AGENDA

PHILCO IMCC CONTRACT REVIEW

JULY 26, 1963

MSC Introduction
IMCC program discussion and allocation of responsibilities
Management control mechanisms

Program Scope and Status Overall
Review of tasks to be performed and plan for accomplishment
Status Review in general – schedule position, people, facilities, etc.

Technical Discussion of the IMCC
Hardware subsystems for IMCC
Physical layout and building standardization
GOSS tasks (GLDS, Merritt Island, DCS, PCM)

Financial Performance & Objectives
Costs negotiated and expended to date
Changes expected and total projection

Discussion

P. Vavra 15 min.
W. LaBerge 10 min.
Cartwright 60 min.
Cronhardt 15 min.
Wye 10 min.
Nichols 20 min.
OPEN
ORGANIZATIONS & TASKS

NASA

GROUND SYSTEMS PROJECT OFFICE

FOD REQUIREMENTS

PHILCO/GSPO INTEGRATION

IBM
RTCC
LTDS
M/O

PHILCO
IMCC
Display/Control
COMM
SCATS
Integration
M/O
LDS
Recovery

GFE
Remote Site
(GSFC)
Sim Consoles
(GSFC)
PCM TM Eqpt.
Comm. Processors
IMCC Building
Network Liaison
GSFC-JPL-DOD
MSFC-LOC
Digital Command

TELCO
Leased Services
Toll Bldg.
IMCC & MISSION CONTROL SYSTEMS

MAJOR TECHNICAL AREAS

Display & Control System
Simulation, Checkout, and Training System
Communications System
  Communications Processor Subsystem
Computing Equipment (RTCC)
Computer Programming
Command System
Telemetry System
Facilities/M & O
Launch Data System
  Launch Trajectory Data Subsystem
RTCC-Display/Control - Comm. Interfaces
IMCC - LDS - Remote Site Integration
Network/IMCC Checkout
EFFORTS IN ESTABLISHING
REQUIREMENTS & PROCEEDING
WITH DESIGN


2. Participation in technical groups by F.O.D., IBM, Philco, GSPO. Meet bi-weekly to establish requirements, review and refine system designs.

Technical Group Outputs:

Meeting summaries

Data Books on each area compile:

Requirement - quantities
System design
Subsystem specifications
Interface specifications
GSPO/FOD EFFORTS TO KEEP

SYSTEM REQUIREMENTS & DESIGN

PLANS IN COST PERSPECTIVE

Pneumatic Tubes

Slide Files

Display Request Keyboards

Display Channels/Character Choices

SCATS
   PCM Equipment
   Dummy Remote Sites
   RTCC Interface

Bissett-Berman Supplemental Studies (Philco)

Full Scale MOCR Mockups

Recovery Room - Staff Support Room Bldg. Changes

Digital Command

Network Status Boards

TV Hard Copy Printer
### FIRST FLOOR - POWER & HEAT LOAD REQUIREMENTS

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** THESE FIGURES REFLECT RM LIGHTING & RM LIGHTING BTU LOAD ONLY.

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* MECH. EQUIP, RM UTILITY HEAT LOAD INDICATED REFLECTS INTERNAL LATENT, FAN MOTORS, FRESH AIR LOADS, ETC.
FUNCTIONS:
1. Distribute hard-wire voice communication from the outside world throughout the IMCC.
2. Provide intercom throughout the IMCC and via dial facilities, provide telephone access to the outside world.
3. Receive, process, distribute, transmit all TTY message traffic.
4. Provide PA facilities.
5. Distribute message hard copy within the IMCC.
TERMINATION S/S

FUNCTIONS:
1. TERMINATE PROCESS AS NECESSARY AND DISTRIBUTE ALL GOSS NETWORK VOICE AND DATA CHANNELS AT THE IMCC.
2. PROVIDE CONTINUOUS QUALITY MONITORING OF THESE CHANNELS.
COMM SYSTEM: VOICE & MESSAGE

- TELCO MDF
- PATCH EQUIPMENT & COMM PROC
- WEATHER RCR, ETC.
- IMCC MESSAGE CENTER
- AUDIO PATCH & TEST
- VOICE
- INTER-COM
- CONFERENCING BOARD
- AIR/GROUND POSITION
- LOOPS & STATIONS
- PA
- TELEPHONE LINES
- CENTREX IMCC PBX
COMM SYSTEM: DATA

- TELCO MDF
  - MODEMS
  - PATCH
  - PCM GS's
  - FORMATTER
  - ANALOG
  - SSR
  - DISPLAYS
  - MASTER DCS
  - RTCC
  - MDCS

- TTY
- SCATS
- HSD
- CONTROL
- MON.
- VIDEO TERM.
- Displays
**INTERNAL COMM. S/S**

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTERCOM</td>
<td>163 LOOPS</td>
</tr>
<tr>
<td></td>
<td>225 STATIONS</td>
</tr>
<tr>
<td></td>
<td>110 EXTRA JACK STATIONS</td>
</tr>
<tr>
<td>HARD COPY DISTRIBUTION</td>
<td>P-TUBE</td>
</tr>
<tr>
<td>TTY MACHINES (MESSAGE CENTER)</td>
<td>21 M-28 ASRs</td>
</tr>
<tr>
<td></td>
<td>7 M-28 ROs</td>
</tr>
<tr>
<td></td>
<td>3 M-28 ROTRs</td>
</tr>
<tr>
<td></td>
<td>2 M-28 MXD</td>
</tr>
</tbody>
</table>
## TERMINATION S/S

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>NOW</th>
<th>21-DATA MODEMS</th>
<th>6-WIDE BAND MODEMS</th>
</tr>
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<tbody>
<tr>
<td>VOICE CONFERENCING &amp; SWITCHING</td>
<td>1 EQUIP. GRP.</td>
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<td></td>
</tr>
<tr>
<td>MODEMS</td>
<td>GFE</td>
<td></td>
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</tr>
<tr>
<td>ERROR CENTRAL</td>
<td>0</td>
<td></td>
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</tr>
<tr>
<td>BUFFER FORMATTER</td>
<td>2</td>
<td></td>
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</tr>
<tr>
<td>VIDEO TERM. UNITS</td>
<td>0 (GFE)</td>
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<td></td>
</tr>
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</table>
## D/C HARDWARE

### SUBSYSTEM COMPONENTS

#### A. COMPUTER-DISPLAY/CONTROL INTERFACE SUBSYSTEM

<table>
<thead>
<tr>
<th>A2</th>
<th>COMPUTER OUTPUT DEMULTIPLEXERS</th>
<th></th>
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<tbody>
<tr>
<td>A2/1</td>
<td>DIGITAL DISPLAY DRIVERS SDD</td>
<td>2</td>
</tr>
<tr>
<td>A2/2</td>
<td>PLOTTING DISPLAYS SDD</td>
<td>2</td>
</tr>
<tr>
<td>A2/3</td>
<td>D/A CONVERTERS SDD</td>
<td>2</td>
</tr>
<tr>
<td>A2/4</td>
<td>DIGITAL TO TV CONVERTER DD</td>
<td>2</td>
</tr>
<tr>
<td>A2/5</td>
<td>CONVERTER SLIDE FILES DD</td>
<td>2</td>
</tr>
</tbody>
</table>

| A2A | AUXILIARY CONVERTERS SLIDE FILES DD | 2 |

#### A3 | DIGITAL-TO-TELEVISION CONVERTERS |

| A3 | DIGITAL-TO-TELEVISION CONVERTERS | 56 |

| A3A | AUXILIARY DIGITAL-TO-TELEVISION CONVERTERS | 8 |

| A3B | AUXILIARY DIGITAL-TO-TELEVISION DD | 2 |
A4 CONVERTER SLIDE FILES
A4A AUXILIARY CONVERTER SLIDE FILES
A5 REFERENCE SLIDE FILES
A6 MANUAL SELECTION KEYBOARD WITH:
   A. TV CHANNEL SELECTION CAPABILITY
   B. REFERENCE FILE SELECTION CAPABILITY
   C. DISPLAY REQUEST FROM RTCC CAPABILITY
   D. HARD COPY REQUEST CAPABILITY
   E. PHOTO RECORD REQUEST CAPABILITY
   F. CONSOLE MONITOR SELECTION CAPABILITY
   G. GROUP TV SELECTION CAPABILITY
A7 FILE SLIDE MAKING EQUIPMENT
A8 DIGITAL DISPLAY DRIVERS
A9 X-Y PLOTBOARDS
<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A10 Analog Display Drivers</td>
<td>300</td>
</tr>
<tr>
<td>A11 Meter Displays</td>
<td>300</td>
</tr>
<tr>
<td>A12 D/A Converters</td>
<td>12</td>
</tr>
<tr>
<td>A13 Chart Recorders</td>
<td>12</td>
</tr>
<tr>
<td>A14 Digital Voltmeters</td>
<td>2</td>
</tr>
<tr>
<td>A15 Computer Input Multiplexers</td>
<td>2</td>
</tr>
<tr>
<td>A15A Auxiliary Computer Input Multiplexers</td>
<td>2</td>
</tr>
<tr>
<td>A16 Display Request Keyboards With:</td>
<td>41</td>
</tr>
<tr>
<td>A. Console Monitor Selection Capability</td>
<td>31</td>
</tr>
<tr>
<td>B. Group TV Selection Capability</td>
<td>6</td>
</tr>
<tr>
<td>C. Plotting Projector Selection Capability</td>
<td>4</td>
</tr>
<tr>
<td>A16A Auxiliary Display Request Keyboards</td>
<td>10</td>
</tr>
<tr>
<td>A17 Computer Entry Keyboards</td>
<td>8</td>
</tr>
<tr>
<td>A18 PCM Digital Monitors</td>
<td>10</td>
</tr>
</tbody>
</table>
D/C HARDWARE (CONT'D)

B. TIMING SUBSYSTEM
   B1-B2 MASTER INSTRUMENTATION TIMING EQUIPMENT 1(DUAL)
   B3  RELATIVE TIME ACCUMULATORS 22
   B4  WALL CLOCK EQUIPMENT 1

C. TELEVISION SUBSYSTEM
   C1 HIGH RESOLUTION TV CAMERA CHAINS FOR:
      A. GROUP DISPLAY PICKUP 11
      B. OPAQUE TELEVISOR 26
      C. REFERENCE SLIDE FILES 32
      D. CONVERTER SLIDE FILES 387
   C2 TV DISPLAY MONITORS
D/C HARDWARE (CONT'D)

C3 TV STANDARDS CONVERTERS:
   A. 945 TO 525 LINE
   B. 525 TO 945 LINE
   C. SLOW-SCAN TO 945 LINE

C4 LAND LINE INTERFACE

C5 SYNCHRONIZATION GENERATION AND DISTRIBUTION

C6 VIDEO SWITCHING MATRIX
C6A AUXILIARY VIDEO SWITCHING MATRIX

C7 VIDEO SWITCHING MATRIX CONTROLS
C7A AUXILIARY VIDEO SWITCHING MATRIX CONTROLS

C8 MANUAL TV SELECT KEYBOARD

C9 PUBLIC AFFAIRS AND SPECIAL EFFECTS

C10 TV HARD COPIERS
C11 TV PHOTO COPIERS

C12 AUTOMATIC TV PHOTORECORDERS

<table>
<thead>
<tr>
<th>QUANTITY</th>
</tr>
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<tbody>
<tr>
<td>5</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>2-80X120</td>
</tr>
<tr>
<td>2-2X20</td>
</tr>
<tr>
<td>2-10X10</td>
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<td>2</td>
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</tr>
<tr>
<td>4</td>
</tr>
<tr>
<td>4</td>
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<td>4</td>
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</tbody>
</table>

7/15
### D/C Hardware (Cont'd)

**D. Console Subsystem**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
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<tbody>
<tr>
<td>D1</td>
<td>Console Shells and Component Supports</td>
<td>95</td>
</tr>
<tr>
<td>D2</td>
<td>Wiring Distribution Modules</td>
<td>160</td>
</tr>
<tr>
<td>D3</td>
<td>Elapsed Time Indicator Modules</td>
<td></td>
</tr>
<tr>
<td>D4A</td>
<td>Event Sequence Indicator Modules</td>
<td></td>
</tr>
<tr>
<td>D4B</td>
<td>Event Sequence Override Modules</td>
<td></td>
</tr>
<tr>
<td>D5</td>
<td>Status Monitor Modules</td>
<td></td>
</tr>
<tr>
<td>D6</td>
<td>Lamp Test Modules</td>
<td>95</td>
</tr>
<tr>
<td>D7</td>
<td>AC Distribution Modules</td>
<td>95</td>
</tr>
<tr>
<td>D8</td>
<td>Digital Display Modules</td>
<td>2500</td>
</tr>
<tr>
<td>D9</td>
<td>Switch Modules</td>
<td>1000</td>
</tr>
</tbody>
</table>

*7/15*
D/C HARDWARE (CONT'D)

E. GROUP DISPLAY SUBSYSTEM

E1  NETWORK STATUS DISPLAY
E2  PROJECTION PLOTTING DISPLAYS
E3  PROJECTION TELEVISION DISPLAYS
E4  SCREENS AND MIRRORS
E5  GROUP TIME DISPLAYS
E6  GUIDANCE STATUS DISPLAYS

MISCELLANEOUS

MICROWAVE LINKS
LINE PRINTERS

<table>
<thead>
<tr>
<th></th>
<th>QUANTITY</th>
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</thead>
<tbody>
<tr>
<td>E1</td>
<td></td>
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<td>E2</td>
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<tr>
<td>E3</td>
<td>7</td>
</tr>
<tr>
<td>E4</td>
<td>10,10</td>
</tr>
<tr>
<td>E5</td>
<td>2</td>
</tr>
<tr>
<td>E6</td>
<td>2</td>
</tr>
<tr>
<td>7/15</td>
<td></td>
</tr>
</tbody>
</table>
SCATS

1. TRAIN REM. SITE OPERATORS
2. TRAIN IMCC CONTROLLERS
3. EXERCISE GOSS
4. SIMULATE ENTIRE MISSION WITHIN MSC
SCATS BLOCK DIAGRAM

A SCATS INTERNAL & EXTERNAL SIGNAL PATHS ARE SET UP BY INTERFACE SUBSYSTEM PATCH-BORDS
MAJOR EQUIPMENTS

2 PCM STATIONS
2 DCS
2 REM. SITE CONS. SETS
2 IMCC SIM. CONT. CONS. SETS
1 REM. SITE SIM. CONT. SETS
SCATS DATA DISTRIBUTION EQUIP.
SIMULATION VOICE & MESSAGE EQUIP.
CURRENT STATUS OF TASKS

INTERFACE RESOLUTION

SCHEDULE INTERRELATION
  • BUILDING VS. OPERATIONAL EQUIPMENT
  • TEST PLANNING

SITE ACTIVATION
  • EQUIPMENT ARRANGEMENTS
  • POWER AND A/C REQUIREMENTS
  • POWER AND A/C DISTRIBUTION

PROGRAM STANDARDS
  • EQUIP. CABINETS
  • CONSOLES
  • LOGIC CARDS
  • M & O MANUALS
  • MISCELLANEOUS
MOW 1ST FLOOR ROOM PLAN

- INTER COMM: 22.5 KVA, 63.4 KBTU
- PCM EQUIP: 15.0 KVA (A), 56.2 KVA, 201.4 KBTU
- PNEUMATIC TUBE: 8.7 KVA (A), 59.8 KVA, 225.5 KBTU
- TELCO: 22.5 KVA, 9.7 KVA, 63.4 KBTU
- TELCO EQUIP. MAINT: 22.5 KVA, 63.4 KBTU
- MECHANICAL EQUIP: 11.0 KVA, 640.0 KBTU
- VOCAMP & A/G EQUIP: 9.7 KVA, 27.2 KBTU
- COMM. CONT: 10.0 KVA, 28.1 KBTU
- MESSAGE CTR: 13.2 KVA, 37.8 KBTU
- VOICE RECORD: 10.0 KVA, 30.0 KBTU
- FACILITY CONT: 50.3 KVA, 142.5 KBTU
- MAINT: 16.0 KVA, 44.8 KBTU
- DATA PROCESSING: 570.3 KVA (A), 53.0 KVA, 1,780,000 KBTU
- TECH. SUPPORT: 17.5 KVA, 48.7 KBTU
- COMPUTER COMP. MAINT: 17.0 KVA, 47.3 KBTU
- MECHANICAL EQUIP: 42.0 KVA, 101.8 KBTU

TOTAL: 741.6 KVA (A), 611.2 KVA (B), 4,127.2 KBTU
MOW 2ND FLOOR ROOM PLAN

D/C EQUIP MAINT
19.5 KVA
54.0 KBTU

MECH EQUIP
115.0 KVA
721.0 KBTU

DUM REM SITES
14.4 KVA
38.4 KBTU

D/C & TERM. EQUIP.
13.6 KVA (A)
150.3 KVA
468.3 KBTU

SIM REMOTE SITE *1
8.6 KVA
24.1 KBTU

SIM REMOTE SITE *2
8.6 KVA
24.1 KBTU

SIMULATION EQUIP
63.3 KVA
178.0 KBTU

SIMULATION CONTROL
9.3 KVA
25.0 KBTU

SIM MAINT
14.6 KVA
24.4 KBTU

MDCS *2
10.1 KVA (A)
8.5 KVA
23.6 KBTU

MDCS *1
10.1 KVA (A)
8.5 KVA
23.6 KBTU

MOCR *1
35.9 KVA
100.1 KBTU

MOCR #1
19.5 KVA
54.0 KBTU

DIG. MAINT
14.3 KVA
40.2 KBTU

VISITORS VIEWING
8.3 KVA
22.6 KBTU

COMM
.2 KVA

COMM. BOOTH

TOTAL
44.5 KVA (A)
681.3 KVA (B)
2,342.2 KBTU

VEHICLE SYS SSR
17.5 KVA
47.9 KBTU

LIFE SYS SSR
8.5 KVA
24.8 KBTU

FLIGHT DYNAMICS SSR
18.9 KVA
52.2 KBTU

FLIGHT CREW SSR
8.5 KVA
24.8 KBTU

VEHICLE SYS SSR
17.5 KVA
47.9 KBTU

NETWORK SSR
112 KVA
30.4 KBTU

SIMULATION =a
13.6 KVA (A)
150.3 KVA
468.3 KBTU

SIM MAINT
14.6 KVA
24.4 KBTU

MOCR #1
19.5 KVA
54.0 KBTU

D/C & TERM. EQUIP.
13.6 KVA (A)
150.3 KVA
468.3 KBTU

SIM REMOTE SITE *1
8.6 KVA
24.1 KBTU

SIM REMOTE SITE *2
8.6 KVA
24.1 KBTU

SIMULATION EQUIP
63.3 KVA
178.0 KBTU

SIMULATION CONTROL
9.3 KVA
25.0 KBTU

MECH EQUIP
115.0 KVA
721.0 KBTU

D/C EQUIP MAINT
19.5 KVA
54.0 KBTU

TOTAL
44.5 KVA (A)
681.3 KVA (B)
2,342.2 KBTU

A403
**MOW 3RD FLOOR ROOM PLAN**

- **TECH. SUPPLY**
  - 15.9 KVA
  - 48.0 KBTU

- **METER CENTER**
  - 16.9 KVA
  - 51.9 KBTU

- **TECH. CENTER**
  - 15.9 KVA
  - 48.0 KBTU

- **MECH. EQUIP**
  - 115.0 KVA
  - 776.0 KBTU

- **CLOSED CIRCUIT TV**
  - 4.5 KVA
  - 43.0 KBTU

- **MOCR*2**
  - CONF. READY
  - 4.9 KVA
  - 16.9 KBTU

- **SIM CONT**
  - 8.6 KVA
  - 26.7 KBTU

- **MAINT**
  - 4.5 KVA
  - 43.0 KBTU

- **MOCR*2**
  - 34.8 KVA
  - 108.6 KBTU

- **COMM BOOTH**
  - 2 KVA

- **VISITORS VIEWING**
  - 7.9 KVA
  - 29.9 KBTU

- **FLIGHT DYNAMICS**
  - 20.2 KVA
  - 61.9 KBTU

- **VEHICLE SYS SSR**
  - 18.7 KVA
  - 59.0 KBTU

- **LIFE SYS**
  - 9.2 KVA
  - 28.4 KBTU

- **FLIGHT CREW SSR**
  - 9.2 KVA
  - 28.4 KBTU

- **OPS/PROC SSR**
  - 54.7 KBTU

- **D/C TERM. EQUIP**
  - 14.2 KVA
  - 101.9 KVA

- **SUM. DISPLAY PROJ**
  - 87.7 KVA
  - 255.0 KBTU

- **D/C TERMINAL**
  - 152.9 KVA
  - 487.6 KBTU

- **NETWORK SSR**
  - 12.3 KVA
  - 40.1 KBTU

**TOTALS**
- 29.6 KVA (A)
- 915.6 KVA (B)
- 3,301 KBTU
POWER DIAGRAM

12.47 KV/2000 AMP @ SUBSTATION
## POWER SYSTEM SUMMARY

### AVAILABLE TO SYSTEM

<table>
<thead>
<tr>
<th>Source</th>
<th>PRIMARY</th>
<th>BACKUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Commercial Power</td>
<td>4000 KVA</td>
<td>3400 KVA</td>
</tr>
<tr>
<td>From Diesels</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For &quot;A&quot; Motors</td>
<td>730 KVA</td>
<td>730 KVA</td>
</tr>
<tr>
<td>For &quot;B&quot; Busses</td>
<td>3270 KVA</td>
<td>2670 KVA</td>
</tr>
</tbody>
</table>

### USAGE STATUS

<table>
<thead>
<tr>
<th>Source</th>
<th>PRIMARY</th>
<th>BACKUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Available From &quot;A&quot; Busses</td>
<td>875 KVA</td>
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<tr>
<td>Required (100% Demand)</td>
<td>815 KVA</td>
<td>60 KVA</td>
</tr>
<tr>
<td>Available From &quot;B&quot; Busses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Required (100% Demand)</td>
<td>3270 KVA</td>
<td>2670 KVA</td>
</tr>
<tr>
<td></td>
<td>3490 KVA</td>
<td>3490 KVA</td>
</tr>
<tr>
<td></td>
<td>- 220 KVA</td>
<td>- 820 KVA</td>
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</tbody>
</table>
# A/C System Summary

**Available To System**
- From Bldg 24 (Primary): 2000 tons
- From Bldg 48 (Backup): 700 tons

## Usage Status

<table>
<thead>
<tr>
<th>Floor Type</th>
<th>Available To Mow</th>
<th>Req'd From Sys.</th>
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<tbody>
<tr>
<td></td>
<td>Underfloor</td>
<td>Overhead</td>
</tr>
<tr>
<td>1st Floor</td>
<td>164</td>
<td>151</td>
</tr>
<tr>
<td>2nd Floor</td>
<td>127</td>
<td>128</td>
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<tr>
<td>3rd Floor</td>
<td>179</td>
<td>190</td>
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<tr>
<td>Mech. Equip.</td>
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<td>80</td>
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<tr>
<td></td>
<td>164</td>
<td>537</td>
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</tbody>
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*All units in tons*