ADVIA 560 SERIAL PROTOCOL 3.1

INTRODUCTION

The new 3.1 protocol was introduced to simplify the receiving, parsing and storing data records. The byte stream is a human readable ASCII character stream, with occasional control characters. Most programming environments are able to handle this stream as a simple ASCII string or text. The stream is line-oriented with special characters to separate fields. The protocol has a single format for transmitting a single measurement record. If more records are sent, they are simply chained together one after the other.

CHARACTERS AND BASIC STRUCTURE

The byte stream uses the ASCII characters in the range 1..255 (http://en.wikipedia.org/wiki/ASCII), or 0x01..0xFF in hexadecimal.

A record transmission consists of three parts: a small header, a big text body, and a small footer.

A transmission always starts with the control character “Start of Header” (<SOH>, 1, 0x01).

The second character is a counter: it will contain a single uppercase English letter in the range “A” to “Z”, incrementing with every record. The first record will contain “A”, the second will contain “B”, etc. If the instrument sends many records without being turned off, the counter will overflow from “Z” to “A”.

The third character is an identifier: if the instrument is an A560, it will be an uppercase “A”.

The fourth character is the control character “Start of Text” (<STX>, 2, 0x02).

The fifth and consecutive characters form the body of the transmission. The body may contain characters from the printable range (32..126, 0x20..0xFF), and the control characters “Horizontal tab” (<HT> or <TAB>, 9, 0x09), “Carriage return” (<CR>,13, 0x0D), and “Line feed” (<LF>, 10, 0x0A). The body contains several lines separated by a two-byte sequence <CR><LF>. See below for the detailed description of the contents.

The body of the transmission is closed by the control character “End of Text” (<ETX>, 3, 0x03).

The footer consists of a two-character checksum in a two-digit hexadecimal form. The checksum is calculated by summing up the values of all characters in the message header and body, including the beginning <SOH> character and the last <ETX> character, adding 255 (hex: 0xFF) to it, and keeping only the last two hexadecimal(!) digits.

The last character of a record is always the single control character “End of Transmission” (<EOT>, 4, 0x04). There is no terminating “NULL” (<NUL>, 0, 0x00) character at the end. The next record can start right after the <EOT> character.

NOTE: Protocol 3.1 when used on ADVIA 560, expects an acknowledgement message. Please use the “ACK” message (composed of the following ASCII codes: 65; 67; 75). Without this acknowledge message, communication from the ADVIA 560 will STOP. Sample transmission **is not** repeated 3 times as it is with other analyzers and protocols.

DETAILS OF THE 3.1 PROTOCOL

The body of a transmission is line-oriented, separated by the two-byte “Carriage Return” “Line Feed” (<CR> <LF>, 13 10, 0x0D 0x0A) sequence. A single line might contain one or more fields, separated by the “Horizontal tab” (<HT>, 9, 0x09) character.

The following lines are usually composed of an identifier field and one or more value fields, all separated by the <HT> character. The **characters in bold** appear in the transmission exactly as written, without any variance between records. Control characters are marked with the < and > characters, for example **<HT>**. {Comments} are marked with { and }, and are not included in the actual transmission. For a more detailed discussion on the meanings of the various parameters and histograms, please refer to the instruments’ user manuals. Please note that this is a general protocol description and Advia560 does not use all the protocol features.

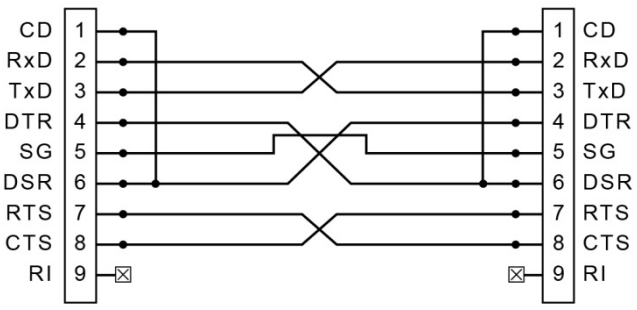
header1	{header1 to header8 are the lab header lines}
header2	{these lines are defined by the user in the instrument settings}
header3	{any or all of these lines can be empty}
header4	
header5	
header6	
header7	
header8	
Serial No.:<HT>serial	{serial is the serial number of the instrument}
RecNo:<HT>recno	{recno is the internal record number }
Sample ID:<HT>sampleid	{sampleid is at most 20 characters long}
Patient ID:<HT>patientid	{patientid is at most 15 characters long}
Patient Name:<HT>patientname	{patinetname is at most 32 characters long}
Mode:<HT>mode	{mode is the used profile/mode name (blank, human, male, female, dog, profile1, profile2, etc.) }
Doctor:<HT>doctor	{doctor is at most 16 characters long}
Age:<HT>value**<HT>**unit	{value is a number of at most 3 digits, unit is either „years” or “months”}
Birth(ymd):<HT>birthdate	{birthdate is an 8 digit number, format: yyyymmdd}
Sex:<HT>gender	{gender is „Male”, „Female”}
Test date(ymd):<HT>date	{date is an 8 digit number, format: yyyymmdd}
Test time(hm):<HT>time	{time is a 6 digit number, format: hhmmss}
Param<HT>Flags<HT>Value<HT>Unit<HT>[min-max]	{this is a header line, always the same}
param**<HT>**flag**<HT>**value**<HT>**unit**<HT>[**min-max**]**	{there are several similar lines according to the number of the measured/calculated parameters. “param” is the parameter name, possible values are (in sequence): WBC, RBC, HGB, HCT, MCV, MCH, MCHC, PLT, PCT, MPV, PDWs, PDWc, RDWs, RDWc, LYM, MON, NEU, LY%, MO%, NE%, EOS, EO%, BAS, BA%. “flag” is a single character indicator and can be ”(space)”, “+”, “-”, “E” or “*”(asterisk). “value” is the measured parameter value, exactly 4 characters: number with a possible decimal dot, padded with spaces on the left side, or 4 minus signs “----”, or 4 spaces “(space)” **“**unit” possible values are „10^9/l”, „10^3/ul”, „10^12/l”, „10^6/ul”, „fl”, „%”, „g/l”, „g/dl”, „mmol/l”, „pg”, „fmol”, depending on the parameter “min and max” are the lower and upper bounds of the normal range, padded with spaces on the left side}
Warnings<HT>Warning letters	
Flags:<HT>flags	{flags is a series of characters indicating errors, at most 32 characters long, upper or lowercase letters „a” to „z”}
WBC graph	{always the same, indicates the beginning of the WBC histogram}

Scale(fl):<HT>wbcscale	{wbcscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 400}
Channels:<HT>wbcchannels	{ wbcchannels is the number of channels (columns) in the histogram, always 256 }
WMarker1:<HT>wm1	{wm1 is the first WBC discriminator channel (RBC/WBC) }
WMarker2:<HT>wm2	{wm2 is the second WBC discriminator channel (LYM/MON) }
WMarker3:<HT>wm3	{wm3 is the third WBC discriminator channel (MON/NEU) }
Points:<HT>ch0**<HT>** ……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always wbcchannels values here (usually 256) }
RBC graph	{always the same, indicates the beginning of the RBC histogram}
Scale(fl):<HT>rbcscale	{rbcscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 200}
Channels:<HT>rbcchannels	{ rbcchannels is the number of channels (columns) in the histogram, always 256}
RMarker1:<HT>rm1	{rm1 is the RBC discriminator channel (PLT/RBC) }
Points:<HT>ch0**<HT>** ……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always rbcchannels values here (usually 256) }
EOS graph	{always the same, indicates the beginning of the EOS histogram}
Scale(fl):<HT>eosscale	{eosscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 400}
Channels:<HT>eoschannels	{eoschannels is the number of channels (columns) in the histogram, always 256}
EMarker1:<HT>em1	{em1 is the EOS discriminator channel (WBC/EOS) }
Points:<HT>ch0**<HT>** ……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always eoschannels values here (usually 256) }
PLT graph	{always the same, indicates the beginning of the PLT histogram}
Scale(fl):<HT>pltscale	{pltscale is maximum 3 digit number, indicating the fl value of the last channel, value is usually 50}
Channels:<HT>pltchannels	{pltchannels is the number of channels (columns) in the histogram, always 256}
PMarker1:<HT>pm1	{pm1 is the first PLT discriminator channel (PLT start) }
PMarker2:<HT>pm2	{pm2 is the second PLT discriminator channel (PLT/RBC) }
Points:<HT>ch0**<HT>**ch1**<HT>**……**<HT>**ch255	{chxx is the histogram height at a given channel (range 0..255), there are always pltchannels values here (usually 256) }

D9 Null-Modem Cable Wiring Diagram

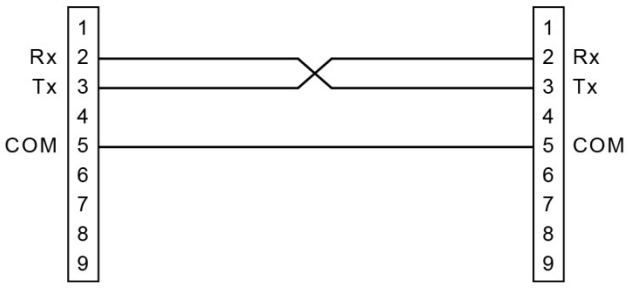
The serial connection for the ADVIA 560 uses the null-modem cable. When connecting the null-modem cable either of the two schemes below will work.

Schema 1:



D9 Female D9 Female

Schema 2:



Sample transmission

```
<SOH>BA<STX>
Serial No.:         510000
RecNo:              5845
Sample ID:          0
Patient ID:         1
Patient Name:
Mode:               Human
Doctor:
Birth(ymd):         19990101
Sex:                Male
Test date(ymd):     20100322
Test time(hm):      140800
Param               Flags     Value     Unit          [min-max]
WBC                           11.49     10^3/uL       [3.00-15.00]
LYM                           1.63      10^3/uL       [1.00-3.70]
NEU                 +         7.86      10^3/uL       [1.50-7.00]
MON                 ++        1.78      10^3/uL       [0.00-0.70]
EOS                           0.02      10^3/uL       [0.00-0.50]
BAS                 +         0.20      10^3/uL       [0.00-0.15]
LY%                 -         14.2      %             [21.0-50.0]
NE%                           68.4      %             [37.0-72.0]
MO%                 +         15.5      %             [0.0-14.0]
EO%                           0.2       %             [0.0-6.0]
BA%                 +         1.7       %             [0.0-1.0]
RBC                           3.78      10^6/uL       [3.50-5.50]
HGB                 -         6.1       mmol/L        [7.5-10.8]
HCT                           28.9      %             [26.0-50.0]
MCV                 -         76.5      fL            [86.0-110.0]
MCH                           1.6       fmol          [1.6-2.4]
MCHC                          21.2      mmol/L        [18.6-21.7]
RDWc                          14.4      %             [0.0-16.0]
RDWs                          54.5      fL            [0.0-0.0]
PLT                           182       10^3/uL       [50-400]
PDWc                          34.8      %             [0.0-0.0]
PDWs                          22.2      fL            [0.0-0.0]
MPV                           10.5      fL            [9.0-13.0]
PCT                           0.19      %             [0.13-0.43]
Warnings:           L
<ETX>02<EOT>
```

The body of the record is closed with the control character “End of Text” (<ETX>, 3, 0x03).

SERIAL PROTOCOL 3.1 EXTENSION FOR IMAGE SENDING

The Serial Protocol 3.1 has been extended for image sending. The protocol is capable of sending histogram and scattergram images. The following example demonstrates the four image data:

DiffImage iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAYAAABccqhmAAAABGdBTUEAALGPC/xhBQAA
ACBjSFJNAAB6JgAAgIQAAPoAAACA6AAAdTAAAOpgAAA6mAAAF3CculE8AAAUjElEQVR4Xu2di5blKM6s+2HP45x
3nj+VlVEdrZQAs7HNJb41WoAkMNgK77zV9D//E2I3VNXN7Hur/v/iR2vd/9PnlLi2ugd6nEIcjF4AQhyMXgBCHIxeAEI
cjF4A4lxU/boFQpyMXgBCHIxeAGJ+VKW3oVsrxMHoBSDEwegFIPZEld2EbpN4jyeqTxVeRLdnN1b/R1DiUVQtQhy
MXgBCHIxeAEIcjF4AO6Dv+0UnqhyxH6rqZnSrxFqoYoei2ynEwegFcCJv/8xAVTcNehTiTHzlH6oEvQDEPlg1f1rRhylC
LwCxH6rqZnSrxLmo+nULxMaouqvoFon9QFW3VHeWc4gy9AIQ+2FV/Wll6wUglmSHfxfwyRGiud6nqv+LboVYh1K
19saMT+YuzubHE1Ogf604LXoyYh5GVqNfS5Ueotsi1sOq9mrlRvned6AaDjyymJ5aVVr8ing5FvWjuaX1NuKQY4rHm
e1fHNbGh6LbIP4w8w/qRmyN17A+G4h8m3PQUcVytFSnz7kyR9WvWyBeZkQF+jVsDCsRxWtzNuOw44otaBX21e
o+UA16AezOSX8anOWV5luM459eazE2OYYQP6CirwiZc/24FT+nZ40XWGSbYguuVlspn2NZP8LitZyD0K0Qe5BVshc
8+qX8iMyfcTX/JRbZpjgWX6EtFWs5yIvyOZ5Ri2/CIccURa78oDDLveuHjaVlEbP26uV9fm3+1fUXYdNjiaXoFW9pnsU
4jjGbJ/IZmf9OHrrmG0cTu1L7KqAU9jEbw4xSiz7gsc+LciM/05Jj1OITsuCWF2KH38G/Te8ttHmYy32jd80N0a0Q68C
CZrIqvlLdfm1rYYD7IPItxOLbF1vTU502BwYiX0QtDnwexi3XmIzFtiuW4NNvfa5O53zfh3kin5H5DcR8TmnO5Cy8dbE
9Vp1coTzO/Ab3jShWyjFszFajNW8yFtyy2JqeioT4ornw+RzfGuzL8tACHvvYAiy4ZXEUVqFRlXofj33fG8j8Bvt8jCnFFm
Dx7YttaRFfhs2BMezj9qovoxafkAW3LJpZ5e8QsE3ebtZnzB/lwe9j0Zj90Rj42CZsdhyxBV54IKpW80U53HoDpbH3gy
xnUTY4gjgGL8SoZXw+m8Fxg/2+zz7DjxdlgyOIS7R+W4C8t7+NwOWt5a34MWA/+uwzsjj7IzL/wmx4JLEFUWWaD3
5uvd/7GB9nA5kPoM8+xvuzvAmYeGviKFhUkYA4zq0RxQ34OW54P8cA+7llY/zYiHyTscAWxdZcqUDLRT632Ro+JzO
P90V50Twj80/KYtsV2xOJzSj5fGtY35sRjdGiz8DvzUBrcH8hFt22eIVRPxAsLYNYa05kRuRnA+hzyzncN7w/ii3EglsWx1
ASl41hgH3wex+bEfkjM7hvcN/w4wVYcMtiWzJB+RZEfuu3mMF9I/ODLB7llriafyMTbUUMZ5U/Bb6KHYuPhj78kRm
R3xvgccnPY4P7C7DYdsWx1MTGcTbD99FGZvixEfV968n8E7HAFsX2cBX6irRxrUqRw2aUfAzneDN8n1sDcfYZPucJLl
7nqW0J0U5UleaLzEDr8f5oDDO49THDxw2OA45PziLbFMfAFYm+93k/+wyfk429Hy37DfZFMW5buZp/E5NsQ4gvv
LBgGVk+zODW+6MY+43SmP2MnzMxi2xTHAeLiKuUfVEO+wyM2YzIXzIGY+/31OITsMAWxfFYlWbmiXLMDD82ojF
ab4D7BsalHJDNfYmXLy/ERUois3GLGZHfzLjqN7i/EItuWyzFp1UGsfl1MGa/z436mRm+jzbyG9xfkMW3L7alVJmZAK
2PMfpsRovPm5H1PZl/UhbbrtiW1kqE+HrNQGt4P5tR8hlomZovir/ERFsRogKq1bcG+1rM8GPAfsT82ODYoiy8dTGU
Wf/hkBecNyPyZ2ZE/lYDPGa/4cdGS84LTLINMQW9L4HRVcTrRX1rYQaPI5/BY+9H2+IzuG/48UIsvHVxFJHoMt9dZvj
2Lu5e/4eHLiOmJvvkn+XbAtsGzMN+zrvLDN8aPs6xXkasUeGBS4gpWfX/LATb9q1h/StmRH6Ygdbj84zINzkLbVU8z
mwviUhc8MEf9VvNaPUD7jOZfzIW2aY4klahlcyI/C1mcOstg2OlvAmYfHtC/OBFh3HJx22rAfR9a3Df8GMj8hmZ/yU
m245Yihm+RbAtsBne94kZaA32b8BGRxHDmUXgpdaw/igzSn7GjxdkgyOII4jEBx+3LWZw62OG90Vj0OKflMm3J4q0
fkKP/iR/omr4GuhHPsP6V82I/JEBHrMf+NwX+eeftg28vE0hKliFemGxL4v1moEW+By2Hnrn3cBEWxHih6wq2Y++tZ
8Yk8Uz/wZsdBQxHSOqi9dAP2rZDO8rmcF9hn2+n81ZiMW3Lx7lzWrx18bYWt9nM1r8BlqDY+wHPndRFt66eISZfhV
oWB/jqM3i3gxuIzO4RR/w2McWYdFtiy3orT7M8wL0ZkT9UszwfbToAz9mruS+yKTbEttxpdKyXPitvWJGzWdwH/A4
ii/OZscRr/HUtwr+MhBlqwH02Wf4XB6zfxM2O47YHq5Y9Ln1ffYBH4MZUZ99hvdxbDEW3ro4Hq5eCLJkBrc+ZkRjw
H0m89/B4Gs9uXUhylytRsuHGTyO/EYUQ4s+k/k3YeOjia3gSkUf4mQzSuOSGVHLcU/mX4TFty+OBFXLre/XzKj5D+C
QY4pl8WJE37dG5vNmRH2MgR97OF7LHcEN13hi20L85tPKs/kwg8fejKjPY4+PcRvlt8DzetcwPpnrGLiUEAlXqyzKZ5/
vwwxuvT+yDMQ4J/L1MmKNAUyyDSECatVp8ZoZWd/IcjyRr0bPnIdZYIviWLwgfbXy2PdrBnhc8nPM8ONF2eQYYjk
+qTwIkg1EMZhxxZdRii3GRkcRRxBVLPusDzN47H2GbwHnGD7eQjSnZ50bmWw7QiRklcp+60cGMh/jx1eI5ras98k1
P+TFS4tpufIv+56oILsGX8f3MUa/xwfYF8VHcufajUywBSEayCoVIoUZvgXshxk+D3h/lrcwGx5JbAdXaalifV5kIBpzC6K
cjdjwSGJ7rGrZDN8aHAec52MlarlX15uEBbcspmNk8WfrZNeAD3EeM7VxiSu5o3jomm8cbQit/+kj8SFv/L8C+0vaG
MZg7P0Gx3yffQz7ovgI7lq3k8m2I8QPmUBhDMYtcW4zonjPnAVYdNviFXqr5dMqK83nmM+zMZvR2tbwea3zmJ45
g5lgC+I1ZviPfvRg22YzojGT+Y3IF9GaB1ryr645mJcvL0QjqFRrYaDW9/meUmxzDj66SJn9K4NI0Nm45SjRep7Sei3Xm
JSFty62oKUCSzkWgxl+nFGL38XA6474Tdhbt0GIz0DlZhVs/lqOwTlZXmn+4mx8NFFl5afv927jyNfStnAldyE2PZYYzh
OV0nINy4nyanOf2P+C6LaIuSlVqMU47vs+Ln6x/e3RnwxvBB6lb0dyWLlIHWIdSsI3X+aP8P4sz9Oa18ro9S7y8uXFltx
RVVizZW3O4XnR3Jb1Nubw44upaBEoxuy3fjTXyPygFt+cw48vlqVX8EaU06OEDdSzwRHE8Vyt4pb8KGdDtegFINbB
qvVuYR6mCL0AxFygIkcIvae6D1PEYccVj+Kr681qK137jX1NorxJtiGm4K1qwHXvun7Puoco45BjitcYXWFX1styVfV/0

a0Q47mrqkavq+rXLRAvcaXyRlTpgDX++X/7yUUvAPEuXIHot1TlqMotrLOj4D37n1D0MaIysjWeqLqr16jk7/oy2PNU
4g93Pt0ra7fmtuRFOT3n7JmzIboNK6On14buU4puze5cecJ3VYOtO0Olqdp/oVtyEnc87RFrzrJGA7v9LGCv04j3GC3i
uytTlf+NboP4nCeFm2HX9de+sJdRn+yrfYWw1m7FfIyqoIUqcadvA/QCOJkZnn7DHq4IbrQ4dxJ7xN6nE9d4ohpwja/
2sriu7q+Uf3WtgGz/K7001tmpyFnhKS6wxx7hrv4Vgl4AYjtaRRnled/qAq+hF8BkHPlfMsqO/NatCK6764vgwGoTt7J
gRbV8JfCXzRSjF4DYjiuf1v/JzTT/lXNlzZXQC0C8ytvC2lncLegFIPp5uXog3JqAo3iL8Dmnlrsqe55KzAtVXE2EPaJrnTM6
b1X2Pp14HC+YNwT0qbjN/8a+32DpUx75K7NZcY9iJgHxXtCP9neK6JnzTix+s1kVmJAj0QOMI8H7ubtzzknFf1nsyV8
R5S+BfzUQ9q8YEfl257wTn0TP070wZ7RgSuJkOA8GOMZEuVf5ZO6s7HeiUznsSdbEiLjPszH7srxPGb3eXayxS1Hm0
KfoxWutFx58HPOt4fs8rnEldzbW3bkQX0QihoB5zK2v+r/+Azn35Dsw4uk1rPG2QH4J+Ivvvv3vq432x35uI7/BfRD5d
mP/E4pXGCEev4aN2cdj3xpR3ICffZ5SLKNnztust2Pxhwee3KwFjX1Zy31uDcTZBziW5ZzAmacWRWYQQ7QH+P7Gv
hrrcy6PvZ/hHB87ie1Prj8X3oNMzCzgrF+ilNMyf3X2P6GYlisCY0Fz3/B9HnuiWCl/d849uZgSL0YeW79FwFmepyVnd
3QHxFSwKH3fCxbjUp6fY0S+U9GdEM2UhNMjqmwO/Nz6XB/jHD+u0Zq3I+eeXEwFizeC/db3edE8P4fbVq7mr8bep
xPL4AVqLYvP9zmPycbeL/6guyKaGS2iaD3zeWsBebV8jl9Zf1fOPr34iF7xlETo16zFgc9jMr/4ujc/rWhAf1NUFtoo/DX
89TCO/Fmu4WPi6578tEuhv+7bn6viHgHWG73uzJxzUvE6LKxWkVmez83mtq7J9MzZibNPL7qpCYfjo0Tm14nWbck
R/6K7Ix6hJMRWkdYEb32f07r2ncywh4x5dyaW4GpxI5/nldbwsavXKzFyrVXRHRBTYaKMhAmfb2u05LWutSPnnlx8
M7L4/Vo2Zl/vtTCvdf7V/JPRHRJdZOKaWXS8N70c/qC7IKrcLZbS+ohJsPeguypCWHB3iI+FHfUZ9kVxI/O38un8VTnz
1OIVRois5WUg2tniDvKfBuvPhMuURPOUoEZfx9bTy6AP3bXNmUEYvAf0fVsjym+d6+mdtyO6E+KbmsCs3yKclhwQ
5V6ZLz5nmrs985fuJ35XASH6tpVeIX/6Avh0/mnobh2KCSUTy1W/wbFo7da5JZA3Yi3xB92tRu7+KqB1/Se+GsmElo
mr5s/iTHSt2ryWdUWZae7g6d8CXLlGlmv+VlFEa7TMrQmzdQ0xB3oSH1ISbouokcO5V9c0X2lOL5nYRwtYL4T3OPb
Otwou4g6xjeKTs0DwEKRvP4HXBSPWFZ+hJ/AAXpRPvkCya/9H+D7nR6yRQOHrEW82x/t5PPI64je6Uw/RK3qb1zI3
ysHcb/sSBY89f3N+rIUsrzQ/irVez9M7T/yL7iDBwohEUuJq/h34PXyL+sciTEAc94Kqja8gsc7Jck/lzd8W1C7durVRR8j
Wgd9anwNfFDNYqFE/E3KvwP283nVEH9Pe7V6ht8wLC7/hcsjJclvWiOidx9gaMMBj34LvnC/Roc3oibE/64t30ZOoE
AkG+Nid+Oti7PeAGNu3/0t0f30//Yzv+I8B9H3LZHN6+GSuaOeou8xFXxLAE0CMLfg8fw6/lvfxGL6MHgEjT6Jdj2Oe
WPStAVw1UfTSsm6Ww36fg7G1MD/+ti9B/vJ9GYjGq6GXzmccdfd6fj5Qm4J4lleabzGe78fcGpwDy/xmHEMfRL5PK
YlRQp0TPZUCLJIeofg50Rp8DbSlPlvmZ0MO8/2VwY8gfawHCX9d9HQ6YeGw2Bj4EYtyPFE+fJHV4r/MCdJ8GX9fEhU
RfxoX7/HKk3nzd/lX4G1CQIyPR8BfmsuYn+e0GEDfx+E3uF9ihGhb1rhyHb1IxqM7SmTiaBVNCb+GjeHj9hMD3BeihE
qlgheYFxfHQCkXLRvw/h4D3I/o/TR9el4NfVXwGcvdvd6/9LtKJKiedTEPc3kMn8FjjnvjOOB+idF5Yn2OedS9RX1FNGz
wMeyvGfLQeoMf+BjwYyGYacrjzh8M8tIQCXzRZTme4XNK/VoeciJDHK03xo+FqDFNydz9m4ERy7Po0K+ty3mRteSY
cZ7vC9HLkiX05q8RWYAR7OfcUt+bj5WoxVt584dp+kHee2x750vCiMRVy4+I1sAYfe8DPmZwXhQ3/NhzNT+jd55Yi2
kf8wp/LGRbjASX+SI/E+VcIZubfcK2fPLq03lvjnm6pRcKCy8V0U+Ozyv5Ij/jx3fA14iu98QexLws/fghamtHfMXQsgTn
WN/PwThbqxbvZfR64gy2Lxv/Yvj3pfHd/KU0Rr/mM2ycxUDmF+JppijFEZ/eNX6/CH46jUT57Mv6QszMVqXa+iIppS
FmbauQfV7rPCHe5vFSzUT6xFcBES2XlaDFrixf2vziQL/3ZXK30PUiEbPxakl6ofYLtzyvHv/XrnA1X4jZuL2Er4jT59q4Nr
8HLFlb+oZLD1/zjj2Kc5i6fPgF0PoiGPHCaFliwGWEeJ3Hy/ieT/T2NVcQrl4u4ikeKTX/Ke5bg30t/itk8zqXE2IbbpNAJLp
MxN7H4yjfyPyjwPI3X0aIVxla3pmQs9bwc4woz5PllPzeJ8TpPKYIFl/WB1HctyDzCyHqPKoaE2km1ChWEnUUY9+f9X
4GHzBiDSFm5Zby/iO+/i+5s/mINdmf5Qgh/stwpUB8JaHCWqnNyWJZvhDiD0MVAiFCeD0CjOZG65jP50Z5QoicWxT
jhRgJM/PBj37Jx37Gj5lSTIjTGKqGSIgwjEHUR240ZovI/EKInKGq8SIsCbZEtA6Trdl7PSFO5Ta1QIhRm4mU/aU8IcQYbl
VYi9CNktD1EhDiPoaqi8UaCbfmQ99anxvNFUJ8hlQlxME89gKIPumFEO9yuxIldiHmReoU4mD0AhDiYPQCEOJY/ve/
//wPoJEUgbjXLGgAAAABJRU5ErkJggg==

BasoImage iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAYAAABccqhmAAAABGdBTUEAALGPC/xhBQA
AACBjSFJNAAB6JgAAgIQAA.....QGMKABo7VAD/+I9w+FNOJVoRwN8gydCYAoDGFAC09e+//wGlW2IS0WRbdAAA
AABJRU5ErkJggg==

RBCImage iVBORw0KGgoAAAANSUh..../y+xuW/62tzotAMt9tCIA6e9b/plZhX377b+aJgCPvfssywD89t/e/D9m9
m0///obn/T80JZtg+oAAAAASUVORK5CYII=

PLTImage iVBORw0KGgoAAAANSU……AwAYBgAgDBBACCCQAEEwAIJgAQTAAgmABAMAGAYAIAwQQAg
gkABBMACCYAEEwAIJgAQDABgGACAMEEAIIJAAQTAAgmABBMACCYAEAwAYBgAgDBBACCCQAEGyoAP97e7gPa
6D4Af4

A png based image data starts with a keyword (DiffImage, BasoImage, RBCImage, PLTImage) then following a TAB character and finishes with a new line character. The Diff observation is complete, Baso, Rbc and Plt segments are not complete in this example due excess space requirements.

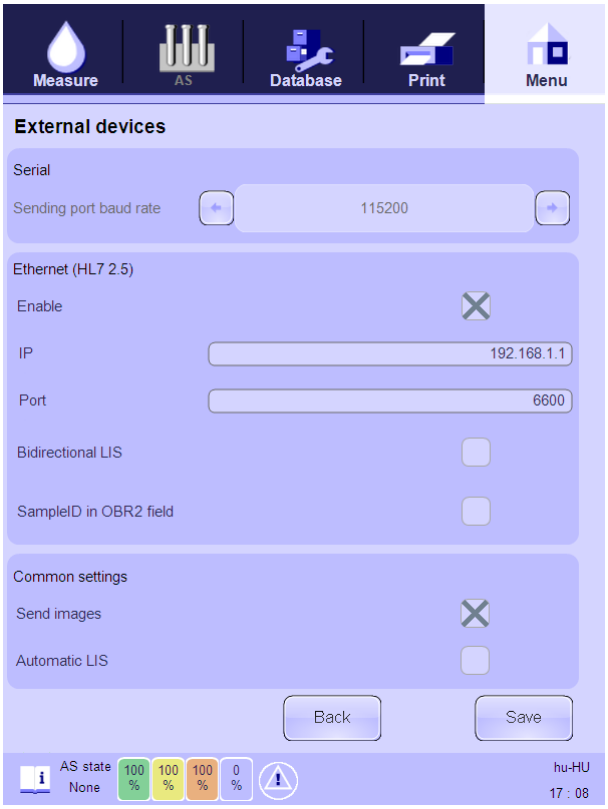
The data are derived from png file by Base64 encoding. Pictures can be retrieved via Base64 decoding.

After the last channel value in the PLT histogram the body of the record is closed with the control character **End of Text** (<ETX>, 3, 0x03).

ADVIA 560 - HL7 PROTOCOL (HL7V2.5)

ADVIA 560 is able to send measurement results to and receive so-called “work lists” from a remote computer. To activate and use this feature, the instrument needs to be connected to a HL7 capable server directly or through a computer local area network (LAN).

ADVIA 560 SENDING MEASUREMENT DATA TO THE SERVER



Setup:

Go to Main > Settings > External Devices.

The following data have to be selected:

- Ethernet (HL7 2.5) **Enable**
- **IP** address of the HL7 server
- Communication **port** of the HL7 server
- Send **Sample ID in OBR2 field**

Upon selecting and saving the above settings, ADVIA 560 is ready to send measurement results to the server.

Usage:

If **Automatic LIS** is enabled sending data takes place automatically at the end of each measurement. Sending data can also be initiated by the user selecting the “Manage records/Send to LIS” button through the database.

The following is an example of a HL7 message v. 2.5 of ADVIA 560:

MSH|$~\&|Advia560$ XYZ_ID||||20091202095847||ORU$R01|AS_378_A560|P|2.5|28461

OBR|1||1234$LAB|88304

OBX|1|TX|WBC||50,86|$10^3|3-15||||P

OBX|2|TX|RBC||0|$10^6|3,5-5,5||||P

OBX|3|TX|PLT||0|$10^3|50-400||||P

OBX|4|TX|HGB||0|$g/l|120-174||||P

OBX|5|TX|LYM||0|$10^3|1-3,7||||P

OBX|6|TX|MON||0|$10^3|0-0,7||||P

OBX|7|TX|NEU||0|$10^3|1,5-7||||P

OBX|8|TX|EO||0|$10^3|0-0,5||||P

OBX|9|TX|BAS||0|$10^3|0-0,15||||P

OBX|10|TX|LYM%||0|$%|21-50||||P

OBX|11|TX|MON%||0|$%|0-14||||P

OBX|12|TX|NEU%||0|$%|37-72||||P

OBX|13|TX|EO%||0|$%|0-6||||P

OBX|14|TX|BAS%||0|$%|0-1||||P

OBX|15|TX|HCT||0|$%|26-50||||P

OBX|16|TX|MCV||0|$fl|86-110||||P

OBX|17|TX|MCH||0|$pg|25-38||||P

OBX|18|TX|MCHC||0|$g/l|300-350||||P

OBX|19|TX|RDWsd||0|$fl|0-0||||P

OBX|20|TX|RDWcv||0|$%|0-16||||P

OBX|21|TX|PDWsd||0|$fl|0-0||||P

OBX|22|TX|PDWcv||0|$%|0-0||||P

OBX|23|TX|MPV||0|$fl|9-13||||P

OBX|24|TX|PCT||0|$%|0,13-0,43||||P

OBX|25|ED|Diff||$$$$iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAYAAABccqhmAAAAAXNSR0IArs4c6QAAA
ARnQU1BAACxjwv8YQUAAAAgY0hSTQAAeiYAAICEAAD6AAAAgOgAAHUwAADqYAAAOpgAABdwnLpRPAAABwt
…JREFUeF7t1gkNADAMA7GOP+h9NM5jEKeKtvZ94xEg0BR4A+ARINAmGZsqQkQ+L9/DAQIdAUMQLd7yQn4Ab

gBAmUBP4By+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcv
e17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAU
MQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8i
cAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQE
DkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA
5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAs
oABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/
gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c
9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag
3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5Ew
BQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAH
InwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7L
nBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZw
ACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/Ag
DKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54X
MAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1B
uX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACg
LGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAO
RPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92f
MCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgA
Mrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BA
GUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsY
gPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcv
e17AAORPAEBZwACU25c9L2AA8icAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAU
MQLl92fMCBiB/AgDKAgag3L7seQEDkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZwACU25c9L2AA8i
cAoCxgAMrty54XMAD5EwBQFjAA5fZlzwsYgPwJACgLGIBy+7LnBQxA/gQAlAUMQLl92fMCBiB/AgDKAgag3L7seQE
DkD8BAGUBA1BuX/a8gAHInwCAsoABKLcve17AAORPAEBZ4ADk0kOG3FnL+AAAAABJRU5ErkJggg==||||||P

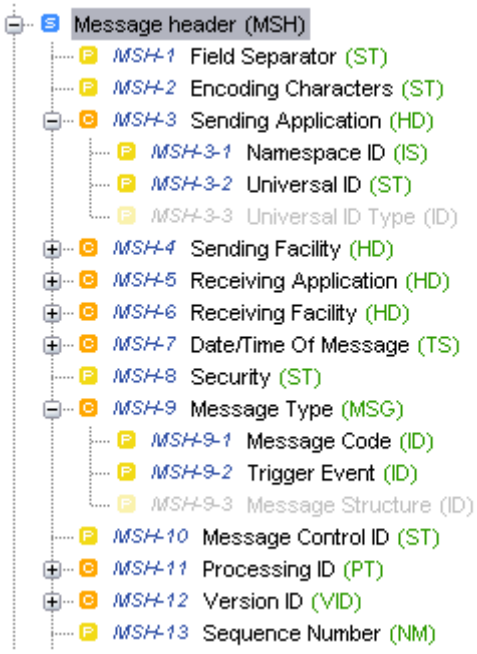
OBX|26|ED|Baso||$$$$iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAYAAABccqhmAAAAAXNSR0IArs4c6QAA
AARnQU1BAACxjwv8YQ…… ||||||P

OBX|27|ED|Rbc||$$$$iVBORw0KGgoAAAANSUhEUgAAAQAAAAEACAYAAABccqhmAAAAAXNSR0IArs4c6QAAA
ARnQU1BAACxjwv8YQUAAA…… ||||||P

OBX|28|ED|Plt||$$$$iVBORw0K…… ||||||P

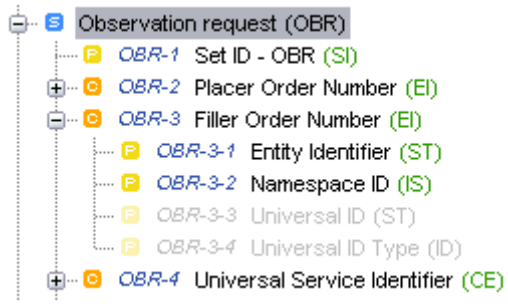
COMMUNICATION MESSAGE DESCRIPTIONS

Following are descriptions of the Message Header (MSH), the Observation Request (OBR) and the Order Observation Result (OBX) formats:

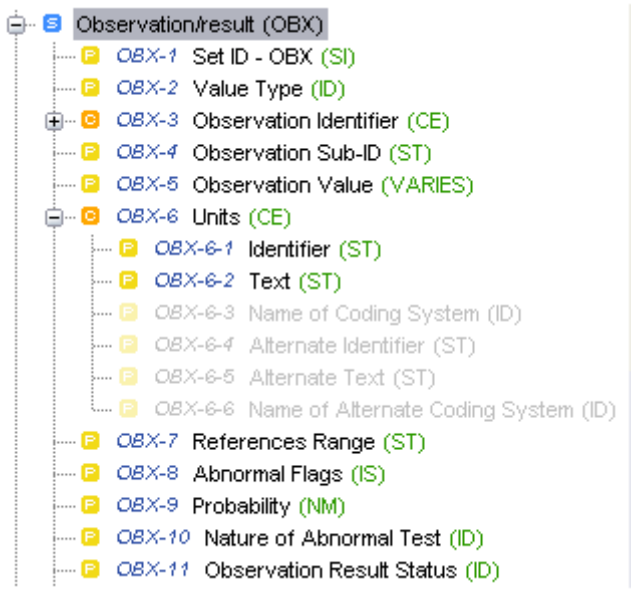


EXAMPLE: MSH|$~\&|ADVIA560$XYZ_ID||||20091202095847||ORU$R01|AS_378_A560|P|2.5|28461

- "|" is the field separator.
- " $~\&" is the encoding characters.
- "ADVIA560$XYZ_ID" is the 'sending application', containing the Namespace ID and the Universal ID.
- "20091202095847" is the timestamp of the transmission.
- "ORU$R01" is the message type.
- "AS_378_A560" is the sample ID (message control ID).
- "P" is the processing ID.
- "2.5" is the HL7 protocol version (version ID).
- "28461" is the result ID (sequence number).



EXAMPLE: OBR|1||1234$LAB|88304



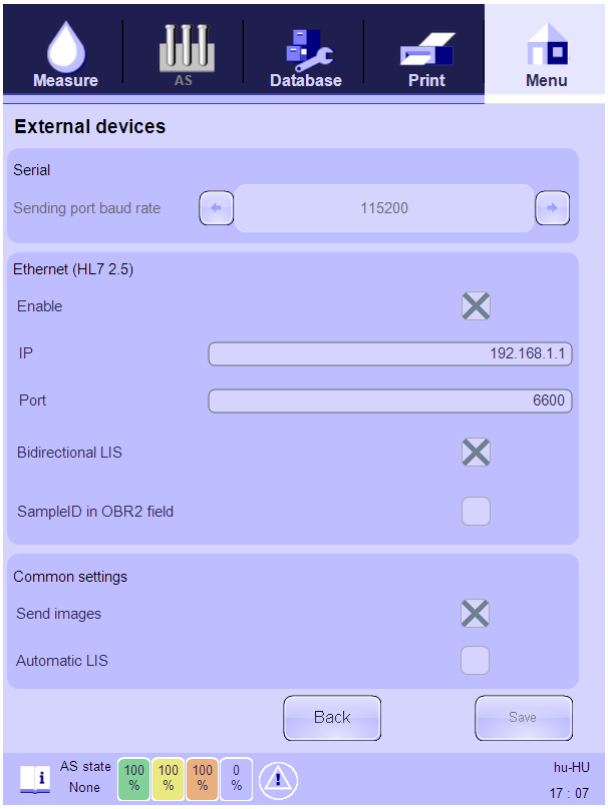
EXAMPLE: OBX|1|TX|WBC||50,86|$10^3|3-15||||P

The last four OBX are the scattergrams and histograms of the observation.

The Diff observation is complete, Baso, Rbc and Plt segments are not complete in this example due excess space requirements.

The data are derived from png files by Base64 encoding. Pictures can be retrieved via Base64 decoding.

ADVIA 560 RECEIVING WORKLIST FROM THE SERVER



Setup:

Go to Main / Settings / External devices

The following data need to be provided:

- Bidirectional LIS: ON / OFF

Upon setting and saving the above setting ADVIA 560 is ready to receive work lists from the HL7 server.

Usage:

Work list information is only relevant in Remote worklist (Free List) mode – only the sequence of the samples in the auto sampler need to match the sequence of the work list.

When entering auto sampler menu, you need to select Remote work list mode.

A screen is displayed with sample information received as the work list.

Status of messages and the communication can be seen in the lower left corner.

After loading the samples, autoloader can be started with the Start button.

BIDIRECTIONAL EXAMPLE OF HL7 MESSAGES (ADVIA 560)

Send work list item to ADVIA 560

Figure 1 shows an example of a HL7 message v. 2.5 to be sent to ADVIA 560 as a Work List Item.

MSH|$~\&|7EDIT$XYZ_ID||||20100427163520||ORM$O01|4534|P|2.5|||||WINDOWS-1250

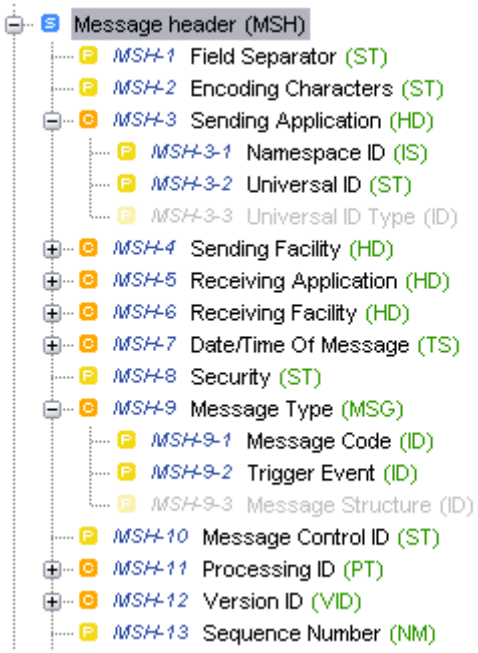
PID|||344||Doe$John||19970527163718|F||||||||||123465798

ORC|NW|5465

OBR||5465||XYZ_Sample_ID||20100527164606

Figure 1

The descriptions of the Message Header (MSH), the Patient ID (PID), the Common Order (ORC) and the Order Observation Request (OBR) can be seen on the following images:



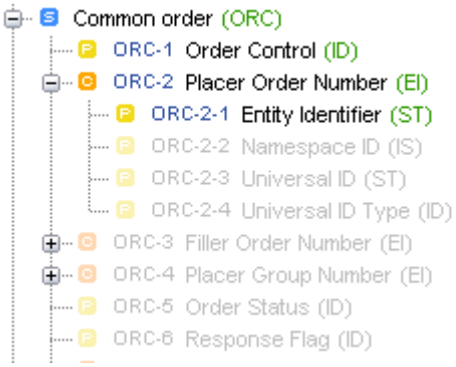
i.e.: MSH|$~\&|7EDIT$XYZ_ID||||20100427163520||ORM$O01|4534|P|2.5|||||WINDOWS-1250

1. '|' is the Field Separator
2. ' $~\&' is the Encoding Characters
3. ' 7EDIT$XYZ_ID' is the Sending Application. which contains the Namespace ID and the Universal ID
4. etc.

- Patient identification (PID)
  - PID-1 Set ID - PID (SI)
  - PID-2 Patient ID (CX)
  - PID-3 Patient Identifier List (CX)
    - PID-3-1 ID Number (ST)
    - PID-3-2 Check Digit (ST)
    - PID-3-3 Check Digit Scheme (ID)
    - PID-3-4 Assigning Authority (HD)
    - PID-3-5 Identifier Type Code (ID)
    - PID-3-6 Assigning Facility (HD)
    - PID-3-7 Effective Date (DT)
    - PID-3-8 Expiration Date (DT)
    - PID-3-9 Assigning Jurisdiction (CWE)
    - PID-3-10 Assigning Agency or Department (CWE)
  - PID-4 Alternate Patient ID - PID (CX)
  - PID-5 Patient Name (XPN)
    - PID-5-1 Family Name (FN)
    - PID-5-2 Given Name (ST)
    - PID-5-3 Second and Further Given Names or Initials Thereof
    - PID-5-4 Suffix (ST)
    - PID-5-5 Prefix (ST)
    - PID-5-6 Degree (IS)
    - PID-5-7 Name Type Code (ID)
    - PID-5-8 Name Representation Code (ID)
    - PID-5-9 Name Context (CE)
    - PID-5-10 Name Validity Range (DR)
    - PID-5-11 Name Assembly Order (ID)
    - PID-5-12 Effective Date (TS)
    - PID-5-13 Expiration Date (TS)
    - PID-5-14 Professional Suffix (ST)
  - PID-6 Mother's Maiden Name (XPN)
  - PID-7 Date/Time of Birth (TS)
    - PID-7-1 Time (DTM)
    - PID-7-2 Degree of Precision (ID)
  - PID-8 Administrative Sex (IS)
  - PID-9 Patient Alias (XPN)
  - PID-10 Race (CE)
  - PID-11 Patient Address (XAD)
  - PID-12 County Code (IS)
  - PID-13 Phone Number - Home (XTN)
  - PID-14 Phone Number - Business (XTN)
  - PID-15 Primary Language (CE)
  - PID-16 Marital Status (CE)
  - PID-17 Religion (CE)
  - PID-18 Patient Account Number (CX)
  - PID-19 SSN Number - Patient (ST)
  - PID-20 Driver's License Number - Patient (DLN)

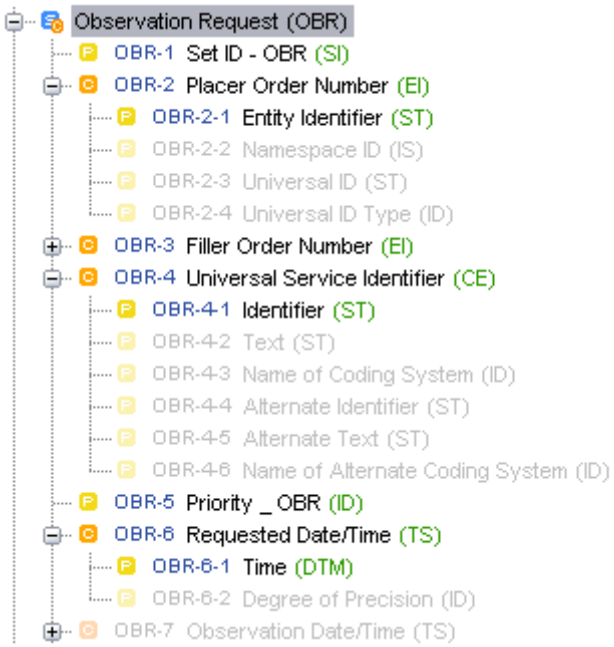
i.e.: PID|||344||Doe$John||19970527163718|F|||||||||123465798

1. ’334’ is the first element (ID Number) of Patient Identifier List
2. ’Doe$John’ is the Family and the Given Name of Patient Name
3. ’19970527163718’ is the Date/Time of Birth
4. ‘F’ Administrative Sex (The value can be: ‘A’ - Ambiguous, ’F’ - Female, ’M’ – Male, ’N’ – Not applicable, ’O’ - Other, ’U’ - Unknown)
5. SSN Number – Patient ID



i.e.: ORC|NW|5465

This segment provides information for Work List. The Entity Identifier (5465) is used to identify the Work List.



i.e.: OBR||5465||XYZ_Sample_ID||20100527164606

1. ’5465’ The Entity Identifier has to be the same as the Entity Identifier of ORC segment.

2. ’XYZ_Sample_ID’ The Identifier of Universal Service Identifier is used for Sample ID.

After Analyzer processed the request a general acknowledge is sent back, which can be seen on Figure 2.

MSH|$~\&|||7EDIT$XYZ_ID ||20100427163520||ACK|4534|P|2.5

MSA|AA|4534

Figure 2

Figure 2 is a requested and acknowledged Work List Item. The Work List Items with the same Common Order (ORC) segment belong to the same Work List.

The analyzer will refuse the request (and will an AR (Application Reject) message), if the number of samples in the Work List exceeds 100.

The first field of MSA segment in the acknowledged message is used to define whether Analyzer accepted the Work List Item or not.

'AA' – Application Acknowledgment,

'AR' – Application Reject

Delete worklist item from Advia560

Figure 3 shows an example of a HL7 message v. 2.5 to be sent to Advia560 as an order to delete a Work List Item.

MSH|$~\&|7EDIT$XYZ_ID||||20100427163520||ORM$O01|4534|P|2.5|||||WINDOWS-1250

PID|||344||Doe$John||19970527163718|F||||||||||123465798

ORC|CA|5465

OBR||8899||XYZ_Sample_ID||20100527164606

Figure 3

The value of the Common Order segment's Order Control entity must be set to 'CA' to delete a Work List Item. The ADVIA 560 software will delete the Work List Item based on the Observation Request segment's Placer Order Number (8899). The Placer Order Number is a unique identifier so this message will delete only one item from the List. After Analyzer processed the request a general acknowledge is sent back, which can be seen on Figure 2. The Work List will be deleted when all its items are deleted.