



FYLDE MICROSYSTEMS Ltd

Advanced Auxilliary Toolkit

for

TK255/355 Trunked Portable

Software Version 0.99

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**This toolkit contains advanced information for
engineers supporting the Kenwood Trunked
Portable**

BETA TEST

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SECTION 1. NETWORK TOOLKIT FOR KENWOOD TK255/355 PORTABLES

This documentation, together with a suite of programs contained on a floppy disk enable an engineering facility to configure parameters in addition to those defined in the Network Personalisation data.

The Network Personalisation Program KENPORT is only one of the utilities required to load a complete suite of software into the TK255/355.

The programs supplied on the Toolkit diskette may be run directly from the disk or copy onto a suitable subdirectory of a Hard Disk. It is essential that a back-up of the disk is taken before use however.

1.1 SOFTWARE OVERVIEW

1.1.1 Main Trunking Software

The entire operation of the radio is contained in this module. Throughout the world there are slightly different variants of the MPT1327/43 Systems. The Trunking Software may be changed if the TK255/355 will be used on a different system, or if a Software Upgrade needs to be downloaded. The HEADER is also downloaded each time the Trunking Software is downloaded.

1.1.2 Header

The HEADER contains parameters which are not normally set during personalisation of the radio. A complete listing of the header and instructions on how to download it to the radio is given later in this document.

1.1.3 Channel Table

The MPT1327 Standard uses Logical Channels rather than discrete frequencies. There are two methods by which the radio can derive the correct frequency from the Logical Channel.

a) Calculation Method

The radio is given the lowest frequency for the transmitter and receiver and the channel spacing. The microprocessor can then calculate the actual frequency for each channel by multiplying the current_logical_channel by the channel spacing and adding the result to the base frequency.

In the circuitry of the radio, there are several crystal oscillators. Unfortunately these can interfere with the receiver and cause desensing.

TK255/355

MAIN TRUNKING SOFTWARE
HEADER
CHANNEL TABLE
FACTORY SETUP
SC11370 PARAMETERS
PERSONALISATION DATA

b) **Table Method**

In this method, each of the channels used by the Trunking System has the calculation performed, and a table of bit patterns downloaded to the radio. In addition, the computer which calculates this table can also ascertain which of the channels will be candidates for receiver desensing. An extra 'bad channels' list is created, added to the table and the complete data is downloaded to the radio. The tK255/355 has space for 1024 receiver channels, 1024 transmitter channels, and 256 marked bad channels. If a bad channel has been selected, the microprocessor in the radio will shift the internal crystal oscillator so that the receiver interference is moved away from the channel.

The TK255/355 supports both of these methods, although the table method is preferred.

1.1.4 Factory Setup

The TK255/355 uses a digital audio processor device - SC11370. This device has the advantage that all adjustments are made electronically and then stored in permanent memory. Some of these adjustments such as transmitter deviation are available for the technician using a Test Mode, but some are only adjusted by Kenwood. These parameters will never require changing during the life of the product.

1.1.5 SC11370 Parameters

The SC11370 parameters which change for each variant are stored in this area. This array of parameters is downloaded using KENENG.

1.1.6 Personalisation Data

This is the Network and Personalisation data. The data is programmed as a radio is personalised for a particular Network and Customer.

SUMMARY

PURPOSE	WHEN LOADED	P.C UTILITY to LOAD
Main Trunking Software and default Header	During Manufacture and for Software upgrades	KENENG [N] option
New Header	As required for special features	KENENG [H] option
Channel Table	To change to a special channel plan	KENENG [C] option
Factory Set	Factory Only	
SC11370 variable gain blocks (Tx deviation etc)	Set directly by technician in TEST mode.	

1.2 SOFTWARE MODULES

1.2.1 MAIN TRUNKING SOFTWARE

The Main Trunking Software controls the entire operation of the radio. In order to satisfy the slight variants across the world, alternative software modules are provided on the Software Toolkit Diskette. The name of each variant is given in this table. The particular software loaded into the radio can be determined by [R]eading the data from the Network Personalisation Software. (Connect the programming cable. Run KENPORT on the P.C. Power up the radio with the call button pressed. Press the [R] key on the P.C)

MPT1327 VARIANT	USE IN		
UK1343	United Kingdom	Spain	Italy
TRAXYS	Holland		
PA2424	France		
REG1343	Germany		

1.2.2 SOFTWARE HEADER

Some of the rarely changed parameters and the messages displayed on the LCD display of the radio are stored in this module. DO NOT CHANGE ANY VALUES OR DOWNLOAD A HEADER UNLESS SUPPORTED BY KENWOOD.

The 'Source Code' for this Header is supplied on the Toolkit Diskette. Its filename is HEADER.ASM. The file is a plain text file which may be edited using a text editor such as EDIT (a DOS program). In order to download this to the radio, it must be compiled to 'Object Code'. It is unwise to edit the file HEADER.ASM itself. It is strongly suggested that the file HEADER.ASM be copied to another name and the new file edited. You must however keep the .ASM extension. A copy of HEADER.ASM is contained in Appendix A of this document.

You must extremely careful not to change any addresses of the data within the Header, only the data itself. As a check, the new header can be compiled using the listing option and compared with the Header listed in Appendix A.

To compile with a listing file use

e.g

```
C>XASM LEADER L >LEADER.PRN
```

In addition to the compressed LEADER.MIK file, this will produce a listing file LEADER.PRN.

e.g from the DOS prompt

```
C>COPY HEADER.ASM LEADER.ASM
      1 file(s) copied

C>XASM LEADER

-----
Assembler KENWOOD version 1.00
-----
(c) Fylde Microsystems Ltd

Assembled OK without errors

C>
```

1.2.3 TABLE OF USEFUL LABLES

XMITDEL	The number of bits between bit 64 of the 1327 downlink and the start of preamble on the uplink. The number 29 positions the codeword in the middle of the uplink window. The units are FFSK data bits
NOFPIPS	At the end of the traffic channel time, a number of pips are generated to indicate that the call is to be cleared
PIPTIME	This number defines the number of seconds before cleardown at which the pips start
HHRETRY	Home Hunt is a feature whereby, mobiles may be persuaded to a lock on to a preferred control channel. If a mobile is locked onto a control channel which is not preferred then at regular intervals, the mobile can try to find its home site. This value in seconds defines this interval.

RINGTM	If a call is not answered, the calling party ident will be stored, in the mobile stack. This timer defines the maximum wait time. Note that a clear message will probably occur before this timer times out.
MAXCHAN	Put in here the highest logical channel used on a particular system. The default value is 1023
ACKMES.....	This is an array of messages. Each message contains up to eight characters. There are 8 languages, which are enabled from the personalisation software. The message is repeated for each language. Thus it is possible to customise all messages by altering the contents of this array
SLOWPTR	mS to wait between chars for unbuffered printer. If the printer connected to the RS232 port has a slow buffer, this location will delay separate each character by 'n' mS
MINCHAN	min channel allowed in GTC
STATCON	default status sent in an RQQ call

1.3 CHANNEL TABLE GENERATION

The control and traffic channels to which the mobile will have access are contained in a table, within the Flash Rom of the portable. In the MPT1327 standard, actual channels are assigned logical channel numbers. Each logical channel has assigned an actual Tx and Rx frequency.

The bits for the synthesiser are held in two bytes for Rx and 2 bytes for Tx (4 bytes per channel). Each logical channel has 4 bytes in a table. The channel table starts with 4 zero bytes which represent a dummy channel 0.

Since the calculations involved in producing a channel table are difficult, utilities are supplied on the 'programers toolkit disk'.

The programs are -

KWPORT.EXE
XASM.EXE

The program KWPORT is run first to calculate the data required for download to the TK255/355. This program produces an Assembler Source Code File (file.ASM) which contains the data in an easy to read (and therefore easy to check check) format.

The second step compiles this Source Code to produce a compressed OBJECT file and an optional LISTING file. This compressed file may then be downloaded to the TK255/355 using the [C] option of the KENENG utility.

Summarising -

Procedure	Files Produced
1. Run KWPORT. Answer the questions. (Note that the local oscillator is HIGH for the TK255 and LOW for the TK355)	file.ASM
2. Run XASM either - XASM file (the program will assume file.ASM) or XASM file L (a check listing on the screen) or XASM file L >file.PRN (a check listing on disk	file.MIK file.MIK file.MIK file.PRN
3. Connect the TK255/355 to the P.C using the special cable Run KENENG download a [C]hannel table	
4. Use TEST MODE if necessary to check that the channels are as expected	

Detailed Steps

1. Run KWPORT to generate the channel table
This example generates a VHF channel table of 100 channels called AIRTRUNK

```
CHANNEL TABLE CREATION FOR KENWOOD PORTABLES          ver 1.00

File XTAL.DAT not found - using defaults of
xtal fundamental = 1.382375 MHz
interference limit high = 5.0kHz
interference limit low  = 6.0kHz

[C]alculated frequencies
from [F]ile
or calculated in [M]obile(Portable) C

Enter 1st Receive Channel in MHz ? 157.575
Enter 1st Transmit Channel in MHz ? 162.125
Enter Channel Separation in kHz ? 12.5
Is local oscillator [H]igh or [L]ow H
Number of Channels ? 100
Enter Name of File to write to ? AIRTRUNK
Calculating Channel nn
FILE AIRTRUNK.ASM WRITTEN TO DISK
```

2. Run the compiler to generate the compressed file

```
C>XASM AIRTRUNK
```

```
-----
Assembler KENWOOD version 1.00
-----
(c) Fylde Microsystems Ltd
```

```
Assembled OK without errors
```

```
C>
```

The compiler produces a compressed file AIRTRUNK.MIK

An additional listing file may also be produced - AIRTRUNK.PRN using the command

```
C>XASM AIRTRUNK L >AIRTRUNK.PRN
```

The AIRTRUNK.PRN listing example is shown.

Assembler KENWOOD version 1.00

(c) Fylde Microsystems Ltd

```
0001 ;-----
0002 ; FYLDE CHANNEL TABLE for KENWOOD PORTABLE
0003 ;-----
0004 ;
0005 ; I.F = 45.05 Output File = AIRTRUNK.ASM
0006 ;
0007 ;Rx channels which are prone to de-sense
0008 ;are marked with an *
0009 ;
0010 ORG $8E00
0011 8E00 00 00 CHANNEL DW $0000 ;Dummy Chan 0 Rx
0012 8E02 00 00 DW $0000 ;Dummy Chan 0 Tx
0013 8E04 3F 52 DW $3F52 ; Rx Ch 1 157.5750 B- 253 A-18
0014 8E06 32 AE DW $32AE ; Tx Ch 1 162.1750 B- 202 A-46
0015 8E08 3F 53 DW $3F53 ;*Rx Ch 2 157.5875 B- 253 A-19
0016 8E0A 32 AF DW $32AF ; Tx Ch 2 162.1875 B- 202 A-47
0017 8E0C 3F 54 DW $3F54 ; Rx Ch 3 157.6000 B- 253 A-20
0018 8E0E 32 B0 DW $32B0 ; Tx Ch 3 162.2000 B- 202 A-48
.
.
0209 8F8C 3F B4 DW $3FB4 ; Rx Ch 99 158.8000 B- 254 A-52
0210 8F8E 33 10 DW $3310 ; Tx Ch 99 163.4000 B- 204 A-16
0211 8F90 3F B5 DW $3FB5 ; Rx Ch 100 158.8125 B- 254 A-53
0212 8F92 33 11 DW $3311 ; Tx Ch 100 163.4125 B- 204 A-17
0213 ;
0214 ;list of logical channel numbers which are a
0215 ;rx harmonic of the CPU clock ( 1.382375 MHz)
0216 ;and within + 5.0 and - 6.0 kHz of Rx Channel
0217 9E00 ORG $9E00
0218 BADCHAN
0219 9E00 00 02 DW 2 ;Rx Freq 157.5875
0220 ;Interfering Freq 157.5907
0221 ;(x 114 harmonic of xtal)
0222 ;
0223 ;extra channels (one and two times above the
calculated channels)
0224 9E02 00 03 DW 3
0225 9E04 00 04 DW 4
0226 ;
0227 9E06 00 00 DW 0
0228 ;
0229 9FF2 ORG $9FF2
0230 9FF2 41 49 52 54 52 55 DB 'AIRTRUNK'
4E 4B
0231 ;
0232 9FFA ORG $9FFA
0233 9FFA 9E 00 BADADDR DW BADCHAN
0234 ;
0235 9FFC ORG $9FFC
0236 9FFC 8E 00 CHANTBL DW CHANNEL
0237 ;
0238 9FFE ORG $9FFE
0239 9FFE 42 00 DW $4200 ;R reg 12.5kHz step. P=64
0240 ;
0241 END
```

Assembled OK without errors

Note -

- a) How the program has found a channel (channel 2) which would suffer de-sense. This channel has been marked, and the interfering signal will be shifted to remove it.
Note that the program also identifies which harmonic would cause the de-sense and the frequency of the interfering signal.
- b) How the program also removes the interfering signal from adjacent channels (channels 3 and 4 marked)
- c) The program lists the 'A' and 'B' synthesiser register constants.

Also Remember -

- a) When using KWPORT, the VHF TK255 local oscillator is HIGH and the TK355 UHF model local oscillator is LOW

And Note that

- a) When using KWPORT, it is possible to allow the TK255/355 to calculate the synthesiser data, but this is not recommended because the radio cannot determine which channels would suffer de-sense.

File Input to KWPORT

If the trunked network does not use contiguous channels, a channel table may be created by reading each channel from a data file.

The input file may be produced by any text editor or word processor using NON DOCUMENT format such as MSDOS EDIT. There must be no embedded control characters except carriage return and line feed characters. The name of the table must have the extension .CHN

Each channel is contained on one line as follows

Logical_Channel_Number , Tx_Frequency , Rx_Frequency

The maximum value of Logical_Channel_Number is 1023

Channels can be listed in any order.

A valid list would be

```
1,172,165.0625
40,172.05,165.5
3,166.0625,162.9875
```

When prompted for the file to read from, do not enter the file extension. (A list of suitable input files is provided on the screen.

e.g Enter file to read from ? **NWKCHAN**

When prompted for the file to write to, enter the name without the extension

e.g Enter file to write to ? **CHNNWK**

The extension .ASM will be added by the program, so the file produced from the example above will be CHNNWK.ASM

Menu Option [M]

The menu option [M] will create a file with data which the Personalisation program can read. The lowest (logical channel 1) frequency for transmit and receive will be prompted followed by the Mobile I.F frequency and channel separation. The file name will then be prompted. The name must be 1 to 8 characters without an extension. The extension .CNL will be added.

Example

```
CHANNEL TABLE CREATION FOR KENWOOD PORTABLES      ver 1.00

File XTAL.DAT not found - using defaults of
xtal fundamental = 1.382375 MHz
interference limit high = 5.0kHz
interference limit low  = 6.0kHz

[C]alculated frequencies from [F]ile or calculated in [M]obile M
Enter 1st Receive Channel in MHz ? 155
Enter 1st Transmit Channel in MHz ? 157
Enter Channel Separation in kHz ? 12.5
Is local oscillator [H]igh or [L]ow H
Enter Name of File to write to ? VHFCHN
FILE VHFCHN.CLN WRITTEN TO DISK

C>TYPE VHFCHN.CLN
3E83310F1
Channel 1 Rx Freq - 155 MHz
Channel 1 Tx Freq - 157 MHz
I.F - 45.0499992370605 MHz      Chan Separation - 12.5 KHz
```

The information from KWPORT (the file xxx.CNL), is embedded into the network definition file (file.NET) by the personalisation software KENPORT.EXE. From the [G] option, bit 7 of the FEATURE variable must be set to turn on 'channels by calculation'. (and the option may be cleared to 'channels from channel table' by clearing this bit.)

The other bits of FEATURE have other meanings which can be found in the Personalisation Documentation.

If this bit is set, and the Normal Hunt Channels have been entered, the software lists all files with a .CLN extension on the screen. (generated by KWCHAN2).

The appropriate file name is selected, and the data within that file is saved with the other Network data as a .NET file.

The mobile may then be [P]rogrammed in the normal way.

APPENDIX A LEADER.PRN LISTING

```

-----
Assembler KENWOOD version 1.00
-----
(c) Fylde Microsystems Ltd

0001          ;-----
0002          ;MAIN CODE
0003          ;-----
0004          ;
0005          ;dont move these config bytes
0006 1000          ORG $1000
0007 1000 30 2D 31 41 VERMAIN DB '0-1A'
0008 1004 4D 50 54 31 33 34 MFILE DB 'MPT1343 .100';trunking standard to which this
software refers
          33 20 2E 30 32 34
0009 1010 32 32 30 38 39 36          DB '220896'          ;day/month/year
0010          ;
0011 1016 10          KTIMER DB 16          ;*timing delay in mS. command signal to
KEY line
0012 1017 02          STIMER DB 2          ;*timing delay in mS. command signal to
SYNTH bits
0013 1018 22          DLYBIT DB 34          ;@Delay between bit 64 and pre-amble
0014          ;in units of data bits
0015          ;minimum value 10 because bits are lost
in ENCODE
0016          ;timed from T0 in MPT1327
0017          ;
0018          ;the config bytes up to this point are IMMOVEABLE
0019 1019 05          NUDELAY DB 5          ;Delay to NU tone
0020 101A 00          DB 0          ; spare
0021 101B 05          NOFPIPS DB 5          ;number of pips generated on timeout
0022 101C 08          PIPTIME DB 8          ;time at which pips start
0023          ;table of defaults from MPT 1327
0024 101D 03          ND1 DB 3          ;number of disconnect messages sent by
called RU
0025 101E 05          ND2 DB 5          ;number of disconnect messages sent by
calling RU
0026 101F 10          NENE DB 16          ;max number of RQE messages
0027 1020 08          NR DB 8          ;max number of RQS,RQD,RQX,RQT,RQR,RQQ
0028 1021 3C          TA DB 60          ;timeout for alerted RU waiting for call
0029 1022 02          TB DB 2          ;time barred from calling same ident
after ACK
0030          ;ACKX,ACKV or any ident after ACKT
0031 1023 00          DB 0          ;spare
0032 1024 00          DB 0          ;spare
0033 1025 05          TP DB 5          ;max interval between periodic messages
0034 1026 3C          TR DB 60          ;timeout for called RU waiting for its
user/data
0035          ;equipment to be ready
0036 1027 00          DB 0          ;spare
0037 1028 00          DB 0          ;spare
0038 1029 00          DB 0          ;spare
0039 102A 11          SETTLE DB 17          ;10's of mS for mobile to wait on a
channel
0040          ;to find sync
0041 102B 00          DB 0          ;spare
0042 102C 00          DB 0          ;spare
0043 102D 03          CIAGAP1 DB 3          ;gap for ciapips (1-10 pips)
0044 102E 1E          CIAGAP2 DB 30          ;gap for ciapips (>10 pips)
0045          ;
0046          ;RS232C Set-Up Requirements (HELD in EPROM)
0047          ; Bit 0-3 is SPARE
0048          ; Bit 4 Selects the Data Word Length      0 = 8 Bit Word
0049          ;                                           1 = 7 Bit Word
0050          ; Bit 5 Selects the No of STOP bits      0 = 1 Stop Bit
0051          ;                                           1 = 2 Stop Bits

```

```

0052          ; Bit 6 Selects Parity Sense          0 = Even Parity
0053          ;                                     1 = Odd Parity
0054          ; Bit 7 Selects Parity                0 = No Parity
0055          ;                                     1 = Parity On
0056          ;default if programming is 9600 baud
0057 102F 01    RS232SU      DB  %00000001      ;default for programming
0058          ;
0059 1030 05    NW           DB  5              ;default value for wait
0060          ;
0061          DB  0              ;spare
0062 1032 05    BTIMER       DB  5              ;sample time for type B memory storage
0063 1033 02    LMPTIMR      DB  2              ;lamp timer for keylock
0064 1034 00    DISPATCH    DB  0              ;non zero for dispatcher sending ACKB to
AHOY
0065 1035 00    SILENT       DB  0              ;non zero for silent running on
0066          ;emergency calls
0067          ;
0068 1036 03    HYSTER       DB  3              ;hysteresis on traffic channel squelch
0069 1037 04    LOWHYS       DB  4              ;hysteresis on low batt vols
0070 1038 5C    HLRSSI      DB  92             ;rssi level at which power switches from
high to low
0071          ;set to -100dBm. other values are -110=67
0072          ;-105=81, -100=92, -95=101, -90=113
0073          ;-85=124
0074 1039 00 00 00 00 00 00  DB  0,0,0,0,0,0 ;spare
0075          ;
0076 103F 1E    WAITACK      DB  30             ;number of 10's mS to wait for a data ack
0077 1040 0A    HANG         DB  10             ;hang from TX to RX in mS
0078 1041 02 58  HHRETRY     DW  600            ;default timeout for home hunt retry
0079 1043 FF    REGON        DB  $FF            ;$FF ;non zero if registration is
required
0080          ;if zero then mobile will NEVER register
0081 1044 00          DB  0              ; spare
0082 1045 00          DB  0              ;spare
0083 1046 00          DB  0              ;spare
0084 1047 00    DEFFILT      DB  $00            ;default value loaded into digital filter
0085          ;when pressel released
0086          ;
0087 1048 C4 D7    SYNCCON    DW  $C4D7
0088 104A 3B 28    SYNCTRF   DW  $3B28
0089          ;
0090 104C 00 00 00 00  DB  0,0,0,0            ;spare config bytes
0091 1050 00 00 00 00  DB  0,0,0,0
0092 1054 00 00 00 00  DB  0,0,0,0
0093          ;
0094 1058 00 00          DW  0000 ;spare
0095 105A 00          DB  0              ;
0096          ;
0097 105B 00    CHANTST      DB  0              ;non zero to display channel number
0098          ;
0099 105C FF    EMERRQQ      DB  $FF            ;if ff then send RQE to EAUX if aux wire
grounded
0100          ;if 0-30 send RQQ to EAUX. if $80 send
RQS to EAUX
0101          ;
0102 105D 05    CARSMPL      DB  5              ;number of 10's of milliseconds after
landing

```

```

0103                                     ;on a new channel in aquire before
sampling
0104                                     ;carrier and DCD
0105 105E 0A AHYTIMR DB 10             ;number of seconds radio will sit waiting
0106                                     ;for GTC after AHY to 'B' party
0107                                     ;REDUNDANT
0108 105F 3C RINGTM DB 60              ;number of seconds alerted mobile will
wait
0109                                     ;before giving up
0110 ;
0111 1060 FA DATDLY DB 250             ;delay - carrier to first bit DATA in
FFSK bits
0112                                     ;1.06 was 120
0113 1061 05 DATOFF DB 5              ;delay - last bit to tx off DATA in FFSK
bits
0114                                     ;1.06 was 90
0115 ;
0116 1062 00 CONFIG DB %00000000     ;bit 0 - use fylde group calling
structure
0117                                     ;bit 1 - spare
0118                                     ;bit 2 - ignore LAB field in ch
aqu
0119 ;
0120 1063 00 DB 0                    ;spare
0121 ;
0122 1064 03 FF MAXCHAN DW 1023       ;max channel allowed in GTC
0123 ;
0124 1066 00 DB 0                    ;spare
0125 ;
0126 1067 00 SLOWPTR DB 0            ;mS to wait between chars for unbuffered
printer
0127 ;
0128 1068 02 CRCCNT DB 2             ;number of bad consecutive CRC's before
0129                                     ;marking SYNCFG as false
0130 ;
0131 1069 00 TOKENON DB 0            ;make non zero if tokenising of messages
enabled
0132 ;
0133 106A 00 QUIET DB 0              ;if non zero, RS232 originated calls are
quiet
0134 ;
0135 106B 00 01 MINCHAN DW 1         ;min channel allowed in GTC
0136 ;
0137 106D 00 STATCON DB 0            ;default status sent in an RQQ call
0138 ;
0139 106E 0A DB $0A                  ;spare
0140 106F 0B DB $0B
0141 1070 0C DB $0C
0142 1071 0D DB $0D
0143 ;
0144 1072 FF DB $FF                  ;spare
0145 1073 FF DB $FF
0146 1074 FF DB $FF
0147 ;
0148 1075 04 NI DB 4                 ;number of attempts at an include
0149 ;
0150 1076 00 DB 0                    ;spare
0151 ;
0152 1077 00 DIVERT DB 0             ;non zero for divert enables

```

```

leader.ASM
0153
zero
0154
0155
0156 1078 0A
0157
0158
0159
0160
in ACKTBL
0161 1079 04
0162
0163 107A 05
0164
0165
0166 107B 00
0167
0168
0169 107C 05
0170
0171 107D 02
GROUP
0172
0173 107E 08 10 18 20
packet
0174
0175 1082 00 01
0176
0177 1084 00
0178
0179 1085 10
data
0180
fragment
0181
of packet
0182
0183 1086 1E
0184
0185
0186
0187 1087 0A
0188
0189
0190
0191
0192
0193
0194
0195
0196
0197
0198
0199
0200
0201
0202
0203
0204 1088 20 20 4F 4E 20 20

```

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```

;note that bit 0 FEATUR must also be non
;
;contants for packet data
AWATE DB 10 ;units of 100mS for A party to wait
;on traffic data call before either
;a) ahoying for data
;b) sending group data info
;non packet mode, timers for packet are
;
;number of seconds 'B' party waits
;for AHOY on traffic (data)
NUMPRDS DB 5 ;number of ahoy's sent on traffic data
;was 1 - 1.06
;
BR DB 0 ;initial baud rate for packet data
;0-1200, 1-600, 2-400, 3-300
;
REPDN DB 5 ;number of SITH's+data retry's
;
REPDN GP DB 2 ;number of ahoy's and SITH's packet data
;
ACKTBL DB 8,16,24,32 ;10 mS to wait for a data ack in
;
FRMT DW 1 ;format of the data
;
AUTOBIT DB 0 ;if non zero, use autobaud on packet data
;
FRAGLMX DB 16 ;fragment length to be used for packet
;note that if bit rate degrades then
;length will be adjusted to keep timing
;the same
DNGRADE DB %00011110 ;mask for downgrade of bit rate
;bit 4 3 2 1 0
; 1200 600 400 300 custom
;and mask for bit rates supported
HOLDDIS DB 10 ;delay holding dispaly for message
;to be read
;
;
;-----
;arrays and messages
;-----
;
;messages to display
;first entry is english
;2nd entry french
;3rd german
;4th italian
;5th spanish
;6th dutch
;7th portugese
;8th spare
ONMSG DB ' ON '

```



```

0205 108E 20 20 4F 4E 20 20      DB ' ON '
0206 1094 20 20 4F 4E 20 20      DB ' ON '
0207 109A 20 20 4F 4E 20 20      DB ' ON '
0208 10A0 20 20 4F 4E 20 20      DB ' ON '
0209 10A6 20 20 4F 4E 20 20      DB ' ON '
0210 10AC 20 20 4F 4E 20 20      DB ' ON '
0211 10B2 20 20 4F 4E 20 20      DB ' ON '
0212                                ;
0213 10B8 20 20 4F 46 46 20      OFFMSG DB ' OFF '
0214 10BE 20 20 4F 46 46 20      DB ' OFF '
0215 10C4 20 20 4F 46 46 20      DB ' OFF '
0216 10CA 20 20 4F 46 46 20      DB ' OFF '
0217 10D0 20 20 4F 46 46 20      DB ' OFF '
0218 10D6 20 20 4F 46 46 20      DB ' OFF '
0219 10DC 20 20 4F 46 46 20      DB ' OFF '
0220 10E2 20 20 4F 46 46 20      DB ' OFF '
0221                                ;
0222 10E8 20 20 50 52 4F 47      PRMES  DB ' PROG'
0223 10EE 20 20 50 52 4F 47      DB ' PROG'
0224 10F4 20 20 50 52 4F 47      DB ' PROG'
0225 10FA 20 20 50 52 4F 47      DB ' PROG'
0226 1100 20 20 50 52 4F 47      DB ' PROG'
0227 1106 20 20 50 52 4F 47      DB ' PROG'
0228 110C 20 20 50 52 4F 47      DB ' PROG'
0229 1112 20 20 50 52 4F 47      DB ' PROG'
0230                                ;
0231 1118 20 20 45 4E 44 20      CLRMES DB ' END '      ;first entry is english
0232 111E 20 20 46 49 4E 20      DB ' FIN '      ;2nd entry french
0233 1124 20 20 45 4E 44 20      DB ' END '      ;3rd german
0234 112A 20 20 46 49 4E 45      DB ' FINE'      ;4th italian
0235 1130 20 20 46 49 4E 20      DB ' FIN '      ;5th spanish
0236 1136 20 20 45 4E 44 20      DB ' END '      ;6th dutch
0237 113C 20 20 45 4E 44 20      DB ' END '      ;7th portugese
0238 1142 20 20 45 4E 44 20      DB ' END '      ;8th spare
0239                                ;
0240 1148 20 20 45 52 52 20      ERRMESS DB ' ERR '
0241 114E 20 20 45 52 52 20      DB ' ERR '
0242 1154 20 20 45 52 52 20      DB ' ERR '
0243 115A 20 20 45 52 52 20      DB ' ERR '
0244 1160 20 20 45 52 52 20      DB ' ERR '
0245 1166 20 20 45 52 52 20      DB ' ERR '
0246 116C 20 20 45 52 52 20      DB ' ERR '
0247 1172 20 20 45 52 52 20      DB ' ERR '
0248                                ;
0249 1178 20 20 47 4F 4F 44      ACKMES DB ' GOOD'
0250 117E 20 20 42 4F 4E 20      DB ' BON '
0251 1184 20 20 47 55 54 20      DB ' GUT '
0252 118A 20 42 55 4F 4E 4F      DB ' BUONO'
0253 1190 20 42 55 45 4E 4F      DB ' BUENO'
0254 1196 20 20 47 4F 4F 44      DB ' GOOD'
0255 119C 20 20 47 4F 4F 44      DB ' GOOD'

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0256 11A2 20 20 47 4F 4F 44      DB ' GOOD'
0257                               ;
0258 11A8 20 20 46 41 49 4C      ACKVMES DB ' FAIL'      ;first entry is english
0259 11AE 20 20 45 43 48 43      DB ' ECHC'      ;2nd entry french
0260 11B4 20 20 45 52 20 20      DB ' ER '      ;3rd german
0261 11BA 20 20 45 52 52 20      DB ' ERR '      ;4th italian
0262 11C0 20 20 45 52 52 20      DB ' ERR '      ;5th spanish
0263 11C6 20 20 46 41 49 4C      DB ' FAIL'      ;6th dutch
0264 11CC 20 46 41 4C 48 41      DB ' FALHA'     ;7th portugese
0265 11D2 20 20 46 41 49 4C      DB ' FAIL'      ;8th spare
0266                               ;
0267 11D8 20 20 46 41 31 4C      ACKXMES DB ' FAIL'
0268 11DE 20 20 45 43 48 43      DB ' ECHC'
0269 11E4 20 20 45 52 20 20      DB ' ER '
0270 11EA 20 20 45 52 52 20      DB ' ERR '
0271 11F0 20 20 45 52 52 20      DB ' ERR '
0272 11F6 20 20 46 41 49 4C      DB ' FAIL'
0273 11FC 20 46 41 4C 48 41      DB ' FALHA'
0274 1202 20 20 46 41 49 4C      DB ' FAIL'
0275                               ;
0276 1208 20 20 48 4F 4C 44      ACKIMES DB ' HOLD'
0277 120E 20 20 54 45 4E 55      DB ' TENU'
0278 1214 20 20 45 52 20 20      DB ' ER '
0279 121A 20 20 48 41 4C 54      DB ' HALT'
0280 1220 20 20 50 41 55 53      DB ' PAUS'
0281 1226 20 20 48 4F 4C 44      DB ' HOLD'
0282 122C 45 35 50 45 52 41      DB 'ESPERA'
0283 1232 20 20 48 4F 4C 44      DB ' HOLD'
0284                               ;
0285 1238 42 20 42 55 53 59      AKQ1MES DB 'B BUSY'      ;first entry is english
0286 123E 42 20 30 43 43 20      DB 'B OCC '      ;2nd entry french
0287 1244 42 20 42 55 53 59      DB 'B BUSY'      ;3rd german
0288 124A 42 20 30 43 43 20      DB 'B OCC '      ;4th italian
0289 1250 42 20 4F 43 55 20      DB 'B OCU '      ;5th spanish
0290 1256 42 20 42 55 53 59      DB 'B BUSY'      ;6th dutch
0291 125C 4F 43 55 50 41 44      DB 'OCUPAD'      ;7th portugese 1.06
0292 1262 42 20 42 55 53 59      DB 'B BUSY'      ;8th spare
0293                               ;
0294 1268 63 68 48 4F 4C 44      AKQ0MES DB 'chHOLD'
0295 126E 63 68 54 45 4E 55      DB 'chTENU'
0296 1274 63 68 48 41 4C 54      DB 'chHALT'
0297 127A 63 68 50 41 55 53      DB 'chPAUS'
0298 1280 63 68 50 41 55 53      DB 'chPAUS'
0299 1286 63 68 48 4F 31 44      DB 'chH01D'
0300 128C 63 68 53 50 45 52      DB 'chSPER'
0301 1292 63 68 48 4F 4C 44      DB 'chHOLD'
0302                               ;
0303 1298 20 20 43 42 41 43      ACKBMES DB ' CBAC'
0304 129E 20 20 43 42 41 43      DB ' CBAC'
0305 12A4 20 20 43 42 41 43      DB ' CBAC'
0306 12AA 20 20 43 42 41 43      DB ' CBAC'

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0307 12B0 20 20 43 42 41 43      DB  '  CBAC'
0308 12B6 20 20 43 42 41 43      DB  '  CBAC'
0309 12BC 43 4F 4E 46 49 52      DB  'CONFIR'
0310 12C2 20 20 43 42 41 43      DB  '  CBAC'
0311                                ;
0312                                ;messages to display for calls rx'D
0313 12C8 20 20 4C 49 4E 45      MSPECL DB  '  LINE'
0314 12CE 20 20 4C 49 4E 45      DB  '  LINE'
0315 12D4 20 20 4C 49 4E 45      DB  '  LINE'
0316 12DA 20 20 4C 49 4E 45      DB  '  LINE'
0317 12E0 20 20 4C 49 4E 45      DB  '  LINE'
0318 12E6 20 20 4C 49 4E 45      DB  '  LINE'
0319 12EC 20 20 4C 49 4E 45      DB  '  LINE'
0320 12F2 20 20 4C 49 4E 45      DB  '  LINE'
0321                                ;
0322 12F8 20 20 49 46 4C 54      MIPFX  DB  '  IFLT'
0323 12FE 20 20 49 46 4C 54      DB  '  IFLT'
0324 1304 20 20 49 46 4C 54      DB  '  IFLT'
0325 130A 20 20 49 46 4C 54      DB  '  IFLT'
0326 1310 20 20 49 46 4C 54      DB  '  IFLT'
0327 1316 20 20 49 46 4C 54      DB  '  IFLT'
0328 131C 20 20 49 46 4C 54      DB  '  IFLT'
0329 1322 20 20 49 46 4C 54      DB  '  IFLT'
0330                                ;
0331 1328 50 48 50 53 54 4E      MPUBL  DB  'PHPSTN'      ;first entry is english
0332 132E 50 48 52 54 43 20      DB  'PHRTC '      ;2nd entry french
0333 1334 50 48 50 53 54 4E      DB  'PHPSTN'      ;3rd german
0334 133A 50 48 50 53 54 4E      DB  'PHPSTN'      ;4th italian
0335 1340 50 48 52 54 43 4E      DB  'PHRTCN'      ;5th spanish
0336 1346 50 48 50 53 54 4E      DB  'PHPSTN'      ;6th dutch
0337 134C 50 48 50 53 54 4E      DB  'PHPSTN'      ;7th portugese
0338 1352 50 48 50 53 54 4E      DB  'PHPSTN'      ;8th spare
0339                                ;
0340 1358 50 48 50 41 42 45      MPABE  DB  'PHPABE'
0341 135E 50 48 50 41 42 20      DB  'PHPAB '
0342 1364 50 48 50 41 42 45      DB  'PHPABE'
0343 136A 50 48 50 41 42 20      DB  'PHPAB '
0344 1370 50 48 50 41 42 20      DB  'PHPAB '
0345 1376 50 48 50 41 42 45      DB  'PHPABE'
0346 137C 50 48 50 41 42 45      DB  'PHPABE'
0347 1382 50 48 50 41 42 45      DB  'PHPABE'
0348                                ;
0349 1388 20 42 43 41 53 54      MALLI  DB  '  BCAST'
0350 138E 20 41 4E 4F 4E 43      DB  '  ANONC'
0351 1394 20 41 4E 53 41 47      DB  '  ANSAG'
0352 139A 20 41 4E 55 4E 43      DB  '  ANUNC'
0353 13A0 20 41 4E 55 4E 43      DB  '  ANUNC'
0354 13A6 20 42 43 41 53 54      DB  '  BCAST'
0355 13AC 20 42 43 41 53 54      DB  '  BCAST'
0356 13B2 20 42 43 41 53 54      DB  '  BCAST'
0357                                ;

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0358 13B8 20 42 43 41 53 54 MCONF DB 'BCAST'
0359 13BE 20 41 4E 4F 4E 43 DB 'ANONC'
0360 13C4 20 41 4E 53 41 47 DB 'ANSAG'
0361 13CA 20 41 4E 55 4E 43 DB 'ANUNC'
0362 13D0 20 41 4E 55 4E 43 DB 'ANUNC'
0363 13D6 20 42 43 41 53 54 DB 'BCAST'
0364 13DC 20 42 43 41 53 54 DB 'BCAST'
0365 13E2 20 42 43 41 53 54 DB 'BCAST'
0366 ;
0367 13E8 20 20 49 4E 43 4C MINC DB 'INCL'
0368 13EE 20 20 49 4E 43 4C DB 'INCL'
0369 13F4 20 20 49 4E 43 4C DB 'INCL'
0370 13FA 20 20 49 4E 43 4C DB 'INCL'
0371 1400 20 20 49 4E 43 4C DB 'INCL'
0372 1406 20 20 49 4E 43 4C DB 'INCL'
0373 140C 20 20 49 4E 43 4C DB 'INCL'
0374 1412 20 20 49 4E 43 4C DB 'INCL'
0375 ;
0376 ;error messages
0377 1418 20 20 53 2D 45 52 ERRMES0 DB 'S-ER'
0378 141E 20 20 53 2D 45 52 DB 'S-ER'
0379 1424 20 20 53 2D 45 52 DB 'S-ER'
0380 142A 20 20 53 2D 45 52 DB 'S-ER'
0381 1430 20 20 53 2D 45 52 DB 'S-ER'
0382 1436 20 20 53 2D 45 52 DB 'S-ER'
0383 143C 20 20 53 2D 45 52 DB 'S-ER'
0384 1442 20 20 53 2D 45 52 DB 'S-ER'
0385 ;
0386 1448 20 20 52 4E 47 45 ERRMES1 DB 'RNGE'
0387 144E 20 20 52 4E 47 45 DB 'RNGE'
0388 1454 20 20 52 4E 47 45 DB 'RNGE'
0389 145A 20 20 52 4E 47 45 DB 'RNGE'
0390 1460 20 20 52 4E 47 45 DB 'RNGE'
0391 1466 20 20 52 4E 47 45 DB 'RNGE'
0392 146C 20 20 52 4E 47 45 DB 'RNGE'
0393 1472 20 20 52 4E 47 45 DB 'RNGE'
0394 ;
0395 1478 44 49 45 52 52 20 ERRMES2 DB 'DIERR '
0396 147E 44 49 45 52 52 20 DB 'DIERR '
0397 1484 44 49 45 52 52 20 DB 'DIERR '
0398 148A 44 49 45 52 52 20 DB 'DIERR '
0399 1490 44 49 45 52 52 20 DB 'DIERR '
0400 1496 44 49 45 52 52 20 DB 'DIERR '
0401 149C 44 49 45 52 52 20 DB 'DIERR '
0402 14A2 44 49 45 52 52 20 DB 'DIERR '
0403 ;
0404 14A8 20 20 45 52 52 20 ERRMES3 DB 'ERR '
0405 14AE 20 20 45 52 52 20 DB 'ERR '
0406 14B4 20 20 45 52 52 20 DB 'ERR '
0407 14BA 20 20 45 52 52 20 DB 'ERR '
0408 14C0 20 20 45 52 52 20 DB 'ERR '

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0409 14C6 20 20 45 52 52 20      DB ' ERR '
0410 14CC 20 20 45 52 52 20      DB ' ERR '
0411 14D2 20 20 45 52 52 20      DB ' ERR '
0412                                ;
0413 14D8 20 20 49 4E 46 20      INFMESS DB ' INF '
0414 14DE 20 20 49 4E 46 20      DB ' INF '
0415 14E4 20 20 49 4E 46 20      DB ' INF '
0416 14EA 20 20 49 4E 46 20      DB ' INF '
0417 14F0 20 20 49 4E 46 20      DB ' INF '
0418 14F6 20 20 49 4E 46 20      DB ' INF '
0419 14FC 20 20 49 4E 46 20      DB ' INF '
0420 1502 20 20 49 4E 46 20      DB ' INF '
0421                                ;
0422 1508 20 44 20 53 45 54      DIVMES0 DB ' D SET'
0423 150E 20 44 20 53 45 54      DB ' D SET'
0424 1514 20 44 20 53 45 54      DB ' D SET'
0425 151A 20 44 20 53 45 54      DB ' D SET'
0426 1520 20 44 20 53 45 54      DB ' D SET'
0427 1526 20 44 20 53 45 54      DB ' D SET'
0428 152C 20 44 20 53 45 54      DB ' D SET'
0429 1532 20 44 20 53 45 54      DB ' D SET'
0430                                ;
0431 1538 20 44 20 43 4C 52      DIVMES1 DB ' D CLR'
0432 153E 20 44 20 43 4C 52      DB ' D CLR'
0433 1544 20 44 20 43 4C 52      DB ' D CLR'
0434 154A 20 44 20 43 4C 52      DB ' D CLR'
0435 1550 20 44 20 43 4C 52      DB ' D CLR'
0436 1556 20 44 20 43 4C 52      DB ' D CLR'
0437 155C 20 44 20 43 4C 52      DB ' D CLR'
0438 1562 20 44 20 43 4C 52      DB ' D CLR'
0439                                ;
0440                                ;message displayed for npd
0441 1568 20 20 44 41 54 41      DATMES1 DB ' DATA'
0442 156E 20 20 44 41 54 41      DB ' DATA'
0443 1574 20 20 44 41 54 41      DB ' DATA'
0444 157A 20 20 44 41 54 41      DB ' DATA'
0445 1580 20 20 44 41 54 41      DB ' DATA'
0446 1586 20 20 44 41 54 41      DB ' DATA'
0447 158C 20 20 44 41 54 41      DB ' DATA'
0448 1592 20 20 44 41 54 41      DB ' DATA'
0449                                ;
0450                                ;message displayed when mobile sends received data to pc in npd
mode
0451 1598 20 44 41 2D 50 43      OPMESS DB ' DA-PC'
0452 159E 20 44 4F 2D 50 43      DB ' DO-PC'
0453 15A4 20 44 41 2D 50 43      DB ' DA-PC'
0454 15AA 20 44 41 2D 50 43      DB ' DA-PC'
0455 15B0 20 44 41 2D 50 43      DB ' DA-PC'
0456 15B6 20 44 41 2D 50 43      DB ' DA-PC'
0457 15BC 20 44 41 2D 50 43      DB ' DA-PC'
0458 15C2 20 44 41 2D 50 43      DB ' DA-PC'
0459                                ;

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0460                                ;ackv(0) message
0461 15C8 4E 4F 52 45 50 20 AKV0MES DB 'NOREP '
0462 15CE 4E 4F 52 45 50 20 DB 'NOREP '
0463 15D4 4E 4F 52 45 50 20 DB 'NOREP '
0464 15DA 4E 4F 52 45 50 20 DB 'NOREP '
0465 15E0 4E 4F 52 45 50 20 DB 'NOREP '
0466 15E6 4E 4F 52 45 50 20 DB 'NOREP '
0467 15EC 4E 4F 52 45 50 20 DB 'NOREP '
0468 15F2 4E 4F 52 45 50 20 DB 'NOREP '
0469                                ;
0470                                ;recall from qikstore
0471 15F8 20 20 52 43 4C 20 RCLM DB ' RCL '
0472 15FE 20 20 52 43 4C 20 DB ' RCL '
0473 1604 20 20 52 43 4C 20 DB ' RCL '
0474 160A 20 20 52 43 4C 20 DB ' RCL '
0475 1610 20 20 52 43 4C 20 DB ' RCL '
0476 1616 20 20 52 43 4C 20 DB ' RCL '
0477 161C 20 20 52 43 4C 20 DB ' RCL '
0478 1622 20 20 52 43 4C 20 DB ' RCL '
0479                                ;
0480                                ;save to qikstor
0481 1628 20 20 53 54 4F 52 STORM DB ' STOR'
0482 162E 20 20 53 54 4F 52 DB ' STOR'
0483 1634 20 20 53 54 4F 52 DB ' STOR'
0484 163A 20 20 53 54 4F 52 DB ' STOR'
0485 1640 20 20 53 54 4F 52 DB ' STOR'
0486 1646 20 20 53 54 4F 52 DB ' STOR'
0487 164C 20 20 53 54 4F 52 DB ' STOR'
0488 1652 20 20 53 54 4F 52 DB ' STOR'
0489                                ;
0490                                ;spare message
0491 1658 20 20 4F 4B 20 20 OK DB ' OK '
0492 165E 20 20 4F 4B 20 20 DB ' OK '
0493 1664 20 20 4F 4B 20 20 DB ' OK '
0494 166A 20 20 4F 4B 20 20 DB ' OK '
0495 1670 20 20 4F 4B 20 20 DB ' OK '
0496 1676 20 20 4F 4B 20 20 DB ' OK '
0497 167C 20 20 4F 4B 20 20 DB ' OK '
0498 1682 20 20 4F 4B 20 20 DB ' OK '
0499                                ;
0500                                ;spare
0501 1688 20 20 20 20 20 20 DB ' '
0502 168E 20 20 20 20 20 20 DB ' '
0503 1694 20 20 20 20 20 20 DB ' '
0504 169A 20 20 20 20 20 20 DB ' '
0505 16A0 20 20 20 20 20 20 DB ' '
0506 16A6 20 20 20 20 20 20 DB ' '
0507 16AC 20 20 20 20 20 20 DB ' '
0508 16B2 20 20 20 20 20 20 DB ' '
0509                                ;
0510                                ;short messages

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0511 16B8 44 52          DR          DB  'DR'
0512 16BA 2D 2D          DSHDSH     DB  '--'
0513 16BC 63 68          CH          DB  'ch'
0514 16BE 63 41          CA          DB  'cA'
0515 16C0 53 54          ST          DB  'ST'
0516 16C2 4E 55          NU          DB  'NU'
0517 16C4 54 45          TE          DB  'TE'
0518 16C6 4C             L           DB  'L'
0519 16C7 44             D           DB  'D'
0520 16C8 63             C           DB  'c'
0521 16C9 52             R           DB  'R'
0522                      ;spare
0523 16CA 2B 2B          DB  '++'
0524 16CC 2B 2B          DB  '++'
0525 16CE 2B 2B          DB  '++'
0526 16D0 2B 2B          DB  '++'
0527 16D2 2B 2B          DB  '++'
0528 16D4 2B 2B          DB  '++'
0529 16D6 2B 2B          DB  '++'
0530 16D8 2B 2B          DB  '++'
0531 16DA 2B 2B          DB  '++'
0532 16DC 2B 2B          DB  '++'
0533 16DE 2B 2B          DB  '++'
0534 16E0 2B 2B          DB  '++'
0535 16E2 2B 2B          DB  '++'
0536                      ;
0537 16E4 20 20 54 45 53 54 TESTMSG DB  ' TEST'
0538                      ;
0539 16EA 50 20 54 45 53 54 PRTEST  DB  'P TEST'
0540                      ;
0541                      ;
0542                      ;4 character error message block
0543 ERDIS
0544 16F0 20 45 53 4E          DB  ' ESN';error 0, no valid ESN
0545 16F4 50 45 52 53          DB  'PERS';error 1, no personalisation
0546 16F8 4E 4F 49 44          DB  'NOID';error 2, no individual ident
0547 16FC 20 44 49 52          DB  ' DIR';error 3, no ident in DR01
0548 1700 43 48 41 4E          DB  'CHAN';error 4, no channels in channel table
0549                      ;
0550 1704 20 20 42 41 54 54 BATLOW  DB  ' BATT'
0551                      ;
0552                      ;
0553 170A 40          RSSITBL DB  $40 ;00-20 is dots=
0554 170B 60          DB  $60 ;21-40 is dots=.
0555 170C 80          DB  $80 ;41-60 is dots=..
0556 170D A0          DB  $A0 ;61-80 is dots=...
0557 170E FF          DB  $FF ;81-ff is dots=....
0558 170F 00 01 02 03 04 DB  0,1,2,3,4 ;message number
0559                      ;
0560                      ;
0561                      ;end of message block

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0562                      ;
0563                      ;-----

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Assembled OK without errors