

JR Shay

Purdue Univ



Made in U. S. A.

Made in U. S. A.

THIS BOOK CONTAINS EYE-EASE PAPER

"Easy on the Eyes"

53-012

Home: 012-8032 - Chevy Chase 3804 Thornapple.

Zaunmeyer 301+GR4-6500 Ext 435 (85-435) Govt Code

McClellan ⁸⁵⁻³²² but diff. extension Home 864-3165 GR4-

Cochran do. Ext 2237

Badgley 202+W02-0574 - [132-0574 Govt Code] Home 654-9139

Jenkins 202+W02-4623

Colwell 415+845-6000

Lyns 415+961-1111 Ext 2627

Walter (Weys) 607+754-1000

Holter - Ofc 313+483-0500 Ext 359
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Raffensperger - W02-0315

Ted Blong - W03-6341

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Allenby, Dr. - W02-0341

Dr. William Nordberg - [134-5003] Nordberg Govt Code
Goddard Spaul. Center 474-9000

Ted Byrly - RE7-4423

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Bruce Kelly - ^{202+ Code} RE7-4142 Ext 6529

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Bernie Scheppe Gimrada Ft Belovir Va. 30150 alternate 29287, 703+780-1100 Ext. 62244

Paris
Cohen
Cohen

Ken Buchholz, ofc. 608+262-1392

2

~~Ken~~
Vic Myers Westaco, 512+ W08-2820; home: W08-3036

Ray Sooy ²⁰²⁺ DU 8-8401. H. Bauer 202+DU8-8411

Mr. John R. Wilson, USAID, 202+451-5473 home Springfield Va,

Dr. Archibald B Park ²⁰²⁺ DU8-7167; Apt 517, 13009 Mistletoe Spring Rd., Laurel Md.
Home 301-725-5291.

Mail Address: Peter Badley
Natural Resources Program Code ST
NASA
Wash. D.C.

Don G. Orr - 703+781-8500. Ext 45705 or 45476. Geographic Intelligence
Div. US Army Engr. GIMRADA, Ft. Belvoir Va.

Bill Fisher
Desl. Survey

Saunders Mac Lane Math O Scienc. 1955.

Marshall Astronomers:

Olen P. Ely - Math & Physics M.A. Candidate,

Edward Noel - Guidance Center Mgr. Systes

Honeywell

Recorder

Mr. F. Philip Weber

School of Natural
Univ. of Mich.
Ann Arbor

Resource

4

I-94 Exit Ann Arbor - Jackson Ave.

~~Proceed on Jackson Ave and merge onto~~
~~Huron St.~~ Stop at Holiday Inn

and call Phil Webber, 764-1413

tell "Margaret" of his mission.

Webber will join in there & lead
him to Stinchfield Woods.

~~Webber's home phone~~

Ph 761-0855

Roger Hoffer.

Lee Trachtman

Purdue Univ - 90

Lafayette Ind - 90

Hu 3-0500

- 337 Canbron

Radar surveys, Yenne's place:

- 1. Springfield - S & a few miles
- 2. Columbus - On the H&S N+W of center of town
- 3. ~~Coshocton~~ -
Coshocton - near town
- 4. W of Ks. Lawrence } approx 1/2 mi
- 5. Garden City Ks. } north

N Oval Research Place

4 radar frequencies - signs vs. 10 am
 over sites 4 & 5.
 Also over Purdue.

Test Site Selection Committee Meeting

Mon PM 1:30.

Mission definition document survey Lunar orbital mission.
 Earth Orbital document, IBM will study
 economic aspects of Ea. orbiting platforms.
 U. of Science + Technology, will help
 in gathering these
 Sid Shapiro
 Tom Chiznell
 Bob Walter

Ms. Holland Northwest Univ.
 Mr. Whittier " " " "
 Statistical treatment of test sites.

Fisher + Daricki Barawicki

As a team reply to NASA in detail - Include statement
on the state of the art.

On Oct 27 a meeting on Radar.

Have 17 teams for Lunar Orbital team - expect the same
 no. plus applications group for earth orbital
 teams.

Lunar Apollo group of scientist is impressive
 Meet in Jan @ Huntsville Ala - ~~ended~~
 Meet in Summer no. Wash. for 2 weeks.

other documents
 1. Chow
 2. Apollo program
 3. Mission for Apollo
 4. Earth orbit mission

At this meeting hopes for returns from various programs on feasibility of lunar flight.

Expect a major request in March '64 for lunar & earth orbital missions. This means new starts in FY '66.

NASA hopes for declassification of all imagery

Test site criteria (4 slides)

Apollo earth orbital flight in 1966

Will carry same kind of equipment that will land on the moon - certain cameras & sensors. Can take some pictures.

1. of interest to many disciplines both US + International
2. Amenable to testing by as many sensors as possible.
3. Max. availability of good track,
4. Sites must be available for 4-5 yrs,
5. No military restrictions
6. Available
7. Nearby airfield
8. Size of sites should be limited, trying to keep within 10 mi sq.

in geological site

9. limit the no. of sites
10. Initial emphasis on 0-20° latitudes
11. Assoc. landmarks for recognition from orbital altitudes

Guidelines for Geological test site

1. Should include several lunar rock types
2. Large segments of terrain should be uniform geologically & chemically
3. free from vegetation
4. Flat uniform elevations
5. Lower altitudes favorable year-round climate
6. Lunar analog, geologic situation (volcanic cones, lava flows, large impact areas, ejecta blankets)

Test site areas being considered by NASA in evaluating terrestrial applications of remote sensors.

1. Coastal-geological + sea-state sites
2. Agricultural soil ecological sites
3. Metropolitan complexes, air pollution problems etc.

air-sea interaction area (pola caribbea)
 Hydrologic basins (Irrigation grid control)
 Mineral districts (alteration halos)
 Forestry preserves + forest fire control sites.

Manned space flight Board.
 Space flight experimenter - these are to be determined later.

Tues AM ^{per} with Head Space flight Meteorology Group.
 Mr. Nagler U.S. Weather Bureau.
 Wash DC, ²⁰²³⁵ 301-440-7130.
 James R. Morrison NASA Hdqrs. ^{PH} WO-21213
 NASA office of Intern. programs.
 Australia, Mexico.

Mr. Farlyce Code MT,
 NASA Hdqrs. WO3-7987 Wash.

Apollo Hardware - ask him for more details.

Bill Fisher Selection of test sites.
 Mr. Baranowski
 Bispa Crater area of Calif. - Mono crater areas.
 185 SE of San Francisco
 100 mi So Lake Tahoe

25 sq. miles - 20 major craters.
 Area next to Hwy 395 (N So.)

Monocrater area is about 8,000 ft altitude. Winters cold + snowy + summer hot + dry.

Prigch crater is within the Marine base.

Two PM

Dr. Nordberg, ^{within} Goddard Space Flight Center Code 651
 Nimbus } Greenbelt Md.

Dr. Harrison Coast + Geodetic Survey,

Virginia Beach as a test site
 for Oceanography
 Va Inst. of Marine Science
 So of Cape Henry + No. of Cape Hatteras.

Bernie Scheyys, Calibrated Test Site.

Wilcox test site, Wilcox dry lake -
 Cochise Co Ariz - Ea. of Tombstone
 by 20 mi. v. flat over most of area
 a 10 inch (!) variation. ○○

Bob Alexander - ONR - Geographic Test Site

Program definitions.

Suggests an album of images to prepared ○

Geomorphology.

Dr. Harrison - Dept Geog + Civil Engr. of NW. Univ.
 Univ. of "Ibadan sp?" Nigeria.

Remote Sensing Symposium

Wed AM:

Peter Badgley.

Exploration of Earth and Moon the other planets.

Block Instruments

Cambridge Mass.

Portable spectral emission device.

Friday AM.

Bob Helle, David Tate, Bob Colwell,

Protochlorophyll^(?) in young oak leaf.

Pine will be cooler than deciduous during day.

Pine will be warmer than deciduous at night.

Mon AM Nov 22, Corn Virus Conference - Wooster, Ohio
1964

I. Williams mid Jan 1st syn. mosaic; Red leaf
Syringon in Ohio. - L. W. W.
" " Miss - Rosenkratz.

First syn. is indistinct yellow
at base of leaf - 2nd stage is a mosaic
3rd stage a chlorotic streaking
Then a red streaking starts generally
at top ~~the~~ sometimes at edges
Final stage strongly pronounced
reddening. (only if direct sunlight
leaves covered by another may remain
green.)

Ustilig. - Mexico = idd - Johnsonian
more striking than corn - no reddening
observed in J.G. as in corn. Root
proliferation syn esp. branching
of brace roots.
In Mexico - proliferation of ea
shoots. Mosaic striping @ base of
leaves typical of Rio Verde strain
(Lowland) - no resemblance found to
R.G. strain. Upper ^{altitude} Mesa Verde strain
a general chlorosis.

Witches Broom situation prevalent
in corn with stub - A. mellow vector
responsible for proliferation?

Paragrass - Miss.

Goosegrass - Elusinae indica,

Dr. Steyer-Uganda - Streak ^{Virus} A+ + A-stria
Leafhopper transmitted.

Corn Mosaic Fuley of Idaho

Leaf fleck -

Corn Mosaic on Corn.

Anonismo arado - Venezuela
transmitted by Paragranos
Striping more specular -
series of streak.

Sugar Cane Mosaic - Occur in field

Barley Stripe -

II Distribution + Economic Imp.

In Dale - Ark. - Mechanically trans-
mitted from No. NW + SW Ark. -

In Phillips Co. saw symp. but
couldn't get mech. trans. - is trying
leafhopper trans.

Alabama - 263 in 4 cos; in 64 ~
18 cos. Primarily in West Central but is being

Ala. + Ark. Men report farmers are abandoning corn.

15

found eastward, Ala Syn. similar to Miss - No
transmission trials of consequence
Shepard of Calif - Sd. part of San Joaquin -
generally disabled, in Sacramento delta a single field
3rd location near LA in San Bernardino valley,
Virus same as Ohio - Id. Economically it appears
to reduce yield

Shurtleff of Ill - 2000 A. 5 cos. in SW

Id - Allshyp

Iowa - Hurlbary - Des Moines R. bottom
Found it in late Aug. - 1 field in Henry Co severe;
Confirmed trans. in 11 ~~cos~~ cos. in Central
Iowa, W to East.

Ky - ^{Hartman} Restricted to Ohio R. in Ky.

Recovered a mech. trans. virus from Johnson Co.

La - Priore - More widespread - scattered
from parishes along Miss. R. Found in nearly
all ~~field~~ areas where corn is grown. Attempt
to Mech. trans. from No, Central + W. Central

La - ad haven't been able to get transmission
Miss - Broga - Present throughout the State,
Econ Imp - severe maybe

Mo. Fairchild 263 - 3 cos. in SE, come
in 64 - Syn p in 42 cos. Along Miss across Mo +
scattered report from other Cos.

No. Carol. 8 Cos. in Piedmont - 5000 A
involved 10 to 90% loss Coher 911 + Biochem
309B,

Forestry especially woodlands and tree + brush
cover of ravines, boggy areas, drainage
ways, creeks and Rivers, overflow
plains.

Ecology shall be represented: especially

a) plants as indicators of soil con-
ditions - phosphorus, calcium
other mineral deficiencies

b) plants as indicator of recent
(past 5 years) land use.

c) wasteland areas adjacent
to agricultural productive areas.

Ohio - Janner In 1962 - 1 or 2 fields
in Portsmouth; In 1963 - in 12 cos along
River + No. of Portsmouth - Sixto R bottom.
In 1964 made a more extensive survey -
from Painesville → Toledo + all over
the state - Saw Syn. in all but
6 or 7 cos. in the state - I present

all thru the western side. - Not in upper -
 most western cos. Major losses along
 all 3 rivers flowing into Ohio R.
 Est. losses '63 - 15,000 A with 10% loss live,
 64 - " " 20% " "
 decreased - total of 5 M
 by loss.

F Tenn - L. Josephson - All over state
 5,000 - 6,000 A in Hampshire Co with
 30% loss.

Va - Roane Pres at E. of Blue Ridge Mt.
 Distribution is where they look for it, estimate
 3,000 A in 28 fields involved.

W. Va - Elliott.

So. Car - Kirk - 4 cos. with typical symptoms.

Pa - Wernhan - No observations.

W. Va - Garrett - Ma - distrib. throughout the state.

In Central Ma - 1 farmer had problem in '63
 thought to be mineral element def. but was ~~undoubtedly~~
 undoubtedly due to virus since element fertilization
 did not correct in '64. No transmission attempts.

Kansas - Web Sill - Sym but no trans.
 mission

Nebr. - Allington - Not confirmed

MD - Not reported or confirmed
 Texas - Not surveyed nor sought for yet.
 Com River Valley in Mass - No symptoms
 in this area.

Fla - ^{Margmowich} Homestead, Fla, positive case of
Dalbulus transmitted virus.

Stoner wishes to have reports on occurrence
 from all so he can accurately record.

II. Hort Range

Linnis Wins: Negative
 wheat, oats barley

Positive

Coms, tonite

Sorghum, Sudan,

✓ hybrid J.g.

Sugar cane

large Crab grass

Foxtails, yel. gr. + (ind)

Barnyard grass -

Setaria italica;

Broodgrass -

Arkansas In Oct

Penisetum glaucum - positive
 Legumes - 50 or 60 were negative
Eriochloa biacilis - cup grass positive

Shepherd - Calif -

Setaria verticillata - positive

Love grass - positive

No infection on Legumes, Solanaceae,
 Chenopodiaceae, Gomphrena, cukes + squash
 etc. cucurbit.

Mo - Segals -

Golden Giant

Id. Ulstrup

Bromus tectorum + *B. japonica* Negative
Festuca
 Witch grass
 Quackgrass

Bromus mollis positive in Calif.

Va - ^{cut} Roane distributed mine showing work on
 hosts + transmission.

IV Transmission

Maramarosch - Boyce Thompson Inst.
Corn stunt work has been in progress since 1949 - coined Mera Centrale & Rio Pradestras since has found several more. All strains are transmitted by Dalbulus maydis. Of the virus strains only some plants show good symptoms.

In 1962 samples were sent to Miss. - Miss + La showed positive

In Dec of 62 - picked up corn stunt in Mera Ariz

In 1963+64 - had sample from Ohio + no other place - Got positive only from Homestead Fla, La + Miss.
Rasik tried mechanical transmission of his samples.

Now optical transmitted disease
level in Czech + Romania as well as U.S.

Proposed Corn dwarf streak as name.
Lunch

Miss. Stoner. Leafhopper collections -
Graminella nigrifans. Began finding Dalbulus maydis in Miss after Aug 20 - 1964. Apparently

this is a migrating population. ~~The~~ *Dalbulus* apparently is not native to Miss.

Miss + Douglas Ent. - USDA - State College - Doubt that *D. maidis* is the vector in Miss - they aren't there until August.

- typical bl. spots.



D. maidis

G. nigrifans also has 4 dots on Venter

These 4 are probably concerned in virus transfer in Miss.

<i>Braculaceptela</i>	<i>portola</i>	abundant early in season
<i>macrostela</i>	<i>fascifrons</i>	
<i>Dalbulus</i>	<i>maidis</i>	scarce in spring abundant in fall on green corn
<i>Graminetta</i>	<i>nigrifans</i>	abundant early in season

Used a ^{portable} vacuum ~~port~~ motorized collector that had a large canopy opening that could be placed over a single corn plant.

D. maidis has been active on Bermuda grass for 27 days but not expected to breed.

Arkans - Jim Dale, - aphids trans, from Soughi & Can
Del - Jim Bancroft - Peach aphid, corn leaf aphid

Calif. Shephard - green peach aphid + corn
 aphid - non persistent. Aazine virus
 in less than 1 min + longest period of
 persistence has been $1\frac{1}{2}$ hrs (in 1 trial).

Dr. Freitag of Berkeley - Has used
 4 sp. - Corn leaf aphid, pea, green peach
 + cotton aphid. Starved 1 hr. the plant
 or dis. of corn plant for 10 min then tested to
 healthy corn.

Best vector was gossypii (15/20 reported
 were positive) \blacktriangleright

Ohio - Dr. Ritz -

Iowa - Dr. Dunleavy - Has transmitted from
 corn to soybeans

Soybean seed quality has been deteriorating
 due to virus? Ash Kirk + Eric ~~may~~ may be
 seed transmitted in Soybeans.

Corn leaf aphid will move virus
 from Setaria to soybeans.

Louisiana - Pirone: Corn this spring a gran-
 viella nymphs for 10 wks beginning in ea. April.

Chen, Richard Davis

Virological Aspects.

Dr. Alexander - Ohio -

Suga cane virus mostly shorter than Corn virus particles, Id + Ohio viruses react to same antiserum

Dr. Dale - Arkansas -

Dilution 10^6 pt 1:1000

Thermal inactivation pts @ 50°C or
@ 55°C .

Aging in vitro lost infectivity after 48 hrs.
@ 23°C temp.

Caliz - Shepherd -

extracted

aging — 1 day; 0 @ 2 days

Dilution 1:10⁶ 1:100 very little 1:10000 nothing.

Heating 55°C max.

Host Range - Crabgrass, bamboo grass, lovegrass
cupgrass etc.

Freitag Gold said 750 m μ of Suga cane mosaic.
He made crude extracts of Corn virus + stated mean
length was 743 m μ . Gold's serological comparison
of Suga cane virus antiserum prepared in '58
reacted with ~~any~~ corn virus.
In La - don't find ~~the~~ virus on Johnson grass

in suga cane fields that have

Bancroft, Id.

Sediment coefficient of 1605.

Rod - abt 750 mm

Ohio + Calif viruses read with same
artifacts

Strain H Suga Cane Virus - won't
react with Dr. Shepherd's serum

La. Pirone -

Strain H Suga cane virus from
Sorghum - Set Ad. end pt 1:300

Syn on sorghum + corn.

Unable to infect J. g. with these.
Particles seem to be 685 nm.

Mo. Segal ~~1/2~~

Illinois - Thornberg - Described a virus
from a perennial vine common in
corn fields that attacks corn causing severe
symptoms. This virus is probably cucumber
mosaic.

Dr. Freitag - Calif - Haven't been able
to confirm corn stunt as originally reported

by Kunkel.

Lansing W^m - Red striped perianth of
corn -

Occurred for first time in 1963 in
NE Ill., SE Mich., NW Ohio.

1942 report from Ill. fungi causing
white striping due to *Cephalosporium*
nigrosporum

Getting a virus out of striped seeds.
Virus is different - longer incubation period
than new corn virus - low titer -
3 ind. ^{from} 28 collection in one case -

I Virus resistance in Corn

Ohio - Bill Filday:

MP 488 - resist.

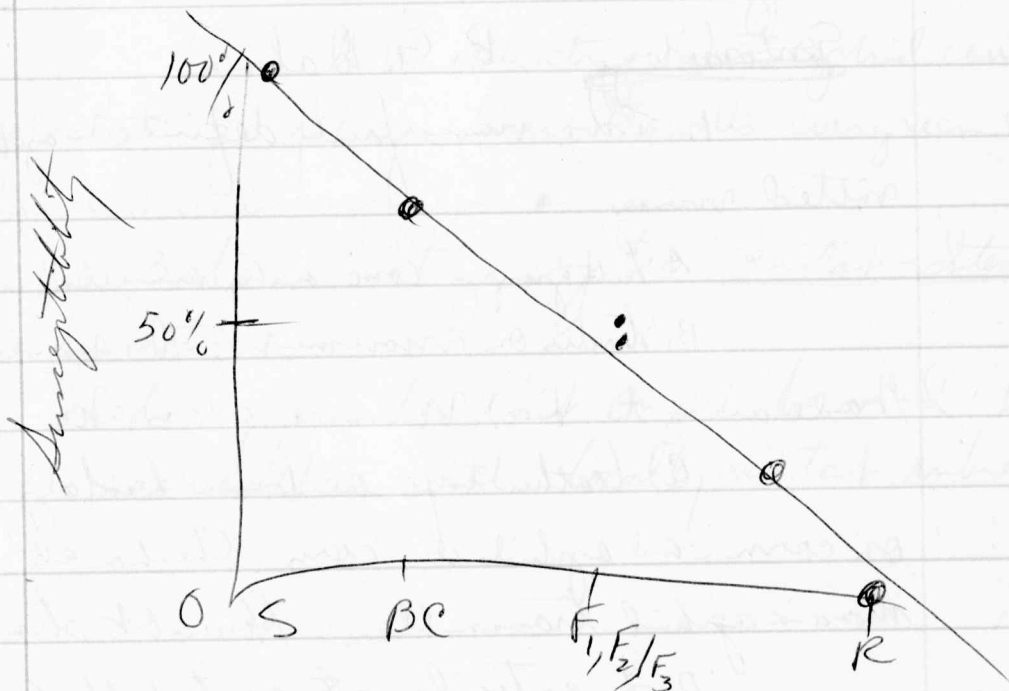
MP 420 - suscep.

MP 426 x MP 488 - Resist

MP 1 x MP 420 - Susc

MP488 x MP426 = Resist SX 26

Some in Xanthophyll lines - some showed
suscept; others tolerance.



Kentucky - Loeffel -
has ~~lots of~~ ^{several} good hybrids. See
list -

Tex. Len Josephson -
T101 & T105 - highly susceptible
T115 - highly resistant
T111 - " " "

Hybrid with these seem to reflect amounts
of resistance of component inbreds.

Ohio Hollinger -

Limited data so only limited conclusion
can be made -

Monday AM.

Entomology - R. G. Dahms

1. Two virus fairly definite - aphid + L.W. trans-
mitted viruses -

A. L.H. group - conc. on *Egrammella nigripennis*,

B. Studies on movement of *D. maidis* from Rio
Grande area to La. Miss + areas no.

C. Gather info on basic biology of leafhoppers
on corn - and aphids on corn. Check all *Suga* corn
mosaic aphid transmitters. How abt stink-bugs.

D. Insecticide - to control the aphid - Aerial
Application - undiluted malathion - 6-8oz per

A. of pure quill rather than 1# in 2 gal. of water.

E. Corn leaf aphid stylet studies to find
where virus is carried.

Survey unit of Plant Pest Control will
help. Lew Davis

Plant Pathology - John Baranoff.

1. Aphid borne disease ^{Maize} Dwarf Mosaic.
First public. on the disease will come from the

Ohio staff + they will deposit a type culture.
 Sugar Corn Strain

Corn Breeders', Dr. Deo Sprague -

1 Regional test of corn breeding lines -

a) in R.H. country + b) in hybrid country

Selected 20 inbred lines; Stowell's evergreen which shows mosaic symptoms.

Use 3 class rating system resistant - Intermediate and Susceptible.

Breeding approaches that might be used: Different with exotics than with locally resistant inbred.

Tolerant vs. Resist.
 Commercial breeds
 in regional test?

NASA Meeting Nov. 25 '64.
H. Steele.

Dr. Anderson - Geography branch

Have David Tate submit application
right away for VI and VII
Check with ONR Geography -

	hours	
SB	40	
MOL	75	
Office Man and space flight Foresty MSF to Ag		600
Foresty # to Foresty		100

Find Jan the Ag, for \$900,000

the Ag thru

18 Science Mgmt Centers - Administer contract
program definitive, how to get from here to
there.

Each will have a comm. of directors or advisors.

Need for Sci Mgmt Center: Recommendation

1. Prebackground
- 2.
3. Selection

78
34
44

name of Expert

Dec. 4

Added organization

Shay - Synopsis of Background + Purpose.

Hary - Organization + Cost of Mgmt Center.

Panel - Holter, Colwell, Gato, Keegan, Heller, Shay, Bruce Kelley, V. Meyers, J. A. Rodenhiser.

Shay - Description of Studies etc.
(Brief # for ea proposal)

Modification of Budget.

all Meyers

Reby \$100,000 from I until Sept 1 on
" 1 flight @ Weslaco + Davis

	1978	last 4 mos
I	362	100
II	110	50
III	44	34

Lv. Work: 30 Tues
Inte Dec 1,

1st 8 mos

Last 4 mos 31

IV
VIII

8767
17

~~40~~64
8

VI + VII

40

640,000

256

Shall Total \$640,000

state in IP that ~~is~~ competition

Bob Walter + Bob MacDonell
IBM Corp
Orwego, NY,
Area 607 R L 4-1000.

Earth Science Remote Sensing Meeting
Nov. 30 '64

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Declassification

Air Materiel Command - Wolf + Rane
Gravelly Pt.

Hubbert - Chm Earth Sciences, Air.

Jim Wilson - Mich

Reed Boyson - Wis - Meteorology

Bill Fisher - WSGeology

Preston Cloud - Minn - Geologist - paleontologist

E. A. McAllister - Scripps Physicist

Paul A. Smith - Rand of Santa Monica - Wash. offc.

Declassification for publication is imp.

NASA wishes to avoid classification but hopes to get into feasibility studies use of the instrumentation.

McAllister thinks this Com. should est. ground rules for declassif.

Public - Health - Would be strong users of remote sensing - stream pollution etc.

Committee needs to help establish ground rules for classification in the future.

1. Low speed, red. low resolution.

Sensitivity of NR2 gadget in a blip was .0001 °C sensitivity.

meeting at Houston on
Dec. 7, on instrumentation

see. Naval Research Rev. June 1959 p 6.

Will establish a sub-committee to write up report with addition by this committee for submission to Seitz and on up to Group on Science and Public Policy. This will deal with general declassification problems and proposals.

II

Other groups -

Military

Instrumentation + Gadgets.

Agricultural Remote Sensing Comm.

NAS should make up a list of active groups and inventory them by activities.

Jin Wilco: Modest amount of good data - well interpreted better off than gathering mountains without looking at it.

~~Reed Beyer~~

Data Collection Centers - Request distribution to other scientists. Data management will be very important.

II International Aspect.

Bill Fisher - France esp. Photo interpretation being used for entries into developing country.

Institute for Vegetation Survey, at Toulouse, France - New Bldg - size of this Bldg. Change of

USA is now a member of NASA Comm.

NASA should supply data to foreign countries.

Geotechnia of France now collecting imagery.
What eqpt. are they using? Maybe their capability could be used to aid declassification.

VI Practical applications -

Bring together an itemization of present day applications. Costs of different methods of mapping?

Coop. use of Platforms + multipurpose instrumentation.
Remote Sensing Newsletter? Geotimes -

Electronics Products - develop a ^{catalogue} list of products etc (unclassified)

Jim Wilson will = work

Submitter conference

Declassification

Next meeting - Bd Mar. 9 & 15th 65 @ U of Mich W.R.

obligation to sponsors - report letter to them instead of minutes.

Photogrammetry Soc. meets Mar. 18-23, '65,

NASA Meeting Houston Tex. Dec 7.

L. Childs: First minor this past week. Had intended to cover Weir and Davis but covered a Ho. site.

APR 97 Radar - Westinghouse @ Baltimore some part of Army
Ornat ~~man~~ army man @ Ft. Belvoir. - All is secret, info.
Have it in a R'B ble. (Douglas mid wing twin engine jet) airplane
belong to the ~~Army~~ Air force assigned to Army.

Shay and Ewing - flight schedule, No. + hours.
for next calendar year.

MSC = Manned
spacecraft center

Dr. Seaman -
~~Dr. Seaman~~ - dep. administrator will be reported
to by Rappensperger and Badgley.

1 Code MTE - Dr. Rappensperger NASA Hdq. Engineer
primary responsibility for the design of manned
spacecraft.

\$120,000

PM USAS - Dr. Moxham.

His agency is interested directly in volcanic survey with
J.R. Have a scanner similar to Michigan's but not
as modified or sophisticated.
AAS-14 of HRB Singer is being built.

Will be delivered in Aug. - liquid N₂ + liq. neon
 HAS-5 scanner by light is mounted on the
 window.

GSA 6 channel capability

John Cronin -

9 lens camera

115V. 400 cycle + 280C
~~270~~

Photographic

Can be moved from plane to plane

Dr. Gilbert Levin

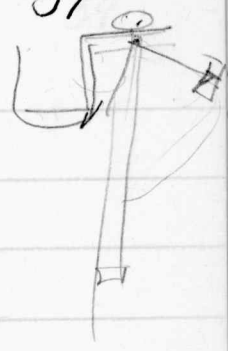
Hazelton Labs

12 Church, Va.

H. E. W. - Mc Kenzie

Chem of Air Pollution
 group.

Don Low - Los a Dec. 17.



- 1 9 len camera + film source.
- 2 Stereo 70 mm. Color.
- 3 Standards in field
- 4

Dec 28 - Phone to Bob Water.

Bob
Mr. Reeves

Home: 1603 Altschul Ave,
Menlo Park Calif.

Ken Lyons
Ames Lab.

Moffit Field, Mount View Calif.
415 + 961-1111 Ext 2627

Home 415 + 854-6143

Hebner Ant & Rappensperger
Ted George Aide to Rappensperger.

vis to 30 micron | 2 Instruments
13 to .8 or 9

Made by Ames
Perkin

Ray Imbrie

Absorp from
Saturn Rocket

Don Cochran
Fountain

and Jim

Huntsville, Ala

205+876-3391 ad/a 5557

Lead sulfide thermometer to 35 microns

Ran's eqpt tied up thru June 1.

1.4 → 4.2 at Lockheed Calif by Mar. 1.

5m → 16m

4 x 24

9^w x 24 hi x 20

2 suitcase 110 - 60 cycle

1 @ Henry Blau - Arthur D. Little

2m → 4m

Delivery in 4 mos.

Chic in 3 wks. Feb 16.

Feb 18th

Approved
Schon

Interview with Dr. Allen F Agnew Ind U.
Water Geologist interested in remote
sensing.

□

1/23

~~XXXX~~

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Dr. Ron Lyon

[Faint, illegible handwriting]

1.



Scope of Presentation

- Brief description of Ag Program
- Use of TAC Concept
- Demonstrate soundness of TAC concept
- Administration

• Copy sent to University

Program Description

- Background
- WAS Com
- Proposed Res.
- Objective
- Specific Projects
- Budget Estimates

Organization of Ag. Center

Mich Conference Jan 18 '65

Center

Ag/for; Econ, Statistics - Instrumentation
Control mgmt. (fund)
Research mgmt.

Phone - Harry Steele -

Harry will try to reach Rody this wk + will call
Shay Fri Jan 22. Shay + Waking will meet with
Harry + Wash Wed or Thur. Jan 27 or 28 to define
applic. center responsibility + present to Pasha office.
Harry is apprehensive about the added responsibility of
Rody's office in present draft. Maybe he can
turn this over to someone in Wash office to handle
the collaboration with NASA boards MSFEB +
MEOTAP.

Proposed Extension of Contract ⁷¹⁵ ~~750~~ (Feb 1 thru Cyn 30)

Interpret of 1964 date

Per mo for 3 mo: Engineering \$13,700+
Instrumentation Manpower 13,700

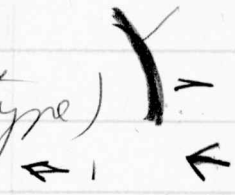
Total Material \$63,800

Jan.	Feb.	63,800 + 27,400	←	May: \$35,000
	Mar	27,400	←	June: 57,600
	Apr	27,400	←	

Tech Applications Center

Staff:

- Director (Acquaint)
- Assoc Director (Instrument type)
- ~~Life Scientist~~
- Physicist (Experimentalist)
- System & Planning Engineer
- Agric. Economist
- Statistician



- Jobs:
1. Future development plan for center
 2. Initiate & Monitor Research Program

for 1965

3. Program definition and instrumentation of R + D Program
4. Define Orbital Research
5. Liaison with NASA, USDA & other Tacs
6. Reporting & documentation

Assoc Dir - Luke Biberma, DDA

Harold Yates, ^{atmospheric transmission} Barnes Engr.

Geo. Arboyan, Hughes (P.H.)

Lloyd Mandle, Lockheed 20-24K.

Agriculturist - R. Bala

Physicist (Experimentalist)

Richard Mac Donald (Bioeng, Ken Lyon)

Sue Rambie PhD
 Physics
 of Texas Institute
 just finished
 PhD in Texas

See Dissertations
 list
 Meissner, PhD @ Purdue

MS Physics
 also problem

systems & planning Engr. Bob Macdonald JB 71
Chas. Wilson Bird
Agric Economist -

Wed AM →

Irvin J Sattinger - Computer system design
Mr. Emiljeb - Statistical Experiment design & analysis

Send a copy of Ag Statistics to Dr. Sattinger

Mike will go to Hoster Rada meet. Write
Lechig + tell Mike will go

70mm camera

Tom Linparis - Aspect angle dependence

Suggest Meet with project leaders, Combic/
NASA Acad meet.

Write Mike to authorize 16 lens camera
constraints.

Bennett Kival-Arco - Everett Mass.

PAD
vis
that
and
epar

Talk Fri ~~the~~ Jan 22 with Bob Walter

44

Bob Macdonald may be made avail on basis of:

1. Leave of Absence
2. TAC & IBM contract for ^{exp.} services

no → 3. Exit of desk officer position
Presented by B. Walter, f. IBM personal resident at TAC under MOI contract responsible to Center.

→ Desk officer ca. advisory panel, to help Dale Jenkins -

Talk / H. Steele -

1. Suggest organization / more resp. on Body OK & suggest H. Steele be Assoc. Chm to handle day to day or wk x wk. work of Mgmt. group.
2. Staff needed as we see it.

Dir.

Assoc Dir - instrument type

Agriculturist - (R. Bula)

Physicist (Experimentalist) (Ron Lyons)

Systems & Planning & Reporting Engineer (Bob Macdonald)

- Ag Econ.

= Statistician -

3. Meet next Wed with J. Waly.

4. Proposal for Extension of present NASA contract 715

With Ed Sabbara

Rental McClure Park - Office + lab.

Wab. Mgntin \$10,000/yr. + janitorial

See

Residences -

Man, 1 - Peter's home avail. Mo. \$150/mo.

15 - 621 Walden - \$155/mo.

Across town. Bldg.

1.50 → 4.00 /sq. ft.

3.50 /sq. ft. per yr.

\$4.50 /sq. ft. for everything

Flex lab - 22 x 22 + off. space.

\$4.15 /sq. ft. /yr.

Call to Podchis.

Ray Sooy - Roddy Asst.

Henry Sower - " "

Geo Jania

Shaw's approval,

Brady's office.

Brooks of Mind

Mr. Philip^A Brooks No Mich Contract Office
 Office of Res. Adminis. Cooley Bldg
 313 + No 3-1511 Am Auto Mr. Cayer

Ch with Sprague on expenses for Co meet + project
 leader on Pade.

Conversation with Bob Colwell, Feb 10

Size of Center Staff: 5 persons OK

Approval of Mich Contract OK
 Colwell Bob on ^{2/13} Saturday be @
 415 + LA 3-2200 Ext 500

or
 415 + 934-4694 Walnut Cr @ Home,
 Mr. Ted George

Res. Mgmt Group Meetg

Duration of Center,
USDA funds.?

Elmer Mostow - Asst. Counselor ^{Downtown Wash.}
Ardis Blackburn - Mostow's asst.

Feb 13 '65

Res. Mgmt Group Meetg Dr. Rodenhiser's office.

1. expected duration of center.
Chas. M

Prin Thomas in OMS - + someone in General
Counselor's office.

OMS will integrate + prevent overlap
OSSA - Santifields

Give Mr. Sacy the line projects that show USDA
is not a ^{performing} service - it is a cooperative
venture.

Add detail & nature of the job ea man.
Reveal program.

Salary to Advisory Comm

USDA ma -
Adv. Comm. Consultat + travel

Call Bill McClellan

Honorable Glenn logical site - Bill will send me
a report of his trip.

Fisher or Mackay attend meeting + report on Childs
Airplane.

Feb 26 '65 - Houston NASA MSC - Radar Applic. Meeting,
D. R. K. Moore

3 frequencies; 500 ^{megacycles} ~~ref~~ 2000mc, 8000mc ^{at this height as is possible,}
synthetic aperture; hi resolution

8.6 mm system

Resolution of this system appears to be abt
50 ft square.

non coherent system planned has resolution of
300 x 320 meters

Data to be recorded on tape

Feasibility studies

aircraft flight expts with same resolution as
that expected in space.

Lab studies a Waterway expt Sta, Cal @ Ohio

AGS = Apollo 4 program
main system

State (has trucks with eggs)

Acoustic modeling still at KSU,

Findings of radar

R. Simonett

4 freq: K band

3 synthetic aperture systems:

8
2
.5 } gc

modified N Res. for aircraft

Radar groups have a permanent member
~~on~~ from each user application
groups.

Data Mgmt capability -

Center which data can be developed, repro-
duced + distributed to experimenters.

Data Service need to know the constraints on
data needed by ea. use group.

Peter Badgelly.

Earth, Lunar + Planetary exploration

Manned vs. Unmanned.

RES program; 30 flights (1968-72) planned,
 2000 - 5000th; 2 KW power maybe 5 KW
 1974 - maybe a multi-discipline
 Research facility (ORL)

1. Ag/fo Purdue
Berkeley USDA
2. Geol/hydrology US Geol
Survey Geol Survey
Water Resources
3. Oceanography - Naval Oceanographic
Bats; Admiral
Nowell's
Office.
4. Geoz/plantography
 raphy = Ofc. Chief
 of Army Engineers in
 coop with Office Naval
 Research.

[Mr. Billis of Deminac &
 Bob Alexander ORL

Instrument Teams,

Pascoe Miami
Ave Frank Rath

Multispectral photography; John Cronin
 Rada - probably #10 m. program before
 we are there.

Annals of Am. Astronautical Society
 May 2 and 3, meeting in Chicago @ offices

of Ill. Inst. Technology.

Earth Orbital Volume by April 19.

Walter Brown - start major work in design of solar instrument by next year. (fiscal 1966)

15-July 15 Will publish a second volume by June for Woods-Hole Meety: NAS Whittier Estate Bldg.
Long range future of space program.

April 6, 7 + 8 @ Huntsville - Lunar Orbital + Lunar Apollo program.

Bob Reeves - Test Site. Bob replaces Bill Fisher as chair of test site committee. Comm. will include members from all each user group.

1. Basic or fundamental test site
(limit 2 or 3 or max of 5 per discipline)

2. Special purpose test site

3. Extended test sites

4. Foreign test sites.

Mar 16+17 - Test Site Meeting - will precede AAS Goddard program.

Convain 240 MSC, 1 rala set (APA86)[?]
 NR Constellation
 Westham - FX Monmouth (APQ97)
 Wn. Field Aircraft

Mafelate - Convain 990 now at Moffitt Field ^{+ will come here,}
 March 1968 - Initial flight.
 Luna orbital sensor will be tested in Earth orbit.

40-50,000' ceiling

Also trying to get a RB57 - has ceiling of 70,000 feet

Rm 372 @ 3PM. with Conference call
 Moore, Brown etc. with Barnidge on passive measures - wave.

Review of Wah by Rala Team.

Walter Brown: JPL.

for Apollo Earth Orbital flights.

Radar instruments to be on board:

75 cm Sea state - looks straight down.
8.6 non coherent - side looking - poor resolution

3.7 coherent side-looking radar - high resolution, narrow swath (20 km. wide)
resol 10-20 m².

film records

tape records

Has a ^{\$}3 1/2 M to carry out prototype - time is about 18 mos.

User document

Trade-off meeting (days)

Pocket Radar for white sands test.

~~Barrie Sheper~~: Test area in Dry Lake Bed - Arizona.

This is OK for a geologic site but how about soil moisture?

Will bury Quartz, Sandstone + Basalt at 0, 3, 6, 9" etc below the surface.

Wright Patterson: Will resume flight in May. In fall of '66 will upgrade the system.

Pete Colled.
 Mr. Allenby

Dep. Dir. NASA

Kans Univ.

Dave Simonett:

1. Existing radar imagery
 Collect variety of resolution of imagery over
 the same areas.

[K Band radar 35gc]

Meeting on Data handling (Interims)
 Peter Badgley

Houston staff:

Jim Mc Laren

Sea Ice Reconnaissance.

Is preparing a report showing ⁱⁿ a folder for
 a strip from Greenland toward North Pole.

Imagery in Mid west of several years ago -

Recommends Thule as a site in a Cold Region.

Plotted 450,000 sq. mi sea ice in a few days.

Frank Barath - Radiometer

Lab measurements at Ohio State at X Bar, K Bar,

at 8 mm. Attempting to measure emission charac-
 teristics of rocks + sands.



Field work - @ Ohio State with the truck. Has established ground-truth site.

Raytheon also has truck - with radar at 3mm.

Stereoscopic x bar + 3cm wavelength.

Use Application Groups.

Bob Alexander

Bill Pierson ~~Carson~~ NYU from Dept. of Oceanography and Meteorology tracking floating objects.

Bill Holt Hemphill Dept Int. US Geol. Surv. Geoscience Application Center. To monitor ^{Skibitzke Ariz.} ~~Geography~~ = Geology = Hydrology.

mineral deposits				
Correlate	Remote	sense	data	with ground truth

J.W. Rouse, Jr. CRS Wj Kr.	Radars coordinators.
----------------------------------	----------------------

Wm. Peake - Elect Eng - Antenna Lab,
Dr. Chas. A. Shultz - Geology - OSU PhD,
 Dept Geol.
 125 So. Oval Dr.
 OSU
 Columbus Ohio 43210

Radiometers - 4 frequency

or more

freq ≈ 20 f $1\frac{1}{2}$
 40' 3-4' diam circle

Onan generator.

~~RFT4~~ Barner

Scanning radiometer

Closed TV set,

isodensitometer will plot Beckman - Whitey
 choice @ Calif + Mass.
 Bill Fisher.

Call Bernie Schey, has control for
Wright Patterson airport plane.
- Call he first = begins recording
thermoplastic records,

Norman Briswold Wright Patterson
field

Report mission to Bernie Schey
afterwards.

"Meso" densitometer (.2 ^{defines point} mm across)

250x but modification

- Jarrald Ash Co. microdensitometer
point data. Astronomy dept.

Mar 1 Call to Peter Badgley:

Asked that H. Steel have Dr. Brady sign + send
in over so they can process thru Seaman's

Mar 10. Phone Call Leo Childs

Leos 2 engine Conways 240 is scheduled in Calif.
area last 2 wks of April.

Is open as yet for June.

Present capability is

4.5m rednofax

1.35m "

8.5-10m AAS 5 scanner

9 lens camera of Cronins.

Will be glad to use our 16 lens camera in his mount.

Ground Data Collection

Color photographs

Date

Observation + records

Spectroradiometric Signature of Crops

Calibration Data

Meteorological data.

Airborne data collection

K-17 Panchromatic

70 mm

CD

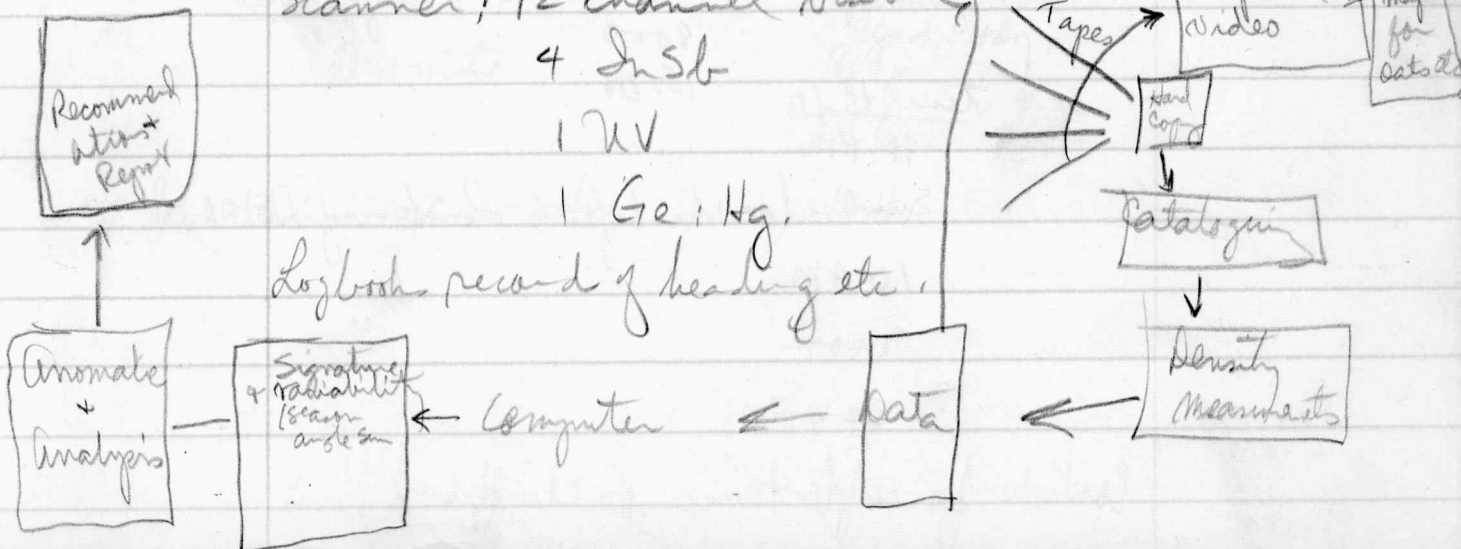
16 lens

Scanner; 12 channel visible
4 InSb

12V

1 Ge: Hg.

Logbook record of heading etc.



Dr. Allenby call Mar 10.

Asked that he activate monthly proposal of U of Mich so we can get equipment upgraded for 1965 growing season. He was fully sympathetic - this would give them more time to consider TAC's. He will contact Ted George and have some news for us on Tuesday at Test site meeting to be held at NASA Hdqtrs.

Purdue Meeting NAS - Mar 11, 12 + 13.

Attendees: Keith Arnold, David DeWitt, Harry Keegan, Vic Myers, Roger Hoffer, Bruce Kelly, David Mates, Don Lowe, Mike Holter, Percy Looney, Bob Mac Donald Kern, Landgren, Bob Miles, Howard Spague, R. Shay.

Comments on NASA-USPAA agreement.
David.

Application Vegetative Map of the Globe - and its changes.
for NASA plans Weslaco.

Altitude study - 1000 foot altitudes
3000
4000
15000

Time of flight
11 PM

Sunrise (as the before is 2.5 is unfiltered)

10 AM.

noon

3:4 PM.

Controls for reflectance on the ground

13
Visit with Vic Myers

→ Com Experiment: Standard reflectance surface

Bare soil

Cotton - Row spacing is fairly uniform
 of other crops.

Measurements we need to take:

Crop condition, height spacing, general appearance,
 Steve Baremechi
 Ninkus. Soil moisture with depth + surface.
 3, 4-4, 2

420 miles flight altitude

.5-2.0°C accuracy in measuring temperature.

Scan frequency 45 lines/foot

2000 Km useful width.

IR-DR system designed specifically for cloud study.

Nocturnal surge Sept 14, '64

Ron Lyons

Granite

Emissance
 Departures from
 Black Body.

Radiance

8.9m

9.6m

Basaltic Basalt rocks

10.4

Slide for Earth Sciences Div. Talk -

1. Spectral reflectance of fresh green and mature brown corn leaves
2. Photographic and scanner rank ordering of Soybeans
3. do; Variation in 4 fields Soybeans
4. do; Two soil types light (Pant) and dark (Chadman)
5. do; Variability in soybeans early in season related to soil influence
6. do; Variability in corn early in season due to planting date
7. do; Variability in corn in July at tasselling time.
8. do; Comparison of wheat and oats in late June
9. Rank ordering of Corn, soybeans, Oats, & wheat in late June.
10. Channels useful in distinguishing crops.

1. Acknowledge credit to NARS committee - Mel Stoff and R. Woffen.

to me,

2. One of most exciting modern eras is the control man has achieved over the ^{complex} factors involved in the production, processing and distribution of food and fibers. ^{the rise of modern agriculture.}

Of this ^{to us} ^{basicon} many developments of which 2 are especially pertinent; one, the release of manpower and brainpower from the essential job of producing food; and two, the gigantic increase in need by agriculture for timely and accurate information. The first, which is in the order of magnitude of 3 to 4, depending upon the ^{methods of} analysis, makes it possible for such meetings as ours today to be meaningful - i.e. we have reasonable hopes there will be men and resources to carry forth ~~to~~ our plans. The second,

practical is the reason there is ~~increased~~ ^{heightened} interest ^{among} agriculturists in the field of remote sensing.

The job of increasing stability of production, which is ~~one of~~ the important ~~foundational~~ cornerstones in the structure of modern agriculture requires timely information to be able to apply technological or managerial corrections for ~~to~~ natural adversities ^{and} as drought and pestilence and for abnormally favorable conditions that result in overproduction. Agricultural census people ^{in this country} tell us they now take a complete agricultural census on some 78 crops each 5 years but would like to do it annually.

Since WWII there has been much work ~~advancing~~ ⁱⁿ improving food production and distribution in the undeveloped countries. In recent years, we have even heard serious discussion of ^{providing} ~~feeding~~ the all the world's people with an adequate diet. Perhaps with improved transportation, education and birth control this goal will be adopted.

It seems to us that from ~~all~~ these sources, and many others our time does not permit us to enumerate, there will be continued pressure for improved and more rapid methods of gathering and processing agricultural information.

If we are to serve this need through remote sensing, we should recognize that the users will impose specifications that will be difficult to meet. Agriculturists will want to know not only the species of the crop or animal but

its stage of development and productivity, not only the topography of the region, but distribution of soil types, and soil conditions as frost, moisture and salinity.

With this in mind our advisory groups recommend a broad research ~~program~~ ^{approach to remote sensing of plants} ranging from basic physics and physiology of plants to the design and development of a sensing instrument for ground, aircraft and satellite use that will yield discriminatory data for programmed processing.

The rationale lies in the hypothesis that ^{each of} the major agricultural objects to be sensed have a "signature" of response that is differentiable if viewed simultaneously with sensors operating in the over a broad range of the electromagnetic spectrum.

QBP

George Dawn
Nutritional Univ. of Fla.
Daineville Fla.

Ed Graham - Thur & Fri -
Conservation.
Du 5-6063 RFD 2, Box 233
Vienna, VA 22180

Dr. Dick Allenby call Tues Am.

Call Pete Badgley @ 12 noon

James Lynch - have lunch with him @ CIA
Bldg Langley Va. Meet at front entrance go to
ward to receptionists & call Dick Allenby @ Ext 4218.

Ted Byrd

Phila Penn Ado.

Chas Gould.

Arden Sherf. - Check bids. timing on publication
action.

letter to program committee for Denver meeting

Walker conference invited N.C.

Mr. Badgley -
eng. agreement typed into form for
inter-agency talk statement. To Agric.

Mr. Iso. will give H. Stebbins a copy

Wright field - A-2. 60,000 fl.

ARPA / Fred Edwards -

CRR

Taylor - NASA

Carl Molineaux, Portelle Spectrometer

Dr. Stephen Aldrich M.D. Research,
N.W. Med School

Jim Lynch's
Harry Woo Physics optics.

ARPA Fred Edwards - Jim Lynch will
discuss this Govt Code 4811-52375
- Pentagon.

Dr. Keith Arnold;
Roderick - $\frac{1:00 \text{ P.M. on}}{2:30 \text{ P.M.}}$ Thursday.

Call Mrs. Thomas Wel @ 7pm.

Ethan D. Churchill - U of Wash Forestry; Ray night
in Dakotas; Photo intelligence in Military WWII. Catholic
Univ graduate work in Plant Ecology. Worked with
Rand Corp. on Samoa.

Mar. 17 '65 Lab Site Meeting

Bob Reeves
 John Cronin
 Tim Whittle
 Bob Colwell
 Roger Leetana
 Childs
 Pruitt

Jim Morrison
 Don Beatty NASA
 Ted George

Clus Kelly N. Pal. Dep. Lab.

Mal Hubbard

Alex Wohlbank N. G. New.

Rich Churchly

Dave, Simonett

Darr US Geol Survey

Skibitsy "

Brown "

Peter Badgely

R. Shay

Alden Colvocoresses

~~Also Colvocoresses~~

3-4 Earth orbit flights between 1968
 & 1972,

Geol + Hydrol - US Geol Survey,

Geography, US Engineers + ONR,
Oceanography -

Advisory committee for each SAC -
Rationale behind SAC's -

1. To aid NASA in monetary area,
2. Project leader would be SAC administrator,
3. To create new experiments not yet thought of. - esp. new instruments,
4. To insure maximum use of data that will be accumulated in satellite.
5. Gain support across the board for NASA's program.
Pete sees an operational satellite for Agric, Oceanography etc. This must be prepared for.
6. Need a merging of talents. EA instrument team must have a rep. from EA user application. Instr. team will be responsible for Moon

+ Mars exploration, Rada team is underway in good shape. Polychromatic radar of coherent type. (will cost 10M to ^{write} satellite).

Multispectral photography - a Boston Electronic center for the telescope, Max Noggle, Physics + Optics background.

Coordination Com: 1 rep ea instr. team + 1 from ea user team, 1 from Test Site group ^{plus} Leo Childs for 1st few mos:

March 2 PM

Other SAC's
Bioscience,
space Physics
etc.
Astronomy -

NASA-OSSA/SM ^{space} ^{armed}

Earth Oriented Remote Sensor Application.

Coordination Committee:

Prog - Leetsma + Pruitt

Agrie - Shig (+ US DARDep)

Forest - Colwell (+ Arnold)

Oceanography - Chas. Bates

Fisher + Skibitzky

Photog: Conner, Sills + Kruger

Radar Moore or Smoell

Microwave Parath or Spaul

DR Lyon or Fisher

Remote (Biochem) (transmit) (analysis)

Test Decider: non ARPA (subcontract NASA)

Barringer

Aircraft Leo Childs
Data hall Perry Schapp

Jl. Inst. Technol.
is preparing
documents

Notes of Coord. Comm.

1. Review data distribution
2. Establish timing for review of 1st Earth orbital document (or Apr 21)
3. Huntsville 26, 27 + 28 of April - Lunar orbital + Lunar surface group meet.

June 15 - July 15,
Wood Hole -

Send Peter Badgley a mailing list to receive the Earth orbital document

at

Don Beatty of NASA

4. See Final review of Lunar document; 2nd iteration. This will be done @ Huntsville

5. Huntsville group will be asked to plan more detailed Lunar program after Wood Hole meeting
NASA Coord. Comm. could meet here at same time (July 15-30)
for 1-2 days. Purpose is to take stock of NASA sci. group of our program.
(This meeting of Coord. Comm. may not be needed)

Mr. Darr
 Res. Survey
 has done the work
 in Brazil

To offer at Reno Meetg (May 6, 7, 8 ^{approx}) the complete list of test sites.

"1" Quadrilateral ^{sq?} furiferal of Brazil is a good test site (fundamental)

Extended test sites -

overflight areas - on line of flight in normal operation.

Subcommittees of Test Site Com.

1. Agric - For. - JRS + Bob Colwell + Dick Churchill

2. Geol. + Lunar Analog - Newsworthy
 Cronin, Whitten, Hibbard

3. Oceanography -

Chas. Bate, Chas. Ewing, Clint Kelly, Dr. Martin

4. Hydrology - Skibby, Russ Brown
 Allen Agnew

Geog + Cartography - Roger Leetsma
 Evelyn Pruitt, Bob Alexander

5. Coord. + data handling comm. Leo Child

Dave Simons + Bill Fischer,

Bernie Schepps.

6. Philosophy - Pete Badger, Ron Lyon
 Friedman, Reeves, Jim Morrison.

Test sites that have been selected

1. Walker Dry Lake
2. Pisgah Crater
3. Scripps Beach
4. Mono Craters in Calif.
5. Kansas site for Radar,

Total amount
Sensometric
Specified

~~Photograph at a scale of 1:40000 is useful for topographic studies~~
1:80000

Data library @ Airfield in Houston, will be storage center

Paul Lehman - Goddard has charge of scheduling work load of Astronauts, No. Africa will be photographed on 1st Gemini flight.

Copy of cover sheet

Forty test sites Proposed

1. Quincy - Buck's Lake Sierra Nevada Mts. California. Mixed stands of timber,
2. San Pablo Reservoir area Central Calif.
3. Black Hills of South Dakota.

Costa Rica, Turrialba

Hawaii - Asa T. site.

Suga Case

Princeton

Colored soils.

Ouro Preto - Brazil,
Sed. Chum hills.

Ethan (Dick) Churchill

1500 38th St. S.E.

Home Wash. D.C. 20020

Home Phone

Lu 4-0450

Military Geology Branch
ofc U.S. Geol. Survey
Wash D.C.

Agric

(P) Westaco Tex

(P) Purdue

(E) Homestead Fla

(E) Davis Calif.

Forestry

(P) Black Hills

(P) Buck's Lake

(P) San Pablo

* (E) Costa Rica

* (E) Hawaii (Oahu)

* (E) Ouro Preto, Brazil

* = Combined Agric. + Forestry sites.

85
Mrs. Thomas.

Dr. Wilmer - NASA contractor - Purchase Order
Invoice - separate memo of acceptance

Skibitzky — Hydrology subcommittee report.

brief abstract

1. Punjab area in Pakistan
Soil salinity

Dress

2. Chad Basin, Central Africa

3. Salton Sea

N.W. Queensland Australia
Montane

Oceanography - Dr. Martin
Salton Sea

Geology: Leve Parewiche
Pisgah
Monocraters

Pinnacote area - reiteration of Pisgah
& inaccessibility - tossed it out.

Kilauea - Ile of Hawaii

Meekins Rens at 8th of May.

Peter Badgley AES Schedule

Date	Task ID	Task Name	Duration	Notes
10/67	208	Cisl. Reg.	U	
1/68	209			
1/68	504	Apollo	3	
2/68	209	Ops/Tech	10-14 days	Maneuvering extra activities
4/68	210	Voy. Qual	U	Qual. for 213
4/68	505	Apollo	3	
7/68	211	Obs. of man	45 days	1 st long duration mission lunar survey qualif.
7/68	506	Apollo	3	
10/68	212	Cisl. Reg.	U	
10/68	507	Apollo/AES	50P	Alternate to Apollo prestige mission
1/69	508	Apollo	3	
2/69	213	Voy. Mars	U	Depend. on SS# program
3/69	509	Ops/Tech	10-14 days	2-3
4/69	214	Voy. Mars	U	Backup for 213
5/69	510	Apollo	3	
6/69	215	Earth Obsv.	10-14 days	2-3 Check out of remote sensors
7/69	511	Lunar Survey	35 days	2-3 System qualification phase data
8/69	512 216	Apollo	U	unassigned
9/69	512	Apollo	3	new (2-3 men)
11/69	513	Ops/Tech (polar)	10-14 days	Maneuvering subsystem develop.
12/69	217	Obs of man	30 days	3 rd Long duration
1/70	514	Lem. Shel	U	1 st extended LS mission
2/70	218	Obsv. of man	30 days	3 Rendez with 217 Biomed.
3/70	515	Lem-Taxi	20/14	1/2 Rendez/514
4/70	219			

In Jan '66 there were thoughts as to be planned as polar activities.

5/70	516	Astron qual	30 days	2-3 men	Telescope qual. Obsv.
6/70	220	Earth Obsv.	30	2-3 men	Met. Oceanog, Agric.
7/70	517	Lunar Survey	35 days	2-3	Extended area survey probes.
9/70	518	Earth Obsv./Polar	45 days	2-3	Met. Oceanog geog.
10/70	222	Venus		U	Depend on SSA
11/70	519	Lem - Shelter		2/U	2 nd Extended LS mission continental
12/70	223	Venus		U	Backup for 222
1/71	520	LEM-Taxi	14	1/2	Rendez with 519
2/71	224				
3/71	521	Earth Obsv.	45	2-3	Met Oceanog
4/71	225	Voy. Mars.		U	Depend on SSA Program
5/71	522	Lunar Survey/polar	35	2-3	Synoptic coverage probes
6/71	226	Voy. Mars.		U	Backup for 225
7/71	523	Astronomy	30-45	3	Telescopes up. observation
8/71	227	Astr / obsv. of man	30-45	3	Rendez with 523. Begin Biomed. Observation
9/71	524	LEM-Shelter		2/U	3 rd Extended LS mission Crater interior
10/71	228	Astr / obsv. of man	30-45	3	Rendez/227, Biomed 105 days.
11/71	525	LEM-Taxi		1/2	Rendez/524

Keith will be away Apr 22 - May 15 '65.

77

June 1969. 215 Checkout of Remote Sensors 10-14 day low orbit

June 1970 220 low orbit Earth Observation Meteorology
30 days; 2-3 man crew.
Oceanography + Agriculture.

September 1970 518 Polar orbit 45 days Earth
Observation. 2-3 man crew

March '71 521 Earth observation 45 days 1/2
man crew

A. Tiffany of Bell Systems Ann Arbor.

Note on Decision to be proposed to RMC Thu PM.

1. Authorize NASA flights over Wedaco
- 2.

Dave Simorett

1. Glaciology - 2-3 frequency radars,
Ice measurements

Bob will be available Tues. Mar. 30

→ [on Wed PM Mar 31 or Thurs. Apr. 1.]
Shayla to arrive Wed @ 12:30 the direct
to Rodig office.

Bill Hayt

Consider Bill McDonald Instr. in Botany \$9,000

Mar 20

Call to

Barras, Stanley J. Home 608+249-8939. Int. interested.
mentioned Dr. P.S. Callahan

Manger, FE Orono Me. 207+866-7011 U of Maine informatics
207+866-7320 ofc. 207+827-3847 home.

Mar 23 Purdue Meetg with Engineers

Dr. C. D. Mc Sillem, Elect Engr. MS + PhD from Purdue ^{experience} with industry

Prof M.B. Scott

" K.B. Woods

Dr. Virgil Anderson

Dr. Roger Hoffer

Dr. Shig

Prof Robt Mates

Prof Mates suggested an
advisory committee
of Engineers.

March 31, Meeting of Research Management Group.

Craig L. Wiegand Worless

Harry Steele

H. A. Rodentimer

Roger Hoffer

Don Lasse

Keith Arnold

Joint work on

Vegetated ~~vs~~ ~~grass~~ non veg.
Cultivation ~~vs~~ ~~no~~ wild

spot
Crop species
bare soil
etc.

Trees
Bunch +
grass

Forestry

Forestry TAC's

50,000

2 Bob Colwells proposals

50,000

Sod Act + Rocky Mts study

43,500

Hirsch

20,000

Agric.

Plans - 10 x 100 miles,

8,000

Econ. Feasibility

125,000

Should shg be Monitor of Pande Prog. 3

" " " a collaborator

PT
IBP Contact

80

Called Mr. Ed Graham
RFD 2 Box 233
Verina, Va 22180

Send him Badgley's report + USPA-NASA work
statement for info. for his committee meeting in
May - Prepare plans for US Com. meet in
fall + for Intern. Comm. - in Feb '66

Apr 7 Call to Bruce Kelly re Mathematics.

Kelly knows of Manjety, Ph.D @ VPI this yr,
named Flora. He will contact Ed will talk
to Harry Trelogan regarding Tac basis or SRS basis
for employment.

8 Norma Siswold

AVRS, Avionics Lab
Wright Patterson Air Force Base
Bldg 23, Area B
Dayton, Ohio

Apr 9. Tom Bushnell -

Costa Rican Ecology test of ^{L.R.} Holdrege's Life Zone
hypothesis:

In Costa Rica - main office is in San Jose. av

Joseph

Tropical Science Center: L.R. Holdredge, Tosiy, Bob
 are owners. They have a contract
 with Assoc. Colleges of Midwest to receive
 undergrads to get experience with tropical
 agriculture.

They also service the Wilson, Nuttall,
 Rainier Engineers of Chestertown, Md.
 Holdredge selected several repr. life "zones" in a hurry
 scattered from 1 end of Costa Rica to another.

Relay Range
 arrangements

Tim Miller
 Mobile Aerial Towers
 Ft Wayne
 Ph 219 + 744 - 6181

Norman Insuwind

C-131 - 180 knots

3 sensors 1. I R - 8-14 m

2. Visual - Electronic Optical display

3. Side looking radar SHAR

1+2 work off same scanner mechanism

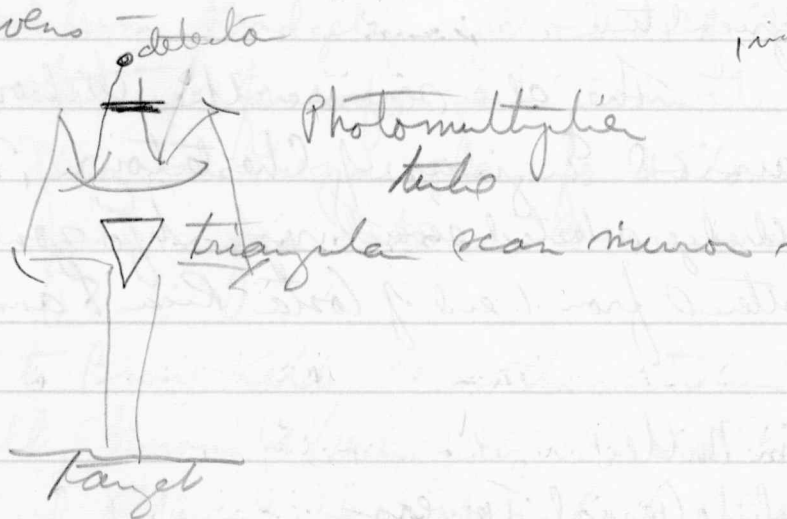
Have a visual display for all 3 sensors, this
 same console,

Imaging is 3 mi behind aircraft.

Have an image enhancer - 80 enhancers on

any combination, red trace display.
 Will add a thermoplastic & data link system
 to transmit to ground,

Jim Stevens detects

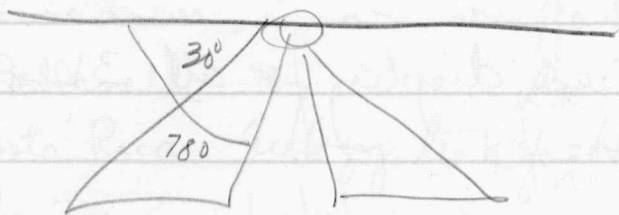


1 inch of film = 80,000 ft on ground
 1:80,000

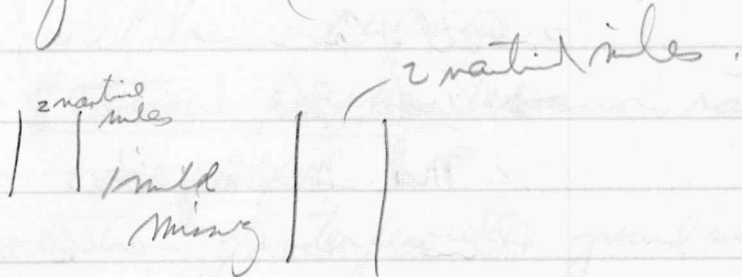
Brute force SLAR is KA bad.
 pulse width .05 μ sec.

gets congested in range @ 7,000 ft

alt of 7,000 ft.
 4 nautical miles



IR - 4" film width (= 4 nautical miles)



Plane return 26-28 of April

- Fly Early in May, May 1-10 - cover both
1. Kansas & Powder flights, ← data hit in old data
 2. June 15-30
 3. July 25-Aug 5

Send Raw Data

Rome Air Development Co. Rome NY.

4/27. Bill Zimmerman

1. Meeting Room

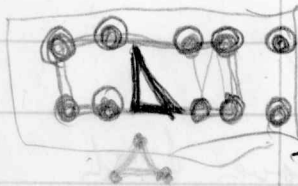
write to Earle Hanson ^{costs} also see Zentgraf

2. Poll of Council

→ 1. Arden Shey brochure & not poll

2. Md. Meeting site.

Future meeting, with selected Soc.



Telephone conv. with Bob

20% of Ray Bela,

Bob Colwell

Funbelle - meeting of photo team

ground observations of moon 2 1/2 days.

Photographic meeting

Discussion on need with 5 ch. infrared scanner.

data for 5 channels

May 10

Bill Fische

1. Distribution of rock temp. and changes in these distribution with time and \angle of view.
2. Measurement of relative absorption / emission ratios from airborne platform
3. Prelim. evaluation of interferometric ground measurements.

Took temps in lava lake to a depth of 12 inches, arrays of thermistors.

Made extensive radiometric temp measurements of Still-Hardy type.

Took a measure of surface temp of rocks + lake surface.

Conel JPK

Spectral research on rocks - Instrumentation spectrometers

Ron Lyons

Spectrometer mtd in cab of truck - ~~sensor~~ ^{sensor} head can go up to 100 ft from truck.
 SG4 Perkin Elmer Spectrophotometer modified.
 Liquid nitrogen cooled, Ge = Cu doped.
 1 spectrum / sec - 5m wavelength range / spectrum.

2 Plane:

86

Huggins Mark II radiometer / along center
Spectrometer / line of flight
camera

T-11 gyro mount for all units
camera will take 1 photo per sec.

In truck will have a rock-mount oscillograph
7 bad tape recorder

Infrarange precision radiometer

15x60 @ 2000 ft

Dr. Salisbury AFCL - spectra of rocks,

Huggins Co - Sunnyvale Calif. 15 yrs.

Bert Bernard microwave co.

Portable Infrarange Mark II - used by industry
for temp measurement - 1° fov, fixed
focus @ 20' with target size of 4"

Infrarange Mark I = Industrial Lab.

fov, 1°; always see what detector
sees - goes from 150° to up.

Fernal bolometer - a new type of detector

Area @ 8:30
to look for
section - theme + 990
aircraft at 11 AM.

thermal sensitive capacitor, $.2 \rightarrow 25 \mu$ range
 detection 10^8 .

Infrared Mark IV. $20 \rightarrow 200^\circ\text{C}$, sensitivity
 1 degree C,

Mark IX Precision radiometer,

fov ~~20~~ $.15^\circ$; room temp or cooled
 lead sulfide, for visible or ultraviolet
 focuses $12'' \rightarrow \infty$. Two 8 position filter
 wheels. Temp range $0^\circ \rightarrow 4000^\circ\text{C}$,

In line black body reference cavity

Mark VIII -

Jawal Williams - Higgins.

Ray Ron Dixon fov $.38^\circ$

Bolometer detector

R. Baum, Te Co, Santa Barbara

scanning device $.4 \rightarrow$ high DR

Bill Mallatt, CalSU. Earth surface temp from
 balloon. Atmosph. attenuation of outgoing
 radiation

Send for papers on this subject to him.

May 25 '65 Phone Leo Childs - re flight minis @ Purdue
 Next plane on way to Wood Hole,
 Ar. 2-3 PM for Santa on June 9. Have a PM flight
 around 1500 then another 400 June 10 then leave for
 New England.

Coverage [IR Scanner 8-14 + a photo analyzer @ 32, 38 jointly.
 Multi lens camera (Brown)
 T-11 maggy camera

Send Leo a map marking areas.

1500' altitude, 1600 ft @ 1000 ft.

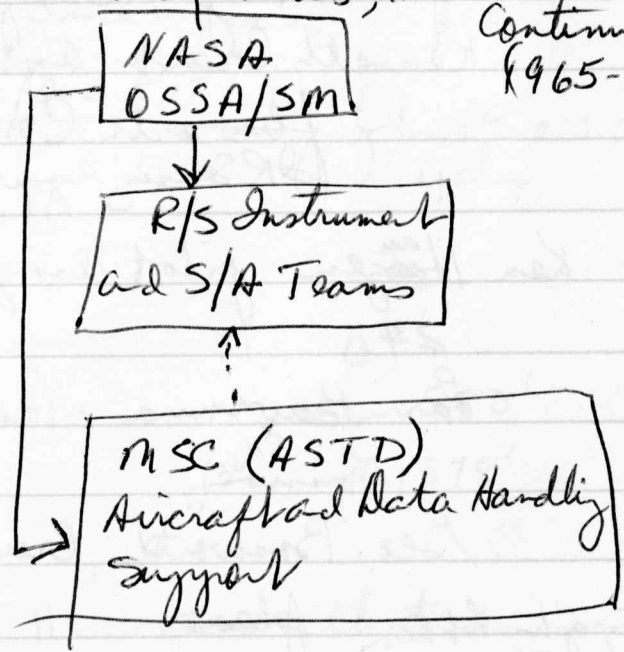
Be specific on file.

Call Bill Peake on June 9th. [614 + 293-5846]
~~614~~
 Columbus, Ohio

Call Leo Childs: Off 713 + HU3-2682
Home: 713 + 534-5820
 Dickinson, Tex

Richard
Dr. Allenby - W02-0341
~~Met~~ Dr. Powell -
Dr. Seamans

Feasibility Studies; Breadboard Experimentation
Continued Research
(1965-1972)



R/S = Remote Sensor
S/A = Science Application

Finally: solid lines
Advice: dotted lines

Leo Childs } Program Coordinator

Bill Daugherty }
~~I Aircraft Operations~~

A. Aircraft Electronics Branch Bud Ream, Chief.

Harold Toy, ~~Chief~~

Kenneth Clark ant & Toy

flies with Conair 240
(DR Sensing eqpt operato)

Ken Haugen pilot Amgen & Louvain
240 Paul Ream Chief

Larry Gavanna - (copilot the
Division)

Geo. Bosworth, Crew Chief of

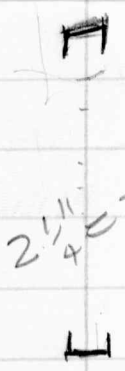
II Photographic Lab Dir. please

Photo instrumentation Section.

Taylor Moorman, Chief
Bob Gray

~~John Brinkman~~ Chief of Division
of Photo tech
Lab.

Eugene Edmonds Branch chief of
General Photography Branch
Taylor Moorman



9 lens camera

fc alt $2\frac{1}{4}''$

$2\frac{1}{4}'' = 70m$

width of body grad coverage

fc height : film size :: altitude ^{aircraft} : width of cov.
 inches inches ft. ft.

$$\frac{6''}{2\frac{1}{4}''} = \frac{3000 \text{ ft}}{7}$$

1200 ft alt 580'

3000 " " 1378'

T11 - double that

ME 3-6550

R13-3543



Dean Timmerman
 Hwy Photo Lab.
 Idylls.

89B in a 3 inch square.
used on for a K17

275-3245

91

fc. alt 2 1/4"

adj grad coverage

film size :: aircraft altitude
 inches :: ft. width of cov.
 ft.

$$\frac{6''}{2\frac{1}{4}''} = \frac{3000 \text{ ft}}{7}$$

580'

1378'

T11 - done that

Sep 3 '65. Phone from Dr. Badgley
 Seaman has signed Ag's proposal - letter going to
 Brady on Fri

9/10/65 Bob Colwell

1. Meeting
2. Meeting of Rudy

Early Sept '65

3 Bob Reeves

Mr. Kratz in Dr. W^m Wilner's office referred inquiry to
 Mrs. Steele NASA Procurement 202+DU2-8304
 Purdue Project 15-005-(028)

Sept 24. Called Mrs. Steele to see if Peter B had furnished necessary
 papers to start project thru procurement.

still need evaluation memo on evaluation
~~form~~ 884 from Badgley

moore +

Perry Mr. Luney - Economist USDA DU8-5492

18

Luna photographic experiment by deines
 Earth orbital experiment

Calvercase

Agrie.

Oct 8, 1965 in Wash -

Mrs. Steele - 9/11

Harry Steele

Walter Chinn -

Oct 14. Ampex FR1300 recorder

$\frac{1}{2}$ " tape - 7 ch cap.

1" tape = 14 ch cap.

1 of ea.

Oct 22 Phone # 2-8320 Mr. Craig - Mr. Green Deputy
negotiator with next 2 weeks.

Call Dr. Wilner by Nov. 1.

Dr. Rodenhiser's Offc.

H. R. Josephson For. Service

#847 USDA - Total less Poudre & Milk.

Park - replaces Frank Todd liaison bet HEW & agric
half-time, with help.

Dr. Park in Wash.

Robt. MacDonald in Wash.

Dr. Frank Manger @ Purdue - I

Dr. Clair Mc Gillem @ Purdue - I]

Consultants - M.R. Helter - Wg Mich -

Ron Lyons - Stanford Calif. -

D. Simonett - U.K. -

Agric. multispectral sensing team

Agric. Remote Sensing ^{Group} ~~Institute~~ ^{Laboratory}, Laboratory
Forestry Remote Sensing Laboratory

Review & update all project statements by Nov. 1.
Transmit copies to each individual in R.M.G.

30 day plan

major activities

Milestones

Sequences

Rody

202+0L2-0964

5805 Aberdeen Rd.

Bethesda Md,

after 2pm

~~at 10:00 AM~~
~~at 10:00 AM~~
 Call Bob MacDonald - 8 AM Sat.

Rody will be in Geo Irving's Ofc. A.R.S.
202 + DU8-3656. Sat Am.

Shay -

Rev. + update all res. project.

Review Senior budgets - Shay with H. Steele

Rework Budgets ad activities

Try to exhaust funds by Oct. 1 '66

Work out Quarterly allotments for A.R.S.

Think thru Sept Oct 1 '66 - 2nd yr. budget.

✓ 3rd yr. budget on separate pages.

Call to Bob MacDonald Sat Oct 23.

Request leave of absence.

^{Emanuel}
 Dr. & Pisnie Coypote Adpts Armonk
 White Plains

Bob leaves Mon P.M.


10/29 Frank Manya

Can't come till June, then for 10 months
\$11,100/yr.

11/1 ~~A.~~ C.B. Tanner, U. of Wis.

608+ 262-~~5753~~ ~~██████████~~ Will return call.

Huntsville, Nov 9 and 10, NASA,
Rev. of Research Underway,

11/5 Don Lane - Mich Proposal No. ^{5C} 23-005-071-(151)
Greene; Steele 

No paperwork has reached Greene
Form 404.

Cover. for Mrs. Steele acknowledging

Taylor.

Computer Apph Analysis

Nov. 9, 1965,

Von Braun - Welton & Marshall Space Flight Center - Remote Sensor MSF Program is the greatest thing that has happened to NASA since Sputnik.

Webb has said \$1 invested in NASA will give \$2 return. Many returns are hidden to man on street. Not so with remote sensors. People will understand.

Marshall staff have an investment in our program. Has a launch vehicle of 4 yrs. ago gives 1000 tons of launch payload.

Can't fly a normal IBM computer, this means bringing earth designed instrument to space - avoiding cost of miniaturizing instrument.

Marshall has experience in powerful rockets and in spacecraft design. Can offer help on data acquisition and memory + interpretation.

Dr. Badgley NASA affiliate in 1963, then chief in 1964.

Data acquisition systems:

AES = Apollo Application Program.

Remote Sensor ^{flight} ^{now} Checkouts 507 40 check for 511,
511 20

513, 517 + 521 40

NASA's program defunct studies
with Ag & other agencies

1. What earth areas

Time of yr

Ground control

Instructions

Resolutions

Flexibility

Define experiment

Send a member of NASA remote sensing team

Pinacate Hills Mex

Alice Springs Aust.

Quadrilatera ~~de~~ Ferrafero Brazil

Miyatan / Hekla, Iceland

Oshima Island, Japan,

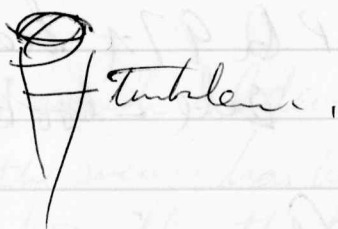
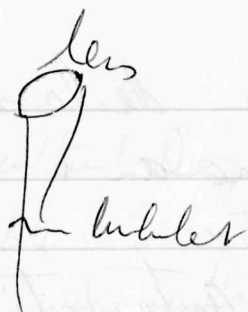
color

Gemin ^{color} picture of Wilcox Lake test

Site, Arizona,

plus ground view.

US Companies spend \$2 Billion for aerial
photos around the world.



Get. Mouth of Colorado River ^{in Gulf of Calif.} ^{Even 4 June 65}
walked handballed thru window.

Reef of Bahamas
Ship Wake No of Hawaii

Get → Granitic rock with lichen
Resolute Cap of Genoa in West
Texas over all Texas
Moisture pattern of recent rainfall

Get → Sand dunes

Get → Hummer off coast of Morocco.
Two pictures of East Coast.

Meets of Orbital Radar -

Synoptic view of 150 mi ~~in~~ for
reasonable altitude (approx)

Have Roger complete the Report for NASA &
Aq. Res. Service.

Get → APQ-97 Radar

Rada

100

AP Q 97A has been declassified -
side-looking rada.

Army is making automatic topographic
maps from rada return signal.

Hi Resol. 15, 2, 8 + 16 GG

med. resol

Geology St Andreas fault,
dk. areas & areas of marshes,
Ant of stream of settlement,
300 miles over 300 AMillion yrs.
Movement on East side is to the So.

Estimate total Manpower for EO
in Aquatic 400 men/yr.
1679 man years total for
Geologic Map program.

Funding

Agricultural Program of research and development is enviable. Secret of the success has been consistent low-level funding that enables the training and hire of career scientists.

CSRS - 54 M.

Total - 300A

ARS - 120 M.

2% of Total Fed Res. budget now for Ag,
In 1940 was 40%.

Altitude 100 mi. 1.2 million scale, 3-base color photo,
30 lines/mm resolution was analyzed.
Haselbled 3-in. fil.

Calvocones - Laser technology needs.

Dr. Helmut - Schmidt of USGS is in
chg of NASA mapping camera program.

Laser may activate materials on
earth + lunar surfaces causing them to emit
gases which can be analyzed spectroscopically.

Need a laser man to head up a NASA
laser team.

Dr. Moore of Kansas

Don't know how far radar beams penetrate,

400 mg, altimeter - will penetrate quite a way. Shorter wavelengths won't penetrate so far.

Adv. of radar - has own energy; penetrate clouds, earth vegetation on moon - some part of surface layer don't know how far.

Radar expt - multiple frequency part of view.

resolution Swath Width

3.75 cm

15 x 15 m.

40 km.

Resolution limited by power requirements - hope for more power + better resd. later.

First scatterometer - altimeter,

3 cm scatterometer
altimeter

Size of area

4.6 x 10 km

altimeter
accuracy
Sea Othe
3 m 100m.

75 cm scatterometer

Side-looking radar
synthetic aperture

Intermediate imaging exp.

3.75 cm

15x15

Swath Width

40

16.7 cm

15x15

40 cm.

30x30

Mr. Thompson - Gravity
Gravity 980 cm/sec^2

Don Lowe - IR Team report.
Excellent discussion

huck -

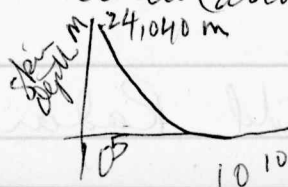
Hemphill UV

Active UV system by Westinghouse
Permits W.L. at shorter than 29μ which
is precluded by absorption by ozone of atmosphere.

Mr. Bruno Sables - Barringer.

→ Barringer

Moon calculations based on dry
sand - skin depth penetration



Lava surface:

~~Sneaky~~ X + Gamma Ray Expts. —

- X + Gamma-ray detectors are highly sensitive nuclear devices Background - galactic cosmic rays can be eliminated but spacecraft will emit energy which must be overcome by mounting sensor on a boom.

Lava gamma ray flux is low.

Acad Comm.

Call Ches. Minors or Bob Holme,

1965
Nov 10. Mes Am

Dr. McCall. Marshall

Broad Center - \$1.8 Billion in '65-'66.

Astronomy Lab - supported by Sperry-Rand,
Scientific Public Relations

Mr. Widener - Dr. McCall Dep. Dir.

Mr. Barr - Has responsibility for High Speed
Digital Transmission - TV, Film Scan +
Radar DATA

Has a file on communication development esp. for
tracking -

Can build Radar - design the instru -

ment.

Mr. Ted Paludan - Measuring System

Contact sensing on vehicle:

Rapid Scan 10-Band Spectral Radiometer.

U. S. Army of Wis. Explorer VII

Woods Bayson



Mr. Winkler -

Data Handling

designed by LVDCO
Digital Control Series

over

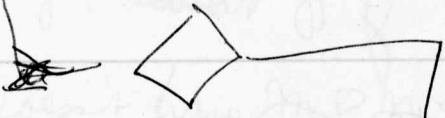
Ground Sta

Sampled data from Expt

Compress Data

Store Data

Expt



Enter
Data Dump

Ground to Satellite Communication

Mr. Boehm - Mechan. Engr. Connected with
Flight Hardware Packaging.

~~Mr. Lucas~~ - Mr. Heller -

Have Pegasus 12+3 in Orbit

Mr. Ervin -

John E.
Mr. Johnson

Chas. Centers

With Peter and
Bob Reeves

J. T. Powell

preferred
Nov 29
Nov

Nov 29 → Wed Dec 1

Nov 30 + Dec 1 preferred by Westlake.

Mr. Paludan -

Mr. Burke - radiometers,

Nov. 15 '65 - Corn Virus Meety Purdue

Epidemiology
Geography
Distrib of
MDM

Meet @ 7:30 P.M.

Dr. Ford Ames - ~~not present~~ have MDM in extreme SW county along Mo. R.

Dr. Kodaskar - Ala. 30 co. with sym. in few fields each; MDM recovered from only 1 co in North on Tenn. River.

Dr. Roeffel - ~~Tenn.~~ ^{Kentucky} Positive identified in some 20

counties: Dr. Thornberry Ill - 14 counties
9 new counties, In Scott Co. infection was not assoc. with Johnson grass,

Dr. Williams Ohio Confined largely to lower 1/3 of State -

Dr. Piore - La. Doesn't have MDM - but does have Sugar cane mosaic in corn but it doesn't cause dwarfing -

Jim Dale - Has a new host - St. Augustine grass.

Dr. Hilly from Tenn

Sill of Kans. - Two samples from Mo. R. just no. of ~~Co.~~ Ks. City were positive - and were assoc. with Johnson Grass
Halisky in N Jersey has found MDM in sweet corn in 3 different locations.

So Carolina - symptoms ^{show} assoc with lodging

Evelyn J. M. ^{id} Saogstad:

Mimi Nemeth - gets virus in 20 secs., ret -

Insect Trans-
mission MDM

ains the virus for 20-25 minutes,
11 species of aphids were capable of trans-
mitting virus.

Bromus japonicus, *Panicum capillare*
Sorghum halepense, *Tripsacum daniellii*
Zea mays, *Setaria faberii*, *Echino-*
ochloa crusgalli in order of efficiency
as sources.

Vic tried up work of Dec 5-10 + 1st wk in Jan.

Advances in Communication Systems
Vol. 1. 1965. Ed. A V. Balakrishnan
Full Time Tax

Lowe, [Polcyn, Jerry Cook, Sattinger et al.,]

Holner part-time tax.

MacDonald full-time TAC

Legant up to half-time,

Dec. 2, '65 Parks - of Rody's office will contact us re
form of Tac & revised budget meanwhile Purdue
can start spending money on Tac + prepare
Plan of Work - Phone conversation with Rodenhiser
PM.

□ Morgan, Vincent P. 202 + 962-0341 1520 N St. NW,
Call Rody get U.S. DA man's name in USDA

J.H. Western Appl Biol + the Univs, Jan.
Appl. Biol. 55: 345-358, 1965.

¹⁰² Dr. Willner ¹³ 2-3587 ⁶⁵⁸

Linda Spence - 132-3658

To be signed by Dr.
Holloway,

7th Floor
721 DE Fares -
Reports sold
307 - 4th St.
300 Seventh
St.

Amendment Mr. Albert Brown + Mr. Nilo Coy
work to be done and a budget.

Frank Parker TCR Technical Cooperation in Research.
Brazil, ^{desk} amendment

Dr. David White - physician 1066,
Rosenfield - Health, Nutrition State Dept.

Mr. John Wilson - Govt Code - 182-7293
Down DU3-7293

Dr. Caton,

Dec 10 Meeting of NDS meeting Dec 10, '65
Pallett Expt

1 UV
2 IR
2 Visible

} to be built
by Aug '66

Paul Lohman - of Goddard Space Center.
for orbital imagery.

Photo team of

Committee designate liaison.

Shay write to Jim Wilson w/ copies to Walt & Harry
that Dave & M. Crute be a liaison repr. from
our committee and they in turn appoint a
member to our committee.

Remote Sensing of the Environment Comm.

Airforce Scientific Advisory Board of the Pentagon
has a committee on Remote Sensing. Mike Hette
is chairman, next meetg will be at Houston.

George Mehrens
Committee pass a resolution to Dept of USDA
requesting that consideration be given to study

part of Remote Sensing work for budget
consideration for FY '68

NASA is presently funding
an operational system will have to be
handed by USDA - same as
Weather Bureau has picked up
Tinos,

Ray Sooy
Henry Bower

Send data paper of David Bates back
to him

David Spomer of Lockheed,
Dr. Geo. Mueller 2024 W02-0224 in Wash.
Badgley - 713+HU-32568.
Geo. Chulis

Dec 17 Hal Boyd IBM

Jan 4 - Ag Res. Mgmt Group - Roderhine's office,
 Annual flight plan for 1970-72.

Gemini 12 flight? 4- Hasselblads to be had held,
 obt 1 yr. off. Chou reason with Leo Childs,
 by telephone. - Paul Solomon @ Goddard might know.

Resol. reqts.

Plan of Work

Flight Program

Funding

Nov. 1 starting date for next year.

Quarterly Billing and Monthly Reports of grant +
 Contracts.

K.

\$800 + \$250 test sites for ag - exclusive of instrument data gathering
 flights.

Invoices - Overseas personnel funded by the com to
 Purdue + Calif to learn then return to their countries
 + interpret NASA-collected data.

Letter from Secy State to US Ambassador in Brazil.

Simon Pietri

Rm. 3115 So. Ag. Bldg. - Tropical Forests, Guatemala + Costa Rica.

9:30 Jan. 5, Chm. Robert Winters,

Mr. Proser is Security Officer for NASA.

Meet 2nd wk of Feb with Air Force Advisory Board -
 Colwell & Shay - de-emphasize instruments, explain
 use, data interpretation, photo interpretation.
 Get copy of Space Act from Peter re Budget meeting
 with NASA Chiefs. Can budget thru operational
 system alt 1975.

First flight 10-20,000 lbs. payload - 3500-5000 lbs
 payload possible for Expt. equipment.

In talks with Webb, et al. - ask all getting NASA
 support for ag budget at Congressional hearing. Also USDA
 should offer support to NASA.

USDA should document and report from
 USDA sources.

Contacts with Weather Bureau & Comsat.

Mr. Jaffee & Dr. T. Egger - Dir. of OSSA
 Dr. Newell heads OSSA

Adm. Boone NASA deputy director for
 Defense Affairs.

President's Advisory Committee should be told by
 Ag of the Security problem in attracting staff into
 area of work.

Space Council V. Pres. Humphrey

By Mar. 1 a report on

Forestry

Milch-Purdie 64 data analysis

Purdie-ERS contract report

ERS-report.

To be put together by Arch. Parker.

Put illustrations together (litographs) on briefing board
2 1/2 x 4' sheets.

Zonetrician careers

Plan of Work for Seal.

Prelim. Mission Definition for Manned Earth

Orbital Mission, 2nd Edition, Nov., 1965

Proposal for Integ. Group for Photographic

Expts. Prelim copy for review, Dec 1 '65

Test-Site Info.

Space Act.

Budget.

Fy '67 '68 '69 '70 '71

800 800 800 800 800

250 275 300 350 350

1/7/70

Handwritten notes at the top of the page, partially obscured by a white sticker.

Jan 7 Telephone/Don Lowe Mich.
Shay's log. sketch,
Letter to project leaders

115

Faint, mostly illegible handwritten notes on the lined paper, including phrases like "Retirement plan", "will not be affected by 10% raise", and "Moon exposure".

Jan 7 Tele

Dec 4 Badgley Prof of Agronomy
Chas. Centers Marion Parker Bob Colwell
Peter Badgley Harry Steele Chas. Senter
Dale Jenkins Arch Parker Henry Bauer
Des. Irving Keith Arnold H. R. Podentine
D. McVerns R. Shay Bill West of
OSTRI

Peter Badgley

M Space Science Office,
new Natural Resource ofc. of Ofc. Space Science
Application

Water-gauge stations

Stream-gauge "

Oceanographic ground stations,

What general sequence of flights
is important? Pertains to Baller
flights. Pie Shaped segment
can carry up to 5,000^{##} of experiment
equipment. Can be operated in
April 1968. - We wish to con-
trol them. In coop. with
Dept. of Defense. First ones
are $\pm 28^\circ$ latitude, orbits are
defined up to 32° lat.

Jan 7 Tele

May have unmanned opera-
tional satellites in 70's,

Overflight areas available
Geology is planing - plan on
route to primary test site

Test site letter to Ambassador ^{Paris}

Thailand photo of Jim McClain
of CRRLO get.

Mane Spy Flight Evaluation Board
meet 5-6 hrs per 2-3 days long

1 man in boat; 1 man
outside

To plan spaceflight
Expts.

from bee plans go to
Hardware bidders on
competitive basis.

Jan 7 Tele

Each lb in space costs
\$10,000/lb. Total cost (small
satellites \$90,000/lb. of satellite
larger the spacecraft & more com-
munity of use being cost down.

Will probably have to
approx Co-principal invest-
igators of Rpts. rather than
one prime! Invest.

Slaman, Webb & Newell should
be informed by USDA of need for
perpetuity of funding - within the
next few months -

Briefing of NASA when Ags. Detailed
plan is developed.

Pates in Navy + Pecora in USGS,
along with Ag staff, ←

Bill Fisher can give us added
copies -

The Scientific Endeavor - Central NAS,

6518302

1. 1963 - Kennedy address
2. Res. on delay of beam
3. Res. on delay of beam
4. Central to Ags. Mill. Fort

Jan 7 Tele

IBP - 1st 3 items as objectives of this program,
with attempts to map resources & study them,
WAS in resp. to the U.S. effort.

~~State~~ Ag should consider joining
in this, on an inter. basis.

Ted Byerly + Stanley ^{of Interior} Cameron co-
chairmen

Dr. Geoffrey Norman is interested +
enthusiastic.

Dr. Rodenhiser - Ag. Dep. Chief

Dr. Jarmison - For. Dep. Chief

1 flight @ Wadaco June 15 - July 1.

If Calif covers in no earlier than 1st wk of June.

25,000 from Wadaco) for combined flights
15,000 " Calif) over Tex + Calif. by Mich. plane.

— ^{wide} 100 x 150 miles long Valley + North.

NASA - Scatterometer

a-lens camera

no in R. Scanner.

Tell Badgley || No imagery delivery @ Houston on Mid Dec
flights. This has got to give on this.

Bob Macdonald,

117

Name in housing lease.

on leave 2 or 3 weeks.

\$16,500, moving expense.

Monroe M. Dickinson
Bethesda Md.

Fairmont Bldg.

Federal Systems Div.

Space Systems Center.

Phone 301-657-2900

Call Jan. 26.

7 Feb. 2.70/wk. IBM contains hosp. pay.
last raised July '65

Med + Insurance benefits
Stock option 1% of sal.

Retirement plan no cost to employee.

Will not be affected by 1 yr. leave.

Moving expense:

Will be reimbursed at Wash. upon completion
of duty.

One added issue - minimum interference
basis. Option of 20%

Wright-Patterson AFB
Agriculturally-related

~~the~~ K-band systems
Westinghouse

Late April + thru early summer months
Stinson Project Eng. of Westinghouse
NR Lab. aircraft

Feb-9. Air Force Briefing.

Conf. with Leo Childs; Person in charge of data handling @ MSC @ Houston -

Ed Zittler HU3-3121

NASA can pick up all of Ag's data gathering needs by Sept '66.

Projected data gathering schedule for agricultural Sites: (Handed to Leo Childs for his planning)

Purdue Univ. vicinity;

1966 - Ea. Oct or last wk of Sept

1967 - Ea. to mid April; late June; late July; late Aug.; late Sept.

1968 - Late April - ea. May; late June; August

1969 - Same as 1968.

Weslaco, Tex. vicinity

1966 - Sept.; late Nov - ea. Dec.

1967 - April; May, Late June; Sept.; late Nov. - ea. Dec.

1968 - April, May; late June

1969 - Same as 1968

Davis, Calif. vicinity.

Bob Colwell provided.

Geography Section
1:24,000
map of N.S.
1:250,000 map of
N.S.

Res Childs report - Data gathering:

Comair 240 10,000 ft - 20,000 ft altitude
limit; also contacted US.

In April will use it over Bermuda
& Argos Is. - for Naval Oceanograph
Ofc also @ Goose Bay region.

Egph. RC 8 camera color + Bl+Wh.
T-11 " Bl+Wh

Multispectral Camera Sleek 9-lens
camera, 370 mm film pool,
.3 thru .9

IR imager AAS-5 IR 4.5-5.5
& UV thru visible

Reconofax mag: IR 8-14 μ

Microwave image 35 mm; 8.5 mm;
10 mm + 13.5 mm.

Ryan Scatterometer
On board separately } 13.3 gigacycle } FOU 3 degree
replacing microwave } } 1 way + 10° the
radiometer } } other

IR Spectrometer

Mission

US Test Sites: 3-4 times per year;

Aircraft will be operation beginning of Sept 66
with limited capability, up to full strength
by Jan '67

Tues into Apr 13 Peter Badgley coordination Meeting.

Detailed info on test sites needed this year.

Significant Achievements in Natural Resources Program: Submit information ERS report -

* Write to Peter for a Chas. Center for Aircraft Program

Satellite program for 15 yrs.

Data facility

Summary of Objectives Instructions

+ flight time recommendations.

Documentation of interpreted data over test sites → ERS report.

By June 1

Tell Vic Myers

4/13

Wed Noon DR Scanner instruments

123

Conair 248, 2-engine propeller

Reconofax single ch. 8-14 μ

Electra
EI-8 P3V Lockheed 4 engine turboprop

Reconofax 8-14 μ

Purchase request for a multippectral scanner:

.3-.45

.45-.7

.7-2.5

3-5.5

8-14

lent to 30

FR 1600 — 14 ch tape record

1 ea Conair + P3 + 1 spare.

6 ch. microwave radiometer

2 ch. scatterometer

1 ch flight

Now she wants 12 ch in visible scanner -

4/13
Wed Noon DR Scanner

Convain 248, 2-
Reconofax single ch

Electra
P3V Lockheed 4
Reconofax
Purchase request for a
.3-.45

.45-7

.7-2,5

3-5,5

8-14

sent to 30

FR 1600 — 14 ch tape record
1 ea Convain + P3 + 1 spare.

6 ch. microwave radiometer
2 ch. scatterometer
1 ch flight

None else wants 12 ch in visible scanner -

PHONE CALL

Date 4-15-66

Mr. Dr. Shay

You were called at 10:55 A.M.
P.M.

By Don Mahoney
at Purdue now
Wrote T.V. Writer - with exper-
ience in CIA with Jim Lynch in
Phone No. 743-2181 Remote
Sensing

The Message was

Return call
when back in
town.

Leo will fly 0 Mich flights over Ag + Forestry site
 from Mich in season of 1967. Don Lane will
 write specs for ultimate aircraft scanner + have
 Gray + Ag + Forestry submit to Leo by June 1.
 This will be built for action in NASA aircraft
 in Jan. 1968.

NASA will proceed to obtain a non-
 classified Bendix scanner tape off, internal
 calibration. 1 ch photomultiplier + 1 ch 8-13

Rada:

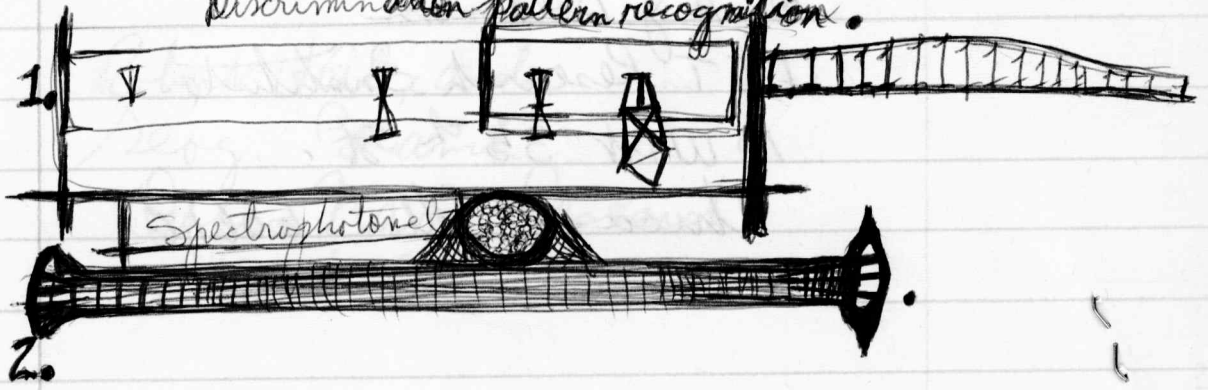
487 Mcycle Scatterometer

441

175

4/27/66 Phone / Mike Holtz

Discrimination pattern recognition.



Miff Sattler
 Wash reg
 202... Ex 86500
 City Eng...
 D.G. Corbett
 2167 994

Send Purdue Report about June 1, ^{'66} to
 Dr. H. J. Goldman
 IIT Research Institute
 10 West 35th St.
 Chicago, Ill. 60616

Phone / Centers 5/26/66
 Dr. Tepper + Peter Badgley
 will be on
 June 27 + 28 at IIT
soodysa

Radar, IR +
 Photography +
 Data Handling
 2 persons from IIT

then June 29 here at
 Purdue.

Send Purdue Report about June 1, '66
 Dr. H. J. Goldman
 IIT Research Institute
 10 West 35th St.
 Chicago, Ill. 60616

Doc

M. J. F. Satterson
 Wash regu.

202 + Fe 8-6500

Chf. Engr @ Ahron.

D.G. Corbett

216 + 794-4092

801

127

6/10/66 Phone Rodenhiser,
Tues P.M. Mehrens.

Robert H. Alexander
Reg. Brand
Office Naval Research
Wash. D.C. 20360

Phone call from June 24 '66
Harmon Area

~~Area~~

N. Amer. Aviat.
Space + Info System
Div.
Downey Calif.

has a multiplexed comm
system + will plan
definitely for a visit
during 2nd or 3rd wk. of
July — will hear
from him later

Peter Badgley's new name:
Earth's Resources Survey Program.

50 Ag 1438.

8/18/66 Recent notes

Chas Poulton of Ore State interested in Range
Mgmt. R. S.

Man @ Fla, doing work on Citrus disease
R. S.: Gerald Norman, Attn Joe Mullin
Statistical Reporting Service, U.S.D.A., Orlando,
Fla.

R. E. Hallgren, ESSA, Director of World
Weather Watch. Washington Science
Center Bldg Rm 1026.

Ph 301-496-8296

He referred us to Les Hubert at Suitland Md.

