UK Pavement Management System

SCANNER HMDIF Specification

Specification

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1.02	Issue	TRL/SJS	02/09/05	Revised following internal feedback
1.03	Issue	TRL/SJS	30/09/05	Revised following feedback from TRL and developers
1.04	Issue	TRL/SJS	28/11/05	Revised following feedback from HA and developers
1.05	Issue	RAC	06/07/06	Updated to clarify that SCANNER data should be supplied on coincident subsections
1.06	Issue	RAC	01/08/06	Updated to list the defects and valid ranges in RP7.01 (pilot)
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Introduction

This document is intended for both SCANNER survey contractors and UKPMS system developers to provide a formal specification of the data to be provided and the format in which it is to be provided by the SCANNER survey contractor for the loading of SCANNER surveys into UKPMS comparable systems. This document supersedes Technical Note 3 for TTS/SCANNER surveys.

There is a need to standardise the HMDIF file format so that users can be confident that the SCANNER survey data will load into their UKPMS system, regardless of which system is used and which survey contractor has supplied the survey data. This specification is also designed to clarify the existing HMDIF format. It is envisaged that changes to improve the existing HMDIF format will be introduced at a later date. It is recognised that it will be necessary to plan future changes well in advance so that all system developers and survey contractors are using the same format specification.

File Syntax and Semantics

Throughout this document various mnemonics and values have been assigned names such as *record_end_term* and are highlighted in italics; all of these are defined in the first table below.

The following is based on an extract of relevant paragraphs from the Highways Agency document on Highways Maintenance Data Interchange Format (HMDIF) Standard. *File ref. HCSL 2/13/78, Document No L3-TS-02*, issued on *7th January 1994*:

The HMDIF file is an ASCII file, containing only the ASCII codes in the range 32-126, 13 and 10.

The maximum length of each record (including spaces and the end record character) is 255 characters.

Each record is terminated by a Carriage Return / Line Feed (CR/LF) pair. With the exception of the HMSTART record the CR/LF must be preceded by the "*record_end_term_value*", which is normally defined as a semi-colon (;)

The HMDIF file consists of two components:
- Template Block, which describes the record types and attributes which the receiving application can expect to be included in the data records.
- Data Block, which contains the actual data to be transferred to the receiving system.

The HMDIF includes three record counts as follows:
- TEND – Record count of the Template Block records.
- DEND – Record count of the Data Block records.
- HMEND – Record count of the HMDIF file.

All SCANNER HMDIF files must have the following syntactical structure:

HMSTART Record
TSTART Record
4 Template Records
TEND Record
DSTART Record
Data Record
{Data Record}
DEND Record
HMEND Record

There must be no blank lines in the HMDIF import file.

HMSTART Record

The HMSTART Record identifies the start of the HMDIF file and includes the following data items separated by spaces and with no terminating record end symbol:

Name	***Description***	***Sample***
HMSTART	The mnemonic HMSTART	HMSTART
hmdif_id_code	File identification code.	ukPMS
hmdif_version_no	Version number of the file.	001
text_start_id_value	The text character used to identify the start of a block of text.	"
text_end_id_value	The text character used to identify the end of a block of text.	"
record_end_term_value	The text character used to identify the end of a record.	;
attr_end_term_value	The text character used to identify the end of a data item.	,
record_id_term_value	The text character used to identify the end of a record identification code.	\

For SCANNER HMDIF import files the HMSTART record will be as follows:

**HMSTART ukPMS 001 " " ; , **

TSTART Record

The TSTART Record identifies the start of the Template Block and consists of the mnemonic TSTART followed by the *record_end_term_value*.

For SCANNER HMDIF import files the TSTART record will be as follows:

TSTART;

Template Record

The Template Record describes the template for each of the 4 types of record block within the SCANNER surveys; they are the details of each survey, network section, observation and its value. The template record has the following syntactical structure:

<record mnemonic> <record_id_term_value> <data mnemonic> {<attr_end_term_value> <data mnemonic>} <record_end_term_value>

For SCANNER HMDIF import files the four template records will be as follows:

SURVEY\TYPE,VERSION,NUMBER,SUBSECT,MACHINE,XSPUSED;
SECTION\LABEL,SNODE,LENGTH,SDATE,EDATE,STIME,ETIME;
OBSERV\DEFECT,XSECT,SCHAIN,ECHAIN;
OBVAL\PARM,OPTION,VALUE,PERCENT;

TEND Record

The TEND Record identifies the end of the Template Block and consists of the mnemonic TEND followed by the *record_id_term_value*, then the record count of the template records (for SCANNER surveys this should always be 6 – the TSTART Record, the four template records and the TEND Record) and finally the *record_end_term_value*.

For SCANNER HMDIF import files the TEND Record will be as follows:

TEND\6;

DSTART Record

The DSTART Record identifies the start of the Data Block of records and consists of the mnemonic DSTART followed by the *record_end_term_value*.

For SCANNER HMDIF import files the DSTART Record will be as follows:

DSTART;

Data Record

The Data Record details the actual data to be transferred to the receiving system. Records, identified by a record mnemonic previously described in the Template Block, contain the attribute values in the same positional sequence as the attribute identifiers described in the Template Block.

For SCANNER surveys, they are the details of each survey, network section, observation and its value.

SURVEY Record

The first record should always be SURVEY; there should be only one SURVEY record in each HMDIF import file.

SECTION Record

SECTION Record is used to define the network sections within the survey. This section must be present in the database in the current network and must be effective on the survey date. If no start or end date is present, then the assumption is that the load date will apply. A section reference must not be repeated within the same HMDIF import file.

Each SECTION Record is followed by one or more OBSERV Record, which is used to define the observations within each network section. Each observation is referenced to the network section by start and end chainage and cross sectional position. Point items will have the same start and end chainage. Logically variable lengths are allowed provided that the end chainage is greater than or equal to the start chainage. However, the subsections used for each measured parameter must coincide with those used for all the other measured parameters (except point items) and no 'overlapping' subsections are permitted.

OBSERV and OBVAL Records

Each OBSERV record is followed by one or more OBVAL records associated with the current observation. If more than one OBVAL occurs for an OBSERV record then the OBVAL records should be in numerical order for the parameters. For example:

OBSERV\LMAP,CL1,11.27,11.27;
OBVAL\2,,1.751,V;
OBVAL\23,,-0.132,V;
OBVAL\24,,0,V;
OBVAL\25,20,,;

The Data Record has the following syntactical structure, which contain the attribute values in the same positional sequence as the attribute identifiers described in the Template Block:

<record mnemonic> <record_id_term_value> <data item> {<attr_end_term_value> <data item>} <record_end_term_value>

An example of data records and how they correspond with their template record for SCANNER HMDIF import files is as follows:

Template record:
SURVEY\TYPE,VERSION,NUMBER,SUBSECT,MACHINE,XSPUSED;
Data example:
SURVEY\TTS,,11,,TTS1,;

Template record:
SECTION\LABEL,SNODE,LENGTH,SDATE,EDATE,STIME,ETIME;
Data example:
SECTION\SAMPLE/010,44055,13.02,140705,140705,1115,1115;

Template record:
OBSERV\DEFECT,XSECT,SCHAIN,ECHAIN;
Data example:
OBSERV\LLRT,CL1,0.00,10.00;

Template record:
OBVAL\PARM,OPTION,VALUE,PERCENT;
Data example:
OBVAL\13,,2.4,V;

DEND Record

The DEND Record identifies the end of the Data Block of records and consists of the mnemonic DEND followed by the *record_id_term_value*, then the record count of the Data Block of records and finally the *record_end_term_value*.

For SCANNER HMDIF import files the DEND record will be as follows:

DEND\##;

Where ## denotes the record count of the Data Block of records (including the DSTART and DEND records)

HMEND Record

The HMEND Record identifies the end of the HMDIF file and consists of the mnemonic HMEND followed by the *record_id_term_value*, then the record count of the HMDIF file and finally the *record_end_term_value*.

For SCANNER HMDIF import files the HMEND record will be as follows:

HMEND\##;

Where ## denotes the record count of the HMDIF file.

Note: The HMEND record count is also the sum of TEND and DEND plus 2 (the HMSTART and HMEND records).

HMDIF-Generating Applications

Applications which generate HMDIF files must:

- Generate files which contain only the ASCII codes 10, 13, 32-126

HMDIF-Receiving Applications

Applications which receive HMDIF files must:

- Be able to process leading and trailing spaces in all data items (except text strings, where they are considered to be part of the string). All other spaces must be maintained.
- Handle files where the SECTION records are in any order.
- Handle files where the OBSERV records within a SECTION are in any order.
- Be able to accept and process additional observations collected on the same date but delivered in a different HMDIF import file.
- Ignore records and data in the file which are inappropriate to the application. This requirement is needed to allow evolution of HMDIF file structures (i.e. the feeder system will be producing data required by a later version of the target application) and the potential for an HMDIF output file to have more than one target application.

Codes and Value Ranges

Permissible codes and value ranges will depend upon the validation rules adopted by generating/receiving systems. The valid codes are available in the UKPMS Data model, issued as the Rules and Parameters database and as follows:

The following convention is used within the "Format" column:

"A*n*" indicates a text field of *n* characters;

"I*n*" indicates an integer numeric field of up to *n* characters;

"F*n.d*" indicates a real number field of up to *n* characters, including the decimal point, with *d* digits after the decimal point.

SURVEY Record

Data Mnemonic	***Format***	***UKPMS Data Model Name***		***Comment***
		Table Name	***Field Name***	
TYPE	A5	Survey	Survey Type Code	Must be "TTS"
VERSION	I4	Survey	Not Defined	Should be left blank
NUMBER	I4	Survey	Survey Number	
SUBSECT	A5	Survey	Sub Section Length Code	Should be left blank
MACHINE	A5	Survey	Machine Code	
XSPUSED	A1	Survey	On Carriageway XSP Referencing Model	Ignored, since there is now no distinction between XSP referencing models

SECTION record

Data Mnemonic	***Format***	***UKPMS Data Model Name***		***Comment***
		Table Name	***Field Name***	
LABEL	A30	Section	Section Label Code	Must be a valid network section, each section reference must not be repeated within the same HMDIF file
SNODE	A30	(See Note 1 below)		
LENGTH	F10.2/ I8	Section within survey	Measured Length Number	Must be up to 1m tolerance of the network length. (See Note 2 below)
SDATE	A8 *ddmmyy* or *ddmmyyyy*	Section within survey	Survey Section Start Date	Should be the date of the survey and must be a valid date
EDATE	A8 *ddmmyy* or *ddmmyyyy*	Section within survey	Survey Section End Date	Should be the date of the survey and must be a valid date
STIME	A5 *hhmm or hh:mm*	Section within survey	Survey Section Start Time	If blank then the assumption is 00:00
ETIME	A5 *hhmm or hh:mm*	Section within survey	Survey Section End Time	If blank then the assumption is 00:00

Note 1: The Section label and start node are used to derive the section surrogate and the survey direction on loading of the HMDIF. If the SNODE is the same as the section's start node or is blank then the forward direction is assumed, else if the SNODE is the same as the section's end node then the reverse direction is assumed.

Note 2: Survey contractors can choose to supply the section length either as a number with 2 decimal places or an integer, but should use a consistent approach within each HMDIF file. UKPMS systems must be able to import either numbers with 2 decimal places or integers, but it is acceptable for UKPMS systems to round lengths supplied with 2 decimal places to the nearest integer. Prior to rounding the section length must be within 1m tolerance of the network length. Stretching and shrinking of the data should be carried out in the pre-processing of the SCANNER survey data

OBSERV record

Data Mnemonic	Format	UKPMS Data Model Name		Comment
		Table Name	Field Name	
DEFECT	A4	Observation	Defect Type Code	Must be a valid defect observation code using the Unknown (UK) pavement type defined in the table on page 13.
XSECT	A4	Observation	Cross Section position Code	Must be a valid Carriageway Lane cross sectional position
SCHAIN	F10.2/ I8	Observation	Observation Start Chainage Number	Must be >= 0, within the surveyed section's length limits and <= ECHAIN
ECHAIN	F10.2/ I8	Observation	Observation End Chainage Number	Must be >= 0, within the surveyed section's length limits and >= SCHAIN

Note: Survey contractors can choose to supply the chainages either as a number with 2 decimal places or an integer, but should use a consistent approach within each HMDIF file. UKPMS systems must be able to import either numbers with 2 decimal places or integers, but it is acceptable for UKPMS systems to round lengths supplied with 2 decimal places to the nearest integer. It is the responsibility of the system supplier to resolve any data integrity issues that arise from rounding the numbers.
Note: If the survey direction is reverse then the chainages and cross sectional positions will be reversed on import.
Note: Point defects must have the same start and end chainage and linear defects the start chainage must be less than the end chainage.
Note: No overlapping subsections are permitted and all measured parameters (except point items) must use coincident subsections.

OBVAL record

Data Mnemonic	***Format***	***UKPMS Data Model Name***		***Comment***
		Table Name	***Field Name***	
PARM	I2	Observation Value	Parameter Number	Must be the valid parameter number defined in the table on page 13
OPTION	I2	Observation Value	Option Number	Must be the valid option code
VALUE	F14.5	Observation Value	Observation Parameter Value Number	Must be within the parameter's valid range – See table below
PERCENT	A1	Observation Value	Observation Value Parameter Value or Percent Indicator	May be "P", "V" or Null indicating that the value is a percentage or a numeric value or that an option has been specified and no value respectively

Note: To indicate that an option has been specified the PERCENT indicator field should be left blank; "O" is ***NOT*** *a valid option for the PERCENT indicator field.*
Note: Where the observation values are not an option UKPMS systems must be able to accept either "P" or "V" in the PERCENT indicator field.

List of SCANNER defects (RP7.01)

The lists below give the codes, value ranges and number of decimal places required for UKPMS rules and parameters rule set version RP7.01 and must be adhered to.

Current Defects

The following defects are those expected to be collected from 1 Apr 2007 onwards.

Defect (OBSERV)		***Parameter (OBVAL)***			
Code	***Description***	***No***	***Description/Unit***	***Format***	***Range***
LOCATION REFERENCING					
LCOO	SCANNER or TTS Coordinate	30	X Coordinate /m	F12.3	0.000 to 10000000.000
		31	Y Coordinate /m	F12.3	0.000 to 10000000.000
		32	Z Coordinate /m	F10.3	-10000.000 to 10000.000
ROAD GEOMETRY					
LCRV	SCANNER or TTS Curvature	13	Number	F9.2	-10000.00 to 10000.00
LFAL	SCANNER or TTS Crossfall	14	Percentage/%	F6.1	-100.0 to 100.0
LGRD	SCANNER or TTS Gradient	14	Percentage/%	F6.1	-100.0 to 100.0
TEXTURE					
LLTX	SCANNER or TTS Left Wheel Path Average Texture depth (SMTD)	13	Number/mm	F8.2	-1000.00 to 1000.00
LLTD	SCANNER Left Wheel Path Average Texture depth (MPD)	13	Number/mm	F5.2	0.00 to 20.00
LLTM	SCANNER Left Wheel Path Mean RMST Texture depth	13	Number/mm	F5.2	0.00 to 20.00
LLTV	SCANNER Left Wheel Path RMST Variance	13	Number/ mm^2	F8.3	0.000 to 1000.000
LCTM	SCANNER Centre Mean RMST Texture depth	13	Number/mm	F5.2	0.00 to 20.00
LCTV	SCANNER Centre RMST Variance	13	Number/ mm^2	F8.3	0.000 to 1000.000
LRTM	SCANNER Right Wheel Path Mean RMST Texture depth	13	Number/mm	F5.2	0.00 to 20.00
LRTV	SCANNER Right Wheel Path RMST Variance	13	Number/ mm^2	F8.3	0.000 to 1000.000

LT05	SCANNER Overall Texture Variability - RMST 5th Percentile Value	13	Number/mm	F5.2	0.00 to 100.00
LT95	SCANNER Overall Texture Variability - RMST 95th Percentile Value	13	Number/mm	F5.2	0.00 to 100.00
LTVV	SCANNER Overall Texture Variability - RMST Variance	13	Number/ mm²	F8.3	0.000 to 1000.000
	LONGITUDINAL PROFILE				
LV3	SCANNER or TTS 3m moving average Longitudinal Profile Variance (left/nearside)	13	Number/ mm²	F9.2	-10000.00 to 10000.00
LL03	SCANNER 3m Longitudinal Profile Enhanced Variance (left/nearside)	13	Number/ mm²	F7.2	0.00 to 1000.00
LV10	SCANNER or TTS 10m moving average Longitudinal Profile Variance (left/nearside)	13	Number/ mm²	F9.2	-10000.00 to 10000.00
LL10	SCANNER 10m Longitudinal Profile Enhanced Variance (left/nearside)	13	Number/ mm²	F8.2	0.00 to 10000.00
LLBI	SCANNER Bump intensity (CDM) left wheel path	13	Number/ unitless	I1	0 or 1
LR03	SCANNER 3m Longitudinal Profile Enhanced Variance (right/offside)	13	Number/ mm²	F7.2	0.00 to 1000.00
LR10	SCANNER 10m Longitudinal Profile Enhanced Variance (right/offside)	13	Number/ mm²	F8.2	0.00 to 10000.00
LRBI	SCANNER Bump intensity (CDM) right wheel path	13	Number/ unitless	I1	0 or 1
	TRANSVERSE PROFILE				
LLRT	SCANNER or TTS Left Wheel Path Rut depth	13	Number/mm	F7.1	-1000.0 to 1000.0
LLRD	SCANNER nearside rut depth from cleaned profile	13	Number/mm	F7.1	-1000.0 to 1000.0
LRRT	SCANNER or TTS Right Wheel Path Rut depth	13	Number/mm	F7.1	-1000.0 to 1000.0
LRRD	SCANNER offside rut depth from cleaned profile	13	Number/mm	F7.1	-1000.0 to 1000.0
LTAD	SCANNER absolute deviation of 1st derivative of transverse profile	13	Number	F9.5	0.00000 to 100.00000
LTRV	SCANNER transverse variance	13	Number/ mm²	F9.2	-10000.00 to 10000.00

EDGE CONDITION					
LEDR	SCANNER edge roughness	13	Number	F5.3	0.000 to 1.000
LES1	SCANNER road edge step L1	14	Percentage/%	F5.1	0.0 to 100.0
LES2	SCANNER road edge step L2	14	Percentage/%	F5.1	0.0 to 100.0
LEDC	SCANNER edge coverage	14	Percentage/%	F5.1	0.0 to 100.0
CRACKING					
LTRC	SCANNER or TTS Cracking (whole carriageway)	14	Percentage/%	F6.1	-100.0 to 100.0
LWCL	SCANNER or TTS Left Wheel Track Cracking Intensity	14	Percentage/%	F6.1	-100.0 to 100.0
LWCR	SCANNER or TTS Right Wheel Track Cracking Intensity	14	Percentage/%	F6.1	-100.0 to 100.0
LECR	SCANNER Edge of carriageway cracking	14	Percentage/%	F5.1	0.0 to 100.0
LRCR	SCANNER Transverse/reflection cracking	13	Number	I4	0 to 9999
LMAP	SCANNER or TTS Crack Map	2	Length/m	F6.3	0.000 to 10.000
		23	Offset	F7.3	-10.000 to 10.000
		24	Angle	I3	-90 to 90
		25	Type Code	A2	10 (Crack), 20 (Joint)
LSUR	SCANNER Surface Deterioration Parameter	13	Number	F5.1	0.0 to 100.0
LOVD	SCANNER Other visible defect (OVD) intensity	14	Percentage/%	F5.1	0.0 to 100.0

Note: The codes relate to the UKPMS RP7.01 codes from the following tables: defect, valid defect, defect parameter and valid defect parameter and are limited to the unknown (UK) pavement code.
Note: All of the parameters in the table above are values and must be recorded in the OBVAL's third field with the exception of the TTS crack map's type code which is an option and must be recorded in the OBVAL's second field. The OBVAL fields are defined in the table on page 12.
Note: LMAP and LCOO are the only point defects in the table above and should have the same start and end chainage; all the other defects are linear and the start chainage must be less than the end chainage.

Dropped Defects

The following defects will no longer be collected after 1 Apr 2007, but have been retained in the rule set to accommodate historical data.

Defect (OBSERV)		***Parameter (OBVAL)***			
Code	***Description***	***No***	***Description/Unit***	***Format***	***Range***
LV30	SCANNER or TTS 30m moving average Longitudinal Profile Variance (left/nearside)	13	Number/ mm^2	F9.2	-10000.00 to 10000.00
LCTX	SCANNER or TTS Wheel Path Centre Average Texture depth (SMTD)	13	Number/mm	F8.2	-1000.00 to 1000.00
LRTX	SCANNER or TTS Right Wheel Path Average Texture depth (SMTD)	13	Number/mm	F8.2	-1000.00 to 1000.00
LLAD	SCANNER absolute deviation of 1st derivative of nearside of transverse profile	13	Number	F9.5	0.00000 to 100.00000
LRAD	SCANNER absolute deviation of 1st derivative of offside of transverse profile	13	Number	F9.5	0.00000 to 100.00000

Sample HMDIF file

Note: This is an example of a SCANNER survey data import file and does not contain every defect. Other presentations of the data are valid provided that the above specification is adhered to.

**HMSTART ukPMS 001 " " ; , **
TSTART;
SURVEY\TYPE,VERSION,NUMBER,SUBSECT,MACHINE,XSPUSED;
SECTION\LABEL,SNODE,LENGTH,SDATE,EDATE,STIME,ETIME;
OBSERV\DEFECT,XSECT,SCHAIN,ECHAIN;
OBVAL\PARM,OPTION,VALUE,PERCENT;
TEND\6;
DSTART;
SURVEY\TTS,,11,,TTS1,;
SECTION\SAMPLE/010,44055,13.02,140705,140705,1115,1115;
OBSERV\LCOO,CL1,0.00,0.00;
OBVAL\30,,441911.126,V;
OBVAL\31,,527547.537,V;
OBVAL\32,,65.047,V;
OBSERV\LLRT,CL1,0.00,3.02;
OBVAL\13,,2.4,V;
OBSERV\LRRT,CL1,0.00,3.02;
OBVAL\13,,4.8,V;
OBSERV\LLTX,CL1,0.00,3.02;
OBVAL\13,,1.24,V;
OBSERV\LGRD,CL1,0.00,3.02;
OBVAL\14,,-0.7,V;
OBSERV\LFAL,CL1,0.00,3.02;
OBVAL\14,,1.4,V;
OBSERV\LCRV,CL1,0.00,3.02;
OBVAL\13,,102.04,V;
OBSERV\LV3,CL1,0.00,3.02;
OBVAL\13,,0.70,V;
OBSERV\LV10,CL1,0.00,3.02;
OBVAL\13,,6.02,V;
OBSERV\LTAD,CL1,0.00,3.02;
OBVAL\13,,4.15091,V;
OBSERV\LTRC,CL1,0.00,3.02;
OBVAL\14,,0.0,V;
OBSERV\LWCL,CL1,0.00,3.02;
OBVAL\14,,0.0,V;
OBSERV\LWCR,CL1,0.00,3.02;
OBVAL\14,,0.0,V;
OBSERV\LCOO,CL1,3.02,3.02;
OBVAL\30,,441912.285,V;
OBVAL\31,,527544.804,V;
OBVAL\32,,65.056,V;
OBSERV\LLRT,CL1,3.02,13.02;

OBVAL\13,,2.3,V;
OBSERV\LRRT,CL1,3.02,13.02;
OBVAL\13,,4.9,V;
OBSERV\LLTX,CL1,3.02,13.02;
OBVAL\13,,0.99,V;
OBSERV\LGRD,CL1,3.02,13.02;
OBVAL\14,,1.2,V;
OBSERV\LFAL,CL1,3.02,13.02;
OBVAL\14,,3.8,V;
OBSERV\LCRV,CL1,3.02,13.02;
OBVAL\13,,94.34,V;
OBSERV\LV3,CL1,3.02,13.02;
OBVAL\13,,2.32,V;
OBSERV\LV10,CL1,3.02,13.02;
OBVAL\13,,31.79,V;
OBSERV\LTAD,CL1,3.02,13.02;
OBVAL\13,,0.79134,V;
OBSERV\LTRC,CL1,3.02,13.02;
OBVAL\14,,0.0,V;
OBSERV\LWCL,CL1,3.02,13.02;
OBVAL\14,,0.0,V;
OBSERV\LWCR,CL1,3.02,13.02;
OBVAL\14,,0.0,V;
OBSERV\LCOO,CL1,13.02,13.02;
OBVAL\30,,441916.994,V;
OBVAL\31,,527536.193,V;
OBVAL\32,,65.157,V;
OBSERV\LMAP,CL1,9.14,9.14;
OBVAL\2,,0.605,V;
OBVAL\23,,-0.298,V;
OBVAL\24,,15,V;
OBVAL\25,10,,;
OBSERV\LMAP,CL1,9.98,9.98;
OBVAL\2,,0.772,V;
OBVAL\23,,-0.161,V;
OBVAL\24,,1,V;
OBVAL\25,20,,;
OBSERV\LMAP,CL1,11.27,11.27;
OBVAL\2,,1.751,V;
OBVAL\23,,-0.132,V;
OBVAL\24,,0,V;
OBVAL\25,20,,;
DEND\79;
HMEND\87;