PROTOCOL O.T.P.

SERIAL PORT COMMS- PROCONM

WYSE 100
TRANSLATE TABLE
01 = 125 = }
02 = 123 = {
04 = 124 = |
13 = 0D = ↵ = 125

7 DATA BITS
ODD PARITY
1 START 1 STOP BIT
300 BAUD

SKANTI

TRP8000

REMOTE CONTROL

DSC READOUT

MESSAGE INTERVAL

COMMUNICATION PROTOCOL

HOST/CU8000T <-> CU8000R

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Doc. no. 993 649 81
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1. TABLE OF CONTENTS.

2. GENERAL INFORMATION.

The present manual contains a detailed description of the software structure and behavior associated with the remote controlled versions of TRP8000.

2.1. NOTICE.

Due to the constant processing of the experience gained during production and operation of our equipment, minor modifications may occur relative to the information given in this manual. Whenever practicable updates and new issues of the manual will be released. Thus, it is advisable to make sure that this manual corresponds to the actual equipment in question.

The contents of this manual corresponds to the CU8000R software version 80.0 when configured to "remote control enabled" by programming address FEDh in the Configuration PROM to 00h.

SKANTI shall not be held responsible for any errors in this manual and reserves the right to update and renew it without notification.

2.2. SCOPE.

This manual is intended for use by the designers of host computers and similar devices for supervision and control of one or more equipments via CU8000R. Further more, some references are made to CU8000T for explanatory reasons.

3. ISO/OSI STRUCTURE.

Structure defined according to ISO's Open Systems Interconnection (OSI) standard :

3.1. APPLICATION LAYER.

The information to be communicated falls into 3 different groups -

1. Operational commands using the syntax available via the CU8000 keyboard.
2. Operational commands using special remote syntax.
3. System status reports.

CU8000 displays all information as if it was entered manually.

3.2. PRESENTATION LAYER.

Even though all keys on the CU8000 keyboard have a specific communication code, some key functions perform toggle operations (i.e. RF AMP) and are therefore supplemented with direct function codes. Communication between 2 CU8000s uses these codes and will further more substitute the RECALL syntax for an equivalent RX-TX-MODE sequence.

Operations like STOre, SET TIME, SPEAKER, SQUELCH etc. are local. Thus, the CU8000T will execute the manually entered local commands, but it will not repeat them to the CU8000R.

3.3. SESSION LAYER.

All information are transmitted and error checked one character at a time to eliminate long repetitions on bad connections.

3.4. TRANSPORT LAYER.

When ever CU8000R receives an information from the remote data link it will exclude all local keyboard operations for at least 5 seconds, and thereby establish a remote priority which may be kept alive by the periodical transmission of an arbitrarily chosen command (e.g. ENTER or BEL).

3.5. NETWORK LAYER.

CU8000R supports a multiplexed connection by means of the SOH, STX, ETX and DLE commands.

3.6. DATA LINK LAYER.

7 data bits coded according to ASCII. Communication is performed by means of messages each consisting of a sequence of characters, which may be broken down into 3 consecutive groups -

1. A nonnumeric command field indicating the function in question.
2. A numeric parameter field giving the value associated with the command.

3. A delimiter (Carriage Return) to indicate end of parameter field or pseudo operation. The delimiter is not required for single character commands such as "AGC ON".

Each received character is error checked with respect to parity and framing, which will result in the transmission of either ACKnowledge to identify no errors detected or NegativeAcKnowledge to identify one or more errors detected. The later situation requires retransmission of the faulty character, since there is no error correction mechanism in the system. The data receiving unit will not transmit new data between the time it issues the first ACK character and the time this or a repeated ACK (if NAK is received) has been accepted by the data transmitting unit. Acceptance of an ACK character is definitive when no NAK character has been received for 100 milliseconds after the stop bit of the ACK character has been transmitted.

3.7. PHYSICAL LINK LAYER.

RS232C serial interface.
Asynchronous mode.
300 or 2400 baud.
1 start bit.
7 data bits.
1 parity bit - odd.
1 stop bit.

4. COMMUNICATIONS CODES & SYNTAXES.

This section describes all valid communications codes. Other codes will be acknowledged but neglected. All standard operational keyboard syntaxes are available as described in the standard manuals. All additional syntaxes are described below.

Terms defined for this section :

Command : Single code transmitted to CU8000R.
Message : Single code transmitted by CU8000R.
Parameter : One or more codes transmitted to CU8000R.
Response : One or more codes transmitted by CU8000R on request.

4.1. COMMUNICATIONS HANDLING.

List format :

[hexadecimal code] [ASCII character] [description]

4.1.1. COMMANDS.

01 SOH ENABLE LINK. After power-on, reset or the DLE command/ message has been issued, SOH is used to enable transmission (incl. ACK and NAK) and further reception. Subsequent to SOH only DLE and STX are executable.

02 STX ENABLE COMMANDS. After the link has been enabled by SOH or commands have been disabled by ETX, STX is used to enable execution of other commands than DLE and STX (plus ACK and NAK if following an ETX).

03 ETX DISABLE COMMANDS. Subsequent commands will have no effect with the exceptions of ACK, DLE, NAK, and STX.

04 EOT END OF TRANSMISSION. The priority timer internal to CU8000R will be cleared. Thus, the remote priority is lost immediately instead of after the usual 5 seconds time out. Both the link and command execution remain enabled except if the priority change generates a reset (ref. 5.1.3).

06 ACK ACKNOWLEDGE LAST CODE. An error free character has been received. This command is used every time a character is received other than ACK and NAK to enable further transmission.

10 DLE DISABLE LINK. Transmission will immediately be limited to ACK and executable commands limited to ACK and NAK until the acknowledge procedure is completed. Then all buffers will be flushed and the link brought to the state prior to SOH.

15 NAK NEGATIVE ACKNOWLEDGE LAST CODE. An erroneous character has been received and neglected. The last character will be retransmitted unless it already has been acknowledged, in which case ACK will be transmitted as default.

18 CAN CANCEL STATUS RESPONSE. Used instead of ACK to acknowledge a received status response code (ref. 4.5.2) and terminate the response readout. Even though it replaces an ACK command, CAN will be acknowledged by CU8000R with ACK.

4.1.2. MESSAGES.

06 ACK ACKNOWLEDGE LAST CODE. An error free character different from ACK and NAK has been received.

10 DLE DISABLE LINK. CU8000R and TU8000 are resetting due to priority switching, end of selftest or fatal error. The remote link will be closed for further receptions in a periode of approximatly 3 seconds and will then have to be reenabled together with the command use.

15 NAK NEGATIVE ACKNOWLEDGE LAST CODE. An erroneous character has been received and neglected because of transmission error or lack of buffer capacity.

4.2. CU8000 KEYBOARD COMPATIBLE COMMANDS.

The following codes represents the keyboard of CU8000 and may be used to implement remote control with the exact same syntax as described for the normal keyboard operation (ref. TRP8### TECHNICAL MANUAL).

Each group represents all the keys in one of the graphically isolated areas of the keyboard layout.

Each key is listed in the format :

[hexadecimal code] [ASCII character] [key label] [remarks]

4.2.1. MAIN GROUP.

0D	CR	ENTER
30	0	0
31	1	1
32	2	2
33	3	3
34	4	4
35	5	5
36	6	6
37	7	7
38	8	8
39	9	9
3A	:	RX
3B	;	TX
3C	<	RCL

4.2.2. RECEIVER GROUP.

3D	=	TUNE DOWN	
3E	>	TUNE UP	
3F	?	TUNE RATE	
40	@	BFO DOWN	(response described in 4.6.1.)
41	A	BFO UP	(response described in 4.6.1.)

42	B	WIDE
43	C	INTERMEDIATE
44	D	NARROW
45	E	VERY NARROW
46	F	SPEAKER
47	G	RF AMP
48	H	ANT ATT
49	I	SQUELCH
4A	J	AGC ON
4B	K	AGC FAST
4C	L	AGC SLOW
4D	M	AGC OFF
4E	N	SENSITIVITY DOWN
4F	O	SENSITIVITY UP
50	P	VOLUME DOWN
51	Q	VOLUME UP

4.2.3. TRANSMITTER GROUP.

52	R	TX TUNE (response described in 4.6.2.)
53	S	LOW POWER
54	T	LOW POWER & MEDIUM POWER (double key for 750 watts only)
55	U	MEDIUM POWER
56	V	MEDIUM POWER & FULL POWER (double key for 750 watts only)
57	W	FULL POWER

4.2.4. MODE GROUP.

58	X	USB
59	Y	LSB
5A	Z	AM
5B	[	TELEX
5C	\	R3E
5D	]	CW
5E	^	MCW

4.2.5. FÁST SELECT GROUP.

5F	_	2182 (the speaker will not be switched on)
60	`	500 (the speaker will not be switched on)

4.2.6. ALARM GENERATOR GROUP.

61	a	TEST ALARM (left key & STOP ALARM pressed simultaneously - the speaker will not be switched on)
62	b	STOP ALARM
63	c	SEND ALARM (left & right keys pressed simultaneously - the speaker will not be switched on)

4.2.7. MISCELLANEOUS GROUP.

64	d	STO
65	e	SCAN
66	f	SET TIME
67	g	DUPLEX
68	h	DIMMER DOWN
69	i	DIMMER UP
6A	j	TX ON/OFF

4.3. CU8000 KEYBOARD SUPPLEMENTARY COMMANDS.

Those keys having status-relative functions are supplemented with absolute function commands listed below.

4.3.1. SINGLE CHARACTER COMMANDS.

Each command is listed in the format :

[hexadecimal code] [ASCII character] [function label]

6B	k	SWITCH SPEAKER ON
6C	l	SWITCH SPEAKER OFF
6D	m	SWITCH RF AMPLIFIER ON
6E	n	SWITCH RF AMPLIFIER OFF
6F	o	SWITCH ANTENNA ATTENUATOR ON
70	p	SWITCH ANTENNA ATTENUATOR OFF
71	q	SWITCH SQUELCH ON
72	r	SWITCH SQUELCH OFF
73	s	SWITCH DUPLEX ON
74	t	SWITCH DUPLEX OFF
75	u	SWITCH TX ON
76	v	SWITCH TX OFF

4.3.2. MULTIPLE CHARACTER COMMANDS.

List format :

[description]

Command : [hexadecimal code] [ASCII character]
Parameter : [decimal range] [translation]
Delimiter : [hexadecimal code] [ASCII character]

The parameters are numerical values expressed in decimal and communicated using ASCII coded numbers and signs. The sign may be omitted for values greater than or equal to zero.

The valid parameter ranges include the limits.

4.3.2.1. SET TUNE RATE.

Command : 77 w
Parameter : 0 - 3 Translation : 0 = 10 Hz/step
1 = 100 Hz/step
2 = 1 kHz/step
3 = programmable

Delimiter : 0D CR

4.3.2.2. SET BFO FREQUENCY.

Command : 78 x
Parameter : -30 - 30 Translation : Direct signed BFO frequency in 100 Hz resolution.

Delimiter : 0D CR

4.3.2.3. SET VOLUME ATTENUATION.

```
Command   :  79  y
Parameter :  0 - 99     Translation : Logarithmic scale
                                      0 = -68 dB
                                      99 = 0 dB
Delimiter :  0D  CR
```

4.3.2.4. SET DIMMER LEVEL.

```
Command   :  7A  z
Parameter :  0 - 5      Translation : Logarithmic scale
                                      0 = no light
                                      5 = full light
Delimiter :  0D  CR
```

4.3.2.5. SET OPTION REGISTER.

```
Command   :  7B  {
Parameter :  0 - 255    Translation : The value of the register
                                      considered as a byte.
Delimiter :  0D  CR
```

4.3.2.6. SET PRESET REGISTER.

```
Command   :  7C  |
Parameter :  0 - 255    Translation : The value of the register
                                      considered as a byte.
Delimiter :  0D  CR
```

4.3.2.7. SET GUARD REGISTER.

```
Command   :  7D  }
Parameter :  0 - 255    Translation : The value of the register
                                      considered as a byte.
Delimiter :  0D  CR
```

4.4. ADDITIONAL COMMANDS.

The following commands are related to functions available for the remote control versions of CU8000 only and are therefore not described in the standard manuals.

4.4.1. SINGLE CHARACTER COMMANDS.

Each command is listed in the format :

[hexadecimal code] [ASCII character] [function label] [remarks]

07	BEL	BEEP	
21	!	RESET SYSTEM	Irrespective of the syntax state.
22	"	KEY TRANSMITTER	Transparent to the syntax state. The transmitter will be keyed automatically whenever CU8000R enables keying if the transmitter mode is either AM, LSB, RSE, USB or (if PRESET bit 0 = 0) TELEX.

23	#	UNKEY TRANSMITTER	Transparent to the syntax state. The transmitter will be unkeyed when ever the mode is either AM, LSB, R3E, USB, or (if PRESET bit 0 = 0) TELEX.

4.4.2. MULTIPLE CHARACTER COMMANDS.

List format :

[description]

Command : [hexadecimal code] [ASCII character]
Parameter : [description]
Delimiter : [hexadecimal code] [ASCII character]

4.4.2.1. FILL TU8000 SCAN BUFFER.

To minimize frequency shift times during scanning, TU8000 contains a frequency pair buffer which is accessible using short commands to direct an internal pointer. To scan frequencies not stored in CU8000R this buffer may be filled using the following syntax.

Command : 24 $
Parameter : One or more frequency pairs (receiver first) using the normal CU8000 keyboard compatible syntax, without the terminating ENTER.
Delimiter : 0D CR

4.4.2.2. SCAN FREQUENCIES IN TU8000 SCAN BUFFER.

Frequencies stored in the TU8000 scan buffer (ref.4.4.2.1) will be used in sequence by the TU8000 when CU8000R receives the syntax below.

During execution of the syntax from the reception of the first parameter code, CU8000R enables keying, lifts receiver muting and displays a "c" in both the RX and TX displays unless the frequency display parameter is used.

At the end of the syntax CU8000R restores according to the latest received RX and TX frequencies (display parameters included), but it will not update the TU8000 until it is required by another command or if the remote priority stops.

If no parameters are used (a single command immediately followed by the delimiter) the internal TU8000 scan buffer pointer (ref. 4.4.2.1) will be reset to the first frequency pair.

Command : 25 %
Parameter : Each time the command code is repeated the TU8000 will advance the internal scan buffer pointer to the next frequency pair and use it. Since the frequencies at this time is unknown to CU8000R the frequency displays will be set to "c". They may be updated using the normal CU8000 keyboard compatible syntaxes, without the terminating ENTER. Digits received after each repeated command code and before a TX command will be interpreted as receiver display digits.
Delimiter : 0D CR

4.5. SYSTEM STATUS COMMANDS.

List format :

[command description]

Command : [hexadecimal code] [ASCII character]
Response : [description]
[translation]

4.5.1. READ TU8000 CONFIGURATION.

Command : 28 (
Response : ASCII coded label string indicating the hardware installed in the TU8000.

Translation :

Leading character - always	: *
Filter heading - always	: X
X1A filter label - if not X1B	: 1A
X1B filter label - if not X1A	: 1B
X2 filter label - if installed	: 2
X3 filter label - if installed	: 3
X4 filter label - if installed	: 4
X5 filter label - if installed	: 5
Simplex label - if not duplex	: S
Duplex label - if not simplex	: D
CEPT filter label - if not FCC	: C
FCC filter label - if not CEPT	: F
MF filter label - if installed	: M
750 W label - if not 250 W	: P
Delimiting character - always	: >

4.5.2. READ TU8000 & ATU8000 STATUS.

This command is used to read the bargraphs and similar status indicators on the frontpanel of CU8000R. The response will continue until the CAN command is issued instead of ACK (ref. 4.1.1). If the command is issued before a response transmission is terminated, the rest of the old and the status response will be transmitted mixed.

Command : 2A *
Response : Continuous string of ASCII coded characters indicating the status in real time. If no other status change occures the signal strength will be read out. The transmitter protection status, SWR status and ATU8000 tuning error status will be read out only if they change or if they have an abnormal state (reduced power, SWR < 4, ATU erroneous) when the command is issued.

Translation :

SIGNAL STRENGTH. Independent of the signal type the numeric range falls between 0 and 20 (decimal - both included). The measurement value is added to the decimal value 96 to cover the ASCII coded characters from ` to t.
The first and every odd time the signal strength is transmitted it will refer to the receiver. The second and every even time it will refer to the transmitter. This is the only way to recognize the measurement source.

OTHER STATUS. A unique ASCII character is assigned to each of 6 different status informations :

Last ATU8000 tuning was succesfull	: u
Last ATU8000 tuning was erroneous	: v
SWR < 4	: w
SWR > 4	: x
Normal transmitter output level	: y
Reduced transmitter output level	: z

4.5.2.1. SINGLE READOUT.

Since all abnormal status informations will be read out first, the CAN command may be issued after the second signal strength have been received to obtain a single momentary readout.

4.5.2.2. CONTINUOUS READOUT.

Until the CAN command is issued the status will continue to be read out, thus obstructing other commands to be issued. To provide fast transfer during the transmission of the status response the below procedure is recommended rather than terminating and restarting the response.

1. Wait until an error free character is received.
2. Transmit the new command or parameter character instead of the ACK command.
3. Wait until the new command character is acknowledged.
4. Repeat from step 2 until all new characters transmitted.
5. Transmit the missing ACK command to resume status response.

If the new command requires response, it will be transmitted mixed with the status response.

4.6. RESPONSES TO STANDARD COMMANDS AND SYNTAXES.

4.6.1. BFO DOWN/UP.

CU8000R will respond by transmitting the resulting BFO frequency in the ASCII coded decimal format :

[sign] [1kHz digit] [100Hz digit]

The format will always contain 3 characters.

4.6.2. TX TUNE.

When the tuning operation is completed CU8000R will transmit the single ASCII coded character > (hexadecimal 3E).

4.6.3. EXECUTE SELFTEST (SECOND FUNCTIONS 200 - 203).

CU8000R will respond by transmitting the test number before and the test result after each test in the following ASCII coded format :

Leading character - repeated for each test	: *
Test number digit - tens - all tests	: 0 - 9
Test number digit - units - all tests	: 0 - 9
Test result digit - tens - manual testing only	: 0 - 9
Test result digit - units - manual testing only	: 0 - 9
Total test result - automatic testing only	: 00
Delimiting character - end of selftest	: >

Having transmitted the delimiting character CU8000R will transmit the DLE message and reset (ref. 4.1.2).

If the start test number entered during second function 202 or 203 are illegal, only a single leading character immediately followed by the delimiting character are transmitted as response. CU8000R will not reset in this situation.

4.6.4. READ BFO FREQUENCY (SECOND FUNCTION 244).

CU8000R will respond by transmitting the present BFO frequency in the format specified in paragraph 4.6.1.

4.6.5. READ CU VERSION (SECOND FUNCTION 246).

CU8000R will respond by transmitting its software version in the ASCII coded format :

Leading character	: *
Version heading	: V
Release year digit - tens	: 0 - 9
Release year digit - units	: 0 - 9
Release month digit - tens	: 0 - 1
Release month digit - units	: 0 - 9
Release day digit - tens	: 0 - 3
Release day digit - units	: 0 - 9
Delimiting character	: -
Version digit - tens	: 0 - 9
Version digit - units	: 0 - 9
Issue digit	: 0 - 9
Delimiting character	: >

4.6.6. READ TU8000 VERSION (SECOND FUNCTION 247).

CU8000R will respond by transmitting the software version of the TU8000 in the format specified in paragraph 4.6.5.

5. CU8000R IN PRACTISE.

As the power is switched on or reset occures CU8000R initializes as a standard Control Unit. That is, TU8000 is polled for hardware configuration and then the old status is transferred before the keyboard is enabled. At this point CU8000R has local priority with the link disabled, but at any later point the link may be enabled and priority changed to remote (ref. 4.1.1 SOH and STX commands). The initialization procedure lasts approximately 3 seconds, in which time the interface hardware is idle. After initialization the remote interface hardware is cleared and reset, which eliminates data communication for the duration of the complete period.

5.1. PRIORITY.

Any system serving more than one user, must include a priority mechanism to avoid operative conflicts. CU8000R is no exception to the rule, as it includes two levels of priority (local and remote) each strictly isolated from the other.

5.1.1. LOCAL PRIORITY.

When in the local priority state CU8000R functions as a standard Control Unit except for the speaker annunciator. This lamp will flash slowly (0.25 sec on / 0.75 sec off) until the speaker button is pressed, to indicate that the setting have been modified during a prior remote priority state.

5.1.2. REMOTE PRIORITY.

When in the remote priority state CU8000R disables the keyboard, and normal keying. The speaker annunciator flashes fast (0.25 sec on / 0.25 sec off) to identify the state and the other annunciators and displays show the present status as normal.

5.1.3. PRIORITY SWITCHING.

Switching FROM LOCAL TO REMOTE priority happens when CU8000R receives the first command character from the remote link (when the link has been enabled by the SOH command - ref.4.1.1), provided it is not in the middle of a manually entered syntax. In that case only the RESET command (ref. 4.4.1) will affect the completion of the syntax.

Switching FROM REMOTE TO LOCAL priority happens automatically 5 seconds after CU8000R receives the last information from the remote link or immediately as it receives the EOT command (ref. 4.1.1), and it will generate a reset in either of the below situations :

1. A command syntax is incomplete.
2. Scanning is in progress.
3. The TU8000 scan table is unknown to CU8000R (ref. 4.4.2.1).
4. The alarm generator is running.

5.2. EXAMPLES OF REMOTE COMMUNICATION.

List format :

[description]

HOST : [ASCII codes transmitted by host]
[time axis - one code period between two vertical bars unless otherwise noted]
CUR : [ASCII codes transmitted by CU8000R]

5.2.1. SINGLE COMMAND SEQUENCE.

TUNE DOWN (ref.4.2.2)

```
HOST :     =
       --|-|---|-->
CUR  :       ACK
```

5.2.2. MULTIPLE COMMAND SEQUENCE.

SET GUARD REGISTER TO 00100101 (binary) (ref.4.3.2.7)

```
HOST :     >     3     7     CR
       --|-|---|-|---|-|---|--|---|-->
CUR  :       ACK   ACK   ACK    ACK
```

5.2.3. COMMAND - RESPONSE SEQUENCE.

BFO DOWN (ref. 4.2.2)

```
HOST :     @                        ACK   ACK   ACK
       --|-|---|- 100 msec -|-|---|-|---|-|---|-->
CUR  :       ACK              +     0     7
```

5.2.4. STATUS RESPONSE SEQUENCE.

SINGLE READOUT (ref. 4.5.2.1)

```
HOST :     *                        ACK   ACK   CAN
       --|-|---|- 100 msec -|-|---|-|---|-|---|---|-->
CUR  :       ACK              z     n           ACK
```

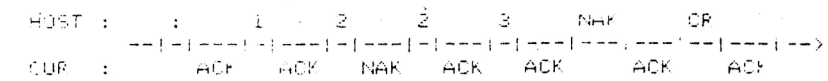
5.2.5. COMMAND INSERTION DURING STATUS RESPONSE.

KEY TRANSMITTER (ref. 4.4.1 & 4.5.2)

```
HOST :       ACK   "     ACK   ACK
       --|-|---|-|-|---|---|-|---|-->
CUR  :     a         ACK     b
```

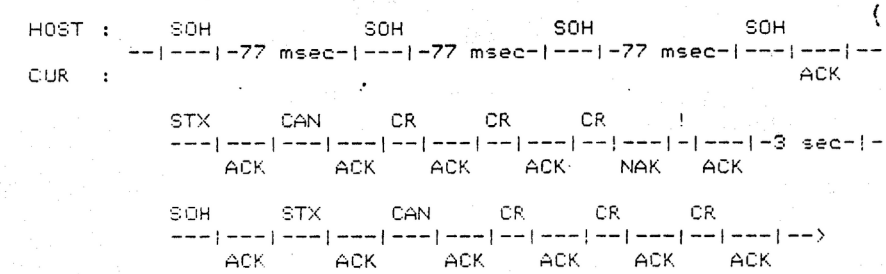
5.2.6. ERROR HANDLING.

SET RECEIVER FREQUENCY TO 12.3 kHz (ref. 4.2.1)



5.2.?. LINK INITIALIZATION.

The following procedure is recommended to initialize the link after power on or reset or when ever the state of the link is unknown. SOH and STX are used to enable the link and further command execution. CAN secures termination of continuous responses and may be omitted if this facility is unused by the host. The first two CR commands will fill up all remote character buffers in CU8000R, if it is in the middle of a local syntax. Thus, the third CR command will force a NAK message to be generated, which may be used to signal that a RESET command is necessary. Otherwise, the CR commands secures that CU8000R has terminated any remote syntax. If nothing at all are transmitted by CU8000R within a period of 10 milliseconds + the transmission time of two codes (67 milliseconds @ 300 baud), measured from the time CU8000R receives the stop bit of the command character code, either the connection is broken or CU8000R is switched off.



Skanti Transmitter Control FROM REMOTE PORT
SINGLE CONTROL UNIT WORKING

Reference should be made to the SKANTI TRP8000 REMOTE CONTROL ~~manual~~ SECTION.

The Skanti serial port is set up as follows.

300 baud
7 data bits
Odd parity
1 stop bit

All data is shown in hex.

Data is received from the Skanti system in response to data sent and is 06 (ACK) or 15 (NAK).
If a NAK is received then the previous character is resent.
In the trials model any character except a NAK is taken to be an ACK.
For this reason, it is possible to fool the DSC equipment into thinking it is connected to a Skanti system by linking data in to data out.
An overall timeout of 3 seconds is allowed for the complete data sequence to be transmitted.

Data sent	Data rcvd	Any other action.	Skanfi command description.
01			switch dsc interface on. note. This is a special command used only for the Coastguard remote sites but should not affect normal Skanti installations.
		wait 2 seconds start 3 sec timeout	
01	06		enable link.
02	06		enable commands.
18	06		cancel status response.
0D	06		enter)
0D	06		enter) clear command buffer.
0D	06		enter)
[illegible]	06		switch Tx on.
38	06		TX
32	06		2)
31	06		1)
38	06		8) frequency.
37	06		7)
35	06		5)
0D	06		enter.
5B	06		telex.
57	06		full power.
52	06		tune transmitter.
04	06		end of message.
10	06		disable link.
		Tx start o/p low Tx key o/p low Check Tx ready is low Send message Tx key o/p high Tx start o/p high	
		start 3 sec timeout	
01	06		enable link.

02	06	enable commands.
18	06	cancel status response.
0D	06	enter)
0D	06	enter) clear command buffer.
0D	06	enter)
75	06	switch Tx on.
5F	06	"2182"
52	06	tune transmitter.
04	06	end of message.
10	06	disable link.

8000 SYSTEMS ARCHITECTURE

MUNICATION PROTOCOL CU 8000/HOST <--> TU 8XXX

UCTURE DEFINED ACCORDING TO ISO/OSI:

YER 1 (PHYSICAL LINK)

RS 232C SERIAL INTERFACE @ 300 BAUD
ASYNCHRONOUS MODE: 1 START BIT, 7 DATA BITS, 1 PARITY (ODD) BIT AND 1 STOP BIT.

YER 2 (DATA LINK)

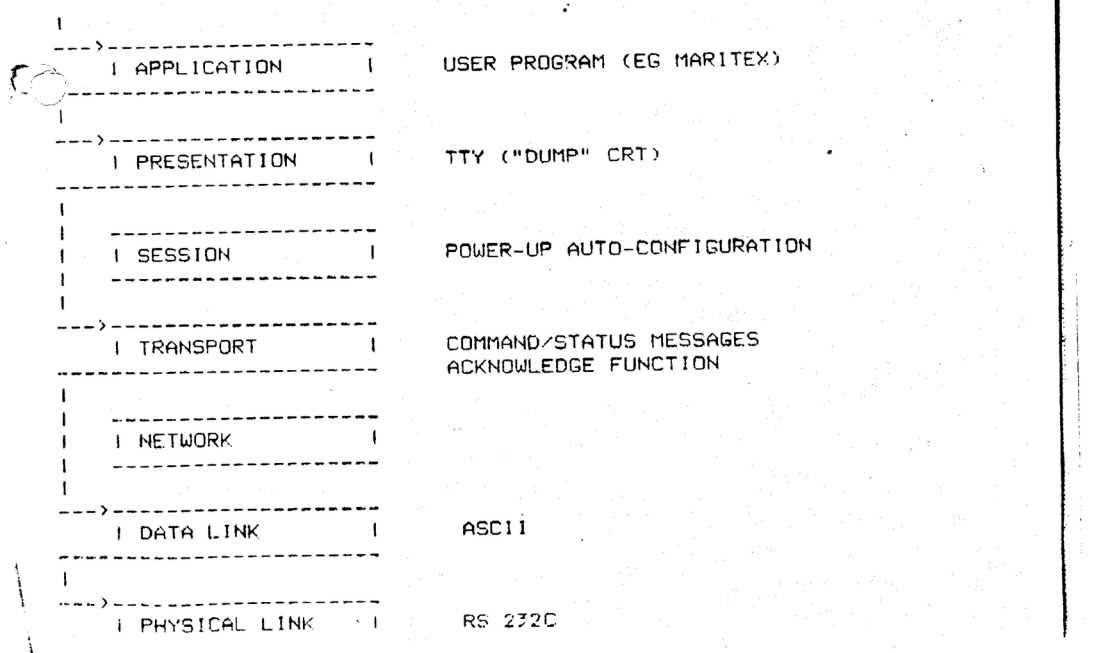
7 DATA BITS CODED ACCORDING TO ASCII UPPER CASE CHARACTER SUBSET (HEX CODES FROM $20 TO $5F).

YER 4 (TRANSPORT)

COMMUNICATION IS PERFORMED BY MEANS OF MESSAGES EACH CONSISTING OF A SE-
E OF CHARACTERS, WHICH MAY BE BROKEN DOWN INTO 3 CONSECUTIVE GROUPS:
N ALPHA CHARACTER FIELD (USUALLY A MNEMONIC) INDICATING THE FUNCTION IN QUESTION, (2) AN OPTIONAL, NUMERIC FIELD GIVING THE VALUE OF THE PARAMETER ASSOCIATED WITH (1), AND FINALLY: (3) THE MESSAGE DELIMITER,( ) = "CARRIAGE RETURN").
TWO KINDS OF MESSAGES ARE SUPPORTED: COMMANDS (CU 8000/HOST -> TU 8XXX) AND STATUS MESSAGES (TU 8XXX -> CU 8000/HOST). A SUBSET OF THE LATTER IS USED TO ACKNOWLEDGE/NOT ACKNOWLEDGE COMMANDS RECEIVED BY TU 8XXX.

SYNCRONIZATION IS PERFORMED USING XON/XOFF CHARACTERS.
THE TRANSCEIVER WILL SEND A XOFF (13H) WHEN ITS BUFFER IS FULL, THE CONTROL UNIT MUST THEN STOP TRANSMISSION UNTIL A XON (11H) IS RECIEVED.

O/OSI, ISS CASE



1.

IMAND MESSAGE FORMAT

NCTION	NORMAL USER	ADVANCED USER/CU 8000
NGE RX FRQ	RX 23496.5]	Z234965]
NGE TX FRQ	TX 23493.0]	T234930]
NGE BFO FRQ	BFO = +1.6]	B=16]
DTE: LAST DIGIT ALLWAYS	INTERPRETED AS "100 HZ"-DIGIT	
NGE MODE TO J3E	J3E]	J]
NGE MODE TO R3E	R3E]	R]
NGE MODE TO H3E	H3E]	H]
NGE MODE TO A1A	A1A]	A1]
MODE TO A2A	A2A]	A2]
NGE MODE TO F1B	F1B]	F]
NGE MODE TO LSB	LSB]	L]
NGE RX MODE TO J3E	RX J3E]	ZJ]
NGE RX MODE TO R3E	RX R3E]	ZR]
NGE RX MODE TO H3E	RX H3E]	ZH]
NGE RX MODE TO LSB	RX LSB]	ZL]
NGE TX MODE TO J3E	TX J3E]	TJ]
NGE TX MODE TO R3E	TX R3E]	TR]
NGE TX MODE TO H3E	TX H3E]	TH]
NGE TX MODE TO LSB	TX LSB]	TL]
NGE BW TO WIDE	WIDE]	W]
NGE BW TO INTERMED	INT]	I]
NGE BW TO NARROW	NARR]	N]
NGE BW TO V NARROW	VNARR]	V]
ATTENUATOR ON	ATT]	AT]
ITCH ATTENUATOR OFF	ATT OFF]	AO]
ITCH RF AMPLIFIER ON	RFAMP]	RF]
ITCH RF AMPLIFIER OFF	RFAMP OFF]	RO]
NGE AGC TO SLOW	AGC SLOW]	AS]
NGE AGC TO FAST	AGC FAST]	AA]
ITCH AGC OFF	AGC OFF]	AF]
NE RX SLOWLY	TUNE S++]	TUS++]
NE RX NORMALLY	TUNE +---]	TUN+---]
NE RX FAST	TUNE F-]	TUF-]
NE BFO	BFO ----+]	B----+]
NGE SENSITIVITY	SENS ++++-]	S++++-]
NGE MODE TO SIMPLEX	SPLX]	SX]
NGE MODE TO DUPLEX	DPLX]	DX]
ITCH TX ON	XON]	XN]
ITCH TX OFF	XOFF]	XF]
NE TX	XTUNE]	XT]
NGE POWER TO LOW	LOW]	LO]
NGE POWER TO MEDIUM-LOW	MLOW]	ML] (ONLY FOR 750W)
NGE POWER TO MEDIUM	MED]	M]
NGE POWER TO FULL-MEDIUM	FMED]	FM] (ONLY FOR 750W)
NGE POWER TO FULL	FULL]	FU]

SWITCH DUMMY LOAD ON	DUMMY]	DM]
SWITCH DUMMY LOAD OFF	DUMMY OFF]	DO]
EXECUTE A SELF-CHECK	CHECK 08]	CC08]
DETERMINE CONFIGURATION	CONFIG]	C]
DETERMINE PROGRAM VERSION	VERSION]	VS]
FILL SCAN BUFFER	FILL....]	FI....]
STEP THRU SCAN BUFFER	SCAN ####]	SC####]
CHANGE TELEX AF SHIFT	TELEX 1700]	TL17]
SELECT TELEX ASSIGNED FRQ	TELEX ASSIGNED]	TLA]
SELECT TELEX CARRIER FRQ	TELEX CARRIER]	TLC]
REDUCE CT POWER (TRP8250)	CT]	CT]
FULL CT POWER (TRP8750)	FUC]	FUC]
REDUCE POWER GENERALLY	PWR 100]	P100]
CHANGE METER TO WATT'S	WATT]	WA]
CHANGE METER TO AMP'S	AMP]	AM]
DISPLAY BFO FRQ	BFO?]	B?]
DISPLAY TX STATUS	TX?]	T?]
DISPLAY RX STATUS	RX?]	Z?]
DISPLAY COMMAND MENU	HELP]	HL]

NOTE: THE LAST 3 COMMANDS CAN'T BE EXECUTED FROM CU 8000.
] = "CR" OR "CR"-"LF".
"SP", "." MAY BE INTERSPERSED BETWEEN CHARACTERS AD LIBITUM TO ENHANCE READABILITY.

STATUS MESSAGE FORMAT

>	NORMAL PROMPT, INDICATES TU 8XXX READY FOR COMMAND
?	PARITY OR SYNTAX ERROR IN RECEIVED COMMAND
	ILLEGAL COMMAND
ATU!	ATU 8XXX DOESN'T RESPOND TO A <XTUNE> COMMAND
SWR?	ATU 8XXX HAS DETECTED SWR>4
SWR!	ATU 8XXX HAS DETECTED SWR<4 AFTER ISSUING <SWR?> MESSAGE
PWR?	POWER LEVEL HAS BEEN REDUCED TO PROTECT PA
PWR!	POWER LEVEL HAS BEEN RESTORED AFTER ISSUING <PWR?> MESSAGE
#03	ERROR CODE 3 RETURNED DURING SELFCHECK
*X1A234X5SCM	THIS MESSAGE IS ISSUED AS RESPONSE TO A <CONFIG> COMMAND
*VERSION 831209-2.0	THIS MESSAGE IS ISSUED AS RESPONSE TO A <VERSION> COMMAND

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BFOFRQ= +1.6 KHZ                                    THIS MESSAGE IS ISSUED AS
                                                    RESPONSE TO A <BFO?> COMMAND

TXFRQ = 23493.00 KHZ                                THIS MESSAGE IS ISSUED AS
MODE  = SMPLX, J3E                                  RESPONSE TO A <TX?> COMMAND
POWER = MAX
STATUS= ON

RXFRQ = 23496.50 KHZ                                THIS MESSAGE IS ISSUED AS
MODE  = SMPLX, J3E                                  RESPONSE TO A <RX?> COMMAND
BANDW = INTERM
STATUS= AGC SLOW, RFAMP OFF, ATT OFF

COMMAND MENU FOR TU 8XXX:
RX 23496.5(Z234965), TX 23493.0(T234930), BFO=+1.6(B=16)
J3E(J), R3E(R), H3E(H), A1A(A1), A2A(A2), F1B(F), LSB(L)
RX J3E(ZJ), RX R3E(ZR), RX H3E(ZH), RX LSB(ZL)
TX J3E(TJ), TX R3E(TR), TX H3E(TH), TX LSB(TL)
WIDE(W), INT(I), NARR(N), UNARR(U)
ATT(AT), ATT OFF(AO), RFAMP(RF), RFAMP OFF(RO), AGC SLOW(AS), AGC FAST(AF)
    OFF (AO)
TU.. S+(TUS+), TUNE -(TUN-), TUNE F+(TUF+)
SPLX(SX), DPLX(D)
XON), XOFF(XF), XTUNE(XT), LOW(LO), MED(M), FULL(FU)
.eek 12(CC12), CONFIG(C), VERSION(VS)
FILL..(FI..), SCAN ##(SC##)
TELEX 1700(TL17)
CT(CT), PWR 100(P100)
BFO?(B?), TX?(T?), RX?(Z?), HELP(HL)
                                                    THIS MESSAGE IS ISSUED AS
                                                    RESPONSE TO A <HELP> COMMAND
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AGC CAPABILITY MATRIX

MODE	SSB	R3E	H3E	A2A	A1A	F1B
T	OK	OK	DEFAULT	OK	DEFAULT	OK
W	DEFAULT	DEFAULT	ILLEGAL	DEFAULT	OK	ILLEGAL
N.	OK	OK	OK	OK	OK	ILLEGAL

BANDWITH CAPBILITY MATRIX

MODE	SSB	R3E	H3E	A2A	A1A	F1B
WIDE	ILLEGAL	ILLEGAL	DEFAULT	OK	OK	ILLEGAL
INTER	DEFAULT	DEFAULT	ILLEGAL	DEFAULT	DEFAULT	ILLEGAL
NARR.	ILLEGAL	ILLEGAL	ILLEGAL	OK	OK	ILLEGAL
UNAR.	ILLEGAL	ILLEGAL	ILLEGAL	OK	OK	DEFAULT