abbreviations used.

(X) Short/Long Menus
Toggle between short and long form of the menu.  The long
form includes Control commands only when control is enabled
from this port.

(I)nformation
Display "canned" informational message about the system loaded
by the system operator.
```

Mailbox

Electronic mailbox messages may be exchanged between the voice repeater channel and the serial ports. From the terminal, messages may be listed, sent, and killed using the L, S, and K commands. It isn't necessary to know the callsign slot numbers of the users, since entry and listings are based on callsigns - not slot numbers. The callsign slots must contain just the user callsign, without pager memories, sound effects, or other words.

The text of the message is displayed in the last column. The text is intended to be a parallel of the speech message stored in the canned mailbox messages 0-9. In order to allow the displayed text to be formatted and spelled properly, it is programmed independent of the speech message. Program the text equivalent of each mail speech message using the T

command. For example, if the mailbox message 3 is programmed as a synthesized speech message "c u tomorrow", program mailbox *text* message 3 as "See you tomorrow".

```
>l
Sorry, no messages.

de WA6AXX 440 Repeater
>s nu6p wa6axx 0
To          From       Date        Time      Message
NU6P        WA6AXX     TODAY       01:55pm   Pse call me.(0)

de WA6AXX 440 Repeater
>l
To          From       Date        Time      Message
NU6P        WA6AXX     TODAY       01:55pm   Pse call me.(0)

de WA6AXX 440 Repeater
>x

de WA6AXX 440 Repeater : Date 880830  Time 1356      1 active message(s)
Messages: L - List, S - Send, K - Kill
Files:    W - What, D - Download
Misc:     X - Short/Long menu, I - Information, H - Help
```

Downloading Files

Several files are available to be downloaded from the controller. The names of the files may be viewed with the What command.

```
de WA6AXX 440 Repeater
>w
ACTIVITY.RDG      AUTODIAL.TXT      CALLSIGN.TXT
COMMAND .LOG      E2PROM  .HEX      HELP    .TXT
MAILMSGS.TXT      METER   .RDG      MSGNAMES.TXT
MINMAX  .RDG      WORDLIST.TXT

de WA6AXX 440 Repeater
>
```

Descriptions of each downloadable file follow.

ACTIVITY.RDG - The readings of VRT channels 25-32.

```
>d activity.rdg
     REPEATER ACTIVITY READINGS - 880830  1350
Chnl Total   Description
------------------------
(25)  298     repeater receiver keyups (clear ch. 57)
(26)  108     minutes of repeater activity (clear ch. 58)
(27)    3     phone patches (clear ch. 59)
(28)    4     mailbox accesses (clear ch. 60)
(29)   29     command entries (clear ch. 61)
(31)    0     seconds of timed out period (clear ch. 63)
(32)    0     message(s) in the mailbox (clear ch. 64)
```

AUTODIAL.TXT - The Emergency and User Loadable autodial numbers. Empty autodial slots are not listed.

```
>d autodial.txt
EMERGENCY
(00)  0
(01)  5551212
(04)  411
(06)  611
(07)  8005551212
(08)  7678900
(09)  911
USER BANK 0
(20)  5552020
(40)  7273330
(41)  2538085
(42)  3582999
(43)  5551213
(44)  9761234
USER BANK 1
(01)  5551234
(02)  5552345
USER BANK 2
(01)  5553456
(02)  5554567
```

CALLSIGN.TXT - The callsigns stored in the controller for use with the reverse patch and mailbox. Empty callsign slots are not listed.

```
>d callsign.txt
(00)    <speech> W A 6 A X X
(01)    <speech> W B 6 K H P
(02)    <speech> N U 6 P
(03)    <speech> N 6 Q Y U
(38)    <speech> TRAIN SMOKE TEST EXPLOSION EXPLOSION EXPLOSION
(39)    <speech> N 6 H W L
(99)    <speech> N 6 P P Y

de WA6AXX 440 Repeater
>
```

COMMAND .LOG - The contents of the command log. The controller stores information about the commands entered from all ports. Only desired commands are logged, as specified by the Command Log Filter programming commands. The selective logging reduces the size of the file to be downloaded by only storing commands of interest. For example, it may be desirable to log Control Op commands, patches, and link activity but nothing else. Lock and unlock commands may be logged, but programming commands entered during an unlocked period cannot be logged.

Each entry of the command log contains the name of the command, the time entered (military time), the command channel it was entered through, and the digits following the command prefix.

The command names are abbreviated (i.e. COPA = Control Op over the air, HU = hang up or lock, PAP = primary autopatch, etc.). The command channels include RX (repeater receiver), L1-L4 (link channels), PH (phone), LM (local mic), S1-2 (serial ports 1 or 2), and A1-2 (auxiliary DTMF decoders 1 or 2). The arguments are the digits following the command prefix. For example, following a COP prefix, the argument would be the root code. Following an autopatch prefix, the argument would be the phone number. Following an emergency autodial, the argument would be the autodial location.

```
>d command.log
REPEATER COMMAND LOG - 880830  1352
Cmd  Time Ch Arguments
---------------------
***DATE000000***
***DATE880829***
UL   1527 A1
HU   1529 A1
HU   1529 A1
COPA 1732 A1 254
COPA 1732 A1 271
HU   1732 A1
COPA 1925 S1 187
COPA 1925 S1 120
COPA 1931 S1 054
COPA 1933 S1 130
***DATE880830***
COPA 1331 A1 254
HU   1331 A1
COPA 1335 RX 271
COPA 1337 S1 031
COPA 1345 A1 254
COPA 1345 A1 271
HU   1345 A1

de WA6AXX 440 Repeater
>
```

E2PROM **.HEX** – The contents of the E²PROM in Intel hex format. This file is intended to be used with an IBM PC compatible program to be available from ACC which will allow printout of complete Programming Sheets based on the contents of this file.

HELP **.TXT** – The entire Help file. See the Help section earlier in this manual for a complete listing.

MAILMSGS.TXT – The mailbox text messages, programmed with the T command, paralleling the stored speech mailbox messages 0 - 9.

```
>d mailmsgs.txt
Call me.(0)
Call me tonite.(1)
Call me at home.(2)
Call me at ...(3)
Cancel our meeting.(4)
See you at the meeting.(5)
(6)
(7)
(8)
The meeting tomorrow is at 9 pm.(9)

de WA6AXX 440 Repeater
>
```

METER **.RDG** – The current values of VRT channels 1-16. Text messages providing a description of each channel may be defined using the T command. Only those VRT channels which are assigned a meter type are displayed.

```
>d meter.rdg
     ANALOG METER READINGS - 880830  1351
Ch    Reading           Description
-------------------------------------
(1) S9+
(3)  15.6 Volts
(4)  North
(5)  31 Watts
(6)   7 Watts
(7)   1.9 Watts
(8)   3.1 Watts
(9)   7.6 Watts
(10) 100
(11)  15.9 Amps
(12)  15.9 Amps
(15) 115 degrees        int. temp.
(16)  13.5 Volts        int. volt.

de WA6AXX 440 Repeater
>
```

MSGNAMES.TXT – The names of the remotely programmable messages available to be printed using the Print a programmable message command. This is a "memory jogger" file, and specifies the exact name of the messages.

```
>d msgnames.txt
*** REMOTELY PROGRAMMABLE CONTROLLER MESSAGE NAMES ***
/IDs/ qst iid1...iid3,fid,aid,pid1,pid2,pida...pide,spid,ttid,pgid,phid
/TAIL MESSAGES/ tm1,tm2,tm3,tm40...tm49
/TIMEOUTs/ repeater time out,repeater time out cancel,time out alert
/COVER TONES (TT AND PATCH)/ ttct,pct
/EMERGENCY AUTODIAL/ ade0...ade9
/PATCH UP, PHONE ANSWER AND HANGUP/ ap up,adu up,phan,hang
/ANTIDIAL, RP CALL FOR/ anti,rpc4   /PHONE NUMBER MACROS/ ma mb mc
/PATCH DIALING PREFIXES (PRIM.,SEC.,TERT.)/ ppre,spre,tpre
/AREA CODES/ area code 1,area code j,area code p1...area code p3
/UF OUTPUTS/ uf1 high...uf8 high,uf1 low...uf8 low,ufb1,ufb2
/COURTESY TONES/ ct1 ... ct13
/LINK/RB NAMES/ l1...14
/LINK/RB FREQ. PREFIXES/ remote 1p,remote 2p
/LINK 1 AND 2 MEMORY NAMES/ l1n1 ... l1n7,12n1 ... l2n7
/LEADING 1 OVERRIDE/ ld over
/MAILBOX MESSAGES/ mbm0...mbm9      /MAIL PRESENT MESSAGE/ mail
/BULLETIN BOARD MESSAGES/ b1...b5   /DEMO TAG/ demo
/PAGER PROMPT/ ppro                 /ALARM/ al1...al4
/GENERIC COP RESPONSE/ copr         /MESSAGE MACROS/ m1...m4
/TOUCH-TONE PAD TEST RESPONSES/ pad
/SCHEDULER CHANGEOVER, EVENT MESSAGES/ changeover,e1...e5

de WA6AXX 440 Repeater
>
```

MINMAX .RDG – The stored min and max readings of VRT channels1-16.

```
>d minmax.rdg
  ANALOG METER MIN/MAX READINGS - 880830  1351
Ch    Max Reading     Date/Time        Min Reading     Date/Time
-------------------------------------------------------------------
(1) S9+               0000 880101      S9+               0400 880823
(3)  15.9 Volts       0000 880101        7.4 Volts       0002 880101
(4)  North            0000 880101       South            0002 880101
(5)  31 Watts         0000 880101        5 Watts         0002 880101
(6)   7 Watts         0000 880101        0 Watts         0002 880101
(7)   1.9 Watts       0000 880101        0.9 Watts       0730 880824
(8)   3.9 Watts       0000 880101        2.0 Watts       0400 880823
(9)   7.9 Watts       0000 880101        4.3 Watts       0730 880824
(10) 100              0000 880101       97               0730 880829
(11)  15.9 Amps       0000 880101       12.7 Amps        0830 880829
(12)  15.9 Amps       0000 880101       13.2 Amps        0730 880824
(15) 118 degrees      1421 880825       66 degrees       0436 880824
(16)  13.7 Volts      0040 880101       12.7 Volts       1749 880823
```

WORDLIST.TXT - The list of synthesized speech vocabulary words available to be used with the Edit programmable messages command.

```
>d wordlist.txt
*RTVS* (TIME) (DATE) (AM/PM) (M/A/E) (MAILPRESENT)
*MACROS* MACRO1 MACRO2 MACRO3 MACRO4
*TYPES* <SPEECH> <MORSE> <DVR> <VRT> <PAGER> <EXT>
*MALE NUMBERS* 0 OH 1 2 3 4 5 6 7 8 9 10 11 12 13 20 THIR-
-TEEN FIF- -TY HUNDRED THOUSAND MILLION FIRST SECOND THIRD FOURTH
*FEMALE NUMBERS* 0/F OH/F 1/F 2/F 3/F 4/F 5/F 6/F 7/F 8/F 9/F
10/F 11/F 12/F 13/F 14/F 15/F 16/F 17/F 18/F 19/F 20/F 30/F
40/F 50/F
*A* A.M. A.M./F ABORT ABOUT ABOVE ACKNOWLEDGE ACTION ADJUST ADVANCED
ADVISE AERIAL AFFIRMATIVE AFTERNOON/F AIR AIRPORT ALERT ALL ALOFT
ALPHA ALTERNATE ALTIMETER ALTITUDE AMATEUR AMPS AND ANSWER APRIL
ARE AREA ARRIVAL AS AT AUGUST AUTO AUTOMATIC AUTOPILOT AUXILIARY
*B* BAND BANK BASE BATTERY BE BEE BELOW BETWEEN BLOWING BOARD BOOST
BOZO BRAKE BRAVO BREAK BROKEN BUTTON BY
*C* CABIN CALIBRATE CALL CALLING CALM CANCEL CAUTION CEILING CENTER
CHANGE CHARLIE CHECK CIRCUIT CLEAR CLIMB CLOCK CLOSED CLUB CODE COME
COMPLETE COMPUTER CONDITION CONGRATULATIONS CONNECT CONTACT CONTROL
CONVERGING COUNT COURSE CRANE CROSSWIND CROWD CURRENT CYCLE
*D* DANGER DAYS DAYTON DAZE DECEMBER DECREASE DECREASING DEGREES DELTA
DEPARTURE DEVICE DIAL DINNER DIRECTION DISPLAY DOOR DOWN DOWNWIND DRIVE
DRIZZLE DUST
*E* EAST ECHO -ED EIGHT EIGHT/F EIGHTEEN/F ELECTRICIAN ELEVATION ELEVEN
ELEVEN/F EMERGENCY ENGINE ENTER EQUAL -ER ERROR ESTIMATED EVACUATE
EVACUATION EVENING/F EXIT EXPECT EXPLOSION EYE
*F* FAIL FAILURE FARAD FARENHEIT FAST FEBRUARY FEET FIFTEEN/F FIFTY/F
FILED FINAL FIRE FIRST FIVE FIVE/F FLAPS FLIGHT FLOW FOG FOR FORTY/F
FOUR FOUR/F FOURTEEN/F FOURTH FOXTROT FREEDOM FREEZING FREQUENCY FRIDAY
FROM FRONT FULL
*G* GALLONS GATE GAUGE GEAR GEE GET GLIDE GO GOLF GOOD/F GREEN GROUND
GUSTINGTO
*H* HAIL HALF HAM HAMFEST HAMVENTION HAVE HAZARDOUS HAZE HEAVY HELP HENRY
HERTZ HIGH HOLD HOME HOTEL HOUR HOURS HUNDRED
*I* ICE ICING IDENTIFY IGNITE IGNITION IMMEDIATELY IN INBOUND INCH
INCREASE INCREASINGTO INDIA INDICATED INFLIGHT INFORMATION -ING INNER
INSPECTOR INTRUDER IS IS/F IT
*J* JANUARY JULIET JULY JUNE
*K* KEY KILO KNOTS
*L* LAND LANDING LASER LATE LAUNCH LEAN LEFT LEG LESSTHAN LEVEL LIGHT
LIMA LINE LINK LIST LOCK LONG LOOK LOW LOWER LUNCH
*M* MACHINE MAINTAIN MANUAL MARCH MARKER MAY MAYDAY ME MEAN MEASURE MEETING
MEGA MESSAGES METER MICRO MIKE MILES MILL MILLI MILLION MINUS MINUTES MIST
MOBILE MODERATE MONDAY MONTH MORETHAN MORNING/F MOTOR MOVE MUCH
*N* NEAR NEGATIVE NET NEW NEXT NIGHT NINE NINE/F NINETEEN/F NO NORTH NOT
NOVEMBER NUMBER
*O* OBSCURED OCLOCK OCLOCK/F OCTOBER OF OFF OH OH/F OHIO OHMS OIL ON ONE
ONE/F OPEN OPERATION OPERATOR OSCAR OTHER OUT OUTER OVER OVERCAST
*P* P.M. P.M./F PAPA PARTIALLY PASS PASSED PATCH PATH PAUSE PER PERCENT
PHASER PHONE PICO PLEASE PLUS POINT POLICE POSITION POWER PRACTICE PRESS
PRESSURE PRIVATE PROBE PROGRAMMING PULL PUSH
*Q* QUEBEC
*R* RADIO RAIN RAISE RANGE RATE READY REAR RECEIVE RED RELEASE REMARK
```

```
REMOTE REPAIR REPEAT REPEATER RICH RIG RIGHT ROAD RODE ROGER ROMEO
ROUTE RUNWAY
*S* -S SAFE SAND SANTACLARA SATURDAY SCATTERED SECOND SECONDS SECURITY
SEE SELECT SEPTEMBER SEQUENCE SERVICE SET SEVEN SEVEN/F SEVENTEEN/F
SEVERE SEXY SHORT SHOWERS SHUT SIDE SIERRA SIGHT SIX SIX/F SIXTEEN/F
SLEET SLOPE SLOW SMOKE SNOW SOUTH SPEED SPRAY SQUAWK STALL START STOP
STORM SUNDAY SWITCH SYSTEM
*T* TANGO TANK TARGET TAXI -TEEN TELEPHONE TEMPERATURE TEN TEN/F
TERMINAL TEST -TH THANKYOU THAT THE THE(LONGE) THE(SHORTE) THE/F THIR-
THIRD THIRTEEN THIRTEEN/F THIRTY/F THIS THISIS THOUSAND THREE THREE/F
THUNDERSTORMS THURSDAY TIC TIME TIME/F TIMER TO TOC TODAY TOMORROW
TONIGHT TOO TOOL TORNADO TOUCHDOWN TOWER TRAFFIC TRAIN TRANSMIT TRIM
TRUE TUESDAY TURBULANCE TURN TWELVE TWELVE/F TWENTY TWENTY/F TWO TWO/F
*U* UNDER UNIFORM UNIT UNLIMITED UNTIL UP USE(NOUN) USE(VERB)
*V* VALLEY VALVE VARIABLE VERIFY VICTOR VISIBILITY VOLT
*W* WAIT WAKE WAKEUP WARNING WATCH WATTS WAY WEATHER WEDNESDAY WELCOME
WEST WHISKEY WHISTLE WHY WILL WIND WITH WON WRITE WRONG
*X* X-RAY
*Y* YANKEE YELLOW YESTERDAY YOU YOUR
*Z* ZED ZERO ZONE ZULU
*CUSTOM* CUSTOM1 CUSTOM2 CUSTOM3 CUSTOM4
*MORSE PUNCTUATION* SPACE - / : ? ; , AR AS SK

de WA6AXX 440 Repeater
>
```

Information

The repeater owner may create an 8 line message providing information about the repeater system, or serving any other purpose desired. Entering the I command causes this message to be displayed. All 8 lines of the message must be programmed with the T command. Blank lines must be programmed as well, with at least 2 spaces.

```
de WA6AXX 440 Repeater
>i
Welcome to the WA6AXX 440 Repeater, with its voice channel on
440.025 MHz (output).  The repeater is co-located with WB6KHP
Repeater on 224.14 MHz in the east foothills of San Jose.

Both repeaters are open, with autopatch facilities
available.  Contact Dave, WB6KHP for codes.

Enjoy using the repeaters.   73
```

This message would be programmed as follows, with control enabled from the serial port.

```
>t info1 Welcome to the WA6AXX 440 Repeater, with its voice channel on

de WA6AXX 440 Repeater
>t info2 440.025 MHz (output).  The repeater is co-located with WB6KHP

de WA6AXX 440 Repeater
>t info3 Repeater on 224.14 MHz in the east foothills of San Jose.
```

```
de WA6AXX 440 Repeater
>t info4  [at least 2 spaces]

de WA6AXX 440 Repeater
>
      etc.
```

Command Entry

Any Touch-Tone command may be entered through the terminal using the C command followed by the Touch-Tone equivalent, when control is enabled from the port. The controller responds with a text equivalent of the speech response message. Remember to enter the C, then the entire Touch-Tone command. User level and Control Operator commands may be entered.

```
de WA6AXX 440 Repeater
>c 73
Command executing ...
<speech> 2 METER -S OFF
de WA6AXX 440 Repeater
>c 815
Command executing ...
<speech> 1 HUNDRED FIF- -TEEN DEGREES
de WA6AXX 440 Repeater
>c 123031
Command executing ...
<speech> REPEATER E
de WA6AXX 440 Repeater
```

The controller may also be unlocked and Programming commands may be entered. Remember to preceed all Touch-Tone commands with the C command, and to lock the controller with "C #" when you're done.

Text Message Entry

Several terminal screen text messages may be programmed by the repeater owner. These include the repeater callsign, VRT channel descriptions, mailbox messages, the information message, and text messages directed to a modem for initialization. Each message is allowed up to a maximum number of characters, specified in the Help file. Programming the information message using the T command was illustrated earlier in this manual. Several other examples are shown below.

```
>t vrt15 int. temp.

de WA6AXX 440 Repeater
>t batch1 AT S0=3

de WA6AXX 440 Repeater
>t call WA6AXX Repeater

de WA6AXX Repeater
```

Print A Programmable Message

Any of the controller's programmable messages (IDs, tail messages, etc.) may be viewed using the P command. The list of message names may be viewed to jog your memory by downloading the MSGNAMES.TXT file (D MSGNAMES.TXT). Stored user callsigns can be viewed by entering P CALL [00-99]. For example, to view callsign 15, enter P CALL 15.

Female speech words are appended with /F. Run time variables are enclosed in parentheses (). Messages can consist of combinations of <speech>, <morse>, <pager> (pager memories), <dtmf> (Touch-Tone sequences), <dvr> (DVR tracks), and <ext> (external devices).

```
de WA6AXX 440 Repeater
>p aid
<morse> W A 6 A X X / R

de WA6AXX 440 Repeater
>p pid1
<speech> PAUSE THISIS W A 6 A X X REPEATER

>p spid
<speech> GOOD/F (M/A/E) PAUSE THISIS <speech> W A 6 A
X X REPEATER PAUSE <morse> S C V

de WA6AXX 440 Repeater
>
```

Edit a Programmable Message

Any of the controller's programmable messages (IDs, tail messages, etc.) may be edited using the E command. The controller then prompts with an asterisk (*) rather than the greater-than (>) symbol. Type the words and letters which make up the message directly. A message is assumed to begin as speech unless another type is specified. If the entire message cannot fit on one line, type a percent (%) following the last word on the line. *Include a space between the last word on the line and the %.* The controller will then again prompt with *, allowing you to continue entering the message. When you terminate a line without the %, the message is converted to tokens and is written into the controller's non-volatile memory. This process will take several seconds. The message will then be printed as it was loaded into memory (identical to using the P command).

The list of message names may be viewed to jog your memory by downloading the MSGNAMES.TXT file (D MSGNAMES.TXT). The list of synthesized speech words, Morse code punctuation, change type tokens, etc. may be viewed by downloading the WORDLIST.TXT file. Stored user callsigns can be edited by entering E CALL [00-99]. For example, to edit callsign 15, enter E CALL 15.

Female speech words are appended with /F. Run time variables are enclosed in parentheses (). Messages can consist of combinations of <speech>, <morse>, <pager> (pager memories), <dvr> (DVR tracks), and <ext> (external devices). DTMF sequences cannot be included in messages using the E command.

```
de WA6AXX 440 Repeater
>e fid
*<morse> d e space w a 6 a x x / r
<morse> D E SPACE W A 6 A X X / R

de WA6AXX 440 Repeater
>e spid
*thisis the number 1 two twenty repeater n the santaclara &
*valley pause w a 6 a x x pause 2 twenty 4 point 68 mega hertz
<speech> THISIS THE NUMBER 1 2 20 REPEATER N THE SANTACLARA
VALLEY PAUSE W A 6 A X X PAUSE 2 20 4 POINT 6 8 MEGA HERTZ

de WA6AXX 440 Repeater
>e uf4 low
*low power
<speech> LOW POWER

de WA6AXX 440 Repeater
>e call 01
*k 8 j w
<speech> K 8 J W

de WA6AXX 440 Repeater
>
```

Autodial Number Print/Load/Erase

Autodial numbers stored in the controller may be viewed, loaded and erased using the A command. The A followed by a number 0-249 will cause the controller to display the telephone number stored in that slot, or a message "Slot is empty". A, E and the slot number will cause the slot to be erased. A, the slot number, and a telephone number will cause the telephone number to be loaded into the slot, unless there is already a number present, in which case the message "Slot not empty" will be present. A new number may only be entered into an empty slot. Erase the slot before writing a new number.

```
de WA6AXX Repeater
>a 40
2538085

de WA6AXX Repeater
>a e 40

de WA6AXX Repeater
>a 40 9870229
```

```
de WA6AXX Repeater
>a 40
9870229

de WA6AXX Repeater
>
```

Front Panel Display

An enhanced replica of the controller's LED front panel may be displayed on the terminal screen by typing F. Control must be enabled from the serial port to view the front panel.

```
de WA6AXX 440 Repeater
>f
          *** WA6AXX 440 Repeater 'FRONT PANEL' DISPLAY ***
_STATUS_              _CONTROL_            _AUDIO_              _I/O_
E  ENABLE             INPUTS               XMTR                 OUTPUTS
A  ACCESS MODE          COS                - RCVR               UF1
D  TT ACCESS            COS/LINK1          - LINK1              - UF2
   IDENT              - COS/LINK2            LINK2              UF3
   KERCH                COS/LINK3            LINK3/SP1          UF4
E  PRIM AP              COS/LINK4            LINK4/CR           UF5
E  SEC  AP              COS/CR               SPEECH/LM          UF6
E  TERT AP              PL                   PHONE              UF7
E  PRIM EAD             USER PL              TONE               UF8
E  SEC  EAD             PHONE RING         PHONE
L  UAD BANK0          OUTPUTS                RCVR               INPUTS
L  UAD BANK1            PTT                  SPEECH             UT1
L  UAD BANK2            PTT/LINK1            TONE               UT2
R  LINK1                PTT/LINK2                               UT3
E  LINK2                PTT/LINK3          L2  DTMF CHANNEL     AL1
E  LINK3                PTT/LINK4          ON  MACRO SET        AL2
E  LINK4              - PWR AMP            6.520S L1 FREQ     - PHBZ
L  LOCK                 PHONE OFFHK        0.000- L2 FREQ

de WA6AXX 440 Repeater
>
```

Under the Status column, the following abbreviations apply:

ENABLE
- E = Enabled
- T = Timed out
- D = Disabled

ACCESS MODE A-K

TT ACCESS
- E = Enabled but down
- U = Enabled and up
- D = Disabled

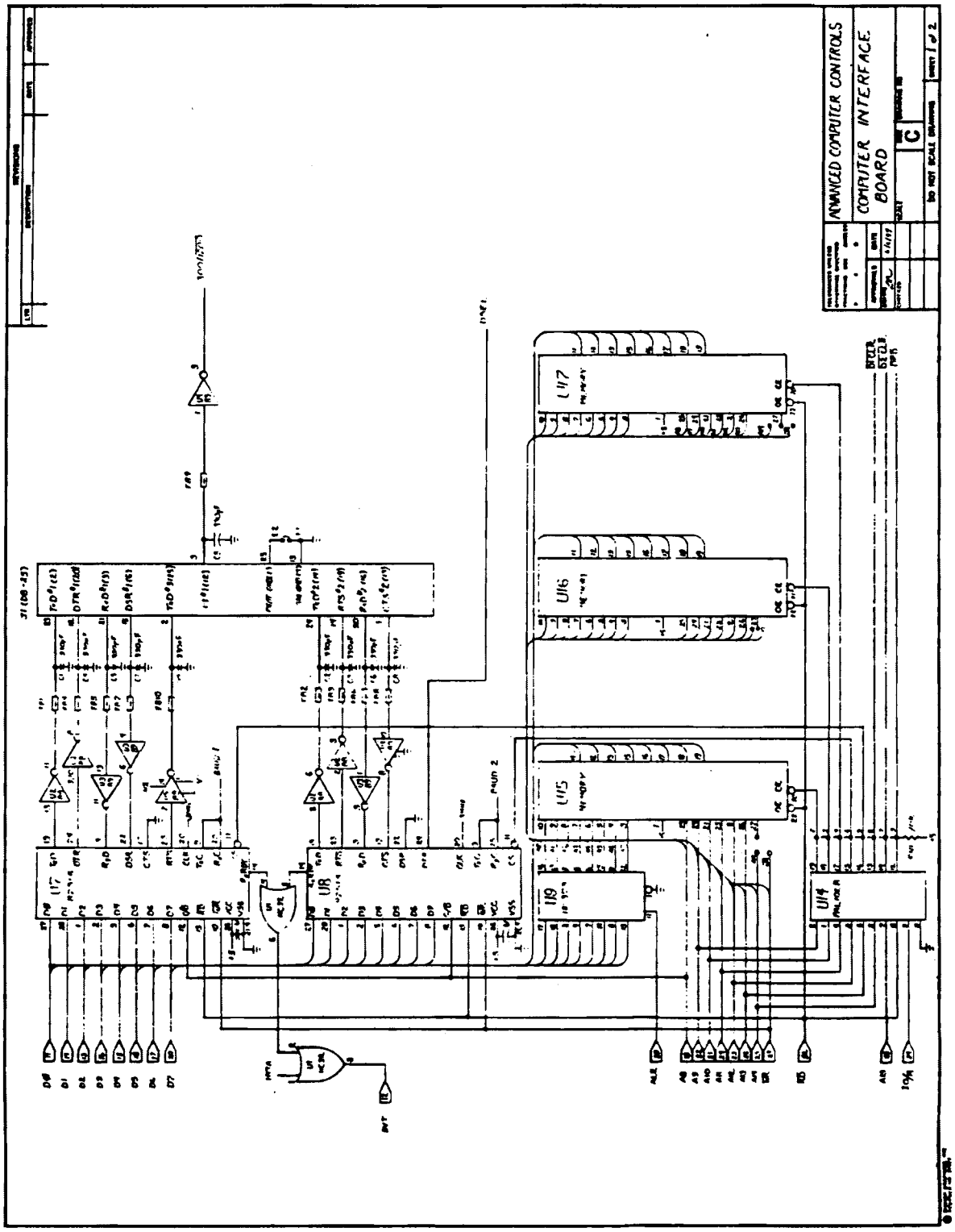
IDENT
- R = ID required
- A = Anxious ID waiting
- P = Pending ID waiting

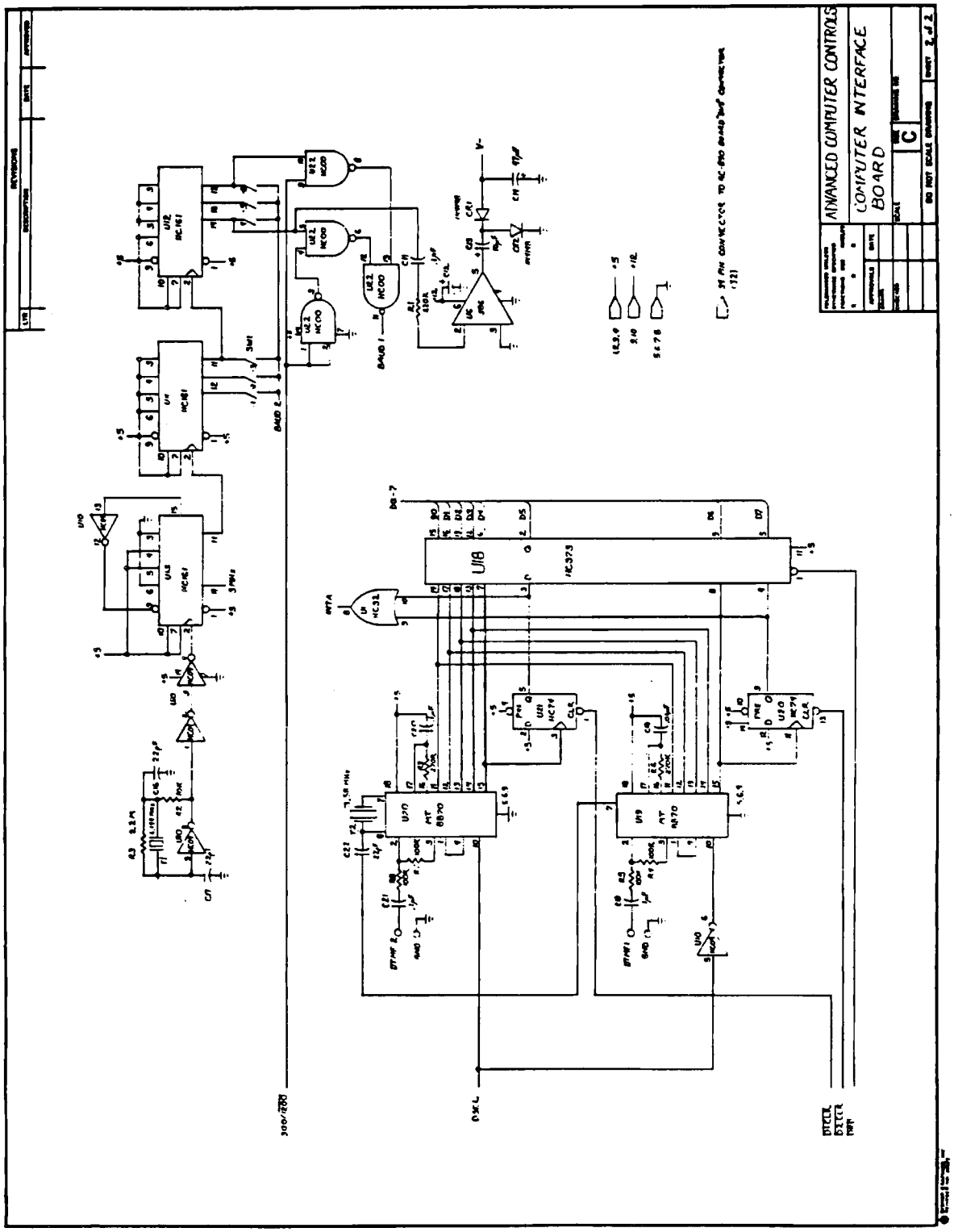
KERCH
- K = has been Kerchunked in the last few seconds

APs	U = In use
	L = Enabled and long distance enabled
	E = Enabled but long distance disabled
	D = Disabled
EADs	U = In use
	E = Enabled
	D = Disabled
UADs	U = In use
	L = Enabled and locked
	E = Enabled and unlocked, available for load/erase
	D = Disabled
LINKs	E = Enabled but off
	R = On in Receive only
	T = On in Receive/Transmit
	D = Disabled
LOCK	U = Unlocked
	L = Locked

Under the other columns, a "–" indicates that the input or output is active, resembling the LED front panel display. The shared DTMF decoder channel is indicated (RX, L1-L4, PH, LM). The currently selected macro set 0-9, and scheduler on/off status is indicated. For example, "0N" indicates macro set 0, with the scheduler turned on. The currently selected link frequencies are also indicated.

Appendix II
Schematic




ADVANCED COMPUTER CONTROLS
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