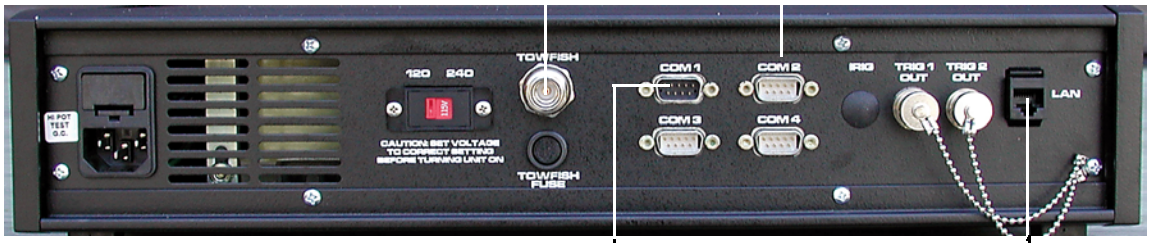
4.41 3000 BASIC SYSTEM SETUP DIAGRAM.

Sample navigation strings:
The preferred is RMC
$GPRMC,101842.572,A,3318.577,N,07845.424,W,7.452,245.4,050202,0.0,E*72
$GPVTG,245.4,T,245.4,M,7.5,N,13.8,K*76
However the following can also be used
$GPGLL,3446.8877,N,07849.0595,W,091739.00,A*1d
$GPVTG,290.0,T,290.0,M,06.6,N,12.2,K*4f

Navigation Unit
NMEA 0183 4800 baud
Formats: RMC or
GLL&VTG or
GGA&VTG

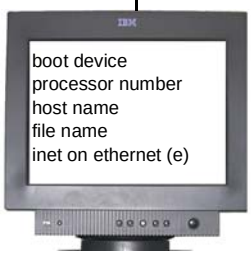
Slip Ring

TPU



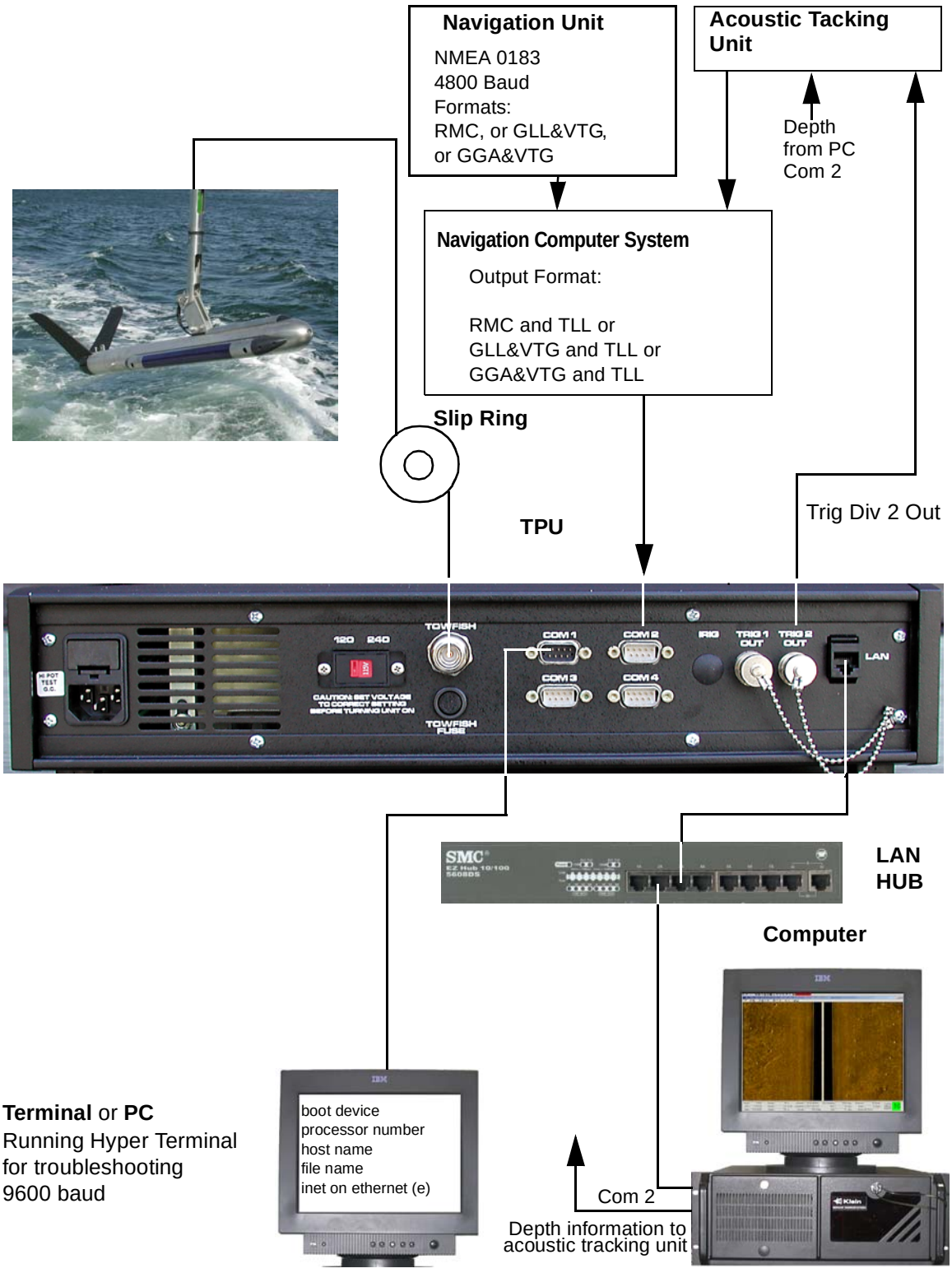
LAN HUB

Terminal or **PC**
Running Hyper Terminal
for troubleshooting
9600 baud



Computer

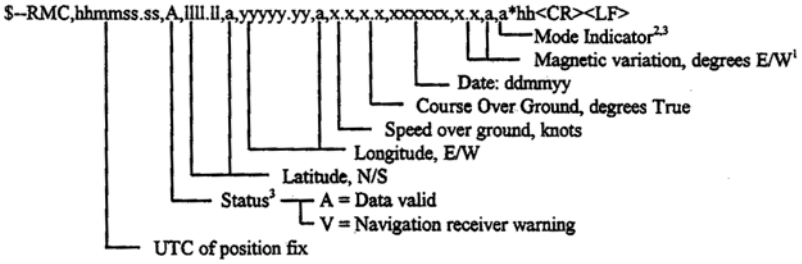
4.42 3000 SYSTEM DIAGRAM WITH ACOUSTIC POSITIONING SYSTEM.



4.43 NMEA 0183 FORMATS AND INFORMATION:

RMC - Recommended Minimum Specific GNSS Data

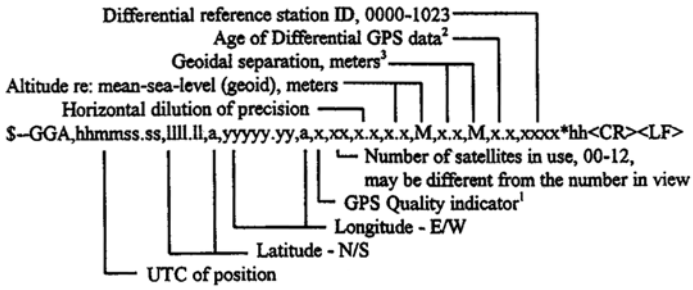
Time, date, position, course and speed data provided by a GNSS navigation receiver. This sentence is transmitted at intervals not exceeding 2-seconds and is always accompanied by RMB when a destination waypoint is active. RMC and RMB are the recommended minimum data to be provided by a GNSS receiver. All data fields must be provided, null fields used only when data is temporarily unavailable.



Notes:

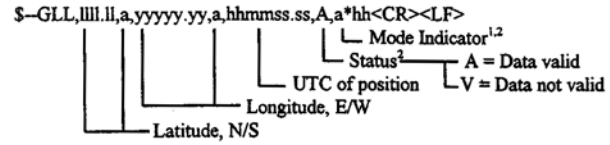
1) Easterly variation (E) subtracts from True course
   Westerly variation (W) adds to True course
2) Positioning system Mode Indicator:
   - A = Autonomous mode
   - D = Differential mode
   - E = Estimated (dead reckoning) mode
   - M = Manual input mode
   - S = Simulator mode
   - N = Data not valid
3) The positioning system Mode Indicator field supplements the positioning system Status field, the Status field shall be set to V = Invalid for all values of Indicator mode except for A= Autonomous and D =

GGA - Global Positioning System Fix Data
Time, position and fix related data for a GPS receiver.



Notes:
1) GPS Quality Indicator: 0 = Fix not available or invalid
1 = GPS SPS Mode, fix valid
2 = Differential GPS, SPS Mode, fix valid
3 = GPS PPS Mode, fix valid
4 = Real Time Kinematic. System used in RTK mode with fixed integers
5 = Float RTK. Satellite system used in RTK mode, floating integers
6 = Estimated (dead reckoning) Mode
7 = Manual Input Mode
8 = Simulator Mode
The GPS Quality Indicator field shall not be a null field.
2) Time in seconds since last SC104 Type 1 or 9 update, null field when DGPS is not used
3) Geoidal Separation: the difference between the WGS-84 earth ellipsoid surface and mean-sea-level (geoid) surface, "-" = mean-sea-level surface below WGS-84 ellipsoid surface.

GLL - Geographic Position - Latitude/Longitude
Latitude and Longitude of vessel position, time of position fix and status.



Notes:
1) Positioning system Mode Indicator: A = Autonomous mode
D = Differential mode
E = Estimated (dead reckoning) mode
M = Manual input mode
S = Simulator mode
N = Data not valid

2) The positioning system Mode Indicator field supplements the positioning system Status field, the Status field shall be set to V = Invalid for all values of Indicator mode except for A= Autonomous and D = Differential. The positioning system Mode Indicator and Status fields shall not be null fields.

VTG - Course Over Ground and Ground Speed

The actual course and speed relative to the ground.

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

- Mode Indicator[1]
- Speed over ground, km/hr
- Speed over ground, knots
- Course over ground, degrees Magnetic
- Course over ground, degrees True

Notes:

1) Positioning system Mode Indicator:
- A = Autonomous mode
- D = Differential mode
- E = Estimated (dead reckoning) mode
- M = Manual input mode
- S = Simulator mode
- N = Data not valid

The positioning system Mode Indicator field shall not be a null field.

TLL - Target Latitude and Longitude

Target number, name, position and time tag for use in systems tracking targets.

$--TLL,xx,llll.ll,a,yyyyy.yy,a,c--c,hhmmss.ss,a,a*h <CR><LF>

- R = Reference target[2], null otherwise
- Target status[1]
- UTC of data
- Target name
- Target longitude, E/W
- Target latitude, N/S
- Target number, 00 to 99

Notes

1) Target status:
- L = Lost, tracked target has been lost
- Q = Query, target in the process of acquisition
- T = Tracking

2) Reference Target: set to "R" if target is a reference used to determined own-ship position or velocity, null otherwise.

***DPT - Depth**

Water depth relative to the transducer and offset of the measuring transducer. Positive offset numbers provide the distance from the transducer to the waterline. Negative offset numbers provide the distance from the transducer to the part of the keel of interest.

$--DPT,x.x,x.x,x.x*hh<CR><LF>

- Maximum range scale in use
- Offset from transducer[1,2], meters
- Water depth relative to the transducer, meters

Notes:

1) "positive" = distance from transducer to water-line, "-" = distance from transducer to keel

* 2) For IEC applications the offset shall always be applied so as to provide depth relative to the keel.

Sample navigation strings:

The preferred is RMC
$GPRMC,101842.572,A,3318.577,N,07845.424,W,7.452,2 45.4,050202,0.0,E*72
$GPVTG,245.4,T,245.4,M,7.5,N,13.8,K*76

However the following can also be used
$GPGLL,3446.8877,N,07849.0595,W,091739.00,A*1d
$GPVTG,290.0,T,290.0,M,06.6,N,12.2,K*4f

Depth
$SNDPT,28.2,0.0,998.9*66

ORE
1 28.2

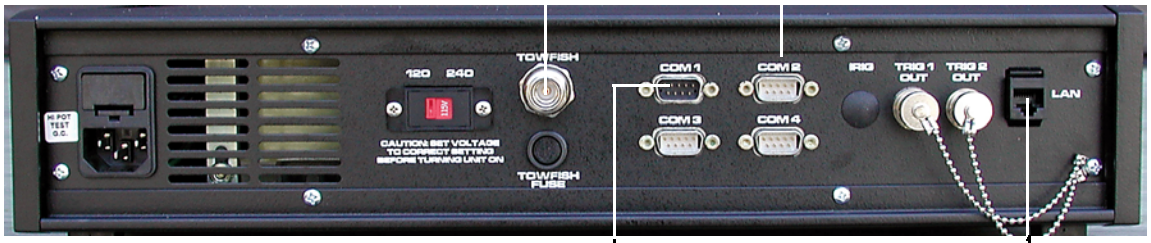
4.41 3000 BASIC SYSTEM SETUP DIAGRAM.

Sample navigation strings:
The preferred is RMC
$GPRMC,101842.572,A,3318.577,N,07845.424,W,7.452,245.4,050202,0.0,E*72
$GPVTG,245.4,T,245.4,M,7.5,N,13.8,K*76
However the following can also be used
$GPGLL,3446.8877,N,07849.0595,W,091739.00,A*1d
$GPVTG,290.0,T,290.0,M,06.6,N,12.2,K*4f

Navigation Unit
NMEA 0183 4800 baud
Formats: RMC or
GLL&VTG or
GGA&VTG

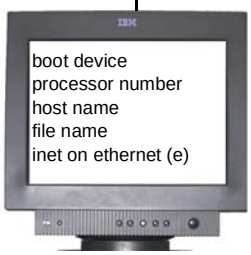
Slip Ring

TPU



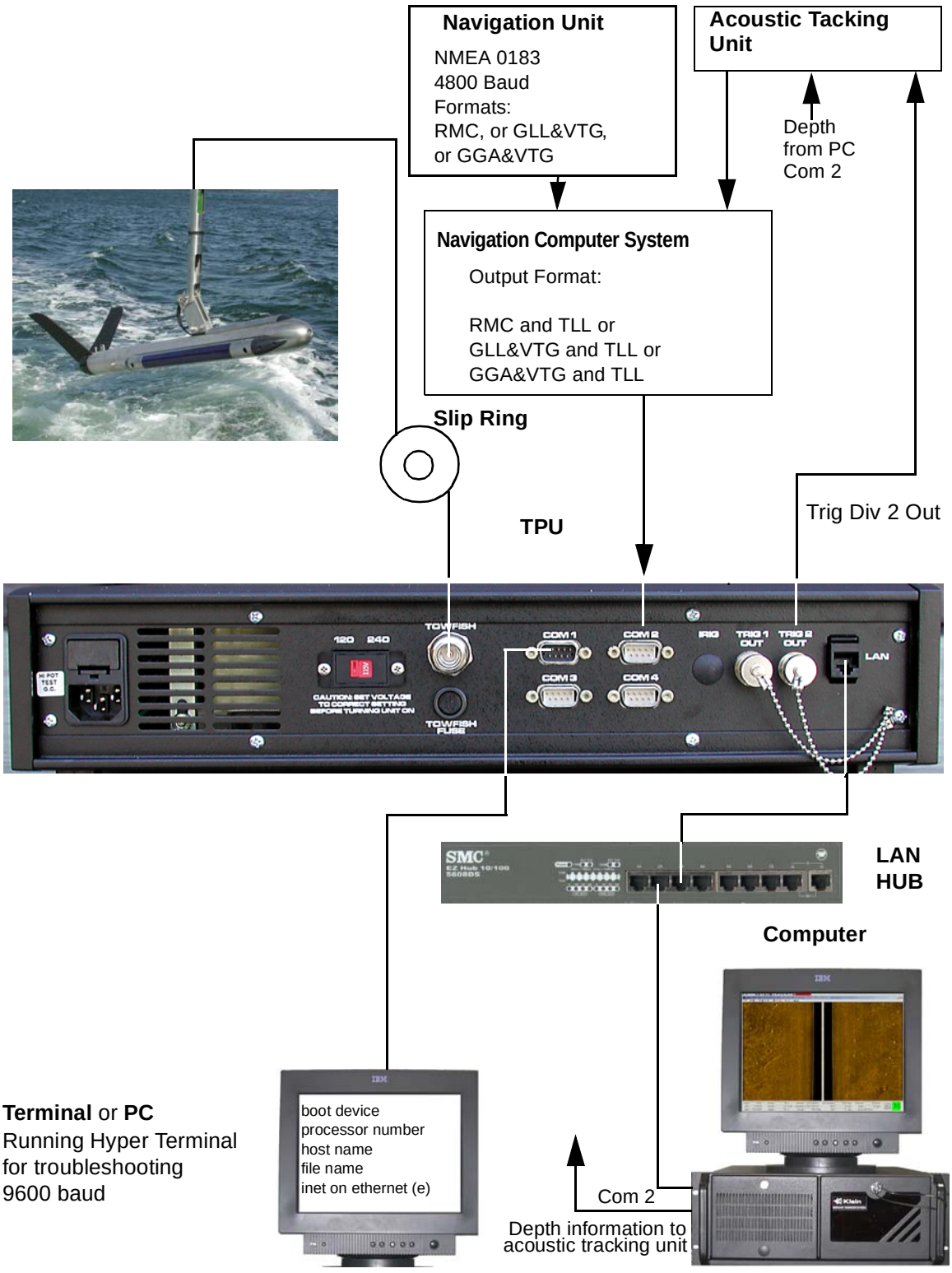
LAN HUB

Terminal or **PC**
Running Hyper Terminal
for troubleshooting
9600 baud



Computer

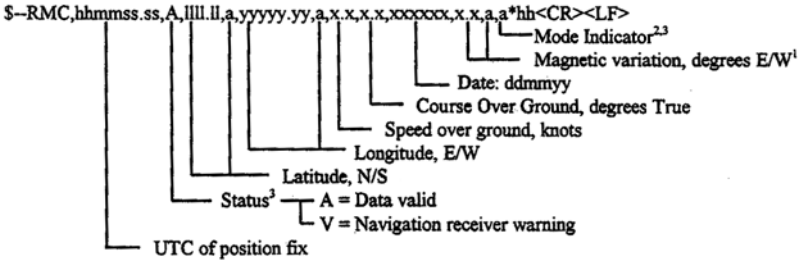
4.42 3000 SYSTEM DIAGRAM WITH ACOUSTIC POSITIONING SYSTEM.



4.43 NMEA 0183 FORMATS AND INFORMATION:

RMC - Recommended Minimum Specific GNSS Data

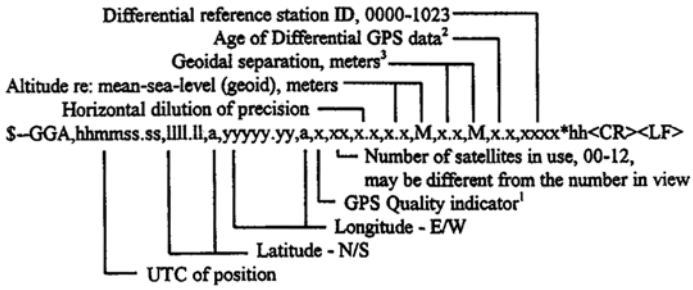
Time, date, position, course and speed data provided by a GNSS navigation receiver. This sentence is transmitted at intervals not exceeding 2-seconds and is always accompanied by RMB when a destination waypoint is active. RMC and RMB are the recommended minimum data to be provided by a GNSS receiver. All data fields must be provided, null fields used only when data is temporarily unavailable.



Notes:

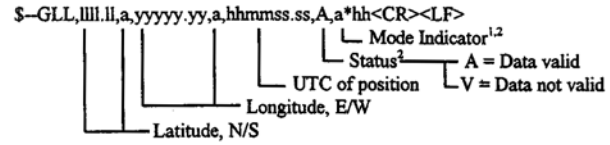
1) Easterly variation (E) subtracts from True course
   Westerly variation (W) adds to True course
2) Positioning system Mode Indicator:
   - A = Autonomous mode
   - D = Differential mode
   - E = Estimated (dead reckoning) mode
   - M = Manual input mode
   - S = Simulator mode
   - N = Data not valid
3) The positioning system Mode Indicator field supplements the positioning system Status field, the Status field shall be set to V = Invalid for all values of Indicator mode except for A= Autonomous and D =

GGA - Global Positioning System Fix Data
Time, position and fix related data for a GPS receiver.



Notes:
1) GPS Quality Indicator: 0 = Fix not available or invalid
1 = GPS SPS Mode, fix valid
2 = Differential GPS, SPS Mode, fix valid
3 = GPS PPS Mode, fix valid
4 = Real Time Kinematic. System used in RTK mode with fixed integers
5 = Float RTK. Satellite system used in RTK mode, floating integers
6 = Estimated (dead reckoning) Mode
7 = Manual Input Mode
8 = Simulator Mode
The GPS Quality Indicator field shall not be a null field.
2) Time in seconds since last SC104 Type 1 or 9 update, null field when DGPS is not used
3) Geoidal Separation: the difference between the WGS-84 earth ellipsoid surface and mean-sea-level (geoid) surface, "-" = mean-sea-level surface below WGS-84 ellipsoid surface.

GLL - Geographic Position - Latitude/Longitude
Latitude and Longitude of vessel position, time of position fix and status.



Notes:
1) Positioning system Mode Indicator: A = Autonomous mode
D = Differential mode
E = Estimated (dead reckoning) mode
M = Manual input mode
S = Simulator mode
N = Data not valid

2) The positioning system Mode Indicator field supplements the positioning system Status field, the Status field shall be set to V = Invalid for all values of Indicator mode except for A= Autonomous and D = Differential. The positioning system Mode Indicator and Status fields shall not be null fields.

VTG - Course Over Ground and Ground Speed

The actual course and speed relative to the ground.

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K,a*hh<CR><LF>

- Mode Indicator[1]
- Speed over ground, km/hr
- Speed over ground, knots
- Course over ground, degrees Magnetic
- Course over ground, degrees True

Notes:

1) Positioning system Mode Indicator:
- A = Autonomous mode
- D = Differential mode
- E = Estimated (dead reckoning) mode
- M = Manual input mode
- S = Simulator mode
- N = Data not valid

The positioning system Mode Indicator field shall not be a null field.

TLL - Target Latitude and Longitude

Target number, name, position and time tag for use in systems tracking targets.

$--TLL,xx,llll.ll,a,yyyyy.yy,a,c--c,hhmmss.ss,a,a*h <CR><LF>

- R = Reference target[2], null otherwise
- Target status[1]
- UTC of data
- Target name
- Target longitude, E/W
- Target latitude, N/S
- Target number, 00 to 99

Notes

1) Target status:
- L = Lost, tracked target has been lost
- Q = Query, target in the process of acquisition
- T = Tracking

2) Reference Target: set to "R" if target is a reference used to determined own-ship position or velocity, null otherwise.

***DPT - Depth**

Water depth relative to the transducer and offset of the measuring transducer. Positive offset numbers provide the distance from the transducer to the waterline. Negative offset numbers provide the distance from the transducer to the part of the keel of interest.

$--DPT,x.x,x.x,x.x*hh<CR><LF>

- Maximum range scale in use
- Offset from transducer[1,2], meters
- Water depth relative to the transducer, meters

Notes:

1) "positive" = distance from transducer to water-line, "-" = distance from transducer to keel

* 2) For IEC applications the offset shall always be applied so as to provide depth relative to the keel.

Sample navigation strings:

The preferred is RMC
$GPRMC,101842.572,A,3318.577,N,07845.424,W,7.452,2 45.4,050202,0.0,E*72
$GPVTG,245.4,T,245.4,M,7.5,N,13.8,K*76

However the following can also be used
$GPGLL,3446.8877,N,07849.0595,W,091739.00,A*1d
$GPVTG,290.0,T,290.0,M,06.6,N,12.2,K*4f

Depth
$SNDPT,28.2,0.0,998.9*66

ORE
1 28.2