

ORDNANCE SURVEY GB

CODE-POINT[®] – TECHNICAL SPECIFICATION

Version history

Version	Date	Description
2.14	12/2014	Minor updates.
3.0	06/2022	Introduction of GeoPackage format to the product. Splitting out of the original combined User Guide and Technical Specification document into three separate documents: an Overview, a Technical Specification, and a Getting Started Guide. Formatting updates.

Purpose of this document

This document provides information about and insight into the Code-Point product and its potential applications. For information on the contents and structure of Code-Point, please refer to the Overview.

The terms and conditions on which Code-Point is made available to you and your organisation are contained in that Ordnance Survey customer contract. Please ensure your organisation has signed a valid current customer contract to be able to use Code-Point.

We may change the information in this document at any time, giving you the notice period set out in your contract. We do not accept responsibility for the content of any third-party websites referenced or accessed in or through this document.

This document has been screened according to Ordnance Survey's Equality Scheme. If you have difficulty reading this information in its current format and would like to find out how to access it in a different format (braille, large print, computer disk or in another language), please contact us on: +44 (0)3456 05 05 05.

Copyright in this document

© Ordnance Survey Limited 2022. This document (including for the avoidance of doubt, any mapping images reproduced within it) is protected by copyright and apart from the rights expressly granted within this document to use the content, all rights are reserved. Any part of this document may be copied for use internally in your organisation or business so that you can use Code-Point under the terms of your licence (but not otherwise).

No part of this document may be reproduced or transmitted in any form or by any means (including electronically) for commercial exploitation, onward sale or as free promotional material without getting the written consent of Ordnance Survey beforehand.

This product contains National Statistics data © Crown copyright and database right 2022.

Trade marks

Ordnance Survey, OS, the OS Logos, and Code-Point are registered trade marks, and Boundary-Line and OSGB36 are trade marks of Ordnance Survey, Britain's mapping agency.

GridLink is a registered trade mark of Ordnance Survey Ltd.

Land & Property Services is a registered trade mark of the Department of Finance, Northern Ireland.

NHS is a trade mark of the Department of Health & Social Care.

PAF, PO Box, Post Office and Royal Mail are registered trade marks of Royal Mail Group Limited.

Contact details

[OS website 'Contact us' page \(https://www.ordnancesurvey.co.uk/contact-us\)](https://www.ordnancesurvey.co.uk/contact-us).

Contents

1. Introduction.....	4
2. Product structure	4
2.1 Attributes	4
3. Supply formats overview.....	6
3.1 CSV and GeoPackage	6
3.2 NTF.....	9
3.2.1 An overview of the data in NTF.....	9
3.2.2 Record size	9
3.2.3 Record structure.....	9
3.2.4 Volume records.....	10
3.2.5 Database records	11
3.2.6 Section records.....	14

1. Introduction

Code-Point is a dataset that contains postcode units for Great Britain and Northern Ireland, each having a notional geographical location. Postcodes are an alphanumeric abbreviated form of an address. Postcode units are unique references and identify an average of 15 addresses. In some cases, where an address receives a substantial amount of mail, a postcode will apply to only one address and is defined as a large-user postcode. The maximum number of addresses in a postcode is 100.

2. Product structure

2.1 Attributes

Attribute	Description
Postcode	Contains elements for postal area, district, sector, and unit.
Positional quality indicator (PQI)	A flag used to indicate the positional accuracy of the coordinates allocated to each postcode record.
PO Box indicator	Denotes if the postcode is a PO Box.
Total delivery points	The total number of both matched and unmatched delivery points in the postcode. Not in BT data for Northern Ireland.
Delivery points	Number of matched addresses in the postcode unit that have a PQI of 10 or 20. Not in BT data for Northern Ireland.
Domestic delivery points	Number of non-PO box delivery points that have no PAF organisation name. Not in BT data for Northern Ireland.
Non-domestic delivery	Number of non-PO box delivery points that have a PAF organisation name. Not in BT data for Northern Ireland.
PO Box domestic delivery points	Number of PO Box delivery points. Not in BT data for Northern Ireland or where PQI is 20 in Scotland.
Matched addressed premises	Number of delivery points in buildings or building subdivisions, after exclusion of duplicated coordinate pairs. Not in BT data for Northern Ireland or where PQI is 20 in Scotland.

Attribute	Description
Unmatched delivery points	Number of delivery points awaiting improvement on location. Not in BT data for Northern Ireland or where PQI is 20 in Scotland.
Easting	Distance in metres east of National Grid origin.
Northing	Distance in metres north of National Grid origin.
Country code	Code used by ONS to identify the country in which the Code-Point georeferenced coordinates lies.
NHS regional health authority code	English Pan Strategic Health Authority in which CPLC falls.
NHS health authority code	English Strategic Health Authority or Scottish Health Board in which CPLC falls.
Administrative county code	County in which CPLC falls.
Administrative district code	Unitary Authority, Metropolitan and Non- Metropolitan District, London Borough or Scottish Council Area in which CPLC falls.
Administrative ward code	Electoral Ward or Division in which CPLC falls.
Postcode type	Indicates whether the user is large, L, or small, S. Large postcode type users receive more than 500 pieces of mail. Small users receive 70 pieces per day.

Each postcode unit location – also known as CPLC (Code-Point Location Co-ordinate) – is coordinated on the respective National Grid, with eastings and northings quoted to a resolution of 1m. The accuracy of each postcode unit coordinate pair is defined by the positional quality indicator (PQI), which provides a quality statement of that Code-Point record. There are seven PQI values for the positional quality:

PQI	Description
10	Within the building of the matched address closest to the postcode mean determined automatically by Ordnance Survey (or Land & Property Services for the BT postcode area only).
20	As above but determined by visual inspection by National Registers of Scotland.
30	Approximate to within 50m of the true position (postcodes relating to developing sites may be within 100m of true position).
40	The mean of the positions of addresses previously matched in PAF but which have subsequently been deleted or recoded (very rarely used).
50	Estimated position based on surrounding postcode coordinates, usually to 100m resolution, but 10m in Scotland.
60	Postcode sector mean.
90	No coordinates available.

3. Supply formats overview

3.1 CSV and GeoPackage

GeoPackage is an open, standard, platform-independent, portable, self-describing, compact format for transferring geospatial information. For more information on this format, please see the Getting Started with GeoPackage Guide, which is available on the [Code-Point Product Support page of the OS website](https://www.ordnancesurvey.co.uk/business-government/tools-support/code-point-support) (<https://www.ordnancesurvey.co.uk/business-government/tools-support/code-point-support>).

The following table gives a comparison between the CSV attributes and the GeoPackage attribution.

CSV attribution and format				GeoPackage attribution and format		
Mnemonic	Description	Data type	Size	Description	Data type	Size
PC	Postcode	A7	7	postcode	TEXT	7
PQ	Positional_quality_indicator	I2	1	positional_quality_indicator	TINYINT	1
PR	PO_Box_indicator	A1	1	po_box_indicator	TEXT	1
TP	Total_number_of_delivery_points	I3	*	total_number_of_delivery_units	TINYINT	*
DQ	Delivery_points_used_to_create_the_CP LC	I3	*	delivery_points_used_to_create_the_cp lc	TINYINT	*
RP	Domestic_delivery_points	I3	*	domestic_delivery_points	TINYINT	*
BP	Non_domestic_delivery_points	I3	*	non_domestic_delivery_points	TINYINT	*
PD	PO_Box_delivery_points	I3	*	po_box_delivery_points	TINYINT	*
MP	Matched_address_premises	I3	*	matched_address_premises	TINYINT	*
UM	Unmatched_delivery_points	I3	*	unmatched_delivery_points	TINYINT	*

CSV attribution and format				GeoPackage attribution and format		
Mnemonic	Description	Data type	Size	Description	Data type	Size
EA	Eastings	I6	*	N/A	N/A	N/A
NO	Northings	I7	*	N/A	N/A	N/A
CY	Country_code	A9	9	country_code	TEXT	9
RH	NHS_regional_HA_code	A9	9	nhs_regional_ha_code	TEXT	9
LH	NHS_HA_code	A9	9	nhs_ha_code	TEXT	9
CC	Admin_county_code	A9	9	admin_county_code	TEXT	9
DC	Admin_district_code	A9	9	admin_district_code	TEXT	9
WC	Admin_ward_code	A9	9	admin_ward_code	TEXT	9
LS	Postcode_type	A1	1	postcode_type	TEXT	1

CSV format

- Those fields containing text (A) will be enclosed by double quotes which have not been included in the sizes listed in the table above. An asterisk (*) denotes variable length.
- Fields with null data will appear as "" for text and 0 for numeric.
- Each record will be terminated with a carriage return character (ASCII 13) and a line feed character (ASCII 10).

Example of a Code-Point CSV record:

```
"SOI60AS",10,"N",1,1,0,1,0,1,0,437292,115542,"E92000001","E19000002","E18000009","E10000014","E07000093","E05012936","L"
```

GeoPackage format

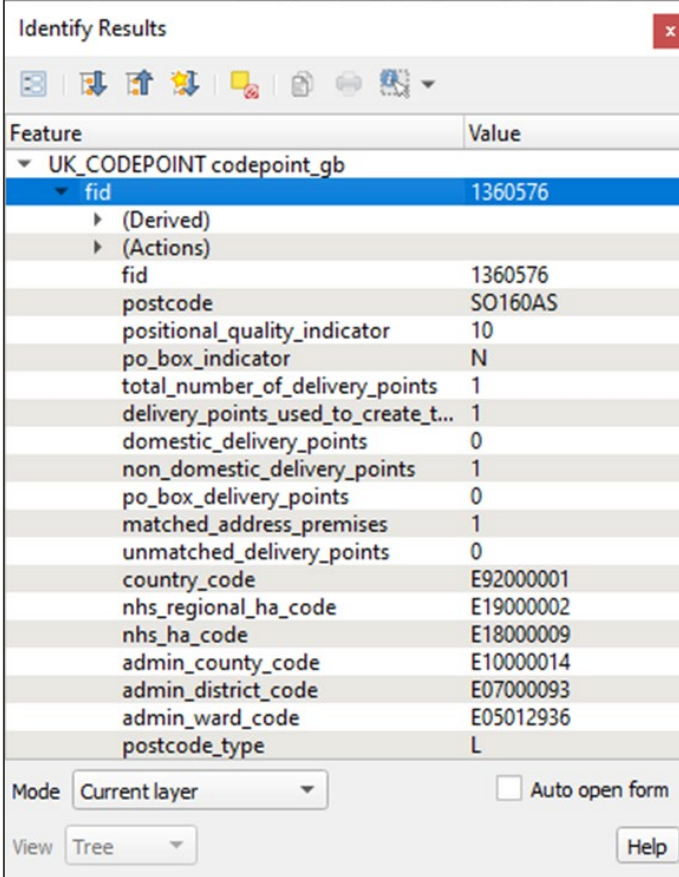
Note that there are no eastings or northings in GeoPackage; the geometry is already created in the GeoPackage container and is not listed as data but will be seen as a column in a database (PostGIS) called geom with a coordinate reference system of British National Grid EPSG: 27700 for GB postcodes.

Also supplied with the GeoPackage is the Code-Point data for Northern Ireland. This is already projected in Irish Grid EPSG: 29902 so will display in the correct position for this region.

Fields with a null value will appear as [Null] for text (PostGIS) or as an empty field in a GIS.

- A null numeric value will appear as 0 in both a database and an attribute table in a GIS.

Example of a GeoPackage record taken from the Information tool in QGIS:



Feature	Value
UK_CODEPOINT codepoint_gb	
fid	1360576
(Derived)	
(Actions)	
fid	1360576
postcode	SO160AS
positional_quality_indicator	10
po_box_indicator	N
total_number_of_delivery_points	1
delivery_points_used_to_create_t...	1
domestic_delivery_points	0
non_domestic_delivery_points	1
po_box_delivery_points	0
matched_address_premises	1
unmatched_delivery_points	0
country_code	E92000001
nhs_regional_ha_code	E19000002
nhs_ha_code	E18000009
admin_county_code	E10000014
admin_district_code	E07000093
admin_ward_code	E05012936
postcode_type	L

Figure 1. GeoPackage record as displayed in QGIS.

Note: The FeatureID (FID) is autogenerated by a GIS when the GeoPackage is loaded into it; it is not present in the GeoPackage.

Postcodes in both CSV and GeoPackage formats have no spaces in them. For information on how to add a space to the postcodes, please see the Code-Point Getting Started Guide, which is available on the [Code-Point Product Support page of the OS website \(https://www.ordnancesurvey.co.uk/business-government/tools-support/code-point-support\)](https://www.ordnancesurvey.co.uk/business-government/tools-support/code-point-support).

3.2 NTF

Code-Point is supplied in NTF v2.0 level 2, which has been formally recognised as a British Standard – BS 7567.

3.2.1 An overview of the data in NTF

The conventions used in the record examples are as follows:

- [] Square brackets are placed around record names, for example, [VOLHDREC]
- { } A pair of braces denotes field names, for example, {REC_DESC} is the record descriptor field.
- [] 21 A two-digit number following square brackets denotes the record descriptor, which uniquely identifies the record name between the brackets.
- <S> This is the space character (ASCII code 32).
- <3S> This denotes three successive space characters.
- % This is a record terminator (ASCII code 37).

3.2.2 Record size

NTF data is written to the supply media in variable length records, with a maximum physical record length of 80 characters, which includes {CONT_MARK} continuation mark and {EOR} record terminator.

Continuation mark {CONT_MARK}

Continuation records are used where the maximum physical record length of 80 characters does not permit a logical record to be transferred wholly within one physical record. The presence of a continuation record is indicated by the value of the continuation mark {CONT_MARK} that immediately precedes the record terminator {EOR}. The value of {CONT_MARK} is 1 if there is a continuation record present and 0 if there is not.

Record terminator {EOR}

The last character of each physical record is the end of record terminator, which is the percent character (%) (ASCII 37).

3.2.3 Record structure

The table below shows the valid record types used in the Code-Point NTF transfer set.

Descriptor	Description	Record name
01	Volume Header Record – defines the donor and data type.	[VOLHDREC]
02	Database Header Record – transfers data about the database.	[DBHREC]
40	Attribute Description Record – defines attribute descriptions and their fields.	[ATTDESC]
05	Feature Classification Record – defines data classifications.	[FEATCLASS]
07	Section Header Record – coordinate and structure types, unit scale factors and so on.	[SECHREC]
15	Point Record – identifies the definition of a postcode unit.	[POINTREC]

Descriptor	Description	Record name
21	Geometry Record – defines the two-dimensional geometry for a postcode unit.	[GEOMETRY1]
14	Attribute Record – defines the attributes or details of a postcode unit.	[ATTREC]
99	Volume Terminator Record – defines the end of the transfer set.	[VOLTERM]

These record types can be grouped into volume records, database records and section records.

3.2.4 Volume records

Each transfer set starts with a compulsory Volume Header Record [VOLHDREC] and terminates with a compulsory Volume Terminator Record [VOLTERM].

Volume Header Record [VOLHDREC] 01

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	01	Record type identifier
DONOR	03:22	A20	ORDNANCE SURVEY<5S>	
RECIPIENT	23:42	A20	<20S>	Not used
TRANDATE	43:50	D8	20051110	Date of processing CCYYMMDD
SERIAL	51:54	I4	0000	Customer sequence number
VOLNUM	55:56	I2	01	Volume number (always 01)
NTFLEVEL	57:57	II	2	NTF Level 2
NTFVER	58:61	R4,2	0200	NTF Version 2.00
NTFOR	62:62	A1	V	Variable length records
EOR	63:63	A1	%	Sets {EOR} to % on formatted media
DIVIDER	64:64	A1	\	Divider used to terminate variable length text fields
CONT_MARK	65:65	II	0	No continuation record
EOR	66:66	A1	%	Record terminator

Record example

01ORDNANCE SURVEY 2005111000000120200V \0%

Volume Terminator Record [VOLTERM] 99

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	99	Record type identifier
FREE_TEXT	03: *	A*	*	Message (see Note below)
CONT_VOL	*.*	I1	0	No continuation volume follows
EOR	*.*	A1	%	Record terminator

Note: The FREE_TEXT field will comprise the message: End Of Transfer Set.

* = variable integer.

Record example

99End Of Transfer Set0%

3.2.5 Database records

Database records transfer information common to all data and their presentation in the subsequent section(s). An NTF transfer set will comprise one database. The database commences with a Database Header Record [DBHREC], which sets up the database. It will be followed by a number of Attribute Description Records [ATTDESC] and Feature Classification Records [FEATCLASS].

Database Header Record [DBHREC] 02

This mandatory record indicates the commencement of a database and gives details of:

- The database name
- NTF release date
- The supply option
- Creation date that applies to the whole transfer set

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	02	Record type identifier
DBNAME	03:22	A20	CODE_POINT_2005.4.0<S>	Database name – Code-Point dataset version
DDNAME	23:42	A20	DEFAULT_02.00<7S>	Standard NTF data dictionary name
DDDATE	43:50	D8	19920515	Date of standard data dictionary
DDBASE	51:70	A20	<20S>	Not used
DDBDATE	71:78	D8	00000000	Not used
CONT_MARK	79:79	A1	1	Continuation record follows
EOR	80:80	A1	%	Record terminator

Continuation of Database Header Record

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	00	Continuation record identifier
FCNAME	03:22	A20	CODE_POINT_03.02<4S>	Code-Point specification version 3.02 (see note)
FCDATE	23:30	D8	20051104	Creation date of dataset
DQNAME	31:50	A20	<20S>	Not used
DQDATE	51:58	D8	00000000	Not used
DATA_MODEL	59:60	I2	02	Data model type – spaghetti
CONT_MARK	61:61	A1	0	No continuation record
EOR	62:62	A1	%	Record terminator

Note: The Code-Point specification version number gives the major version before the decimal point (3 in the above example) and after it the supply option (2 in the example).
CODE_POINT_03.02 = Code-Point product

Record examples

02CODE_POINT_2002.1.0 DEFAULT_02.00 19920515 000000001%
00CODE_POINT_03.02 19990401 00000000020%

Attribute Description Record [ATTDESC] 40

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	40	Record type identifier
VAL_TYPE	03:04	A2	PR	Attribute mnemonic, for example, PO Box indicator
FWIDTH	05:07	A3	001 or <3S>	Fixed width of attribute or three spaces if variable width
FINTER	08:12	A5	A1<3S>	Interpretation of field (A* if variable width)
ATT_NAME	13:*	A*	PO Box indicator	Name given to attribute
DIVIDER	*:*	A1	\	
CONT_MARK	*:*	A1	0	No continuation record
EOR	*:*	A1	%	Record terminator

* = variable integer

Note: An attribute description will be needed to describe all attributes used in Code-Point data. All the attributes that may appear within the data are given in the record examples below.

Record examples:

40PC007A7 Postcode unit\0%
 40PQ002I2 Positional quality indicator\0%
 40PR001A1 PO box indicator\0%
 40TP003I3 Total number of delivery points\0%
 40DQ003I3 Delivery points with same PQI as unit itself\0%
 40RP003I3 Domestic delivery points\0%
 40BP003I3 Non-domestic delivery points\0%
 40PD003I3 PO box delivery points\0%
 40MP003I3 Matched address premises\0%
 40UM003I3 Unmatched delivery points\0%
 40CY009A9 Country code\0%
 40RH009A9 NHS regional health authority code\0%
 40LH009A9 NHS health authority code\0%
 40CC009A9 Administrative county code\0%
 40DC009A9 Administrative district code\0%
 40WC009A9 Administrative ward code\0%
 40LS001A1 Postcode type\0%

Feature Classification Record [FEATCLASS] 05

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	05	Record descriptor
FEAT_CODE	03:06	I4	2801	Feature code
CODE_COM	07:16	A10	<10S>	Not used
STCLASS	17:36	A20	<20S>	Not used
FEATDES	37:*	A*	Unit Postcode Point	Textual description of feature classification
DIVIDER	*.*	A1	\	Divider used to terminate variable length fields
CONT_MARK	*.*	I1	0	No continuation record
EOR	*.*	A1	%	Record terminator

* = variable integer.

Record example

052801 Unit Postcode Point\0%

3.2.6 Section records

The section records contain the Code-Point data within the postcode area being transferred by that section. It starts with the Section Header Record [SECHREC] and is followed by a number of Section Data Records that contain data on all the postcode units within the section. In Code-Point, these data records consist of a sequence of three logical records, which is repeated for each postcode unit within the section.

Section Header Record [SECHREC] 07

This mandatory record starts a section. It contains information and parameters essential for understanding, interpreting and processing some of the fields within the data. It establishes the unit of measure for X and Y coordinates, origins and other constants.

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	07	Record type identifier
SECT_REF	03:12	A10	SO<8S>	Postcode area covered by dataset
COORD_TYPE	13:13	11	2	Defines rectangular coordinates
STRUC_TYP	14:14	11	1	Defines vector data
XYLEN	15:19	15	00007	Defines {X_COORD}, {Y_COORD} as seven-digit fields
XY_UNIT	20:20	11	2	Defines X and Y units as metres
XY_MULT	21:30	R10,3	0000001000	Multiply X and Y coordinates by 1.000
ZLEN	31:35	15	00006	Defines Z coordinates as six-digit fields
Z_UNIT	36:36	11	2	Defines Z units as metres
Z_MULT	37:46	R10,3	0000001000	Multiply Z units by 1.000
X_ORIG	47:56	110	0000000000	Origin of National Grid, zero
Y_ORIG	57:66	110	0000000000	Origin of National Grid, zero
Z_DATUM	67:76	110	0000000000	Not used
CONT_MARK	77:77	A1	1	Continuation record follows
EOR	78:78	A1	%	Record terminator

Geometry Record [GEOMETRY] 2I

This record contains the coordinate position of the postcode unit identified in the previous point record. All coordinate values within Code-Point are given with a precision of 1 metre.

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	2I	Record type identifier
GEOM_ID	03:08	I6	000000	Not used
GTYPE	09:09	AI	I	Defines point geometry
NUM_COORD	10:13	I4	000I	Number of coordinate pairs
X_COORD	14:20	I7	0272530	Easting
Y_COORD	21:27	I7	0196956	Northing
QPLAN	28:28	AI	<S>	Not used
CONT_MARK	29:29	AI	0	No continuation record or
			I	continuation record follows
EOR	30:30	AI	%	Record terminator

Postcodes that have no coordinated position will be given zero coordinates ('00000000000000') and the positional quality indicator in the accompanying Attribute Record will be set to '0'.

Record example

2I000000I000I02725300I96956 0%

Attribute Record [ATTREC] I4

The Attribute Record gives the attributes or details of the postcode unit, for example, the postcode itself, PQI and so on. This logical record may have one or more continuation records to transfer all the attribute information.

Field	Position	Format	Value example	Description
REC_DESC	01:02	A2	I4	Record type identifier
ATT_ID	03:08	I6	000000	Not used
VAL_TYPE	09:10	A2	PC	Attribute mnemonic
VALUE	II:*		SO5I5RU	Attribute value
CONT_MARK	*:*	AI	0	No continuation record or
			I	continuation record follows
EOR	*:*	AI	%	Record terminator

* = variable integer

The pair of fields {VAL_TYPE} and {VALUE} will repeat to specify all the attributes required. It may be necessary to use a continuation record to specify all attributes.

The Attribute Record will contain all or some of the following fields:

Attribute mnemonic	Description	Fixed or variable	Size
PC	Postcode unit	F	A7
PQ	Positional quality indicator	F	I2
PR	PO Box indicator	F	A1
TP	Total number of delivery points	F	I3
DQ	Delivery points – used to create the CPLC where PQI value is 10 or 20	F	I3
RP	Domestic delivery points	F	I3
BP	Non-domestic delivery points	F	I3
PD	PO Box delivery points	F	I3
MP	Matched address premises	F	I3
UM	Unmatched delivery points	F	I3
CY	Country code	F	A9
RH	NHS regional health authority code	F	A9
LH	NHS health authority code	F	A9
CC	Administrative county code	F	A9
DC	Administrative district code	F	A9
WC	Administrative ward code	F	A9
LS	Postcode type	F	A1

Attributes with null data will be omitted from this record.

Each of the attribute mnemonics will be defined in an Attribute Description Record [ATTDESC] 40 at the start of the transfer set.

Record example

I4000000PCSO5I5RUPQI0PRNTP0I7DQ0I7RP0I6BP00IPD000MP0I7UM000CYE9200000IRHEI9000I
%

00002LHEI8000009CCEI00000I4DCE07000093WCE050046490%