Introduction
vtocx_to_record is a command that converts an octal VTOCE index to a Multics record number and sector offset. It computes the incorrect values when used on a 3381 drive.

Problem
If you invoke this program, without specifying a device type, or when specifying a d451 or 3381 device type, you get the same results:

vtocx_to_record (10 11)
  vtocx 10 = Rec 11, rs 11; abs sect 231 (d451)
  vtocx 11 = Rec 11, rs 14; abs sect 234 (d451)
  r 16:24 0.090 0 level 2

vtocx_to_record (10 11) d451
  vtocx 10 = Rec 11, rs 11; abs sect 231 (d451)
  vtocx 11 = Rec 11, rs 14; abs sect 234 (d451)
  r 16:24 0.055 0 level 2

vtocx_to_record (10 11) 3381
  vtocx 10 = Rec 11, rs 11; abs sect 231 (3381)
  vtocx 11 = Rec 11, rs 14; abs sect 234 (3381)
  r 16:24 0.175 0 level 2

This is incorrect. The 3381 case should provide different values for the absolute sector and rs values.

This command includes the two internal subroutines, below:

mulphy: proc (rec) returns (fixed bin);
  dcl (sect, rec) fixed bin;
  sect = rec * 16;
  sect = sect + divide (sect, usable, 17, 0) * unusable;
  return (sect);
end mulphy;

phymul: proc (sect) returns (fixed bin);
  dcl (r, sect) fixed bin;
  r = divide (sect, sect_per_cyl (dvt), 17, 0) * unusable;
  return (divide (sect - r, 16, 17, 0));
end phymul;

In both of those procedures, the constant 16 is used. This value represents the number of sectors in a record. This value is 16 for most disk devices, such as the d500, d451, d400, d191, d181, and d501. However, for 3380 and 3381 disks, this value should be 2.

Proposed Changes
There is a constant array defined in fs_dev_types_sector.incl.pl1, called sect_per_rec, which provides the correct value for “sectors per record” based on the provided device type index.
The proposed fix is to change the above two procedures to:

```
mulphy: proc (rec) returns (fixed bin);
    dcl (sect, rec) fixed bin;
    sect = rec * sect_per_rec (dvt);
    sect = sect + divide (sect, usable, 17, 0) * unusable;
    return (sect);
end mulphy;

phymul: proc (sect) returns (fixed bin);
    dcl (r, sect) fixed bin;
    r = divide (sect, sect_per_cyl (dvt), 17, 0) * unusable;
    return (divide (sect - r, sect_per_rec (dvt), 17, 0));
end phymul;
```

The proposed fix is courtesy of Charles Anthony.

**Testing of the Change**

Run the vtocx_to_record command on various vtoce indices and verify that the correct value is displayed for various device types.

For example:

```text
vtocx_to_record (10 11)
    vtocx 10 = Rec 11, rs 11; abs sect 231 (d451)
    vtocx 11 = Rec 11, rs 14; abs sect 234 (d451)
    r 16:24 0.090 0 level 2

vtocx_to_record (10 11) d451
    vtocx 10 = Rec 11, rs 11; abs sect 231 (d451)
    vtocx 11 = Rec 11, rs 14; abs sect 234 (d451)
    r 16:24 0.055 0 level 2

vtocx_to_record (10 11) 3381
    vtocx 10 = Rec 14, rs 0; abs sect 300 (3381)
    vtocx 11 = Rec 14, rs 1; abs sect 301 (3381)
    r 16:24 0.175 0 level 2
```

**Bug Reference**


**Documentation**

The change is the documentation. No further document needed.

**Version History**

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Author</th>
<th>Comment</th>
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<td>2018-01-17</td>
<td>1.0</td>
<td>Eric Swenson</td>
<td>Initial version of MCR.</td>
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