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CEOG COMBUSTION ENGINEERING OWNERS GROUP

Auxiliary Feedwater System Safety System Functional Assessment

Palo Verde Nuclear Generating Station Units 1, 2 and 3

CEOG Task 2031

Westinghouse

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Revision 1

Auxiliary Feedwater System Safety System Functional Assessment

Palo Verde Nuclear Generating Station Units 1, 2 and 3

CEOG Task 2031

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1.0 SYSTEM SELECTION AND SUMMARY

An Auxiliary Feedwater (AF) Safety System Functional Assessment (SSFA) was performed at the Palo Verde Nuclear Generation Station site the week of June 3-7, 2002. The assessment inspected the AF and supporting systems (e.g. condensate and electrical systems), which include associated branch interfaces. Also included were a few components of the steam generator system important to the AF system performing its function. The area reviewed was engineering with its associated interfaces.

The AF system was selected based on a review of the plant Probability Risk Assessment, modifications and recent Palo Verde Nuclear Generation Station (PVNGS) and industry operating experience. Focus areas for the SSFA considered the past few years of PVNGS performance and problem areas found in recent self-assessments.

The assessment was performed consistent with the CE Owners Group (CEOG) assessment process using resources from APS, SCE, Callaway and Westinghouse. The revised CEOG procedure for this assessment emphasized the use of NRC inspection procedure 71111.21 and selection of risk-based components. The assessment method consisted of three elements: review of key documents, system walk-downs and interview of utility personnel. Documents and personnel interviewed are identified below. Assessor Observations and Summaries are captured in Appendix A and Appendix B of this report.

Section 4 presents the objectives of the evaluation and section 6.1 evaluates those objectives against the results of the assessment.

The team had 63 observations consisting of no Adverse Conditions, 28 Findings, 31 Recommendations, and 3 Strengths. The condition classifications used are based on the common CE Owner's Group classification system. The adverse conditions are the most severe. It is important to note that the term adverse, as used here, is not consistent with the APS corrective action program adverse classification (rather, it is most similar to the potentially significant classification).

The team found that the Auxiliary Feedwater system and associated components are capable of performing their safety functions. Overall, the team also found that engineering has been effective in controlling the plant modification, design bases, and configuration control processes. The SSFA conclusions and the summary of what the team found against each objective is presented in Section 6.

2.0 ASSESSMENT SCOPE

The scope of the Safety Systems Functional Assessment (SSFA) was to assess the PVNGS engineering effectiveness through an in-depth review of calculations, analysis and other engineering documents used to support systems performance during normal and accident or abnormal conditions. The plan and guidance for developing the inspection scope was based on the Combustion Engineering Owners Group generic assessment plan CE-NPSD-1159 R2 (Draft). The SSFA also used the NRC Inspection Procedure 71111.21 Safety Systems Design and Performance Capability as a basis for the conduct of the SSFA.

As discussed above, the AF system was selected based on its risk significance, the number of recent modifications and industry and PVNGS operating experience.

The assessment included the following areas: engineering, design and configuration control, systems design and licensing basis, 50.59's, corrective actions, operations and maintenance control of out-of service time.

The assessment followed the PVNGS Assessment Policy 120 and Self Assessment Guidance PG-120 and covered recent cycles of plant operation.

Components that the assessment focused on were selected based on the failure history of components, the current level of risk created by the component failing, and the potential impact of the failure (without consideration of the probability of failure).

The other considerations for the selection were: the highest current risk value components within a component type (breakers, MOVs, etc) and the highest risk value components in the AF system associated support systems.

The components that were reviewed based on the above considerations (with the high risk failure modes listed) were: _

- Turbine Driven Pump [ ] – fails to run, fails to start (local mechanical or control fault) or unavailable due to maintenance (including inadequate operations / maintenance control of out of service time).
- AF system Pump B discharge valve [ ] (not restored after maintenance, fails to remain open).
- AF system injection valve to S/G 1 and/or S/G 2 (common cause failures).
- Electrical Motor Driven AF Pump B [ ] – fails to start (e.g. electrical control fault), unavailable due to maintenance common cause failure (start and run AF pumps B & N)

Check Valves:

- AF Injection check valves [ ] (common cause failure to open, individual failure to open) (also recent hinge pin issues).
- [ ] and [ ] pump discharge check valves [ ] (common cause failure, also recent inspection failure – seat and disc lapping needed).

Circuit Breakers:

- AF Pump B [ ] control circuit breaker [ ]– Unavailability due to maintenance, fails to close (local fault).

MOVs:

- AF Pump 'B' regulating and containment isolation discharge valves [ ] (Control circuit fault, mechanical fault)

SOVs:

- AF Pump 'A' turbine steam admission valves [ ].

In addition the following operator actions were reviewed:

- Override MSIS signal and remotely align [ ]
- Depress the steam generator and supply alternate feedwater within the required times

3.0 ASSESSORS

Assessor Organization Area of Inspection

- [ ], APS: Team Lead
- [ ], W: Co-Lead / Integrated system operation and design
- [ ], San Onofre: Integrated system operation and design
- [ ], Callaway: In-service testing, materials, mechanical
- [ ], APS: Valves and mechanical
- [ ], APS: Valves and Instrument and Control
- [ ], APS: Electrical
- [ ], APS: AF and SG integrated system operation and design, operation experience and corrective action timeliness
- [ ], APS: Normal and abnormal operation procedures System out-of service control, operator work-arounds, Chapter 15 accident analysis
- [ ], APS: Civil/structural

4.0 ASSESSMENT OBJECTIVES

- Objective 1: Verify design adequacy against design bases requirements. As part of this review, provide reasonable assurance that the Auxiliary Feedwater System design meets or exceeds the regulatory requirements in the PVNGS UFSAR and Technical Specifications

- Objective 2: Provide a review consistent with the CEOG Generic Assessment Procedure and focused on the risk-significant components or actions

- Objective 3: Ensure the design basis is adequately translated into plant processes, drawings and procedures and is consistent with the system configuration. Determine the effectiveness of design and configuration control.

- Objective 4: Evaluate station effectiveness in identifying and resolving system related Problems

- Objective 5: Assess system condition and capability against its design functions. Assure system out-of-service time is minimized by operators and maintenance.

5.0 PERFORMANCE STANDARDS

The review was conducted consistent with the following documents:

- Combustion Engineering Owners Group, *Generic Assessment Plan*, CE-NPSD-1159 R2 (Draft)
- NRC Inspection Procedure 71111.21, *Safety Systems Design and Performance Capability*
- PVNGS Self Assessment Policy 120 and Self Assessment Guidelines PG-120
- PVNGS UFSAR
- PVNGS Technical Specifications

6.0 CONCLUSIONS

Objective 1: Verify design adequacy against design bases requirements. As part of this review, provide reasonable assurance that the Auxiliary Feedwater System design meets or exceeds the regulatory requirements in the PVNGS UFSAR and Technical Specifications.

Summary of Results:

The AF system was found to be in good condition and in general consistent with regulatory and plant requirements. One supporting system requires special attention due to inconsistencies of design and regulatory requirements as discussed below. Of specific concern is the hazards design basis of the condensate storage tank. In addition, a number of inconsistencies were identified between the design and design basis calculations. None of the identified areas were judged to challenge the licensing or design basis, however, confirmation is required by PVNGS.

Detailed Observations:

1. SER and UFSAR differ on requirement for missile and tornado design of Condensate Storage Tank (CST) roof. The roof of the condensate storage tank is not designed to protect against external hazards such as tornado's or missiles. Additional review by civil design engineering determined that the licensing basis for the CST roof with regards to missile protection has been consistent since the initial issue of the FSAR. It clearly states in section 3.8.4.1.7 that the roof is not designed to be tornado missile resistant. Also, Table 3.5-9, "Missile Barriers for Tornado and Accident Missiles" clearly shows that only the walls are considered tornado missile barriers. This requirement has been translated appropriately into the design basis for PVNGS (Design Criteria and calculations). In addition, the design calculation for the CST [ ] refers to calculation [ ] which is a PRA that concludes a missile penetrating the roof of the CST is not a credible event for PVNGS. Civil Engineering also spoke to licensing personnel to get their interpretation of the impact of this discrepancy. They concluded that the SER is a historical document only. The licensing basis is contained in the UFSAR and is supported by station analysis. However, any discrepancies that exist between the UFSAR and SER may need to be identified to the regulator – corrective action document will be reviewed by regulatory affairs. (CRDR # 2533249) (Observations 4 and 55)

2. Risk-significant motor operated valves (MOVs) were identified with low margin. The U1R10 MOV trend report noted that [ ] and [ ] have minimal close thrust margin. Although acceptable design margin exists to ensure that these MOVs are still capable of performing their design basis function, they are high risk-significant valves, the valves have had a trend of decreasing margin, and it is not known if the margin erosion will continue. In addition, the margin for these valves has resulted in increased testing including online testing of the valves. Therefore, action is recommended to increase the design margin. (CRDR # 2532194) (Observation 35,56)

3. UFSAR Chapter 10.4.9, Auxiliary Feedwater System was reviewed and found to contain most functional requirements of the system. One function identified in the Design Basis Manual but not found in the UFSAR was the requirement for the Turbine Driven AF system pump to

operate 2 hours under blackout conditions with no room cooling. (CRDR 2532034) (Observation 26)

4. UFSAR Chapter 15, Accident Analysis was reviewed. No information was found that contradicted functional operations of the system. Inconsistencies were found on AFAS actuation points due to built-in conservatisms. Section 15.4.8, Control Element Assembly Ejection, neglected to mention that an MSIS would occur in response to a HI-HI Containment pressure CIAS. (Observation 46)

5. During the walkdown a temperature difference was identified between two pump rooms. The difference was potentially due to a small amount of steam leakage. The heat load and steam leakage calculations were reviewed to evaluate the condition. Recommendations were made to create an instrument setpoint calculation and a temperature monitoring program to assure normal maximum room temperatures support design bases calculations and equipment qualification assumptions. (Observation 60)

6. UFSAR Section 15.6.3.3.2 describes the sequence of events and systems operation (typical) for a SGTR with loss of offsite power. The analysis assumes that, following the isolation of the affected steam generator the operator cools the RCS at the rate of about 50F/hr for up to two hours into the event. The Emergency Procedures direct a cool-down rate limit of 30F/hr after affected S/G isolation. The CEN-152 basis (40DP-9AP09 revision 11) states that the 30F/hr limit is necessary to ensure that the asymmetric cooling does not result in uncoupling the isolated generator from the cool-down. The slower cool-down rate, directed by the Emergency Operating procedure and CEN-152, may have an adverse impact on the off-site dose consequence of the (SGTR with Loss of Offsite Power) analysis of record if it assumes a 50F/hr cool-down for the first 2 hours as discussed in UFSAR Section 15.6.3.3.2. Nuclear Analysis should verify assumptions in this analysis and if appropriate re-analyze. If the 30F/hr limit is appropriate for the first 2 hrs, consider changing the UFSAR assumed cool-down rate. (Observation 47)

7. Penetration seals were installed in a manner that was believed to be different from the penetration qualification test. Evaluation of the function of the penetrations determined that in all cases these penetrations are above the maximum possible flood height in the Auxillary Pump Rooms. (Observation 2)

8. The SER and the UFSAR provide different values for Condensate Storage Tank volume (330,000 vs. 300,000 gallons).

Objective 2: Provide a review consistent with the CEOG Generic Assessment Procedure and focused on the risk-significant components or actions.

Summary of Results:

The assessment objectives focused on the risk-based components consistent with the CEOG recommendation. In this regard, two valves were identified with an acceptable but with low margin. Attention should be given to increasing the margin of these valves, as discussed in Objective 1, Item 2 above.

This review was also consistent with the CEOG Generic Assessment Procedure (GAP). Clarification of the procedure regarding observation classification is recommended. In the procedure an adverse condition is regarded as the highest level of significance while at PVNGS it is a lower level of significance. To maintain consistency with the GAP the higher order of significance is used in this report. The GAP is currently being revised. It is recommended that the current revision be finalized for future use.

Objective 3: Ensure the design basis is adequately translated into plant processes, drawings and procedures and is consistent with the system configuration. Determine the effectiveness of design and configuration control.

Summary of Results:

The system, plant configuration and related documentation were found, in general, to be consistent with the design. A few instances were found where changes to drawings, calculations and procedures are needed. In addition, a number of minor changes were recommended to the UFSAR as a result of differences from the plant design. With these minor exceptions, the team found the station design and configuration controls to be effective.

Key operator actions were determined to be properly integrated into emergency operation procedures; however, in two cases the operator is directed to use the steam driven AF pump when it is not available.

Also, a review of 50.59's associated with recent system modifications identified no issues.

Detailed Observations:

1. A difference between calculation assumptions and operating procedures for design basis CST volume was identified. Design calculation for CST volume assumes that the mini-flow valve will be closed to provide the design basis volume of 300,000 gal. The procedures explicitly state that the mini-flow valve shall not be closed due to a concern of air entrainment and system vibration. The available volume exceeds the volume required for design basis calculations so this is not safety significant; however, it is less than the volume specified in the UFSAR. (Observations 36 and 55) (CRDR #2531536)

2. A number of observations were made relative to both adherence to procedures and configuration control. Most of the items can be easily remedied; however, increased attention to detail is needed in both of these areas based on the number of observations. Identified below are the specific observations related to this area:

    a) Emergency Operations Procedure [ ] appendices 38 and 40 each contain a step to direct feeding one steam generator with the steam driven AF pump when both steam generators are dry (but no steam is available for the pump). (Observation 34)

    b) Safety aids were installed in the AF system pump rooms for personnel protection. However, documentation was not available to indicate that they were to be left in place. Also, no Transient Combustible Control permit was identified for this material. (Observations 3 and 52)

c) A relay CR4 deletion from design documents was inconsistent with the design change work order scope. (Observation 40)
d) Temporary tie wrap left in place on permanent pipe support. (Observation 38)
e) A minor drawing discrepancy was identified. (Observation 5)
f) Minor inconsistencies were found and recommendations were made to improve the UFSAR and the DBM. (Observations 26, 29, 46, 47, 51, 55, 60, 61)
g) Procedurally required housekeeping tags were not found in a few cases. (Observation 11)
h) A loose Pipe cap sitting on HVAC support steel looks like it belongs downstream of nearby drain line at [ ]. The drain line is capped with a heavier schedule cap that may not be in accordance with configuration documents but should not present a significant pipe stress issue. (Observation 43)

3) Several observations were identified relative to design basis calculations:
   a) A calculation is not available to start pump [ ] and supporting valves at the lowest voltage condition. (Observation 28)
   b) Calculation [ ] was not updated to reflect the modification drawing [ ] (Observations 27, 28, 39).
   c) During HA Calculation Review it was found that the design basis room temperature switch information was missing from the HA DBM and the ESF Pump Room Temperature Switch Setpoint Calculation. (Observation 60)

4) The team observed that MOV troubleshooting procedure (and associated trouble report) [ ] was not used for troubleshooting activities associated with a Unit 1 MOV [ ] surveillance test failure. During interviews with Operations personnel it was noted that [ ] does not have any reference to [ ], even though [ ] are specifically addressed in the procedure. This procedural enhancement was also identified in Observation 25.

5) During the assessment electrical review, omission of drawing information and document references were identified and documented on assessment Observation sheets 40 and 50. The missing drawing information is present on other documentation and is not a problem for maintenance or plant operation; however, it is a document configuration problem requiring correction of the drawings. The inclusion of the missing document references is consistent with standard document references provided within PVNGS Loop Diagrams and Design Basis Manuals.

6) During system walkdowns it was noticed that there are CCI drag valves installed on the mini-flow lines in place of Flow Orifices for [ ], [ ], and [ ], however, on the Unit P&ID's, only [ ] and [ ] have notes indicating such. (Observation 58)

7) A nonconservative apparent inconsistency was found between AF admission valve steam leakage Surveillance Test [ ] acceptance criteria and calculation [ ]. Actual steam leakage has been well below both acceptance criteria. (Observation 63)

Objective 4: Evaluate station effectiveness in identifying and resolving system related problems.

Summary of Results:

The team determined that station personnel, processes, and procedures are effective in identifying and resolving system related problems.

Use of operating experience is procedurally required during several engineering activities and is listed as an expectation for system engineers. This is an important tool for preventing degradation of system safety functions. The station operating experience personnel send the more significant operating experience to the applicable engineers for review. The SSFA team had the AF system engineer perform a comprehensive review of operating experience and he identified several items he had not seen. None of these items were determined to be significant; however, the system engineer was concerned that pertinent experience could be missed that could have prevented future system problems. Also, a review of the AF system pattern of industry issues correlated well with the problem areas at PVNGS (pump overspeeds, etc.). This correlation did include an analysis of whether the causes were similar. A review CRDR was issued to evaluate changes to distribution and use of operating experience. (Observations 42 and 54)

Objective 5: Assess system and associated plant condition and capability against design functions. Assure system out-of-service time is minimized by operations and maintenance.

Summary of Results:

A number of observations were made regarding the physical condition of the Auxiliary Feedwater System. The observations were minor, however, increased attention is needed to identify and plan for routine housekeeping.

A review of corrective action documents associated with station control of out-of service time suggested that increasing operator understanding and use of technical specifications would have contributed to better AF out-of-service control in two cases of inappropriate Mode 3 entry without a train of AF available. Corrective actions exist to correct this condition.

Detailed Observations:

a) A number of missing or inconsistent tags and labels were identified. (Observations 7, 8, 11, 14, 15, 18, 44)
b) A pipe cap in a floor drain. (Observation 9)
c) Lack of cleanliness in area adjacent to pump rooms. (Observation 11)
d) Coatings of components require attention. (Observation 11)
e) Corrosion of parts. (Observation 13, 32, 37)
f) Loosened or damaged conduit. (Observation 15, 24)
g) Missing tie wrap. (Observation 15,16)
h) Missing Hilti Bolt. (Observation 17)
i) Lack of timely completion of a valve position indication repair work order. (Observation19)

j) Trico glass oil reservoir cage is missing. (Observation 21)
k) Minor AF B pump room damper air leak. (Observation 23)
l) Loose material found in area. (Observation 43, 45)
m) Evidence of corrosion was found on Gland Follower and socket cap screw for EQIDs
n) [ ] and [ ] and on eyebolt for EQID [ ]. (Observation 32)
o) Minor CT pump leak was identified. (Observation 10)

7.0 OBSERVATIONS

Strengths:

- Observation 1 - Operational alignment of recirculation flow from Unit 2 and 3 auxiliary feedwater pumps to condensate storage tank
- Observation 41 - ECALC and CKT software utilized electrical calculation analysis
- Observation 48 - System Health Report is thorough and notes good use of industry experience.
- Observation 53 - High level of Plant Knowledge of the design basis of the AF system

Findings:

- Observation 2 - Penetration seals not installed in approved configuration or missing
- Observation 4 - Possible reduction of AF pump net pump suction head available and condensate inventory margin below design calculation values.
- Observation 12 - Auxiliary Feedwater System Design Basis Manual Revision 11 was found in the technical library rather than the current revision. (Revision 12)
- Observation 13 - Plant Walkdown – corrosion on two pipe welds.
- Observation 16 - Component problems at Non-1E pump [ ].
- Observation 17 - Support for conduit [ ] has hole in center of unistrut and wall but no Hilti bolt installed.
- Observation 18 - Missing/degraded conduit identification.
- Observation 19 - Tag for WO [ ] at [ ].
- Observation 20 - Seismic Gap Open in Unit 2 – covered in Unit 1.
- Observation 21 - Recommend that glass Trico oil reservoir containers on Unit 1 [ ] pump use guard cages like Unit 2 and essential Pumps [ ] & [ ].
- Observation 22 - Open conduit is protruding through thermal lag in Unit 1 AFB Pump Room
- Observation 23 – [ ] (return damper for AFB pump room has an instrument air leak).
- Observation 27 – [ ] and related calculations have not been revised to reflect battery replacement under modification (note – follow-up was done to assure that the battery load is acceptable)
- Observation 29 - Correction of error and improvements in the AF system Design Basis Documents.
- Observation 31 - Procedure [ ] Compliance Issue.
- Observation 32 - Corrosion on Gland Follower and cap screws. EQIDs [ ] and Closed.
- Observation 37 - Eye bolt corrosion on EQID [ ].
- Observation 38 - Temporary tie-wrap support was found on FP System in Unit 1 AFA Pump Room.
- Observation 39 - No update of [ ] for DMWO [ ]

- Observation 40 – The incorporation of EDCs [ ], [ ] & [ ], documents in [ ] and [ ] were performed inappropriately resulting omission of relay CR4.
- Observation 43 - Unit 2 AFA Pump Room at El. 80 ft. and the MSSS Missile Door at El. 120 were found with loose hardware requiring maintenance.
- Observation 45 - During Unit 3 walkdown of AFA Pump Room a loose pipe cap was found sitting on the Room HVAC unit support steel.
- Observation 47 - Apparent minor discrepancy between UFSAR section 15.6.3 (SGTR) and [ ] (SGTR), [ ] (Functional Recovery).
- Observation 51 - CST available inventory for AF system to meet Design Basis sizing (300,000 Gals) is dependent on isolation of recirculation Emergency Operating procedures do not allow isolation of recirculation. (Ref: Observation 36)
- Observation 52 - No Transient Combustible Control Permit was found for Safety Aids (Pads & Tap on Exposed Steel Edges) in Unit 1 or 3 AFA Pump Rooms. (Ref: Observation 3)
- Observation 54 - Review Industry Event 423-961108-1, Auxiliary Feedwater Piping Inside Containment Building not designed for Post Accident Environment.
- Observation 26 - FSAR 10.4.9 inconsistencies (minor).
- Observation 56 - During MOV Setpoint Calculation Review an impact on a relative low margin valve needs to be reviewed (Ref: Observation 35) and the EDC that updated AF system DBM Table 5-1 was missed from at least two control document libraries. (Ref: Observation 12)

Recommendations:

- Observation 3 - Safety aids left in place following maintenance.
- Observation 5 - Drawing discrepancy on [ ].
- Observation 6 - Inconsistency in tagging between [ ] and [ ].
- Observation 7 - Inconsistency in tagging between [ ] and [ ].
- Observation 8 – Use of 10CFR 50.59 process to evaluate acceptability of potential long-term deficient equipment condition.
- Observation 9 – Unit 3 housekeeping observations.
- Observation 10 - Substantial leakage from [ ].
- Observation 11 - Material Condition and misc. items.
- Observation 14 – [ ] Tag was found loose.
- Observation 15 - Equipment Maintenance Issues
- Observation 24 – [ ] Flex Conduit not made up properly.
- Observation 25 – [ ] failed Section XI stroke time testing during the performance of [ ] on 6/3/02 at 1531 hrs. A seven-day action statement was entered.
- Observation 26 - FSAR 10.4.9 inconsistencies (minor).
- Observation 28 - No electrical analysis for starting [ ] under lowest voltage condition of [ ].
- Observation 30 - Design Temperature for the AF system hydraulic calculations are very conservative. Design Margin can be identified by using less conservative values.
- Observation 33 - EOP Appendix 40 (local operation of [ ]) contains an extraneous step.

- Observation 34 - EOP Appendix 38 (Resetting [ ]) contains an extraneous step.
- Observation 35 – [ ] and [ ] Low Margin.
- Observation 36 - CST available inventory for AF system may be less than 300,000 gallons .without further justifying the AF pump for gas entrainment.
- Observation 42 - AF Turbine Over speed trips – Industry information review.
- Observation 44 - AFN Pump Area and AFA & AFB Pump Rooms and MSSS El. 120 ft walkdowns found various missing, damaged, or loose tags.
- Observation 46 - Minor inconsistencies between AF/SG system operation and UFSAR Chapter 15 description.
- Observation 49 - Two methods are being used to record and track in-service test results. Not all data is being recorded is tracked by IST Engineering.
- Observation 50 - Missing document references.
- Observation 57 - During MOV Setpoint Calculation Review an apparent inconsistency in references was found for the allowable maximum stroke time.
- Observation 58 - During system walkdowns it was noticed that there are CCI drag valves installed on the mini-flow lines in place of Flow Orifices for [ ], [-], and [ ]; however, on the Unit P&ID's only [ ] and [ ] have notes indicating such.
- Observation 59 - During MOV Setpoint Calculation Review a number of input/output references were missing from the SWMS Association screens.
- Observation 60 - During MOV Setpoint Calculation Review an impact on a relative low margin valve needs to be reviewed (Ref: Observation 35) and the EDC that updated AF system DBM Table 5-1 was missing from at least two control document libraries (Ref: Observation 12).
- Observation 61 - Observation 61 - During AF system Walkdown and associated document reviews a couple of items were identified to improve the AF system DBM.
- The addition of the high Risk check valves on the suction of auxiliary feedwater pumps [ ] on figures in section 1.2 and 2). The identification of the basis for the train A and C DC power supplies for the Steam Generator injection valves on the [ ] discharge lines.
- Observation 62 - During AF system SSFA exit meeting inclusion of the MOV trend performance in the System Health Report was discussed as a potential enhancement.
- Observation 63 – A follow-up of an AF system SSFA review into steam leakage criteria found an apparent inconsistency between Surveillance Test [ ] acceptance criteria and calculation [ ].

8.0 ACTIONS INITIATED

The following action log identifies the corrective action that will be taken for each observation. In many of the cases the items were answered and resolved and no action was needed, these are identified as "No Action".

No.	Classification	Description	Work Mech	Number
1	S	No Action	NO ACTION	NA
2	F	(U-3) problems were found with the flexible boot seal in the U-3 "B" Aux Feedwater Pump Room.	CRDR PCP	2532244 2525780
3	F	Foam Padding found in the AF Pump Room U23 "A" without transient conservation controls	CRDR	2535814
4	F	Reconcile the difference between SER and UFSAR on the CST Roof design	CRDR	2533249
5	R	CRDR to correct P&ID drawings	CRDR	2531467
6	R	Condensate transfer system needs heat tracing.	REVIEW	Note sent to C. Landstrom
7	R	Tagging requirements per [ ]	NO ACTION	NA
8	R	Proper evaluation of equipment deficiencies	NO ACTION	NA
9	R	Housekeeping issues with Bulb/3" drain line loose	CRDR	2532697
10	F	CT pump seal leak and tygon tubing installation	CRDR	2532718
11	R	Various housekeeping issues	RT CMWO CRDR	104990 2534578 2532697
12	F	Satellite Technical Reference Library does not contain the current revision of the AF-DBM	CRDR	2531471
13	F	Corrosion on weld in U/1 "A" pump room	NO ACTION	NA
14	R	Loose tag discovered	CRDR	2532697

No.	Classification	Description	Work Mech	Number
15	R	1) [ ]..... Lower flex conduit loose. 2) [ ]..... Downstream of instrument drain valve the tubing/fitting is loose. Threads appear to be damaged. 3) [ ].....Adjacent j-box is not labeled and a lower opening is not plugged. This is located by the entrance missile door in the Terry Turbine pump room. 4) Two J-boxes in "B" pump room, plant SE corner, are not labeled. Both have "TOR" written in red on them. 5) [ ].....QSS wires not tie-wrapped. 6) [ ].....lamacoid label is missing.	CMWO CMWO CMWO CMWO CMWO CRDR	2533313 2533315 2537601 2537601 2533316 2532697
16	F	Various [ ] discrepancies.	CMWO CMWO CMWO	2533317 2533319 2533320
17	R	Unistrut configuration	NO ACTION	NA
18	F	Tag missing or not connected properly	CMWO	2537601
19	F	Green light for [ ] not functional in Unit 1	NO ACTION	NA
20	F	Seismic Gap configuration	NO ACTION	NA
21	F	Trico Oiler guard cage	CMWO	2533321
22	F	Thermo-Lag configuration	NO ACTION	NA
23	F	Instrument Air on [ ]	CMWO	2533323
24	R	Flex conduit sheathing not captured by connector	CMWO	2533324
25	R	[ ] needs to be reviewed, [ ] needs to reference [ ].	CRDR CRDR	2533338 2535815
26	R	Clarification to UFSAR	CRDR	2532034
27	F	Revise PK calculations to reflect battery replacement	NO ACTION	NA

No.	Classification	Description	Work Mech	Number
28	R	No electrical analysis for starting [ ] under lowest voltage conditions of [ ].	CRDR	2534587
29	F	Changes to AF-DBM	CRDR	2532034
30	R	Calculation [ ] needs calculation to margin	NO ACTION	NA
31	R	MOV Trend Report	NO ACTION	NA
32	F	Corrosion on gland follower	CRDR	2532218
33	F	Appendix 40 of EOP delete step 7	CRDR	2532113
34	R	Appendix 38 of [ ] delete step 8	CRDR	2532113
35	R	Minimum close thrust margin	CRDR	2532194
36	R	CST Volume	CRDR	2531536
37	F	Corrosion on eye bolt	CRDR	2532218
38	F	Permanent support configuration Revise FP DBM	CMWO CRDR	2533316 2532034
39	F	Confirm negligible effect of fuse addition on circuitry	CRDR	2532219
40	F	EDC incorporation were performed inappropriately	CRDR	2532220
41	S	Analysis Software used to provide useful information	NO ACTION	NA
42	R	Turbine overspeed issue	NO ACTION	NA
43	R	Missing leakage piece, loose crank piece on dog mech. on MSSS 120' doors	CMWO CMWO CMWO	2524233 2524233 2524233

No.	Classification	Description	Work Mech	Number
44	R	Missing, damaged loose tags	CRDR	2532697
45	R	Loose pipe cap sitting on HVAC Room unit support steel. [ ] has heavier scheduled cap	CRDR	2535814 .
46	R	Inconsistency on AF initiation points	CRDR	2532034
47	F	Update UFSAR Chapter 15 as it related to EOPs and AOPs	CRDR	2532034
48	S	System Health Report	NO ACTION	NA
49	R	Efficiencies to be gained by recording data in on place	CRDR	2533337
50	R	Various references not listed in DMB and Calculations	CRDR	2532034
51	F	EOP for CST needs to be reviewed	CRDR	2531536
52	R	Padding found in the AF Pump Room U13 without transient conservation controls	NO ACTION	NA
53	----------	NO OBSERVATION	----------	NA
54	R	Millstone report should be reviewed for applicability to PVNGS	NO ACTION	NA
55	F	Condensate configuration	CRDR CRDR	2532034 2533249
56	F	Missed Impact to AF-DBM for MOV thrust	CRDR	2532194
57	R	Inconsistencies for maximum stroke time requirements	CRDR	2532194
58	R	Drag valves installed on mini-flow lines	CRDR	2532034
59	R	Associates missing in SWMS	CRDR	2532194

No.	Classification	Description	Work Mech	Number
60	R	DBM HA does not list Temperature Switches	CRDR	2532034
61	R	DBM AF recommends to add high risk check valves and identify basis for A/C DC power	CRDR	2532034
62	R	Include MOV Trend Performance in System Health Report.	No Action	e-mail sent to Scott Burns
63	R	Inconsistency in acceptance criteria	CRDR	2533336

9.0 KEY PERSONNEL CONTACTED

Organizations

- Unit 1 Operations
- Valve Services Engineering
- Fire Department

10.0 DOCUMENTS REFERENCED

Licensing Documents

- UFSAR R/11 (06/30/2001), PVNGS Units 1,2,3 Updated Safety Analysis Report
- NUREG 0857 (November 1981) PVNGS Safety Evaluation Report
- PVNGS Operating License Technical Specifications
- PVNGS Technical Specification Amendment 141 (05/24/2002)
- PVNGS Technical Requirements Manual R/19 (05/24/2002)
- PVNGS Technical Specification Basis R/17 (05/24/2002)

Design Basis Manuals

- Auxiliary Feedwater System (AF) Design Basis Manual R/11 and R/12
- Auxiliary Building HVAC System (HA) Design Basis Manual R/12
- Steam Generator System (SG) Design Basis Manual R/16
- Electrical Topical Design Basis Manual (E2) System Design Basis Manual

Calculations and Studies

Drawings:

Logic Diagrams

[ ]

Instrument Loops

[ ]

Elementary Diagrams

[ ]

Vendor Documents

[ ]

P&IDs

[ ]

[ ]

Installation Specifications

[ ]

Procedures

[ ]

Design Modification Work Orders (Design Changes) reviewed

[ ]

Condition Response / Disposition Resolution reviewed

[ ]

[ ]

IST Engineering Data Sheets 2 years for

[ ]

IST Engineering data sheets for Unit 2

[ ]

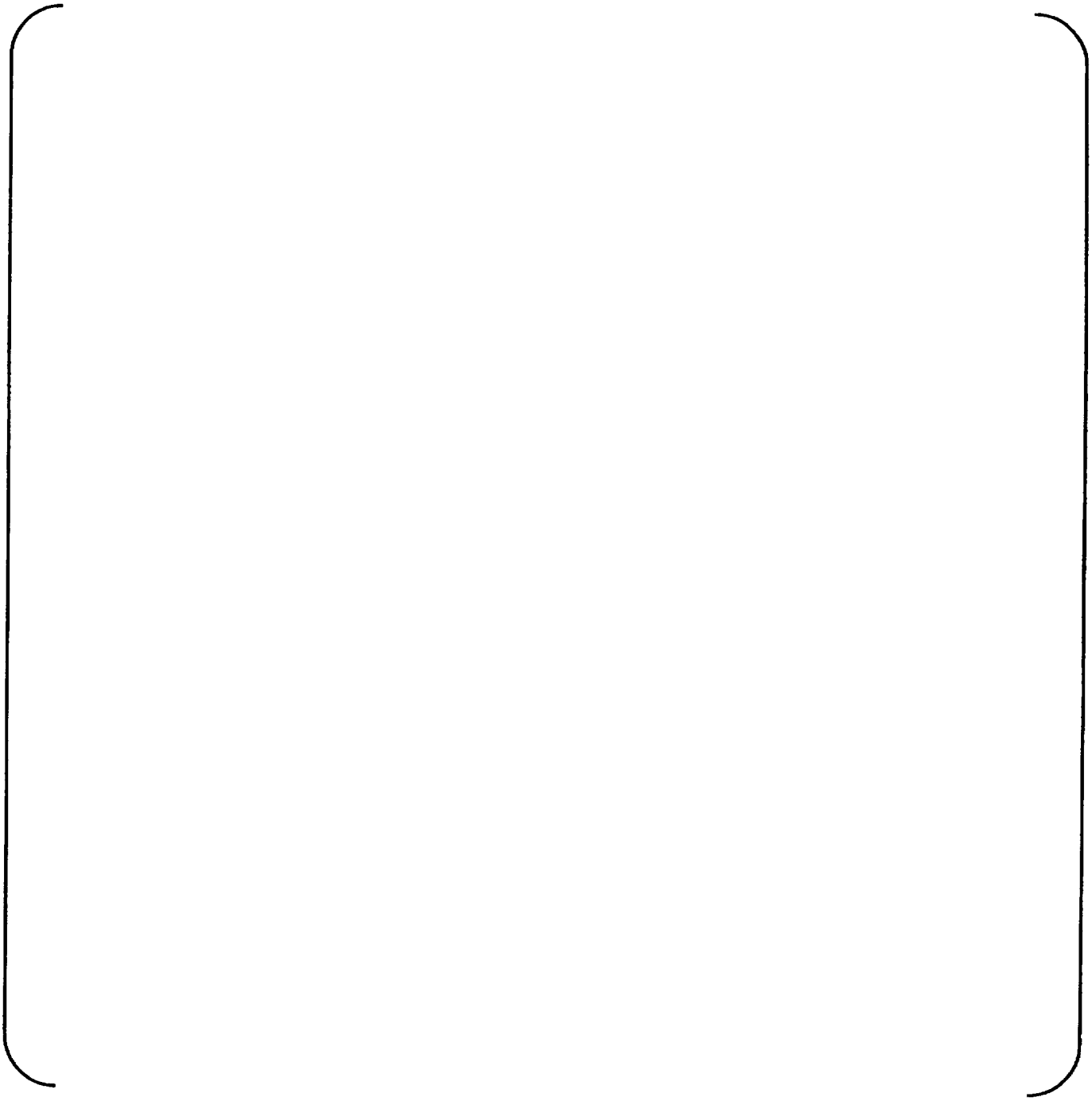
Industry Event Report

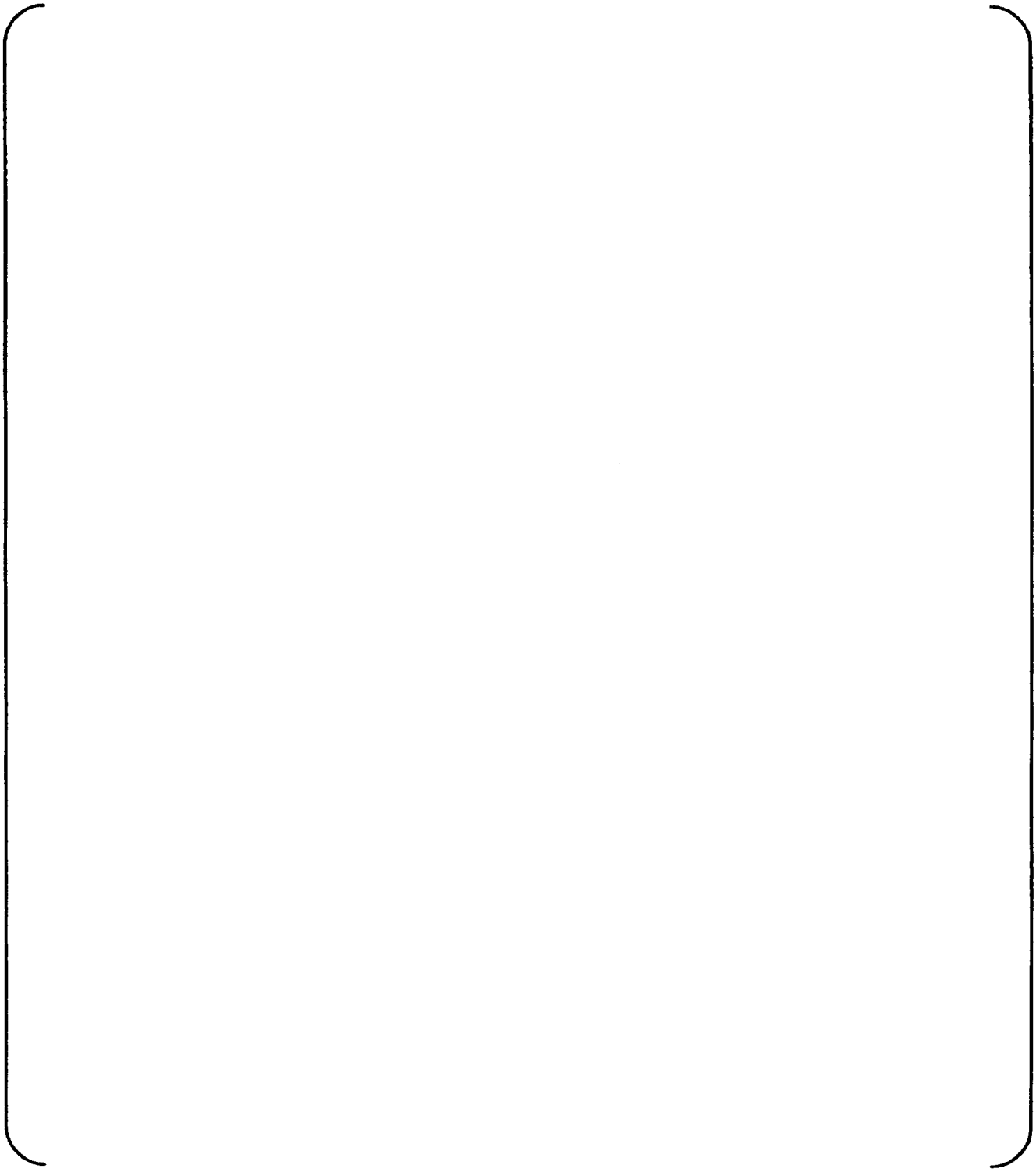
- 423-961108-1, Auxiliary Feedwater Piping Inside Containment Building not designed for Post Accident Environment

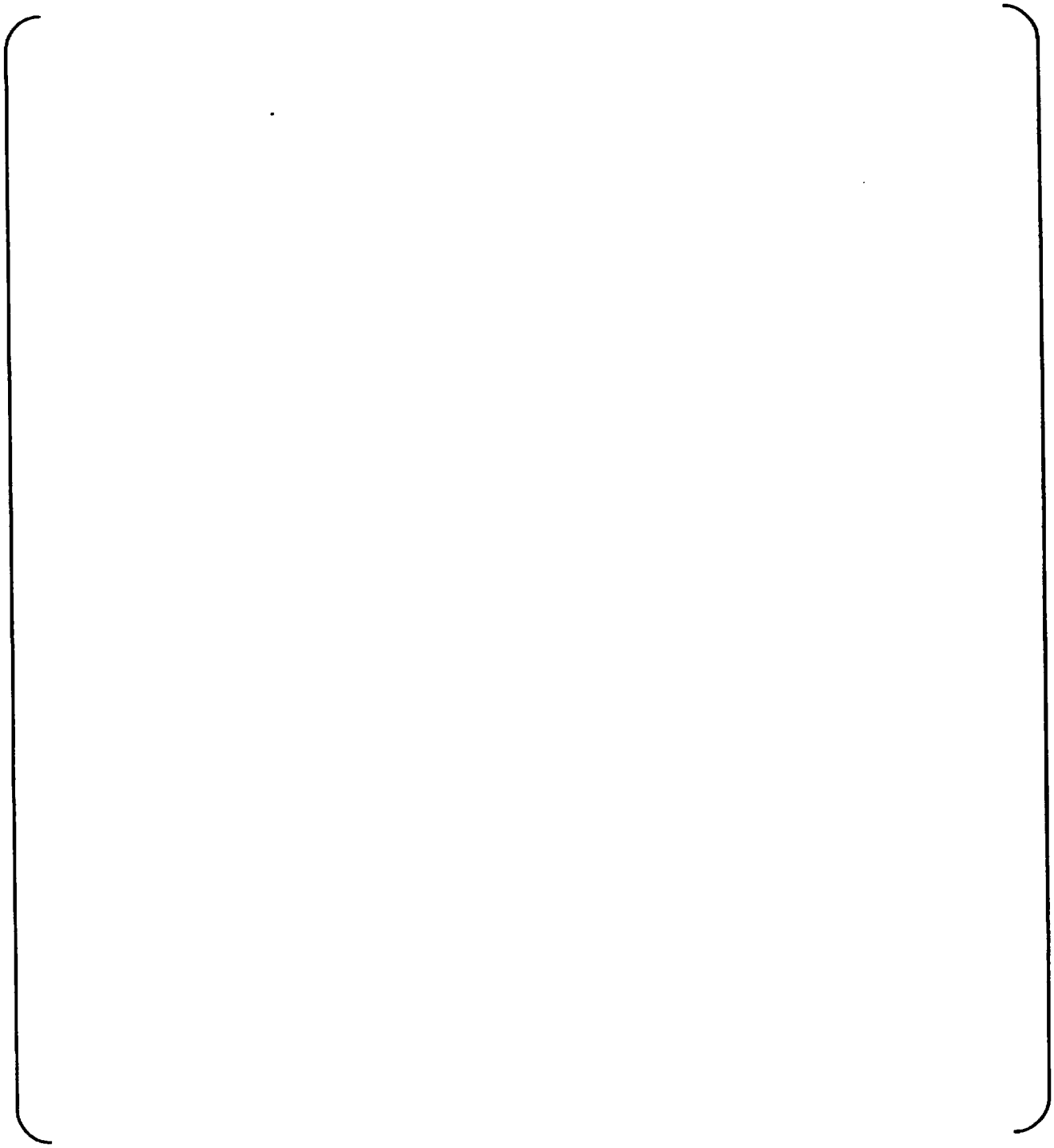
Misc. References

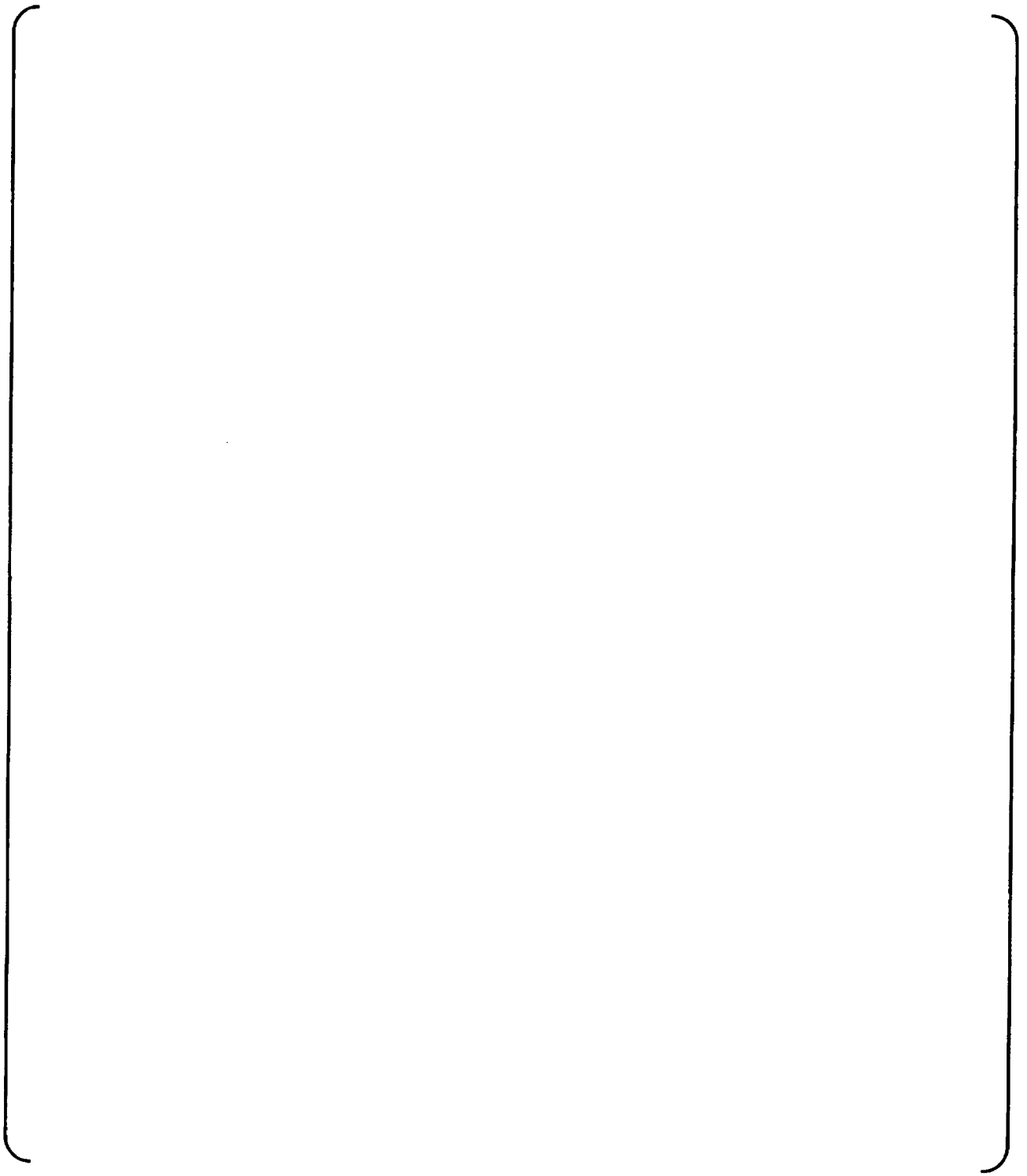
[ ]

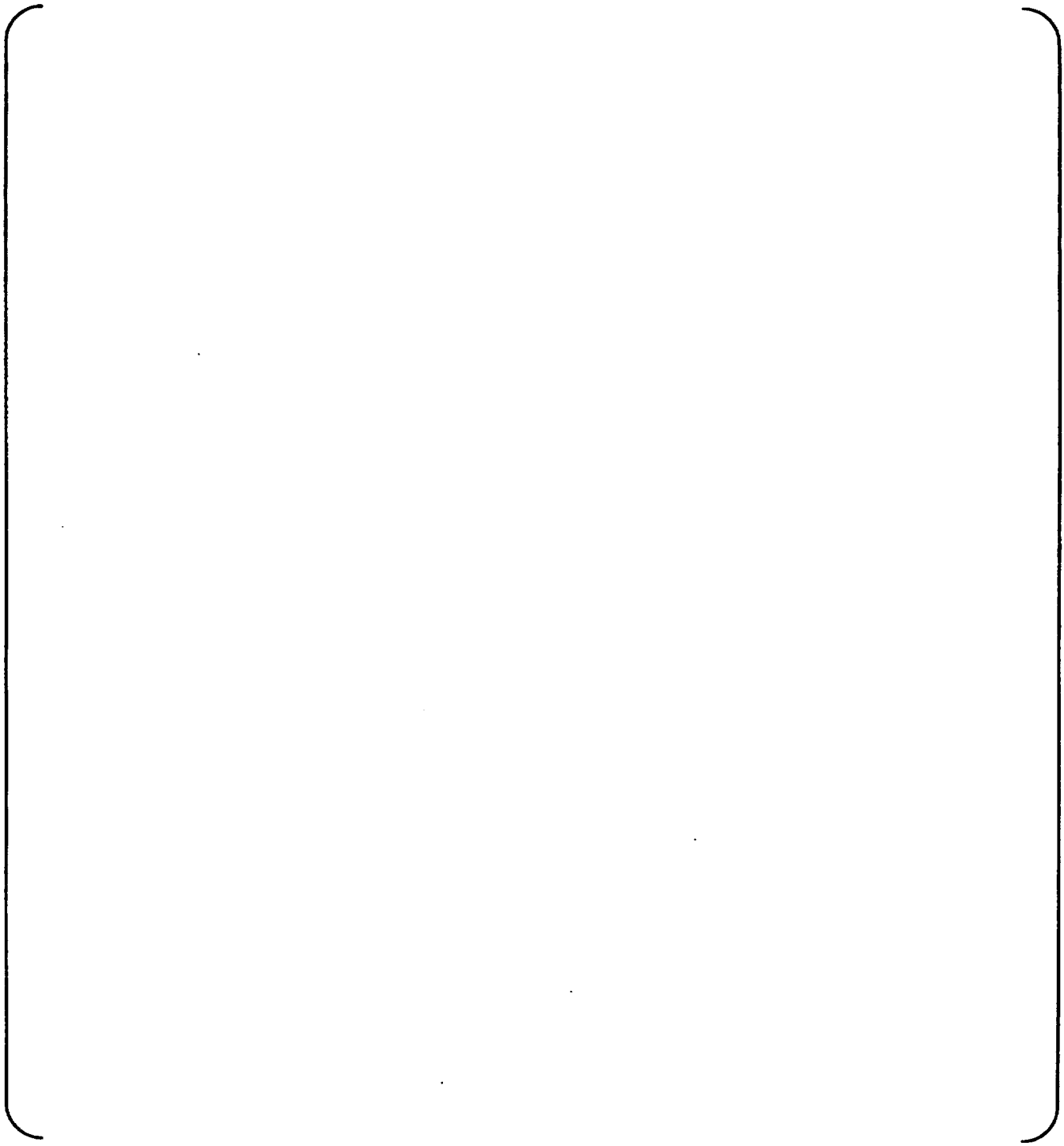
APPENDIX A
Detailed Observations

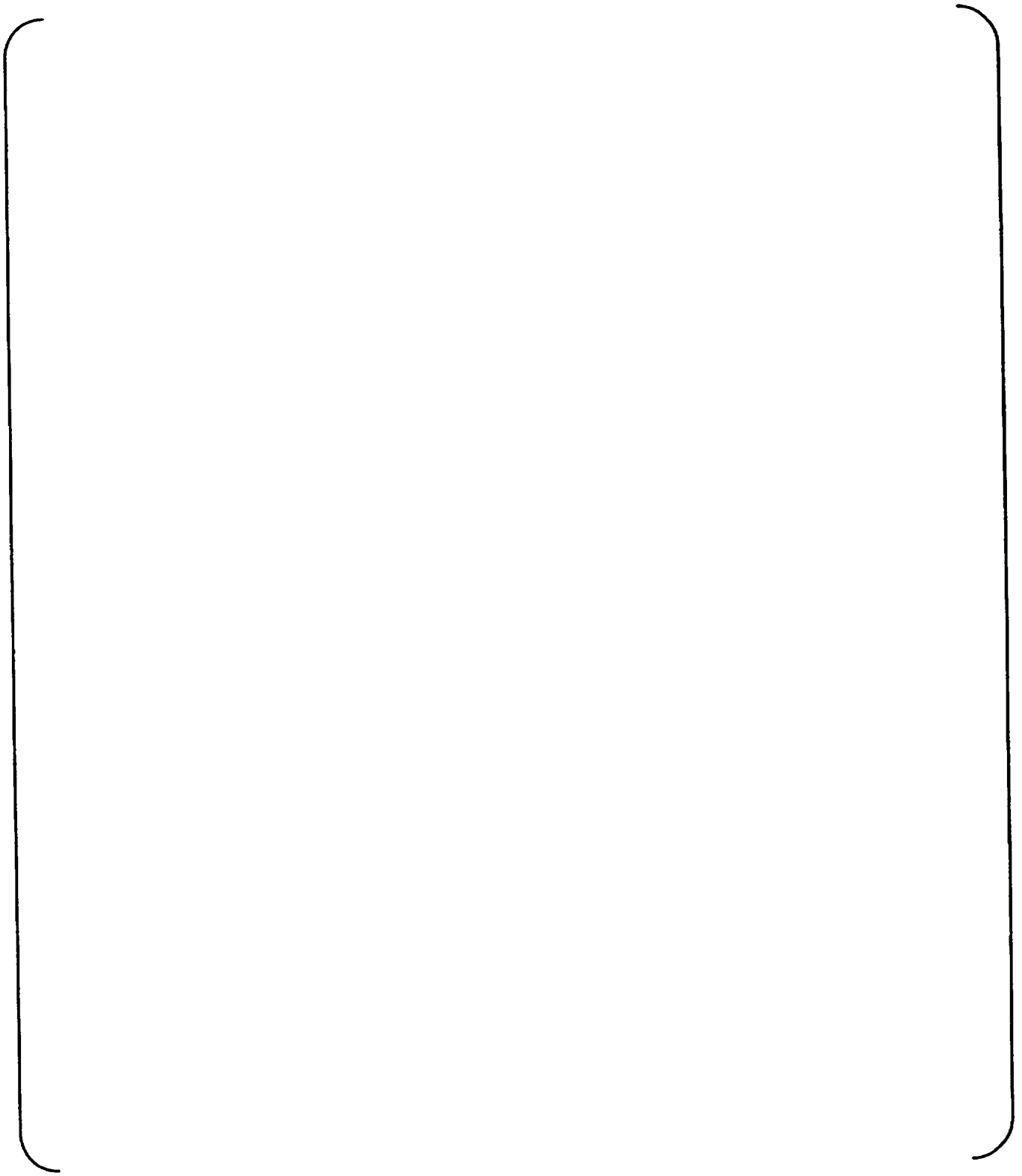


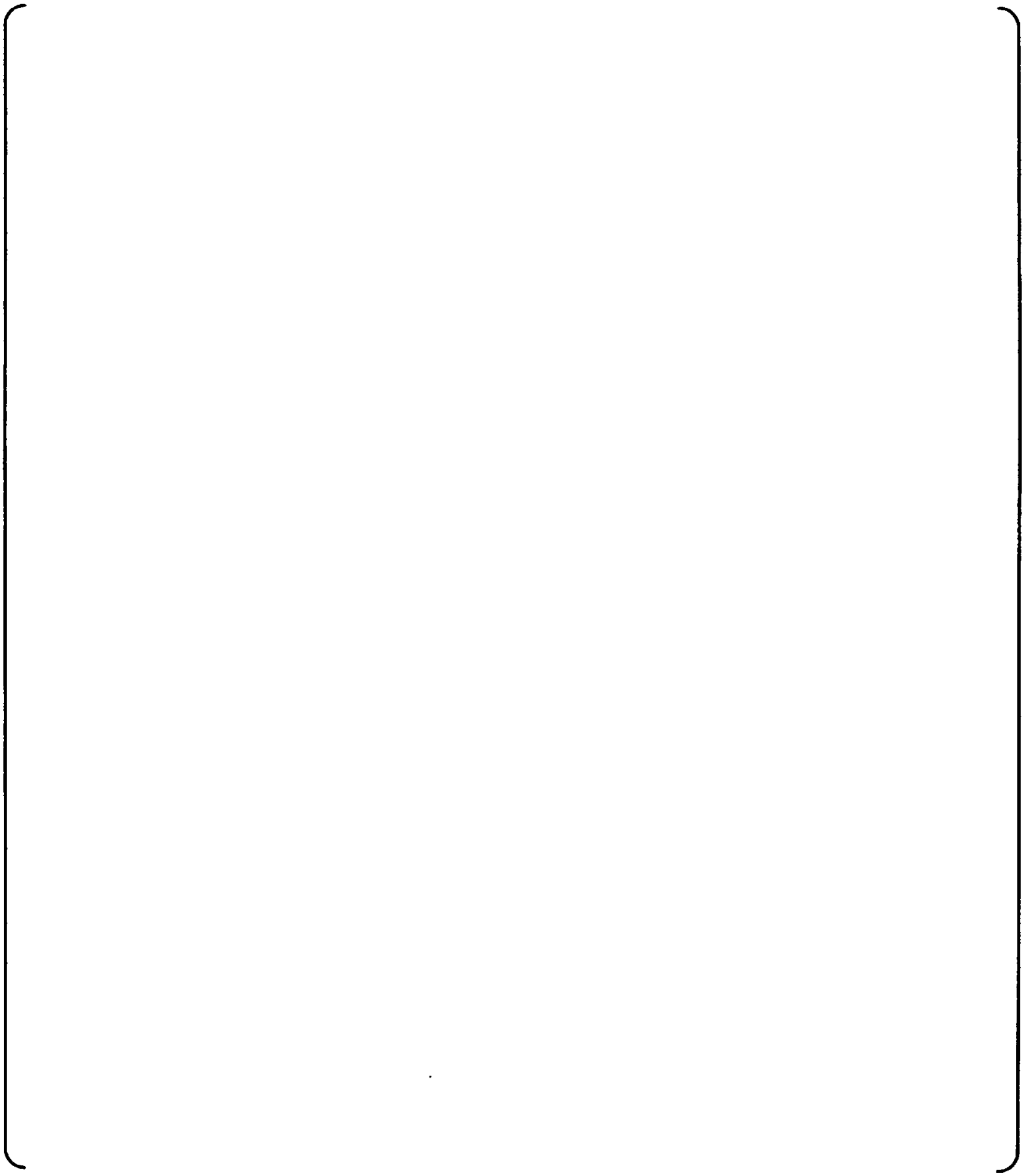


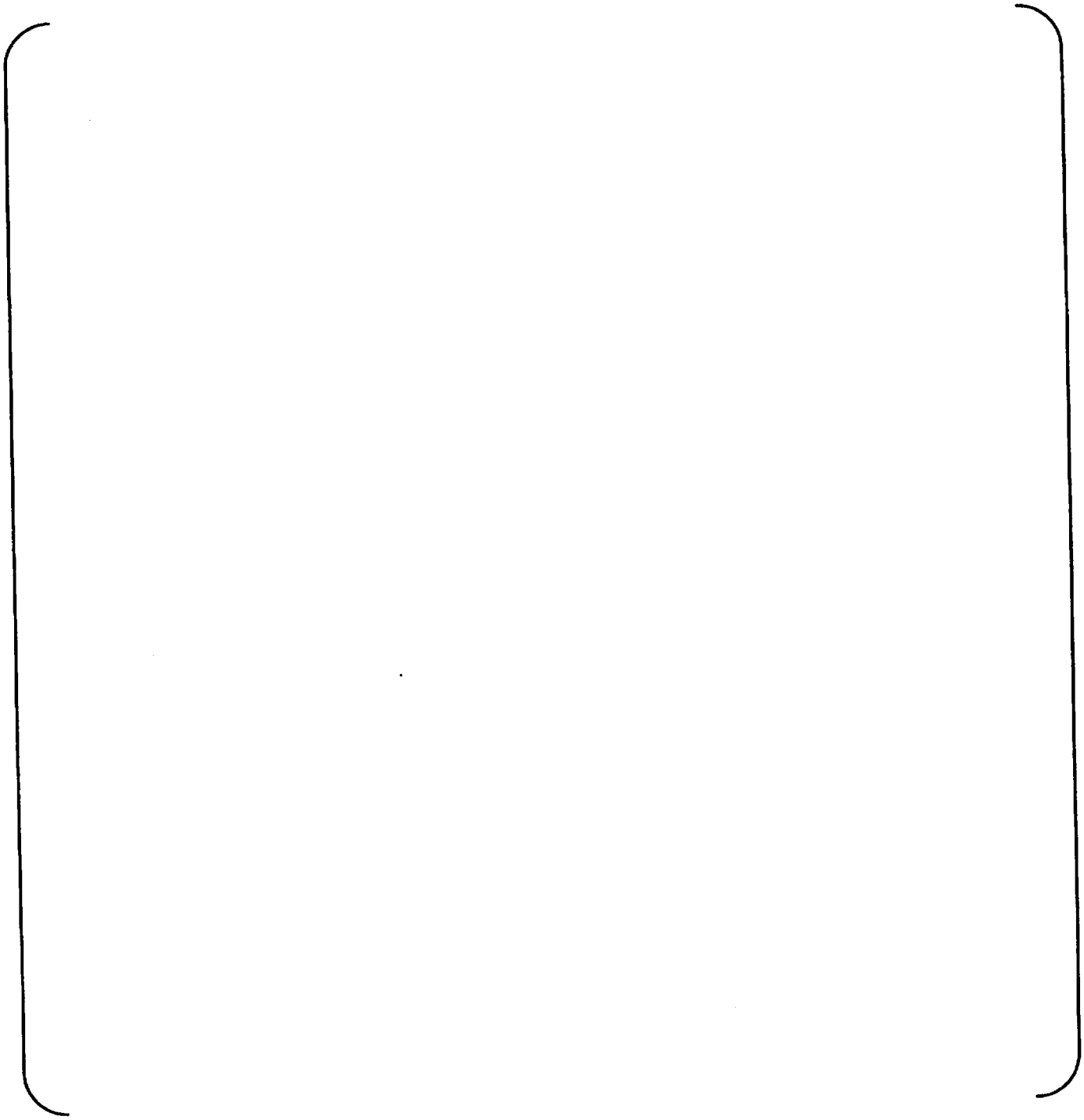


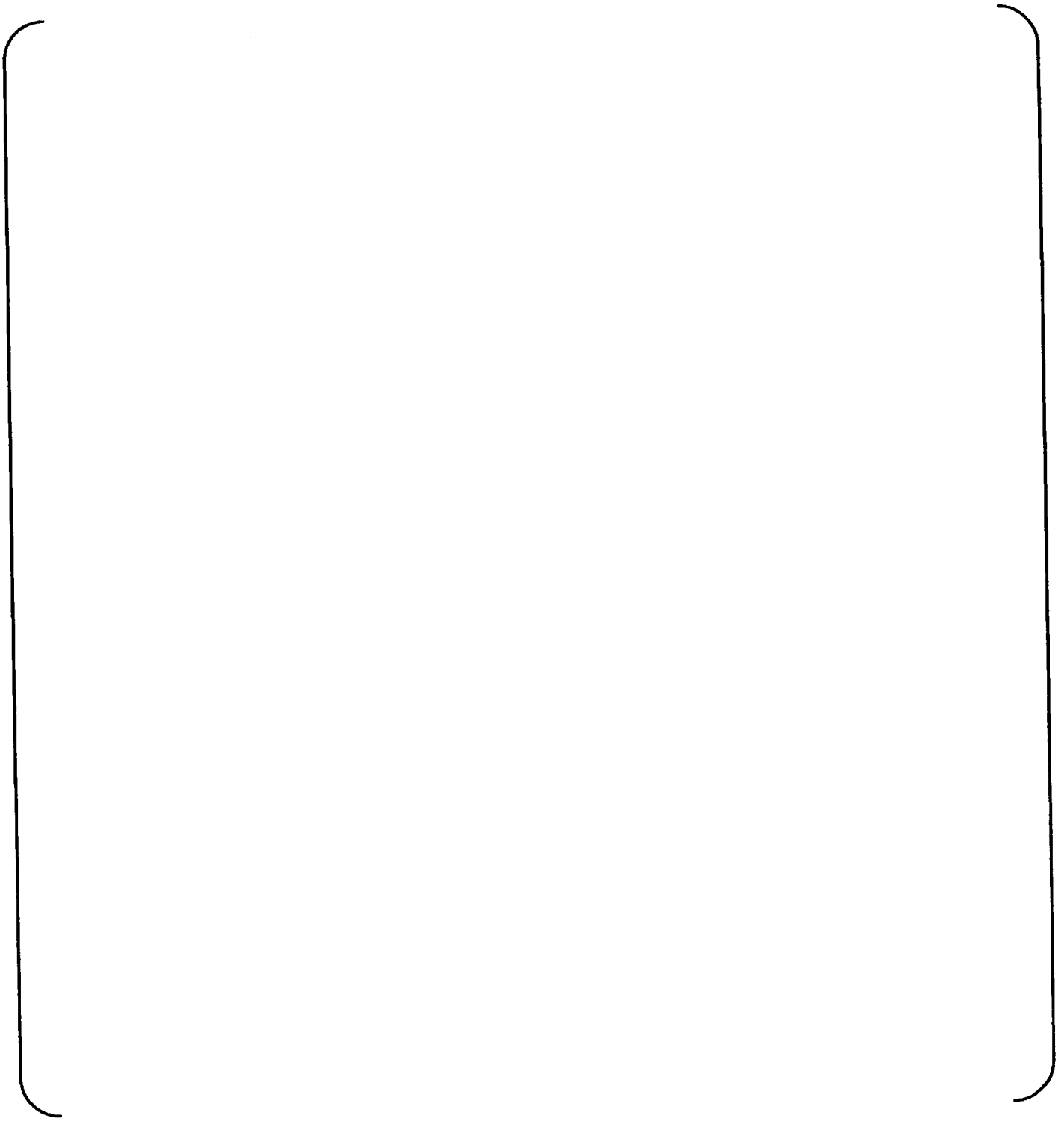


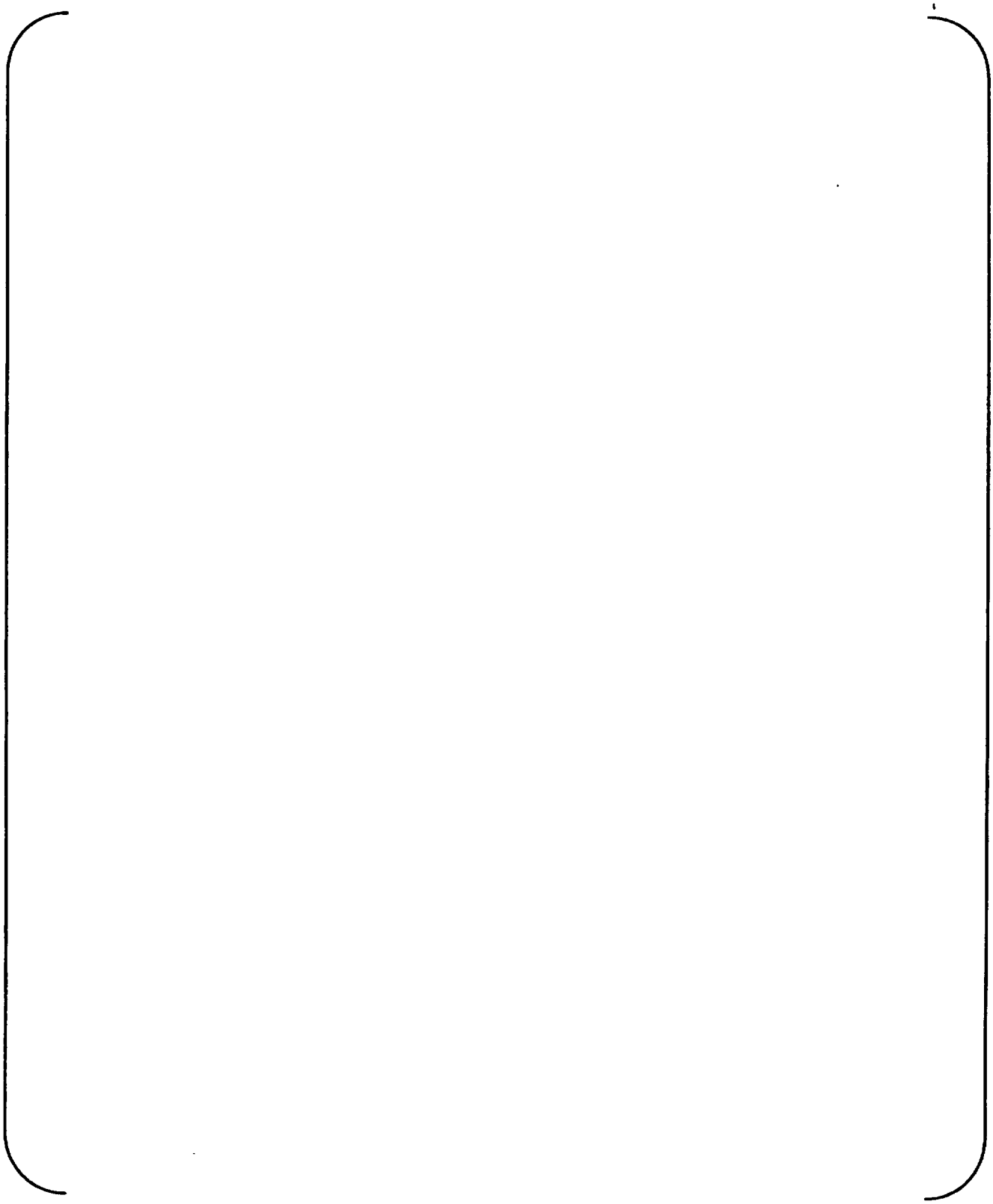


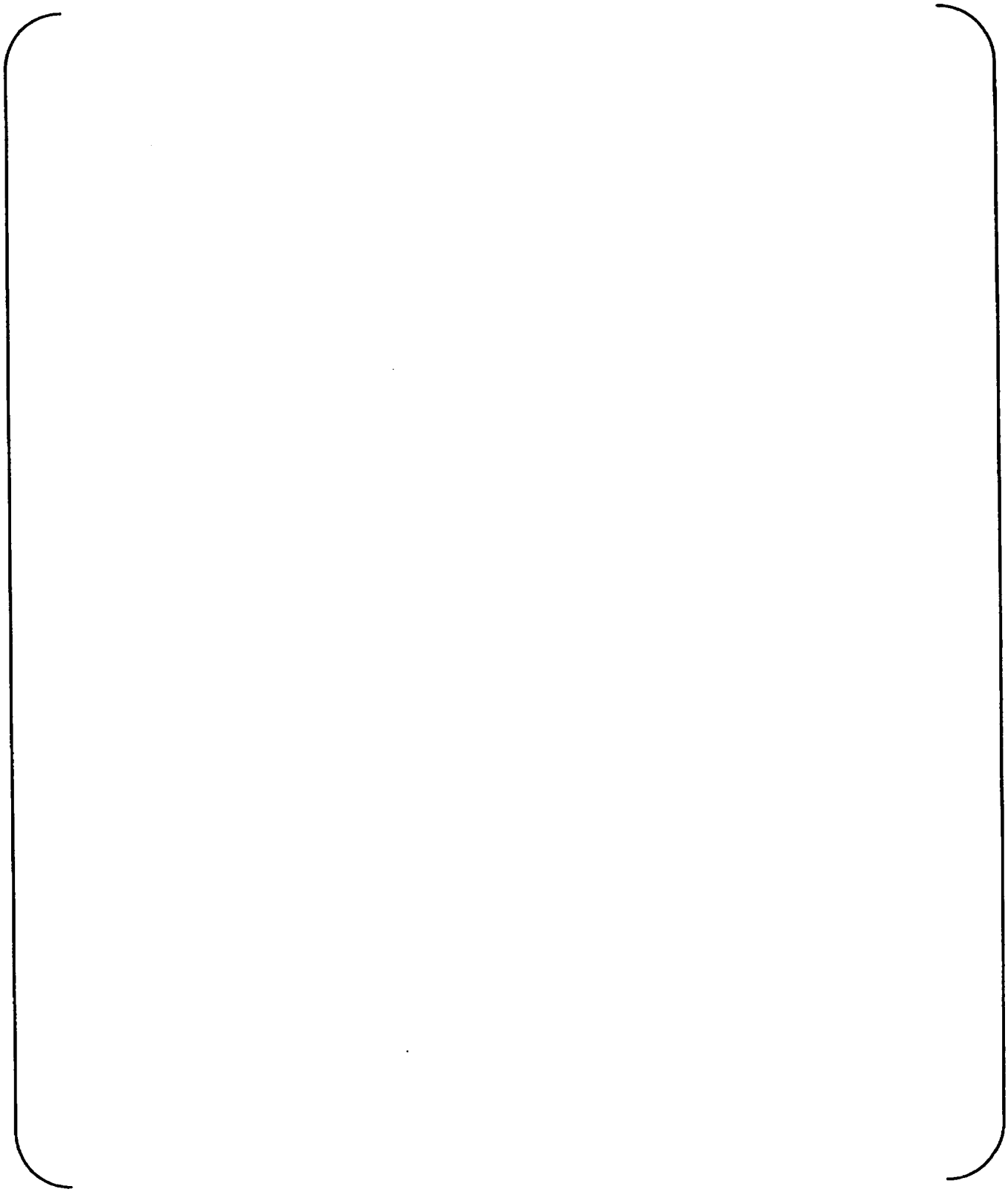


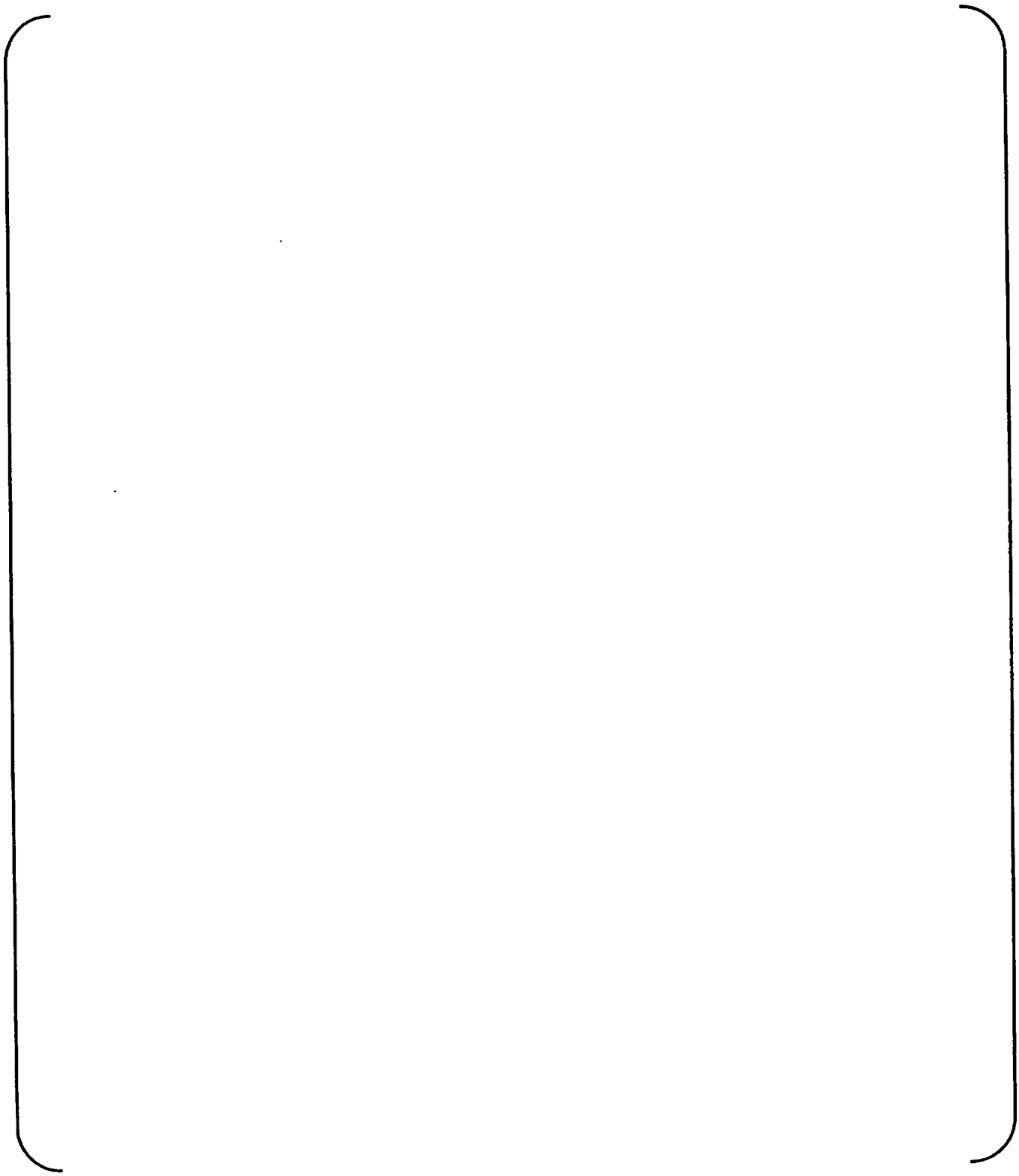


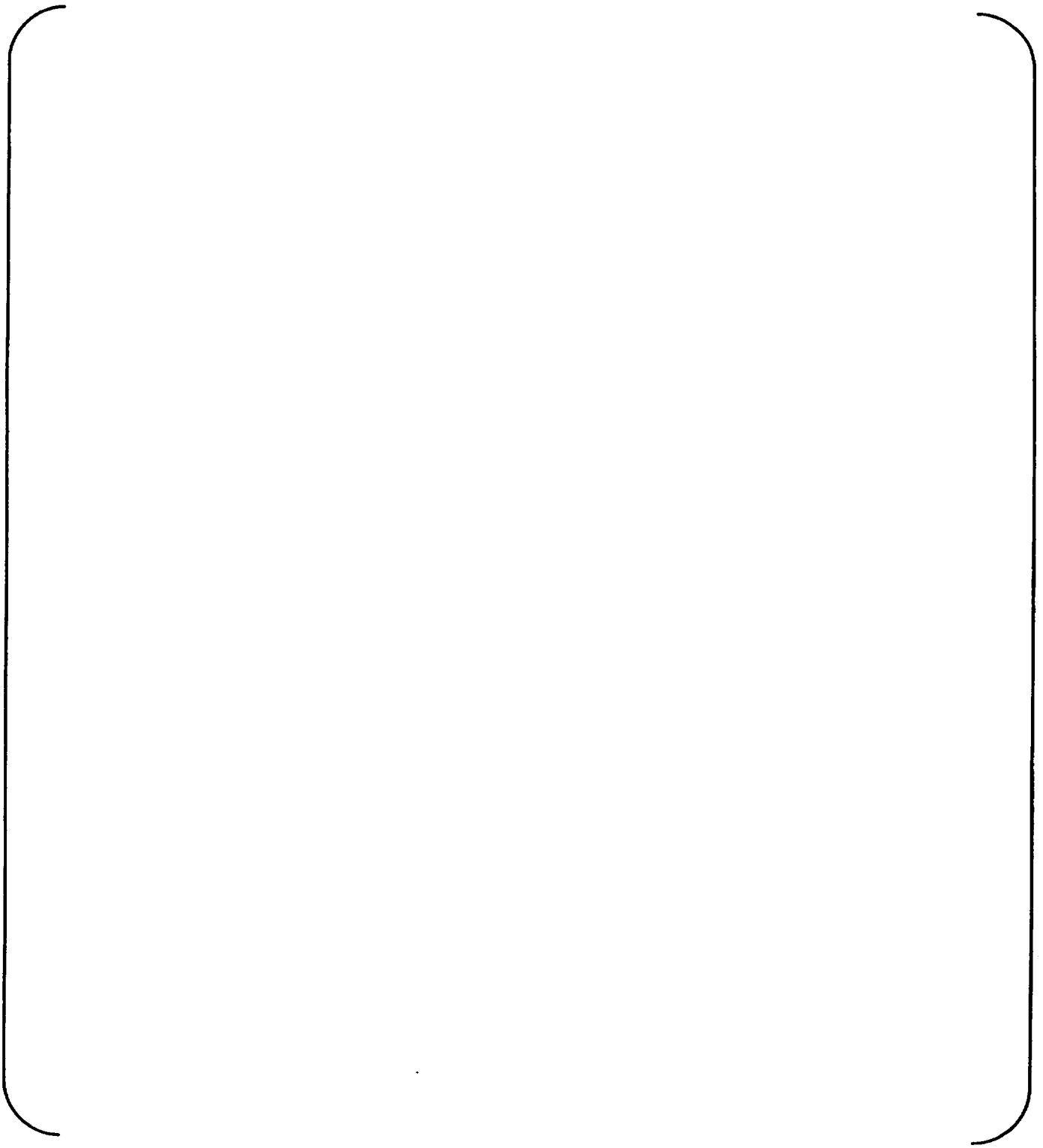


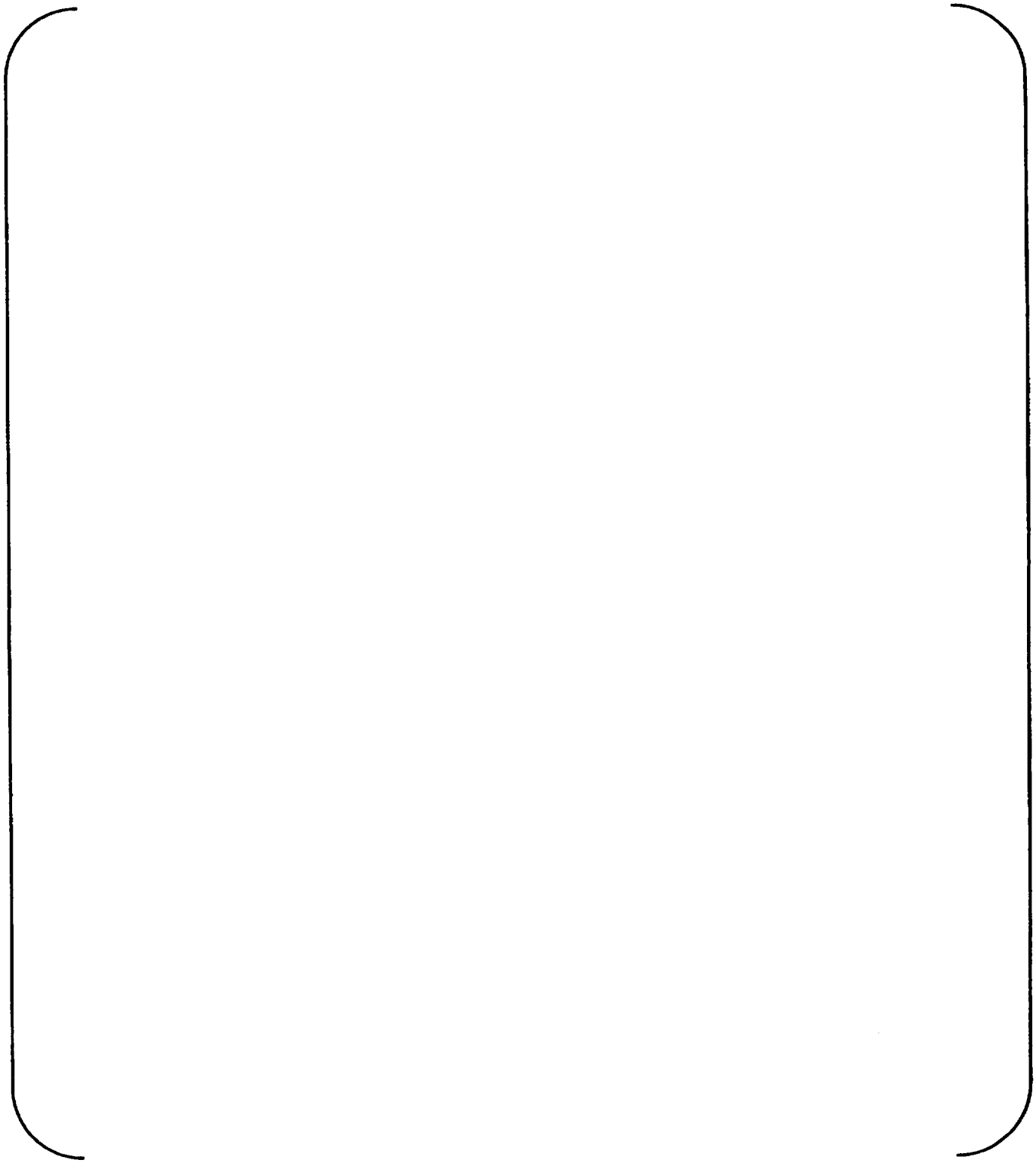


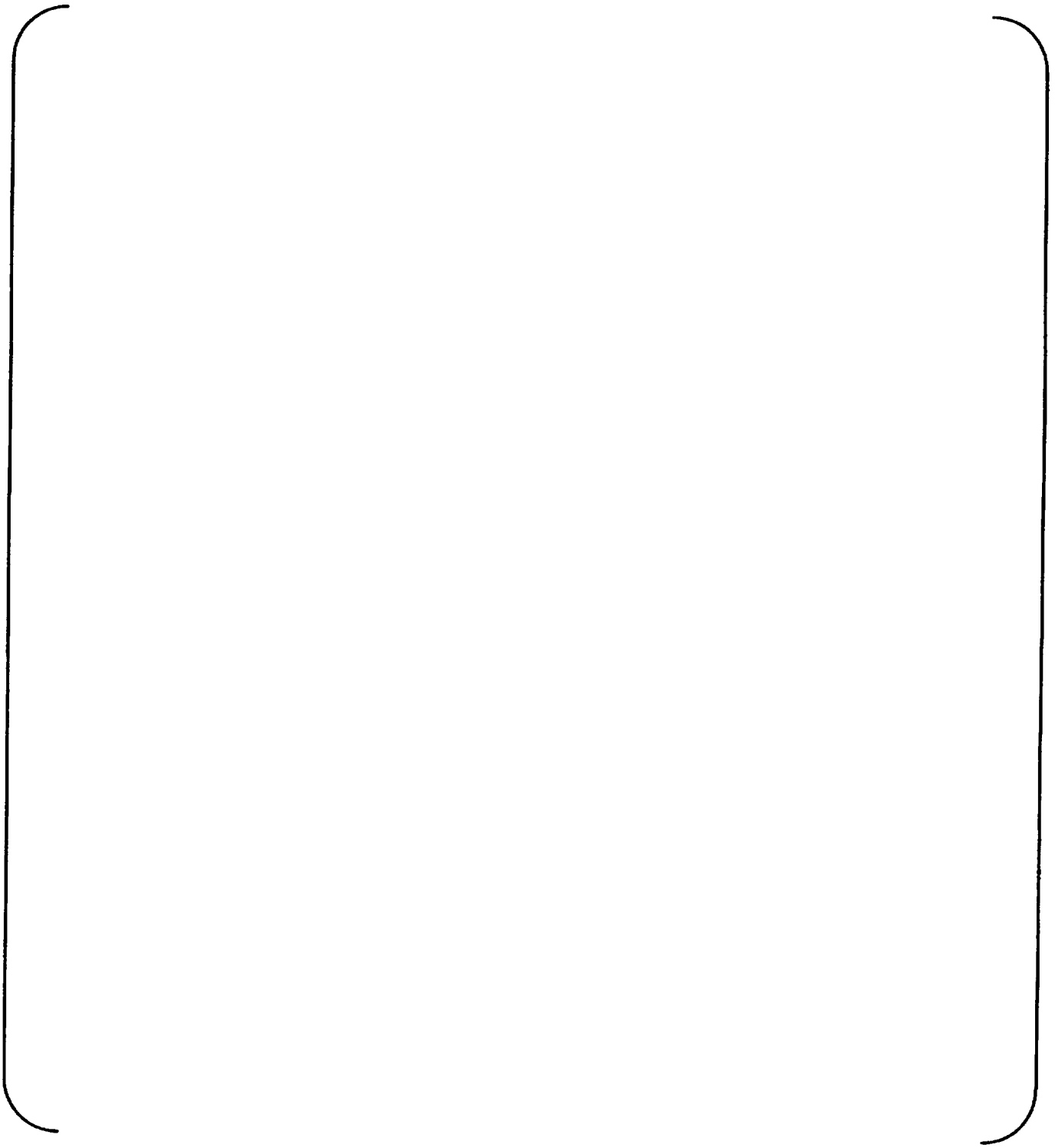


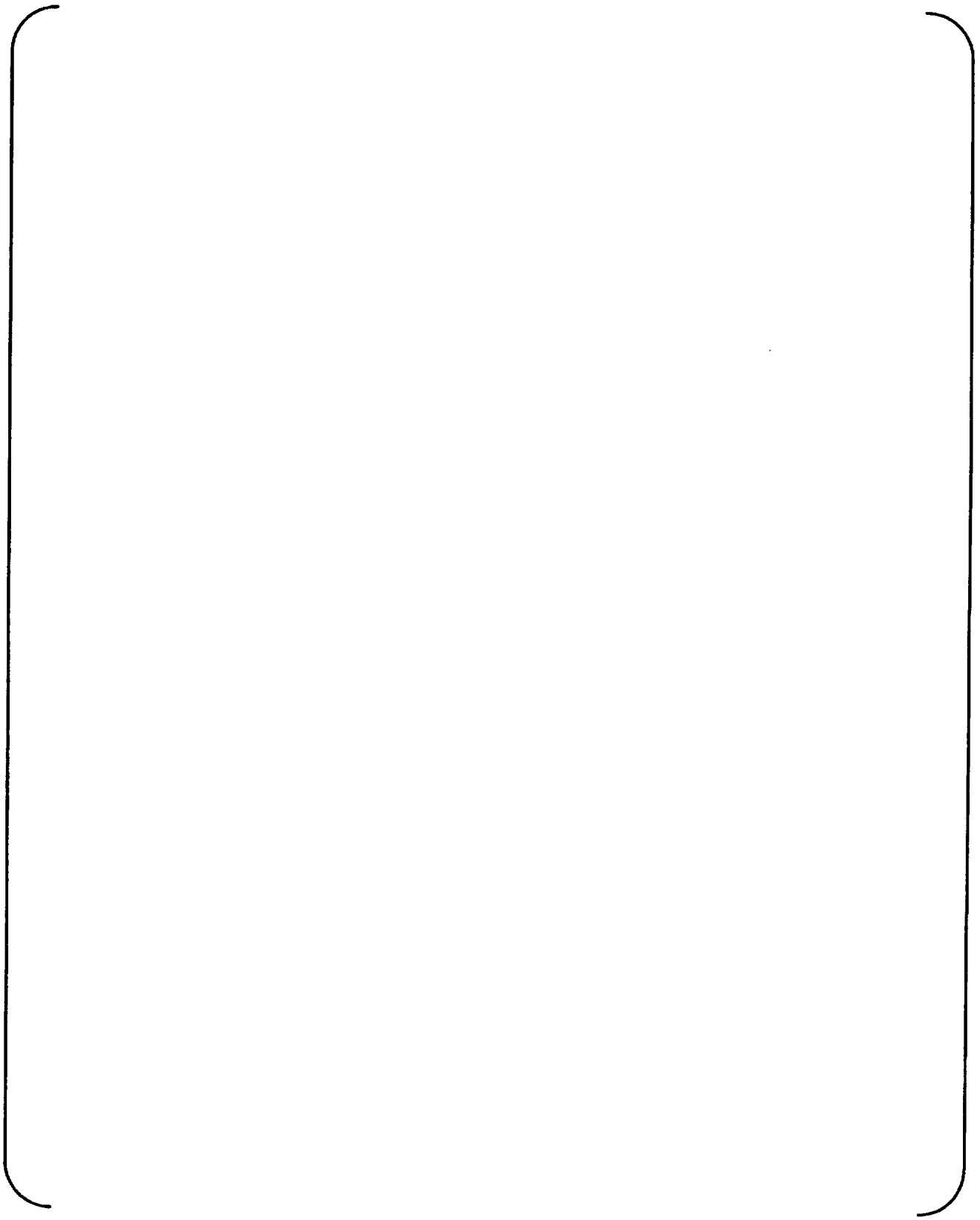












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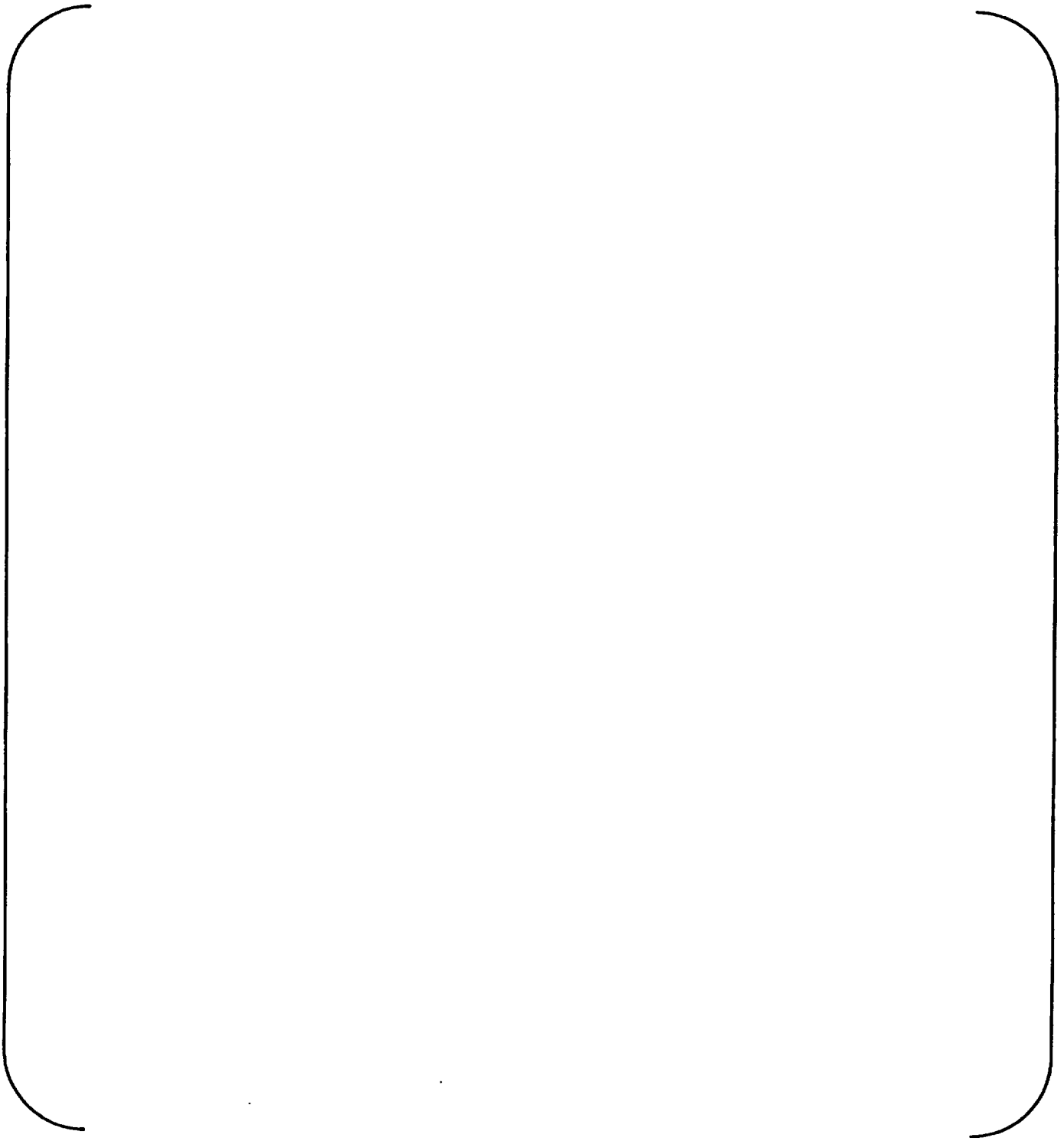

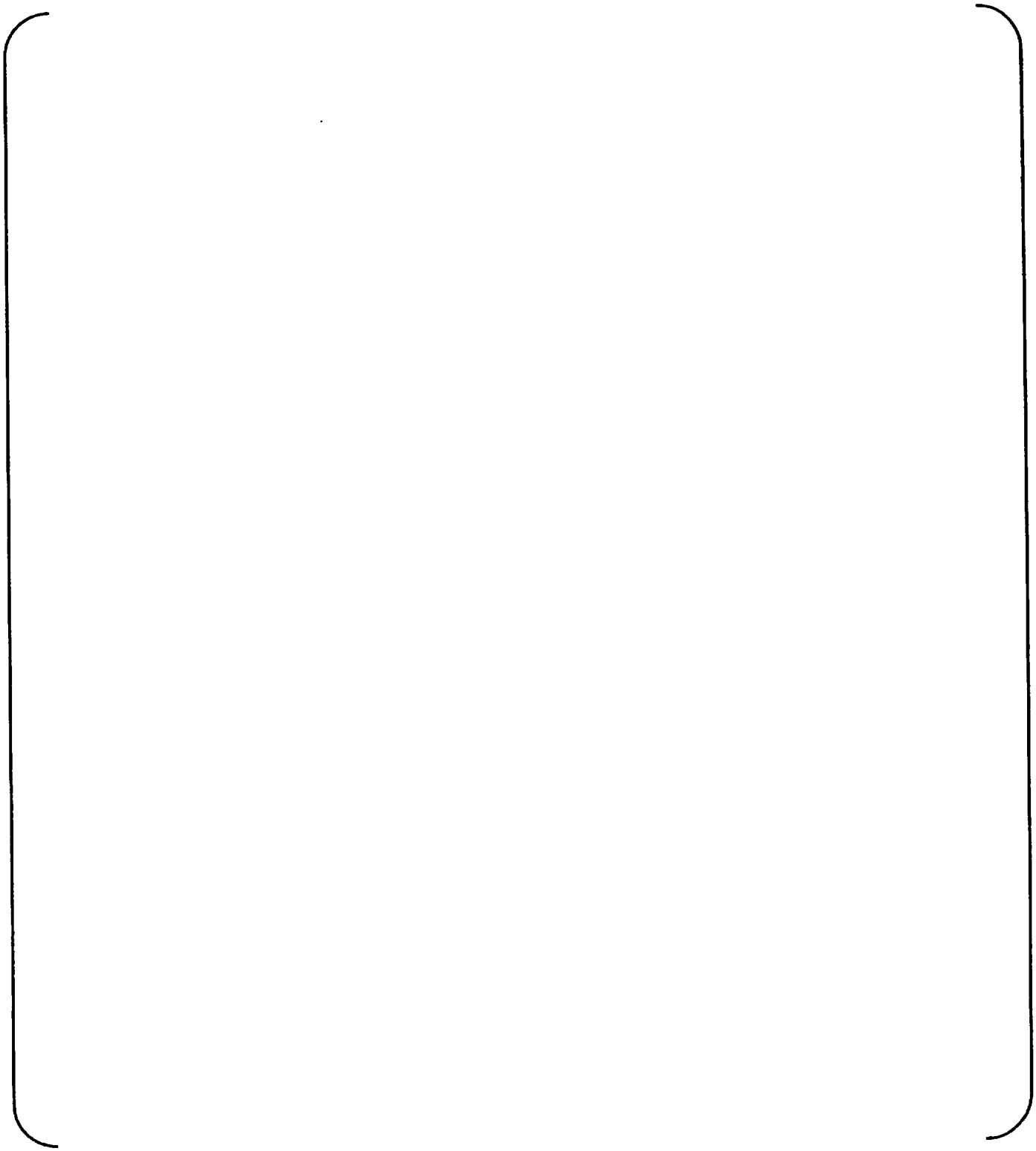

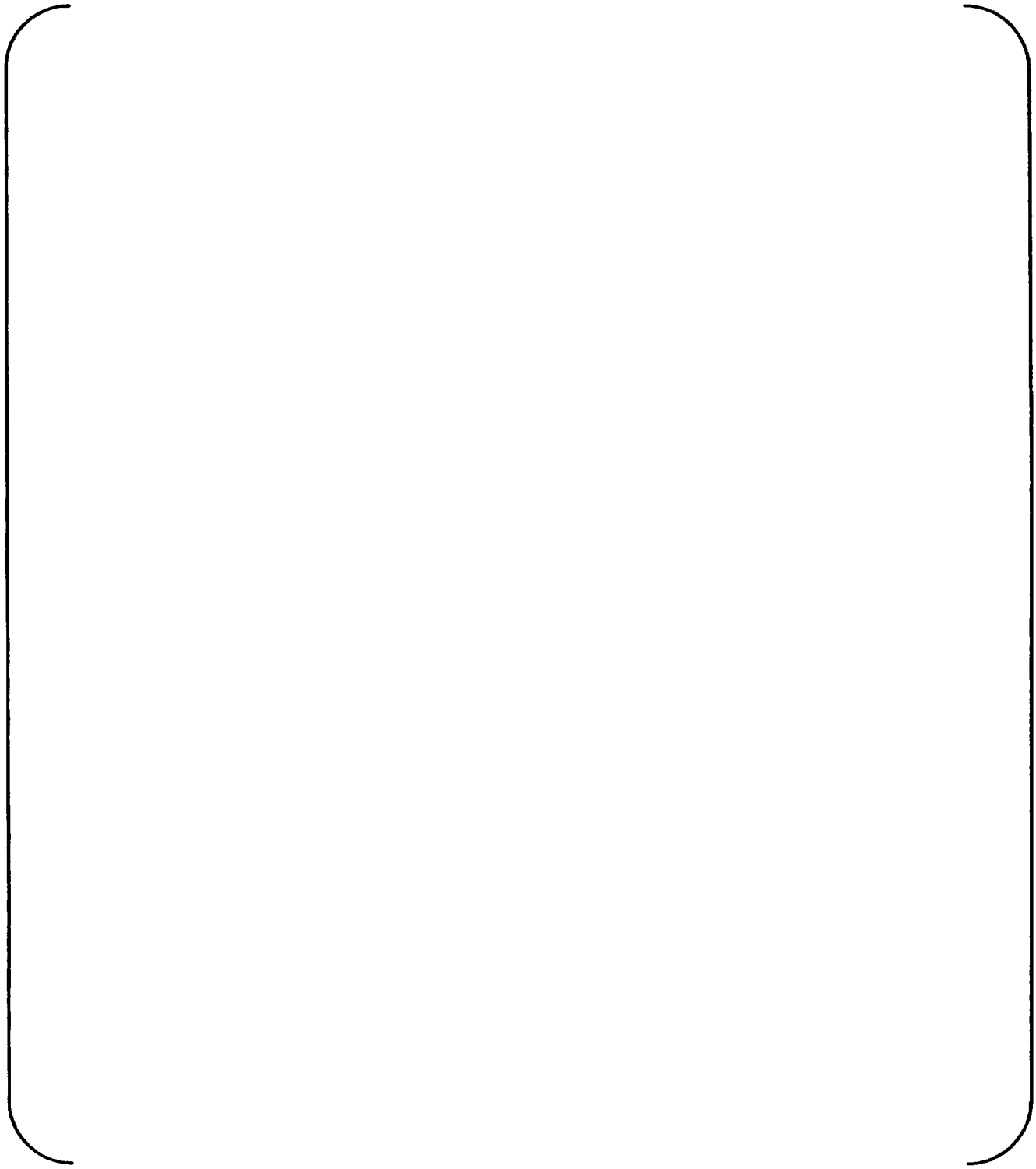

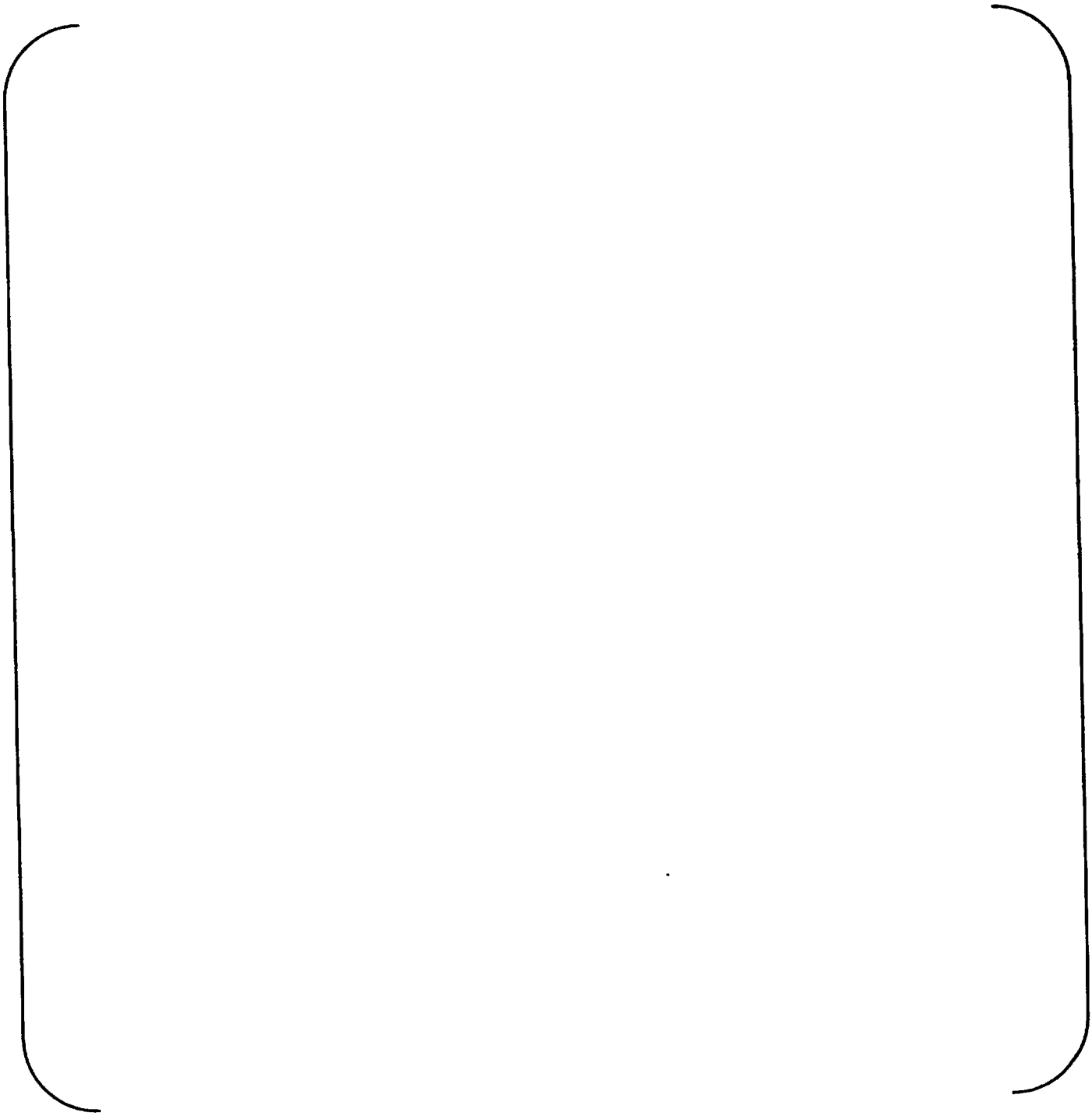

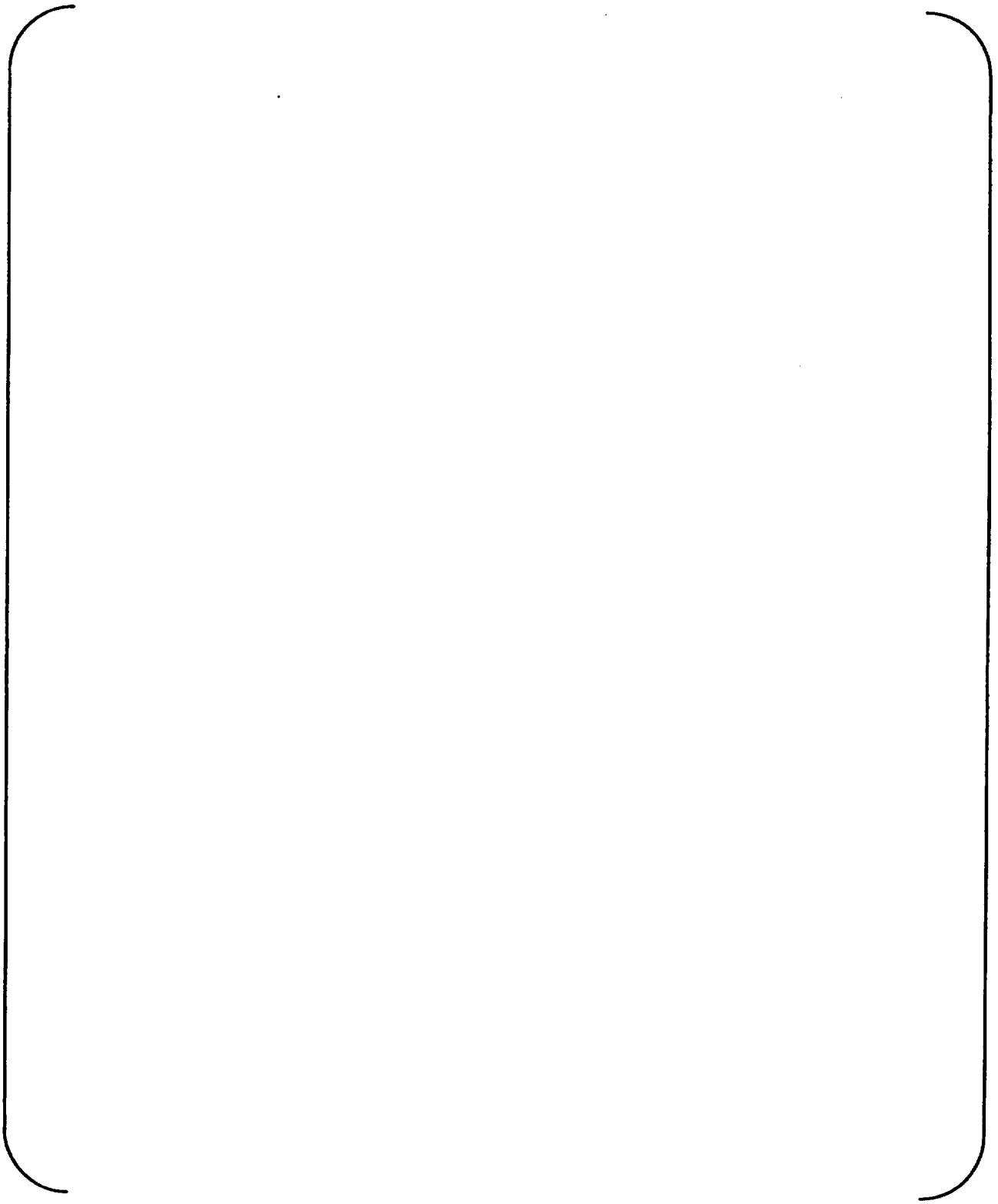

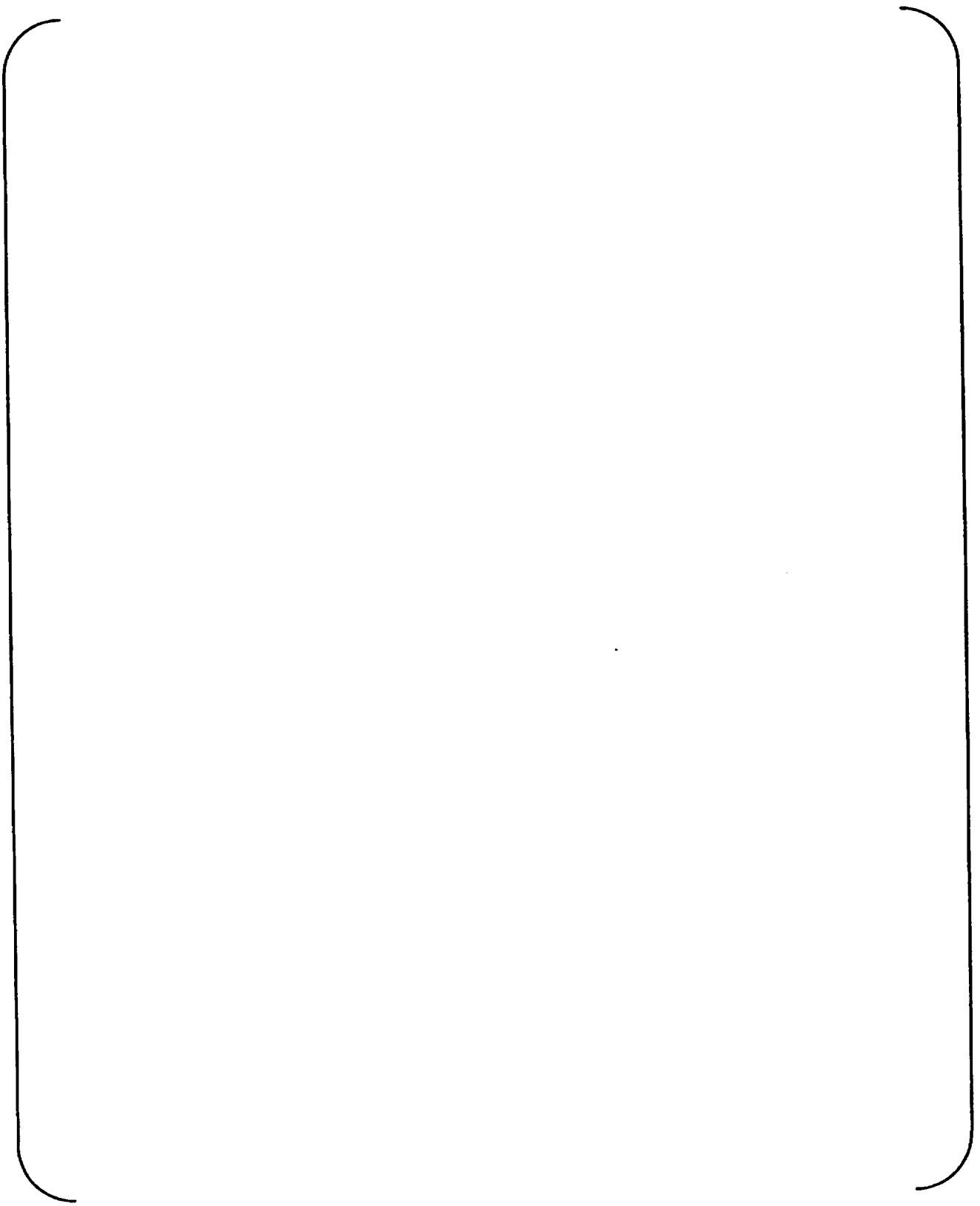

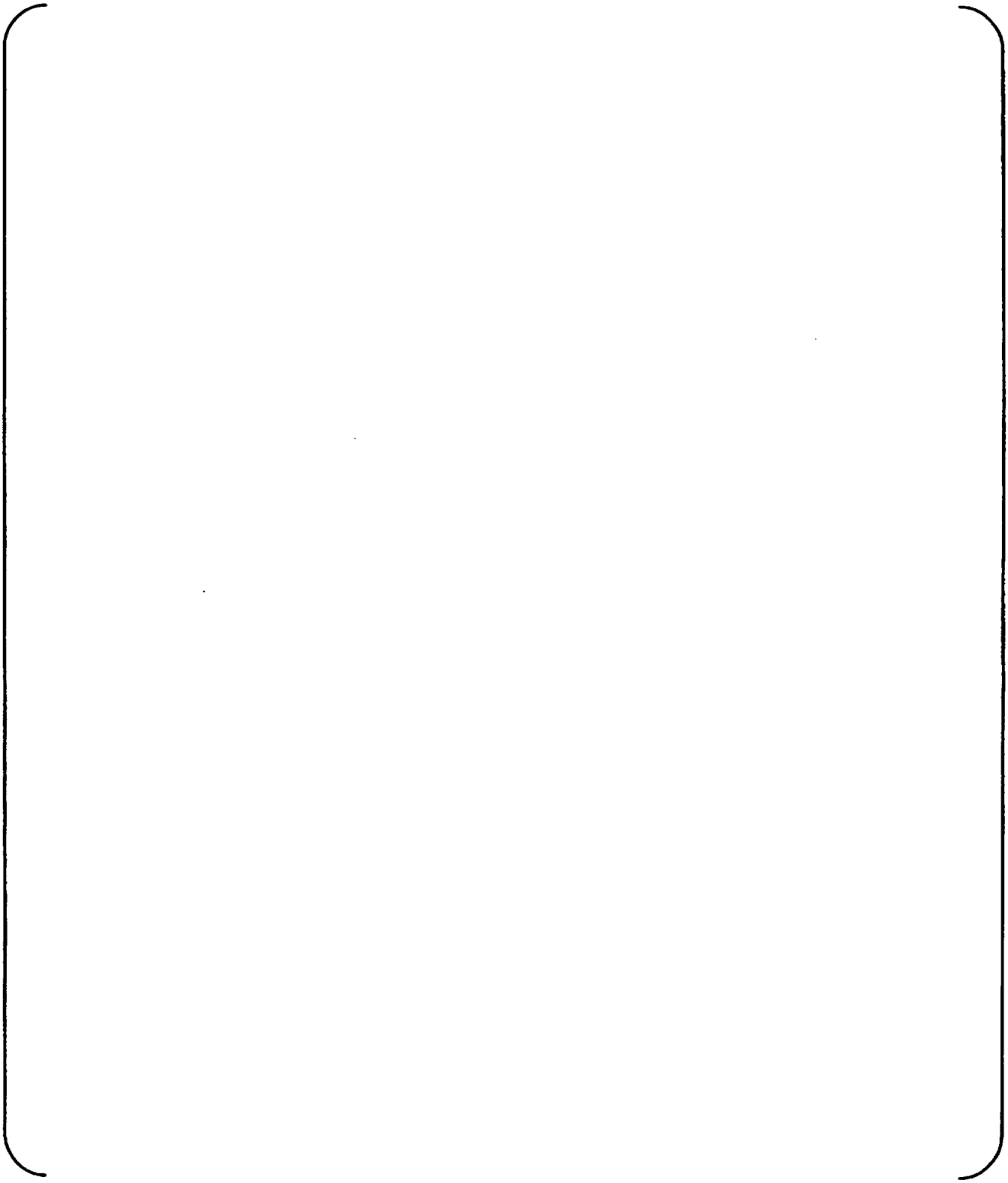

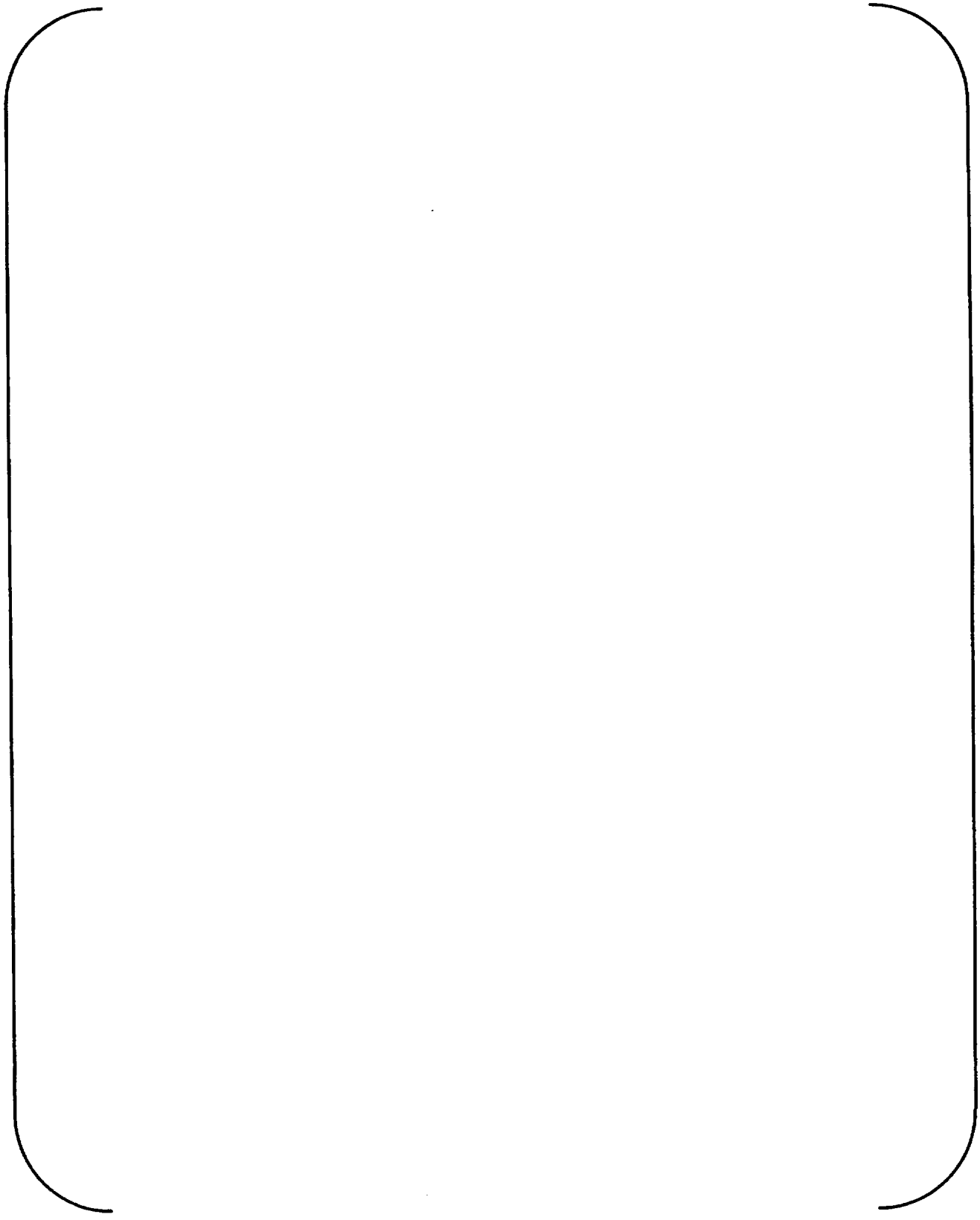

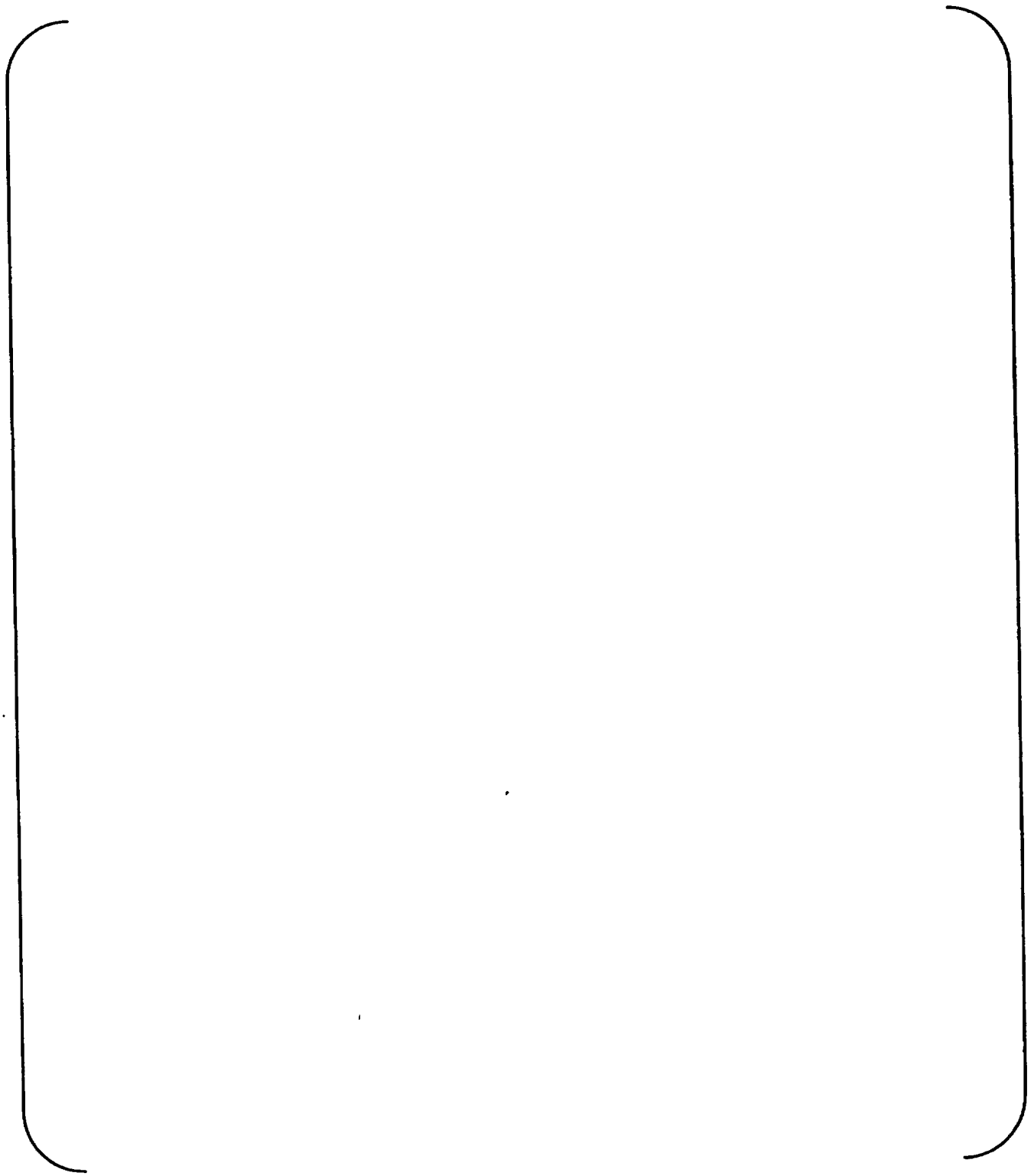

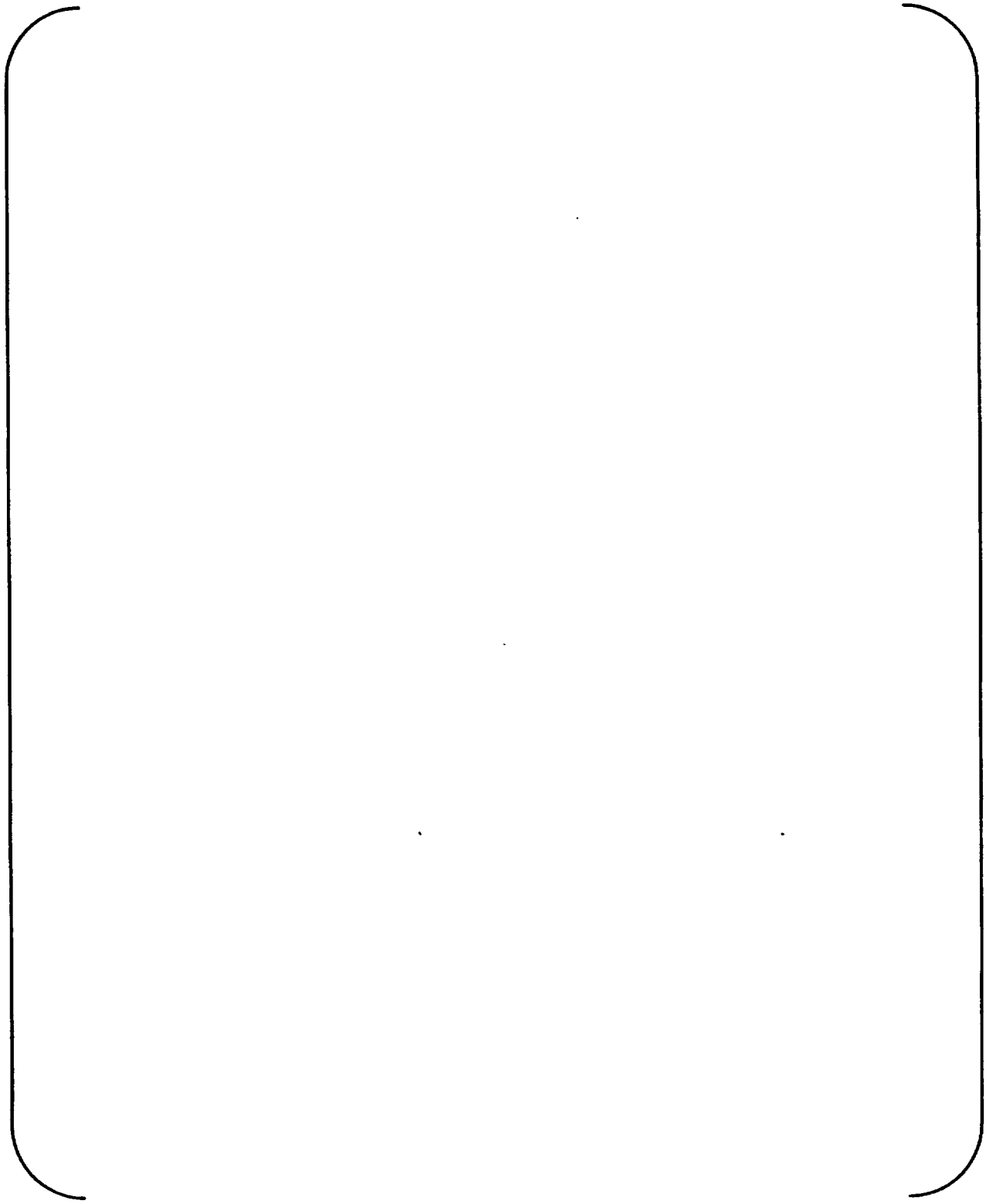

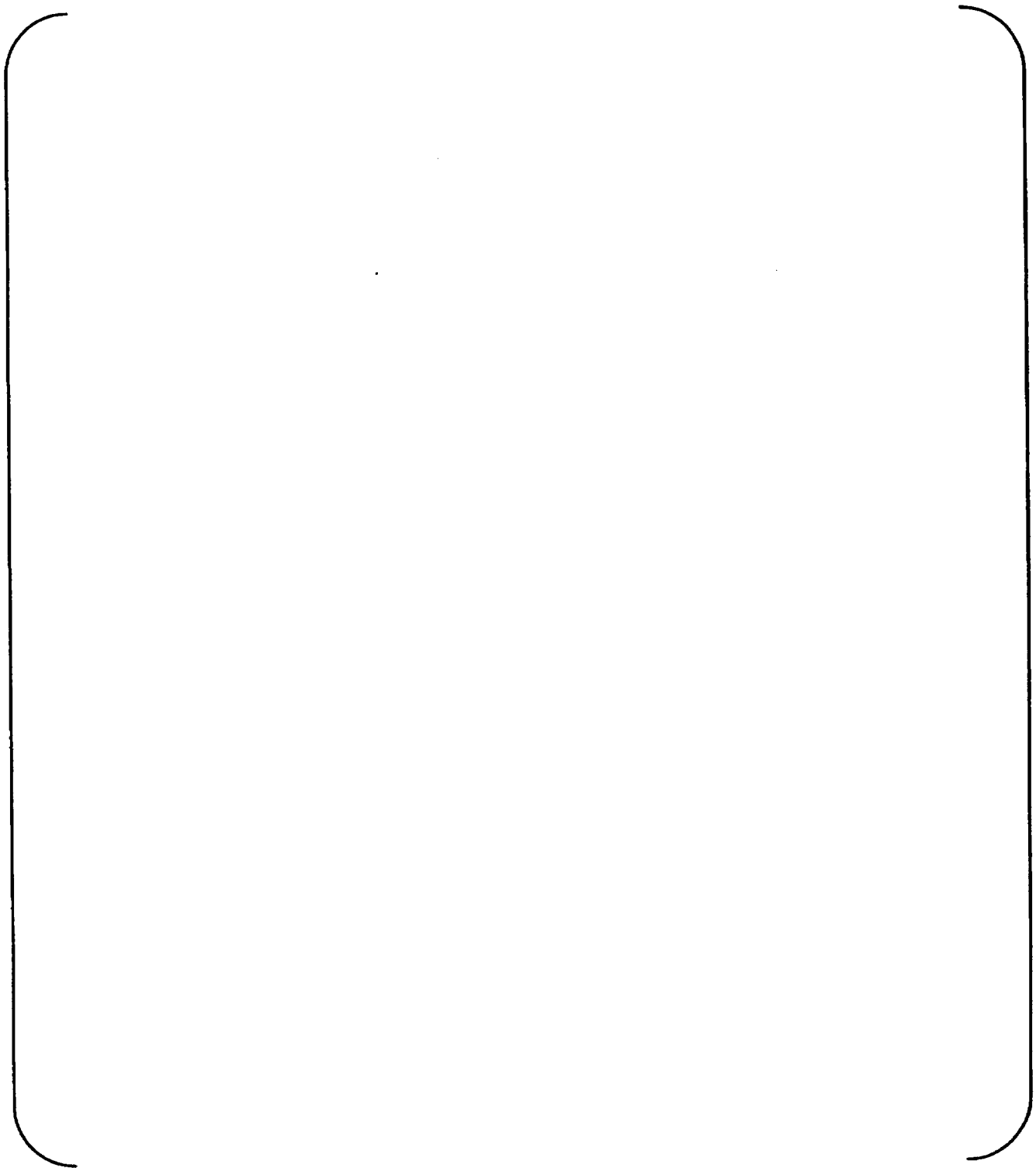

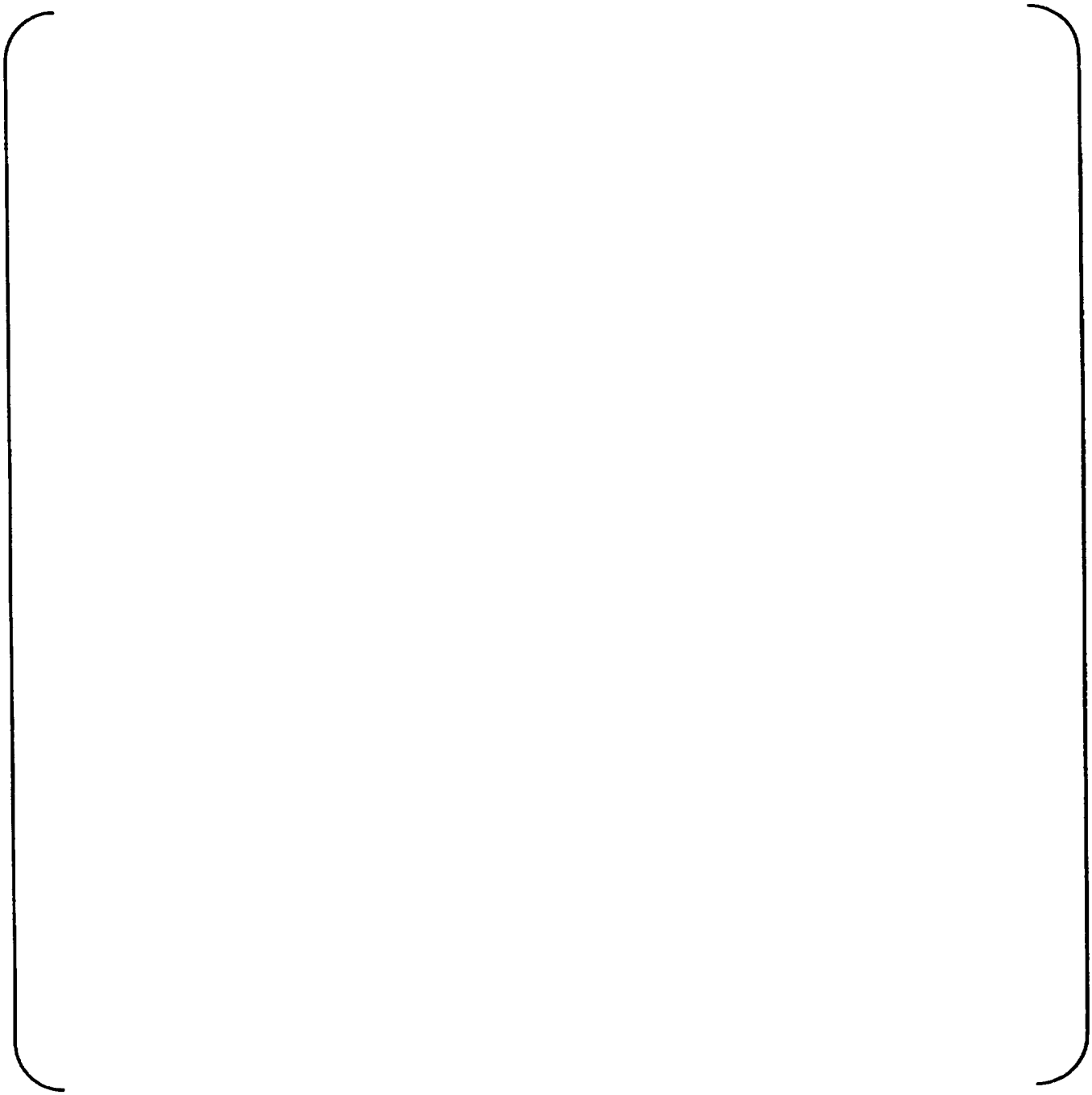

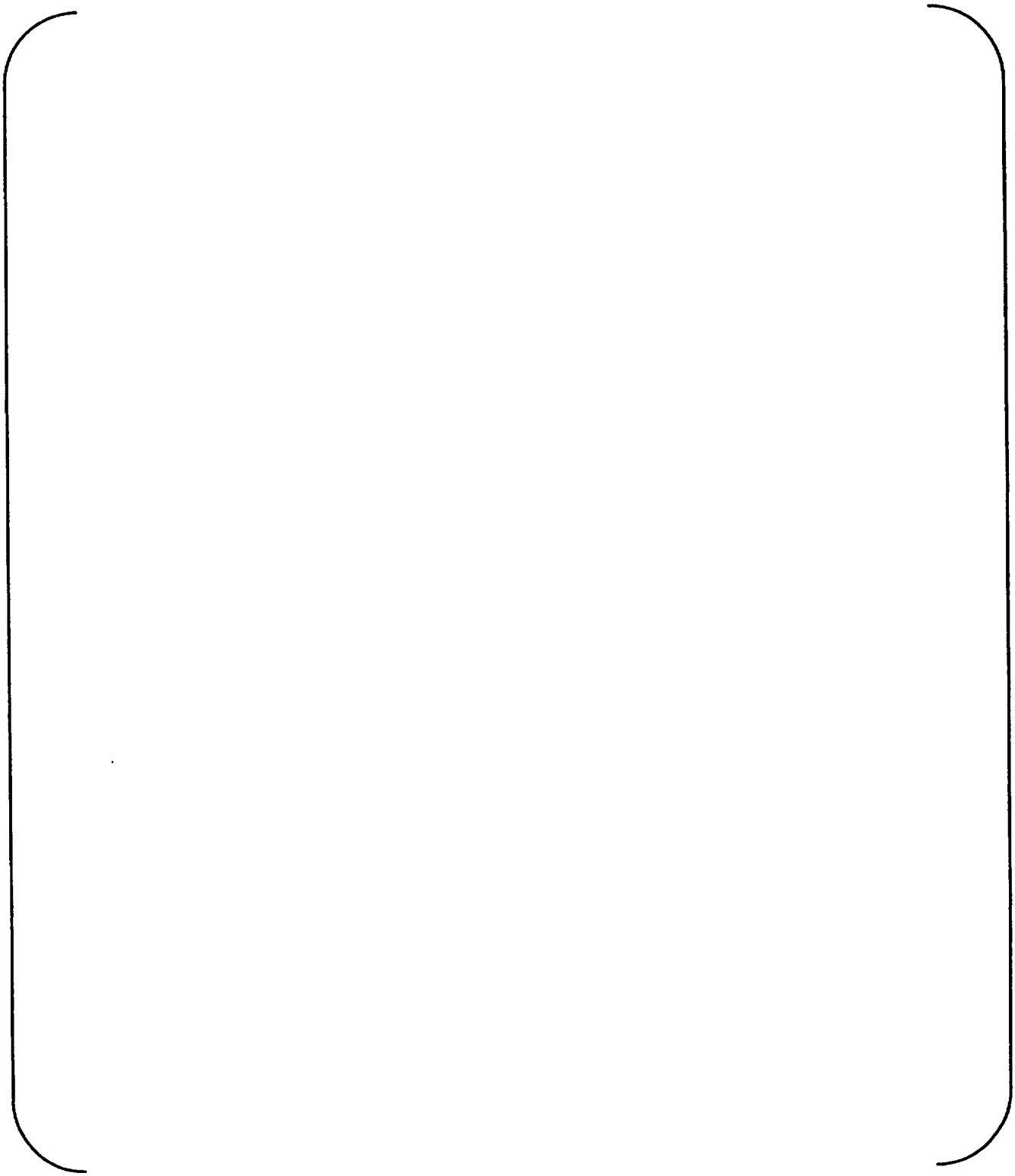

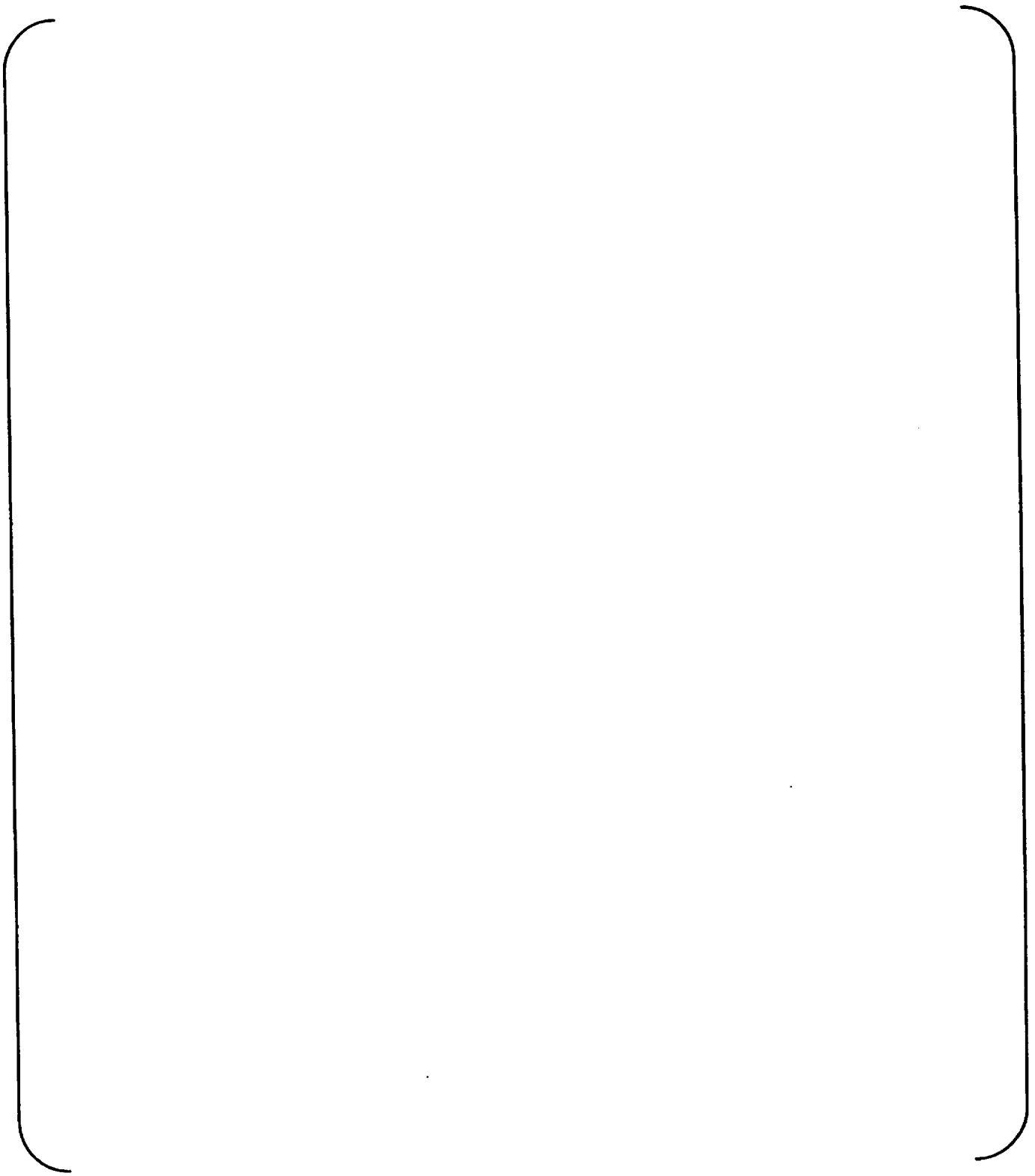

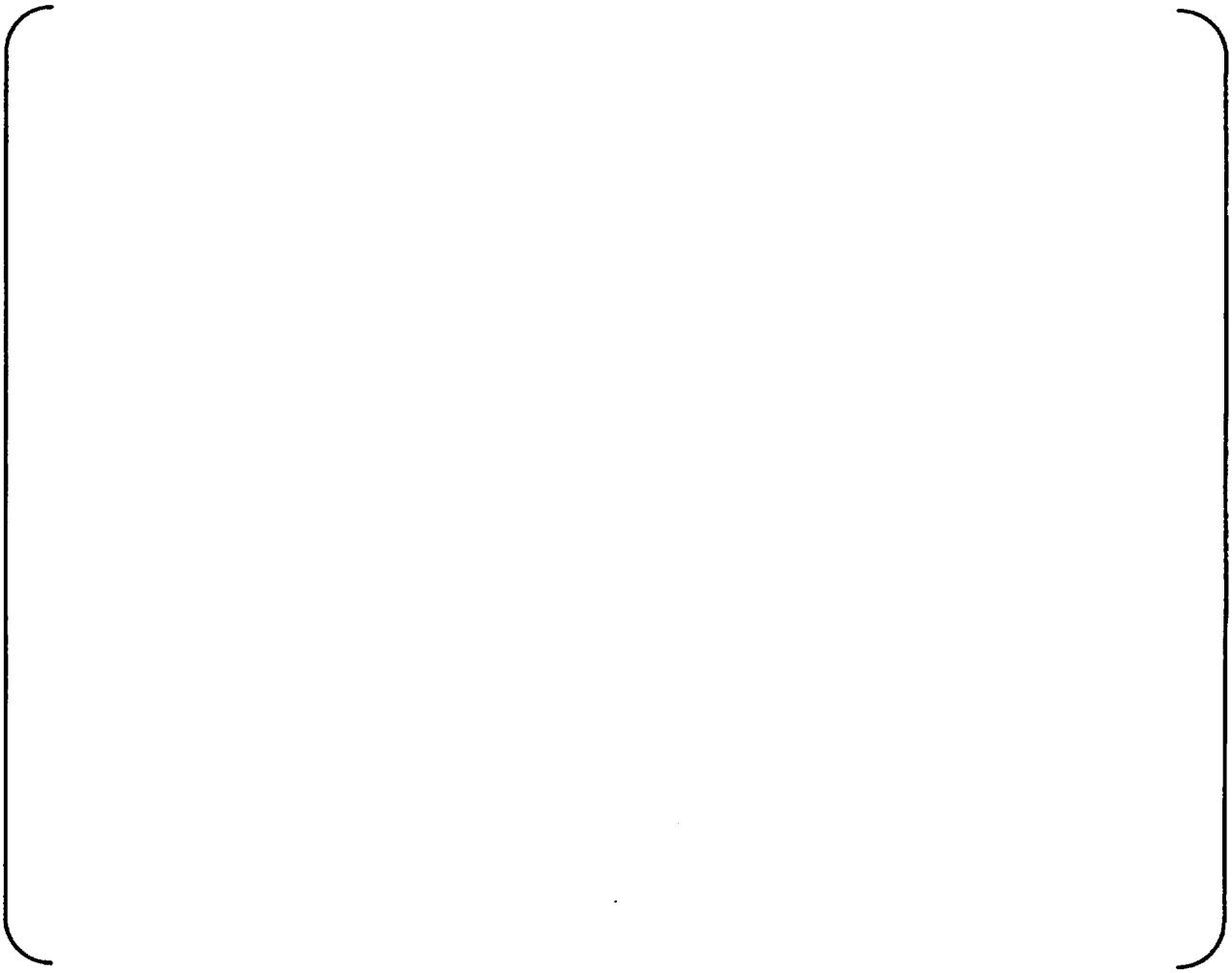

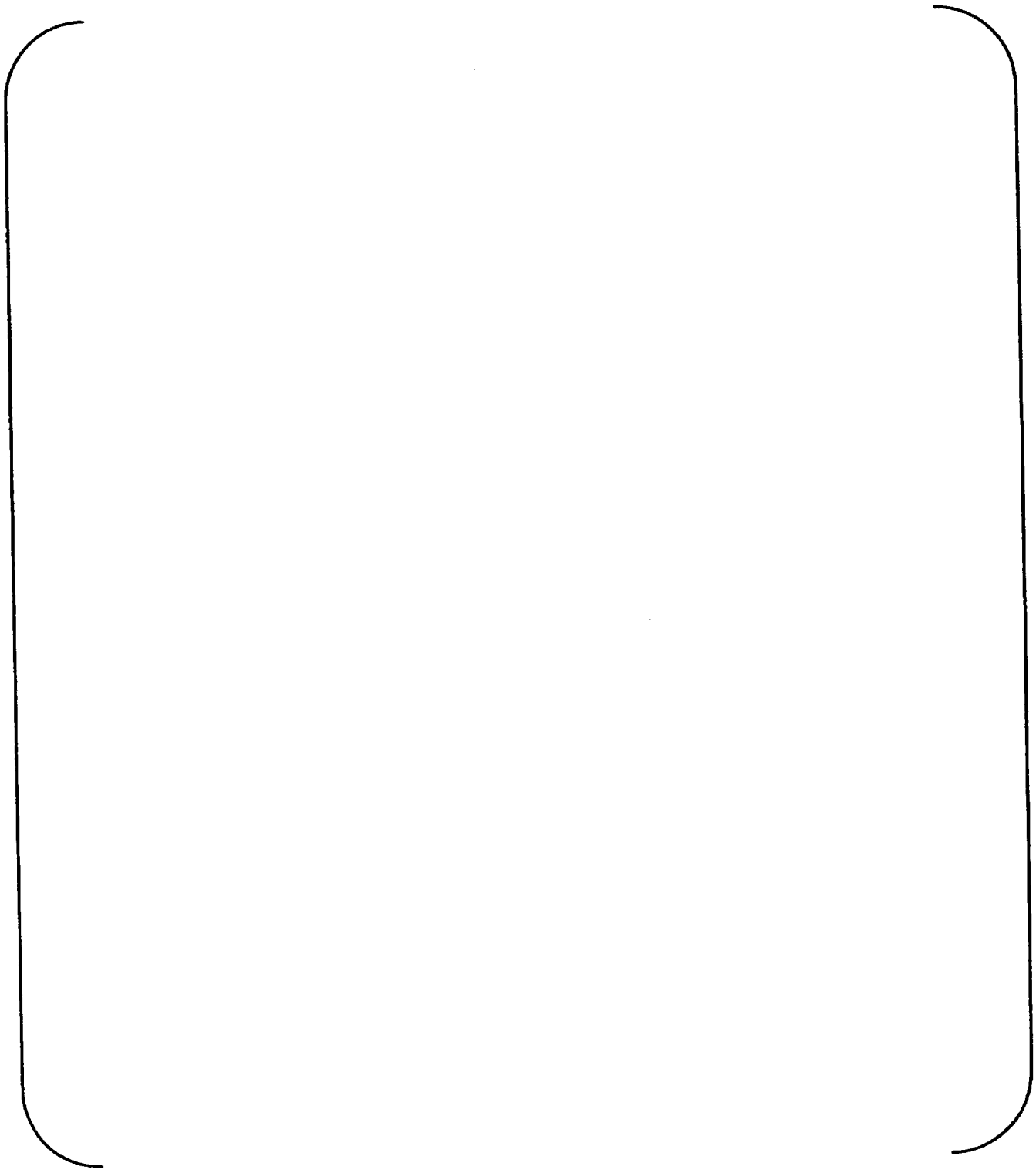

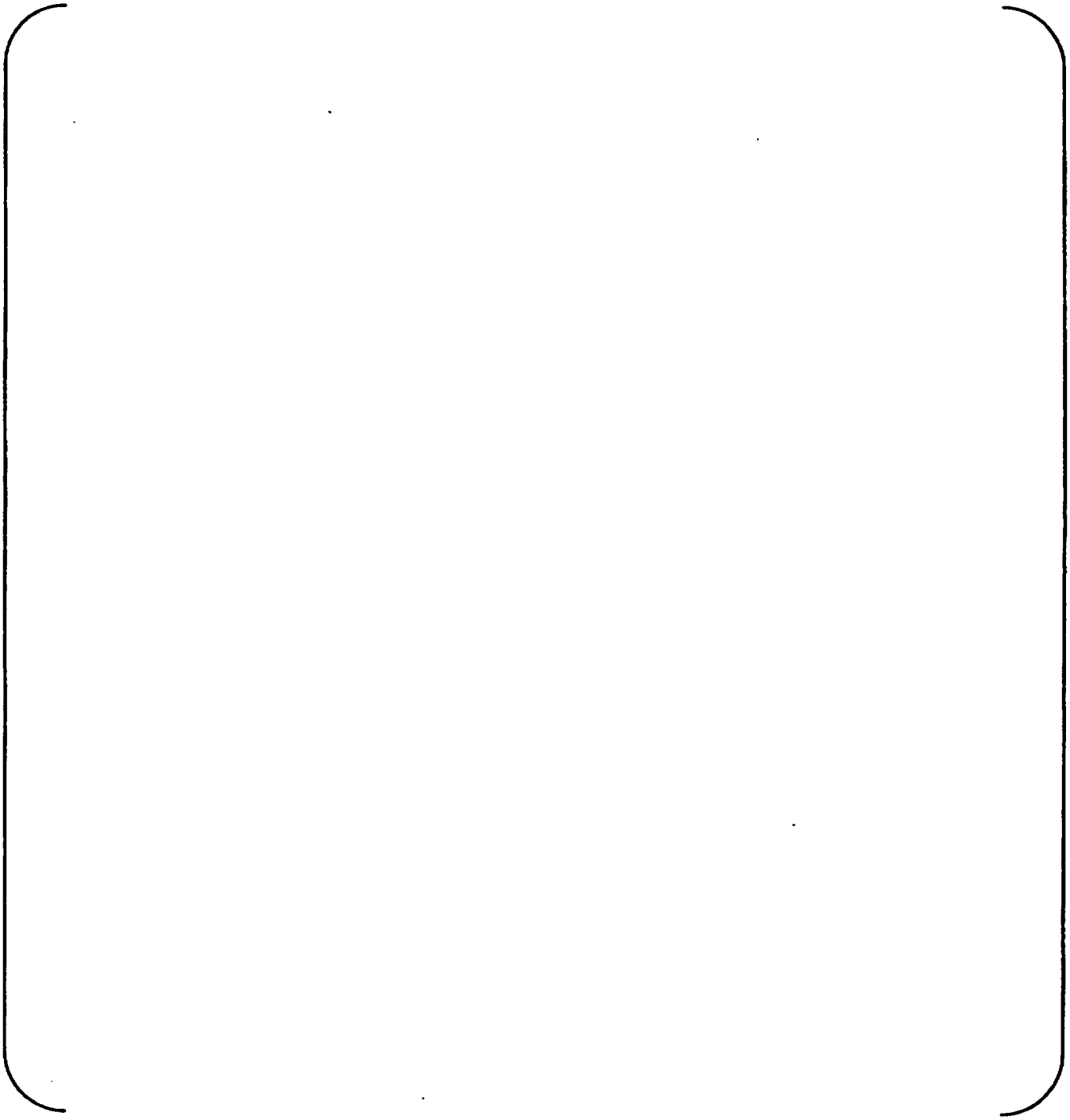

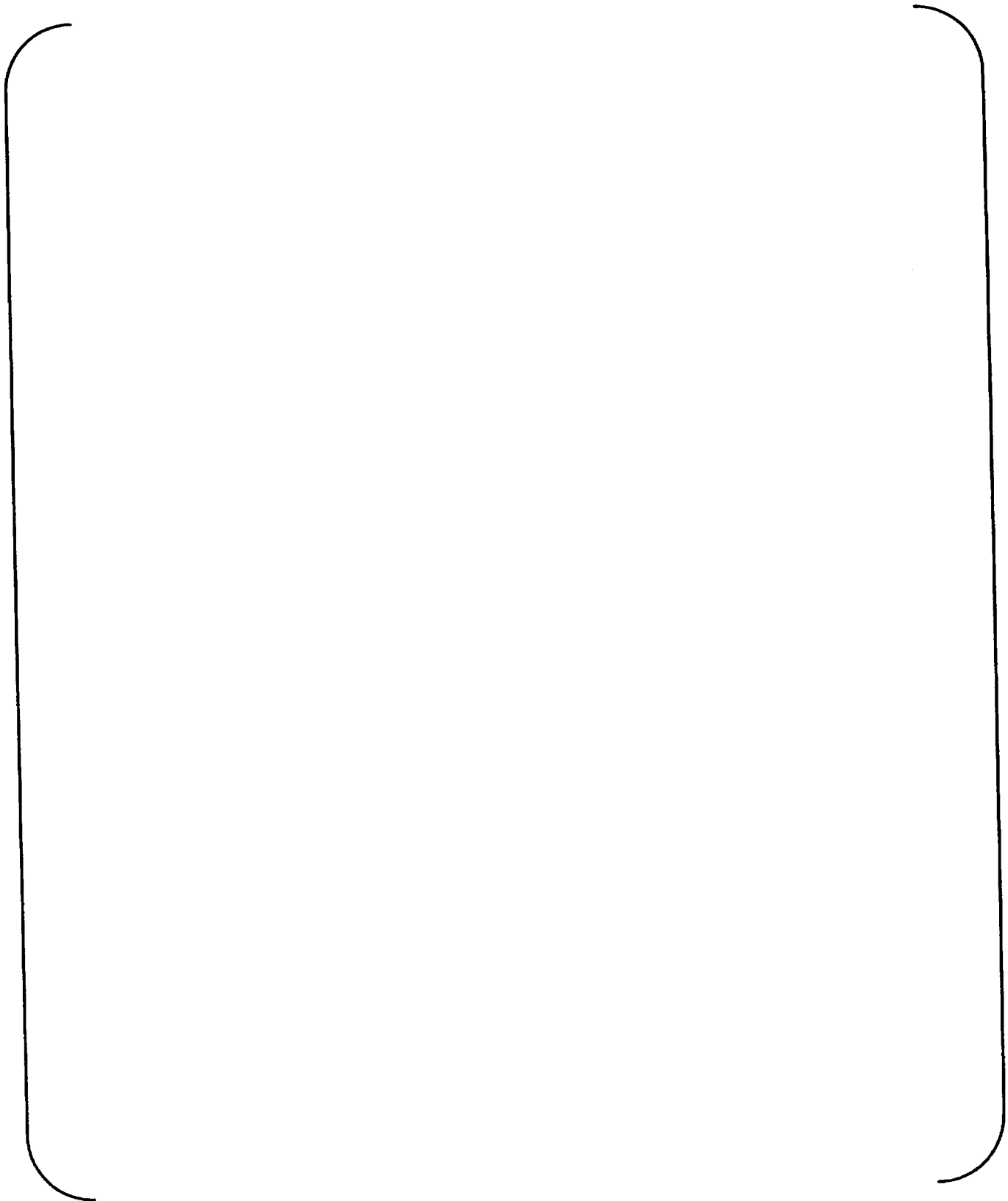

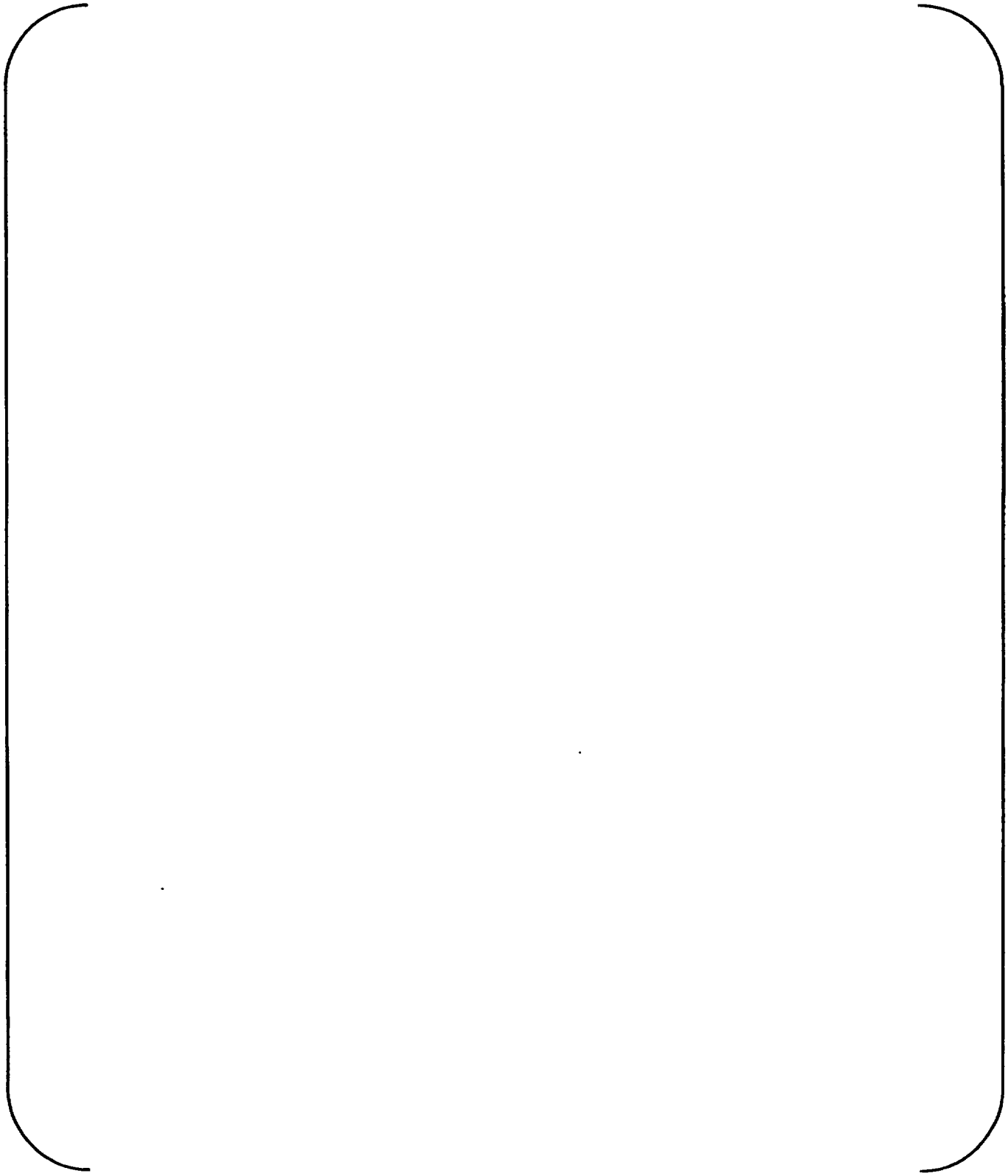

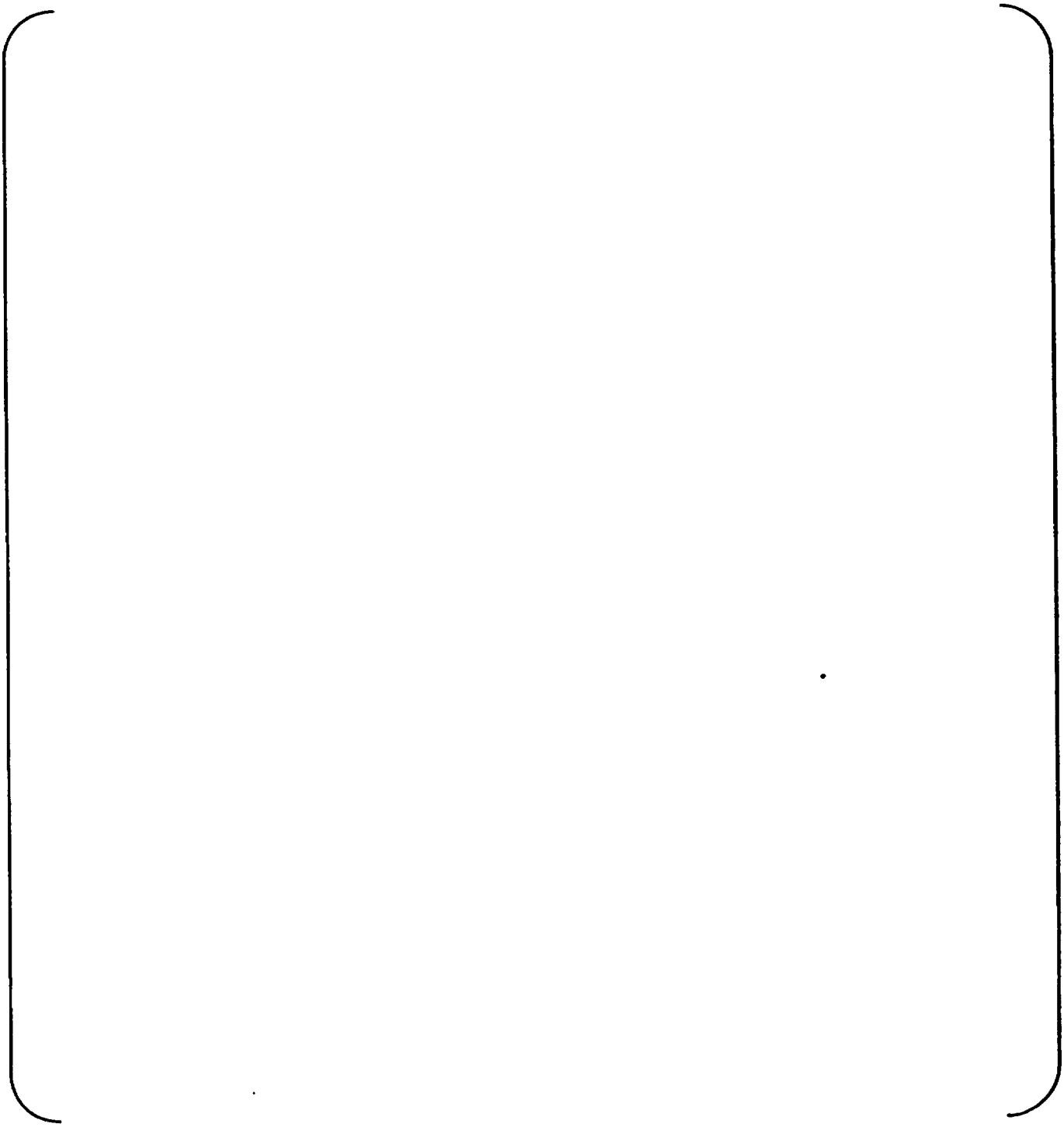

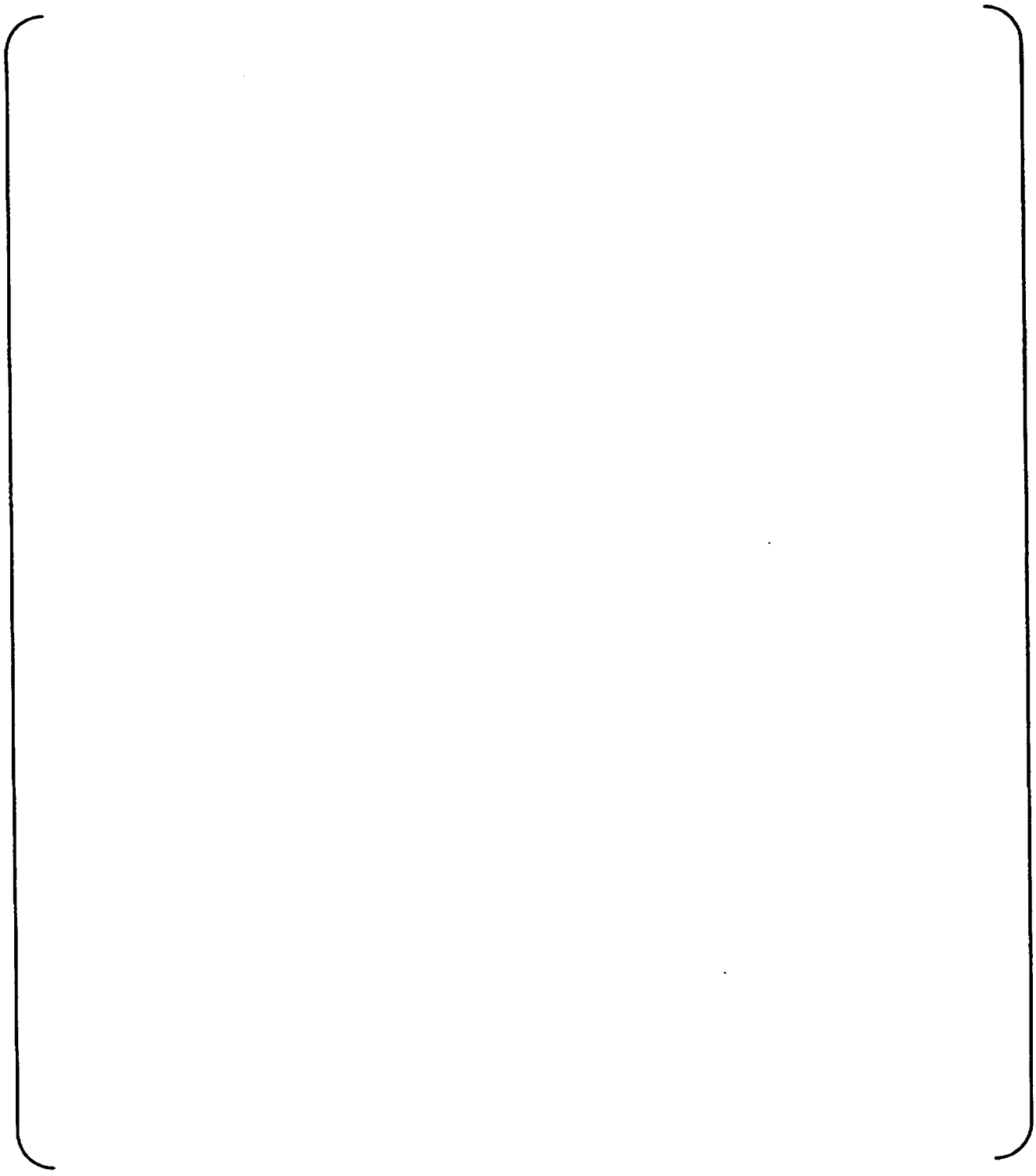

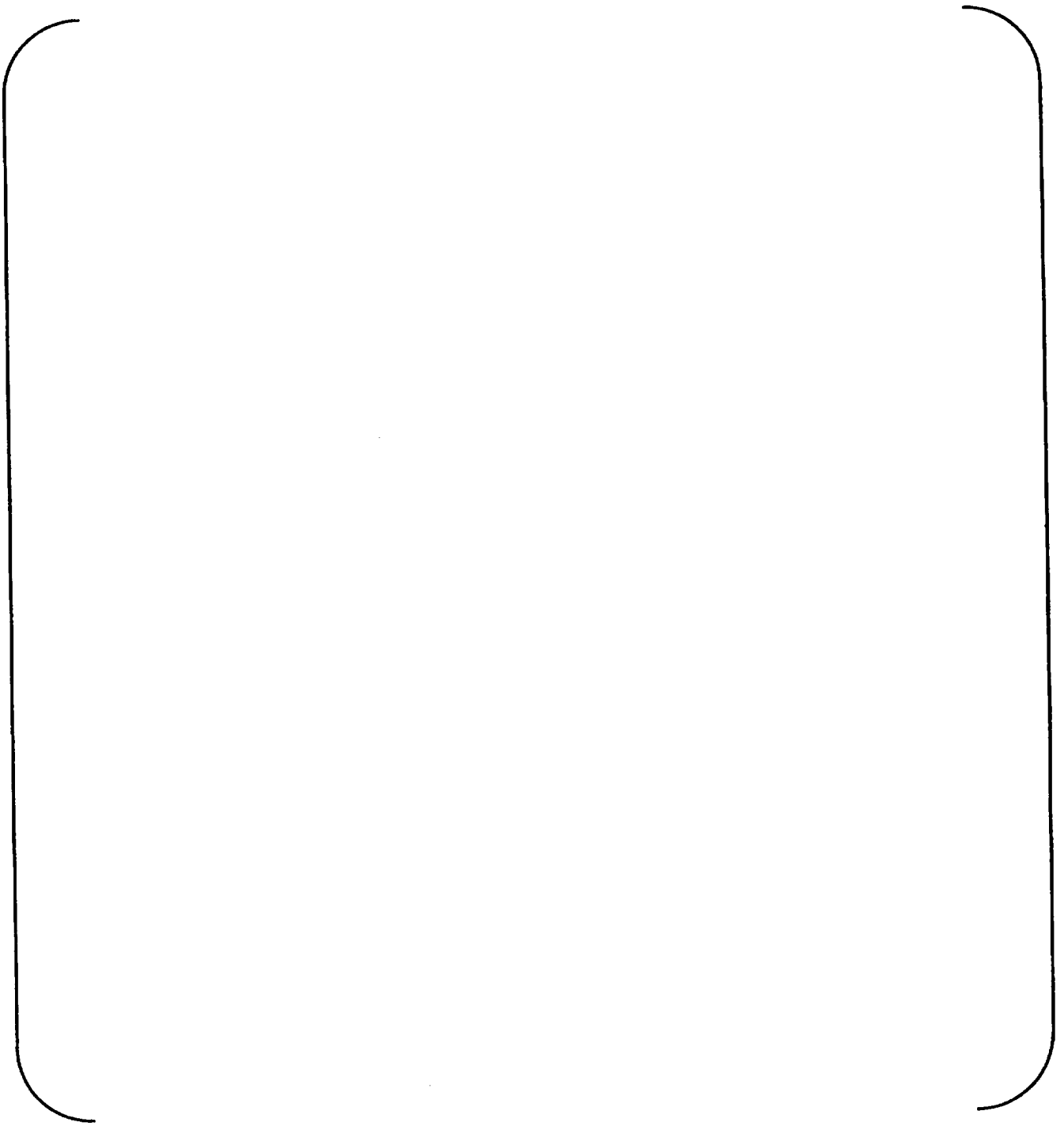

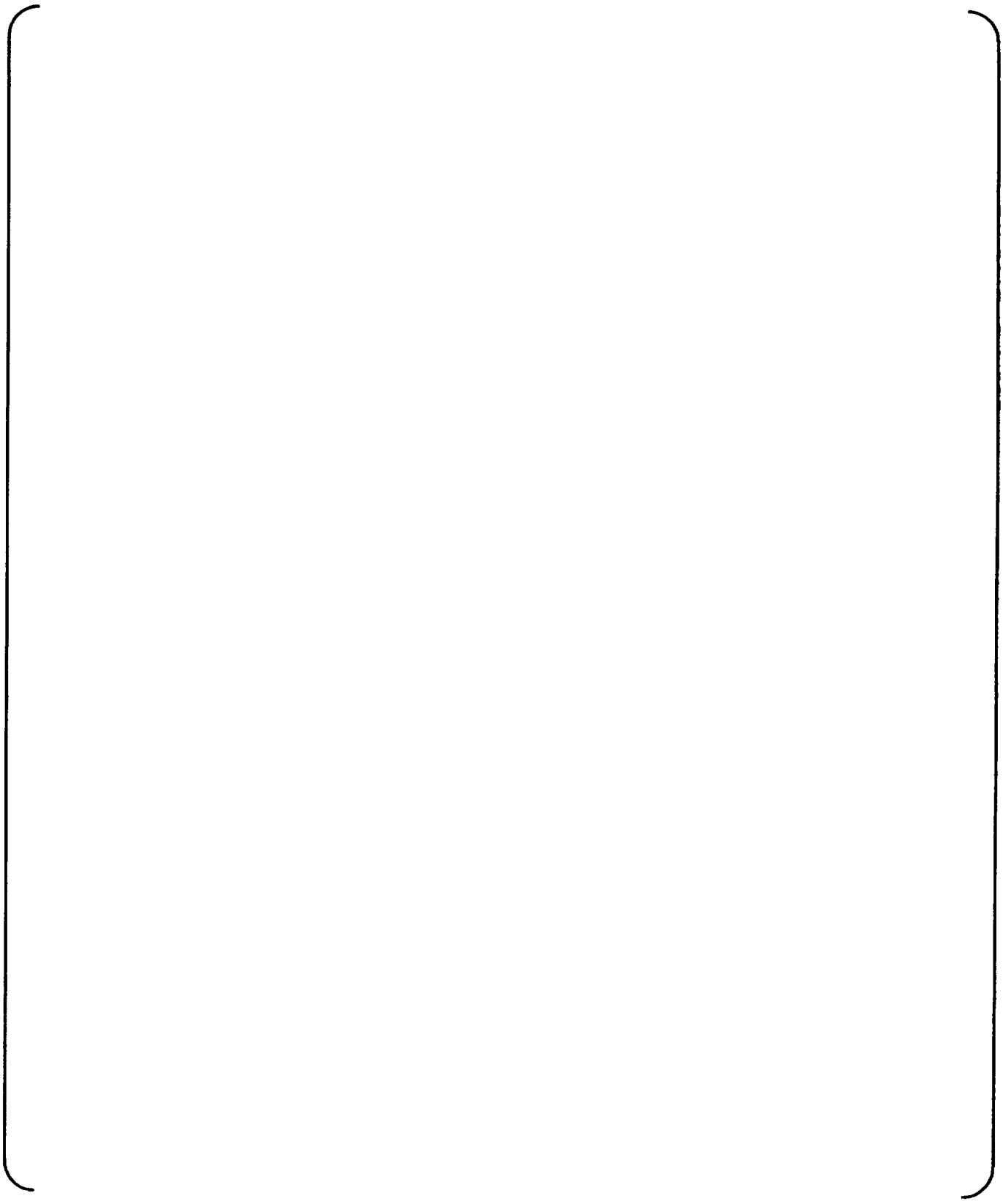

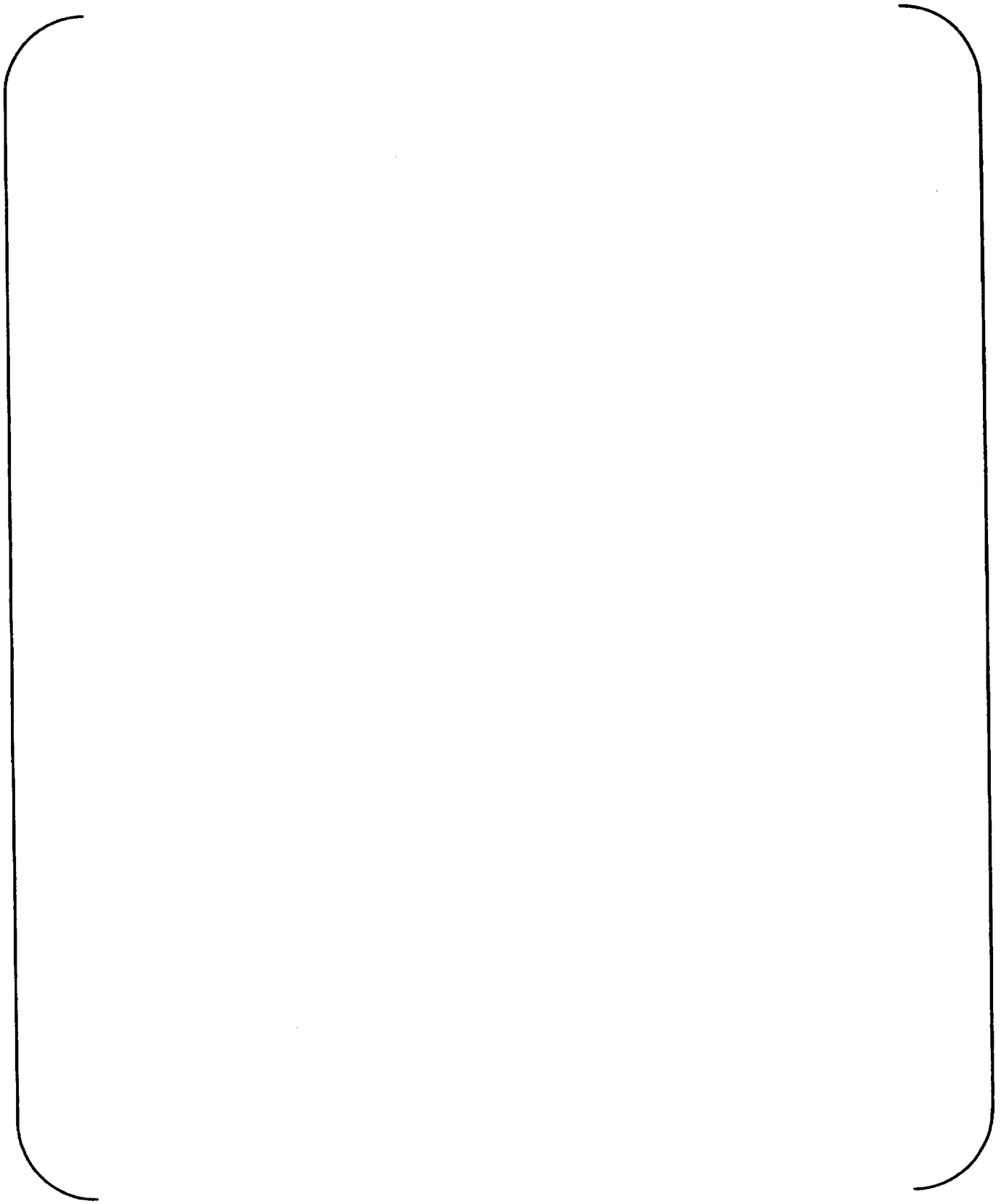

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