Buffer as Circular Array
Hoare-Style Proof of Correctness

$0 \le size \wedge size \le max\_size \wedge ibuffer[1..maxsize] \wedge$
$1 \le bot \wedge bot \le maxsize \wedge 1 \le top \wedge top \le maxsize$

```
{PROCEDURE BufferIn(x:X; VAR report:ReportType);
  top.in := top; bot.in := bot; size.in := size;
  max_size.in := max_size; ibuffer.in := ibuffer;
    IF size < max_size THEN
      BEGIN
      size := size+1;
      top := (top MOD max_size) + 1;
      ibuffer[top] := x;
      report := OK
      END
    ELSE report := full; }
```

$(size.in < max\_size) \wedge$
$max\_size = max\_size.in \wedge$
$bot = bot.in \wedge$
$0 \le size \wedge$
$size = size.in + 1 \wedge$
$top = (top.in \bmod max\_size.in) + 1 \wedge$
$\forall i\{i \neq top \Rightarrow ibuffer[i] = ibuffer.in[i]\} \wedge$
$buffer[top] = x \wedge$
$report = OK)$
$\vee (size.in = max\_size \wedge$
$max\_size = max\_size.in \wedge$
$bot = bot.in \wedge$
$top = top.in \wedge$
$size = size.in \wedge$
$ibuffer = ibuffer.in \wedge$
$report = full)$