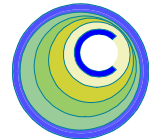## The CEDRA Corporation's

COMMAND OF THE MONTH

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FEATURED COMMAND

Copy Selected
Features

Application Description

Have you ever had the need to copy one or more features from one layer into another? Chances are, you probably have. As a matter of fact, it is probably more common than you thought.

A typical scenario is when one receives work from an outside source and it is desired to update the master database with the newly received work. In this case, the task is to take the newly received work and add it to the master database. The trick is how to perform this task quickly and easily.

The CEDRA Solution

To address the application of copying features from one layer into another, the [Copy Selected Features] command, within the {CEDRA Commands} combo-box can be used. Note that this functionality is available for ArcGIS® and ArcView® GIS users.

To utilize the [Copy Selected Features] command, ArcGIS® users should activate the CEDRA-AVcad-Menus toolbar to display the toolbar shown in Figure 1. Shown in Figure 2 is the {CEDRA Commands} combo-box. The [Copy Selected Features] command appears towards the middle of the drop-down list.

Copy Selected Features - Overview

The intent of the [Copy Selected Features] command is to provide the user the ability to copy one or more selected features, which may reside in one or more layers, into another layer.

Figure 1 - CEDRA-AVcad-Menus Toolbar for ArcGIS Users

In addition to copying the geometry of the features, the [Copy Selected Features] command provides the ability to copy attribute (field) information as well.

For ArcGIS users, the [Copy Selected Features] command also offers the user the ability to specify a field mapping file. The field mapping file provides the user the ability to map a specific field to one or more other fields.

> ### Command Of The Month bulletin
>
> *This month's issue discusses the process of copying one or more selected features, which can reside in one or more layers, into another layer.*

For example, a feature in layer A is to be copied into layer B. The feature in layer A has an attribute (field) called PNT. It is possible to use the field mapping file to have the values stored under the attribute PNT copied into the attributes NUMBER and POINT_ID. There is no limit to the number of fields a field can be mapped to, as well as, no limit to the number of field mappings.

In addition to mapping a field to one or more fields, the user can specify an equation in order to calculate a value. So that, rather than simply copying an attribute value, the field mapping file can be used to calculate a value for storage.
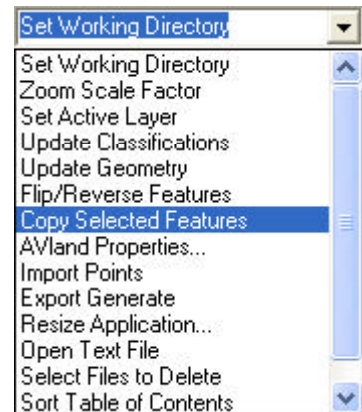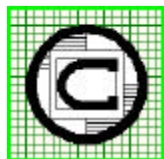

**Figure 2
{CEDRA Commands} Combo-Box**

Copy Selected Features - Operation

Once the command has been activated, the following steps can be performed:

1a. If there are no selected features at the time the command is activated, the error message shown in Figure 3 will be displayed. At this point, click the OK button and select the feature(s) to be processed, at which point the command can be reactivated.

**Figure 3
No Selected Features Error Message**

1b. If there are selected features, the command checks to see if there are multiple feature types. If multiple feature types are selected, the command will query the user as to which feature type is to be processed. A choice list message box similar to the one shown in Figure 4 will be presented. The feature types, which were detected, will appear in the choice list. The user simply selects the appropriate feature type followed by clicking the OK button.
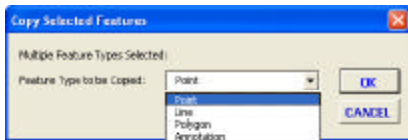

Figure 4
Multiple Feature Type Choice List

2. Once the command determines the feature type to be processed, the multi-input dialog box of Figure 5 will appear for ArcGIS users. ArcView GIS users will notice that the Field Map File parameter does not appear in the dialog box. At this point:
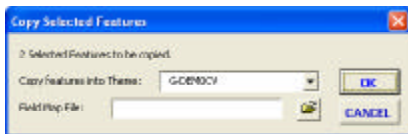

Figure 5
Copy Selected Features Parameters

◗ Specify the layer in which the selected features are to be copied into and for ArcGIS users, the field mapping file to be used, if any.
◗ Click the OK button to continue or the Cancel button to abort the command.

3. The command will now query the user as to if the attributes that are associated with the selected features are to be copied into the specified layer, see Figure 6. As such:
◗ Click the Yes button to indicate that any attributes that are associated with the selected features and which do not appear in
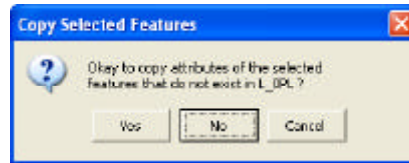

Figure 6
Include Attributes Query

the specified layer are to be added to the layer identified in Step 2.
◗ Click the No button to indicate that only the geometry of the selected features is to be copied.
◗ Click the Cancel button to abort the command.

If the Yes or No buttons are selected, the command will begin to copy the selected features into the layer specified in Step 2. Once the features have been copied, a message in the status bar area will appear indicating the number of features copied and the number of new attributes that were added to the layer specified in Step 2, if any.

Notes

a. When copying features from one layer to another, the values of common attributes are copied. For example, if a feature from layer A is to be copied into layer B and both layers have an attribute called ID, the value of ID will be copied in addition to the geometry of the feature.

b. To select the field mapping file using the typical file navigation dialog box, the user should select the file folder icon which appears on the right side of the Field Map File parameter.

Field Mapping File Description

Figure 7 contains a sample field mapping file. Any text editor or word processor can be used to establish this file.

The field mapping file is an ASCII based file containing at a minimum two arguments per data line. An optional third argument can be specified. This argument is referred to as the attribute equation.

The first argument on a data line is the name of the field to be mapped. This is the name of a field in a layer containing features to be copied.

The second argument is the name of the field in the layer, which is to receive the features being copied to, which the first argument is to be mapped to.

The third argument as mentioned above is optional and represents an equation that is to be evaluated in order to determine the value to be stored in the field specified in the second argument.

A comma, space or tab character can be used to delineate the arguments on a data line. Note that if a space character is to be used to delineate the arguments, the field names can not contain the space character.

Comment lines are indicated by the /* characters appearing in columns 1 and 2 of a data line. Comment lines can be used to improve the "readability" of the file. So that, should others need to view the file, they will be able to understand the intent of the field mapping.

In the sample, shown in Figure 7, the attributes LAYER and STATUS are mapped to 2 and 3 fields, respectively, and all but 2 of the field mappings employ an attribute equation. The syntax for an attribute equation is identical to that used by the CEDRA-DataEditor software. As a matter of fact, the equation solver used by the CEDRA-DataEditor software is also used by the [Copy Selected Features] command.

Attribute Equation Description

The attribute equation is an optional argument in the field mapping file and can contain mathematical operators, as well as, certain intrinsic functions.

Within an equation, the user is able to:

a. access the values stored in attributes which are associated with the features being copied,

```
/*
/*                              Sample Field Mapping File
/*
/* Each data line contains two or three arguments which control how data is copied
/* from one layer into another.
/*
/* Argument 1: original field name in Layer 1
/* Argument 2: new field name in Layer 2
/* Argument 3: attribute equation for computing value to be stored in the new field
/*             name (argument 2) in Layer 2
/*
/* The first argument is the name of the field in the layer from which features are
/* to be copied. This argument must be present.
/*
/* The second argument is the name of the field in the second layer (layer to contain
/* the features to be copied) that corresponds to the first argument. These names do
/* not need to be the same. This argument must be present
/*
/* The last argument is optional and contains an equation which should be evaluated to
/* establish the value to be stored under the field name specified in Argument 2
/*
LAYER,SUBTYPE,IF(LAYER="FUSED_CUTOUT",1,IF(LAYER="LINE_FUSE",2))
/*
LAYER,LAYER_ID
/*
/* THE FOLLOWING EQUATION NEEDS TO GET RID OF THE "A" IN THE CAPACITY VALUE FOR ALL
/* VALUES NOT EQUAL TO 'EMPTY' OR 'NA', IF THE CAPACITY VALUE IS NA, SET THE NEW VALUE
/* TO BE -9, IF THE CAPACITY VALUE IS EMPTY, SET THE VALUE TO -6, IF THE VALUE IS 100A
/* CHANGE IT TO BE 100 (THE TRIMR1 FUNCTION WILL TRIM THE LAST CHARACTER FROM A
/*  STRING)
/*
CAPACITY,MAXCURRENT,IF(CAPACITY="NA","-9",IF(CAPACITY="EMPTY","-6",TRIMR1(CAPACITY)))
/*
INSTALLED,INSTALLATION_DATE
/*
STATUS,NORMAL_POSITION_A,IF(STATUS="OPEN",0,IF(STATUS="CLOSED",1))
/*
STATUS,NORMAL_POSITION_B,IF(STATUS="OPEN",0,IF(STATUS="CLOSED",1))
/*
STATUS,NORMAL_POSITION_C,IF(STATUS="OPEN",0,IF(STATUS="CLOSED",1))
```

Figure 7 - Sample Field Mapping File

b. apply mathematical operators and/or functions, and
c. specify conditionals by using the IF(statement.

An example attribute equation is:

```
((EZ-SZ)/LEN)*100.0
```

In the example above there are three attributes (SZ, EZ and LEN). The values assigned to the SZ, EZ and LEN attributes will be those that are currently assigned to the feature being copied. The computed value could then be mapped to a specific attribute via the second argument on a data line in the field mapping file.

Equations are solved proceeding left to right resolving expressions within parentheses first. When parentheses are nested they are resolved inside to outside. That is, the inner most set of parentheses are solved first, then the next inner most and so forth.

When there are more then one nest of parentheses, each nest is resolved inside to outside and from left to right. The user is able to use parentheses to ensure that the desired sequence of calculations is performed.

The supported Mathematical operators include (see note 1 below):

1. ^   Exponentiation,
2. /   Division,
3. *   Multiplication,
4. +   Addition,
5. -   Subtraction.

The supported Boolean operators include:

1. =   Equality,
2. <   Less than,
3. >   Greater than,
4. <=   Less than or equal to,
5. >=   Greater than or equal to,
6. <>   Not equal to.

The supported Functions include:

ABS	= absolute value of a number,
ACOS	= arc cosine of a number expressed in radians (see note 2 below),
ASIN	= arc sine of a number expressed in radians (see note 2 below),
ATAN	= arc tangent of a number expressed in radians (see note 2 below),
CHR	= returns a string containing the character associated with the specified numeric character code (see Table 2),
COS	= cosine of a number expressed in decimal degrees (see note 3 below),
DEG2RAD	= conversion of degrees to radians,
LEN	= returns the number of characters in a string,
RAD2DEG	= conversion of radians to degrees,
ROUND	= rounding up of a number to the nearest whole number,
SIN	= sine of a number expressed in decimal degrees (see note 3),
SQRT	= square root of a number greater than zero,
TAN	= tangent of a number expressed in decimal degrees (see note 3),
TRUNCATE	= truncation of a number,
STRING	= treat the value as a string, not as a numeric value,
TRIM	= remove leading and trailing blanks from the value,

TRIML1	= remove the first character in a string,
TRIML2	= remove the first two characters in a string,
TRIML3	= remove the first three characters in a string,
TRIML4	= remove the first four characters in a string,
TRIML5	= remove the first five characters in a string,
TRIML6	= remove the first six characters in a string,
TRIMR1	= remove the last character in a string,
TRIMR2	= remove the last two characters in a string,
TRIMR3	= remove the last three characters in a string.
TRIMR4	= remove the last four characters in a string.
TRIMR5	= remove the last five characters in a string,
TRIMR6	= remove the last six characters in a string.

Note 1: Mathematical operators appearing in an equation are resolved by evaluating exponentiation first, division and multiplication second, and addition and subtraction last. Division and multiplication operations are resolved proceeding left to right in the order they appear. Likewise, addition and subtraction operations are resolved in a similar manner.

Note 2: The input values for the arc sine (ASIN), arc cosine (ACOS) and arc tangent (ATAN) functions are expressed in radians, while the values they generate will be expressed in decimal degrees.

Note 3: The input values used with the sine (SIN), cosine (COS) and tangent (TAN) functions should be expressed in decimal degrees, not radians. The values returned by these functions, however, will be in terms of radians.

Note 4: The STRING function is used when the result of an equation is to be a string and not a number. Since it is possible for numbers to be stored in fields (attributes) that are of string type, as well as number type, the default is to treat all attribute values as numbers. If the values of a field (attribute) are to be treated as strings, the STRING function must be used.

Note 5: If the result of an equation is to be of string type the only supported mathematical operator is addition (+). In this case the individual arguments are directly concatenated. Should the user wish to enter a string explicitly, the double-quote character, ", must enclose the string. For example if the equation "A" + "B" appeared, the result would be AB. No space would be inserted between the arguments. If a space (blank character) is to separate the values, the equation should appear as: "A" + " " + "B".

Note 6: If a special character is to be used in an equation, such as the double-quote character ("), use the CHR function to represent the character. For example,

Table 1 - Sample Equations

```
1.     J2-K2
2.     29.8*P2*R2*Q2^2*SQRT(M2)
3.     ((J2-20)/L2)^0.54*N2
4.     S2*N2
5.     IF(Q2=2.5,0.9,IF(Q2=4.5,0.78,IF(Q2=1.9,0.97,IF(Q2=2.5,(Q2^-0.092*1.0808),4.0))))
6.     DEG2RAD(ACOS(0.5))
7.     ASIN(0.75)
8.     ATAN(0.35)
9.     SIN(30)
10.    COS(60)
11.    TAN(45)
12.    ROUND(4.75)
13.    TRUNCATE(4.75)
14.    STRING(PIN1)+STRING(PIN2)
15.    STRING(PIN1)+"-"+STRING(PIN2)+"-"+STRING(PIN3)
16.    "My String = "+STRING(PIN1)+"000-"+STRING(PIN2)+"0010"
17.    IF(MAP=SLN,"TRUE_CONDITION","FALSE_CONDITION")
18.    IF(BLDNUM<>" ",(TRIM(HOUSENUM)+TRIM(ST_DIR)+TRIM(STREET)),BLDNUM)
19.    TRIM(HOUSENUM)+TRIM(ST_DIR)+TRIM(STREET)
20.    IF(CAPACITY="NA","-9",IF(CAPACITY="EMPTY","-6",TRIMR1(CAPACITY)))
21.    IF(KVAR_RATIN="NA","-9",IF(KVAR_RATIN="400",450,KVAR_RATIN))
22.    TRIML2((TRIMR1(LAYER)))
```

to represent the double-quote character, CHR(34), should be used, (see Table 2).

The user also has the ability to specify a conditional clause by utilizing the IF operator. In so doing, the user can introduce some decision making capabilities into the attribute value calculation. The IF operator follows the following syntax:

IF(expression,true_condition,false_condition)

In using the IF operator the user specifies an *expression* that will be evaluated such that it results in either a *true* or *false* condition. As such, the user must specify the *true* and *false* conditions, in addition to the *expression*.

For example, if an attribute A2 was assigned the equation IF(Q2=4.5,0.5,0.75) the command would assign A2 the value 0.5, if the value for the attribute Q2 was equal to 4.5, or the value 0.75, if the value for the attribute Q2 was not equal to 4.5.

Note that if the *true* or *false* condition is to contain an equation, **the user must** enclose the condition in parentheses in order for it to be properly evaluated (refer to the, (Q2^-0.092*1.0808), portion of the sample equation 5 below).

Shown in Table 1 is the correct syntax for various sample equations. Note that J2, K2, P2, R2, Q2, M2, L2, S2, N2, PIN1, PIN2, PIN3, MAP, SLN, BLDNUM, HOUSENUM, ST_DIR and STREET represent sample attributes (fields).

It is noted that in the sample equations there are no leading, trailing or embedded blank spaces. However, such blank spaces may be introduced if deemed necessary for the sake of clarity. If so, they will be disregarded by the program.

Summary

The [Copy Selected Features] command is an extremely useful tool for copying features from one layer to another. For those of you who have a need to copy features we suggest that you try this command.

If you have a request for Command Of The Month, feel free to phone, fax or e-mail your request to The CEDRA Corporation.

```
 0  •                32 space        64 @           96 `
 1  •                33 !            65 A           97 a
 2  •                34 "            66 B           98 b
 3  •                35 #            67 C           99 c
 4  •                36 $            68 D          100 d
 5  •                37 %            69 E          101 e
 6  •                38 &            70 F          102 f
 7  •                39 `            71 G          103 g
 8  backspace        40 (            72 H          104 h
 9  tab              41 )            73 I          105 i
10  linefeed         42 *            74 J          106 j
11  •                43 +            75 K          107 k
12  •                44 ,            76 L          108 l
13  carriage return  45 -            77 M          109 m
14  •                46 .            78 N          110 n
15  •                47 /            79 O          111 o
16  •                48 0            80 P          112 p
17  •                49 1            81 Q          113 q
18  •                50 2            82 R          114 r
19  •                51 3            83 S          115 s
20  •                52 4            84 T          116 t
21  •                53 5            85 U          117 u
22  •                54 6            86 V          118 v
23  •                55 7            87 W          119 w
24  •                56 8            88 X          120 x
25  •                57 9            89 Y          121 y
26  •                58 :            90 Z          122 z
27  •                59 ;            91 [          123 {
28  •                60 <            92 \          124 |
29  •                61 =            93 ]          125 }
30  •                62 >            94 ^          126 ~
31  •                63 ?            95 _          127 •
```

Table 2 - ANSI Character Codes (0-127)