SATELLITE ON-BOARD PROCESSING OF EARTH

RESOURCES DATA

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ABSTRACT

Earth resources data processing is presently in a research phase. Scientific
spacecraft collect data and telemeter it to ground stations for processing. It is
becoming apparent that significant amounts of useful information can be extracted
from the multispectral scanner images by ERSS-1.

It appears that in the 1980-1990 de-
cade operational spacecraft will be
launched to continuously monitor crop pro-
duction, severe weather systems, earth
and water pollutants, etc., in order to
provide operational information to the
users of this information on a near-real
time basis. It appears that it may be
more cost effective to process the data on-
board the satellite and transmit the re-
results directly to the users of the infor-
mation as opposed to transmitting down the
raw data, processing it on the ground, and
then disseminating the results via another
satellite system.

In this paper we consider the feasibil-
ity of processing earth resources data
on-board the satellite. We first deter-
mine some likely user application areas
and from these the required data process-
ing algorithms. These algorithms are
then analyzed with respect to the compu-
tational load they impose on the on-board
data processor. The on-board processor
must also be matched to the format of the
data as it is produced by the imaging
system. Given the data input format con-
straints and the computational require-
ments required by the algorithms we in-
vestigate some computer architectures for
the on-board processor. Since the multi-
spectral scanner produces parallel data
streams with high data rates and because
of the many computations required by the
algorithms some sort of multiprocessor
organization seems appropriate.

INTERFACING OF A COLOR-TV-MONITOR AND A

PROCESSOR WITH THE AID OF AN EXTERNAL

CORE-MEMORY FOR INTERACTIVE PICTURE

PROCESSING.

SYMPOSIUM ON "MACHINE PROCESSING OF

REMOTELY SENSED DATA"

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ABSTRACT

An interactive picture processing sys-
tem was developed for semi-automatic pro-
cessing of the NOAA-3-type weather sat-
elites picture data. This can be helpful
in cases where the experiences and the
knowledge of the meteorologists can support
the digital data processing. Also the sys-

A precision color-TV monitor is used
with a 19-inch screen, operating according
to the TV-standards. This monitor receives
the picture data from a core-memory which
is the interface to a PDP 11/45 digital
data-processor. The separate core-memory
comprises 163,840 18-bit-locations and is
organized as a random access memory with
respect to a maximum flexibility. The ca-
pacity of the memory was chosen to be suf-
ficient for operating in a section of the
screen where the distortions are negligible.
The core-memory is used as a quick image-
refresiing memory as well as a buffer e-
qualizing the highly from each other dif-
fering transfer rates by transferring data
from the processor to the memory and from
the memory to the TV-monitor. A TV-camera
is coupled with the core-memory to enable
the operator to put additional informations
on the screen or to feed this information
to the processor. By using a light-dot
receiver, the operator can pick up co-or-di-
nate values from the monitor screen to be
transferred to the core-memory or to the
processor. Also marking signals can be
transferred to the screen as well by hand
as by a mini computer.