

THE UNIVERSITY OF CALGARY

Cumulonimbus

by

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## **Abstract**

*Cumulonimbus* is a work for orchestra that imitates each developmental stage of a meteorological event by translating them into a harmonic language and a musical form. It is scored for: two flutes, two oboes, two clarinets, two bassoons, four horns, two trumpets, bass trombone, tuba, timpani, tom-toms, snare drum, bass drum, tam-tam, glockenspiel, piano and strings. It is a single movement piece with varying tempos and has an approximate duration of nineteen minutes.

The thesis also contains an introductory essay which describes the musical materials used in the piece.

## **Acknowledgements**

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## Introduction

*Cumulonimbus* is a composition that I have written that synthesizes three fields. I have combined elements of meteorology, psychology and music which all share an active role in expressing the moment-to-moment developments within the work. On the simplest level, the title that I have given to the piece refers to a meteorological phenomenon. However, the musical form and harmonic language that I have created reflects the way in which a *Cumulonimbus* phenomenon develops.

In Lutgens and Tarbuck's book The Atmosphere : An Introduction to Meteorology, a point-form summary of the event is given.

1. The cumulus stage in which updrafts dominate throughout the cloud and growth from a cumulus to cumulonimbus cloud occurs.
2. The mature stage characterised by violent weather when downdrafts are found side by side with updrafts.
3. The dissipating stage dominated by downdrafts and entrainment causing evaporation of the structure.

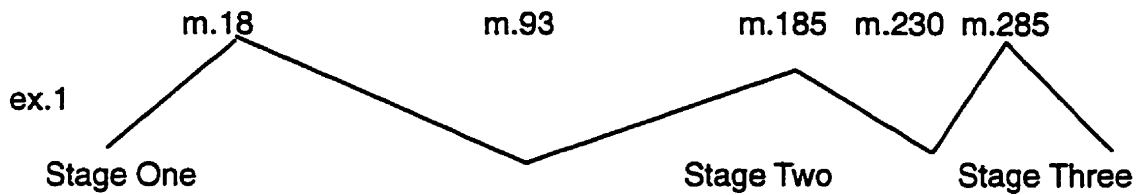
( Lutgens and Tarbuck, 1989, P.262 )

The updrafts found within the first stage metaphorically suggest a slight building of intensity until the first peak of the piece is reached. The second stage suggests a musical context in which the updrafts and downdrafts are imitated on several levels: gesturally, harmonically, registrally and dynamically. The third stage suggests a dissipation of intensity which leads finally to a sense of resolution.

The psychological element within the piece also operates on a number of levels. Fundamentally, *Cumulonimbus* is a tone poem that expresses emotional elements found deep within the primordial human psyche. It is my opinion that the human animal responds to danger on an instinctive level which is a legacy from our distant past. In order to present this idea within a musical context, I began by imagining a landscape. I envisioned a lone person standing in the middle of a wheat field witnessing the onset of this ominous elemental event. As time passes, the storm moves towards the subject until he is enveloped by the ferocity of the cumulonimbus phenomenon. Finally, the storm passes and a sense of safety and resolution returns to both the subject and the landscape.

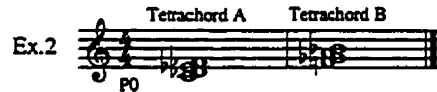
## Analysis of the Harmonic and Motivic Materials

I have divided the work into the three sections (ex.1) which correspond to Lutgen's and Tarbuck's three stages of cumulonimbus development. I have created a row which, in its contour, reflects both the musical and meteorological form.



The first peak is reached almost immediately, and it is at this point that the phenomenon's stage one updrafts are paired with the music. The downward arch gradually gains momentum building to the second peak at the second, mature stage of the cloud's development. There is a brief "calm before the storm" until the piece's true peak of intensity is reached. Finally, the last dissipating stage brings the piece and the phenomenon to its resolution.

In response to the deep purples, blacks, and distant flickers of light found within the cloud cover, I have created a pair of chromatic tetrachords (ex.2) that define these two colours based upon the density of their colours and sounds.



In my opinion, tetrachord A (0,1,3,4) is black because it has a denser structure than tetrachord B (0,1,4,5) which is purple. These colouristic elements are used in the piece either as a sustained sonority (referring to the distant event horizon) or as melodic material. In ex. 3, the bassoon combines both of these gestural elements into what I call the "triplet" motive.



To create the effect of "distant flickers of light", I have developed a two-part motive that imitates the way in which lightning flashes throughout the cloud cover. The "lightning" motive (ex. 4) is a rhythmic gesture which states the row in various transpositions throughout the piece.



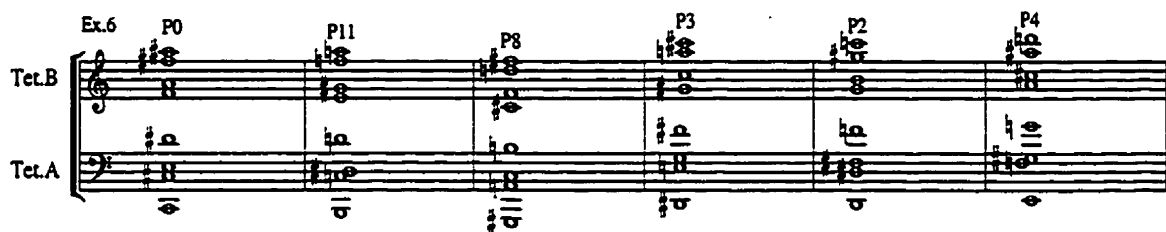
Each time this motive occurs, it is followed by the bass drum's imitation of distant rumblings of thunder. To give the listener a sense of the event drawing nearer, the amount of time between these motivic elements is decreased upon each statement.

The twelve-tone series is directly extracted from tetrachords A and B (ex.2). I generally divide the intervals found within an aggregate into levels of hierarchy encompassing the majority through to the minority.

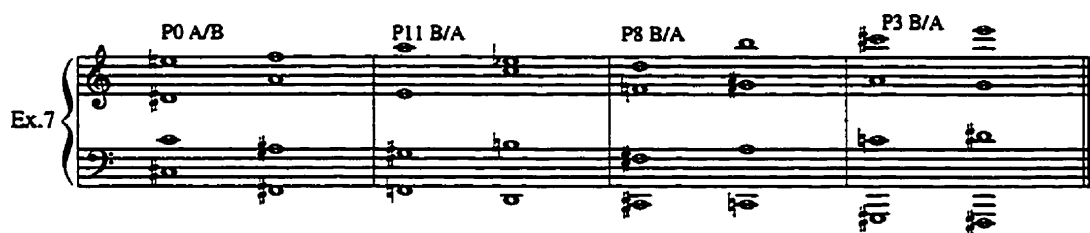
Because minor and major seconds and their inversions permeate the tetrachords, they are the majority of intervals found within the row, occurring six times. The next intervalic set is dominated by minor and major thirds, and so they occupy a slightly lower order, occurring three times. Finally, the perfect fourths, perfect fifths and tritones occupy the lowest order, occurring twice.



I created progressions (ex. 6) from the permutations of the two combined vertical aggregates by following the row and interpreting each note as the bass note of the chord until all of the notes in the series are used. Therefore, the first hexachord of the row will generate the following progression:  $P^0$ ,  $P^{11}$ ,  $P^8$ ,  $P^3$ ,  $P^2$ ,  $P^4$ .



The tetrachords can also be used to create four-voice progressions (ex. 7) which follow the movement outlined above.



I have also created a way of tripling the available series by generating two more rows based upon the original. The first is one which I call the inverted interval series. This series inverts each successive interval found within the original generating an angular multi-registral row. This has the same pitch class content as  $I^0$ , but by maintaining the exact intervals it creates a different melodic contour. The table (ex. 8) shows the way in which the first hexachord of this series is generated :



<u>Original</u>	<u>Inverted Interval</u>
Major seventh	minor second
minor third	Major sixth
Perfect fourth	Perfect Fifth
minor second	Major seventh
Major second	minor seventh



This series can be used according to normal serial procedures (P, R, I, RI) to create melodic materials and harmonic sonorities (diads, trichords and tetrachords).

The second generated row is called the Major-minor opposite interval series because each interval within this series is the opposite of the original. A major seventh becomes a minor seventh, a minor third becomes a major third and so on. This row is generally used harmonically rather than melodically and is therefore divided into hexachords. The reason for this is that the Major-minor opposite interval series will often generate repeated notes that require adjustment if used melodically. The table (ex. 9) shows the way in which the first hexachord of this series is generated:

<u>Original</u>	<u>Major- minor opposite interval</u>
Major seventh	minor seventh
minor third	Major third
Perfect fourth	Perfect Fifth
minor second	Major second
Major second	minor second



## Analysis of the Piece

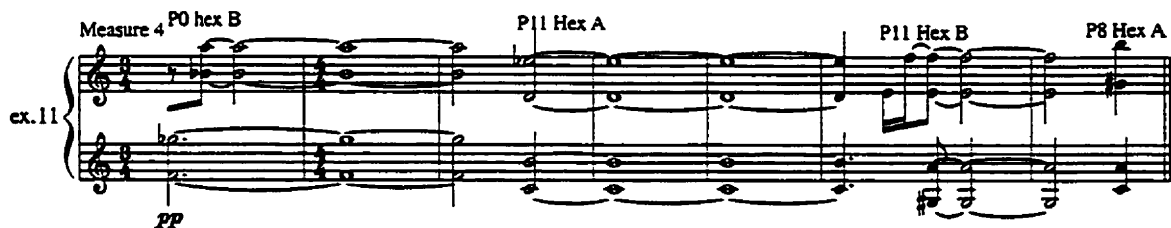
Because the form of *Cumulonimbus* closely reflects the developmental stages of a meteorological event, I have chosen to link the analysis of the piece with each phase of the storm.

In the opening measures of the piece, I require the members of the woodwind, brass, and string sections to imitate the sound of wind by exhaling. In order to do this, each of the performers must shape their mouths similar to the way in which they would pronounce the word "who". Coupled with the use of crescendi and diminuendi, this gesture closely imitates the sound of the wind's gusts. While this effect is being presented, the glockenspiel enters with a motive that grows out of the "wind". I chose the glockenspiel because it is the instrument which most accurately reflects the sound of a wind chime and because it is an instrument which can be controlled rhythmically, intervallically, and dynamically whereas a wind chime cannot.

In order to imitate the natural rhythm of the wind flowing through the chime, I require the percussionist to treat this introductory material as an unmetred cadenza.



The entrance of the glockenspiel introduces the first hexachord of the row giving the audience a partial sense of the linear musical language. While the glockenspiel and orchestra continue playing these two motives, the first entrance of the piano (m.4) is inserted into the texture. As the "wind" motive slowly fades away, the piano introduces the listener to the progression generated by the row (ex.11) beginning with tetrachord B.



In order to create a harmonic canon, the piano is followed by the introduction of the first tetrachord (P<sup>0</sup>A) presented by the strings and winds as another motive.

In conjunction with the staggered string entrances, the distinctive colour of the oboe and bassoon introduce the first examples of the "triplet" motive, activating the texture. However, the four notes of this ascending and descending woodwind figure are not part of the harmonic progression. These are merely preparatory gestures which ornament the sustained notes in the strings, which add colour to the attack of the string entrances and reinforces within the listener's mind the sound of the

harmonic language. This example (ex.12) shows the way in which the “triplet” motive found in the oboe and bassoon adds interest to the texture.

Ex.12

Ob. m. 7 m. 10 tet B m. 14 m. 16 tet B

Bsn. tet A

Str. Hex A PO

The strings, woodwinds and piano continue the progression while the final motive is presented. This is the first statement of the paired “lightning and thunder” motive (ex.4). The interval of time between the “distant flickers of light” (flute) and the “thunder” (bass drum) creates an illusion of distance. Because the interval is the longest, the storm is the furthest away at this first presentation.

The flute’s notes are meant to be understood as an aural representation of the visual phenomenon. In response to the “lightning” motive, the articulation of the thunder (bass drum) is obscured in the same way that sound travels and reflects throughout the landscape.

ex.13

m. 18 Solo P3

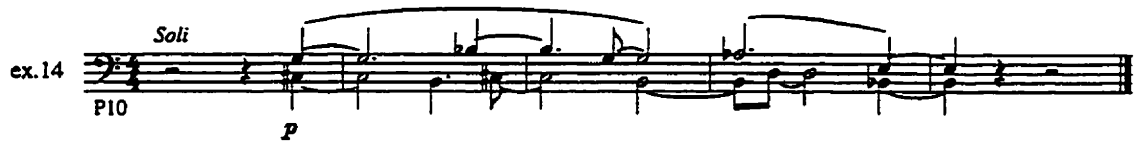
Fl. *mp*

m. 25

B.D. *p* *mp* *pp*

The transposition of the flute’s statement of the row is extracted from the ongoing progression in the piano; however, this particular transposition has already been used. By reintroducing the transposition, I am attempting to prepare the listener for later canons and fugues within the piece, and to restate the harmonic canon. The strings, piano and woodwinds continue to rotate through the progression generated by the prime series until they gradually thin out in preparation for the end of the first section of the piece.

The second formal section (the maturation stage of the phenomenon) begins as an elision. The piano and upper strings fade out and are replaced by the cellos and basses which are in turn doubled by the timpani’s glissandi in the background. The middle ground is occupied by the two bassoons playing a “gently rocking” motive (ex.14) that is derived from the two tetrachords of P<sup>10</sup>.



At m. 37, the oboe presents the main thematic material of the piece (ex.15). I have chosen to avoid the obvious and predictable presentation of the row and have replaced it with a melodic rather than harmonic version of the notes extracted from the two tetrachords of  $P^{10}$ . This motive is derived directly from the preparatory woodwind ornaments found in measures ten through thirty.



The violas then elide with the oboe soloist and provide a consequent to the oboe's antecedent phrase. The viola's phrase is also derived from measures ten through thirty, but it is generated out of the sustained strings found earlier (ex.11).

Each of the background, middleground and foreground phrases are repeated following the harmonic progression of the row, until m.53 where  $P^0$  (solo flute) is stated melodically for the first time. Apart from the closing measures of the piece, and the "lightning and thunder" motive, this is the only example of the row being stated.



In this section I combine a multiple of row forms. While the flute (foreground) plays the prime order of the row, the violas play  $P^{11}$  (middle ground) and the cellos and basses (background) play the inverted interval series  $P^0$  *pizzicato*.

The horns enter at m.58 with a statement of a homophonic four-part texture which operates as punctuation at the ends of orchestral phrases (ex. 16). This statement is intended to remind the listener of the piano music at the opening of the piece (m.4).



The horns play the inverted interval series  $P^3$  at a point when the transposition  $P^8$  should occur. This reintroduces the harmonic canon that appeared at measure four. As this phrase ends, the cellos and basses state the row (inverted interval series  $P^{11}$ )

ending it with a descending three-note gesture doubled by the tuba (ex.18). This entrance is also a restatement of music that occurs in the first measures. It is a rhythmically augmented version of the oboe and bassoon motive that added colour to the string's sustained entrances at the opening of the piece.

Ex.18

The musical score for Ex.18 shows three staves: Tuba, Cello, and D.B. (Double Bass). The Tuba staff has a single note on a whole rest. The Cello and D.B. staves show a descending three-note gesture (G2, F2, E2) with dynamics *pizz*, *p*, *mp*, and *mf*. The Cello staff also has a dynamic *p* and a dynamic *mp*. The D.B. staff has a dynamic *p* and a dynamic *mp*. The Cello staff has a dynamic *p* and a dynamic *mp*. The D.B. staff has a dynamic *p* and a dynamic *mp*. The Cello staff has a dynamic *p* and a dynamic *mp*. The D.B. staff has a dynamic *p* and a dynamic *mp*.

The combination of all of the motives found in mm. 53-61 comprises the antecedent phase of this section, leading to a new phrase which begins with a dramatic change of colour. The bassoons enter into the foreground once again with the syncopated "gently rocking" motive on the transposition  $P^8$ , accompanied by the violins which mirror the bassoons gesturally and echo the horns harmonically. The solo flute enters and states the consequent phrase as a harmonic canon with the bassoons ( $P^8$ ) until they are replaced by the lower strings (who then occupy the middle and background). The cellos and basses are again playing pizzicato (inverted interval series  $P^8$ ) while the violas enter with a consequent phrase ( $P^2$ ). The string's entrance elides with the flute, and the phrase returns to the original orchestral texture of this section. The horns enter once again with the four-part homophonic texture signalling the end of the phrase. The low strings and tuba bring the section to a close by eliding with the beginning of the next section, changing orchestral colour and ensembles.

The texture is thinned out by using only an oboe, a clarinet and a bassoon in a three-part texture. As the horns are elided with the woodwinds, a natural sense of growth from rhythmic and chromatic homophony (horns) to polyphony (winds) is achieved. While the woodwind passage is progressing, the piano presents the second statement of the paired "lightning and thunder" motive (m.74) in its highest register. Because this is the second statement of the motive, the time interval between the two parts of the motive has been noticeably shortened to imitate the effect of the cumulonimbus phenomenon drawing nearer.

On the harmonic level, the piano's entrance is treated as a harmonic canon because the woodwinds have already stated this permutation of the row within the ongoing chorale. As the chorale ends, the section is brought to a close with a piano entrance playing another statement of the "triplet" motive. Placing this motive in the piano's lowest register (which is the opposite of the earlier "lightning and thunder" motive), making it a different instrument altogether. To add resonance to the texture, the upper line of the piano is doubled by the sustained clarinet. In order to

elide the end of this section with the beginning of the next, the tam-tam enters to mask the division between the two, which signals the beginning of a major formal point in the piece.

The form of *Cumulonimbus* follows the development of the elemental event and the “shape” of the row, and at m.92, the piece arrives at the point of lowest intensity. This also occurs at the approximate middle of the second (or maturation) stage of the phenomenon’s development, and is associated with the D natural found in the row.



The cellos and violas enter at m.92 with a chorale that is played *pianissimo* in their warmest registers. The woodwinds and double basses enter at the ends of phrases to add a rich, orchestral warmth to the texture, with material derived from the piano and strings opening statement at m.4. In parallel with the harmonic progression first stated at the opening of the piece, this chorale also moves through the row until all of the possible transpositions have been used. The chorale is reminiscent of the sustained, distant flavour of the strings first introduced in the opening measures. The chorale ends at m.111 and, as the texture gradually intensifies, the next formal level is being approached by ascending to the E natural in the formal series.

Once again, the use of elision plays an important role in joining the end of one section to the beginning of another. In m.110, the solo clarinet links two sections by sustaining the G natural of the violins until the entrance of the oboe. This makes musical sense because both sections of this part of the piece are comprised of sustained pitches. However, the texture is completely different in the new section because the doublings of each of the pitches are combinations of staggered and simultaneous entrances (ex. 20). The effect of these entrances can be associated with the approaching squall line on the distant horizon. The entrance of the snare drum at m.115, a rhythmic military gesture should be heard metaphorically as an oncoming battalion which represents the onset of the squall line.

Ex.20  
m. 112

W.W. Cl. Ob. *p* Bsn. *p*

S.D.

Pno. *p* *ppp*

Str. *ppp*

The horns return at m.124 with a homophonic four-part texture leading to a solo horn sustaining a D natural, eliding the end of this section with the beginning of the next.

The cellos and violas present the “gently rocking” motive normally played by the bassoons (ex.14) until the piano enters with the third statement of the paired “thunder and lightning” motive. During the presentation of this motive, the violins imitate the cellos and violas as a background accompaniment for the bassoons which state the “triplet” motive in the foreground. Each of these motives are repeated following the order of the series progression until the entrance of the strings at m.143 leads to the next important formal point in the piece.

ex.21

stage1 stage2 stage3

po

Referring once again to the series and the stages of formal development stated by the row (ex. 21), the string's entrance at this point brings the piece to the G flat in the second hexachord. This section is a chorale that begins in the middle registers of the violins and violas, gradually building in intensity and volume until it reaches a peak at m.185. It is at this point that the B flat in the formal series has been reached.

This peak is prefaced by the removal of the violas and the insertion of an agitated bassoon solo at m.169, increasing the intensity of this section. This is made possible by the “triplet” motive and the harmonic language itself. In order to increase the intensity even further, the cellos enter at m.168, and the basses enter doubling

the cellos, at m.183.

With the arrival of the sub-peak of the maturation stage (B flat in the formal series), the combined forces of the orchestra are finally brought to bear. The entrance of the brass (at m.185) and the percussion (at m.187) herald the thunderous power of the cumulonimbus phenomenon. The first percussion (snare and tom-toms) imitates the cracks and bangs of the oncoming storm and the timpani and bass drum doubling the strings imitate the way in which the thunder rumbles throughout the landscape. The woodwind gesture (m.189) imitates the swirls and gusts of wind in this increasingly violent storm with material derived from the “triplet” motive.

**Ex.22**  
m.189 a2

Fl.  
P9a  
Ob.  
P10 ab  
Cl.

In this section the snare drum, lower strings (doubled by the tuba) and bassoons announce the arrival of each of the combined tetrachords as they progress throughout the series, using another statement of the “triplet” motive.

**Ex.23**  
m.187

Bsn.  
Perc.1  
Str.

This motive is sandwiched between two statements of a four-part harmonic canon, first in the trumpets, then in the horns.



Ex.24  
193

Bsn.

Hrn.

Hrn.

Tpt.

Perc. I

Str.

This formal section continues until all of the transpositions of the row have been stated whereupon the piece arrives at another point of formal importance. After passing the sub-peak the formal series (B flat), the harmonic and rhythmic intensity diminishes noticeably, bringing the audience to a point in the piece that I call the “calm before the storm”.

ex.25

stage 1

stage 2

stage 3

P0

Arriving at the A natural in the formal series, the brass and woodwinds combine the “gently rocking” motive (ex.26) with three and four-part choral textures uniting the two orchestral sections into statements of antecedent and consequent phrases. Furthermore, each section is given its own form of the series combining different forms of the row and harmonic canon as constructional elements. Therefore, the brass choir opens this section with the prime order of the row and its progression, while the woodwinds answer using the inverted interval series as a progression.

Ex. 26  
211

Fl.  
Ob.  
Cl.  
Hrn.  
Hrn.  
Tpt.  
Trmb.  
Tba.

POP!!  
P8

In keeping with the shape of the formal series, the two ensembles *diminuendo* over the next eighteen measures in preparation for the next section, arriving at the G natural (measure 230). Once again, continuity is achieved by joining sections together with an elision, and in this case the entrance of the cellos (m. 227) is another example.

The section beginning at m.230 is best described as a pointilistic fugue, which is intended to imitate the rhythm of falling rain around the orchestra. This effect is made more convincing by combining the opening of the fugue with the sound of wind originally found at the beginning of the piece. The subject of the fugue is unusual in that the melodic line is divided into phraselets and assigned to the soloists in the woodwind section. Eventually, the violin entrance at m.237 shows the way in which the fugue subject and all of the separate gestures found in the primary exposition are combined to create one distinct series melodically and rhythmically.

Ex. 27  
230

Fl. *L* *p*

Ob. *L* *p*

Cl. *I. LLP0* *p* *L* *IIPI1* *p*

Bsn.

Perc. I

Pno. *(IIPI1)* *p*

Vln. I *M.M.O.LP0*

Cello *p*

236

*L* *p* *(IIPI3)*

*L* *IIPI3* *p*

Bongos *p*

*LLP8* *solo* *p*

The subject is also presented in the percussion section. The entrance of the bongos (m. 240) shows an example of the subject's rhythm being used as a fugue statement.

ex.27

240 Bongos

*p*

247

Ultimately, the accumulation of entrances creates an increasingly dense orchestral texture quickly raising the intensity of the section. This follows the shape of the formal series as it ascends sharply from the G natural to the D flat, generating the illusion that one is in the centre of a quickly developing torrential downpour.

ex.28

stage1 stage2 stage3

*p0* *v*

The fugue consists of two different series that are in operation simultaneously. From the opening of the fugue, the cellos use the major-minor opposite interval series while the rest of the orchestra uses the inverted interval. As the fugue develops and entrances grow exponentially, a wall of sound is created until the entire brass section enters at m.269 with a restatement of the harmonic progression with its rhythm extracted from the fugue subject itself.

Ex.29

269

Hrn. P0a P11a P11b -3- P3a P2b P4b -3- P6a

Hrn. *f*

Tpt. *f*

Trbn. *f*

Tba. *f*

The strings enter in unison with the brass at m.279 bringing the piece to the highest point in the formal series and to the point of greatest intensity in the piece. Then a new section begins (m. 285).

This section opens with a statement of the two tetrachords stacked on top of each other and played *sforzando* as an orchestral “shot” (ex. 30). This statement of the eight-note chord imitates the sound of lightning striking directly overhead, and announces the divisions between subsections within this larger section.



This section consists of two pairs of ostinatos that operate as accompaniment offset by entrances of the winds, brass and upper strings. The percussion section has within it a paired ostinato that is divided between the timpani and tom-toms moving in rhythmic polymeter. While the timpani part is in 9/8, the tom-toms part has a three measure-long ostinato in 4/4.



The percussion section is offset by the violas, cellos and the basses (ex. 32) who play their own six measure paired *ostinato* doubled by the tuba and trombone at the end of each phrase.



While these two pairs of *ostinati* are occurring, the woodwinds, trumpets, violins and horns (in combination with the low brass) enter with different gestures. For example, the trumpets (m.286) state the tetrachord  $P^0$  split into diads as a motive.



The trumpets are then answered by the woodwinds (ex. 34) in a restatement of the "triplet" motive, leading to the next tetrachord in the harmonic progression.

Ex.34  
287

The strings enter with an arpeggiated triple-stop answering the woodwinds (ex. 35):

Ex.35

Finally, the horn and low brass gesture is presented in order to announce the re-entrance of the trumpets and their motive.

Ex.36  
292 P<sup>0</sup>

Hrn. 1+3

Hrn. 2+4

Trb.

Tba.

Both of these motives are repeated, following the progression of the series, until the arrival of a brief interlude and change of texture at m. 303. This interlude restarts the harmonic progression with the orchestral “shot” first found at m. 285 ( $P^0$ ). This gesture is repeated, dividing the interlude into antecedent and consequent phrases based upon the melodic language of the oboe. The oboe soloist enters with melodic material that has been generated by hexachord B ( $P^0$ ). While this is occurring, the cellos play a melodic line in counterpoint with the oboe ( $P^{11}$ ). As background accompaniment, the bassoons enter simultaneously with a simple figure on transposition  $P^{11}$  while the piano occupies the middle ground stating the harmonic progression. The antecedent phrase ends at m. 309 with the restatement of the orchestral “shot” (ex. 29), then a brief consequent phrase begins, leading back to the section containing multiple *ostinati* which rejoins the harmonic progression from where it left off at m. 302 ( $P^3$ ). and at m. 315 the entire orchestra re-establishes the harmonic progression ( $P^8$ ). A change in orchestral texture (m. 334) begins the gradual transition from the piece’s peak of intensity to the final resolution.

Based upon the viola’s agitated ostinato from the previous section, the first and second violins present tetrachord  $P^3B$  in combination with the lower strings (ex. 37). As another example of paired *ostinato*, the violas, cellos, and basses operate as the harmonic foundation of the orchestra ( $P^3A$ ).

Ex.37

Ex. 37 is a musical score for five string staves: Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is in 4/4 time and features a series of eighth-note patterns across the strings, marked with *ff* and *Divisi*. The patterns are repeated across the staves, creating a rhythmic texture.

With the arrival of each new chord in the progression, the strings are paired with the piano, tom-toms and bass drum as another version of the orchestral “shot” (ex. 38). Each of the “shots” are used to punctuate the introduction of each of the paired soloists.

337

Ex. 38 is a musical score for three percussion staves: Piano (Pno.), Tom-toms (Timp.), and Bass Drum (B.D.). The score is in 4/4 time and features a series of eighth-note patterns across the piano, tom-toms, and bass drum, marked with *sf*. The patterns are repeated across the staves, creating a rhythmic texture.

At m.334 the trumpets and horns play a gesture which is reminiscent of the “triplet” motive, but the triplet has been replaced by a simple eighth-note anacrusis (ex. 39). However, this truncated version of the motive still operates as the ornament of a sustained note.





Ex.41

357

Fl.

Ob.

Cl.

Bsn.

P7 Solo

f

P10a

P9a

At m. 361 the entire orchestra begins it's gradual *decrecendo* in preparation for the final stage of the piece, reinforcing the diminuendo in a systematic reduction of the texture in the violins (ex.42) from a tetrachord to a trichord (m. 362), to a dichord (m. 368) to a single note (m. 373).

Ex.42

m.361

Vln.1

Vln.2

P9

P7 Unison m.368

m.373

f

mf

mp

p

Unison

The final solos are abbreviated, relaxing the texture. The flutes and oboes are the last to state the two versions of the "triplet" motive.

Ex.43

357

Fl.

Ob.

P7a

P7b

f

mf

Finally, the trumpet enters with the last solo bringing the the formal series to it's final stage (ex. 44) where the section is brought to a close with the last statement of the "thunder and lightning" motive in the piano as the first violins and cellos *decrecendo* to the point of inaudibility.

368 *Solo*

Ex. 44

The formal series and the phenomenon have achieved the point of resolution, arriving at the F in the formal row, which marks the beginning of a brief closing fugue. Only the strings play the fugue with the first violins presenting the subject on transposition  $P^0$ .

Ex. 45

The cellos answer (ex. 46) with the inversion of the row ( $I^{11}$ ) which is used to create contrary motion within this contrapuntal texture.

Ex. 46

A countersubject uses the inverted interval series thereby combining the three forms of the basic material.

Ex. 47

Each of the three fugal elements are rhythmically similar because the introduction of an active countersubject would be contrary to the shape of the formal series. The fugue is a culmination point for all the material in the piece, but it is not used to intensify. Once the voices have been presented, they begin to drop out, creating a formal "sigh". As this is occurring, the "wind chime" motive from the opening of the piece is reintroduced, resolving the dramatic and formal circle.

The piece closes with the lower strings sustaining a tritone, while the winds enter with the "gently rocking" motive on the two tetrachords of  $P5$  (the last chord in the row). To punctuate the ending, the upper strings enter at m. 456 sustaining an eight-note chord with the winds and lower strings.

Ex. 48 P5ab  
457

Fl.  
Ob.  
Cl.  
Bsn.  
Glock  
Vln.1  
Vln.2  
Vla.  
Vc.  
D.B.

### Conclusion

*Cumulonimbus* has been a difficult piece to write. Attempting to combine all of the musical, meteorological, and psychological elements with the framework of an essentially musical structure, has been, at very least, daunting. I originally thought about the piece a year before starting it, when I imagined myself as the "lone person standing in a wheat field". However, I also thought that if I wanted to imitate nature and create a believable story about it, I had to be at one with it. Therefore, I think that my decision to go out and see the real thing had a more profound effect.

While I was watching the way that the phenomenon developed, I began to imagine how humans thousands of years ago must have felt as this powerful spectacle moved angrily towards them. It was easy for me to understand why this event was feared and looked upon with awe.

I generally try to stimulate visual responses through my writing. In this case, the subject matter required a lot of thought because each of the motives in the piece had to accurately reflect all of the storm's elements. For example, all storms are generally preceded by a sense of "electricity" in the air. So, how does this sound? I feel that I was able to capture this by the way in which the piece opened. The "wind" and "wind chime" motives combine well to achieve a ghostly "electricity". For another example, as the lightning flashes distantly on the horizon, we never get a sense of the power of this event until we are enveloped by its sound. The flashes seem like sprightly entities harmlessly dancing amongst the clouds until we are savagely attacked by the sound of the event's raw power. The structure of the "lightning and thunder" motive, with its inherent time interval, effectively projects that image.

The creation of the form of the piece was also difficult. How does one convincingly deal with a very common phenomenon in a medium that is purely aural, over a period of time that is shorter than the event itself? The answer did not lie in the use of classical forms, but rather the form of the event itself. The three stages of a storm (cumulus, maturation and dissipation) were presented as points within the musical form. The relative intensity of each of the stages was also presented within the musical context. The passage of time in the piece, both in relative duration and relative tension, was, in essence, drawn from the event. Therefore, accounting for all of the elements found within the phenomenon, the piece has a convincing dramatic structure.

Cumulonimbus

by

Shane Fage

Cumulonimbus is scored for:

2 Flutes

2 Oboes

2 Clarinets (B flat)

2 Bassoons

4 Horns

2 Trumpets (C)

Bass Trombone

Tuba

Timpani

Percussion 1

Glockenspiel

Tom-Toms

Snare Drum

Percussion 2

Bass Drum

Tam -Tam

Piano

and

Strings

Duration: Nineteen Minutes

The score is in C.

$\text{♩} = 90$  *colle parte*

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc2 *Glockenspiel very delicately*  
*ppp*

B.D.

*imitate the sound of wind by exhaling* *colle parte*

Vln.1

Vln.2

Vla.

Vc.

D.B.

*p* *mf* *p* *p* *f* *p* *p*



[illegible]

9

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

1. *pp* *acc b*

*acc a* *pp*

*P11 hex B* *P8 hex a* *P3 hex a* *P2 hex b*

*p* *pp* *mp* *mp*

[illegible]

22

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*test b*

*p*

*test a*

*p*

*g*

*Loco*

*P6b*

*P6a*

*p*

*P10a*

*P9b*

*pp*

*pp*

This image shows a page from a musical score, likely for a symphony orchestra. The score is written for various instruments, including Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpets (Tpt.), Trombones (Trmb.), Tubas (Tba.), Piano (Pno.), Timpani (Timp.), Percussion (Perc. 1 and 2), and Strings (Violins 1 and 2, Viola, Violoncello, and Double Bass). The score includes various musical notations such as notes, rests, and dynamic markings like 'p' (piano) and 'pp' (pianissimo). The Piano part is particularly prominent, featuring complex chordal structures and melodic lines. The string section provides a harmonic foundation with sustained notes and some movement in the lower registers.

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Puo.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*Solo*

*P*

*P10*

*pp*

*P*

*P*



46

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vla.1

Vla.2

Via.

Vc.

D.B.

ps  
*Soli*

p

L.V.

pp

fff

ff

f

v



This image shows a page from a musical score, likely for a symphony orchestra. The score is written for various instruments, including Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpets (Tpt.), Trombones (Trmb.), Tubas (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violins 1 (Vln.1), Violins 2 (Vln.2), Viola (Via.), Violoncello (Vc.), and Double Bass (D.B.). The score includes various musical notations such as notes, rests, and dynamic markings like 'p' (piano) and 'mp' (mezzo-piano). The page is numbered '52' in the top left corner. The notation is in a standard musical format with staves and clefs.

58

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trub.

Tba.

Pnc.

Timp.

Perc 1

Perc 2

B.D.

Vln. 1

Vln. 2

Vla.

Vc.

D.B.

*mp*

*pp*

*p*

*pp*

*p*

*pp*

*ppp*

*ppp*

*pp*

*mp*

*mf*

*p*

*mp*

*mf*

(this octave preferred)



[illegible]

76

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Via.

Vc.

D.B.

82

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Via.

Vc.

D.B.

*p*

*pp*

*Solo*

*pp*

*p*

*pp*

*pp*

*p*

*mp*

*p*

*P1b*

*mp*

*pp*

*L.V.*

*arco*

88

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hm.

Tpt.

Tmb.

Tba.

Pno.

Timp.

Perc I

Perc 2

B.D.

Vin. 1

Vin. 2

Vla.

Vc.

D.B.

Tam-Tam

*p*

*f*

*pp*

*ff*

*Divisi*

*Foro*

*PP*

*Divisi (arco)*

*PP*

[illegible]



99

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*pp* *p* *pp* *pp* *p* *p*

*P1B* *P3a* *P2b* *p*



[illegible]

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*Divisi*

*ppf*

*P4b*

*p*

*P7b*

123

Fl.

Ob.

Cl.

Ban.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*p*

*pp*

(P4b)

*p*

*ppp*

[illegible]

[illegible]

[illegible]



145

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

ppp

p

fp

p

fp

p

p2

p

fp

p4

p

p

fp

151

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vcl.

D.B.

L.V.

*mp* *mf* *p* *ppp* *divisi* *p* *mp* *p*

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

The musical score for page 157, measures 157-162, is presented below. The score includes staves for Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpets (Tpt.), Trombones (Trmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violins 1 and 2 (Vln.1, Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). Measures 157-160 are empty for most instruments, while measures 161 and 162 contain musical notation for the strings and woodwinds.

Instrument	Measure 157	Measure 158	Measure 159	Measure 160	Measure 161	Measure 162
Fl.						
Ob.						
Cl.						
Bsn.						
Hrn.						
Hrn.						
Tpt.						
Trmb.						
Tba.						
Pno.						
Timp.						
Perc.1						
Perc.2						
B.D.						
Vln.1					$mp$	$mf$
Vln.2					$mp$	$mf$
Vla.					$mp$	$mf$
Vc.						
D.B.						

163

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

169

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

Solo

f

ff

p3

adj

p2

mp

p3

p2

p3

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Via.

Vc.

D.B.

181

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

sf

f

sfz

P6

Tam-Tam

P10

P6

187

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

P6

P10

P10

P9

B.D.

L.V.

P10



193

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Tmb.

Tba.

Pno.

Timp.

Perc1

Perc.2

Tam-Tam

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

P5 hex a

P1 hex ab

P1

P1

P7

P1

P7

L.V.

Tam-Tam

B.D.

this Sve preferred

205

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pho.

Timp.

Perc.1

Perc.2

B.D.

Vla.1

Vla.2

Vla.

Vc.

D.B.

P1/P5

L.V.

Tam-Tam

PO

211

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

P0

P11

P8

P3

Tpt.

Tmb.

Tba.

Pno.

L.V.

Timp.

Perc.1

Perc.2

L.V.

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

This image shows a page from a musical score, likely for a symphony orchestra. The score is written for multiple instruments, with staves arranged vertically. The instruments listed on the left side of the page are:

- Fl.
- Ob.
- Cl.
- Bsn.
- Hrn.
- Hrn.
- Tpt.
- Trmb.
- Tba.
- Pno.
- Timp.
- Perc.1
- Perc.2
- B.D.
- Vln.1
- Vln.2
- Vla.
- Vc.
- D.B.

The score includes various musical notations, such as notes, rests, and dynamic markings. Dynamic markings like *mp* (mezzo-piano) and *p* (piano) are visible. The notation is in a standard musical format, with staves and clefs. The page is numbered '1' in the top right corner.



[illegible]

FL.

Ob.

Cl.

Bsn.

Hm.

Hm.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

11



Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Bongos (Canon)

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*p*

*pp*

*f*

*gliss*

*Solo*

*HIP2*

*HIP3*

*(P2)*

*15" (P2)*

This image shows a page from a musical score, likely for a symphony. The score is written for a large ensemble of instruments, including woodwinds, brass, strings, and percussion. The instruments listed on the left side of the page are: Fl. (Flute), Ob. (Oboe), Cl. (Clarinet), Bsn. (Bassoon), Hrn. (Horn), Tpt. (Trumpet), Trmb. (Trombone), Tba. (Tuba), Pno. (Piano), Timp. (Timpani), Perc.1 and Perc.2 (Percussion), B.D. (Bass Drum), Vln.1 and Vln.2 (Violins), Vla. (Viola), Vc. (Violoncello), and D.B. (Double Bass). The score is written in a standard musical notation with staves for each instrument. Dynamic markings such as *mp* (mezzo-piano), *p* (piano), and *sf* (sforzando) are used throughout. Rehearsal marks are indicated by Roman numerals, specifically II P11 and II P6. The page is numbered 25 in the top left corner.



255

FL

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

IP11

IP5

Solo IP0

IP9

IP8

gliss.

L.V.

MMOIP3

[illegible]

265

FL.

IIP10

Ob.

Cl.

Bsn.

a2 IIP2

f

a2

sf

Hrn.

Opening Chords

P0a

P11a

Hrn.

Tpt.

f

Trmb.

f

Tba.

f

Pno.

Poa

gliss.

L.V.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

IIP10

IIP1

IIP0

Vln.2

f

IIP5

Via.

Vc.

D.B.

FL.

Ob.

CL.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

II P5

II P1

P11b

P3a

P2b

P4b

P6a

P4b

II P5

II P6

II P11

274

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

II P3

II P4

II P8

P10a

P9b

P7a

P6a

P10a

P9b

P7a

P1b



278

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Tmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

IIIP2

IIIP6

IIIP6

POa

POb

POa

Divisi

Divisi

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

POb

L.V.

L.V.

POb

285

Fl.

Ob.

Cl.

Bsn.

P0ab

Hrn.

Hrn.

P0

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc2

Tam-Tam

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

P11

9/8

[illegible]

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

9/8

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Tmb.

Tba.

Pno.

Timp.

Perc1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

This musical score page, numbered 81, contains staves for the following instruments: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horn (Hrn.), Trumpet (Tpt.), Trombone (Tmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The woodwinds and brass sections have some initial notation in the first measure, while the strings and percussion have more extensive notation throughout the page. The piano part is mostly empty.

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

Solo

Hex B P0

1.

P11

2.

P11 Hex A

Tam-Tam

P11





FL.

Ob. PII Hex a Hex b

Cl.

Bsn. 1. 2.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno. P3a P3b P2

Timp.

Perc1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc. P2

D.B.

This page of a musical score, numbered 84, contains staves for the following instruments: Flute (FL.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpet (Tpt.), Trombone (Trmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is written in a standard musical notation with various dynamic and performance markings. The Oboe part features two hexachordal passages labeled 'PII Hex a' and 'Hex b'. The Bassoon part includes first and second endings, marked '1.' and '2.'. The Piano part has complex textures with markings P3a, P3b, and P2. The Violoncello part also features a P2 marking. The score is divided into four measures by vertical bar lines.

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

P4ab

P8

L.V.

Divisi

Divisi

This musical score page, numbered 85, contains staves for the following instruments: Flute (FL.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpets (Tpt.), Trombones (Trmb.), Tubas (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violins 1 and 2 (Vln.1, Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is written in a standard musical notation with various clefs and time signatures. Key markings include a forte 'f' dynamic at the beginning of the Bsn. staff, a piano 'P4ab' marking above the Pno. staff, and a piano 'P8' marking above the Tpt. staff. The B.D. staff features a 'L.V.' (Larghetto) marking. The Vln.1 and Vln.2 staves are marked 'Divisi' (divided). The Vc. and D.B. staves have a 'f' dynamic marking at the bottom. The score is divided into measures by vertical bar lines, with some measures containing multiple notes and rests.

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

This musical score page, numbered 86, contains staves for the following instruments: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horn (Hrn.), Trumpet (Tpt.), Trombone (Trmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is written in a standard musical notation with various clefs, key signatures, and dynamic markings such as *f* (forte) and *sf* (sforzando). The woodwinds and brass sections have complex passages with many beamed notes and slurs. The percussion section includes a steady rhythmic pattern in the Timpani and various drum parts. The string section provides a harmonic and rhythmic foundation, with the Violins and Violas playing more active roles than the lower strings.

521

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

P0

Tmb.

Tba.

Pno.

Timp.

Perc 1

Perc 2

L.V.

B.D.

Vln. 1

Vln. 2

Vla.

Vc.

D.B.

9/8

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

This musical score page, numbered 88, contains staves for various instruments. The woodwind section (Flute, Oboe, Clarinet, Bassoon) and brass section (Trumpet, Trombone, Tuba) have staves with notes and dynamic markings like 'f' and 'ff'. The string section (Violins 1 & 2, Viola, Violoncello, Double Bass) and percussion section (Piano, Timpani, Percussion 1 & 2, Bass Drum) also have staves with musical notation. The percussion staves show rhythmic patterns with notes and rests. The woodwinds and brass play melodic lines with some rests. The strings provide a harmonic and rhythmic foundation.

329

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

Fl.

Ob.

Cl.

Bsn.

Hrn. I.I. Po Hex A

Hrn. I.I. Po Hex B

Tpt.

Tmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vin.1

Vin.2

Vla.

Vc.

D.B.

*Bells up*

*P3*

*P3a*

*P3b*

*Divisi*

337

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

Go To Tam-Tam

Detailed description of the musical score: The score is for a full orchestra. Measures 337-340 are shown. Flute, Oboe, Clarinet, and Bassoon are in the woodwind section. Horns and Trumpets are in the brass section. Trombones and Tubas are in the lower brass section. Piano, Timpani, and Percussion 1 and 2 are in the percussion section. Bass Drum is in the low percussion section. Violins 1 and 2, Viola, Violoncello, and Double Bass are in the string section. The score includes various musical notations such as notes, rests, and dynamic markings. A specific instruction 'Go To Tam-Tam' is written above the Bass Drum staff in measure 340.



FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc2

B.D.

Vln.1

Vln.2

Vla.

Vcl.

D.B.

P2

P3b

The musical score for page 92 is arranged in a standard orchestral format. The top section includes woodwinds (Flute, Oboe, Clarinet, Bassoon) and brass (Horn, Trumpet, Trombone, Tuba). Below these are the strings (Violins 1 and 2, Viola, Violoncello, Double Bass) and percussion (Piano, Timpani, Percussion 1 and 2, Bass Drum). The score features various musical notations, including notes, rests, and dynamic markings. The piano part (Pno.) has a long, sustained note in the right hand and a shorter, sustained note in the left hand. The timpani part (Timp.) has a single note. The percussion parts (Perc1, Perc2) have single notes. The bass drum part (B.D.) has a single note. The string parts (Vln.1, Vln.2, Vla., Vcl., D.B.) have sustained notes. The woodwind and brass parts have various notes and rests. The score is written in a standard orchestral format with various musical notations.

[illegible]

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

P10a

Tpt.

Trmb.

Tba.

Puo.

L.V.

Timp.

Perc1

Perc.2

L.V.

B.D.

P6

Vln.1

Vln.2

Vla.

Vcl.

D.B.

This musical score page, numbered 94, contains staves for the following instruments: Flute (FL.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpet (Tpt.), Trombone (Trmb.), Tuba (Tba.), Piano (Puo.), Timpani (Timp.), Percussion 1 (Perc1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vcl.), and Double Bass (D.B.). The woodwinds and strings are active throughout the page. The brass section (Bsn., Hrns., Tpts., Trmb., Tba.) is mostly silent. The percussion section includes Timpani (Timp.), Percussion 1 (Perc1), and Bass Drum (B.D.), with specific markings like 'L.V.' and 'P6' indicating dynamic or performance changes. The Piano (Puo.) part features a large oval marking in the third measure. The string section (Vlns., Vla., Vcl., D.B.) plays a continuous, rhythmic pattern.

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

This musical score page, numbered 95, contains staves for the following instruments: Flute (FL.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horn (Hrn.), Trumpet (Tpt.), Trombone (Trmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is written in 4/4 time. The woodwinds and strings have active parts, while the brass and percussion sections are mostly silent, with some dynamic markings like 'f' (forte) and 'mf' (mezzo-forte) visible.

157

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Via.

Vc.

D.B.

P10a

P7

Solo

P7a

L.V.

P10b

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc.2

B.D.

Tam-Tam

L.V.

P9

Unison

Vln.1

Vln.2

Vla.

Vc.

D.B.

This musical score page, numbered 97, contains staves for the following instruments: Flute (FL.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpets (Tpt.), Trombones (Trmb.), Tubas (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc1), Percussion 2 (Perc.2), Bass Drum (B.D.), Tam-Tam, Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is written in 4/4 time. The woodwinds and bassoon have melodic lines with some triplets and accents. The brass section is mostly silent. The piano part features a long, sustained chord in the right hand and a moving line in the left hand, with a dynamic marking of *f*. The timpani and percussion 1 have rhythmic patterns. The strings (violins, viola, cello, and double bass) play a rhythmic pattern in unison, marked with a dynamic of *f*. The bass drum and tam-tam have specific rhythmic markings, including a 'L.V.' (Lento) marking for the bass drum.



FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc2

B.D.

Vln.1

Vln.2

Vla.

Vcl.

D.B.

The musical score for page 99 is organized into a system of staves. The instruments are listed on the left: FL., Ob., Cl., Bsn., Hrns. (two staves), Tpt., Trmb., Tba., Pno. (grand staff), Timp., Perc1, Perc2, B.D., Vln.1, Vln.2, Vla., Vcl., and D.B. The woodwind and brass sections (FL., Ob., Cl., Bsn., Hrns., Tpt., Trmb., Tba.) are mostly silent, indicated by whole rests. The string section (Vln.1, Vln.2, Vla., Vcl., D.B.) and the Tpt. part are active. The Tpt. part has a melodic line starting in the second measure with a dynamic marking of *mp*. The string parts (Vln.1, Vln.2, Vla., Vcl., D.B.) are playing a rhythmic pattern of eighth notes, also marked with *mp*. The percussion section (Perc1, Perc2, B.D., Timp.) is silent. The piano (Pno.) is also silent. The score is divided into four measures by vertical bar lines.



FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*p*

*pp*

*ps*

*p*

*p*

*p*

*p*

*p*

This musical score page, numbered 100, contains staves for the following instruments: Flute (FL.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpets (Tpt.), Trombones (Trmb.), Tubas (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The woodwind and brass sections are mostly empty. The strings and percussion sections have musical notation. The Tpt. staff has a dynamic marking of *p* followed by a line and *pp*. The Vln.1 staff has a dynamic marking of *ps* followed by a line and *p*. The Vln.2 staff has a dynamic marking of *p*. The Vla. staff has a dynamic marking of *p*. The Vc. staff has a dynamic marking of *p*. The D.B. staff has a dynamic marking of *p*.

FL

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

P1

Vln.1

Vln.2

Vla.

Vc.

D.B.

The musical score is arranged in a standard orchestral format. The woodwind section (Flute, Oboe, Clarinet, Bassoon, Horns) and brass section (Trumpets, Trombones, Tuba) are at the top. Below them are the strings (Violins 1 & 2, Viola, Violoncello, Double Bass) and percussion (Piano, Timpani, Percussion 1 & 2, Bass Drum). The piano part features a melodic line in the right hand with a dashed line above it, and a more rhythmic line in the left hand. The strings play a steady eighth-note pattern, and the percussion provides a rhythmic foundation.

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*pp*

*pp*

*p*

*p*

*p*

*ppp*

This page of a musical score, numbered 102, contains staves for the following instruments: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), Trumpet (Tpt.), Trombone (Trmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The woodwind and brass sections are currently silent. The string section (Vln.1, Vln.2, Vla., Vc., D.B.) and the B.D. part are active, playing a rhythmic pattern of eighth and sixteenth notes. Dynamic markings include *pp* (pianissimo) for the B.D. and Vln.1 parts, *p* (piano) for the Vla. and Vc. parts, and *ppp* (fortissimissimo) for the D.B. part.

Fl.

Ob.

Cl.

Ban.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pho.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*mp*

*pp*

*fff*

L.V.

The musical score is arranged in a standard orchestral format. The woodwind section (Flute, Oboe, Clarinet, Bassoon, Horns) and brass section (Trumpets, Trombones, Tuba) are at the top. Below them are the strings (Violins 1 & 2, Viola, Violoncello, Double Bass) and percussion (Percussion 1 & 2, Timpani, Bass Drum, Snare Drum). The score is divided into measures by vertical bar lines. Dynamic markings are placed below the notes: *mp* (mezzo-piano) and *pp* (pianissimo) are under the Bass Drum part, and *fff* (fortissimo) is under the Violin 1 part. The section marked L.V. (Larghetto) begins in the fourth measure of the Bass Drum part.

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*allargando poco a poco*

*allargando poco a poco*

*allargando poco a poco*

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

Divisi

ppp

Divisi

ppp

pp

P0

P

Detailed description: This is a page from a musical score, page 105, titled 'Cantabile' with a tempo of 90 beats per minute. The score is for a large ensemble, including woodwinds (Flute, Oboe, Clarinet, Bassoon, Horns), brass (Trumpets, Trombones, Tuba), piano, timpani, percussion, and strings (Violins, Viola, Violoncello, Double Bass). The woodwind and brass sections are mostly empty, indicating rests. The piano, timpani, and percussion sections also have rests. The string section is active. Violin 1 and Violin 2 have a melodic line starting in the first measure, with a 'Divisi' instruction and 'ppp' dynamic marking in the third measure. Viola, Violoncello, and Double Bass have a similar melodic line, also with 'Divisi' and 'ppp' markings. The Double Bass has a 'pp' marking in the third measure. The Violoncello has a 'P' marking in the fourth measure. The Viola has a 'P0' marking in the fourth measure. The Violin 1 and Violin 2 have a 'P' marking in the fourth measure.

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc1

Perc2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

The musical score for page 106 is written for a large ensemble. The instruments are arranged in the following order from top to bottom: Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horn (Hrn.), Horn (Hrn.), Trumpet (Tpt.), Trombone (Trmb.), Tuba (Tba.), Piano (Pno.), Timpani (Timp.), Percussion 1 (Perc1), Percussion 2 (Perc2), Bass Drum (B.D.), Violin 1 (Vln.1), Violin 2 (Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The score is in 3/4 time. The woodwinds and brass sections are mostly silent, with only a few notes or rests visible. The strings (Vln.1, Vln.2, Vla., Vc., D.B.) are active, with Vln.1 and Vln.2 playing melodic lines, Vla. playing a sustained note, and Vc. and D.B. playing a rhythmic pattern. The percussion section (Perc1, Perc2, B.D.) is also active, with Perc1 and Perc2 playing rhythmic patterns and B.D. playing a steady beat. The piano (Pno.) is silent. The score includes dynamic markings such as *p* (piano) and trill markings (trills) in the Vc. and D.B. parts.

Fl.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

LI. P8

Tutti

*p*

P3

P4

This page of a musical score, numbered 107, contains staves for a variety of instruments. The woodwind section includes Flute (Fl.), Oboe (Ob.), Clarinet (Cl.), Bassoon (Bsn.), Horns (Hrn.), and Trumpets (Tpt.). The brass section includes Trombones (Trmb.) and Tubas (Tba.). The keyboard section features a Piano (Pno.). The percussion section includes Timpani (Timp.), Percussion 1 (Perc.1), Percussion 2 (Perc.2), and Bass Drum (B.D.). The string section includes Violins 1 and 2 (Vln.1, Vln.2), Viola (Vla.), Violoncello (Vc.), and Double Bass (D.B.). The Violin 1 staff begins with the marking 'LI. P8'. The Viola staff has a 'Tutti' marking and a dynamic change to 'p' (piano). The Violoncello staff has markings for 'P3' and 'P4' at the end of the page.



FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc. 1

Perc. 2

B.D.

Vln. 1

Vln. 2

Vla.

Vc.

D.B.

Measures 1-5 of the musical score. The woodwinds and brass sections are mostly silent in the first measure, with some instruments entering in subsequent measures. The strings (Violin 1, Violin 2, Viola, Violoncello, Double Bass) are playing sustained notes or chords throughout the measures. The double bass part in measure 5 includes a 'p' (piano) dynamic marking.

415

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*Tutti*

*p*

110

11P8

RI7(modified from sequence [P8])

19



427

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vla.1

Vla.2

Vla.

Vc.

D.B.

LLP8

P3

FP

The musical score for page 111, measures 427-431, is presented below. The staves are arranged vertically, with woodwinds and brass at the top, followed by strings and percussion. Measures 427-430 are mostly empty, while measure 431 contains musical notation for several instruments. Dynamic markings include p, P3, LLP8, and FP.

Instrument	Measure 427	Measure 428	Measure 429	Measure 430	Measure 431
FL.					
Ob.					
Cl.					
Bsn.					
Hrn.					
Hrn.					
Tpt.					
Trmb.					
Tba.					
Pno.					
Timp.					
Perc.1					
Perc.2					
B.D.					
Vla.1					LLP8
Vla.2					
Vla.					P3
Vc.					
D.B.					FP

FL.

Ob.

Cl.

Bsn.

Hrn.

Hrn.

Tpt.

Trmb.

Tba.

Pno.

Timp.

Perc.1

Perc.2

B.D.

Vln.1

Vln.2

Vla.

Vc.

D.B.

*pp* *pp* *ppp* *HP10 (adj series)* *12* *pp*

The musical score for page 112, measures 1 through 6, is presented below. The staves are arranged vertically, with woodwinds and brass at the top, followed by percussion, piano, and strings at the bottom. Measures 1-6 contain the following musical elements:

- Measures 1-6:** The woodwind and brass staves (FL., Ob., Cl., Bsn., Hrns., Tpts., Trmb., Tba.) contain rests. The piano (Pno.) and timpani (Timp.) staves also contain rests. The percussion staves (Perc.1, Perc.2, B.D.) contain rests. The string staves (Vln.1, Vln.2, Vla., Vc., D.B.) contain musical notation. Vln.1 and Vln.2 have a *pp* marking. Vla. has a *ppp* marking. Vc. has a *pp* marking. The Vla. staff also has a *HP10 (adj series)* marking. The Vc. staff has a *12* marking.





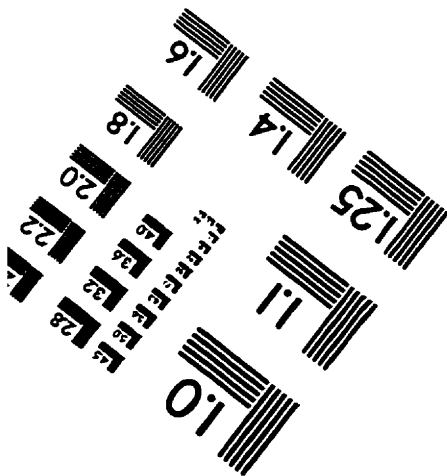
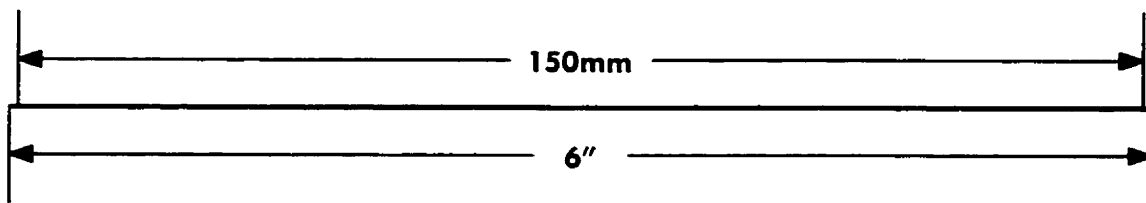
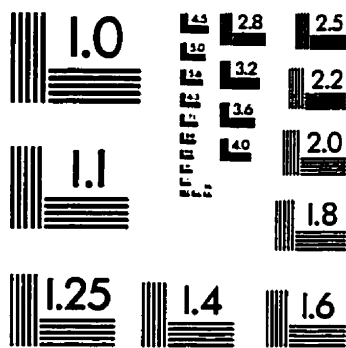
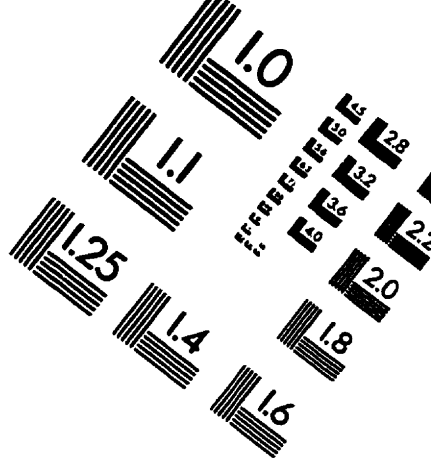
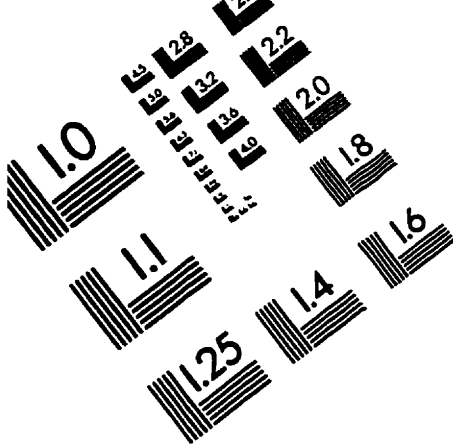




## References

Lutgens, Frederick K. and Tarbuck, Edward J. *The Atmosphere: An Introduction to Meteorology* Fourth Edition. Englewood Cliffs, New Jersey 1989.

# TEST TARGET (QA-3)



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