How to Read a METAR

Weather is a key component to aviation, but weather sources don't make it easy (at first) to understand the information. METARs are one of the first weather reports pilots learn to read and understand. Let's break one down.

KJFK 162251Z 16007KT 10SM FEW055 SCT190 BKN260 26/13 A2982 RMK AO2 SLP098 T02610128

That's a long string of letters and numbers! METARs can be split up into two sections, the main section and the remarks section.

BLUE (KJFK): This is the airport identifier. K signifies the airport is in the 48 contiguous states PH is for Hawaii and PA for Alaska.

RED (162251Z): Issued time and date. The first two numbers are the day (the 16th) and the rest is the time 2251 in Zulu time (denoted by the Z). If you don't know yet, Zulu time is also Universal time. Get used to converting it, on the East coast you minus 4 hours during daylight savings.

GREEN (16007KT): Wind direction and velocity. Here the wind is coming from 160 degrees (or southeast) at 07 knots (KT=knots). For those new pilots, knots is what is used instead of mph. A knot is nautical miles per hour, a nautical mile is about 1.15 mile.

PURPLE (10SM): Visibility. 10 Statue Miles, these are the miles you know and love from every other mile measurement in life.

ORANGE (FEW055 SCT190 BKN260): These are clouds and their levels. Few cloud at 5500 - you always add 00 to these numbers. Scatter at 19,000 and Broken at 26,000. What constitutes a cloud ceiling? Broken or Overcast (OVC).

YELLOW (26/13): Temperature and dewpoint. These are always in Celsius. Dewpoint is the temperature at which the air will be come fully saturated, the closer these numbers are the more likely there are lower clouds or fog.

PINK (A2982): Altimeter setting. 29.82 is the current altimeter setting. It is the pressure at field elevation and you put this number into your altimeter (you'll most likely get an updated number from the ATIS or whatever weather reporting system at the airport)

Now, you can read the major and most pertinent part of the METAR! There is still the remarks section though.

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BLUE (RMK): This signifies the start of the remarks section, not all METARs will have this section.

RED (AO2): Type of station, this one is automatic weather with a precipitation discriminator. That means it can tell if it's rain or snow. AO1 is the other option and it won't tell you the type of precipitation.
BLACK (SLP098): This is telling you the Sea Level Pressure, and I wish someone told me sooner that this means absolutely nothing to pilots, it's not for pilots, just ignore it.

GREEN (T02610128): Remember your temperature and dewpoint? This is exactly the same information just more specific. T is temperature 0 means it is positive (there'd be a 1 if it was below freezing i.e 0) 26.1 and following it is the dewpoint 0, again it is positive) 12.8. As you can see the temperature and dewpoint in the main body is just rounded to the closest whole number.

Precipitation Type

The table below shows all codes that can exist in a METAR or TAF for different precipitation types.

Coded	Meaning
RA	Rain
DZ	Drizzle
SN	Snow
SG	Snow Grains
UP	Unknown Precipitation
GR	Hail (1/4” in diameter +)
GS	Small Hail/Snow Pellets
PL	Ice Pellets
IC	Ice Crystals

To those above these intensity symbols will be added to them. Also, if they are in the vicinity (5-10 miles from airport).

Intensity or proximity

- - Light
  Moderate
- \+ Heavy
- VC In the Vicinity

Sky Conditions

These are all the contractions that can be included in a METAR or TAF for what type of cloud coverage is in the area. Note: There are three specific cloud types that can be reported.

Contraction	Meaning	Sky Coverage
SKC or CLR	Clear	0 (or 0 below 12,000ft)
FEW	Few	>0 to 2/8
SCT	Scattered	3/8 to 4/8
BKN	Broken	5/8 to 7/8
OVC	Overcast	8/8
VV	Vertical Visibility (indef. ceiling)	8/8
CB	Cumulonimbus	When present
TCU	Towering Cumulus	When present
FC	Funnel Cloud	When present

Descriptor of Weather Phenomena

Below are the different descriptors of weather phenomena that are to further identify and are ADDED to certain types of precipitation and obscuration.

Coded	Meaning
TS	Thunderstorm
SH	Showers
FZ	Freezing
BL	Blowing
DR	Low Drifting
MI	Shallow
BC	Patches
PR	Partial

Examples: You can have TSRA (thunderstorms rain) or FZPL (freezing ice pellets) or even BLSN (blowing snow).
BL will only be used with snow, sand, dust or spray is present and the wind is pushing it to 6 ft or higher.
DR is only for dust, sand, snow and is raised by less than 6ft
BC is only for fog and it doesn't raise too far off the ground. It's to note reduced horizontal visibility.
MI is also only for fog and is less than 6ft off the ground.

Obscuration to Visibility

These codes will only affect visibility (so they are very important to dispatchers and PICs for airlines since we only use visibility as a limiting factor.

Coded	Meaning
FG	Fog (vis > 5/8 SM)
BR	Mist (vis 5/8 to 6SM)
FU	Smoke
HZ	Haze
PY	Spray
SA	Sand
DU	Dust
VA	Volcanic Ash

BR will never have a descriptor.
BCFG or **PRFG** is only used for fog if the visibility is equal to or greater than 7SM
You can have precipitation types together but these obscurations will be separate.
Example: TSRA BR

Other

Kind of fun ones here, you won't see these in your everyday METARs because they are more on the rare side. I don't think I've ever seen any of these in an actual METAR I've looked at, but have seen FC in examples.

Coded	Meaning
SQ	Squall
DS	Duststorm
SS	Sandstorm
PO	Well-Developed Sand/Dust Whirls
FC	Funnel Cloud
+FC	Tornado or Waterspout

I included FC in two of these tables because it is an other, but is also cloud specific. Just remember you'll see CB more than FC, maybe unless you live in tornado alley.

Lightning

These are used for lightning in thunderstorms. It will be in the remarks section of the METAR. It's hard to understand sometimes CC or CG, but I highly encourage you to watch a bad thunderstorm from a high building. It can be pretty cool and helped me really understand these contractions and what they meant to see them in action.

Contraction	Meaning
OCNL	Occasional (less than one flash per min.)
FRQ	Frequent (1-6 flashes per min.)
CONS	Continuous (more than 6 flashes per min.)
CG	Cloud-to-ground
IC	In-cloud
CC	Cloud-to-cloud
CA	Cloud-to-air

Other Other Symbols Found in METAR

$ - Means the station needs maintenance
AO1 - Automated station without a precipitation discriminator
AO2 - Automated station with a precipitation discriminator
AUTO - Automated weather reporting without any human intervention (AO1/2 can have human intervention)
R19/0600FT - RVR (Runway Visual Range) This can be a tricky one. R19 is telling you the runway (runway 19) and then it has a 600 ft visibility (normally measured at the touchdown zone, but there is mid-range and rollout too, touchdown is controlling. It will always be in thousands of feet (that's why there is a 0 before 600). It can have a P before the number for more than the number or M for minus. If the RVR is variable you'll see R19/1000V1500, which means it's varying between 1000 ft and 1500 ft. RVR will always be in FT in METARs
RVRNO - This will be in the remarks if it should be reported, but is missing.

Disclaimer: I am a certificated private pilot and aircraft dispatcher. I am not a Certified Flight Instructor, nor a Basic or Advance Ground Instructor. The information above I wrote as a help to myself and other students to better gain a basic knowledge of METARs and TAFs. There may be errors; if they are pointed out I will fix them.

Tables and some information pulled from FAA's Aviation Weather Services (AC 00-45G)